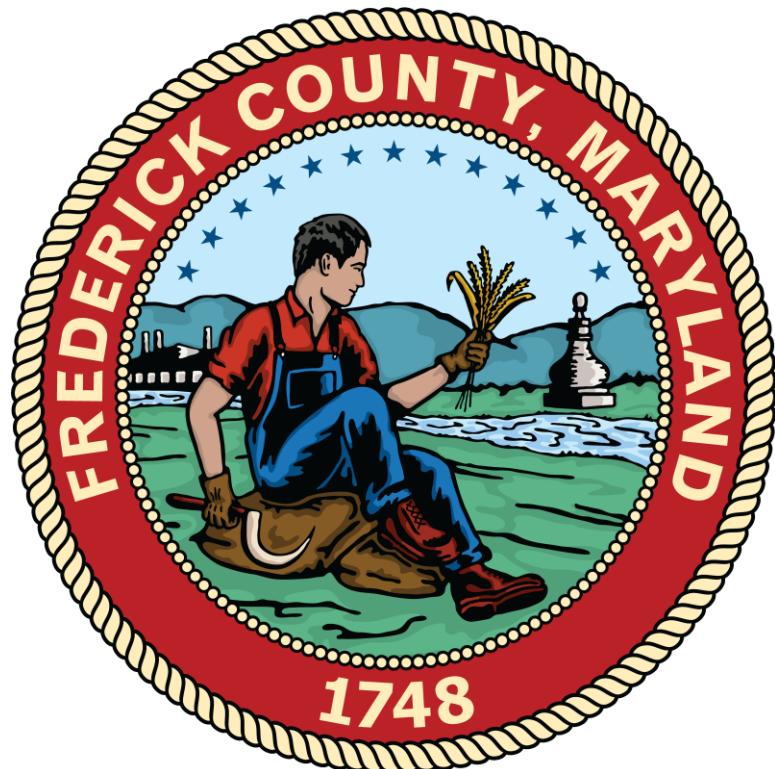


Frederick County, Maryland  
Division of Utilities and Solid Waste Management [DUSWM]  
Department of Engineering and Planning

## **Standard Details**

for Water Mains, Sanitary Sewers and Related Structures



4520 Metropolitan Court  
Frederick, Maryland 21704

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THE EFFECTIVE DATE OF THIS RESOLUTION IS JANUARY 24, 2013

RESOLUTION NO. 13-01

RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS  
OF FREDERICK COUNTY, MARYLAND

Re: Amendments to Standard Details (including Special Provisions)  
for Water Mains, Sanitary Sewers and Related Structures

RECITALS

Pursuant to the authority contained in Chapter 2-13 of the Code of Public Local Laws of Frederick County, Maryland, the Board of County Commissioners is seeking to amend the *Standard Details for Water Mains, Sanitary Sewers and Related Structures* (originally adopted via Resolution 83-34 on December 13, 1983 with most recent changes, including the formal adoption of the "Special Provisions", adopted via Resolution 06-30 on July 20, 2006). These amendments to the *Standard Details for Water Mains, Sanitary Sewers and Related Structures* are necessary due to equipment changes, installation and maintenance issues.

A public hearing was held on these proposed changes on January 17, 2013, at which time the public had the opportunity to comment.

NOW THEREFORE BE IT RESOLVED by the Board of County Commissioners of Frederick County that the current *Standard Details for Water Mains, Sanitary Sewers and Related Structures* are hereby repealed and replaced with the revised *Standard Details for Water Mains, Sanitary Sewers and Related Structures* attached hereto as Exhibit A;

AND BE IT FURTHER RESOLVED that this Resolution shall take effect on January 24, 2013.

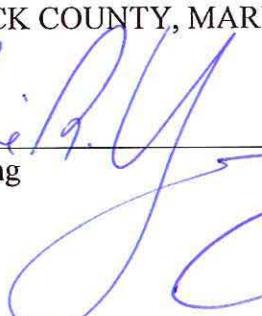
The undersigned hereby certifies that this Resolution was approved and adopted on the 24<sup>th</sup> day of January, 2013.

ATTEST:

  
\_\_\_\_\_  
Lori L. Depies, CPA  
County Manager

BOARD OF COUNTY COMMISSIONERS  
OF FREDERICK COUNTY, MARYLAND

By:   
\_\_\_\_\_  
Blaine R. Young  
President

  
\_\_\_\_\_  
1/24/13

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Frederick County Division of Utilities & Solid Waste Management	Revisions	
	Date	Note
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Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions	
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### Sheet #2

# Miscellaneous Water & Sewer Details

County Boundary Lines	-----
Prop. lines (except R/W)	-----
R/W lines	----- R
Fences	xxxxxx
Walls (Conc., stone, etc.)	
Slopes	Y Y Y
Conc. curb and sidewalk	Conc. curb
Existing drains and culverts	-----
Gas mains	--- · G ---
Gas meter	◎
Utility poles	T P.E. # T C. & P. #
Electric lines - buried	--- E ---
Telephone lines - buried	--- T ---
Trees and Brush	blob
Earth and Stone roads	====
Bituminous and Conc. roads	====
Railroads (per set of rails)	++ + + + +
Streams, Ponds, Ditches	---
Marsh	--- - - - -
Sign post	○ S
Excavation or Cut	XXXXXX
Sink holes	Y Y Y Y Y Y
Prop. mon. or stone	-----
Triang. sta., Traverse sta.	△
Hub and tack	○
Iron pipe	I.P.
Bench mark	B.M.
Nail, spike or iron rod	.
Vitrified Clay Pipe Extra strength	V.C.P.X
Cast Iron Pipe	C.I.P.
Ductile Iron Pipe	D.I.P.
Corrugated Metal Pipe	C.M.P.
Reinforced Conc. Pipe	R.C.P.
Poly (Vinyl Chloride)	P.V.C.
Acrylonitrile Butadiene Styrene	A.B.S.
Pay Width	P.W.
Excavation	Exc.
First floor	F.F.
Footing	Ftg.
Cellar	C.
Right of Way	R/W

## Existing Work

Sewers	----- EX. 8"S
Storm water drains	--- · --- EX. 8"S
Sewer Manhole	M.H. ○ EX. 8"S
Rectangular Vaults	□ □ □ EX. 8"S
Lampholes	L.H. ○ EX. 8"S
Water mains	----- EX. 8"W
Water Manholes	W ○ EX. 8"W
Valves	EX. 8"W A.V.
Air valve	EX. 8"W
Tee	EX. 8"W
Cross	EX. 8"W
Reducer	EX. 8"W
Bend	EX. 8"W
Blow-off	EX. 8"W
Fire hydrant and valve	EX. 8"W
Meter Boxes	M. ○
Elevated tank	EX. 8"W
Stand pipe	○

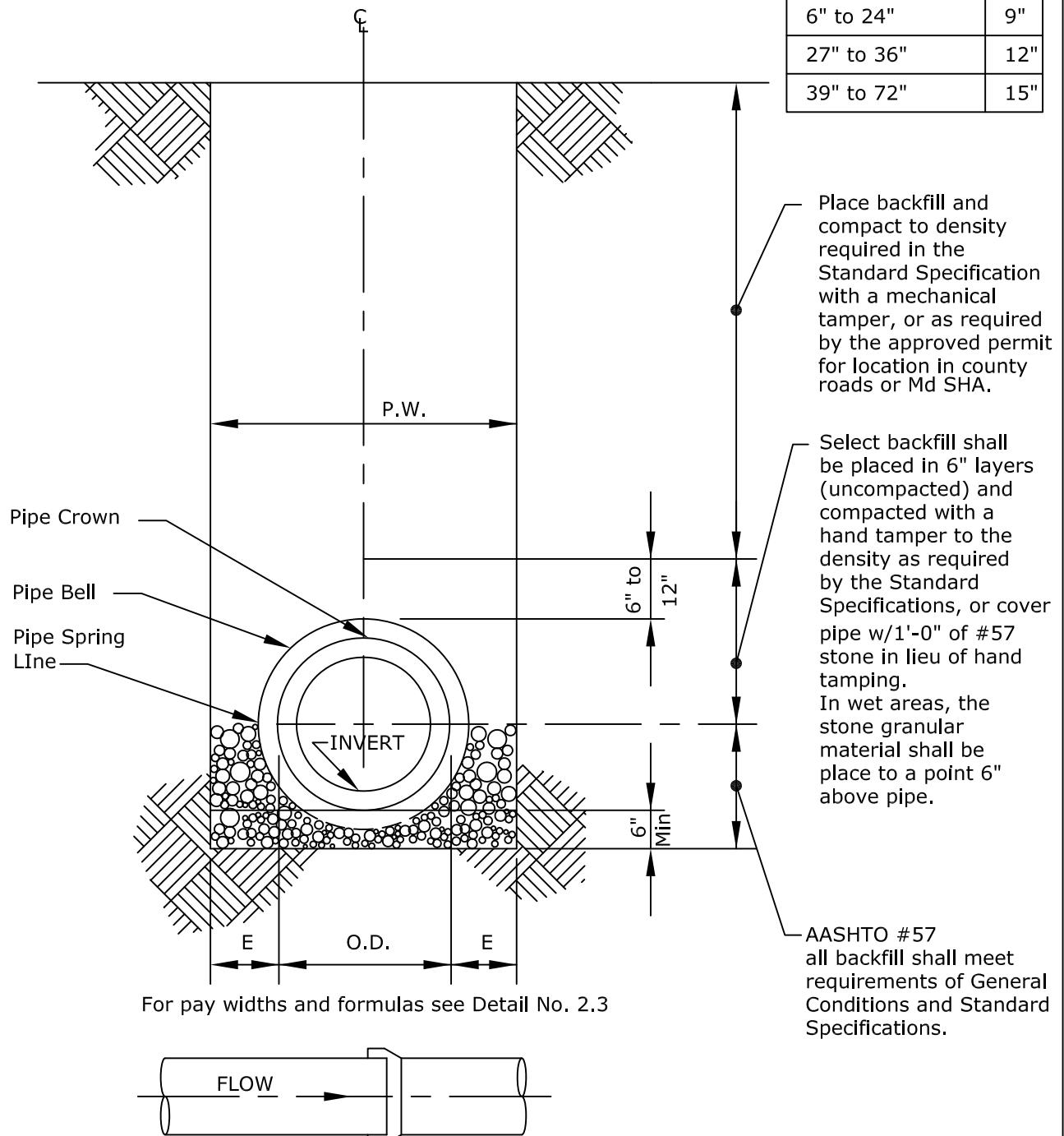
## Proposed Work

Sewers	----- 8"S
Manholes	MH. ● 8"S
Water-tight Manhole	W.T. MH. ● 8"S
Lamphole	L.H. ● 8"S
Y branch	8"S
Sewer Service Conn.- S.S.C.	8"S
Drop Sewer Service Conn.- D.S.S.C.	8"S
Water main w/ valve	8"W
Automatic air-release valve	A 8"W
Tee	8"W
Cross	8"W
Reducer	8"W
Bend	EX. 8"W
Fire hydrant w/ valve	F.H. 8"W
Blow-off	8"W
House water service and meter	M. ○ 8"W
House water service - W.S.C.	8"W
Tapping sleeve & valve	TS&V 8"W
Plug or Cap	8"W P. or C.

Frederick County Division of Utilities & Solid Waste Management Department of Engineering & Planning	Revisions		Standard Symbols for Water and Sewer	Detail No. 1.1 Date: 01-24-2013
	Date	Note		
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Maximum payment width (P.W.) = Pipe Barrel O.D. + 2E

Nominal Pipe size	E
6" to 24"	9"
27" to 36"	12"
39" to 72"	15"



Note:  
If ductile iron pipe watermain, stone backfill not required.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Typical Trench for Sewer or Water Lines	Detail No. 2.1
	Date	Note		
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				Date: 01-24-2013

## PAY WIDTH FOR DIFFERENT PIPE BY MATERIAL AND SIZE

PVC

Dia. 6" - 2.02' p.w.  
Dia. 8" - 2.20' p.w.  
Dia. 10" - 2.38' p.w.  
Dia. 12" - 2.54' p.w.  
Dia. 15" - 2.78' p.w.  
Dia. 18" - 3.06' p.w.  
Dia. 21" - 3.34' p.w.  
Dia. 24" - 3.57' p.w.  
Dia. 27" - 4.33' p.w.

RCSP

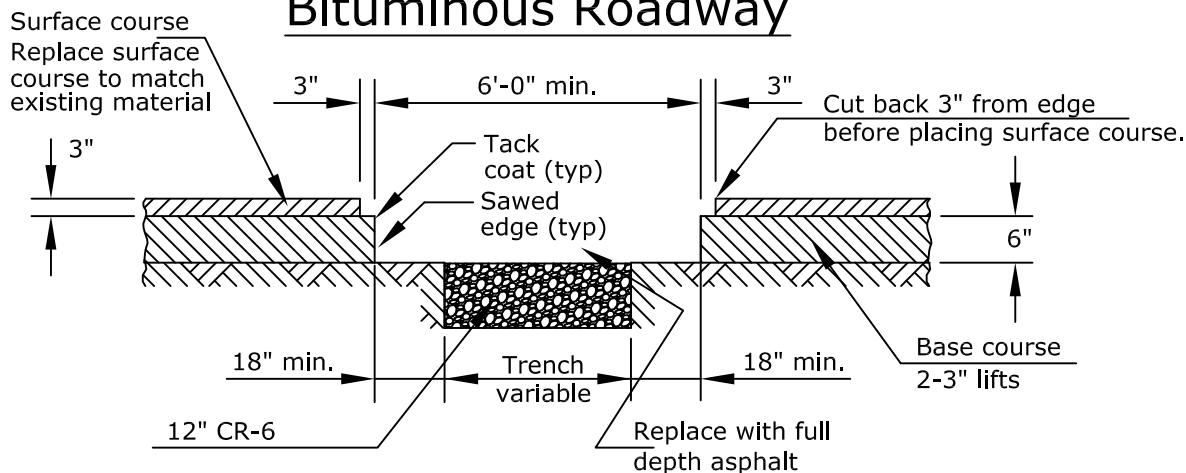
Dia. 18" - 3.65' p.w.  
Dia. 30" - 5.25' p.w.  
Dia. 36" - 5.83' p.w.

DIP

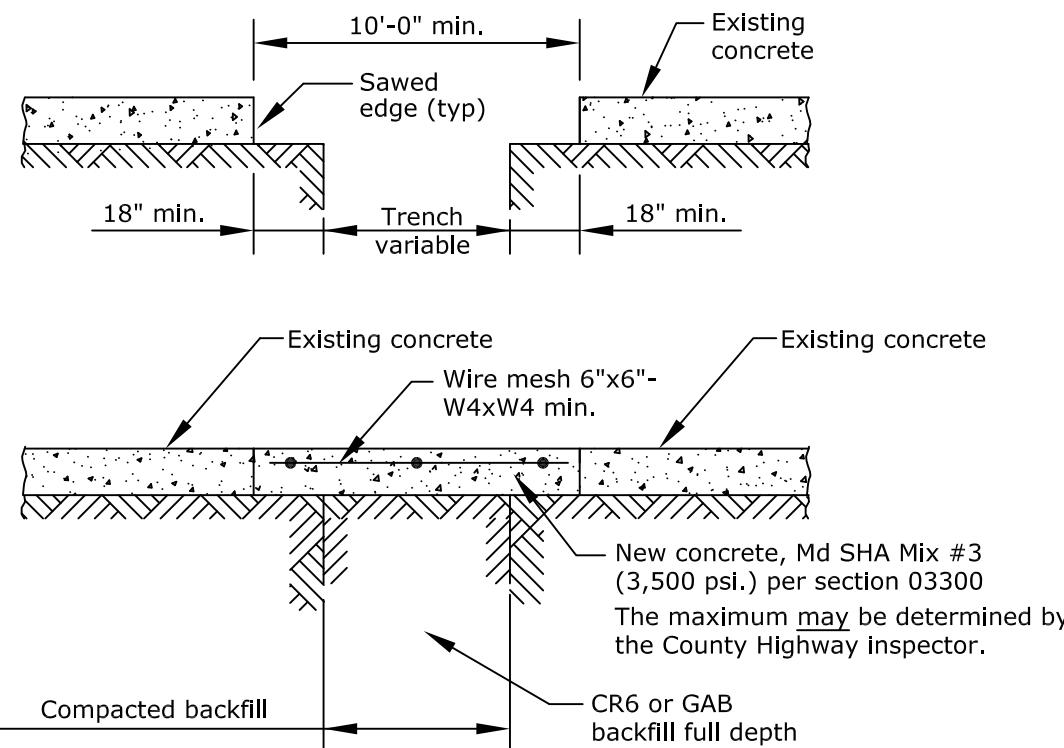
Dia. 6" - 2.08' p.w.  
Dia. 8" - 2.25' p.w.  
Dia. 10" - 2.42' p.w.  
Dia. 12" - 2.60' p.w.  
Dia. 16" - 2.95' p.w.  
Dia. 20" - 3.30' p.w.  
Dia. 24" - 3.65' p.w.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Pay Width By Materials	Detail No.
	Date	Note		2.3
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				Date: 01-24-2013

## Bituminous Roadway

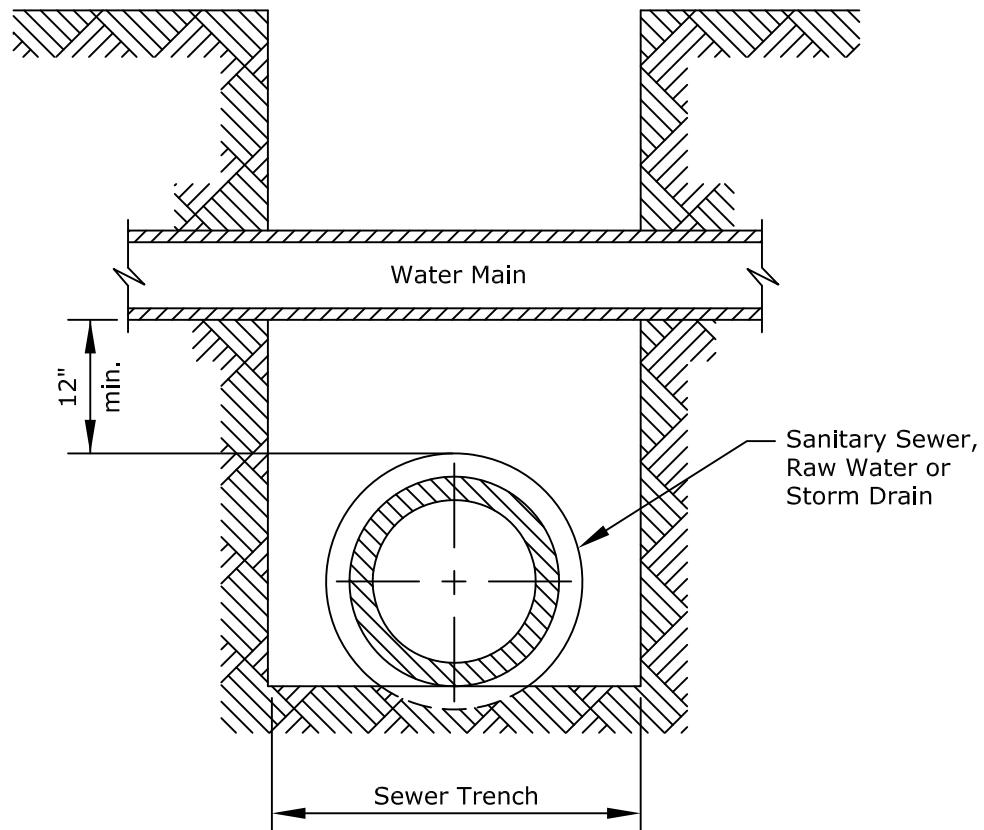


## Cement Concrete Roadway



- 1: County roads shall be repaired as above unless the County Road crossing permit requires other repairs - then perform the work in accordance with the permit.
- 2: Measurement and payment for these items shall be the number of square yards of surface course materials furnished and installed in-place and in accordance with the project specific details (note any variations) and to the limits as shown on the drawings.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		County Road Repair Over Water and Sewer Trenches	Detail No. 3.1
	Date	Note		
				Date: 01-24-2013



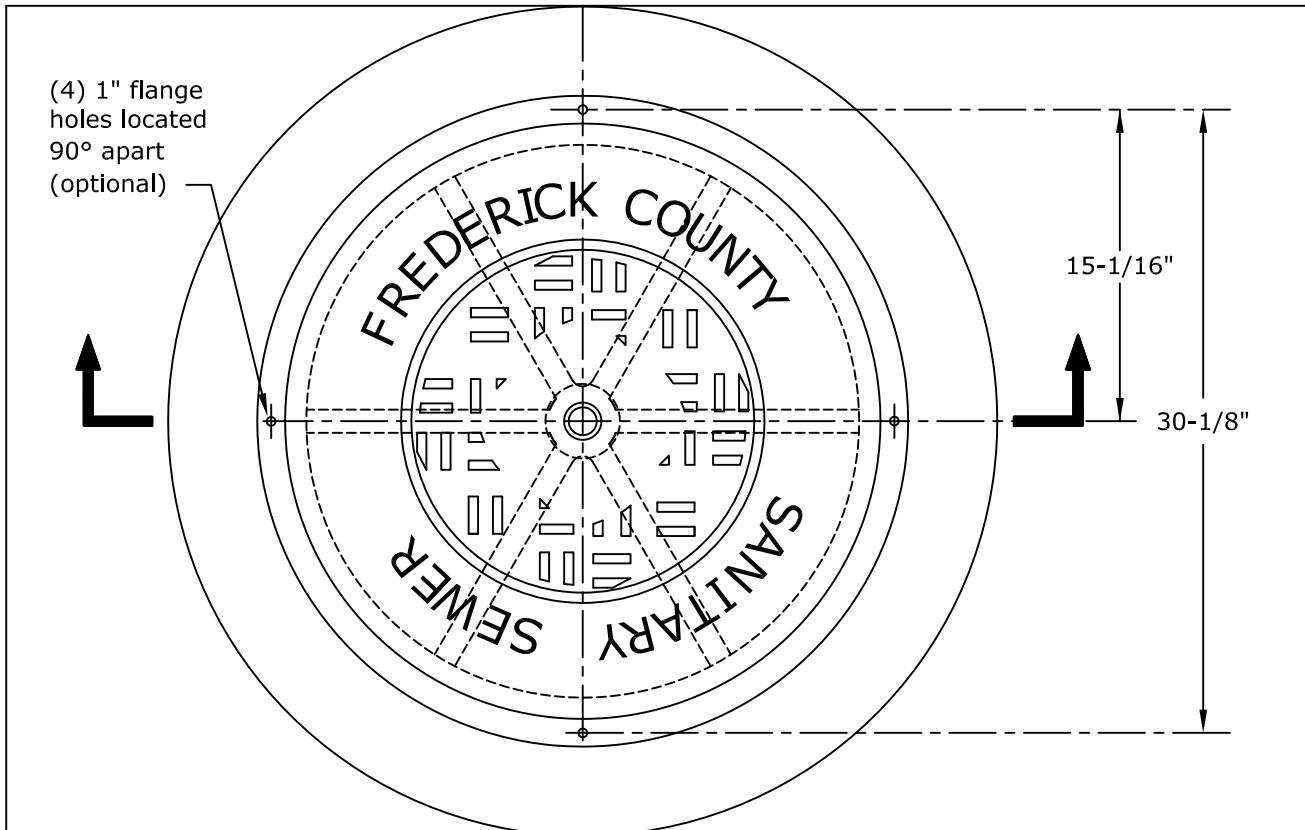
## Section

### Notes:

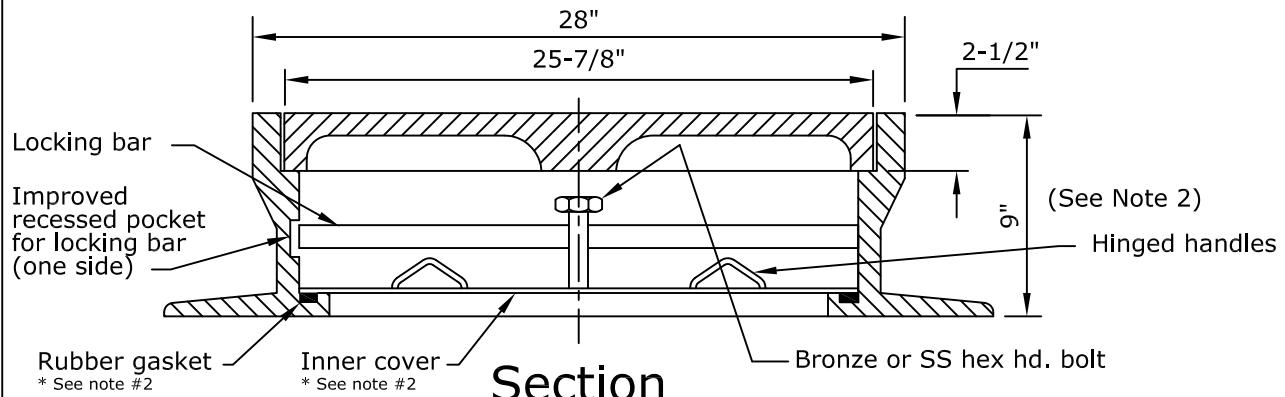
1. If clearance is less than 12 inches - Encase the lower of the two pipe lines in concrete 10 feet minimum each side of crossing. Concrete shall extend to the face of the bells at both ends of the encasement.
2. If joint on exposed existing water main is within the limits of newly constructed sewer trench, a bell clamp joint shall be provided on the water main joint.
3. If water main is below sanitary sewer line, encasement is required as per note No. 1 above, regardless of clearance. An alternative to the above encasement is the use of 20 foot lengths of pipe so that no joint is within 10 feet of crossing.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Water and Sewer Line Crossing	Detail No. 4.1
	Date	Note		
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Date:  
01-24-2013



## Manhole Frames and Covers



### Section

Frame & outer cover - cast iron ASTM A-48, class 30 and designed for H-20 loading.  
 Inner cover, hinges & locking bar - steel ASTM A-36.

Neoprene "O" ring endless gasket, glued in place.

Inner cover lift handles are hinged type to prevent breakage.

Recessed pocket permits installation and removal of inner cover.

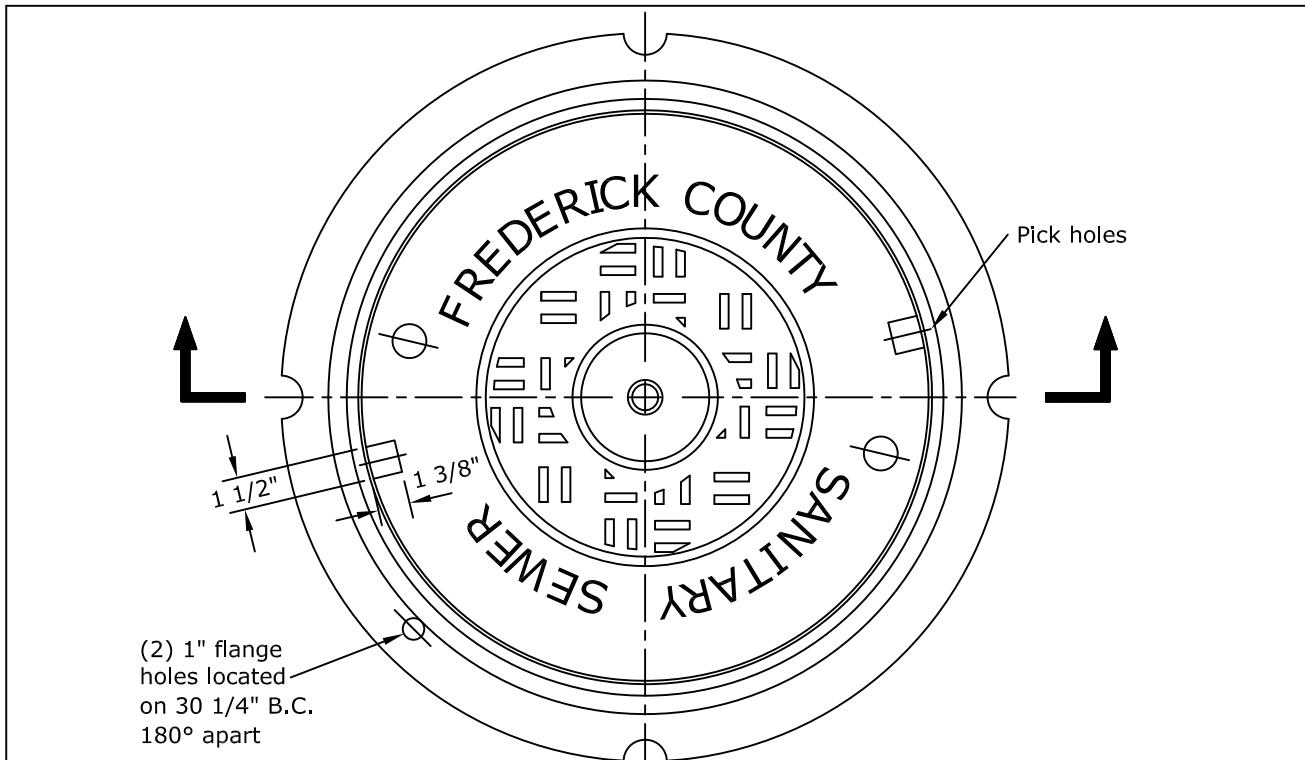
Locking bolt to have a 3/4" dia. shank.

Weight - approximately 480 lbs. (frame & cover).

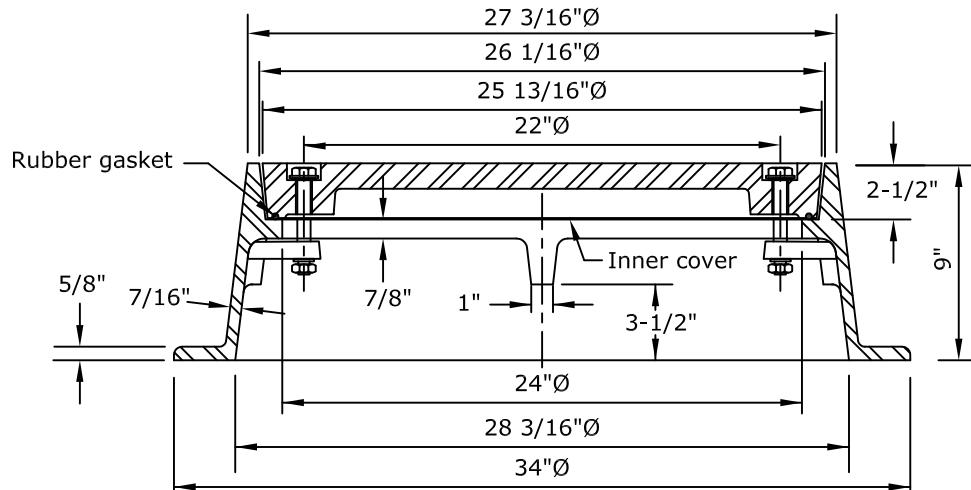
#### Notes:

1. When frame and cover are used for water structures, replace "Sanitary Sewer" with "Water".
2. Standard frame and cover does not include inner cover or rubber gasket. Watertight frame and cover includes the inner cover and rubber gasket as shown. Use of a 4" frame may NOT be used with watertight installations. A 4-inch frame may be used, if approved by the County prior to installation, which is attributed to unforeseen field conditions or design changes beyond the control of the contractor.
3. Detail 5.1 acceptable except when specific contract documents dictate otherwise.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Manhole Frame and Cover for Water & Sewer	Detail No.  5.1
	Date	Note		
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				Date: 01-24-2013



## Heavy Frames and Covers



## Section

Frame & outer cover - cast iron ASTM A-48, class 30 and designed for H-20 loading.

Inner cover, hinges & locking bar - steel ASTM A-36.

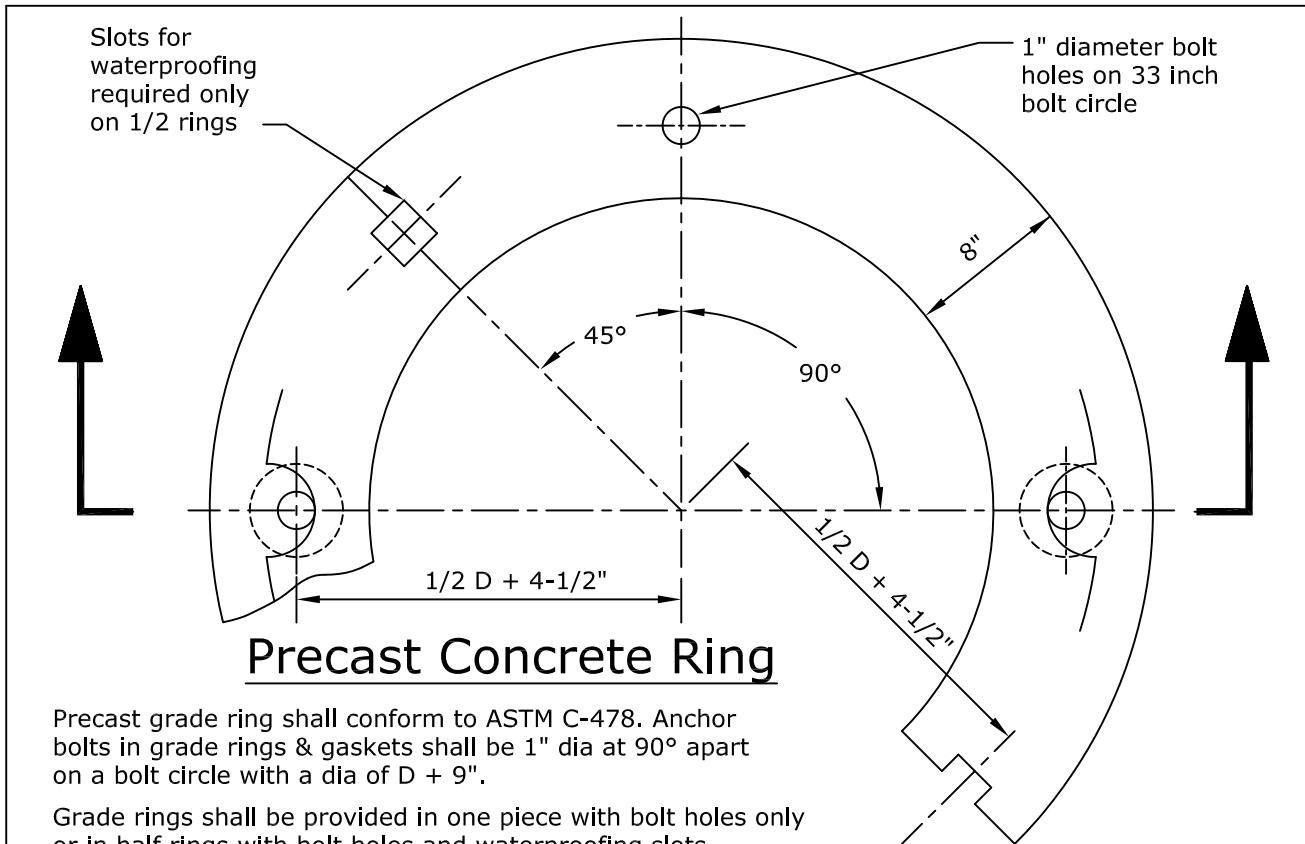
Neoprene "O" ring endless gasket - 3/4" dia, solid.

Weight - approximately 480 lbs. (frame & cover).

### Notes:

1. When frame and cover are used for water vaults or related structures, replace "Sanitary Sewer" with "Water".
2. Standard straight wall frame and cover does not include cams, bolts, bolt holes or rubber gasket. Watertight straight wall frame and cover includes cams, bolts, bolt holes and rubber gasket.
3. Detail 5.2 acceptable except when specific contract documents dictate otherwise.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Straight Wall Manhole Frame and Cover for Water & Sewer	Detail No.  5.2
	Date	Note		
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				Date: 01-24-2013

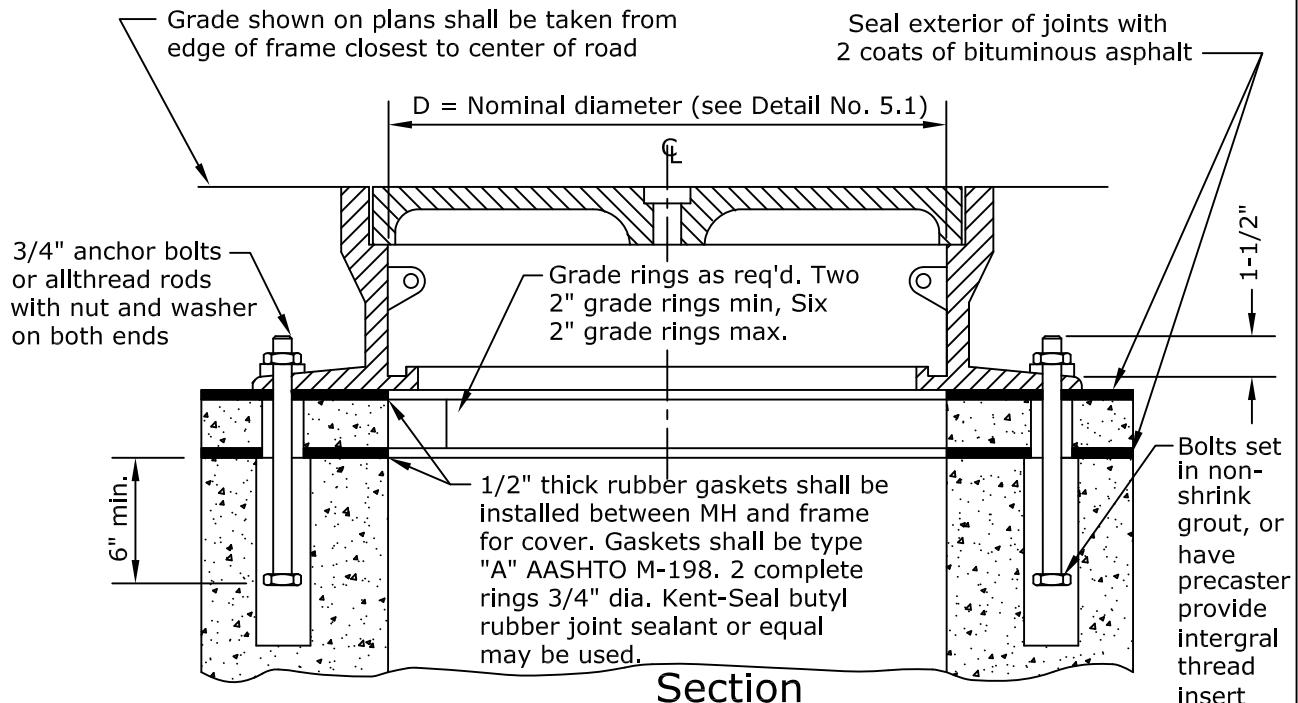


Precast grade ring shall conform to ASTM C-478. Anchor bolts in grade rings & gaskets shall be 1" dia at 90° apart on a bolt circle with a dia of  $D + 9"$ .

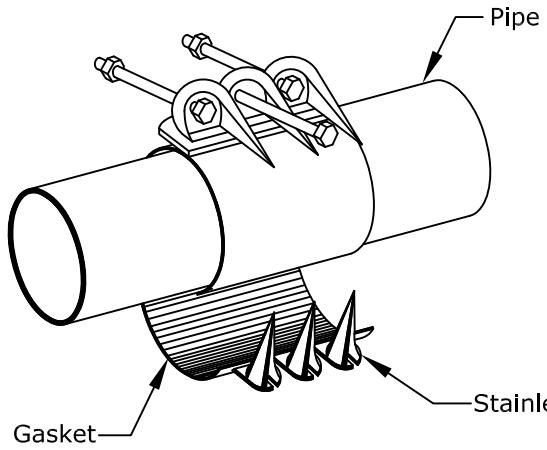
Grade rings shall be provided in one piece with bolt holes only or in half rings with bolt holes and waterproofing slots.

Grade adjustment rings allow for correction not only at the time of installation and paving, but provide for some adjustment with future paving projects.

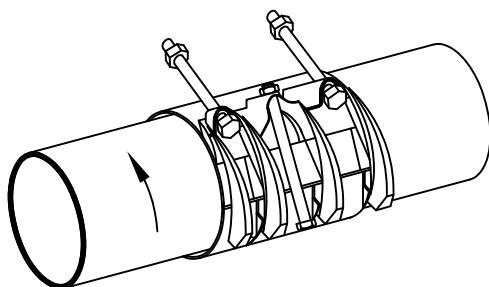
Waterproofing slots shall be filled with bituminous asphalt and all exposed steel bolts, etc. shall be coated with bituminous asphalt.



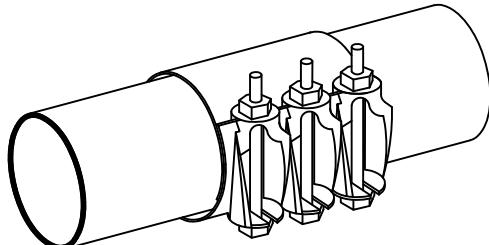
Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Method of Anchoring Frame, Grade Rings and Gaskets to Manholes	Detail No.  5.3
	Date	Note		
				Date: 01-24-2013



Clean pipe and mark for position where repair clamp is to be installed for centering over break. Lubricate pipe with soap solution. Center clamp over damaged area.



Tuck tapered gasket flap in place and mesh lug fingers. Then engage center bolt and tighten finger tight.



Rotate clamp on pipe in the direction indicated by arrow to seat gasket flap smoothly on the pipe.

Engage remaining bolts and tighten all evenly with a torque wrench. All 5/8" bolts shall be torqued to 60-65 foot lb. and all 3/4" bolts shall be torqued to 80-85 foot lb.  
On multi-band units, equalize gaps between bands.

Contractor shall provide Rockwell full circle repair clamp Nos. 226 or 228 or approved equal at no extra cost to Frederick County.

**NOTE:**

When pipe is found to be damaged, DUSWM Operations will evaluate to determine exactly how standard detail shall be applied.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Installation of Full Circle Repair Clamp	Detail No.
	Date	Note		8.1
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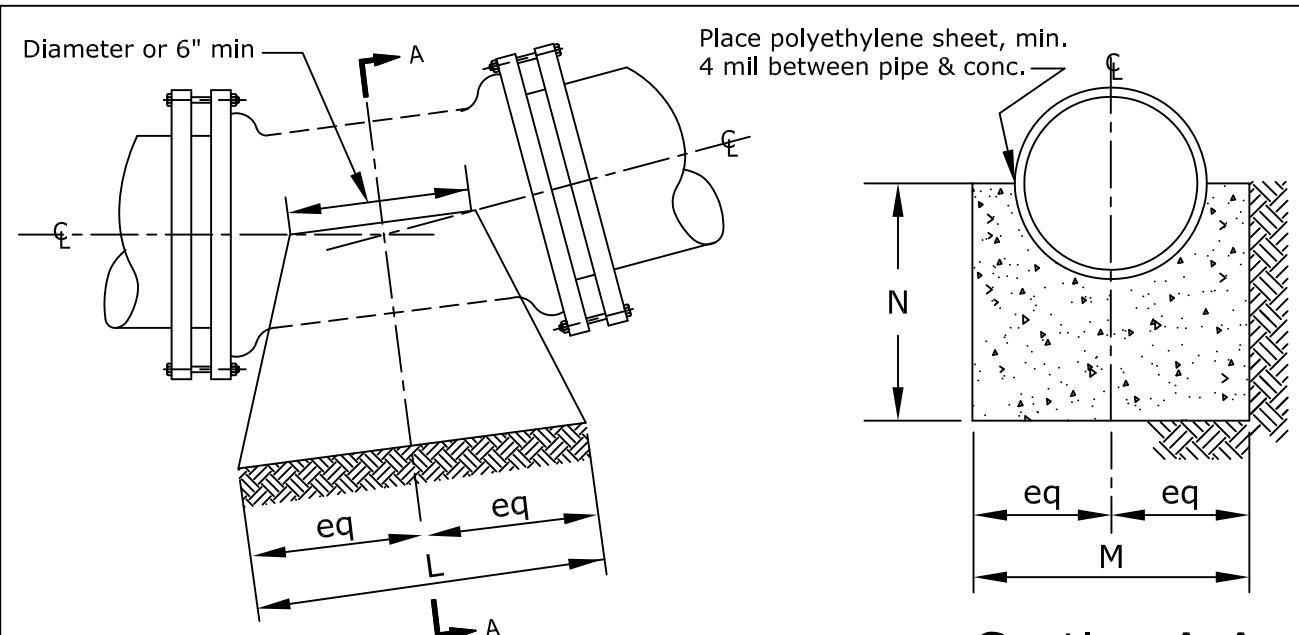
# Water Details

Mechanical Joint Pipe						
Nominal Pipe Size	Max. Deflection				Minimum Radius-Feet	
	18 Ft Length		20 Ft Length		18 Ft Length	20 Ft Length
	Inches	Degrees	Inches	Degrees		
4	31	8.17	35	8.30	125	140
6	27	7.13	30	7.13	145	160
8	20	5.29	22	5.24	195	220
10	20	5.29	22	5.24	195	220
12	20	5.29	22	5.24	195	220
16	13.5	3.57	15	3.58	285	320
18	11	2.92	12	2.86	340	380
20	11	2.92	12	2.86	340	380
24	9	2.39	10	2.39	450	500
36	9	2.39	10	2.39	450	500
42	7.5	1.99	8	1.91	510	570
48	7.5	1.99	8	1.91	510	570

Push-on Joint Pipe						
Nominal Pipe Size	Max. Deflection				Minimum Radius-Feet	
	18 Ft Length		20 Ft Length		18 Ft Length	20 Ft Length
	Inches	Degrees	Inches	Degrees		
4	19	5.03	21	5.00	205	230
6	19	5.03	21	5.00	205	230
8	19	5.03	21	5.00	205	230
10	19	5.03	21	5.00	205	230
12	19	5.03	21	5.00	205	230
16	11	2.92	12	2.86	340	380
18	11	2.92	12	2.86	340	380
20	11	2.92	12	2.86	340	380
24	11	2.92	12	2.86	340	380
36	11	2.92	12	2.86	340	380
42	7.5	1.99	8	1.91	510	570
48	7.5	1.99	8	1.91	510	570

The Above Charts Are in Accordance With AWWA C600.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Curvature of Water Mains	Detail No.
	Date	Note		
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				Date: 01-24-2013



Elevation or Plan

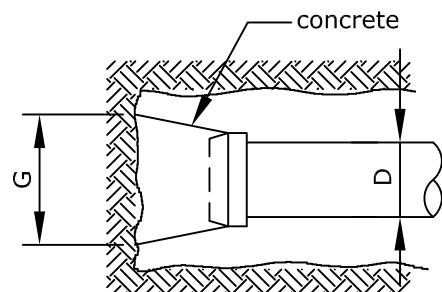
Section A-A

Bend		Size										
		3"	4"	6"	8"	10"	12"	16"	20"	24"	30"	
1/32	11 1/4°	L	6"	6"	6"	8"	8"	8"	1'-1"	1'-5"	1'-10"	2'-8"
	22 1/2°	M	1'-0"	1'-0"	1'-2"	1'-4"	1'-6"	2'-0"	2'-4"	2'-8"	3'-0"	3'-4"
	45°	N	8"	8"	8"	8"	8"	8"	9"	10"	12"	12"
1/16	11 1/4°	L	6"	8"	10"	11"	1'-3"	1'-4"	2'-1"	2'-9"	3'-7"	5'-3"
	22 1/2°	M	1'-0"	1'-0"	1'-2"	1'-4"	1'-6"	2'-0"	2'-4"	2'-8"	3'-0"	3'-2"
	45°	N	8"	8"	8"	8"	9"	9"	12"	1'-2"	1'-4"	1'-6"
1/8	11 1/4°	L	10"	1'-0"	1'-2"	1'-9"	2'-5"	2'-8"	4'-0"	5'-6"	6'-0"	8'-2"
	22 1/2°	M	1'-0"	1'-0"	1'-2"	1'-4"	1'-6"	2'-0"	2'-4"	2'-8"	3'-6"	4'-0"
	45°	N	8"	8"	8"	8"	12"	1'-2"	1'-6"	2'-0"	2'-6"	3'-0"
1/4	11 1/4°	L	1'-0"	1'-4"	2'-0"	2'-8"	3'-4"	3'-8"	5'-6"	6'-8"	8'-0"	9'-8"
	22 1/2°	M	9"	10"	12"	1'-4"	1'-9"	2'-3"	2'-8"	3'-6"	4'-0"	4'-7"
	45°	N	1'-8"	1'-8"	1'-8"	1'-8"	1'-8"	1'-8"	2'-0"	2'-3"	2'-9"	3'-5"

Notes:

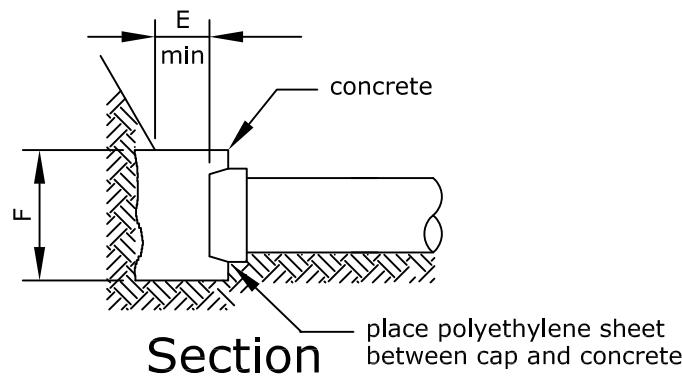
1. All concrete to be Md. S.H.A. mix No. 1.
2. All bearing surfaces shall be placed against undisturbed ground with a min. soil bearing pressure of 3,000 lbs. per s.f. & static water pressure of 150 p.s.i. Where pressure exceeds 150 p.s.i. or where soil bearing pressure is less than 3,000 p.s.f., special buttress design is required.
3. These buttresses shall be used for horizontal and lower vertical bends.
4. Mechanical joint restraint may be used in lieu of concrete buttresses.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Buttresses for Use at Horizontal and Lower Vertical Bends	Detail No.  102.1
	Date	Note		
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				Date: 01-24-2013

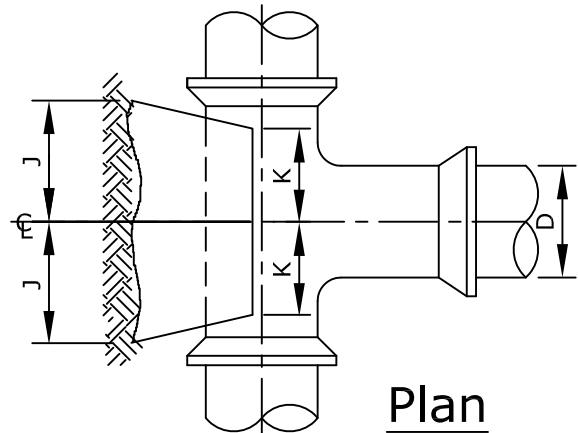


**Plan**

Buttress for Caps										
D	3"	4"	6"	8"	10"	12"	16"	20"	24"	30"
E	7"	7"	6"	8"	8"	10"	1'-0"	1'-4"	1'-8"	2'-0"
F	14"	14"	1'-0"	1'-4"	1'-8"	2'-0"	2'-8"	3'-3"	4'-0"	4'-9"
G	12"	12"	1'-5"	1'-11"	2'-5"	2'-10"	3'-9"	4'-9"	5'-8"	7'-6"

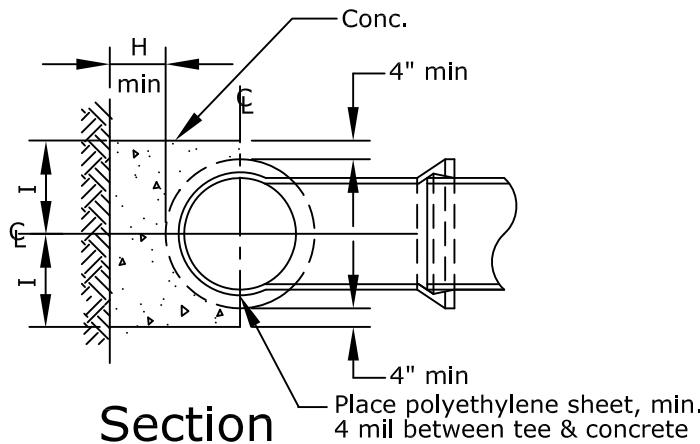


**Section**



**Plan**

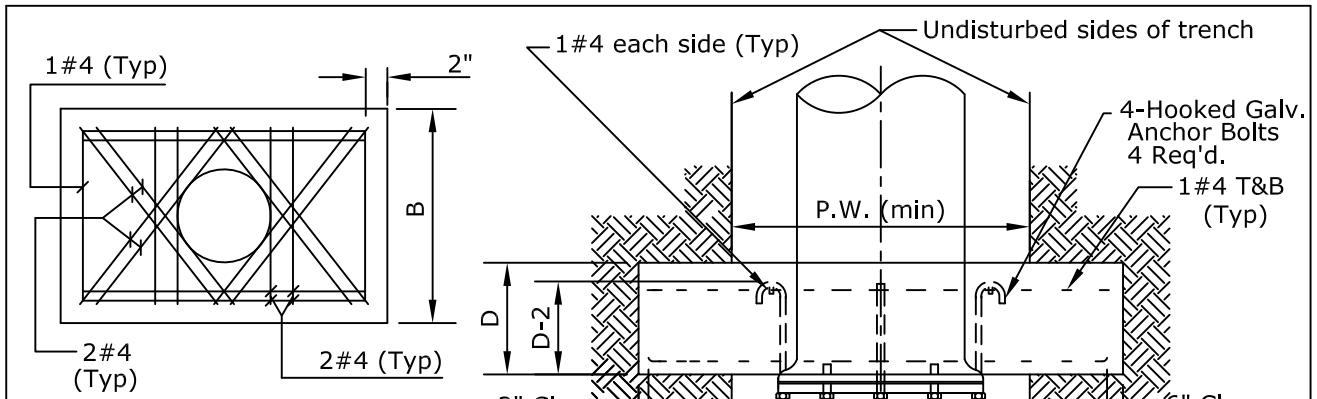
Buttress for Tees										
D	3"	4"	6"	8"	10"	12"	16"	20"	24"	30"
H	7"	7"	8"	9"	10"	1'-0"	1'-4"	1'-8"	2'-2"	2'-8"
I	7"	7"	10"	1'-1"	1'-4"	1'-7"	2'-2"	2'-8"	3'-2"	3'-8"
J	6"	6"	6"	8"	1'-1"	1'-1"	1'-5"	1'-9"	2'-1"	2'-6"
K	4"	4"	6"	7"	8"	9"	10"	1'-2"	1'-4"	1'-6"



**Section**

**Notes:**

1. All concrete shall be Mix No. 1.
2. Buttress dimensions shown are based upon soil bearing pressure of 3,000 p.s.f. & static water pressure of 150 p.s.i. Where pressure exceeds 150 p.s.i. or where soil bearing pressure is less than 3,000 p.s.f., special buttress design is required.
3. For caps on mains where rock has been excavated ahead of pipe laying, use Detail No. 104.1.
4. Mechanical joint restraint may be used in lieu of concrete buttresses.

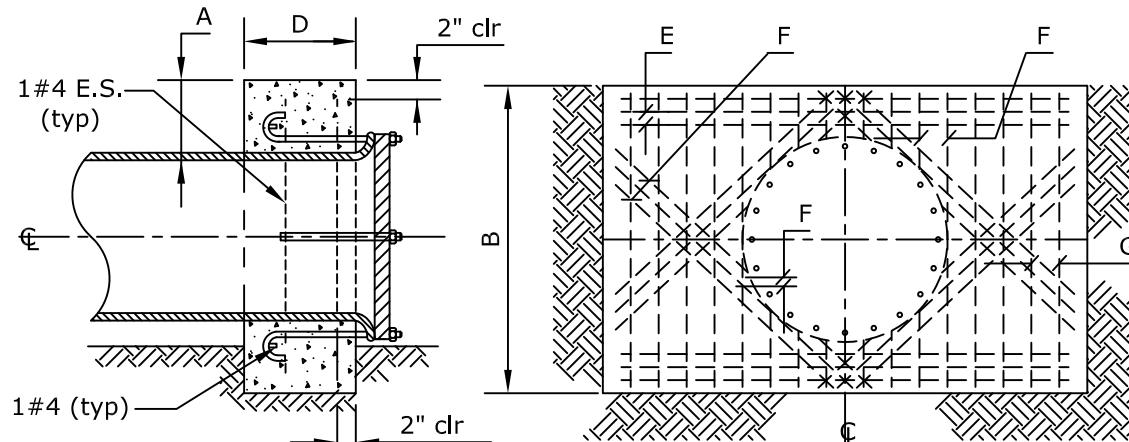


## Front Elevation for 3" & 4" Pipes

Minimum clearance shall be 1" from pipe to reinforcing steel.

Complete trench in front of plug shall be backfilled and compacted per the General Cond. and Std. Specs. prior to testing.

## Plan for All Pipes



## Section Front Elevation for 6" to 12" Pipes

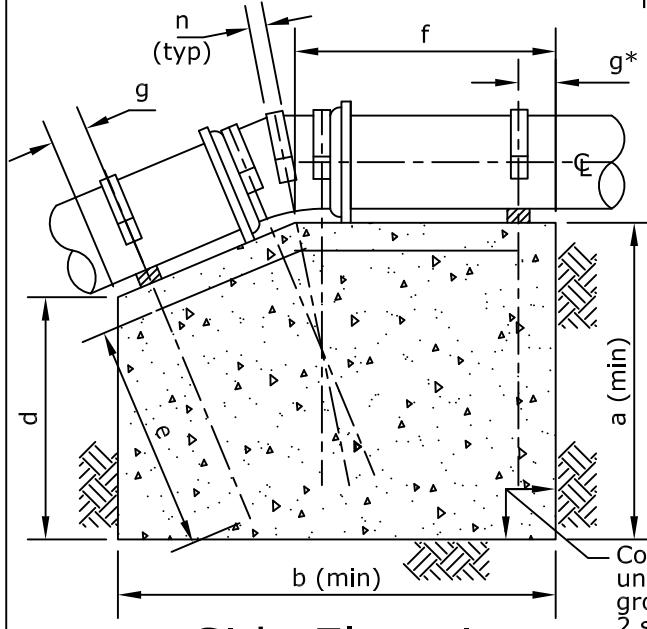
Pipe size	Anchor Dimensions				Steel-Size & Spacing		
	A	B	C	D	E	F	G
3"	4"	1'-0"	6"	12"	—	—	—
4"	4"	1'-0"	9"	12"	—	—	—
6"	6"	1'-6"	1'-0"	12"	2-#4	2-#4	#4@3"
8"	1'-0"	2'-9"	1'-0"	1'-6"	2-#4	2-#4	#4@3"
10"	1'-0"	3'-3"	1'-3"	1'-6"	3-#4	2-#4	#4@3"
12"	1'-0"	3'-9"	1'-6"	1'-6"	4-#4	2-#4	#4@3"

### Notes:

1. Concrete shall be MSHA Mix No. 1.
2. Reinforcing Steel to be A.S.T.M. A-615 Grade 40 and/or Grade 60.
3. Galvanized anchor bolts to have a minimum  $F_y = 36,000$  p.s.i..
4. If trench width exceeds P.W. by more than 25% anchor wall design must be verified for structural adequacy.
5. Pipe test pressure = 150 p.s.i. hydrostatic.
6. Mechanical joint restraint may be used in lieu of concrete anchors.

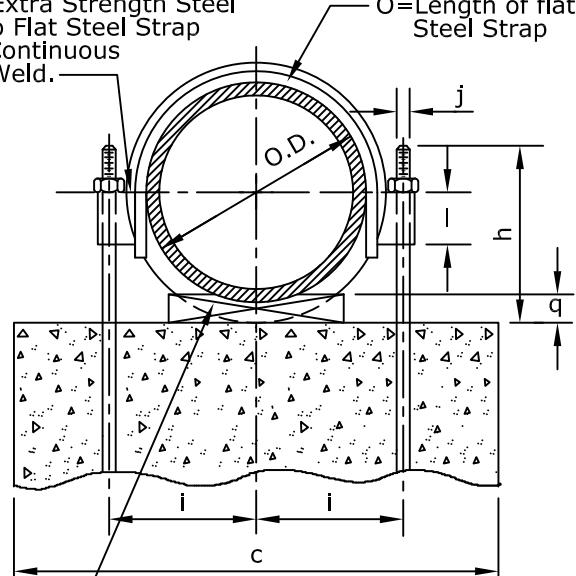
Frederick County Division of Utilities & Solid Waste Management Department of Engineering & Planning	Revisions		Anchors for Plugs	Detail No.
	Date	Note		104.1
				Date: 01-24-2013

\*Omit strap at ends of block, where 'g' has no tabulated dimension.

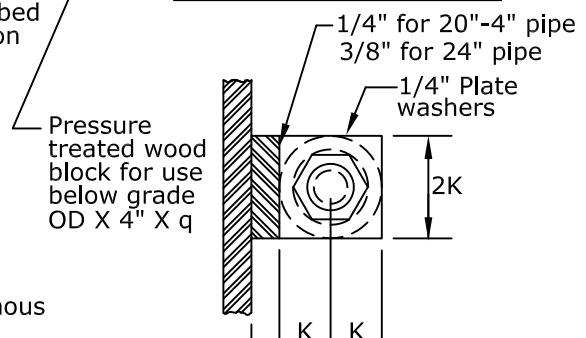


Side Elevation

Weld Extra Strength Steel Pipe to Flat Steel Strap With Continuous Fillet Weld.



Cross Section



Strap Attachment

Notes:

1. Concrete shall be MSHA mix No. 1.
2. Anchor bolts shall have 3" threaded length & std. 90° hook facing center of block, and shall be tied to rebar w/equal diameter.
3. All exposed steel to be painted with 2 coats of bituminous paint conforming to MIL-P-23236P, class 2.
4. Bell to rest on screeded upper surfaces of block.
5. Test pressure 150 p.s.i. hydrostatic.

\* This method is alternative to use of Mega-Lugs.

Dimensions for Vertical Bend Anchorages - In Inches

Bend	1/32 - 11-1/4°								1/16 - 22-1/2°								1/8 - 45°							
	4	6	8	10	12	16	20	24	4	6	8	10	12	16	20	24	4	6	8	10	12	16	20	24
a	12	16	18	22	26	34	36	42	15	20	26	36	36	42	48	56	18	27	45	48	60	66	72	76
b	12	18	20	26	34	44	50	54	18	22	33	44	50	72	80	90	21	39	51	63	75	84	99	111
c	15	18	28	30	30	34	42	50	18	30	30	36	39	48	54	30	30	30	36	36	51	60	72	
d	11	14-1/4	16	19-1/2	22-3/4	30	31-1/2	37	11-1/2	16	19-3/4	27-1/4	26-1/2	28-1/4	38-1/2	39	9	13	28	28	31	37	37	40
e	8	12	14	18	22	28	30	36	11	16	22	30	30	36	42	50	14	23	39	42	54	60	66	70
f	6-1/2	9-1/2	10	14	18	24	27	29	9-1/2	18	22	24	27	39	43	49	12	25	34	43	46	55	64	75
g	—	—	—	—	6	6	6	—	—	—	6	6	6	6	6	—	—	—	6	6	6	6	6	
h	6-1/2	7-1/2	8-1/2	9-1/2	10-3/4	13	15-1/8	18	6-1/2	7-1/2	8-1/2	9-1/2	10-3/4	15	15-1/2	18	6-1/2	7-1/2	8-1/2	9-1/2	10-3/4	13-1/4	15-1/2	18
i	3-1/2	4-9/16	5-11/16	6-3/4	7-3/4	9-3/4	12-1/16	14-1/4	3-1/2	4-9/16	5-11/16	6-3/4	7-3/4	9-3/4	12-1/4	14-1/4	3-1/2	4-5/16	5-11/16	6-3/4	7-7/8	10-1/16	12-1/4	14-5/16
j	3/4	3/4	3/4	3/4	3/4	3/4	7/8	1	3/4	3/4	3/4	3/4	3/4	3/4	7/8	15/16	3/4	3/4	3/4	3/4	3/4	15/16	15/16	1-1/4"
k	3/4	3/4	3/4	3/4	3/4	3/4	7/8	15/16	3/4	3/4	3/4	3/4	3/4	3/4	7/8	15/16	3/4	3/4	3/4	3/4	3/4	15/16	15/16	1-1/4"
l	1	1	1	1	1-1/4	2	3	4	1	1	1-1/4	2	1-1/2	2-1/4	3-1/2	5	1	1-1/2	2-1/2	2	2-1/2	4-1/4	4-1/4	6
m	1	1	1	1	1	1	1-1/4	1-1/2	1	1	1	1	1	1	1-1/4	1-1/2	1	1	1	1	1	1-1/4	1-1/2	1-1/2
n	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	2	2	2-1/2	1-1/4	1-1/4	1-1/4	1-1/4	2	2	2-1/2	1-1/4	1-1/4	2	2	2	2-1/2	2-1/2	2-1/2	
o	12-1/4	15-3/4	19	22-1/4	26-1/8	33-3/4	42-1/8	51-1/8	12-1/4	15-1/2	19-1/2	24	26-1/2	34	43	53	12-1/4	16-1/8	22	24	29	38	46	55
p	1/4	1/4	1/4	1/4	1/4	1/4	3/8	3/8	1/4	1/4	1/4	1/4	1/4	1/4	3/8	3/8	1/4	1/4	1/4	1/4	3/8	3/8	1/2	1/2
q	1	1	1	1-1/8	1-1/8	1-5/8	1-5/8	1-5/8	1	1	1	1-1/8	1-1/8	1-5/8	1-5/8	1-5/8	1	1	1	1-1/8	1-1/8	1-5/8	1-5/8	1-5/8

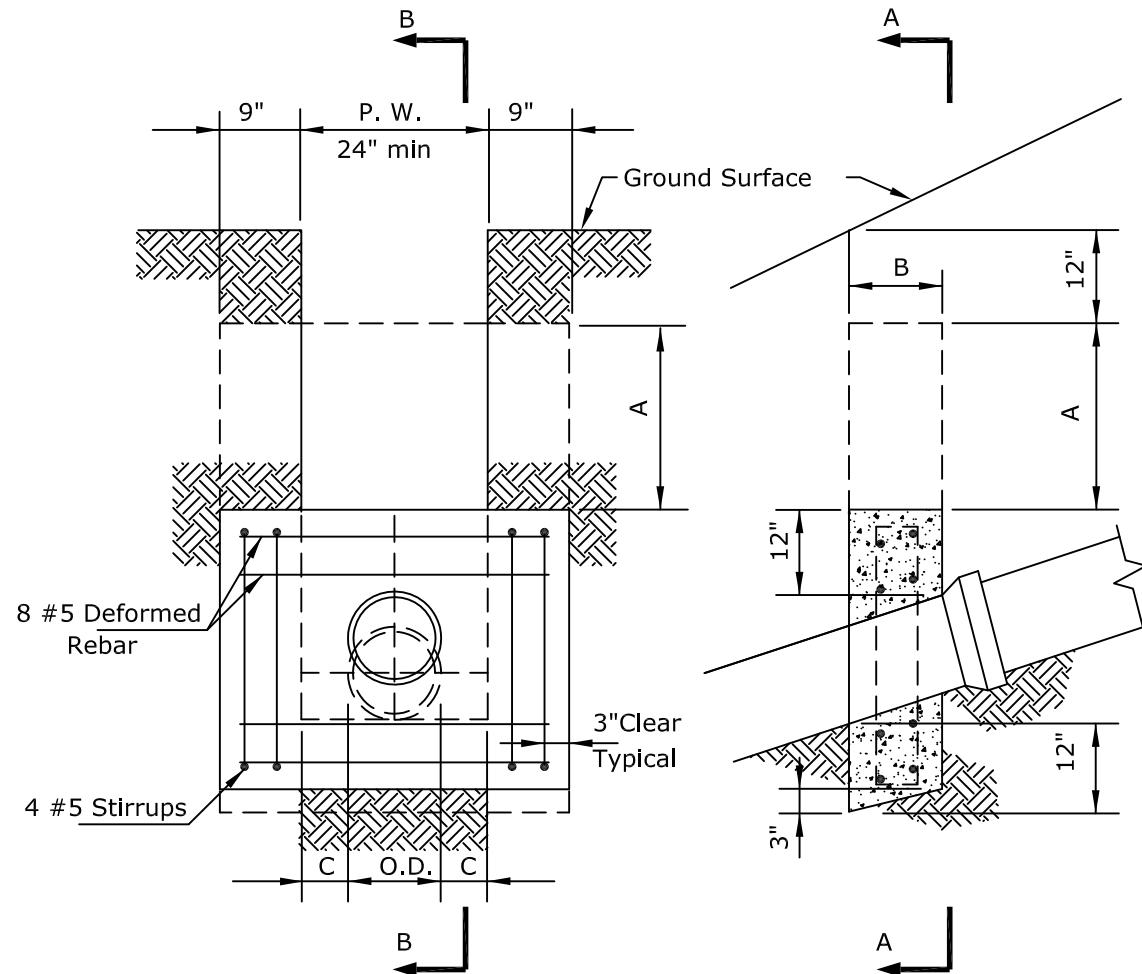
Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

Revisions

Date	Note
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Anchors for 11-1/4°, 22-1/2°  
and 45° Upper Vertical  
Bends

Detail No.  
105.1  
Date:  
01-24-2013



**Section "A - A"**

**Section "B - B"**

A= Extension of anchor to 12" below ground, when necessary to prevent washout of backfill by surface water.

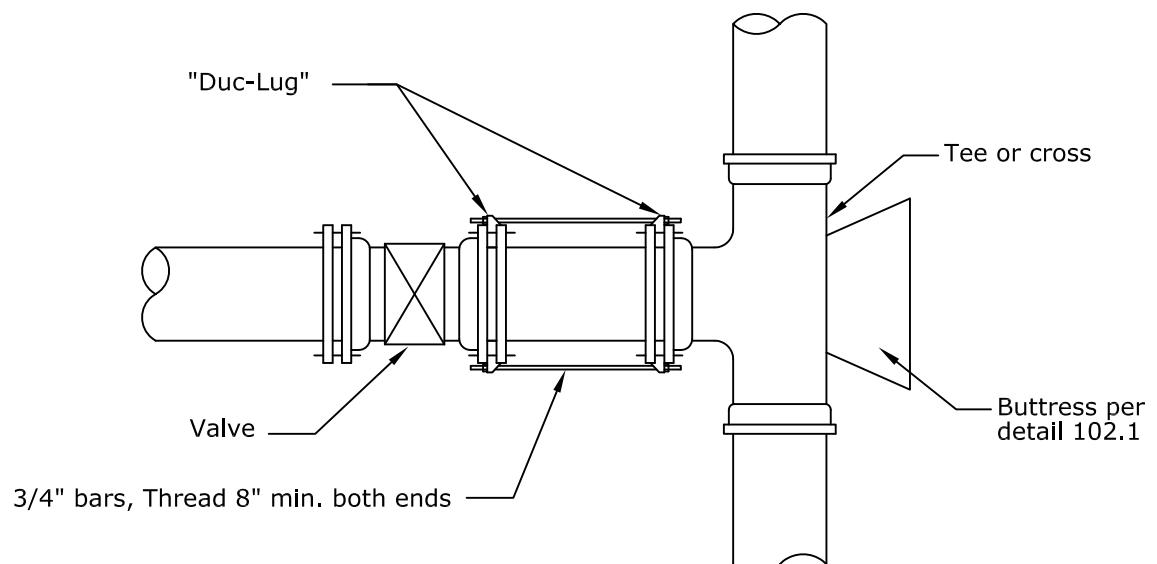
B= 12" for pipes 10" or less, 18" for pipes 10" to 18" nominal diameter  
 P.W. - O.D. + 2E.

E= See Detail 2.1

Notes:

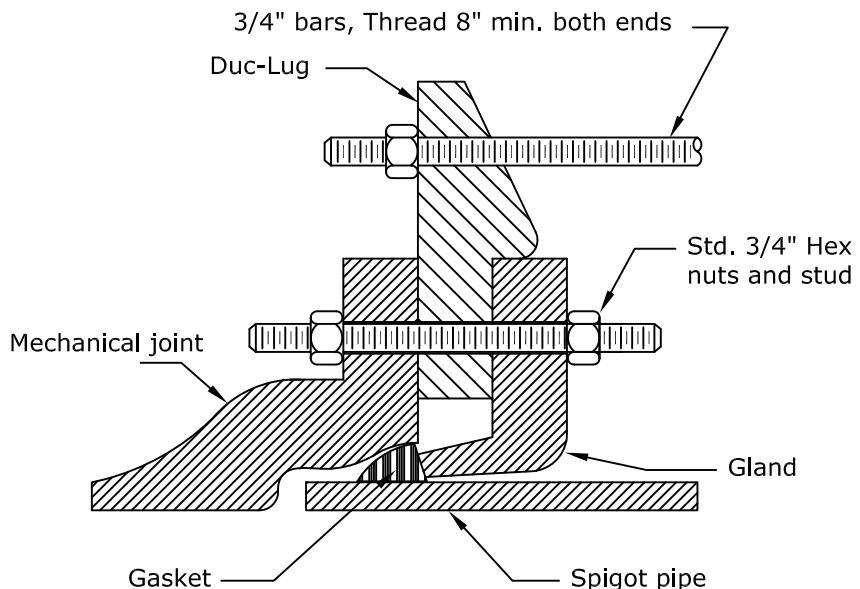
1. Provide no anchors on grades less than 20% unless noted on the plans.
2. Provide anchors 36 feet center to center on grades between 20% & 34%.
3. Provide anchors 24 feet center to center on grades between 34% & 50%.
4. On grades over 50% the method of anchoring pipe is to be determined via geotechnical study.
5. Provide anchors 16 feet center to center on grades between 50% & 70%.
6. All anchors to be MSHA mix no. 1 concrete, placed downgrade of bell, as shown above.
7. Place anchors in multiple lengths, 18' or 20', if anchors is to be immediately downgrade of bell.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Concrete Anchors for Pipe Installed on Grades 20% or More	Detail No.  106.1
	Date	Note		
				Date: 01-24-2013



## Plan

Valve size	No. of 3/4" dia bars required	Max. Spigot length
3"	2	27"
4"	2	27"
6"	2	27"
8"	2	27"
10"	4	27"
12"	6	27"
16"	8	36"
20"	12	36"
24"	16	36"
30"	20	36"



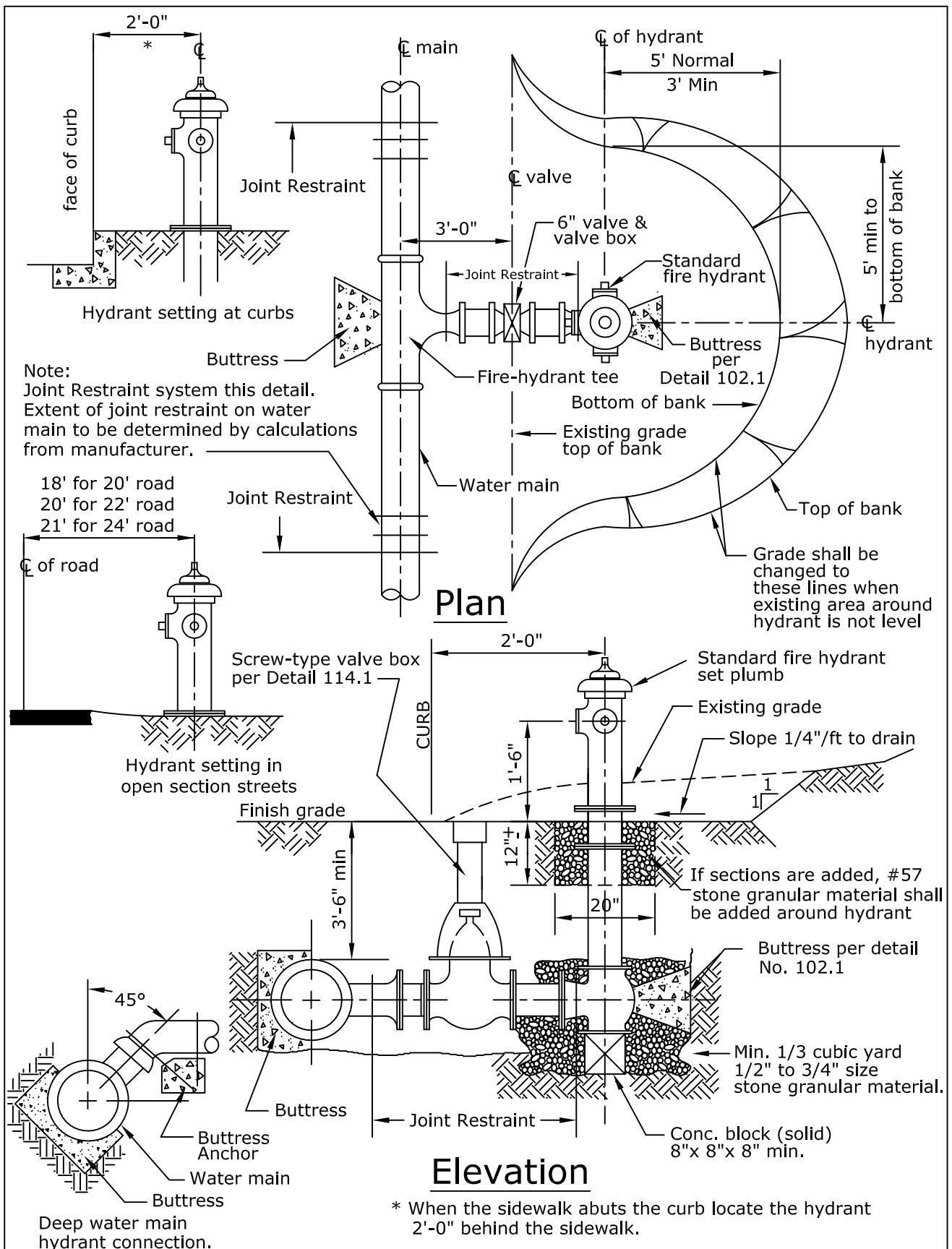
## Cross Section of Lug Assembly

### Notes:

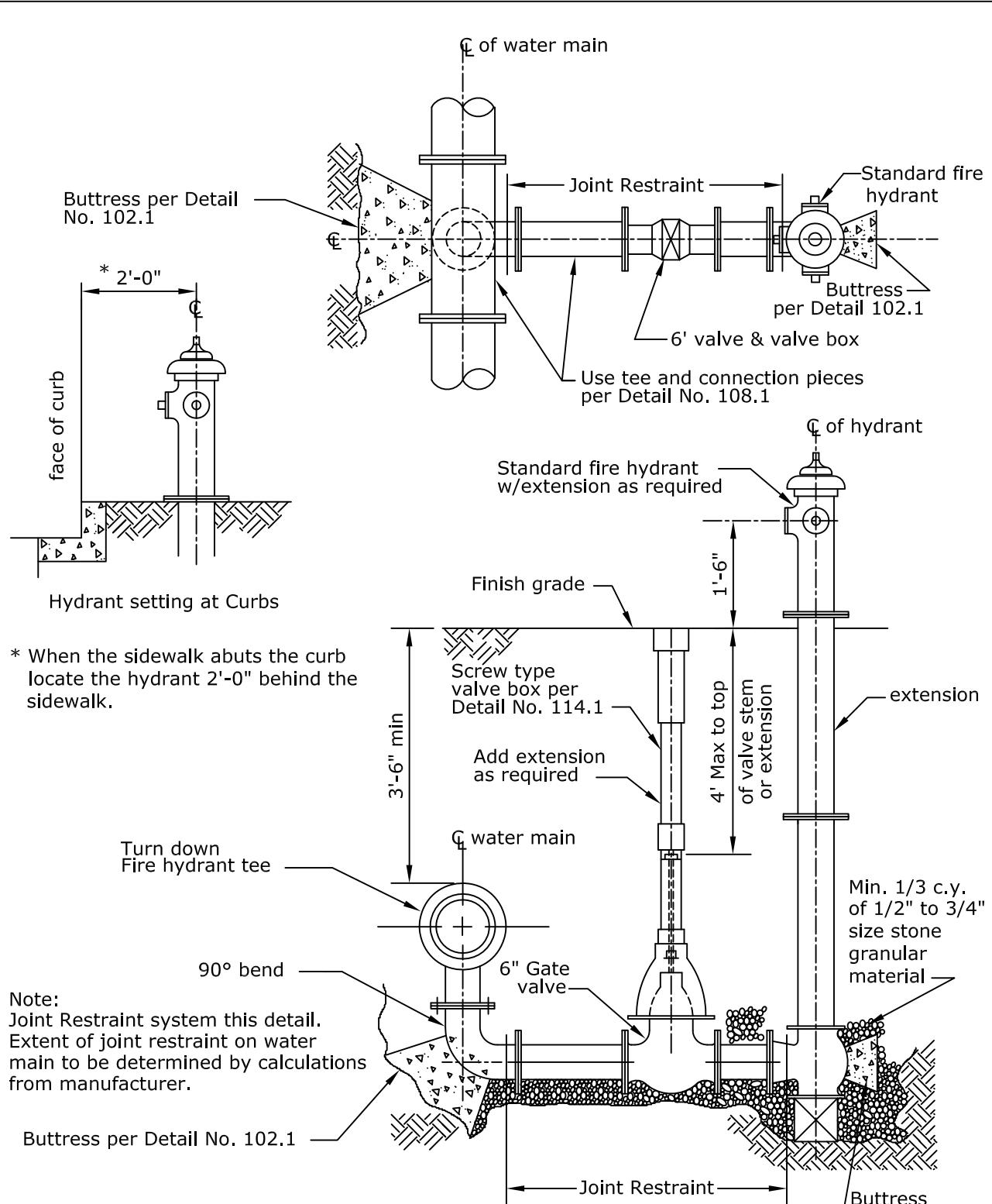
1. Mechanical joint fittings only shall be used.
2. All steel shall be coated with two coats of bituminous paint, conforming to MIL-P-23236P, class 2.
3. If tapping sleeve & valve are used, omit strapping and spigot pipe.
4. Tie bolts by "Star" are an approved equal to "Duc-Lugs".
5. "Duc-Lugs" only to be used when "Mega-Lug" restraint is not possible.

\* Used as alternative to Mega-Lug restraints.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Method of Strapping Valve to Tee with "Duc-Lugs"	Detail No. 107.1
	Date	Note		
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				Date: 01-24-2013

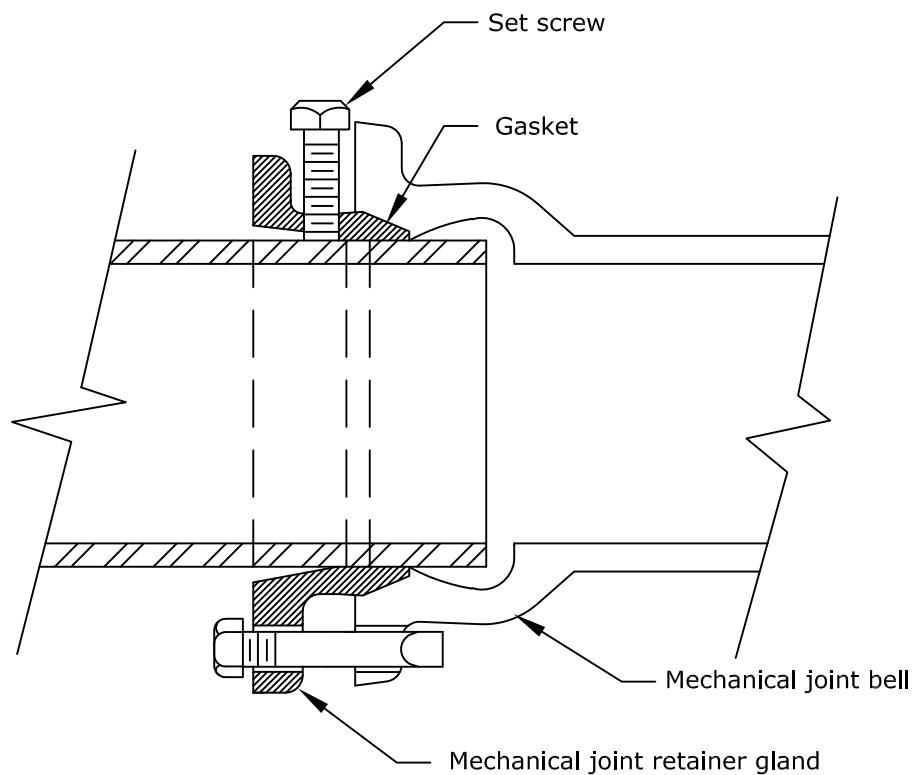


Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Fire Hydrant Setting and Grading	Detail No. 108.1
	Date	Note		
.	.	.	.	Date: 01-24-2013



Note: Alternate method per Detail No. 108.1 requires rodding.  
1. When hydrant height would exceed 8'-0" then 45° vertical bends may be used in place of the 90° bends to mitigate necessary cut and hydrant height.

Frederick County Division of Utilities & Solid Waste Management Department of Engineering & Planning	Revisions		Low Point Dewatering Fire Hydrant	Detail No. 108.2
	Date	Note		
				Date: 01-24-2013



Nominal size in inches	No. of set screws	Pressure rating in PSI
3	4	300
4	4	300
6	6	300
8	9	200
10	16	200
12	16	200
16	24	200
20	28	200
24	32	150
30	40	150

Notes:

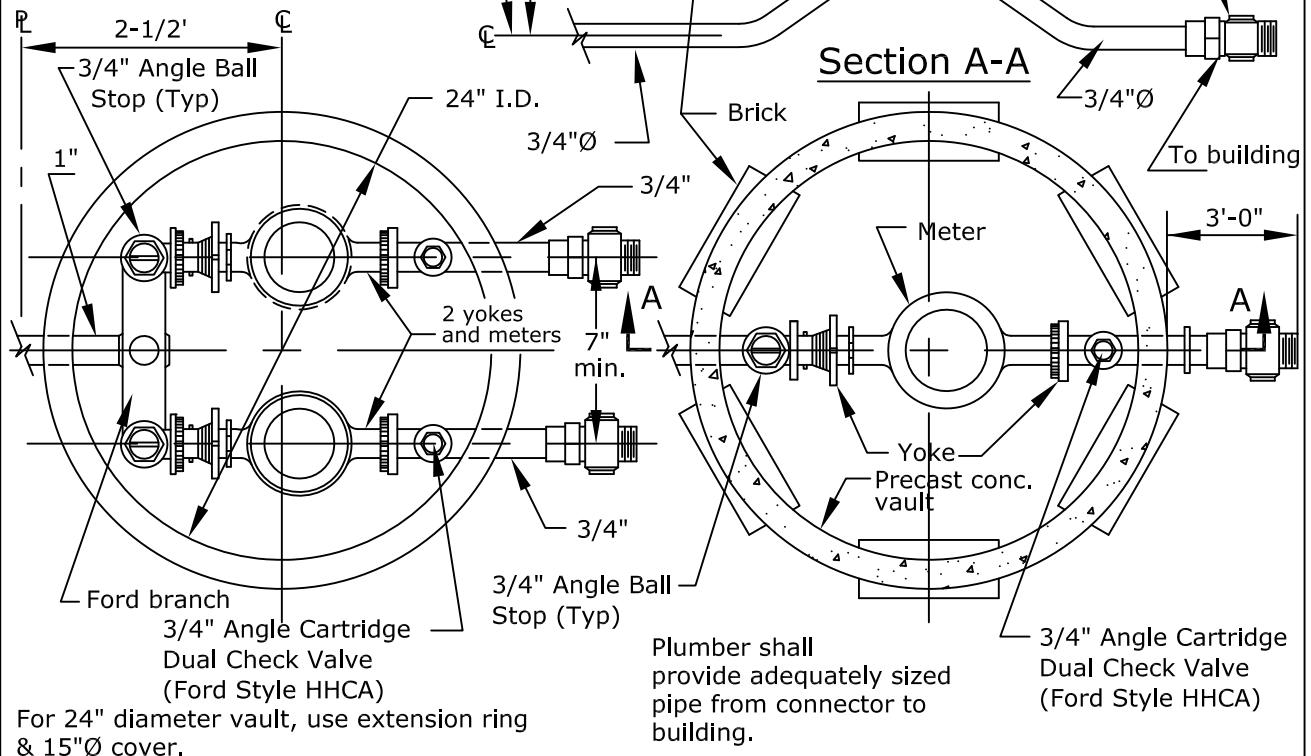
1. Mechanical joint pipe & fittings only.
2. All set screws are 5/8" with hardened cupped ends and 5/8" square heads.
3. Sizes 16" through 30" are for installation on ductile iron pipe only.
4. Tighten set screws evenly to 80 foot-pounds on 3"-12" glands and 65 foot-pounds on 16"- 30" glands.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Mechanical Joint Retainer Gland	Detail No. 109.1
	Date	Note		
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				Date: 01-24-2013

Notes:

1. Idler shall be furnished by contractor with a Ford EC-23 expansion connection or approved equal and be installed in the yoke for testing purposes and shall remain installed until the meter is installed by the County.
2. Single 3/4" meter all pipe and fittings shall be 3/4". Single 1" meter all pipe and fittings shall be 1". See Section 02550 of Standard Specifications. Double connections will require minimum 1" service from main to meter.
3. Vault shall be placed on bricks. Bricks shall be placed on compacted or undisturbed earth.
4. All angle stops shall have locking wings
5. For a double hole cover add two "t's" (Example A53TTPP)
6. 3/4" meter shall only be used to serve existing structures W/O sprinklers systems.

Type K copper from corporation stop in water main installed without splices.



## Double Service Plan

Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

### Revisions

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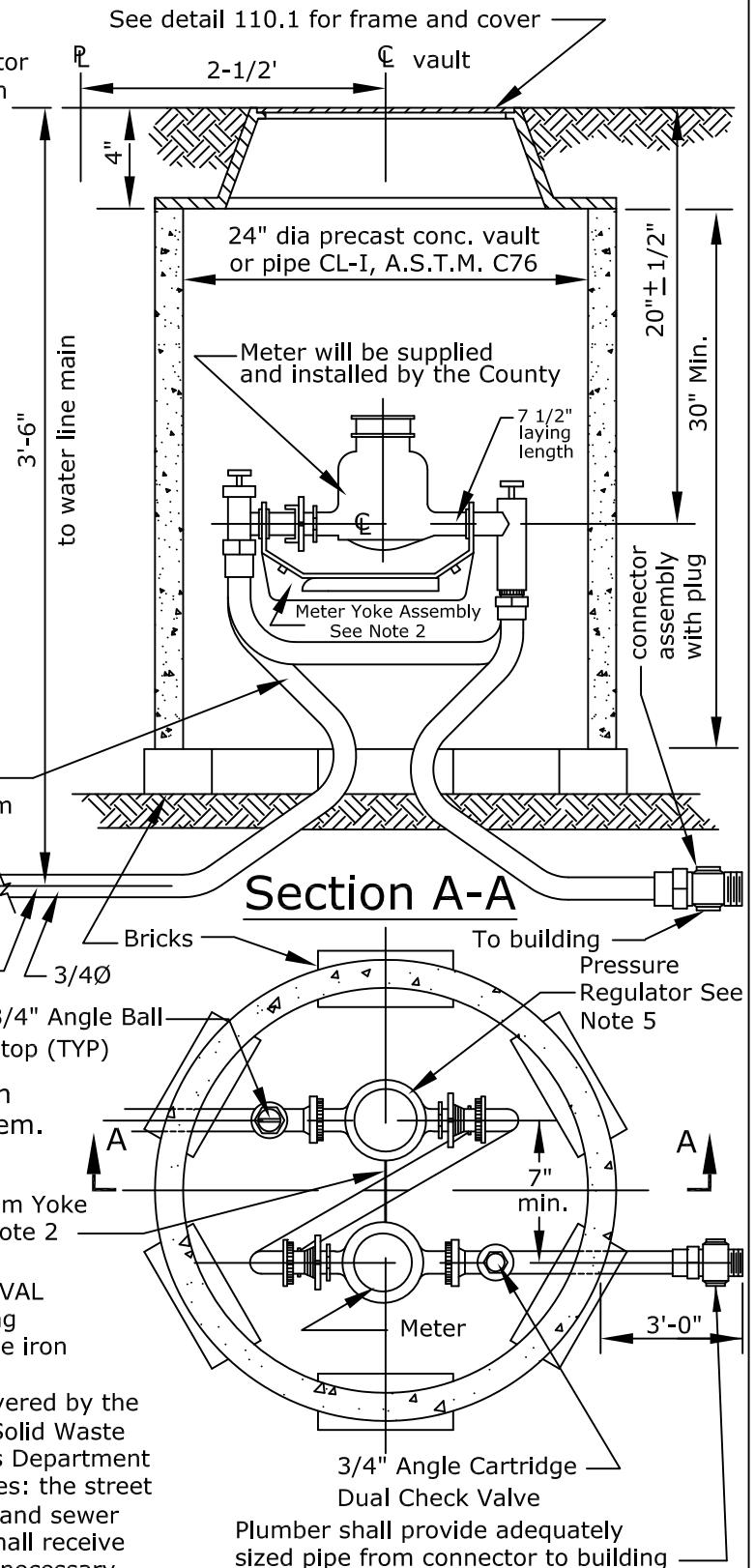
## Single Service Plan

3/4" & 1" Water  
Meter Setting

Detail No.
110.1
Date: 01-24-2013

Notes:

1. Idlers shall be furnished by the contractor with a Ford EC-23 expansion connection or approved equal and be installed in both yokes for testing purposes and shall remain installed until the meter and PRV are installed by the County.
2. Twin yoke assembly shall be a 5/8" x 3/4" Ford model A-95095 or approved equal. Assembly includes: yoke bars, PRV adapters, yoke elbows (with crossover pipe), angle valve and angle cartridge dual check valve.
3. Vault shall be placed on bricks. Bricks shall be placed on compacted or undisturbed earth.
4. All angle stops shall have locking wings



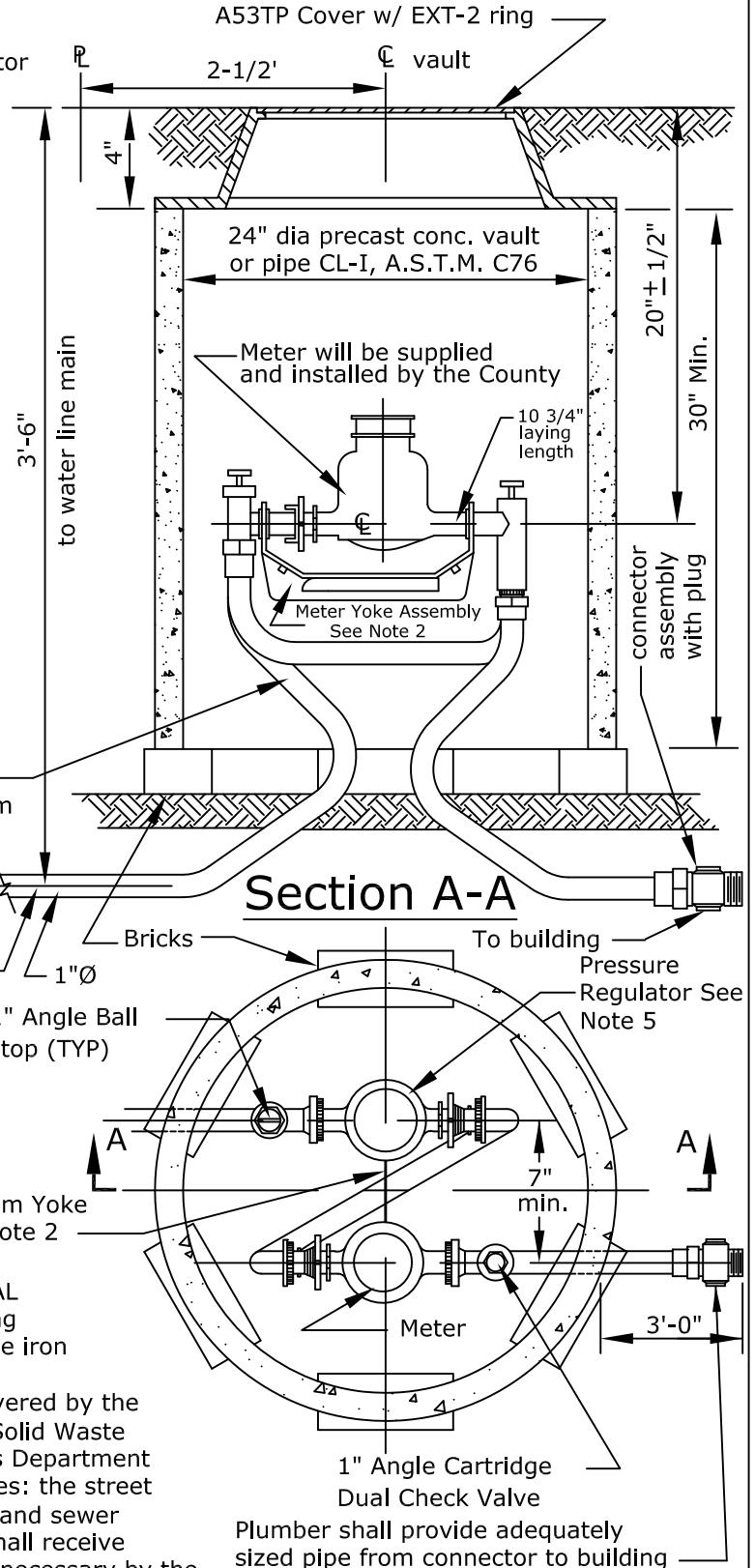
5. The contractor shall furnish a 3/4" CLA-VAL Model No. 990 PRV with two (2) reducing bushings. Bushings shall be brass female iron pipe thread by male iron pipe thread. The PRV and two bushings shall be delivered by the contractor to the Division of Utilities & Solid Waste Management Water & Sewer Operations Department with an itemized transmittal that includes: the street name, subdivision name, County water and sewer contract number, lot numbers(s) that shall receive the PRV(s) and any other item deemed necessary by DUSWM.

## Single Service Plan

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		3/4" Water Meter Setting with Pressure Regulator	Detail No. 110.2
	Date	Note		
				Date: 01-24-2013

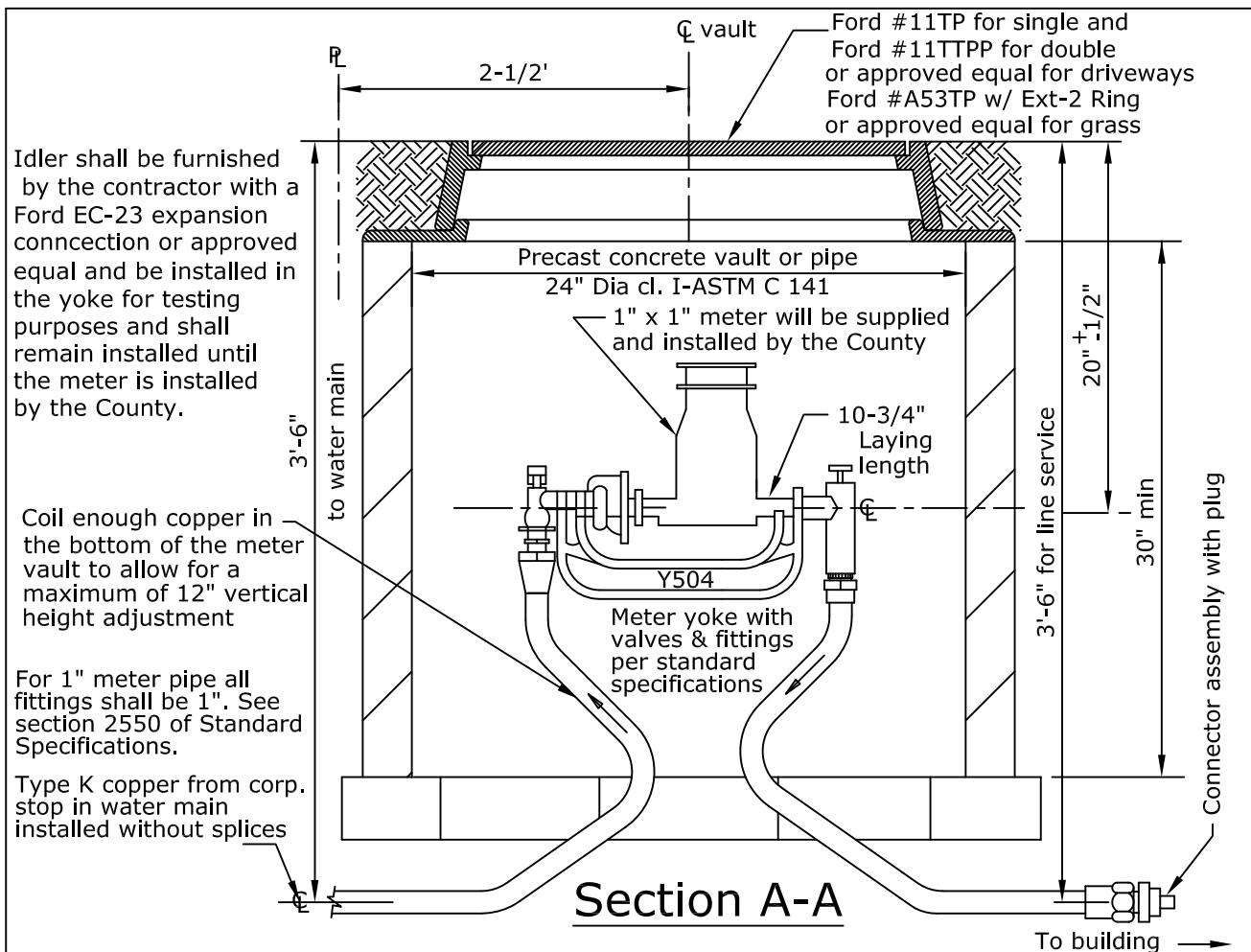
Notes:

1. Idlers shall be furnished by the contractor with a Ford EC-4 expansion connection or approved equal and be installed in both yokes for testing purposes and shall remain installed until the meter and PRV are installed by the County.
2. Twin yoke assembly shall be a 1" Ford drawing number B-95095-059 approved equal. Assembly includes: yoke bars, PRV adapters, yoke elbows (with crossover pipe), angle ball valve angle cartridge dual check valve.
3. Vault shall be placed on bricks. Bricks shall be placed on compacted or undisturbed earth.
4. All angle stops shall have locking wings



## Single Service Plan

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		1" Water Meter Setting with Pressure Regulator	Detail No. 110.3
	Date	Note		
				Date: 01-24-2013

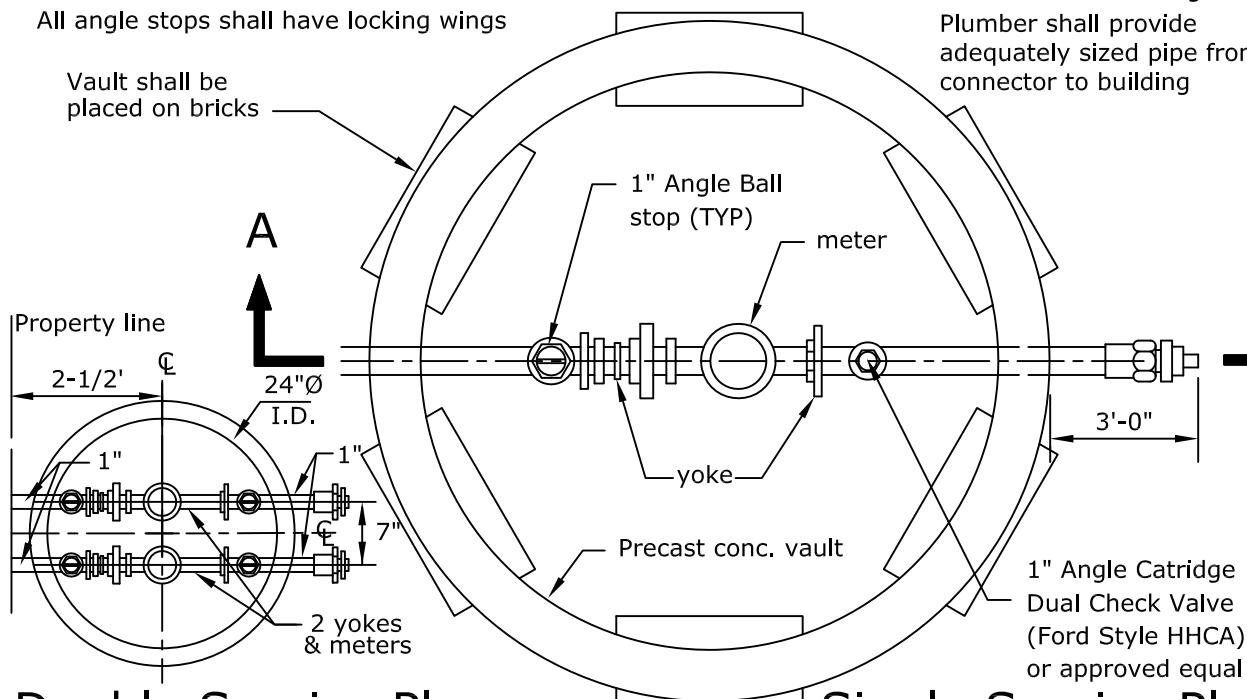


Section A-A

All angle stops shall have locking wings

Vault shall be placed on bricks

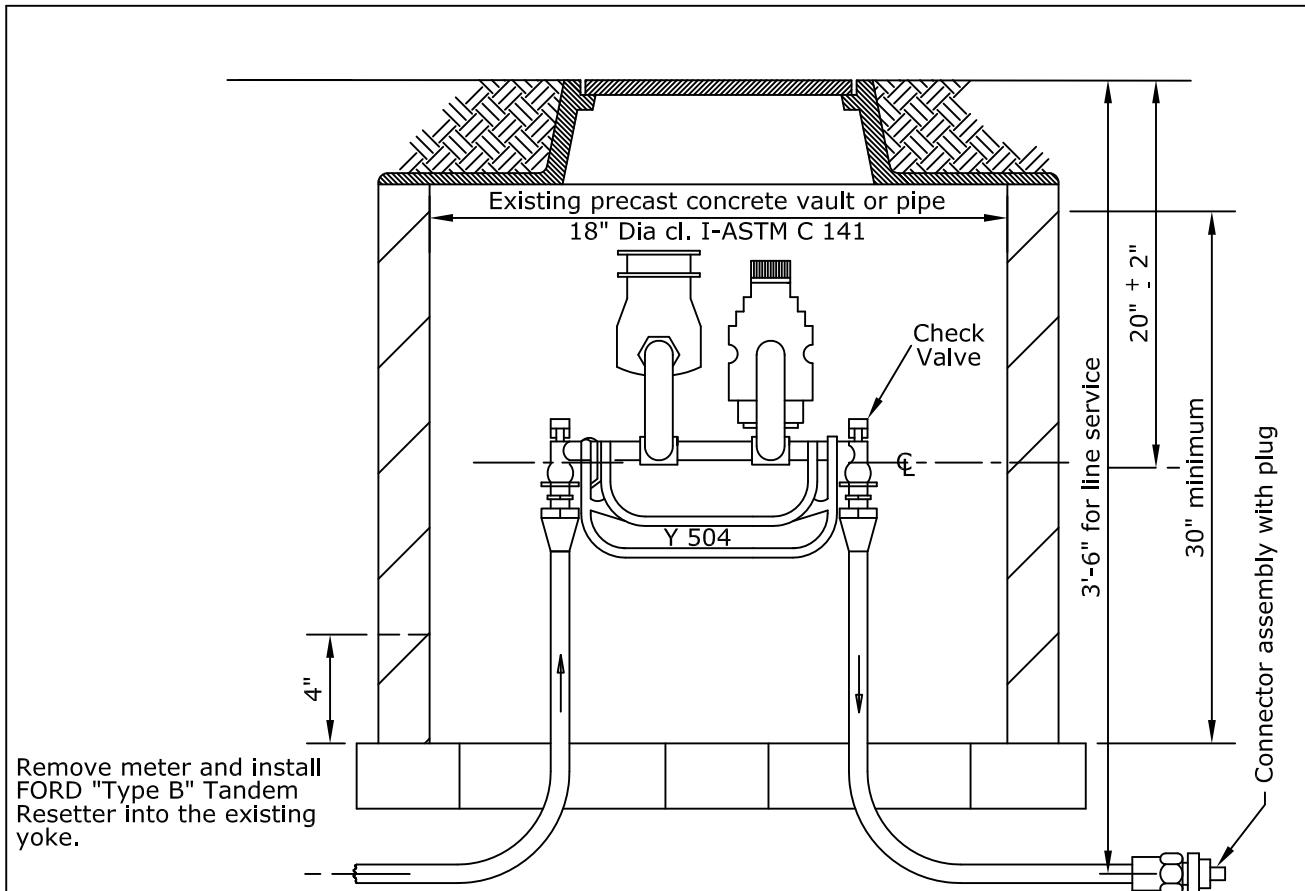
Plumber shall provide adequately sized pipe from connector to building



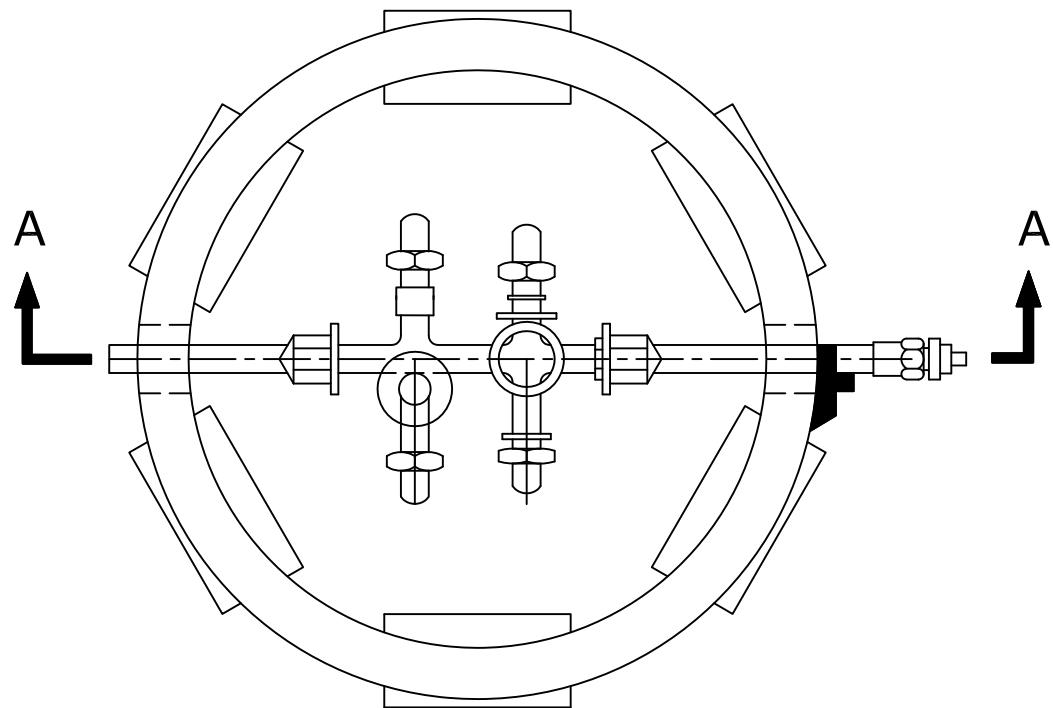
Double Service Plan

Single Service Plan

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Single & Double 1" Water Meter Setting (Townhouse)	Detail No. 110.4
	Date	Note		
				Date: 01-24-2013



Section A-A

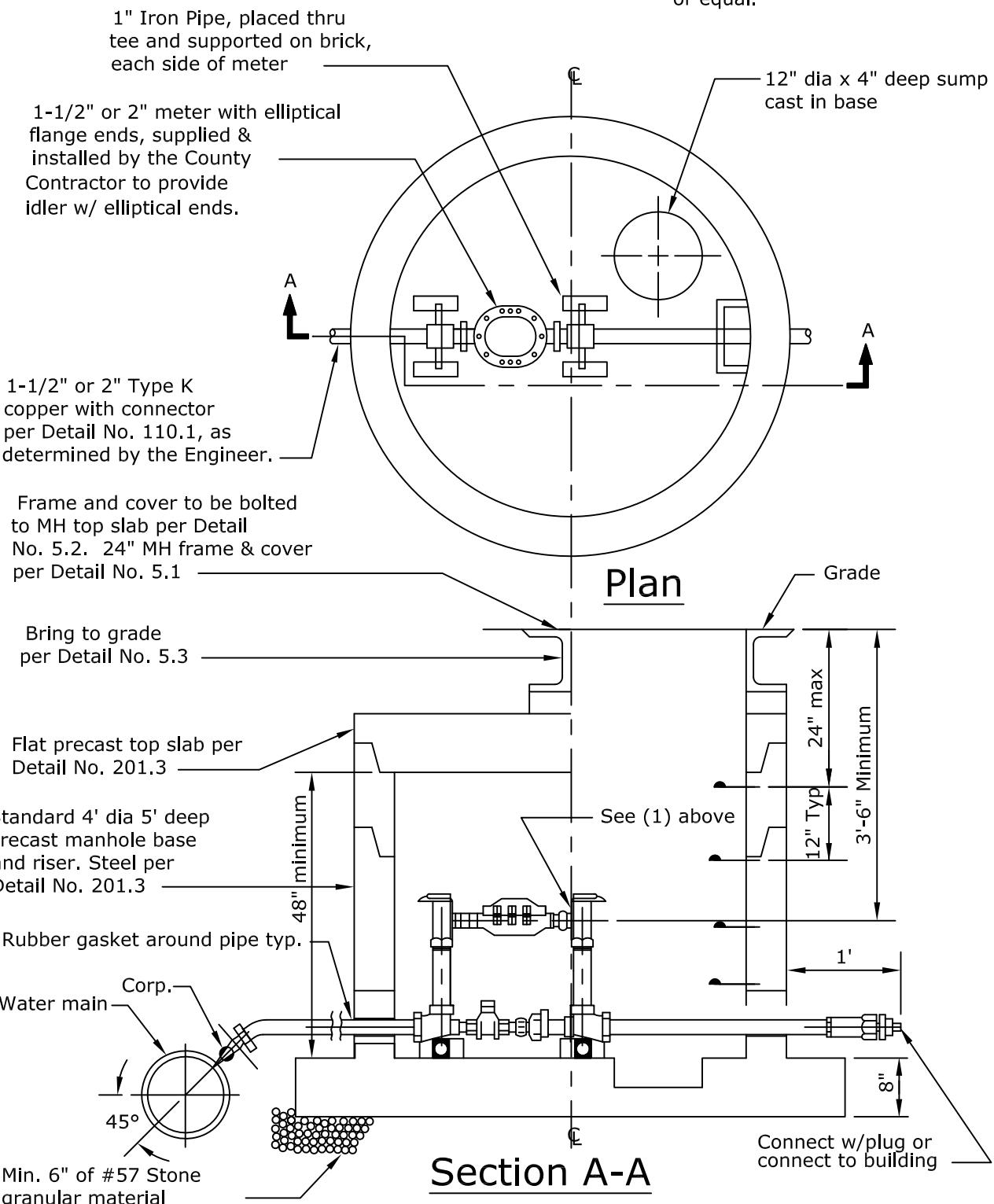


Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Retro-fitting of 3/4" Water Meter with Pressure Regulators	Detail No. 110.5
	Date	Note		
.	.	.		Date: 01-24-2013

Waterproof all joints between top, bottom and grade rings with rubber gasket or equal.

(1) 1-1/2" meter use Ford Custom setter "VBHH76-15B-44-66-G or equal.

2" meter use Ford Custom setter "VBHH77-15B-44-77-G or equal.



Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

Revisions

Date	Note
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1-1/2" & 2" Water Meter Installation

Detail No.

111.1

Date:  
01-24-2013

Buttresses shall conform to Detail No's 102.1 & 103.1

## Plan

Grade → Bring to grade per Detail No. 5.3  
Provide (4) 2" dia holes to anchor  
F.& C. per Detail No. 5.3

## Notes:

Notes:

1. Reinforcing steel to be designed for min. H-20 loading.
2. Provide a min. of eight diameters of straight pipe at inlet end of installation.
3. 1", 1-1/2", 2" by-pass lines to be Copper Type "K" and placed inside vault, all others outside vault.
4. For the 2" meter use copper tubing, 2" x 1" copper tee, copper to iron thread adaptors, brass valves, brass pipe nipples, and connect to meter w/class 125 flanges.
5. All joints shall have a flexible gasket, be parged with non-shrink grout and waterproofed with a bituminous coating, conforming to MIL-P-23236 P class 2.
6. Provide MH frame and cover per Detail No. 5.1 except that cover shall be labeled "Frederick County Water" and is 30"Ø.
7. Standon adjustable pipe support model S-89 as mfg. by Material Resources, or equal.
8. All vault dimensions are minimum.

□ 9. Drawings are not to scale.

9. Drawings are not to scale.

10. Mechanical joint restraint may be used to negate need for concrete thrust blocks.

Final determination shall be made by DUSWM

Department of Engineering and Planning.

### Vaults to be Precast Conc.

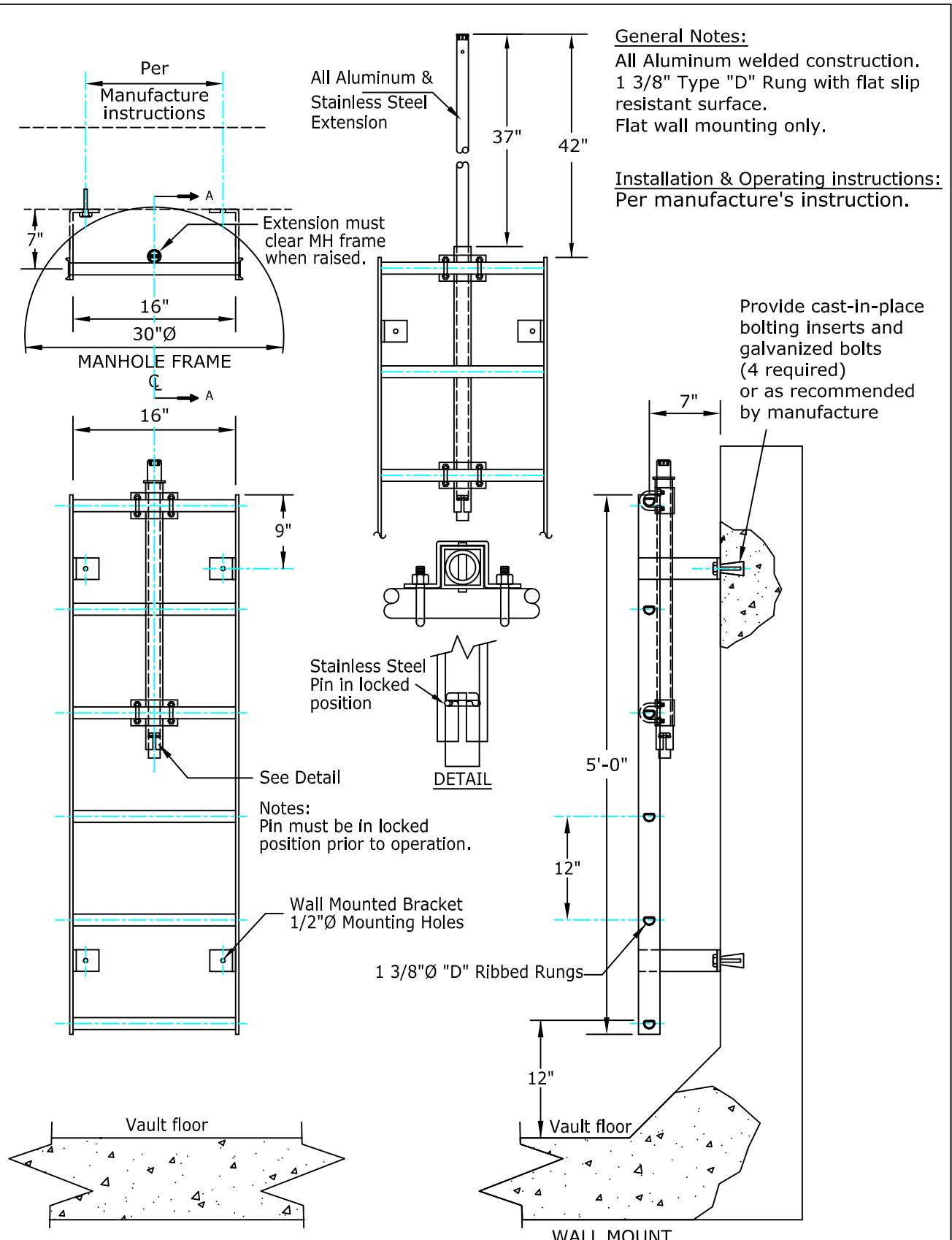
Provide top slab with removable section as per detail.

Meter size	By Pass size	A	B	C	D	E	MH dia
3"	1-1/2"	72"	72"	84"	84"	46"	30"
4"	2"	72"	72"	84"	84"	47"	30"
6"	3"	84"	72"	84"	96"	51"	30"
8"	4"	96"	96"	108"	108"	57"	30"
10"	6"	108"	96"	108"	120"	66"	30"

Frederick County  
Division of Utilities &  
Solid Waste Management  
  
Department of  
Engineering & Planning

## 3", 4", 6", 8" and 10" Compound and Detector Meter Installation

Detail No.  
112.1  
Date:  
01-24-2013



Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

**Revisions**

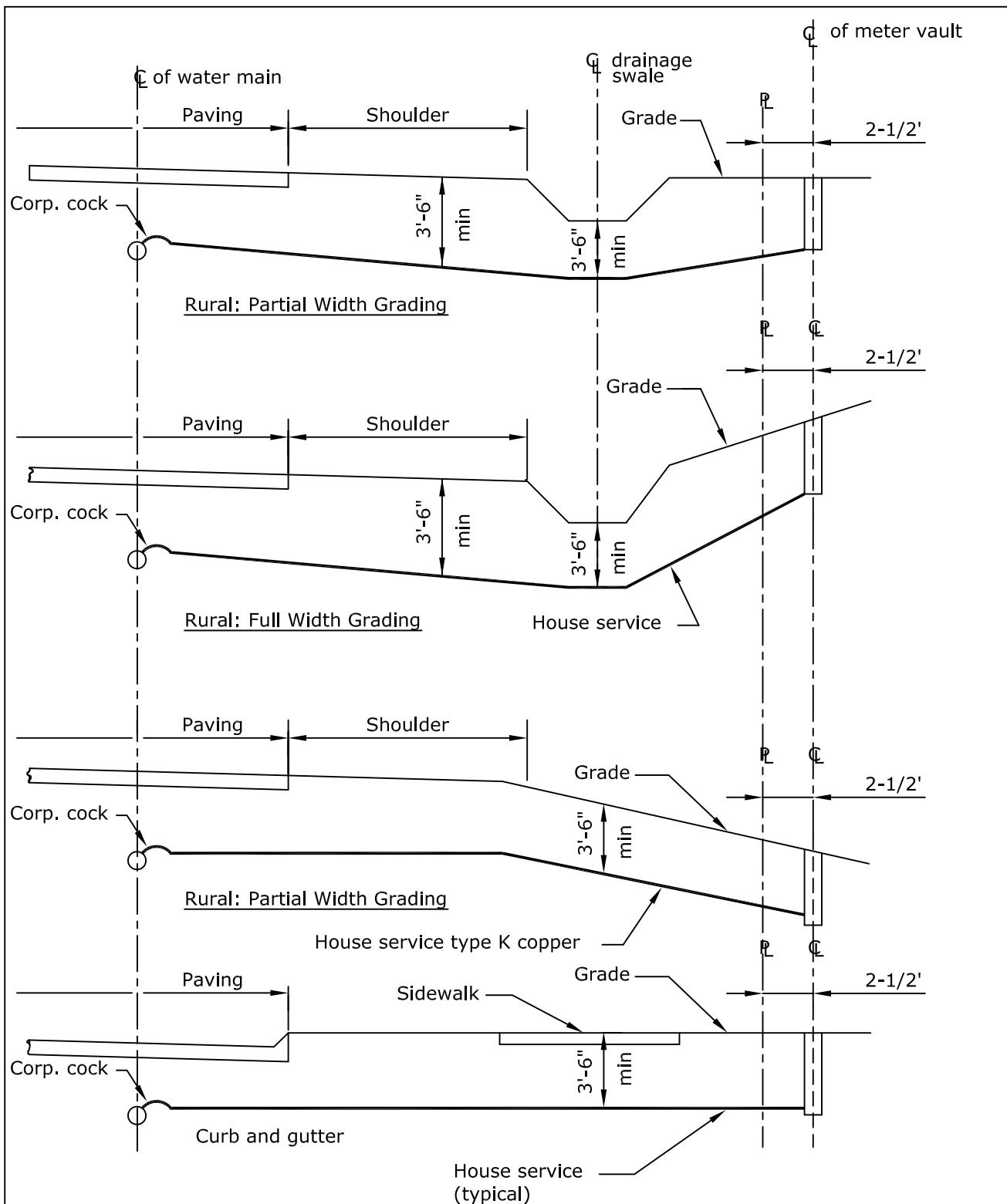
Date	Note
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**Meter Vault Ladder  
with Support  
Extension**

**Detail No.**

**112.2**

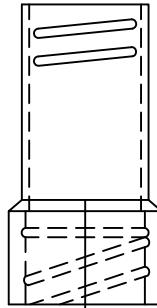
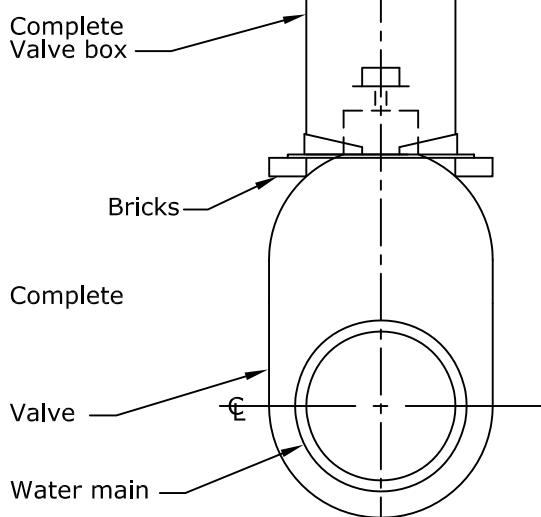
**Date:**  
01-24-2013



- 1: House service shall be type K copper pipe.
- 2: Meter vault shall be provided with a plug or cap unless house is connected immediately.
- 3: 1 1/2" & 2" lines require tapped tee at main line.

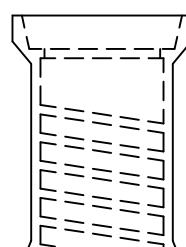
Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		3/4", 1", 1-1/2", & 2" Water House Connections	Detail No. 113.1
	Date	Note		
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				Date: 01-24-2013

Finish Grade → Box to be 1/4" to 1/2" below finish grade.  
 C of box & valve

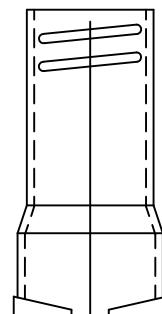


Drop Lid

Extension



Top

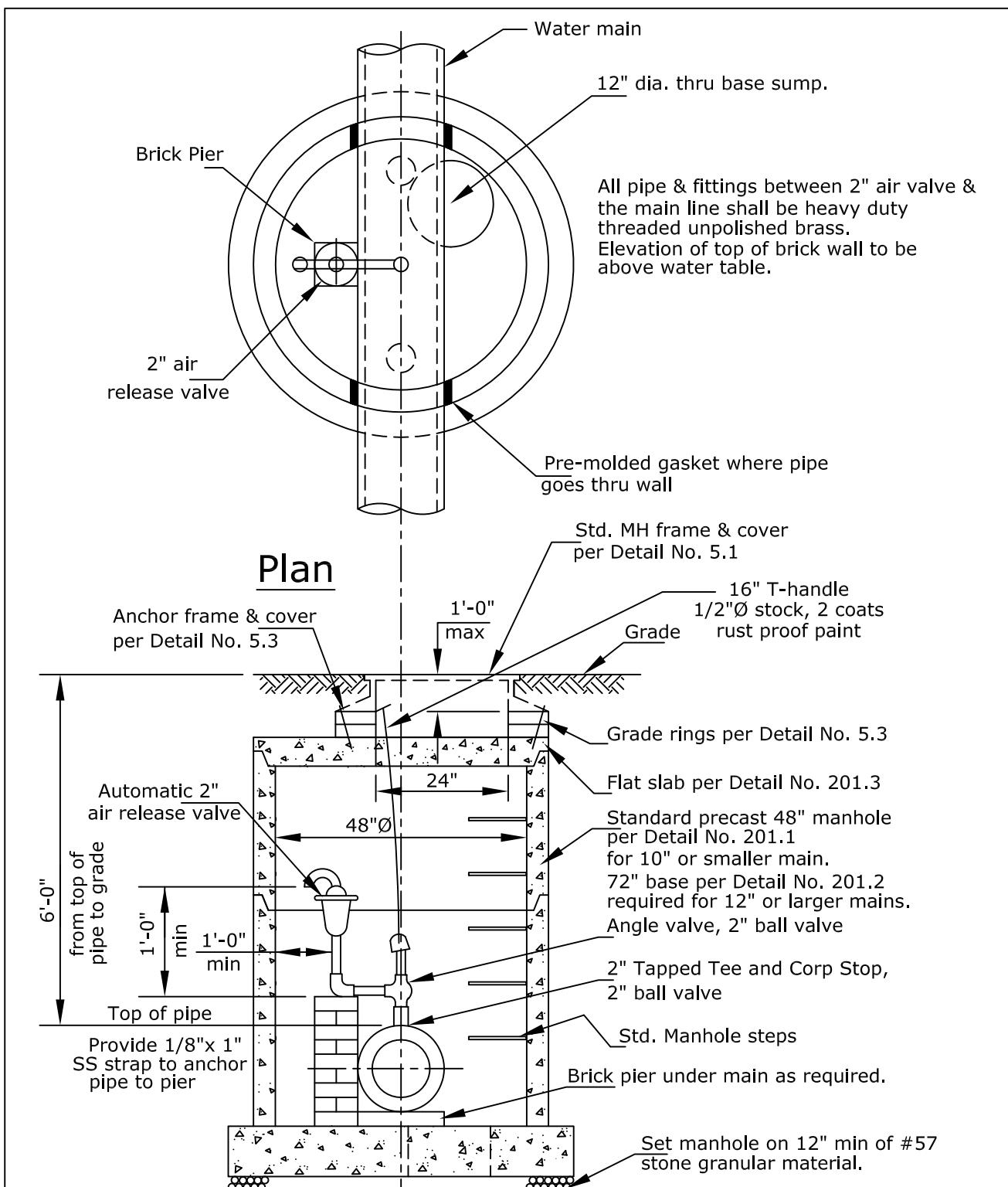


Bottom

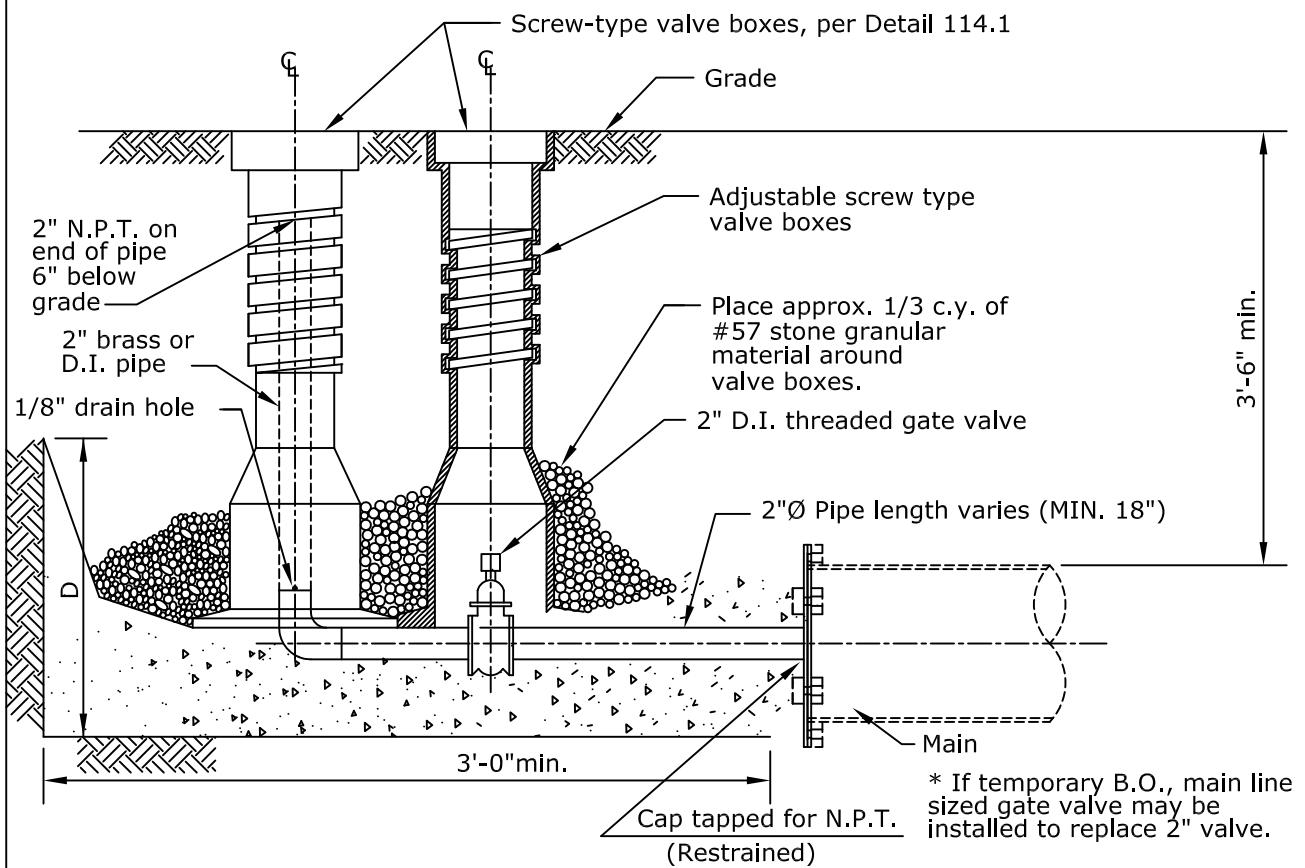
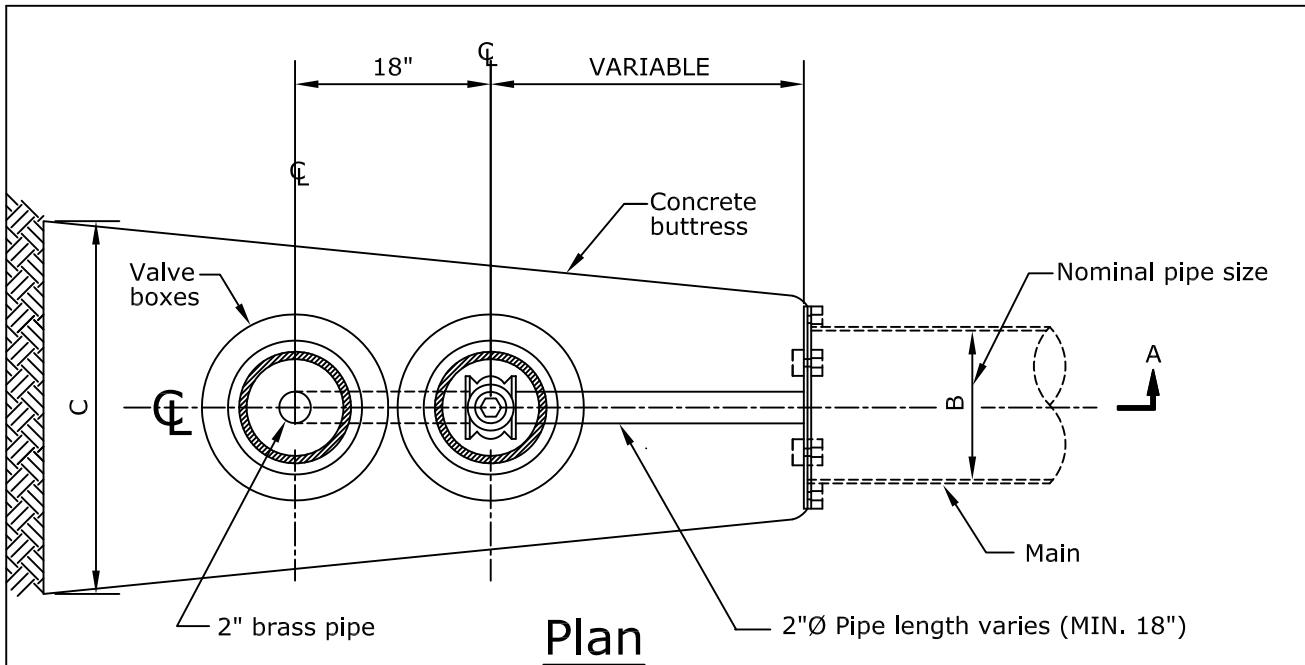
Notes:

1. Valve box bases shall be sized and installed so that valve box can not transfer loads to valves. Place base on bricks.
2. Valve box shall be adjusted to finished grade to allow future 6" adjustment up or down.
3. Valve boxes shall be cast iron, screw type with 5-1/4" shaft by Tyler Pipe, General Engineering or equal.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Valve Boxes for Water Mains	Detail No. 114.1
	Date	Note		
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				Date: 01-24-2013



Frederick County Division of Utilities & Solid Waste Management Department of Engineering & Planning	Revisions		2" Air Release Valve in MH for 24" & Smaller Water Mains	Detail No. 115.1
	Date	Note		
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				Date: 01-24-2013



To undisturbed ground  
(Limit of measurement for payment)

## Section A-A

Concrete shall be Mix. No. 1.

Buttress Dimensions in Inches						
B	4	6	8	10	12	16
C	17	17	23	29	34	45
D	10	12	16	20	24	32

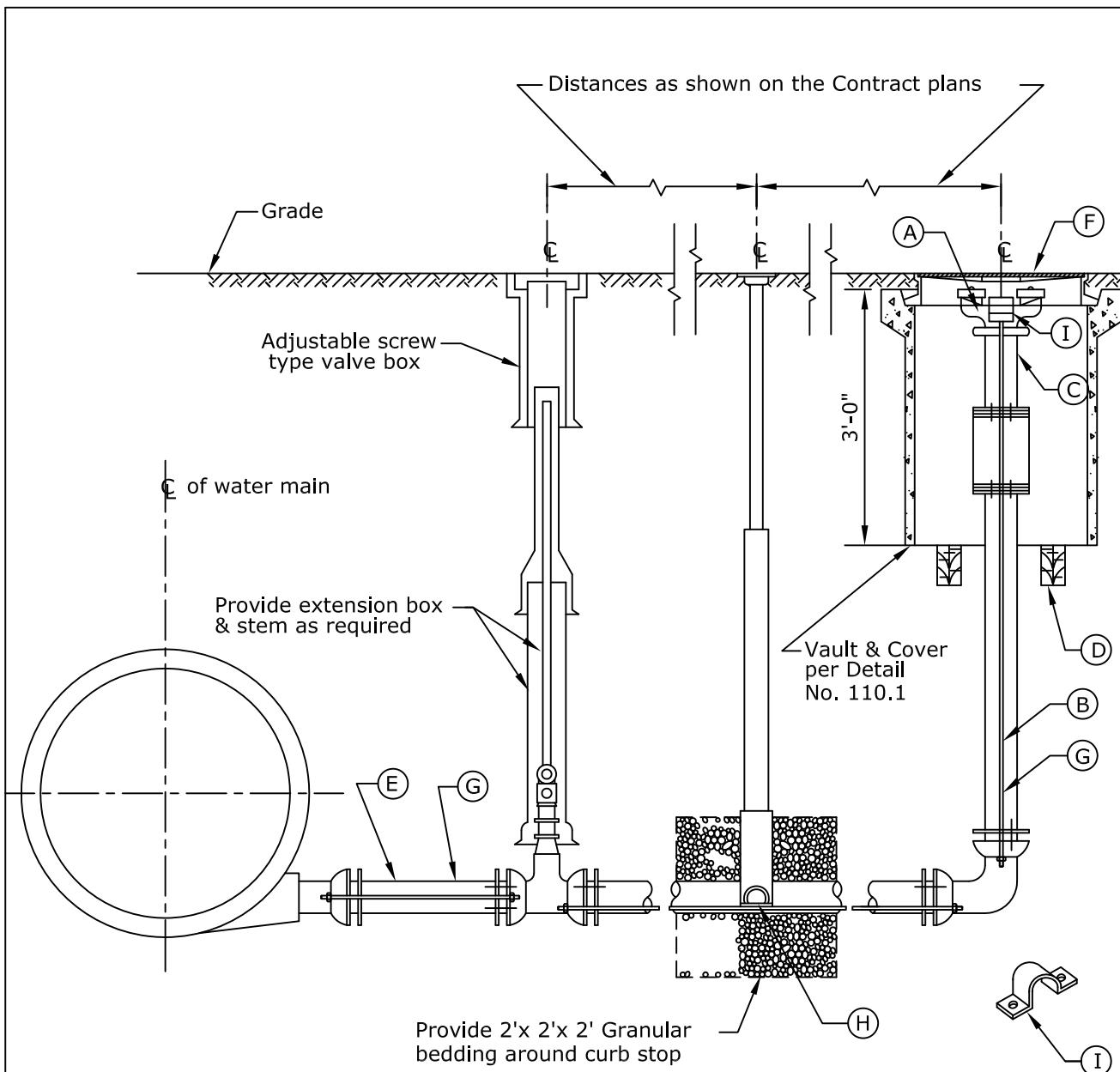
Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

### Revisions

Date	Note
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Cap and Blow-off  
at End of Main  
Modified

Detail No.  
116.1  
Date:  
01-24-2013



(A) 2-1/2"x 2-1/2"x4" straight body siamese connection-install without clappers.

(B) Strap siamese connection to bell of bend with two 3/4" dia stainless steel bars and strap I

(C) 1'-3" long-4" stainless steel pipe, 4-1/2" O.D. schedule 40 with one end plain and one end threaded to match thread on siamese connection.

(D) 2-pressure treated (rated for ground contact) oak 2x6's spiked together shall extend a min. of 18" on each side beyond the limits of the trench to firm bearing.

(E) Strap valve and 90° bend to main line using 3/4" stainless steel bars or retainer glands per Detail No. 107.1

(F) Siamese connection housing to be located outside of present or proposed traffic bearing area.

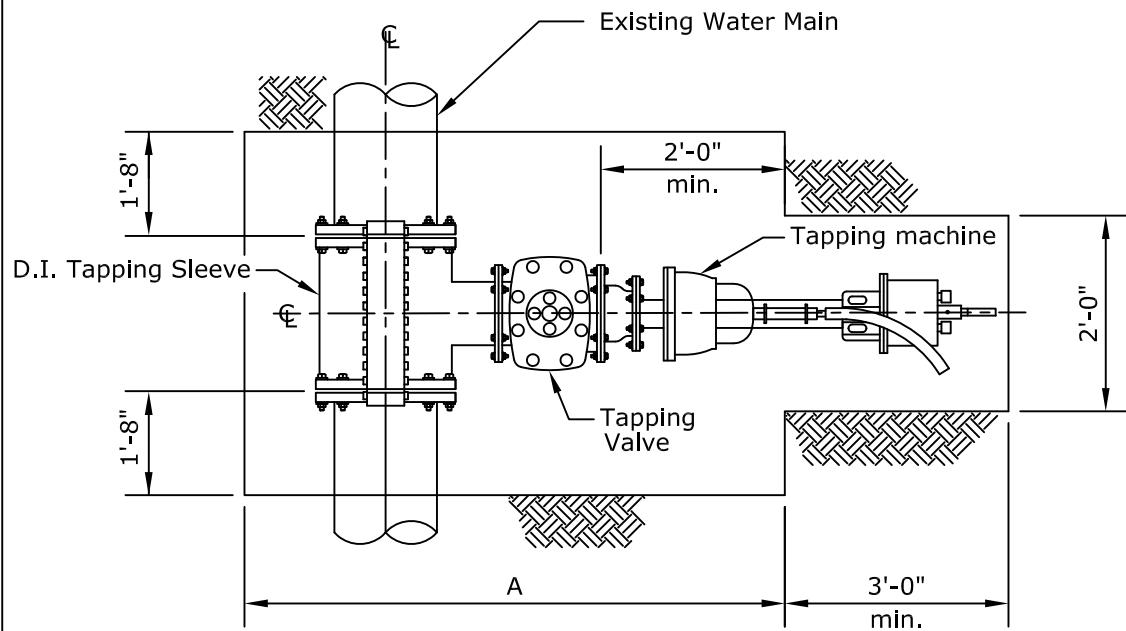
(G) Paint all exposed steel surfaces with 2 coats of bituminous paint per MIL-P-23236P, cl.2.

(H) 3/4" corp. cock, short copper nipple and curb stop with curb box and cut-off stem to ground surface as required to drain pipe.

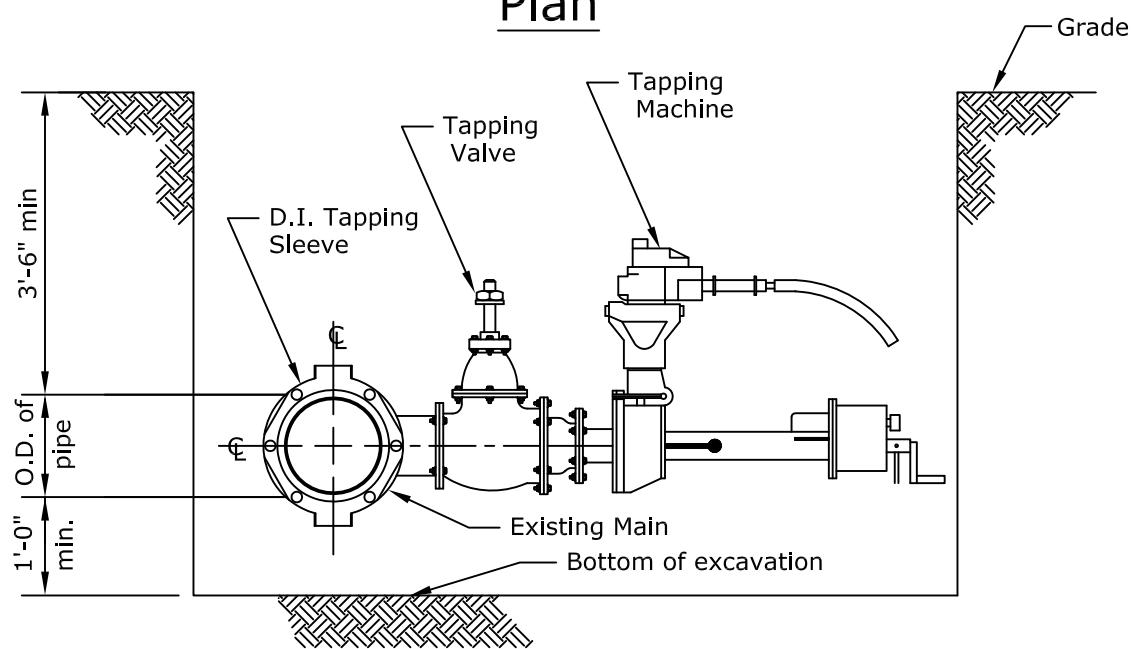
(I) 2-1/2" wide x 1/4" thick stainless steel strap bent to conform to the siamese connection.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Blowoff for 30" or 36" Water Mains	Detail No.  116.2
	Date	Note		
				Date: 01-24-2013

Main Dia.	4"	6"	8"	10"	12"	14"	16"	18"	20"
A (min)	4'-10"	5'-3"	5'-6"	5'-9"	6'-0"	6'-2"	6'-8"	7'-3"	7'-6"



## Plan



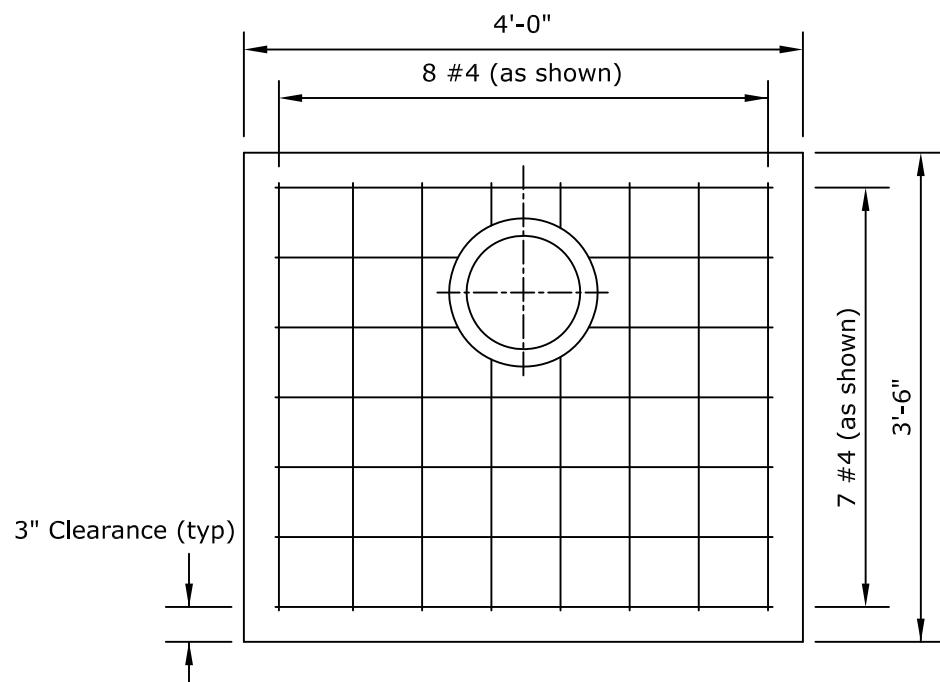
After tapping, buttress per Detail No. 103.1

## Elevation

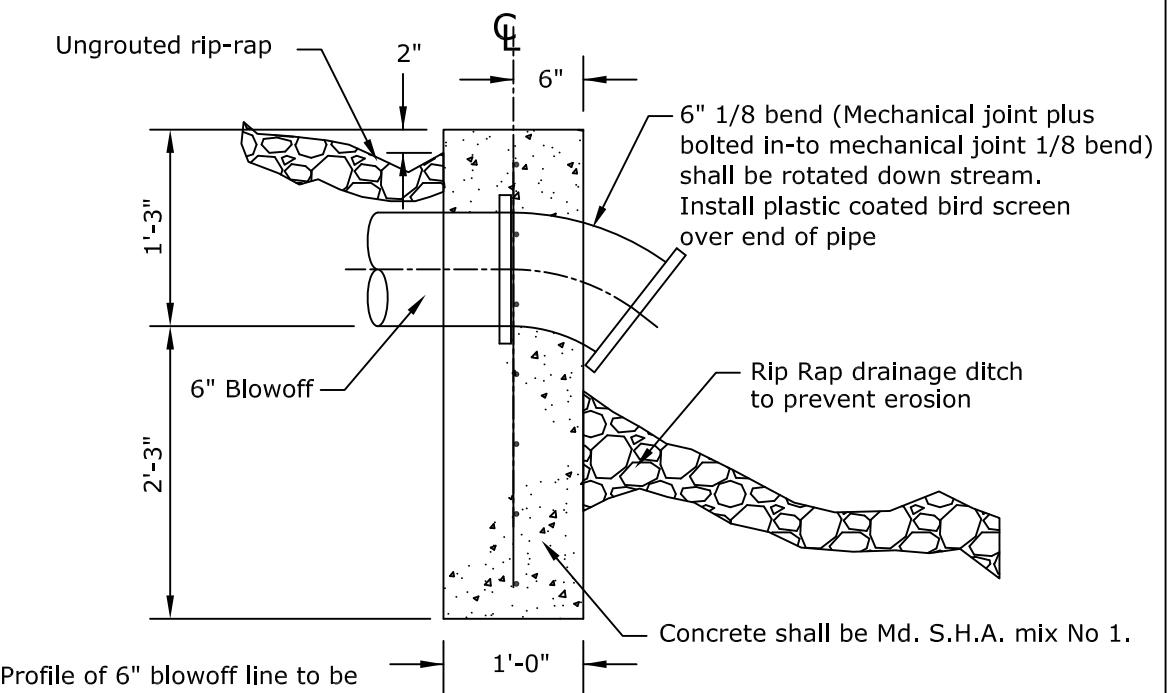
Not to scale

**NOTE:**  
**NO STAINLESS STEEL**

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Tapping Sleeve and Valve Installation	Detail No.
	Date	Note		117.1
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## Elevation

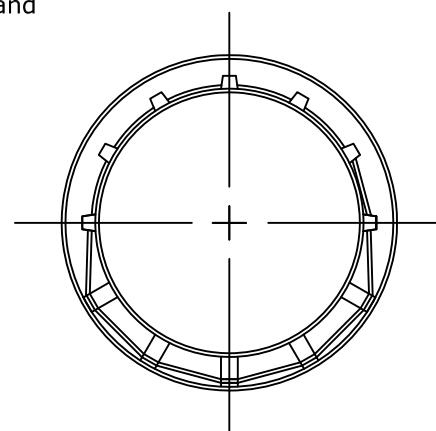
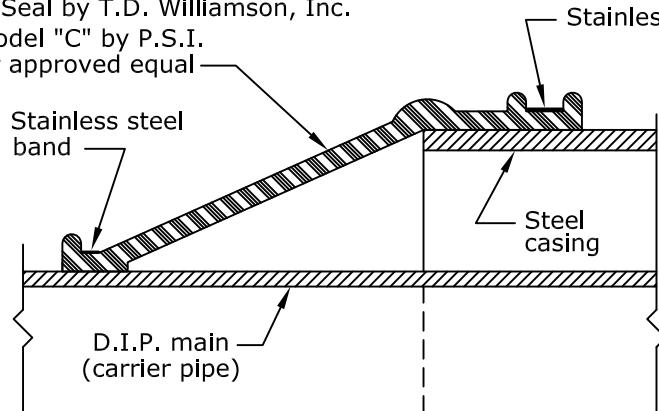


## Section

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Endwall For 6" Blowoff  <b>118.1</b>  <b>Date:</b> 01-24-2013
	Date	Note	
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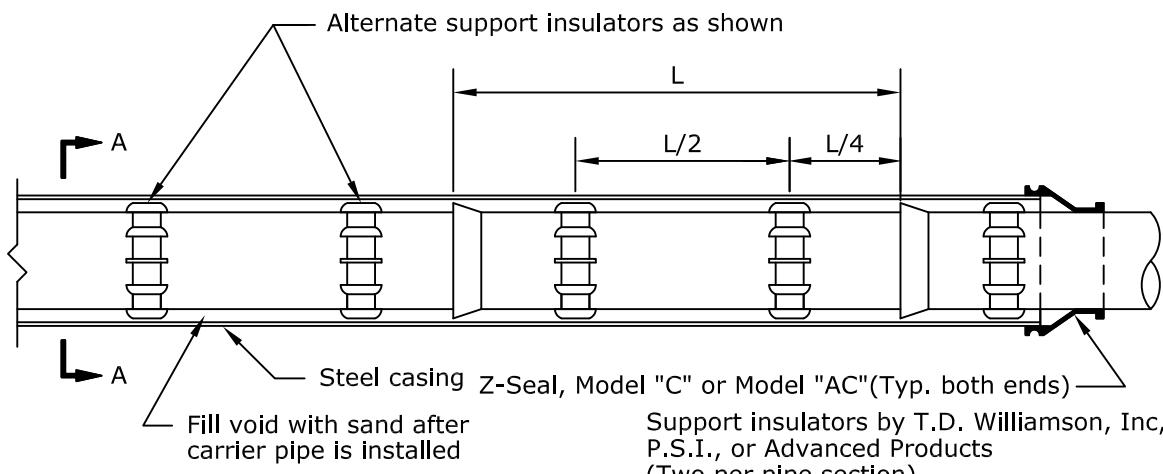
Model "AC" by Advanced Products and Systems  
 Z-Seal by T.D. Williamson, Inc.

Model "C" by P.S.I.  
 or approved equal



## End Seal Installation

## Section A-A



## Location of Insulators

Nominal Diameters in Inches

Main Diameter D.I.P.	Min. Steel Casing Diameter	
	Push Joint D.I.P.	Mech. Joint D.I.P.
3	10	12
4	10	12
6	12	16
8	16	18
10	18	20
12	20	24
14	24	24
16	30	30
18	30	30
20	30	36
24	36	36

Casing shall conform to AWWA C200.  
 Min. Wall thickness shall be 3/8".

Ductile Iron carrier pipe shall be coated in accordance with AWWA C-104.

All carrier pipe joints shall be restrained within casing.

Frederick County  
 Division of Utilities &  
 Solid Waste Management  
 Department of  
 Engineering & Planning

### Revisions

Date	Note
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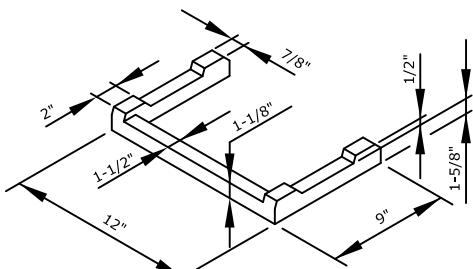
Casing for D.I.P.  
 Main under Highways  
 and Railroads

Detail No.

123.1

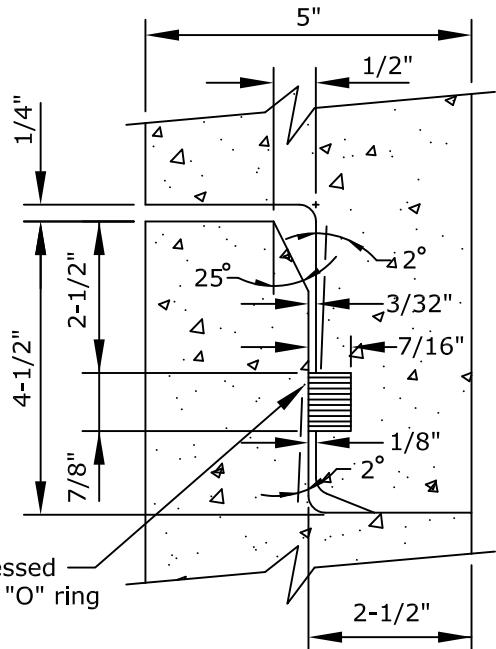
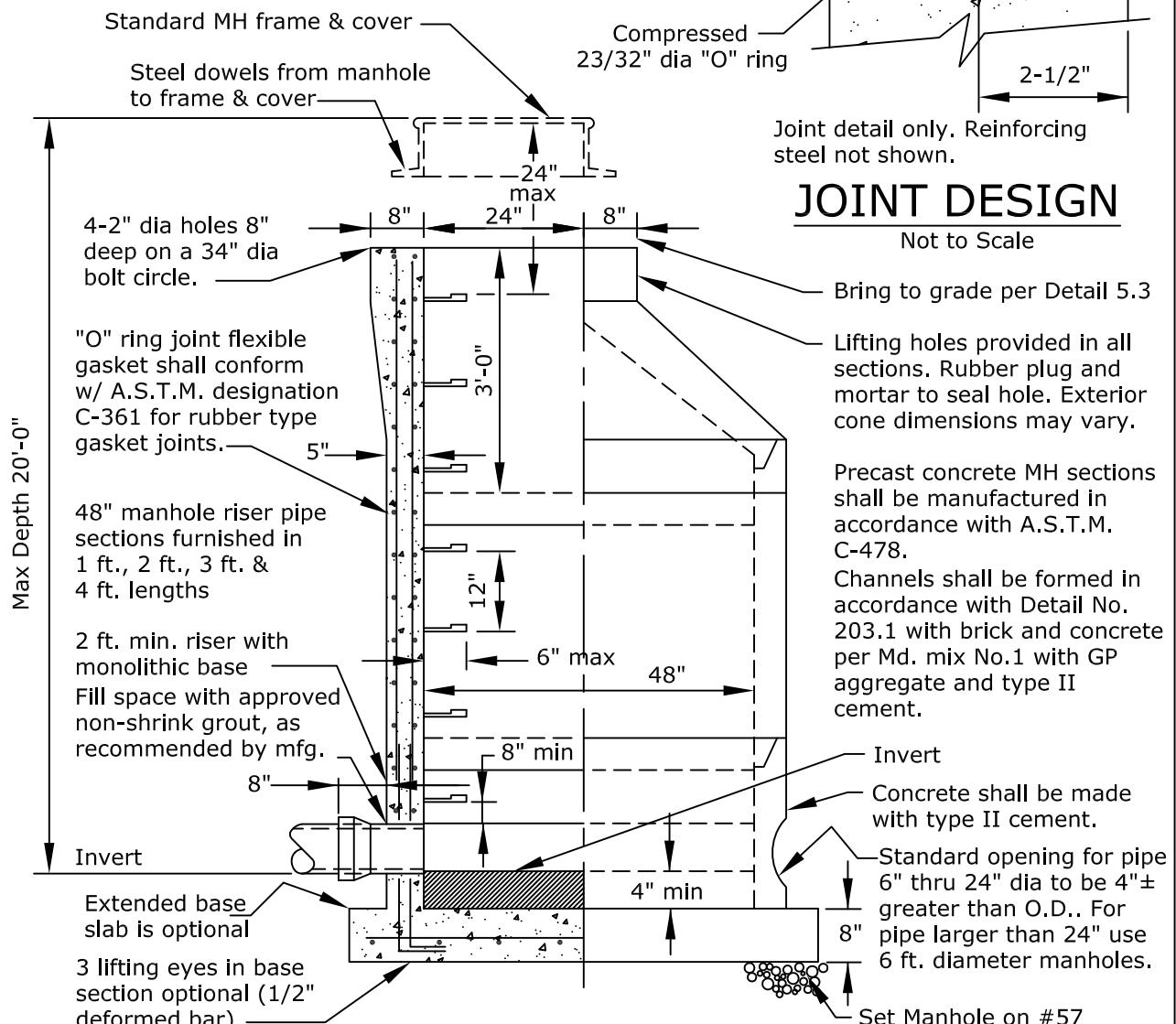
Date:  
 01-24-2013

# Sewer Details



## Plastic Covered Steel Manhole Step

**NOTE:**  
All joints to be "Chem" patched on interior and exterior.  
Exterior shall be painted with Bitumastic.



Date	Note
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Bottom steel 1/2" dia rods 6" O.C. both ways 1-3/4" clear from bottom

1/2" dia hoop rods-weld all points of contact

2-3/4" dia diagonal rods

3-3/4" dia. rods adjacent to opening in lieu of 1/2" dia rods

Top steel to be 1/2" dia hoop bars and 3"x8"-#2x#6 mat with #6 bars parallel to hoop centers.

Lifting holes shall be sealed with rubber plugs and mortar

## 72" Slab Reinforcing

### Plan

Standard MH frame and cover.

4-2" dia holes 6" deep on a 34" dia bolt circle.

Grade

Bring to grade per Detail No. 5.3

24" max. between cover and first step.

48" manhole riser pipe Sections furnished in 2ft., 3ft., & 4ft. lgths. 10ft. max

"O" ring flexible gasket joint-see Detail No. 201.1

MH steps shall be plastic covered steel per detail No. 201.1

72" manhole riser pipe sections furnished in 1ft., 2ft., 3ft. & 4ft lgths.

7ft. min. riser with monolithic base.

Fill annular space with approved non-shrink grout. For plastic pipe see Detail No. 210.1

Excavation below pipe to be back-filled with compacted 1/2" to 3/4" size stone granular material

Shallow manhole shall be any without 48" riser. Slab to be same as above except for 24" opening.

Slab on 48" riser to have 24" opening. Steel to be same as 72" slab except bottom mat to be all 1/2" bar.

Use type II cement, Identify MH's by Number & Manufacturer.

Concrete slab (for reinf. see above plan)

Double wrap circumferential steel in bells.

All MH bases, risers, cones and flat slabs shall be precast concrete in accordance with A.S.T.M. C-478 as modified herein.

Channels shall be formed per Detail No. 203.1 with brick or conc. per Md. mix No. 1 with GP aggregate and type II cement.

Standard opening for pipe 27" thru 48" dia. to be 4"± greater than pipe O.D.

3 lifting eyes in base section optional (1/2" deformed bar)

Steel in base to be 1/2" dia 9" @ 16" O.C. each way-min.

MH to be set on 6" of 1/2" to 3/4" size stone granular material.

### Section A-A

Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

#### Revisions

Date	Note
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Precast Concrete  
Manhole Detail 72"  
Diameter

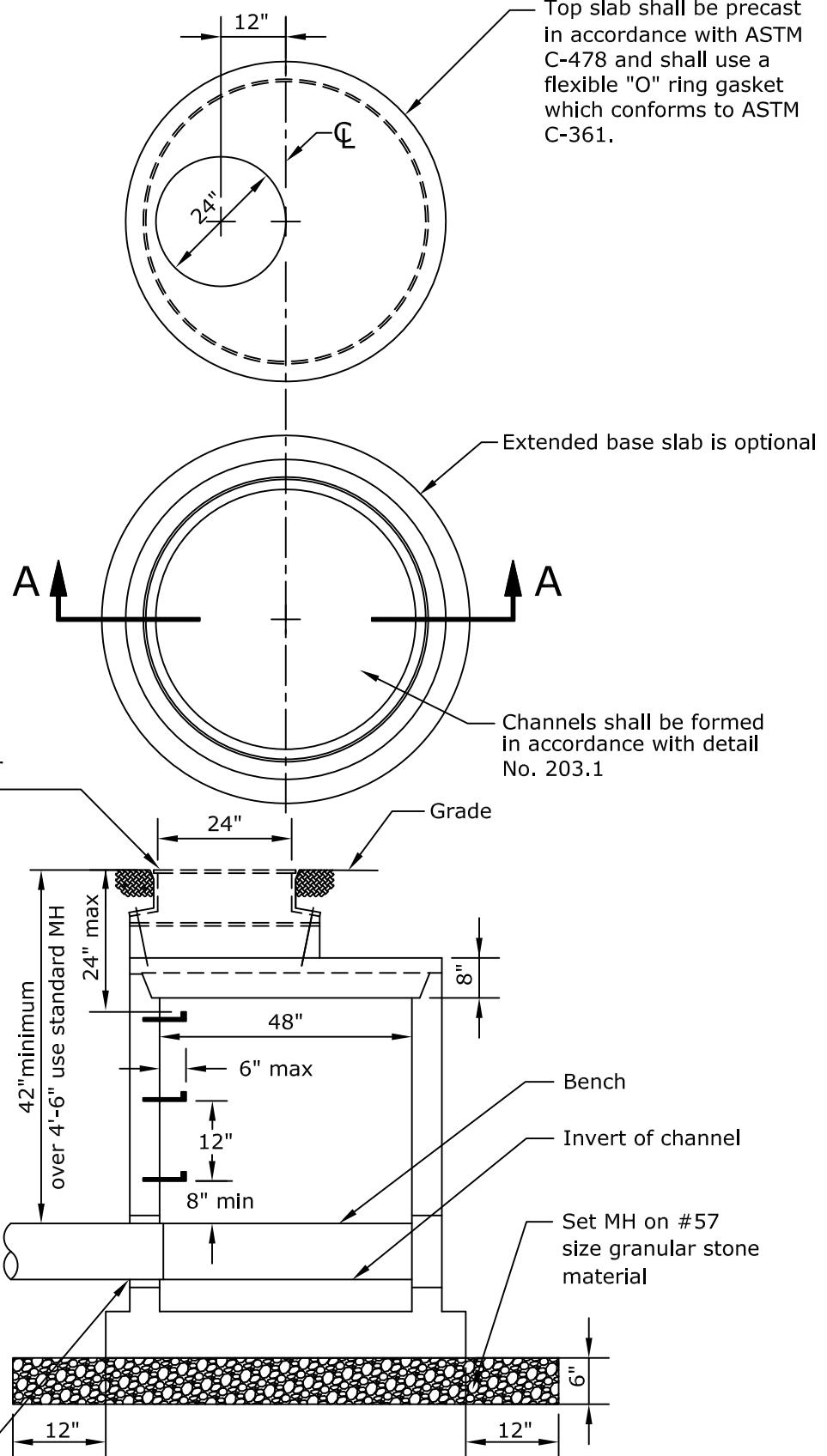
Detail No.  
201.2  
Date:  
01-24-2013

Notes:

1. Lifting holes shall be provided in base and top slab.
2. Riser shall have a monolithic base.
3. Plastic covered steel MH steps per Detail No. 201.1
4. Pipe openings  $4'' \pm$  greater than pipe O.D.
5. 48" MH shall be used with 24" and smaller pipe.
6. See joint on Detail No. 201.1
7. Precast concrete base and flat top slab, ASTM C 478, using type II cement.

Frame and cover per Detail No. 5.1  
Bring to grade & anchor per Detail No. 5.3

Fill annular space with non-shrink grout. For plastic pipe, a rubber gasket is required, per Detail No. 210.1



Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

Revisions

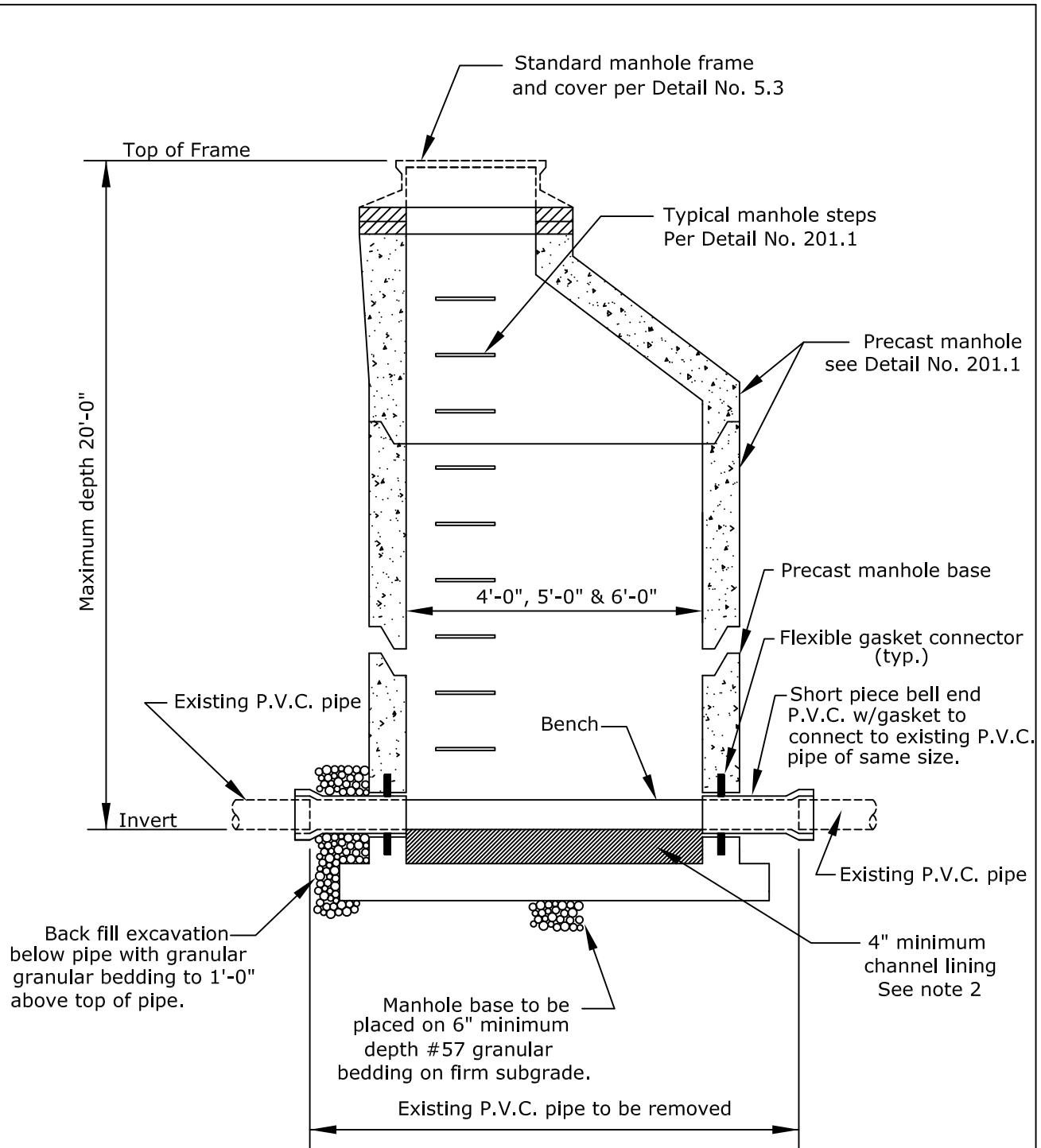
Date      Note

Shallow Manhole

Detail No.

201.3

Date:  
01-24-2013



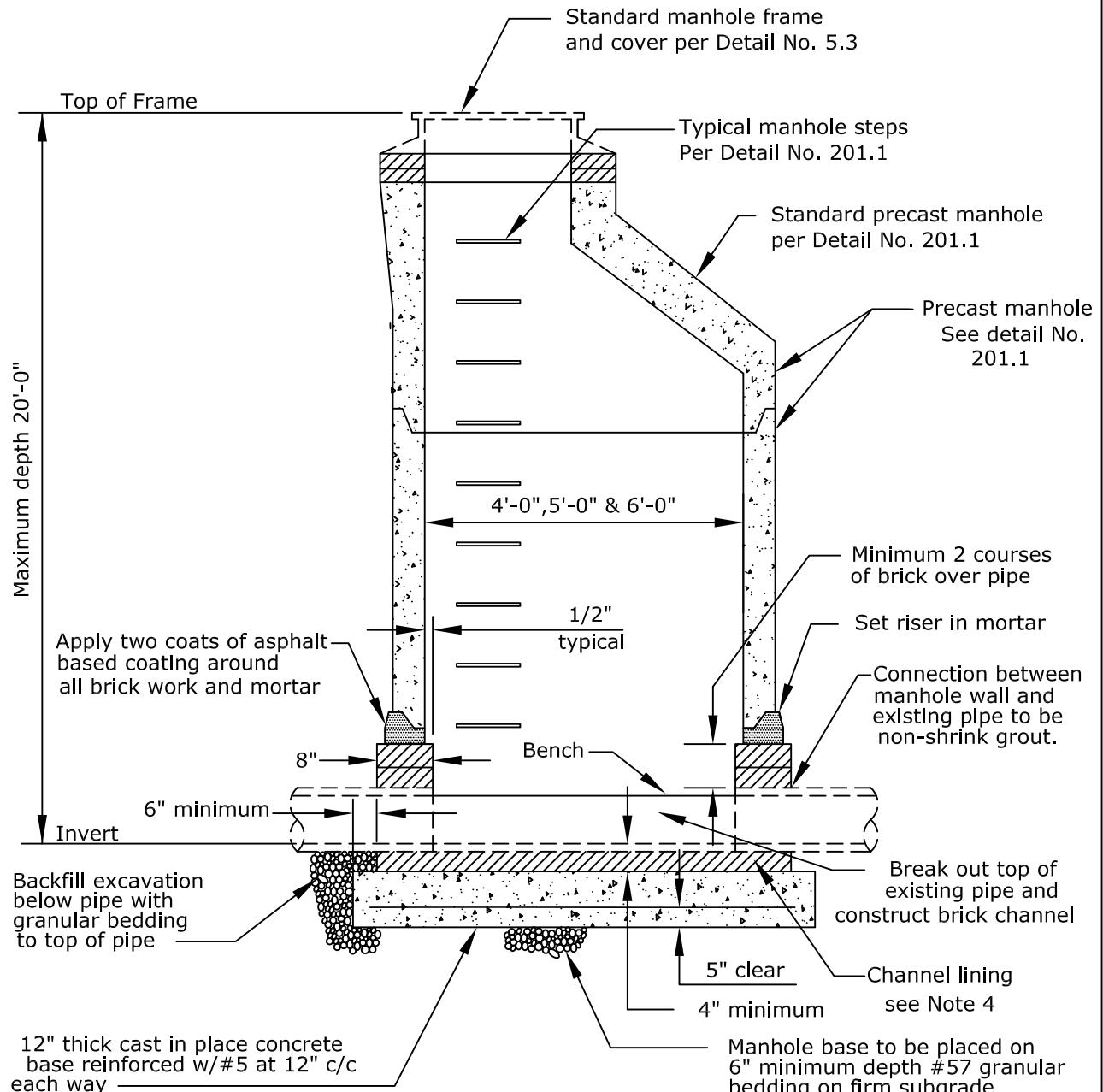
Notes:

1. Manhole maximum depth = 20'-0".
2. Channel must be constructed so as to allow "TV" equipment to be pulled through manhole.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Precast Manhole Built on Existing PVC Pipe	Detail No.
	Date	Note		201.4
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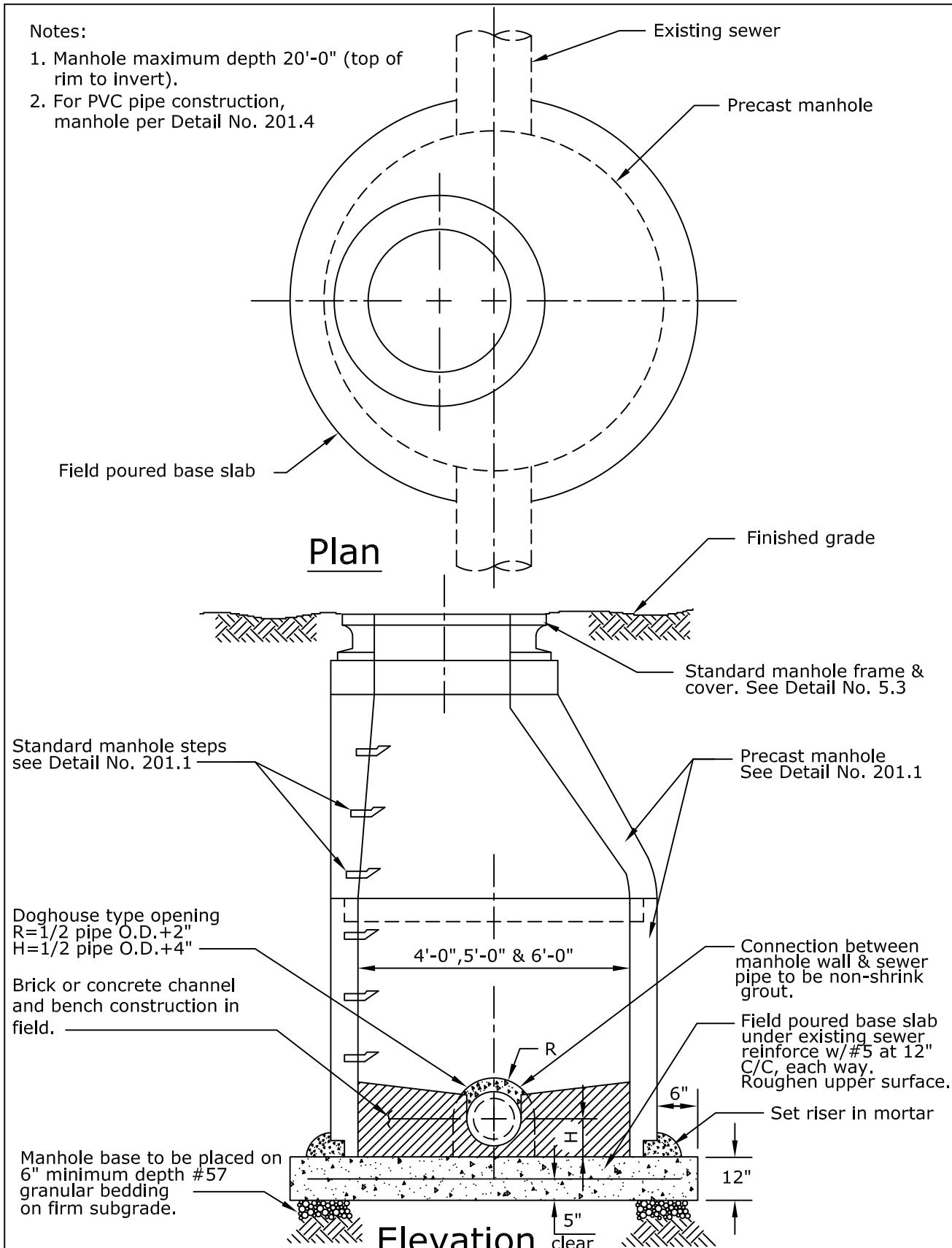
1. Manhole maximum depth 20'-0".
2. For P.V.C. pipe, construct manhole per detail No. 201.4.
3. Engineer may at his option allow precast variation of detail shown. See Detail No. 201.6.
4. Channel must be constructed to permit "TV" equipment to be pulled through manhole.



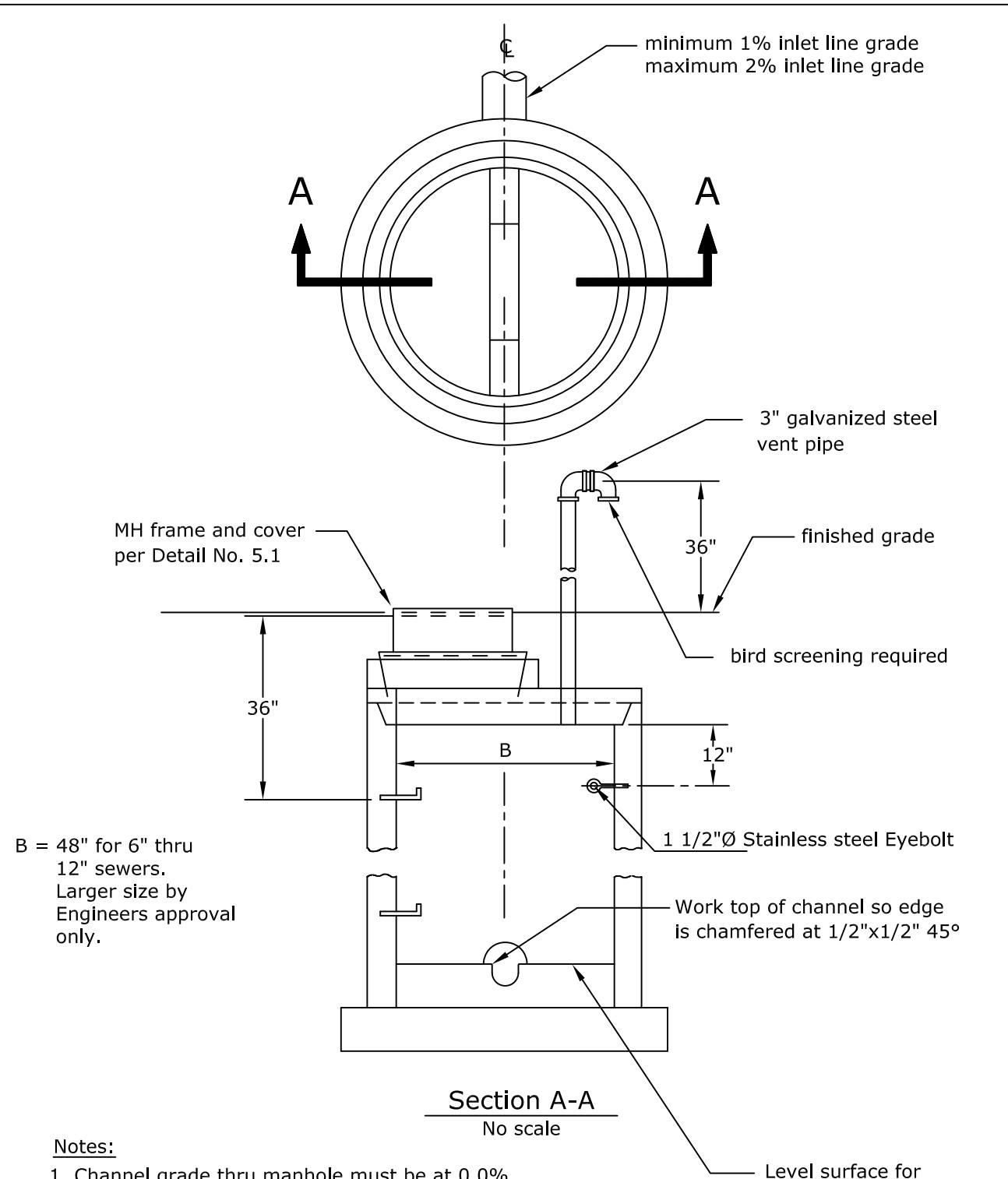
Frederick County Division of Utilities & Solid Waste Management Department of Engineering & Planning	Revisions		Precast Concrete Manhole Built Over Existing Sewer Type 1	Detail No. 201.5
	Date	Note		
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Notes:

1. Manhole maximum depth 20'-0" (top of rim to invert).
2. For PVC pipe construction, manhole per Detail No. 201.4



Frederick County Division of Utilities & Solid Waste Management Department of Engineering & Planning	Revisions		Precast Concrete Manhole Built Over Existing Sewer Type II	Detail No. 201.6
	Date	Note		
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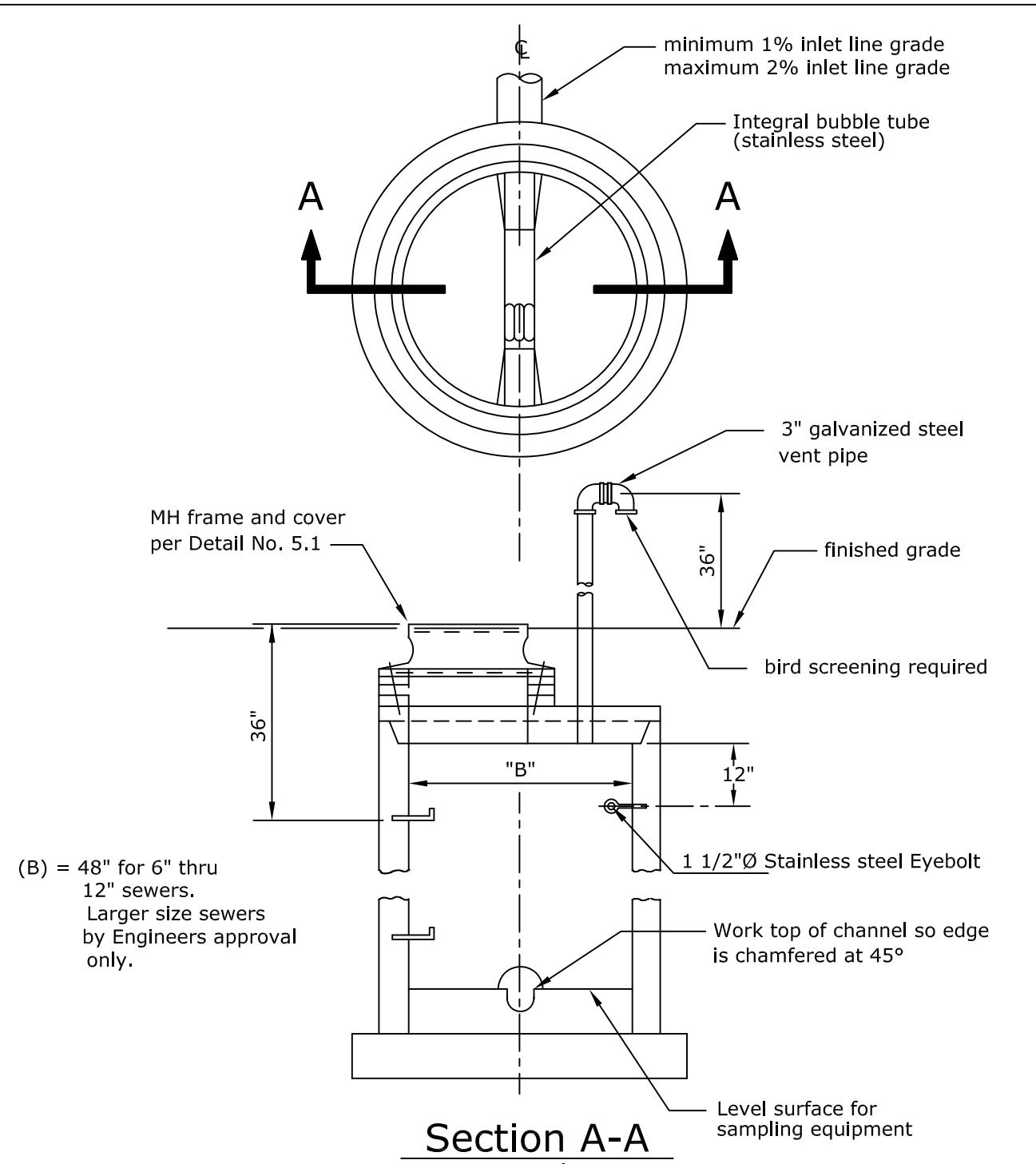


Notes:

1. Channel grade thru manhole must be at 0.0%.
2. Flow must be stabilized (straight pipe) a minimum of 25 pipe diameters before entering the manhole.
3. Incoming flow must be under gravity flow.
4. Locate manholes in non-traffic areas.
5. See shallow manhole Detail 201.3 for specific design details.

Level surface for sampling equipment

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Type I (Without Flume) Industrial Monitoring Manhole	Detail No. 201.7
	Date	Note		
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				Date: 01-24-2013

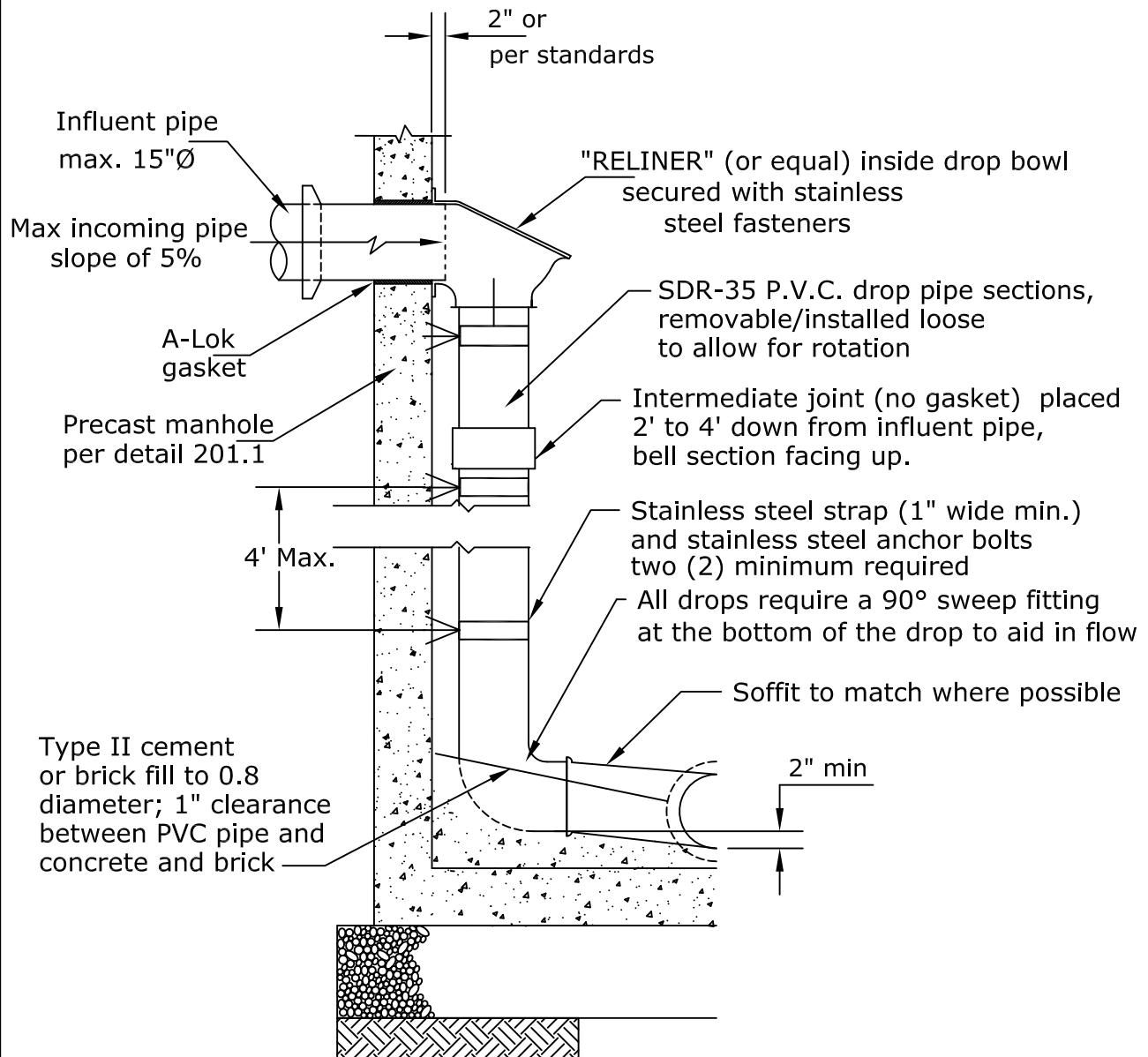


Notes:

No scale

1. Channel grade thru manhole must be at 0.0%.
2. Flow must be stabilized (straight pipe) a minimum of 25 pipe diameters before entering the manhole.
3. Incoming flow must be under gravity flow.
4. Sizing of flume must be based on volume of flow not diameter of incoming pipe.
5. Locate manholes in non-traffic areas.
6. See shallow manhole Detail No. 201.3 for specific design details.
7. Type II manhole only for larger industrial users with a DUSWM approval.

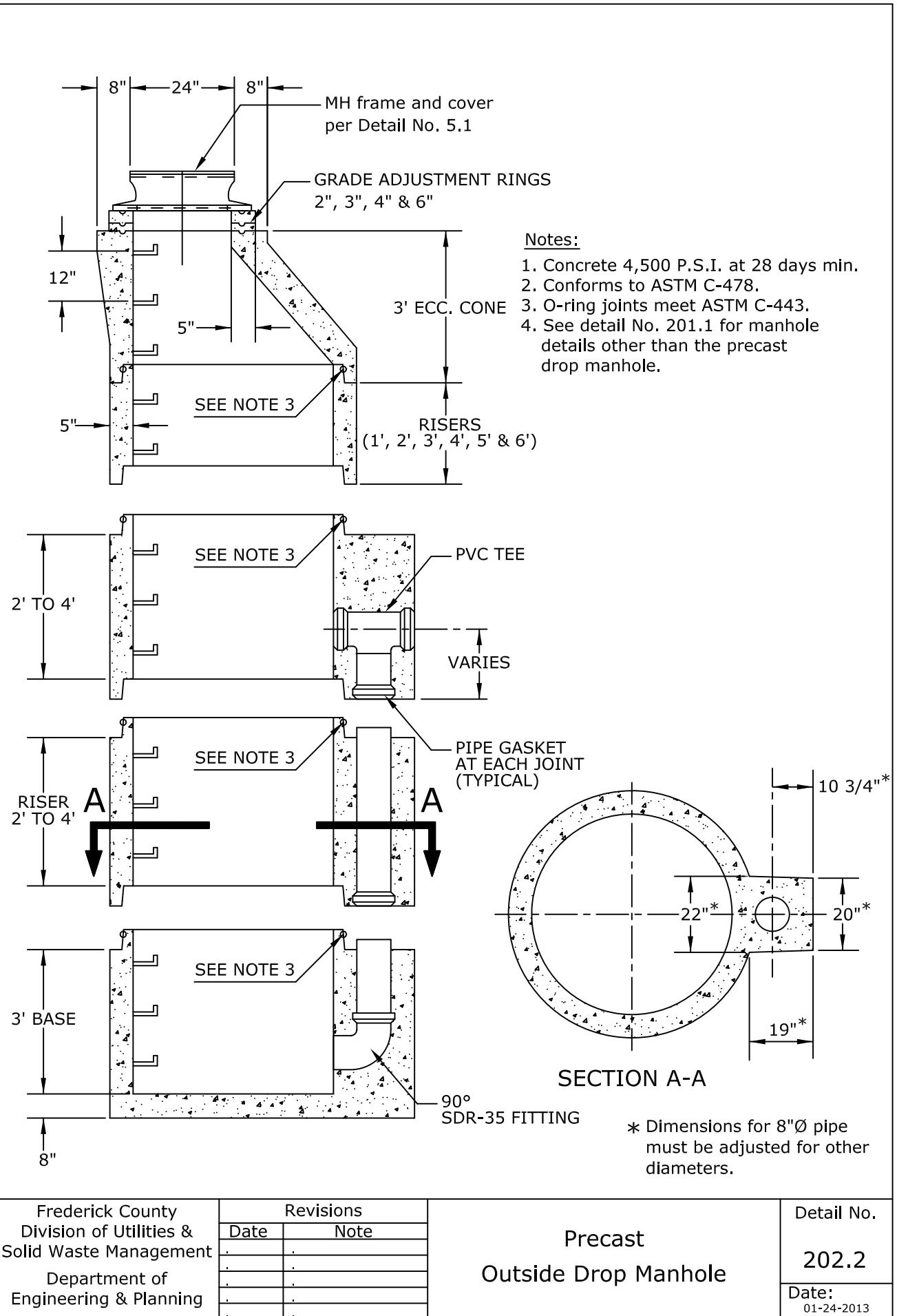
Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Type II (With Flume) Industrial Monitoring Manhole	Detail No. 201.8
	Date	Note		
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				Date: 01-24-2013



Notes:

1. 48" diameter Manhole may be used with one (1) 8" inside drop.
2. 72" diameter Manhole required when two (2) or more inside drops.
3. Drop pipe dia. same as incoming pipe dia. (up to 8"Ø), for larger pipe downsize the drop pipe dia.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Inside Drop Manhole	Detail No.
	Date	Note		202.1
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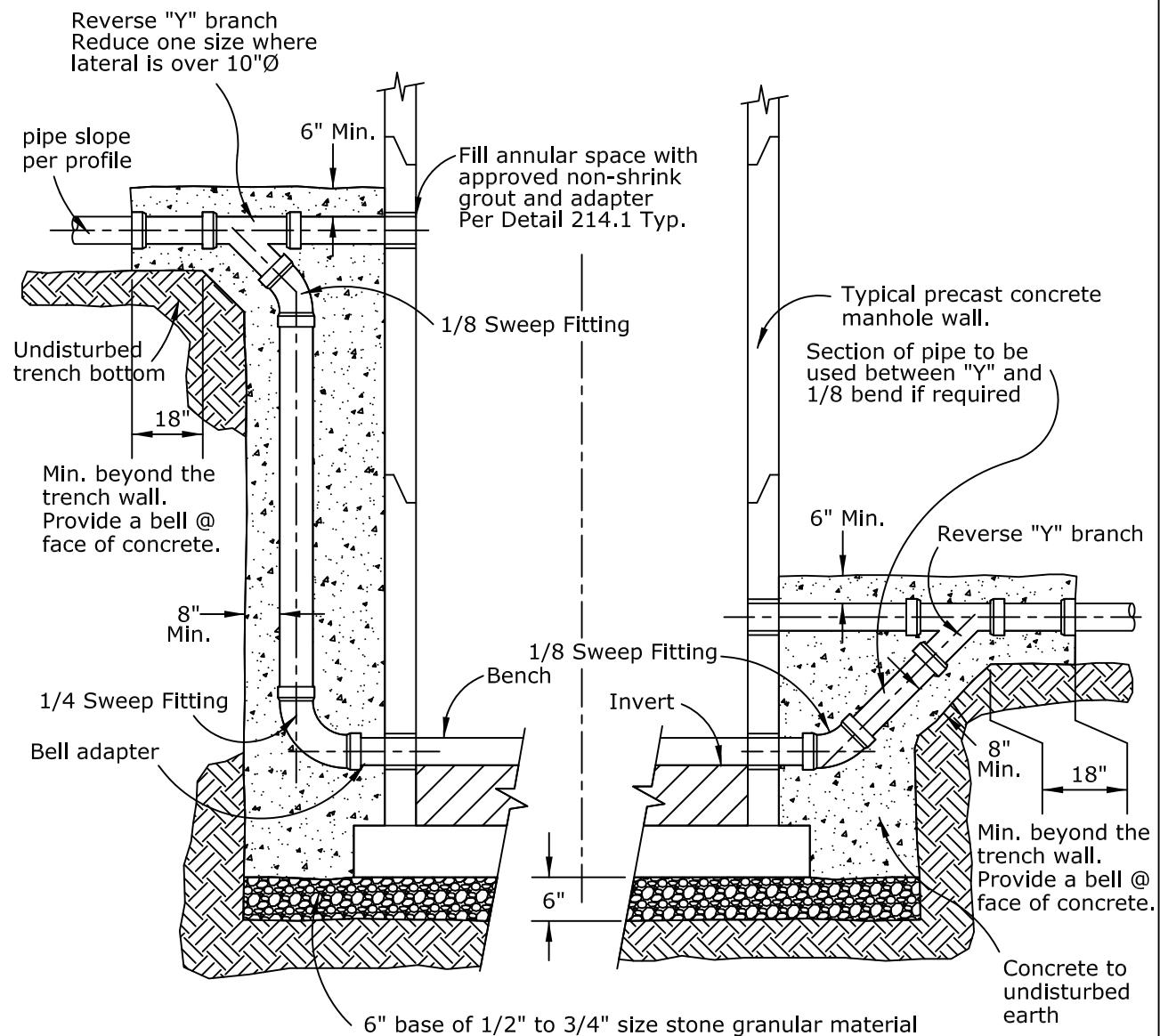


Notes:

1. P.V.C. pipe shall be provided as per the "General Conditions and Standard Specifications."
2. All fittings shall be the same type of material as that used for the main lines.
3. Concrete shall be MSHA mix no.1.

Drop Connections

Nom. Pipe Ø	Type "E"		Type "F"
	Max. Drop	Min. Drop	Min. Drop
6"-8"	3'-9"	1'-9"	3'-9"
10"	4'-0"	2'-0"	4'-0"
12"	6'-0"	2'-6"	6'-0"
15"	6'-0"	2'-6"	6'-0"

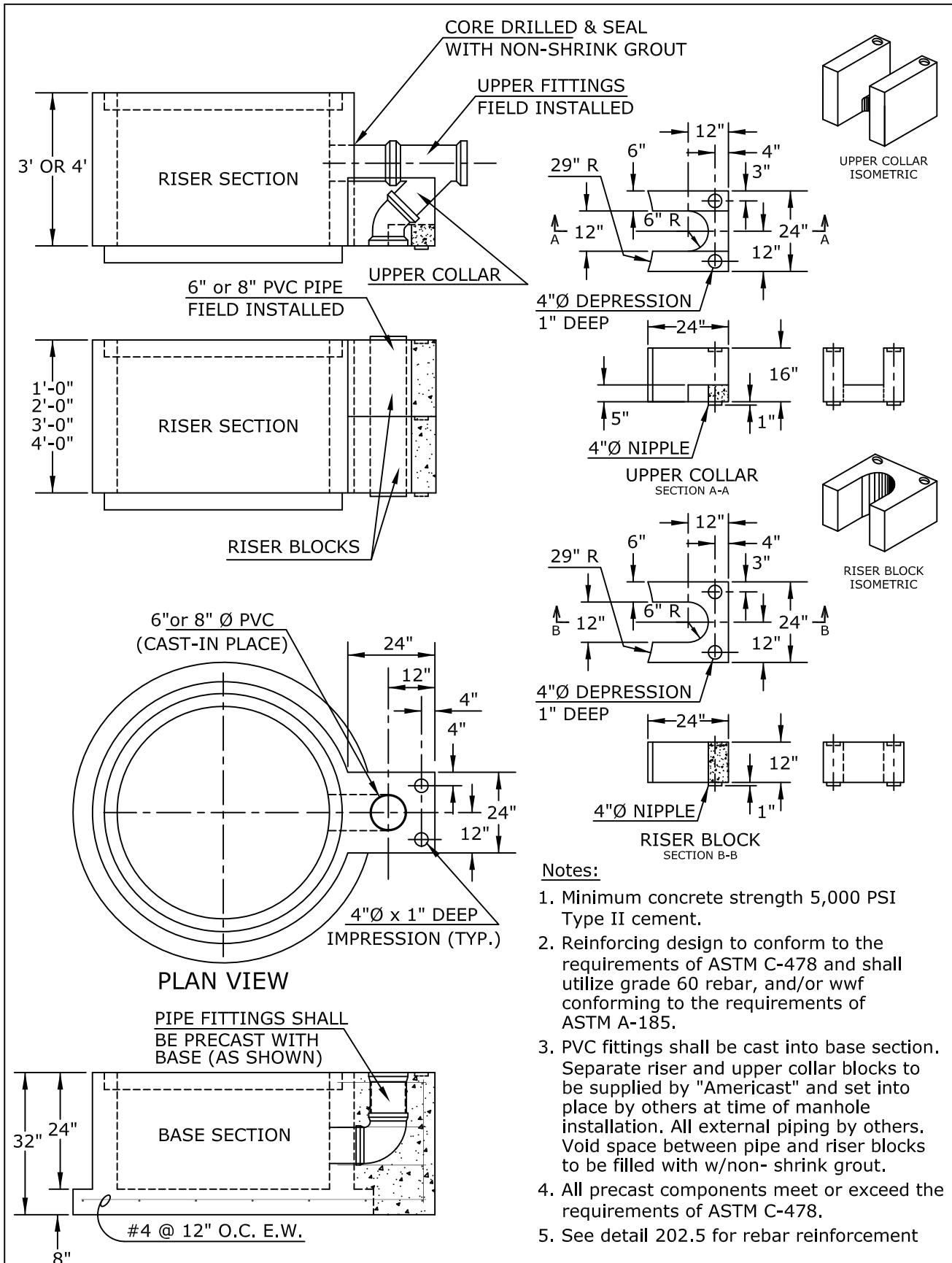


Type "F" Drop

Type "E" Drop

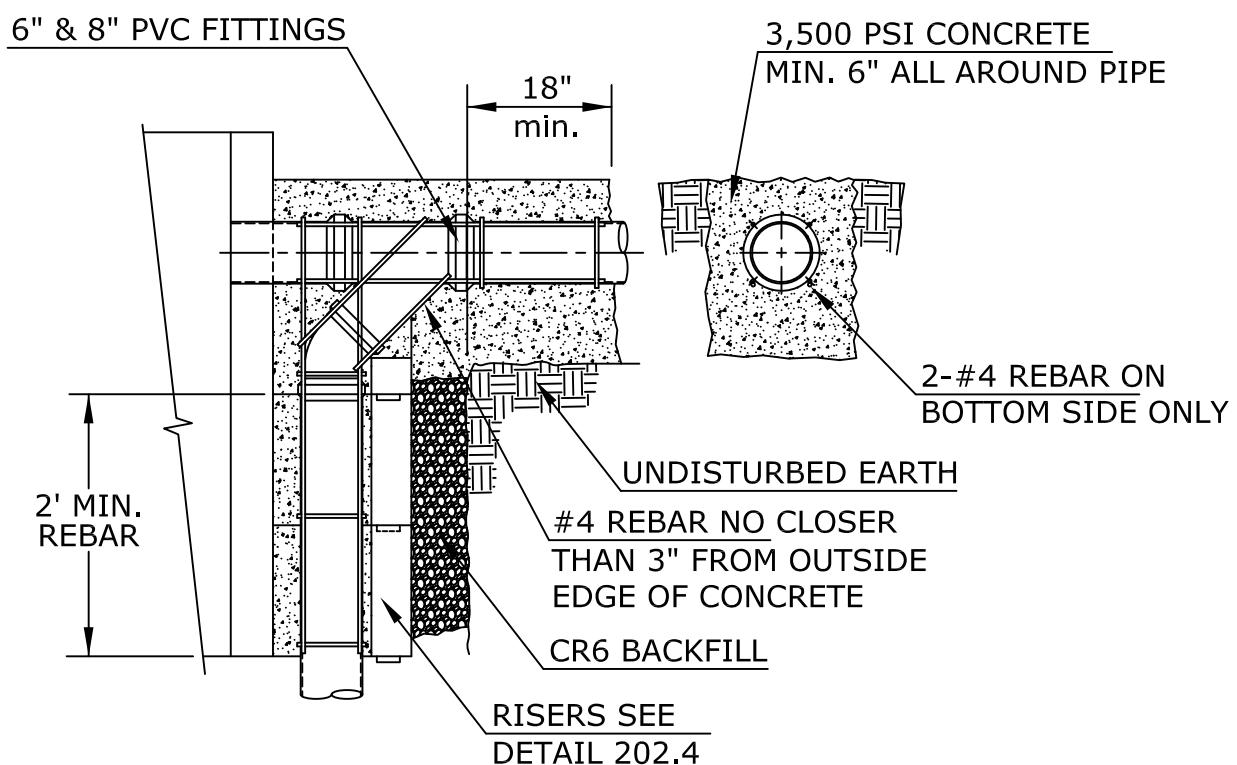
Note: 6" sewer service connection slope shall be 2%-5%.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Detail No.  202.3
	Date	Note	
			Date: 01-24-2013



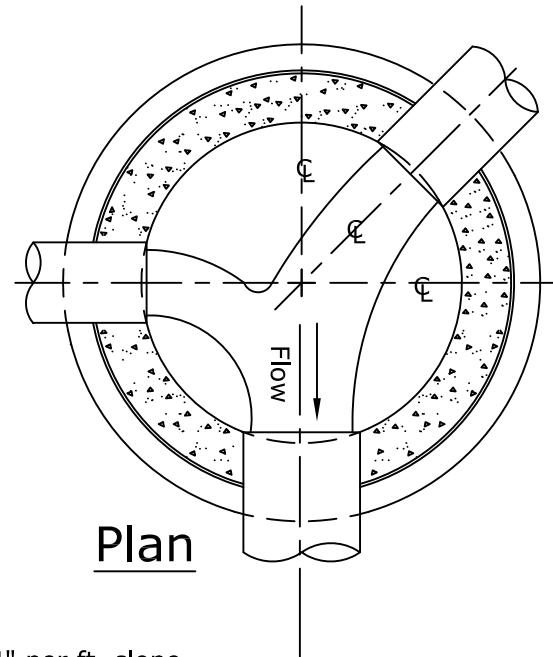
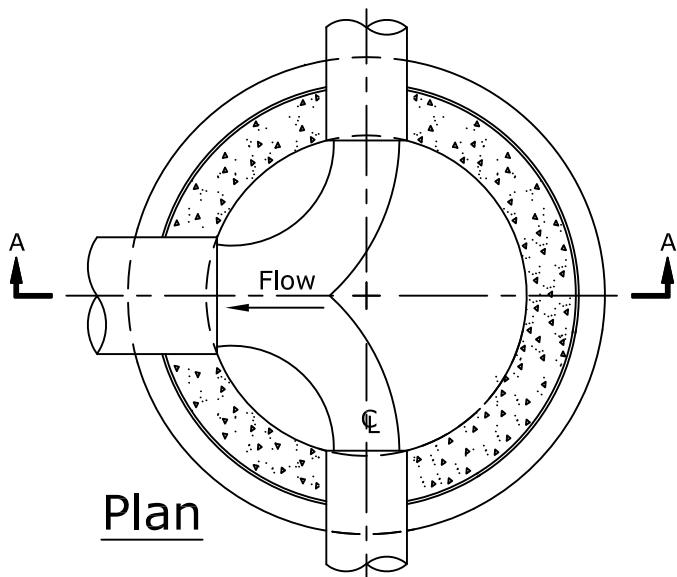
Frederick County Division of Utilities & Solid Waste Management Department of Engineering & Planning	Revisions		Detail No. 202.4
	Date	Note	
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			Date: 01-24-2013

**Precast  
Outside Drop Manhole  
6" & 8" PVC Sewer lines Only**

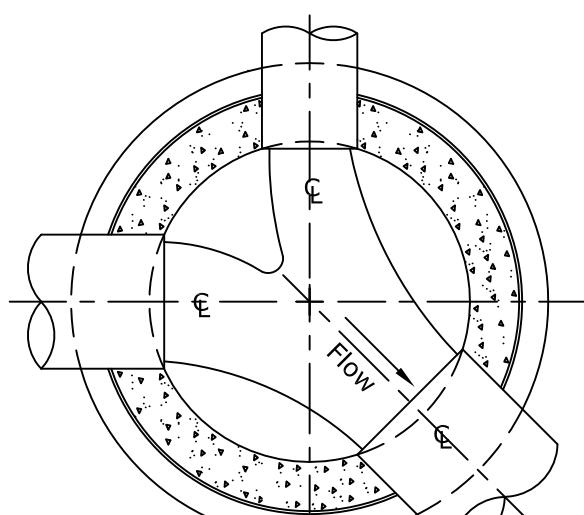
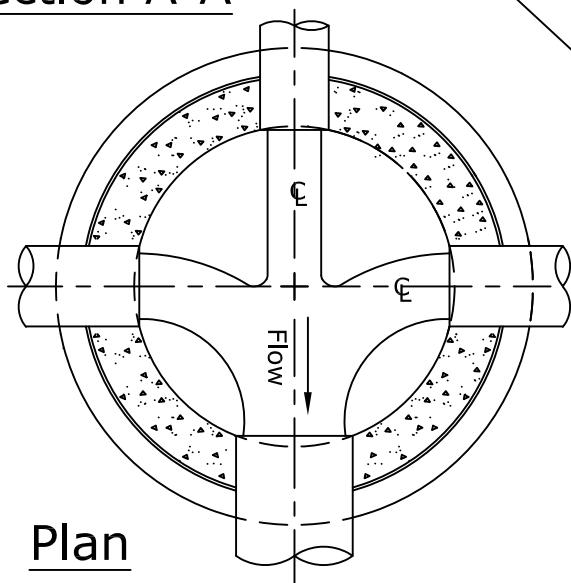


**NOTES:**  
See detail sheet 202.4 for risers.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Rebar Placement 6" & 8" PVC In Risers	Detail No.  202.5
	Date	Note		
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				Date: 01-24-2013



### Section A-A

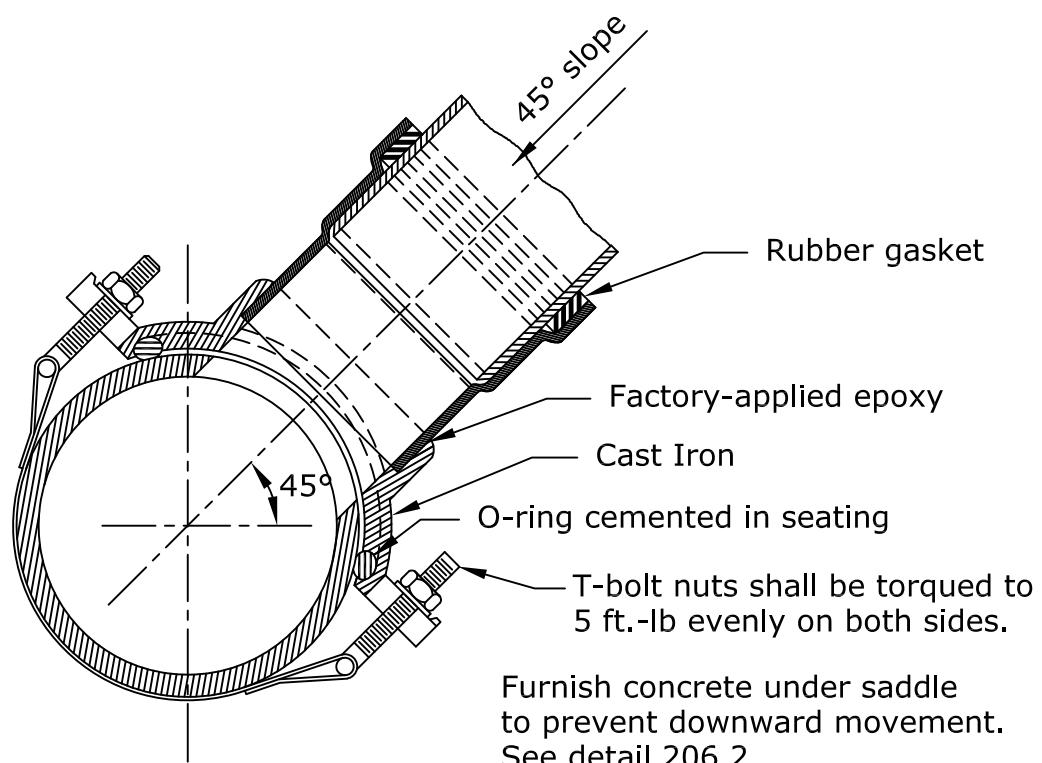


Channels shall be constructed using a template to ensure that channel cross-section will allow insertion of testing, cleaning and inspection equipment.

Inside diameter of MH's is either 48" or 72".

Conc. channels shall be Md. S.H.A. mix No.1 with type II cement and GP aggregate.

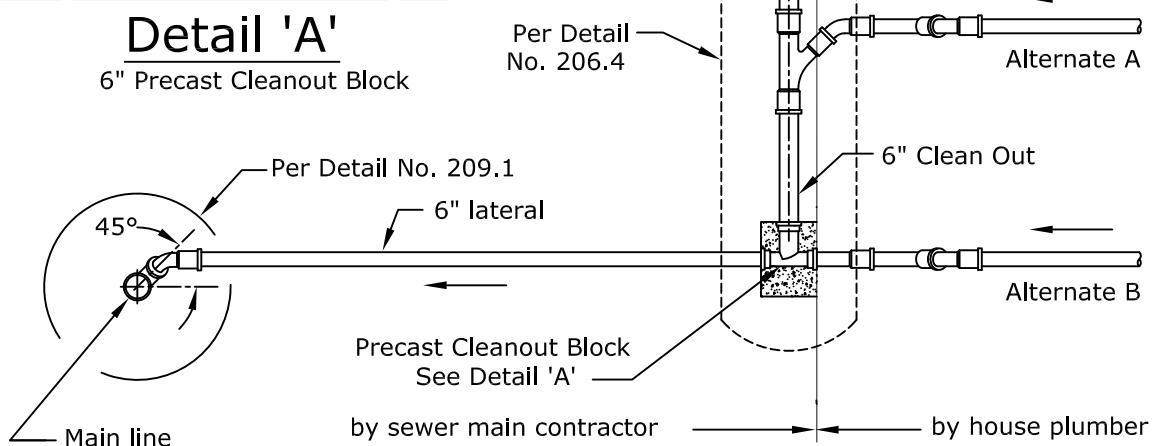
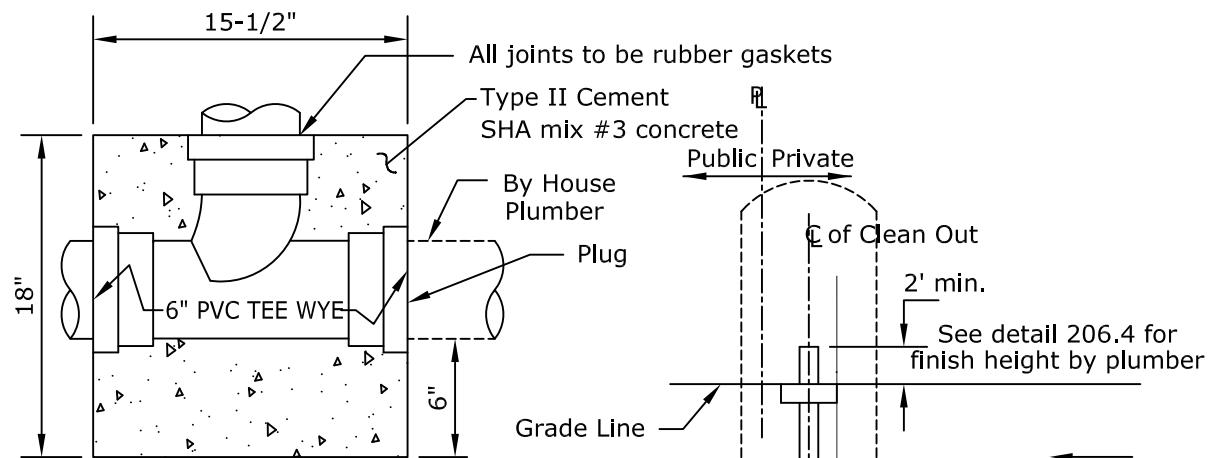
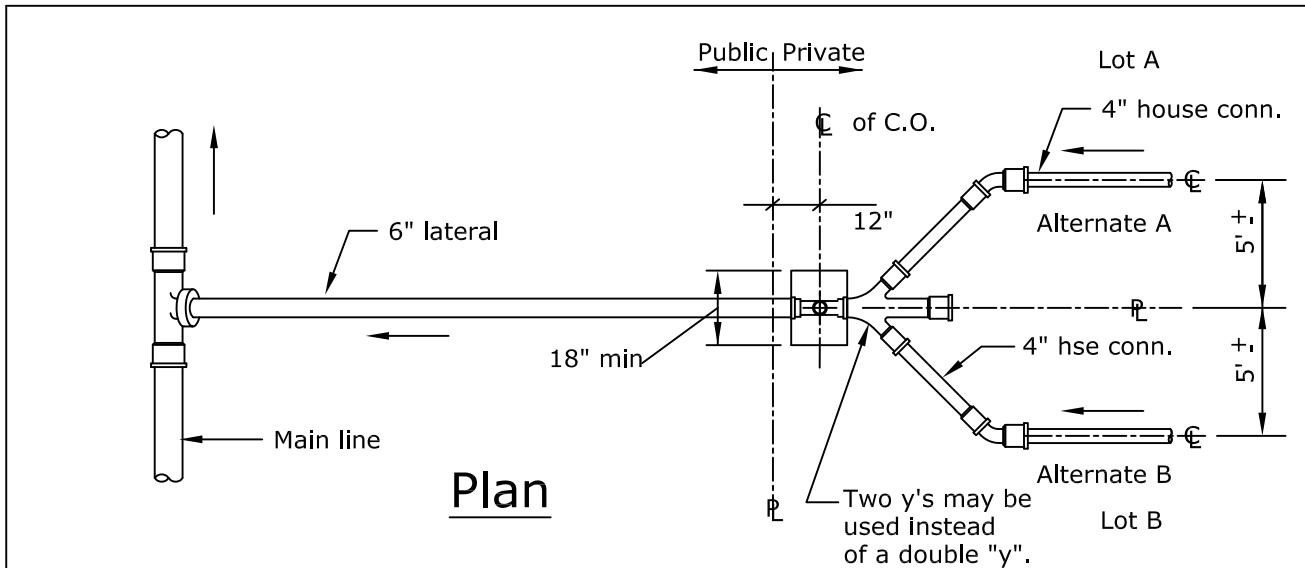
Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Channel Layout for Sewer Manhole Bases	Detail No. 203.1
	Date	Note		
				Date: 01-24-2013



## Existing Mains 6" thru 12"

Opening in existing pipe wall shall be cored and  
Coupon given to inspector.  
Saddle shall be for use with the two sizes  
and types of pipe being joined as manufactured  
by Sealtite 8 The General Engineering Co. or equal.

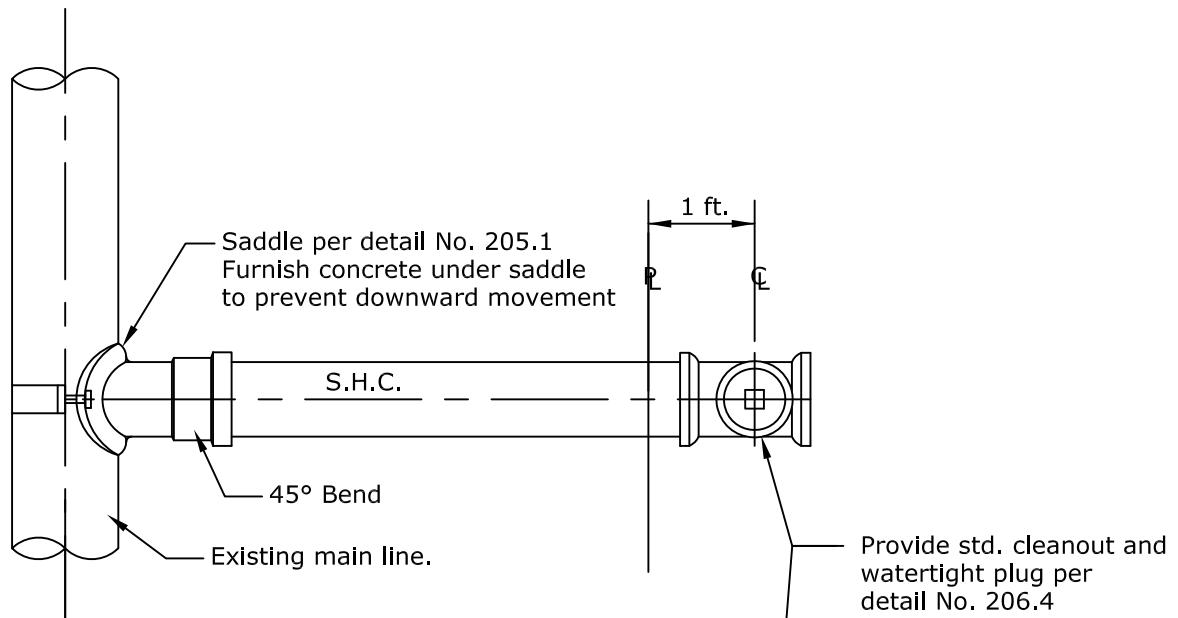
Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Saddle to Connect House Connection to Existing Main Line Sewer	Detail No.
	Date	Note		
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				Date: 01-24-2013



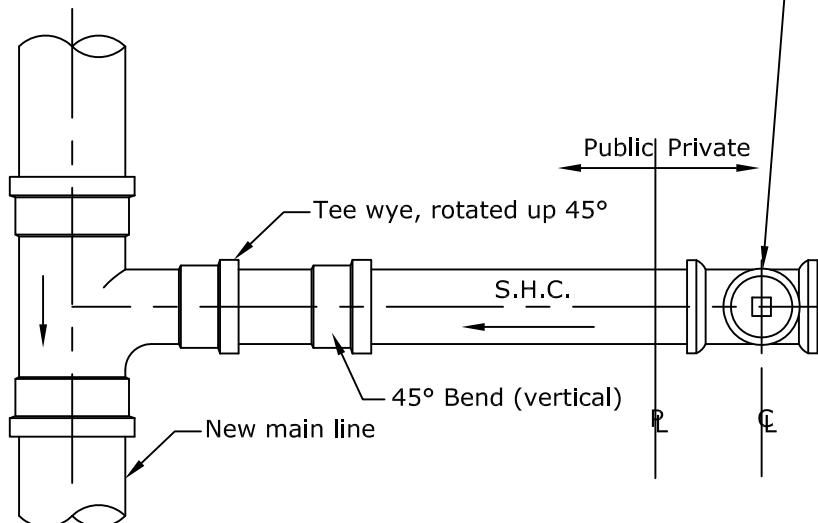
## Elevation

- 1) The double house connection shown can be connected to type A, B, C, or D house drop connections.
- 2) House sewer can be connected at point A or B.
- 3) Precast cleanout block shall be from Pre-Approved materials list or submitted for engineer approval.
- 4) Doubles only allowed for townhouses.
- 5) Pannella cap to be used on all installations.

Frederick County Division of Utilities & Solid Waste Management Department of Engineering & Planning	Revisions		Type A Double House Connection	Detail No. 206.1
	Date	Note		
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				Date: 01-24-2013



## Adding Lateral to Existing Main - Plan

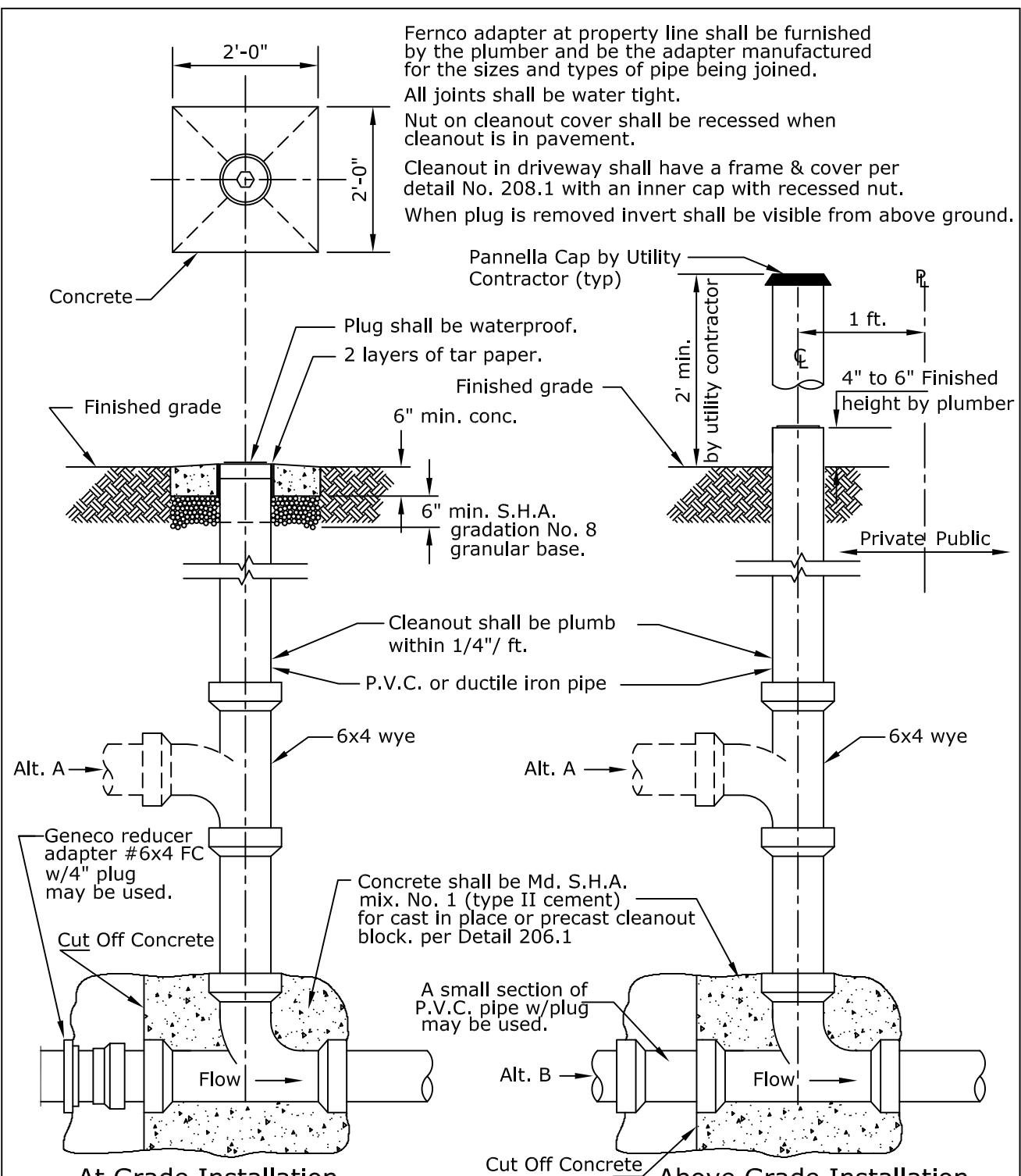


## New Construction - Plan

### Notes:

1. Abbreviation for sewer service connection is S.H.C.
2. S.H.C. to be laid at a minimum 2% - maximum 5%, per section 2570, III.C.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		House Connection Fittings for Sewer	Detail No.  206.2
	Date	Note		
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				Date: 01-24-2013



### At Grade Installation

#### Notes:

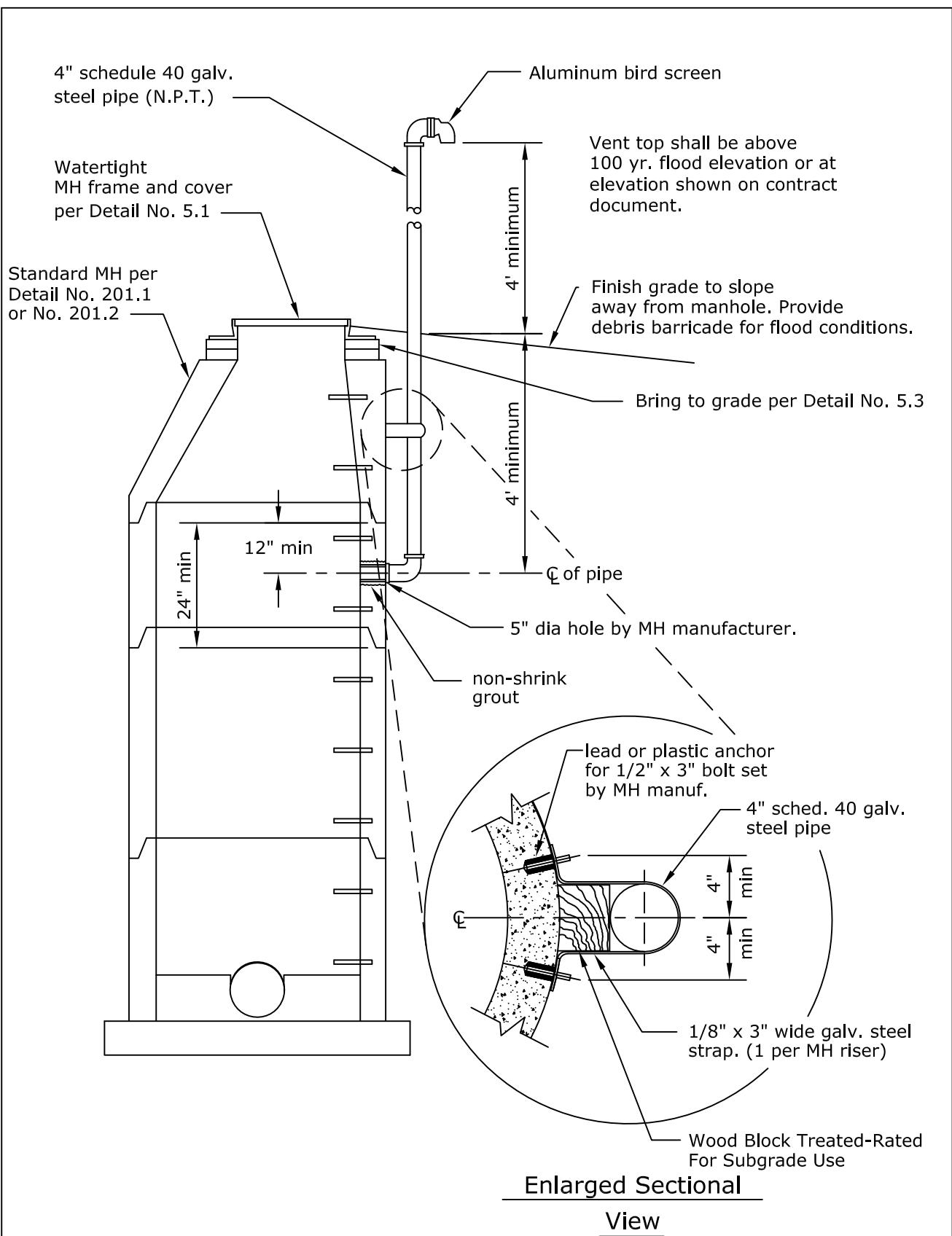
1. Either a slab block must be poured around the cleanout or cleanout must be 4" to 6" higher than finished grade.
2. House sewer can be connected at point A or B.
3. Vertical pipe to be installed by Utility Contractor.
4. House side of concrete shall be vertical, use adapter #6x4" FC or 12" Long bell end 6" P.V.C.
5. Plugs shall be blocked to withstand air or water test.
6. Concrete for flushing tee shall be poured to match bell faces.

Standard Cleanout  
for Sanitary House  
Connection

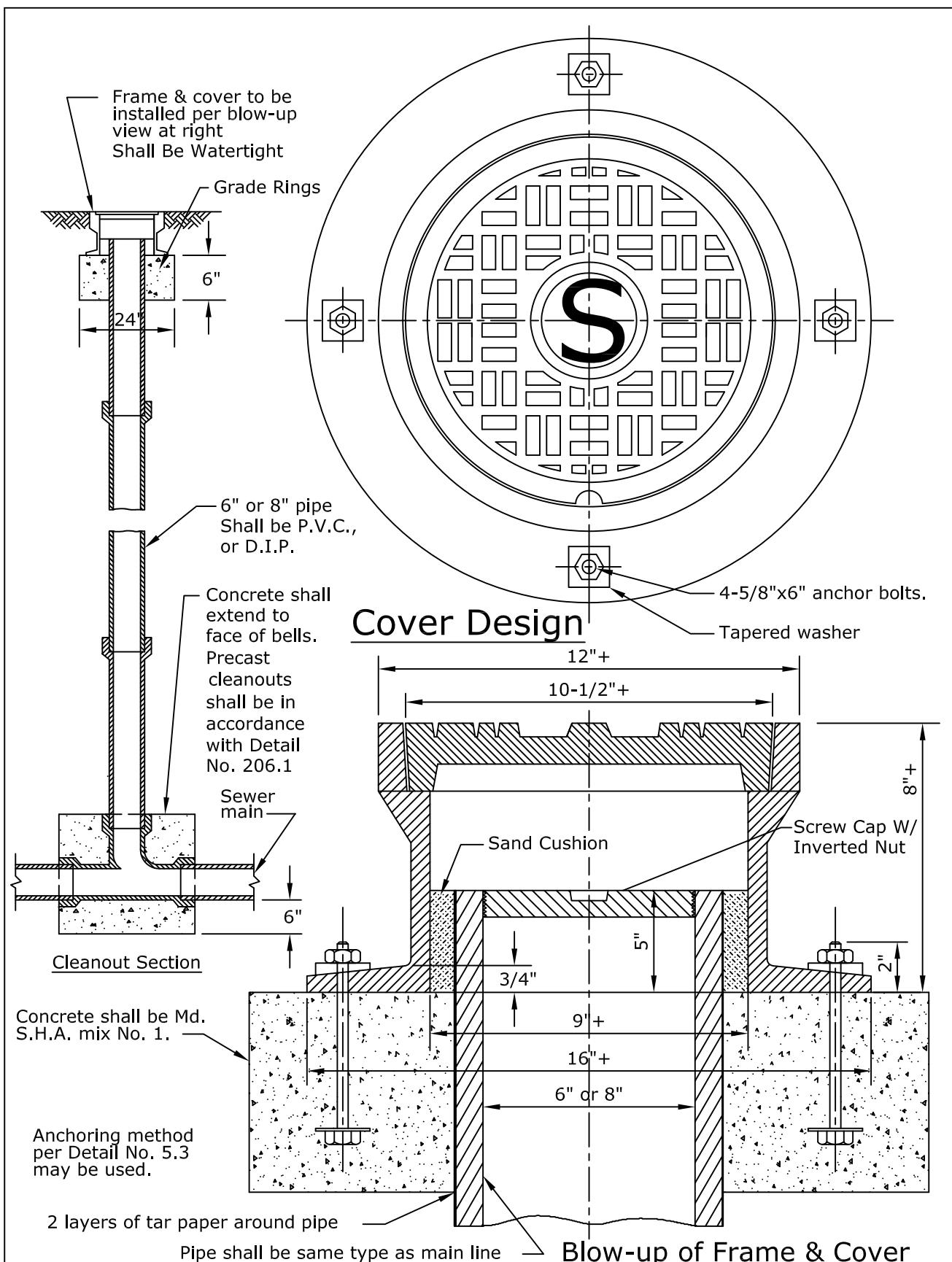
Detail No.  
**206.4**  
Date:  
01-24-2013

Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

Revisions	
Date	Note
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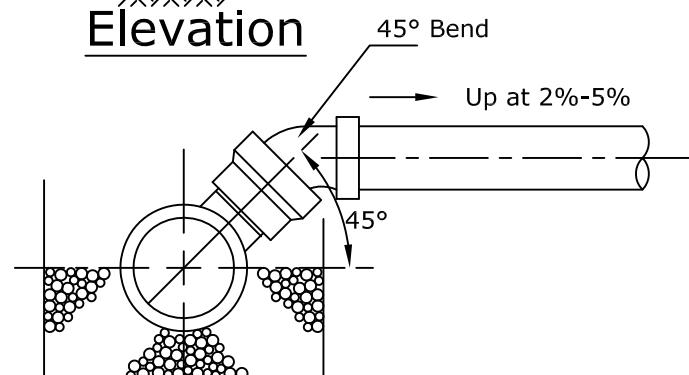
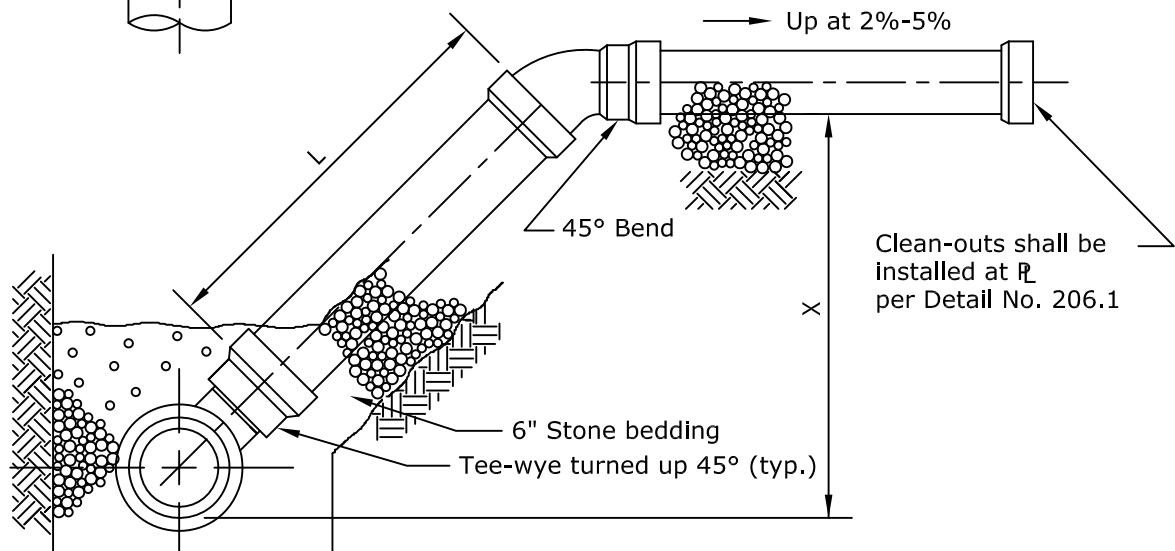
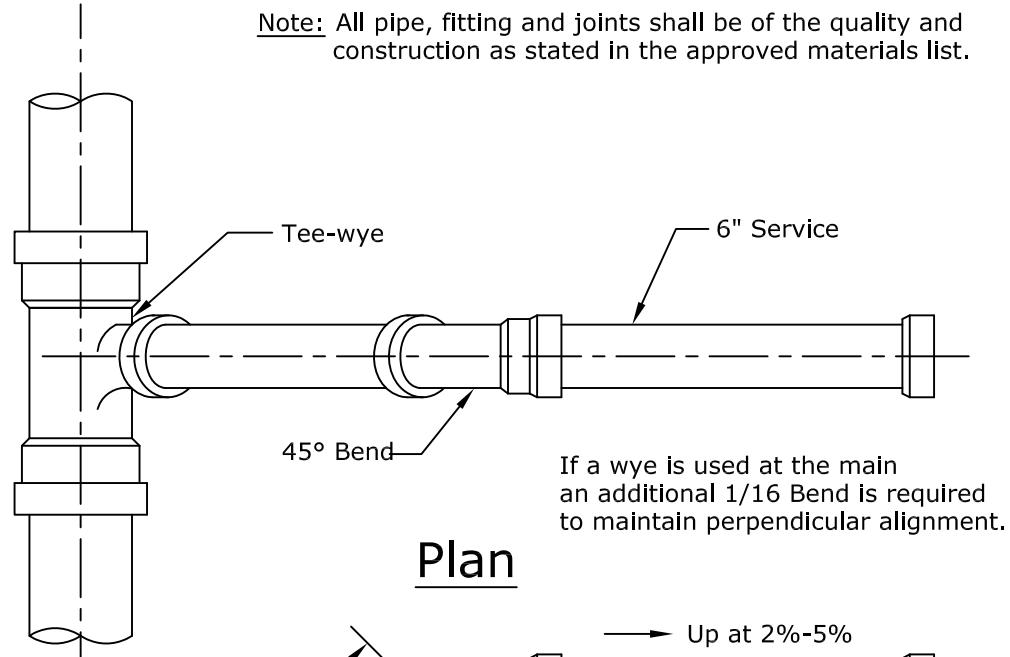


Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Sewer Manhole Vent	Detail No.
	Date	Note		207.1
				Date: 01-24-2013



Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Main Line Cleanout (Lamphole)	Detail No. 208.1
	Date	Note		
				Date: 01-24-2013

Note: All pipe, fitting and joints shall be of the quality and construction as stated in the approved materials list.



Notes:

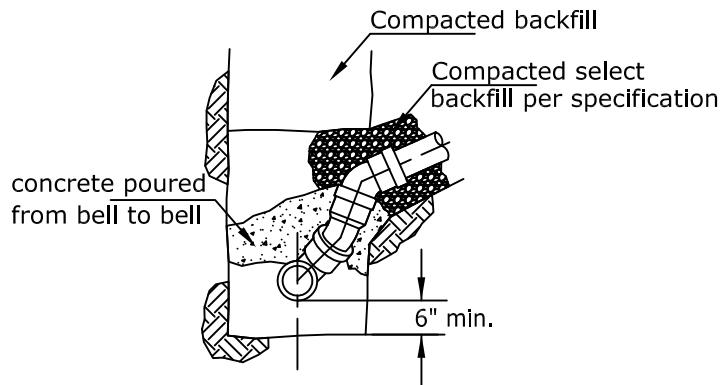
1. The "X" & "L" dimensions shall be determined in the field to meet the cleanout elevation required on contract drawing,  
where:  $L = \sqrt{2} \left( \frac{D}{24} \right) - 0.75$

X=Difference in elevation between the invert of the service at the main and the invert of the 1/4 bend in feet.

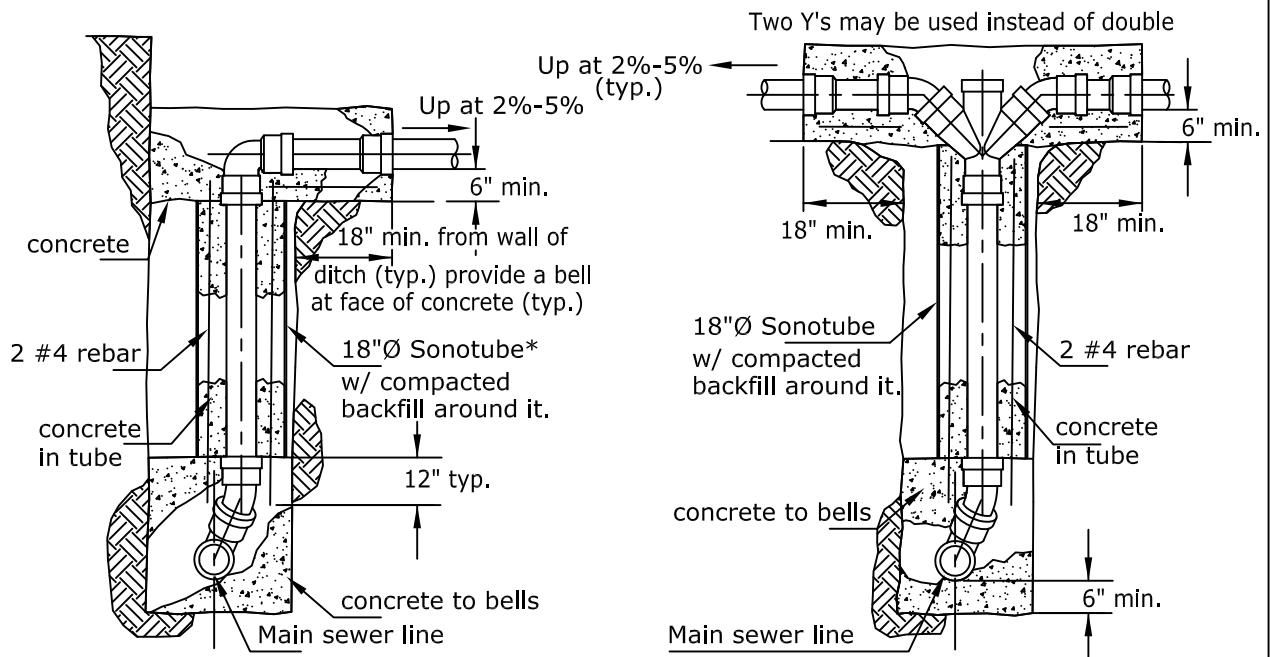
L=Length of pipe in feet.  
D=Diameter of sewer in inches.

Standard Type "A"

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Standard & Type A Drop House Connection	Detail No. 209.1
	Date	Note		
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				Date: 01-24-2013



Type "B"



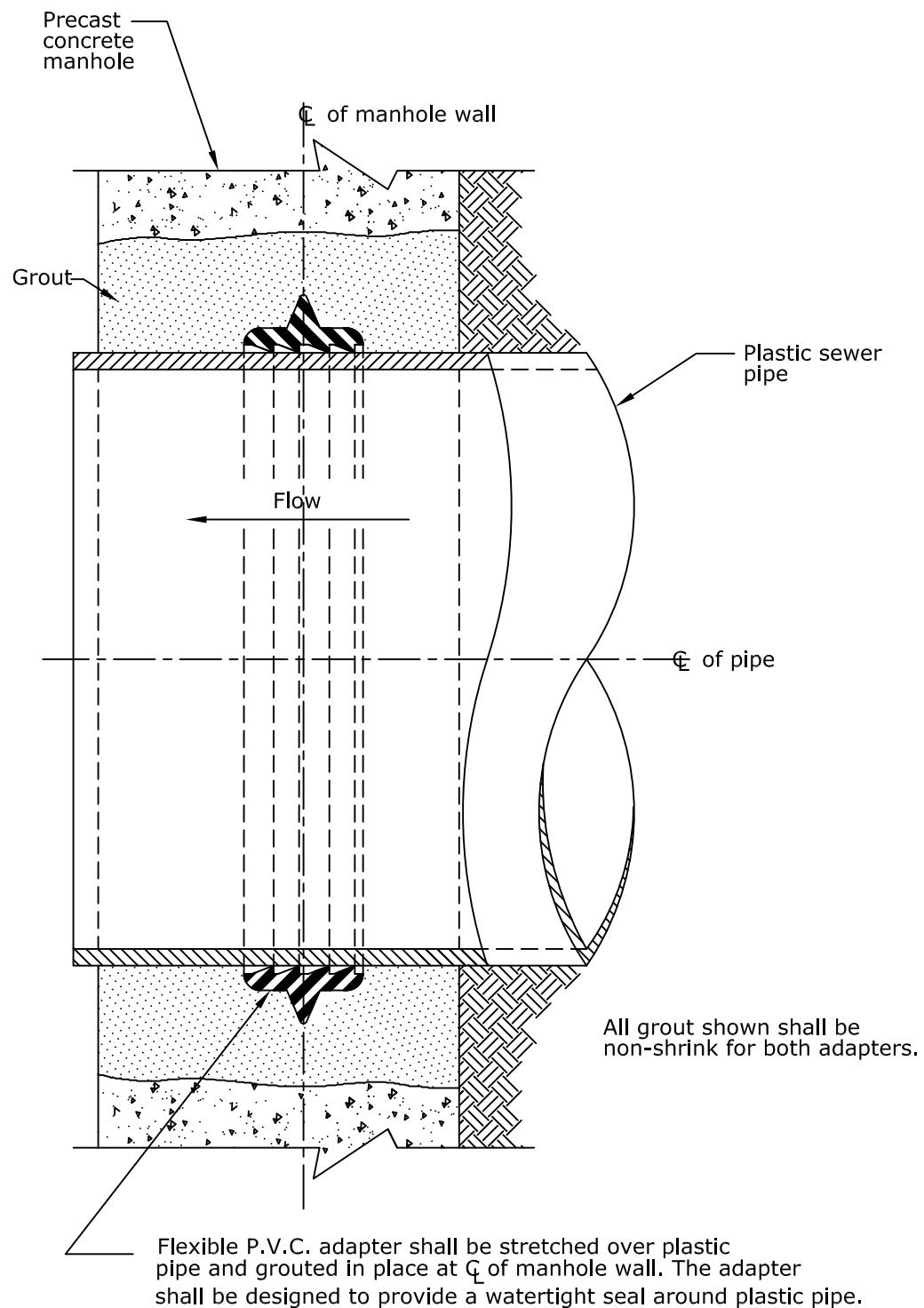
Type "C"

Type "D"

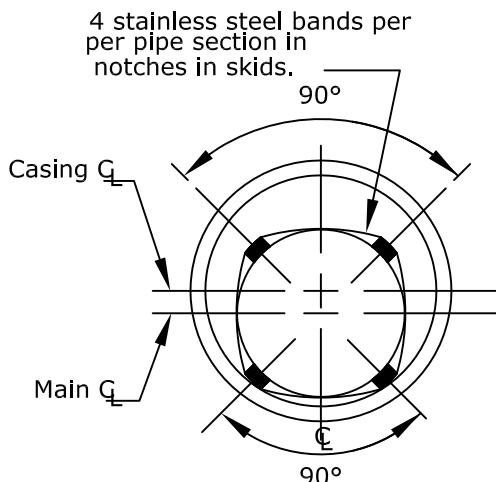
\*The Sonotube shall be installed plumb; the vertical PVC stack tolerance may be between 2% and 5% off plumb but must ensure positive drainage from the cleanout to the elbow.

Note: All concrete shall be Md. Mix No. 1 and poured from bell to bell.

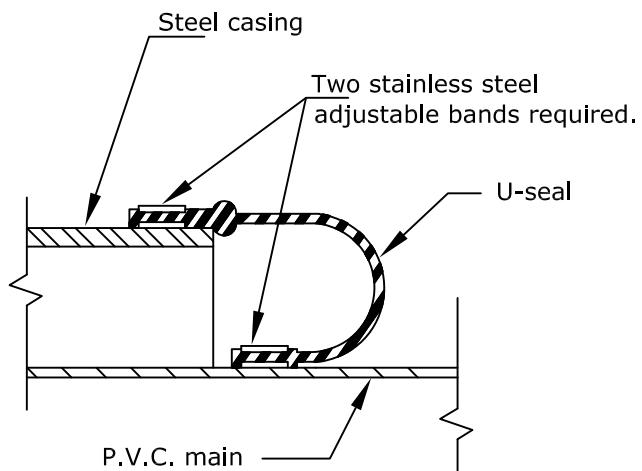
Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Type B, C & D Drop House Connection	Detail No.  209.2
	Date	Note		
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				Date: 01-24-2013



Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Plastic Pipe Adapter Installation	Detail No.
	Date	Note		210.1
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	.	.		Date: 01-24-2013



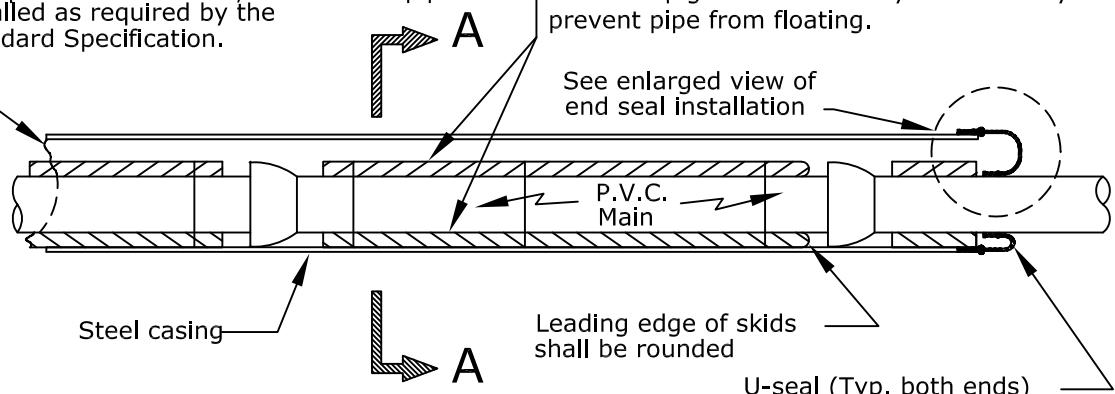
**Section A-A**



**End Seal installation**

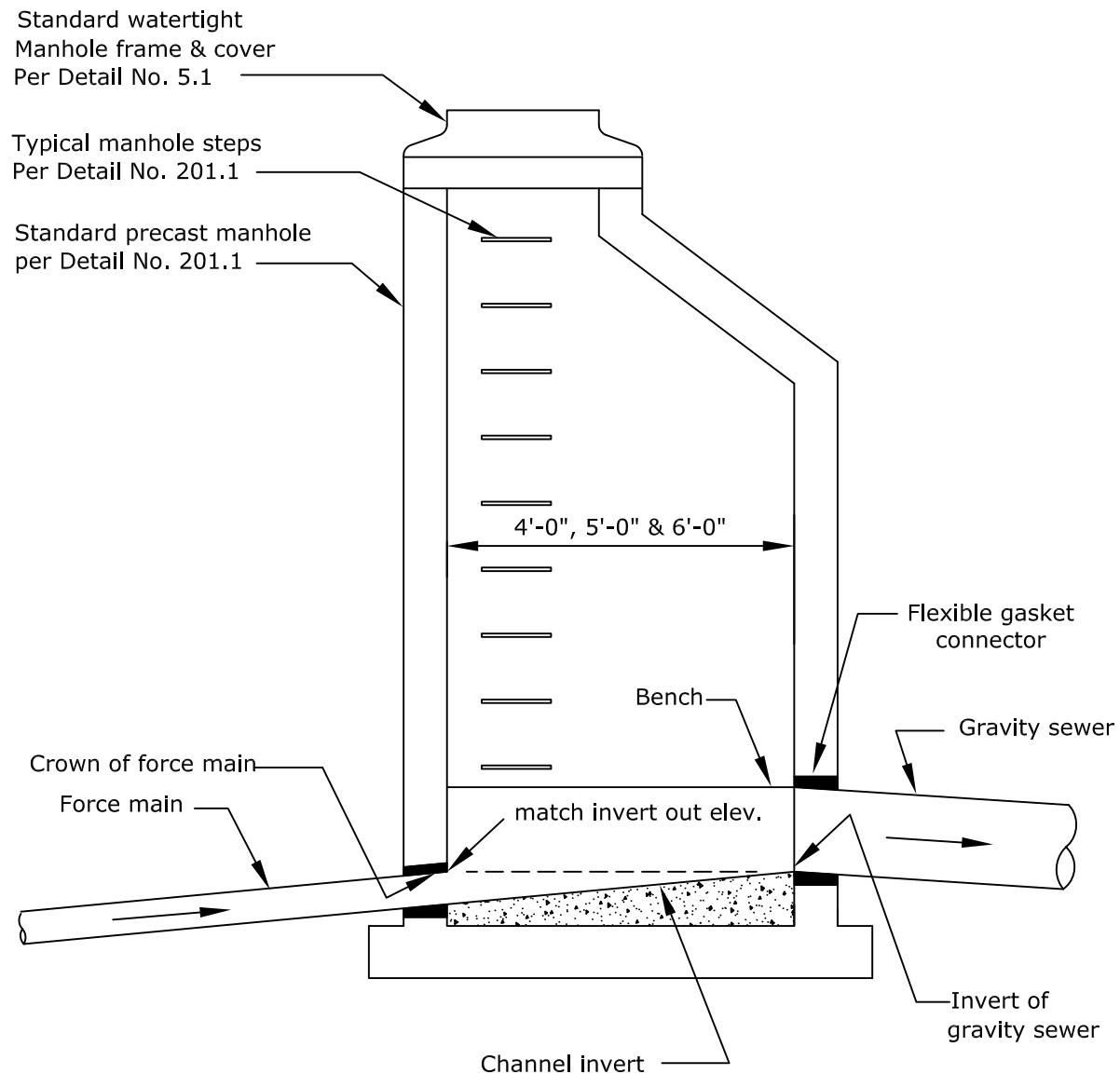
Enlarged View

Fill void with dry sand blown, cement grout, or approved flowable fill, after carrier pipe is installed as required by the Standard Specification.

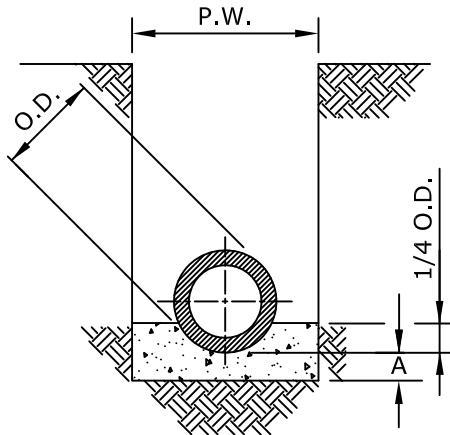


Notes:

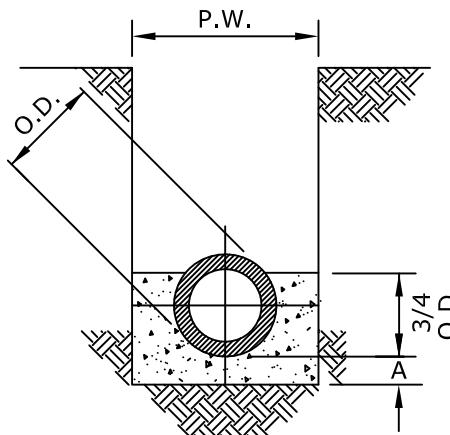
1. Elevation of gravity sewer invert shall be minimum 0.1' above elevation of force main crown.
2. Provide smooth upward sloping channel from force main to gravity sewer.
3. For transition manhole details for a grinder pump/pressure sewer system  
See Details No. 213.2, 213.3 & 217.1.
4. The relationship of the inlet (force main) to the outlet (gravity sewer)  
Shall be maximum of 30° deflection 180°.



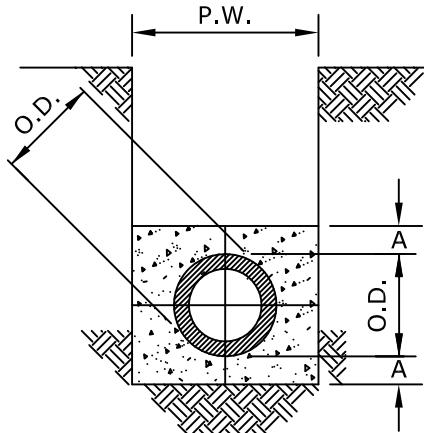
Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		<b>Transition Manhole</b> <b>Force Main to</b> <b>Gravity Sewer</b>	Detail No.
	Date	Note		212.1
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	.	.		Date: 01-24-2013



## Concrete Low Cradle



## Concrete High Cradle



# Concrete Encasement

All concrete shall be Md. S.H.A. mix No. 1.

All concrete shall be M40.5:1.5:1.5 mix No.1.  
Pour concrete against undisturbed earth. Remove sheeting before pouring concrete or pull sheeting up above the poured concrete.

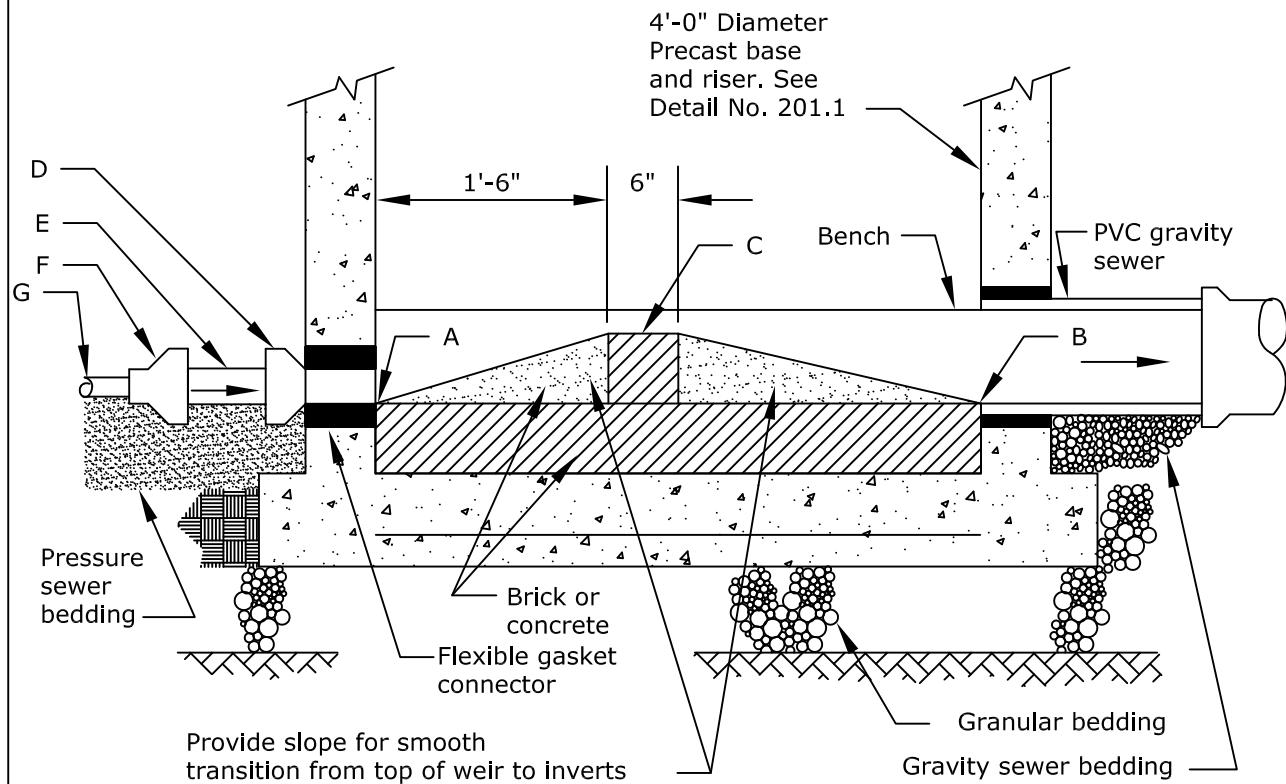
**Anchor all pipe prior to pouring concrete to insure that the pipe doesn't float.**

- A=3" min. for pipes 24" dia and smaller.
- A=4" min. for pipes larger than 24" dia.
- P.W. (pay width) shall be determined per detail No. 2.1

Nominal Diameter	Payment Allowance in Cu. Ft. per Lin. Ft.		
	Low Cradle	High Cradle	Encasement
6" PVC/ABS	.73	1.12	1.85
6" DIP	.75	1.21	1.98
8" PVC	.86	1.40	2.26
8" ABS	.92	1.52	2.44
8" DIP	.90	1.47	2.37
10" PVC	1.00	1.68	2.68
10" ABS	1.08	1.82	2.92
10" DIP	1.04	1.76	2.80
12" PVC	1.13	1.93	3.06
12" ABS	1.24	2.14	3.38
12" DIP	1.18	2.03	3.21
15" PVC	1.33	2.33	3.66
15" ABS	1.50	2.65	4.15
16" DIP	1.55	2.62	4.10
18" PVC	1.59	2.81	4.39
21" PVC	1.85	3.30	5.16
24" PVC	2.08	3.73	5.81
27" PVC	3.12	5.56	8.68

To calculate the cubic yards of concrete payment, multiply Lin. ft. by figure from above table, then divide by 27.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Concrete Encasement & Cradles Payment Allowance	Detail No.
	Date	Note		
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				Date: 01-24-2013



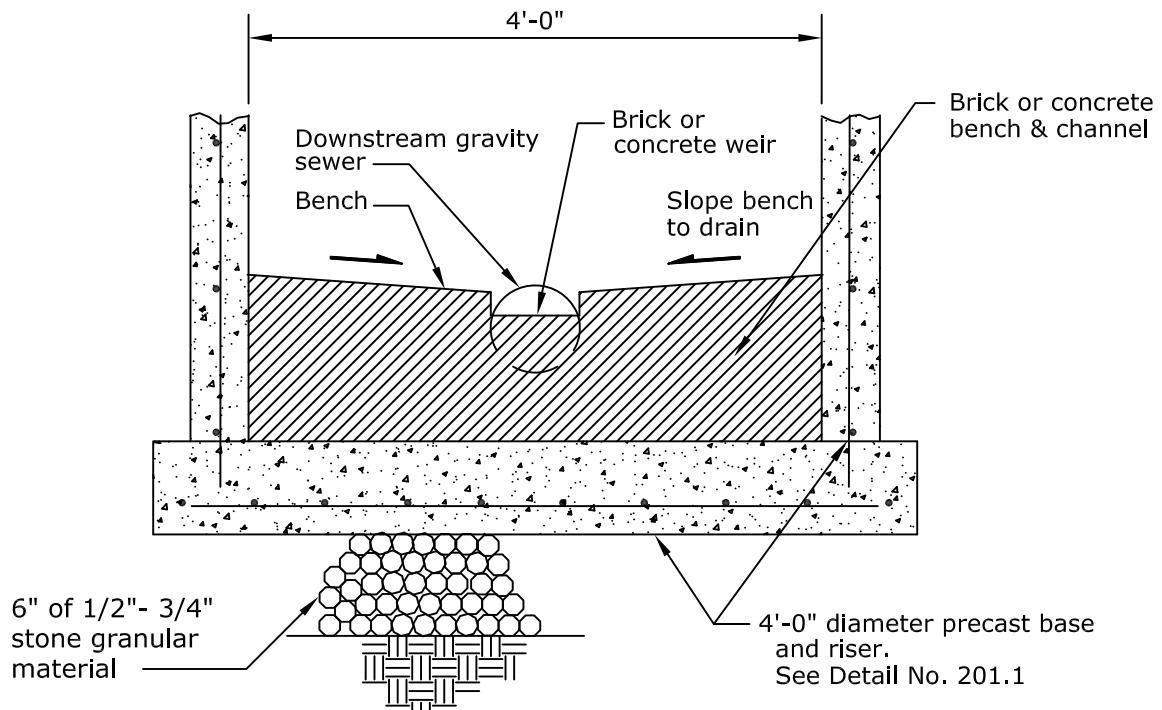
## Elevation and Fitting Schedule

A	Pressure sewer influent invert elevation
B	Gravity sewer invert elevation
C	Weir top elevation 0.1'higher than crown of pressure sewer
D	P.V.C. Bell-end section-4"O /minimum size
E	P.V.C. Nipple-4"Q
F	P.V.C. Reducer-increase to 4" O /
G	P.V.C. Pressure sewer

Note:

1. See Detail No. 217.1 for Plan View.
2. For specific elevations and fitting sizes, see contract drawings

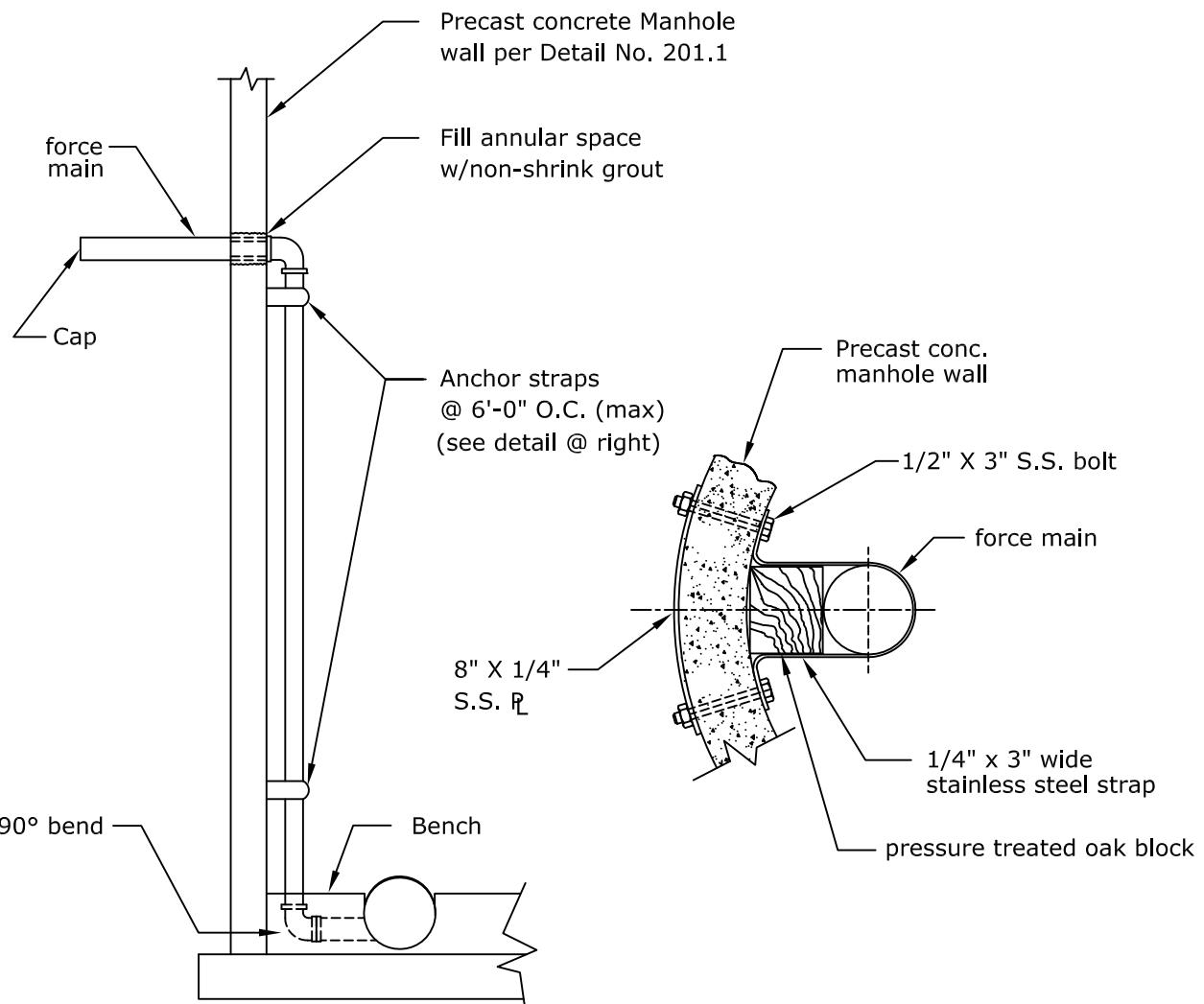
Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Transition Manhole Section A-A	Detail No. 213.2
	Date	Note		
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				Date: 01-24-2013



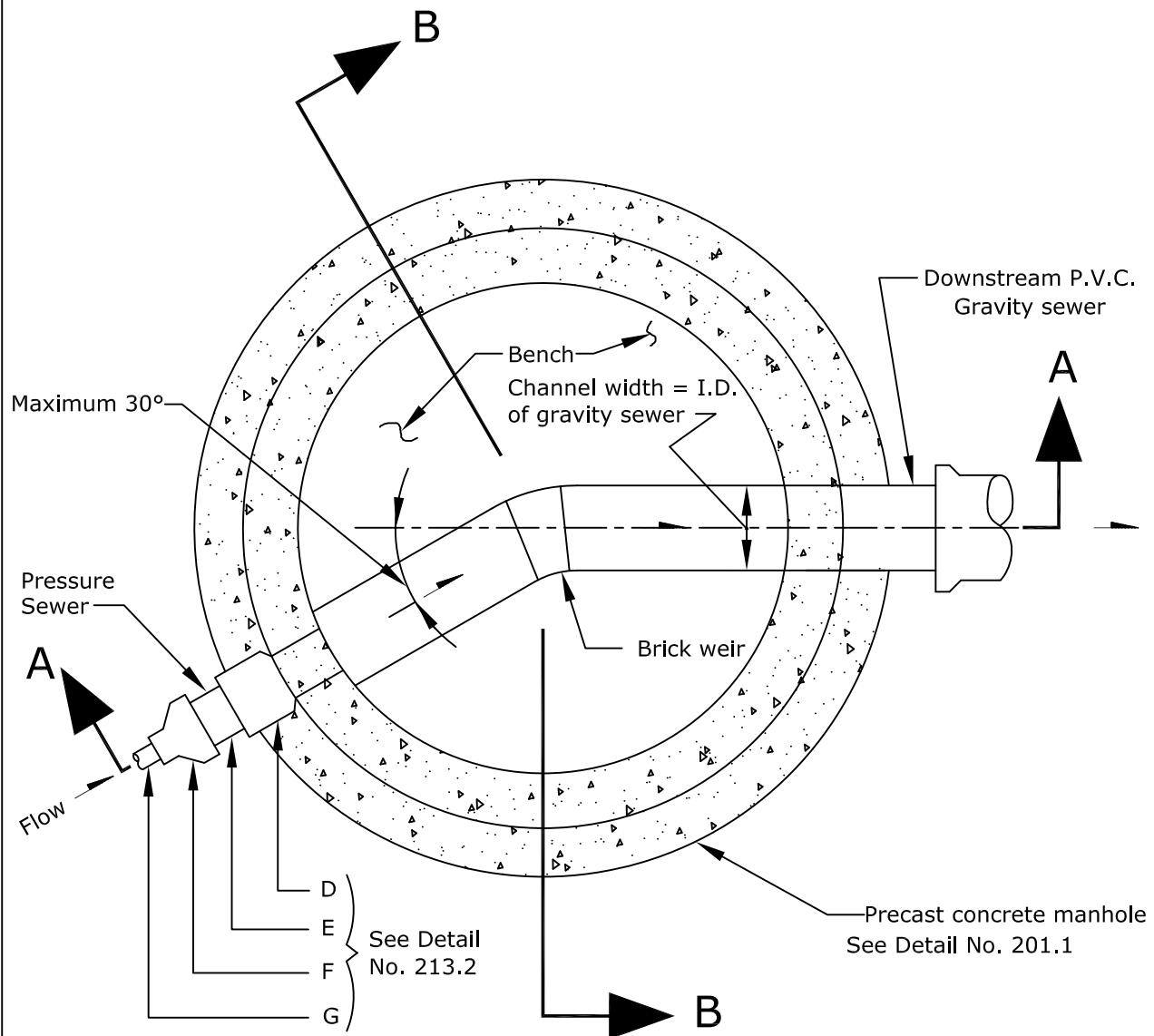
Note:

1. See Detail No. 217.1 for Plan View.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Transition Manhole Section B-B	Detail No.
	Date	Note		213.3
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Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Force Main Connection at Manhole	Detail No.
	Date	Note		214.1
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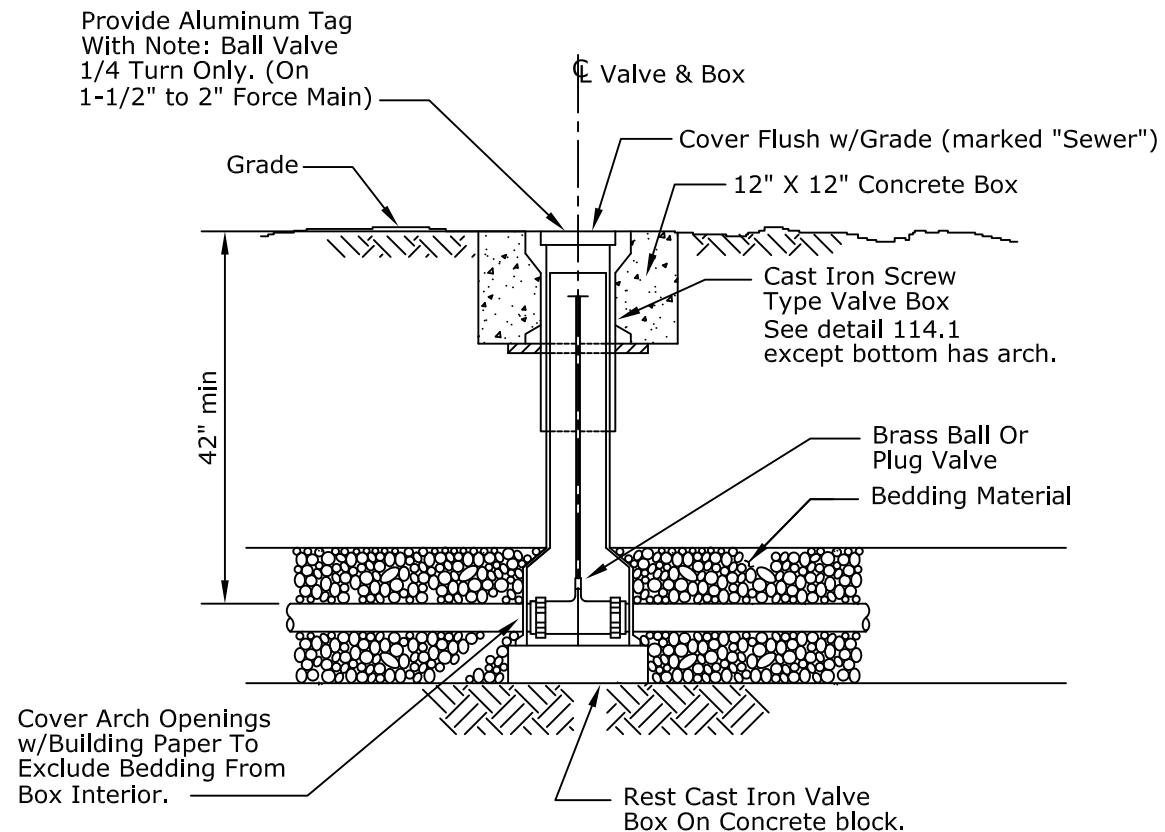
## Plan View

### Notes:

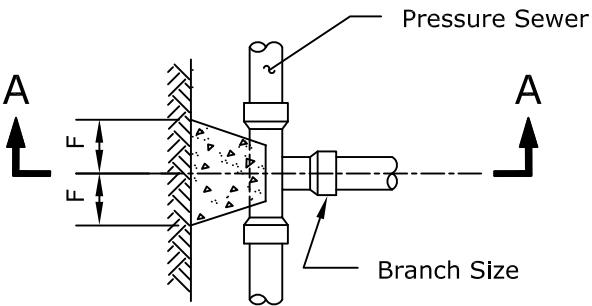
1. For section A-A, see Detail No. 213.2
2. For section B-B, see Detail No. 213.3

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Transition Manhole for Grinder Pump/Pressure Sewer System	Detail No.
	Date	Note		217.1
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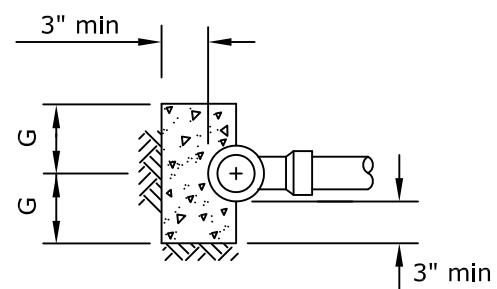
# Low Pressure Sewer Details



Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Low Pressure Sewer In-line Valve	Detail No.
	Date	Note		301.1
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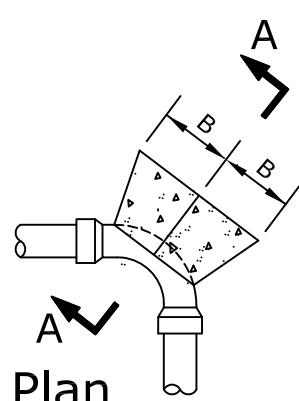


Plan

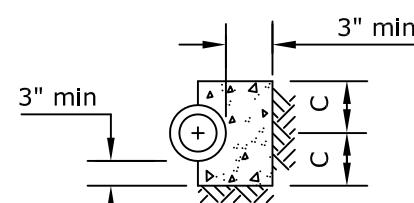


Section A-A

Tees, Including Pressure SHC'S

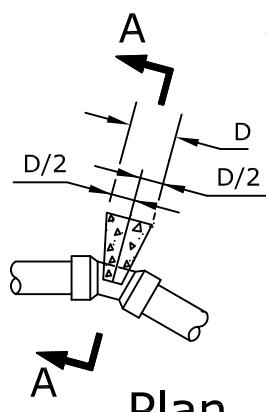


Plan

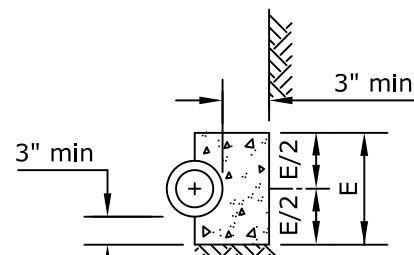


Section A-A

90°Horizontal Bends



Plan



Section A-A

11-1/4°, 22-1/2°, 45° Horizontal & Lower Vertical Bends

Notes:

1.  $f'_c = 3000$  p.s.i. @ 28 days.
2. Carry All Bearing Surfaces to Undisturbed Ground Or Firm Subgrade.
3. Buttress Sized For 160 p.s.i.
4. See Detail 303.1 For Upper Vert. Bends.
5. Do Not Encase Joints.

Pipe Size	B	C	D	E	F	G
1-1/4" & 1-1/2"	4"	4"	5"	5"	3"	3"
2"	5"	5"	7"	7"	5"	5"

Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

Revisions

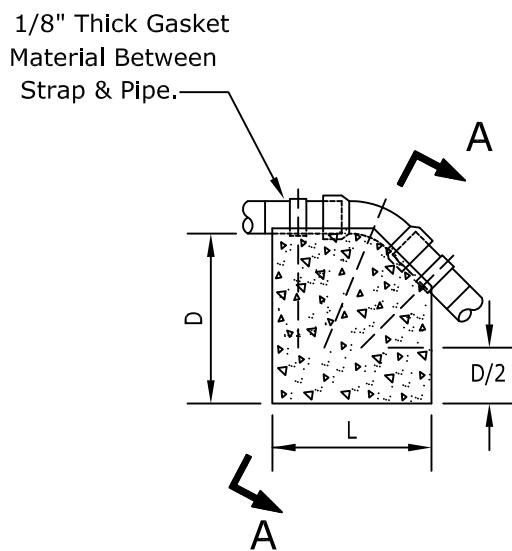
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Low Pressure Sewer  
Pressure Sewer  
Blocking

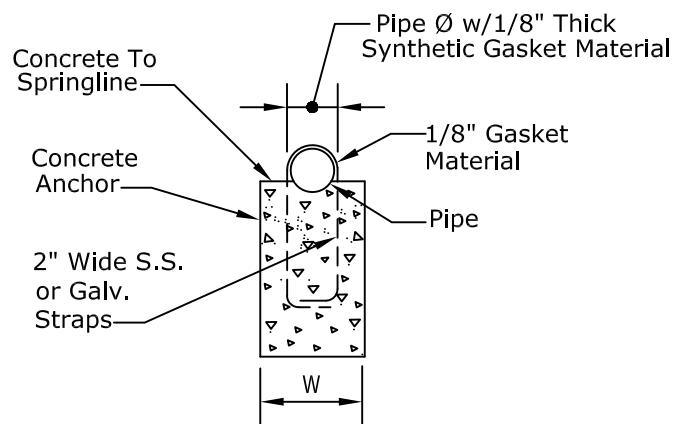
Detail No.

302.1

Date:  
01-24-2013



Profile



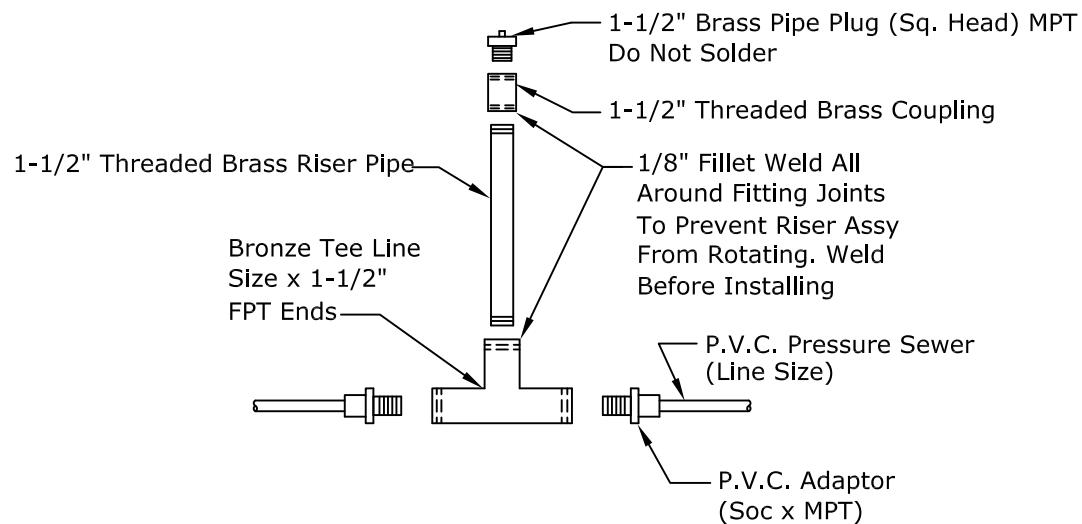
Section A-A

Bend	Size in inches				
	1-1/4, 1-1/2	2, 2-1/2	3	4	
11 1/4°	L 12	15	18	18	
	W 10	12	15	18	
	D 10	15	15	18	
22 1/2°	L 15	20	20	24	
	W 15	20	20	24	
	D 12	12	18	20	
45°	L 20	24	24	30	
	W 20	20	24	30	
	D 12	20	24	26	

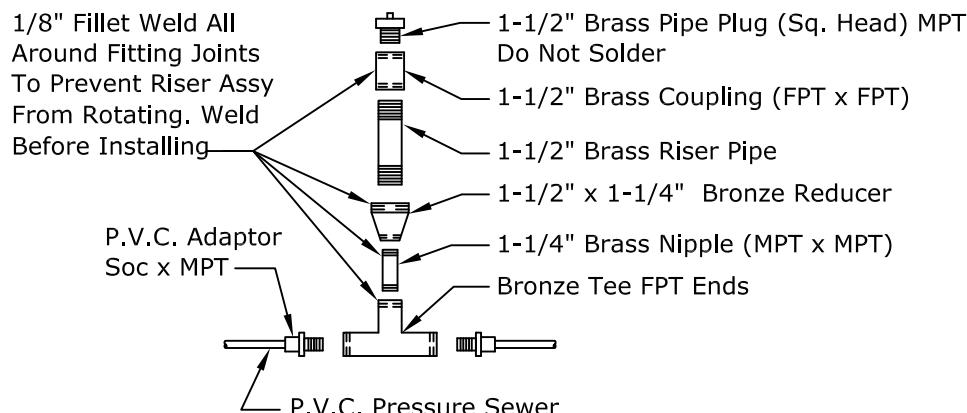
Notes:

1. Galvanized or Stainless Steel Straps Shall Be 20 Gage and 2" Wide.
2. Straps Shall Be Embedded in Concrete A Distance Of D/2.
3. 1/8" Thick Synthetic Gasket Material Shall Be Placed Between Strap And Pipe.
4. Paint Exposed Galvanized With 2 Coats Of Bituminous Paint.
5. f's=3000 p.s.i. At 28 Days.
6. Carry All Bearing Surfaces To Undisturbed Earth Or Firm Subgrade.
7. Concrete Anchorage Dimensions Are Based On Total Pressure Of 150 p.s.i.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Low Pressure Sewer Vertical Blocking	Detail No.
	Date	Note		303.1
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	.	.		Date: 01-24-2013



## Connection For 1-1/2"-4" Main Line Pressure Sewer



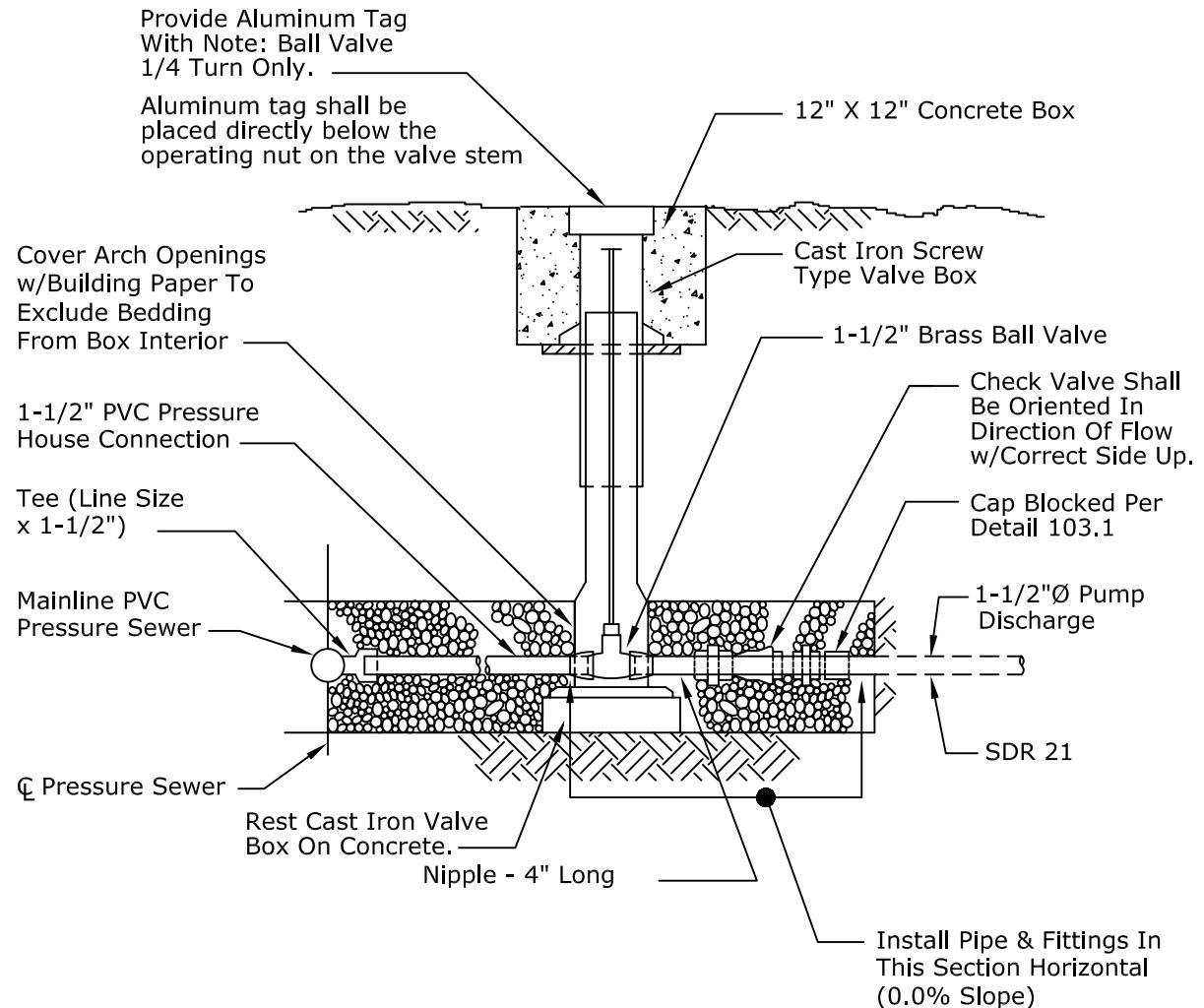
## Connection For 1-1/4" Main Line Pressure Sewer

### LEGEND:

MPT = Male Pipe Thread  
 FPT = Female Pipe Thread

Note: Copper tracer wire shall be installed with all P.V.C. pipe.

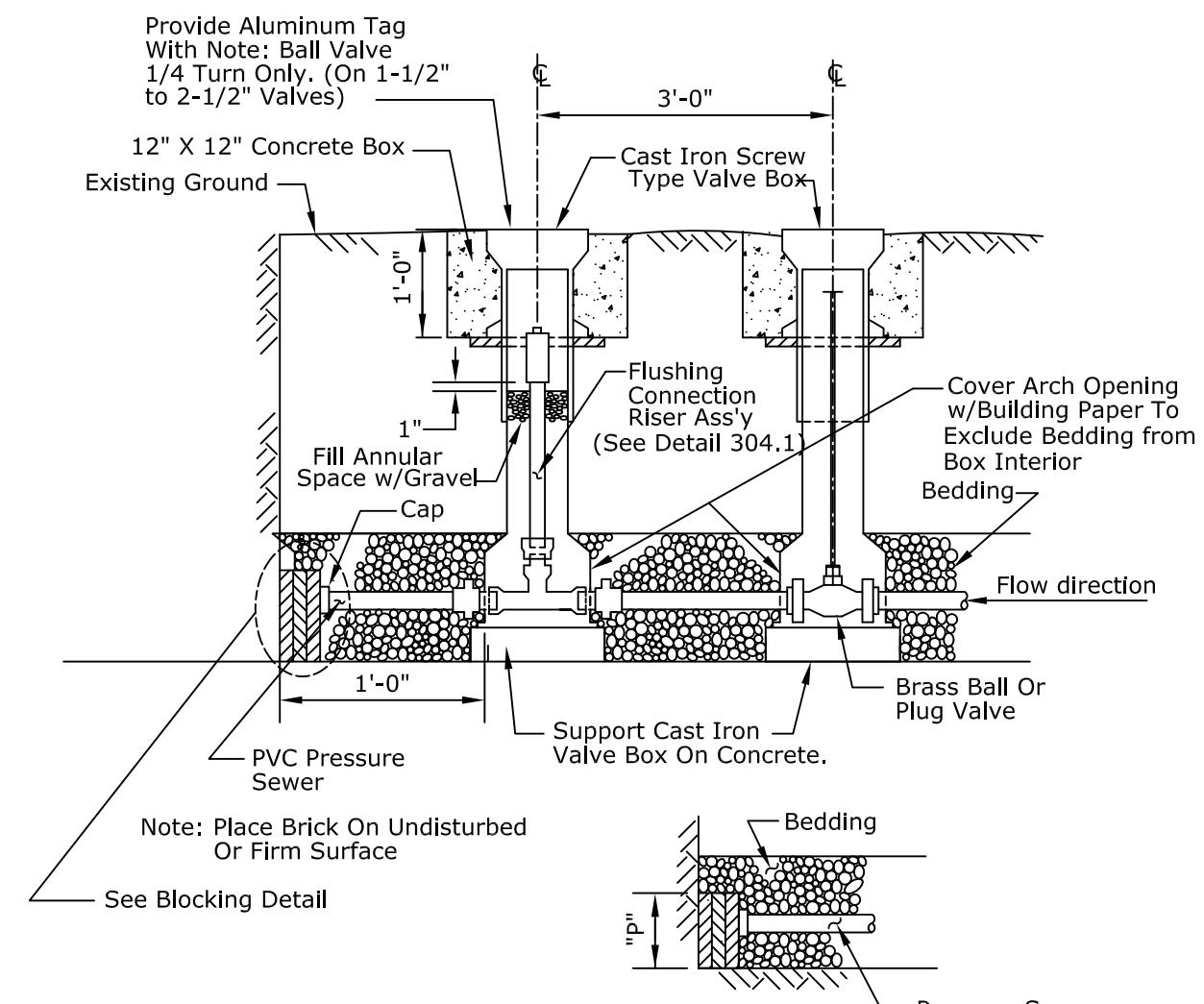
Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Low Pressure Sewer Riser Assembly	Detail No.
	Date	Note		304.1
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### Notes:

1. Place Brick On Undisturbed Earth Or Firm Soil.
2. Installation Of New Pressure Sewer Service Connections To Previously Installed Mains Requires Tapping. Tap Main Using A Ford #FC202 Series Saddle And A Ford #FB1600 Series Corporation Stop. Provide Male PVC Adaptor Between The Corporation Stop And Pressure Sewer Service Connection.

Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Low Pressure Sewer Service Connection	Detail No.
	Date	Note		305.1
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				Date: 01-24-2013



Notes:

1. Carry All Bearing Surfaces To Undisturbed Earth Or Firm Subgrade
2. Nominal Thickness Of All Boards Is 2".
3. All Boards To Be Pressure Treated (CCA) Yellow Pine.

Pipe Size	M	N	P
1/4"	6"	6"	8"
1/2"	6"	6"	8"
2"	6"	8"	8"
2-1/2"	8"	8"	10"
3"	12"	18"	12"
4"	12"	18"	12"

Blocking Details

Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

Revisions

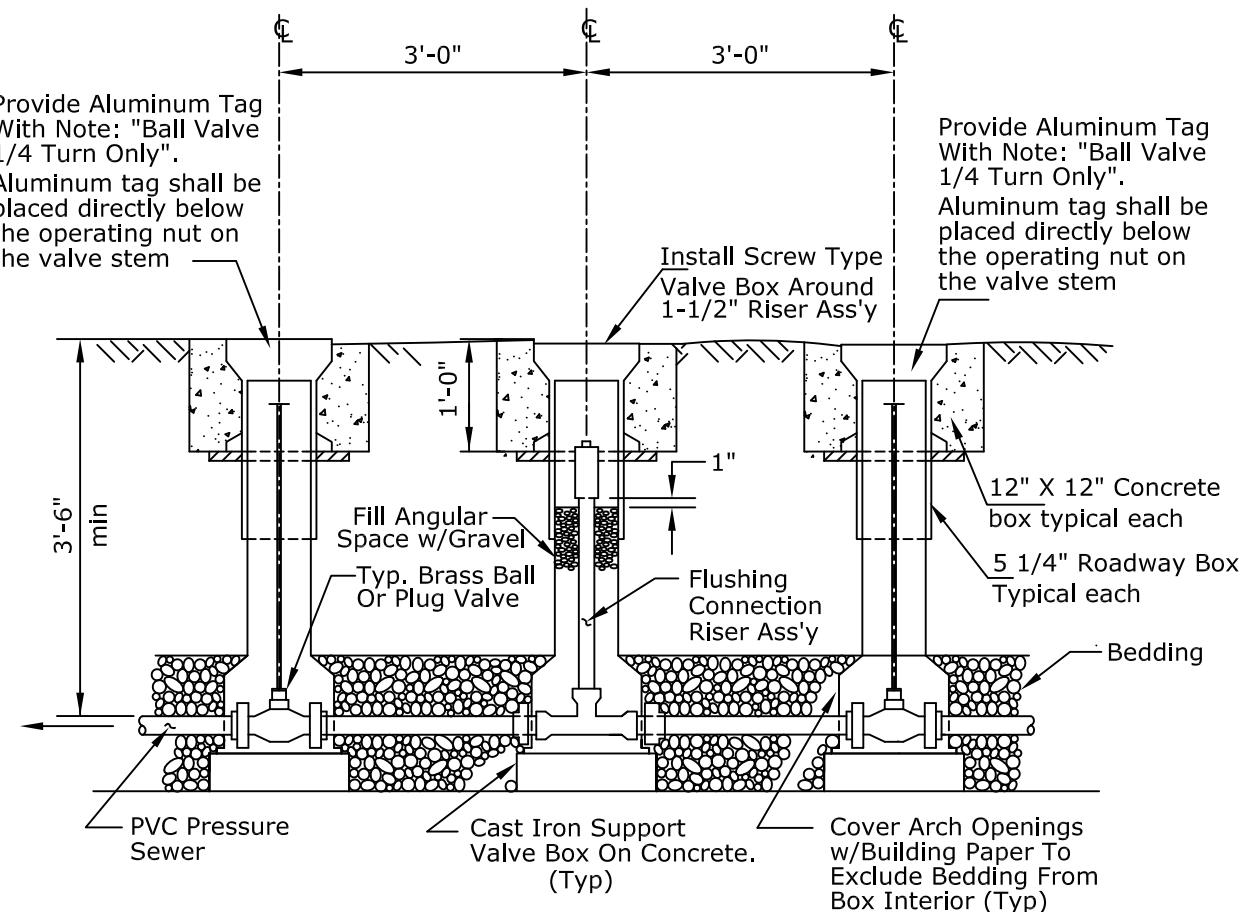
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Low Pressure Sewer  
Terminal Flushing  
Connection

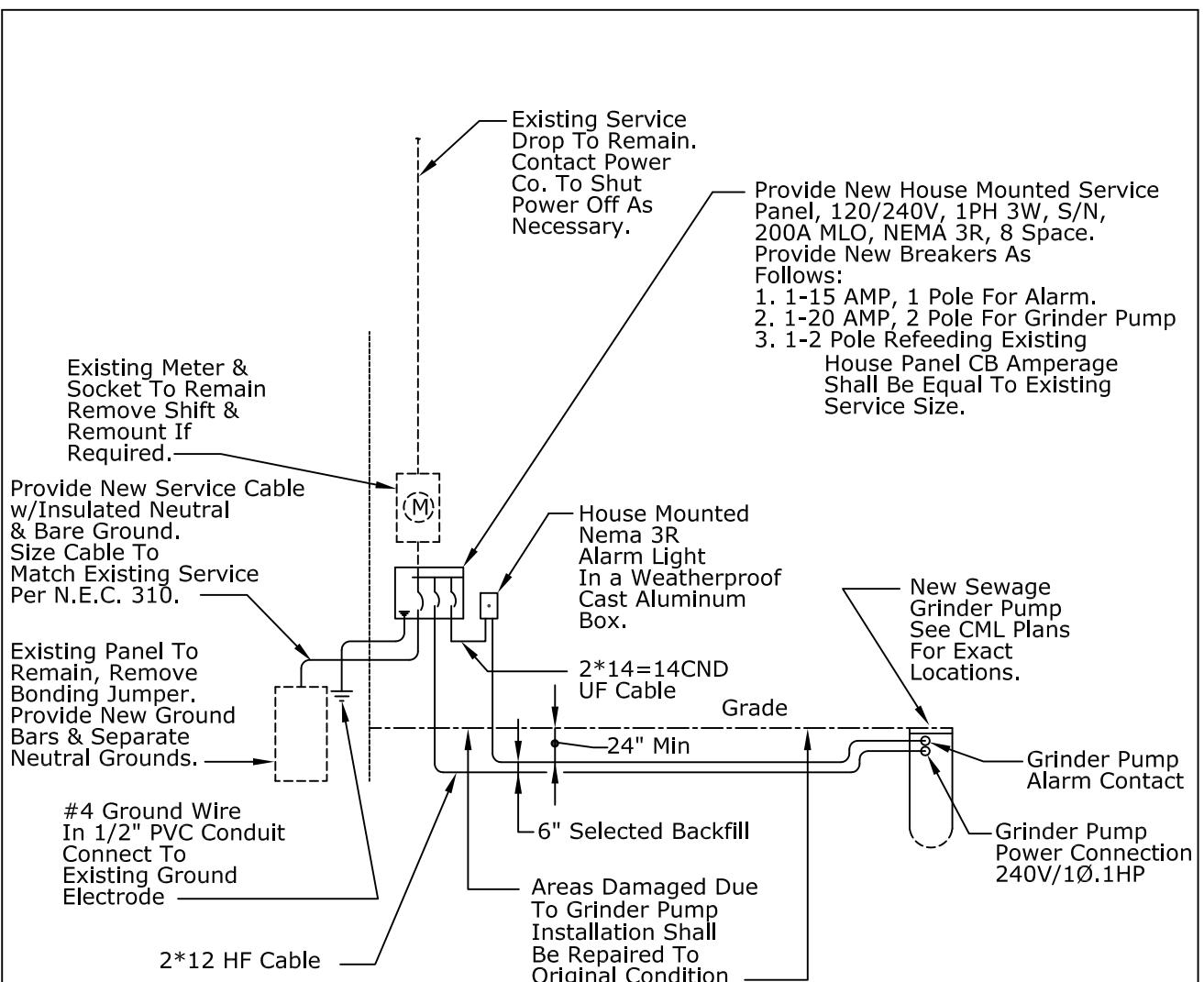
Detail No.

306.1

Date:  
01-24-2013



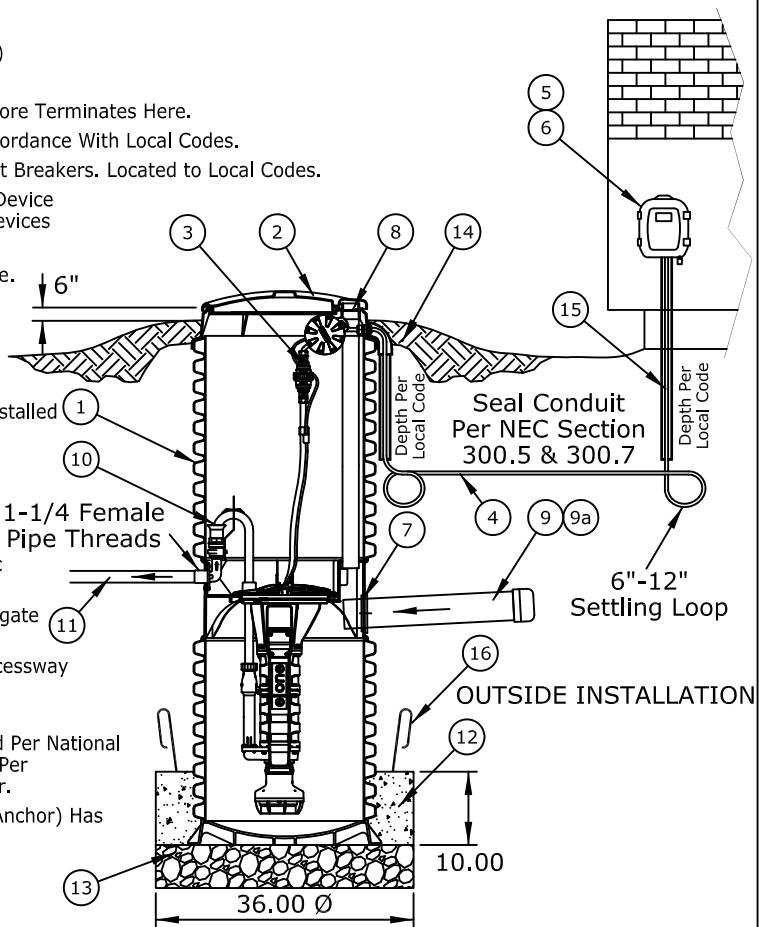
Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Low Pressure Sewer In-Line Flushing Connection	Detail No.
	Date	Note		307.1
				Date: 01-24-2013



Frederick County Division of Utilities & Solid Waste Management  Department of Engineering & Planning	Revisions		Grinder Pump System Electrical Service To An Existing Dwelling	Detail No.  308.1
	Date	Note		
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**Specifications:**

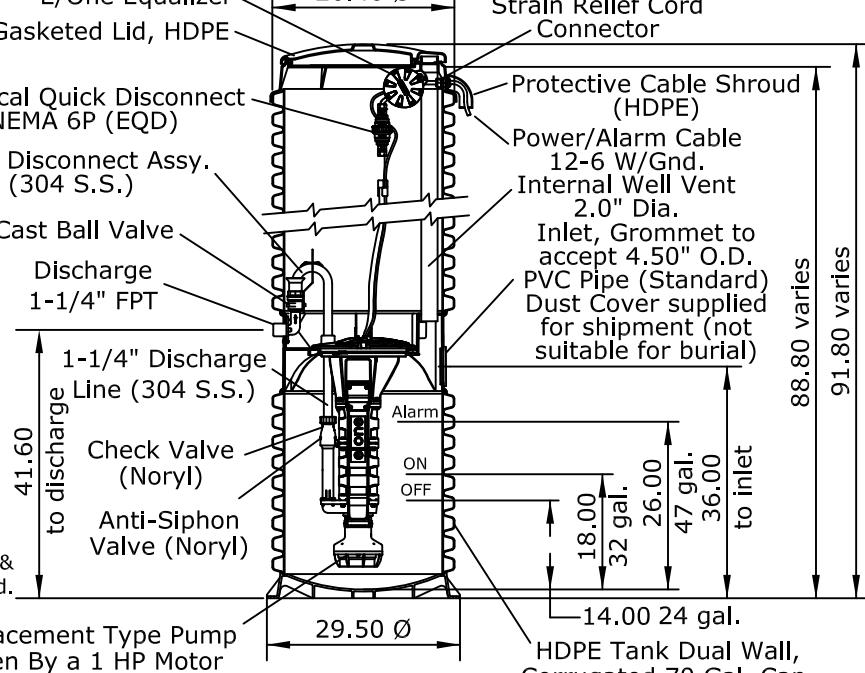
1. Grinder Pump Basin - High Density Polyethylene (HDPE)
2. Accessway Cover - FRP.
3. Electrical Quick Disconnect (EQD) - Cable From Pump Core Terminates Here.
4. Power And Alarm Cable - Circuits To Be Installed In Accordance With Local Codes.
5. Alarm Panel - NEMA 4X Enclosure. Equipped With Circuit Breakers. Located to Local Codes.
6. Alarm Device - Every Installation Is To Have An Alarm Device to Alert Homeowner of a Potential Malfunction. Visual Devices Should Be Placed in Very Conspicuous Locations.
7. Inlet - EDPM Grommet (4.5" ID). For 4.5" OD DWV. Pipe. 6"
8. Wet Well Vent - 2.0" Tank Vent. Supplied By Factory In Units With Accessway.
9. Gravity Service Line - 4" DWV. (4.5" OD). Supplied By contractor.
- 9a. Stub-Out - 4" X 5" long Watertight Stub-Out, To Be Installed At Times Of Burial Unless The Gravity Service Line Is Connected During Installation. Supplied By Contractor.
10. Discharge Valve - 1-1/4" Female Pipe Threads. Supplied By Contractor.
11. Discharge Line - 1-1/4" Nominal Pipe size. Supplied By Contractor.
12. Concrete Anchor - See Ballast Calculations For Specific Weight For Station Height. Supplied By contractor.
13. Bedding Material - 6" Minimum Depth, Rounded Aggregate (Pea Gravel).
14. Finished Grade - Grade Line to Be 6" Below Top Of Accessway And Slope Away From Accessway Opening. And Local Codes.
15. Conduit - 1" Or 1-1/4" Material And Depth As Required Per National Conduit Must Enter Panel From Bottom And Be Sealed Per Per NEC Section 300.5 & 300.7. Supplied By Contractor.
16. Rebar - Required To Lift Tank After Ballast (Concrete Anchor) Has Been Attached, 4 Places, Evenly Spaced Around Tank.



**Notes:**

1. All Dimensions In Inches Unless Noted Otherwise.
2. Do Not Scale Drawing.
3. Discharge Line To Be Below Frost Line.
4. All Joints In Tank And Accessway Are Manufactured And Tested For Watertight Integrity.
5. All Dimensions And Specifications Are Subject To Change Without Notice.
6. \*FRP - Fiberglass Reinforced Polyester.
7. E/One Typical Installation Instructions & Warranty Information Shall Be Followed.

Semi-Positive Displacement Type Pump  
Each Directly Driven By a 1 HP Motor



Frederick County  
Division of Utilities &  
Solid Waste Management  
Department of  
Engineering & Planning

Revisions

Date	Note
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Typical Simplex Grinder Pump  
Installation

Detail No.

309.1

Date:  
01-24-2013