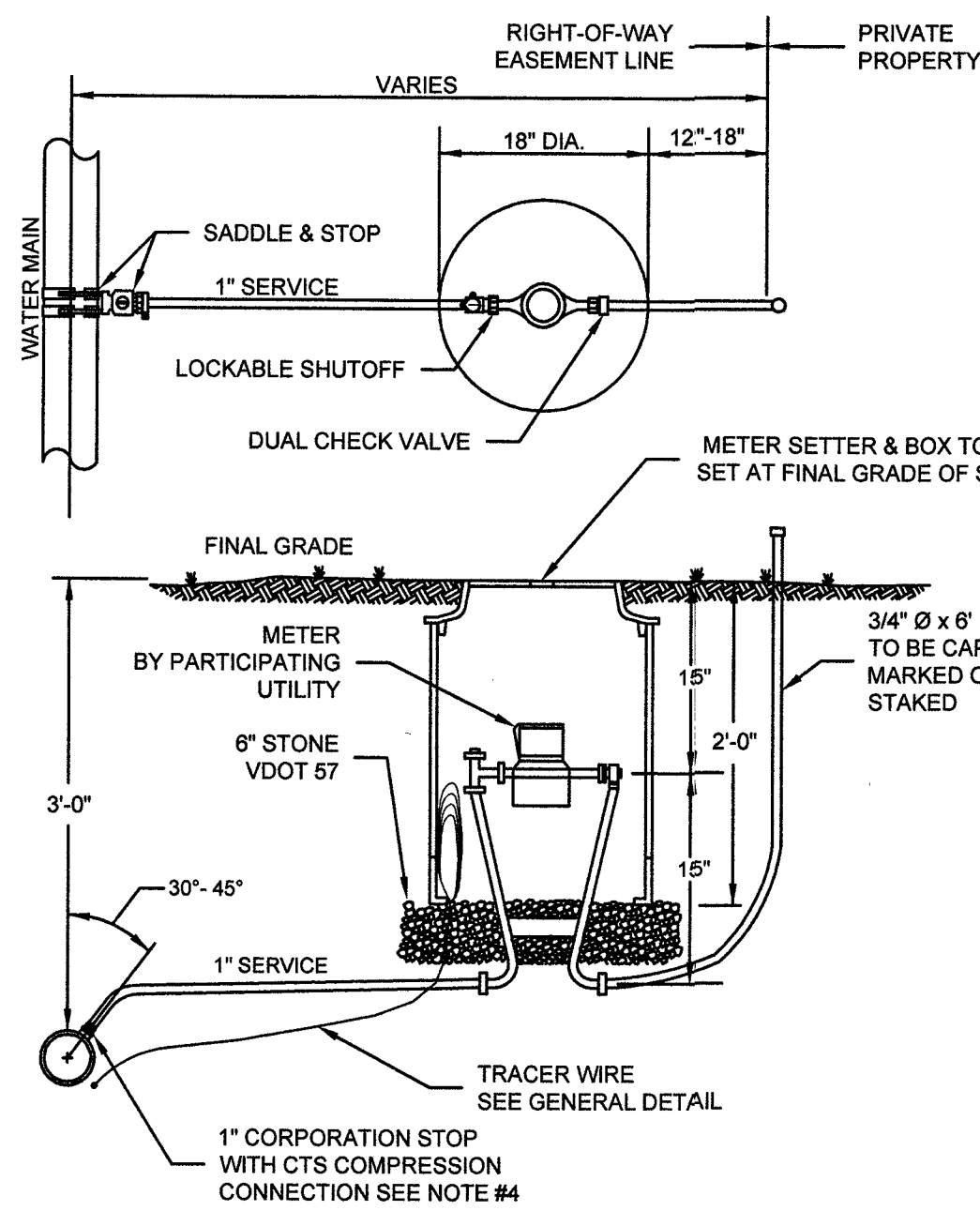


1. SETTER TO BE A.Y. McDONALD 720-215WDD33, FORD VBHH72-15W-11-33 OR APPROVED EQUAL.
2. SADDLES MUST BE USED WITH ALL PLASTIC & DUCTILE IRON PIPE. SERVICE SADDLES SHALL BE USED IN ACCORDANCE WITH WATER DISTRIBUTION PIPING SPECIFICATION. SERVICE SADDLES FOR PLASTIC PIPE SHALL BE: POWERSEAL 3417, OR 3412AS, ROMAC 202S, OR 306, OR FORD METER FS202 OR FS303. FOR DUCTILE IRON PIPE USE THE ABOVE OR POWERSEAL 3413, ROMAC 202 OR FORD METER F202.
3. METER BOX SHALL BE CARSON/MID-STATES PLASTICS, INC. PLASTIC BOX WITH FORD A32-T (ELECTRONIC READ LID), ADS CORRUGATED HDPE BOX WITH FORD A32-T (ELECTRONIC READ LID), OR A.Y. McDONALD MODEL 74M32AT CAST IRON BASE & COVER 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 FB1000-4-G-NL, MUELLER B-25008 OR APPROVED EQUAL.
5. SERVICE SHALL BE "K" TYPE COPPER, OR COPPER TUBE SIZE POLYETHYLENE (PE) 4710, SODR-9 (200 psi).
6. WHENEVER SIDEWALK EXISTS OR IS PROPOSED, MODIFY METER LOCATION AS DIRECTED.

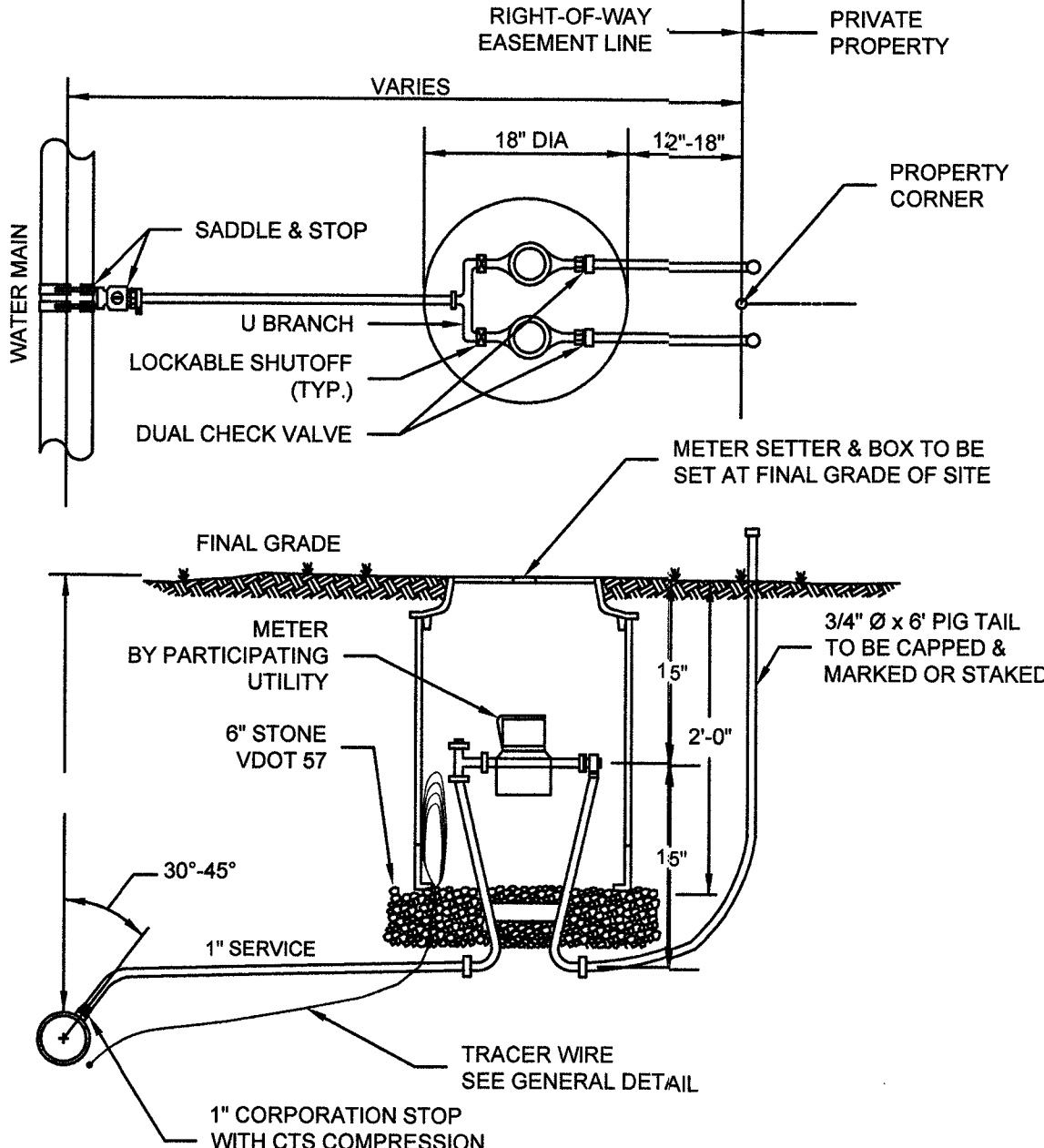


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

SINGLE RESIDENTIAL
WATER SERVICE (NEW DEVELOPMENT)
(LINE PRESSURE UNDER 120 PSI)

02/10/15

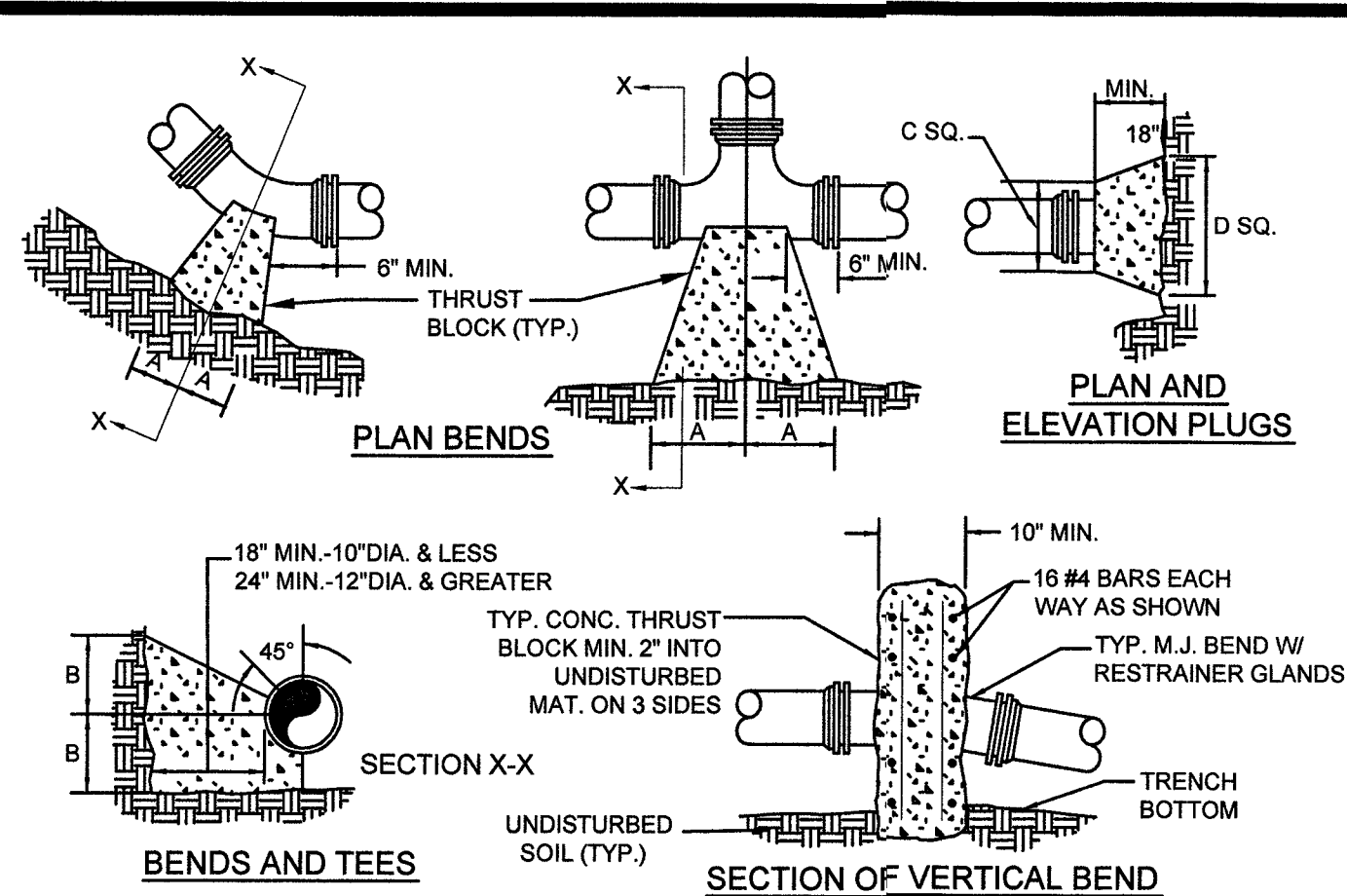
1. SETTER TO BE A.Y. McDONALD 720-215WDD33, FORD VBHH72-15W-11-33 OR APPROVED EQUAL.
2. SADDLES MUST BE USED WITH ALL PLASTIC DUCTILE IRON PIPE. SERVICE SADDLES SHALL BE USED IN ACCORDANCE WITH WATER DISTRIBUTION PIPING SPECIFICATION. SERVICE SADDLES FOR PLASTIC PIPE SHALL BE POWERSEAL 3417, OR 3412AS, ROMAC 202S, OR 306, OR FORD METER FS202 OR FS303. FOR DUCTILE IRON PIPE USE THE ABOVE OR POWERSEAL 3413, ROMAC 202 OR FORD METER F202.
3. METER BOX SHALL BE CARSON/MID-STATES PLASTICS, INC. PLASTIC BOX WITH FORD A32-T (ELECTRONIC READ LID), ADS CORRUGATED HDPE BOX WITH FORD A32-T (ELECTRONIC READ LID), OR A.Y. McDONALD MODEL 74M32AT CAST IRON BASE & COVER OR APPROVED EQUAL. USE OF TRAFFIC BEARING BOX SHALL BE APPROVED BY THE AUTHORITY. 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. WHENEVER SIDEWALK EXISTS OR IS PROPOSED, MODIFY METER LOCATION AS DIRECTED.
5. CORPORATION STOP SHALL BE FORD FB1000-4-G-NL, MUELLER B-25008 OR APPROVED EQUAL.
6. SERVICE SHALL BE "K" TYPE COPPER, OR COPPER TUBE SIZE POLYETHYLENE (PE) 4710, SODR-9 (200 psi).



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

DOUBLE RESIDENTIAL
WATER SERVICE
(LINE PRESSURE UNDER 120 PSI)

02/10/15



- NOTES**
1. FOR VERT. BEND DOWN IN EXCESS OF 11 1/4" BEND, ANCHORAGE SHALL BE DESIGNED BY ENGINEER.
 2. FOR VERT. BEND UPWARD, BLOCKING TO BE SIMILAR TO THAT FOR HORIZ. BEND.
 3. GLANDS & BOLTS SHALL BE PROTECTED FROM CONC. WITH PLASTIC SHEETING WHEN POURING THRUST BLOCKS.
 4. ALL THRUST BLOCK & SUPPORT CONCRETE SHALL BE 3000 PSI READY MIX CONCRETE.
 5. THRUST BLOCKS WITH "B" DIMENSION GREATER THAN 30" SHALL HAVE THE RESTRAINED PIPE INSTALLED WITH A MINIMUM OF 4' OF COVER.
 6. REFER TO "MINIMUM THRUST RESTRAINT OF PIPE JOINTS DESIGN LENGTHS" DETAIL FOR WHEN THRUST BLOCKS ARE REQUIRED TO BE USED.
 7. WHEN THRUST BLOCK IS REQUIRED BUT NOT FEASIBLE TO CONSTRUCT, THRUST COLLAR SHALL BE USED. SEE "THRUST COLLAR" DETAIL.

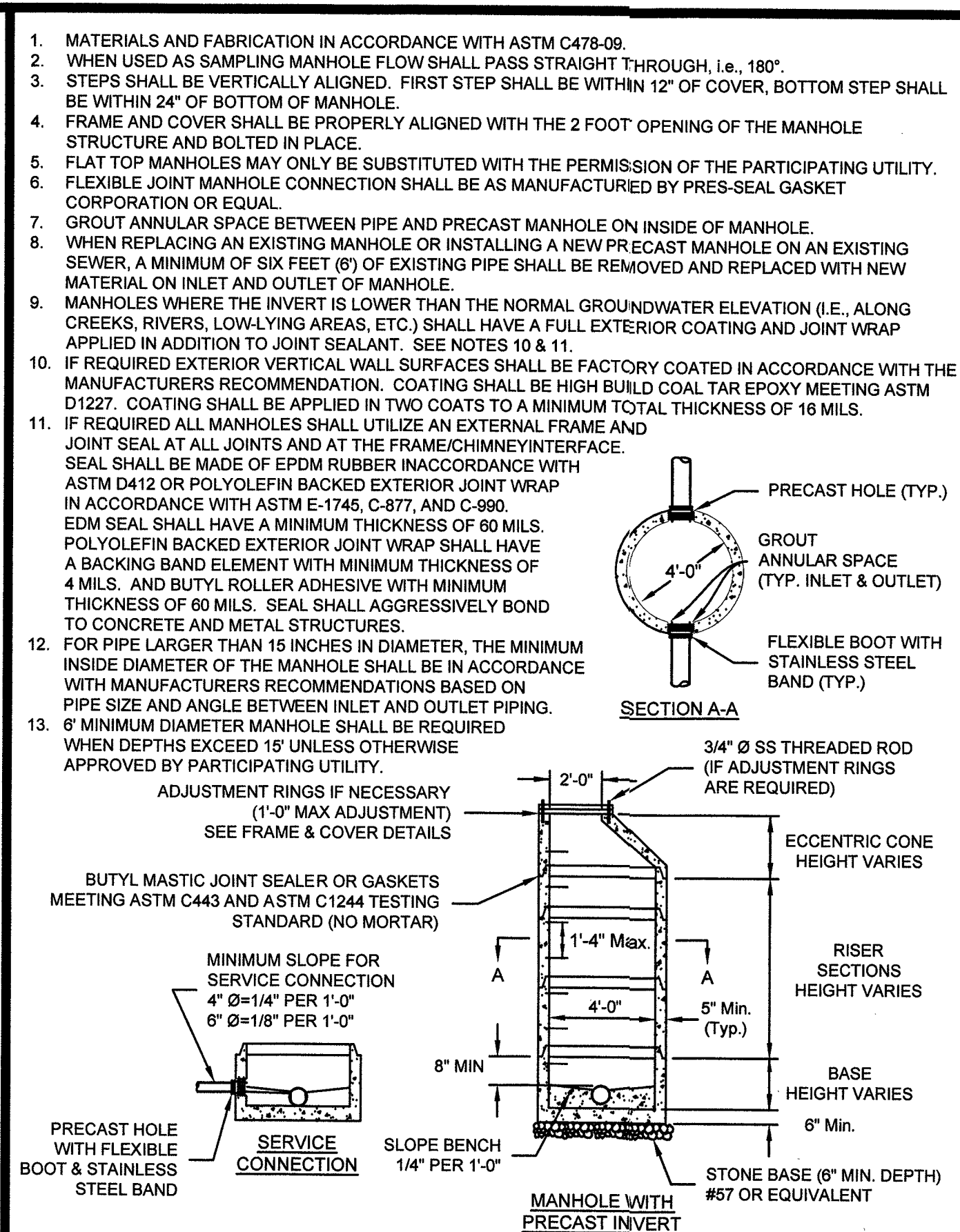
PRESSURE = 200psi
BEARING = 2000psf
FACTOR OF SAFETY = 1.5

| PIPE SIZE | 90° BEND | | 45° BEND | | 22 1/2° BEND | | 11 1/4° BEND | | TEE | | PLUG | |
|-----------|----------|-----|----------|-----|--------------|-----|--------------|-----|------|-----|------|-----|
| | A | B | A | B | A | B | A | B | A | B | C | D |
| 4" | 8" | 12" | 8" | 8" | 6" | 6" | 6" | 6" | 11" | 9" | 10" | 6" |
| 6" | 18" | 12" | 8" | 10" | 8" | 8" | 8" | 8" | 11" | 10" | 12" | 18" |
| 8" | 18" | 13" | 10" | 10" | 8" | 8" | 8" | 8" | 11" | 12" | 12" | 24" |
| 10" | 20" | 16" | 12" | 14" | 8" | 12" | 8" | 12" | 14" | 16" | 16" | 30" |
| 12" | 20" | 16" | 12" | 14" | 8" | 12" | 8" | 12" | 14" | 16" | 16" | 30" |
| 16" | 26" | 20" | 16" | 18" | 11" | 13" | 11" | 13" | 18" | 20" | 20" | 36" |
| 24" | 82" | 42" | 62" | 30" | 44" | 22" | 16" | 82" | 42" | 42" | 42" | 42" |
| 30" | 185" | 42" | 100" | 42" | 52" | 42" | 40" | 30" | 185" | 42" | 185" | 42" |

WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

THRUST BLOCK
REQUIREMENTS

02/10/15

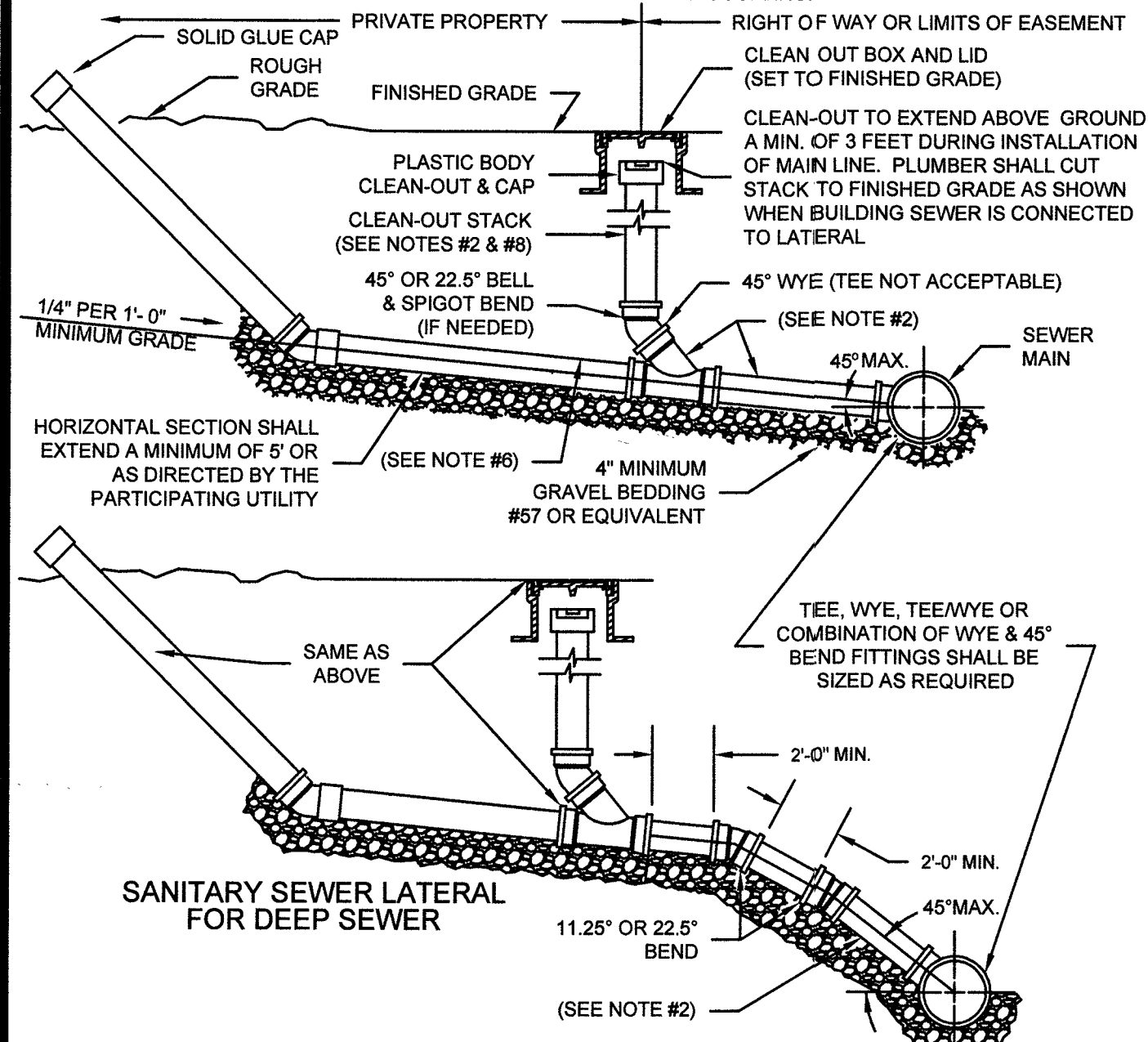


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

4' STANDARD MANHOLE
FOR PIPE 15" OR SMALLER
(FOR DEPTHS UP TO 15 FEET)

08/01/15

1. TRAFFIC BEARING BOX AND LID REQUIRED IN TRAFFIC AREAS (CAPITOL FOUNDRY VB-9'S).
2. SEWER LATERAL AND CLEANOUT PIPING SHALL BE ASTM D3034 SDR 26. SEWER LATERAL FITTINGS SHALL BE OF SAME SDR RATING AS THE SEWER MAIN. SCHEDULE 40 SOLVENT WELD PIPE AND FITTINGS MAY BE USED FOR THE SEWER LATERAL AND CLEANOUT ASSEMBLY WITH APPROVAL FROM THE PARTICIPATING UTILITY.
3. ALL PIPE SHALL BE OF SAME SIZE.
4. NO BENDS ARE ALLOWED IN THE LATERAL FROM THE MAIN TO THE CLEANOUT STACK WYE. (EXCEPT FOR DEEP SEWER, AS SHOWN BELOW).
5. ALL MAIN LINE TAPS ON ACTIVE MAINS SHALL BE PERFORMED BY PARTICIPATING UTILITY.
6. PIPING ON PRIVATE SIDE OF CLEANOUT TO BE INSTALLED PER GOVERNING JURISDICTION REQUIREMENTS.
7. MINIMUM LATERAL SIZE: 4" FOR RESIDENTIAL SERVICE, 6" FOR NON-RESIDENTIAL SERVICE.
8. SEWER CLEANOUTS SHALL BE SAME SIZE AS SEWER LATERAL.
9. MINIMUM COVER FOR ALL SEWER LATERALS SHALL BE THREE (3) FEET.
10. PROPERTY OWNER RESPONSIBLE FOR INSTALLING CLEANOUT ON PROPERTY LINE (IN ACCORDANCE WITH THIS DETAIL) WHEN MAINTENANCE OCCURS.
11. LOWEST SERVED FINISHED FLOOR ELEVATION SHALL BE A MINIMUM OF THREE FEET (3) ABOVE THE TOP OF THE MAIN AT THE POINT WHERE THE SERVICE LATERAL CONNECTS TO THE MAIN.
12. WHEN CONNECTING TO EXISTING LATERAL USE FERNCO FLEXIBLE COUPLING.



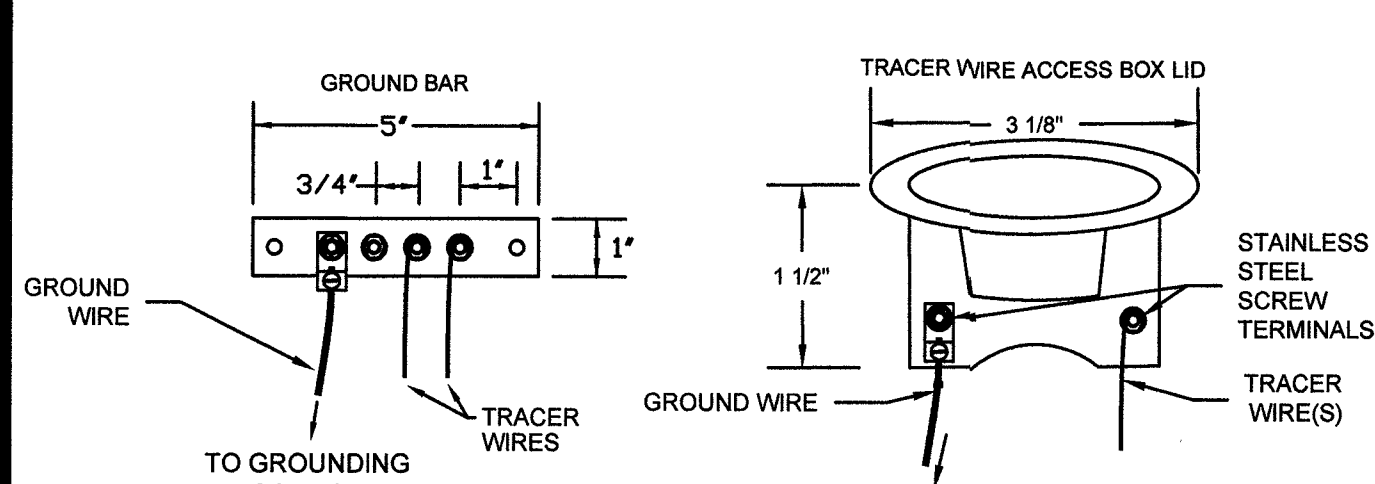
WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

SANITARY SEWER LATERAL

S-6

01/01/14

1. TRACER WIRES SHALL BE INSTALLED USING MANHOLES, TRACER WIRE ACCESS BOXES, VALVE BOXES OR VAULTS, WATER METERS AND FIRE HYDRANTS AS ACCESS POINTS.
2. FOR WATER AND SEWER INSTALLED BY OPEN TRENCHING, HORIZONTAL DIRECTIONAL DRILLING, OR PIPE BURSTING, TRACER WIRE SHALL BE NEPTCO TRADESAFE WATER BLOCKING TRACER WIRE OR APPROVED EQUAL. TRACER WIRE SHALL BE A 16 AWG SOLID COPPER CONDUCTOR WITH POLYETHYLENE INSULATION SURROUNDED BY A CORE MATERIAL COMPOSED OF HIGH-TENSILITY WOVEN POLYESTER WITH WATER BLOCKING YARNS ENCAPSULATED IN AN ABRASION RESISTANT (GREEN OR BLUE) 30 MIL HDPE JACKET. TRACER WIRE SHALL HAVE A MINIMUM TENSILE STRENGTH OF 1,800 LBS. AND SHALL NOT CONDUCT AN ELECTRICAL CURRENT IF STRUCK BY LIGHTNING. SPLICES SHALL ONLY BE MADE WITH GEL FILLED CONNECTORS DESIGNED FOR WIRE WITH A WOVEN POLYESTER FIBER CORE SUCH AS NEPTCO TRADESAFE WATER BLOCKING CONNECTORS OR APPROVED EQUAL. SPLICES SHALL BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
3. SPLICES AT THE ENDS OF TRACER WIRE, INTERMITTENT OF ACCESS POINTS, SHALL BE MADE USING NEPTCO TS-19-IL WATER BLOCKING BUTT SPLICE CONNECTORS OR APPROVED EQUAL.
4. AT ALL ACCESS POINTS, TRACER WIRE SHALL BE SPLICED USING NEPTCO TS-19-IL WATER BLOCKING BUTT SPLICE CONNECTORS OR APPROVED EQUAL. 12 AWG COPPER TRACER WIRE WITH 30 MIL HDPE JACKET SHALL BE CONNECTED IN THE 12 AWG OPENING OF THE BUTT SPLICE CONNECTOR, EXTENDED UP INTO THE ACCESS POINT STRUCTURE, AND ATTACHED TO THE GROUND BAR PER NOTE #12 OR LID TERMINALS PER NOTE #13. AT ALL ACCESS POINTS, EACH DIRECTION OF PIPE SHALL HAVE AN INDEPENDENT TRACER WIRE FEED EXTENDED TO GROUND BAR OR LID TERMINALS TO ALLOW FOR DIRECTIONALLY INDUCING CURRENT DURING LOCATING. THE 12 AWG COPPER TRACER WIRE SHALL BE OF ADEQUATE LENGTH TO EXTEND FIVE (5) FEET ABOVE THE TOP OF STRUCTURE.
5. WHERE HDPE PIPE IS INSTALLED WITHOUT STEEL CASING PIPE, SUCH AS A DIRECTIONALLY DRILLED CROSSINGS, AND CONNECTED TO DUCTILE IRON PIPE ON EACH END, TRACER WIRE SHALL BE INSTALLED ALONG FULL LENGTH OF HDPE PIPE WITH AN ACCESS POINT INSTALLED AT EACH HDPE/DUCTILE IRON TRANSITION. TRACER WIRE SHALL BE CONNECTED TO THE ACCESS POINT IN ACCORDANCE WITH THIS DETAIL.
6. AS-BUILTS SHALL SHOW TRACER WIRE(S) LOCATION AND ACCESS POINT(S).
7. THE TRACER WIRE SHALL BE PLACED ALONG THE LOWER QUADRANT OF THE PIPE. THE WIRE SHALL NOT TOUCH THE PIPE, BUT SHALL BE A MAXIMUM OF 6" FROM THE PIPE. NON-METALLIC SPACERS MAY BE USED TO MAINTAIN A SET DISTANCE FROM THE UTILITY.
8. WHERE LINES ARE GREATER THAN SIX (6) FEET IN DEPTH, WIRE SHALL BE BROUGHT TO THE SURFACE EVERY FIVE-HUNDRED (500) FEET AND PLACED IN A WATER METER BOX OR DRAINAGE & WATER SOLUTIONS, INC. (OR APPROVED EQUAL) ALL CAST IRON TRACER WIRE ACCESS BOX.
9. THE TRACER WILL BE TESTED BY THE PARTICIPATING UTILITY AS PART OF THE PROJECT'S FINAL ACCEPTANCE.
10. THE GROUND WIRE SHALL BE #6 AWG COPPER WIRE AND SHALL BE OF ADEQUATE LENGTH TO EXTEND A MINIMUM OF (5) FEET BEYOND THE TOP OF THE STRUCTURE. THE END OF THE GROUND WIRE SHALL CONNECT TO THE GROUND BAR OR LID TERMINAL USING A BUNDY KASU MECHANICAL TERMINAL LUG.
11. A GROUND ROD SHALL BE INSTALLED AT EACH LOCATION WHERE GROUND WIRE SURFACES AND CONNECTS TO GROUND BAR OR LID TERMINAL. GROUND ROD SHALL BE COPPER COATED WITH A MINIMUM DIAMETER OF .68" AND SHALL BE BURIED A MINIMUM OF FOUR (4) FEET INTO THE GROUND.
12. THE GROUND BAR SHALL BE STAINLESS STEEL AND SHALL BE ATTACHED USING SS 3/4" X 1 1/4" SS HEX TAPCON. THE FOLLOWING SHALL BE INSTALLED IN (4) FOUR CENTER HOLES: 10-32SS NUTS, #10 SS WASHERS AND 10-32 X 1.5 SS PHILLIPS. THE FOURTH HOLE SHALL HAVE A BUNDY KASU MECHANICAL LUG FOR THE #6 AWG GROUND WIRE. THE ASSEMBLY CAN BE ACQUIRED AT RCS INDUSTRIAL SUPPLY, INC. (640-353-0883) - CLAMP RFC-11. THE ENDS OF THE TRACER WIRES SHALL BE PLACED IN THE GROUND BAR AS SHOWN BELOW.
13. IF USING TRACER WIRE ACCESS BOX AS ACCESS POINT, GROUND BAR WILL NOT BE REQUIRED. THE REMOVABLE LID ON THE ACCESS BOX SHALL CONTAIN TWO SCREW TERMINALS. THE 12 AWG COPPER TRACER WIRE SHALL BE BROUGHT UP IN ACCESS BOX AND CONNECTED TO ONE OF THE SCREW TERMINALS. IF MORE THAN ONE TRACER WIRE IS NECESSARY TO ACCOUNT FOR TOTAL NUMBER OF PIPE DIRECTIONS AT ACCESS BOX, MULTIPLE TRACER WIRES SHALL BE CONNECTED TO THAT SAME SCREW TERMINAL. THE #6 AWG GROUND WIRE SHALL BE CONNECTED FROM THE GROUND ROD TO THE REMAINING SCREW TERMINAL WITH THE USE OF A BUNDY KASU MECHANICAL TERMINAL LUG. WIRES SHALL BE CONNECTED AS SHOWN BELOW. TRACER WIRE AND GROUND WIRE SHALL BOTH BE OF ADEQUATE LENGTH TO EXTEND FIVE (5) FEET ABOVE THE TOP OF ACCESS BOX.
14. TWO WRAPS OF TRACER WIRE SHALL BE WRAPPED SNUGGLY AROUND BASE OF HYDRANT. WIRE SHALL NOT BE LEFT IN A WAY THAT WOULD INTERFERE WITH MOVING AROUND HYDRANT.

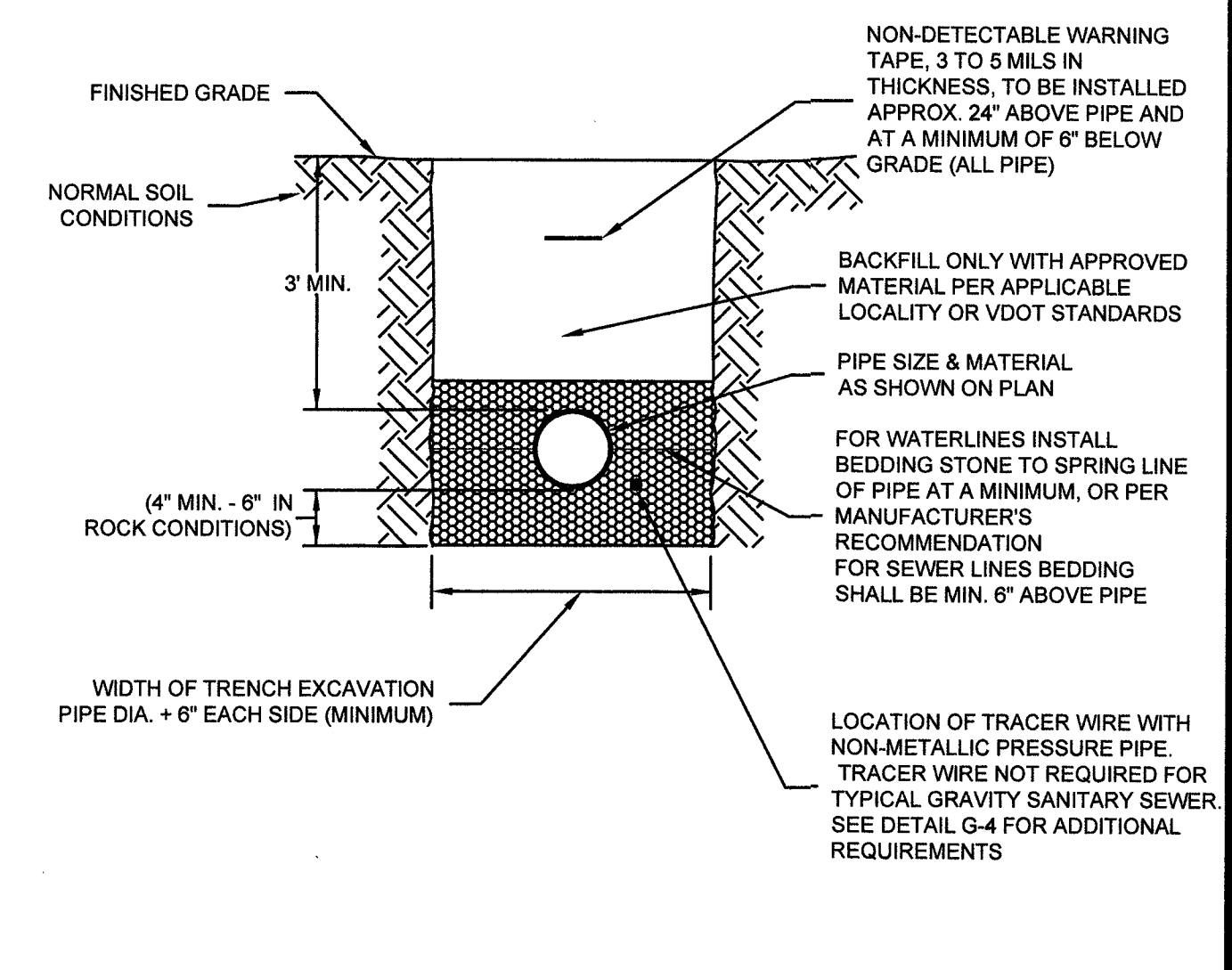


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

TRACER WIRE
FOR NON-METALLIC
PRESSURE PIPE

G-4

01/01/14

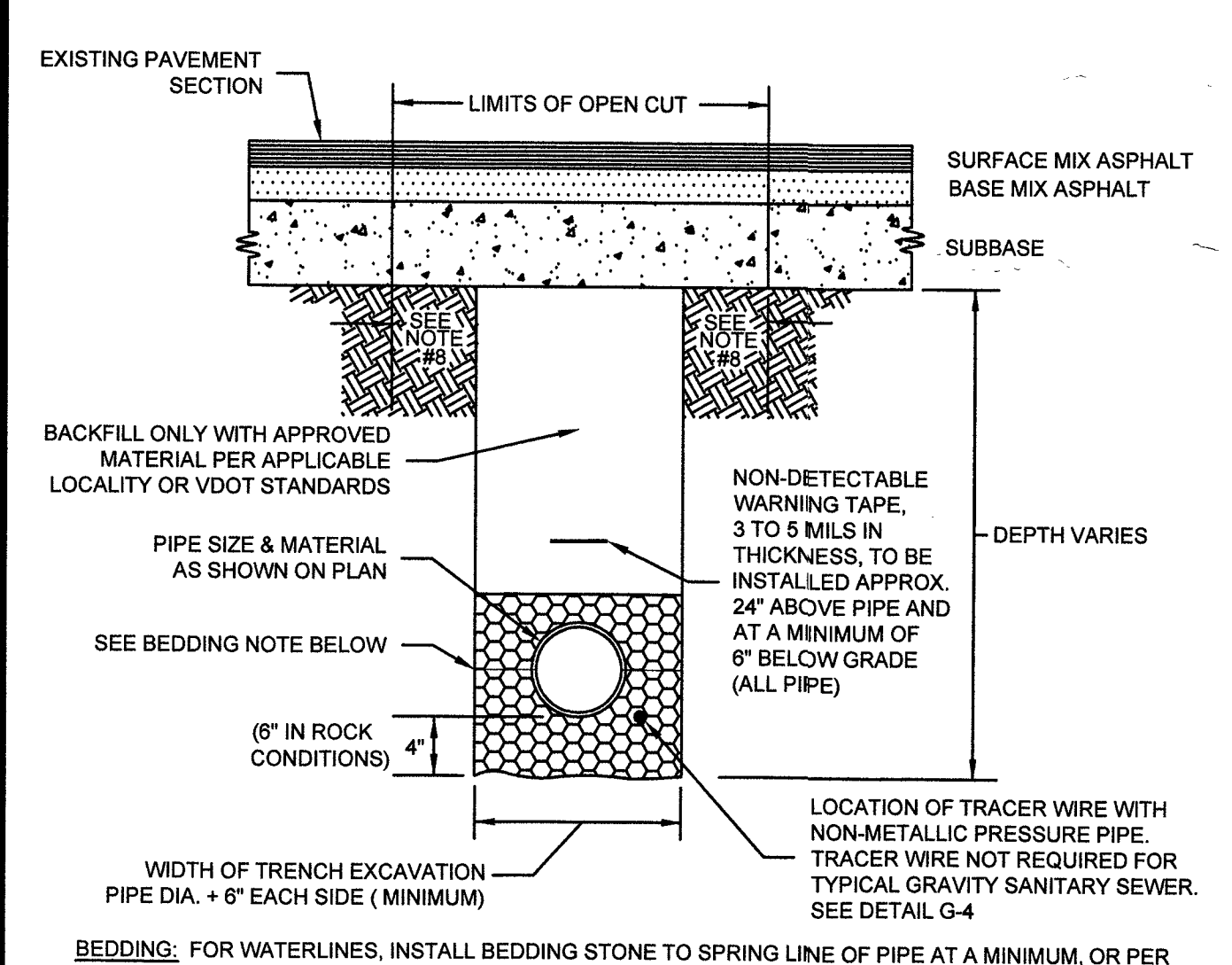


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

BEDDING AND BACKFILL
OUTSIDE OF PAVED AREAS

G-11

08/01/15

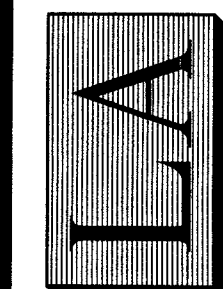


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

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

G-12

08/01/15

LUMSDEN ASSOCIATES, P.C.
ENGINEERS-SURVEYORS-PLANNERS
ROANOKE, VIRGINIACOMMONWEALTH OF VIRGINIA
THOMAS C. DALE
Lic. No. 033002
6/2/16
PROFESSIONAL ENGINEERWVWA
DETAILS"WEDGWOOD"
SECTION 4
PREPARED FOR
MAVEN INVESTMENTS, LLC
HOLLIS MAGISTERIAL DISTRICT
ROANOKE COUNTY, VIRGINIA

| REVISIONS | NO. | DATE | DESCRIPTION |
|-----------|-----|------|-------------|
| | 1 | | |
| | 2 | | |
| | 3 | | |
| | 4 | | |
| | 5 | | |

DATE: June 2, 2016

SCALE: 1" = 30'

COMMISSION NO. 15-121

SHEET 7 OF 7

APPROVED