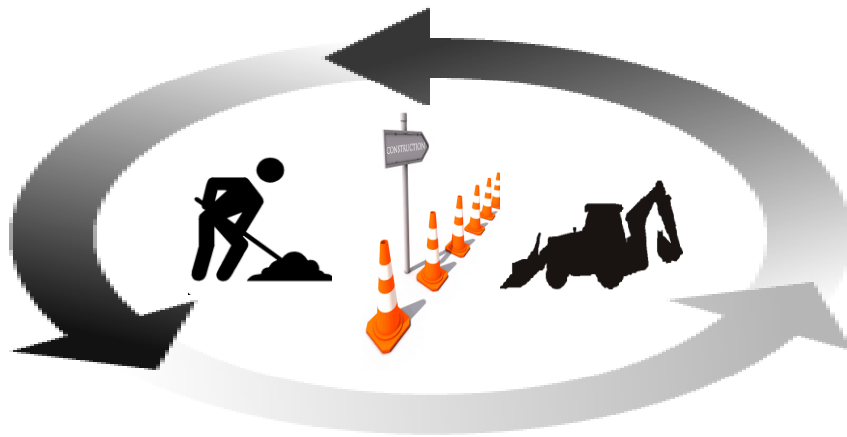





dallas **water** utilities
city of dallas

STANDARD DRAWINGS FOR WATER & WASTEWATER CONSTRUCTION



October 2021

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	Description of Last Change:	Revision 1		
Document Title:	Standard Drawings For Water And Wastewater Construction			

PREFACE

The intent of this manual is to provide guidelines for the standard appurtenances of water and wastewater mains owned and operated by Dallas Water Utilities (DWU). This manual replaces the previous edition of “Standard Drawings for Water and Wastewater Construction” by DWU dated October, 2017.

This edition of “Standard Drawings for Water and Wastewater Construction” is written by Engineering Services, Dallas Water Utilities. Any questions or suggestions regarding to this manual should be forwarded to Engineering Services, Dallas Water Utilities.

Copies Available On-line At:

http://www.dallascityhall.com/dwu/dwu_design_standards.html

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PART 1
(Series 100)

COMMON FOR
WATER & WASTEWATER MAIN
CONSTRUCTION



City of Dallas
Water Utilities Department

PART 1

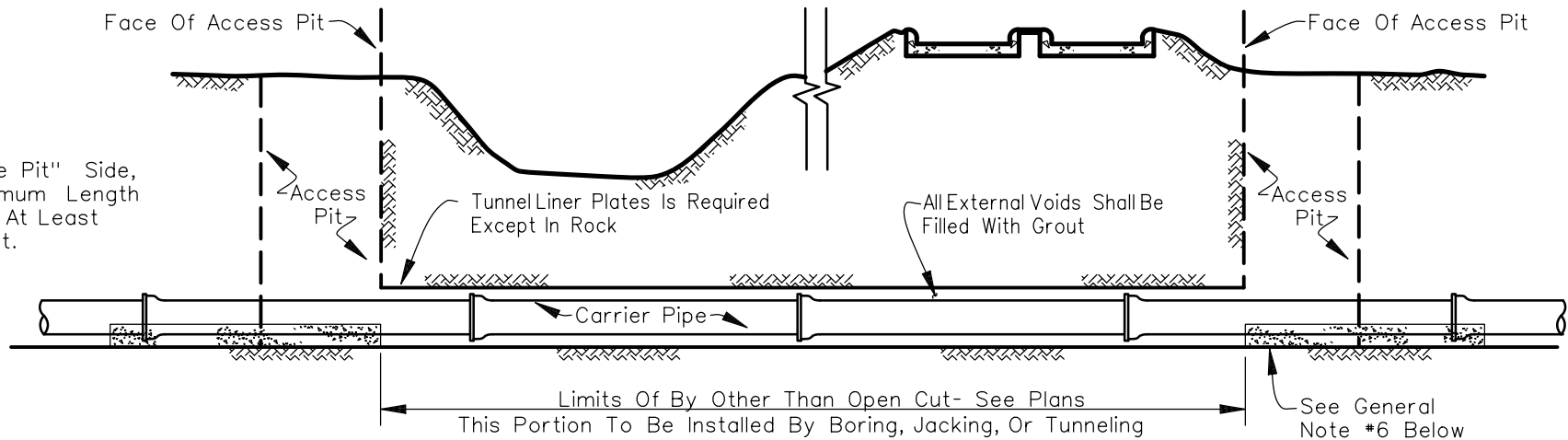
COMMON FOR WATER & WASTEWATER CONSTRUCTION

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BY OTHER THAN OPEN CUT-FOR WATER MAINS & WASTEWATER MAINS (NON Tx.D.O.T. - NON RAILROAD)

NOTE:

On "Bore Pit" Side,
The Minimum Length
Must Be At Least
One Joint.



GENERAL NOTES

1. By Other Than Open Cut Construction Methods Are To Conform NCTCOG Specifications Item 503.3 Methods Of Jacking, Boring, Or Tunneling & 2010 City of Dallas Addendum To NCTCOG Specs. (Unless Otherwise Noted)
2. Carrier Pipe To Be Made Up Outside The Limits Of By Other Than Open Cut Area, Then Pushed Through Shaft Area.
3. The Carrier Pipe Must Be Restrained (Weighted) In Place Prior To The Placing Of Grout To Prevent The Carrier Pipe From Floating.
4. The Voids Between The Encasement Pipe/Tunnel Liner Plate And The Earthen Bore Are To Be Filled With Grout.
5. The Voids Between The Encasement Pipe/Tunnel Liner Plate And The Carrier Pipe Are To Be Filled With Grout.
6. Hold-Down Jacks Or Pipe Spacers (If Required By Design) Shall Conform To Page 109. Additionally, Grout Will Be Applied To All Voids Between The Carrier Pipe And Encasement Pipe.
7. When Main Is Installed With An Encasement Pipe Or Tunnel Liner Plate, The Carrier Pipe Is To Be Supported By A Class "B" Concrete Cradle As Shown On Page 108.
8. The Contractor Must Submit An Encasement Design For Approval By The Owner. For Encasement Pipes Greater Than 15 Inches (I.D.), The Submittal Must Be Sealed By A Professional Engineer Registered Within The State Of Texas.
9. Foam Grout Is An Acceptable Type Of Grout.

NCTCOG Spec: 503.3- Methods Of Jacking, Boring Or Tunneling
2021 COD Addendum 503.3.3.1. - General

**BY OTHER THAN OPEN CUT
(Non-Tx.D.O.T. & Non-Railroad)**

COD

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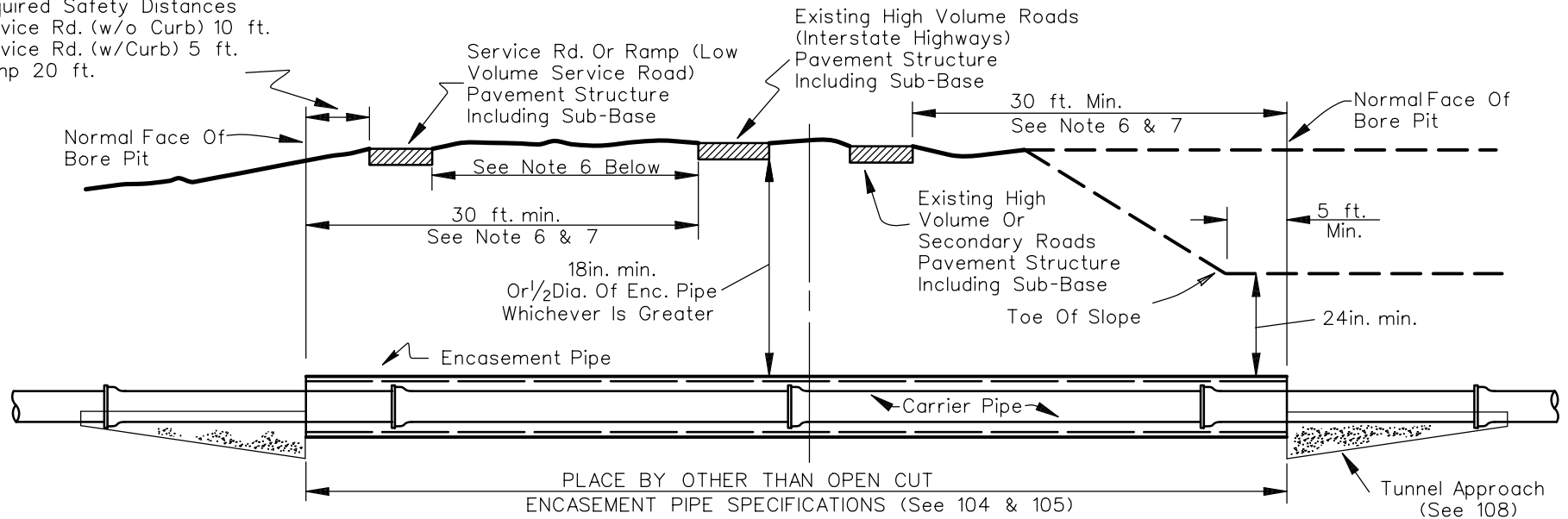
101

DATE

JULY, 2021

TYPICAL FOR HIGHWAY CROSSING FOR ALL WASTEWATER MAINS & FOR WATER MAINS 12 in. & UNDER IN DIAMETER

Required Safety Distances
 Service Rd. (w/o Curb) 10 ft.
 Service Rd. (w/Curb) 5 ft.
 Ramp 20 ft.



GENERAL NOTES

1. Carrier Pipe To Be Made Up Outside The Encasement Pipe And Pushed Through With The Bell Of The Pipe Resting On The Encasement Pipe Or A Class "B" Concrete Cradle Where Applicable.
2. Carrier Pipe Shall Be Supported On A Continuous Class "B" Concrete Cradle, Within Corrugated Metal And Flange Liner Encasements.
3. Carrier Pipe Must Be Restrained (Weighted) In Place Prior To The Placing Of Grout To Prevent The Carrier Pipe From Floating.
4. Construct Tapered Concrete Tunnel Approach At Each End Of Enc. Pipe. See Detail On 108.
5. The Contractor Must Submit An Encasement Design For Approval By The Owner. For Encasement Pipes Great Than 15 Inches (I.D.), The Submittal Must Be Sealed By A Professional Engineer Restered Within The State Of Texas.
6. Where Circumstances Necessitate The Excavation Of A Bore Pit Or Trench Closer To The Edge Of Pavement Than Set Forth On This Sheet, Guard Fence Or Other Approved Protective Devices Will Be Installed For The Protection Of The Traveling Public.
7. If Construction Site Is Wider Than Required Safety Distances And If Side Slopes Will Allow, Construction Of Bore Pits May Be Allowed (With Tx.D.O.T. Approval) But Access To Those Pits Must Be By Means Other Than Main Traffic Lanes.
8. In Tunnel Sections, Voids Between Earth Or Rock & Enc. Pipe Shall Be Filled With 1:7 Grout Including 5% Air Entrainment By Pressure Injection.
9. In Tunnel Sections, Voids Between Encasement Pipe And Carrier Pipe Shall Be Filled With 1:7 Grout Including 5%-40% Air Entrainment By Pressure Injection.

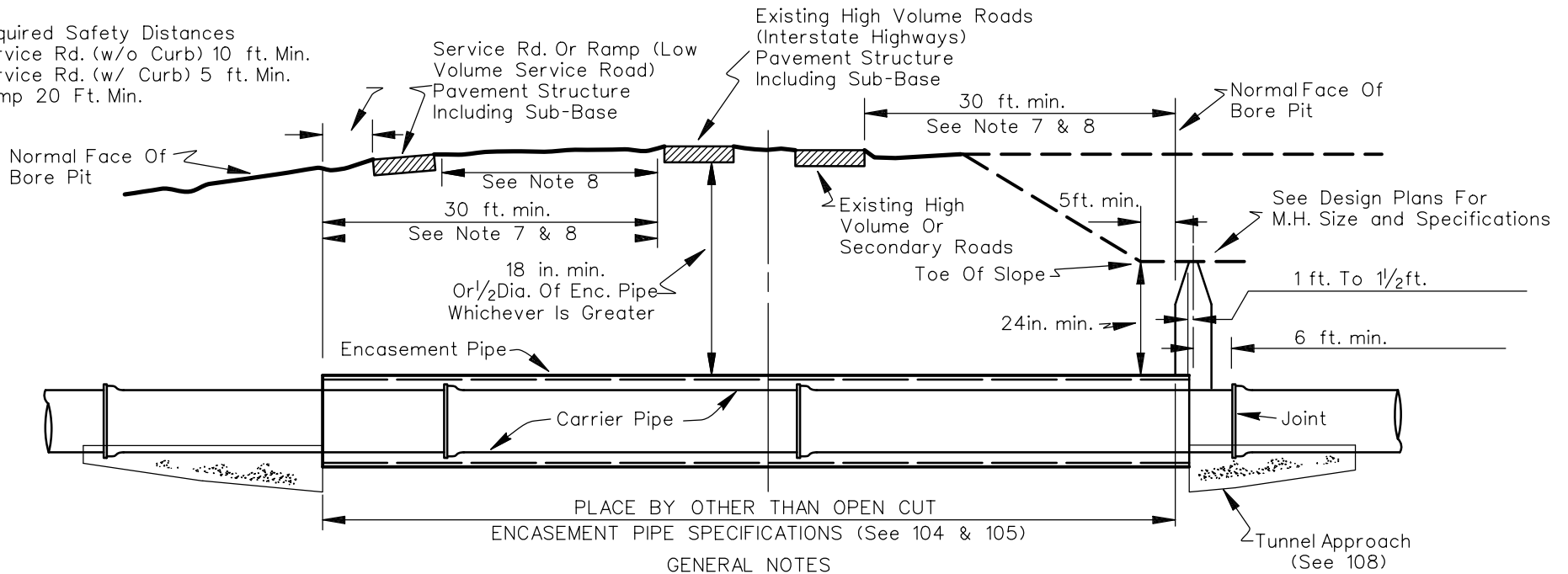
REFER TO PAGES: 103 104
 105 106
 107 108
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NCTCOG Spec: 509.2 - State Highway Crossing
 NCTCOG Spec: 702.3.4 - Quality Of Concrete

HIGHWAY CROSSING FOR ALL WASTEWATER MAINS & FOR WATER MAINS 12" & UNDER IN DIAMETER.	COD	(Page No.) 102
	DATE JULY. 2021	

TYPICAL FOR HIGHWAY CROSSING FOR WATER MAINS OVER 12in. (30.5cm.) DIAMETER

Required Safety Distances
 Service Rd. (w/o Curb) 10 ft. Min.
 Service Rd. (w/ Curb) 5 ft. Min.
 Ramp 20 Ft. Min.



1. There Shall Be A Minimum Of Two Hold-Down Jacks or Pipe Spacers Per Carrier Pipe Joint, See 109.
2. Carrier Pipe Shall Be Supported On A Continuous Class "B" Concrete Cradle, Within Corrugated Metal And Flange Liner Encasements.
3. Construct Tapered Concrete Tunnel Approach At Each End Of Enc. Pipe. See Detail On 108.
4. When Standard Pipe Is Made Up Inside Larger Enc. Pipe, The Carrier Pipe Shall Be Laid To Grade On A Class "B" Concrete Embedment Which Shall Extend To The 1/4 Point Of The Diameter Of The Carrier Pipe. When Mechanical Joint Pipe Is Used As A Carrier Pipe In Larger Enc. Pipe, Precast Concrete Blocks May Be Placed Back Of Each Bell. Each Block Will Have Minimum Dimensions Of 9 in. In Length By 0.866 "D" In Breadth (Where "D" Is The External Diameter Of The Placed Carrier Pipe) With A Sufficient Thickness To Clear The Bells From The Enc. Pipe And To Bring The Carrier Pipe To Grade.
5. Where Circumstances Necessitate The Excavation Of A Bore Pit Or Trench Closer To The Edge Of Pavement Than Set Forth On This Sheet, Guard Fence Or Other Approved Protective Devices Will Be Installed For The Protection Of The Traveling Public.
6. If Construction Site Is Wider Than Required Safety Distances And If Side Slopes Will Allow, Construction Of Bore Pits May Be Allowed (With Tx.D.O.T. Approval) But Access To Those Pits Must Be By Means Other Than Main Traffic Lanes.
7. The Contractor Must Submit An Encasement Design For Approval By The Owner. For Encasement Pipes Greater Than 15 Inches (I.D.), The Submittal Must Be Sealed By A Professional Engineer Registered Within The State Of Texas.
8. In Tunnel Sections, Voids Between Earth Or Rock & Enc. Pipe Shall Be Filled With 1:7 Grout Including 5% Air Entrainment By Pressure Injection.
9. In Tunnel Sections, Voids Between Encasement Pipe And Carrier Pipe Shall Be Filled With 1:7 Grout Including 5%-40% Air Entrainment By Pressure Injection.
10. Foam Grout Is An Acceptable Type Of Grout.

REFER TO PAGES:
 102, 104, 105, 106, 107, 108 & 109

NCTCOG Spec: 509.2 - State Highway Crossing
 NCTCOG Spec: 702.3.4 - Quality Of Concrete

**HIGHWAY CROSSING FOR
 WATER MAINS OVER 12" DIAMETER**

COD

(Page No.)

103

DATE

JULY, 2021

ENC. PIPE I.D. in.	2 FLNG. LINER H-20-L.L.		4 FLNG. LINER H-20-L.L.		CORRUGATED METAL		COUPLING BAND		R.C. CULVERT PIPE			STEEL PIPE				
	Gauge	Max. Cov.	Gauge	Max. Cov.	Gauge	Max. Cov.	Min. Width	Gauge	Class	Wall	For Open-Cut			Wall Thick.	Max. Cov.	
	Ga.	Ft.	Ga.	Ft.	Ga.	Ft.	In.	Ga.			Maximum Cover			In.	Ft.	
												Ft. (M) Embedment				
											Class "C"	Class "B"	Class "A"			
12"														3/16"	∞	
15"														1/4"	∞	
18"														1/4"	∞	
21"														5/16"	∞	
24"														3/8"	∞	
27"														7/16"	∞	
30"														7/16"	∞	
36"														1/2"	∞	
42"														1/2"	∞	
48"	14	∞	12	∞												
54"	14	∞	12	∞												
60"	14	∞	12	∞												
66"	14	∞	12	∞												
72"	14	∞	12	∞												
	ALT. "B"												ALT. "D"			

NOT ALLOWED IN TX.D.O.T. DISTRICT 18 FOR CITY OF DALLAS
 NOT ALLOWED IN TX.D.O.T. DISTRICT 18 FOR CITY OF DALLAS
 NOT ALLOWED IN TX.D.O.T. DISTRICT 18 FOR CITY OF DALLAS

NOTE:
∞ Infinity

HIGHWAY CROSSING ENCASEMENT PIPE, GAUGE, CLASS, COVER	DWU	(Page No.) 104
	DATE OCT. 2009	

STATE HIGHWAY CROSSINGS

All State Highway crossings shall conform to Tx.D.O.T.'s Public Transportation Utility Accommodation Policy Manual Special Specifications, and the following requirements:

All excavations within the State controlled right-of-way shall be back filled by tamping in 6 inch horizontal layers. All surplus material shall be removed from the right-of-way and the excavation area shall be restored flush with the surrounding natural ground.

All areas of sod that are disturbed by the construction operations are to be restored at completion of project. Areas with slopes of 2% or less are to be restored by mulch sodding. Areas with slopes greater the 2% are to be restored with block sod.

Crossings below paved roadways by water and wastewater mains within the State controlled right-of-way are to be installed by boring or tunneling methods. Optional "Wet"bore or "Slurry" bore methods must be approved by Tx.D.O.T. Water or other fluids used in the boring operation may only be used for lubricating the cutting head of the tunneling machine. Bores may not be installed by water jetting or jacking.

Highway crossings for all wastewater lines and water lines 12 inches and under will require an encasement pipe at least 2 inches greater than the largest outside diameter of the carrier pipe. The diameter of the encasement pipe for water lines over 12 inches will be determined by the Design Engineer and indicated on design plans. Encasement pipes will be of sectional liner or smooth bore steel pipe to suit conditions of crossing. Manholes will be specified on design plans. For all mains, voids between encasement and carrier pipe will be filled with 1:7 Grout with 5% Air Entrainment. Regardless of method used for installing the encasement pipe, it will be installed with even bearing throughout its length, and all voids between the encasement pipe and the earth or rock shall be filled with grout. Timber supports shall not be used. Trench excavations and bore pits shall not be closer than 30 feet from the edge of the nearest through traffic lane of High Volume Roadways. For other paved areas (Service Roads), open trenching and bore pits shall not be closer than 10 feet from the edge of pavement or 5 feet from the face of curb. The carrier pipe will be the kind and class designed to carry the water and wastewater. No explosives shall be used within limits of Highway without written permission from the Tx.D.O.T.

See 102, 103, 104, 105, 107

NCTCOG Spec: 509.2 - State Highway Crossing

HIGHWAY CROSSING Tx.D.O.T. REQUIREMENTS		DWU	(PAGE NO.) 106
		DATE OCT. 2009	

STATE HIGHWAY CROSSINGS

Continued

Depth of Cover

If depth of cover is insufficient to support live and dead loads, encasement or carrier pipe shall be installed concurrently as excavation of hole progresses so as to leave no more than 2 linear feet of unprotected hole at one time.

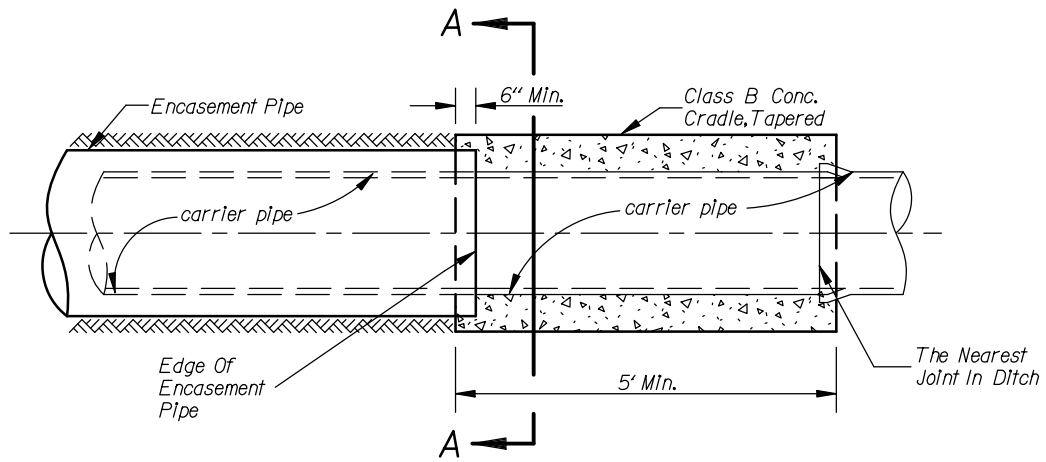
Open Cutting Of Pavement

Specific Tx.D.O.T. written approval is required for open cutting of all State Highway pavements. Any approved open cutting of pavement must conform to the special Tx.D.O.T. specification "Utility Facilities Involving Open Cutting of Pavement".

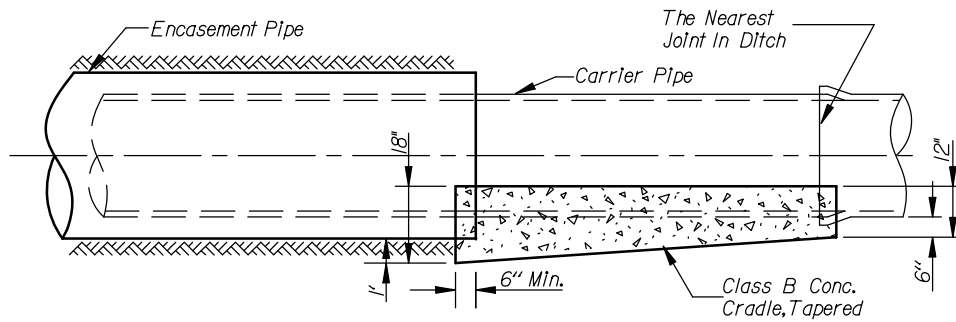
See 102, 103, 104, 105, 106

NCTCOG Spec: 509.2 - State Highway Crossing

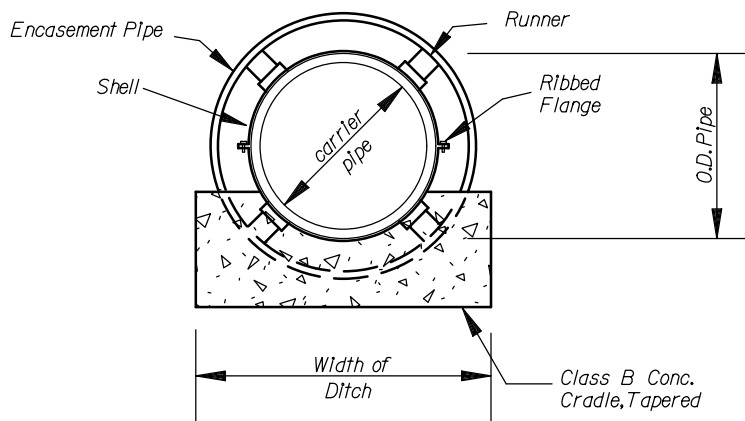
HIGHWAY CROSSING Tx.D.O.T. REQUIREMENTS		DWU	(PAGE NO.) 107
		DATE OCT. 2009	



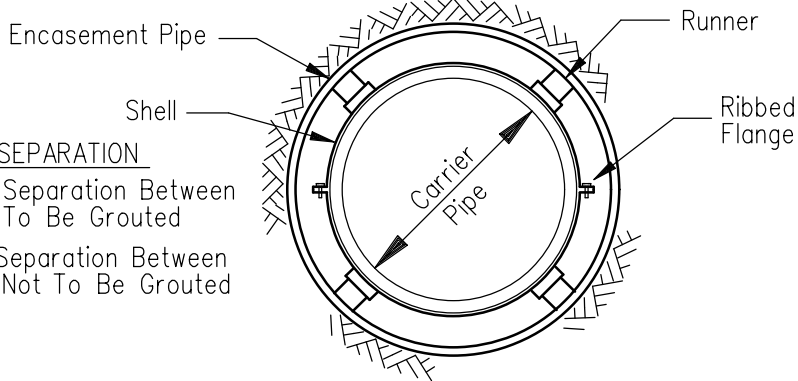
PLAN VIEW



PROFILE VIEW



SECTION A-A



CASING SPACERS SEPARATION

A Maximum Of 10' Separation Between Spacers If Pipe Is To Be Grouted

A Maximum Of 7' Separation Between Spacers If Pipe Is Not To Be Grouted

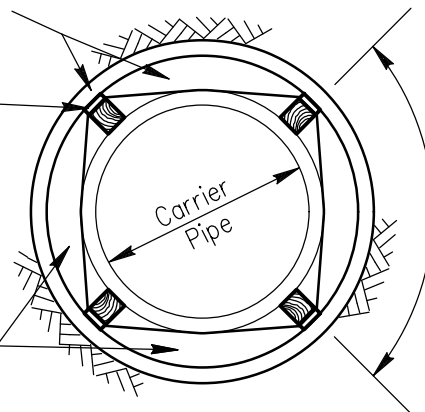
CASING SPACERS

Wooden Skids Strapped To Carrier Pipe With Steel Straps or Heavy Wire

Notch Skids To Facilitate Strapping Operation And To Prevent Strap Or Wire Movement

Skids To Run Length Of Pipe (With Exception Of Bell And Spigot Areas)

Fill All Voids Between Carrier Pipe And Encasement Pipe With Grout.



Evenly Space Skids

- 4 Skids For 12" Or Less Carrier Pipes
- 6 Skids For Carrier Pipes Larger Than 12"

Skids Shall Be Evenly Spaced Around Carrier Pipe

Skids Shall Be Trimmed And Shimmed As Necessary To Maintain Grade On Wastewater Mains.

WOODEN SKIDS

Encasement Pipe

Hold-Down-Jacks

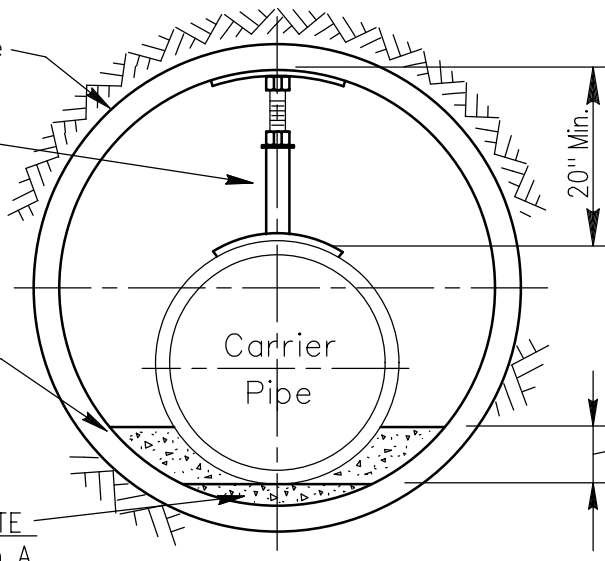
Minimum 2 Per Pipe Joint If Accessible Or 1 Per Pipe Joint If Not Accessible (See Fabrication Detail Pg.109A)

FOR STEEL ENCASEMENT PIPE

Carrier Pipe Is to Rest On Bottom Of Encasement Pipe

FOR FLANGED LINER PLATE

Carrier Pipe Is To Rest On A 6" Thick Concrete Pad.



Concrete Cradle
1/4 O.D. of Carrier Pipe

HOLD-DOWN-JACK

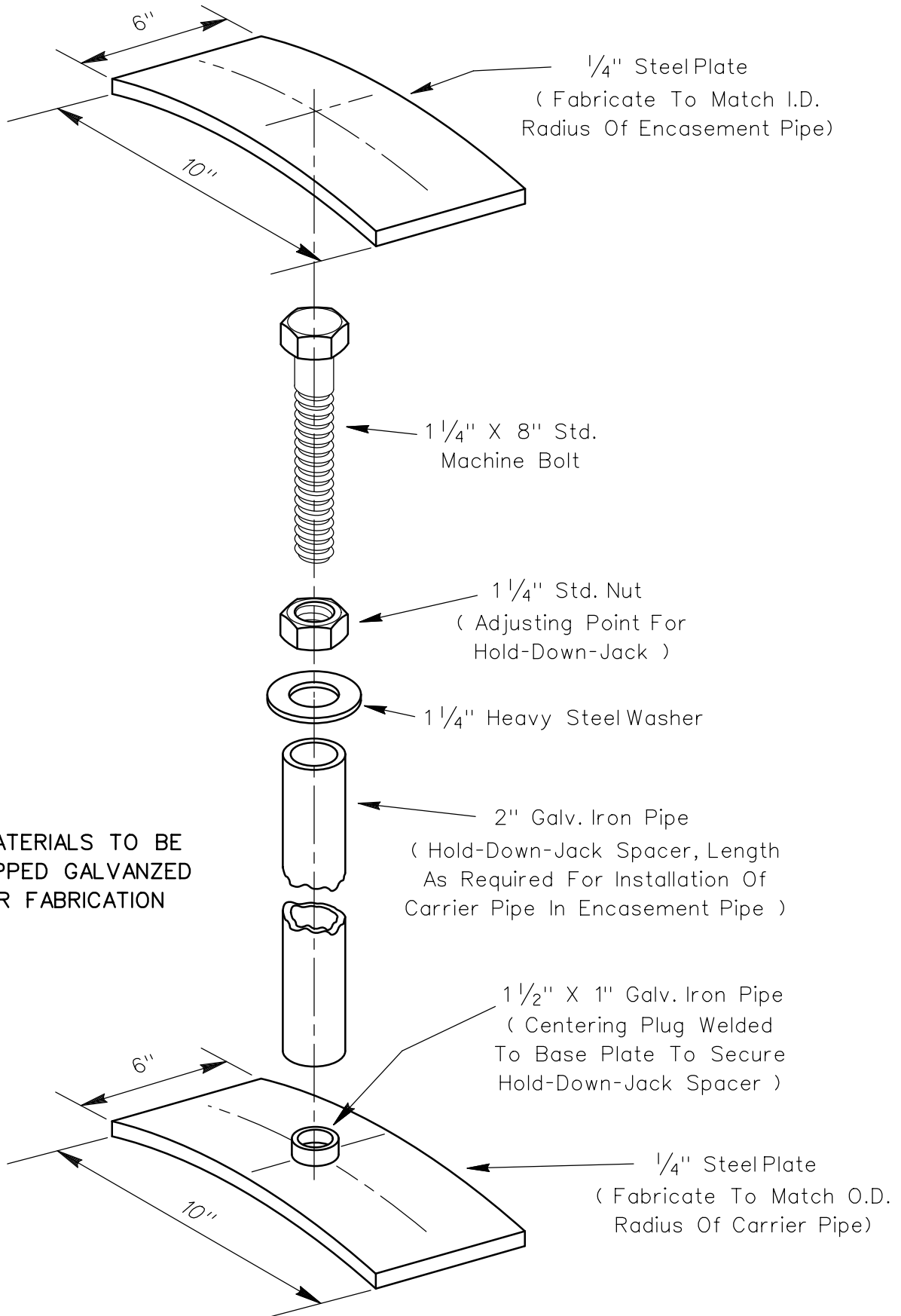
Hold-Down-Jacks To Be Used On Water Mains ONLY

**CARRIER PIPE SUPPORT
(TUNNEL)**

DWU

(PAGE No.)
109

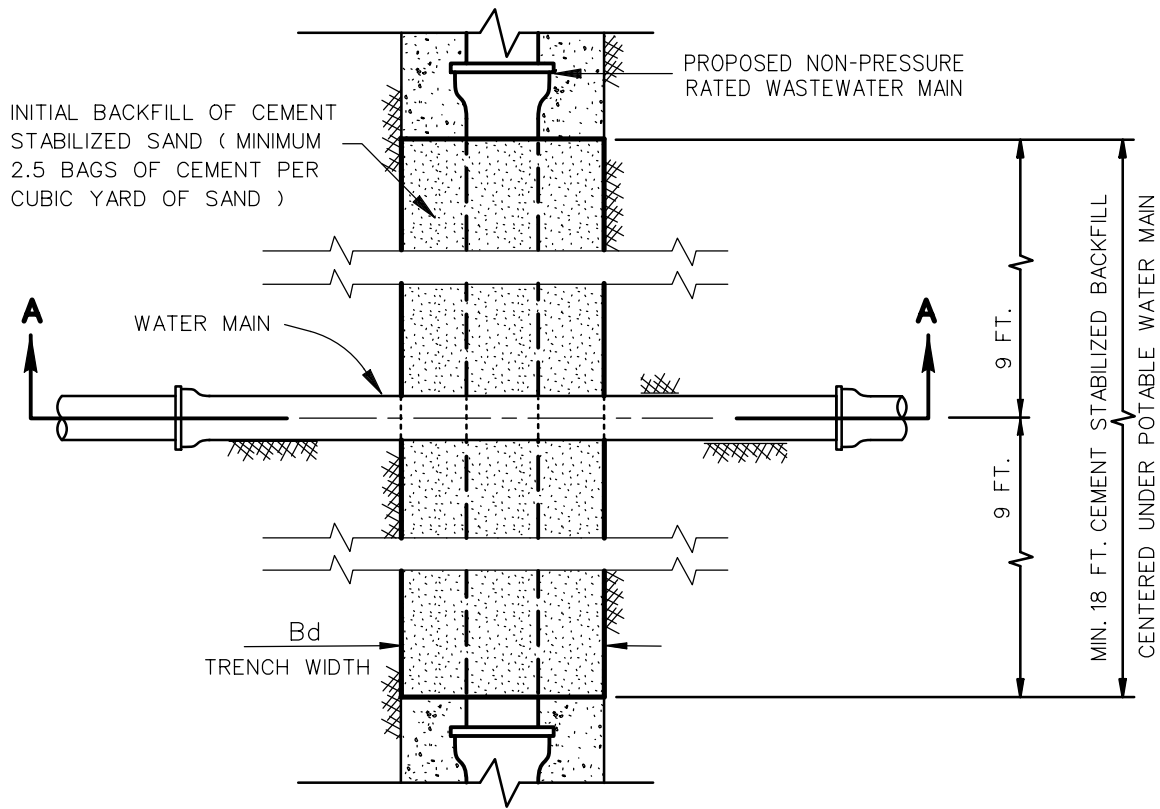
DATE
OCT. 2015



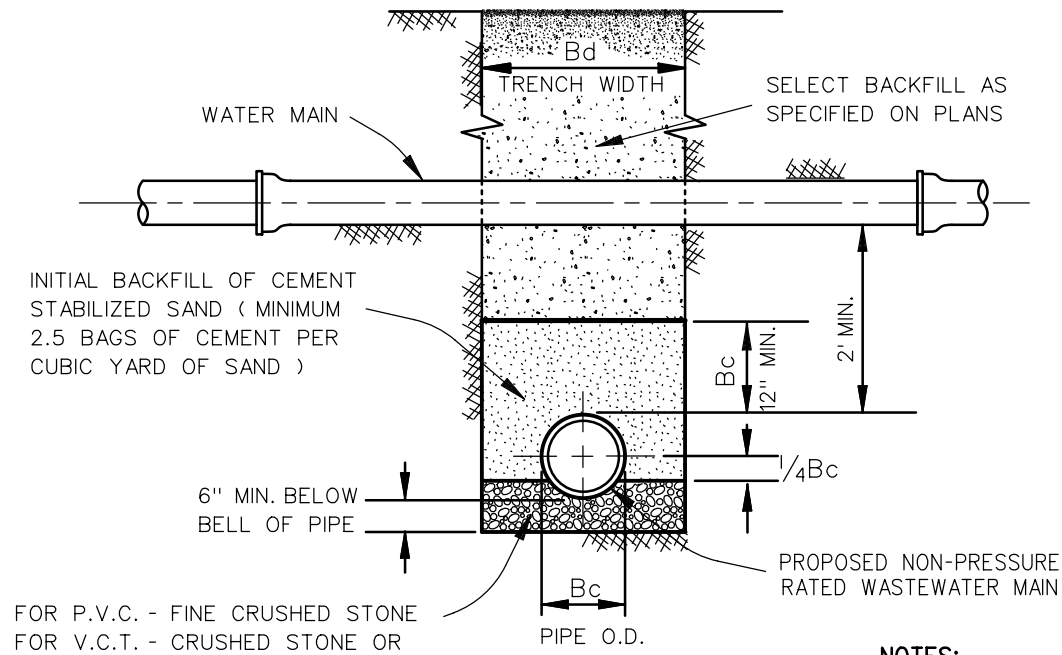
HOLD-DOWN-JACK FABRICATION DETAIL

DWU
DATE
DEC.2001

(PAGE No.)
109A



SECTIONAL PLAN VIEW



SECTION A-A

NOTES:

1. Bc = Outside Diameter Of Pipe
2. Bd = Trench Width (See Pg.112 for Calculation Of "Bd")

EMBEDMENT DETAIL FOR NON-PRESSURE RATED WASTEWATER MAINS BELOW WATER MAINS	DWU	(PAGE No.) 110
	DATE OCT. 2009	

SEAL THE SPACE BETWEEN THE ENCASEMENT PIPE AND THE CARRIER PIPE AT EACH END WITH NON-SHRINK CEMENT GROUT OR WITH A MANUFACTURED SEAL TO PREVENT SOIL MIGRATION INTO THE ENCASEMENT PIPE OR FULLY GROUT THE SPACE BETWEEN THE ENCASEMENT PIPE AND THE CARRIER PIPE PER THE DISCRETION OF THE PROJECT ENGINEER.

CARRIER PIPE TO BE SUPPORTED WITHIN ENCASEMENT PIPE AT FIVE FEET INTERVALS WITH CASING SPACERS

PROPOSED NON-PRESSURE RATED WASTEWATER MAIN

WATER MAIN

ENCASEMENT PIPE TO BE MIN. 150 P.S.I. PRESSURE RATED AND TWO (2) NOMINAL SIZES LARGER THAN CARRIER PIPE

9 FT.
9 FT.
MIN. 18 FT. PRESSURE RATED ENCASEMENT PIPE
CENTERED ABOVE POTABLE WATER MAIN

SECTIONAL PLAN VIEW

EMBEDMENT AND BACKFILL AS SPECIFIED ON PLANS

PROPOSED NON-PRESSURE RATED WASTEWATER MAIN

ENCASEMENT PIPE TO BE MIN. 150 P.S.I. PRESSURE RATED AND TWO (2) NOMINAL SIZES LARGER THAN CARRIER PIPE

CARRIER PIPE TO BE SUPPORTED WITHIN ENCASEMENT PIPE AT FIVE FEET INTERVALS WITH CASING SPACERS

WATER MAIN

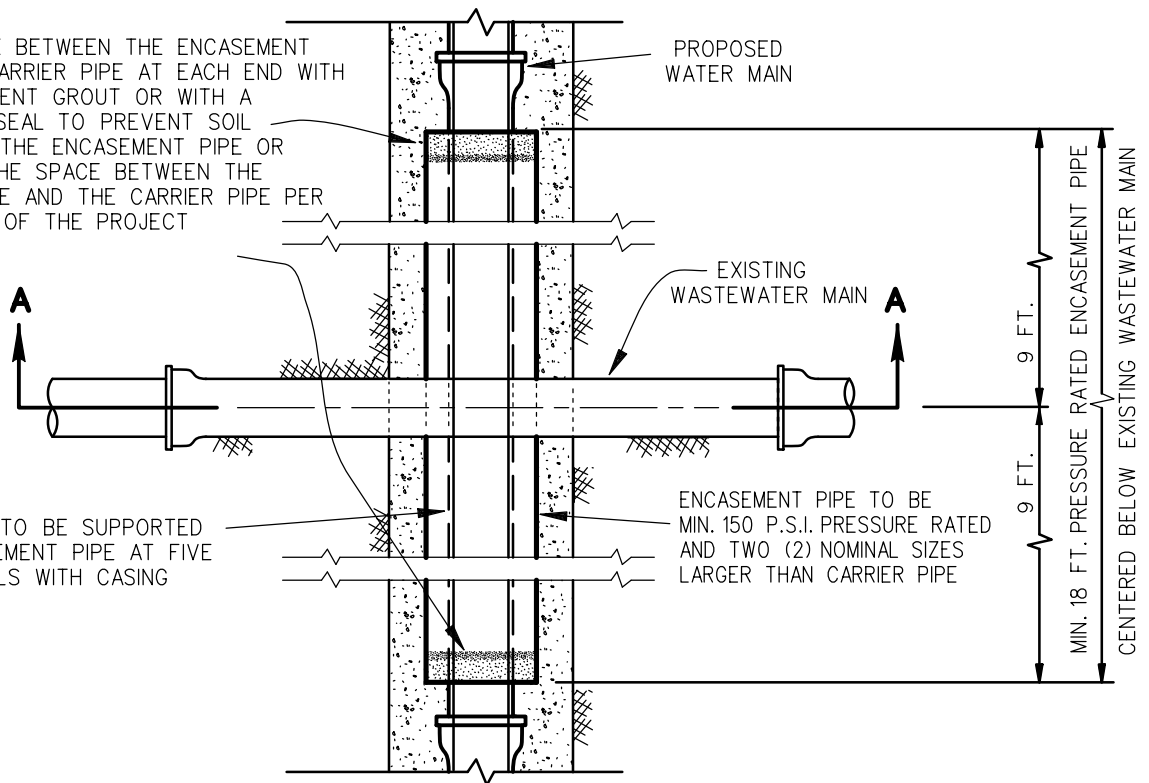
SECTION A-A

ENCASEMENT DETAIL FOR NON-PRESSURE RATED WASTEWATER MAINS ABOVE WATER MAINS

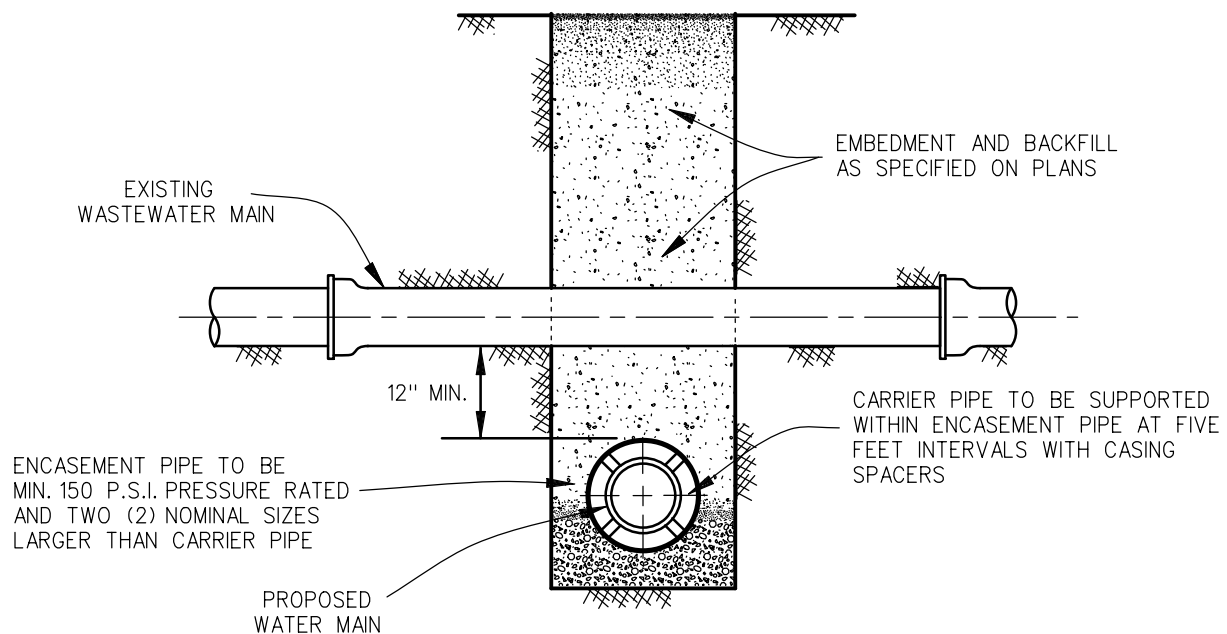
DWU
DATE
OCT. 2009

(Page No.)
111

SEAL THE SPACE BETWEEN THE ENCASEMENT PIPE AND THE CARRIER PIPE AT EACH END WITH NON-SHRINK CEMENT GROUT OR WITH A MANUFACTURED SEAL TO PREVENT SOIL MIGRATION INTO THE ENCASEMENT PIPE OR FULLY GROUT THE SPACE BETWEEN THE ENCASEMENT PIPE AND THE CARRIER PIPE PER THE DISCRETION OF THE PROJECT ENGINEER.



SECTIONAL PLAN VIEW



SECTION A-A

**ENCASEMENT DETAIL FOR PROPOSED
WATER MAINS BELOW WASTEWATER MAINS**

DWU
DATE
OCT. 2009

(Page No.)
111A

TRENCH WIDTH FOR WATER & WASTEWATER MAINS ARE LIMITED TO "Bd" AS CALCULATED BY THE FOLLOWING FORMULAS:

For 12" Diameter Pipe and Smaller :

Minimum - "Bd" (Trench Width) = Outside Diameter of Pipe Bell plus 12 inches or a minimum of 24", Whichever is greater

Maximum - "Bd" (Trench Width) = Shall Not Exceed 32"

For Pipe Diameters Greater Than 12" to 24" :

"Bd" (Trench Width) Shall Be Limited To Outside Diameter of Pipe Bell plus 12 inches

For Pipe Diameters Greater Than 24" to 72" :

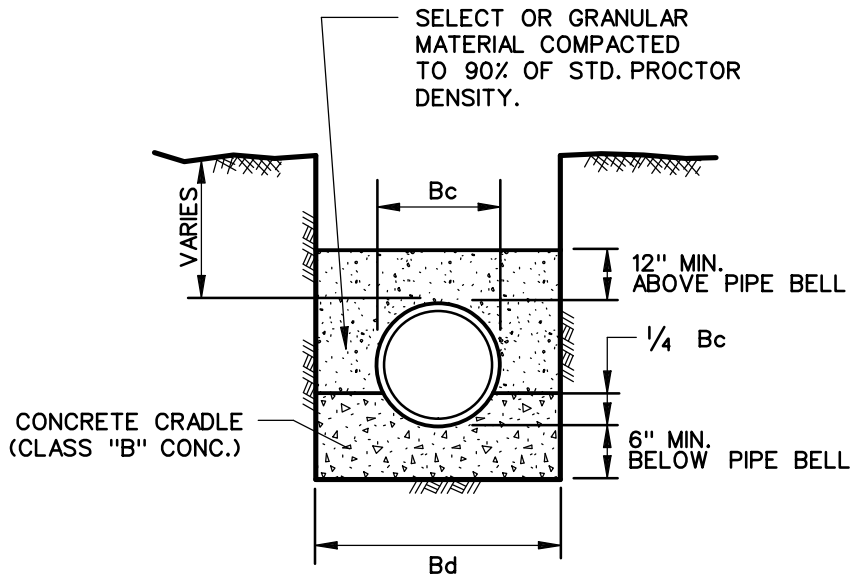
"Bd" (Trench Width) Shall Be Limited To Outside Diameter of Pipe plus 24 inches

For Pipe Diameters Greater Than 72" :

"Bd" (Trench Width) Shall Be Limited To Outside Diameter of Pipe Times (X) 1.25 plus 12 inches

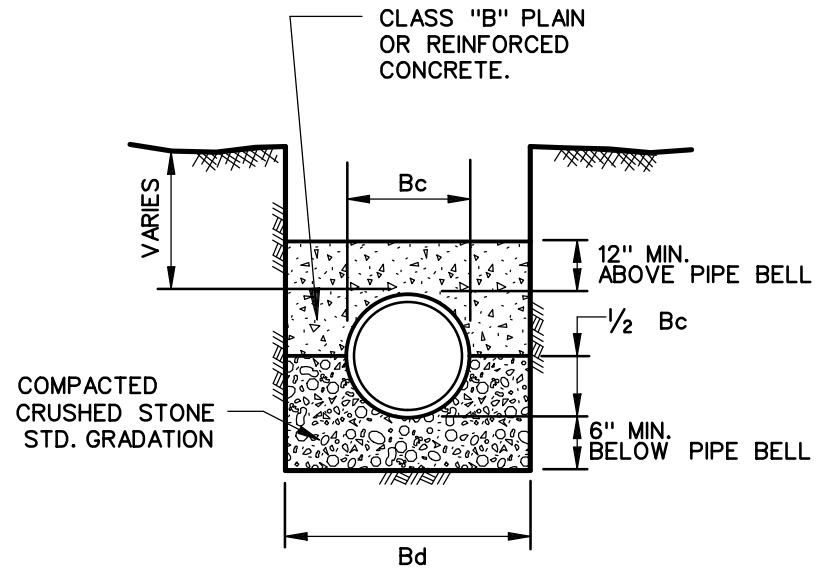
(REFER TO PAGES 113 THRU 119 FOR USAGE OF "Bd")

TRENCH WIDTH CALCULATIONS FOR "Bd"		DWU	(Page No.) 112
		DATE FEB.2009	



CLASS "A"

CLASS "B" CONCRETE CRADLE
 PLAIN CONC. LF 2.8
 REINF. CONC. LF 3.4 P=0.4%
 N.T.S.



CLASS "A-1"

CLASS "B" CONCRETE CAP
 PLAIN CONC. LF 2.8
 REINF. CONC. LF 3.4 P=0.4%
 REINF. CONC. LF 4.8 P=1.0%
 N.T.S.

NOTES:

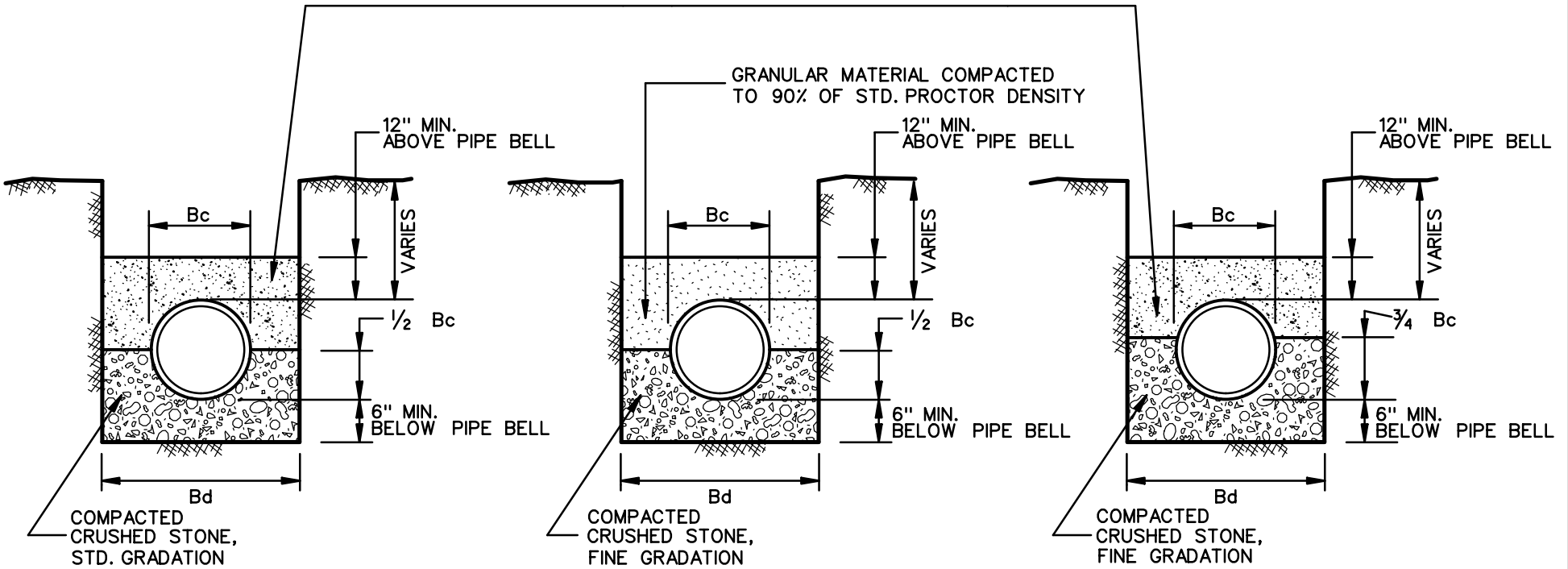
1. LF. = LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
2. FREE-FALL OF CONCRETE NOT TO EXCEED 5 FT. MAXIMUM.
3. P = Rho FOR STEEL %
4. Bc = OUTSIDE DIAMETER OF PIPE
5. Bd = TRENCH WIDTH
6. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

(REFER TO PAGE 112 FOR CALCULATION OF "Bd")

**EMBEDMENT
 CLASS "A" & "A-1"**

DWU	(PAGE NO.) 113
DATE JAN. 2010	

SELECT OR GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY



CLASS "B"

N.T.S.

L.F. = 1.9
E' = 700

CLASS "B+"

N.T.S.

BEDDING ANGLE 150°
L.F. = 1.9
E' = 700

CLASS "B-1"

N.T.S.

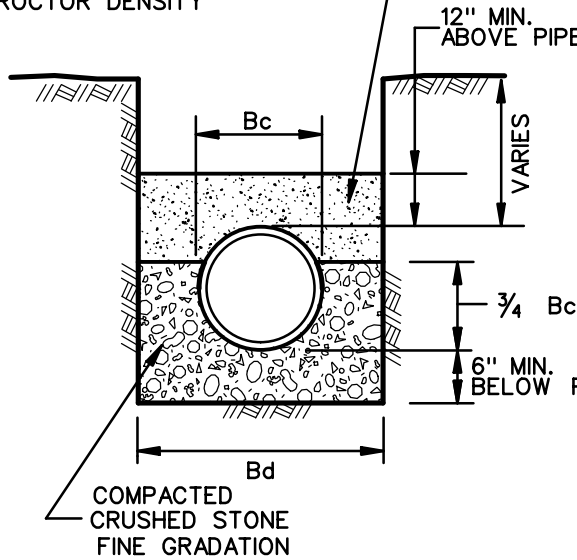
NOTES:

1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH
3. LF. = LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
4. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

(REFER TO PAGE 112 FOR CALCULATION OF "Bd")

<p>EMBEDMENT CLASS "B", "B+", & "B-1"</p>	<p>DWU</p>	<p>(PAGE NO.) 114</p>
	<p>DATE OCT. 2011</p>	

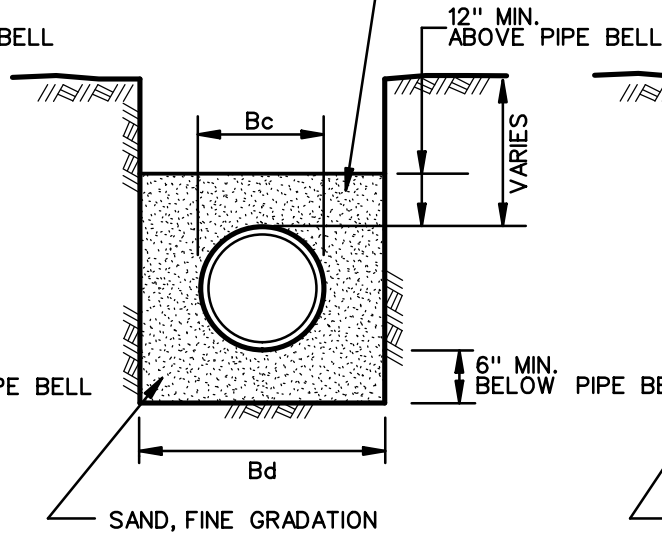
COMPACTED SELECT OR GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY



CLASS "B-2"

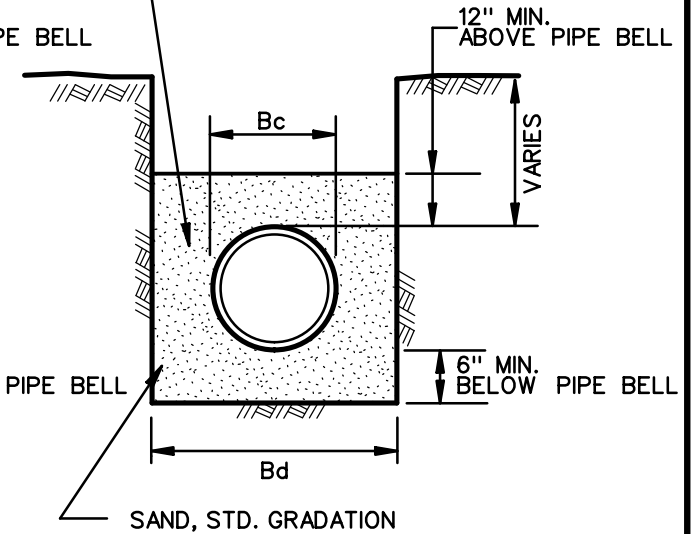
N.T.S.

SAND COMPACTED TO 90% OF STD. PROCTOR DENSITY



CLASS "B-3"

N.T.S.



CLASS "B-4"

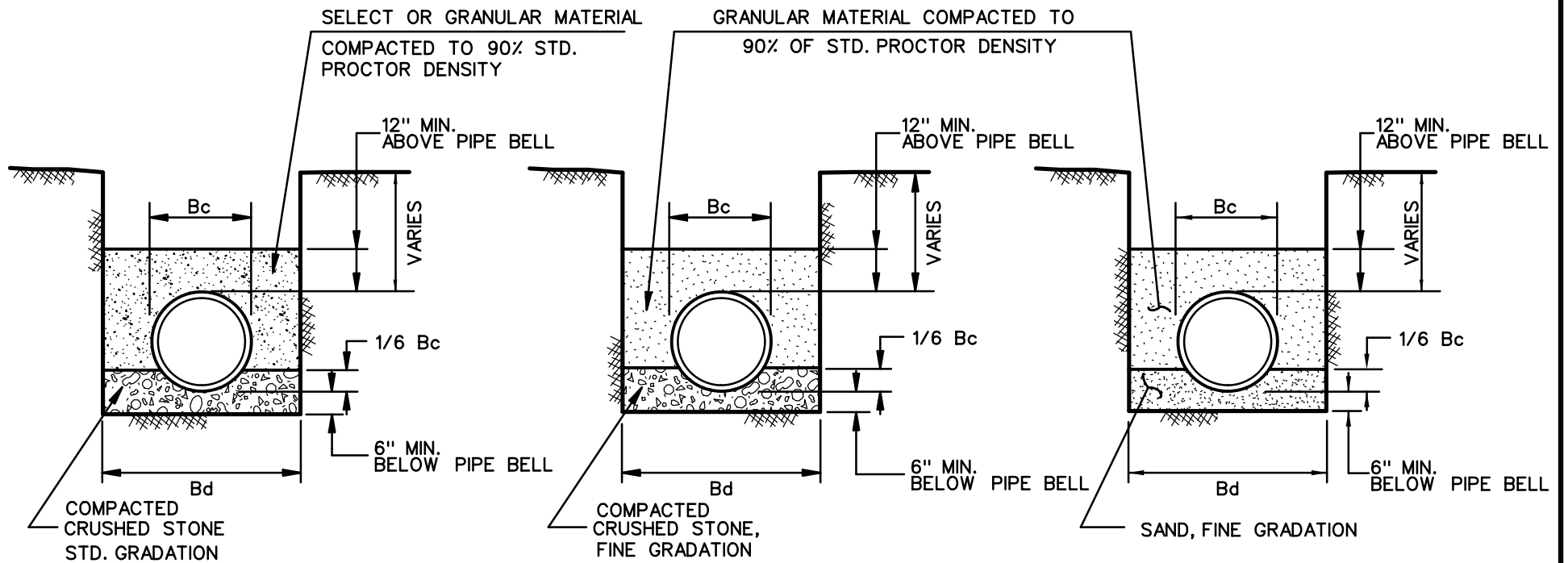
N.T.S.

NOTES:

1. Bc - OUTSIDE DIAMETER OF PIPE
2. Bd - TRENCH WIDTH
3. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

(REFER TO PAGE 112 FOR CALCULATION OF "Bd")

<p>EMBEDMENT CLASS "B-2", "B-3", & "B-4"</p>	<p>DWU</p>	<p>(PAGE NO.) 115</p>
	<p>DATE JAN. 2010</p>	



CLASS "C"

N.T.S.
 BEDDING ANGLE 75°
 L.F. = 1.5
 E' = 300

CLASS "C+"

N.T.S.
 BEDDING ANGLE 75°
 L.F. = 1.5
 E' = 300

CLASS "C-1"

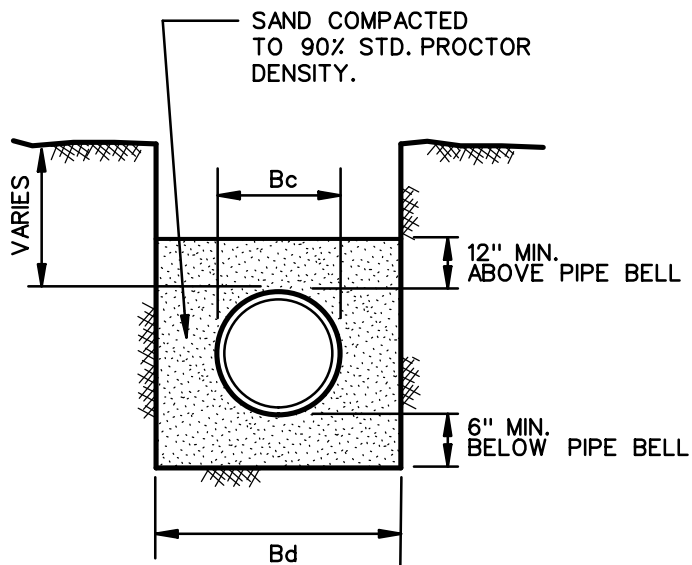
N.T.S.

NOTES:

1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH
3. LF. = LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
4. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

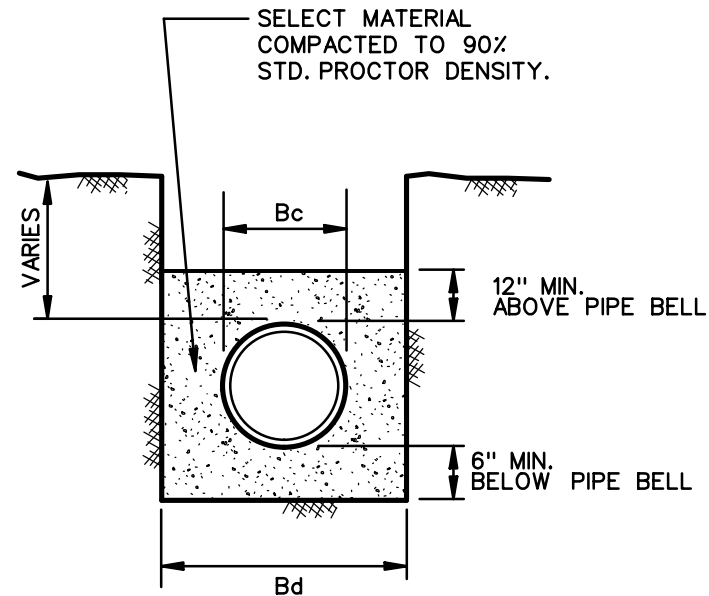
(REFER TO PAGE 112 FOR CALCULATION OF "Bd")

EMBEDMENT CLASS "C", "C+", & "C-1"	DWU	(PAGE NO.) 116
	DATE OCT. 2011	



CLASS "C-2"

N.T.S.



CLASS "D+"

N.T.S.

BEDDING ANGLE 30°

L.F. = 1.3

E' = 200

NOTES:

1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH
3. LF. = LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
4. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

(REFER TO PAGE 112 FOR CALCULATION OF "Bd")

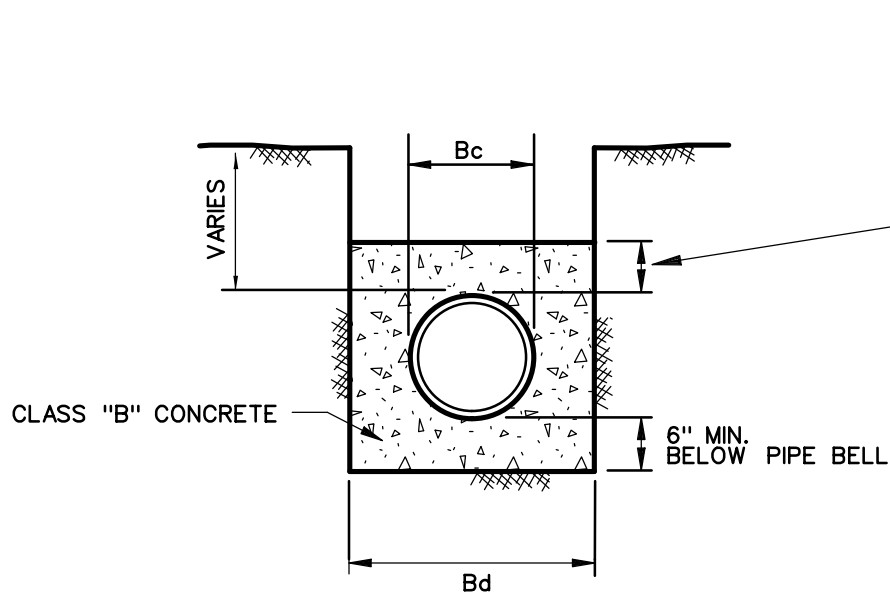
**EMBEDMENT
CLASS "C-2" & "D+"**

DWU

(PAGE NO.)

117

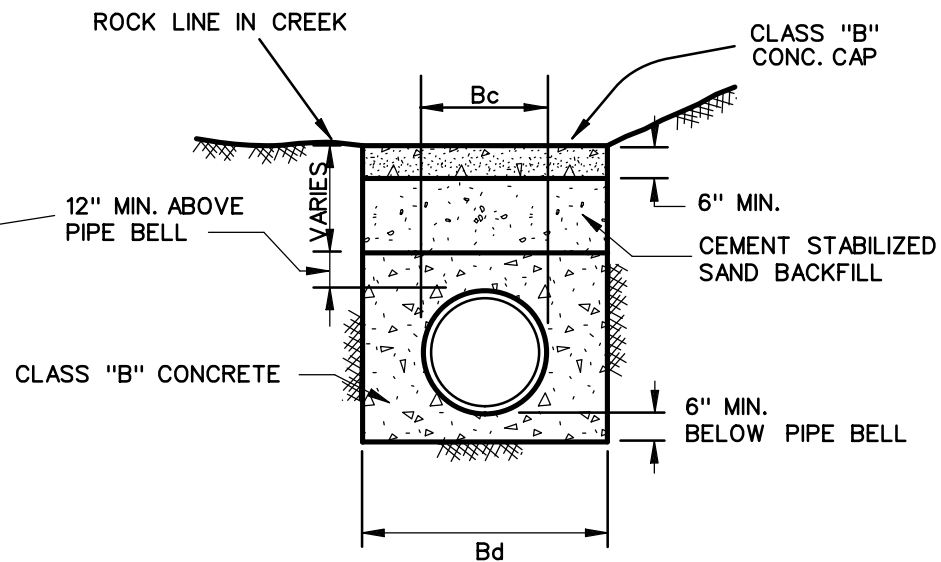
DATE
OCT. 2011



CLASS "G"

N.T.S.

L.F. = 4.2



CLASS "G-1"

(FOR ROCK DITCHES IN CREEKS)

N.T.S.

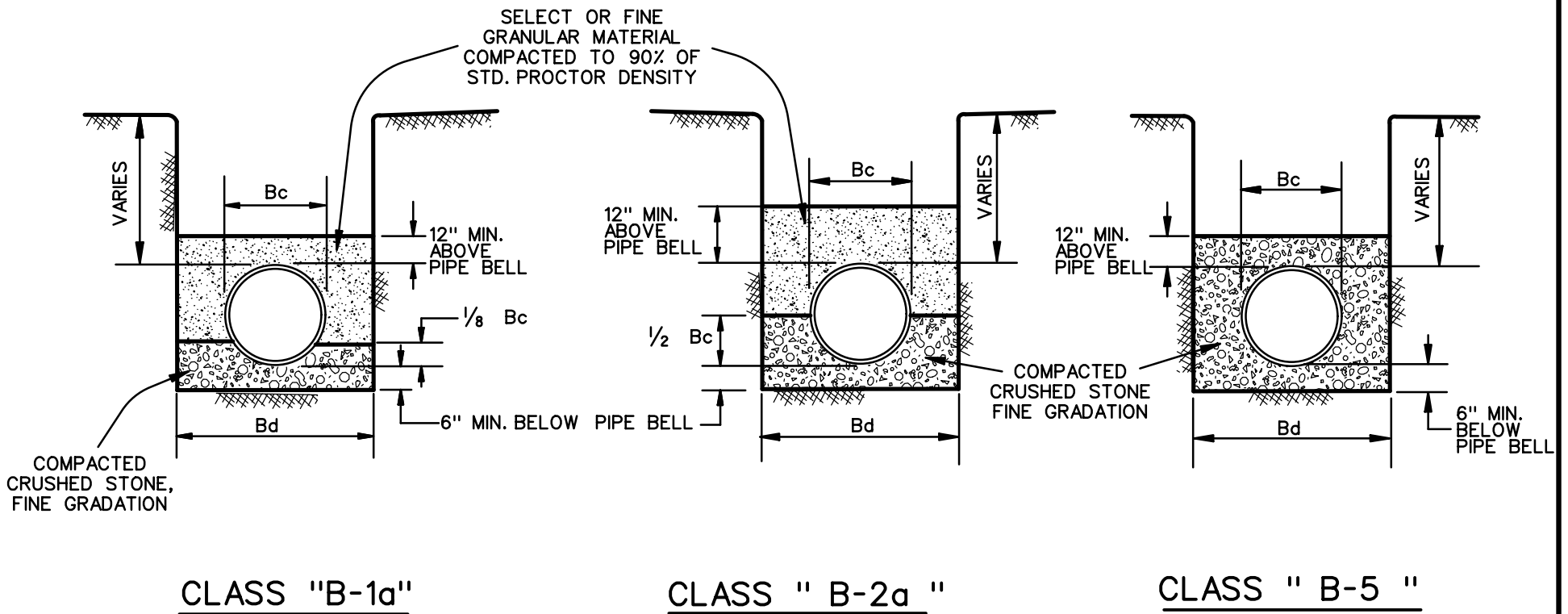
L.F. = 4.2

NOTES:

1. Bc - OUTSIDE DIAMETER OF PIPE
2. Bd - TRENCH WIDTH
3. LF. - LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
4. FREE-FALL OF CONCRETE NOT TO EXCEED 5 FT. MAXIMUM.
5. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

(REFER TO PAGE 112 FOR CALCULATION OF "Bd")

<p>EMBEDMENT CLASS "G" & "G-1"</p>	<p>DWU</p>	<p>(PAGE NO.) 118</p>
	<p>DATE OCT. 2011</p>	



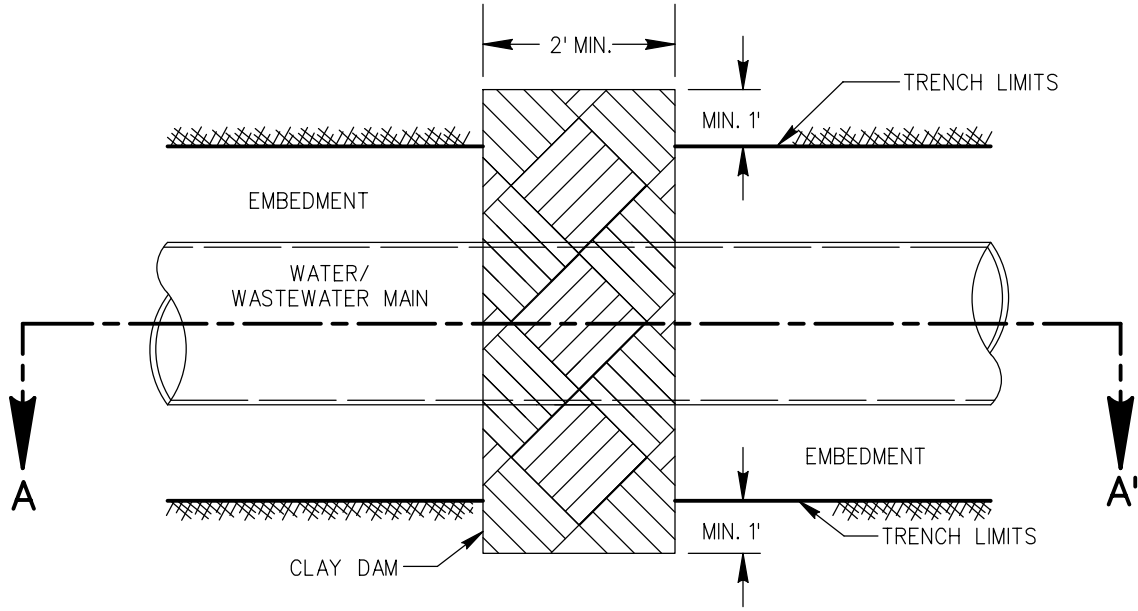
NOTES:

1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH
3. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

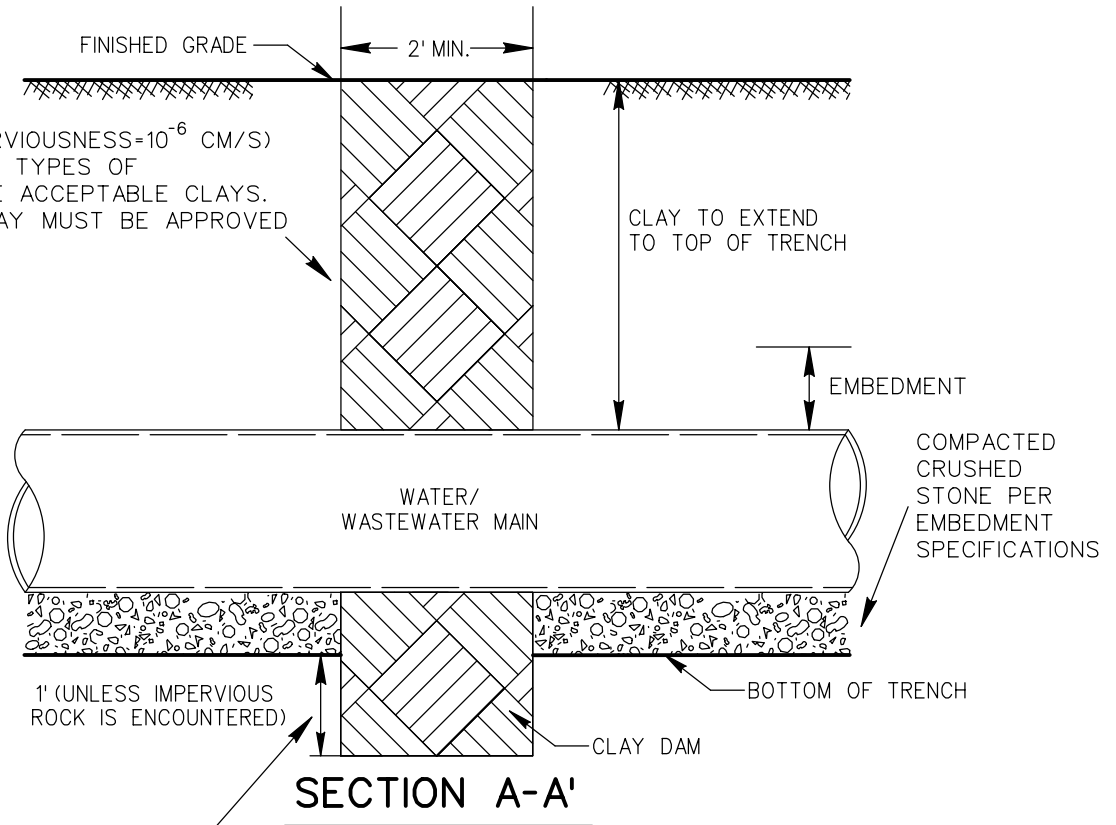
(REFER TO PAGE 112 FOR CALCULATION OF "Bd")

<p>EMBEDMENT CLASS "B-1a", "B-2a" & "B-5"</p>	<p>DWU</p>	<p>(PAGE NO.) 119</p>
	<p>DATE OCT. 2011</p>	

CLAY DAMS SHALL BE PLACED AT CONTAMINATION PLUME LIMITS TO PREVENT CONTAMINANT CONVEYANCE THROUGH UTILITY TRENCH. PLACEMENT AND LOCATION OF DAMS ARE SUBJECT TO DWU APPROVAL.



CLAY DAM PLAN VIEW



CLAY DAM (MIN. IMPERVIOUSNESS= 10^{-6} CM/S)
BENTONITE OR OTHER TYPES OF
MONTMORILLONITE ARE ACCEPTABLE CLAYS.
OTHER TYPES OF CLAY MUST BE APPROVED
BY OWNER.

SECTION A-A'

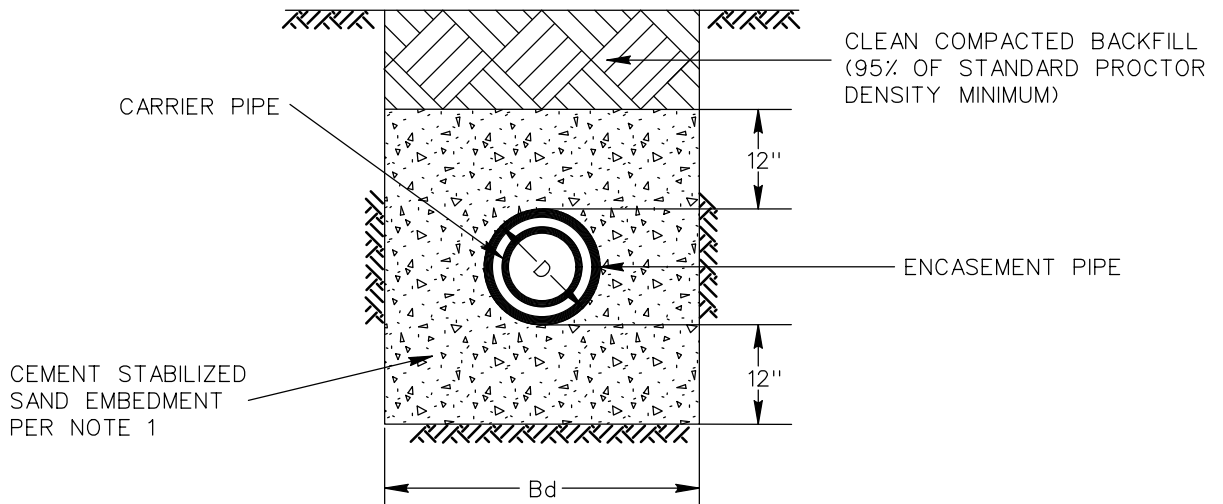
REFER TO PAGES 112, 113, 114, 115, 116, 117, 118 & 119

CONTAMINATED SOIL
CLAY CUT-OFF DAM

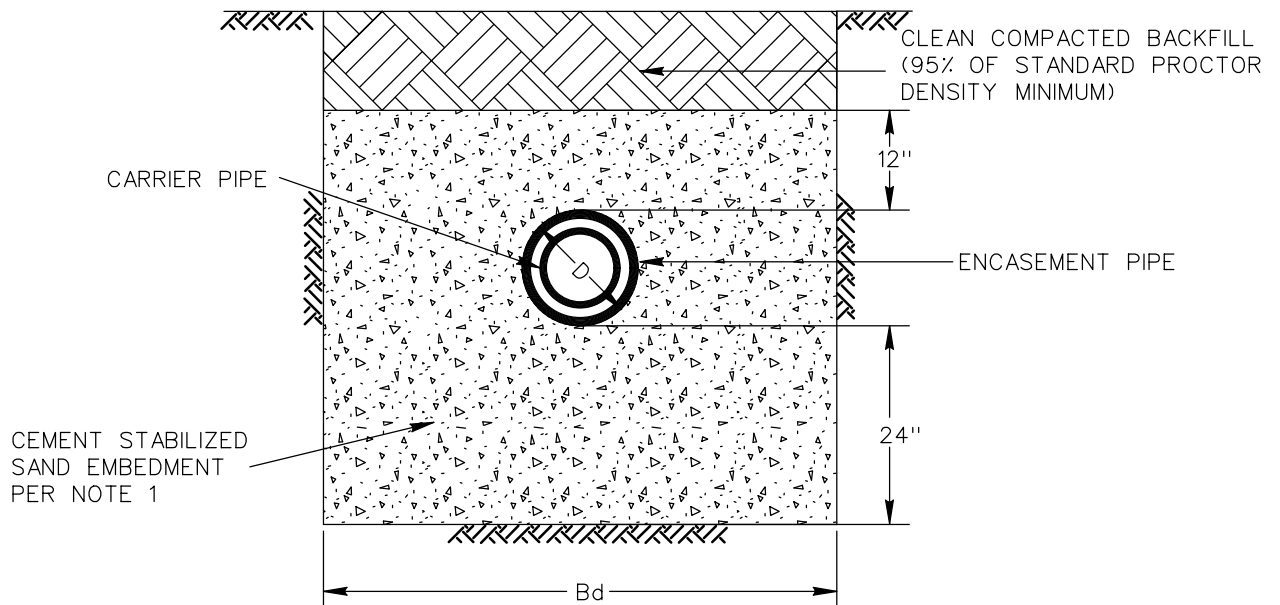
DWU

119A

OCT. 2011



**TRENCH E-1 (CLEAN ZONE)
CEMENT STABILIZED SAND EMBEDMENT**



**TRENCH E-2 (TRASH ZONE)
CEMENT STABILIZED SAND EMBEDMENT**

DIMENSIONS NOTES:

1. D = Inside Diameter Of Containment Pipe
2. Bd = Trench Width Per Standard Drawing 112

Note 1: Cement stabilized sand shall have a minimum of 12% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 3 bags of cement per cubic yard of mixture).

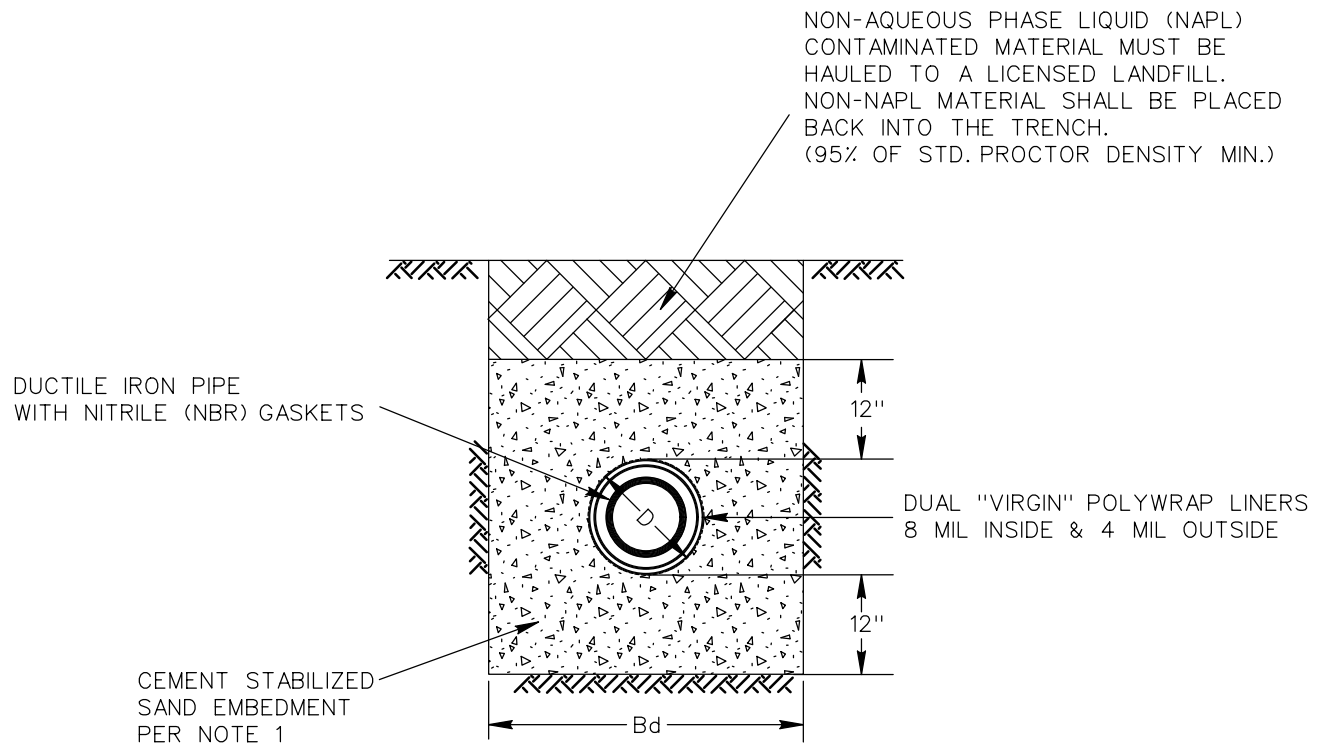
REFER TO PAGE 112

**EMBEDMENT
CLASS "E-1" & "E-2" LANDFILL**

DWU

119B

OCT. 2011

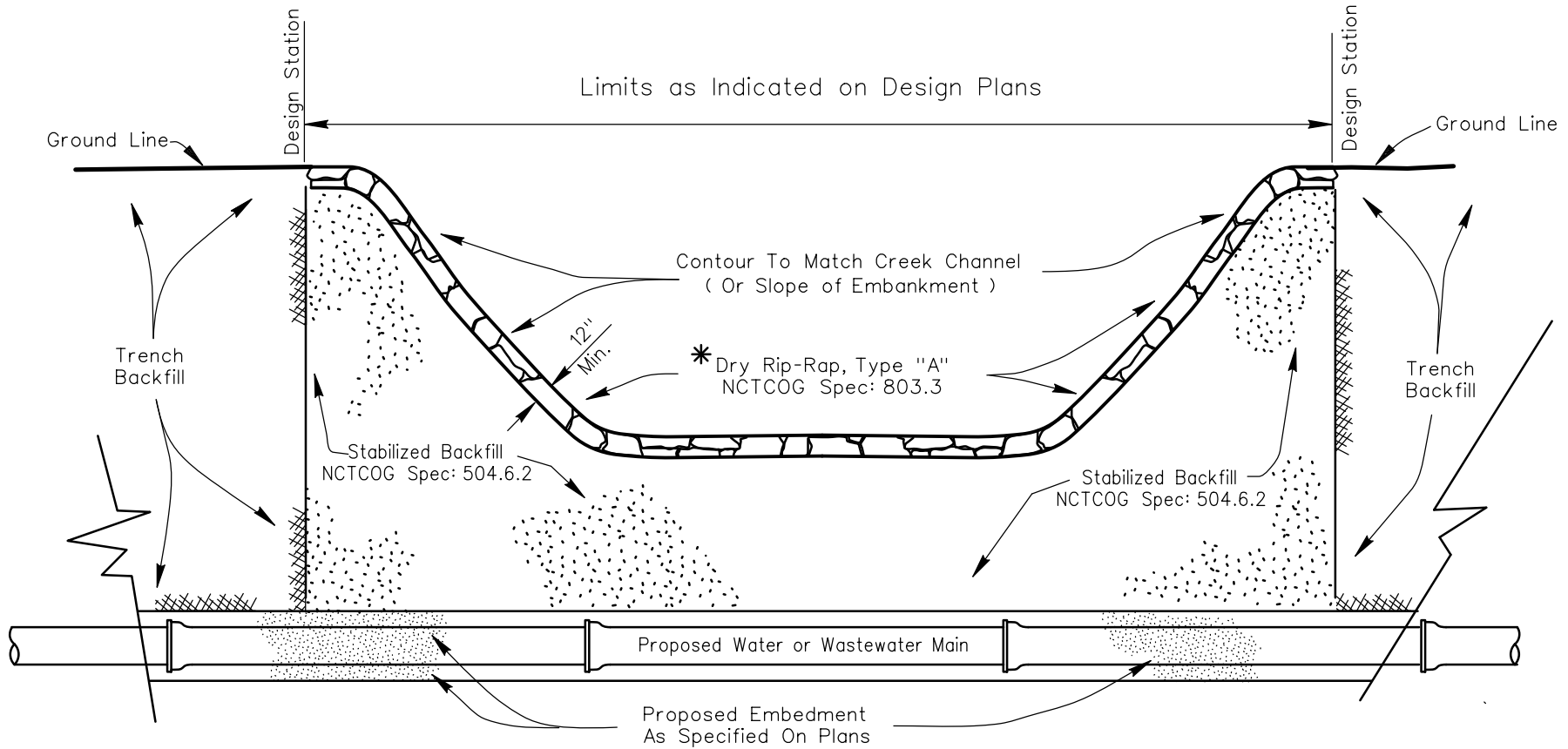


**TRENCH E-3
"HIGH" CHEMICAL OF CONCERN ZONE**

Note 1: Cement stabilized sand shall have a minimum of 12% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 3.0 bags of cement per cubic yard of mixture). Minimum final permeability to be 10^{-6} cm/s.

EMBEDMENT CLASS "E-3" HIGH CHEMICAL OF CONCERN ZONE		DWU	119C
		OCT. 2011	

DETAIL SHOWN FOR CREEK CROSSING (TYPICAL FOR EMBANKMENT SLOPE PROTECTION)



* OPTION
 Dry Rip-Rap As Indicated on Design Plans.
 Dry Rip-Rap to Span Disturbed Trench
 Width Area Plus 1 Ft. on Each Side.

NCTCOG Spec: 803.3 - Riprap
 NCTCOG Spec: 504.6.2 - Stabilized Backfill
 2021 COD Addendum: 803.3.4.DWU - Measurement And Payments

STABILIZED BACKFILL & RIP-RAP DETAIL FOR EMBANKMENT SLOPE PROTECTION

	(Page No.)	
COD	120	
DATE		
JULY, 2021		

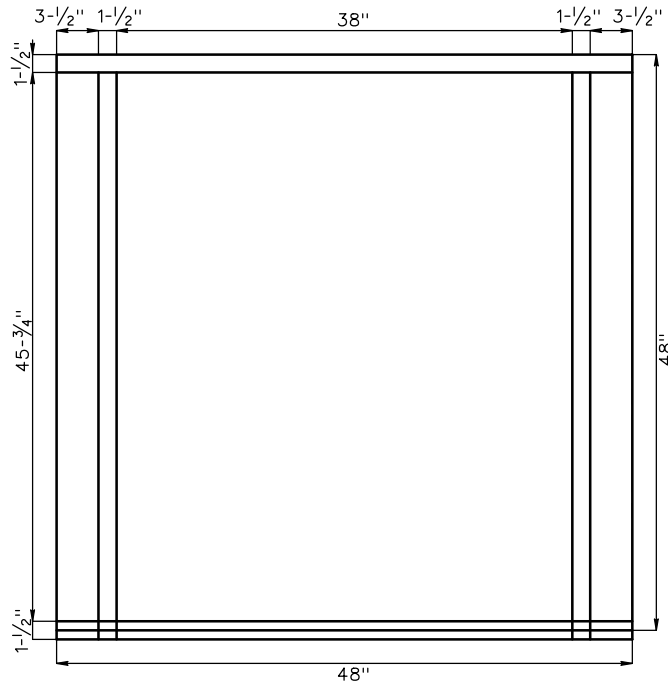
PROJECT CONSTRUCTION SIGN



PROJECT SIGN TECHNICAL SPECIFICATIONS

- 1) BOARD - 1/2" PRE-FINISHED (WHITE) SIGN GRADE, MDO PLYWOOD ("SIGN READY", FORMICA FINISH)
- 2) DALLAS SYMBOL AND THE DALLAS PLAN SYMBOL - LEFT-HAND SECTION OF SIGN
 1. Shaded Area - Painted With Bulletin Color Type, Sign Grade Enamel. Sign Color Per Department As Shown Below:
 - a) Public Works And Transportation Department - Pantone 1945 (3M Burgundy), 4010106 Carmine, Or Approved Equal
 - b) Dallas Water Utilities Department - Pantone 286 (3M Royal Blue), 4010152 Light Blue, Or Approved Equal
 - c) Parks Department - Pantone 5753 (3M Moss Green), 4010144 Medium Green, Or Approved Equal
 - d) Equipment And Building Services Department - Pantone 1595 (3M Burnt Orange), 4010124 Orange, Or Approved Equal
 2. Shaded Area Lettering
 - a) White Paint (101-L Polar White) On Colored Background
- 3) PROJECT INFORMATION - RIGHT-HAND SECTION OF SIGN
 1. Vinyl Lettering (Used On Multi-Segment Projects. Specified on Purchase Order)
 - a. Background Color - White
 - b. Lettering - Black Vinyl
 2. Painted Lettering (Used On Facility Projects. Specified on Purchase Order)
 - a. Background Color - White
 - b. Lettering - Black Paint (199-L Black)
- 4) STRIPES AND BORDERS - BLACK REFLECTIVE VINYL APPROX. 1/2" WIDE
- 5) LETTERING TYPE - ARIAL BLACK, SIZES AS SPECIFIED ON THIS DRAWING SPECIFICATION
- 6) FRAME TO BE PAINTED WHITE
- 7) LUMBER - TREATED

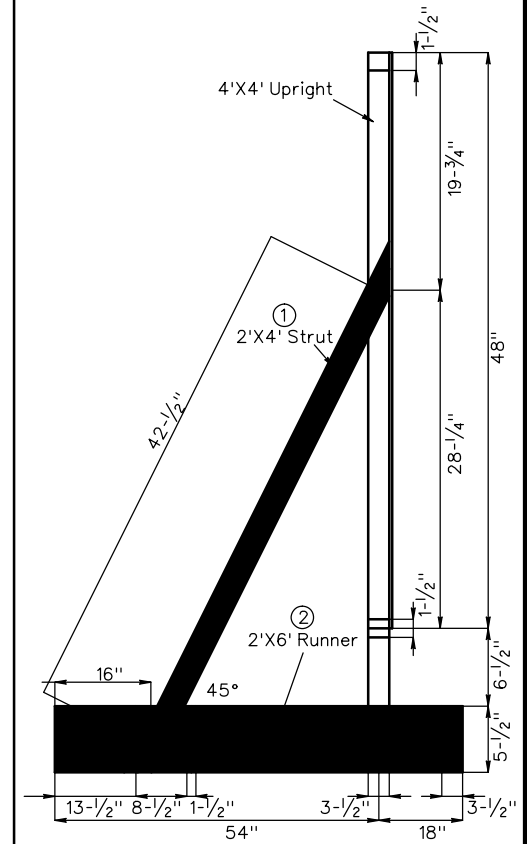
PROJECT SIGN FRAME



NOT TO SCALE

Notes:

- 1) All Dimensions Are In Inches.
- 2) All Materials Exterior Grade, Pressure Treated Pine, Two By Four (2"x4") Dimensional Lumber.
- 3) 16P Nails Acceptable For Butt Connections.
- 4) Use 1/2" Galvanized Coated Bolts, Washers And Nuts For Side Connections.
- 5) Screw Front Panels To Frame Using #8 1-3/4" Galvanized Screws 2 Ft. OC.



SIDE
NOT TO SCALE

Note: Contractor Shall Provide Items ① & ②

PROJECT CONSTRUCTION SIGN TECHNICAL SPECIFICATIONS

(Page No.)

DWU

121

DATE
OCT. 2015

PART 2

(Series 200)

WATER MAIN CONSTRUCTION



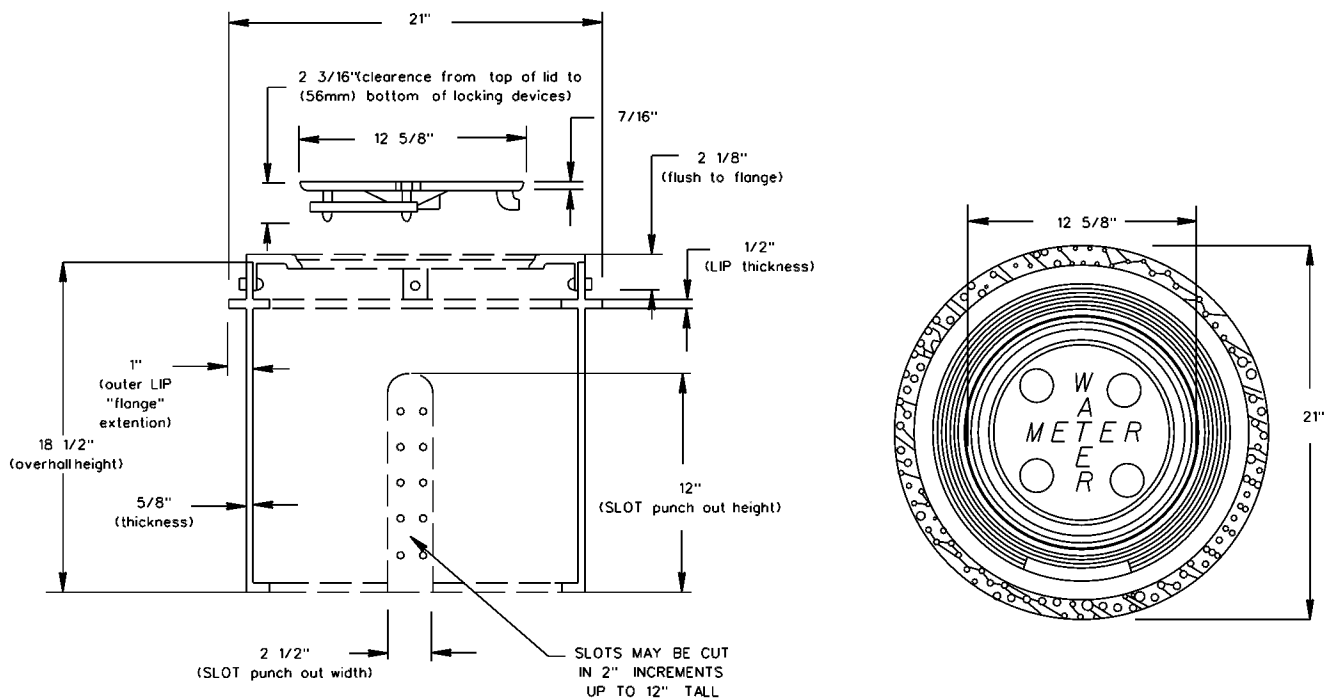
City of Dallas
Water Utilities Department

PART 2

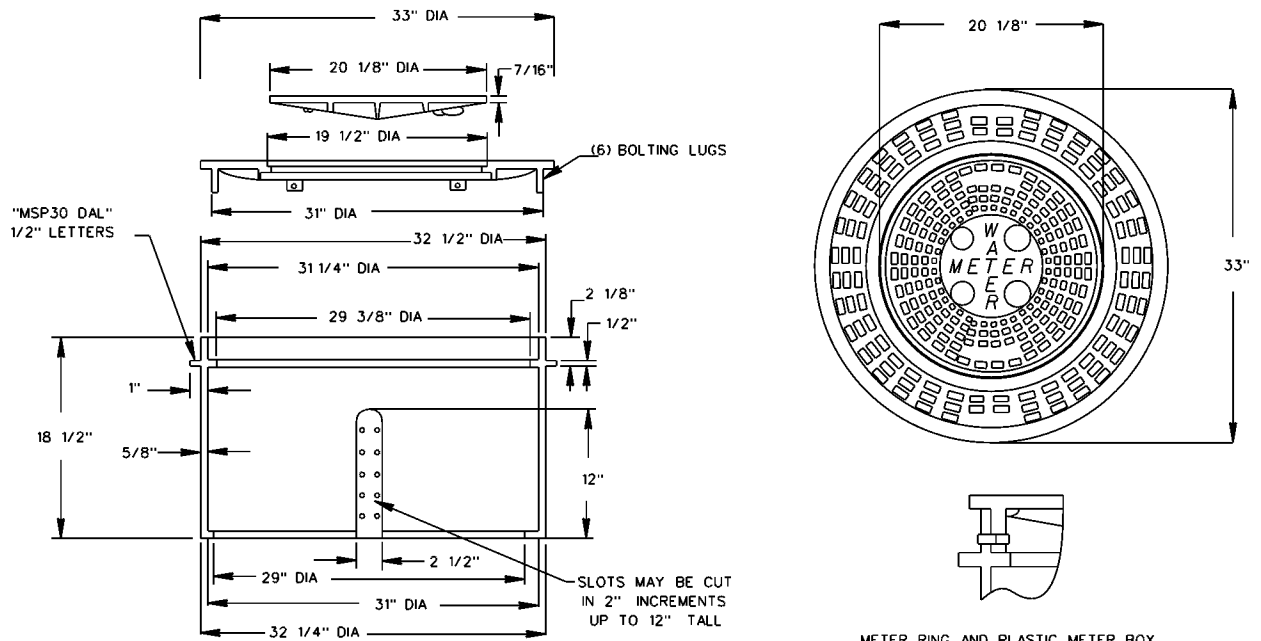
WATER MAIN CONSTRUCTION

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Meter Box (5/8" and 2") With Plastic Ami Lid	--- 200A
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1" Water Service Installations (Sidewalk 5' from Curb)	--- 205
1 ½" or 2" Water Service Installations (Sidewalk 5' from Curb)	--- 206
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PRV General Notes	---	244
PRV General Notes	---	245



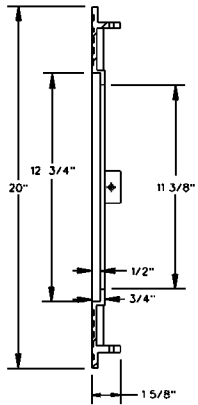
5/8" Meter Box



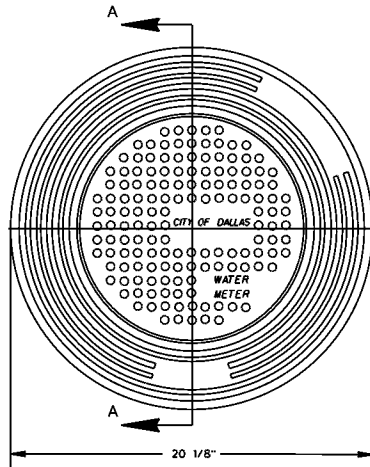
2" Meter Box

METER BOX (5/8" and 2")
WITH DUCTILE RING AND COVER

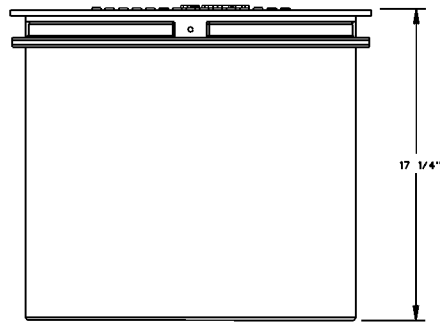
DWU	200
DATE	
OCT. 2013	



SECTION VIEW A-A

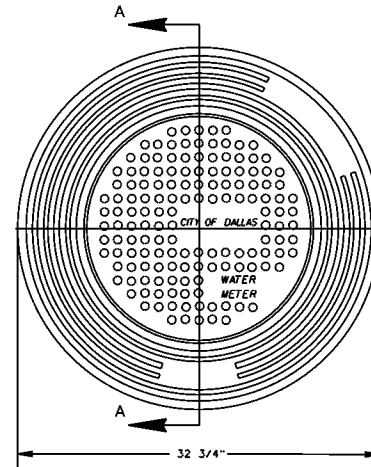


TOP VIEW

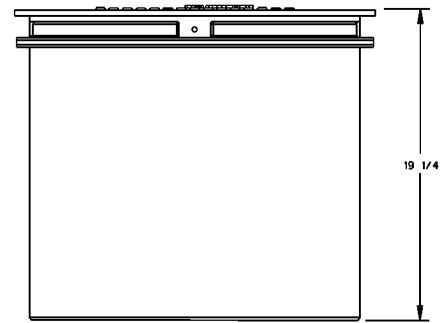


SIDE VIEW

5/8" Meter Box

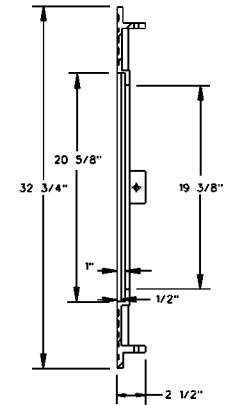


TOP VIEW

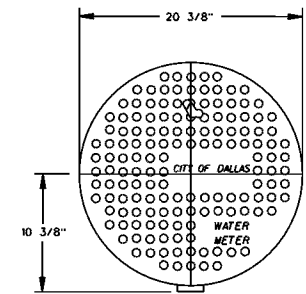


SIDE VIEW

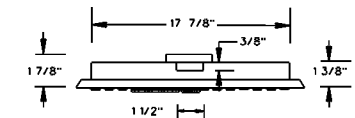
2" Meter Box



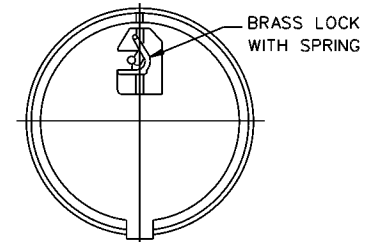
SECTION VIEW A-A



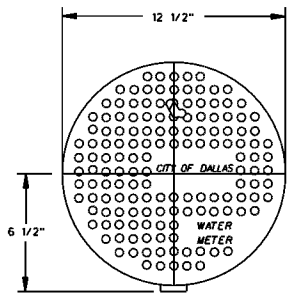
PLASTIC LID - TOP VIEW



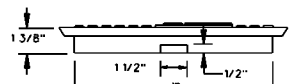
PLASTIC LID - SIDE VIEW



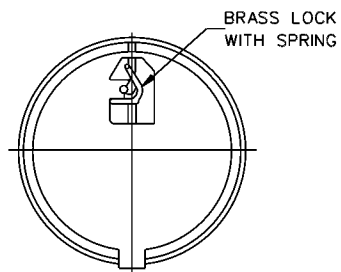
PLASTIC LID - BACK VIEW



PLASTIC LID - TOP VIEW



PLASTIC LID - SIDE VIEW



PLASTIC LID - BACK VIEW

N.T.S.

METER BOX (5/8" and 2")
WITH PLASTIC AMI LID

DWU	200A
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OCT. 2013	

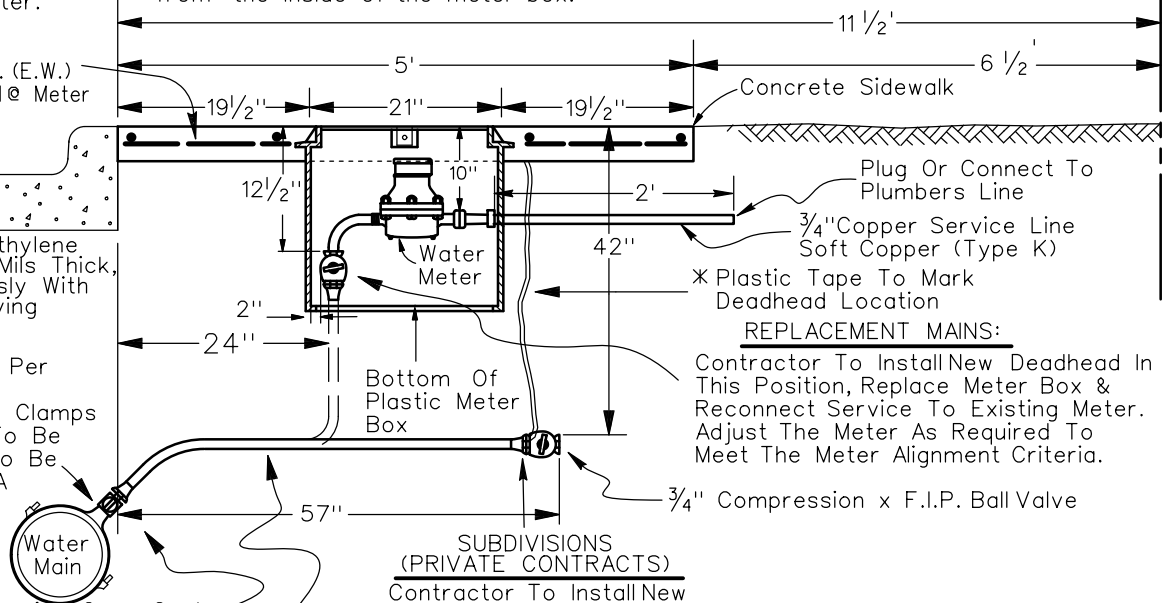
NOTE:
Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

METER ALIGNMENT CRITERIA
VERTICAL: The private side ferrule nut or flange must be 10" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.

*3 Bars @ 24" O.C. (E.W.) & 4-*3 Bars Diagonal @ Meter

* Blue Inert Polyethylene Tape, 6" Wide x 2 Mils Thick, Imprinted Continuously With Black Letter Identifying Water Service

Taps On Mains As Per NCTCOG Spec: 502.10.2.1. Service Clamps Location Of Tap To Be At 45°. All Taps To Be Made With A.W.W.A Tapered Threads.



NOTE: 3/4" Compression Corp. Cock
Install Meter & Box In The Sidewalk When Possible. Meter And Box SHALL NOT BE Installed In A Driveway Or Driveway Approach.

SUBDIVISIONS (PRIVATE CONTRACTS)
Contractor To Install New Deadhead In This Position. New Meter Box, Meter, And Connection To Service Line By Others.

Plug Or Connect To Plumbers Line
3/4" Copper Service Line Soft Copper (Type K)
* Plastic Tape To Mark Deadhead Location

REPLACEMENT MAINS:
Contractor To Install New Deadhead In This Position, Replace Meter Box & Reconnect Service To Existing Meter. Adjust The Meter As Required To Meet The Meter Alignment Criteria.

NCTCOG Spec: 502.10.3.1 - Taps And Tap Assemblies In Water Conduit
2021 COD Addendum:
502.10.3.1.1.COD - Taps Through
502.10.3.1.7.COD - Tapping Of PVC Pipe

WATER MAIN IN STREET

NOTE:
Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

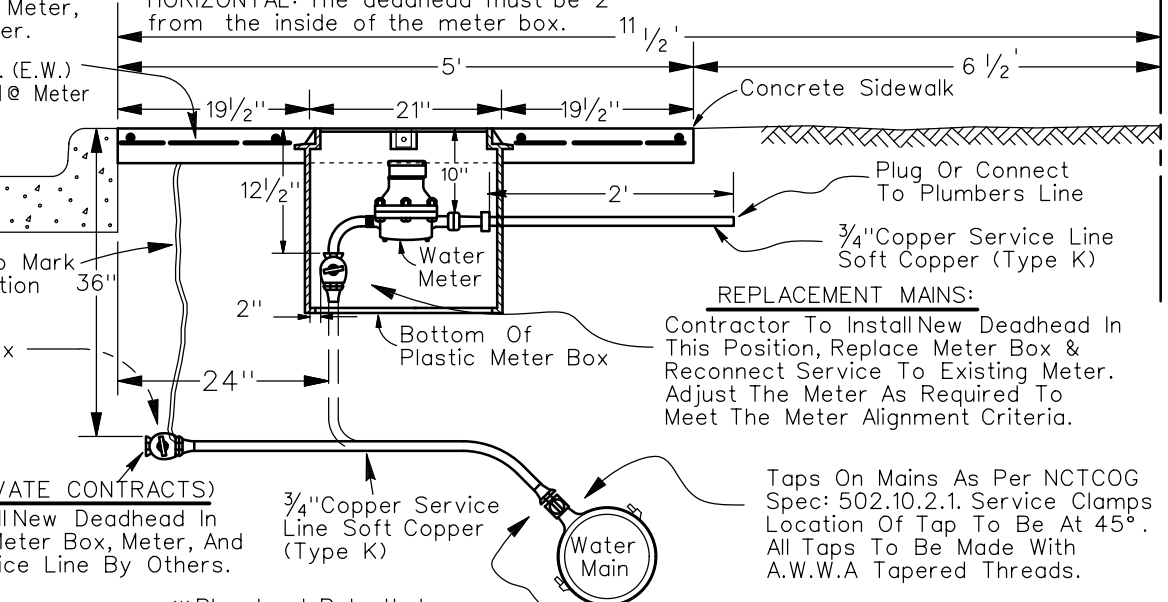
METER ALIGNMENT CRITERIA
VERTICAL: The private side ferrule nut or flange must be 10" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.

NOTE:
3/4" Service Lines To Have A Minimum Of 3' Separation.

*3 Bars @ 24" O.C. (E.W.) & 4-*3 Bars Diagonal @ Meter

* Plastic Tape To Mark Deadhead Location

3/4" Compression x F.I.P. Ball Valve



SUBDIVISIONS (PRIVATE CONTRACTS)
Contractor To Install New Deadhead In This Position. New Meter Box, Meter, And Connection To Service Line By Others.

NOTE:
Install Meter & Box In The Sidewalk When Possible. Meter And Box SHALL NOT BE Installed In A Driveway Or Driveway Approach.

* Blue Inert Polyethylene Tape, 6" Wide x 2 Mils Thick, Imprinted Continuously With Black Letter Identifying Water Service
3/4" Compression Corp. Cock

REPLACEMENT MAINS:
Contractor To Install New Deadhead In This Position, Replace Meter Box & Reconnect Service To Existing Meter. Adjust The Meter As Required To Meet The Meter Alignment Criteria.

Taps On Mains As Per NCTCOG Spec: 502.10.2.1. Service Clamps Location Of Tap To Be At 45°. All Taps To Be Made With A.W.W.A Tapered Threads.
NCTCOG Spec: 502.10.3.1 - Taps And Tap Assemblies In Water Conduit
2021 COD Addendum:
502.10.3.1.1.COD - Taps Through
502.10.3.1.7.COD - Tapping Of PVC Pipe

WATER MAIN IN PARKWAY

3/4" WATER SERVICE INSTALLATIONS (SIDEWALK ADJACENT TO CURB)

COD

(PAGE No.)

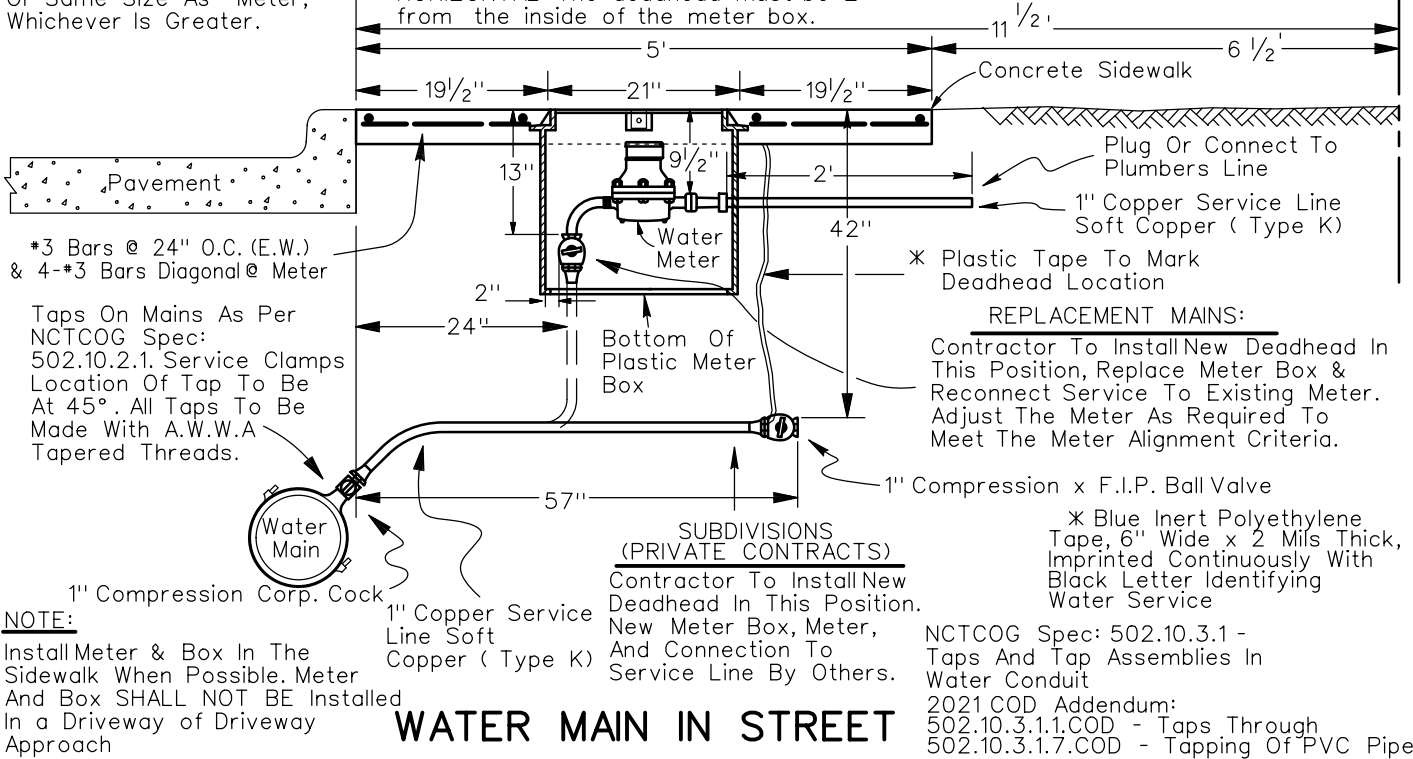
201

DATE

JULY 2021

NOTE:
Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

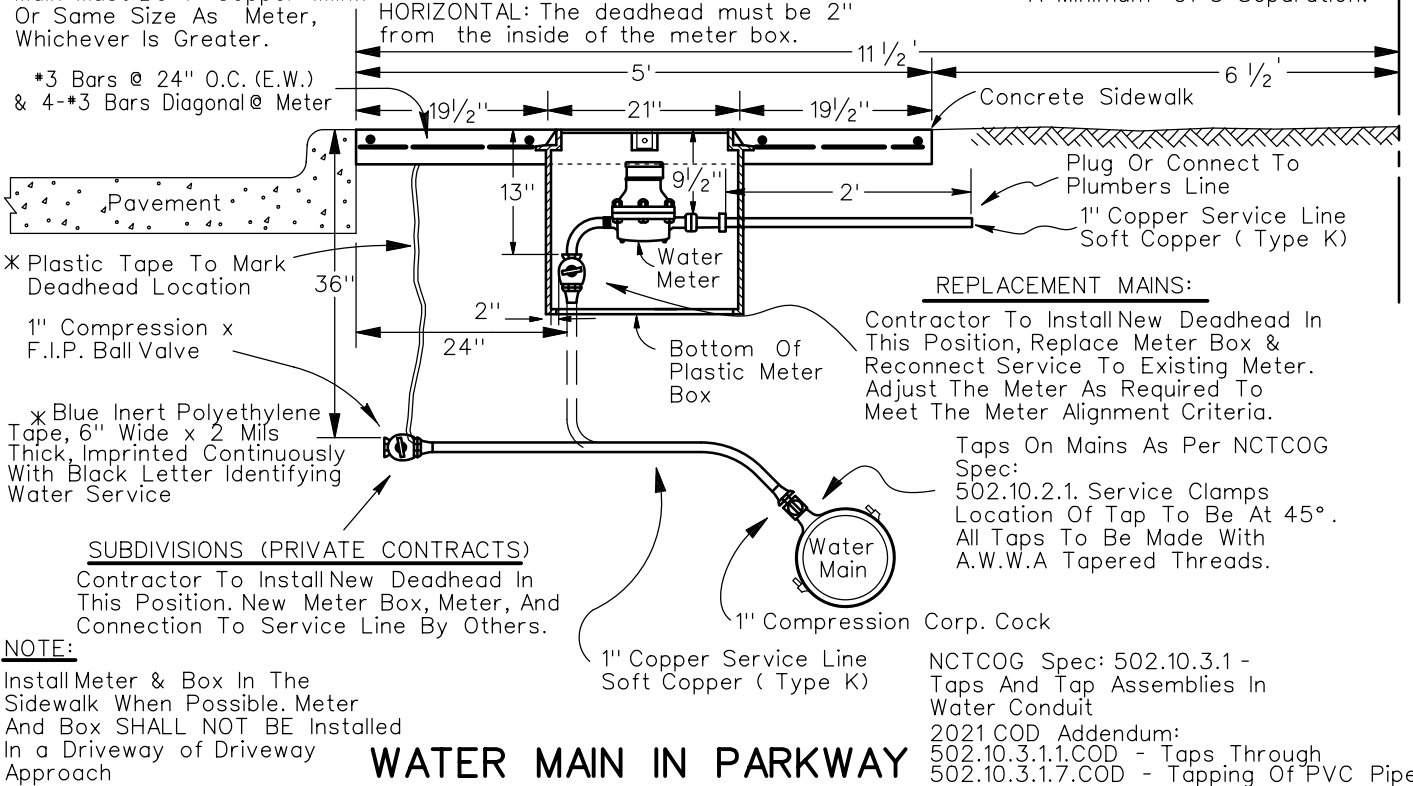
METER ALIGNMENT CRITERIA
VERTICAL: The private side ferrule nut or flange must be 9 1/2" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.



WATER MAIN IN STREET

NOTE:
Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

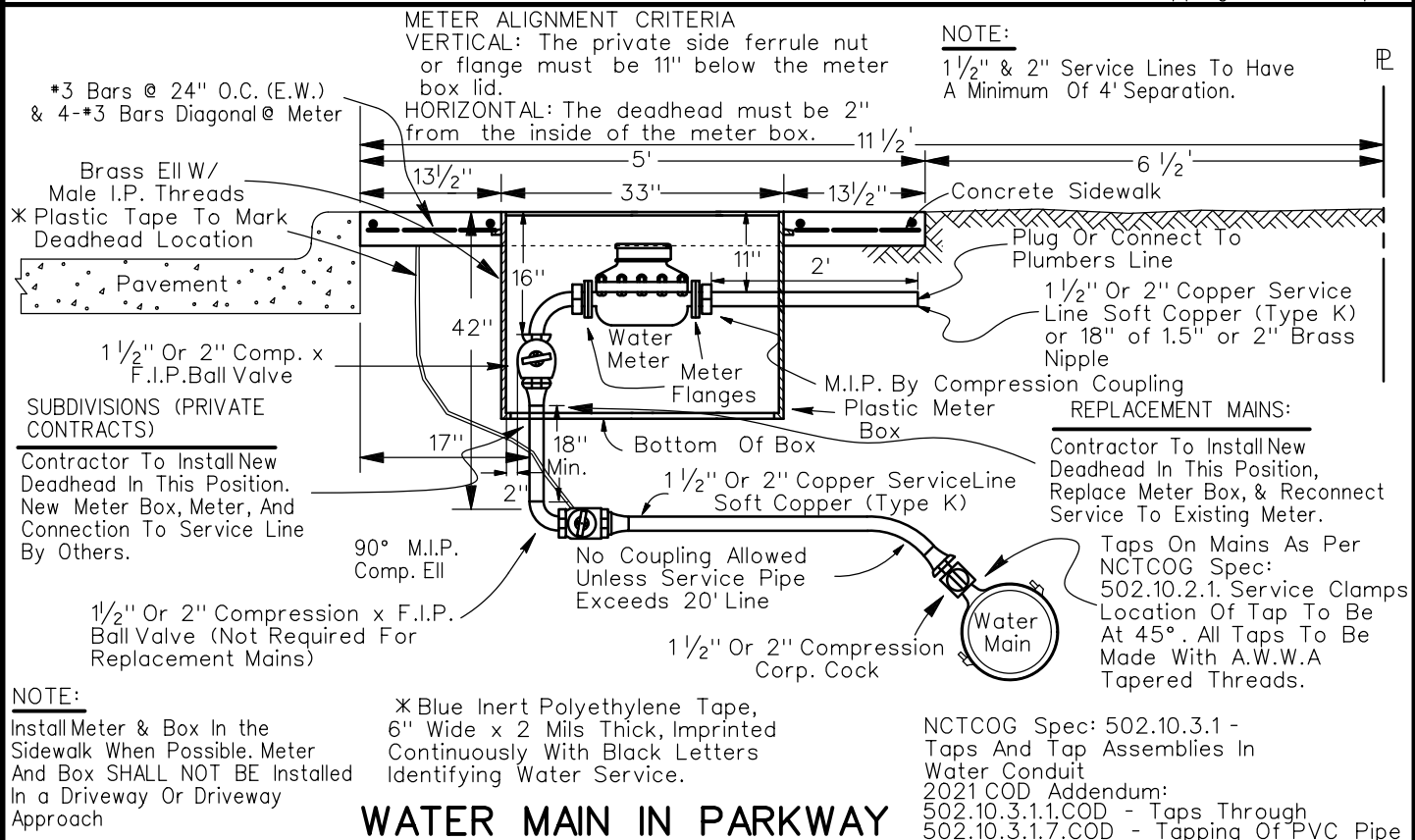
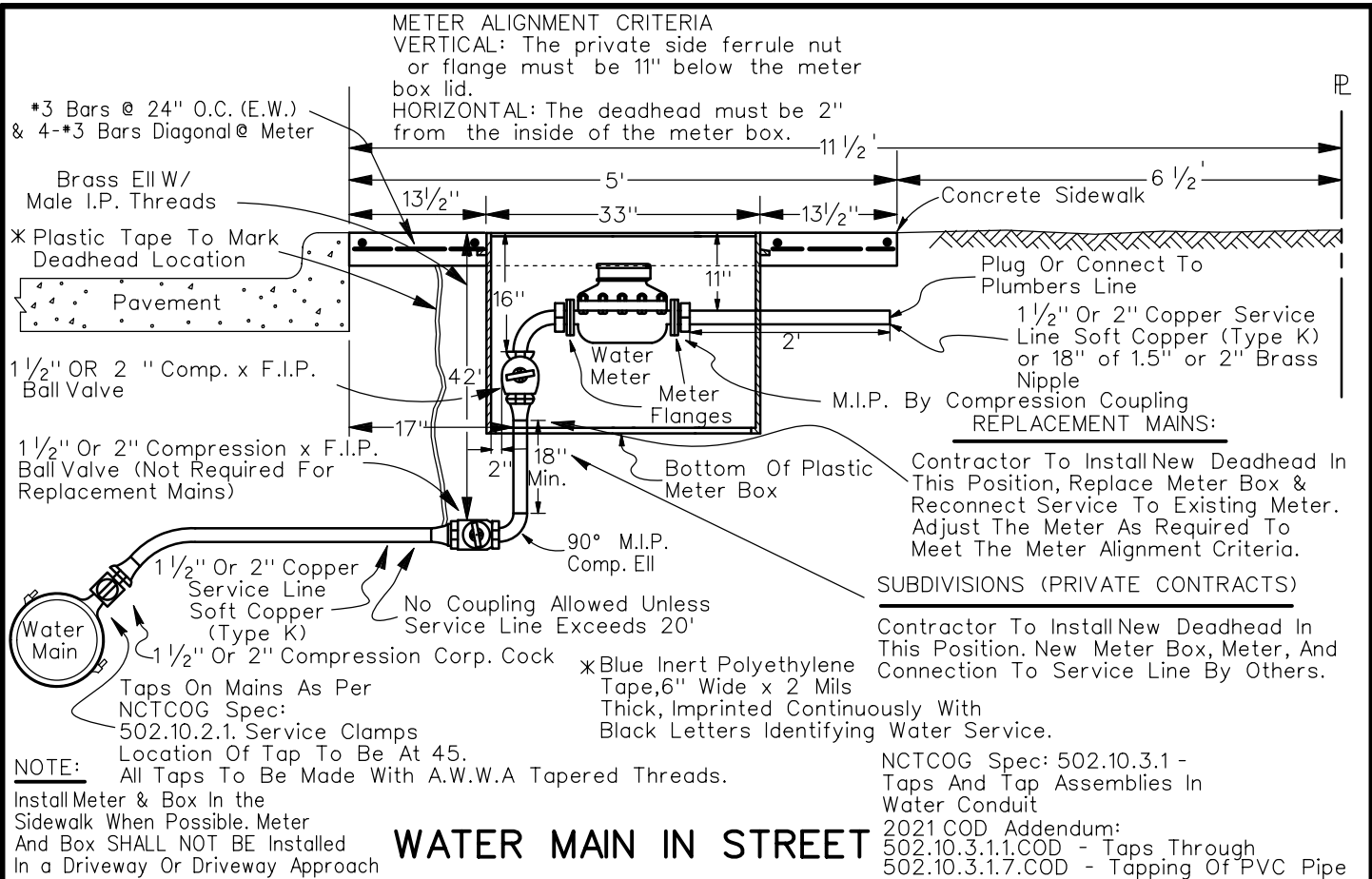
METER ALIGNMENT CRITERIA
VERTICAL: The private side ferrule nut or flange must be 9 1/2" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.



WATER MAIN IN PARKWAY

1" WATER SERVICE INSTALLATIONS (SIDEWALK ADJACENT TO CURB)

COD	(PAGE No.) 202
DATE JULY 2021	

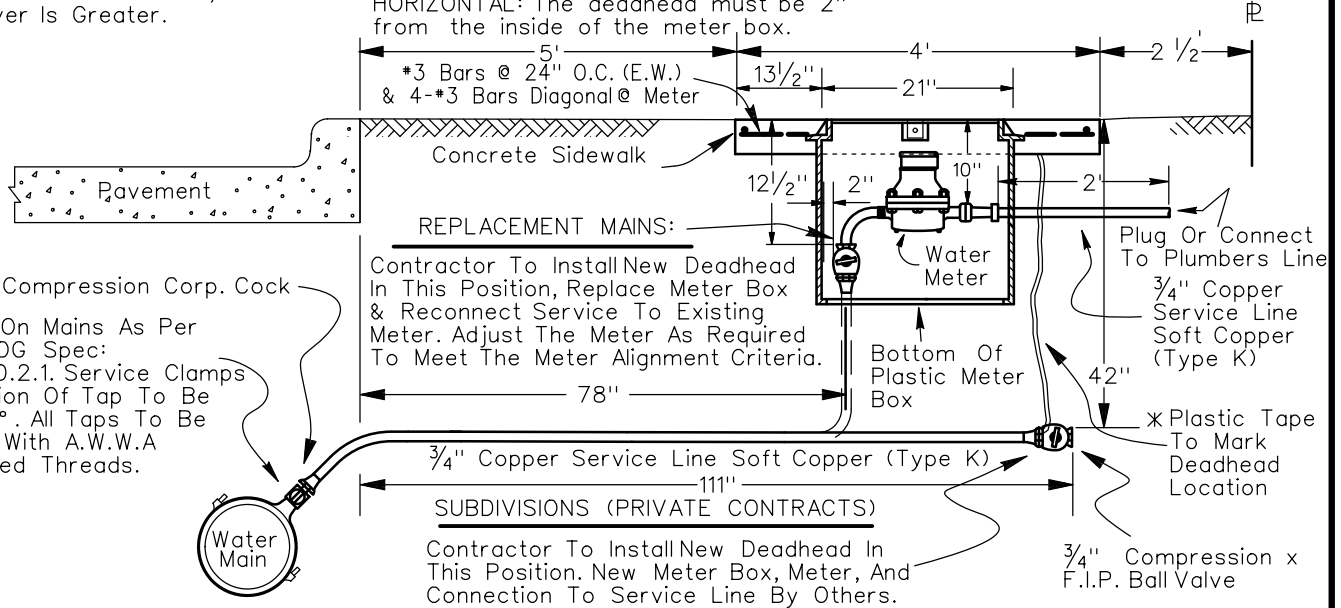


1 1/2" OR 2" WATER SERVICE INSTALLATION (SIDEWALK ADJACENT TO CURB)	COD	203
	DATE JULY 2021	(PAGE No.)

NOTE:

Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

METER ALIGNMENT CRITERIA
VERTICAL: The private side ferrule nut or flange must be 10" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.



NOTE:

Install Meter & Box in The Sidewalk When Possible. Meter And Box SHALL NOT BE Installed In a Driveway or Driveway Approach.

* Blue Inert Polyethylene Tape, 6" Wide x 2 Mils Thick, Imprinted Continuously With Black Letters Identifying Water Service.

NCTCOG Spec: 502.10.3.1 - Taps And Tap Assemblies In Water Conduit
 2021 COD Addendum:
 502.10.3.1.1.COD - Taps Through
 502.10.3.1.7.COD - Tapping Of PVC Pipe

WATER MAIN IN STREET

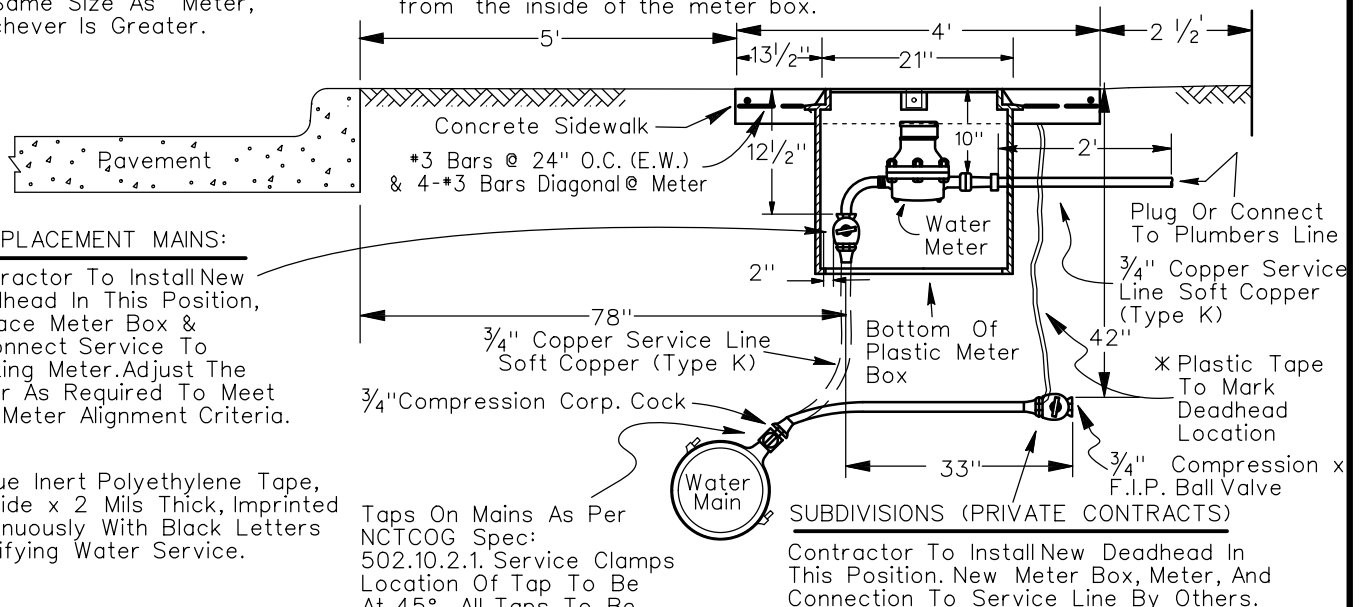
NOTE:

Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

METER ALIGNMENT CRITERIA
VERTICAL: The private side ferrule nut or flange must be 10" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.

NOTE:

3/4" Service Lines To Have A Minimum Of 3' Separation.



NOTE:

Install Meter & Box in The Sidewalk When Possible. Meter And Box SHALL NOT BE Installed In a Driveway or Driveway Approach.

* Blue Inert Polyethylene Tape, 6" Wide x 2 Mils Thick, Imprinted Continuously With Black Letters Identifying Water Service.
 Taps On Mains As Per NCTCOG Spec:
 502.10.2.1. Service Clamps Location Of Tap To Be At 45°. All Taps To Be Made With A.W.W.A Tapered Threads.

Contractor To Install New Deadhead In This Position. New Meter Box, Meter, And Connection To Service Line By Others.

NCTCOG Spec: 502.10.3.1 - Taps And Tap Assemblies In Water Conduit
 2021 COD Addendum:
 502.10.3.1.1.COD - Taps Through
 502.10.3.1.7.COD - Tapping Of PVC Pipe

WATER MAIN IN PARKWAY

3/4" WATER SERVICE INSTALLATIONS (SIDEWALK 5' FROM CURB)

COD

(PAGE No.)
204

DATE

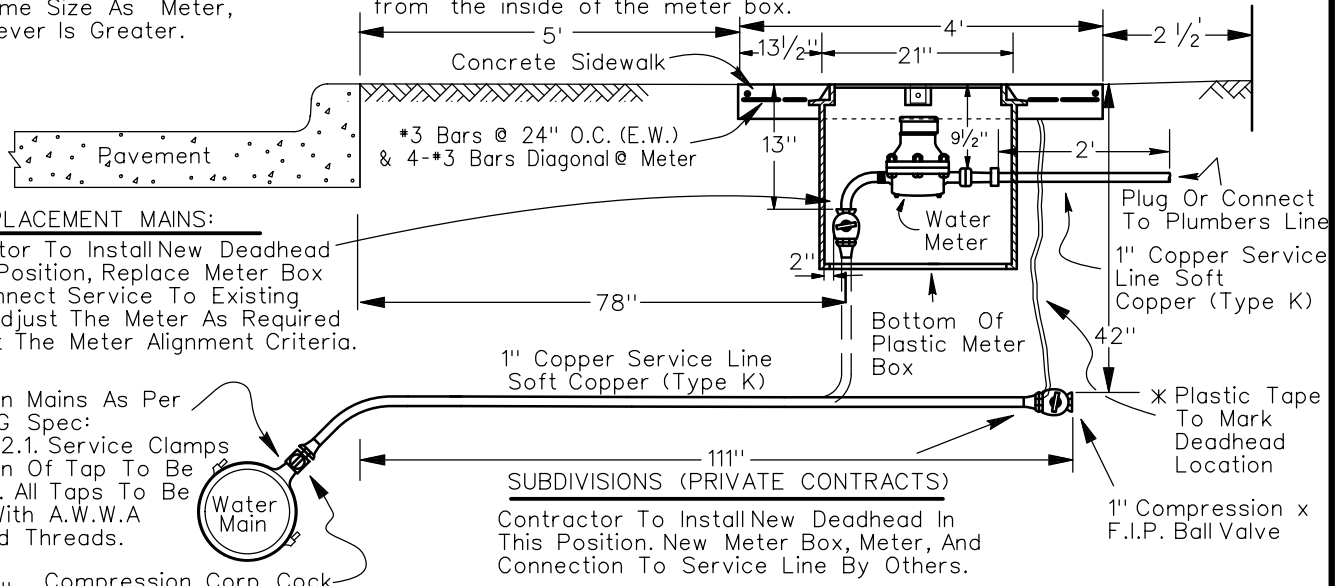
JULY 2021

NOTE:

Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

METER ALIGNMENT CRITERIA

VERTICAL: The private side ferrule nut or flange must be 9 1/2" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.



REPLACEMENT MAINS:

Contractor To Install New Deadhead In This Position, Replace Meter Box & Reconnect Service To Existing Meter. Adjust The Meter As Required To Meet The Meter Alignment Criteria.

Taps On Mains As Per NCTCOG Spec: 502.10.2.1. Service Clamps Location Of Tap To Be At 45°. All Taps To Be Made With A.W.W.A Tapered Threads.

1" Compression Corp. Cock

SUBDIVISIONS (PRIVATE CONTRACTS)

Contractor To Install New Deadhead In This Position. New Meter Box, Meter, And Connection To Service Line By Others.

* Blue Inert Polyethylene Tape, 6" Wide x 2 Mils Thick, Imprinted Continuously With Black Letters Identifying Water Service.

NCTCOG Spec: 502.10.3.1 - Taps And Tap Assemblies In Water Conduit
 2021 COD Addendum:
 502.10.3.1.1.COD - Taps Through
 502.10.3.1.7.COD - Tapping Of PVC Pipe

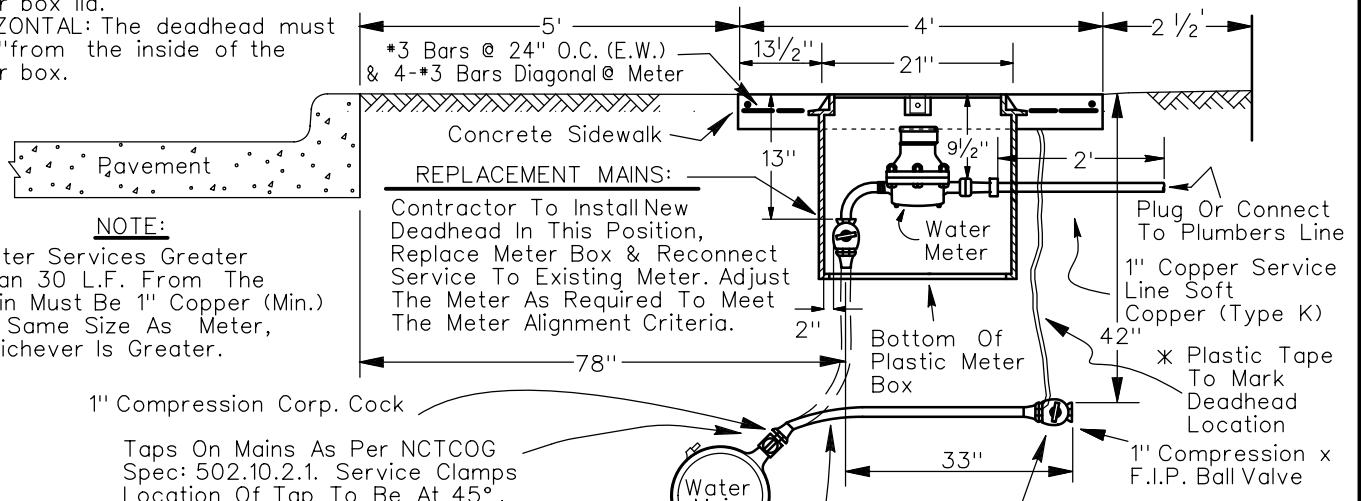
NOTE:

Install Meter & Box in The Sidewalk When Possible. Meter And Box SHALL NOT BE Installed In a Driveway or Driveway Approach.

WATER MAIN IN STREET

NOTE:

1 Service Lines To Have A Minimum Of 3' Separation.



NOTE:

Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

Taps On Mains As Per NCTCOG Spec: 502.10.2.1. Service Clamps Location Of Tap To Be At 45°. All Taps To Be Made With A.W.W.A Tapered Threads.

* Blue Inert Polyethylene Tape, 6" Wide x 2 Mils Thick, Imprinted Continuously With Black Letters Identifying Water Service.

Contractor To Install New Deadhead In This Position, Replace Meter Box & Reconnect Service To Existing Meter. Adjust The Meter As Required To Meet The Meter Alignment Criteria.

1" Copper Service Line Soft Copper (Type K)

SUBDIVISIONS (PRIVATE CONTRACTS)

Contractor To Install New Deadhead In This Position. New Meter Box, Meter, And Connection To Service Line By Others.

NCTCOG Spec: 502.10.3.1 - Taps And Tap Assemblies In Water Conduit
 2011 COD Addendum:
 502.10.3.1.1.COD - Taps Through
 502.10.3.1.7.COD - Tapping Of PVC Pipe

NOTE:

Install Meter & Box in The Sidewalk When Possible. Meter And Box SHALL NOT BE Installed In a Driveway or Driveway Approach.

WATER MAIN IN PARKWAY

1" WATER SERVICE INSTALLATIONS (SIDEWALK 5' FROM CURB)

COD

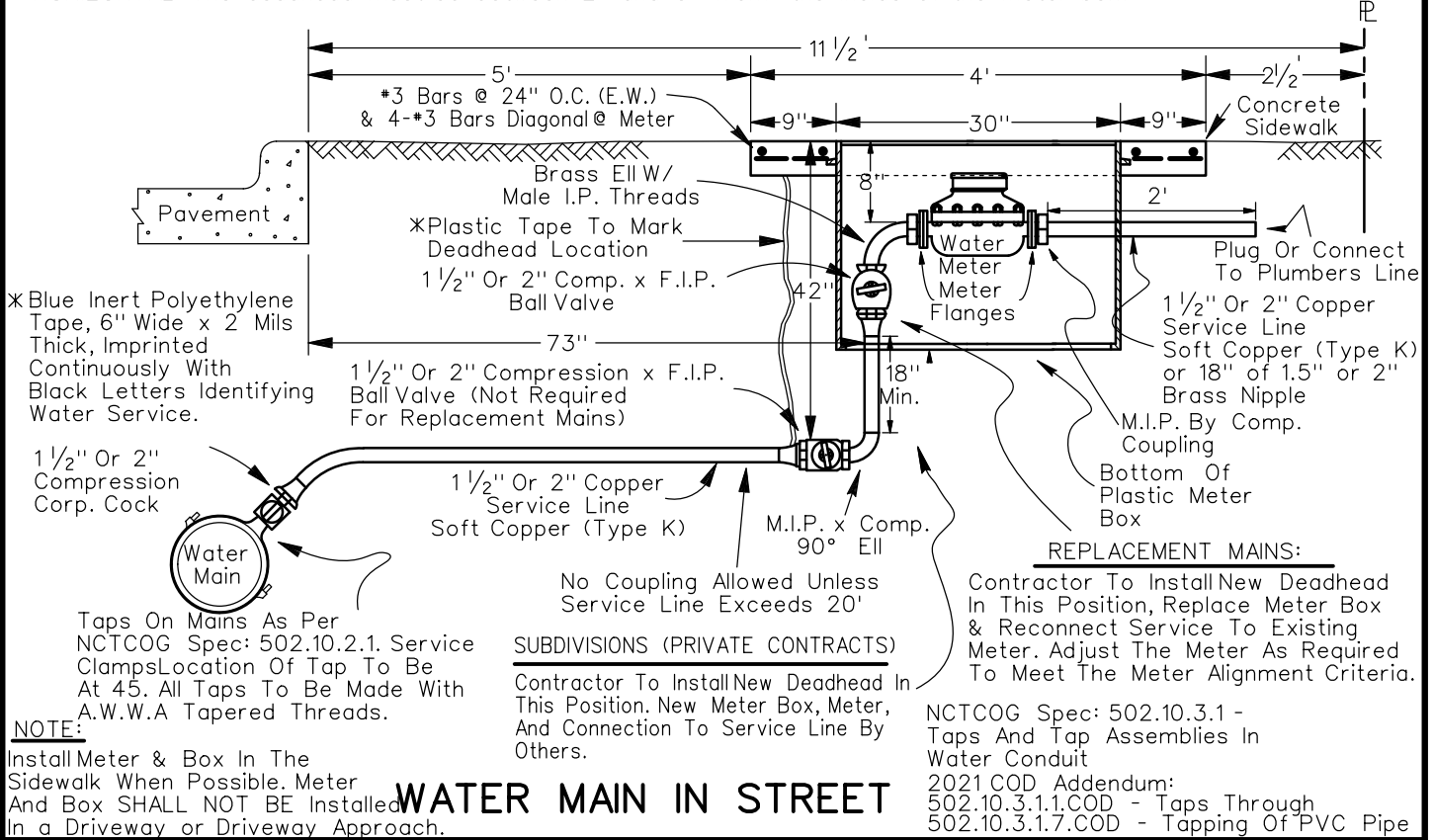
(PAGE No.)
205

DATE
JULY 2021

METER ALIGNMENT CRITERIA

VERTICAL: The private side ferrule nut or flange must be between 6" and 10" below the meter box lid.

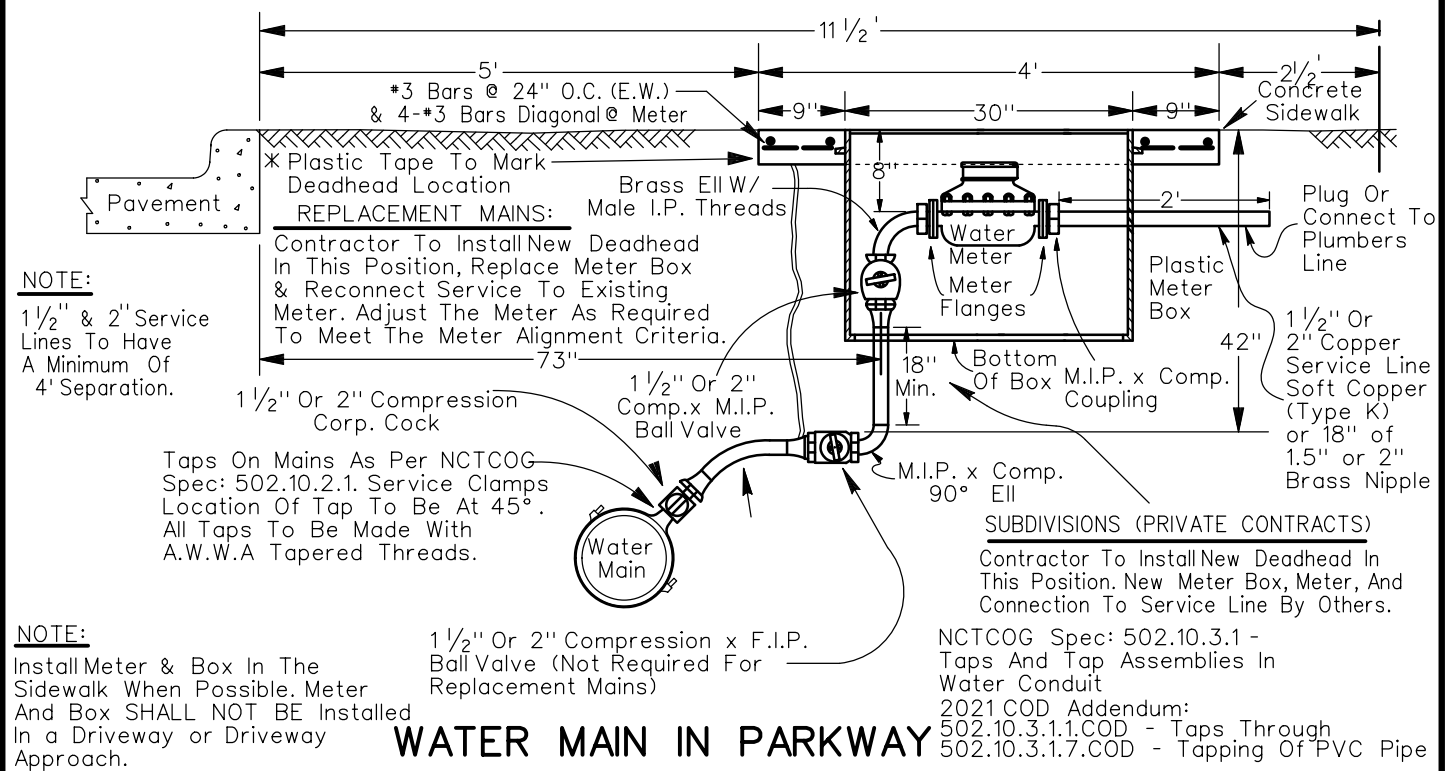
HORIZONTAL: The deadhead must be between 2" and 3" from the inside of the meter box.



METER ALIGNMENT CRITERIA

VERTICAL: The private side ferrule nut or flange must be between 6" and 10" below the meter box lid.

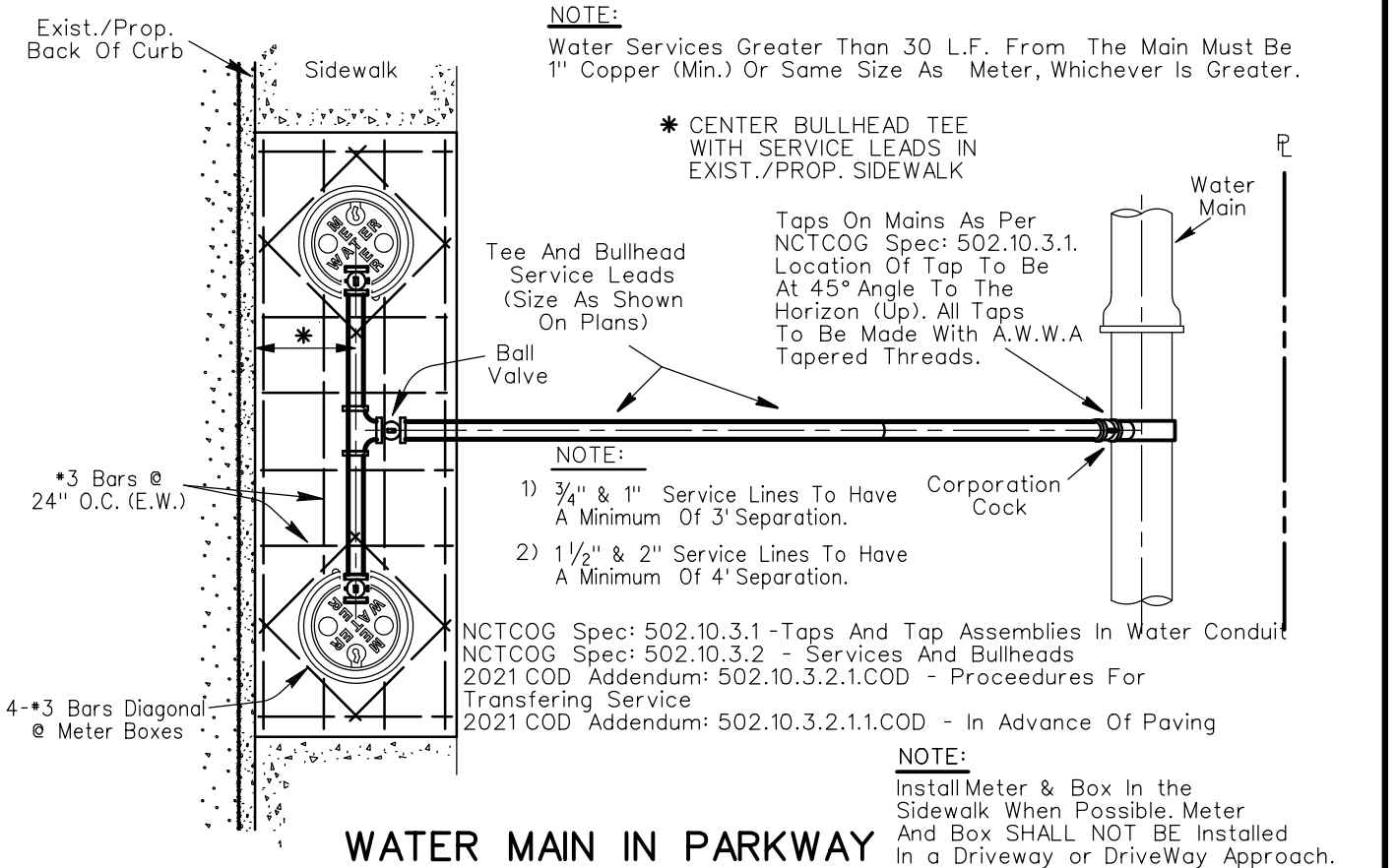
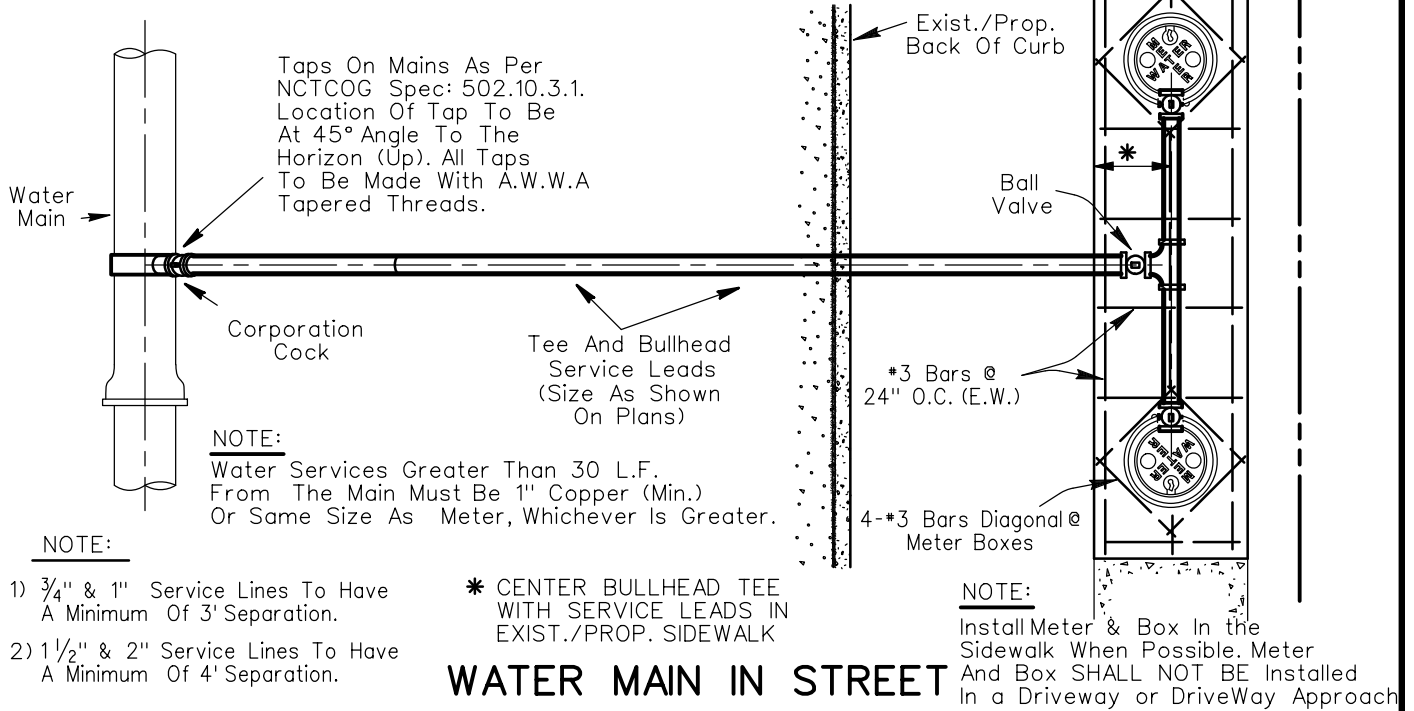
HORIZONTAL: The deadhead must be between 2" and 3" from the inside of the meter box.



**1 1/2" OR 2" WATER SERVICE INSTALLATIONS
(SIDEWALK 5' FROM CURB)**

COD	(PAGE No.) 206
DATE JULY 2021	

NCTCOG Spec: 502.10.3.1 - Taps And Tap Assemblies In Water Conduit
 NCTCOG Spec: 502.10.3.2 - Services And Bullheads
 2021 COD Addendum: 502.10.3.2.1.COD - Procedures For
 Transferring Service
 2021 COD Addendum: 502.10.3.2.1.1.COD - In Advance Of Paving



BULL HEAD SERVICES

COD	(PAGE NO.) 206A
DATE	JULY, 2021

Installation For Advanced Metering Infrastructure (AMI) Meter

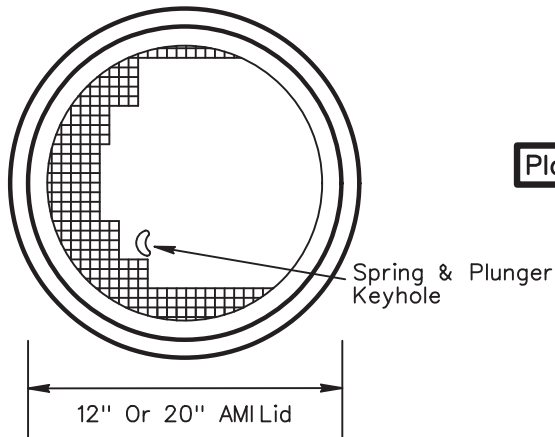
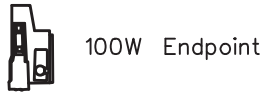
1. The Contractor Shall Not Remove, Damage, Or Otherwise Disturb The AMI Meter Endpoint Components Except By Direction Of The Meter Reading Operation (MRO) Technician. The Installer Shall Be Liable For The Replacement Cost Of Any Lost Or Damaged AMI Components.
2. For Meters 2" Or Smaller:
 The Contractor Shall Install A New Meter Box With A New Meter AMI Lid For Water Meters 2" And Smaller In Existing And Proposed AMI Areas With The Following Configuration As Applicable:
 - For 5/8" to 1" Meters: 12" Water Meter AMI Lid As Per the Approved Material List.
 - For 1 1/2" to 2" Meters: 20" Water Meter AMI Lid As Per the Approved Material List.
 The Contractor Shall Also Return The Existing AMI Lids From Existing AMI Area TO DWU MRO For All Meters 2" And Smaller.

For Meters 3" Or Larger:
 The Contractor Shall Either Connect To The Existing Meter Vault Or Construct A New Meter Vault As Specified On The Plans.
3. All Meters In The Existing And Proposed AMI Area Shall Be AMI Ready Meters As Furnished By DWU. A Non AMI Ready Meter Shall Be Replaced With An AMI Ready Meter By DWU.
4. The Contractor Shall Contact DWU MRO Five (5) Working Days In Advance At 214-670-5537 And By Email At DWUMRO@dallascityhall.com Before Any Removal, Disconnection, Reconnection, Or Installation Of AMI Endpoint Components.

REFER TO PAGES 206C & 206D

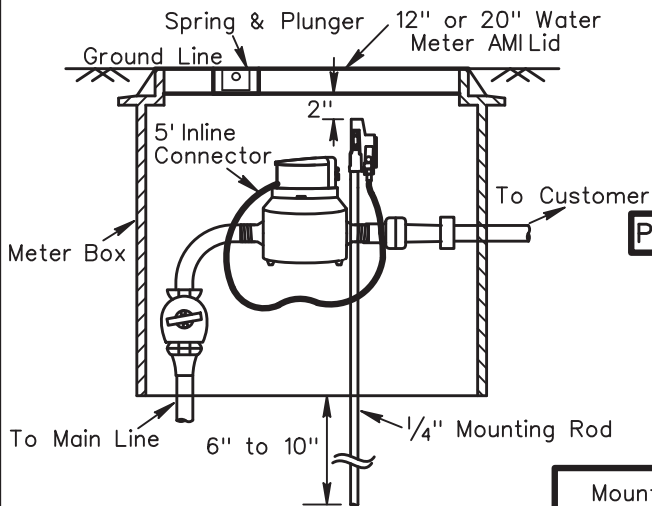
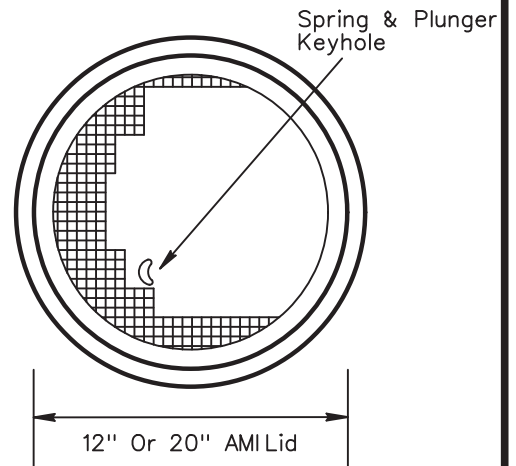
Installation Requirements For AMI Meter		DWU	(PAGE No.) 206B
		DATE MAY 2012	

Fixed Network Or Mobile System
(100W Endpoint Or Approved Equal)

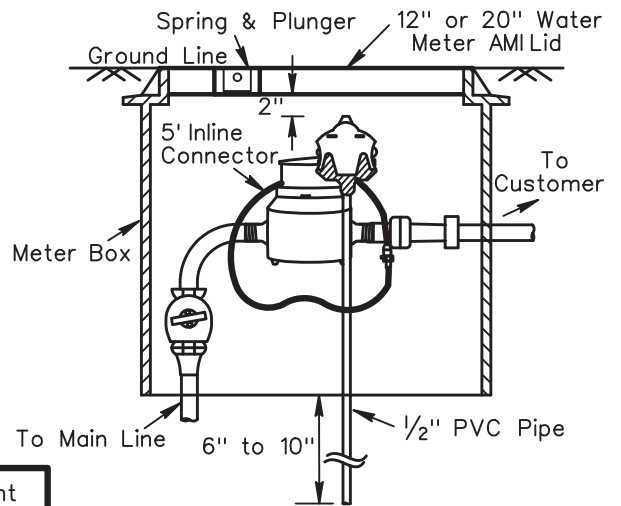


Plan View

Fixed Network
(200W Endpoint Or Approved Equal)



Profile View



Finished Installation With 100W Endpoint Configuration

Mount The Endpoint As Near To The Center Of The Meter Box As Possible Without Touching The Meter

Finished Installation With 200W Endpoint Configuration

REFER TO PAGES 206B & 206D

AMI Meter Installation Details
For 2" Or Smaller Meters

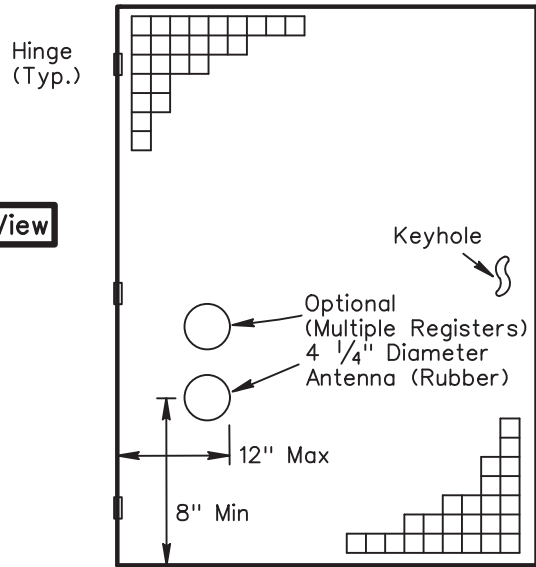
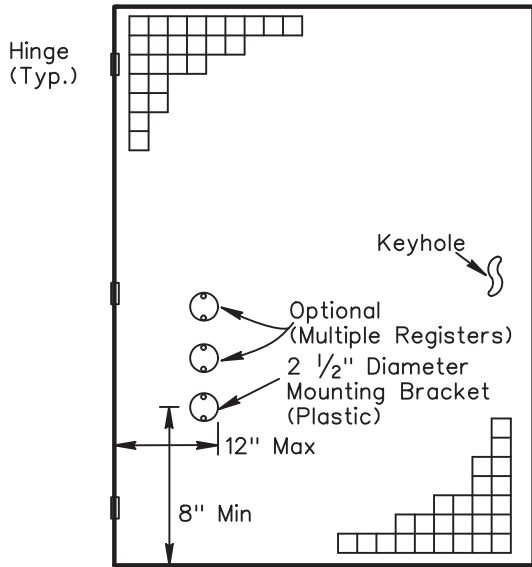
DWU

(PAGE No.)
206C

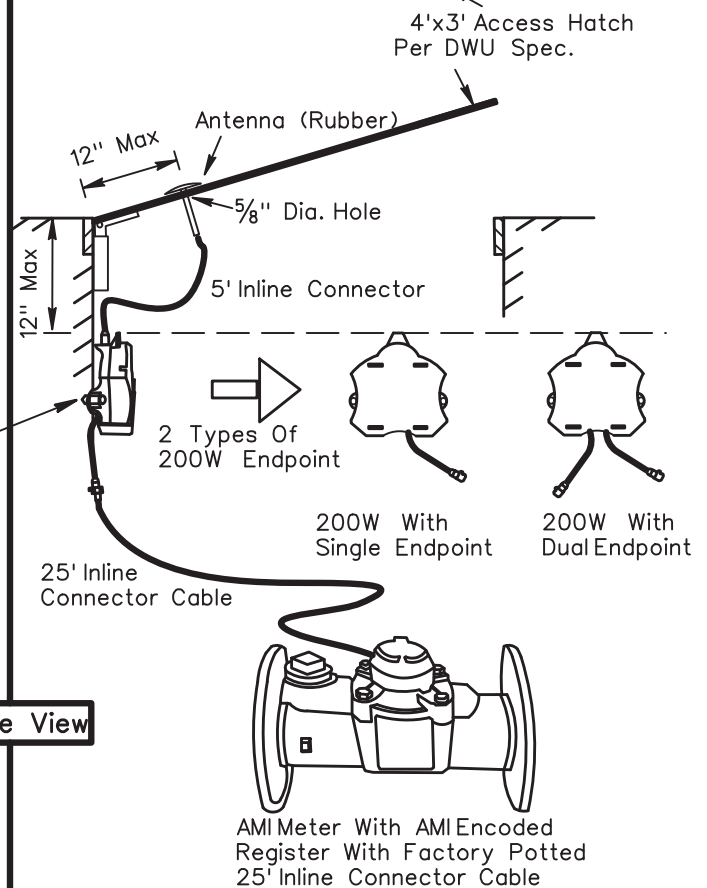
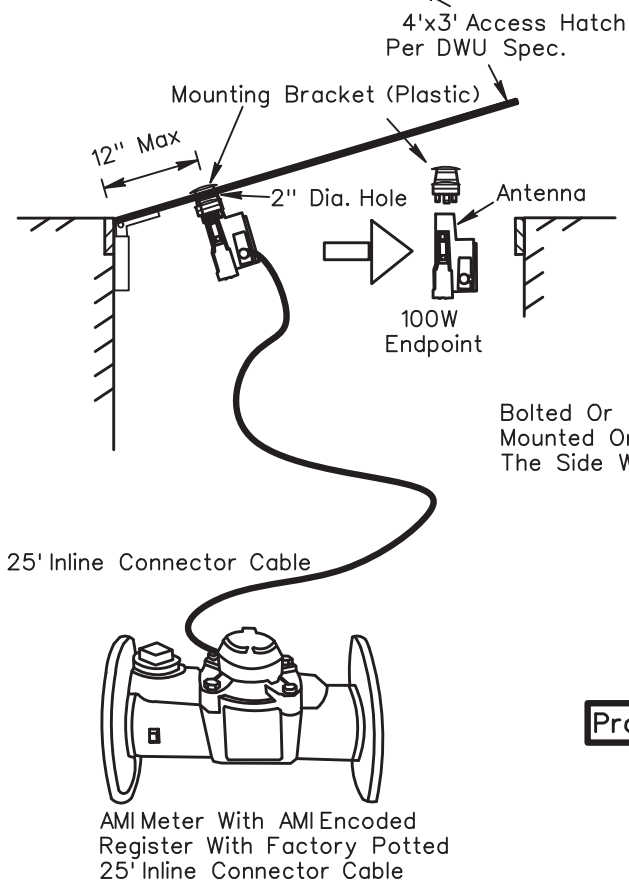
DATE
MAY 2012

**Fixed Network Or Mobile System
(100W Endpoint Or Approved Equal)**

**Fixed Network
(200W Endpoint Or Approved Equal)**



Plan View



Profile View

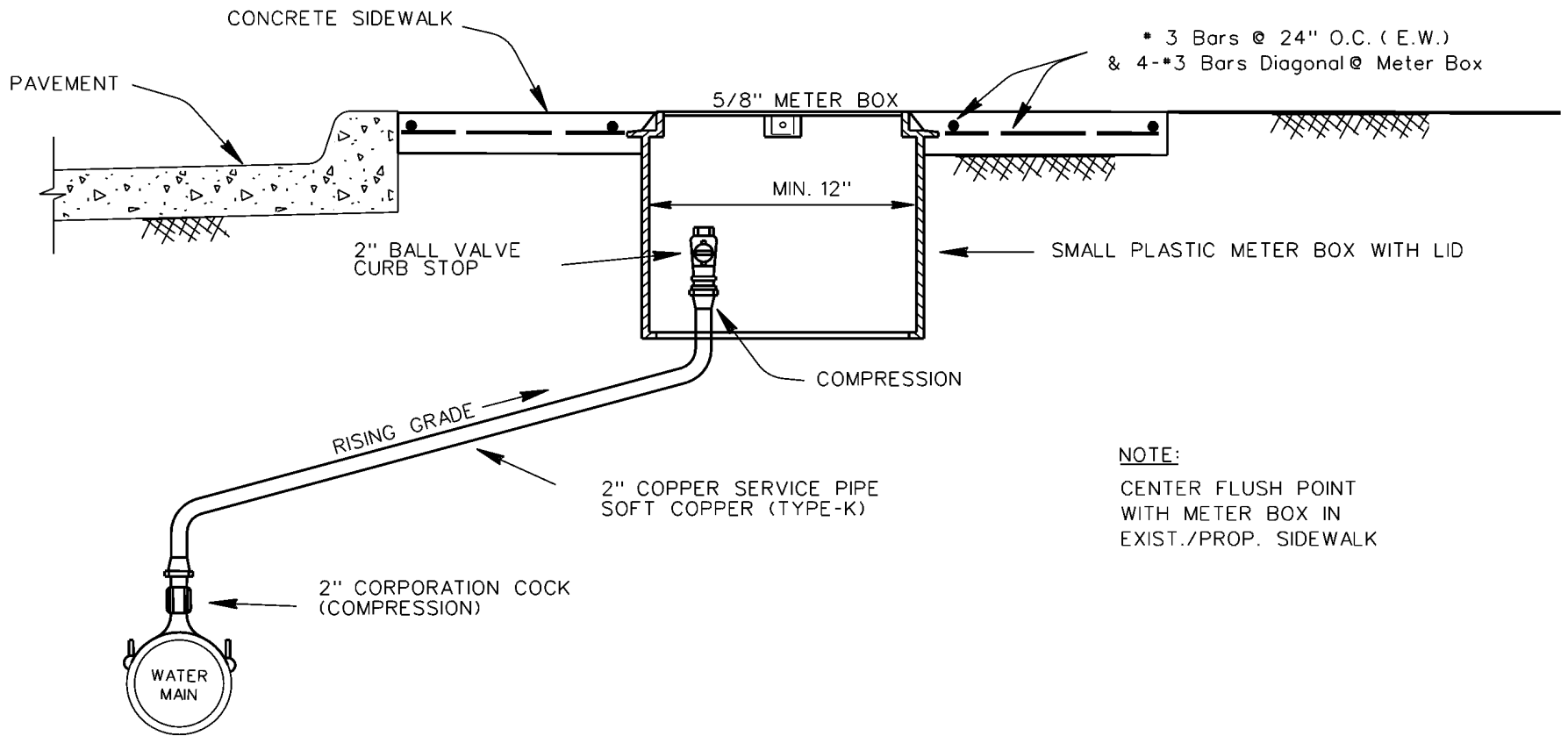
REFER TO PAGES 206B & 206C

**AMI Meter Installation Details
For 3" And Larger Meters**

DWU

(PAGE No.)
206D

DATE
MAY 2012



* 3 Bars @ 24" O.C. (E.W.)
 & 4-#3 Bars Diagonal @ Meter Box

SMALL PLASTIC METER BOX WITH LID

NOTE:
 CENTER FLUSH POINT
 WITH METER BOX IN
 EXIST./PROP. SIDEWALK

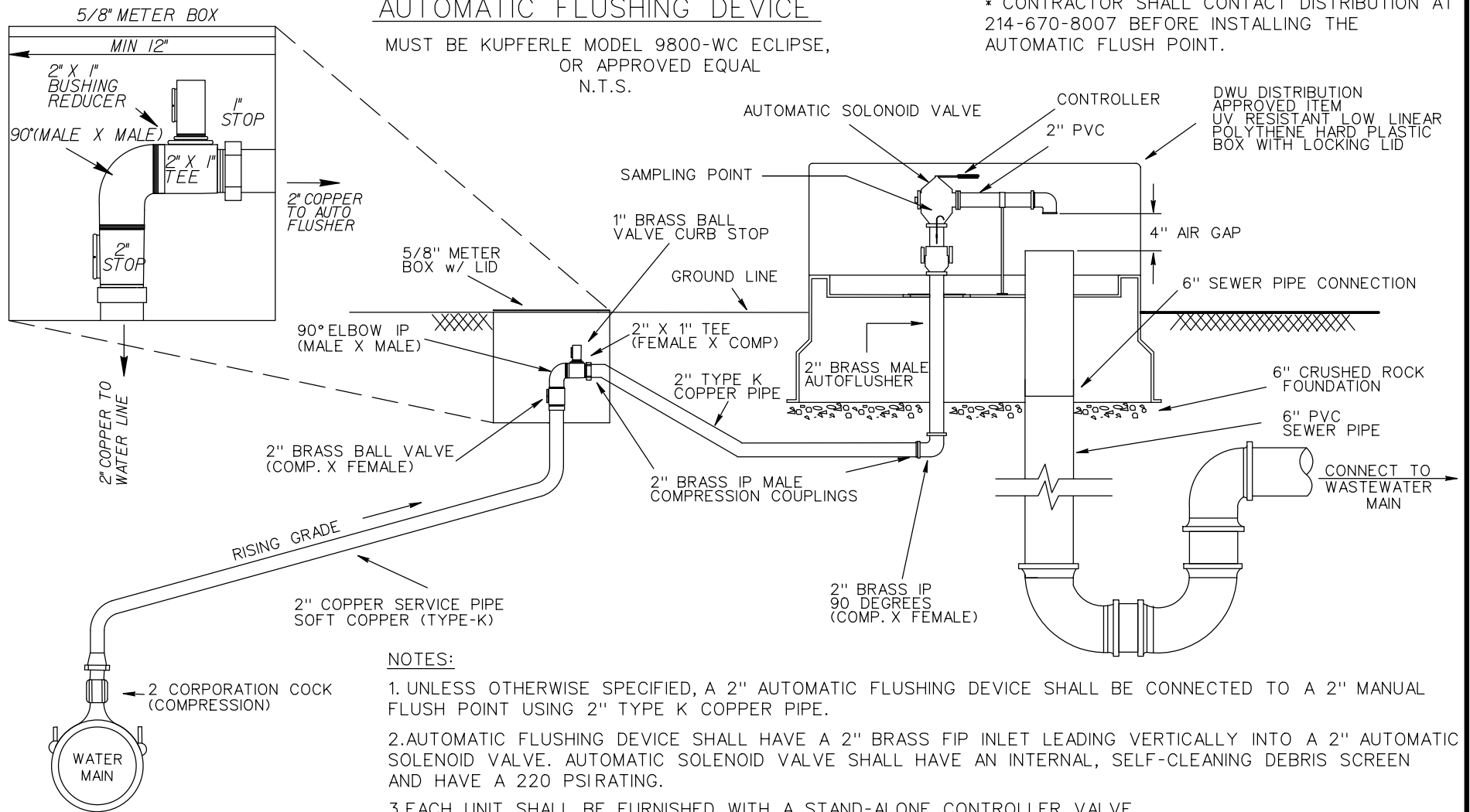
MANUAL FLUSH POINT

2 INCH MINIMUM
 OR
 LARGER/SMALLER IF STATED ON PLANS
 N.T.S.

MANUAL FLUSH POINT INSTALLATION	DWU	(Page No.) 207
	DATE OCT. 2012	

AUTOMATIC FLUSHING DEVICE

* CONTRACTOR SHALL CONTACT DISTRIBUTION AT 214-670-8007 BEFORE INSTALLING THE AUTOMATIC FLUSH POINT.



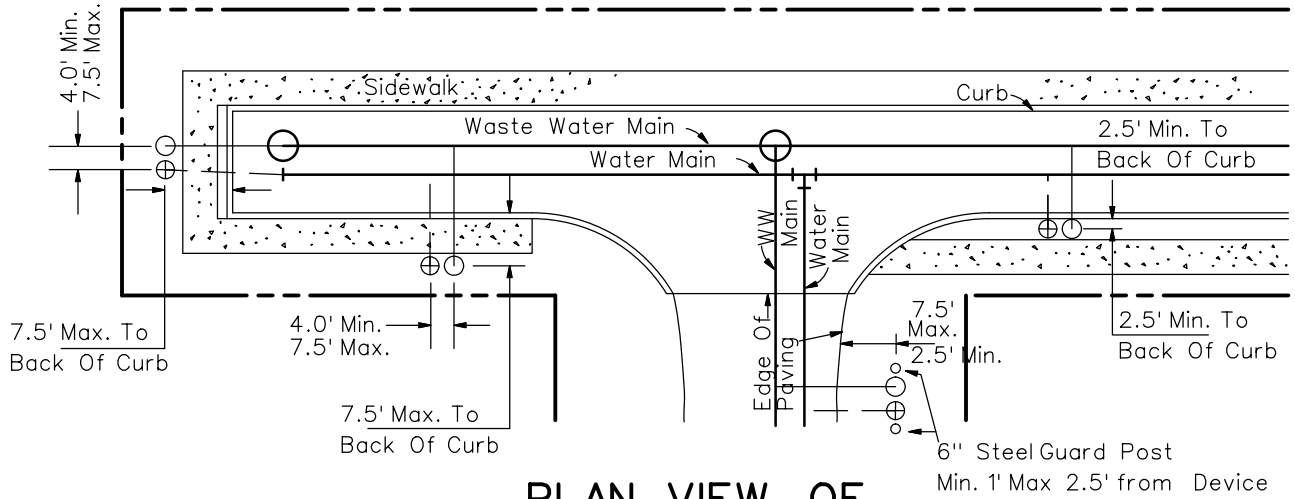
MUST BE KUPFERLE MODEL 9800-WC ECLIPSE,
OR APPROVED EQUAL
N.T.S.

DWU DISTRIBUTION
APPROVED ITEM
UV RESISTANT LOW LINEAR
POLYTHENE HARD PLASTIC
BOX WITH LOCKING LID

NOTES:

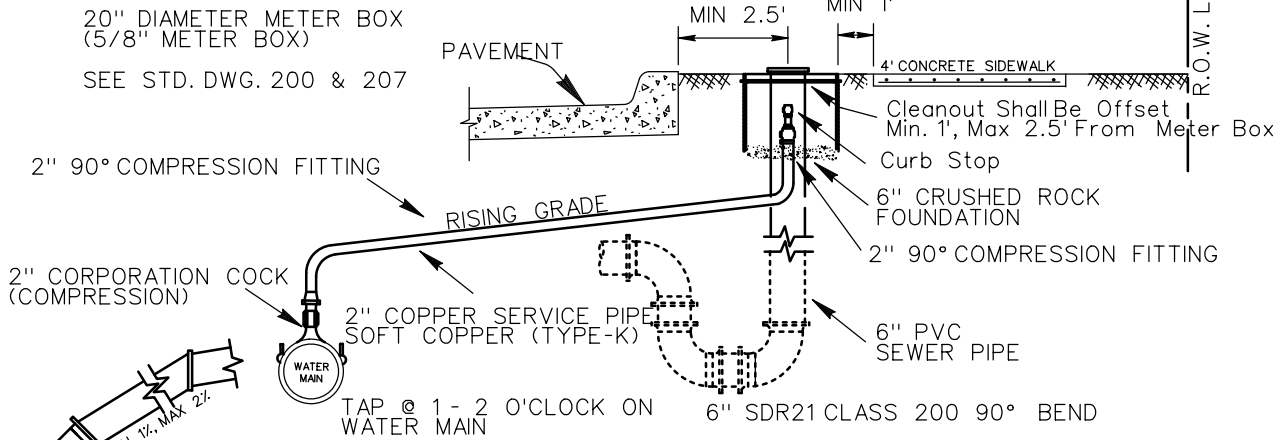
1. UNLESS OTHERWISE SPECIFIED, A 2" AUTOMATIC FLUSHING DEVICE SHALL BE CONNECTED TO A 2" MANUAL FLUSH POINT USING 2" TYPE K COPPER PIPE.
2. AUTOMATIC FLUSHING DEVICE SHALL HAVE A 2" BRASS FIP INLET LEADING VERTICALLY INTO A 2" AUTOMATIC SOLENOID VALVE. AUTOMATIC SOLENOID VALVE SHALL HAVE AN INTERNAL, SELF-CLEANING DEBRIS SCREEN AND HAVE A 220 PSIRATING.
3. EACH UNIT SHALL BE FURNISHED WITH A STAND-ALONE CONTROLLER. VALVE CONTROLLER WILL NOT REQUIRE A SECOND HAND-HELD DEVICE FOR PROGRAMMING. CONTROLLER MUST HAVE A MINIMUM OF 9 POSSIBLE FLUSHING CYCLES PER DAY, SHALL BE SUBMERSIBLE TO 12 FEET, OPERATE 9 VOLT BATTERY AND HAVE RESIN-SEALED ELECTRICAL COMPONENTS. SOLENOID SHALL HAVE NO LOOSE PARTS WHEN REMOVED FROM VALVE. EACH UNIT SHALL HAVE A DOUBLE VALVE, ALL BRASS SAMPLING POINT. REMOVAL OF 2" SOLENOID VALVE SHALL BE POSSIBLE VIA A QUICK DISCONNECT BELOW THE VALVE.
4. ALL ABOVE-GROUND COMPONENTS SHALL BE CONTAINED WITHIN A UV-RESISTANT LOCKING COVER KUPFERLE FOUNDRY COMPANY. 2511 NORTH 9TH STREET ST. LOUIS, MO. 63102 1-800-231-3990.

<h2 style="margin: 0;">AUTOMATIC FLUSH POINT</h2>	DWU	(Page No.) 207A
	DATE OCT. 2017	

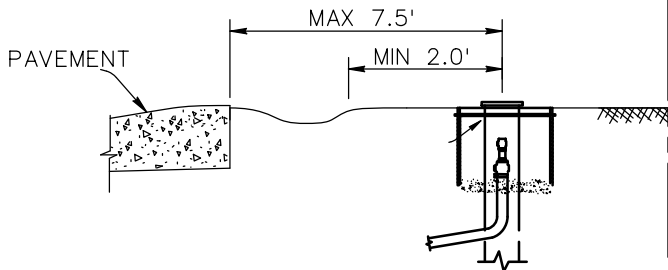


PLAN VIEW OF AUTO. READY FLUSH POINT PLACEMENT

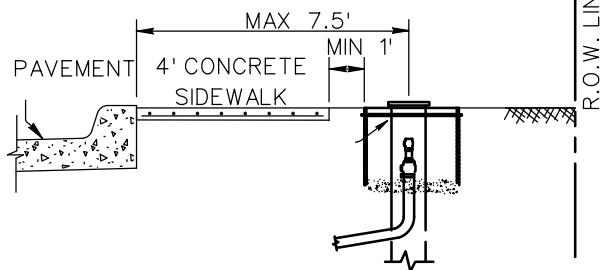
SIDE WALK OFFSET FROM CURB



BAR DITCH WITH NO CURB/GUTTER



SIDE WALK IMMEDIATELY ADJACENT TO CURB



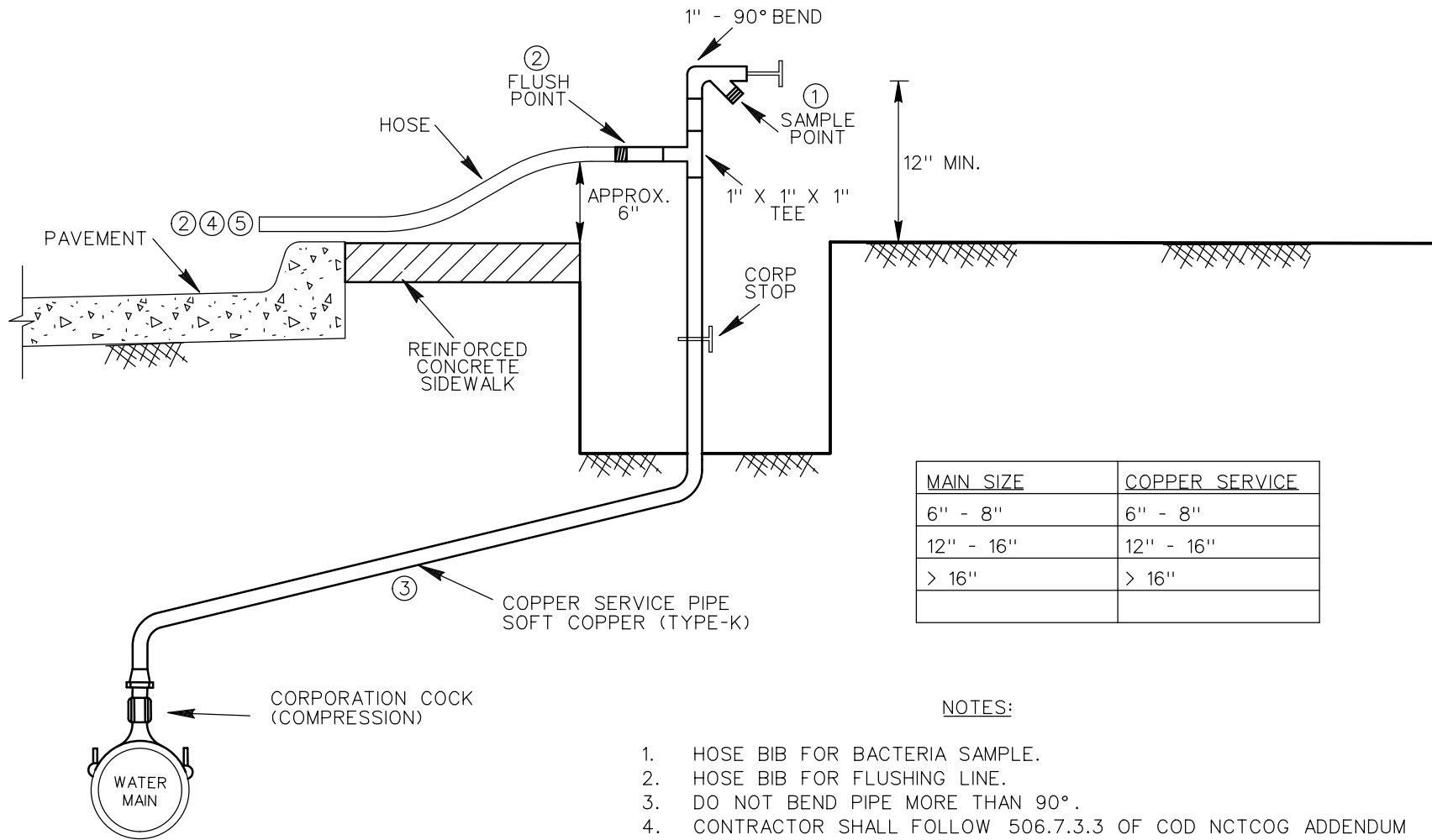
ELEVATION VIEW N.T.S.

- * SIDEWALK: SET 1FT MIN BEHIND SIDEWALK
- * NO SIDEWALK: SET 2FT MIN BEHIND CURB
- INSTALL 2 - 6" STEEL GUARD POSTS AS PER STANDARD DRAWINGS 236
- * NO CURB: SET 4FT MIN BEHIND STREET
- INSTALL 2 - 6" STEEL GUARD POSTS AS PER STANDARD DRAWINGS 236

REFER TO PAGES 200, 207 & 323

**AUTOMATIC READY MANUAL
FLUSH POINT WITH 6" LATERAL**

DWU	(PAGE NO.) 207B
DATE OCT. 2016	

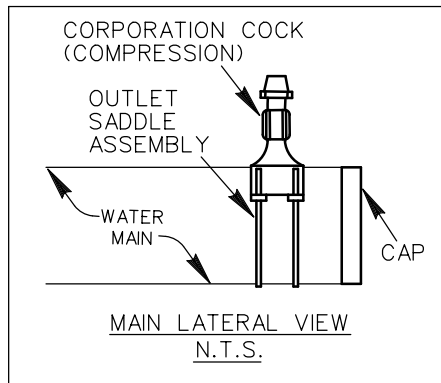


NOTES:

1. HOSE BIB FOR BACTERIA SAMPLE.
2. HOSE BIB FOR FLUSHING LINE.
3. DO NOT BEND PIPE MORE THAN 90°.
4. CONTRACTOR SHALL FOLLOW 506.7.3.3 OF COD NCTCOG ADDENDUM
5. HOSE WILL BE TAKEN TO NEAREST STORM WATER MANHOLE OR INLET.

TEMPORARY FLUSH POINT WITH SAMPLE POINT

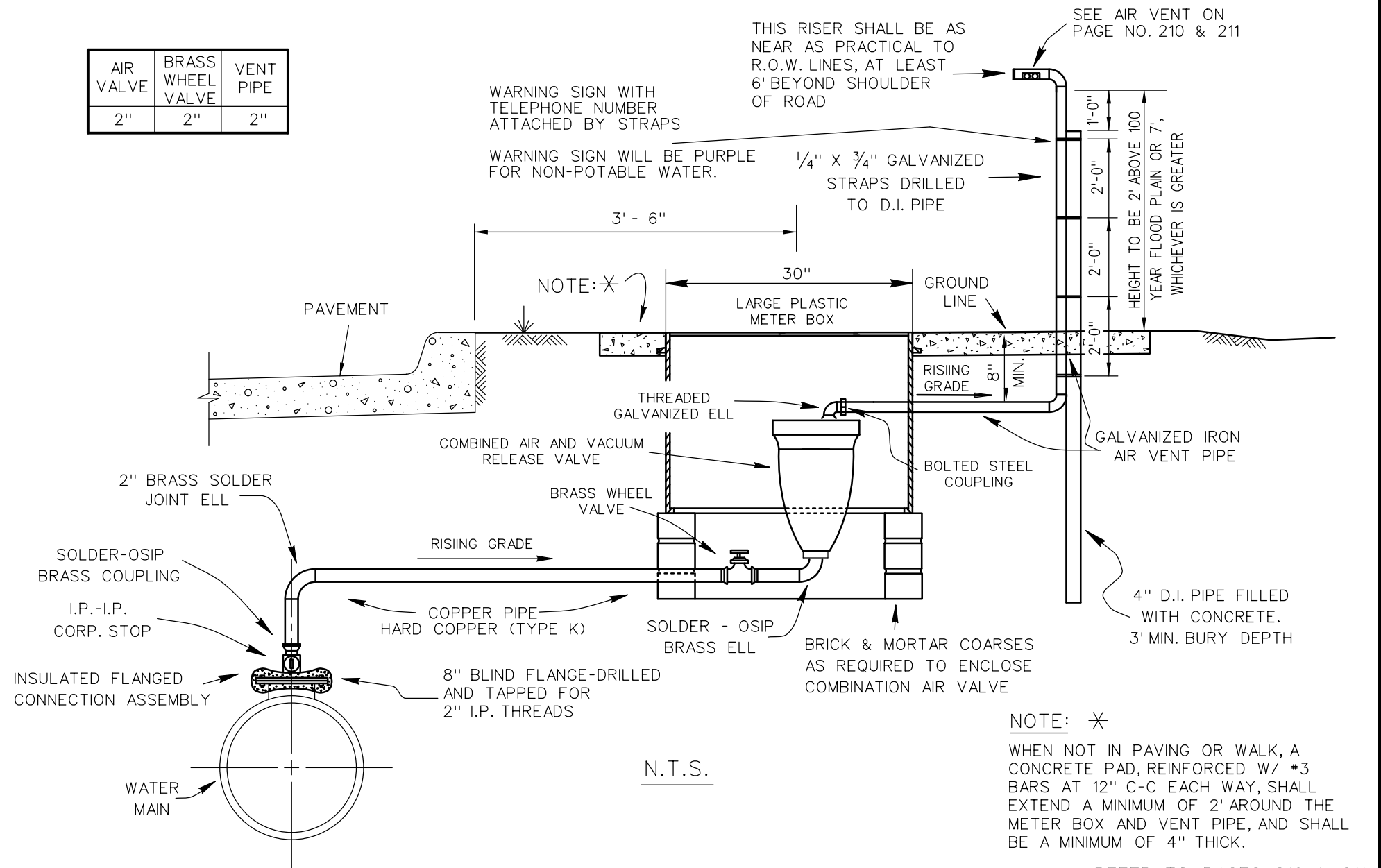
N.T.S.



**FLUSH POINT WITH SAMPLE POINT
INSTALLATION**

(Page No.)	
COD	207C
DATE	
JULY, 2021	

AIR VALVE	BRASS WHEEL VALVE	VENT PIPE
2"	2"	2"



REFER TO PAGES 210 & 211

AIR RELEASE VALVE TYPE 1

DWU

(Page No.)

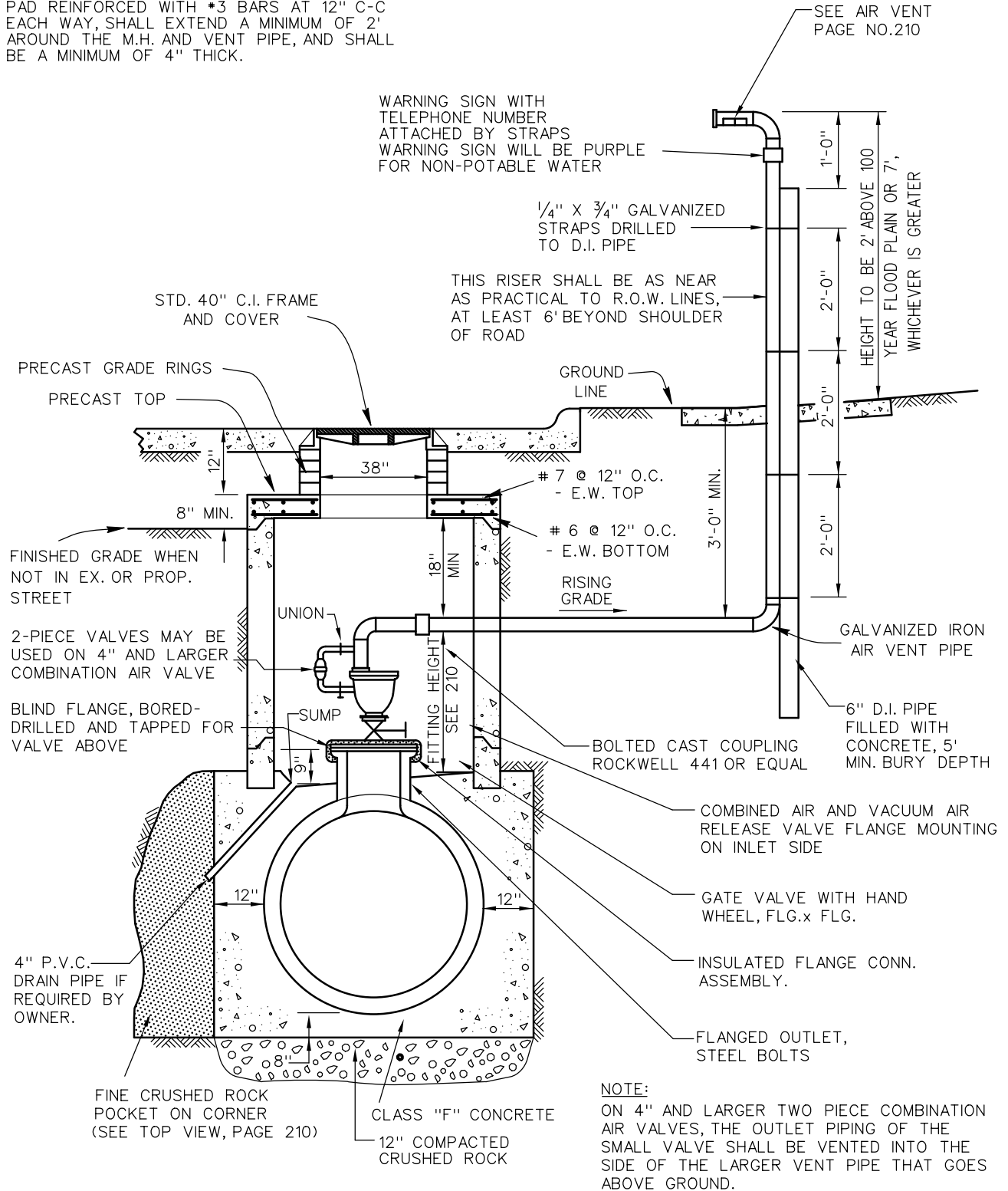
208

DATE

OCT. 2015

NOTE:

WHEN NOT IN PAVING OR WALK, A CONCRETE PAD REINFORCED WITH #3 BARS AT 12" C-C EACH WAY, SHALL EXTEND A MINIMUM OF 2' AROUND THE M.H. AND VENT PIPE, AND SHALL BE A MINIMUM OF 4" THICK.



REFER TO PAGES 210 & 211

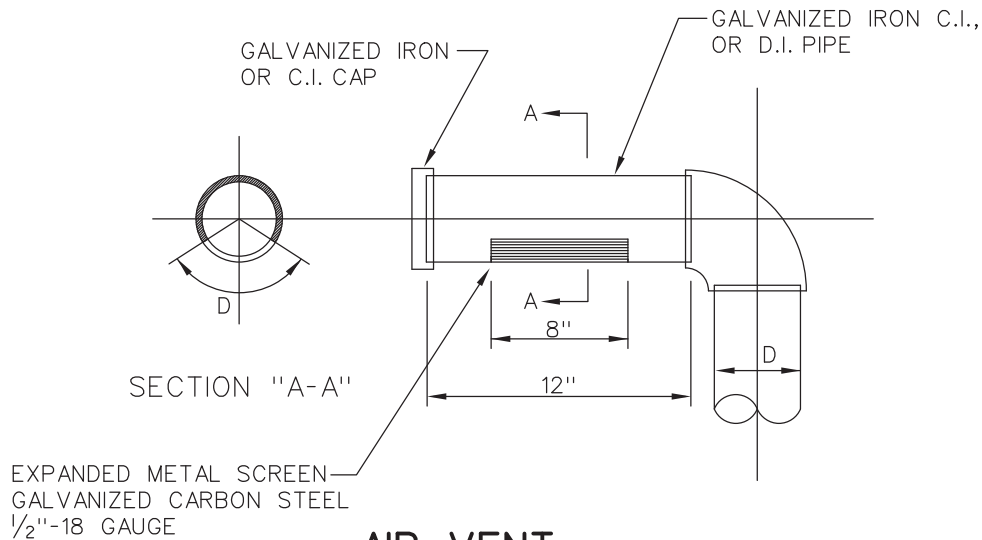
**AIR RELEASE VALVE
TYPE 2**

DWU

(Page No.)

209

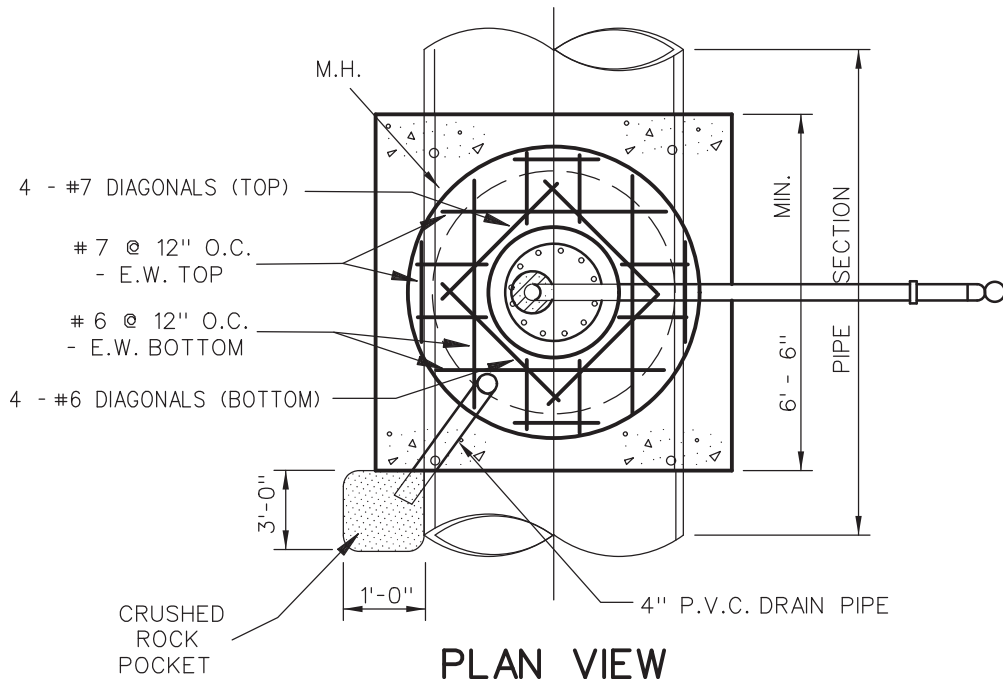
DATE
OCT. 2015



AIR VENT

N.T.S.

AIR VALVE	GATE VALVE	FLANGE OUTLET	MINIMUM FITTING HEIGHT	VENT PIPE DIAMETER	MANHOLE DIAMETER	VENT PIPE MATERIAL
2"	2"	8"	26"	2"	5'	GALVANIZED OR PAINTED BLACK IRON
3"	3"	18"	31"	3"	5'	
4"	4"	18"	38"	4"	5'	CLASS 52 DUCTILE IRON
6"	6"	18"	46"	6"	5'	
8"	8"	18"	53"	8"	6'	
10"	10"	20"	62"	10"	6'	
12"	12"	24"	72"	12"	6'	



PLAN VIEW

N.T.S.

REFER TO PAGES 208, 209, & 211

AIR RELEASE VALVE
TYPE 2

DWU

(Page No.)

210

DATE

OCT. 2015

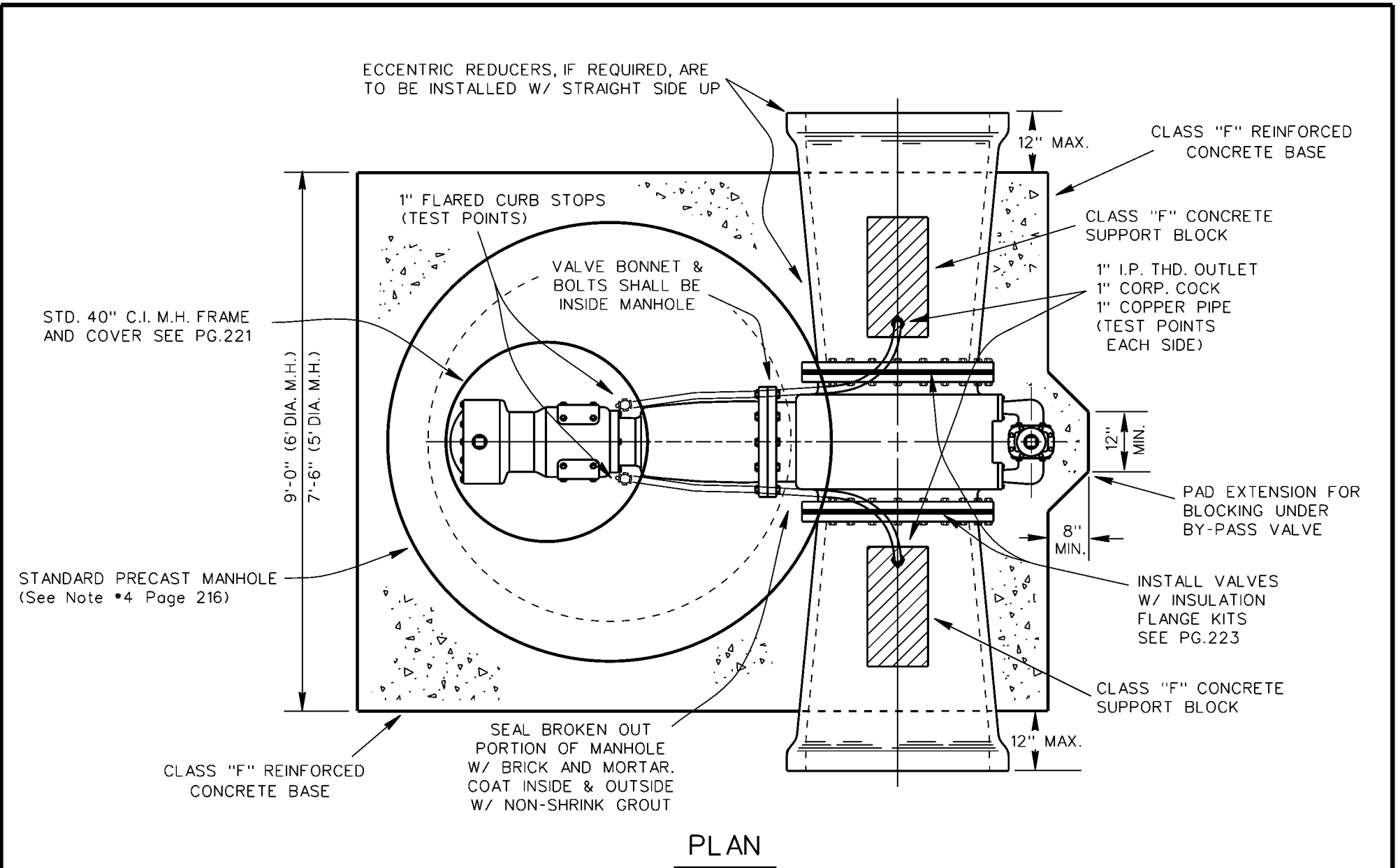
GENERAL NOTES

1. Manholes must be precast.
2. Air vent pipes 4" and larger shall be Class 52 Ductile Iron Pipe with flange fittings with Rustoleum 7582 gray primer or equal in lieu of tar coating. Pipe shall be painted with Devguard 4308 or equal (SILVER COLOR) per manufacture's instructions prior to installation.
3. A Dallas Water Utilities warning sign shall be furnished by the City and installed by the Contractor. Where the air valve is installed on a non-potable water line, the sign must be painted purple to designate the type of water.
4. Vent pipe must be extended a minimum of 7 feet above ground line, or (AS STATED ON DESIGN PLANS).
5. If vent pipe is located within a 100 year flood zone, vent pipe must be extended a minimum of 2 feet above the water surface, or (AS STATED ON DESIGN PLANS).
6. All underground portions of Ductile Iron Pipe will be encased in polywrap.
7. The following table of dimensions govern the required depths of cover for the installation of Type 2 air valves within public rights-of-ways;

TABLE OF DIMENSIONS FOR DEPTH OF COVER		
AIR VALVE SIZE	VALVE FITTING ASSEMBLY MIN. HEIGHT	MINIMUM REQUIRED DEPTH OF COVER
2"	26"	7.5'
3"	31"	7.8'
4"	38"	8.6'
6"	46"	9.3'
8"	53"	10.1'
10"	62"	10.8'
12"	72"	11.7'

REFER TO PAGES 209 & 210

<h3 style="margin: 0;">GENERAL NOTES</h3> <h3 style="margin: 0;">TYPE 2 AIR VALVE</h3>		DWU	(Page No.) 211
		DATE OCT. 2015	



REFER TO GENERAL NOTES FOR LARGE VALVES WITH MANHOLES - PAGE 216

HORIZONTAL GATE VALVE WITH MANHOLE INSTALLATION

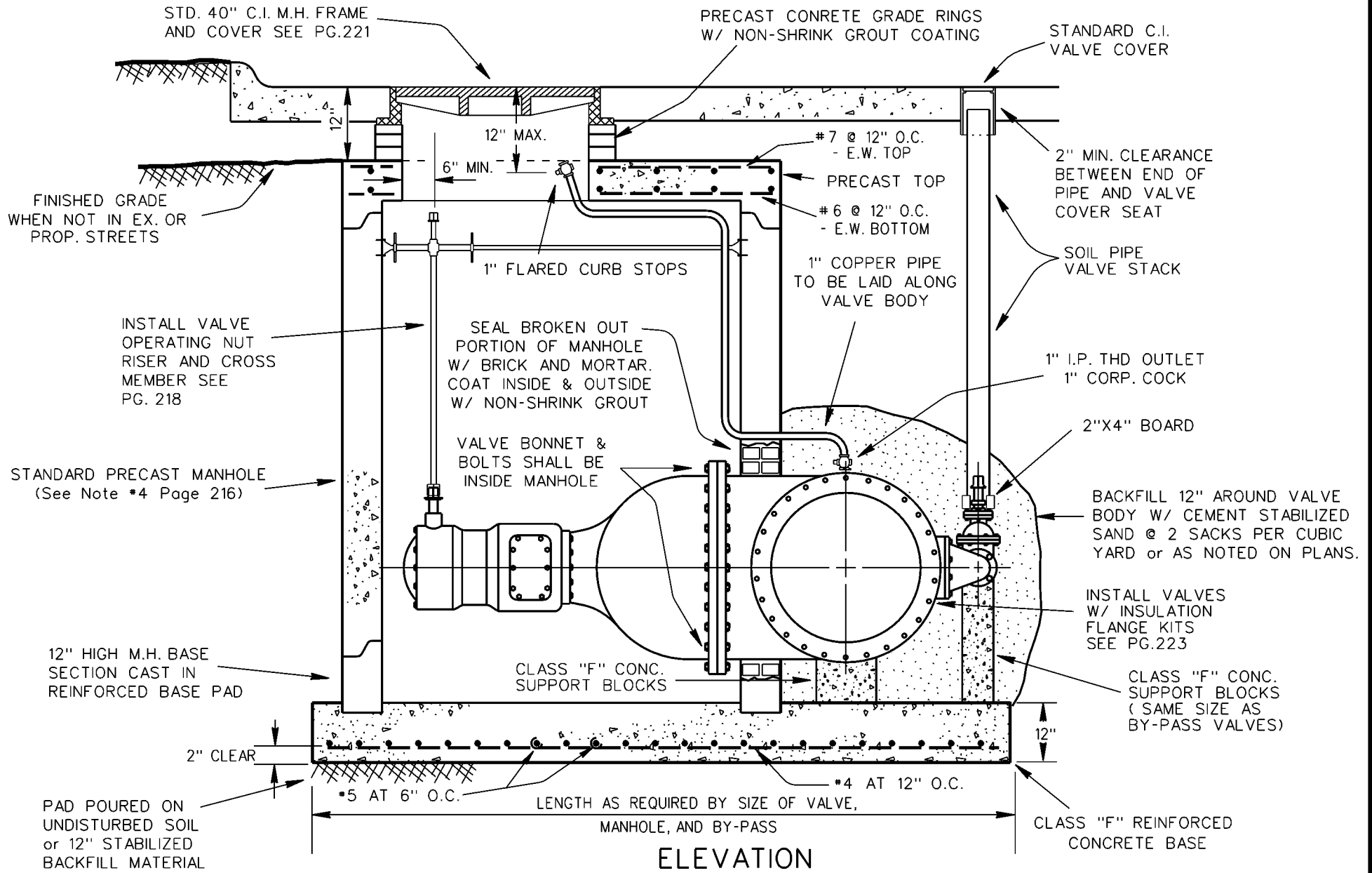
DWU

(Page No.)

212

DATE

OCT.2009



REFER TO GENERAL NOTES FOR LARGE VALVES WITH MANHOLES - PAGE 216

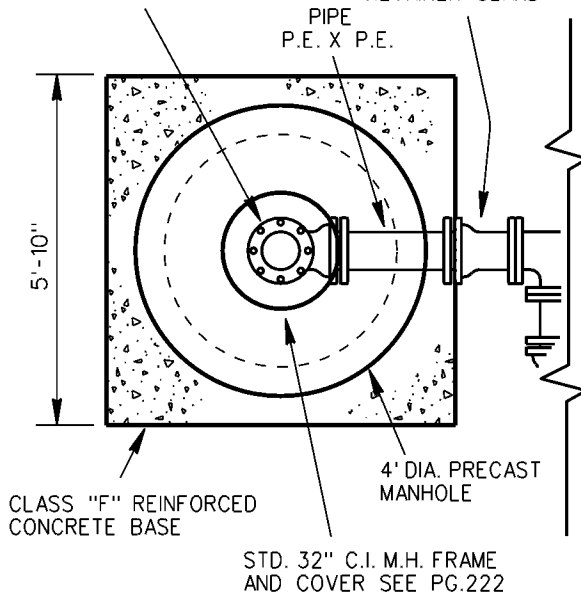
HORIZONTAL GATE VALVE WITH MANHOLE INSTALLATION

	DWU	(Page No.) 213
	DATE	
	OCT. 2010	

**BLOWOFF
INSTALLATIONS**

90° BASE BEND
M.J. W/RETAINER GLAND X
FLG. & BLIND FLANGE (UP)

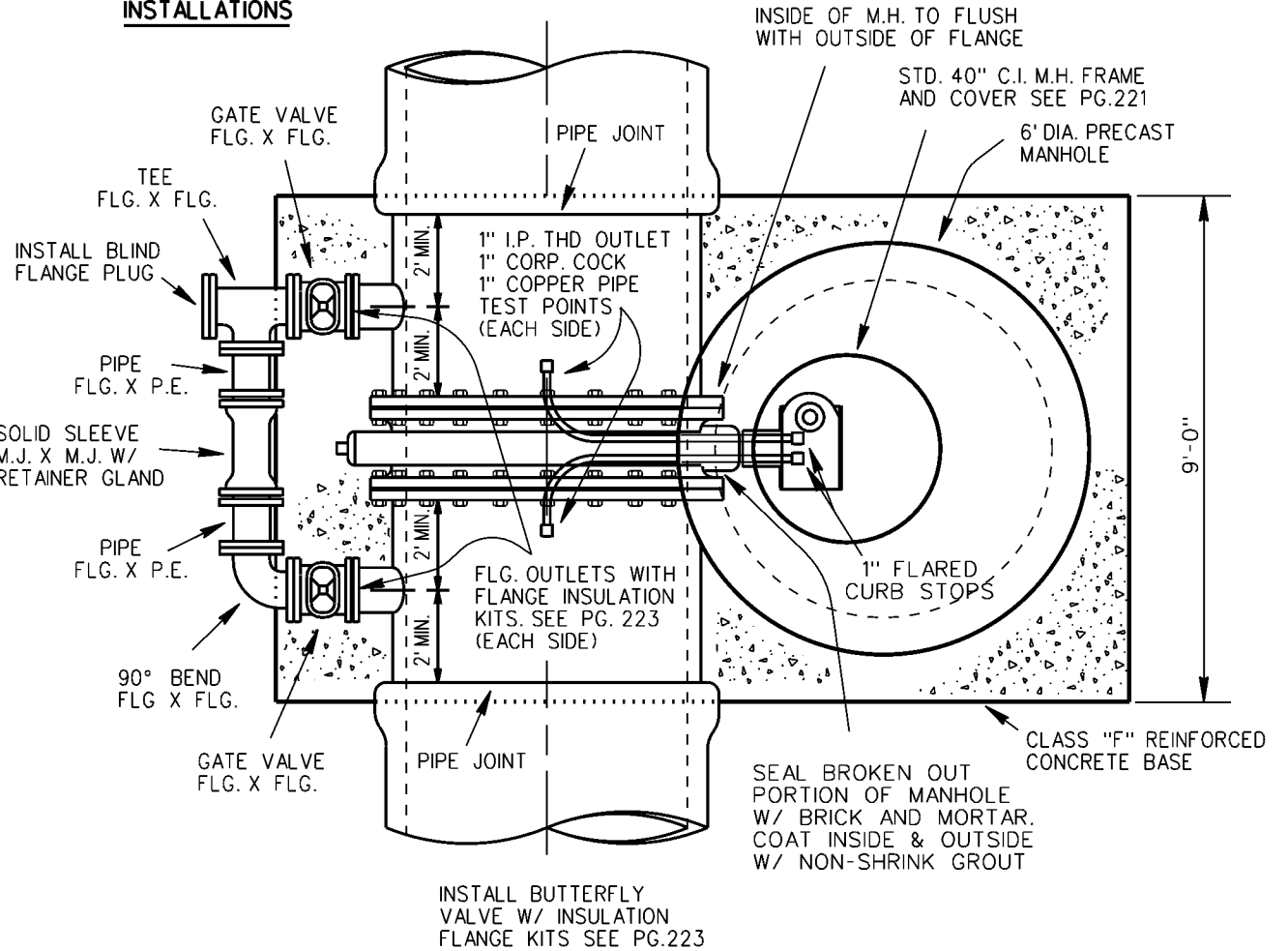
CONNECTOR-ADAPTOR
FLG. X M.J. W/
RETAINER GLAND



**OPTIONAL BLOWOFF
WITH MANHOLE**

(AS SPECIFIED ON DESIGN PLANS)

**NON-BLOWOFF
INSTALLATIONS**

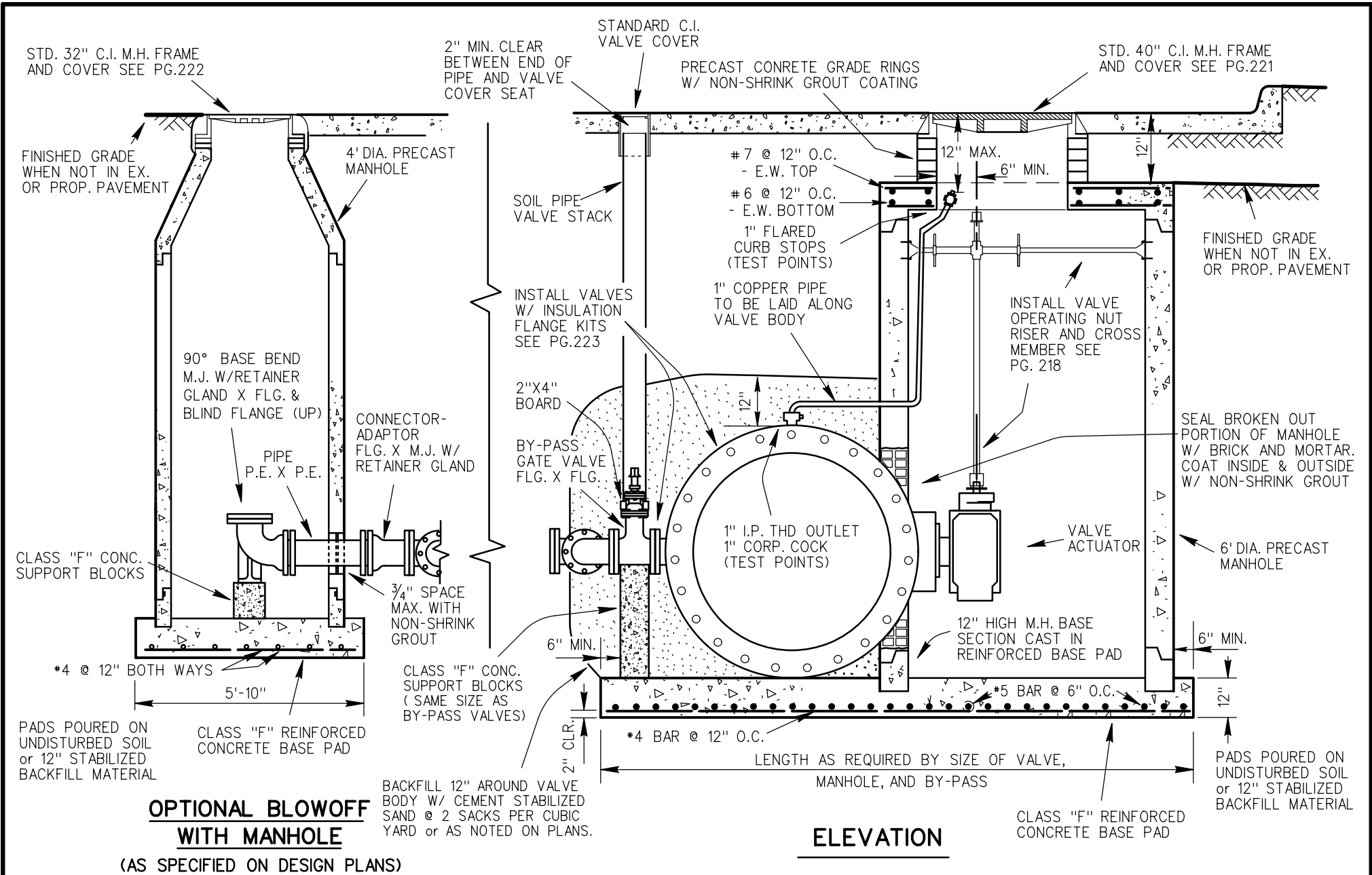


PLAN

REFER TO GENERAL NOTES
FOR LARGE VALVES WITH
MANHOLES - PAGE 216

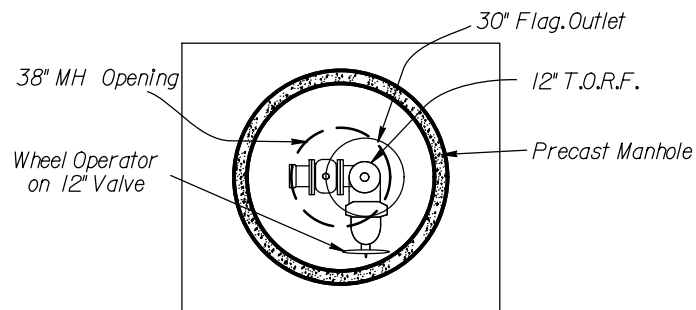
**BUTTERFLY VALVE
WITH MANHOLE INSTALLATION**

DWU	(Page No.) 214
DATE OCT.2009	

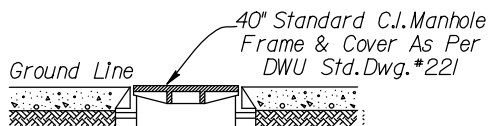


REFER TO GENERAL NOTES FOR LARGE VALVES WITH MANHOLES - PAGE 216

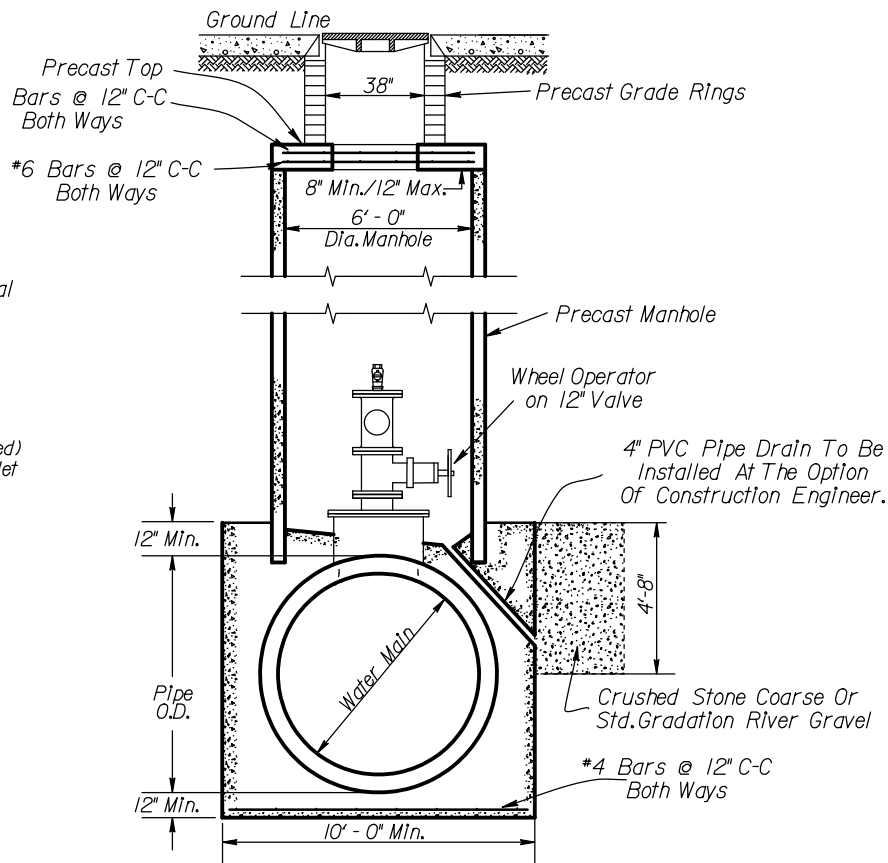
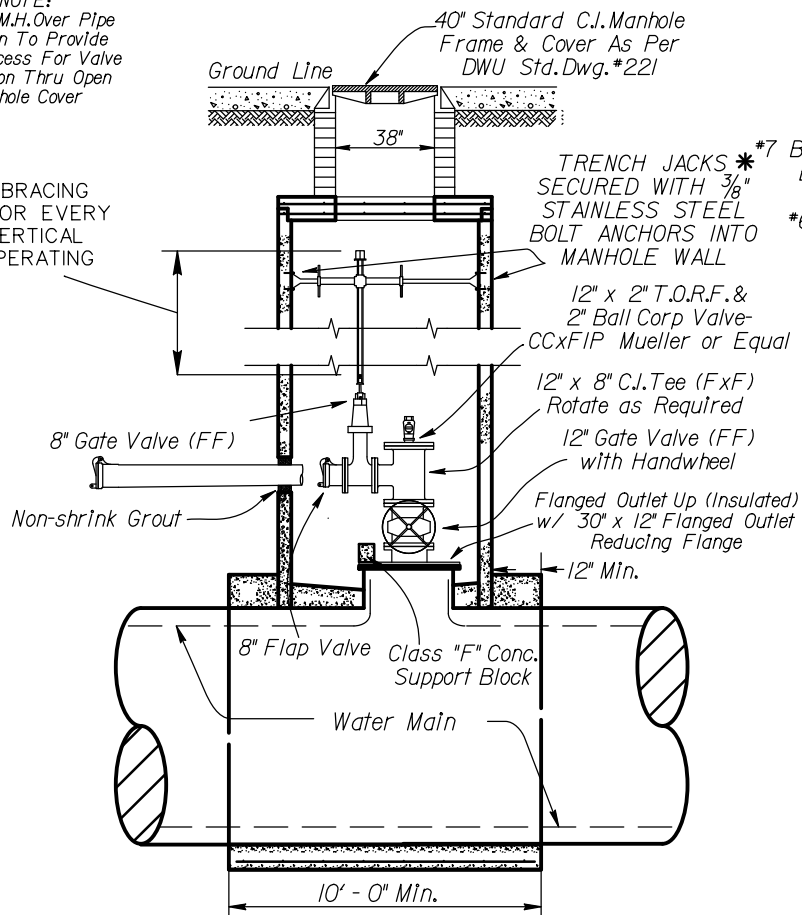
BUTTERFLY VALVE WITH MANHOLE INSTALLATION		DWU <small>DATE</small> OCT. 2015	<small>(Page No.)</small> 215



NOTE:
Adjust M.H. Over Pipe
Location To Provide
Easy Access For Valve
Operation Thru Open
Manhole Cover



ADDITIONAL BRACING
REQUIRED FOR EVERY
EIGHT (8) VERTICAL
FEET OF OPERATING
NUT RISER



FLANGED OUTLET SIZES	
Pipe Diameter	Flange Size
Smaller than 24"	12"
24" to 42"	24"
Larger than 42"	30"

LARGE MAIN BLOW-OFF

REFER TO PAGE 218

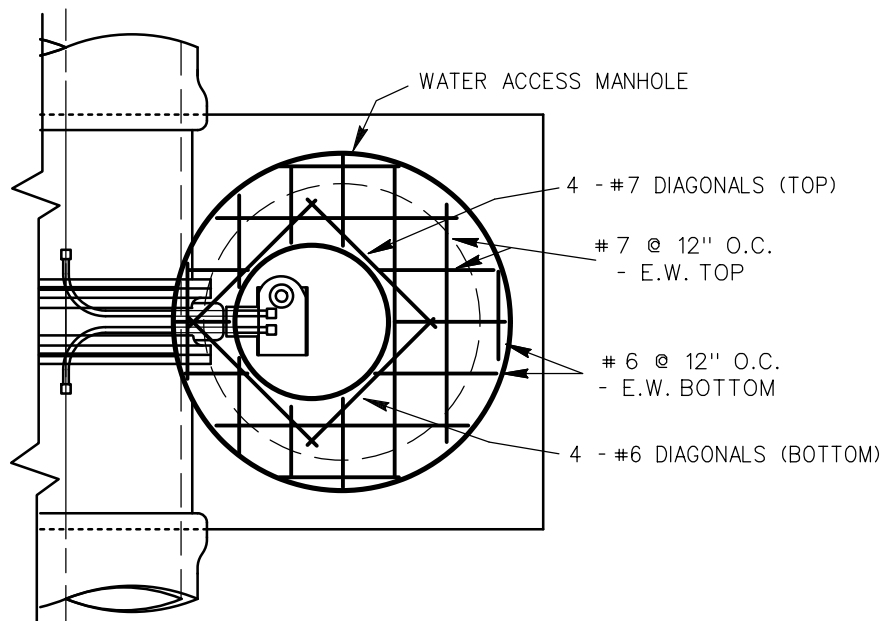
(Page No.)

DWU 215A

DATE
AUG. 2021

GENERAL NOTES

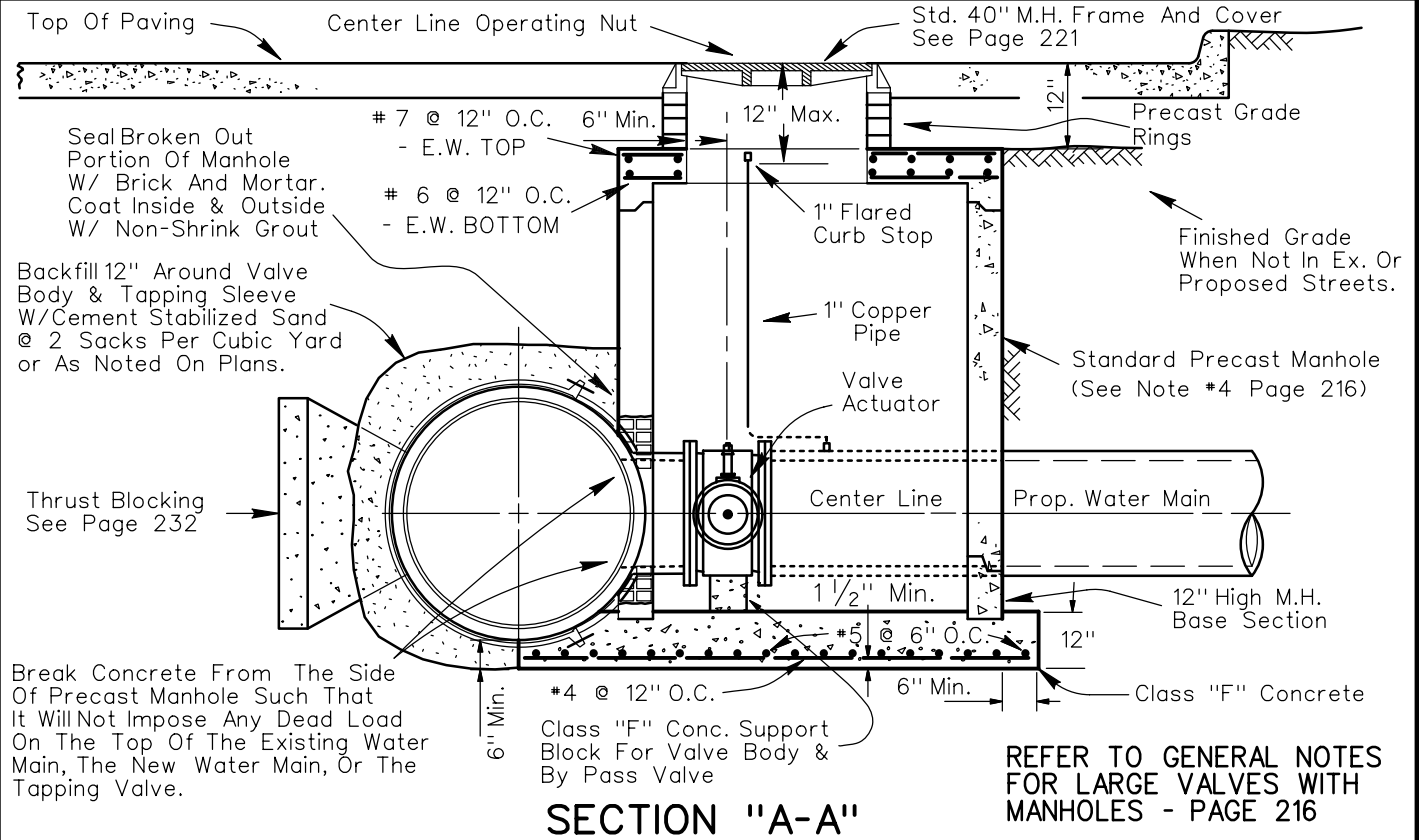
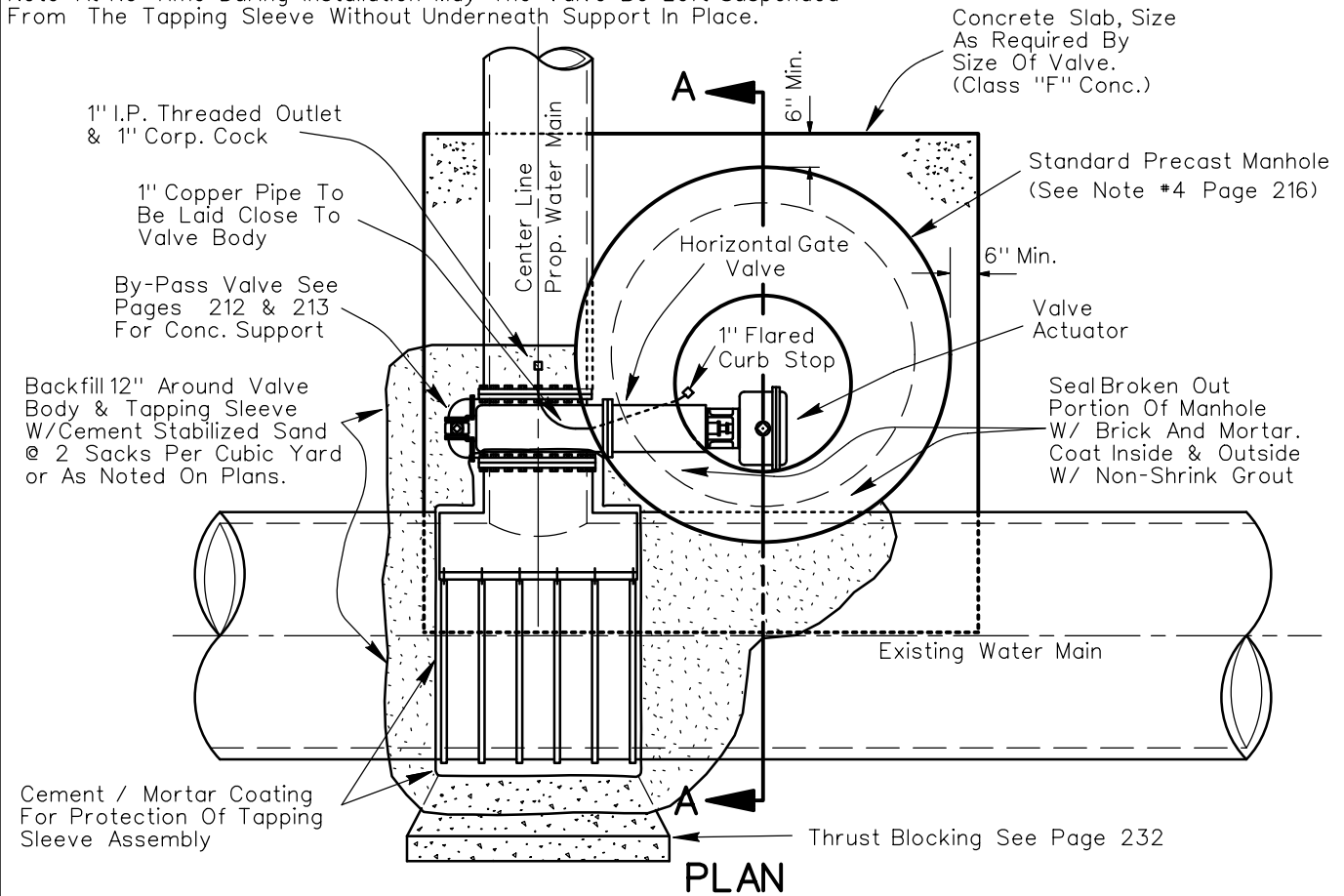
1. Precast grade rings shall be eliminated and the top of the manhole shall be placed at existing grade when the location is not in an existing or proposed street. For this case only, the standard 40" manhole frame and cover will be set in the manhole precast top.
2. In open country, a 4" thick concrete pad, reinforced with #3 bars on 12" centers each way shall extend a minimum of 2' around the manholes and bypass valve stack.
3. When a reducer is installed into a hub and valve, the exposed steel on the end of the reducer will be wrapped with wire mesh and a minimum of 1" mortar coating shall be applied.
4. Manholes for 30" and larger valves shall be 6' in diameter.



PLAN VIEW FOR TYPICAL REINFORCING
FOR WATER ACCESS MANHOLE TOPS
 (MANHOLE FOR VALVE ACCESS SHOWN)

GENERAL NOTES FOR LARGE VALVES WITH MANHOLES	DWU	(Page No.)	216
	DATE OCT. 2010		

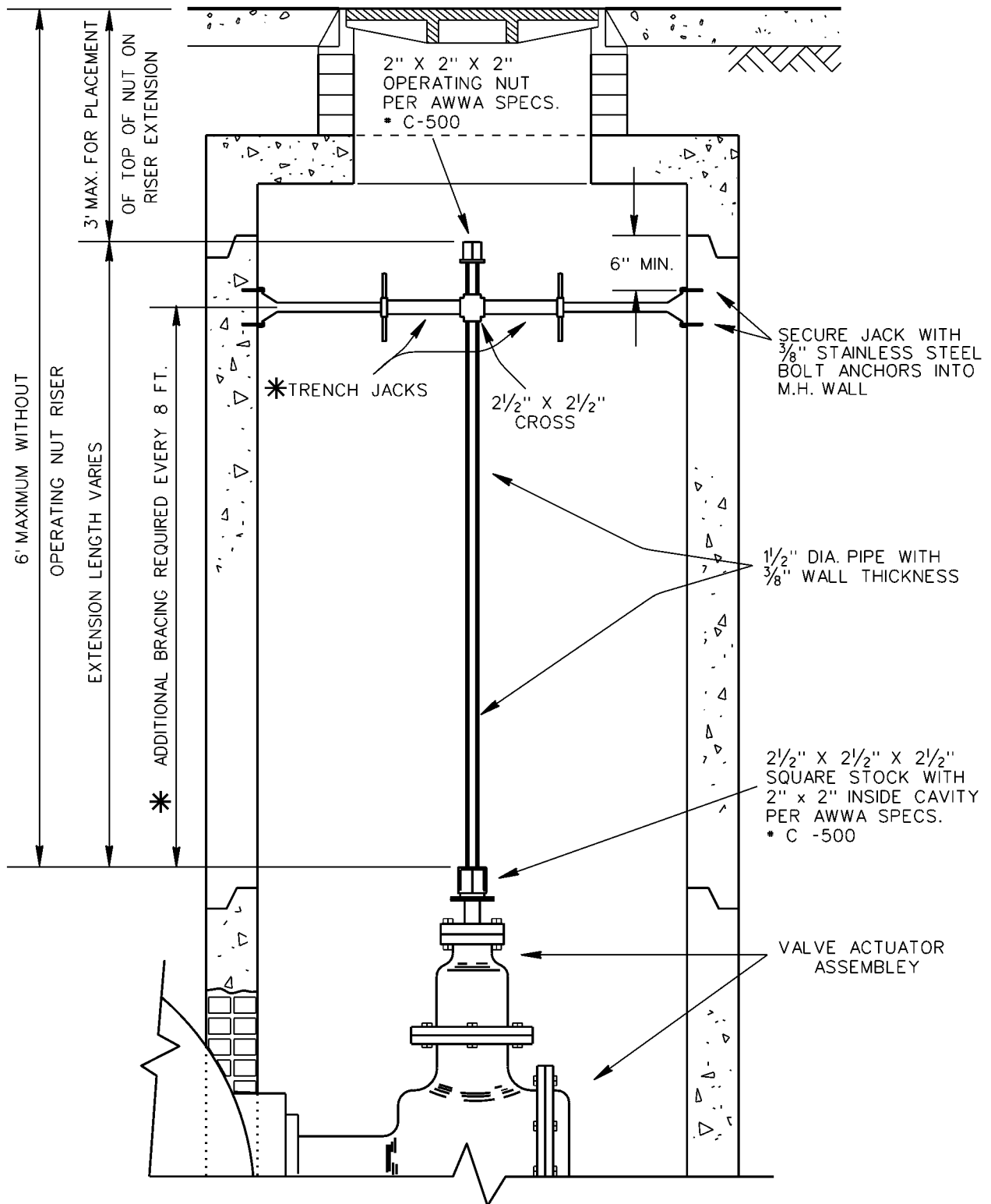
Note: At No Time During Installation May The Valve Be Left Suspended From The Tapping Sleeve Without Underneath Support In Place.



REFER TO GENERAL NOTES FOR LARGE VALVES WITH MANHOLES - PAGE 216

LARGE TAPPING VALVE INSTALLATION

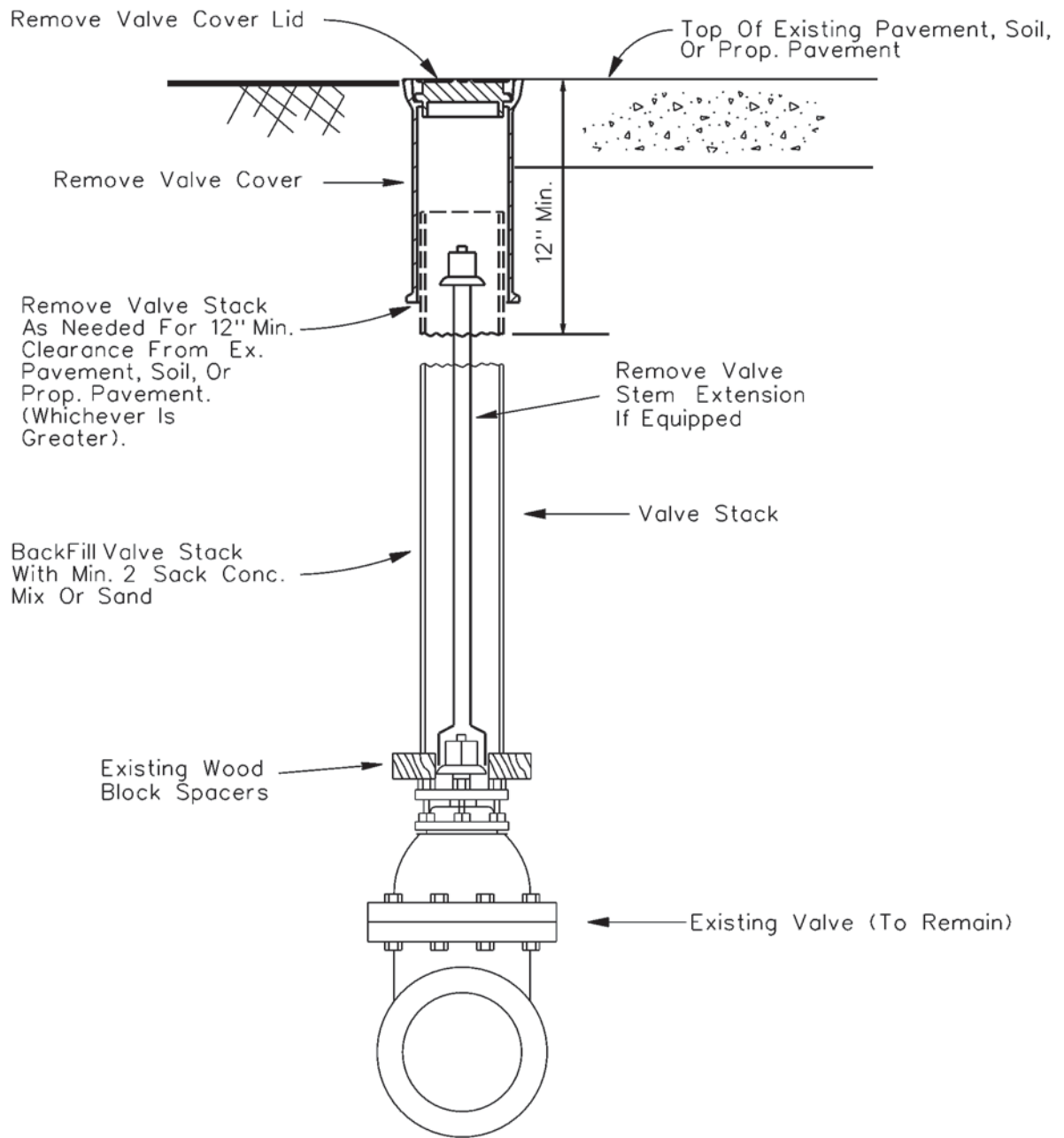
DWU	(PAGE NO.) 217
DATE	
OCT. 2015	



* ADDITIONAL BRACING REQUIRED FOR EVERY EIGHT (8) VERTICAL FEET OF OPERATING NUT RISER

**OPERATING NUT RISER
(For Large Valve Installations)**

DWU	(PAGE NO.) 218
	DATE DEC.2001



NOT IN PAVEMENT

Match Existing Soil & Compact As Needed Or As Required By Construction Inspector.

IN PAVEMENT

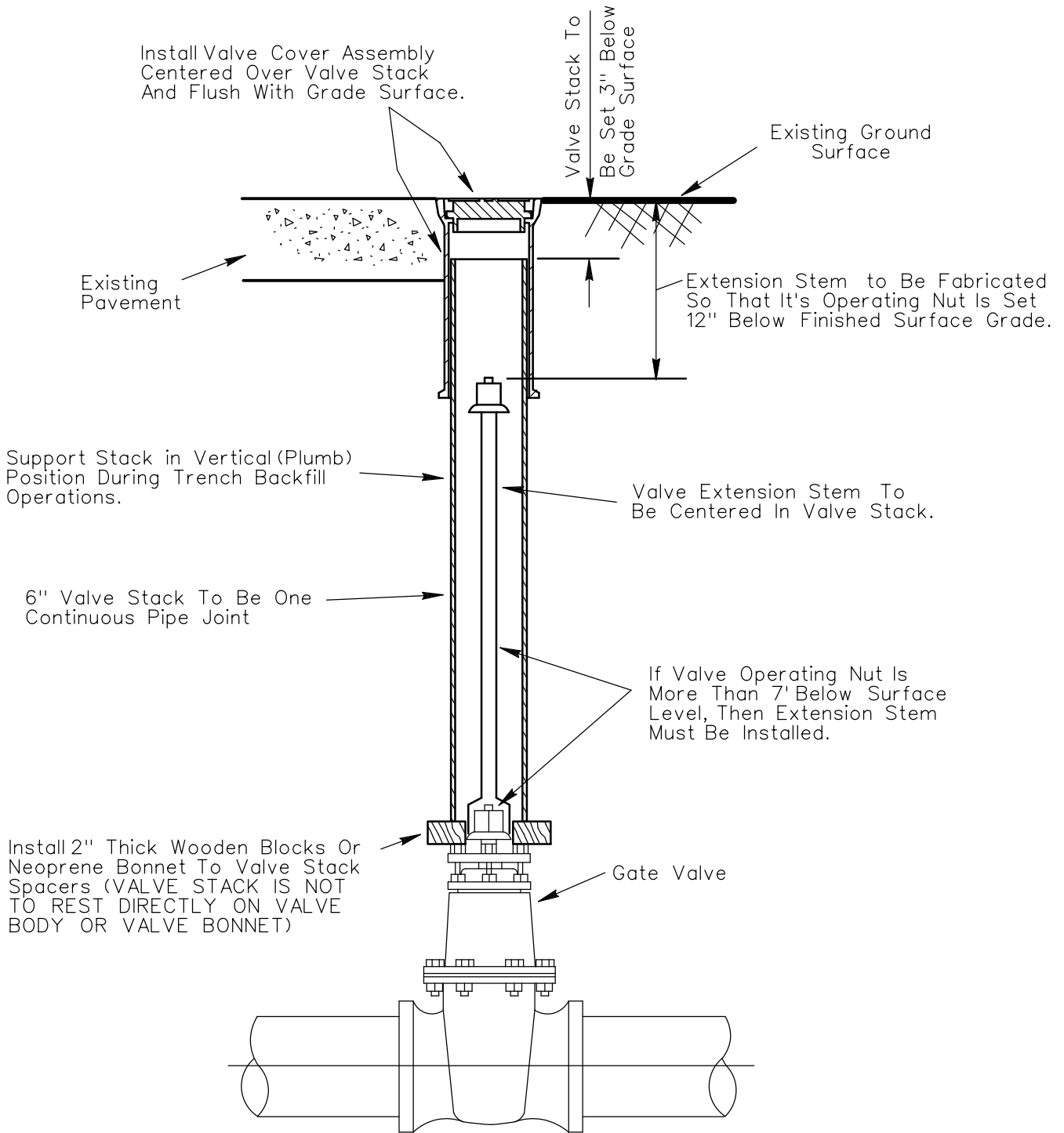
All Cuts And Repairs To Ex. Paving Must Conform P.W. & T. Pavement Cut And Repair Standards Manual.

**4" to 16" GATE
VALVE ABANDONMENT**

DWU

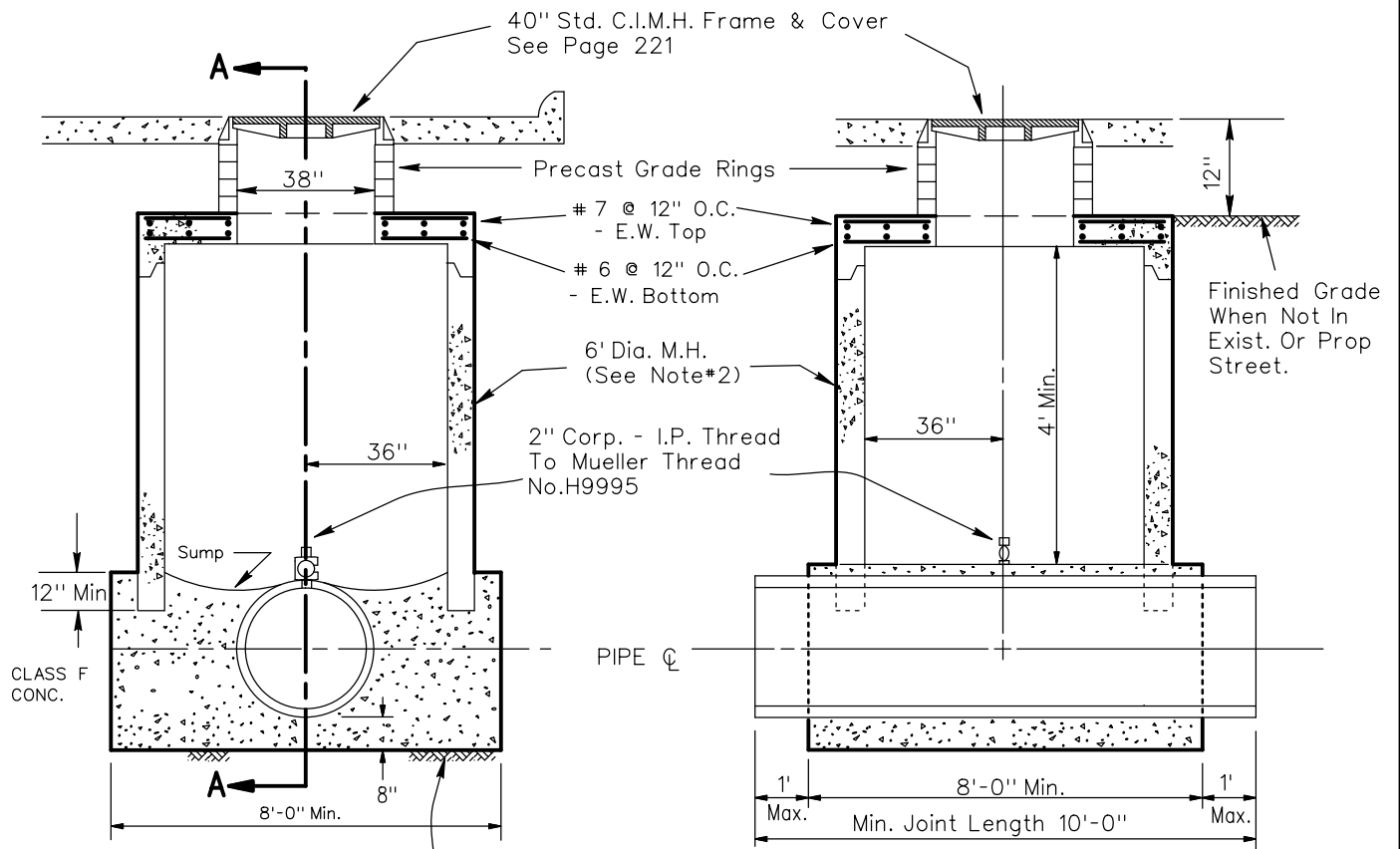
(PAGE NO.)
219

DATE
JAN. 2010



**4" to 16" GATE VALVE
COVER, STACK, & STEM INSTALLATION**

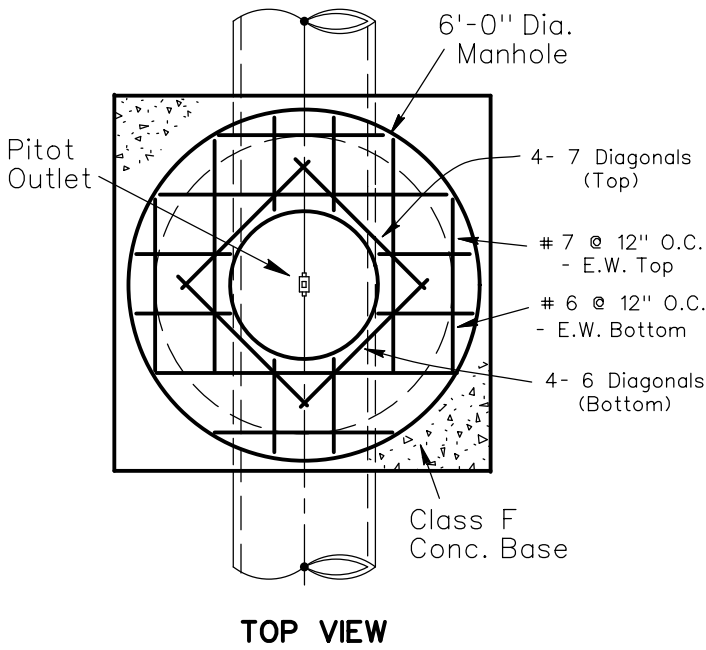
DWU	(PAGE NO.) 219A
DATE JUNE 2002	



END VIEW

SECTION A-A

Undisturbed Earth Or Rock As Directed By Construction Inspector.



TOP VIEW

NOTES

1. Locate Access Points At Least 20 Pipe Diameters From Any Bends, Tees, Reducers Or Other Obstructions.
2. Precast Grade Rings Shall Be Eliminated When Not In Existing Or Proposed Street (Open Country). In This Case, 40" Standard C.I. M.H. Frame And Cover Shall Be Set In M.H. Top.

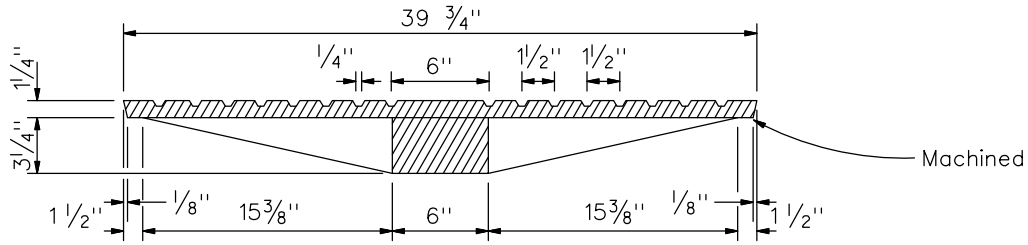
**INSPECTION INSERTION
ACCESS POINT**

DWU

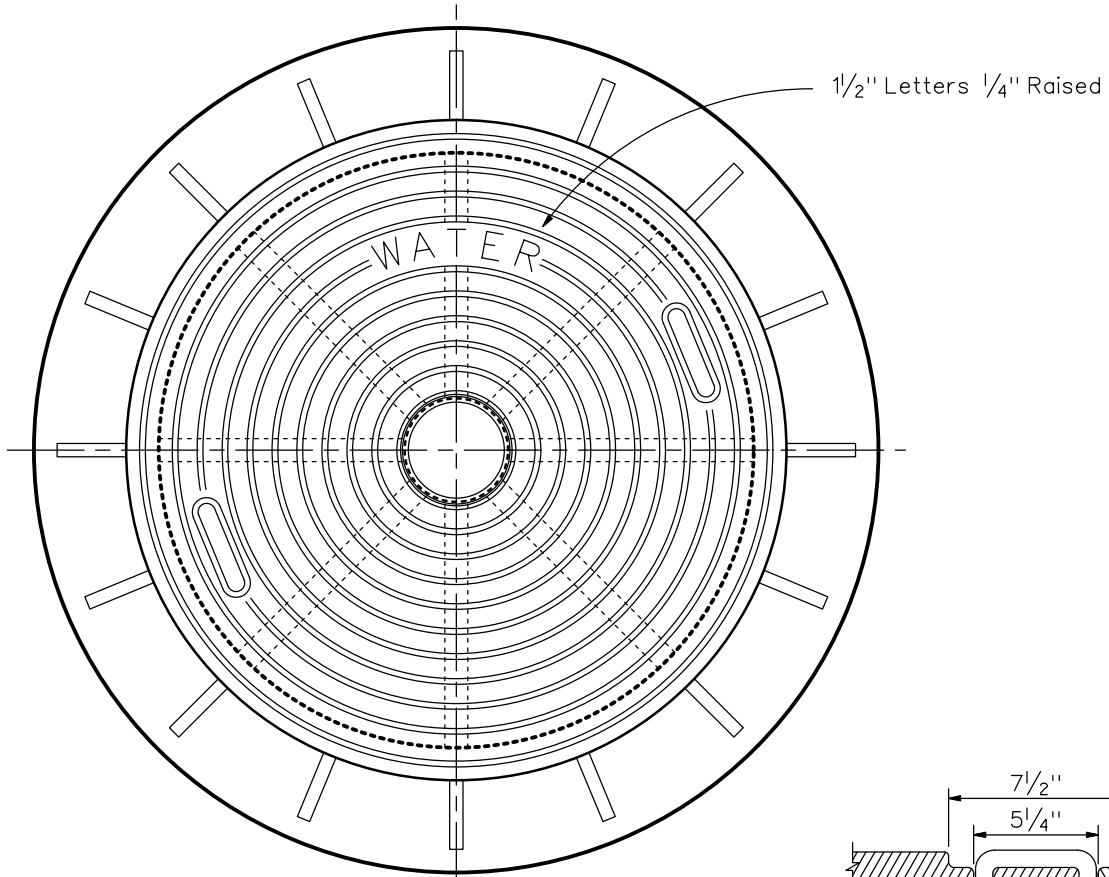
(PAGE NO.)
220

DATE

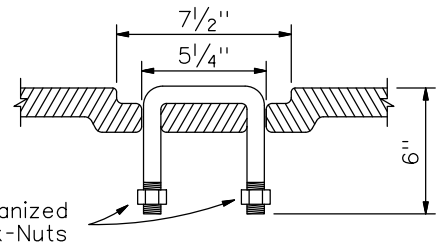
June 2021



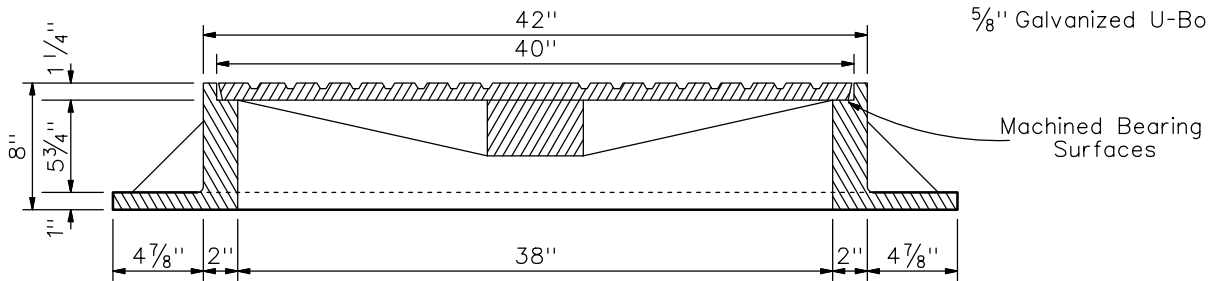
SECTION THRU COVER



PLAN



5/8" Galvanized U-Bolt



SECTION THRU FRAME

Ring & Cover Material per
ASTM A48 Class 35B Min.
Gray Iron Castings.

**STANDARD 40" MANHOLE
FRAME AND COVER**

DWU

(PAGE NO.)
221

DATE
DEC. 2001

LETTERS (RECESSED FLUSH)

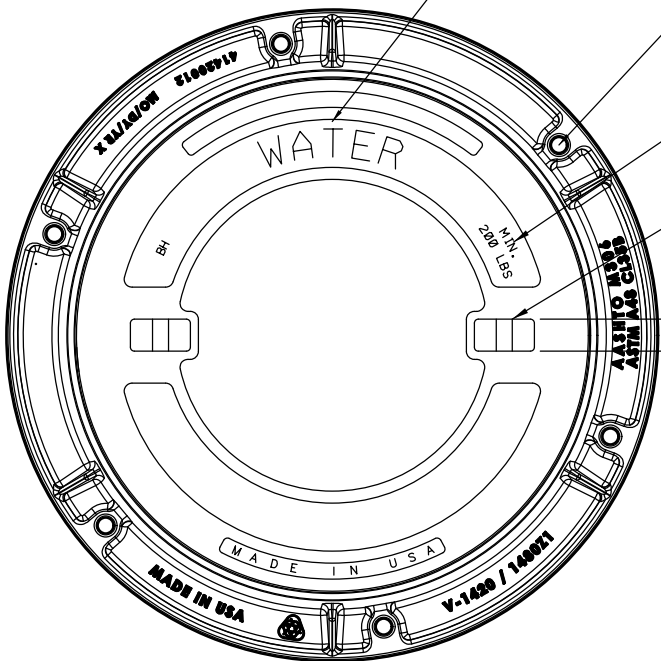
1" Minimum

1 1/2" Preferred

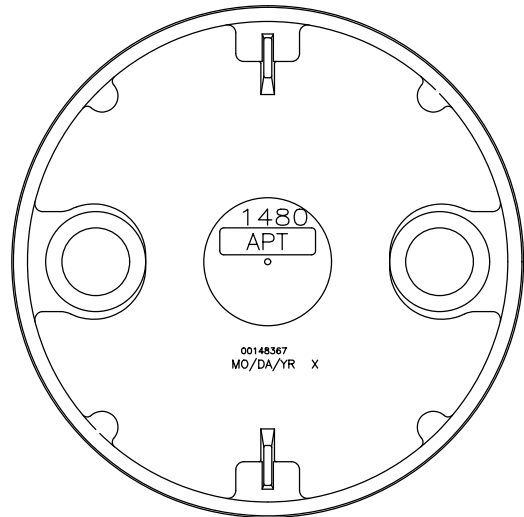
(6) 1" DIA HOLES
ON A 37" DIA B.C.

1/2" LETTERS (RECESSED FLUSH)

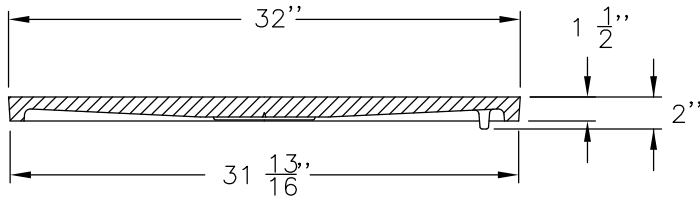
(2) PICKBARS



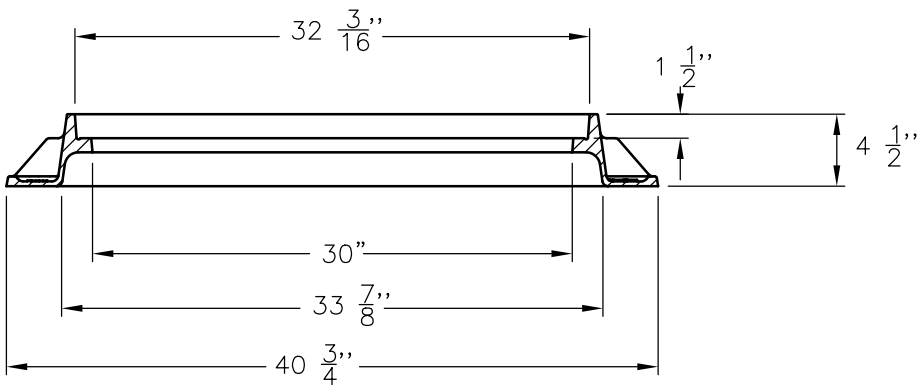
PLAN VIEW



BOTTOM VIEW
OF COVER



COVER SECTION



COVER — GRAY IRON
ASTM A48 CL35B
FRAME — GRAY IRON
ASTM A48 CL35B

STANDARD 32" MANHOLE.
FRAME AND COVER

WATER

DWU

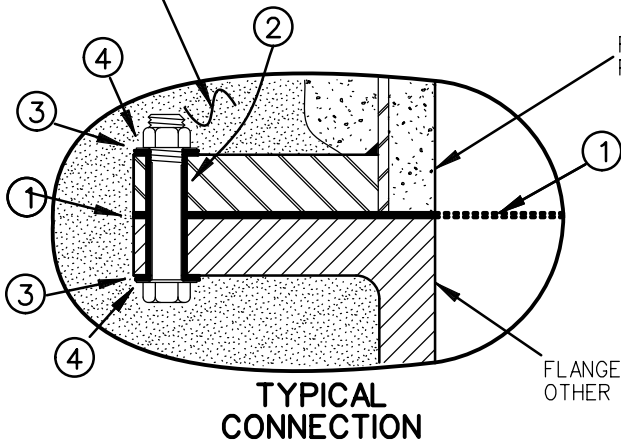
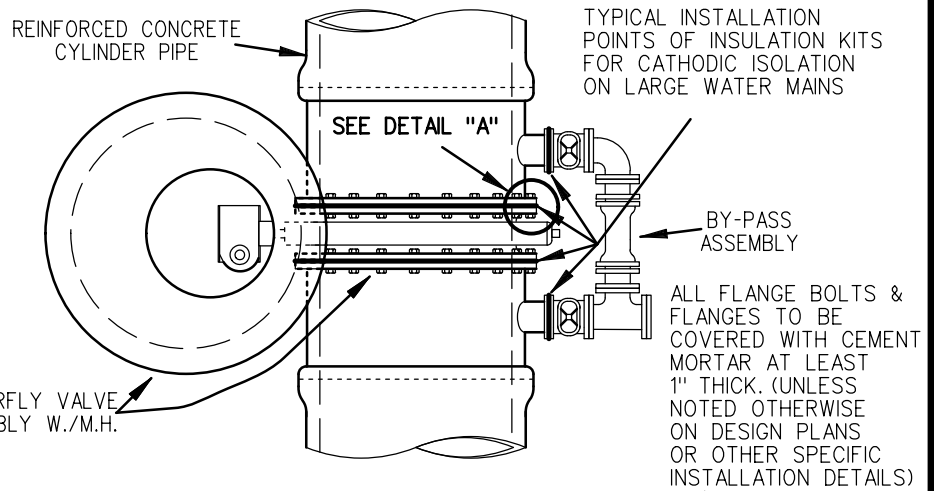
(PAGE NO.)
222

DATE
OCT. 2011

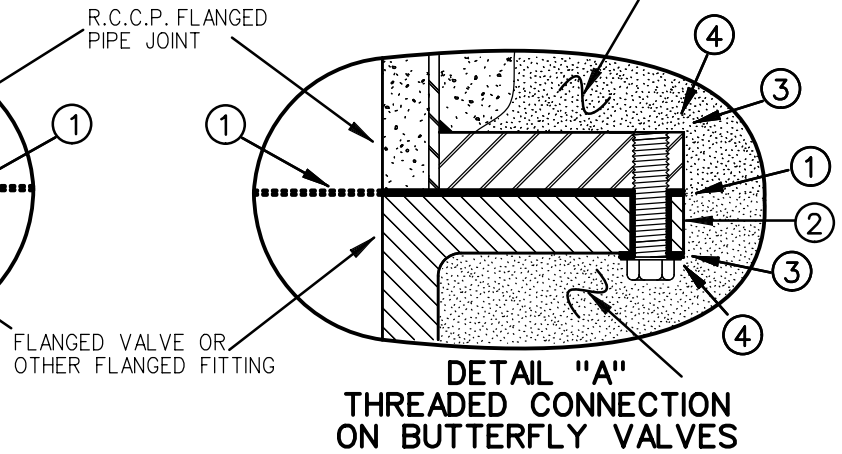
INSULATING MATERIAL (KIT)

- ① 1/8" THICK - CIRCULAR (DOUGHNUT) GASKET
- ② INSULATING SLEEVE FOR EACH BOLT
- ③ 2 ~ INSULATING WASHERS FOR EACH BOLT
- ④ 2 ~ STEEL WASHERS FOR EACH BOLT

ALL FLANGE BOLTS & FLANGES TO BE COVERED WITH CEMENT MORTAR AT LEAST 1" THICK. (UNLESS NOTED OTHERWISE ON DESIGN PLANS OR OTHER SPECIFIC INSTALLATION DETAILS)

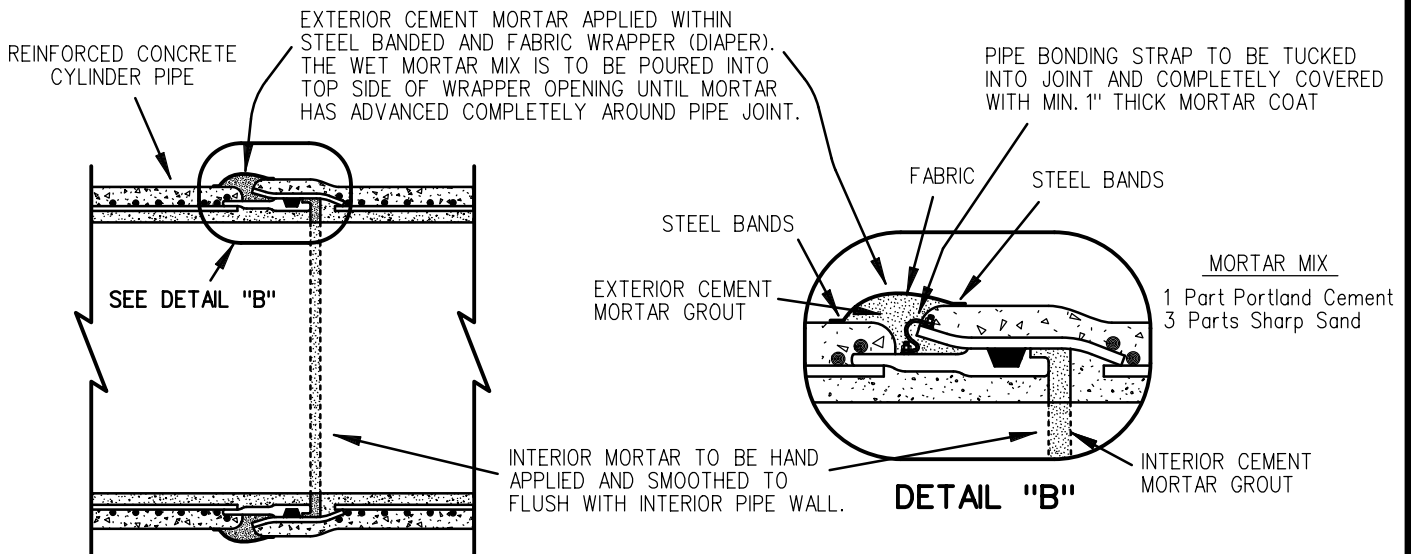


TYPICAL CONNECTION



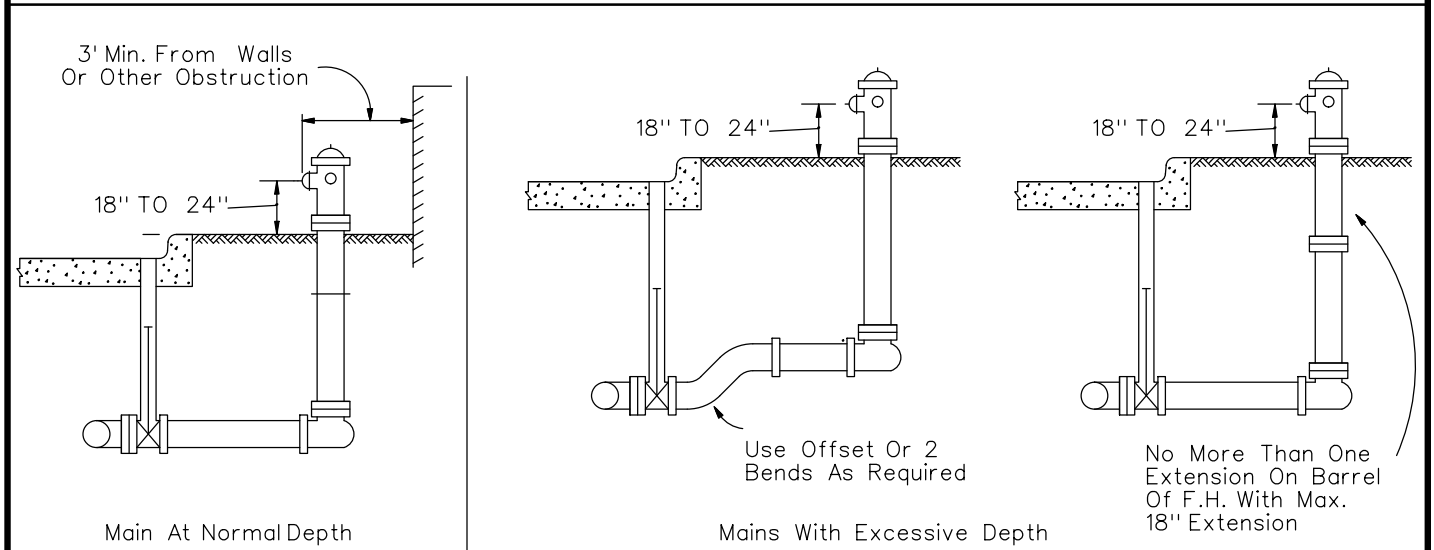
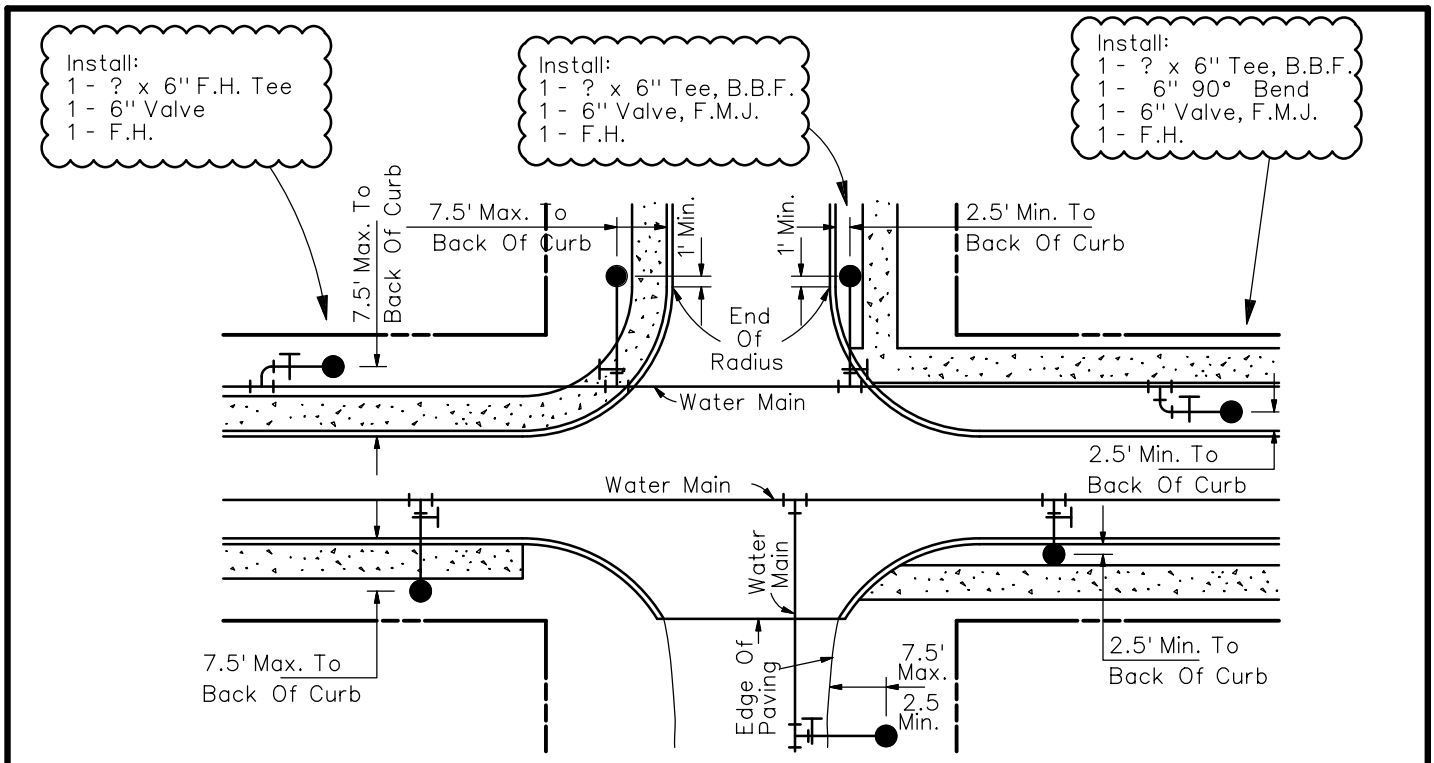
DETAIL "A" THREADED CONNECTION ON BUTTERFLY VALVES

INSULATION KIT INSTALLATION DETAIL (FOR R.C.C.P. INSTALLATIONS)

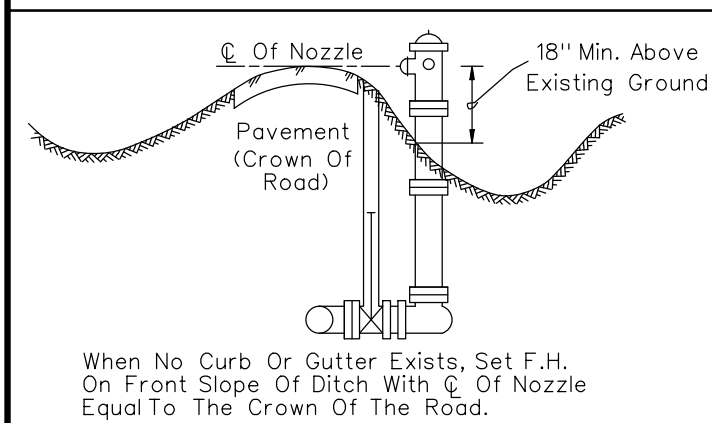


MORTAR PROTECTION @ R.C.C.P. JOINTS (BELL & SPIGOT JOINT SHOWN - ALSO APPLIES TO FLANGED JOINTS)

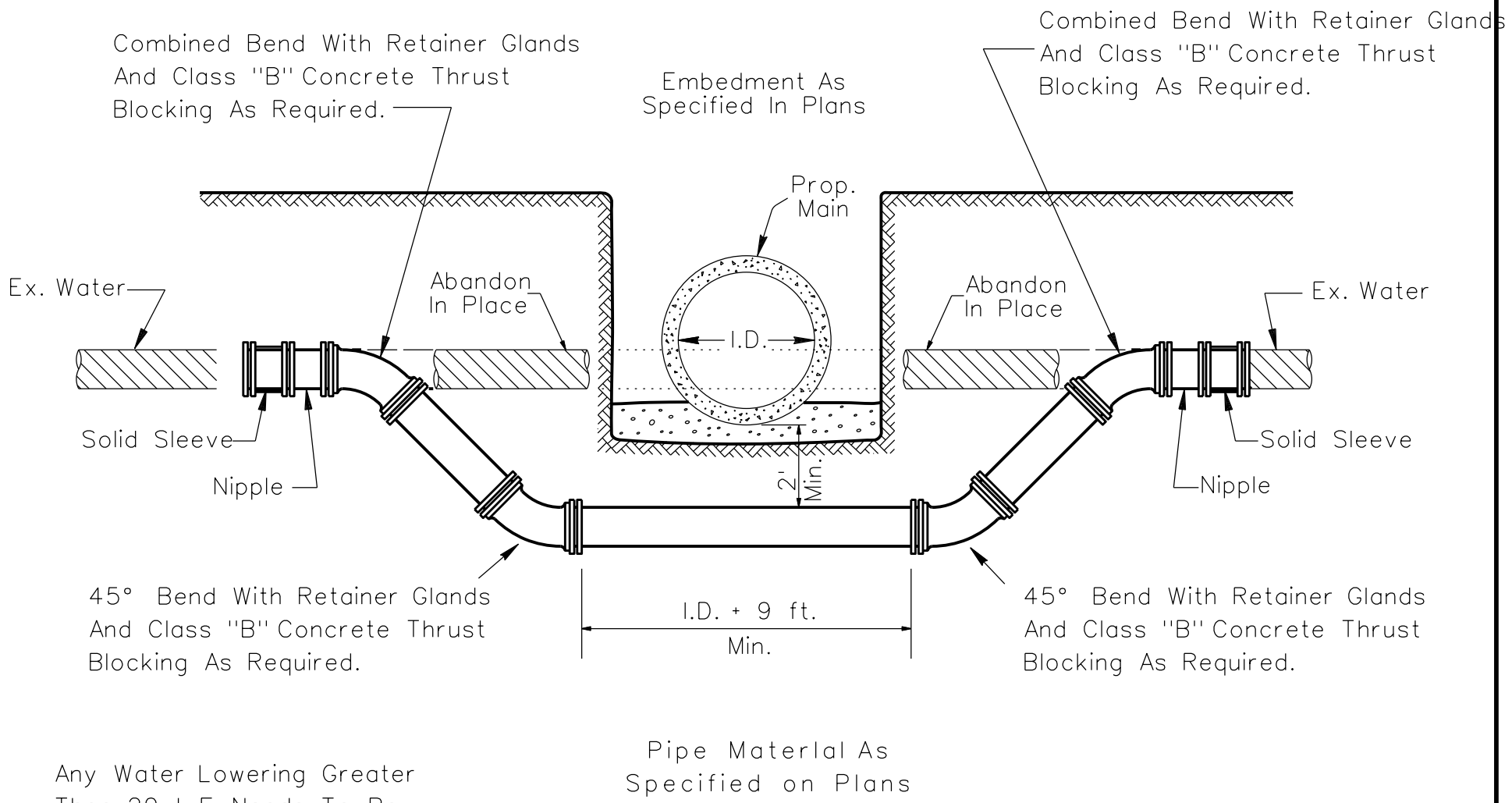
MORTAR PROTECTION SHALL BE PER PIPE MANUFACTURER RECOMMENDATION.



ELEVATION VIEW OF FIRE HYDRANT



- GENERAL NOTES**
1. ϕ Of F.H. Barrel Shall Not Be Less Than 2.5 Or More Than 7.5 From Back Of Curb Or Edge Of Pavement.
 2. Do Not Set F.H. In An Existing Or Proposed Sidewalk, Unless Otherwise Noted.
 3. All Tees For F.H.s Must Provide Secure Anchoring From The Main To F.H. Valves
 4. Set F.H. On The Lot Line Extended When Possible.
 5. On Private Contracts, The Developer's Engineer Will Stake Location & Grade, Must Still Meet DWU Requirements.
 6. Never Place F.H. Where Fire Truck Could Not Park Beside It.



Combined Bend With Retainer Glands
And Class "B" Concrete Thrust
Blocking As Required.

Combined Bend With Retainer Glands
And Class "B" Concrete Thrust
Blocking As Required.

Ex. Water

Abandon
In Place

Embedment As
Specified In Plans

Prop.
Main

Abandon
In Place

Ex. Water

Solid Sleeve

Nipple

Solid Sleeve

Nipple

45° Bend With Retainer Glands
And Class "B" Concrete Thrust
Blocking As Required.

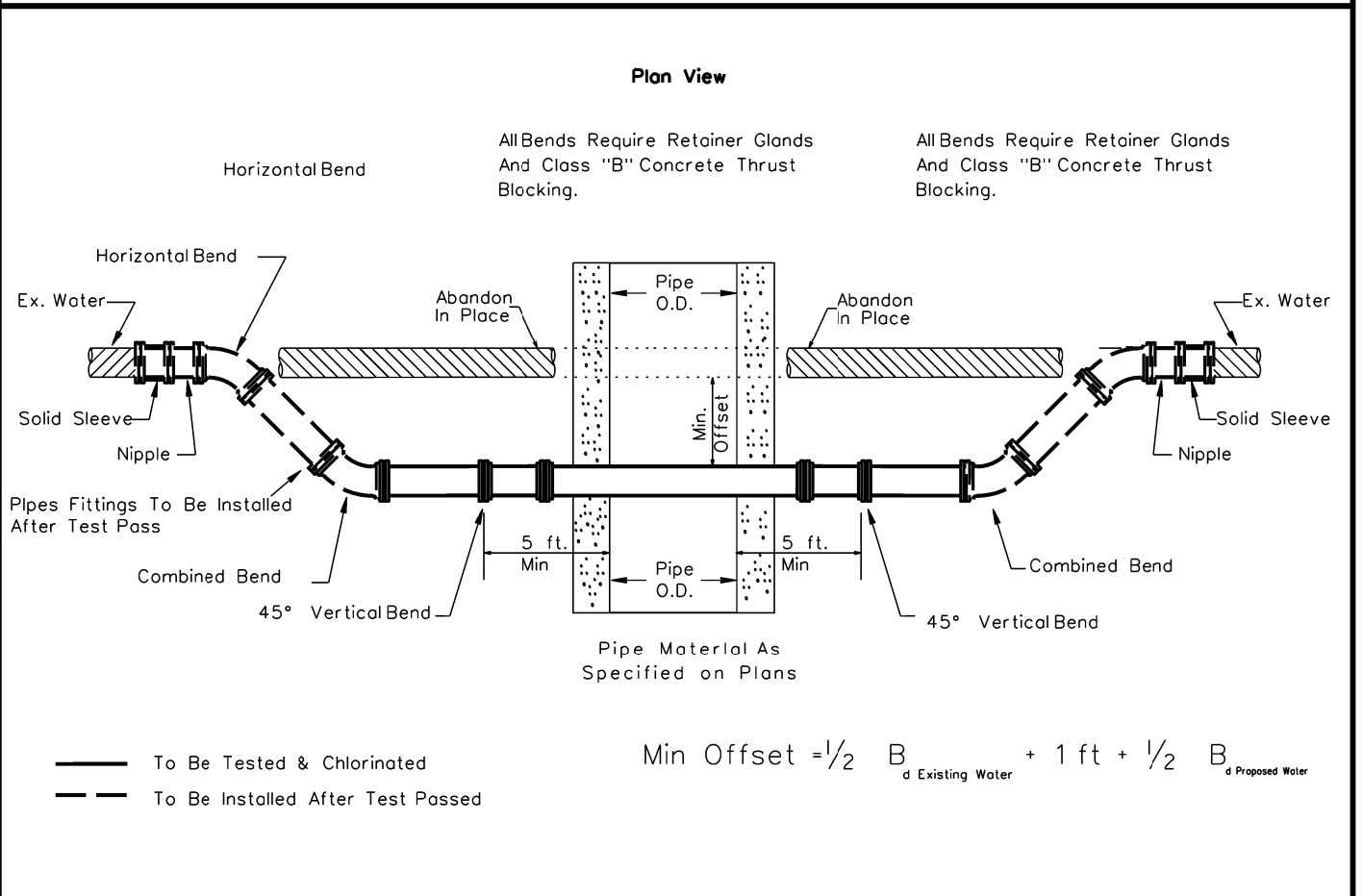
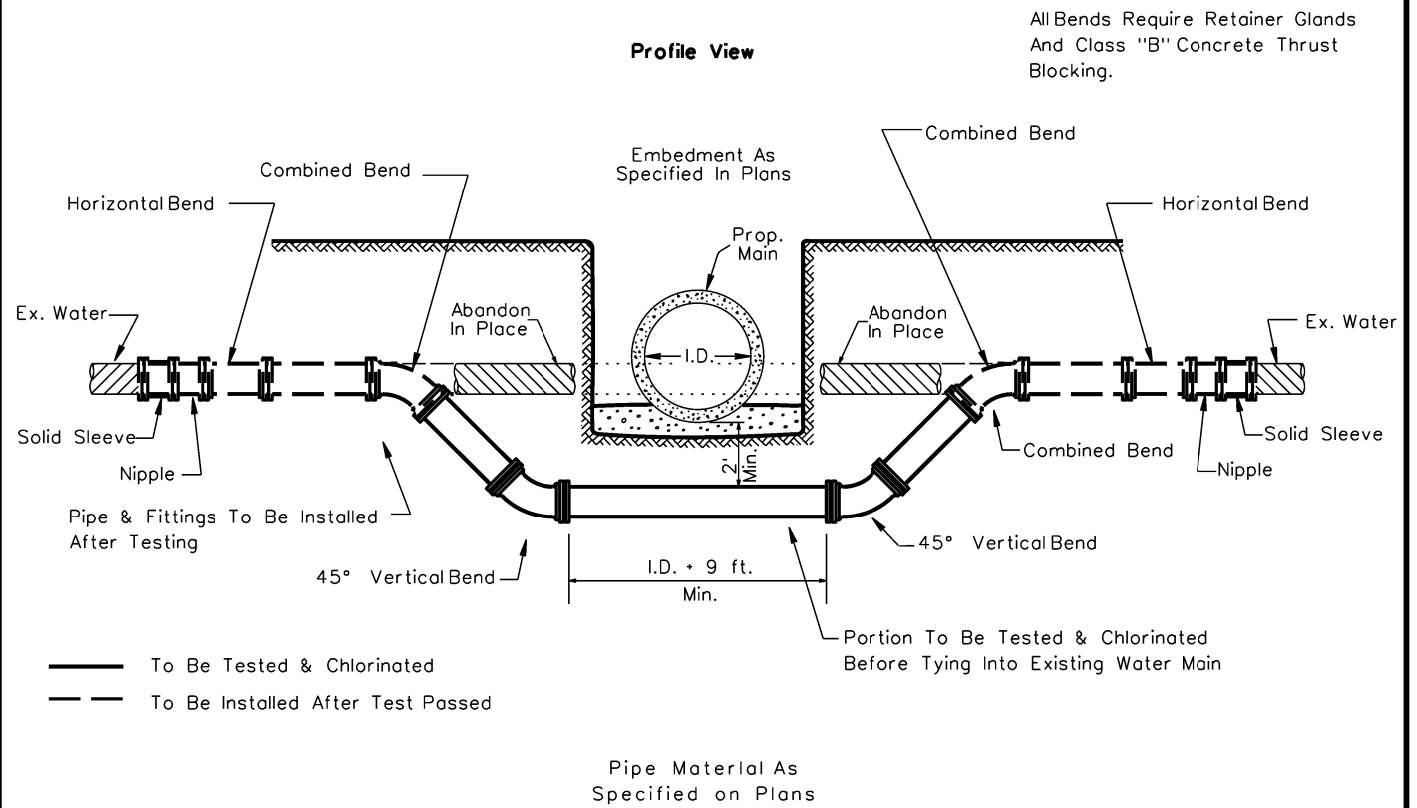
I.D. + 9 ft.
Min.

45° Bend With Retainer Glands
And Class "B" Concrete Thrust
Blocking As Required.

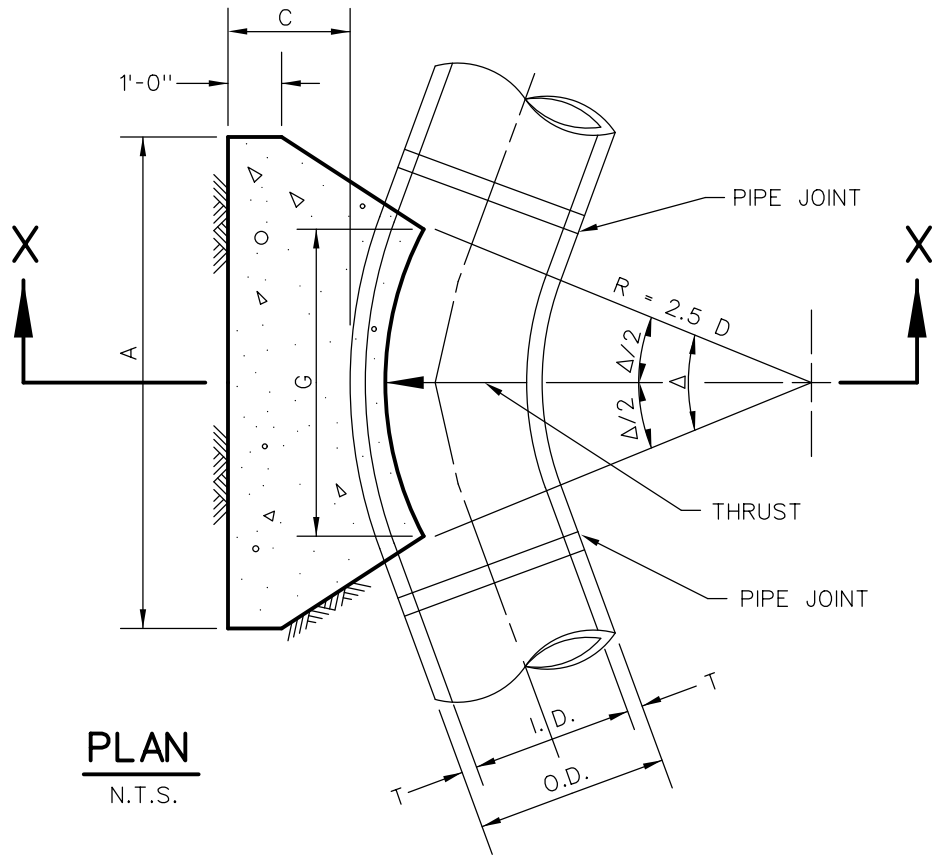
Pipe Material As
Specified on Plans

Any Water Lowering Greater
Than 20 L.F. Needs To Be
Offset, Refer to Std. Dwg 226

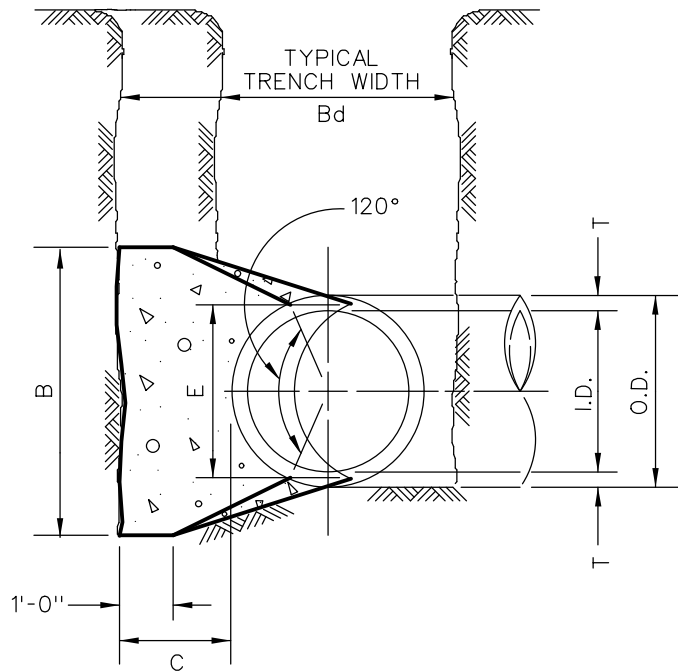
STANDARD WATER MAIN LOWERING	DWU	(PAGE NO.) 225
	DATE JUN. 2021	



OFFSET WATER MAIN LOWERING	DWU	(PAGE NO.) 226
	DATE JUN. 2021	



PLAN
N.T.S.



SECTION X-X
N.T.S.

REFER TO GENERAL NOTES FOR
THRUST BLOCKING - PAGE 234

HORIZONTAL THRUST BLOCK
AT PIPE BEND

DWU

(Page No.)
229

DATE
DEC.2001

TABLES OF DIMENSIONS AND QUANTITIES

Cubic Yard To Sacks of
Concrete Conversion Table

VOL. (C.Y.)	60 LB SACK	80 LB SACK
0.1	6	5
0.2	12	10
0.3	18	14
0.4	24	19
0.5	30	23
0.6	36	28
0.7	42	32
0.8	48	37
0.9	54	41
1.0	60	46

I.D. (IN.)	T (IN.)	C $\Delta = 11.25^\circ$ (FT.)	C $\Delta \geq 22.50^\circ$ (FT.)	E (FT.)
4,6,8	0.4	1.5	1.5	0.9
10,12	0.5	1.5	1.5	1.2
16,18	0.6	1.5	1.5	1.6
20	0.7	1.5	1.5	1.8
24	0.9	1.5	1.5	2.1
30	2.9	1.5	1.9	2.6
36	4.5	1.5	2.3	3.3
42	5.0	1.8	2.6	3.8
48	5.5	2.0	3.0	4.3
54	6.0	2.3	3.4	4.8
60	6.5	2.5	3.8	5.3
66	6.8	2.8	4.1	5.7
72	7.5	3.0	4.5	6.3
78	7.5	3.3	4.9	6.7
84	8.0	3.5	5.3	7.2
90	8.5	3.8	5.6	7.7
96	9.0	4.0	6.0	8.2

I.D. (IN.)	$\Delta = 11.25^\circ$								I.D. (IN.)	$\Delta = 22.50^\circ$							
	G (FT.)	THRUST (TONS)	EARTH			ROCK				G (FT.)	THRUST (TONS)	EARTH			ROCK		
			A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)				A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)
4,6,8	0.4	1.0	1.0	1.5	0.1	1.0	1.0	0.1	4,6,8	0.8	2.0	1.5	1.5	0.1	1.0	1.0	0.1
10,12	0.6	2.2	1.5	1.5	0.1	1.0	1.5	0.1	10,12	1.1	4.4	2.0	2.5	0.3	1.5	1.5	0.1
16,18	0.8	5.0	2.0	2.5	0.3	1.5	2.0	0.2	16,18	1.6	9.9	3.0	3.5	0.6	2.0	2.5	0.3
20	0.9	6.2	2.0	3.5	0.4	1.5	3.0	0.3	20	1.8	12.3	3.5	3.5	0.7	2.0	3.0	0.4
24	1.1	8.9	3.0	3.5	0.5	1.5	3.0	0.3	24	2.2	17.7	4.0	4.5	1.0	3.0	3.5	0.5
30	1.4	10.4	3.0	3.5	0.6	2.0	3.5	0.4	30	2.7	20.7	5.0	4.5	1.5	3.0	4.0	0.8
36	1.7	15.0	3.5	4.5	0.9	2.0	4.0	0.5	36	3.3	29.8	5.5	5.5	2.3	4.0	4.0	1.3
42	1.9	20.4	4.5	5.0	1.5	2.5	5.0	0.8	42	3.8	40.5	7.0	6.0	3.9	4.5	5.0	2.1
48	2.2	26.6	4.5	6.0	2.0	2.5	6.0	1.1	48	4.4	52.9	8.0	7.0	5.7	4.5	6.0	2.8
54	2.5	33.7	6.0	6.0	3.0	3.0	6.0	1.4	54	4.9	67.0	9.0	8.0	8.0	6.0	6.0	4.1
60	2.7	41.6	6.0	7.0	3.8	3.0	7.0	1.8	60	5.5	82.7	9.5	9.0	10.6	6.0	7.0	5.3
66	3.0	50.3	6.5	8.0	5.1	3.5	8.0	2.7	66	6.0	100.1	10.5	10.0	14.1	6.5	8.0	7.2
72	3.3	59.9	7.5	8.0	6.3	4.0	8.0	3.3	72	6.6	119.1	11.0	11.0	17.6	7.5	8.0	9.1
78	3.6	70.2	8.0	9.0	8.1	4.0	9.0	3.9	78	7.1	139.8	12.0	12.0	22.5	8.0	9.0	11.7
84	3.8	81.5	8.5	10.0	10.3	4.5	10.0	5.3	84	7.6	162.1	13.0	12.5	27.2	8.5	10.0	14.8
90	4.1	93.5	9.5	10.0	12.2	5.0	10.0	6.3	90	8.2	186.1	14.0	13.5	33.7	9.5	10.0	17.7
96	4.4	106.4	10.0	11.0	15.0	5.0	11.0	7.4	96	8.7	211.7	15.0	14.5	41.2	10.0	11.0	21.8

REFER TO GENERAL NOTES FOR
THRUST BLOCKING - PAGE 234

HORIZONTAL THRUST BLOCK
AT PIPE BEND

DWU

(Page No.)
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DATE
OCT.2015

TABLES OF DIMENSIONS AND QUANTITIES

Δ = 30°									Δ = 45°								
I.D. (IN.)	G (FT.)	THRUST (TONS)	EARTH			ROCK			I.D. (IN.)	G (FT.)	THRUST (TONS)	EARTH			ROCK		
			A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)				A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)
4,6,8	1.0	2.6	2.0	1.5	0.2	1.0	1.5	0.1	4,6,8	1.5	3.9	2.0	2.0	0.2	1.5	1.5	0.1
10,12	1.5	5.9	2.5	2.5	0.3	2.0	1.5	0.2	10,12	2.2	8.7	3.5	2.5	0.5	2.0	2.5	0.3
16,18	2.2	13.2	3.5	4.0	0.8	2.5	3.0	0.4	16,18	3.2	19.5	4.5	4.5	1.2	3.0	3.5	0.6
20	2.4	16.3	4.5	4.0	1.0	3.0	3.0	0.5	20	3.6	24.1	5.5	4.5	1.5	3.5	3.5	0.7
24	2.9	23.4	6.0	4.0	1.4	3.5	3.5	0.7	24	4.3	34.6	8.0	4.5	2.3	4.5	4.0	1.1
30	3.6	27.5	6.5	5.0	1.9	3.5	4.0	0.9	30	5.4	40.6	8.5	5.0	3.2	5.5	4.0	1.6
36	4.4	39.5	7.0	6.0	3.4	4.5	4.5	1.6	36	6.5	58.5	10.0	6.0	5.3	6.5	4.5	2.6
42	5.1	53.8	8.0	7.0	5.1	5.5	5.0	2.5	42	7.5	79.6	11.5	7.0	8.1	8.0	5.0	4.2
48	5.8	70.3	9.0	8.0	7.4	6.0	6.0	3.7	48	8.6	104.0	13.0	8.0	11.9	9.0	6.0	6.3
54	6.5	89.0	10.0	9.0	10.3	7.0	6.5	5.3	54	9.7	131.5	15.0	9.0	17.1	10.5	6.5	8.9
60	7.3	110.0	11.0	10.0	13.9	7.5	7.5	7.3	60	10.7	162.4	16.5	10.0	23.1	11.0	7.5	12.0
66	8.0	132.9	12.5	11.0	18.9	8.5	8.0	9.6	66	11.8	196.5	18.0	11.0	30.1	12.0	8.5	16.2
72	8.7	158.2	13.5	12.0	24.0	9.0	9.0	12.3	72	12.9	233.9	19.5	12.0	38.6	14.0	8.5	20.7
78	9.4	185.6	14.5	13.0	30.0	10.0	9.5	15.6	78	13.9	274.5	21.5	13.0	49.8	14.5	9.5	25.9
84	10.1	215.3	15.5	14.0	37.1	10.5	10.5	19.5	84	15.0	318.4	23.0	14.0	61.2	15.5	10.5	32.6
90	10.9	247.1	16.5	15.0	45.0	11.5	11.0	23.9	90	16.1	365.5	24.5	15.0	74.5	17.5	10.5	39.6
96	11.6	281.2	18.0	16.0	55.5	12.5	11.5	28.9	96	17.1	415.6	26.0	16.0	89.5	18.5	11.5	48.5

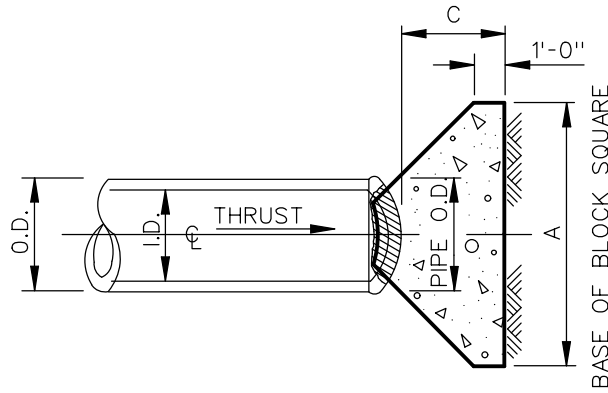
Δ = 67.50°									Δ = 90°								
I.D. (IN.)	G (FT.)	THRUST (TONS)	EARTH			ROCK			I.D. (IN.)	G (FT.)	THRUST (TONS)	EARTH			ROCK		
			A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)				A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)
4,6,8	2.1	5.6	3.0	2.0	0.3	2.0	1.5	0.2	4,6,8	2.7	7.1	5.0	1.5	0.4	2.0	2.0	0.2
10,12	3.1	12.6	5.5	2.5	0.8	3.5	2.0	0.4	10,12	4.0	16.0	6.5	2.5	1.0	3.5	2.5	0.5
16,18	4.7	28.3	7.5	4.0	1.9	5.5	3.0	0.9	16,18	6.0	36.0	9.0	4.0	2.4	4.5	4.0	1.0
20	5.2	34.9	9.0	4.0	2.3	5.5	3.5	1.2	20	6.6	44.4	10.0	4.5	3.1	6.0	4.0	1.5
24	6.2	50.3	11.5	4.5	3.5	6.5	4.0	1.6	24	7.9	64.0	14.5	4.5	5.0	8.0	4.0	2.1
30	7.8	58.9	12.0	5.0	4.8	7.5	4.0	2.2	30	9.9	75.0	15.0	5.0	6.7	10.0	4.0	3.3
36	9.4	84.9	14.5	6.0	8.2	9.5	4.5	3.8	36	11.9	108.0	18.0	6.0	11.4	12.0	4.5	5.3
42	10.9	115.5	17.0	7.0	12.8	11.0	5.5	6.3	42	13.9	147.0	21.0	7.0	17.8	14.0	5.5	8.7
48	12.5	150.9	19.0	8.0	18.4	13.0	6.0	9.2	48	15.9	192.0	24.0	8.0	26.2	16.0	6.0	12.4
54	14.0	191.0	21.5	9.0	26.0	15.0	6.5	12.9	54	17.9	243.0	27.0	9.0	36.9	18.0	7.0	18.1
60	15.6	235.8	24.0	10.0	35.6	16.0	7.5	17.6	60	19.9	299.8	30.0	10.0	50.3	20.0	7.5	24.0
66	17.1	285.3	26.0	11.0	46.0	18.0	8.0	23.0	66	21.8	362.8	33.0	11.0	66.2	22.0	8.5	32.5
72	18.7	339.5	28.5	12.0	57.8	19.0	9.0	28.4	72	23.8	431.8	36.0	12.0	85.6	24.0	9.0	41.0
78	20.2	398.5	31.0	13.0	75.7	21.0	9.5	37.4	78	25.7	506.7	39.0	13.0	108.2	26.0	10.0	53.2
84	21.8	462.1	33.5	14.0	94.7	22.0	10.5	46.5	84	27.7	587.7	42.0	14.0	134.4	28.0	10.5	64.8
90	23.3	530.5	35.5	15.0	114.4	24.5	11.0	58.2	90	29.0	674.6	45.0	15.0	164.9	30.0	11.5	81.2
96	24.9	603.6	38.0	16.0	138.9	25.5	12.0	70.0	96	31.6	767.5	48.0	16.0	199.0	32.0	12.0	95.1

REFER TO GENERAL NOTES FOR
THRUST BLOCKING - PAGE 234

HORIZONTAL THRUST BLOCK
AT PIPE BEND

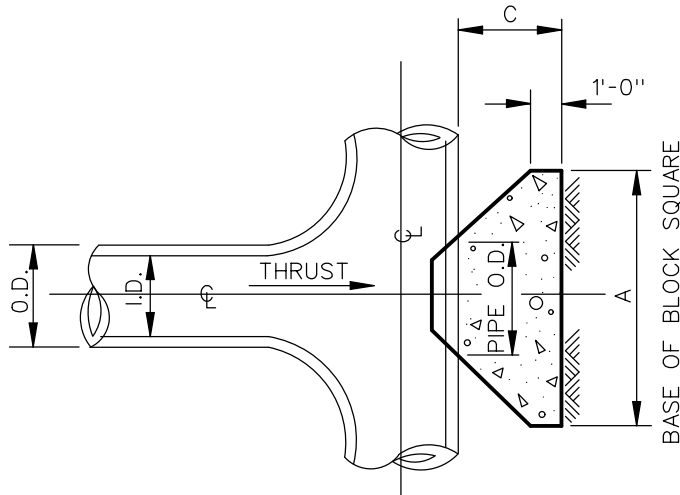
DWU
DATE
DEC.2001

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PLAN OF PLUG THRUST BLOCK

N.T.S.



PLAN OF TEE THRUST BLOCK

N.T.S.

I.D. (IN.)	THRUST (TONS)	C (FT.)	EARTH		ROCK	
			A (FT.)	VOL. (C.Y.)	A (FT.)	VOL. (C.Y.)
4,6,8	5.1	1.5	2.5	0.3	2.0	0.2
10,12	11.3	1.5	3.5	0.6	2.5	0.3
16,18	25.5	2.0	5.5	1.6	4.0	0.9
20	31.5	2.0	6.0	1.9	4.0	0.9
24	45.2	2.5	7.0	3.1	5.0	1.7
30	53.0	3.0	7.5	4.1	5.5	2.4
36	76.3	4.0	9.0	7.3	6.5	4.2
42	104.0	4.5	10.5	11.0	7.5	6.2
48	136.0	5.0	12.0	15.6	8.5	8.7
54	172.0	5.5	13.5	21.4	9.5	11.9
60	212.0	6.0	15.0	28.4	10.5	15.7
66	257.0	6.5	16.5	36.8	11.5	20.5
72	305.0	7.5	17.5	47.2	12.5	27.2
78	358.0	8.0	19.0	58.9	13.5	33.7
84	416.0	8.5	20.5	72.3	14.5	41.2
90	477.0	9.0	22.0	87.7	15.5	49.7
96	543.0	9.5	23.5	104.8	16.5	61.0

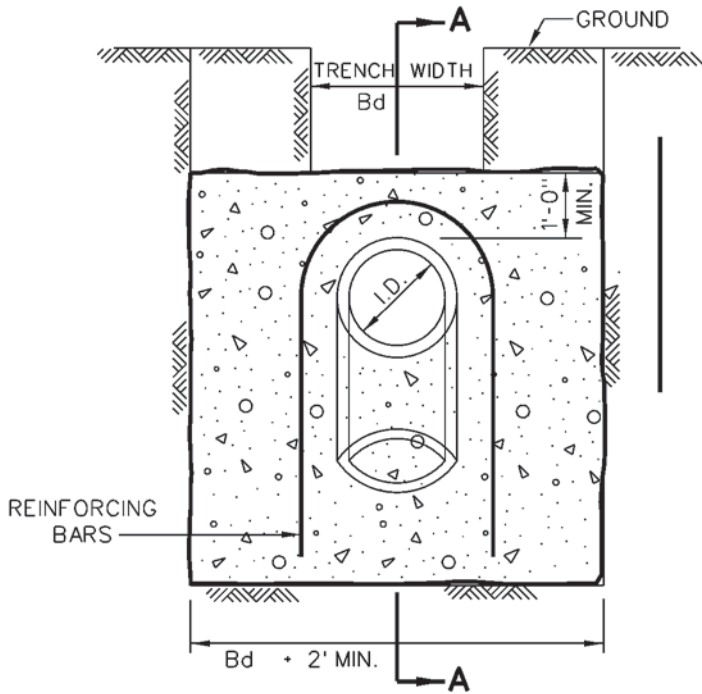
REFER TO GENERAL NOTES FOR THRUST BLOCKING - PAGE 234

HORIZONTAL THRUST BLOCK
AT TEES AND PLUGS

DWU

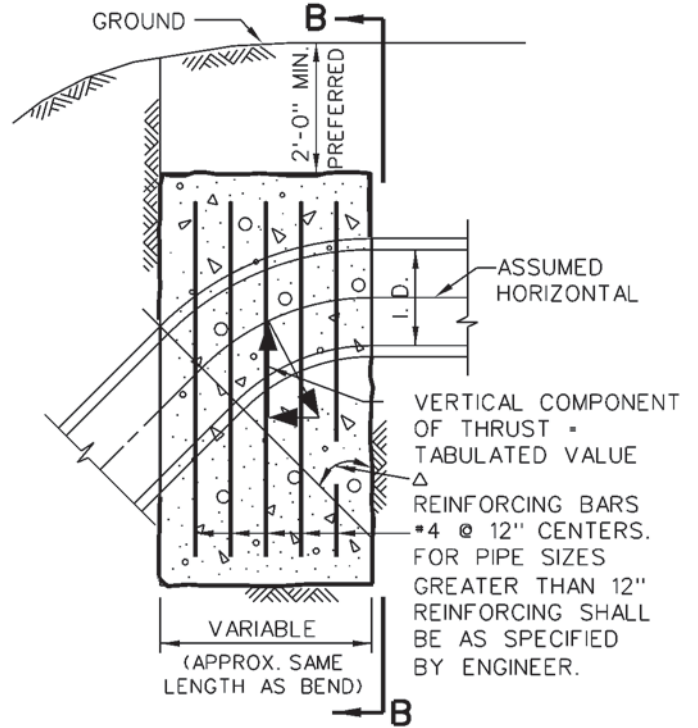
(Page No.)
232

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DEC.2001



ELEVATION "B-B"

N.T.S.



SECTION "A-A"

N.T.S.

Δ →	11.25°		22.50°		30°		45°		67.50°		90°		← Δ
I.D. (IN.)	THRUST (TONS)	VOL. (C.Y.)	THRUST (TONS)	VOL. (C.Y.)	THRUST (TONS)	VOL. (C.Y.)	THRUST (TONS)	VOL. (C.Y.)	THRUST (TONS)	VOL. (C.Y.)	THRUST (TONS)	VOL. (C.Y.)	I.D. (IN.)
4,6,8	1.0	0.5	2.0	1.0	2.5	1.3	3.6	1.8	4.6	2.3	5.0	2.5	4,6,8
10,12	2.2	1.1	4.3	2.2	5.7	2.8	8.0	4.0	10.5	5.2	11.3	5.7	10,12
16,18	5.0	2.5	9.7	4.9	12.7	6.4	18.0	9.0	23.5	11.8	25.5	12.7	16,18
20	6.1	3.1	12.0	6.0	15.7	7.9	22.2	11.1	29.2	14.5	31.4	15.7	20
24	8.2	4.4	17.3	8.7	22.6	11.3	32.0	16.0	41.8	20.9	45.2	22.6	24
30	10.5	5.2	20.3	10.1	26.5	13.3	37.5	18.8	49.0	24.5	53.1	26.5	30
36	14.9	7.5	29.2	14.6	38.2	19.1	54.0	27.0	70.5	35.3	76.4	38.2	36
42	20.3	10.1	39.8	19.9	52.0	26.0	73.5	36.7	96.0	48.0	104.0	52.0	42
48	26.5	13.2	51.9	26.0	67.9	33.9	96.0	48.0	126.0	62.7	136.0	67.9	48
54	33.5	16.8	65.7	32.9	85.9	42.9	122.0	60.7	159.0	79.4	172.0	85.9	54
60	41.4	20.7	81.2	40.6	106.0	53.0	150.0	75.0	196.0	98.0	212.0	106.0	60
66	50.1	25.0	98.2	49.1	128.0	64.2	182.0	90.7	237.0	119.0	257.0	128.0	66
72	59.6	29.8	117.0	58.4	153.0	76.3	216.0	108.0	282.0	141.0	305.0	153.0	72
78	69.9	35.0	137.0	68.6	179.0	90.0	254.0	127.0	331.0	166.0	358.0	179.0	78
84	81.1	40.5	159.0	79.5	208.0	104.0	294.0	147.0	384.0	192.0	416.0	208.0	84
90	93.1	46.5	183.0	91.3	239.0	119.0	337.0	169.0	441.0	221.0	477.0	239.0	90
96	106.0	53.0	208.0	104.0	272.0	136.0	384.0	192.0	502.0	251.0	543.0	272.0	96

REFER TO GENERAL NOTES FOR THRUST BLOCKING - PAGE 234

**VERTICAL THRUST BLOCK
AT PIPE BEND**

DWU

(Page No.)

233

DATE

DEC.2001

GENERAL NOTES FOR ALL THRUST BLOCKS:

1. Concrete for blocking shall be CLASS "B". See NCTCOG 702.2.4.2
2. All calculations are based on internal pressure of 200 P.S.I. for ductile iron and P.V.C., and 150 P.S.I. for concrete pipe.
3. Volumes of thrust blocks are net volumes of concrete to be furnished. The corresponding weight of the concrete (CLASS "B") is equal to or greater than the vertical component of the thrust on the vertical bend.
4. Wall thickness T (See Table Page 230) assumed for estimating purposes only.
5. Pour concrete for thrust blocks against undisturbed earth.
6. Dimensions may be varied as required by field conditions where and as directed by the inspector. The volume of concrete blocking shall not be less than shown in tables.
7. The calculations are based on bearing pressures equal to 1,000 lbs./s.f. in soil and 2,000 lbs./s.f. in rock.
8. Use polyethylene wrap between concrete blocking and bends, tees, and plugs to prevent the concrete from sticking to fittings.
9. Concrete shall not extend beyond joints.

REFER TO PAGES:
229, 230, 231, 232, & 233

<p style="font-size: 1.2em; margin: 0;">THRUST BLOCK GENERAL NOTES</p>		DWU	(Page No.) 234
		DATE OCT. 2012	

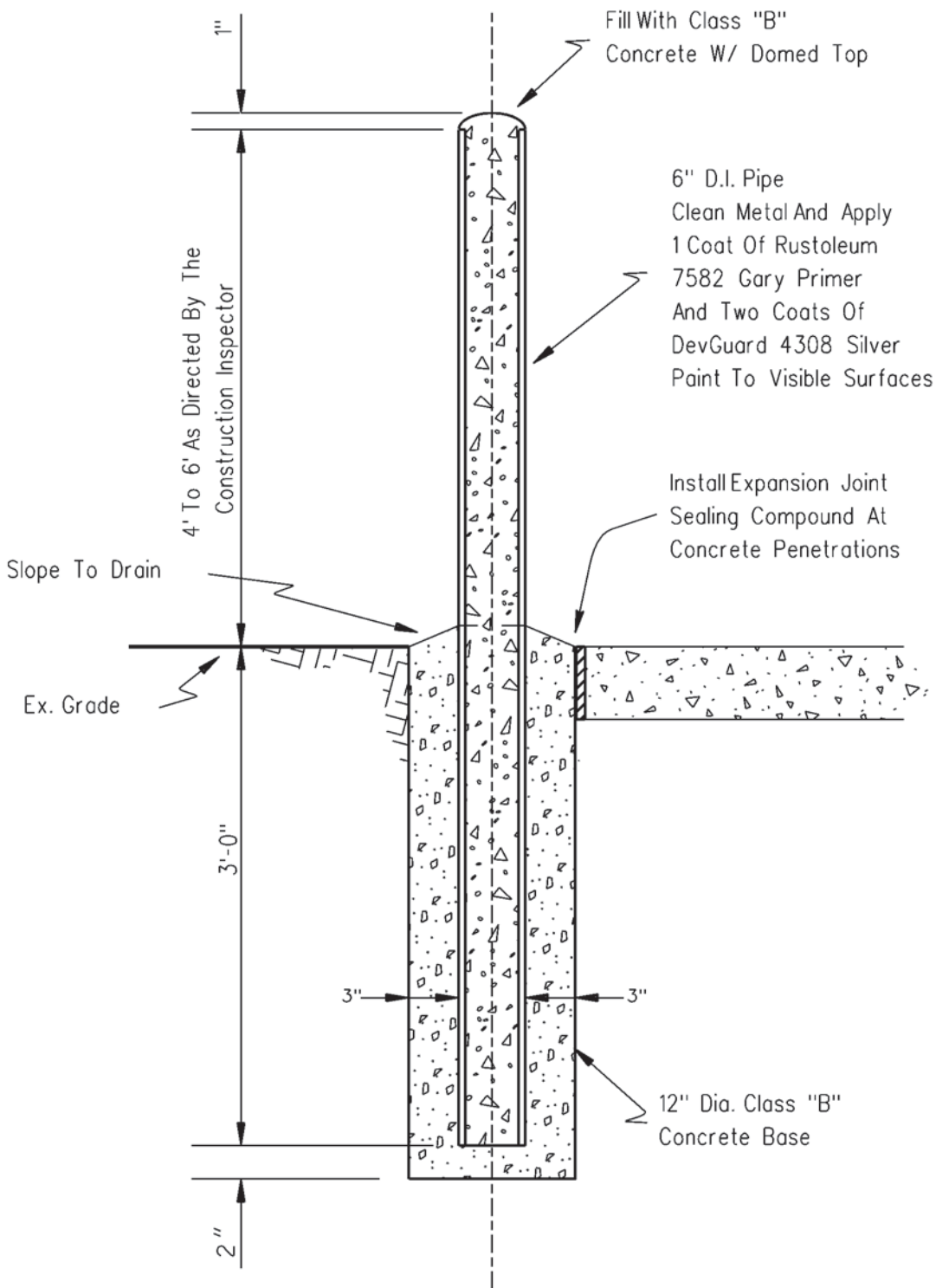
SIZE AND MATERIAL TYPE OF WATER MAINS	EMBEDMENT TYPE PER DEPTH IN EARTH			EMBEDMENT TYPE PER DEPTH IN ROCK		
	0' -8'	8' -16'	>16'	0' -8'	8' -16'	>16'
16" And Smaller Ductile Iron	D+	C	B	C	C	B
18" And Larger Ductile Iron	B	B	B	B	B	B
16" And Smaller Pretensioned	C	C	B	C	C	B
18" And Larger Pretensioned	B	B	B	B	B	B
All Prestressed	C	C	B	C	C	B
All Steel	B+	B+	B+	B	B	B
All P.V.C. Water Pipe	C+	B+	B+	C+	B+	B+

EMBEDMENT TYPES-
SPECIFIED FOR WATER MAINS

DWU

(PAGE NO.)
235

DATE
JAN 2010



STEEL GUARD POST

(SIZE DESIGNATED ON PLANS)
N.T.S.

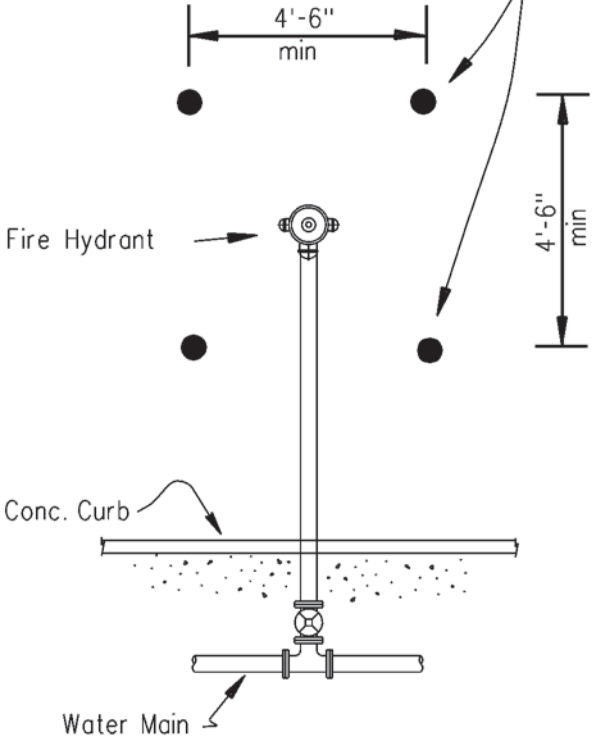
STEEL GUARD POST
DETAIL

DWU

(PAGE NO.)
236

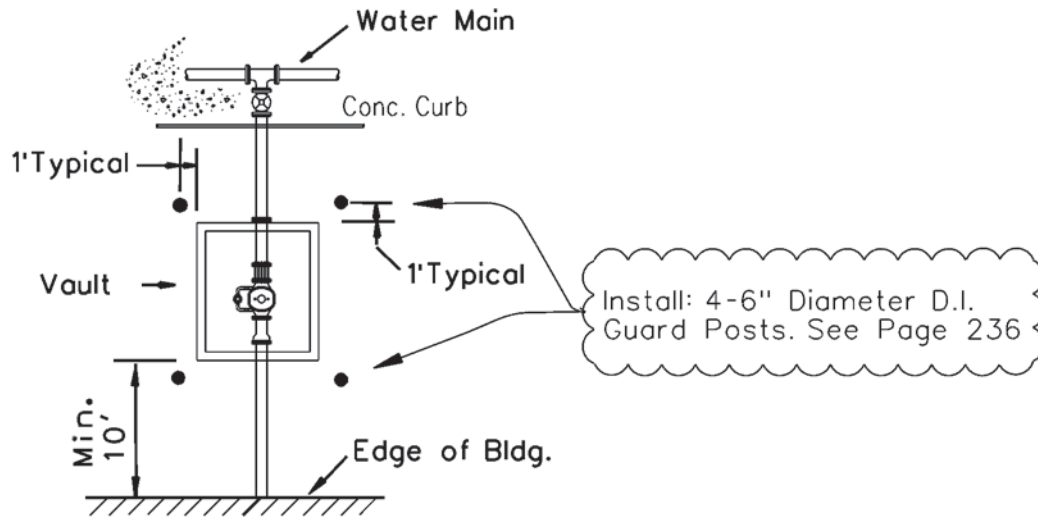
DATE
OCT. 2010

Install: 4 - 6" Dia. Steel Guard Posts Spaced 4'-6" Apart (Equal Distance From F.H.) See Page No. 236

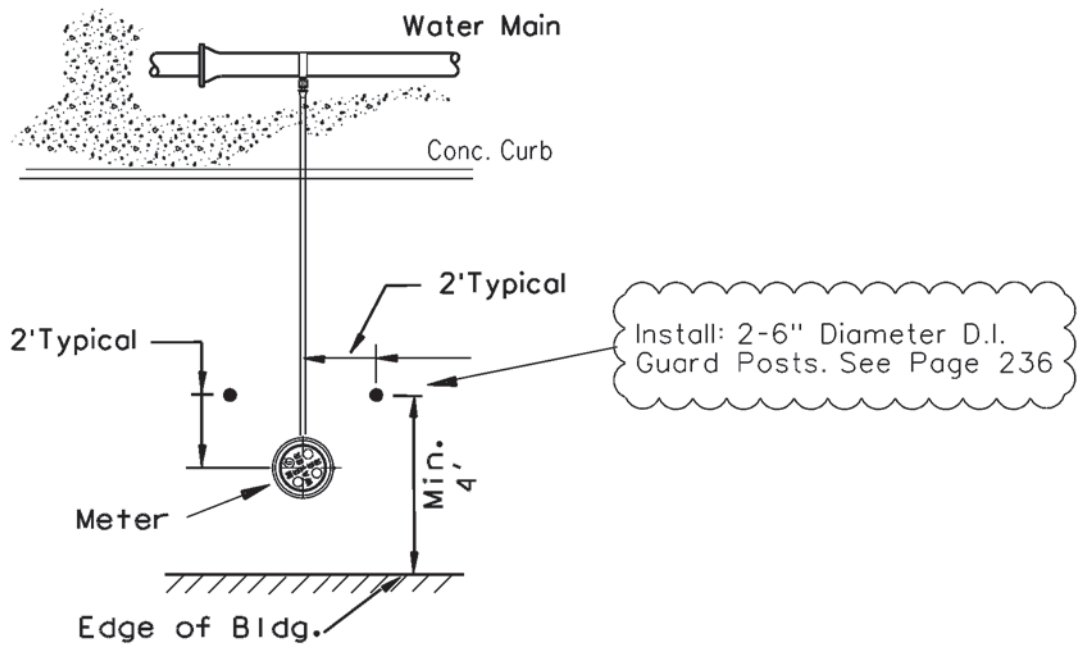


Refer. To Pages 224 & 236

<p>GUARD POST PROTECTION FOR FIRE HYDRANTS</p>	<p>DWU</p>	<p>(PAGE NO.) 237</p>
	<p>DATE JAN. 2010</p>	

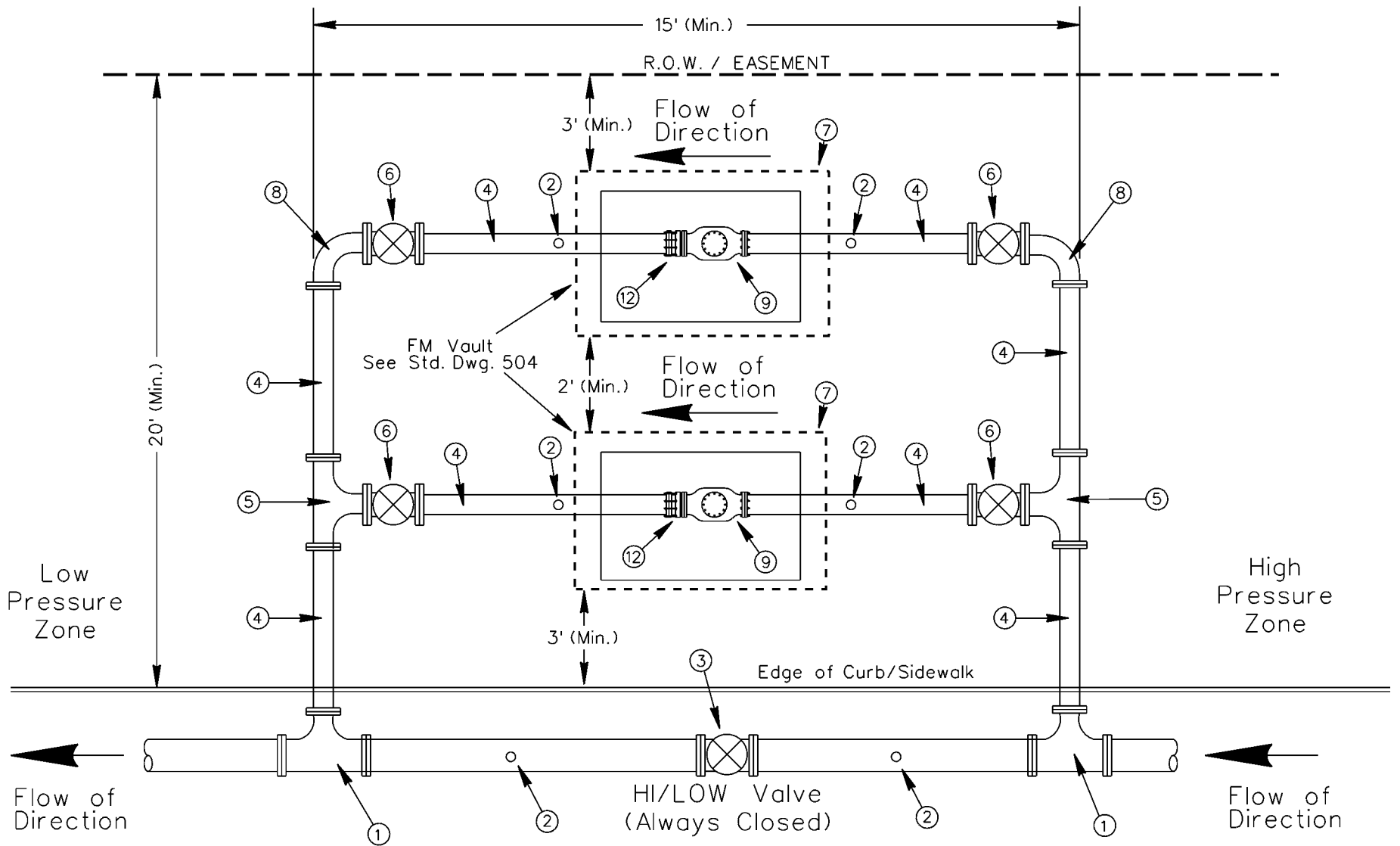


DETAIL FOR METER VAULTS



DETAIL FOR METERS 2" AND SMALLER

ATTENTION: PRV Design Subject to DWU Approval.



Refer To Pages 242, 243, 244, 245 & 504

**DUAL PRV ASSEMBLY
(OPTION 1)**

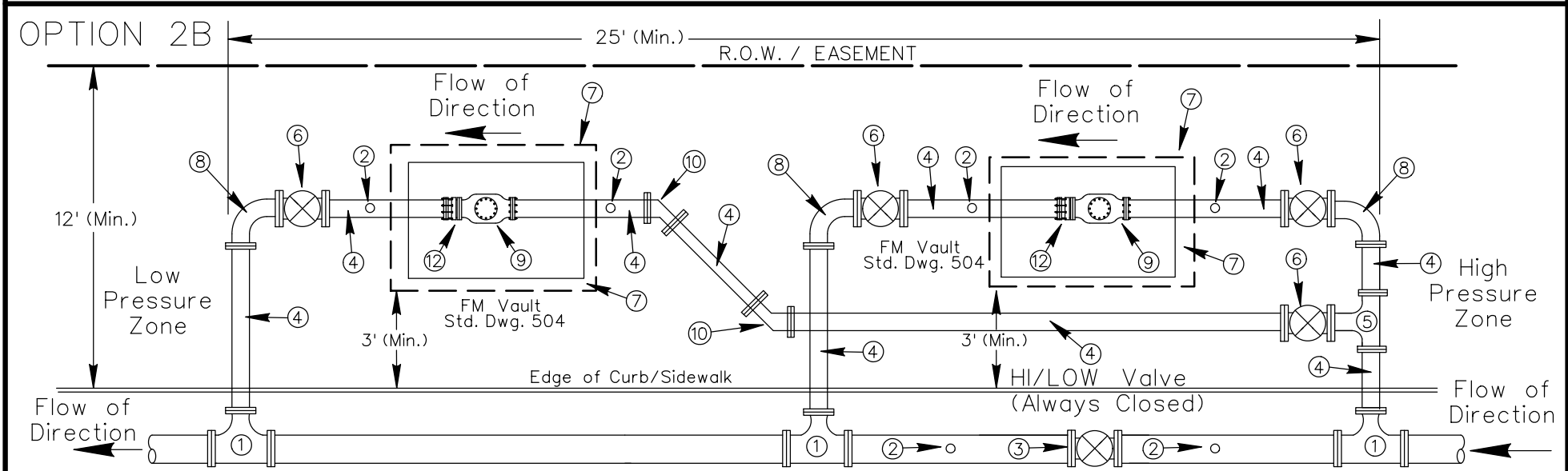
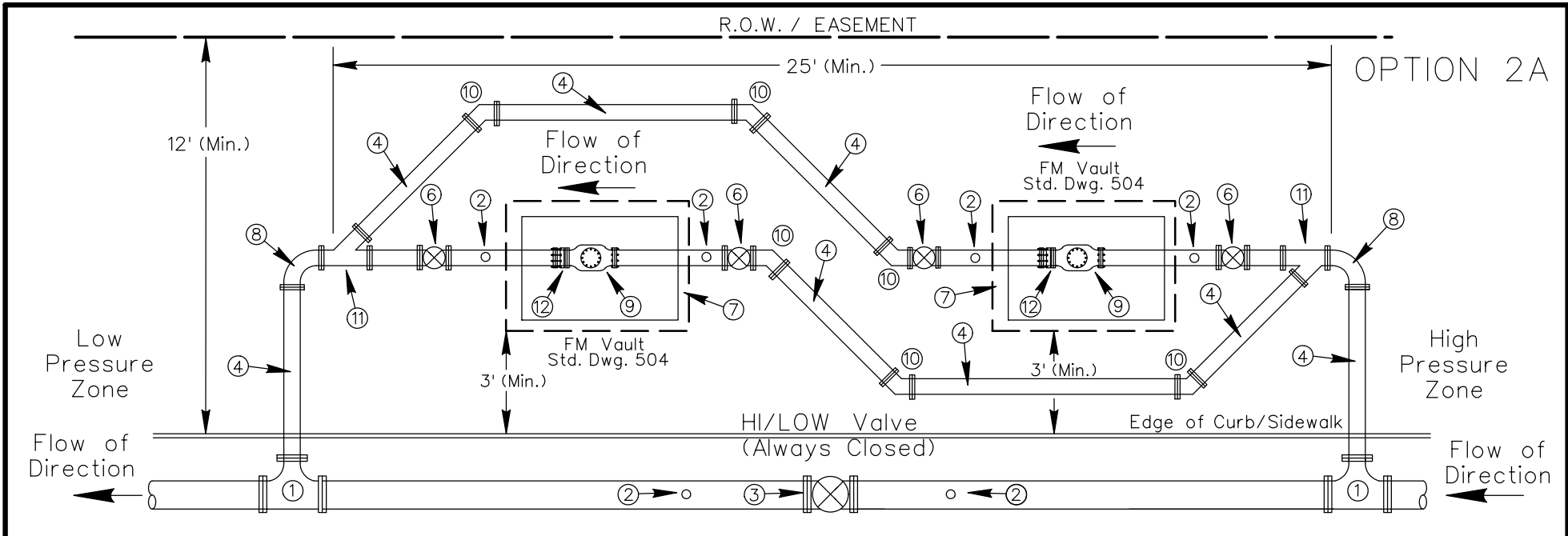
DWU

(PAGE NO.)

239

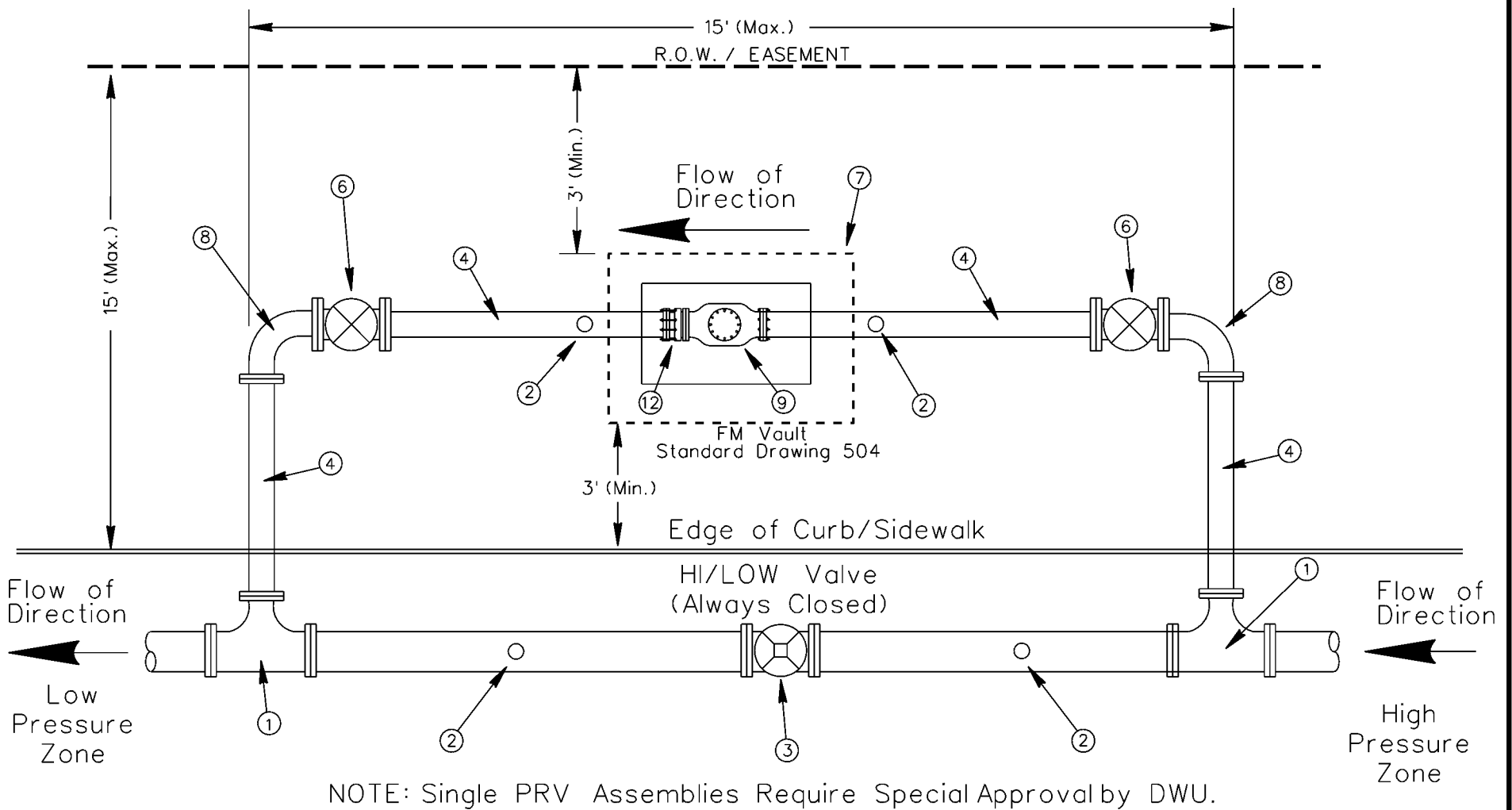
DATE

OCT. 2011



ATTENTION:
 PRV Designs Are Subject
 To DWU Approval.
 Refer To Pages
 242, 243, 244, 245 & 504

DUAL PRV ASSEMBLY (OPTIONS 2A & 2B)	DWU	(PAGE NO.) 240
	DATE OCT. 2011	



Refer To Pages 242, 243, 244, 245 & 504

SINGLE PRV ASSEMBLY	DWU	(PAGE NO.) 241
	DATE OCT. 2011	

Tag No.	Description	Fitting/Pipe Type	MAIN SIZE		
			8"	12"	16"
1	Reducing Tee	Flange x Flange	8"x8"x6"(Max)	12"x12"x8"(Max)	16"x16"x12"(Max)
2	1" Flush Point	Copper	1"	1"	1"
3	Hi/Low Valve	Flange x Flange	8"	12"	16"
4	Pipe	Ductile Iron	6"	8"	12"
5	Tee	Flange x Flange	6"x6"x6"	8"x8"x8"	12"x12"x12"
6	Gate Valve	Flange x Flange	6"	8"	12"
7	Precast Vault	Precast	-	-	-
8	90° Bend	Flange x Flange	6"	8"	12"
9	Pressure Reducing Valve	Flange x Flange	4" - 8"	6" - 10"	10" - 16"
10	45° Bend	Flange x Flange	6"	8"	12"
11	45° Wye	Flange x Flange	6"	8"	12"
12	Flange Coupling Adaptor	Flange x Flange	6"	8"	12"

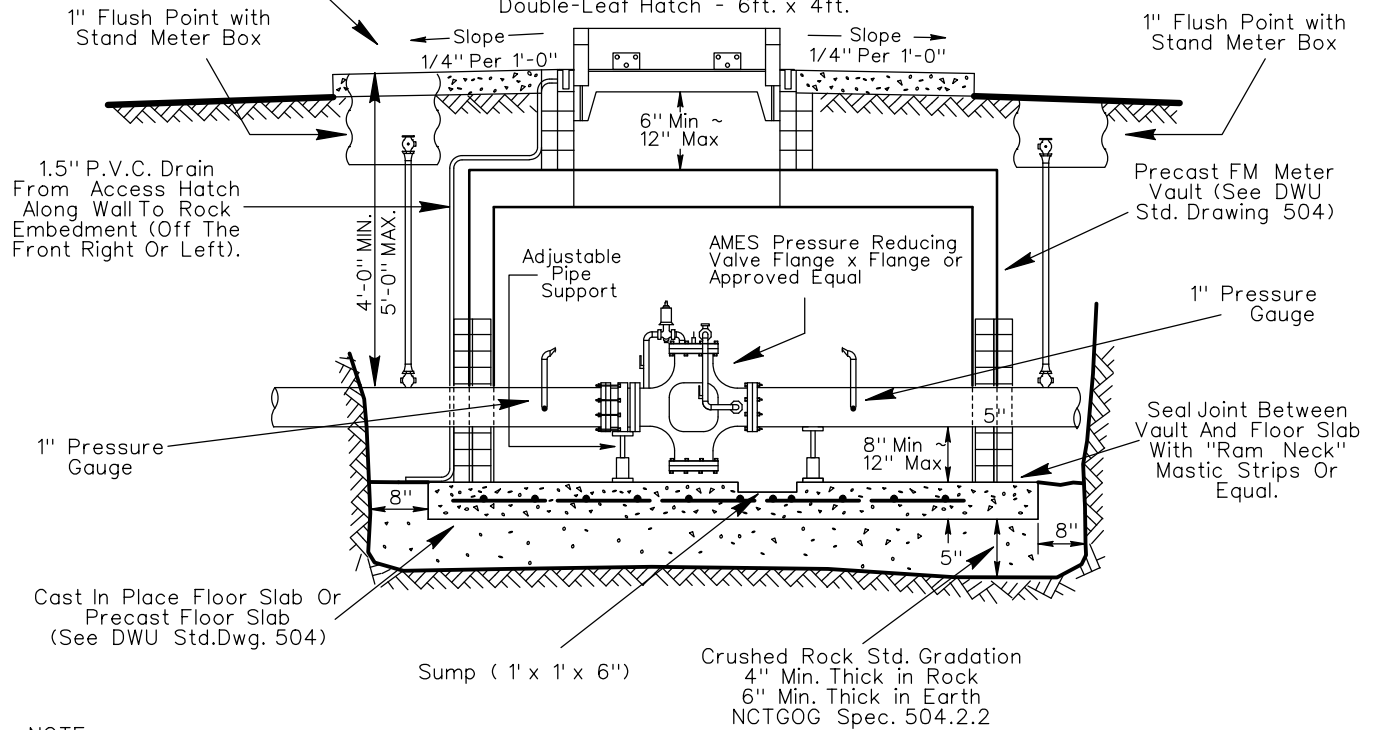
ATTENTION:
PRV Design And Parts Selection Are Subject to DWU Approval.

PRV PARTS LIST	DWU	(PAGE NO.) 242
	DATE OCT. 2011	

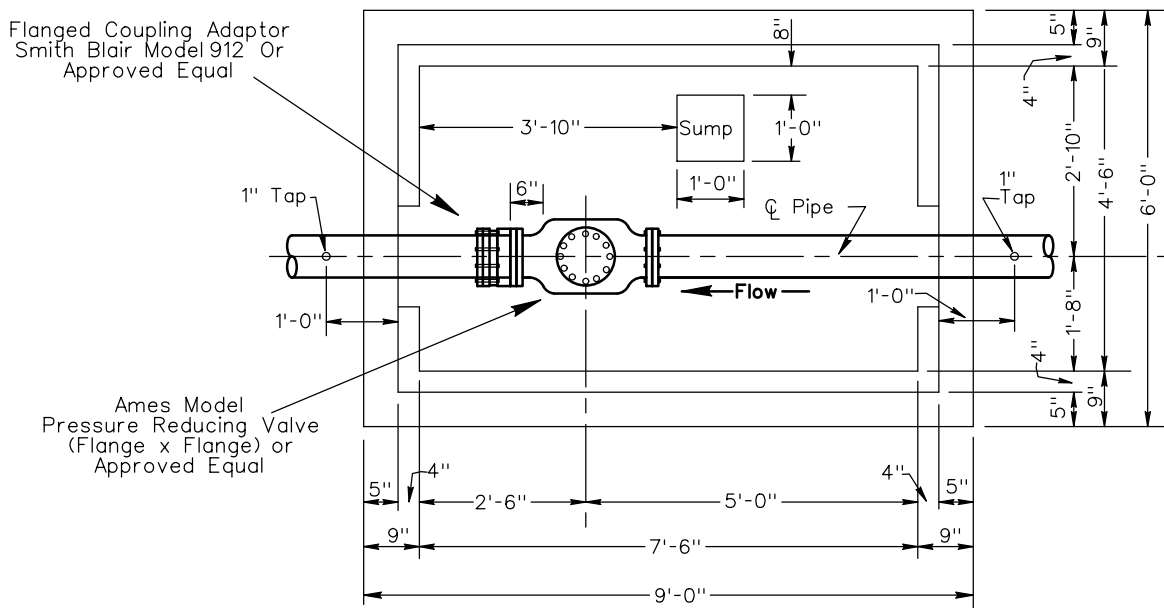
All Hardware Must be Stainless Steel.
Zinc Plated And Chromate Sealed
Finishes Are NOT Acceptable.

When Outside Of Pavement,
A Concrete Pad Shall Be
Constructed Extending A
Minimum Of 2 ft Beyond The
Perimeter Of The Hatch And
Be A Minimum of 6 in Thick.

Vault Lid:
BILCO Hatch or Approved Equal
with Hasp & Pad Lock
Single-Leaf Hatch - 3ft. x 4ft.
Double-Leaf Hatch - 6ft. x 4ft.



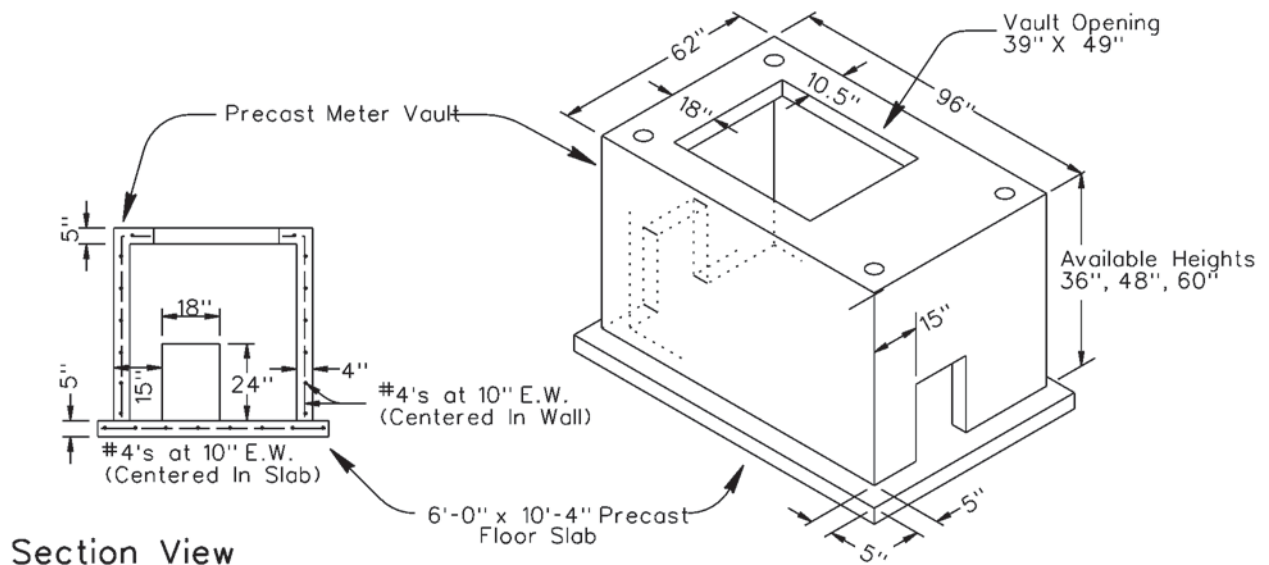
NOTE:
PRV Shall Be Centered Under The Hatch.
The Top Of The Vault Shall Be At Least 6 in
Above The Finished Grade.



Refer To Page 504

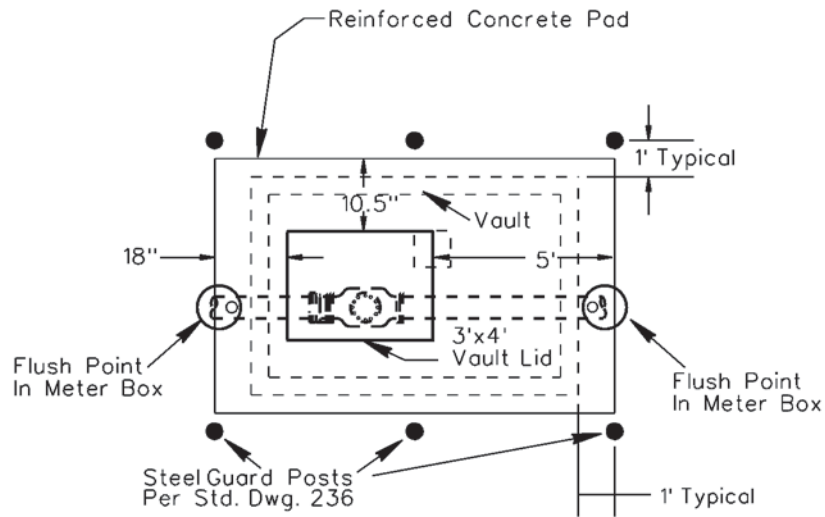
NCTCOG Spec: 504.2.2 -
Pipe Embedment Material for Water and Wastewater Mains

<p>PRV VAULT ELEVATION & SECTIONAL PLAN</p>	<p>COD</p>	<p>(PAGE NO.) 243</p>
	<p>DATE JULY, 2021</p>	



Vault Size
(NTS)

* Special Applications To Be Determined By Engineer. Vault shall be built according to Engineering Specifications.



Bollard Location Plan
(NTS)

Refer To Pages TO 236

PRV DETAILS

DWU

(PAGE NO.)
244

DATE
OCT. 2011

1. All pressure-reducing valves shall include a verifiable certification of compliance with the National Sanitation Foundation (NSF) Standard 61. Every bidder shall submit with their bid a signed statement clearly stating the present status of their receiving certification of compliance with the NSF 61 Standard for each particular make, model and size of pressure reducing valve being bid. A failure to submit this verification shall result in the disqualification of that bid and its removal from consideration.
2. Every bidder shall submit re-lined copies of these standard drawings for exception requests needing final approval by DWU. If there are no exceptions to the specification, a signed statement at the bottom of the specification shall indicate "No Exception Taken". A failure to do so shall result in the disqualification of that bid and its removal from consideration.
3. All materials contained in the valves being bid shall be described and specified in the most current manufacturer's product literature.
4. The Distribution Division of the Dallas Water Utilities Department shall be the sole authority in determining the acceptability of any alternate valves.
5. All pressure reducing valves shall be certified by the manufacturer as being capable of withstanding a cold hydrostatic test of at least one hundred percent (100%) above the maximum pressure for which the valve is to operate.
6. All valves, parts and components shall be new and unused original factory-authorized manufacturer's parts and components. No "after-market" substitute parts from other manufacturers shall be accepted. No rebuilt or remanufactured parts allowed.
7. The pressure reducing valve provided shall be designed and constructed to maintain a pre-adjusted downstream pressure regardless of changes in the flow rate.
8. The adjustment range of the pilot valve shall be from 15 to 175 psi.
9. The main body flanges of the pressure reducing valves provided shall have bolt patterns compatible with ANSI/ASME B 16.1.
10. The pressure reducing valves provided shall be complete and shall all have factory-installed position indicators, gauge cocks, control valve isolation valves, strainers and pilot valves.
11. All external control piping on the pressure reducing valve shall be copper or stainless steel.
12. The body of the valve and the cover of the valves shall be fabricated entirely of stainless steel.
13. The entire interior wetted surface of the valve, including the spring, the upper diaphragm support, the disc holder, the seat ring and the shaft shall be fabricated of stainless steel and shall be inherently corrosion-resistant without any special coating.
14. The diaphragm shaft shall be guided at the top and at the bottom.
15. All internal and external threaded studs and nuts shall be fabricated of stainless steel.
16. The seat disc shall be fabricated of Buna-N resilient synthetic rubber.
17. All valves, parts and components shall be supplied with a three (3) year manufacturer's warranty on materials and workmanship.
18. All valves shall be AMES MODEL 605GS reduced port, single chamber pressure reducing valves.
19. All valves, parts, and components shall either be bid Freight On Board (FOB) Factory, Freight Allowed or FOB Destination (4120 Scottsdale, Dallas, Tx 75227)
20. All valves shall be crated in sturdy shipping containers to prevent damage to position indicators, control valves and control valve piping during shipment.
21. The pressure reducing valve must be installed by the manufacturer in the presence of DWU Distribution and Pumping personnel.
22. All construction materials including valves, pipes, fittings and flush points shall conform to the most current version of the NCTCOG specifications, the City of Dallas Addendum to those specifications, this manual and the Approved Materials List.
23. All precast vaults shall meet DWU specifications and be approved by DWU.
24. The location of the vault must be approved by DWU.
25. The minimum depth for the piping in the vault shall be 4 feet.
26. All spool pipe shall be ductile iron pipe.

PRV GENERAL NOTES

DWU

(PAGE NO.)

245

DATE

OCT. 2011

PART 3

(Series 300)

WASTEWATER MAIN CONSTRUCTION



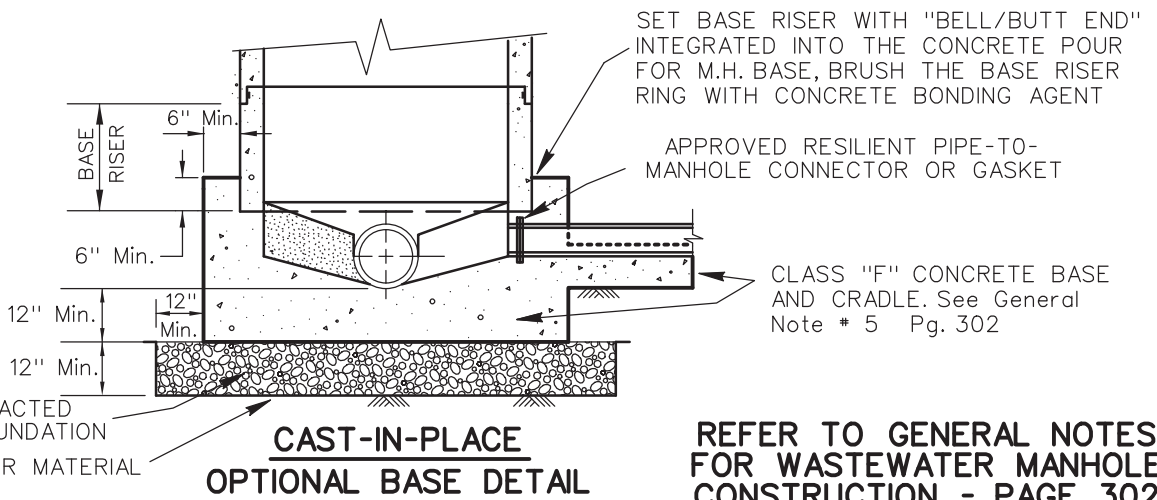
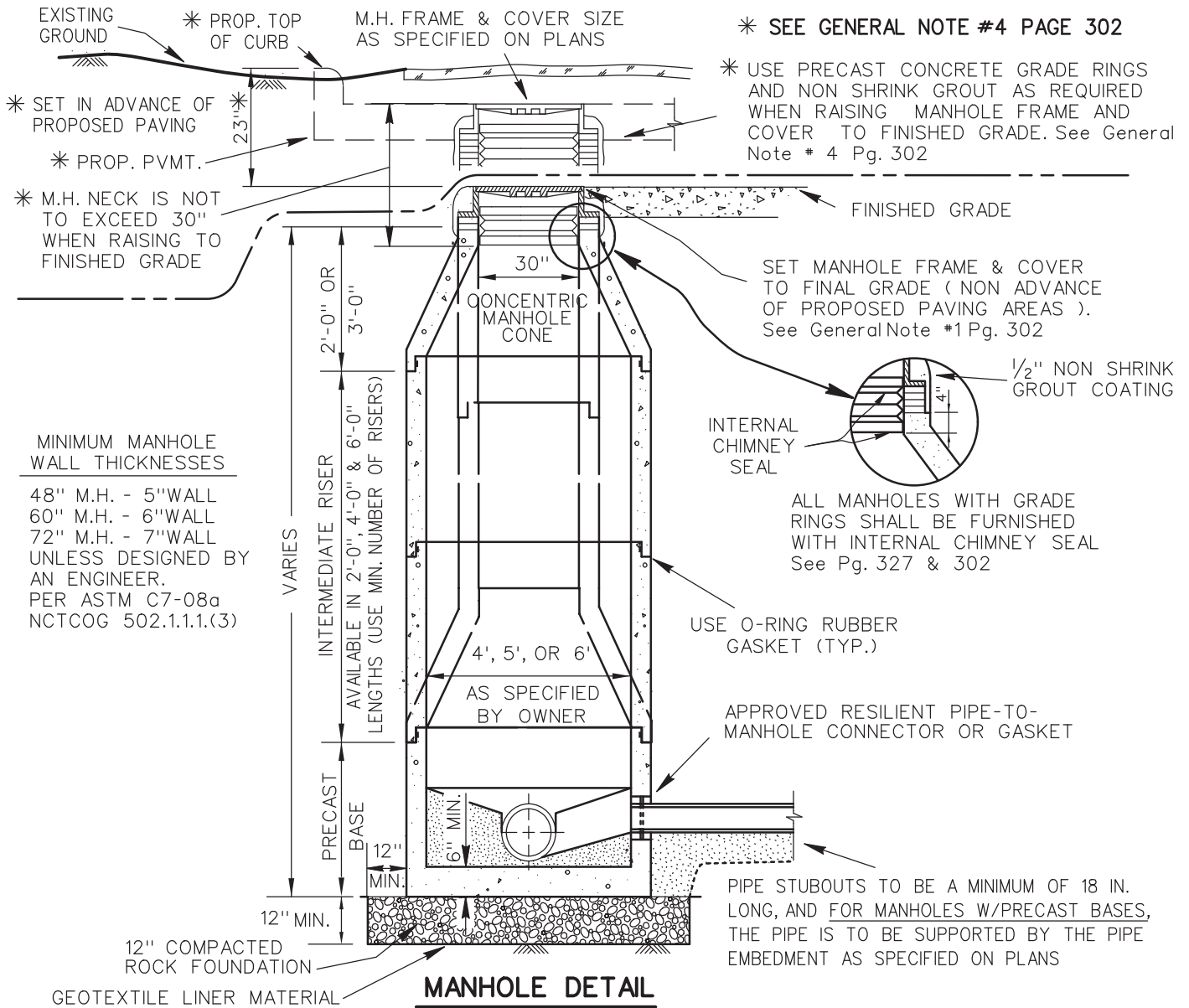
City of Dallas
Water Utilities Department

PART 3
WASTEWATER MAIN CONSTRUCTION

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Wastewater Manhole--Pressure Type	--- 304
Wastewater Manhole--Fiberglass	--- 305
Wastewater Manhole--Vented	--- 306
Wastewater Manhole--Outside Drop Connections	--- 307
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*** MANHOLE UNDER PROPOSED PAVING WITHIN STREET R.O.W.**

(IN ADVANCE OF PROPOSED PAVING IMPROVEMENT PROJECTS)



REFER TO GENERAL NOTES FOR WASTEWATER MANHOLE CONSTRUCTION - PAGE 302

**WASTEWATER MANHOLE
PRECAST**

DWU

(Page No.)

301

DATE

OCT. 2015

GENERAL NOTES FOR
WASTEWATER MANHOLE CONSTRUCTION

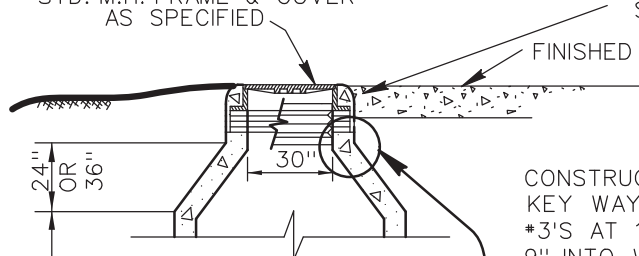
- 1) All non-pressure type manholes are to be constructed with a minimum of 2 - precast concrete grade rings and with an internal chimney seal. The maximum allowable extension of manhole necks using grade rings is limited to 30". See typical drawing detail on page 327.
- 2) All manholes are to have inverts constructed as per details on pages 309 and 309A.
- 3) All wastewater main stubouts from manholes shall be a minimum of 18 inches in length and terminated with a water tight stopper or cap.
- 4) Where new manholes are constructed in advance of proposed paving, the frame and cover shall be set 23" below the proposed top of curb, or flush with the existing ground, whichever ever is lower. Use precast concrete grade rings to raise M.H. frame and cover to final paving grade. (LIMITED TO 30" MAXIMUM MANHOLE NECK EXTENSION, AS MEASURED FROM THE TOP TAPER OF THE M.H. CONE TO M.H. LID). When M.H. neck extension exceeds 30", then the M.H. cone is to be removed and reset in such a manner as to reduce the number of grade rings required to reset M.H. frame and cover to final grade. See typical drawing detail on page 301.
- 5) For all manholes with cast in place bases, the first pipe joint must extend a minimum of 18 inches past the edge of manhole, with a concrete cradle poured integrally with the base, and under the entire pipe joint length.
- 6) All cast in place manholes are to be constructed with pipe to manhole connectors as per detail on page 310, or with a connector as approved by the DWU construction superintendent.
- 7) False manhole bottoms are required on all advance of paving projects. They shall be constructed, installed, and removed in accordance with details and instructions on page 311.
- 8) Minimum manhole wall thicknesses are per ASTM C76-08a unless designed by and engineer. The standard thicknesses are:
48" manhole=5"wall; 60" manhole=6" wall; 72" manhole=7"wall

GENERAL NOTES FOR WASTEWATER MANHOLES		DWU	(Page No.) 302
		DATE OCT. 2015	

FOR CONSTRUCTION OF MANHOLES IN ADVANCE OF PROPOSED PAVING PROJECTS, See Detail On Pg. 301 & General Note #4 On Pg. 302.

USE PRECAST CONCRETE GRADE RINGS AND NON SHRINK GROUT AS REQUIRED TO SET MANHOLE FRAME AND COVER TO FINAL GRADE. See General Note #1 On Page 302

STD. M.H. FRAME & COVER AS SPECIFIED

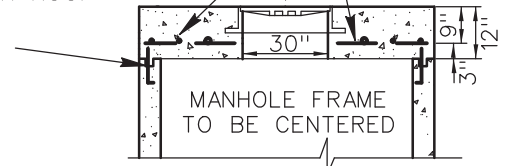


FINISHED GRADE

PRESSURE-TYPE-MANHOLE: TO HAVE M.H. FRAME CAST IN ROOF

FRAME & COVER AS SPECIFIED ON PLANS

#3'S AT 6" O.C. E.W.

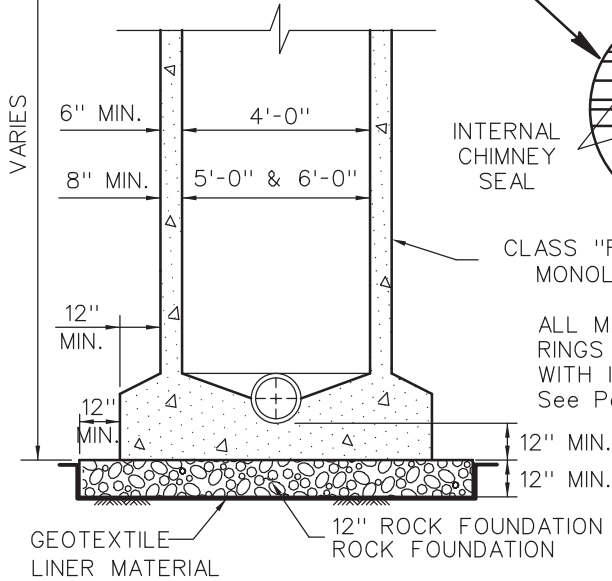


CONSTRUCTION JOINT WITH KEY WAY WATERSTOP, AND #3'S AT 12" O.C. EXTENDING 9" INTO WALL (NOT REQ'D FOR CONTINUOUS POUR)

1/2" NON SHRINK GROUT COATING

#3'S AT 6" O.C., E.W.

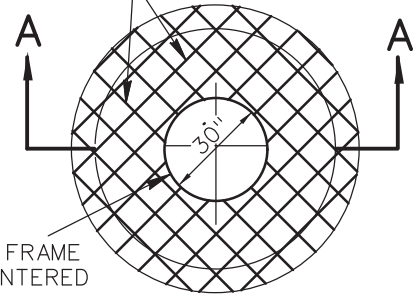
FOR 5' & 6' DIA. M.H.'S SEE TRANSITION DETAIL



INTERNAL CHIMNEY SEAL

CLASS "F" CONCRETE MONOLITHIC POUR

ALL MANHOLES WITH GRADE RINGS SHALL BE FURNISHED WITH INTERNAL CHIMNEY SEAL See Pg. 327 & 302

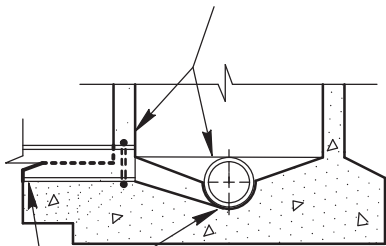


ROOF STEEL LAYOUT

N.T.S.

MANHOLE DETAIL

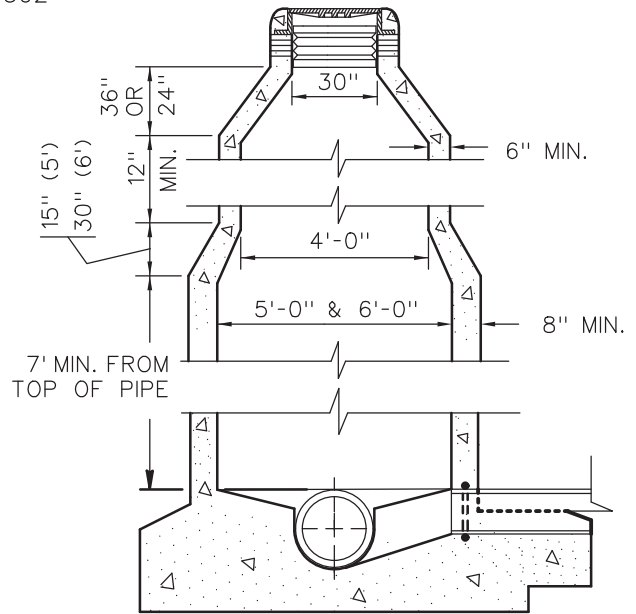
APPROVED RESILIENT PIPE-TO-MANHOLE CONNECTOR OR GASKET



CONNECTION DETAIL

N.T.S.

FIRST MAIN LINE JOINT TO BE A MIN. OF 18" LONG, WITH CONC. CRADLE (POURED CONTIGUOUS WITH CONC. BASE) AND UNDER ENTIRE JOINT See General Note # 5 On Pg. 302



TRANSITION DETAIL FOR 5' & 6' DIA. M.H.'S

N.T.S.

REFER TO GENERAL NOTES FOR WASTEWATER MANHOLE CONSTRUCTION - PAGE 302

WASTEWATER MANHOLE CAST-IN-PLACE

DWU

(Page No.)

303

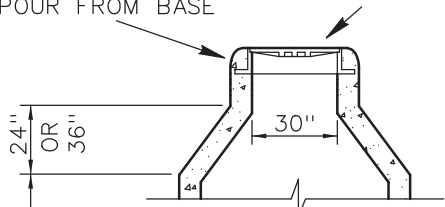
DATE
OCT. 2015

CONCRETE CONE ← **ROOF OPTIONS** → **REINFORCED CONCRETE SLAB**

N.T.S.

PRESSURE-TYPE-MANHOLE:
TO HAVE M.H. FRAME CAST
IN ROOF WITH CONTINUOUS
POUR FROM BASE

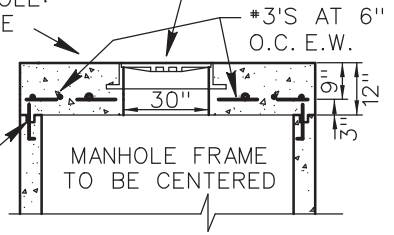
FRAME & COVER AS
SPECIFIED ON PLANS



FOR 5' & 6' DIA. M.H.'S
SEE TRANSITION DETAIL

PRESSURE-TYPE-MANHOLE:
TO HAVE M.H. FRAME
CAST IN ROOF

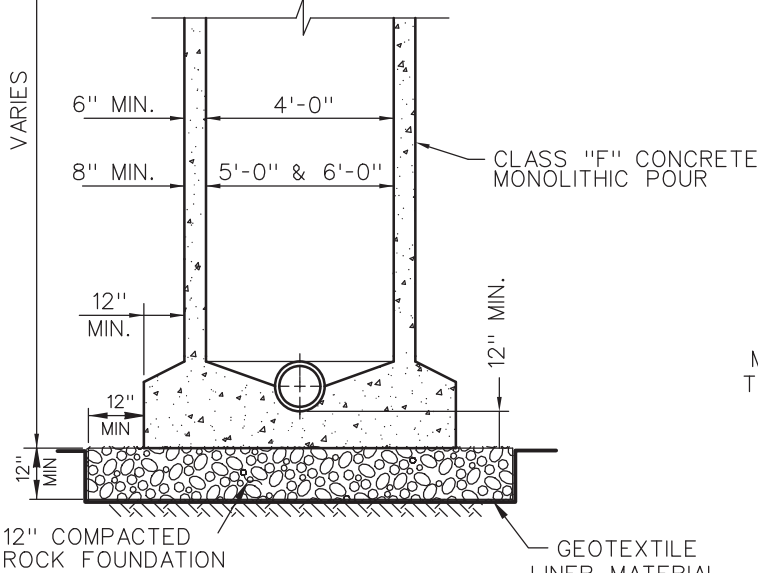
FRAME & COVER AS
SPECIFIED ON PLANS



CONSTRUCTION JOINT WITH
KEY WAY WATERSTOP, AND
#3'S AT 12" O.C. EXTENDING
9" INTO WALL (NOT REQ'D
FOR CONTINUOUS POUR)

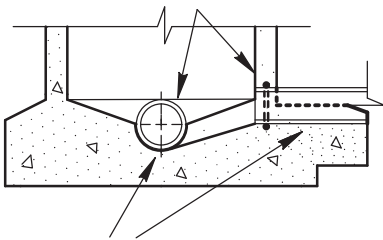
SECTION A - A

N.T.S.



MANHOLE DEAL

APPROVED RESILIENT PIPE-TO-
MANHOLE CONNECTOR OR GASKET



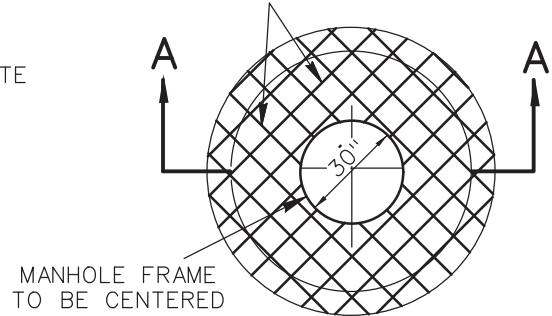
FIRST MAIN LINE JOINT TO BE A MIN.
OF 18" LONG, WITH CONC. CRADLE
(POURED CONTIGUOUS WITH CONC.
BASE) AND UNDER ENTIRE JOINT
See General Note # 5 On Pg. 302

CONNECTION DETAIL

N.T.S.

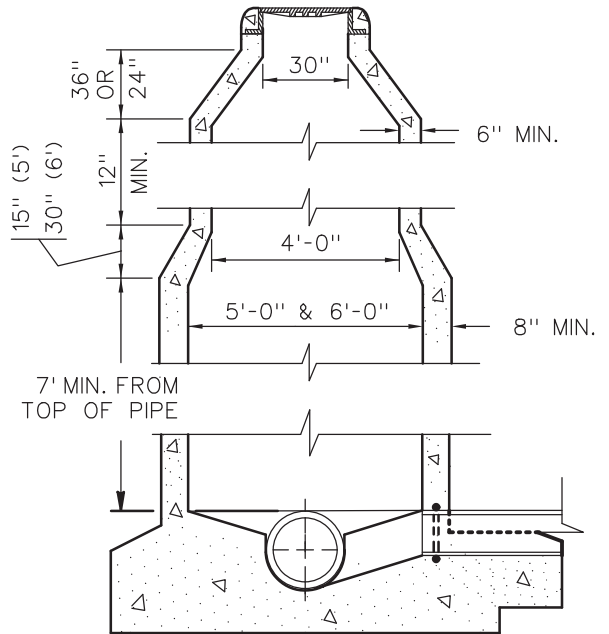
REFER TO GENERAL NOTES
FOR WASTEWATER MANHOLE
CONSTRUCTION - PAGE 302

#3'S AT 6" O.C., E.W.



ROOF STEEL LAYOUT

N.T.S.



**TRANSITION DETAIL FOR
5' & 6' DIA. M.H.'S**

N.T.S.

**WASTEWATER MANHOLE
PRESSURE-TYPE**

DWU

(Page No.)

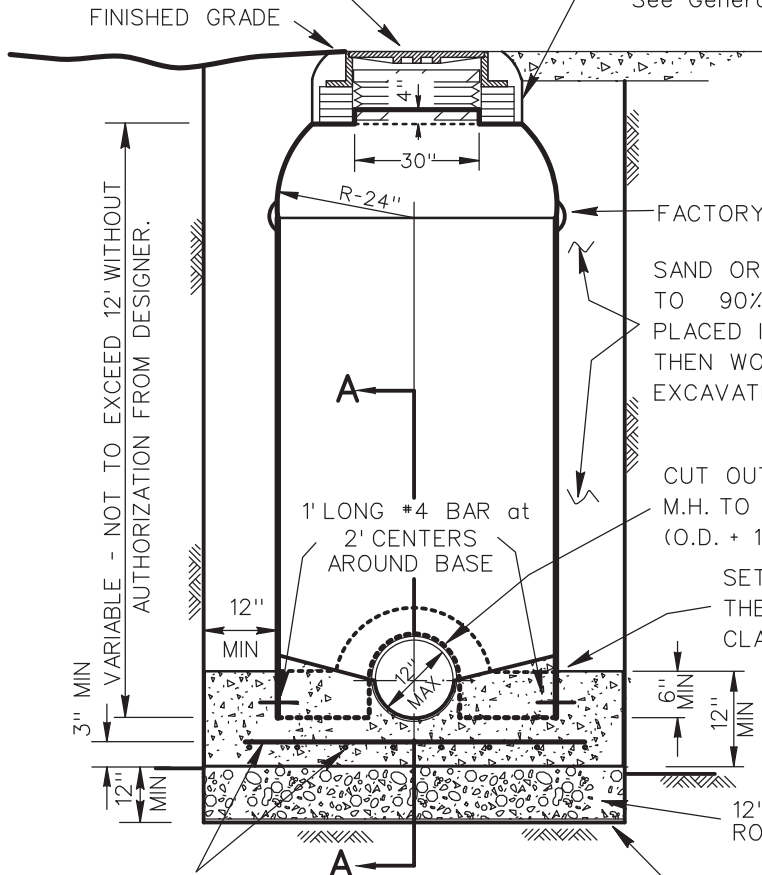
304

DATE

OCT. 2015

STANDARD CAST-IRON M.H. FRAME
& COVER AS SPECIFIED ON PLANS

USE PRECAST CONCRETE GRADE RINGS AND
NON SHRINK GROUT AS REQUIRED TO SET
MANHOLE FRAME AND COVER TO FINAL GRADE.
See General Note #1 On Page 302



ALL MANHOLES WITH GRADE
RINGS SHALL BE FURNISHED
WITH INTERNAL CHIMNEY SEAL
See Pg. 327 & 302

FACTORY - BONDED JOINT

SAND OR STABILIZED SOIL COMPACTED
TO 90% STD. PROCTOR DENSITY AND
PLACED IN 6-INCH LIFTS. BEGINNING AT M.H.
THEN WORKING OUTWARD TO THE
EXCAVATION LIMITS.

CUT OUT FIBERGLASS
M.H. TO SET OVER PIPE
(O.D. + 1" MAX.)

SET BOTTOM OF FIBERGLASS M.H. WITHIN
THE INTEGRALLY POURED, CAST-IN-PLACE,
CLASS "F" REINFORCED CONCRETE BASE.

VARIABLE - NOT TO EXCEED 12' WITHOUT
AUTHORIZATION FROM DESIGNER.

1' LONG #4 BAR at
2' CENTERS
AROUND BASE

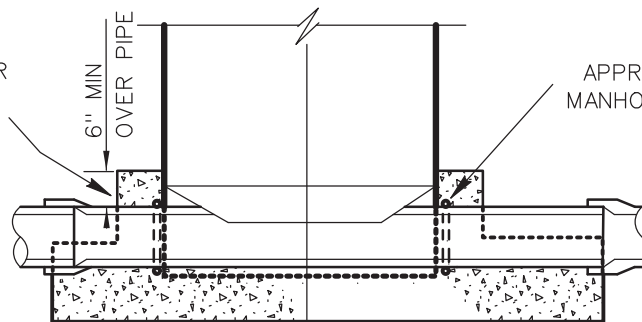
12" COMPACTED
ROCK FOUNDATION

GEOTEXTILE LINER
MATERIAL

*5 BARS @10" O.C. - E.W.

MANHOLE DETAIL

CONTINUOUS POUR
CONCRETE OVER
PIPE WITH BASE



APPROVED RESILIENT PIPE-TO-
MANHOLE CONNECTOR OR GASKET

SECTION A-A

N.T.S.

FIRST MAIN LINE JOINT TO BE A MIN.
OF 18" LONG, WITH CONC. CRADLE
(POURED CONTIGUOUS WITH CONC.
BASE) AND UNDER ENTIRE JOINT
See General Note # 5 On Pg. 302

NOTES:

1. FUTURE CONNECTIONS. IF A SEALANT BETWEEN PIPE & M.H. IS NEEDED, USE APPROVED SILICONE SEALANT.
2. DESIGN : HS 20 LOADING

**REFER TO GENERAL NOTES
FOR WASTEWATER MANHOLE
CONSTRUCTION - PAGE 302**

**WASTEWATER MANHOLE
FIBERGLASS**

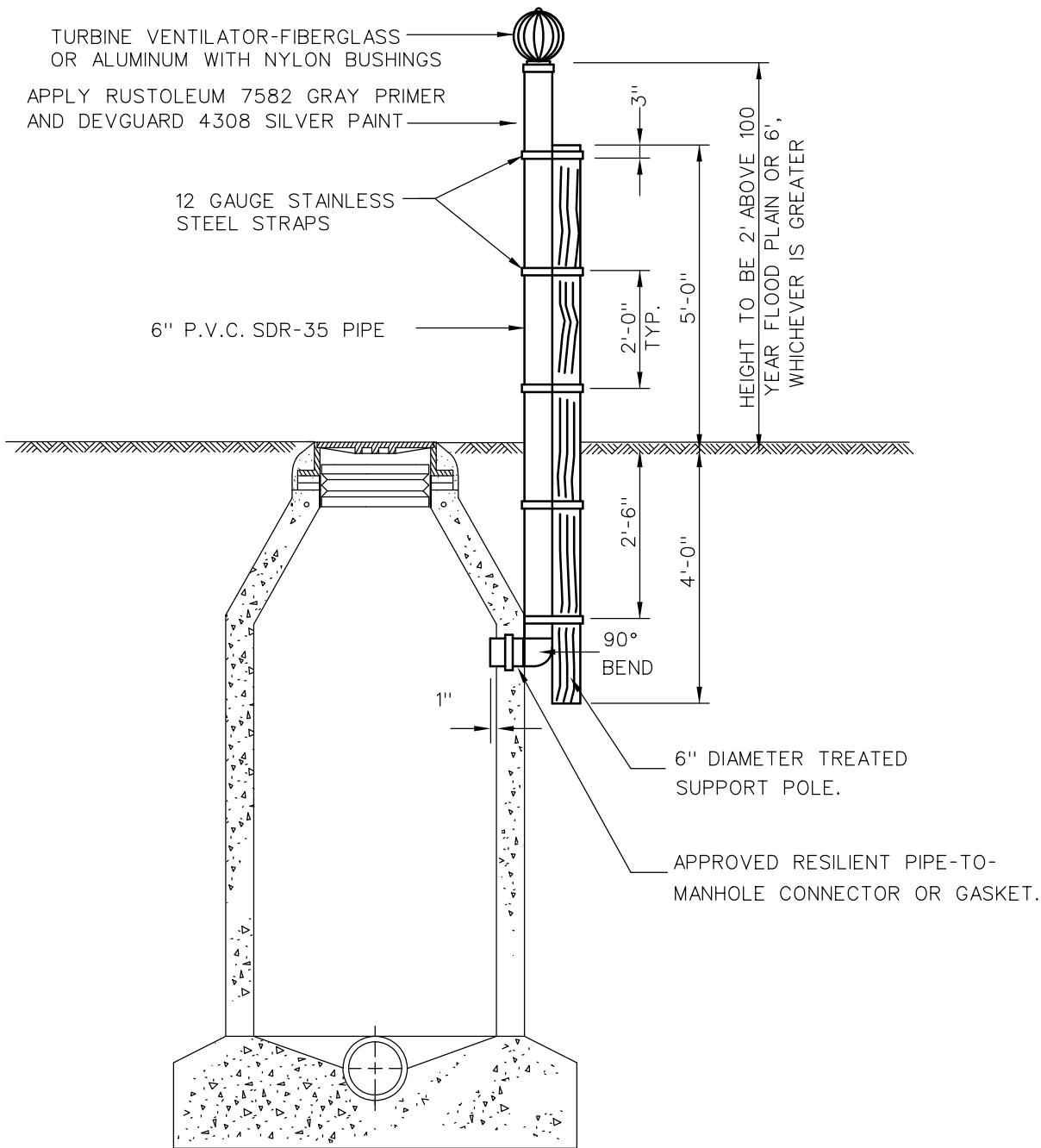
DWU

(Page No.)

305

DATE

OCT.2015



WASTEWATER MANHOLE
VENTED

DWU
DATE
JAN. 2010

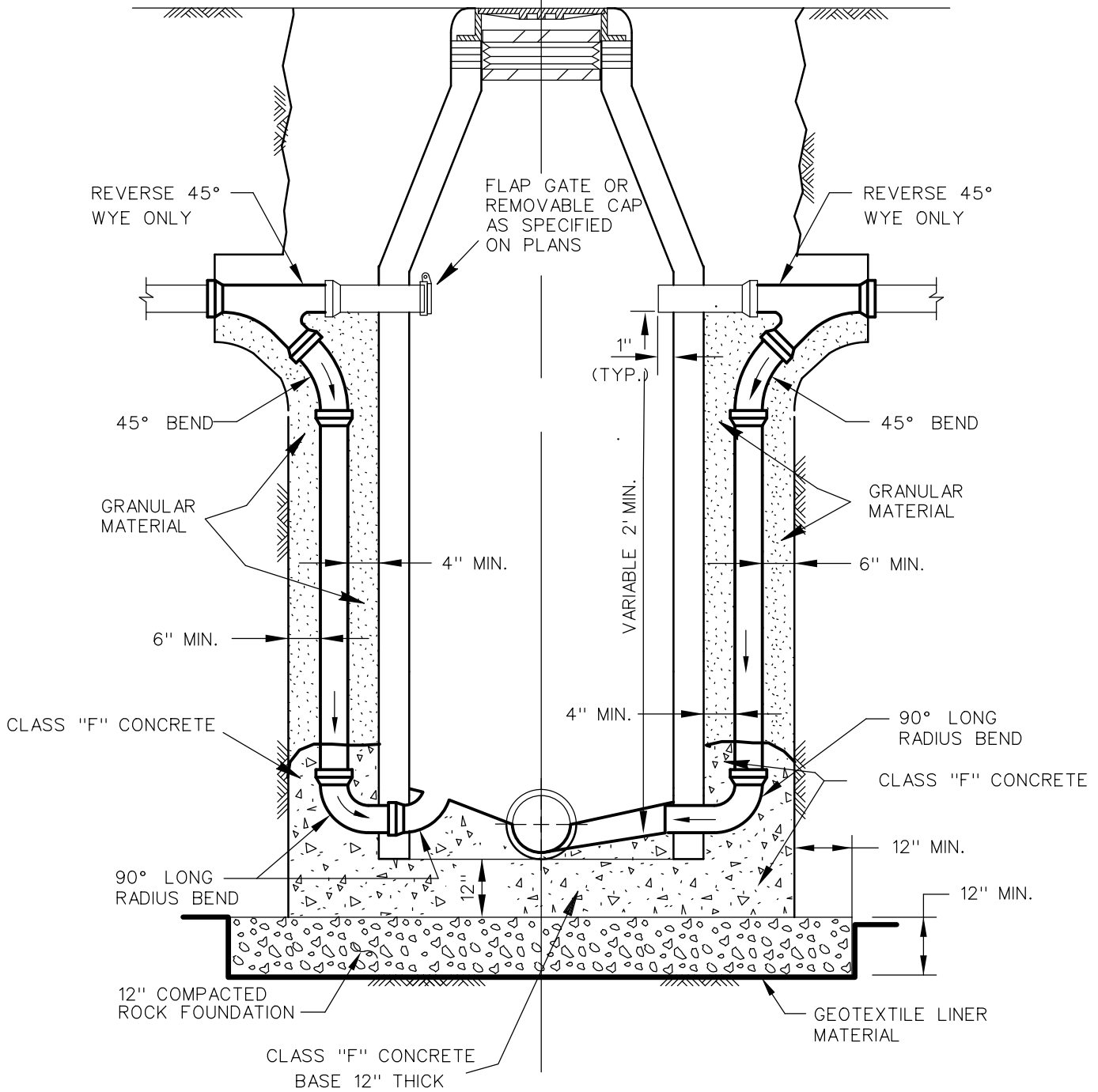
MANHOLE TYPE-AS
SPECIFIED ON PLANS

GAS SEALED
DROP CONNECTION

N.T.S.

STANDARD
DROP CONNECTION

N.T.S.



SEE GENERAL NOTES
FOR WASTEWATER MANHOLE
CONSTRUCTION - PAGE 302

WASTEWATER MANHOLE
OUTSIDE DROP CONNECTIONS

DWU

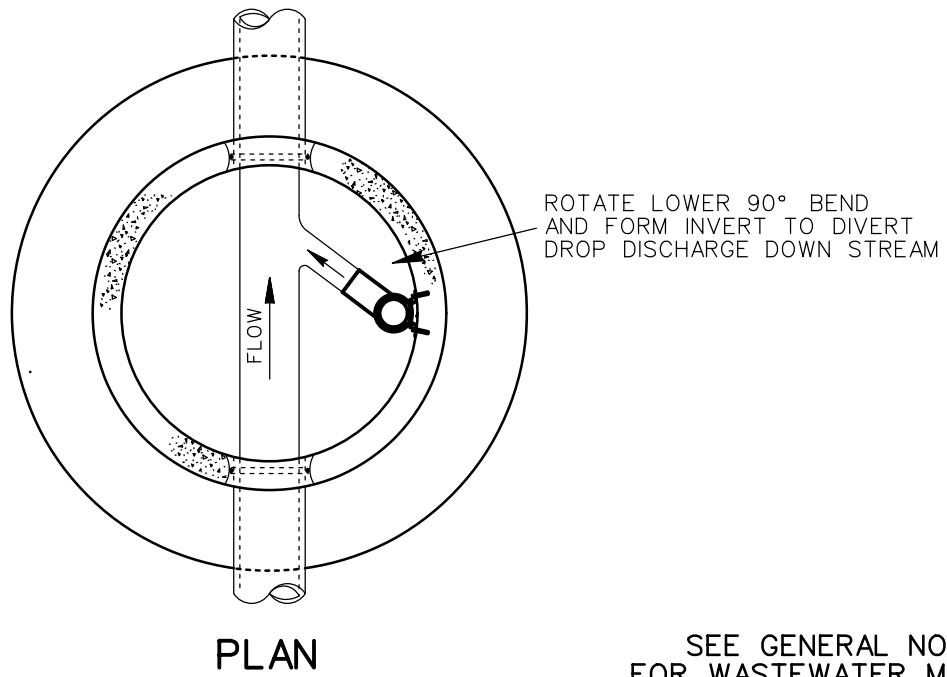
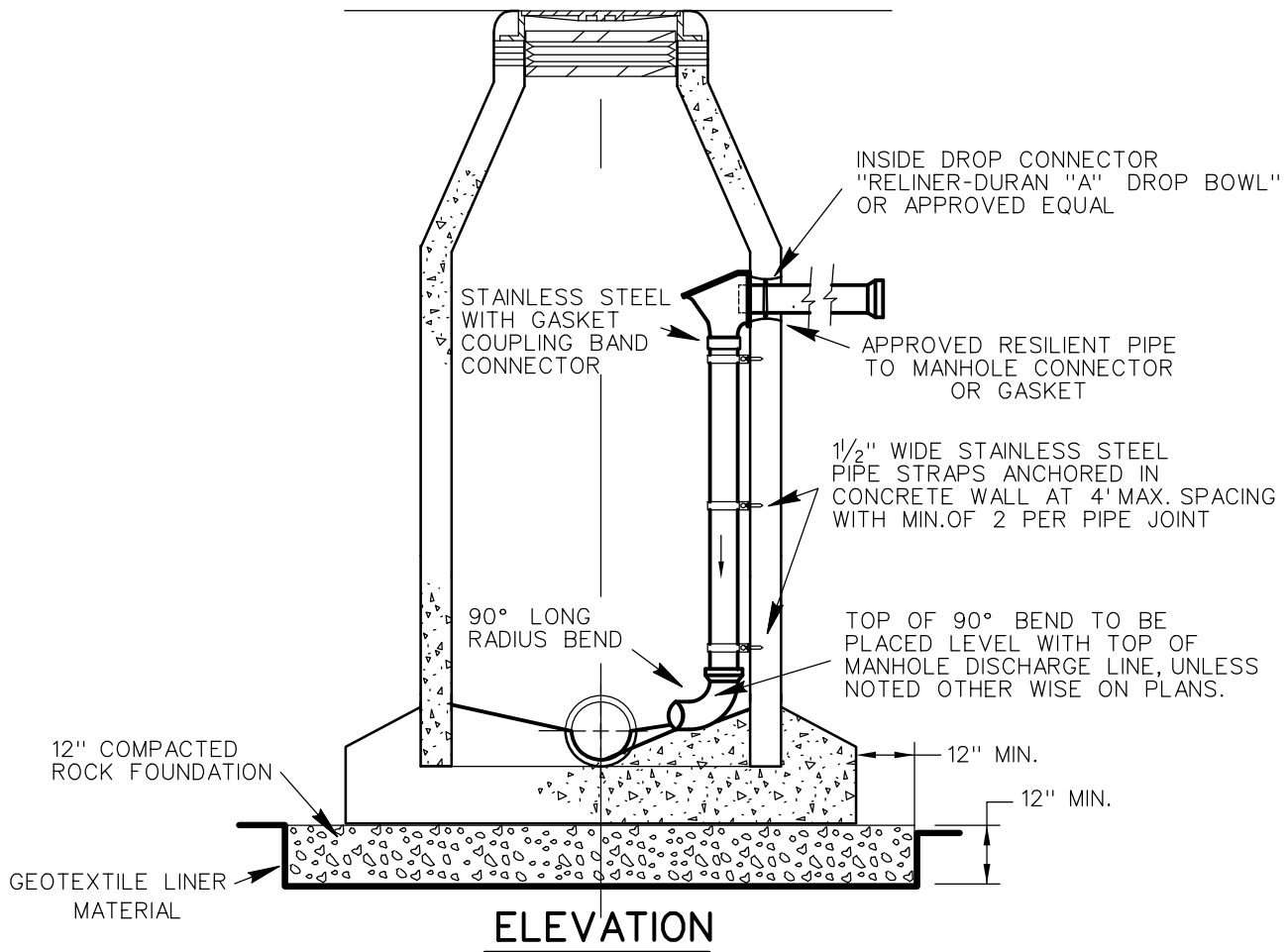
(Page No.)

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DATE

OCT.2010

MANHOLE TYPE-AS
SPECIFIED ON PLANS



SEE GENERAL NOTES
FOR WASTEWATER MANHOLE
CONSTRUCTION - PAGE 302

WASTEWATER MANHOLE
INSIDE DROP CONNECTION

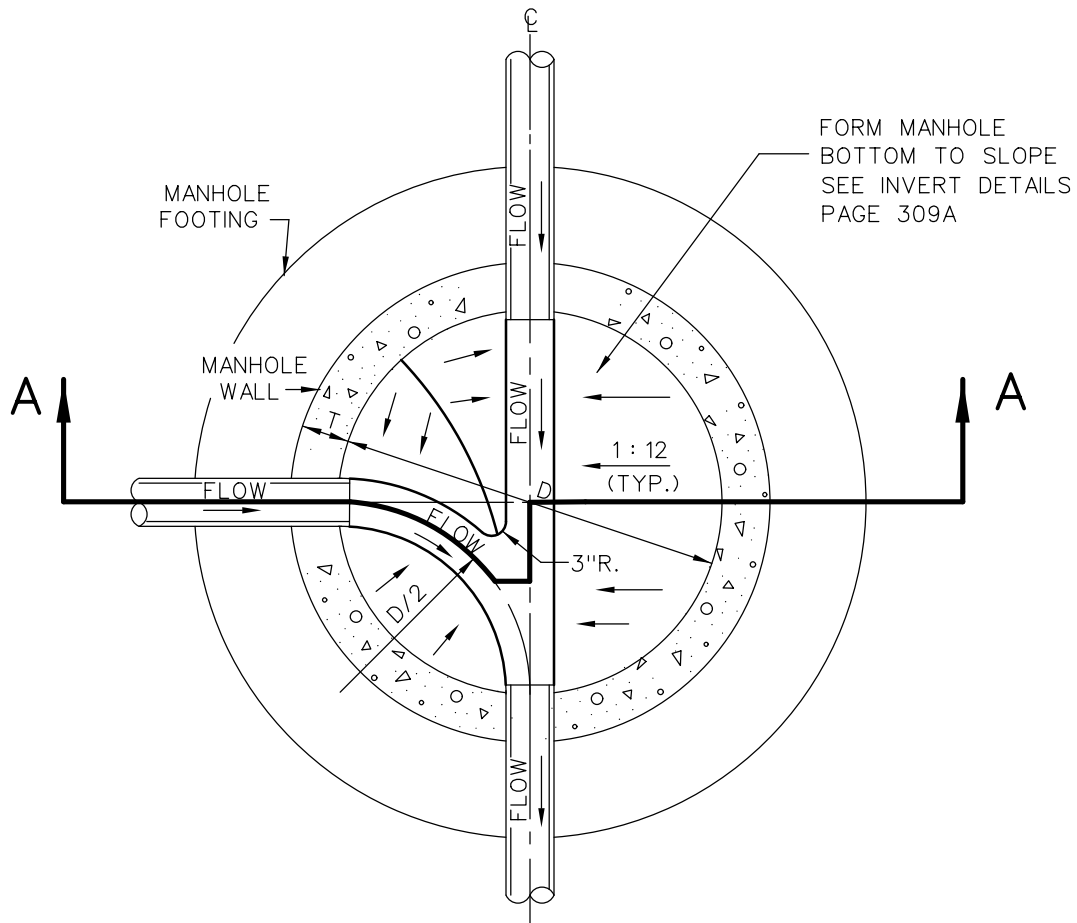
DWU

(Page No.)

308

DATE

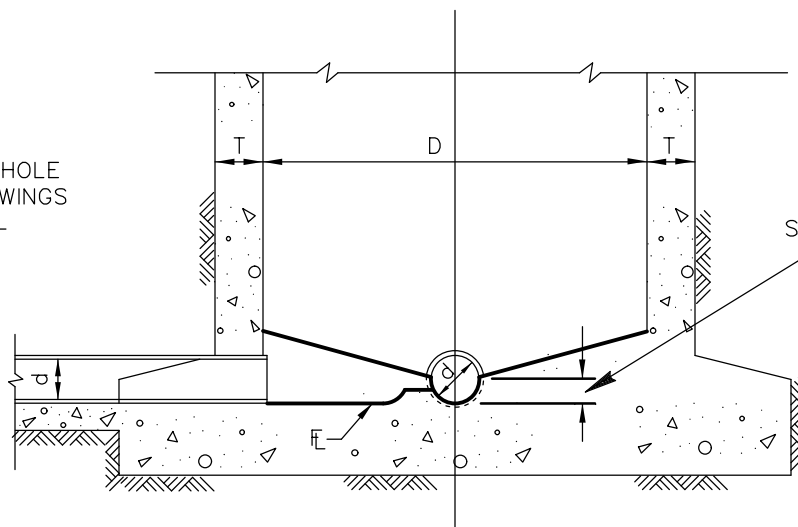
SEP.2010



PLAN
N.T.S.

T = WALL THICKNESS
D = MANHOLE DIAMETER
d = PIPE DIAMETER

NOTE:
REFER TO MANHOLE
STANDARD DRAWINGS
FOR ADDITIONAL
DETAIL OF M.H.



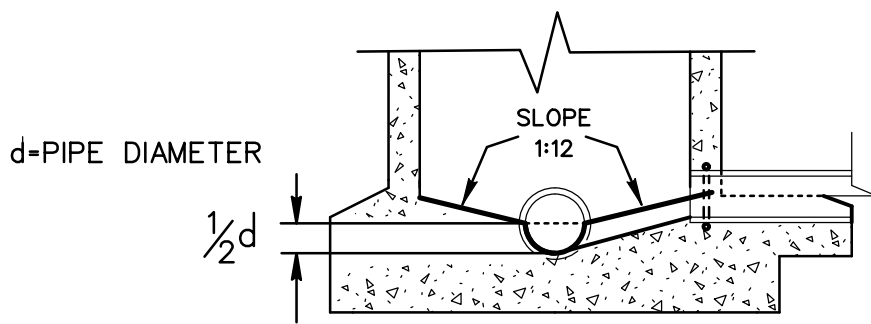
SECTION A-A
N.T.S.

SEE INVERT BENCH DETAILS
PAGE 309A

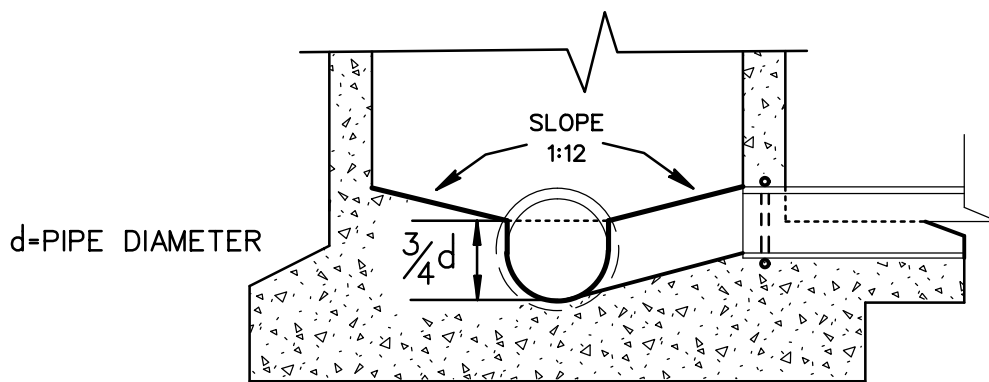
**WASTEWATER MANHOLE
INVERT INTERSECTION DETAIL**

DWU
DATE
DEC.2001

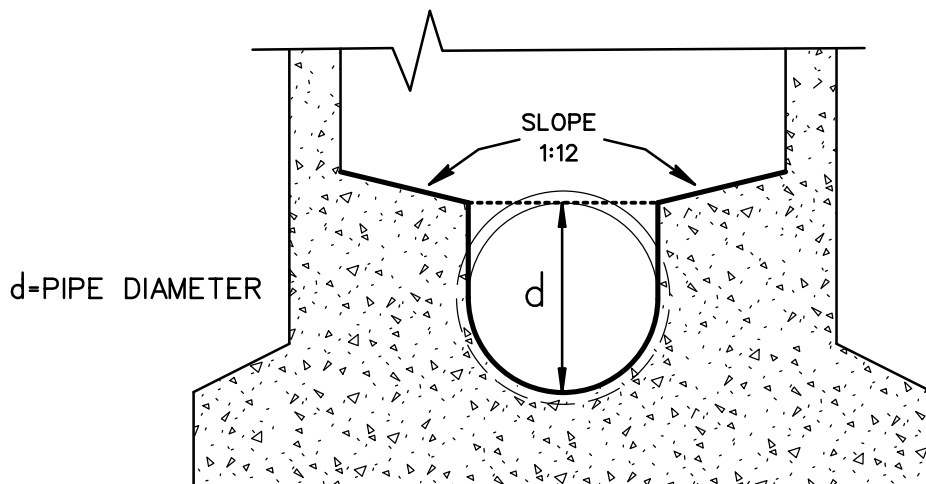
(Page No.)
309



FOR PIPE SMALLER
THAN 15" IN DIAMETER



FOR PIPE FROM
15" TO 24" IN DIAMETER

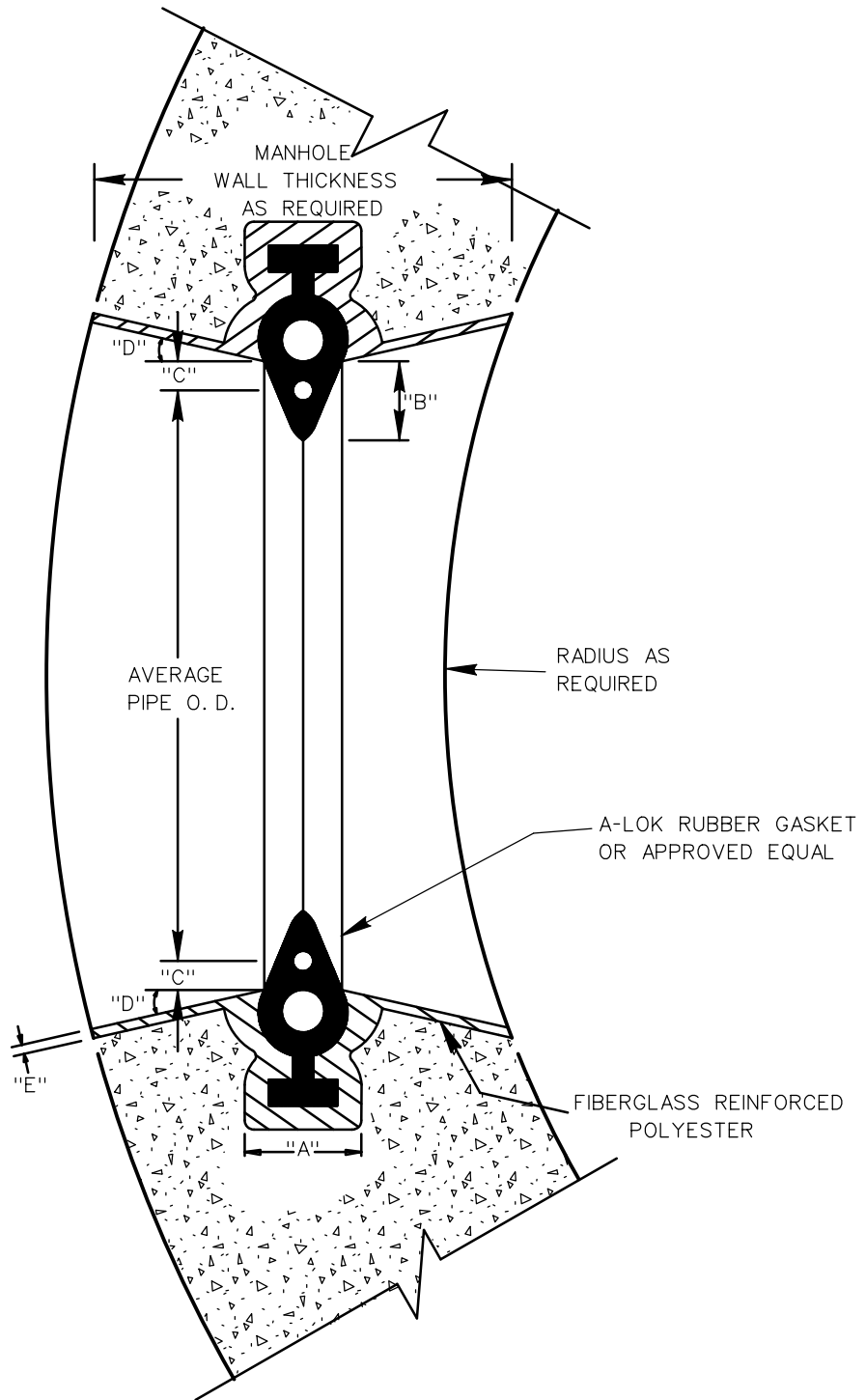


FOR PIPE LARGER
THAN 24" IN DIAMETER

WASTEWATER MANHOLE
INVERT BENCH DETAIL

DWU
DATE
JAN.2001

(Page No.)
309A



DIMENSION FOR MANHOLE PIPE CONNECTOR A.S.T.M. C-923

PIPE SIZE	A	B	C	D	E
4" - 6"	1 1/2"	7/8"	3/8"	10°	1/4"-3/8"
8" - 21"	2 1/8"	1 3/8"	5/8"	10°	1/4"-3/8"
24" - 60"	2 3/8"	1 3/4"	3/4"	10°	1/4"-3/8"

MANHOLE PIPE CONNECTOR
(FOR CAST-IN-PLACE MANHOLES)

DWU

(PAGE No.)
310

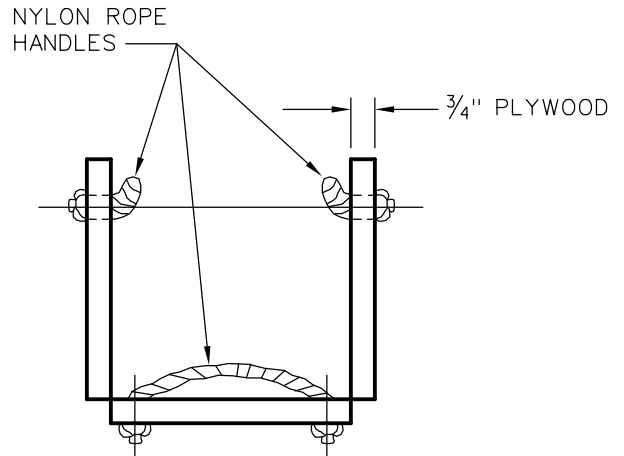
DATE
JAN. 2010

INSTALLATION

FALSE MANHOLE BOTTOM SHALL BE FURNISHED AND INSTALLED IN ALL MANHOLES CONSTRUCTED IN ADVANCE OF PAVING. THESE FALSE MANHOLE BOTTOMS WILL BE INSTALLED AT A TIME DIRECTED BY THE ENGINEER BUT WILL USUALLY BE AFTER ALL WORK IS COMPLETED ON THE WASTEWATER SYSTEM INCLUDING THE AIR TEST, BUT PRIOR TO THE FINAL INSPECTION.

REMOVAL

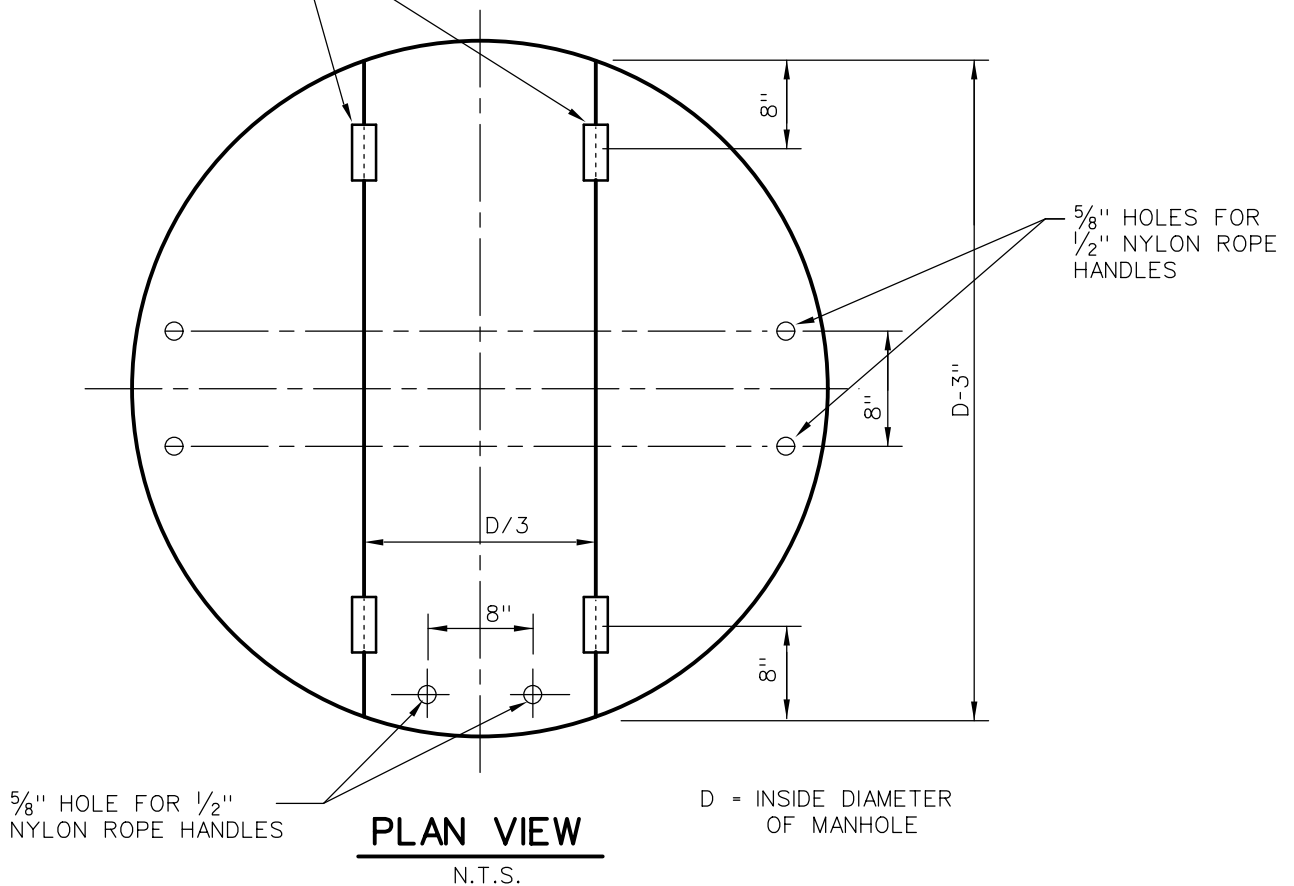
FALSE MANHOLE BOTTOM SHALL BE REMOVED AFTER THE FINAL APPURTENANCE ADJUSTMENT INSPECTION. THE PAVING CONTRACTOR AND OWNER'S REPRESENTATIVE WILL COORDINATE THE REMOVAL OF THE FALSE MANHOLE BOTTOMS.



INSTALLATION AND REMOVAL POSITION

N.T.S.

METAL STRAP HINGES
(MIN. 3" LONG) W/BOLTS



5/8" HOLE FOR 1/2" NYLON ROPE HANDLES

5/8" HOLES FOR 1/2" NYLON ROPE HANDLES

D = INSIDE DIAMETER OF MANHOLE

PLAN VIEW

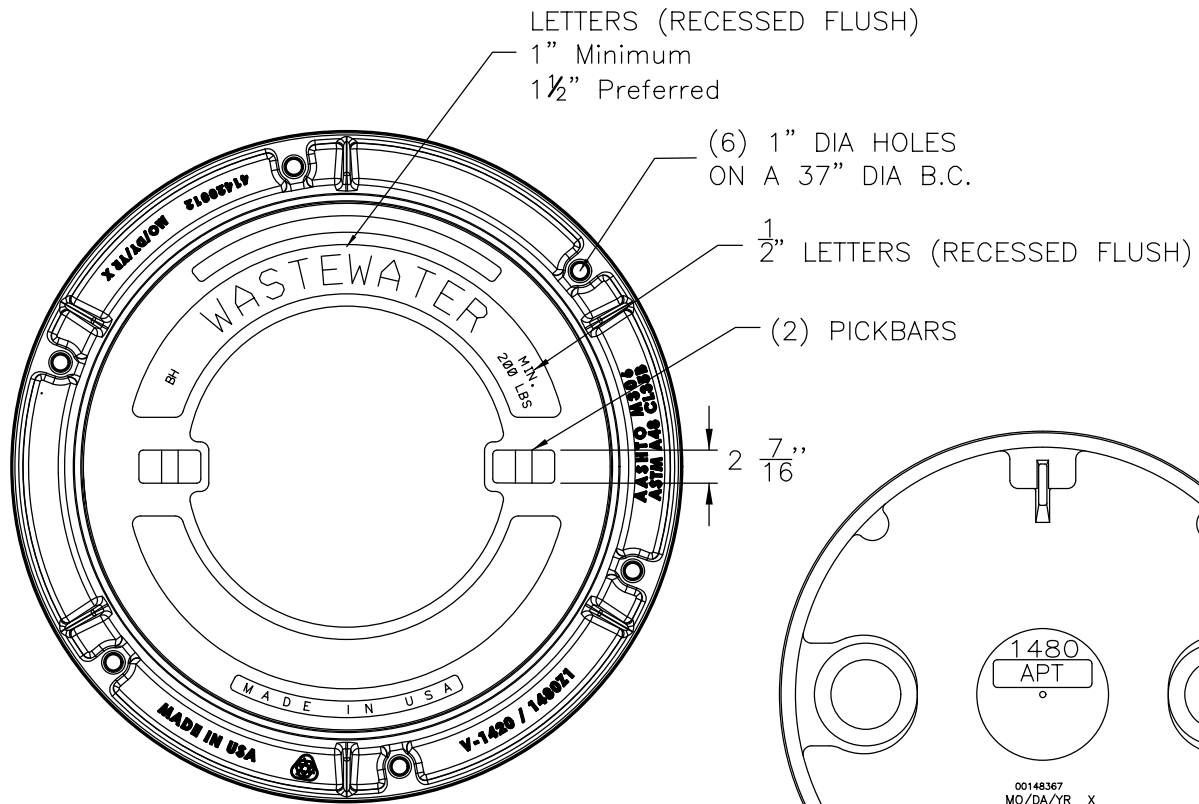
N.T.S.

**WASTEWATER MANHOLE
FALSE BOTTOM**

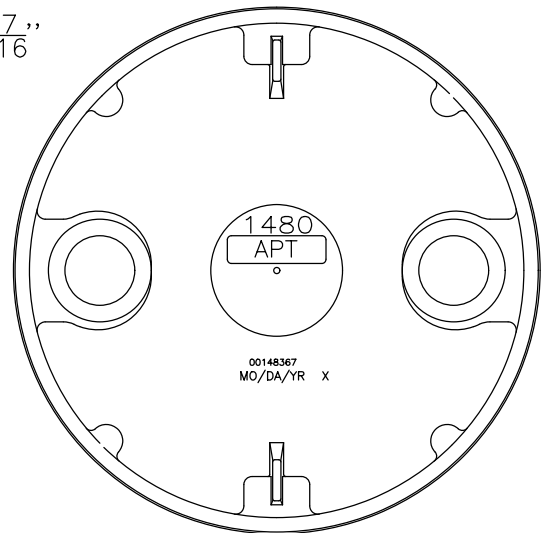
DWU

(Page No.)
311

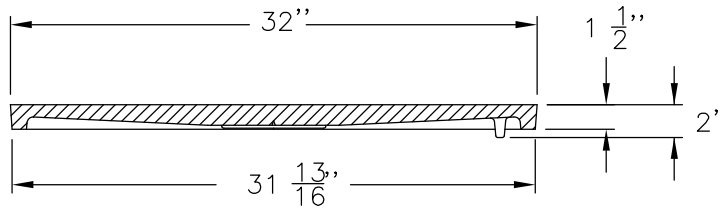
DATE
DEC.2001



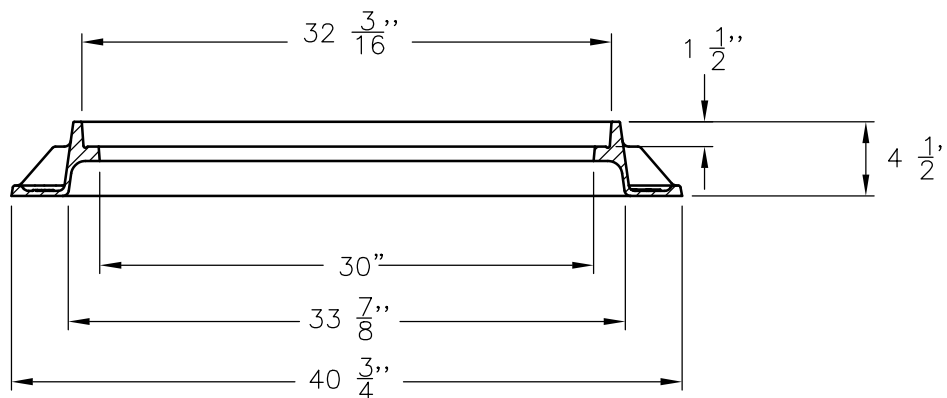
PLAN VIEW



BOTTOM VIEW OF COVER



COVER SECTION



LID MAY BE IDENTIFIED WITH EITHER "WASTEWATER" OR "SANITARY SEWER"

COVER - GRAY IRON
ASTM A48 CL35B
FRAME - GRAY IRON
ASTM A48 CL35B

**STANDARD 32"
C.I. M.H. FRAME & COVER**

WASTEWATER

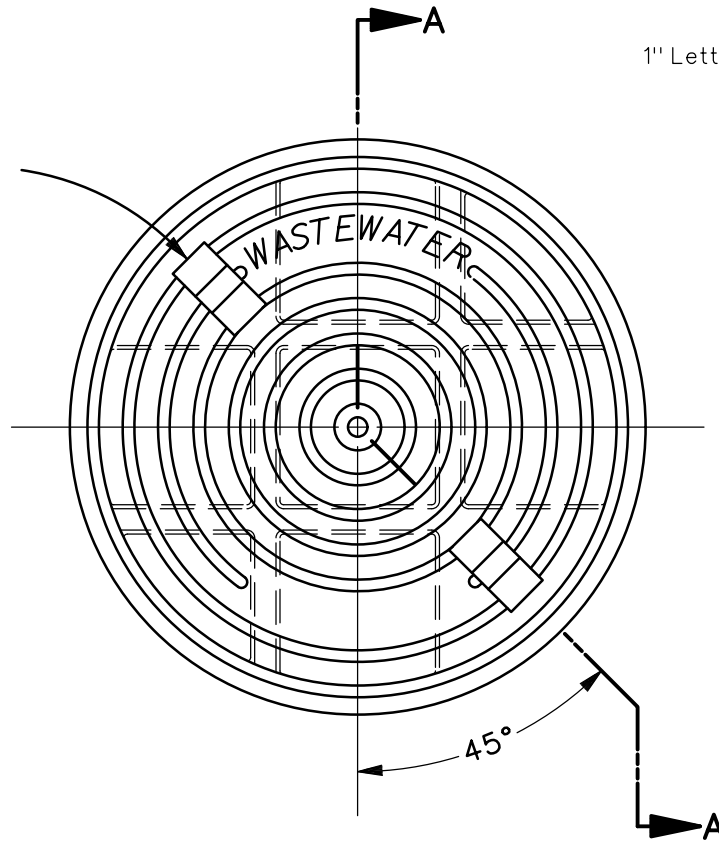
DWU
DATE
OCT.2011

(PAGE No.)
312

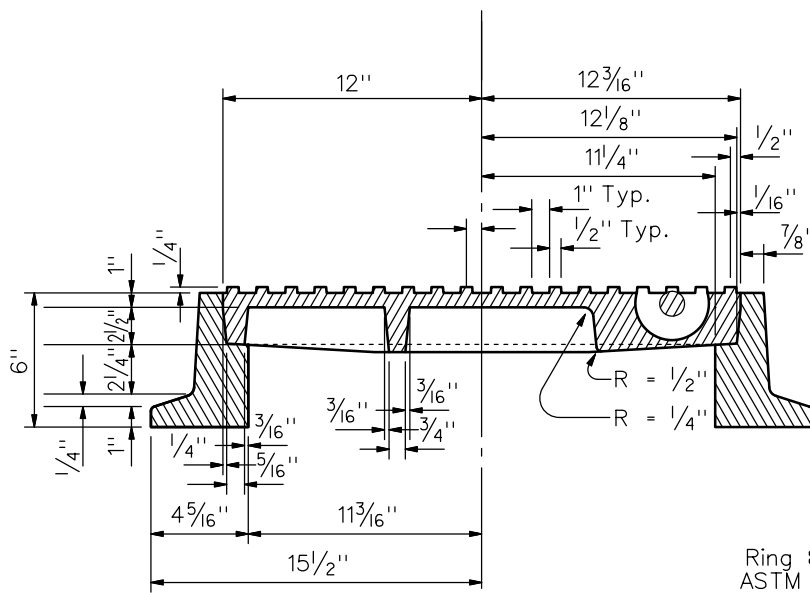
NOT TO BE USED FOR NEW CONSTRUCTION

2 - 2" x 3³/₄" Pick Slots
With 2 - 1" Dia. Steel Rods

1" Letters Raised 1/4"



PLAN



SECTION "A-A"

Ring & Cover Material per
ASTM A48 Class 35B Min.
Gray Iron Castings.

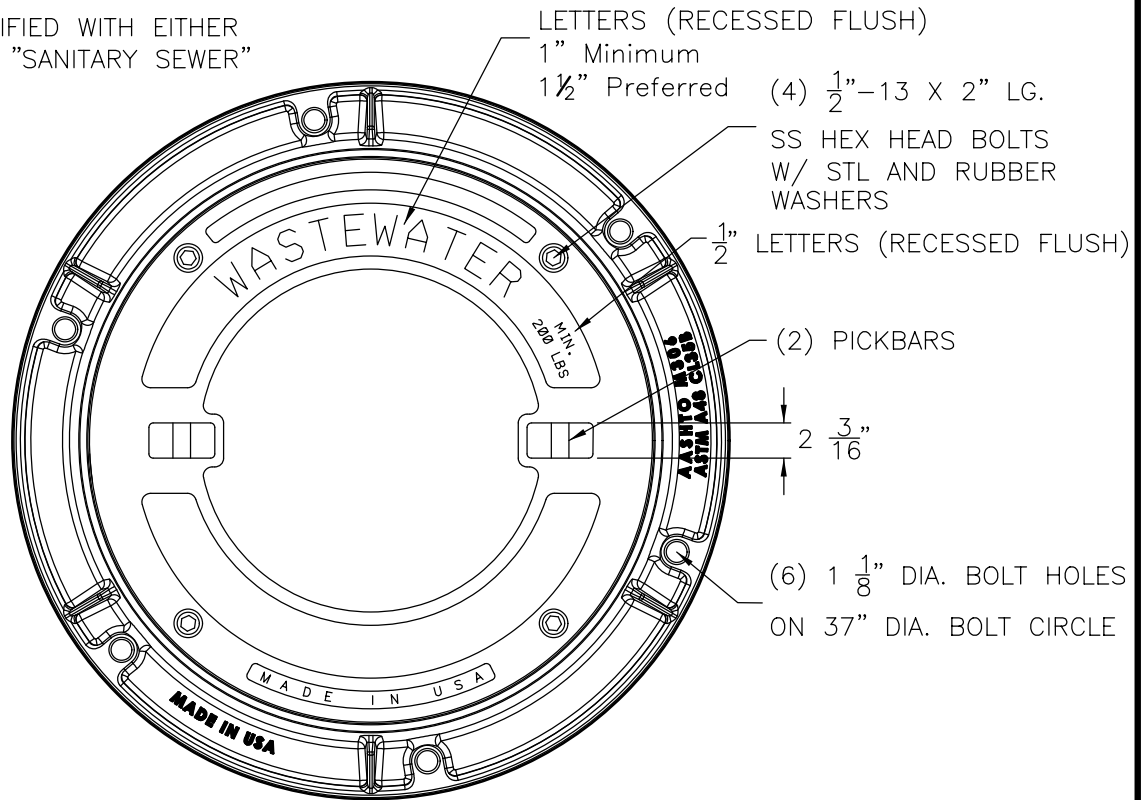
STANDARD 24"
C.I. M.H. FRAME & COVER

DWU

(PAGE No.)
312A

DATE
JAN. 2010

LID MAY BE IDENTIFIED WITH EITHER
"WASTEWATER" OR "SANITARY SEWER"



LETTERS (RECESSED FLUSH)
1" Minimum
1 1/2" Preferred (4) 1/2"-13 X 2" LG.

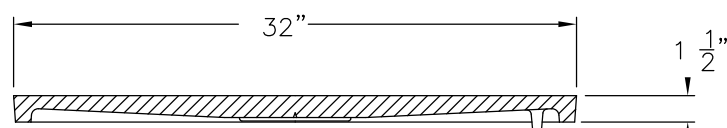
SS HEX HEAD BOLTS
W/ STL AND RUBBER
WASHERS

1/2" LETTERS (RECESSED FLUSH)

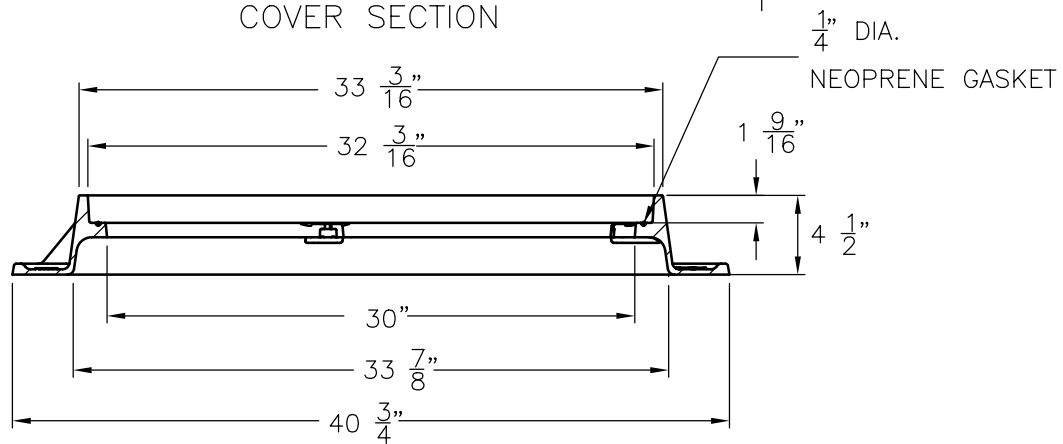
(2) PICKBARS

2 3/16"

(6) 1 1/8" DIA. BOLT HOLES
ON 37" DIA. BOLT CIRCLE

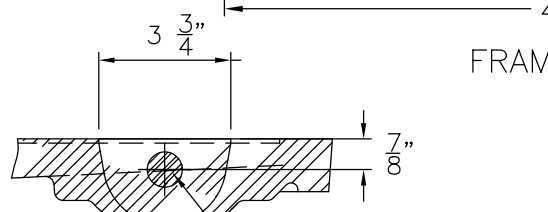


COVER SECTION

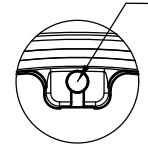


FRAME SECTION

1/4" DIA.
NEOPRENE GASKET



PICKBAR DETAIL



FRAME BOLTING DETAIL

EON LOCK™ OR EQUAL
POCKETS FOR 1/2"-13 SQ NUT
ON A 29 3/8" DIA. B.C. (TYP)

COVER - GRAY IRON
ASTM A48 CL35B
FRAME - GRAY IRON
ASTM A48 CL35B

32" PRESSURE TYPE
CAST-IRON MH. FRAME & COVER

WASTEWATER

DWU

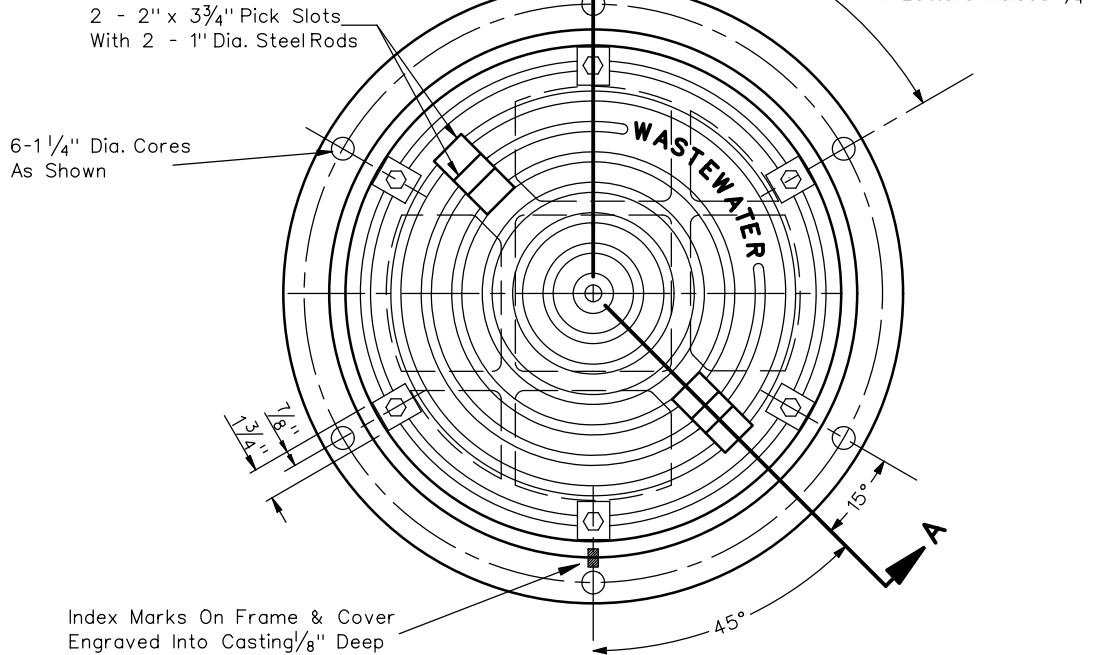
DATE
OCT. 2011

(PAGE No.)
313

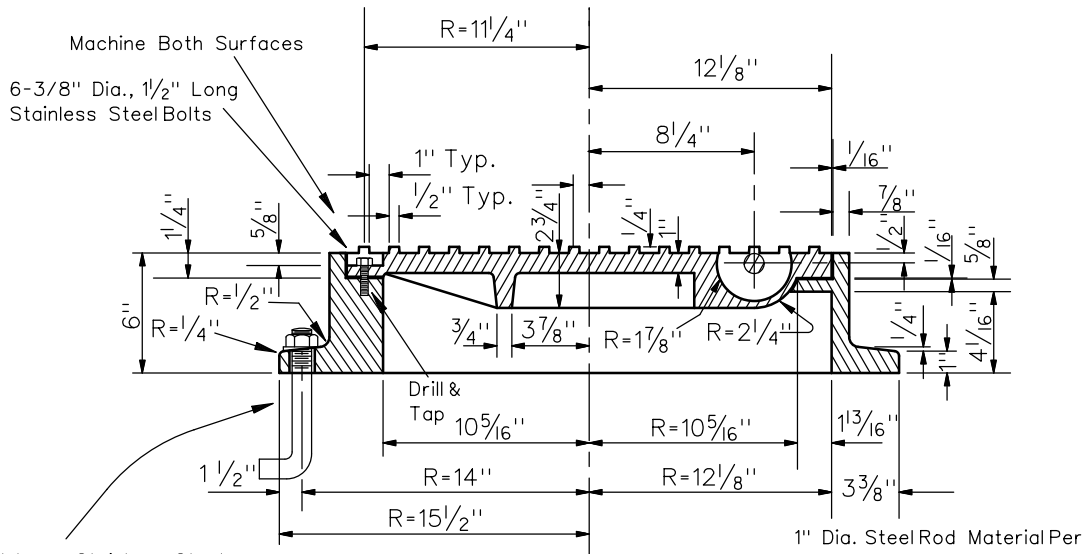
NOT TO BE USED FOR NEW CONSTRUCTION

NOTE:

For Seal Between Frame & Cover Use
 Either A 1/6" Copper Gasket Or A 1/4" Dia.
 Neoprene O-Ring Gasket (Location Of Ring
 Is Left To Mfr., But Subject To Approval By
 Construction Engineer.



PLAN



SECTION "A-A"

1" Dia.-6" Long Stainless Steel
 Anchor Bolts w/Hex. Head Nut
 6-Required

1" Dia. Steel Rod Material Per
 Item 2.11.5 (b) (2)
 Ring & Cover Material Per
 Item 2.11.5 (c)

Ring & Cover Material per
 ASTM A48 Class 35B Min.
 Gray Iron Castings.

**24" PRESSURE TYPE
 CAST-IRON MH. FRAME & COVER**

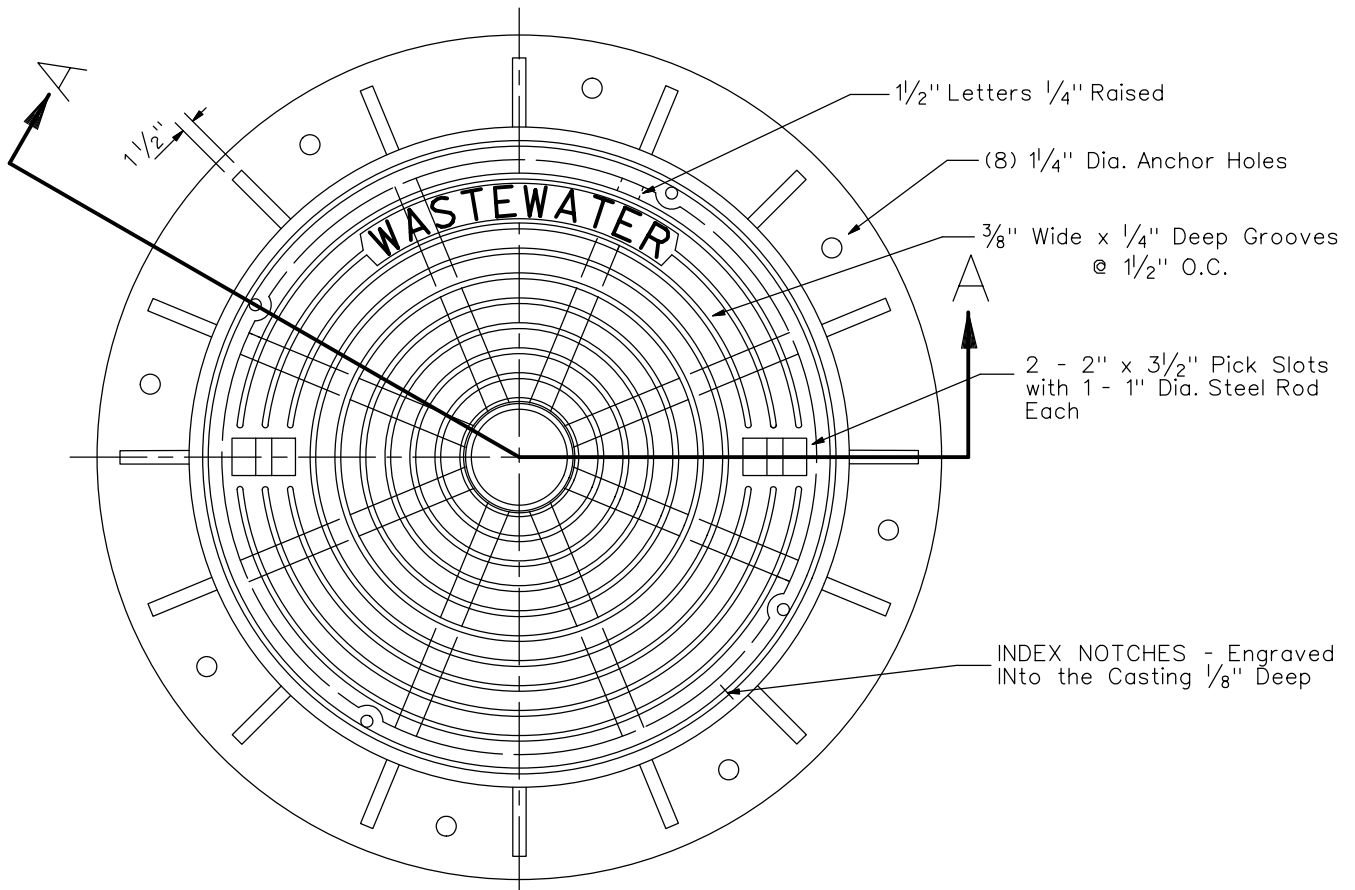
DWU

(PAGE No.)
313A

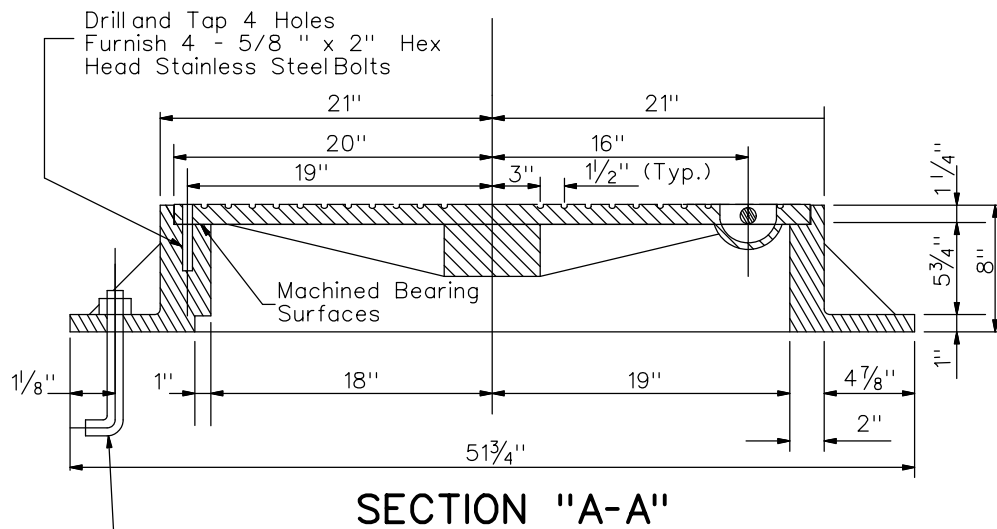
DATE
JAN. 2010

NOTE: For seal between frame and cover use either a $\frac{1}{16}$ " thick copper gasket or a $\frac{1}{4}$ " diameter neoprene "O"-ring. Location of the "O"-ring is left to the manufacturer, but subject to approval by DWU Construction Engineer.

LID MAY BE IDENTIFIED WITH EITHER "WASTEWATER" OR "SANITARY SEWER"



PLAN



SECTION "A-A"

Drill and Tap 4 Holes
Furnish 4 - $\frac{5}{8}$ " x 2" Hex Head Stainless Steel Bolts

Machined Bearing Surfaces

1" Dia. - 6" Long Stainless Steel Anchor Bolts w/ Hex Head Nuts
8 Required

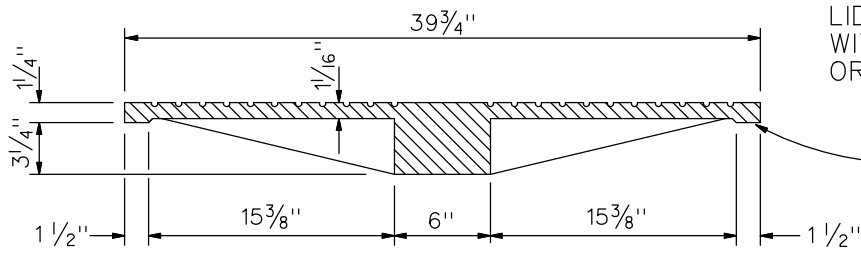
Ring & Cover Material per ASTM A48 Class 35B Min. Gray Iron Castings.

**40" PRESSURE TYPE CAST IRON
M.H. FRAME & COVER**

DWU

(PAGE NO.)
314

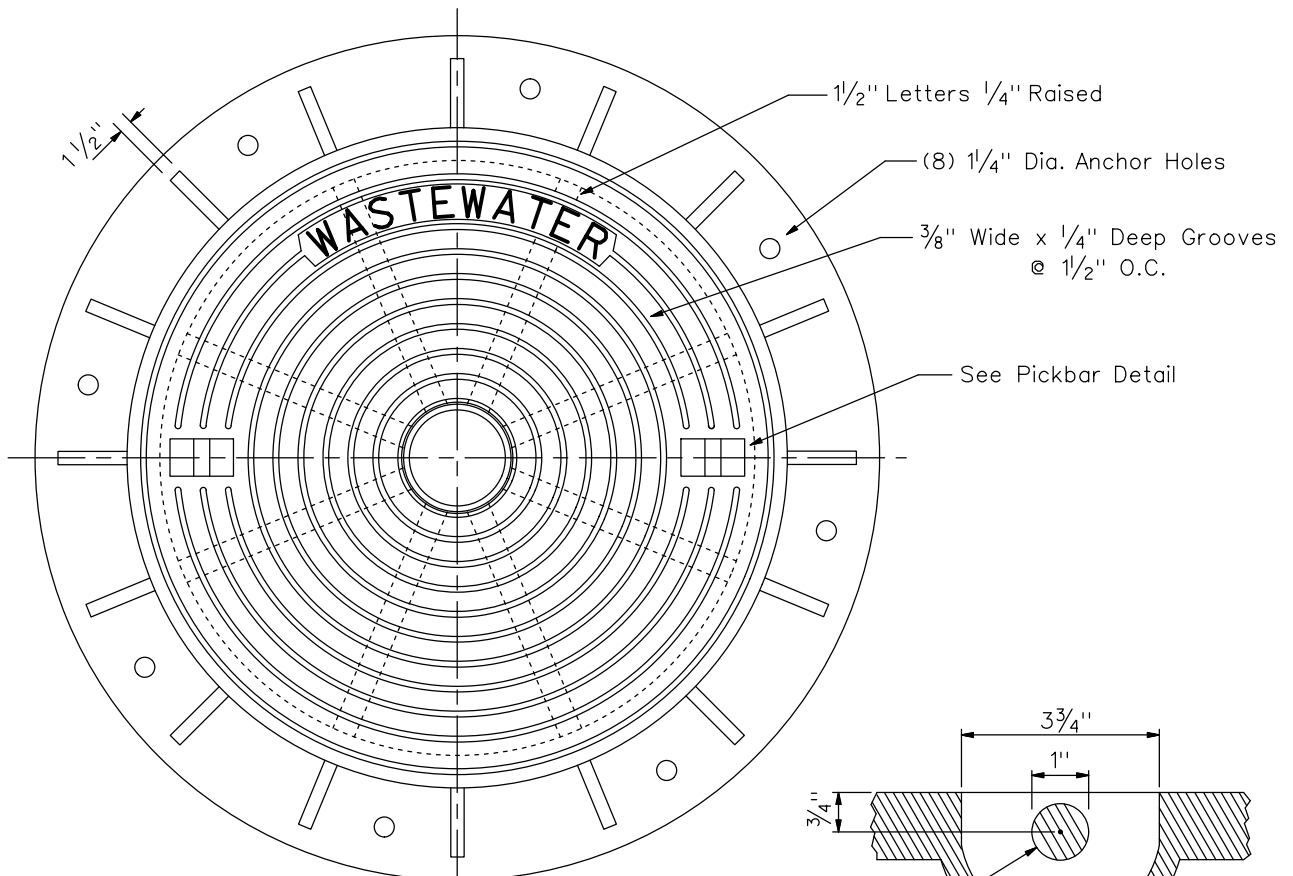
DATE
JAN. 2010



LID MAY BE IDENTIFIED WITH EITHER "WASTEWATER" OR "SANITARY SEWER"

Machined Bearing Surface

SECTION THRU COVER



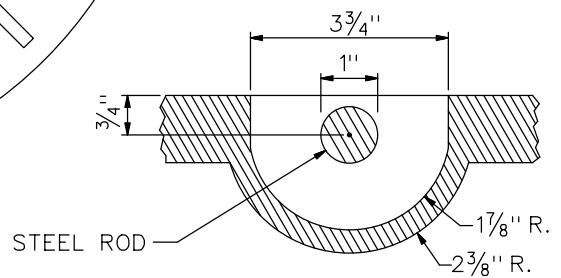
1/2" Letters 1/4" Raised

(8) 1/4" Dia. Anchor Holes

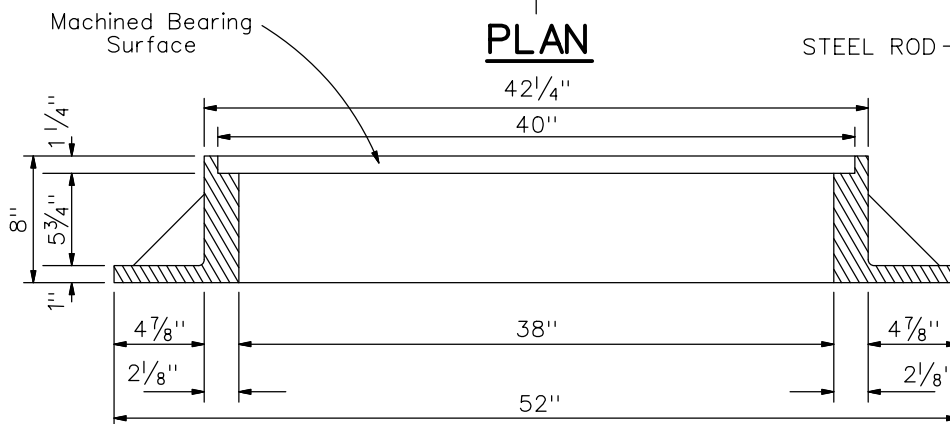
3/8" Wide x 1/4" Deep Grooves @ 1/2" O.C.

See Pickbar Detail

PLAN



PICKBAR DETAIL



Machined Bearing Surface

SECTION THRU FRAME

Ring & Cover Material per ASTM A48 Class 35B Min. Gray Iron Castings.

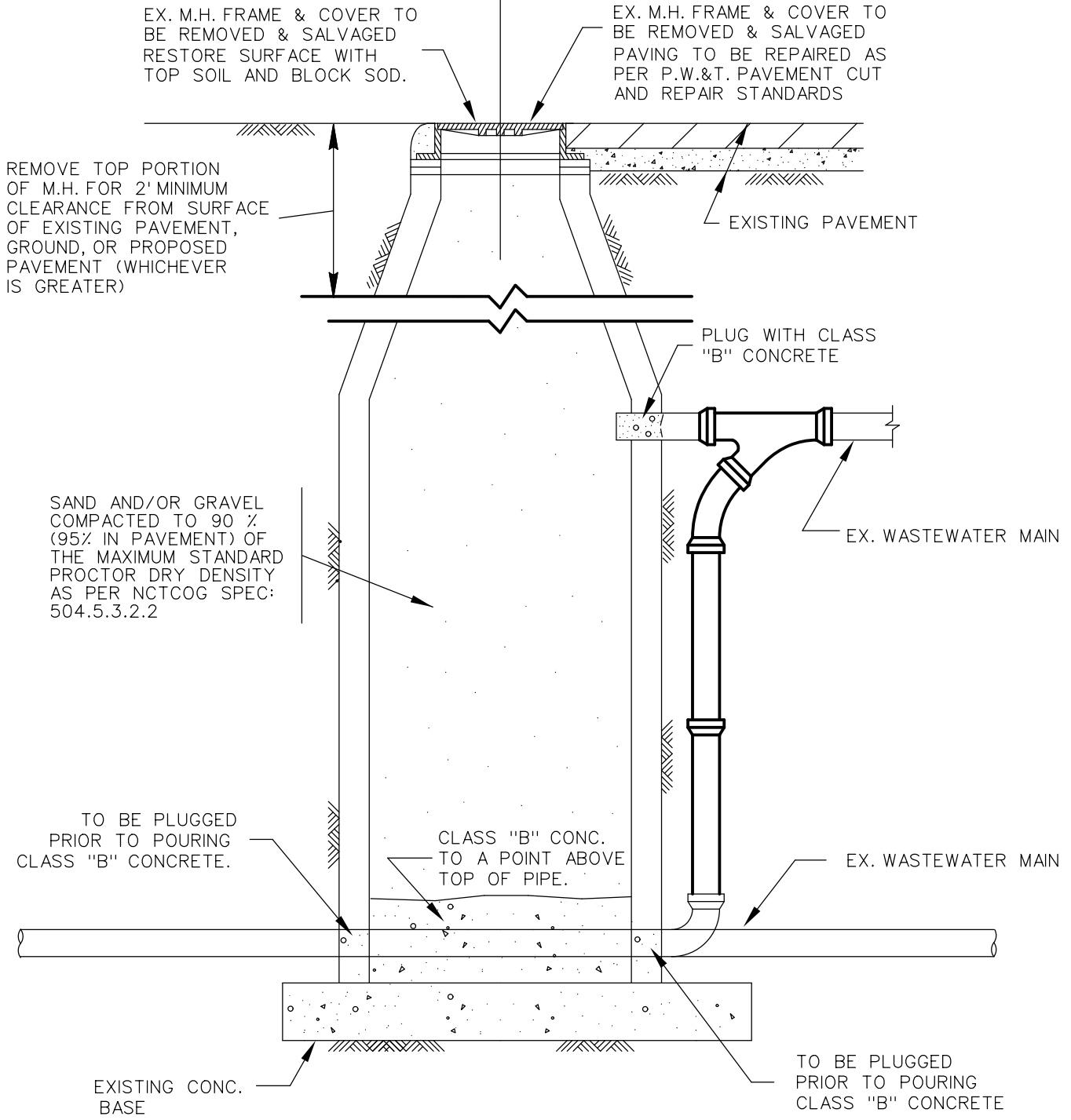
**STANDARD 40" MANHOLE
FRAME AND COVER**

DWU

(PAGE NO.)
315

DATE
DEC. 2001

OUT OF PAVEMENT IN PAVEMENT
 ← N.T.S. N.T.S. →

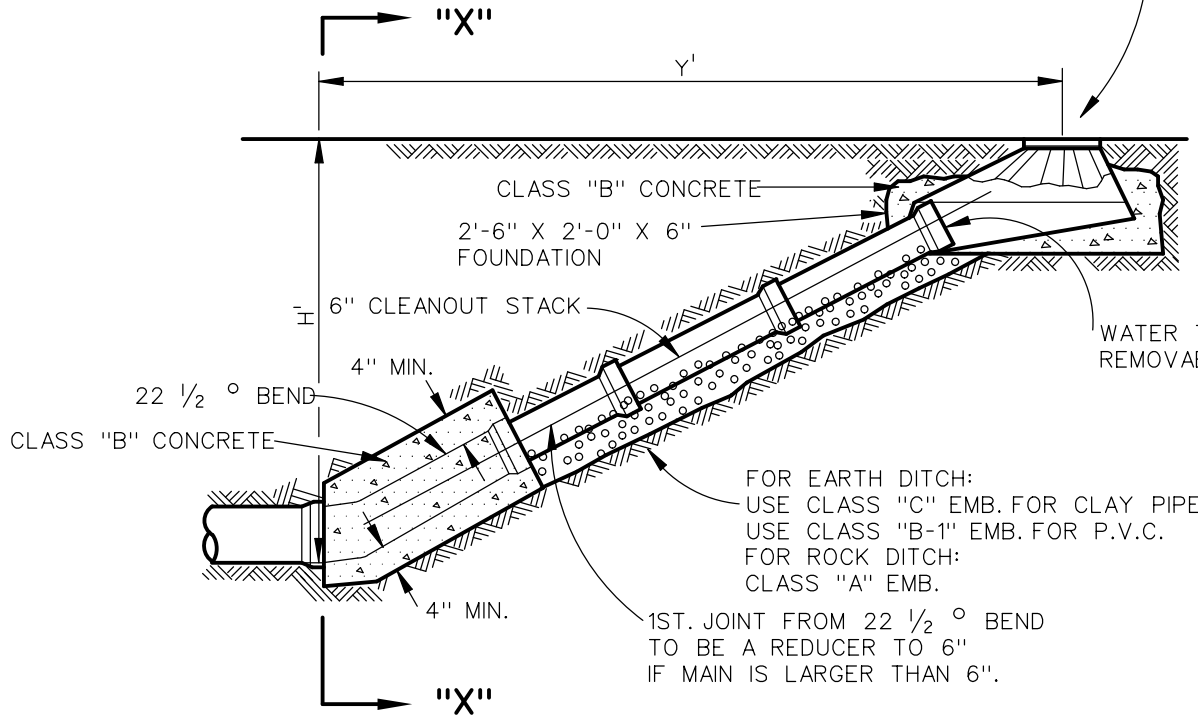


NCTCOG Spec: 504.5.3.2.2. - Densities - Areas Not Subjected To Or Influenced By Vehicular Traffic
 2009 DWU Addendum: 504.5.3.2.2.DWU: Densities - Areas Not Subjected To Or Influenced By Vehicular Traffic

ABANDONMENT OF MANHOLE IN OR OUT OF PAVEMENT	DWU	(Page No.) 316
	DATE OCT.2010	

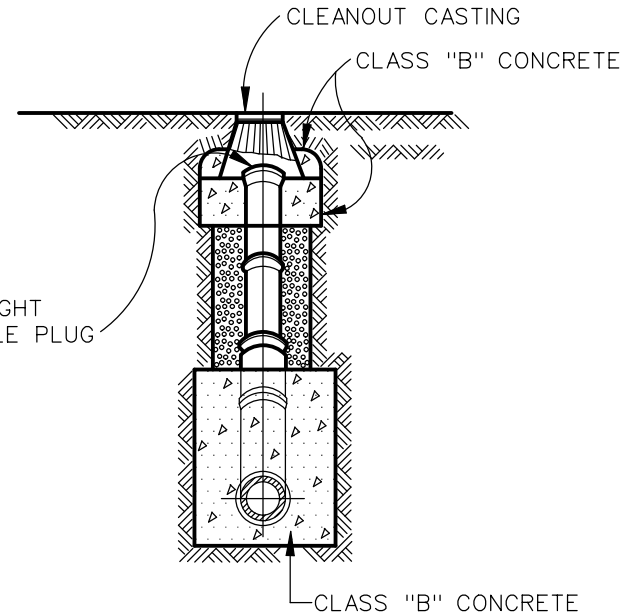
H'	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	H'
Y'	10	12	14	17	19	22	24	27	29	31	34	36	39	41	43	46	48	Y'

CLEANOUT CASTING OPENING TO BE INSTALLED CENTERED OVER THE CENTERLINE OF THE CLEANOUT STACK EXTENDED TO GROUND LEVEL.



FOR EARTH DITCH:
USE CLASS "C" EMB. FOR CLAY PIPE
USE CLASS "B-1" EMB. FOR P.V.C.
FOR ROCK DITCH:
CLASS "A" EMB.

1ST. JOINT FROM 22 1/2 ° BEND
TO BE A REDUCER TO 6"
IF MAIN IS LARGER THAN 6".

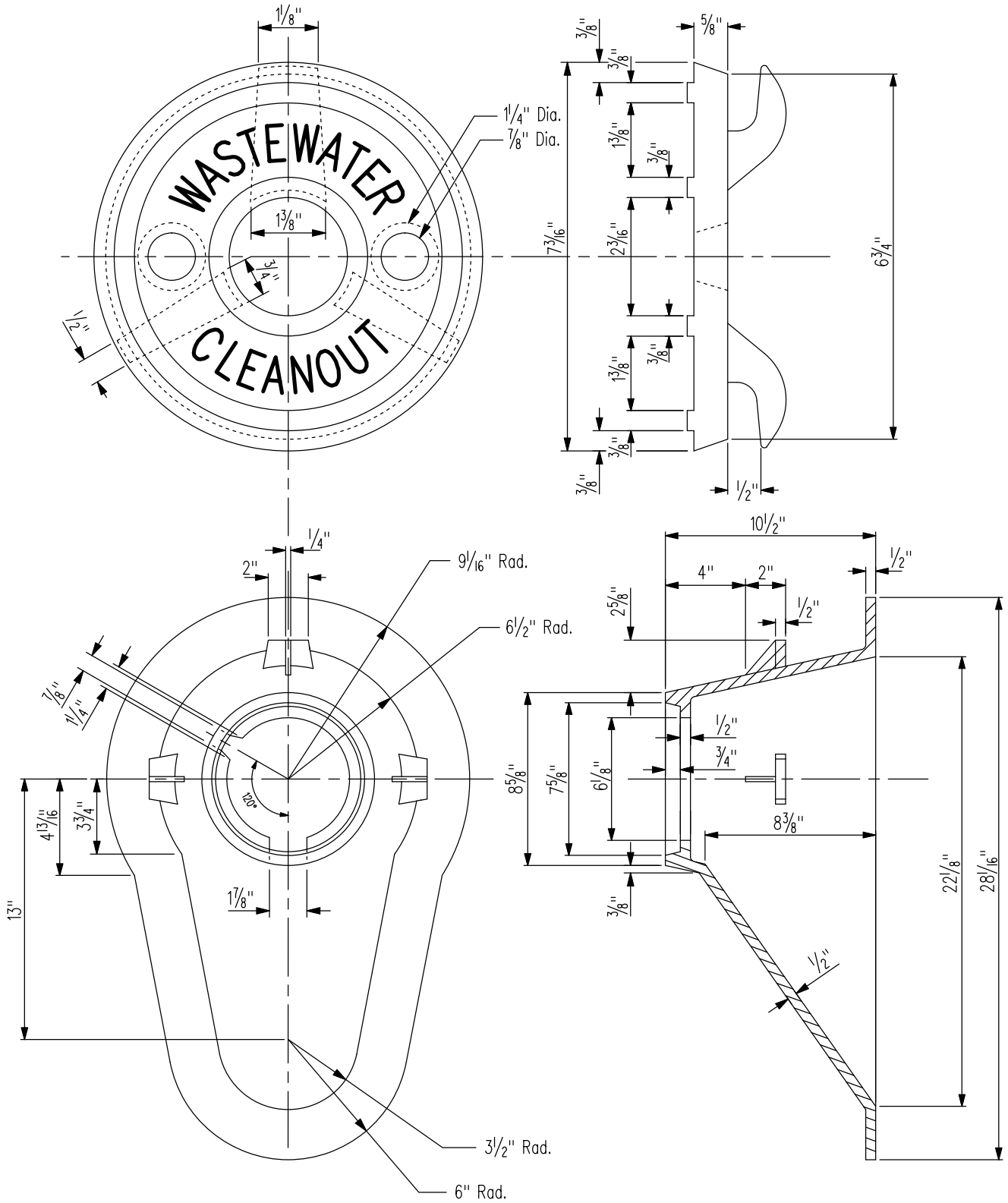


SECTION "X - X"
N.T.S.

PROFILE VIEW
N.T.S.

NOTE:
IF CLEANOUT IS PLACED IN ADVANCE OF PAVEMENT PLACE SAND AROUND CLEANOUT CASTING IN LIEU OF CLASS "B" CONCRETE.

WASTEWATER MAIN CLEANOUT	DWU	(Page No.) 317
	DATE JAN.2001	

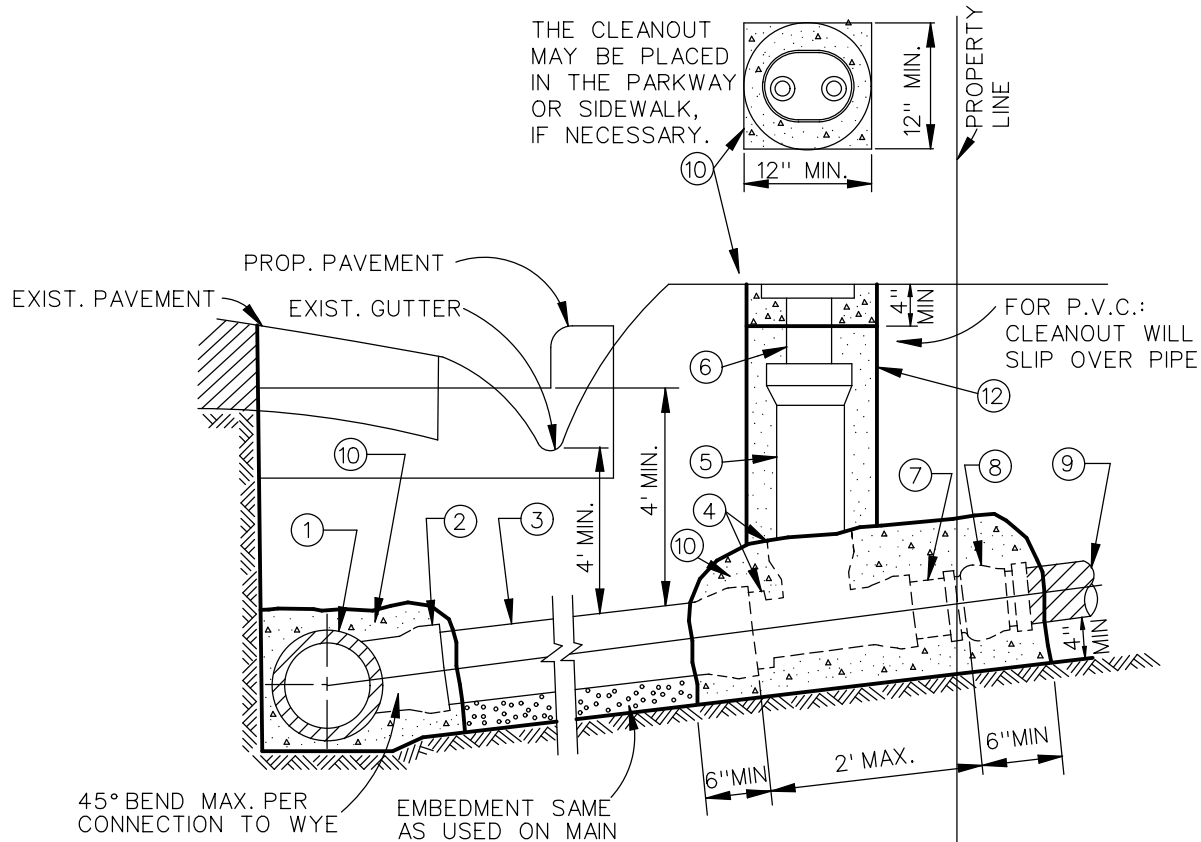


**CAST IRON C.O. CASTING
FOR WASTEWATER MAINLINE**

DWU	(PAGE No.) 318
	DATE JAN. '98

KEY:

- ①. WASTEWATER MAIN
- ②. 6" WYE OR TAPPING SADDLE (SEE NOTE 8)
- ③. 6" WASTEWATER LAT. (LENGTH VARIES)
- ④. 6" X 4" RED. AND 4" X 4" TEE OR 6" X 4" TEE.
- ⑤. 4" STACK (LENGTH VARIES)
- ⑥. 4" WASTEWATER LAT. CLEANOUT CASTING
- ⑦. 4" WASTEWATER PIPE (LENGTH VARIES)
- ⑧. ADAPTOR
- ⑨. BUILDING SEWER LAT.
- ⑩. CLASS "B" CONCRETE
- ⑪. 6" X 4" REDUCER
- ⑫. COMPACTED AS SPECIFIED, OR INUNDATED SAND



NOTES:

1. CLEANOUT CASTING TO BE FURNISHED AND PLACED PER SPECIAL CONDITIONS. IN VEHICLE TRAFFIC AREAS AND FOR COMMERCIAL MAINLINE LATERALS, WASTEWATER CLEANOUT SHALL BE OF CAST IRON.
2. SLOPE OF LATERAL TO BE 1% MIN., 2% MAX. UNLESS INSTRUCTED OTHERWISE BY OWNER.
3. THE WASTEWATER LATERAL SHALL BE CONNECTED TO BUILDING LATERAL AND CONSTRUCTED IN SUCH MANNER AS TO CLEAR EXISTING UTILITES AND PROPOSED FACILITIES SUCH AS STORM SEWER MAINS, PAVING, SIDEWALKS, RETAINING WALLS, ETC. VERTICAL BENDS (22.5° MAX.) MAY BE USED IF APPROVED BY OWNER.
4. THE MAINLINE LATERAL CONNECTION TO THE PRIVATE BUILDING LATERAL SHALL BE AS CLOSE TO THE PROPERTY LINE AS POSSIBLE.
5. INSTALL 4" STOPPER OR CAP AT PROPERTY LINE IF BUILDING LATERAL DOES NOT EXIST.
6. SUBSTITUE 4" FOR 6" FITTINGS IF PLANS OR SPEC. COND. CALL FOR 4" LATERALS.
7. THE CLEANOUT STACK & CASTING MAY BE PLACED IN THE PARKWAY, VEHICLE TRAFFIC AREAS, OR SIDEWALK, IF NECESSARY.
8. TAPPING SADDLES CAN ONLY BE USED IN CONJUNCTION WITH PIPE BURSTING OR IF THE EXISTING MAIN IS 10" OR LARGER.

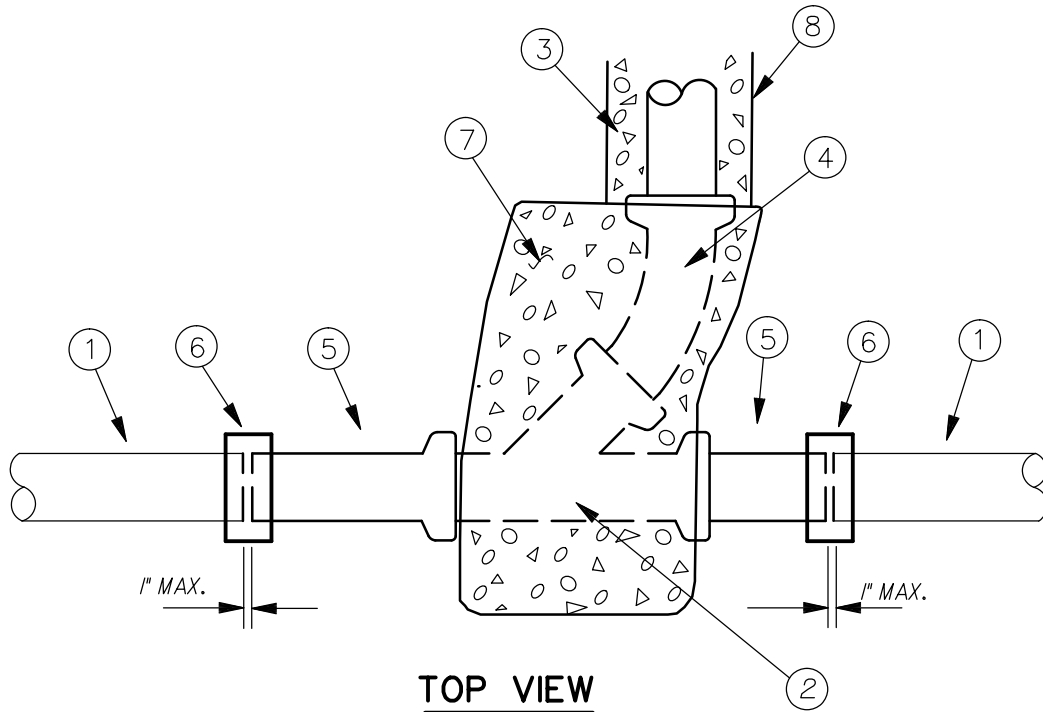
WASTEWATER LATERALS WITH CLEANOUT

DWU
DATE
OCT. 2011

KEY

- ① WASTEWATER MAIN
- ② WYE (45° MAX.)
- ③ MAINLINE LATERAL
- ④ 45° BEND (MAX.)

- ⑤ ADAPTOR
- ⑥ RUBBER SLEEVE COUPLING OR PVC ADAPTER COUPLING
- ⑦ CLASS "B" CONCRETE
- ⑧ EMBEDMENT SAME AS USED ON MAIN.

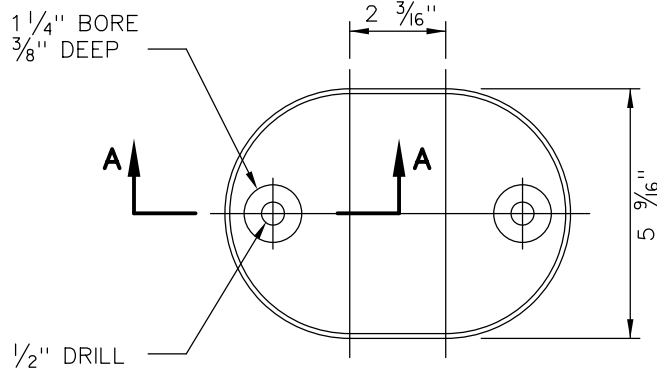


NOTES :

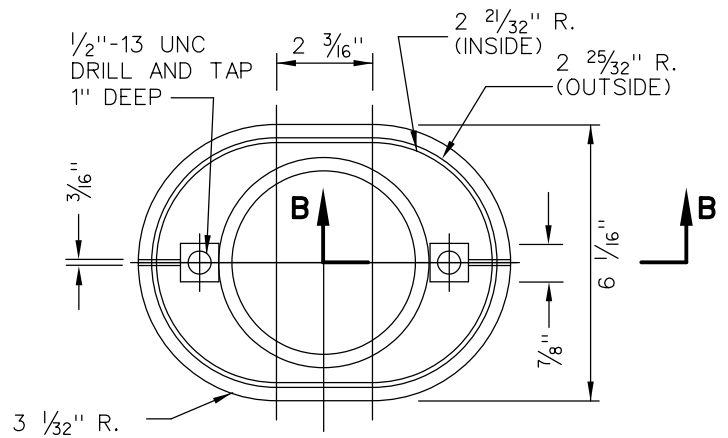
- A) THE WYE AND ADAPTORS INSTALLED SHALL BE OF THE SAME MATERIAL AS THE WASTEWATER MAINLINE.
- B) THE WYE AND ADAPTORS SHALL BE ASSEMBLED PRIOR TO INSTALLATION.
- C) CONNECTIONS TO THE EXISTING MAIN SHALL BE MADE USING A RUBBER SLEEVE COUPLING WITH STAINLESS STEEL BAND CLAMPS. THE CLAMPS SHALL BE TIGHTENED TO THE TORQUE RECOMMENDED BY THE MANUFACTURER.
- D) THE EMBEDMENT USED SHALL BE EQUAL TO THAT USED FOR THE MAINLINE SEWER.

NOTE: THIS DETAIL SHALL NOT BE USED FOR THOSE CASES WHERE 150 PSI PVC IS REQUIRED BY T.C.E.Q.

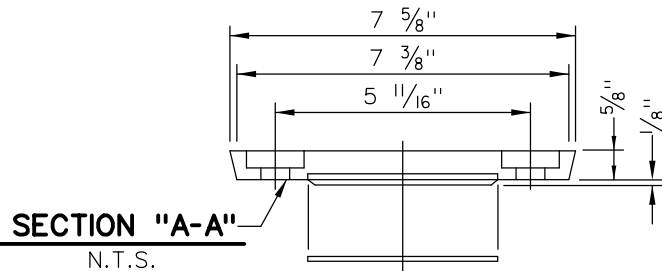
WASTEWATER LATERAL WYE CONNECTION TO THE EXISTING MAINLINE		DWU	(PAGE No.) 320
		DATE JAN. 2010	



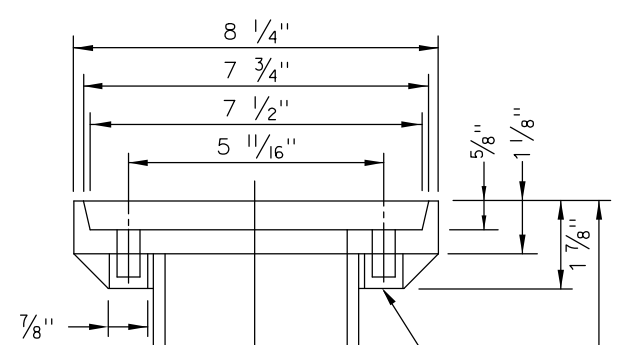
COVER
N.T.S.



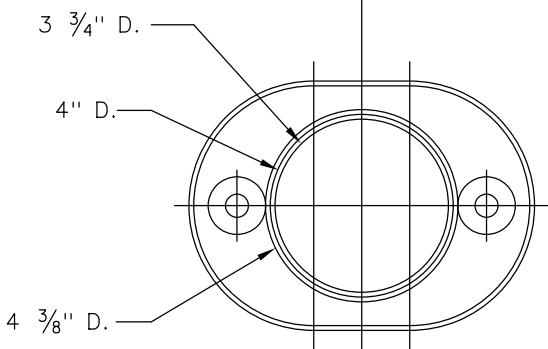
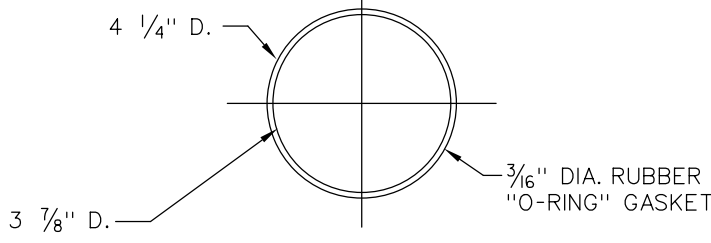
CLEANOUT FRAME TOP
N.T.S.



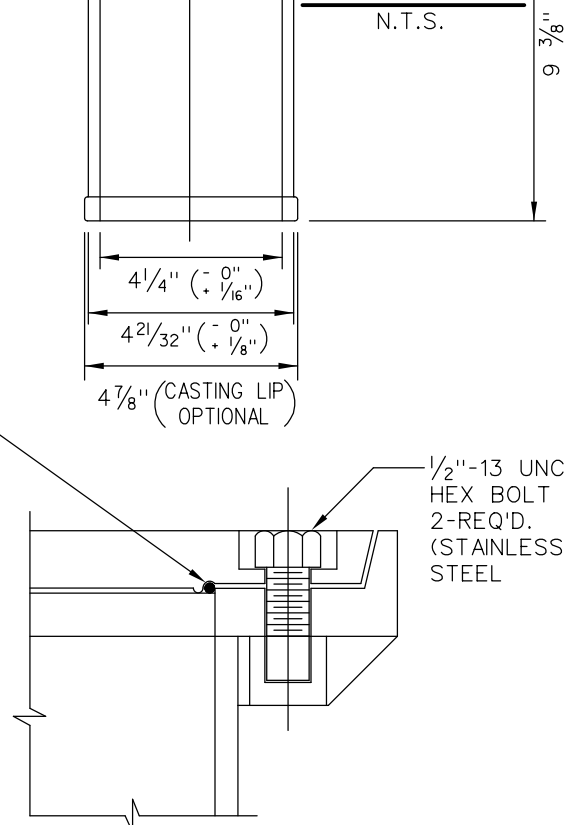
SECTION "A-A"
N.T.S.



SECTION "B-B"
N.T.S.



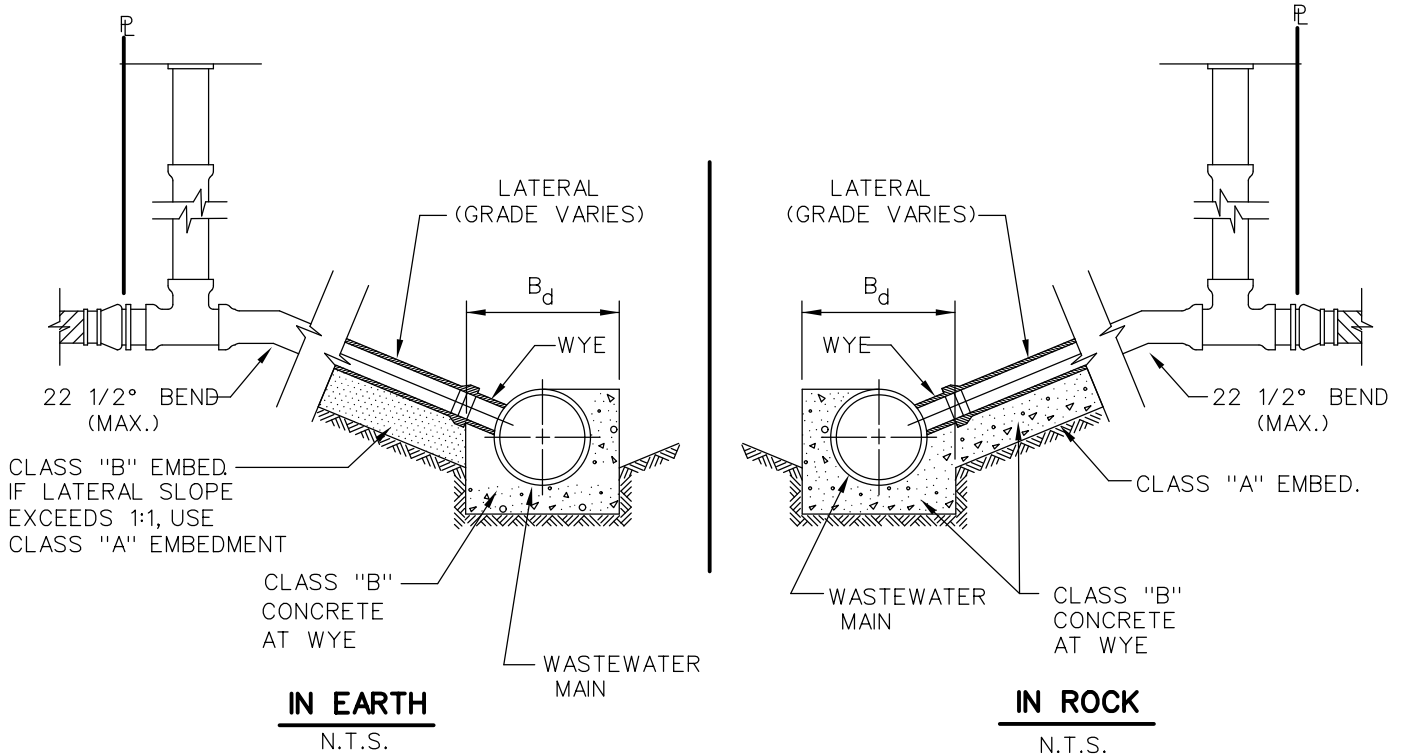
CLEANOUT FRAME BOTTOM
N.T.S.



ASSEMBLY VIEW
N.T.S.

NOTES:

1. THE WORDS "WASTEWATER LATERAL CLEANOUT" SHALL BE CAST INTO TOP OF COVER.
2. MATERIALS TO BE CAST IRON, P.V.C. OR ABS PLASTIC.
3. CAST IRON REQUIRED WHERE TRAFFIC MAY BE PRESENT.



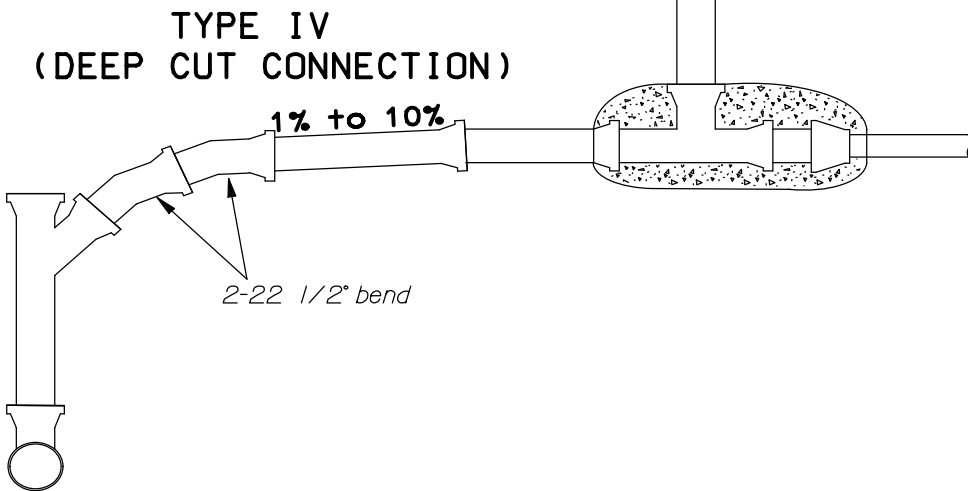
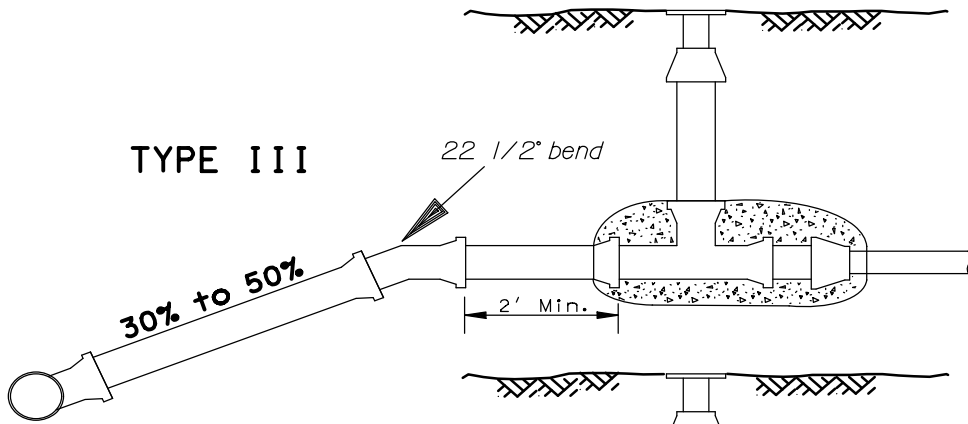
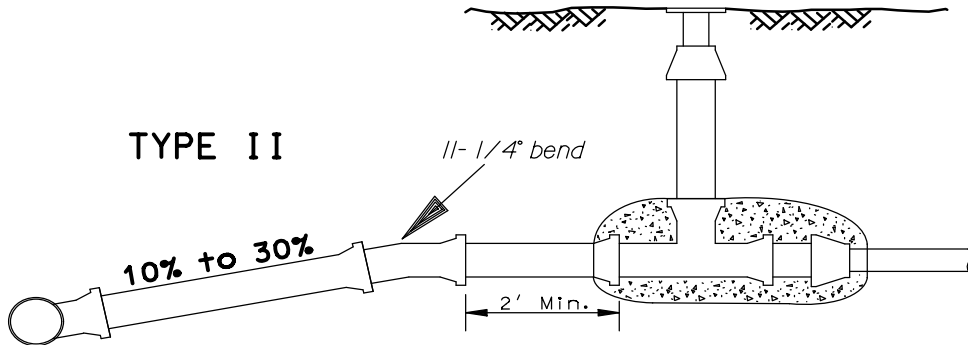
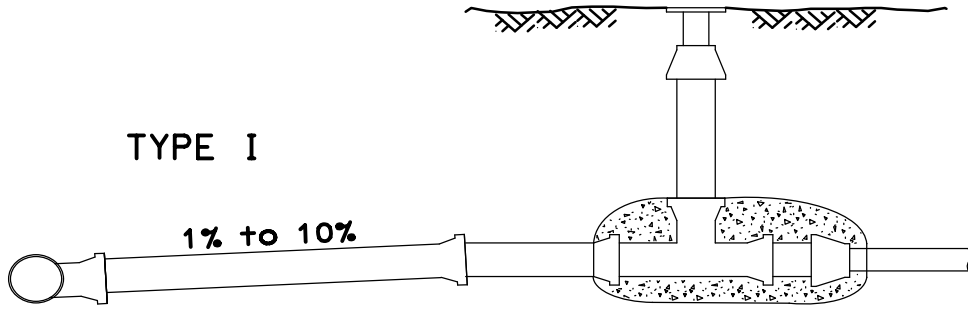
TRENCH WITH SLOPING SIDES
N.T.S.

NOTES:

1. WYE SHALL BE SUPPORTED AS SHOWN FOR WYE CONNECTION SUPPORT.
2. LATERALS ARE TO CLEAR ALL EXISTING UTILITIES. 11 1/4" OR 22 1/2° BEND, ONLY, MAY BE REQUIRED.

REFER TO PAGES 319, 320, 323, 324 & 325

WASTEWATER LATERAL CONNECTIONS IN EARTH & IN ROCK	DWU	<small>(Page No.)</small> 322
	DATE OCT. 2011	



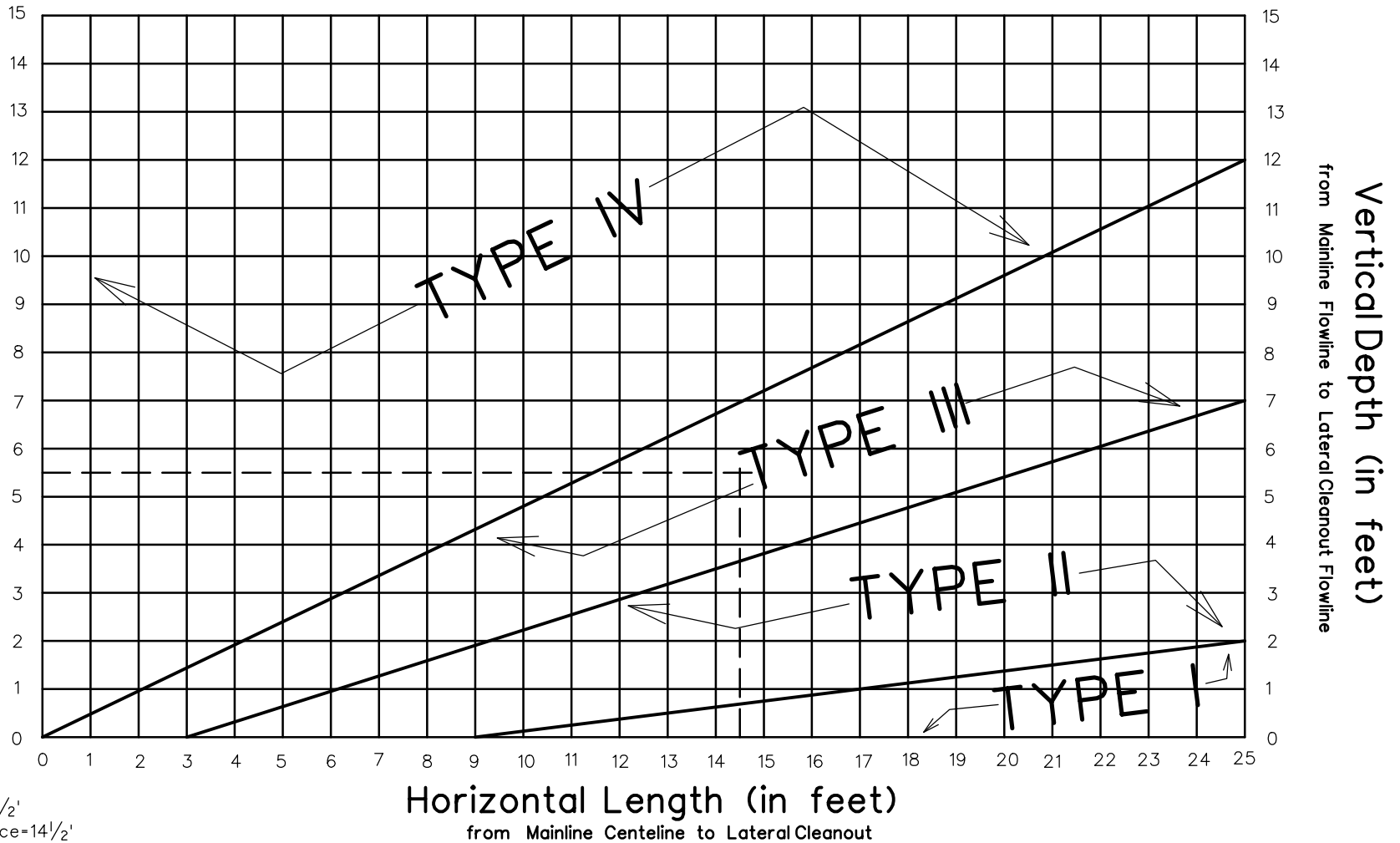
REFER TO PAGES 319, 320, 324 & 325

LATERALS TYPES

DWU

(PAGE NO.)
323

DATE
OCT. 2011



Example:
 Vertical Depth=5½'
 Horizontal Distance=14½'
 Use Lateral Type III As
 Shown Above

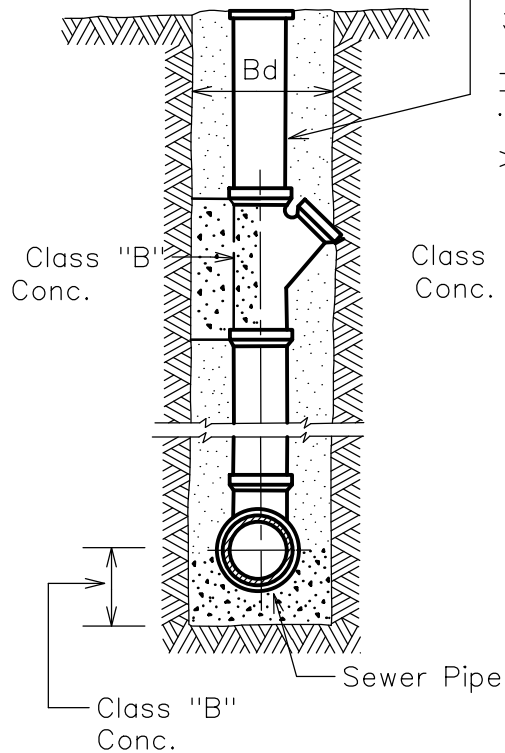
REFER TO PAGES 323 & 325

LATERAL APPLICATION
SCHEDULE

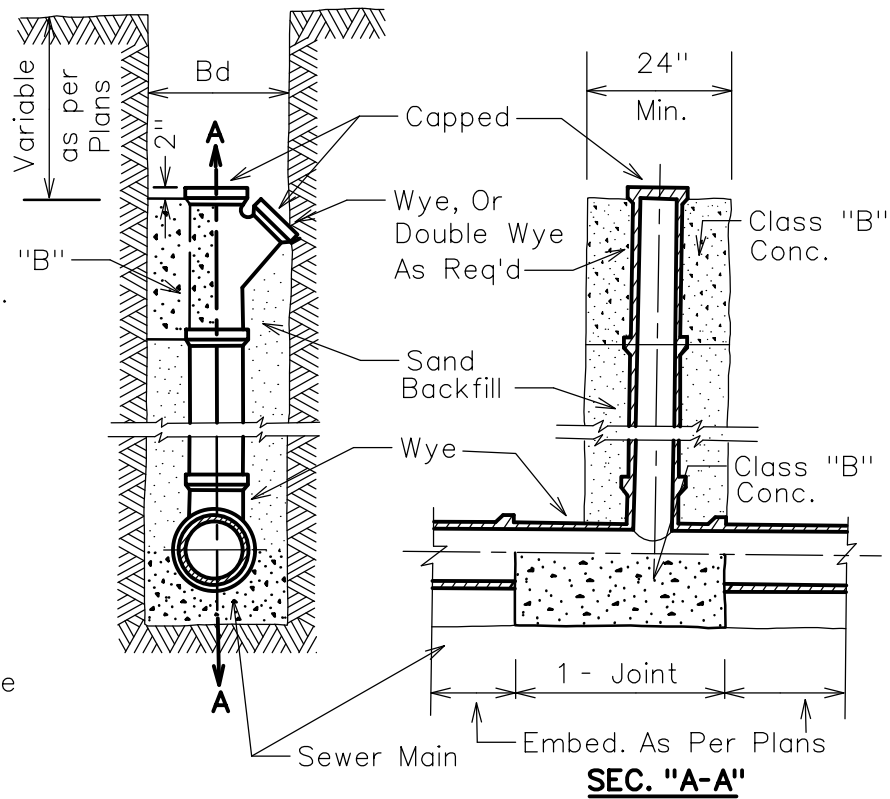
DWU	(Page No.) 324
DATE DEC. 2010	

Note! Clean out as per Page 319 to Ground Surface

DEEP CUT CONNECTION
W / C. O.



DEEP CUT CONNECTION



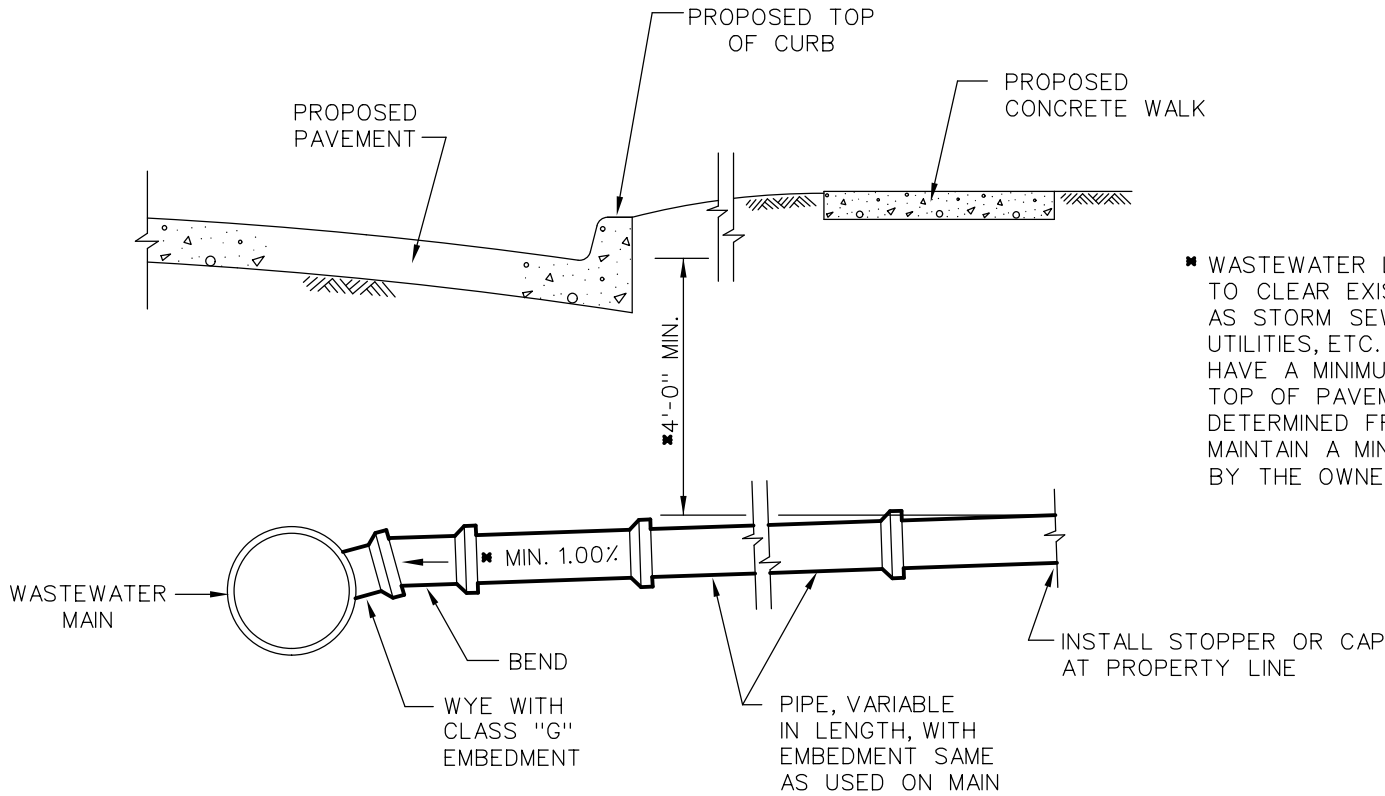
Refer To Pages 319, 320, 321, 322, 323 & 324

DEEP - CUT CONNECTION

DWU

(PAGE NO.)
325

DATE
OCT. 2011



WASTEWATER LATERALS ARE TO BE CONSTRUCTED TO CLEAR EXISTING AND PROPOSED FACILITIES, SUCH AS STORM SEWER MAINS, RETAINING WALLS, OTHER UTILITIES, ETC. THE WASTEWATER LATERAL SHALL HAVE A MINIMUM COVER OF 4'-0" BELOW THE PROPOSED TOP OF PAVEMENT CURB GRADE AT THE PROPERTY LINE, DETERMINED FROM PAVING GRADE, OR AS REQUIRED TO MAINTAIN A MINIMUM OF 1.00% GRADE, OR AS DIRECTED BY THE OWNER.

WASTEWATER LATERAL STUBOUT

N.T.S.

REFER TO 319, 320, 321, 322, 323, 324 & 325

WASTEWATER LATERAL STUBOUT	DWU	(Page No.) 326
	DATE OCT. 2011	

USE PRECAST CONCRETE GRADE RINGS AND NON SHRINK GROUT AS NECESSARY TO SET MANHOLE FRAME AND COVER TO FINAL GRADE.
See General Note #1 On Page 302

MANHOLE FRAME AND COVER AS SPECIFIED ON PLANS

1/2" NON SHRINK GROUT COATING

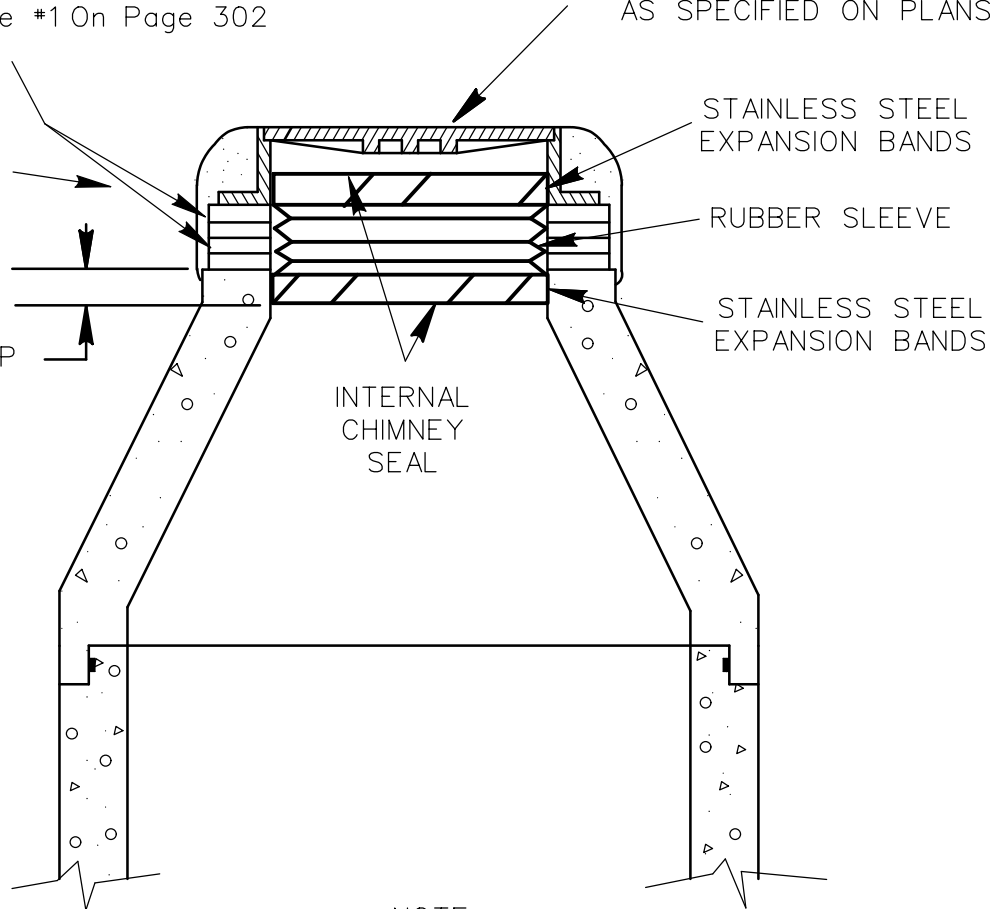
STAINLESS STEEL EXPANSION BANDS

RUBBER SLEEVE

4" OVERLAP

STAINLESS STEEL EXPANSION BANDS

INTERNAL CHIMNEY SEAL



NOTE :
INTERNAL CHIMNEY SEAL TYPE TO BE APPROVED BY CONSTRUCTION ENGINEER

REFER TO GENERAL NOTES FOR WASTEWATER MANHOLE CONSTRUCTION - PAGE 302, & DRAWINGS ON PAGES 301, 303, 304, & 305

WASTEWATER MANHOLE
INTERNAL SEAL

DWU

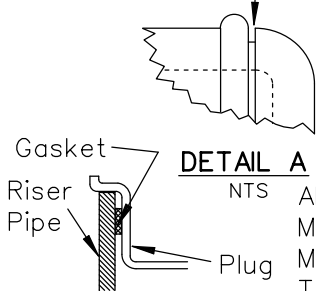
(Page No.)

327

DATE

MARCH 2001

Cut as Required
for 6, 8, 10, 12 inch
Pipe Along Cutting
Groove



DETAIL B
NTS

Water Tight Adapter
PVC to PVC for PVC Pipe
Clay to PVC for Clay Pipe

Alternate Connection
May Be Made With A
Manufacturers
Trapped Gasket

15" P.V.C.
SDR 35

Water Tight Adaptor
P.E. to PVC

Cross Link High
Density Polyethelene
Access Fitting or
Linear Low Density
Polyethelene

DETAIL A

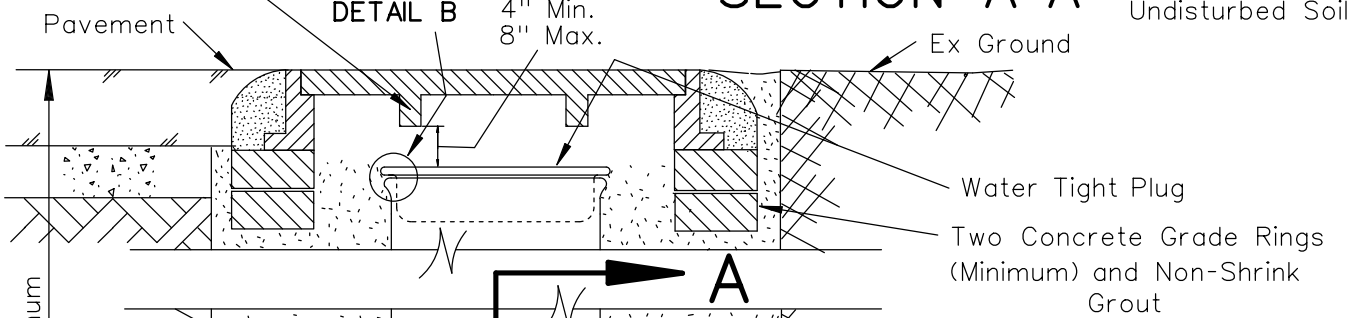
Pipe Embedment as Specified on Plans

24" Standard Cast Iron
M. H. Frame & Cover

Clearance:
4" Min.
8" Max.

SECTION A-A

Undisturbed Soil



Water Tight Plug

Two Concrete Grade Rings
(Minimum) and Non-Shrink
Grout

10" Minimum

15" P.V.C. PIPE
ASTM D 3034
(SDR 35)

Undisturbed
Soil

Sand or Stabilized Soil
Compacted to 95% Std.
Proctor Density and Placed in
6-inch Lifts
Beginning at the Wastewater
Access Device Working Outward
to the Excavation Walls

Cross Link High Density
Polyethelene Access Fitting
or Linear Low Density
Polyethelene

Compacted Crushed
Stone, Fine Gradation

26"

6" Min.

6" Min.

Undisturbed
Soil

Equal to Pipe
Embedment

**WASTEWATER ACCESS
DEVICE**

DWU

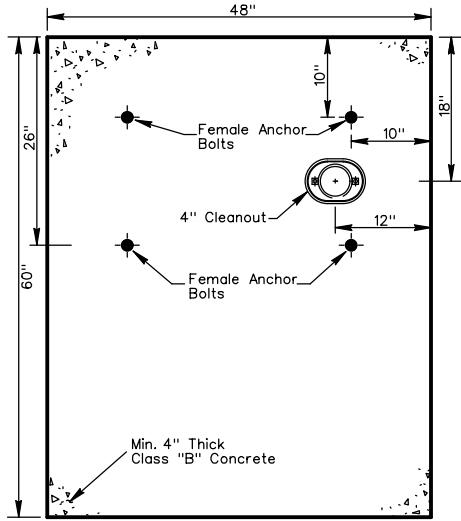
(Page No.)
328

DATE

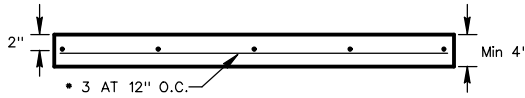
OCT. 2011

SAMPLING PLATFORM DETAIL

FOR CLEAN OUT

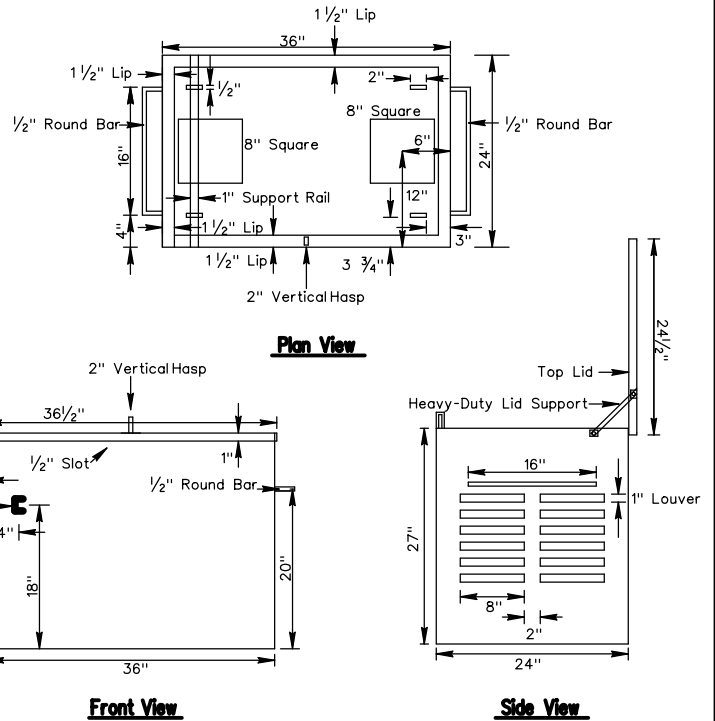


Plan View



Vertical View

DIAGRAM OF SECURITY BOX



Plan View

Front View

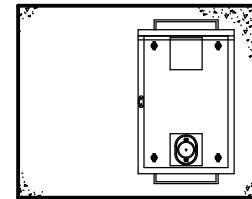
Side View

Not To Scale

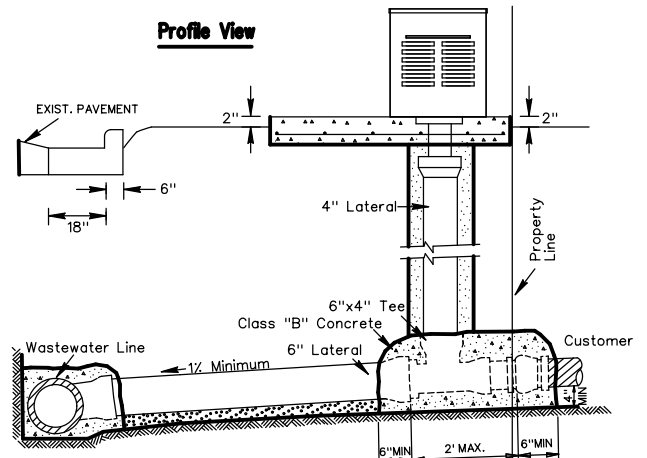
SAMPLE SITE CONSTRUCTION NOTES

- A. The 5'x4' Platform Is To Be Constructed Of Class "B" Concrete And A Minimum Of 4" Thick Reinforce Pad With #3 Bars at 12" O.C. In Both Directions And Centered Within Pad
- B. The Platform Is To Be Level, With The Cleanout Cover Flush With The Surface Of The Platform.
- C. The Platform And Cleanout Cover Are To Be Elevated A Minimum Of 2" To 3" Above Ground Level To Prevent Intrusion Of Rainwater Runoff.
- D. The Pipe Opening Shall Be Covered With A C.O. Casting And Cover. The Casting Shall Be Connected To The Pipe With Water Tight Adaptor. The Pipe Running Down From The Platform Should Connect To The Sewer Lateral With A Straight Tee (C. O. Tee), Not A Curve Tee, So That The Wastewater Flow Into The Lateral Be Observed From The Platform. Standard Lateral C. O. Castings (Plastic Or Cast Iron) Will Be Furnished Upon Request.
- E. 1/2" Threaded Female Anchor Bolts Shall Be Set In Each Corner 10" Inset From The Rear And Sides Of The Pad. The Front Bolts Need To Be 28" From The Rear Of The Pad. The Top Of The Female Anchor Bolts Shall Be Flush With The Surface Of The Platform.
- F. The Box And Lid Will Be Constructed Of Aluminum Or Steel. All Seams and Joints Are To Be Joined By A Continuous Weld.
- G. The Sides Of The Box Will Consist Of Two Banks Of 8" Louvers With a Total Of Twelve Stamped. Each Louver Will Be 8"x1". A Sixteen-inch Aluminum Grab Handle Will Be Installed On Each 24" Side Panel. The Support Rail Will Be 18" From The Bottom Of The Box And 4" From The Side Of The Box. The Handle Will Be 1/2" Round Bar Stock.
- H. The Lid Is Attached To The Box By A Heavy Hinge With A Continuous Weld Along The Length Of One Side (36"). The Lid Is To Be Locked To The Box With A Heavy-Duty Hasp, Which Enters Through A Hole Punched In The Lid. The Lid Will Have A 1/2" Lip.
- I. Two Heavy-Duty Plated Steel Lid Supports (See Example) Will Be Installed To Allow Lid To Remain Open During Setup Of An Automatic Sampler.
- J. The Security Box Will Be Painted White.
- K. Modifications May Occur For Security Boxes If Approved And Any Question Concerning The Installation Of The Sample Platform Should Be Addressed To: Pretreatment And Laboratory Services

*Suggested Vendors for Security Boxes:
 Company: The EMF Co. Model: DWU CAB-001 Tel: (214) 350-6848
 or Approved Equal



Profile View



Reference DWU Std. Drawing #319 For Lateral Details

Not To Scale

WASTEWATER SAMPLE SITE -
 CONCRETE PLATFORM DETAIL

DWU
 DATE
 OCT. 2011

(PAGE NO.)
 329

PART 4

(Series 400)

WATER & WASTEWATER ADJUSTMENTS



City of Dallas
Water Utilities Department

PART 4
WATER AND WASTEWATER ADJUSTMENTS

<u>TITLE</u>	<u>Pg.</u>
Alter & Adjustment of Standard Precast Manhole	--- 401
Adjustment of Standard Cast-in-Place Manhole	--- 402
Adjustment of Fiberglass Manhole	--- 403
Adjustment of Valve Stack	--- 404
New Lateral Cleanout on Existing Lateral	--- 405
Adjustment of Existing Lateral	--- 406
Replace Existing Lateral Cleanout	--- 407
Replace Existing Lateral to Existing Mainline	--- 408
Meter Box Placement	--- 409
Alteration and Adjustment of Standard Mainline Cleanout	--- 410
Adjustment of Existing Water Service	--- 411
Adjustment of Type "S" Manhole	--- 412
Wastewater Main Under-Cut By Proposed Stormwater Main	--- 413
Encasement Protection For Wastewater Main	--- 414
Wastewater Main Passing Thorough Stormwater Manhole	--- 416
Relocation of Pipe-To-Soil Potential Test Station	--- 417

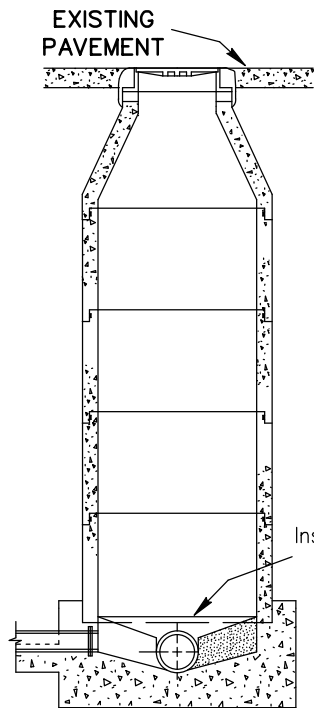


FIGURE 1

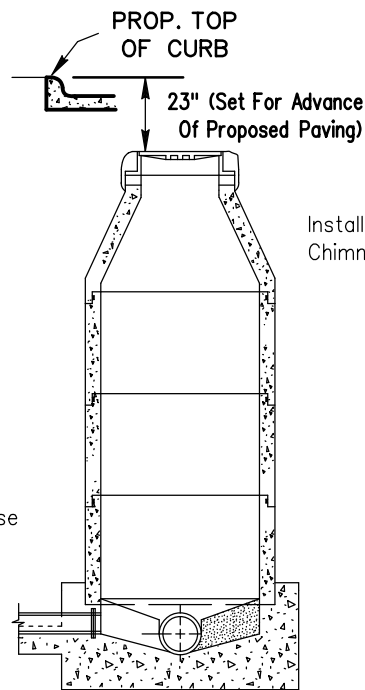


FIGURE 2
PRE-GRADING
(ALTER)

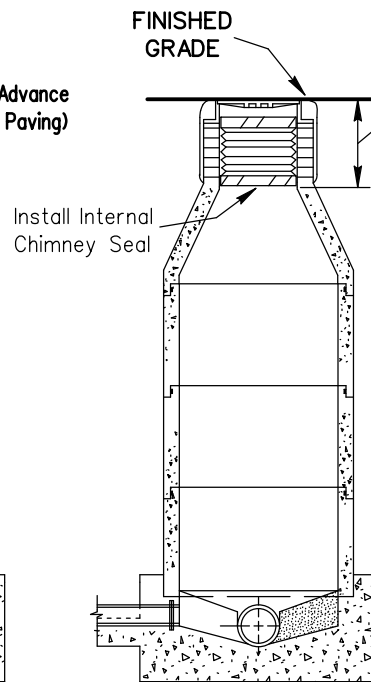


FIGURE 3
PRE-PAVING
(ADJUST)

NOTE: If the existing wastewater main is in cone section or if there is only one riser section, the entire manhole must be removed and a new manhole is to be installed.

FIGURE 1 EXISTING MANHOLE

1. Install a false bottom in the manhole.
2. Remove and salvage the existing ring and cover and remove the existing grade rings or brick. If the ring and/or cover are damaged at any time prior to final acceptance, it will be replaced by the contractor at no cost to the City.
3. Remove the cone section and remove or add one or more riser section as required.

FIGURE 2 PRE-GRADING (ALTER)

4. Reset the cone section on the existing manhole. To meet the required depth, one or more existing riser sections may have to be removed and replaced with new riser section(s) of a different height.
5. Reset the salvaged ring and cover on the cone section with concrete mortar.

FIGURE 3 PRE-PAVING (ADJUST)

6. Remove the salvaged ring and cover and mortar.
7. Use precast concrete grade rings and non-shrink grout to raise M.H. frame and cover to final paving grade. (LIMITED TO 30" MAX. MANHOLE NECK EXTENSION, AS MEASURED FROM THE TOP TAPER OF THE M.H. CONE TO M.H. LID). When M.H. neck extension exceeds 30", then the M.H. cone is to be removed and reset in such a manner as to reduce the number of grade rings required to reset M.H. frame and cover to final grade.
8. Set the salvaged ring and cover in place with non-shrink grout. Install internal chimney seal. See pg. 327
9. Coat the entire outside of the neck with a waterproof bituminous coating.
10. The false bottom will be removed during the final inspection

**ALTER & ADJUSTMENT OF
STANDARD PRECAST MANHOLE**

DWU	(Page No.) 401
DATE DEC. 2001	

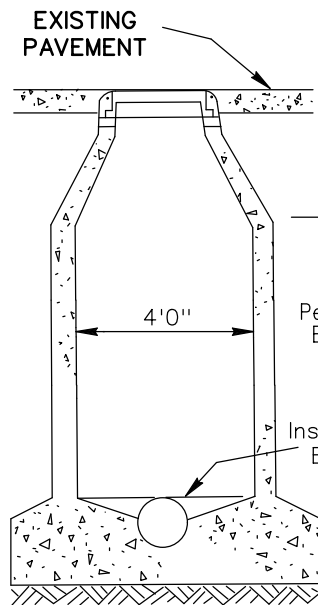


FIG. 1

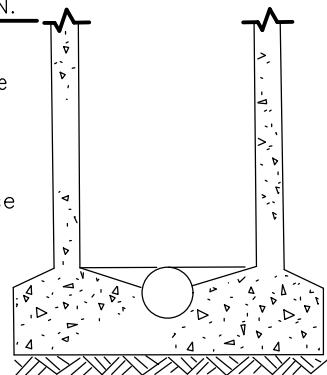


FIG. 2

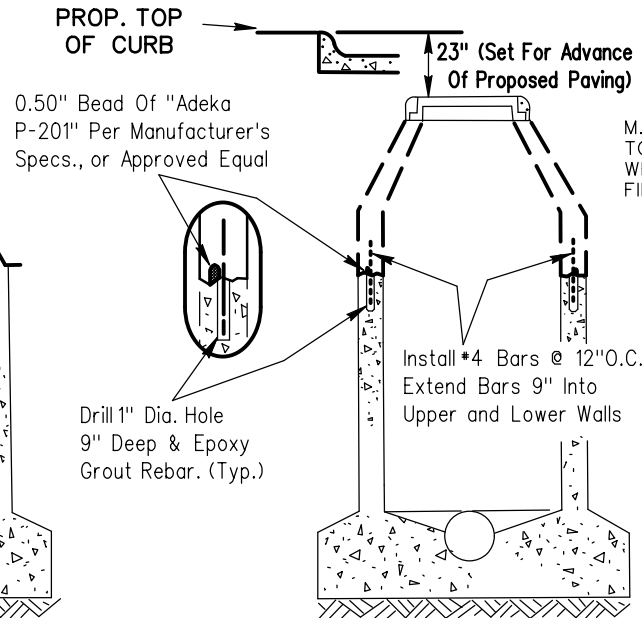


FIG. 3 PRE-GRADING

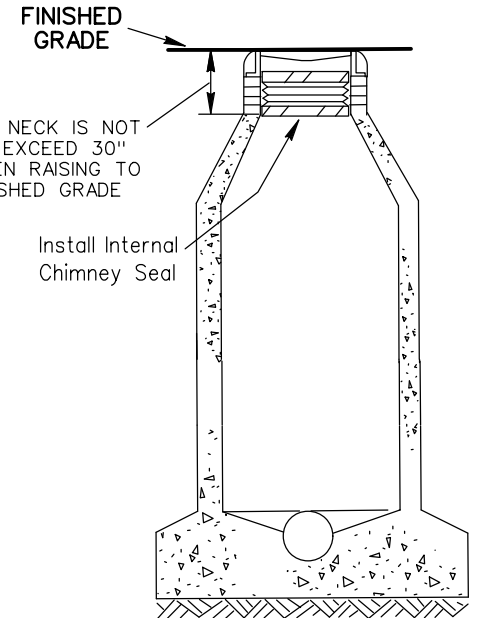


FIG. 4 PRE-PAVING

FIGURE 1 EXISTING MANHOLE

1. Install a false bottom in the manhole.
2. Remove the existing ring, cover and any grade rings or bricks.

FIGURE 2

3. Remove the existing manhole cone section to a minimum of 6" below the cone taper to M.H. Wall.

FIGURE 3 PRE-GRADING

4. Form and monolithically pour a new manhole extension with cone section. Use epoxy bonding agent. "Sikadur 32, HiMod" or approved equal, to bond new concrete to existing concrete. Coat entire outside of the new concrete with a waterproof bituminous coating. Set a new ring and cover meeting current TCEQ requirements on top of the new section with concrete mortar.

FIGURE 4 PRE-PAVING

5. Remove the new ring and cover and mortar.
6. Use precast concrete grade rings to raise manhole frame and cover to final paving grade. (LIMITED TO 30" MAX. MANHOLE NECK EXTENSION, AS MEASURED FROM THE TOP TAPER OF THE MANHOLE. CONE TO MANHOLE LID). When M.H. neck extension exceeds 30", then the manhole cone is to be removed and reset in such a manner as to reduce the number of grade rings required to reset manhole frame and cover to final grade.
7. Set the new ring and cover in place with non-shrink grout. Install internal chimney seal. See pg. 327
8. Coat the entire outside of the neck with a waterproof bituminous coating.
9. The false bottom will be removed during the final inspection.

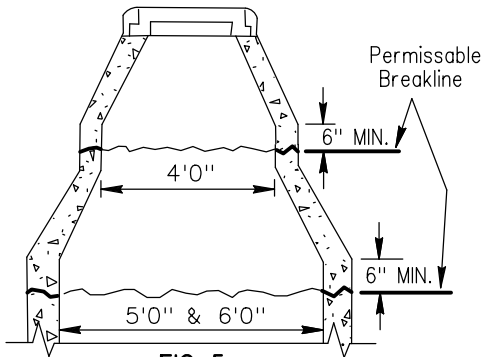


FIG. 5

ALTER & ADJUSTMENT OF STANDARD CAST-IN-PLACE MANHOLE	DWU	(Page No.) 402
	DATE OCT. 2011	

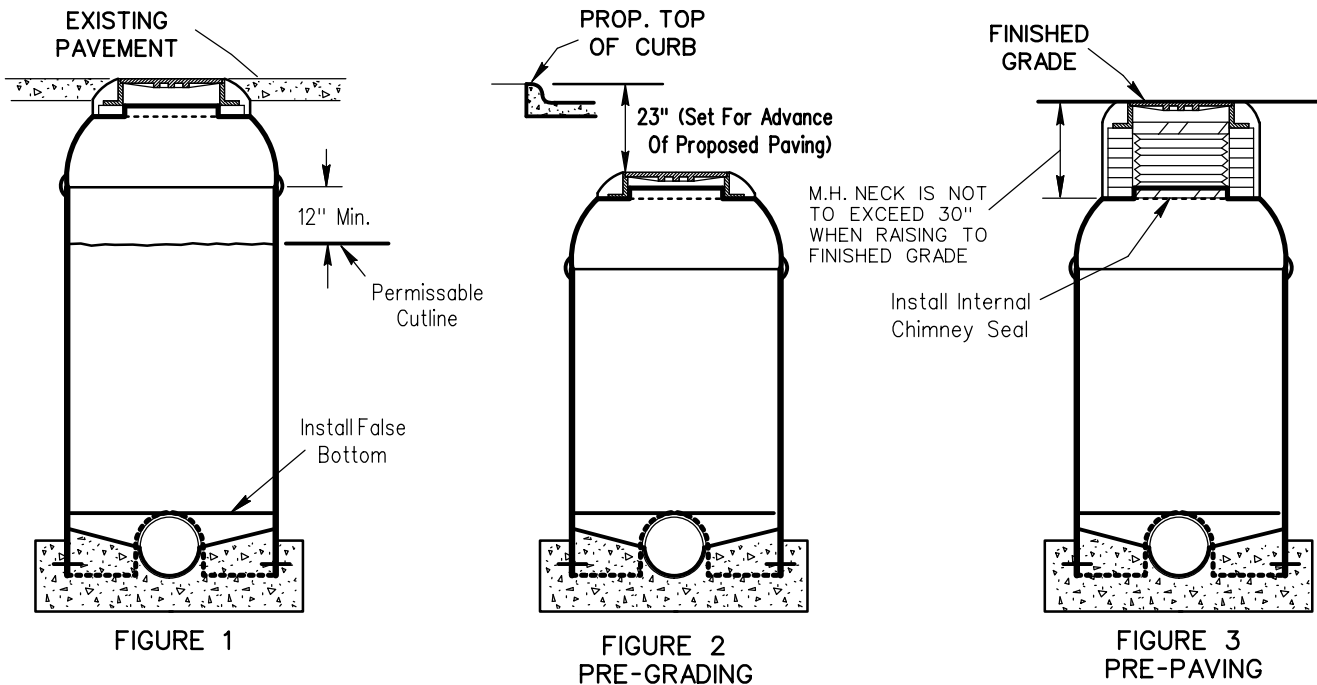


FIGURE 1 EXISTING MANHOLE

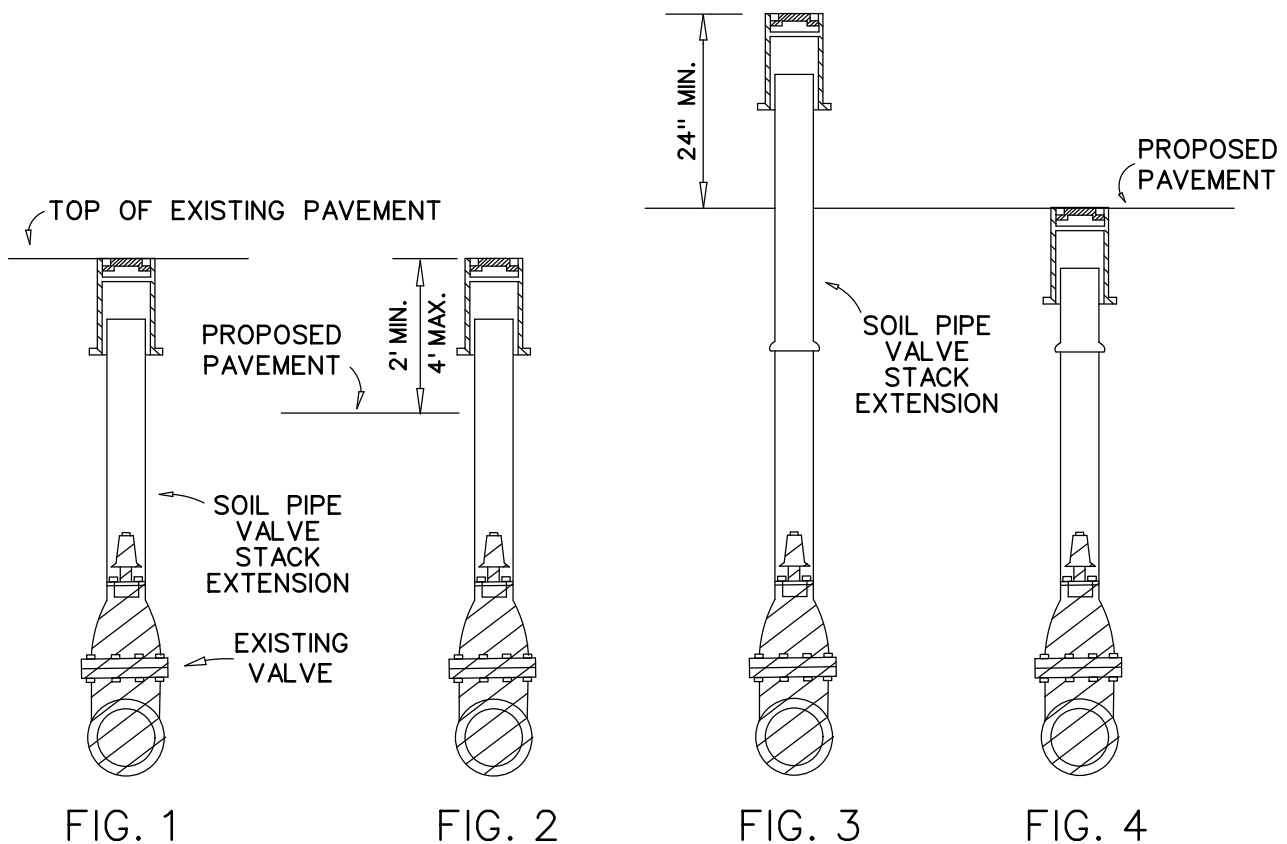
1. Install a false bottom in the manhole.
2. Remove the existing ring, cover and any grade rings or bricks.
3. Cut the existing manhole at a point no closer than 1' below the bottom of the cone section.

FIGURE 2 PRE-GRADING

4. Build up or remove a portion of the manhole to meet the required depth. A new riser section may be required if the manhole is to be raised. The salvaged cone section may be used if approved by the engineer. A manufacturer's repair kit approved by the engineer must be used to make the connection(s).
5. Backfill material must be sand or stabilized soil compacted to a minimum of 90% Std. Proctor Density and placed in 6" lifts beginning at the manhole and working outward to the excavation walls.
6. Set the new ring and cover meeting current TCEQ requirements on the cone section with concrete mortar.

FIGURE 3 PRE-PAVING

7. Remove the new ring and cover and mortar.
8. Use precast concrete grade rings and non-shrink grout to raise manhole frame and cover to final paving grade. (LIMITED TO 30" MAX. MANHOLE NECK EXTENSION, AS MEASURED FROM THE TOP TAPER OF THE MANHOLE CONE TO MANHOLE LID). When manhole neck extension exceeds 30", then the manhole cone is to be removed and reset in such a manner as to reduce the number of grade rings required to reset manhole frame and cover to final grade.
9. Set the new ring and cover in place with non-shrink grout. Install internal chimney seal. See pg. 327
10. Coat the entire outside of the neck with a waterproof bituminous coating.
11. The false bottom will be removed during the final inspection.



NOTE: The valve cover must always be exposed so the valve can be operated at any time. Exceptions must be approved by the engineer in advance.

The existing valve cover and lid may be reused if not damaged during removal. If the valve cover and/or lid is damaged at any time prior to final acceptance, it will be replaced by the contractor at no cost to the City.

FIGURE 1 EXISTING VALVE STACK AND COVER

FIGURE 2 PRE-GRADING

1. If the proposed paving is 2' to 4' below the top of the existing valve cover , the entire valve stack and cover may be left in place until final adjustment for paving.

FIGURE 3 PRE-GRADING

2. If the proposed paving is less than 2' below the top of the existing valve cover, the valve stack must be extended.

3. The cover is removed and an extension of soilpipe only is installed on the existing valve stack. The valve stack and extension must be properly aligned so that the valve can be operated properly. The extension must be connected to the existing valve stack with a bell and rubber gasket.

FIGURE 4 PRE-PAVING

4. The valve stack or extension is cut to a point not more than 3" below the proposed top of paving.

5. The valve cover is installed over the valve stack or extension to the top of the paving grade.

KEY:

- | | | |
|--------------------------|---|-------------------------------|
| 1. WASTEWATER MAIN | 5. 4" STACK | 8. PRIVATE WASTEWATER LATERAL |
| 2. WYE OR TAPPING SADDLE | 6. 4" WASTEWATER CLEANOUT CASTING
(CAST IRON, P.V.C. OR ABS PLASTIC) | 9. CLASS "B" CONCRETE |
| 3. MAINLINE LATERAL | 7. WATER TIGHT ADAPTOR
(CAST IRON ONLY FOR COMMERCIAL LATERALS) | 10. COMPACTED AS SPECIFIED |
| 4. TEE | 11. WATER TIGHT RUBBER SLEEVE COUPLING | |

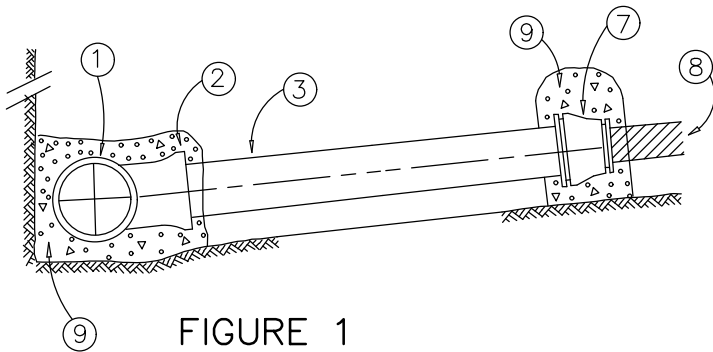


FIGURE 1

FIGURE 1 EXISTING LATERAL WITHOUT CLEANOUT

1. The adaptor may not be encased in concrete. If it is not, the same adaptor may be used if it is in serviceable condition. If the adaptor is encased in concrete, the concrete and adaptor must be removed and replaced.

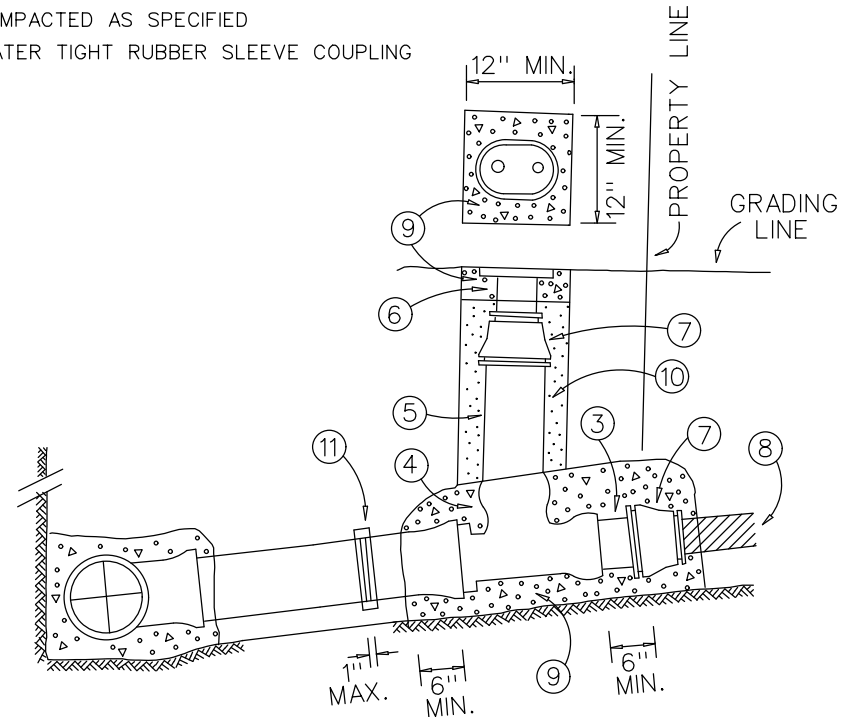


FIGURE 2

FIGURE 2 NEW CLEANOUT INSTALLED

2. Cut the existing lateral as shown and remove the existing lateral pipe to the private line.
3. Install the new cleanout as shown. The new pipe and embedment shall be of the same type as the existing.

<p>NEW LATERAL CLEANOUT ON EXISTING LATERAL</p>	<p>DWU</p>	<p>(Page No.) 405</p>
	<p>DATE DEC.2001</p>	

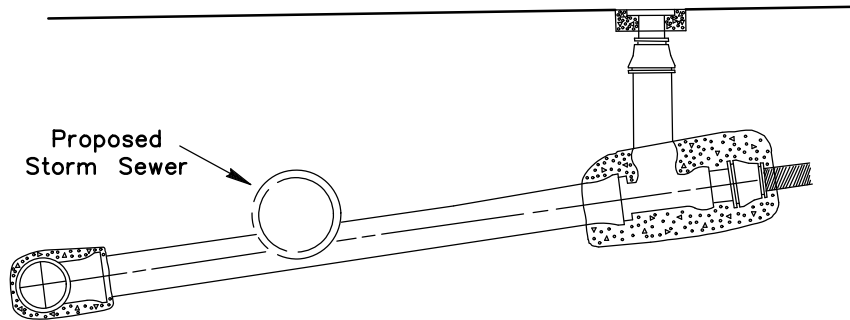


FIGURE 1

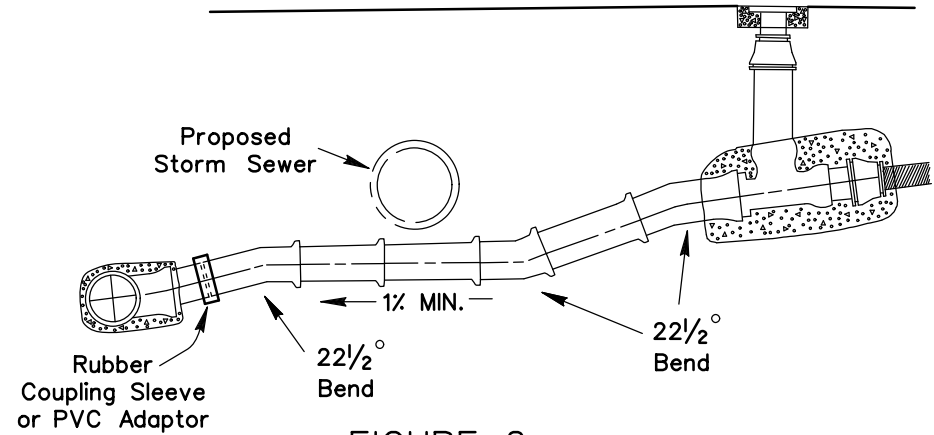


FIGURE 2

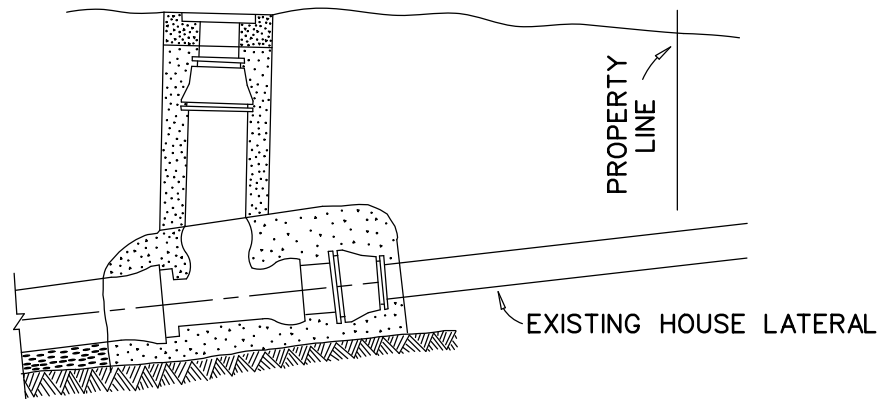
FIGURE 1 EXISTING LATERAL

1. Conflict with a proposed utility shown.

FIGURE 2 PRE-PAVING

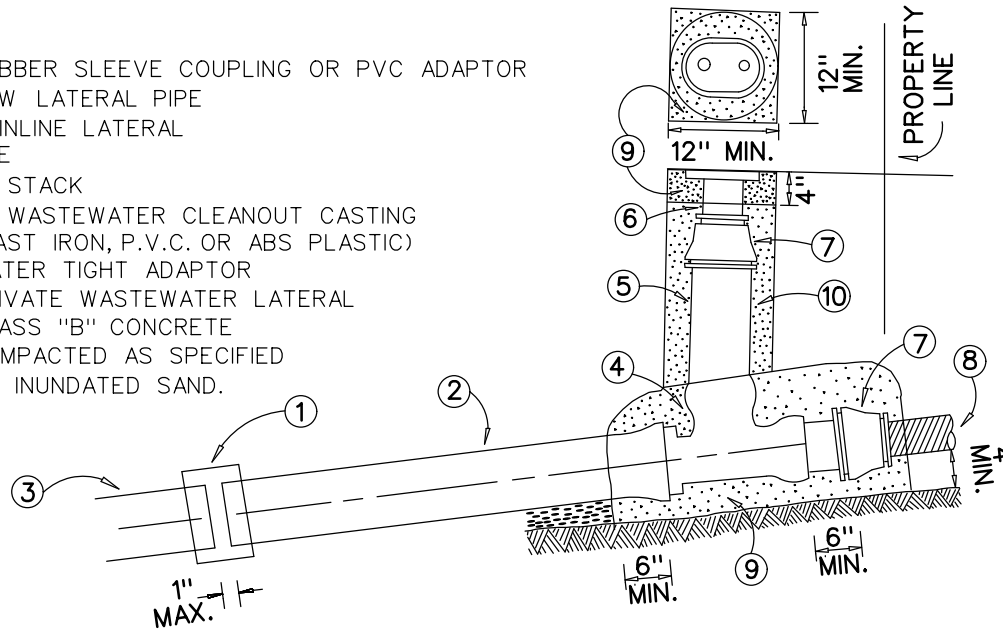
2. The new adjustment may be constructed over or under the proposed conflict:
 - A. A downstream minimum grade of 1.0% must be maintained.
 - B. Bends greater than 22-1/2 degrees are NOT permitted.
 - C. The new pipe and embedment must be of the same type as the existing. (Unless the lateral is concrete pipe, in which case clay pipe is to be used.)
 - D. Connections between the existing lateral pipe and new lateral pipe may be made with a rubber sleeve coupling or PVC adaptor, whichever is appropriate.
 - E. A minimum clearance between the outside of the new lateral pipe and the proposed conflict will be 6". If the clearance is less than 6", a steel pipe or D.I. pipe encasement will be required as shown on PAGE 414, ENCASEMENT PROTECTION FOR WASTEWATER MAINS.
3. The existing wye or tee connection to the existing main may have to be removed and reinstalled to meet the proposed new grade of the lateral. This work, if required, will be included at no additional cost to the City.

ADJUSTMENT OF EXISTING LATERAL	DWU	(Page No.) 406
	DATE JAN. 2010	



EXISTING CLEANOUT

1. RUBBER SLEEVE COUPLING OR PVC ADAPTOR
2. NEW LATERAL PIPE
3. MAINLINE LATERAL
4. TEE
5. 4" STACK
6. 4" WASTEWATER CLEANOUT CASTING (CAST IRON, P.V.C. OR ABS PLASTIC)
7. WATER TIGHT ADAPTOR
8. PRIVATE WASTEWATER LATERAL
9. CLASS "B" CONCRETE
10. COMPACTED AS SPECIFIED OR INUNDATED SAND.



NEW CLEANOUT

NOTES

- A) The new lateral pipe shall be the same type of pipe as the existing lateral. If the lateral is concrete, the entire lateral must be rebuilt.
- B) For commercial laterals, use cast iron cleanout castings only.
- C) The new cleanout shall be constructed as close to the property line as possible.
- D) The embedment will match the embedment on the existing lateral.

PROCEDURE

1. Remove existing cleanout and lateral to limits of existing concrete.
2. Salvage the cleanout casting and lid. If either is damaged, a new cleanout casting and/or lid will be furnished at no cost to the City.
3. Install the lateral extension and cleanout as shown in the detail using all new materials. The salvaged cleanout casting and lid may be used if approved by the engineer.

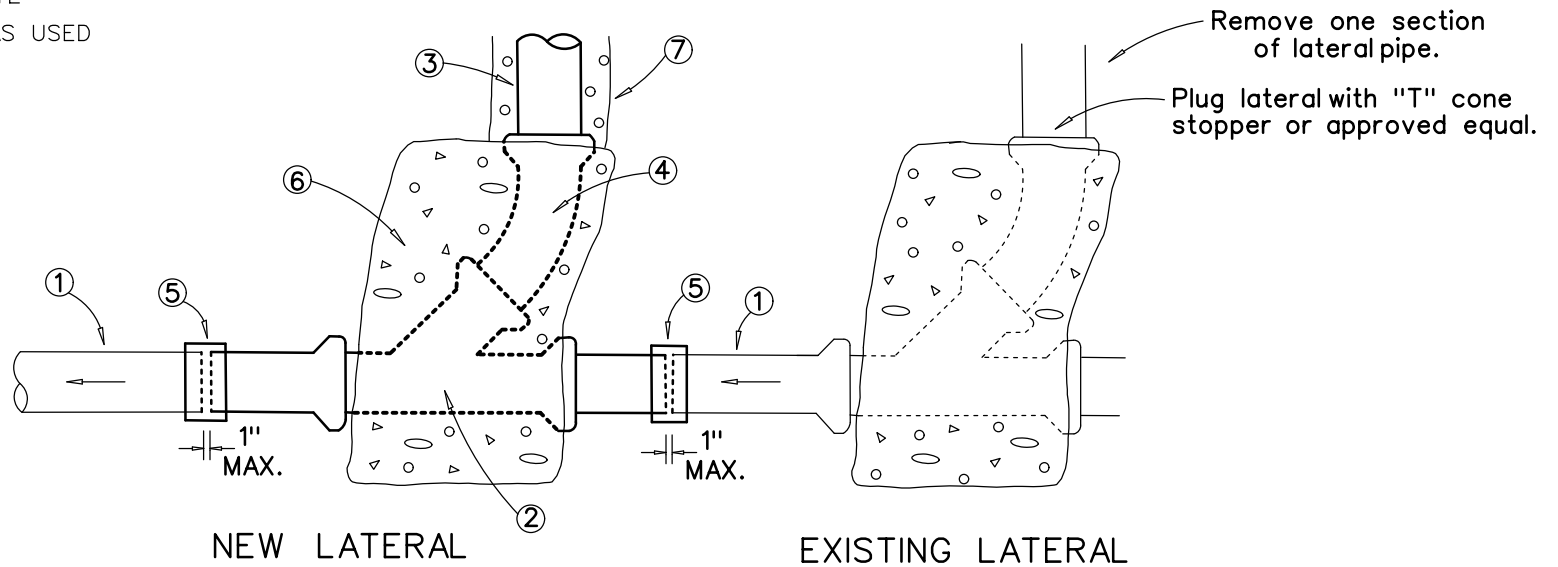
NCTCOG Spec: 702.3.4 - Quality of Concrete
 2021 COD Addendum: Item 702.COD - Concrete Structures

REPLACE EXISTING LATERAL CLEANOUT	COD	(Page No.) 407
	DATE JULY. 2021	

REFER TO PAGE 319 "LATERAL CONSTRUCTION"

FOR PROFILE VIEW

1. WASTEWATER MAIN
2. WYE (45° MAX.)
3. MAINLINE LATERAL
4. 45° BEND (MAX.)
5. WATER TIGHT RUBBER SLEEVE COUPLING OR PVC ADAPTOR
6. CLASS "B" CONCRETE
7. EMBEDMENT SAME AS USED ON MAIN



- A) The wye and adaptors installed shall be of the same material as the wastewater mainline.
- B) The wye and adaptors shall be assembled prior to installation.
- C) Connections to the existing main shall be made using a rubber sleeve coupling with stainless steel band clamps or PVC adaptor. The clamps shall be tightened to the torque recommended by the manufacturer.
- D) The embedment used shall be equal to that used for the mainline sewer.
- E) Class "B" concrete shall be installed in accordance with PAGE 322 to support the wye.

**REPLACE EXISTING LATERAL
TO EXISTING MAINLINE**

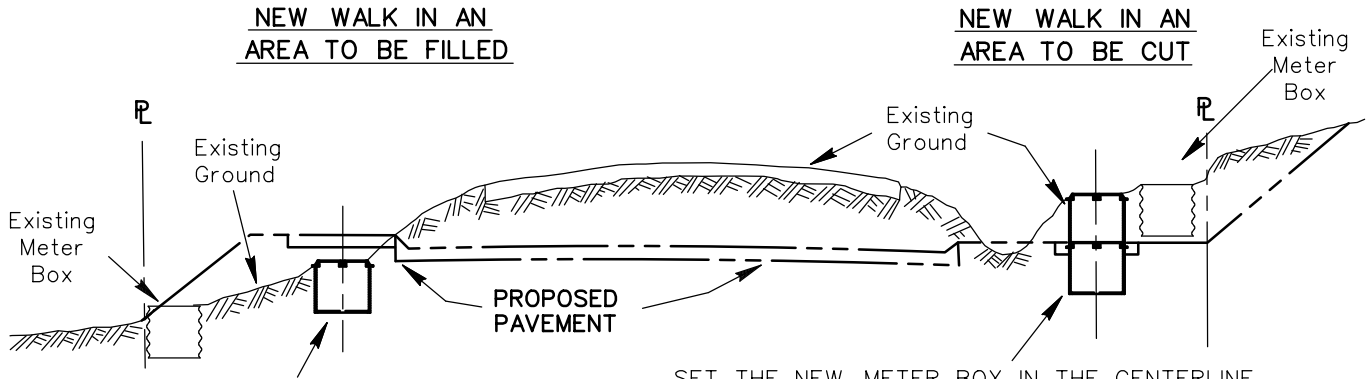
COD

(Page No.)

408

DATE

JULY.2021

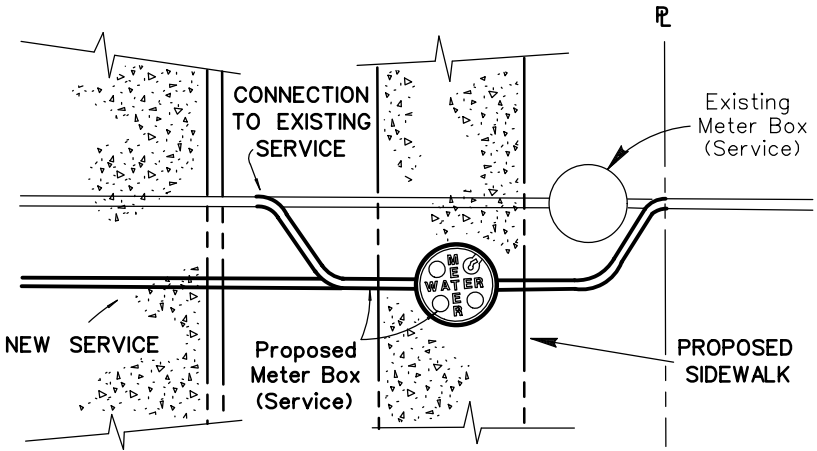


SET THE NEW METER BOX IN THE CENTERLINE OF THE PROP. NEW WALK. SET THE METER BOX AT THE EXISTING GROUND ELEVATION. IT WILL BE RAISED TO GRADE DURING PAVING OPERATIONS.

SET THE NEW METER BOX IN THE CENTERLINE AND AT THE ELEVATION OF THE PROP. NEW WALK. SET THE METER IN THIS BOX. STACK METER BOX ON TOP OF THIS BOX TO THE EXISTING GROUND. PUT THE METER BOX LID ON THE TOP BOX. (THIS IS LIMITED TO 2 STACKED METER BOXES. ANY ADDITIONAL LOWERING TO GRADE WILL BE DONE DURING PAVING OPERATIONS)

ELEVATION

A NEW WATER SERVICE IS INSTALLED TO THE NEW BOX. A LINE IS RUN FROM THE NEW BOX TO THE PROPERTY LINE NEXT TO THE EXISTING HOUSE LINE AND TURNED UP WITH A CURB STOP. AFTER FLUSHING, THE NEW LINE IS CONNECTED TO THE EXISTING HOUSE LINE AT THE PROPERTY LINE.



PLAN

IF A NEW SERVICE IS INSTALLED TO REPLACE AN EXISTING SERVICE TO THE EXISTING MAIN, THE CONNECTION WILL BE MADE AS FOLLOWS:

EXISTING MAIN UNDER PRESSURE. Connect the new copper pipe to the existing corporation cock on the main

EXISTING MAIN NOT UNDER PRESSURE. Tap the existing main a minimum of 1' from the existing tap and install a new corporation cock and service. Remove the existing corporation cock and plug the tap with a plug approved by the engineer.

If the new copper pipe is connected to the existing copper pipe, it shall be accomplished with the use of an approved compression type coupling.

If any existing water service is galvanized pipe, it must be replaced to the existing main with a new copper service.

REFER TO PAGES 201 thru 206 WATER SERVICE INSTALLATIONS

METER BOX REPLACEMENT	DWU	(PAGE NO.) 409
	DATE JUNE 2002	

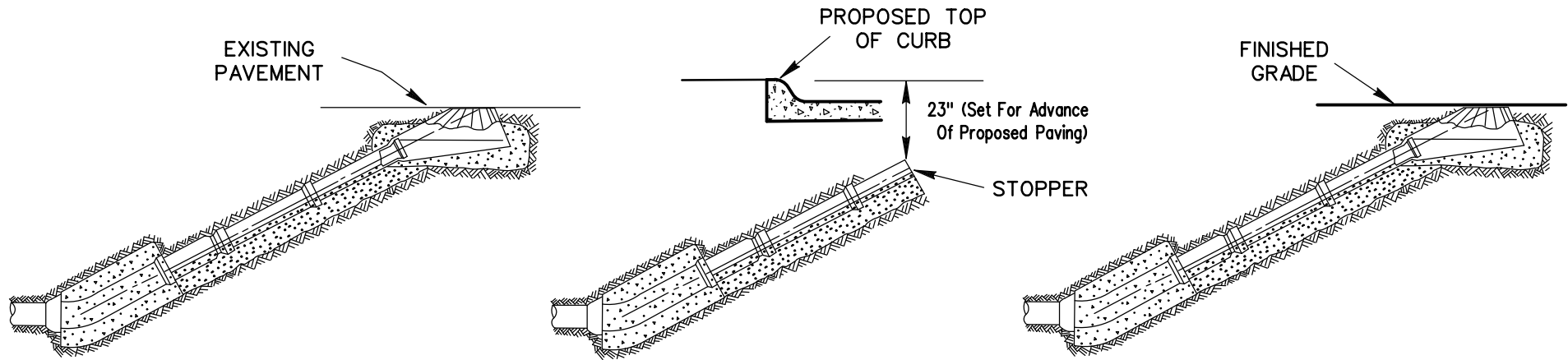


FIGURE 1

FIGURE 2
PRE - GRADING

FIGURE 3
PRE - PAVING

FIGURE 1. EXISTING CLEANOUT

1. Remove and salvage the existing cleanout. If the cleanout cannot be salvaged or is damaged prior to final acceptance, it will be replaced by the contractor at no cost to the city.

FIGURE 2. PRE - GRADING

2. Remove the cleanout pipe to a point 23" below the proposed top of curb.
3. Plug the pipe with a "T" Cone Stopper or approved equal.

FIGURE 3. PRE - PAVING

4. Extend the existing cleanout pipe, if required. The connection to the existing pipe will be made with a rubber sleeve coupling. The new pipe and embedment shall be of the same type as the existing.
5. Set the salvaged or new cleanout on a Class B concrete pad.
6. Insert a "T" Cone Stopper or approved equal in the cleanout pipe.

REFER TO PAGE 317 MAINLINE CLEANOUT

ALTERATION & ADJUSTMENT OF
STANDARD MAINLINE CLEANOUT

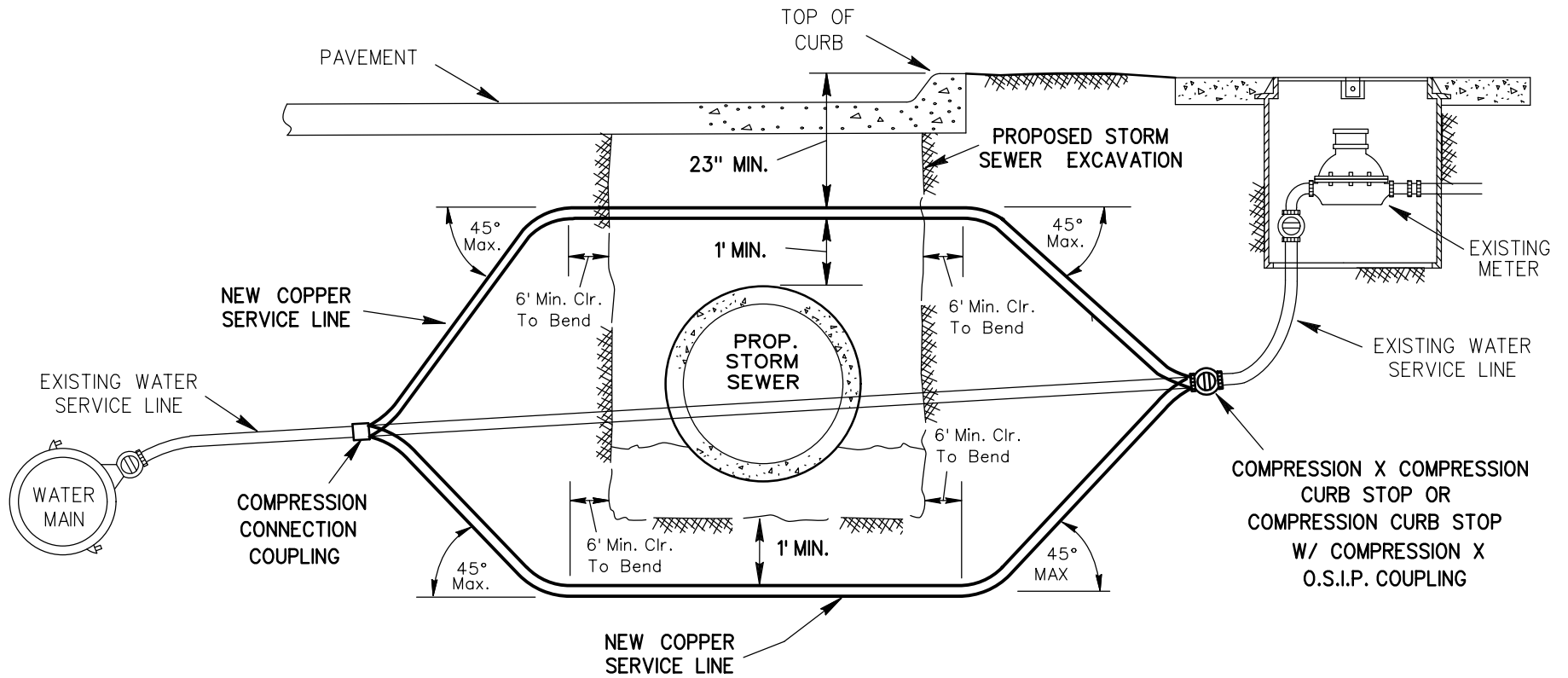
DWU

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410

DATE

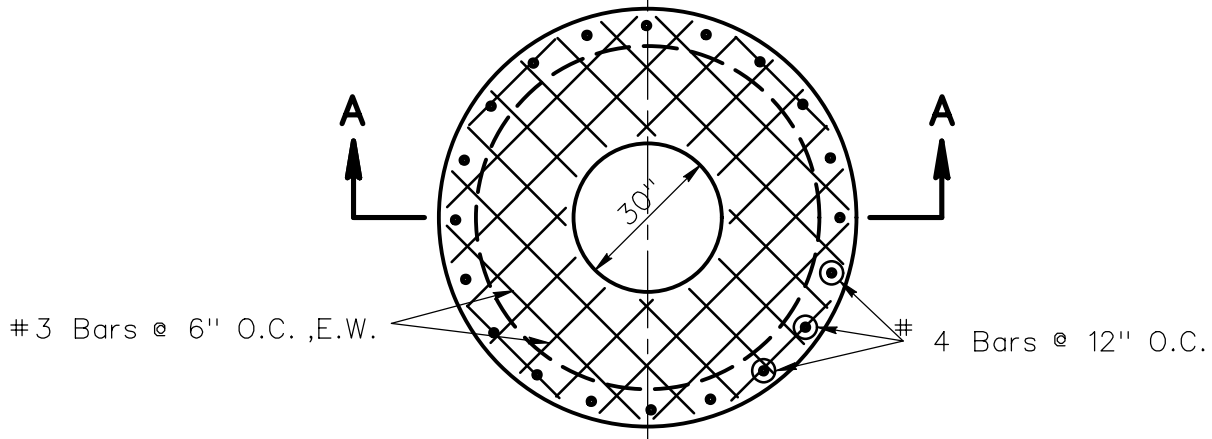
DEC.2001



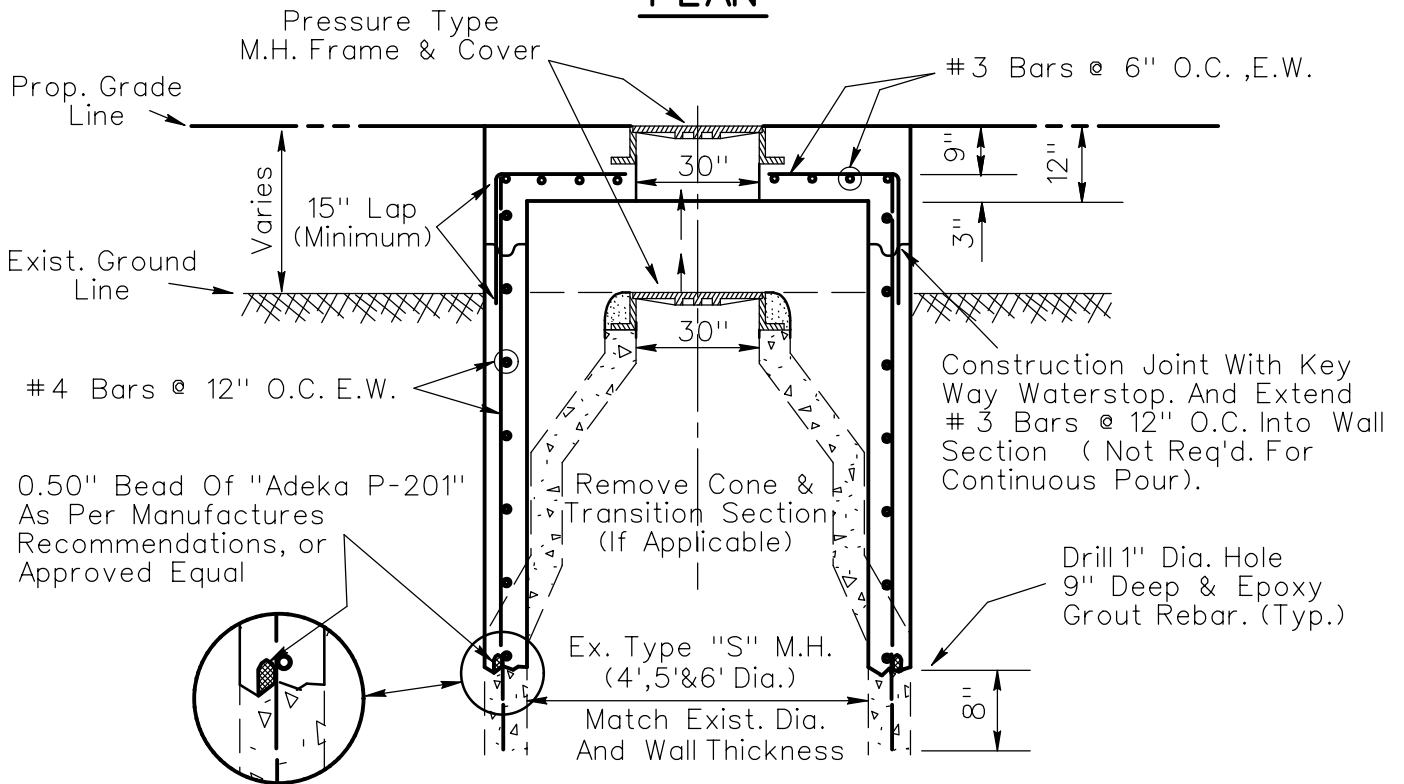
NOTES:

1. All materials must be new.
2. Install the new service with a minimum clearance of 1 foot below the excavation of the trench for the proposed storm sewer and a minimum of 1 foot clearance from the edge of the trench excavation when the service is installed laterally along the proposed storm sewer.
3. The minimum bending radius of the copper shall be 6 times the O.D. of the pipe.
4. Adjustment of the proposed water service may be over the proposed storm sewer only if the minimum clearances are maintained, otherwise the service must be installed under the proposed storm sewer excavation.
5. The bend angle is not to exceed 45° for any bend in a new copper service line.

<p>ADJUSTMENT OF EXISTING WATER SERVICE</p>	<p>DWU</p>	<p>(Page) 411</p>
	<p>DATE JAN. 2010</p>	



PLAN



SECTION "A-A"

NOTES

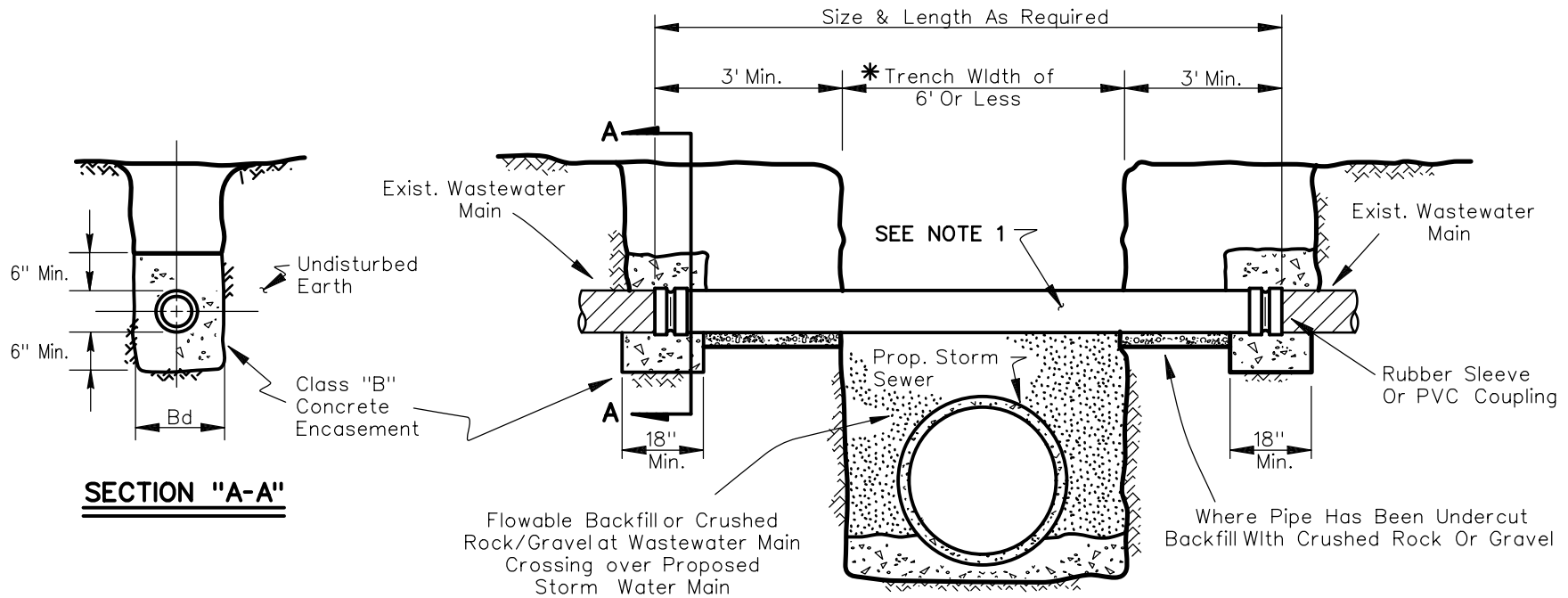
N.T.S.

- 1) Use an epoxy bonding agent to bond new concrete to existing concrete. Bonding agent shall be "Sikadur 32, Hi Mod" or Approved Equal.
- 2) Epoxy grout to be a high strength rigid epoxy adhesive manufactured for the purpose of anchoring dowels into hardened concrete. Epoxy grout shall be "Sikadur Hi-Mod, LV No. 32" or approved equal.
- 3) Coat the entire outside of the new concrete with a waterproof bituminous coating.
- 4) Follow construction sequence typical to the notes as outlined on page 402.

**ADJUSTMENT OF
TYPE "S" MANHOLE**

DWU	(PAGE NO.) 412
DATE OCT. 2011	

*If Trench Width Exceeds 6' Or If The Diagonal Crossing Of Trench Exceeds 6', The Use Of Type "A" Utility Support Shall Be Required. See 121. If The Crossing Exceeds 25', A Special Utility Support Design Will Be Required.



SECTION "A-A"

NOTES:

1. REPLACE EX. R.C.P./CLAY PIPE WITH CLAY PIPE.
REPLACE P.V.C. PIPE WITH P.V.C. PIPE.
2. USE RUBBER SLEEVE COUPLINGS FOR R.C.P./CLAY PIPE WITH CLAY PIPE.
USE PRESSURE RATE PVC COUPLINGS FOR PVC PIPE WITH PVC PIPE.
3. RELAY NEW WASTEWATER MAIN TO MATCH EXISTING GRADE.

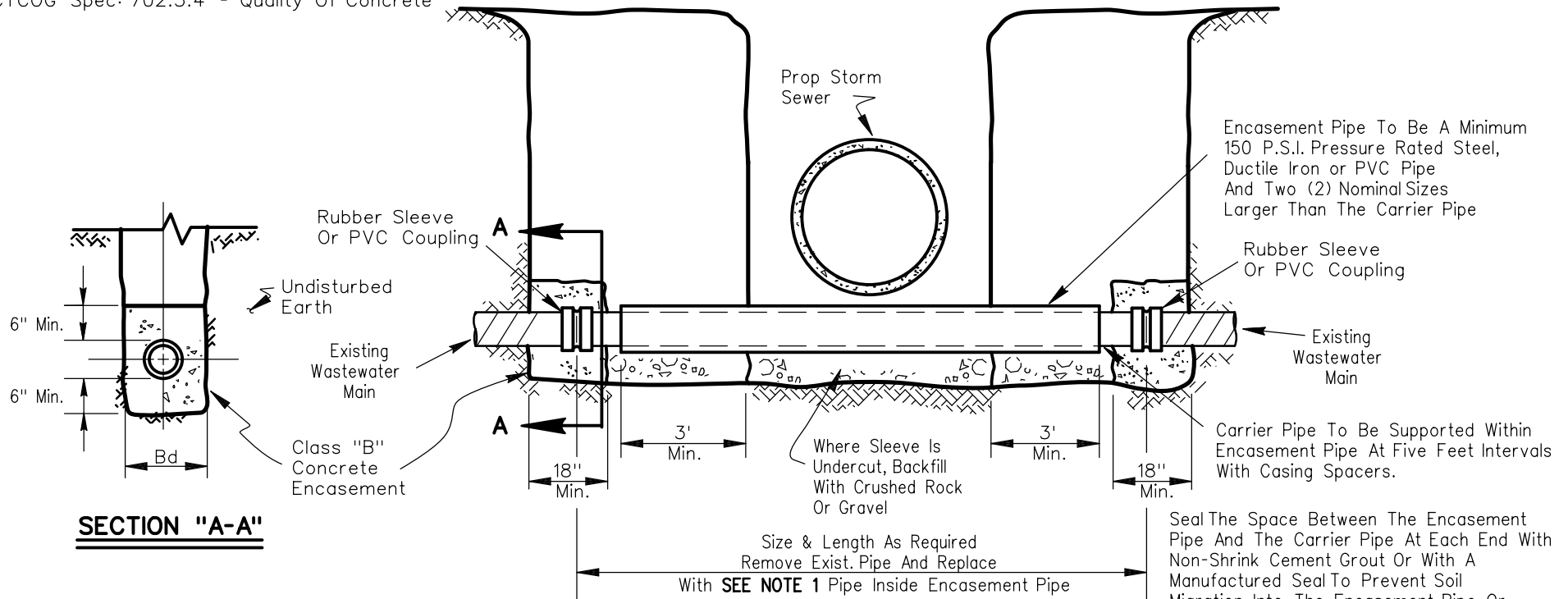
Contractor Must Contact Wastewater Collection Two Working Days Prior To Construction.

**WASTEWATER MAIN UNDERCUT
BY PROPOSED STORMWATER MAIN**

	(Page No.) 413
COD	
DATE JULY.2021	

NCTCOG Spec: 501.17 - Polyvinyl Chloride (PVC) Wastewater Pipe And Fittings With Dimensional Control
 NCTCOG Spec: 501.7 - Ductile Iron Pressure Pipe and Fittings
 2021 COD Addendum Item 501.7.COD: Ductile Iron Pressure Pipe And Fittings
 2021 COD Addendum Item 501.7.2.COD: Joints through 501.7.4.1.DWU: NSF 61 Compliance
 NCTCOG Spec: 501.9 - Steel Pipe And Fittings
 2021 COD Addendum Item 501.9.3.COD: Pipe And Fittings
 2021 COD Addendum Item 501.9.3.1.COD: NSF 61 Compliance
 NCTCOG Spec: 702.3.4 - Quality Of Concrete

Encasement Protection For Wastewater Mains Under Proposed Storm Sewers Where Vertical Clearance Is Less Than 0.5' (To Be Installed By Public Works Storm Sewer Contractor or Trinity Watershed Management).



SECTION "A-A"

NOTES:

1. REPLACE EX. R.C.P./CLAY PIPE WITH CLAY PIPE.
REPLACE P.V.C. PIPE WITH P.V.C. PIPE.
2. USE RUBBER SLEEVE COUPLINGS FOR R.C.P./CLAY PIPE WITH CLAY PIPE.
USE PRESSURE RATE PVC COUPLINGS FOR PVC PIPE WITH PVC PIPE.
3. RELAY NEW WASTEWATER MAIN TO MATCH EXISTING GRADE.

Seal The Space Between The Encasement Pipe And The Carrier Pipe At Each End With Non-Shrink Cement Grout Or With A Manufactured Seal To Prevent Soil Migration Into The Encasement Pipe Or Fully Grout The Space Between The Encasement Pipe And The Carrier Pipe Per The Discretion Of The Project Engineer.

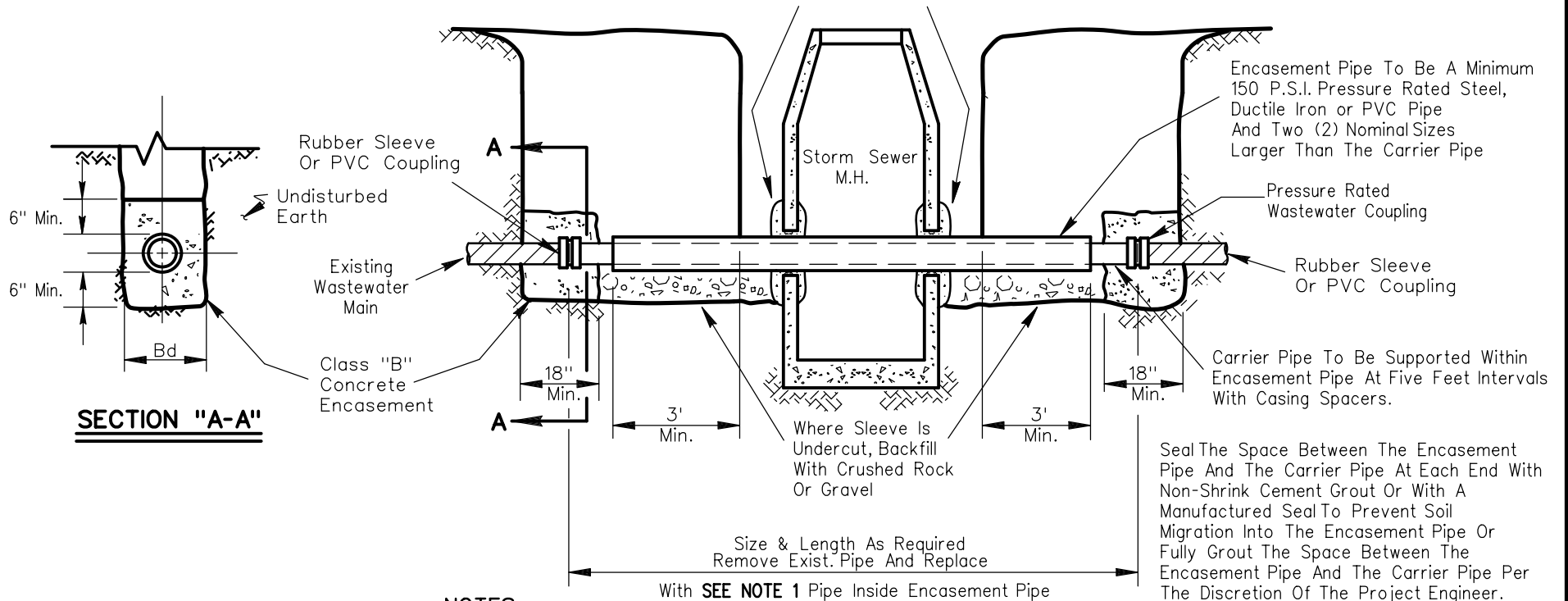
Contractor Must Contact Wastewater Collection Two Working Days Prior To Construction.

**ENCASEMENT PROTECTION FOR
WASTEWATER MAIN**

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COD	414
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JULY, 2021	

NCTCOG Spec: 501.17 - Polyvinyl Chloride (PVC) Wastewater Pipe And Fittings With Dimensional Control
 NCTCOG Spec: 501.7 - Ductile Iron Pressure Pipe and Fittings
 2021 COD Addendum Item 501.7.COD: Ductile Iron Pressure Pipe And Fittings
 2021 COD Addendum Item 501.7.2.COD: Joints through 501.7.4.1.DWU: NSF 61 Compliance
 NCTCOG Spec: 501.9 - Steel Pipe And Fittings
 2021 COD Addendum Item 501.9.3.COD: Pipe And Fittings
 2021 COD Addendum Item 501.9.3.1.COD: NSF 61 Compliance
 NCTCOG Spec: 702.3.4 - Quality Of Concrete

Break Holes In Storm Sewer To Allow Installation Of Encasement With Wastewater Main To Grade. Seal Breakouts With Non-Shrink Grout To Insure Watertight Seal.



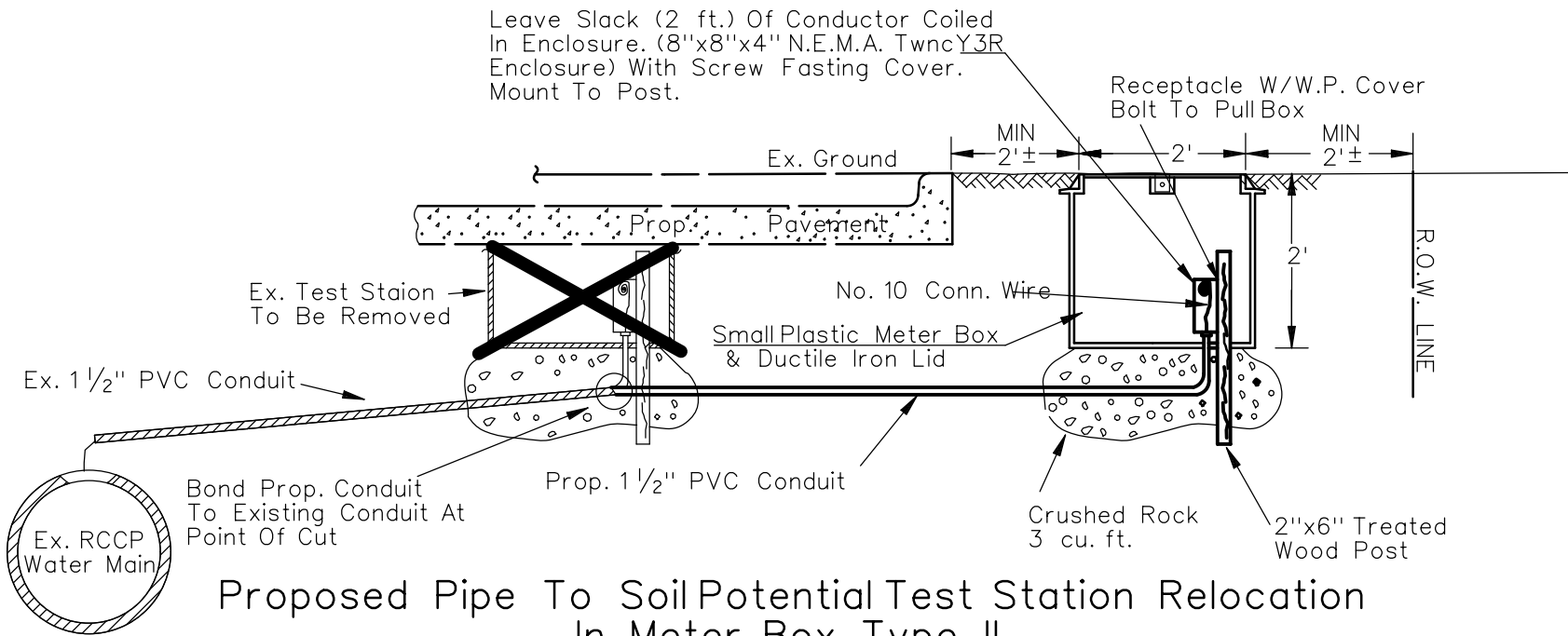
NOTES:

1. REPLACE EX. R.C.P./CLAY PIPE WITH CLAY PIPE.
REPLACE P.V.C. PIPE WITH P.V.C. PIPE.
2. USE RUBBER SLEEVE COUPLINGS FOR R.C.P./CLAY PIPE WITH CLAY PIPE.
USE PRESSURE RATE PVC COUPLINGS FOR PVC PIPE WITH PVC PIPE.
3. RELAY NEW WASTEWATER MAIN TO MATCH EXISTING GRADE.

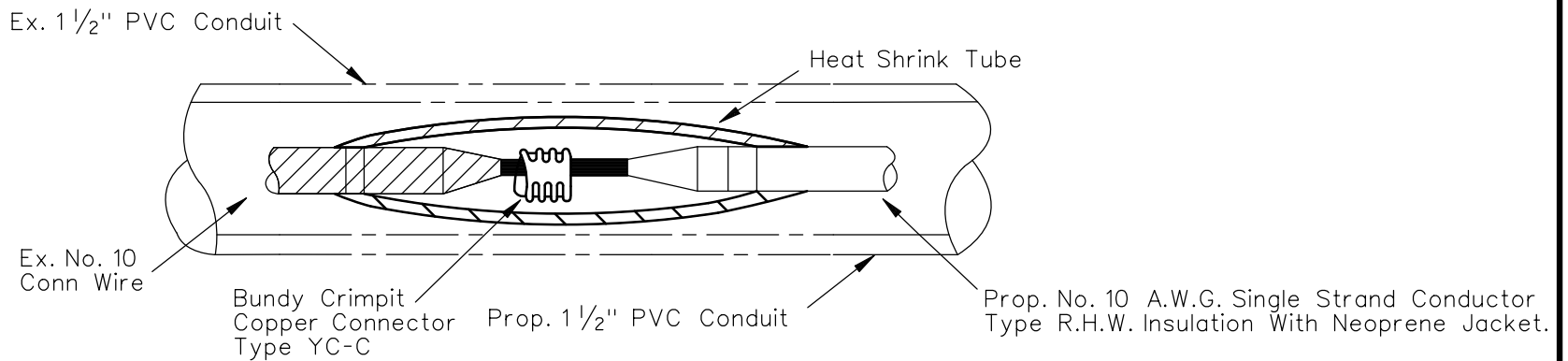
Contractor Must Contact Wastewater Collection Two Working Days Prior To Construction.

**WASTEWATER MAIN PASSING THROUGH
STORM WATER MANHOLE**

	(Page No.)
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Proposed Pipe To Soil Potential Test Station Relocation
In Meter Box Type II



MECHANICAL CABLE SPLICE DETAIL

RELOCATION OF PIPE-TO-SOIL POTENTIAL TEST STATION (BURIED CONFIGURATION)		DWU	(Page No.) 417
		DATE JAN. 2010	

PART 5

(Series 500)

4" and LARGER WATER SERVICE INSTALLATIONS



City of Dallas
Water Utilities Department

PART 5
LARGE WATER SERVICE INSTALLATIONS

<u>TITLE</u>	<u>Pg.</u>
Large Water Services (4" and Larger) Descriptions and Typical Uses	--- 501
Large Service Installation Details and Plan Views	--- 502
Minimum Easement Sizes for Large Meter Installation	--- 502A
Large Service Installation Detail--Elevation View	--- 503
Large Service Installation Details--Precast Vaults (F.M. & D.C. Type)	--- 504
Large Service Installation Details--Precast Vaults (10" or Larger Meter Size)	--- 505
Large Service Installation Details--General Notes	--- 506
4" Combined Service with 4" Meter	--- 507
6" Combined Service with 6" Meter	--- 508
8" Combined Service with 6" Meter	--- 509
8" Combined Service with 8" Meter	--- 510
10" Combined Service with 8" Meter	--- 511
10" Combined Service with 10" Meter	--- 512
4" Domestic Service with 3" Meter	--- 513
4" Domestic Service with 4" Meter	--- 514
6" Domestic Service with 6" Meter	--- 515
8" Domestic Service with 6" Meter	--- 516
4" Closed Fireline Service with 4" Detector Check Device	--- 517
6" Closed Fireline Service with 6" Detector Check Device	--- 518
8" Closed Fireline Service with 6" Detector Check Device	--- 519
8" Closed Fireline Service with 8" Detector Check Device	--- 520
10" Closed Fireline Service with 10" Detector Check Device	--- 521

GENERAL DESCRIPTION OF LARGE WATER SERVICES

1) A Closed Fireline Service -

- A) Definition - A system with automatic sprinklers only, regularly inspected and supervised by an insurance agency.
- B) Metering - Monitored with a detector check device.

2) Combined Water Service - (Domestic and Fire)

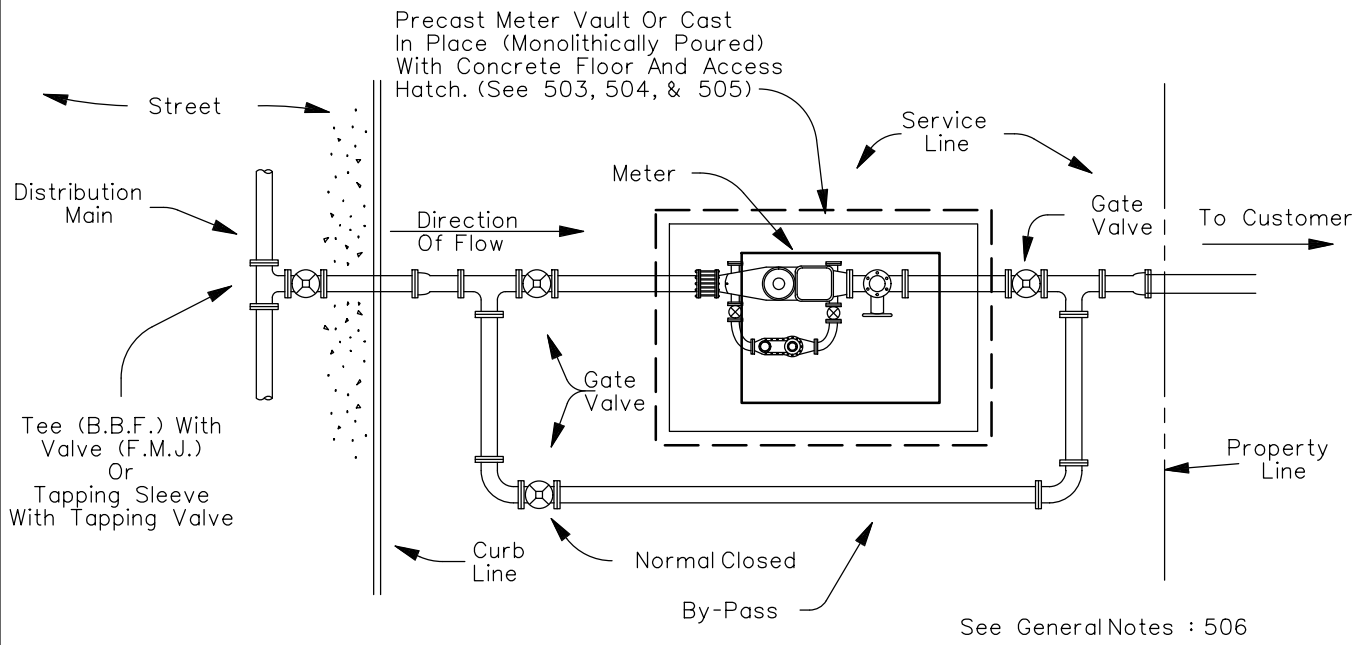
- A) Definition - Fire protection and domestic water through a single water service and meter.
- B) Metering - Metered with Underwriter approved "FM" full flow meter or turbine meter with U.L. approved strainer.

3) Domestic Water Service

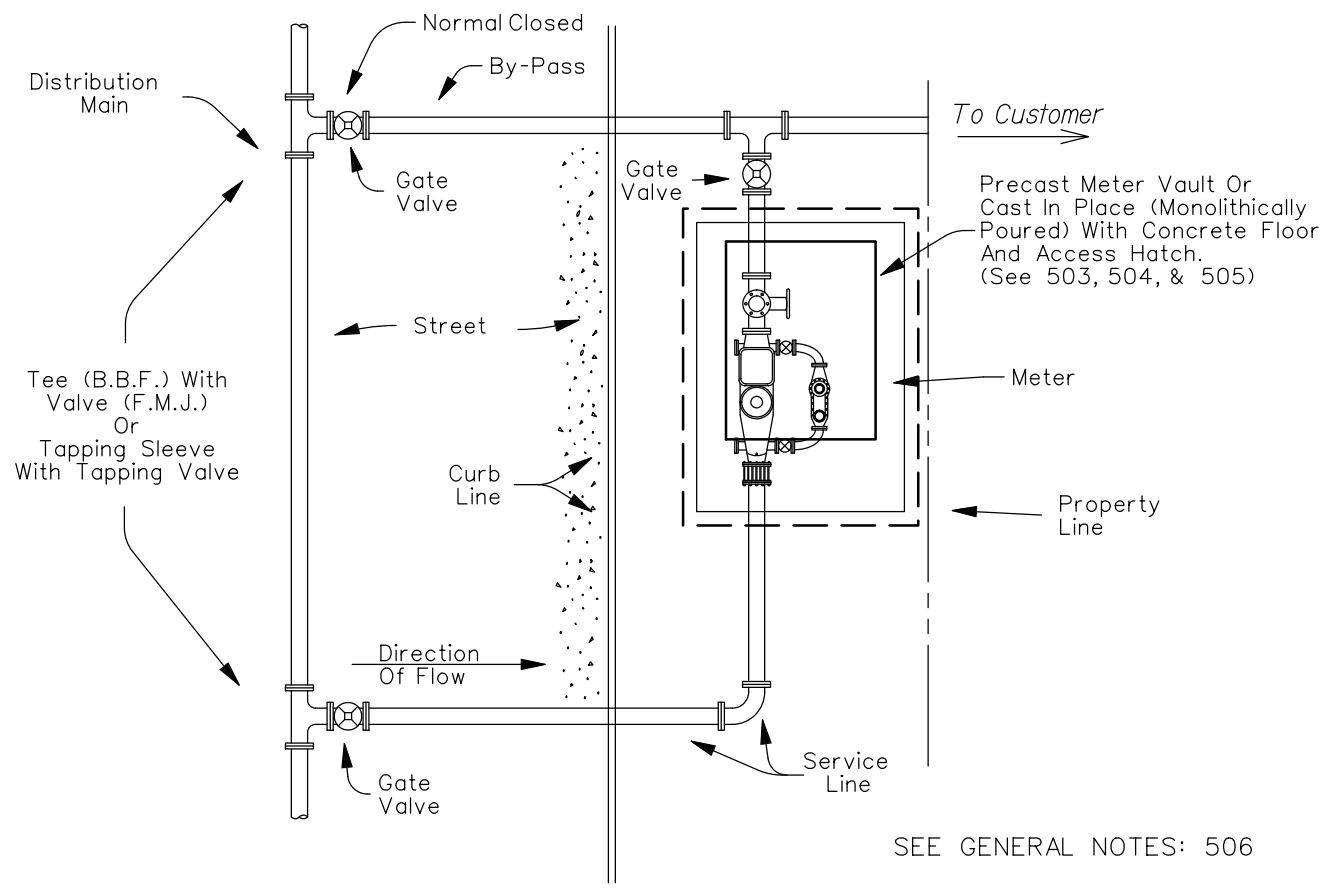
- A) Definition - Domestic water through a single water service and meter.
- B) Metering - Metered with compound meter or turbine meter with domestic type strainer.

4) Irrigation Water Service

- A) Definition - Same as domestic water through a single water service and meter without a bypass and for irrigation purpose only.
- B) Metering - Metered with compound meter or turbine meter with domestic type strainer.

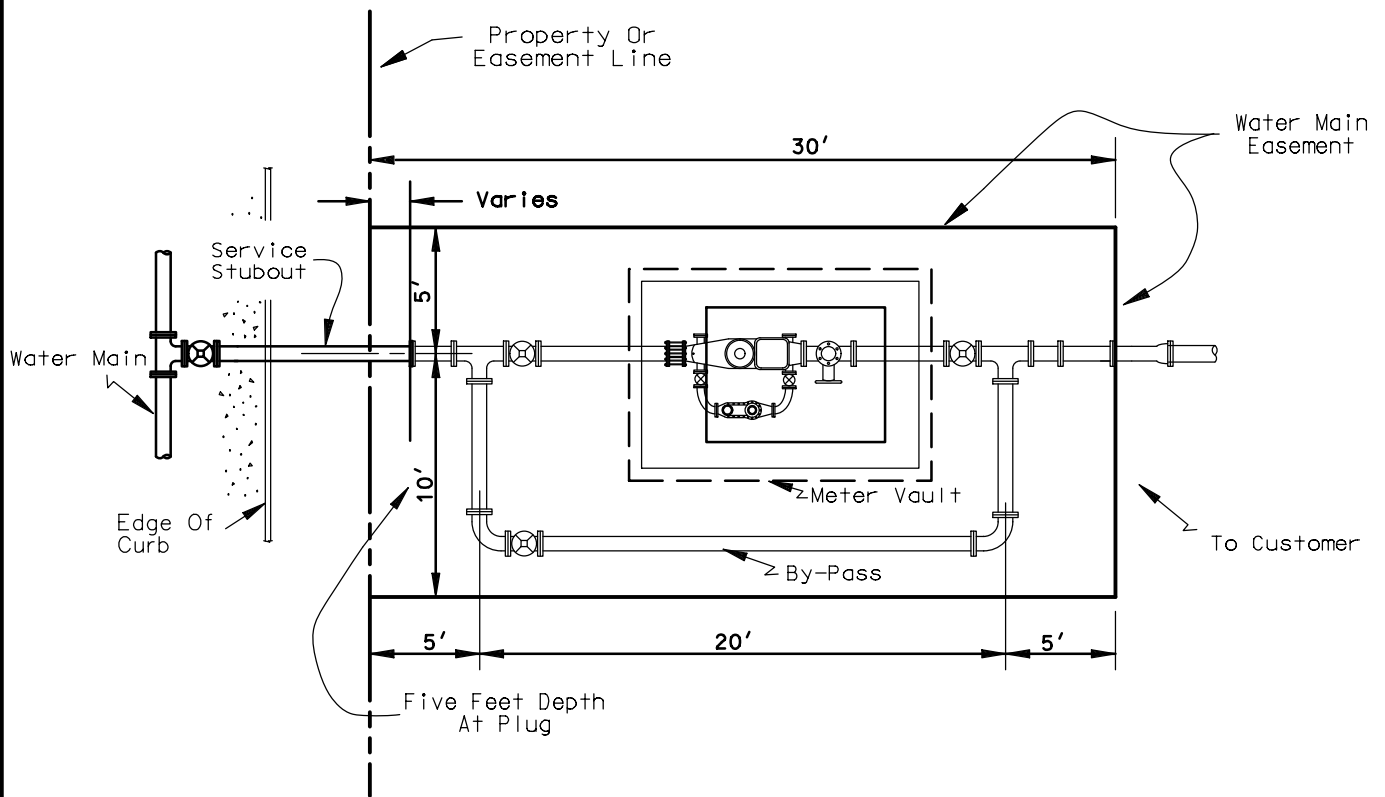


TYPICAL METER ALIGNMENT
(Combined Service Shown)

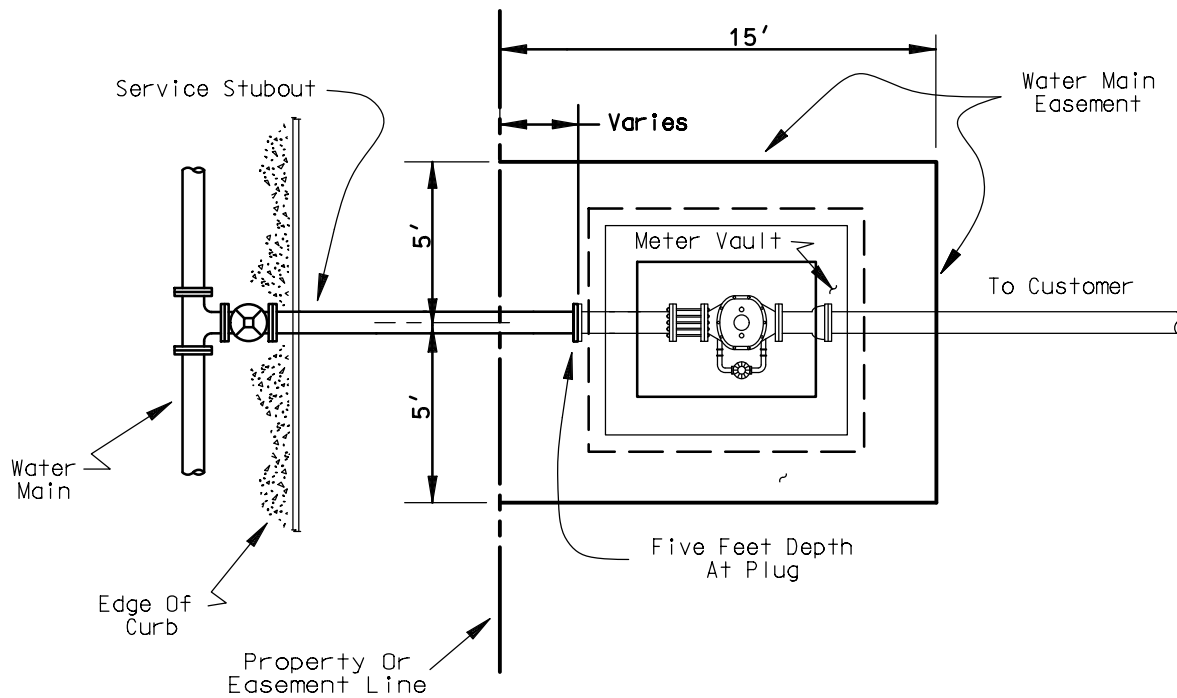


ALTERNATE METER ALIGNMENT
FOR LIMITED SPACE INSTALLATION
(Combined Service Shown)

LARGE SERVICE INSTALLATION DETAILS PLAN VIEWS	DWU	(Page No.) 502
	DATE JAN. 2010	



COMBINED SERVICE - 15' x 30' EASEMENT

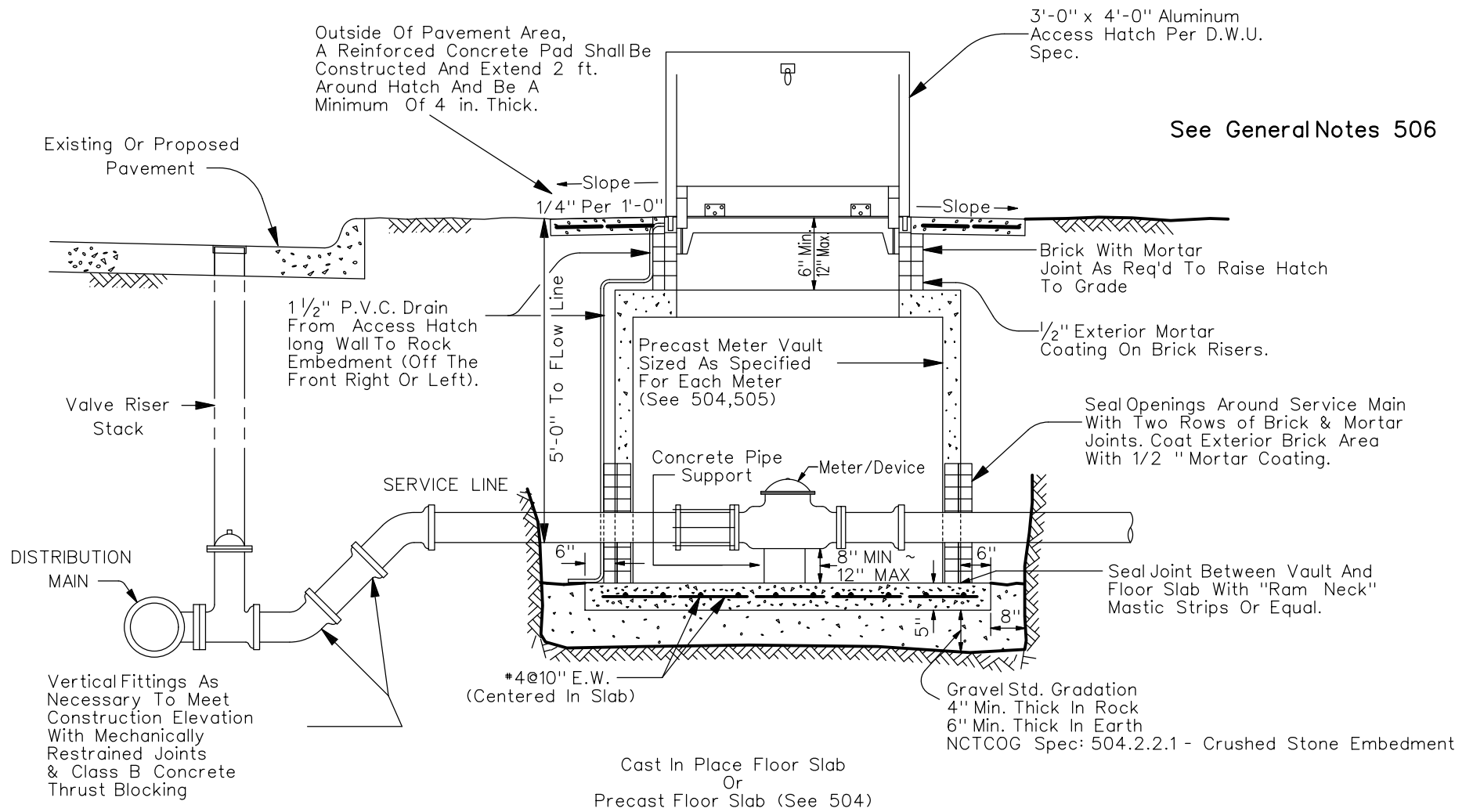


FIRE LINE SERVICE - 10' x 15' EASEMENT

MINIMUM EASEMENT SIZES
FOR LARGE METER INSTALLATIONS

DWU
DATE
OCT. 2011

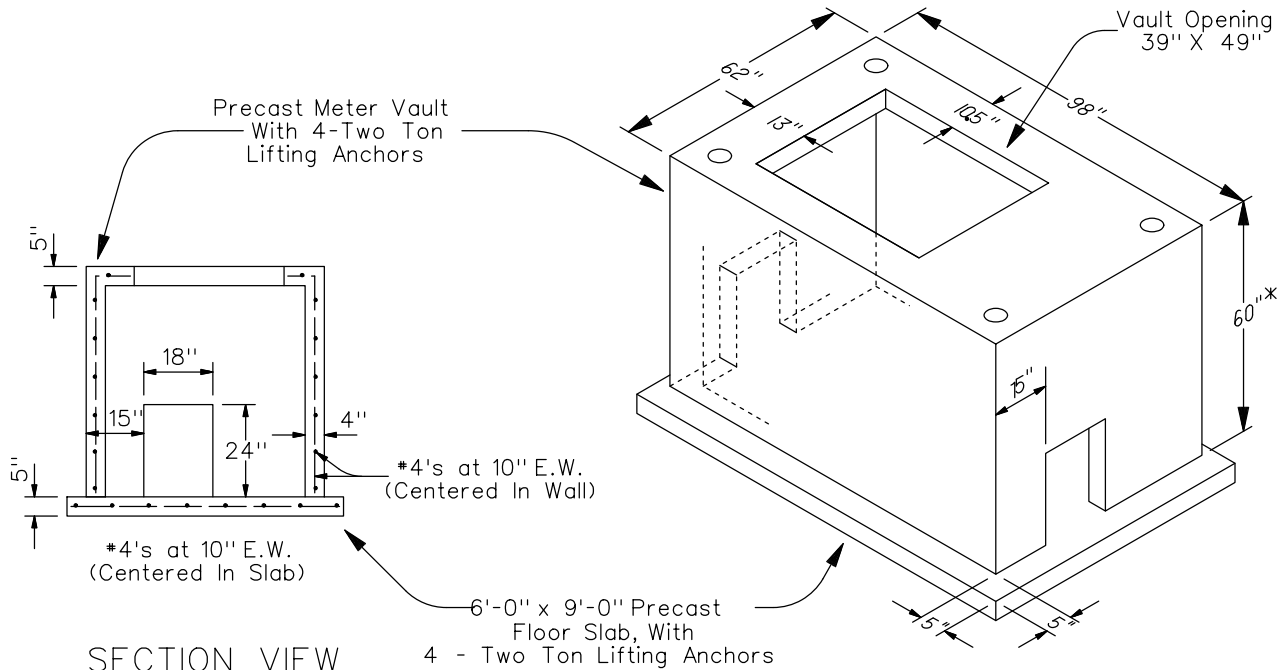
(PAGE NO.)
502A



TYPICAL FOR ALL LARGE METER VAULTS

NCTCOG Spec: 504.2.2.1 - Crushed Stone Embedment

LARGE SERVICE INSTALLATION DETAIL ELEVATION VIEW	DWU	(Page No.) 503
	DATE OCT.2009	

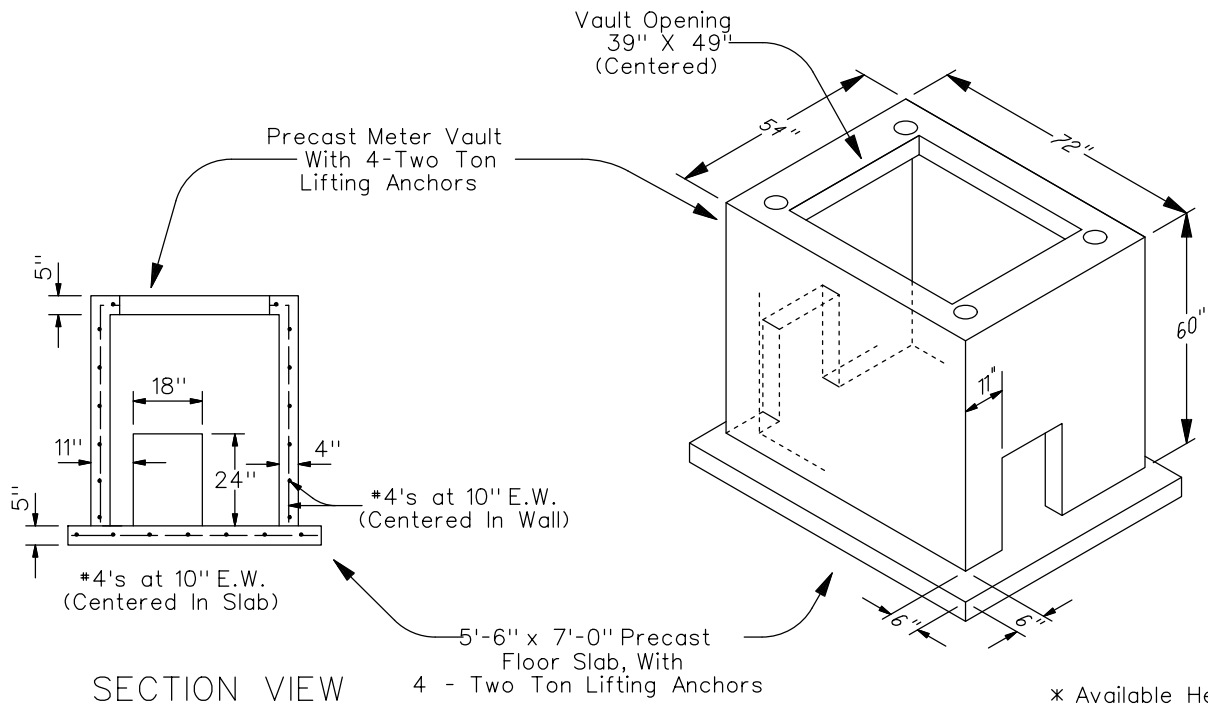


SECTION VIEW

F.M. VAULT

* Available Heights
36", 48", 60"

* Special Applications To Be Determined
By Engineer.

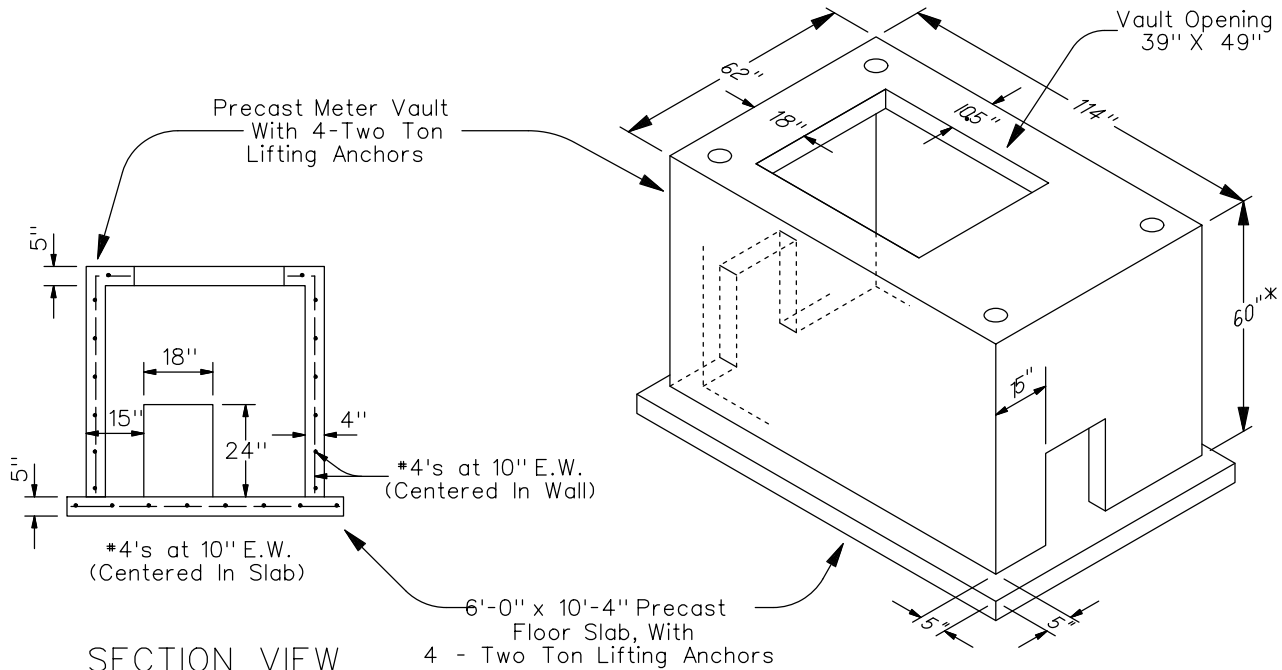


SECTION VIEW

D.C. VAULT

* Available Heights
36", 48", 60"

* Special Applications To Be Determined
By Engineer.



SECTION VIEW

10" VAULT

* Available Heights
36", 48", 60"

* Special Applications To Be Determined By Engineer.

GENERAL NOTES FOR MATERIAL AND CONSTRUCTION METHODS

- 1.) All materials including tapping sleeves, tapping valves, valves, pipe, associated fittings and construction methods shall conform to the most current version of the NCTCOG specifications, the DWU Addendum to that specification, this manual and the latest edition of the approved materials list.

NOTE:

A.) Only fullbody gray or ductile iron fittings and glands will be permitted for large water service installation. In no case will compact fittings be allowed

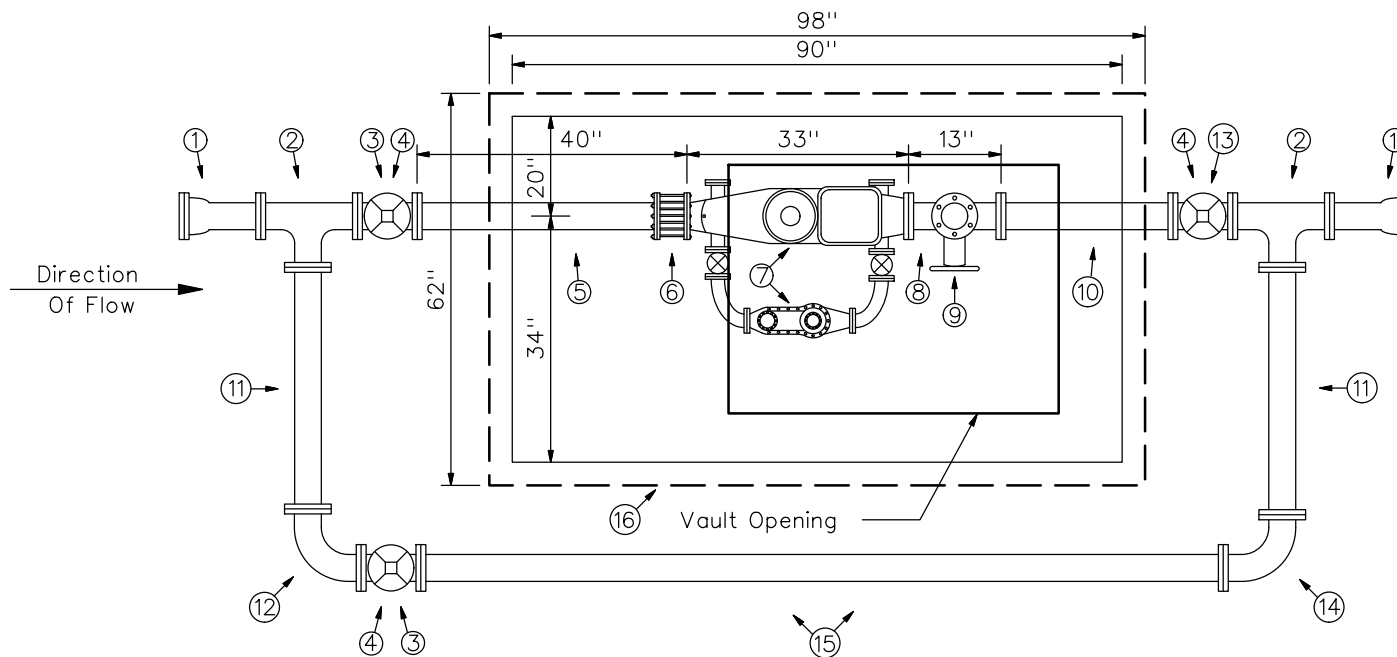
B.) All connections including valves and fittings shall be restrained joints. No threaded rod will be allowed. Along with restrained joints, thrust blocking will be required.

C.) All pipe must be either Ductile Iron (Class 52) or PVC C900 (DR-14).

- 2.) All precast vaults and precast floors used in the installation of large water services will meet DWU specifications and must be on the approved materials list.
- 3.) Cast in place concrete shall be class "F" concrete, except for concrete used for thrust blocking, which shall be class "B" concrete.
- 4.) The 3' x 4' aluminum access hatch cover shall meet DWU specifications and must be on the approved material list. (Currently supplied by DWU and may be purchased for use on DWU facilities only.)

LARGE SERVICE INSTALLATION DETAILS GENERAL NOTES		DWU	<small>(Page No.)</small> 506
		<small>DATE</small> OCT. 2011	

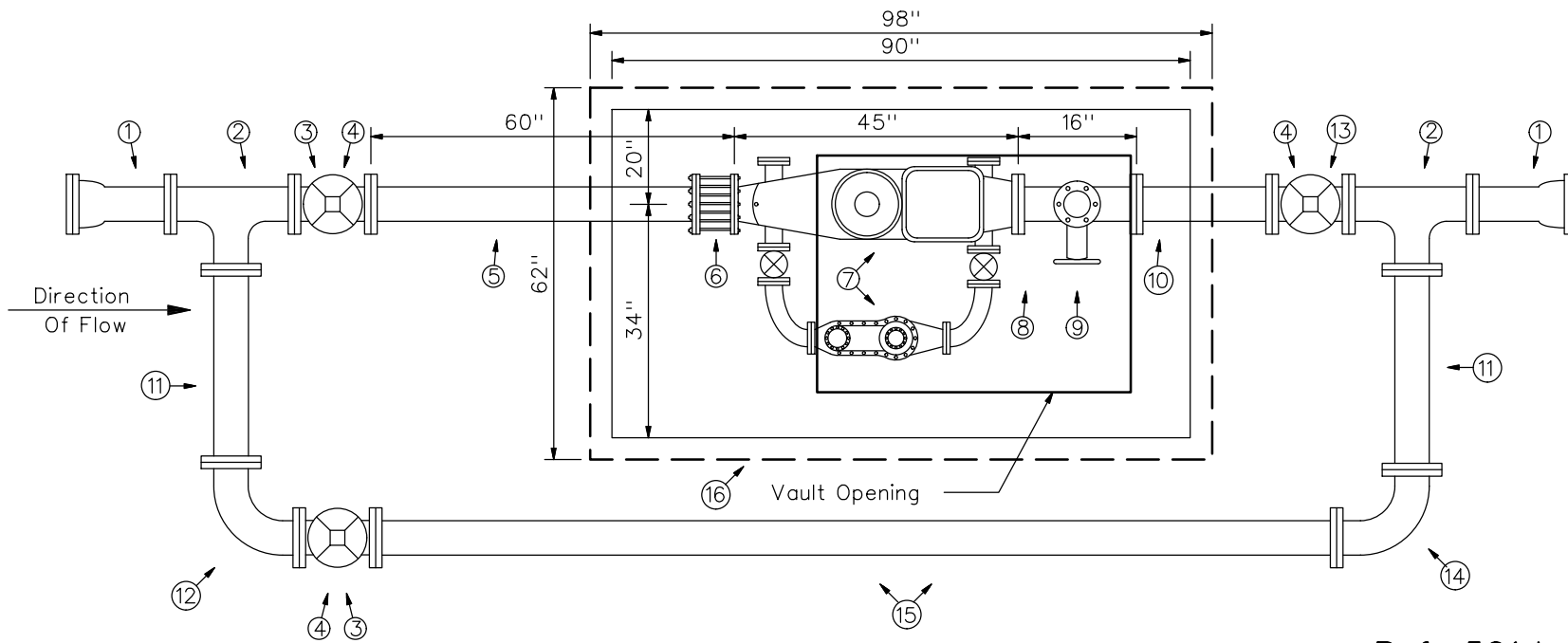
Material List			Material List		
Part No.	Quantity	Description	Part No.	Quantity	Description
①	2 Ea.	4" x 8" Nipple M.J. x F.	⑩	1 Ea.	4" x 24" Nipple F. x F.
②	2 Ea.	4" x 4" Tee F. x F.	⑪	2 Ea.	4" x 36" Nipple F. x F.
③	2 Ea.	4" Gate Valve F. x M.J.	⑫	1 Ea.	4" 90° Bend F. x F.
④	3 Ea.	Valve Stack Riser Cover & Lid	⑬	1 Ea.	4" Gate Valve F. x F.
⑤	1 Ea.	4" x 40" Pipe S. x S.	⑭	1 Ea.	4" 90° Bend M.J. x F.
⑥	1 Ea.	4" Flanged Coupling Adaptor	⑮	1 Ea.	4" Pipe
⑦	1 Ea.	4" Meter As Specified (Type F.M. Shown)	⑯	1 Ea.	Precast F.M. Vault
⑧	1 Ea.	4" x 4" Tee F. x F. (test Point)		1 Ea.	F.M. Vault Floor (Not Shown)
⑨	1 Ea.	4" Gate Valve F. x F. (Test Point)		1 Ea.	Access Hatch (Not Shown)



Ref. 501 to 506

4" COMBINED SERVICE WITH 4" METER	DWU	(Page No.) 507
	DATE JUNE 2002	

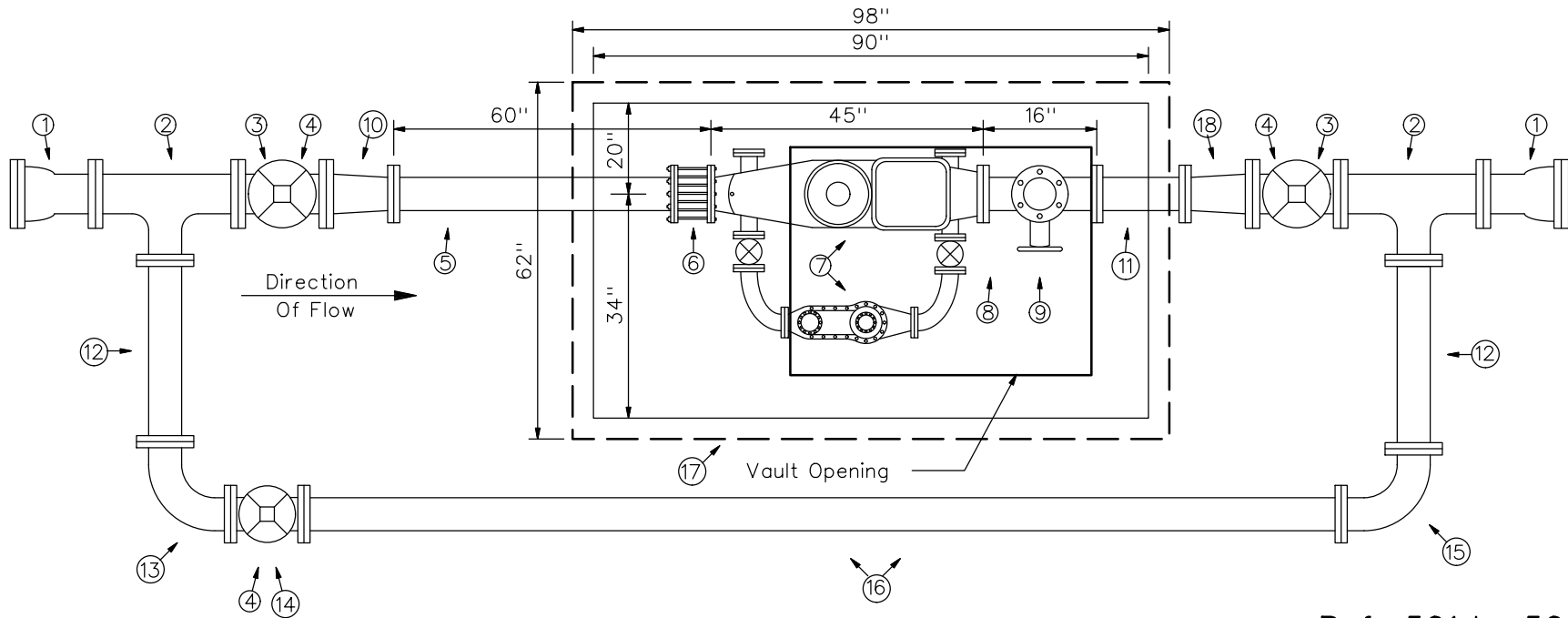
Material List			Material List		
Part No.	Quantity	Description	Part No.	Quantity	Description
①	2 Ea.	6" x 8" Nipple M.J. x F.	⑩	1 Ea.	6" x 24" Nipple F. x F.
②	2 Ea.	6" x 6" Tee F. x F.	⑪	2 Ea.	6" x 36" Nipple F. x F.
③	2 Ea.	6" Gate Valve F. x M.J.	⑫	1 Ea.	6" 90° Bend F. x F.
④	3 Ea.	Valve Stack Riser Cover & Lid	⑬	1 Ea.	6" Gate Valve F. x F.
⑤	1 Ea.	6" x 60" Pipe S. x S.	⑭	1 Ea.	6" 90° Bend M.J. x F.
⑥	1 Ea.	6" Flanged Coupling Adaptor	⑮	1 Ea.	6" Pipe
⑦	1 Ea.	6" Meter As Specified (Type F.M. Shown)	⑯	1 Ea.	Precast F.M. Vault
⑧	1 Ea.	6" x 4" Tee F. x F. (test Point)		1 Ea.	F.M. Vault Floor (Not Shown)
⑨	1 Ea.	4" Gate Valve F. x F. (Test Point)		1 Ea.	Access Hatch (Not Shown)



Ref. 501 to 506

6" COMBINED SERVICE WITH 6" METER	DWU	(Page No.) 508
	DATE JUNE 2002	

Material List			Material List		
Part No.	Quantity	Description	Part No.	Quantity	Description
①	2 Ea.	8" x 8" Nipple M.J. x F.	⑪	1 Ea.	6" x 12" Nipple F. x F.
②	2 Ea.	8" x 6" Tee F. x F.	⑫	2 Ea.	6" x 36" Nipple F. x F.
③	2 Ea.	8" Gate Valve F. x F.	⑬	1 Ea.	6" 90° Bend F. x F.
④	3 Ea.	Valve Stack Riser Cover & Lid	⑭	1 Ea.	6" Gate Valve F. x M.J.
⑤	1 Ea.	6" x 60" Pipe S. x S.	⑮	1 Ea.	6" 90° Bend M.J. x F.
⑥	1 Ea.	6" Flanged Coupling Adaptor	⑯	1 Ea.	6" Pipe
⑦	1 Ea.	6" Meter As Specified (Type F.M. Shown)	⑰	1 Ea.	Precast F.M. Vault
⑧	1 Ea.	6" x 4" Tee F. x F. (Test Point)		1 Ea.	F.M. Vault Floor (Not Shown)
⑨	1 Ea.	4" Gate Valve F. x F. (Test Point)		1 Ea.	Access Hatch (Not Shown)
⑩	1 Ea.	8" x 6" Reducer F. x M. J.	⑱	1 Ea.	8" x 6" Reducer F. x F.



Ref. 501 to 506

**8" COMBINED SERVICE
WITH 6" METER**

DWU

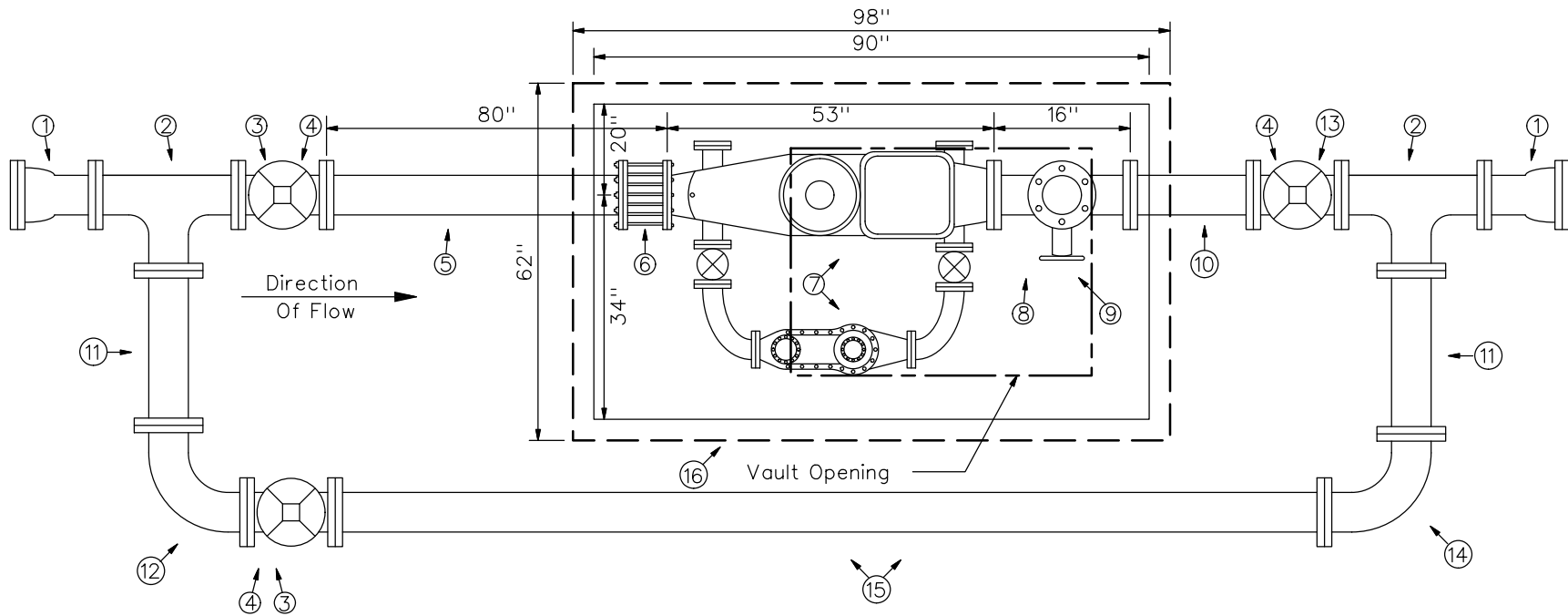
(Page No.)

509

DATE

JUNE 2002

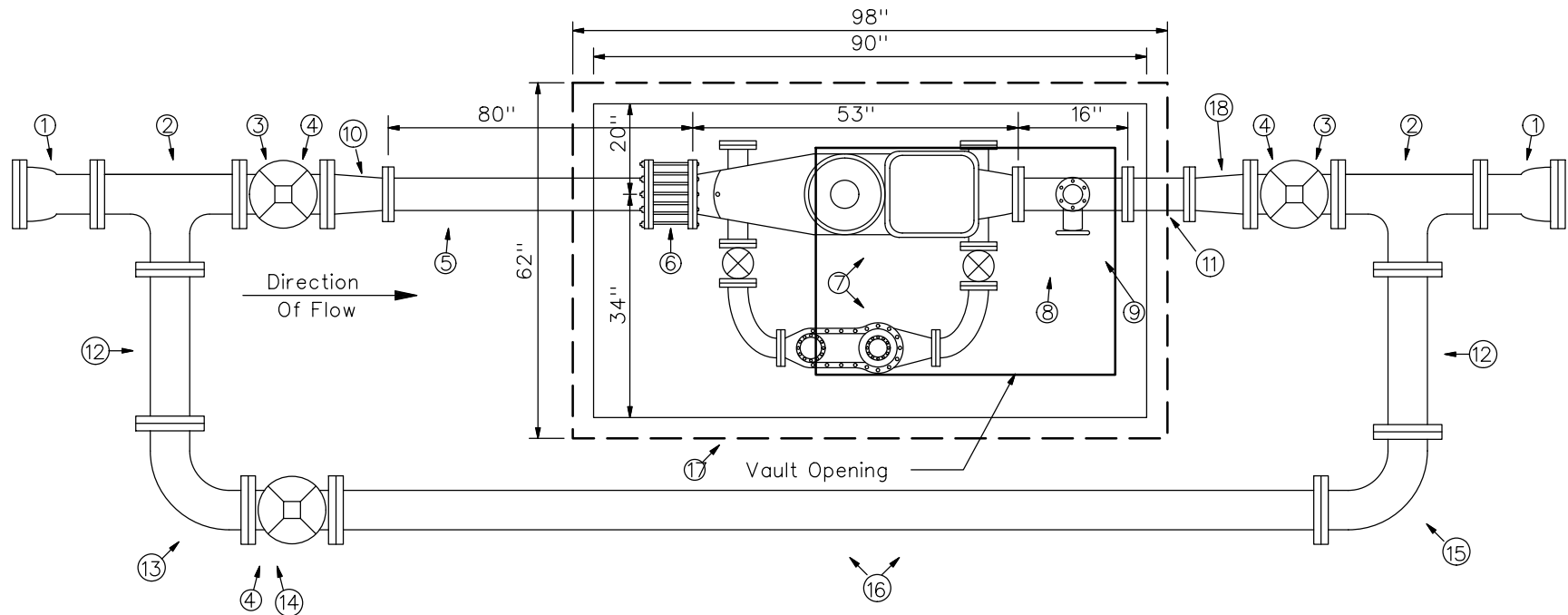
Material List			Material List		
Part No.	Quantity	Description	Part No.	Quantity	Description
①	2 Ea.	6" x 8" Nipple M.J. x F.	⑩	1 Ea.	6" x 24" Nipple F. x F.
②	2 Ea.	6" x 8" Tee F. x F.	⑪	2 Ea.	6" x 36" Nipple F. x F.
③	2 Ea.	6" Gate Valve F. x M.J.	⑫	1 Ea.	6" C.I. 90° Bend F. x F.
④	3 Ea.	Valve Stack Riser Cover & Lid	⑬	1 Ea.	6" Gate Valve F. x F.
⑤	1 Ea.	6" x 80" Pipe S. x S.	⑭	1 Ea.	6" 90° Bend M.J. x F.
⑥	1 Ea.	6" Flanged Coupling Adaptor	⑮	1 Ea.	6" Pipe
⑦	1 Ea.	6" Meter As Specified (Type F.M. Shown)	⑯	1 Ea.	Precast F.M. Vault
⑧	1 Ea.	6" x 4" Tee F. x F. (Test Point)	⑰	1 Ea.	F.M. Vault Floor (Not Shown)
⑨	1 Ea.	4" Gate Valve F. x F. (Test Point)	⑱	1 Ea.	Access Hatch (Not Shown)



Ref. 501 to 506

8" COMBINED SERVICE WITH 8" METER	DWU	(Page No.) 510
	DATE OCT 2011	

Material List			Material List		
Part No.	Quantity	Description	Part No.	Quantity	Description
①	2 Ea.	10" x 8" Nipple M.J. x F.	⑪	1 Ea.	8" x 12" Nipple F. x F.
②	2 Ea.	10" x 8" Tee F. x F.	⑫	2 Ea.	8" x 36" Nipple F. x F.
③	2 Ea.	10" Gate Valve F. x F.	⑬	1 Ea.	8" 90° Bend F. x F.
④	3 Ea.	Valve Stack Riser Cover & Lid	⑭	1 Ea.	8" Gate Valve F. x M.J.
⑤	1 Ea.	8" x 80" Pipe S. x S.	⑮	1 Ea.	8" 90° Bend M.J. x F.
⑥	1 Ea.	8" Flanged Coupling Adaptor	⑯	1 Ea.	8" Pipe
⑦	1 Ea.	8" Meter As Specified (Type F.M. Shown)	⑰	1 Ea.	Precast F.M. Vault
⑧	1 Ea.	8" x 4" Tee F. x F. (Test Point)		1 Ea.	F.M. Vault Floor (Not Shown)
⑨	1 Ea.	4" Gate Valve F. x F. (Test Point)		1 Ea.	Access Hatch (Not Shown)
⑩	1 Ea.	10" x 8" Reducer F. x M. J.	⑱	1 Ea.	10" x 8" Reducer F. x F.

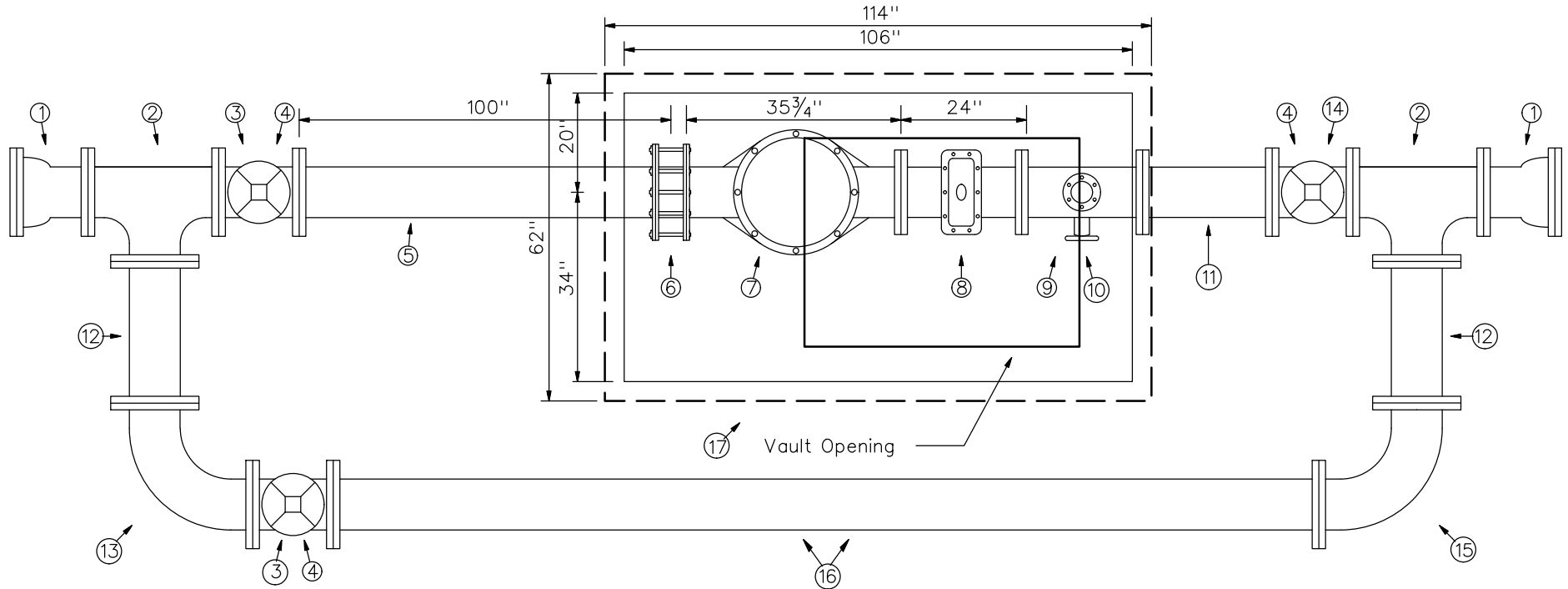


Ref. 501 to 506

10" COMBINED SERVICE
WITH 8" METER

DWU	(Page No.) 511
DATE JUNE 2002	

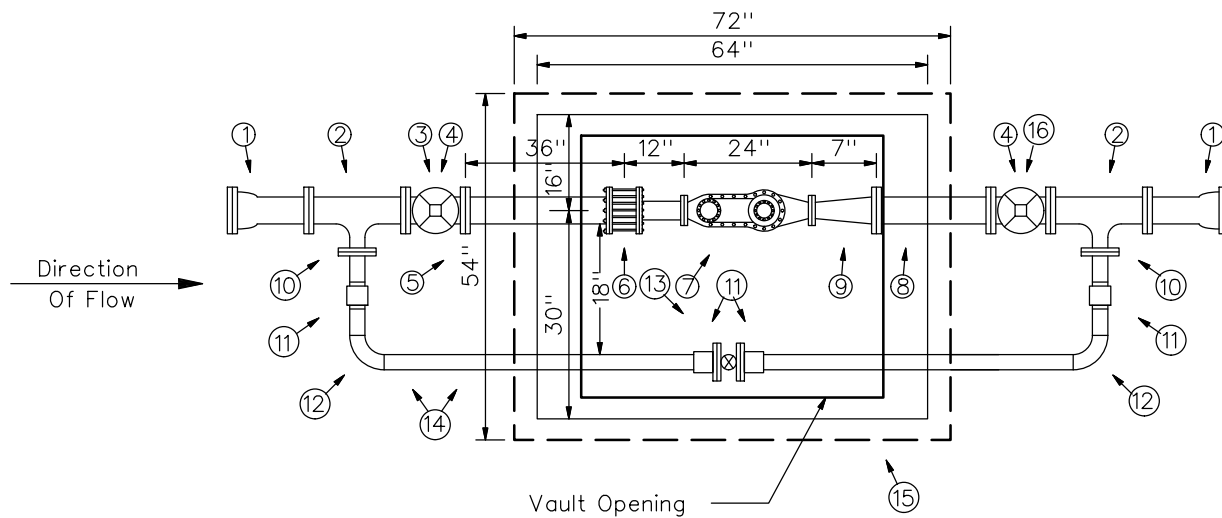
Material List			Material List		
Part No.	Quantity	Description	Part No.	Quantity	Description
①	2 Ea.	40" x 8" Nipple M.J. x F.	⑪	1 Ea.	40" x 24" Nipple F. x F.
②	2 Ea.	40" x 10" Tee F. x F.	⑫	2 Ea.	40" x 72" Nipple F. x F.
③	2 Ea.	40" Gate Valve F. x M.J.	⑬	1 Ea.	40" 90° Bend F. x F.
④	3 Ea.	Valve Stack Riser Cover & Lid	⑭	1 Ea.	40" Gate Valve F. x F.
⑤	1 Ea.	40" x 100" Pipe S. x S.	⑮	1 Ea.	40" 90° Bend M.J. x F.
⑥	1 Ea.	40" Flanged Coupling Adaptor	⑯	1 Ea.	40" Pipe
⑦	1 Ea.	40" U.L. Approved Strainer (For Turbine)	⑰	1 Ea.	Precast 10" Vault
⑧	1 Ea.	40" Meter As Specified (Type F.M. Shown)		1 Ea.	F.M. Vault Floor (Not Shown)
⑨	1 Ea.	40" x 4" Tee F. x F. (Test Point)		1 Ea.	Access Hatch (Not Shown)
⑩	1 Ea.	4" Gate Valve F. x F. (Test Point)			



Ref. 501 to 506

10" COMBINED SERVICE WITH 10" METER	DWU	(Page No.) 512
	DATE OCT 2011	

Material List			Material List		
Part No.	Quantity	Description	Part No.	Quantity	Description
①	2 Ea.	4" x 8" Nipple M.J. x F.	⑩	2 Ea.	2" Companion Flange
②	2 Ea.	4" x 2" Tee F. x F.	⑪	4 Ea.	2" Comp X OSIP Adaptor
③	1 Ea.	4" Gate Valve F. x M.J.	⑫	2 Ea.	2" Comp 90 Deg. Ell
④	3 Ea.	Valve Stack Riser Cover & Lid	⑬	1 Ea.	2" Ball Valve
⑤	1 Ea.	4" x 36" Pipe S. x S.	⑭	1 Ea.	2" Copper Pipe
⑥	1 Ea.	4" X 3" Reducing Flanged Coupling Adaptor	⑮	1 Ea.	Precast D.C. Vault
⑦	1 Ea.	3" Meter As Specified (Type Compound Shown)	⑯	1 Ea.	D.C. Vault Floor (Not Shown)
⑧	1 Ea.	4" x 24" Nipple F. x F.	⑰	1 Ea.	Access Hatch (Not Shown)
⑨	1 Ea.	4" x 3" Reducer F. x F.	⑱	1 Ea.	4" Gate Valve F. x F.



Ref. 501 to 506

**4" DOMESTIC SERVICE
WITH 3" METER**

DWU

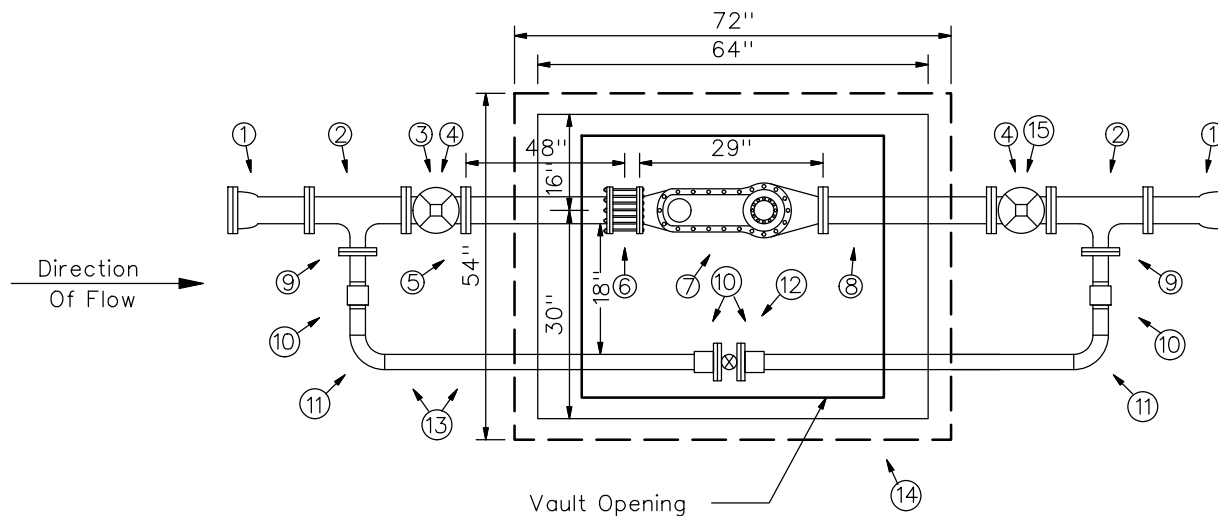
(Page No.)

513

DATE

OCT 2010

Material List			Material List		
Part No.	Quantity	Description	Part No.	Quantity	Description
①	2 Ea.	4" x 8" Nipple M.J. x F.	⑨	2 Ea.	2" Companion Flange
②	2 Ea.	4" x 2" Tee F. x F.	⑩	4 Ea.	2" Comp X OSIP Adaptor
③	1 Ea.	4" Gate Valve F. x M.J.	⑪	2 Ea.	2" Comp 90 Deg. Ell
④	2 Ea.	Valve Stack Riser Cover & Lid	⑫	1 Ea.	2" Ball Valve
⑤	1 Ea.	4" x 36" Pipe S. x S.	⑬	1 Ea.	2" Copper Pipe
⑥	1 Ea.	4" Flanged Coupling Adapter	⑭	1 Ea.	Precast D.C. Vault
⑦	1 Ea.	4" Meter As Specified (Type Compound Shown)	1 Ea.	1 Ea.	D.C. Vault Floor (Not Shown)
⑧	1 Ea.	4" x 36" Pipe F. x F.	1 Ea.	1 Ea.	Access Hatch (Not Shown)
			⑮	1 Ea.	4" Gate Valve F. x F.

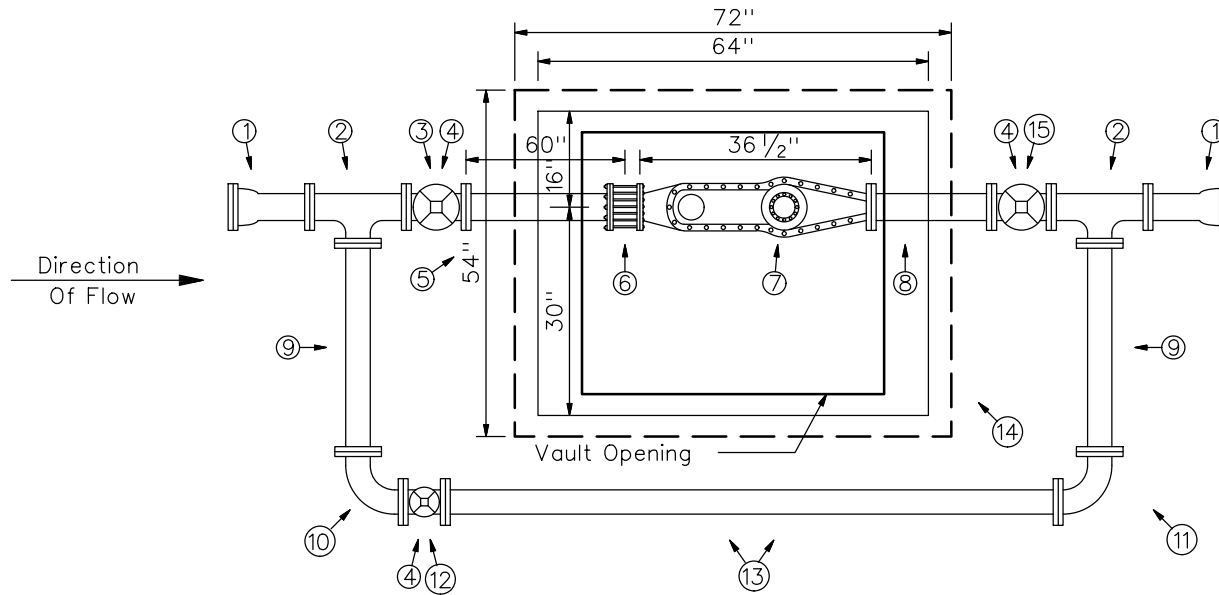


Ref. 501 to 506

**4" DOMESTIC SERVICE
WITH 4" METER**

DWU	(Page No.) 514
DATE OCT 2010	

Material List			Material List		
Part No.	Quantity	Description	Part No.	Quantity	Description
①	2 Ea.	6" x 8" Nipple M.J. x F.	⑨	2 Ea.	4" x 36" Nipple F. x F.
②	2 Ea.	6" x 4" Tee F. x F.	⑩	1 Ea.	4" 90 Deg. Bend F.x F.
③	1 Ea.	6" Gate Valve F. x M.J.	⑪	1 Ea.	4" 90 Deg. Bend M.J. x F.
④	3 Ea.	Valve Stack Riser Cover & Lid	⑫	1 Ea.	4" Gate Valve F. x M.J.
⑤	1 Ea.	6" x 24" Pipe S. x S.	⑬	1 Ea.	4" Pipe
⑥	1 Ea.	6" Flanged Coupling Adapter	⑭	1 Ea.	Precast D.C. Vault
⑦	1 Ea.	6" Meter As Specified (Type Compound Shown)	⑮	1 Ea.	D.C. Vault Floor (Not Shown)
⑧	1 Ea.	6" x 24" Pipe F. x F.		1 Ea.	Access Hatch (Not Shown)
				1 Ea.	6" Gate Valve F. x F.

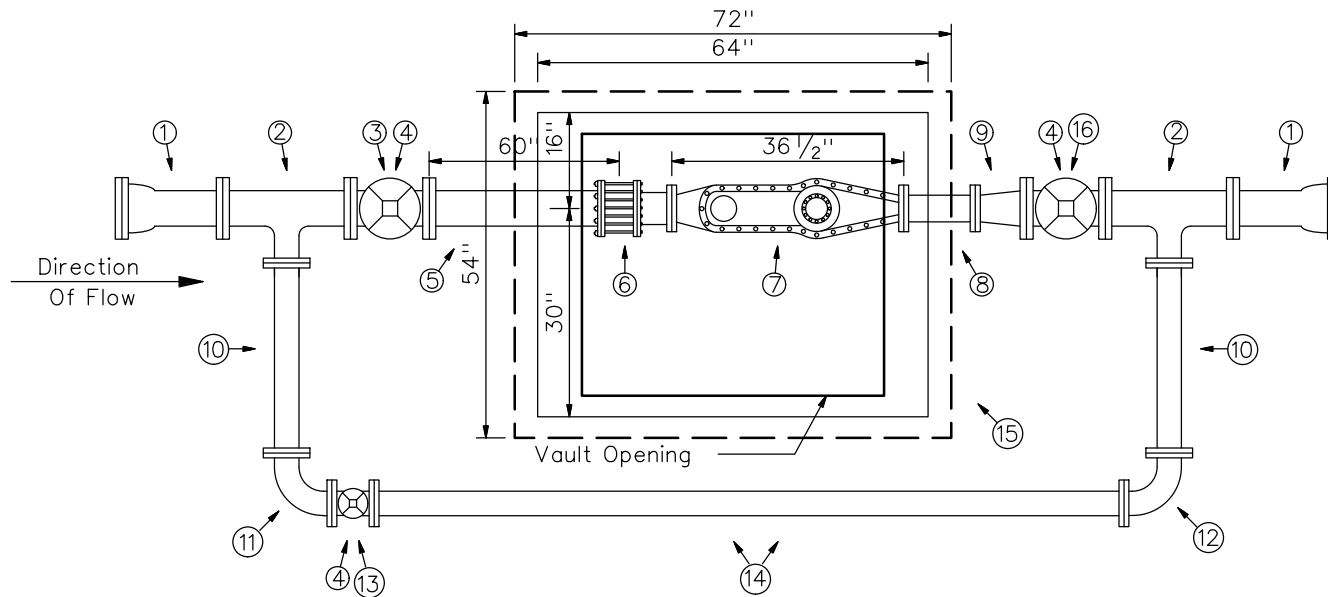


Ref. 501 to 506

**6" DOMESTIC SERVICE
WITH 6" METER**

	DWU	(Page No.) 515
	DATE OCT 2011	

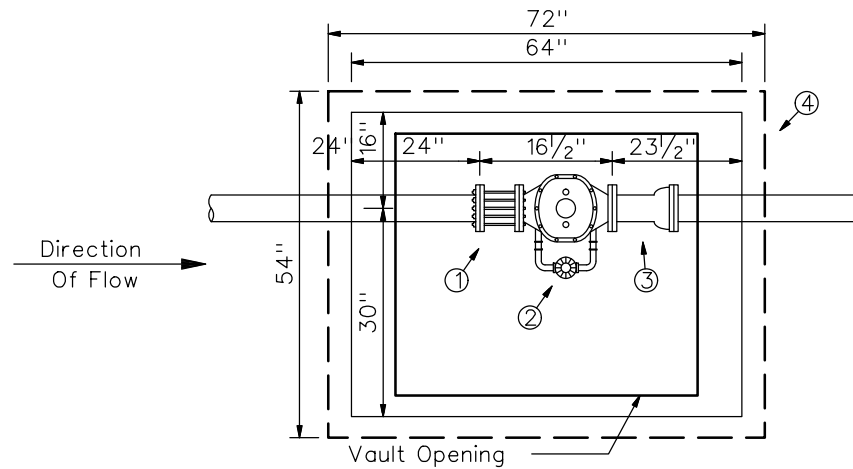
Material List			Material List		
Part No.	Quantity	Description	Part No.	Quantity	Description
①	2 Ea.	8" x 8" Nipple M.J. x F.	⑩	2 Ea.	4" x 36" Nipple F. x F.
②	2 Ea.	8" x 4" Tee F. x F.	⑪	1 Ea.	4" 90 Deg. Bend F.x F.
③	1 Ea.	8" Gate Valve F. x M.J.	⑫	1 Ea.	4" 90 Deg. Bend M.J. x F.
④	3 Ea.	Valve Stack Riser Cover & Lid	⑬	1 Ea.	4" Gate Valve F. x M.J.
⑤	1 Ea.	8" x 24" Pipe S. x S.	⑭	1 Ea.	4" Pipe
⑥	1 Ea.	8" x 6" Reducing Flanged Coupling Adaptor	⑮	1 Ea.	Precast D.C. Vault
⑦	1 Ea.	6" Meter As Specified (Type Compound Shown)		1 Ea.	D.C. Vault Floor (Not Shown)
⑧	1 Ea.	6" x 24" Pipe F. x F.		1 Ea.	Access Hatch (Not Shown)
⑨	1 Ea.	8" x 6" Reducer F. x F.	⑯	1 Ea.	8" Gate Valve F. x F.



Ref. 501 to 506

8" DOMESTIC SERVICE WITH 6" METER	DWU	(Page No.) 516
	DATE OCT 2010	

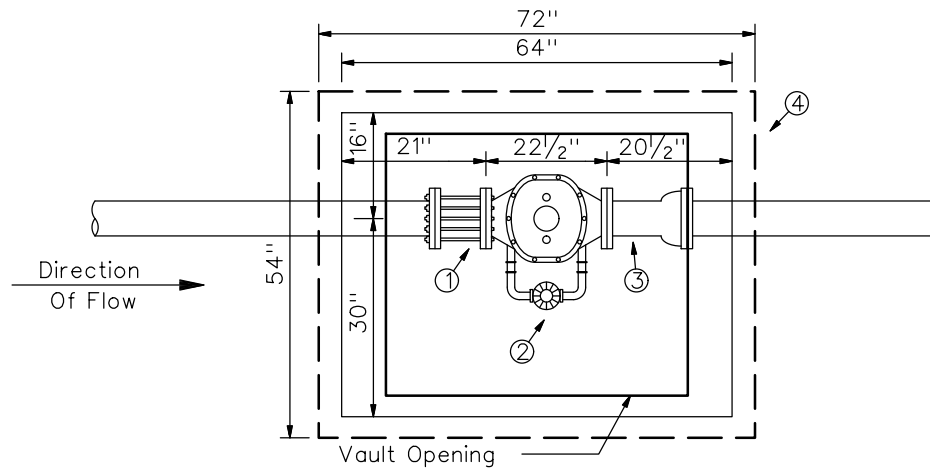
Material List		
Part No.	Quantity	Description
①	1 Ea.	4" Flanged Coupling Adaptor
②	1 Ea.	4" Detector Check Device W/ By-Pass Meter
③	1 Ea.	4" x 8" Nipple M.J. x F.
④	1 Ea.	Precast D.C. Vault
	1 Ea.	D.C. Vault Floor (Not Shown)
	1 Ea.	Access Hatch (Not Shown)



Ref. 501 to 506

4" CLOSED FIRELINE SERVICE WITH 4" DETECTOR CHECK DEVICE	DWU	(Page No.) 517
	DATE JUNE 2002	

Material List		
Part No.	Quantity	Description
①	1 Ea.	6" Flanged Coupling Adaptor
②	1 Ea.	6" Detector Check Device W/ By-Pass Meter
③	1 Ea.	6" x 8" Nipple M.J. x F.
④	1 Ea.	Precast D.C. Vault
	1 Ea.	D.C. Vault Floor (Not Shown)
	1 Ea.	Access Hatch (Not Shown)



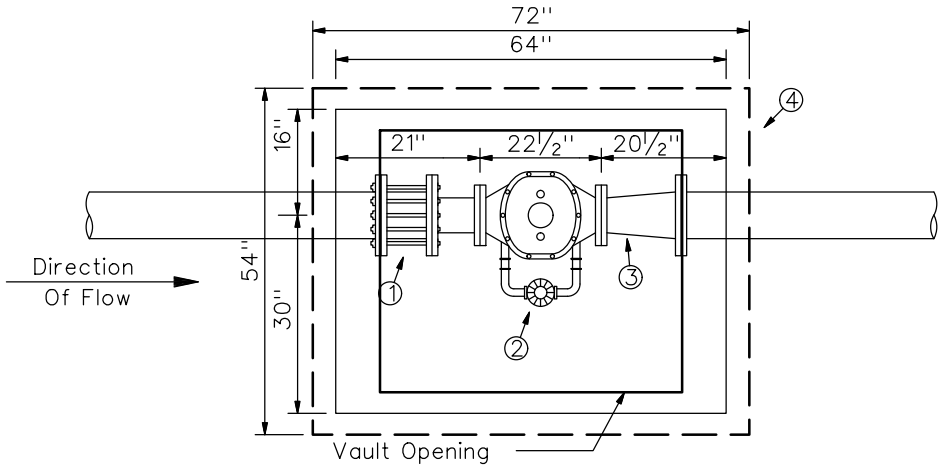
Ref. 501 to 506

6" CLOSED FIRELINE SERVICE
WITH 6" DETECTOR CHECK DEVICE

DWU
DATE
JUNE 2002

(Page No.)
518

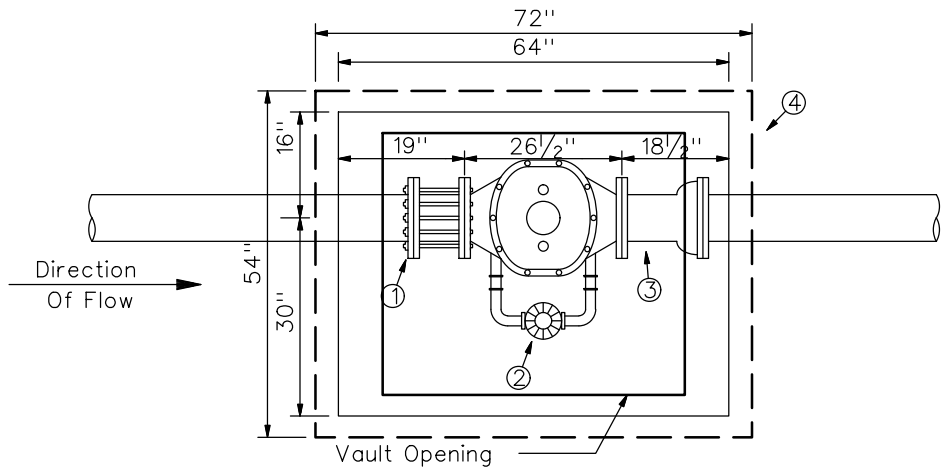
Material List		
Part No.	Quantity	Description
①	1 Ea.	8" X 6" Flanged Coupling Adaptor
②	1 Ea.	6" Detector Check Device W/ By-Pass Meter
③	1 Ea.	8" X 6" Reducer M.J. X F.
④	1 Ea.	Precast D.C. Vault
	1 Ea.	D.C. Vault Floor (Not Shown)
	1 Ea.	Access Hatch (Not Shown)



Ref. 501 to 506

8" CLOSED FIRELINE SERVICE WITH 6" DETECTOR CHECK DEVICE	DWU	(Page No.) 519
	DATE JUNE 2002	

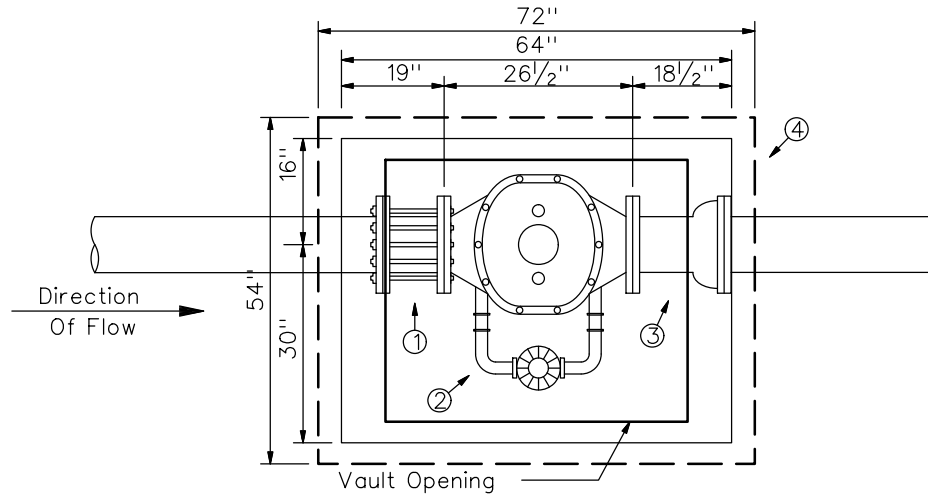
Material List		
Part No.	Quantity	Description
①	1 Ea.	8" Flanged Coupling Adaptor
②	1 Ea.	8" Detector Check Device W/ By-Pass Meter
③	1 Ea.	8" X 8" Nipple M.J. X F.
④	1 Ea.	Precast D.C. Vault
	1 Ea.	D.C. Vault Floor (Not Shown)
	1 Ea.	Access Hatch (Not Shown)



Ref. 501 to 506

8" CLOSED FIRELINE SERVICE WITH 8" DETECTOR CHECK DEVICE	DWU	(Page No.) 520
	DATE JUNE 2002	

Material List		
Part No.	Quantity	Description
①	1 Ea.	10" Flanged Coupling Adaptor
②	1 Ea.	10" Detector Check Device W/ By-Pass Meter
③	1 Ea.	10" X 8" Nipple M.J. X F.
④	1 Ea.	Precast D.C. Vault
	1 Ea.	D.C. Vault Floor (Not Shown)
	1 Ea.	Access Hatch (Not Shown)



Ref. 501 to 506

10" CLOSED FIRELINE SERVICE
WITH 10" DETECTOR CHECK DEVICE

DWU
DATE
JUNE 2002

(Page No.)
521

PART 6

(Series 600)

CATHODIC PROTECTION

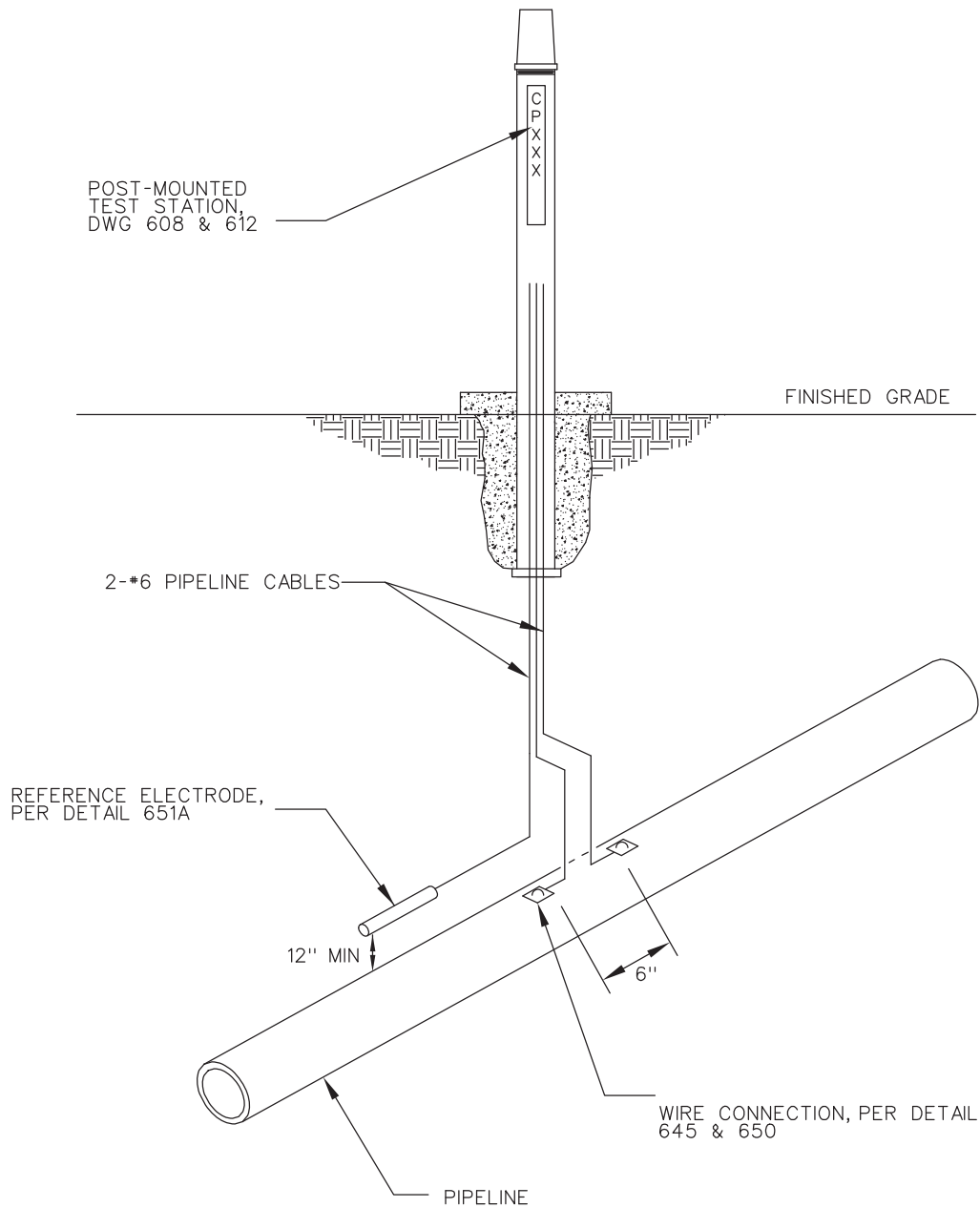


City of Dallas
Water Utilities Department

PART 6
CATHODIC PROTECTION

<u>TITLE</u>	<u>Pg.</u>
Potential Test Station	--- 601
Insulating Joint Test Station	--- 602
Casing Test Station	--- 603
Foreign Pipeline Test Station	--- 604
Galvanic Anode Test Station	--- 605
Flush Mounted Test Station	--- 606
Condulet Style Test Station	--- 607
Post Mounted Test Station	--- 608
Type Roadway Offset	--- 609
Wall Mounted Vault Style Test Station	--- 610
Flush Mounted Vault Style Test Station	--- 611
Flush Mounted Potential Test Station Test Terminal Board	--- 612
Flush Mounted Insulating Joint Test Station Test Terminal	--- 613
Flush Mounted Casing Test Station Test Terminal Board	--- 614
Flush Mounted Foreign Pipeline Test Station Test Terminal Board	--- 615
Flush Mounted Anode Test Station Test Terminal Board	--- 616
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Galvanic Anode Junction Box	--- 619
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Post Mounted Foreign Pipeline Test Station Test Terminal Board (Section A-A)	--- 621
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Galvanic Ribbon Installation Section-A	--- 624
Anode To Lead Cable Connection	--- 625
Soldered Terminal Connection	--- 625A
Flush Mounted Ribbon Anode Test Station Test Terminal Board	--- 626
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Cable Identifier	---	649
Pin Brazing Wiring-To-Structure Weld Detail	---	650
IR Free Coupon Detail	---	651A
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Low Profile ER Probe (Electrical Resistance) Probe Detail	---	655
Copper Sulfate Reference Electrode Cell	---	657
Line Current Span Test Station	---	660

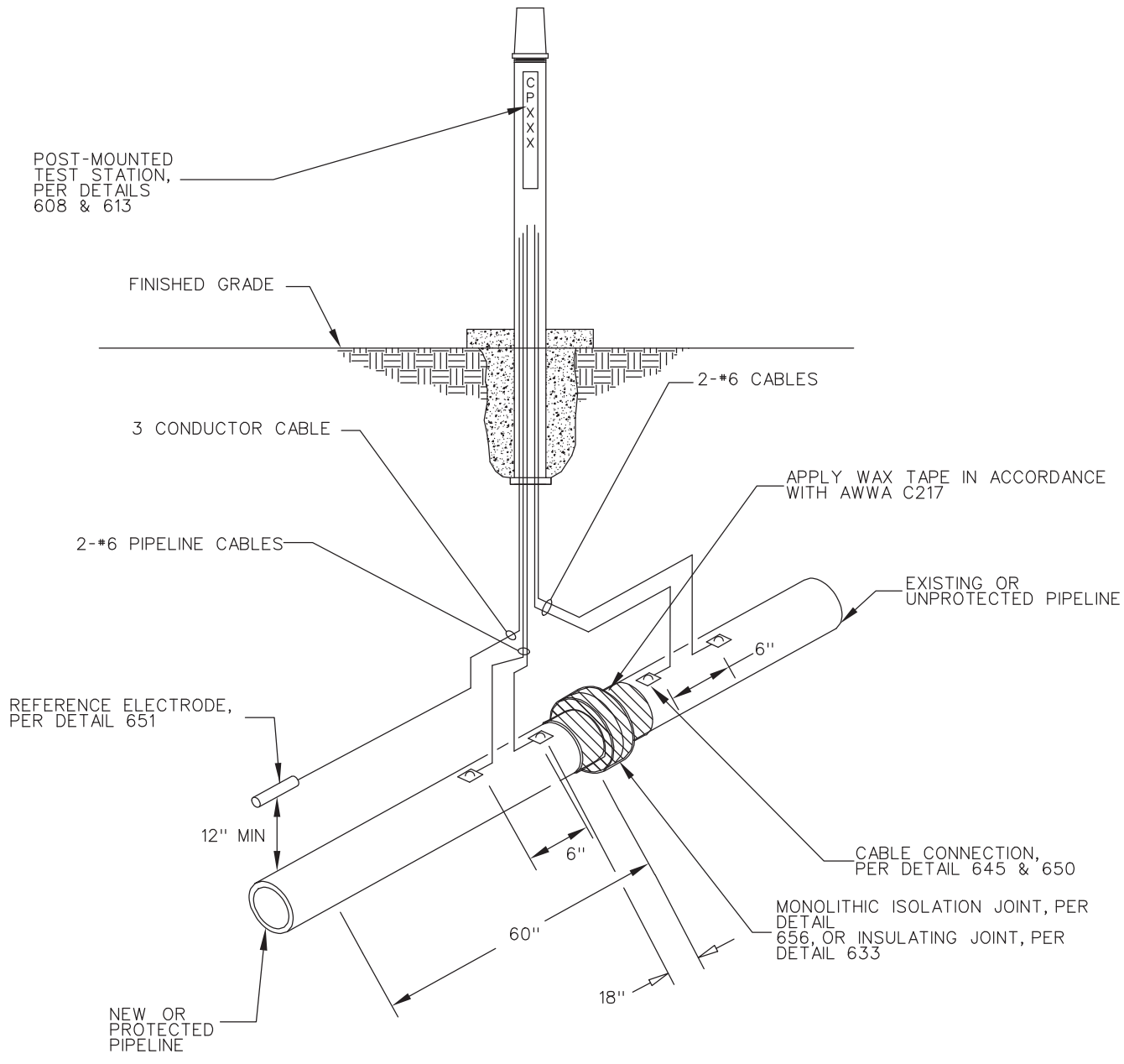


NOTES:

1. PLACE PLASTIC WARNING TAPE 12" ABOVE CABLES RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.

REFER TO PAGES 608, 612, 645, 650 & 651A

POTENTIAL TEST STATION	DWU	601
	DATE OCT. 2016	(Page No.)

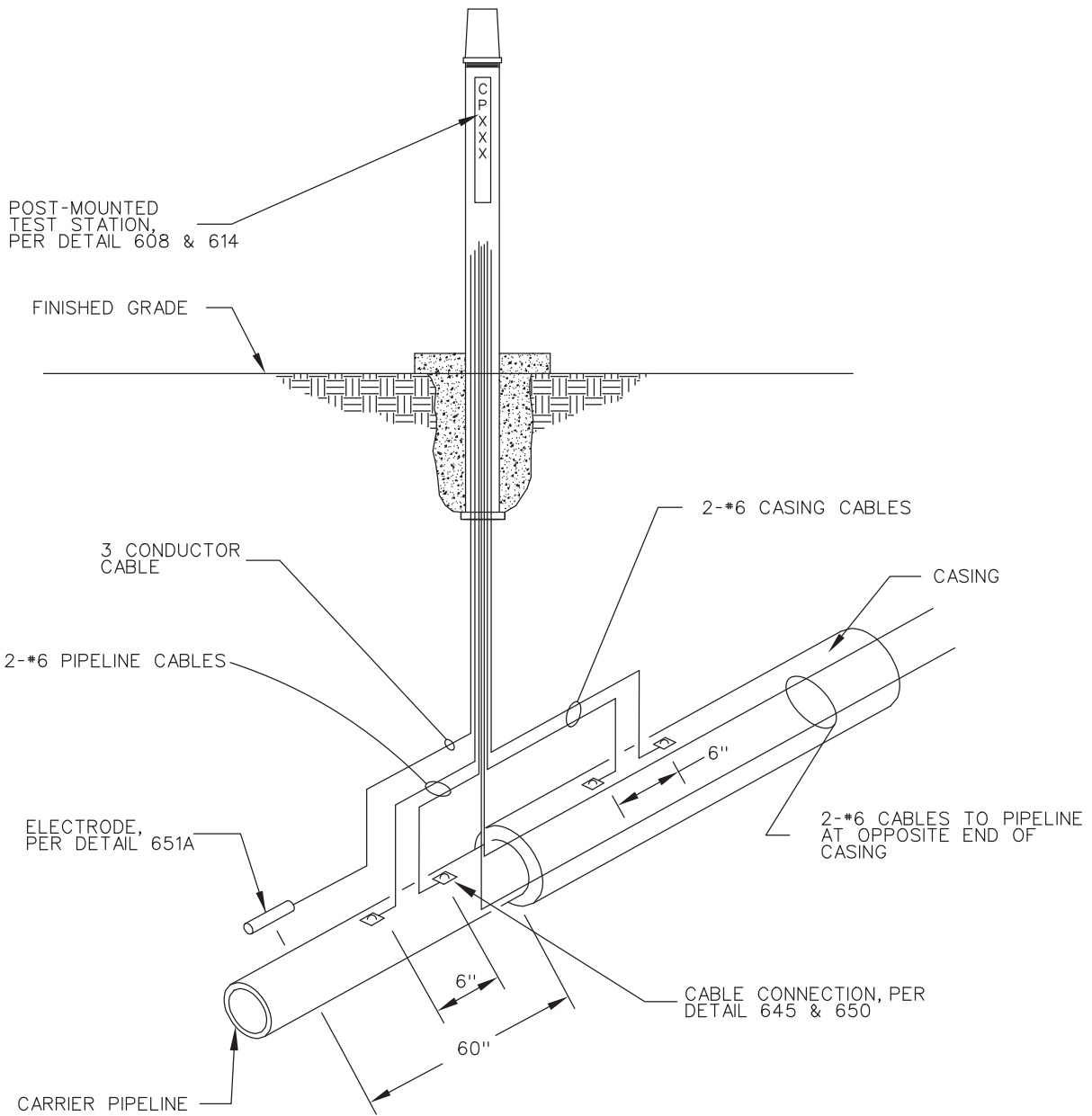


NOTES:

1. PLACE PLASTIC WARNING TAPE 12" ABOVE CABLE RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.
3. DO NOT MAKE CABLE CONNECTIONS WITHIN 18" OF MONOLITHIC ISOLATION JOINT.

REFER TO PAGES 608,613,633,645, 650, 651A & 656

<h1>INSULATING JOINT TEST STATION</h1>	DWU	(Page No.) 602
	DATE OCT. 2016	



NOTES:

1. PLACE PLASTIC WARNING TAPE 12" ABOVE WIRE RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.

REFER TO PAGES 608, 614, 645, 650, & 651A

CASING TEST STATION

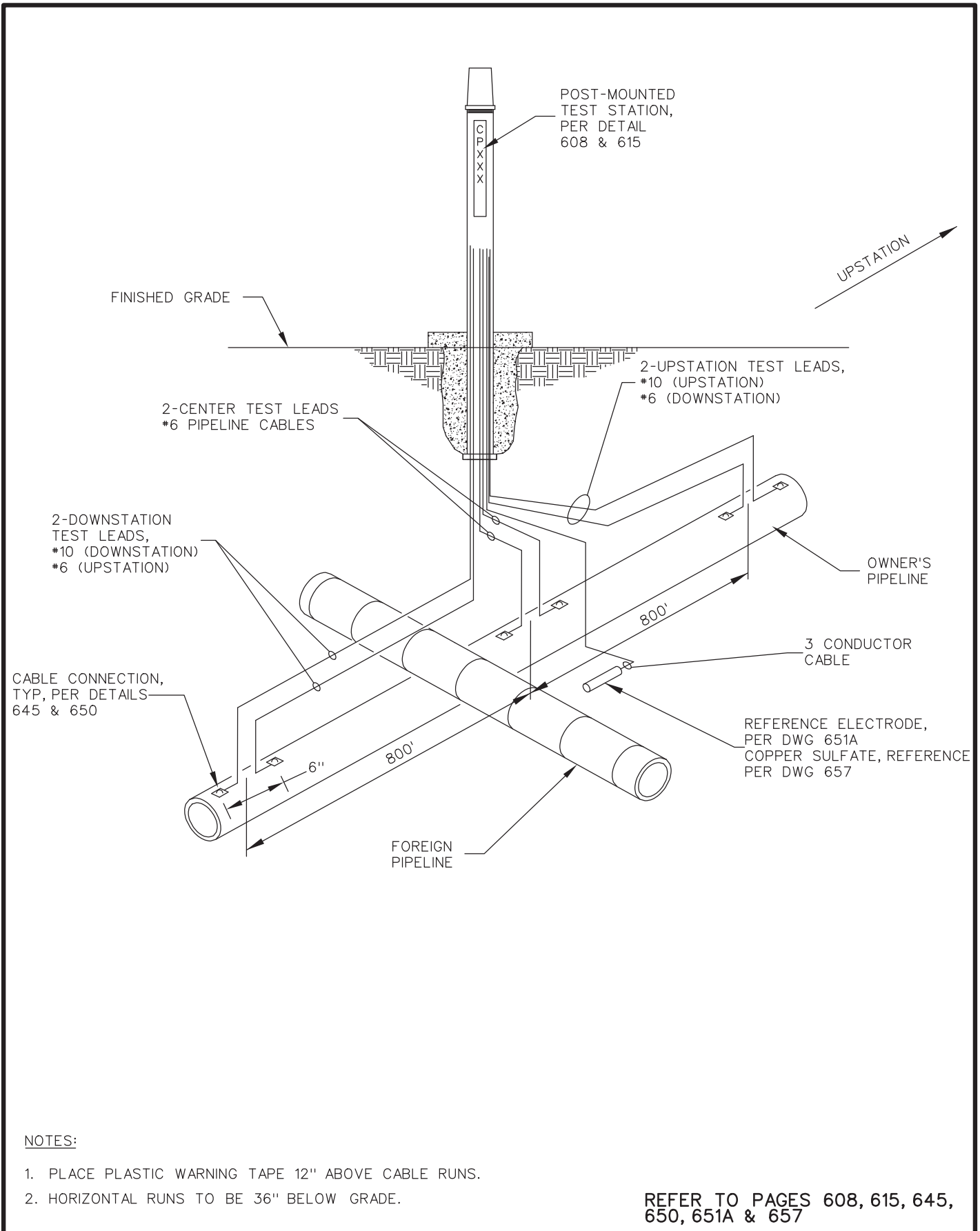
DWU

(Page No.)

603

DATE

OCT. 2016

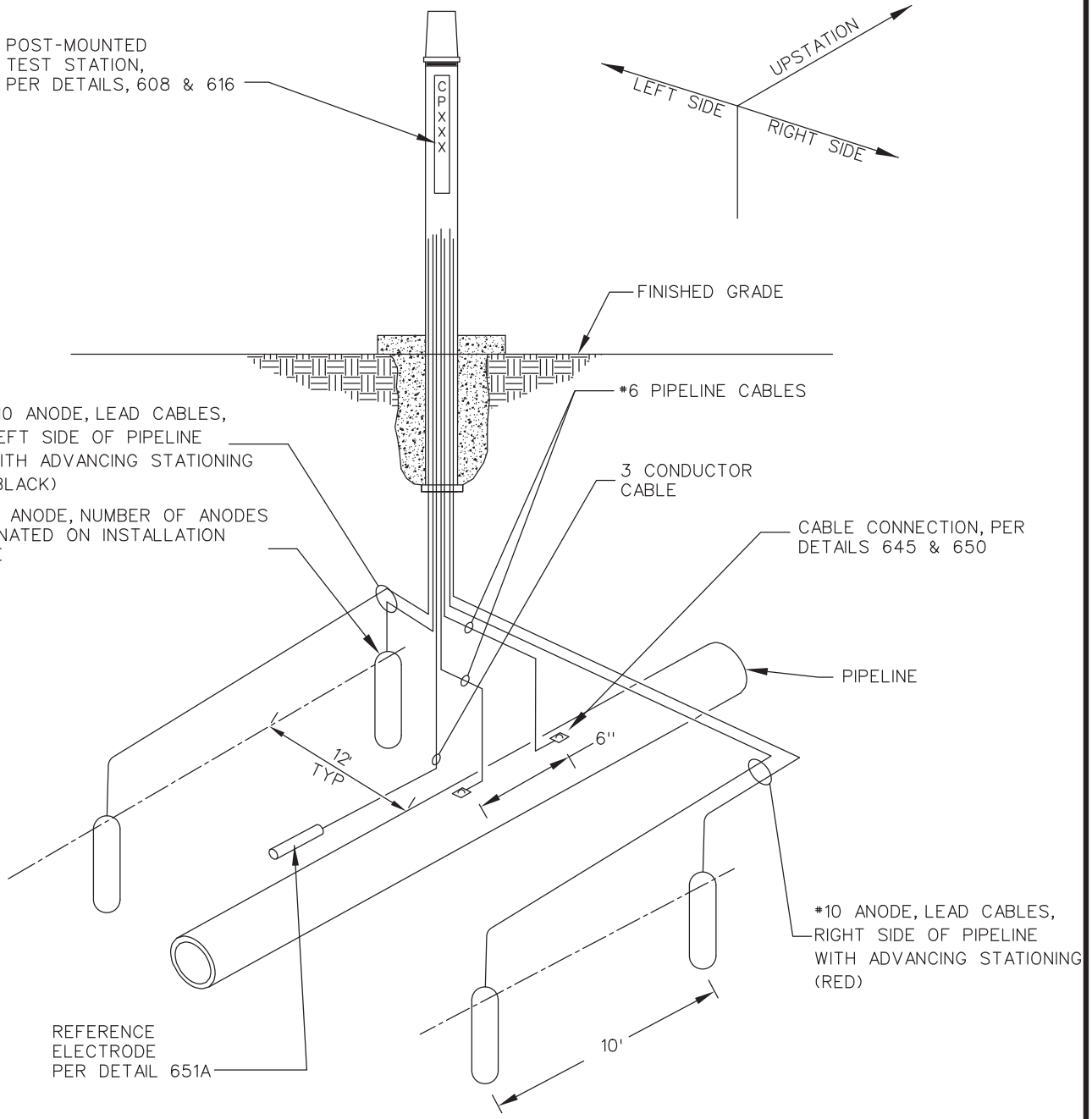


NOTES:

1. PLACE PLASTIC WARNING TAPE 12" ABOVE CABLE RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.

REFER TO PAGES 608, 615, 645, 650, 651A & 657

<p>FOREIGN PIPELINE TEST STATION</p>	<p>DWU</p>	<p>(Page No.) 604</p>
	<p>DATE OCT. 2016</p>	

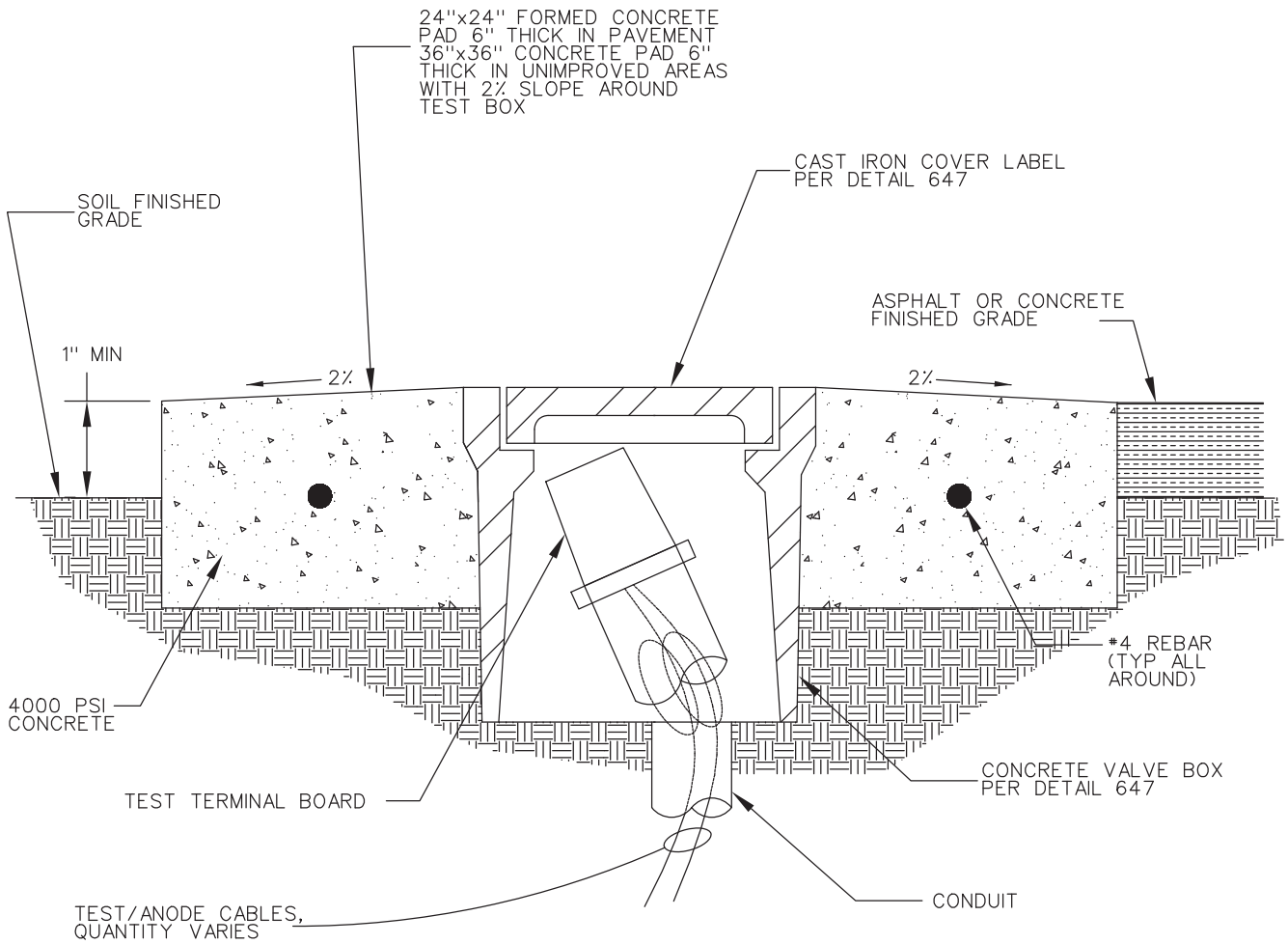


NOTES:

- 1. PLACE PLASTIC WARNING TAPE 12" ABOVE CABLE RUNS.
- 2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.

REFER TO PAGES 608, 616, 645, 650 & 651A

GALVANIC ANODE TEST STATION	DWU	(Page No.) 605
	DATE OCT. 2016	

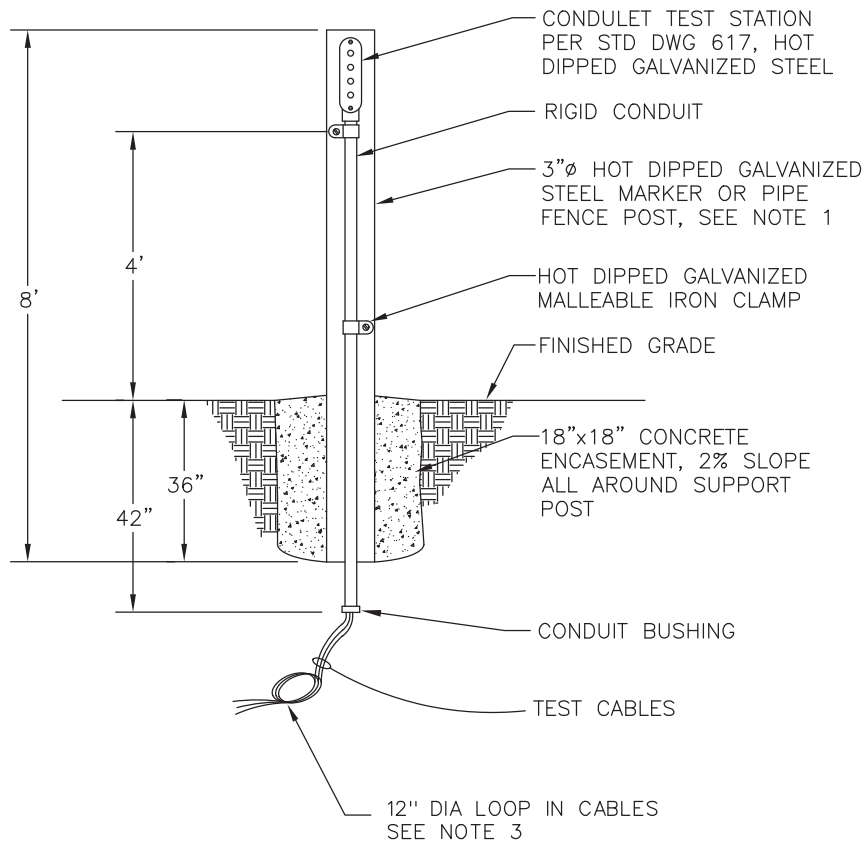


NOTES:

1. PROVIDE SLACK IN CABLES, 24" MINIMUM
2. INSTALL CONCRETE SLAB 1" TO 2" ABOVE FINISH GRADE IN OPEN AREAS AND FLUSH WITH FINISH GRADE IN ASPHALT OR CONCRETE PAVED AREAS.
3. PROVIDE EXTENSIONS AS REQUIRED TO MATCH OR EXCEED PAVEMENT THICKNESS, NOT SHOWN.
4. BOTTOM OF VALVE BOX SHALL BE NATIVE SOIL. DO NOT PLACE ROCK, GRAVEL, OR SAND IN VALVE BOX.

REFER TO PAGE 647

<p>FLUSH MOUNTED TEST STATION</p>	<p>DWU</p>	<p>(Page No.) 606</p>
	<p>DATE OCT. 2016</p>	

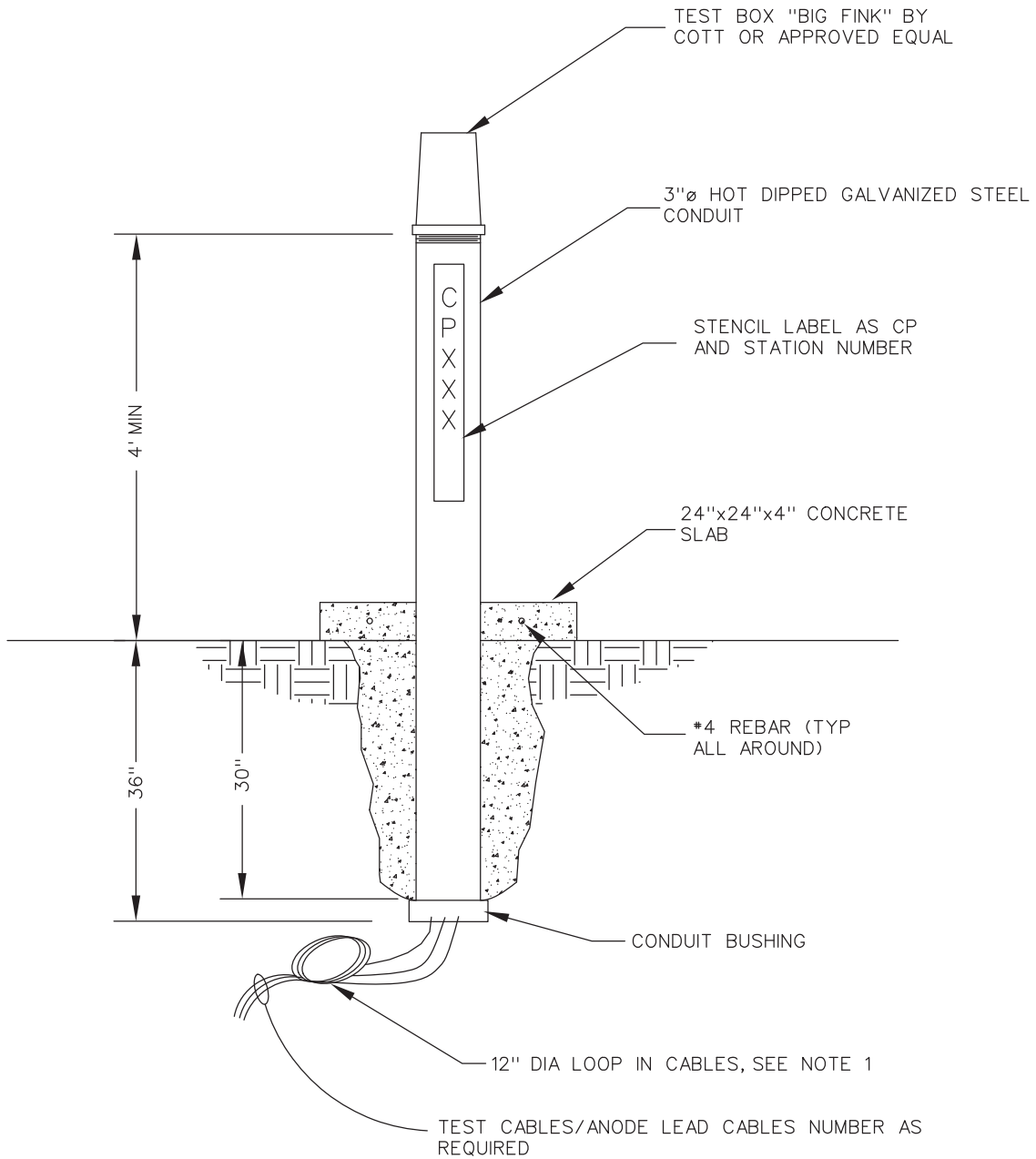


NOTES:

1. USE CONDULET STYLE TEST STATION ONLY WHERE SUPPORT IS PROVIDED BY STEEL PIPE MARKER, FENCE POST, ABOVE GROUND STRUCTURE, MANHOLE, OR BUILDING.
2. LOOP WIRE AT BASE OF POST TO MINIMIZE CABLE STRESS.
3. STENCIL LABEL ON SIDE OF POST AS DEPICTED IN DWG 608.

REFER TO PAGE 617

<h1>CONDULET STYLE TEST STATION</h1>	DWU	(Page No.) 607
	DATE OCT. 2016	

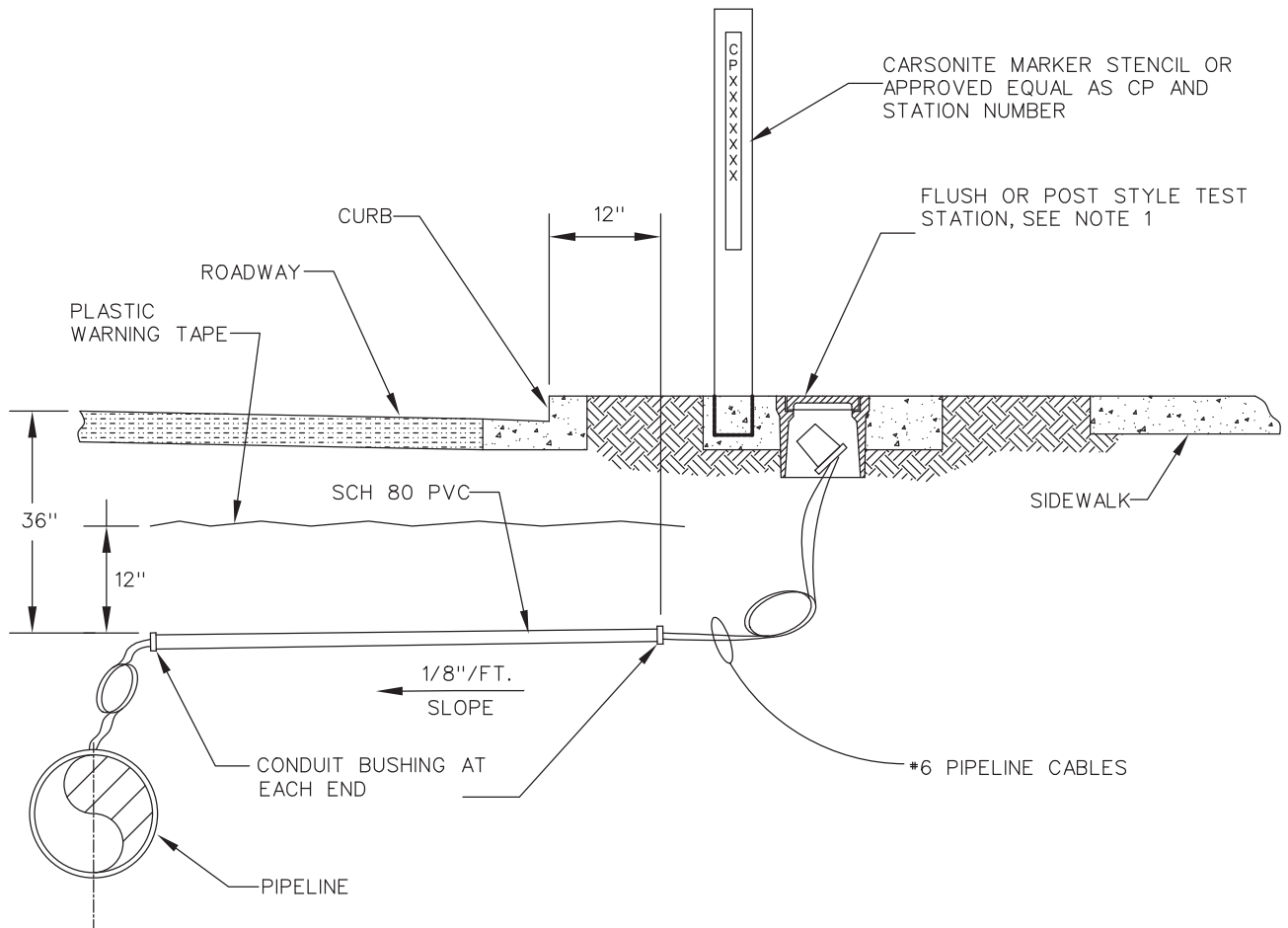


NOTES:

1. LOOP WIRE AT BASE OF POST TO MINIMIZE CABLE STRESS.
2. COAT CABLES WITH INORGANIC ZINC PRIMER OR COLD GALVANIZING REPAIR COATING.
3. FOR ANODE TEST STATION, USE ANODE JUNCTION BOX IF NUMBER OF ANODES IS MORE THAN 4, PER STD DWG 618.
4. ALL WELDING BEFORE WIRE INSTALLATION TO PREVENT DAMAGE TO CABLE.
5. REMOVE SHARP EDGES FROM STEEL CONDUIT.

REFER TO PAGE 618

POST MOUNTED TEST STATION		DWU	(Page No.) 608
		DATE OCT. 2016	

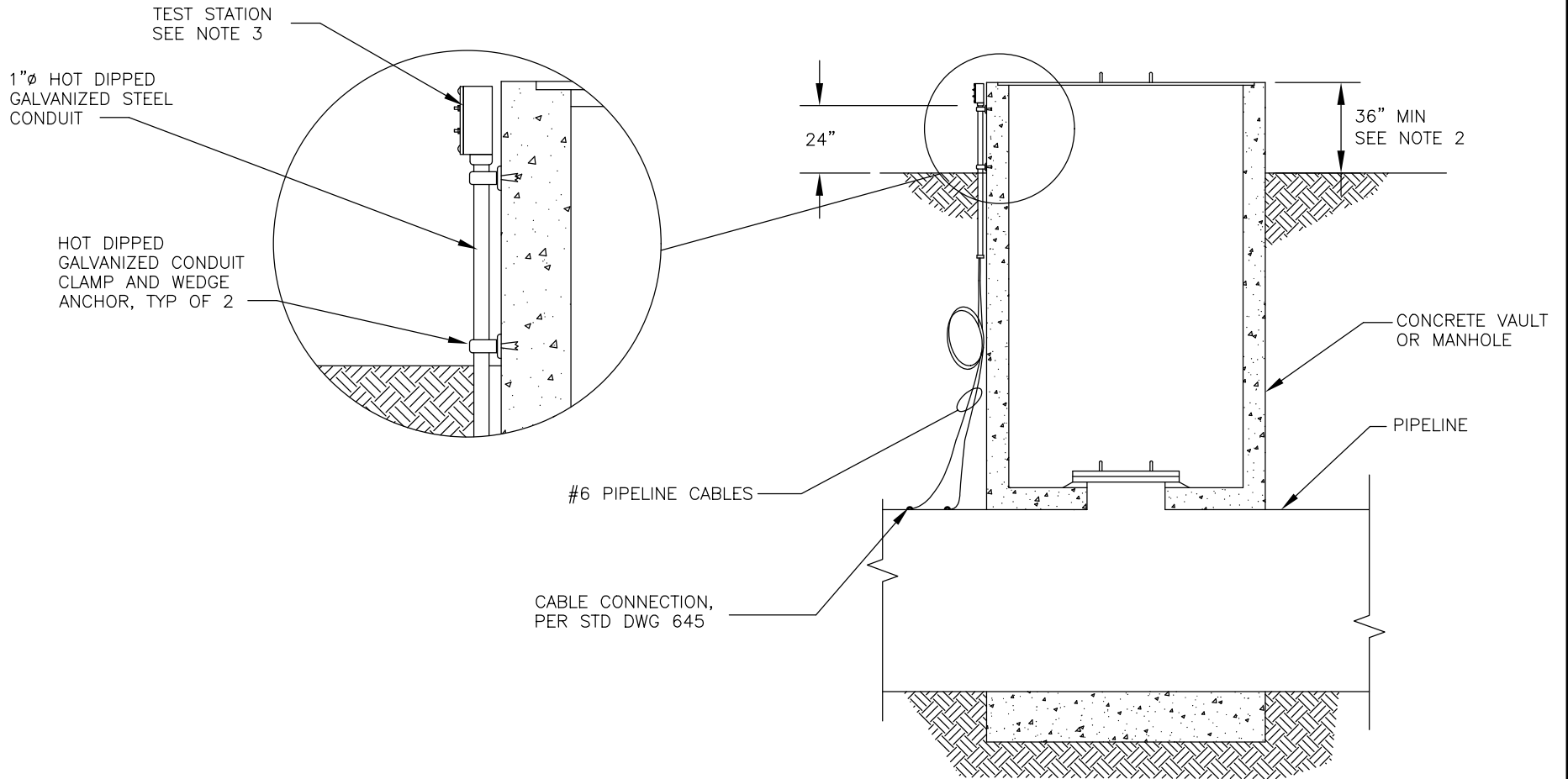


NOTES:

1. INSTALLATION SIMILAR FOR POST STYLE TEST STATION.
2. BURIED CONDUIT TO BE SCH 80 PVC.
3. SEAL BOTH ENDS OF RIGID CONDUIT WITH DUCT COMPOUND OR URETHANE FOAM.
4. EMBED CARSONITE MARKER IN CONCRETE.

REFER TO PAGES 608 & 618

TYPE ROADWAY OFFSET	DWU	(Page No.) 609
	DATE OCT. 2016	



NOTES:

1. INSTALL TEST STATION OVER CENTER OF PIPE.
2. IF VAULT TOP IS LESS THAN 36" ABOVE FINISHED GRADE, THEN INSTALL FLUSH MOUNTED VAULT PER STD DWG 611.
3. TEST BOX SHOULD BE TYPE CONDULET TEST BOX. PER STD DWG 617.

REFER TO PAGES 611, 617 & 645

REFER TO GENERAL NOTES
FOR LARGE VALVES WITH
MANHOLES - PAGE 216

WALL MOUNTED VAULT STYLE TEST STATION

DWU

(Page No.)

610

DATE

OCT. 2016

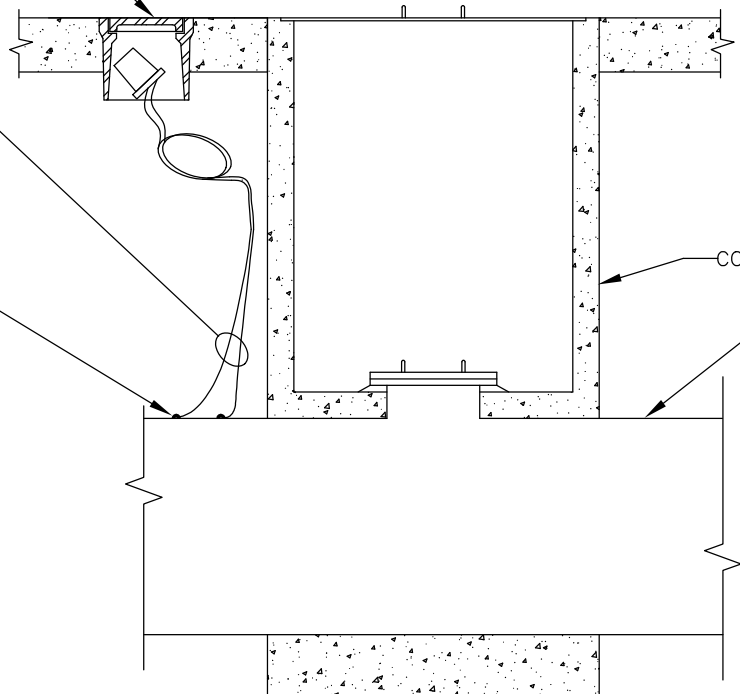
FLUSH MOUNTED TEST STATION
PER STD DWG 606

#6 PIPELINE CABLES

CABLE CONNECTION,
PER STD DWGS
645 OR 650

CONCRETE VAULT/MANHOLE

PIPELINE



NOTE:

1. INSTALL TEST STATION OVER CENTER OF PIPE.

REFER TO PAGES 606, 645 & 650

REFER TO GENERAL NOTES
FOR LARGE VALVES WITH
MANHOLES - PAGE 216

FLUSH MOUNTED VAULT STYLE
TEST STATION

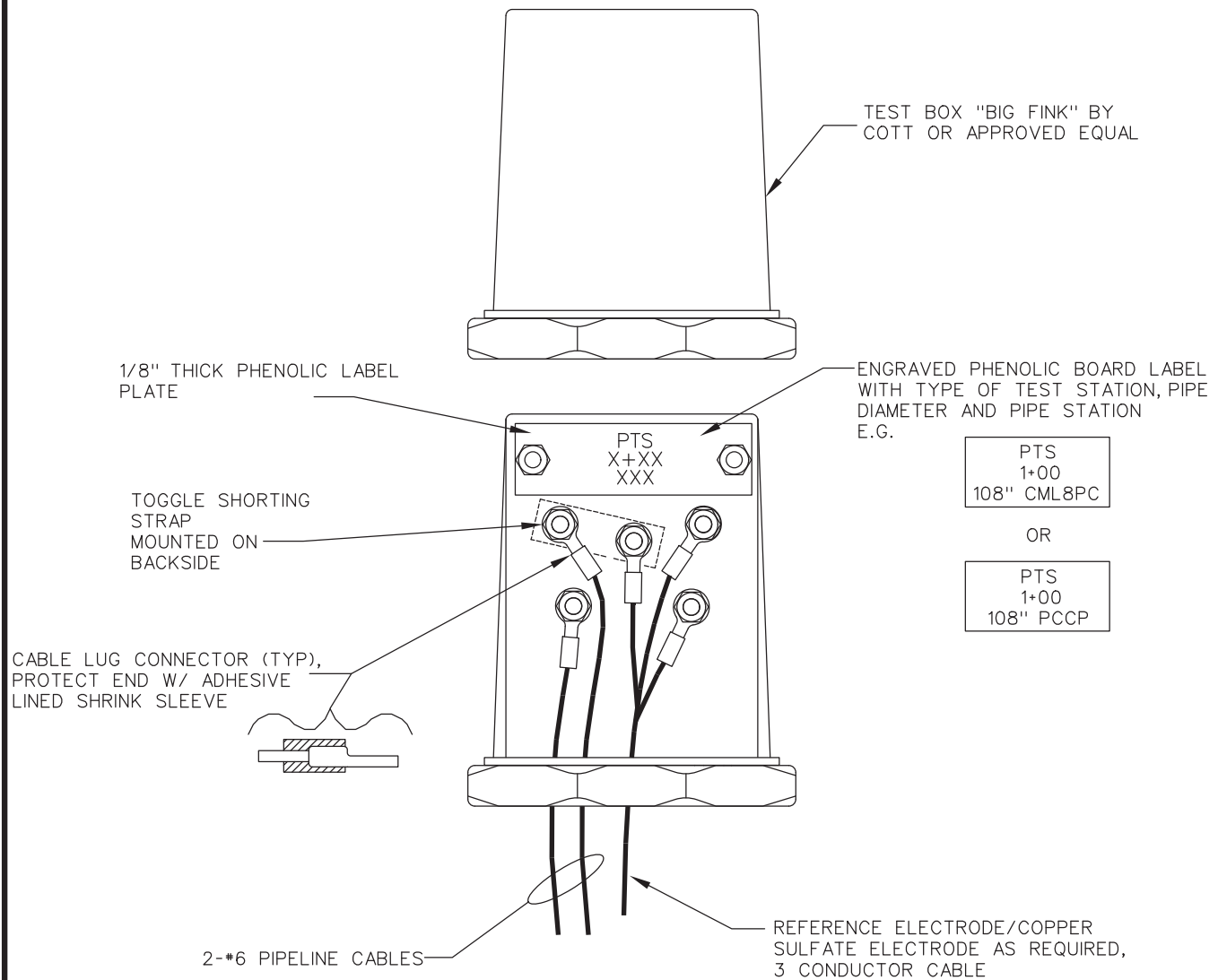
DWU

(Page No.)

611

DATE

OCT. 2016

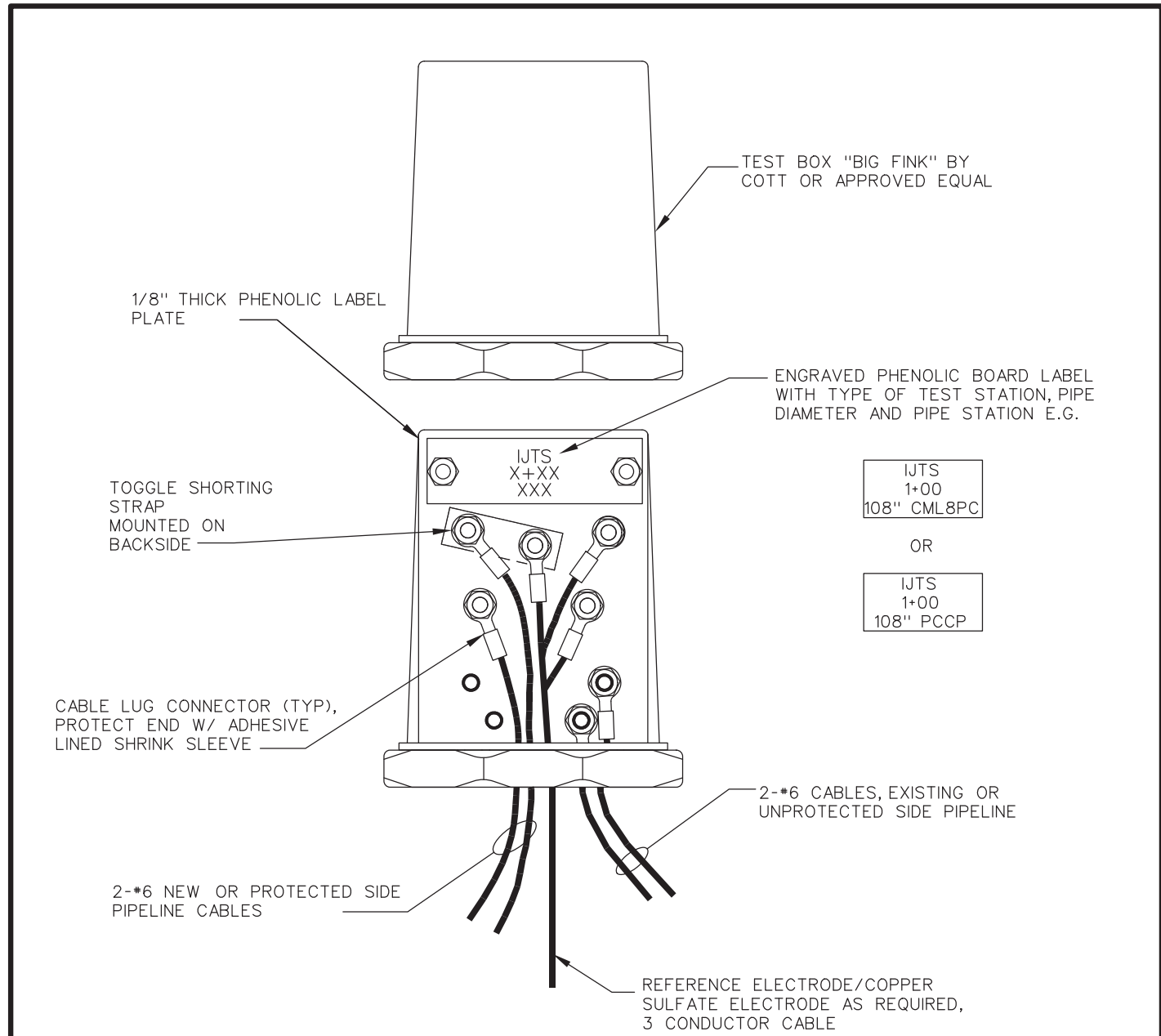


NOTES:

1. TERMINALS SHALL BE 1/4" NICKEL PLATED BRASS LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
2. SOLDER ALL LUGS TO CABLES.
3. REFERENCE ELECTRODE SHOULD ONLY BE INSTALLED AT TEST STATIONS DESIGNATED IN THE INSTALLATION SCHEDULE.

REFER TO PAGE 657

FLUSH MOUNTED POTENTIAL TEST STATION TEST TERMINAL BOARD	DWU	(Page No.) 612
	DATE OCT. 2016	

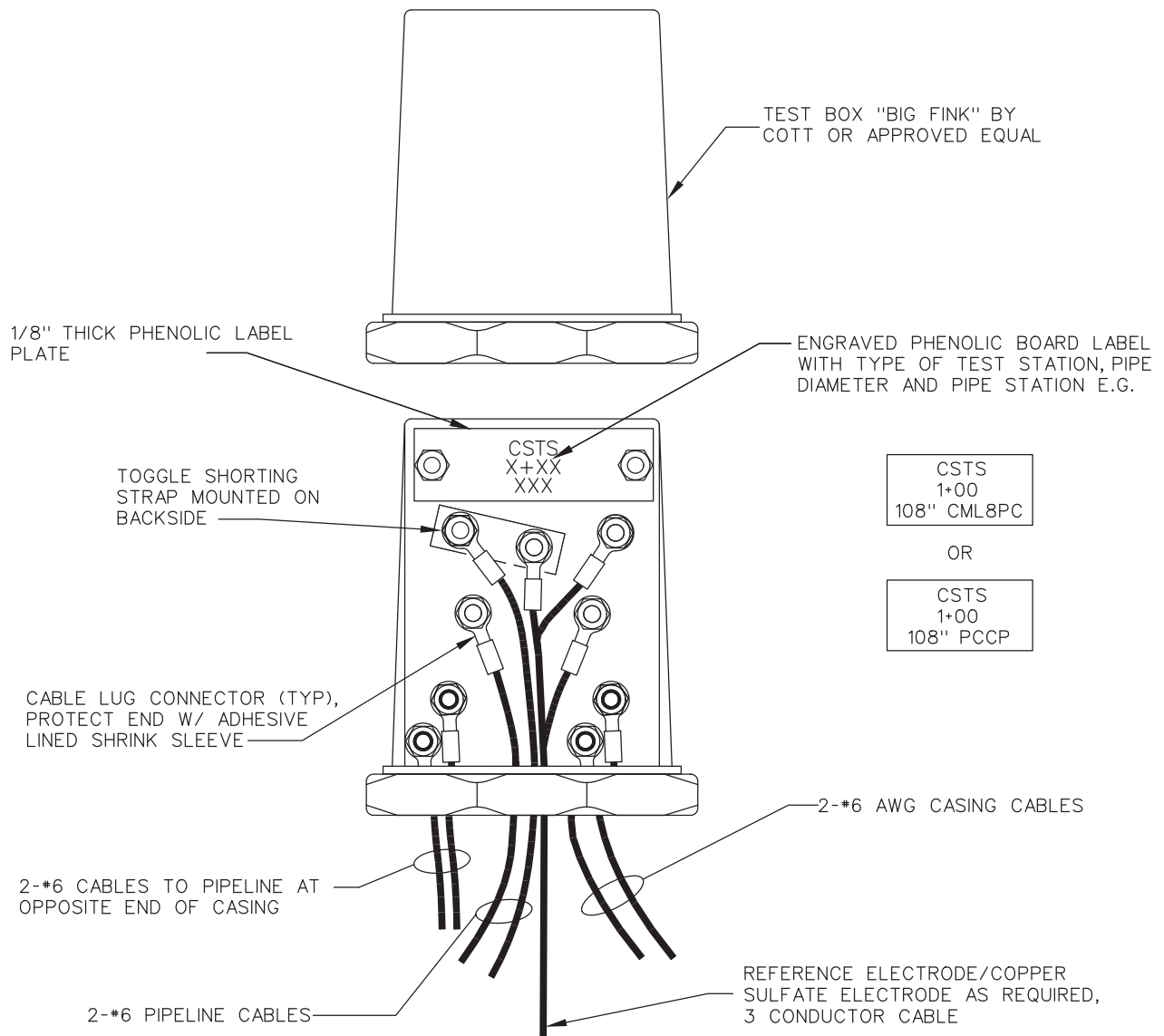


NOTES:

1. TERMINALS SHALL BE 1/4" NICKEL PLATED BRASS WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
2. SOLDER ALL LUGS TO CABLES.

REFER TO PAGE 657

FLUSH MOUNTED INSULATING JOINT TEST STATION TEST TERMINAL BOARD		DWU	(Page No.) 613
		DATE OCT. 2016	



NOTES:

1. TERMINALS SHALL BE 1/4" NICKEL PLATED BRASS WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
2. SOLDER ALL LUGS TO CABLES.

REFER TO PAGE 657

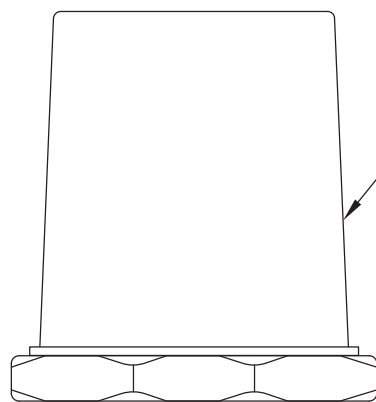
**FLUSH MOUNTED CASING TEST
STATION TEST TERMINAL BOARD**

DWU

(Page No.)

614

DATE
OCT. 2016



TEST BOX "BIG FINK" BY
COTT OR APPROVED EQUAL

1/8" THICK PHENOLIC LABEL
PLATE

ENGRAVED PHENOLIC BOARD LABEL
WITH TYPE OF TEST STATION, PIPE
DIAMETER AND PIPE STATION E.G.

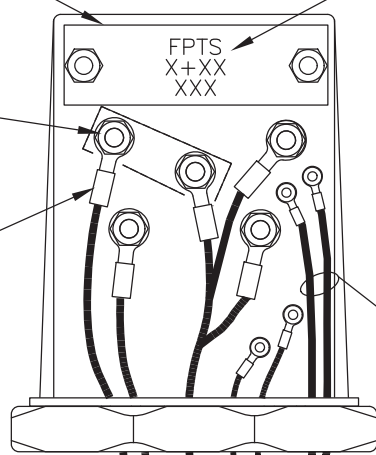
TOGGLE SHORTING
STRAP
MOUNTED ON
BACKSIDE

FPTS
1+00
108" CML8PC

OR

FPTS
1+00
108" PCCP

CABLE LUG CONNECTOR (TYP),
PROTECT END W/ ADHESIVE
LINED SHRINK SLEEVE



#10 (OUTSIDE),
#6 (INSIDE)

#10 (OUTSIDE)
#6 (INSIDE)

REFERENCE ELECTRODE/COPPER
SULFATE ELECTRODE AS REQUIRED,
3 CONDUCTOR CABLE

#6 PIPELINE CABLES

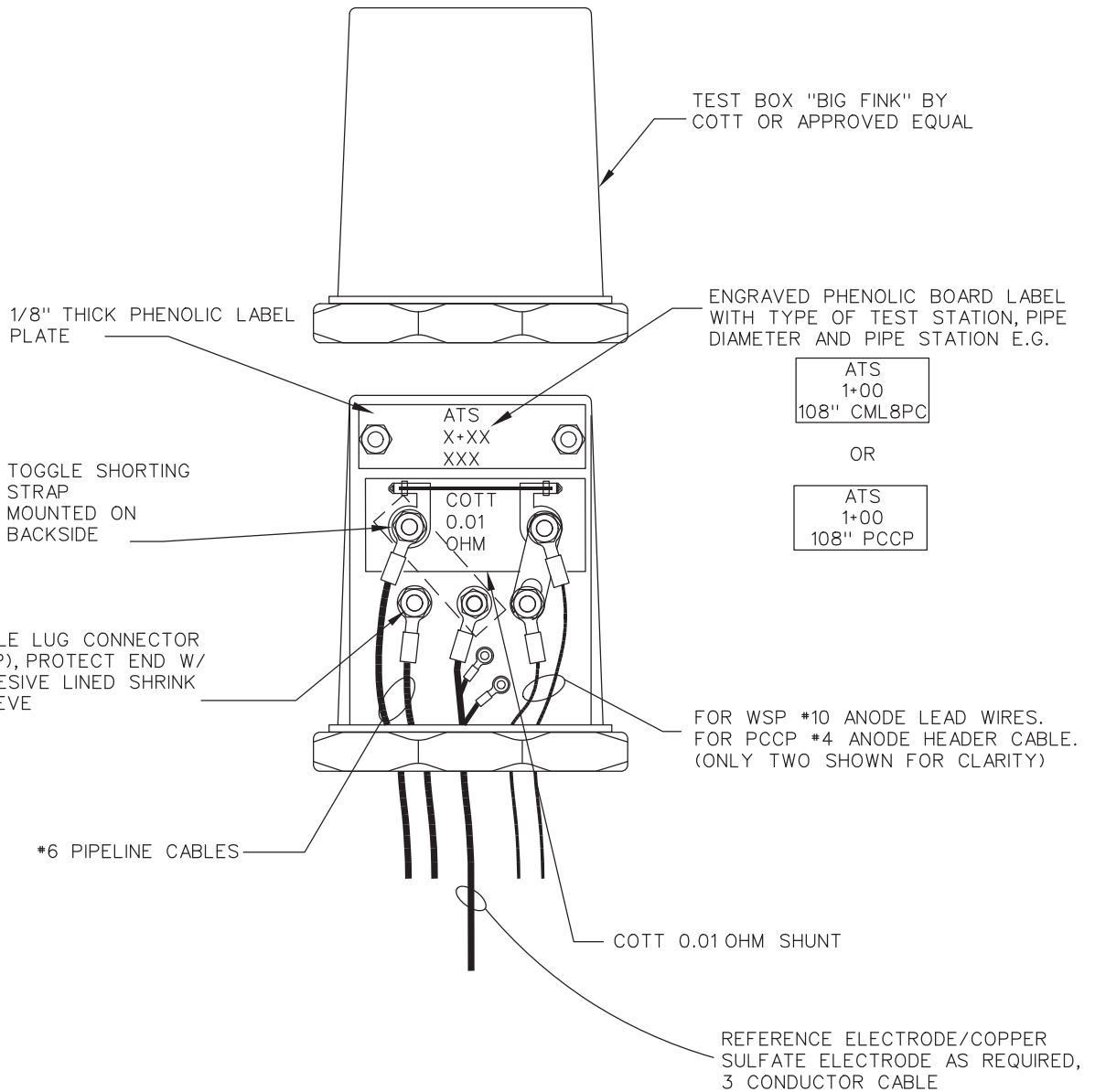
NOTES:

1. TERMINALS SHALL BE 1/4" NICKEL PLATED BRASS WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
2. SOLDER ALL LUGS TO CABLES.

REFER TO PAGE 657

**FLUSH MOUNTED FOREIGN
PIPELINE TEST STATION
TEST TERMINAL BOARD**

DWU	(Page No.) 615
DATE OCT. 2016	

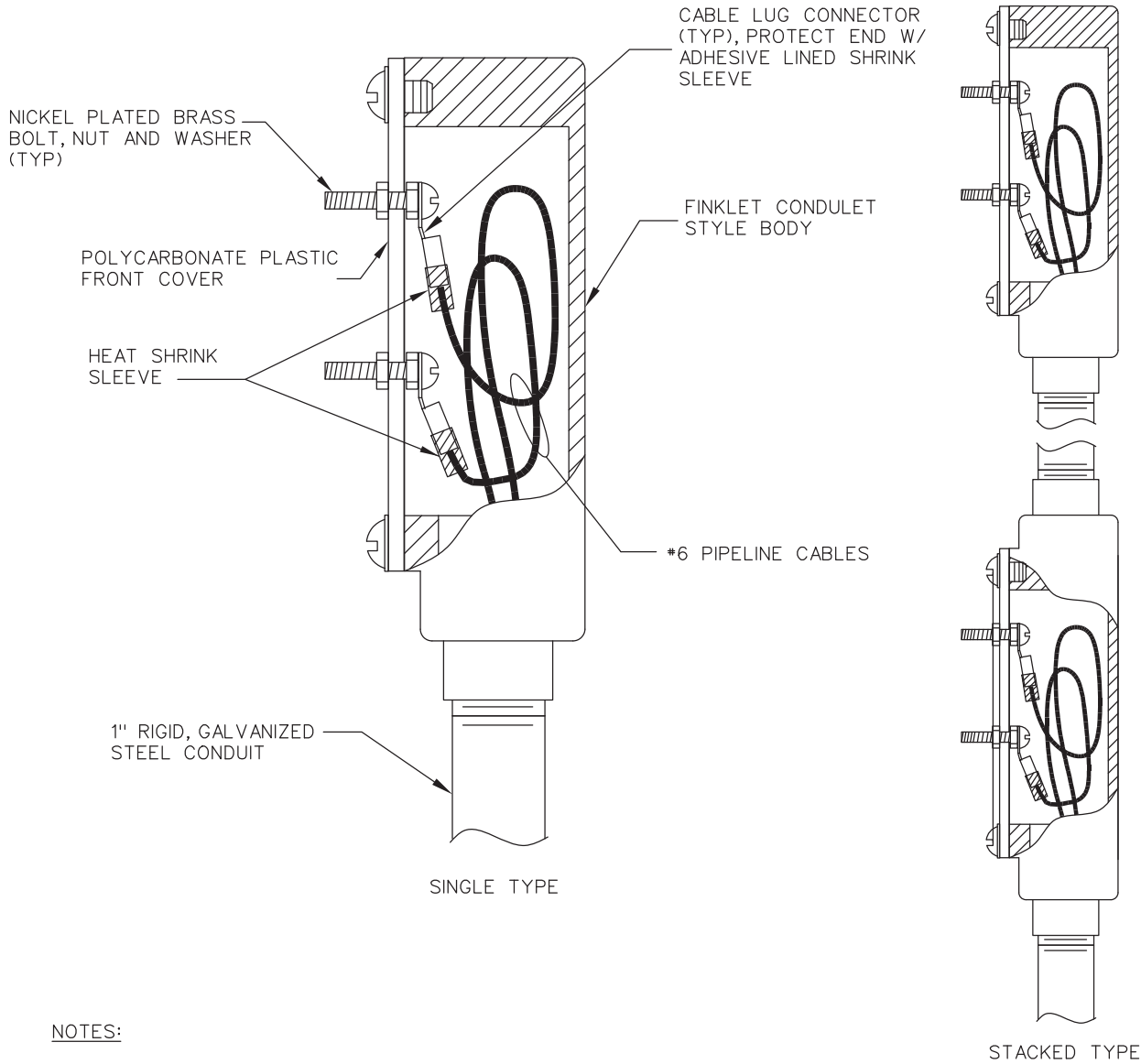


NOTES:

1. TERMINALS SHALL BE 1/4" NICKEL PLATED BRASS WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
2. SOLDER ALL LUGS TO CABLES.
3. REFERENCE ELECTRODE SHOULD ONLY BE INSTALLED AT TEST STATIONS DESIGNATED IN THE INSTALLATION SCHEDULE.

REFER TO PAGE 657

FLUSH MOUNTED ANODE TEST STATION TEST TERMINAL BOARD	DWU	(Page No.) 616
	DATE OCT. 2016	



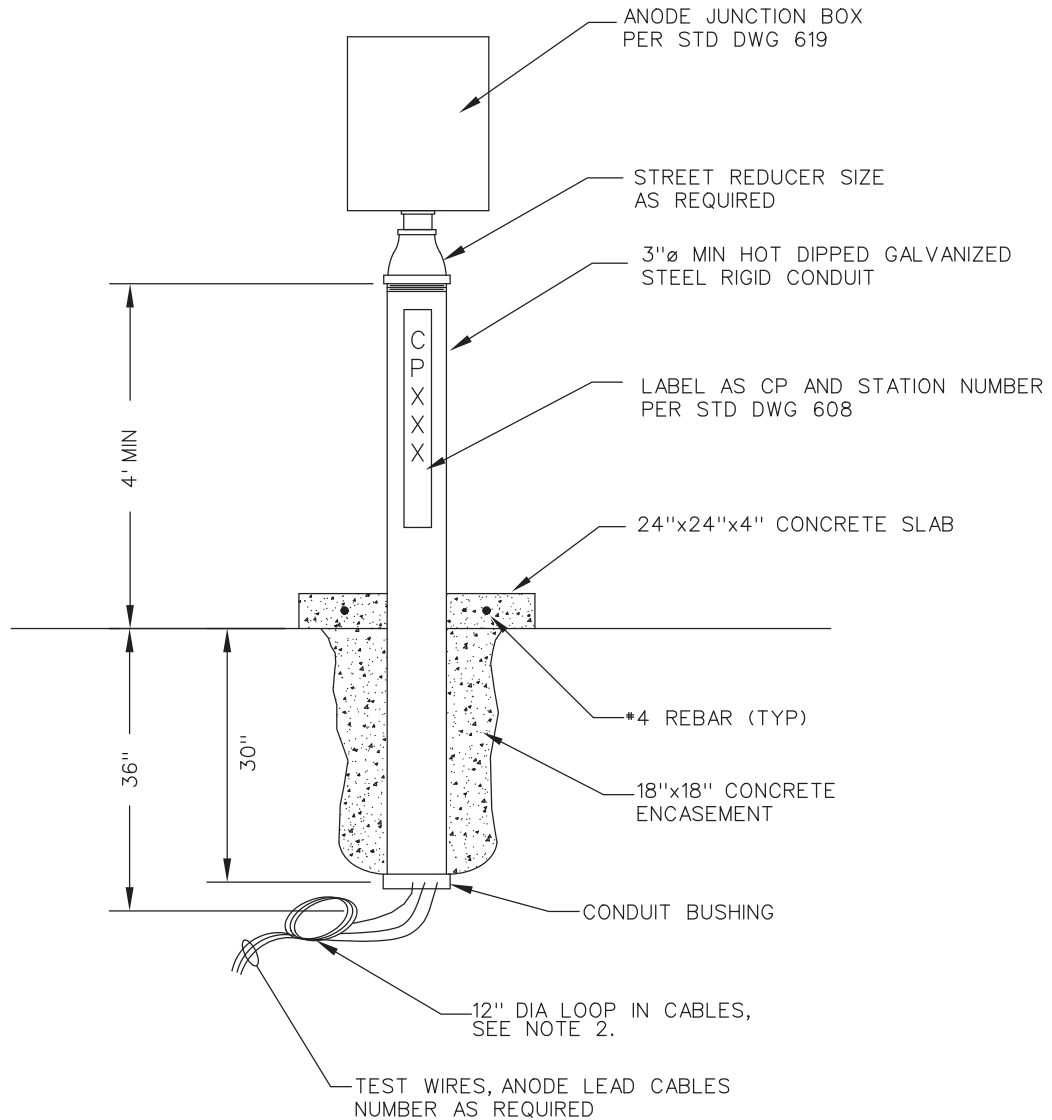
NOTES:

1. COLOR OF FRONT COVER TO DENOTE APPLICATION,
2. USE CONDULET STYLE TEST STATION ONLY WHERE SUPPORT IS PROVIDED BY STEEL PIPE MARKER, FENCE POST, ABOVE GROUND STRUCTURE, MANHOLE, OR BUILDING.
3. LOOP WIRE AT BASE OF POST TO MINIMIZE CABLE STRESS.
4. STENCIL LABEL ON SIDE OF POST AS DEPICTED IN DWG 608.

REFER TO PAGE 608

CONDULET TEST BOX

DWU	(Page No.) 617
DATE OCT. 2016	



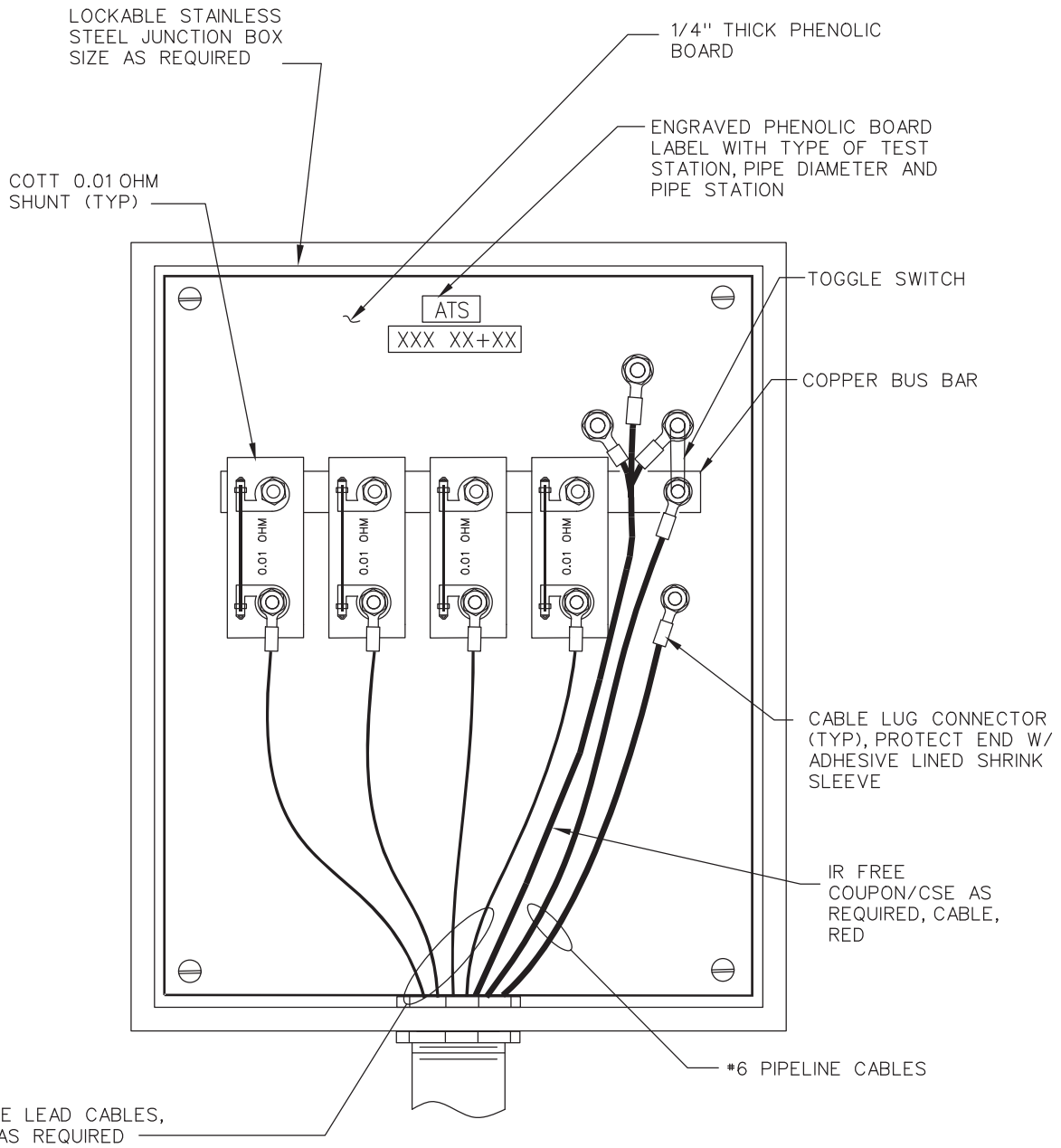
NOTES:

1. LOOP WIRE AT BASE OF POST TO MINIMIZE WIRE STRESS.
2. COAT THREADS WITH INORGANIC ZINC PRIMER OR COLD GALVANIZING REPAIR COATING.

REFER TO PAGES 608 & 619

POST MOUNTED GALVANIC ANODE
JUNCTION BOX TEST STATION

DWU	(Page No.) 618
DATE OCT. 2016	



NOTE:

1. TERMINALS SHALL BE 1/4" STAINLESS STEEL WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.

GALVANIC ANODE JUNCTION BOX

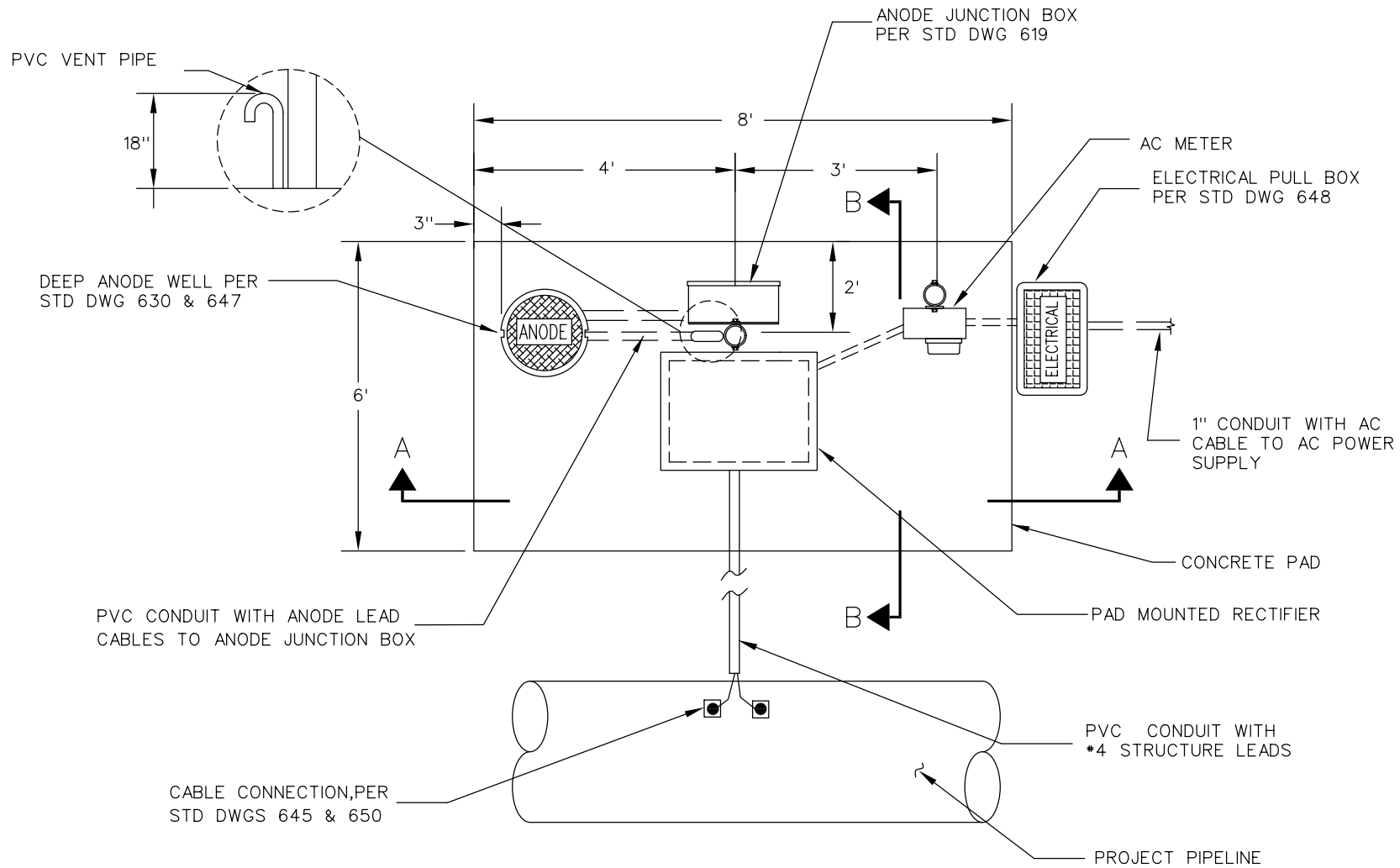
DWU

(Page No.)

619

DATE

OCT. 2016



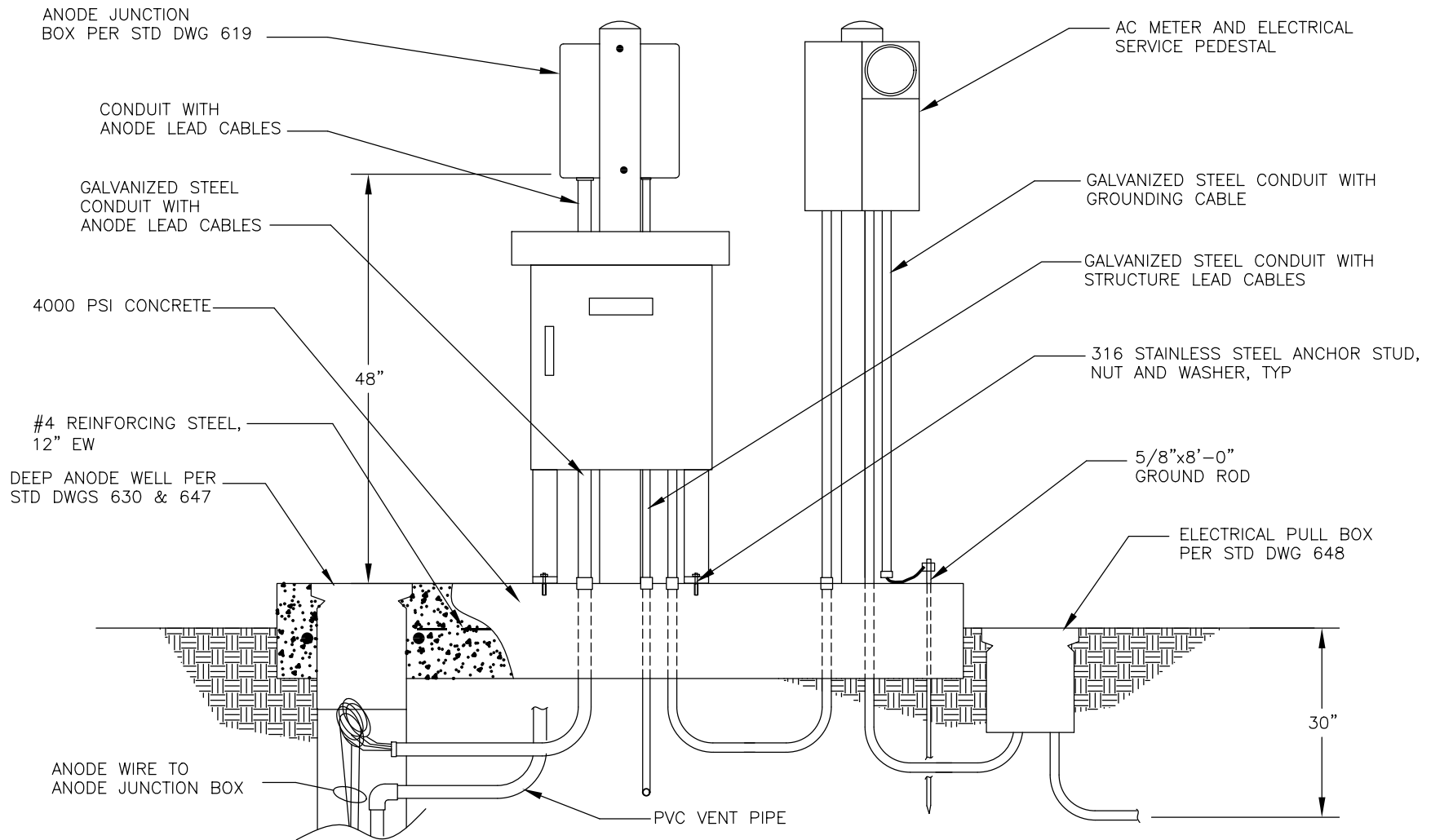
REFER TO PAGES 621, 622, 630, 645, 647, 648 & 650

POST MOUNTED FOREIGN PIPELINE
TEST STATION TEST TERMINAL BOARD

DWU

(Page No.)
620

DATE
OCT. 2016

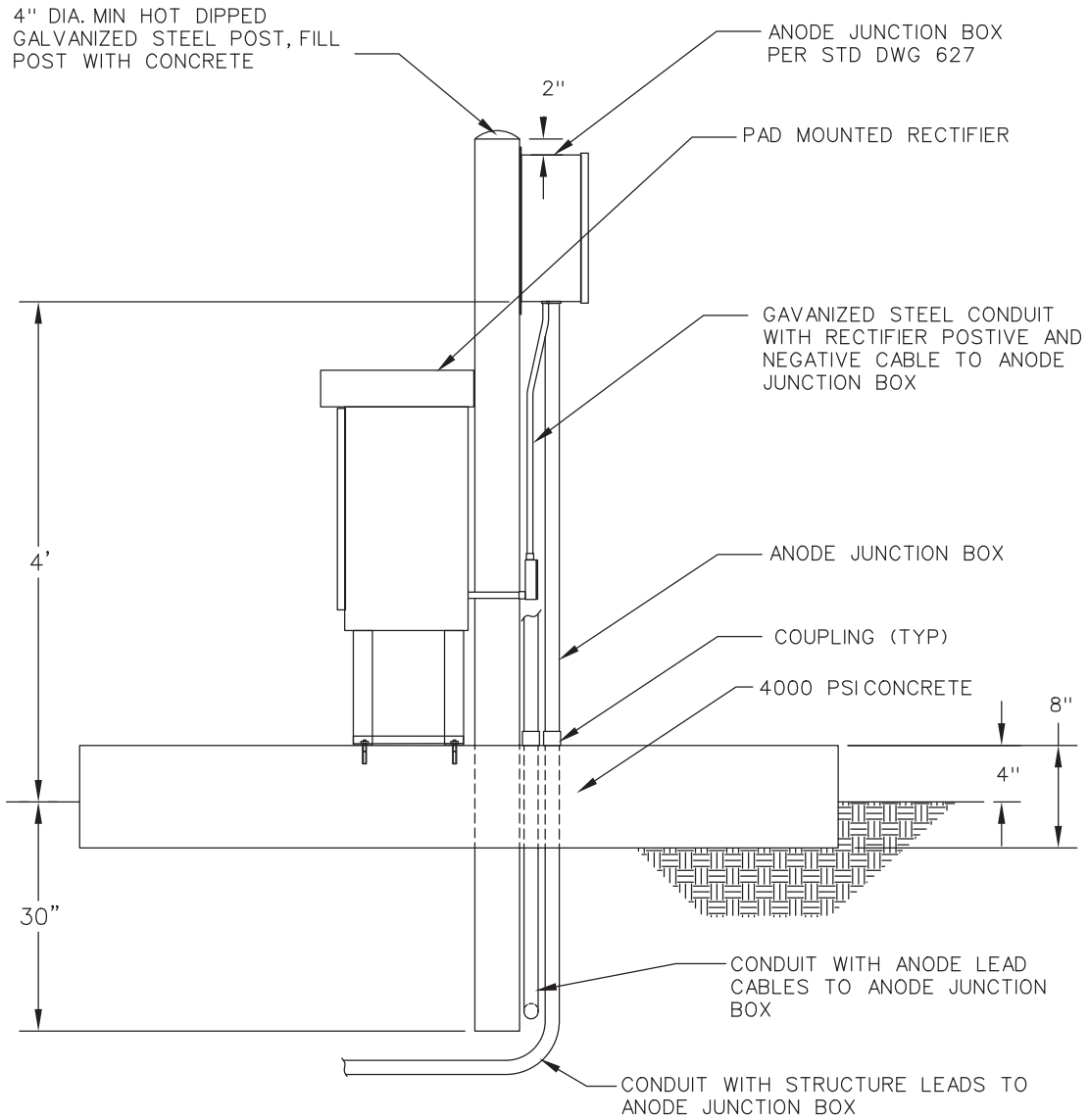


SECTION A-A

REFER TO PAGES 619, 620, 622, 630, 647 & 648

POST MOUNTED FOREIGN PIPELINE
TEST STATION TEST TERMINAL BOARD

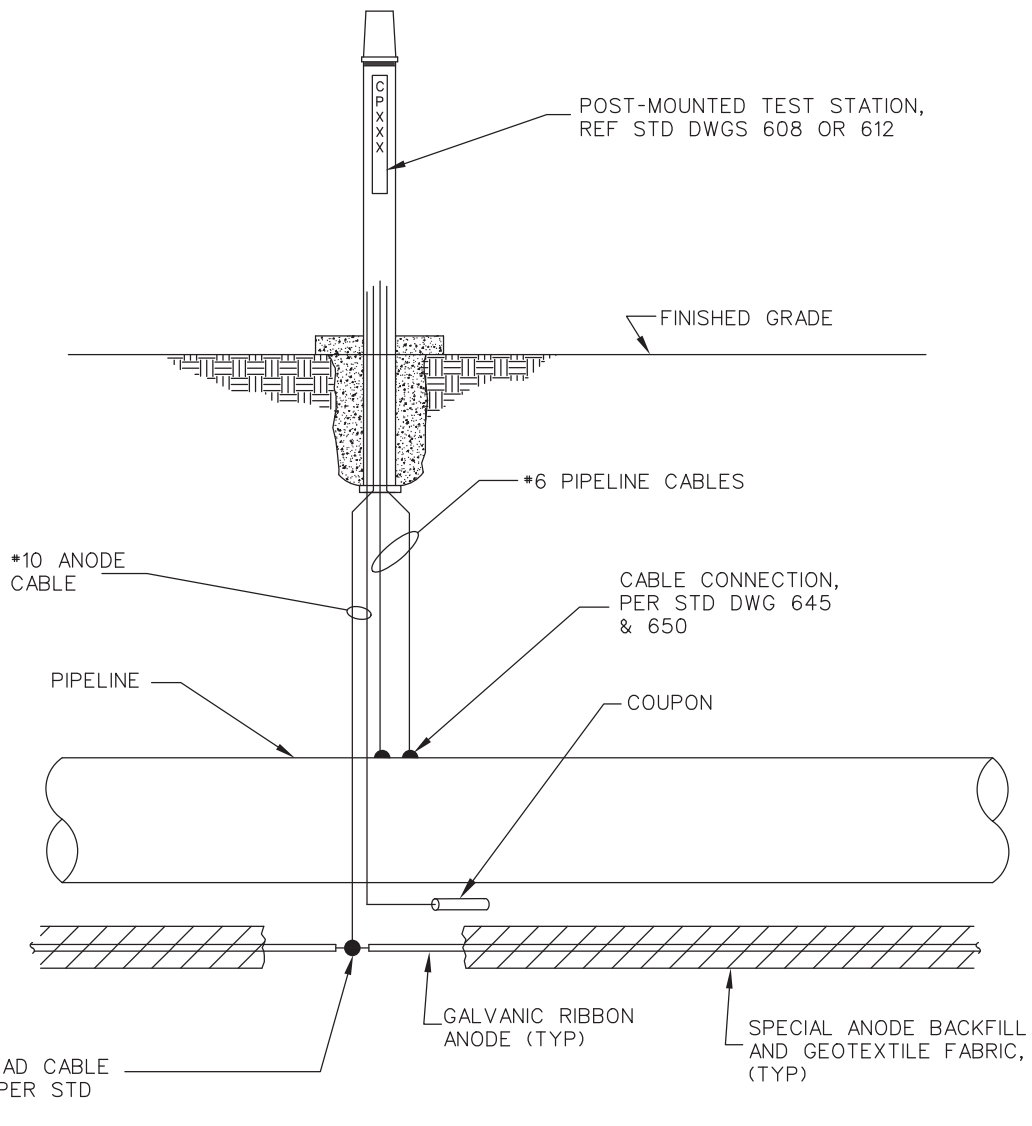
	DWU	(Page No.) 621
	DATE OCT. 2016	



SECTION B-B

REFER TO PAGES 620, 621, 627, 631, 645 & 650

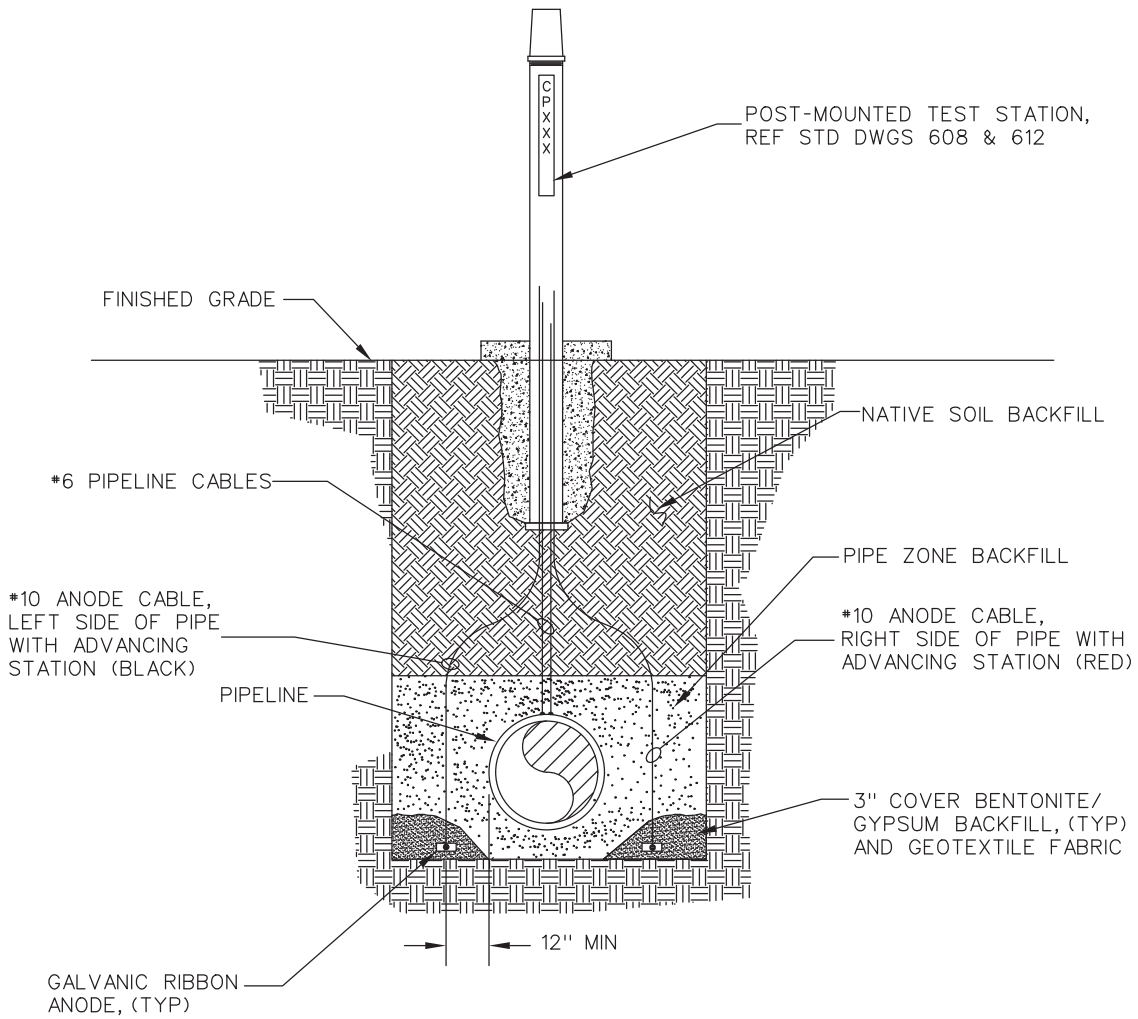
POST MOUNTED FOREIGN PIPELINE TEST STATION TEST TERMINAL BOARD	DWU	(Page No.) 622
	DATE OCT. 2016	



REFER TO PAGES 608, 612, 625, 645 & 650

**GALVANIC RIBBON
TEST STATION**

DWU	(Page No.) 623
DATE OCT. 2016	



NOTES:

1. MAINTAIN 12" MINIMUM SEPARATION BETWEEN GALVANIC RIBBON ANODE AND PIPELINE.
2. WET ANODE BACKFILL AND GEOTEXTILE FABRIC PRIOR TO PIPE BACKFILL TO PREVENT LOSS OF ANODE BACKFILL.

REFER TO PAGES 608 & 612

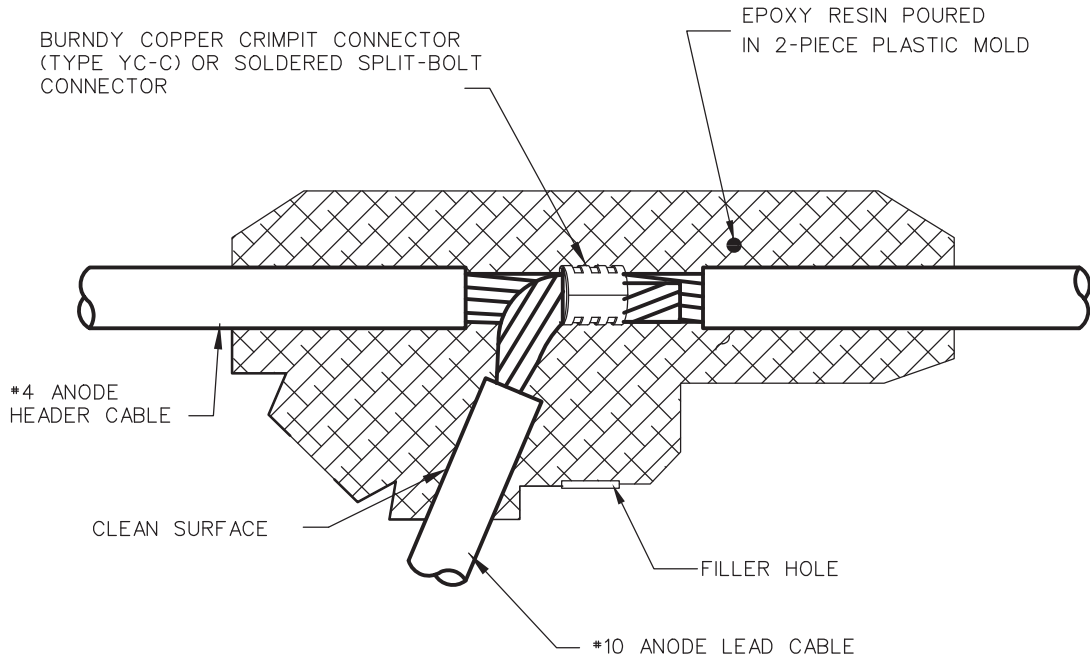
GALVANIC RIBBON INSTALLATION SECTION-A

DWU

(Page No.)

624

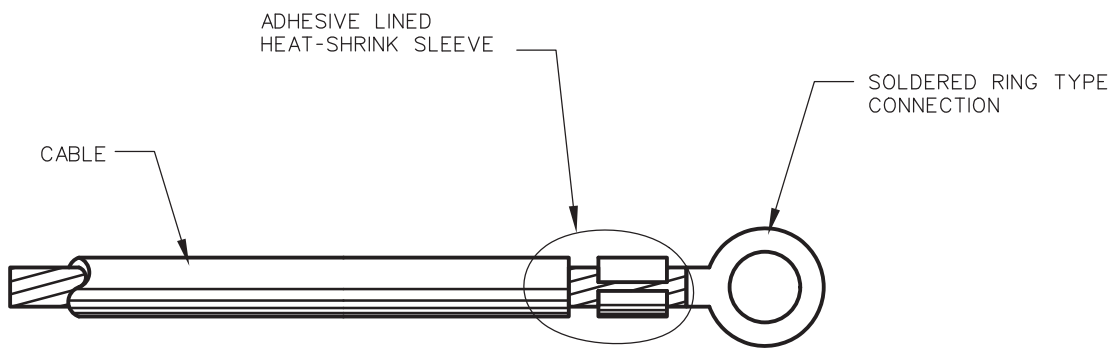
DATE
OCT. 2016



NOTES:

1. ANODE HEADER CABLE COLOR VARIES PER ANODE CONFIGURATIONS.
2. ONLY ONE ANODE LEAD CABLE CONNECTION ALLOWED PER SPLICE.

ANODE TO LEAD CABLE CONNECTION	DWU	(Page No.) 625
	DATE OCT. 2016	



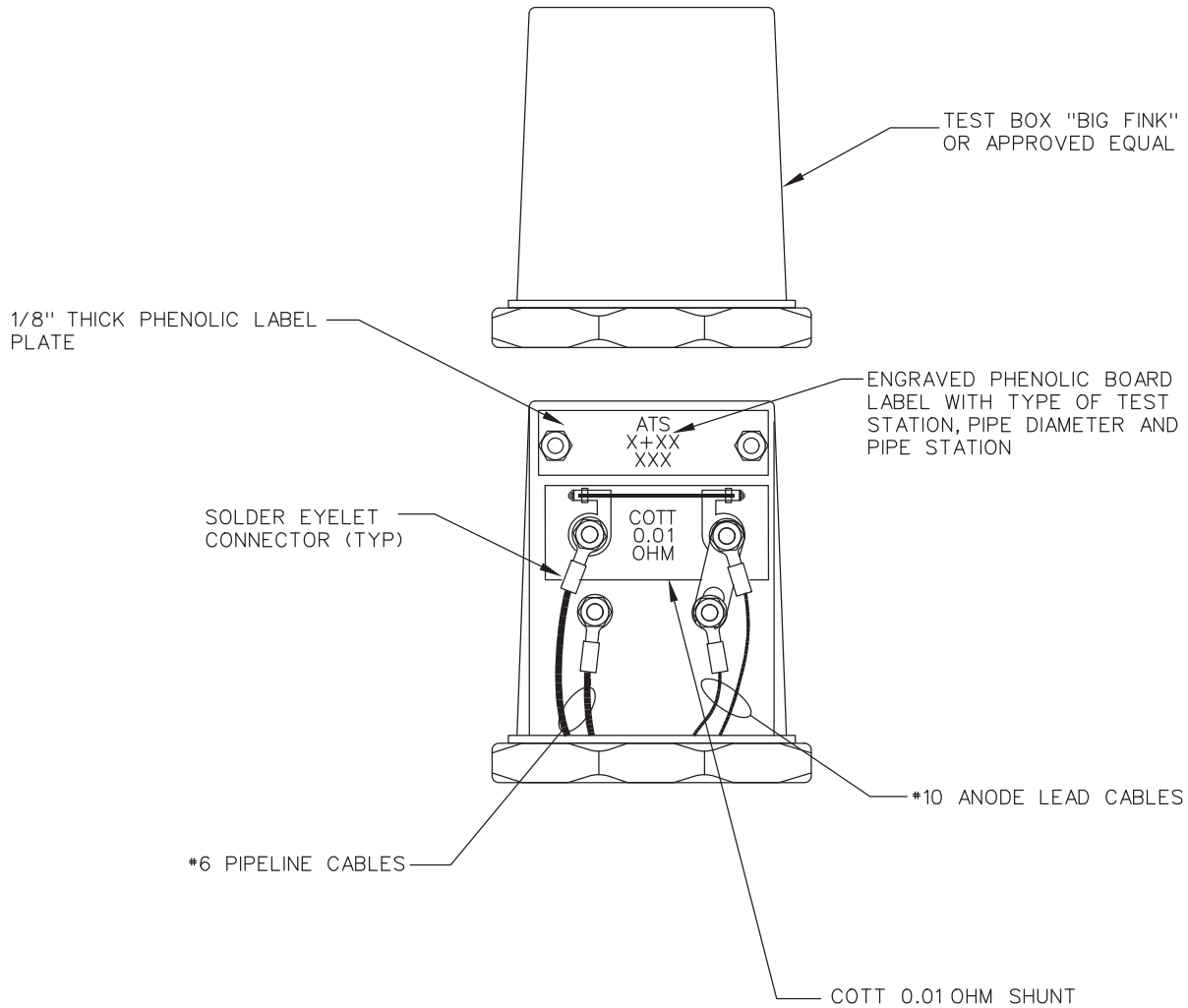
SOLDERED TERMINAL
CONNECTION

DWU

(Page No.)

625A

DATE
OCT. 2016

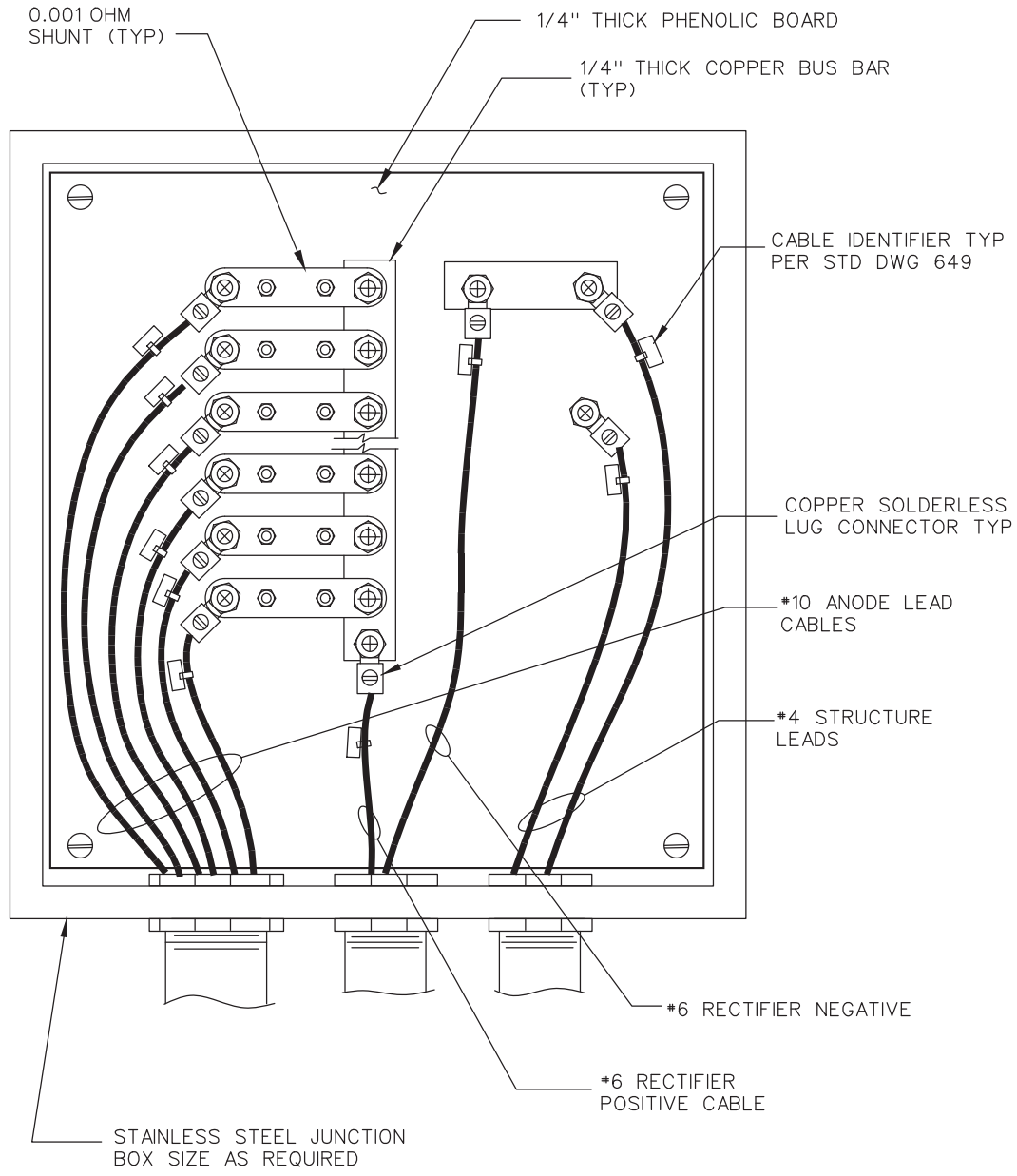


NOTE:

1. TERMINALS SHALL BE 1/4" STAINLESS STEEL WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.

FLUSH MOUNTED RIBBON
 ANODE TEST STATION TEST
 TERMINAL BOARD

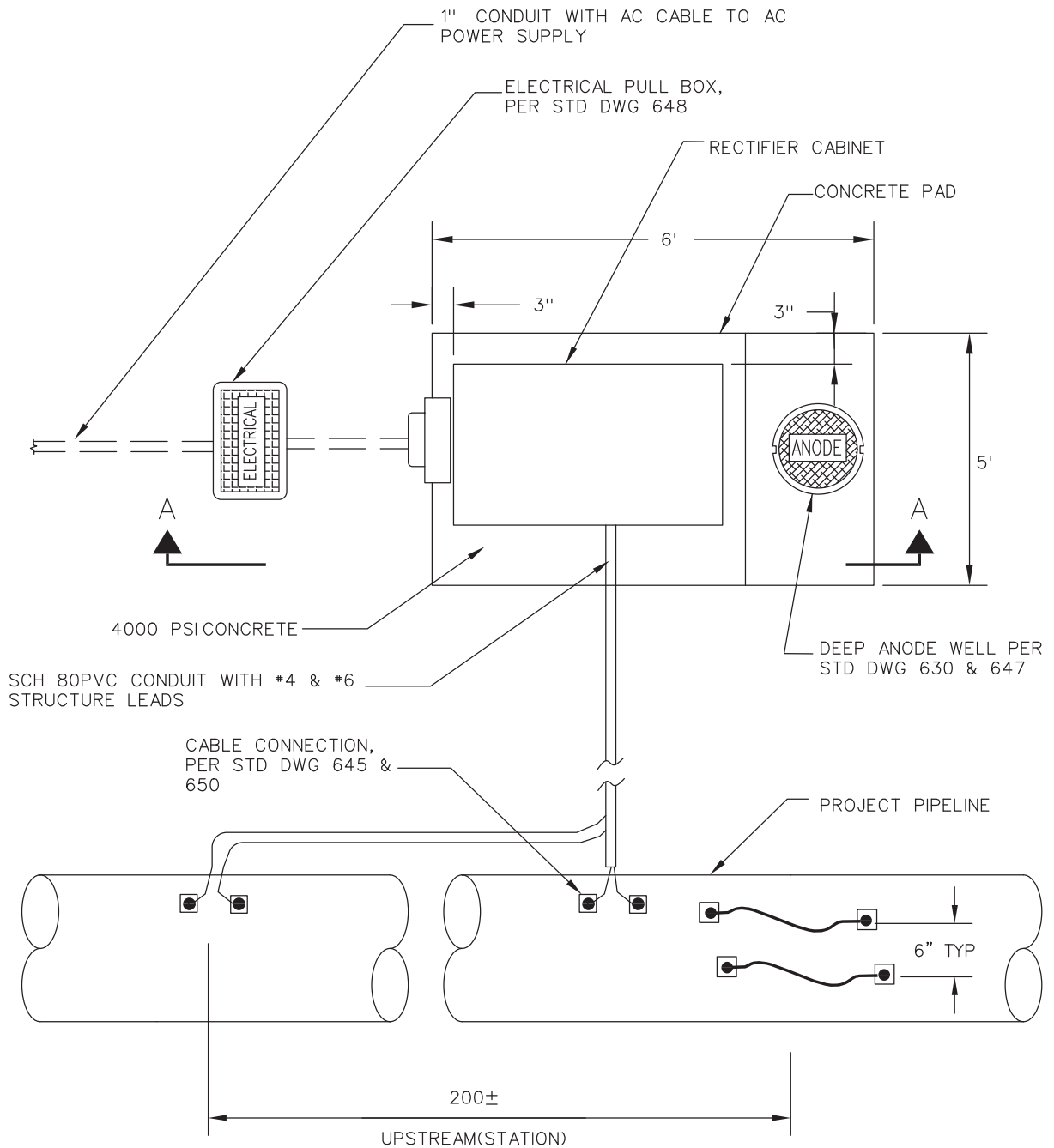
DWU	(Page No.) 626
DATE OCT. 2016	



REFER TO PAGE 649

ANODE JUNCTION BOX

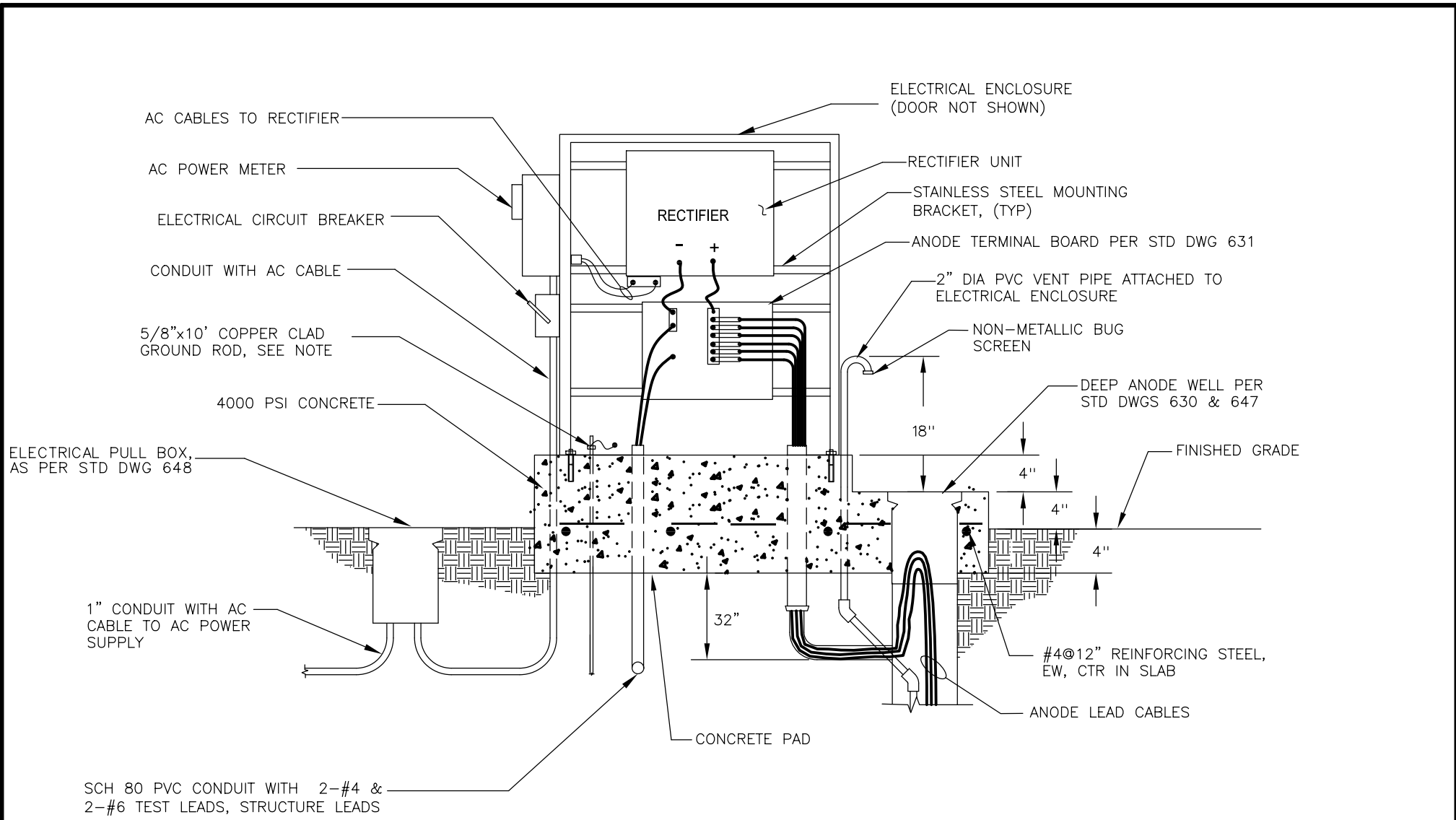
DWU	(Page No.) 627
DATE OCT. 2016	



REFER TO PAGES 629, 630, 645, 647, 648 & 650

RECTIFIER/DEEP ANODE WELL
INSTALLATION PLAN VIEW

DWU	(Page No.) 628
DATE OCT. 2016	

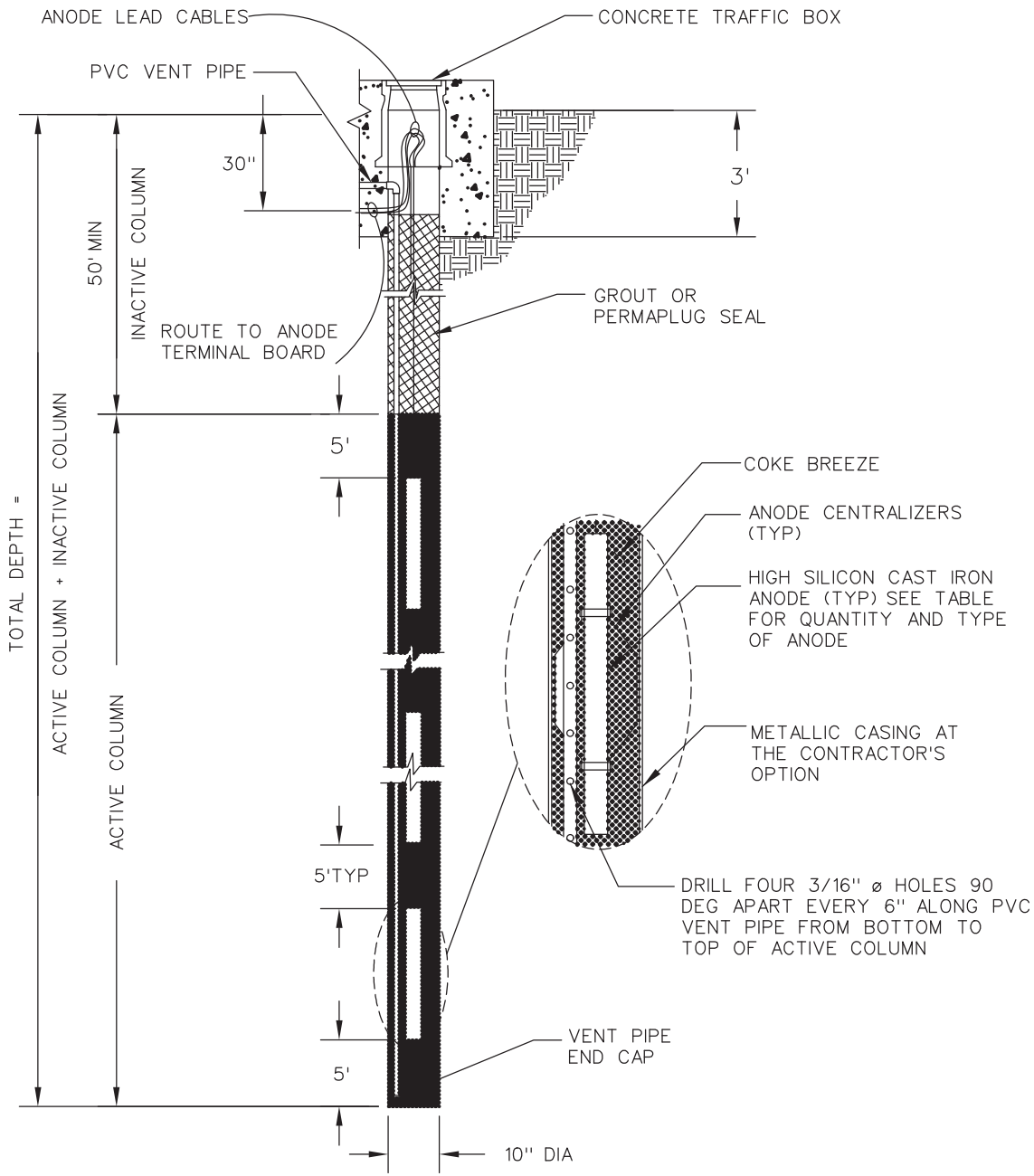


SECTION A-A

NOTE:
 MAXIMUM AC GROUNDING SYSTEM
 TO EARTH IS 2 OHMS.

REFER TO PAGES 628, 630, 631, 647, 648 & 650

RECTIFIER/DEEP ANODE WELL INSTALLATION SECTION A	DWU	(Page No.) 629
	DATE OCT. 2016	



DEEP WELL ANODE

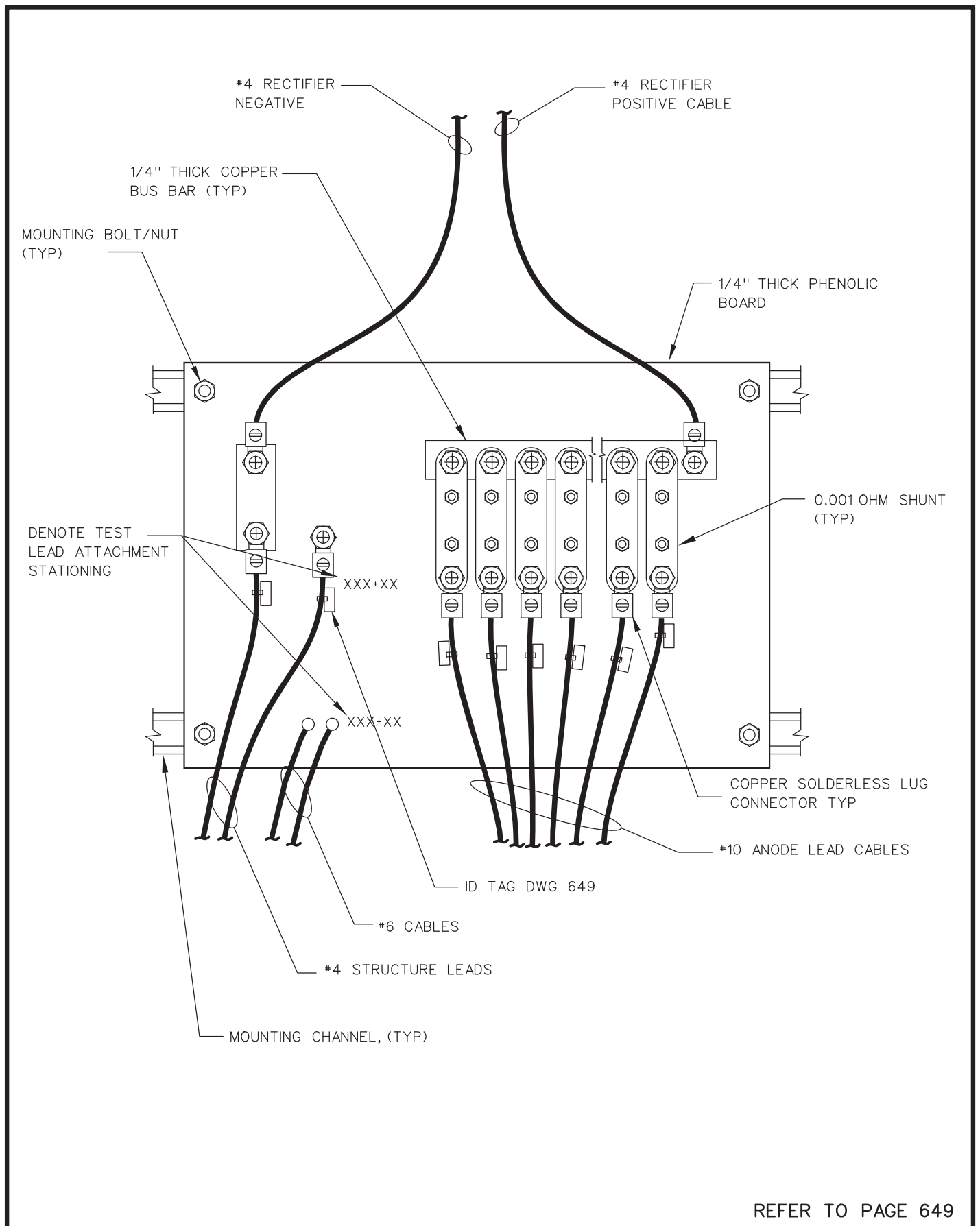
DWU

(Page No.)

630

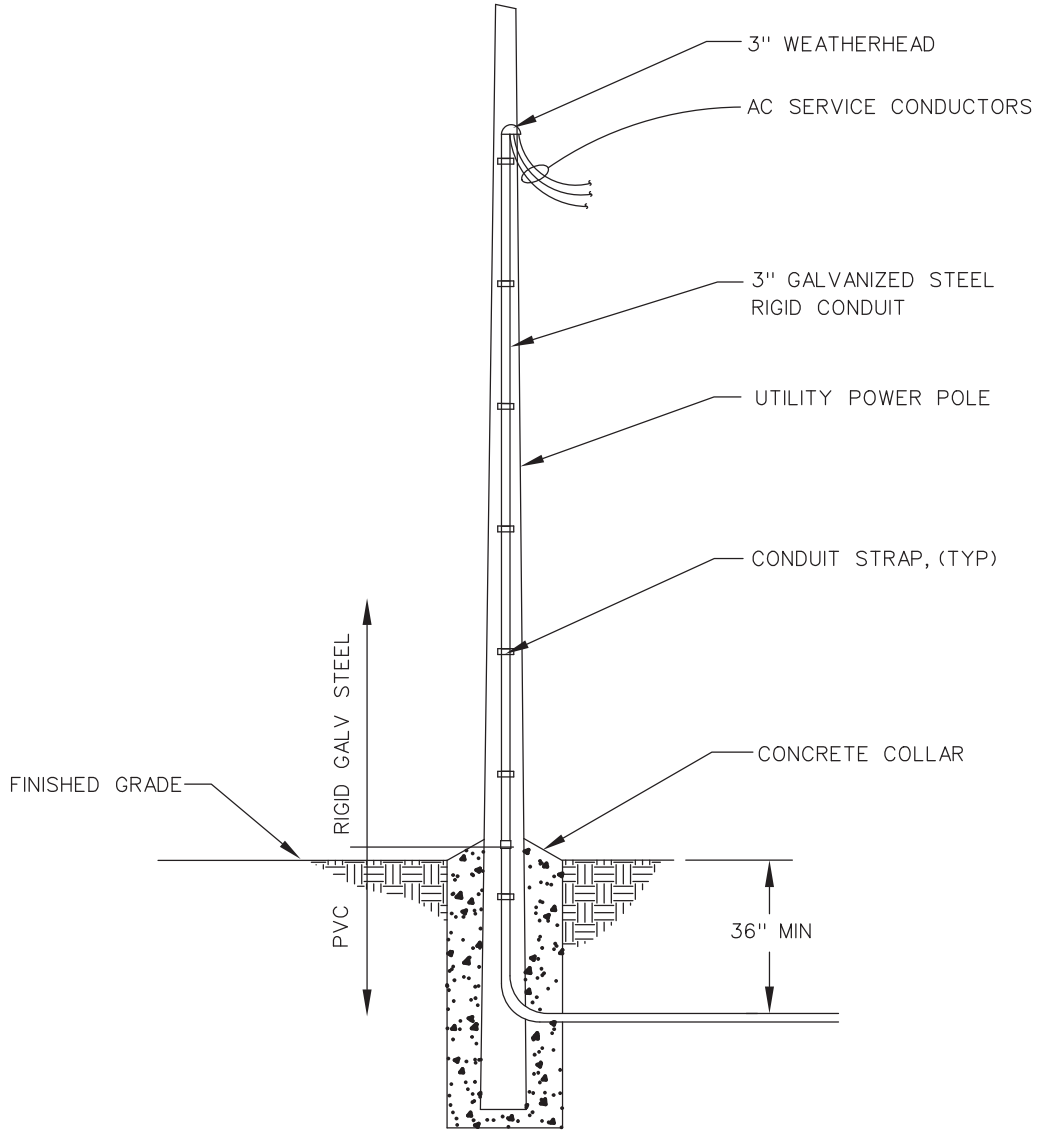
DATE

OCT. 2016



REFER TO PAGE 649

DEEP WELL ANODE	DWU	(Page No.) 631
	DATE OCT. 2016	



UTILITY POLE

DWU

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632

DATE
OCT. 2016

G-10 TYPE E, FULL
FACE GASKET, SEE NOTE 3

G-10 INSULATING SLEEVE

STEEL WASHER, (TYP)

STEEL STUD OR BOLT

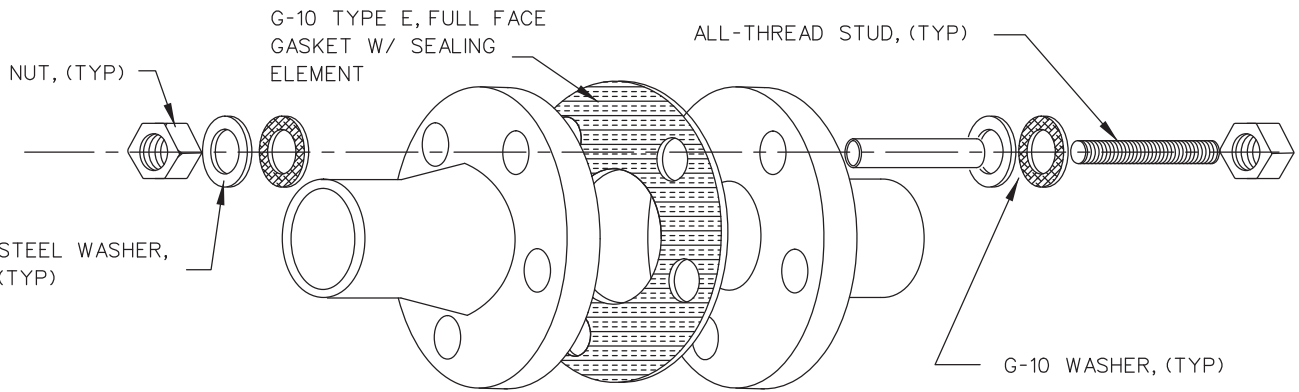
PETROLATUM WAX TAPE
PER AWWA C217, (TYP)

STEEL NUT, (TYP)

G-10 INSULATING
WASHER, (TYP)

APPLY NSF
APPROVED EPOXY
LINING FOR TWO
PIPE DIAMETERS

STEEL FLANGES
ELASTOMERIC SEALANT



NOTES:

1. TEST INSULATING FLANGE BEFORE APPLYING WAX TAPE AND BURIAL.
2. EXTEND WAX TAPE 12" BEYOND FLANGE FACE OR 12" ONTO PIPE COATING, WHICHEVER IS GREATER.
3. EXTEND FULL FACE GASKET 1/8" BEYOND STEEL CAN ID. FILL REMAINING ANNULUS BETWEEN LINING W/ NSF APPROVED ELASTOMERIC SEALANT COMPATIBLE W/ LINING MATERIAL.

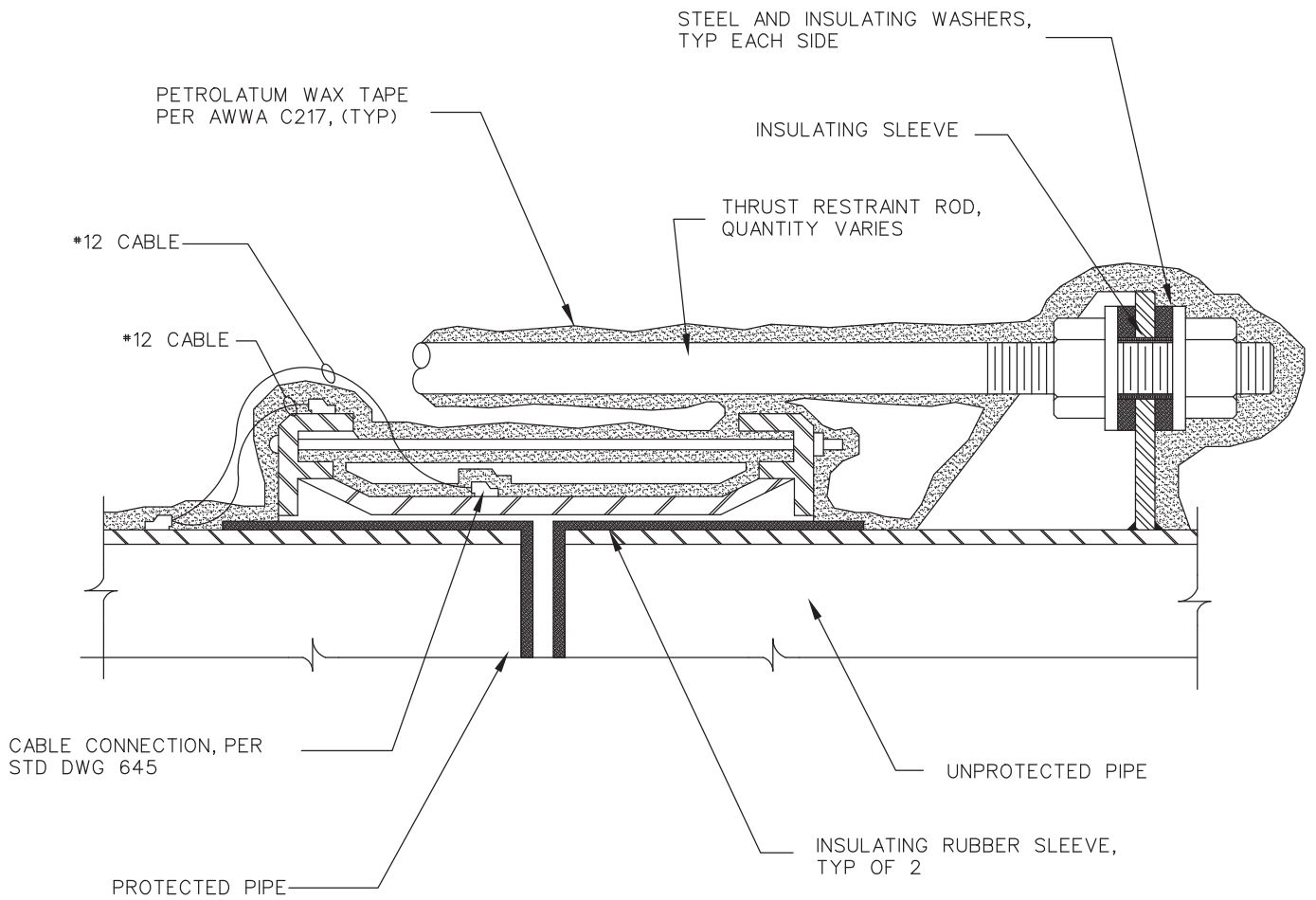
INSULATING FLANGE

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(Page No.)

633

DATE
OCT. 2016

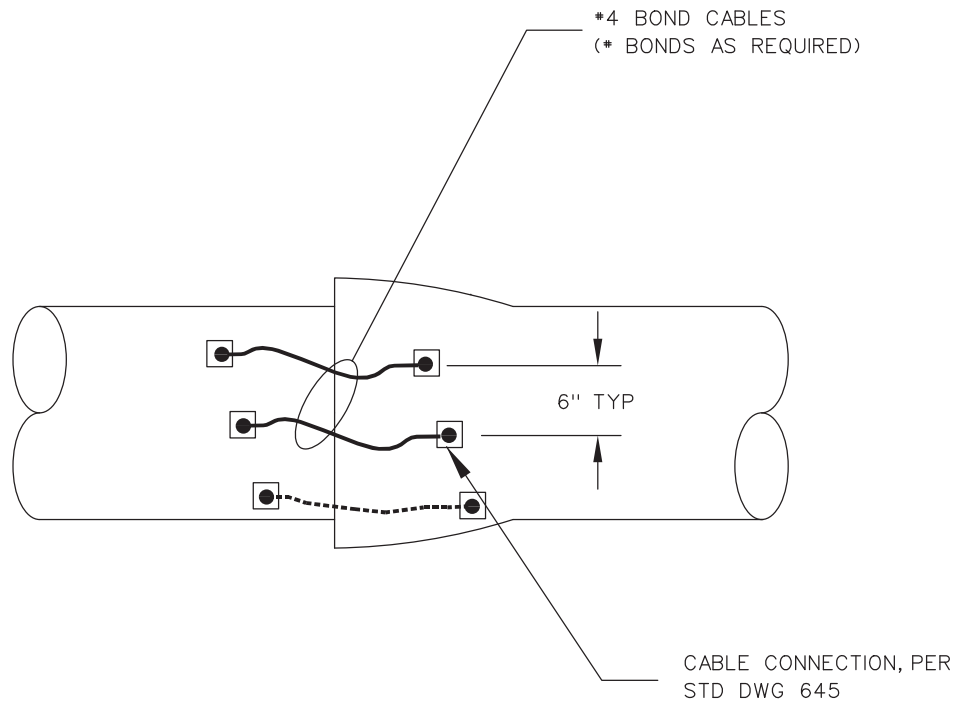


NOTE:

1. EXTEND WAX TAPE 12" BEYOND RESTRAINT HARNESS OR 12" ONTO PIPE COATING, WHICHEVER IS GREATER.

REFER TO PAGE 645

<h1>INSULATING FLEXIBLE COUPLING</h1>	DWU	(Page No.) 635
	DATE OCT. 2016	

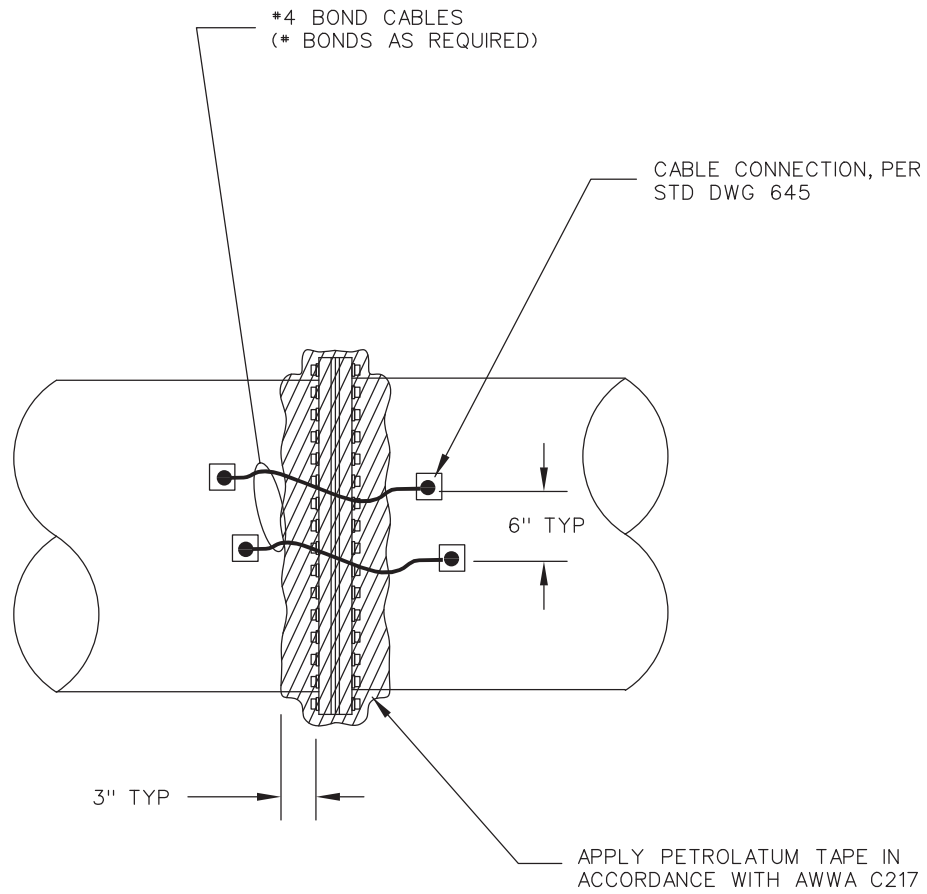


NOTES:

1. 2 BOND CABLES REQUIRED FOR PIPES DIAMETERS LESS THAN 18".
2. 3 BOND CABLES REQUIRED FOR PIPE DIAMETERS GREATER THAN OR EQUAL TO 18".

REFER TO PAGE 645

DUCTILE IRON PUSH-ON	DWU	(Page No.) 636
	DATE OCT. 2016	

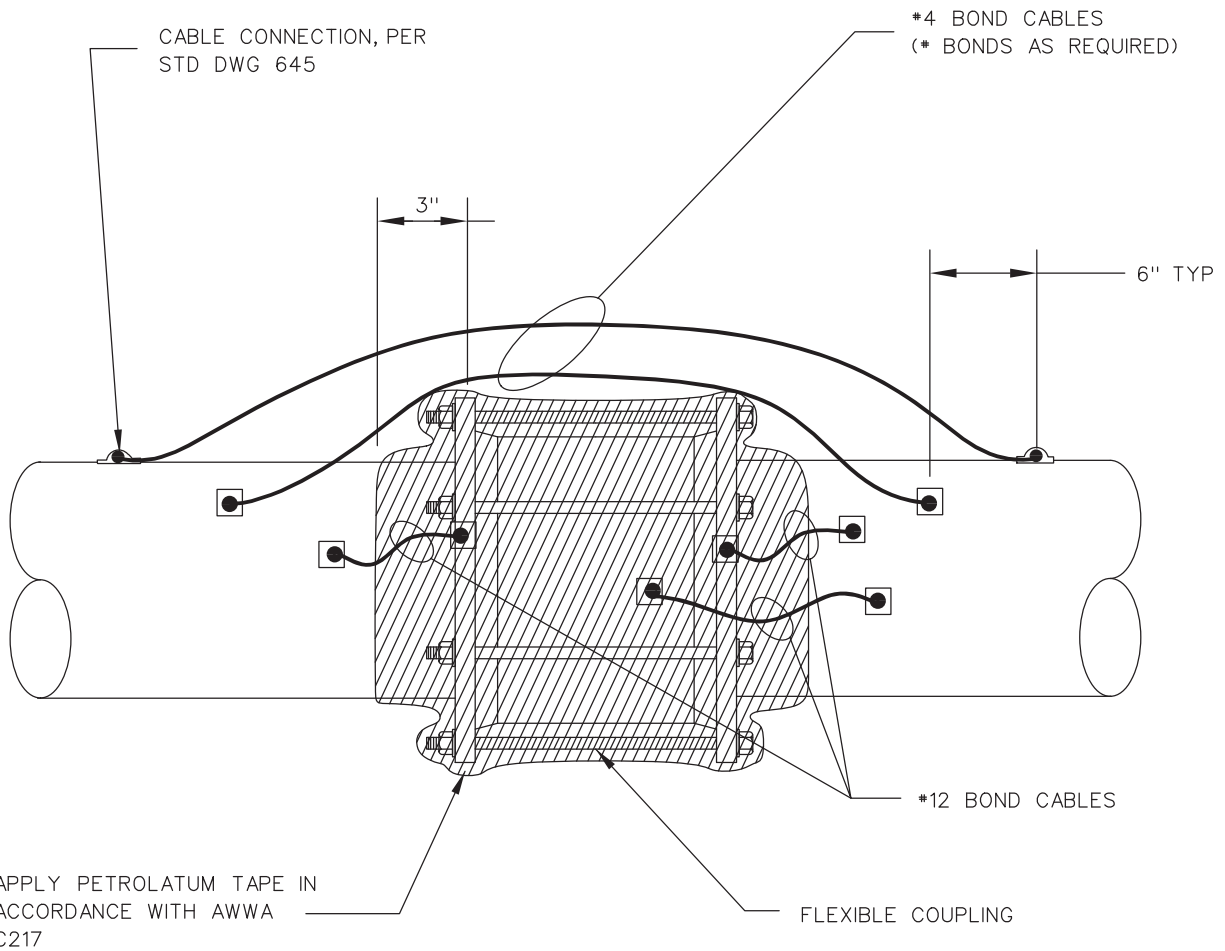


NOTES:

1. 2 BOND CABLES REQUIRED FOR PIPES DIAMETERS LESS THAN 18".
2. 3 BOND CABLES REQUIRED FOR PIPE DIAMETERS GREATER THAN OR EQUAL TO 18".
3. DO NOT INSTALL BOND CABLES IF JOINT IS AN INSULATING JOINT.

REFER TO PAGE 645

FLANGED JOINT BOND CABLES	DWU	(Page No.) 637
	DATE OCT. 2016	



APPLY PETROLATUM TAPE IN ACCORDANCE WITH AWWA C217

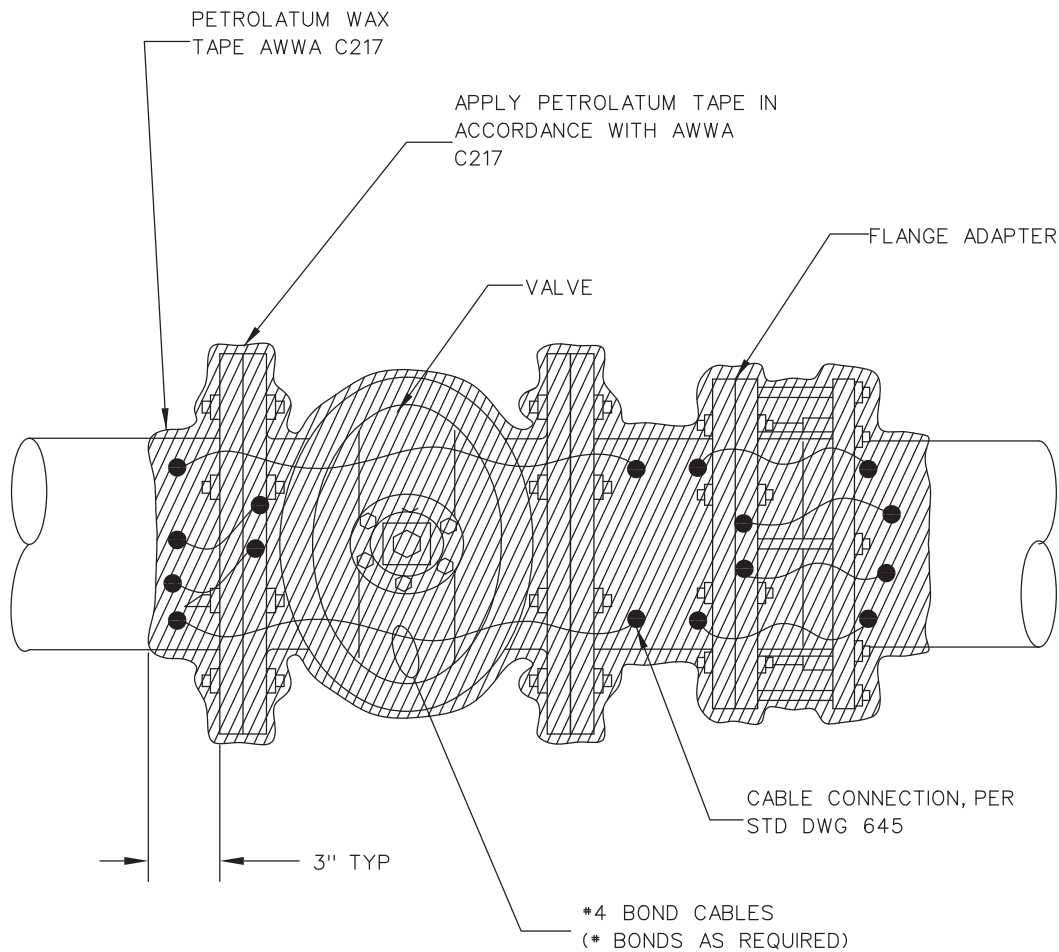
FLEXIBLE COUPLING

NOTES:

1. 2 BOND CABLES REQUIRED FOR PIPES DIAMETERS LESS THAN 18".
2. 3 BOND CABLES REQUIRED FOR PIPE DIAMETERS GREATER THAN OR EQUAL TO 18".
3. DO NOT INSTALL BOND CABLES IF JOINT IS AN INSULATING JOINT.

REFER TO PAGE 645

<p>FLEXIBLE COUPLING BOND CABLES</p>	<p>DWU</p>	<p>(Page No.) 638</p>
	<p>DATE OCT. 2016</p>	



NOTES:

1. 2 BOND CABLES REQUIRED FOR PIPES DIAMETERS LESS THAN 18".
2. 3 BOND CABLES REQUIRED FOR PIPE DIAMETERS GREATER THAN OR EQUAL TO 18".
3. DO NOT INSTALL BOND CABLES IF JOINT IS AN INSULATING JOINT.

REFER TO PAGE 645

<p>GATE VALVE AND FLANGE ADAPTER BONDINGS</p>	<p>DWU</p>	<p>(Page No.) 639</p>
	<p>DATE OCT. 2016</p>	

EXOTHERMIC WELD
PER STD DWG 646

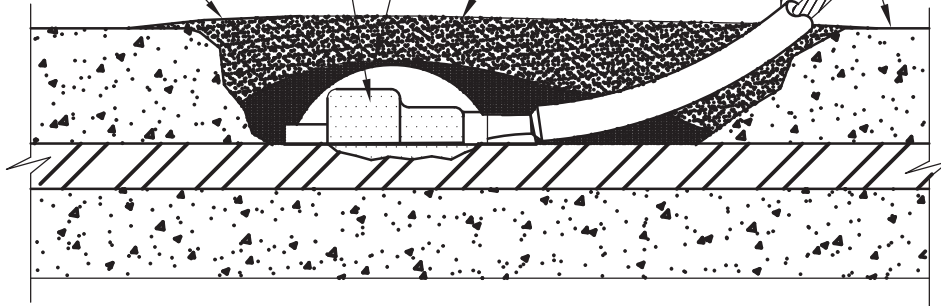
FILL WITH EPOXY TO COVER ALL EXPOSED
STEEL & COPPER A MINIMUM OF 1/4"

CHIP BACK MORTAR COATING TO
PROVIDE CLEARANCE TO ALLOW
INSTALLATION OF CABLE
CONNECTION IN JOINT RECESS

FILL TO ORIGINAL THICKNESS
WITH CEMENT MORTAR

JOINT BOND OR TEST
STATION CABLE

CEMENT MORTAR
COATING



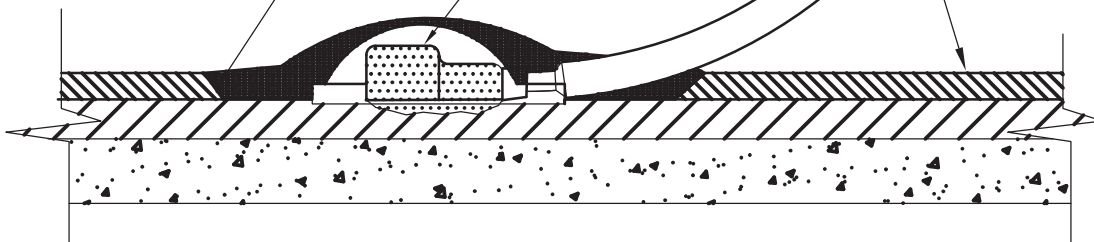
MORTAR LINED AND COATED STEEL PIPE

REMOVE PIPE COATING AS REQUIRED FOR
CONNECTION

EXOTHERMIC WELD
PER STD DWG 646

JOINT BOND OR TEST
STATION CABLE

DIELECTRIC
COATING



DUCTILE IRON OR STEEL PIPE

NOTE:

PLACE CONNECTIONS AT PIPE JOINTS/SPECIALS TO MINIMIZE
COATING DAMAGE.

REFER TO PAGE 646

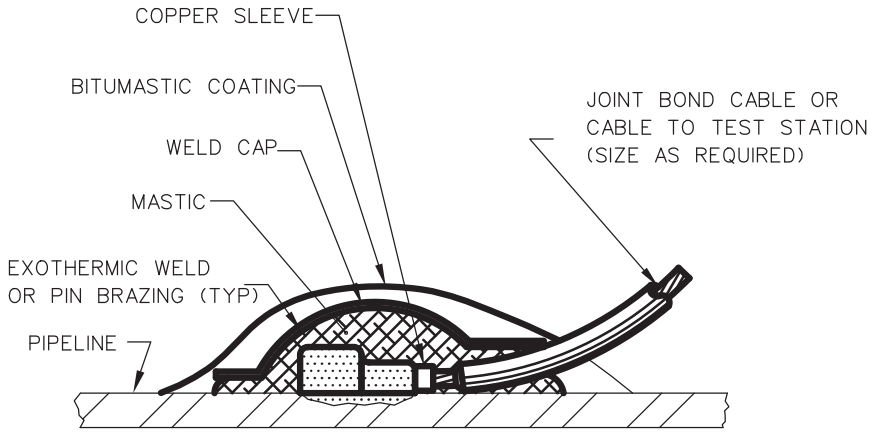
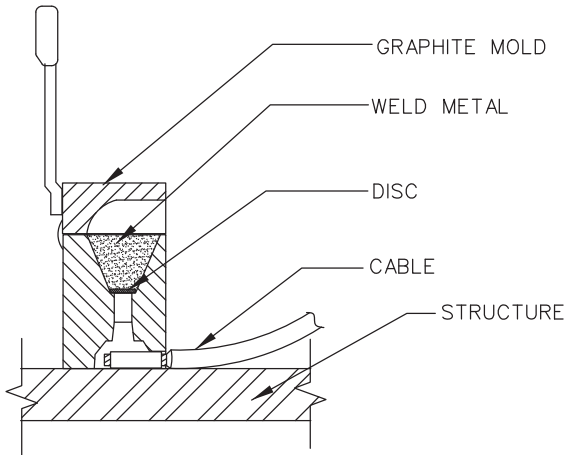
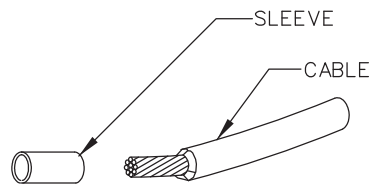
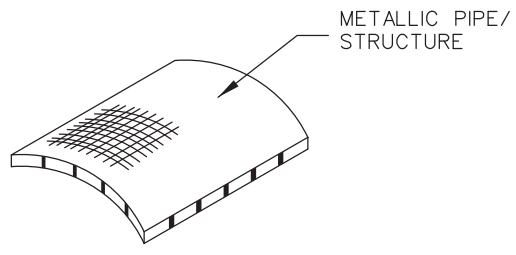
**CABLE-TO-PIPE
CONNECTION**

DWU

(Page No.)

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DATE
OCT. 2016



NOTES:

1. GRIND PIPE/STRUCTURE TO BARE METAL AND CLEAN SURFACE.
2. STRIP INSULATION FROM CABLE AND ATTACH SLEEVE.
3. HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR. IGNITE WITH FLINT GUN, REMOVE SLAG FROM CONNECTION WITH CHIPPING HAMMER. TEST WELD WITH 22 OZ HAMMER W/GLANCING BLOW. IF WELD FAILS, POSITION WIRE ATTACHMENT A MINIMUM 3" AWAY REPEATING THE ABOVE STEPS. ATTACH LEAD CABLES A MINIMUM 6" APART.
4. COVER CONNECTION WITH BITUMASTIC COATING OVER ALL EXPOSED METAL, PLACE WELD CAP OVER CONNECTION. REPAIR ALL DAMAGE TO COATING AND LINING IN ACCORDANCE WITH MFG RECOMMENDATIONS.
5. ALLOW COATING TO CURE BEFORE BURIAL.
6. ILLUSTRATION DEPICTS HORIZONTAL WELDER. FOR OTHER ORIENTATION USE MOLD RECOMMENDED BY MANUFACTURER.

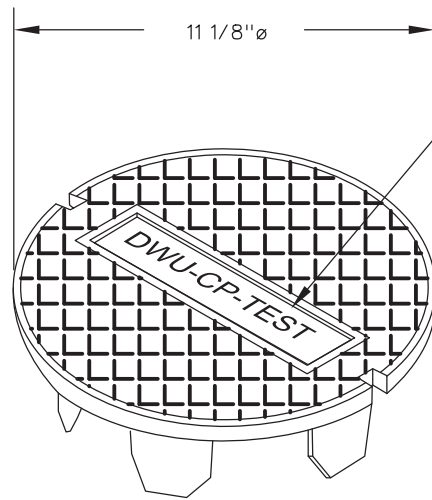
EXOTHERMIC WELD DETAIL

DWU

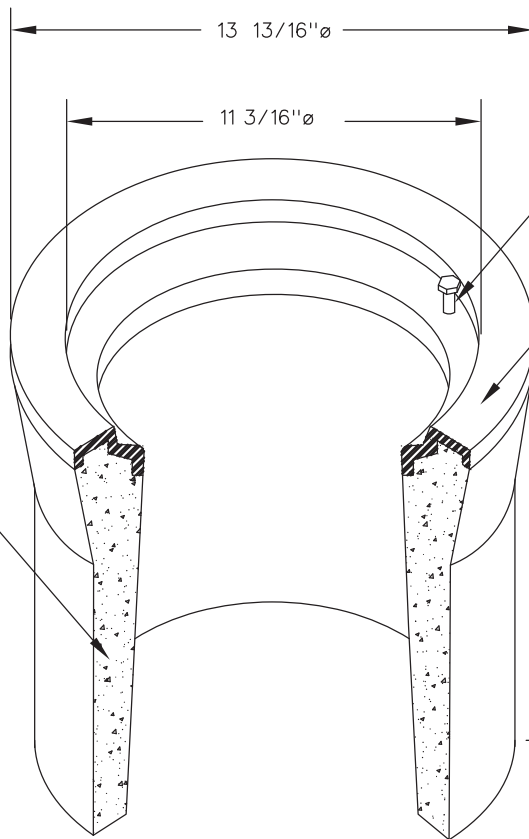
DATE
OCT. 2016

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CAST IRON COVER LABEL WITH
"ANODE" OR "DWU-CP-TEST"
ASSHTO H-20 RATED



5/16" \varnothing STAINLESS STEEL BOLT

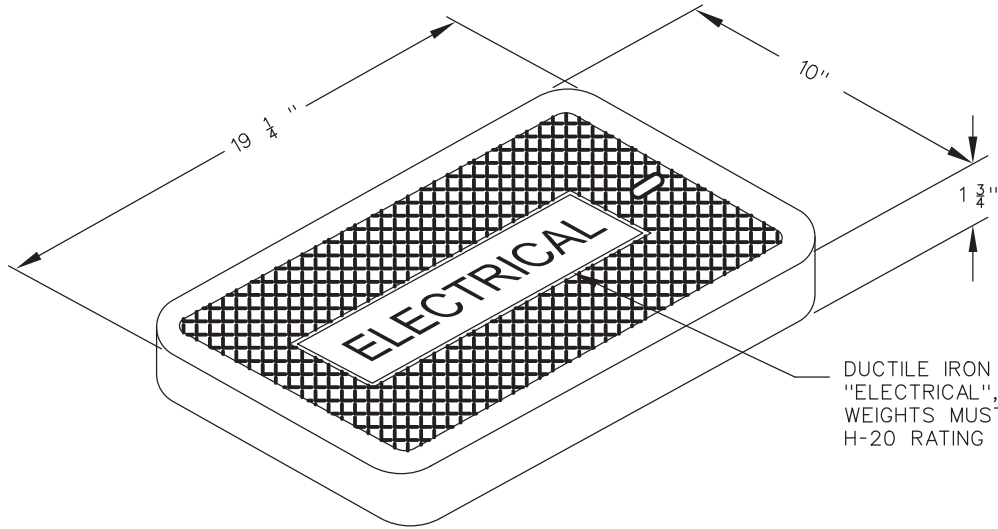
ASSHTO H-20 RATED

CAST IRON COVER &
VALVE BOX

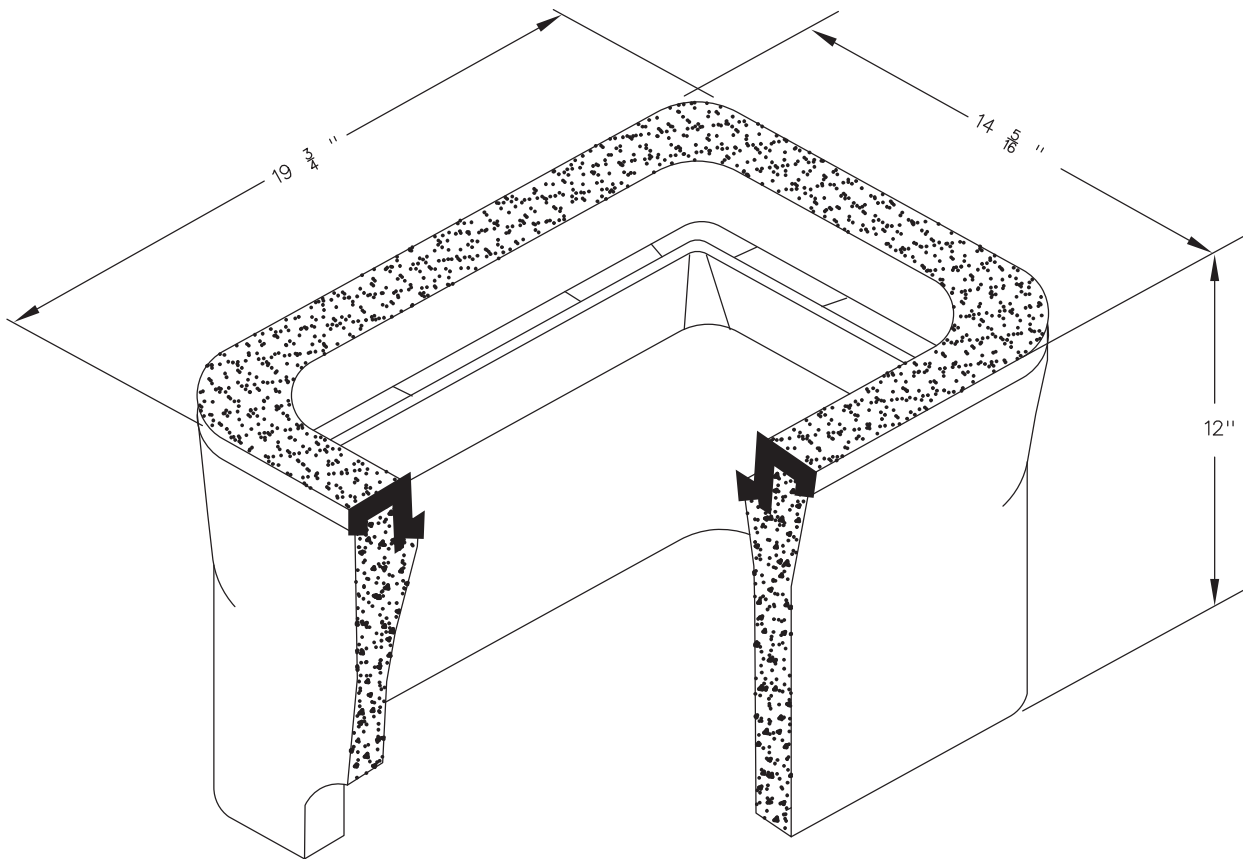
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DUCTILE IRON COVER LABELED "ELECTRICAL", LID AND BODY WEIGHTS MUST MEET ASSHTO H-20 RATING



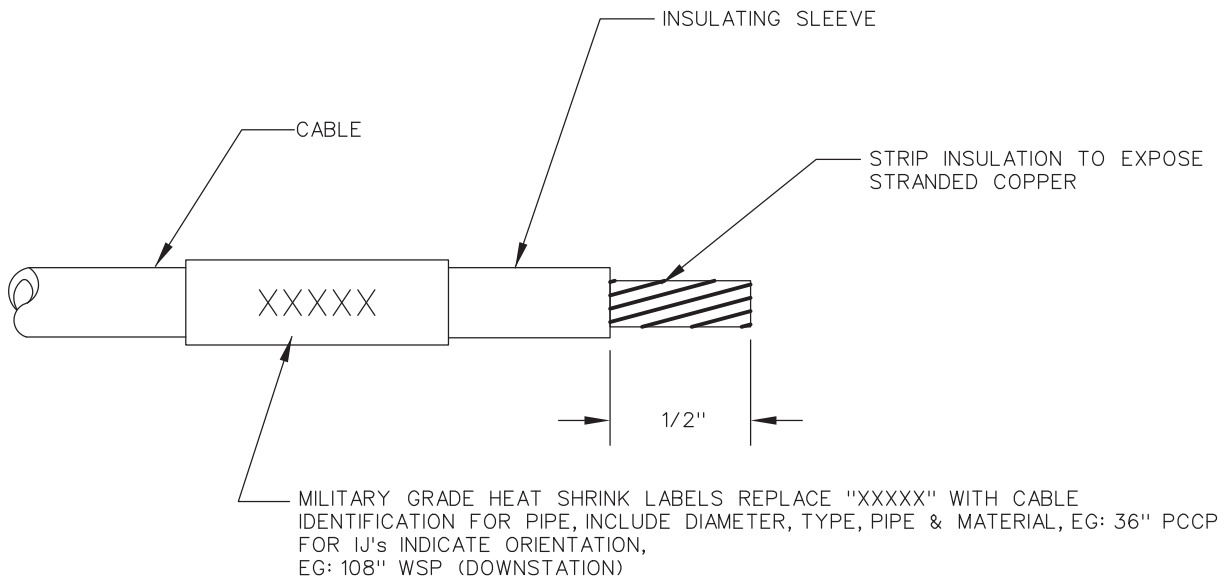
ELECTRICAL PULL BOX

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648

DATE
OCT. 2016

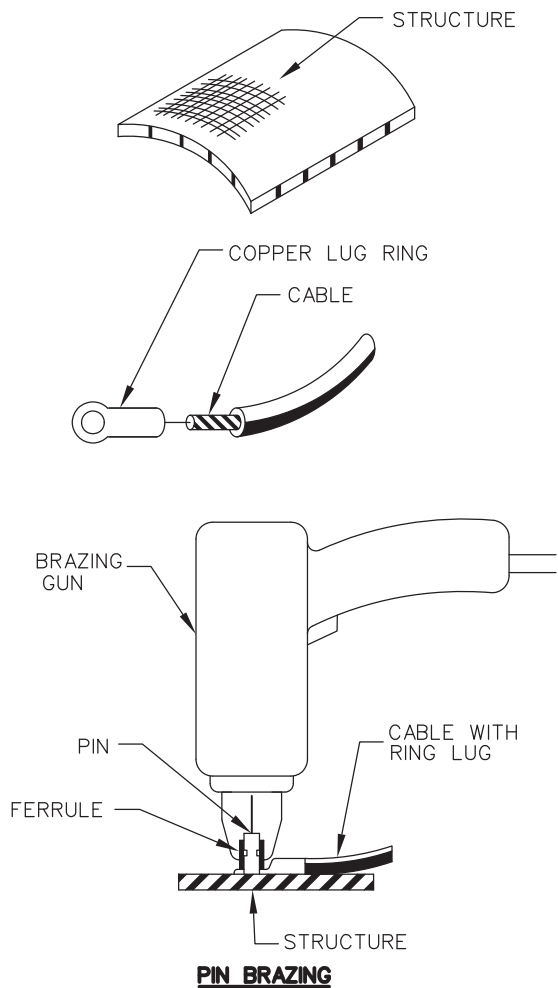


LEGEND:

- PCCP - PRE-STRESSED PIPE
- WSP - WELDED STEEL PIPE
- IR-CSE - IR-FREE COPPER-COPPER SULFATE ELECTRODE
- ANODE - GALVANIC ANODE
- CASING - CASING

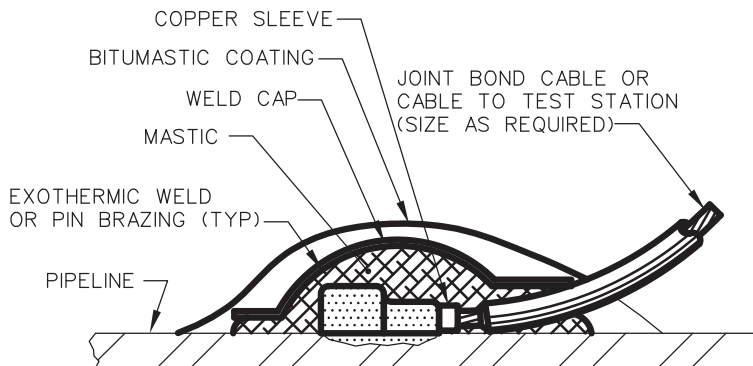
*FOR FOREIGN TEST STATIONS INDICATE ATTACHMENT LOCATIONS RELATIVE TO TEST STATION (UPSTATION OR DOWNSTATION) AND FOR PCCP ANODES THE LOCATION RELATIVE TO TEST STATION AND SIDE OF PIPE (UPSTATION OR DOWN STATION AND LEFT OR RIGHT)

CABLE IDENTIFIER		DWU	(Page No.) 649
		DATE OCT. 2016	



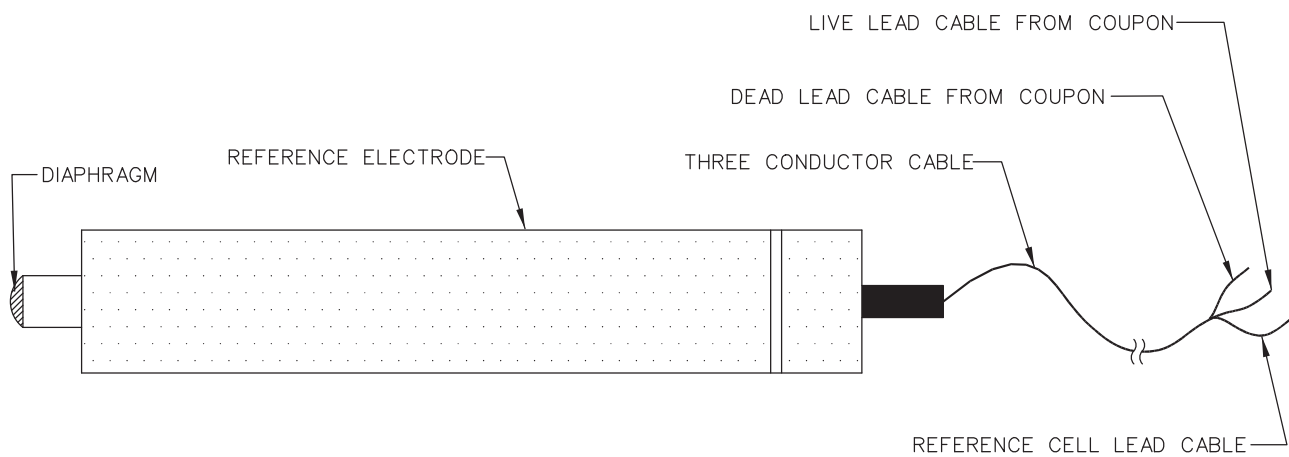
NOTES:

1. DEGREASE AND CLEAN STRUCTURE TO BARE, BRIGHT METAL WITH MECHANICAL DEVICES.
2. STRIP INSULATION FROM WIRE AND ATTACH A BAC M1 COMPRESSION TERMINAL OR APPROVED EQUAL.
3. LOAD THE BRAZING GUN WITH A DIRECT BRAZING PIN AND FERRULE. USE A THREADED TYPE CONNECTION FOR ABOVE-GROUND USE ONLY.
4. BRAZE THE CABLE TO THE PIPE. EXTRA MATERIAL REQUIRED FOR DIOR CIPIPE.
5. TEST BRAZE BY BREAKING OFF THE SHANK OF THE PLAIN PIN WITH A HAMMER.
6. COVER CONNECTION WITH MASTIC FILLED WELD CAP AND BITUMASTIC COATING 80% SOLIDS BY VOLUME OVER WELD CAP AND ALL EXPOSED METAL.
7. ALL WELDS SHALL BE A MINIMUM OF 6" APART.
8. ALLOW WELD COATING TO CURE PER MANUFACTURER'S RECOMMENDATIONS BEFORE BURIAL.



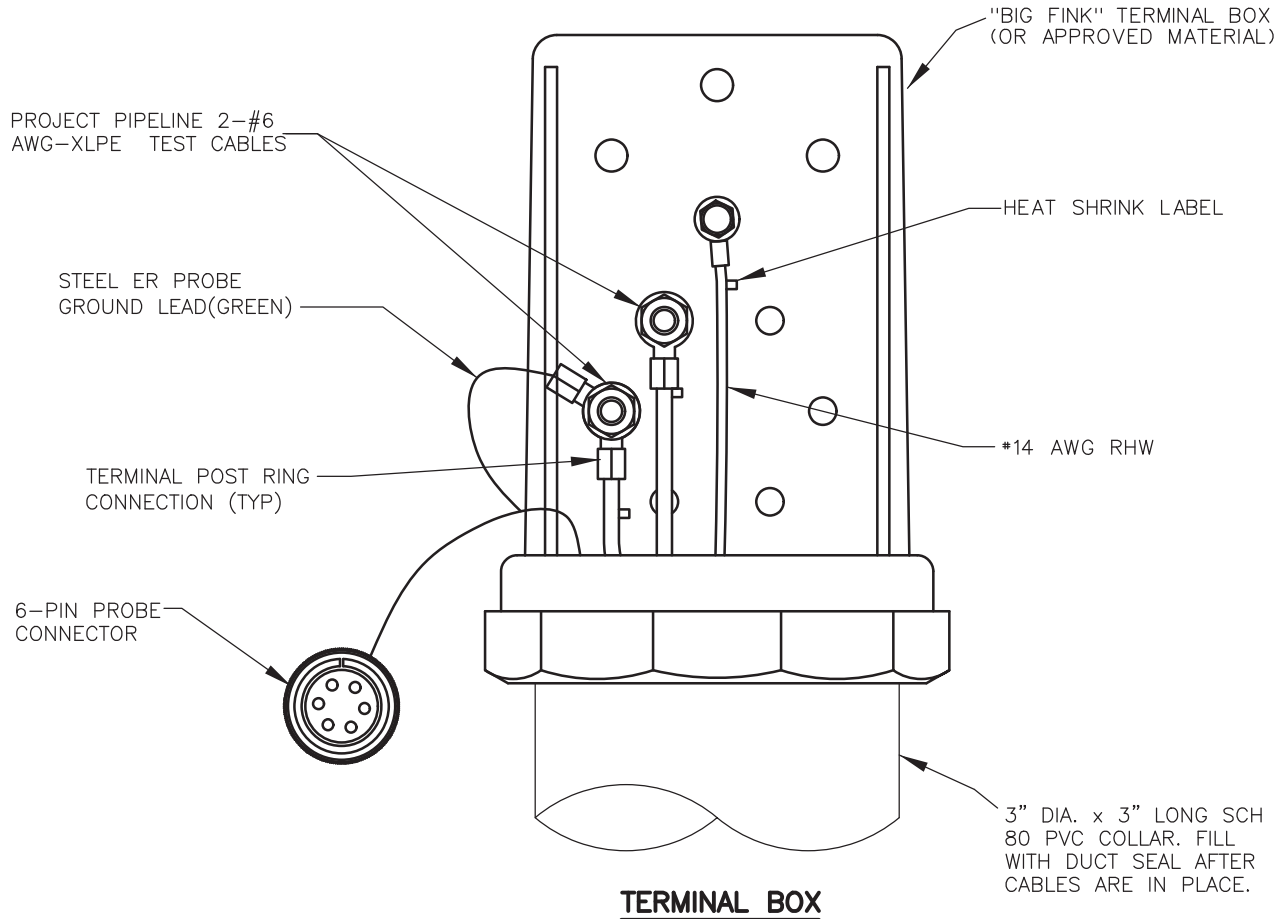
**PIN BRAZING
WIRING-TO-STRUCTURE
WELD DETAIL**

	DWU	(Page No.) 650
	DATE OCT. 2016	



IR FREE COUPON DETAIL

DWU	(Page No.) 651A
DATE OCT. 2016	

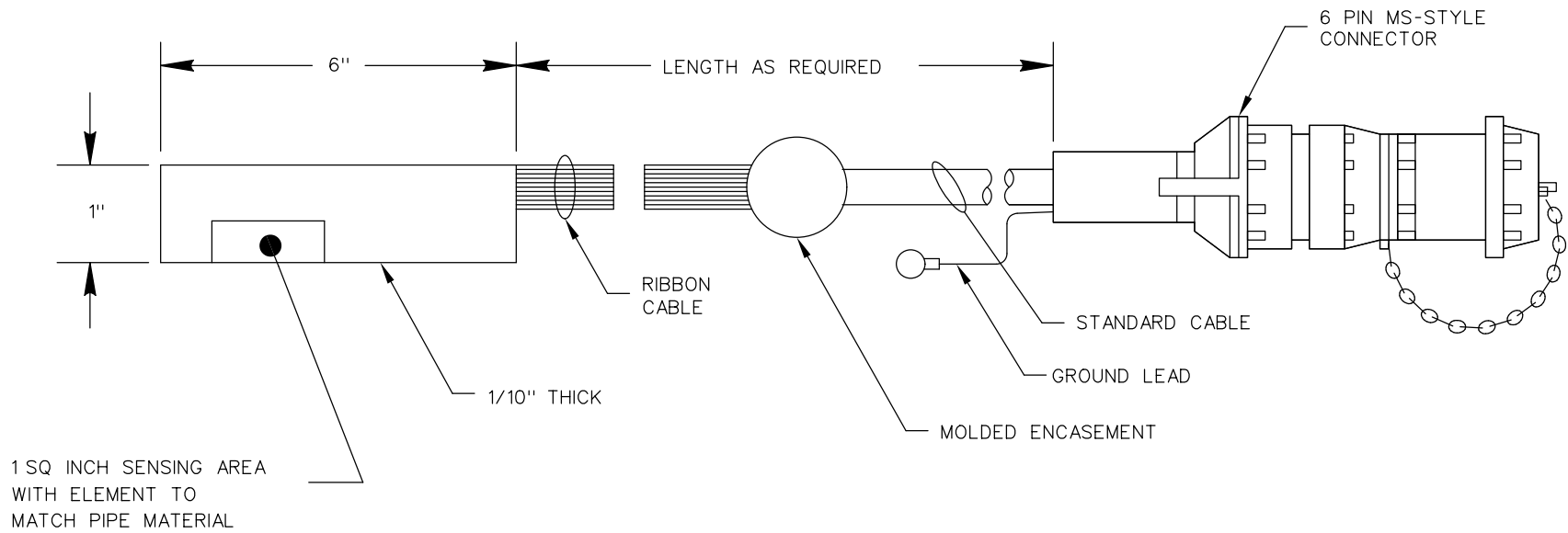


TERMINAL BOX

**2-CABLE TEST STATION
WITH ER PROBE DETAIL**

DWU
DATE
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LOW PROFILE ER PROBE
(ELECTRICAL RESISTANCE)
PROBE DETAIL

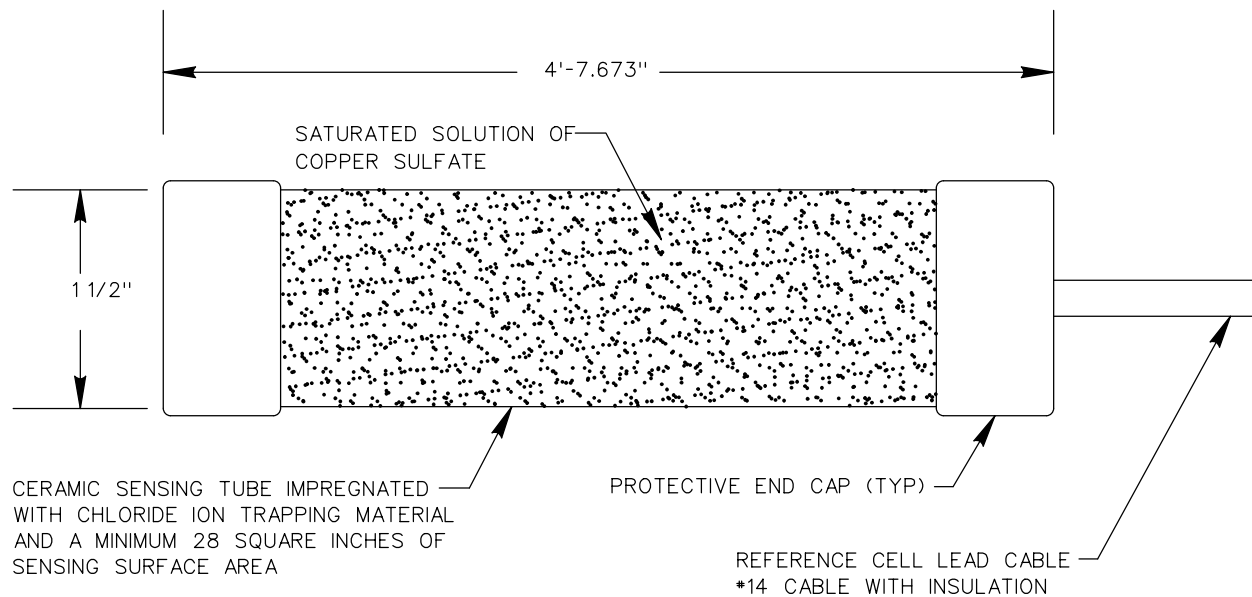
DWU

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DATE

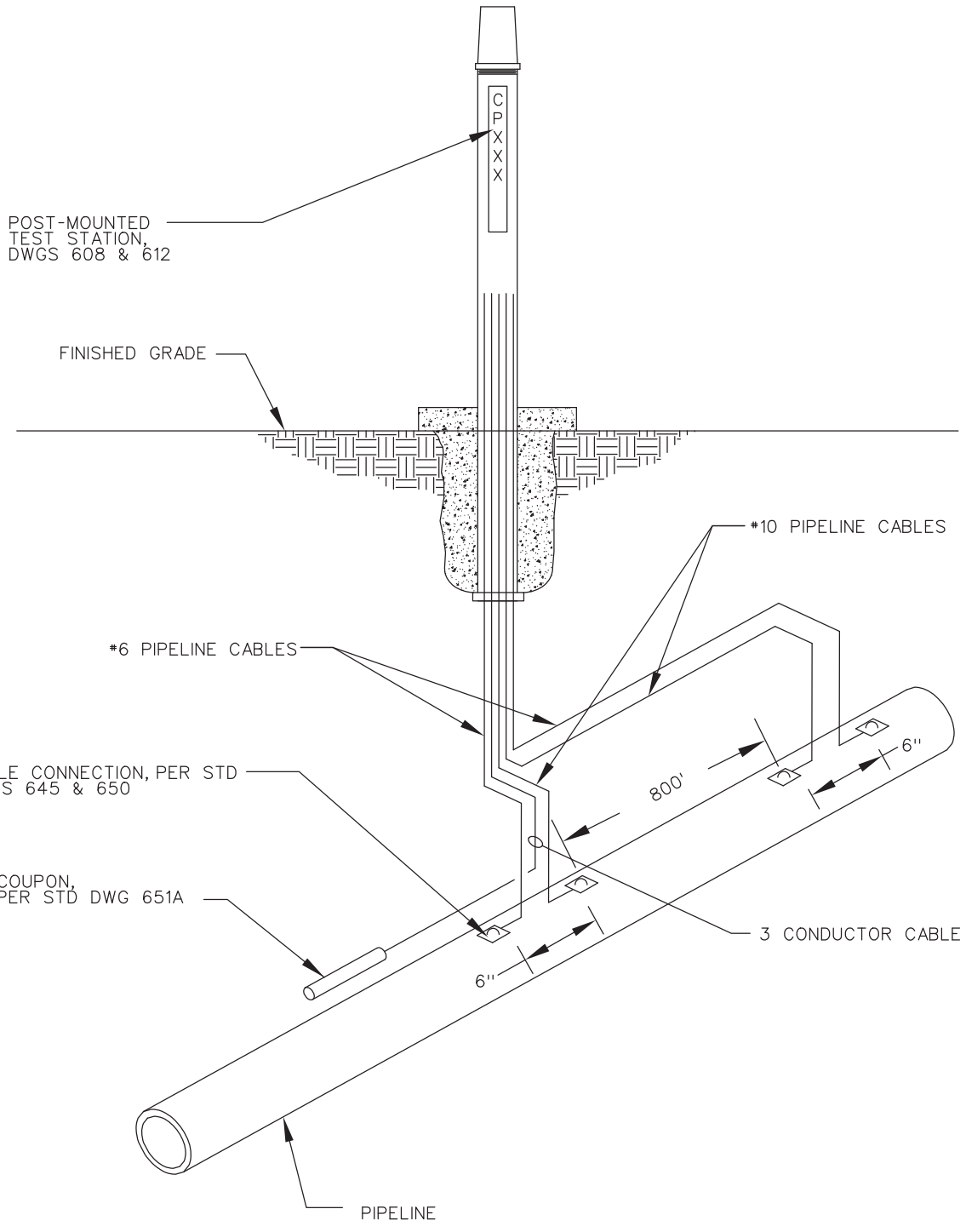
OCT. 2016



NOTES:

1. THE REFERENCE ELECTRODE SHALL HAVE A MINIMUM SENSING SURFACE AREA OF 28 SQUARE INCHES. IT SHALL BE CAPABLE OF MAINTAINING A STABLE POTENTIAL WITHIN PLUS OR MINUS 10 MILLIVOLTS TO THAT OF A FRESHLY MADE COPPER SULFATE REFERENCE ELECTRODE WHILE A 3 MICROAMPERE ELECTRICAL CURRENT IS APPLIED TO IT. PROVIDE STEALTH 2 MODEL SRE-007-CUY BY BORIN MANUFACTURING OR STAPERM MODEL CU-1-UGPC BY GMC CORROSION, OR APPROVED EQUAL
2. MEASURE THE ACCURACY OF EACH COPPER SULFATE REFERENCE ELECTRODE BEFORE INSTALLING IT BY MEASURING THE DC VOLTAGE DIFFERENCE BETWEEN IT AND ONE OR MORE REFERENCE ELECTRODES OF KNOWN ACCURACY. THE MEASUREMENTS SHALL BE LESS THAN PLUS OR MINUS 0.010 DC VOLTS FOR ALL REFERENCE ELECTRODES. PERFORM THESE MEASUREMENTS AFTER TOTALLY SUBMERGING THE REFERENCE ELECTRODES IN A FIVE-GALLON BUCKET OF WATER FOR A MINIMUM PERIOD OF 15 MINUTES. USE ONLY POTABLE DRINKING WATER FOR THIS TEST. BRACKISH WATER OR SALTWATER WILL AFFECT THE TEST RESULTS AND DAMAGE THE REFERENCE ELECTRODE. PROVIDE FIVE DAYS WRITTEN NOTICE TO THE ENGINEER TO ALLOW THESE TESTS TO BE WITNESSED.

<p>COPPER SULFATE REFERENCE ELECTRODE CELL DETAIL</p>		DWU	(Page No.) 657
		DATE OCT. 2010	



NOTES:

1. PLACE PLASTIC WARNING TAPE 12" ABOVE CONDUIT.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.

REFER TO PAGES 608, 612 645, 650 & 651A

<h1>LINE CURRENT SPAN TEST STATION</h1>	DWU	(Page No.) 660
	DATE OCT. 2016	