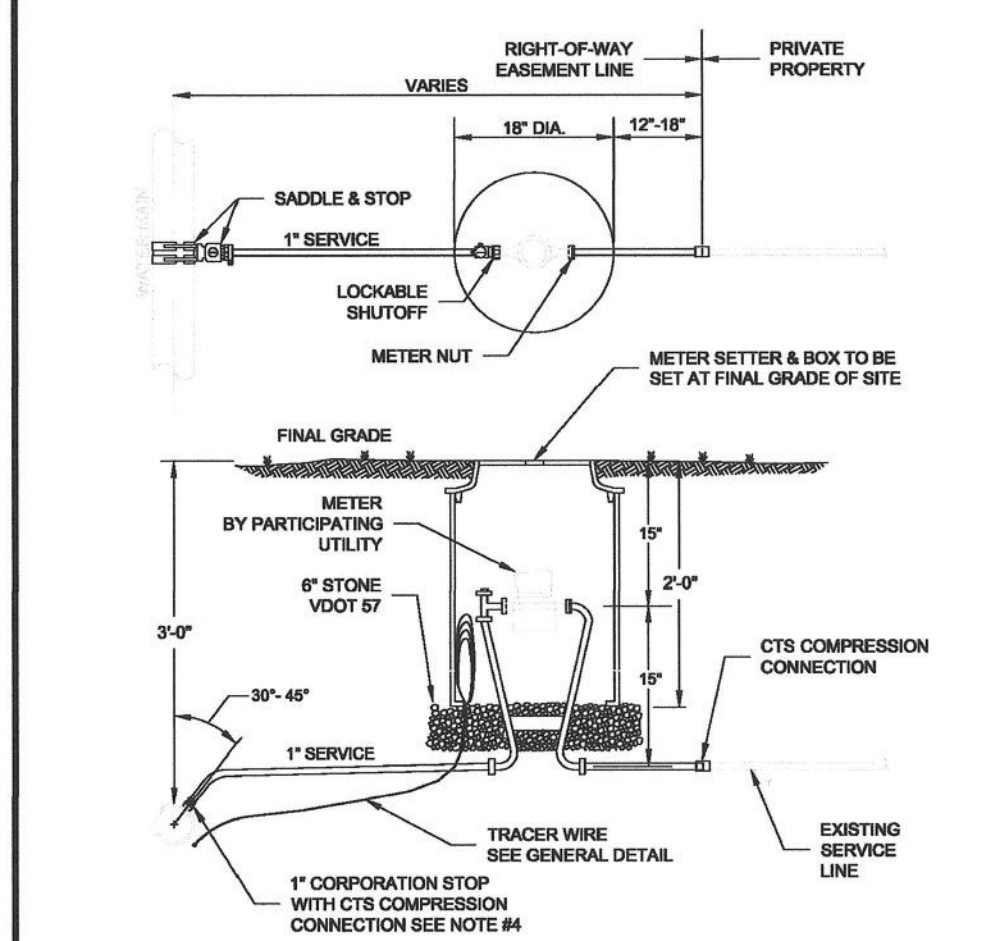


1. SETTER TO BE A.Y. McDONALD 725-21WV0033, FORD 1972-19-11-33 OR APPROVED EQUAL.
2. SADDLES MUST BE USED WITH ALL PLASTIC & DUCTILE IRON PIPE. SERVICE SADDLES SHALL BE USED IN ACCORDANCE WITH WATER DISTRIBUTION PIPING SPECIFICATION. SERVICE SADDLES FOR PLASTIC PIPE SHALL BE POWERSEAL 3417, OR 3412AS, ROMAC 200, OR 300, OR FORD METER F2002 OR F2003. FOR DUCTILE IRON PIPE USE THE ABOVE OR POWERSEAL 3413, ROMAC 202 OR FORD METER F2002.
3. METER BOX SHALL BE CAPSOMMA DESIGN, INC. PLASTIC BOX WITH FORD "M" DOMESTIC SERIES FRAME WITH A NICO DOMESTIC 12.25 CK LID WITH SENSUS RECESS AND WYMA LOGO, ADS CORRUGATED HOPE BOX WITH FORD "M" DOMESTIC SERIES FRAME WITH A NICO DOMESTIC 12.25 CK LID WITH SENSUS RECESS AND WYMA LOGO OR APPROVED EQUAL. METER BOX SHALL NOT BE PLACED IN AREAS SUBJECT TO VEHICULAR TRAFFIC. IF TRAFFIC BEARING BOX IS REQUIRED, DESIGN ENGINEER SHALL CONSULT WITH PARTICIPATING UTILITY TO DETERMINE SITE SPECIFIC REQUIREMENTS.
4. CORPORATION STOP SHALL BE FORD F81004-4-NL, MUELLER 9-2500B OR APPROVED EQUAL.
5. SERVICE SHALL BE "C" TYPE COPPER, OR COPPER TUBE SIZE POLYETHYLENE (PE) 4710, 300R (200 psi).
6. WHENEVER SIDEWALK EXIST OR IS PROPOSED, MODIFY METER LOCATION AS DIRECTED.

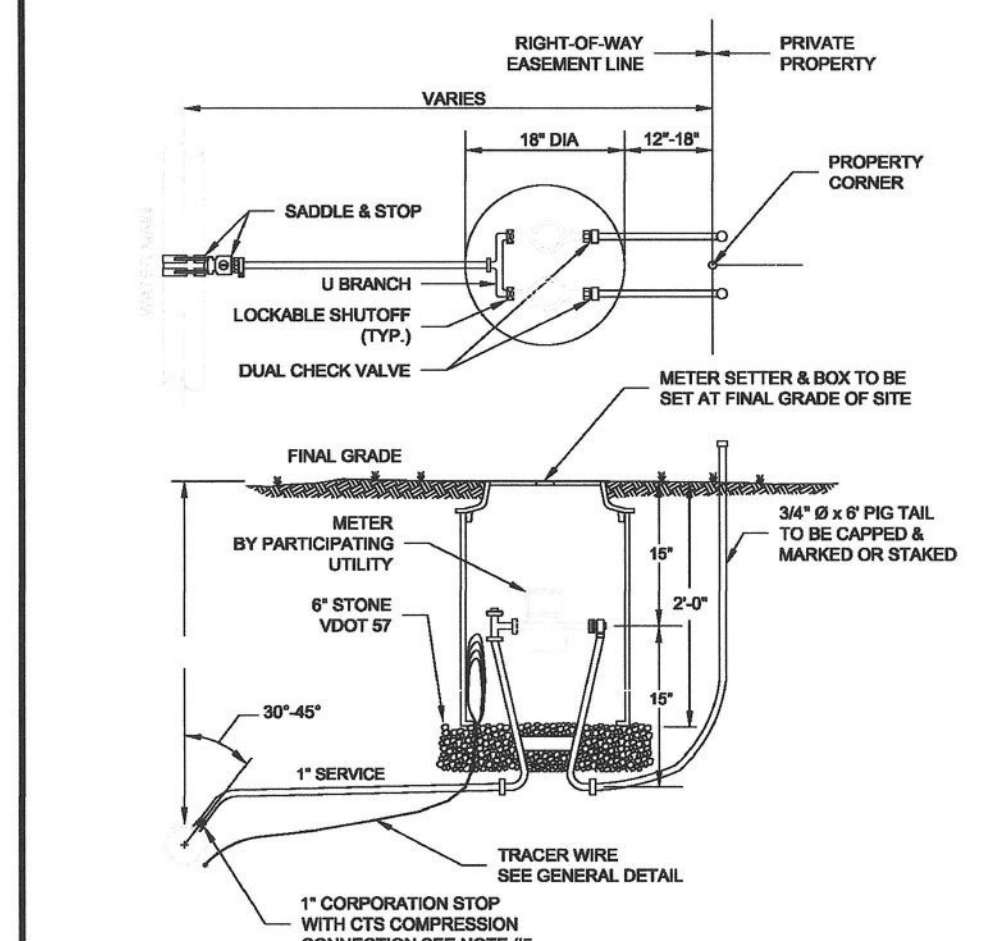


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

SINGLE RESIDENTIAL WATER SERVICE
(REPLACEMENT OF EXISTING SERVICE)

W-2

1. SETTER TO BE A.Y. McDONALD 725-21WV0033, FORD 1972-19-11-33 OR APPROVED EQUAL.
2. SADDLES MUST BE USED WITH ALL PLASTIC & DUCTILE IRON PIPE. SERVICE SADDLES SHALL BE USED IN ACCORDANCE WITH WATER DISTRIBUTION PIPING SPECIFICATION. SERVICE SADDLES FOR PLASTIC PIPE SHALL BE POWERSEAL 3417, OR 3412AS, ROMAC 200, OR 300, OR FORD METER F2002 OR F2003. FOR DUCTILE IRON PIPE USE THE ABOVE OR POWERSEAL 3413, ROMAC 202 OR FORD METER F2002.
3. METER BOX SHALL BE CAPSOMMA DESIGN, INC. PLASTIC BOX WITH FORD "M" DOMESTIC SERIES FRAME WITH A NICO DOMESTIC 12.25 CK LID WITH SENSUS RECESS AND WYMA LOGO, ADS CORRUGATED HOPE BOX WITH FORD "M" DOMESTIC SERIES FRAME WITH A NICO DOMESTIC 12.25 CK LID WITH SENSUS RECESS AND WYMA LOGO OR APPROVED EQUAL. METER BOX SHALL NOT BE PLACED IN AREAS SUBJECT TO VEHICULAR TRAFFIC. IF TRAFFIC BEARING BOX IS REQUIRED, DESIGN ENGINEER SHALL CONSULT WITH PARTICIPATING UTILITY TO DETERMINE SITE SPECIFIC REQUIREMENTS.
4. CORPORATION STOP SHALL BE FORD F81004-4-NL, MUELLER 9-2500B OR APPROVED EQUAL.
5. SERVICE SHALL BE "C" TYPE COPPER, OR COPPER TUBE SIZE POLYETHYLENE (PE) 4710, 300R (200 psi).
6. WHENEVER SIDEWALK EXIST OR IS PROPOSED, MODIFY METER LOCATION AS DIRECTED.

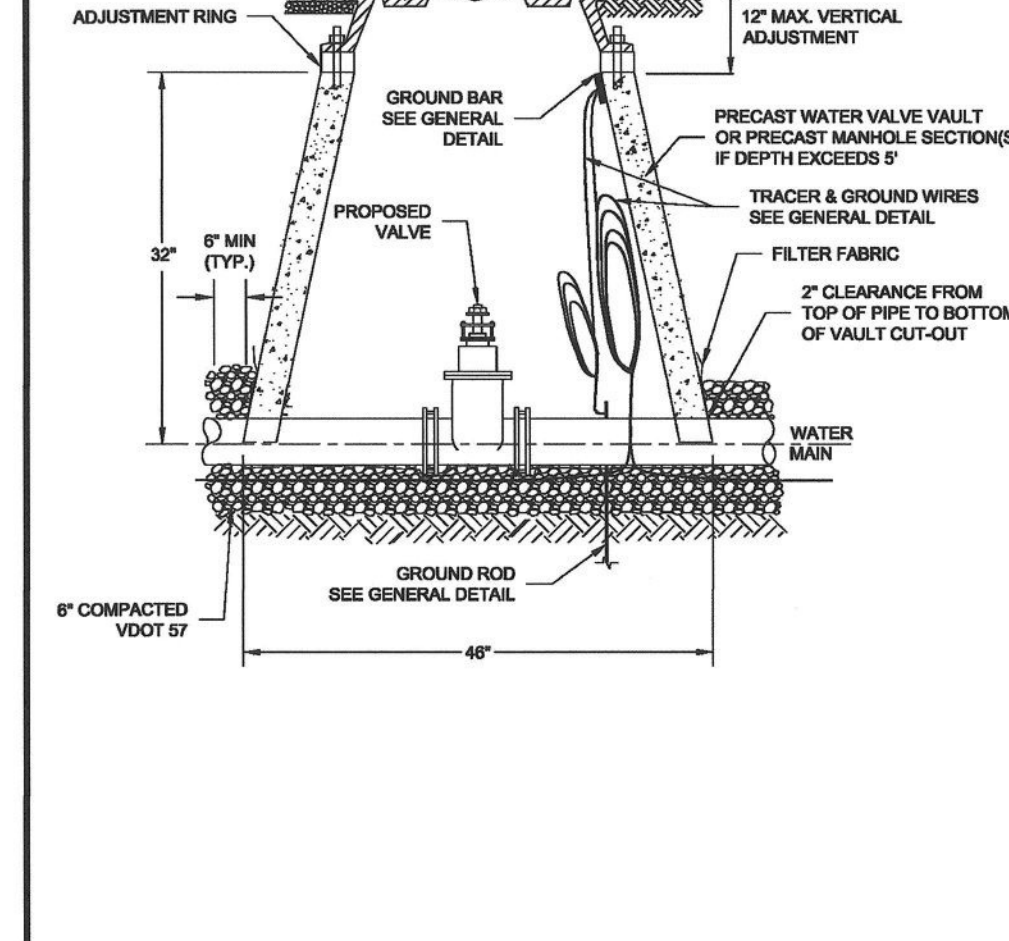


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

DOUBLE RESIDENTIAL WATER SERVICE
(LINE PRESSURE UNDER 150 PSI)

W-4

1. FILTER FABRIC TO BE INSTALLED BETWEEN BOTTOM OF PIPE AND STONE BEDDING. FABRIC TO EXTEND VERTICALLY A MINIMUM OF 6" FROM BOTTOM OF VAULT (FULL CIRCUMFERENCE).

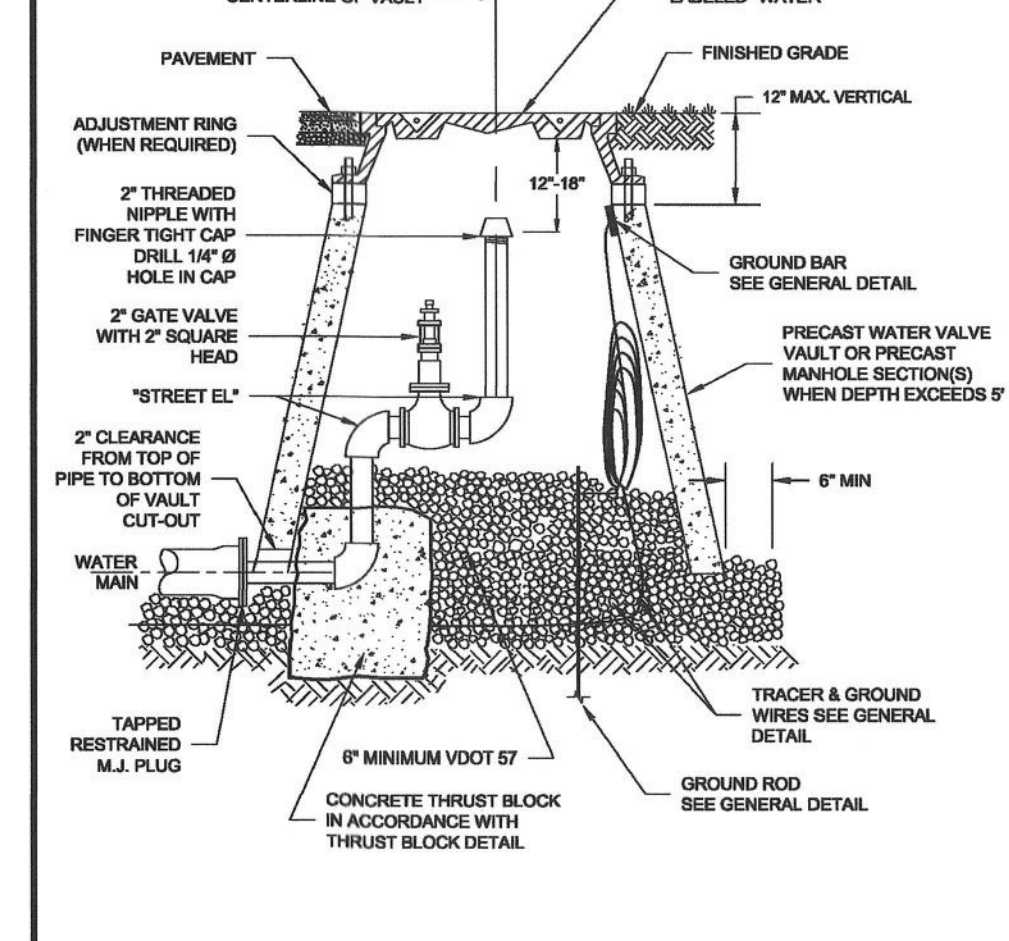


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

WATER LINE VALVE & VAULT

W-9

1. WHEN APPROVED BY PARTICIPATING UTILITY, FIRE HYDRANT ASSEMBLIES MAY BE USED AS PERMANENT END OF LINES.
2. DETAIL FOR UP TO 8" MAINS, LARGER LINES SEE WATER SYSTEM DESIGN STANDARDS FOR MIN. FLUSHING VALVE REQUIREMENTS.
3. THE END OF A PIPELINE SHALL NOT TERMINATE IN A PAVED AREA OR UNDER A CONCRETE CURB & GUTTER.
4. THE PIPING AND "STREET ELB" BETWEEN THE MAIN LINE AND 2" GATE VALVE SHALL BE LEAD FREE BRASS OR DUCTILE IRON.
5. RESTRAINED JOINTS SHALL BE INSTALLED BEFORE M.J. PLUG FOR DISCHARGE SHOWN IN THE MINIMUM THRUST RESTRAINT OF PIPE JOINTS DESIGN LENGTH DETAIL FOR VALVE PLUS AND CORRESPONDING PIPE JOINT DETAIL.

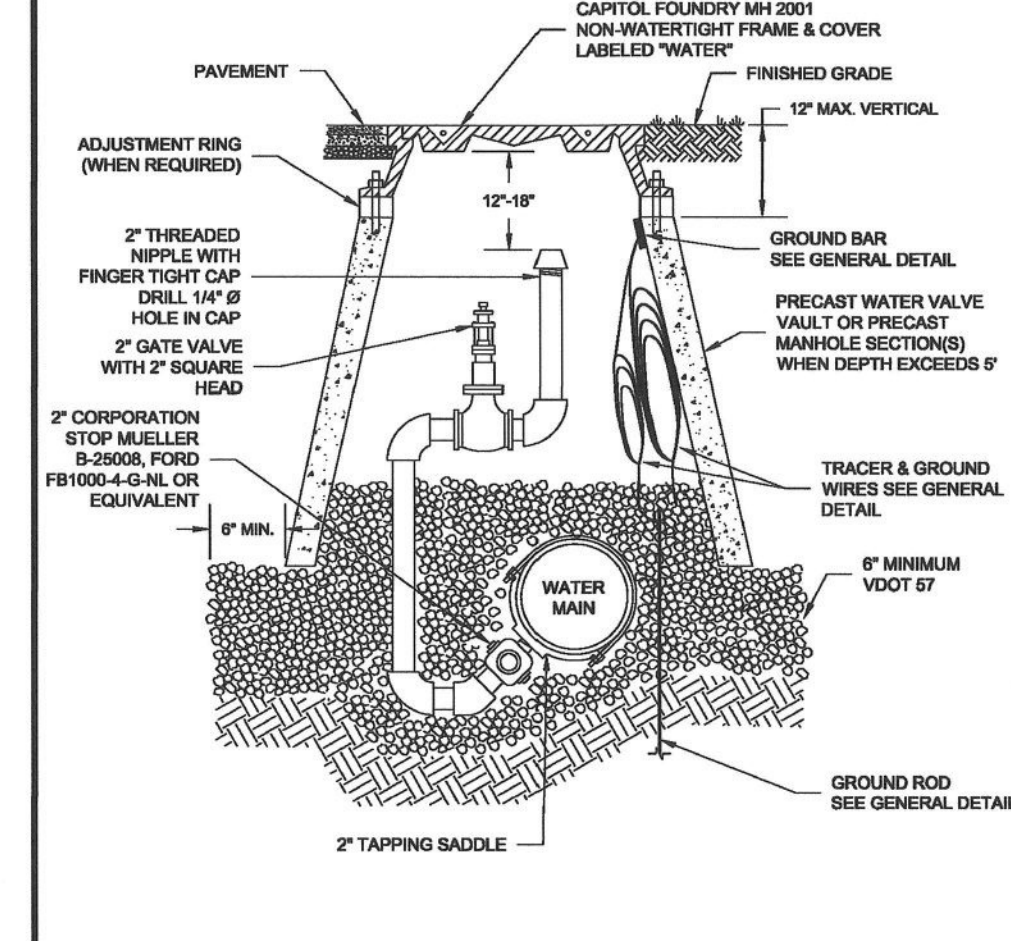


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

PERMANENT END OF LINE BLOW-OFF ASSEMBLY

W-10

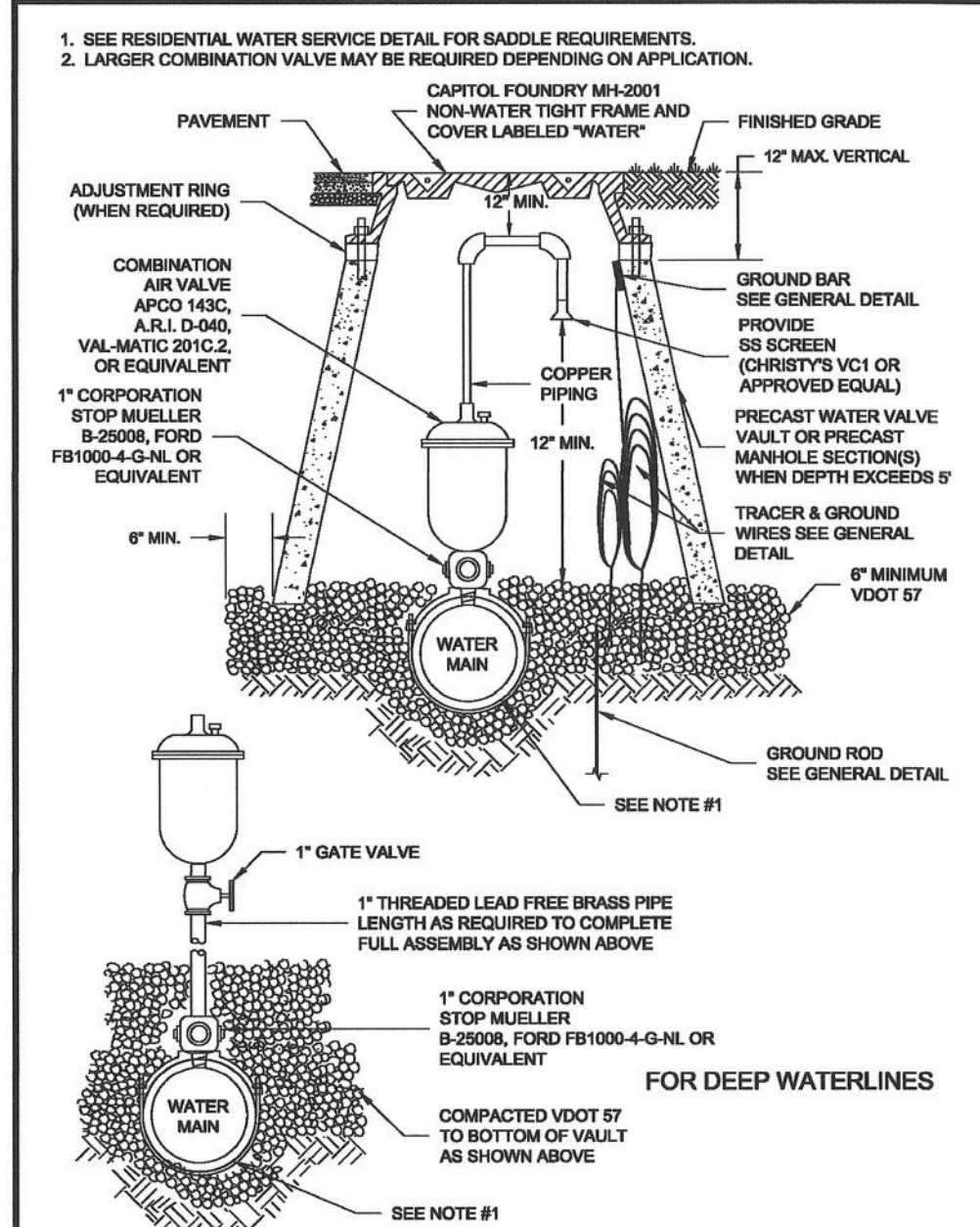
1. FIRE HYDRANTS MAY BE USED AT LOW POINTS IN PLACE OF BLOW-OFFS.
2. THE PIPING AND "STREET ELB" BETWEEN CORPORATION STOP AND 2" GATE VALVE SHALL BE LEAD FREE BRASS OR DUCTILE IRON.
3. THE POINT OF CONNECTION TO THE WATER MAIN SHALL BE LOCATED NEAR THE BOTTOM OF THE MAIN (AS SHOWN) TO FACILITATE REMOVAL OF ACCUMULATED SEDIMENT.
4. SADDLES FOR PLASTIC PIPE SHALL BE PER RESIDENTIAL WATER SERVICE DETAIL.



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

IN-LINE BLOW-OFF ASSEMBLY

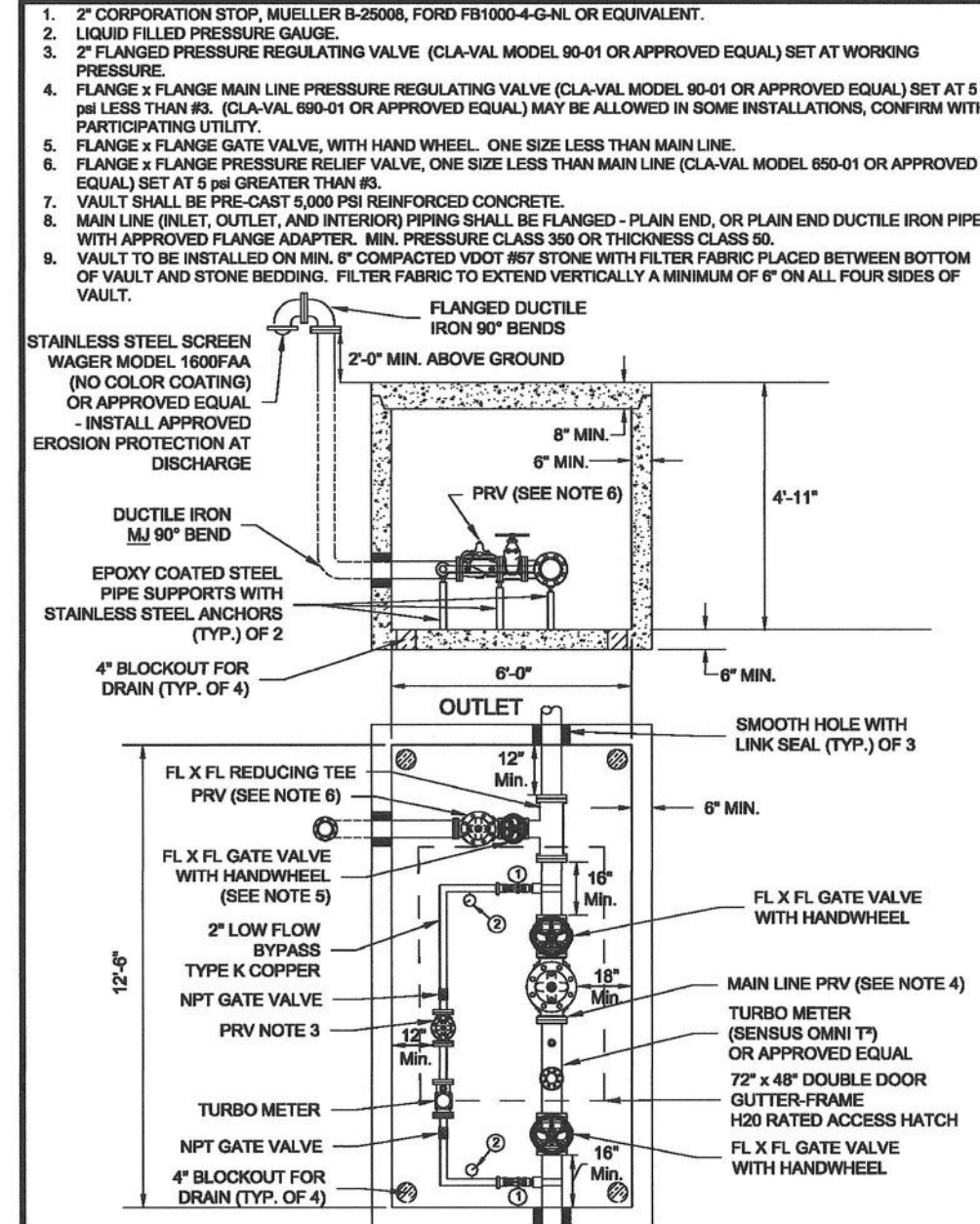
W-12



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

COMBINATION AIR VALVE ASSEMBLY

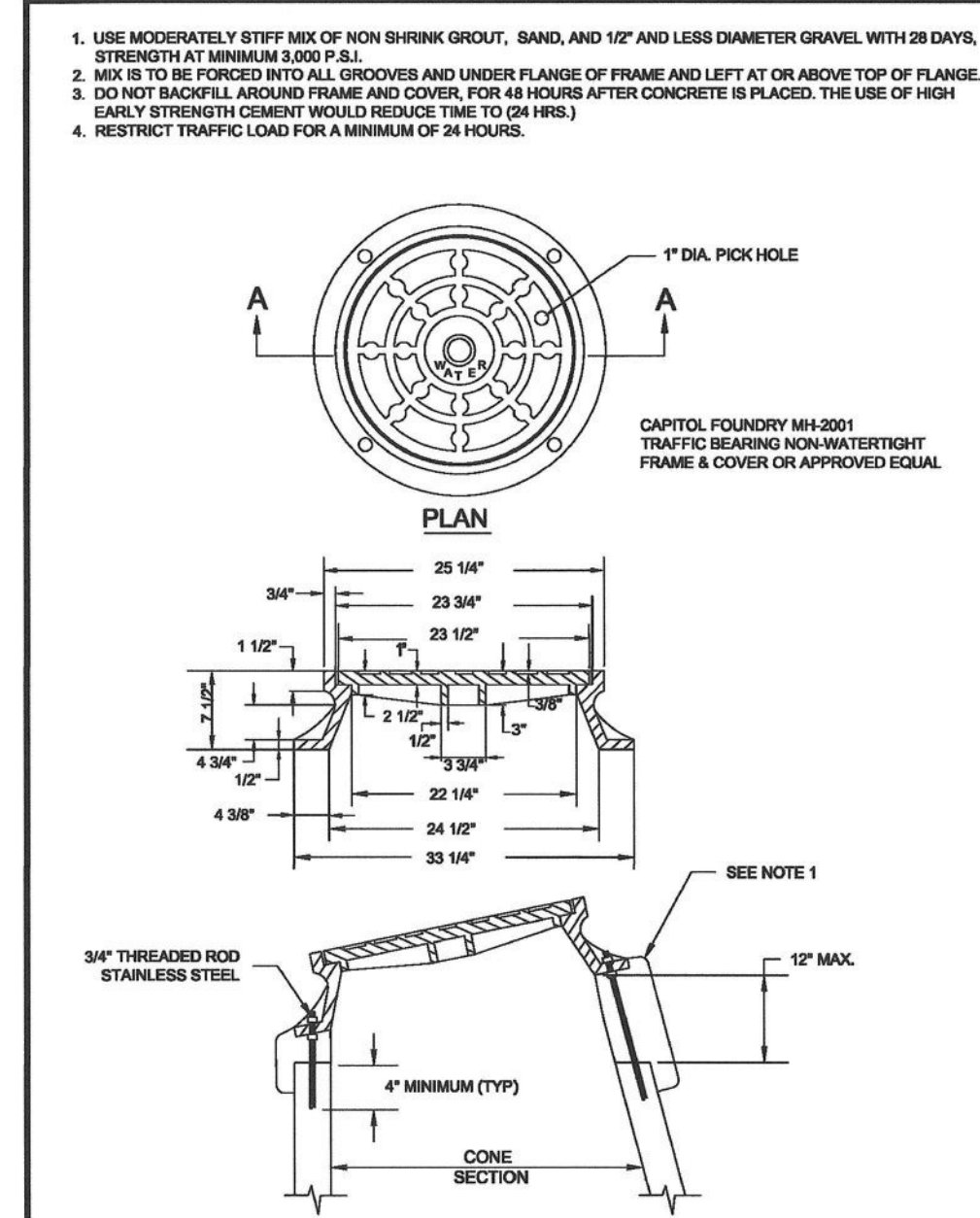
W-13



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

MAIN LINE - PRESSURE REDUCING VALVE ASSEMBLY

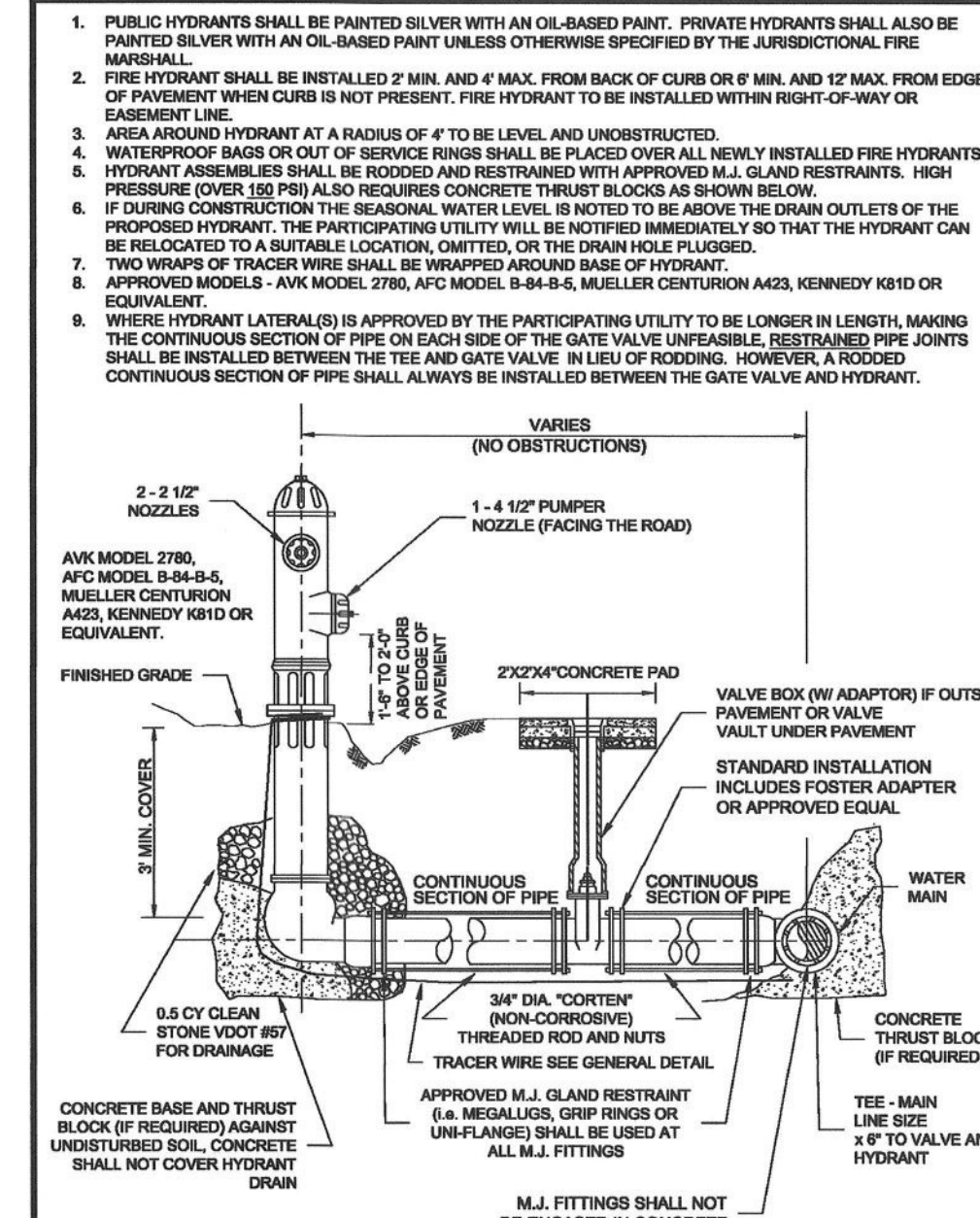
W-14



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

VAULT FRAME AND COVER

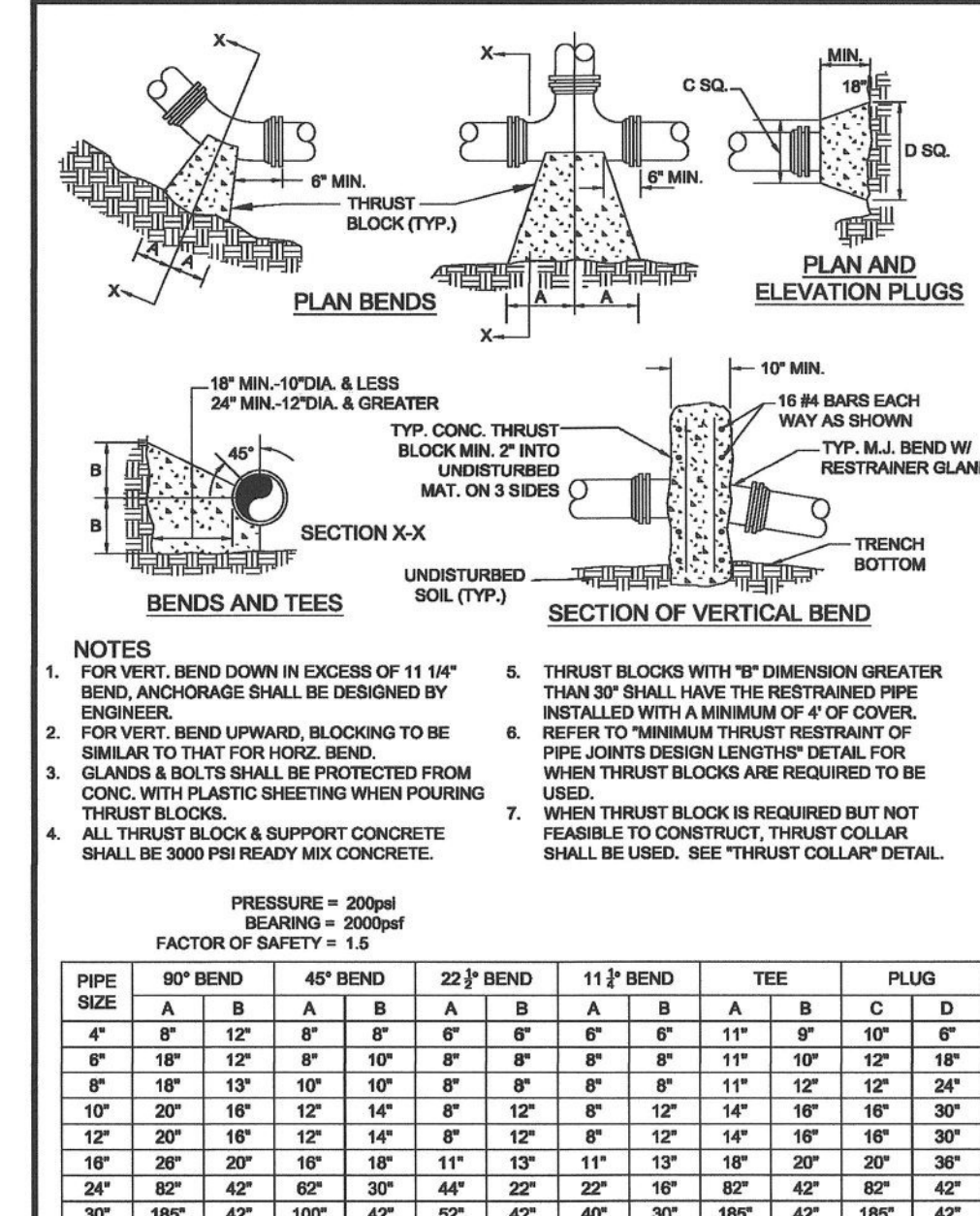
W-16



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

FIRE HYDRANT ASSEMBLY

W-17



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

THRUST BLOCK REQUIREMENTS

W-18

FACTORS OF SAFETY = 1.5											
PIPE SIZE (INCHES)	PIPE MATERIAL	90° BEND	45° BEND	22 1/2° BEND	11 1/2° BEND	TEE	PLUG	REDUCER (NOTES 4, 5)	45° VOLT.	22 1/2° VOLT.	11 1/2° VOLT.
6"	D.I.	28"	21"	18"	15"	36"	28"	27"	18"	15"	12"
8"	D.I.	36"	28"	21"	18"	48"	36"	36"	24"	21"	18"
10"	D.I.	43"	36"	28"	21"	54"	42"	42"	30"	27"	24"
12"	D.I.	51"	43"	36"	28"	66"	51"	51"	36"	33"	30"
6"	PVC	28"	21"	18"	15"	36"	28"	27"	18"	15"	12"
8"	PVC	36"	28"	21"	18"	48"	36"	36"	24"	21"	18"
10"	PVC	44"	36"	28"	21"	54"	42"	42"	30"	27"	24"
12"	PVC	51"	43"	36"	28"	66"	51"	51"	36"	33"	30"

WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

MINIMUM THRUST RESTRAINT OF PIPE JOINTS DESIGN LENGTHS

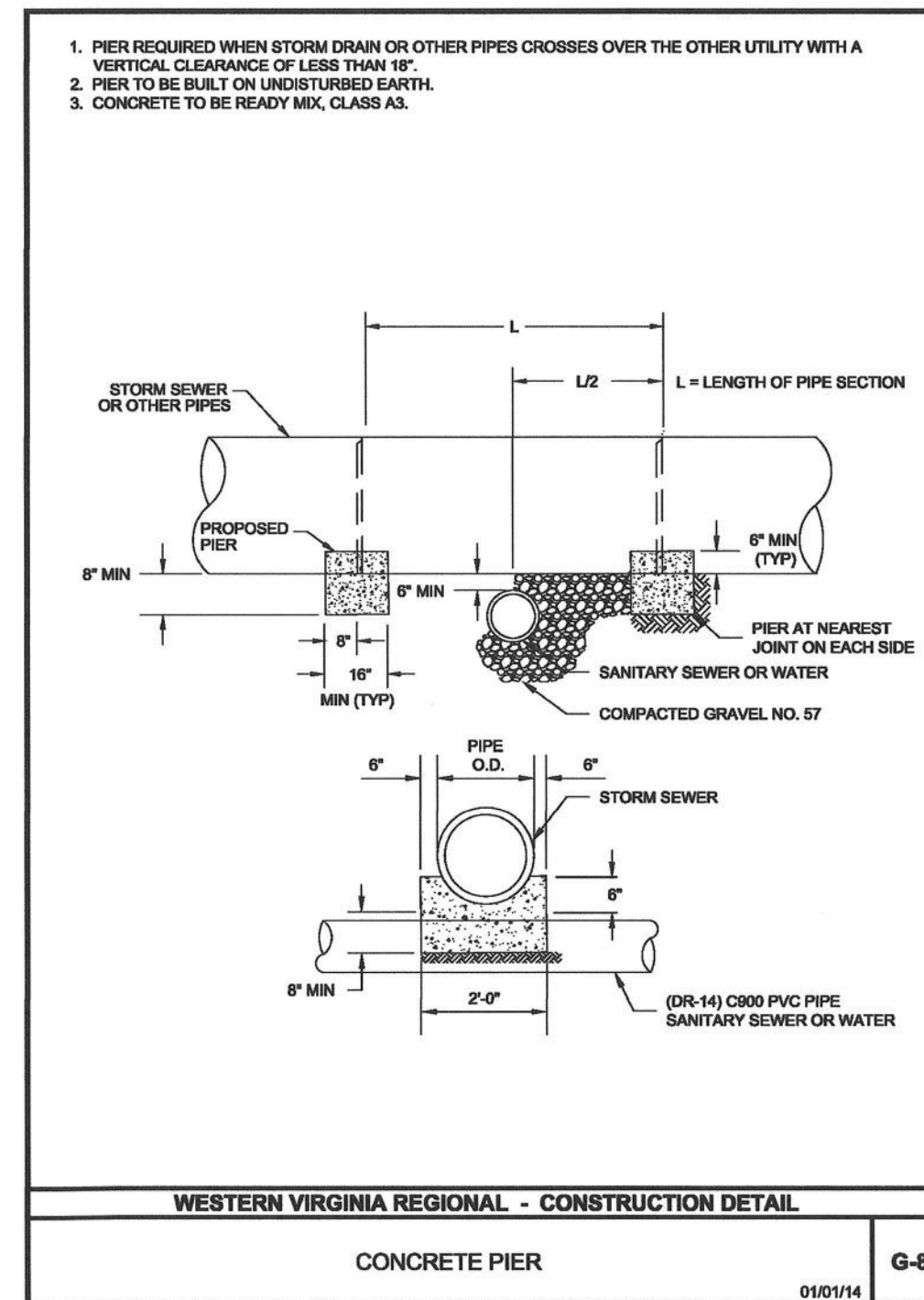
W-19

INSTALLATION OF DUCTILE IRON WATER MAINS											
TABLE 1 AWWA C900-09											
Maximum Joint Deflection Full Length of Pipe - Push on Type Joint											
Nominal Pipe Size (Inches)	Deflection Angle - θ (Degrees)	Joint Length 18'-Feet	Joint Length 20'-Feet	Joint Length 22'-Feet	Joint Length 24'-Feet	Joint Length 26'-Feet	Joint Length 28'-Feet	Joint Length 30'-Feet	Joint Length 32'-Feet	Joint Length 34'-Feet	Joint Length 36'-Feet
3"	5°	19	21	205	230						
4"	5°	19	21	205	230						
6"	5°	19	21	205	230						
8"	5°	19	21	205	230						
10"	5°	19	21	205	230						
12"	5°	19	21	205	230						
14"	3°	11	12	340	380						
16"	3°	11	12	340	380						
18"	3°	11	12	340	380						
20"	3°	11	12	340	380						
24"	3°	11	12	340	380						
30"	3°	11	12	340	380						

WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

DUCTILE IRON PIPE DEFLECTION ALLOWANCE TABLES

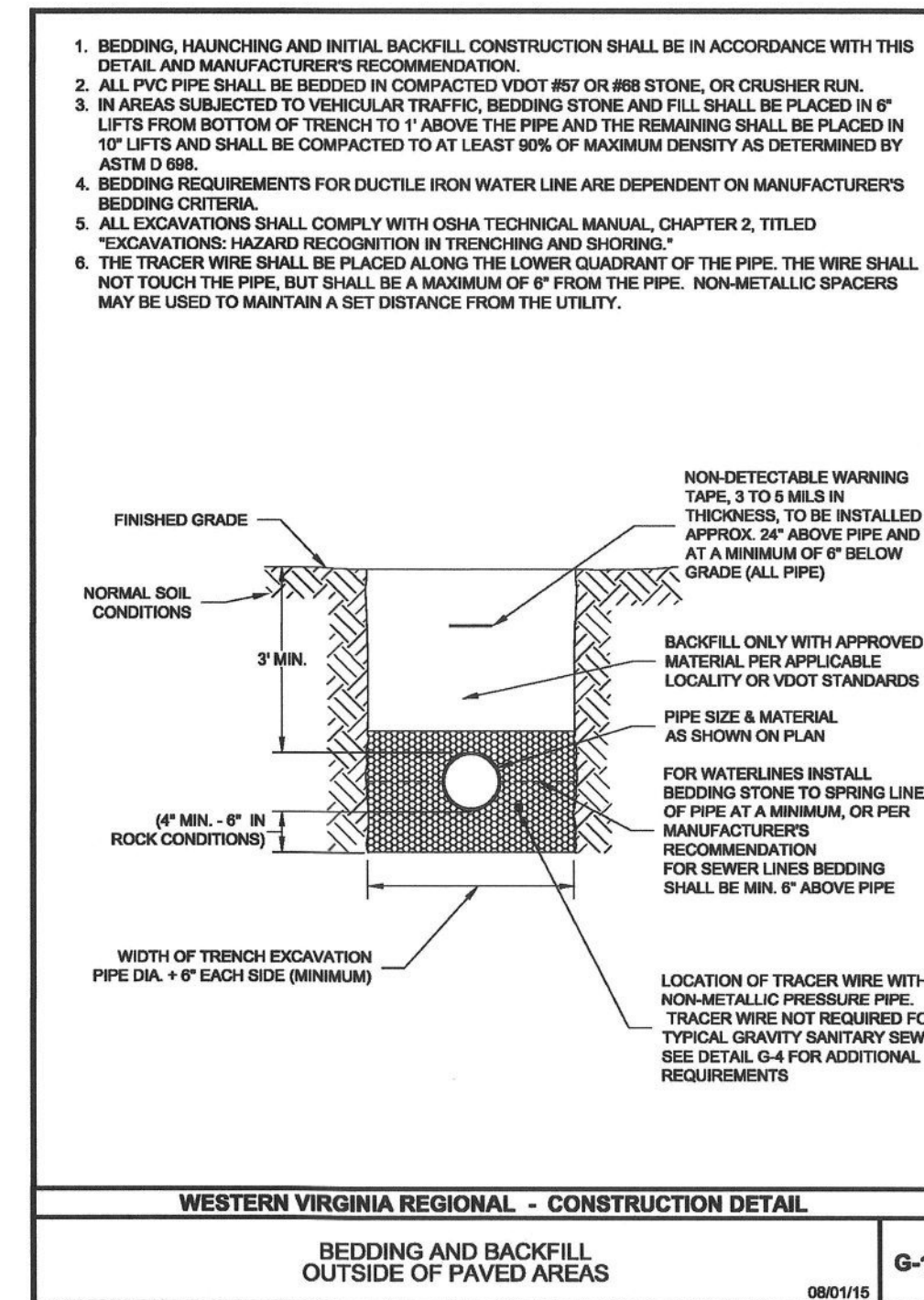
W-22



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

CONCRETE PIER

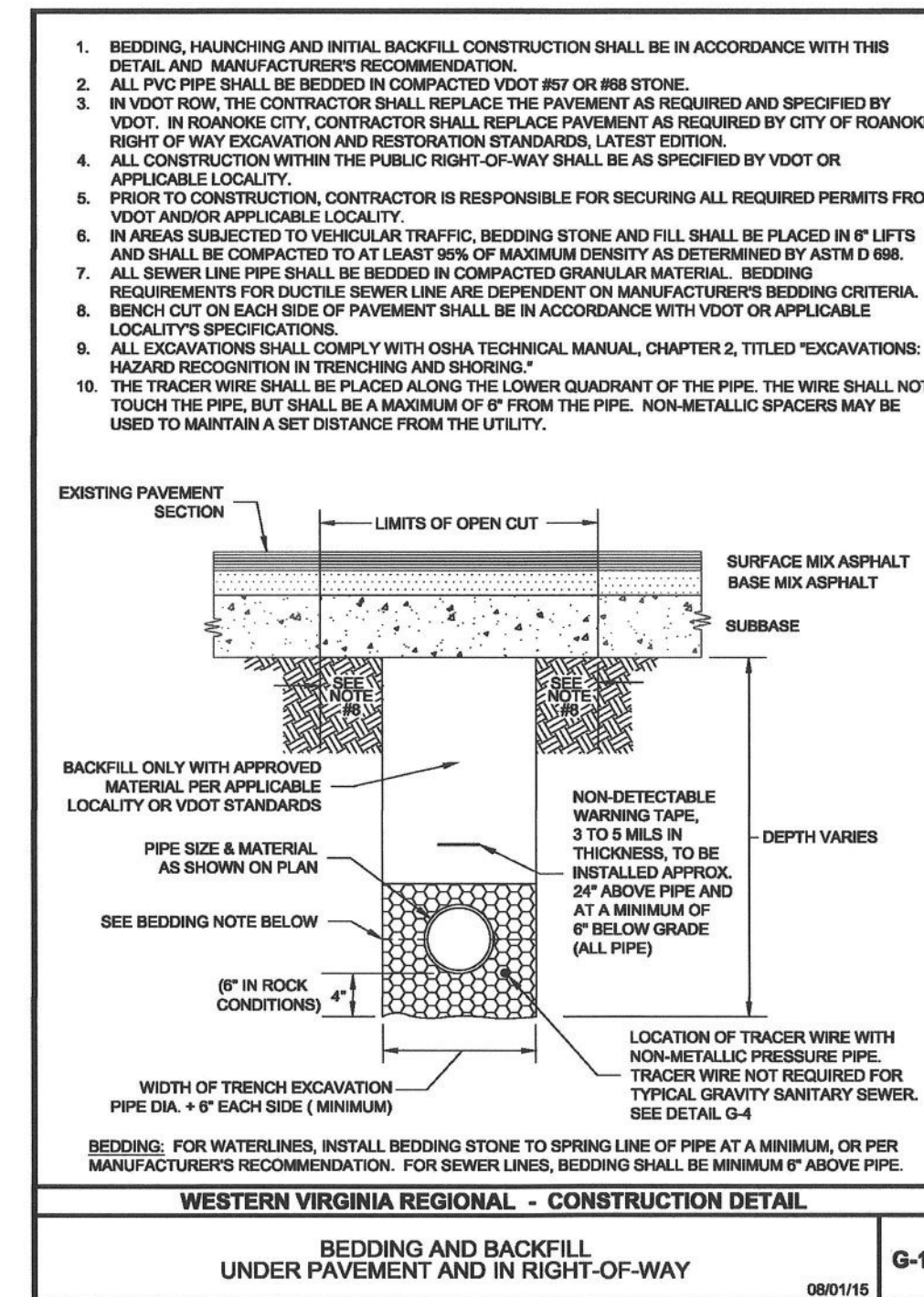
G-8



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

BEDDING AND BACKFILL OUTSIDE OF PAVED AREAS

G-11



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

BEDDING AND BACKFILL UNDER PAVEMENT AND IN RIGHT-OF-WAY

G-12

Lumsden Associates, P.C.
ENGINEERS | SURVEYORS | PLANNERS

4664 BRAMBLETON AVENUE
PO BOX 1000
ROANOKE, VIRGINIA 24018

PHONE: (540) 774-4411
FAX: (540) 774-4412
WWW.LUMSDENPC.COM

COMMONWEALTH OF VIRGINIA
ANDREW P. LUMSDEN
Lic. No. 052216
12/18/19
PROFESSIONAL ENGINEER

GRIFIN / VAN WINKLE
WATERLINE REPLACEMENTS
PREPARED FOR
WESTERN VIRGINIA WATER AUTHORITY
SITUATED IN
THE CITY OF ROANOKE, VIRGINIA

REVISIONS

NO.	DATE	DESCRIPTION
1		
2		
3		
4		
5		

DATE: December 18, 2019
SCALE: NONE
COMMISSION NO: 19-034
SHEET 11 OF 12