

CITY OF ALBUQUERQUE

Planning Department
Suzanne Lubar, Director



Mayor Richard J. Berry

August 27, 2015

To: All Shareholders of the City of Albuquerque Standard Specifications for Public Works Construction, 1986

From: Shahab Biazar, P. E., City Engineer,
Planning Department, City of Albuquerque

Subject: City of Albuquerque Standard Specifications and Drawings Update No. 9 for Revisions, Deletions, and Additions to ABCWUA Sections: 18, 100, 125, 131, 170, 900, 901, 905, 910, 915, 920, 921, 925, 2000, 2100, 2200, 2300, and 2400. Landscaping Sections: 1001, 1005, 1010, 1011, 1012, and 2700.

SECTION 18 UTILITIES

18.3.6 Extension of Water Shutoff Moratorium: The period is now from April 1 through September 30 for Transmission, Well Collector, San Juan Chama, or other lines designated at critical for operations.

PO Box 1293

SECTION 100 MATERIALS

100.2 Contents section revised to remove Section 125 Vitrified Clay Pipe and to add the Section 131 Centrifugally Cast Fiberglass Reinforced Polymer Pipe;

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SECTION 125 VITRIFIED CLAY PIPE - REMOVE ENTIRE SECTION

The entire vitrified clay pipe section was removed from the specifications because this type of pipe is no longer an acceptable material for use;

New Mexico 87103

SECTION 131 CENTRIFUGALLY CAST FIBERGLASS REINFORCED POLYMER MORTAR PIPE

This is a new section to the standard specifications;

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SECTION 170 ELECTRONIC MARKING DEVICES

170.4.1.4 Addition of EMD to deflections (points of curvature) to gravity sanitary sewer lines;

170.4.1.9.2 Change the EMD bend requirement to deflections, and bends of 11 ¼ degrees and larger for sanitary sewer force mains;

170.4.1.9.6 Creation of a maximum distance between EMDs of 100-feet on sanitary sewer lines;

170.4.2.3 Change the EMD bend requirement to pipe deflections and bends of 11 ¼ degrees and larger for water lines;

170.4.2.8 Creation of a maximum distance between EMDs of 100-feet on water lines;

SECTION 900 SANITARY AND STORM SEWER FACILITIES

- 900.2 Changed title of Section 905 to “Sanitary Sewer Service Lines” from Sanitary Service Lines;
- 900.2 Change title of Section 920 to “Sanitary Sewer Manholes” from Sanitary and Storm Sewer Manholes;
- 900.2 Addition of Section 921 Storm Manholes;

SECTION 901 SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

- 901.2.1 Removal of reference to ASTM C425 Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings;
- 901.2.1 Removal of reference to ASTM C 43 Standard Terminology of Structural Clay Products (Withdrawn by ASTM in 2009);
- 901.2.1 Removal of reference to ASTM C443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets;
- 901.2.1 Removal of reference to ASTM C478 Standard Specification for Precast Reinforced Concrete Manhole Sections;
- 901.2.2 Removal of reference to AWWA C603 Standard for Installation of Asbestos-Cement Pressure Pipe;
- 901.2.3 Removal of reference to Section 101 Portland Cement Concrete;
- 901.2.3 Removal of reference to Section 102 Steel Reinforcement;
- 901.2.3 Removal of reference to Section 105 Concrete Curing Compound;
- 901.2.3 Removal of reference to Section 106 Cement Mortar and Grout;
- 901.2.3 Removal of reference to Section 108 Brick;
- 901.2.3 Removal of reference to Section 123 Reinforced Concrete Pipe;
- 901.2.3 Removal of reference to Section 124 Reinforced Concrete Pressure Pipe;
- 901.2.3 Removal of reference to Section 125 Vitrified Clay Pipe;
- 901.2.3 Removal of reference to Section 129 Ductile Iron Pipe;
- 901.3.1 Removal of Reinforced Concrete Pipe, Reinforced Concrete Pressure Pipe, Vitrified Clay Pipe, and Ductile Iron Pipe references; Addition of Fiberglass Pipe Section 131;
- 901.5.1.3 The subsection was updated to reflect the responsibility of the Contractor to remove plugs from the sanitary sewer system. Written authorization by the ENGINEER or Water Authority will be issued and the Contractor shall certify the plug removal task prior to project acceptance;
- 901.5.1.4 Removal of reference to “staked in the field”;
- 901.5.1.6 Replace socket or collar ends reference with bell end;
- 901.5.1.7 Removal of concrete saw option on concrete structure removal for installation of line;
- 901.5.1.8 New specification for installation of sewer warning tape;
- 901.5.2.3 Addition of fiberglass pipe to section for connection to manholes;
- 901.5.2.3 Delete reference to PS-10 by Press Seal Gasket Corporation, Large Diameter Waterstops for Concrete Manhole Adapters by Fernco;
- 901.5.2.4 Include reference to fiberglass pipe in section and include minimum mandrel diameter;
- 901.5.2.6 Include reference to fiberglass pipe in section;
- 901.6 Delete entire subsection: Joints for CLAY PIPE;
- 901.6.2 Delete entire subsection: Joints for CONCRETE PIPE;
- 901.6.4 Addition of Joint for Fiberglass Pipe section;
- 901.7.2.4 Add requirement for Contractor to remove plugs installed for the Infiltration Test;
- 901.7.3.4 Add requirement for Contractor to remove plugs installed for the Exfiltration Test;
- 901.7.4.5 Add requirement for Contractor to remove plugs installed for the Air Test;
- 901.7.4.2.3 Change maximum Air Test pressure given the presence of groundwater surrounding the test pipe to 9 psig.;
- 901.7.4.2.8 New Air Test passing provision for zero leakage after 1 hour of testing;
- 901.7.4.2.10 Addition of requirement to properly install plugs and braces to avoid blowouts;

- 901.7.5 Revision of section for a single Air testing table that will be applied for groundwater and non-groundwater conditions;
- 901.8.1.1 Add requirement for Contractor to remove plugs installed for pipe cleaning;
- 901.8.2 Television inspection subsections were renumbered to match numbering format;
- 901.8.2.2 Addition of requirement for Contractor to remove plugs prior to television inspection;
- 901.8.2.3 Remove VHS videotape submittal and replace with a submittal in a format acceptable to the Water Authority;
- 901.9.1.3 Delete sub section on payment for lateral lines;
- 901.9.4.2 The reference was removed and replaced with television inspection and documentation being incidental to the construction item unless otherwise specified in the Bid Proposal;
- 901.9.5 Removal of reference to Storm Sewers and deleted reference to salvaged materials to the Liquid Waste Division

SECTION 905 SANITARY SEWER SERVICE LINES

- 905.1.2 Addition of coordinate to location of service line language in subsection;
- 905.2.1 Addition of ASTM A 74 Standard Specification for Cast Iron Soil Pipe and Fittings to reference;
- 905.2.2 Addition of Section 170 Electronic Marker Devices to reference;
- 905.3.1 Include reference to Water Authority Approved Product List for materials;
- 905.3.2 Removal of pre-approved products in this section;
- 905.3.2.1 Deleted subsection on saddles pre-approved in specification;
- 905.3.2.2 Deleted sub section on saddles pre-approved in specification;
- 905.3.2.3 Renumbered to 905.3.2.1; Change specification to require a 2 ½ inch strap when attaching to a sewer line;
- 905.3.3 Addition of reference to Water Authority Approved Product List;
- 905.3.3.1 Deleted subsection on pre-approved saddles for connection of service line to a manhole;
- 905.3.4 Addition of reference to ASTM A 74 Standard Specification for Cast Iron Soil Pipe and Fittings;
- 905.4.3 Increased soil compaction density to 95% minimum; Correction of compaction reference from Section 801 to Section 701;
- 905.4.4 Addition of reference to Section 170
- 905.4.5 New section requiring coordinates at the service connection to the main;
- 905.5.3 New section requiring coordinates on service riser;
- 905.6.1 Addition of Cured-In-Place exception for new saddle requirement for reconnection on replacement/rehabilitation type projects;
- 905.6.3 Increased soil compaction to 95% on bedding under the service line;
- 905.6.4 Sub-section moved to 905.6.5 and replaced with the placement of an electronic marking device per Section 170;
- 905.6.5 Movement of requirement to stamp or saw cut an “S” in the curb to this subsection;
- 905.7 Change specification to require coordinates for location of service on records;

SECTION 910 STORM SEWER PIPE INSTALLATIONS

- 910.2.1 Delete reference to ASTM C43 (Withdrawn in 2009)
- 910.2.1 Delete reference to ASTM 425 Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings
- 910.2.1 Delete reference to ASTM D3034 Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- 910.2.1 Delete reference to ASTM F679 Standard Specification for Poly (Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings
- 910.2.2 Delete reference to AWWA specifications;
- 910.2.3 Delete reference to Section 121 Plastic Pipe;
- 910.2.3 Delete reference to Section 129 Ductile Iron Pipe;

- 910.2.3 Delete reference to Section 801 Installation of Water Transmission, Collector, and Distribution Lines;
- 910.5.1.3 Delete plug installation requirement;

SECTION 915 STORM SEWER DRAINAGE APPURTENANCES

- 915.4.2 Corrected reference sections listed to the appropriate sections for 701 Trenching Excavation and Backfill and 910 Storm Sewer Pipe Installations;
- 915.4.6 Corrected reference sections listed to the appropriate sections for 343 Removal and Disposal of Existing Pavements, Curb and Gutter, Sidewalk, Drivepads, and Slope Pavement
- 915.6.6 Delete payment for storm drainage manholes in this section and moved to the new Section 921 Storm Sewer Manholes and Appurtenances;

SECTION 920 SANITARY AND STORM SEWER MANHOLES

- 920.0 Change title to “SANITARY SEWER MANHOLES”; Storm sewer manhole specifications were moved to New Section 921 Storm Manholes;
- 920.1 Remove storm sewer reference; Inclusion of rehabilitation to section description;
- 920.2.1 Addition of reference to ASTM C 32 Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale);
- 920.2.1 Removal of reference to ASTM C 43 Standard Terminology of Structural Clay Products;
- 920.2.1 Removal of reference to ASTM C 1557 Standard Test Method for Tensile Strength and Young’s Modulus of Fibers;
- 920.2.1 Addition of reference to ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort;
- 920.2.2 Addition of reference to Section 170 Electronic Marker Devices;
- 920.3 Materials references moved to REFERENCES subsection 920.2.2;
- 920.4 Change subsection title to “SANITARY SEWER MANHOLE CONSTRUCTION”;
- 920.4.1.3 Addition of coordinate requirement to specification;
- 920.4.1.5 Change specification to reference Section 101;
- 920.4.1.6 Type-O: changed “performed” with “preformed”;
- 920.4.1.7 NEW sub-section requiring placement of electronic marker devices at all manholes;
- 920.4.2.2 Changed eccentric cone to concentric cone for precast concrete manholes;
- 920.4.2.2 Change specification to reference Section 101 rather than listing concrete strength;
- 920.4.2.4 Changed eccentric cone to concentric cone for shop drawings;
- 920.4.2.5 Remove the listed approved products and add reference to Water Authority Approved Product List;
- 920.4.3.2 Change specification to reference Section 101 for formed in place concrete manhole concrete strength;
- 920.4.3.3 Remove eccentric cone and replace with concentric cone for formed in place manholes; Remove “flat cover” and replace with “flat top cover” for approved use;
- 920.4.4.3 Remove eccentric cone and replace with concentric cone for use; Remove “flat-type” and replace with “flat top” for use;
- 920.4.5 Tee Pipe Manhole removed from Sanitary Sewer Manhole Section and moved to Storm Manhole Section;
- 920.4.5.1 Specification is updated for Tee type manhole to be used where specified;
- 920.4.5.4 Change of approver to OWNER for products related to joint sealants in vertical portions of tee pipe manholes;
- 920.4.6.2 Removal of specification approved products and inclusion of reference to Water Authority Approved Product List;
- 920.4.7 Manhole Steps removed from Sanitary Sewer Manhole Section and moved to Storm Manhole Section;

- 920.4.9 Removal of storm drain manhole and Section 161 references and addition of reference to Section 163 Ductile Iron Castings to section;
- 920.5.1.1 Addition of requirement for Contractor to remove plugs after manhole testing;
- 920.5.4 Testing of storm sewer manholes moved to Storm Sewer Manhole Section;
- 920.6.4 Deleted section on Salvaged Material and replaced with disposal by the CONTRACTOR requirement;
- 920.6.8 Change survey requirement to require a GPS location on abandoned manholes;
- 920.7 NEW section for Sanitary Sewer Manhole Rehabilitation; Storm Sewer manhole rehabilitation moved to Storm Sewer Manhole section;
- 920.8.1.1 Delete reference to manhole type “F” and manhole type “G”; Manhole diameter size range is from 4’ to 8’. Depth for additional payment was corrected for depths greater than 14-feet;
- 920.8.1.3 Delete payment description for Tee-Type manholes and replace with an updated subsection with general included items;
- 920.8.1.4 Subsection moved to 920.8.1.3; Replace “shelving” with “benching” and include EMD placement;
- 920.8.2.2.1 Payment for adjustment ring removed;
- 920.8.2.3 Inclusion of EMD and reinforced concrete collar to manhole adjustment payment section and removal of adjusting rings;
- 920.8.3 New Section on payment for Exterior Coating of Manhole;
- 920.8.4 Manhole steps moved to storm manhole section and replaced with Interior Coating of Manhole payment section;

SECTION 921 STORM SEWER MANHOLES AND APPURTENANCES

All storm sewer manhole specifications were added to this new section;

SECTION 925 VACUUM SEWER COLLECTOR, INTERCEPTOR AND FORCE MAIN FACILITIES

- 925.2.1 Remove reference to Section 106 Cement Mortar and Grout;
- 925.2.1 Remove reference to Section 108 Brick;
- 925.2.1 Addition of reference to Section 163 Ductile Iron Castings;
- 925.2.1 Update reference to Section 170 from Electronic Marker Disks to Electronic Marker Devices;
- 925.2.1 Addition of reference to Section 920 Sanitary Sewer Manholes
- 925.3.1 Addition of green color to sanitary sewer PVC pipe requirement;
- 925.3.2 Change pipe certification requirement from 24 inches of mercury vacuum to 22 inches of mercury vacuum;
- 925.3.3.1 Change in classification for fittings from Schedule 40 to Schedule 80;
- 925.3.5 Addition of reference to Section 101 Table 101.C;
- 925.3.6 Corrected reference number for Precast Concrete Manholes to Section 920.4.2;
- 925.3.7 Include reference to Section 161, 163, and Standard Detail Drawings for manhole frames and covers;
- 925.3.8 Removed concrete strength specification in this section due to redundancy with concrete specifications;
- 925.3.9 Removal of extension bar requirement in valve assembly;
- 925.3.9.1 New requirement for coordinates for isolation valves on Record Drawings;
- 925.3.10 Removal of specification approved valve and added reference to Water Authority Approved Product List;
- 925.3.12.1 Addition of reference to Water Authority Approved Product List;
- 925.3.12.2 Removal of specification approved vacuum valve pit product;
- 925.3.13 Removal of AISI abbreviation and changed Stainless Steel Type to Type 316;

- 925.5.1.4 The subsection was updated to reflect the responsibility of the Contractor to remove plugs from the sanitary sewer system. Written authorization by the ENGINEER or Water Authority will be issued and the Contractor shall certify the plug removal task prior to project acceptance;
- 925.5.2.1 The reference to laser equipment use for laying the pipe to line and grade was removed; The elevation recording interval was changed from being required at each pipe joint to being required at 100 foot intervals along the pipe;
- 925.5.2.2 The reference to laser equipment use for laying the pipe to line and grade was removed;
- 925.5.2.8 Removal of concrete shall be performed to the nearest full expansion joint or edge. The option of removal of sections using a concrete saw has been eliminated;
- 925.5.2.10 Update to the warning tape specification to include tape minimum width, inscription, and material;
- 925.5.2.11 Change pipe end marker from a stainless steel marker to an electronic marking device with reference to Section 170;
- 925.5.2.12 Addition of reference to Standard Detail Drawing 2180 Casing Detail for Bore and Jack Vacuum Sewer System to the installation specification of pipe through a casing;
- 925.5.2.13 New requirement to add GPS coordinates on fittings, grade changes, and runs of mainline with a maximum spacing of 100 feet along pipeline to the Record Drawings;
- 925.5.3 Remove references to Gage Taps in the Isolation Valve section;
- 925.5.3.2 New requirement to add GPS coordinates to Record Drawings for isolation valves;
- 925.5.4.3 New requirement for GPS coordinates for vacuum valve pits on Record Drawings;
- 925.5.5.4 Corrected the buffer tank reference to Standard Detail Drawing 2167/2168;
- 925.5.5.3 Change reference from Owner to Water Authority-furnished vacuum pump and gage;
- 925.5.5.6 New requirement for GPS coordinates for buffer tanks on Record Drawings;
- 925.5.6 Addition of reference to Standard Detail Drawing 2180 Casing Detail for vacuum main or force main installation;
- 925.5.7 NEW Air Release Valve Installation subsection;
- 925.6.1 Change reference from Owner to Water Authority-furnished vacuum pump and chart recorder;
- 925.6.1 Change vacuum level from 24 inches of mercury to 22 inches of mercury for vacuum test;
- 925.6.5 Change the valve reference from division valve to isolation valve;
- 925.6.5 Change vacuum level from 24 inches of mercury to 22 inches of mercury for vacuum test;
- 925.7.1.1 Change OWNER to Water Authority as the coordination entity with Contractors for the vacuum sewer line flushing procedure;
- 925.7.1.1.1 Change vacuum from 24 inches of mercury to 22 inches of mercury during vacuum sewer flushing operation;
- 925.9.1.1 Change valve reference from division valves to isolation valves;
- 925.9.1.2 Inclusion of installation of electronic marking devices and warning tape to sanitary sewer force main payment section;
- 925.9.2.1 Change pig launcher drawing reference from “standard drawing” to “construction drawings”;
- 925.9.2.2 Inclusion of electronic marker device to pig launcher payment section;
- 925.9.4.2 Inclusion of electronic marker device to air release valve payment section;
- 925.9.5 Change title to ISOLATION VALVE AND VALVE BOX
- 925.9.5.1 Replace valve reference from “division valve and vault” to “isolation valve and valve box”;
- 925.9.5.2 Inclusion of electronic marker devices in payment section included items for valve and vault; Replace OWNER with Water Authority as recipient of the socket and T-handle bar and remove gage tap assembly from payment section included items for Vacuum Sewer Isolation Valve and Valve Vault;
- 925.9.7 Changed title to Vacuum Valve Pit in this payment section;
- 925.9.8.2 Replace OWNER furnished trailer with Water Authority furnished trailer in payment inclusion section;

SECTION 2000 STANDARD DETAIL DRAWINGS

2000.2 Changed Title of Section No. 2100 to "Standard Details for Sanitary Sewer";

SECTION 2100 STANDARD DETAILS FOR SEWER

- 2100 Changed Title to "STANDARD DETAILS FOR SANITARY SEWER";
The detail drawing titles were updated to include "Sanitary Sewer" in the drawing name for drawing number 2101 through 2160;
Drawing 2107, 2128, 2170, 2181, 2182, 2183, 2184, and 2185 are new details that were added to the section;
Drawings 2110 and 2111 were moved to Section 2200 Drainage Detail Drawings;
Drawings 2151 and 2172 were removed;
- 2101 Changed drawing title to Sanitary Sewer Manhole Type "C"; Steps were removed;
Addition of pipe size and flow direction arrows in concrete collar; Rebar is now shown in the concrete collar;
- 2102 Changed drawing tile to Sanitary Sewer Manhole Type "E"; Steps were removed; Addition of pipe size and flow direction arrows in concrete collar; Rebar is now shown in the concrete collar;
- 2107 NEW DETAIL – Sanitary Sewer Concrete Manhole Top Slab Type "C". This detail shows the opening centered over the top of the manhole rather than the side as shown on the older detail which has been moved to the Drainage Section detail No.2212;
- 2109 This detail shows the new 32" sanitary sewer manhole cover in addition to the existing 24" cover;
- 2110 Moved to Section 2210 - Details for Drainage, Storm Manhole Frame and Covers;
- 2111 Detail moved to Drainage Section, Detail No. 2211 Manhole Cover Adjustment Ring;
- 2125 New General Note No. 2: 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;
- 2128 NEW DETAIL – SANITARY SEWER RING AND COVER FOR VALVE BOX;
- 2134 EMD included in detail;
- 2145 EMD shown as a sphere in detail;
- 2150 Door change to a 3 foot square aluminum hinged door; Entry steps changed to a ladder;
- 2151 Detail removed: SEWER SAMPLING & METERING MANHOLE 8 FOOT DIAMETER;
- 2160 EMD included in detail; Pipe size and direction of flow in concrete collar are now shown in detail;
- 2162 Note I changed to Note J and the valve is referenced as an Isolation Valve;
- 2163 Vent Inlet Detail was added to the drawing;
- 2164 EMD is shown in the drawing as a sphere;
- 2165 Construction note minor cleanup;
- 2167 Change Construction Note E for location of vent location to be between 20 feet and 60 feet of the vacuum valve collection pit;
- 2168 Minor Construction Notes cleanup;
- 2169 Minor Construction Notes cleanup;
- 2170 New vacuum sewer valve boxes will be constructed from 4 foot diameter precast manhole sections with a 24" manhole frame and cover;
- 2171 Concrete collar modified to show collar construction detail for Paved Areas (Type A) and Unpaved Areas (Type B);
- 2172 Detail removed with information combined into detail 2171;
- 2173 EMD shown as a sphere;
- 2174 Minor Construction Notes cleanup;
- 2180 Minor Construction Notes cleanup;
- 2181 NEW DETAIL – Forcemain Sewer Valve Box;

- 2182 NEW DETAIL – Forcemain Sewer Low Pressure Sanitary Sewer;
- 2183 NEW DETAIL – Forcemain Sewer Connection to Gravity Sewer at Manhole;
- 2184 NEW DETAIL – Forcemain Sewer Typical Forcemain Configuration;
- 2185 NEW DETAIL – Forcemain Sewer Service Line Detail;

SECTION 2200 STANDARD DETAILS FOR DRAINAGE

- Storm detail drawings 2208, 2209, 2210, 2211, 2212, and 2213 were added to the drawing index;
- 2208 Storm Manhole Type “C” – Moved from Section 2100, Detail 2101;
- 2209 Storm Manhole Type “E” – Moved from Section 2100, Detail 2102;
- 2210 Storm Manhole Frame and Covers – Moved from Section 2100, Detail 2110
- 2211 Storm Manhole Cover Adjustment Ring – Moved from Section 2100, Detail 2111;
- 2212 Storm Conc. MH Cover Type “C” – Moved from Section 2100, Detail, 2107;
- 2213 Storm Vertical Drop at MH – Moved from Section 2100, Detail, 2116;

SECTION 2300 STANDARD DETAILS FOR WATER

- 2310 The 24” water manhole cover has been eliminated; A 36” water manhole is now used;
- 2321 NEW Detail – WATER CONCRETE ENCASEMENT DETAILS;
- 2322 NEW Detail – WATER STATIONARY POST DETAIL
- 2326 WATER VALVE BOX – Change/clarification to Construction Note A to require FIRE Ring and Cover (detail 2329) on fire line valve boxes; Rebar has been added to the concrete collar;
- 2328 Minor General Notes cleanup;
- 2330 NEW Detail – NON-POTABLE WATER RING AND COVER FOR VALVE BOX
- 2334 Valve vault detail modifications to eliminate conflicts with the 36” manhole type frame and cover;
- 2335 Dimensions updated on Water Ladder Detail
- 2341 NEW Detail – WATER SAMPLING STATION;
- 2341-A NEW Detail – WATER SAMPLING STATION ALTERNATE
- 2350 Combination Air and Vacuum Release Valve detail change from a manhole type structure to a precast with removable concrete lid type structure;
- 2367 General Note 4 removed for optional cast iron reader lid;
- 2368 Remove Note requiring Asphalt Paint on meter cover; Endpoint Cap is added to the meter box cover installation; Automatic Meter Reading Touch Read hole added to specification;

SECTION 2400 STANDARD DETAILS FOR PAVING

- 2460 Water valve concrete collar detail revised to match geometry of detail 2461; Rebar in the collar is shown;
- 2461 Addition of rebar around manhole and valve concrete collar; Correction to Note D: change “PAYING” to “PAVING”

SECTION 1001 LANDSCAPE IRRIGATION

- General Change “Engineer” to “Landscape Architect” throughout the document
- 1001.1.1 Addition of “the installation and/or renovation of an” and “irrigation” to the first sentence. Addition of “irrigation” to the fourth sentence.
- 1001.1.2.1 Addition of applicable standards description
- 1001.1.2.2 Addition of references to ASTM A-53/M, D-2672, F402, F-656
- 1001.1.2.3 Addition of references to ASME standards
- 1001.1.3.1 Addition of reference to Section 1502 – Submittals
- 1001.1.3.2 Addition of Submittals for Product Data
- 1001.1.3.3 Addition of Submittals for Existing Static Pressure Verification
- 1001.1.3.4 Addition of Submittals for Closeout Submittals

1001.1.4.1	Addition of “drip equipment” to the first sentence
1001.1.4.2	Addition of requirements to Record Drawings
1001.2.1.1	Addition of “in accordance with Section 6”
1001.2.1.2	Addition of “as stipulated in the Contract Documents”
1001.2.2	Addition of section regarding Reclaimed Water Designation
1001.2.3.1	Addition of section regarding compliance with requirements in the plans
1001.2.3.2	Addition of section regarding galvanized steel pipe
1001.2.3.3	Revisions to pipe sizing, materials, and ASTM references
1001.2.3.5	Revisions to pipe sizing and materials
1001.2.3.6	Addition of “or as specified in the plans”
1001.2.3.7	Addition of section regarding HDPE pipe
1001.2.4.1	Addition of section regarding pipe-flange gasket materials
1001.2.4.2	Addition of section regarding metal, pipe-flange bolts and nuts
1001.2.4.3.a	Addition of section regarding primer
1001.2.4.3.b	Addition of section regarding threaded connections
1001.2.4.4	Addition of section regarding plastic, pipe-flange gasket, bolts and nuts
1001.2.4.5	Addition of section regarding joint restraints
1001.2.5.2	Addition of section regarding valve boxes
1001.2.5.3	Addition of section regarding valve identification tags
1001.2.6.1	Addition of description of swing joints or flexible nipple assembly
1001.2.7	Addition of section regarding backflow preventers
1001.2.8	Addition of section regarding plastic ball valves
1001.2.9	Addition of section regarding brass/bronze/iron body gate valves
1001.2.10	Addition of section regarding pressure-reducing valves
1001.2.11	Addition of section regarding quick couplers
1001.2.12	Addition of section regarding flow sensor
1001.2.13	Addition of section regarding drip irrigation specialties
1001.2.14.2	Addition of section regarding exterior control enclosures
1001.2.14.3	Addition of section regarding wiring
1001.2.14.3.b	Addition of description of wiring between controllers and automatic control valves
1001.2.14.3.c	Addition of description of splices
1001.2.14.3.d	Addition of section regarding 2-wire control wiring
1001.2.15	Addition of section regarding controller decoders
1001.2.16	Addition of section regarding booster pump
1001.3.1.2	Addition of section regarding plan locations
1001.3.2.1	Addition of section regarding site conditions
1001.3.4.3	Addition of description of trenching under the drip line of an existing tree
1001.3.4.6	Addition of section regarding depth of bury at valve box
1001.3.4.7	Addition of section regarding rock
1001.3.4.8	Addition of section regarding directional boring
1001.3.5.10	Addition of section regarding weather and temperature requirements for installation
1001.3.6.1	Addition of section regarding removals prior to joint construction
1001.3.6.2.a	Addition of section regarding compliance with ASTM F 402
1001.3.6.2.b	Addition of section regarding PVC pressure pipe joints
1001.3.6.2.c	Addition of section regarding PVC non-pressure pipe joints
1001.3.6.3	Addition of section regarding threaded joints
1001.3.6.5	Addition of section regarding HDPE fittings
1001.3.6.6	Addition of section regarding joint restraints
1001.3.7.1	Addition of “observation” in the first sentence
1001.3.7.4	Addition of “suitable backfill” in the second sentence
1001.3.9	Revision of description of thrust blocks
1001.3.10.1	Addition of section regarding installation after hydrostatic test completion

- 1001.3.10.4 Addition of “the flexible nipple or swing joint” to the first sentence
- 1001.3.11 Addition of section regarding drip irrigation specialty installation
- 1001.3.13.2 Addition of “bolt down” and “and color” to the first sentence
- 1001.3.13.3 Addition of “connectors as specified on the plans” to the first sentence. Revision to the length of coiled slack.
- 1001.3.14.3 Addition of “connectors as specified on the plans” to the last sentence
- 1001.3.14.5 Addition of “wire marking tape” in the first sentence
- 1001.3.14.6 Addition of section regarding spare wire
- 1001.3.17 Revision of “inspection” to “observation” in this section
- 1001.3.17.3 Addition of section regarding sprinkler system audit
- 1001.3.17.4 Addition of section regarding backflow preventer test
- 1001.3.18.2 Addition of section regarding booster pump startup service
- 1001.3.18.3 Addition of section regarding adjustment of system
- 1001.3.18.4 Addition of section regarding adjustment of equipment
- 1001.3.21 Revision of “inspection” to “review” in this section
- 1001.3.23 Revision of “inspection” to “review” or “observe” in this section

SECTION 1005 PLANTING

- General Change “Engineer” to “Landscape Architect” throughout the document
- 1005.1.2.1 Addition of applicable standards description
- 1005.1.2.2 Addition of applicable standards
- 1005.1.2.3 Addition of references to ANSI and Standardized Plant Names
- 1005.1.3.1 Addition of section regarding submittals
- 1005.1.3.2 Addition of section regarding product data
- 1005.1.3.3 Addition of section regarding product certificates
- 1005.1.3.4 Addition of section regarding pesticides and herbicides
- 1005.1.5.1 Addition of section regarding packaged materials
- 1005.1.5.2 Addition of section regarding bulk materials
- 1005.1.5.3 Addition of section regarding protection
- 1005.1.5.4 Addition of section regarding wrapping trees
- 1005.1.5.5 Addition of section regarding delivery and preparation
- 1005.1.6.1 Addition of section regarding field measurements
- 1005.1.6.2 Addition of section regarding weather limitations
- 1005.1.6.3 Addition of section regarding soil testing
- 1005.2.1.1 Revise general description
- 1005.2.1.1.a Addition of section regarding not using trees with specific conditions
- 1005.2.1.1.b Addition of section regarding not using collected stock with specific conditions
- 1005.2.1.2 Addition of section and sub-sections regarding root quality
- 1005.2.1.3 Addition of section and sub-sections regarding measurements
- 1005.2.1.4 Addition of section regarding plant size, grade, ball and container size compliance
- 1005.2.1.6 Addition to the second and third sentences regarding measurement and root collar
- 1005.2.1.7 Addition of section regarding labeling
- 1005.2.1.8 Addition of section regarding formal arrangements
- 1005.2.1.9 Addition of “as stipulated in the Contract Documents” to the last sentence
- 1005.2.2 Addition of section and sub-sections regarding fertilizers
- 1005.2.3 Addition of section regarding organic and aggregate mulch
- 1005.2.4.1.b Revise description of curing period
- 1005.2.4.3 Revise the term “will” to “may”
- 1005.2.5 Addition of section and sub-sections regarding pesticides
- 1005.2.6 Addition of section regarding tree stabilization materials
- 1005.2.7 Addition of section regarding weed barrier fabric
- 1005.2.8 Addition of section regarding miscellaneous products

- 1005.3.1.2 Addition of section regarding site examination
- 1005.3.1.3 Addition of section regarding contamination
- 1005.3.1.4 Addition of section regarding unsatisfactory conditions
- 1005.3.2.1 Addition of section regarding protection
- 1005.3.2.2 Addition of section regarding erosion control measures
- 1005.3.3 Addition of section and sub-sections regarding planting area establishment
- 1005.3.4.1 Addition of section and sub-sections regarding planting pits
- 1005.3.4.2 Addition of section regarding backfill soil
- 1005.3.4.3 Addition of section regarding obstructions
- 1005.3.4.4 Addition of section regarding drainage
- 1005.3.4.5 Addition of section regarding percolation test
- 1005.3.5.2 Addition of section regarding root flare and roots
- 1005.3.5.3 Addition of section and sub-sections regarding balled and burlapped stock
- 1005.3.5.4 Addition of section and sub-sections regarding container grown stock
- 1005.3.5.5 Addition of section regarding slopes
- 1005.3.5.6 Addition of section regarding container and boxed root ball shaving
- 1005.3.6 Addition of section and sub-sections regarding mechanized tree-spade planting
- 1005.3.7 Addition of section and sub-sections regarding tree, shrub, and vine pruning
- 1005.3.8 Addition of section and sub-sections regarding tree stabilization
- 1005.3.9 Addition of section and sub-sections regarding mulching
- 1005.3.10 Addition of section and sub-sections regarding pesticide application
- 1005.3.11 Addition of section and sub-sections regarding repair and replacement
- 1005.3.12 Addition of section and sub-sections regarding cleaning and protection
- 1005.3.13.1 Addition of section regarding maintenance service
- 1005.3.13.2 Addition of section regarding maintenance
- 1005.3.14 Revision of “inspection” to “review” or “observe” in this section
- 1005.3.15.1 Revision of “guarantee” to “warranty” and add “final” in the first sentence
- 1005.3.16.2.a Addition of “square footage of mulch, and any other non-living materials as” in the first sentence. Addition of “and installation of other non-living materials” to the last sentence.
- 1005.3.16.2.b Addition of section regarding other items

SECTION 1010 TURF SODDING

- General Change “Engineer” to “Landscape Architect” throughout the document
- 1010.1.1.1 Addition of section regarding scope
- 1010.1.2 Addition of section and sub-sections regarding applicable standards and references
- 1010.1.3 Addition of section and sub-sections regarding submittals
- 1010.1.4 Addition of section and sub-sections regarding delivery, storage and handling
- 1010.1.5 Addition of section and sub-sections regarding project conditions
- 1010.2.1.1 Addition of section regarding turfgrass sod
- 1010.2.1.2 Addition of section regarding turfgrass species
- 1010.2.1.3 Addition of section regarding sod cutting
- 1010.2.2.1 Addition of section and sub-section regarding fertilizer
- 1010.2.3.1 Addition of section and sub-sections regarding compost mulch
- 1010.2.3.2 Addition of section regarding humates
- 1010.2.4 Addition of section and sub-sections regarding pesticides
- 1010.3.1.1 Addition of section and sub-sections regarding examination
- 1010.3.1.2 Addition of section regarding unsatisfactory conditions
- 1010.3.2.1 Addition of section regarding protection
- 1010.3.2.2 Addition of section regarding erosion control
- 1010.3.2.3 Addition of the sentence “If existing tree roots exist that prevent rototilling to a 6 inch depth, CONTRACTOR shall notify LANDSCAPE ARCHITECT for alternate direction.”
- 1010.3.2.4 Revision of “inspected” to “reviewed”

- 1010.3.3.3 Addition of “moistening soil” to the first sentence
- 1010.3.3.4 Addition of section regarding sodding restrictions
- 1010.3.4 Addition of section and sub-sections regarding turf renovation
- 1010.3.5.1 Addition to the description of the section and sub-sections of general turf protection
- 1010.3.5.2 Addition to the section regarding watering
- 1010.3.5.3 Addition of section regarding turf post-fertilization
- 1010.3.6 Addition of section and sub-sections regarding satisfactory turf
- 1010.3.7 Addition of section and sub-sections regarding pesticide and herbicide application
- 1010.3.8 Addition of section and sub-sections regarding cleanup and protection
- 1010.3.9 Revision of “inspection” to “review” or “observe” in this section
- 1010.3.9.3.e Addition of section regarding sod review after installation
- 1010.3.9.3.f Addition of section regarding substantial completion review

SECTION 1011 TURF SEEDING

- General Change “Engineer” to “Landscape Architect” throughout the document
- 1011.1.1 Addition of section regarding scope
- 1011.1.2 Addition of section and sub-sections regarding applicable standards and references
- 1011.1.3 Addition of section regarding performance requirements
- 1011.1.4 Addition of section and sub-sections regarding submittals
- 1011.1.5 Addition of section and sub-sections regarding delivery, storage and handling
- 1011.1.6 Addition of section and sub-sections regarding project conditions
- 1011.2.1.1 Revisions to the section regarding seed species, mix and blends
- 1011.2.2 Addition of section and sub-section regarding fertilizer
- 1011.2.3 Addition of section and sub-sections regarding organic amendments
- 1011.2.4 Addition of section and sub-sections regarding pesticides
- 1011.3.1 Addition of section and sub-sections regarding examination
- 1011.3.2 Addition of section and sub sections regarding preparation
- 1011.3.3.b Addition of section regarding moistening prepared area
- 1011.3.3.c Addition of the sentence “If existing tree roots exist that prevent rototilling to a6 inch depth, CONTRACTOR shall notify LANDSCAPE ARCHITECT for alternate direction.”
- 1011.3.3.c Revision of “inspected” to “reviewed”
- 1011.3.3.c Addition of the sentence “If humates or composted bio-waste materials are specified in the plans, CONTRACTOR shall follow seed bed preparation notes as shown on the plans.”
- 1011.3.4.3.c Addition of section regarding weather limitations
- 1011.3.5.1 Addition of “until final acceptance or as otherwise noted in the Contract Documents” to the second sentence.
- 1011.3.6 Addition of section and sub-sections regarding turf renovation
- 1011.3.7.1 Addition the section and sub-sections regarding general seeded turf protection and maintenance
- 1011.3.7.2 Addition of “and has been final accepted” to the first sentence.Addition of “prior to substantial completion” to the second sentence.Addition of “or fertilize as shown on the plans, or as recommended in the soils report and approved by the LANDSCAPE ARCHITECT.” to the last sentence.
- 1011.3.7.3 Addition of section regarding mowing
- 1011.3.8 Addition of section and sub-sections regarding satisfactory turf
- 1011.3.9 Addition of section and sub-sections regarding cleanup and protection
- 1011.3.10 Addition of section regarding warranty
- 1011.3.11 Revision of “inspection” to “review” or “observe” in this section

SECTION 1012 MISCELLANEOUS SEEDING

- General Change “Engineer” to “Landscape Architect” throughout the document
- 1012.1.1 Addition of section regarding scope

- 1012.1.2 Addition of section and sub-sections regarding applicable standards and references
- 1012.1.3 Addition of section regarding performance requirements
- 1012.1.4 Addition of section and sub-sections regarding submittals
- 1012.1.5 Addition of section and sub-sections regarding delivery, storage and handling
- 1012.2.1.2 Addition of section regarding grass seed
- 1012.2.1.3 Addition of section and sub-sections regarding delivery to the site
- 1012.2.1.4 Addition of section and sub-sections regarding seed mixture and application rate
- 1012.2.2 Addition of section and sub-sections regarding native grass and wildflower meadows
- 1012.2.3.1 Addition of section and sub-sections regarding hydro-mulch/tackifier
- 1012.2.3.3 Addition of section and sub-sections regarding germination/erosion control mats
- 1012.2.4 Addition of the sentence at the end of the section regarding fertilizer and soil amendments
- 1012.3.1 Addition of section and sub-sections regarding examination
- 1012.3.2 Addition of section and sub sections regarding preparation
- 1012.3.3.5 Addition of “loosened” to the first sentence
- 1012.3.4 Addition of section and sub sections regarding preparation for germination / erosion-control materials
- 1012.3.5.1 Addition of section regarding seed types and rates
- 1012.3.5.1.b Addition of section regarding seed vehicles
- 1012.3.5.1.d Addition of section regarding weather limitations
- 1012.3.5.2 Addition of the last sentence
- 1012.3.5.3 Addition of the last two sentences
- 1012.3.5.4 Addition of section regarding hydro-mulch slurry blower
- 1012.3.6 Addition of section and sub sections regarding meadow seeding
- 1012.3.7.2 Addition of section regarding mulching on slopes
- 1012.3.7.4 Addition of section regarding hydro-mulching
- 1012.3.7.5 Addition of section regarding erosion control
- 1012.3.7.6 Addition of section regarding aggregate mulch
- 1012.3.8.1 Addition of section regarding maintenance of seeded areas
- 1012.3.9 Addition of section and sub-sections regarding meadow maintenance
- 1012.3.10 Addition of section and sub-sections regarding pest and weed control
- 1012.3.11 Addition of section and sub-sections regarding warranty
- 1012.3.12 Revision of “inspection” to “review” or “observe” in this section
- 1012.3.12.c Addition of section regarding implementation plan
- 1012.3.12.f Addition of section regarding mulched area review
- 1012.3.12.h Addition of section regarding warranty review

SECTION 2700 STANDARD DETAILS FOR LANDSCAPING

- 2700 Reduced Pressure Backflow Preventer / Master Valve Assembly with Flow Sensor
- 2701 Master Valve with RPBA
- 2702 Reduced Pressure Backflow Preventer Assembly with Combination Master Valve / Flow Sensor
- 2703 Reduced Pressure Backflow Preventer Assembly with Master Valve and Flow Sensor- Large Diameter Pipe
- 2704 Pressure Vacuum Breaker Assembly with Master Valve
- 2705 Automatic Irrigation Valve Assembly
- 2706 Air Relief Valve Assembly
- 2707 Manual Isolation Valve Assembly
- 2708 Iron Body Gate Valve Assembly
- 2709 Quick Coupling Valve Assembly
- 2710 Pop-Up Sprinkler with Swing Joint Assembly
- 2711 Pop-UP Sprinkler with Flex Nipple Assembly
- 2712 Bubbler Assembly

2713	Tree Planting in Turf
2714	Tree Planting
2715	Tree Planting on Slope
2716	Shrub Planting
2717	Shrub Planting on Slope
2725	Concrete Edger at Fence
2726	Concrete Mowstrip
2728	Turn Down Slab at Play Area
2729	Edger Wall at Play Area

SECTION 18
UTILITIES

18.1 POLICY ON THE PROXIMITY OF WATER AND SEWER LINES

18.1.1 Whenever possible, it is desirable to lay parallel water and sewer lines at least ten (10) feet apart horizontally, and the waterline should be at higher elevation than the sewer. In cases where it is not practical to maintain a ten (10) foot separation, ENGINEER, after consultation with the Water Authority, may allow deviation on a case by case basis. Such deviation may allow installation of the sewer line closer to the waterline, provided the waterline is in a separate trench or on an undisturbed earth shelf located on one side of the sewer at an elevation such that the bottom of the waterline is at least eighteen (18) inches from the top of the sewer.

18.1.2 When water and sewer lines cross each other, the waterline shall be at least eighteen (18) inches above the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the waterline joints.

18.1.3 When it is impractical to obtain proper horizontal and vertical separation, the sewer line should be designed and constructed of pressure rated (125 psi) green plastic pipe (C900 or C905), and should be pressure tested similar to a water line to assure water tightness. When pressure rated pipe is required for a sewer crossing, it shall be installed the entire distance between the adjacent manholes.

18.2 EXISTING BUILDING SEWER SERVICES OR WATER SERVICE CONNECTIONS, AND REPLACEMENT OF MAINS.

18.2.1 Where building service line connections to existing sewer mains and water mains are encountered, CONTRACTOR shall ensure that the service line will not be disturbed or damaged. Should any service line connection be broken during the construction of the new line, it shall be replaced by the CONTRACTOR. In the case of a sewer service, the trench shall not be backfilled until the service line is inspected by OWNER'S Plumbing Inspector. In the case of a water service line, the trench shall not be backfilled until the service line is inspected by the Water Authority. No extra compensation will be allowed to the CONTRACTOR for this item. Unless specifically provided otherwise, OWNER assumes no liability for damage to or replacement of building sewer and water service line connections.

18.2.2 When a new sanitary sewer main is required as a replacement for an existing line, the alignment of the new line coincides with the existing line and the grade of the new line is approximately at the same grade as the existing line or lower, then the existing line shall be removed or dealt with as ordered by ENGINEER. The cost of this Work shall be paid for under the appropriate item in the Bid Proposal. ENGINEER shall determine if it is

necessary to pump sewage around the replacement work, or if it is possible to temporarily plug the sewer line during the replacement operation. In the case of by-pass pumping, it will be paid for as indicated in the Bid Proposal.

18.2.3 All work performed on privately owned sewer line and service lines must be inspected by the City of Albuquerque's Code Administration Division. In order that inspection by the Planning Department, Code Administration Division, Plumbing Section can be efficiently handled, with a minimum loss of time to CONTRACTOR, the following shall be noted:

18.2.3.1 Inspection arrangements for a sewer service line shall be made by the CONTRACTOR calling the City of Albuquerque, Code Administration Division, Plumbing Section.

18.2.3.2 Inspection requests called in between the hours of 8:00 a.m. and 12:00 noon will be inspected the same afternoon. Inspection requests called in between the hours of 1:00 p.m. and 5:00 p.m. will be inspected the following morning, except in cases of emergency.

18.3 WATER SYSTEM SHUT-OFF AND TURN-ON PROCEDURES

18.3.1 No one without written permission or direct supervision from the Water Authority Field Division Supervisor may operate any valve or fire hydrant which will cause water to flow within, into or out of the existing system. This includes new waterlines and extensions to the water system which have not been accepted but are connected to the existing water system.

18.3.2 When new waterline tie-ins to the existing water system are required, an electronic request and a street map for the water shut-off or water turn-on shall be submitted to the Water Authority. Request forms are found in the Water Authority Web Page at the following address:
<http://www.abcwua.org/content/view/471/746>

18.3.2.1 The request for a water shut-off or turn-on for a main designated as a Distribution Line must be submitted at least seven (7) working days before the date of the actual shut-off or turn-on. Request forms received after 8:00 a.m. will be logged in and scheduled on the following working day and the seven (7) working day requirement will commence.

18.3.2.2 The request for a water shut-off or turn-on for a main designated as a Transmission Line, Master Plan Line, Collector, or Well Collector Line must be submitted at least fourteen (14) working days before the date of the actual shut-off or turn-on. Requests received after 8:00 a.m. will be logged in and scheduled on the following working day and the fourteen (14) working day requirement will commence.

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UTILITIES

18.3.2.3 The request for a water shut-off or turn-on for a San Juan Chama designated transmission line or any other water line in the vicinity of San Juan Chama lines will be required to follow the procedures stated in the Water Authority Administrative Instruction No. 9 and must be submitted at least thirty (30) working days before the date of the actual shut-off or turn-on. Requests received after 8:00 a.m. will be logged in and scheduled on the following working day and the thirty (30) working day requirement will commence. CONTRACTOR shall complete the electronic request form, the electronic Request Form for Work Affecting San Juan Chama Transmission Lines, and submit all required design documentation.

18.3.3 - (intentionally left blank)

18.3.4 The reason for the water shut-off or turn-on shall be detailed and descriptive.

18.3.5 Water shut-offs may have to be scheduled at night or on weekends to accommodate water customers and traffic flow.

18.3.6 Water shutoffs involving Transmission, Well Collector, San Juan Chama, or other Water Authority designated lines may not be permitted from April 1 through September 30 due to the demand on the system. Construction schedules will need to be coordinated with the Water Authority, Plant & Field Divisions when these types of waterlines are impacted. All subsurface work around San Juan Chama transmission lines require special procedures outlined in the Water Authority Administrative Instruction No. 9.

18.3.7 If the water shut-off or turn-on cannot be done on the requested date, the Field Supervisor will notify the CONTRACTOR as soon as possible. The Water Authority shall have the authority to cancel scheduled water shut-offs if the Field Supervisor determines that:

18.3.7.1 CONTRACTOR is not ready to start work and completion of the work will extend beyond the requested time;

18.3.7.2 CONTRACTOR is lacking the necessary equipment, parts, or materials on the job site;

18.3.7.3 Any existing condition giving just cause to show that the scheduled water shut-off will extend beyond the requested time.

18.3.7.4 Field operating conditions have changed which may impact the number of customers or fire hydrants in the shut-off or turn-on request.

18.3.8 EMERGENCY BREAKS:

The Water Authority Field Division shall be notified immediately so that it can perform the shut-off.

18.4 RESPONSIBILITY OF THE CONTRACTOR

18.4.1 CONTRACTOR shall be held responsible for all costs for the repair of any and all damage to the Work or to any utility (which is previously known and disclosed by the utility) as may be caused by their operations. Utilities not shown on the drawings to be relocated or altered shall be protected and maintained by CONTRACTOR. Utilities which are relocated by others in order to avoid interference with structures and which cross the Work shall be maintained in their relocated positions by CONTRACTOR. All costs for such work shall be at CONTRACTOR'S expense without change in the Contract Price.

18.4.2 CONTRACTOR shall never unnecessarily interfere with or interrupt the services of any public or private utility having property within or adjacent to the streets, alleys and easements involved in the Work and shall take all necessary precaution and effort to locate and protect all underground conduit, cables, pipes, waterlines, sewers, structures, gas lines, trees, monuments, power lines, telephone and telegraph lines, traffic control devices and other structures, both below and above ground. CONTRACTOR shall give all public and private utility companies prior written notice, in no event less than forty eight (48) hours, for any work that the CONTRACTOR contemplates, which would interfere in any way whatsoever with the service of any existing public or private utility and Water Authority or City-owned facilities. If such public or private utility does not cooperate for the protection of its services, CONTRACTOR shall notify ENGINEER. Utility lines identified on plans shall be located by CONTRACTOR far enough in advance of construction work in order that the owner of such lines may raise, lower, realign or remove lines and structures, if necessary, and in order that ENGINEER may make any line and grade changes necessary should the existing utility lines conflict with the work under construction, providing such adjustments do not materially affect the Work. In the event an unplanned conflict between an existing, but previously unidentified, utility line and new construction arises, both the owner of such line and the ENGINEER will be notified immediately by CONTRACTOR. CONTRACTOR shall immediately report any damages to public or private property to the owner of the property involved, and to the ENGINEER.

18.4.3 CONTRACTOR shall repair or restore at his own expense any damage to public, Water Authority, City-owned, or private property, for which they are directly or indirectly responsible, to a condition equal to that existing before damage. The CONTRACTOR shall promptly notify their insurance carrier of such damage. If CONTRACTOR fails to give such notice to his insurance carrier or refuses to perform such repairs or restoration upon receipt of

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notice, OWNER may cause such repairs or restoration and deduct the cost thereof from monies due, or which may become due, the CONTRACTOR.

18.4.4 CONTRACTOR shall not remove, realign, or adjust any official City traffic control device including stop signs, warning signs or any other traffic or parking control signs. CONTRACTOR shall give the Construction Coordinator three (3) working days prior notice of any official City traffic control devices that need to be moved. The Construction Coordinator shall take all appropriate actions as soon as practical thereafter.

18.5 LOCATION OF EXISTING UTILITIES

18.5.1 The public and private utility owners shall be responsible to locate their utilities and provide information stating the horizontal alignments of same. If field verification excavations are required, the utility owner will provide same in a timely manner. Utility locations may be obtained by calling the New Mexico One Call System, telephone (811 or 505-260-1990), two (2) working days in advance.

18.5.2 Utilities, which upon exploration are found to interfere with the permanent project work, or if for safety and/or to facilitate construction, it may be necessary to remove exposed lines from the trenching prism, will not be relocated, altered, or reconstructed without the concurrence of the utility owner involved; or ENGINEER may order changes in location, line, or grade of structures being built in order to avoid the utilities. The cost of such changes will be paid for under applicable bid items.

18.5.3 In certain cases where indicated on the drawings, CONTRACTOR shall locate utilities in advance of his construction operations in coordination with the appropriate utility owner. In these cases, CONTRACTOR shall determine the exact locations of utilities, backfill the excavations and construct either temporary or permanent resurfacing over the backfill. The temporary resurfacing shall be constructed when the exploratory excavations are made in an area located within the proposed Project excavations. Permanent resurfacing, when specified, shall be constructed when the exploratory excavations are made in an area located outside the proposed Project excavation and shall be constructed in accordance with the Excavation Ordinance which may require temporary resurfacing or plating. Said permanent resurfacing shall be of the type and thickness specified or as field conditions may otherwise require. In either case, the excavations shall be backfilled by the methods specified and to the relative density specified.

18.5.4 This exploratory excavation work shall be performed as soon as practical, and in any event, a sufficient time in advance of construction to avoid possible delays to CONTRACTOR'S work. All costs for making

such exploratory excavations (including the backfilling and the resurfacing as specified herein) shall be at CONTRACTOR'S expense without change in the Contract Price.

18.6 UNKNOWN UTILITIES DISCLOSED DURING THE CONTRACT WORK

18.6.1 In the event that a utility is disclosed subsequent to the award of the Contract, such utility not being indicated on the drawings, or in the event that an existing utility is found to be in a materially different location than shown on the drawings and thus requires additional work on the part of CONTRACTOR for its maintenance, relocation or support, the necessary alteration, relocation, proper support and protection shall be done and paid for as follows:

18.6.1.1 When said utility is found to occupy the space to be occupied by a part of the permanent works to be constructed or when this utility is, in the opinion of ENGINEER, in such close proximity to the new work as to require the relocation or alteration of said utility, CONTRACTOR shall arrange with the utility owner for such relocation or alteration as directed by ENGINEER.

18.6.1.2 When any portion of the utility is in close proximity and more or less parallel to a structure or conduit, CONTRACTOR shall advise owner thereof, and in cooperation with the utility owner, provide and place the necessary support for proper protection to ensure continuous and safe operation of the utility infrastructure. All costs for such work shall be borne by CONTRACTOR.

18.6.2 In the event the CONTRACTOR discovers an unknown line, the CONTRACTOR shall immediately notify the ENGINEER in writing and all public and private utility companies to identify ownership and status. No work shall proceed that shall affect said line until written approval from the ENGINEER is obtained.

18.7 ABANDONED UTILITIES

18.7.1 Unless otherwise specified or directed, CONTRACTOR shall remove all interfering portions of utilities which are shown on the drawings as "abandoned" or "to be abandoned in place" and which interfere with the construction of the Project. All abandoned waterlines shown on the drawings as "abandoned" or "abandoned in place" or found during construction shall be removed or capped at a minimum, unless otherwise specified. All costs involved in said removals shall be included in the prices bid for the various items of Work. All such abandoned utilities removed by CONTRACTOR shall be disposed of or recycled.

18.7.2 Where utilities are shown on the drawings as "abandoned" or "to be abandoned in place", it shall be the

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CONTRACTOR'S responsibility to contact the utility company involved, within forty eight (48) hours, prior to excavating around such utilities to ascertain that the abandonment of the utility has been completed.

18.8 COORDINATION FOR RELOCATION BY OTHERS

18.8.1 Where removal or relocation of facilities by others is shown on plans or found necessary through exploratory excavations, CONTRACTOR shall coordinate the work with that of the affected owner to minimize the scheduling impact on both parties.

18.8.2 Where parties other than CONTRACTOR are responsible for the relocation of utilities and a delay in CONTRACTOR'S work is caused by the failure on the part of said parties to remove or relocate such utilities in time to prevent such delay, or by any action or lack of action on the part of OWNER, it shall be understood that the CONTRACTOR shall not be entitled, as a result of such delays, to damages or additional payments over and above the Contract Price. If delays in CONTRACTOR'S work are caused by the reasons mentioned herein, CONTRACTOR shall be entitled to an extension of time. The length of such extension of time will be determined by ENGINEER with consideration as to the effect of the delay on the Project as a whole.

18.8.3 In order to minimize delays to the CONTRACTOR caused by the failure of other parties to relocate utilities which interfere with new facilities, CONTRACTOR upon request to ENGINEER may be permitted to temporarily omit the portion of the Work affected by the utility. The portion thus omitted shall be constructed by the CONTRACTOR immediately following the relocation of the utility involved.

MATERIALS

100.1 GENERAL

The contents of Section 100 pertain to materials which are common on public works construction items. For convenience selected materials in this section will be referenced in the appropriate construction activity. Materials which are incidental to only one construction activity will be defined in the activity's section.

100.2 CONTENTS

Section No.	Title
101	Portland Cement Concrete
102	Steel Reinforcement
103	Epoxy-Coated Steel Reinforcement
105	Concrete Curing Compound
106	Cement Mortar and Grout
107	Joint Filler and Sealant Material
108	Brick
109	Riprap Stone
111	Colored Portland Cement Concrete
112	Paving Asphalt (Asphalt Cement)
113	Emulsified Asphalts
114	Asphalt Paving Hot Recycling
115	Slurry Seal Materials
116	Asphalt Concrete
117	Asphalt Rejuvenating Agents
118	Hydrated Lime Mineral Filler
119	Paving Fabrics
121	Plastic Pipe
122	Plastic Liner Plate
123	Reinforced Concrete Pipe
124	Reinforced Concrete Pressure Pipe
127	Steel Water Pipe
128	Concrete Cylinder Pipe
129	Ductile Iron Pipe
130	Gray Iron, Ductile Iron, and Steel Fittings
131	Fiberglass Pipe
135	Corrugated Metal Pipe and Arches (Steel)
136	Structural Steel Plate for Pipe, Arches and Pipe Arches
137	Corrugated Aluminum Pipe and Arches
138	Pipe Arches and Box Culverts
139	Structural and Rivet Steel, Rivets, Bolts, Pins and Anchor Bolts
143	Galvanizing
145	Lumber
146	Wood Preservatives
150	Timber Piles
151	Steel Piles
152	Concrete Piles
157	Paint
160	Steel Castings
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SECTION 131

CENTRIFUGALLY CAST FIBERGLASS REINFORCED POLYMER MORTAR PIPE

131.1 GENERAL

131.1.1 The design, materials, manufacture, testing, and construction requirements of the centrifugally cast fiberglass reinforced polymer mortar pipe in sizes of 18-inch through 96-inch with gasketed bell and spigot joints shall conform to this specification.

131.1.2 The piping for sliplining and/or direct-bury applications supplied in compliance with this section shall be listed on the Water Authority Approved Products List.

131.1.3 The piping shall be in accordance with the latest edition of ASTM D 3262, Standard Specification for Glass-Fiber-Reinforced-Thermosetting-Resin Sewer Pipe; and all applicable sections of AWWA C950: Fiberglass Pressure Pipe.

131.1.4 The pipe shall consist of interior surface, interior layer and an exterior surface. The resins, reinforcing materials, and fillers materials, when combined as a composite structure, shall produce a pipe which meet or exceed the service and design conditions specified.

131.1.5 The interior surface of the pipe shall be a resin rich finish, 40 mils thick minimum, of epoxy, polyester or vinylester resin with no fillers and shall be free of cracks and crazing when placed under the design loading.

131.1.6 The interior and exterior layers of the pipe shall be composed of resin impregnated glass fibers and silica sand fillers in layers.

131.2 REFERENCES

131.2.1 American Society for Testing and Materials (Latest Editions) (ASTM):

C33 Specification for Concrete Aggregates

D2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

D3262 Specification for Fiberglass Sewer Pipe

D3681 Test Method for Chemical Resistance of Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe in Deflected Condition

D4161 Specification for Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals

F477 Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

131.2.2 American Water Works Association (Latest Edition) (AWWA)

C950 Fiberglass Pressure Pipe

131.2.3 THIS PUBLICATION

SECTION 900 SANITARY AND STORM SEWER FACILITIES

SECTION 1502 SUBMITTALS

131.3 MATERIALS:

The centrifugally cast fiberglass liner shall conform to ASTM D 3262, Type 1, Liner 2, Grade 3. The pipe shall also meet the strain corrosion resistance requirements of ASTM D 3681 and joint requirements of ASTM D 4161. Certified test data proving conformance with specifications shall be required from the pipe manufacturer and submitted to the ENGINEER.

131.3.1 Resin Systems:

The manufacturer shall use a thermosetting polyester resin system with a minimum tensile elongation of 2 percent.

131.3.2 Glass Reinforcements:

The reinforcing glass fibers used to manufacture the components shall be commercial grade of E-type glass filaments with binder and sizing compatible with impregnating resins.

131.3.3 Fillers:

Sand shall be in accordance with ASTM C 33 and shall be a minimum 98% silica, kiln-dried and graded, with a maximum moisture content of 0.2%.

131.3.4 Fittings:

Flanges, elbows, reducers, tees, wyes, laterals, and other fittings shall be capable of withstanding all operating conditions when installed. Fittings may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber reinforced overlays.

131.4 JOINING SYSTEM

The CCFRPM pipe shall be field connected with low profile or flush gasketed fiberglass bell and spigot joints meeting the performance requirements of ASTM D 4161. An O-ring type elastomeric gasket meeting the requirements of ASTM F 477 shall be used to provide a positive leak proof sealing system at each pipe joint. Maximum allowable joint angular deflection shall be 1.0 degrees.

131.5 PIPE LENGTHS

Pipe shall be supplied in nominal lengths of 20 feet. Where radius curves in the existing pipe or limitations in the entry pipe dimensions restrict the pipe to shorter lengths, nominal

SECTION 131

CENTRIFUGALLY CAST FIBERGLASS REINFORCED POLYMER MORTAR PIPE

sections of 10 feet or other even divisions of 20 feet shall be used.

131.6 PIPE STIFFNESS

The CCFRPM pipe produced shall have a minimum pipe stiffness of 46 psi at 5% deflection as set forth in ASTM D 2412.

131.7 CERTIFICATIONS

131.7.1 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 manufactured in the United States of America will be acceptable.

131.7.2 Certifications of the materials shall include the cell classification, grades, type of resins, glass fibers, and all other materials used in the manufacturing of the pipe.

131.7.3 Pipe certification shall include calculations with parameter listing, formulas, and all other data which are necessary for the pipe design. Calculations submitted shall use a design temperature of 80°F and shall include, but not be limited to; soil loads, live loads, hydrostatic loads, pipe stiffness, Standard Dimension Ratio, pipe wall crushing strength, initial and long term (50 years) values of pipe deflection including grout load deflection, pipe bonding strain, hydrostatic collapse resistance, constrained buckling strength, and allowable jacking force and length.

131.7.3.1 The CONTRACTOR shall submit the liner pipe manufacturer's details of the pushing or pulling heads to be used.

131.7.4 Certifications shall include drawings showing the cross sectional profile of the pipe wall and pipe joint details.

131.7.5 The manufacturer of pipe and fittings must demonstrate a ten-year minimum history of successful installations in the United States for direct-bury and slip line rehabilitation of sanitary sewers.

131.8 PIPE QUALIFICATION AND PRE INSTALLATION INSPECTION: Pipes shall be inspected by the OWNER or ENGINEER for damage prior to installation.

131.8.1 If pipe is found to be superficially damaged by cracks, holes, delaminations, foreign inclusions, blisters, or other defects that would, due to their nature, degree, or extent, have a deleterious effect on the pipe performance as determined by the ENGINEER; the ENGINEER may reject the pipe or may allow the pipe to be repaired. Rejected pipe shall be replaced with a new section of pipe at no additional cost to the OWNER.

131.10 INSTALLATION

131.10.1 Liner Pipe Installation Plan and Procedures: The CONTRACTOR shall prepare and submit, for review and approval a minimum of 30 working days prior to commencing work, the plan with procedures, and the locations of insertion/access pits. The pits shall be located such that their total number shall be minimized, and the footage of liner pipe installed in a single push shall be maximized. As directed by the OWNER, insertion pits shall be located where obstructions or damaged pipe are planned to be removed.

131.10.2 LINER PIPE INSERTION

131.10.2.1 The existing sewer shall remain in operation during the relining process.

131.10.2.2 Obstructions such as roots, hanging gaskets, special duct and grout invert, large joint offsets, rocks or other debris, that would prevent passage or damage to the liner sections shall be removed or repaired prior to installing the liner.

131.10.2.3 After completing the insertion pit excavation, the top of the existing sanitary sewer interceptor shall be removed, where required, down to the spring line. Bumpers shall be provided in the insertion pit in order to prevent the edges of the existing pipe from damaging the outside of the liner as it is inserted into the existing sewer.

131.10.2.4 The liner shall be inserted into the existing sewer spigot end first with the bell end trailing.

131.10.2.4 The pushing force shall be applied to the pipe wall end inside of the bell in accordance with the manufacturer's printed instructions. No jacking load shall be applied to the end of the bell. The installation heads or mechanism shall incorporate a gauging system which shall provide a continuous monitor of the force being applied during liner insertion operations.

131.10.2.4.1 If the gauging system does not provide a direct reading of the force being applied to the pipe in pounds, the system shall be calibrated and such calibrated data shall be tabulated in written form to allow the ENGINEER to readily determine the force in pounds being applied to the pipe during the insertion operation.

131.10.2.4.2 The insertion force used by the CONTRACTOR shall not exceed the liner pipe manufacturer's recommended maximum allowable pulling or pushing force that can be exerted on the pipe without damaging integrity of the liner pipe or pipe joints.

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CENTRIFUGALLY CAST FIBERGLASS REINFORCED POLYMER MORTAR PIPE

131.10.2.4.3 Maximum allowable joint angular deflection shall be 1.0 degree.

131.10.2.5 For manholes where no point of intersection occurs in the manhole, the interceptor liner shall be inserted through the manholes with no pipe joints in the manhole. For manholes where points of intersection occur in the manhole, the interceptor liner shall be terminated and sealed.

131.10.3 DIRECT-BURY PIPE:
Direct-bury pipe installation and testing shall be in accordance with Section 901.

131.11 MEASUREMENT AND PAYMENT

131.11.1 Payment for pipe liner or direct-bury pipe shall be measured and paid for at the contract unit price as specified in Section 900 or as defined in the Bid Proposal.

131.11.2 The payment shall include all labor, materials, tools, equipment, and performance all of the work involved in furnishing, installing, testing, and incidentals required to complete the installation, as specified in the construction drawings.

131.11.2.1 Modification of the pipe thickness or other properties to meet varying site conditions shall be incidental to the bid amount.

131.11.3 Measurement and payment for obstruction removal by remote device or by excavation, reconnecting sewer services, abandonment of sewer service, insertion and access pits, backfill, paving replacement, clamps and encasement, sealing the liner at the manhole, and grouting of the annular space shall be defined in the Bid Proposal.

131.11.4 Measurement and payment for sewer line cleaning shall be as specified in the Bid Proposal unless otherwise stated in the bid documents.

131.11.5 Measurement and payment for sewer line inspection by CCTV shall be considered incidental unless otherwise stated in the bid documents.

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 from a listed manufacturer on the current Water Authority Approved Product List
- 170.2 REFERENCES
- 170.3 INSTALLATION: Marker devices shall be installed approximately 6-inches over the point to be located, and a minimum of 6-inches from any metal object. However, depth of burial shall not be less than 2-1/2-feet nor more than 6-feet. Devices 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 ¼ -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.
- 170.5 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 900
SANITARY AND STORM SEWER FACILITIES

900.1 GENERAL: This section pertains to the collection and conveyance facilities for sewage and storm runoff in underground piping systems.

900.2 CONTENTS

Section No.	Title
_____	_____
901	Sanitary Sewer Collector and Interceptor Facilities
905	Sanitary Sewer Service Lines
910	Storm Sewer Pipe Installations
915	Storm Sewer Drainage Appurtenances
920	Sanitary Sewer Manholes
921	Storm Manholes
925	Vacuum Sewer Collector, Interceptor and Force Main Facilities

SECTION 901

SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

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:

- Section 121 Plastic Pipe
- Section 131 Fiberglass Pipe

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

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SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

manhole wall. The CONTRACTOR shall take care to avoid unnecessary damage to the existing manhole.

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.

901.5.2 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 1/4-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

901.5.2.7.1

<u>Nominal Pipe Size</u> <u>Diameter</u>	<u>Min. Mandrel</u>
8 in.	7.28 in.
10 in.	9.08 in.
12 in.	10.80 in.
15 in.	13.20 in.
18 in.	16.13 in.
21 in.	19.00 in.
24 in.	21.36 in.
27 in.	24.07 in.

901.6 JOINTS FOR PIPE

901.6.1 (deleted section)

901.6.2 (deleted section)

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

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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:

$$Q = 3240 H^{2.5}$$

H = Head in inches
Q = Discharge in gallons per day

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 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

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SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

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.

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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.

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SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

TABLE 901.7.5.1
LOW-PRESSURE AIR TEST TIME SPECIFICATION
FOR A NON-PRESSURE SEWER LINE

(A) Pipe Diameter (inches)	(B) Minimum Time (min:sec)	(C) Maximum Length for Minimum Time (feet)	(D) Time for Longer Length (seconds)	(E)							
				Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	.38*L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854*L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.52*L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374*L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418*L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342*L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692*L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.47*L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674*L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306*L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366*L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852*L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768*L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46
42	39:48	57	41.883*L	69:48	104:42	139:37	174:30	209:24	244:19	279:13	314:07
48	45:34	50	54.705*L	91:10	136:45	182:21	227:55	273:31	319:06	364:42	410:17
54	51:02	44	69.236*L	115:24	173:05	230:47	228:29	346:11	403:53	461:34	519:16
60	56:40	40	85.476*L	142:28	213:41	284:55	356:09	427:23	498:37	569:50	641:04

901.7.5.2 EXPLANATION AND USE OF TABLE

Explanation of Tables

- 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
- Column D L = length of line in feet; product of computation yields duration
of air test
(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.

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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 arc 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 or right-of-way 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

SECTION 901

SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

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.

SECTION 905

SANITARY SEWER SERVICE LINES

905.1 GENERAL

905.1.1 The requirements of this section apply only to sanitary sewer service lines installed or reconnected within the public right-of-way or easement. Although the maintenance of sanitary sewer lines is the responsibility of the property owner, including the portion within the public right-of-way as established by City Ordinance, the CONTRACTOR shall be responsible for the integrity of the installation or reconnection of all sanitary sewer service lines during the warranty period.

905.1.2 Sanitary sewer service lines shall be installed at all locations shown on the construction plans. The CONTRACTOR shall be aware of the importance of accurately recording coordinate horizontal and vertical locations of sanitary sewer service lines.

905.2 REFERENCES

905.2.1 ASTM:

A 74 Standard Specification for Cast Iron Soil Pipe and Fittings

D 1557 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort

D 2661 Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings

D 2665 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

905.2.2 This publication:

SECTION 170 Electronic Marker Devices

SECTION 701 Trenching, Excavation and Backfill

905.3 MATERIALS

905.3.1 Materials to be utilized on the project shall be those listed in the current Water Authority Approved Products List. All materials not listed must be submitted to the ENGINEER for approval no less than thirty (30) calendar days prior to the proposed date of use.

905.3.2 The CONTRACTOR shall be responsible for assuring that the supplied saddle is compatible with the size and type of both the collection line and service line. Saddles shall be so constructed to have a positive stop to prevent service line from protruding into the main.

905.3.2.1 A 2½-inch wide strap will be required when saddle is attached to the collector line.

905.3.3 Materials to be utilized in the connection of sanitary sewer services to manholes shall be those listed in

the current Water Authority Approved Products List. Manhole connections shall only be allowed if shown on the construction plans or approved by the ENGINEER.

905.3.4 Service risers, if required, shall be PVC Schedule 40 pipe conforming to ASTM D 2665, cast iron soil pipe (service weight) conforming to ASTM A 74, or ABS Schedule 40 sewer pipe conforming to ASTM D 2661. Only PVC or ABS shall be used when connecting to flexible pipe.

905.3.5 Fittings shall be compatible with the service line material. PVC or ABS fittings shall be schedule 40 injection molded only.

905.3.6 Service line laterals shall be cast iron soil pipe (service weight), PVC Schedule 40, or ABS Schedule 40.

905.4 INSTALLATION
(NEW CONSTRUCTION STUB-OUTS)

905.4.1 Service lines shall be installed to the right-of-way line or 5-feet beyond any existing or proposed improvements (i.e., pavement, curb and gutter, sidewalk, etc.).

905.4.2 Saddle connections shall be installed at a 45-degree angle (upward) above the springline of the main sewer and shall be spaced a minimum of 3 feet apart (centerline to centerline).

905.4.3 Service lines shall be installed at a minimum slope of 2 percent with a minimum bury at the terminus of 4 feet, unless otherwise authorized by the ENGINEER. The pipe shall be placed on suitable bedding having a soil compaction density of not less than 95 percent of maximum density, as determined by ASTM D 1557. The pipe shall be uniformly supported by the bedding. Backfill of the service line shall be carefully placed and compacted per the requirements of Section 701.

905.4.4 The terminus of the service line shall be plugged with an end cap compatible with the pipe size and material. An electronic marker device shall be placed above the service tap at the main and over the end of the service line at the property line per Section 170. An "S" (3 inches high and ¼ inch depth) shall be stamped or saw-cut into top of the curb surface directly over the service.

905.4.5 RECORD INFORMATION:
The CONTRACTOR shall provide coordinates, accurate to within 0.3 feet, determined from a field survey by a Professional Surveyor, licensed in the state of New Mexico, to the ENGINEER regarding the horizontal and vertical location of the service at the connection point to the public sewer collector line. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate. A report certified by the licensed Professional Surveyor shall be referenced on the Record Drawings.

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SANITARY SEWER SERVICE LINES

905.5 RISERS

905.5.1 Risers shall be utilized where the sewer main is 15-feet or greater in depth. The riser shall extend to an elevation such that the service line can be installed as specified in Subsection 905.4.3.

905.5.2 The riser shall be installed in accordance with the Standard Detail Drawings. The riser shall be one length of pipe cut to the appropriate length as necessary, unless otherwise approved by the ENGINEER.

905.5.3 RECORD INFORMATION:

The CONTRACTOR shall provide coordinates, accurate to within 0.3 feet, determined by a field survey by a Professional Surveyor, licensed in the state of New Mexico, to the ENGINEER regarding the horizontal and vertical location of the service. Coordinates shall be provided at the service tee and at the top elbow of the riser on the service. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate. A report certified by the licensed Professional Surveyor shall be referenced on the Record Drawings.

905.6 SERVICE RECONNECTIONS

905.6.1 On replacement/rehabilitation type projects, all existing services shall be reconnected to the new sewer main utilizing new saddles and service line pipe, except for Cured-In-Place rehabilitations. The length of removed existing service line shall be as necessary to accommodate the trench excavation and backfill conditions.

905.6.2 The CONTRACTOR shall visually assess the condition of the existing service line and notify the ENGINEER of any obviously deteriorated or defective conditions. The ENGINEER or CONTRACTOR shall notify the property owner of the situation and the property owner shall be given the opportunity to visually assess the service within a reasonable amount of time as dictated by normal construction activity.

905.6.3 The CONTRACTOR shall connect the new service line pipe to the existing pipe at the same slope and alignment as the existing service. Particular care shall be taken to assure a sound connection. The service line shall be uniformly supported on suitable bedding compacted to a density of not less than 95 percent of maximum density, as determined by ASTM D 1557. If service lines are reconnected such that the pipe is not fully supported, hand tampers shall be used to properly compact under the pipe.

905.6.4 The CONTRACTOR shall place an electronic marker device above the service connection to the public sewer line per Section 170.

905.6.5 The CONTRACTOR shall stamp or saw-cut an "S" (3 inches high and ¼ inch depth) into top of curb surface directly over the service line.

905.7 RECORD INFORMATION:

The CONTRACTOR shall provide coordinates, accurate to within 0.3 feet, determined by a field survey by a Professional Surveyor, licensed in the state of New Mexico, to the ENGINEER regarding the horizontal and vertical location of the service. Coordinates shall be provided at the service tee or saddle tap, and if applicable at the top elbow of a riser. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate. A report certified by the licensed Professional Surveyor shall be referenced on the Record Drawings.

905.8 MEASUREMENT AND PAYMENT

905.8.1 Sanitary sewer service lines installed on new construction shall be measured by the linear foot horizontally from the center of the sewer main, or top of riser, if applicable, to the end of the service line. Payment shall be made at the unit price per linear foot and shall include the saddle connection, pipe, trenching, compaction and backfill, electronic marker device, testing, and all incidental work necessary to complete the installation.

905.8.2 Sanitary sewer service risers shall be measured by the vertical foot from the top of the sewer main to the top of the riser. Payment shall be made at the unit price per vertical foot, and shall include the pipe and casing (if required).

905.8.3 Sanitary sewer service reconnections shall be measured per each. Payment shall be made at the unit price per each reconnection shall include the saddle connection, new service pipe, connection to the existing service line, and all incidental work necessary for a complete reconnection.

SECTION 910

STORM SEWER PIPE INSTALLATIONS

910.1 GENERAL

910.1.1 The construction items, specified in this section, are common to storm sewer pipe installation and pipe type culverts.

910.1.2 Reinforced concrete pipe may be used for storm sewer pipe installations or pipe type culverts. Corrugated metal pipe will only be used for pipe-type culverts.

910.2 REFERENCES

910.2.1 ASTM

C361 Standard Specification for Reinforced Concrete Low Head Pressure Pipe

C443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

C478 Standard Specification for Precast Reinforced Concrete Manhole Sections

910.2.2 This publication per SECTIONS:

- 101 Portland Cement Concrete
- 102 Steel Reinforcement
- 105 Concrete Curing Compound
- 106 Cement Mortar and Grout
- 108 Brick
- 123 Reinforced Concrete Pipe
- 124 Reinforced Concrete Pressure Pipe
- 125 Vitrified Clay Pipe
- 135 Corrugated Metal Pipe and Arches (Steel)
- 136 Structural Steel Plate for Pipe, Arches and Pipe Arches
- 137 Corrugated Aluminum Pipe and Arches
- 161 Gray Iron Castings

910.3 MATERIALS

910.3.1 Pipe: Storm sewer line pipe and fittings shall be as specified in other sections as follows:

- Section 123 Reinforced Concrete Pipe
- Section 124 Reinforced Concrete Pressure Pipe
- Section 125.8 Perforated Clay Pipe
- Section 135 Corrugated Metal Pipe and Arches
- Section 136 Structural Steel Plate for Pipe, Arches, and Pipe Arches
- Section 137 Corrugated Aluminum Pipe and Arches
- Section 138 Pipe Arches and Box Culverts

910.4 CERTIFICATION

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

910.5 INSTALLATION

910.5.1 GENERAL:

910.5.1.1 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 drawings. Pipe and appurtenances shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken to prevent damage to any pipe coating.

910.5.1.2 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 laying shall be replaced with sound pipe, or repaired in a manner satisfactory to the ENGINEER, without additional expense to the owner.

910.5.1.3 Pipe shall be laid to line and grade as shown on the plans and as staked in the field. The bottom 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 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 and the CONTRACTOR shall 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 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.

910.5.1.4 CONTRACTOR shall submit to the ENGINEER the proposed method for making connections to existing manholes. Connection methods will be dependent upon manhole size and pipe sizes. Unnecessary damage to the existing manhole should be avoided.

910.5.1.5 Pipe shall be laid upgrade in a continuous operation from structure to structure, with the socket or collar ends of the pipe upgrade unless otherwise permitted by the ENGINEER. Concrete pipe with elliptical

SECTION 910

STORM SEWER PIPE INSTALLATIONS

reinforcement shall be laid with the minor axis of the reinforcement cage in a vertical position. Corrugated metal pipe shall be laid with the external laps of the circumferential seams toward the inlet end.

910.6 JOINTS FOR PIPE

910.6.1 JOINTS FOR CONCRETE PIPE:

910.6.1.1 The type of joint to be used shall be O-ring rubber gasket joints conforming to ASTM C 361 and C 443.

910.6.1.2 Gasketed Type of Joints for Reinforced Concrete Pipe

910.6.1.2.1 General – The ends of the pipe shall be so formed that when the pipes are laid together and joined, they shall make a continuous and uniform line of pipe with a smooth and regular surface.

910.6.1.2.2 Rubber gaskets for making compression-type joints for concrete pipe shall be factory fabricated in accordance with ASTM C 443; for pipes 12 inches in diameter and larger shall be O-ring and shall be handled, primed, installed, etc. in strict accordance with the manufacturer's recommendations.

910.6.1.2.3 The CONTRACTOR'S attention is particularly called to ASTM C 443, regarding storage of gaskets.

910.6.1.2.4 The CONTRACTOR shall furnish the ENGINEER complete information concerning the type and make of all joint material which he intends to use under the contract, including certification that the joint material meets the requirements of the specifications.

910.6.2 JOINTS FOR CORRUGATED METAL PIPE:

910.6.2.1 The seams of the pipe are to be placed at the sides, not on the bottom. The inside circumferential seams should be placed pointing downstream. Care should be taken to insure that dirt or other particles do not get between the outside of the pipe and the pipe coupling. Paved inverts should be placed and centered on the bottom of the trench. Any damage to the protective lining and coating shall be repaired prior to the backfilling around the pipe.

910.6.2.2 If waterproof joints are called for on the plans or specified in the Supplementary Specifications, the caulking compound or other waterproofing material used shall be subjected to the approval of the ENGINEER.

910.7 TESTING FOR LEAKAGE

Normally storm sewer lines need not be tested, but if in the opinion of the ENGINEER, the workmanship or materials do not appear to be satisfactory, the ENGINEER may

require that a section of the storm sewer line be tested in a similar manner as that for a sanitary sewer line, see Section 901.

910.8 CLEANING AND INSPECTION

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

910.8.2 INSPECTION: Before lines become operational or final acceptance of the installation, small size lines shall be inspected by a television camera and larger size lines will be inspected by walking through the line.

910.8.3 TELEVISION: After the CONTRACTOR has cleaned and flushed the line, the CONTRACTOR will notify the ENGINEER that the line is ready for television inspection. Prior to the television inspection (possibly during flushing operation) the CONTRACTOR will insert a ¼ inch nylon rope in the line for the purpose of towing the television unit through the pipe. The OWNER will perform the first television inspection at no cost to the CONTRACTOR. If during the first inspection debris is found in the line, the television inspection will cease. When further cleanup has been completed, the CONTRACTOR will request the ENGINEER to have a second inspection performed. The cost of the second inspection and any subsequent inspections of that segment of the line will be paid for by the CONTRACTOR at the rate of \$50.00 per hour while the television crew is at the line site.

910.9 MEASUREMENT AND PAYMENT

910.9.1 STORM SEWER PIPE: Installed pipe shall be measured and paid for as follows:

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

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

910.9.1.3 For lateral lines, such as from main or manhole to a storm inlet, the pipe length shall be the distance between the center of a manhole or centerline of the main to the interior wall face of the storm inlet along a line parallel to the pipe invert.

910.9.1.4 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

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STORM SEWER PIPE INSTALLATIONS

materials necessary to connect to other sections of pipe, manholes, and other appurtenances.

910.9.2 REMOVAL AND DISPOSAL OF SEWER PIPE: Removal and disposal of storm sewer pipe 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.

910.9.3 TESTING OF PIPE: No payment will be made for required initial or subsequent tests on sections of the storm sewer line.

SECTION 915

STORM SEWER DRAINAGE APPURTENANCES

915.1 GENERAL – The construction items, specified in this section, are related to the storm sewer underground facilities.

915.2 REFERENCES

915.2.1 This publication:

SECTION 300 Streets and Related Work
SECTION 501 Excavation and Backfill for Structures
SECTION 701 Trenching, Excavation and Backfill

915.3 MATERIALS

915.3.1 The construction plans will specify the size and material for the pipe between the storm sewer main and the storm water collection structure.

915.3.2 The various types of storm inlets and their relation to curb and gutter, or valley gutter are shown in the Standard Detail Drawings. Construction plans will identify the type to be constructed.

915.3.3 Grating size, material, and configuration shall conform to the Standard Detail Drawings.

915.4 INSTALLATION OF DRAINAGE FACILITIES

915.4.1 Excavation and backfilling for the storm inlet shall be accomplished in accordance with Section 501.

915.4.2 Trenching, backfilling, and compaction for the connecting pipe between the storm sewer main and the storm inlet shall conform to the specification contained in Section 701. Pipe shall be installed in accordance with Section 910.

915.4.3 All pipe and structures shall be installed per location and elevations, as shown on the construction plans. If during the course of installation, an underground obstruction (i.e., existing utility line) the work shall stop and the ENGINEER shall be immediately notified so that the problem can be resolved.

915.4.4 Direct connection to storm sewer main will be permitted if the main is a minimum of 36 inches in diameter (I.D.) and the connecting line is not greater than 12 inches (I.D.). If storm sewer mains are 48 inches (I.D.) or larger, the connecting line diameter may be increased to 18 inches (I.D.). For connecting line sizes greater than those specified above, the connection to the main will be made into a manhole or by inserting into the main a factory constructed wye. Connection to the main will comply with the Standard Detail Drawings.

915.4.5 Removal of curb and gutter, and sidewalk for installation of a storm inlet shall be made at a scored or full depth joint.

915.4.6 Existing pavement removal and replacement shall conform to Sections 343 and shall conform to residential or arterial pavement sections of the same material (asphalt or Portland Cement concrete) as the existing pavement.

915.4.7 No width greater than ½ inch will be permitted between the inlet grate and the roadside portion of the inlet frame.

915.5 Private drainage facility installations, which are to be constructed under the authorization of “Drainage Facilities Within Public Right-of Way,” shall comply with the Standard Detail Drawings and appropriate sections of this publication.

915.6 MEASUREMENT AND PAYMENT

915.6.1 Pavement removal and replacement will be measured by square yard. Payment will be made at the unit price per square yard per type of replacement paving material, as specified in the Bid Proposal.

915.6.2 Trenching, backfilling, and compaction shall be measured by the linear foot from the main side wall of the inlet to the centerline of the main. Payment will be made at the unit price per linear foot per the average depth increment between connection points, as defined in the Bid Proposal.

915.6.3 Connecting pipe shall be measured by the linear foot along centerline of pipe from the main side wall of the inlet to the centerline of the main. Payment will be made at the unit price per linear foot per type and size of pipe, and shall include pipe in place and all necessary jointing materials.

915.6.4 Storm inlets shall be measured on a unit basis. Payment will be made at the unit price per each type of storm inlet, and shall include structure, grating, excavation, backfilling and compaction, and curb removal and replacement, as defined in Bid Proposal.

915.6.5 Removal and replacement of sidewalk shall be measured by the square foot and payment will be made at the unit price per square foot.

SECTION 920

SANITARY SEWER MANHOLES

920.1 GENERAL: This section contains items which are relative to the installation and rehabilitation of sanitary sewer manholes.

920.2 REFERENCES

920.2.1 ASTM

C 32 Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale)

C 139 Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes

C 478 Standard Specification for Precast Reinforced Concrete Manhole Sections

C 497 Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile

D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

920.2.2 This publication:

- SECTION 101 PORTLAND CEMENT CONCRETE
- SECTION 102 STEEL REINFORCING
- SECTION 105 CONCRETE CURING COMPOUND
- SECTION 106 CEMENT MORTAR AND GROUT
- SECTION 108 BRICK
- SECTION 161 GRAY IRON CASTINGS
- SECTION 163 DUCTILE IRON CASTINGS
- SECTION 170 ELECTRONIC MARKER DEVICES

920.3 MATERIALS

920.4 SANITARY SEWER MANHOLE CONSTRUCTION

920.4.1 GENERAL

920.4.1.1 Soil Foundations for manhole base shall be compacted to a density of 95 percent of the maximum density per ASTM D 1557. Compaction limits shall be one foot beyond the perimeter of the concrete base and shall be a minimum of one foot in depth.

920.4.1.2 Manholes shall be constructed in accordance with the Standard Detail Drawings and as shown on the construction plans. Precast reinforced concrete units, concrete blocks or formed in-place, reinforced concrete may be used to construct manhole.

920.4.1.3 Invert elevation of the pipes entering or exiting the manhole and interior inverts shall not vary more than 0.05 feet from the elevation indicated on the construction plans. In order to ensure compliance with the design drawings, the CONTRACTOR shall provide the

ENGINEER with coordinates, determined by a field survey by a Professional Surveyor licensed in the state of New Mexico. The vertical precision of the coordinates shall be, at a minimum, accurate to within 0.05 feet. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate. A report certified by the licensed Professional Surveyor shall be referenced on the Record Drawings.

920.4.1.4 All cement used for poured foundations, mortar, fillets, grout, and concrete shelf construction shall be Type II or approved equal.

920.4.1.5 All concrete for formed in place foundations or bases, concrete shelves, and pipe supports shall conform to Section 101.

920.4.1.6 Depending on the size of the pipe, connections to existing and new manholes shall be made by either core drilling through the manhole wall, preformed for new precast units, or for large-size pipe the manhole wall may be removed by carefully chipping the wall segment which will permit entry of the pipe. In the latter operation, exposed manhole reinforcement should be bent and tied to the reinforcement of the pipe tied to the reinforcement of the pipe collar. If core drilling is not practical, the CONTRACTOR shall request the ENGINEER to authorize the chipping operation. During either operation the CONTRACTOR shall take care to avoid unnecessary damage to the manhole surfaces or walls.

920.4.1.7 Electronic marker devices shall be installed at all sanitary sewer manholes, one foot upstream of the manhole over the centerline of the main line as specified in Section 170.

920.4.2 PRECAST CONCRETE MANHOLES:

920.4.2.1 The vertical sections of the manhole may be of different dimensions in order that manholes of various depths can be readily assembled.

920.4.2.2 Concrete, used for precast bases, vertical sections, and concentric cones, shall conform to Section 101.

920.4.2.3 Vertical sections of the manhole shall conform to the requirements of ASTM C 478.

920.4.2.4 The CONTRACTOR shall submit shop drawings of the precast base and concentric cone to the ENGINEER for review and approval.

920.4.2.5 Circular precast manhole sections shall be provided with mastic gasket to seal joints between sections. Material used shall conform to the Water Authority Approved Product List.

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SANITARY SEWER MANHOLES

920.4.2.6 All lifting holes, except Type "C" manhole covers, and gaps at joints shall be filled with a non-shrink grout.

920.4.2.7 Precast concrete manhole bases may be used when approved by the ENGINEER. If approved, it shall be with the understanding that the CONTRACTOR shall be responsible for placing the bases at the specified elevation, location, and alignment.

920.4.3 FORMED-IN-PLACE REINFORCED CONCRETE MANHOLE:

920.4.3.1 The CONTRACTOR shall submit preconstruction drawings of the proposed manholes to the ENGINEER for review and approval.

920.4.3.2 Concrete used for this type of manhole construction shall conform to Section 101.

920.4.3.3 If desired, a precast concentric cone or a flat top cover can be used.

920.4.4 CONCRETE BLOCK MANHOLE:

920.4.4.1 The CONTRACTOR shall submit preconstruction drawings of the proposed manhole to the ENGINEER for review and approval.

920.4.4.2 Concrete masonry units for the construction of this type of manhole shall conform to ASTM C 139 and the Standard Detail Drawings. All blocks shall be mortared into place.

920.4.4.3 Concentric cone or flat top cover shall be used.

920.4.5 (intentionally left blank)

920.4.6 COATING OF MANHOLES:

920.4.6.1 Exterior of Manholes:
Exterior coating of manholes shall be required in areas where ground water is present. The coating shall be a waterproofing type of bitumastic or asphaltic material, as approved by the ENGINEER. Application shall be in accordance with the manufacturer's published recommendations.

920.4.6.2 Interior of Manholes:
Interior coating of manholes shall be required only when specified on the construction plans. The coating shall be an epoxy resin-type material, listed on the Water Authority Approved Product List, and shall be capable of protecting the concrete from deterioration due to a gaseous environment. Application shall be in accordance with the manufacturer's published recommendations.

920.4.6.3 Plastering of Manholes:

The work shall include the coating of the surface of existing block manholes with plaster as required on the construction plans.

920.4.7 (intentionally left blank):

920.4.8 ADJUSTMENT BRICKS:

920.4.8.1 Manhole adjustment bricks shall conform to the requirements for manhole bricks, per ASTM C 32 for Grade MS.

920.4.8.2 Mortar shall be used to lay the bricks, as well as coating the interior and exterior surfaces of the laid brick. Thickness of the mortar coating shall be ½-inch.

920.4.9 MANHOLE FRAME AND COVER:

The manhole frame and cover for the sanitary sewer shall conform to the specifications contained in Section 163 Ductile Iron Castings.

920.5 LEAKAGE TESTING OF SEWER MANHOLES:

920.5.1 All sanitary sewer manholes shall be tested for leakage by either a water exfiltration test or a vacuum test. Whichever leakage test is utilized, it is recommended that the test be performed prior to backfilling around the manhole and prior to placement of the manhole frame and cover. All inlet and outlet lines shall be properly plugged and the lift holes and barrel joints filled and sealed as specified. The CONTRACTOR shall be responsible for all materials and equipment necessary to perform the test and shall conduct the test in the presence of the ENGINEER or his representative. The CONTRACTOR has the option of performing a manhole test in increments appropriate to the depth of the manhole.

920.5.1.1 Under all circumstances, the CONTRACTOR shall be required to remove all plugs immediately after testing and 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.

920.5.2 The water exfiltration test shall consist of filling the entire manhole with water to the bottom of the frame elevation. A stabilization period of one hour will be allowed for absorption, after which the manhole shall be refilled as necessary before starting the test. The test period shall be two (2) hours, after which the manhole shall be refilled, measuring the necessary quantity of water. The allowable leakage shall be 0.25 gallons per foot diameter per vertical foot per day and is represented by the following formula:

$$V = 0.25 \text{ DHT} / 24$$

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SANITARY SEWER MANHOLES

Where: V = Allowable loss in gallons
D = Manhole diameter in feet
H = Initial depth of water to invert in feet
T = Duration of test in hours

920.5.3 The vacuum test shall consist of utilizing an inflatable compression band, vacuum pump, gauges and appurtenances specifically designed for vacuum testing. Test procedures shall be in accordance with the manufacturer's printed recommendations. The ENGINEER shall be the sole judge as to the adequacy of the equipment.

920.5.3.1 A vacuum of 10" Hg shall be placed in the manhole and the time measured for a drop to 8.5" Hg. The test shall be considered to be successful if the measured time exceeds the test period. Should the test fail, the manhole shall be repaired as necessary and the test rerun. The test periods are:

920.5.3.2 Sixty (60) seconds for four (4) foot diameter manholes

920.5.3.3 Seventy-five (75) seconds for five (5) foot diameter manholes

920.5.3.4 Ninety (90) seconds for six (6) foot diameter manholes

920.5.3.5 One hundred and twenty (120) seconds for eight (8) foot diameter manholes

920.6 ABANDONMENT OF MANHOLES

920.6.1 Abandonment of manhole, which is part of a sewer line being abandoned, shall require the following work and materials:

920.6.2 Manhole will not be removed but will be abandoned in place.

920.6.3 All manhole inlet and outlet lines shall be plugged with a 12-inch thick concrete or concrete mortar plug.

920.6.4 The concrete collar, ring, and cover shall be removed and disposed of by the CONTRACTOR.

920.6.5 Manhole bottom will be pulverized.

920.6.6 The manhole shall be filled with cement treated base (CTB) material to the bottom elevation of the asphalt base course of the pavement or to the ground surface level.

920.6.7 All labor, materials, and equipment necessary to complete this work shall be furnished by the CONTRACTOR.

920.6.8 For historical information the ENGINEER shall provide coordinates accurate to within 0.3 feet, determined

by a field survey by a Professional Surveyor licensed in the state of New Mexico, on the record drawings. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate. A report certified by the licensed Professional Surveyor shall be referenced on the Record Drawings.

920.7 SANITARY SEWER MANHOLE REHABILITATION

920.7.1 GENERAL

920.7.1.1 Sanitary sewer manhole rehabilitation shall include coating of manholes with a cementitious liner, rebuilding of manhole invert benches to the profile shown on Standard Drawings 2101 and 2102 or to the specific profiles provided on the construction plans, and installation of protective epoxy or polyurethane coating systems. Where shown on the construction plans, sanitary sewer manhole rehabilitation shall also include miscellaneous structural modifications including installation of 30-inch diameter opening with approved manhole cover and frame, and installation of new concrete collar.

920.7.2 SANITARY SEWER MANHOLE REHABILITATION ASSOCIATED WITH TRENCHLESS REHABILITATION WORK

920.7.2.1 This specification shall govern all work, materials, and equipment required for new manhole lining or manhole rehabilitation for the purpose of eliminating infiltration, providing corrosion protection, repair of voids, and restoration of the structural integrity of the manhole as a result of applying a monolithic fiber-reinforced cementitious liner to the wall and bench surfaces of brick, concrete, or any other construction material followed by a protective epoxy or polyurethane coating system, where specifically required on the construction plans.

920.7.2.2 For sliplining and cured-in-place pipe technologies where no point of intersection occurs in the manhole, the sewer liner may be installed continuous through the manhole. If installed in this manner, the portion within the manhole shall be neatly cut out and removed, and terminations sealed per liner manufacturer's recommendation. For those manholes where point of intersections occur in the manholes, the sewer liner shall be terminated and sealed per liner manufacturer's recommendation at the inside wall of the manhole. For those sewer rehabilitation methods that require annular grouting, a bulkhead shall be installed. The manhole shall be thoroughly cleaned using a high pressure washing system as recommended. A new bench shall be constructed to the pipe soffit and the manhole wall sealed with a monolithic, cementitious liner followed by application of a protective epoxy or polyurethane coating system.

920.7.2.3 Described are procedures for manhole preparation, cleaning, application and testing. The

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applicator, approved and trained by the manufacturer, shall furnish all labor, equipment and materials for applying a cementitious mix to form a monolithic liner of minimum 1/2-inch thickness using a machine specially designed for the application.

920.7.2.3.1 All aspects of the installation shall be in accordance with the manufacturer's recommendations and with the following specifications which include: Elimination of all infiltration prior to making the application; Repair and sealing the invert benches; Removal of any loose and unsound material; Re-building of manhole invert benches to the pipe soffit; Spray application of a cementitious liner mix to form a monolithic liner; and Spray application of a protective epoxy or polyurethane liner system.

920.7.3 MATERIALS

920.7.3.1 All materials used shall be listed on the Water Authority Approved Product list.

920.7.3.1.1 Patching Mix: a quick setting fiber reinforced, calcium aluminate, corrosion resistant cementitious material shall be used as patching material to fill large voids.

920.7.3.1.2 Infiltration Control: a rapid setting cementitious product specifically formulated for leak control shall be used to stop minor water infiltration of water into the manhole.

920.7.3.1.3 Grouting Mix: a cementitious grout shall be used for stopping active infiltration into the manhole and filling voids in the manhole wall. Chemical grouts may be used to stop excessively active infiltration.

920.7.3.1.4 Cementitious Liner Mix: shall be used to form the monolithic liner covering all interior manhole surfaces. The liner mix shall be made with calcium aluminate cement or other approved corrosion preventative admixture and shall be applied according to the manufacturer's recommendations.

920.7.3.1.5 Protective Epoxy or Polyurethane Liner: shall be used to resist chemical attack and deterioration of the manhole walls.

920.7.4 SUBMITTALS AND CERTIFICATIONS

920.7.4.1 Before commencing work, the CONTRACTOR shall submit the following for Approval:

920.7.4.1.1 Technical Data Sheets for proposed materials.

920.7.4.1.2 Certifications that the proposed materials meet or exceed the requirements listed in the Specifications.

920.7.4.1.3 Installation procedures as recommended by the manufacturer.

920.7.4.1.4 Product testing results.

920.7.4.1.5 Design calculations.

920.7.4.1.6 Applicator qualifications and proof of manufacturer training.

920.7.5 APPLICATION

920.7.5.1 PREPARATION, CLEANING, AND LEAK PREVENTION

920.7.5.1.1 Place covers over sewer invert to prevent extraneous material from entering the lines.

920.7.5.1.2 All foreign material, deposits, and other contaminants shall be removed from the manhole wall and bench using a high pressure washer or water sprayer having a minimum nozzle discharge pressure of 1,200 psi. Care shall be taken not to cause additional damage to the manhole structure resulting from overpressure used in cleaning process.

920.7.5.1.2.1 Loose and protruding brick, mortar, and concrete shall be removed using a mason's hammer and chisel and/or scraper.

920.7.5.1.2.2 Large voids shall be filled with quick setting patching mix.

920.7.5.1.2.3 Active leaks shall be stopped using quick setting specially formulated mixes according to the manufacturer's recommendations.

920.7.5.1.2.4 Existing manhole steps or ladders shall be removed by cutting off flush to the manhole wall prior to application of any rehabilitation coatings.

920.7.5.2 INVERT REPAIR

920.7.5.2.1 Invert Repair shall be performed on all inverts with visible damage, where infiltration is present, or when vacuum testing is specified.

920.7.5.2.2 After blocking flow through the manhole and thoroughly cleaning the invert, the quick setting patch material shall be applied to the invert and bench. The material shall be troweled uniformly onto the damaged invert at a minimum thickness of 1/2-inch at the invert extending out onto the bench of the manhole sufficiently to tie into the structurally enhanced monolithic liner.

920.7.5.2.3 The finish invert surfaces shall be smooth and free of ridges and shall be tapered at the inlets and outlet of the channel for flow.

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SANITARY SEWER MANHOLES

920.7.5.3 MIXING LINER MATERIALS

920.7.5.3.1 The material shall be mixed per the manufacturer's recommendations at a rate to allow for continuous spraying without interruption until each application is complete.

920.7.5.3.2 If ambient temperatures are in excess of 95° F, precautions shall be taken to keep the mix temperature at time of application below 90° F. If necessary, use ice or chilled water during mixing.

920.7.5.4 SPRAYING LINER MATERIALS

920.7.5.4.1 Prior to spraying, the surface shall be clean and free of all foreign material and shall be damp without noticeable free water droplets or running water. Materials shall be applied by spraying a minimum uniform thickness to ensure that all cracks, crevices, and voids are filled and a smooth surface remains after light troweling. The troweling shall compact the material into voids and set the bond.

920.7.5.4.2 Material shall not be applied to frozen surfaces or if freezing is expected to occur within the manhole for 24 hours after application.

920.7.5.4.3 The second application of material shall not begin before the first application has achieved an initial set. The minimum total finished thickness of cementitious material shall not be less than 1/2 inch. The second application shall be trowelled to a smooth finish being careful not to over trowel and to bring additional water to the surface thereby weakening it.

920.7.5.4.4 Ambient manhole conditions are adequate for curing so long as the manhole is covered. It is imperative that the manhole be covered as soon as possible after the application has been completed.

920.7.5.4.5 Contractor shall protect surfaces from contamination of any type between coats and through curing periods.

920.7.5.4.6 Epoxy or polyurethane liner systems shall be applied to a dry film thickness no less than 125 mils excluding any primer coats required by the manufacturer.

920.7.5.4.7 Active flows shall not be introduced through the manhole until the manufacturer's recommended cure time for the product's final coat has been achieved.

920.7.6 TESTING AND INSPECTION

920.7.6.1 A visual inspection of the manhole shall be performed to evaluate workmanship of the coating application

920.6.2 The cementitious materials used shall be compression strength tested as described in ASTM C39. The Contractor shall provide at least two (2) cylinders of material for testing, each 3 inch diameter x 6 inch long.

920.6.3 All manholes shall be tested per Section 920.5 of this Specification.

920.6.4 If requested by the Water Authority or Engineer, a Spark test shall be performed to ensure that there is a full monolithic lining and to ensure that there are no pinholes in the coating.

920.6.5 If requested by the Water Authority or the Engineer due to concerns regarding delamination or disbanding of the coating resulting from the integrity of the substrate under the coating, the strength of the substrate, or the contamination of substrate, a Pull Test shall be required.

920.8 MEASUREMENT AND PAYMENT

920.8.1 NEW MANHOLES:

920.8.1.1 Type "C" or "E" manholes of 4-foot, 6-foot, and 8-foot diameters shall be measured per each within the following increments of depth: 3 to 6 feet, 6 to 10 feet, and 10 to 14 feet. Manholes greater than 14 feet deep shall be measured and paid per Section 9.8.1.2. Measurements will be made to the nearest foot and will be from the manhole rim elevation to the manhole invert elevation.

920.8.1.2 Payment for manholes 14 feet deep or less will be made on the unit price per manhole diameter per depth increment as specified in the Bid Proposal. Payment for manhole depths which exceed 14 feet will be made on the unit price per manhole diameter per vertical foot. This payment is in addition to the manhole unit price for the portion above the 14 foot depth.

920.8.1.3 Payment for any type diameter or depth of manhole will include excavation, compacted backfilling, benching, cover or cone, leveling bricks, frame and cover, concrete pad or collar, and placement of EMD for sanitary sewers.

920.8.2 ELEVATION ADJUSTMENTS:

920.8.2.1 When a new manhole is installed, no measurement or payment will be made for rim elevation adjustments to conform to street surface grades.

920.8.2.2 The following measurements and payments for rim elevation adjustments on existing manholes will be made for indicated conditions:

920.8.2.2.1 Unit price per inch of leveling brick adjustment.

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920.8.2.2.2 Unit price per manhole diameter per vertical foot of adjustment to cone and/or barrel.

920.8.2.3 As required, the following items will be included in the unit price per appropriate adjustment: pavement removal and replacement, excavation, compacted backfilling, concrete collar or pad, leveling bricks, frame, cover, and EMD placement.

920.8.3 EXTERIOR COATING OF MANHOLE:
Exterior waterproof coating for manholes shall be measured and paid for on the unit price per square foot of surface area covered.

920.8.4 INTERIOR COATING OF MANHOLE:
Plastering or epoxy coating for manholes shall be measured and paid for on the unit price per square foot of surface area covered.

920.8.5 ABANDONMENT OF MANHOLES:
Measurement and payment for abandonment of a manhole shall be the unit price per manhole for defined work in Subsection 920.6.

920.8.6 MANHOLE REHABILITATION IN REPLACEMENT WORK: Work under this item shall be measured and paid for by the unit price per manhole for work specified in the Bid Proposal.

920.8.7 TESTING: There will be no payment for required testing of sewer manholes.

SECTION 921

STORM MANHOLES

921.1 GENERAL: This section contains items which are relative to the installation of storm manholes.

921.2 REFERENCES

921.2.1 ASTM

C 43 Standard Terminology of Structural Clay Products

C 139 Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes

C 478 Standard Specification for Precast Reinforced Concrete Manhole Sections

C 497 Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile

C 1557 Standard Test Method for Tensile Strength and Young's Modulus of Fibers

921.2.2 This publication:

- SECTION 101 PORTLAND CEMENT CONCRETE
- SECTION 102 STEEL REINFORCING
- SECTION 105 CONCRETE CURING COMPOUND
- SECTION 106 CEMENT MORTAR AND GROUT
- SECTION 161 GRAY IRON CASTINGS

921.3 MANHOLE MATERIALS

Storm manhole materials shall be as specified in other sections, as follows:

Portland Cement Concrete	Section 101
Steel Reinforcing	Section 102
Concrete Curing Compound	Section 105
Cement Mortar and Grout	Section 106
Gray Iron Castings	Section 161

921.4 MANHOLE CONSTRUCTION

921.4.1 GENERAL

921.4.1.1 Soil Foundations for manhole base shall be compacted to a density of 95 percent of the maximum density per ASTM D 1557. Compaction limits shall be one foot beyond the perimeter of the concrete base and shall be a minimum of one foot in depth.

921.4.1.2 Manholes shall be constructed in accordance with the Standard Detail Drawings and as shown on the construction plans. Precast reinforced concrete units, concrete blocks or formed in-place, reinforced concrete may be used to construct manhole.

921.4.1.3 Invert elevation of the pipes entering or exiting the manhole and interior inverts shall not vary more than 0.05 foot from the elevation indicated on the construction plans.

921.4.1.4 All cement used for poured foundations, mortar, fillets, grout, and concrete shelf construction shall be Type II or approved equal.

921.4.1.5 All concrete for formed in place foundations or bases, concrete shelves, and pipe supports shall be 3000 psi compressive strength concrete.

921.4.1.6 Depending on the size of the pipe, connections to existing and new manholes shall be made by either core drilling through the manhole wall, performed for new precast units, or for large-size pipe the manhole wall may be removed by carefully chipping the wall segment which will permit entry of the pipe. In the latter operation, exposed manhole reinforcement should be bend and tied to the reinforcement of the pipe tied to the reinforcement of the pipe collar. If core drilling is not practical, the CONTRACTOR shall request the ENGINEER to authorize the chipping operation. During either operation the CONTRACTOR shall take care to avoid unnecessary damage to the manhole surfaces or walls.

921.4.2 PRECAST CONCRETE MANHOLES:

921.4.2.1 The vertical sections of the manhole may be of different dimensions in order that manholes of various depths can be readily assembled.

921.4.2.2 Concrete, used for precast bases, vertical sections, and eccentric cones, shall be 4000 psi compressive strength concrete.

921.4.2.3 Vertical sections of the manhole shall conform to the requirements of ASTM C 478

921.4.2.4 The CONTRACTOR shall submit shop drawings of the precast base and eccentric cone to the ENGINEER for review and approval.

921.4.2.5 Circular precast manhole sections shall be provided with mastic gasket to seal joints between sections, such as RAM-NEK, KENT SEAL, or approved equal.

921.4.2.6 All lifting holes, except Type "C" manhole covers, and gaps at joints shall be filled with a non-shrink grout.

921.4.2.7 Precast concrete manhole bases may be used when approved by the ENGINEER. If approved, it shall be with the understanding that the CONTRACTOR shall be responsible for placing the bases at the specified elevation, location, and alignment.

921.4.3 FORMED INPLACE REINFORCED CONCRETE MANHOLE:

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STORM MANHOLES

921.4.3.1 The CONTRACTOR shall submit preconstruction drawings of the proposed manholes to the ENGINEER for review and approval.

921.4.3.2 Concrete used for this type of manhole construction shall be 4000 psi compressive strength concrete.

921.4.3.3 If desired, a precast eccentric cone or a flat cover can be used.

921.4.4 CONCRETE BLOCK MANHOLE:

921.4.4.1 The CONTRACTOR shall submit preconstruction drawings of the proposed manhole to the ENGINEER for review and approval.

921.4.4.2 Concrete masonry units for the construction of this type of manhole shall conform to ASTM C 139 and the Standard Detail Drawings. All blocks shall be mortared into place.

921.4.4.3 Eccentric cone or flat-type cover shall be used.

921.4.5 TEE PIPE MANHOLE:

921.4.5.1 Tee pipe manholes will be used for all 4-foot-diameter mainline pipes and larger. Horizontal section of the tee pipe shall be the same class of pipe as the adjacent sections. The vertical sections shall comply with the requirements set forth in ASTM C 478.

921.4.5.2 Top of the vertical portion of tee pipe unit will extend a minimum of 18-inches above the outside diameter of the horizontal pipe. The 4-foot-diameter vertical section of the tee pipe shall be connected at the longitudinal center point of the horizontal pipe section. The minimum length of horizontal pipe section shall be 8 feet.

921.4.5.3 The CONTRACTOR shall submit to the ENGINEER for review and approval preconstruction shop drawings on the fabrication of the tee pipe section as developed by a precast reinforced concrete pipe manufacturer. Field fabrication of this eccentric pipe unit will not be accepted. Shop drawings for the eccentric cone will also be submitted for review and approval.

921.4.5.4 RAM-NEK, Kent Seal, or approved equal sealants shall be used to seal the joints in the vertical portion of this manhole.

921.4.5.5 All lifting holes, except for Type "C" manhole covers, and gaps at joints shall be filled with a non-shrink grout.

921.4.5.6 Standard Detail Drawings show some of the components of the tee-type pipe manhole.

921.4.6 MANHOLE STEPS:

921.4.6.1 Manhole steps shall be ½" diameter, grade 60, reinforcing rod completely encapsulated in copolymer polypropylene or corrosion resistant rubber compound. Steps shall be designed to be cast in place or hammered into holes in manhole walls.

921.4.6.2 Approved manhole steps of only one manufacturer model shall be used on any specific project and shall not be intermixed with other approved steps. Approved steps must bear the manufacturer name and model on the exposed surface of the step and shall be one of the following products or approved equals: M.A. Industries, Inc. – Model PS-2-PFS H.Bowen Co. – Bowco, Model 81213 or 93813 Delta Pipe Products – WEDG-LOK, Model W-11

921.4.6.3 The minimum width of step tread shall be 11-inches. Steps will be spaced uniformly in each manhole. Spacing may be between 12-inches to 16-inches on center. Lower step will be 12-inches above manhole shelf or top of main. The upper step shall be 6-inches below the top portion of the eccentric cone or 6 inches below the bottom of the flat cover. Also the steps shall be aligned vertically with the opening of the cone or cover.

921.4.6.4 Steps shall be embedded in the manhole wall a minimum of 3-inches and protrude from the manhole interior surface a minimum of 4 ¾-inches.

921.4.6.5 Holes for step installation shall be drilled or precast per manufacturer's recommended size, or of sufficient size to allow for step insertion into the wall. Cast-in-place sockets or tapered holes recommended by the step manufacturer may be used with prior approval of ENGINEER. If the hole has been drilled too large, then the step shall be secured in place by using epoxy grout for the full depth of the drilled hole.

921.4.6.6 Acceptable manhole step installations must be capable of withstanding a 400 pound, horizontal, pull out load applied in accordance with ASTM C 497.

921.4.7 ADJUSTMENT BRICKS:

921.4.7.1 Manhole adjustment bricks shall conform to the requirements for manhole bricks, per ASTM C 32 for Grade MS.

921.4.7.2 Mortar shall be used to lay the bricks, as well as coating the interior and exterior surfaces of the laid brick. Thickness of the mortar coating shall be ½-inch.

921.4.8 MANHOLE FRAME AND COVER: The manhole frame and cover for the storm manholes shall conform to the specifications contained in section 161.

921.5 TESTING OF STORM MANHOLES:

921.5.1 Normally storm manholes need not be tested unless specifically required by the project plans or supplemental technical specifications. However, if in the

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opinion of the ENGINEER, the workmanship or materials do not appear to be satisfactory, the ENGINEER may require that any storm manhole be tested in a similar manner as that for a sanitary sewer manhole.

921.6 ABANDONMENT OF MANHOLES

921.6.1 Abandonment of manhole, which is part of a storm drain being abandoned, shall entail the following work and materials:

921.6.2 Manhole will not be removed but will be abandoned in place.

921.6.3 All manhole inlet and outlet lines shall be plugged with a 12-inch –thick concrete or concrete mortar plug.

921.6.4 Salvageable material shall be stockpiled on the job site. The CONTRACTOR shall contact Owner to arrange for a representative to inspect the materials for usability. Salvageable materials shall be transported by the CONTRACTOR to the City Yards. CONTRACTOR will receive a receipt for the turned-in materials. Receipts will be submitted to the ENGINEER prior to final acceptance of the Project. Unusable materials will be disposed of by the CONTRACTOR.

921.6.5 Manhole bottom will be pulverized.

921.6.6 The manhole shall be filled with cement treated base (CTB) material to the bottom elevation of the asphalt base course of the pavement or to the ground surface level.

921.6.7 All labor, materials, and equipment necessary to complete this work shall be furnished by the CONTRACTOR.

921.6.8 For historical information the ENGINEER shall have a survey performed which will locate the abandoned manhole, relative to permanent survey markers.

921.7 STORM MANHOLE REHABILITATION IN REPLACEMENT WORK

921.7.1 The work under this item shall be to replace the existing manhole frame and cover and to place a concrete pad around the existing manhole as required per the construction plans. This work will be done only when an existing manhole is encountered in the normal course of the replacement work that has a light-weight, vented, multi-holed manhole cover.

921.7.2 The work and materials shall include the following:

921.7.2.1 Remove any and all existing brick under frame and replace with new Grade MS brick as necessary to bring new frame and cover up to street grade.

921.7.2.2 Remove and replace existing concrete pad, or construct a new pad.

921.7.2.3 Remove existing steps and replace with new steps or if steps are nonexistent, install new steps. Steps will be installed as per Subsection 921.4.6.

921.7.2.4 Remove and replace pavement.

921.7.2.5 Excavation and compaction of backfill as necessary.

921.7.2.6 All materials, labor, and equipment necessary to do the work under this item shall be furnished by the CONTRACTOR.

921.7.2.7 The work and materials under this item shall be done according to the manner set forth in the Standard Detail Drawings and other section of these specifications.

921.7.3 Salvageable material shall be stockpiled on the job site. The CONTRACTOR shall contact Owner to arrange for a representative to inspect the materials for usability. Salvageable materials shall be transported by the CONTRACTOR to the City Yards. CONTRACTOR will receive a receipt for the turned-in materials. Receipts will be submitted to the ENGINEER prior to final acceptance of the Project. Unusable materials will be disposed of by the CONTRACTOR.

921.8 MEASUREMENT AND PAYMENT

921.8.1 NEW MANHOLES:

921.8.1.1 Type “C”, “E”, “F”, or “G” manholes of 4-foot or 6-foot diameters shall be measured per each within the following increments of depth: 3 to 6 feet, 6 to 10 feet, and 10 to 14 feet. Manholes which are greater in depth than 1 foot shall be measured by the vertical foot. Measurements will be made to the nearest foot and will be from the manhole rim elevation to the manhole invert elevation.

921.8.1.2 Payment for manholes 14 feet deep or less will be made on the unit price per manhole diameter per depth increment as specified in the Bid Proposal. Payment for manhole depths which exceed 14 feet will be made on the unit price per manhole diameter per vertical foot. This payment is in addition to the manhole unit price for the portion above the 14 foot depth.

921.8.1.3 Type “A” or Tee-type manholes shall be measured and paid for by the methods described in 921.8.1.1 and 921.8.1.2 above. Measurement will be from the invert of the main line to the manhole rim. Payment under this item will include the normal manhole costs described below, as well as any additional pipe costs for the precast tee and for the concrete cradle under the tee.

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921.8.1.4 Payment for any type diameter or depth of manhole will include excavation, compacted backfilling, shelving, cover or cone, leveling bricks, frame and cover, and concrete pad or collar.

921.8.2 ELEVATION ADJUSTMENTS:

921.8.2.1 When a new manhole is installed, no measurement or payment will be made for rim elevation adjustments to conform to street surface grades.

921.8.2.2 The following measurements and payments for rim elevation adjustments on existing manholes will be made for indicated conditions:

920.8.2.2.1 Unit price per inch of adjustment ring for adjustment to manhole frame by the addition of adjustment ring.

921.8.2.2.2 Unit price per inch of leveling brick adjustment.

921.8.2.2.3 Unit price per manhole diameter per vertical foot of adjustment to cone and/or barrel.

921.8.2.3 As required, the following items will be included in the unit price per appropriate adjustment: pavement removal and replacement, excavation, compacted backfilling, concrete collar or pad, leveling bricks, adjusting rings, and/or frame and cover.

921.8.3 MANHOLE STEPS:

Unless otherwise shown on the Bid Proposal, the cost of manhole steps shall be incidental to the unit prices for construction of manholes of various types and depths.

921.8.4 ABANDONMENT OF MANHOLES:

Measurement and payment for abandonment of a manhole shall be the unit price per manhole for defined work in Subsection 921.6.

921.8.5 MANHOLE REHABILITATION IN REPLACEMENT WORK:

Work under this item shall be measured and paid for by the unit price per manhole for work specified in the Bid Proposal.

921.8.6 TESTING:

There will be no payment for required testing of storm manholes.

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VACUUM SEWER COLLECTOR, INTERCEPTOR AND FORCE MAIN FACILITIES

925.1 GENERAL:

The construction items specified in this section are common to vacuum sewer facilities.

925.2 REFERENCES

925.2.1 American Society for Testing and Materials (ASTM) Standard Specifications, Latest Edition

C 478 Standard Specification for Precast Reinforced Concrete Manhole Sections

D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

D 1784 Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

D 2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)

D 2564 Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems

D 2665 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

D 2672 Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement

D 3139 Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

925.2.1 This Publication, Latest Edition

SECTION 101 PORTLAND CEMENT CONCRETE

SECTION 102 STEEL REINFORCEMENT

SECTION 105 CONCRETE CURING COMPOUND

SECTION 121 PLASTIC PIPE

SECTION 161 GRAY IRON CASTINGS

SECTION 163 DUCTILE IRON CASTINGS

SECTION 170 ELECTRONIC MARKER DEVICES

SECTION 701 TRENCHING, EXCAVATION AND BACKFILL

SECTION 710 BORING, DRILLING AND JACKING

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

SECTION 920 SANITARY AND STORM SEWER MANHOLES

925.3 MATERIALS

925.3.1 PIPE:

All buried vacuum collector lines, branch lines, force mains, vacuum service laterals, and gravity service stubs shall be PVC C900 SDR21 (or Class 200) rated PVC pipe, green in color and conforming to ASTM D 2241, ASTM D 1784 Cell Classification 12454-B. Pipe and appurtenances shall be new and unused.

925.3.2 JOINTS:

All joints shall conform to ASTM D 2672, using solvent cement; or ASTM D 3139 using elastomeric seals. This pipe must be certified by the manufacturer that pipe and seal will operate at 22 inches of mercury vacuum with a maximum loss of 1% of initial vacuum per hour for a 4 hour period.

925.3.3 FITTINGS

925.3.3.1 Fittings shall be Schedule 80 solvent weld drain, waste and vent pipe per ASTM D 2665.

925.3.3.2 Wye fittings and 45-degree ells shall be used throughout; except that a long radius 3" 90-degree ell may be used on the 3" suction line entering the vacuum valve and at the wye connection of the vacuum service lateral to the vacuum main. Tee fittings and short radius ells are prohibited exclusively.

925.3.4 SOLVENT CEMENT:

Shall conform to ASTM D 2564: primer and cement shall not be of same color. Cement shall be gray in color.

925.3.5 MANHOLE SECTIONS:

Manhole sections used for buffer tanks, vacuum isolation valve vaults, pig launchers, and air release valves shall be reinforced precast concrete manhole sections, 48" nominal diameter, conforming to the requirements of ASTM C478 and Section 101 Table 101.C.

925.3.6 MANHOLE JOINTS:

Tongue and groove in precast wall; shall conform to Section 920.4.2 PRECAST CONCRETE MANHOLES.

925.3.7 MANHOLE FRAMES AND COVERS:

Frames and covers for sanitary sewer applications such as manholes used for buffer tanks, vacuum isolation valve boxes or vaults, pig launchers, and air release valves shall conform to this Publication, Section 161 Gray Iron Castings, Section 163 Ductile Iron Castings and the Standard Detail Drawings.

925.3.8 CAST-IN-PLACE CONCRETE:

Cast-in-place concrete used for footings, anti-flotation collars, grade-level pads, mass concrete for buffer tanks, and other installations not otherwise addressed shall be air-entrained concrete in accordance with Sections 101, 102, and 105 of this Publication.

925.3.9 VALVES: Valves used for pig launchers and vacuum isolation valves shall be mechanical joint gate

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valves conforming to Sections 801.3.3 of this Publication. Vacuum isolation valves shall be equipped with five-sided nuts per Standard Detail Drawing 2169. Only valves specified on the Water Approved Product List shall be used.

925.3.10 AIR RELEASE VALVES:

Only air release valves specified on the Water Authority Approved Product List shall be used.

925.3.11 VACUUM VALVES AND APPURTENANCES:

Vacuum valves shall be those listed on the Water Authority Approved Product List. Furnish all mechanical appurtenances required for a complete installation per manufacturer specifications. Vacuum valves and appurtenances are to be delivered to the Water Authority's Water Reclamation warehouse, unloaded, and stored as directed by the ENGINEER in complete packages.

925.3.12 VACUUM VALVE PITS

925.3.12.1 Only deep Vacuum valve pits listed on the Water Authority Approved Product List shall be installed.

925.3.12.2 The deep valve pit shall have a sump 54 inches in depth.

925.3.13 STAINLESS STEEL:

Stainless steel for brackets and fasteners shall be Type 316.

925.4 SUBMITTALS

925.4.1 The following shall be submitted for the ENGINEER'S approval prior to incorporation in the work of the corresponding item:

- a) Concrete Mix Design(s)
- b) Material and method of sealing pipe penetrations in buffer tank walls
- c) Pipe certification for vacuum service

925.4.2 The OWNER/ENGINEER will be supplied with a certificate of compliance for each item or type of material required in the system, as to that item meeting the specifications and/or the reference specifications before that item is installed.

925.4.3 The following records shall be maintained by the CONTRACTOR, shall be kept at all times for inspection by the ENGINEER, and shall be submitted to the ENGINEER upon request or as provided in these Specifications.

925.4.3.1 Vacuum tests shall be performed daily or as otherwise stipulated. These tests shall be recorded on charts provided by the OWNER or in hard-board notebooks as stipulated herein depending on the type of test.

925.4.3.2 Record Drawings markups and related survey notebooks shall be kept current by the CONTRACTOR to record work performed and to reflect any and all revisions made from the original construction drawings.

925.5 INSTALLATION

925.5.1 GENERAL

925.5.1.1 Handle pipe and appurtenances in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken to prevent damage to any coating.

925.5.1.2 Prior to installation, store plastic pipe and protect from prolonged periods of sunlight per Section 121.

925.5.1.3 The interior of the pipe, pits, and all appurtenances shall be thoroughly cleaned of foreign material before being lowered into the trench and shall be kept clean during construction operations.

925.5.1.4 Install a plug in the new system 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.

925.5.1.4.1 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.

925.5.1.4.2 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.

925.5.1.5 Perform trenching, backfilling, and compaction in accordance with Section 701.

925.5.2 PIPE INSTALLATION

925.5.2.1 All vacuum sewers shall be laid to line and grade as shown on the construction drawings. All pipe which has been designed to slope downward shall slope uniformly downward, with a tolerance of no more than 0.01 feet per 20 feet of line. Abrupt sags or bellies will not be permitted. The elevation at 100 foot intervals of pipe shall be recorded by the CONTRACTOR in bound field books which shall be submitted to the ENGINEER.

925.5.2.2 All sanitary sewer force mains shall be laid to line and grade as shown on the drawings. Particular care shall be taken to avoid crests in the profile at locations other than those shown on the drawings. Elevations shall be

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recorded by the CONTRACTOR at 100-foot intervals, and at each change in grade, in bound field books which shall be submitted to the ENGINEER.

925.5.2.3 Handle and install pipe and fittings in accordance with manufacturer's recommendations.

925.5.2.4 Prevent entrance of dirt or foreign matter or damage to pipe lining or coating. Plug the pipe any time work is stopped.

925.5.2.5 No defective pieces are permitted. Defective pieces discovered after use will be removed and replaced with a sound piece.

925.5.2.6 Place bedding, embedment and backfill in accordance with Section 701 unless otherwise indicated on the 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. 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 adjustments to the line and grade shall be made by scraping away or filling in with pipe zone material under the body of the pipe, but not by wedging or blocking. When connections are to be made to any existing pipe, valve pit, or any other improvement, where the actual elevation or position cannot be determined without excavation, excavate and expose the existing improvement before laying the connecting pipe or conduit. Should existing underground improvements 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 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 plans shall 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.

925.5.2.7 Lay pipe upgrade in a continuous operation from structure to structure, with the socket ends of the pipe upgrade unless otherwise permitted by the ENGINEER.

925.5.2.8 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.

925.5.2.9 Place and hand-tamp fill to 95% of maximum dry density per ASTM D 1557, in entire space between the pipe or fitting and the trench walls.

925.5.2.10 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.

925.5.2.11 Electronic marker devices shall be installed in the locations specified in Section 170 at the manufacturer's recommended bury depth.

925.5.2.12 Provide pipe through casing with support skids as shown on the construction drawings and/or Standard Detail Drawing 2180 and 2380. Alternate support methods may be acceptable upon ENGINEER'S review and approval.

925.5.2.13 Before the work will be accepted, coordinates accurate to within 0.3 feet horizontally and 0.1 feet vertically shall be provided on the Record Drawings for all fitting locations, runs of mainline at a maximum of 100 foot intervals, and all changes in pipe grade. Coordinates shall be determined by a field survey by a Professional Surveyor licensed in the state of New Mexico. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate. A report certified by the licensed Professional Surveyor shall be referenced on the Record Drawings.

925.5.3 ISOLATION VALVE

925.5.3.1 Isolation valves and valve box shall be installed per Standard Detail Drawing 2170.

925.5.3.2 Before the work will be accepted, vacuum isolation valve coordinates, accurate to within 0.3 feet, shall be provided on the Record Drawings. Coordinates shall be determined by a field survey by a Professional Surveyor licensed in the state of New Mexico. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate. A report certified by the licensed Professional Surveyor shall be referenced on the Record Drawings.

925.5.4 VACUUM VALVE PIT INSTALLATION

925.5.4.1 Install complete vacuum valve pits in accordance with manufacturer instructions and Standard Detail Drawing 2165. Perform pressure testing on each valve pit assembly per the manufacturer instructions.

925.5.4.2 Stub-outs for the gravity service line from the collection sump should be 4" diameter, extended to the property line unless otherwise indicated. Each stub-out should have a stop glued in place 4" to 6" from the end inserted into the tank, to prevent it being pushed too far into the collection sump. A solvent welded 4" cap should be fitted and glued to each stub-out to prevent rocks and groundwater entering the sump prior to connection of the house gravity line. Expandable test plugs or rubber caps are not acceptable as temporary covers for gravity stub-outs.

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925.5.4.3 Before the work will be accepted, vacuum valve pit coordinates, accurate to within 0.3 feet, shall be provided on the Record Drawings. Coordinates shall be determined by a field survey by a Professional Surveyor licensed in the state of New Mexico. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate. A report certified by the licensed Professional Surveyor shall be referenced on the Record Drawings.

925.5.5 SINGLE OR DOUBLE BUFFER TANK INSTALLATION

925.5.5.1 Install single or double buffer tank as shown on the construction drawings and Standard Detail Drawing 2167 (single) or 2168 (double).

925.5.5.2 All pipe penetrations through the buffer tank walls shall be water tight. Submit manufacturer's literature on material and technique for sealing to the ENGINEER.

925.5.5.3 Install suction and sensor pipes as shown on the Standard Detail Drawings. Attach these lines to the buffer tank side walls using Type 304 stainless steel brackets and fasteners. The 3" service lateral is to be stubbed into the buffer tank and capped or otherwise sealed until the vacuum valve is installed.

925.5.5.4 Install breather pipe through buffer tank wall as shown on Standard Detail Drawing 2167 (single) or 2168 (double). This line is to be capped or otherwise sealed to prevent any infiltration of water during construction. It shall be tested in accordance with Breather Test Procedure, Paragraph 925.8.

925.5.5.5 Buffer tanks shall be tested after assembly. The entire buffer tank shall be tested as follows:

925.5.5.5.1 Stub-outs, manhole boots, and pipe plugs shall be permanently secured to prevent movement while the vacuum is drawn.

925.5.5.5.2 Installation and operation of vacuum equipment and indicating devices shall be in accordance with manufacturer's recommendations.

925.5.5.5.3 Using Water Authority-furnished vacuum pump and gage, establish a measured vacuum of 10 inches of mercury in the buffer tank then record the time for the vacuum to drop to nine inches of mercury.

925.5.5.5.4 The maximum allowable leakage rate for a four foot diameter manhole shall be in accordance with the following:

Min. Elapsed Time For a Pressure Manhole Depth Change of 1" Hg	
10' or less	60 seconds
> 10' but < 15'	75 seconds
≥ 15' but < 25'	90 seconds

925.5.5.5.5 If the buffer tank fails the test, necessary repairs shall be made and the vacuum test and repairs shall be repeated until the tank passes the test. The extent and type of repairs that may be allowed shall be subject to the approval of the ENGINEER. Leaks shall be repaired on the outside of the manhole unless otherwise approved by the ENGINEER.

925.5.5.5.6 If the joint mastic in a buffer tank is pulled out during the vacuum test, the manhole shall be disassembled and the mastic replaced.

925.5.5.5.7 Record test results on a calibrated chart recorder as described in Section 925.6, Field Quality Control.

925.5.5.6 Before the work will be accepted, buffer tank coordinates, accurate to within 0.3 feet, shall be provided on the Record Drawings. Coordinates shall be determined by a field survey by a Professional Surveyor licensed in the state of New Mexico. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate. A report certified by the licensed Professional Surveyor shall be referenced on the Record Drawings.

925.5.6 INSTALLATION OF CASING FOR SANITARY SEWER VACUUM MAIN OR FORCE MAIN: Casing for sanitary sewer vacuum main or force main shall be per construction drawings, Standard Detail Drawing 2180, Standard Detail Drawing 2380, and per Section 710 of this publication.

925.5.7 AIR RELEASE VALVE INSTALLATION:

925.5.7.1 Air release valves shall be installed per Standard Detail Drawing 2160.

925.5.7.2 Before the work will be accepted, air release valve coordinates, accurate to within 0.3 feet shall be provided on the Record Drawings. Coordinates shall be determined by a field survey by a Professional Surveyor licensed in the state of New Mexico. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate. A report certified by the licensed Professional Surveyor shall be referenced on the Record Drawings.

925.6 FIELD QUALITY CONTROL

925.6.1 Provide daily testing of all sewer mains and lateral connections that are laid. Plug all open connections with rubber stoppers or temporary caps, fitted to the pipe by "no-hub" couplings. Using Water Authority-furnished vacuum pump and chart recorder, apply a vacuum to 22 inches of mercury to the pipes with pump running continuously for 15 minutes to allow vacuum to stabilize before proceeding with test. There shall be no loss in excess of 1% of initial vacuum per hour for a two hour test

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period. As pipe is laid the new section shall be tested in addition to the previously laid pipe on that main.

925.6.2 Leave uncovered the sewer main pipe joints until after the daily vacuum test is complete so that any leaks can be easily located and repaired. Exposed joints shall be adequately restrained.

925.6.3 Two hour Vacuum Line Test Modification Provision: If the CONTRACTOR succeeds in meeting the daily 2-hour test for seven consecutive working days or two thousand feet of pipe, the ENGINEER may amend the procedure to allow the trench to be covered as work progresses rather than the trench being kept open all day as is the norm with the daily 2-hour test. Should a line fail the vacuum test while utilizing this test modification, the CONTRACTOR shall take whatever action is necessary at his cost to pass the test including the excavation of the trench, leak detection and line repair, and additional cleanup as required by the ENGINEER. After the failure, the CONTRACTOR must re-qualify as specified above. Note this test modification is optional, and as such, the CONTRACTOR assumes all liability in its use. Allowance of this modification by the ENGINEER is not considered acceptance of the sewer line or ability to withstand test vacuum pressures.

925.6.4 Installation and operation of vacuum equipment and indicating devices shall be in accordance with manufacturer's recommendations.

925.6.5 Required Final Acceptance Testing on complete system: Provide 48 hour notice (minimum) to ENGINEER prior to test. Ensure all isolation valves are open prior to beginning of test. Subject the entire sewerage system to a vacuum of 22 inches of mercury, and allow the system to stabilize for 15 minutes before proceeding with test. There shall be no loss greater than 1% of initial vacuum per hour over a four hour test period.

925.6.6 All daily testing and Final Acceptance Test shall be recorded on vacuum charts to be provided by the ENGINEER. These charts will not be considered valid unless witnessed by ENGINEER on test equipment at beginning and end of vacuum test period.

925.6.7 The ENGINEER will sign and date charts to verify witness of tests. This signature does not indicate acceptance of the system.

925.7 LINE FLUSHING

925.7.1 After acceptance testing, flush lines to remove debris and foreign materials that accumulated in the lines during construction.

925.7.1.1 Suggested procedure (This procedure requires the use of vacuum valves. Coordination of installation by the Water Authority is the responsibility of the CONTRACTOR):

925.7.1.1.1 Place system under vacuum to 22 inches mercury.

925.7.1.1.2 Add water to valve pits at extreme ends of system and cause vacuum valves to operate and draw water into piping system.

925.7.1.1.3 Utilize system vacuum to transport the water and debris to collection point. Continue procedure until water entering at collection point is free of contamination or debris. If vacuum station collection tank is used as collection point, monitor volume of liquid in tank and pump out as necessary by means other than system sewage pumps. After completion of flushing, clean collection tank of all collected debris.

925.7.1.1.4 Restore vacuum collection tank and collection system to permanent configuration and make ready to place into operation.

925.7.1.2 Alternate flushing procedures are subject to ENGINEER'S review and approval.

925.8 BREATHER TESTING

925.8.1 After entire breather assembly is complete from the above ground flexible extension to the interior of the valve vault or buffer chamber, it shall be pressure tested as follows:

925.8.1.1 Fabricate a test pipe using ¾-inch PVC materials or approved equal; one end to be ¾-inch male pipe thread, the opposite end to terminate with a 1/8-inch tubing connection.

925.8.1.2 Remove breather dome and install the test pipe in its place. Pressurize the breather assembly to a minimum 40-inch water gage as measured with a magnehelic gauge. The assembly shall remain at a constant pressure with no detectable leaks for a minimum of one minute in the presence of the on-site field inspector. A dated record of all testing of breather domes shall be maintained in a bound notebook, which shall be turned over to the ENGINEER upon completion of all work.

925.9 MEASUREMENT AND PAYMENT

925.9.1 SANITARY SEWER FORCE MAIN WITH BEDDING

925.9.1.1 Measurement shall be per linear foot measured horizontally along the centerline of pipeline and fittings from the collection/lift station interface to the point of discharge as shown on the construction drawings. No deduction from the total will be made for intermittent installations such as isolation valves, pig launchers, and associated manholes.

925.9.1.2 Payment will be in accordance with the unit price per linear foot per size and material as defined in the Bid Proposal, and shall include: unclassified

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excavation in open trench, backfilling, and compaction for all trench zones; hand digging; removing and replacing surface obstructions; discovery and protection of subsurface obstructions; shoring and bracing; hauling excavated material; restoration of disturbed areas not included in other pay items; all fittings, concrete thrust blocking or restrained joints; installation of electronic marking devices and green metalized warning tape; preparation of pipe subgrade; furnishing and placing granular bedding; trench dewatering; temporary connections; jointing and coupling materials; furnishing and installing pipe in open trench; flushing and cleaning the pipe; air and hydrostatic pressure testing; and all other labor, material, and equipment incidental thereto.

925.9.2 SANITARY SEWER FORCE MAIN PIG LAUNCHER

925.9.2.1 Measurement of installed pig launcher shall be per each unit installed as shown on the construction drawings.

925.9.2.2 Payment for the pig launchers will be in accordance with the unit price per each as defined in the Bid Proposal, and shall include: furnishing and installing all fittings, flanges, restraining glands, and harnesses; drilling and preparing precast manhole section for slotted opening including gaskets, sealants, and grout; furnishing and installing resilient seat gate valves; preparing and installing cast-in-place concrete footer and pad on finished ground including trenching, backfilling, and compaction, furnishing and installing reinforcing steel; furnishing and installing precast manhole sections including trenching, backfilling, and compaction, gaskets, electronic marker device, frame and cover; furnishing and installing gravel bed for floor of manhole; and all other labor, material, and equipment incidental thereto.

925.9.3 BORE AND JACK, CASING FOR SANITARY SEWER VACUUM MAIN OR FORCE MAIN

925.9.3.1 Measurement shall be per linear foot, measured horizontally along the centerline of the encasement pipe actually installed for the work accomplished as shown on the Standard Detail Drawings and on the construction drawings.

925.9.3.2 Payment will be in accordance with the unit price per linear foot as defined in the Bid Proposal, and shall include: trenching, unclassified excavation, backfilling, and compaction; furnishing and installing bored steel casing, casing insulators, and casing end seals; repair and replacement of existing roadway, bridge abutments, utilities, or any other structures damaged during boring and jacking operations; removal and disposal of waste material; providing grout for backfilling; inspections or permits; and all other labor, material, and equipment incidental thereto; except that the carrier pipe will be paid for under the appropriate bid item for vacuum main or force main.

925.9.4 SANITARY SEWER AIR RELEASE VALVE

925.9.4.1 Measurement shall be per each air release valve installed as shown on the Standard Detail Drawings and the construction drawings.

925.9.4.2 Payment will be in accordance with the unit price per each as defined in the Bid Proposal, and shall include: furnishing and installing air release valve with all necessary fittings and appurtenances; drilling and preparing precast manhole section for slotted opening including gaskets, sealants, and grout; preparing and installing cast-in-place concrete footer and pad on finished ground including trenching, backfilling, and compaction, furnishing and installing reinforcing steel; furnishing and installing precast manhole sections including trenching, backfilling, and compaction, gaskets, electronic marker device, frame, and cover; furnishing and installing gravel bed for floor of manhole; and all other labor, material, and equipment incidental thereto.

925.9.5 VACUUM SEWER ISOLATION VALVE AND VALVE BOX

925.9.5.1 Measurement shall be per each vacuum sewer isolation valve and valve box installed as shown on the construction drawings and the Standard Detail Drawing.

925.9.5.2 Payment will be in accordance with the unit price per each as defined in the Bid Proposal, and shall include: furnishing and installing resilient seat gate valve with all necessary fittings and appurtenances; furnishing the Water Authority with one 6-foot long T-handle extension bar for every five valves installed; furnishing, drilling, and preparing precast manhole section for slotted opening including gaskets, sealants, and grout; preparing and installing cast-in-place concrete footer and pad on finished ground including trenching, backfilling, and compaction; furnishing and installing reinforcing steel; furnishing and installing precast manhole sections including trenching, backfilling, and compaction, gaskets, electronic marker device, frame, and cover; furnishing and installing gravel bed for floor of manhole; and all other labor, material, and equipment incidental thereto.

925.9.6 VACUUM SEWER BUFFER TANK

925.9.6.1 Measurement shall be per each installed buffer tank (single or double per the respective bid item) as shown on the construction drawings and the Standard Detail Drawings.

925.9.6.2 Payment will be in accordance with the unit price per each as defined in the Bid Proposal, and shall include: furnishing and installing all necessary equipment, including pipe and breather connections, breather vent piping and flexible breather pipe assembly; preparing and installing cast-in-place concrete footer and pad on finished ground including trenching, backfilling, and compaction, furnishing and installing reinforcing steel; furnishing and installing precast manhole sections including trenching,

SECTION 925

VACUUM SEWER COLLECTOR, INTERCEPTOR AND FORCE MAIN FACILITIES

backfilling, and compaction, gaskets, frame, and cover; furnishing and installing all fittings, pipe, and all appurtenances; connection of the new or existing sanitary sewer gravity lines including drilling precast manhole sections, gaskets, sealants, and grout; furnishing and installing concrete grout for shelf; air and vacuum testing as required; and all other labor, material, and equipment incidental thereto.

925.9.9 VACUUM VALVES AND APPURTENANCES:

Measured and paid for per each as a separate pay item as included in the associated Vacuum Pit or Buffer Tank as specified and provided in the Bid Proposal.

925.9.7 VACUUM VALVE PIT

925.9.7.1 Measurement shall be per each deep vacuum pit installed as shown on the construction drawings and the Standard Detail Drawings.

925.9.7.2 Payment will be in accordance with the unit price per each as defined in the Bid Proposal, and shall include: furnishing and installing all necessary equipment including unclassified excavation in open trench, backfilling, and compaction for all trench zones; hand digging; removing and replacing surface obstructions including fencing, landscaping, and all other obstructions; discovery and protection of subsurface obstructions; shoring and bracing; hauling excavated material, restoration of disturbed areas not included in other pay items; all fittings and concrete anti-flotation collar; installation of flexible breather pipe assembly and all appurtenances; stub-outs for connection of gravity and vacuum lines; air, vacuum, and all other testing as required; and all other labor, material, and equipment incidental thereto.

925.9.8 VACUUM COLLECTION LINES AND VACUUM SERVICE LATERALS

925.9.8.1 Measurement of vacuum collection lines and vacuum service laterals shall be per linear foot measured horizontally along the centerline of pipeline as shown on the drawings.

925.9.8.2 Payment will be in accordance with the unit price per linear foot per size and material as defined in the Bid Proposal, and shall include: unclassified excavation in open trench, backfilling, and compaction for all trench zones; hand digging; removing and replacing surface obstructions; discovery and protection of subsurface obstructions; shoring and bracing; hauling excavated material, restoration of disturbed areas not included in other pay items; all fittings, concrete thrust blocking or restrained joints; preparation of pipe subgrade; furnishing and placing granular bedding; trench dewatering; temporary connections; jointing and coupling materials; furnishing and installing pipe in open trench; flushing and cleaning the pipe; field quality control testing including daily vacuum testing of lines using Water Authority furnished trailer mounted vacuum pump, breather testing, and all other testing required; making all required submittals; and all other labor, material, and equipment incidental thereto.

SECTION 2000

STANDARD DETAIL DRAWINGS

2000.1 GENERAL

2000.1.1 This section contains City of Albuquerque Standard Detail Drawings which are related to the construction or installation of City utilities, streets, drainage improvements, paving cuts and repairs, landscaping and certain private facilities within a right-of-way or easement.

2000.0.2 These details are not required to be included in a project set of construction drawings if the individual details are properly referenced on the plan set. If a particular project design warrants additional details or modifications of these details, they shall be included in the project's construction plans.

2000.2 CONTENTS

SECTION NO. TITLE

2100-----Standard Details for Sanitary Sewer

2200-----Standard Details for Drainage

2300-----Standard Details for Water

2400-----Standard Details for Paving

2500-----Standard Details for Traffic

2600-----Standard Details for N.M.S.H.T.D.

2700-----Standard Details for Landscaping

2800-----Standard Details for Temporary Traffic Control

SECTION 2100

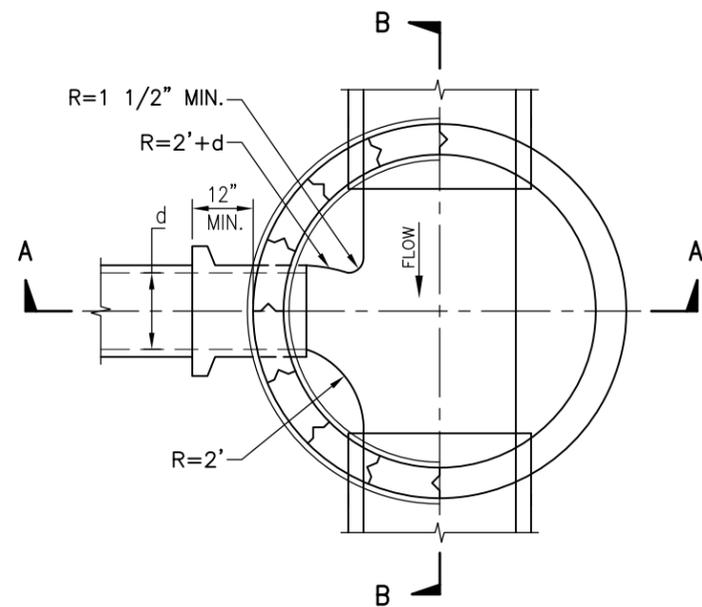
STANDARD DETAILS FOR SANITARY SEWER

<i>DWG. NO.</i>	<i>TITLE</i>
2101	SANITARY SEWER MANHOLE TYPE "C"
2102	SANITARY SEWER MANHOLE TYPE "E"
2107	SANITARY SEWER CONCRETE MANHOLE TOP SLAB TYPE "C"
2109	SANITARY SEWER MANHOLE FRAMES AND COVERS
2116	SANITARY SEWER VERTICAL DROP AT MANHOLE
2118	SANITARY SEWER SERVICE LINE CONNECTIONS AT MANHOLE
2125	SANITARY SEWER SERVICE LINE DETAILS
2128	SANITARY SEWER RING AND COVER FOR VALVE BOX
2134	SANITARY SEWER SERVICE REPLACEMENT DETAIL
2135	SANITARY SEWER RISER DETAILS RIGID PIPE MAIN
2136	SANITARY SEWER RISER DETAILS FLEXIBLE PIPE MAIN
2140	SANITARY SEWER ENCASMENT DETAILS
2145	SANITARY SEWER - SEWER LINE DEAD-END MARKER
2150	SANITARY SEWER SAMPLING AND METERING MANHOLE 6' x 8' RECTANGULAR
2160	SANITARY SEWER AIR RELEASE VALVE DETAIL
2162	VACUUM SEWER STANDARD DETAILS
2163	VACUUM SEWER VALVE AND PIT INSTALLATION WITH LIFT IN VACUUM SERVICE LATERAL
2164	VACUUM SEWER TYPICAL VACUUM BRANCH LINE CONNECTION
2165	VACUUM SEWER 3" VALVE AND PIT INSTALLATION WITH INTERNAL BREATHER
2167	VACUUM SEWER SINGLE BUFFER TANK 30 GALLON PER MINUTE MAX. FLOW
2168	VACUUM SEWER DUAL BUFFER TANK 60 GALLON PER MINUTE MAX. FLOW
2169	VACUUM SEWER VALVE STEM NUT AND SOCKET DETAILS
2170	VACUUM SEWER VALVE BOX
2171	VACUUM SEWER VACUUM VALVE PIT
2173	VACUUM SEWER BLOCKING AND SEEPAGE COLLAR DETAILS
2174	VACUUM SEWER SERVICE WYE ON EXISTING VACUUM MAIN

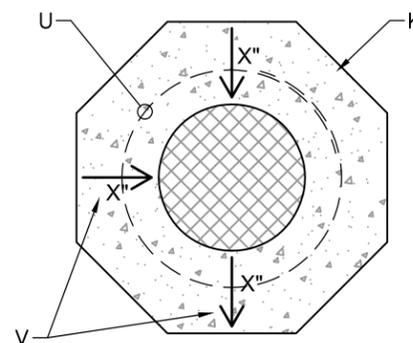
SECTION 2100

STANDARD DETAILS FOR SANITARY SEWER

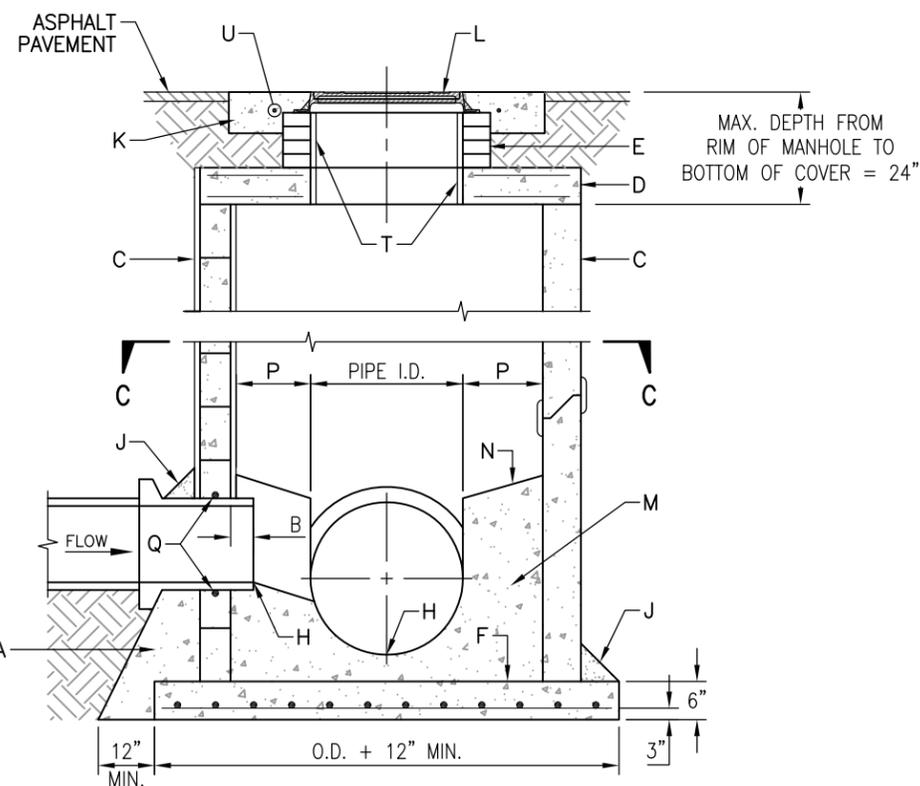
- 2180----- VACUUM SEWER CASING DETAIL FOR BORE AND JACK
- 2181----- FORCEMAIN SEWER VALVE BOX
- 2182----- FORCEMAIN SEWER LOW PRESSURE SANITARY SEWER FLUSHING
CONNECTION
- 2183----- FORCEMAIN SEWER CONNECTION TO GRAVITY SEWER AT MANHOLE
- 2184----- FORCEMAIN SEWER TYPICAL FORCEMAIN CONFIGURATION
- 2185----- FORCEMAIN SEWER SERVICE LINE VALVE DETAIL



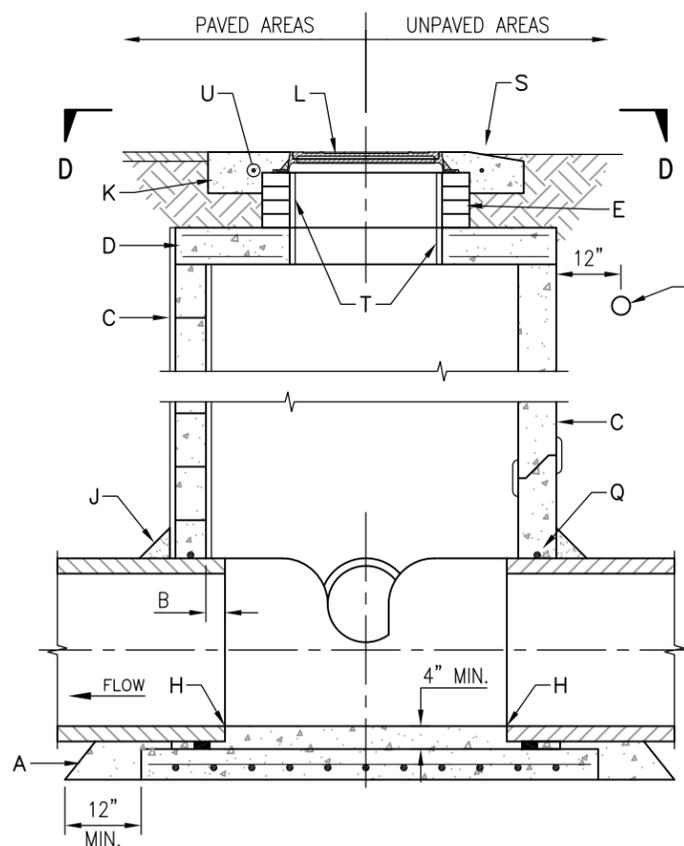
PLAN AT C-C



PLAN AT D-D



CROSS SECTION A-A



CROSS SECTION B-B

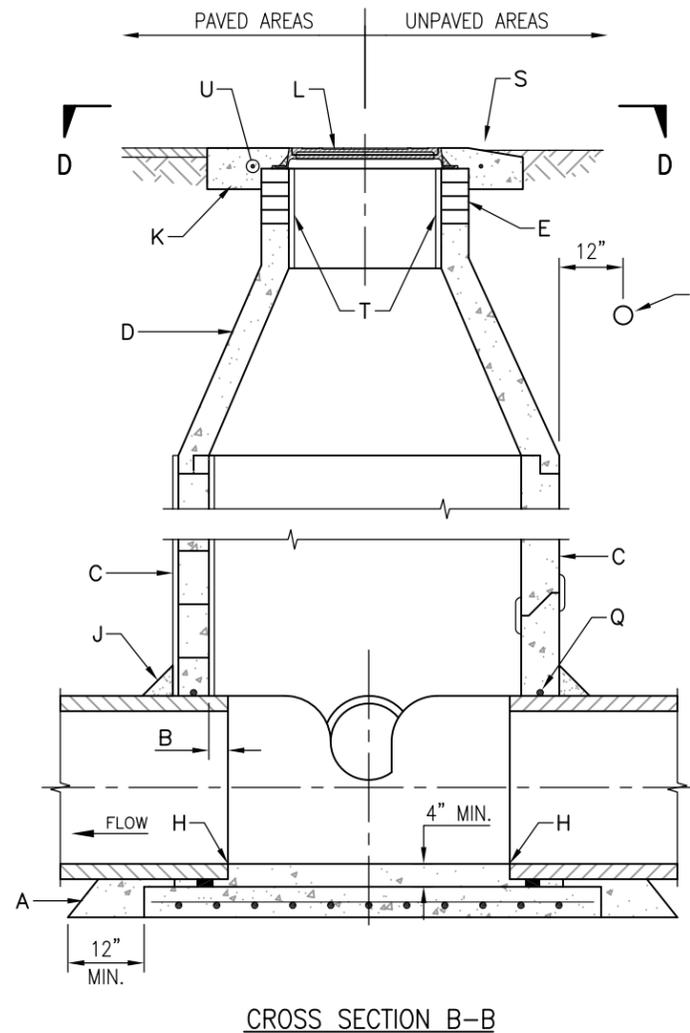
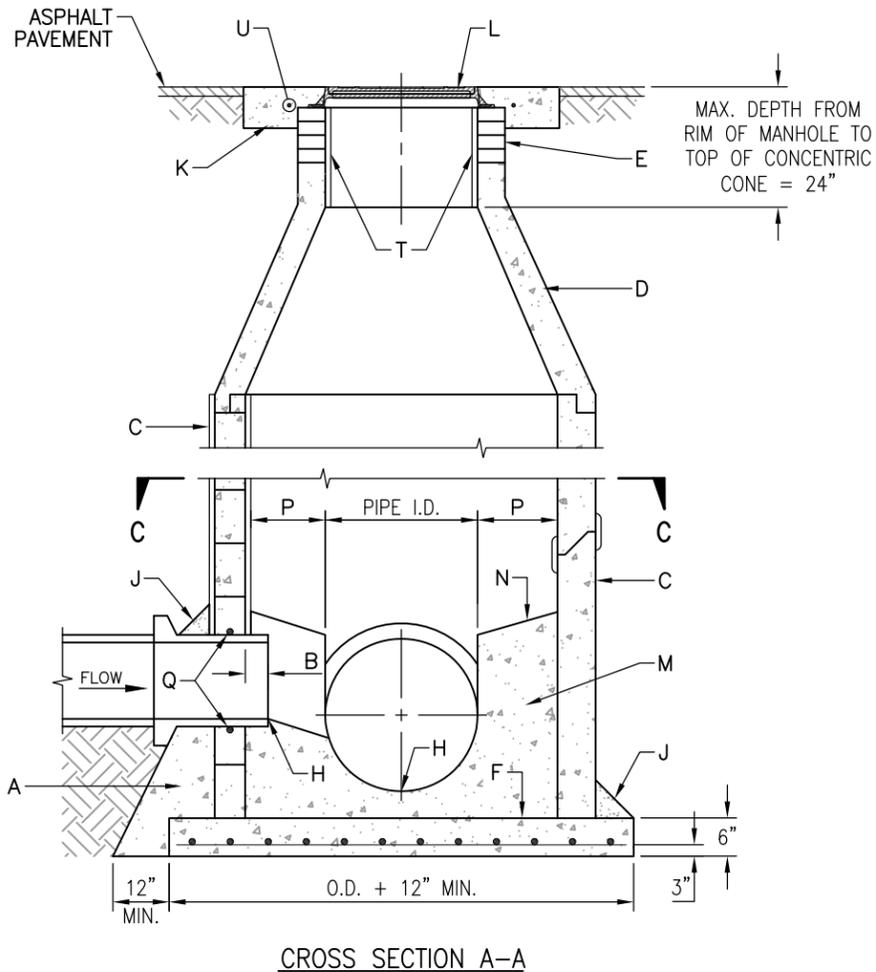
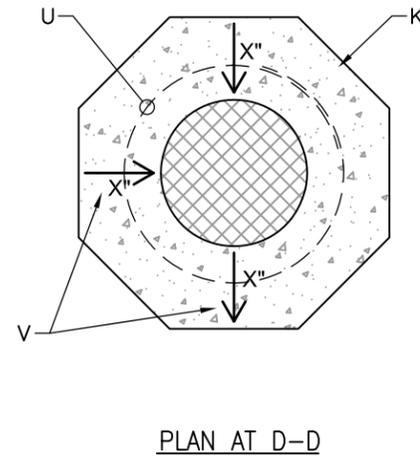
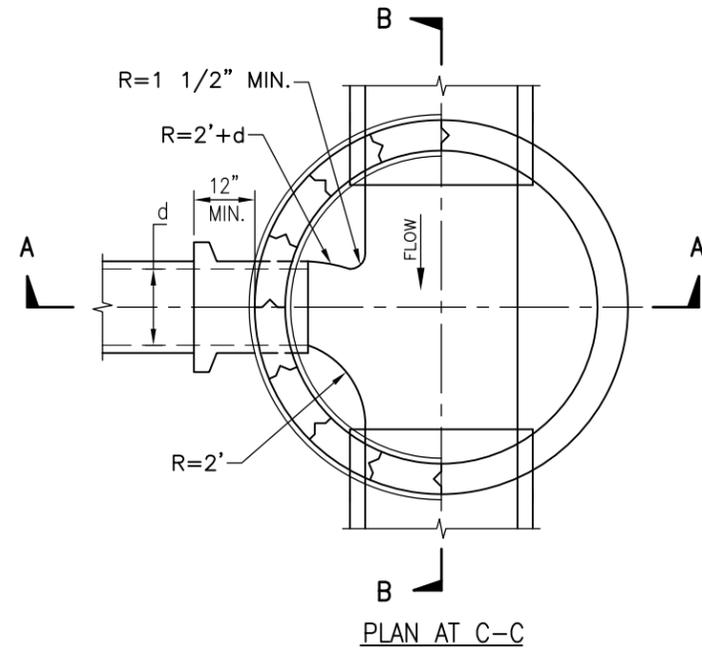
GENERAL NOTES

1. USE TYPE "C" MANHOLE FOR DEPTHS OF <6' MEASURED FROM INVERT TO RIM.
2. CONTRACTOR HAS OPTION TO CONSTRUCT TYPE "C" MANHOLE IN LIEU OF TYPE "E" MANHOLE FOR DEPTHS ≥6'.
3. MANHOLES >18' IN DEPTH SHALL BE CONSTRUCTED OF PRECAST CONCRETE SECTIONS ONLY.
4. DESIGN APPLIES TO 4' TO 6' I.D. MANHOLES.
5. COMPACT ALL BACKFILL AROUND MANHOLE TO 95% (ASTM).
6. USE NON-SHRINK GROUT FOR JOINTS, FILLETS AND PIPE PENETRATIONS.
7. APPLY WATERPROOFING COATING TO EXTERIOR OF MANHOLE IN AREAS WHERE GROUNDWATER IS PRESENT.
8. AN INTERIOR COATING, WITH A WATER AUTHORITY APPROVED EPOXY RESIN-TYPE MATERIAL, SHALL BE APPLIED TO MANHOLES ON MAINS LARGER THAN 24" IN DIAMETER.
9. POSITION MANHOLE OPENING OVER THE CENTER OF MANHOLE.

CONSTRUCTION NOTES

- A. CONCRETE PIPE SUPPORTS SHALL EXTEND OUTSIDE OF MANHOLE TO BELL OF FIRST JOINT AND SHALL CRADLE PIPE TO SPRING LINE. NOT APPLICABLE FOR FLEXIBLE PIPE.
- B. PIPE PENETRATION INTO MANHOLE SHALL BE FLUSH TO 2" MAX., MEASURED AT SPRINGLINE OF PIPE.
- C. MANHOLE MAY BE CONSTRUCTED OF CONCRETE BLOCK, POURED CONCRETE, OR PRECAST REINFORCED CONCRETE. IF PRECAST CONCRETE IS USED, USE MASTIC GASKETS AND APPLY NON-SHRINK GROUT TO EXTERIOR AND INTERIOR OF EXPANSION JOINTS. IF BLOCK IS USED, APPLY 1/2" THICK MORTAR COATING TO EXTERIOR AND INTERIOR OF MANHOLE.
- D. PRECAST CONCRETE TOP SLAB, SEE STANDARD DRAWING 2107.
- E. USE MAX. 4 COURSES GRADE MS BRICK ON UNPAVED STREET FOR FUTURE ADJUSTMENT OF MANHOLE FRAME TO PAVEMENT GRADE.
- F. CONCRETE BASE TO BE POURED IN PLACE USING NO. 4 BARS AT 6" O.C. EA. WAY FOR MANHOLE DEPTH OF ≥16'. NO. 4 BARS AT 12" O.C. EA. WAY FOR MANHOLE DEPTH OF <16'.
- H. INVERT ELEVATION OF STUB OR LATERAL AS SHOWN ON PLANS.
- J. 6" GROUT FILLET ON UPPER HALF OF PIPE AND AROUND BASE.
- K. OCTAGONAL CONCRETE PAD, SEE STANDARD DWG. 2461 FOR REFERENCE.
- L. MANHOLE FRAME AND COVER, SEE DRAWING 2109. INSTALL A 24" COVER FOR SEWER LINE ≤24", AND A 32" COVER FOR SEWER LINE >24".
- M. CONCRETE, SEE SPECIFICATION SECTION 101.
- N. SLOPE 1" PER FT. FROM PIPE CROWN.
- P. SHELF TO BE 9" WIDE MIN.
- Q. APPROVED WATERSTOP TO BE COMPATIBLE WITH TYPE OF PIPE.
- R. ELECTRONIC MARKER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170.
- S. CONCRETE COLLAR IN UNPAVED AREAS, SEE STANDARD DRAWING 2461.
- T. APPLY 1/2" THICK MORTAR COATING TO INTERIOR OF OPENING.
- U. #4 REBAR PER STANDARD DRAWING 2461.
- V. TOP OF CONCRETE COLLAR SHALL BE STAMPED WITH LINE SIZE AND FLOW DIRECTION ARROWS. MINIMUM LETTER SIZE SHALL BE 3" IN HEIGHT.

REVISIONS	WATER AUTHORITY
	SANITARY SEWER MANHOLE TYPE "C"
	DWG. 2101 JAN. 2013



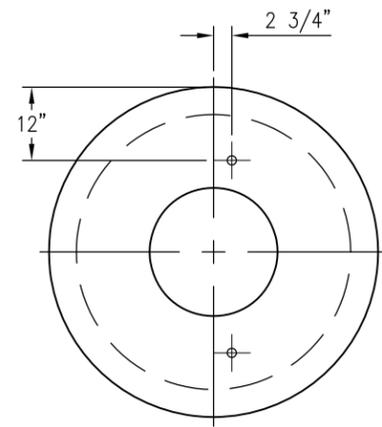
GENERAL NOTES

1. USE TYPE "E" MANHOLE FOR DEPTHS OF $\geq 6'$ MEASURED FROM INVERT TO RIM.
2. CONTRACTOR HAS OPTION TO CONSTRUCT TYPE "C" MANHOLE IN LIEU OF TYPE "E" MANHOLE FOR DEPTHS $\geq 6'$.
3. MANHOLES $> 18'$ IN DEPTH SHALL BE CONSTRUCTED OF PRECAST CONCRETE SECTIONS ONLY.
4. DESIGN APPLIES TO 4' TO 6' I.D. MANHOLES.
5. COMPACT ALL BACKFILL AROUND MANHOLE TO 95% (ASTM).
6. USE NON-SHRINK GROUT FOR JOINTS, FILLETS AND PIPE PENETRATIONS.
7. APPLY WATERPROOFING COATING TO EXTERIOR OF MANHOLE IN AREAS WHERE GROUNDWATER IS PRESENT.
8. AN INTERIOR COATING, WITH A WATER AUTHORITY APPROVED EPOXY RESIN-TYPE MATERIAL, SHALL BE APPLIED TO MANHOLES ON MAINS LARGER THAN 24" IN DIAMETER.
9. POSITION MANHOLE OPENING OVER THE CENTER OF MANHOLE.

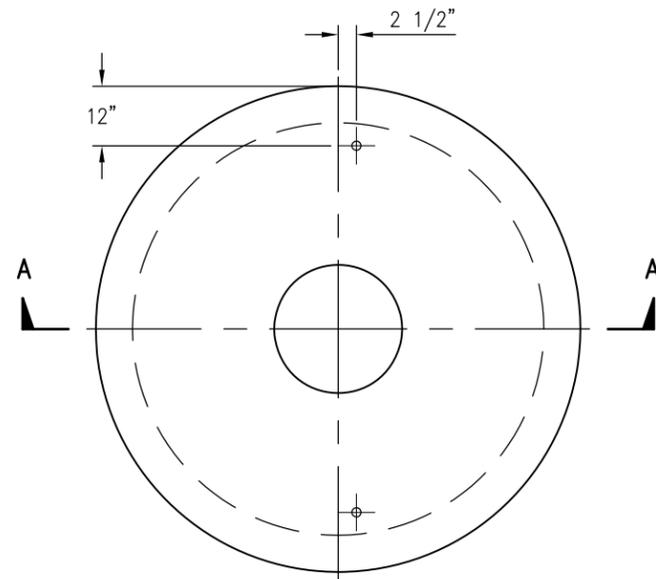
CONSTRUCTION NOTES

- A. CONCRETE PIPE SUPPORTS SHALL EXTEND OUTSIDE OF MANHOLE TO BELL OF FIRST JOINT AND SHALL CRADLE PIPE TO SPRING LINE. NOT APPLICABLE FOR FLEXIBLE PIPE.
- B. PIPE PENETRATION INTO MANHOLE SHALL BE FLUSH TO 2" MAX., MEASURED AT SPRINGLINE OF PIPE.
- C. MANHOLE MAY BE CONSTRUCTED OF CONCRETE BLOCK, POURED CONCRETE, OR PRECAST REINFORCED CONCRETE. IF PRECAST CONCRETE IS USED, USE MASTIC GASKETS AND APPLY NON-SHRINK GROUT TO EXTERIOR AND INTERIOR OF EXPANSION JOINTS. IF BLOCK IS USED, APPLY 1/2" THICK MORTAR COATING TO EXTERIOR AND INTERIOR OF MANHOLE.
- D. PRECAST REINFORCED CONCRETE CONCENTRIC CONE. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR APPROVAL.
- E. USE MAX. 4 COURSES GRADE MS BRICK ON UNPAVED STREET FOR FUTURE ADJUSTMENT OF MANHOLE FRAME TO PAVEMENT GRADE.
- F. CONCRETE BASE TO BE POURED IN PLACE USING NO. 4 BARS AT 6" O.C. EA. WAY FOR MANHOLE DEPTH OF $\geq 16'$. NO. 4 BARS AT 12" O.C. EA. WAY FOR MANHOLE DEPTH OF $< 16'$.
- H. INVERT ELEVATION OF STUB OR LATERAL AS SHOWN ON PLANS.
- J. 6" GROUT FILLET ON UPPER HALF OF PIPE AND AROUND BASE.
- K. OCTAGONAL CONCRETE PAD, SEE STANDARD DWG. 2461 FOR REFERENCE.
- L. MANHOLE FRAME AND COVER, SEE DRAWING 2109. INSTALL A 24" COVER FOR SEWER LINE $\leq 24"$, AND A 32" COVER FOR SEWER LINE $> 24"$.
- M. CONCRETE, SEE SPECIFICATION SECTION 101.
- N. SLOPE 1" PER FT. FROM PIPE CROWN.
- P. SHELF TO BE 9" WIDE MIN.
- Q. APPROVED WATERSTOP TO BE COMPATIBLE WITH TYPE OF PIPE.
- R. ELECTRONIC MARKER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170.
- S. CONCRETE COLLAR IN UNPAVED AREAS, SEE STANDARD DRAWING 2461.
- T. APPLY 1/2" THICK MORTAR COATING TO INTERIOR OF OPENING.
- U. #4 REBAR PER STANDARD DRAWING 2461.
- V. TOP OF CONCRETE COLLAR SHALL BE STAMPED WITH LINE SIZE AND FLOW DIRECTION ARROWS. MINIMUM LETTER SIZE SHALL BE 3" IN HEIGHT.

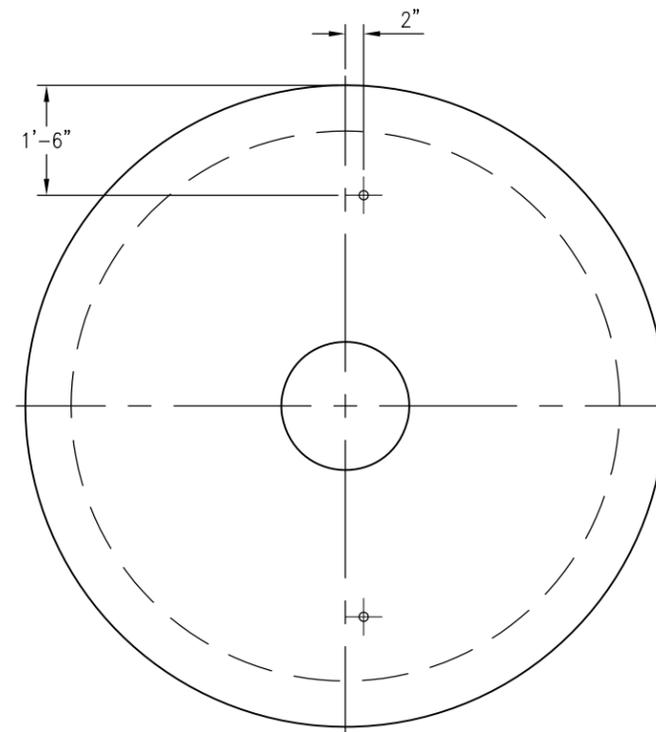
REVISIONS	WATER AUTHORITY
	SANITARY SEWER MANHOLE TYPE "E"
	DWG. 2102 JAN. 2013



4' I.D. MH



6' I.D. MH



8' I.D. MH

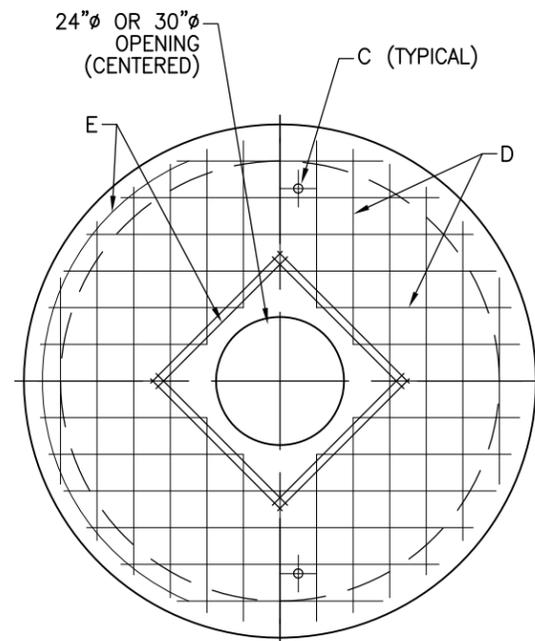
PLAN

GENERAL NOTES

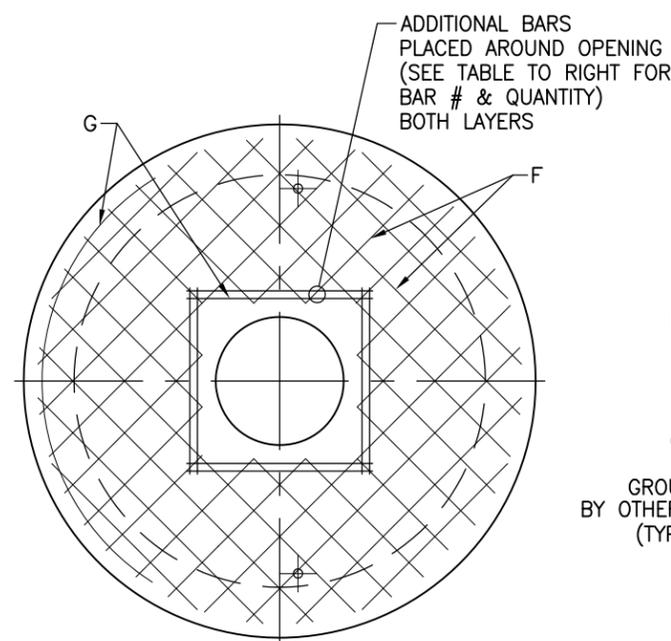
1. ALL MANHOLES $\geq 20'$ IN DEPTH WILL REQUIRE AN INTERMEDIATE LANDING IN THE MANHOLE BARREL. TYPE "C" MANHOLE TOP SLABS SHALL BE USED AS INTERMEDIATE LANDINGS.
2. INTERMEDIATE LANDINGS SHALL BE LOCATED AT THE MID POINT $\pm 2'$ OF THE HEIGHT OF THE MANHOLE. AT NO TIME SHALL AN INTERMEDIATE LANDING OR A SIZE ADJUSTMENT TOP BE INSTALLED CLOSER THAN 8' UP FROM THE INVERT OF THE MANHOLE.

CONSTRUCTION NOTES

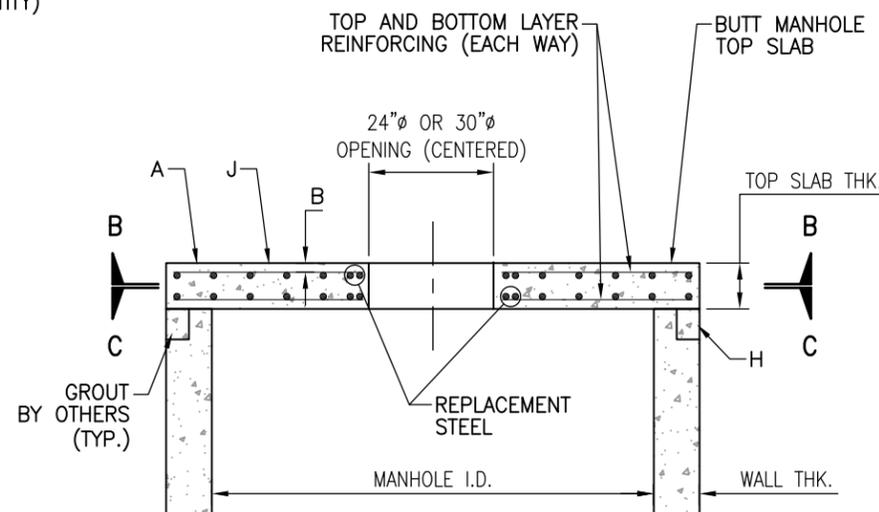
- A. PRECAST REINFORCED CONCRETE MANHOLE TOP SLAB.
- B. ALL BARS TO HAVE 1 1/2" MIN. COVER.
- C. 1" PIPE SLEEVE VERTICALLY THROUGH TOP SLAB.
- D. TOP MAT NO. 4 BARS 6" O.C. EACH WAY FOR 4', 6' AND 8' I.D. MANHOLES.
- E. NO. 4 BARS
- F. BOTTOM MAT NO. 4 BARS 6" O.C. EACH WAY FOR 4' AND 6' I.D. MANHOLES, NO. 8 BARS 8" O.C. EACH WAY FOR 8' I.D. MANHOLES.
- G. NO. 4 BARS FOR 4' AND 6' I.D. MANHOLES.
- H. WHEN PRECAST MANHOLE SECTIONS ARE USED, TOP SLAB SHALL BE MODIFIED TO SHAPE OF APPROPRIATE SIZE TONGUE AND GROOVE JOINT.
- J. CONCRETE, SEE SECTION 101.



SECTION B-B
TOP MAT



SECTION C-C
BOTTOM MAT

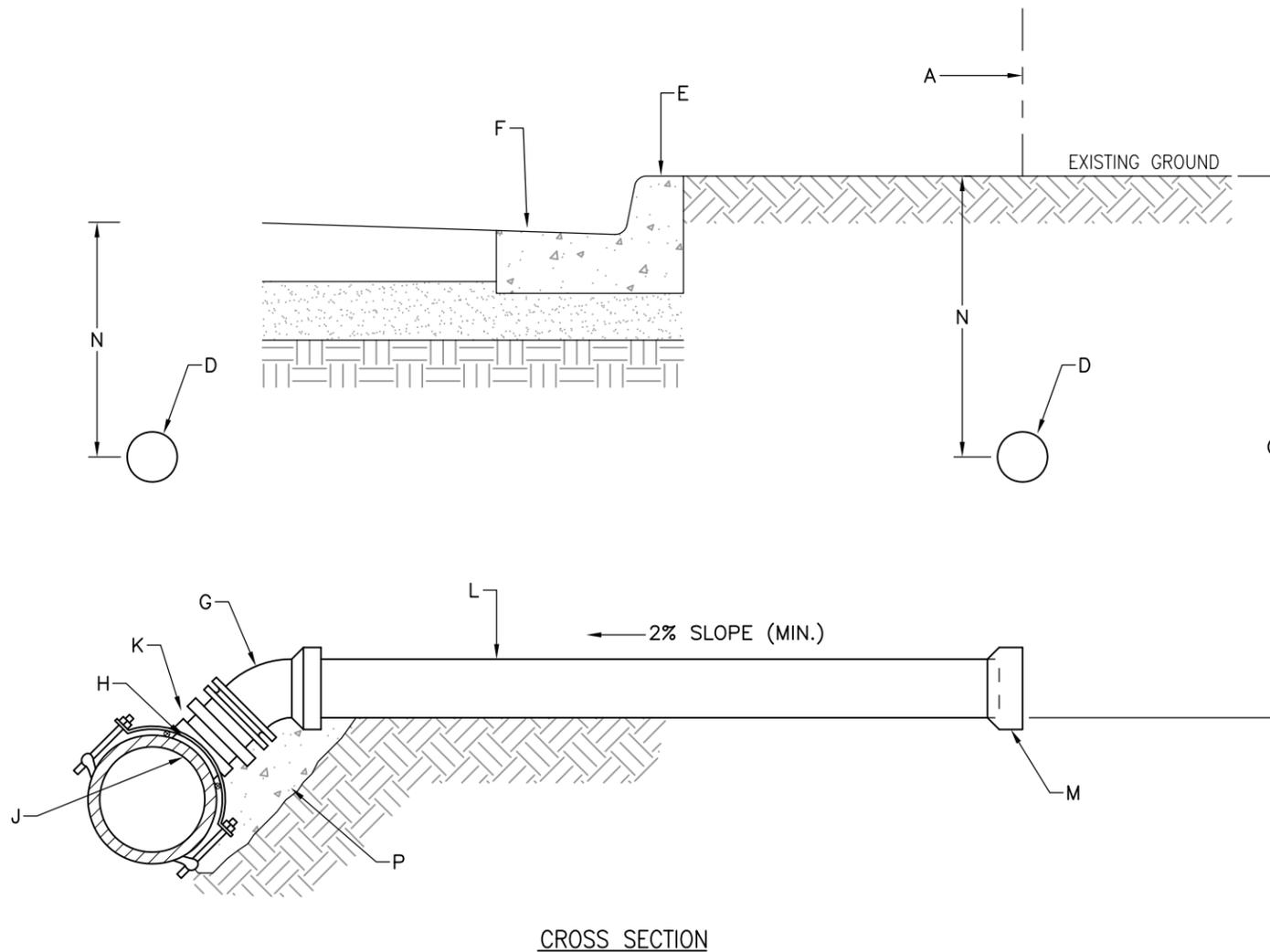
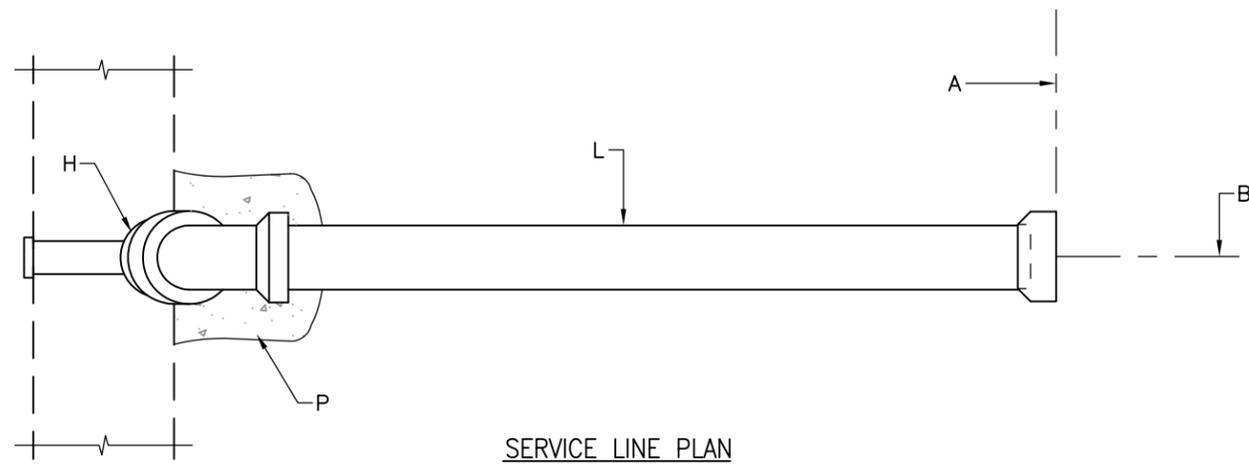


SECTION A-A
FLAT TOP SLAB REINFORCEMENT DETAIL

MANHOLE I.D.	48"	60"	72"	96"	120"
TOP SLAB THK.	8"	8"	8"	10"	10"
WALL THK.	5"	6"	7"	9"	11"
TOP LAYER STEEL (IN ² /FT)	0.40	0.40	0.40	0.40	0.40
BTM LAYER STEEL (IN ² /FT)	0.40	0.43	0.50	1.19	1.19
REPLACEMENT STEEL (BAR #)	(8)#5's	(8)#5's	(8)#6's	(8)#8's	(8)#8's
APPROX. WEIGHT (LBS.)	1,521	2,513	3,720	8,468	13,355

- NOTES:
- 1) $f'_c = 4000$ psi (MIN.)
 - 2) $f_y = 60,000$ (MIN.)
 - 3) 1 1/2" MINIMUM CLEAR CONCRETE COVER OVER REINFORCEMENT
 - 4) HS-20 LIVE LOAD
 - 5) SEE TABLE FOR APPROXIMATE WEIGHT

REVISIONS	WATER AUTHORITY
	SANITARY SEWER CONCRETE MANHOLE TOP SLAB TYPE "C"
	DWG. 2107
	JAN. 2013



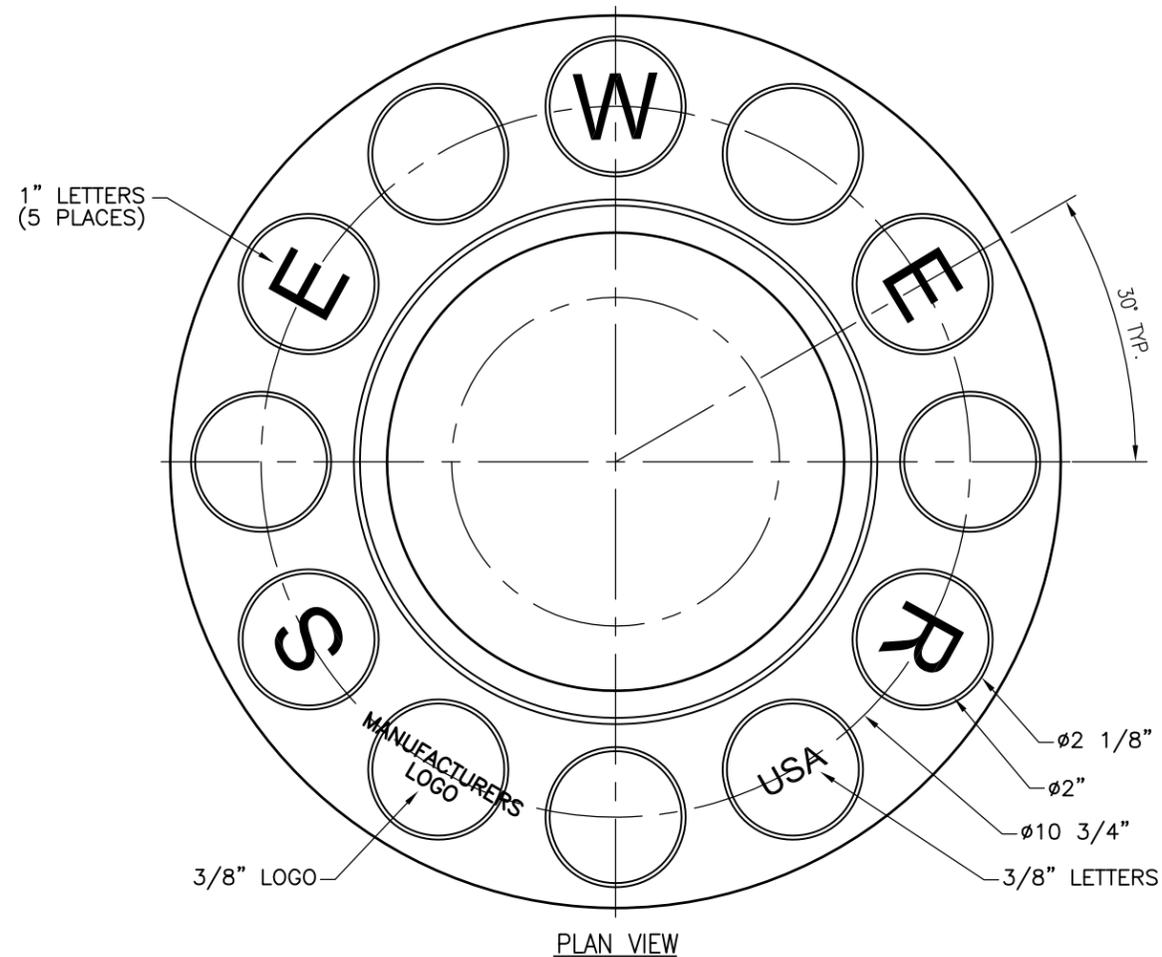
GENERAL NOTES

1. ALL SERVICE LINES SHALL CONFORM TO THE PLUMBING CODE OF THE CITY OF ALBUQUERQUE.
2. 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.

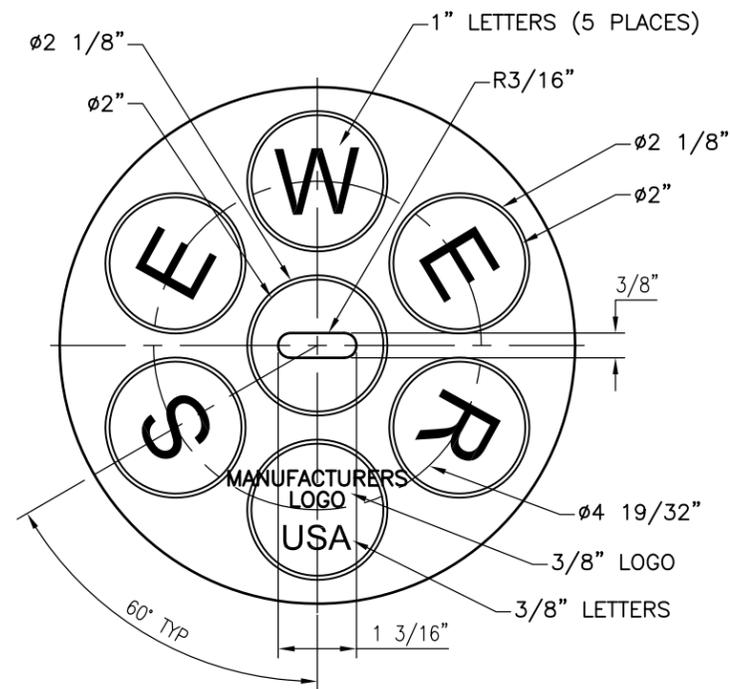
CONSTRUCTION NOTES

- A. RIGHT-OF-WAY LINE.
- B. CENTER LINE OF SERVICE LINE.
- C. MINIMUM OF 4' TO 6' FROM INVERT TO TOP OF CURB AT RIGHT-OF-WAY LINE. MINIMUM DEPTH WILL DEPEND ON THE DEPTH OF THE MAIN SEWER LINE, THE MINIMUM SERVICE LINE SLOPE, THE DEPTH OF THE LOT BEING SERVED, LOCATION OF THE HOUSE ON THE LOT, AND THE GRADE OF THE LOT.
- D. ELECTRONIC MARKER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170.
- E. STAMP OR CHISEL 3" SIZE, "S" ON TOP OF CURB OVER LOCATION OF SERVICE LINE, MINIMUM 1/4" DEEP.
- F. CURB & GUTTER.
- G. 22.5° OR 45° BEND.
- H. CORE DRILL.
- J. SERVICE LINE SHALL NOT PROTRUDE INTO SEWER MAIN.
- K. SANITARY SEWER TAPPING TEE PER WATER AUTHORITY APPROVED PRODUCTS LIST. DO NOT OVER TIGHTEN SADDLE BOLTS WHICH WOULD PREVENT FREE PASSAGE OF REQUIRED MANDREL.
- L. SERVICE LINE.
- M. PLUG OR CAP UNTIL LATERAL IS PLACED IN SERVICE.
- N. DEPTH PLACEMENT PER MANUFACTURER'S RECOMMENDATIONS.
- P. BACKFILL UNDER SERVICE WITH MINIMUM 1 CUBIC FOOT OF CONCRETE.

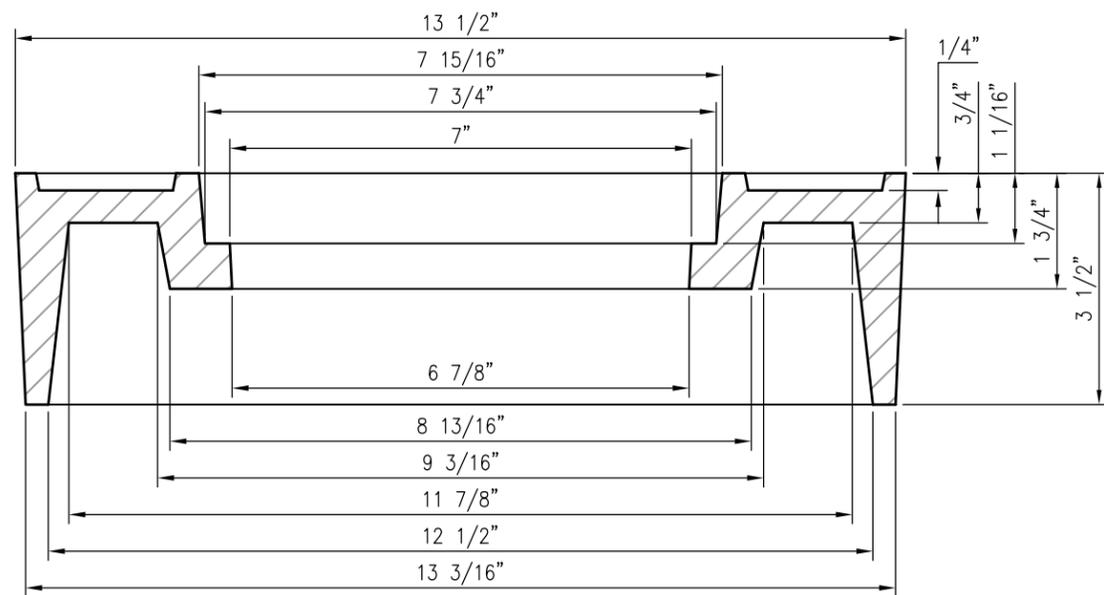
REVISIONS	WATER AUTHORITY
	SANITARY SEWER SERVICE LINE DETAILS
	DWG. 2125 JAN. 2013



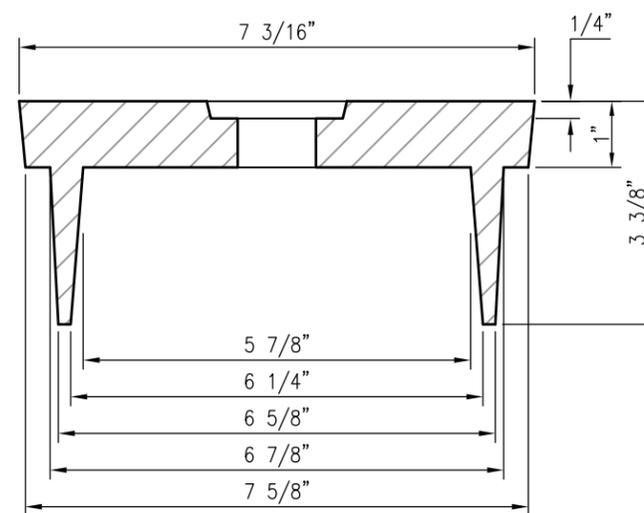
PLAN VIEW



PLAN VIEW



SECTION
VALVE BOX RING



SECTION
VALVE BOX COVER

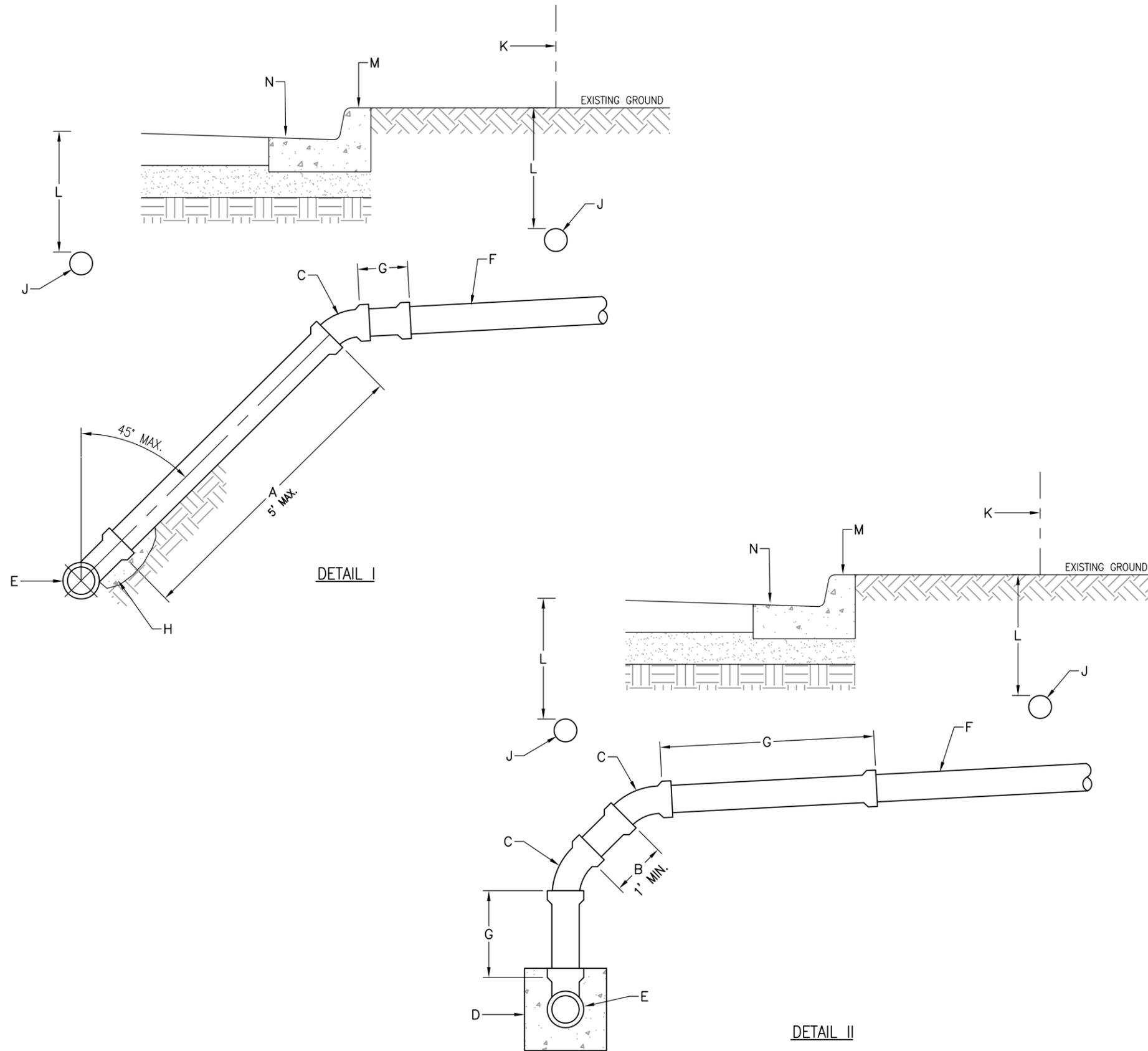
GENERAL NOTES — RING

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"R UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH: REMOVE EXCESS IRON AND FINIS.
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"R UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH: REMOVE EXCESS IRON AND FINIS.
6. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

REVISIONS	WATER AUTHORITY
	SANITARY SEWER RING AND COVER FOR VALVE BOX
	DWG. 2128
	JAN. 2013



GENERAL NOTES

1. IF DISTANCE 'A' IS 5' OR LESS, ROTATE MAIN SERVICE TEE AND RECONNECT SERVICE AS PER DETAIL I. IF DISTANCE 'A' IS GREATER THAN 5', INSTALL RISER 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' MIN., 1.5' MAX.
- C. ELBOWS, 45° DEFLECTION MAX.
- D. INSTALL CONCRETE CRADLE ON TEE AS PER DWG. 2135, RIGID 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. STAMP OR CHISEL 3" SIZE, "S" ON TOP OF CURB OVER LOCATION OF SERVICE LINE, MINIMUM 1/4" DEEP.
- N. CURB & GUTTER.

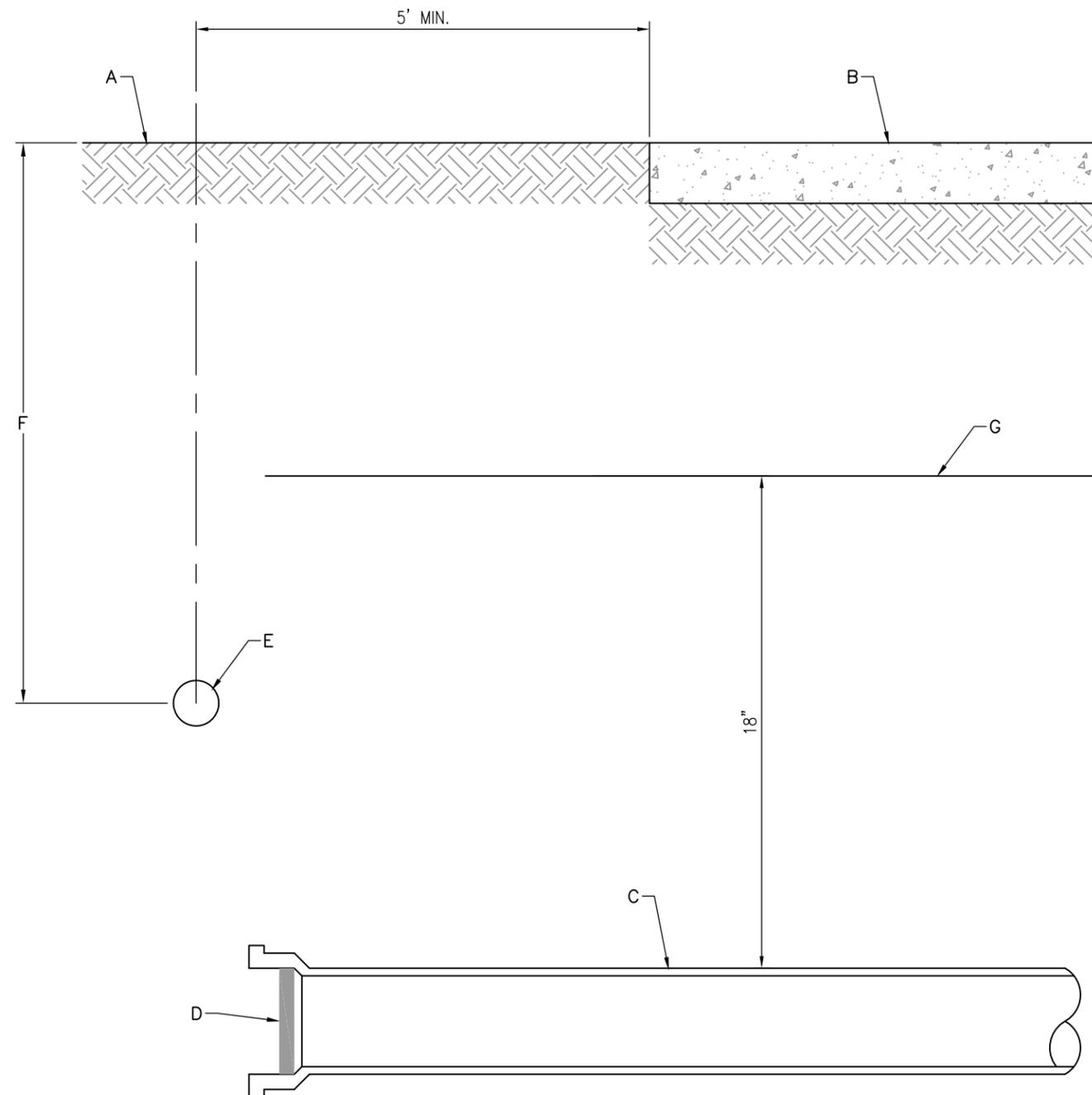
REVISIONS	WATER AUTHORITY
	SANITARY SEWER SERVICE REPLACEMENT DETAIL
	DWG. 2134 JAN. 2013

GENERAL NOTES

1. PRIOR 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 MARKER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170.
- F. DEPTH PLACEMENT PER MANUFACTURER'S RECOMMENDATIONS.
- G. WARNING TAPE TO BE INSTALLED ON ALL SANITARY SEWER LINES.

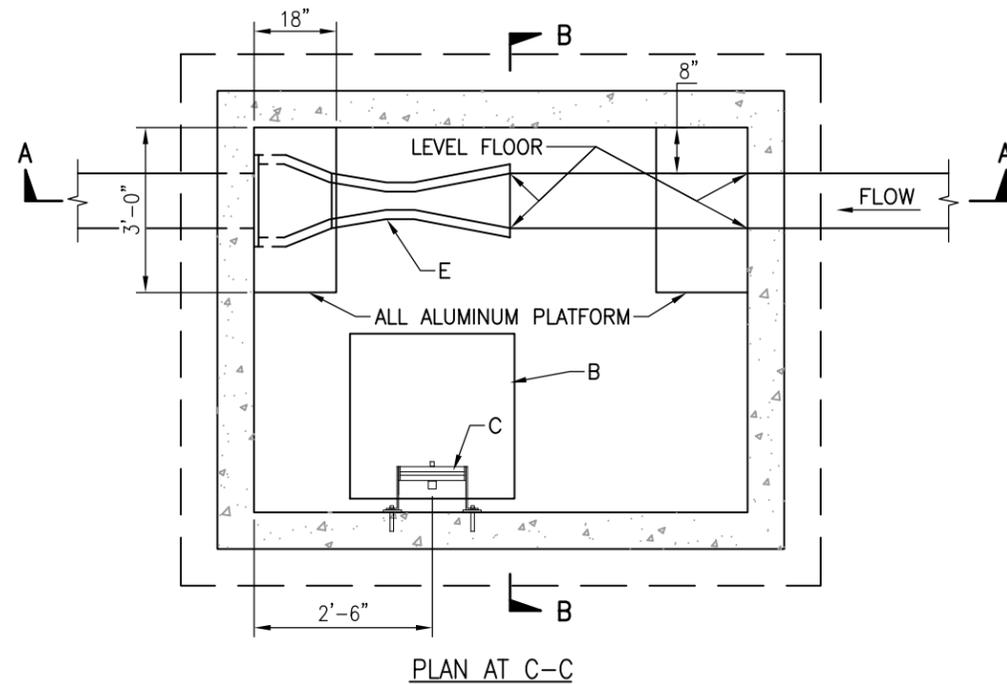


ELEVATION

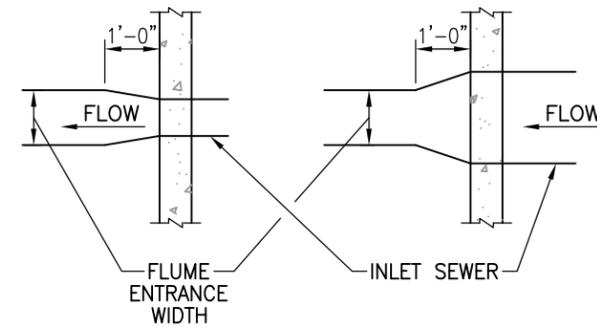
REVISIONS	WATER AUTHORITY
	SANITARY SEWER SEWER LINE DEAD-END MARKER
	DWG. 2145 JAN. 2013

TABLE 1

PIPE SIZE (IN)	REQUIRED INLET SLOPE (FT/FT)
4	0.0060
6	0.0050
8	0.0040
10	0.0028
12	0.0022
15	0.0015
18	0.0012



NOTE: WHEN THE INLET SEWER IS SMALLER OR LARGER, IN DIAMETER THAN THE FLUME ENTRANCE WIDTH, A SMOOTH TRANSITION SHALL BE PROVIDED CHANGING FROM THE INLET SEWER DIAMETER TO THE FLUME ENTRANCE CHANNEL WIDTH OVER THE FIRST FOOT INSIDE THE MH.



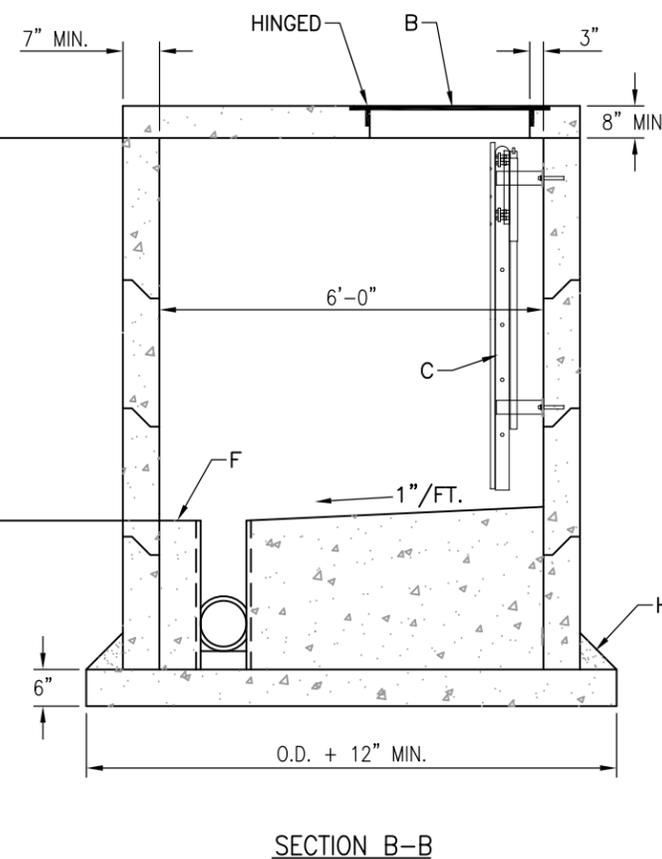
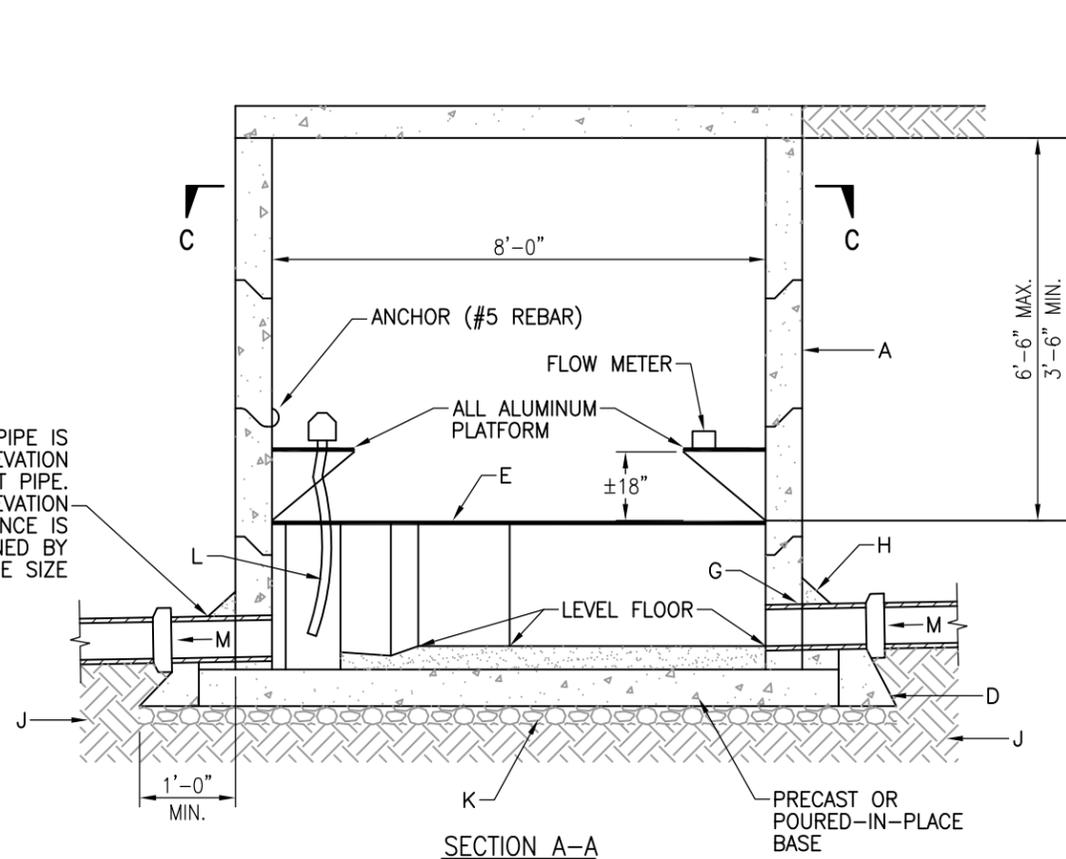
GENERAL NOTES

1. THIS DESIGN IS APPLICABLE FOR MANHOLES $\leq 6.5'$ IN DEPTH MEASURED FROM FLOOR TO CONCRETE COVER. DEPTHS $> 6.5'$ WILL REQUIRE DESIGN BY A REGISTERED ENGINEER IN NM.
2. INDUSTRIAL MANHOLE 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. NOT ALL INSTALLATIONS WILL REQUIRE THE ALUMINUM PLATFORMS. SAMPLER AND FLOW METERING APPARATUS TO BE PROVIDED BY THE INDUSTRIAL USER. FINAL DECISIONS 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 BOWLUS 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 OF THE MANHOLE MUST BE AS SPECIFIED IN TABLE 1 FOR THE VARIOUS SIZE LINES. OUTLET SEWER LINES MUST BE DESIGNED TO CONVEY THE MAXIMUM DESIGN FLOWS WITHOUT CREATING A SURCHARGED CONDITION IN THE FLUME.

CONSTRUCTION NOTES

- A. ALL MANHOLE BASES, RISERS SECTIONS AND FLAT SLAB TOP SECTIONS SHALL BE PRECAST REINFORCED CONCRETE.
- B. 3'-0" SQ. ALUMINUM FLOOR DOOR WITH RECESSED HASP COVERED BY A HINGED LID FLUSH WITH TOP SURFACE. HARDWARE AND HINGES SHALL BE 316 STAINLESS STEEL. BILCO TYPE J, OR EQUAL. HS-20 LIVE LOAD RATED WHERE APPLICABLE.
- C. LADDER PER STANDARD DRAWING 2335.
- D. CONCRETE PIPE SUPPORTS SHALL EXTEND OUTSIDE THE MANHOLE TO BELL OF FIRST JOINT AND SHALL CRADLE PIPE TO THE SPRING LINE.
- E. PREFABRICATED MONITORING FLUME TO BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. A PARSHALL FLUME OR A PALMER BOWLUS FLUME SHALL BE INSTALLED AS DIRECTED BY THE WATER AUTHORITY.
- F. CONCRETE FILLETS. FILLETS 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 FILLET ON UPPER HALF OF PIPE AND AROUND BASE.
- J. BACKFILL PER SECTION 501.
- K. 2" GRAVEL CRUSHED STONE LEVELING COURSE.
- L. FLUME OUTLET END ADAPTER.
- M. SLOPE PER TABLE 1.

NOTE: OUTLET PIPE IS AT A LOWER ELEVATION THAN THE INLET PIPE. MINIMUM ELEVATION DIFFERENCE IS DETERMINED BY THE FLUME SIZE



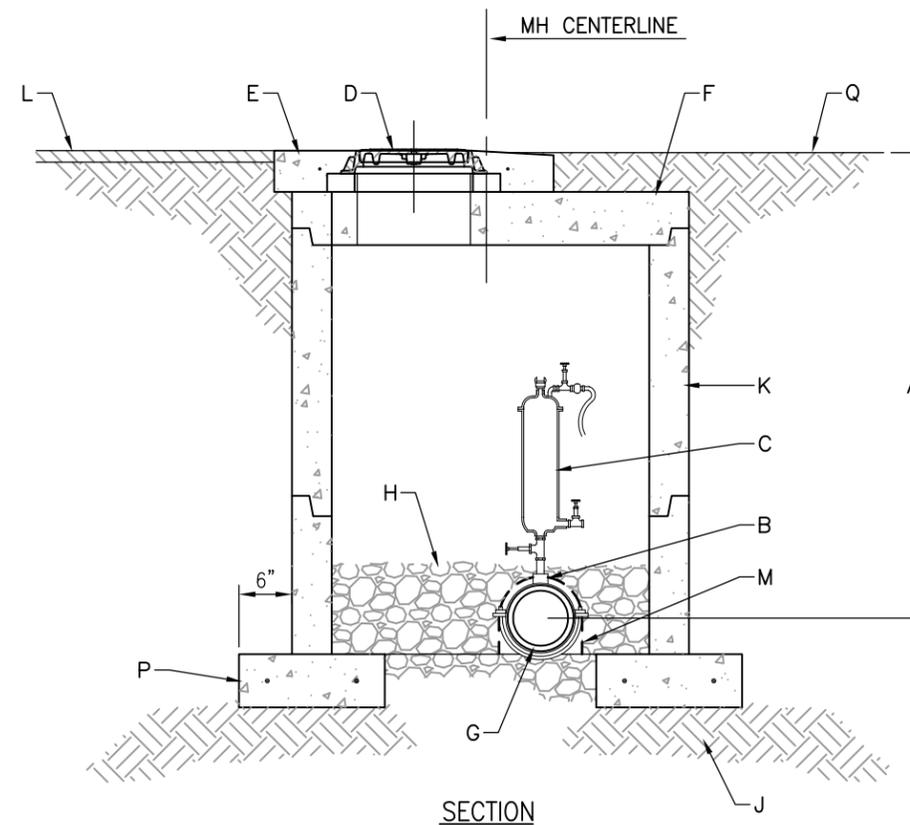
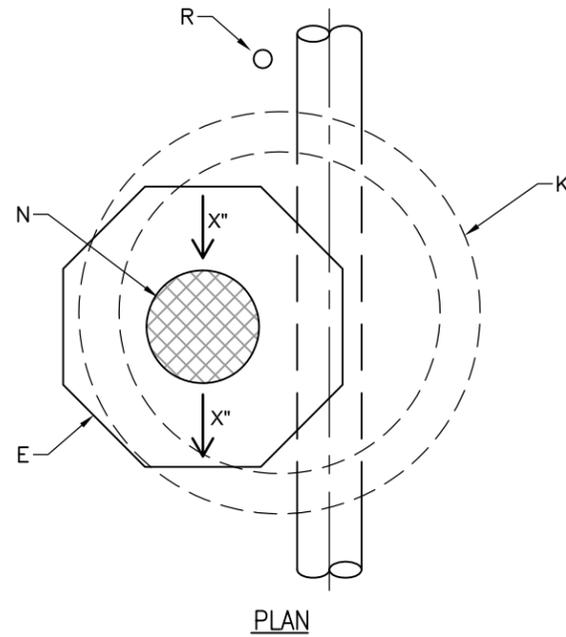
REVISIONS	WATER AUTHORITY
	SANITARY SEWER SAMPLING AND METERING MANHOLE 6'x8' RECTANGULAR DWG. 2150 JAN. 2013

GENERAL NOTES

1. ALL COMPACTION FOR INSTALLATION OF ARV MANHOLE TO BE 95% OF MAXIMUM DRY DENSITY PER ASTM D 1557.
2. INTERIOR OF MANHOLE SHALL BE COATED IN ACCORDANCE WITH SECTION 920.4.6.2 OF THE SPECIFICATIONS.

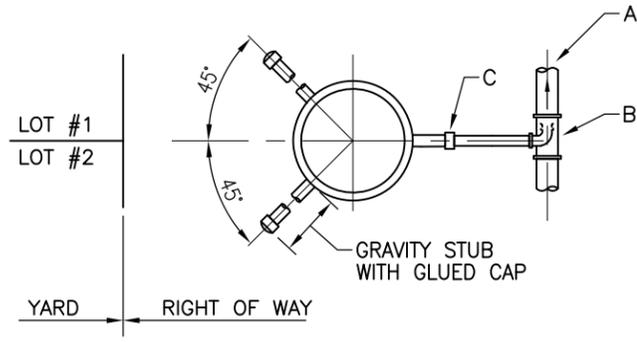
CONSTRUCTION NOTES

- A. SEE CONSTRUCTION PLANS FOR DEPTH REQUIRED.
- B. 2" TAPPING SADDLE
- C. SEWAGE 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 2461.
- F. PRECAST CONCRETE TOP SLAB FOR MANHOLE WITH 2'-0" DIA. OPENING PER STANDARD DRAWING 2107.
- G. FORCE MAIN
- H. 12" DEEP 3/4" GRAVEL, ASTM C33, NO. 57 GRAVEL
- J. COMPACTED SUBGRADE, OVEREXCAVATED TO 12" BELOW FOUNDATION.
- K. USE 4'-0" I.D. CONCRETE MANHOLE SECTIONS (PER SECTION 101, SAS CONCRETE. $f'_c=400$ 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 LID
- P. 2~CONCRETE ANTI-FLOATATION COLLAR HALVES. SEE STANDARD DRAWING 2171, OR CAST-IN-PLACE CONCRETE OF SIMILAR DESIGN
- Q. FINISH GRADE IN UNPAVED AREAS
- R. ELECTRONIC MARKER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170.

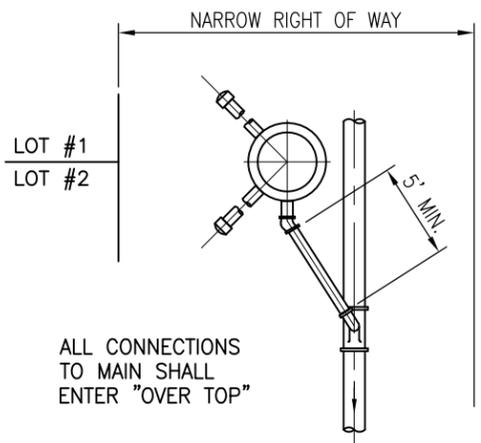


REVISIONS	WATER AUTHORITY
	SANITARY SEWER AIR RELEASE VALVE DETAIL
	DWG. 2160 JAN. 2013

NOTE:
EACH HOUSE GRAVITY LATERAL
MUST BE DIRECTLY CONNECTED
TO HOLDING TANK.



PLAN SHOWING HOLDING TANK
WITH TWO HOUSE CONNECTIONS



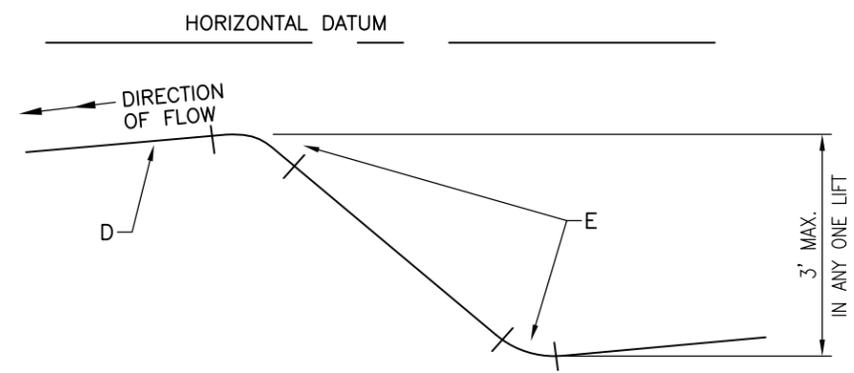
VALVE PIT INSTALLATION
IN NARROW RIGHT OF WAY

GENERAL NOTES

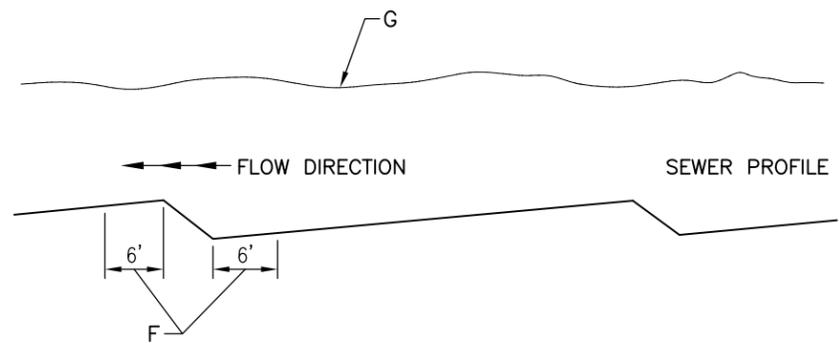
1. ONLY HOMES AND APARTMENTS WHOSE LOWER FLOOR ELEVATION ARE THE SAME SHOULD BE CONNECTED TO A COMMON VACUUM VALVE PIT INSTALLATION. WITH MULTIPLE FLOOR APARTMENTS EACH FLOOR SHOULD BE SERVICED BY ITS OWN VACUUM VALVE PIT INSTALLATION.
2. NOT LESS THAN 20' BETWEEN SUCCESSIVE LIFTS.
3. LOWER PORTION OF VALVE PIT IS A WASTE HOLDING TANK.

CONSTRUCTION NOTES

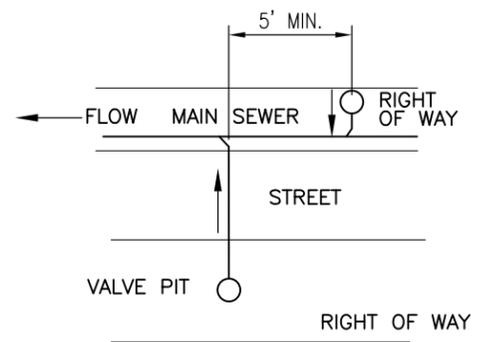
- A. 4", 6", 8" OR 10" VACUUM SEWER
- B. 10"x10"x3" OR 8"x8"x3" OR 6"x6"x3" OR 4"x4"x3" D.W.V. YIELD
- C. 3" SCHEDULE 40 PVC
- D. SLOPE: CONSULT DESIGN MANUAL
- E. LONG TURN 45° BENDS IN TWO POSITIONS.
- F. DO NOT MAKE ANY INLET CONNECTIONS IN THIS AREA
- G. GRADE
- H. ELL 90° AND WYE. IMPORTANT: WYE SHALL BE IN VERTICAL POSITION.
- J. ISOLATION VALVE
- K. LIFT
- L. WYE AND ST. 45° IN VERTICAL POSITION.



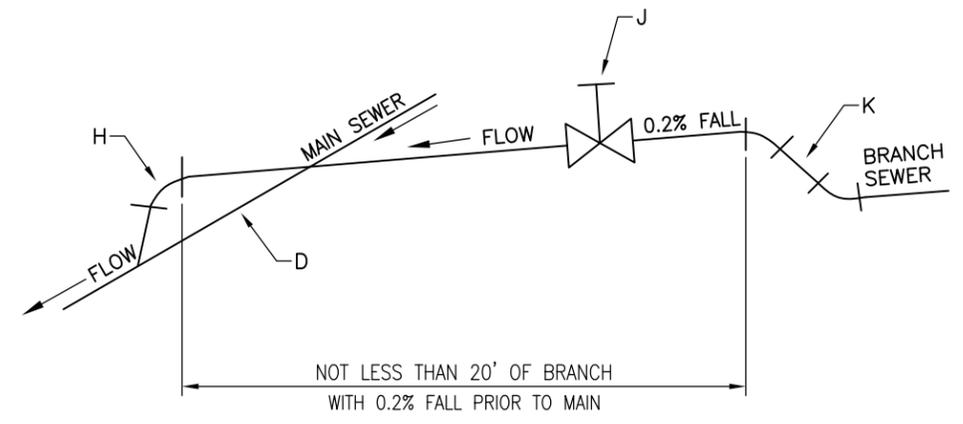
LIFT DETAILS



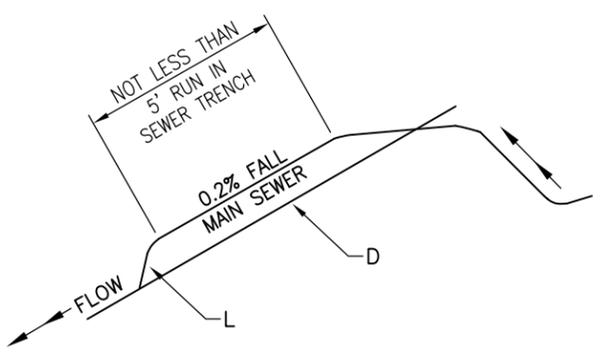
RECOMMENDED POSITIONS FOR CONNECTIONS TO MAIN



SKETCH SHOWING MINIMUM
SPACING OF VACUUM SERVICE LATERALS



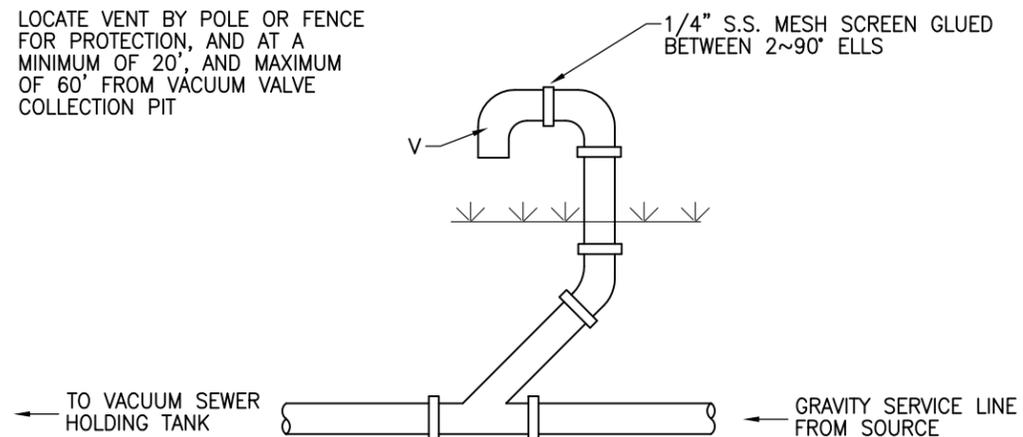
DIAGRAMMATIC OF BRANCH
CONNECTION TO MAIN



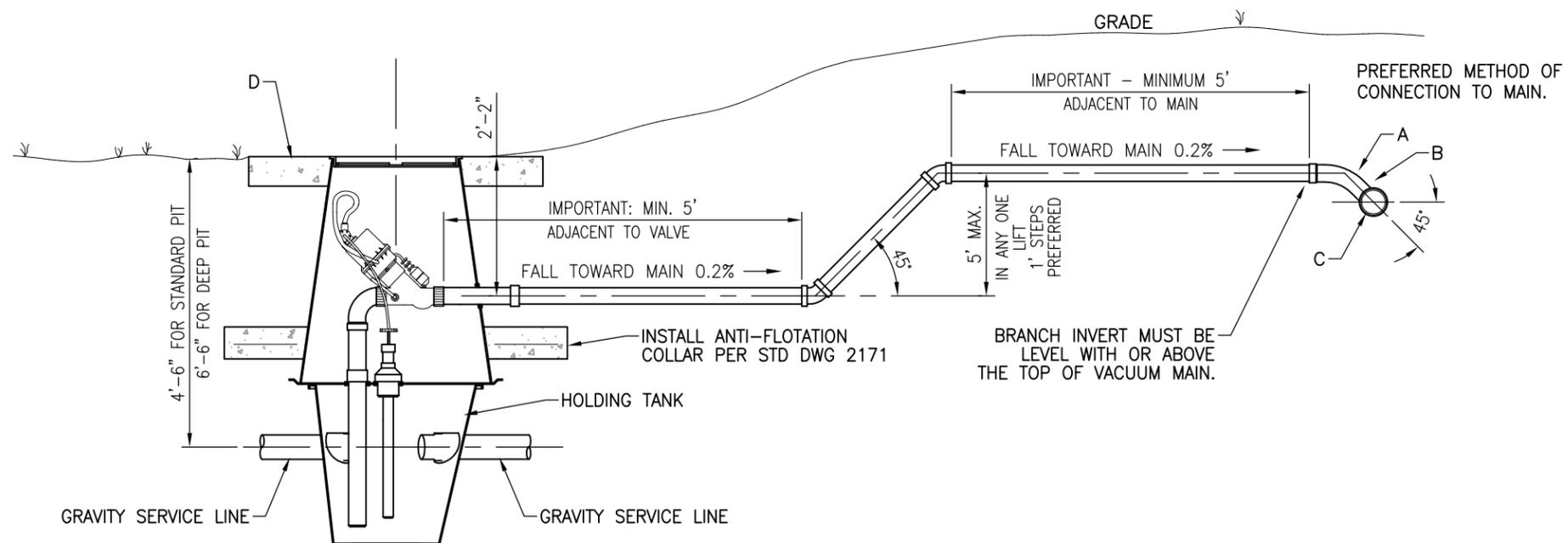
ALTERNATE METHOD OF CONNECTING
BRANCH OR VACUUM SERVICE LATERAL TO MAIN

REVISIONS	WATER AUTHORITY
	VACUUM SEWER STANDARD DETAILS
	DWG. 2162 JAN. 2013

LOCATE VENT BY POLE OR FENCE FOR PROTECTION, AND AT A MINIMUM OF 20', AND MAXIMUM OF 60' FROM VACUUM VALVE COLLECTION PIT



VENT INLET DETAIL



GENERAL NOTES

1. GRAVITY LINES: IN ALL INSTALLATIONS, SEWAGE 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 VALVE COLLECTION PIT. VENT PIPING SHALL BE THE SAME DIAMETER OF THE PRIVATE GRAVITY SERVICE LINE.

CONSTRUCTION NOTES

- A. 45° ELL
- B. WYE IN VERTICAL POSITION
- C. VACUUM SEWER MAIN
- D. CONCRETE COLLAR PER STANDARD DRAWING 2461.

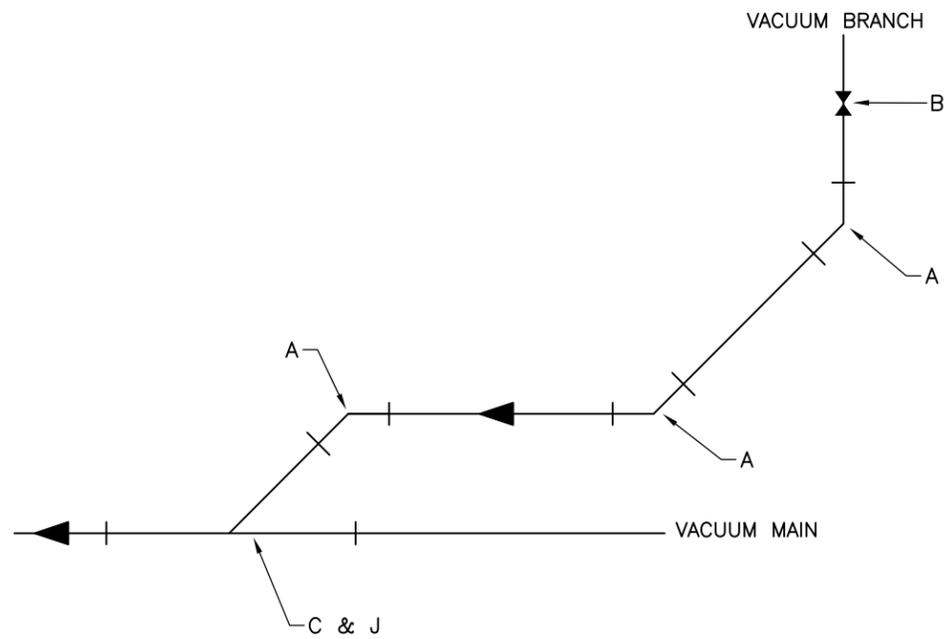
REVISIONS	WATER AUTHORITY
	VACUUM SEWER VALVE AND PIT INSTALLATION WITH LIFT IN VACUUM SERVICE LATERAL
	DWG. 2163
	JAN. 2013

GENERAL NOTES

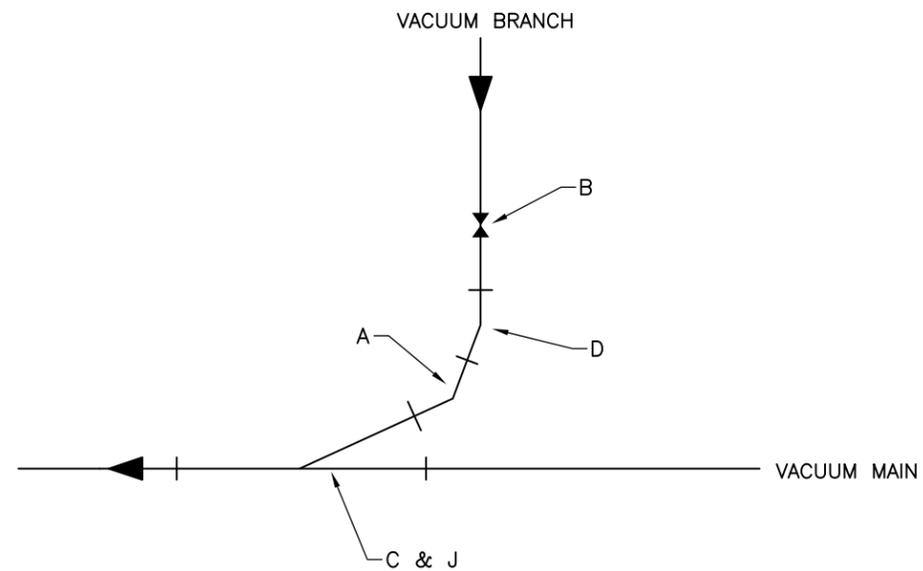
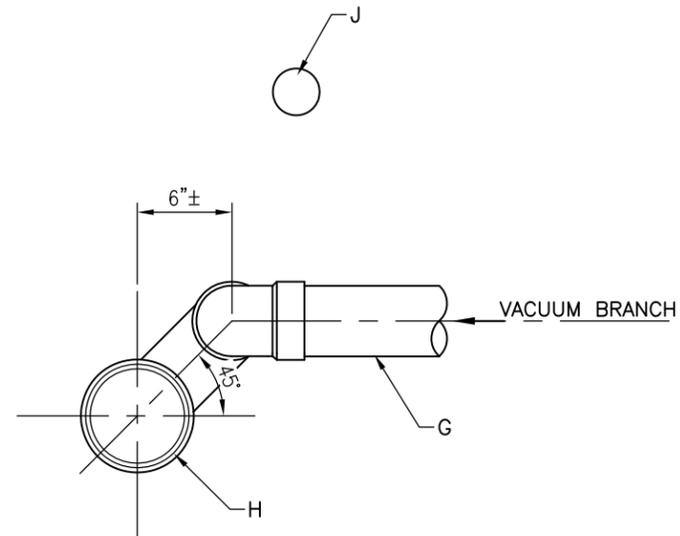
- UNLESS SHOWN ON CONSTRUCTION DRAWINGS, DIVISION VALVES WILL NOT BE INSTALLED FOR SERVICE CONNECTIONS.

CONSTRUCTION NOTES

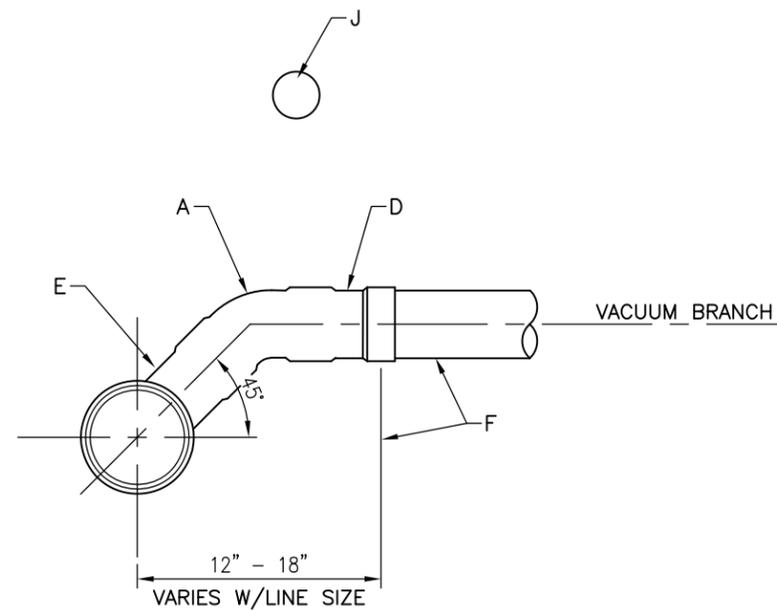
- 45° ELBOW
- DIVISION VALVE AS SHOWN ON CONSTRUCTION DRAWINGS
- REDUCTION WYE AT 45°
- 22 1/2° ELBOW
- MAIN LINE WYE AT 45°
- BOTTOM OF BRANCH IS AT TOP OF MAIN
- BOTTOM OF BRANCH IS 1" TO 2" ABOVE TOP OF MAIN
- VACUUM MAIN
- ELECTRONIC MARKER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170.



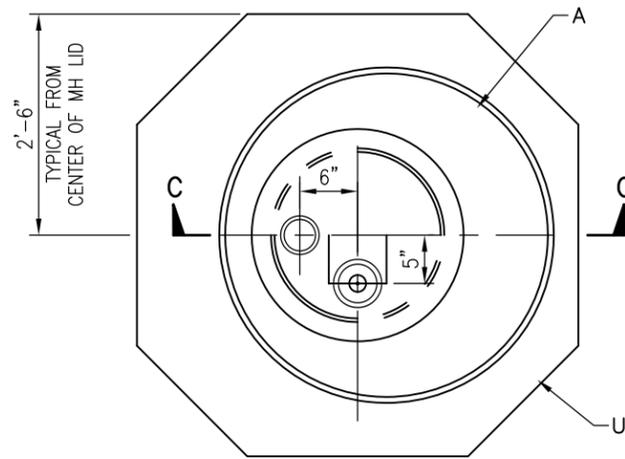
ALTERNATE "A"



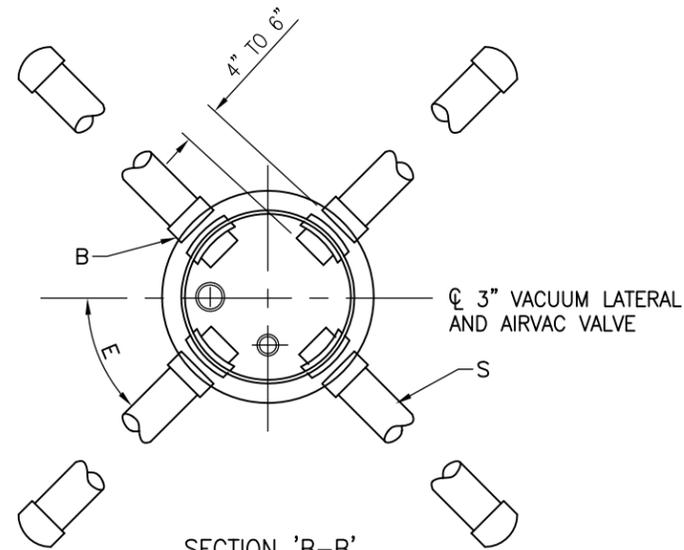
ALTERNATE "B"



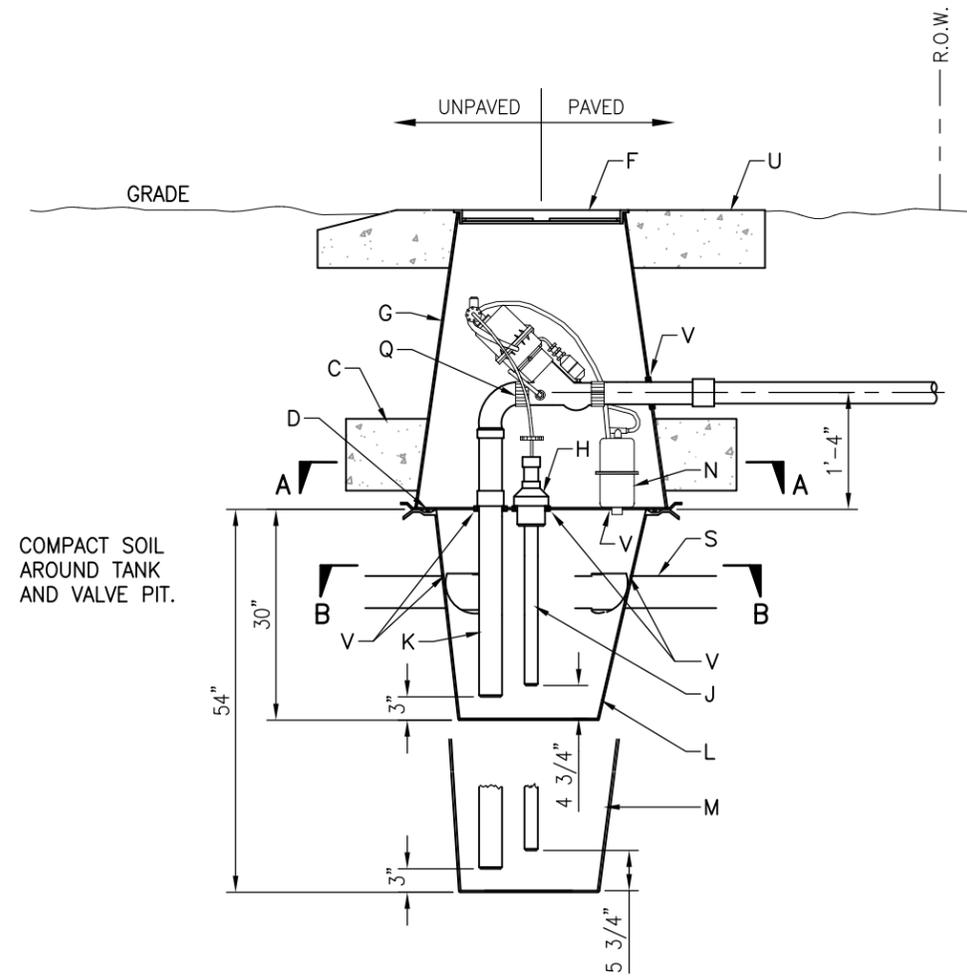
REVISIONS	WATER AUTHORITY
	VACUUM SEWER TYPICAL VACUUM BRANCH LINE CONNECTION
	DWG. 2164 JAN. 2013



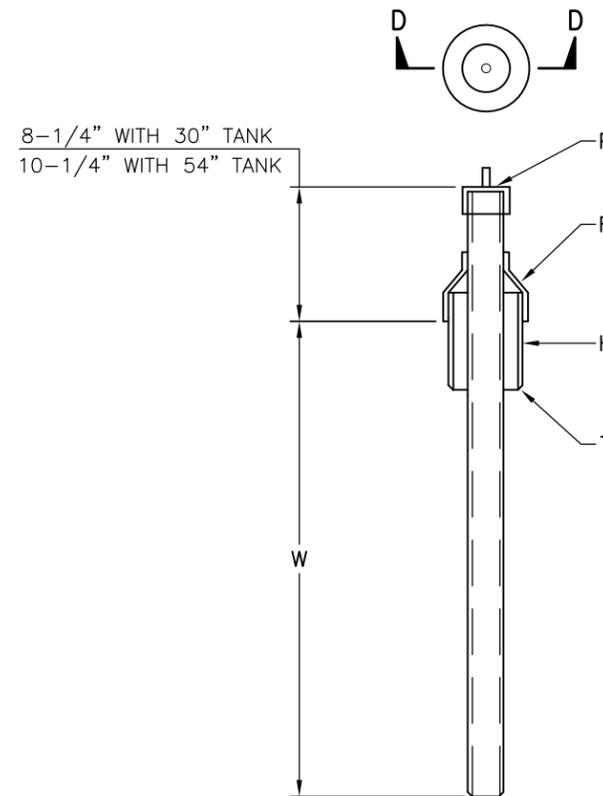
SECTION 'A-A'



SECTION 'B-B'
SHOWING UP TO 4
GRAVITY CONNECTIONS
TO SUMP



SECTION 'C-C'



SECTION 'D-D'
COMBINATION CLEAN OUT-SENSOR PIPE DETAIL

GENERAL NOTES

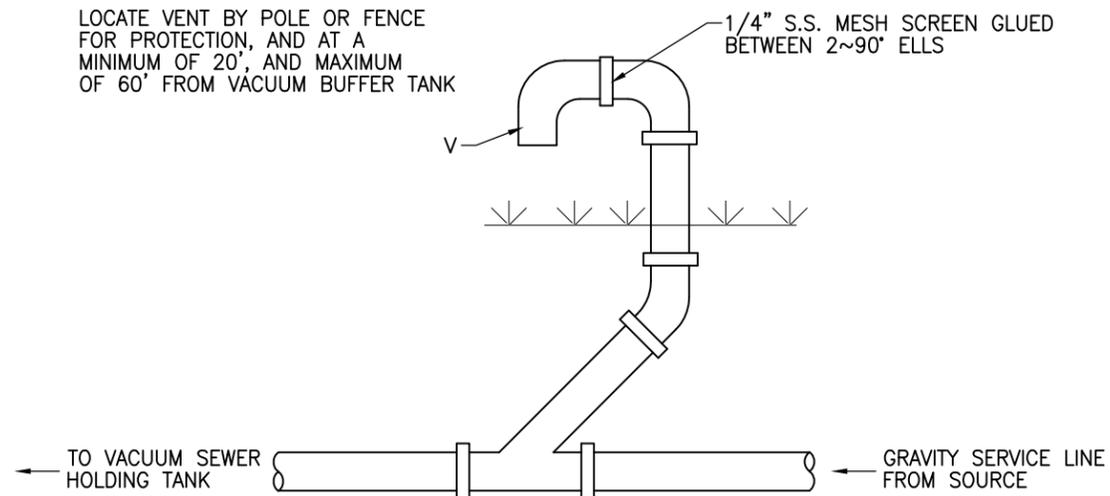
1. THE FOLLOWING HOLES IN VALVE PIT AND SUMP TO BE FIELD CUT: 5" GRAVITY (SUMP)
2. ONLY HOMES OR APARTMENTS WHOSE LOWER FLOOR ELEVATIONS ARE THE SAME SHOULD BE CONNECTED TO A COMMON VACUUM VALVE PIT INSTALLATION. WITH MULTIPLE FLOOR APARTMENTS, EACH FLOOR SHOULD BE SERVICED BY ITS OWN VACUUM VALVE PIT PACKAGE.
3. FOR ANTI-FLOATATION RING, GRADE-LEVEL PAD, PIPING FROM VALVE PIT TO VACUUM MAIN AND GRAVITY SERVICE STUBS. VALVE TO BE INSTALLED BY OWNER. ALL OTHER INSTALLATION AND TESTING BY CONTRACTOR.

CONSTRUCTION NOTES

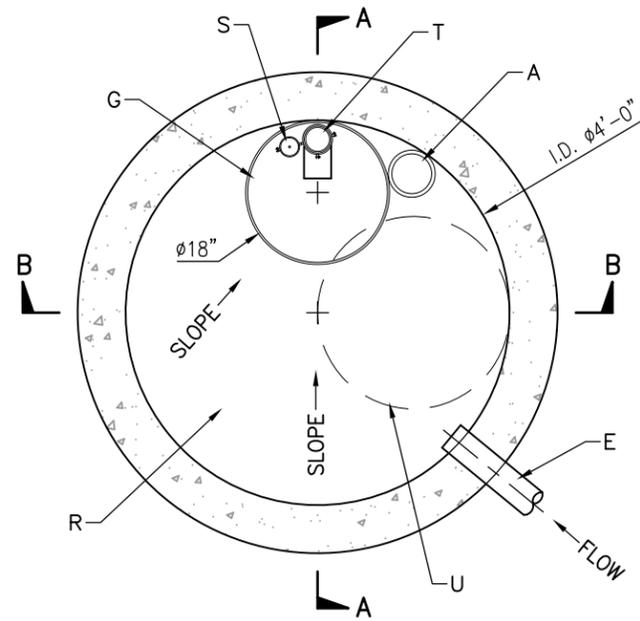
- A. RTM MOLDED FIBERGLASS VALVE PIT BOTTOM WITH HOLES FACTORY CUT.
- B. GLUE HALF OF A SLIP COUPLING IN PLACE AT 4" TO 6" FROM END OF GRAVITY LINE TO ACT AS A STOP.
- C. ANTI-FLOTATION RING (TYP), SEE STANDARD DRAWING 2171.
- D. JOINT SEALED WITH NEOPRENE RUBBER O-RING. HOLDING TANK BOLTED TO VALVE 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 H2O LOADING.
- G. SPIRAL WOUND, H2O LOADING RATED, FIBERGLASS VALVE PIT. 27" I.D. AT TOP, 36" 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, 16" I.D. AT BOTTOM.
- M. FIBERGLASS SUMP 54" DEEP TO ALLOW CONNECTION OF DEEP GRAVITY LINES. DIAMETERS SAME AS 30" SUMP.
- N. SUMP BREATHER ASSEMBLY
- P. 2" AIRVAC PVC SENSOR CAP
- Q. 3" NO-HUB COUPLINGS
- R. 2"x4" REDUCER COUPLING W/INDEX REMOVED. (GLUE JOINTS)
- S. 4" PVC GRAVITY STUB. EXTEND TO PROPERTY LINE UNLESS OTHERWISE DIRECTED AND GLUE CAP.
- T. END BEVELED
- U. CONCRETE COLLAR PER STANDARD DRAWING 2461.
- V. GROMMET
- W. 26" LONG, WITH 30" DEEP HOLDING TANK OR 49" LONG, WITH 54" DEEP HOLDING TANK. FULLY INSERT THROUGH PIT BOTTOM TO STOP.

REVISIONS	WATER AUTHORITY
	VACUUM SEWER 3" VALVE AND PIT INSTALLATION WITH INTERNAL BREATHER
	DWG. 2165 JAN. 2013

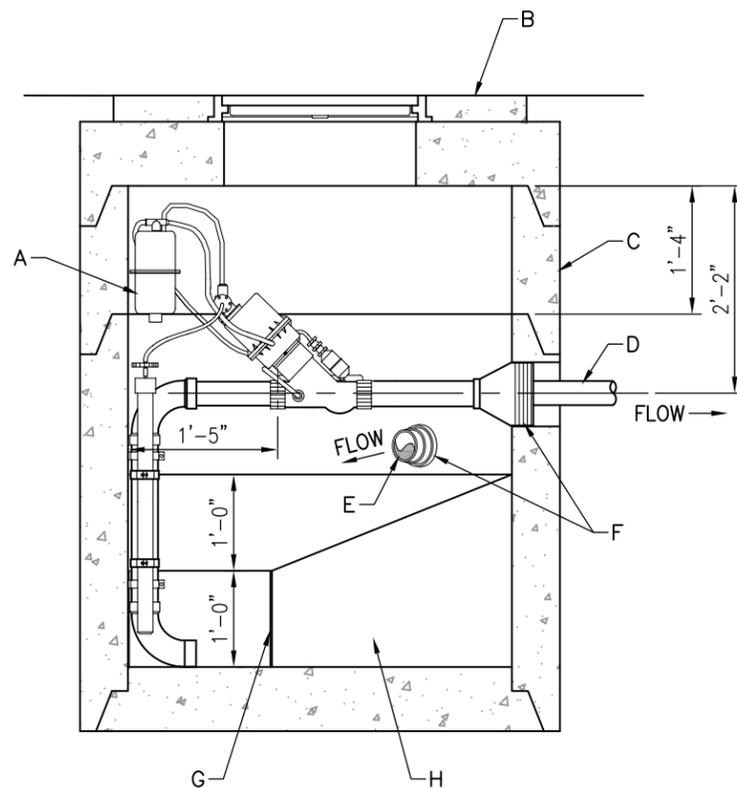
LOCATE VENT BY POLE OR FENCE FOR PROTECTION, AND AT A MINIMUM OF 20', AND MAXIMUM OF 60' FROM VACUUM BUFFER TANK



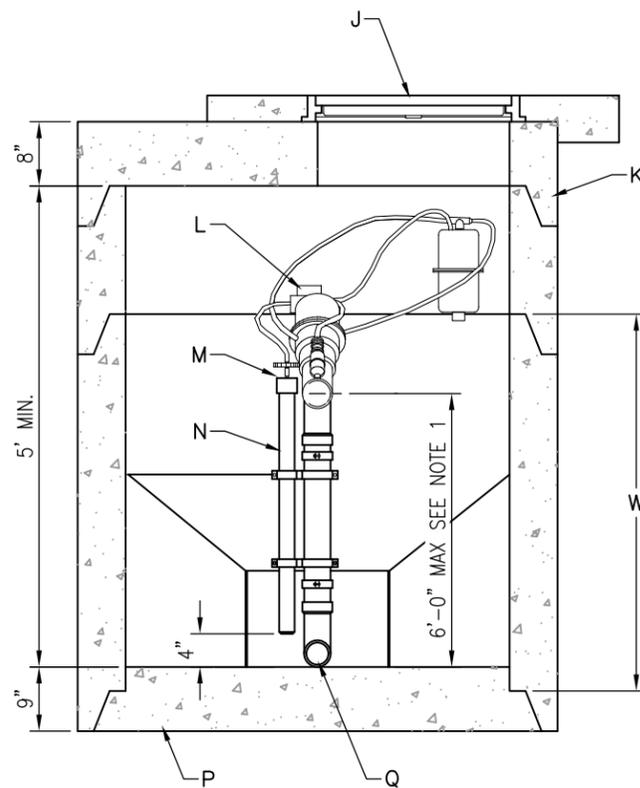
VENT INLET DETAIL



PLAN



SECTION A-A



SECTION B-B

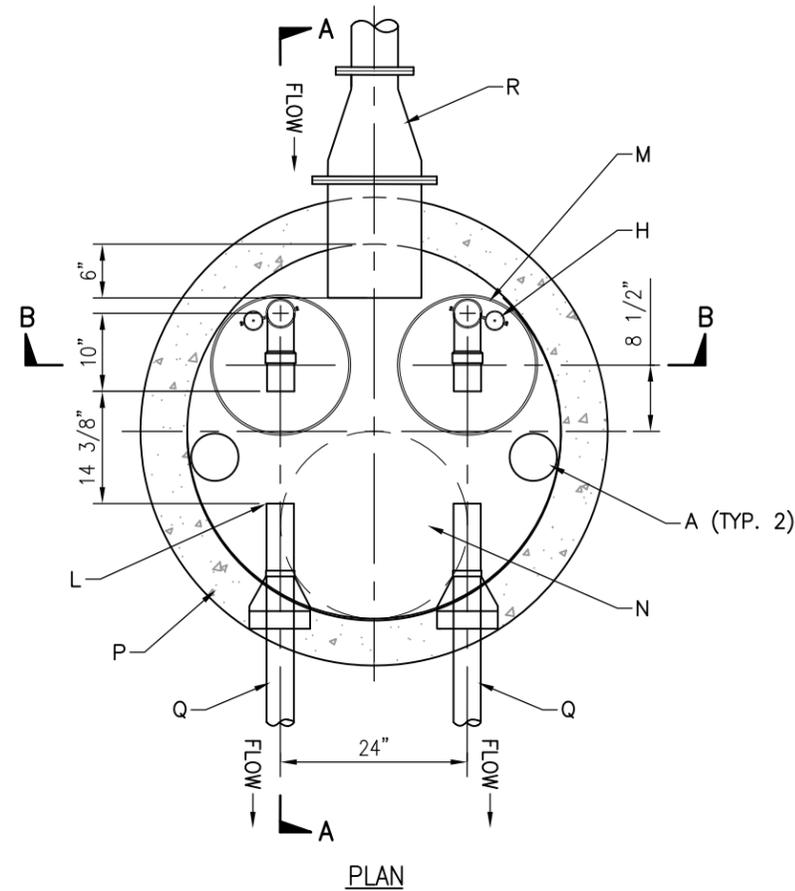
GENERAL NOTES

1. ANY LIFT EXCEEDING 6' 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. DRILL HOLE IN WALL FOR MOUNTING SCREW FOR SUMP BREATHER.

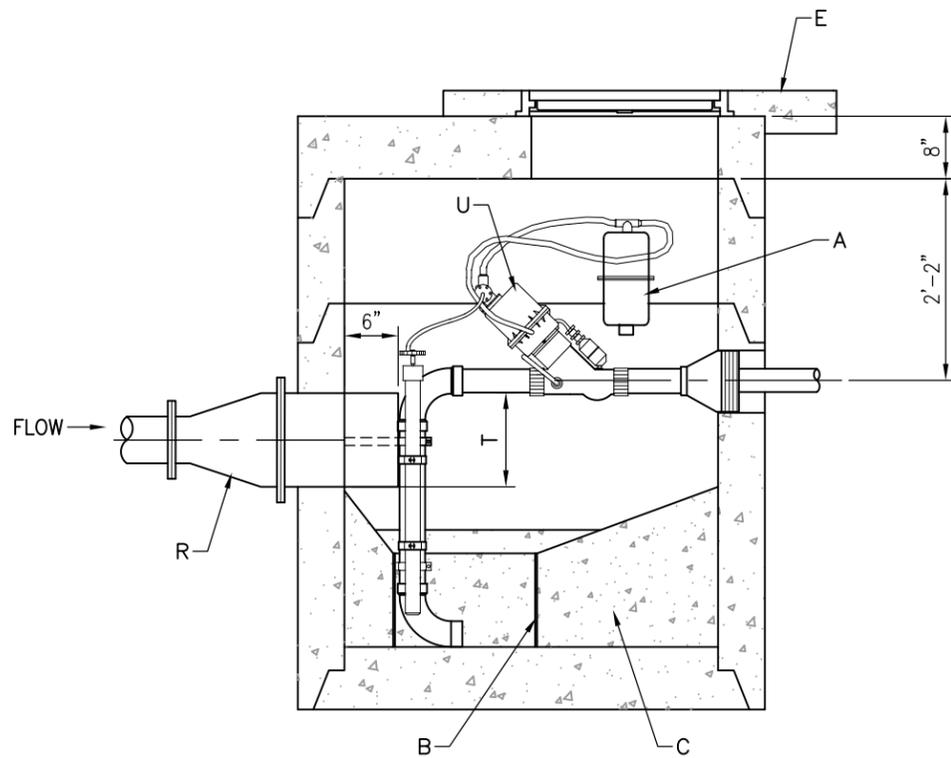
CONSTRUCTION NOTES

- A. SUMP BREATHER ASSEMBLY
- B. CONCRETE COLLAR, SEE STANDARD DRAWING 2461.
- 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" I.D. PVC PIPE MAY BE USED TO FORM SUMP AREA.
- H. MASS CONCRETE
- J. SEWER FRAME & COVER PER STANDARD DRAWING 2109.
- K. PRECAST CONCRETE FLAT TOP FOR MANHOLE WITH 2'-0" DIA. OPENING.
- L. 3" MODEL "D" VALVE BY AIRVAC 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, BUT BELOW FINISHED FLOOR LEVEL OF LOWEST RESIDENCE SERVED.
- W. USE 4'-0" I.D. CONCRETE MANHOLE SECTIONS. ADDITIONAL SECTIONS MAY BE ADDED TO ALLOW CONNECTION OF DEEP GRAVITY LINES OR FOR ADDED STORAGE CAPACITY.

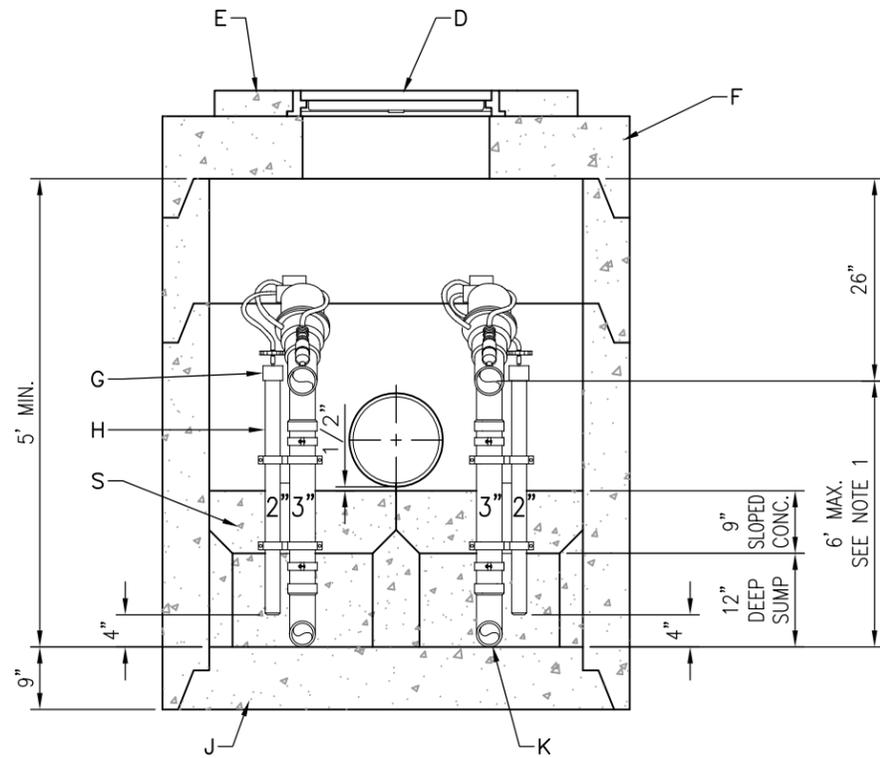
REVISIONS	WATER AUTHORITY
	VACUUM SEWER SINGLE BUFFER TANK 30 GAL./MINUTE MAX. FLOW DWG. 2167
	JAN. 2013



PLAN



SECTION A-A



SECTION B-B

GENERAL NOTES

1. ANY LIFT EXCEEDING 6' 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. DRILL 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. MASS CONCRETE CENTER DIVIDER WALL
- D. SEWER MANHOLE FRAME & COVER PER STANDARD DRAWING 2109.
- E. CONCRETE COLLAR PER STANDARD DRAWING 2461.
- F. PRECAST CONCRETE FLAT TOP FOR MANHOLE WITH 2'-0" DIA. OPENING.
- G. 2" PVC SENSOR CAP SUPPLIED WITH VALVE.
- H. 2" PVC SENSOR PIPE
- J. PRECAST CONCRETE BOTTOM IN MANHOLE SECTION
- K. 3" STREET ELL TOUCHING BASE OF SUMP WITH PLAIN END. NO CONNECTION.
- L. VALVE AND PIPING REMOVED FOR CLARITY
- M. 18" DIAMETER SUMP (2)
- N. LOCATION OF LID
- P. USE 4'-0" I.D. CONCRETE MANHOLE SECTIONS. ADDITIONAL SECTIONS MAY BE ADDED TO ALLOW CONNECTION OF DEEP GRAVITY LINES OR FOR ADDED STORAGE CAPACITY.
- Q. 3" VACUUM SERVICE LINES MUST (EACH) CONNECT DIRECTLY TO A 6" MINIMUM SEPARATION AT MAIN. SERVICE LINES FITTED WITH STANDARD FLEXIBLE CONNECTORS AT THE HOLE IN THE MANHOLE SECTION TO INSURE THAT THE BUFFER TANK IS WATER TIGHT.
- R. MINIMUM 6" GRAVITY LINE WITH MATCHING DIAMETER VENT, MIN. 20', MAX. 60' FROM BUFFER TANK. CONNECT 6" LINE TO 12" x 6" REDUCER. CONNECT REDUCER TO 12" PIPE ENTERING MANHOLE. CENTER 12" PIPE OVER CENTER DIVIDER WALL 'C'. 12" LINE SHALL BE FITTED WITH STANDARD FLEXIBLE CONNECTORS AT THE HOLE TO INSURE THAT BUFFER TANK IS WATERTIGHT.
- S. SHAPE SLOPED CONCRETE TO DISTRIBUTE FLOW EVENLY BETWEEN SUMPS.
- T. GRAVITY INLET MUST BE LOCATED BETWEEN THE VACUUM SERVICE LINE AND THE START OF SLOPE TO SUMP.
- U. 3" MODEL "D" VALVE, BY AIRVAC OR EQUAL, TO BE INSTALLED BY OWNER.

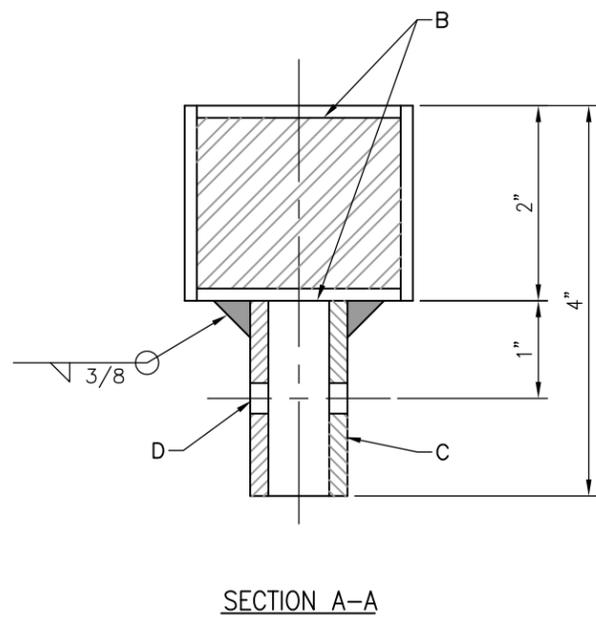
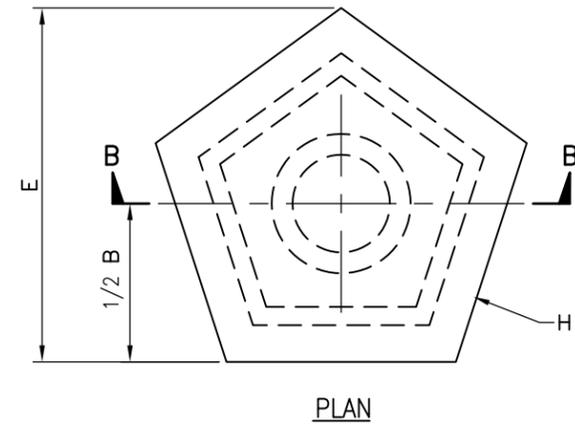
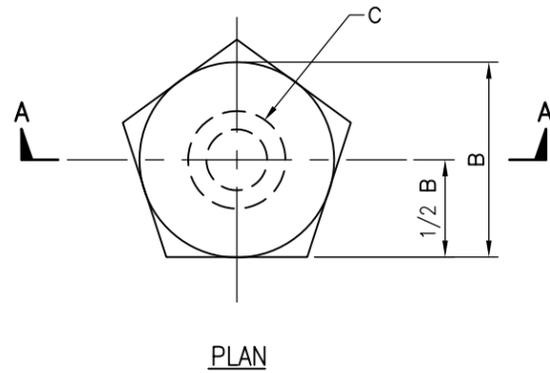
REVISIONS	WATER AUTHORITY
	VACUUM SEWER DUAL BUFFER TANK 60 GAL./MINUTE MAX. FLOW DWG. 2168
	JAN. 2013

GENERAL NOTES

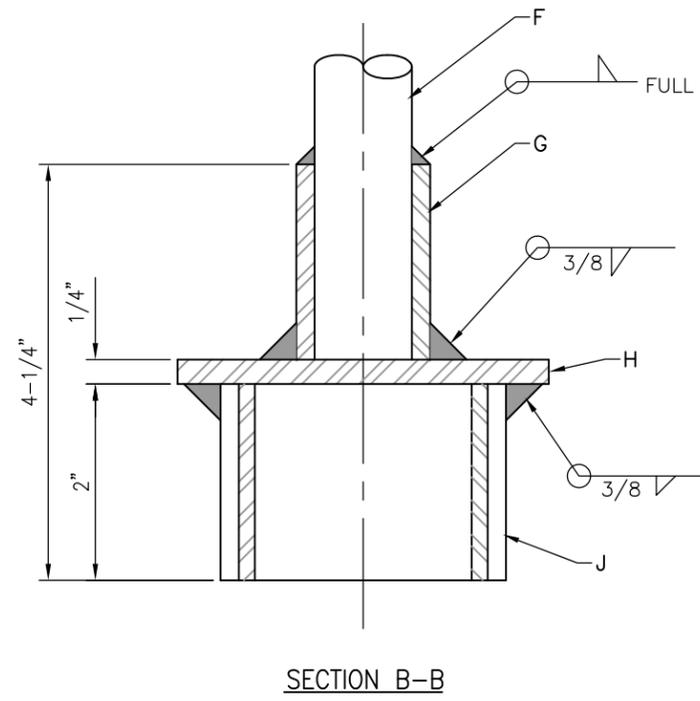
1. THESE NUTS AND SOCKETS ARE A PART OF THE VALVE STEM EXTENSION, SEE VACUUM SEWER VALVE BOX DWG. 2170.

CONSTRUCTION NOTES

- A. 2" LONG H.R. STEEL BAR, 2" x 2"
- B. 2" DIA. STEEL CIRCLE WITH PENTAGON CIRCUMSCRIBED ABOUT CIRCLE
- C. 1" DIA. SCHEDULE 40 PIPE x 2" (1.315 O.D. x 1.049 I.D.)
- D. DRILL 0.312 DIAMETER HOLE THROUGH PIPE FOR 0.31 DIAMETER CLEVIS PIN/COTTER 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. PENTAGON SHAPED x 1/4" H.R. STEEL PLATE 1/2" LARGER THAN TUBULAR SECTION BELOW
- J. 2" LONG H.R. STEEL PENTAGON SHAPED TUBULAR SECTION x 0.1875 WALL WITH 1/8" TOTAL CLEARANCE TO EXTENSION NUT.



EXTENSION NUT



EXTENSION SOCKET

REVISIONS	WATER AUTHORITY
	VACUUM SEWER VALVE STEM NUT AND SOCKET DETAILS
	DWG. 2169 JAN. 2013

GENERAL NOTES

1. ALL COMPACTION OF SUBGRADE AND AND BACKFILL FOR INSTALLATION OF VACUUM VALVE PIT TO BE 95% OF MAXIMUM DRY DENSITY PER ASTM D 1557.
2. AVOID EXCESSIVE EXPOSURE TO SUNLIGHT OF OPEN VACUUM VALVE PITS. CLOSE & COMPLETE WITHIN 3 DAYS TO INSURE INTEGRITY OF RUBBER O-RING.
3. SEE STANDARD DRAWING 2165 FOR ADDITIONAL DETAILS.

CONSTRUCTION NOTES

- A. 62" SQUARE CONCRETE ANTI-FLOATATION COLLAR, WITH #4 REBAR AT 6" E.W. 3" FROM EDGE OF CONCRETE. SEE TABLE 1 THIS SHEET FOR THICKNESS. CONCRETE PER SECTION 101, HYDRAULIC STRUCTURAL CONCRETE, $f'_c=4000$ 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 H20 LOADING.
- G. 1" CLEARANCE TO BOTTOM OF 3" LATERAL
- H. 3" THICK 3/4" GRAVEL, ASTM C33, NO. 57 GRAVEL
- J. COMPACTED SUBGRADE
- K. FINISH PAVING SURFACE

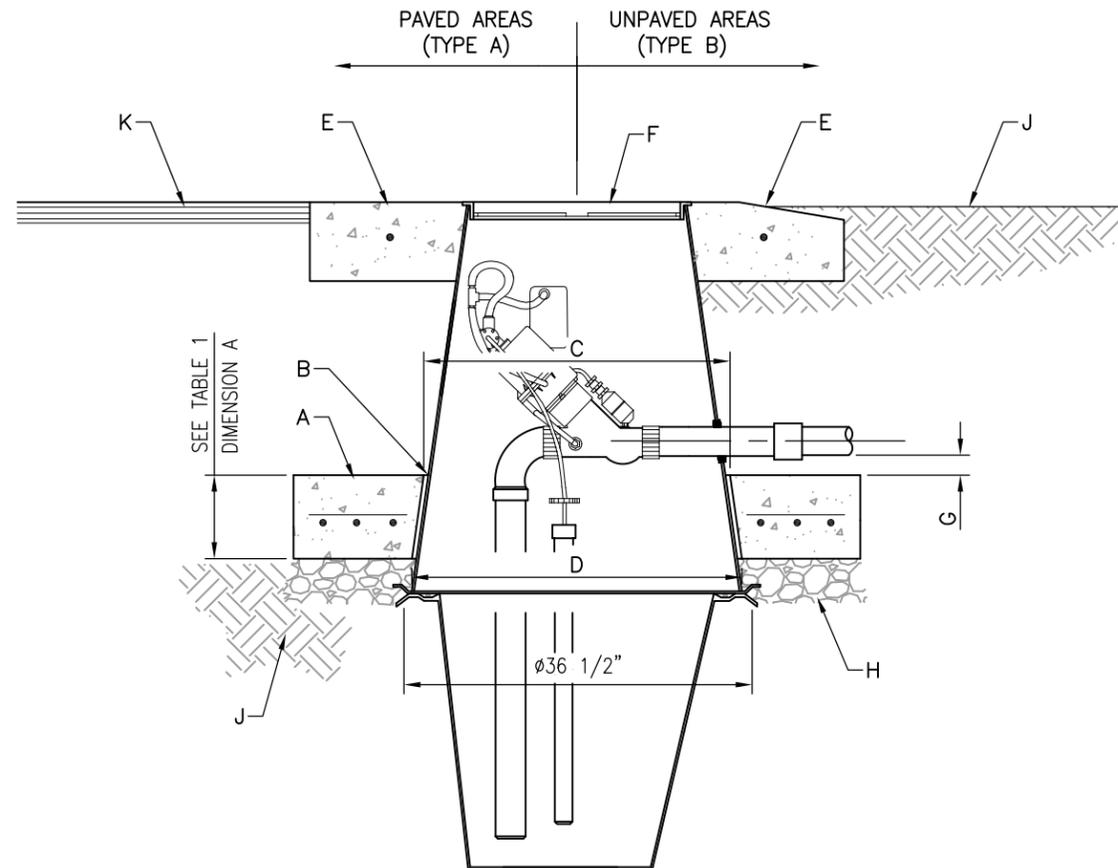
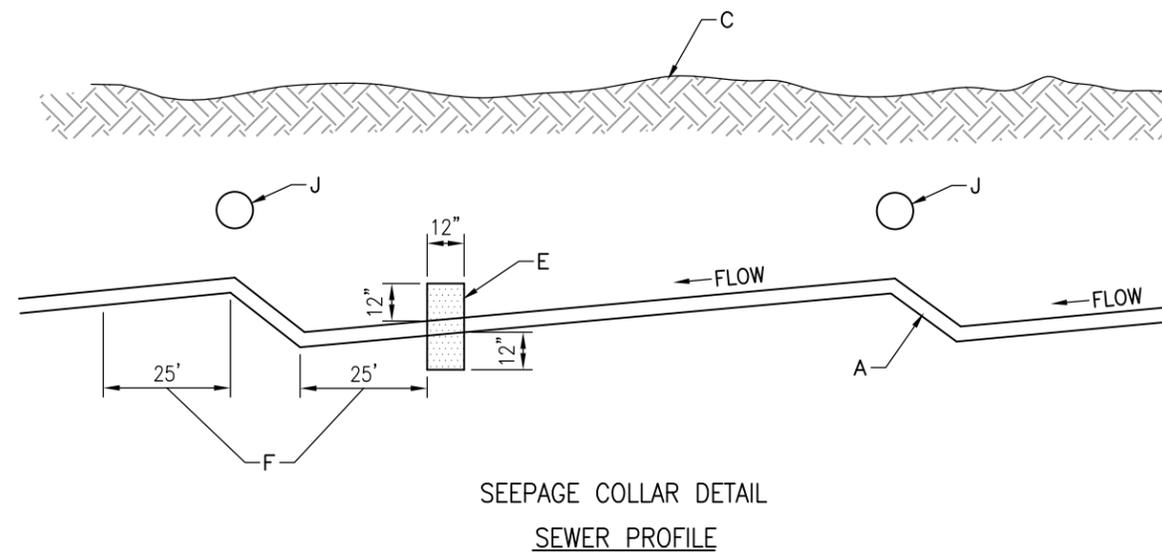
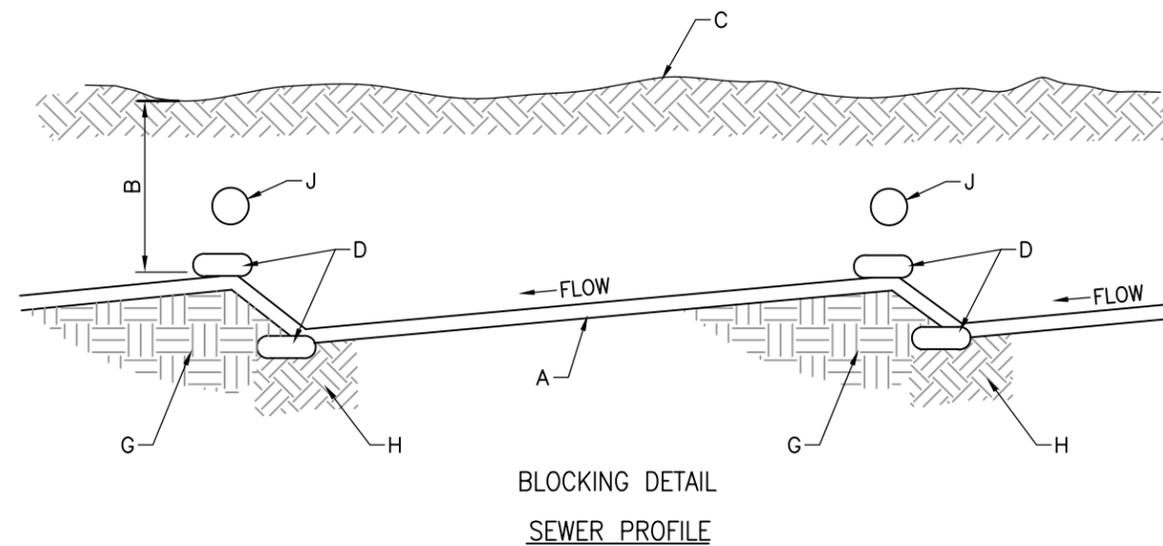


TABLE 1

DESCRIPTION	DIMENSION A
30" SUMP PACKAGE	7 1/2"
54" SUMP PACKAGE	9 1/2"

(SEE STANDARD DRAWING 2165)

REVISIONS	WATER AUTHORITY
	VACUUM SEWER VACUUM VALVE PIT
	DWG. 2171
	JAN. 2013



GENERAL NOTES

1. BENTONITE COLLAR TO BE INSTALLED EVERY 250' ALONG VACUUM SEWER RUN AND FORCE MAIN.
2. BENTONITE SEEPAGE COLLARS ARE FOR VACUUM SEWER MAINS AND FORCE MAINS INSTALLED IN MRGCD IRRIGATION 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 10" VACUUM SEWER
- B. DEPTH PER PLANS
- C. FINISH GRADE
- D. 80 LB BAG OF REDI-MIX CONCRETE WITH CUT ON TOP.
- E. BENTONITE SEEPAGE COLLAR; SEE SPECS. BELOW
- F. MIN. DISTANCE FROM 45° BENDS
- G. UNDISTURBED EARTH
- H. 95% COMPACTED SUBGRADE
- J. ELECTRONIC MARKER DEVICE (EMD) 12" ABOVE TOP OF PIPE. SEE STANDARD SPECIFICATION SECTION 170.

BENTONITE SPECIFICATIONS:

HYDROGEL BENTONITE BY WYO-BEN, INC. OR APPROVED EQUAL

BARREL YIELD	92
VISCOMETER READING AT 600 R.P.M.	39 +/- 5
WATER LOSS	13.5 +/- 1
% THRU 200 MESH SCREEN	80 +/- 2
WET SCREEN ANALYSIS RESIDUE ON U.S. SIEVE NO. 200	3.0 +/- .5
% MOISTURE	7 +/- 1
pH	9.1 +/- .1
GEL STRENGTH-10SEC.	18 +/- 2
GEL STRENGTH-10 MIN.	
PLASTIC VISCOSITY	14 +/- 2
YIELD POINT, LB/200 ft.	16 +/- 4

MIX 80 LBS. PER 100 GALLONS OF MAKE-UP WATER.

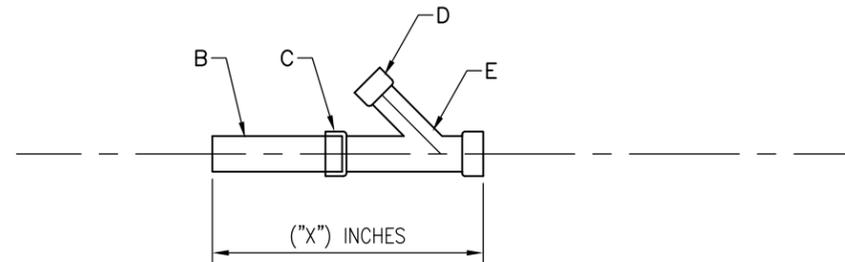
REVISIONS	WATER AUTHORITY
	VACUUM SEWER BLOCKING AND SEEPAGE COLLAR DETAILS DWG. 2173 JAN. 2013

GENERAL NOTES

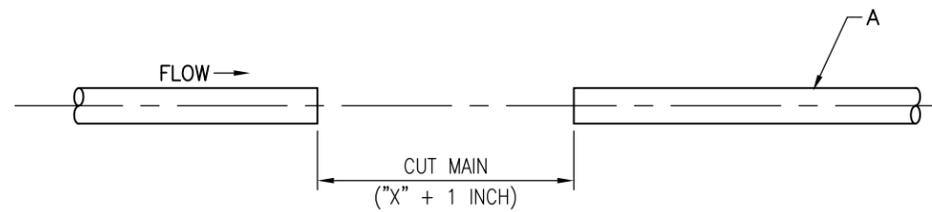
1. ALL SOIL COMPACTION FOR INSTALLATION OF SERVICE WYE TO BE 95% OF MAXIMUM DRY DENSITY PER ASTM D 1557.

CONSTRUCTION NOTES

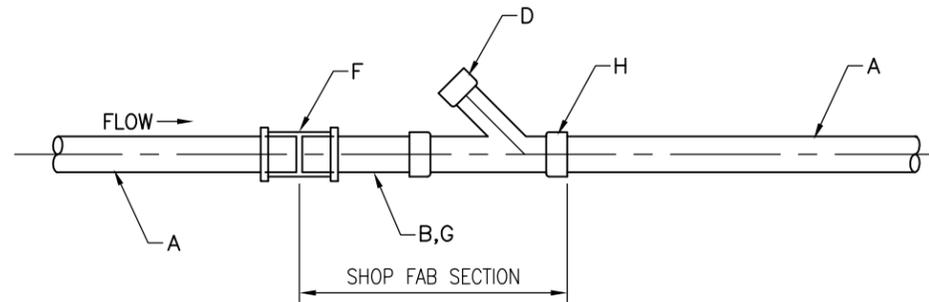
- A. EXISTING VACUUM SEWER MAIN
- B. SCHEDULE 40 PVC PIPE. LENGTH TO BE GREATER THAN COMPRESSION COUPLING.
- C. SOLVENT WELD AT SHOP
- D. SEE STANDARD DRAWING 2163
- E. SCHEDULE 40 PVC WYE (P x P x P)
SEE STANDARD DRAWING 2163
- F. COMPRESSION COUPLING AS PER AUTHORITY SPECIFICATION
- G. SLIDE COMPRESSION COUPLING ONTO THIS PIECE OF PIPE BEFORE INSERTING IN TRENCH
- H. SOLVENT WELD IN FIELD



SHOP FAB SECTION



PIPE CUT IN FIELD



COMPLETED INSTALLATION IN FIELD

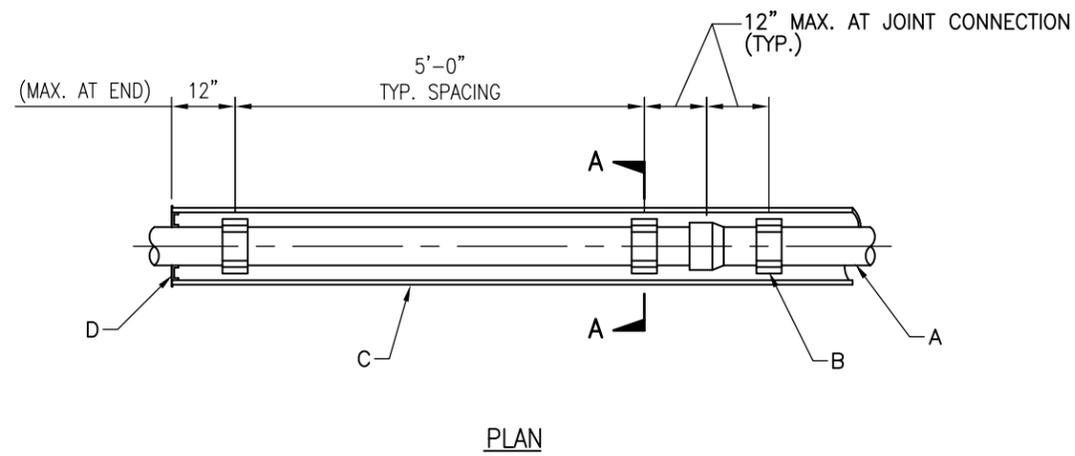
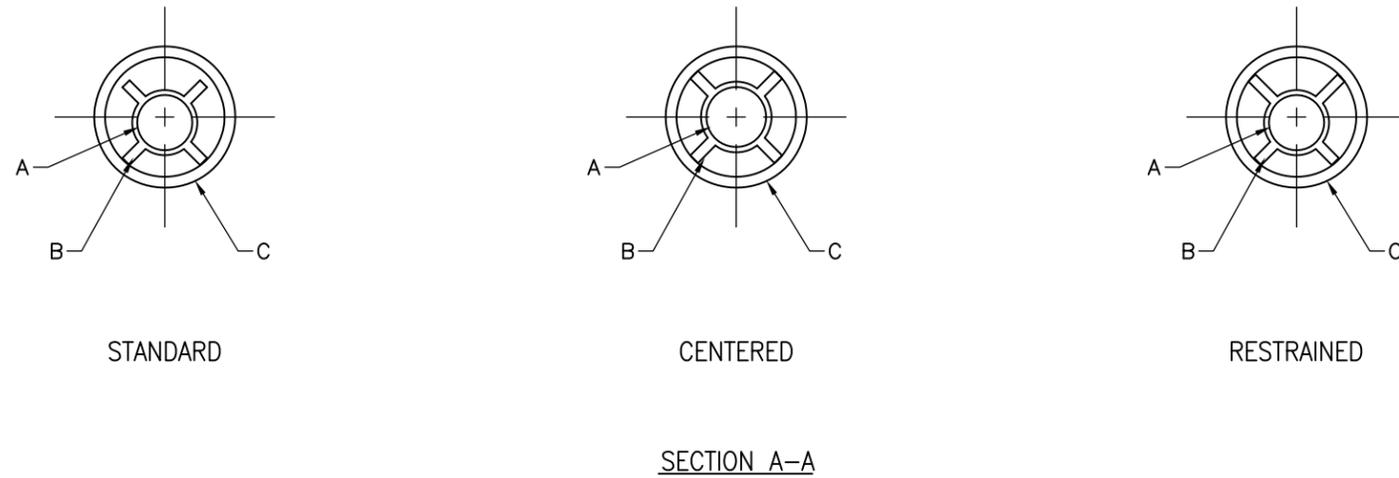
REVISIONS	WATER AUTHORITY
	VACUUM SEWER SERVICE WYE INSTALLATION ON EXISTING VACUUM MAIN DWG. 2174 JAN. 2013

GENERAL NOTES

1. SEE CONSTRUCTION PLANS AND SPECIFICATIONS FOR SKID TYPE AND SECTION CONFIGURATION (STANDARD, CENTERED AND RESTRAINED) AS SHOWN PER SECTION A-A.

CONSTRUCTION NOTES

- A. CARRIER PIPE
- B. PIPELINE SUPPORT SKID (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).



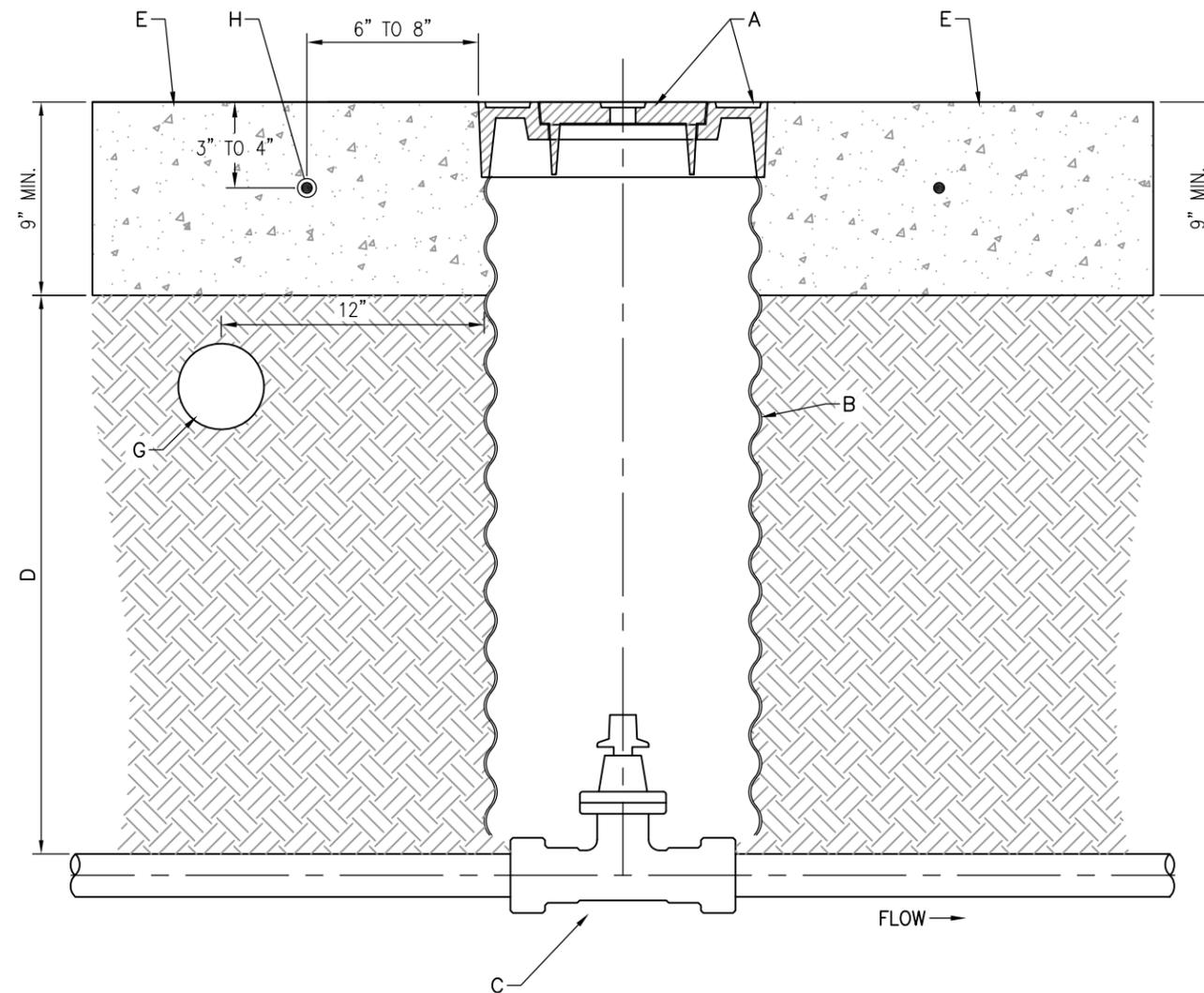
REVISIONS	WATER AUTHORITY
	VACUUM SEWER CASING DETAIL FOR BORE AND JACK DWG. 2180 JAN. 2013

GENERAL NOTES

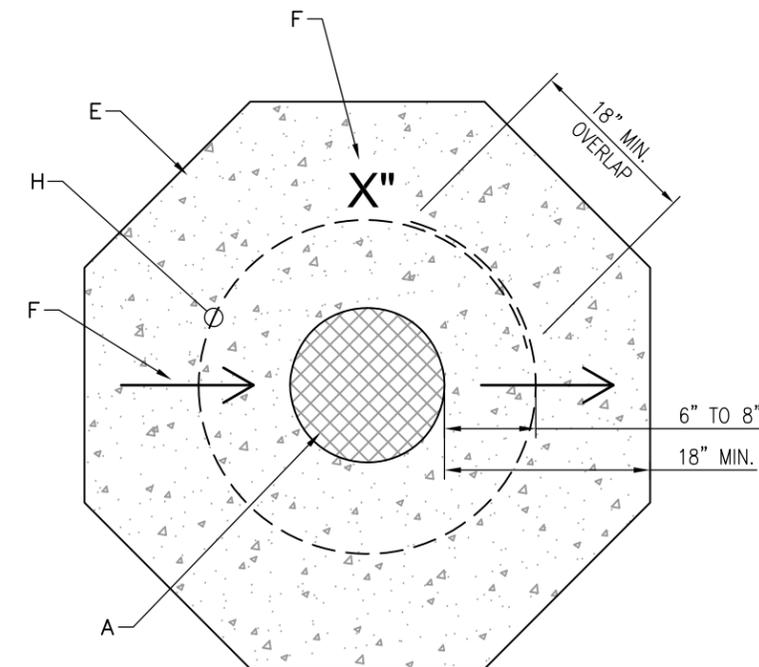
1. LABEL REQUIREMENTS: BEFORE THE WORK WILL BE ACCEPTED, SEWER VALVE GPS COORDINATES SHALL BE PROVIDED ON THE RECORD DRAWINGS. GPS COORDINATES OBTAINED BY A PROFESSIONAL SURVEYOR LICENSED IN THE STATE OF NEW MEXICO SHALL BE TAKEN AT THE VALVE OPERATING NUT. USE THE NAD 1983 NM STATE PLANE CENTRAL ZONE FOR X AND Y COORDINATES AND NAVD 1988 FOR Z COORDINATE.

CONSTRUCTION NOTES

- A. RING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2128.
- B. 12" DIAMETER POLYMER COATED STEEL PIPE CMP
- C. GATE VALVE WITH PENTAGONAL OPERATING NUT
- D. COMPACTED BACKFILL. SOIL OR BASE COURSE MATERIAL (95% COMPACTION). SEE SECTION 701
- E. CONCRETE COLLAR PER STANDARD DRAWING 2461.
f'c = 4000 psi
- F. TOP OF CONCRETE COLLAR SHALL BE STAMPED WITH LINE SIZE AND FLOW DIRECTION ARROWS. MINIMUM LETTER SIZE SHALL BE 3" IN HEIGHT.
- G. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
- H. #4 REBAR, SEE STANDARD DRAWING 2461.



SECTION



PLAN

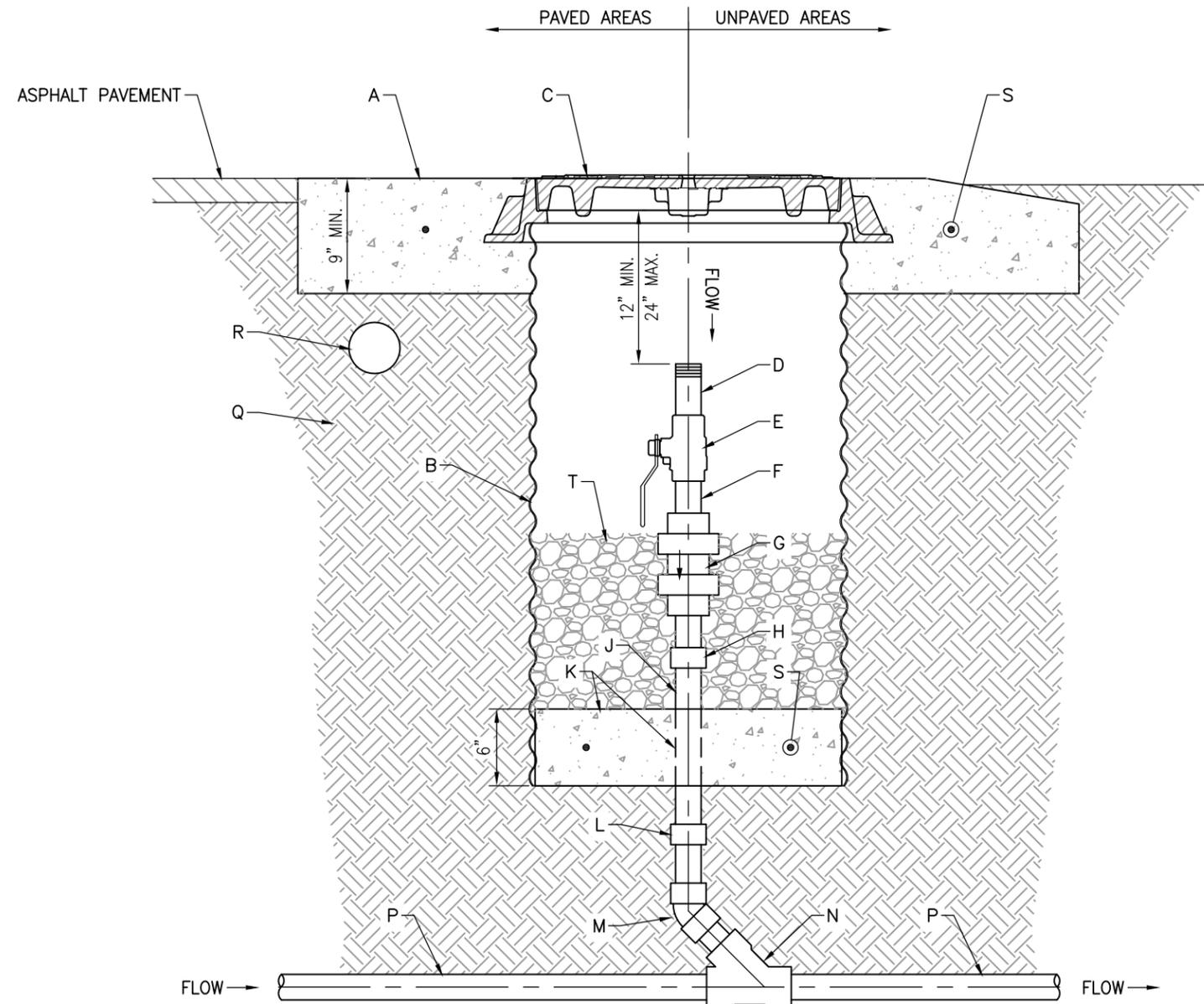
REVISIONS	WATER AUTHORITY
	FORCEMAIN SEWER VALVE BOX
	DWG. 2181
	JAN. 2013

GENERAL NOTES

1. LABEL 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 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. CONCRETE COLLAR PER STANDARD DRAWING 2461 ($f'c=4000$ psi). INSCRIBE 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 SLOPE 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 2109.
- D. VACTOR 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 MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
- 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"Ø PIPE SHOWN)

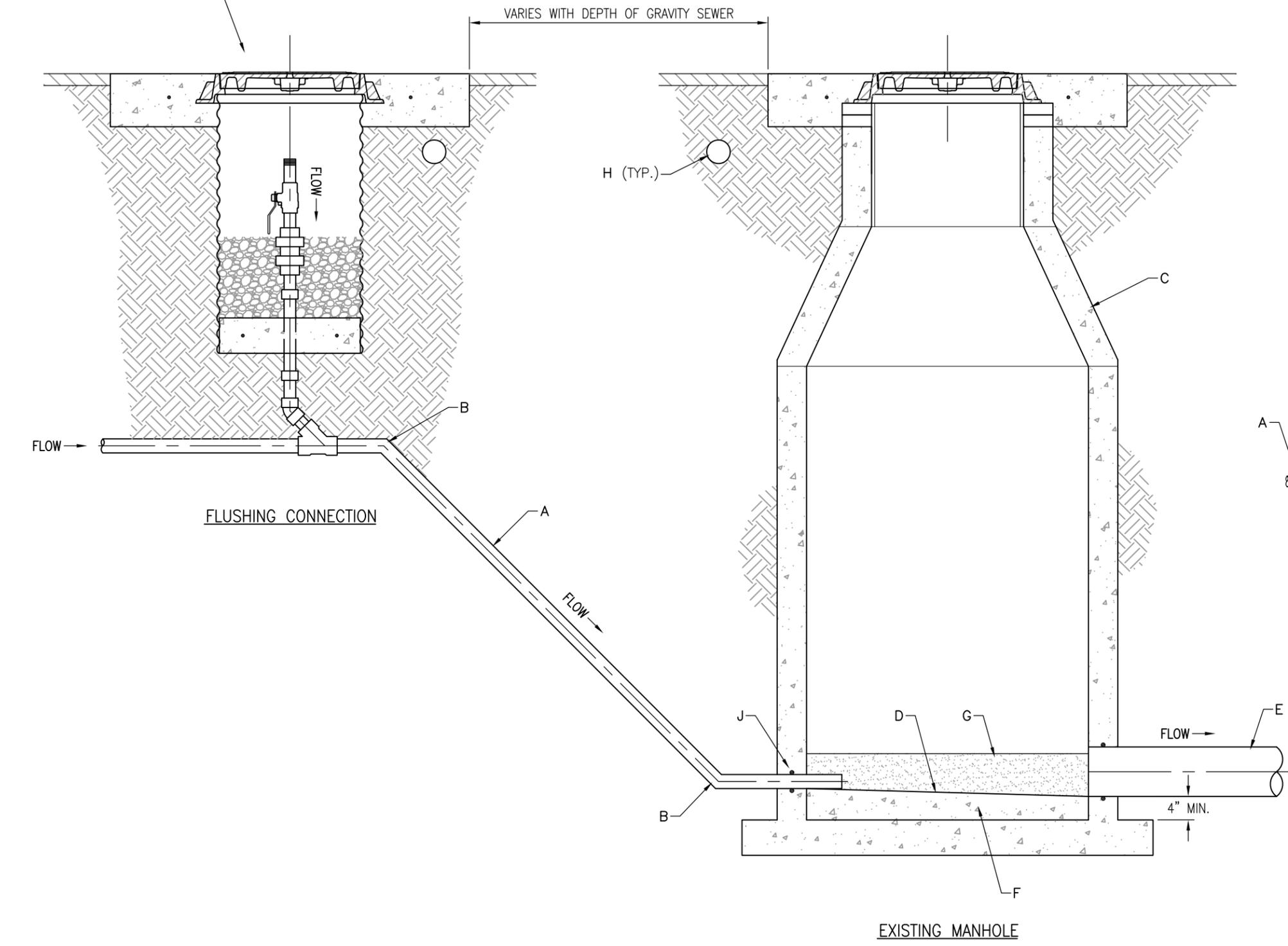
FLUSHING CONNECTION
SECTION

REVISIONS	WATER AUTHORITY
	FORCEMAIN SEWER LOW PRESSURE SANITARY SEWER (LPSAS) FLUSHING CONNECTION DWG. 2182
	JAN. 2013

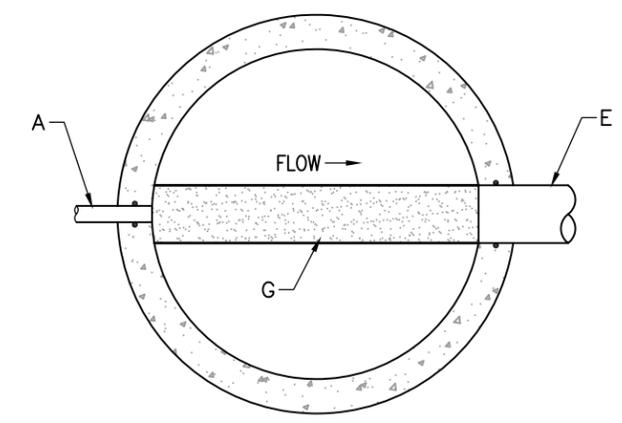
CONSTRUCTION NOTES

- A. PVC LOW PRESSURE SANITARY SEWER MAIN (LPSAS) SCHEDULE 40 NOT ALLOWED.
- B. 45° BEND
- C. EXISTING MANHOLE, TYPE "E" SHOWN.
- D. 0.10 FT. DROP ACROSS MANHOLE MIN.
- E. 8" GRAVITY SEWER
- F. CONCRETE, SEE SECTION 101
- G. FORMED GROUT CHANNEL
- H. ELECTRONIC MARKER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170. DEPTH PLACEMENT PER MANUFACTURER'S RECOMMENDATIONS.
- J. APPROVED WATERSTOP TO BE COMPATIBLE WITH TYPE OF PIPE

FLUSHING CONNECTION
SEE STANDARD DRAWING 2182



SECTION



GROUT CHANNEL
PLAN

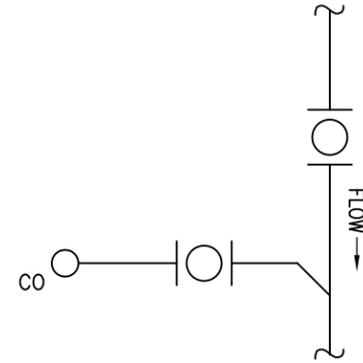
REVISIONS	WATER AUTHORITY
	<p>FORCEMAIN SEWER CONNECTION TO GRAVITY SEWER AT MANHOLE</p> <p>DWG. 2183 JAN. 2013</p>

LEGEND

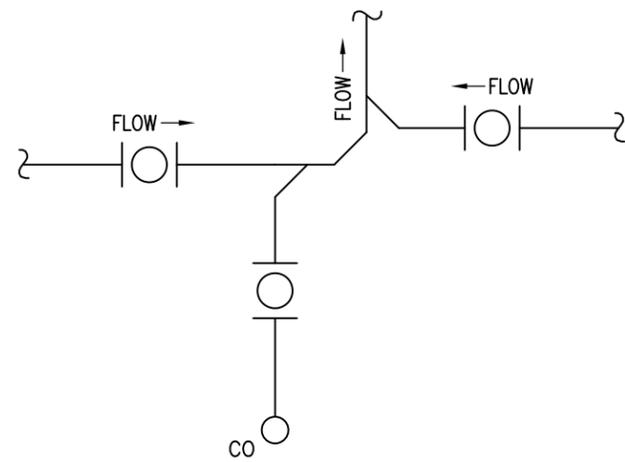
- 2" PVC PIPE
- |○|— BALL VALVE
- co ○ — CLEANOUT
- |/|— CHECK VALVE



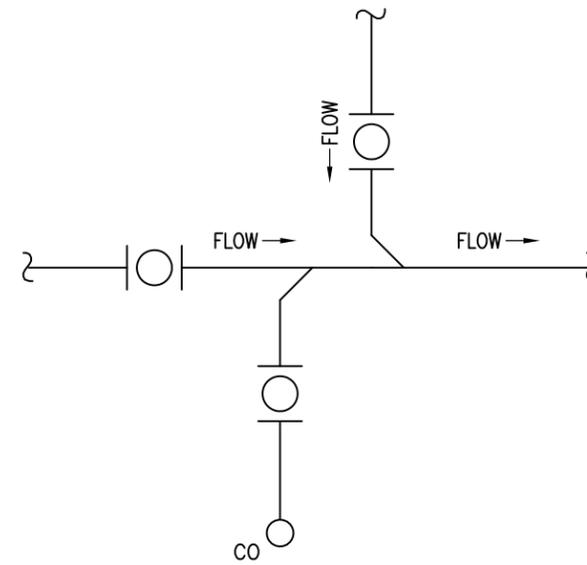
TERMINAL CLEANOUT



INLINE CLEANOUT (TYPE B)



JUNCTION CLEANOUT (TYPE C)



JUNCTION CLEANOUT (TYPE D)

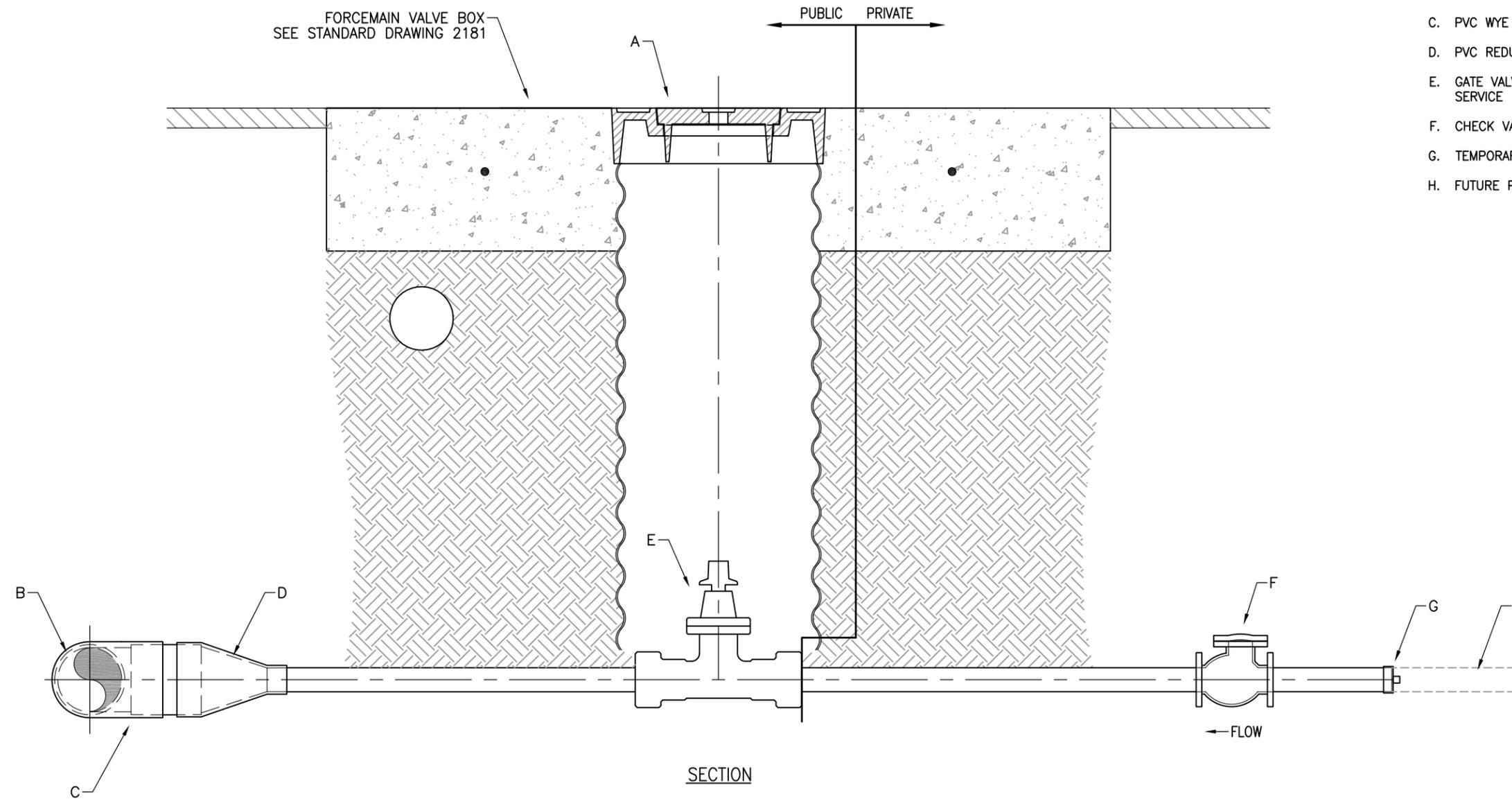
REVISIONS	WATER AUTHORITY
	FORCEMAIN SEWER TYPICAL FORCEMAIN CONFIGURATION
	DWG. 2184 JAN. 2013

GENERAL NOTE

- SAS SERVICE LINES SHALL BE CONSTRUCTED USING SCHEDULE 80 PVC PIPE.

CONSTRUCTION NOTES

- SANITARY SEWER RING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2128.
- PVC LOW PRESSURE SANITARY SEWER MAIN (LPSAS)
- PVC WYE
- PVC REDUCER (AS REQUIRED)
- GATE VALVE WITH PENTAGONAL OPERATING NUT. SIZE PER SERVICE
- CHECK VALVE, SIZE PER SERVICE
- TEMPORARY CAP
- FUTURE PVC LINE FROM OWNER FURNISHED GRINDER PUMP

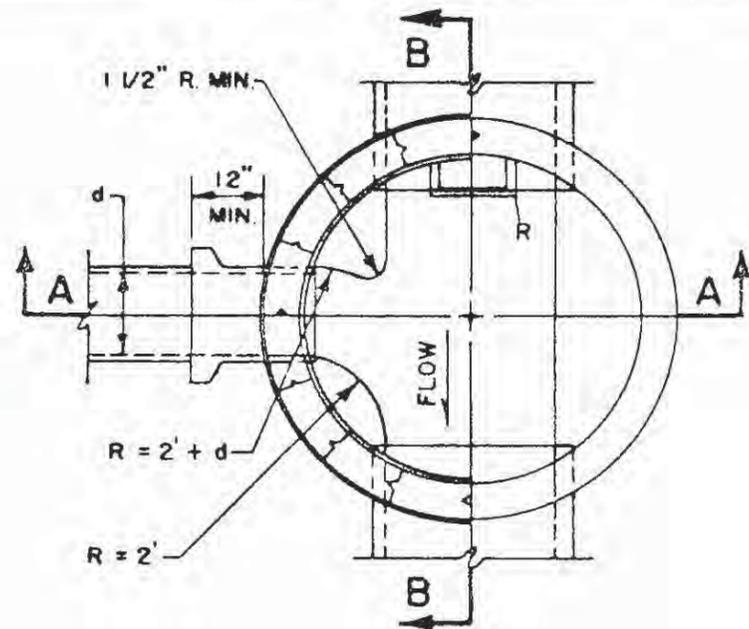


REVISIONS	WATER AUTHORITY
	<p>FORCEMAIN SEWER SERVICE LINE VALVE DETAIL</p>
	<p>DWG. 2185 JAN. 2013</p>

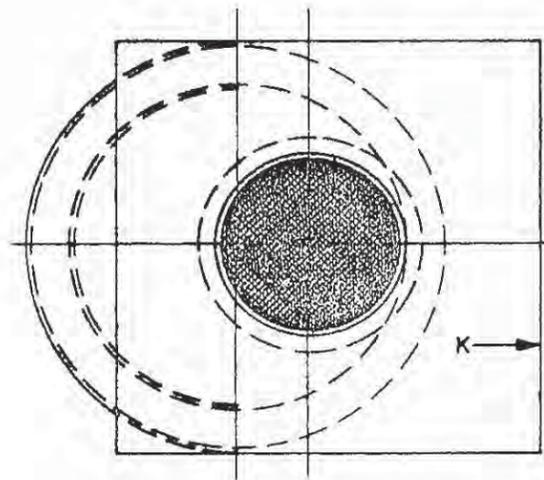
SECTION 2200

STANDARD DETAILS FOR DRAINAGE

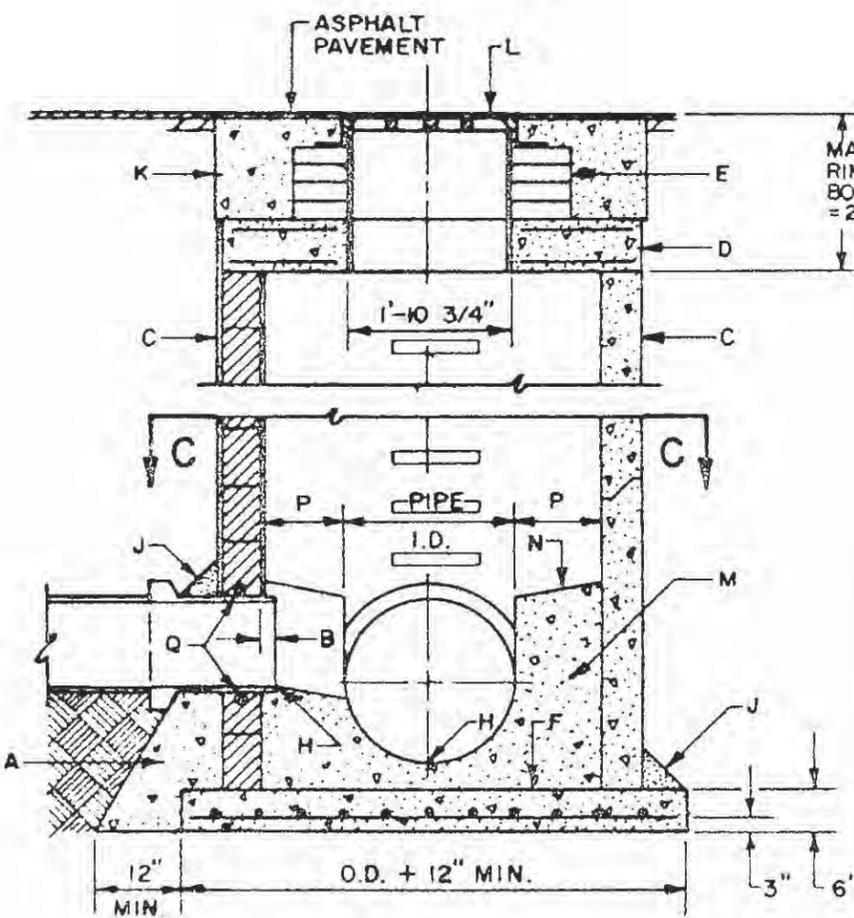
<i>DWG. NO.</i>	<i>TITLE</i>
2201	DRAINAGE STORM INLET TYPE "A" PLAN AND SECTION A-A
2202	DRAINAGE STORM INLET TYPE "A" SECTIONS B-B, C-C, D-D, AND E-E
2203	DRAINAGE STORM INLET TYPE "B"
2205	DRAINAGE STORM INLET DOUBLE "C"
2206	DRAINAGE STORM INLET DOUBLE "D"
2207	DRAINAGE STORM INLET GUTTER TRANSITION
2208	STORM MANHOLE TYPE "C"
2209	STORM MANHOLE TYPE "E"
2210	STORM MANHOLE FRAME AND COVERS
2211	STORM MANHOLE COVER ADJUSTMENT RING
2212	STORM CONCRETE MANHOLE COVER TYPE "C"
2213	STORM VERTICAL DROP AT MANHOLE
2215	DRAINAGE STORM INLET CENTER SUPPORT ASSEMBLY
2216	DRAINAGE STORM INLET FRAME
2220	DRAINAGE STORM INLET ALBUQUERQUE GRATE
2221	DRAINAGE STORM INLET ALTERNATE GRATE
2225	DRAINAGE SLOTTED DRAIN
2229	DRAINAGE STEP DETAILS
2235	DRAINAGE DRAIN LINE THROUGH CURB
2236	DRAINAGE SIDEWALK CULVERT WITH STEEL PLATE TOP
2237	DRAINAGE DRAIN LINE CONNECTION TO EXISTING STORM INLET
2250	DRAINAGE STATIONARY AND REMOVABLE POST DETAILS
2251	DRAINAGE PIPE GATE DETAIL
2252	DRAINAGE STANDARD CHAIN LINK GATE AND FENCE DETAIL
2253	DRAINAGE SQUARE TUBE GATE DETAIL
2260	DRAINAGE TYPICAL LINING FOR DRAINAGE EASEMENTS
2261	DRAINAGE CHANNEL DETAILS
2265	DRAINAGE CHANNEL EXPANSION JOINT WITH SLEEPER
2266	DRAINAGE EXPANSION JOINT CONNECTION TO CONCRETE WALL
2267	DRAINAGE CHANNEL EXPANSION JOINT REPAIR
2268	DRAINAGE SLEEP JOINT PROTECTION PLATE
2270	DRAINAGE WIRE ENCLOSED RIPRAP
2271	DRAINAGE CATTLE GUARD INLET
2272	DRAINAGE CATTLE GUARD INLET
2273	DRAINAGE MEDIAN STORM INLET
2274	DRAINAGE STATIONING AND WATER DEPTH MARKS IN CONCRETE LINED CHANNEL



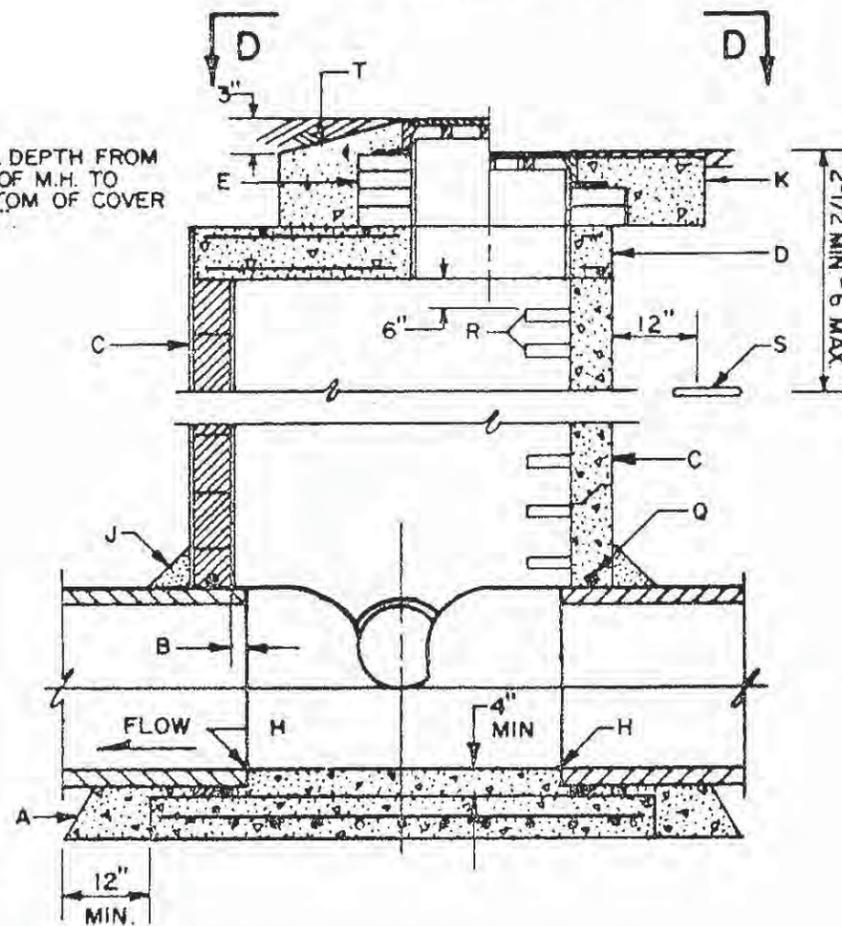
PLAN AT C-C



PLAN AT D-D



CROSS SECTION A-A



CROSS SECTION B-B

GENERAL NOTES

1. USE TYPE "C" MANHOLE FOR DEPTHS OF LESS THAN 6' MEASURED FROM INVERT TO RIM.
2. CONTRACTOR HAS OPTION TO CONSTRUCT TYPE "C" MANHOLE IN LIEU OF TYPE "E" MANHOLE FOR DEPTHS OF 6' OR MORE.
3. DESIGN APPLIES TO 4' TO 6' I.D. MANHOLES.
4. MANHOLE GREATER THAN 18' IN DEPTH SHALL ONLY BE CONSTRUCTION PRECAST CONCRETE SECTIONS.
5. USE NON-SHRINK GROUT FOR JOINTS, FILLETS AND PENETRATIONS.
6. COMPACT ALL BACKFILL AROUND MANHOLE TO 95%.
7. POSITION MANHOLE OPENING OVER THE UPSTREAM SIDE OF MAIN LINE.

CONSTRUCTION NOTES

- A. CONCRETE PIPE SUPPORTS SHALL EXTEND OUTSIDE OF MANHOLE TO BELL OF FIRST JOINT AND SHALL CRADLE PIPE TO SPRING LINE NOT APPLICABLE FLEXIBLE PIPE.
- B. PIPE PENETRATION INTO MANHOLE SHALL BE FLUSH TO 2" MAX., MEASURED AT SPRINGLINE OF PIPE.
- C. MANHOLE MAY BE CONSTRUCTED OF CONCRETE BLOCK, GR. MS BRICK, POURED CONCRETE OR PRECAST REINFORCED CONCRETE IF BLOCK OR BRICK PLASTER INSIDE AND OUT WITH 1/2" MORTAR. SEE DWG. 2118 FOR DETAILS.
- D. PRECAST CONCRETE COVER, SEE DWG. 2107.
- E. USE MAX., 4 COURSES GR. MS BRICK ON UNPAVED STREET FOR FUTURE ADJUSTMENT OF MANHOLE FRAME TO PAVEMENT GRADE PLASTER INSIDE WITH 1/2" MORTAR.
- F. CONCRETE BASE TO BE POURED IN PLACE USING NO. 4 BARS AT 6" O.C. EA. WAY FOR MANHOLE DEPTH OF 16' OR GREATER. NO. 4 BARS AT 12" O.C. EA. WAY FOR MANHOLE LESS THAN 16' IN DEPTH.
- H. INVERT ELEVATION OF STUB OR LATERAL AS SHOWN ON PLANS.
- J. 6" GROUT FILLET ON UPPER HALF OF PIPE AND AROUND BASE.
- K. USE A 5' X 5' CONCRETE PAD IN ALL AREAS.
- L. FRAME AND COVER, SEE DWG. 2110.
- M. CONCRETE, SEE SECTION 101.
- N. SLOPE 1" PER FT. FROM PIPE CROWN.
- P. SHELF TO BE 9" WIDE MIN.
- Q. APPROVED WATERSTOP TO BE COMPATIBLE WITH TYPE OF PIPE.
- R. STEPS TO BE INSTALLED AS PER SPEC. SECTION 920.
- S. EMD (IN UNPAVED AREAS).
- T. IN UNPAVED AREAS SET FRAME TO GRADE AND SLOPE TOP OF PAD.

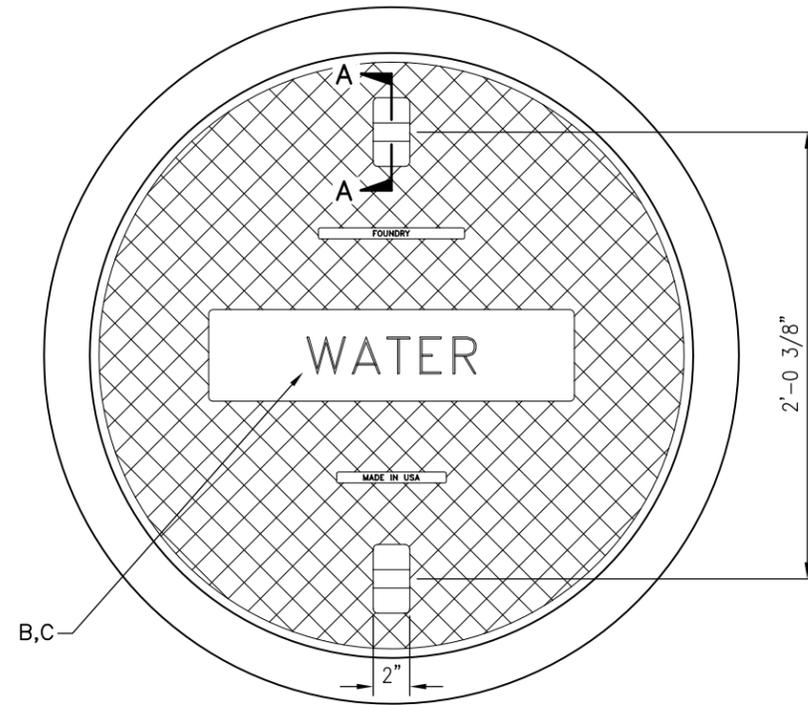
REVISIONS
11-14-91

CITY OF ALBUQUERQUE

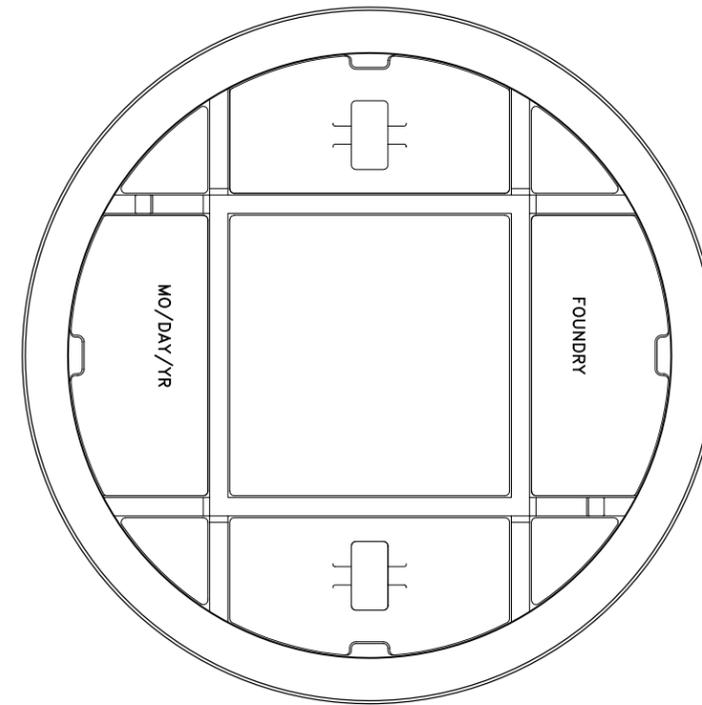
**STORM
MANHOLE TYPE "C"**

DWG. 2208

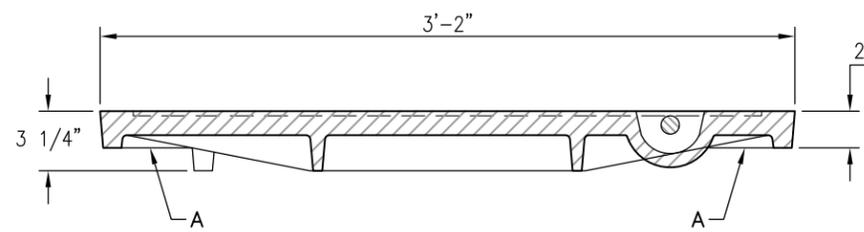
AUG. 1986



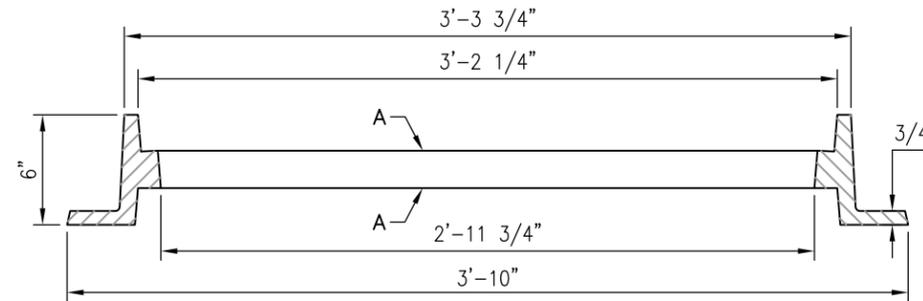
36" MANHOLE COVER
PLAN VIEW



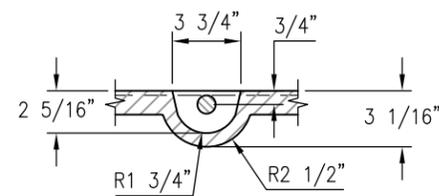
36" MANHOLE COVER
BOTTOM VIEW



36" MANHOLE COVER
CROSS SECTION



36" MANHOLE FRAME
CROSS SECTION



SECTION A-A

GENERAL NOTES

1. STANDARD 36" CAST IRON M.H. FRAME AND COVER.
WEIGHTS: COVER = 355 LBS., FRAME = 315 LBS.
TOTAL = 670 LBS. (TOLERANCE = ±5%)
2. REFERENCE SPEC. SECTION 130.
3. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE

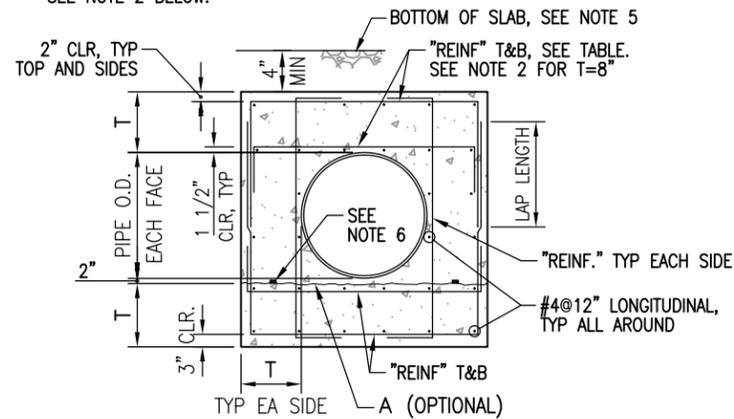
CONSTRUCTION NOTES

- A. MACHINED OR GROUND BEARING SURFACES.
- B. "WATER" CAST ON COVER TO IDENTIFY WATERLINE.
- C. 2" LETTERS (RECESSED FLUSH).

REVISIONS	WATER AUTHORITY
	WATER MANHOLE FRAME AND COVER
	DWG. 2310 JAN. 2013

PIPE DIA (IN.)	PIPE ENCASEMENT TABLE							
	H=10 FEET		H=20 FEET		H=30 FEET		H=40 FEET	
	T (in)	REINF	T (in)	REINF	T (in)	REINF	T (in)	REINF
20 THRU 30	8	#5@12"	10	#5@12"	10	#5@12"	10	#6@12"
36 THRU 42	10	#5@12"	10	#6@12"	10	#7@12"	10	#6@6"
48 THRU 54	10	#6@12"	10	#7@12"	10	#7@6"	12	#7@6"
UP TO 60	10	#6@12"	10	#6@6"	14	#7@6"	14	#7@6"

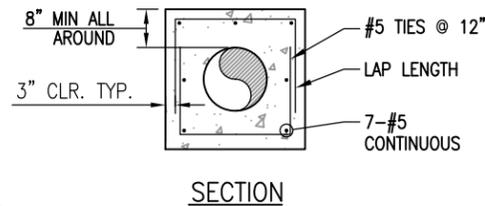
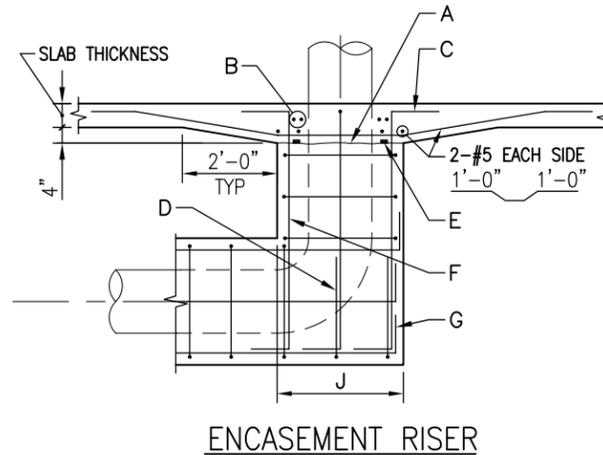
DARK LINE INDICATES BREAK BETWEEN ONE LAYER OF REINFORCING AND TWO. SEE NOTE 2 BELOW.



NOTES:

1. THIS DETAIL APPLIES TO PIPE DIAMETERS OF 20" THROUGH 60". FOR $\leq 18" \phi$, SEE DETAIL 2.
2. FOR T=8" REINFORCING SHALL BE ONE LAYER AND CENTERED IN SLABS OR WALLS, SEE DETAIL 2.
3. FOR ENCASEMENT AT PIPE RISER, SEE DETAIL 2.
4. "H" IS FILL HEIGHT OR WATER DEPTH OR COMBINATION ABOVE PIPE.
5. WHEN PIPE ENCASEMENT CLOSER THAN 4" TO SLAB ABOVE, TIE SLAB & ENCASEMENT TOGETHER. SEE DETAIL 3.
6. HYDROPHILIC WATERSTOP CONTINUOUS ALL AROUND IN ALL CONSTRUCTION JOINTS.
7. EXTEND PIPE ENCASEMENT BEYOND STRUCTURE PER DETAIL 4.

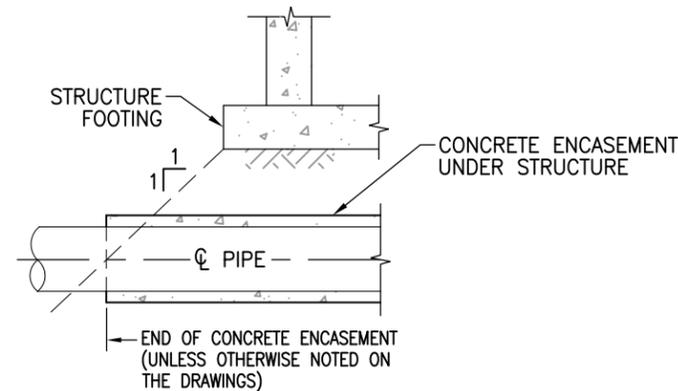
DETAIL 1
PIPE ENCASEMENT (20"φ-60"φ)



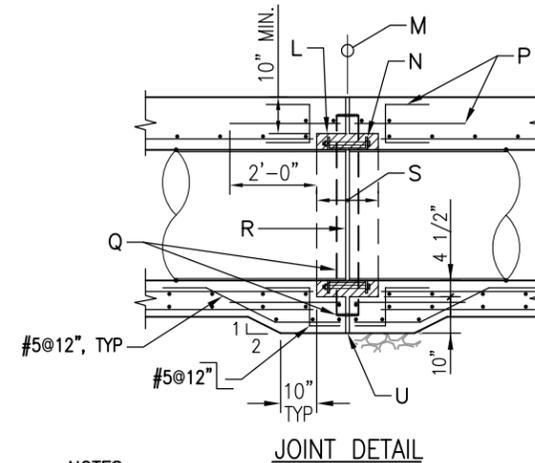
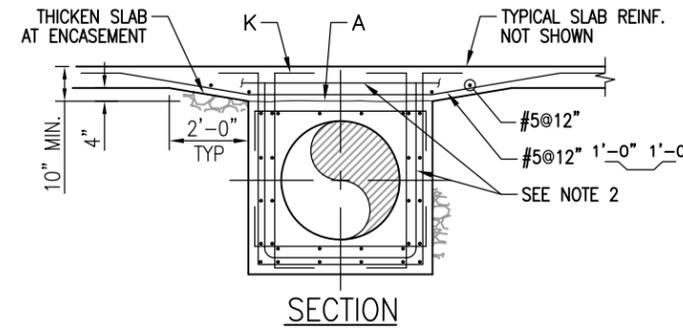
NOTES:

1. SECTION APPLIES TO PIPES $\leq 18" \phi$. FOR $\geq 20" \phi$, SEE DETAIL 1.
2. WHEN PIPE ENCASEMENT IS CLOSER THAN 4" TO SLAB ABOVE, TIE SLAB AND ENCASEMENT TOGETHER. SEE DETAIL 3.
3. EXTEND PIPE ENCASEMENT BEYOND STRUCTURE PER DETAIL 4.

DETAIL 2
PIPE ENCASEMENT ($\leq 18" \phi$)



DETAIL 4
END OF PIPE ENCASEMENT UNDER STRUCTURES



NOTES:

1. TIE PIPE ENCASEMENT TO SLAB AS SHOWN WHEN DISTANCE BETWEEN PIPE ENCASEMENT AND BOTTOM OF SLAB IS LESS THAN 4".
2. 6" PLASTIC WS IN ENCASEMENT JOINTS. WELD TO WS IN SLAB JOINTS.
3. EXTEND PIPE ENCASEMENT BEYOND STRUCTURE PER DETAIL 4.

DETAIL 3
PIPE ENCASEMENT AT SLAB

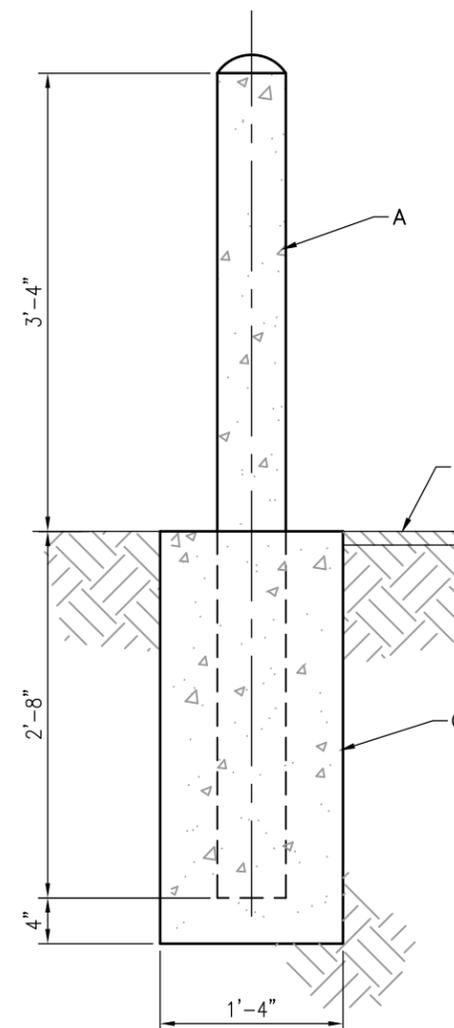
CONSTRUCTION NOTES

- A. CONSTRUCTION JOINT
- B. TYPICAL OPENING REINF. AROUND PIPE
- C. EXTEND ENCASEMENT VERTS. AND BEND 1'-0" INTO TOP OF SLAB
- D. BOTTOM "U" SECTION OF TIES CONT. TO END OF ENCASEMENT
- E. HYDROPHILIC WATERSTOP CONTINUOUS ALL AROUND IN ALL CONSTRUCTION JOINTS.
- F. TYPICAL PIPE ENCASEMENT REINF.
- G. BEND & LAP PIPE ENCASEMENT REINF. 1'-0", TYP
- J. PROVIDE LEVEL BEARING AREA BELOW VERT. PIPE RISER EQUAL TO ENCASEMENT GROSS END AREA
- K. PIPE ENCASEMENT REINF. SEE DETAILS 1 AND 2. EXTEND VERTS. AND BEND 1'-0" INTO TOP OF SLAB ABOVE.
- L. CLOSED CELLULAR SPONGE RUBBER ALL AROUND COUPLING TO ALLOW JT MOVEMENT (1" MIN)
- M. CL SLAB EXP, CONTRACTION OR CONTROL JT, SEE PLANS FOR LOCATION & JT TYPE
- N. LOCATE PIPE FLEX COUPLING (WITHOUT THRUST TIES) AT ALL SLAB EXPANSION & CONTROL JOINTS
- P. #5@12" TYPICAL ENCASEMENT REINF. DISCONTINUOUS AT JOINT
- Q. 6" PLASTIC WATERSTOP IN ENCASEMENT JOINT. WELD TO WATERSTOP IN SLAB JOINT FOR CONTINUOUS SEAL
- R. PIPE JOINT CENTERED ON SLAB JOINT
- S. COUPLING LENGTH +6"
- U. ENCASEMENT JOINT TYPE SAME AS SLAB JOINT, SEE SLAB JOINT DETAILS

REVISIONS	WATER AUTHORITY
	WATER CONCRETE ENCASEMENT DETAILS
	DWG. 2321
	JAN. 2013

CONSTRUCTION NOTES

- A. 6"Ø 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. PAVEMENT, OR FINISHED GRADE.
- C. 16"Ø CONCRETE FOOTING, 3000 PSI AT 28 DAYS, WITH SMOOTH OR BROOM FINISH WHEN ADJACENT TO PAVEMENT.



SECTION

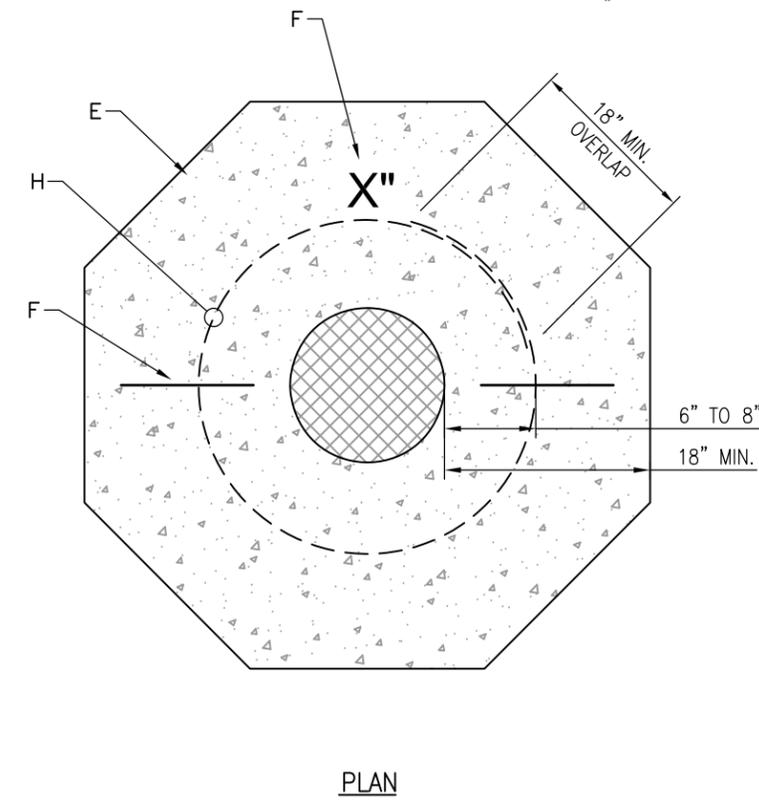
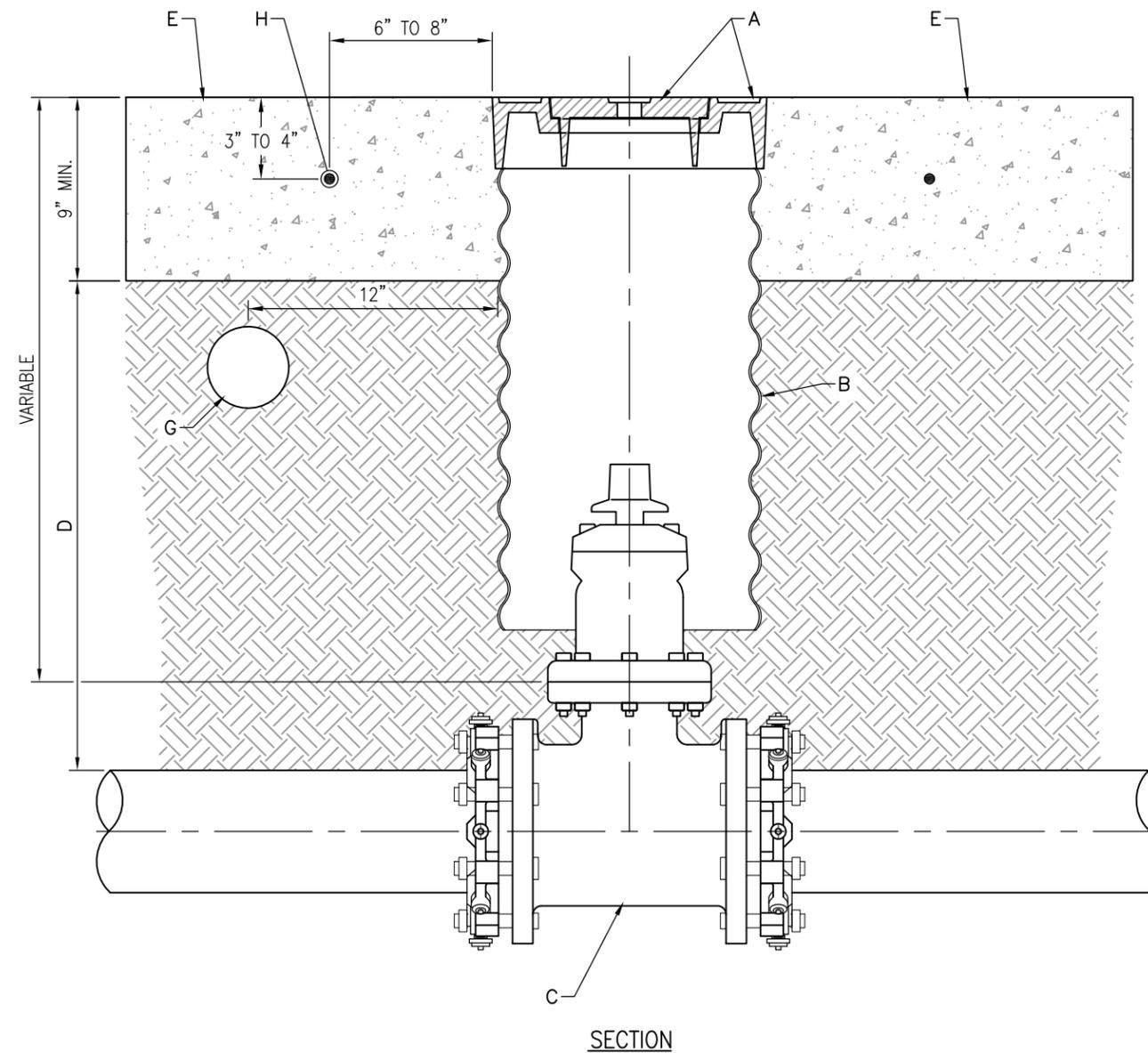
REVISIONS	WATER AUTHORITY
	WATER STATIONARY POST DETAIL
	DWG. 2322 JAN. 2013

GENERAL NOTES

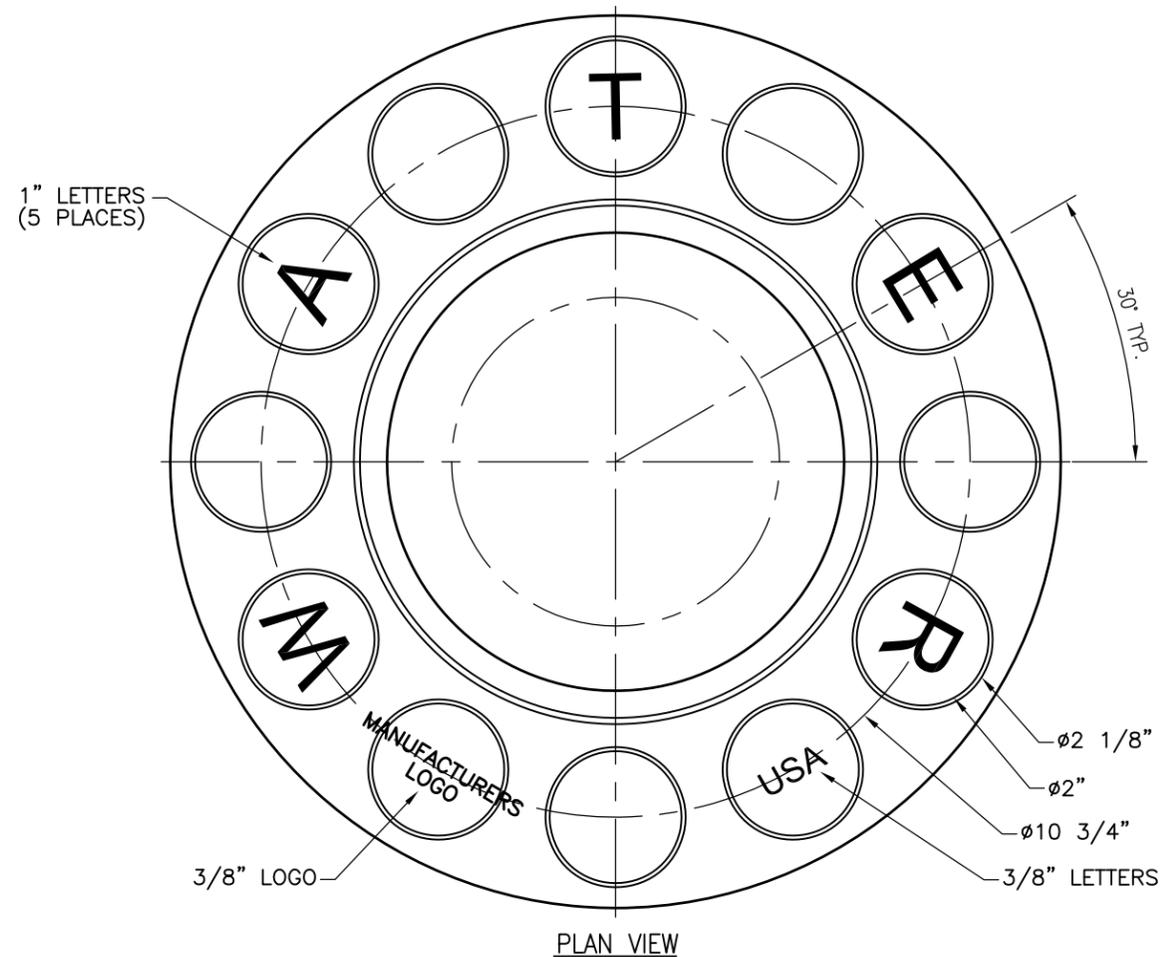
1. LABEL REQUIREMENTS: BEFORE THE WORK WILL BE ACCEPTED, WATER VALVE GPS COORDINATES SHALL BE PROVIDED ON THE RECORD DRAWINGS. GPS COORDINATES OBTAINED BY A PROFESSIONAL SURVEYOR LICENSED IN THE STATE OF NEW MEXICO SHALL BE TAKEN AT THE VALVE OPERATING NUT. USE THE NAD 1983 NM STATE PLANE CENTRAL ZONE FOR X AND Y COORDINATES AND NAVD 1988 FOR Z COORDINATE.

CONSTRUCTION NOTES

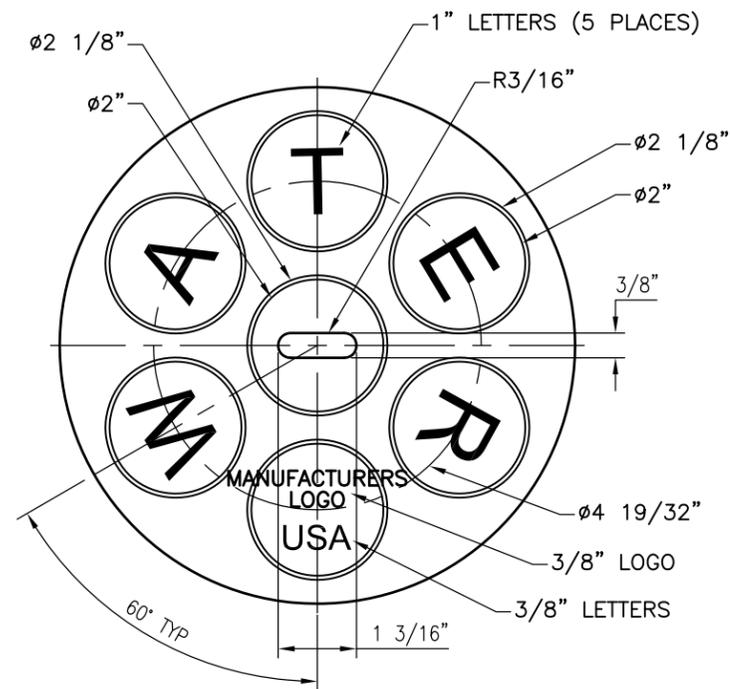
- A. RING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2328. INSTALL FIRE LINE RING AND COVER ON FIRE LINES PER STANDARD DRAWING 2329, AND NON-POTABLE RING AND COVER ON NON-POTABLE LINES PER DRAWING 2330.
- B. 12" DIAMETER POLYMER COATED STEEL PIPE CMP
- C. NEW OR EXISTING VALVE
- D. COMPACTED BACKFILL. SOIL OR BASE COURSE MATERIAL (95% COMPACTION). SEE SECTION 701
- E. CONCRETE COLLAR PER STANDARD DRAWING 2461.
 $f'_c = 4000$ psi
- F. TOP OF CONCRETE COLLAR SHALL BE STAMPED WITH WATERLINE SIZE AND DIRECTION. MINIMUM LETTER SIZE SHALL BE 3" IN HEIGHT. ADD THE LETTERS "NPW" FOR NON-POTABLE WATER VALVE INSTALLATIONS.
- G. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
- H. #4 REBAR PER STANDARD DRAWING 2461.



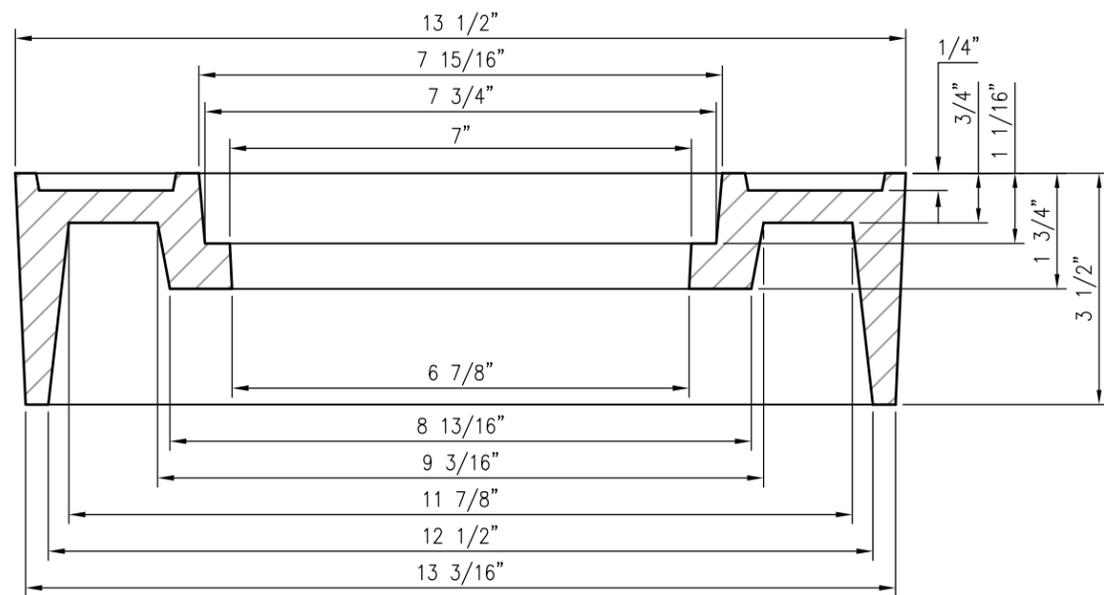
REVISIONS	WATER AUTHORITY
JAN. 2015	WATER VALVE BOX
	DWG. 2326
	JAN. 2013



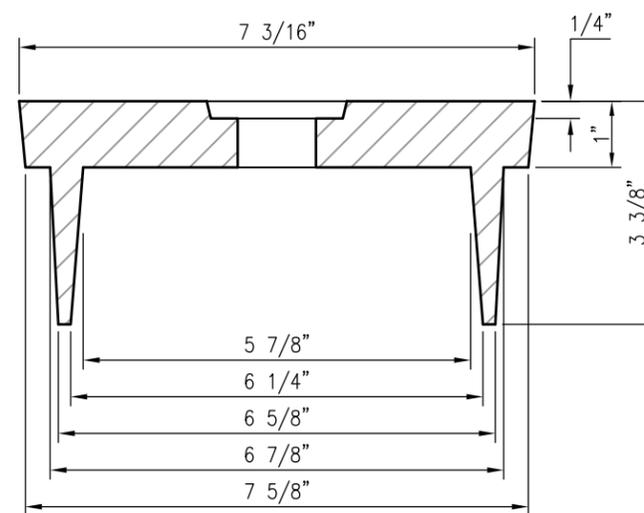
PLAN VIEW



PLAN VIEW



SECTION
VALVE BOX RING



SECTION
VALVE BOX COVER

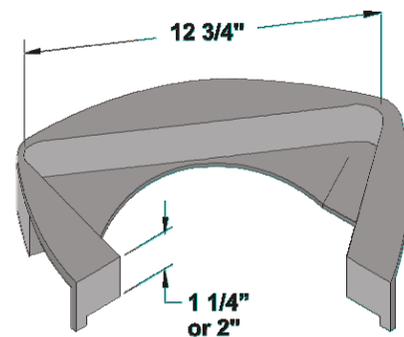
GENERAL NOTES — RING

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"R UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH: REMOVE EXCESS IRON AND FINIS.
6. THIS DETAIL DOES NOT APPLY FOR VALVE BOX RING AND COVER TO BE USED ON REUSE OR NON-POTABLE WATER SYSTEMS.
7. SEE STANDARD DRAWING 2329 FOR FIRE LINE RING AND COVER.
8. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

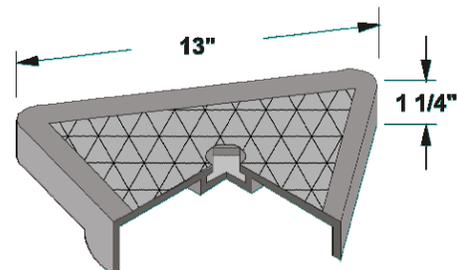
GENERAL NOTES — COVER

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"R UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH: REMOVE EXCESS IRON AND FINIS.
6. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

REVISIONS	WATER AUTHORITY
	WATER RING AND COVER FOR VALVE BOX
	DWG. 2328 JAN. 2013



RISER RING



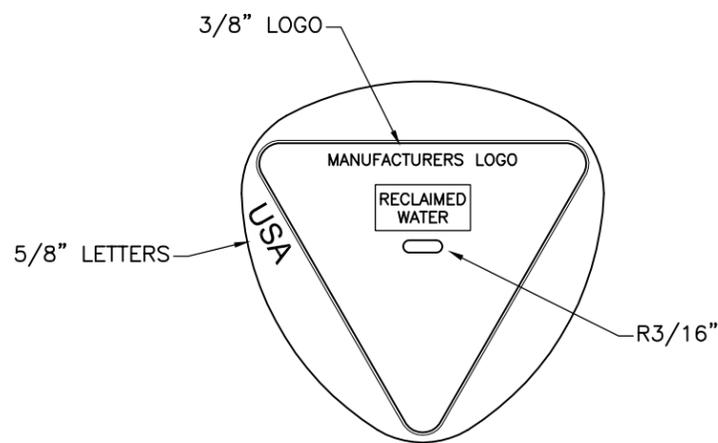
COVER

GENERAL NOTES – RING

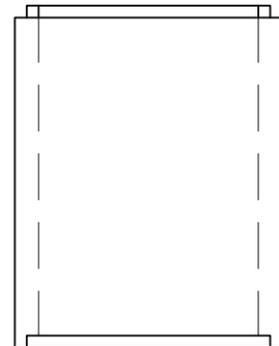
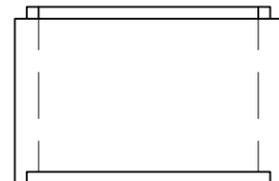
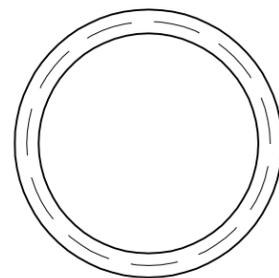
1. VALVE BOX RING DESIGNED TO ACCEPT A VALVE BOX COVER.
2. THE CASTING NUMBER, MANUFACTURER'S LOGO, DATE OF MANUFACTURE AND "USA" SHALL BE CAST IN A CONSPICUOUS LOCATION ON BOTH THE RING AND THE COVER.
3. FILLETS SHALL BE 1/4"R UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH: REMOVE EXCESS IRON AND FINIS.
6. THIS DETAIL DOES NOT APPLY FOR VALVE BOX RING AND COVER TO BE USED ON POTABLE WATER SYSTEMS.
7. SEE STANDARD DRAWING 2328 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"R UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH: REMOVE EXCESS IRON AND FINIS.
6. ONLY PRODUCTS CAST IN THE USA AND ON THE WATER AUTHORITY APPROVED PRODUCTS LIST WILL BE ACCEPTABLE.



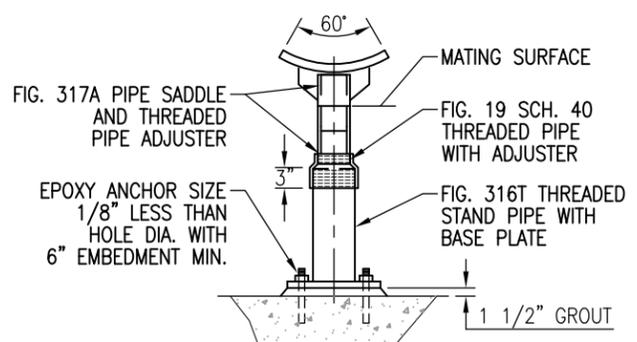
RING AND COVER ASSEMBLY



CONCRETE EXTENSION

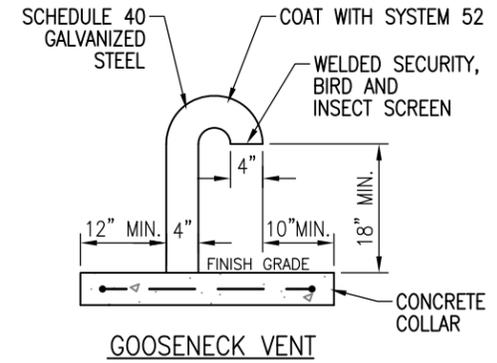
REULEAUX TRIANGLE

REVISIONS	WATER AUTHORITY
	<p>NON-POTABLE WATER RING AND COVER FOR VALVE BOX</p> <p>DWG. 2330 JAN. 2015</p>



NOTE:
ALL COMPONENTS BY TOLCO OR ENGINEER APPROVED EQUAL. GALVANIZE AFTER FABRICATION. DESIGN TO MATCH PIPE OR VALVE DIAMETER. PROVIDE SHOP DRAWINGS SPECIFIC TO EACH VALVE AND PIPE SIZE.

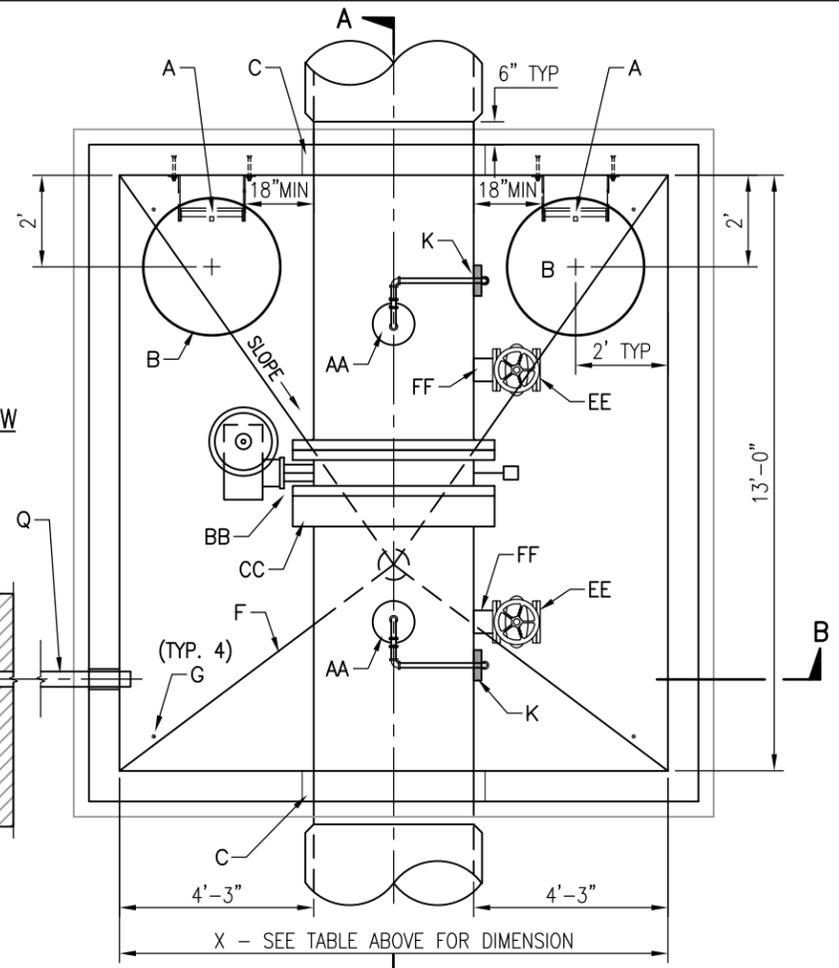
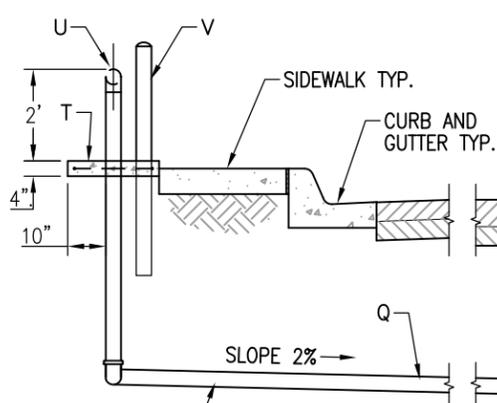
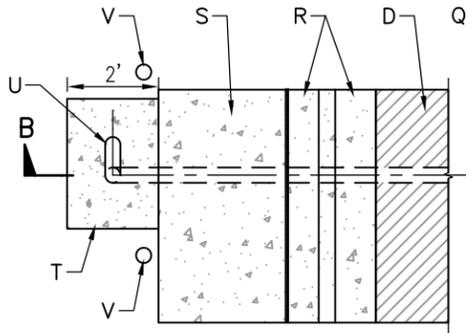
PIPE SUPPORT



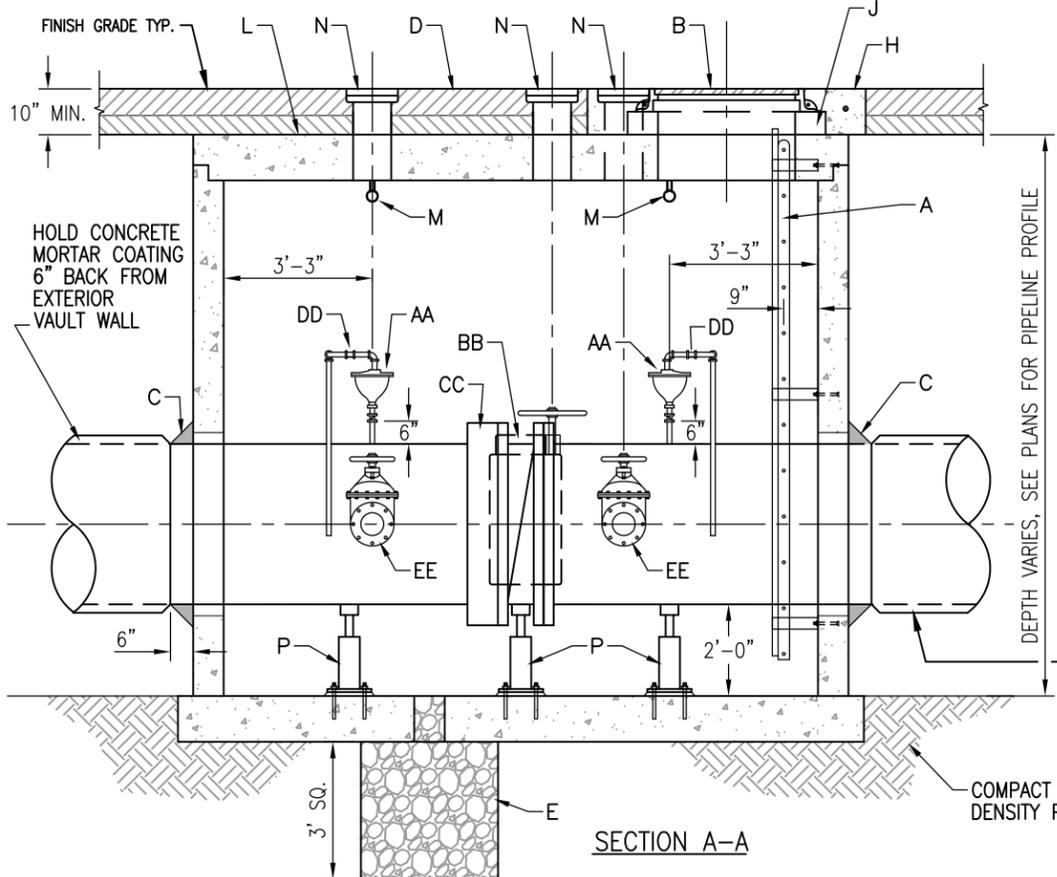
GOOSENECK VENT

Ø	X
24"	10'-6"
30"	11'-0"
36"	11'-6"
42"	12'-0"
48"	12'-6"

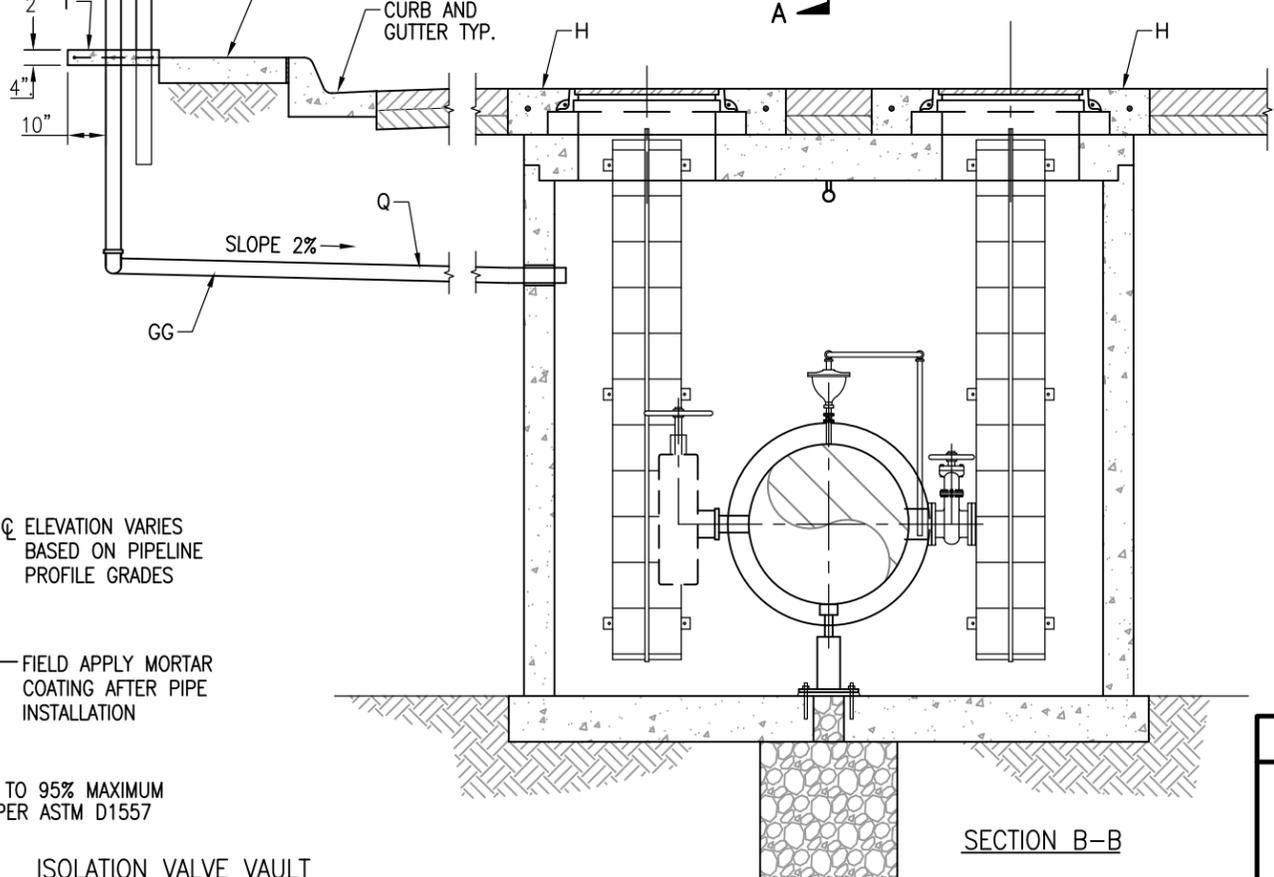
PLAN VIEW



PRECAST VAULT DESIGN CRITERIA	
MATERIAL:	
STRUCTURAL CONCRETE	$f'_c = 4000$ psi
REINFORCING SHALL BE	ASTM 615 GRADE 60
CONCRETE SHALL MEET	SPECIFICATION SEC. 512 AND SEC. 101
LOADING:	
VAULT LID =	HS25 LIVE LOAD PLUS 1.3 IMPACT PLUS DEAD LOADS
VAULT WALLS EQUIVALENT FLUID PRESSURE =	60 psf
SURCHARGE (VEHICLE) =	2 FEET
VAULT BASE SLAB ALLOWABLE BEARING PRESSURE =	1500 psf



SECTION A-A



SECTION B-B

GENERAL NOTES

1. VALVE VAULT SHALL NOT BE USED IN GROUND WATER CONDITIONS OR IN CLAY SOILS.
2. BACKFILL MATERIAL SHALL BE CLASS II OR CLASS III IN ACCORDANCE WITH SPECIFICATION SEC. 501.
3. PIPE DIA. VARIES FROM 24" DIA. TO 48" DIA.
4. HOLD CENTERLINE OF TAP LOCATIONS AND CENTER OF BUTTERFLY VALVE.
5. INTERIOR PIPING SHALL BE STEEL PIPE, DUCTILE IRON PIPE, OR CCP.
6. CONCRETE VAULT SHALL BE PRECAST WITH REMOVABLE CONCRETE LID.
7. LOCATE ACCESS MANHOLE FRAME, ADJUSTMENT RINGS AND COVER ON REMOVABLE CONCRETE LID TO ALLOW LID REMOVAL WITH THESE APPURTENANCES IN PLACE.
8. SUBMIT SHOP DRAWINGS OF VAULT, PIPING, AND AIR AND VACUUM VALVE ASSEMBLY PRIOR TO VAULT FABRICATION AND PIPE INSTALLATION.
9. OWNER WILL SELECT PAINT COLORS FOR PIPING AND APPURTENANCES INSIDE VALVE VAULTS.
10. ENGINEER SHALL SUBMIT A PROJECT SPECIFIC DETAIL AND A FLOOR AND PIPING PLAN.

CONSTRUCTION NOTES

- A. 1'-4" ALUMINUM LADDER. INSTALL LADDER-UP SAFETY POST MODEL LU-4 BY BILCO.
- B. 36" DIAMETER MANHOLE FRAME AND COVER MARKED "WATER" PER STANDARD DRAWING 2110.
- C. LINK SEAL, GROUT PENETRATION AROUND EXTERIOR CIRCUMFERENCE.
- D. REMOVE AND REPLACE PAVEMENT.
- E. 4" DIAMETER DRAIN WITH 3"x3"x3" GRAVEL DRAIN POCKET WITH CLEAN GRAVEL, ASTM C33, NO. 57. LINE DRAIN POCKET WITH GEOTEXTILE FABRIC, CLASS 3.
- F. SLOPE VAULT FLOOR TO DRAIN TYPICAL.
- G. RECESSED LIFTING EYE, 4 REQUIRED. FLUSH W/TOP OF CONCRETE LID.
- H. CONCRETE COLLAR PER STANDARD DRAWING 2461.
- J. ADJUSTMENT RINGS PER STANDARD DRAWINGS 2461 AND 2111.
- K. UNISTRUT PIPE BRACKET TYPICAL FOR COMBINATION AIR VALVE VENT. (2 EACH TYPICAL)
- L. TACK COAT.
- M. 1 1/4" STAINLESS STEEL THREADED EYEBOLT, CENTERED ON COMBINATION AIR VALVE ASSEMBLY. 1300 POUNDS LIFT CAPACITY.
- N. RING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2328.
- P. PIPE SUPPORT, SEE DETAIL THIS SHEET.
- Q. COORDINATE VENT PIPE ORIENTATION DURING SHOP DRAWING SUBMITTAL.
- R. REMOVE AND REPLACE CURB AND GUTTER PER STANDARD DRAWING 2415A.
- S. REMOVE AND REPLACE SIDEWALK PER STANDARD DRAWING 2430.
- T. CONCRETE COLLAR WITH 1-#4 REBAR EACH WAY CENTERED. SEE GOOSENECK VENT DETAIL THIS SHEET.
- U. 4" DIA GOOSENECK VENT. SCHEDULE 40 GALVANIZED STEEL, SEE DETAIL THIS SHEET.
- V. STATIONARY PIPE BOLLARD, SEE STANDARD DRAWING 2250.
- AA. COMBINATION AIR VALVE ASSEMBLY (FL). SIZE PER PLANS. ROUTE AIR RELEASE VENT PIPING AS SHOWN AND SUPPORT WITH UNISTRUT. TERMINATE 3.5' ABOVE FF.
- BB. AWWA C504 BUTTERFLY VALVE (FLxFL) WITH 3" OPERATING NUT AND HANDWHEEL. ORIENT SHAFT HORIZONTAL. VERIFY VALVE ACTUATOR ORIENTATION AND CLEARANCES PRIOR TO PIPE AND VAULT FABRICATION.
- CC. MEGAFLANGE
- DD. UNION TYPICAL, ALL AIR AND VACUUM RELEASE VALVES
- EE. 6" GATE VALVE WITH HANDWHEEL (FLxFL), 2" WELDED OPERATING NUT AND BLIND FLANGE (24" TO 30" PIPING). 8" GATE VALVE WITH HANDWHEEL (FLxFL), 2" WELDED OPERATING NUT AND BLIND FLANGE (36" TO 48" PIPING).
- FF. TAPPING SADDLE OR FLANGED OUTLET
- GG. 4" DIA SCHEDULE 40 GALVANIZED STEEL FOR VAULT VENT. ROUTE TO BACK OF SIDEWALK, SEE SECTION B-B, THIS SHEET.

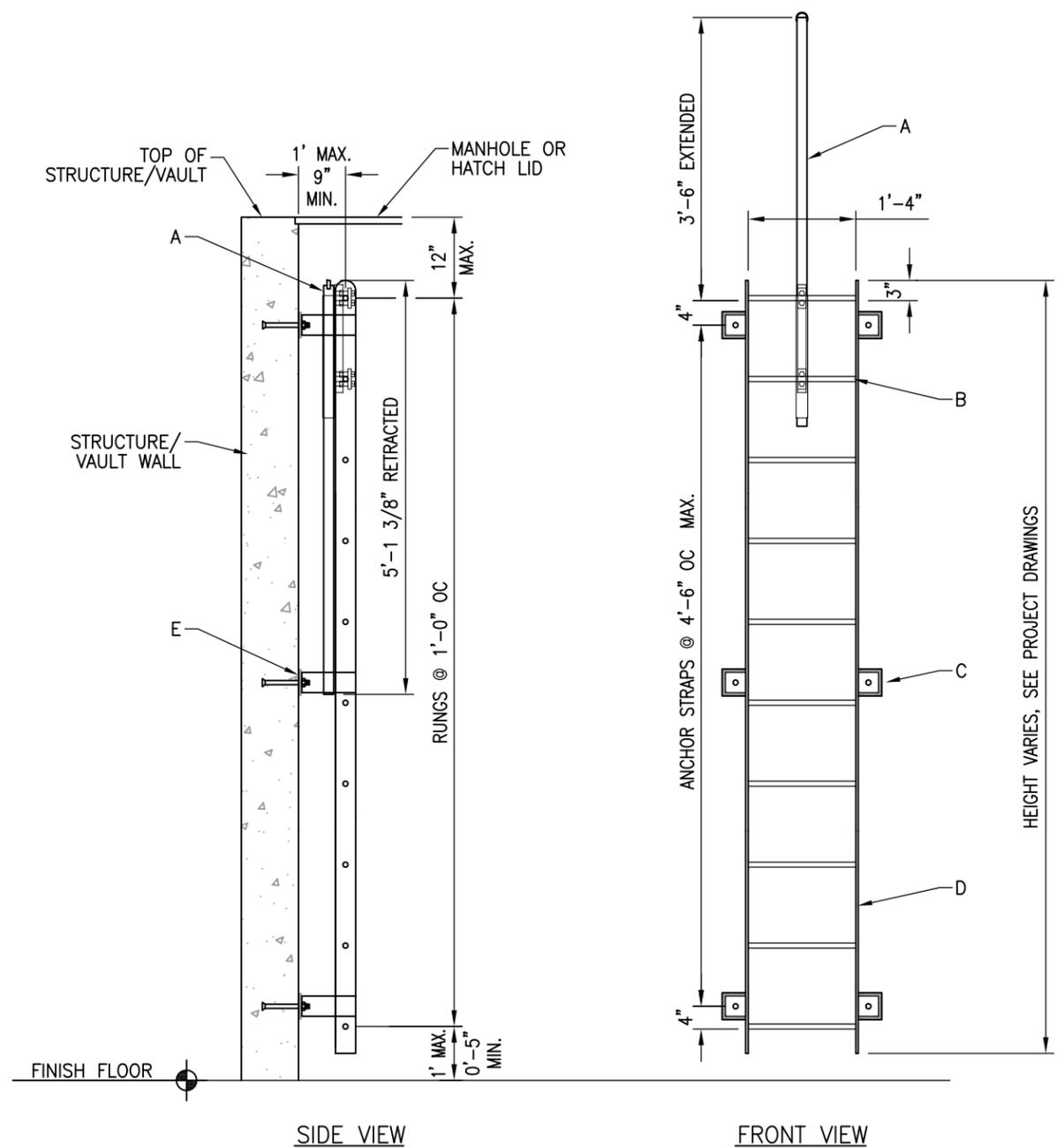
⊕ ELEVATION VARIES BASED ON PIPELINE PROFILE GRADES

FIELD APPLY MORTAR COATING AFTER PIPE INSTALLATION

COMPACT TO 95% MAXIMUM DENSITY PER ASTM D1557

ISOLATION VALVE VAULT

REVISIONS	WATER AUTHORITY
	WATER LARGE DIAMETER ISOLATION VALVE VAULT DWG. 2334 JAN. 2013



LADDER DETAIL

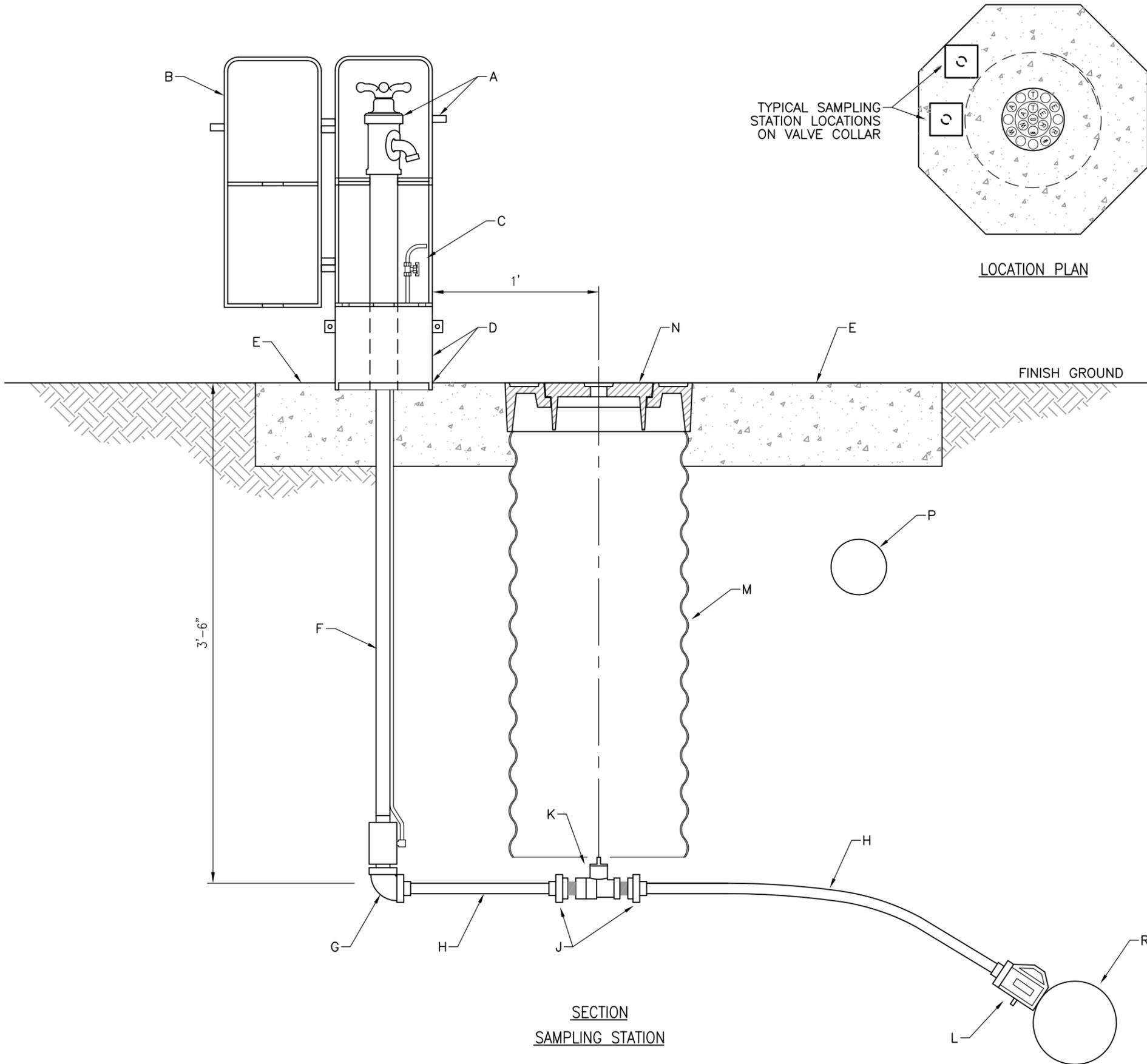
GENERAL NOTES

- LADDER AND SUPPORTS SHALL BE ALUMINUM.
- DIMENSIONS SHOWN ARE MINIMUMS. CONTRACTOR SHALL COORDINATE DESIGN AND DIMENSIONS OF THE LADDER AND SUPPORTS WITH THE MANUFACTURER AND OWNER.
- THE LADDER MANUFACTURER SHALL DESIGN THE LADDER FOR THE SPECIFIC INSTALLATION CONDITIONS SUCH AS DEPTH, TYPE OF VAULT OR MANHOLE, OFFSET DISTANCE FROM THE WALL AND OTHER PROJECT SPECIFIC ASPECTS SHOWN ON THE PROJECT DRAWINGS AND TECHNICAL SPECIFICATIONS. THE LADDER DESIGN SHALL COMPLY WITH OSHA REQUIREMENTS.

CONSTRUCTION NOTES

- LADDER UP SYSTEM, MODEL LU-4 BY BILCO OR APPROVED EQUAL.
- 1 1/8" MAX. RUNGS WITH 1" WIDE NON-SLIP GRIP SURFACE @ 12" OC, PLUG WELD TO SIDE BARS (TYP.)
- 3" x 3/8" FLAT WALL STRAP MIN. WITH 1/2" x 4" LONG STAINLESS STEEL EXPANSION ANCHORS. COAT ANCHORS WITH BITUMEN WHERE IN CONTACT WITH ALUMINUM
- 3" x 3/8" SIDEBARS MIN. ROUND ALL CORNERS SMOOTH 1/8" RADIUS
- INSTALL CHLOROPRENE PADS BETWEEN CONCRETE WALL AND ALUMINUM LADDER SUPPORTS

REVISIONS	WATER AUTHORITY
JAN. 2015	WATER LADDER DETAIL
	DWG. 2335 JAN. 2011



GENERAL NOTES

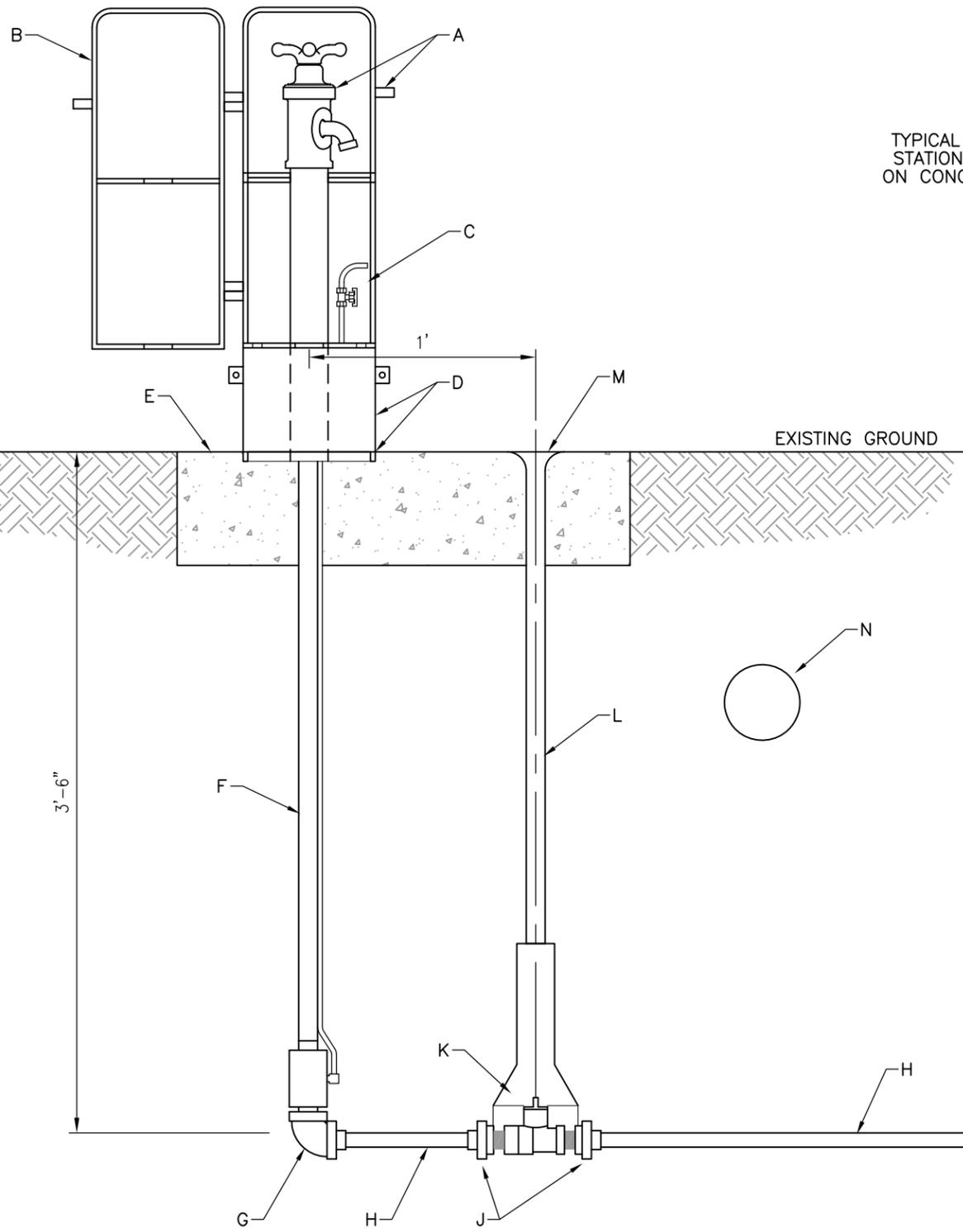
1. SAMPLING STATIONS SHALL BE BURIED TO A DEPTH OF 3'-6" ±1", WITH A 1" MIP INLET, AND A 1" FIP DISCHARGE.
2. ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE, ALUMINUM-CAST HOUSING.
3. ALL WORKING PARTS SHALL BE BRASS AND BE REMOVABLE FROM ABOVE GROUND WITH NO DIGGING.

CONSTRUCTION NOTES

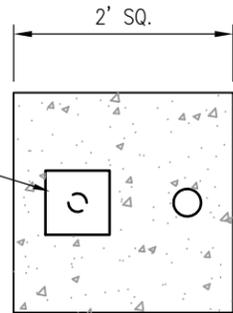
- A. ECLIPSE #88 SAMPLING STATION*, OR WATER AUTHORITY APPROVED EQUAL. SEE LOCATION PLAN TO LEFT FOR PLACEMENT ON A STANDARD VALVE BOX CONCRETE COLLAR.
- B. ALUMINUM HOUSING (SHOWN OPEN)
- C. COPPER VENT TUBE WITH 1/4" PET COCK (OPTIONAL 1/4" BALL VALVE) FOR DRAINING WITH MANUAL HAND PUMP
- D. ALUMINUM BASE. EMBED IN CONCRETE MIN. 1/4" MAX. 1/2"
- E. 6" THICK CONCRETE COLLAR. f'c = 3000 psi IN UNPAVED AREAS. USE STANDARD 9" COLLAR IF VALVE IS INSTALLED AWAY FROM SAMPLING STATION IN PAVED AREA.
- F. 1" GALVANIZED STEEL EXTERIOR CASING PIPE
- G. 3/4" MIPT x COPPER ELBOW
- H. 3/4" DOMESTIC COPPER K-TYPE, OR WATER AUTHORITY APPROVED EQUAL.
- J. 3/4" MIPT x COPPER FLARE. FORD C28-33 OR WATER AUTHORITY APPROVED EQUAL.
- K. CURBSTOP PER WATER AUTHORITY APPROVED PRODUCTS LIST.
- L. CORPORATION STOP PER WATER AUTHORITY APPROVED PRODUCTS LIST.
- M. VALVE BOX PER STANDARD DRAWING 2326.
- N. RING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2328.
- P. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
- R. CONNECT TO MAIN

* THE ECLIPSE #88 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 (SEE DETAIL TO LEFT). THE ECLIPSE #88 IS FULLY SERVICEABLE FROM ABOVE GROUND.

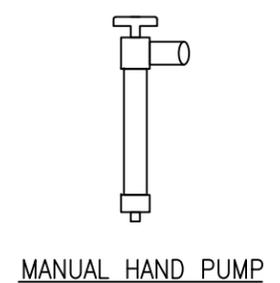
REVISIONS	WATER AUTHORITY
JAN. 2015	WATER SAMPLING STATION
	DWG. 2341
	JAN. 2013



TYPICAL SAMPLING STATION LOCATION ON CONCRETE PAD



LOCATION PLAN



MANUAL HAND PUMP

SECTION
SAMPLING STATION - ALTERNATE
(FOR INFILL LOCATIONS)

GENERAL NOTES

1. SAMPLING STATIONS SHALL BE BURIED TO A DEPTH OF 3'-6" ±1", WITH A 1" MIP INLET, AND A 1" FIP 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 #88 SAMPLING STATION*, OR WATER AUTHORITY APPROVED EQUAL.
- B. ALUMINUM HOUSING (SHOWN OPEN)
- C. COPPER VENT TUBE WITH 1/4" PET COCK (OPTIONAL 1/4" BALL VALVE) FOR DRAINING WITH MANUAL HAND PUMP
- D. ALUMINUM BASE. EMBED IN CONCRETE MIN. 1/4" MAX. 1/2"
- E. 2'x2'x6" THICK CONCRETE PAD. f'c = 3000 psi
- F. 1" GALVANIZED STEEL EXTERIOR CASING PIPE
- G. 3/4" MIPT x COPPER ELBOW
- H. 3/4" DOMESTIC COPPER K-TYPE, OR WATER AUTHORITY APPROVED EQUAL.
- J. 3/4" MIPT x COPPER FLARE. FORD C28-33 OR WATER AUTHORITY APPROVED EQUAL.
- K. CURBSTOP PER WATER AUTHORITY APPROVED PRODUCTS LIST.
- L. VALVE BOX / CURB BOX EXPANDABLE
- M. APPROVED PRODUCT VALVE BOX OR CURB BOX - FORD PL EA2-30-50 OR WATER AUTHORITY APPROVED EQUAL.
- N. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
- P. CONNECT TO SERVICE LINE

* THE ECLIPSE #88 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 (SEE DETAIL TO LEFT). THE ECLIPSE #88 IS FULLY SERVICEABLE FROM ABOVE GROUND.

REVISIONS	WATER AUTHORITY
JAN. 2015	WATER SAMPLING STATION ALTERNATE
	DWG. 2341-A JAN. 2013

GENERAL NOTES

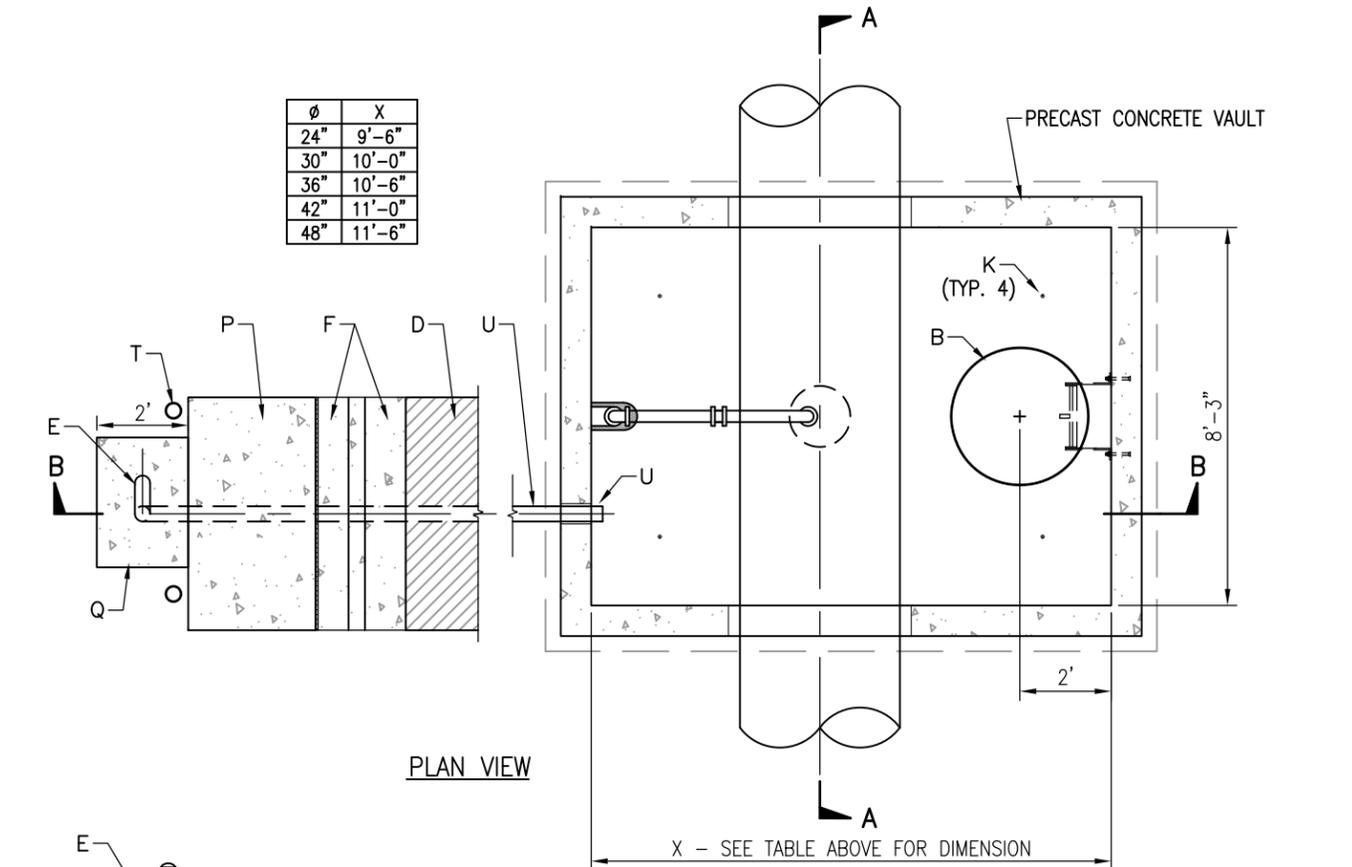
- INTERIOR PIPING SHALL BE STEEL PIPE, DUCTILE IRON PIPE, OR CONCRETE CYLINDER PIPE. ALL CAV PIPING AND FITTINGS SHALL BE SCHEDULE 40 THREADED GALVANIZED STEEL.
- CONCRETE VAULT SHALL BE PRECAST WITH REMOVABLE CONCRETE LID.
- LOCATE ACCESS MANHOLE FRAME, ADJUSTMENT RINGS AND COVER ON REMOVABLE CONCRETE LID TO ALLOW LID REMOVAL WITH THESE APPURTENANCES IN PLACE.
- SUBMIT SHOP DRAWINGS OF VAULT AND PIPING, AIR AND VACUUM VALVE ASSEMBLY PRIOR TO VAULT FABRICATION AND PIPE INSTALLATION.
- OWNER WILL SELECT PAINT COLORS FOR PIPING AND APPURTENANCES INSIDE VALVE VAULTS.
- BACKFILL MATERIAL SHALL BE CLASS II OR CLASS III IN ACCORDANCE WITH SPECIFICATION SEC. 501.
- ENGINEER SHALL SUBMIT A PROJECT SPECIFIC DETAIL AND A FLOOR AND PIPING PLAN.

CONSTRUCTION NOTES

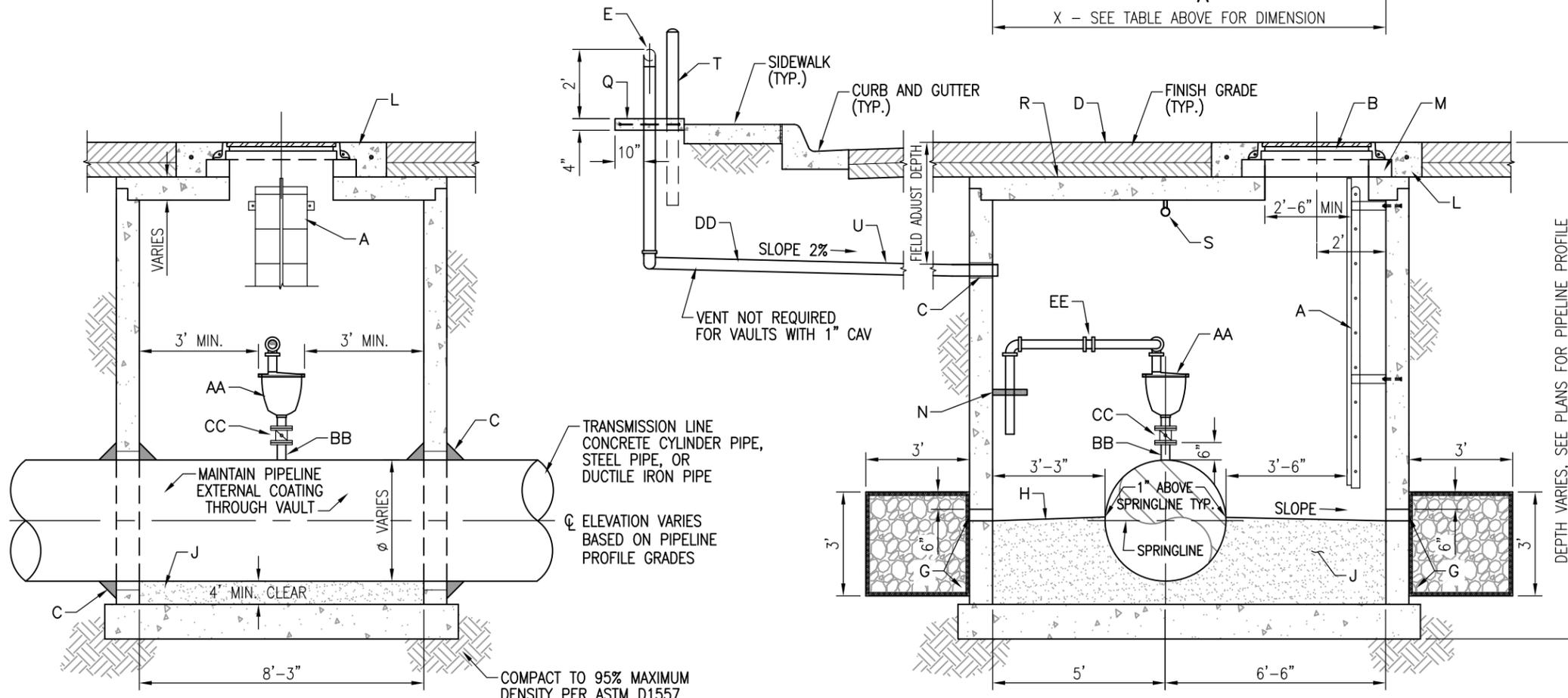
- 1'-4" ALUMINUM LADDER. PROVIDE AND INSTALL LADDER-UP SAFETY POST MODEL LU-4 BY BILCO.
- 36" DIAMETER MANHOLE FRAME AND COVER MARKED "WATER" PER STD DWG 2310.
- LINK SEAL. GROUT PENETRATION AROUND EXTERIOR CIRCUMFERENCE.
- REMOVE AND REPLACE PAVEMENT.
- GOOSENECK VENT, 4"Ø SCHEDULE 40 GALVANIZED STEEL. SEE STANDARD DWG 2334
- REMOVE AND REPLACE CURB AND GUTTER PER STANDARD DRAWING 2415A.
- 4" DIAMETER DRAIN WITH 3'x3'x3" GRAVEL DRAIN POCKET WITH CLEAN GRAVEL, ASTM C33, NO. 57. LINE DRAIN POCKET WITH GEOTEXTILE FABRIC NMDOT CLASS 3.
- SLOPE VAULT FLOOR TO DRAIN TYPICAL.
- CAST IN PLACE CONCRETE FILL.
- RECESSED LIFTING EYE, 4 REQUIRED. FLUSH W/TOP OF CONCRETE LID.
- CONCRETE COLLAR PER STD DWG 2461.
- ADJUSTMENT RINGS (IF NEEDED) PER STANDARD DRAWINGS 2461 AND 2111.
- UNISTRUT PIPE BRACKET TYPICAL FOR COMBINATION AIR VALVE VENT.
- REMOVE AND REPLACE SIDEWALK PER STD DWG 2430.
- CONCRETE COLLAR WITH 1~#4 REBAR EACH WAY CENTERED. SEE STD DWG 2334
- TACK COAT.
- 1 1/4" STAINLESS STEEL THREADED EYEBOLT, CENTERED ON COMBINATION AIR VALVE ASSEMBLY. 1300 POUNDS LIFT CAPACITY.
- STATIONARY PIPE BOLLARD, SEE STD DWG 2250.
- COORDINATE VENT PIPE ORIENTATION FOR EACH VAULT LOCATION DURING SHOP DRAWING SUBMITTAL.
- COMBINATION AIR VALVE ASSEMBLY, SIZE PER PLANS.
- TAPPING SADDLE OR FLANGED OUTLET.
- GATE VALVE. SIZE THE SAME AS COMBINATION AIR AND VACUUM RELEASE VALVE.
- 4" SCHEDULE 40 GALVANIZED STEEL PIPE FOR VAULT VENT. ROUTE TO BACK OF SIDEWALK. FIELD ADJUST DEPTH AND ROUTING TO AVOID EXISTING UTILITIES.
- UNION TYPICAL, ALL AIR AND VACUUM RELEASE VALVES.

PRECAST VAULT DESIGN CRITERIA	
MATERIAL:	
STRUCTURAL CONCRETE	$f'_c = 4000$ psi
REINFORCING	SHALL BE ASTM 615 GRADE 60
CONCRETE	SHALL MEET SPECIFICATION SEC. 512 AND SEC. 101
LOADING:	
VAULT LID	= HS25 LIVE LOAD PLUS 1.3 IMPACT PLUS DEAD LOADS
VAULT WALLS	EQUIVALENT FLUID PRESSURE = 60 psf
SURCHARGE (VEHICLE)	= 2 FEET
VAULT BASE SLAB	ALLOWABLE BEARING PRESSURE = 1500 psf

Ø	X
24"	9'-6"
30"	10'-0"
36"	10'-6"
42"	11'-0"
48"	11'-6"



PLAN VIEW



SECTION A-A

COMBINATION AIR AND VACUUM RELEASE VALVE (CAV) VAULT

SECTION B-B

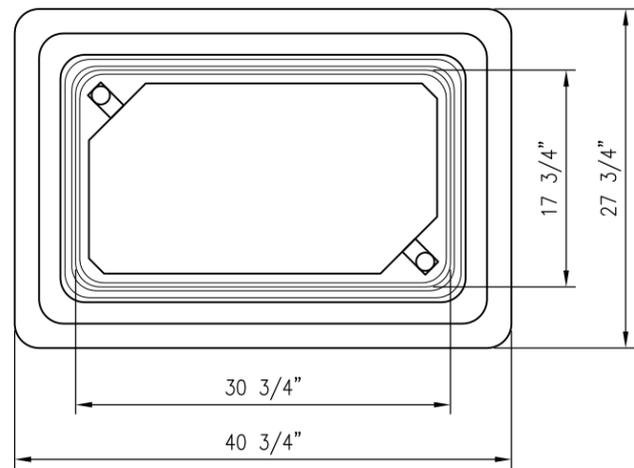
REVISIONS	WATER AUTHORITY
	COMBINATION AIR AND VACUUM RELEASE VALVE VAULT
	DWG. 2350 JAN. 2013

GENERAL NOTES

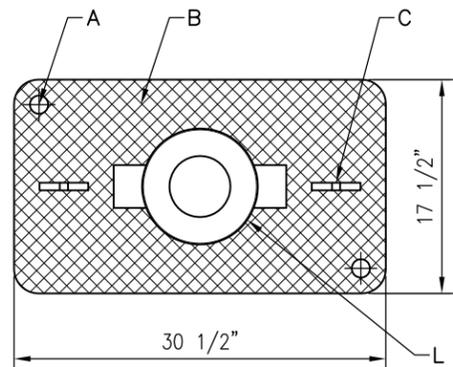
1. BOX AND COVER MATERIAL: FIBERGLASS REINFORCED POLYMER CONCRETE AND FIBERGLASS REINFORCED POLYMER. LID MATERIAL: DUCTILE IRON
2. STANDARD COLOR: CONCRETE GRAY (OPTIONAL COLORS ARE AVAILABLE FOR COVER AND COLLAR).
3. FLARED WALL BOXES ARE NESTABLE.

CONSTRUCTION NOTES

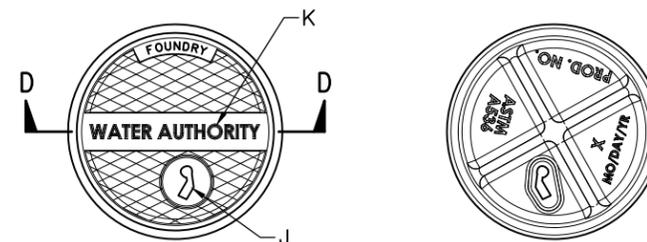
- A. COVER BOLTDOWN OPTION
- B. SKID RESISTANT SURFACE
- C. 5/8" x 4" LIFTING SLOTS
- D. OPTIONAL KNOCKOUTS OR TERMINATORS
- E. COVER
- F. STAINLESS STEEL CAPTIVE BOLT
- G. BOX
- H. SELF-CENTERING CORROSION RESISTANT NUT
- J. METER LID KEYHOLE
- K. 1/2" RAISED LETTERING (FLUSH)
- L. LID



TOP VIEW

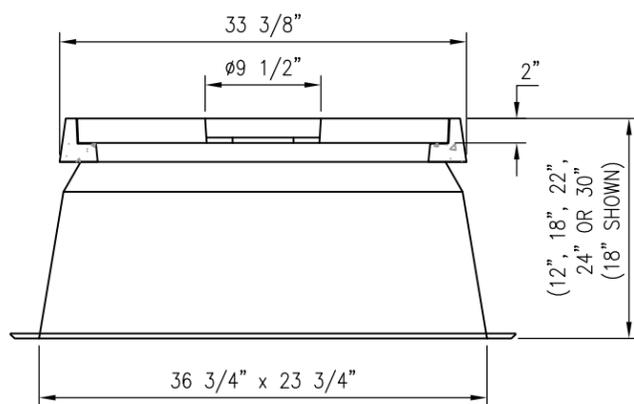


COVER

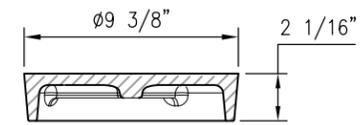
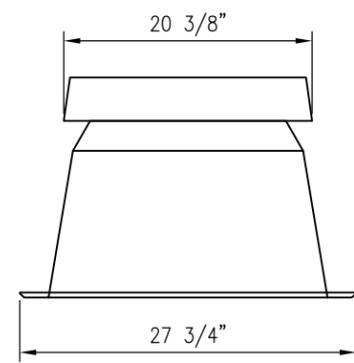


METER LID PLAN

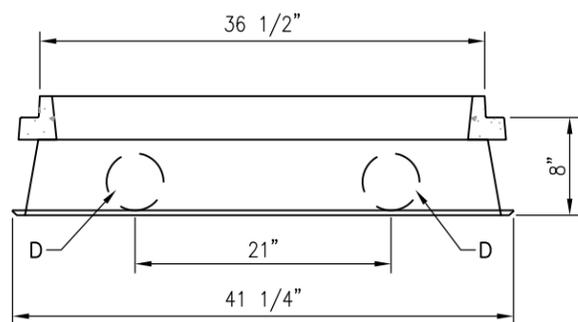
BOTTOM VIEW



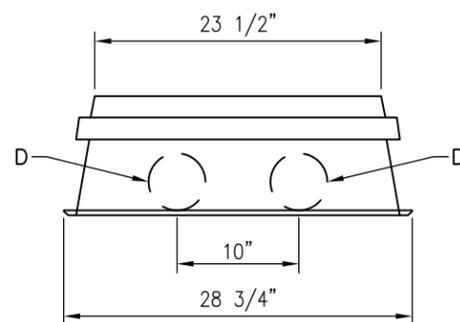
BOX & COVER SECTION



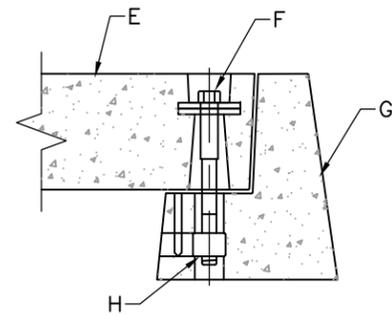
SECTION D-D



EXTENSION SECTION

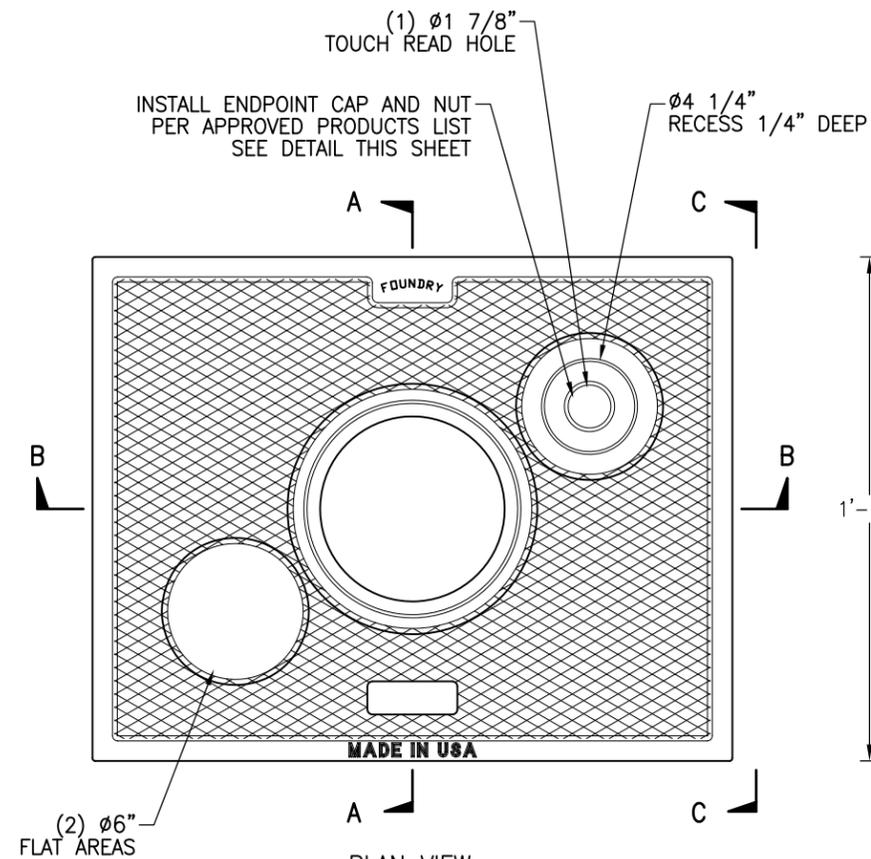


END VIEWS



COVER BOLTDOWN OPTION

REVISIONS	WATER AUTHORITY
	<p>WATER METER BOX, COVER AND LID FOR 1 1/2" TO 2" METERS DWG. 2367 JAN. 2013</p>



INSTALL ENDPOINT CAP AND NUT
PER APPROVED PRODUCTS LIST
SEE DETAIL THIS SHEET

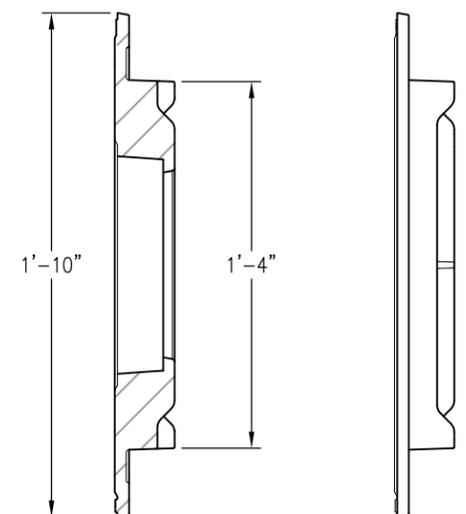
(1) $\phi 1 \frac{7}{8}$ "
TOUCH READ HOLE

$\phi 4 \frac{1}{4}$ "
RECESS 1/4" DEEP

(2) $\phi 6$ "
FLAT AREAS

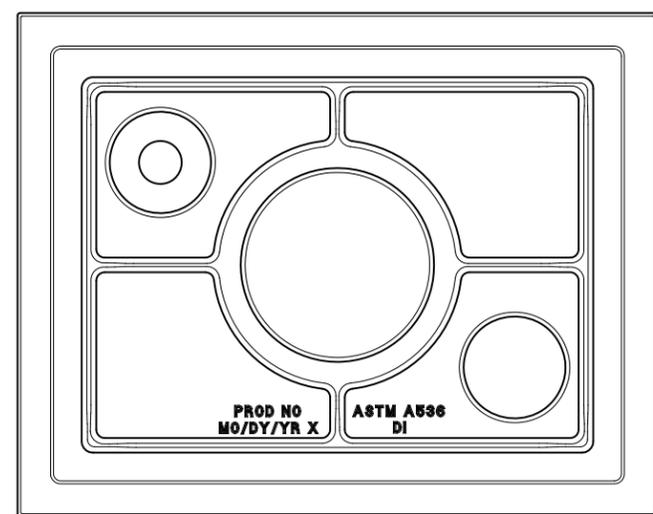
PLAN VIEW

BOX COVER FOR 3/4" TO 1" METERS

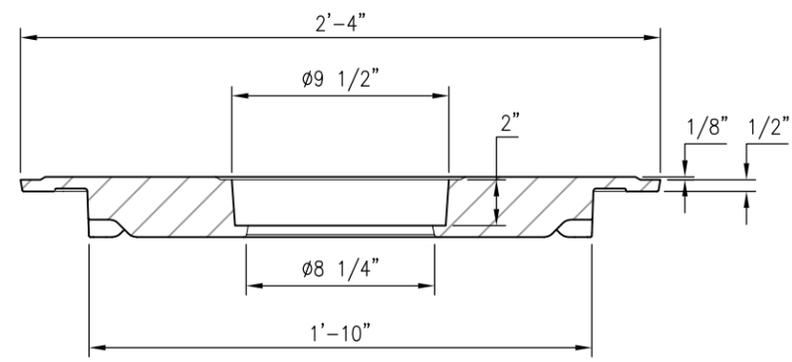


SECTION A-A

SECTION C-C



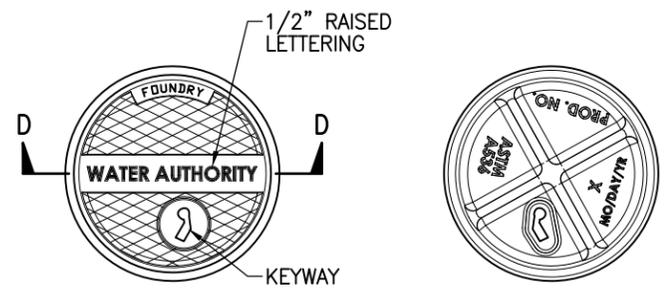
BOTTOM VIEW



SECTION B-B

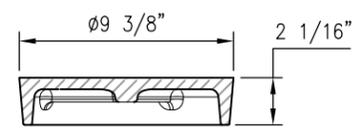


ENDPOINT CAP AND NUT



METER LID PLAN

BOTTOM VIEW



SECTION D-D

GENERAL NOTES

1. TO BE USED IN SIDEWALKS, MOUNTABLE CURB OR IN UNPAVED 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.

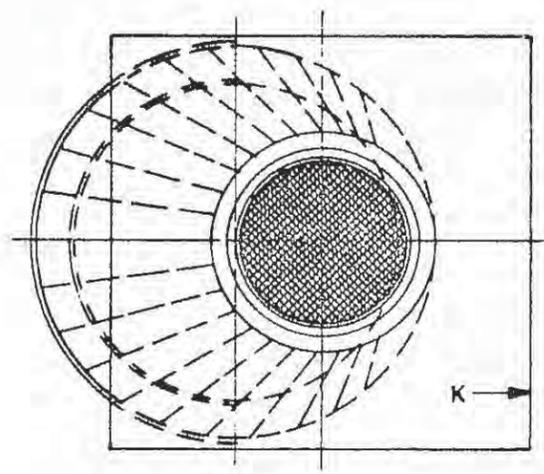
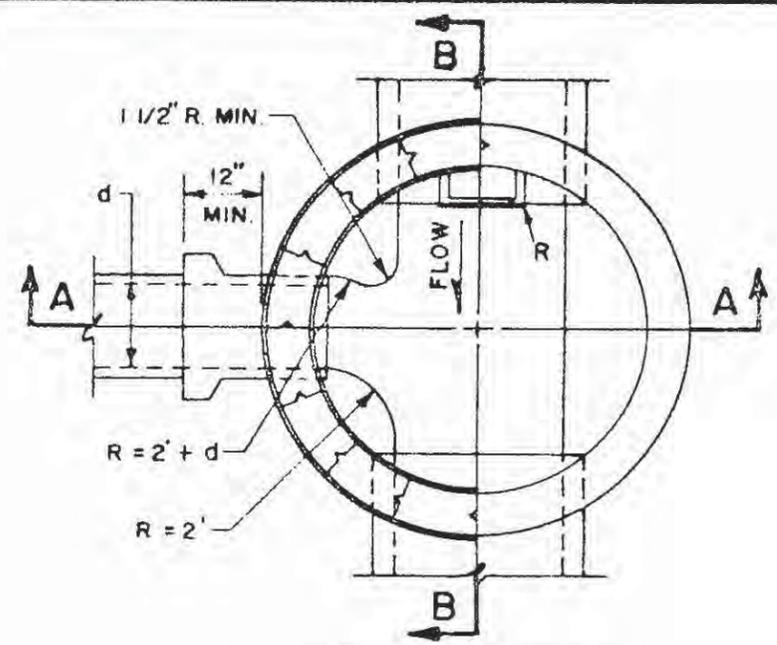
REVISIONS	WATER AUTHORITY
	<p>WATER METER BOX COVER AND LID FOR 3/4" TO 1" METERS DWG. 2368</p> <p style="text-align: right;">JAN. 2013</p>

GENERAL NOTES

1. TYPE "E" MANHOLE NOT TO BE USED FOR DEPTHS LESS THAN 6' MEASURED FROM INVERT TO RIM.
2. MANHOLE GREATER THAN 18' IN DEPTH SHALL BE OF PRECAST CONCRETE SECTIONS ONLY.
3. DESIGN APPLIES TO 4' AND 6' I.D. MANHOLES.
4. USE NON-SHRINK GROUT FOR JOINTS, FILLETS AND PIPE PENETRATIONS.
5. COMPACT ALL BACKFILL AROUND MANHOLES TO 95%.
6. POSITION MANHOLE OPENING OVER THE UPSTREAM SIDE OF MAIN LINE.

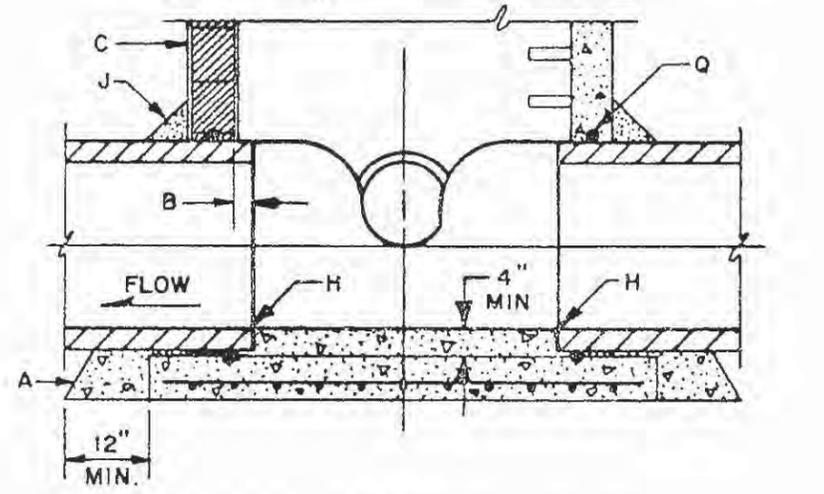
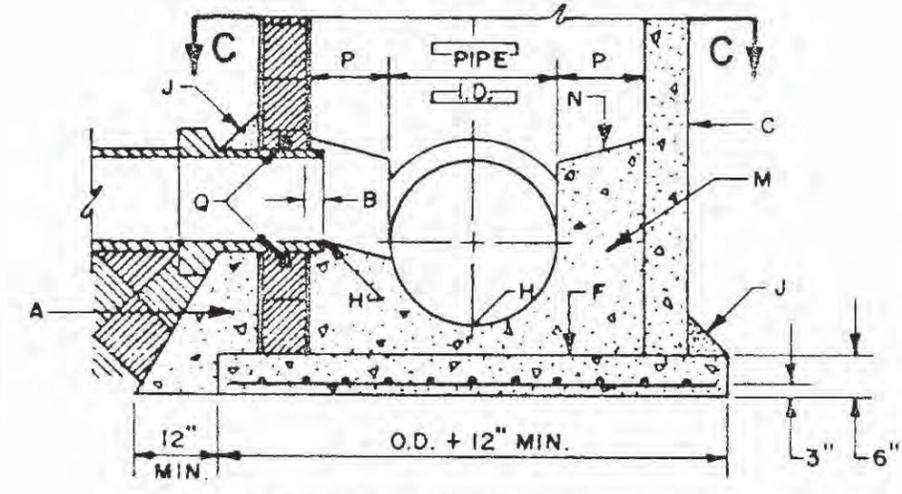
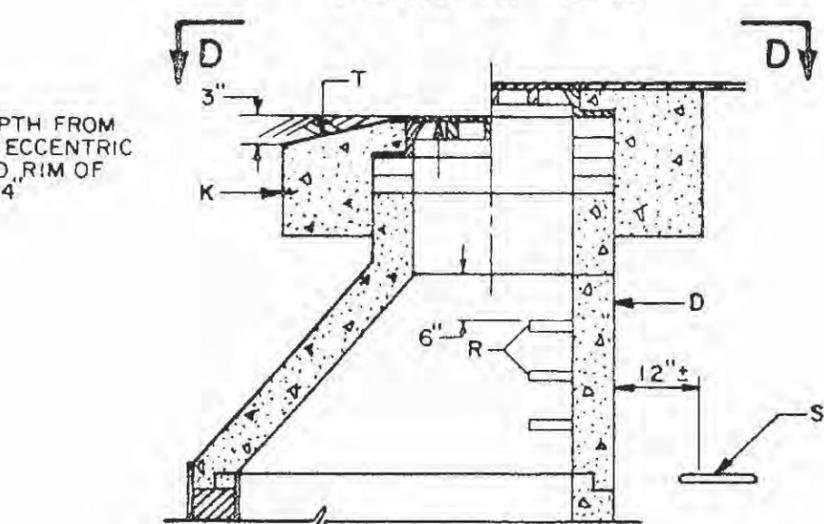
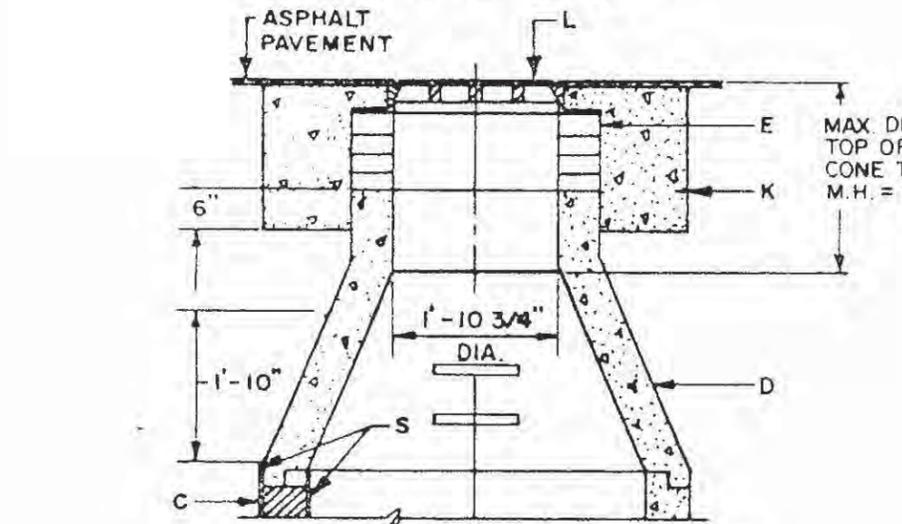
CONSTRUCTION NOTES

- A. CONCRETE PIPE SUPPORTS SHALL EXTEND OUTSIDE OF MANHOLE TO BELL OF FIRST JOINT AND SHALL CRADLE PIPE TO SPRING LINE NOT APPLICABLE FLEXIBLE PIPE.
- B. PIPE PENETRATION INTO MANHOLE SHALL BE FLUSH TO 2" MAX., MEASURED AT SPRINGLINE OF PIPE.
- C. MANHOLE MAY BE CONSTRUCTED OF CONCRETE BLOCK, GR. MS BRICK, POURED CONCRETE OR PRECAST REINFORCED CONCRETE, IF BLOCK OR BRICK PLASTER INSIDE AND OUT WITH 1/2" MORTAR, SEE DWG. 2118 FOR DETAILS.
- D. PRECAST REINFORCED CONCRETE ECCENTRIC CONE. THE CONTRACTOR SHALL PROVIDE SHOP DWGS. FOR APPROVAL.
- E. USE MAX., 4 COURSES GR. MS BRICK ON UNPAVED STREET FOR FUTURE ADJ. OF FRAME TO PAVEMENT GRADE PLASTER INSIDE WITH 1/2" MORTAR.
- F. BASE TO BE POURED IN PLACE USING NO. 4 BARS AT 6" O.C. EA. WAY FOR MANHOLE DEPTH OF 16' OR GREATER NO. 4 BARS AT 12" O.C. EA. WAY FOR MANHOLE LESS THAN 16' DEEP.
- H. INVERT ELEVATION OF STUB OR LATERAL AS SHOWN ON PLANS.
- J. 6" GROUT FILLET ON UPPER HALF OF PIPE AND AROUND BASE.
- K. USE A 5' X 5' CONCRETE PAD IN ALL AREAS.
- L. MANHOLE FRAME AND COVER, SEE DWG. 2110.
- M. CONCRETE, SEE SECTION 101.
- N. SLOPE 1' PER FT. FROM PIPE CROWN.
- P. SHELF TO BE 9" WIDE MIN.
- Q. APPROVED WATERSTOP TO BE WITH TYPE OF PIPE.
- R. STEPS TO BE INSTALLED AS PER SPEC. SECTION 920.
- S. EMD (IN UNPAVED AREAS).
- T. IN UNPAVED AREAS SET FRAME TO GRADE AND SLOPE TOP OF PAD.



PLAN AT C-C

PLAN AT D-D



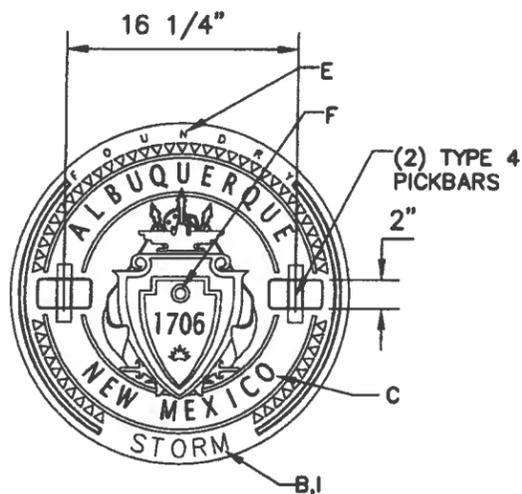
CROSS SECTION A-A

CROSS SECTION B-B

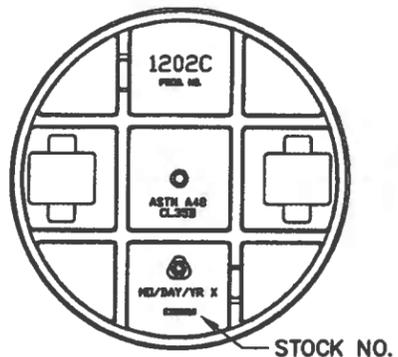
2'-1/2" MIN - 6' MAX

REVISIONS
11-14-91

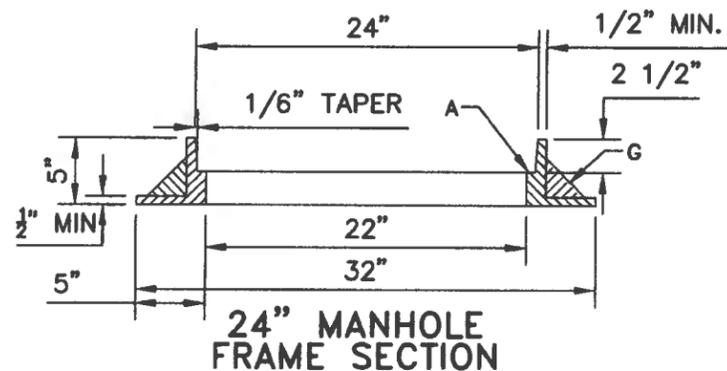
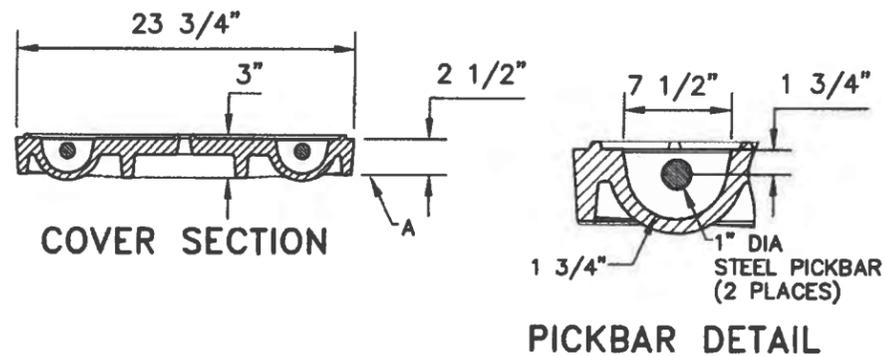
CITY OF ALBUQUERQUE	
STORM	
MANHOLE TYPE "E"	
DWG. 2209	AUG. 1986



24" MANHOLE TOP VIEW



24" MANHOLE BOTTOM VIEW



24" GENERAL NOTES:

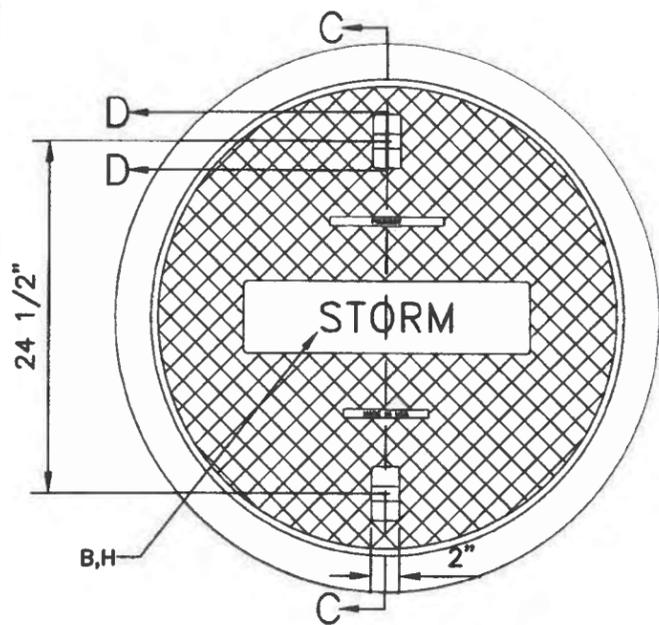
1. STANDARD 24" CAST IRON M.H. FRAME AND COVER. WEIGHTS: COVER = 180 LBS., FRAME = 145 LBS. TOTAL = 325 LBS. (TOLERANCE = ±5%)
2. REFERENCE SPEC. SECTION 130.
3. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

36" GENERAL NOTES:

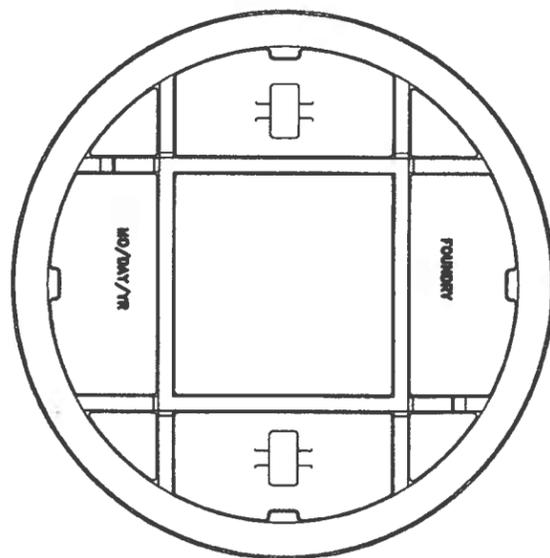
1. STANDARD 36" CAST IRON M.H. FRAME AND COVER. WEIGHTS: COVER = 355 LBS., FRAME = 315 LBS. TOTAL = 670 LBS. (TOLERANCE = ±5%)
2. REFERENCE SPEC. SECTION 130.
3. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

CONSTRUCTION NOTES:

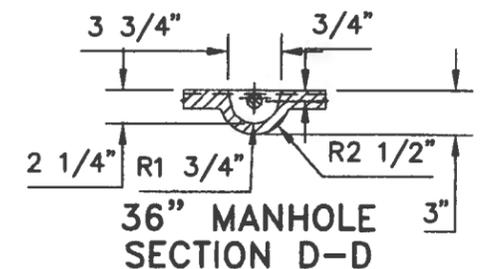
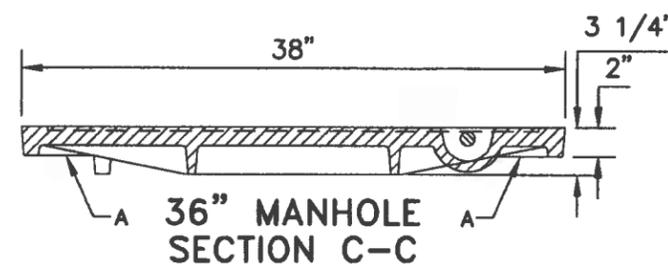
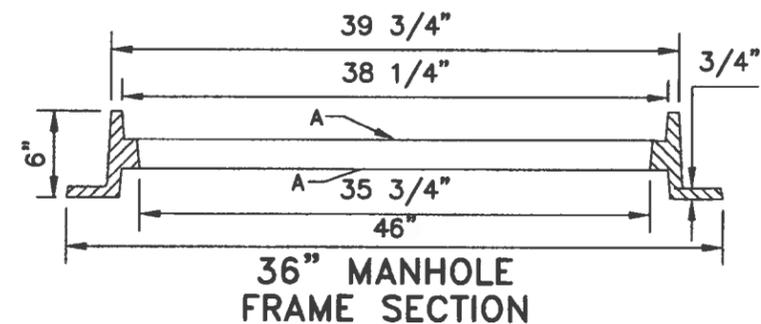
- A. MACHINED OR GROUND BEARING SURFACES.
- B. "STORM" CAST ON COVER TO IDENTIFY STORM DRAINAGE.
- C. LETTER SIZE TO BE 1 1/4" IN HEIGHT RAISED LETTERING.
- D. LETTER SIZE TO BE 3/4" IN HEIGHT RAISED LETTERING.
- E. LETTER SIZE TO BE 3/8" MIN. IN HEIGHT RAISED LETTERING.
- F. 3/4" DIA VENT HOLE REQUIRED.
- G. GUSSETS OPTIONAL IF REQUIRED BY MANUFACTURER.
- H. 2" LETTERS (RECESSED FLUSH).
- I. LETTER SIZE TO BE 1" IN HEIGHT RAISED LETTERING.



36" MANHOLE TOP VIEW



36" MANHOLE BOTTOM VIEW



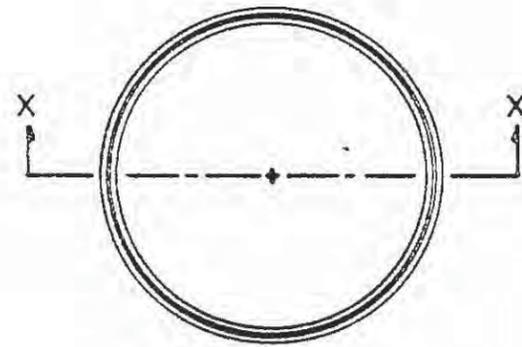
REVISIONS	CITY OF ALBUQUERQUE
	STORM
	MANHOLE FRAME AND COVERS
	DWG. 2210
	JANUARY 2011

GENERAL NOTES

1. ADJUSTMENT RING MADE FROM STANDARD ALUMINUM CASTING, ALLOY 319.
2. I.D., O.D. AND DEPTH SHALL BE MACHINED TO REQUIRED DIMENSIONS.
3. DUE TO VARYING EXISTING FRAME AND COVER SIZES, ALL DIMENSIONS MUST BE FIELD VERIFIED PRIOR TO MACHINING.
4. ALL EDGES OF RING SHALL BE LIGHTLY GROUND AFTER MACHINING TO REMOVE SHARPNESS AND BURRS.
5. COAT ALL SURFACES OF RING WITH CLEAR ACRYLIC RESIN AFTER MACHINING.

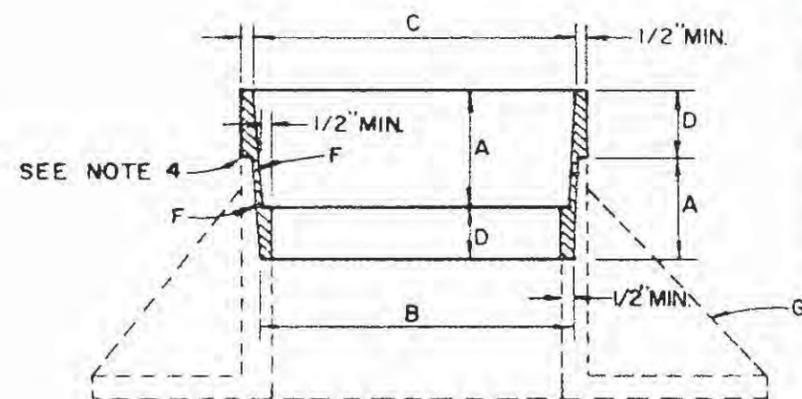
CONSTRUCTION NOTES

- A. DIMENSION=DEPTH OF EXISTING COVER EDGE.
- B. DIMENSION=RING O.D.=FRAME ID AT SEAT.
- C. DIMENSION=RING I.D.=FRAME O.D. AT RIM.
- D. DIMENSION=HEIGHT OF RING ADJUSTMENT.
- E. EXISTING FRAME AND COVER SHALL BE CLEANED AND REUSED.
- F. TAPER=1/2X(C-B).
- G. EXISTING FRAME.



COMMON C.O.A.
MH FRAME SIZES

A	B	C	D
2 3/8	23 1/2	23 5/8	
2 1/2	23 5/8	23 3/4	
2 5/8	23 5/8	23 3/4	
2	23 3/4	23 7/8	
2 1/4	23 3/4	23 7/8	
2 3/8	23 3/4	23 7/8	
2 1/2	23 3/4	23 7/8	
2 5/8	23 3/4	23 7/8	
2 3/4	23 3/4	23 7/8	
2 1/2	23 8	24	
1	24 7/8	25	1 1/4



SECTION X-X

NOT TO SCALE
VERTICAL SCALE EXAGGERATED FOR CLARITY

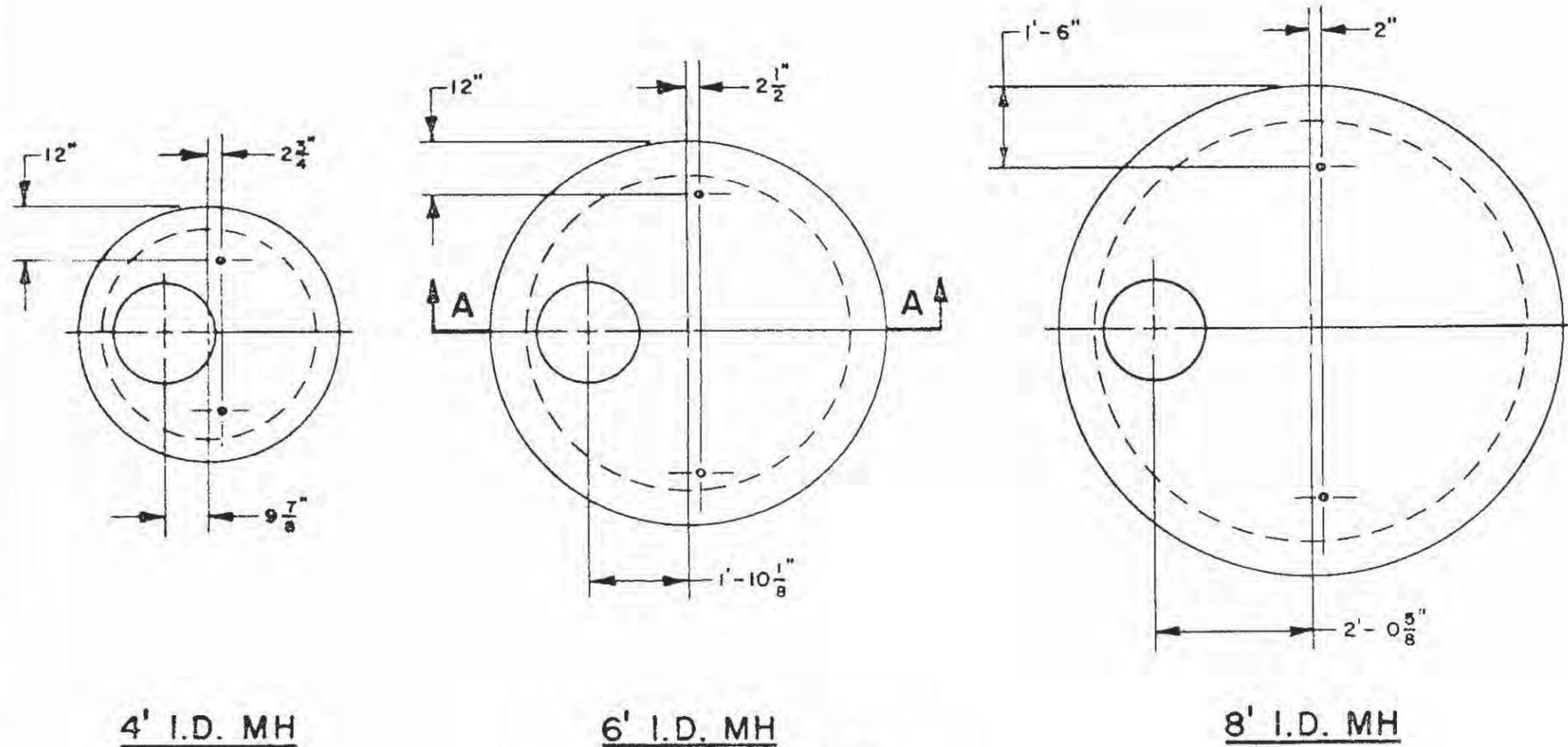
CITY OF ALBUQUERQUE	
REVISIONS	STORM MANHOLE COVER ADJUSTMENT RING DWG.2211
	AUG. 1986

GENERAL NOTES

1. ALL MANHOLES 20' DEEP OR DEEPER WILL REQUIRE A INTERMEDIATE LANDING IN THE MANHOLE BARREL. TYPE "C" MANHOLE COVERS SHALL BE USED AS INTERMEDIATE LANDINGS.
2. INTERMEDIATE LANDINGS SHALL BE LOCATED AT THE MID POINT + OR - 2 FEET OF THE HEIGHT OF THE MANHOLE. AT NO TIME SHALL A INTERMEDIATE LANDING OR A SIZE ADJUSTMENT TOP BE INSTALLED CLOSER THAN 8' UP FROM THE INVERT OF THE MANHOLE.

CONSTRUCTION NOTES

- A. PRECAST REINFORCED CONCRETE MANHOLE COVER.
- B. ALL BARS TO HAVE 1-1/2" MIN. COVER.
- C. 1" PIPE SLEEVE VERTICALLY THROUGH COVER.
- D. TOP MAT NO. 4 BARS 6" O.C. EA. WAY FOR 4, 6, AND 8 FT. I.D. MANHOLES.
- E. NO. 4 BARS.
- F. BOTTOM MAT NO. 4 BARS 6" O.C. EA. WAY FOR 4 AND 6 FT. I.D. MANHOLES, NO. 8 BARS 8" O.C. EA. WAY FOR 8 FT. I.D. MANHOLES.
- G. NO. 4 BARS FOR 4 AND 6 FT. I.D. MANHOLES.
- H. WHEN PRECAST MANHOLE SECTIONS ARE USED, COVER SHALL BE MODIFIED TO SHAPE OF APPROPRIATE SIZE I AND G JOINT.
- I. CONCRETE, SEE SECTION 101.

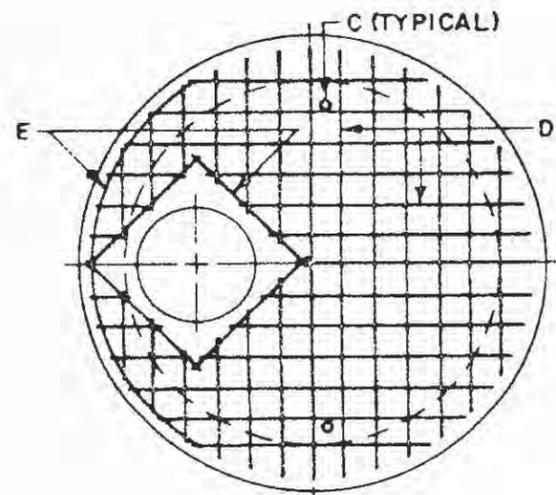


4' I.D. MH

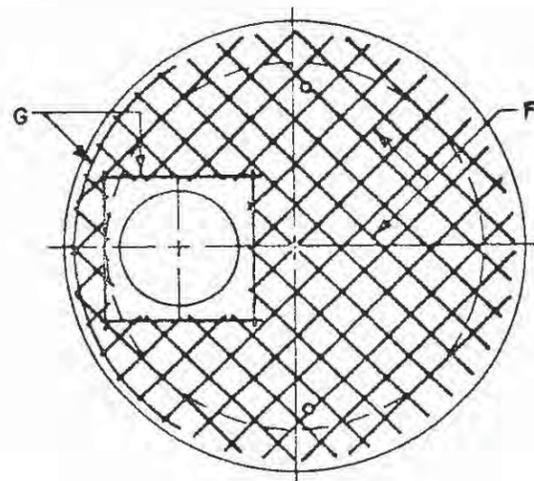
6' I.D. MH

8' I.D. MH

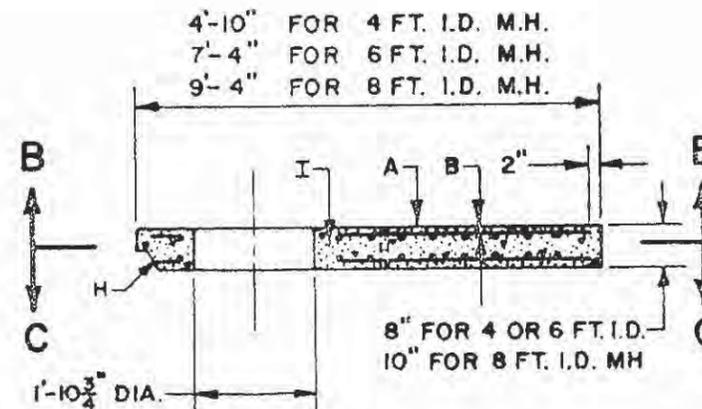
PLAN



SECTION B-B
TOP MAT



SECTION C-C
BOTTOM MAT



SECTION A-A

REVISIONS
11-14-91

CITY OF ALBUQUERQUE	
STORM	
CONC. MH COVER TYPE "C"	
DWG. 2212	AUG. 1986

SECTION 2300

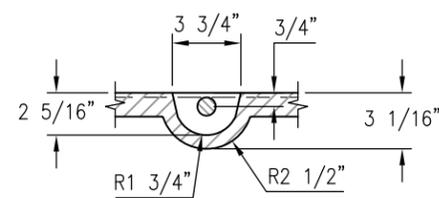
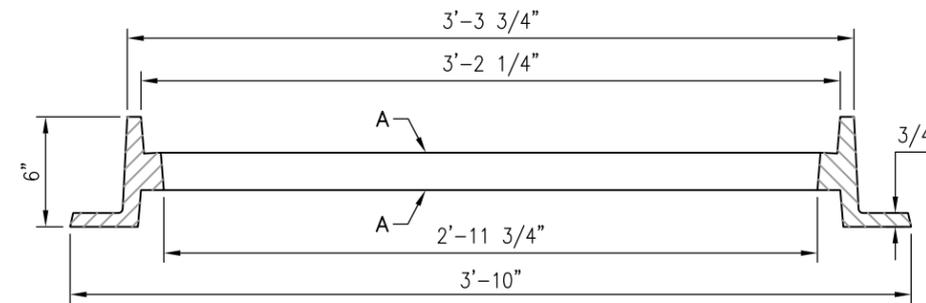
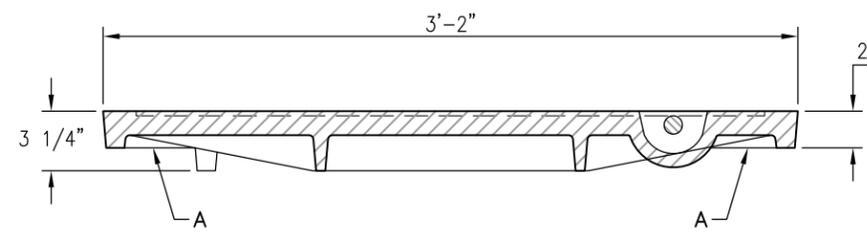
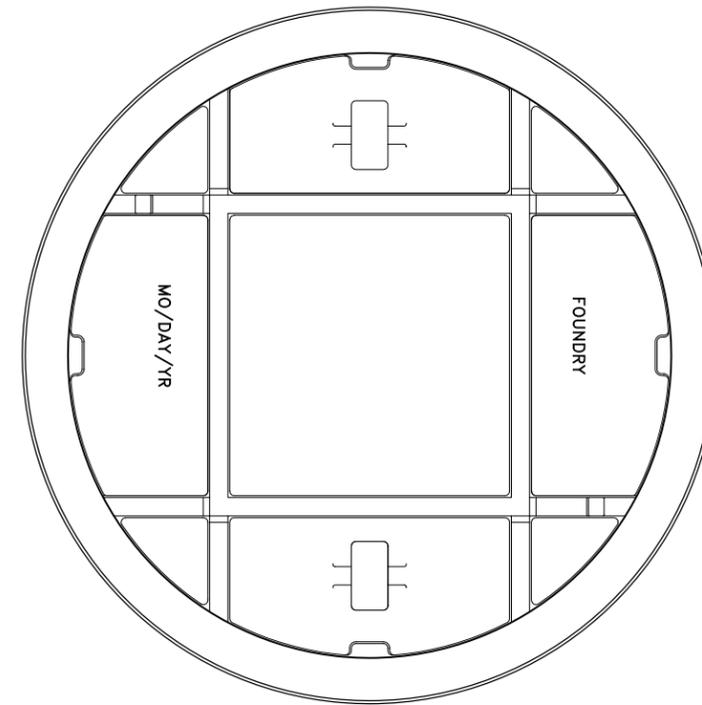
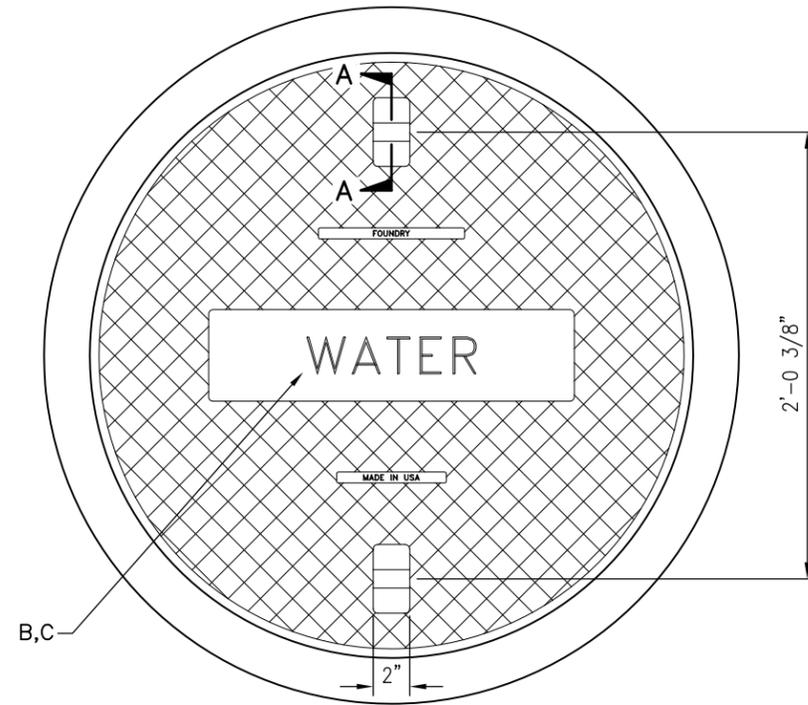
STANDARD DETAILS FOR WATER

<u>DWG. NO.</u>	<u>TITLE</u>
2301-----	WATERLINE CONNECTION DETAILS
2305-----	WATER CONCRETE CYLINDER PIPE RIGID JOINT DETAIL
2310-----	WATER MANHOLE FRAME AND COVERS
2315-----	WATER PIPE TRENCH TERMINOLOGY
2320-----	WATER CONCRETE BLOCKING DESIGN
2321-----	WATER CONCRETE ENCASEMENT DETAILS
2322-----	WATER STATIONARY POST DETAIL
2326-----	WATER VALVE BOX
2328-----	WATER RING & COVER FOR VALVE BOX
2329-----	FIRE LINE RING AND COVER FOR VALVE BOX
2330-----	NON-POTABLE WATER RING AND COVER FOR VALVE BOX
2333-----	WATER VALVE INSERTION ANCHORAGE
2334-----	WATER LARGE DIAMETER VALVE VAULT
2335-----	WATER LADDER DETAIL
2340-----	WATER FIRE HYDRANT INSTALLATION
2341-----	WATER SAMPLING STATION
2341-A-----	WATER SAMPLING STATION ALTERNATE
2344-----	WATER AIR RELEASE FIRE HYDRANT CONNECTION
2347-----	WATER DETAILS ON TYPICAL FIRE HYDRANT LOCATIONS
2350-----	WATER AIR / VACUUM RELEASE VALVE
2351-----	WATER CONCRETE CYLINDER BUTTERFLY VALVE IN VAULT INSTALLATION
2352-----	WATER DUCTILE IRON BUTTERFLY VALVE IN VAULT INSTALLATION DETAILS
2353-----	WATER SURGE RELIEF VALVE STATION
2354-----	WATER STANDARD PRV STATION, NO METER
2355-----	WATER STANDARD PRV STATION WITH PROPELLER METER
2356-----	WATER STANDARD PRV STATION WITH POWER/TELEMETRY
2357-----	WATER STANDARD PRV STATION STRUCTURAL DETAILS
2358-----	WATER THRUST TIE DETAILS
2359-----	WATER DUCTILE IRON BUTTERFLY VALVE DIRECT BURY INSTALLATION DETAILS
2360-----	WATER DUCTILE IRON BUTTERFLY VALVE DIRECT BURY INSTALLATION
2361-----	WATER TYPICAL METER BOX INSTALLATIONS
2362-----	WATER 3/4" TO 1" METER SERVICE LINE INSTALLATION
2363-----	WATER 1 1/2" TO 2" METERED SERVICE LINE INSTALLATION
2366-----	WATER METER BOX FOR 3/4" TO 1" METERS
2367-----	WATER METER BOX COVER AND LID FOR 1 1/2" TO 2" METERS

SECTION 2300

STANDARD DETAILS FOR WATER

- 2368-----WATER METER BOX COVER AND LID FOR 3/4" TO 1" METERS
- 2370-----WATER LARGE DIAMETER METER VAULT FOR 3" TO 6" SERVICE
- 2371-----WATER LARGE DIAMETER METER VAULT FOR 8" TO 12" SERVICE
- 2372-----WATER 6" PRV ASSEMBLY DETAILS
- 2373-----WATER 8" PRV ASSEMBLY DETAILS
- 2374-----WATER 10" PRV ASSEMBLY DETAILS
- 2375-----WATER STANDARD PRV STATION STRUCTURAL DETAILS
- 2380-----WATER BORING INSTALLATION
- 2381-----WATER TYPICAL LINE RELOCATION
- 2385-----WATER REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION
ASSEMBLY (RPBA)
- 2386-----WATER DOUBLE CHECK VALVE ASSEMBLY (DCVA)
- 2387-----WATER DOUBLE CHECK – DETECTOR CHECK ASSEMBLY (DCDA)
- 2388-----LANDSCAPE PRESSURE VACUUM BREAKER (PVB)
- 2389-----WATER ENCLOSURES
- 2390-----WATER INSTALLATION FOR CONTINUOUS SERVICE
- 2394-----WATER RESIDENTIAL WATER PRIVATE FIRE PROTECTION SYSTEMS
- 2395-----WATER APPROVED METHODS FOR FILLING TANKS
- 2396-----WATER CORROSION MONITORING DETAILS – 1
- 2397-----WATER CORROSION MONITORING DETAILS – 2
- 2398-----WATER CORROSION MONITORING DETAILS – 3



GENERAL NOTES

1. STANDARD 36" CAST IRON M.H. FRAME AND COVER.
WEIGHTS: COVER = 355 LBS., FRAME = 315 LBS.
TOTAL = 670 LBS. (TOLERANCE = ±5%)
2. REFERENCE SPEC. SECTION 130.
3. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE

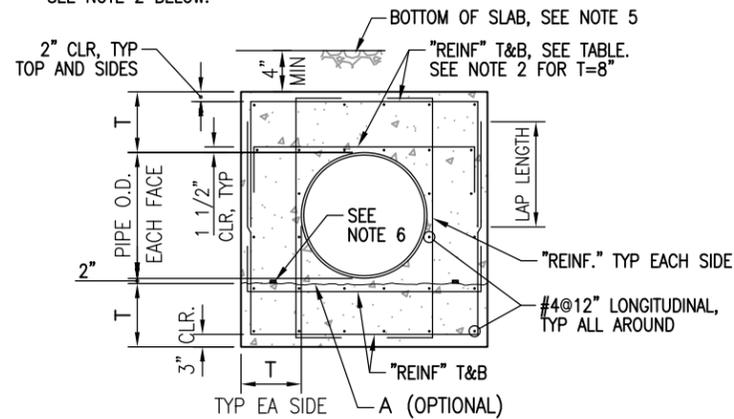
CONSTRUCTION NOTES

- A. MACHINED OR GROUND BEARING SURFACES.
- B. "WATER" CAST ON COVER TO IDENTIFY WATERLINE.
- C. 2" LETTERS (RECESSED FLUSH).

REVISIONS	WATER AUTHORITY
	WATER MANHOLE FRAME AND COVER
	DWG. 2310 JAN. 2013

PIPE DIA (IN.)	PIPE ENCASEMENT TABLE							
	H=10 FEET		H=20 FEET		H=30 FEET		H=40 FEET	
	T (in)	REINF	T (in)	REINF	T (in)	REINF	T (in)	REINF
20 THRU 30	8	#5@12"	10	#5@12"	10	#5@12"	10	#6@12"
36 THRU 42	10	#5@12"	10	#6@12"	10	#7@12"	10	#6@6"
48 THRU 54	10	#6@12"	10	#7@12"	10	#7@6"	12	#7@6"
UP TO 60	10	#6@12"	10	#6@6"	14	#7@6"	14	#7@6"

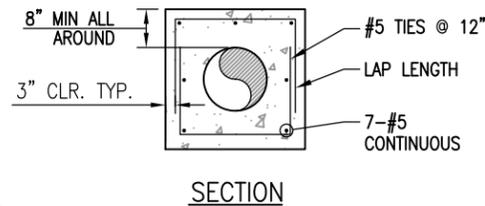
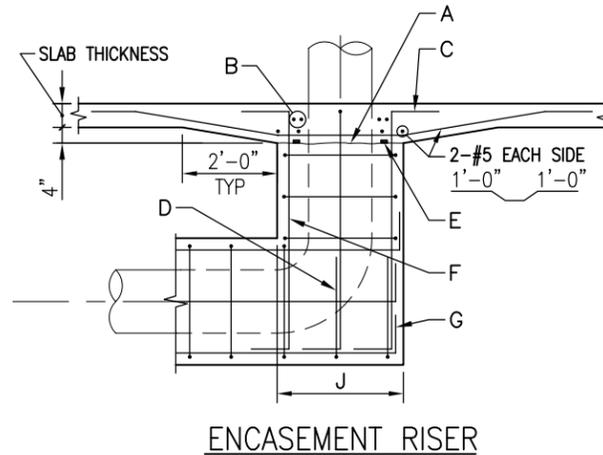
DARK LINE INDICATES BREAK BETWEEN ONE LAYER OF REINFORCING AND TWO. SEE NOTE 2 BELOW.



NOTES:

1. THIS DETAIL APPLIES TO PIPE DIAMETERS OF 20" THROUGH 60". FOR $\leq 18"$, SEE DETAIL 2.
2. FOR T=8" REINFORCING SHALL BE ONE LAYER AND CENTERED IN SLABS OR WALLS, SEE DETAIL 2.
3. FOR ENCASEMENT AT PIPE RISER, SEE DETAIL 2.
4. "H" IS FILL HEIGHT OR WATER DEPTH OR COMBINATION ABOVE PIPE.
5. WHEN PIPE ENCASEMENT CLOSER THAN 4" TO SLAB ABOVE, TIE SLAB & ENCASEMENT TOGETHER. SEE DETAIL 3.
6. HYDROPHILIC WATERSTOP CONTINUOUS ALL AROUND IN ALL CONSTRUCTION JOINTS.
7. EXTEND PIPE ENCASEMENT BEYOND STRUCTURE PER DETAIL 4.

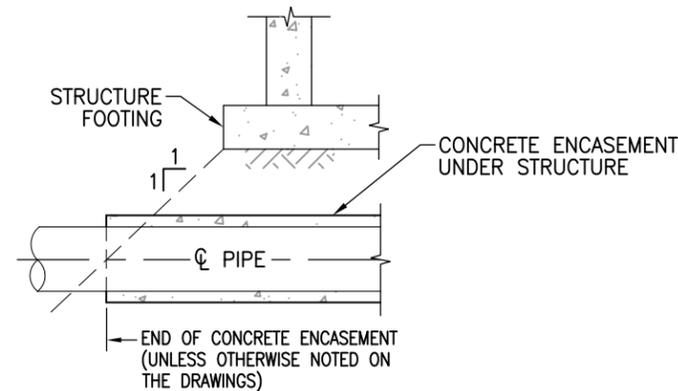
DETAIL 1
PIPE ENCASEMENT (20"φ-60"φ)



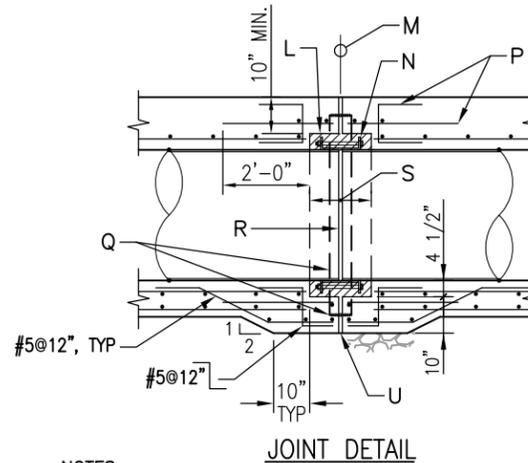
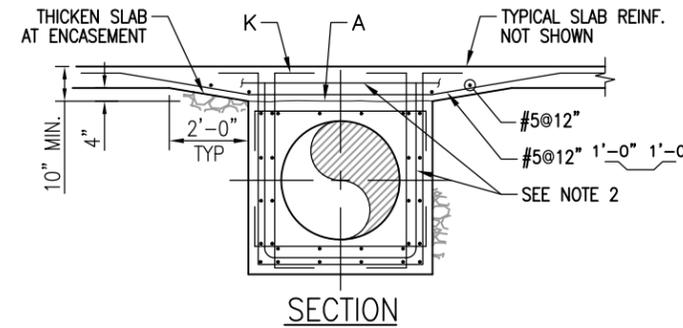
NOTES:

1. SECTION APPLIES TO PIPES $\leq 18"$. FOR $\geq 20"$, SEE DETAIL 1.
2. WHEN PIPE ENCASEMENT IS CLOSER THAN 4" TO SLAB ABOVE, TIE SLAB AND ENCASEMENT TOGETHER. SEE DETAIL 3.
3. EXTEND PIPE ENCASEMENT BEYOND STRUCTURE PER DETAIL 4.

DETAIL 2
PIPE ENCASEMENT ($\leq 18"$ φ)



DETAIL 4
END OF PIPE ENCASEMENT UNDER STRUCTURES



NOTES:

1. TIE PIPE ENCASEMENT TO SLAB AS SHOWN WHEN DISTANCE BETWEEN PIPE ENCASEMENT AND BOTTOM OF SLAB IS LESS THAN 4".
2. 6" PLASTIC WS IN ENCASEMENT JOINTS. WELD TO WS IN SLAB JOINTS.
3. EXTEND PIPE ENCASEMENT BEYOND STRUCTURE PER DETAIL 4.

DETAIL 3
PIPE ENCASEMENT AT SLAB

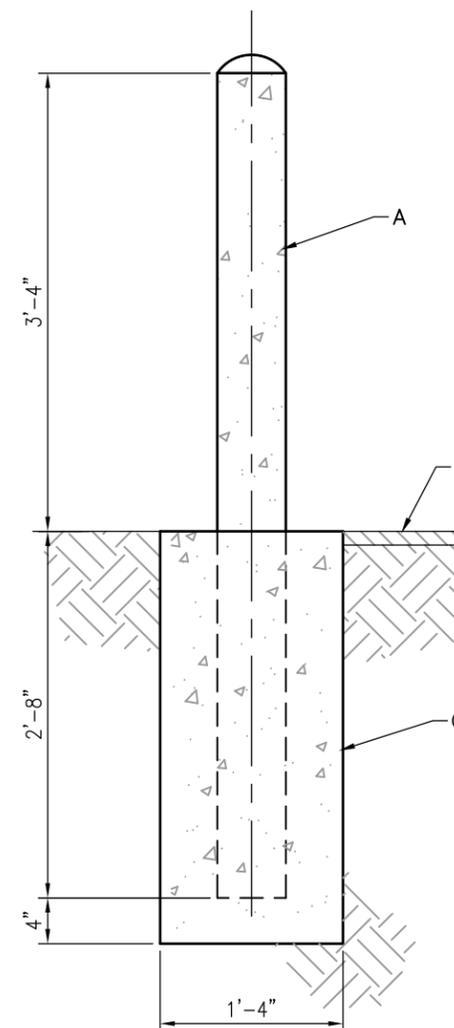
CONSTRUCTION NOTES

- A. CONSTRUCTION JOINT
- B. TYPICAL OPENING REINF. AROUND PIPE
- C. EXTEND ENCASEMENT VERTS. AND BEND 1'-0" INTO TOP OF SLAB
- D. BOTTOM "U" SECTION OF TIES CONT. TO END OF ENCASEMENT
- E. HYDROPHILIC WATERSTOP CONTINUOUS ALL AROUND IN ALL CONSTRUCTION JOINTS.
- F. TYPICAL PIPE ENCASEMENT REINF.
- G. BEND & LAP PIPE ENCASEMENT REINF. 1'-0", TYP
- J. PROVIDE LEVEL BEARING AREA BELOW VERT. PIPE RISER EQUAL TO ENCASEMENT GROSS END AREA
- K. PIPE ENCASEMENT REINF. SEE DETAILS 1 AND 2. EXTEND VERTS. AND BEND 1'-0" INTO TOP OF SLAB ABOVE.
- L. CLOSED CELLULAR SPONGE RUBBER ALL AROUND COUPLING TO ALLOW JT MOVEMENT (1" MIN)
- M. CL SLAB EXP, CONTRACTION OR CONTROL JT, SEE PLANS FOR LOCATION & JT TYPE
- N. LOCATE PIPE FLEX COUPLING (WITHOUT THRUST TIES) AT ALL SLAB EXPANSION & CONTROL JOINTS
- P. #5@12" TYPICAL ENCASEMENT REINF. DISCONTINUOUS AT JOINT
- Q. 6" PLASTIC WATERSTOP IN ENCASEMENT JOINT. WELD TO WATERSTOP IN SLAB JOINT FOR CONTINUOUS SEAL
- R. PIPE JOINT CENTERED ON SLAB JOINT
- S. COUPLING LENGTH +6"
- U. ENCASEMENT JOINT TYPE SAME AS SLAB JOINT, SEE SLAB JOINT DETAILS

REVISIONS	WATER AUTHORITY
	WATER CONCRETE ENCASEMENT DETAILS
	DWG. 2321
	JAN. 2013

CONSTRUCTION NOTES

- A. 6"Ø 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. PAVEMENT, OR FINISHED GRADE.
- C. 16"Ø CONCRETE FOOTING, 3000 PSI AT 28 DAYS, WITH SMOOTH OR BROOM FINISH WHEN ADJACENT TO PAVEMENT.



SECTION

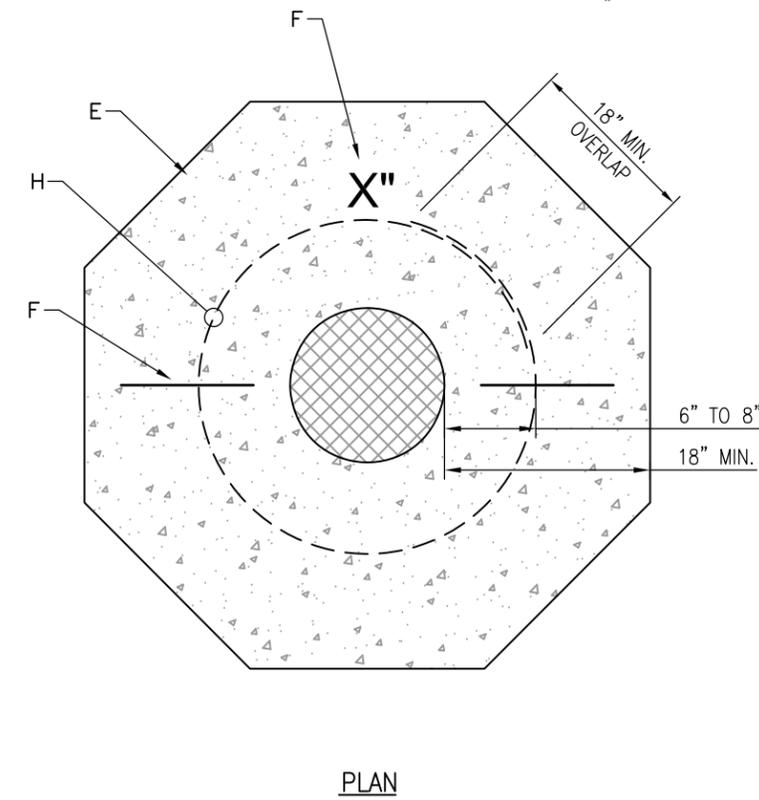
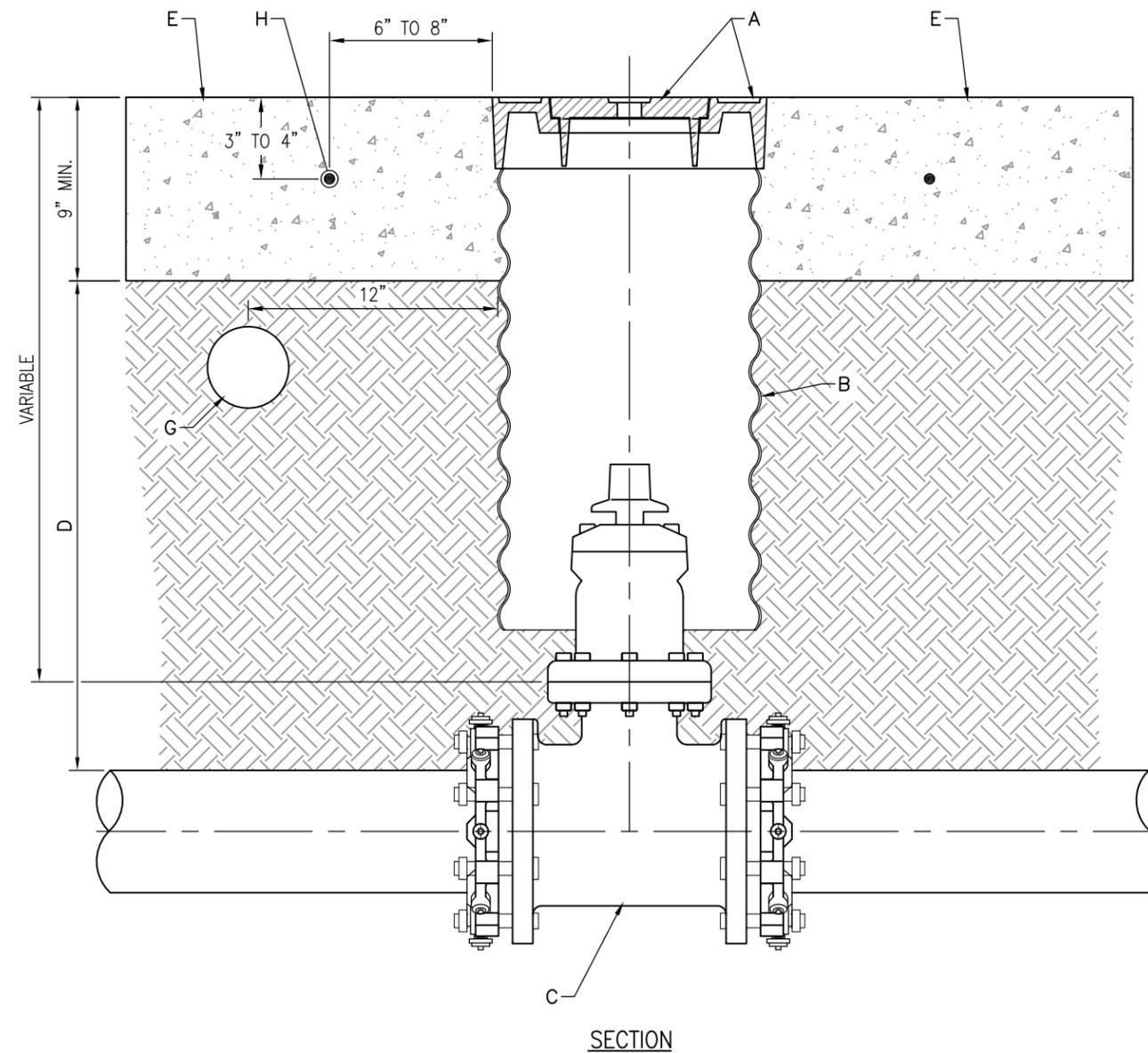
REVISIONS	WATER AUTHORITY
	WATER STATIONARY POST DETAIL
	DWG. 2322 JAN. 2013

GENERAL NOTES

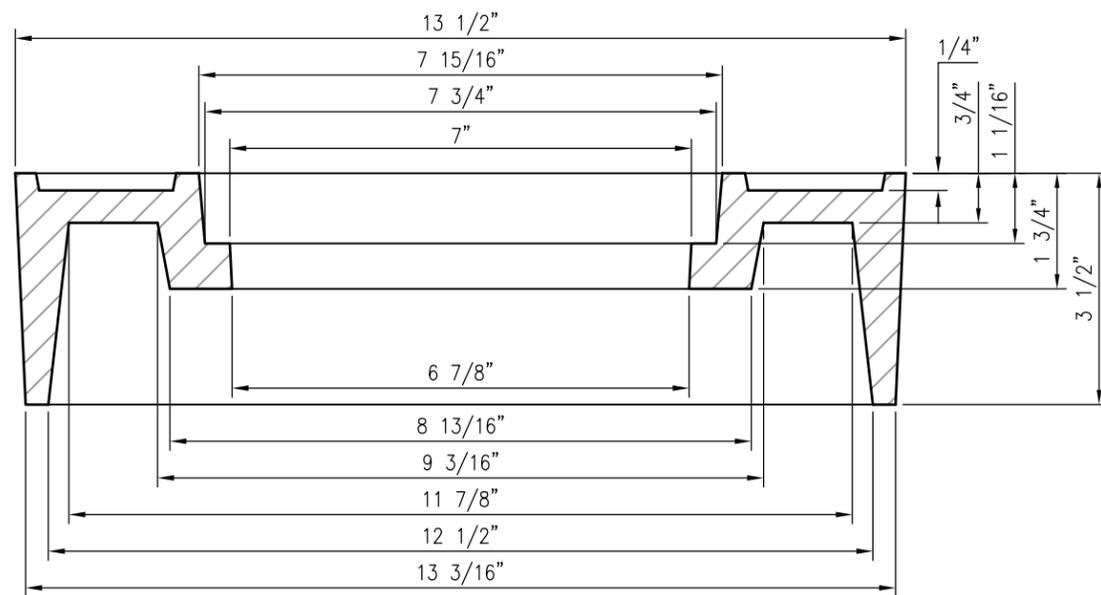
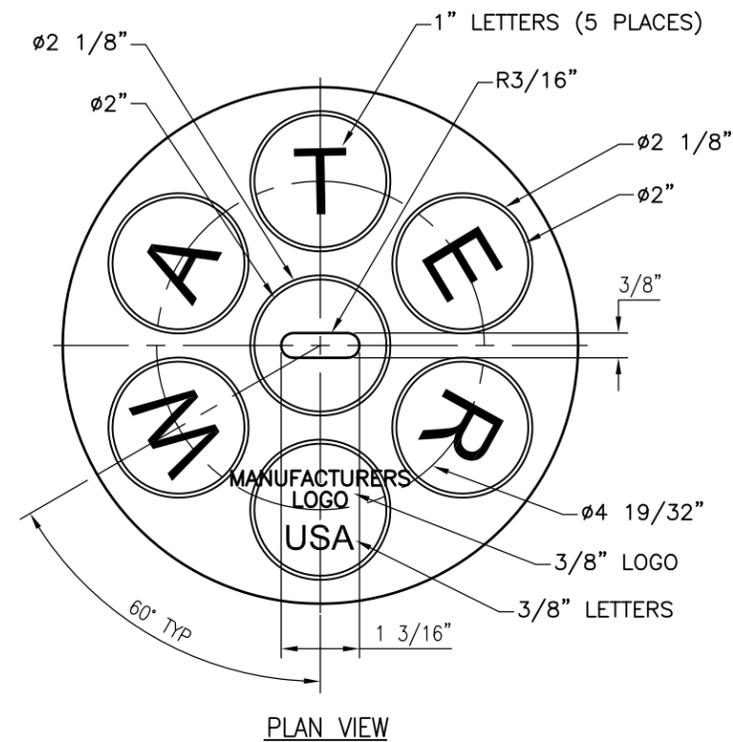
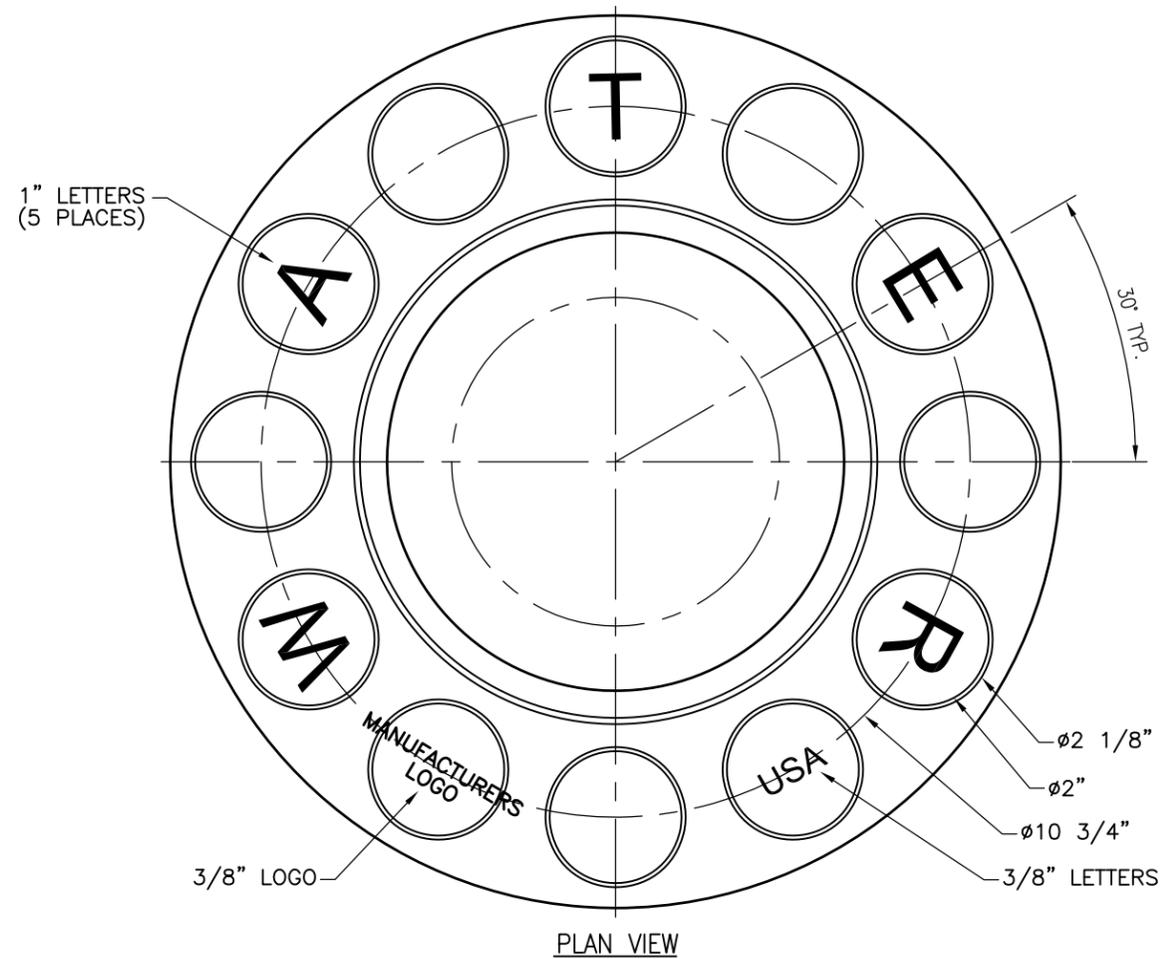
1. LABEL REQUIREMENTS: BEFORE THE WORK WILL BE ACCEPTED, WATER VALVE GPS COORDINATES SHALL BE PROVIDED ON THE RECORD DRAWINGS. GPS COORDINATES OBTAINED BY A PROFESSIONAL SURVEYOR LICENSED IN THE STATE OF NEW MEXICO SHALL BE TAKEN AT THE VALVE OPERATING NUT. USE THE NAD 1983 NM STATE PLANE CENTRAL ZONE FOR X AND Y COORDINATES AND NAVD 1988 FOR Z COORDINATE.

CONSTRUCTION NOTES

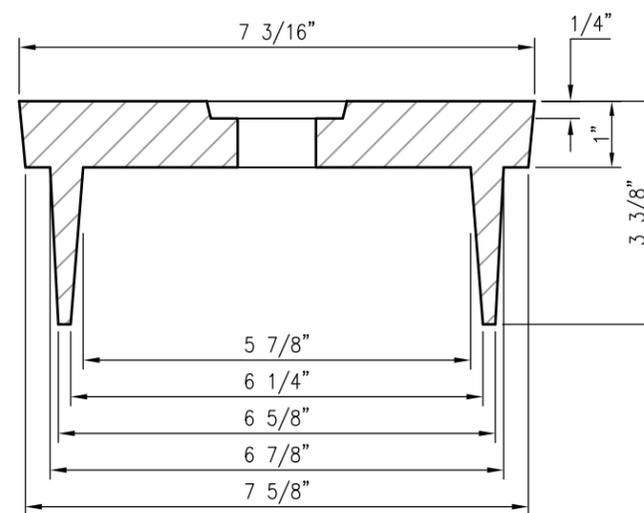
- A. RING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2328. INSTALL FIRE LINE RING AND COVER ON FIRE LINES PER STANDARD DRAWING 2329, AND NON-POTABLE RING AND COVER ON NON-POTABLE LINES PER DRAWING 2330.
- B. 12" DIAMETER POLYMER COATED STEEL PIPE CMP
- C. NEW OR EXISTING VALVE
- D. COMPACTED BACKFILL. SOIL OR BASE COURSE MATERIAL (95% COMPACTION). SEE SECTION 701
- E. CONCRETE COLLAR PER STANDARD DRAWING 2461.
 $f'_c = 4000$ psi
- F. TOP OF CONCRETE COLLAR SHALL BE STAMPED WITH WATERLINE SIZE AND DIRECTION. MINIMUM LETTER SIZE SHALL BE 3" IN HEIGHT. ADD THE LETTERS "NPW" FOR NON-POTABLE WATER VALVE INSTALLATIONS.
- G. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
- H. #4 REBAR PER STANDARD DRAWING 2461.



REVISIONS	WATER AUTHORITY
JAN. 2015	WATER VALVE BOX
	DWG. 2326
	JAN. 2013



SECTION
VALVE BOX RING



SECTION
VALVE BOX COVER

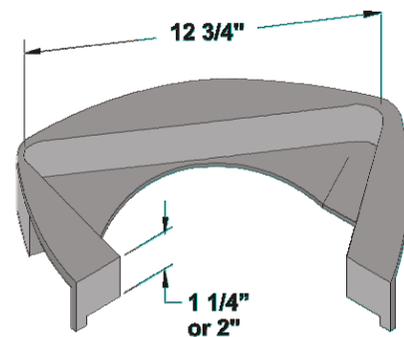
GENERAL NOTES — RING

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"R UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH: REMOVE EXCESS IRON AND FINIS.
6. THIS DETAIL DOES NOT APPLY FOR VALVE BOX RING AND COVER TO BE USED ON REUSE OR NON-POTABLE WATER SYSTEMS.
7. SEE STANDARD DRAWING 2329 FOR FIRE LINE RING AND COVER.
8. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

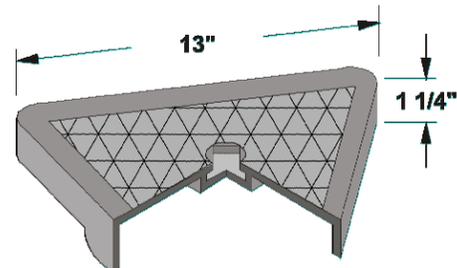
GENERAL NOTES — COVER

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"R UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH: REMOVE EXCESS IRON AND FINIS.
6. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

REVISIONS	WATER AUTHORITY
	<p>WATER RING AND COVER FOR VALVE BOX</p> <p>DWG. 2328</p> <p>JAN. 2013</p>



RISER RING



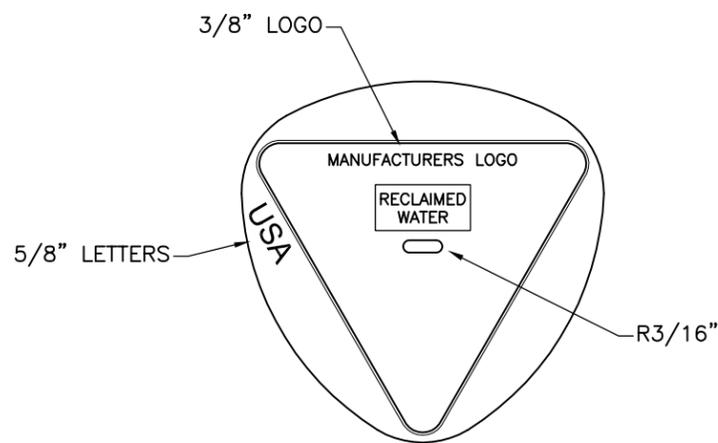
COVER

GENERAL NOTES – RING

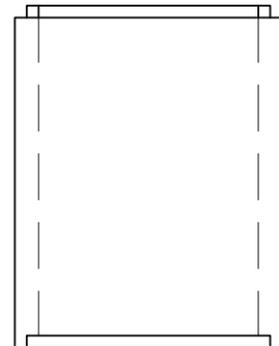
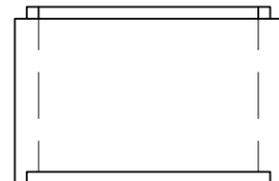
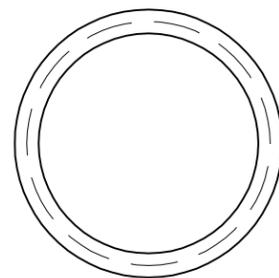
1. VALVE BOX RING DESIGNED TO ACCEPT A VALVE BOX COVER.
2. THE CASTING NUMBER, MANUFACTURER'S LOGO, DATE OF MANUFACTURE AND "USA" SHALL BE CAST IN A CONSPICUOUS LOCATION ON BOTH THE RING AND THE COVER.
3. FILLETS SHALL BE 1/4"R UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH: REMOVE EXCESS IRON AND FINIS.
6. THIS DETAIL DOES NOT APPLY FOR VALVE BOX RING AND COVER TO BE USED ON POTABLE WATER SYSTEMS.
7. SEE STANDARD DRAWING 2328 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"R UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH: REMOVE EXCESS IRON AND FINIS.
6. ONLY PRODUCTS CAST IN THE USA AND ON THE WATER AUTHORITY APPROVED PRODUCTS LIST WILL BE ACCEPTABLE.



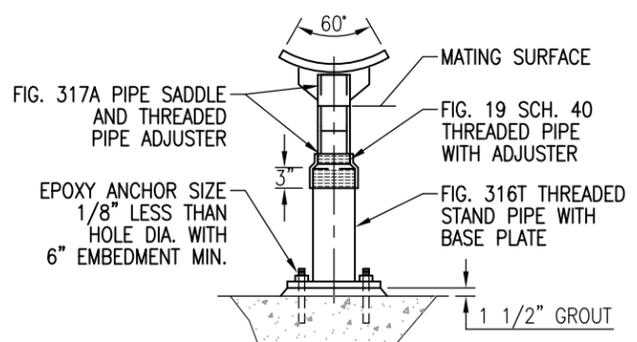
RING AND COVER ASSEMBLY



CONCRETE EXTENSION

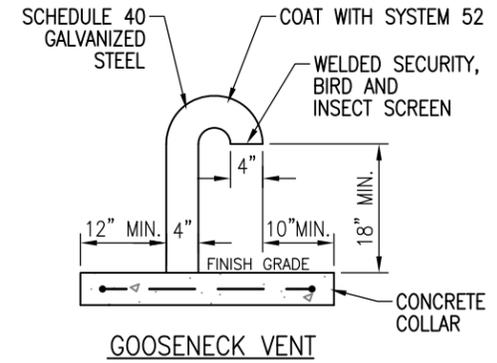
REULEAUX TRIANGLE

REVISIONS	WATER AUTHORITY
	NON-POTABLE WATER RING AND COVER FOR VALVE BOX
	DWG. 2330 JAN. 2015



NOTE:
ALL COMPONENTS BY TOLCO OR ENGINEER APPROVED EQUAL. GALVANIZE AFTER FABRICATION. DESIGN TO MATCH PIPE OR VALVE DIAMETER. PROVIDE SHOP DRAWINGS SPECIFIC TO EACH VALVE AND PIPE SIZE.

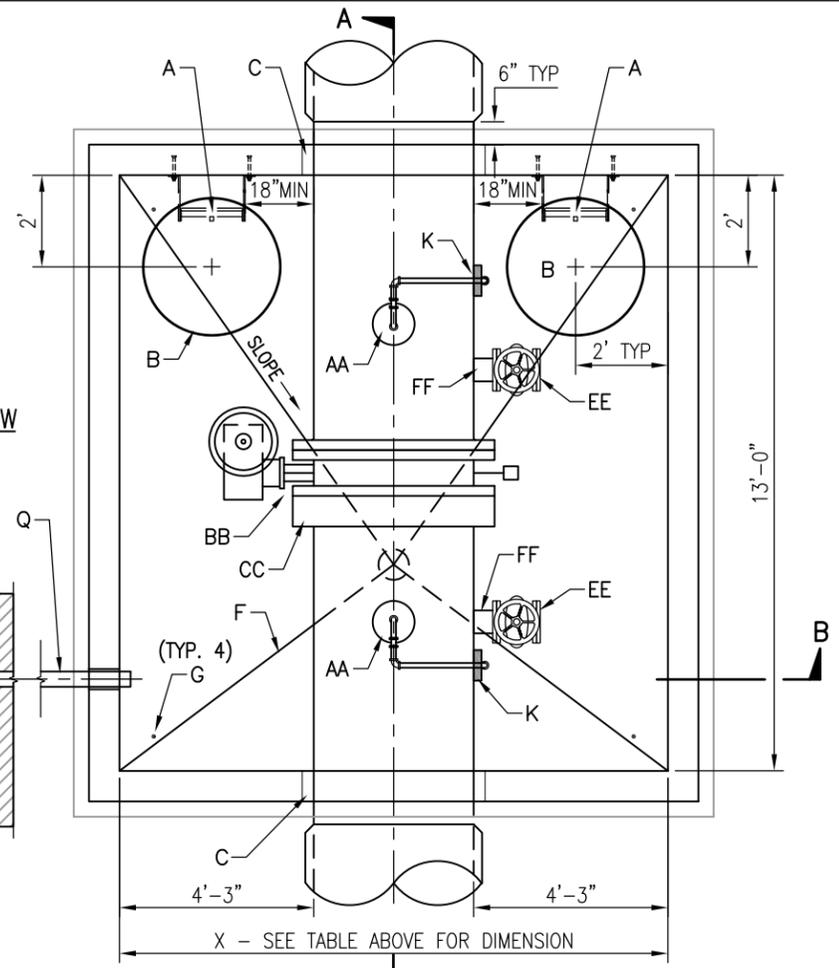
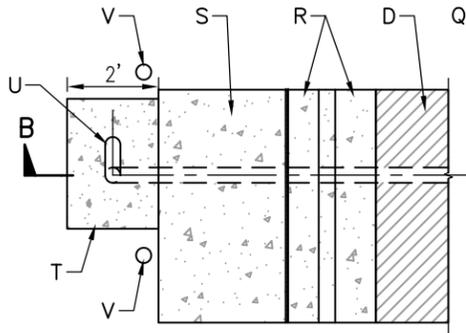
PIPE SUPPORT



GOOSENECK VENT

Ø	X
24"	10'-6"
30"	11'-0"
36"	11'-6"
42"	12'-0"
48"	12'-6"

PLAN VIEW



GENERAL NOTES

1. VALVE VAULT SHALL NOT BE USED IN GROUND WATER CONDITIONS OR IN CLAY SOILS.
2. BACKFILL MATERIAL SHALL BE CLASS II OR CLASS III IN ACCORDANCE WITH SPECIFICATION SEC. 501.
3. PIPE DIA. VARIES FROM 24" DIA. TO 48" DIA.
4. HOLD CENTERLINE OF TAP LOCATIONS AND CENTER OF BUTTERFLY VALVE.
5. INTERIOR PIPING SHALL BE STEEL PIPE, DUCTILE IRON PIPE, OR CCP.
6. CONCRETE VAULT SHALL BE PRECAST WITH REMOVABLE CONCRETE LID.
7. LOCATE ACCESS MANHOLE FRAME, ADJUSTMENT RINGS AND COVER ON REMOVABLE CONCRETE LID TO ALLOW LID REMOVAL WITH THESE APPURTENANCES IN PLACE.
8. SUBMIT SHOP DRAWINGS OF VAULT, PIPING, AND AIR AND VACUUM VALVE ASSEMBLY PRIOR TO VAULT FABRICATION AND PIPE INSTALLATION.
9. OWNER WILL SELECT PAINT COLORS FOR PIPING AND APPURTENANCES INSIDE VALVE VAULTS.
10. ENGINEER SHALL SUBMIT A PROJECT SPECIFIC DETAIL AND A FLOOR AND PIPING PLAN.

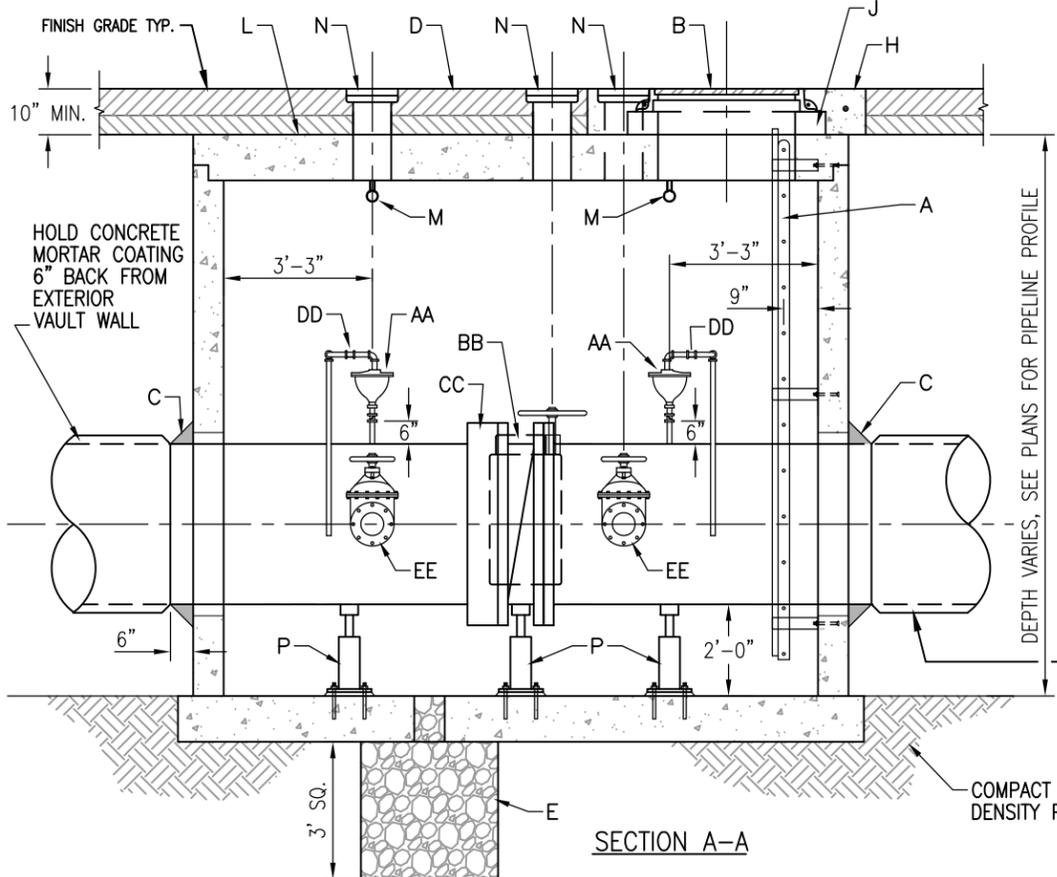
CONSTRUCTION NOTES

- A. 1'-4" ALUMINUM LADDER. INSTALL LADDER-UP SAFETY POST MODEL LU-4 BY BILCO.
- B. 36" DIAMETER MANHOLE FRAME AND COVER MARKED "WATER" PER STANDARD DRAWING 2110.
- C. LINK SEAL, GROUT PENETRATION AROUND EXTERIOR CIRCUMFERENCE.
- D. REMOVE AND REPLACE PAVEMENT.
- E. 4" DIAMETER DRAIN WITH 3'x3'x3" GRAVEL DRAIN POCKET WITH CLEAN GRAVEL, ASTM C33, NO. 57. LINE DRAIN POCKET WITH GEOTEXTILE FABRIC, CLASS 3.
- F. SLOPE VAULT FLOOR TO DRAIN TYPICAL.
- G. RECESSED LIFTING EYE, 4 REQUIRED. FLUSH W/TOP OF CONCRETE LID.
- H. CONCRETE COLLAR PER STANDARD DRAWING 2461.
- J. ADJUSTMENT RINGS PER STANDARD DRAWINGS 2461 AND 2111.
- K. UNISTRUT PIPE BRACKET TYPICAL FOR COMBINATION AIR VALVE VENT. (2 EACH TYPICAL)
- L. TACK COAT.
- M. 1 1/4" STAINLESS STEEL THREADED EYEBOLT, CENTERED ON COMBINATION AIR VALVE ASSEMBLY. 1300 POUNDS LIFT CAPACITY.
- N. RING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2328.
- P. PIPE SUPPORT, SEE DETAIL THIS SHEET.
- Q. COORDINATE VENT PIPE ORIENTATION DURING SHOP DRAWING SUBMITTAL.
- R. REMOVE AND REPLACE CURB AND GUTTER PER STANDARD DRAWING 2415A.
- S. REMOVE AND REPLACE SIDEWALK PER STANDARD DRAWING 2430.
- T. CONCRETE COLLAR WITH 1-#4 REBAR EACH WAY CENTERED. SEE GOOSENECK VENT DETAIL THIS SHEET.
- U. 4" DIA GOOSENECK VENT. SCHEDULE 40 GALVANIZED STEEL, SEE DETAIL THIS SHEET.
- V. STATIONARY PIPE BOLLARD, SEE STANDARD DRAWING 2250.
- AA. COMBINATION AIR VALVE ASSEMBLY (FL). SIZE PER PLANS. ROUTE AIR RELEASE VENT PIPING AS SHOWN AND SUPPORT WITH UNISTRUT. TERMINATE 3.5' ABOVE FF.
- BB. AWWA C504 BUTTERFLY VALVE (FLxFL) WITH 3" OPERATING NUT AND HANDWHEEL. ORIENT SHAFT HORIZONTAL. VERIFY VALVE ACTUATOR ORIENTATION AND CLEARANCES PRIOR TO PIPE AND VAULT FABRICATION.
- CC. MEGAFLANGE
- DD. UNION TYPICAL, ALL AIR AND VACUUM RELEASE VALVES
- EE. 6" GATE VALVE WITH HANDWHEEL (FLxFL), 2" WELDED OPERATING NUT AND BLIND FLANGE (24" TO 30" PIPING). 8" GATE VALVE WITH HANDWHEEL (FLxFL), 2" WELDED OPERATING NUT AND BLIND FLANGE (36" TO 48" PIPING).
- FF. TAPPING SADDLE OR FLANGED OUTLET
- GG. 4" DIA SCHEDULE 40 GALVANIZED STEEL FOR VAULT VENT. ROUTE TO BACK OF SIDEWALK, SEE SECTION B-B, THIS SHEET.

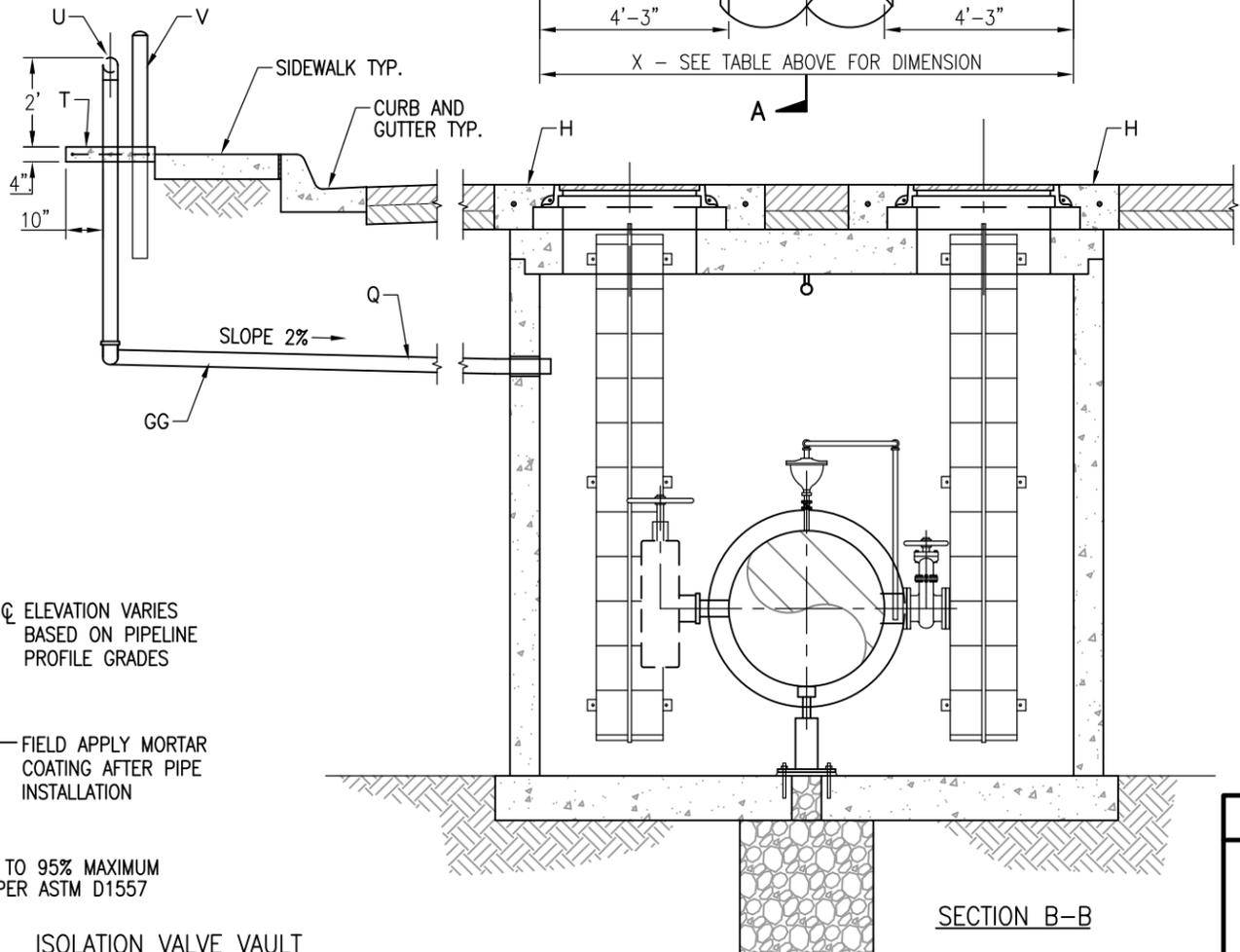
PRECAST VAULT DESIGN CRITERIA

MATERIAL:
STRUCTURAL CONCRETE $f'_c = 4000$ psi
REINFORCING SHALL BE ASTM 615 GRADE 60
CONCRETE SHALL MEET SPECIFICATION SEC. 512 AND SEC. 101

LOADING:
VAULT LID = HS25 LIVE LOAD PLUS 1.3 IMPACT PLUS DEAD LOADS
VAULT WALLS EQUIVALENT FLUID PRESSURE = 60 psf
SURCHARGE (VEHICLE) = 2 FEET
VAULT BASE SLAB ALLOWABLE BEARING PRESSURE = 1500 psf



SECTION A-A



SECTION B-B

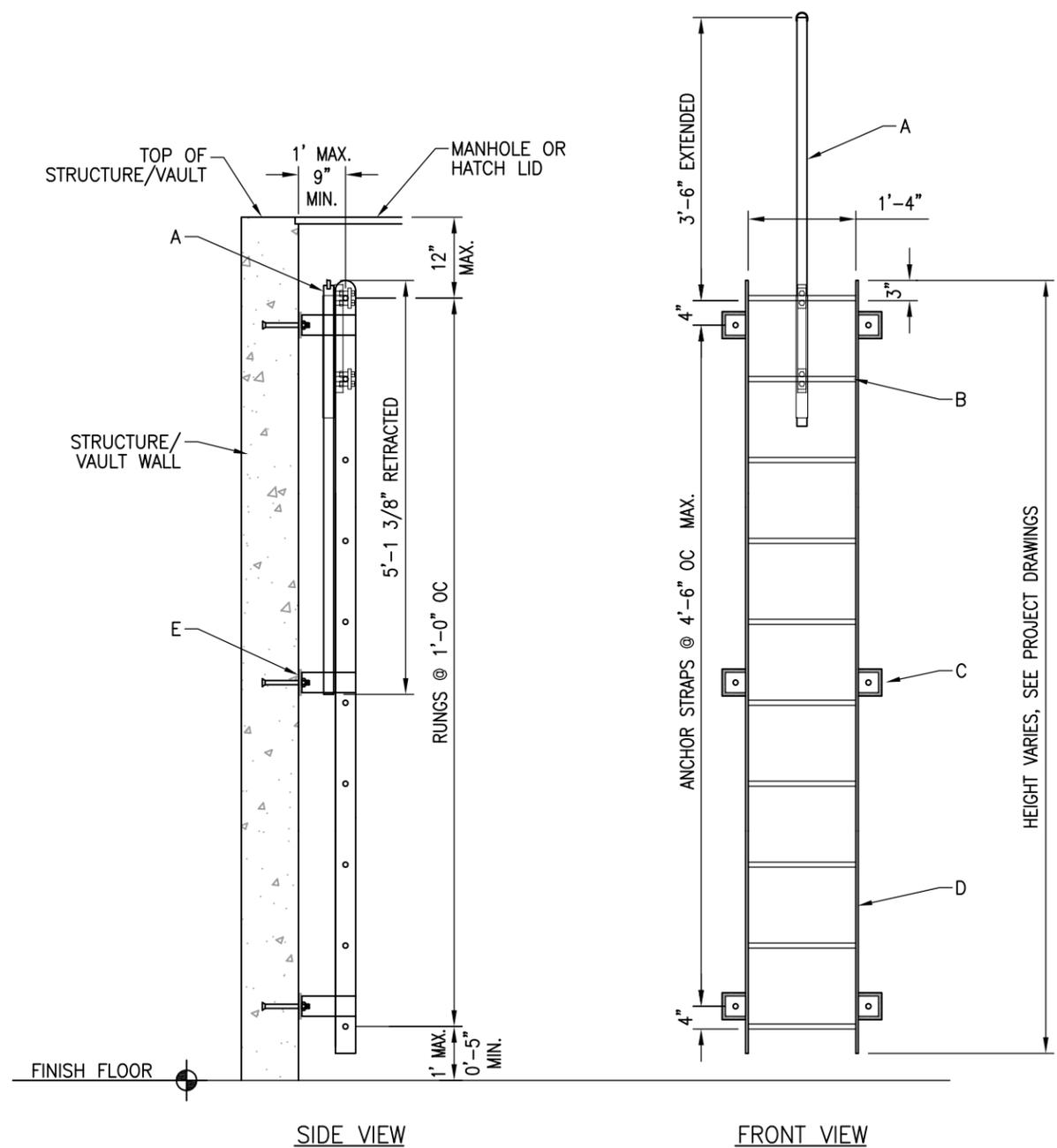
Ⓢ ELEVATION VARIES BASED ON PIPELINE PROFILE GRADES

FIELD APPLY MORTAR COATING AFTER PIPE INSTALLATION

COMPACT TO 95% MAXIMUM DENSITY PER ASTM D1557

ISOLATION VALVE VAULT

REVISIONS	WATER AUTHORITY
	WATER LARGE DIAMETER ISOLATION VALVE VAULT
	DWG. 2334 JAN. 2013



LADDER DETAIL

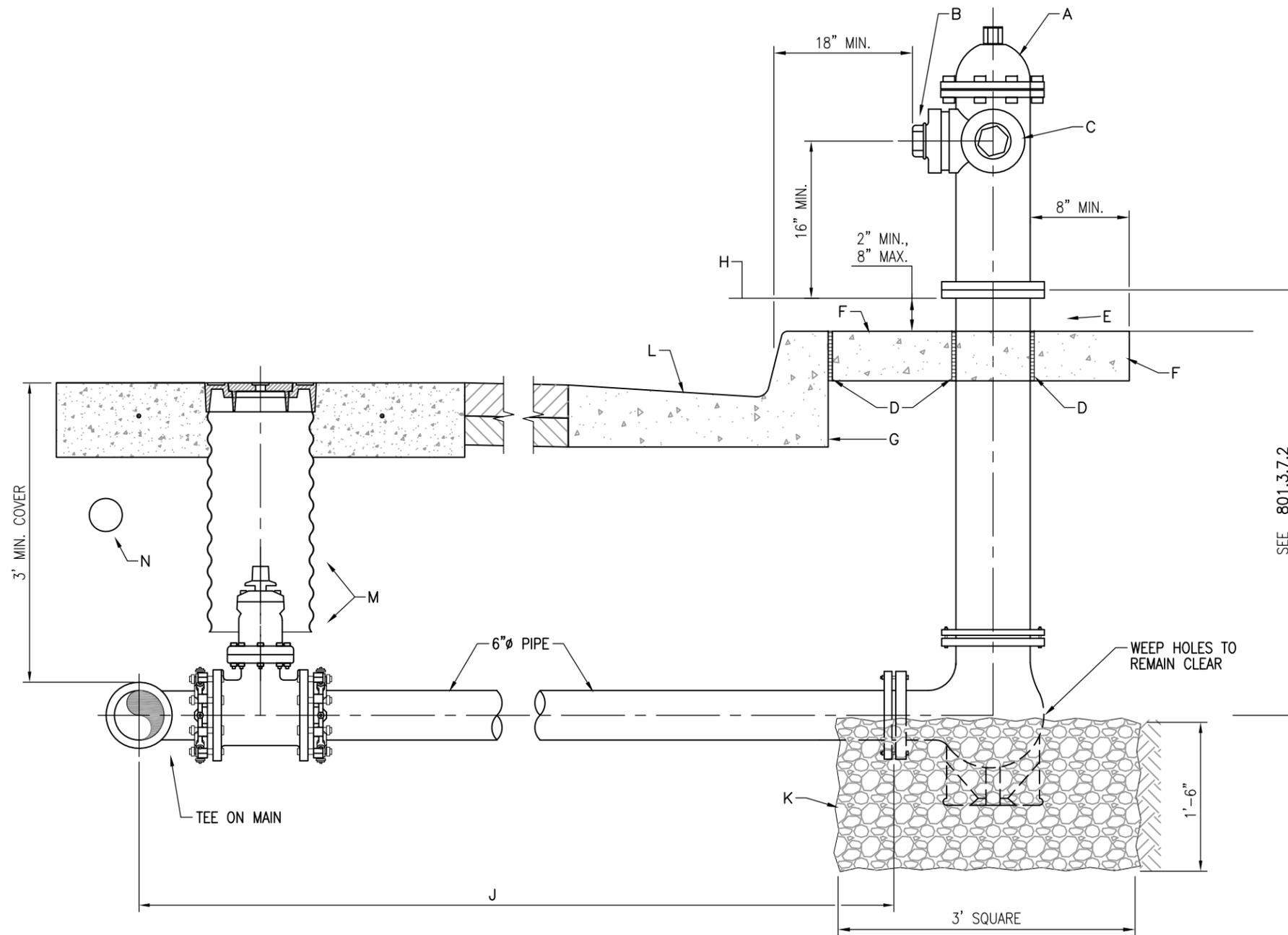
GENERAL NOTES

1. LADDER AND SUPPORTS SHALL BE ALUMINUM.
2. DIMENSIONS SHOWN ARE MINIMUMS. CONTRACTOR SHALL COORDINATE DESIGN AND DIMENSIONS OF THE LADDER AND SUPPORTS WITH THE MANUFACTURER AND OWNER.
3. THE LADDER MANUFACTURER SHALL DESIGN THE LADDER FOR THE SPECIFIC INSTALLATION CONDITIONS SUCH AS DEPTH, TYPE OF VAULT OR MANHOLE, OFFSET DISTANCE FROM THE WALL AND OTHER PROJECT SPECIFIC ASPECTS SHOWN ON THE PROJECT DRAWINGS AND TECHNICAL SPECIFICATIONS. THE LADDER DESIGN SHALL COMPLY WITH OSHA REQUIREMENTS.

CONSTRUCTION NOTES

- A. LADDER UP SYSTEM, MODEL LU-4 BY BILCO OR APPROVED EQUAL.
- B. 1 1/8"Ø MAX. RUNGS WITH 1" WIDE NON-SLIP GRIP SURFACE @ 12" OC, PLUG WELD TO SIDE BARS (TYP.)
- C. 3" x 3/8" FLAT WALL STRAP MIN. WITH 1/2"Ø x 4" LONG STAINLESS STEEL EXPANSION ANCHORS. COAT ANCHORS WITH BITUMEN WHERE IN CONTACT WITH ALUMINUM
- D. 3" x 3/8" SIDEBARS MIN. ROUND ALL CORNERS SMOOTH 1/8" RADIUS
- E. INSTALL CHLOROPRENE PADS BETWEEN CONCRETE WALL AND ALUMINUM LADDER SUPPORTS

REVISIONS	WATER AUTHORITY
JAN. 2015	WATER LADDER DETAIL
	DWG. 2335 JAN. 2011



SECTION

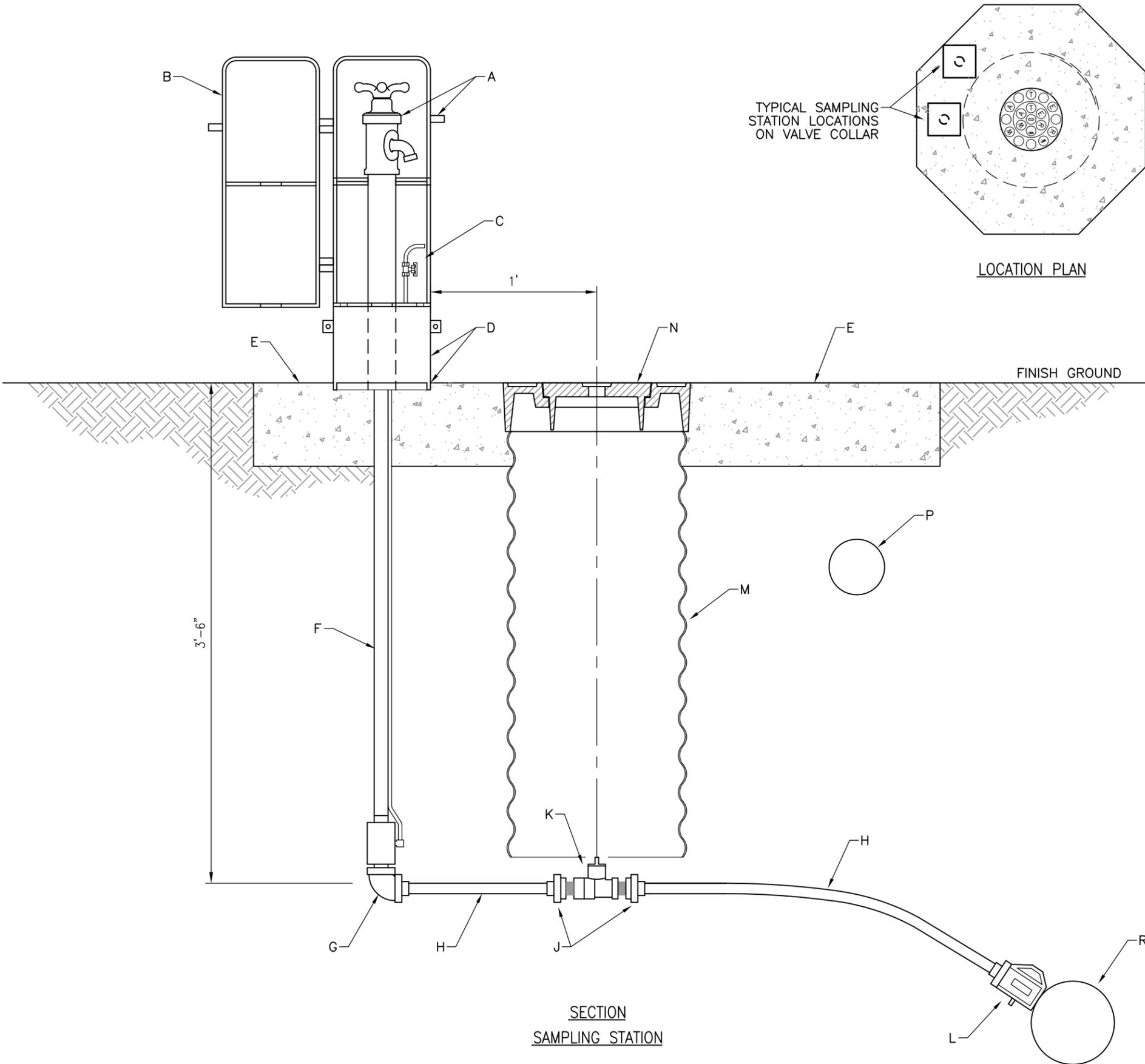
GENERAL NOTES

1. NO OBSTRUCTIONS WILL BE PERMITTED WITHIN 3'-0" OF FIRE HYDRANT.
2. HYDRANT LEG SHALL BE VALVED.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR SETTING THE TOP FLANGE OF THE FIRE HYDRANT TO THE CONTROLLED ELEVATION LINE.
4. FOR FIRE HYDRANT LOCATIONS, SEE STANDARD DRAWING 2347.
5. WHEN NEW OR EXISTING SIDEWALK ABUTS 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 FIVE FOOT CLEAR PEDESTRIAN PATH PER ADA STANDARD.
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 FLANGE. USE THE NAD 1983 NM STATE PLANE CENTRAL ZONE FOR X AND Y COORDINATES AND NAVD 1988 FOR Z COORDINATE.

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. MATCH SIDEWALK SLOPE, OR SLOPE 1/4" PER FOOT.
- F. 3'x3'x6" SQUARE CONCRETE PAD, TO BE CONSTRUCTED AROUND FIRE HYDRANT'S CENTER LINE WHEN NOT LOCATED WITHIN SIDEWALK OR CONCRETE AREA. CONCRETE PER SEC. 101 EXTERIOR CONCRETE, f'c=3000 psi @ 28 DAYS.
- G. BACK OF CURB
- H. CONTROLLED ELEVATION LINE, LEVEL IN ALL DIRECTIONS.
- J. USE OF RESTRAINED JOINTS IS MANDATORY. ALL FIRE HYDRANT LEG PIPING AND FITTINGS INCLUDING TEE ON MAIN SHALL BE RESTRAINED JOINT.
- K. 3'x3'x18" GRAVEL DRAIN POCKET WITH CLEAN GRAVEL, ASTM C33, NO. 57. LINE DRAIN POCKET WITH GEOTEXTILE FABRIC NMDOT CLASS 3.
- L. STANDARD CURB AND GUTTER. IF NO CURB AND GUTTER IS PRESENT, BOLLARDS ARE REQUIRED. FOR OTHER TYPES 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 2326.
- N. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.

REVISIONS	WATER AUTHORITY
	WATER FIRE HYDRANT INSTALLATION
	DWG. 2340 MAY 2013



GENERAL NOTES

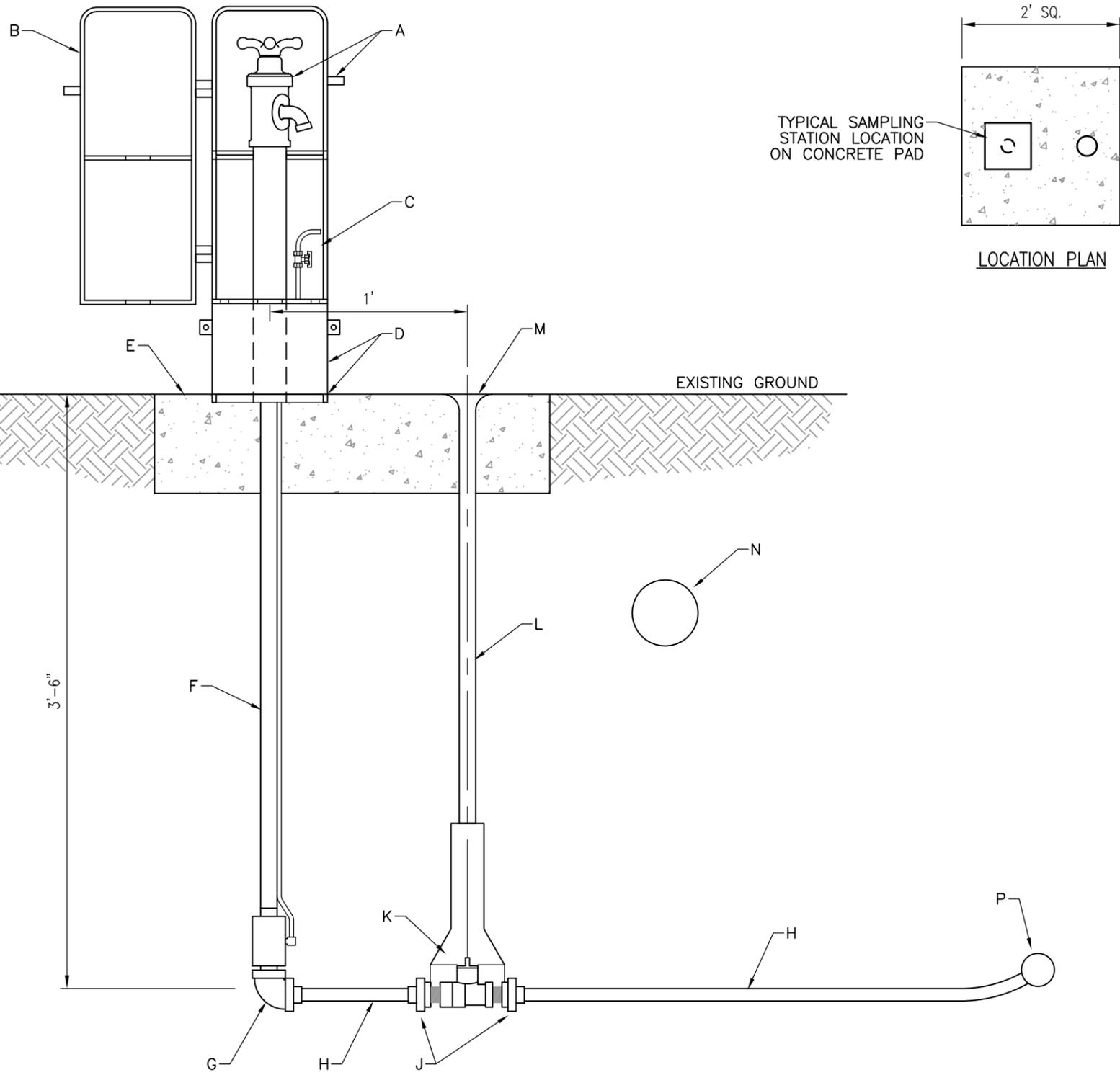
1. SAMPLING STATIONS SHALL BE BURIED TO A DEPTH OF 3'-6" ±1", WITH A 1" MIP INLET, AND A 1" FIP DISCHARGE.
2. ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE, ALUMINUM-CAST HOUSING.
3. ALL WORKING PARTS SHALL BE BRASS AND BE REMOVABLE FROM ABOVE GROUND WITH NO DIGGING.

CONSTRUCTION NOTES

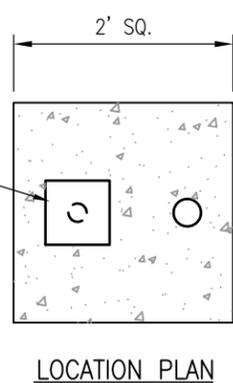
- A. ECLIPSE #88 SAMPLING STATION*, OR WATER AUTHORITY APPROVED EQUAL. SEE LOCATION PLAN TO LEFT FOR PLACEMENT ON A STANDARD VALVE BOX CONCRETE COLLAR.
- B. ALUMINUM HOUSING (SHOWN OPEN)
- C. COPPER VENT TUBE WITH 1/4" PET COCK (OPTIONAL 1/4" BALL VALVE) FOR DRAINING WITH MANUAL HAND PUMP
- D. ALUMINUM BASE. EMBED IN CONCRETE MIN. 1/4" MAX. 1/2"
- E. 6" THICK CONCRETE COLLAR. f'c = 3000 psi IN UNPAVED AREAS. USE STANDARD 9" COLLAR IF VALVE IS INSTALLED AWAY FROM SAMPLING STATION IN PAVED AREA.
- F. 1" GALVANIZED STEEL EXTERIOR CASING PIPE
- G. 3/4" MIPT x COPPER ELBOW
- H. 3/4" DOMESTIC COPPER K-TYPE, OR WATER AUTHORITY APPROVED EQUAL.
- J. 3/4" MIPT x COPPER FLARE. FORD C28-33 OR WATER AUTHORITY APPROVED EQUAL.
- K. CURBSTOP PER WATER AUTHORITY APPROVED PRODUCTS LIST.
- L. CORPORATION STOP PER WATER AUTHORITY APPROVED PRODUCTS LIST.
- M. VALVE BOX PER STANDARD DRAWING 2326.
- N. RING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2328.
- P. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
- R. CONNECT TO MAIN

* THE ECLIPSE #88 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 (SEE DETAIL TO LEFT). THE ECLIPSE #88 IS FULLY SERVICEABLE FROM ABOVE GROUND.

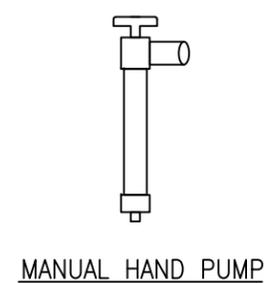
REVISIONS	WATER AUTHORITY
JAN. 2015	WATER SAMPLING STATION
	DWG. 2341
	JAN. 2013



TYPICAL SAMPLING STATION LOCATION ON CONCRETE PAD



EXISTING GROUND



SECTION
SAMPLING STATION - ALTERNATE
(FOR INFILL LOCATIONS)

GENERAL NOTES

1. SAMPLING STATIONS SHALL BE BURIED TO A DEPTH OF 3'-6" ±1", WITH A 1" MIP INLET, AND A 1" FIP 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 #88 SAMPLING STATION*, OR WATER AUTHORITY APPROVED EQUAL.
- B. ALUMINUM HOUSING (SHOWN OPEN)
- C. COPPER VENT TUBE WITH 1/4" PET COCK (OPTIONAL 1/4" BALL VALVE) FOR DRAINING WITH MANUAL HAND PUMP
- D. ALUMINUM BASE. EMBED IN CONCRETE MIN. 1/4" MAX. 1/2"
- E. 2'x2'x6" THICK CONCRETE PAD. f'c = 3000 psi
- F. 1" GALVANIZED STEEL EXTERIOR CASING PIPE
- G. 3/4" MIPT x COPPER ELBOW
- H. 3/4" DOMESTIC COPPER K-TYPE, OR WATER AUTHORITY APPROVED EQUAL.
- J. 3/4" MIPT x COPPER FLARE. FORD C28-33 OR WATER AUTHORITY APPROVED EQUAL.
- K. CURBSTOP PER WATER AUTHORITY APPROVED PRODUCTS LIST.
- L. VALVE BOX / CURB BOX EXPANDABLE
- M. APPROVED PRODUCT VALVE BOX OR CURB BOX - FORD PL EA2-30-50 OR WATER AUTHORITY APPROVED EQUAL.
- N. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
- P. CONNECT TO SERVICE LINE

* THE ECLIPSE #88 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 (SEE DETAIL TO LEFT). THE ECLIPSE #88 IS FULLY SERVICEABLE FROM ABOVE GROUND.

REVISIONS	WATER AUTHORITY
JAN. 2015	WATER SAMPLING STATION ALTERNATE
	DWG. 2341-A JAN. 2013

GENERAL NOTES

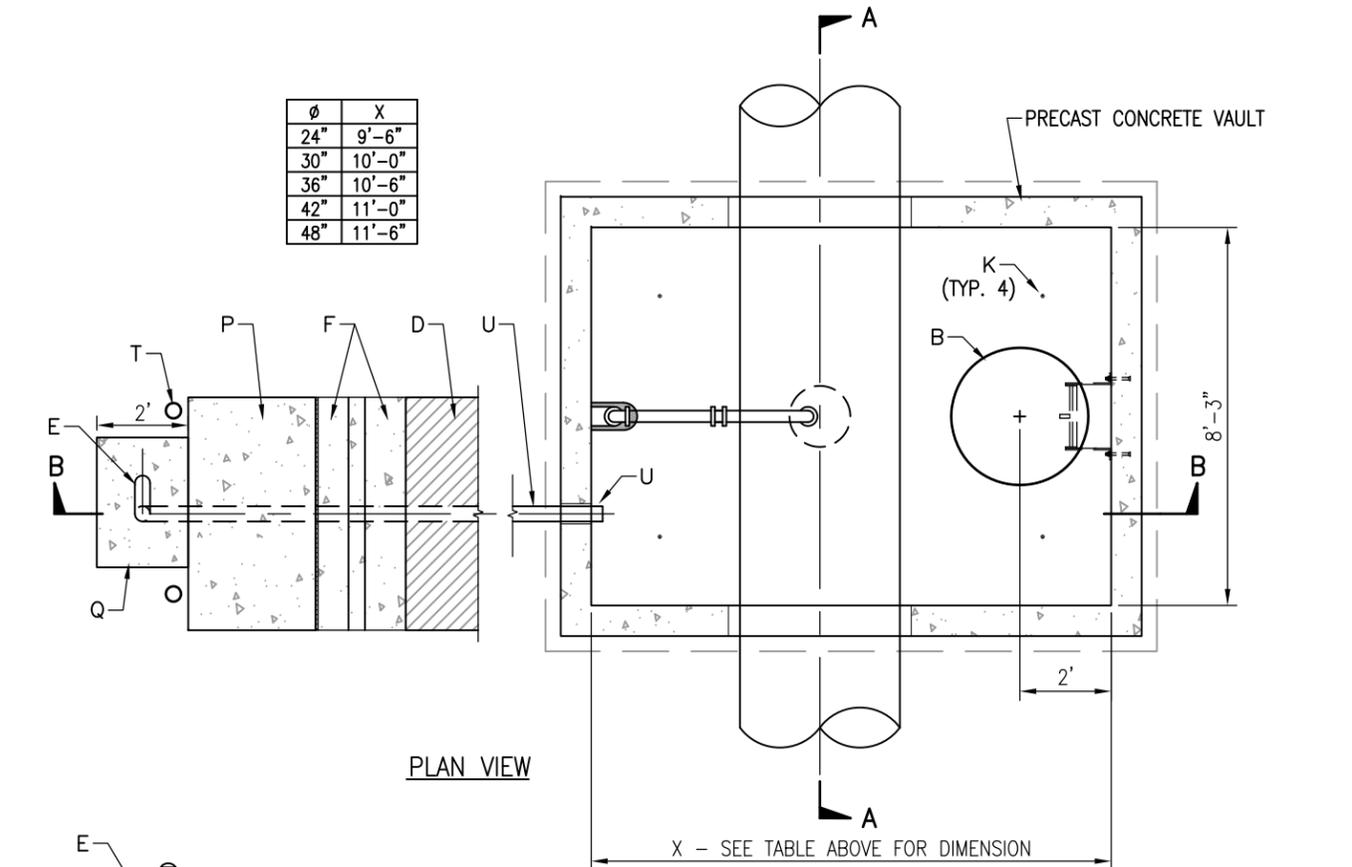
- INTERIOR PIPING SHALL BE STEEL PIPE, DUCTILE IRON PIPE, OR CONCRETE CYLINDER PIPE. ALL CAV PIPING AND FITTINGS SHALL BE SCHEDULE 40 THREADED GALVANIZED STEEL.
- CONCRETE VAULT SHALL BE PRECAST WITH REMOVABLE CONCRETE LID.
- LOCATE ACCESS MANHOLE FRAME, ADJUSTMENT RINGS AND COVER ON REMOVABLE CONCRETE LID TO ALLOW LID REMOVAL WITH THESE APPURTENANCES IN PLACE.
- SUBMIT SHOP DRAWINGS OF VAULT AND PIPING, AIR AND VACUUM VALVE ASSEMBLY PRIOR TO VAULT FABRICATION AND PIPE INSTALLATION.
- OWNER WILL SELECT PAINT COLORS FOR PIPING AND APPURTENANCES INSIDE VALVE VAULTS.
- BACKFILL MATERIAL SHALL BE CLASS II OR CLASS III IN ACCORDANCE WITH SPECIFICATION SEC. 501.
- ENGINEER SHALL SUBMIT A PROJECT SPECIFIC DETAIL AND A FLOOR AND PIPING PLAN.

CONSTRUCTION NOTES

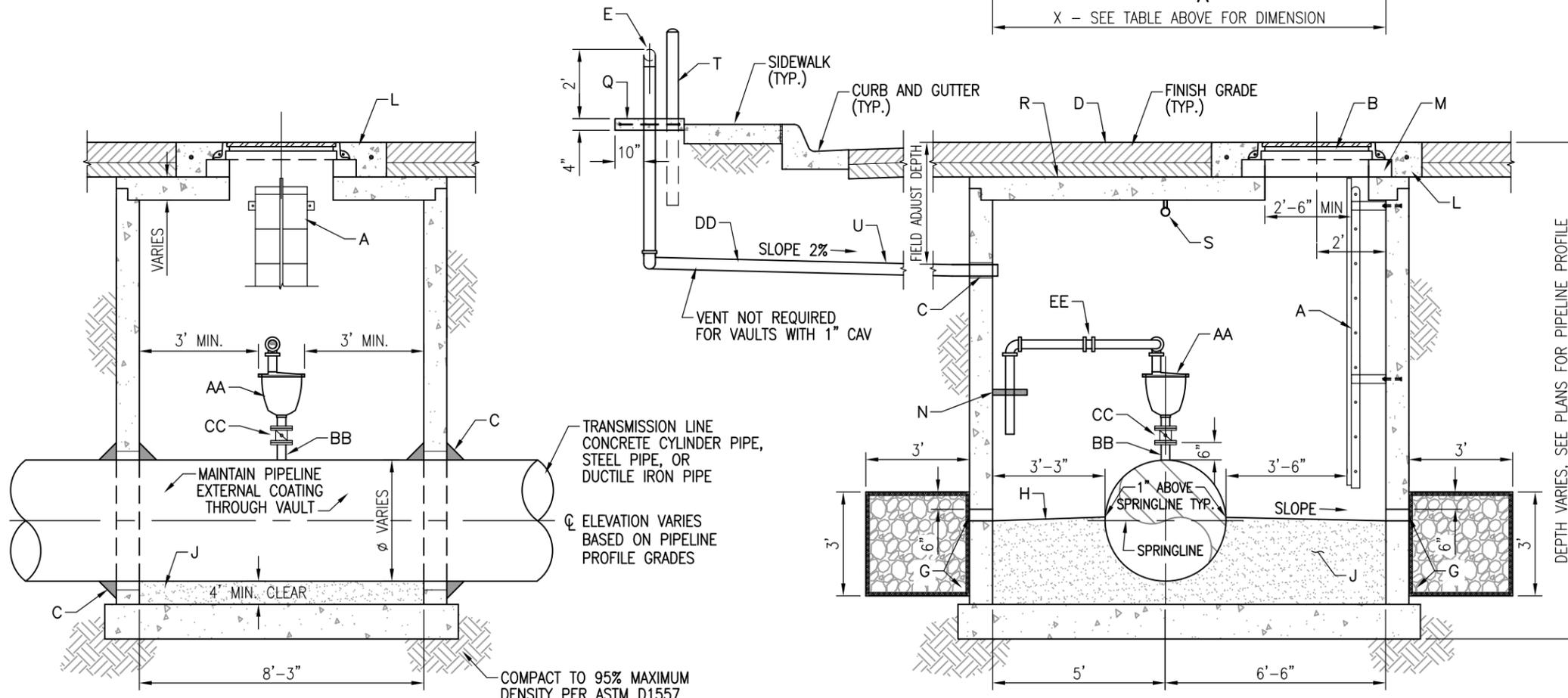
- 1'-4" ALUMINUM LADDER. PROVIDE AND INSTALL LADDER-UP SAFETY POST MODEL LU-4 BY BILCO.
- 36" DIAMETER MANHOLE FRAME AND COVER MARKED "WATER" PER STD DWG 2310.
- LINK SEAL. GROUT PENETRATION AROUND EXTERIOR CIRCUMFERENCE.
- REMOVE AND REPLACE PAVEMENT.
- GOOSENECK VENT, 4"Ø SCHEDULE 40 GALVANIZED STEEL. SEE STANDARD DWG 2334
- REMOVE AND REPLACE CURB AND GUTTER PER STANDARD DRAWING 2415A.
- 4" DIAMETER DRAIN WITH 3'x3'x3" GRAVEL DRAIN POCKET WITH CLEAN GRAVEL, ASTM C33, NO. 57. LINE DRAIN POCKET WITH GEOTEXTILE FABRIC NMDOT CLASS 3.
- SLOPE VAULT FLOOR TO DRAIN TYPICAL.
- CAST IN PLACE CONCRETE FILL.
- RECESSED LIFTING EYE, 4 REQUIRED. FLUSH W/TOP OF CONCRETE LID.
- CONCRETE COLLAR PER STD DWG 2461.
- ADJUSTMENT RINGS (IF NEEDED) PER STANDARD DRAWINGS 2461 AND 2111.
- UNISTRUT PIPE BRACKET TYPICAL FOR COMBINATION AIR VALVE VENT.
- REMOVE AND REPLACE SIDEWALK PER STD DWG 2430.
- CONCRETE COLLAR WITH 1~#4 REBAR EACH WAY CENTERED. SEE STD DWG 2334
- TACK COAT.
- 1 1/4" STAINLESS STEEL THREADED EYEBOLT, CENTERED ON COMBINATION AIR VALVE ASSEMBLY. 1300 POUNDS LIFT CAPACITY.
- STATIONARY PIPE BOLLARD, SEE STD DWG 2250.
- COORDINATE VENT PIPE ORIENTATION FOR EACH VAULT LOCATION DURING SHOP DRAWING SUBMITTAL.
- COMBINATION AIR VALVE ASSEMBLY, SIZE PER PLANS.
- TAPPING SADDLE OR FLANGED OUTLET.
- GATE VALVE. SIZE THE SAME AS COMBINATION AIR AND VACUUM RELEASE VALVE.
- 4" SCHEDULE 40 GALVANIZED STEEL PIPE FOR VAULT VENT. ROUTE TO BACK OF SIDEWALK. FIELD ADJUST DEPTH AND ROUTING TO AVOID EXISTING UTILITIES.
- UNION TYPICAL, ALL AIR AND VACUUM RELEASE VALVES.

PRECAST VAULT DESIGN CRITERIA	
MATERIAL:	
STRUCTURAL CONCRETE	$f'_c = 4000$ psi
REINFORCING	SHALL BE ASTM 615 GRADE 60
CONCRETE	SHALL MEET SPECIFICATION SEC. 512 AND SEC. 101
LOADING:	
VAULT LID	= HS25 LIVE LOAD PLUS 1.3 IMPACT PLUS DEAD LOADS
VAULT WALLS	EQUIVALENT FLUID PRESSURE = 60 psf
SURCHARGE (VEHICLE)	= 2 FEET
VAULT BASE SLAB	ALLOWABLE BEARING PRESSURE = 1500 psf

Ø	X
24"	9'-6"
30"	10'-0"
36"	10'-6"
42"	11'-0"
48"	11'-6"



PLAN VIEW

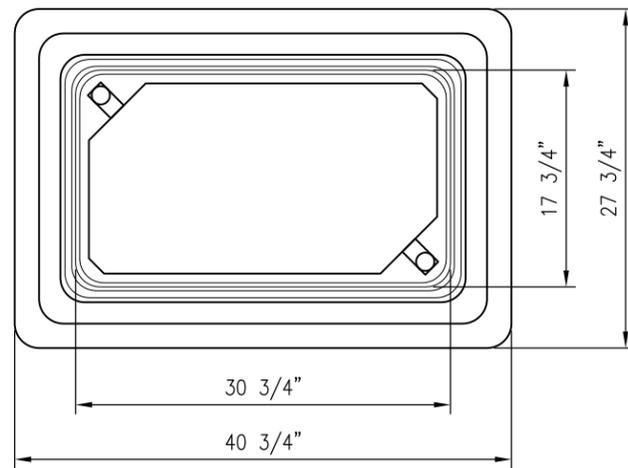


SECTION A-A

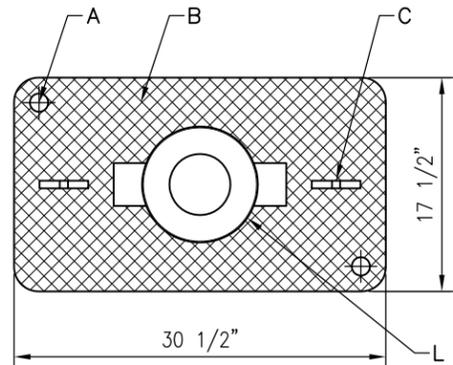
COMBINATION AIR AND VACUUM RELEASE VALVE (CAV) VAULT

SECTION B-B

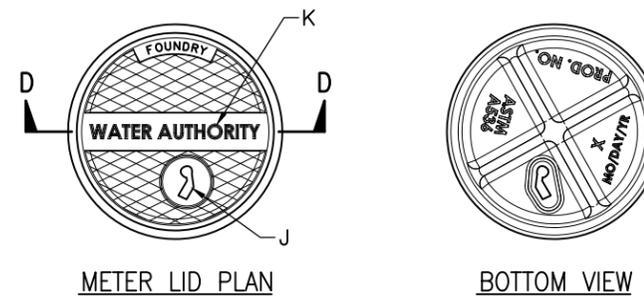
REVISIONS	WATER AUTHORITY
	COMBINATION AIR AND VACUUM RELEASE VALVE VAULT
	DWG. 2350 JAN. 2013



TOP VIEW

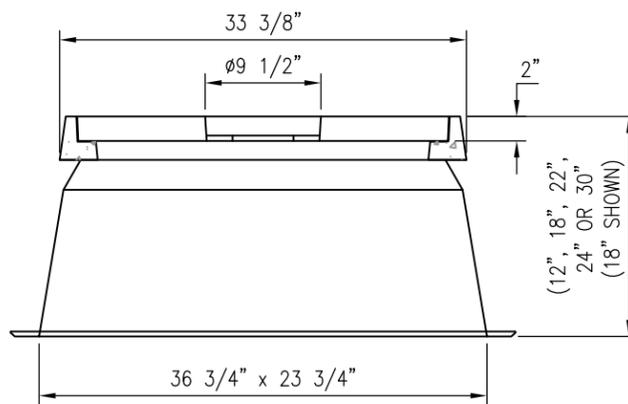


COVER

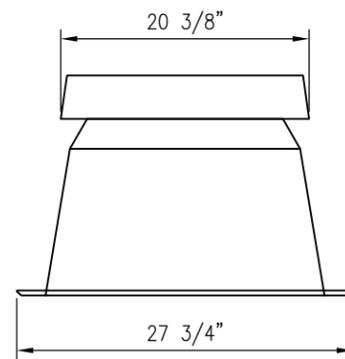


METER LID PLAN

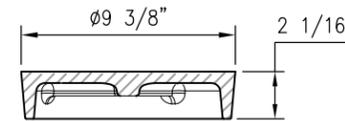
BOTTOM VIEW



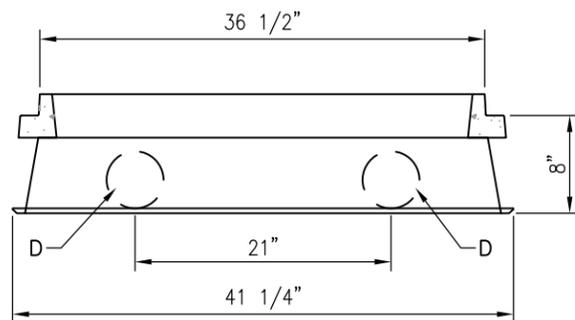
BOX & COVER SECTION



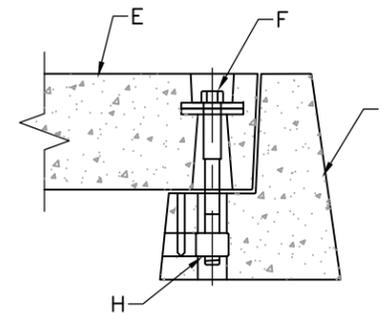
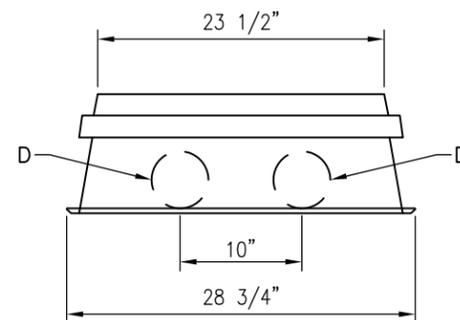
END VIEWS



SECTION D-D



EXTENSION SECTION



COVER BOLTDOWN OPTION

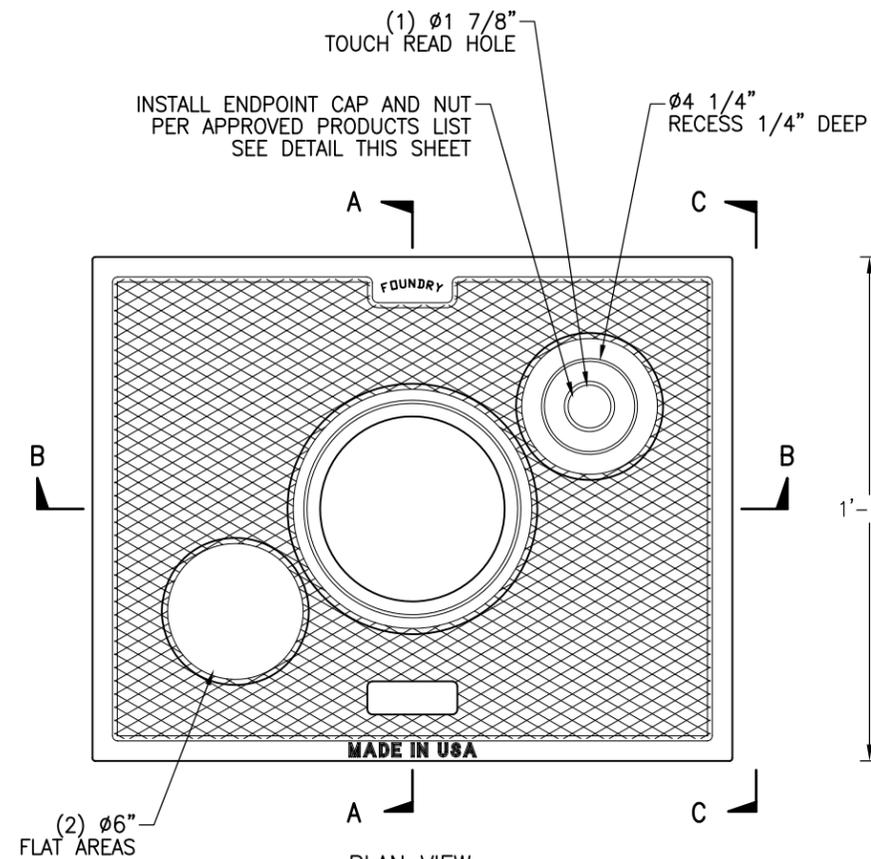
GENERAL NOTES

1. BOX AND COVER MATERIAL: FIBERGLASS REINFORCED POLYMER CONCRETE AND FIBERGLASS REINFORCED POLYMER. LID MATERIAL: DUCTILE IRON
2. STANDARD COLOR: CONCRETE GRAY (OPTIONAL COLORS ARE AVAILABLE FOR COVER AND COLLAR).
3. FLARED WALL BOXES ARE NESTABLE.

CONSTRUCTION NOTES

- A. COVER BOLTDOWN OPTION
- B. SKID RESISTANT SURFACE
- C. 5/8" x 4" LIFTING SLOTS
- D. OPTIONAL KNOCKOUTS OR TERMINATORS
- E. COVER
- F. STAINLESS STEEL CAPTIVE BOLT
- G. BOX
- H. SELF-CENTERING CORROSION RESISTANT NUT
- J. METER LID KEYHOLE
- K. 1/2" RAISED LETTERING (FLUSH)
- L. LID

REVISIONS	WATER AUTHORITY
	<p>WATER METER BOX, COVER AND LID FOR 1 1/2" TO 2" METERS DWG. 2367 JAN. 2013</p>



INSTALL ENDPOINT CAP AND NUT
PER APPROVED PRODUCTS LIST
SEE DETAIL THIS SHEET

(1) $\phi 1 \frac{7}{8}$ "
TOUCH READ HOLE

$\phi 4 \frac{1}{4}$ "
RECESS 1/4" DEEP

A

C

B

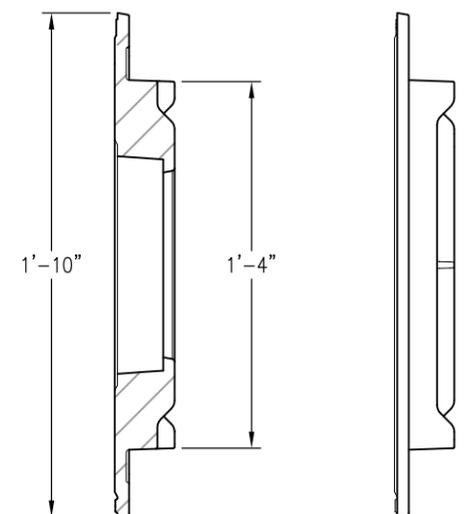
B

MADE IN USA

(2) $\phi 6$ "
FLAT AREAS

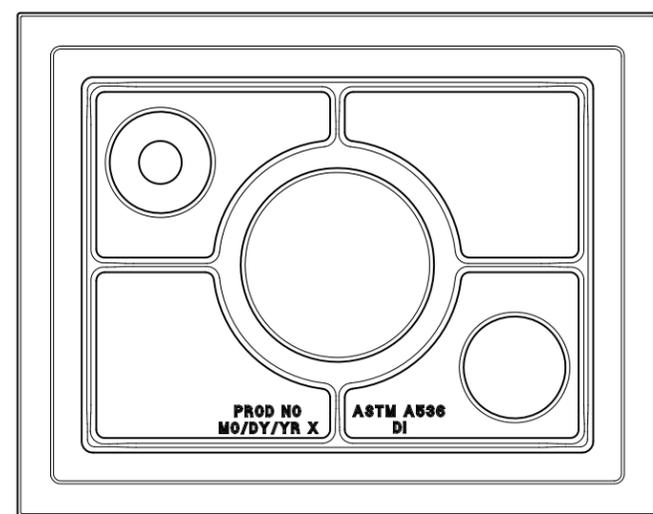
PLAN VIEW

BOX COVER FOR 3/4" TO 1" METERS

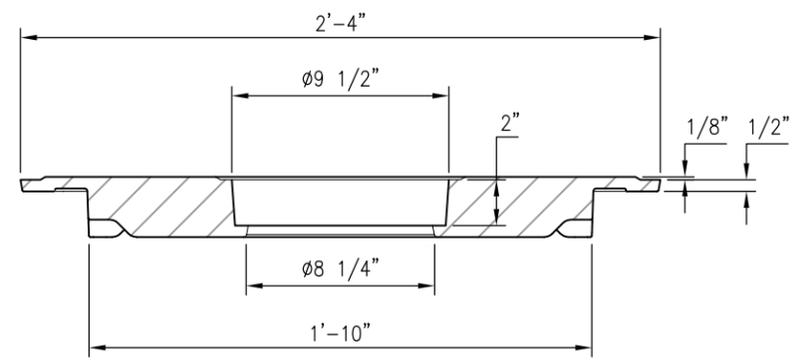


SECTION A-A

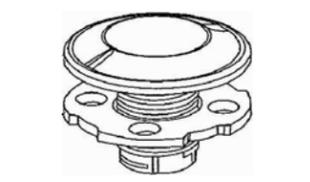
SECTION C-C



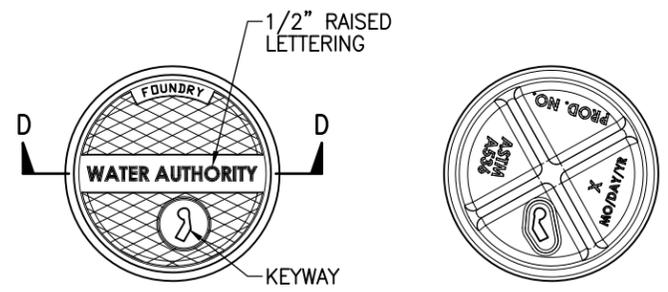
BOTTOM VIEW



SECTION B-B

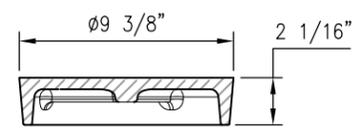


ENDPOINT CAP AND NUT



METER LID PLAN

BOTTOM VIEW

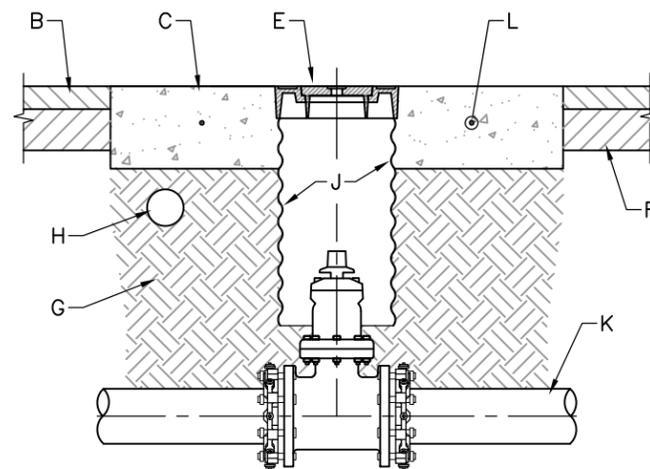
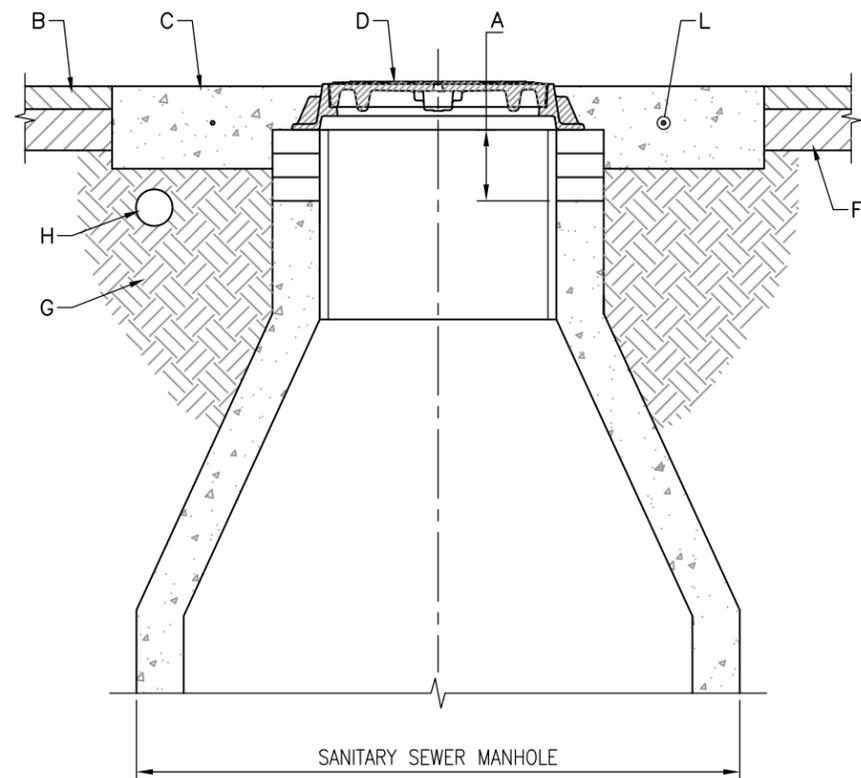


SECTION D-D

GENERAL NOTES

1. TO BE USED IN SIDEWALKS, MOUNTABLE CURB OR IN UNPAVED 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.

REVISIONS	WATER AUTHORITY
	<p>WATER METER BOX COVER AND LID FOR 3/4" TO 1" METERS DWG. 2368</p>
	JAN. 2013



GENERAL NOTES

1. GRADE ADJUSTMENTS OF MANHOLE FRAME AND COVER SHALL BE MADE BY ADDING BRICK COURSES OR STEEL/CONCRETE ADJUSTMENT RINGS DIRECTLY UNDER THE FRAME. THE ADJUSTMENT MAY BE MADE IN THIS FASHION TO A MAXIMUM HEIGHT OF 24" FOR THE ADJUSTMENT BRICKS/RINGS. IF ADJUSTMENTS REQUIRE GREATER THAN A 24" ADJUSTMENT, THE CONE SHALL BE REMOVED, THE BARREL HEIGHT ADJUSTED AND CONE REPLACED. IF LESS THAN ONE COURSE OF BRICKS (6") IS REQUIRED, GROUT MAY BE USED. THE USE OF CONCRETE AND STEEL ADJUSTMENT RINGS IS PREFERRED.
2. ALL MATERIALS MUST COMPLY WITH THE CURRENT WATER AUTHORITY OR CITY APPROVED PRODUCTS LISTS.
3. NEW RINGS AND COVERS, REMOVAL AND REPLACEMENT OF CONCRETE COLLARS, INSTALLATION OF EMD'S AND THE INSTALLATION OF NEW POLYMER COATED CORRUGATED METAL PIPE FOR VALVE CANS SHALL BE CONSIDERED INCIDENTAL TO THE ADJUSTMENT PAY ITEM.
4. NEW RINGS AND COVERS WILL BE REQUIRED IF CURRENT RINGS AND COVERS DO NOT MEET CURRENT STANDARD SPECIFICATIONS.
5. INSTALLATION MUST COMPLY WITH THE FOLLOWING STANDARD DRAWINGS:
 - 5.1. 2109 - SANITARY SEWER MANHOLE COVERS
 - 5.2. 2210 - STORM MANHOLE COVERS
 - 5.3. 2128 - VACUUM SEWER VALVE RINGS AND COVERS
 - 5.4. 2310 - WATER MANHOLE COVERS
 - 5.5. 2328 - WATER VALVE AND HYDRANT RINGS AND COVERS
 - 5.6. 2329 - FIRE LINE 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. EMD PLACEMENT MUST COMPLY WITH THE FOLLOWING:
 - 7.1. SANITARY SEWER MANHOLES - EMD SHALL BE PLACED 1 FOOT UPSTREAM OF THE MANHOLE OVER THE MAIN.
 - 7.2. WATER VALVE AND SANITARY SEWER VALVE CANS - EMD SHALL BE PLACED 1 FOOT NORTH OR WEST (DEPENDING ON LINE DIRECTION) OF THE VALVE OVER THE WATER MAIN OR VACUUM SEWER MAIN.
 - 7.3. STORM DRAIN MANHOLES - EMD'S ARE NOT REQUIRED AND SHALL NOT BE PLACED AT STORM DRAIN MANHOLES.

CONSTRUCTION NOTES

- A. BRICKS OR ADJUSTMENT RINGS, 24" MAXIMUM
- B. OVERLAY
- C. NEW PORTLAND CEMENT CONCRETE COLLAR ($f'_c = 4000$ PSI) PER STANDARD DRAWING 2461. ALL ADJUSTMENTS SHALL BE INSTALLED WITH A NEW CONCRETE COLLAR. THE OLD COLLAR(S) SHALL BE REMOVED AND DISPOSED OF PROPERLY. REFER TO STANDARD DRAWINGS 2101, 2102, 2181, 2326, AND 2461 FOR PROPER LINE IDENTIFICATION ON THE COLLAR.
- D. MANHOLE FRAME AND COVER PER STANDARD DRAWINGS 2109, 2210 AND 2310
- E. RING AND COVER FOR VALVE BOX. REFER TO STANDARD DRAWINGS 2128, 2328, 2329, AND 2330.
- F. EXISTING PAVING SECTION
- G. SUBGRADE SHALL BE COMPACTED TO 95% (ASTM)
- H. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170. EMD'S ARE REQUIRED ON ALL WATER AND SANITARY SEWER ADJUSTMENT, THEY ARE NOT TO BE INSTALLED ON STORM DRAIN MANHOLES.
- J. POLYMER COATED STEEL PIPE CMP
- K. WATER OR SEWER LINE
- L. #4 REBAR PER STANDARD DWG. 2461

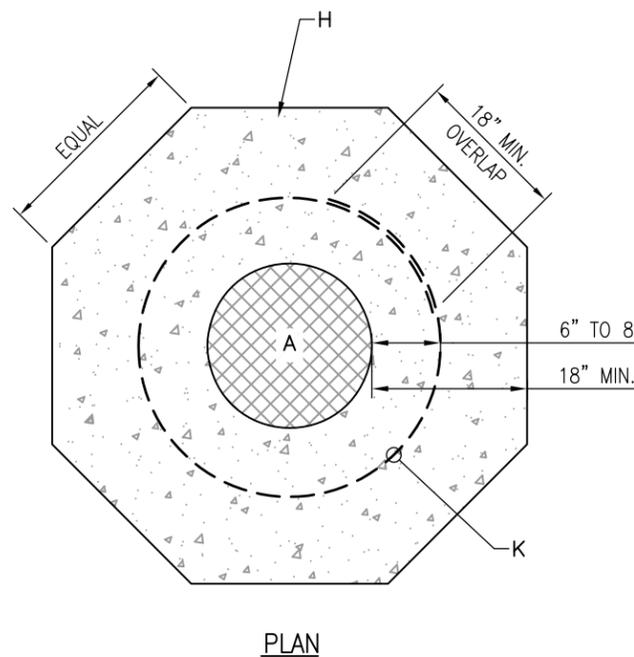
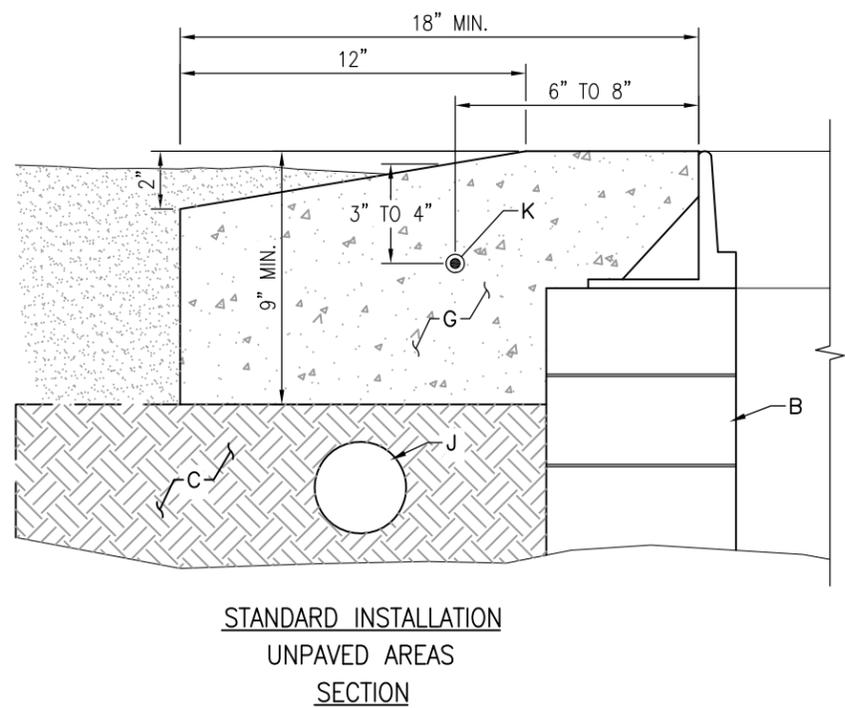
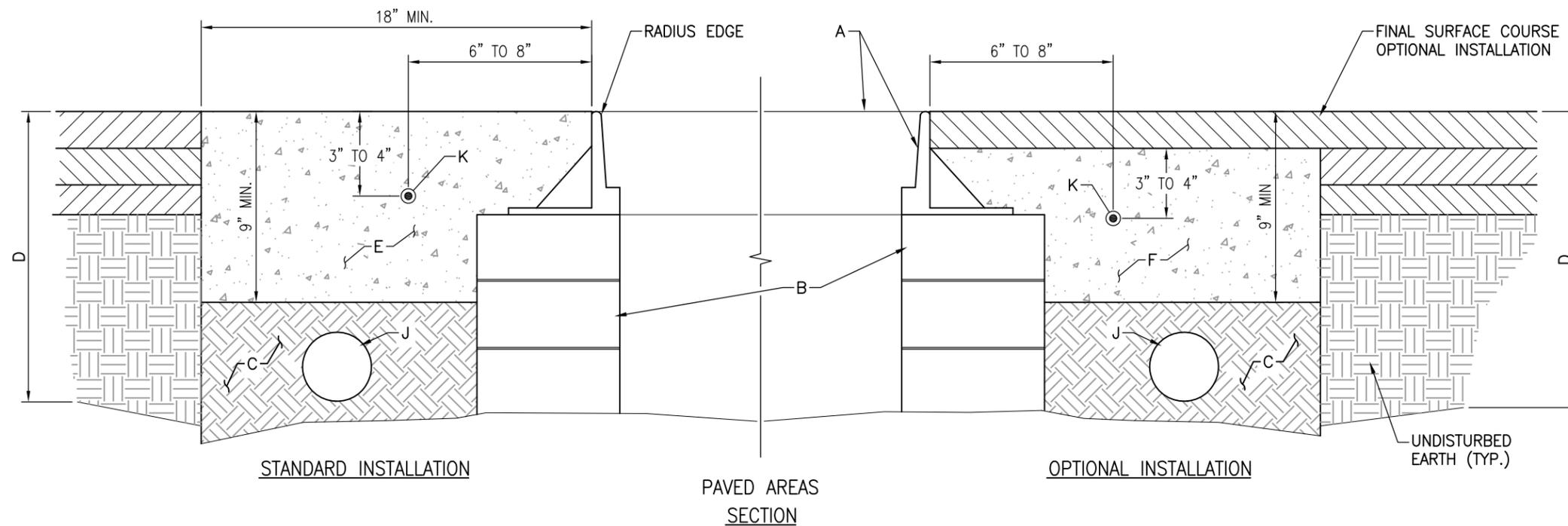
REVISIONS	CITY OF ALBUQUERQUE
JAN. 2015	PAVING MANHOLE AND VALVE BOX REGRADING
	DWG. 2460 JAN. 2013

GENERAL NOTES

1. ALL MATERIALS MUST COMPLY WITH THE CURRENT WATER AUTHORITY OR CITY APPROVED PRODUCTS LISTS.
2. CONCRETE COLLAR SHALL BE PORTLAND CEMENT CONCRETE ($f'_c = 4000$ PSI)

CONSTRUCTION NOTES

- A. MANHOLE, OR RING AND COVER FOR VALVE BOX PER WATER AUTHORITY STANDARDS.
- B. MANHOLE CONE/EXTENSION OR CMP.
- 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 APPLICATIONS.
- G. CONCRETE COLLAR IN UNPAVED AREAS. SET RING 1" ABOVE GRADE AND SLOPE CONCRETE DOWN AS SHOWN TO 1" BELOW GRADE.
- H. SANITARY SEWER MANHOLE INSTALLATIONS SHALL HAVE CONCRETE COLLAR STAMPED WITH LINE SIZE AND FLOW DIRECTION ARROWS PER STANDARD DRAWINGS 2101 AND 2102. SEE STANDARD DRAWING 2181 FOR FORCEMAIN SEWER VALVE INSTALLATIONS, AND STANDARD DRAWINGS 2326, 2329, AND 2330 FOR WATER VALVE INSTALLATIONS.
- J. ELECTRONIC MARKER DEVICE (EMD) REQUIRED FOR ALL SANITARY SEWER VALVES AND MANHOLES, AND WATER VALVES. SEE STANDARD SPECIFICATION SECTION 170.
- K. #4 REBAR FORMED INTO RING. EMBED 3" TO 4" IN CONCRETE, AND INSTALL 6" TO 8" FROM EDGE OF MANHOLE FRAME OR VALVE BOX RING. PROVIDE 18" MIN. OVERLAP AS SHOWN.



REVISIONS	CITY OF ALBUQUERQUE
JAN. 2015	MANHOLE/VALVE CONCRETE COLLAR DETAIL
	DWG. 2461 JAN. 2013

SECTION 1001
LANDSCAPE IRRIGATION

1001.1 GENERAL

1001.1.1 SCOPE

Work under this section consists of the installation and/or renovation of an underground irrigation system as shown on the drawings and as specified hereafter. The CONTRACTOR performing this work shall furnish all labor, equipment, materials, and permits necessary for the completion of the system, except those specified to be furnished by others. Unless otherwise specified or indicated on the drawings, or authorized by the LANDSCAPE ARCHITECT. The construction of the irrigation system shall include the furnishing, installing, and testing of all pipe, fittings, valves, heads, controllers, wires, air release and vacuum valves, backflow preventers inlet and discharge piping, automatic drain valves, manual drain valves, valve boxes, and all other components pertinent to the drawings and specifications of this system. The CONTRACTOR shall perform all trenching, excavating, boring, backfilling, compacting, concrete pouring, electrical work, welding, and any other work necessary for the completion of the project.

1001.1.2 APPLICABLE STANDARDS & REFERENCES

1001.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1001.1.2.2 American Society for Testing and Materials (ASTM) Standard Specifications, Latest Edition:

A-53/M	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
D-1784	Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds.
D-1785	Specification for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120.
D-1875	Test Method for Density of Adhesives in Fluid Form.
D-2241	Specification for Polyvinyl Chloride (PVC) Pressure-Rated Pipe.
D-2466	Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.
D-2467	Specification for Socket-Type Polyvinyl Chloride (PVC) Plastic Pipe Fittings, schedule 80.
D-2564	Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings.
D-2672	Specification for Joints for IPS PVC Pipe Using Solvent Cement
D-2774	Recommended Practices Underground Installation Thermoplastic

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Pressure Piping.

- D-2855 Recommended Practice for Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.
 - D-3139 Specification for Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals.
 - F-402 Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
 - F-656 Specification for Primers for Use in Solvent Cement Joints of Polyvinyl Chloride (PVC) Plastic Pipe and Fittings
- 1001.1.2.3 American Society of Mechanical Engineers (ASME) Standards, Latest Edition:
- B1 Screws and Pipe Threads
 - B16 Pipes and Fittings
 - B18 Fasteners

1001.1.3 SUBMITTALS

1001.1.3.1 THIS PUBLICATION - Section 1502 - Submittals

1001.1.3.2 PRODUCT DATA

1001.1.3.2.1 For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories. Clearly identify on each submitted sheet by highlighting the specific product being submitted for approval. Failure to clearly identify the specific product being submitted will result in a rejection for the entire submittal. No substitutions of material or procedures shall be made concerning these documents without the written consent of the LANDSCAPE ARCHITECT.

1001.1.3.3 EXISTING STATIC PRESSURE VERIFICATION

1001.1.3.3.1 The CONTRACTOR shall verify actual static pressure at the designated point of connection prior to construction. In the event that the actual static pressure varies from the pressure noted on the plans, the CONTRACTOR shall notify the LANDSCAPE ARCHITECT for any necessary design modifications.

1001.1.3.4 CLOSEOUT SUBMITTALS

1001.1.3.4.1 Operation and Maintenance Data: For irrigation controllers and automatic control valves; to be included in operation and maintenance manuals.

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LANDSCAPE IRRIGATION

1001.1.4 RECORD DRAWINGS

- 1001.1.4.1 The CONTRACTOR in conjunction with the LANDSCAPE ARCHITECT, shall provide and keep up to date a complete set of "as-built" drawings which shall be corrected daily to show all changes in the location of heads, controllers, backflow preventers, valves, drains, meters, points of connection, wire splice points, pipe, drip equipment and wire routing and other changes that may have been made from the original drawings and specifications as provided to him. All gate valves, manual drains, wire splices, automatic and manual valve locations, controllers, power supply, and mainline piping shall be shown with actual measurements to reference points so they may be easily located in the field.
- 1001.1.4.2 At the time of final acceptance the CONTRACTOR shall furnish to the OWNER a reproducible "as-built" record drawing(s) prepared by a qualified drafts-person showing the entire completed irrigation system. The CONTRACTOR shall also provide and install in each of the controller pedestals on the project a legible reduction, laminated in plastic, layout drawing of the irrigation system that the controller operates with each valve zone color-coded. In addition to the charts for the controller vaults, the CONTRACTOR shall provide two additional laminated, color coded reductions of the layout drawing of the irrigation system for the OWNER'S records.

1001.2 MATERIALS

1001.2.1 GENERAL

- 1001.2.1.1 All materials shall be new and without flaws or defects of any type and shall be the best of their class and kind. All materials shall be of the brands and types noted on the plans or as specified herein, or approved as equal by the LANDSCAPE ARCHITECT in accordance with Section 6.
- 1001.2.1.2 The irrigation system was designed around equipment manufactured by specific companies as a standard. Approved as equal equipment by other manufacturers may be used only with the approval of the LANDSCAPE ARCHITECT and the OWNER prior to the opening of bids as stipulated in the Contract Documents.

1001.2.2 RECLAIMED WATER DESIGNATION

- 1001.2.2.1 Where irrigation systems use reclaimed water, all products including valve boxes, lateral and main line pipe, etc. where applicable and/or required by local code shall have the reclaimed water purple color designation.

1001.2.3 PIPES, AND FITTINGS

- 1001.2.3.1 Comply with requirements in the plans for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

SECTION 1001

LANDSCAPE IRRIGATION

- 1001.2.3.2 Galvanized-Steel Pipe: Galvanized pipe shall be used for above ground connections to; backflow prevention device assemblies and booster pumps as shown on the plans and details. Pipe shall be hot dip galvanized continuous welded, seamless, Schedule 40 conforming to applicable current ASTM standards.
- 1001.2.3.3 PVC Pipe: All mainline plastic pipe which is 2 1/2 inches or smaller, shall be Schedule 40 PVC and shall conform to ASTM D 1785. All mainline pipe which is 3 inches or larger shall be bell gasket Class 200 PVC, Type1, Grade 2 conforming to ASTM D 1785 with a 200 psi pressure rating with flexible joints conforming to ASTM D 3139. All lateral lines plastic pipe shall be solvent weld schedule 40 PVC and shall conform to ASTM D 1785.
- 1001.2.3.4 PVC pipe shall be continuously marked with identification of the manufacture, type, class, size and material and shall conform to ASTM D 1784. Solvent joints shall meet ASTM D 2774 and D 2855 requirements. All plastic pipe shall be continuously and permanently marked with the following information: manufacturer's name, nominal pipe size, schedule, kind of material, kind of pipe, and the pressure rating in psi in accordance with the standards of the National Sanitation Foundation. Pipe shall be free of holes, foreign material, blisters, wrinkles, dents, or sun scald.
- 1001.2.3.5 PVC Fittings: Fittings on PVC mainlines larger than 3 inches shall be ring and gasket fittings. Ring and gasket joints at all changes in direction shall utilize mechanical joint restraints. In-line ring and gasket joints shall utilize mechanical joint restraints as recommended by the manufacturer. Fittings on PVC mainlines 2 1/2 inches in diameter and smaller shall be solvent weld PVC, Type 1, Cell Classification 12454-B, and shall comply with ASTM D 2466, D 2467, and D 1784.
- 1001.2.3.6 Risers and Threaded Nipples: All threaded PVC nipples and risers shall be Schedule 80 PVC pipe, or as specified in the plans.
- 1001.2.3.7 HDPE Pipe: HDPE pipe shall conform to ASTM D3350, Standard Specification for Polyethylene Plastic Pipe and Fittings Material. Heat fusion joints shall conform to ASTM D2657. HDPE pipe may be in pre-cut lengths or continuous coil. Pipe shall be free of holes, foreign material, blisters, wrinkles, or dents.
- 1001.2.4 PIPING JOINING MATERIALS
- 1001.2.4.1 Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick unless otherwise indicated; full-face or ring type unless otherwise indicated.
- 1001.2.4.2 Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- 1001.2.4.3 Solvent Cements, cleaners / primers, and compounds for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
- a. Primer shall conform to ASTM F 656 and meet NSF. Cement shall be low VOC, NSF approved, and meet ASTM D 2564. Primer and cement shall be rated for the type of pipe shown on the plans.
 - b. All threaded connections between metal to metal, PVC to metal, and PVC to

SECTION 1001

LANDSCAPE IRRIGATION

PVC shall be made using Spears Blue 75 thread sealant or Polytetrafluoroethylene (PTFE) thread seal tape. PTFE thread seal tape shall comply with MIL-T-27730A Specifications shall have a minimum thickness of 3.5 mils and shall be 99% pure PTFE. Thread sealing compound shall not be used on threaded connections between sprinkler and nipple or bubbler and nipple. Thread sealant or PTFE tape shall be used in accordance with manufacturer's installation instructions.

- c. "O"-ring gasket and pipe spigot ends shall be lubricated using the lubricant recommended or supplied by the pipe manufacturer.

1001.2.4.4 Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

1001.2.4.5 Joint Restraints: For use in changes in pipe size, changes in pipe direction, and in-line as recommended by the joint restraint manufacturer. Manufacturer and models shall be as specified on the plans.

1001.2.5 VALVES, VALVE BOXES, AND VALVE IDENTIFICATION TAGS

1001.2.5.1 Valves: Valves for use in electrically controlled automatic control systems shall be diaphragm activated and hydraulically operated solenoid valves as specified on the plans.

1001.2.5.2 Valve Boxes: Valve boxes shall be constructed of ABS (acrylonitrile butadiene styrene) plastic, color as shown on the plans, with rigid base and sides and shall be supplied with bolt lock cover secured with stainless steel bolts with box extensions as required. Valve box manufacturer and size shall be as specified on the plans.

1001.2.5.3 Valve Identification Tags: Valve Identification Tags shall be metal or polyurethane permanently marked with the valve number. Color: potable water; yellow / Non-potable water; purple. Tags shall be permanently attached to each remote control valve with tamper proof seals.

1001.2.6 SPRINKLER HEADS AND BUBBLERS

1001.2.6.1 Sprinkler heads and bubblers shall be as specified on the plans and shall be installed on swing joints or flexible nipple assembly as per the standard drawings as specified on the plans, or as otherwise approved by the LANDSCAPE ARCHITECT in writing.

1001.2.7 BACKFLOW PREVENTION

1001.2.7.1 Backflow preventers shall be as specified on plans and shall comply with all state and local cross connection regulations.

1001.2.8 PLASTIC BALL VALVES

1001.2.8.1 Plastic ball valves shall be as specified on the plans.

SECTION 1001
LANDSCAPE IRRIGATION

1001.2.9 BRASS/BRONZE/IRON BODY GATE VALVES

1001.2.9.1 Brass/Bronze/Iron Body Gate Valves shall be as specified on the plans.

1001.2.10 PRESSURE-REDUCING VALVES

1001.2.10.1 Pressure-Reducing Valves shall be as specified on the plans.

1001.2.11 QUICK COUPLERS

1001.2.11.1 Quick couplers shall be as specified on plans.

1001.2.12 FLOW SENSOR

1001.2.12.1 Flow sensor shall be as specified on the plans.

1001.2.13 DRIP IRRIGATION SPECIALTIES

1001.2.13.1 All drip irrigation equipment shall be as specified on the plans.

1001.2.14 CONTROLLERS AND WIRING

1001.2.14.1 Controllers shall be provided and installed as specified on the plans and/or standard drawings.

1001.2.14.2 Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two matching keys; include provision for grounding per plans and details.

1001.2.14.3 Wiring: UL 493, Type UF multi-conductor, with solid-copper conductors; insulated cable; suitable for direct burial.

- a. WIRE (120 VOLTS): Wire for the 120 volt wiring shall be solid copper (or stranded copper in larger wire sizes) underground feeder for direct burial and PVC insulated. Size of wire shall be No. 12 AWG.
- b. Low-Voltage, Wire (24 Volts) Branch-Circuit Cables: Wire for the 24 volt wiring shall be solid copper wire, PVC insulated; UL approved underground feeder wire for direct burial in ground. Common wires shall be No. 12, white, except as noted on drawings. The wire shall be supplied in either 500 feet or 2,500 feet rolls. Wiring between controllers and automatic control valves; No. 12 AWG minimum color-coded different from feeder-circuit-cable jacket color.
- c. Wire splicing materials: All wire splices shall be made watertight using wire connectors as specified on the plans. All wiring installed under sidewalks, roadways, parking lots, etc., shall be installed in a 1-1/4 inch or larger Class 200 PVC sleeve. All splices shall be located in valve boxes as shown on the plans.
- d. 2-Wire control wiring: For 2-wire controllers all irrigation wire for the controller, flow sensor, master valve and remote control valves shall be per the controller manufacturer's specifications and recommendations.

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LANDSCAPE IRRIGATION

1001.2.15 CONTROLLER DECODERS

1001.2.15.1 Controller decoders shall be as specified on the plans.

1001.2.16 BOOSTER PUMP

1001.2.16.1 Booster pump shall be as specified on the plans.

1001.2.17 OTHER MISCELLANEOUS FITTINGS AND MATERIALS

1001.2.17.1 All other miscellaneous fittings and materials shall be as specified on the plans.

1001.3 EXECUTION

1001.3.1 GENERAL

1001.3.1.1 All materials and equipment shall be installed in a neat and workmanlike manner according to manufacturer's published recommendations and specifications, local, and state codes, as shown on the detail drawings, plans and as specified herein.

1001.3.1.2 Plan locations of backflow preventers, valves, controllers, irrigation lines, sleeves, spray heads and other equipment are diagrammatic and indicate the spacing and relative locations of all installations. Final site conditions and existing and proposed plantings shall determine final locations and adjusted as necessary and as directed to meet existing and proposed conditions and obtain complete water coverage. Minor changes in locations of the above from locations shown shall be made as necessary to avoid existing and proposed trees, piping, utilities, structures, etc. at the CONTRACTOR'S expense or when directed by the LANDSCAPE ARCHITECT. CONTRACTOR shall be held responsible for relocation of any items without first obtaining the LANDSCAPE ARCHITECT'S approval. CONTRACTOR shall remove and relocate such items at their expense if so directed by the LANDSCAPE ARCHITECT.

1001.3.2 SITE CONDITIONS

1001.3.2.1 It is the responsibility of the CONTRACTOR to be aware of all surface and sub-surface conditions, and to notify the LANDSCAPE ARCHITECT, in writing, of any circumstances that would negatively impact the installation of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

1001.3.2.2 The Contractor shall contact the New Mexico One Call two working days in advance of any excavation.

1001.3.3 PRODUCT HANDLING

1001.3.3.1 The CONTRACTOR shall be responsible for correct procedures in loading, unloading, staking, transporting, and handling all materials to be used in the

SECTION 1001
LANDSCAPE IRRIGATION

system. The CONTRACTOR shall avoid rough handling which could affect the useful life of equipment. Pipe shall be handled in accordance with the manufacturer's published recommendations on loading, unloading, and storage.

1001.3.4 EXCAVATION AND TRENCHING

- 1001.3.4.1 The CONTRACTOR shall stake out the location of each run of pipe and all sprinkler heads and valves prior to trenching. Each run of the system shall be approved by the LANDSCAPE ARCHITECT before actual installation is started.
- 1001.3.4.2 Excavation and trenching for pipe lines shall be true to line. The width of the trenches shall not be greater than necessary to permit proper jointing, tamping, backfilling, bedding or any other installation procedures that may be necessary. Trench widths shall also be wide enough so that there will be a minimum horizontal separation of 4 inches between pipes in the same trench.
- 1001.3.4.3 In areas where trees are present, trench lines will be adjusted on the site to install trenches beyond the drip line of the tree. If lines cannot be adjusted to be outside of the drip line, trenches shall be dug by hand to avoid cutting roots greater than 1" diameter. No additional compensation will be paid to the CONTRACTOR for hand trenching under the drip line of a tree.
- 1001.3.4.4 Trench depths shall be sufficient to provide the specified pipe cover as described in these specifications or as noted on the plans. In rocky areas the trenching depth shall be 6 inches below normal trench depth to allow for pipe bedding as described in these specifications.
- 1001.3.4.5 Depth of bury: There shall be a minimum of 28 inches and a maximum of 30 inches of cover for all constant pressure mainline. There shall be a minimum of 18 inches and a maximum of 20 inches of cover for all mainline located downstream of the master valve. There shall be a minimum of 18 inches and a maximum of 20 inches of cover for all lateral lines.
- 1001.3.4.6 Depth of bury at valve boxes: Provide sufficient valve box extension to provide the full required depth of bury per 1001.3.4.5. Additional extensions shall be utilized to achieve specified depths. Penetrations through the valve box or extensions shall be as shown in the standard drawings or as specified on the plans.
- 1001.3.4.7 Rock: It shall be the CONTRACTOR'S responsibility to remove and dispose of all unsuitable materials removed from the trench that cannot be used in the backfill operation. When material from the excavation or trenching is unsuitable for use as backfill, additional backfill material suitable for this purpose and approved by the LANDSCAPE ARCHITECT, shall be brought in at the expense of the CONTRACTOR. No additional compensation will be paid to the CONTRACTOR for encountering rock or unsuitable material unless specified otherwise in the Contract Documents.
- 1001.3.4.8 Directional Boring: CONTRACTOR may directional bore lines where it is practical or where required on the plans. Extend the bore a minimum 1 foot past the edge of pavement unless noted differently on the plans. Cap ends of each bore and locate ends at finished grade using metal stakes. All boring and sleeving shall have detectable locator placed at each end of the pipe.

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1001.3.5 PIPING AND FITTINGS INSTALLATION

- 1001.3.5.1 Installation of plastic pipe and fittings shall be in accordance with the manufacturer's published recommendations and procedures and as specified herein. Manufacturer's published recommended procedures for making solvent weld fittings shall be strictly adhered to.
- 1001.3.5.2 Caution shall be exercised by the CONTRACTOR in handling, loading, unloading and storing of PVC pipe and fittings. All PVC pipe shall be stored and transported in a vehicle with a bed long enough to allow the pipe to lie flat without subjecting it to undue bending or concentrated external load at any point. Any section of pipe that has been dented or damaged or in any other way found to be defective, either before, or after laying shall be replaced with sound pipe without additional expense to the OWNER.
- 1001.3.5.3 Before installation, the inside of the pipe shall be cleaned of all direct and foreign matter and shall be kept in cleaned condition during and after laying of the pipe. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth or other foreign substances will enter the pipe or fittings. Where pipe ends are left for future expansion or connections, they shall be valved and capped, as directed on the plans and or by the LANDSCAPE ARCHITECT.
- 1001.3.5.4 All PVC pipe and fittings shall be assembled to permit the pipe or fittings to be joined at the true parallel position of the fitting. Placement of pipe in curving trenches which causes bending and stress on pipe and fittings will not be permitted. No excess piping or fittings shall be permitted in the installation of the system, which may increase pressure loss or potential blockage.
- 1001.3.5.5 Excavation and trenching shall be true to line and depth specified in these specifications or indicated on the plans. Before installing the pipe, all rubbish and rocks shall be removed from the trenches. If the soil is extremely rocky, the trenches shall be padded with dirt or sand as outlined in these specifications. Material used for pipe padding shall be approved by the LANDSCAPE ARCHITECT. The full length of each section of the pipe shall rest solidly upon the bottom of the trench or bedding material.
- 1001.3.5.6 Pipe shall not be laid in water or when trench or weather conditions are unsuitable for the work. Any water which may be encountered or may accumulate in the trenches or excavation shall be pumped out or otherwise removed as necessary to keep the bottom of the trench or excavation free and clear of water during the progress of the work.
- 1001.3.5.7 Unless otherwise specified on sleeving the plans, all piping passing under sidewalks, roadways, parking lots, etc., shall be sleeved in a Class 200 PVC pipe two sizes larger than the pipe to be sleeved.
- 1001.3.5.8 When more than one pipe is installed in the same trench, in no case shall one pipe be installed above or below another. Pipe can be installed in the same trench if pipes are laid side by side. In no case shall mainline and lateral pipe be installed in the same trench. The minimum horizontal clearance between lines in the same trench shall be 4 inches.

SECTION 1001
LANDSCAPE IRRIGATION

- 1001.3.5.9 After all piping, risers, valves, thrust blocks, etc., have been installed and partial backfilled as specified herein, the control valve shall be opened and a full head of water used to flush out the system. After the system is thoroughly flushed, risers shall be capped off and the system pressure tested in accordance with the testing section. At the conclusion of the pressure test the heads shall be installed and the backfill operation completed.
- 1001.3.5.10 Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.
- 1001.3.6 JOINT CONSTRUCTION AND SOLVENT WELDING PROCEDURE
- 1001.3.6.1 Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- 1001.3.6.2 PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
- a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - c. PVC Non-pressure Piping: Join according to ASTM D 2855.
 - d. PVC plastic pipe shall be squarely cut.
 - e. Burrs left from cutting shall be wiped off with a clean, dry cloth.
 - d. Utilizing a cleaner / primer, thoroughly clean the mating pipe end and the fitting socket with a clean dry cloth.
 - e. Apply a uniform coat of solvent cement to the outside of the pipe end with a non-synthetic brush or dauber.
 - f. In like manner, apply a thin coating of solvent cement to the inside of the fitting socket.
 - g. Re-apply a light coat of solvent cement to the pipe and quickly insert it into the fitting to the full depth of the fitting socket.
 - h. Rotate the pipe or fitting approximately 1/4 turn to insure even distribution of the solvent cement.
 - i. Hold in position for approximately 30 seconds.
 - j. Wipe off any excess solvent cement that forms as a bead around the outer shoulder.
 - k. Care should be taken so as not to use an excess amount of solvent cement that could cause burrs or obstructions to form on the inside of the pipe joint.
 - l. Solvent weld joints shall be allowed to cure for at least 24 hours before pressure is applied to the system.

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- 1001.3.6.3 Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Join pipe fittings and valves as follows:
- a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- 1001.3.6.4 Saddle Taps: No saddle taps shall be permitted unless specified on the plans.
- 1001.3.6.5 HDPE Fittings: Install heat fusion or compression fittings per manufacturer's written instructions and in conformance with ASTM D2657.
- 1001.3.6.6 Joint Restraints: Install joint restraints per manufacturer's written instructions.
- 1001.3.7 **BACKFILLING**
- 1001.3.7.1 Upon completion of a particular section of the irrigation system, and after sufficient time has elapsed for the curing of solvent weld joints, partial backfilling can begin, leaving all joints, risers and connections exposed for visual observation during the hydrostatic test. After completion and acceptance of the hydrostatic test by the LANDSCAPE ARCHITECT for a particular section of the irrigation system the backfill operation can be completed.
- 1001.3.7.2 All backfill material shall be subject to approval by the LANDSCAPE ARCHITECT. Backfill materials shall be free from rubbish, rock, large stones, brush, sod, frozen material or other unsuitable substances that may damage pipe during the backfilling operations.
- 1001.3.7.3 In the event that the material from the excavation or trenching is found to be unsuitable for use in backfill, it shall be removed from the site and properly disposed of by the CONTRACTOR at his own expense. The CONTRACTOR shall then, at no additional cost to the OWNER, arrange for, purchase and/or furnish suitable backfill material consisting of earth, loam, sandy clay, sand, or other approved materials free of large clods of earth or sharp stones, approved by the LANDSCAPE ARCHITECT.
- 1001.3.7.4 In rocky areas, the trench depth shall be 6 inches below the normal trench depth to allow for 6 inches of suitable backfill as padding for the pipe. In like manner, there shall be at least 6 inches of suitable backfill on either side of the pipe as padding against the rock wall of the trench.
- 1001.3.7.5 Backfill shall be placed in horizontal layers not exceeding 6 inches in depth and shall be thoroughly tampered, rolled or otherwise compacted to original density or better so that no settling will result. Continuous warning tape shall be provided at 6 inches depth below sub-grade for all constant pressure mainline trenches. Backfill shall be placed to the original ground level or to the limits designated on the plans. If settlement of trenches occurs within one year from date of completion, it shall be the CONTRACTOR'S responsibility to refill trenches and re-seed or sod the repaired areas.

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1001.3.8 SLEEVED CROSSING

- 1001.3.8.1 Unless otherwise noted on plans, all piping installed under sidewalks, roadways, parking lots, etc., shall be sleeved in a Class 200 PVC pipe two sizes larger than the pipe to be sleeved. Wiring shall be placed in a separate sleeve from that of the pipe crossing and shall be 1-1/4 inch or larger Class 200.
- 1001.3.8.2 Every effort shall be made by the CONTRACTOR to install sleeving prior to the pouring or construction of the sidewalks, roadways, parking lots, etc. If prior sleeving is not possible, all crossings must be bored unless authorization for an open cut is obtained from the LANDSCAPE ARCHITECT.
- 1001.3.8.3 Sleeving ends, with the inner pipe or wire installed, shall be capped or taped closed using a good quality duct tape to prevent the entrance of dirt into the sleeve.

1001.3.9 THRUST BLOCKS

- 1001.3.9.1 Thrust blocks: Concrete thrust blocks shall be provided where necessary to resist system pressure, including at all direction changes, size changes, valves and terminations or at any other points of the system that will result in an unbalanced thrust line for equipment 2-1/2" and larger. Thrust blocks shall not obstruct the outlets of fittings which are intended for future connections. Thrust blocks shall be poured against undisturbed earth and in accordance with the plans or standard details.

1001.3.10 SPRINKLER INSTALLATION

- 1001.3.10.1 Install sprinklers and flexible nipples (if specified on the plans) after hydrostatic test is completed.
- 1001.3.10.2 Sprinkler heads shall be the type and make specified and shall be installed to grade unless otherwise specified. Sprinkler heads shall be installed 8 inches from curbs, walls, driveways, building walls, etc. Heads shall be installed in the vertical positions, hand backfilled and compacted to original density or better.
- 1001.3.10.3 Sprinkler head spacing shall not exceed the spacing shown on the plans and shall be in the locations and configuration as shown on the plans. CONTRACTOR shall verify area dimensions while staking sprinkler head location. Sprinkler heads shall be spaced so that they are equidistant from one another for the given lengths and widths of the area to achieve uniform coverage.
- 1001.3.10.4 After all piping is in place and connected and before installation of the flexible nipple or swing joint and sprinkler heads, all control valves for a given section shall be fully opened and a full head of water shall be used to flush out the system.
- 1001.3.10.5 If water pressure without the heads installed is not sufficient to provide adequate water flow from end risers, the CONTRACTOR shall cap off enough heads closest to the water source to provide adequate flushing of the end riser assemblies.

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1001.3.11 DRIP IRRIGATION SPECIALTY INSTALLATION

1001.3.11.1 Install drip irrigation system components as shown in the plans.

1001.3.12 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION:

1001.3.12.1 The Controller location is indicated on the plans. The CONTRACTOR shall familiarize himself with the requirements of connections at the locations noted (120 volt supply to the controller) and shall include the cost to complete this portion of the contract.

1001.3.12.2 Controller shall be installed in a locking controller enclosure as specified on the plans. The controller shall be mounted and wired according to the manufacturer's recommended procedures and as specified in these specifications and on the plans.

1001.3.12.3 Electric control valves shall be connected to controller in the numerical sequences as shown on the plans.

1001.3.13 ELECTRIC AUTOMATIC CONTROL VALVES

1001.3.13.1 All electric control valves shall be of the type and size as indicated on the plans and shall be installed where shown on the plans, following the published recommendations of the manufacturer and in accordance with these specifications and plans.

1001.3.13.2 The valve boxes shall be bolt down and of the size, type and color as shown on the plans. Valve boxes shall be installed as shown on the plans.

1001.3.13.3 Valve wire splices shall be waterproofed using connectors as specified on the plans and the CONTRACTOR shall leave 36 inches of coiled slack to facilitate raising splices to ground level without cutting wires.

1001.3.14 24-VOLT CONTROL VALVE WIRING

1001.3.14.1 All wire installation procedures as described herein shall be checked to conform to local electrical codes.

1001.3.14.2 Whenever possible, the CONTRACTOR shall install the 24 volt control valve wiring in the same trench as the mainline piping. All wires shall be laid on the bottom on one side of the pipe only and 2 inches below the pipe. The wires shall be laid loose in the trench to allow for contraction of the wire. Control wires shall be taped together in 10 foot-0 inch increments. When trenches used for piping are not appropriate for routing of wire, a trench, 18 inches deep, shall be provided by the CONTRACTOR for 24 volt wires and shall be identified with location dimensions on the "as-built" record drawings.

1001.3.14.3 Wire splices, other than at valve box locations, shall be kept to a minimum and if needed shall be made only at common splice points and placed in a wire splice box as shown on the plans or as approved by the LANDSCAPE ARCHITECT. The location of these wire splice boxes shall be shown on the "as-built" record drawings. There shall be a 24-inch coil in the wires placed in the wire splice boxes

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so that the splices can be pulled out above ground level to facilitate testing and trouble shooting. No buried wire splices shall be permitted. All wire splices shall be made waterproof using connectors as specified on the plans.

- 1001.3.14.4 In no case shall wires of different colors be spliced together.
 - 1001.3.14.5 Control wires shall be identified with wire marking tape at each valve and at the Controller and at all splices. Valves shall be numbered on the "as-built" record drawings.
 - 1001.3.14.6 Spare wire: Install one spare #12 wire from controller along entire mainline to last electric remote control valve on each and every leg of mainline. Label spare wires at controller and wire stub to be located in a valve box. Spare wire is not required on decoder systems.
- 1001.3.15 120-VOLT CONTROLLER POWER WIRING:
- 1001.3.15.1 The CONTRACTOR shall familiarize himself with the work required to complete this portion of the installation. All 120 volt wiring shall be installed in accordance with state and local electrical codes. The 120 volt service shall consist of one black and one white wire. The neutral wire must be bonded.
 - 1001.3.15.2 120 volt power shall be supplied to the controller location by a licensed electrician.
- 1001.3.16 MANUAL DRAIN VALVE-MAINLINE:
- 1001.3.16.1 Manual drain valves of the size and type indicated on the plans shall be installed at all low points of mainline piping, or at any other points that may be indicated on the irrigation system plans or as specified herein.
- 1001.3.17 FIELD QUALITY CONTROL AND TESTING:
- 1001.3.17.1 Upon completion of the irrigation system's mainline, the entire mainline shall be tested for a 4 hour period at 150 psi. Prior to testing the mainline shall be partially backfilled leaving all joints and connections exposed for visual observation. All dirt shall be flushed from the system and the line filled with water to remove air. The mainline shall be brought to static pressure. A pressure gauge and temporary valve shall be installed at the end of the mainline to permit hydrostatic pressure to be applied to the main. A pressure of 150 psi must be retained for a 4 hour period. Any leaks resulting in the 4 hour pressure test shall be repaired and the system retested until the system passes the test.
 - 1001.3.17.2 Upon completion of the irrigation system's lateral sections and after sufficient time has been allowed for solvent weld joints to cure, the entire system shall be hydrostatically tested by capping off all irrigation head risers. On systems using flex nipples, or swing joints, the lateral line shall be tested prior to installation of the flex nipples or swing joints. Prior to capping, all air and dirt shall be flushed from the system and the pipe partially backfilled by center loading, leaving all joints, risers, swing joints and connections exposed for visual observation. All

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lateral irrigation piping must be pressure tested for 1 hour at 100 psi. The procedure shall be the same as used for the mainline. If after one hour no visible leakage has occurred and the 100 psi pressure has been retained, the heads shall be installed, and the backfill operation completed. Any leaks resulting from the hydrostatic test shall be repaired and the system retested until the system passes the test.

- 1001.3.17.3 Audit sprinkler system as required by the City of Albuquerque Water Waste and Water Conservation Landscape Ordinance and adjust as necessary prior to turf installation.
 - 1001.3.17.4 Backflow Preventer Test: The backflow preventer shall be tested according to procedures and meet performance results per the requirements of all local and national codes.
- 1001.3.18 ADJUSTING OF SYSTEM AND STARTUP SERVICE
- 1001.3.18.1 Upon completion of the installation, the CONTRACTOR shall adjust all heads and valves and program controller to provide optimum system performance. It will be the OWNER'S responsibility to make any minor adjustment to the system during the guarantee period.
 - 1001.3.18.2 Perform booster pump startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Verify that controllers are installed and connected according to the Contract Documents.
 - c. Verify that electrical wiring installation complies with manufacturer's submittal.
 - 1001.3.18.3 Adjust settings of controllers, to meet watering window requirements as specified on plans.
 - 1001.3.18.4 Adjust sprinklers bubblers and boxes, except those intended to be mounted aboveground, so they will be flush with, or not more than indicated on drawings above finish grade.
- 1001.3.19 CLEAN-UP
- 1001.3.19.1 The CONTRACTOR shall continuously keep a neat and orderly area in which he is installing the system. Disposal of rubbish and waste material resulting from the installation shall be continual. Upon completion of the system, the CONTRACTOR shall remove from the OWNER'S property at his own expense, all temporary structures, rubbish, waste material, tools, and equipment resulting from or used in the installation of the system.

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1001.3.20 PROTECTION OF EXISTING UTILITIES

1001.3.20.1 The CONTRACTOR shall be responsible for locating all cables, conduits, piping, and any other utilities or structures that may be encountered either above or below ground. All necessary precautions must be taken by the CONTRACTOR to prevent any damage to these existing improvements. In the event that such damage should occur from his operations, the CONTRACTOR shall repair or replace or bring to original condition the damaged utilities or improvements at his own expense.

1001.3.21 FINAL ACCEPTANCE

1001.3.21.1 When the CONTRACTOR is satisfied that the system is operating properly, that it is balanced and adjusted, that all work and cleanup is completed, he shall request a review of the irrigation system by the LANDSCAPE ARCHITECT and OWNER. At that time, the CONTRACTOR shall demonstrate each system in its entirety. In reviewing the work, no allowance for deviation from the original plans and specifications will be made unless prior approval has been obtained. This system review must be completed prior to beginning planting operations.

1001.3.21.2 Any inconsistencies to the specifications shall be noted by the LANDSCAPE ARCHITECT and the OWNER and a written copy of corrections needed shall be given to the CONTRACTOR. Any work deemed not acceptable shall be reworked to the complete satisfaction of the OWNER and the LANDSCAPE ARCHITECT at no additional cost to the OWNER.

1001.3.21.3 When all work is completed to the satisfaction of the OWNER, a written acceptance of the total project will be given to the CONTRACTOR upon furnishing, by the CONTRACTOR of a complete "as-built" record drawing of the irrigation system that is acceptable to the OWNER.

1001.3.21.4 Operational Instruction: After the system has been tested and accepted, the CONTRACTOR, along with the LANDSCAPE ARCHITECT shall instruct the OWNER in the operation and maintenance of the system.

1001.3.22 SYSTEM MAINTENANCE AND WARRANTY

1001.3.22.1 All materials shall have a minimum guarantee of one year against material defects or defective workmanship.

1001.3.22.2 For a period of one year from final acceptance of the system, the CONTRACTOR will promptly furnish and install, without cost to the OWNER, any and all parts or materials which prove defective in material or workmanship. All damage due to irrigation system line breaks caused by defective material or workmanship shall be repaired and brought to original condition by the CONTRACTOR at no expense to the OWNER. The CONTRACTOR shall complete all repairs within 24 hours of receipt of notification from the OWNER of system failure.

1001.3.22.3 Minor maintenance of the system shall be the responsibility of the OWNER.

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1001.3.22.4 For a period of one year from final acceptance of the system, the CONTRACTOR shall repair any settlement of the trenches by one of the following methods as directed by the LANDSCAPE ARCHITECT and the OWNER.

- a. Bring to grade by top dressing (raking top soil into the grass).
- b. Bring to grade with top soil and seed.
- c. Remove existing sod, fill depression with top soil, and replace with new sod to match existing sod.

1001.3.22.5 Repair by any of the above methods must result in a smooth, level area. Maintenance of repaired areas shall be the responsibility of the OWNER. Repair shall be completed by the CONTRACTOR within 48 hours after notification from the OWNER of trench settlement problems.

1001.3.23 REVIEWS AND OBSERVATIONS

1001.3.23.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations shall be made at any time at the discretion of the LANDSCAPE ARCHITECT or OWNER. It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT in writing 48 hours in advance of each required review or observation. The sequence of required review shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work in the next sequence without written approval of the previous sequence. Payment will not be approved for items which have not been reviewed and approved in writing.

- a. Review staked locations of mainline, valves, laterals, and sprinkler heads.
- b. Review 24 volt control wire installation.
- c. Review and observe mainline installation and pressure test, and electric control valve installation.
- d. Review and observe lateral line pressure test and installation.
- e. Review automatic controller installation and operation.
- f. Review and observe sprinkler and bubbler head placement, coverage and operating pressure prior to planting.
- e. Final project review and acceptance.
- f. Review at end of the warranty period.

1001.3.24 MEASUREMENT & PAYMENT

1001.3.24.1 Measurement of the landscape irrigation system shall be lump sum or by units of the major components of the system as specified in the Supplemental Technical Specifications and/or the Bid Proposal and shall include the entire irrigation system from the water meter.

1001.3.24.2 Payment shall be at the contract price per lump sum or per unit as specified in the Supplemental Technical Specifications and in the Bid Proposal, which shall

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include all material, equipment and labor required to install and make operational the irrigation system.

END OF SECTION 1001

SECTION 1005

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1005.1 GENERAL

1005.1.1 SCOPE

Work under this section consists of the planting of trees, shrubs, and groundcovers, including the furnishing of all labor, equipment, and materials and performing all work in connection therewith in accordance with the plans and specifications, or as authorized by the LANDSCAPE ARCHITECT.

1005.1.2 APPLICABLE STANDARDS & REFERENCES

1005.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1005.1.2.2 This Publication, Latest Edition:
Section 1001 Landscape Irrigation
Section 1010 Turf Sodding
Section 1011 Turf Seeding

1005.1.2.3 The scientific and common names used for the plants called for on the drawings are generally in conformity with the approved names given in the Latest Edition of the American Standard for Nursery Stock (ANSI Z60.1), published by the AmericanHort, Latest Edition and Standardized Plant Names, published by the American Joint Committee on Horticultural Nomenclature, Latest Edition. The names of varieties not included therein are generally in conformity with the names accepted in the nursery trade.

1005.1.3 SUBMITTALS

1005.1.3.1 THIS PUBLICATION - Section 1502 - Submittals

1005.1.3.2 PRODUCT DATA: For each type of product.

- a. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
- b. Other materials: Submit manufacturer product data and literature describing all products required by this section to the LANDSCAPE ARCHITECT for approval. Submit samples of each product and material where required by this section to the LANDSCAPE ARCHITECT for approval.
- c. Plant Photographs: When plant material is located outside the Albuquerque Metropolitan Area, CONTRACTOR may submit color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three plants in photograph or

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three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

- 1005.1.3.3 Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
- a. Manufacturer's certified analysis of standard products.
 - b. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- 1005.1.3.4 Pesticides and Herbicides: Product label, Product Safety Data, and manufacturer's application instructions specific to Project.

1005.1.4 PLANT MATERIAL OBSERVATION

- 1005.1.4.1 Plant Material Observation: LANDSCAPE ARCHITECT may observe plant material either at place of growth, wholesale nursery, or at CONTRACTORS yard before delivery for compliance with requirements, for genus, species, variety, cultivar, size, and quality. However at no additional expense to the OWNER, the CONTRACTOR shall be responsible for all travel expenses incurred by the LANDSCAPE ARCHITECT for any travel outside the Albuquerque Metropolitan Area. LANDSCAPE ARCHITECT may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. The LANDSCAPE ARCHITECT shall be the judge of the quality and acceptability of all plant materials. Remove rejected trees or shrubs immediately from project site.

1005.1.5 DELIVERY, STORAGE & HANDLING

- 1005.1.5.1 Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- 1005.1.5.2 Bulk Materials:
- a. Do not dump or store bulk materials near fuel containers / storage, structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - c. Accompany each delivery of bulk materials with appropriate certificates.
- 1005.1.5.3 Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants

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during delivery and handling.

- 1005.1.5.4 Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- 1005.1.5.5 Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 - a. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 - b. Do not remove container-grown stock from containers before time of planting.
 - c. Water root systems of plants stored on-site deeply and thoroughly. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1005.1.6 PROJECT CONDITIONS

- 1005.1.6.1 Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- 1005.1.6.2 Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- 1005.1.6.3 Soil testing: CONTRACTOR shall conduct soil testing for each sample of topsoil, existing site soil and planting soil with an approved soil-testing laboratory. CONTRACTOR shall provide soils test result and testing lab recommendations to LANDSCAPE ARCHITECT for review. If test reporting recommends amendments, fertilizers or conditioners that differ from those noted in the Contract Documents, the CONTRACTOR shall furnish and install alternate materials as directed by LANDSCAPE ARCHITECT and no additional expense to the OWNER. All soil testing will be at the expense of the Contractor. The soils test report shall include at a minimum the following information:
 - a. pH
 - b. Percent organic content by oven dried weight
 - c. Nutrient levels by parts per million including: nitrate nitrogen,, potash, sulfur, boron, phosphorus, potassium, magnesium, manganese, iron, sodium, copper, zinc and calcium. Testing shall also include salinity, computed percentage of sodium and free lime level. Soil test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified

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1005.2 MATERIALS

1005.2.1 PLANT MATERIAL

1005.2.1.1 General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on plans. A complete list of plants, including a schedule of quantities, sizes and other requirements is shown on the plans. In the event that discrepancies occur between plant quantities listed in the Plant Legend and the planting plan, the plant quantities illustrated on the planting plan shall govern. All plants shall comply with ANSI Z60.1; with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

- a. Do not use trees with pruned, damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable, unless otherwise specified on plans.
- b. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise specified on plans or approved in writing by the LANDSCAPE ARCHITECT
- c. All plant material shall have a uniform shape around its complete indicated in the schedule of plants circumference. Plant material with irregular branching patterns or with branching patterns more highly developed on one side than on other sides shall not be acceptable.

1005.2.1.2 Root Quality: Plant roots shall be normal to the plant type specified. Root observations shall take place without impacting tree health. Root quality at or below the soil line shall comply with the following:

- a. The roots shall be reasonably free of scrapes, broken or split wood.
- b. The root system shall be reasonably free of injury, damage or decay. Wounds resulting from root pruning used to produce a high quality root system are not considered injuries.
- c. A minimum of three structural roots reasonably distributed around the trunk (not clustered on one side) shall be found in each plant. Root distribution shall be uniform throughout the root ball, and growth shall be appropriate for the species. Plants with structural roots on only one side of the trunk (J roots) shall be rejected.
- d. The root collar shall be within the upper 2 inches of the substrate/soil. Two structural roots shall reach the side of the root ball near the top surface of the root ball. The grower may request a modification to this requirement for species with roots that rapidly descend, provided that the grower removes all stem girdling roots above the structural roots across the top of the root ball

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- e. The root system shall be free of stem girdling roots over the root collar or kinked roots from nursery production practices.
- 1005.2.1.3 Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
- a. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 - b. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- 1005.2.1.4 Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to the LANDSCAPE ARCHITECT and at no additional cost to the OWNER, with a proportionate increase in size of roots or balls.
- 1005.2.1.5 Container grown plant material shall have been established in its delivery container for not less than six months, but for not more than two years. Any plant material found to be root bound at planting will not be accepted.
- 1005.2.1.6 Balled and burlapped plant material shall have a solid ball of earth of minimum specified size and held in place securely by burlap and a stout twine or rope. Broken or loose balls will be rejected. Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. d. The root collar shall be within the upper 2 inches of the substrate/soil.
- 1005.2.1.7 Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.
- 1005.2.1.8 If formal arrangements or consecutive order of plants is indicated on the plans, select stock for uniform height and spread, and number the labels to assure symmetry in planting.
- 1005.2.1.9 Plant material substitutions shall not be made without the written approval of the LANDSCAPE ARCHITECT. The use of materials differing in kind, quality, or size from that specified will be allowed only after the LANDSCAPE ARCHITECT is convinced that all means of obtaining the specified materials have been exhausted. At the time bids are submitted, the CONTRACTOR is assumed to have located the materials necessary to complete the job as specified. All requests for substitutions must be submitted prior to the opening of bids as stipulated in the Contract Documents.

1005.2.2 FERTILIZERS

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- 1005.2.2.1 Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
- a. Size tablets based on plant material size per manufacturer’s specifications.
 - b. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

1005.2.3 ORGANIC AND AGGREGATE MULCH

- 1005.2.3.1 Organic and aggregate mulches shall be as specified on the plans.

1005.2.4 PLANTING SOIL MIXTURES:

- 1005.2.4.1 Specification for complete planting backfill. Planting soil mixture shall be a premixed, homogeneous soil. It will consist of sand and organic matter and meet performance characteristics outlined below.

- a. Sand, 60% by volume of clean masonry sand with a sieve analysis of:

<u>sieve size</u>	<u>% passing</u>
3/8”	100%
#4	93-99%
#8	82-88%
#16	73-79%
#30	55-61%
#50	24-30%
#100	6-12%
#200	7-2%

- b. Organic Matter, 40% by volume of compost material specified as follows: Organic matter shall be a combination organic carbon sources such as straw, hay, bark, sawdust or wood shavings and nitrogen sources such as manure, blood meal, or chemical fertilizers. Nitrogen sources must be added prior to composting. This mixture shall be aerobically composted at temperatures between 120 F and 160 F for a period of not less than 15 days, with further curing of not less than 3 months. Weed seeds are to be destroyed during composting and urea and ammonia form nitrogen ratio shall be as listed below. Finished compost is to be screened to provide less than 2% remaining on a 1/2 inch screen. Carbon to Nitrogen Ratio of organic matter shall be less than 50 parts carbon to one part nitrogen.

- 1005.2.4.2 The complete PLANTING SOIL MIXTURE shall have the following characteristics:

- a. Calcium to magnesium ratios shall not exceed 20 parts calcium to one part magnesium. Potash (Potassium) (K) shall be present at a rate of at least 200 parts per million of exchangeable potassium. Salinity (EGXK) not to exceed 2 AMHOS/CM Nitrate nitrogen (NO3-N) shall be present at a rate of at least 30 parts per million. Phosphorus as measured by the Olson sodium bicarbonate measurement method shall be at greater than 25 parts per

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million. PH of the planting soil mixture shall be between 6.5 and 7.5. Organic matter by weight (by simple combustion) shall be more than 5%. Available moisture capacity in the one third to 15 bar tension shall be greater than 15%. TKN2 or Total Kjeldahl Nitrogen shall be 250 ppm or greater. NH4 shall be 25 ppm or less

- b. The LANDSCAPE ARCHITECT reserves the right to adjust the above characteristics and waive all irregularities.
- c. The PLANTING SOIL MIXTURE shall be tested by the CONTRACTOR at an approved soils testing laboratory. Test results shall be submitted to and approved by the LANDSCAPE ARCHITECT prior to delivery of the planting soil mixture. Test Results shall list the as tested qualities of the above characteristics and any recommendations the testing lab has.

1005.2.4.3 The OWNER may also test the final product as delivered or installed to verify the mixture matches the listed characteristics and the submitted soils report.

1005.2.4.4 Each Delivery shall have a load ticket. The load ticket shall list:

- a. Source of Mixture.
- b. Approximate volume of load.
- c. Date of delivery or loading.
- d. Typed name of individual representing the source.
- e. Inked original signature of individual representing the source.
- f. Area of site product delivered to.

Tickets shall be collected and provided to the LANDSCAPE ARCHITECT.

1005.2.5 PESTICIDES

1005.2.5.1 General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

1005.2.5.2 Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

1005.2.5.3 Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

1005.2.6 TREE-STABILIZATION MATERIALS

1005.2.6.1 Tree-stabilization materials shall be as specified on the plans. Tree-stabilization shall only be installed if noted on the plans.

1005.2.7 WEED BARRIER FABRIC

1005.2.7.1 Weed barrier fabric shall be as specified on the plans.

1005.2.8 MISCELLANEOUS PRODUCTS

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1005.2.8.1 All other miscellaneous materials shall be as specified on the plans.

1005.3 EXECUTION

1005.3.1 EXAMINATION

1005.3.1.1 Planting operations as specified herein shall begin only when other work including placing of topsoil to finished grade has progressed sufficiently to permit planting.

1005.3.1.2 Examine areas to receive plants, with LANDSCAPE ARCHITECT present, for compliance with requirements and conditions affecting installation and performance of the Work.

1005.3.1.3 If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by LANDSCAPE ARCHITECT and replace with new planting soil.

1005.3.1.4 Proceed with installation only after unsatisfactory conditions have been corrected and approved by LANDSCAPE ARCHITECT.

1005.3.2 PREPARATION

1005.3.2.1 Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

1005.3.2.2 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

1005.3.2.3 Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain LANDSCAPE ARCHITECT'S acceptance of layout before excavating or planting. Make minor adjustments as required.

1005.3.3 PLANTING AREA ESTABLISHMENT

1005.3.3.1 General: Prepare planting area for soil placement and mix planting soil according to the specifications or plans.

1005.3.3.2 Before planting, obtain LANDSCAPE ARCHITECT'S acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

1005.3.3.3 Application of Fertilizer: At time of planting if specified on plans or directed by LANDSCAPE ARCHITECT, apply fertilizer to planting locations.

1005.3.4 EXCAVATION FOR TREES AND SHRUBS:

1005.3.4.1 Planting Pits: Excavate circular planting pits.

- a. Excavate planting pits with sides sloping inward as shown in the plans and details. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised approximately 4 inches to

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support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify and loosen sides of planting pit.

- b. Excavate an area a minimum three times as wide as ball diameter for plant stock or as shown in the plans.
- c. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
- d. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly compact the added soil to prevent settling.
- e. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate sub-grades of adjacent paving, structures, hardscapes, or other new or existing improvements.
- f. Maintain supervision of excavations during working hours.
- g. Keep excavations covered or otherwise protected when unattended by CONTRACTOR personnel.

1005.3.4.2 Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

1005.3.4.3 Obstructions: Notify LANDSCAPE ARCHITECT if unexpected rock, hardpan or obstructions detrimental to trees or shrubs are encountered in excavations.

1005.3.4.4 Drainage: Notify LANDSCAPE ARCHITECT if subsoil conditions show evidence of unexpected water seepage or retention in tree or shrub planting pits.

1005.3.4.5 Fill excavations with water and allow to percolate away before positioning trees and shrubs.

1005.3.5 TREE, SHRUB, AND VINE PLANTING:

1005.3.5.1 Delivery: In any one day, only those plant materials intended to be planted that day shall be delivered to the project site unless otherwise approved by the LANDSCAPE ARCHITECT.

1005.3.5.2 Root Flare and Roots: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

1005.3.5.3 Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with top of root flare flush with adjacent finish grade.

- a. Backfill: Backfill with 10% (by volume) Planting Soil Mixture and 90% excavated soil.
- b. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from

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sides, but do not remove from under root balls. Do not fold burlap down into planting soil. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

- c. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
- d. Place fertilizer planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole. Install planting tablets on a species-by-species basis as noted on the plans.
- e. Continue backfilling process. Water again after placing and tamping final layer of soil.

1005.3.5.4 Container Grown Stock: Set each plant plumb and in center of planting pit or trench with top of root flare flush with adjacent finish grade.

- a. Backfill: Backfill with 10% (by volume) Planting Soil Mixture and 90% excavated soil.
- b. Carefully remove root ball from container without damaging root ball or plant.
- c. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
- d. If specified on plans, place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole. Install planting tablets on a species by species basis as noted on the plans.
- e. Continue backfilling process. Water again after placing and tamping final layer of soil.

1005.3.5.5 Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

1005.3.5.6 Container and Boxed Root Ball Shaving: The outer surfaces of all root balls in containers and boxes, including the top, sides and bottom of the root ball shall be shaved to remove all circling, descending and matted roots. Shaving shall be performed using saws, knives, sharp shovels or other suitable equipment that is capable of making clean cuts on the roots. Shaving shall remove a minimum of one inch of root mat or up to 2 inches as required to remove all root segments that are not growing reasonably radial to the trunk.

1005.3.6 MECHANIZED TREE-SPADE PLANTING

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- 1005.3.6.1 Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.
 - 1005.3.6.2 Use the same tree spade to excavate the planting hole as will be used to extract and transport the tree.
 - 1005.3.6.3 When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.
 - 1005.3.6.4 Cut exposed roots cleanly during transplanting operations.
 - 1005.3.6.5 Where possible, orient the tree in the same direction as in its original location.
- 1005.3.7 TREE, SHRUB, AND VINE PRUNING
- 1005.3.7.1 Remove only dead, dying, or broken branches. Do not prune for shape.
 - 1005.3.7.2 Prune, thin, and shape trees, shrubs, and vines only with approval of and as directed by LANDSCAPE ARCHITECT.
 - 1005.3.7.3 Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by LANDSCAPE ARCHITECT, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
 - 1005.3.7.4 Do not apply pruning paint to wounds.
- 1005.3.8 TREE STABILIZATION
- 1005.3.8.1 Tree Stabilization by Upright Staking and Tying: Install tree stabilization as shown on the plans.
- 1005.3.9 MULCHING
- 1005.3.9.1 Mulch backfilled surfaces of planting areas and other areas indicated.
 - a. Trees in Turf Areas: Apply organic mulch ring of 4-inch average thickness, with sufficient radius to cover planting pit backfill radius around trunks or stems. Do not place mulch within 4 inches of trunks or stems.
 - b. Mulch in Planting Areas: Apply 4 inch average thickness of organic or aggregate mulch over entire surface of planting area as specified on the plans. Top of mulch shall be below the top of adjacent surface at the dimension shown in the plans. Do not place mulch within 4 inches of trunks or stems.
- 1005.3.10 PESTICIDE APPLICATION
- 1005.3.10.1 Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with OWNER and others in proximity

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to the Work. Notify OWNER before each application is performed.

1005.3.10.2 Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Apply pre-emergent herbicides only in areas shown on the plans. Do not apply to seeded areas.

1005.3.10.3 Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

1005.3.11 REPAIR AND REPLACEMENT

1005.3.11.1 General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by the LANDSCAPE ARCHITECT.

- a. Submit details of proposed pruning and repairs.
- b. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
- c. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by LANDSCAPE ARCHITECT.

1005.3.11.2 Remove and replace trees and other plants that are more than 25 twenty five percent dead or in an unhealthy condition or are damaged during construction operations that the LANDSCAPE ARCHITECT determines are incapable of restoring to normal growth pattern.

1005.3.12 CLEANING AND PROTECTION

1005.3.12.1 During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

1005.3.12.2 Remove and legally dispose of surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris.

1005.3.12.3 Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

1005.3.12.4 After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

1005.3.13 PLANT MAINTENANCE

1005.3.13.1 Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of the CONTRACTOR. Begin maintenance immediately after plants are installed and continue until final acceptance of the project.

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1005.3.13.2 Maintenance shall include watering, weeding, cultivating, removal of dead material and debris, resetting of trees to upright positions, restoration of earth basins, and such other operations as may be necessary for the health of the planted stock and the general appearance of the landscaped areas. Protection shall include care of the planted stock from damages resulting from trespass, erosion (including watering), weather, vandalism, disease and the like.

1005.3.13.3 WATER: The CONTRACTOR shall be responsible for the cost of water during the installation and maintenance of plant material until final acceptance.

1005.3.14 REVIEWS AND OBSERVATIONS

1005.3.14.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations shall be made at any time at the discretion of the LANDSCAPE ARCHITECT.

1005.3.14.2 It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT, in writing, 48 hours in advance of each required review and observation.

1005.3.14.3 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next sequence without written approval of the work of the previous sequence. Payment will not be approved for items which have not been reviewed and approved in writing.

- a. Review plant material at CONTRACTOR'S yard or designated nursery prior to delivery to job site.
- b. Review staked locations of material prior to planting.
- c. Review material at the job site prior to and during planting.
- d. Review at end of maintenance period.
- e. Final review of the project and acceptance.
- f. Review at end of growing season or 12 months, whichever comes first.

1005.3.15 WARRANTY

1005.3.15.1 All plant materials shall be warranted to be in a live, healthy, and normal growing condition following the date of final acceptance by the LANDSCAPE ARCHITECT. through 12 months or one growing season whichever comes first. A growing season shall be defined as May 15 through September 15. Such plant materials that are dead or in an unhealthy, impaired growth condition, shall be replaced by the CONTRACTOR within 10 days after the end of the warranty period.

1005.3.16 MEASUREMENT & PAYMENT

1005.3.16.1 The measurement shall be made per each size of a particular species of tree shrub and/or ground cover plant.

1005.3.16.2 PAYMENT:

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- a. Payment shall be made at the contract unit price for each size of a particular species of plant, square footage of mulch, and any other non-living materials as specified in the bid proposal or approved by the LANDSCAPE ARCHITECT, which shall include all materials, equipment and labor required in furnishing and planting the landscape plants and installation of other non-living materials.
- b. All other items specified within this section, including but not limited to: pruning, fertilizing, pesticide application, planting soil mixture, watering and tree stabilization, unless noted otherwise in the plans, shall be considered incidental to the payment for planting / plants.

END OF SECTION 1005

SECTION 1010
TURF SODDING

1010.1 GENERAL

1010.1.1 SCOPE

Furnish all labor, materials and equipment necessary for preparation of sodbed, furnishing and installation of sod, fertilizer, soil amendments, and related work specified herein and as indicated on plans or as authorized by the LANDSCAPE ARCHITECT.

1010.1.2 APPLICABLE STANDARDS & REFERENCES

1010.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1010.1.2.2 This Publication, Latest Edition:
Section 1001 Landscape Irrigation
Section 1005 Planting for trees, shrubs, ground covers, and soil amendments.

1010.1.2.3 Turfgrass Producers International (TPI) Guideline Specifications for Turfgrass Sodding, Latest Edition.

1010.1.3 SUBMITTALS

1010.1.3.1 THIS PUBLICATION - Section 1502 - Submittals

1010.1.3.2 Certification of Turfgrass Sod: From sod vendor for each turfgrass monostand or mixture, stating the botanical and common name, percentage of each species and variety, and location of production. Include the year of production and date of cutting.

a. Certification of each mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

1010.1.3.3 Product Certificates: For fertilizers and organic amendments, from manufacturer.

1010.1.3.4 Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1010.1.4 DELIVERY, STORAGE & HANDLING:

1010.1.4.1 Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from tearing, breakage and drying, or any other damage.

1010.1.4.2 Bulk Materials:

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- a. Do not dump or store bulk materials near fuel containers or storage, structures, utilities, walkways and pavements, or on existing turf areas or plants.
- b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
- c. Accompany each delivery of bulk materials with appropriate certificates.

1010.1.5 PROJECT CONDITIONS

1010.1.5.1 Soil testing: CONTRACTOR shall conduct soil testing for each sample of topsoil, existing site soil and planting soil with an approved soil-testing laboratory. CONTRACTOR shall provide soils test result and testing lab recommendations to LANDSCAPE ARCHITECT for review. If test reporting recommends amendments, fertilizers or conditioners that differ from those noted in the Contract Documents, the CONTRACTOR shall furnish and install alternate materials as directed by LANDSCAPE ARCHITECT and no additional expense to the OWNER. All soil testing will be at the expense of the Contractor. The soils test report shall include at a minimum the following information:

- a. pH
- b. Percent organic content by oven dried weight
- c. Nutrient levels by parts per million including: nitrate nitrogen,, potash, sulfur, boron, phosphorus, potassium, magnesium, manganese, iron, sodium, copper, zinc and calcium. Testing shall also include salinity, computed percentage of sodium and free lime level. Soil test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified

1010.2 MATERIALS

1010.2.1 TURFGRASS SOD

- 1010.2.1.1 Turfgrass Sod: Certified Number 1 Quality / Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, and complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
- 1010.2.1.2 Turfgrass Species: Sod shall be a Park Blend mixture of 30% Olympic or Falcon tall fescue (*Festuca*) 40% perennial bluegrass (*Poa*), and 30% perennial Ryegrass (*Lolium*) species unless otherwise specified on the plans. Other species or sod blends / mixes may be substituted for above if indicated on the drawings or with prior written approval of the LANDSCAPE ARCHITECT. A written description of the seed mix shall be submitted a minimum of 30 days prior to laying of sod. It shall be free of other grasses, stones, and other harmful or deleterious matter.
- 1010.2.1.3 Sod shall be cut by an approved mechanical sod cutter to a thickness of not more than 1-3/4 inches, or less than 1-1/2 inches. Sod shall be installed in place on the site not more than 24 hours after cutting.

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1010.2.2 FERTILIZER

- 1010.2.2.1 Starter Fertilizer: Granular complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
- a. Composition: 4 lb./1000 sq. ft., 18 percent of actual nitrogen, 24 percent available phosphorous, and 16 percent available potassium, by weight (18-24-16), or as specified on the plans.

1010.2.3 ORGANIC AMENDMENT

- 1010.2.3.1 Compost Mulch: Well-composted (minimum 1 year), stable, and weed-free organic matter, pH range of 5.5 to 7.5; moisture content 35 to 55 percent by weight; 90% percent passing through a 1/4 inch sieve; soluble salt content not exceeding 1.5 mnhos/cm, not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
- a. Organic Matter Content: 80 percent of dry weight minimum.
 - b. Feedstock: Agricultural, food, or industrial residuals; bio-solids; yard trimmings; or source-separated or compostable mixed solid waste.
- 1010.2.3.2 Humates or composted bio-waste materials may be utilized with prior written approval of the LANDSCAPE ARCHITECT or as specified on the plans.

1010.2.4 PESTICIDES AND HERBICIDES

- 1010.2.4.1 General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- 1010.2.4.2 Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the organic amendment layer.
- 1010.2.4.3 Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

1010.3 EXECUTION

1010.3.1 EXAMINATION

- 1010.3.1.1 Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
- a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

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- c. Uniformly moisten excessively dry soil that is not workable or which is dusty.

1010.3.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.

If contamination by foreign or deleterious material or liquid is present in soil within a sodding area, remove the soil and contamination as directed by the LANDSCAPE ARCHITECT and replace with new planting soil at no additional cost to the OWNER.

1010.3.2 PREPARATION OF SODBED

1010.3.2.1 Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by sodding operations.

- a. Protect grade stakes set by others until directed to remove them.

1010.3.2.2 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

- a. Reference project NEPA and/or SWPPP requirements if applicable.

1010.3.2.3 Prior to start of soil preparation all finish grades shall be established and approved as meeting the requirements of the grading plan. Apply a uniform one inch layer (3 C.Y./1000 square feet) of organic amendment and 4 lbs. of starter fertilizer per each 1000 square feet to the entire area to be sodded. After application of organic amendment and starter fertilizer all areas to be sodded shall be thoroughly rototilled to a minimum depth of 6 inches. If existing tree roots exist that prevent rototilling to a 6 inch depth, CONTRACTOR shall notify LANDSCAPE ARCHITECT for alternate direction. After rototilling is complete at cross directions, drag to an even grade, then roll for firmness. If humates or composted bio-waste materials are specified in the plans, CONTRACTOR shall follow sodbed preparation notes as shown on the plans.

1010.3.2.4 Installation: Before laying sod, the finish grade shall be brought to a firm, even surface, free from stones or lumps, in excess of one inch diameter, and shaped to provide drainage. The finish grade shall be reviewed and approved by the LANDSCAPE ARCHITECT prior to laying any sod.

1010.3.3 SODDING

1010.3.3.1 Do not lay sod if dormant, or if ground is frozen or muddy.

1010.3.3.2 Lay sod over moistened soil lightly raking the soil ahead of each sod strip. Sod shall be laid perpendicular to or across the slope with staggered joints. Remove and dispose any netting from sod as laid. Pieces shall be fitted together tightly so that no joint is visible, and sod tamped firmly and evenly by hand to insure contact with soil, eliminate air pockets, and form a smooth surface. After all the sodding has been laid it shall be rolled with a hand roller.

1010.3.3.3 Watering: Water all sodded areas immediately after final rolling with a fine spray

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moistening soil to a depth of 4 inches. Irrigate by means of the automatic underground irrigation system all sodded areas as often as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod and promote healthy grass growth until a thick, even stand of grass has been obtained.

1010.3.3.4 Sodding Restrictions: Sodding shall occur during the following period. Coordinate sodding period with maintenance period to provide required maintenance from date of sodding completion. Sodding may occur outside this period with prior written approval of the LANDSCAPE ARCHITECT.

a. Sodding: April 1st – September 30th.

1010.3.4 TURF RENOVATION

1010.3.4.1 Renovate existing turf where indicated on the plans.

1010.3.4.2 Renovate turf damaged by CONTRACTOR'S operations, such as storage of materials or equipment and movement of vehicles.

a. Reestablish turf where settlement or washouts occur or where minor regrading is required.

b. Install new planting soil as required.

1010.3.4.3 Remove dead or diseased sod and/or vegetation from unsatisfactory turf areas; do not bury in soil.

1010.3.4.4 Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from CONTRACTOR's operations, and replace with new planting soil.

1010.3.4.5 Mow, dethatch, core aerate, and rake existing turf.

1010.3.4.6 Remove weeds before sodding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

1010.3.4.7 Remove and legally dispose of waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf.

1010.3.4.8 Remove existing turf with an approved sod cutter leaving a clean, uniform edge. Remove existing turf to the minimum dimension of the width of a roll of sod to be installed during renovation.

1010.3.4.9 Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches. If existing tree roots exist that prevent tilling to a 6 inch depth, CONTRACTOR shall notify LANDSCAPE ARCHITECT for alternate direction.

1010.3.4.10 Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 6 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

a. Organic Amendment(s): Reference 1010.2.3

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- b. Starter Fertilizer: Reference 1010.2.2

1010.3.4.11 Install sod as required for new turf.

1010.3.4.12 Water newly planted areas and keep moist until new turf is established.

1010.3.5 TURF PROTECTION AND MAINTENANCE

1010.3.5.1 General: Protection and Maintenance shall continue until final acceptance. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

- a. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
- b. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

1010.3.5.2 Watering: Keep soil uniformly moist to a depth of 1-1/2 inches below sod.

- a. Schedule watering to prevent wilting, puddling, and erosion. Avoid walking over muddy or newly planted areas.
- b. The CONTRACTOR shall be responsible for the cost of water during the installation and maintenance of sod until final acceptance.

1010.3.5.3 Mowing: Sod shall be maintained at a height of 2 inches. The maximum height between cuttings shall not exceed 3 inches. Do not mow when turf is wet.

1010.3.5.4 Turf Post-fertilization: Apply fertilizer after initial mowing and when grass is dry.

1010.3.6 SATISFACTORY TURF

1010.3.6.1 Turf installations shall meet the following criteria:

- a. Satisfactory Sodded Turf: Final acceptance shall only occur after healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

1010.3.6.2 Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

1010.3.7 PESTICIDE AND HERBICIDE APPLICATION

1010.3.7.1 Apply pesticides, herbicides, and other chemical products and biological control agents only with prior written approval of the LANDSCAPE ARCHITECT and according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with LANDSCAPE

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ARCHITECT and others in proximity to the Work. Notify LANDSCAPE ARCHITECT before any application is performed.

1010.3.7.2 Post-Emergent Herbicides (Selective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

1010.3.8 CLEANUP AND PROTECTION

1010.3.8.1 Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

1010.3.8.2 Remove and legally dispose of surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris.

1010.3.8.3 Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades until sod is established or as otherwise approved by the LANDSCAPE ARCHITECT.

1010.3.9 REVIEWS AND OBSERVATIONS

1010.3.9.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations shall be made any time at the discretion of the LANDSCAPE ARCHITECT.

1010.3.9.2 It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT in writing, 48 hours in advance of each required review.

1010.3.9.3 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next sequence without written approval of the work of the previous sequence. Payment will not be approved for items which have not been reviewed and approved in writing.

- a. Automatic irrigation system, if required, shall be installed, tested, and approved.
- b. Each phase of soil preparation shall be observed in process.
- c. Finish grade shall be reviewed.
- d. Sod shall be reviewed prior to installation.
- e. Sod shall be reviewed after installation.
- f. Substantial completion review.
- g. Final review of the project and acceptance.
- h. Sod shall be reviewed 12 months after completion.

1010.3.10 MEASUREMENT & PAYMENT

1010.3.10.1 The measurement of grass sodding shall be by the square foot or square yard as

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TURF SODDING

indicated in the bid proposal.

- 1010.3.10.2 Payment shall be made at the contract unit price per square foot or square yard for grass sodding complete in place, which shall include all material, equipment and labor required in preparation, final grading, fertilizing, sod placement, watering, and maintenance as specified herein.

END OF SECTION 1010

SECTION 1011
TURF SEEDING

1011.1 GENERAL

1011.1.1 SCOPE

Furnish all labor, materials and equipment necessary for preparation of seedbed, furnishing and installation of seed, fertilizer, soil amendments, and related work specified herein and as indicated on plans or as authorized by the LANDSCAPE ARCHITECT.

1011.1.2 APPLICABLE STANDARDS & REFERENCES

1011.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1011.1.2.2 This Publication, Latest Edition:

Section 1001 Landscape Irrigation for irrigation of landscaped areas.

Section 1005 Planting for trees, shrubs, ground covers, and soil amendments.

Section 1012 Miscellaneous Seeding for hand seeding and hydro-seeding / mulching.

1011.1.3 PERFORMANCE REQUIREMENTS

1011.1.3.1 The CONTRACTOR shall be responsible for protecting and caring for turf seeded areas until final acceptance of the work and shall repair at CONTRACTOR expense any damage to seeded areas caused by pedestrian, vehicular traffic, vandalism or other cause.

1011.1.4 SUBMITTALS

1011.1.4.1 THIS PUBLICATION - Section 1502 - Submittals

1011.1.4.2 Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

a. Include identification of source and name and telephone number of supplier.

1011.1.4.3 Product Certificates: For fertilizers and organic amendments, from manufacturer.

1011.1.4.4 Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1011.1.5 DELIVERY, STORAGE, & HANDLING

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TURF SEEDING

1011.1.5.1 Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

1011.1.5.2 Bulk Materials:

- a. Do not dump or store bulk materials near fuel containers, herbicides, structures, utilities, walkways and pavements, or on existing turf areas or plants.
- b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
- c. Accompany each delivery of bulk materials with appropriate certificates.

1011.1.6 PROJECT CONDITIONS

1011.1.6.1 Soil testing: CONTRACTOR shall conduct soil testing for each sample of topsoil, existing site soil and planting soil with an approved soil-testing laboratory. CONTRACTOR shall provide soils test result and testing lab recommendations to LANDSCAPE ARCHITECT for review. If test reporting recommends amendments, fertilizers or conditioners that differ from those noted in the Contract Documents, the CONTRACTOR shall furnish and install alternate materials as directed by LANDSCAPE ARCHITECT and no additional expense to the OWNER. All soil testing will be at the expense of the Contractor. The soils test report shall include at a minimum the following information:

- a. pH
- b. Percent organic content by oven dried weight
- c. Nutrient levels by parts per million including: nitrate nitrogen,, potash, sulfur, boron, phosphorus, potassium, magnesium, manganese, iron, sodium, copper, zinc and calcium. Testing shall also include salinity, computed percentage of sodium and free lime level. Soil test shall include the testing laboratory recommendations for supplemental additions to the soil for optimum growth of the plantings specified

1011.2 PRODUCTS

1011.2.1 SEED

1011.2.1.1 Turf grass seed shall consist of 30% Olympic or Falcon Tall Fescue (Festuca), 40% perennial bluegrass (Poa), and 30% perennial Ryegrass (Lolium) species. The LANDSCAPE ARCHITECT shall receive all labels from seed bags for verification. Purity of seed shall not be less than 98% and germination shall not be less than 85%. Other seed species or blends / mixes may be substituted for above if indicated on the drawings or with prior approval of the LANDSCAPE ARCHITECT.

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1011.2.1.2 Each bag of seed shall be sealed and labeled by the seed dealer in accordance with Federal Seed Laws and New Mexico Department of Agriculture Labeling Laws. This includes: variety, kind of seed, lot number, purity, germination, percent crop, percent inert, percent weed (including noxious weeds), origin, test data and net weight. Federal Seed Laws require that analysis shall be no older than 5 months for seed shipped interstate and no older than 9 months for seed shipped intra-state.

1011.2.2 FERTILIZERS

1011.2.2.1 Starter Fertilizer: Granular complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

- a. Composition: 4 lb./1000 sq. ft., 18 percent of actual nitrogen, 24 percent available phosphorous, and 16 percent available potassium, by weight (18-24-16).
- b. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

1011.2.3 ORGANIC AMENDMENTS

1011.2.3.1 Compost Mulch: Well-composted (minimum 1 year), stable, and weed-free organic matter, pH range of 5.5 to 7.5; moisture content 35 to 55 percent by weight; 90% percent passing through a 1/4 inch sieve; soluble salt content not exceeding 1.5 mnhos/cm, not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

- a. Organic Matter Content: 80 percent of dry weight minimum.
- b. Feedstock: Agricultural, food, or industrial residuals; bio-solids; yard trimmings; or source-separated or compostable mixed solid waste.

1011.2.3.2 Humates, or composted bio-waste materials may be utilized with prior written approval of the LANDSCAPE ARCHITECT or as specified on the plans.

1011.2.4 PESTICIDES

1011.2.4.1 General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

1011.2.4.2 Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the organic amendment layer.

1011.2.4.3 Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

1011.3 EXECUTION

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TURF SEEDING

1011.3.1 EXAMINATION

- 1011.3.1.1 Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
- a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - c. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- 1011.3.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.
- 1011.3.1.3 If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the LANDSCAPE ARCHITECT and replace with new planting soil at no additional cost to the OWNER.

1011.3.2 PREPARATION

- 1011.3.2.1 Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by seeding operations.
- a. Protect grade stakes set by others until directed to remove them.
- 1011.3.2.2 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Reference project NEPA and/or SWPPP requirements if applicable.

1011.3.3 SEED BED PREPARATION

- 1011.3.3.1 Prior to start of soil preparation all finish grades shall be established and approved as meeting the requirements of the grading plan.
- 1011.3.3.2 Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- 1011.3.3.3 Apply a uniform 1-inch layer of organic amendment and starter fertilizer per this specification to the entire area to be seeded. After application of organic amendment and starter fertilizer all areas to be seeded shall be thoroughly rototilled to a minimum depth of 6 inches. If existing tree roots exist that prevent rototilling to a 6 inch depth, CONTRACTOR shall notify LANDSCAPE ARCHITECT for alternate direction. After rototilling is complete at cross directions, drag to an even grade, then roll for firmness. Before seeding, the finish grade shall be brought to a firm, even surface, free from stones or lumps in excess of one inch diameter, and shaped to provide drainage. The finish grade shall be reviewed and approved by the LANDSCAPE ARCHITECT prior to seeding. If humates or composted bio-waste materials are specified in the plans, CONTRACTOR shall follow seed bed preparation notes as shown on the plans.

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1011.3.4 SEEDING

- 1011.3.4.1 The seeding rate shall be 250 lbs. pure live seed (PLS) per acre or as shown on the plans. The specific mix shall be uniformly applied over the area to be seeded.
- 1011.3.4.2 CONTRACTOR'S vehicles and other equipment shall not travel over the seeded areas. If, as determined by the LANDSCAPE ARCHITECT, rain or some other factor occurs over prepared surfaces prior to seeding which prevents seeding to the proper depth, the CONTRACTOR shall again prepare the seed bed without additional compensation.
- 1011.3.4.3 Time of seeding: (Seeding Season) Turf grass seeding shall only be accomplished in the Spring from April 1 through May 30 or in the Fall from August 15 through September 30. If seeding is not accomplished during the "time of seeding" the CONTRACTOR shall accomplish the seeding at the "time of seeding" during the next calendar year. Extension of the CONTRACT to meet the "time of seeding" shall be accomplished at no additional expense to the OWNER.
- a. All soil slopes which have been completed prior to the seeding season shall be seeded immediately after the opening of the current seeding season.
 - b. All soil slopes which are completed during the seeding season shall be seeded that same season.
 - c. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to this specification.
- 1011.3.4.4 Drill Seeding: All seed shall be drilled in cross directions, where practical, with 50% of the seed applied in each direction. The second pass of the seeder when seeding in cross directions shall be across the slope. In areas where seeding in cross directions is impractical, seeding shall be accomplished by drilling and shall be across the slope. Seed shall be planted approximately 1/4 inch deep, with a maximum depth of 1/2 inch unless otherwise specified on the plans. The distance between the drilled furrows shall not be more than 2 inches. Seeding shall be done with grass seeding equipment in good working order with double disc openers, depth bands, drop tubes, packer wheels or drag chains, rate control attachments, seed boxes with agitators for trashy seed.
- 1011.3.4.5 Broadcasting: The seed will be broadcast by a mechanical spreader at a rate as specified or as indicated on the plans. Seeds shall be planted to a minimum depth of 1/4 inch and no deeper than 1/2 inch. Broadcasting shall only be used when specified on the plans and/or approved by the LANDSCAPE ARCHITECT.

1011.3.5 WATERING

- 1011.3.5.1 Permanent Irrigation Systems for Turf Grasses: Seeded areas having a permanent irrigation system as specified on the plans will be watered by said system. Watering of the seed will be the responsibility of the CONTRACTOR until final acceptance or as otherwise noted in the Contract Documents. All seeded areas shall be watered immediately after completion of seeding, keeping the top two inches of soil evenly moist until seed has uniformly germinated and grown to a

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height of two inches.

- 1011.3.5.2 Water: The CONTRACTOR shall be responsible for the cost of water during seeding and maintenance of seeded turf until final acceptance.

1011.3.6 TURF RENOVATION

- 1011.3.6.1 Renovate existing turf where indicated.
- 1011.3.6.2 Renovate turf damaged by CONTRACTOR's operations, such as storage of materials or equipment and movement of vehicles.
- a. Reestablish finished grade and turf where settlement or washouts occur or where minor re-grading is required.
 - b. Install new planting soil as required.
- 1011.3.6.3 Remove dead or diseased turf and/or vegetation from unsatisfactory turf areas; do not bury in soil.
- 1011.3.6.4 Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from CONTRACTOR'S operations, and replace with new planting soil.
- 1011.3.6.5 Mow, dethatch, core aerate, and rake existing turf.
- 1011.3.6.6 Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required and approved by the LANDSCAPE ARCHITECT. Do not use pre-emergence herbicides.
- 1011.3.6.7 Remove and legally dispose of waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf.
- 1011.3.6.8 Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches. If existing tree roots exist that prevent tilling to a 6 inch depth, CONTRACTOR shall notify LANDSCAPE ARCHITECT for alternate direction.
- 1011.3.6.9 Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into top 6 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.
- 1011.3.6.10 Apply seed as required for new turf.
- 1011.3.6.11 Water newly planted areas and keep moist until new turf is established.

1011.3.7 SEEDED TURF PROTECTION AND MAINTENANCE

- 1011.3.7.1 General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- a. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 - b. Apply treatments as required and approved by the LANDSCAPE ARCHITECT to keep turf and soil free of pests and pathogens or disease. Use

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integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

- 1011.3.7.2 Protection and Maintenance for Seeded Turf: Protect and maintain all turf seeded areas until a dense uniform stand of grass has been established and has been final accepted. The grass shall have been cut a minimum of three times at a height of 2 inches prior to substantial completion. After completion of second mowing, apply an additional 4 pounds per 1000 square feet of starter fertilizer, or fertilize as shown on the plans, or as recommended in the soils report and approved by the LANDSCAPE ARCHITECT.
- 1011.3.7.3 Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain the specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowing. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowing to maintain the specified grass heights.
- 1011.3.8 SATISFACTORY TURF
- 1011.3.8.1 Turf installations shall meet the following criteria as determined by the LANDSCAPE ARCHITECT:
- a. Satisfactory Seeded Turf: Prior to substantial completion, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 3 inches in diameter.
- 1011.3.8.2 Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory at no additional cost to OWNER.
- 1011.3.9 CLEANUP AND PROTECTION
- 1011.3.9.1 Promptly remove soil and debris created by seeding work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- 1011.3.9.2 Remove and legally dispose of surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris.
- 1011.3.9.3 Erect temporary fencing or barricades and warning signs as required to protect newly seeded areas from traffic. Maintain fencing and barricades until satisfactory turf is established or as otherwise approved by the LANDSCAPE ARCHITECT.
- 1011.3.9.4 Remove non-degradable erosion-control measures after grass establishment period.
- 1011.3.10 WARRANTY
- 1011.3.10.1 If at the end of one complete growing season, it has been determined by the LANDSCAPE ARCHITECT that insufficient germination has occurred in turf areas the CONTRACTOR shall reseed such areas with no additional cost to the OWNER.

SECTION 1011
TURF SEEDING

1011.3.11 REVIEWS AND OBSERVATIONS

- 1011.3.11.1 The following shall be the minimum required reviews and observations to seeded turf grass during the course of construction. Additional reviews and observations shall be made at any time at the discretion of the LANDSCAPE ARCHITECT.
- 1011.3.11.2 It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT, in writing, 48 hours in advance of each required review or observation.
- 1011.3.11.3 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next sequence without written approval of the work of the previous sequence. Payments will not be approved for items which have not been reviewed and approved in writing.
- a. Automatic irrigation system where required shall be installed, tested, and approved in accordance with Section 1001, if required.
 - b. Each phase of soil preparation shall be observed in process.
 - c. Finish grade shall be reviewed.
 - d. Seed shall be reviewed prior to seeding.
 - e. Seeded area shall be reviewed after completion.
 - f. Substantial completion review.
 - g. Final review of the project and acceptance.

1011.3.12 MEASUREMENT & PAYMENT

- 1011.3.12.1 The measurement of turf grass seeding shall be by the acre.
- 1011.3.12.2 PAYMENT: Payment shall be made at the contract unit price per acre of turf grass seeding complete in place, which shall include the seed, soil preparation, fertilizing, seeding, watering, and maintenance.

END OF SECTION 1011

SECTION 1012
MISCELLANEOUS SEEDING

1012.1 GENERAL

1012.1.1 SCOPE

Furnish all labor, materials and equipment necessary for preparation of seedbed, furnishing and installation of seed, fertilizer, erosion control measures, soil amendments, and related work specified herein and as indicated on plans or as authorized by the LANDSCAPE ARCHITECT.

1012.1.2 APPLICABLE STANDARDS & REFERENCES:

1012.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1012.1.2.2 All seed shall be certified by state of origin. The certification authority for the state of New Mexico is the New Mexico Crop Improvement Association.

1012.1.2.3 Reclamation efforts are controlled by the requirements stipulated in the National Pollution Discharge Elimination System General Permit for Region VI of the Environmental Protection Agency.

1012.1.3 PERFORMANCE REQUIREMENTS

1012.1.3.1 The CONTRACTOR shall be responsible for protecting and caring for seeded areas until final acceptance of the work and shall repair at CONTRACTOR expense any damage to seeded areas caused by pedestrian, vehicular traffic, vandalism or other cause.

1012.1.4 SUBMITTALS

1012.1.4.1 THIS PUBLICATION - Section 1502 - Submittals

1012.1.4.2 Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging. Include identification of source and name and telephone number of supplier.

1012.1.4.3 Product Certificates: For fertilizers and organic amendments, from manufacturer.

1012.1.4.4 Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1012.1.4.5 Sources of supply for native grass hay, straw, hydro mulch, erosion control blankets, and/or gravel mulch.

1012.1.5 DELIVERY, STORAGE & HANDLING

1012.1.5.1 Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as

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applicable.

1012.1.5.2 Bulk Materials:

- a. Do not dump or store bulk materials near fuel containers, herbicides, structures, utilities, walkways and pavements, or on existing turf areas or plants.
- b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
- c. Accompany each delivery of bulk materials with appropriate certificates.

1012.2 PRODUCTS

1012.2.1 SEED

1012.2.1.1 Native Seed: The native seed species and rate of application shall be as shown below and shall be used based on the type of soil or as specified on the plans or in the Supplemental Technical Specifications.

1012.2.1.2 Grass seed shall be fresh, re-cleaned seed of the latest crop, mixed in the proportions by weight, and be pure live seed as denoted within these specifications or as per the plans.

1012.2.1.3 Seed shall be delivered to the site in the original unopened containers which shall bear the vendor's guarantee of analysis. Labeling of seed shall be in accordance with Federal Seed Laws and the New Mexico Department of Agriculture labeling laws. Federal seed laws require that analysis shall be no older than five months for seed shipped interstate and no older than nine months for seed shipped intra-state. Seeds may be pre-mixed by a seed dealer. Documentation must be provided, the same as if the seeds were sold or bagged separately. The LANDSCAPE ARCHITECT shall receive all labels from all bags of seed used for verification. For each species included in the mix the following information will be found on each bag tag:

- a. Variety - specify if certified.
- b. Kind of seed
- c. Lot number
- d. Purity
- e. Germination
- f. % of Crop seed, % inert, % noxious weed
- g. Origin
- h. Test date
- i. Pounds of this species or percentage of total lot.

1012.2.1.4 Seed Mixture and Rate: Seed species mixtures and application rates shall be as follows and shall be used based on the soil type unless otherwise specified in the plans or Supplemental Technical Specifications.

- a. Gravelly Uplands and Slopes (Mainly East Foothills): Seed rate is given in pounds of pure live seed (PLS) per acre. Shrub species noted shall only be included in the seed mix if required in the plans or approved by the

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MISCELLANEOUS SEEDING

LANDSCAPE ARCHITECT prior to seeding. If the area to be seeded is along a recreational trail or roadway the shrub species shall not be included in the mix. Perennial wildflower species shall be included if required in the plans and shall be installed at the rate of 2# PLS/AC.

a. Gravelly Uplands & Slopes	#PLS/AC	Notes
<i>Bouteloua gracilis</i> 'Hacita' – Blue Grama	7.0	
<i>Bouteloua curtipendula</i> 'Niner' - Sideoats Grama	5.0	
<i>Stipa neomexicana</i> – Needle & Thread Grass	2.0	
<i>Oryzopsis hymenoides</i> - "Indian Rice Grass"	2.0	
<i>Koeleria macrantha</i> – June Grass	1.0	
<i>Pleuraphis jamesii</i> 'Viva' – Galleta	1.0	
<i>Fallugia Paradoxa</i> - Apache Plume	.25	Shrub
<i>Krascheninnikovia lanata</i> - Winterfat	.25	Shrub
<i>Yucca glauca</i> – Soapweed Yucca	.25	Shrub
<i>Ericameria nauseosis</i> – Chamisa	.25	Shrub
<i>Psilostrophe cooperi</i> – Paper Flower	.25	Perennial Wildflower
<i>Eriogonum jamesii</i> var – Sulphur Buckwheat	.25	Perennial Wildflower
<i>Gaillardia aristata</i> - Blanket Flower	.25	Perennial Wildflower
<i>Sphaeralcea parvifolia</i> - Nelson Globemallow	.25	Perennial Wildflower
<i>Oenothera pallida</i> - White Evening Primrose	.25	Perennial Wildflower
<i>Baileya multiradiata</i> - Desert Marigold	.25	Perennial Wildflower
<i>Castilleja integra</i> - Indian Paintbrush	.25	Perennial Wildflower
<i>Abronia fragrans</i> - Sand Verbena	.25	Perennial Wildflower

- b. Sandy Soils: (Mainly Westside Areas) Seed rate is given in pounds of pure live seed (PLS) per acre. Shrub species noted shall only be included in the seed mix if required in the plans or approved by the LANDSCAPE ARCHITECT prior to seeding. If the area to be seeded is along a recreational trail or roadway the shrub species shall not be included in the mix. Perennial wildflower species shall be included if required in the plans and shall be installed at the rate of 1.5# PLS/AC.

b. Sandy Soils	#PLS/AC	Notes
<i>Hilaria jamesii</i> 'Viva' - Galleta	7.0	
<i>Oryzopsis hymenoides</i> 'Nespar' - Indian Rice Grass	5.0	
<i>Bouteloua gracilis</i> 'Hachita' – Blue Grama	2.0	
<i>Bouteloua curtipendula</i> 'Vaughn' – Sideoats Grama	1.0	
<i>Agropyron smithii</i> – Western Wheat	1.0	
<i>Sporobolus cryptandrus</i> – Sand Dropseed	1.0	
<i>Sporobolus airoides</i> 'Salado' – Alkali Sacaton	1.0	
<i>Ephedra viridis</i> – Green Mormon Tea	.25	Shrub
<i>Atriplex canescens</i> – Fourwing Saltbush	.25	Shrub
<i>Artemisis filifolia</i> – Sand Sage	.5	Shrub
<i>Yucca glauca</i> – Soapweed Yucca	.5	Shrub
<i>Sphaeralcea ambigna</i> – Desert Globemallow	.25	Perennial wildflower
<i>Spaeralcea parvifolia</i> – Nelson Globemallow	.25	Perennial wildflower

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b. Sandy Soils	#PLS/AC	Notes
<i>Oenothera pallid</i> – <i>White Evening Primrose</i>	.25	Perennial wildflower
<i>Baileya multiradiata</i> – <i>Desert Marigold</i>	.25	Perennial wildflower
<i>Penstemon ambiques</i> – <i>Sand Penstemon</i>	.25	Perennial wildflower
<i>Abronia fragrans</i> – <i>Sand Verbena</i>	.25	Perennial wildflower

- c. Clay, Clay Loam Soils: Mainly Valley & Bosque areas). Seed rate is given in pounds of pure live seed (PLS) per acre. Shrub species noted shall only be included in the seed mix if required in the plans or approved by the LANDSCAPE ARCHITECT prior to seeding. If the area to be seeded is along a recreational trail or roadway the shrub species shall not be included in the mix. Perennial wildflower species shall be included if required in the plans and shall be installed at the rate of 1.5# PLS/AC.

c. Clay, Clay Loam Soils	#PLS/AC	Notes
<i>Hilaria jamesii</i> ‘Viva’ - <i>Galleta</i>	4.0	
<i>Bouteloua curtipendula</i> ‘Vaughn’ – <i>Sideoats Grama</i>	3.0	
<i>Panicum obtusum</i> – <i>Vine Mesquite</i>	3.0	
<i>Oryzopsis hymenoides</i> ‘Nespar’ - <i>Indian Rice Grass</i>	2.0	
<i>Sporobolus airoides</i> ‘Salado’ – <i>Alkali Sacaton</i>	2.0	
<i>Agropyron smithii</i> – <i>Western Wheat</i>	1.0	
<i>Bouteloua gracilis</i> ‘Hachita’ – <i>Blue Grama</i>	1.0	
<i>Sporobolus cryptandrus</i> – <i>Sand Dropseed</i>	1.0	
<i>Stipa neomexicana</i> – <i>NM Needle & Thread Grass</i>	1.0	
<i>Soraghastrum nutans</i> – <i>Indian Grass</i>	.5	
<i>Krascheninnikovia lanata</i> - <i>Winterfat</i>	.25	Shrub
<i>Artemisia ludoviciana</i> – <i>Prairie Sage</i>	.25	Shrub
<i>Sphaeralcea coccinea</i> - <i>Scarlet Globemallow</i>	.25	Perennial wildflower
<i>Oenothera hookeri</i> – <i>Evening Primrose</i>	.25	Perennial wildflower
<i>Oenothera pallida</i> – <i>White Evening Primrose</i>	.25	Perennial wildflower
<i>Baileya multiradiata</i> - <i>Desert Marigold</i>	.25	Perennial wildflower
<i>Berlandiera lycrata</i> – <i>Chocolate Flower</i>	.25	Perennial wildflower
<i>Lineum lewissi</i> – <i>Blue Flax</i>	.25	Perennial wildflower

- d. Specific seed mixture application areas shall be determined in the field with the LANDSCAPE ARCHITECT prior to seed installation. Alternate seed mixes, variations of species, and variations of application rates are acceptable if noted on the plans or approved in writing by the LANDSCAPE ARCHITECT. Variations in application rates due to the presence of irrigation are acceptable if noted on the plans or approved in writing by the LANDSCAPE ARCHITECT.

1012.2.2 NATIVE GRASS AND WILDFLOWER MEADOWS

- 1012.2.2.1 Native grass and wildflower meadow seeding shall be installed to the extents shown on the plans. Seed mix for meadow plantings shall differ from those identified in 1012.2.1.4 as follows:

- 1012.2.2.2 Wildflower Seed: Fresh, clean, and dry new seed, of mixed species as follows:

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- a. Wildflower seed mix shall be developed based on soil type from seed mixes listed in Section 1012.2.1.4 and applied at a rate of 50# PLS/Acre.
- 1012.2.2.3 Native-Grass Seed: Fresh, clean, and dry new seed, of mixed species as follows:
- a. Native-grass seed mix shall be 50% / 50% (by weight) combination of *Bouteloua gracilis* 'Hachita' – Blue Grama, and *Buchloe dactyloides* – Buffalo grass, applied at a rate of 100# PLS/Acre.
- 1012.2.2.4 Wildflower and Native-Grass Seed: Fresh, clean, and dry new seed, of mixed species as follows:
- a. Wildflower and native grass seed mix shall be an equal combination of 1012.2.2.2 and 1012.2.2.3 above applied at rates noted.
- 1012.2.2.5 Seed Carrier: Inert material, sharp clean sand, or perlite.
- 1012.2.3 MULCHES
- 1012.2.3.1 Hydro-mulch/Tackifier:
- a. Hydro-mulch shall consist of a mulch/tackifier combination independently laboratory tested for erosion control performance using a rainfall simulator raining at 4 inches per hour and mulch/tackifier applied at 1,600 lbs. per acre. No combination of mulch and tackifier shall be used unless laboratory test results based upon the above conditions show the mulch-tackifier combination to give a calculated apparent erosion rate of 5 tons per acre per hour or less.
 - b. The mulch shall include Silt Stop P.A.M. or approved equal tackifier. This tackifier shall be adhered to the fibers during manufacturing, to prevent separation during shipment and to avoid chemical agglomeration during mixing in the hydraulic mulching equipment. The tackifier shall be homogenous within the unit package. It shall have no growth or germination inhibiting factors and be nontoxic.
 - c. The mulch material shall consist of straw fibers manufactured expressly from annually renewable organic fibers. The fibers shall be processed in such a manner as to contain no growth or germination inhibiting factors. Fiber shall not be produced from residue from wood pulp and paper plants.
 - d. The fibers of the mulch must maintain uniform suspension in water under agitation. The fiber mulch shall blend with the additives to form homogenous slurry. Upon application, the mulch material shall form a blotter-like mat covering the ground. This mat shall have the characteristics of moisture absorption and percolation and shall cover and hold grass seed in contact with the soil. The fiber much shall be dyed a different color for each type of seed mixture to aid in visual metering and measurement during application. The dye shall be biodegradable and not inhibit plant growth.
 - e. The rate of application of the mulch/tackifier shall be a minimum 2,000 lbs. per acre. This application rate may vary according to soil type and slope as noted in the plans.
 - f. Alternate hydro-mulch/tackifier products and applications are acceptable if specified on the plans or with prior written approval by the LANDSCAPE

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ARCHITECT.

1012.2.3.2 Native Grass Hay and Straw Mulch

- a. Hay Mulch: Perennial native or introduced grasses of fine-stemmed varieties shall be used unless otherwise specified on the plans or approved in writing by the LANDSCAPE ARCHITECT. At least 65 percent of the herbage by weight of each bale of hay shall be 10 inches in length or longer. Hay with noxious seed or plants will not be acceptable. Rotted, brittle, or moldy hay will not be acceptable. Marsh grass or prairie hay composed of native grass species to be seeded will be acceptable. Marsh grass hay shall be composed of mid and tall native, usually tough and wiry grass and grass-like plants found in the lowland areas within the Rocky Mountain region. Tall wheat grass, Timothy grass, intermediate wheat grass, switch grass, or orchard hay will be acceptable only upon prior written approval of the LANDSCAPE ARCHITECT and then only if cut prior to seed formation. Hay shall be properly cured prior to use. Hay which is brittle, short fibered or improperly cured is not acceptable.
- b. Straw Mulch: Small grain straw such as wheat, barley, rye or oats will not be allowed except by prior written approval of the LANDSCAPE ARCHITECT and with the concurrence of the Air Division of the Environmental Health Department. Other materials, such as alfalfa, are not acceptable. Material which is brittle, shorter than 10 inches or which breaks or fragments during the crimping operation will not be acceptable.

1012.2.3.3 Germination/Erosion Control Mats

- a. Erosion-Control Blankets: Maximum 1-inch thick biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.
- b. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb./sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.
- c. Other products as specified on the plans or within the Supplemental Technical Specifications, or as approved by the LANDSCAPE ARCHITECT.

1012.2.3.4 Aggregate Mulch: Sloped areas greater than 3:1

- a. Aggregate mulch shall consist of 3/4 inch to 1 inch depth maximum size crushed or angular material and will only be allowed with prior written approval of the LANDSCAPE ARCHITECT.

1012.2.4 SOIL AMENDMENT

- 1012.2.4.1 Fertilizer: Fertilizer and Soil Amendments: Unless otherwise specified on the plans or in the Supplemental Technical Specification, no fertilizer or other soil amendments are required on areas specified to receive native seeding. If fertilizer and/or other soil amendments are required they shall be in accordance with Section 1011.2.2 of these specifications. If fertilizer and soil amendments are required CONTRACTOR shall perform a soils test in accordance with Section 1011.1.6.1 of these specifications.

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1012.3 EXECUTION

1012.3.1 EXAMINATION

- 1012.3.1.1 Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
- a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - c. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- 1012.3.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.
- 1012.3.1.3 If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the LANDSCAPE ARCHITECT and replace with new planting soil at no additional cost to the OWNER.

1012.3.2 PREPARATION

- 1012.3.2.1 Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by seeding operations.
- a. Protect grade stakes set by others until directed to remove them.
- 1012.3.2.2 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Reference project NEPA and/or SWPPP requirements if applicable.

1012.3.3 SEED BED PREPARATION

- 1012.3.3.1 Prior to the starting of any seed bed preparation the final grades of all earthwork shall be inspected and approved by the LANDSCAPE ARCHITECT.
- 1012.3.3.2 No preparation shall be performed when the surface is wet or muddy or when the soil moisture content is such that the soil is not fully loosened by the disking operation.
- 1012.3.3.3 The extent of seed bed preparation shall not exceed the area on which seeding, mulching and crimping operations can be completed prior to crusting or wind or water erosion of the prepared surface. If erosion, crusting or re-compaction occurs, the affected area shall be re-worked beginning with seed bed preparation. Depth of preparation must be approved by the LANDSCAPE ARCHITECT prior to the seeding and mulching operations.
- 1012.3.3.4 Mechanical Preparation: Seed bed shall be prepared to a minimum depth of 6 inches, tilling with a disc, harrow or chiseling tools. Seed bed preparation shall be confined to disturbed areas unless otherwise specifically directed by the

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LANDSCAPE ARCHITECT. Area of heavy or compacted soil may require additional preparation such as chiseling or ripping if disking alone does not result in specified depth. All competitive vegetation shall be uprooted during seed bed preparation and the soil shall be uniformly worked to a smooth, firm surface free of clods, stones or other foreign materials, 4 inches or larger, that would interfere with seeding or crimping equipment operations and germination. Tilling shall not occur when the wind is over 10 mph and is causing a dust problem to adjoining areas. No work shall be done when the moisture content of the soil is unfavorable or the ground is otherwise in an un-tillable condition.

- 1012.3.3.5 Hand preparation: Areas which cannot be prepared with mechanized equipment because of small size or irregular shape, slope angle, or significant existing vegetation which is to remain, may be loosened to a minimum depth of 2 inches using hand tools or a rototiller. Any such areas will be specified on the plans or approved in writing by the LANDSCAPE ARCHITECT.

- 1012.3.4 PREPARATION FOR GERMINATION/ EROSION-CONTROL MATERIALS
 - 1012.3.4.1 For erosion-control mats, provide seed bed preparation and seeding prior to installation as specified within this section. Install erosion-control germination materials and fasten as recommended by material manufacturer.
 - 1012.3.4.2 For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
 - 1012.3.4.3 Moisten prepared area after planting if surface is dry. Water thoroughly without creating erosion or run-off.

- 1012.3.5 SEEDING
 - 1012.3.5.1 General: Seed types and rates shall be as shown on plans or as directed by the LANDSCAPE ARCHITECT. Three specific seed mixes have been specified for distinct areas of the city. Seeded areas shall be drilled seeded and hay mulched where slopes are less than 3:1 unless otherwise directed by the LANDSCAPE ARCHITECT. Slopes greater than 3:1 shall be broadcast seeded and hydro-mulched, aggregate mulched or erosion control blankets applied as per plans or as directed by the LANDSCAPE ARCHITECT.
 - a. Seeding shall not start until the seed bed preparation has been inspected and approved by the LANDSCAPE ARCHITECT.
 - b. CONTRACTOR'S vehicles and other equipment shall not travel over the prepared areas. If, as determined by the LANDSCAPE ARCHITECT, that rain or some other factor has impacted prepared surfaces so that it is not possible to seed to the proper depth, the CONTRACTOR shall again prepare the seed bed without additional compensation.
 - c. No more area may be seeded than can be stabilized (i.e. covered with mulch and crimped, covered with gravel mulch or erosion control mats, hydro-mulched) by the end of the work day. No seeding operations may be conducted when steady wind speeds exceed 10 mph. If winds exceed 10 mph, seeding operations will be halted and any areas seeded shall be

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mulched and crimped.

- d. Weather Limitations: Proceed with seeding operations only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to this specification.

1012.3.5.2 Drill Seeding: Drill seeding is required for reclamation areas unless otherwise specified in the plans or in the Supplemental Technical Specifications or approved in writing by the LANDSCAPE ARCHITECT. Seed shall be applied with a "rangeland" type seed drill equipped with packer wheels. Seed shall be drilled to a maximum depth of 1/2 inch unless otherwise specified. Direction of seeding shall be in long sweeping and overlapping S-curves on flats and perpendicular to slopes and on the contour whenever possible.

1012.3.5.3 Broadcast Seeding: Seed may be applied by hand or by utilizing a rotary spreader or a seeder box with a gear feed mechanism if mechanized seeding is not possible due to limited size, irregular shape, or slope angle exceeding 3:1. Rice hulls or other fillers shall be used to prevent uneven separation of lighter seed. Seed shall be evenly distributed and applied at a rate which is a minimum of twice that of drilled seed rate unless otherwise specified. Immediately following the seeding operation, the seed-bed shall be lightly raked to provide approximately 1/2 inch cover of soil over most of the seed.

1012.3.5.4 A hydro-mulch slurry blower may be used only with the prior written approval of the LANDSCAPE ARCHITECT.

1012.3.6 MEADOW SEEDING

1012.3.6.1 Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.

- a. Before sowing, mix seed with seed carrier at a ratio of not less than four parts seed carrier to one part seed.
- b. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
- c. Do not use wet seed or seed that is moldy or otherwise damaged.

1012.3.6.2 Broadcast, hand or hydro-seed as specified within this section. Brush or rake seed into top 1/16 inch of soil, roll lightly, and water with fine spray.

1012.3.6.3 On slopes greater than 3:1, protect seeded areas from hot, dry weather or drying winds by applying erosion control/germination materials within same day after completing seeding operations.

1012.3.6.4 Water newly planted areas and keep moist until meadow is established.

1012.3.7 MULCHING FOR MISCELLANEOUS SEEDING

1012.3.7.1 General: All seeded areas shall be mulched unless otherwise specified on the plans or in the Supplemental Technical Specifications or approved in writing by the LANDSCAPE ARCHITECT.

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- 1012.3.7.2 On seeded areas that are level or have slopes 3:1 or less, hay mulching shall be utilized unless otherwise specified on the plans or in the Supplemental Technical Specifications or with prior written approval of the LANDSCAPE ARCHITECT. On seeded areas that have slopes steeper than 3:1, only hydro-mulch, gravel mulch, or erosion control mats may be used as specified on the plans and in the Supplemental Technical Specifications.
- 1012.3.7.3 Hay/Straw Mulching: Hay mulch shall be applied at a minimum rate of 2.5 tons per acre of air-dry hay. If approved, straw mulch shall be applied at a minimum rate of 2.5 tons per acre of air-dry straw.
- a. Crimping: Hay and/or straw mulch shall be crimped into the soil. The mulch shall be spread uniformly over the area either by hand or with a mechanical mulch spreader. When spread by hand, the bales of mulch shall be torn apart and fluffed before spreading. Mulching will not be permitted when wind velocity exceeds 15 miles per hour. The mulch shall be wetted down and allowed to soften for 15 to 20 minutes prior to crimping. A heavy disc such as a mulch-tiller, with flat serrated discs at least 1/4 inch in thickness, having dull edges and the disc spaced 6 inches to 8 inches apart shall be used to crimp (or anchor) the mulch into the soil to a minimum depth of 2 inches or as specified on the plans or in the Supplemental Technical Specifications. The discs shall be of sufficient diameter to prevent the frame of the equipment from dragging the mulch.
 - b. The crimping operations shall be across the slope where practical but not be parallel to prevailing Westerly winds (270 degrees magnetic). Crimping shall be in a general north-south direction where practical, and with tight interlocking "S" curves to avoid straight crimp lines.
 - c. If small grain straw mulch is used it shall be crimped in two directions in a cross-hatch pattern.
- 1012.3.7.4 Hydro-mulching: Immediately following the raking operation, all seeded areas shall receive hydro-mulch application with tackifier at the minimum rate of 2,000 lbs. per acre. The slurry shall be mixed in a tank with an agitation system and shall be sprayed, under pressure, uniformly to a depth of 1/8 inch over the soil surface. The hydraulic mulching equipment shall keep all materials in uniform suspension throughout the mixing and suspension cycle. The applicator shall use both horizontal and vertical movements to achieve an even application of the slurry material. All areas receiving insufficient coverage in the opinion of the LANDSCAPE ARCHITECT shall receive additional slurry.
- 1012.3.7.5 Erosion Control, Germination Blankets, Mats, or Fabric
- a. The erosion control blankets shall be applied over seeded slope areas on the same day that seeding occurs without exception. Installation and anchoring of blankets shall occur as per approved manufacturer's specifications.
- 1012.3.7.6 Aggregate Mulch
- a. If slope is accessible by appropriate equipment, steep slopes can be mulched with aggregate mulch with written approval of the LANDSCAPE ARCHITECT. Immediately following seeding and raking operation, all seeded areas shall receive aggregate mulch as noted in the plans. The mulch shall be placed in a layer approximately one stone deep over seeded areas. Seeding and mulch shall be completed simultaneously in strips from the top

SECTION 1012

MISCELLANEOUS SEEDING

of the slope to the bottom so that seeded areas are not damaged by equipment use over seeded areas.

1012.3.8 MAINTENANCE AND PROTECTION

1012.3.8.1 The CONTRACTOR shall maintain the seeded areas regularly following installation until final acceptance.

1012.3.8.2 The CONTRACTOR shall be responsible for protecting and caring for seeded and mulched areas until final acceptance of the work and shall repair at his/her expense any damage to seeded and mulched areas caused by pedestrian or vehicular traffic or vandalism.

1012.3.9 MEADOW MAINTENANCE

1012.3.9.1 Maintain and establish areas designated as meadows by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable meadow. Roll, re-grade, and replant bare or eroded areas and re-mulch. Provide materials and installation the same as those used in the original installation.

a. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and meadow damaged or lost in areas of subsidence.

b. In areas where erosion control/germination materials have been disturbed by wind or maintenance operations, add new mats and anchor as required to prevent displacement.

1012.3.9.2 Watering:

a. Schedule watering to provide germination and establishment, prevent wilting, puddling, erosion, and displacement of seed or erosion control/germination materials.

1012.3.10 PEST AND WEED CONTROL

1012.3.10.1 Pest Control: Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with the LANDSCAPE ARCHITECT and any others in proximity to the Work. Notify the LANDSCAPE ARCHITECT before each application is performed. Pest control shall be implemented as necessary at no cost to the OWNER until final acceptance of the Project.

1012.3.10.2 CONTRACTOR shall control germination of weed species that are not included as part of the seed mix. Weed control may be mechanical or hand removal methods as determined by the CONTRACTOR with approval by the LANDSCAPE ARCHITECT. Weed control shall be implemented as necessary at no cost to the OWNER until final acceptance of the Project.

1012.3.11 WARRANTY

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- 1012.3.11.1 If at the end of one complete growing season, it has been determined by the LANDSCAPE ARCHITECT that insufficient germination has occurred in reclamation areas the CONTRACTOR shall reseed such areas with no additional cost to the OWNER.
- 1012.3.11.2 Where miscellaneous seeding is installed in areas without an irrigation system, no warranty shall be required after the date of final acceptance.
- 1012.3.11.3 Warranty inspection performance standards for non-irrigated seeding will be based upon achieving the establishment of at least the baseline vegetative cover (baseline for pre-construction vegetative cover ranges from 25% to 50% coverage unless otherwise pre-approved in writing by the LANDSCAPE ARCHITECT). The percentage of vegetative cover may vary as required in the Contract Documents.

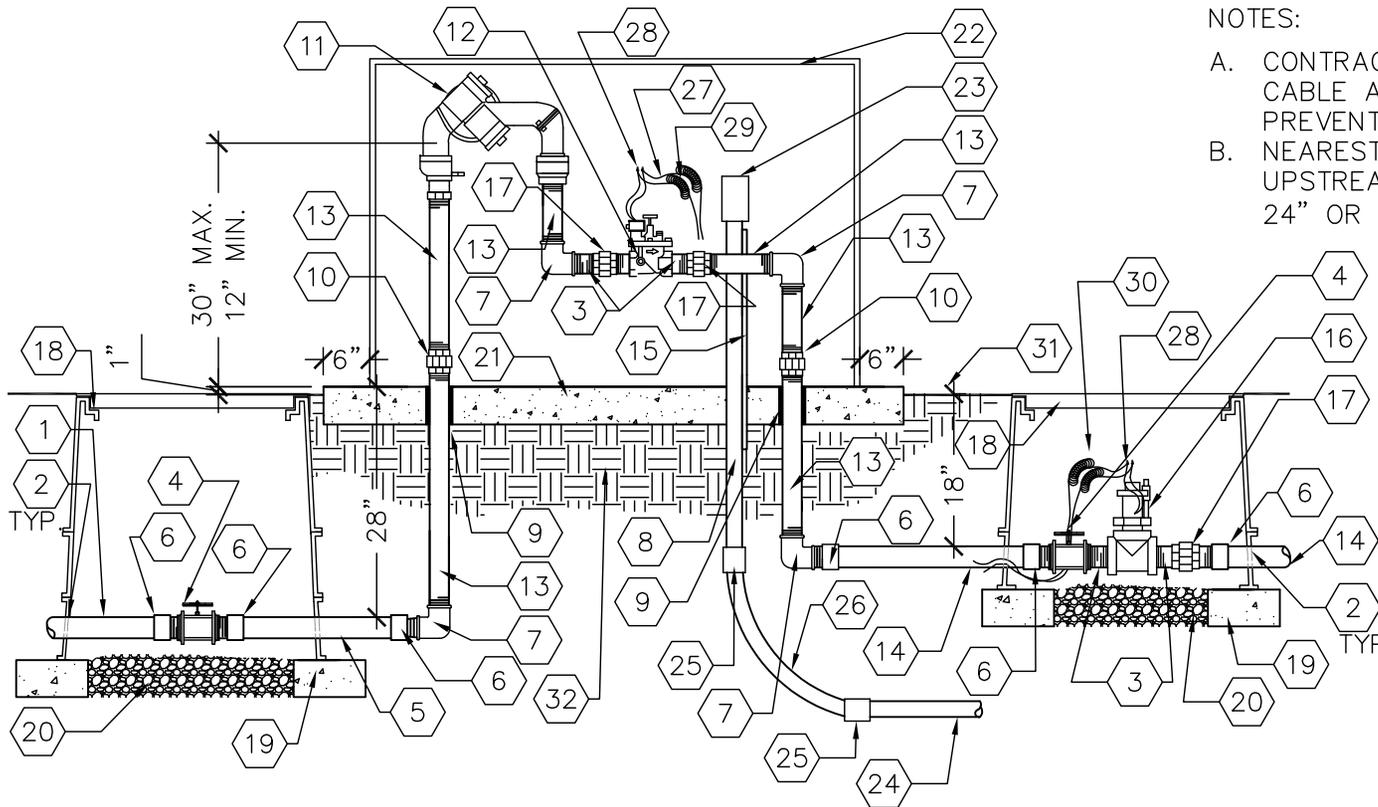
1012.3.12 REVIEWS AND OBSERVATIONS

- 1012.3.12.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations can be made at any time at the discretion of the LANDSCAPE ARCHITECT. It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT, in writing, 48 hours in advance of each required review or observation.
- 1012.3.12.2 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next phase without written approval of the work of the previous phase by the LANDSCAPE ARCHITECT. Payment will not be approved for items which have not been reviewed and approved in writing.
- a. Each phase of soil preparation shall be observed in process.
 - b. Finish grade shall be reviewed.
 - c. Implementation plan shall be approved prior to seeding.
 - d. Seed shall be reviewed prior to seeding.
 - e. Seeded area shall be reviewed after completion.
 - f. Mulched areas shall be reviewed after completion.
 - g. Final review and acceptance.
 - h. Warranty review

1012.3.13 MEASUREMENT & PAYMENT

- 1012.3.13.1 Measurement: The measurement of native grass seeding shall be by the acre.
- 1012.3.13.2 Payment: Payment shall be made at the contract unit price per acre, of native grass seeding complete in place, which shall include the seed, fertilizer (if required), area preparation , seeding, soil amendments (if required), and mulching.

END OF SECTION 1012



NOTES:

- A. CONTRACTOR SHALL SUPPLY AND INSTALL HEAT CABLE AROUND EXPOSED PIPES AND BACKFLOW PREVENTER. MINIMUM 1:3 SPIRALING RATIO.
- B. NEAREST SIZE OR DIRECTION CHANGE FITTING UPSTREAM AND DOWNSTREAM SHALL BE MIN. 24" OR 10X PIPE DIAMETER FROM FLOW SENSOR.

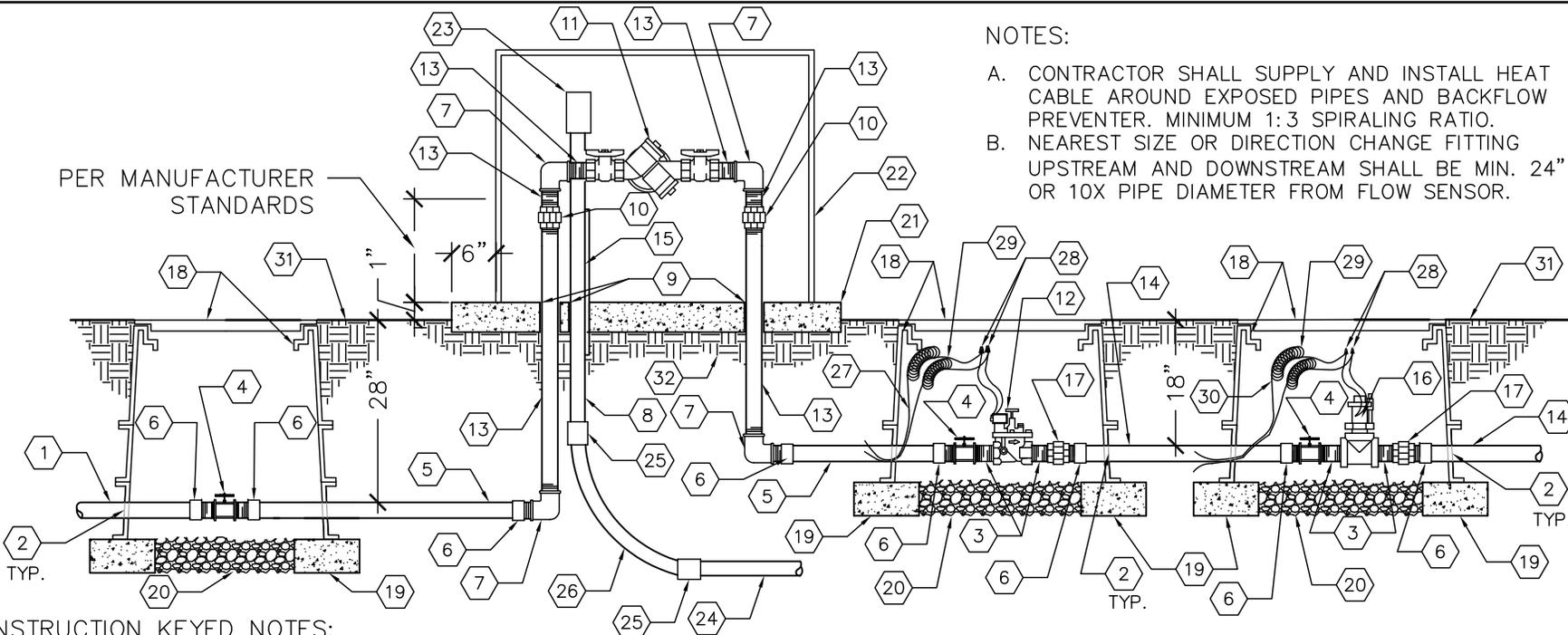
- 19. 8"x 8"x 16" SOLID CMU BLOCK, FOUR PER VALVE BOX
- 20. 6" DEPTH OF 1" DIAMETER WASHED GRAVEL, MINIMUM 2" CLEARANCE FROM BOTTOM OF ANY EQUIPMENT OR PIPING
- 21. 4" 3000 PSI CONCRETE SLAB
- 22. PROTECTIVE ENCLOSURE – SEE IRRIGATION LEGEND. INSTALL PER MANUFACTURERS INSTRUCTIONS
- 23. 110V ELECTRICAL GFI OUTLET FOR HEAT CABLE. PLACE AWAY FROM RELIEF VALVE
- 24. GRAY ELECTRICAL CONDUIT – DEPTH OF BURY SHALL BE 36"
- 25. WATER TIGHT CONNECTOR
- 26. GRAY ELECTRICAL SWEEP ELL
- 27. MASTER VALVE CONTROL WIRES
- 28. WATERPROOF WIRE CONNECTOR
- 29. 36" LENGTH WIRE EXPANSION LOOPS
- 30. FLOW SENSOR COMMUNICATION WIRE
- 31. FINISH GRADE
- 32. 95% COMPACTED SUBGRADE

CONSTRUCTION KEYED NOTES:

- 1. MAINLINE FROM METER
- 2. DRILLED HOLE THROUGH VALVE BOX EXTENSION. DIAMETER SHALL BE 1/2" LARGER THAN PIPE
- 3. SCH. 80 PVC NIPPLE
- 4. SCH. 80 PVC TRUE UNION BALL VALVE
- 5. CONSTANT PRESSURE IRRIGATION MAINLINE
- 6. SCH. 40 PVC MALE ADAPTER
- 7. GALVANIZED ELL
- 8. RIGID ELECTRICAL CONDUIT SECURED TO UNISTRUT
- 9. PVC SLEEVE AND INSULATION (MIN. 1" THICK)
- 10. GALVANIZED UNION (MIN. 4" ABOVE CONCRETE SLAB)
- 11. REDUCED PRESSURE BACKFLOW PREVENTION DEVICE – SEE IRRIGATION LEGEND
- 12. AUTOMATIC MASTER VALVE – SEE IRRIGATION LEGEND
- 13. GALVANIZED NIPPLE
- 14. NON-CONSTANT PRESSURE IRRIGATION MAINLINE
- 15. UNISTRUT BRACING, MINIMUM 2" CLEARANCE FROM ANY EQUIPMENT OR PIPING
- 16. FLOW SENSOR – SEE IRRIGATION LEGEND
- 17. SCH. 80 PVC UNION
- 18. 17"X30" VALVE BOX WITH T-STYLE BOLT DOWN COVER AND EXTENSIONS AS REQUIRED – SEE IRRIGATION LEGEND

CITY OF ALBUQUERQUE

REVISIONS	REDUCED PRESSURE BACKFLOW PREVENTER / MASTER VALVE ASSEMBLY WITH FLOW SENSOR
	JULY 2015 DWG. No 2700



NOTES:

- A. CONTRACTOR SHALL SUPPLY AND INSTALL HEAT CABLE AROUND EXPOSED PIPES AND BACKFLOW PREVENTER. MINIMUM 1:3 SPIRALING RATIO.
- B. NEAREST SIZE OR DIRECTION CHANGE FITTING UPSTREAM AND DOWNSTREAM SHALL BE MIN. 24" OR 10X PIPE DIAMETER FROM FLOW SENSOR.

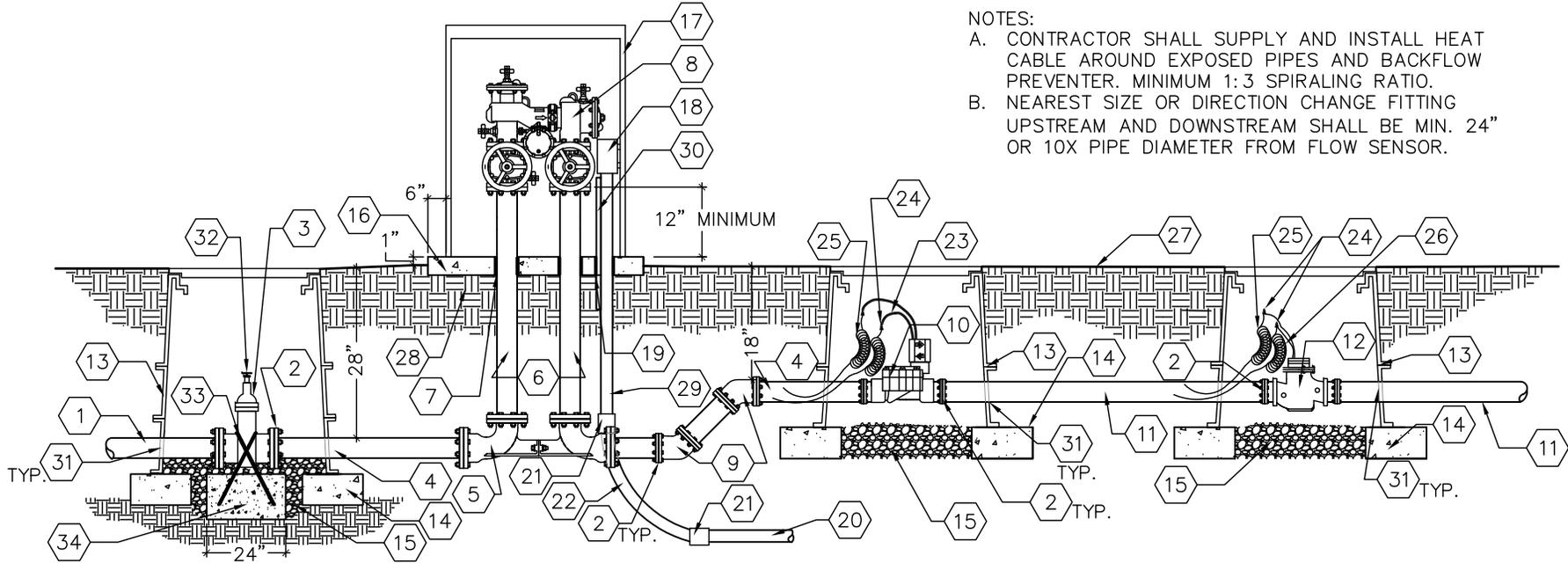
CONSTRUCTION KEYED NOTES:

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> 1. MAINLINE FROM METER 2. DRILLED HOLE THROUGH VALVE BOX EXTENSION. DIAMETER SHALL BE 1/2" LARGER THAN PIPE 3. SCH. 80 PVC NIPPLE 4. SCH. 80 PVC TRUE UNION BALL VALVE 5. CONSTANT PRESSURE IRRIGATION MAINLINE 6. SCH. 40 PVC MALE ADAPTER 7. GALVANIZED ELL 8. RIGID ELECTRICAL CONDUIT SECURED TO UNISTRUT 9. PVC SLEEVE AND INSULATION (MIN. 1" THICK) 10. GALVANIZED UNION (MIN. 4" ABOVE CONCRETE SLAB) 11. REDUCED PRESSURE BACKFLOW PREVENTION DEVICE—SEE IRRIGATION LEGEND 12. AUTOMATIC MASTER VALVE — SEE IRRIGATION LEGEND | <ul style="list-style-type: none"> 13. GALVANIZED NIPPLE 14. NON-CONSTANT PRESSURE IRRIGATION MAINLINE 15. UNISTRUT BRACING MINIMUM 2" CLEARANCE FROM ANY EQUIPMENT OR PIPING 16. FLOW SENSOR — SEE IRRIGATION LEGEND 17. SCH. 80 PVC UNION 18. 17"X30" VALVE BOX WITH T-STYLE BOLT DOWN COVER AND EXTENSIONS AS REQUIRED — SEE IRRIGATION LEGEND 19. 8"x 8"x 16" SOLID CMU BLOCK, FOUR PER VALVE BOX 20. 6" DEPTH OF 1" DIAMETER WASHED GRAVEL, MINIMUM 2" CLEARANCE FROM BOTTOM OF ANY EQUIPMENT OR PIPING 21. 4" 3000 PSI CONCRETE SLAB 22. PROTECTIVE ENCLOSURE—SEE IRRIGATION LEGEND. INSTALL PER MANUFACTURERS INSTRUCTIONS | <ul style="list-style-type: none"> 23. 110V ELECTRICAL GFI OUTLET FOR HEAT CABLE. PLACE AWAY FROM RELIEF VALVE 24. GRAY ELECTRICAL CONDUIT — DEPTH OF BURY SHALL BE 36" 25. WATER TIGHT CONNECTOR 26. GRAY ELECTRICAL SWEEP ELL 27. MASTER VALVE CONTROL WIRE 28. WATERPROOF WIRE CONNECTOR 29. 36" LENGTH WIRE EXPANSION LOOP 30. FLOW SENSOR COMMUNICATION WIRE 31. FINISH GRADE 32. 95% COMPACTED SUBGRADE |
|---|---|---|

CITY OF ALBUQUERQUE	
REVISIONS	MASTER VALVE WITH RPBA
	JULY 2015 DWG. No 2701

NOTES:

- A. CONTRACTOR SHALL SUPPLY AND INSTALL HEAT CABLE AROUND EXPOSED PIPES AND BACKFLOW PREVENTER. MINIMUM 1:3 SPIRALING RATIO.
- B. NEAREST SIZE OR DIRECTION CHANGE FITTING UPSTREAM AND DOWNSTREAM SHALL BE MIN. 24" OR 10X PIPE DIAMETER FROM FLOW SENSOR.

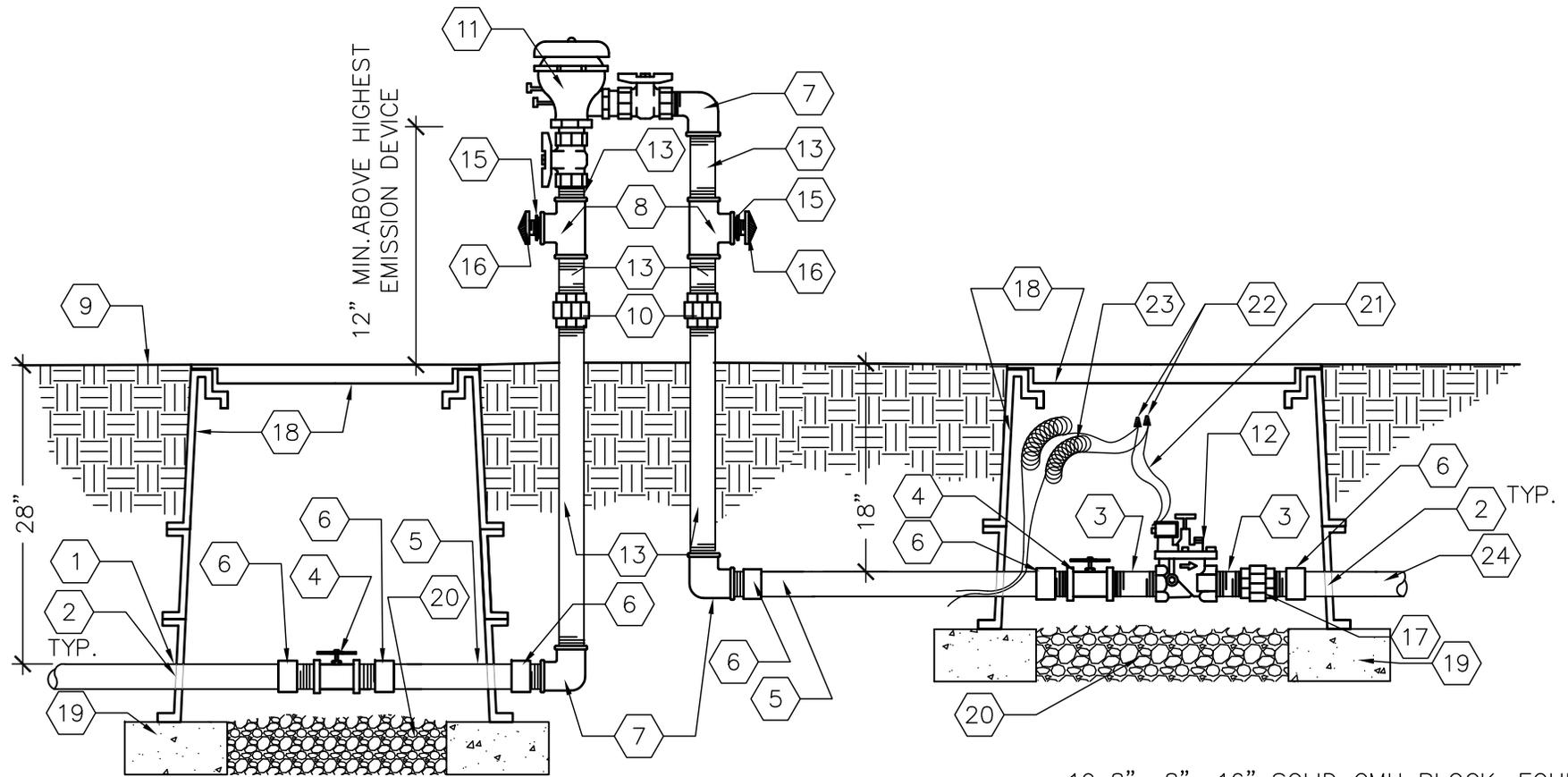


CONSTRUCTION KEYED NOTES:

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> 1. MAINLINE FROM METER 2. MECHANICAL JOINT 3. IRON BODY GATE VALVE – SEE IRRIGATION LEGEND 4. CONSTANT PRESSURE IRRIGATION MAINLINE 5. FLANGED VALVE SETTER 6. FLANGED SPOOL 7. ½" FELT EXPANSION MATERIAL FORMED TO PIPE 8. REDUCED PRESSURE BACKFLOW PREVENTION DEVICE – SEE IRRIGATION LEGEND 9. FLANGED 45° FITTING 10. AUTOMATIC MASTER VALVE – SEE IRRIGATION LEGEND 11. NON-CONSTANT PRESSURE IRRIGATION MAINLINE 12. FLOW SENSOR – SEE IRRIGATION LEGEND | <ul style="list-style-type: none"> 13. 17"X30" VALVE BOX WITH T-STYLE BOLT DOWN COVER AND EXTENSIONS AS REQUIRED– SEE IRRIGATION LEGEND 14. 8"x 8"x 16" SOLID CMU BLOCK, FOUR PER VALVE BOX 15. 6" DEPTH OF 1" DIAMETER WASHED GRAVEL WITH MINIMUM 2" CLEARANCE 16. 4" 3000 PSI CONCRETE SLAB 17. PROTECTIVE ENCLOSURE – SEE IRRIGATION LEGEND. INSTALL PER MANUFACTURERS INSTRUCTIONS 18. 110V ELECTRICAL GFI OUTLET FOR HEAT CABLE. PLACE AWAY FROM RELIEF VALVE 19. PVC SLEEVE AND INSULATION (MIN. 1" THICK) 20. GRAY ELECTRICAL CONDUIT – DEPTH OF BURY SHALL BE 36" 21. WATER TIGHT CONNECTOR 22. GRAY ELECTRICAL SWEEP ELL 23. MASTER VALVE CONTROL WIRES 24. WATERPROOF WIRE CONNECTOR | <ul style="list-style-type: none"> 25. 36" LENGTH WIRE EXPANSION LOOPS 26. FLOW SENSOR COMMUNICATION WIRE 27. FINISH GRADE 28. 95% COMPACTED SUBGRADE 29. RIGID ELECTRICAL CONDUIT SECURED TO UNISTRUT 30. UNISTRUT BRACING MINIMUM 2" CLEARANCE FROM ANY EQUIPMENT OR PIPING 31. DRILLED HOLE THROUGH VALVE BOX EXTENSION. DIAMETER SHALL BE 1/2" LARGER THAN PIPE 32. 2" OPERATING NUT 33. NO. 4 REBAR 34. THRUST BLOCK – 3000 PSI CONCRETE PLACED AGAINST UNDISTURBED SOIL |
|---|--|---|

CITY OF ALBUQUERQUE

REVISIONS	REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLY WITH MASTER VALVE AND FLOW SENSOR-LARGE DIAMETER PIPE
	JULY 2015 DWG. No 2703



CONSTRUCTION KEYED NOTES:

- 1. MAINLINE FROM METER
- 2. DRILLED HOLE THROUGH VALVE BOX EXTENSION. DIAMETER SHALL BE 1/2" LARGER THAN PIPE
- 3. SCH. 80 PVC NIPPLE
- 4. SCH. 80 PVC TRUE UNION BALL VALVE
- 5. CONSTANT PRESSURE IRRIGATION MAINLINE
- 6. SCH. 40 PVC MALE ADAPTER
- 7. GALVANIZED ELL
- 8. GALVANIZED TEE
- 9. FINISH GRADE

- 10. GALVANIZED UNION (MIN. 4" ABOVE FINISH GRADE)
- 11. PRESSURE VACUUM BREAKER – SEE IRRIGATION LEGEND
- 12. AUTOMATIC MASTER VALVE – SEE IRRIGATION LEGEND
- 13. GALVANIZED NIPPLE
- 14. NON-CONSTANT PRESSURE IRRIGATION MAINLINE
- 15. GALVANIZED REDUCER BUSHING
- 16. GALVANIZED DRAIN PLUG
- 17. SCH. 80 PVC UNION
- 18. 17"X30" VALVE BOX WITH T-STYLE BOLT DOWN COVER AND EXTENSIONS AS REQUIRED – SEE IRRIGATION LEGEND

- 19. 8"x 8"x 16" SOLID CMU BLOCK, FOUR PER VALVE BOX
- 20. 6" DEPTH OF 1" DIAMETER WASHED GRAVEL, MINIMUM 2" CLEARANCE FROM BOTTOM OF ANY EQUIPMENT OR PIPING
- 21. MASTER VALVE CONTROL WIRE
- 22. WATERPROOF WIRE CONNECTOR
- 23. 36" LENGTH WIRE EXPANSION LOOPS
- 24. NON-CONSTANT PRESSURE IRRIGATION MAINLINE

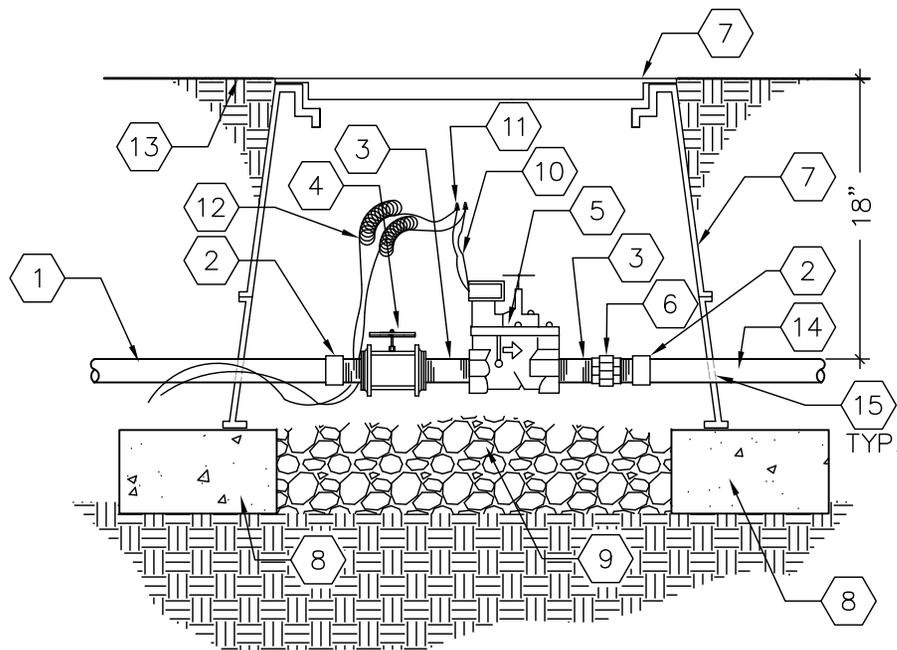
CITY OF ALBUQUERQUE

PRESSURE VACUUM
BREAKER ASSEMBLY WITH
MASTER VALVE

JULY 2015

DWG. No 2704

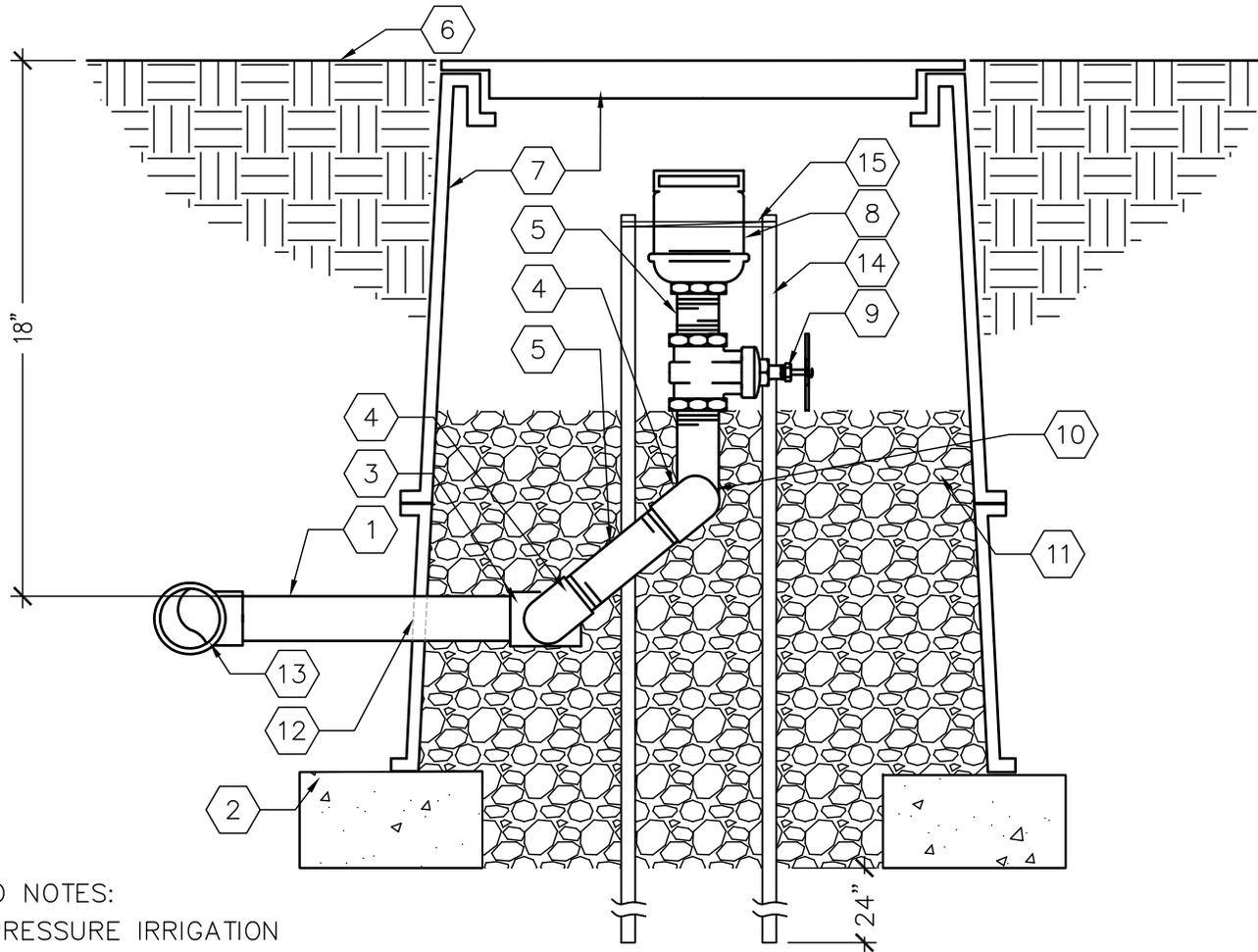
REVISIONS



CONSTRUCTION KEYED NOTES:

- | | |
|---|---|
| <p>1. NON-CONSTANT PRESSURE IRRIGATION MAINLINE</p> <p>2. SCH. 40 PVC MALE ADAPTER</p> <p>3. SCH. 80 PVC NIPPLE</p> <p>4. SCH. 80 PVC TRUE UNION BALL VALVE</p> <p>5. AUTOMATIC VALVE – SEE IRRIGATION LEGEND</p> <p>6. SCH. 80 PVC UNION</p> <p>7. 17”X30” VALVE BOX WITH T-STYLE BOLT DOWN COVER AND EXTENSIONS AS REQUIRED – SEE IRRIGATION LEGEND</p> <p>8. 8”x 8”x 16” SOLID CMU BLOCK, FOUR PER VALVE BOX</p> | <p>9. 6” DEPTH OF 1” DIAMETER WASHED GRAVEL, MINIMUM 2” CLEARANCE FROM BOTTOM OF VALVE</p> <p>10. AUTOMATIC VALVE CONTROL WIRE</p> <p>11. WATERPROOF WIRE CONNECTOR</p> <p>12. 36” LENGTH WIRE EXPANSION LOOPS</p> <p>13. FINISH GRADE</p> <p>14. IRRIGATION LATERAL PIPE</p> <p>15. DRILLED HOLE THROUGH VALVE BOX EXTENSION SHALL BE ½” SIZE LARGER THAN PIPE</p> |
|---|---|

CITY OF ALBUQUERQUE	
REVISIONS	AUTOMATIC IRRIGATION VALVE ASSEMBLY
	JULY 2015 DWG. No 2705



CONSTRUCTION KEYED NOTES:

- | | |
|---|---|
| <p>1. NON-CONSTANT PRESSURE IRRIGATION MAINLINE</p> <p>2. 8"x 8"x 16" SOLID CMU BLOCK, FOUR PER VALVE BOX</p> <p>3. SCH. 40 PVC ELL, SLIP TO THREAD</p> <p>4. SCH. 40 PVC ELL</p> <p>5. SCH. 80 PVC NIPPLE</p> <p>6. FINISH GRADE</p> <p>7. 17"x30" VALVE BOX WITH T-STYLE BOLT DOWN COVER AND EXTENSIONS AS REQUIRED - SEE IRRIGATION LEGEND</p> <p>8. AIR RELIEF VALVE- SEE IRRIGATION LEGEND</p> | <p>9. GATE VALVE</p> <p>10. SCH. 40 PVC ST. ELL</p> <p>11. 1" DIAMETER WASHED GRAVEL</p> <p>12. DRILLED HOLE THROUGH VALVE BOX EXTENSION. DIAMETER SHALL BE 1/2" SIZE LARGER THAN PIPE</p> <p>13. PVC TEE</p> <p>14. 1" DIAMETER ROUND REBAR</p> <p>15. BAILING WIRE SECURED TO REBAR AT MIDDLE OF AIR RELIEF VALVE</p> |
|---|---|

NOTE:

- A. WASHED ROCK SHALL BE INSTALLED FLUSH WITH BOTTOM OF GATE VALVE

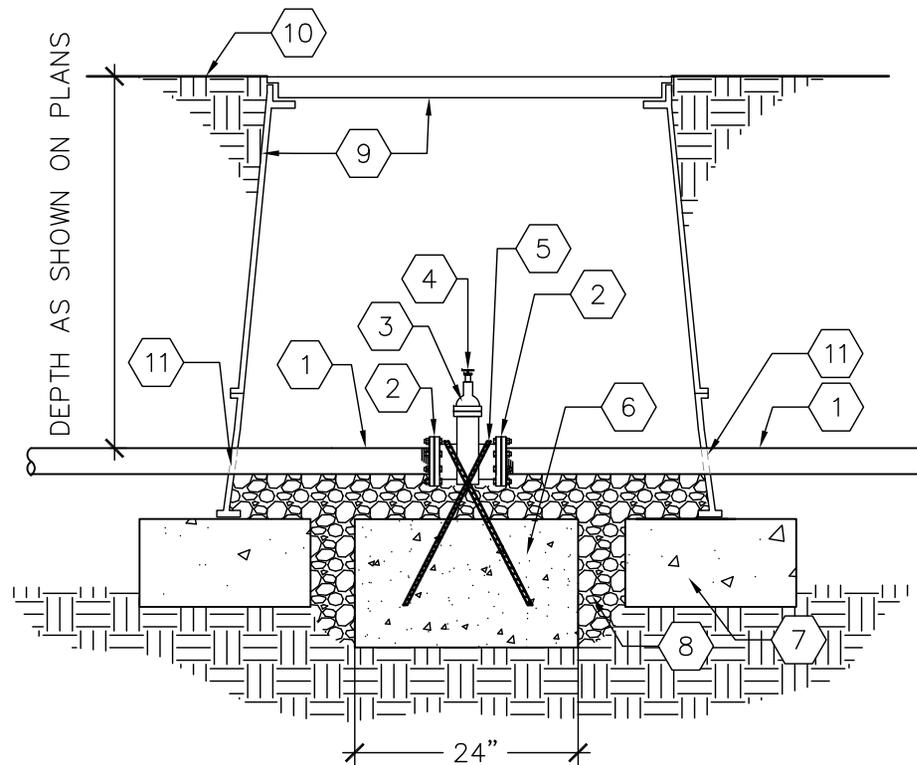
CITY OF ALBUQUERQUE

REVISIONS

AIR RELIEF VALVE ASSEMBLY

JULY 2015

DWG. No 2706



CONSTRUCTION KEYED NOTES:

- | | |
|---|---|
| <p>1. IRRIGATION MAINLINE</p> <p>2. MECHANICAL JOINT</p> <p>3. IRON BODY GATE VALVE – SEE IRRIGATION LEGEND</p> <p>4. 2" OPERATING NUT</p> <p>5. NO. 4 REBAR</p> <p>6. THRUST BLOCK – 3000 PSI CONCRETE PLACED AGAINST UNDISTURBED SOIL</p> <p>7. 8"x 8"x 16" SOLID CMU BLOCK, FOUR PER VALVE BOX</p> | <p>8. 1" DIAMETER WASHED GRAVEL</p> <p>9. 17"x30" VALVE BOX WITH T-STYLE BOLT DOWN COVER AND EXTENSIONS AS REQUIRED– SEE IRRIGATION LEGEND</p> <p>10. FINISH GRADE</p> <p>11. DRILLED HOLE THROUGH VALVE BOX EXTENSION. DIAMETER SHALL BE 1/2" LARGER THAN PIPE</p> |
|---|---|

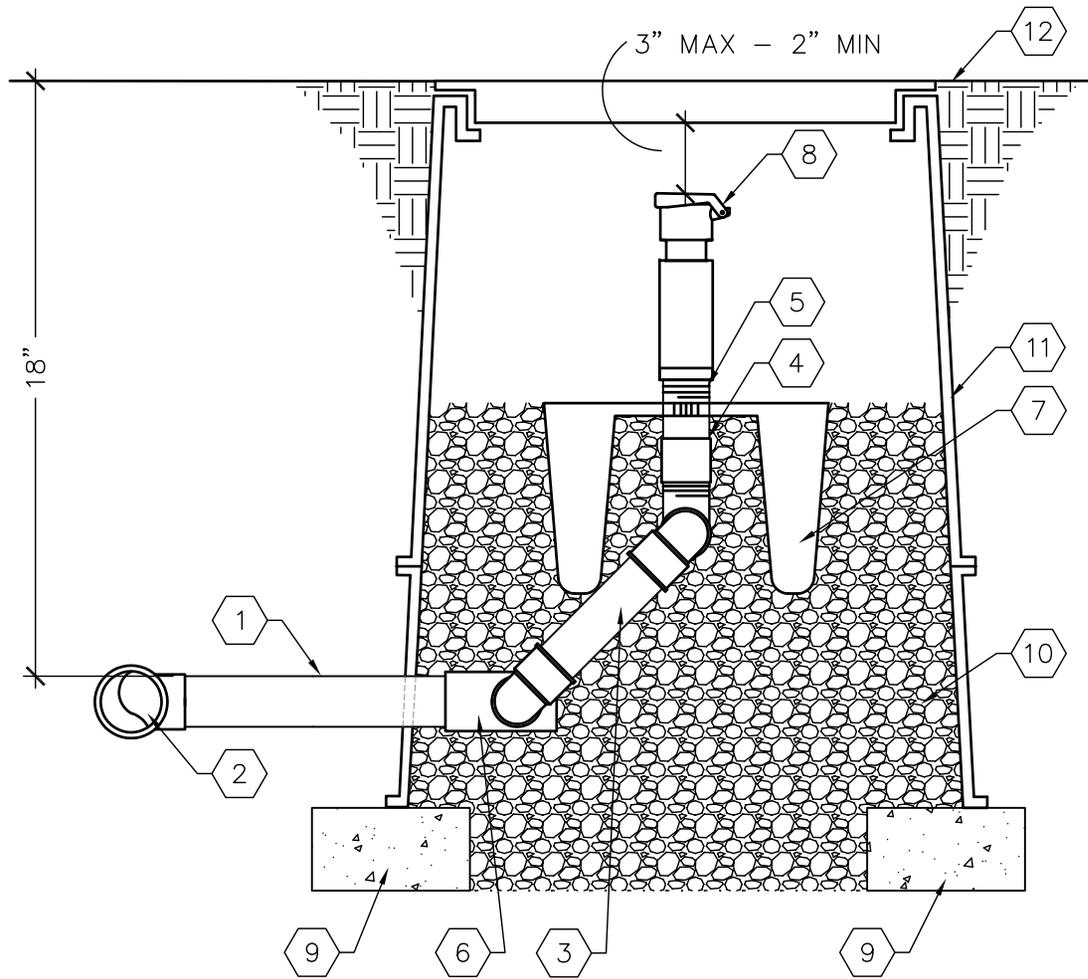
CITY OF ALBUQUERQUE

REVISIONS

IRON BODY GATE VALVE
ASSEMBLY

JULY 2015

DWG. No 2708



CONSTRUCTION KEYED NOTES:

1. NON-CONSTANT PRESSURE IRRIGATION MAINLINE
2. PVC TEE
3. PRE-FABRICATED SWING JOINT – SEE IRRIGATION LEGEND
LAY LENGTH SHALL ALLOW 45° INSTALLATION
4. SCH. 40 PVC COUPLING
5. SCH. 80 PVC NIPPLE
6. SCH. 40 PVC ELL, SLIP TO THREAD
7. QUICK COUPLER ANCHOR – SEE IRRIGATION LEGEND
8. QUICK COUPLING VALVE – SEE IRRIGATION LEGEND
9. 8”x 8”x 16” SOLID CMU BLOCK, FOUR PER VALVE BOX
10. 1” WASHED GRAVEL
11. 17”X30” VALVE BOX WITH T-STYLE BOLT DOWN COVER AND EXTENSIONS AS REQUIRED – SEE IRRIGATION LEGEND
12. FINISH GRADE

NOTE:

- A. FURNISH FITTINGS AND PIPING NOMINALLY SIZED IDENTICAL TO NOMINAL QUICK COUPLING VALVE INLET SIZE

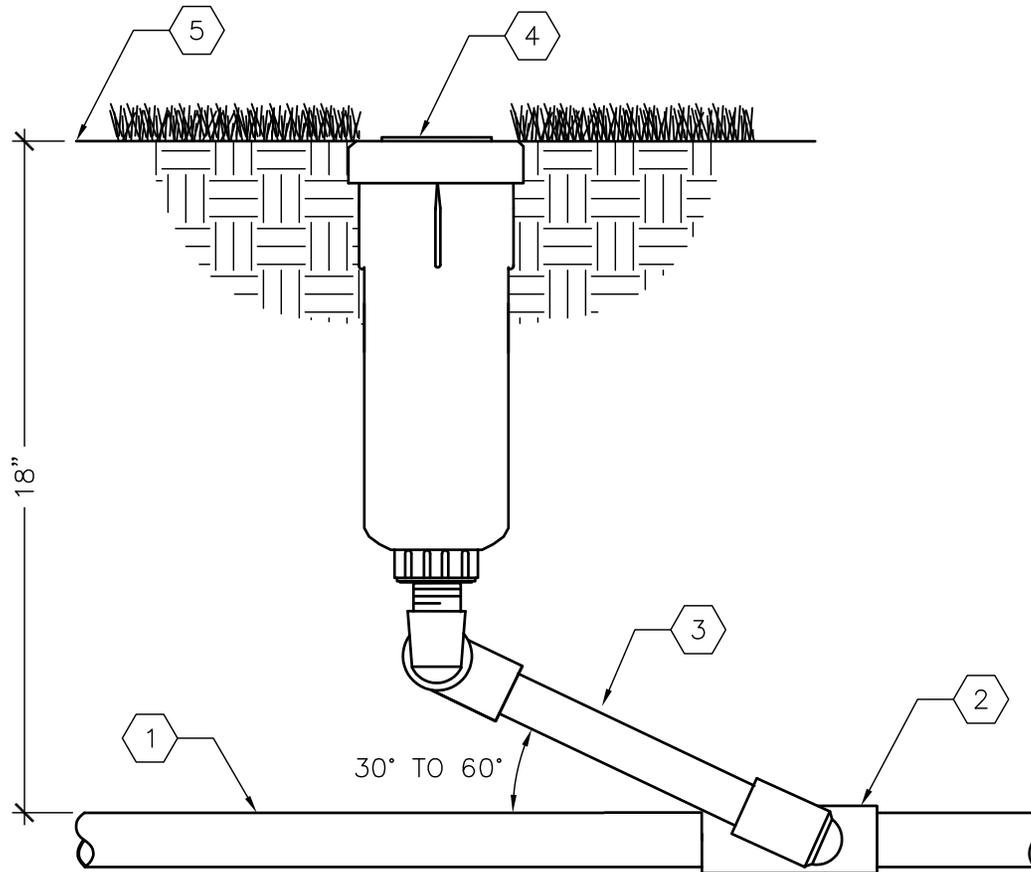
CITY OF ALBUQUERQUE

REVISIONS

QUICK COUPLING VALVE
ASSEMBLY

JULY 2015

DWG. No 2709



CONSTRUCTION KEYED NOTES:

1. IRRIGATION LATERAL PIPE
2. PVC LATERAL PIPE FITTING
3. UNITIZED SWING JOINT, SIZE SAME AS HEAD INLET SIZE – SEE IRRIGATION LEGEND
4. POP UP SPRINKLER – SEE IRRIGATION LEGEND
5. TOP OF TURF FINISH GRADE

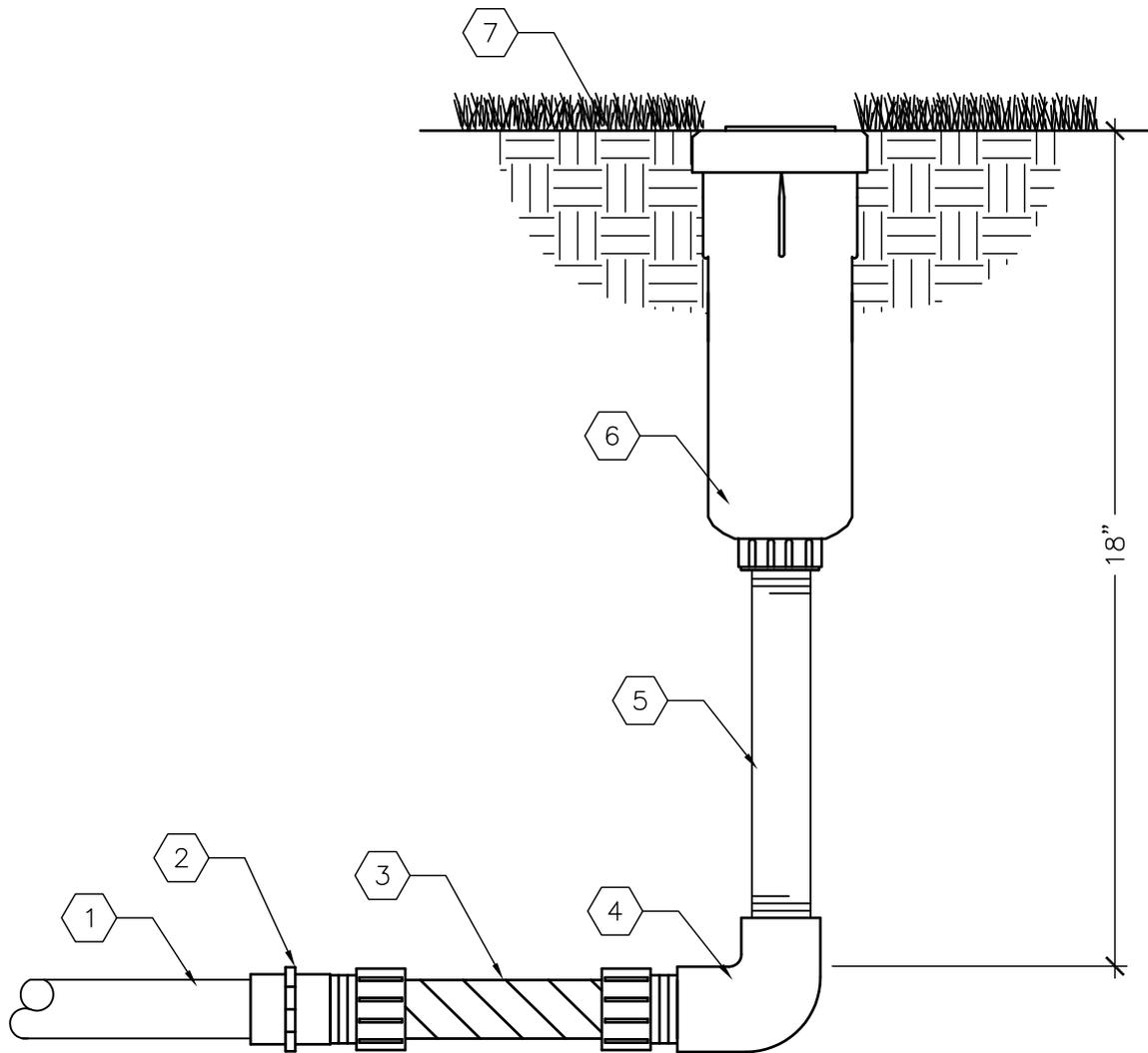
CITY OF ALBUQUERQUE

REVISIONS

POP-UP SPRINKLER WITH
SWING JOINT ASSEMBLY

JULY 2015

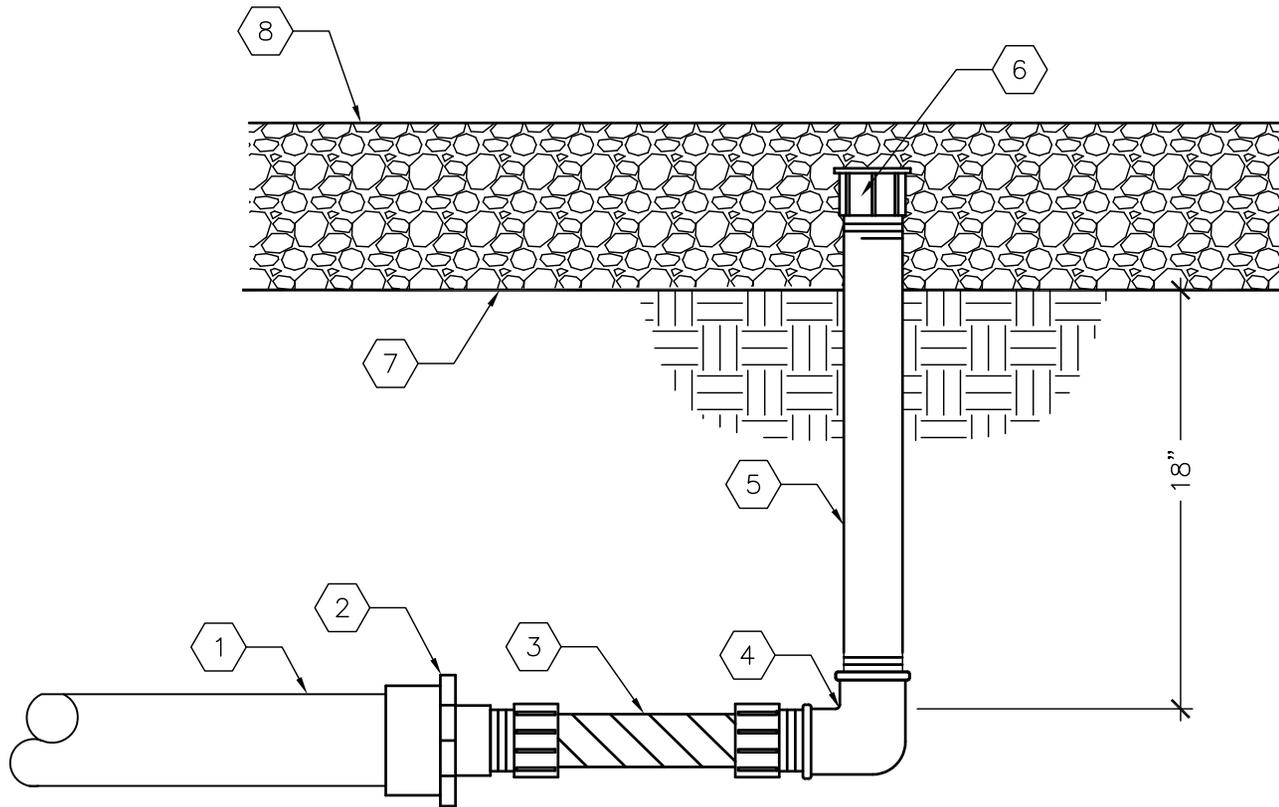
DWG. No 2710



CONSTRUCTION KEYED NOTES:

- | | |
|---|---|
| <ul style="list-style-type: none"> 1. IRRIGATION LATERAL PIPE 2. SCH. 40 PVC FEMALE ADAPTER 3. 6" FLEX NIPPLE – SIZE TO MATCH SPRINKLER INLET 4. SCH. 40 PVC THREADED ELBOW – SIZE TO MATCH SPRINKLER INLET | <ul style="list-style-type: none"> 5. SCH. 80 PVC THREADED NIPPLE, LENGTH AS REQUIRED – SIZE TO MATCH SPRINKLER INLET 6. POP-UP SPRINKLER – SEE IRRIGATION LEGEND 7. TURF FINISH GRADE |
|---|---|

CITY OF ALBUQUERQUE	
<small>REVISIONS</small>	<p>POP-UP SPRINKLER WITH FLEX NIPPLE ASSEMBLY</p>
	<p>JULY 2015 DWG. No 2711</p>



CONSTRUCTION KEYED NOTES:

1. IRRIGATION LATERAL PIPE
2. $\frac{3}{4}$ " X $\frac{1}{2}$ " SCH. 40 PVC FEMALE ADAPTER
3. $\frac{1}{2}$ " X 6" PVC FLEX NIPPLE
4. $\frac{1}{2}$ " SCH. 40 PVC THREADED ELBOW
5. $\frac{1}{2}$ " SCH. 80 PVC THREADED NIPPLE, LENGTH AS REQUIRED
6. PRESSURE COMPENSATING BUBBLER, SET TOP OF BUBBLER 1" BELOW TOP OF MULCH OR AS SPECIFIED IN PLANS – SEE IRRIGATION LEGEND
7. TOP OF GRADE
8. TOP OF MULCH, SEE PLANTING NOTES FOR DEPTH OF MULCH

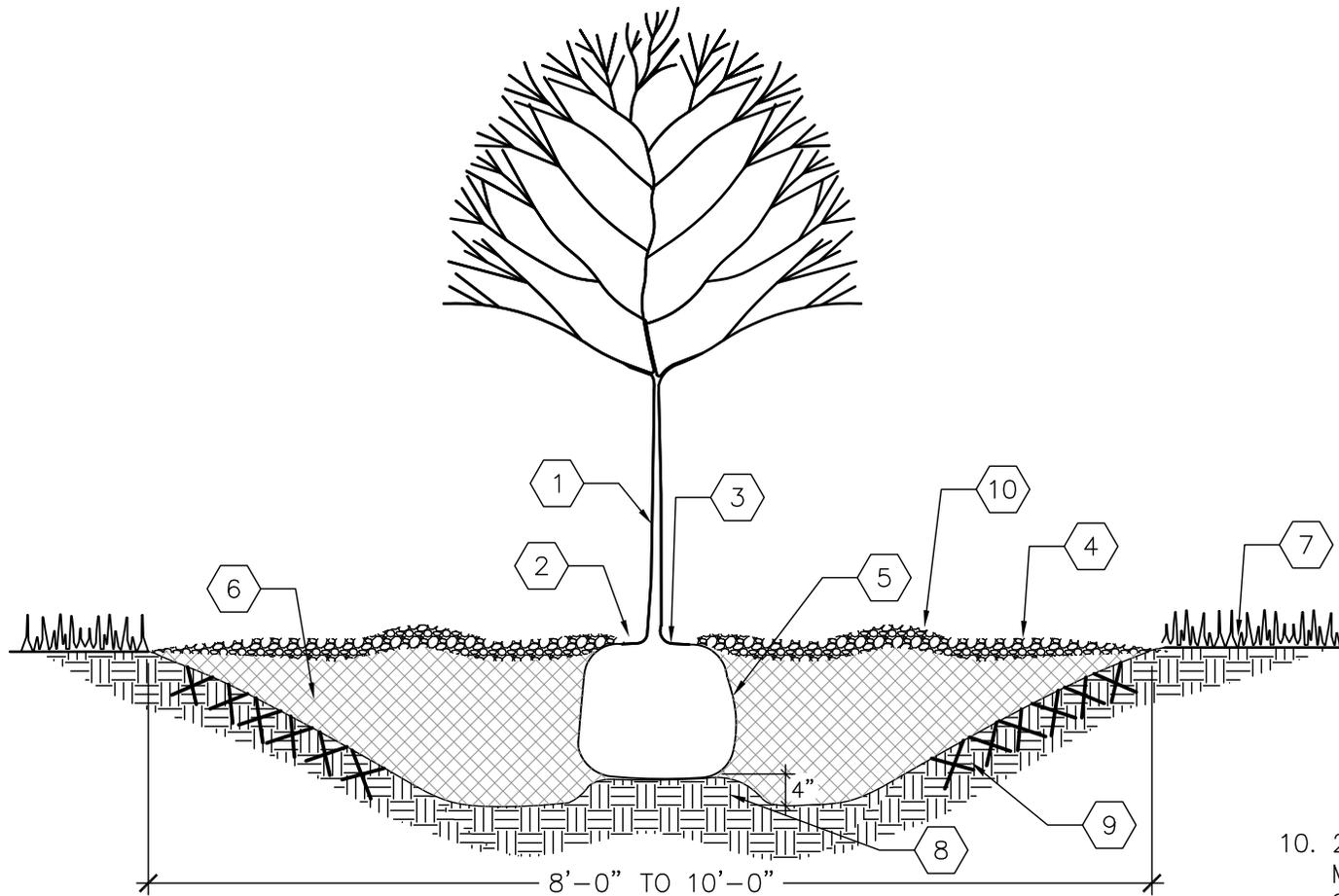
CITY OF ALBUQUERQUE

REVISIONS

BUBBLER ASSEMBLY

JULY 2015

DWG. No 2712



10. 2" HIGH X 16" WIDE BERM, 4' MINIMUM DIAMETER OR AS SPECIFIED ON THE PLANS

NOTE:

- A. THE WIDTH OF THE TREE WELL MAY BE REDUCED AS NOTED ON THE PLANS OR ADJUSTED BY THE LANDSCAPE ARCHITECT TO MEET FIELD CONDITIONS

CONSTRUCTION NOTES:

1. TREE LOCATION AND SPECIES AS PER PLAN
2. MULCH SHALL BE HELD BACK 4" FROM TREE TRUNK
3. REMOVE EXISTING SOIL (FROM NURSERY) AS NEEDED TO EXPOSE ROOT FLARE. INSTALL WITH ROOT FLARE FLUSH WITH SUBGRADE (BOTTOM OF MULCH)
4. 4" DEPTH ORGANIC MULCH – SEE PLANTING PLAN
5. INSTALL TREE PLUMB. REMOVE WIRE BASKET, WOOD BOX, PLASTIC, TWINE, AND/OR ROPE PRIOR TO BACKFILL. REMOVE BURLAP EXCEPT FROM BOTTOM OF ROOT BALL
6. BACKFILL PER SPECIFICATIONS. LIGHTLY TAMP IN LIFTS AND WATER-IN TO ELIMINATE VOIDS AND AIR POCKETS
7. TURF AT FINISH GRADE
8. UNDISTURBED NATIVE SOIL
9. SCARIFY AND LOOSEN EDGES OF PLANTING PIT

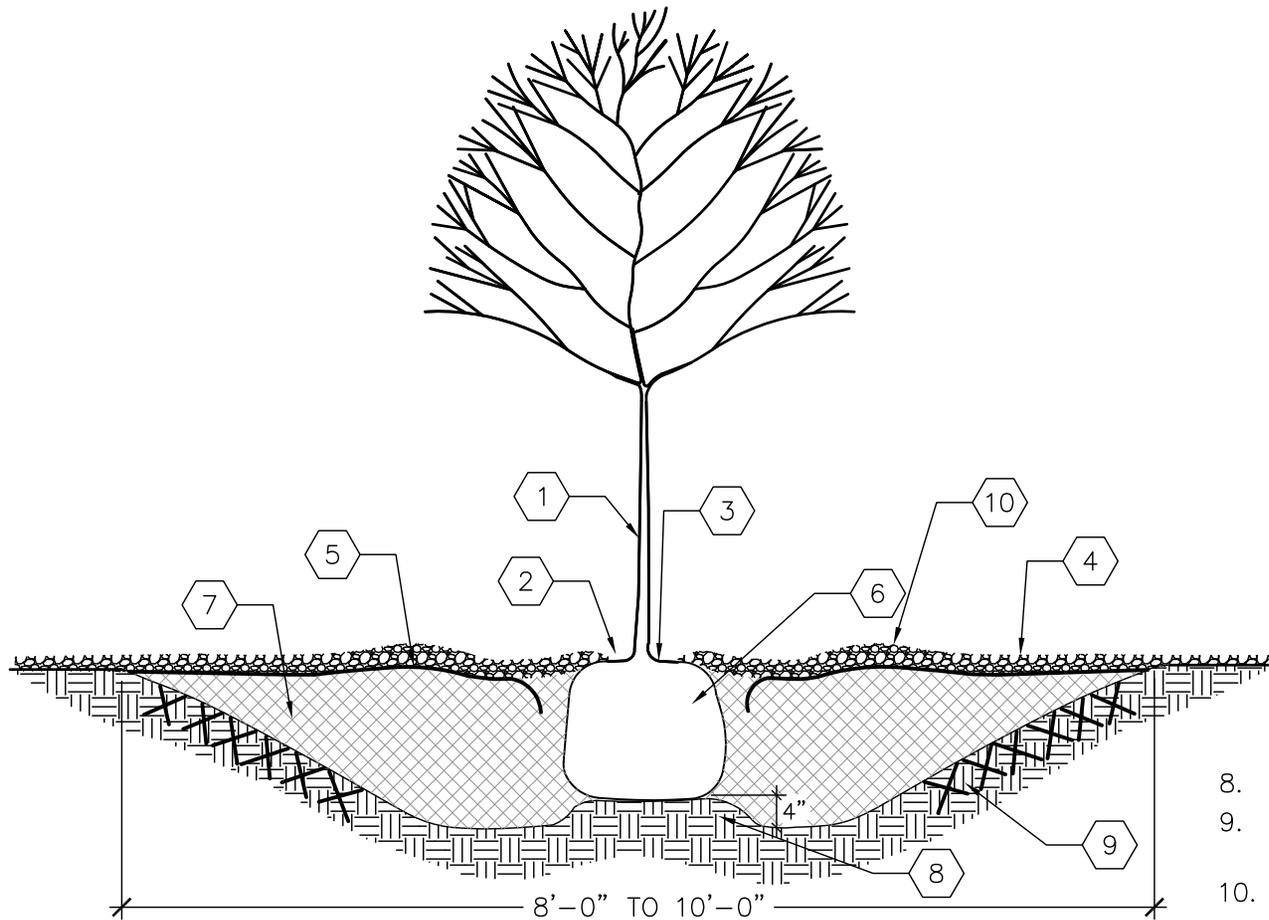
CITY OF ALBUQUERQUE

REVISIONS

TREE PLANTING IN TURF

JULY 2015

DWG. No 2713



CONSTRUCTION NOTES:

1. TREE LOCATION AND SPECIES AS PER PLAN
2. MULCH SHALL BE HELD BACK 4" FROM TREE TRUNK
3. REMOVE EXISTING SOIL (FROM NURSERY) AS NEEDED TO EXPOSE ROOT FLARE. INSTALL WITH ROOT FLARE FLUSH WITH SUBGRADE (BOTTOM OF MULCH)

4. MULCH – SEE PLANTING PLAN
5. WEED BARRIER FABRIC – SEE PLANTING PLAN – TURN DOWN 6" AT EDGES
6. INSTALL TREE PLUMB. REMOVE WIRE BASKET, WOOD BOX, PLASTIC, TWINE, AND/OR ROPE PRIOR TO BACKFILL. REMOVE BURLAP EXCEPT FROM BOTTOM OF ROOT BALL
7. BACKFILL PER SPECIFICATIONS. LIGHTLY TAMP IN LIFTS AND WATER-IN TO ELIMINATE VOIDS AND AIR POCKETS

8. UNDISTURBED NATIVE SOIL
9. SCARIFY AND LOOSEN EDGES OF PLANTING PIT
10. 2" HIGH X 16" WIDE BERM, 4' MINIMUM DIAMETER OR AS SHOWN ON THE PLANS

NOTE:

- A. THE WIDTH OF THE TREE WELL MAY BE REDUCED AS NOTED ON THE PLANS OR ADJUSTED BY THE LANDSCAPE ARCHITECT TO MEET FIELD CONDITIONS

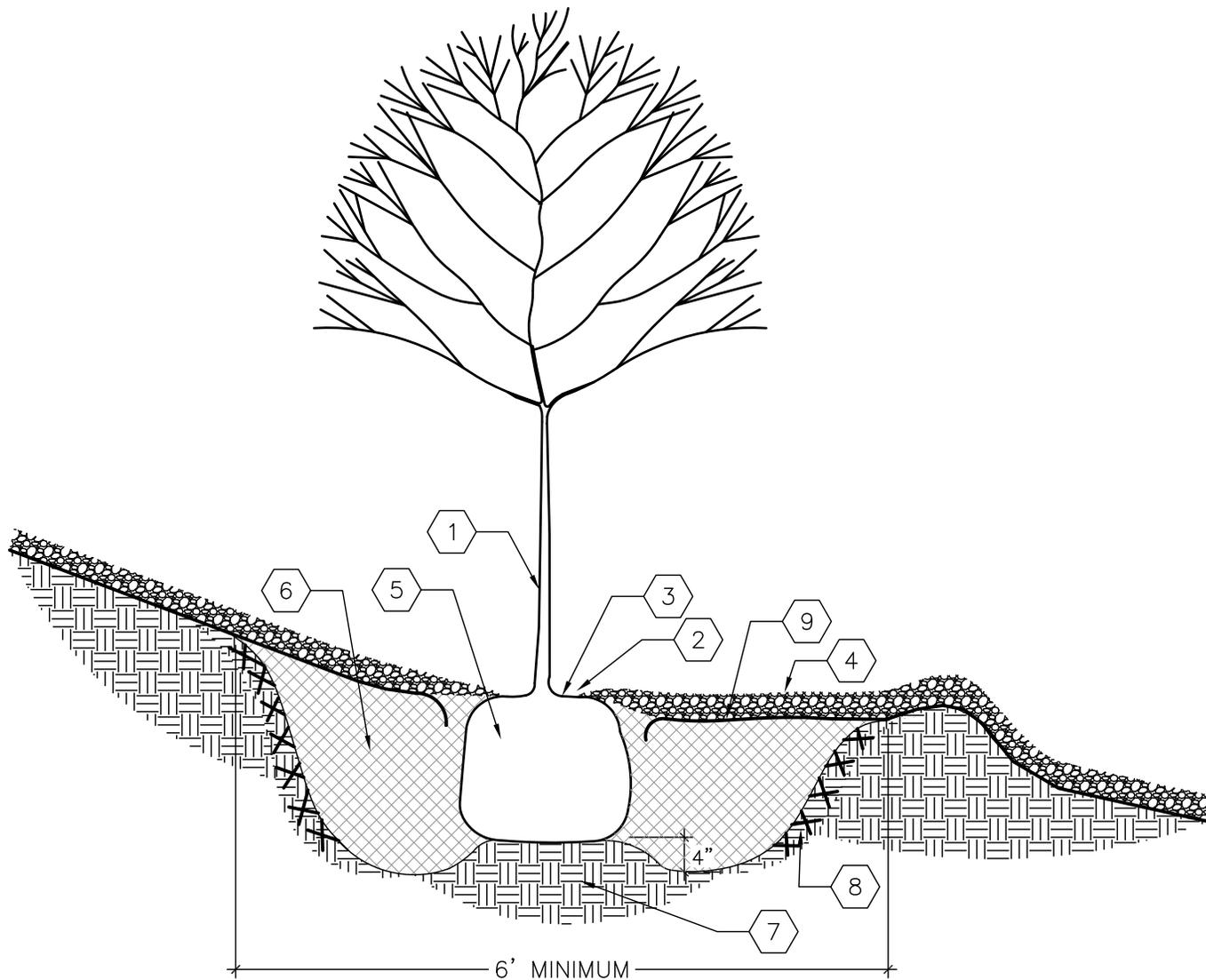
CITY OF ALBUQUERQUE

REVISIONS

TREE PLANTING

JULY 2015

DWG. No 2714



4. MULCH – SEE PLANTING PLAN
5. INSTALL TREE PLUMB. REMOVE WIRE BASKET, WOOD BOX, PLASTIC, TWINE, AND/OR ROPE PRIOR TO BACKFILL. REMOVE BURLAP EXCEPT FROM BOTTOM OF ROOT BALL
6. BACKFILL PER SPECIFICATIONS. LIGHTLY TAMP IN LIFTS AND WATER-IN TO ELIMINATE VOIDS AND AIR POCKETS
7. UNDISTURBED NATIVE SOIL
8. SCARIFY AND LOOSEN EDGES OF PLANTING PIT
9. WEED BARRIER FABRIC – SEE IRRIGATION PLANTING PLAN – TURNDOWN 6” AT EDGES

NOTE:

- A. THE WIDTH OF THE TREE WELL MAY BE REDUCED AS NOTED ON THE PLANS OR ADJUSTED BY THE LANDSCAPE ARCHITECT TO MEET FIELD CONDITIONS

CONSTRUCTION NOTES:

1. TREE LOCATION AND SPECIES AS PER PLAN
2. MULCH SHALL BE HELD BACK 4” FROM TREE TRUNK

3. REMOVE EXISTING SOIL (FROM NURSERY) AS NEEDED TO EXPOSE ROOT FLARE. INSTALL WITH ROOT FLARE FLUSH WITH SUBGRADE (BOTTOM OF MULCH)

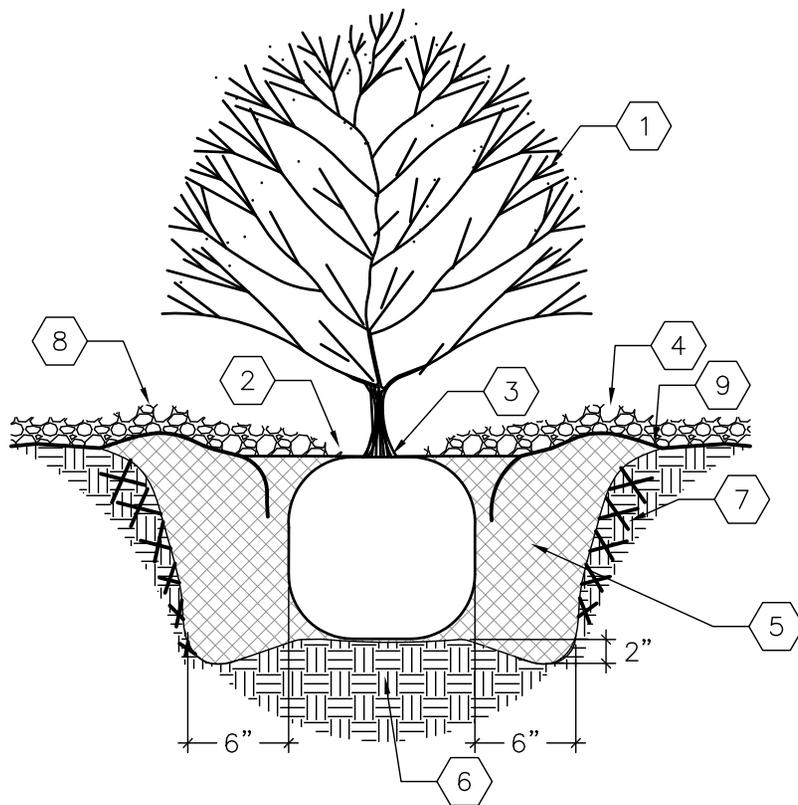
CITY OF ALBUQUERQUE

REVISIONS

TREE PLANTING ON SLOPE

JULY 2015

DWG. No 2715



CONSTRUCTION NOTES:

1. SHRUB LOCATION AND SPECIES AS PER PLAN
2. MULCH SHALL BE FEATHERED TO A 2" DEPTH ON TOP OF ROOT BALL AND SHALL BE HELD BACK 2" FROM SHRUB STEM(S)
3. PLANT WITH TOP OF ROOT BALL FLUSH WITH SUBGRADE (BOTTOM OF MULCH)

4. 4" DEPTH MULCH THROUGHOUT SHRUB BED UNLESS OTHERWISE NOTED
5. BACKFILL PER SPECIFICATIONS. LIGHTLY TAMP IN LIFTS AND WATER-IN TO ELIMINATE VOIDS AND AIR POCKETS
6. UNDISTURBED NATIVE SOIL
7. SCARIFY AND LOOSEN EDGES OF PLANTING PIT
8. 2" HIGH X 6" WIDE BERM

9. WEED BARRIER FABRIC – SEE IRRIGATION PLANTING PLAN – TURN DOWN 6" AT EDGES

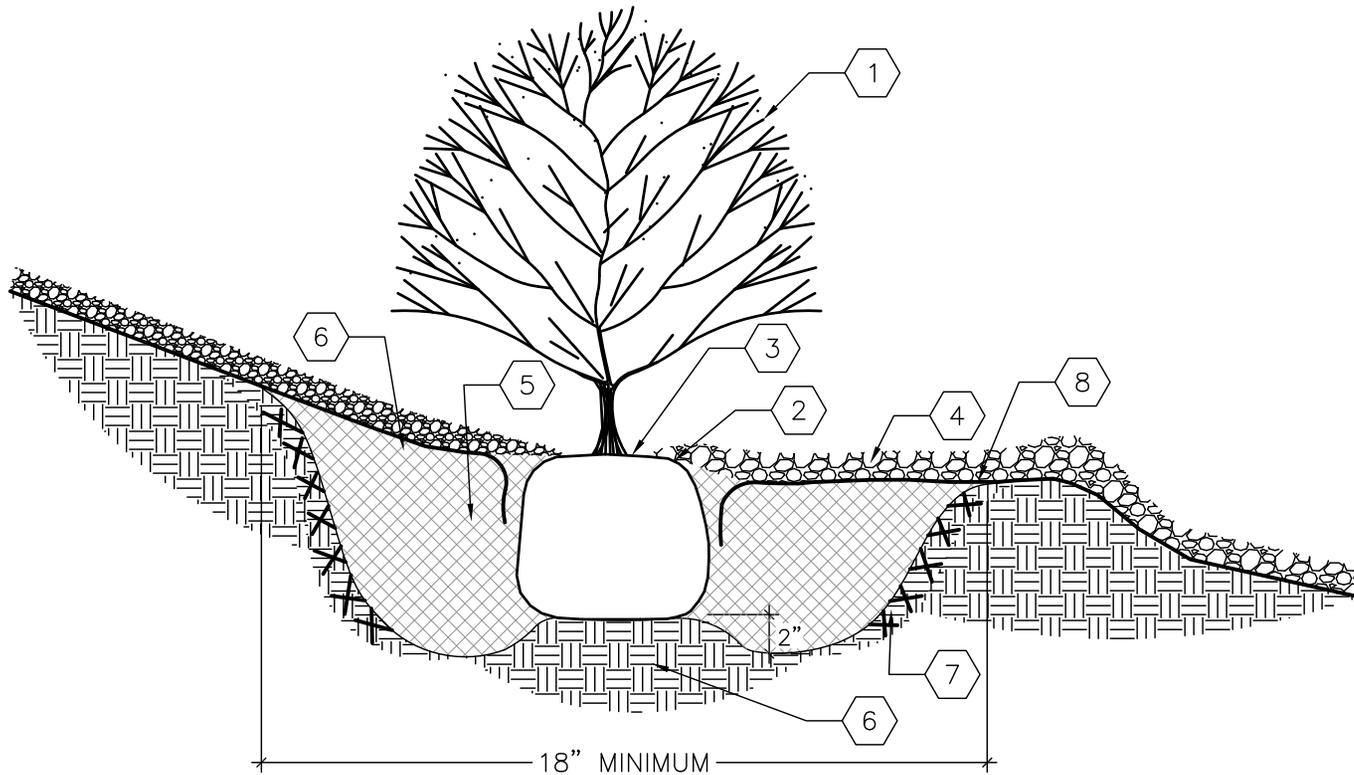
CITY OF ALBUQUERQUE

REVISIONS

SHRUB PLANTING

JULY 2015

DWG. No 2716



CONSTRUCTION NOTES:

1. SHRUB LOCATION AND SPECIES AS PER PLAN
2. MULCH SHALL BE FEATHERED TO A 2" DEPTH ON TOP OF ROOT BALL AND SHALL BE HELD BACK 2" FROM SHRUB STEM(S)
3. PLANT WITH TOP OF ROOT BALL FLUSH WITH SUB-GRADE (BOTTOM OF MULCH)

4. 4" DEPTH MULCH THROUGHOUT SHRUB BED UNLESS OTHERWISE NOTED
5. BACKFILL PER SPECIFICATIONS. LIGHTLY TAMP IN LIFTS AND WATER-IN TO ELIMINATE VOIDS AND AIR POCKETS
6. UNDISTURBED NATIVE SOIL
7. SCARIFY AND LOOSEN EDGES OF PLANTING PIT

8. WEED BARRIER FABRIC – SEE PLANTING PLAN – TURNDOWN 6" AT EDGES

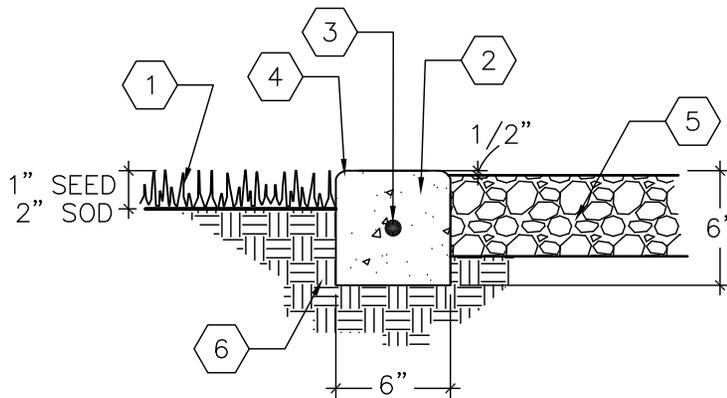
CITY OF ALBUQUERQUE

REVISIONS

SHRUB PLANTING ON SLOPE

JULY 2015

DWG. No 2717



CONSTRUCTION NOTES:

1. SOD OR SEEDED TURF – SEE PLANS
2. 3000 PSI CONCRETE MOWSTRIP WITH BRUSH FINISH
3. No. 3 REBAR HORIZONTAL AND CONTINUOUS
4. TOOLED EDGE
5. MATERIAL VARIES – SEE PLANS
6. 95% COMPACTED SUBGRADE

NOTES:

- A. CONTROL JOINTS SHALL BE PLACED AT 5' O.C.
- B. EXPANSION JOINTS SHALL BE PLACED AT 20' O.C AND WHERE THE MOWSTRIP ABUTS ANOTHER HARD SURFACE
- C. TOP OF MOWSTRIP SHALL FOLLOW FINISH GRADE OR MATCH GRADES SHOWN ON THE PLANS

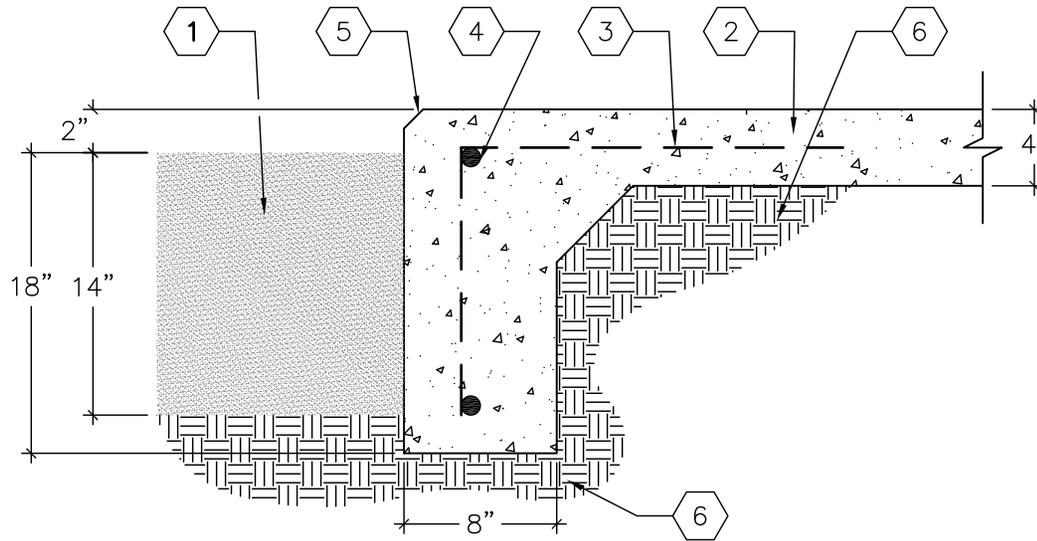
CITY OF ALBUQUERQUE

REVISIONS

CONCRETE
MOWSTRIP

JULY 2015

DWG. No 2726



CONSTRUCTION NOTES:

1. PLAY AREA SURFACING – SEE PLANS
2. 3000 PSI CONCRETE PAVING/SIDEWALK WITH BRUSH FINISH
3. No 4 REBAR AT 12"O.C.
4. No. 4 REBAR HORIZONTAL AND CONTINUOUS
5. 1" CHAMFER

6. 95% COMPACTED SUBGRADE

NOTES:

- A. CONTROL JOINTS SHALL BE PLACED AT 5' O.C.
- B. EXPANSION JOINTS SHALL BE PLACED AT 20' O.C AND WHERE THE TURNDOWN ABUTS ANOTHER HARD SURFACE.

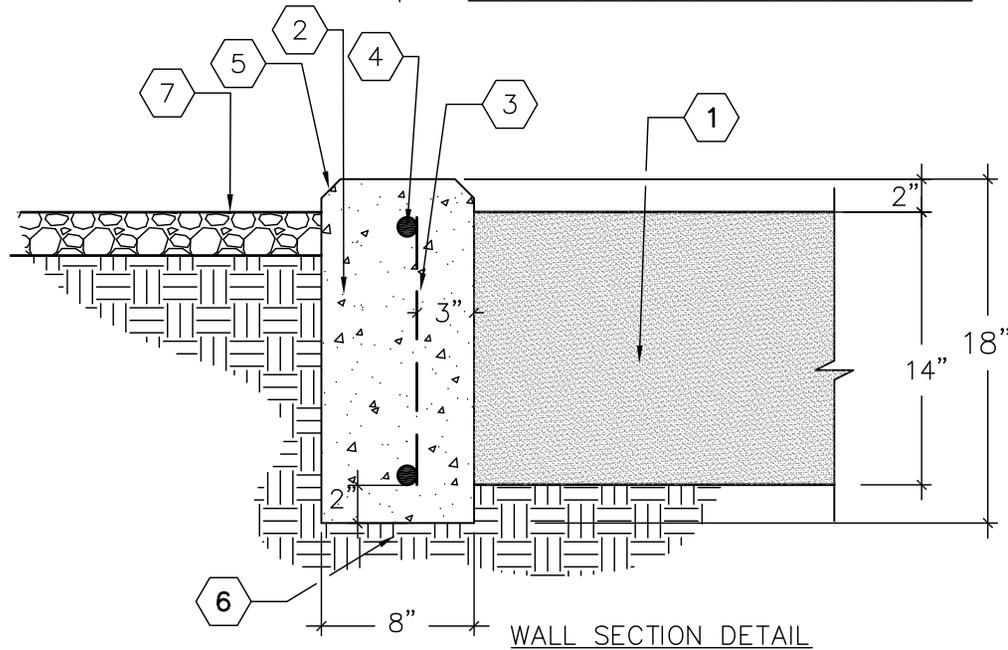
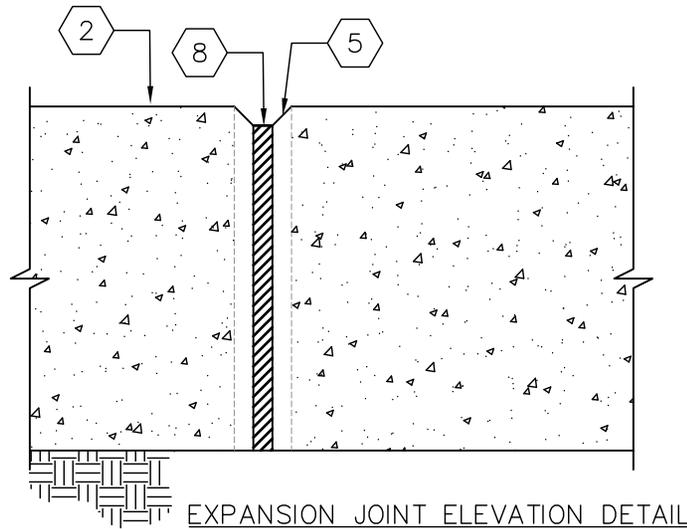
CITY OF ALBUQUERQUE

REVISIONS

TURN DOWN
SLAB AT PLAY AREA

JULY 2015

DWG. No 2728



CONSTRUCTION NOTES:

1. PLAY AREA SURFACING – SEE PLANS
2. 3000 PSI CONCRETE WITH BRUSH FINISH
3. #4 REBAR AT 24" O.C.
4. #4 REBAR, HORIZONTAL AND CONTINUOUS.
5. 1" CHAMFER
6. 95% COMPACTED SUBGRADE
7. MATERIAL VARIES – SEE PLANS
8. 1/2' EXPANSION JOINT MATERIAL

NOTES:

- A. CONTROL JOINTS SHALL BE PLACED AT 5' O.C.
- B. EXPANSION JOINTS SHALL BE PLACED AT 20' O.C. AND WHERE EDGER WALL ABUTS ANOTHER CONCRETE SURFACE

CITY OF ALBUQUERQUE

REVISIONS

EDGER WALL AT PLAY AREA

JULY 2015

DWG. No 2729