Howard County Design Manual Volume IV, May 1, 2014 Revisions

This file contains the Howard County Design Manual Volume IV revised specification pages and standard detail sheets as modified on May 1, 2014. Items included in this file include:

1. Letter of May 1, 2014 to Holders of Howard County Design Manuals containing a list of specification paragraphs and standard details that have been modified.

2. Category 900 revised pages 95, 96, 96a, 137 and 138.

3. Category 1000 revised page 198 and 199.

4. Construction Details Table of Contents revised pages only (4 pages)

5. Revised Standard Details (20 pages)

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May 1, 2014

To: Holders of Howard County Design Manuals

Subject: Revisions to Howard County Design Manual, Volume IV
Standard Specifications and Details for Construction

Dear Sir or Madam:

Howard County periodically updates its Design Manuals. The last comprehensive update to Volume IV Standard Specifications and Details for Construction was May 18, 2007. In order to maintain current design standards the Department of Public Works periodically issues policy statements addressing revisions in design and construction standards, approved construction materials and standard details.

The attached sheets list the specification paragraphs and standard details that have been modified. Copies of the revised specification pages and standard detail sheets can be downloaded by going to the Howard County website http://howardcountymd.gov/departments.aspx?ID=343. The complete updated Volume IV Design Manual is also available on this site.

All engineering plans approved by the County after June 1, 2014 are required to comply with the revised requirements. The revisions will be incorporated into Volume IV in the next amendment to the Design Manual. Until that time, these revisions are in affect for all construction within Howard County.

Very truly yours,

Thomas E. Butler, Deputy Director
Department of Public Works
Engineering, Development and Construction

Enclosures:

1. The following paragraphs in Categories 900 and 1000 of the Howard County Design Manual Volume IV, Standard Specification and Details for Construction have been revised. The revisions are noted in red on the following pages.
   1. Page 95, Paragraph 905.01.02 (j), PVC Pipe and Fittings For Sanitary Sewers. Added Paragraph (j) Elastomeric Couplings.
   2. Page 96. Page reformatted.
   3. Page 96a, Paragraph 905.01.05 (c)(1), PVC Pressure Pipe. Added pipe quality control documentation requirements, PVC 5-degree sweeps, PVC high-deflection couplings and bell stops.
   4. Page 137, Paragraph 961.08 Water House Services and Appurtenances For 5/8-inch Through 2-inch Pipe. Added couplings with grip joints, no lead brass fittings and 300 psi rated corporation and curb stops,
   5. Page 138, Paragraph 961.08.09 Service Saddles. Revised service saddle requirements.
   6. Page 198, Paragraph 1002.03.04 (b), PVC Pipe. Added paragraph on the use of 5-degree sweeps and high-deflection couplings.
   7. Page 199, Paragraph 1002.03.04 (b), PVC Pipe. Added paragraph on the requirement for the use of sacrificial anodes on metallic fittings used with PVC pressure pipe.

2. The following pages of the Table of Content for the Construction Details have been revised to reflect the latest standard detail revision dates: pages 1, 5, 6 and 7.

3. The following Standard Details in the Howard County Design Manual Volume IV, Standard Specification and Details for Construction have been added, revised or replaced. The revisions to the Standard Details are noted in red on the following sheets.

	Detail Number	Detail Name	Date Approved or Revised
1.	G-2.01	Public Utilities Closed Section Roadways	5/01/14
2.	G-2.02	Public Utilities Open Section Roadways	5/01/14
3.	G-4.01	Utility Trench Roadway Repaving	5/01/14
4.	G-5.11	Precast Manholes Notes	5/01/14
5.	G-5.12	Precast Manhole Standard and Shallow 4'-0" for 24" Pipe and Smaller	5/01/14
6.	W-3.12	Water Mater Frame and Cover	5/01/14
7.	W-3.13	Water Mater 15" Frame and Cover	5/01/14
8.	W-3.21	Water Service Connection 5/8", 3/4", 1", 1½", & 2" Inside Meter Settings	5/01/14
9.	W-3.22	Water Service Connection 5/8", 3/4", 1", 1½", & 2" Existing A.C.P. Main	5/01/14
10.	W-3.23	Water Service Connection 5/8", 3/4" & 1" Dual Building Inside Meter Settings	5/01/14

11.	W-3.26	Water Meter 1½" & 2" Inside Meter Setting	5/01/14
12.	W-3.27	Water Meter 3/4" Outside Meter Setting	5/01/14
13.	W-3.28	Water Meter 1" Outside Meter Setting	5/01/14
14.	W-3.29	Water Meter 5/8" Outside Meter Setting	5/01/14
15.	W-3.30	Water Meter Water Service Saddle 3/4" thru 2"	5/01/14
16.	W-3.31	Water Meter Twin 5/8" Outside Meter Settings	5/01/14
17.	W-3.32	Water Meter Twin 1" Outside Meter Settings	5/01/14
18.	W-3.33	Water Meter Twin 3/4" Outside Meter Settings	5/01/14
19.	W-3.41	Water Meter 3", 4" & 6" Connection Commercial Inside Meter Settings	5/01/14
20.	W-3.44	Water Meter 3", 4", 6", 8" & 10" Inside Combined Fire/Domestic	5/01/14

(d) Pipe shall be made of PVC plastic having a cell classification of 12364-B as defined in ASTM D1784.

(e) The pipe shall be made and joined with an integral bell, bell and spigot rubber gasket joint. Each integral bell joint shall consist of a formed bell complete with a single rubber gasket. Gaskets shall conform to ASTM F477 and shall meet ASTM D3212 .

(f) Pipe shall be supplied in the sizes noted on the plans and shall be furnished in standard laying lengths of 13 and 20 feet.

(g) Each piece of pipe shall have the material, size, pressure class designation, dimension ratio, manufacturer's name and production record code conspicuously painted on it as near as possible to the flanged or bell end of the pipe and these designations shall be clearly legible.

(h) All pipe sections between two manholes or two structures shall be of the same material, size, and of the same manufacturer.

(i) PVC wye branches, laterals, pipe stoppers, and other fittings shall be manufactured in accordance with the same specifications, and have the same thickness, depth of socket, and annular space as the pipe. Wye branches shall be complete pipe sections. Saddles will not be permitted for new construction. Gaskets shall conform to ASTM F477. All PVC fittings shall be SDR 35.

(j) Elastomeric couplings may be used, with the approval of the Department of Public Works, for joining sections of gravity sewer for purposes of connection or repair. The couplings may be used for size to size (standard), material to material (transition), or varying size (reducing) connections. Couplings shall meet the requirements of ASTM C 1173, ASTM D 5926, and ASTM CSA B602. Couplings shall be made from flexible PVC, shall have stainless steel shear ring of no less than .012 inch thickness, and shall be supplied with stainless steel worm gear clamps.

905.01.04 PVC Storm Drains.

PVC storm drains shall be in accordance with the requirements of AASHTO Specifications Section 18.

905.01.05 PVC Pressure Pipe.

All PVC pressure pipe shall be unplasticized polyvinyl chloride normal impact type in conformance with ASTM D1784.

(a) Pressure Pipe Less Than 2-Inch. All PVC pressure pipe less than 2-inch shall be solvent welded. All solvent welded pipe shall be schedule 40 and meet the requirements of ASTM D1785. Solvent cement shall be purchased from the pipe manufacturer. It shall be compounded to conform with the socket fit, weather conditions at the time of installation and make a joint of maximum strength. Solvent cement shall meet the requirements of ASTM D2564. Primer shall meet ASTM F656.

PVC fittings shall be Schedule 80 in accordance with ASTM D2466.

(b) Pressure Pipe from 2-inch to less than 4-inch. All pressure PVC pipe shall be gasketed pipe, conforming to the requirements of ASTM D2241 and have a minimum SDR of 21. Gaskets shall conform to the requirements of ASTM F477.

All fittings and pipe shall be manufactured in one piece of injection molded PVC compound meeting ASTM D1784. Fittings shall be Class 200 and shall be designed to withstand a minimum of 630 psi quick burst pressure at 73 degrees F., tested in accordance with ASTM D1599.

(c) Pressure Pipe 4-Inch and Greater

(1) Pipe, Fittings, and Joints

All polyvinyl chloride (PVC) pipe, fabricated fittings, and couplings shall be manufactured and tested in accordance with AWWA C900, minimum DR18, for 4-inch through 12-inch diameter pipe and AWWA C905, minimum DR18 for 14-inch through 30-inch diameter pipe. Third-party certification (listing) by Underwriters Laboratory (UL) shall also be required for all PVC pipe. PVC pipe manufactured more than one year prior to work being installed will not be accepted.

All products shall be homogeneous throughout and free from visible cracks, bubbles, blisters, holes, foreign inclusions, cuts, or scrapes on inside or outside surfaces, or other imperfections, which may impair the performance or life of the pipeline. Each pipe shall be straight to within 1¼ inch per 20-foot length of pipe when uniformly supported along its entire length, and shall have a true circular cross-section to within +/- 1/64 inch.

Fittings for use with PVC mains shall be ductile iron, in accordance with Section 905.10 and shall be exterior epoxy coated in accordance with AWWA C116, or PVC. All tee fittings used with PVC mains shall be ductile iron. PVC fittings shall have push on rubber gasketed joints, be injection-molded meeting AWWA C907 (4-inch through 12-inch), Pressure Class 150 or higher; or fabricated meeting AWWA C900 (4-inch through 12-inch), Pressure Class 200, or fabricated meeting AWWA C905 (14-inch

through 48-inch), Pressure Class 150 or higher. Pipe joints shall be in accordance with the standards specified for the pipe and fittings.

All metallic fittings and appurtenances used with PVC water piping meeting the requirements of AWWA C-900 or AWWA C-905 shall be cathodically protected. Anodes shall be sized for the intended application by a NACE certified corrosion engineer and installed in accordance with the specifications. Generally zinc anodes shall be installed on stainless steel fittings and appurtenances, magnesium anodes shall be installed on ferrous fittings and appurtenances.

All 4-inch and larger PVC pipe shall be manufactured with integral bell and spigot joints which shall utilize elastomeric gaskets conforming to ASTM F477. All pipe ends shall be beveled to accept the gasketed fittings. Gaskets for push on joints and mechanical joints for joint connections between pipe and metal fittings, valves and other accessories shall be as specified in AWWA C111/A21.11 for push on joints and mechanical joints. All PVC pressure pipe shall be factory marked on the spigot end for depth of insertion into the bell and factory tested in accordance with AWWA C900.

All records for Quality Control and Qualification Test Requirements noted in Section 5.1 of the AWWA Standard C900 for PVC pressure pipe shall be submitted with the pipe material certifications or shop drawings prior to approval of the material for use on PVC water mains. The test records shall be for the pipe to be installed on the specified project. All PVC pipe shall contain markings to allow cross referencing of the pipe supplied to the test records received.

PVC 5-degree sweeps and PVC high-deflection couplings may be used to facilitate changes in direction on 8-inch and smaller PVC water mains. PVC 5-degree sweeps and PVC high-deflection couplings may be used on 12-inch PVC water mains with the approval of the Department of Public Works. Where 5-degree sweeps or high defection couplings are permitted for use, bell stops shall be used to prevent over insertion of the spigot into the bell. PVC 5-degree sweeps shall be bell by spigot, rated for a minimum 225 psi, DR18 meeting the requirements of AWWA C900. PVC high deflection couplings shall be rated for a minimum 200 psi meeting the requirements of AWWA C900, shall have a minimum lay length of 9-inches and shall have center stops. The bell stop shall be manufactured of ductile iron and incorporate an expansion retention spring to allow for pipe expansion and contraction.

961.08 WATER HOUSE SERVICES AND APPURTENANCES FOR 5/8-INCH THROUGH 2-INCH PIPE.

961.08.01 Copper tubing shall comply with the latest standard specifications for seamless copper water tube, ASTM B88 soft temper, type k unless otherwise shown or directed.

961.08.02 Unions, couplings and other fittings for copper tubing shall-be the copper service thread type. Three part unions shall be used. All unions, couplings and other fittings shall be for flared end or compression end with grip joints unless otherwise approved by the County. All brass fittings shall be of the "No-Lead" type and marked with manufacturer's designation.

961.08.03 Corporation stops for use on copper base services shall be the ballcorp style with full port opening and 300 psi rating, taper thread inlet with either flared end or compression end with grip joint outlets. Corporation stops shall be manufactured in accordance with AWWA C800.

961.08.04 Curb Stops shall be full port ¼ turn valves, 300 psi rating, with either flared end or compression fittings with grip joints. Curb stops shall be heavy cast bronze body that conforms to material requirements of AWWA C800.

961.08.05 Outside Meter Settings 1-inch and Smaller.
Outside meter settings 1-inch and smaller shall be the angle yoke style with vertical inlet and outlet. Yokes settings shall have inlet and outlet angle key valves with bleeders.

961.08.06 Twin Services.
For twin services inside meter vaults, t-bar setters shall be used. Yokes shall be as specified in 961.08.05.

961.08.07 ¾-inch and 1-inch Inside Meter Setting.
¾-inch and 1-inch inside meter settings shall be vertical inlet and outlet with ends for flared copper or compression end with grip joints. Settings shall be manufactured in accordance with AWWA C800.

961.08.08 1-1/2-inch and 2-inch copper water meter settings shall be horizontal inlet and outlet, high bypass option, and ends for flared copper or compression end with grip joints. Settings shall be constructed of brass conforming to AWWA C800 and copper tubing.

961.08.09 Service Saddles.

(a) Service Saddles For Metallic Pipe: Service saddles for metallic pipe shall be ductile iron body in accordance with ASTM A395 or ASTM A536 double strap type meeting the requirements of AWWA C-800. Straps shall have a flat pipe bearing surface and shall be 5/8-inch AISI C1010, ASTM A510 steel, zinc plated with trivalent seal.

(b) Service Saddles For Non Metallic Pipe: Service saddles for non metallic pipe shall be ductile iron body meeting ASTM A395 or ASTM A536 with a single 3¼ -inch minimum width or double 1½-inch minimum width 18-8 type 304 stainless steel band(s), be epoxy or nylon coated and meet the requirements of AWWA C-800. Saddles and straps shall be formed to meet the curvature of the pipe, provide full support around the circumference of the main and shall not distort, scratch or damage the pipe when tightened. Saddles shall be manufactured for underground service and shall be rated for a minimum service of 200 psi. Saddles shall have water tight rubber gaskets meeting ASTM D2000 around the tap hole. Service saddles shall be used for 2-inch and smaller water house connections on nonmetallic pipe. Saddles for use on PVC water mains shall be manufactured specifically for use on AWWA C900 PVC pressure pipe. Only core-cutting type tapping machines shall be used with service saddles on non-metallic pipe.

961.08.10 Curb Stop Boxes.

Cover shall be cast iron or poly-iron. Curb Service Box shall be injection molded and commercially manufactured utilizing a compound manufactured per ASTM D-2853-70, Class 1212. Material shall be a rigid combination of polyolefin with fibrous inorganic component reinforcing and UV stabilizer additives to assure resistance to material degradation from ultraviolet light. The box shall be telescoping two-piece (screw style) with polycarbonate ring, pentagon bolt and cover. Upper section shall be locatable electronically and magnetically with ring riveted to the top piece. Lower section shall be a full threaded shaft of 2.35" ID over a Buffalo style arch, 4" wide by 7" high and saddle, 3-1/3" wide by 4" high.

961.08.11 Meter Boxes.

Meter boxes for 2-inch and smaller meters shall be the pre-cast concrete type with cast iron cover and frame. Meter boxes for 1- inch and smaller meters shall be in accordance with Standard Details W3.27 through W3.32. Boxes for 1 ½" and 2" meters shall be in accordance with Standard Detail W3.34. Meter box cover and frame shall be in accordance with Standard Detail W3.12.

961.09 METER VAULTS. Unless otherwise noted on the Contract Documents, meter vaults for meters 3-inch and larger shall be pre-cast concrete structures and shall have

(a) Delivery and Storage. Loading, unloading, handling, inspection and storage of PVC pipe and fittings shall be in accordance with AWWA C605. PVC pipe shall be supported during storage so that it does not deform or bend. PVC pipe manufactured more than one year prior to work site inspection will not be accepted.

(b) Installation: Installation shall be in accordance with AWWA C605, the manufacturer's installation instructions and recommendations except as modified herein.

Changes in horizontal and vertical alignment and curved alignments shown on the Contract Documents shall be made by using fittings, standard bends, PVC 5-degree sweeps or PVC high-deflection couplings. All "tees" used with PVC mains shall be ductile iron. Deflecting PVC pipe joints or bending PVC pipe will not be permitted.

Where 5-degree sweeps or high defection couplings are permitted to facilitate changes in horizontal or vertical alignments of PVC water mains, one full pipe length (20-foot long) shall be provided on either side of the 5-degree sweep or high deflection coupling. High deflection couplings shall be limited to the lesser of a total 3-degrees defection (1½-degree on either end of the coupling) or 60% of the manufacture's maximum allowable defection.

Bell stop devices shall be installed on the spigot at the insertion line on both sides of the 5-degree sweep and/or high defection coupling to prevent over-insertion of the pipe spigot into the bell joint.

Vibratory plate compactors or other approved means shall be used to thoroughly compact the #57 stone on both sides of the 5-degree sweep and/or high defection coupling, taking care not to use compaction equipment directly over the fitting.

Proper Assembly of Gasketed PVC Pipe Joints: The manufacturer's insertion line of gasketed PVC pipe joints indicates the maximum depth of insertion of the spigot into the bell. After assembly of the joint, the insertion line shall remain visible. Dual insertion lines on gasketed PVC pipe indicate the maximum and minimum depth of insertion of the spigot into the bell. The contractor shall not over insert or over home the spigot into the bell of PVC pipe.

Whenever a pipe requires cutting, the work shall be done in a manner that leaves a smooth, square end. Cut PVC pipe ends shall have burrs removed and the end beveled to match factory bevel. To ensure the proper length of insertion of the spigot into the bell, PVC pipe cut in the field shall be beveled and marked on the spigot end to the dimensions specified by the manufacturer prior to assembly.

Prior to making gasketed joints, both mating pipe ends and the gasket shall be cleaned of all foreign material. The rubber gasket shall then be inserted in or stretched over the clean gasket seat and lubricant applied to the gasket and mating

pipe end per the pipe manufacturer's recommendations. The method for inserting the spigot into the bell shall be as recommended by the manufacturer and approved by the County. The pipe ends shall be carefully aligned and pushed together to meet the required manufacturer's insertion depth. Insertion of the spigot end of the pipe shall be made to a point where the factory mark is even with the face of the bell. For connections to mechanical joint fittings and appurtenances, cut the bevel off of the PVC pipe and insert the PVC pipe spigot, in straight alignment, until it contacts the bell taper of the mechanical joint fittings or appurtenance.

The push on joint is assembled by positioning the elastomeric gasket(s) in the annular groove(s) of the bell or coupler and inserting the spigot end of the pipe into the bell compressing the gasket radially to form a positive seal. All PVC pipe shall be factory marked on the spigot end for depth of insertion into the bell. Any pipe that is field cut shall have the spigot end prepared and remarked to the proper dimensions prior to insertion. The gasket and annular groove are designed, sized and shaped so that the gasket will resist displacement. Care shall be taken so that only the correct elastomeric gasket compatible with the annular groove(s) of the bell or coupler is used. Insertion of the elastomeric gasket in the annular groove must be in accordance with the manufacturer's recommendations.

Sacrificial anodes shall be installed on all valves and metallic fittings used with PVC water mains unless otherwise noted. Unless otherwise noted on the plans or in the specifications, seventeen (17) pound magnesium anodes shall be installed on all valves and ductile iron fittings including restraints and harnesses. Twelve (12) pound zinc anodes shall be installed on all stainless steel fittings and saddles used with PVC mains. When bell stops are used to prevent over insertion of the spigot into the bell of the PVC pipe, sacrificial anodes are not required to be installed on the bell stops.

(a) Tracer Wires and Continuity Stations: For locating PVC water mains, continuity test stations shall be located adjacent to each fire hydrant within the

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Italics notes SHA Detail approved for use in Howard County

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Detail #	Detail Title	Date Approved or Revised
	WATER DETAILS (continued)	
W-3.21	WATER SERVICE CONNECTION 5/8", 3/4", 1", 11/2" & 2" Inside Meter Settings	5/1/2014
W-3.22	WATER SERVICE CONNECTION 5/8", 3/4", 1", 11/2" & 2" Existing A.C.P. Main	5/1/2014
W-3.23	WATER SERVICE CONNECTION 5/8", 3/4" & 1" Dual Building Inside Meter Settings	5/1/2014
W-3.24	WATER SERVICE CONNECTION 3", 4", 6", 8",10" & 12" Inside Meter Settings	5/7/2007
W-3.25	WATER METER 3/4" & 1" Inside Settings	5/7/2007
W-3.26	WATER METER 11/2" & 2" Inside Meter Setting	5/1/2014
W-3.27	WATER METER 3/4" Outside Meter Setting	5/1/2014
W-3.28	WATER METER 1" Outside Meter Setting	5/1/2014
W-3.29	WATER METER 5/8" Outside Meter Setting	5/1/2014
W-3.30	WATER METER Water Service Saddle 3/4" thru 2"	5/1/2014
W-3.31	WATER METER Twin 5/8" Outside Meter Settings	5/1/2014
W-3.32	WATER METER Twin 1" Outside Meter Settings	5/1/2014
W-3.33	WATER METER Twin 3/4" Outside Meter Settings	5/1/2014
W-3.34	WATER METER 11/2" & 2" Outside Meter Settings	6/30/2011

Italics notes SHA Detail approved for use in Howard County

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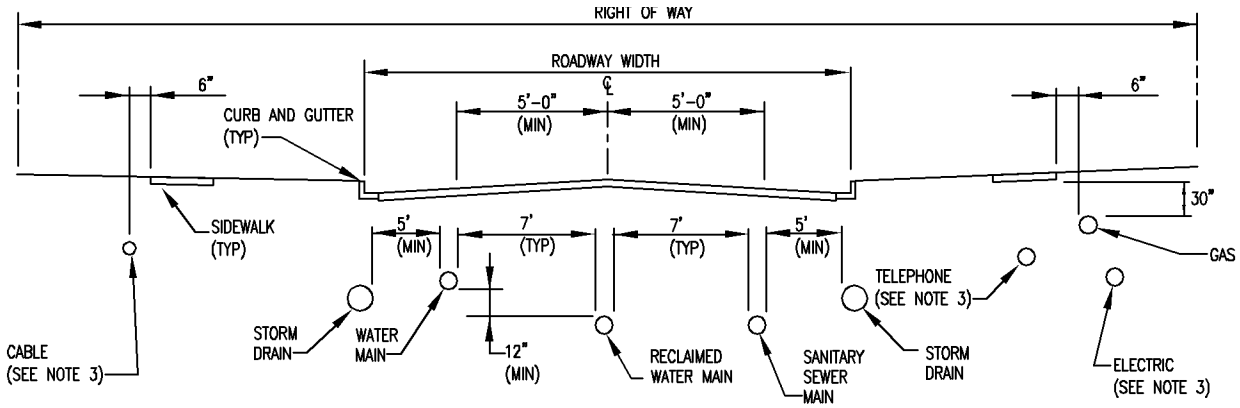
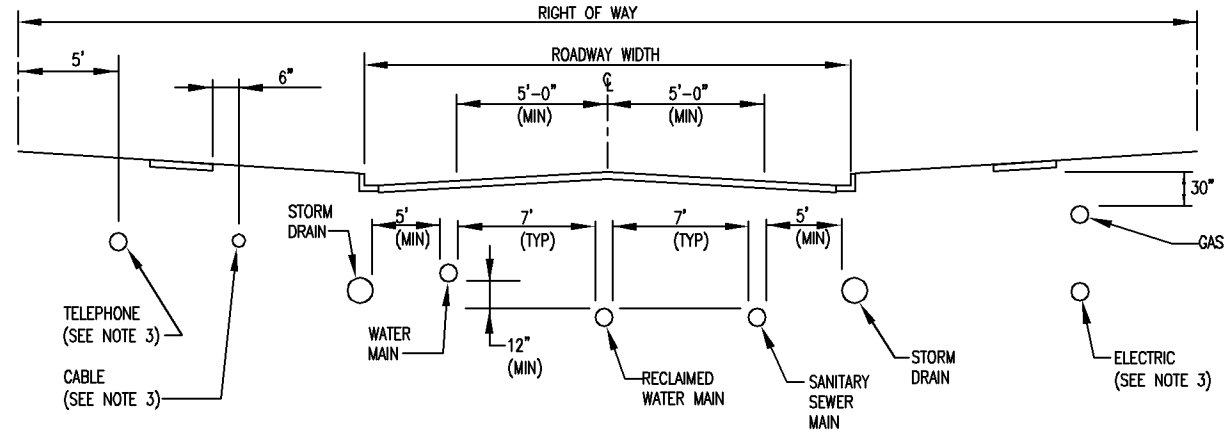
Detail #	Detail Title	Date Approved or Revised
	WATER DETAILS (continued)	
W-3.35	WATER METER 3" Meter Vault	5/7/2007
W-3.36	WATER METER 4" Meter Vault	5/7/2007
W-3.37	WATER METER 6", 8" & 10" Outside Combined Fire/Domestic	5/7/2007
W-3.41	WATER METER 3", 4" & 6" Connection Commercial Inside Meter Settings	5/1/2014
W-3.44	WATER METER 3", 4", 6", 8" & 10" Inside Combined Fire/Domestic	5/1/2014
W-3.64	WATER MAIN Large Concrete Vaults Sections	5/7/2007
W-3.65	WATER MAIN Valve Key Extension	5/7/2007
W-4.11	WATER MAIN Air Release Valve Manhole	5/7/2007
W-4.12	WATER MAIN Drain	5/7/2007
W-4.13	WATER MAIN 6" - 12" Blow-off	5/7/2007
W-5.01	PVC WATER MAIN Valve Anchorage	5/7/2007
W-9.01	Backflow Prevention Between Meter and Building Private	5/7/2007

Italics notes SHA Detail approved for use in Howard County



PUBLIC UTILITY LAYOUT IN CLOSED SECTION PUBLIC R/W

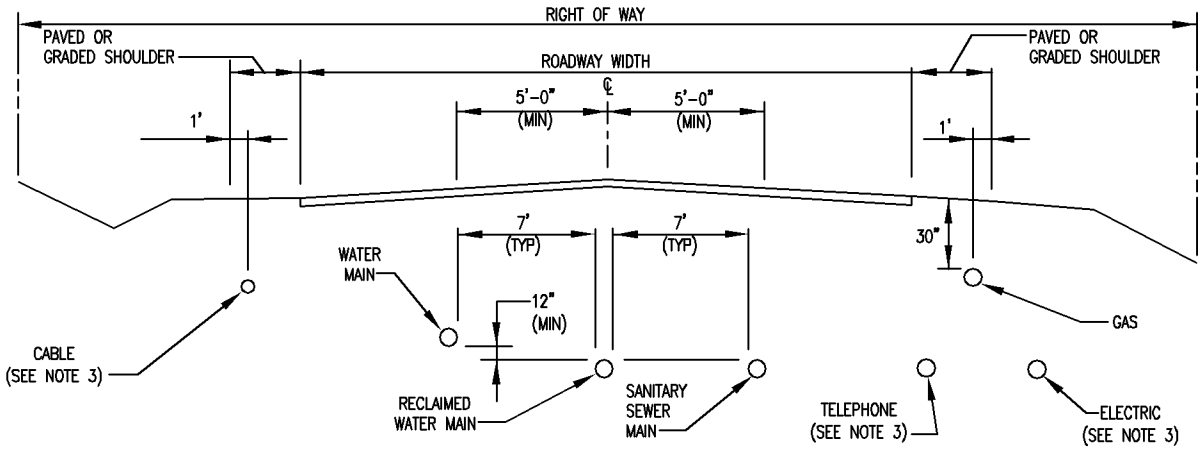


PUBLIC UTILITY LAYOUT IN CLOSED SECTION PUBLIC R/W (ALTERNATE)

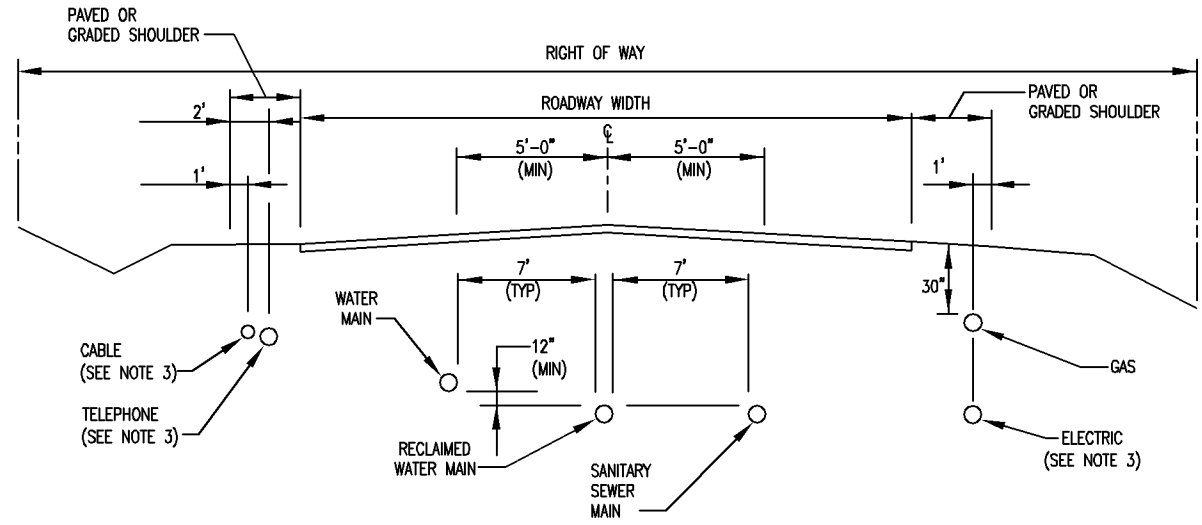
NOTES:

1. DPW SHALL BE CONSULTED CONCERNING THE UTILITY LOCATION ARRANGEMENTS FOR A GIVEN ROADWAY PROJECT.
2. GAS, ELECTRIC AND TELEPHONE LINES MAY BE PLACED IN THE SAME TRENCH AT THE OPTION OF THE UTILITY OWNERS AND AS SHOWN ON THE CONTRACT DRAWINGS.
3. ⚠1 ELECTRIC REQUIRES 36" MINIMUM COVER. GAS REQUIRES 30" MINIMUM COVER. COMMUNICATIONS (TELEPHONE, CABLE, INTERNET, ETC.) REQUIRES 24" MINIMUM COVER IN PAVED ROADWAY AND 18" MINIMUM COVER IN ALL OTHER RIGHT-OF-WAY. COVER IS THE DEPTH OF MATERIAL FROM THE TOP OF UTILITY TO THE FINISHED GRADE.
4. TELEPHONE. CABLE, GAS AND ELECTRIC SHALL HAVE A MINIMUM OF 5' HORIZONTAL SEPARATION FROM WATER AND SEWER UTILITIES.
5. SEE W-3.11 FOR WATER METER VAULT LOCATION.

Revised ⚠1 5/1/2014 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	Public Utilities Closed Section Roadway	Detail G-2.01



PUBLIC UTILITY LAYOUT IN OPEN SECTION PUBLIC R/W



PUBLIC UTILITY LAYOUT IN OPEN SECTION PUBLIC R/W (ALTERNATE)

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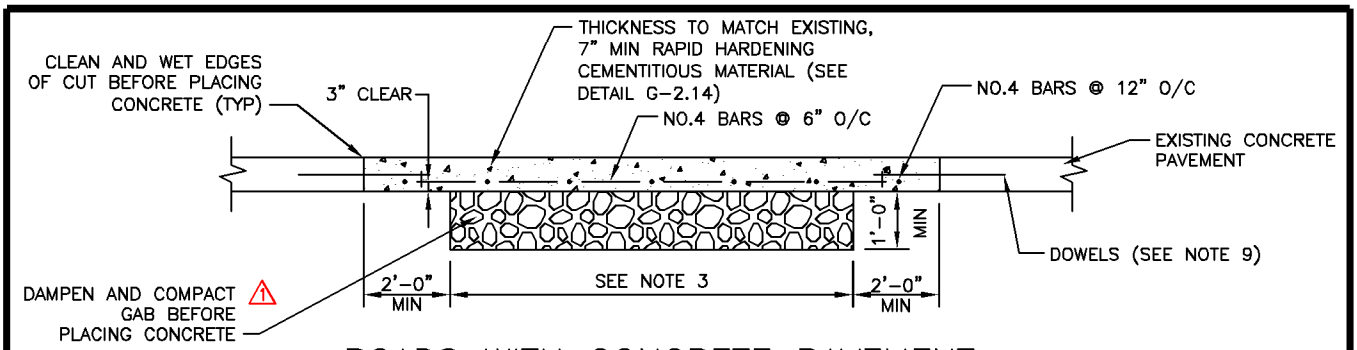
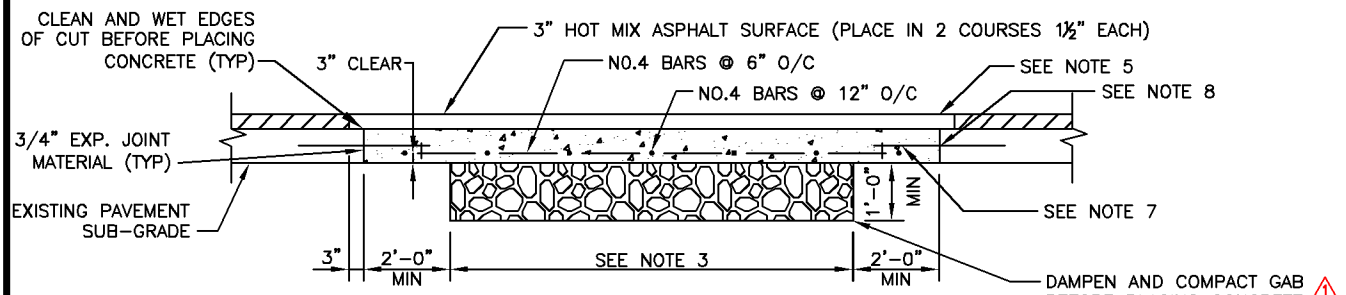
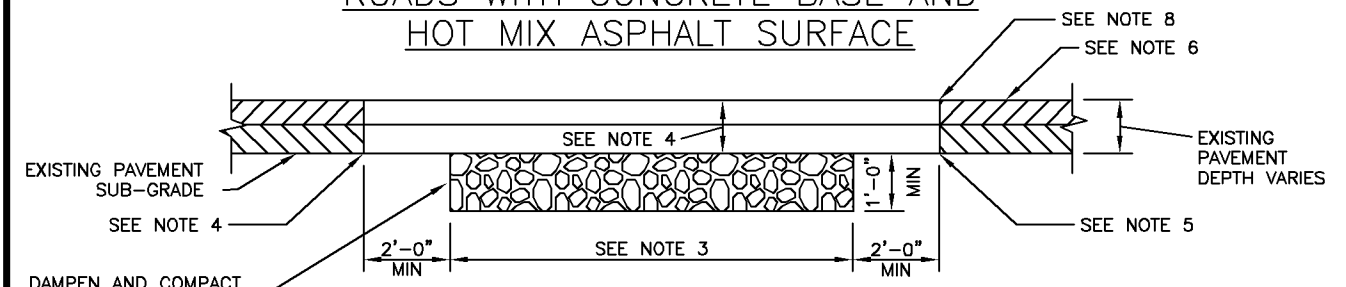
Revised ⚠1 5/1/2014 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	Public Utilities Open Section Roadway	Detail G-2.02



ROADS WITH CONCRETE PAVEMENT



ROADS WITH CONCRETE BASE AND HOT MIX ASPHALT SURFACE

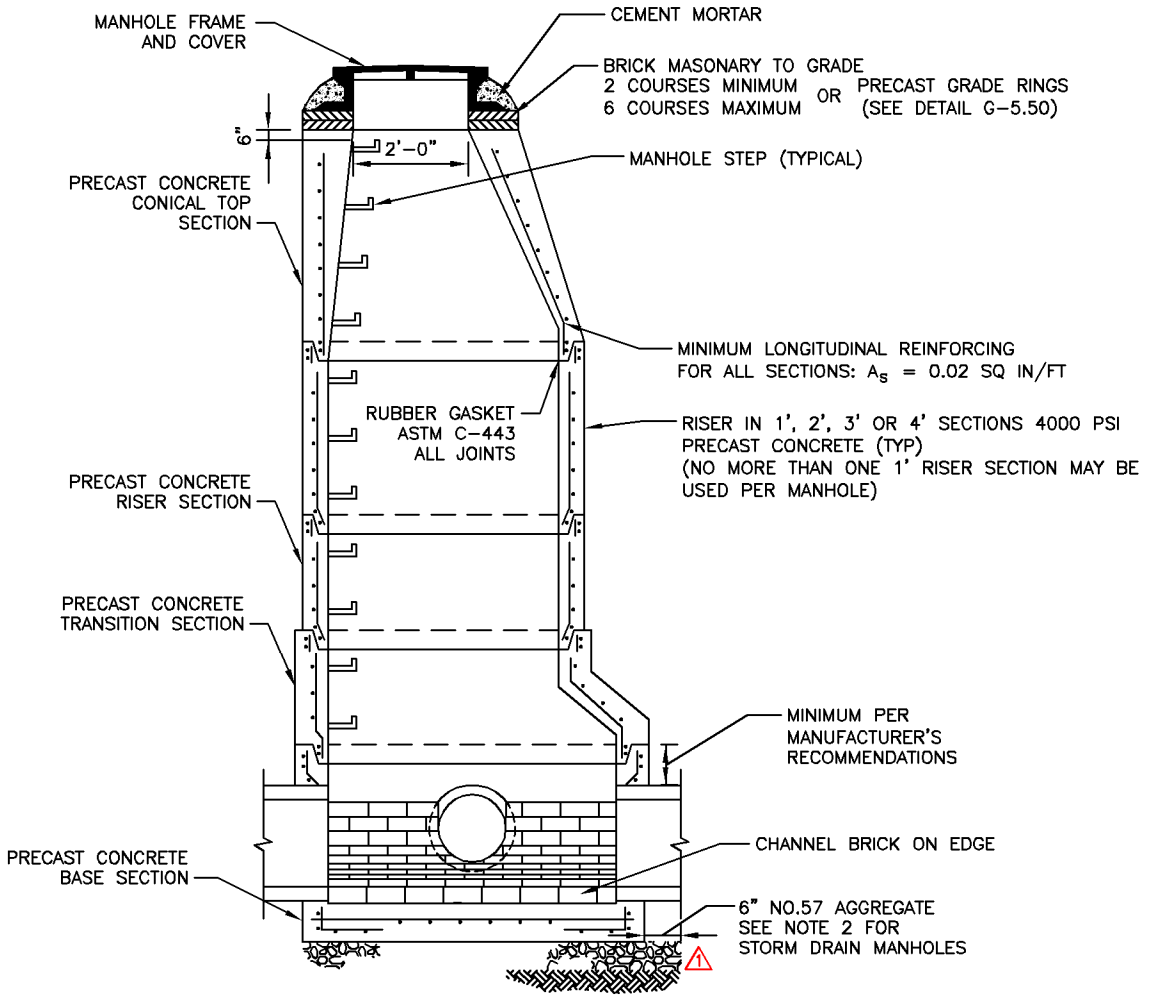


ROADS WITH FLEXIBLE PAVEMENT

NOTES:

1. WHEREVER A TRENCH CROSSES A CONCRETE ROADWAY THAT HAS JOINT INSTALLATIONS THE ENTIRE SLAB BETWEEN THE EDGE OF THE TRENCH AND THE NEAREST JOINT SHALL BE REMOVED IF THE DISTANCE IS LESS THAN 10 FEET.
2. CLEAN AND WET EDGES OF CUT AND SUBGRADE BEFORE PLACING CONCRETE.
3. AGGREGATE SUB-BASE WIDTH SHALL BE 6 FT MINIMUM OR ACTUAL TRENCH WIDTH, WHICH EVER IS GREATER.
4. (1) HOT MIX ASPHALT PAVEMENT PATCH THICKNESS SHALL BE EQUAL TO THE EXISTING PAVING SECTION OR AS APPROVED BY DPW. THE MINIMUM PAVING PATCH SHALL CONSIST OF 2" HMA SURFACE COURSE OVER 4" HMA BASE COURSE. GRADED AGGREGATE BASE (GAB) SHALL BE PLACED AND COMPACTED IN 6" MAXIMUM COMPACTED THICKNESS LAYERS.
5. CLEAN EXPOSED VERTICAL SURFACE OF ADJACENT PAVEMENT AND PLACE TACK COAT ON ALL VERTICAL SURFACES PRIOR TO PLACING HMA.
6. IF THE REMAINING EXISTING PAVEMENT IS LESS THAN 4' WIDE , THE RESIDUAL PAVEMENT SHALL BE REMOVED IN ITS ENTIRITY AND REPLACED.
7. CONCRETE REPLACEMENT SHALL BE 10" MINIMUM MIX NO. 6.
8. SAW CUT FULL DEPTH ALL JOINTS OF EXISTING CONCRETE, BITUMINOUS, AND BASE PAVEMENTS.
9. REINFORCEMENT OF CONCRETE PAVING SHALL BE ACCOMPLISHED BY DOWELING. DOWELS SHALL BE CENTERED IN PAVEMENT THICKNESS. NEW REINFORCING SHALL BE TIED TO DOWELS.
10. TOTAL REPAIR WIDTH SHALL BE EQUAL TO THE LANE WIDTH IN ACCORDANCE WITH THE SPECIFICATIONS.

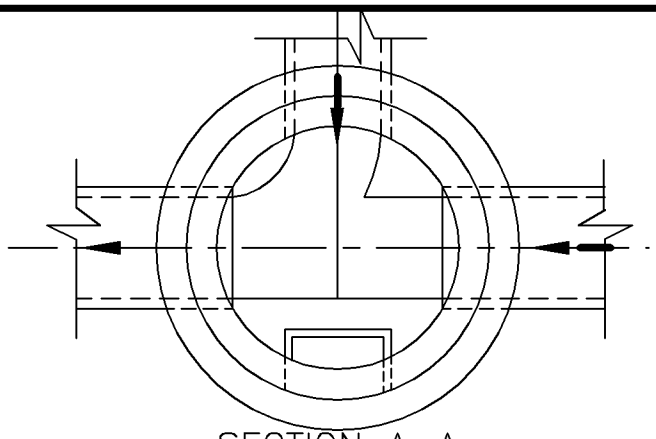
Revised (1) 5/1/2014 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	Utility Trench Roadway Repaving	Detail G-4.01



GENERAL NOTES APPLICABLE TO ALL PRECAST MANHOLES

1. MANHOLE BASE SECTION SHALL BE BEDDED ON 6-INCH NO.57 AGGREGATE ON FIRM SUBGRADE.
2. NO.57 AGGREGATE MATERIAL SHALL BE EXTENDED FROM 6-INCHES UNDERNEATH BOTTOM OF STRUCTURE TO SUBGRADE (STORM ONLY).
3. CONNECTION BETWEEN MANHOLE WALL AND SEWER SHALL BE NON-SHRINK GROUT (STORM) OR COMPRESSION TYPE RUBBER GASKET (SANITARY SEWER).
4. MANHOLE STEPS SHALL BE AS INDICATED ON DETAIL G-5.21.
5. MANHOLE COVER SHALL BE AS SPECIFIED ON DETAIL G-5.51, G-5.52, & G-5.53.
6. PROVIDE TWO APPLICATIONS OF BITUMINOUS MATERIAL (MINIMUM 16 MILS DFT) COATING ON EXTERIOR SURFACE OF MANHOLES (SANITARY SEWER ONLY).
7. MANHOLE CHANNELS SHALL BE FORMED TO PROVIDE A SMOOTH HYDRAULIC TRANSITION BETWEEN PIPES. BENCH SHALL BE TO TOP OF PIPE OR AS SHOWN ON CONTRACT DOCUMENTS. SANITARY SEWER MANHOLE CHANNEL AND BENCH SHALL BE PRECAST OR FORMED FROM SEWER BRICK SET ON EDGE. STORM DRAIN MANHOLE CHANNELS SHALL BE SEWER BRICK SET ON EDGE.
8. MANHOLE SHALL BE IN ACCORDANCE WITH ASTM C-478 EXCEPT AS INDICATED.
9. MAXIMUM INVERT DIFFERENTIAL IS 6 INCHES WITHOUT A DROP CONNECTION. SEE DETAIL S-1.32 FOR DROP CONNECTION DETAILS.
10. THE MINIMUM DISTANCE BETWEEN PIPE OPENINGS IN THE WALL OF THE MANHOLE SHALL BE 12 INCHES.
11. A MINIMUM OF 4" SHALL BE PROVIDED BETWEEN MANHOLE FLOOR AND LOWEST PIPE INVERT.
12. PRECAST RINGS MAY BE SUPPLIED IN PLACE OF BRICK MASONRY COURSES. SEE DETAIL G-5.50.
13. MANHOLE INTERMEDIATE LANDINGS SHALL BE AS INDICATED ON DETAIL G-5.16.

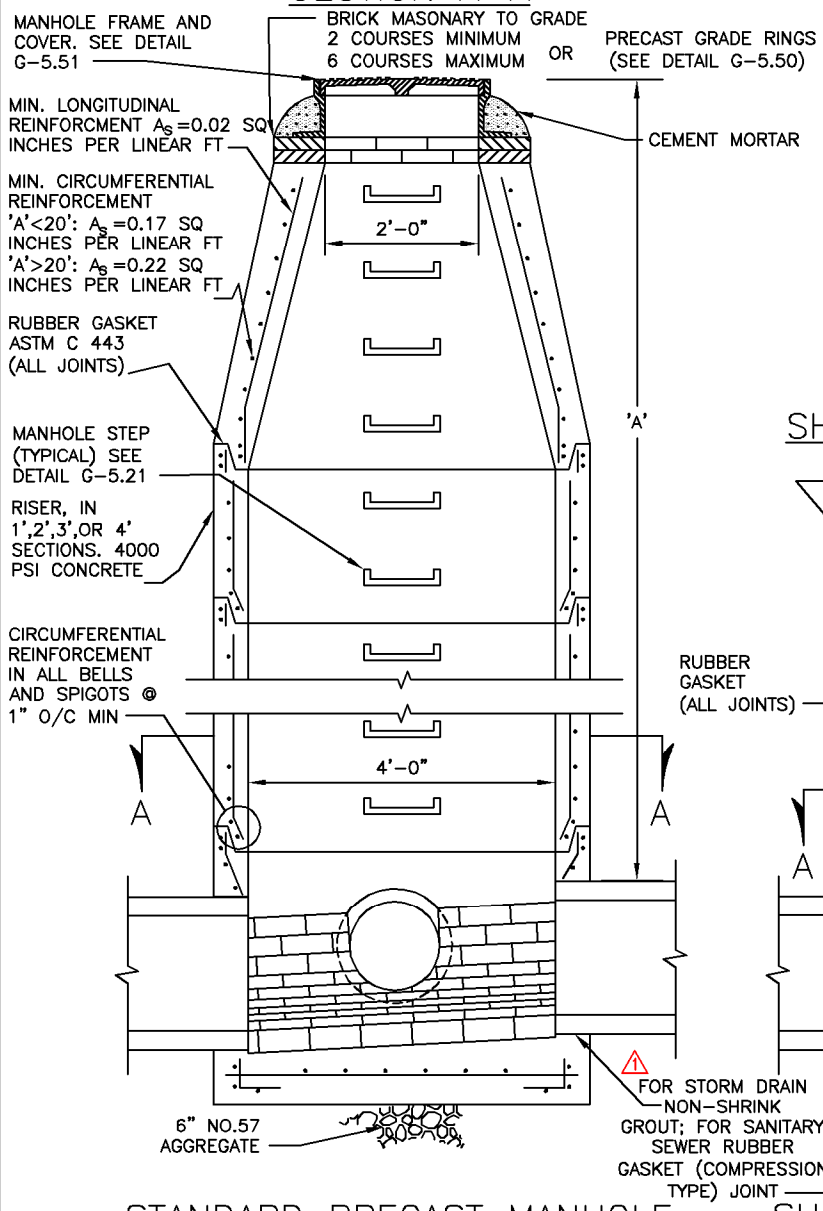
Revised 1 5/1/2014 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	PRECAST MANHOLE Notes	Detail G-5.11



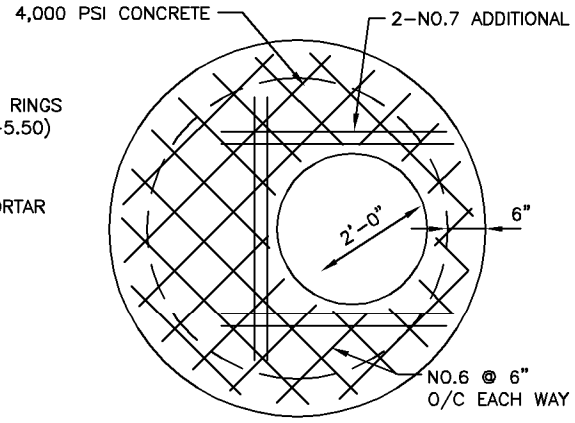
SECTION A–A

NOTES:

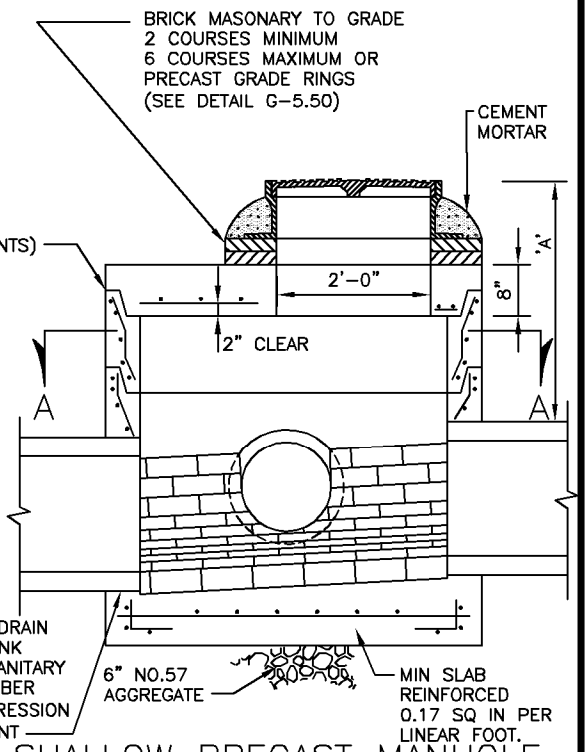
1. SEE GENERAL NOTES APPLICABLE TO ALL PRECAST MANHOLES ON DETAIL G–5.11.
2. FOR PIPE SIZES 27" TO 36" AND LARGER USE DETAIL G–5.13.
3. WHERE 'A' (COVER) IS MORE THAN 4.5 FEET USE STANDARD PRECAST MANHOLE.
4. MAXIMUM INVERT DIFFERENTIAL IS 6" WITHOUT DROP CONNECTION. (SEE DETAIL S–1.32 FOR DROP CONNECTION)



STANDARD PRECAST MANHOLE

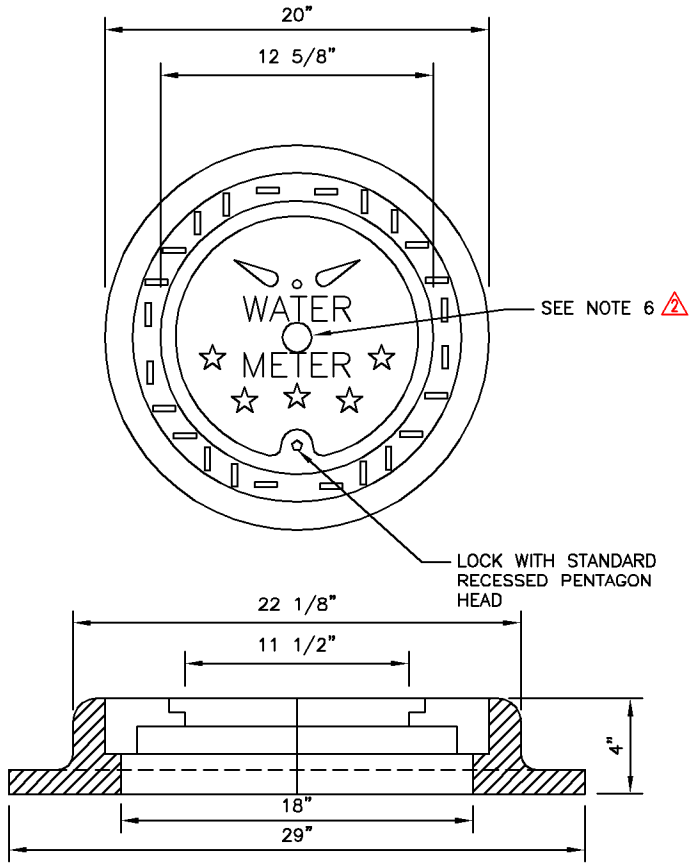


SLAB REINFORCING SHALLOW PRECAST MANHOLE

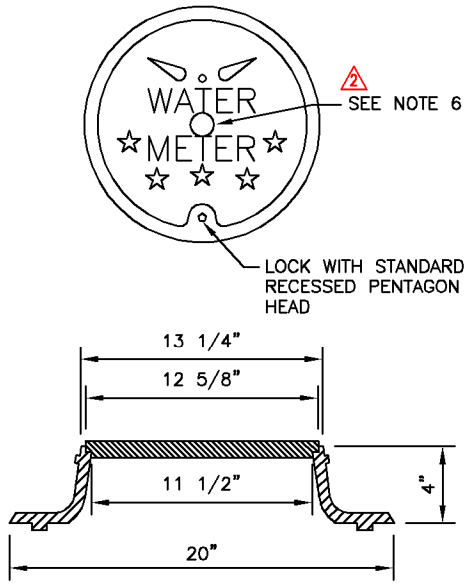


SHALLOW PRECAST MANHOLE

Revised 1 5/1/2014 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	PRECAST MANHOLE Standard and Shallow 4'–0" for 24" Pipe and smaller	Detail G–5.12



18"x12" METER FRAME AND COVER
CAST IRON



12" METER FRAME AND COVER
CAST IRON

NOTES:

2 1. 12" METER FRAME AND COVER FOR USE WITH EXISTING WATER SERVICES FOR PURPOSE OF RELOCATION, TYPE "A" FRAME AND COVER (RECESSED).

2. 18"x12" METER FRAME AND COVER FOR USE WITH SECTIONAL CONCRETE VALVE VAULTS.

3. ALL STANDARD FRAME & COVER MATERIAL SHALL BE CAST IRON AND SHALL CONFORM TO ASTM A48, CLASS 30.

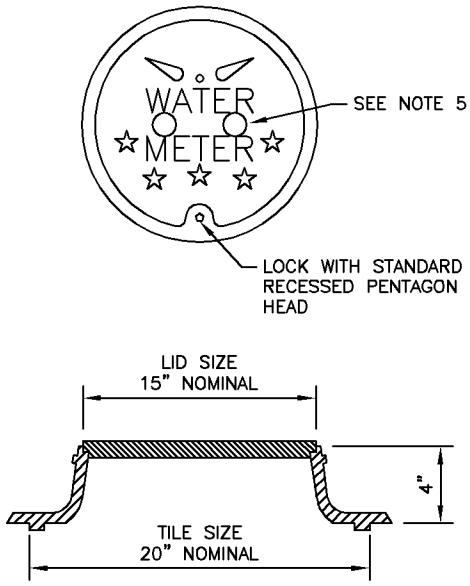
4. THE USE OF ADJUSTABLE FRAME AND COVER IS ALSO ACCEPTABLE. SEE THE HOWARD COUNTY APPROVED MATERIALS LIST SECTION 961.08.11.

2 5. EXTENSION RINGS FOR ADAPTING THE 12" METER FRAME TO THE VAULT SHALL BE USED.

2 6. SINGLE 2" DIAMETER HOLE FOR RADIO READ METERS WITH PLUG.

* PRIOR REVISION LABELS REMOVED FOR PRESENTATION CLARITY.

2 5/1/2014 * Revised 1 6/30/2011 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	WATER METER Frame and Cover	Detail W-3.12



15" METER FRAME AND COVER
CAST IRON

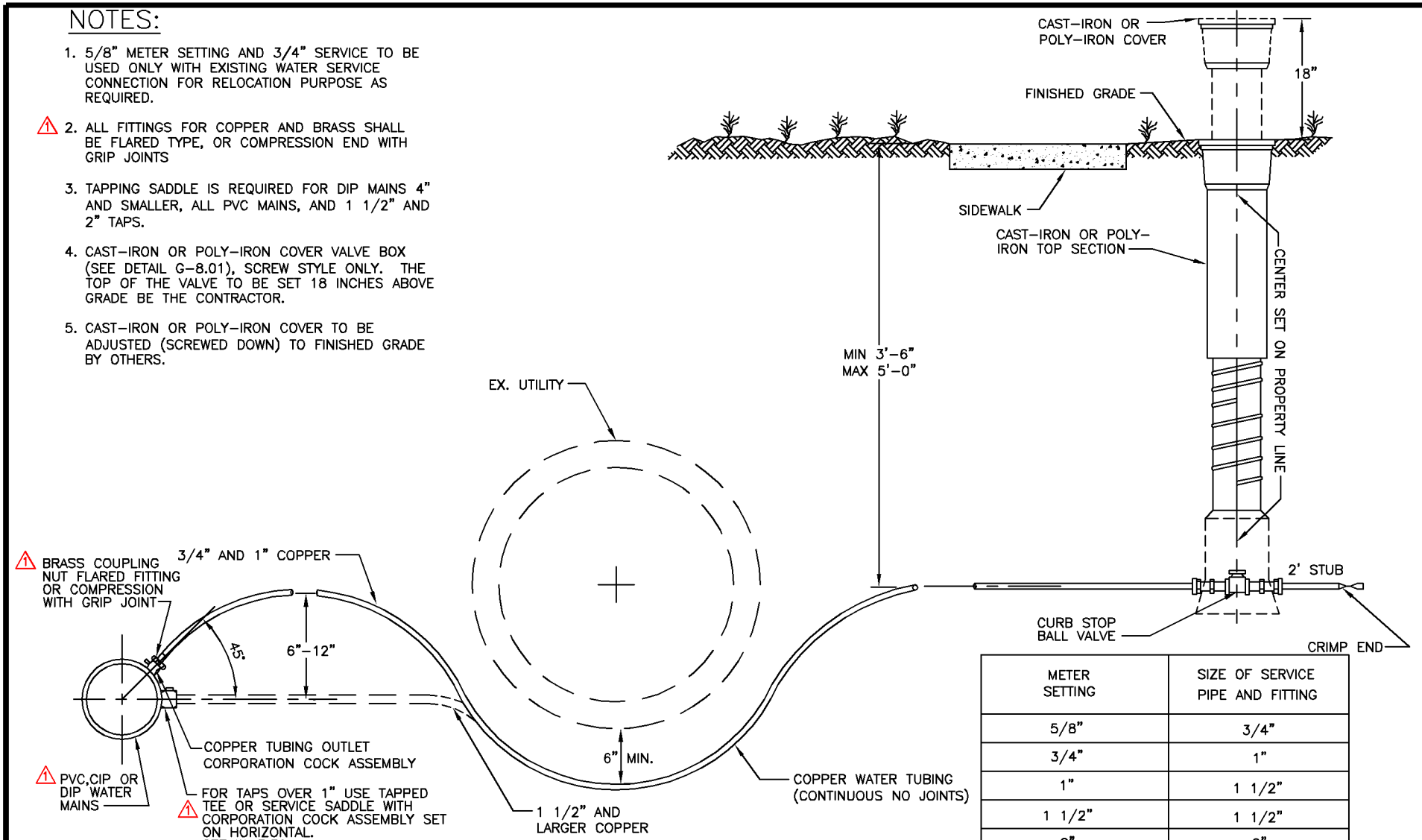
NOTES:

1. 15" METER FRAME AND COVER FOR USE WITH 24 AND 30–INCH DIAMETER METER BOX, TYPE "A" (RECESSED).
2. ALL STANDARD FRAME & COVER MATERIAL SHALL BE CAST IRON AND SHALL CONFORM TO ASTM A48, CLASS 30.
3. THE USE OF ADJUSTABLE FRAME AND COVER IS ALSO ACCEPTABLE. SEE THE HOWARD COUNTY APPROVED MATERIALS LIST SECTION 961.08.11.
4. EXTENSION RINGS FOR ADAPTING THE 15" METER FRAMES TO THE VAULT SHALL BE USED.
5. DUAL 2" DIAMETER HOLES FOR RADIO READ METERS WITH PLUGS.

Revised Revised 5/1/2014 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	WATER METER 15" Frame and Cover	Detail W-3.13

NOTES:

1. 5/8" METER SETTING AND 3/4" SERVICE TO BE USED ONLY WITH EXISTING WATER SERVICE CONNECTION FOR RELOCATION PURPOSE AS REQUIRED.
2. ALL FITTINGS FOR COPPER AND BRASS SHALL BE FLARED TYPE, OR COMPRESSION END WITH GRIP JOINTS
3. TAPPING SADDLE IS REQUIRED FOR DIP MAINS 4" AND SMALLER, ALL PVC MAINS, AND 1 1/2" AND 2" TAPS.
4. CAST–IRON OR POLY–IRON COVER VALVE BOX (SEE DETAIL G–8.01), SCREW STYLE ONLY. THE TOP OF THE VALVE TO BE SET 18 INCHES ABOVE GRADE BE THE CONTRACTOR.
5. CAST–IRON OR POLY–IRON COVER TO BE ADJUSTED (SCREWED DOWN) TO FINISHED GRADE BY OTHERS.



ELEVATION

METER SETTING	SIZE OF SERVICE PIPE AND FITTING
5/8"	3/4"
3/4"	1"
1"	1 1/2"
1 1/2"	1 1/2"
2"	2"

Revised
1 5/1/2014
Revised
5/7/2007
Approved

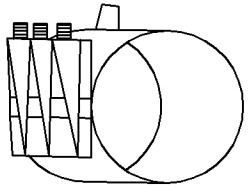
Howard County, Maryland
Department of Public Works
Approved: Thomas E. Butler
Chief, Bureau of Engineering

WATER SERVICE CONNECTION
5/8", 3/4", 1", 1 1/2", & 2"
Inside Meter Settings

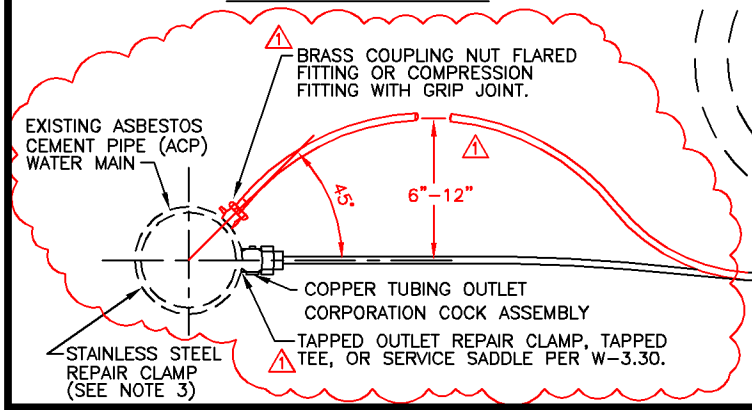
Detail
W–3.21

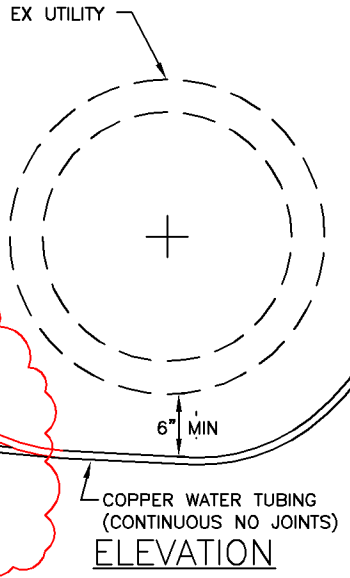
NOTES:

1. 5/8" METER SETTING AND 3/4" SERVICE TO BE USED ONLY WITH EXISTING WATER SERVICE CONNECTION FOR RELOCATION PURPOSE AS REQUIRED.
2. ALL FITTINGS FOR COPPER AND BRASS SHALL BE FLARED TYPE, OR COMPRESSION END WITH GRIP JOINTS.
3. REPAIR CLAMP LENGTH TO BE NO LESS THAN 12". PIPE OD WILL DETERMINE THE SIZE OF THE CLAMP. PVC SERVICE SADDLES PER W-3.30 ARE ALSO ACCEPTABLE.
4. CAST-IRON OR POLY-IRON COVER VALVE BOX (SEE DETAIL G-8.01), SCREW STYLE ONLY. THE TOP OF THE VALVE TO BE SET 18 INCHES ABOVE GRADE BE THE CONTRACTOR.
5. CAST-IRON OR POLY-IRON COVER TO BE ADJUSTED (SCREWED DOWN) TO FINISHED GRADE BY OTHERS.

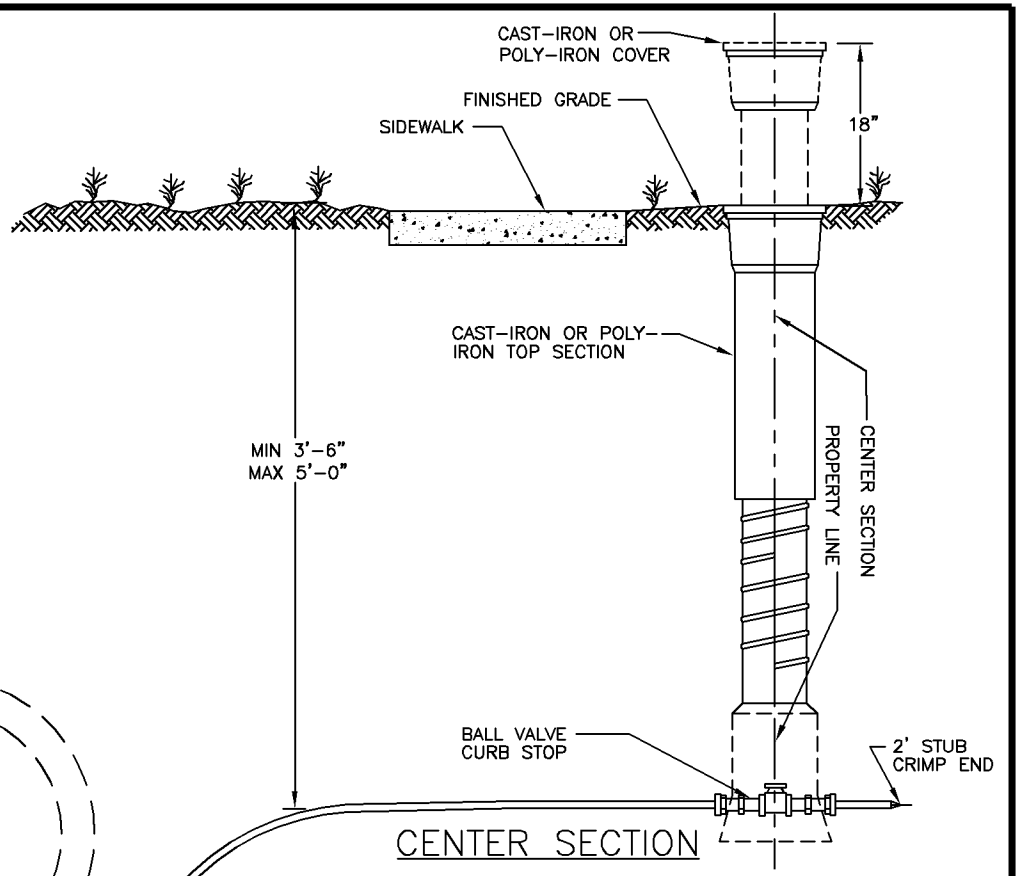


REPAIR CLAMP





ELEVATION



CENTER SECTION

METER SETTING	SIZE OF SERVICE PIPE AND FITTING
5/8"	3/4"
3/4"	1"
1"	1 1/2"
1 1/2"	1 1/2"
2"	2"

Revised
1 5/1/2014
Revised
5/7/2007
Approved

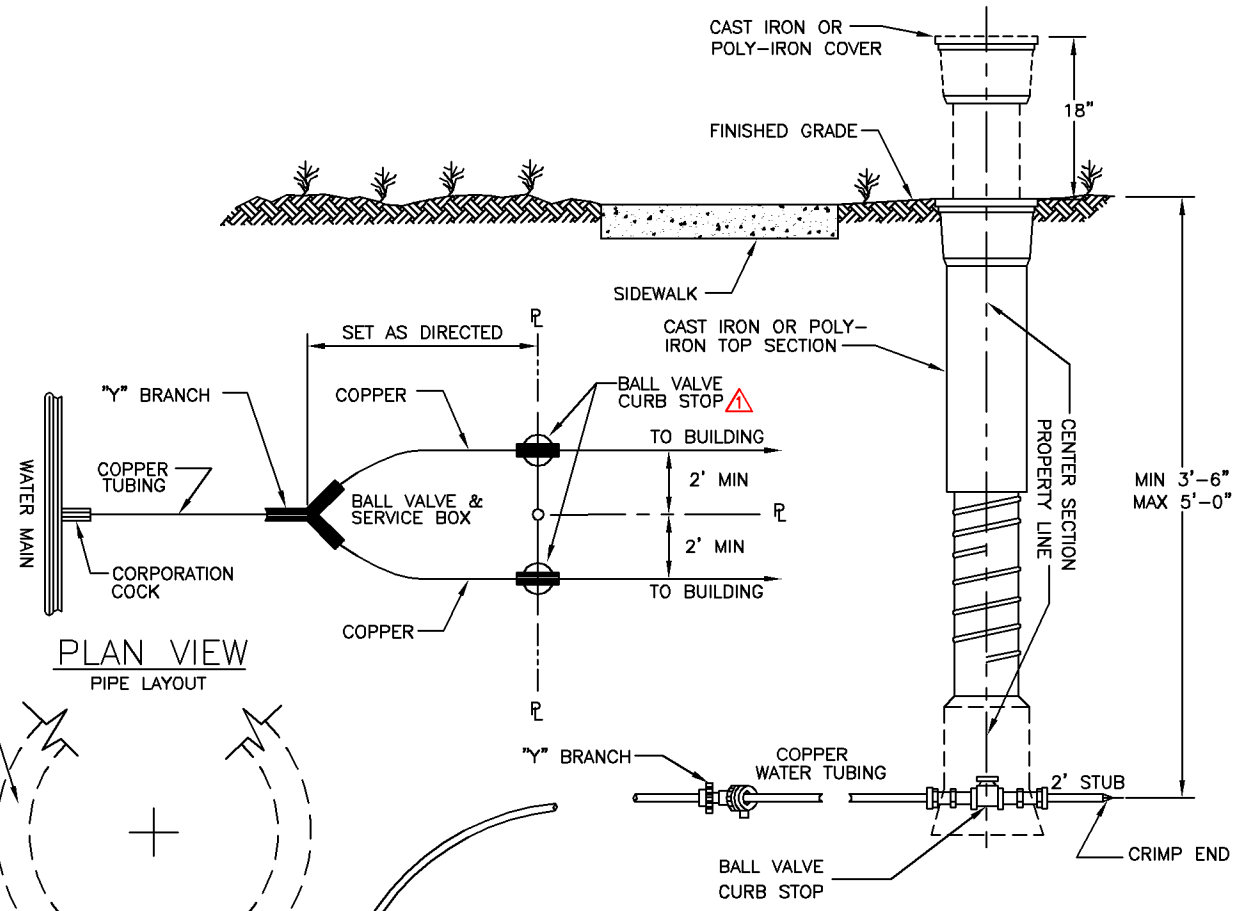
Howard County, Maryland
Department of Public Works
Approved: Thomas E. Butler
Chief, Bureau of Engineering

WATER SERVICE CONNECTION
5/8", 3/4", 1", 11/2", & 2"
Existing A.C.P. Main

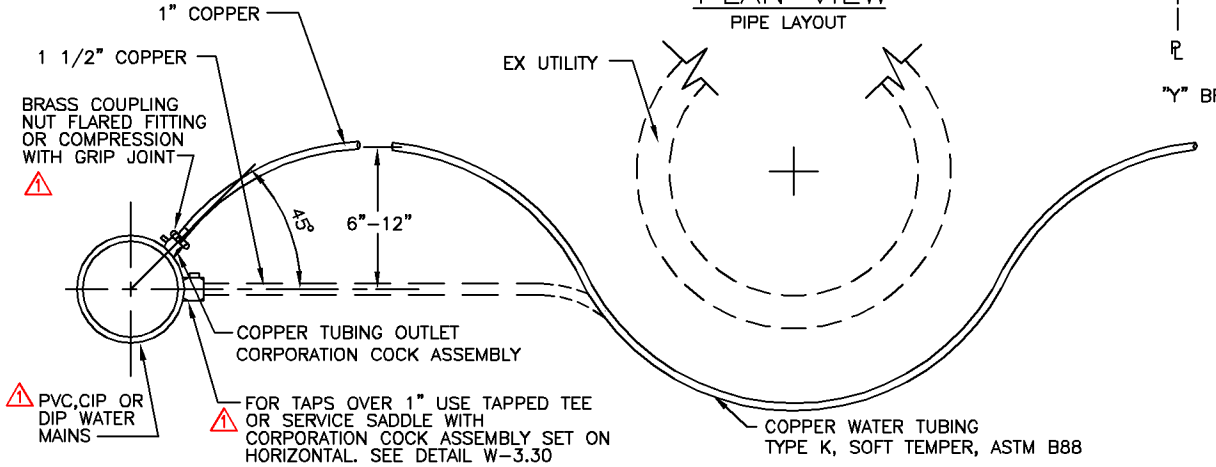
Detail
W-3.22

NOTES:

1. 5/8" METER SETTINGS MAY ONLY BE USED FOR RELOCATION PURPOSES.
2. ⚠1 ALL FITTINGS FOR COPPER AND BRASS SHALL BE FLARED TYPE, OR COMPRESSION END WITH GRIP JOINTS.
3. TAPPING SADDLE IS REQUIRED FOR 4" DIAMETER AND SMALLER DIP MAINS, ALL PVC MAINS, AND ALL 1 1/2" AND 2" TAPS.
4. CAST-IRON OR POLY-IRON COVER VALVE BOX (SEE DETAIL G-8.01), SCREW STYLE ONLY. THE TOP OF THE VALVE TO BE SET 18 INCHES ABOVE GRADE BE THE CONTRACTOR.
5. CAST-IRON OR POLY-IRON COVER TO BE ADJUSTED (SCREWED DOWN) TO FINISHED GRADE BY OTHERS.



PLAN VIEW
PIPE LAYOUT



ELEVATION

METER SETTING	SIZE OF SERVICE PIPE & FITTING	
	INLET	OUTLET
5/8"	1"	3/4"
3/4"	1 1/2"	1"
1"	1 1/2"	1 1/2"

Revised
⚠1 5/1/2014
Revised
5/7/2007
Approved

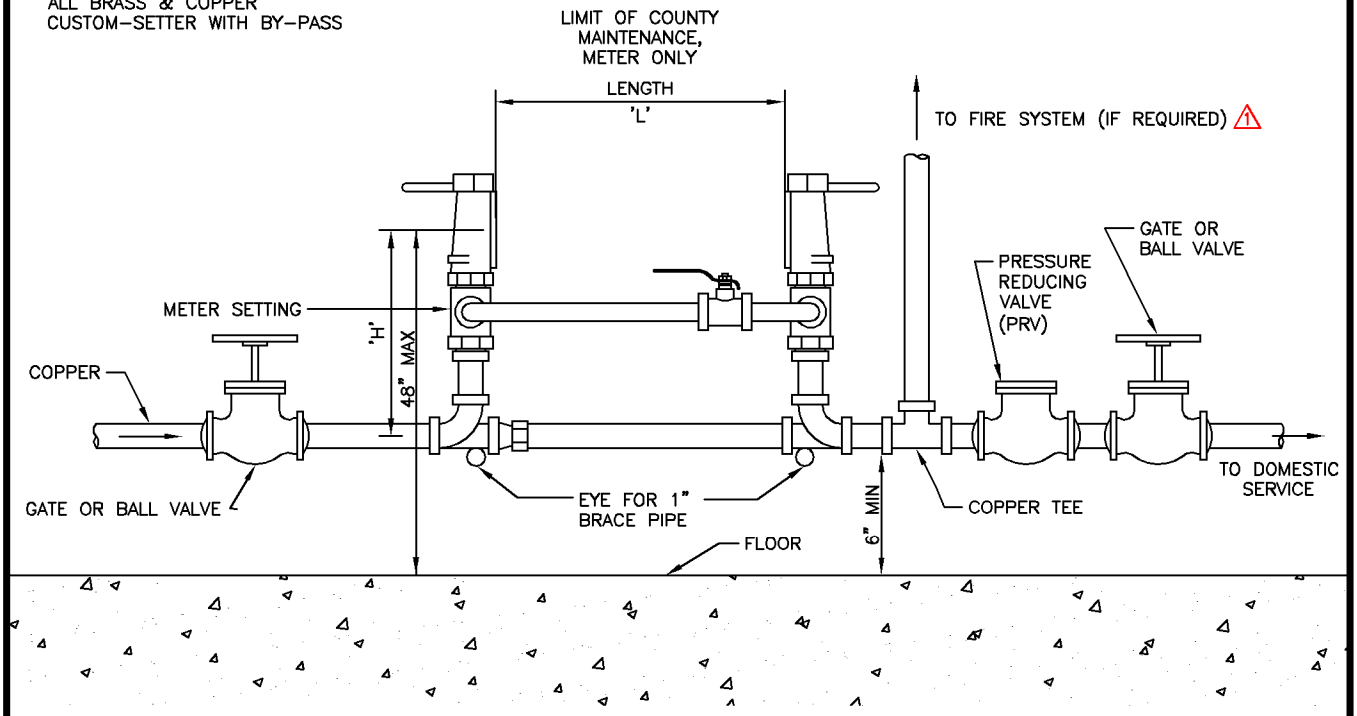
Howard County, Maryland
Department of Public Works
Approved: Thomas E. Butler
Chief, Bureau of Engineering

WATER SERVICE CONNECTION
5/8", 3/4", & 1" Dual Building Inside Meter Settings

Detail
W-3.23

METER SIZE	LENGTH 'L'	HEIGHT 'H'
1 1/2"	13 1/4"	15"
2"	17 1/4"	15"

ALL BRASS & COPPER
CUSTOM-SETTER WITH BY-PASS

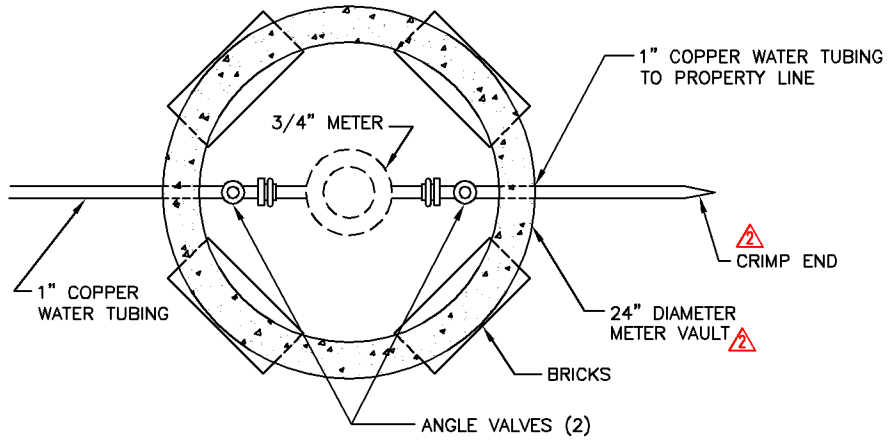


ELEVATION

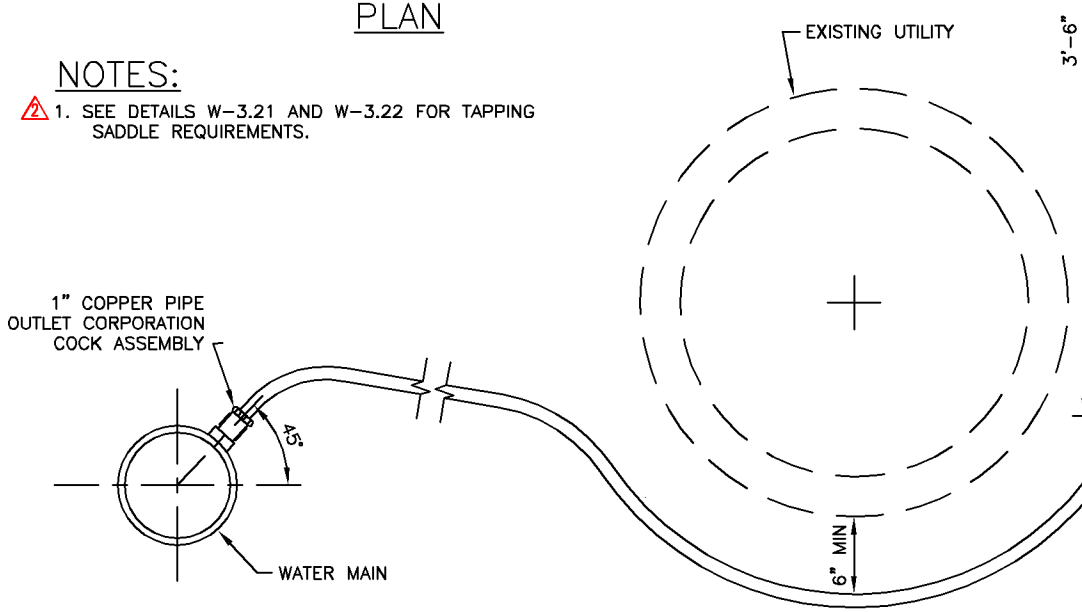
NOTES:

1. 1. MINIMUM OF 6" CLEAR BETWEEN METER AND WALL.
2. WATER METER SUPPLIED BY HOWARD COUNTY BUREAU OF UTILITIES AND INSTALLED BY CONTRACTOR.
3. PROVIDE RIGID WALL AND/OR FLOOR BRACING TO ACCOMMODATE WEIGHT OF METER, UTILIZING EYES FOR BRACE PIPE.
4. 1. FOR PARTIAL FIRE SPRINKLER SYSTEM PROVIDE DRAIN, GAUGE, AND BACKFLOW PREVENTER AS REQUIRED.

Revised	Howard County, Maryland	WATER METER	Detail
1 5/1/2014 Revised	Department of Public Works	1 1/2" & 2"	W-3.26
5/7/2007 Approved	Approved: Thomas E. Butler	1 Inside Meter Settings	
	Chief, Bureau of Engineering		



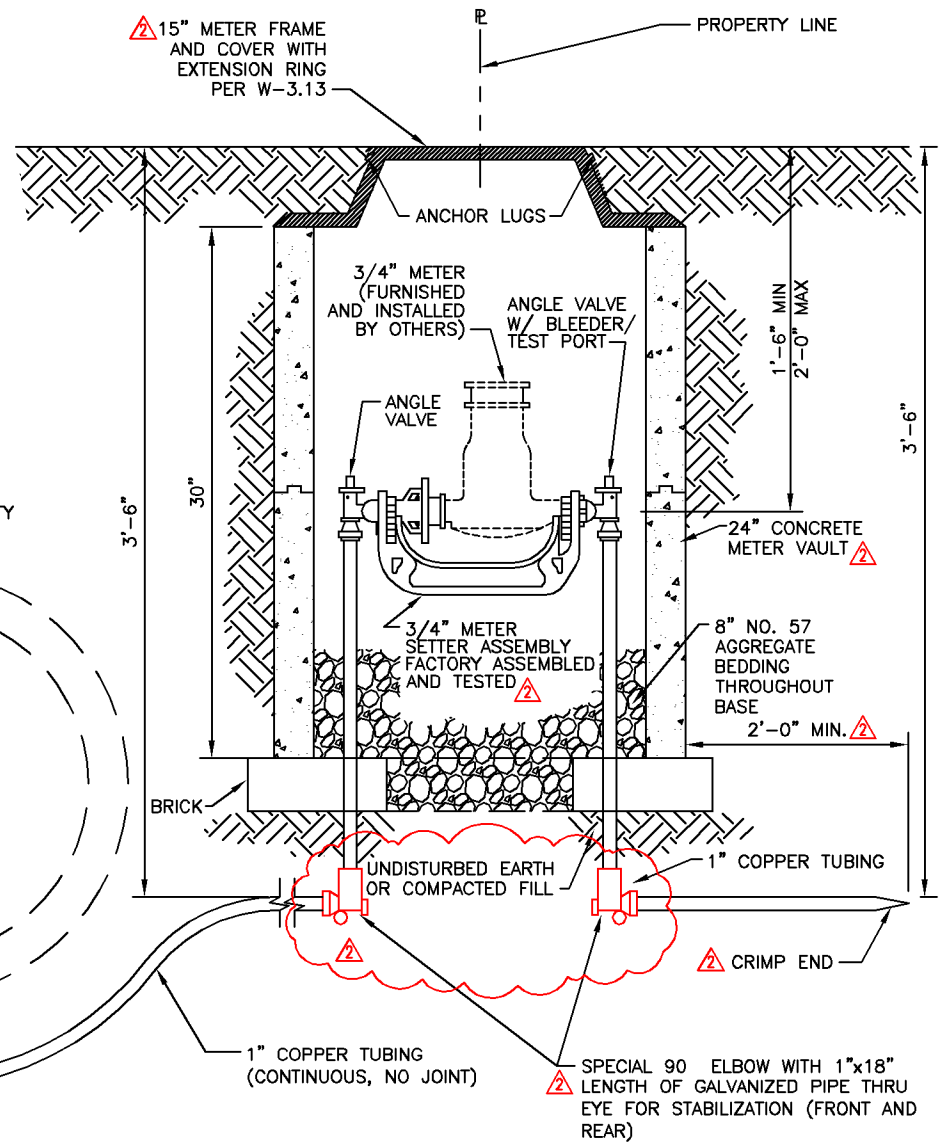
PLAN



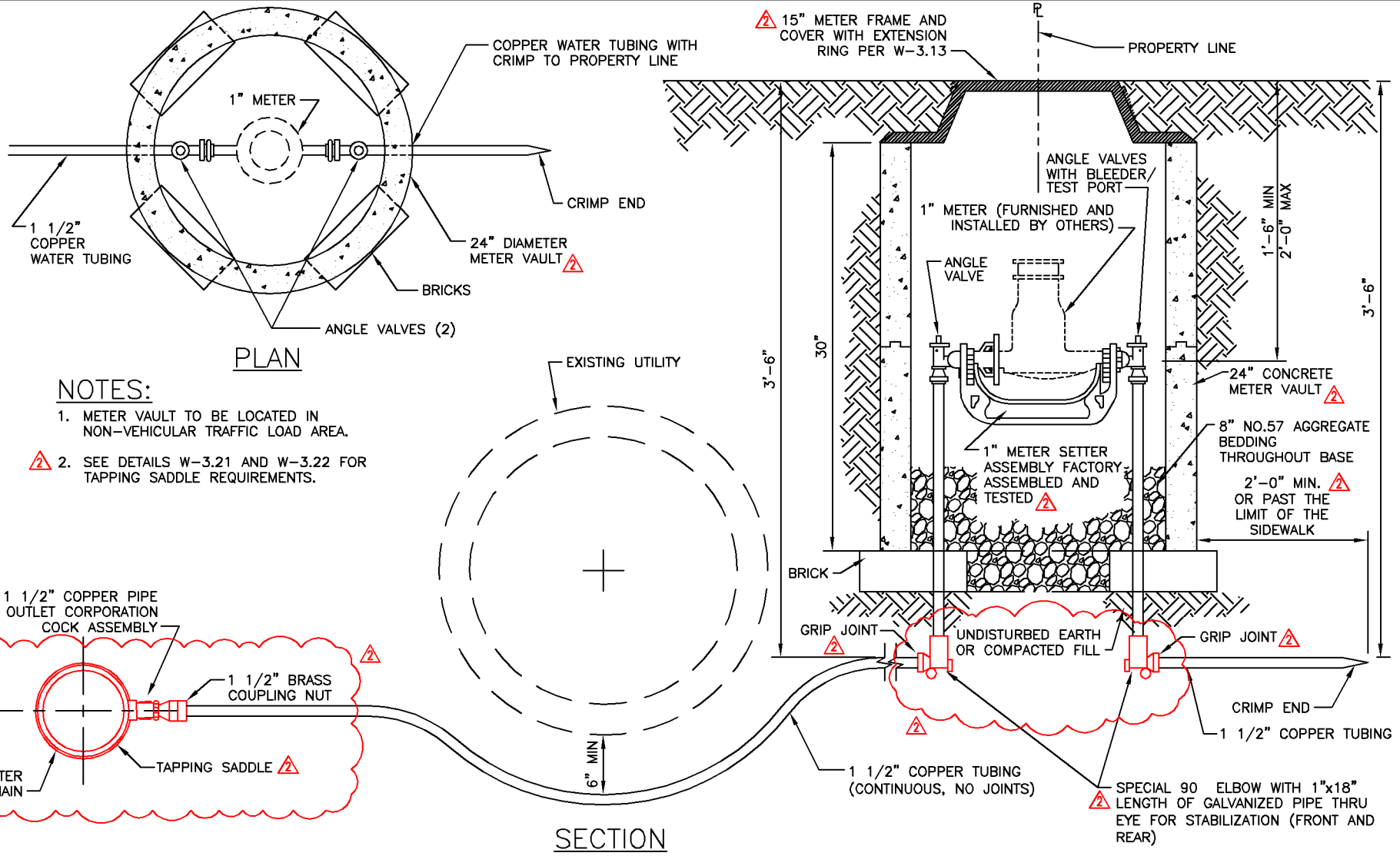
SECTION

NOTES:

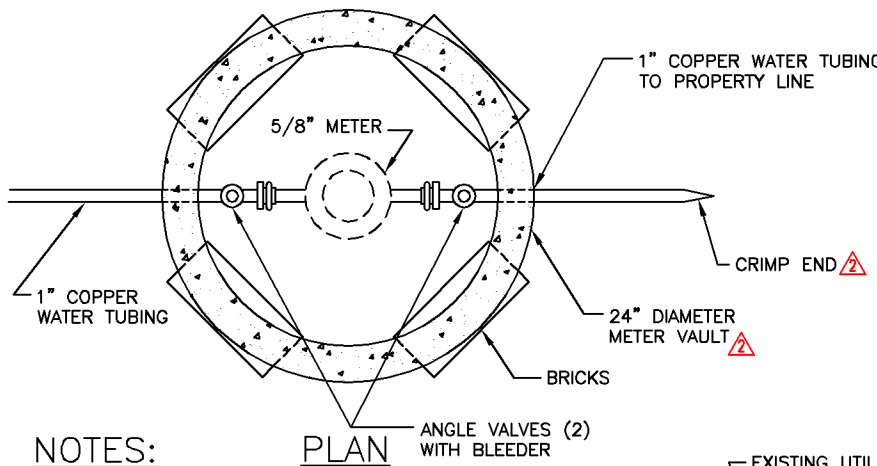
2 1. SEE DETAILS W-3.21 AND W-3.22 FOR TAPPING SADDLE REQUIREMENTS.



2 5/1/2014 Revised 1 6/30/2011 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	WATER METER 3/4" Outside Meter Setting	Detail W-3.27



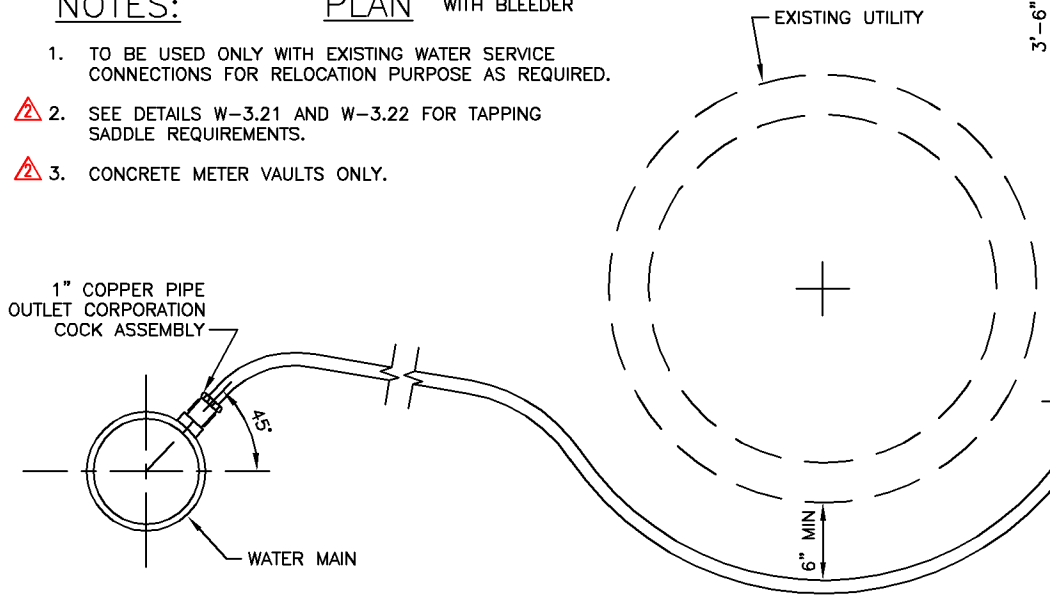
2 5/1/2014 Revised 1 6/30/2011 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	WATER METER 1" Outside Meter Setting	Detail W-3.28



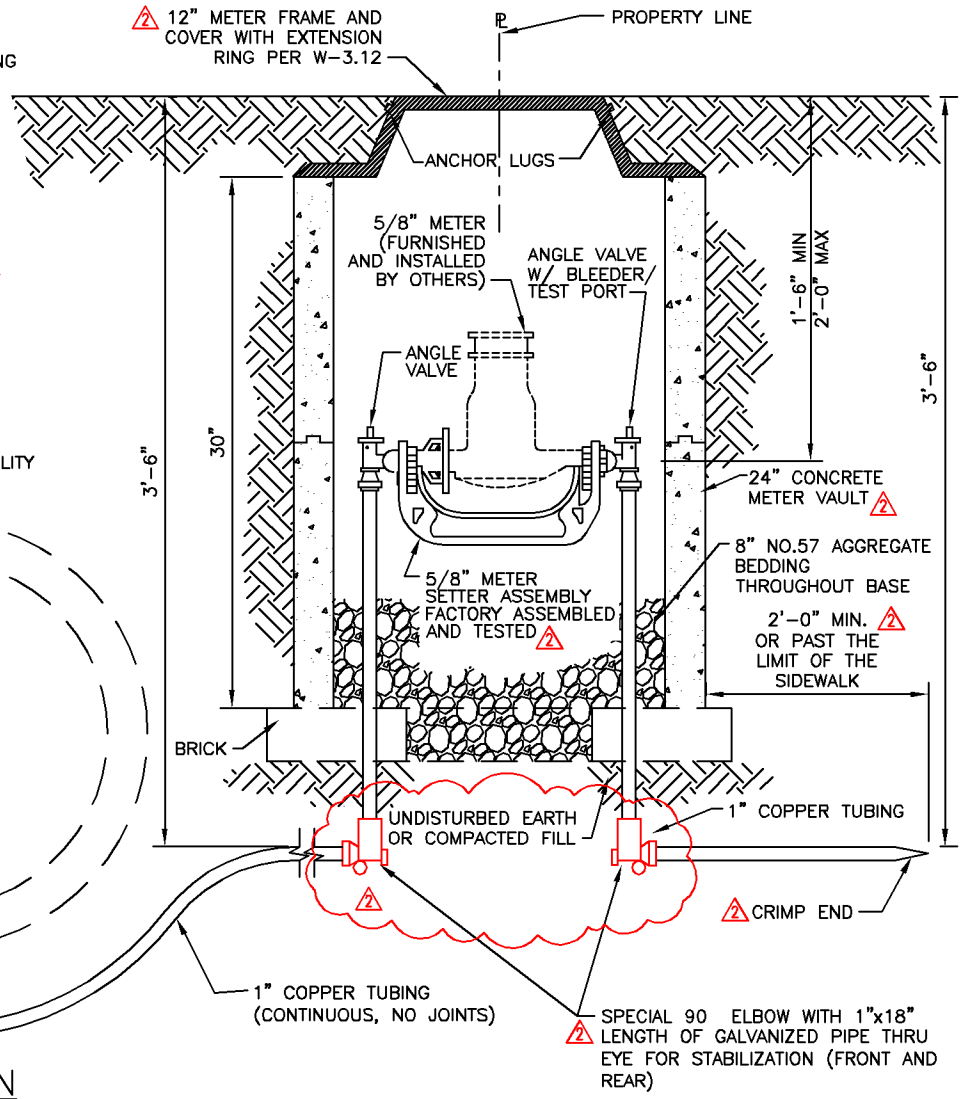
PLAN

NOTES:

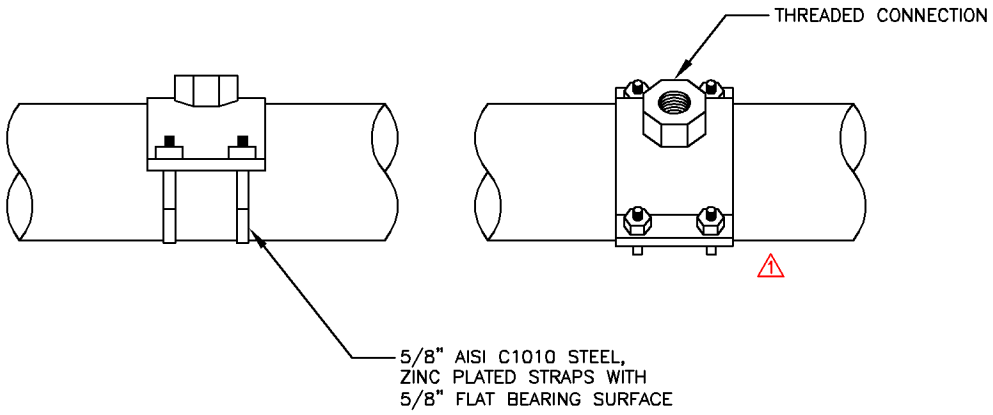
1. TO BE USED ONLY WITH EXISTING WATER SERVICE CONNECTIONS FOR RELOCATION PURPOSE AS REQUIRED.
2. 2. SEE DETAILS W-3.21 AND W-3.22 FOR TAPPING SADDLE REQUIREMENTS.
3. 2. CONCRETE METER VAULTS ONLY.



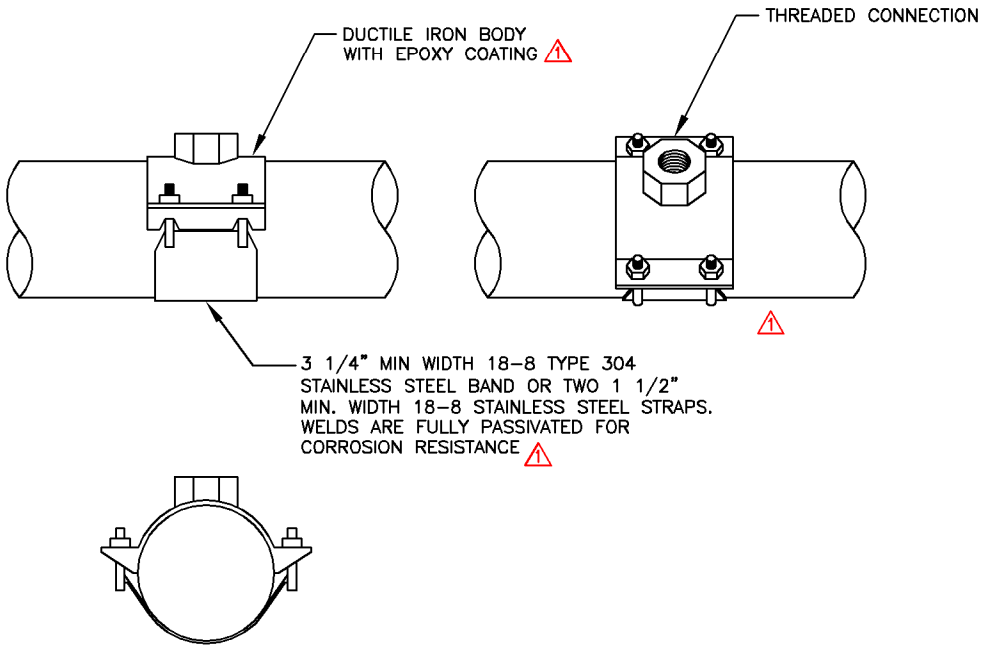
SECTION



2 5/1/2014 Revised 1 6/30/2011 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	WATER METER 5/8" Outside Meter Setting	Detail W-3.29



METAL PIPE



PLASTIC PIPE

NOTES:

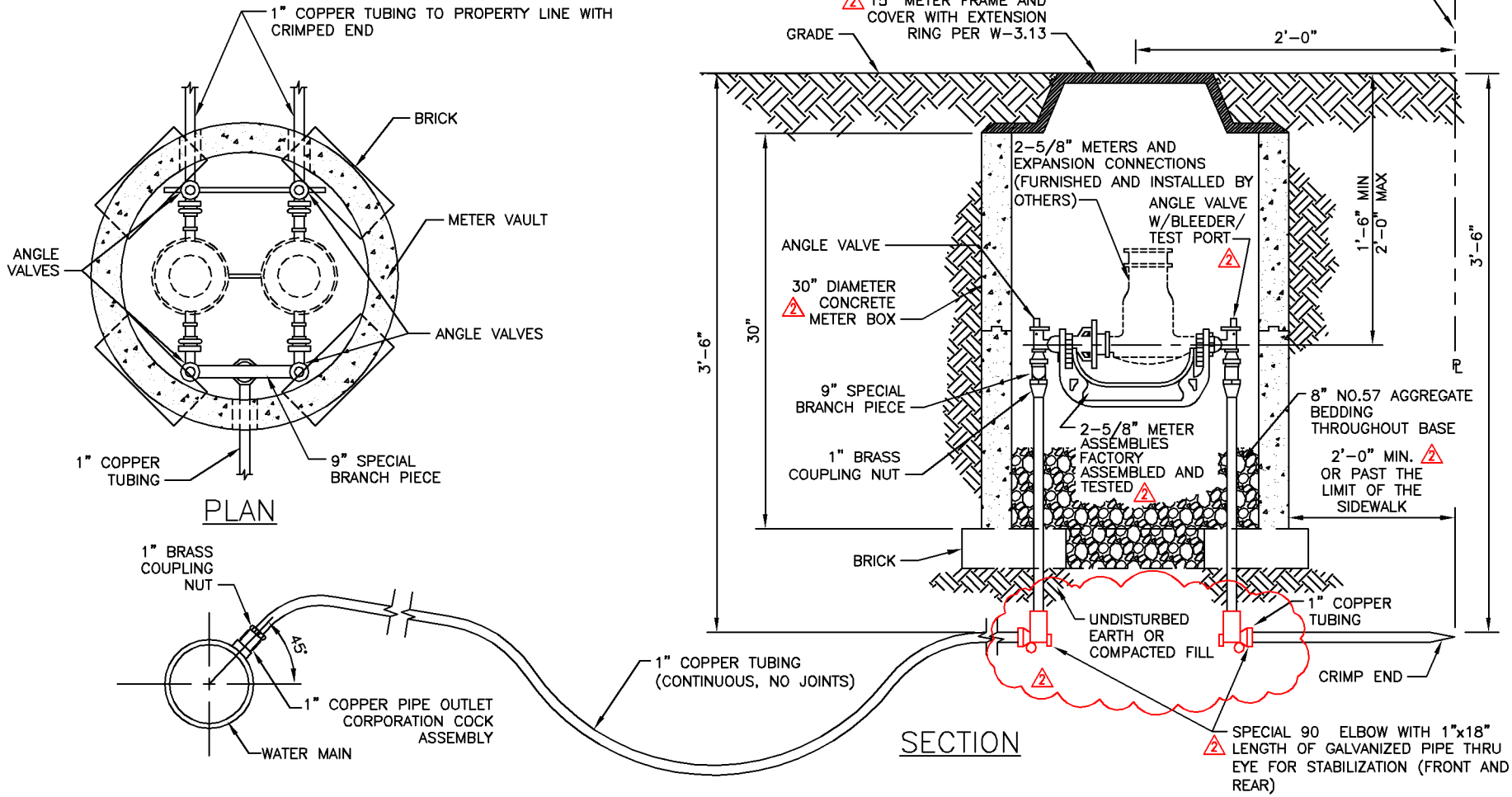
1. SADDLE SHALL CONFORM TO ANSI/NSF STANDARD 61.
1. 2. PLASTIC PIPE SADDLE SHALL CONFORM TO THE RECOMMENDATION OF UNI-BELL HANDBOOK OF PVC PIPE AND AWWA MANUAL M23.
3. TIGHTEN SADDLE PER MANUFACTURER'S REQUIREMENTS.
1. 4. NUTS SHALL BE 1/2" TO 5/8" HEAVY HEX NUTS AND WASHERS AND SHALL BE COATED TO PREVENT GALLING.
1. 5. GASKETS SHALL BE RUBBER PER ASTM D2000.

Revised 1 5/1/2014 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	WATER METER Water Service Saddle 3/4" Thru 2"	Detail W-3.30

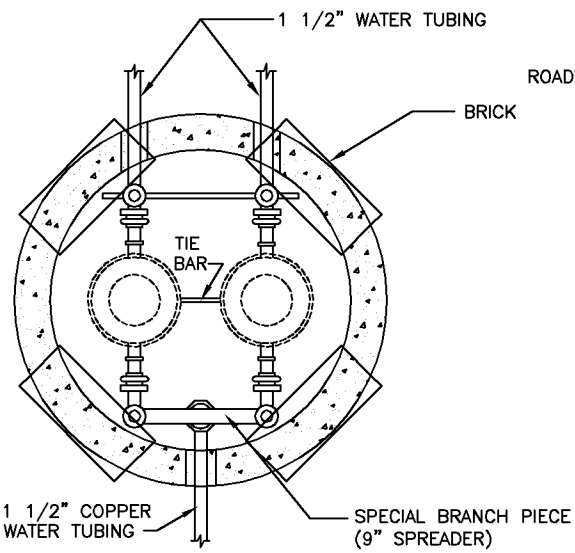
NOTES:

1. TO BE USED ONLY WITH EXISTING WATER SERVICE CONNECTIONS FOR RELOCATION PURPOSE AS REQUIRED.

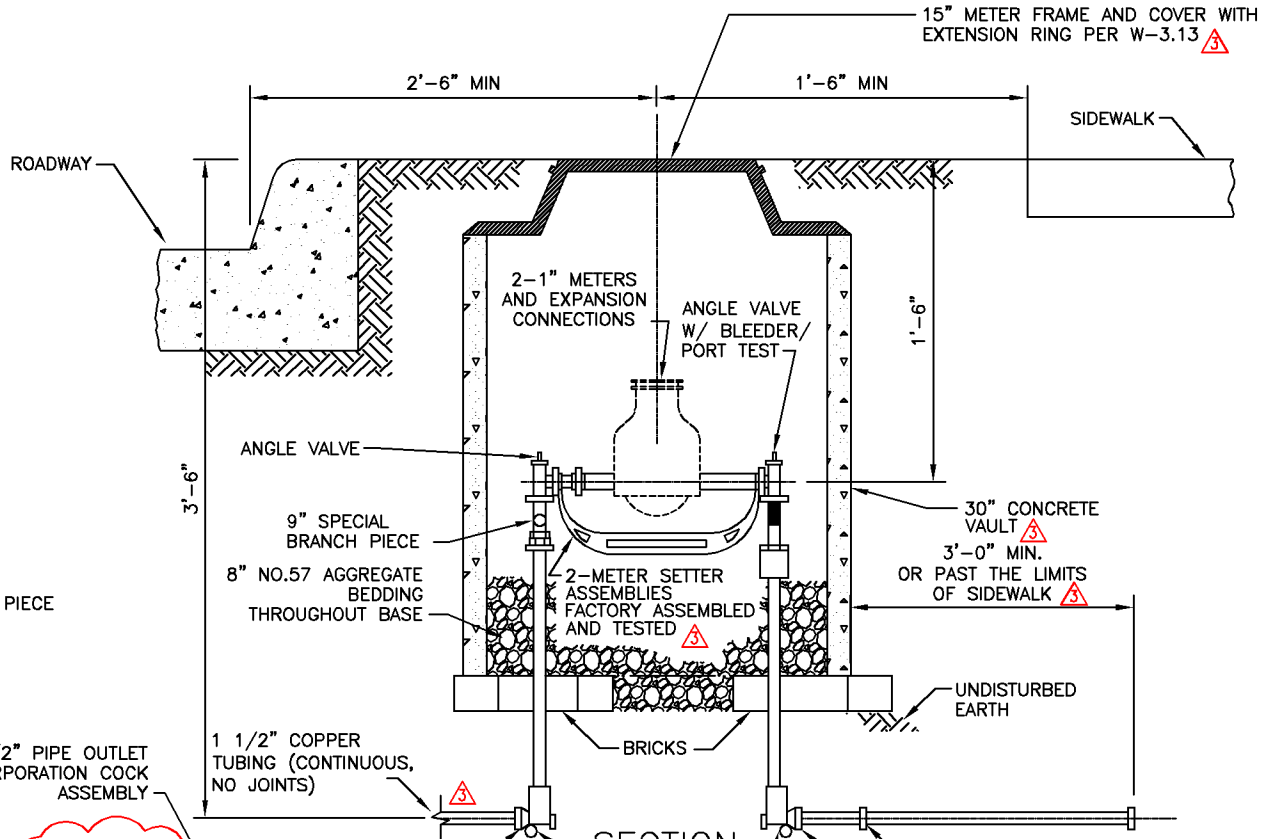
2. SEE DETAILS W-3.21 AND W-3.22 FOR TAPPING SADDLE REQUIREMENTS.



2 5/1/2014 Revised 1 6/30/2011 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	WATER METER Twin 5/8" Outside Meter Settings	Detail W-3.31



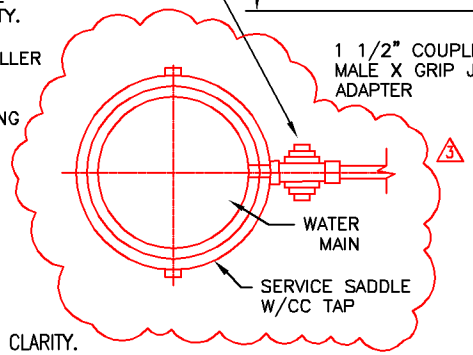
PLAN



SECTION

NOTES:

1. METER AND EXPANSION CONNECTION SHALL BE FURNISHED AND INSTALLED BY HOWARD COUNTY.
2. PLACE 1/2" PREMOLDED BITUMINOUS JOINT FILLER BETWEEN CONCRETE AND METER FRAME.
3. 3. SEE DETAILS W-3.21 AND W-3.22 FOR TAPPING SADDLE REQUIREMENTS.



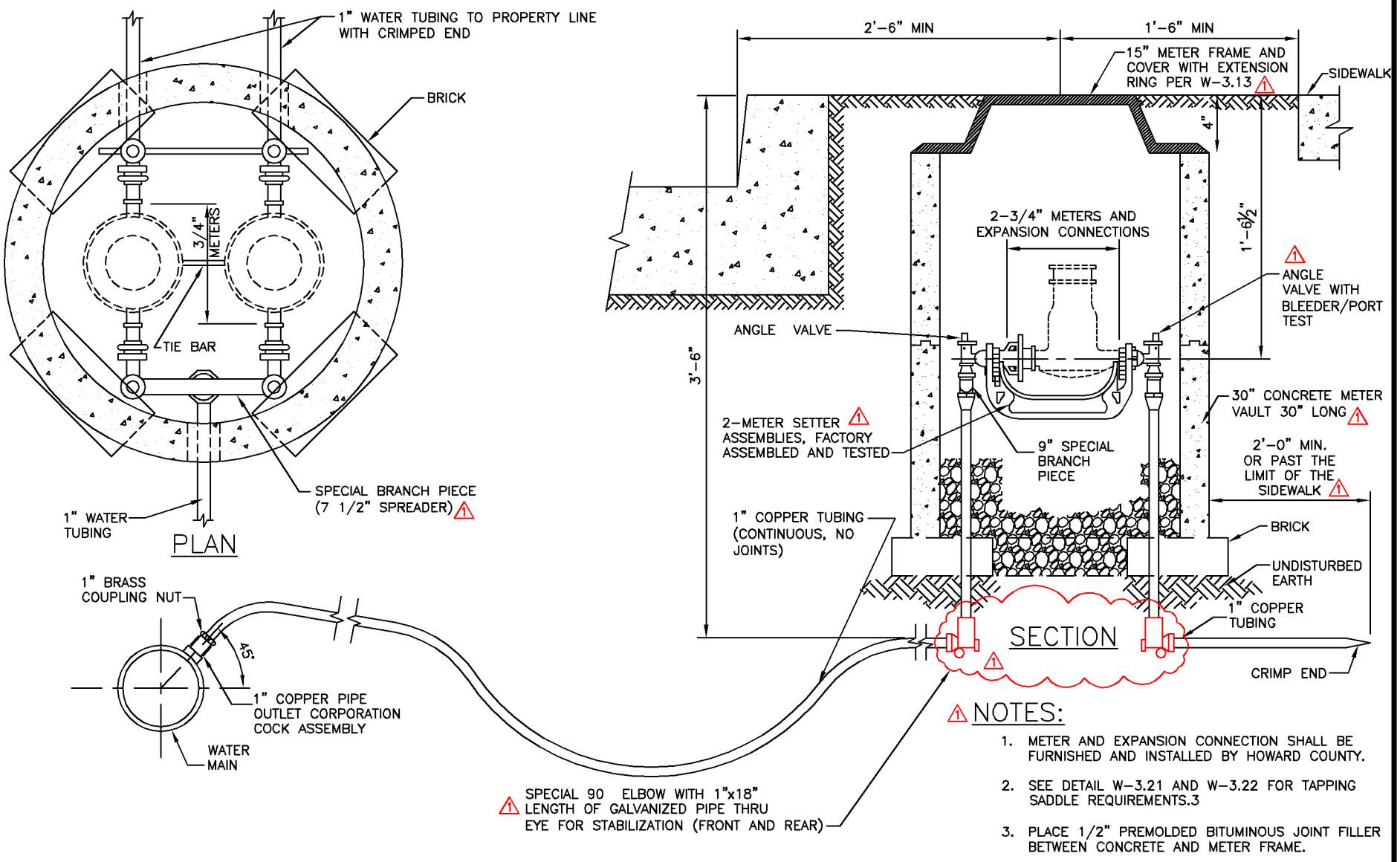
3 5/1/2014 *

* PRIOR REVISION LABELS REMOVED FOR PRESENTATION CLARITY.

2 7/29/2011 Revised 1 6/30/2011 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	WATER METER Twin 1" Outside Meter Settings

Detail

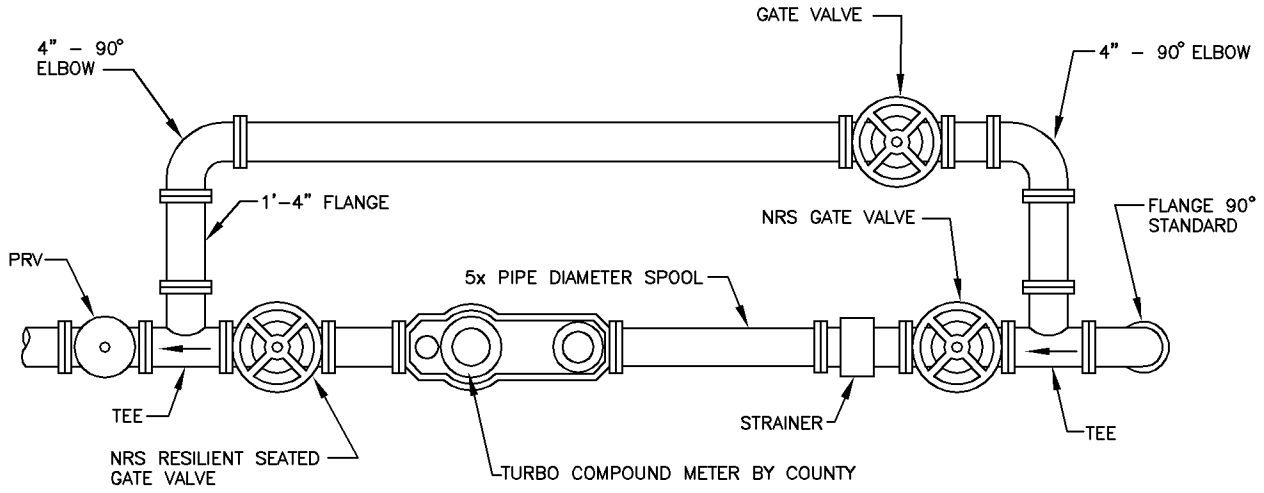
W-3.32



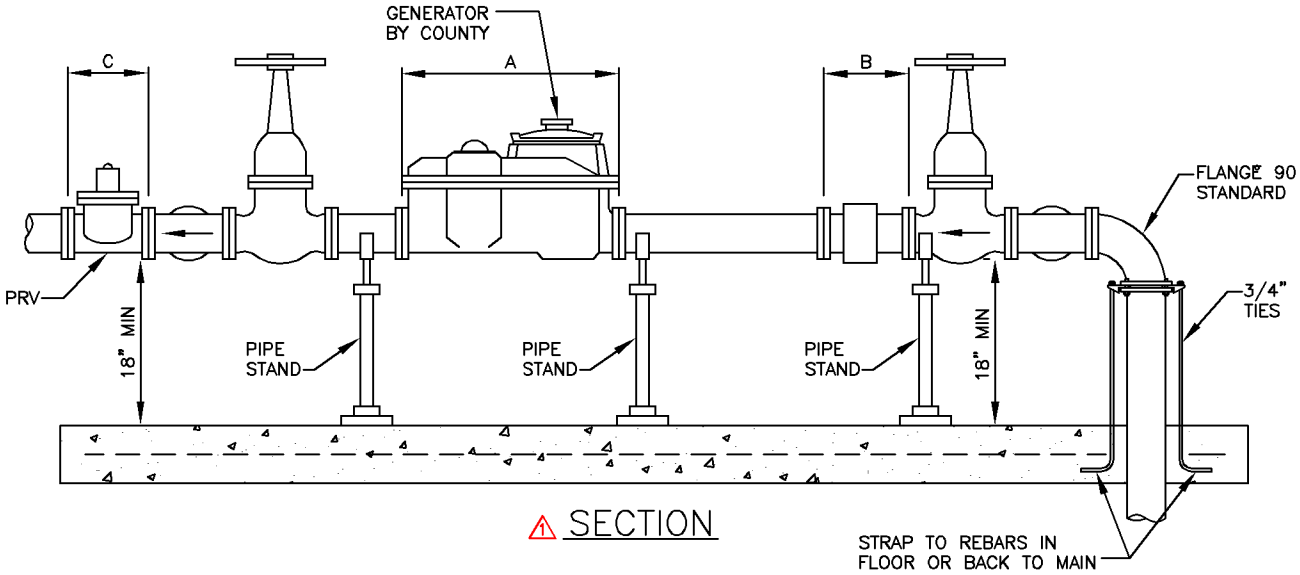
1 NOTES:

1. METER AND EXPANSION CONNECTION SHALL BE FURNISHED AND INSTALLED BY HOWARD COUNTY.
2. SEE DETAIL W-3.21 AND W-3.22 FOR TAPPING SADDLE REQUIREMENTS.3
3. PLACE 1/2" PREMOLDED BITUMINOUS JOINT FILLER BETWEEN CONCRETE AND METER FRAME.

Revised	Howard County, Maryland	WATER METER	Detail
1 5/1/2014 Revised	Department of Public Works	Twin 3/4"	W-3.33
5/7/2007 Approved	Approved: Thomas E. Butler	Outside Meter Settings	
	Chief, Bureau of Engineering		



⚠1 PLAN



⚠1 SECTION

⚠1 NOTES:

1. OUTSIDE THE WATER SERVICE CONNECTION IS CONTROLLED AS PER W-3.24.
2. STRAINER SIZED ACCORDING TO METER AND SUPPLIED BY HOWARD COUNTY WITH METER.
3. PRV (PRESSURE REDUCING VALVE) SIZED ACCORDING TO METER.
4. A MINIMUM OF 6" REQUIRED BETWEEN METER, PIPING AND APPURTENANCE AND WALL OF BUILDING.
5. EXCEPTIONS TO STANDARD LAYOUT DUE TO MATERIAL AVAILABILITY OR ARCHITECTURAL RESTRICTIONS ARE TO BE APPROVED BY DEPARTMENT OF INSPECTIONS, LICENSES AND PERMITS AND DPW, BUREAU OF UTILITIES 410-313-1980.
6. ALL PIPING, TEES, VALVES, PRV, STRAINER AND METER SHALL BE FLANGE TO FLANGE CONNECTIONS.

DIMENSIONS OF COMPOUND WATER METER, STAINER AND PRV

METER SIZE	A	B ⚠1 STRAINER	C ⚠1 PRV	TEE
3"	24"	8 1/2"	12 1/2"	3" x 3"
4"	29"	9"	27 1/2"	4" x 3"
6"	36"	9"	33 7/16"	6" x 3"

Revised
⚠1 5/1/2014
Revised
5/7/2007
Approved

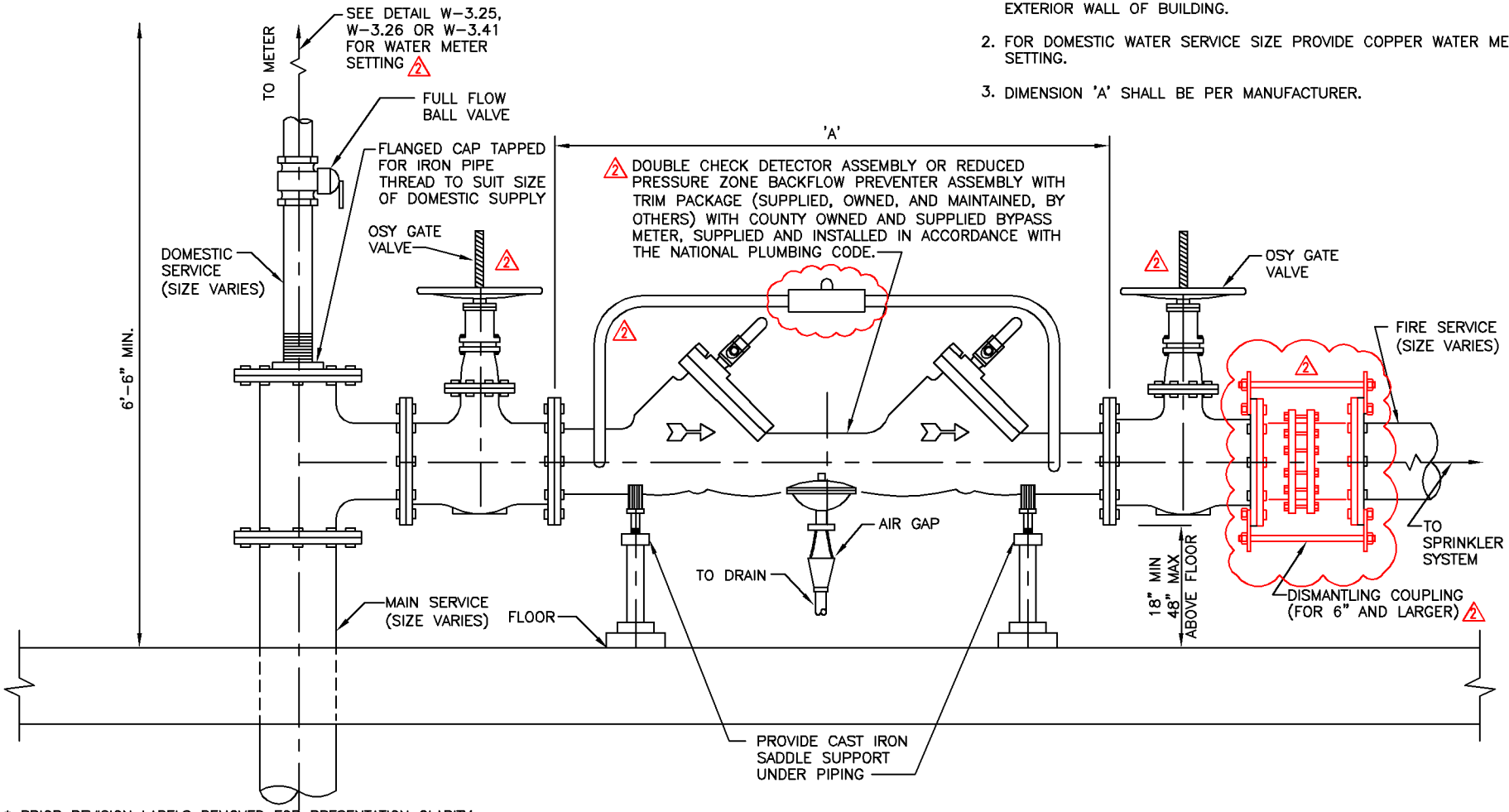
Howard County, Maryland
Department of Public Works
Approved: Thomas E. Butler
Chief, Bureau of Engineering

WATER METER
3",4"& 6" Connection
Commercial Inside Meter Settings

Detail
W-3.41

NOTES:

1. MAINTAIN 6" MINIMUM CLEARANCE BETWEEN BACKFLOW DEVICE AND EXTERIOR WALL OF BUILDING.
2. FOR DOMESTIC WATER SERVICE SIZE PROVIDE COPPER WATER METER SETTING.
3. DIMENSION 'A' SHALL BE PER MANUFACTURER.



* PRIOR REVISION LABELS REMOVED FOR PRESENTATION CLARITY.

2 5/1/2014 * Revised 1 6/30/2011 Revised 5/7/2007 Approved	Howard County, Maryland Department of Public Works Approved: Thomas E. Butler Chief, Bureau of Engineering	WATER METER 3",4",6",8" & 10" Inside Combined Fire/Domestic	Detail W-3.44