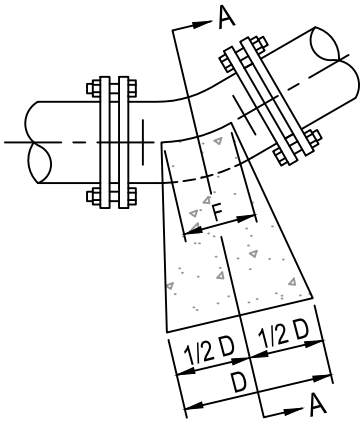
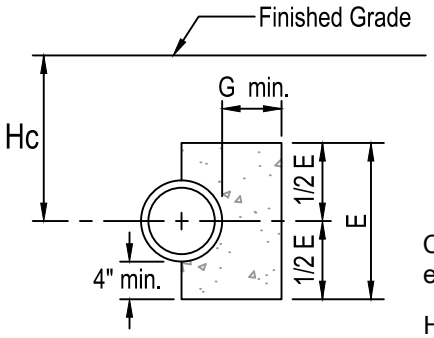
STANDARD DETAILS
FLUVANNA COUNTY, VIRGINIA
INDEX OF DRAWINGS

TRENCH BEDDING, PIPE LAYING & PAVEMENT

WATER MAINS & APPURTENANCES



PLAN



SECTION A-A

Carry concrete to undisturbed earth or firm subgrade.

Hc shall be measured from Finished Grade to ℄ of Pipe.

SOIL PROPERTIES	SIZE	Concrete Block Dimensions (up to 150 PSI design 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 Surface Area of Concrete Block for Increasing Values of Hc			
		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"				

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 extended to undisturbed earth or firm subgrade.

Notes on Table:

1) As Hc increases, adjust dimensions D & E as indicated.
2) Dimensions F & G shall be constant for a given pipe size.
3) Dimension D shall be adjusted for required pressure in excess of 150 psi before making the adjustment for Hc noted above.

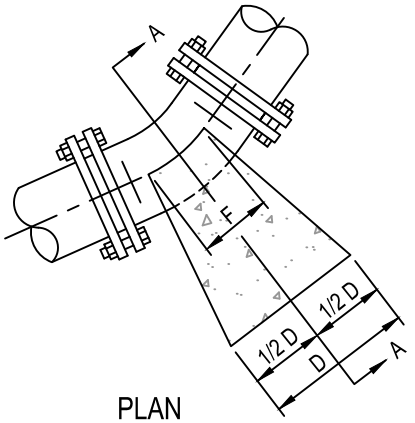
BLK-1

Fluvanna County Virginia
Construction Detail

Concrete Thrust Blocking
11-1/4° Horizontal Bend

Not to Scale

Revised: 09/2022



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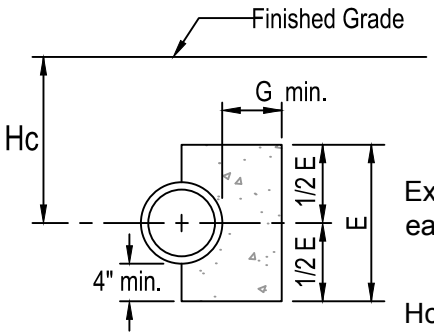


SECTION A - A

Extend concrete to undisturbed earth or firm subgrade.

Hc shall be measured from Finished Grade to ℄ of Pipe.

SOIL PROPERTIES	Pipe Size	Concrete Block Dimensions (up to 150 PSI design 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 Surface Area of Concrete Block for Increasing Values of Hc			
		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"				

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 extended to undisturbed earth or firm subgrade.

Notes for Table:

1) As Hc increases, adjust dimensions D & E as indicated.
2) Dimensions F & G shall be constant for a given pipe size.
3) Dimension D shall be adjusted for required pressure in excess of 150 psi before making the adjustment for Hc noted above.

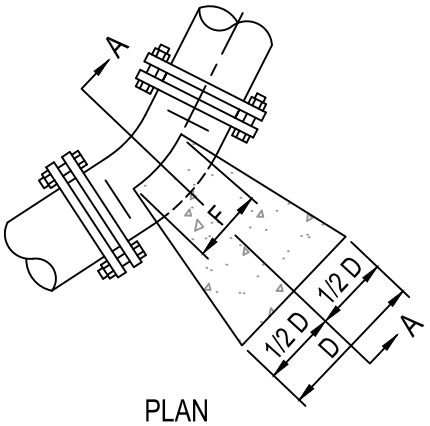
BLK-2

Fluvanna County Virginia
Construction Detail

Concrete Thrust Blocking for 22-1/2° Horizontal Bend

Not to Scale

Revised: 09/2022



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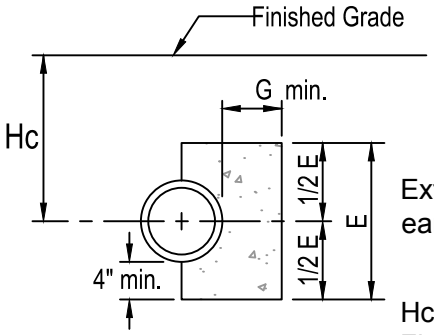


SECTION A-A

Extend concrete to undisturbed earth or firm subgrade.

Hc shall be measured from Finished Grade to ℄ of Pipe.

SOIL PROPERTIES	Pipe Size	Concrete Block Dimensions (up to 150 PSI design 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 Surface Area of Concrete Block for Increasing Values of Hc			
		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"				

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 extended to undisturbed earth or firm subgrade.

Notes for Table:

1) As Hc increases, adjust dimensions D & E as indicated.
2) Dimensions F & G shall be constant for a given pipe size.
3) Dimension D shall be adjusted for required pressure in excess of 150 psi before making the adjustment for Hc noted above.

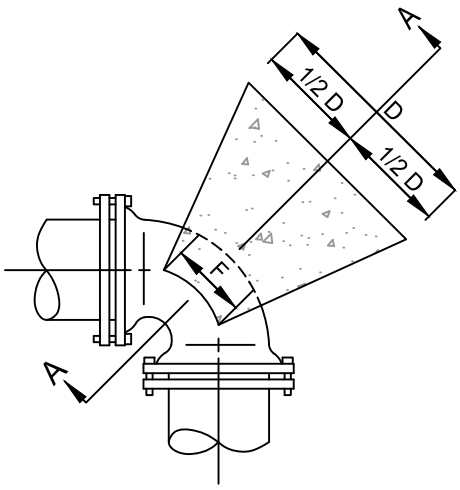
BLK-3

Fluvanna County Virginia
Construction Detail

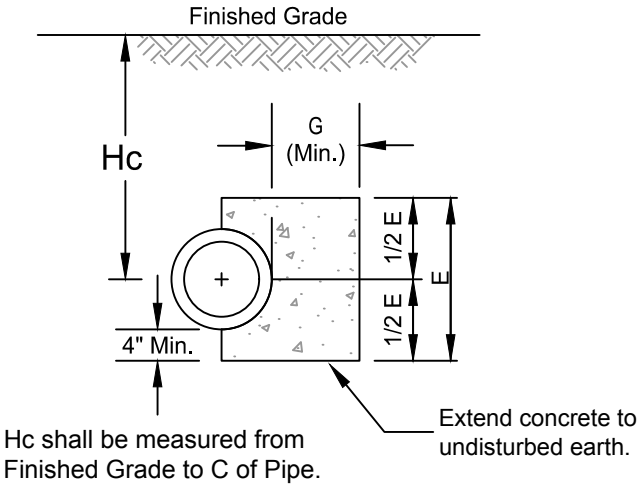
Concrete Thrust Blocking
45° Horizontal Bend

Not to Scale

Revised: 09/2022



Plan



Section A - A

Pipe Size	Concrete Block Dimensions (up to 150 PSI design 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 Surface Area of Concrete Block for Increasing Values of Hc			
	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	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"	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"				

Concrete Notes:

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

Notes For Table:

1) As Hc increases, adjust dimensions D & E as indicated.
2) Dimensions F & G shall be constant for a given pipe size.
3) Dimension D shall be adjusted for required pressure in excess of 150 psi before making the adjustment for Hc noted above.
4) Special design required for lines 24" in diameter or greater.

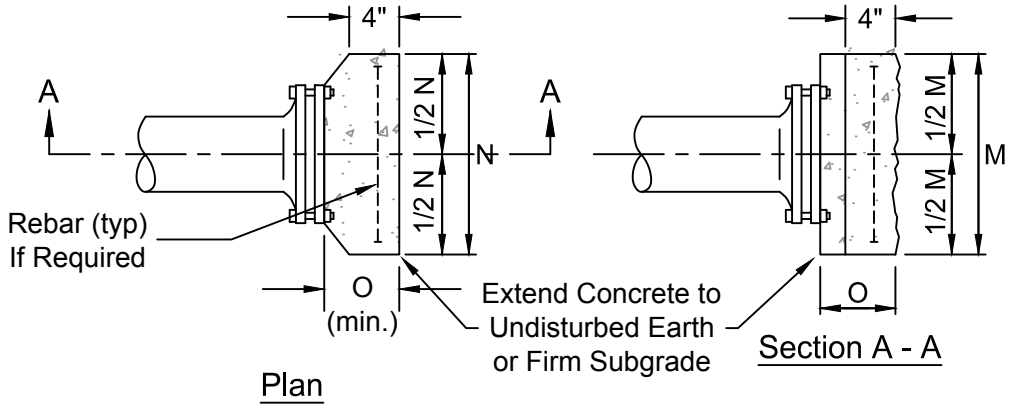
BLK-4

Fluvanna County Virginia
Construction Detail

Concrete Thrust Blocking
90° Horizontal Bend

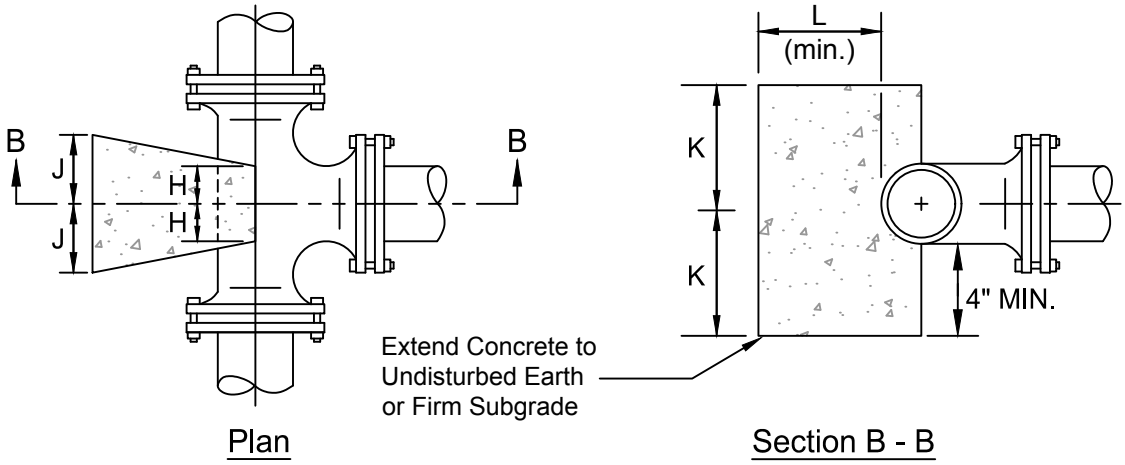
Not to Scale

Revised: 09/2022



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

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



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 Face = 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 pressure exceeds 150 psi, block dimensions shall be increased, proportional to the 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.

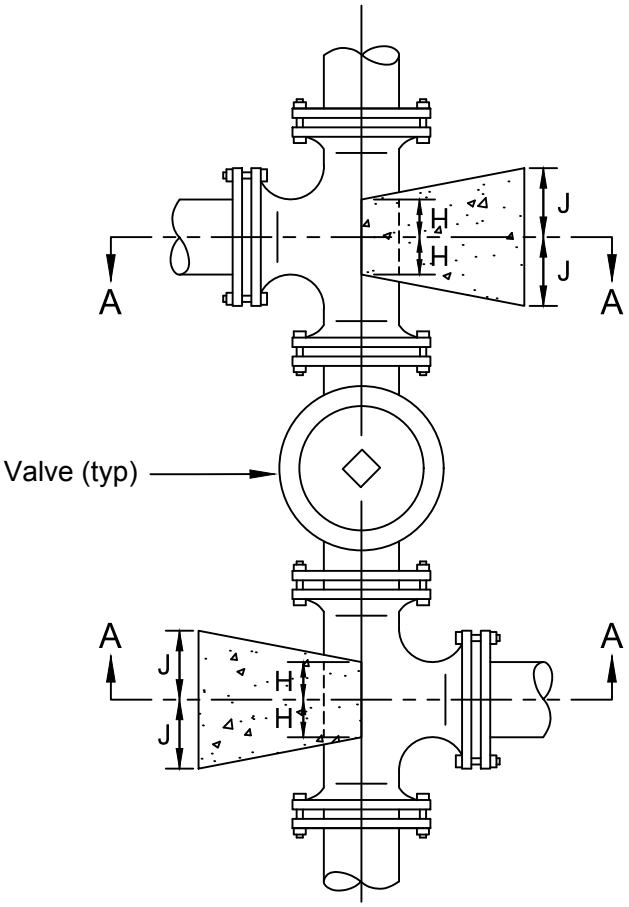
BLK-5

Fluvanna County Virginia
Construction Detail

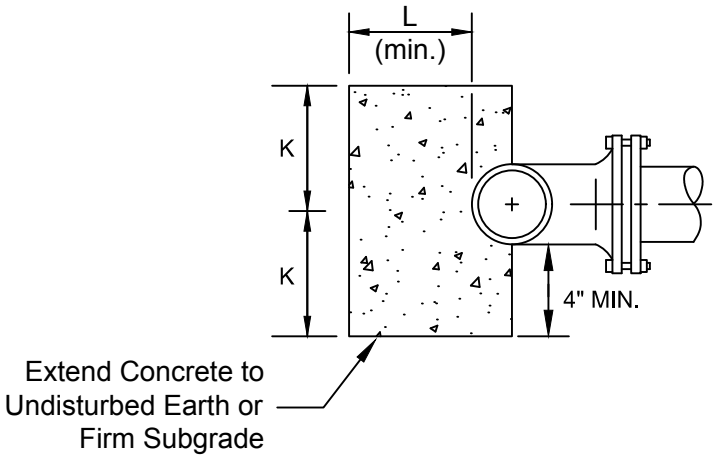
Concrete Thrust Blocking
Tees, Plugs and Caps

Not to Scale

Revised: 09/2022



Plan



Section A - A
(Applies to Both Tees)

Buttress Sizing for Double 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 proportioned 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.

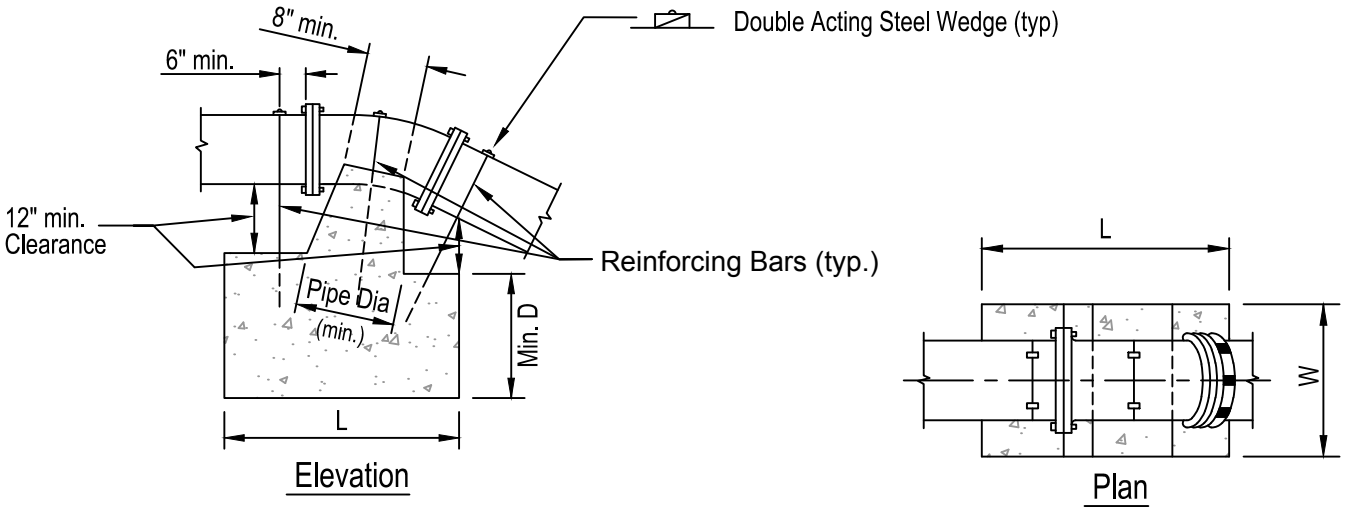
BLK-6

Fluvanna County Virginia
Construction Detail

Concrete Thrust Blocking
Two Tees at 4-Pipe Intersection

Not to Scale

Revised: 09/2022



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		Pipe 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

Note: 90° Vertical Bends are not permitted.

Concrete Notes:

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

BLK-7

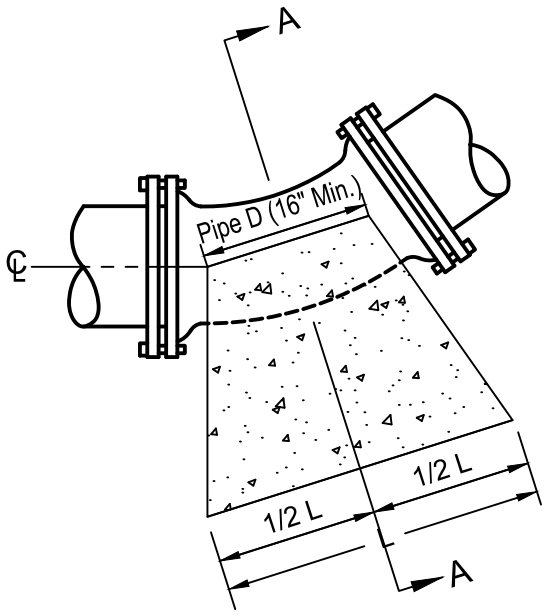
Fluvanna County Virginia
Construction Detail

Concrete Anchors

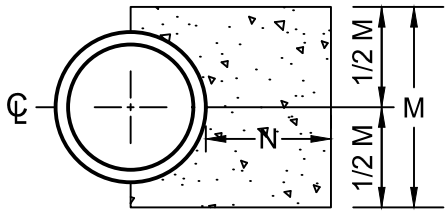
11-1/4°, 22-1/2° & 45° Upper Vertical Bends

Not to Scale

Revised: 09/2022



Elevation



Section A - A

Buttresses for Lower Vertical Bends										
Bend		Pipe 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.
5) All bearing surfaces shall be extended to undisturbed earth or firm subgrade.

BLK-8

Fluvanna County Virginia
Construction Detail

Concrete Buttressing

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

Not to Scale

Revised: 09/2022

CASING PIPE			
CARRIER PIPE DIAMTER	CASING PIPE DIAMTER	MINIMUM WALL THICKNESS	
		CRITERIA WITHIN RAILROAD RIGHT OF WAY	CRITERIA WITHIN VDOT RIGHT OF WAY
		STEEL WITHOUT COATING	STEEL
6"	16"	0.281"	0.313"
8"	20"	0.344"	0.313"
10"	20"	0.344"	0.313"
12"	24"	0.375"	0.313"
15"	24"	0.375"	0.313"
16"	30"	0.469"	0.375"
18"	30"	0.469"	0.375"
20"	30"	0.469"	0.375"
21"	30"	0.469"	0.375"
24"	36"	0.532"	0.375"
30"	42"	0.625"	0.500"
33"	42"	0.625"	0.500"
36"	48"	0.688"	0.500"
42"	54"	0.781"	0.500"

STEEL CASING PIPE SHALL BE ASTM 1-139, GRADE 8.

NOTES:

1. SLOPES THROUGH BORES SHALL NOT BE BASED ON MINIMUM GRADE UNLESS IT IS THE ONLY SLOPE AVAILABLE.
2. INCREASING THICKNESS OF CASING MUST BE CONSIDERED WHERE BORE LENGTHS EXCEED 125'.
3. WHEN USING STEEL CASING, A MINIMUM OF 0.500" THICKNESS IS REQUIRED WHERE GROUNDCOVER OVER PIPE EXCEED 15'.
4. CONTRACTOR SHALL MAKE AN EFFORT TO BORE IN THE APPROPRIATE DIRECTION BASE DON EXISTING SOIL CONDITIONS. ENGINEER MUST SHOW LOCATION AND SIZE OF BORE PIT; AND LOCATION AND SIZE OF PERMANENT AND CONSTRUCTION EASEMENT.
5. WHERE RESTRAINING DEVICES ARE REQUIRED FOR THE CARRIER PIPE, THE CASING PIPE SHALL BE INCREASED AS NECESSARY.
6. MINIMUM CASING DIAMETER SHALL PROVIDE A MINIMUM CLEARANCE OF 4" ALL AROUND JOINT RESTRAINTS HARDWARE.

* WHERE PIPE IS RESTRAINED, APPROVED RESTRAINED JOINT PIPE MAY BE USED IN A 24" CASING PIPE TO AVOID HAVING TO INSTALL A 30" CASING PIPE.

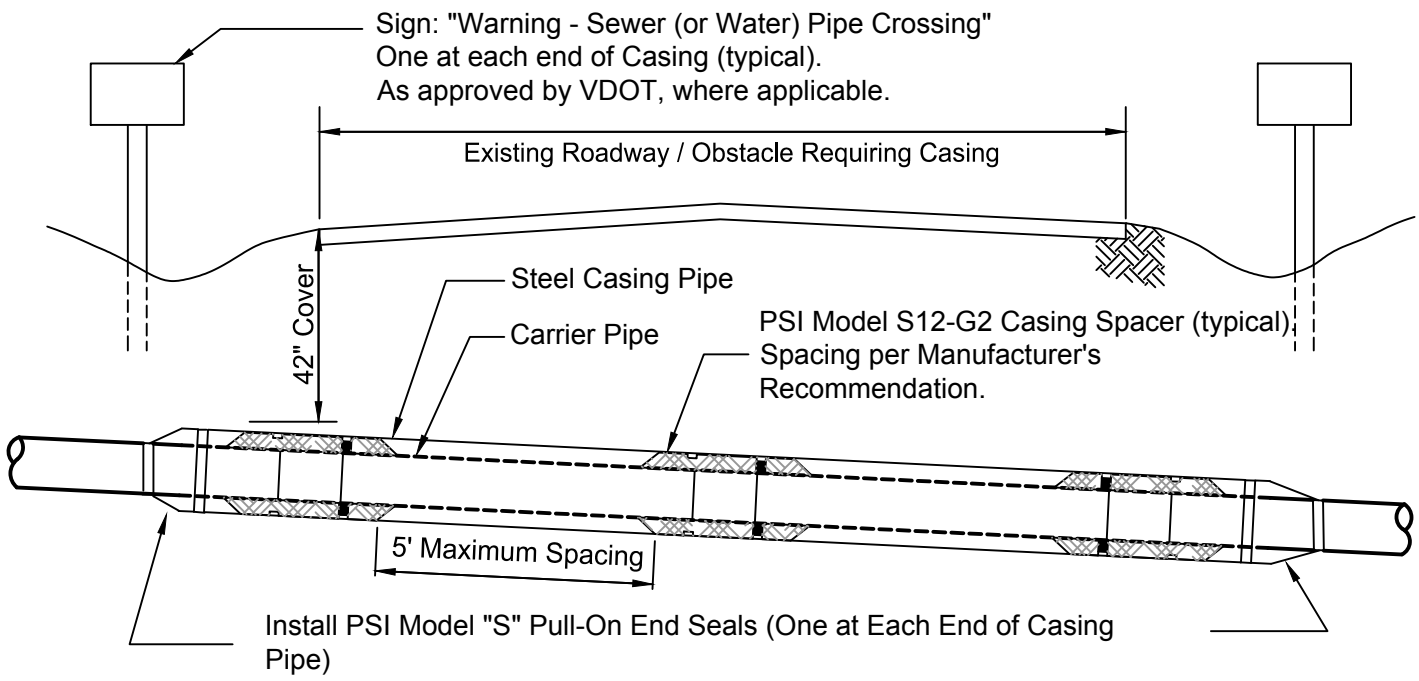
CAS-1

Fluvanna County Virginia Construction Detail

Casing Pipe Requirements

Not to Scale

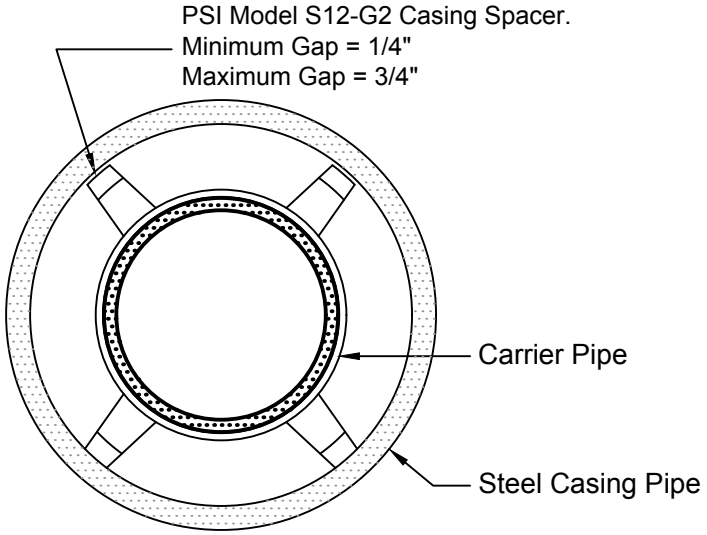
Revised: 09/2022



Notes:

1) Neat grout or sand will be pumped into the void between the carrier and the casing pipe at the direction of the County Engineer.
2) All carrier pipe shall be restrained joint ductile iron and shall be pushed through the casing.
3) Casing spacers shall be sized to center the carrier pipe within the casing.
4) Casing spacers shall be PSI Model S12-G2 or approved equal.
5) Number of casing spacers required varies by pipe size. Follow manufacturer recommendation.
6) Casing end seals shall be PSI Model "S" or approved equal.
7) See plans & profiles for length of casing pipe (adjust in field as directed by County Engineer).
8) On water lines and force mains, a valve shall be installed within 50' of each end of casing pipe.

Carrier Pipe Dia.	Casing Pipe Requirements		
	Casing Pipe (Min. O.D.)	Min. Casing Thickness	
		Cover to 15'	Cover >15'
4	14	3/8"	3/8"
6	16	3/8"	3/8"
8	18	3/8"	3/8"
10	18	3/8"	3/8"
12	24	3/8"	3/8"
14	24	3/8"	3/8"
16	30	3/8"	3/8"
18	30	3/8"	3/8"
20	30	3/8"	3/8"
24	36	3/8"	3/8"
30	42	7/16"	1/2"
36	48	7/16"	1/2"
42	54	7/16"	1/2"
48	60	7/16"	1/2"



End View of Casing with Spacers (Typical)

CAS-2

Fluvanna County Virginia Construction Detail

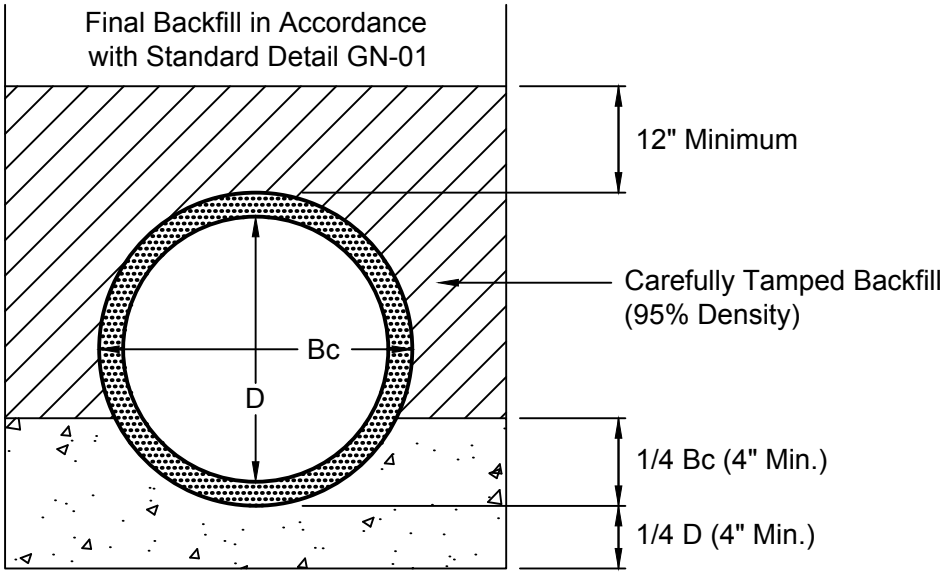
Steel Pipe Casing Detail & Specifications

Not to Scale

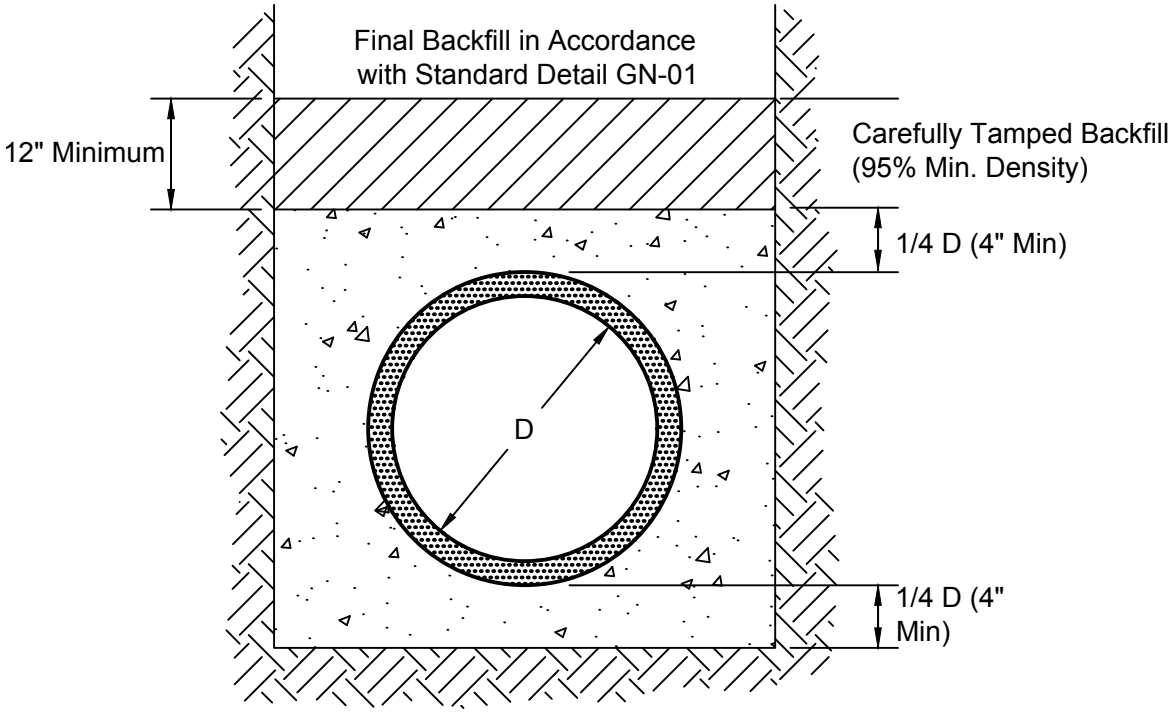
Revised: 09/2022

Concrete Cradle and Encasement Notes:

1) Concrete to be class "B" unless otherwise specified.
2) Trench width shall be as Specified in the USM or as shown on plans.
3) Reinforcing shall be provided as directed by the County Engineer or Inspector.



Standard Concrete Cradle



Standard Concrete Encasement

CAS-3

Fluvanna County Virginia
Construction Detail

Standard Concrete
Cradle and Encasement

Not to Scale

Revised: 09/2022

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 Across 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

DES-1

Fluvanna County Virginia
Construction Detail

Gravity Sanitary Sewer Design Calculation Sheet

Not to Scale

Revised: 09/2022

GENERAL NOTES

- ALL WORK SHALL BE COORDINATED WITH FLUVANNA COUNTY.
- CONTRACTOR SHALL NOTIFY THE VIRGINIA DEPARTMENT OF TRANSPORTATION PRIOR TO ANY CONSTRUCTION ON STREET RIGHT-OF-WAYS (PHONE NO. 434-432-7219).
- ANY CONSTRUCTION WITHIN THE VIRGINIA DEPARTMENT OF TRANSPORTATION'S RIGHT-OF-WAY IS TO BE IN ACCORDANCE WITH THE VDOT 2016 ROAD AND BRIDGE SPECIFICATIONS AND THE 2016 VDOT ROAD AND BRIDGE STANDARDS REGARDING MATERIALS, INSTALLATION, AND TESTING, UNLESS NOTED OTHERWISE IN THE CONTRACT DRAWINGS AND TECHNICAL SPECIFICATIONS, DCEPT THE METHOD OF PAYMENTS WHICH WILL BE AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS AND CONTACT DOCUMENTS. ANY CONSTRUCTION WITHIN THE VDOT RIGHTS-OF-WAYS AND AT ENTRANCES TO VDOT RIGHT-OF-WAYS ARE TO BE SIGNED IN ACCORDANCE WITH THE 2011 VIRGINIA WORK AREA PROTECTION MANUAL STANDARDS, REV.1.
- CONTRACTOR SHALL FIELD VERIFY VERTICAL AND HORIZONTAL LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE UTILITY COMPANIES 48 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY. CONTRACTOR SHALL CONTACT MISS UTILITY (811) 48 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION.
- PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING BUT NOT LIMITED TO, OFFSITE BORROW AND WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE PLAN APPROVING AUTHORITY AND DEPARTMENT OF ENVIRONMENTAL QUALITY, DEQ.
- CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO VERIFY LOCATION OF AND PREVENT DISTURBANCE OF ANY EXISTING UTILITIES IN WORK AREA, AND PROVIDE IMMEDIATE TEMPORARY SERVICE TO ANY DAMAGED UTILITIES.
- WHEN WORKING ADJACENT TO EXISTING STRUCTURES, POLES, ETC., CONTRACTOR SHALL USE WHATEVER METHODS NECESSARY TO PROTECT STRUCTURES FROM DAMAGE. REPLACEMENT OF DAMAGED STRUCTURES SHALL BE AT THE CONTRACTOR'S EXPENSE.
- DRIVEWAYS, FENCES, MAILBOXES, ROAD SIGNS, STEPS, SIDEWALKS, ETC., THAT INTERFERE WITH CONSTRUCTION ARE TO BE RESTORED TO ORIGINAL CONDITION.
- PAVED DRIVEWAYS, PARKING LOTS, AND PRIVATE ROADS SHALL BE OPEN-CUT UNLESS SHOWN OTHERWISE. ALL DISTURBED CONCRETE, PAVEMENT, AND GRAVEL DRIVES ARE TO BE RESTORED TO ORIGINAL CONDITION OR BETTER
- ALL AREAS WITHIN VDOT'S RIGHT-OF-WAYS THAT ARE DISTURBED BY CONSTRUCTION SHALL BE RESTORED PRIOR TO FINAL ACCEPTANCE IN ACCORDANCE WITH SECTION 107.08 OF THE 2016 VDOT ROAD AND & BRIDGE SPECIFICATIONS AND THE LAND USE PERMIT SPECIAL PROVISIONS (LUP SP). RESTORATION SHALL INCLUDE, BUT NOT BE LIMITED TO, REPLACING SHRUBBERY, SOD OR TOPSOIL WITH SEED, LIME, FERTILIZER, AND MULCH; REPLACING PAVED OR FINISHED SURFACES WITH SIMILAR MATERIALS, AND REPLACING AND/OR REPAIRING DAMAGED DRAINAGE STRUCTURES. SOIL STABILIZATION BLANKETS SHALL BE INSTALLED ON ALL SLOPES BEING REPLACED THAT ARE GREATER THAN 3:1 WITHIN VDOT RIGHT-OF-WAY.
- CONTRACTOR SHALL NOT DISTURB ANY TREES, SHRUBS, OR LANDSCAPING OUTSIDE THE CONSTRUCTION LIMITS. CONTRACTOR SHALL USE EXTREME CAUTION TO PREVENT DISTURBANCE TO THE TREES, SHRUBS, ETC., WHICH ARE IN THE CONSTRUCTION LIMITS AND NOTED TO REMAIN. "ANY TREE THAT IS DESIRED TO CUT ON VDOT'S RIGHT-OF-WAY REQUIRES APPROVAL FROM THE DISTRICT ARBORIST. TREES DESIRED TO BE CUT NEEDS TO BE FLAGGED PRIOR TO OBTAINING VDOT APPROVAL. CLEARING AND GRUBBING SHALL BE CONFINED TO THOSE AREAS APPROVED FOR CONSTRUCTION. NO TREES OR SHRUBS IN UNGRADED AREAS SHALL BE CUT WITHOUT THE PERMISSION OF THE VDOT."
- EROSION AND SEDIMENT CONTROL NOTES:
  A. ALL SEDIMENT CONTROL PRACTICES AND MEASURES SHALL CONFORM TO THE LATEST EDITION OF THE VIRGINIA EROSION AND CONTROL HANDBOOK AND THE 2016 VDOT ROAD AND BRIDGE SPECIFICATIONS.
  B. CONTRACTOR SHALL INSTALL SILT BARRIERS, INLET PROTECTION, CONSTRUCTION ENTRANCES AT POINTS OF INGRESS AND EGRESS TO PUBLIC RIGHT-OF-WAY, STABILIZE DISTURBED AREAS, AND PROVIDE OTHER MEASURES REQUIRED AS SHOWN ON THE DRAWINGS AND SPECIFIED.
  C. CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PREVENT TRACKING ON EXISTING PAVEMENTS.
  D. CONTRACTOR SHALL INSTALL GRAVEL CONSTRUCTION ROAD STABILIZATION OF ADEQUATE AREA TO ACCOMMODATE CONSTRUCTION VEHICLE PARKING, MATERIAL STORAGE, ETC. AT A LOCATION CONVENIENT TO THE INDIVIDUAL CONSTRUCTION AREAS AND CONSISTENT WITH THE CONSTRUCTION SEQUENCES.
  E. THE LOCATIONS OF SEDIMENT AND EROSION CONTROL MEASURES SHOWN ON PLANS ARE APPROXIMATE, THE EXACT LOCATION MUST BE DETERMINED IN THE FIELD.
  F. A ROCK CHECK DAM SHALL BE INSTALLED BELOW THE DISTURBED AREA WITHIN DITCH LINES AND/OR WHERE DITCH LINES OUTLET TO UNDISTURBED AREAS.
  G. SILT FENCE SHALL BE PROVIDED BELOW DISTURBED AREAS FOR ALL LOCATIONS WHERE DISTURBED AREA DRAINS TOWARD PROPERTY OWNER BY OTHERS AND/OR TOWARD STREAMS. SHOULD EXISTING DRAINAGE PIPES BECOME SILTED AS A RESULT OF CONSTRUCTION, IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CLEAN THE PIPES TO THE SATISFACTION OF VDOT. IN ADDITION, ANY DITCHES DISTURBED IN VDOT'S RIGHT-OF-WAY SHALL BE CLEANED/RESTORED.
  H. IN ACCORDANCE WITH VDOT ROAD AND BRIDGE SPECIFICATION §107.16 (A), LAND DISTURBING ACTIVITY WHICH OCCURS WITHIN THE VDOT RIGHT-OF-WAY MUST BE SUPERVISED BY A CERTIFIED EROSION AND SEDIMENT CONTROL (ESC) CONTRACTOR WHO IS REQUIRED TO BE ON-SITE AT ALL TIMES DURING THAT LAND-DISTURBING ACTIVITY. IF EROSION OR SCOUR OCCURS, THE DEVELOPER SHALL BE RESPONSIBLE FOR ALL CORRECTION MEASURES.

12. ALL DISTURBED AREAS ARE TO BE MULCHED AND SEEDED PER THE SPECIFICATIONS WITHIN 7 DAYS OF ACHIEVING FINAL GRADES.
13. IF CONSTRUCTION SCHEDULE DOES NOT ALLOW PERMANENT SEEDING IN THE DATES SHOWN IN THE SPECIFICATIONS OR IF CONSTRUCTION IS TEMPORARILY HALTED FOR A PERIOD OF 21 DAYS OR LONGER DUE TO WEATHER, WINTER SHUT DOWN, ETC., CONTRACTOR SHALL INSTALL TEMPORARY SEEDING WITHIN 7 DAYS. WHEN PERMANENT SEEDING DATES CAN BE ACCOMMODATED, THE CONTRACTOR SHALL RESEED WITH PERMANENT SEEDING MIXTURES. ALL SEEDED AREAS, WHICH DO NOT PRODUCE A THICK, HEALTHY, DESIRABLE VEGETATIVE COVER, ARE TO BE RESEEDED AND MULCHED AS NECESSARY UNTIL ACCEPTABLE VEGETATIVE COVER IS ESTABLISHED. PRIOR TO RESEEDING WITH PERMANENT VEGETATION, ALL ESTABLISHED TEMPORARY VEGETATION IS TO BE REMOVED.
14. TOPSOIL IS TO BE STOCKPILED AND RE-SPREAD OVER DISTURBED AREAS TO BE SEEDED PER THE TECHNICAL SPECIFICATIONS. STOCKPILES SHALL BE GRADED TO PROVIDE POSITIVE DRAINAGE AND SEDIMENT AND EROSION CONTROLS DEVICES/MEASURES SHALL BE INSTALLED AS NECESSARY. THESE STOCKPILES ARE TO BE LOCATED IN AREAS THAT MINIMIZE DISTURBANCE TO CONSTRUCTION OPERATIONS.

DES-2.1

Fluvanna County Virginia
Construction Detail

General Notes

Not to Scale

Revised: 09/2022

GENERAL NOTES

- WHEN CONSTRUCTION DISTURBS EXISTING DITCHLINES, THE RESTORED DITCHLINES SHALL BE STABILIZED WITH EXCELSIOR MAT FOR EROSION CONTROL.
- ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES TO BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER MEASURES ARE NO LONGER NEEDED, UNLESS OTHERWISE AUTHORIZED BY THE LOCAL PROGRAM ADMINISTRATOR.
- VERTICAL CONTROL FOR THIS PROJECT IS REFERENCED TO VIRGINIA STATE PLANE GRID COORDINATES (INSERT PROJECT ZONE) US SURVEY FEET.

  HORIZONTAL: 12345
  VERTICAL: 12345
  AVERAGE COMBINED FACTOR: GROUND TO GRID 12345
- CONSTRUCTION WITHIN VDOT'S RIGHT-OF-WAY SHALL CONFORM TO ALL APPLICABLE SECTIONS OF THE 2011 VIRGINIA WORK AREA PROTECTION MANUAL, REV. 1, AND TO THE APPROVED TRANSPORTATION MANAGEMENT PLAN (TMP). ANY PROPOSED DEVIATION FROM THE APPROVED PLAN SHALL BE APPROVED BY VDOT. CONTROL OF TRAFFIC ELEMENTS RELATING TO ROAD REGULATIONS & CONSTRUCTION MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY VDOT".
- LAND DISTURBANCE ACTIVITIES AND RELATED EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT EDITION OF THE PITTSYLVANIA COUNTY PUBLIC SERVICE AUTHORITY'S STANDARD SPECIFICATION UNLESS, A MORE STRINGENT REQUIREMENT IS SHOWN ON PLANS OR LISTED IN PROJECT SPECIFICATIONS.
- "ALL CONTRACTORS PERFORMING CONSTRUCTION ACTIVITIES UNDER THE AUSPICES OF A VDOT LAND USE PERMIT MUST HAVE AT LEAST ONE (1) EMPLOYEE ON-SITE WHO, AT A MINIMUM, IS VERIFIED BY VDOT IN BASIC WORK ZONE TRAFFIC CONTROL FOR ACTIVITIES INVOLVING THE INSTALLATION, MAINTENANCE AND REMOVAL OF WORK ZONE TRAFFIC CONTROL DEVICES. AN EMPLOYEE VERIFIED BY VDOT IN INTERMEDIATE OR ADVANCED WORK ZONE TRAFFIC CONTROL MUST BE ON-SITE TO PROVIDE SUPERVISION DURING WORKZONE ADJUSTMENTS OR CHANGES TO TRAFFIC CONTROL DUE TO FIELD CONDITIONS. THESE PERSONS MUST HAVE THEIR CERTIFICATION CARD WITH THEM WHILE ON THE PROJECT SITE."
- A LAND USE PERMIT (LUP) SHALL BE OBTAINED FROM THE VIRGINIA DEPARTMENT OF TRANSPORTATION PRIOR TO BEGINNING ANY CONSTRUCTION WITHIN THE EXISTING STATE MAINTAINED RIGHT OF WAY. THE LUP MAY BE OBTAINED FROM THE LOCAL VDOT LAND USE OFFICE LOCATED AT (INSERT LOCAL VDOT LAND USE OFFICE ADDRESS). VDOT SHALL BE INVITED TO THE PRECONSTRUCTION MEETING.
- ALL UTILITY LINES SHALL HAVE A MINIMUM OF THREE (3) FEET OF COVER AND BE INSTALLED NOT LESS THAN 3' FROM ANY EXISTING/PROPOSED GUARDRAIL POSTS. ALL UTILITY LINES & APPURTENANCES SHALL BE INSTALLED 5' OR GREATER OFF THE EDGE OF PAVEMENT. DO NOT INSTALL UTILITY APPURTENANCES IN DITCH LINES. IN CASES WHERE THERE ARE LESS THAN 5 FEET BETWEEN THE EDGE OF PAVEMENT AND GUARDRAIL POSTS AND THE UTILITY CANNOT BE INSTALLED BEYOND THE GUARDRAIL, INSTALL UTILITY HALF-WAY BETWEEN THE TWO ITEMS, BUT NO CLOSER THAN TWO FEET TO THE POSTS (OUTSIDE DIMENSION OF THE UTILITY TO POSTS).
- VDOT APPROVAL OF THESE PLANS EXPIRES THREE YEARS FROM DATE OF APPROVAL, IF A LAND USE PERMIT HAS NOT BEEN ISSUED."
- FINAL RIM ELEVATIONS IN VDOT'S R/W SHALL NOT BE GREATER THAN THE FINISH GRADE. ALL AREAS WITHIN VDOT'S R/W WITH SLOPES OF 3:1 OR GENTLER SHALL BE CONSIDERED TRAFFIC BEARING AREAS, AND ANY UTILITY VAULTS/MANHOLES SHALL BE INSTALLED WITH TRAFFIC BEARING COVERS."
- "ANY EDGE LINE OR CENTERLINE MARKINGS DESTROYED SHALL BE REPLACED ACCORDING TO THE CURRENT VDOT REQUIREMENTS.
- "REPLACE ANY DISTURBED RIGHT OF WAY MONUMENTS IN ACCORDANCE TO 2016 ROAD AND BRIDGE STANDARDS RM-2."
- PROPOSED TEMPORARY ENTRANCES, FROM VDOT MAINTAINED ROADWAYS TO ACCESS WORK SITE, MATERIAL/EQUIPMENT STORAGE AREAS, OR DISPOSAL SITES, SHALL BE APPROVED BY VDOT PRIOR TO WORK BEING STARTED. ALL TEMPORARY ENTRANCES APPROVED SHALL BE REMOVED AND RESTORED TO ORIGINAL CONDITION PRIOR TO FINAL ACCEPTANCE.
- CONTRACTOR SHALL PERFORM ALL WORK IN ACCORDANCE WITH SEQUENCE OF CONSTRUCTION AND WORK RESTRICTIONS DESCRIBED IN SPECIFICATION SECTION 12345.
- THE LIMITS OF DISTURBANCE IS LOCATED WITHIN THE EXISTING VDOT RIGHT-OF-WAY AND/OR 20' PERMANENT AND 30' TEMPORARY UTILITY CONSTRUCTION EASEMENT, REFERENCE DRAWINGS FOR LIMITS.
- CONTRACTOR SHALL REMOVE TREES AND UNDERGROWTH WITHIN THE PROPOSED 20' PERMANENT EASEMENT.
- INSTALL BLANKET MATTING ON ALL DISTURBED DITCHLINES STEEPER THAN 2.00% SLOPE. ALL DISTURBED AREAS ARE TO BE MULCHED AND SEEDED PER THE SPECIFICATIONS WITHIN 7 DAYS OF ACHIEVING FINAL GRADES.
- REFRAIN FROM DISTURBING ALL WETLANDS AND STREAMS UNLESS OTHERWISE DIRECTED IN THE CONTRACT DOCUMENTS. IF CONTRACTOR DOES DISTURB WETLANDS, THEY MUST BE RESTORED TO ORIGINAL CONTOUR, AND ALL EXCESS EXCAVATED MATERIAL MUST BE COMPLETELY REMOVED FROM THE WETLANDS. (REF. NATIONWIDE 12 PERMIT FOR ALL REGULATIONS REGARDING WETLANDS FOR THIS PROJECT.)
- ALL UTILITIES MAY NOT BE SHOWN AND ARE SHOWN GRAPHICALLY ONLY. CONTRACTOR IS RESPONSIBLE FOR CONTACTING MISS UTILITY 811 AND FIELD VERIFYING LOCATION VERTICALLY AND HORIZONTALLY. THE CONTRACTOR IS RESPONSIBLE FOR TEMPORARY AND PERMANENT REPAIRS TO ANY UTILITY DAMAGED DURING CONSTRUCTION.
- CONTRACTOR SHALL PROVIDE A MIN. 18" VERTICAL AND HORIZONTAL SEPARATION BETWEEN WATERLINE, SEWERLINE, AND CULVERTS.
- RESTRAINED JOINTS TO BE PROVIDED AT ALL FITTINGS AND CONNECTIONS ON FORCEMAIN AND WATERLINE AND AS NOTED ON PLANS (REF. DETAILS.)

DES-2.2

Fluvanna County Virginia
Construction Detail

General Notes

Not to Scale

Revised: 09/2022

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		BUILDING
		CONTOURS
		CURB & GUTTER
		CONCRETE WALK OR SLAB
		PAVEMENT
		UNIMPROVED OR GRAVEL
		TREE LINE
		TREE OR SHRUB
		FENCE & GATE
		DITCH OR SWALE
		CREEK / WATERS EDGE
		PROPERTY LINE
		CENTERLINE
R/W	R/W	STREET RIGHT-OF-WAY
		LIMITS OF GRADING
		STORM STRUCTURE & LINE
		FLARED END SECTION
		ENDWALL
W	W	WATERLINE
YH	YH	YARD HYDRANT
		WATER METER
		FIRE HYDRANT ASSEMBLY
		VALVE ASSEMBLY
		PRESSURE PIPE & FITTINGS
	ARV	AIR RELEASE VALVE
SS S		SAN. SEWER M.H. & LINE
		FORCEMAIN
C.O.	C.O.	CLEANOUT
G	G	GASLINE
OHE	OHE	OVERHEAD ELECTRIC LINE

EXISTING	PROPOSED	DESCRIPTION
UGE	UGE	UNDERGROUND ELECTRIC LINE
OHT	OHT	OVERHEAD UTILITY LINE
		POLE, GUY, & ANCHOR
T	T	TELEPHONE PEDESTAL
FO	FO	FIBER OPTIC CABLE
UGT	UGT	UNDERGOUND TELEPHONE
UGU	UGU	UNDERGOUND UTILITY
		SURVEY TRAVERSE POINTS
		SUBSURFACE BORING
		BENCHMARK
	1	REVISION NUMBER
		CABLE (TELEVISION OR FIBER OPTIC)
		WELL
		MONUMENT
		ROAD SIGN
		MAILBOX
		GROUND LIGHTS
		LIGHT POLE
		GUARD PIPE POST
x100.00	x100.00	SPOT ELEVATION
	SF	SILT FENCE
	CD	CHECK DAM
	DV	DIVERSION
	CE	CONSTRUCTION ENTRANCE
	CIP	CULVERT INLET PROTECTION
	OP	OUTLET PROTECTION
	IP	INLET PROTECTION
PS		PERMANENT SEEDING
TS		TEMPORARY SEEDING
	LS	LEVEL SPREADER
BM	BM	BLANKET MATTING
	UCS	UTILITY STREAM CROSSING

DES-3

Fluvanna County Virginia
Construction Detail

Symbols Legend

Not to Scale

Revised: 09/2022

ABBREVIATIONS

A	AIR
A.B.	ANCHOR BOLT
ABUT	ABUTMENT
ADD	ADDITIONAL
ADJ	ADJUSTABLE
AGGR	AGGREGATE
ALT	ALTERNATE
ALUM	ALUMINUM
ASTM	AMERICAN STANDARD FOR TESTING & MATERIALS
AWWA	AMERICAN WATER WORKS ASSOCIATION
ASSY	ASSEMBLY
APPROX	APPROXIMATE
BOC	BACK OF CURB
BSMT	BASEMENT
BO	BLOW OFF
BRG	BEARING
BM	BENCH MARK
B	BEND
BOTT	BOTTOM
BOB	BOTTOM OF BANK
BRZ	BRONZE
BLDG	BUILDING
CI	CAST IRON
CB	CATCH BASIN
CEM	CEMENT
CL	CENTERLINE
CO	CLEAN OUT
CONC	CONCRETE
CONN	CONNECTION
CONT	CONTINUOUS
CMP	CORRUGATED METAL PIPE
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CU IN	CUBIC INCH
CULV	CULVERT
CV	CHECK VALVE
C & G	CURB & GUTTER
CY	CUBIC YARD
DEPT	DEPARTMENT
GEN	GENERATOR
GOVT	GOVERNMENT
DET	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DIST	DISTANCE
DN	DOWN
DWG	DRAWING
DR	DRIVE
DI	DROP INLET
DIP	DUCTILE IRON PIPE
DMH	DROP MANHOLE
D	DRAIN
DWL	DWELLING
EA	EACH
EF	EACH FACE
EW	EACH WAY, END WALL
EOP	EDGE OF PAVEMENT
EL	ELBOW
ELEC	ELECTRICAL, ELECTRIC
ELEV	ELEVATION
ENGR	ENGINEER
ENTR	ENTRANCE
EQUIP	EQUIPMENT
EX, EXIST.	EXISTING
EJ	EXPANSION JOINT
EXT	EXTERIOR
FOC	FACE OF CURB
FT	FEET
FES	FLARED END SECTION
FIG	FIGURE
FIN	FINISH
FH	FIRE HYDRANT
FLEX	FLEXIBLE
F.F.	FINISHED FLOOR
FL	FLOOR
FD	FLOOR DRAIN
FLOUR	FLOURESCENT
FM	FORCE MAIN
FLG	FLANGE
GPM	GALLONS PER MINUTE
GALV	GALVANIZED
GV	GATE VALVE
GRD	GRADE
GA	GAUGE
GPDW	GYPSUM DRYWALL
HTR	HEATER
HVAC	HEATING VENTILATION & AIR CONDITIONING
HT	HEIGHT
HWY	HIGHWAY
HOR	HORIZONTAL
HP	HORSEPOWER, HIGH POINT
IN	INCH
ID	INSIDE DIAMETER
INSUL	INSULATION
INT	INTERIOR
INV	INVERT
JB	JUNCTION BOX
LB	POUND
LG	LENGTH OR LONG
LF	LINEAR FEET
LP	LOW POINT
LT	LEFT
MB	MAILBOX
MH	MANHOLE
MFR	MANUFACTURER
MATL	MATERIAL
MAX	MAXIMUM

DES-4.1

Fluvanna County Virginia
Construction Detail

Abbreviations

Not to Scale

Revised: 09/2022

ABBREVIATIONS

MJ	MECHANICAL JOINT
MGD	MILLION GALLONS PER DAY
MIN	MINIMUM
MISC	MISCELLANEOUS
ML	MIXED LIQUOR
NEMA	NATIONAL ELECTRIC MANUFACTURERS ASSOCIATION
NPW	NON POTABLE WATER
NPR	NON POTABLE REUSE WATER
NATL	NATIONAL
N	NEW
NCDOT	NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
NO	NUMBER
OC	ON CENTER
OD	OUTSIDE DIAMETER
OSHA	OCCUPATIONAL SAFETY & HEALTH ACT
PB	PAPER BOX
PVC	POLYVINYL CHLORIDE
PRV	PRESSURE RELIEF VALVE, PRESSURE REDUCING VALVE
PL	PROPERTY LINE
PED	PEDESTAL
PVMT	PAVEMENT
PERF	PERFORATED
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND
PI	CURVATURE POINT OF INTERSECTION
PP	POWER POLE
PRC	POINT OF REVERSE CURVE
PT	POINT OF TANGENCY
POVC	POINT OF VERTICAL CURVE
PVI	POINT OF VERTICAL INTERSECTION
RAD	RADIUS REF REFERENCE
RAS	RETURN ACTIVATED SLUDGE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD, ROOF DRAIN
REQ'D	REQUIRED REV REVISED
RT	RIGHT
R/W, ROW	RIGHT OF WAY
R	RISER
RS	RAW SEWAGE
SE	SECONDARY EFFLUENT
SIM	SIMILAR
SPEC	SPECIFICATION
SR	STATE ROUTE OR SECONDARY ROAD
STD	STANDARD
STA	STATION
STL	STEEL
S.S.	SANITARY SEWER, STAINLESS STEEL
SSC	SECONDARY SCUM
SCH	SCHEDULE
SECT	SECTION
SHT	SHEET
STM	STORM
ST	STREET
STY	STORY
TD	TANK DRAIN
TEL	TELEPHONE
TEMP	TEMPORARY OR TEMPERATURE
THK	THICK
T & B	TOP AND BOTTOM
TOB	TOP OF BANK
TOW	TOP OF WALL
TDC	TURNED DOWN CURB
TYP	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITER'S LABORATORY
VERT	VERTICAL
VC	VERTICAL CURVE
VDOT	VIRGINIA DEPT OF TRANSPORATION
W/	WITH
WAS	WASTE ACTIVATED SLUDGE
WL	WATER MAIN

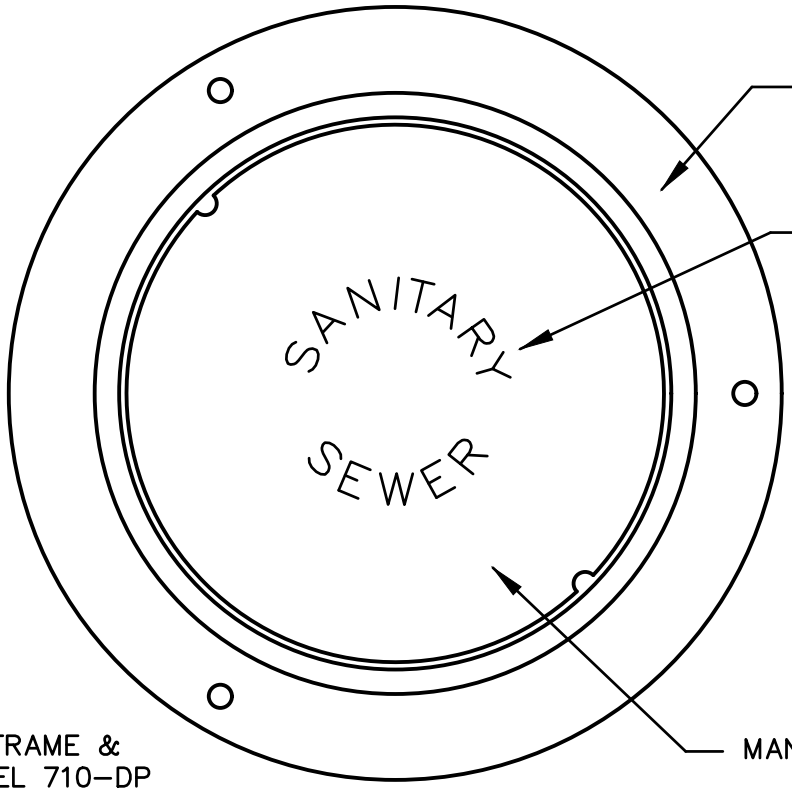
DES-4.2

Fluvanna County Virginia
Construction Detail

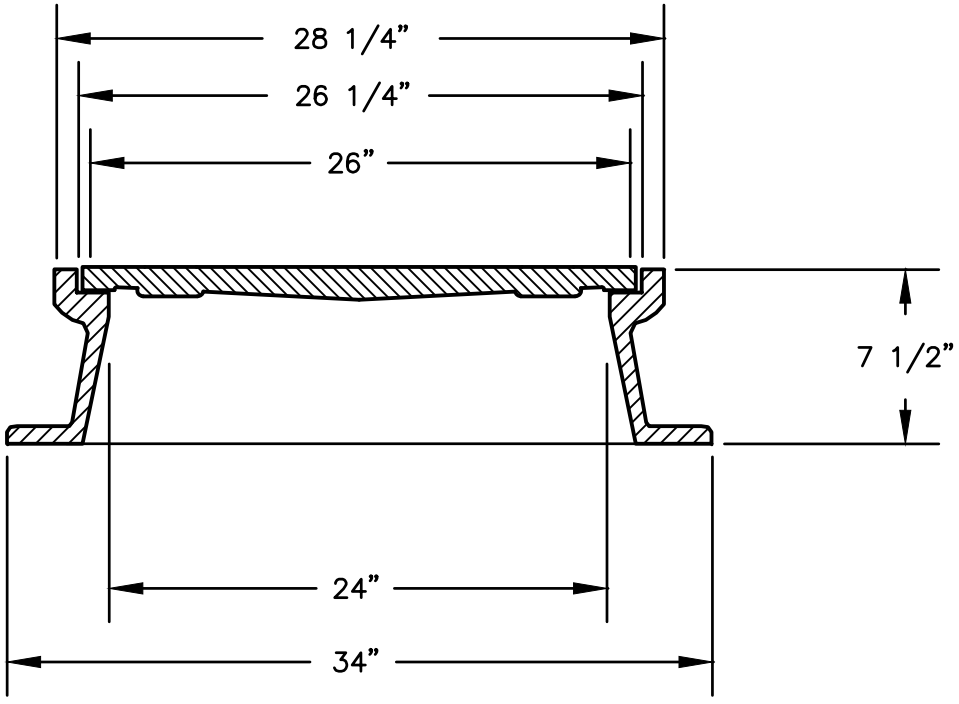
Abbreviations

Not to Scale

Revised: 09/2022



NOTE : MANHOLE FRAME & COVER TO BE MODEL 710–DP BY U.S. FOUNDRY & MFG. CORP. OR ENGR. APPROVED EQUAL



MAN-7

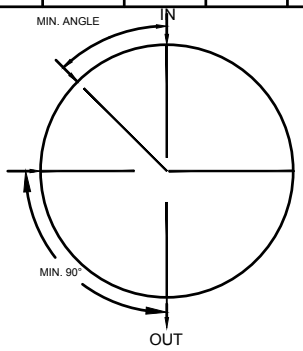
Fluvanna County Virginia
Construction Detail

Non-Traffic Area Manhole Frame and Cover

Not to Scale

Revised: 09/2022

		PIPE SIZE													
		8	10	12	15	18	21	24	27	30	33	36	42	48	54
48" MH	8	38°	40°												
	10	40°	43°												
	12	43°'	45°	48°											
	15	47°	49°	51°	55°										
	18	55°	57°	59°	63°	71°									
	21	59°	61°	64°	67°	76°	80°								
	24	63°	65°	68°	71°	80°	84°	88°							
60" MH	12	34°	36°	38°	41°										
	15	37°	39°	41°	44°										
	18	44°	46°	48°	51°	57°									
	21	47°	49°	51°	54°	61°	64°								
	24	51°	53°	54°	57°	64°	67°	71°							
	27	54°	56°	58°	61°	67°	71°	74°	77°						
	30	57°	59°	61°	64°	71°	74°	77°	81°	84°					
	33	61°	63°	64°	67°	74°	77°	81°	84°	87°	90°				
72" MH	15				37°	42°									
	18				42°	48°									
	21				45°	50°	53°								
	24				48°	53°	56°	59°							
	27				50°	56°	59°	62°	64°						
	30				53°	59°	62°	64°	67°	70°					
	33				56°	62°	64°	67°	70°	73°	76°		②		
	36				59°	64°	67°	70°	73°	76°	78°	81°	87°		
84" MH	18					41°	43°								
	21					43°	46°								
	24					46°	48°	50°							
	27					48°	50°	53°	55°						
	30					50°	53°	55°	58°	60°					
	33					53°	55°	58°	60°	62°	65°				
	36					55°	58°	60°	62°	65°	67°	70°			
	42					60°	62°	65°	67°	70°	72°	74°	79°		
	48					65°	67°	70°	72°	74°	77°	79°	84°	89°	
96" MH	54								67°	69°	71°	73°	78°	82°	86°



THICK-WALL OR NON-FLOAT PIPE MUST BE CALCULATED.

*D=PIPE DIAMETER
W=PIPE WALL THICKNESS

PIPE 18" AND OVER IS ASSUMED TO BE CONCRETE.

② 42" PIPE WILL BE ALLOWED IN 72" MH WHERE THE CALCULATION ALLOWS IT. FOR EXAMPLE, STRAIGHT THRU OR MIN. ANGLE OVER 92° FOR TWO 42" PIPES.

MINIMUM ANGLE FOR COMBINATIONS NOT GIVEN MAY BE DERVIVED BY:

$$\frac{D1/2 + D2/2 + (7 + W1 + W2)}{\Pi * \text{MH DIA.}} \times 360$$

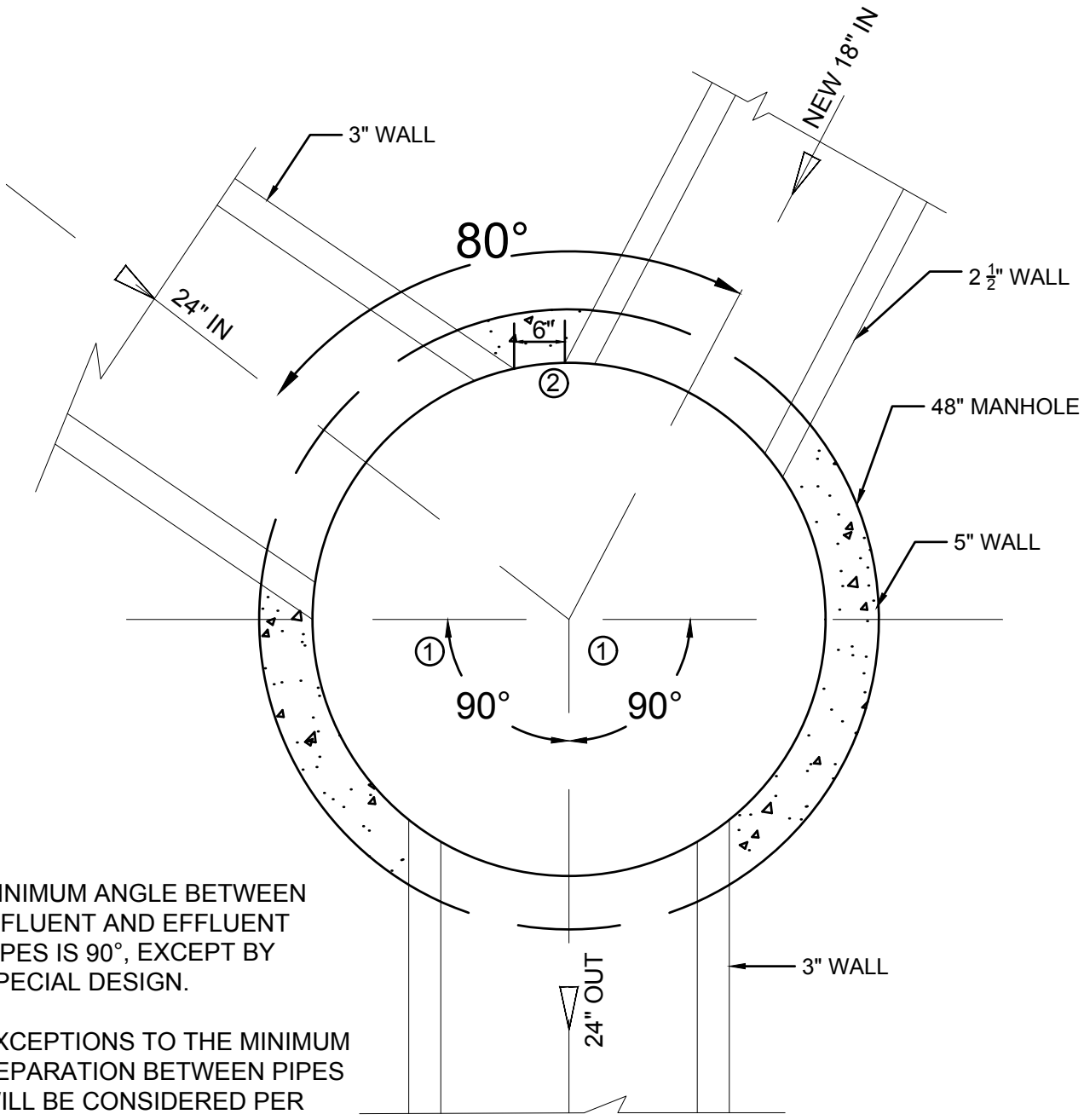
MAN-1.1

Fluvanna County Virginia
Construction Detail

Manhole Sizing and Minimum Angle Table

Not to Scale

Revised: 09/2022



NOTES:

1. MINIMUM ANGLE BETWEEN INFLUENT AND EFFLUENT PIPES IS 90°, EXCEPT BY SPECIAL DESIGN.

2. EXCEPTIONS TO THE MINIMUM SEPARATION BETWEEN PIPES WILL BE CONSIDERED PER EACH, BY SPECIAL DESIGN.

EXAMPLE: 48" MANHOLE, EXISTING 24" IN, EXISTING 24" OUT, NEW 18" IN, ALL CONCRETE. MAN-1 TABLE INDICATES A MINIMUM ANGLE OF 80° BETWEEN THE EXISTING 24" (IN) AND THE NEW 18" (IN), RESULTING IN APPROXIMATE 6" OF INTERIOR MANHOLE WALL REMAINING BETWEEN THE 2 PIPES.

MAN-1.2

Fluvanna County Virginia
Construction Detail

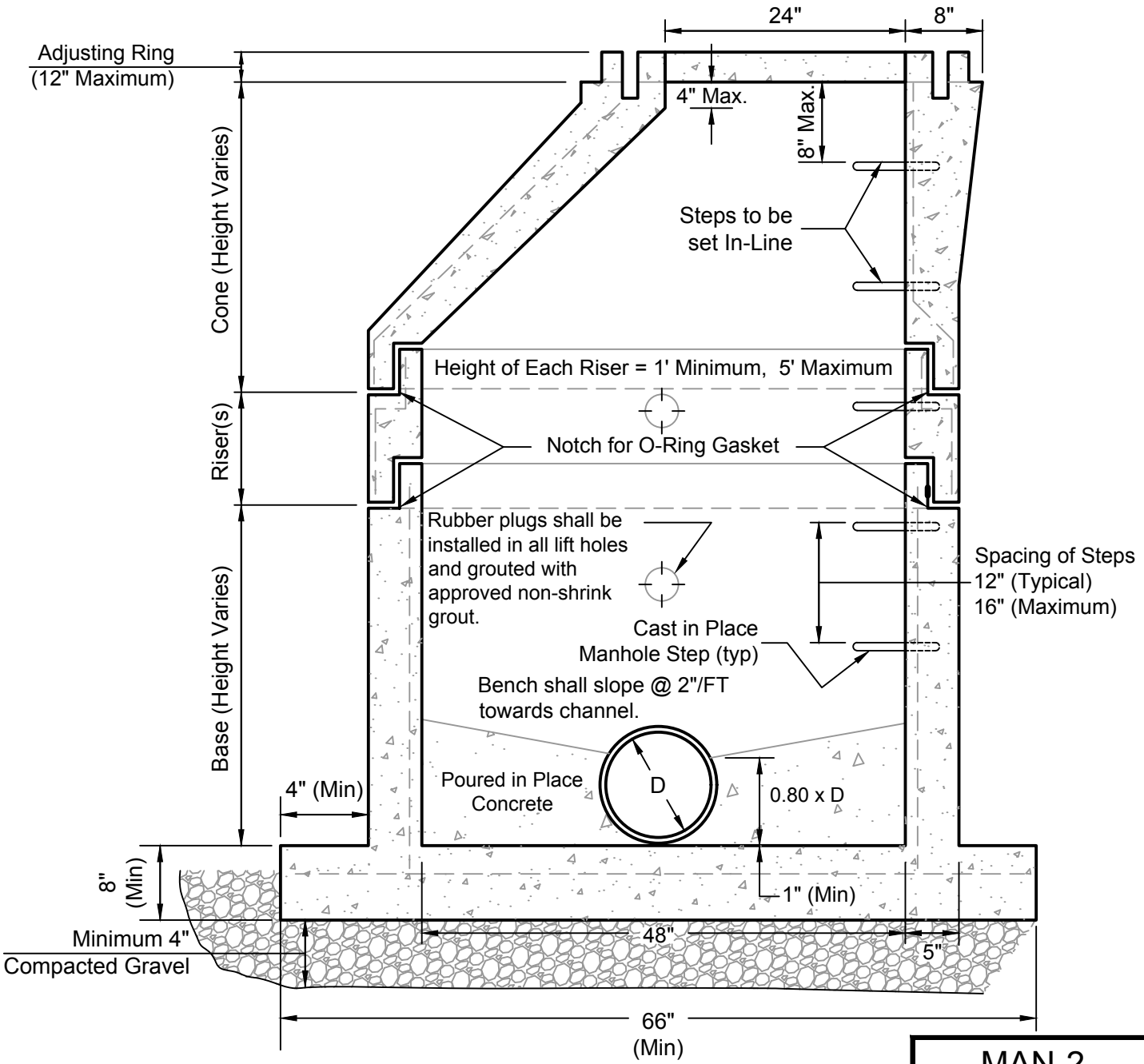
Manhole Sizing and Minimum Angle Table

Not to Scale

Revised: 09/2022

Notes:

1) All manholes shall meet the current requirements of ASTM Specification C-476.
2) Concrete shall be 4,000 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) A 12" minimum width band of Infiltration Sealing Tape shall be wrapped around the manhole at each joint, centered on the joint. Mastic Sealing Tape shall be Boa-Tape Brand, or approved equal.
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 all gouges and/or bare spots shall be touched-up before backfilling.



MAN-2

Fluvanna County Virginia
Construction Detail

Precast Concrete Manhole
Standard 4' Inside Diameter

Not to Scale

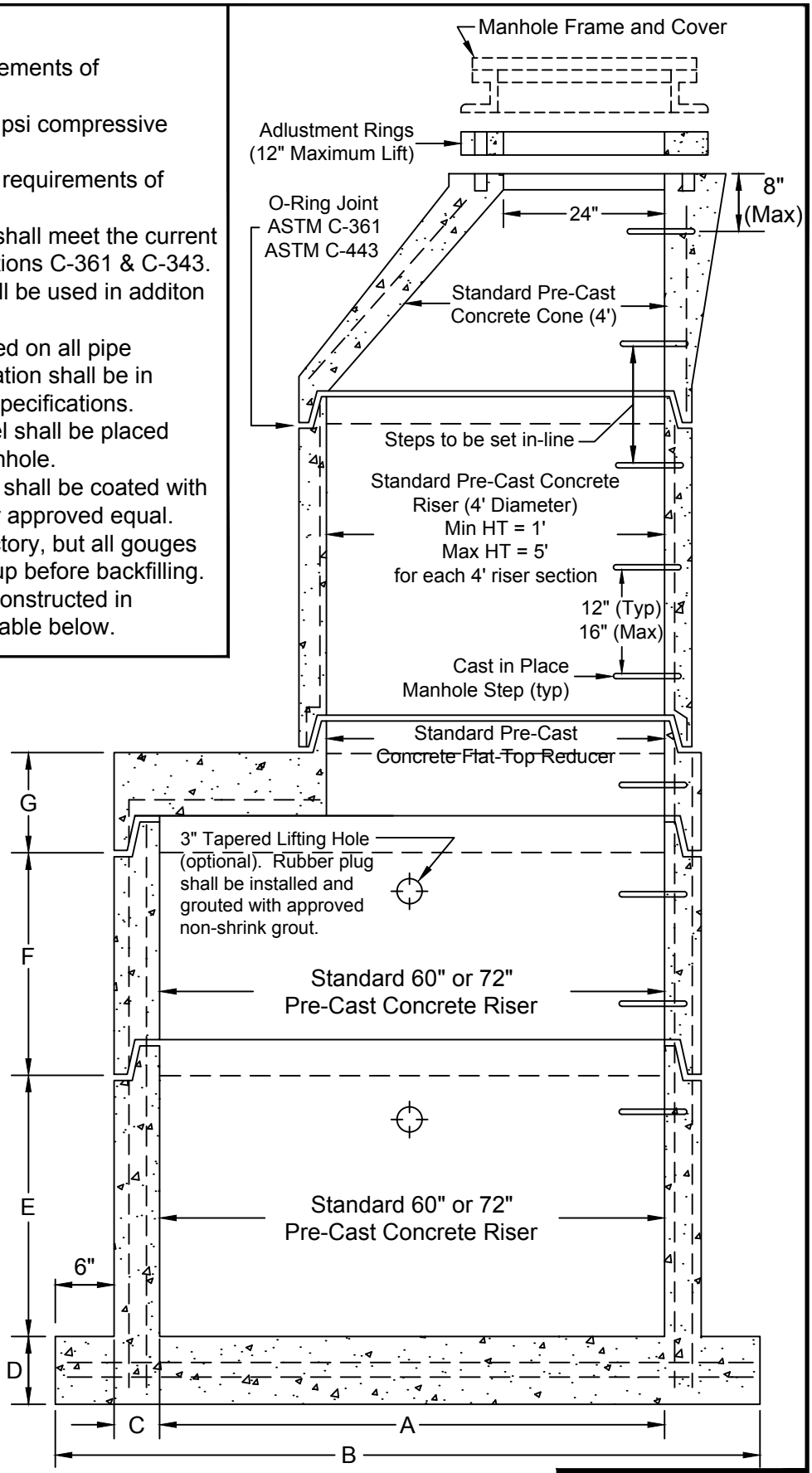
Revised: 09/2022

Notes:

1) All manholes shall meet the requirements of ASTM Specification C-478.
2) Concrete shall be minimum 4,000 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 all gouges and 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'
Dimensions (see drawing at right)	A	60"	72"
	B	84"	98"
	C	6"	7"
	D	8"	8"
	E	Varies (Min 3', Max 5')	
	F	Varies (Min 1', Max 5')	
	G	13" min.	

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



MAN-3

Fluvanna County Virginia
Construction Detail

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

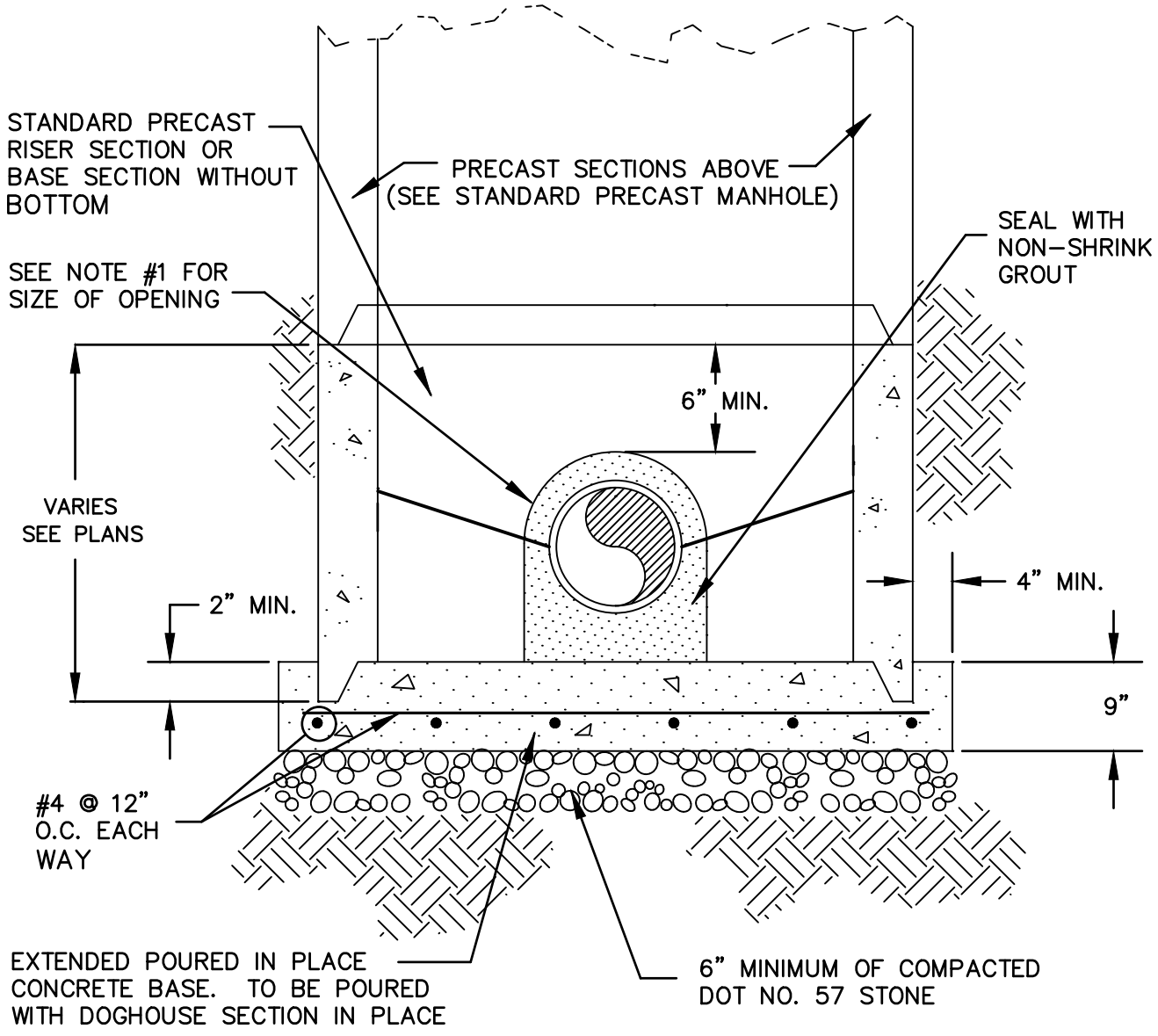
Not to Scale

Revised: 09/2022

NOTES :

1. HOLES IN PRECAST UNIT ARE TO BE 4" MINIMUM TO 8" MAXIMUM LARGER THAN THE OUTSIDE DIAMETER OF THE EXISTING PIPE.

2. DOGHOUSE OPENING TO BE USED ONLY WHEN PLACING A NEW MANHOLE OVER AN EXISTING LINE. SIZE, LOCATION, AND ANGLE OF ENTRY TO BE AS SHOWN ON PLANS



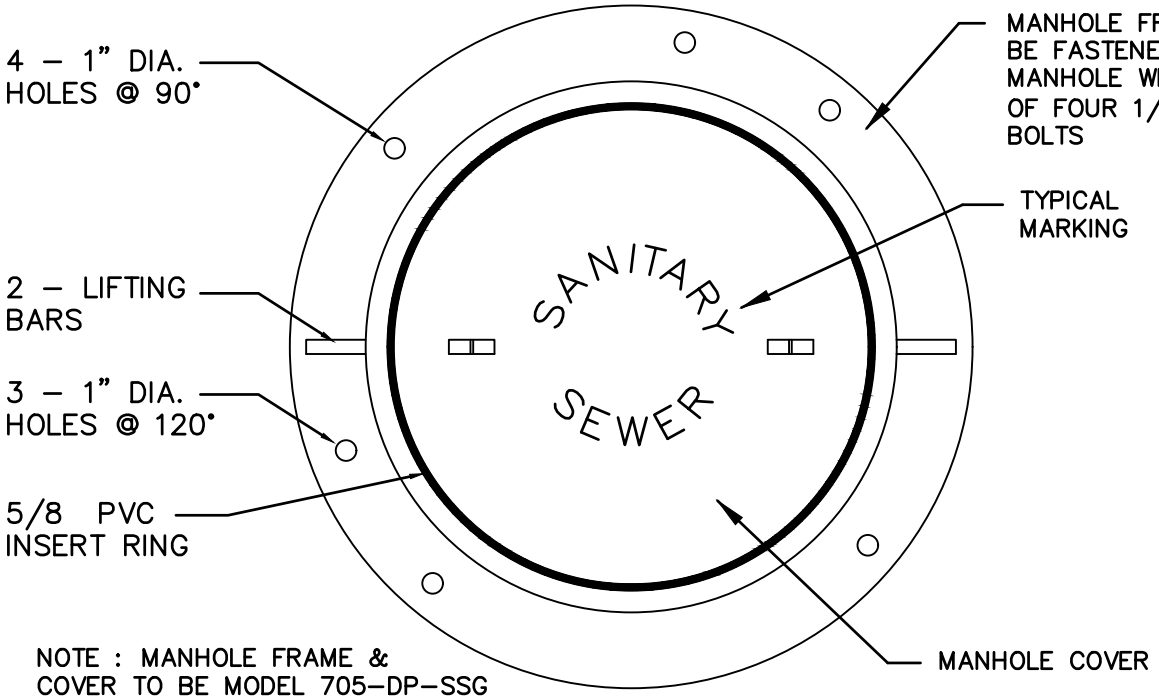
MAN-4

Fluvanna County Virginia
Construction Detail

Typical Doghouse Manhole

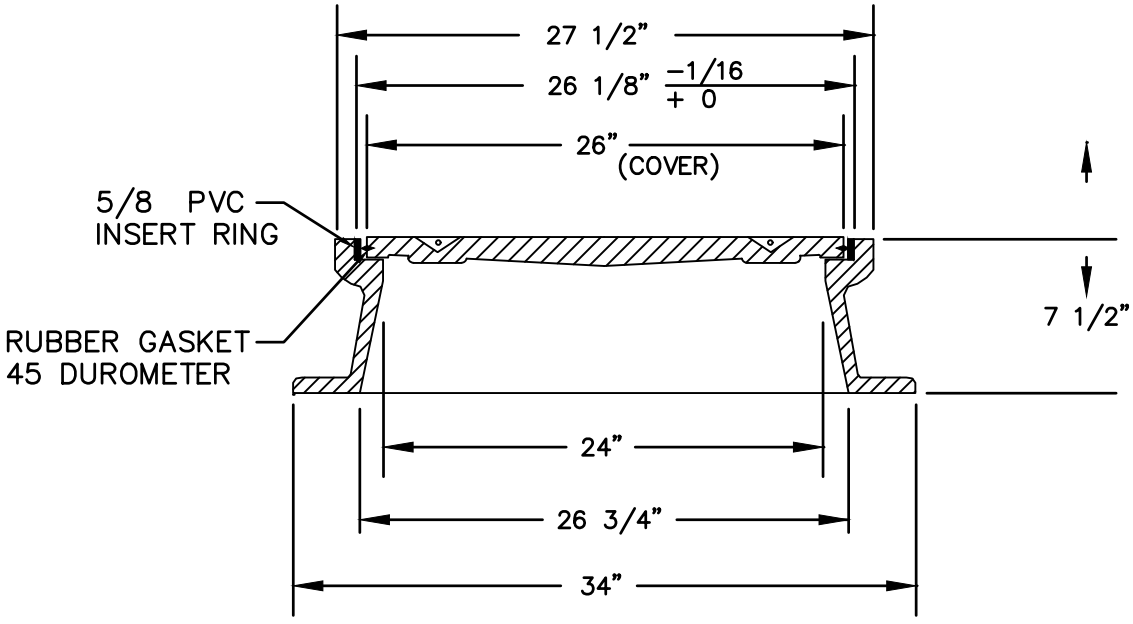
Not to Scale

Revised: 09/2022



NOTE : MANHOLE FRAME & COVER TO BE MODEL 705–DP–SSG BY U.S. FOUNDRY & MFG. CORP. OR ENGR. APPROVED EQUAL

MATERIAL = GRAY IRON (ASTM–A48 CLASS 30B)



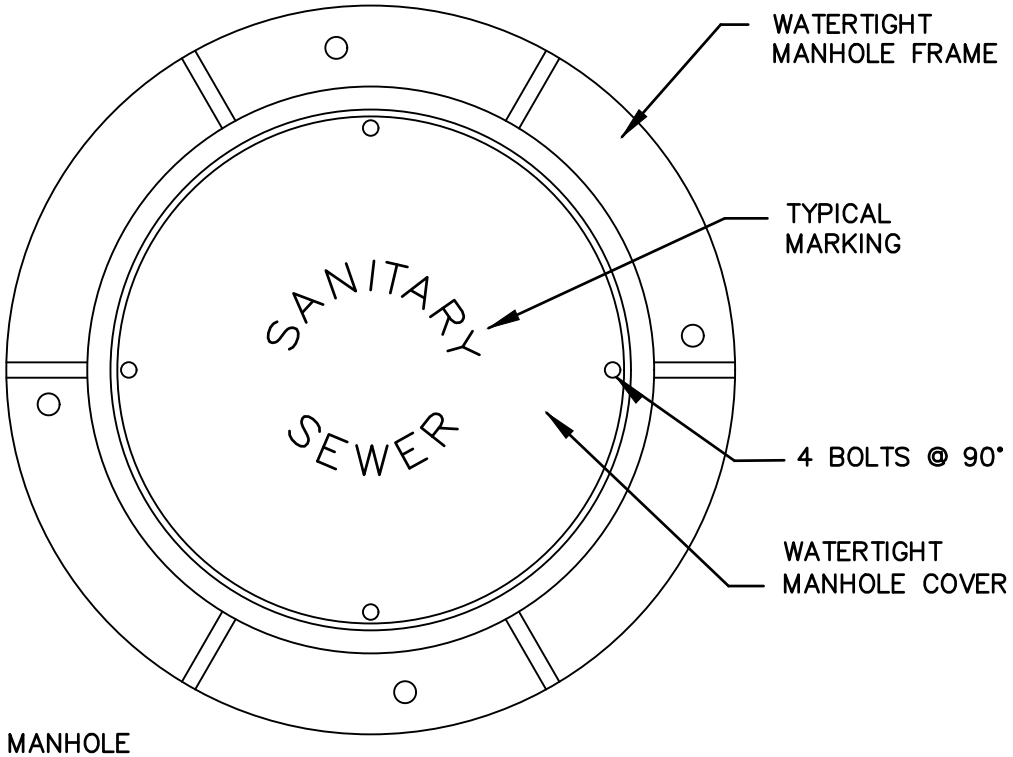
MAN-5

Fluvanna County Virginia
Construction Detail

Standard Manhole Frame and Cover

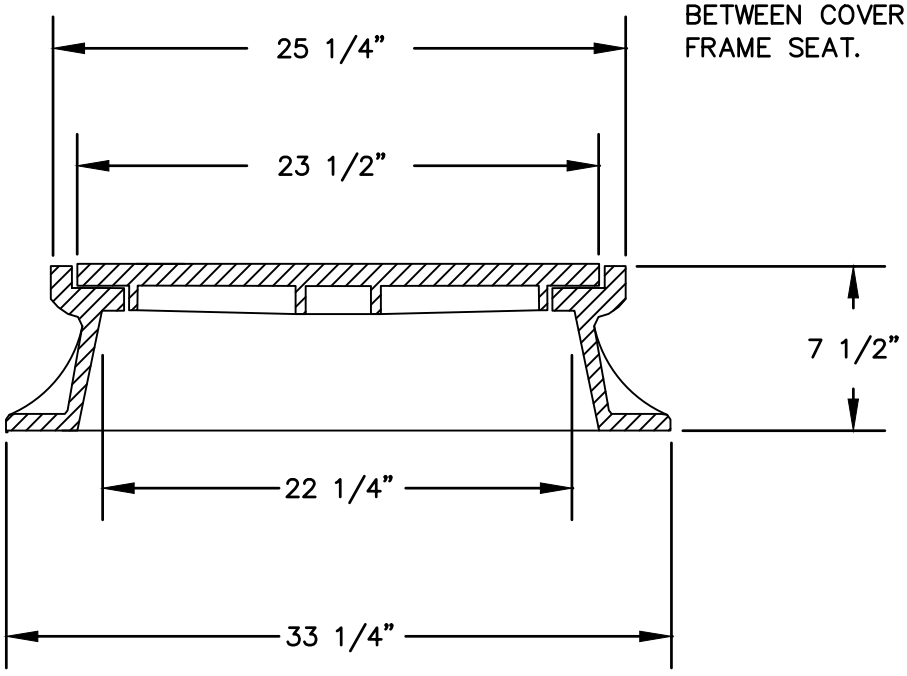
Not to Scale

Revised: 09/2022



NOTE: WATERTIGHT MANHOLE FRAME & COVER TO BE MODEL 700–KL–SSG BY U.S. FOUNDRY & MFG. CORP. OR ENGR. APPROVED EQUAL.

NOTE: FURNISH STAINLESS STEEL MACHINE SCREWS NECESSARY TO SECURE COVER TO FRAME AND POLYVINYL GASKET BETWEEN COVER AND FRAME SEAT.



MAN-6

Fluvanna County Virginia
Construction Detail

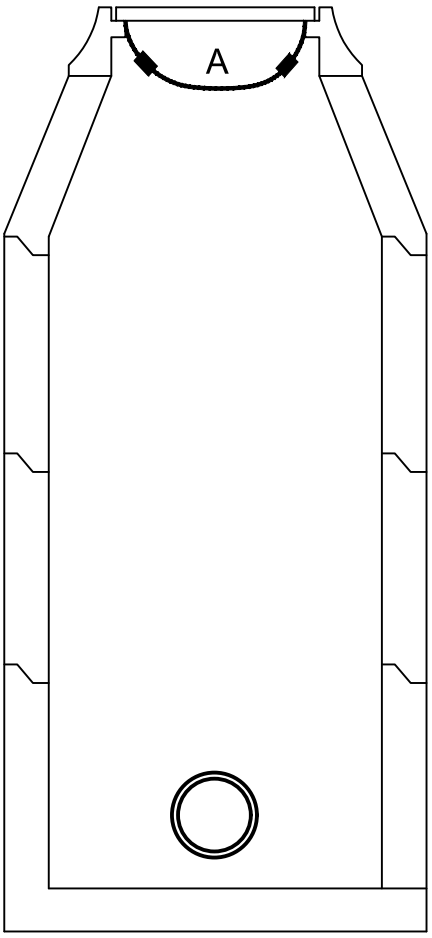
Watertight Manhole Frame and Cover

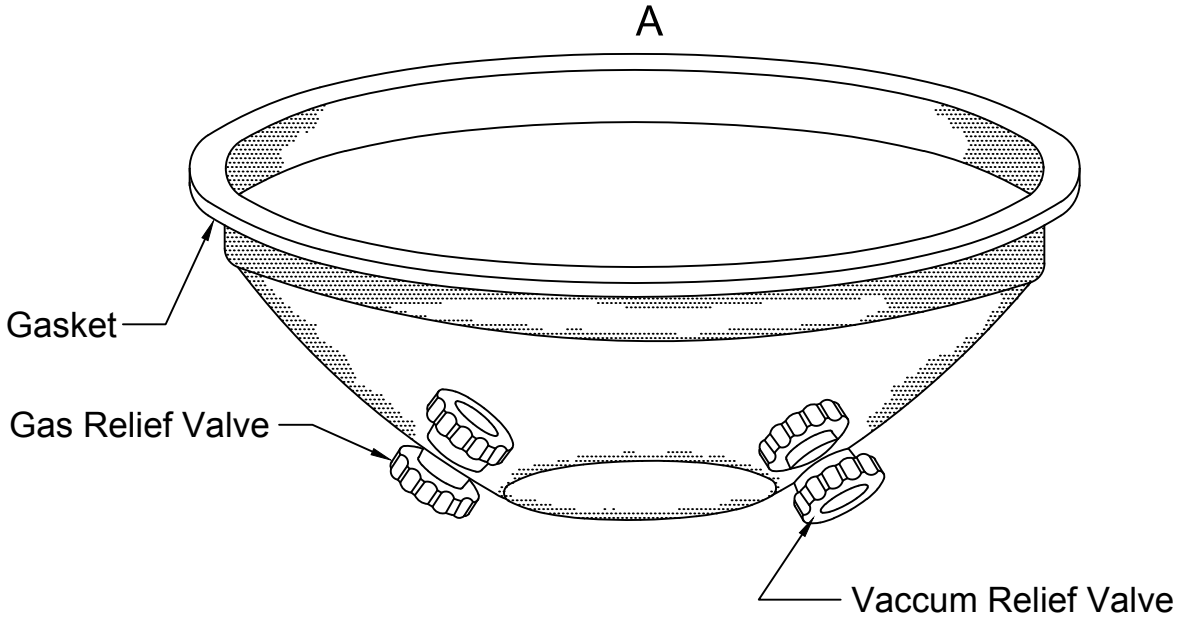
Not to Scale

Revised: 09/2022

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 gallon in 24 hrs.





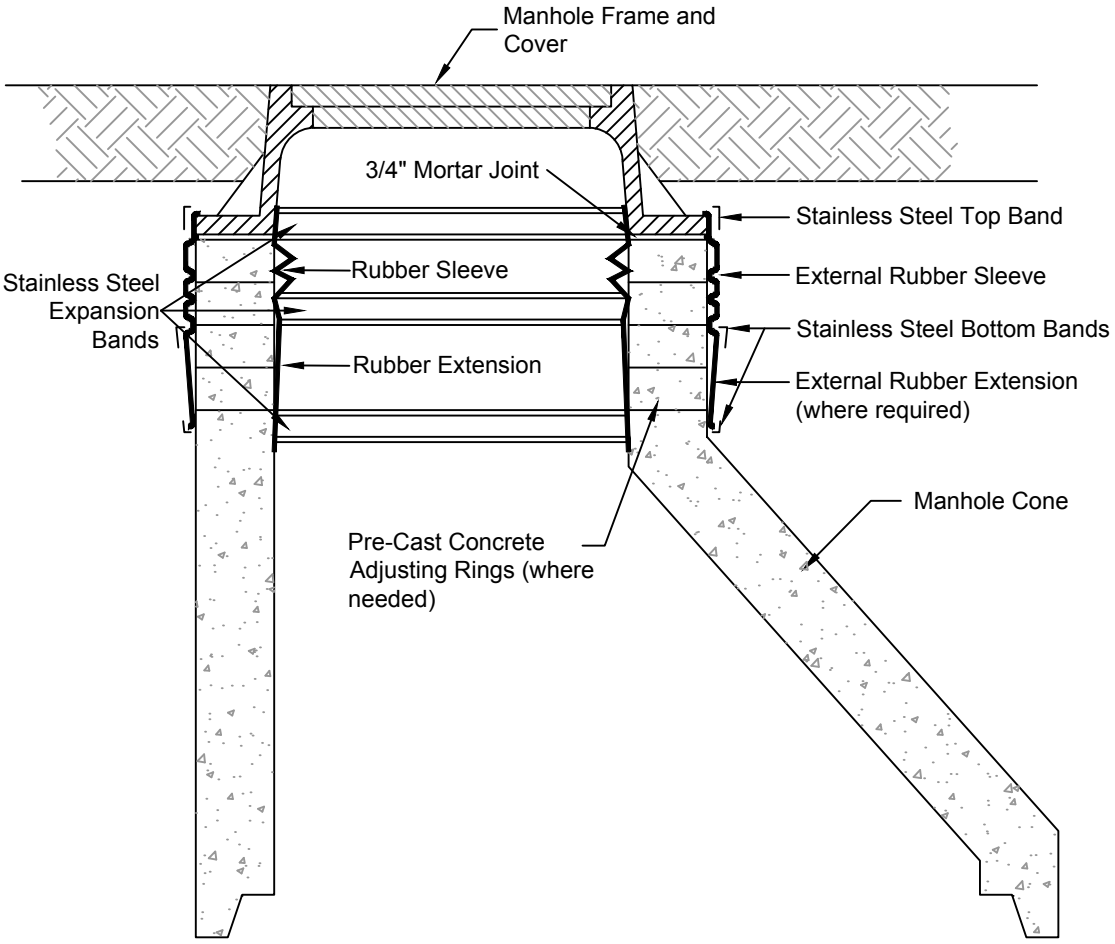
MAN-8

Fluvanna County Virginia
Construction Detail

Waterproof
Manhole Insert

Not to Scale

Revised: 09/2022



Standard Internal Rubber Seal

Chimney Height to be Spanned	Item(s) 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)

Standard (9") External Rubber Seal

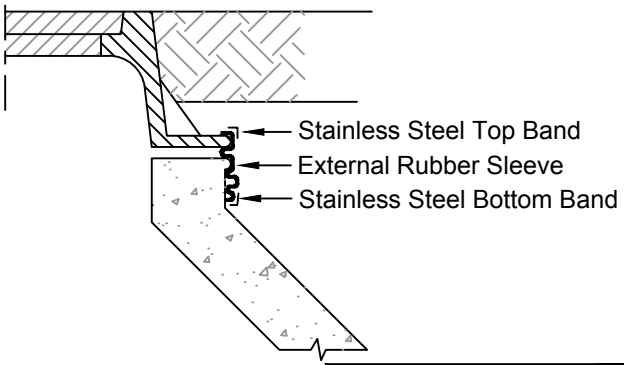
Chimney Height to be Spanned	Items Required
0" - 3"	Narrow (6") Seal only
> 3" - 6-1/2"	Standard (9") Seal only
> 6-1/2" - 12"	Standard (9") Seal + Extension
> 12"	Standard (9") Seal + Multiple Extensions

Standard Internal & External Rubber Seal

Notes:

1) Chimney seals shall be as manufactured by Cretex, or approved equal.
2) Internal Chimney Seals may only be used on existing manholes
3) External Chimney Seals shall be used on all new manoles at time of installation.

Narrow (6") External Rubber Seal



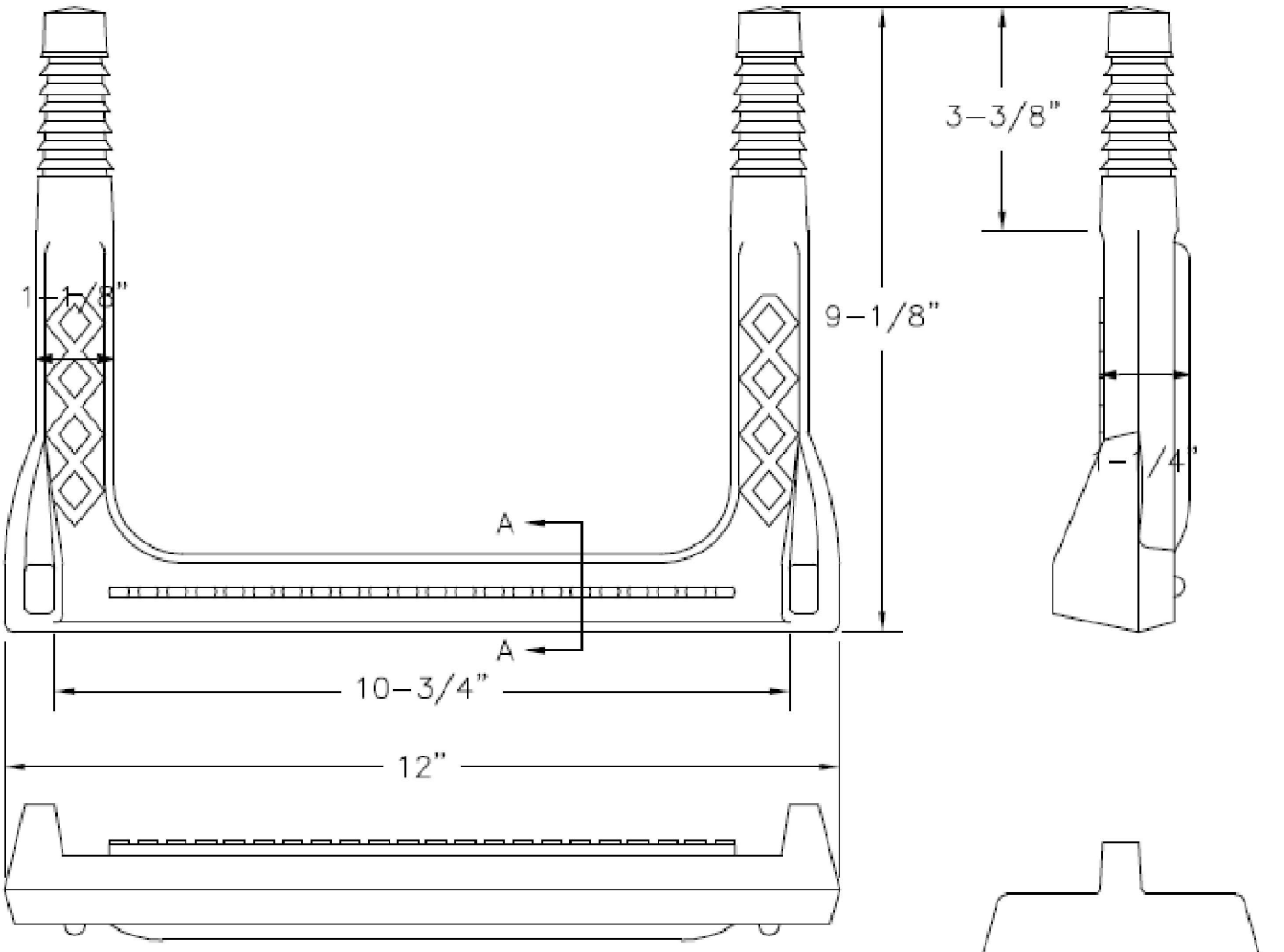
MAN-9

Fluvanna County Virginia Construction Detail

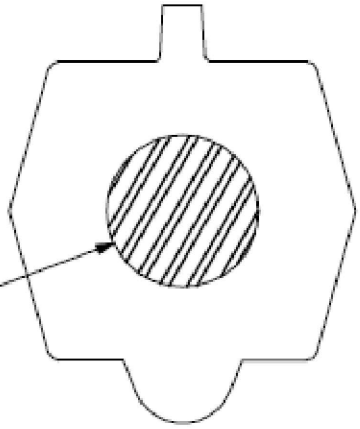
Internal & External Chimney Seal for Sewer Manhole

Not to Scale

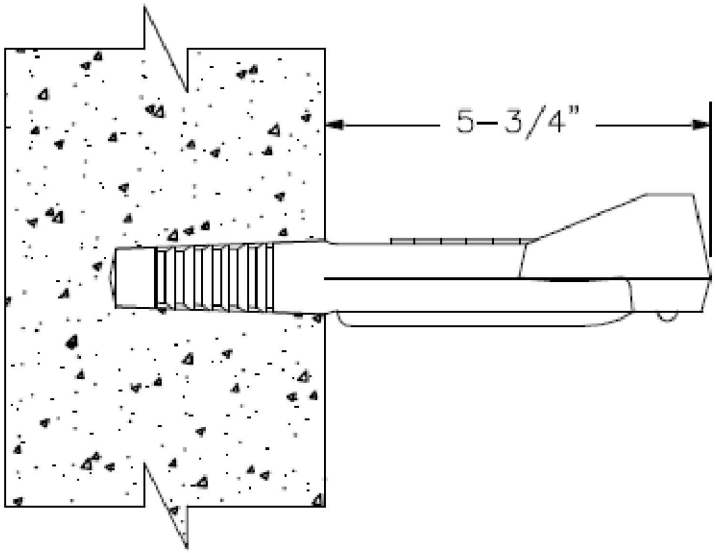
Revised: 09/2022



Copolymer Polypropylene Plastic



SECTION-A



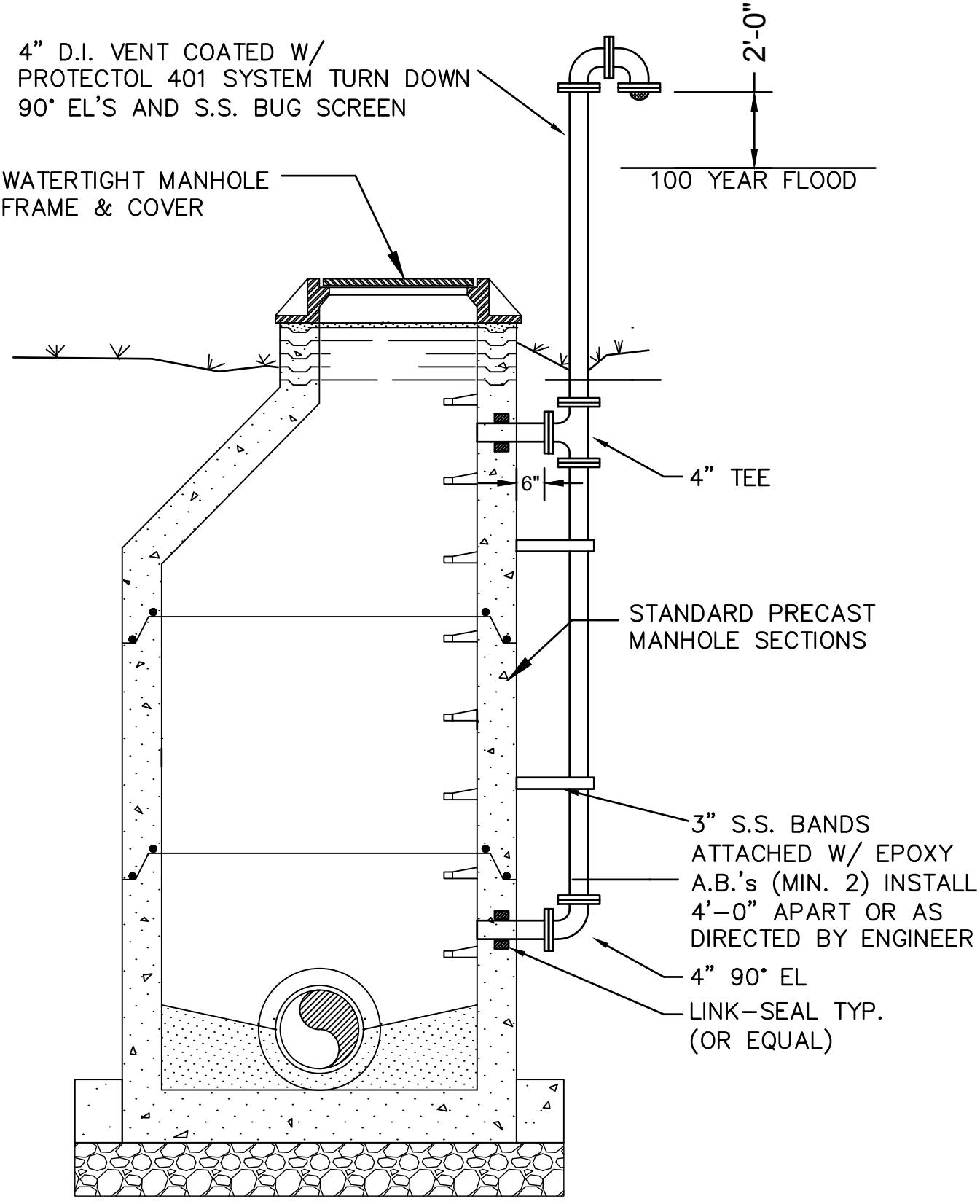
MAN-10

Fluvanna County Virginia
Construction Detail

Typical Manhole Step

Not to Scale

Revised: 09/2022



NOTE: SECTIONS OF WATERTIGHT MANHOLES SHALL NOT SPAN MORE THAN 1000' WITHOUT A MANHOLE VENT

MAN-11

Fluvanna County Virginia
Construction Detail

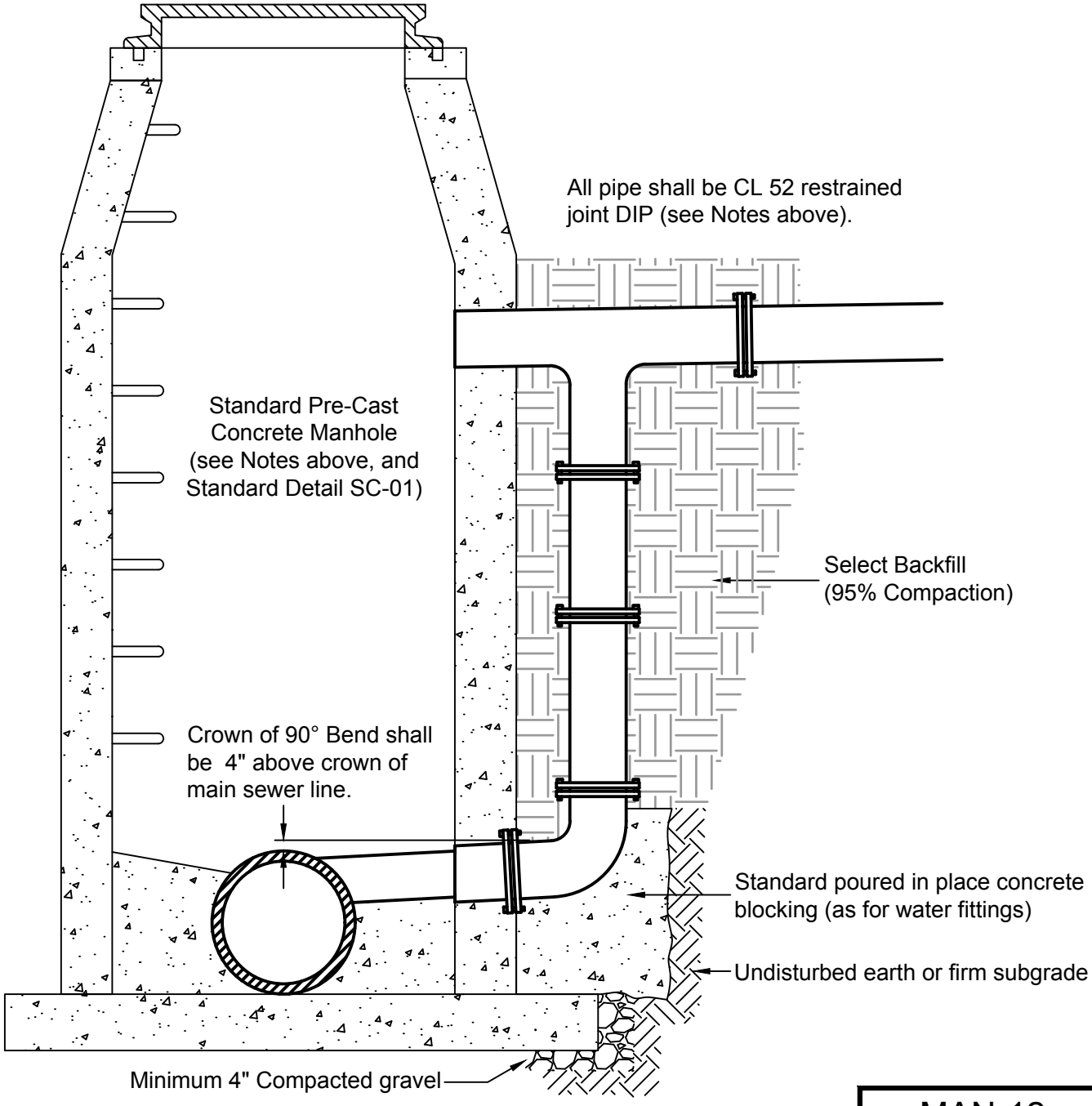
Standard Manhole Vent

Not to Scale

Revised: 09/2022

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).
5) See USM for applicability and dimensional requirements for outside drops.
6) Inside or outside drop shall be installed for any laterals tied in 2 feet or higher above than the flow path invert.



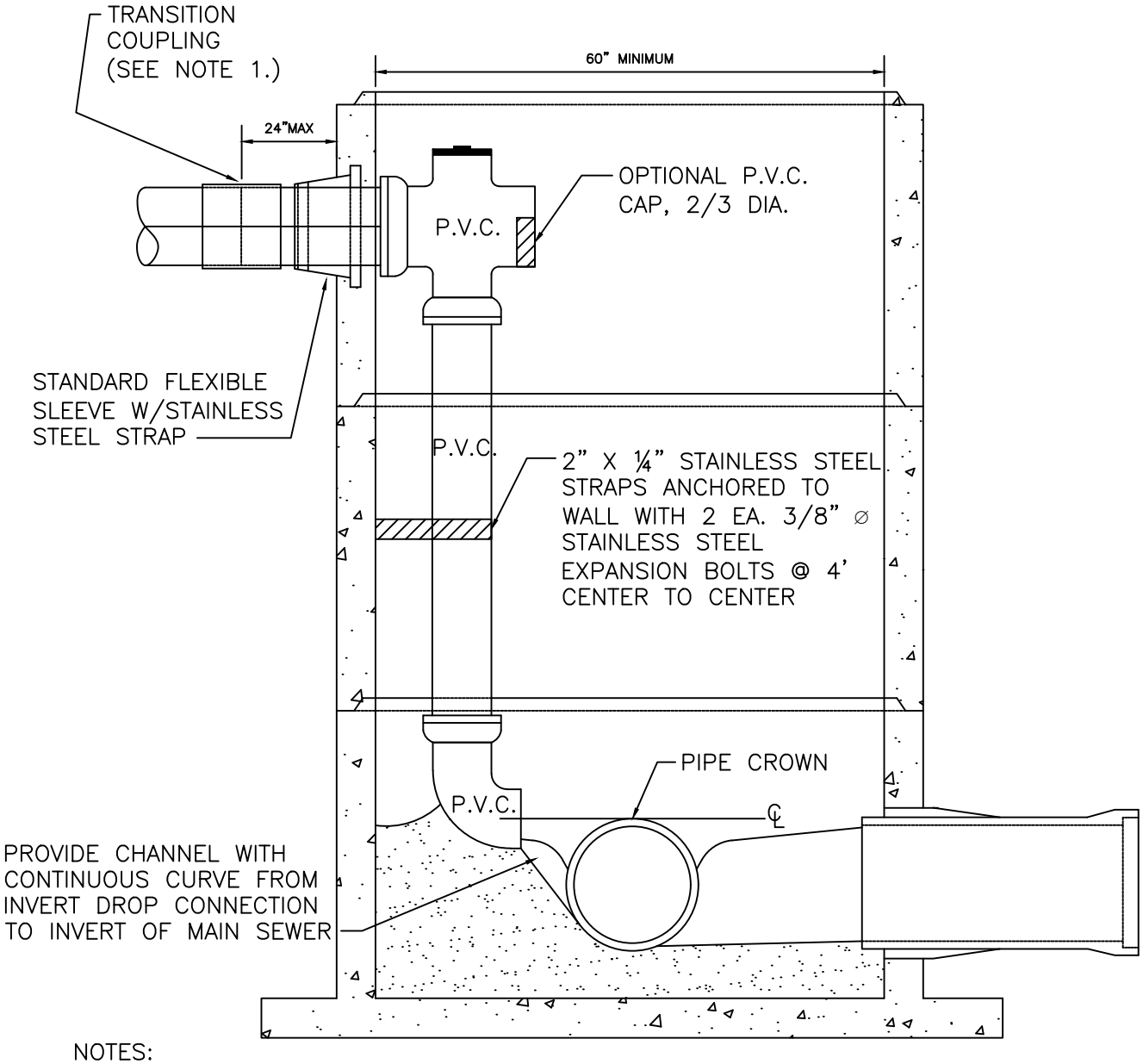
MAN-12

Fluvanna County Virginia
Construction Detail

Typical 4' Precast Manhole with Outside Drop Connection

Not to Scale

Revised: 09/2022



NOTES:

1. MAINLINE TO PVC DROP CONNECTION SHALL BE MADE WITH APPROVED COUPLING. PROVIDE SOLVENT/GLUE JOINTS ON ALL INSIDE PIPING & FITTINGS.
2. DROP CONNECTION SHALL NOT CONFLICT WITH THE LOCATION OF MANHOLE STEPS.
3. BOTTOM 90° BEND SHALL BE AT 45° WITH RESPECT TO THE DOWNSTREAM FLOW.
4. INSIDE OR OUTSIDE DROP SHALL BE INSTALLED FOR ANY LATERALS TIED IN 2 FEET OR HIGHER ABOVE THAN THE FLOW PATH INVERT.

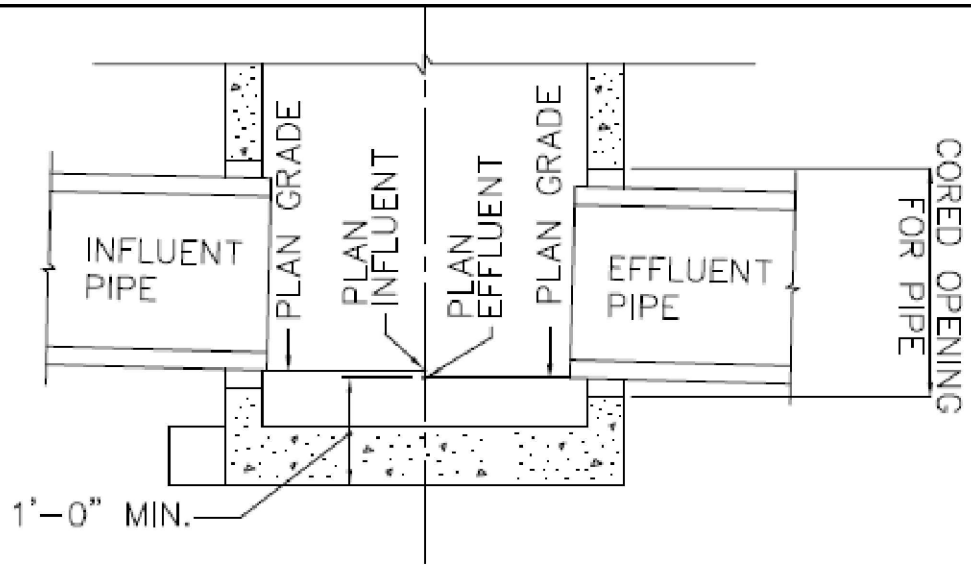
MAN-13

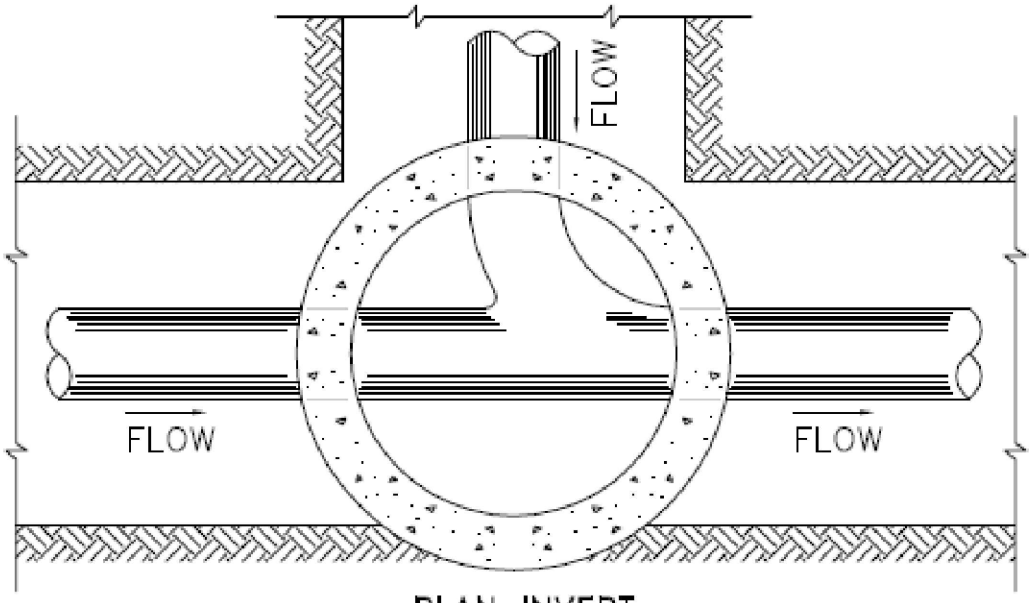
Fluvanna County Virginia
Construction Detail

Manhole with Inside Drop Connection

Not to Scale

Revised: 09/2022





PLAN INVERT

NOTES:

1. THE EFFLUENT ELEVATION SHOWN AT A MANHOLE IS ESTABLISHED FROM THE INFLUENT ELEVATION OF THE MANHOLE IMMEDIATELY DOWNSTREAM BASED UPON PIPE SLOPE. ELEVATIONS SHOWN APPLY AT THE CENTERLINE OF MANHOLES AND ARE BASED ON THE HORIZONTAL DISTANCE, C.L. TO C.L. OF M.H., USING PERCENT OF GRADE INDICATED.
2. PIPE OPENINGS SHALL BE LOCATED TO BE CONCENTRIC WITH THE PIPE AT THE SPECIFIED INVERT
3. PIPE OPEN DIAMETER BE AS RECOMMENDED BY BOOT MANUFACTURER FOR THE PIPE OUTSIDE DIAMETER.
4. MINIMUM INVERT DROP SHALL BE 0.10 INCH UNLESS SPECIFIED OTHERWISE ON PLANS.

MAN-14

Fluvanna County Virginia
Construction Detail

Manhole Invert Detail

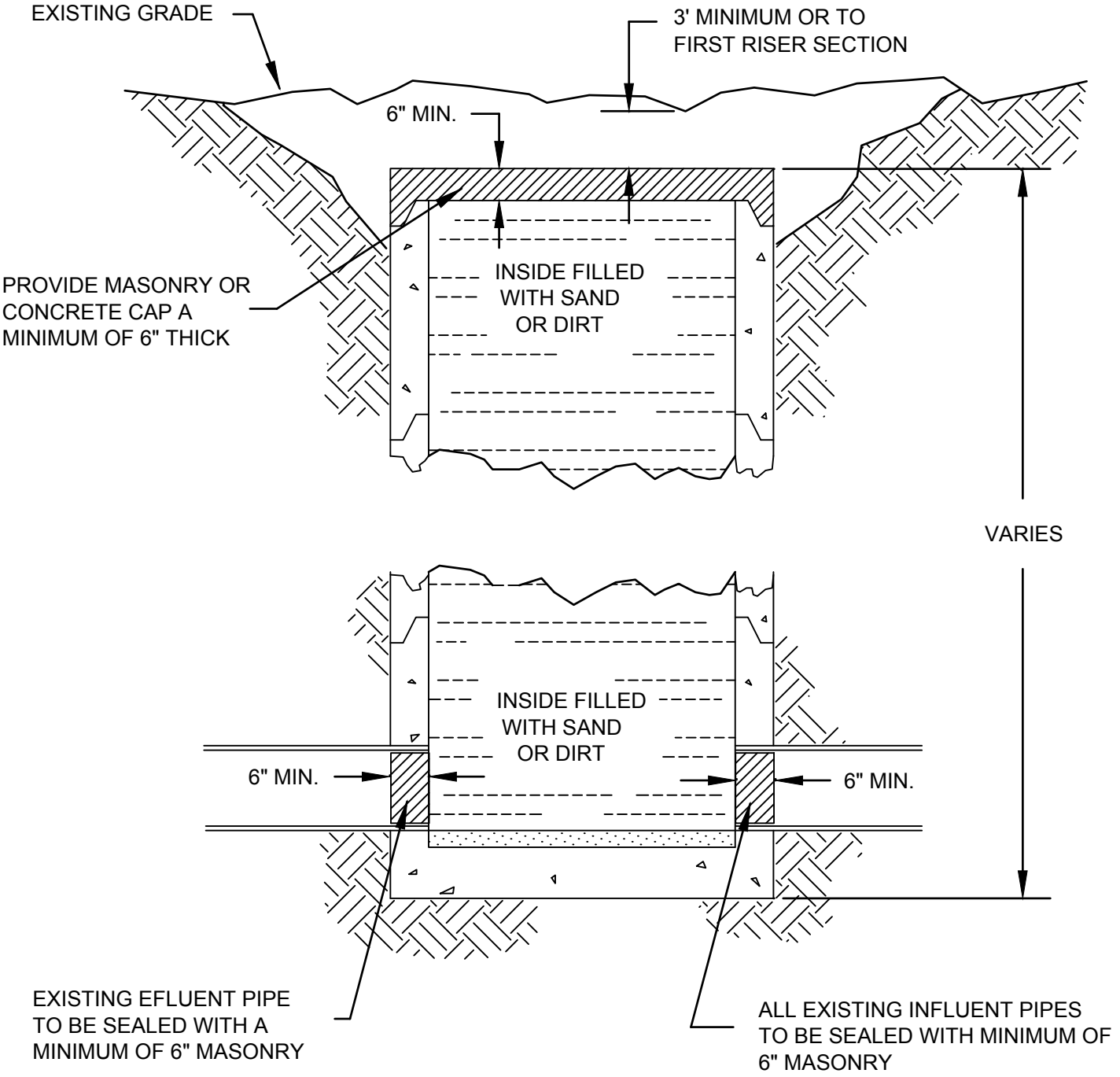
Not to Scale

Revised: 09/2022

NOTES :

1. MANHOLE FRAME & COVER AND ANY PRECAST CONCRETE SECTIONS THAT ARE REMOVED WILL REMAIN PROPERTY OF THE OWNER.

2. ALL EXISTING MANHOLE ITEMS REMOVED SHALL BE DELIVERED TO A STORAGE LOCATION SPECIFIED BY THE OWNER.



MAN-15

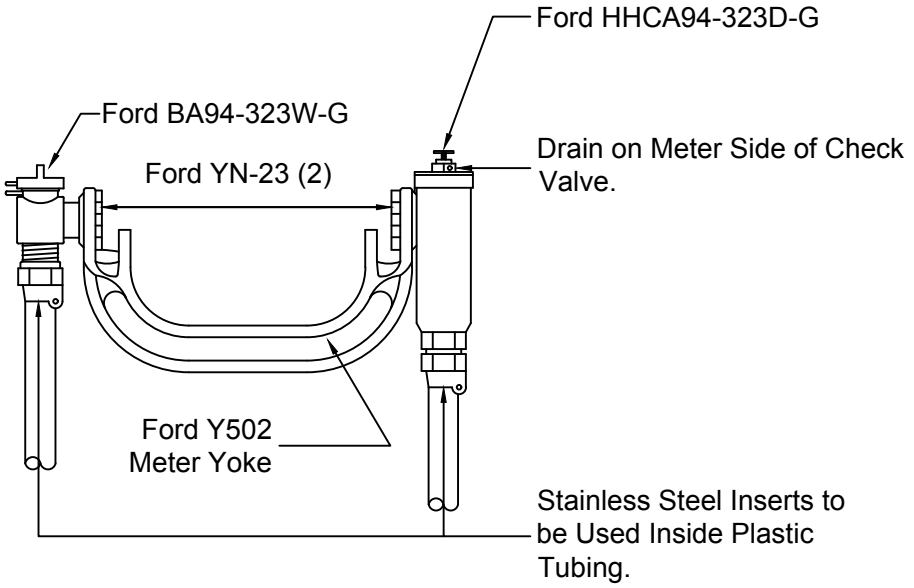
Fluvanna County Virginia
Construction Detail

Manhole Abandonment Detail

Not to Scale

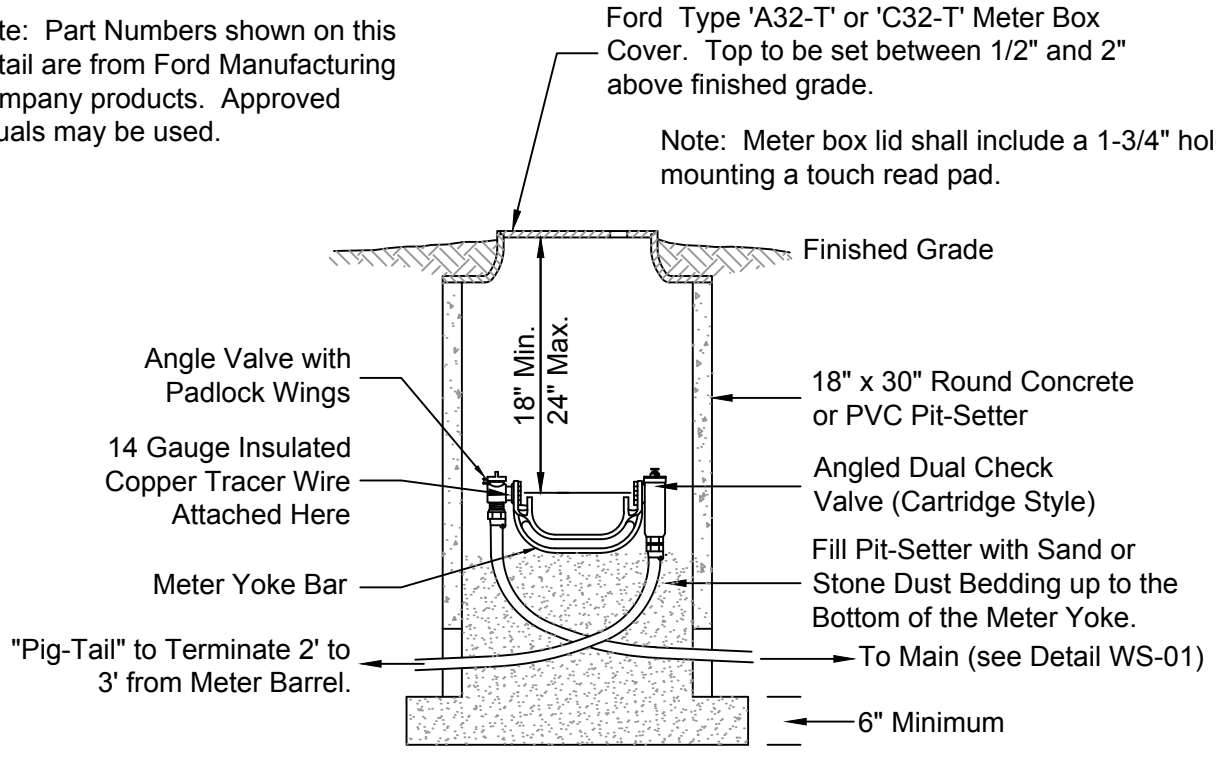
Revised: 09/2022

Note: ALL compression fittings shall include grip joints.



Meter Yoke Detail

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 Meter

Note: See Standard Detail WS-01 for service connection requirements.

MET-1

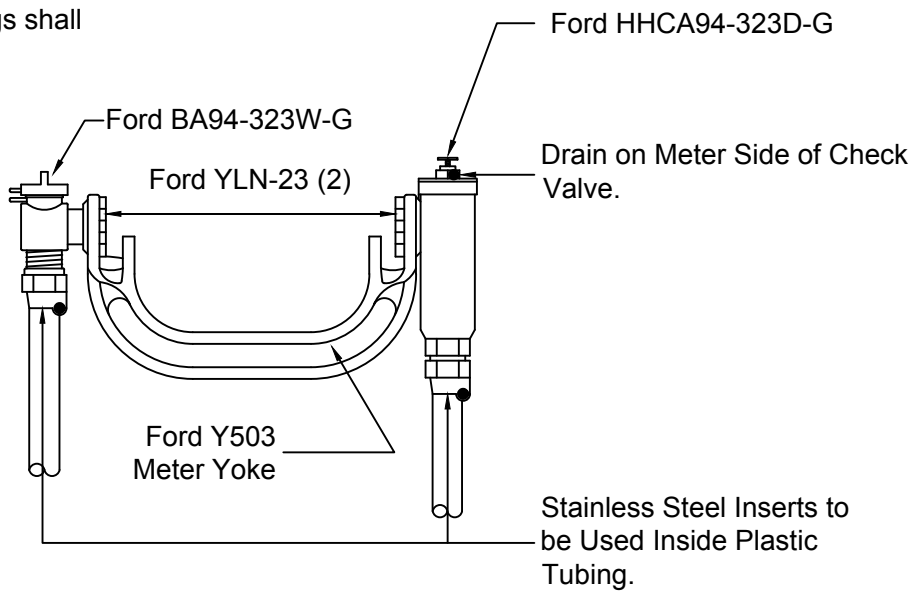
Fluvanna County Virginia Construction Detail

Standard 5/8" x 3/4" Water Meter Box & Fittings

Not to Scale

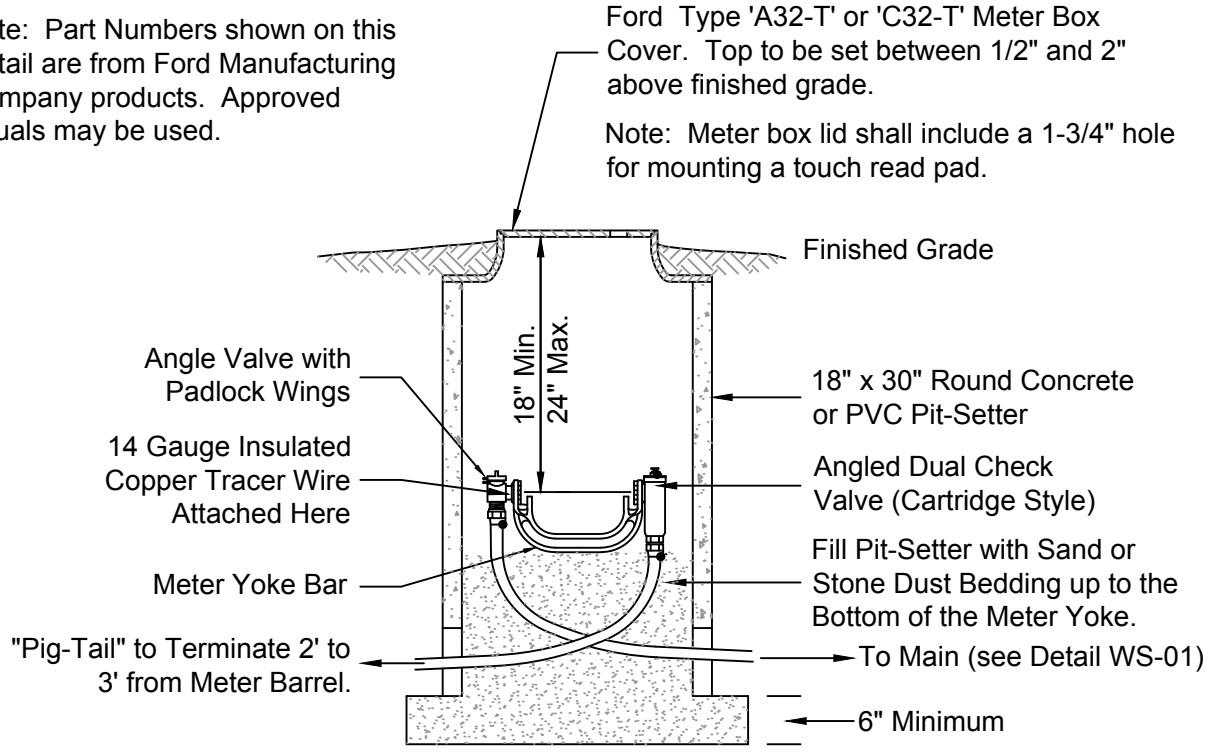
Revised: 09/2022

Note: ALL compression fittings shall include grip joints.



Meter Yoke Detail

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



Meter Box Detail

for Full 3/4" Water Meter

Note: See Standard Detail WS-01 for service connection requirements.

MET-2

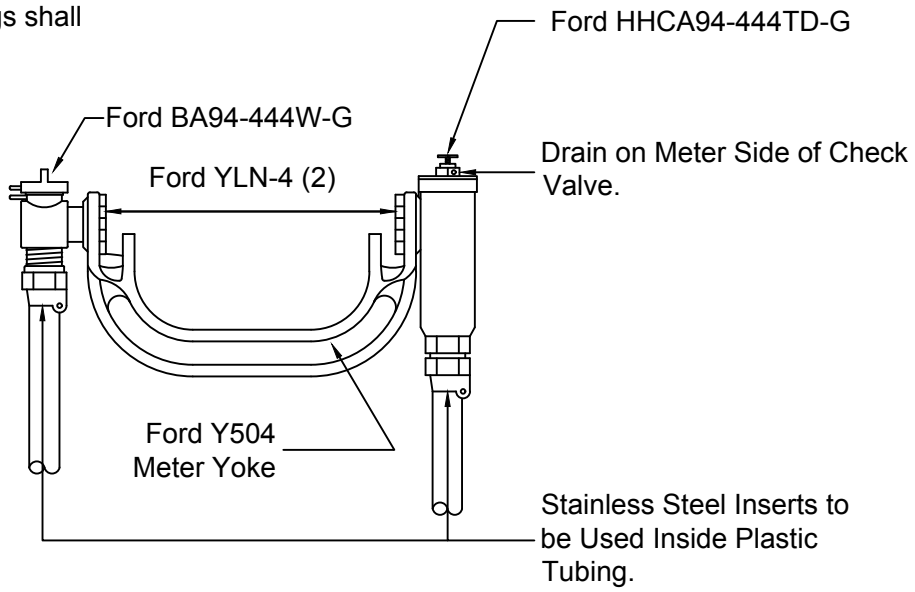
Fluvanna County Virginia Construction Detail

Standard Full 3/4" Water Meter Box & Fittings

Not to Scale

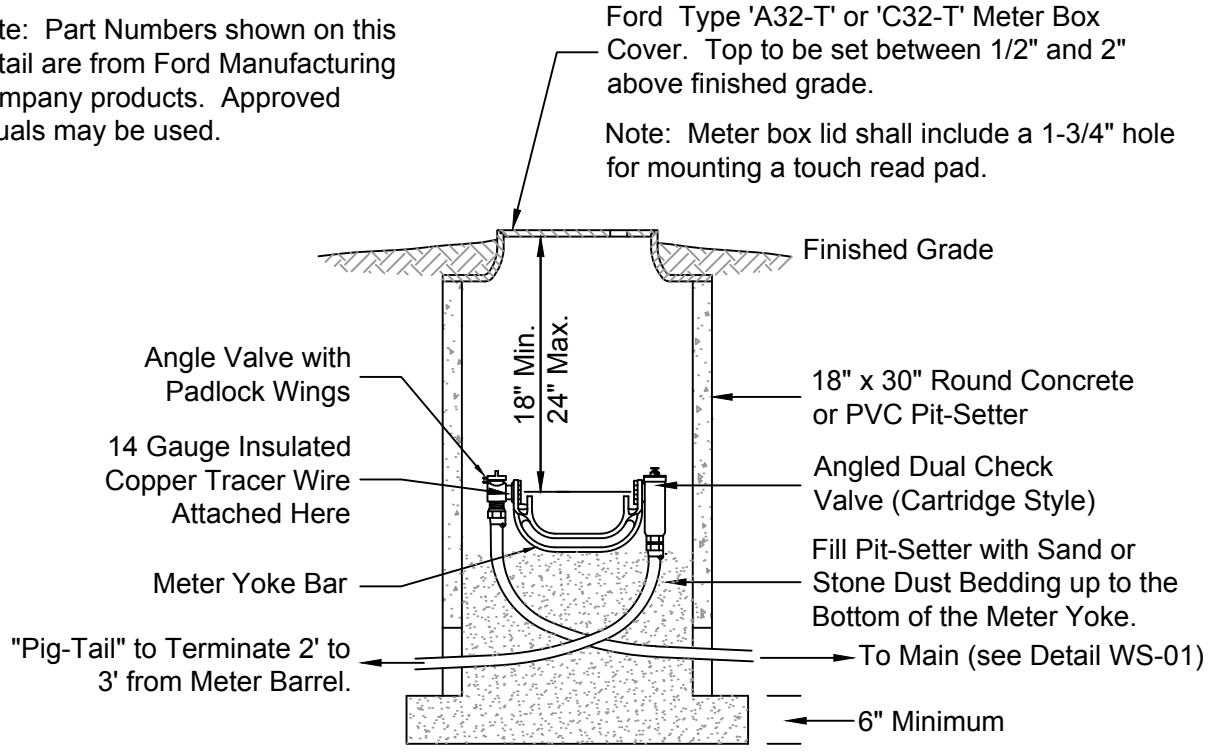
Revised: 09/2022

Note: ALL compression fittings shall include grip joints.



Meter Yoke Detail

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



Meter Box Detail

for 1" Water Meter

Note: See Standard Detail WS-01 for service connection requirements.

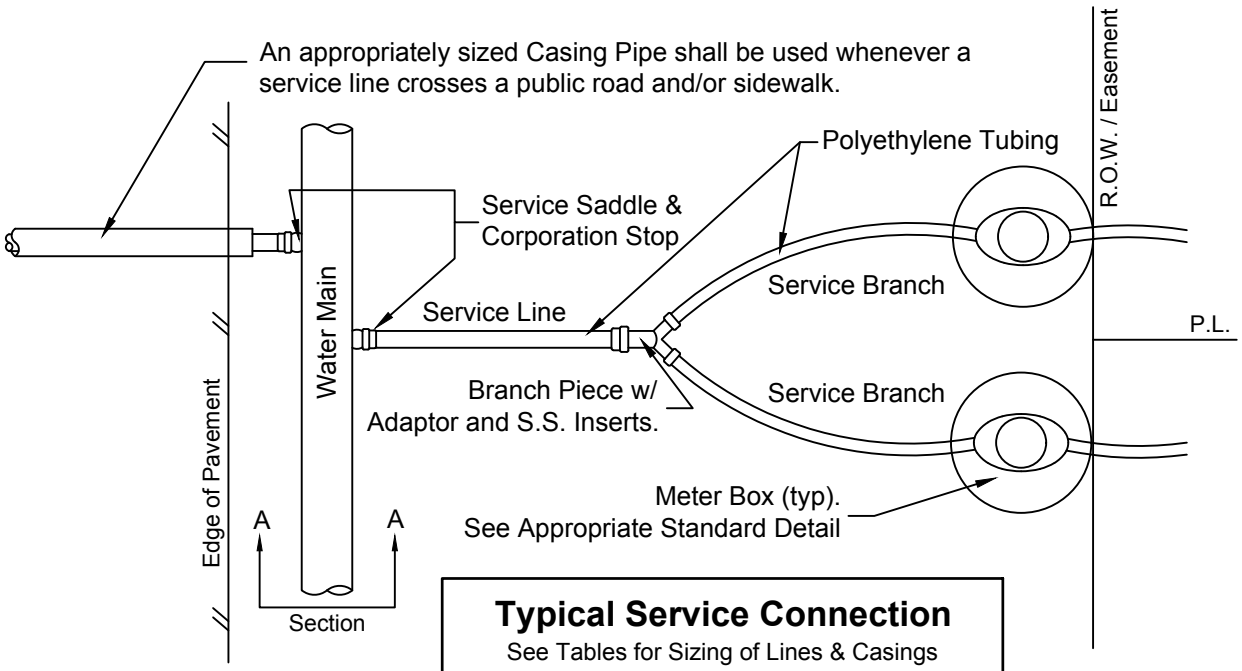
MET-3

Fluvanna County Virginia Construction Detail

Standard 1" Water Meter Box & Fittings

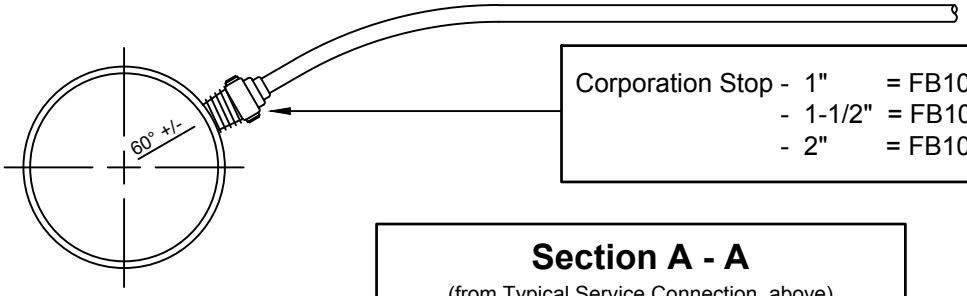
Not to Scale

Revised: 09/2022



Typical Service Connection

See Tables for Sizing of Lines & Casings



Corporation Stop - 1" = FB1000-4-G
- 1-1/2" = FB1000-6G
- 2" = FB1000-7G

Section A - A

(from Typical Service Connection, above)

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	
Line Size	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 is the design standard for all new water connections. Exceptions must be approved by the County Engineer.
2) All service lines shall be polyethylene tubing, SDR-9, 200 psi, CTS., as manufactured by Orange Burge or approved equal.
3) 14 GA insulated copper tracer wire shall follow service/branch lines to the meter box, and shall be secured to the yoke.
4) A 3M Full Range Water Marker (blue) shall be placed directly over the service connection location during back-fill.
5) Part numbers provided on this Detail are for Ford Manufacturing Company products. Approved equals may be used.
6) 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 County Engineer or Inspector for details.

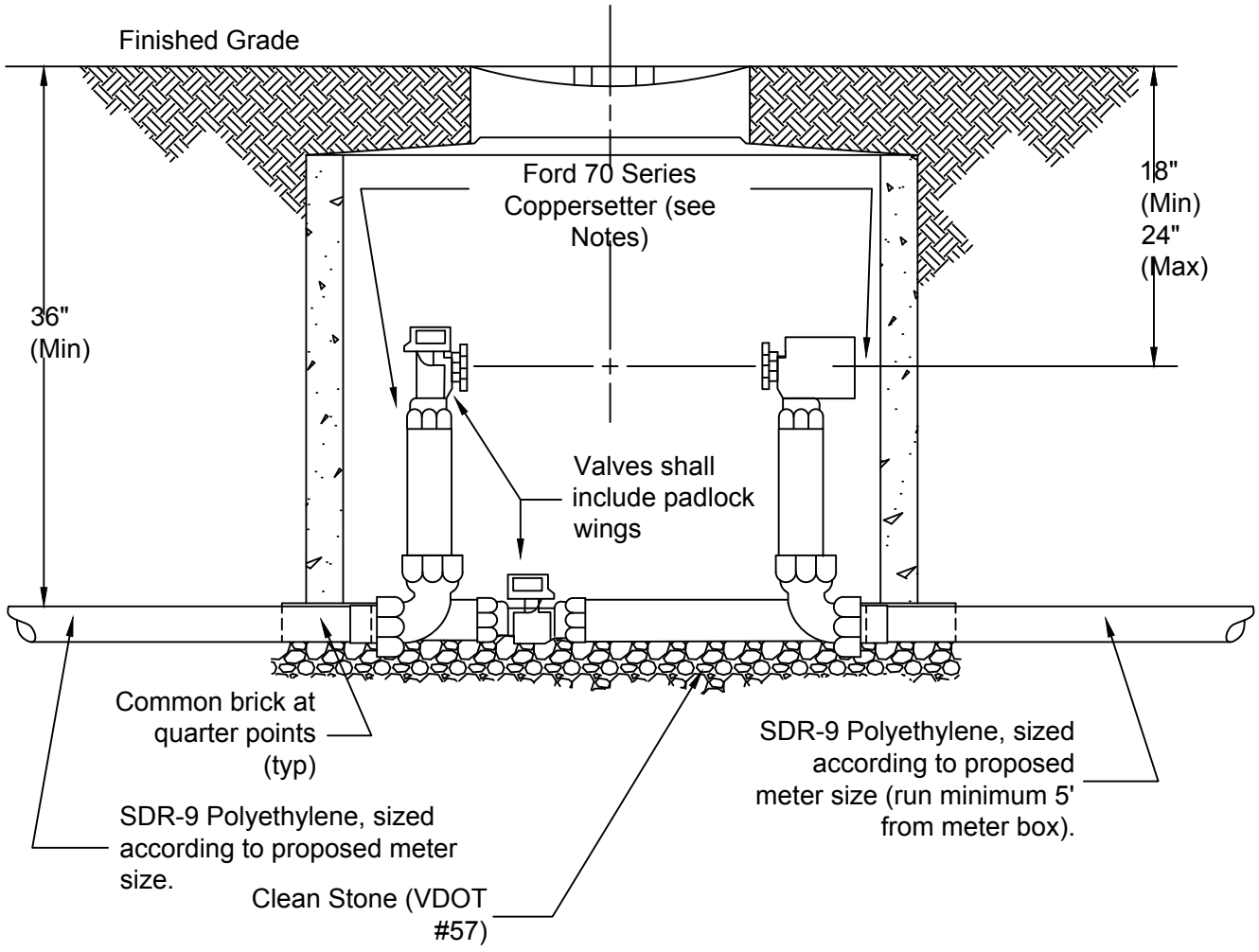
MET-4

Fluvanna County Virginia
Construction Detail

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

Not to Scale

Revised: 09/2022



Notes:

1) Ford 70 Series Coppersetter (or approved equal) shall include flanged connections and an angled check valve:
   1-1/2" = VBHH76-15B-44-66W-G
   2" = VBHH76-15B-44-77W-G
2) Properly sized meter, including touch read pad and wiring, shall be provided by the developer.
3) A 30" diameter one-piece meter box (Ford Monitor or approved equal) shall be used.
4) Material for meter box shall be concrete, PVC or rigid FRP.
5) Meter box lid shall be Ford Monitor or approved equal and shall include a 1-3/4" hole for touch read pad.
6) The service line between the main and the meter shall be one continuous piece of pipe (No joints will be permitted).
7) All compression fittings (including the corporation stop at the main) shall include grip joints.

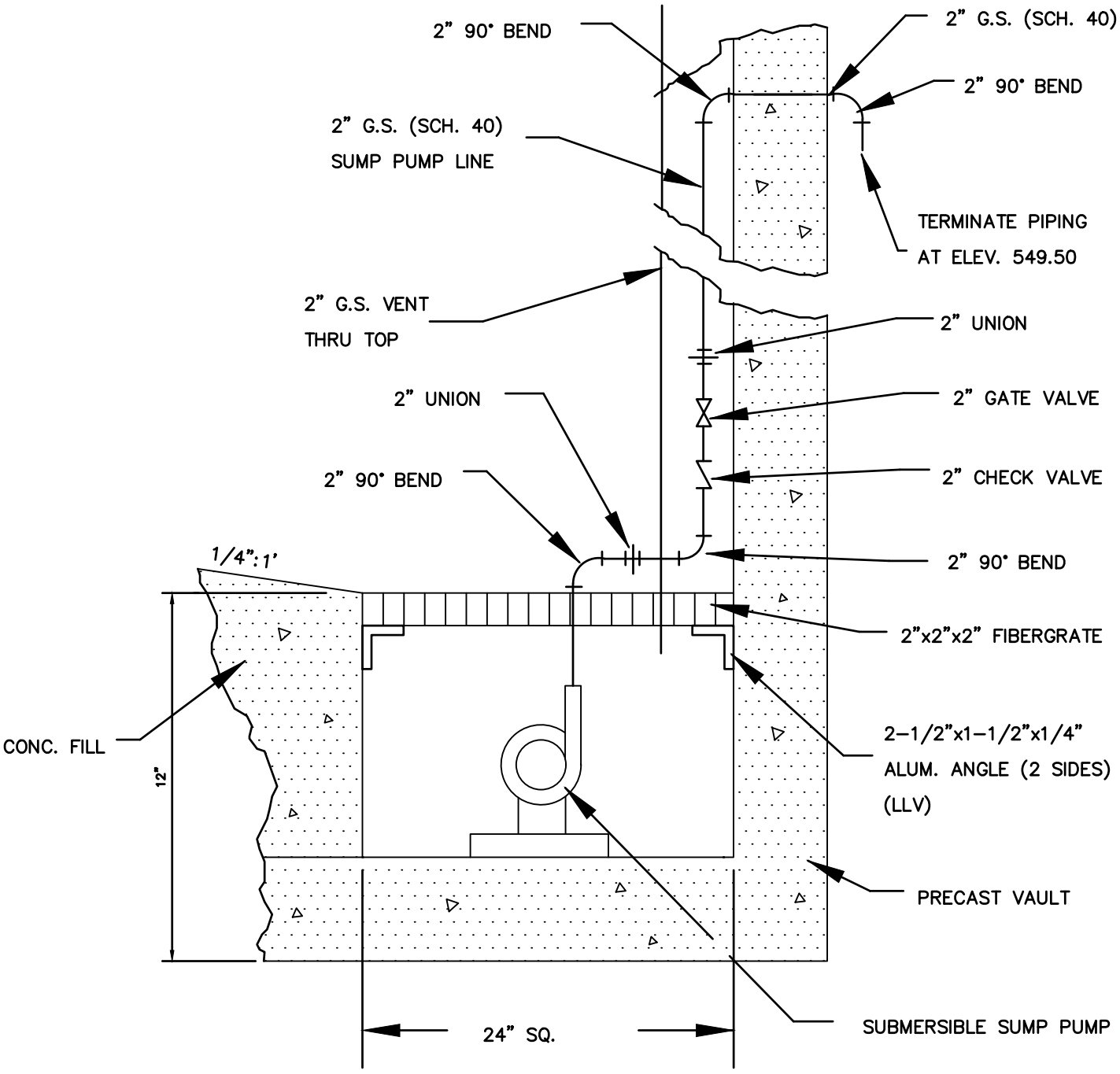
MET-5

Fluvanna County Virginia
Construction Detail

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

Not to Scale

Revised: 09/2022



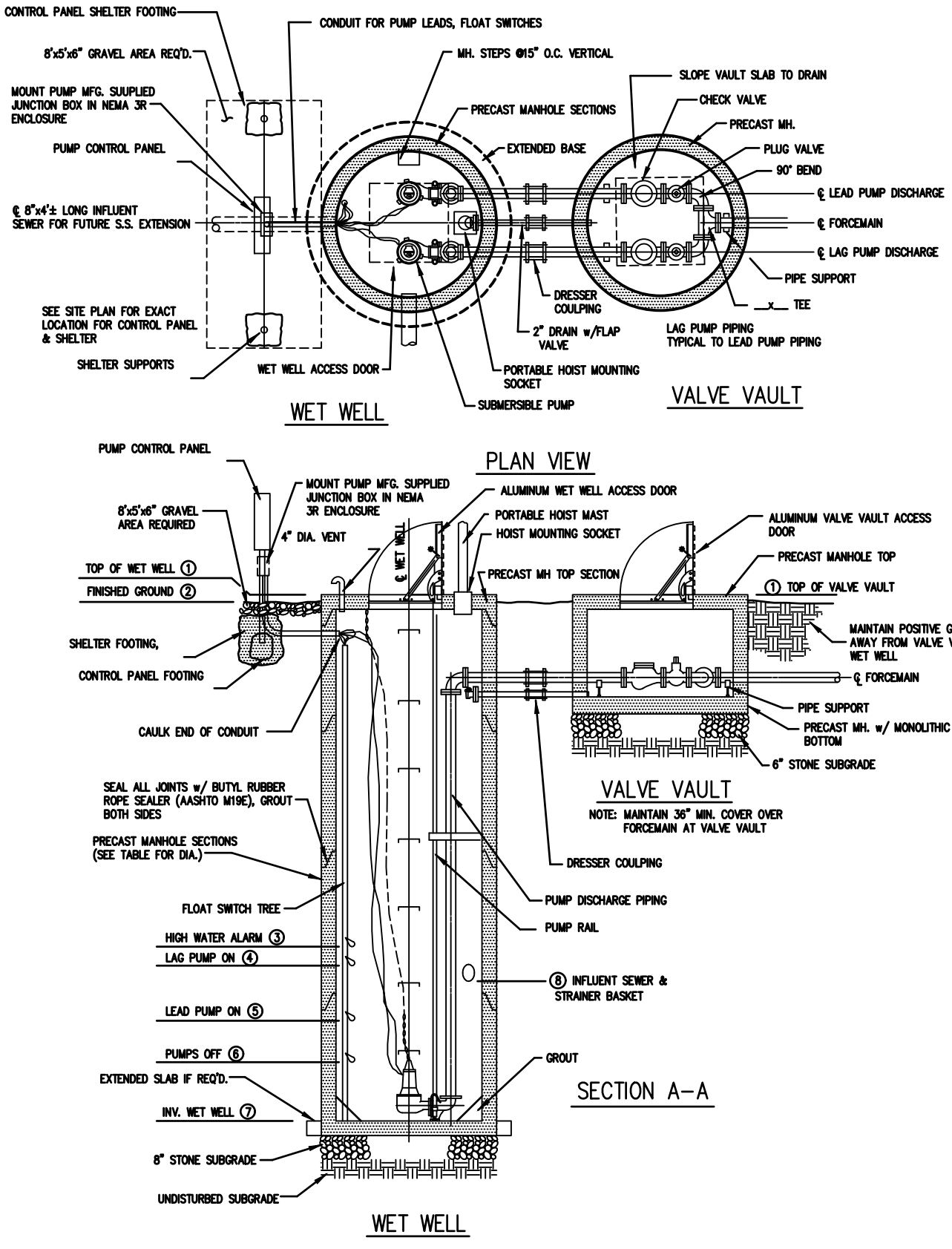
PMP-1

Fluvanna County Virginia
Construction Detail

Sump Pump Detail

Not to Scale

Revised: 09/2022



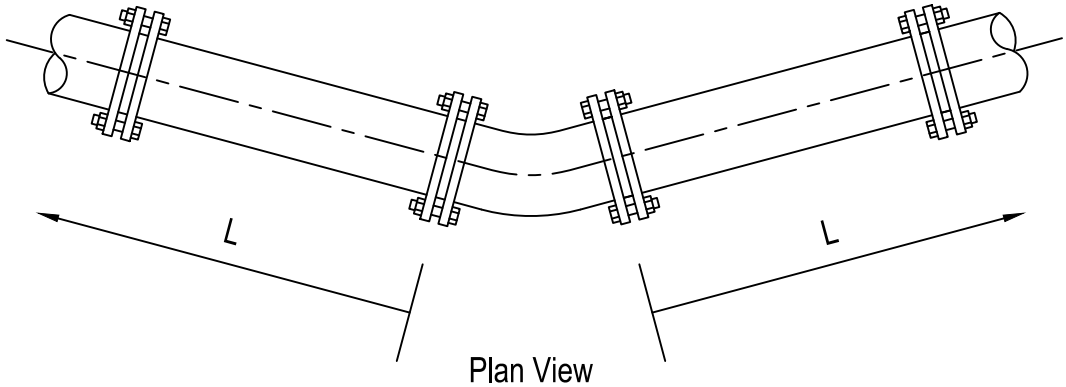
PMP-2

Fluvanna County Virginia
Construction Detail

Duplex Submersible Pump Station

Not to Scale

Revised: 09/2022



Plan View

L : Restrained Lengths for PVC & Poly-Wrapped Pipes (Feet)											
Pipe Diameter	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
11-1/4° Horizontal Bend	5'	5'	5'	5'	10'	10'	10'	10'	10'	15'	15'
22-1/2° Horizontal Bend	5'	5'	10'	10'	15'	15'	20'	20'	20'	25'	25'
45° Horizontal Bend	10'	15'	15'	20'	25'	30'	35'	40'	45'	45'	55'
90° Horizontal bend	25'	30'	40'	50'	60'	70'	80'	90'	100'	110'	130'
Dead Ends & Valves	45'	55'	75'	100'	120'	145'	165'	185'	205'	225'	270'

L : Restrained Lengths for Unwrapped Ductile Iron Pipe (Feet)											
Pipe Diameter	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
11-1/4° Horizontal Bend	5'	5'	5'	5'	10'	10'	10'	10'	10'	10'	15'
22-1/2° Horizontal Bend	5'	5'	10'	10'	10'	15'	15'	15'	20'	20'	25'
45° Horizontal Bend	10'	10'	15'	20'	25'	25'	30'	35'	40'	40'	50'
90° Horizontal bend	20'	25'	35'	45'	55'	60'	70'	80'	90'	95'	110'
Dead Ends & Valves	30'	40'	55'	70'	85'	100'	115'	130'	145'	160'	190'

Notes:

1) Soil Designation is Cohesive Granular
2) Design depth of cover is 3.5 Feet
3) Lengths are based on 100 psi working pressure + 120 psi surge allowance
4) Minimum safety factor is 1.5
5) Lengths shall be increased proportionally for design working pressures greater than 100 psi
6) Combined fittings shall be evaluated individually and greatest L shall be used
7) Required restrained lengths shall be shownand labeled on the pipe profile

RES-1

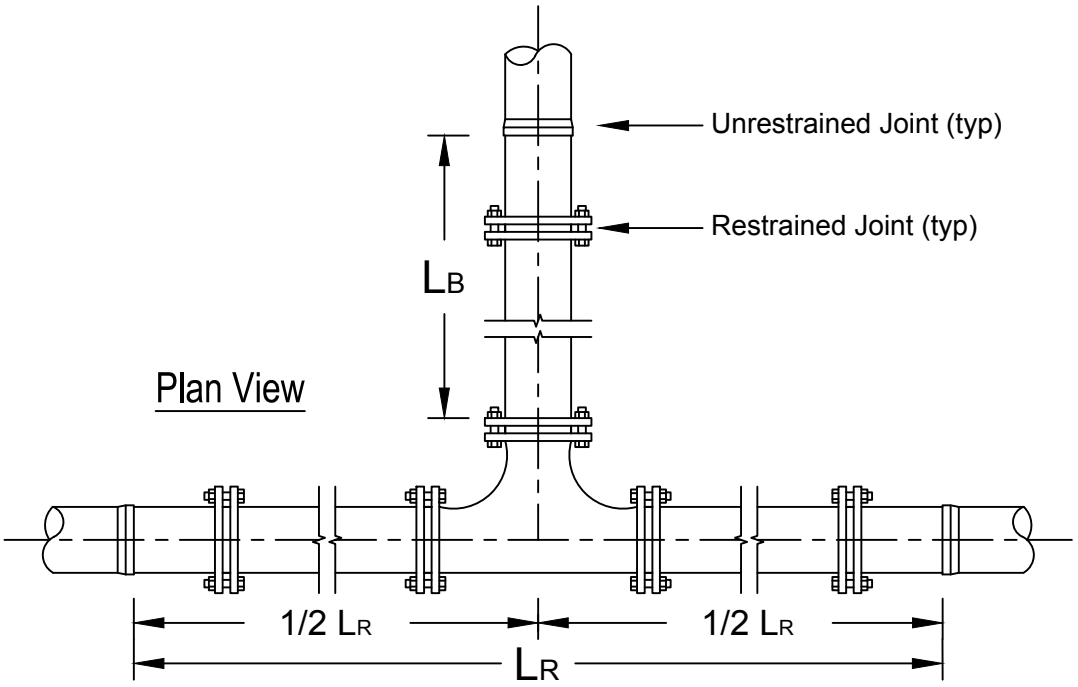
Fluvanna County Virginia
Construction Detail

Restrained Joint Pipe Lengths for
Horizontal Bends, Dead Ends & Valves

Not to Scale

Revised: 09/2022

L_B = Length of restrained joint pipe required along branch (distance from tee to first unrestrained joint)
L_R = Length of restrained joint pipe required along run (1/2 L_R = distance from tee to first unrestrained joint)



L_B: Length of Restrained Pipe (Tee Branch)				
Diameter		Unwrapped DIP	Plastic Pipe & Wrapped Pipe	L_R
RUN	BRANCH			
6"	4"	5'	10'	25'
6"	6"	15'	25'	40'
8"	4"	5'	5'	40'
8"	6"	10'	10'	40'
8"	8"	35'	45'	40'
10"	6"	5'	5'	35'
10"	8"	25'	35'	40'
10"	10"	50'	65'	40'
12"	6"	5'	10'	30'
12"	8"	15'	20'	40'
12"	10"	40'	55'	40'
12"	12"	65'	90'	40'

L_B: Length of Restrained Pipe (Tee Branch)				
Diameter		Unwrapped DIP	Plastic Pipe & Wrapped Pipe	L_R
RUN	BRANCH			
6"	4"	40'	55'	0
6"	6"	55'	75'	0
8"	4"	40'	55'	0
8"	6"	55'	75'	0
8"	8"	70'	100'	0
10"	6"	55'	75'	0
10"	8"	70'	100'	0
10"	10"	85'	120'	0
12"	6"	55'	75'	0
12"	8"	70'	100'	0
12"	10"	85'	120'	0
12"	12"	100'	145'	0

Notes:
1) Soil Designation is Cohesive Granular
2) Depth of Cover is 3.5 Feet
3) Lengths are based on 100 psi working pressure + 120 psi surge allowance
4) Minimum safety factor is 1.5+
5) Lengths shall be increased proportionally for design working pressures greater than 100 psi
6) Combined fittings shall be evaluated individually and greatest L shall be used
7) Required restrained lengths shall be shown and labeled on the water line profile

RES-2

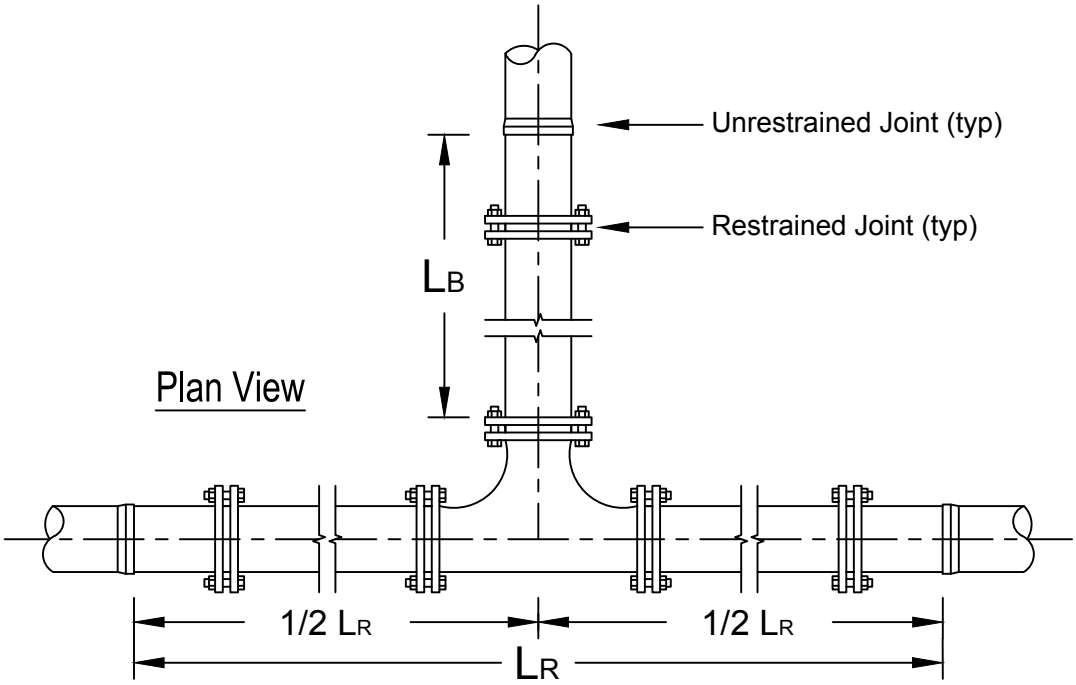
Fluvanna County Virginia
Construction Detail

Restrained Joint Pipe Lengths for
Tees - Pipe Run Diameters 6" to 12"

Not to Scale

Revised: 09/2022

L_B = Length of restrained joint pipe required along branch (distance from tee to first unrestrained joint)
L_R = Length of restrained joint pipe required along run (1/2 L_R = distance from tee to first unrestrained joint)



L_B: Length of Restrained Pipe (Tee Branch)				
Diameter		Unwrapped DIP	Plastic Pipe & Wrapped Pipe	L_R
RUN	BRANCH			
14"	8"	5'	5'	40'
14"	14"	80'	110'	40'
16"	6"	5'	5'	20'
16"	8"	10'	10'	34'
16"	10"	25'	35'	40'
16"	12"	50'	70'	40'
16"	16"	90'	130'	40'
18"	6"	5'	5'	18'
18"	8"	10'	10'	30'
18"	12"	45'	60'	40'
18"	18"	105'	150'	40'

L_B: Length of Restrained Pipe (Tee Branch)				
Diameter		Unwrapped DIP	Plastic Pipe & Wrapped Pipe	L_R
RUN	BRANCH			
14"	8"	70'	100'	0
14"	14"	115'	165'	0
16"	6"	55'	75'	0
16"	8"	70'	100'	0
16"	10"	85'	120'	0
16"	12"	100'	145'	0
16"	16"	130'	185'	0
18"	6"	55'	75'	0
18"	8"	70'	100'	0
18"	12"	100'	145'	0
18"	18"	145'	205'	0

Notes:
1) Soil Designation is Cohesive Granular
2) Depth of Cover is 3.5 Feet
3) Lengths are based on 100 psi working pressure + 120 psi surge allowance
4) Minimum safety factor is 1.5
5) Lengths shall be increased proportionally for design working pressures greater than 100 psi
6) Combined fittings shall be evaluated individually and greatest L shall be used
7) Required restrained lengths shall be shown and labeled on the water line profile

RES-3

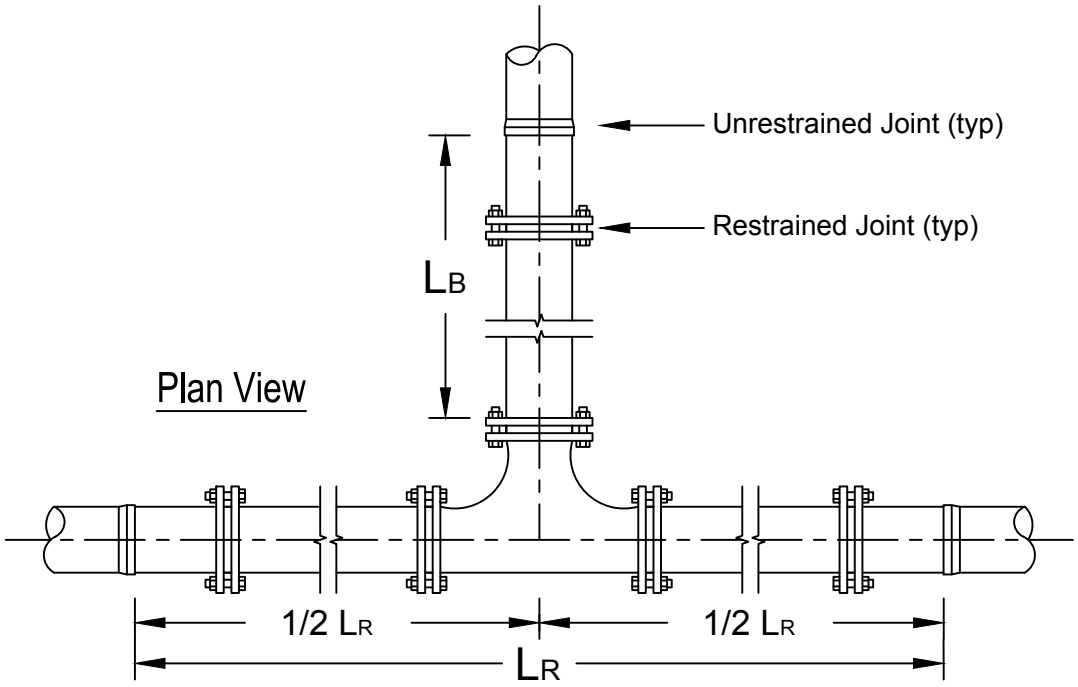
Fluvanna County Virginia
Construction Detail

Restrained Joint Pipe Lengths for
Tees - Pipe Run Diameters 14" to 18"

Not to Scale

Revised: 09/2022

L_B = Length of restrained joint pipe required along branch (distance from tee to first unrestrained joint)
L_R = Length of restrained joint pipe required along run (1/2 L_R = distance from tee to first unrestrained joint)



L_B: Length of Restrained Pipe (Tee Branch)				
Diameter		Unwrapped DIP	Plastic Pipe & Wrapped Pipe	L_R
RUN	BRANCH			
20"	8"	5'	5'	30'
20"	12"	35'	50'	40'
20"	16"	80'	115'	40'
20"	20"	120'	170'	40'
24"	8"	5'	5'	25'
24"	10"	10'	10'	35'
24"	12"	20'	30'	40'
24"	14"	45'	65'	40'
24"	16"	70'	100'	40'
24"	18"	90'	130'	40'
24"	20"	110'	160'	40'
24"	24"	150'	215'	40'

L_B: Length of Restrained Pipe (Tee Branch)				
Diameter		Unwrapped DIP	Plastic Pipe & Wrapped Pipe	L_R
RUN	BRANCH			
20"	8"	70'	100'	0
20"	12"	100'	145'	0
20"	16"	130'	185'	0
20"	20"	160'	225'	0
24"	8"	70'	100'	0
24"	10"	85'	120'	0
24"	12"	100'	145'	0
24"	14"	145'	205'	0
24"	16"	115'	165'	0
24"	18"	145'	205'	0
24"	20"	160'	225'	0
24"	24"	190'	270'	0

Notes:
1) Soil Designation is Cohesive Granular
2) Depth of Cover is 3.5 Feet
3) Lengths are based on 100 psi working pressure + 120 psi surge allowance
4) Minimum safety factor is 1.5
5) Lengths shall be increased proportionally for design working pressures greater than 100 psi
6) Combined fittings shall be evaluated individually and greatest L shall be used
7) Required restrained lengths shall be shown and labeled on the water line profile

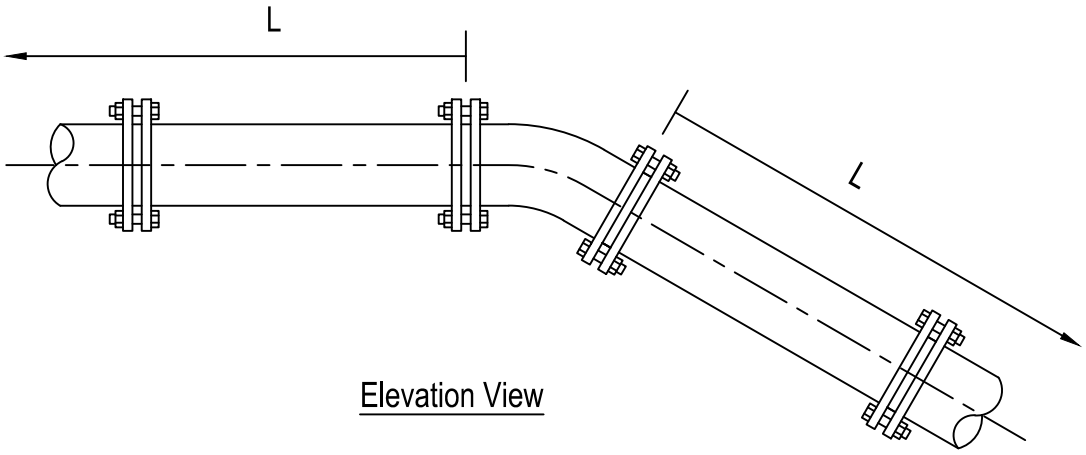
RES-4

Fluvanna County Virginia
Construction Detail

Restrained Joint Pipe Lengths for
Tees - Pipe Run Diameters 20" to 24"

Not to Scale

Revised: 09/2022



Elevation View

L : Restrained Lengths for PVC & Poly-Wrapped Pipes (Feet)											
Pipe Diameter	3"	4"	6"	8"	10"	12"	16"	18"	20"	24"	30"
11-1/4° Horizontal Bend	5'	5'	5'	5'	10'	10'	10'	10'	15'	15'	15'
22-1/2° Horizontal Bend	5'	5'	10'	10'	15'	15'	20'	20'	25'	25'	30'
45° Horizontal Bend	10'	15'	15'	20'	25'	30'	40'	45'	45'	55'	65'

L : Restrained Lengths for Unwrapped Ductile Iron Pipe (Feet)											
Pipe Diameter	3"	4"	6"	8"	10"	12"	16"	18"	20"	24"	30"
11-1/4° Horizontal Bend	5'	5'	5'	5'	10'	10'	10'	10'	10'	15'	15'
22-1/2° Horizontal Bend	5'	5'	10'	10'	10'	15'	15'	20'	20'	25'	30'
45° Horizontal Bend	10'	10'	15'	20'	25'	25'	35'	40'	40'	50'	55'

Notes:

1) Soil Designation is Cohesive Granular
2) Design depth of cover is 3.5 Feet
3) Lengths are based on 100 psi working pressure + 120 psi surge allowance
4) Minimum safety factor is 1.5
5) Lengths shall be increased proportionally for design working pressures greater than 100 psi
6) Combined fittings shall be evaluated individually and greatest L shall be used
7) Required restrained lengths shall be shown and labeled on the pipe profile
8) 90° Vertical bends are not permitted

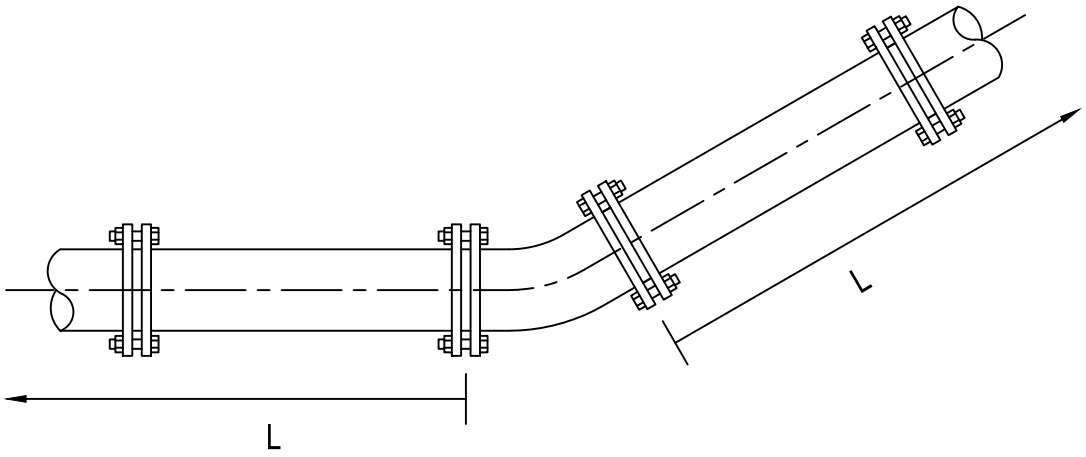
RES-5

Fluvanna County Virginia
Construction Detail

Restrained Joint Pipe Lengths for
11-1/4°, 22-1/2° & 45° Upper Vertical Bends

Not to Scale

Revised: 09/2022



Elevation View

L : Restrained Lengths for PVC & Poly-Wrapped Pipes (Feet)											
Pipe Diameter	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
11-1/4° Horizontal Bend	10'	10'	15'	15'	20'	20'	25'	30'	30'	35'	40'
22-1/2° Horizontal Bend	15'	15'	25'	30'	35'	40'	50'	55'	65'	65'	75'
45° Horizontal Bend	30'	35'	45'	60'	75'	85'	100'	110'	125'	135'	160'

L : Restrained Lengths for Unwrapped Ductile Iron Pipe (Feet)											
Pipe Diameter	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
11-1/4° Horizontal Bend	5'	5'	10'	10'	15'	15'	20'	20'	20'	25'	30'
22-1/2° Horizontal Bend	10'	15'	15'	20'	25'	30'	35'	40	45'	45'	55'
45° Horizontal Bend	20'	25'	35'	45'	50'	60'	70'	80'	85'	95'	110'

Notes:

1) Soil Designation is Cohesive Granular
2) Design depth of cover is 3.5 Feet
3) Lengths are based on 100 psi working pressure + 120 psi surge allowance
4) Minimum safety factor is 1.5
5) Lengths shall be increased proportionally for design working pressures greater than 100 psi
6) Combined fittings shall be evaluated individually and greatest L shall be used
7) Required restrained lengths shall be shown and labeled on the pipe profile
8) 90° Vertical Bends are not permitted

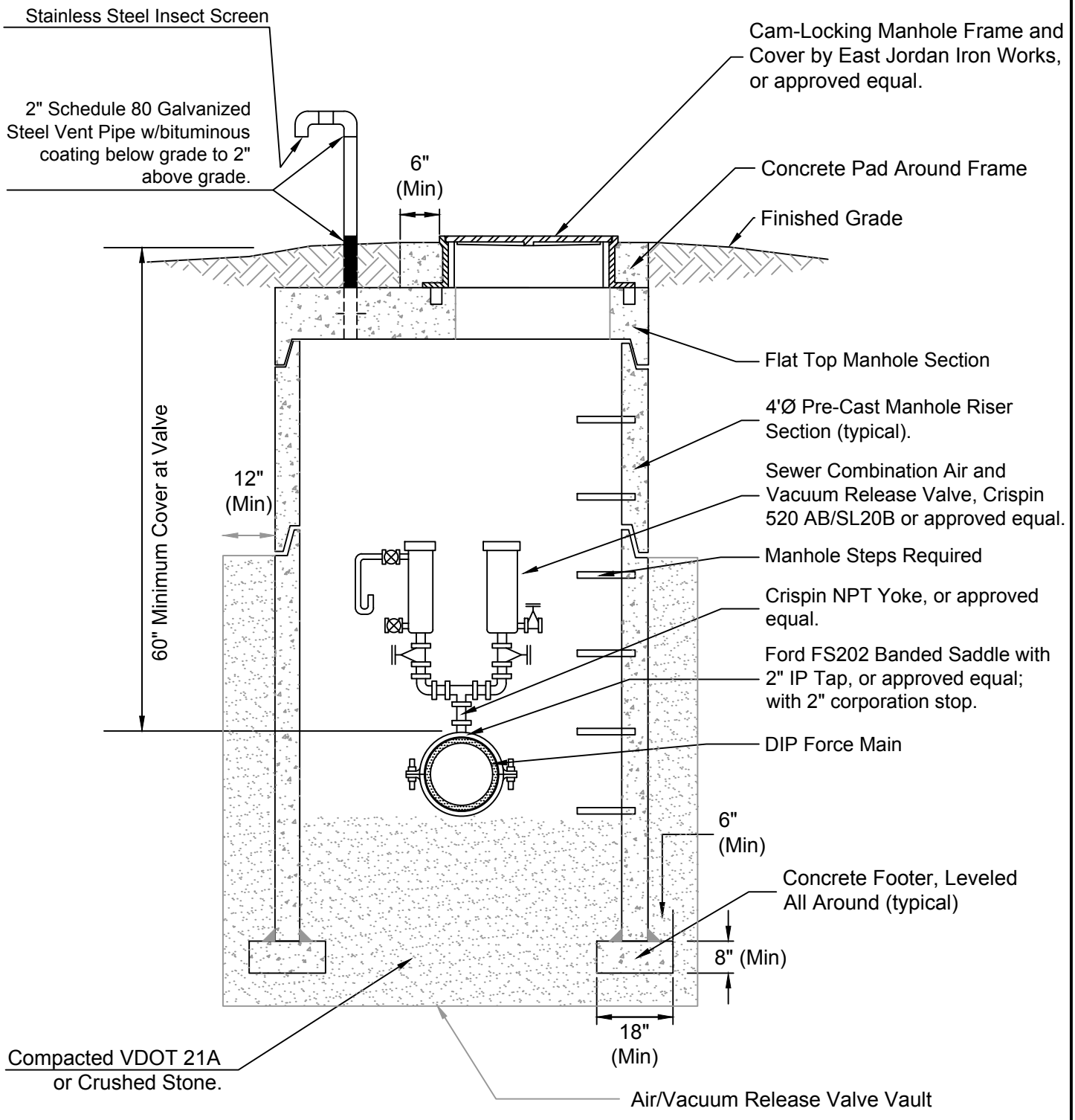
RES-6

Fluvanna County Virginia
Construction Detail

Restrained Joint Pipe Lengths for
11-1/4°, 22-1/2° & 45° Lower Vertical Bends

Not to Scale

Revised: 09/2022



Note:
See Standard Detail SC-01 for Manhole Components not detailed here.

SEW-1

Fluvanna County Virginia
Construction Detail

Combination Air/Vacuum Release Valve for Sewage Force Main

Not to Scale

Revised: 09/2022

Fluvanna County Virginia
Construction Detail

Force Main Connection to Gravity Sewer Manhole

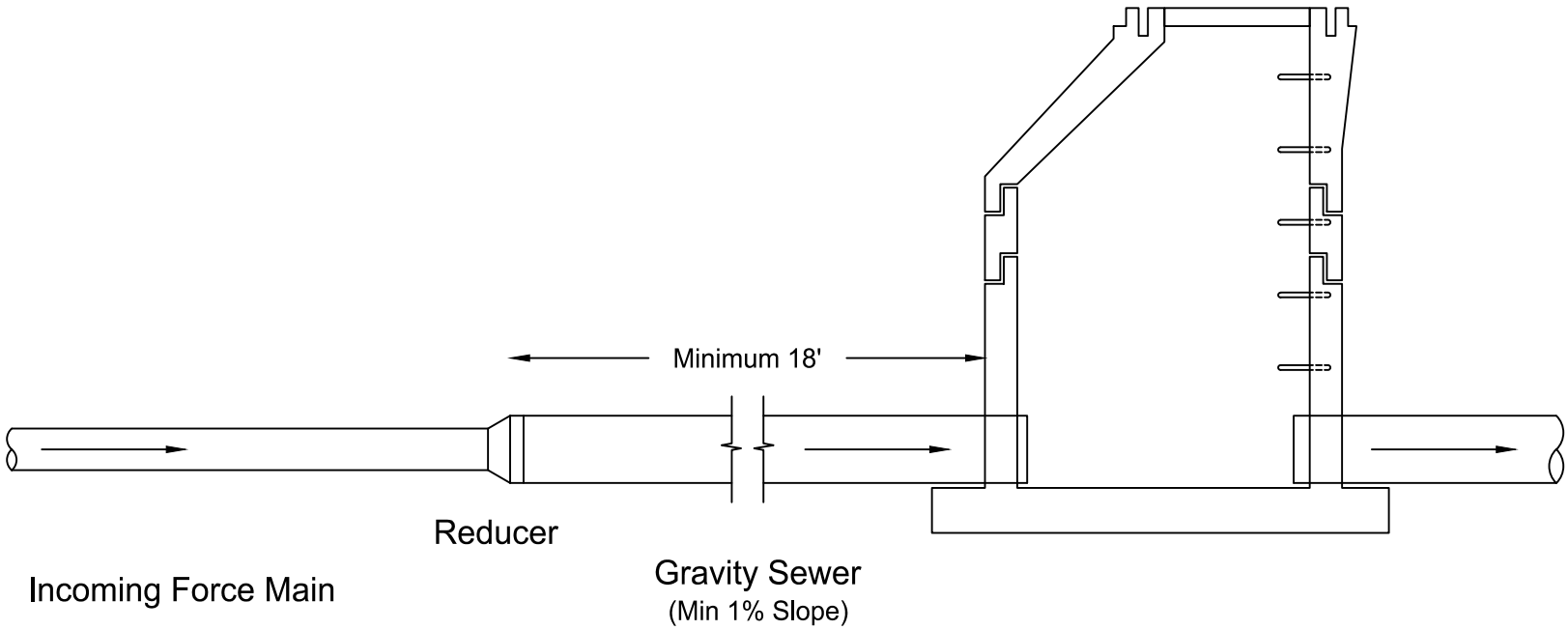
Not to Scale

SEW-2

PIPE SIZING REQUIREMENTS	
FORCE MAIN DIAMETER	GRAVITY SEWER (REQ'D DIAMETER)
6" & Smaller	8"
8"	12"
10"	12"
12"	15"

Notes:

1) See Detail SC-01 or SC-02 for manhole construction specifications.
2) Restrained joints shall be used at the reducer fitting.
3) Gravity sewer line shall be installed with minimum 1% slope.
4) Connections for force mains greater than 12" diameter shall be considered on a case-by-case basis



Revised: 09/2022

Fluvanna County Virginia
Construction Detail

Force Main Connection to Gravity Sewer for Individual Grinder or Effluent Pump

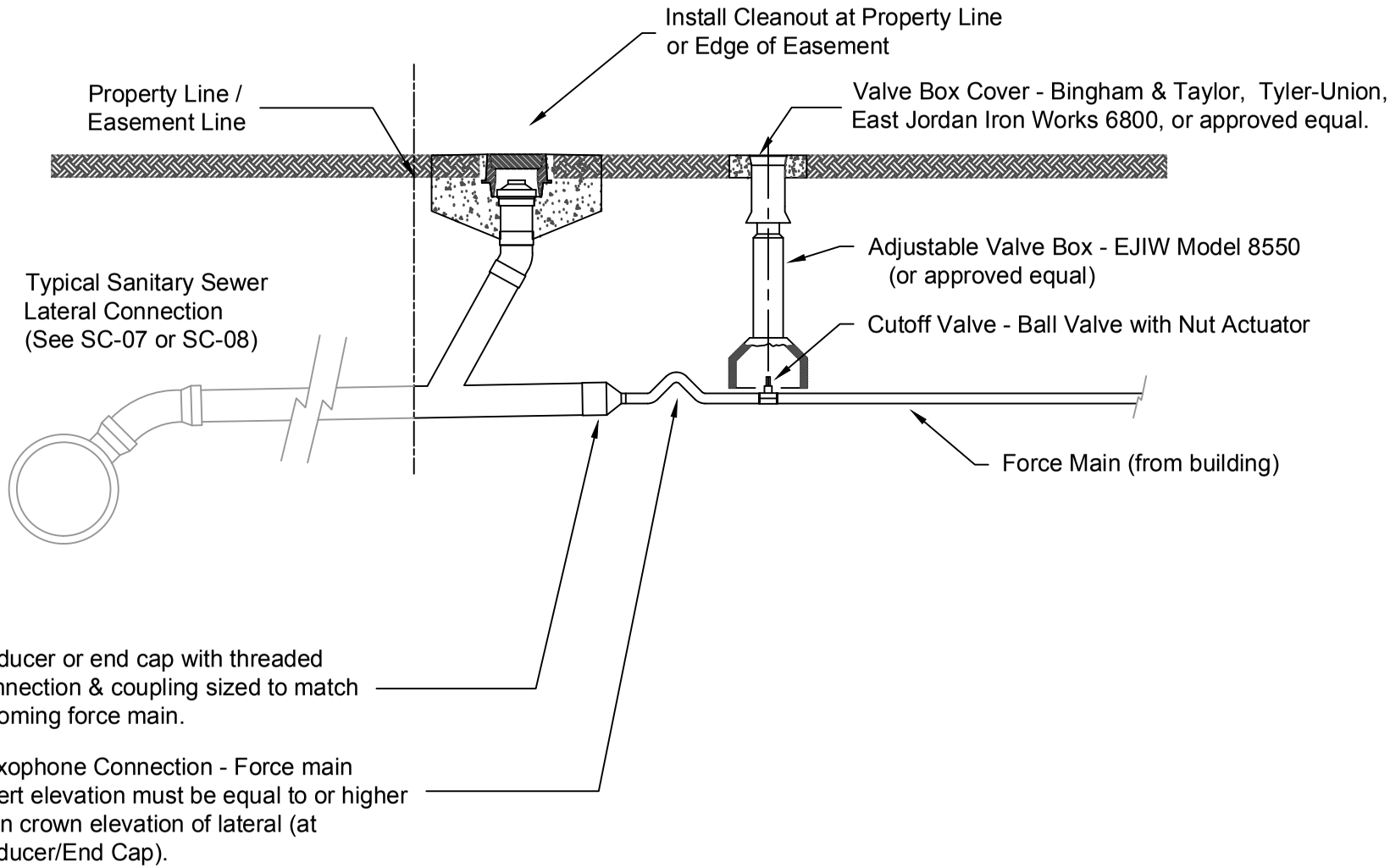
Not to Scale

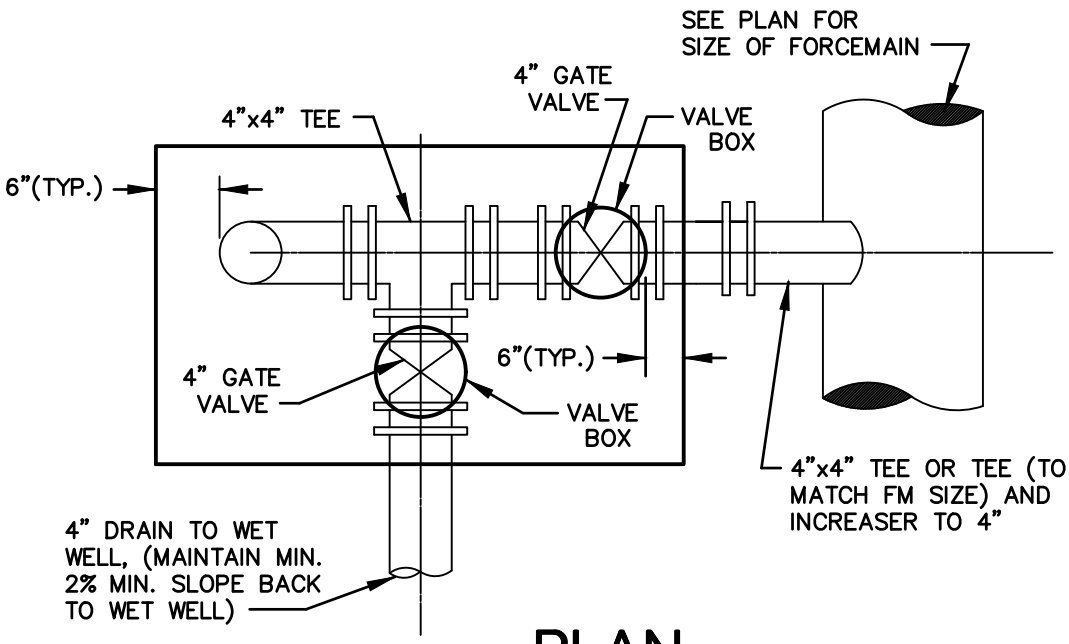
Revised: 09/2022

SEW-3

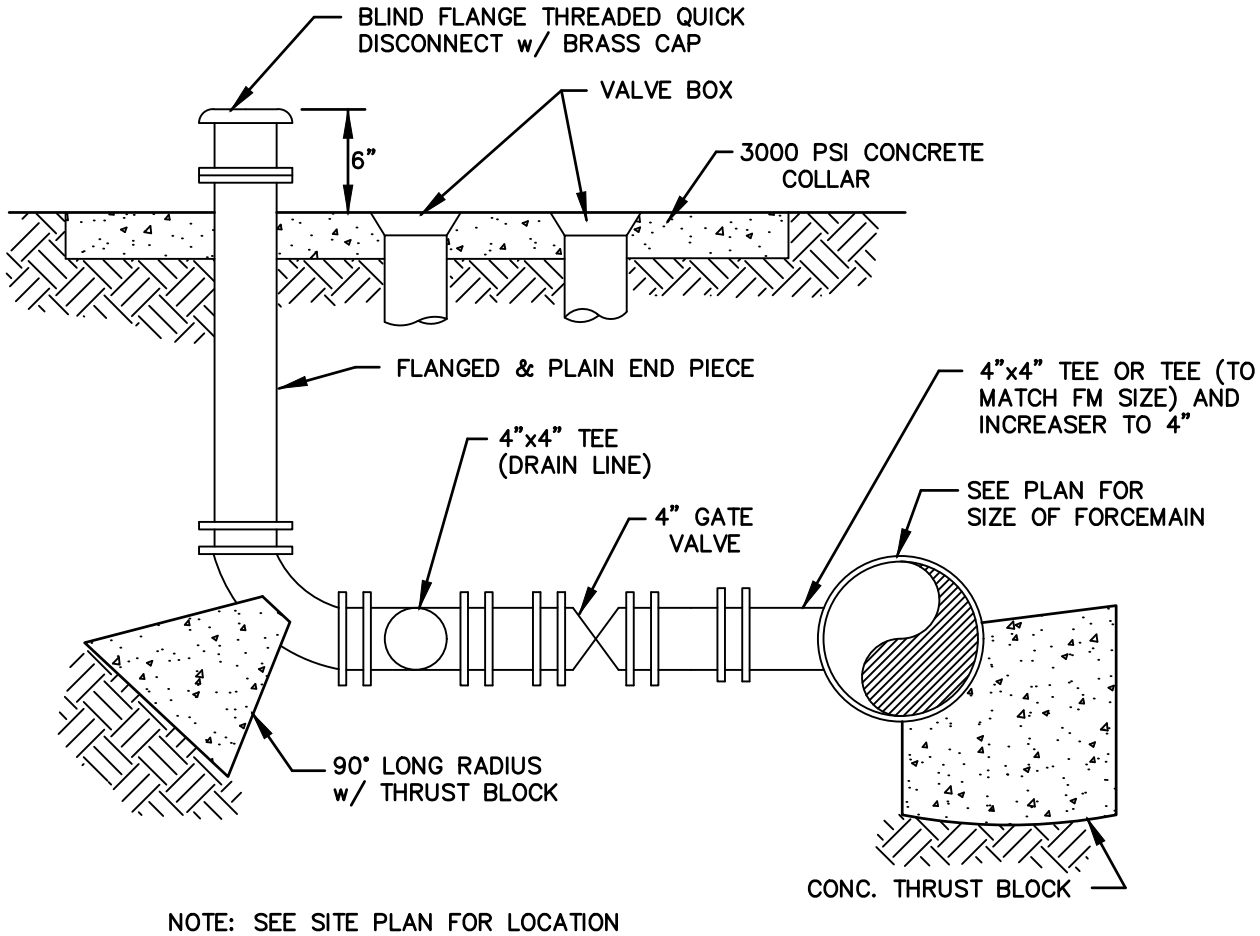
Notes:

1) This Detail applies to force mains up to 2" diameter (d) connecting to a gravity line via a sewer lateral.
2) All piping shall be bedded in accordance with the appropriate Construction Detail for the material used.
3) Force main shall have minimum 30" cover (24" at top of saxophone connection).
4) Concrete Collar(s) Shall be Poured Around Valve Box and Clean-out (when located out of pavement). Concrete Collars shall be minimum 24" x 24" x 4" thick.





PLAN



NOTE: SEE SITE PLAN FOR LOCATION

SECTION

SEW-4

Fluvanna County Virginia
Construction Detail

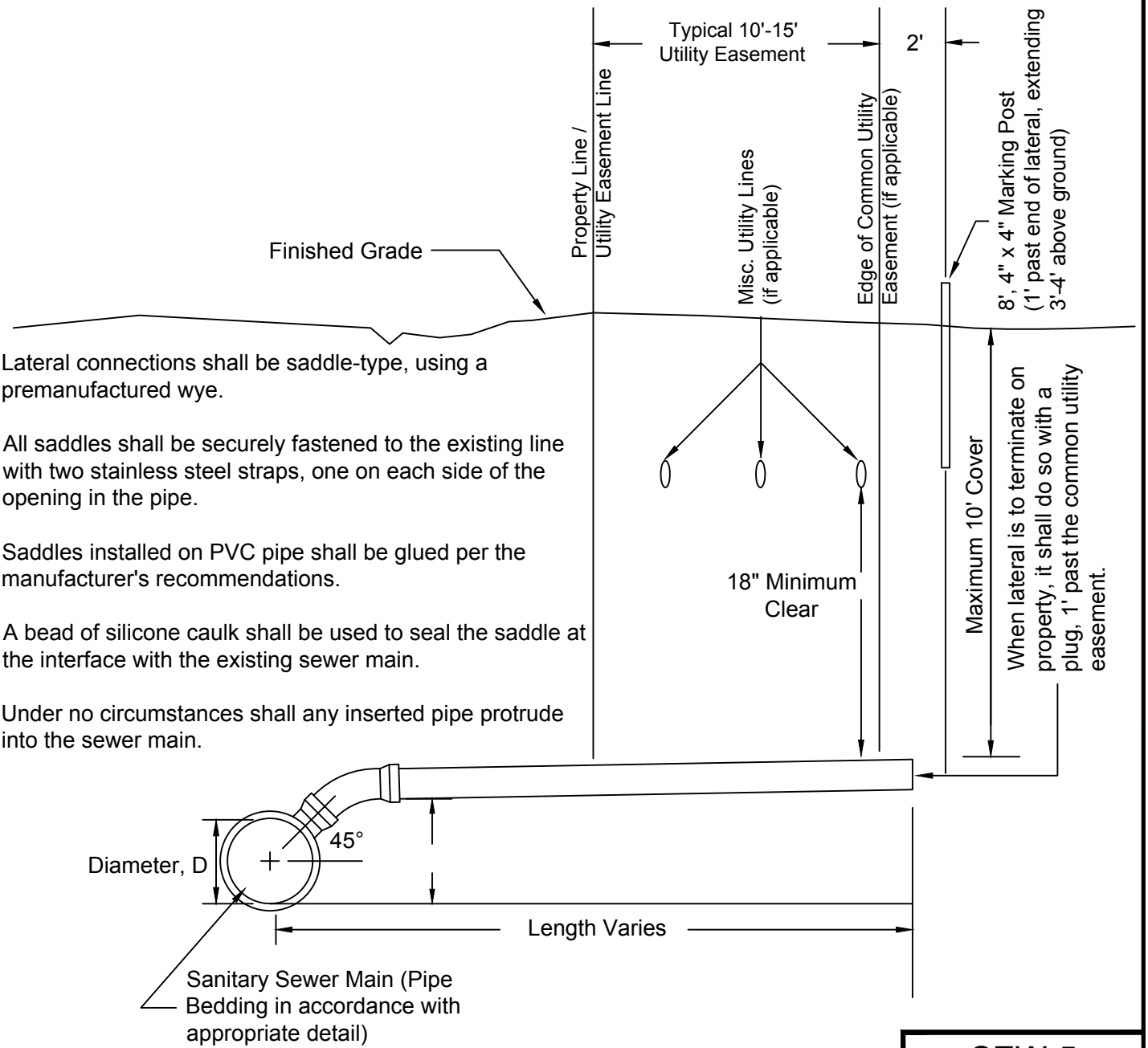
Emergency Pump Connection

Not to Scale

Revised: 09/2022

Notes:

1) The entire lateral shall be bedded in accordance with the appropriate Construction Detail for the pipe material used.
2) If maximum depth cannot be met, use SC-08, *Sanitary Sewer Service - Lateral Connection with Riser*.
3) Minimum slope for 4" laterals shall be 2.08%.
4) Minimum slope for 6" laterals shall be 1.00%.
5) Maximum slope shall be 4.16% for any lateral.
6) A 3M Brand, Full Range Sewer Marker shall be located along the gravity main at the point of connection for each lateral, and at the terminal point of the lateral if applicable.
7) If no common utility easement is present then end of lateral and marker post shall be located relative to the property/easement line.



Lateral connections shall be saddle-type, using a premanufactured wye.

All saddles shall be securely fastened to the existing line with two stainless steel straps, one on each side of the opening in the pipe.

Saddles installed on PVC pipe shall be glued per the manufacturer's recommendations.

A bead of silicone caulk shall be used to seal the saddle at the interface with the existing sewer main.

Under no circumstances shall any inserted pipe protrude into the sewer main.

SEW-5

Fluvanna County Virginia
Construction Detail

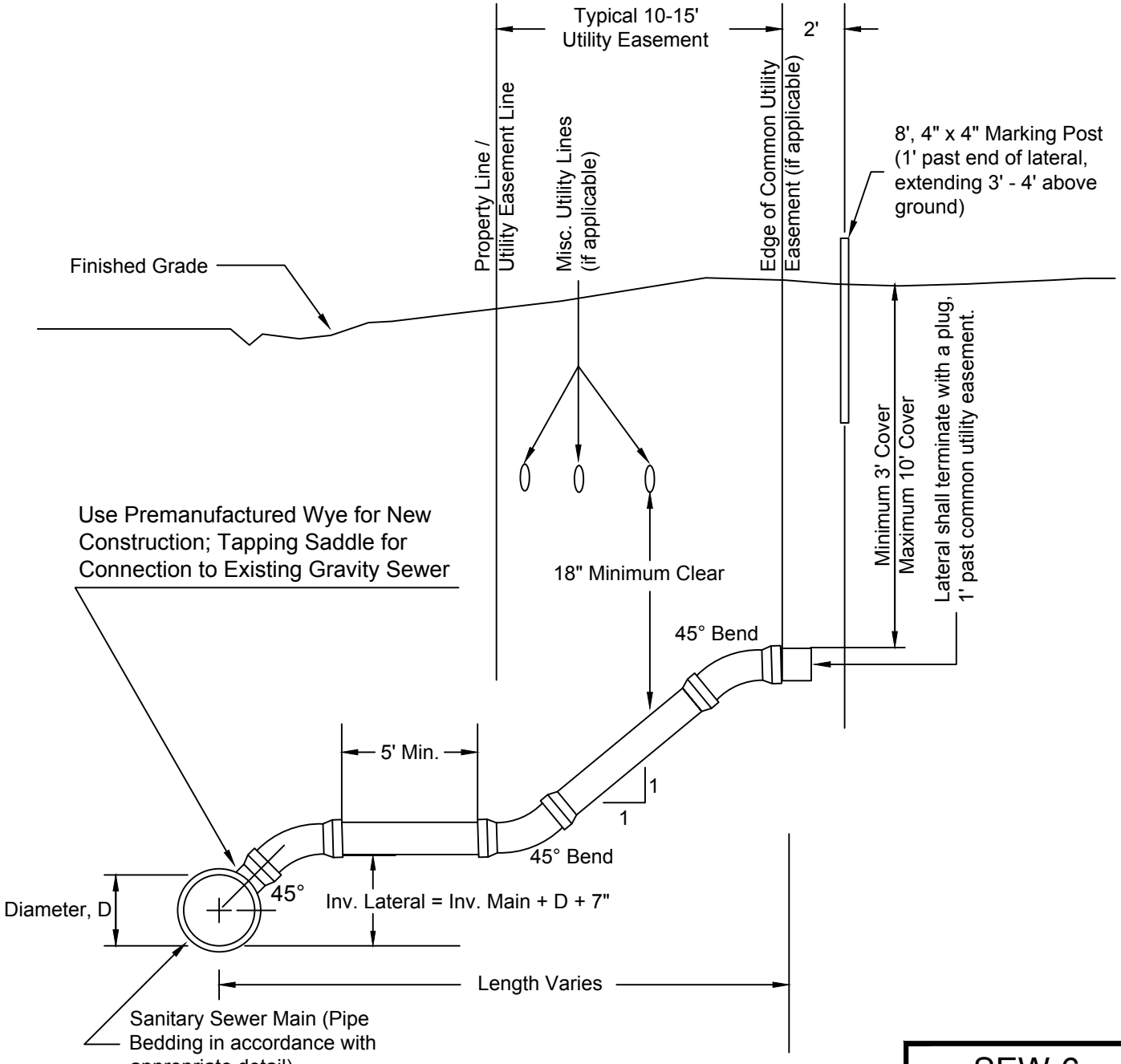
Standard Sanitary Sewer Service Lateral Connection

Not to Scale

Revised: 09/2022

Notes:

1) The entire lateral shall be bedded in accordance with the appropriate Construction 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 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.



SEW-6

Fluvanna County Virginia Construction Detail

Sanitary Sewer Service Lateral Connection with Riser

Not to Scale

Revised: 09/2022

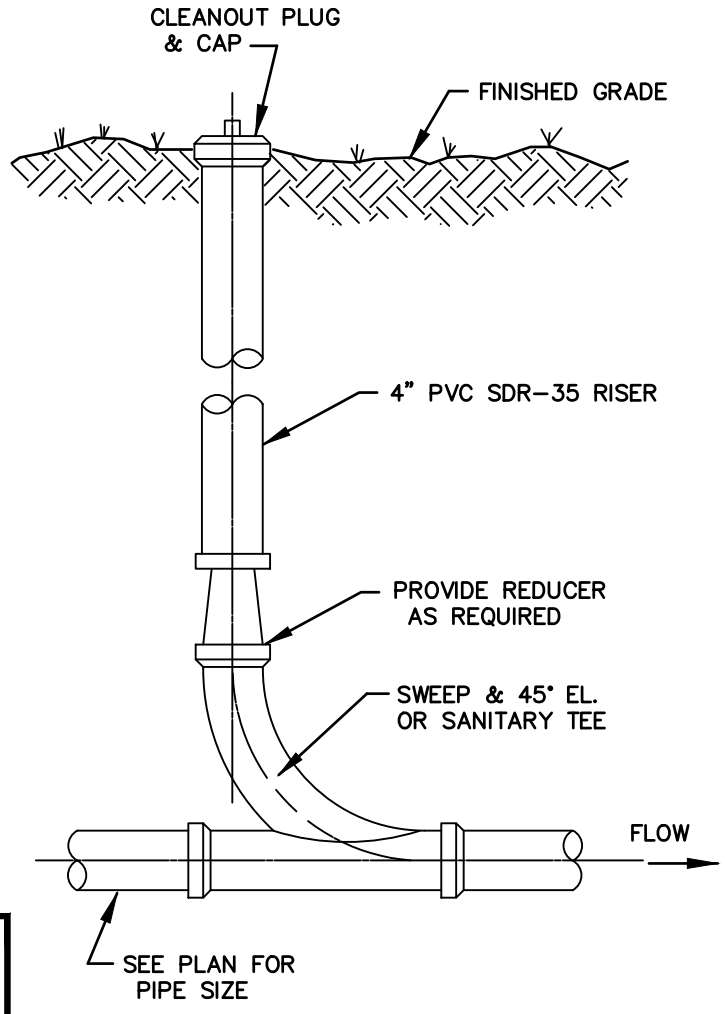
Fluvanna County Virginia
Construction Detail

Typical Cleanout Detail

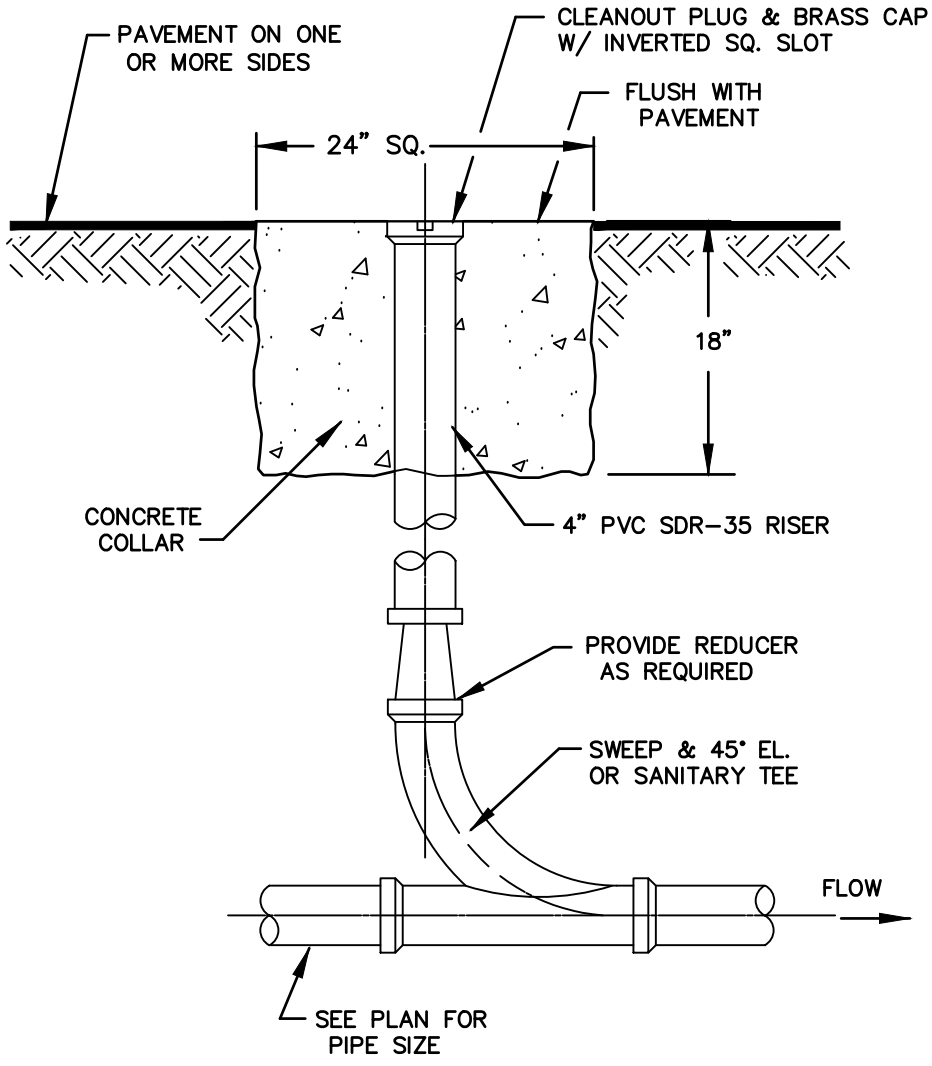
Not to Scale

Revised: 09/2022

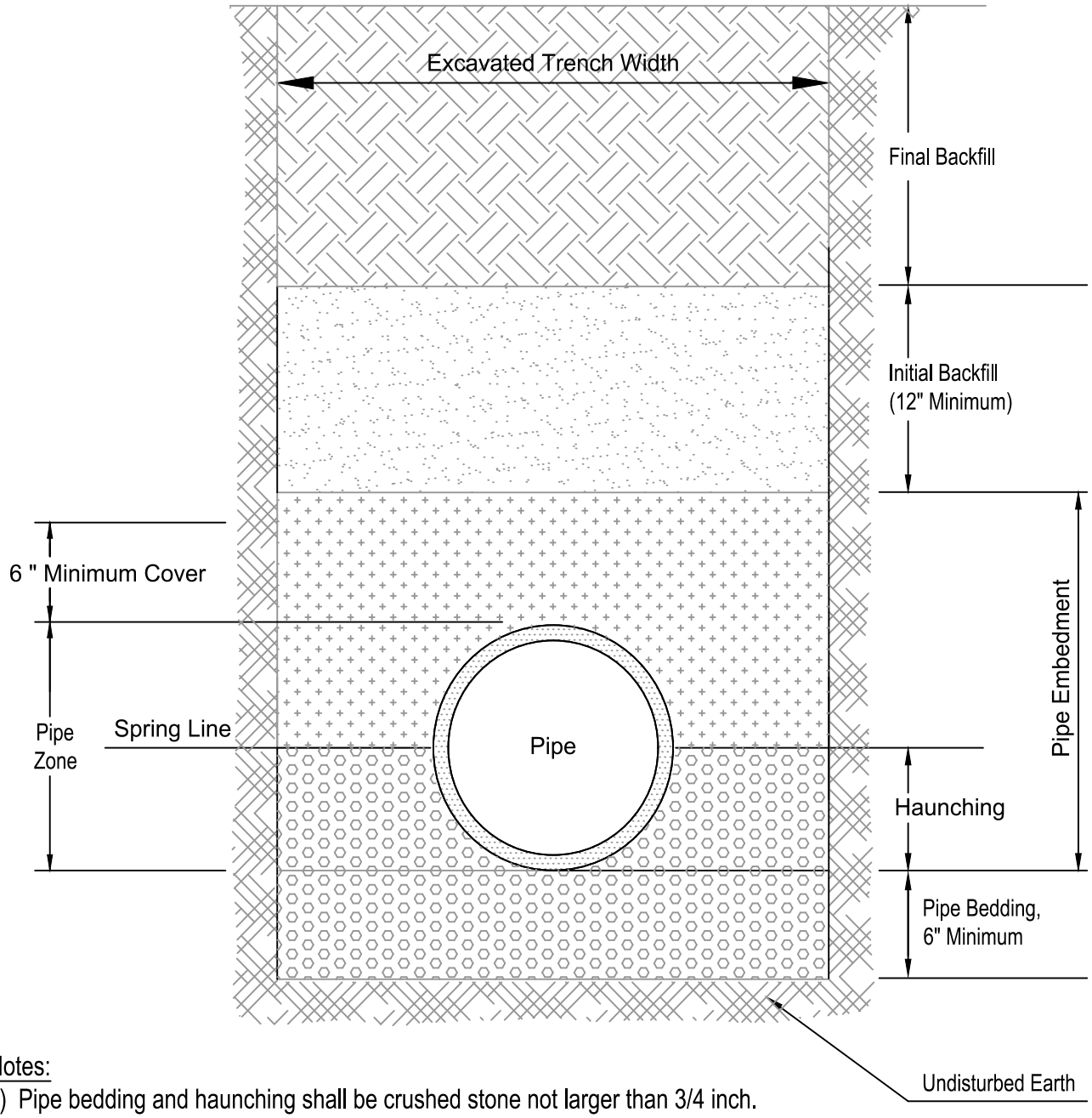
SEW-7



IN YARD AREAS



IN PAVED AREAS



Notes:

1) Pipe bedding and haunching shall be crushed stone not larger than 3/4 inch.
2) Pipe embedment shall be crushed stone not larger than 3/4 inch, or loose soil free of stones larger than 1 inch in their greatest dimension.
3) Initial backfill shall be loose soil free of foreign materials, frozen soil and stones larger than 3 inches in their greatest dimension.
4) Final backfill shall be loose soil free of foreign materials, frozen soil, and stones larger than 8 inches in their greatest dimension.
5) The top 6" (to finished grade) of final backfill shall meet the requirements for Initial Backfill.
6) Installation of DIP shall, in addition to the above, conform to ANSI/AWWA C600-99.

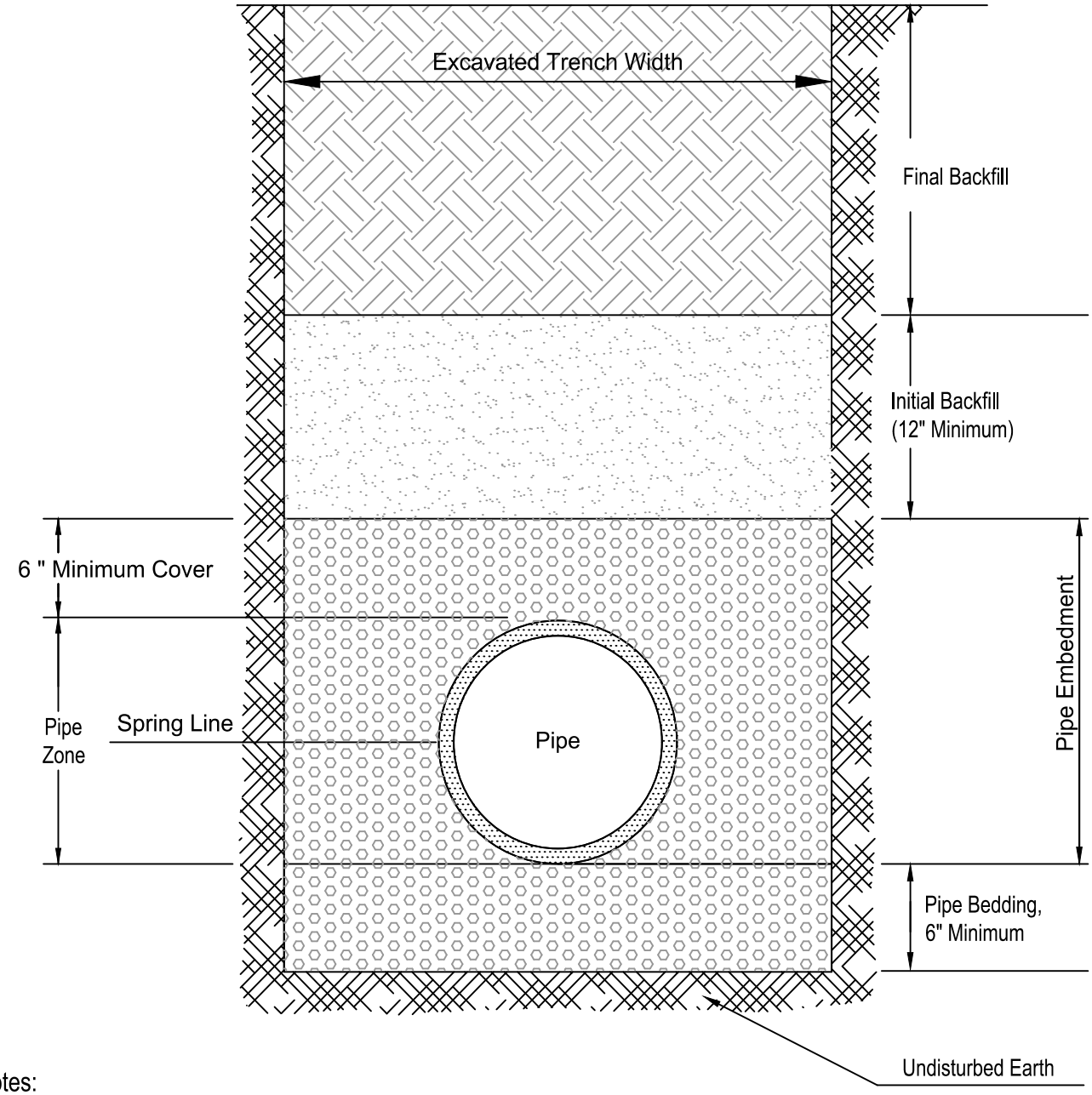
TR-1

Fluvanna County Virginia
Construction Detail

Pipe Embedment and Backfill for Ductile Iron Pipe

Not to Scale

Revised: 09/2022



Notes:

1) Pipe bedding and embedment shall be crushed stone not larger than 3/4 inch.
2) Initial backfill shall be loose soil free of foreign materials, frozen soil and stones larger than 3 inches in their greatest dimension.
3) Final backfill shall be loose soil free of foreign materials, frozen soil, and stones larger than 8 inches in their greatest dimension.
4) The top 6" (to finished grade) of final backfill shall meet the requirements for Initial Backfill.
5) Installation of plastic pipe shall, in addition to the above, conform to ANSI/AWWA C605-94.

TR-2

Fluvanna County Virginia
Construction Detail

Pipe Embedment and Backfill for Plastic Pipe

Not to Scale

Revised: 09/2022

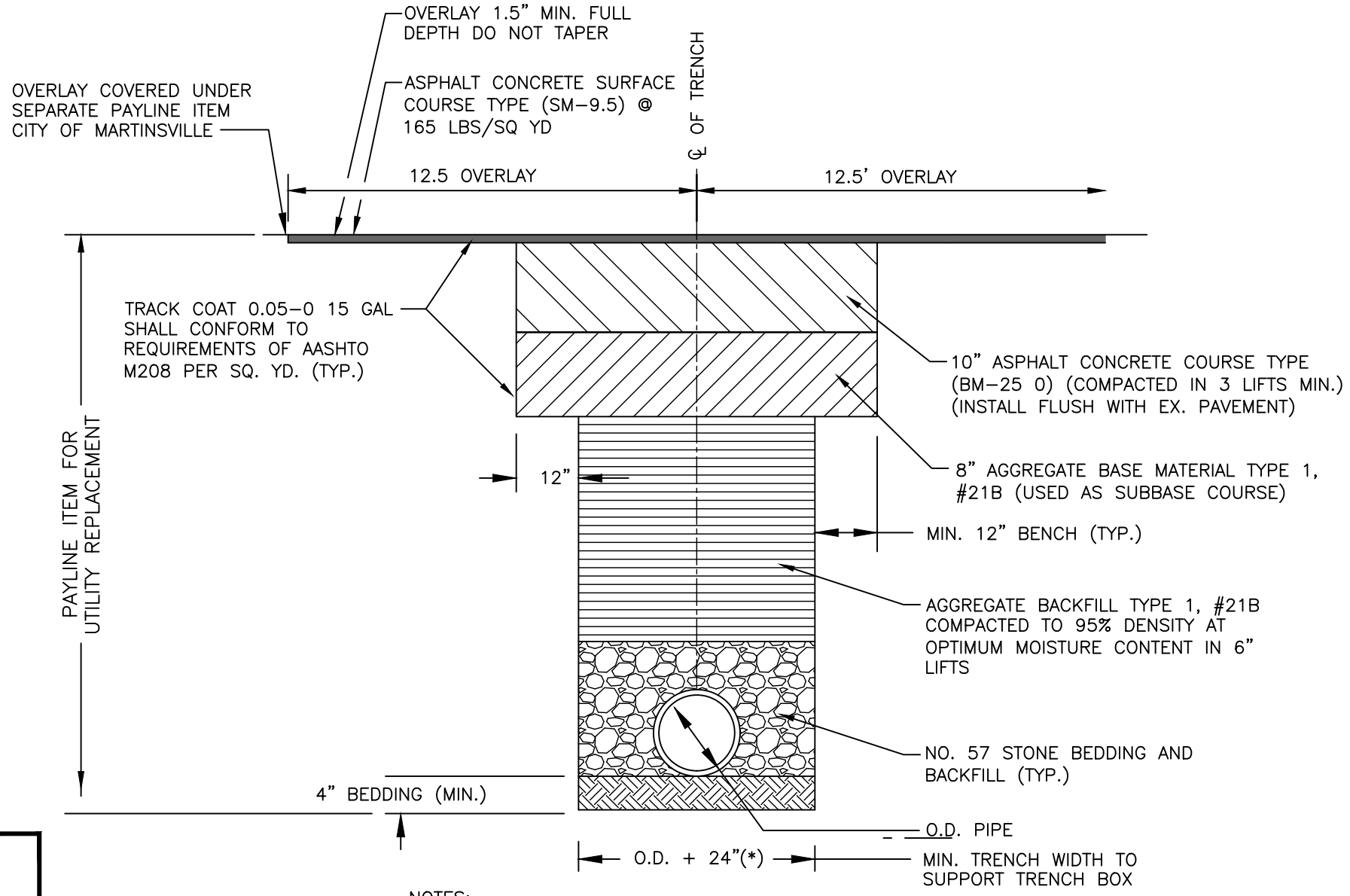
Fluvanna County Virginia
Construction Detail

Open Cut Trenching Detail

Not to Scale

Revised: 09/2022

TR-3



NOTES:

1. ALL PAVEMENT MARKINGS DAMAGED OR DESTROYED BY TRENCH EXCAVATION ACTIVITY SHALL BE REPLACED BY PERMITEE PER VDOT SPECIFICATIONS.
2. THIS DETAIL FOR HIGHWAYS WITH EXISTING ASPHALT CONCRETE PAVEMENT SECTIONS.
3. THE ROAD SURFACE SHALL RECEIVE A PAVEMENT OVERLAY 25' (MINIMUM) CENTERED ON TRENCH FOR PERPENDICULAR CROSSINGS.

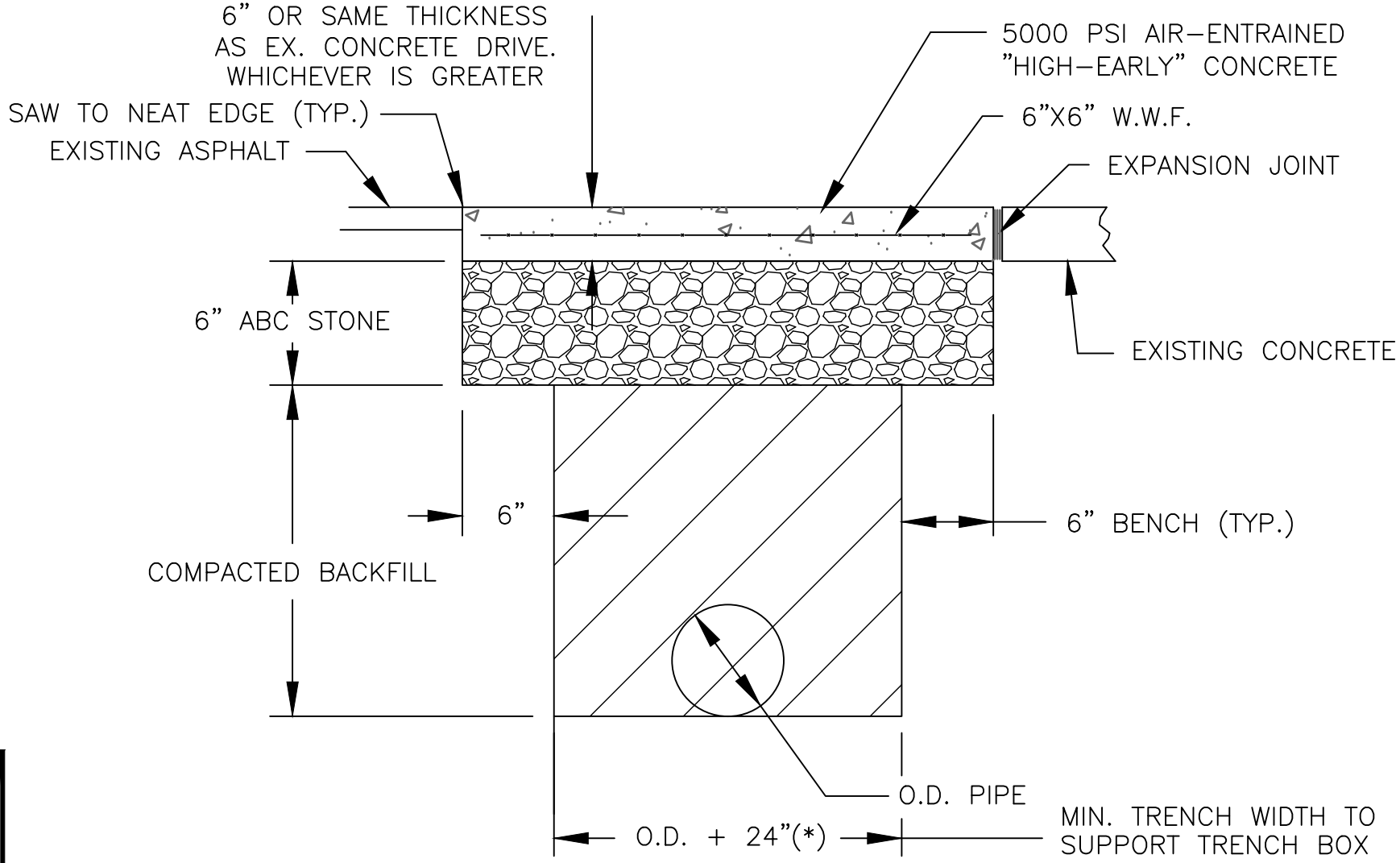
Fluvanna County Virginia
Construction Detail

Concrete Driveway Repair Detail

Not to Scale

Revised: 09/2022

TR-4



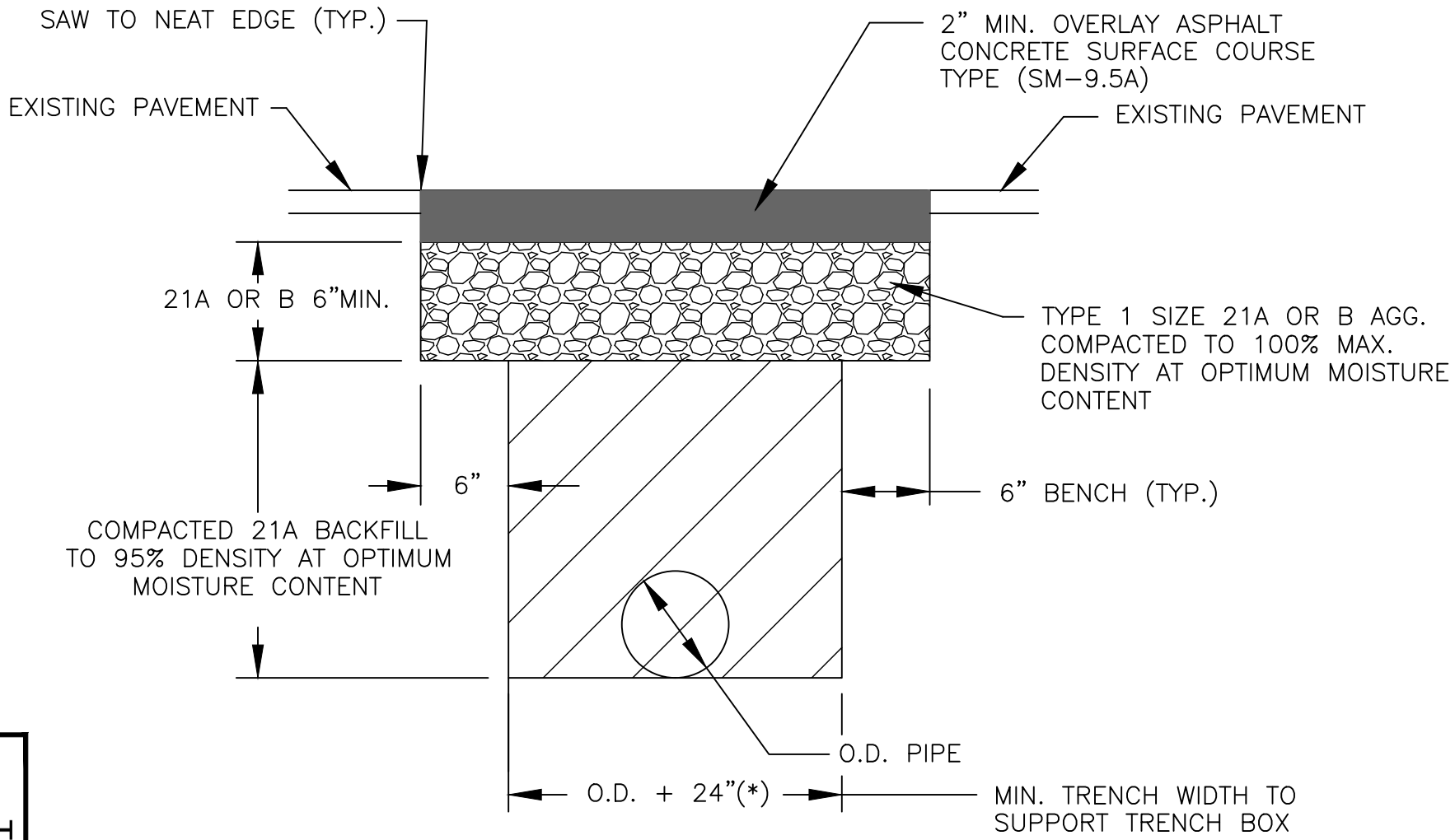
Fluvanna County Virginia
Construction Detail

Asphalt Driveway Repair Detail

Not to Scale

Revised: 09/2022

TR-5



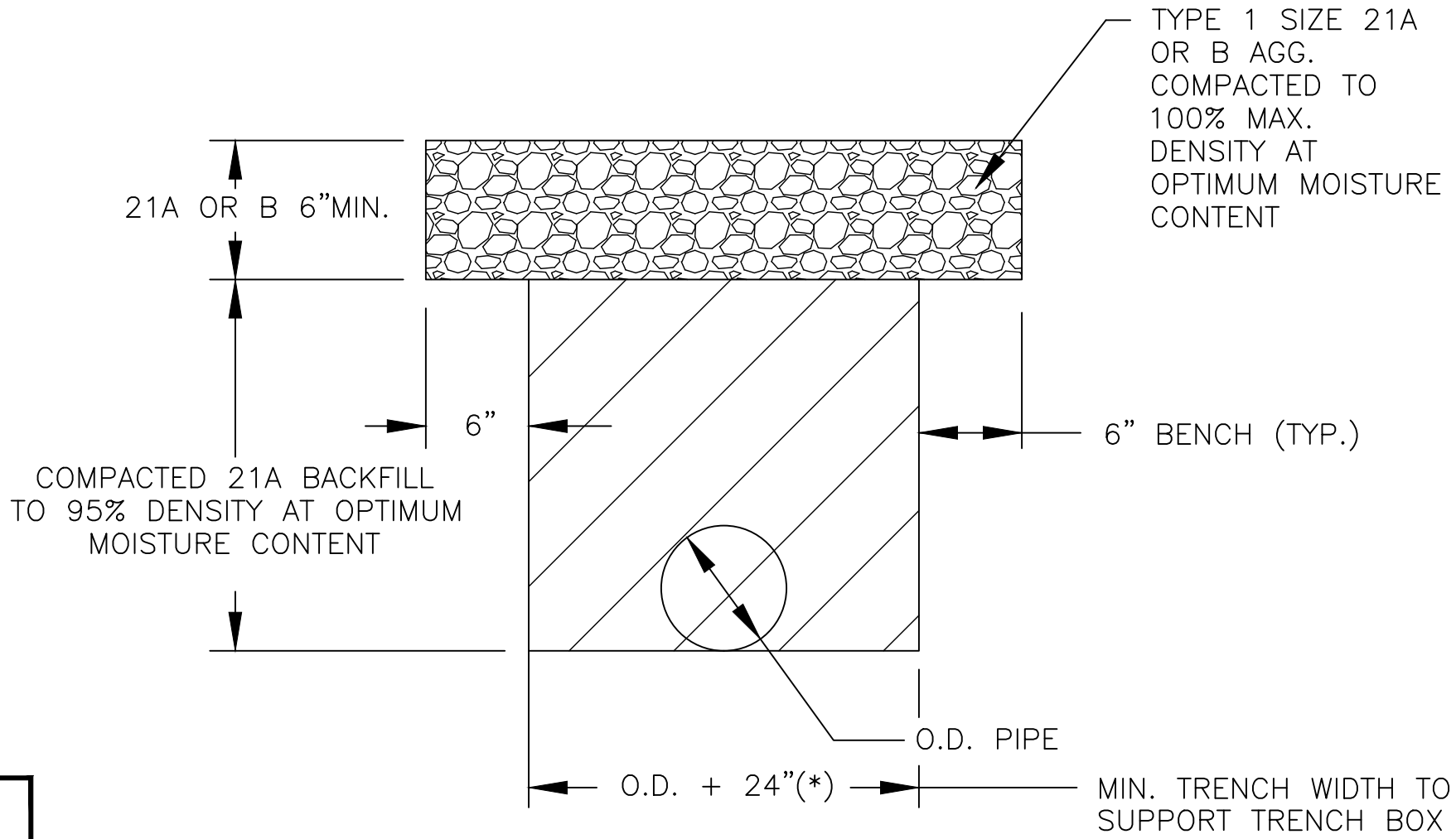
Fluvanna County Virginia
Construction Detail

Gravel Driveway Repair Detail

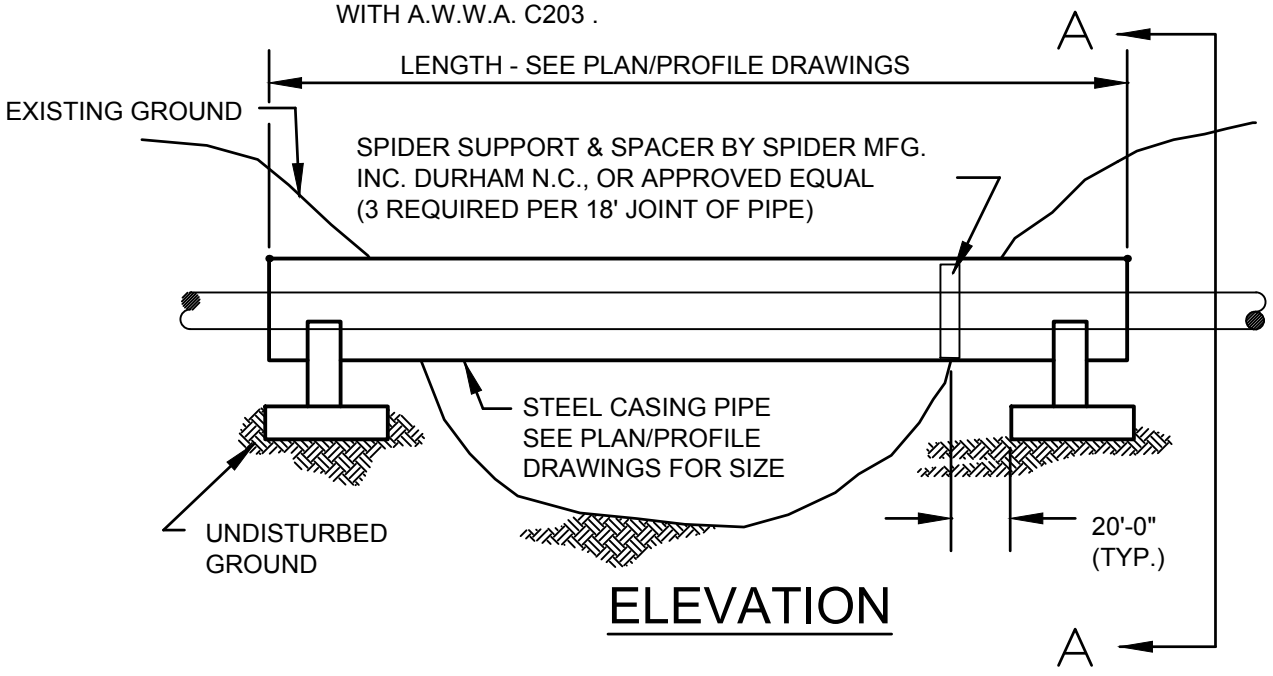
Not to Scale

Revised: 09/2022

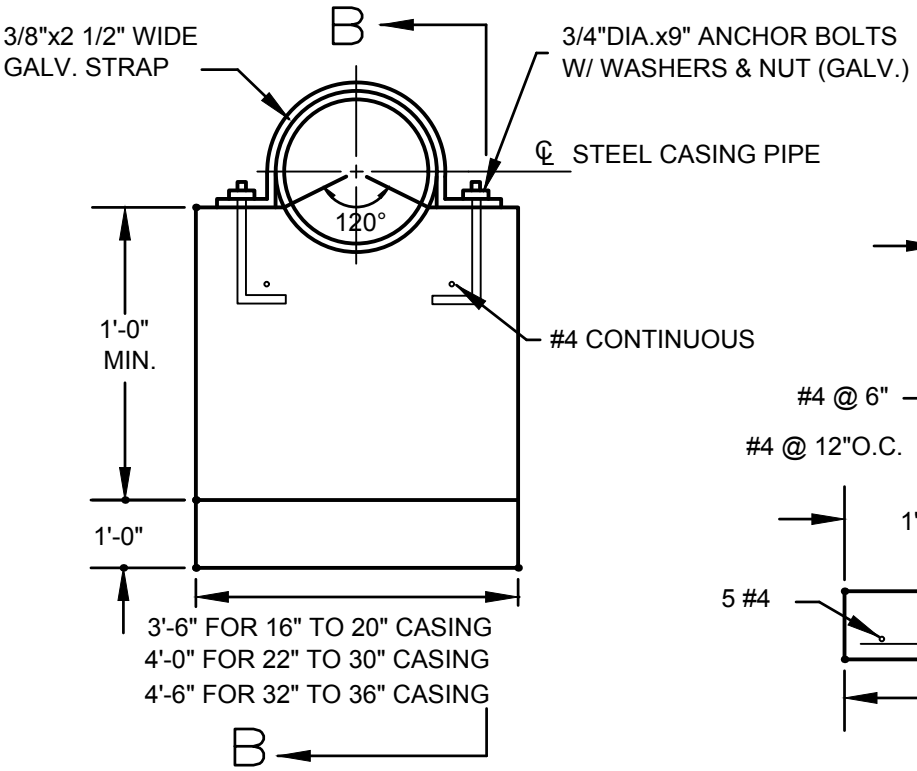
TR-6



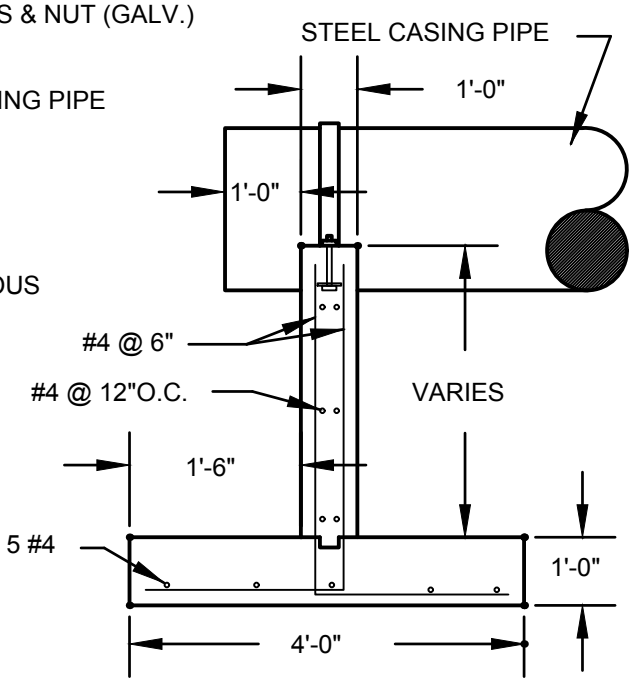
NOTE: CASING PIPE SHALL HAVE A COAL-TAR PROTECTIVE COATING APPLIED INSIDE AND OUTSIDE, IN ACCORDANCE WITH A.W.W.A. C203 .



ELEVATION



SECTION A-A



SECTION B-B

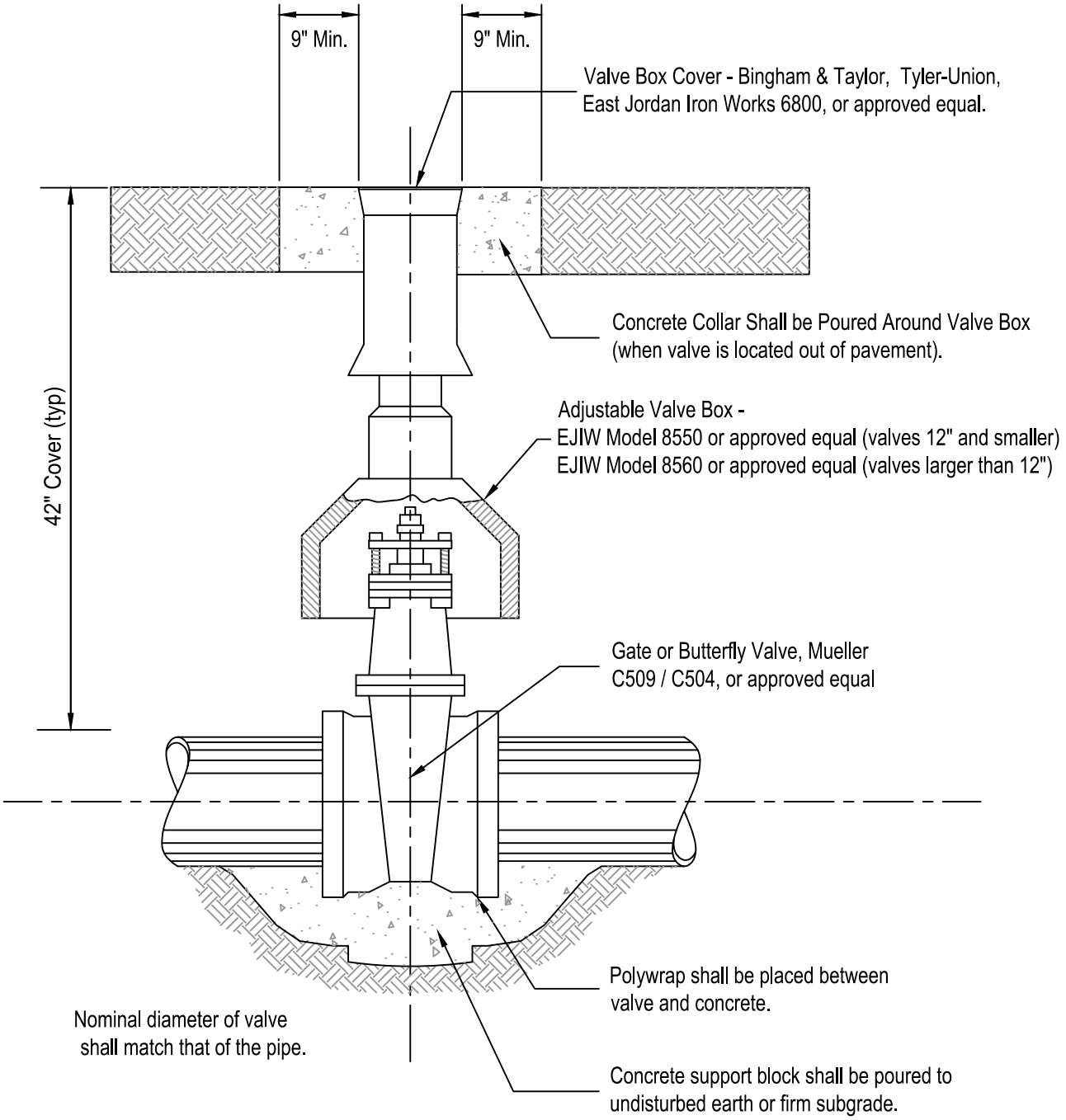
TR-7

Fluvanna County Virginia Construction Detail

Aerial Stream or River Crossing

Not to Scale

Revised: 09/2022



WAT-1

Fluvanna County Virginia
Construction Detail

Typical Gate Valve and Valve Box

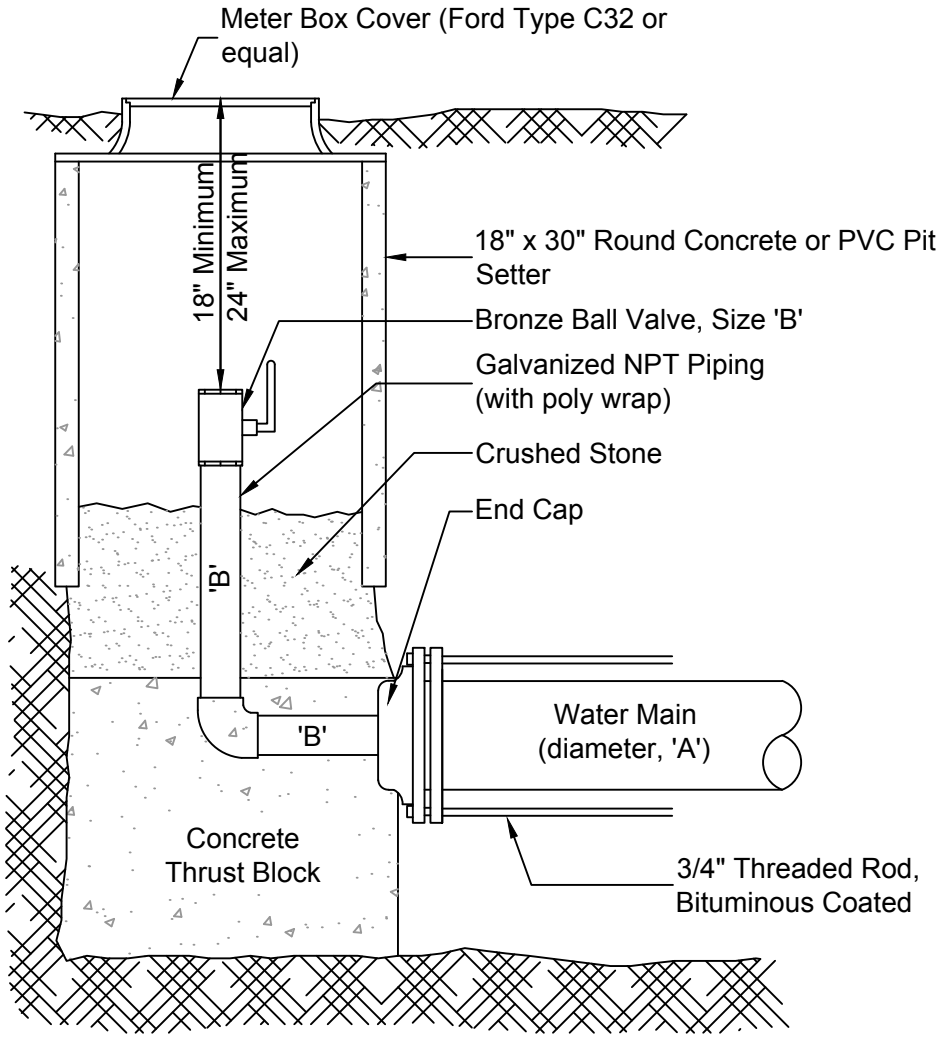
Not to Scale

Revised: 09/2022

Notes:

1) This blow-off is for use only in areas where the water main is above the seasonal high groundwater level.
2) A customized detail must be designed and submitted to the Authority for use in areas subject to flooding or where the water main is below the seasonal high groundwater level.
3) Table of Sizes:

Water Main Diameter 'A'	Ball Valve & Piping Size 'B'
6" or Less	2"
8" to 15"	4"
Greater than 15"	As Determined by County Engineer



WAT-2

Fluvanna County Virginia Construction Detail

Water Distribution System Blow-Off Detail

Not to Scale

Revised: 09/2022

Fluvanna County Virginia
Construction Detail

Water Distribution System
Flushing Valve Detail

Not to Scale

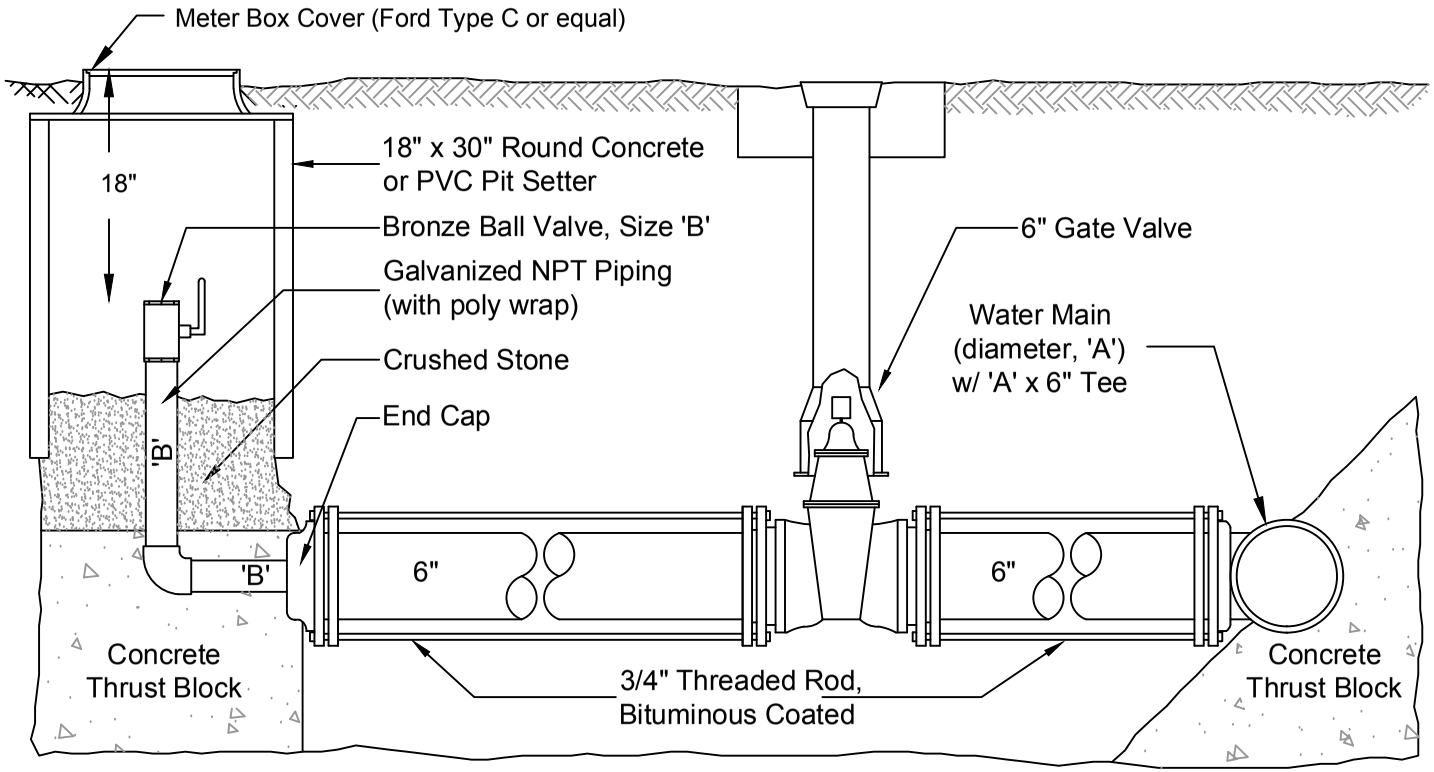
Revised: 09/2022

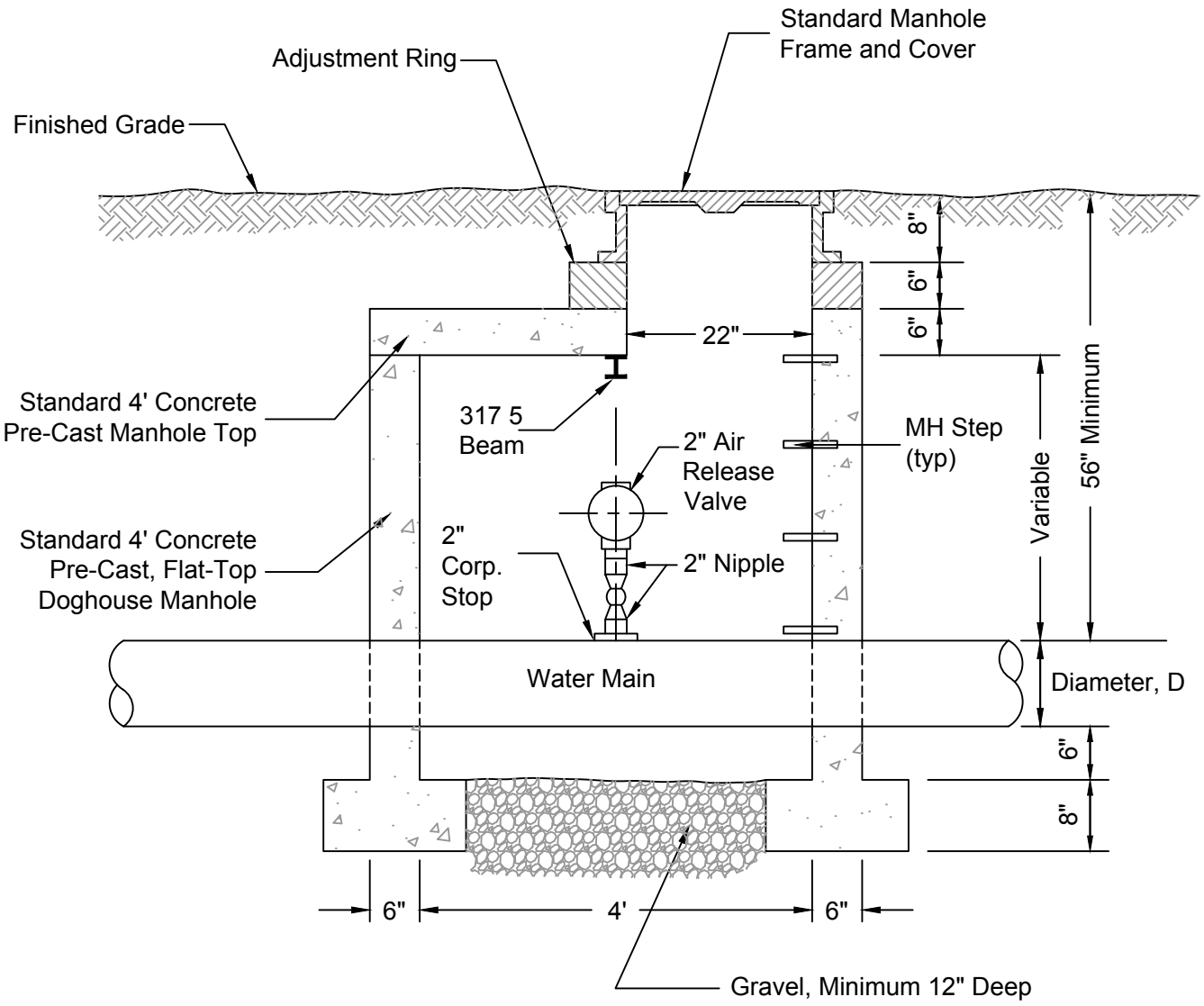
WAT-3

Notes:

1) This blow-off is for use only in areas where the water main is above the seasonal high groundwater level.
2) A customized detail must be designed and submitted to the Authority for use in areas subject to flooding or where the water main is below the seasonal high groundwater level.
3) Table of Sizes:

Water Main Diameter 'A'	Ball Valve & Piping Size 'B'
6" or Less	2"
8" to 15"	4"
Greater than 15"	As Determined by County Engineer





Notes:

1) This blow-off is for use only in areas where the water main is above the seasonal high groundwater level.
2) A customized detail must be designed and submitted to the County Engineer for installations in areas subject to flooding, or where the water main is below the seasonal high groundwater level.
3) Air release valve shall be Simplex Type "AV", "Crispin Universal", or approved equal.
4) Air release valve shall have a 2" diamter screwed connection.
5) Air release valve shall operate at working pressures of 150 psi or actual working pressure, whichever is greater.

WAT-4

Fluvanna County Virginia
Construction Detail

Water Distribution System
Air Release Valve

Not to Scale

Revised: 09/2022

Fluvanna County Virginia
Construction Detail

Water Distribution System
Typical Fire Hydrant

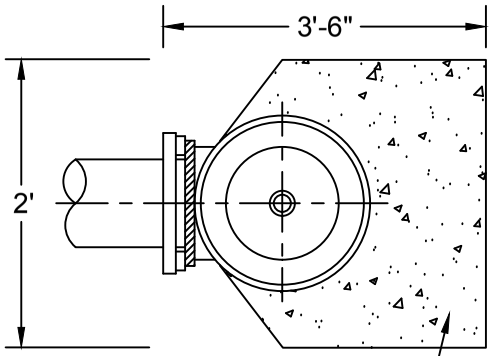
Not to Scale

Revised: 09/2022

WAT-5

Notes:

1) Hydrant shall be Mueller Centurion, Kennedy Model K-81-A, or approved equal.
2) Hydrant must be plumb.
3) Pipe sections shall be mortar lined Class 52 Ductile Iron.
4) Use two all thread tie-rods, same diameter as fitting bolt, at or near horizontal plane, through pipe centerline.



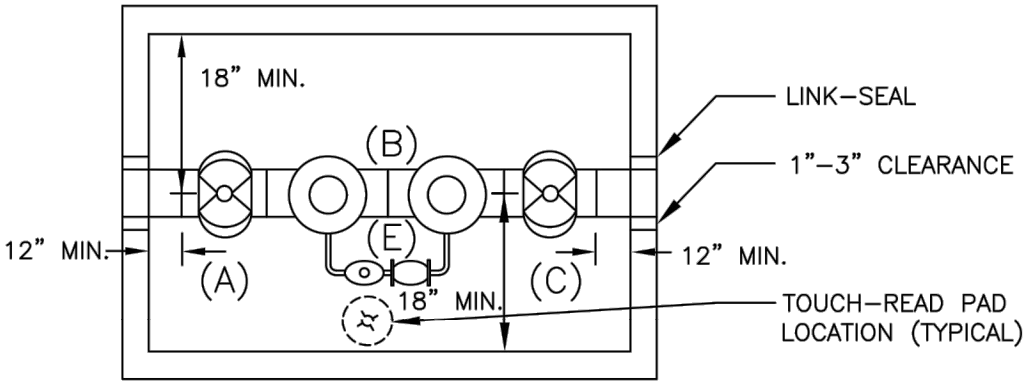
Plan View

Elevation

NOTES:

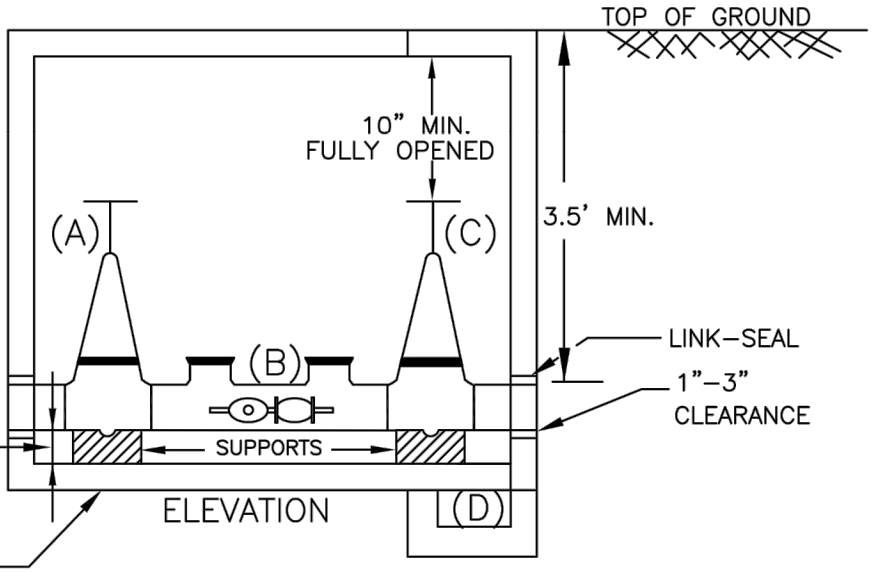
1. DOUBLE CHECK DEVICE SHALL BE INSTALLED IN A BOX AS NEAR TO THE WATER MAIN AS POSSIBLE WITHOUT PLACING BOX IN AREAS SUBJECT TO VEHICULAR TRAFFIC.

2. DOUBLE DETECTOR CHECK ASSEMBLY MUST BE U.L. LISTED OR F.M. APPROVED AND APPROVED BY FLUVANNA COUNTY DEPARTMENT OF PUBLIC UTILITIES.



PLAN

(A) OUTSIDE STEM AND YOKE GATE VALVE
(B) DOUBLE DETECTOR CHECK VALVE ASSEMBLY
(C) OUTSIDE STEM AND YOKE GATE VALVE
(D) SUMP PUMP WHERE WATER TABLE IS A PROBLEM OR GRAVITY DRAIN WHERE WATER TABLE IS NOT
(E) BY–PASS LOW FLOW METER WITH ISOLATION VALVES, AND BACKFLOW PREVENTER. METER TO BE PURCHASED FROM THE COUNTY.



VAULT SHALL BE AS MANUFACTURED BY CARSON–INDUSTRIES (MODEL #3660) OR APPROVED EQUAL (SIZE NECESSARY TO MEET MINIMUM VAULT STANDARDS).

BOX WITH CONCRETE BASE AND DOUBLE CHECK MUST BE SUPPORTED BY POURED IN PLACE CONCRETE PIPE SADDLES OR METAL PIPE STANDS [COATED WITH RUST RETARDANT] COATING.

NOTE: ISOLATION VALVES ON LOW–FLOW BYPASS SHALL BE 1/4 TURN BALL VALVES WITH SINGLE LEVER HANDLE. GATE VALVES WITH HANDWHEEL ACTUATOR ARE STRICTLY PROHIBITED.

WAT-6

Fluvanna County Virginia
Construction Detail

2" or Smaller Double Detector Check Assembly and Vault

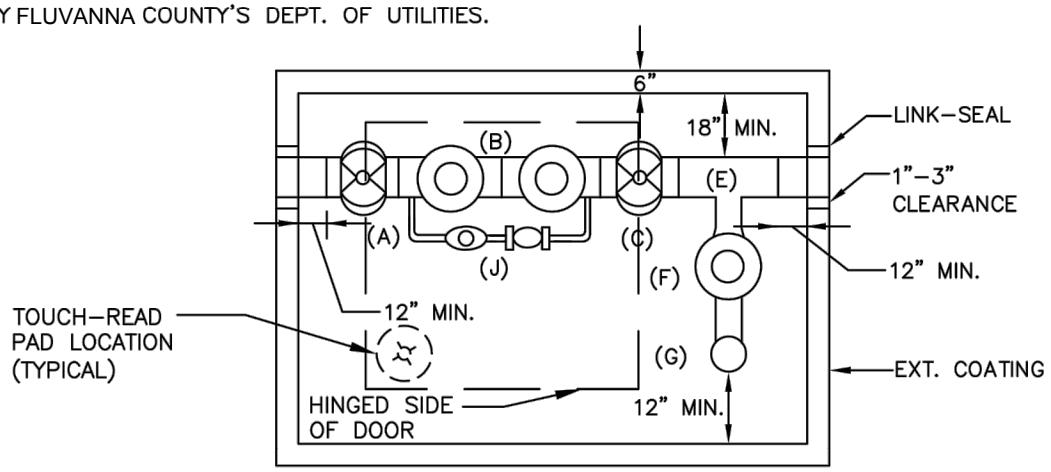
Not to Scale

Revised: 09/2022

NOTES:

1. DOUBLE CHECK DEVICE SHALL BE INSTALLED IN A BOX AS NEAR TO THE WATER MAIN AS POSSIBLE WITHOUT PLACING BOX IN AREAS SUBJECT TO VEHICULAR TRAFFIC.

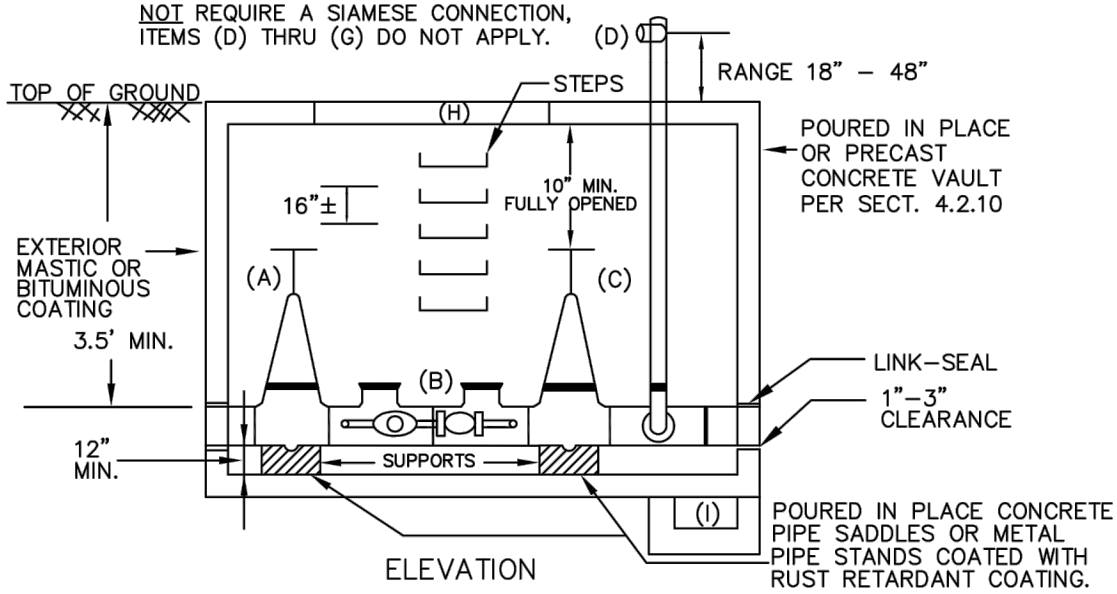
2. DOUBLE DETECTOR CHECK ASSEMBLY MUST BE U.L. LISTED OR F.M. APPROVED AND APPROVED BY FLUVANNA COUNTY'S DEPT. OF UTILITIES.



PLAN

(A) OUTSIDE STEM AND YOKE GATE VALVE
(B) DOUBLE DETECTOR CHECK VALVE ASSEMBLY
(C) OUTSIDE STEM AND YOKE GATE VALVE
* (D) 2 1/2" THREADED N.S.T. SIAMESE CONNECTION FOR FIRE DEPARTMENT W/AUTOMATIC BALL DRIP
* (E) REQUIRED (MAIN LINE SIZE) " X 4" TEE
* (F) 4" CHECK VALVE
*(G) 4" – 90° BEND
(H) JD-2AL 4' X 4' BILCO DOOR, OR AS MANUFACTURED BY VA. SPRINKLER COMPANY, OR APPROVED EQUAL.
(I) SUMP WHERE WATER TABLE IS A PROBLEM OR GRAVITY DRAIN WHERE WATER TABLE IS NOT A PROBLEM.
(J) BY-PASS LINE WITH LOW-FLOW METER, ISOLATION VALVE, BACKFLOW PREVENTER. METER TO BE PURCHASED FROM THE COUNTY.

*WHERE A 3" OR LARGER FIRE LINE DOES NOT REQUIRE A SIAMESE CONNECTION, ITEMS (D) THRU (G) DO NOT APPLY.



ELEVATION

NOTE: ISOLATION VALVES ON LOW-FLOW BYPASS SHALL BE 1/4 TURN BALL VALVES WITH SINGLE LEVER HANDLE. GATE VALVES WITH HANDWHEEL ACTUATOR ARE STRICTLY PROHIBITED.

WAT-7

Fluvanna County Virginia
Construction Detail

3" or Larger Double Detector Check Assembly and Vault

Not to Scale

Revised: 09/2022