Fauquier County Water and Sanitation Authority

7172 Kennedy Road

Warrenton, Virginia 20187

Appendix C - Construction Details

April 2024

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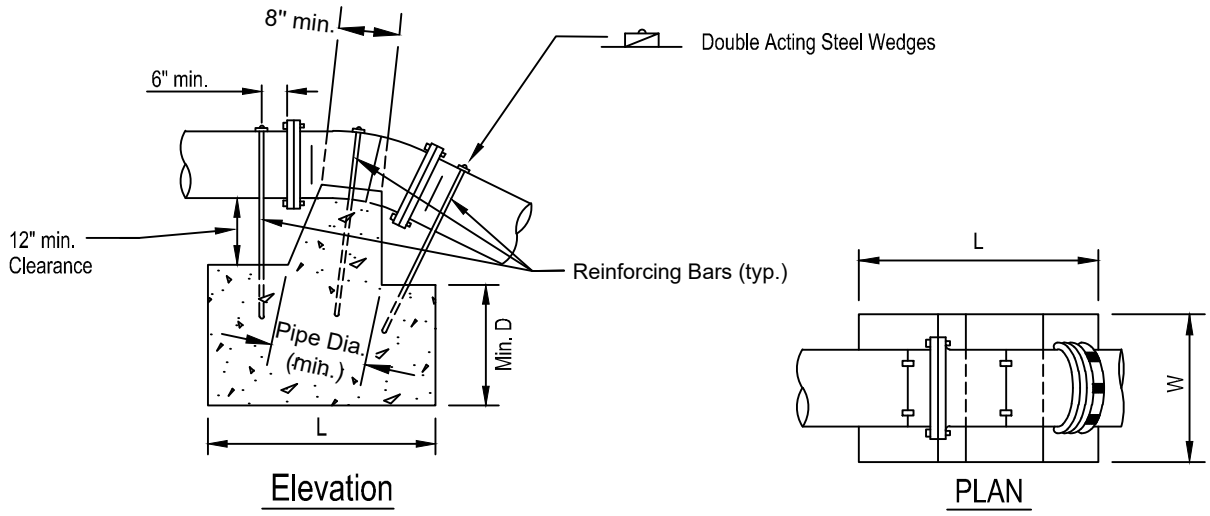


Reinforcing Bar Notes:

1) Reinforcing Bars shall be hooked at each end and embedded minimum 8" into concrete. Exposed portion of all bars shall be painted with a minimum two coats of bituminous paint.
2) Where 3 bars are used, they shall be arranged as shown on the detail above.
3) Where 4 bars are used, 2 bars shall be located at each of end of the bend, symmetrically located on either side of the fitting.

Bend		Size									
		3"	4"	6"	8"	10"	12"	16"	20"	24"	30"
11-1/4°	L	1'-6"	1'-6"	2'-0"	2'-0"	2'-3"	2'-6"	3'-3"	4'-0"	4'-6"	5'-0"
	W	1'-6"	1'-6"	2'-0"	2'-0"	2'-3"	2'-6"	3'-3"	4'-0"	4'-6"	5'-0"
	D	1'-6"	1'-6"	1'-6"	2'-0"	2'-0"	2'-3"	2'-6"	2'-6"	3'-0"	3'-0"
	Reinf Bars (No., Size)	3, #5	3, #5	3, #5	3, #6	3, #6	3, #6	3, #6	3, #8	3, #8	3, #8
22-1/2°	L	1'-6"	2'-0"	2'-6"	2'-9"	3'-6"	4'-0"	4'-6"	5'-6"	6'-0"	7'-0"
	W	1'-6"	2'-0"	2'-6"	2'-9"	3'-6"	4'-0"	4'-6"	5'-6"	6'-0"	7'-0"
	D	1'-6"	1'-6"	2'-0"	2'-3"	2'-3"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"
	Reinf Bars (No., Size)	3, #5	3, #5	3, #5	3, #6	3, #6	4, #6	4, #6	3, #8	4, #8	4, #8
45°	L	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	6'-0"	7'-6"	8'-6"	10'-0"
	W	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	6'-0"	7'-6"	8'-6"	10'-0"
	D	1'-6"	2'-0"	2'-0"	2'-6"	2'-9"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"
	Reinf Bars (No., Size)	3, #5	3, #5	3, #5	3, #6	4, #6	4, #6	4, #8	4, #8	4, #8	4, #9

Concrete Notes:

1) Fc=3000 PSI AT 28 DAYS.
2) Carry all bearing surfaces to undisturbed earth or firm subgrade.
3) The anchorage dimensions shown are based on design water pressure of 150 psi. Where a higher pressure specification is required, the volume of the concrete (L x W x D) shall be adjusted proportionally according to the design pressure used.

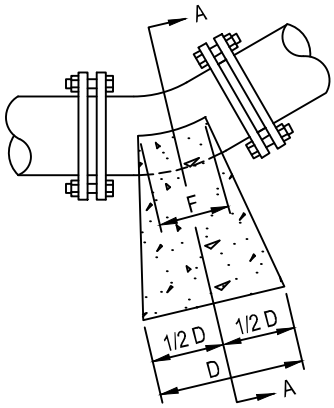
AV-01

Fauquier County
Water and Sanitation Authority

Anchorage for
11-1/4°, 22-1/2° & 45° Upper Vertical Bends

Not to Scale

Revised: 03/31/05



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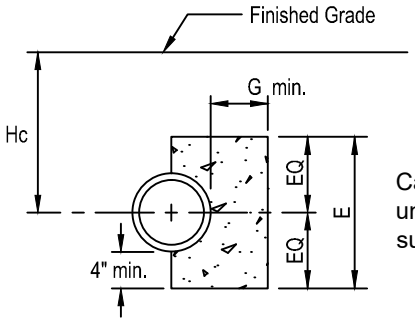


SECTION A-A

Carry concrete to undisturbed earth or firm subgrade.

SOIL PROPERTIES	SIZE	Concrete Block Dimensions At 150 PSI Pressure				Amount to be added to dimension 'D' for each 50 psi (or portion thereof) design pressure above 150 psi (up to 300 psi).	Adjustment to Concrete Area for Different Height, Hc. To Be Measured from Finished Grade to ℄ of Pipe			
		D	E	F	G		Up To 8'	8'-1" To 12'	12'-1" To 16'	16'-1" To 20'
CS = 1000 PSF Φ = 15° Soft Silty Clay & Better	3"	4"	1'	4"	6"	2"	CONC. BLOCK AREA 1.0 X D X E	CONC. BLOCK AREA 0.875 X D X E	CONC. BLOCK AREA 0.75 X D X E	CONC. BLOCK AREA 0.625 X D X E
	4"	4"	1'	4"	6"	2"				
	6"	6"	1'-2"	6"	7"	2"				
	8"	8"	1'-4"	8"	7"	2"				
	10"	9"	1'-6"	8"	8"	4"				
	12"	1'	1'-8"	1'	9"	4"				
	16"	1'-3"	2'	1'	9"	6"				
	20"	1'-3"	2'-6"	1'	10"	6"				
	24"	1'-6"	3'	1'	1'	6"				
	30"	2'	3'-6"	1'-4"	1'-2"	9"				
CS = 0 PSF Φ = 15° Loose Silty Sand	3"	10"	1'-6"	6"	9"	2"	CONC. BLOCK AREA 1.0 X D X E	CONC. BLOCK AREA 0.5 X D X E	CONC. BLOCK AREA 0.375 X D X E	CONC. BLOCK AREA 0.25 X D X E
	4"	1'	2'	6"	9"	2"				
	6"	1'-6"	2'	6"	1'	2"				
	8"	2'-4"	2'	8"	1'	2"				
	10"	2'-6"	2'-3"	8"	1'	4"				
	12"	3'-4"	2'-6"	1'	1'	4"				
	16"	4'-2"	3'	1'	1'-6"	6"				
	20"	4'-6"	3'-6"	1'	1'-6"	6"				
	24"	5'-8"	4'	1'-6"	1'-6"	6"				
	30"	7'	5'	2'	1'-6"	9"				

Notes:

1) Dimensions D & E shall be adjusted based on required area for value of Hc.
2) Dimensions F & G are constant for a given pipe size.
3) Dimension D shall be adjusted for required pressure in excess of 150 psi before making adjustment for Hc (above).

Soil and Concrete Notes:

1) FC = 3000 psi at 28 days.
2) CS = Soil cohesion in psf
3) Φ = Angle of Internal Friction.
4) All bearing surfaces shall be carried to undisturbed earth or firm subgrade.

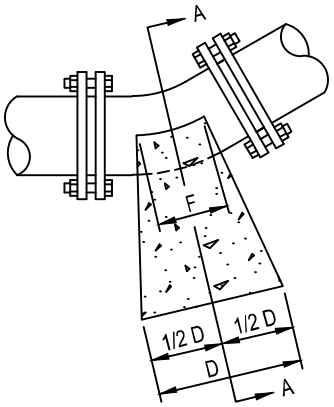
BB-01

Fauquier County
Water and Sanitation Authority

Buttresses for 11-1/4° Horizontal Bend

Not to Scale

Revised: 03/31/05



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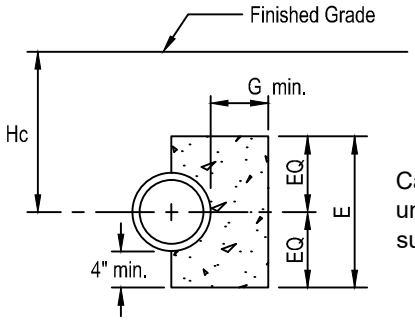


SECTION A-A

Carry concrete to undisturbed earth or firm subgrade.

SOIL PROPERTIES	SIZE	Concrete Block Dimensions At 150 PSI Pressure				Amount to be added to dimension 'D' for each 50 psi (or portion thereof) design pressure above 150 psi (up to 300 psi).	Adjustment to Concrete Area for Different Height, Hc. To Be Measured from Finished Grade to ℄ of Pipe			
		D	E	F	G		Up To 8'	8'-1" To 12'	12'-1" To 16'	16'-1" To 20'
CS = 1000 PSF Φ = 15° Soft Silty Clay & Better	3"	6"	1'-0"	6"	7"	2"	CONC. BLOCK AREA = 1.0 X D X E	CONC. BLOCK AREA = 0.875 X D X E	CONC. BLOCK AREA = 0.75 X D X E	CONC. BLOCK AREA = 0.625 X D X E
	4"	6"	1'-0"	6"	7"	2"				
	6"	8"	1'-2"	6"	8"	2"				
	8"	1'-0"	1'-4"	8"	8"	4"				
	10"	1'-3"	1'-6"	8"	10"	4"				
	12"	1'-6"	1'-8"	1'-0"	1'-0"	6"				
	16"	2'-0"	2'-0"	1'-0"	1'-3"	6"				
	20"	2'-6"	2'-6"	1'-0"	1'-6"	9"				
	24"	3'-0"	3'-0"	1'-0"	1'-6"	9"				
	30"	4'-0"	3'-6"	1'-4"	1'-9"	1'-0"				
CS = 0 PSF Φ = 15° Loose Silty Sand	3"	1'-0"	1'-6"	6"	9"	2"	CONC. BLOCK AREA = 1.0 X D X E	CONC. BLOCK AREA = 0.5 X D X E	CONC. BLOCK AREA = 0.375 X D X E	CONC. BLOCK AREA = 0.25 X D X E
	4"	1'-6"	2'-0"	6"	9"	2"				
	6"	2'-0"	2'-0"	6"	1'-0"	2"				
	8"	3'-4"	2'-0"	8"	1'-0"	4"				
	10"	4'-2"	2'-3"	8"	1'-0"	4"				
	12"	4'-8"	2'-9"	1'-0"	1'-6"	6"				
	16"	5'-9"	3'-6"	1'-0"	1'-6"	6"				
	20"	7'-10"	4'-0"	1'-0"	2'-0"	9"				
	24"	9'-10"	5'-0"	1'-6"	2'-0"	9"				
	30"	11'-8"	6'-0"	2'-0"	2'-0"	1'-0"				

Notes:

1) Dimensions D & E shall be adjusted based on required area for value of Hc.
2) Dimensions F & G are constant for a given pipe size.
3) Dimension D shall be adjusted for required pressure in excess of 150 psi before making adjustment for Hc (above).

Soil and Concrete Notes:

1) FC = 3000 psi at 28 days.
2) CS = Soil cohesion in psf
3) Φ = Angle of Internal Friction.
4) All bearing surfaces shall be carried to undisturbed earth or firm subgrade.

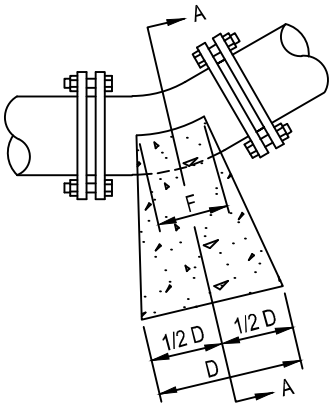
BB-02

Fauquier County
Water and Sanitation Authority

Buttresses for 22-1/2° Horizontal Bend

Not to Scale

Revised: 03/31/05



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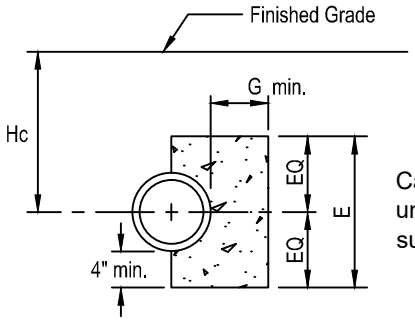


SECTION A-A

Carry concrete to undisturbed earth or firm subgrade.

SOIL PROPERTIES	SIZE	Concrete Block Dimensions At 150 PSI Pressure				Amount to be added to dimension 'D' for each 50 psi (or portion thereof) design pressure above 150 psi (up to 300 psi).	Adjustment to Concrete Area for Different Height, Hc. To Be Measured from Finished Grade to ℄ C of Pipe			
		D	E	F	G		Up To 8'	8'-1" To 12'	12'-1" To 16'	16'-1" To 20'
CS = 1000 PSF Φ = 15° Soft Silty Clay & Better	3"	9"	1'-0"	6"	6"	4"	CONC. BLOCK AREA 1.0 X D X E	CONC. BLOCK AREA 0.875 X D X E	CONC. BLOCK AREA 0.75 X D X E	CONC. BLOCK AREA 0.625 X D X E
	4"	9"	1'-0"	6"	6"	4"				
	6"	1'-0"	1'-2"	6"	8"	4"				
	8"	1'-6"	1'-4"	8"	9"	6"				
	10"	2'-0"	1'-6"	8"	10"	6"				
	12"	2'-6"	1'-8"	1'-0"	1'-0"	9"				
	16"	3'-6"	2'-6"	1'-0"	1'-3"	9"				
	20"	4'-8"	2'-6"	1'-0"	1'-4"	1'-4"				
	24"	5'-0"	3'-0"	1'-0"	1'-9"	2'-0"				
	30"	6'-0"	4'-0"	1'-4"	2'-3"	2'-0"				
CS = 0 PSF Φ = 15° Loose Silty Sand	3"	1'-6"	1'-6"	6"	1'-0"	4"	CONC. BLOCK AREA 1.0 X D X E	CONC. BLOCK AREA 0.5 X D X E	CONC. BLOCK AREA 0.375 X D X E	CONC. BLOCK AREA 0.25 X D X E
	4"	2'-0"	2'-0"	6"	1'-0"	4"				
	6"	3'-0"	2'-0"	6"	1'-0"	4"				
	8"	4'-0"	2'-6"	8"	1'-0"	6"				
	10"	6'-0"	2'-6"	8"	1'-0"	6"				
	12"	7'-0"	3'-0"	1'-0"	1'-6"	9"				
	16"	11'-0"	4'-0"	1'-0"	1'-6"	9"				
	20"	11'-8"	5'-0"	1'-0"	2'-0"	1'-4"				
	24"	12'-6"	6'-0"	1'-6"	2'-0"	2'-0"				
	30"	20'-0"	6'-0"	2'-0"	2'-6"	2'-0"				

Notes:

1) Dimensions D & E shall be adjusted based on required area for value of Hc.
2) Dimensions F & G are constant for a given pipe size.
3) Dimension D shall be adjusted for required pressure in excess of 150 psi before making adjustment for Hc (above).

Soil and Concrete Notes:

1) FC = 3000 psi at 28 days.
2) CS = Soil cohesion in psf
3) Φ = Angle of Internal Friction.
4) All bearing surfaces shall be carried to undisturbed earth or firm subgrade.

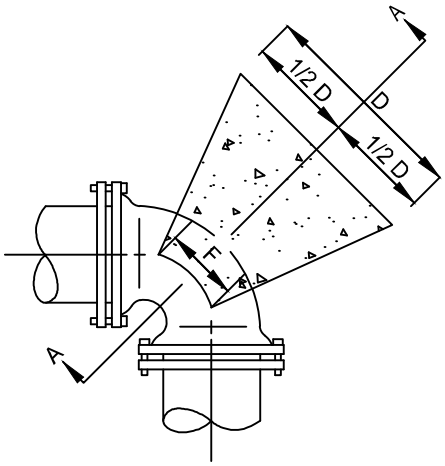
BB-03

Fauquier County
Water and Sanitation Authority

Buttresses for 45° Horizontal Bend

Not to Scale

Revised: 03/31/05



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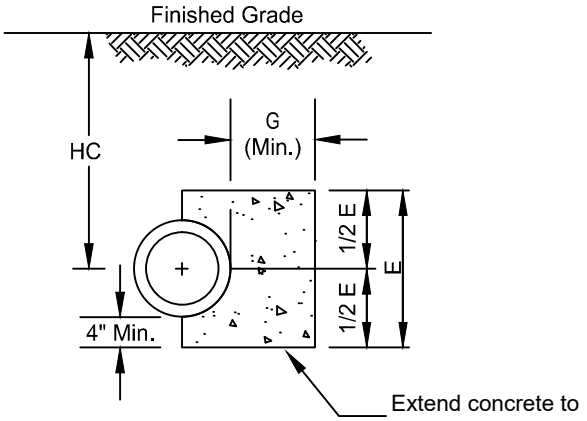


Section A - A

SIZE	Concrete Block Dimensions At 150 PSI Pressure				Amount to be added to dimension 'D' for each 50 psi (or portion thereof) design pressure above 150 psi (up to 300 psi).	Adjustment to Concrete Area for Different Height, Hc. To Be Measured from Finished Grade to C of Pipe			
	D	E	F	G		Up To 8'-0"	8'-1" To 12'	12'-1" To 16'	16'-1" To 20'
3"	2'-6"	2'-0"	8"	1'-0"	6"	CONC. BLOCK AREA 1.0 X D X E	C. B. A. 0.5 X D X E	C. B. A. 0.375 X D X E	C. B. A. 0.25 X D X E
4"	3'-4"	2'-0"	8"	1'-0"	6"				
6"	5'-2"	2'-0"	1'-0"	1'-6"	6"				
8"	6'-8"	2'-6"	1'-0"	1'-6"	9"				
10"	10'-0"	3'-0"	1'-6"	1'-6"	9"				
12"	10'-0"	4'-0"	1'-6"	2'-0"	1'-0"				
16"	12'-6"	5'-0"	2'-0"	2'-0"	1'-0"				
20"	15'-10"	6'-0"	2'-0"	2'-0"	2'-0"				

Notes:

1) Dimensions D & E shall be adjusted based on required area for value of Hc.
2) Dimensions F & G are constant for a given pipe size.
3) Dimension D shall be adjusted for required pressure in excess of 150 psi before making adjustment for Hc (above).
4) Special design required for lines 24" in diameter or greater.

Concrete Notes:

1) FC = 3000 psi at 28 days.
2) All bearing surfaces shall be carried to undisturbed earth or firm subgrade.

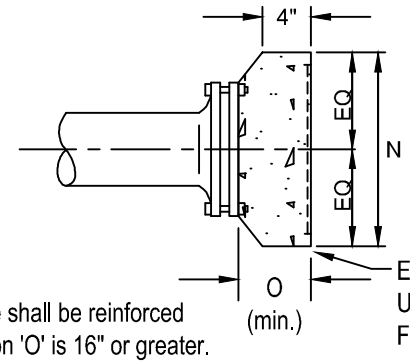
BB-04

Fauquier County
Water and Sanitation Authority

Buttresses for 90° Horizontal Bend

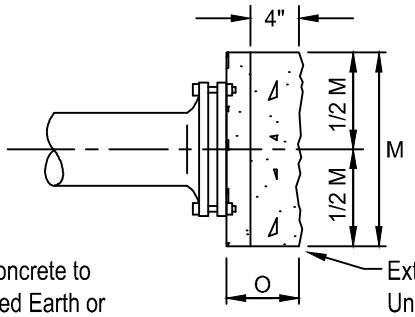
Not to Scale

Revised: 03/31/05



Note: Concrete shall be reinforced when dimension 'O' is 16" or greater.

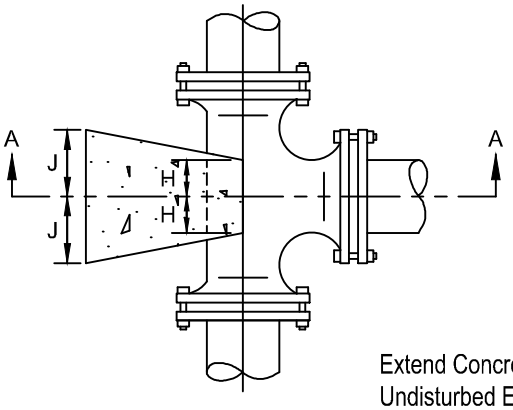
Extend Concrete to Undisturbed Earth or Firm Subgrade



Elevation

Extend Concrete to Undisturbed Earth or Firm Subgrade

Buttress Sizing for Plugs and Caps									
	Size (Pipe Diameter) of Plug/Cap								
	3"	4"	6"	8"	10"	12"	16"	20"	24"	30"
M	*	*	*	2'-6"	2'-8"	3'-6"	4'-8"	6'-0"	6'-8"	8'-0"
N	*	*	*	1'-6"	2'-2"	2'-6"	3'-4"	4'-0"	5'-0"	6'-8"
O	*	*	*	10"	1'-0"	1'-2"	1'-4"	1'-6"	1'-8"	2'-0"
							Reinforce with 66" EW			



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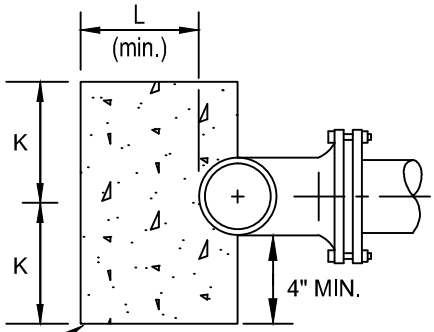


Extend Concrete to Undisturbed Earth or Firm Subgrade

Section A - A

Buttress Sizing for Tees										
	Size (Pipe Diameter) of Branch									
	3"	4"	6"	8"	10"	12"	16"	20"	24"	30"
J	6"	6"	8"	9"	1'-1"	1'-3"	1'-8"	2'-0"	2'-6"	3'-4"
K	6"	8"	10"	1'-3"	1'-4"	1'-9"	2'-4"	3'-0"	3'-4"	4'-0"
L	6"	6"	8"	9"	10"	12"	1'-2"	1'-6"	1'-8"	2'-0"
H	4"	4"	6"	6"	6"	6"	8"	1'-0"	1'-0"	1'-0"

Surface Area of Block = 2J x 2K

Notes:

1) FC = 3000 psi at 28 days.
2) Buttress block dimensions are appropriate for design water pressure less than or equal to 150 psi.
3) Where design water pressure exceeds 150 psi, block dimensions shall be proprtioned based on actual design pressure.
4) All bearing surfaces shall be extended to undisturbed earth or firm subgrade.
5) Tapping assemblies and sleeves shall be buttressed as comparably sized tees.

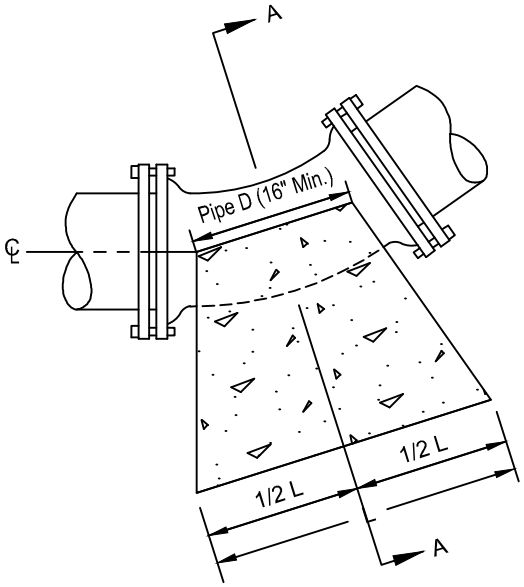
BT-01

Fauquier County
Water and Sanitation Authority

Buttresses for Tees, Plugs and Caps

Not to Scale

Revised: 03/31/05



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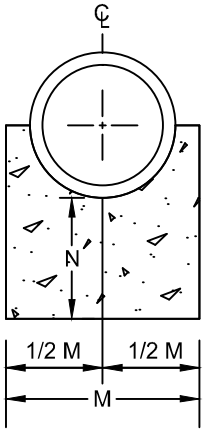


Section

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

Notes:

1) FC = 3000 psi at 28 days.
2) Buttress block dimensions are appropriate for design water pressure less than or equal to 150 psi.
3) Where design water pressure exceeds 150 psi, block dimensions shall be proprtioned based on actual design pressure.
4) Where soil bearing pressure is less than 2500 psi, dimension 'L' shall be muliplied by 2 and Dimension 'M' shall be multiplied by 1.5.
4) All bearing surfaces shall be extended to undisturbed earth or firm subgrade.

BV-01

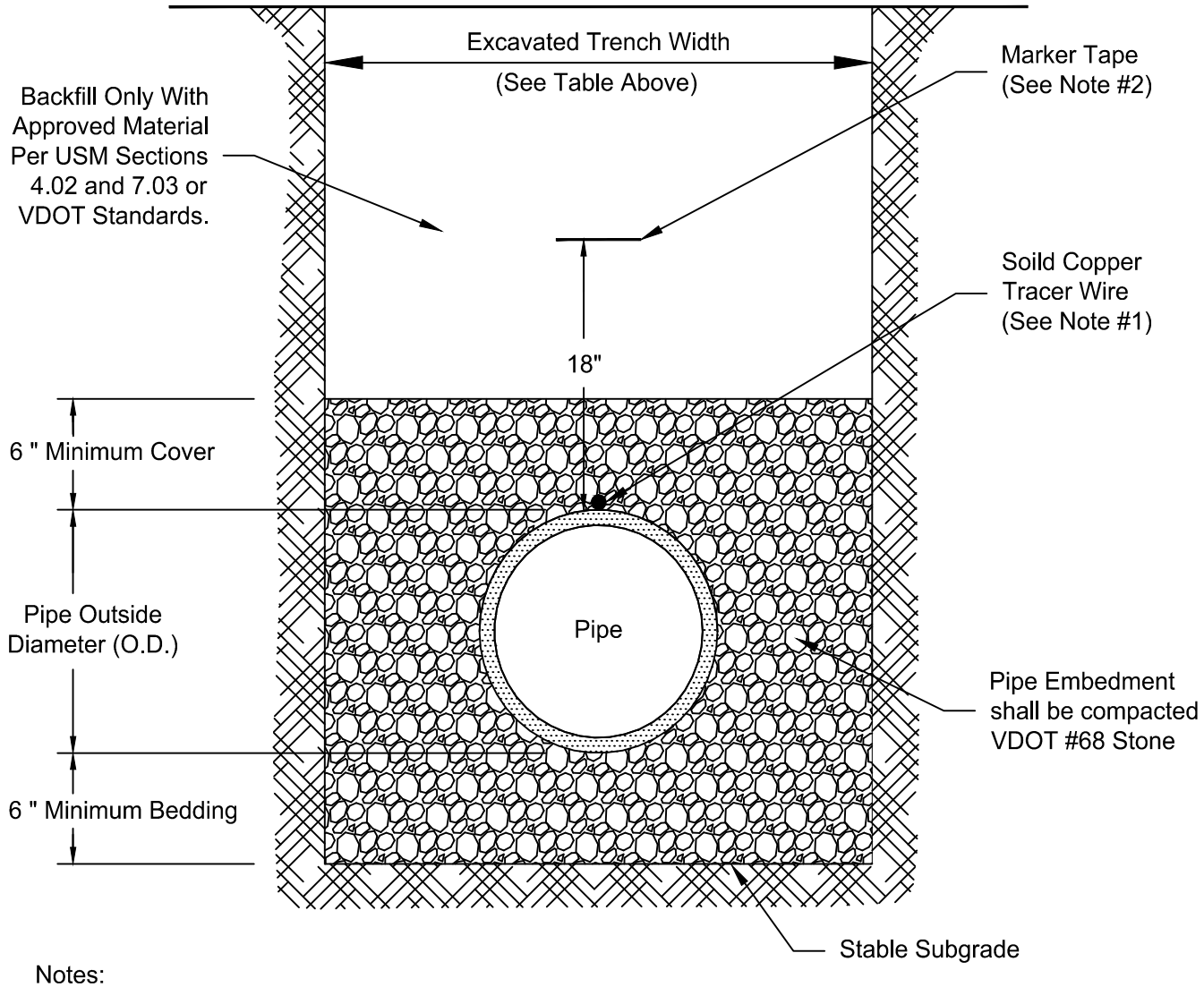
Fauquier County
Water and Sanitation Authority

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

Not to Scale

Revised: 03/31/05

SUBGRADE	MAIN SIZE	MINIMUM TRENCH WIDTH
SOIL	≤ 16"	O.D. + 12"
SOIL	> 16"	O.D. + 18"
ROCK	ALL	O.D. + 48"



Notes:

1. Solid copper tracer wire shall be installed at the 12 o'clock position for all non-metallic pipe.
2. Non-detectable marker tape shall be buried 18 inches above the pipe for the entire length of the pipe.
3. All materials must conform to the applicable sections of the Utility Standards Manual (USM) Appendix D Approved Materials List.
4. Trenches in public roadways shall be excavated, backfilled and compacted in accordance with the standards specified in the VDOT's Road and Bridge Specifications or other acceptable criteria.
5. Installation of ductile iron pipe, in addition to the above, shall conform with the applicable provisions of ANSI/AWWA C600 or latest version.
6. Excavation shall be performed in accordance with OSHA Standard 29 CFR Part 1926, Subpart P "*Excavation and Trenching*".

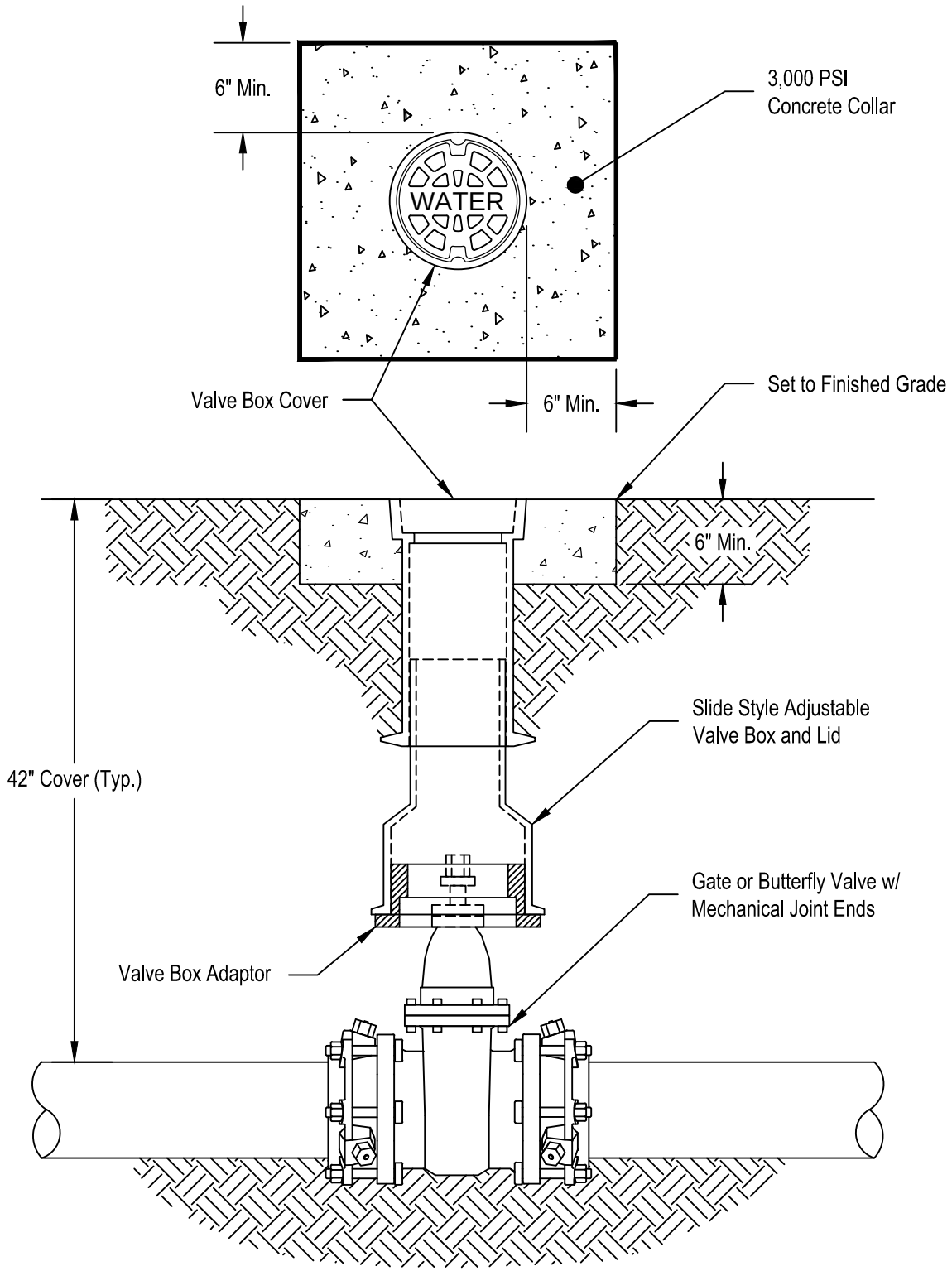
G-01

Fauquier County
Water and Sanitation Authority

Pipe Embedment and Backfill

Not to Scale

Revised: 11/01/21



Notes:

1. Valve and pipe shall have the same nominal diameter.
2. Valve boxes shall be centered over the valve wrench nut and set plumb.
3. Concrete collar to be poured square around valve box using wood forms when located out of pavement.
4. Valve extensions to be one rod only. Use of multiple extensions is prohibited.
5. All materials must conform to the applicable sections of the Fauquier County Water and Sanitation Authority's Approved Materials List.

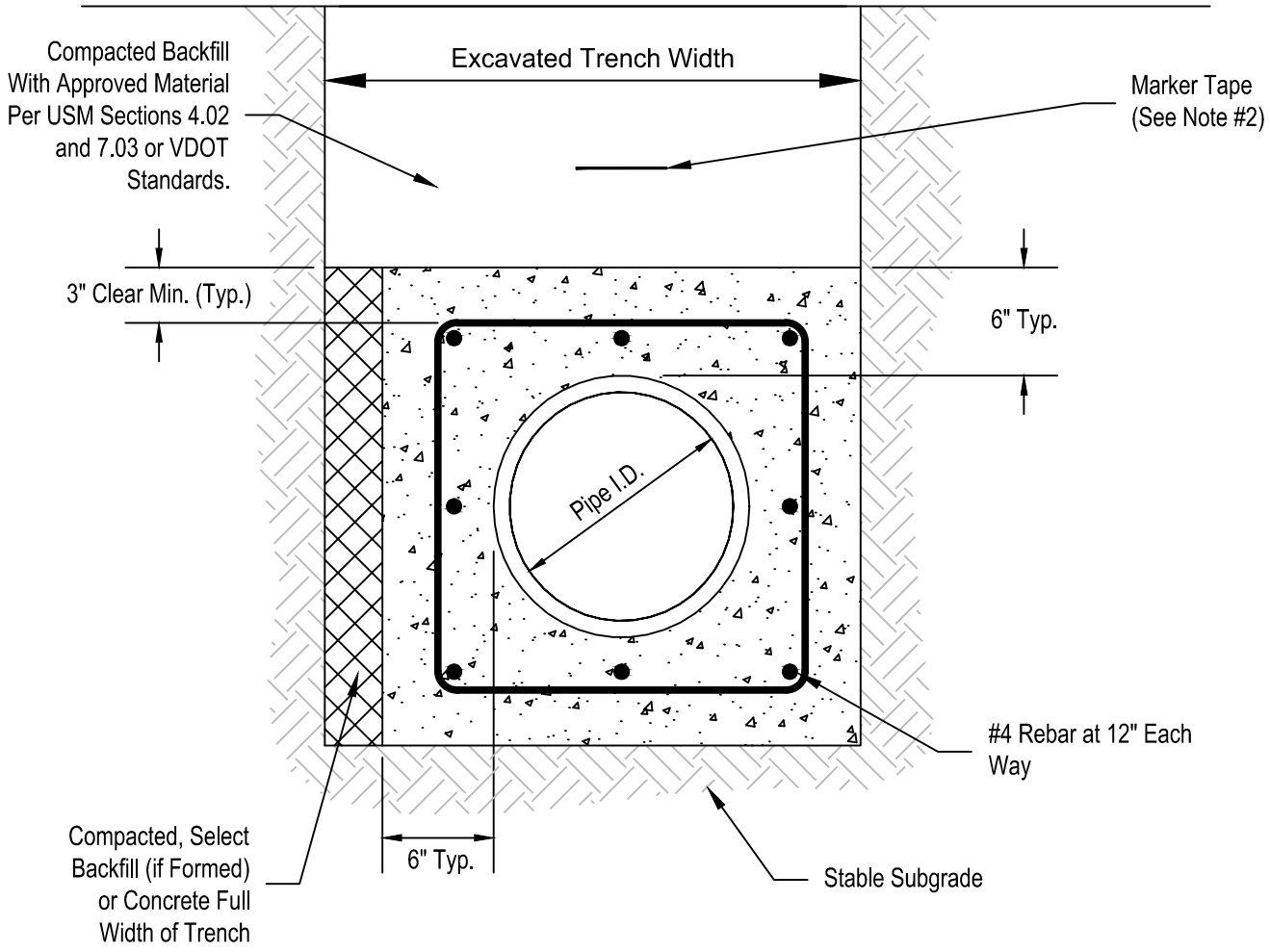
G-03

Fauquier County
Water and Sanitation Authority

Typical Gate Valve and Valve Box

Not to Scale

Revised: 04/08/24



Notes:

1) Concrete shall be class "B" with a minimum 3,500 psi compressive strength after 28 days.
2) Non-detectable marker tape shall be buried 18 inches above the pipe for the entire length of the pipe.
3) Support pipe on concrete blocks when encasing pipe.
4) Buoyancy calculations required for pipes larger than 12 inches in diameter or if encasement is to be longer than 60 feet.

G-04

Fauquier County
Water and Sanitation Authority

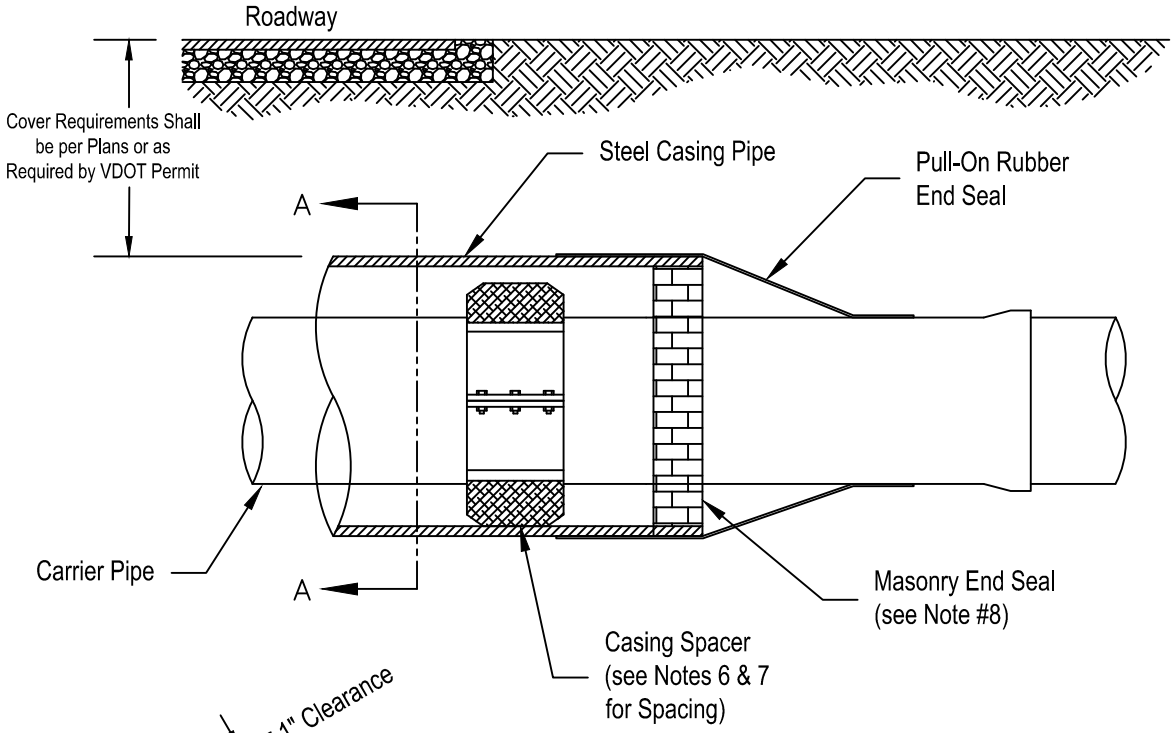
Standard Concrete Encasement

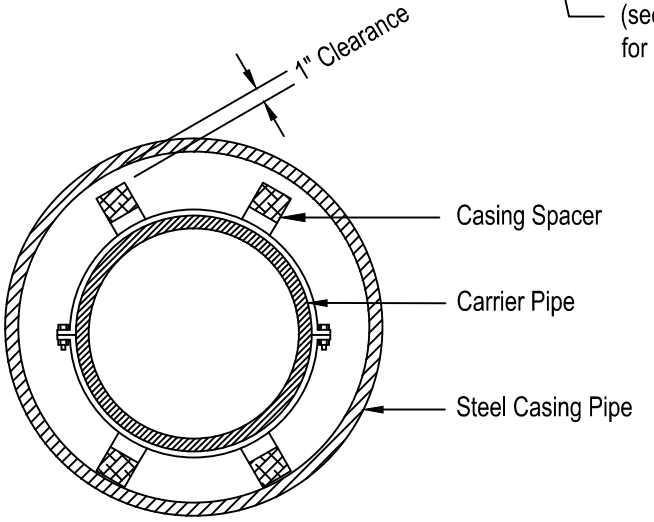
Not to Scale

Revised: 04/08/24

Notes:

1. Ductile iron carrier pipe shall be connected with restrained joint. C-900 PVC carrier pipe shall be a minimum of DR 18 and restrained using approved bell restraint harness.
2. Consult the manufacturer of the carrier pipe as to whether pipe should be pushed or pulled through casing. Installation shall conform to manufacturer's recommendation for the type of joint employed.
3. Casing spacers shall be sized to center the carrier pipe within the casing.
4. For casings 48" and larger, weld a runner in the bottom of the casing to prevent the carrier pipe from spinning during installation.
5. See plans for length of casing pipe (adjust in field as directed by Authority Inspector).
6. A minimum of three casing spaces required per pipe length, or more as required by the manufacturer with a maximum separation of 6-ft from centerline.
7. A spacer shall be placed to support the carrier pipe within 2' of the end of the casing pipe.
8. The ends of the steel casing pipe shall be sealed with brick and mortar.
9. All materials must conform to the applicable sections of the Fauquier County Water and Sanitation Authority's Approved Materials List.





Section A-A

Carrier Pipe Size	Minimum Casing Pipe Size
4"	14"
6"	16"
8"	20"
10"/12"	24"
16"/18"	30"
20"	36"
24"	42"
30"	48"
36"	54"

G-05

Fauquier County
Water and Sanitation Authority

Steel Casing Detail

Not to Scale

Revised: 04/08/24

Sanitary Sewer Design Table

Description			Flow Determination								Sewer Design, Manning's n=0.13									
Location	Manhole Number		Units		GPD per Unit	Domestic Flows (mgd)			Industrial Flow (mgd)	Total Peak Flow (mgd)	Length (ft)	Slope %	Pipe Diameter (in)	at d/D = 0.80		at Peak Flow		Drop in Manhole (ft)	Invert Elevation	
	From	To	Incr.	Total		Average Flow	Peaking Factor	Peak Flow						Capacity MGD	Velocity FPS	Depth (in)	Velocity (fps)		Upper End	Lower End

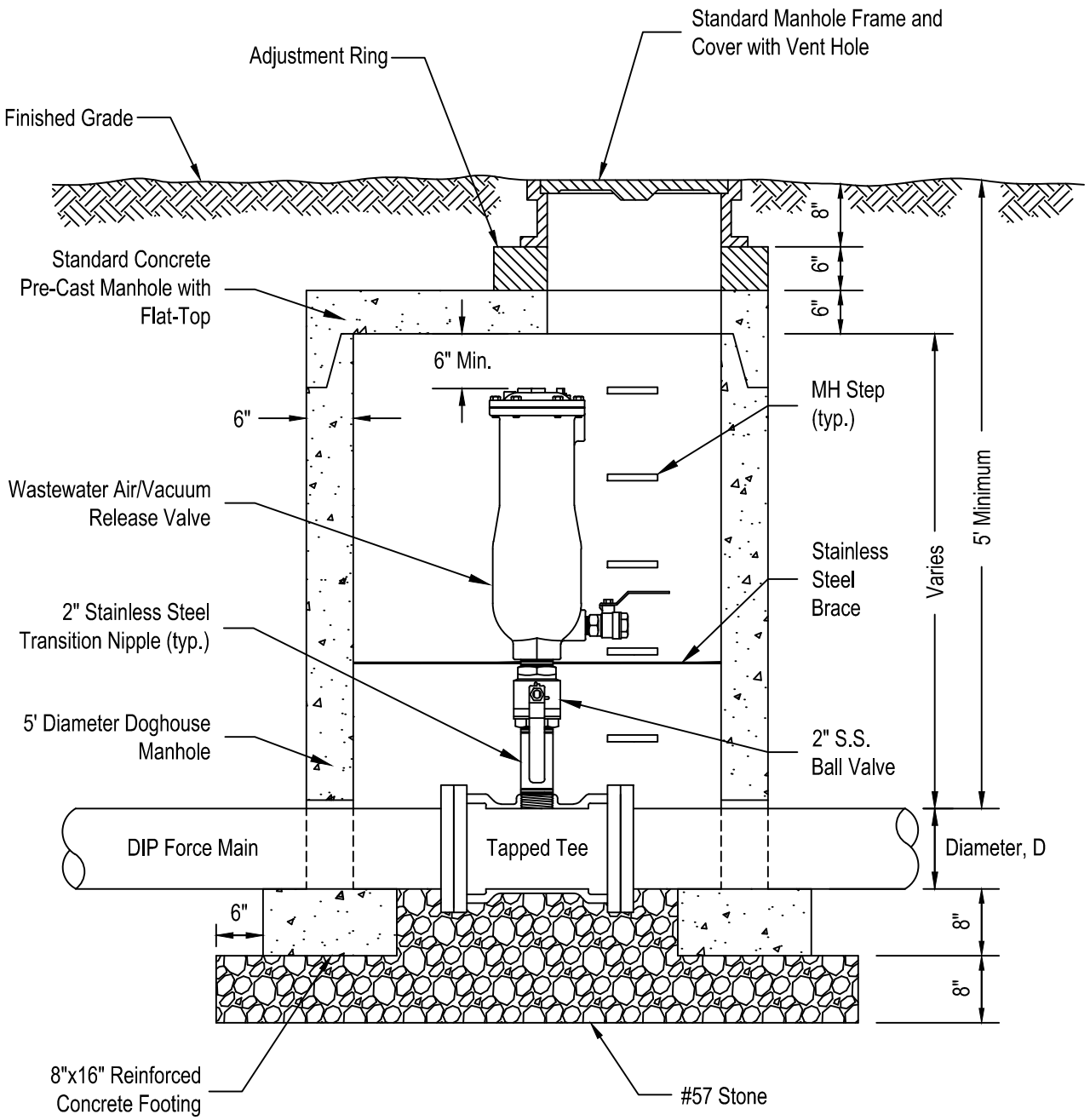
G-06

Fauquier County
Water and Sanitation Authority

Sanitary Sewer
Design Calculation Sheet

Not to Scale

Revised: 03/31/05



Notes:

1. Installation to be located at high point of force main.
2. Pipe to be sealed with non-shrink grout at doghouse openings.
3. Concrete shall be a minimum of 4000 psi compressive strength.
4. 1.5" stainless steel support brace to be bolted to manhole walls and fasten to valve using a U-bolt clamp. Support brace shall not be positioned beneath manhole cover to impede entry.
5. All materials must conform to the applicable sections of the Fauquier County Water and Sanitation Authority's Approved Materials List.

SC-01

Fauquier County
Water and Sanitation Authority

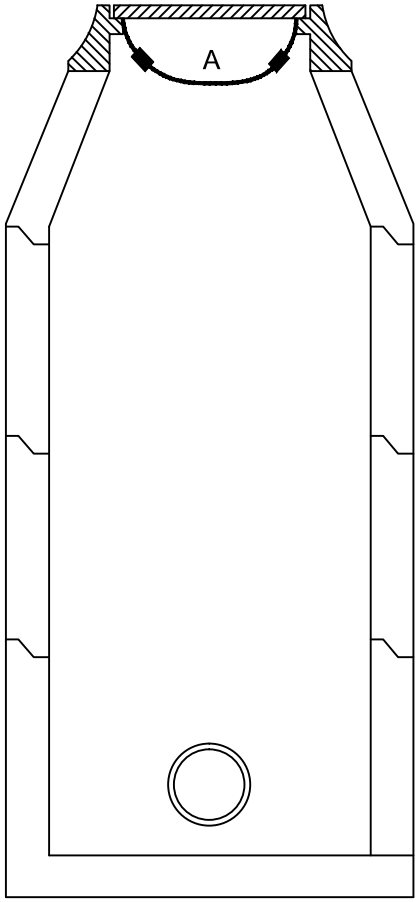
Combination Air/Vacuum Release Valve for Sewage Force Main

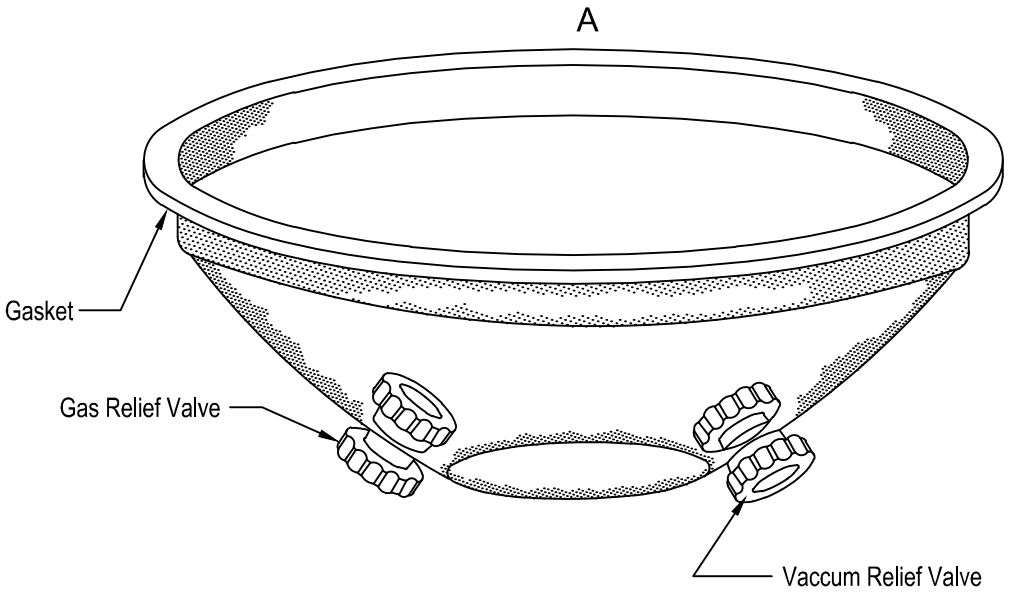
Not to Scale

Revised: 11/28/17

Notes:

1) The manhole insert shall be constructed of non-corrodable materials which will not be damaged by sewer gases or road oil.
2) Both the gas relief and the vacuum relief valves shall be self-cleaning and made of non-corrodable materials.
3) The gas relief valve shall be automatically activated at a pressure differential of approx. 2.25 psi.
4) The vacuum relief valve shall be automatically activated at a pressure differential of approx. 2.25 psi.
5) A properly fitted rubber gasket shall be installed under the lip of the insert to insure a tight seal between the insert and the manhole frame.
6) The insert shall be deep enough to prevent the manhole cover from coming into contact with the valves when the manhole cover is removed or installed.
7) The insert shall be designed to restrict inflow to no more than 1 gal. in 24 hrs.





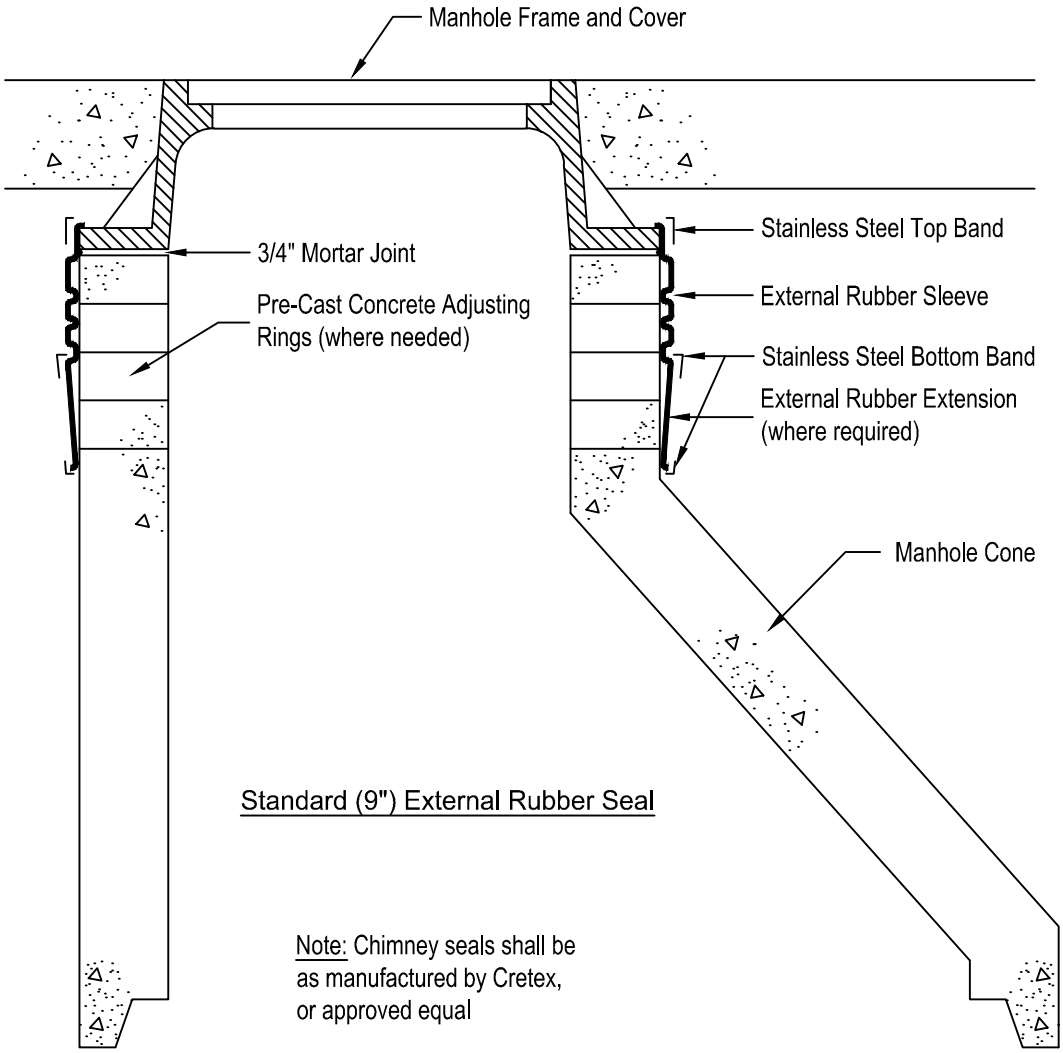
SC-02

Fauquier County
Water and Sanitation Authority

Waterproof Manhole Insert

Not to Scale

Revised: 03/31/05

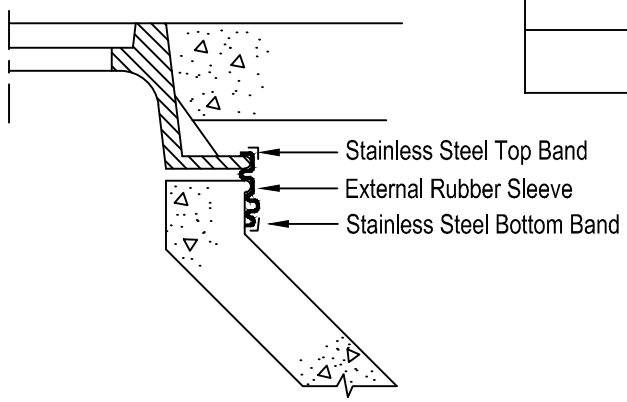


Standard (9") External Rubber Seal

Note: Chimney seals shall be as manufactured by Cretex, or approved equal

Chimney Height to be Spanned	Items Required
0 - 3"	Narrow (6") Seal only
> 3" - 6-1/2"	Standard (9") Seal only
> 6-1/2" - 12"	Standard (9") Seal + Extension
> 12"	Standard (9") Seal + Multiple Extensions

Narrow (6") External Rubber Seal



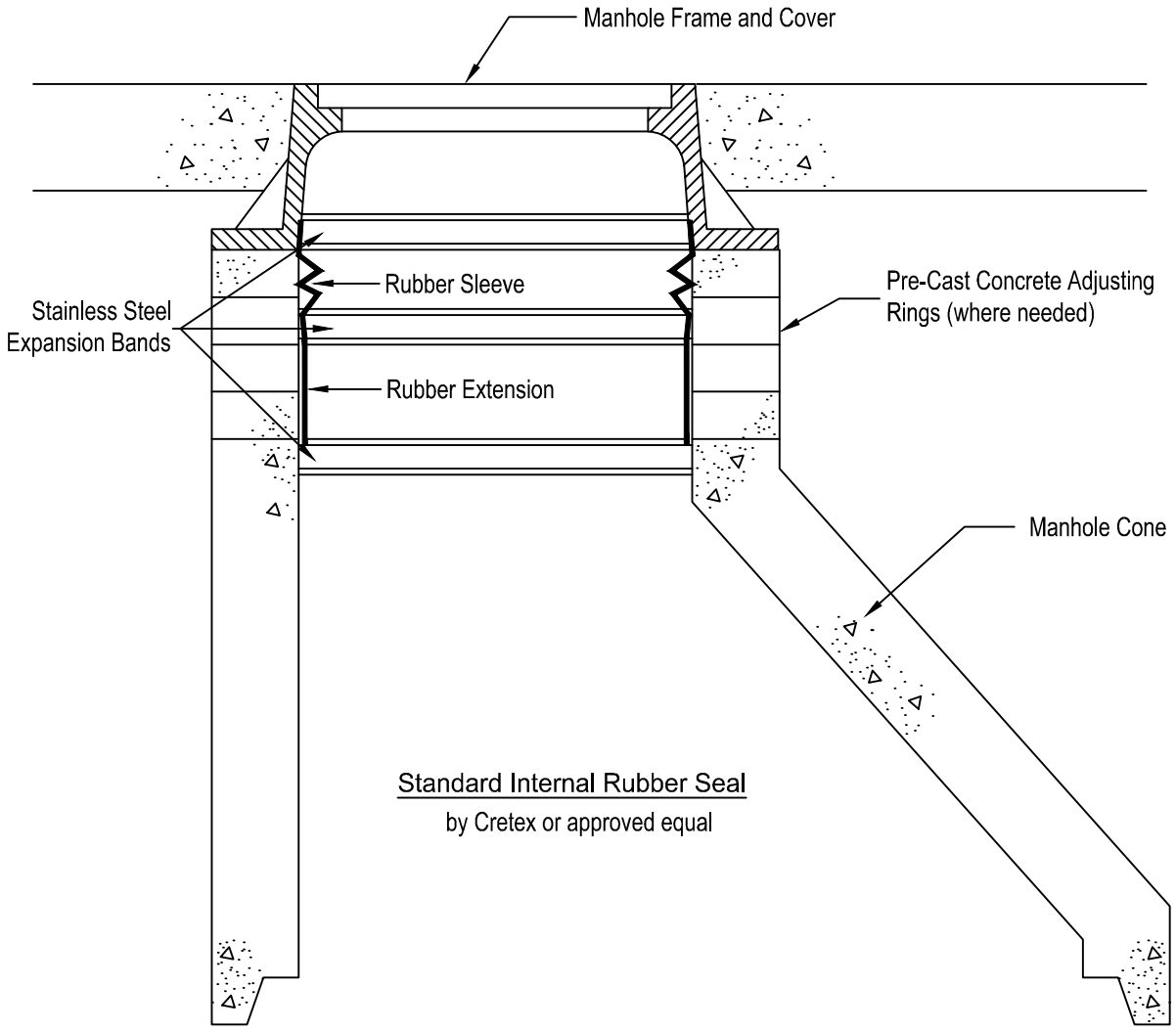
SC-03

Fauquier County
Water and Sanitation Authority

External Manhole Chimney Seal

Not to Scale

Revised: 03/31/05



Standard Internal Rubber Seal
by Cretex or approved equal

Note: Chimney seals shall be as manufactured by Cretex, or approved equal

Chimney Height to be Spanned	Items Required
0 - 4-1/2"	Chimney Seal Only
> 4-1/2" - 9"	Seal + 7" Extension
> 9" - 12"	Seal + 10" Extension
> 12"	Seal + Multiple Extensions (as Needed)

SC-04

Fauquier County
Water and Sanitation Authority

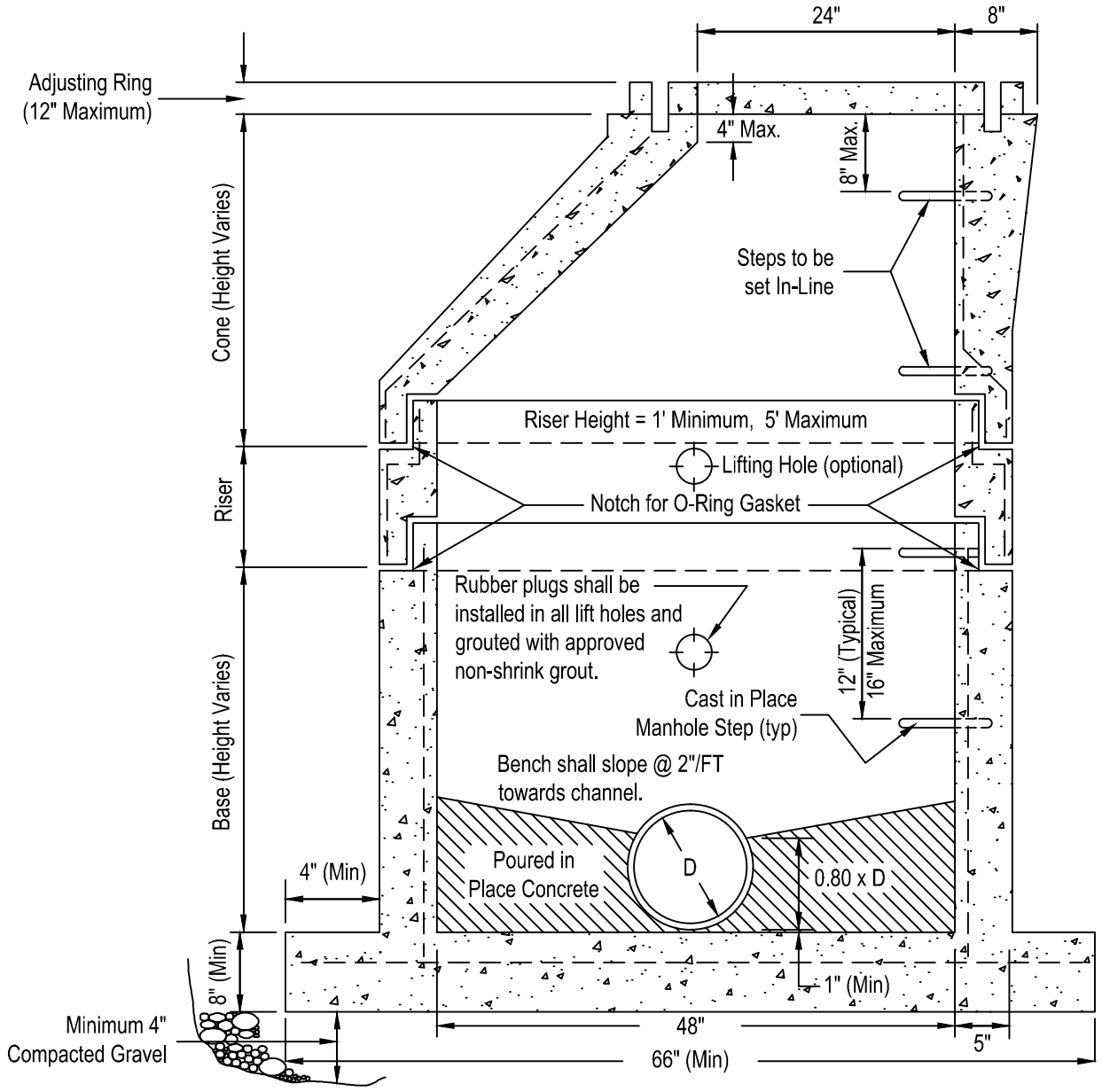
Internal Manhole Chimney Seal

Not to Scale

Revised: 03/31/05

Notes:

1) All manholes shall meet the current requirements of ASTM Specification C-476.
2) Concrete to be 4000 psi minimum compressive strength.
3) All reinforcing steel shall meet the current requirements of ASTM Specification A-615.
4) Tapered joint with O-Ring gasket shall meet the current requirements of ASTM Specifications C-361 & C-443.
5) Approved flexible joint shall be used on all pipe connections to manholes. Installation shall be in accordance with manufacturer's specifications.
6) 301 Mastic or approved equal shall be used in additon to the joint specified.
7) The entire exterior of the manhole shall be coated with 16 Mils DFT of Kop Coat 300M or approved equal. Coating may be applied at the factory, but any gouges and/or bare spots shall be touched-up before backfilling.



SC-05

Fauquier County
Water and Sanitation Authority

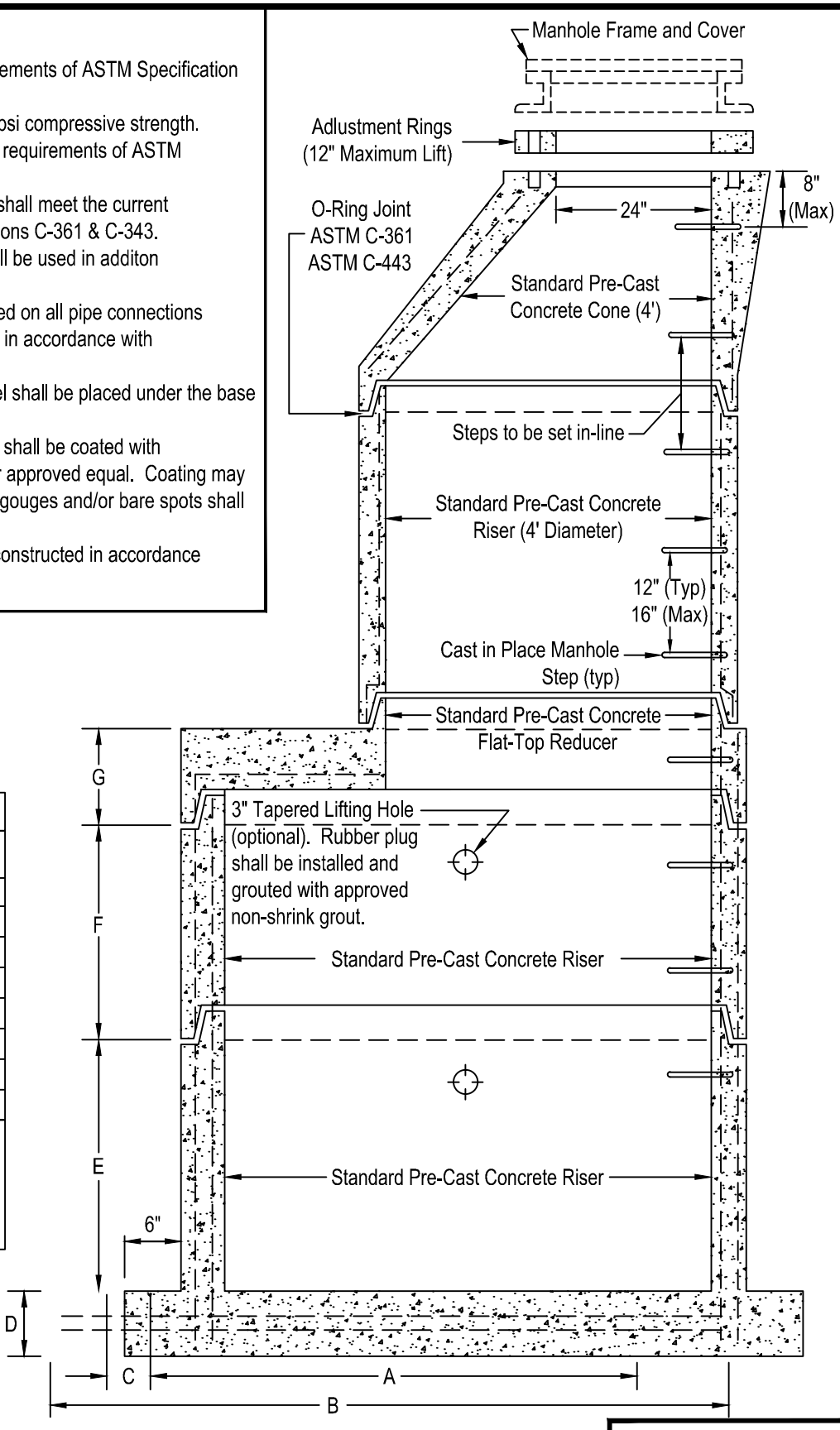
Standard 4' ID Precast Concrete Manhole

Not to Scale

Revised: 03/31/05

Notes:

1) All manholes shall meet the requirements of ASTM Specification C-478.
2) Concrete shall be minimum 4000 psi compressive strength.
3) All reinforcing steel shall meet the requirements of ASTM Specification A-615.
4) Tapered joint with O-Ring gasket shall meet the current requirements of ASTM Scepifications C-361 & C-343.
5) 301 Mastic or approved equal shall be used in additon to the joint specified.
6) Approved flexible joint shall be used on all pipe connections to manholes. Installation shall be in accordance with manufacturer's specifications.
7) A minimum 6" of compacted gravel shall be placed under the base section of the manhole.
8) The entire exterior of the manhole shall be coated with 16 Mils DFT of Kop Coat 300M or approved equal. Coating may be applied at the factory, but any gouges and/or bare spots shall be touched-up before backfilling.
9) Manholes shall be designed and constructed in accordance with the Dimension Table below.



Dimension Table			
		Manhole Diameter (ft) *	
		5'	6'
Dimension (from drawing at right)	A	60"	72"
	B	84"	98"
	C	6"	7"
	D	8"	8"
	E	Varies	
	F	Varies	
	G	13"min.	

* Note: Manholes greater than 6' in diameter require a detailed design, which shall be included on the construction plans and profiles.

SC-06

Fauquier County
Water and Sanitation Authority

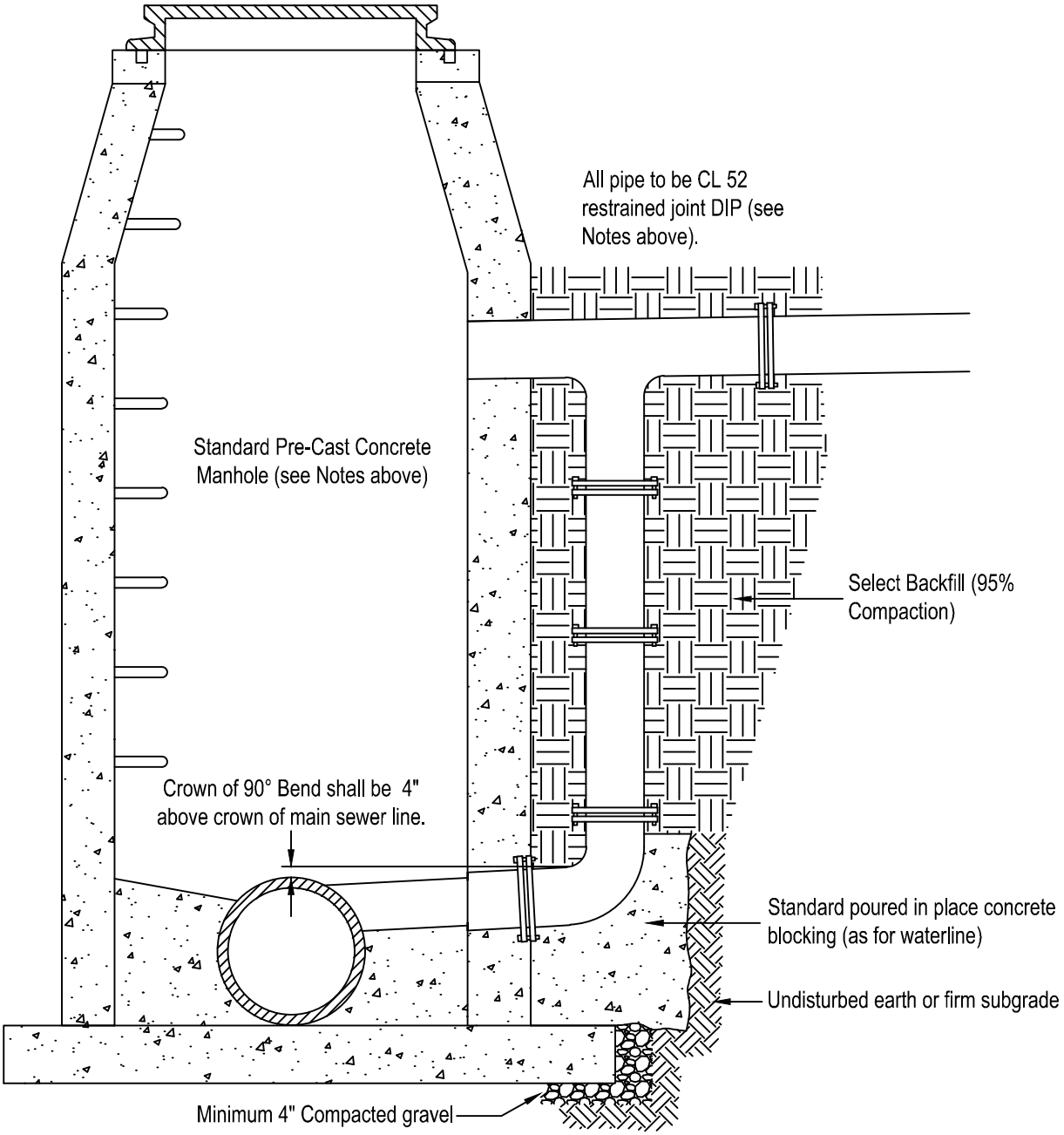
Typical 5' and 6' Diameter Pre-Cast Concrete Manhole with 4' Stack

Not to Scale

Revised: 03/31/05

Notes:

1) See appropriate details for pre-cast concrete manhole construction requirements.
2) All piping for outside drop shall be constructed of Class 52 Ductile Iron Pipe with Mega-Lug restraints, including both sides of tee and 90° bend.
3) All piping shall be DIP Class 52 along the run leading to the manhole with outside drop.
4) Concrete blocking for 90° bend shall meet the specifications for water line blocking (see appropriate detail).



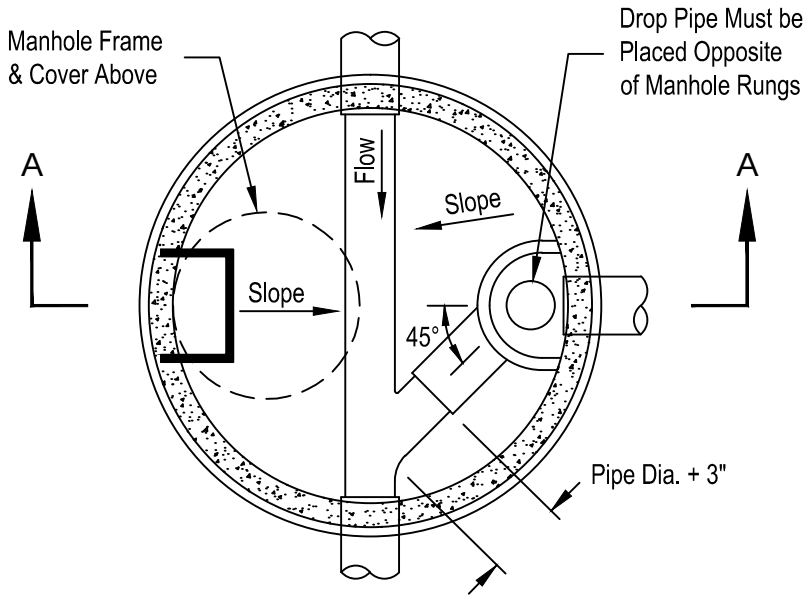
SC-07

Fauquier County
Water and Sanitation Authority

Typical 4' Manhole with Outside Drop Connection

Not to Scale

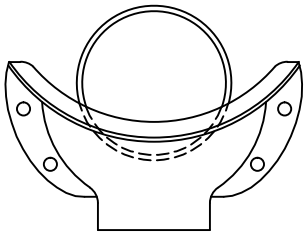
Revised: 03/31/05



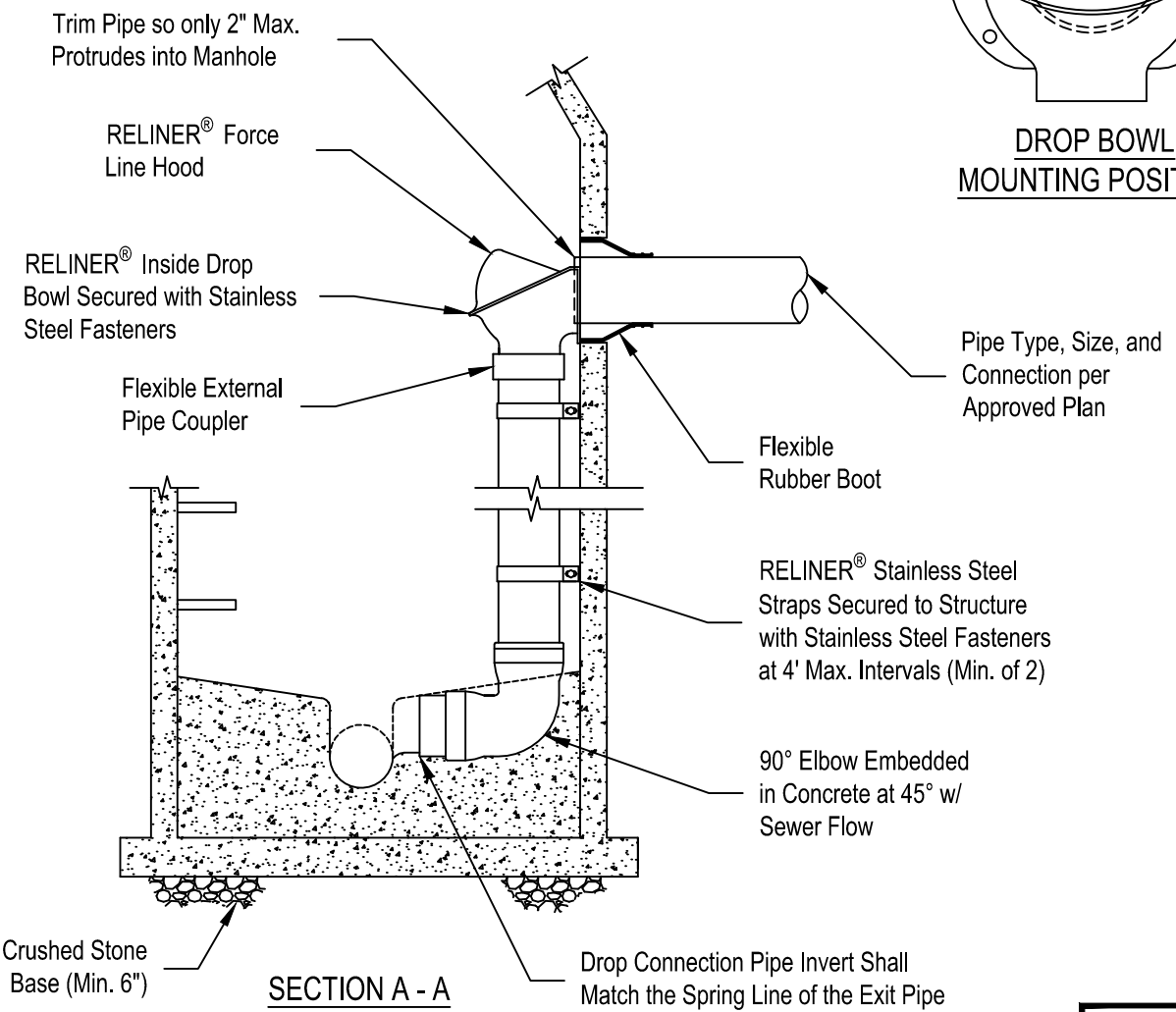
INSIDE DROP - PLAN

Notes:

1. The construction of an inside drop manhole is only permitted with prior approval of the Authority.
2. Only one inside drop connection per manhole will be allowed.
3. PVC drop pipe shall be the same diameter as the influent pipe.
4. Influent pipe slope shall not exceed 5%.
5. Maximum diameter of influent pipe shall not exceed 10".
6. Inside diameter of pre-cast concrete manhole shall be 60".
7. All inside drop pipe material shall be constructed using gasketed PVC C900.



DROP BOWL
MOUNTING POSITION



SECTION A - A

SC-07A

Fauquier County
Water and Sanitation Authority

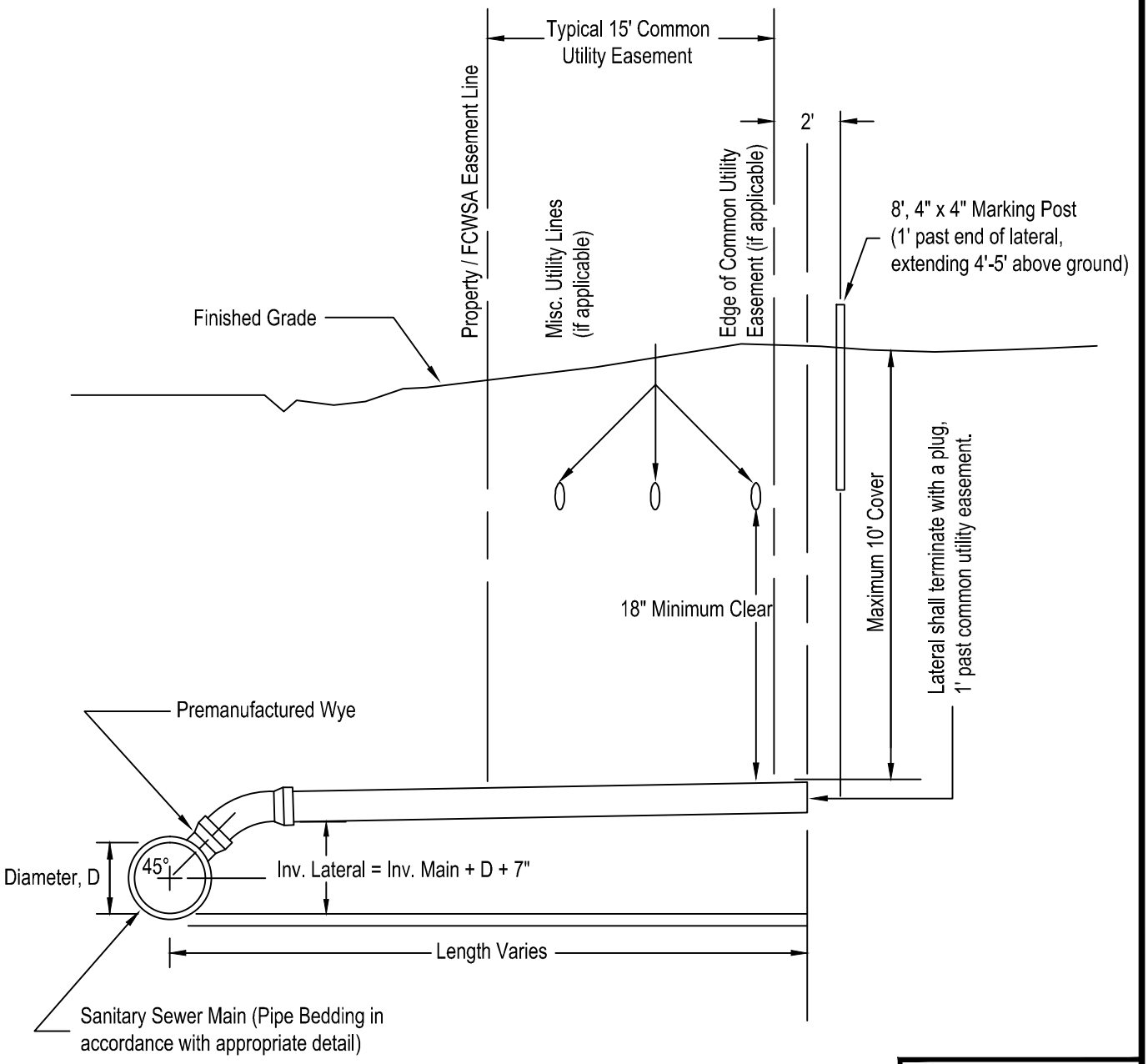
Inside Drop Manhole

Not to Scale

Revised: 04/08/24

Notes:

1) The entire length of lateral shall be bedded in accordance with the appropriate FCWSA Detail for the pipe material used.
2) An appropriate riser shall be used where maximum depth requirement cannot be met (see Detail for Sanitary Sewer Service Lateral Connection with Vertical Bends).
3) Minimum slope for 4" laterals shall be 2.08%.
4) Minimum slope for 6" laterals shall be 1.00%.
4) Maximum slope shall be 4.16% for any lateral.
5) A 3M Brand, Full Range Sewer Marker, shall be located along the main at the point of connection for each lateral and at the terminal point of the lateral.
6) If no common utility easement is present then end of lateral and marker post shall be located relative to the property/easement line.



SC-08

Fauquier County
Water and Sanitation Authority

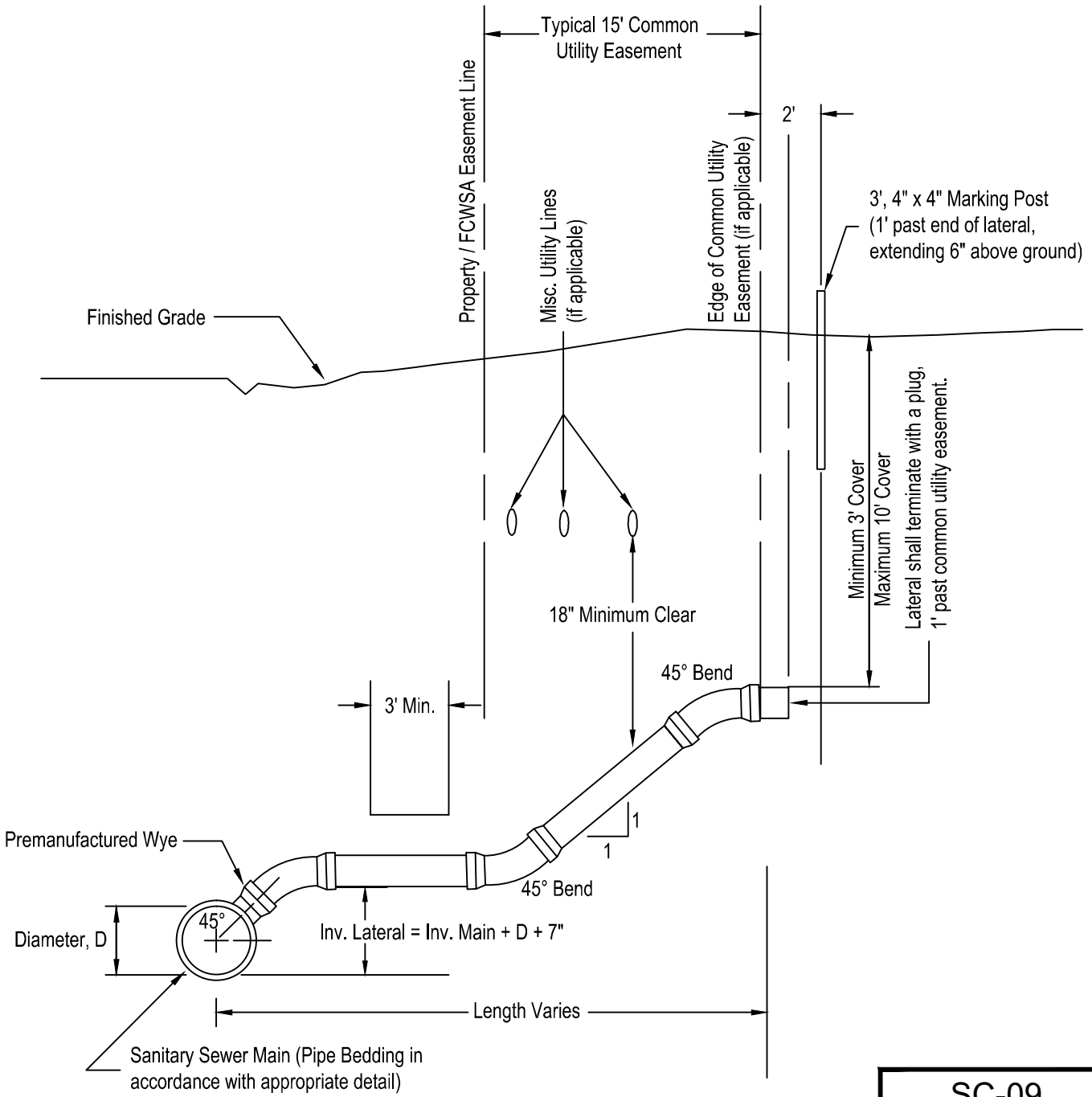
Standard Sanitary Sewer Service Lateral Connection

Not to Scale

Revised: 03/31/05

Notes:

1) The entire length of lateral shall be bedded in accordance with the appropriate FCWSA Detail for the pipe material used.
2) Minimum slope for 4" laterals shall be 2.08%.
3) Minimum slope for 6" laterals shall be 1.00%.
4) Riser slope shall be 1:1.
5) Maximum slope shall be 4.16% for any lateral.
6) A 3M Brand, Full Range Sewer Marker, shall be located along the main at the point of connection for each lateral, at each vertical bend and at the terminal point of the lateral.
7) The first vertical bend of the riser shall be located at the FCWSA utility easement line or a minimum of 5' from the main, whichever is greater.
8) If no common utility easement is present then the first vertical bend of the riser shall be located minimum 5' from the main.



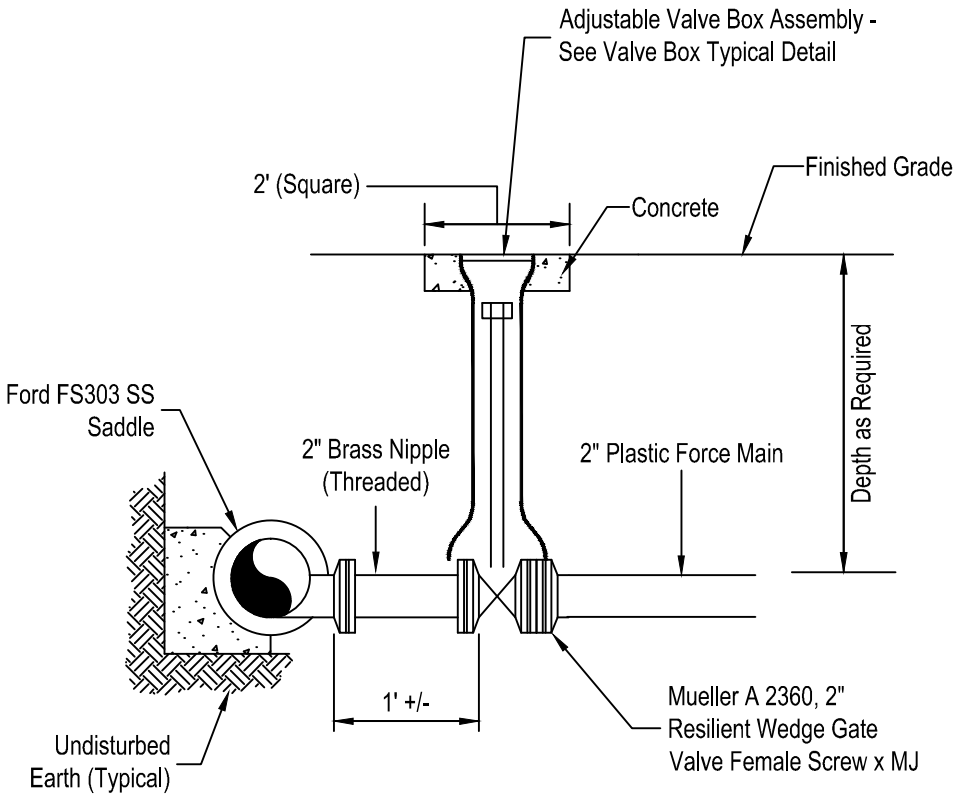
SC-09

Fauquier County
Water and Sanitation Authority

Sanitary Sewer Service
Lateral Connection with Riser

Not to Scale

Revised: 03/31/05



Notes:

1) All methods and materials shall be in conformance with the FCWSA Utility Standards Manual (USM).
2) The 2" gate valve shall be installed with concrete support block in accordance with the appropriate detail form the USM.
3) Mechanical joint restraining glands shall be EBBA Iron Mega Lug or approved equal.
4) Force main connections may only be made with the specific approval of the General Manager.
5) All pipe shall be bedded in accordance with the appropriate FCWSA Pipe Embedment Deatail.

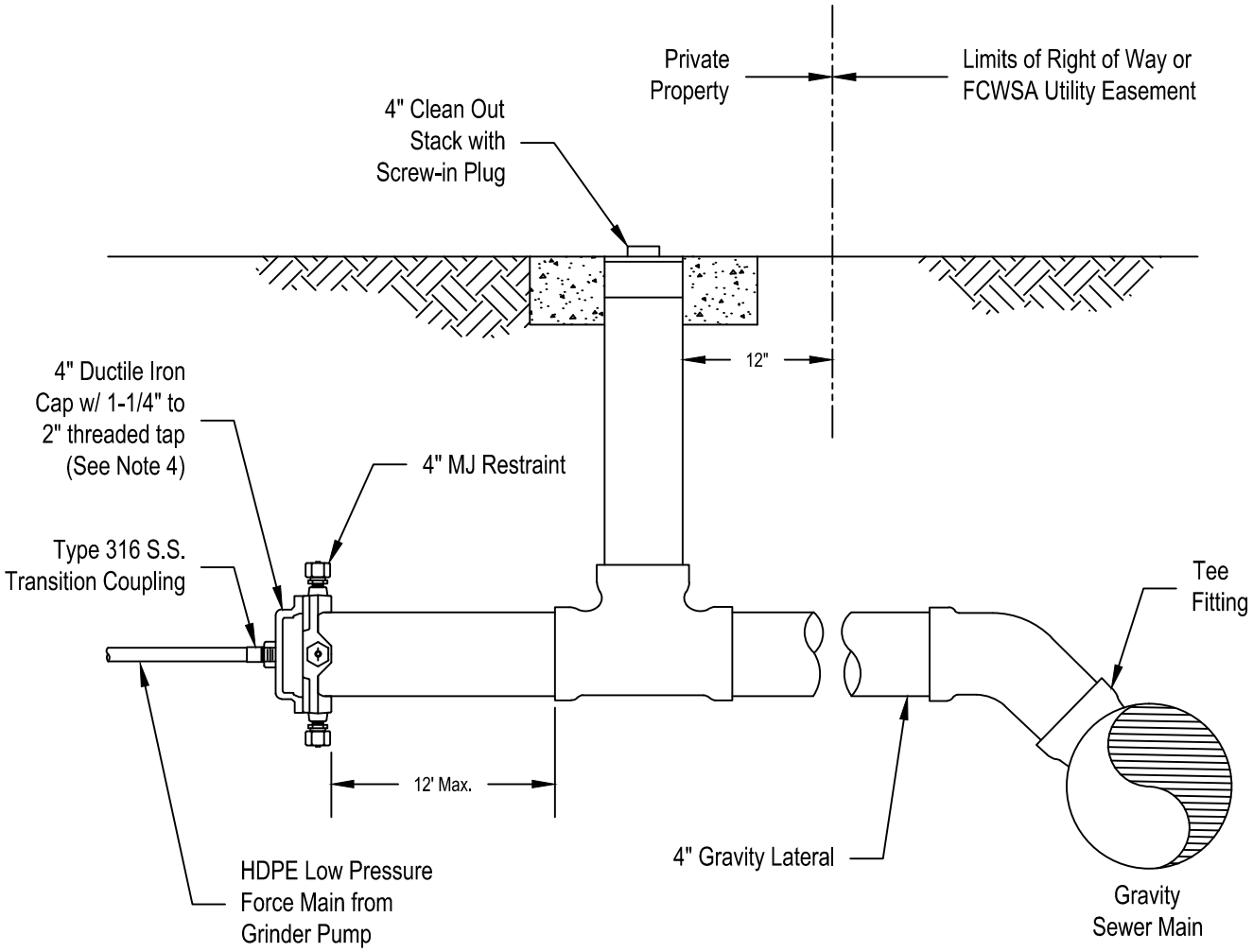
SC-10

Fauquier County
Water and Sanitation Authority

Sewage Force Main
2" Connection

Not to Scale

Revised: 03/31/05



Notes:

1. Gravity lateral shall conform to the standard sanitary sewer service lateral connection detail SC-08.
2. A line location marker shall be placed above the connection point to the gravity sewer main during backfill.
3. The force main service line shall be installed so as to provide a positive slope upward toward its terminus.
4. Ductile iron cap shall be lined with Protecto 401 ceramic epoxy. Threaded tap size shall depend on the pumping requirements.

SC-11

Fauquier County
Water and Sanitation Authority

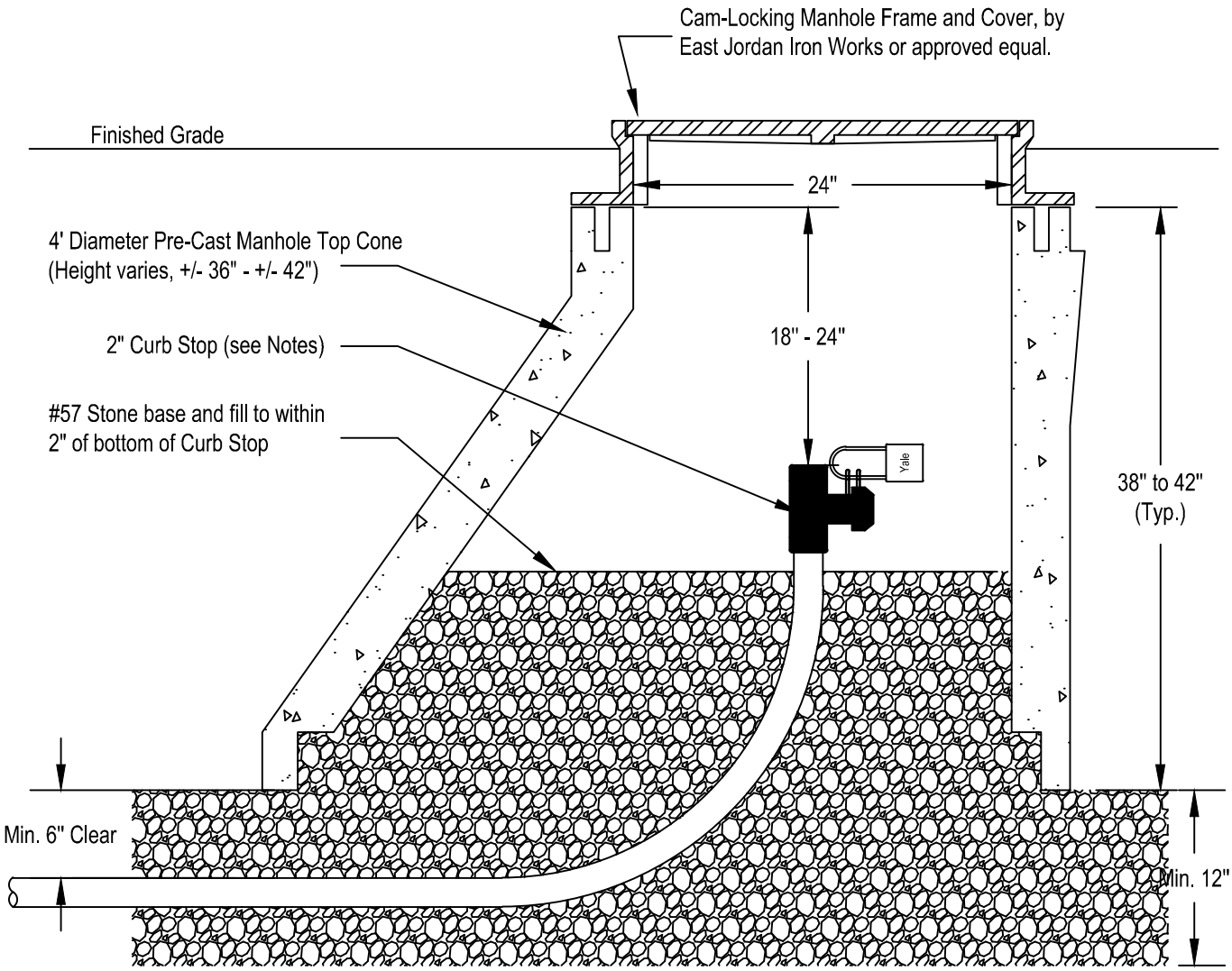
Small Diameter Sewage Force Main Service Connection to Gravity Sewer

Not to Scale

Revised: 11/28/17

Notes:

1) This Standard Detail shall be used for constructing the upstream terminus of any/all Sewage Force Mains constructed of HDPE pipe material which are 2" and smaller in diameter and which are to be owned and maintained by the Authority.
2) Manhole Cone-Section shall meet the current requirements of ASTM Specification C-476.
3) Concrete to be 4000 psi minimum compressive strength.
4) All reinforcing steel shall meet the current requirements of ASTM Specification A-615.
5) Manhole Frame and Cover shall be sealed to top of Cone with 301 Mastic and Bolted Down (Min. 4 Bolts).
6) 2" Curb Stop shall be Ball Type, compression fittings, by Ford or approved equal; shall be equipped with padlock wings.
7) Stainless Steel Inserts shall be used on HDPE Pipe at all fittings.



SC-12

Fauquier County
Water and Sanitation Authority

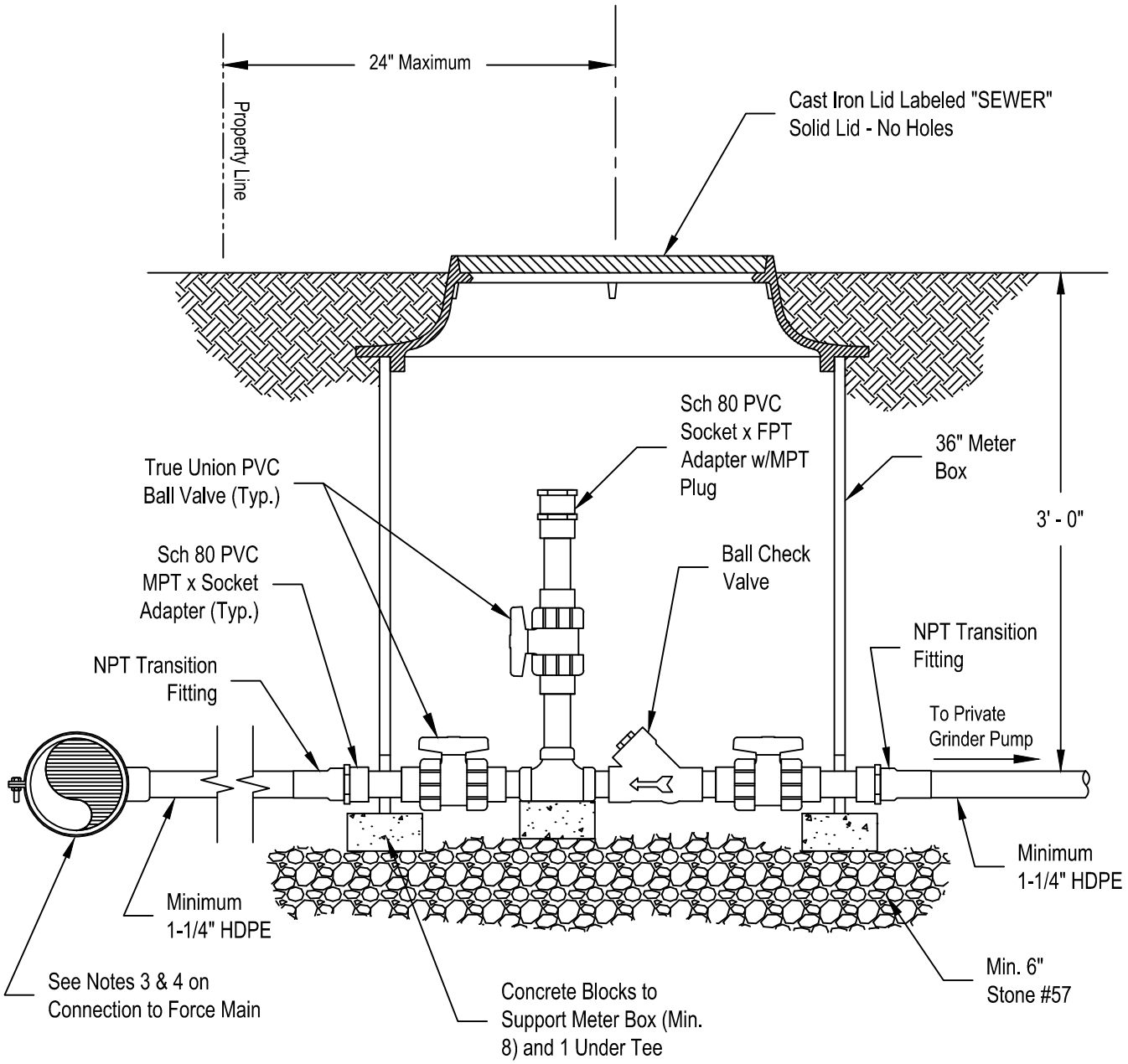
Termination for Dead-End Runs of HDPE Force Main (2" and Smaller)

Not to Scale

Adopted: 04/29/09

Notes:

1. All pipe and fittings within the meter box between the NPT transition fittings shall be schedule 80 solvent weld bell and spigot PVC.
2. The lateral diameter between the force main and grinder pump housing to be 1-1/4" to 2" depending on pumping requirements.
3. Use Electrofusion tee to connect to HDPE force main.
4. Use tapping saddle to connect to PVC or ductile iron force main.
5. Provide solid copper tracer wire along the entire force main and lateral connection to the grinder pump housing. Tracer wire shall be looped in box so that it can be extended a minimum of 18" above top of box. Wire to be strapped to main and lateral using plastic cable ties placed every 5 feet.
6. All other portions of the private force main or service lateral shall meet the pump manufacturer's requirements and recommendations.



SC-13

Fauquier County
Water and Sanitation Authority

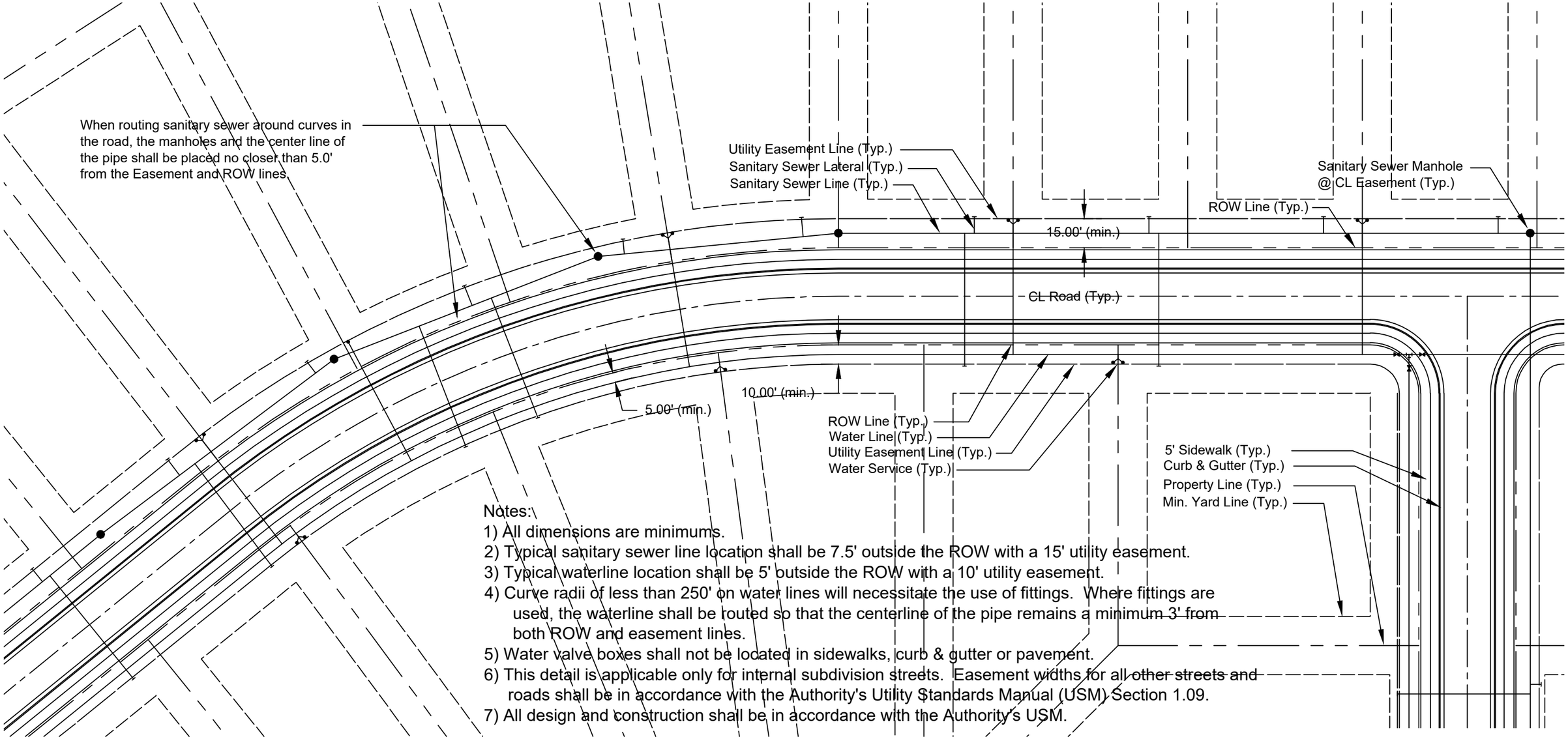
Pressure Lateral Assembly

Not to Scale

Revised: 11/01/21

FCWSA Utility Location & Easement Layout Detail (UL-01)

Showing Typical Water & Sewer Utility Locations and Minimum Easement Widths along Internal Subdivision Streets
in R-2 Conventional Subdivisions & other Subdivisions with lots sized 20,000 SF or greater



Notes:

1) All dimensions are minimums.
2) Typical sanitary sewer line location shall be 7.5' outside the ROW with a 15' utility easement.
3) Typical waterline location shall be 5' outside the ROW with a 10' utility easement.
4) Curve radii of less than 250' on water lines will necessitate the use of fittings. Where fittings are used, the waterline shall be routed so that the centerline of the pipe remains a minimum 3' from both ROW and easement lines.
5) Water valve boxes shall not be located in sidewalks, curb & gutter or pavement.
6) This detail is applicable only for internal subdivision streets. Easement widths for all other streets and roads shall be in accordance with the Authority's Utility Standards Manual (USM) Section 1.09.
7) All design and construction shall be in accordance with the Authority's USM.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

UL-01

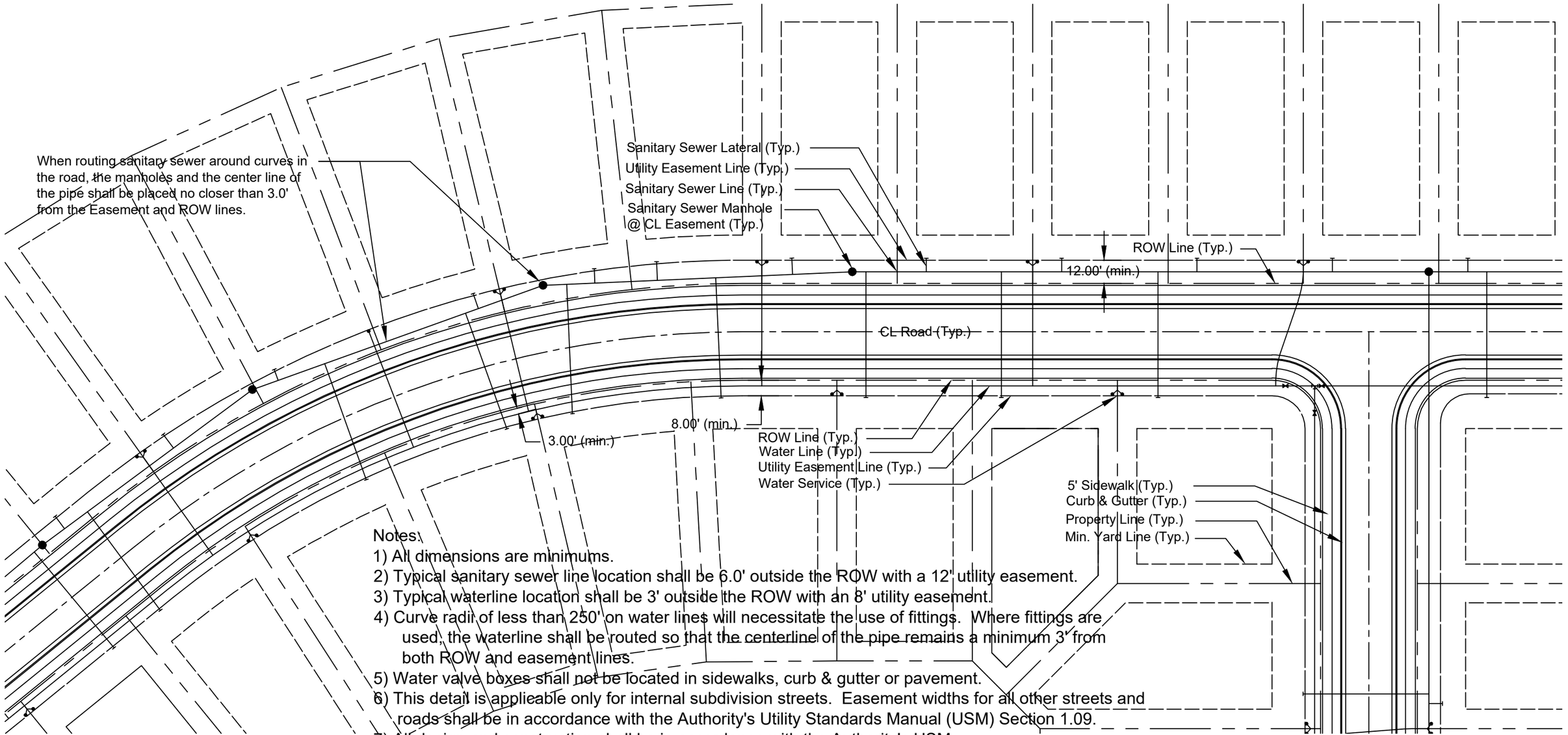
Fauquier County
Water and Sanitation Authority

Utility Location & Easement Layout
R-2 Conventional & Larger Lot Subdivisions

Scale: 1" = 50' 03/05/07

FCWSA Utility Location & Easement Layout Detail (UL-02)

Showing Typical Water & Sewer Utility Locations and Minimum Easement Widths along Internal Subdivision Streets
in R-3 Conventional, R-4 Conventional and R-2 Cluster Subdivisions with Single Family Dwellings



Notes:

1) All dimensions are minimums.
2) Typical sanitary sewer line location shall be 6.0' outside the ROW with a 12' utility easement.
3) Typical waterline location shall be 3' outside the ROW with an 8' utility easement.
4) Curve radii of less than 250' on water lines will necessitate the use of fittings. Where fittings are used, the waterline shall be routed so that the centerline of the pipe remains a minimum 3' from both ROW and easement lines.
5) Water valve boxes shall not be located in sidewalks, curb & gutter or pavement.
6) This detail is applicable only for internal subdivision streets. Easement widths for all other streets and roads shall be in accordance with the Authority's Utility Standards Manual (USM) Section 1.09.
7) All design and construction shall be in accordance with the Authority's USM.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

UL-02

Fauquier County
Water and Sanitation Authority

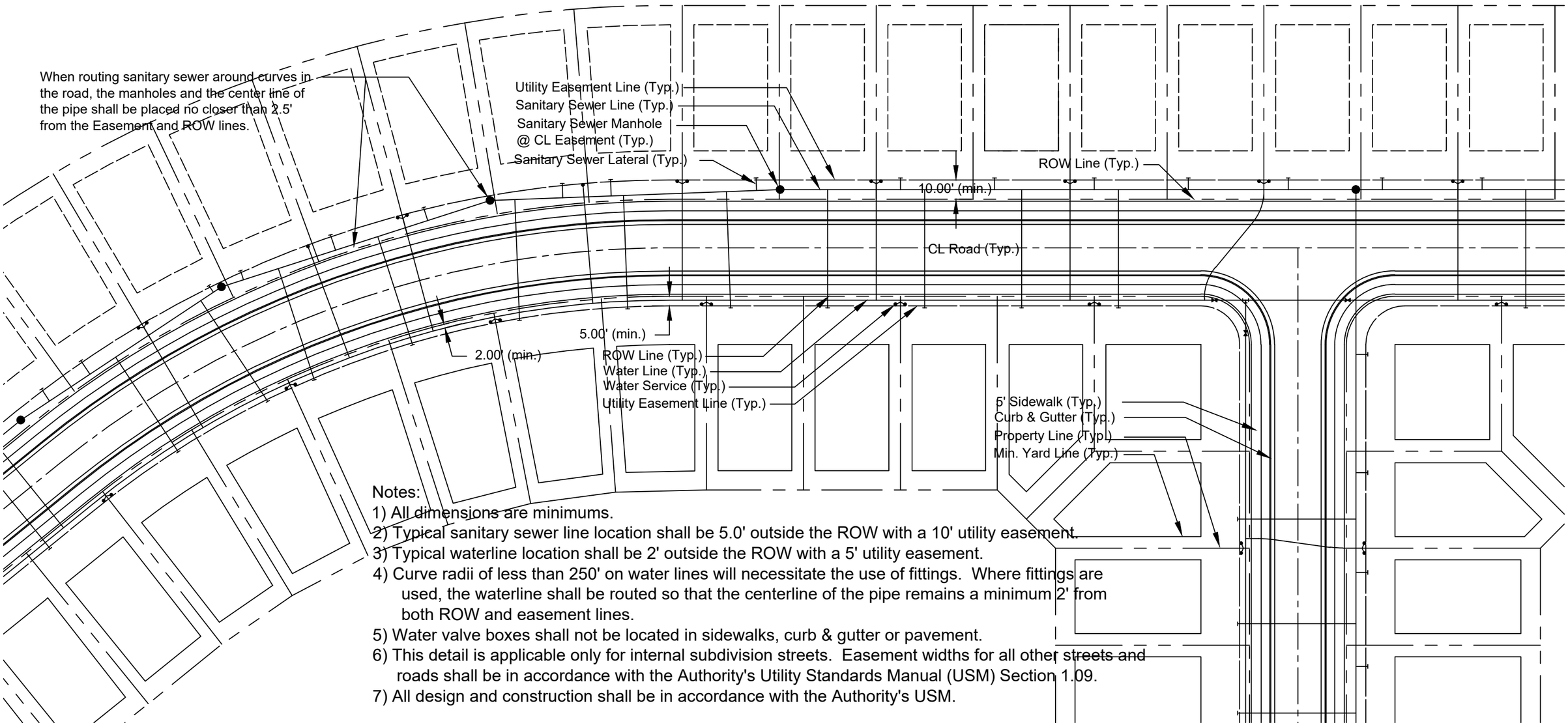
Utility Location & Easement Layout
R-3 & R-4 Conventional and R-2 Cluster Subdivisions

Scale: 1" = 50'

03/05/07

FCWSA Utility Location & Easement Layout Detail (UL-03)

Showing Typical Water & Sewer Utility Locations and Minimum Easement Widths along Internal Subdivision Streets
in R-3 Cluster and R-4 Cluster Subdivisions with Single Family Dwellings



Notes:

1) All dimensions are minimums.
2) Typical sanitary sewer line location shall be 5.0' outside the ROW with a 10' utility easement.
3) Typical waterline location shall be 2' outside the ROW with a 5' utility easement.
4) Curve radii of less than 250' on water lines will necessitate the use of fittings. Where fittings are used, the waterline shall be routed so that the centerline of the pipe remains a minimum 2' from both ROW and easement lines.
5) Water valve boxes shall not be located in sidewalks, curb & gutter or pavement.
6) This detail is applicable only for internal subdivision streets. Easement widths for all other streets and roads shall be in accordance with the Authority's Utility Standards Manual (USM) Section 1.09.
7) All design and construction shall be in accordance with the Authority's USM.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

UL-03

Fauquier County
Water and Sanitation Authority

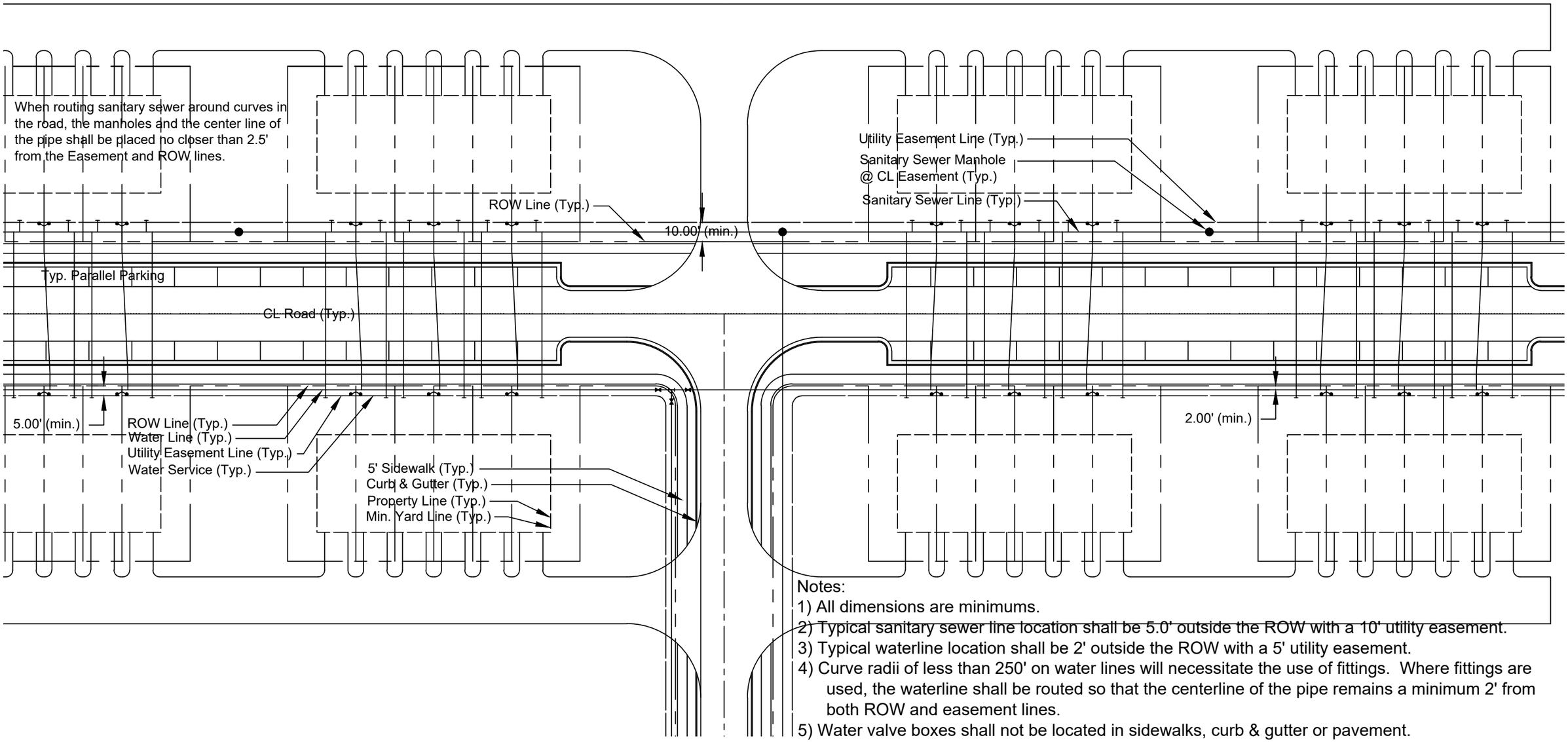
Utility Location & Easement Layout
R-3 & R-4 Cluster Subdivisions

Scale: 1" = 50'

03/05/07

FCWSA Utility Location & Easement Layout Detail (UL-04)

Showing Typical Water & Sewer Utility Locations and Minimum Easement Widths along Internal Streets
in Townhouse Subdivisions with units fronting on Public Roads with parallel parking.



Notes:

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GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

UL-04

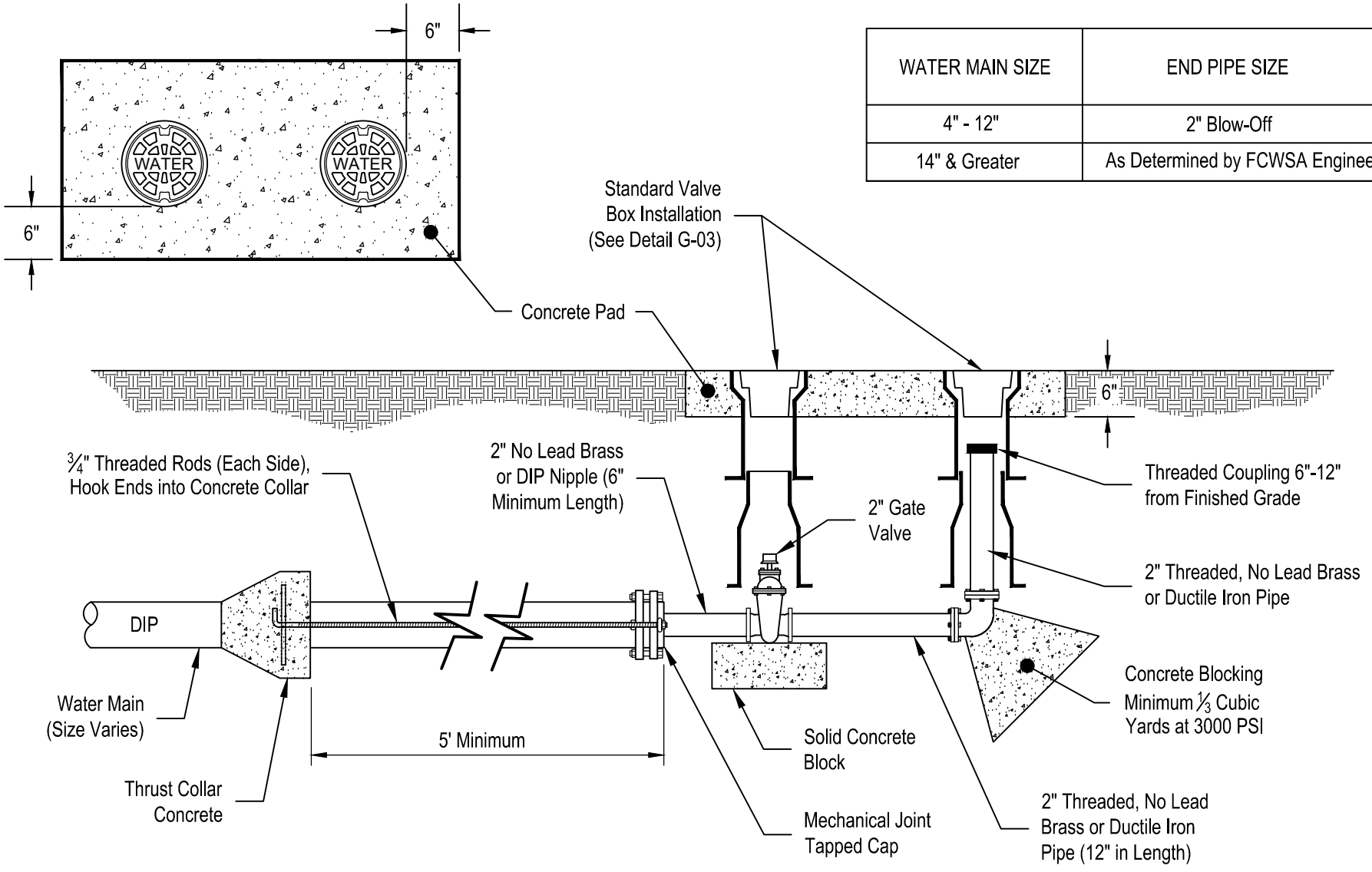
Fauquier County
Water and Sanitation Authority

Utility Location & Easement Layout
Townhouse Subdivisions on Public Roads

Scale: 1" = 50'

03/05/07

WATER MAIN SIZE	END PIPE SIZE
4" - 12"	2" Blow-Off
14" & Greater	As Determined by FCWSA Engineer



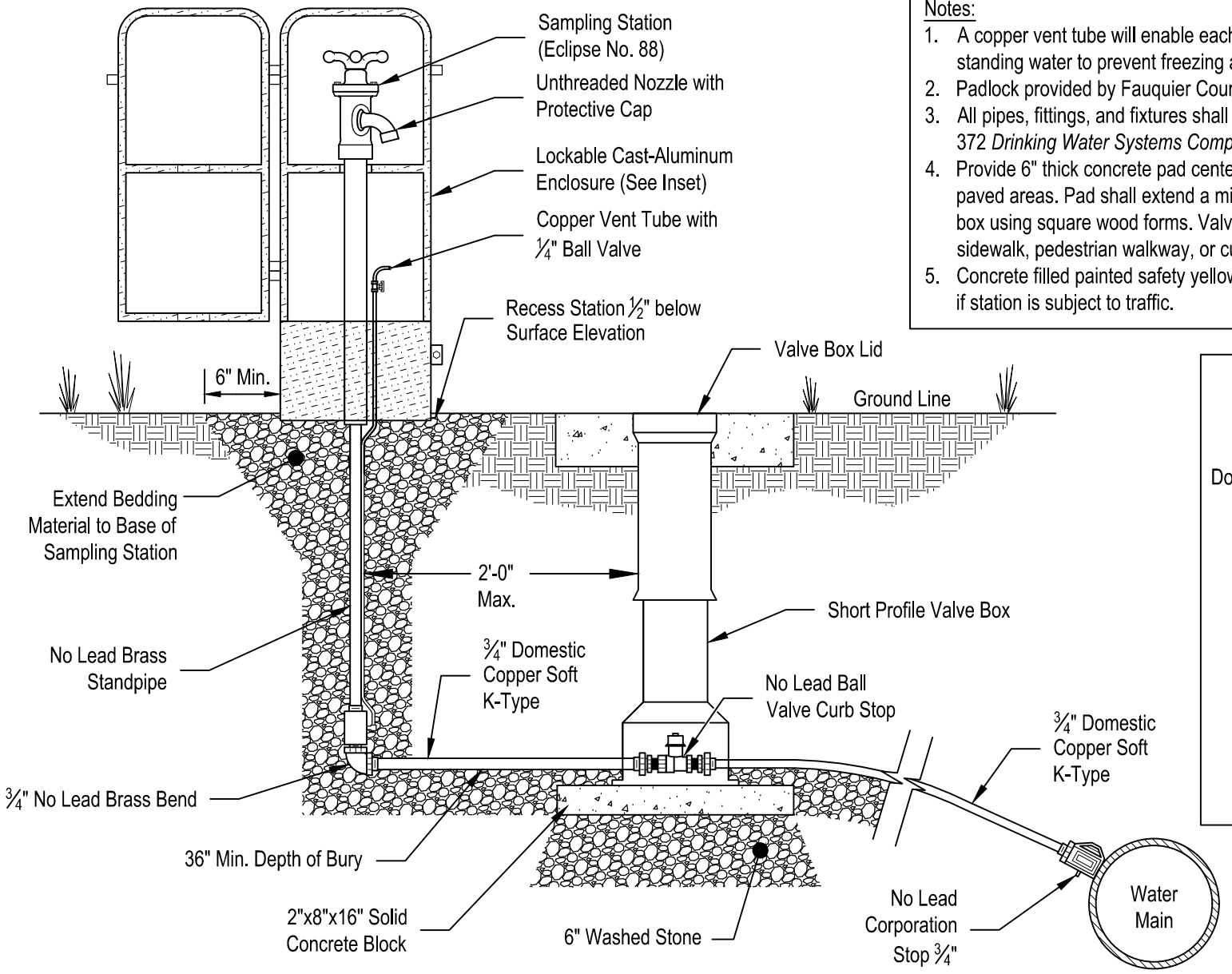
WD-01

Fauquier County
Water and Sanitation Authority

Water Distribution System
Blow-Off Detail

Not to Scale

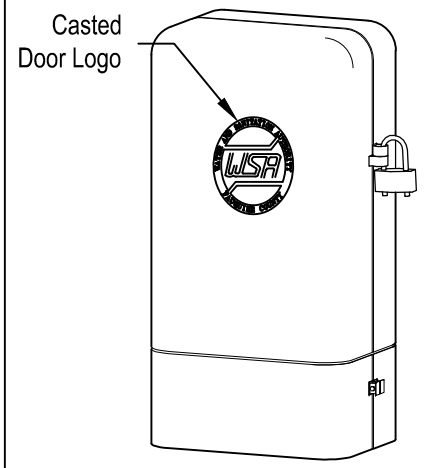
Revised: 11/28/17



Notes:

1. A copper vent tube will enable each station to be pumped free of standing water to prevent freezing and to minimize bacteria growth.
2. Padlock provided by Fauquier County Water and Sanitation Authority.
3. All pipes, fittings, and fixtures shall be "lead-free" in accordance with NSF 372 *Drinking Water Systems Components - Lead Content*.
4. Provide 6" thick concrete pad centered around valve box if outside of paved areas. Pad shall extend a minimum of 6" beyond all sides of valve box using square wood forms. Valve box lid shall not be located within a sidewalk, pedestrian walkway, or curb & gutter.
5. Concrete filled painted safety yellow bollards to be installed per inspector if station is subject to traffic.

INSET



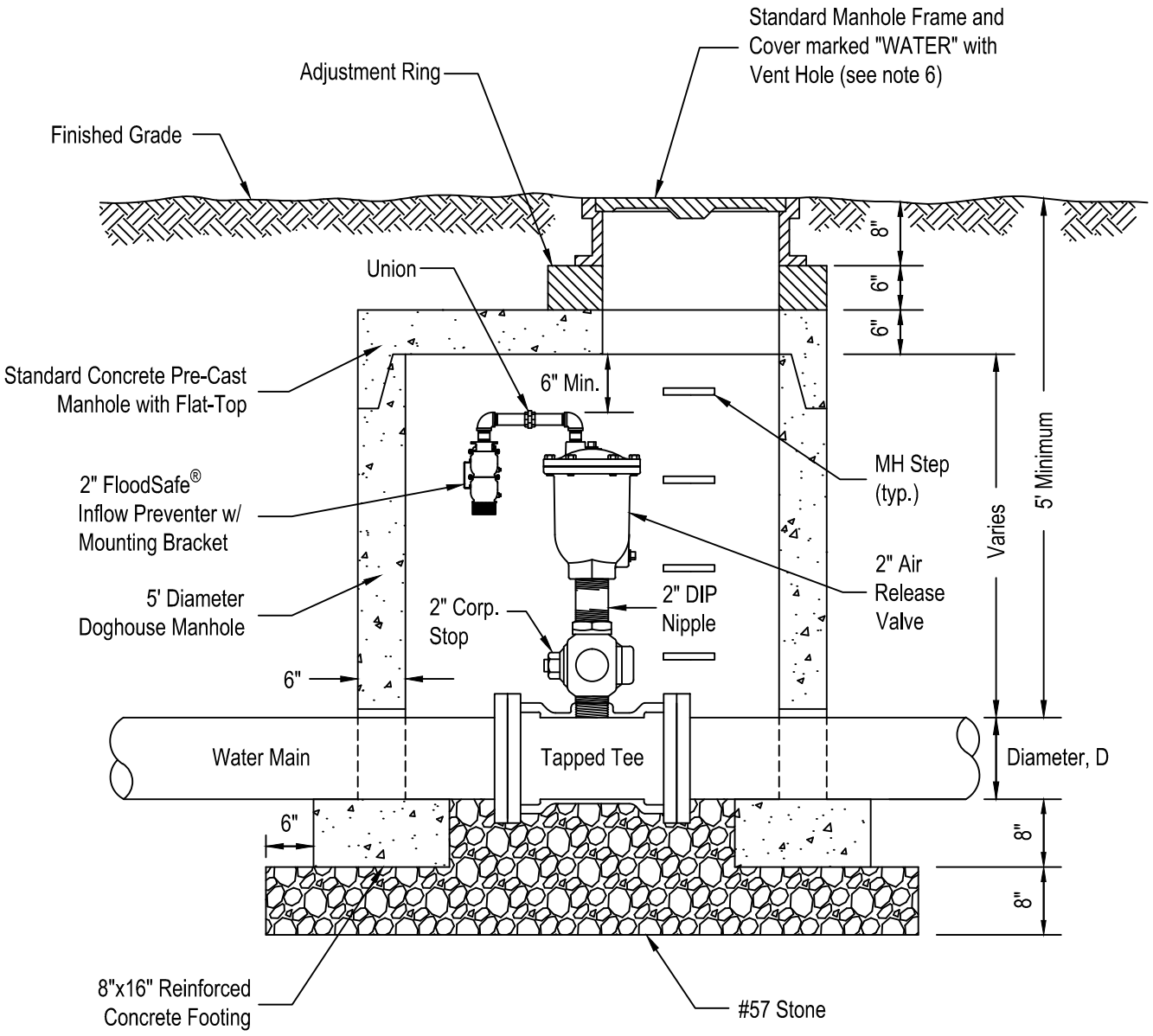
WD-02

Fauquier County
Water and Sanitation Authority

Water Distribution System
Sampling Station

Not to Scale

Revised: 11/28/17



Notes:

1. Installation to be located at high point of water main.
2. Pipe to be sealed with non-shrink grout at doghouse openings.
3. Concrete shall be a minimum of 4000 psi compressive strength.
4. A 2" Flood Safe Inflow Preventer with mounting bracket shall be installed in areas subject to high groundwater or flooding. The inflow preventer shall be mounted to the wall of the manhole structure.
5. All materials must conform to the applicable sections of the Fauquier County Water and Sanitation Authority's Approved Materials List.
6. Standard manhole cover shall have "WATER" casted in 1-inch letters in the center and be furnished with a 1-inch vent hole. All other design and specifications of the manhole frame and cover shall be the same as those required for sewer construction.

WD-03

Fauquier County
Water and Sanitation Authority

Water Distribution System
Air Release Valve

Not to Scale

Revised: 04/08/24

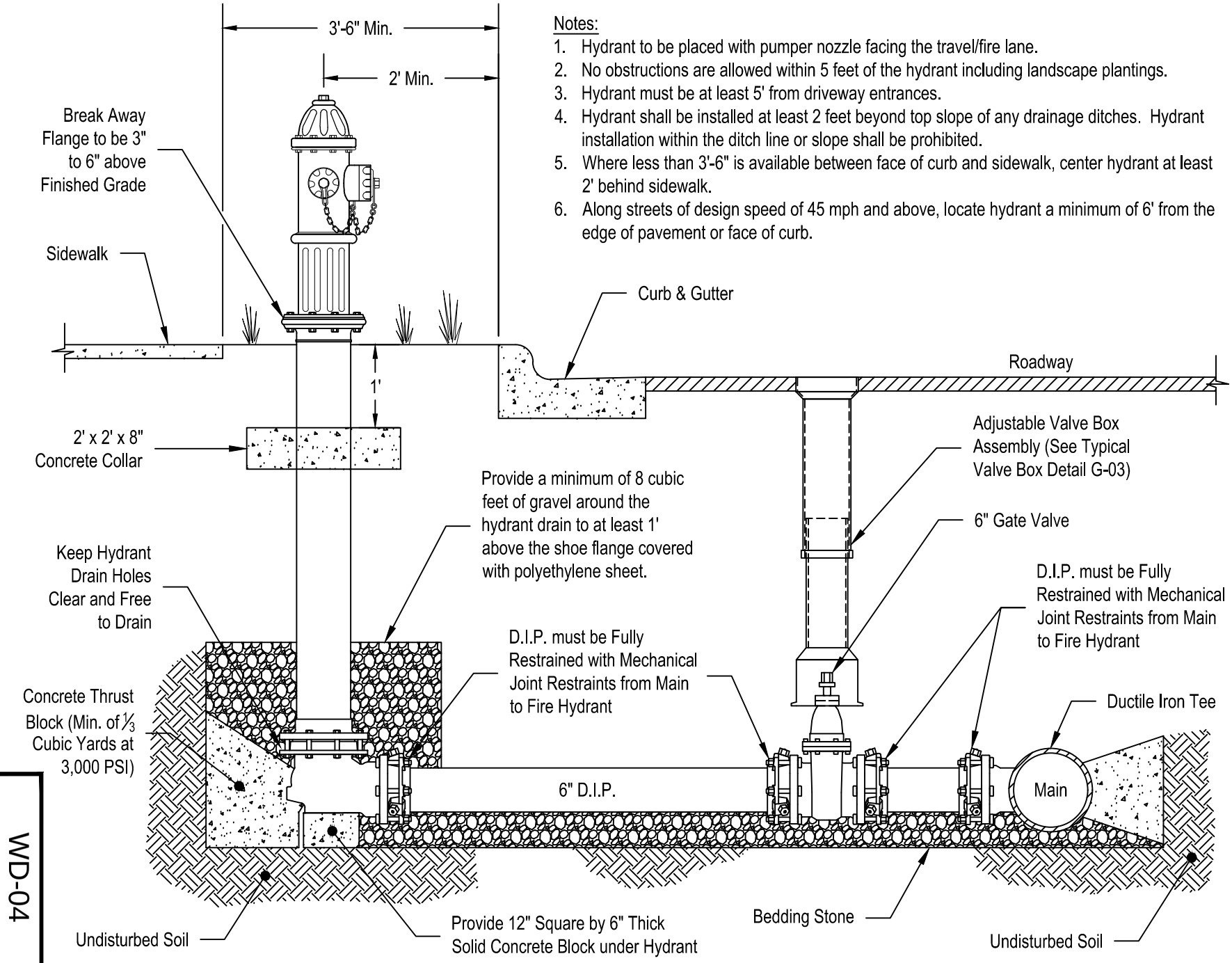
Fauquier County
Water and Sanitation Authority

Water Distribution System
Typical Fire Hydrant

Not to Scale

Revised: 04/08/24

WD-04

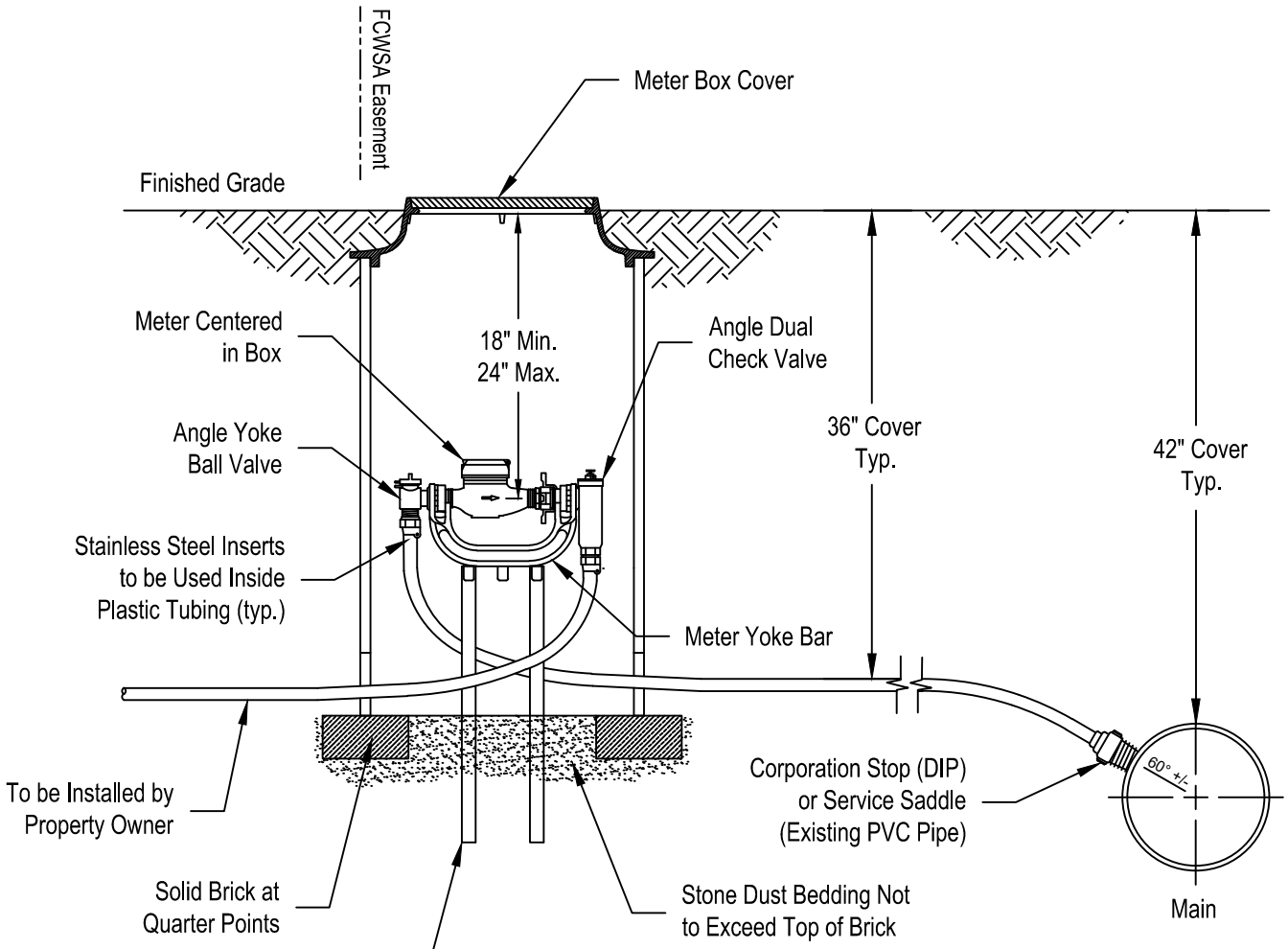


Notes:

1. Hydrant to be placed with pumper nozzle facing the travel/fire lane.
2. No obstructions are allowed within 5 feet of the hydrant including landscape plantings.
3. Hydrant must be at least 5' from driveway entrances.
4. Hydrant shall be installed at least 2 feet beyond top slope of any drainage ditches. Hydrant installation within the ditch line or slope shall be prohibited.
5. Where less than 3'-6" is available between face of curb and sidewalk, center hydrant at least 2' behind sidewalk.
6. Along streets of design speed of 45 mph and above, locate hydrant a minimum of 6' from the edge of pavement or face of curb.

Notes:

1. Set meter box cover 1" above final grade.
2. All compression fittings shall include pack joints.
3. Meter box lid shall include a 1-3/4" hole for mounting a radio frequency meter interface unit.
4. The service line between the main and the meter shall be one continuous piece of pipe. No joints will be permitted.
5. Where service between the meter and water main is plastic tubing, a tracer wire shall follow the service/branch line to the meter box and shall be secured to the yoke bar.
6. No structures, poles, sign posts, trees, or shrubs to be installed within four feet of meter box.
7. Meter box shall be centered within a minimum 2' wide utility strip. Otherwise meter box shall be installed behind sidewalk. Meter box shall not be located within driveways, sidewalks or pedestrian walkways.
8. All materials must conform to the applicable sections of the Fauquier County Water and Sanitation Authority's Approved Materials List. All fittings and meters shall be "lead free" in accordance with the Safe Drinking Water Act.
9. Public meters sized $\frac{5}{8}$" x $\frac{3}{4}$" and full $\frac{3}{4}$" will be installed by the Authority upon construction approval and payment of appropriate fees.
10. See Standard Detail WS-01 for service connection requirements.



WATER METER SIZE	METER BOX SIZE
$\frac{5}{8}$" x $\frac{3}{4}$"	18" x 30"
$\frac{3}{4}$"	24" x 30"
1"	24" x 30"

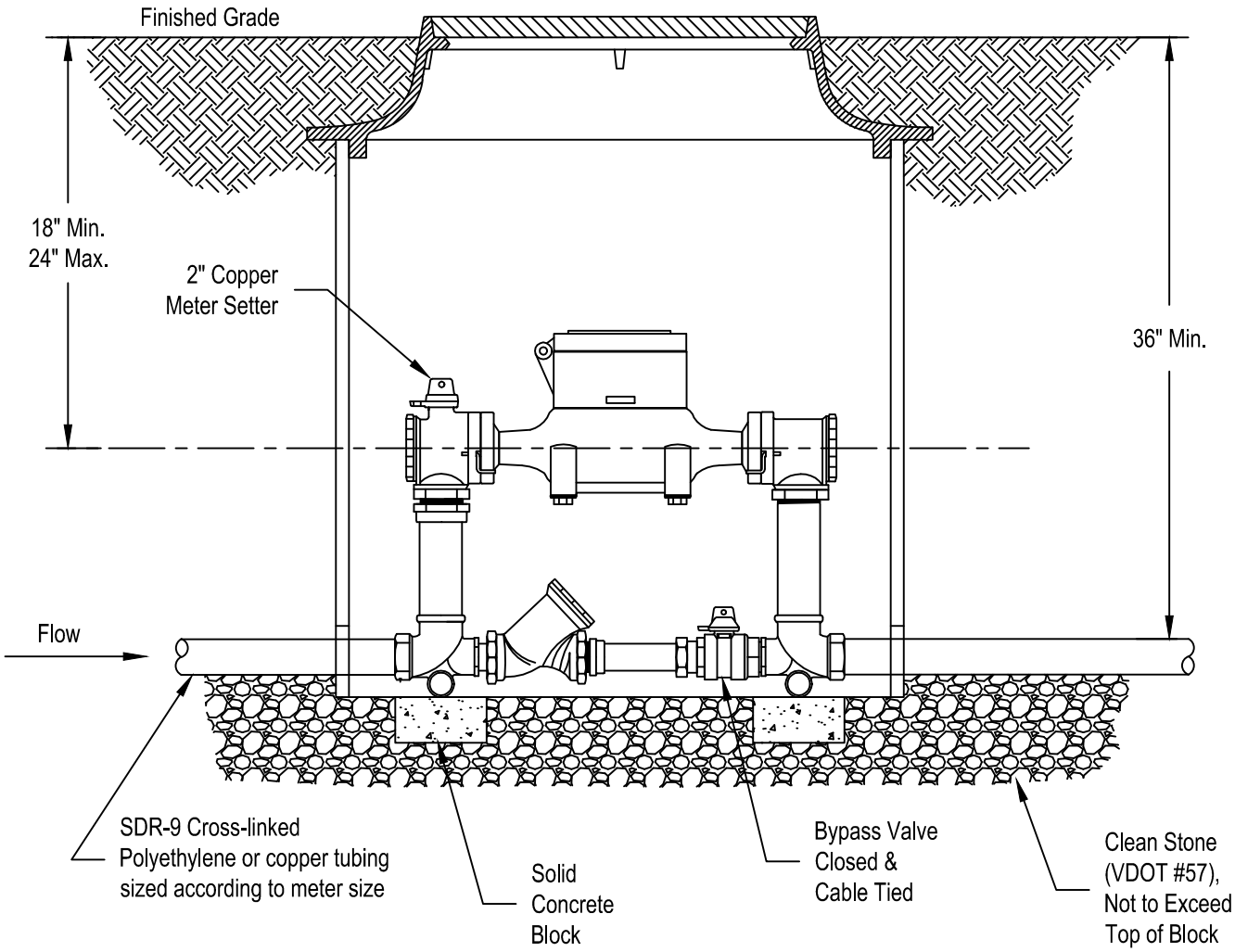
WM-01

Fauquier County
Water and Sanitation Authority

Standard Water Meter Box & Fittings Up to 1"

Not to Scale

Revised: 04/08/24



Notes:

1. See FCWSA Approved Materials List for approved manufacturers and part numbers.
2. Inlet valve and bypass valve shall include padlock wings.
3. Properly sized meter, including radio frequency meter interface unit and wiring, shall be provided by the developer.
4. A 36" diameter x 36" height one-piece meter box shall be used.
5. The service line between the main and the meter shall be one continuous piece of pipe (No joints will be permitted).
6. All compression fittings (including the corporation stop at the main) shall include grip joints.
7. Only 2" meter setter to be installed. Use a pair of meter adapters to extend a smaller meter to a 2" size.
8. No field adjustment of meter setter is permitted.

WM-02

Fauquier County
Water and Sanitation Authority

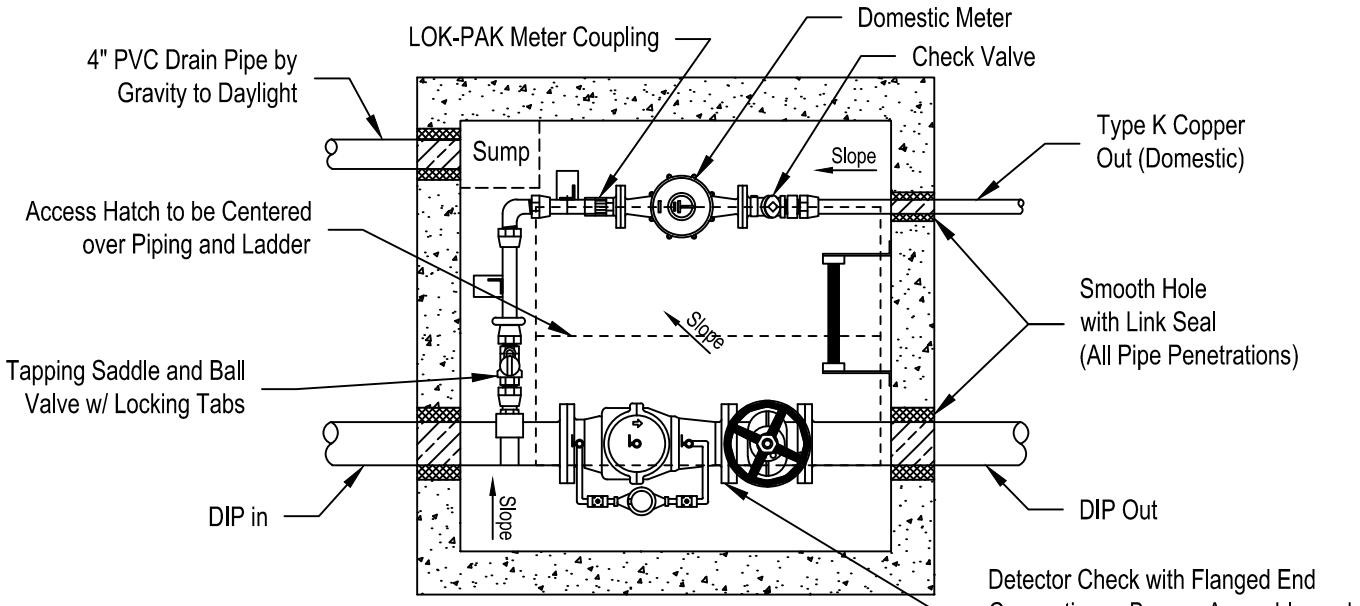
1-1/2" and 2" Water Meter and Service Connection

Not to Scale

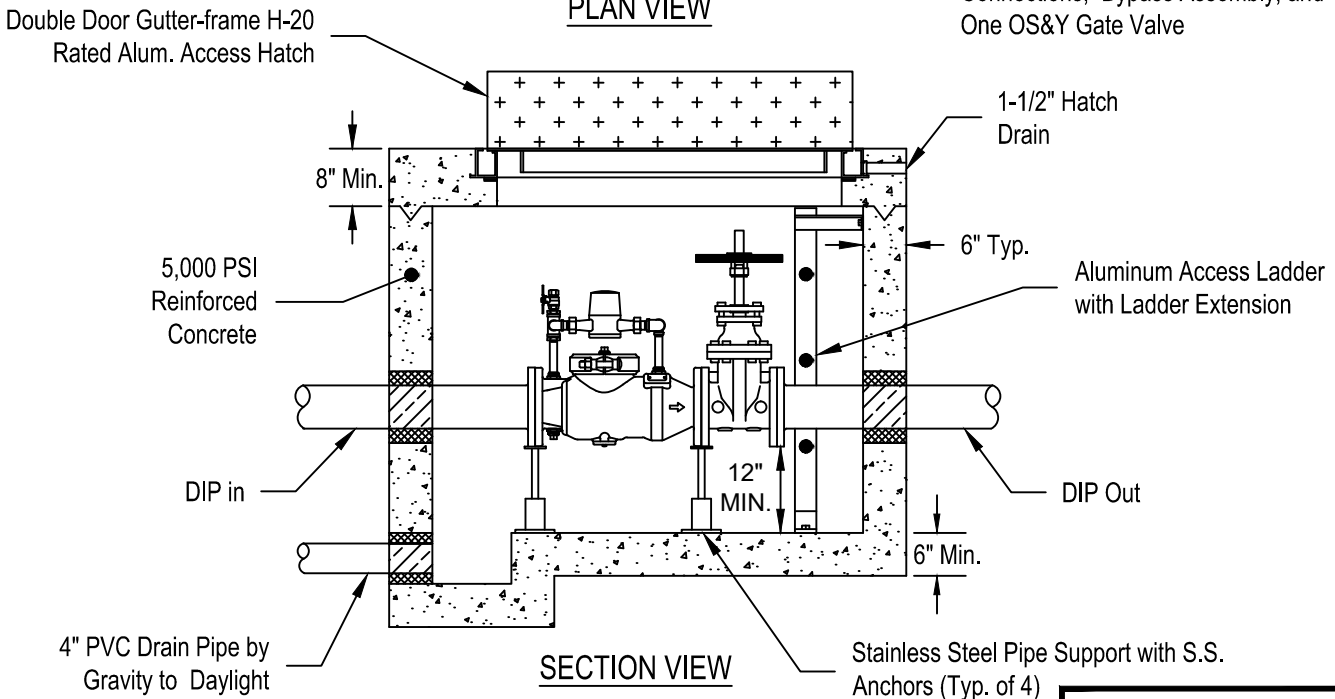
Revised: 11/28/17

Notes:

1. Exterior vault dimensions shall be a minimum of (L x W x H) 6' x 6 'x 6' with domestic tap made inside vault.
2. Bypass assembly shall include 2 ball valves to isolate meter.
3. Domestic line shall be type K copper pipe with grip joint fittings.
4. Vault to be installed on minimum 6" compacted VDOT #57 stone with filter fabric placed between bottom of vault and stone bedding. Filter fabric to extend vertically a minimum of 6" on all sides of vault.
5. Sump shall be piped by gravity to daylight or a sump pump provided. A VDOT Std. EW-12 endwall shall be installed at the outlet of the drain pipe with the opening covered by mesh or connect to a storm sewer inlet.
6. Vaults shall be non-buoyant when installed. Manufacturer to provide buoyancy calculations with assumed water table elevation at the ground surface. Calculations shall not include the weights of the piping installed.
7. Complete shop drawings shall be submitted to the FCWSA for approval. See Approved Materials List (Appendix D of the Utility Standards Manual) for additional design requirements.



PLAN VIEW



SECTION VIEW

WM-03

Fauquier County
Water and Sanitation Authority

Combined Domestic & Fire Service Meter Vault Detail

Not to Scale

Revised: 11/28/17

Fauquier County
Water and Sanitation Authority

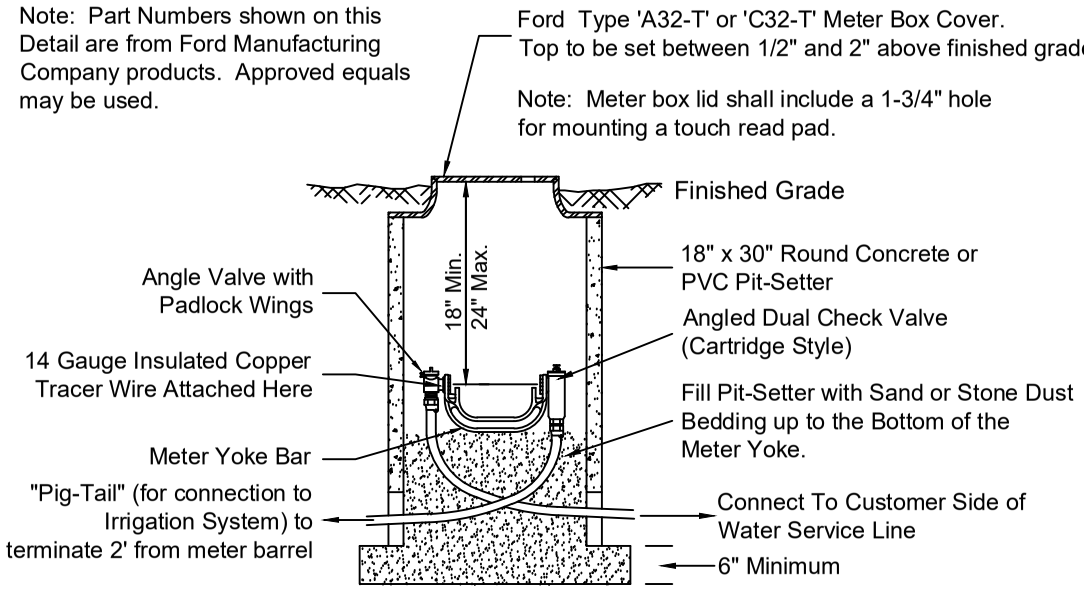
Standard Water Subtraction Meter

Not to Scale

Revised: 03/20/07

WM-04

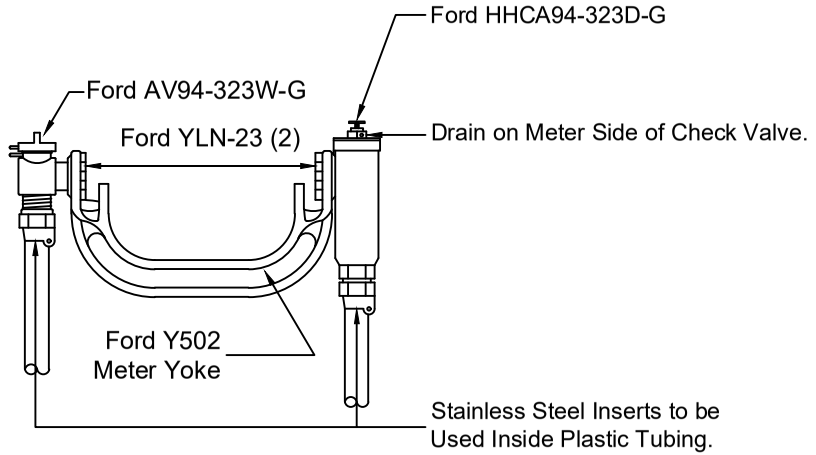
Note: Part Numbers shown on this Detail are from Ford Manufacturing Company products. Approved equals may be used.



Meter Box Detail

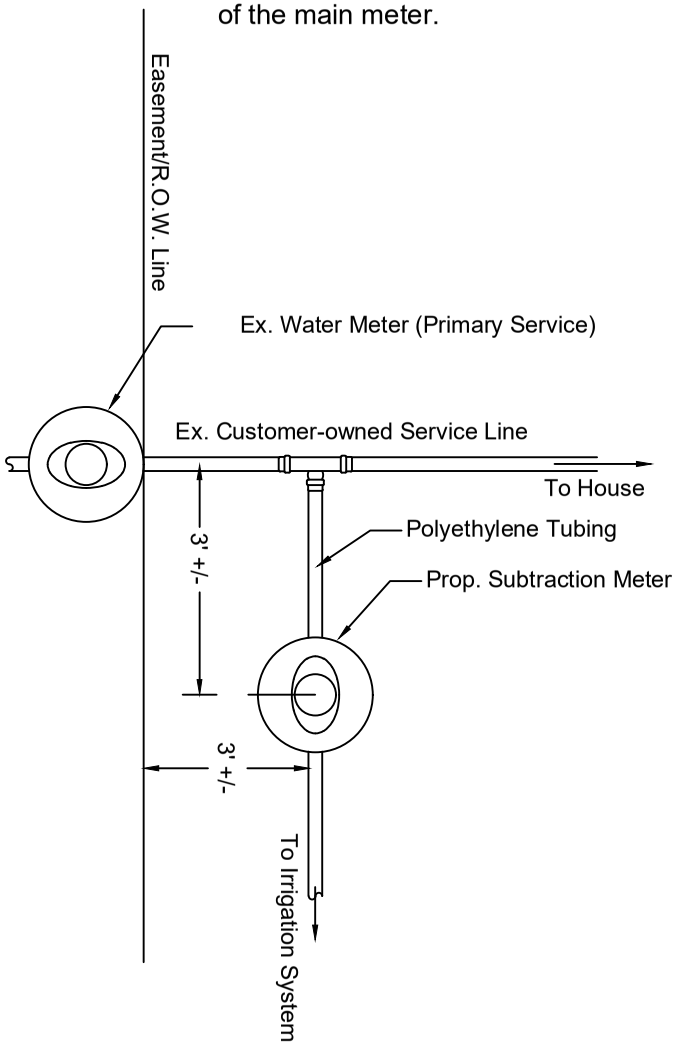
for 5/8" x 3/4" Water Subtraction Meter

Note: ALL compression fittings shall include grip joints.

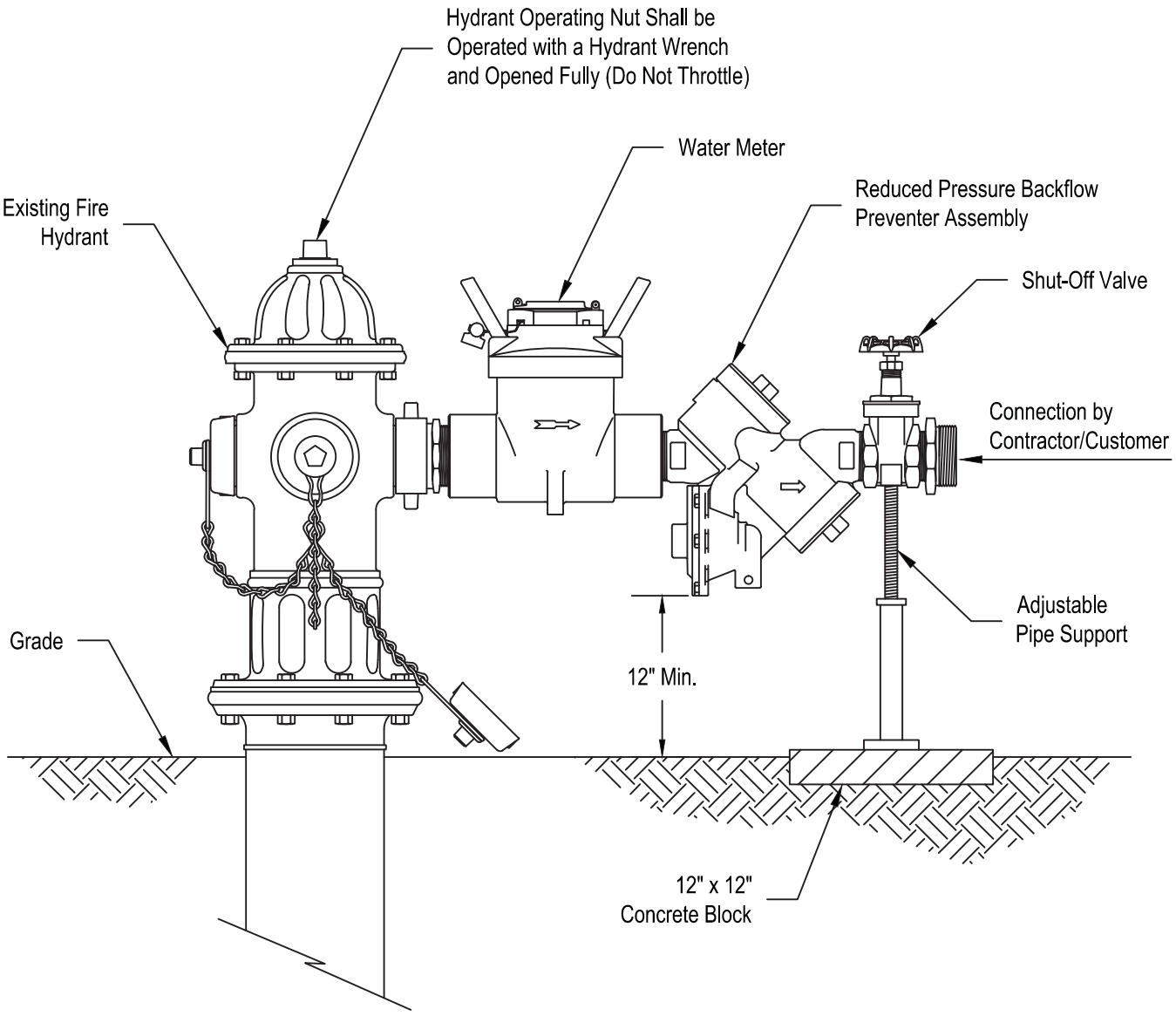


Meter Yoke Detail

NOTE: Irrigation service line shall be connected to the customer's service line on the customer's side of the main meter.



Typical Connection of Subtraction Meter



Notes:

1. Fire hydrant water use shall be permitted on a temporary basis where a permanent water connection is not available, subject to the terms and conditions established in Volume 2, Part A, Section 5.5 of the Authority's Operating Code.
2. Start with hydrant and shut-off valve closed. Slowly open the hydrant until the backflow preventer is completely pressurized. After the device has been pressurized, vent all trapped air from both check valves by slightly opening each of the four test cocks. Slowly open the downstream shut-off valve. The hydrant meter assembly is now in service. **Do not close valves on the assembly or discharge line quickly.**
3. Contractor/Customer shall protect the hydrant meter assembly from damage, theft, and misuse.
4. Contractor/Customer is held responsible for any damage to the fire hydrant and infrastructure due to improper use.
5. Broken or damaged hydrant meter assemblies must be reported to the Authority immediately.
6. Contractor/Customer is responsible for any and all water consumption.

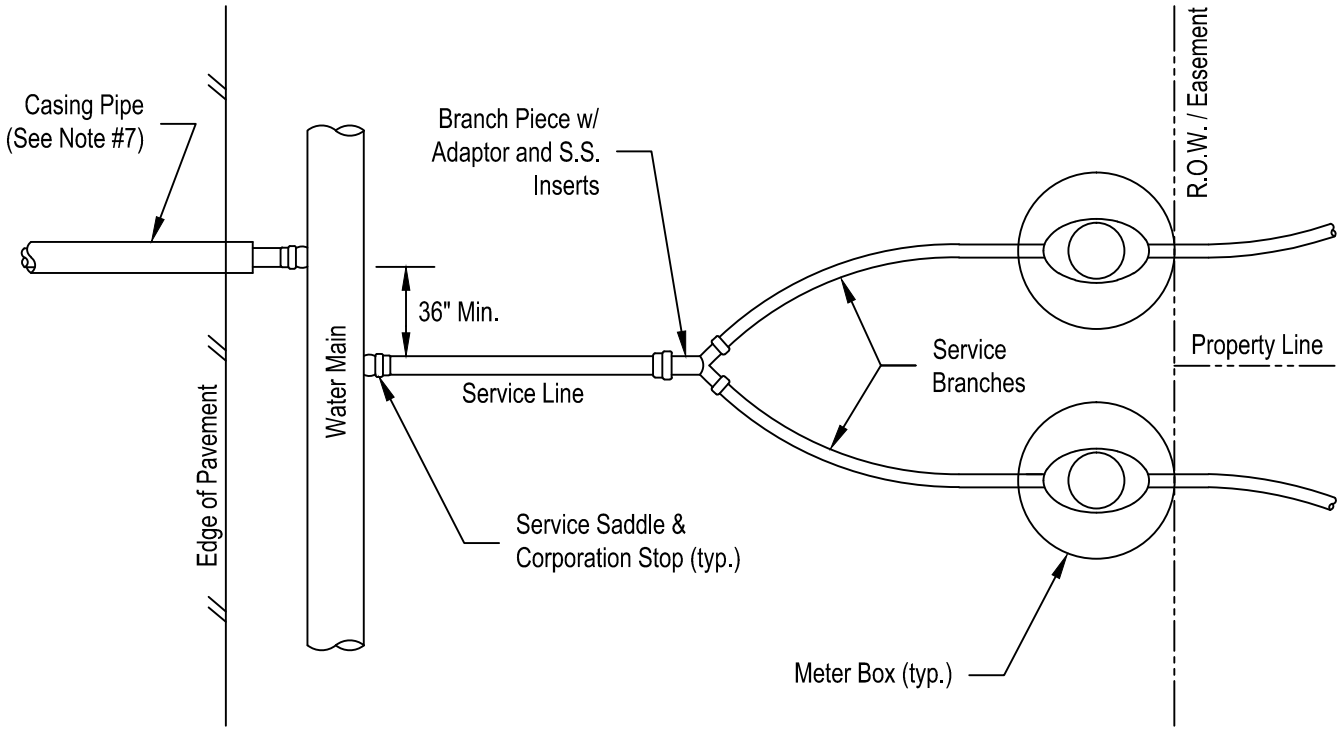
WM-05

Fauquier County
Water and Sanitation Authority

Temporary Hydrant Meter Assembly

Not to Scale

Revised: 11/28/17



Service & Branch Line Sizing Table		
Meter Size	Service Line (min)	Service Branch (min)
5/8" x 3/4"	1"	3/4"
Full 3/4"	1"	3/4"
1"	1-1/2"	1"

Casing Size Table	
Water Line	Casing Size
up to 1"	2"
1-1/2"	3"
2"	4"
Service Line Casing Pipes to be HDPE or SCH 40 PVC	

Notes:

1. This Detail shall be the design standard for all new water connections. Exceptions must be approved by the Authority.
2. Provide a minimum 6 foot horizontal separation from sanitary laterals.
3. Provide a minimum 5 foot horizontal separation from driveways.
4. Provide a minimum 10 foot horizontal separation from fire hydrant lines.
5. Taps shall be spaced a minimum of 36 inches.
6. A full range marker disc shall be placed directly over the service connection location during backfill.
7. An appropriately sized casing pipe shall be used whenever a service line crosses a road, sidewalk, and/or pedestrian walkway. See Casing Size Table for size and acceptable material.
8. All materials must conform to the applicable sections of the Fauquier County Water and Sanitation Authority's Approved Materials List.
9. It is advisable to increase tubing diameter for unusually long service lines and/or branch lines. This will necessitate the use of appropriate adaptors in the meter box. Consult the Authority's Engineer or Inspector for details.

WS-01

Fauquier County
Water and Sanitation Authority

Standard Water Service Connection For Water Meter Sizes Up to 1"

Not to Scale

Revised: 04/08/24