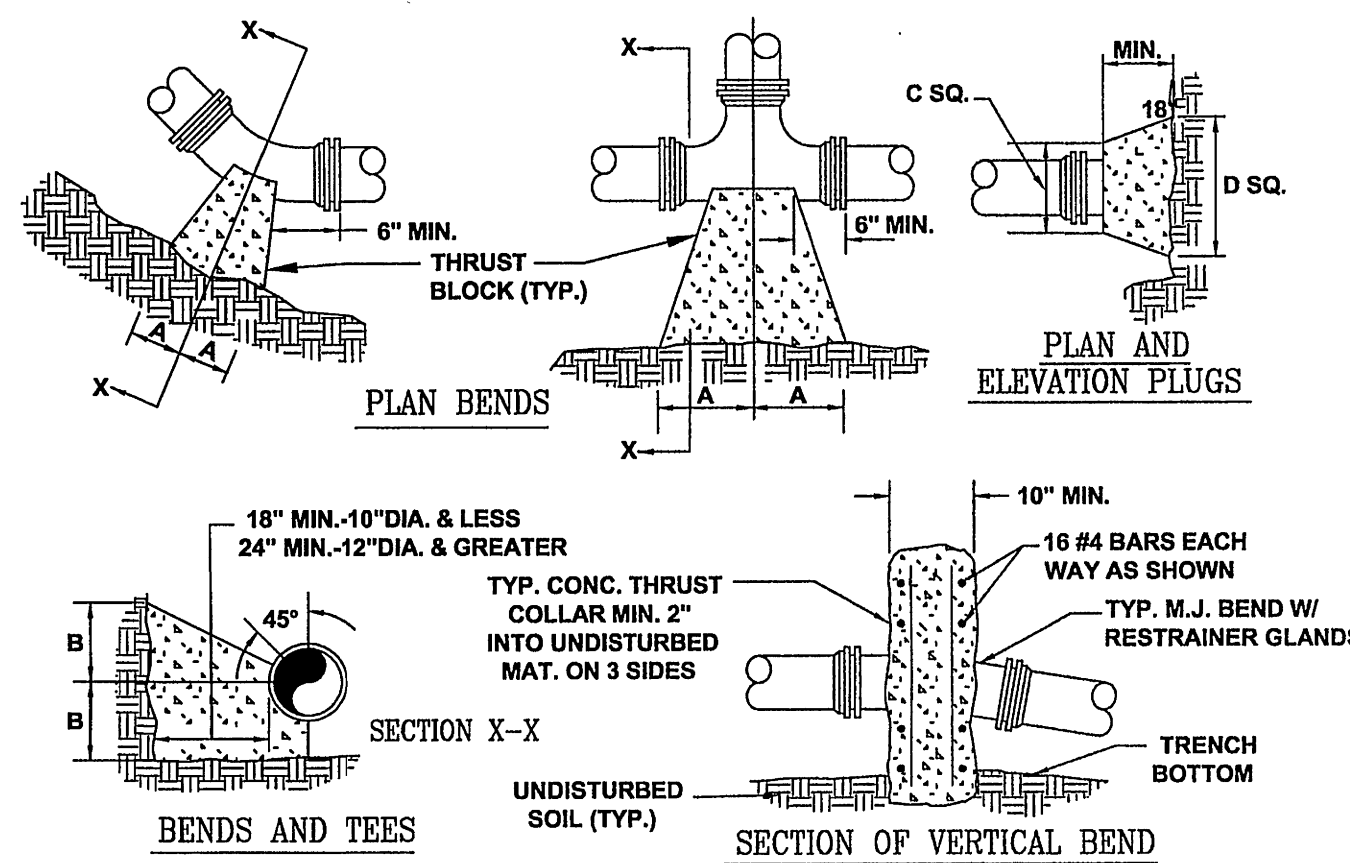


-

-
- VARIES
(NO OBSTRUCTIONS)
- 2 - 2 1/2" NOZZLES
- 1 - 4 1/2" PUMPER NOZZLE (FACING THE ROAD)
- AVK MODEL 2780, AFC MODEL B-94-B, MUELLER CENTURIUM A423, KENNEDY K81D EQUIVALENT.
- FINISHED GRADE
- 1'-6" TO 2'-0" ABOVE CURB OR EDGE OF PAVEMENT
- 2'X2'X4" CONCRETE PAD
- 3' MIN. COVER
- VALVE BOX OUTSIDE PAVEMENT OR VALVE VAULT UNDER PAVEMENT
- STANDARD INSTALLATION INCLUDES FOSTER ADAPTER OR APPROVED EQUAL
- WATER MAIN
- CONCRETE THRUST BLOCK
- TEE - MAIN LINE SIZE BY 6"
- APPROVED M.J. GLAND RESTRAINT (I.e. MEGALUGS, GRIP RINGS OR UNI-FLANGE) MAY BE SUBSTITUTED FOR CONCRETE THRUST BLOCKS
- M.J. FITTINGS SHALL NOT BE ENCASED IN CONCRETE
- 0.5 CY CLEAN STONE VDOT #57 FOR DRAINAGE
- CONTINUOUS SECTION OF PIPE
- 3/4" DIA. "CORTEN" THREADED ROD AND NUTS
- TRACER WIRE SEE GENERAL DETAIL
- CONCRETE BASE AND THRUST BLOCK AGAINST UNDISTURBED SOIL. CONCRETE SHALL NOT COVER HYDRANT DRAIN

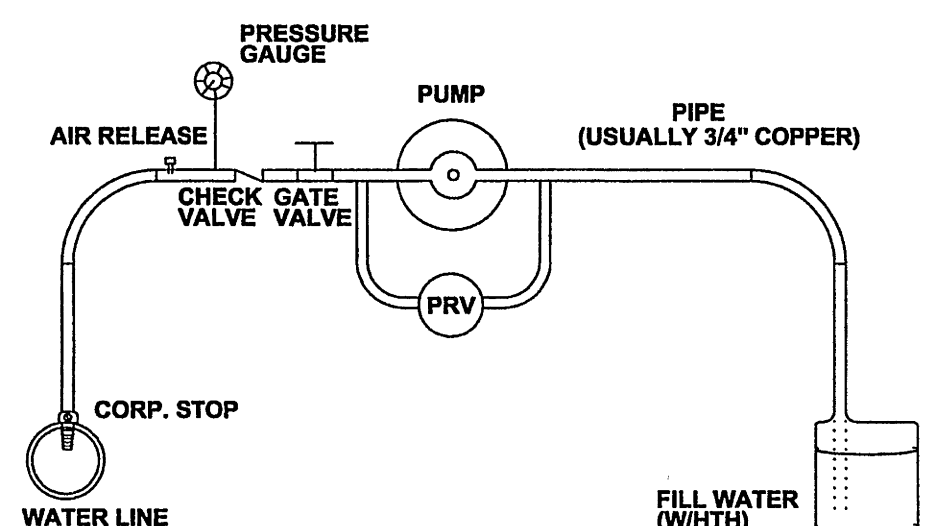


- PRESSURE= 200psf
 BEARING= 2000psf
 FACTOR OF SAFETY= 1.5
- | PIPE
SIZE | 90° BEND | | 45° BEND | | 22 1/2° BEND | | 11 1/4° BEND | | TEE | | PLUG | |
|--------------|----------|-----|----------|-----|--------------|-----|--------------|-----|-----|-----|------|-----|
| | A | B | A | B | A | B | A | 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" | 8" | 8" | 8" | 8" | 8" | 11" | 12" | 12" | 24" |
| 10" | 20" | 16" | 12" | 8" | 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" |
| 20" | 30" | 24" | 18" | 22" | 12" | 16" | 12" | 16" | 22" | 22" | 22" | 42" |
| 30" | 185" | 42" | 100" | 42" | 52" | 42" | 40" | 30" | 42" | 42" | 185" | 42" |

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"	18"
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"	16"	20"	20"	36"
24"	82"	42"	62"	30"	44"	22"	22"	16"	82"	42"	82"	42"
30"	185"	42"	62"	42"	52"	42"	40"	30"	185"	42"	185"	42"

- | FACTOR OF SAFETY = 1.5 | | | | | | | | | | | |
|------------------------|---------------|-------------|-------------|-----------------|-----------------|----------------|---------------|---------------------|--------------|------------------|------------------|
| PIPE
SIZE | PIPE
MAT'L | 90°
BEND | 45°
BEND | 22 1/2°
BEND | 11 1/4°
BEND | VALVE
P/LUG | TEE
BRANCH | REDUCER
(NOTE 2) | VERT.
45° | VERT.
22 1/2° | VERT.
11 1/4° |
| 6" | D.I. | 28' | 12' | 6' | 3' | 38' | 34' | 20' | 23' | 11' | 5' |
| 8" | D.I. | 37' | 15' | 7' | 4' | 51' | 47' | 21' | 30' | 15' | 7' |
| 10" | D.I. | 45' | 19' | 9' | 4' | 61' | 57' | 20' | 37' | 18' | 9' |
| 12" | D.I. | 53' | 22' | 11' | 5' | 73' | 69' | 38' | 43' | 21' | 10' |
| 6" | PVC | 30' | 12' | 6' | 3' | 56' | 38' | 29' | 35' | 17' | 8' |
| 8" | PVC | 40' | 16' | 8' | 4' | 74' | 56' | 31' | 46' | 22' | 11' |
| 10" | PVC | 47' | 20' | 9' | 5' | 89' | 82' | 30' | 56' | 27' | 13' |
| 12" | PVC | 56' | 23' | 11' | 6' | 106' | 88' | 56' | 66' | 32' | 16' |

1. TRACER WIRES SHALL BE INSTALLED USING MANHOLES, VALVE BOXES OR VAULTS, WATER METERS AND FIRE HYDRANTS AS ACCESS POINTS.
2. FOR WATER OR SEWER INSTALLED BY OPEN TRENCHING, TRACER WIRE SHALL BE COPPERHEAD INDUSTRIES COPPER CLAD STEEL DIRECT BURRY #14 AWG SOLID (.0341" DIAMETER), STEEL CORE SOFT DRAWN HIGH STRENGTH TRACER WIRE, 250# AVERAGE TENSILE BREAK LOAD, 30 MIL HIGH MOLECULAR WEIGHT-HIGH DENSITY (GREEN OR BLUE) POLYETHYLENE JACKET COMPLYING WITH ASTM-D-1248, 30 VOLT RATING. A HEAVIER GAUGE MAY BE REQUIRED FOR DEPTHS EXCEEDING SIX FEET.
3. FOR WATER OR SEWER INSTALLED BY HORIZONTAL DIRECTIONAL DRILLING METHOD, TRACER WIRE SHALL BE COPPERHEAD INDUSTRIES COPPER CLAD STEEL DIRECT BURRY #12 AWG SOLID (.0808" DIAMETER), STEEL CORE HARD DRAWN EXTRA HIGH STRENGTH HORIZONTAL DIRECTIONAL DRILL TRACER WIRE, 1150# AVERAGE TENSILE BREAK LOAD, 45 MIL HIGH MOLECULAR WEIGHT-HIGH DENSITY (GREEN OR BLUE) POLYETHYLENE JACKET COMPLYING WITH ASTM-D-1248, 30 VOLT RATING.
4. SPLICES SHALL BE MADE USING COPPERHEAD INDUSTRIES SNAKE BITE SPLICE KIT PART #1000, OF THE APPROPRIATE COLOR, 3M DIRECT BURRY SPLICE KIT (DBY), OR EQUIVALENT.
5. TRACER WIRE SHALL BE LONG ENOUGH TO EXTEND A DISTANCE OF FIVE (5) FEET BEYOND THE STRUCTURE.
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. TRACER LINES ARE TO BE PLACED 12-14 INCHES (12" TO 14") DEPTH. WIRE SHALL BE BROUGHT TO THE SURFACE EVERY ONE-HUNDRED (100) FEET AND PLACED IN A WATER METER BOX OR APPROVED JUNCTION 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 GAUGE COPPER WIRE AND SHALL BE OF ADEQUATE LENGTH TO EXTEND A MINIMUM OF FIVE (5) FEET BEYOND THE TOP OF STRUCTURE. THE END OF GROUND WIRE SHALL CONNECT TO THE GROUND BAR USING A BURNDY KASU MECHANICAL CABLE LUG.
11. THE GROUND ROD SHALL BE INSTALLED AT EACH LOCATION WHERE GROUND WIRE SURFACES AND CONNECTS TO GROUND BAR. GROUND ROD SHALL BE COPPER COATED, MINIMUM DIAMETER OF 5/8", 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 SIX 1/4" X 1 1/4" SXS HEX TAPCON. THE FOLLOWING SHALL BE INSTALLED IN (4) FOUR) CENTER HOLES: 10-32 SS NUTS, #10 SS WASHERS AND 10-32 X 3/4 SS PHILLIPS. THE FOURTH HOLE SHALL HAVE A BURNDY CONNECTOR KASU FOR THE #6 GAUGE GROUND WIRE. THE ASSEMBLY CAN BE ACQUIRED AT THE CITY SUPPLY CLAMP RFC-11. THE ENDS OF THE TRACER WIRES SHALL BE PLACED IN THE GROUND BAR AS SHOWN.
13. 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 MOWING AROUND HYDRANT.



TYPICAL WATER PRESSURE TEST RIG

-
- CONTRACTOR TO EXPOSE
& CLEAN PIPE IN
ACCORDANCE WITH
MANUFACTURERS
RECOMMENDATIONS

- | | | Joint | | Approximate Radius of Curve - R'
Produced by Succession of Joints | |
|----------------------------|-------------------------------|------------------------------|--------------------|--|--------------------|
| | | Maximum Offset - S' (Inches) | | | |
| Nominal Pipe Size (Inches) | Deflection Angle - θ (degree) | Joint Length 18-Ft | Joint Length 20-Ft | Joint Length 18-Ft | Joint Length 20-Ft |
| 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 |

- | Nominal
Pipe Size
(Inches) | Deflection
Angle -
θ (degree) | Maximum Offset - S'
(Inches) | | Approximate Radius
of Curve - R'
Produced by
Succession of Joints | |
|----------------------------------|-------------------------------------|---------------------------------|--------------------------|--|--------------------------|
| | | Joint
Length
18-Ft | Joint
Length
20-Ft | Joint
Length
18-Ft | Joint
Length
20-Ft |
| 3 | 8°-18" | 31 | 35 | 125 | 140 |
| 4 | 8°-18" | 31 | 35 | 125 | 140 |
| 6 | 7°-07" | 27 | 30 | 145 | 160 |
| 8 | 5°-21" | 20 | 22 | 195 | 220 |
| 10 | 5°-21" | 20 | 22 | 195 | 220 |
| 12 | 5°-21" | 20 | 22 | 195 | 220 |
| 14 | 3°-35" | 13.5 | 15 | 285 | 320 |
| 16 | 3°-35" | 13.5 | 15 | 285 | 320 |
| 18 | 3°-00" | 11 | 12 | 340 | 380 |
| 20 | 3°-00" | 11 | 12 | 340 | 380 |
| 24 | 2°-23" | 9 | 10 | 450 | 500 |

- * SEE FIGURE 4

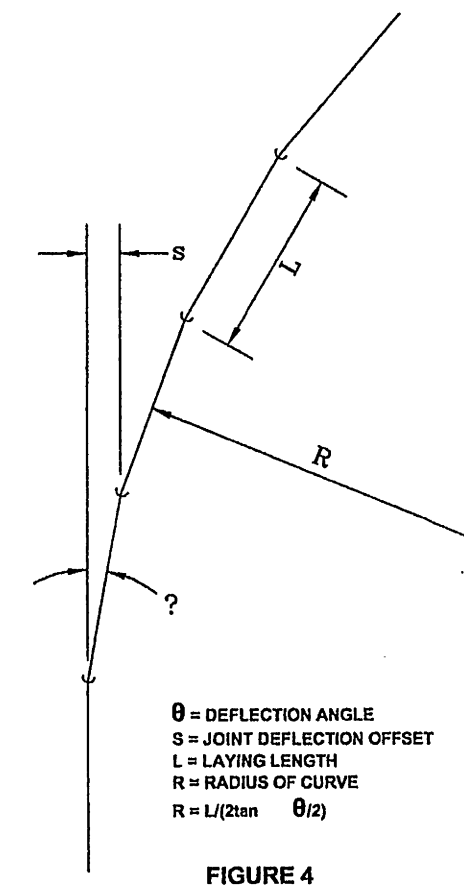
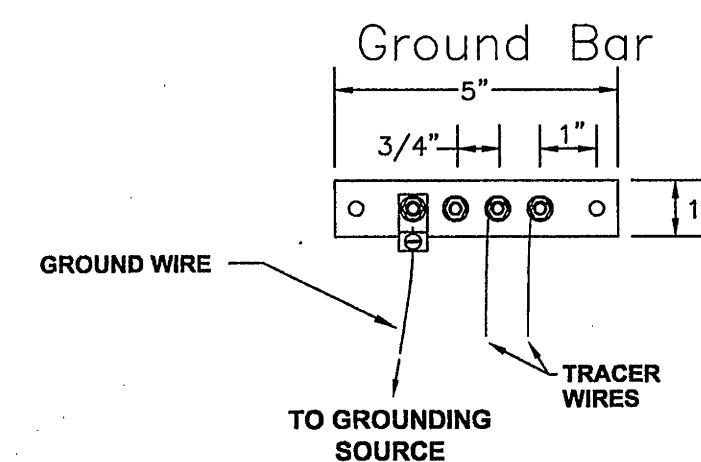


FIGURE 4.

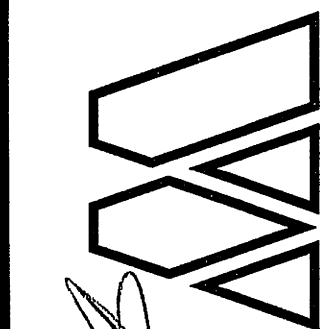


TRACER WIRE FOR NON-METALLIC PRESSURE PIPE

01/01/12

G-

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Professional Design Services
www.andassoc.com
VA - NC - WV
100 Ardmore St.
Blacksburg, Va. 24060



100 Ardmore St.
Blacksburg, Va. 24060
540-552-5592

**SHENANDOAH AVENUE
WATER LINE REPLACEMENT PROJECT
DETAILS III**

Designed By:	LTB
Drawn By:	CBD/LTB
Checked By:	TFB
Date:	26 JULY 2012
Revised:	22 AUG 2012 08 OCT 2012
Scale:	
Plan #:	29753-001
Sheet:	11 OF 12