

Diagram illustrating the components and dimensions of a private property easement line:

- RIGHT-OF-WAY EASEMENT LINE**: The boundary line of the easement.
- PRIVATE PROPERTY**: The area adjacent to the easement.
- VARIABLES**: Dimensions that can vary.
- 18" DIA.**: Diameter of the pipe.
- 12"-18"**: Distance from the easement line to the property boundary.
- SADDLE & STOP**: A component used for service connection.
- 1" SERVICE**: The service line.
- LOCKABLE SHUTOFF**: A valve for shutting off the service.
- DUAL CHECK VALVE**: A valve preventing backflow.
- METER SETTER & BOX 1**: A component for meter installation.
- SET AT FINAL GRADE OF**: The final grade of the easement line.
- FINAL GRADE**: The ground level.
- 3'-0"**: Distance from the easement line to the property boundary.
- 30°-45°**: Angle of the easement line.
- METER BY PARTICIPATING UTILITY**: The meter installed by the utility.
- 8" STONE VDOT 57**: The material used for the meter pit.
- 1" SERVICE**: The service line.
- 34" Ø x 6' TO BE CA MARKED STAKED**: The dimensions and marking of the easement line.
- TRACER WIRE**: A wire used for locating the pipe.
- SEE GENERAL DETAIL**: Reference to the general detail for the tracer wire.
- 1" CORPORATION STOP WITH ITS COMPRESSION CONNECTION SEE NOTE #4**: A stop for the corporation stop.

Technical drawing showing a cross-section of a water valve assembly. The drawing includes the following labels and dimensions:

- GROUND BAR SEE GENERAL DETAIL
- PRECAST WATER VALVE OR PRECAST MANHOLE IF DEPTH EXCEEDS 9'
- TRACER & GROUND SEE GENERAL DETAIL
- FILTER FABRIC
- 2' CLEARANCE TOP OF PIPE TO TOP OF VAULT CUT
- WATER MAIN
- GROUND ROD SEE GENERAL DETAIL
- 45"
- 6" MIN (TOP)
- 12" MAX. VERTICAL ADJUSTMENT
- PROPOSED VALVE

[illegible]

Capitol Foundry MH-2011  
TRAFFIC BEARING NON-WAY  
FRAME & COVER OR APPROVAL

**PLAN**

25 1/4"  
23 3/4"  
23 1/2"  
1 1/2"  
3/4"  
2 1/2"  
1/2"  
1/2"  
4 3/4"  
2 1/4"  
22 1/4"  
24 1/2"  
33 1/4"

**CONCRETE SECTION**

12" MIN  
4" MINIMUM COVER  
HEAVY ROD (LESS STEEL)  
HEAVY ROD (LESS STEEL)  
SEE NOTE 1

1. PUBLIC HYDRANT SHALL BE PAINTED SILVER WITH AN OILBASED PAINT. PRIVATE HYDRANTS SHALL ALSO BE PAINTED SILVER WITH AN OIL-BASED PAINT UNLESS OTHERWISE SPECIFIED BY THE JURISDICTIONAL FIRE AGENCY.

2. FIRE HYDRANT SHALL BE INSTALLED 2' MIN. AND 4' MAX. FROM BACK OF CURB OR 6' MIN. AND 12' MAX. FROM EDGE OF DRIVEWAY WHEN CARS ARE NOT PRESENT. FIRE HYDRANT TO BE INSTALLED WITH NOISE-OF-GATE OR CASING LINE.

3. AREA AROUND HYDRANT AT A RADIUS OF 7' TO 8' LEVEL AND UNOBSTRUCTED.

4. WATERPROOF BASIN OUT OF SERVICE RISERS SHALL BE PLACED OVER ALL NEWLY INSTALLED FIRE HYDRANT ASSEMBLIES SHALL BE ROODED AND RESTRAINED WITH APPROVED M.J. GLAND RODS/NUTS. HIGH PRESSURE (OVER 150 PSI) ALSO REQUIRES CONCRETE THRUST BLOCKS AS SHOWN BELOW.

5. DURING CONSTRUCTION THE SEASONAL WATER LEVEL IS NOTED TO BE ABOVE THE DRAIN OUTLETS OF THE PROPOSED HYDRANT. THE PARTICIPATING UTILITY TO BE INSTALLED IMMEDIATELY SO THAT THE HYDRANT CAN BE RELOCATED TO A SATURABLE LOCATION, OMITTED, OR THE DRAIN HOLE PUGGED.

6. TWO INCHES OF TRACER WIRE SHALL BE INSTALLED AROUND BASE OF HYDRANT.

7. APPROVED MODELS: AVK MODEL 2780, APC MODEL B-84-B-A, MUELLER CENTRON AXI, KENNEDY KRIBO OR EQUIVALENT.

8. WHERE HYDRANT LATERALLY IS APPROVED BY THE PARTICIPATING UTILITY TO BE LONGER IN LENGTH, MARKING THE CONTINUOUS SECTION OF PIPE ON EACH SIDE OF THE GATE VALVE IS UNDESIRABLE. BEST PRACTICE JOINTS SHALL BE INSTALLED BETWEEN THE TEE AND GATE VALVE; IN USE OF RODDING, HOWEVER, A RODDED CONTINUOUS SECTION OF PIPE SHALL ALWAYS BE INSTALLED BETWEEN THE GATE VALVE AND HYDRANT.

VARIES \*  
(NO OBSTRUCTIONS)

1 - 4" I.D. PUMPER  
NOZZLE (FACING THE ROAD)

CONCRETE PAD

CONTINUOUS SECTION OF PIPE

CONTINUOUS SECTION OF PIPE

WATER MAIN

TEE - MAIN  
LINE SIZE  
TO VALVE &  
HYDRANT

CONCRETE THRUST BLOCK (IF REQUIRED)

APPROVED M.J. GLAND RESTRAINT  
(i.e. MEAGLAS, GRIP SPRINGS OR  
UN-PLANNED) SHALL BE USED AT ALL  
M.J. FITTINGS

M.J. FITTINGS SHALL NOT  
BE ENCASED IN CONCRETE

FINISHED GRADE

AVK MODEL 2780  
APC MODEL B-84-B-A  
MUELLER CENTRON  
AXI, KENNEDY KRIBO OR  
EQUIVALENT

2 - 2 1/2"  
NOZZLE

5.5 CY CLEAN  
STONE FOOT RT FOR  
DRAINAGE

CONCRETE BASE AND THRUST  
BLOCK (IF REQUIRED) SHALL BE  
UNOBTAINED SOIL, CONCRETE  
SHALL NOT COVER HYDRANT  
DRAIN

**PLAN BENDS**

6" MIN. THRUST BLOCK (TYP.)

**PLAN AND ELEVATION PLUGS**

18" MIN. D SQ.

**SECTION X-X**

12" MIN. 12-DIA. & LESS  
24" MIN. 12-DIA. & GREATER

TYP. CONC. THRUST BLOCK MIN. 2" INTO UNDISTURBED MAT. ON 3 SIDES

UNDISTURBED SOIL (TYP.)

**SECTION OF VERTICAL BEND**

10" MIN. 16" #4 BARS EACH WAY AS SHOWN

TYP. #4 B BEND WITH REINSTRAIN GLAZ

TRENCH BOTTOM

**NOTES**

- FOR VERT. BEND DOWN IN EXCESS OF 1 1/4" THICK, ANCHORAGE SHALL BE DESIGNED BY ENGINEER.
- FOR VERT. BEND UPWARD, BLOCKING TO BE SIMILAR TO THAT FOR HORIZ. BEND.
- GLANDS & BOLTS SHALL BE PROTECTED FROM COLL. WITH PLASTIC SHEETING WHEN POURING THRUST BLOCKS.
- ALL THRUST BLOCK & SUPPORT CONCRETE SHALL BE 3000 PSI READY MIX CONCRETE.
- THRUST BLOCKS WITH "B" DIMENSION GREATER THAN 30" SHALL HAVE THE RESTRAINED PIPE INSTALLED WITH A MINIMUM OF 4" OF COVER.
- IF UNDER 100 PSI WORKING PRESSURE, RESTRAINED JOINTS MUST BE USED IF EQUAL OR GREATER THAN 100 PSI, BOTH THRUST BLOCK AND RESTRAINED JOINTS ARE REQUIRED.
- WHEN THRUST BLOCK IS REQUIRED BUT NOT FEASIBLE TO CONSTRUCT, THRUST COLLAR SHALL BE USED. SEE THRUST COLLAR DETAIL.

**FACTORS OF SAFETY = 1.05**

BEARING = 2000PSF

PIPE SIZE	8" BEND	12" BEND	18" BEND	24" BEND	30" BEND	36" BEND	42" BEND	48" BEND	54" BEND	60" BEND	72" BEND	84" BEND	96" BEND	108" BEND	120" BEND	132" BEND	144" BEND	156" BEND	168" BEND	180" BEND	192" BEND	216" BEND	240" BEND	264" BEND	288" BEND	312" BEND	336" BEND	360" BEND	384" BEND	408" BEND	432" BEND	456" BEND	480" BEND	504" BEND	528" BEND	552" BEND	576" BEND	600" BEND	624" BEND	648" BEND	672" BEND	696" BEND	720" BEND	744" BEND	768" BEND	792" BEND	816" BEND	840" BEND	864" BEND	888" BEND	912" BEND	936" BEND	960" BEND	984" BEND	1008" BEND	1032" BEND	1056" BEND	1080" BEND	1104" BEND	1128" BEND	1152" BEND	1176" BEND	1200" BEND	1224" BEND	1248" BEND	1272" BEND	1296" BEND	1320" BEND	1344" BEND	1368" BEND	1392" BEND	1416" BEND	1440" BEND	1464" BEND	1488" BEND	1512" BEND	1536" BEND	1560" BEND	1584" BEND	1608" BEND	1632" BEND	1656" BEND	1680" BEND	1704" BEND	1728" BEND	1752" BEND	1776" BEND	1800" BEND	1824" BEND	1848" BEND	1872" BEND	1896" BEND	1920" BEND	1944" BEND	1968" BEND	1992" BEND	2016" BEND	2040" BEND	2064" BEND	2088" BEND	2112" BEND	2136" BEND	2160" BEND	2184" BEND	2208" BEND	2232" BEND	2256" BEND	2280" BEND	2304" BEND	2328" BEND	2352" BEND	2376" BEND	2400" BEND	2424" BEND	2448" BEND	2472" BEND	2496" BEND	2520" BEND	2544" BEND	2568" BEND	2592" BEND	2616" BEND	2640" BEND	2664" BEND	2688" BEND	2712" BEND	2736" BEND	2760" BEND	2784" BEND	2808" BEND	2832" BEND	2856" BEND	2880" BEND	2904" BEND	2928" BEND	2952" BEND	2976" BEND	3000" BEND
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FACTOR OF SAFETY = 1.5											
PIPE SIZE	PIPE MAT'L	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND	VALVE FLUID O.D.	TEE BRANCH O.D.	REDUCER O.D.	45° VERT.	22 1/2° VERT.	11 1/4° VERT.
6"	D.I.	28"	21"	6"	3"	50"	26"	26"	21"	10"	5"
8"	D.I.	36"	21"	8"	4"	65"	41"	27"	27"	13"	8"
10"	D.I.	42"	21"	9"	5"	77"	56"	32"	32"	16"	8"
12"	D.I.	51"	21"	10"	5"	91"	67"	27"	38"	18"	9"
6"	PVC	29"	21"	6"	3"	78"	25"	40"	32"	16"	8"
8"	PVC	37"	21"	8"	4"	102"	49"	43"	42"	21"	10"
10"	PVC	44"	21"	9"	5"	122"	68"	41"	51"	25"	12"
12"	PVC	51"	21"	11"	6"	143"	89"	42"	60"	29"	15"

- ALL JOINTS SHALL BE RESTRAINED ON BOTH SIDES OF THE FITTING AND DOCUMENTED BY THE INSPECTOR FOR THE LENGTH SHOWN UNLESS OTHERWISE INDICATED.
- RESTRAINED LENGTH SHOWN REFERS TO ANY DESIGNED OR POTENTIAL LINE STOP, INCLUDING ALL GATE VALVES.
- RESTRAINED LENGTH SHOWN REFERS TO THE BRANCH LINE ONLY. THE CONTINUOUS PIPE LENGTH OF THE MAIN RUN SHALL BE A MINIMUM OF 10' ON EACH SIDE OF THE TEE.
- RESTRAINED LENGTH SHOWN IS BASED ON REDUCING PIPE DIAMETER TO ONE SIZE SMALLER THAN PIPE LISTED (ANY OTHER DIAMETER REDUCTION WILL REQUIRE ADDITIONAL CALCULATIONS BEFORE INSTALLATION). RESTRAINED LENGTH SHOWN IS UPSTREAM ON THE LARGE SIDE OF THE REDUCER.

**12" AND SMALLER DIAMETER:** IF UNDER 150 PSI WORKING PRESSURE, RESTRAINED JOINT(S) ARE TO BE USED. IF EQUAL TO OR OVER 150 PSI WORKING PRESSURE, BOTH THRUST BLOCK(S) AND RESTRAINED JOINT(S) SHALL BE USED.

**LARGER THAN 12" DIAMETER:** IF UNDER 100 PSI WORKING PRESSURE, RESTRAINED JOINT(S) ARE TO BE USED. IF EQUAL TO OR OVER 100 PSI WORKING PRESSURE, BOTH THRUST BLOCK(S) AND RESTRAINED JOINT(S) SHALL BE USED, UNLESS OTHERWISE SPECIFIED BY THE PARTICIPATING UTILITY).

- FOR RESTRAINED JOINT PIPING REQUIREMENTS AT FITTING R.J. PVC AND R.J. DIP MAY BE USED INTERCHANGEABLY WITH APPROVAL FROM PARTICIPATING UTILITY. CONTRACTOR MUST PLAN ACCORDINGLY FOR THE DIFFERENCE IN PVC AND DIP BELL AND SPOOT DIMENSIONS.

1. TAPPING SLEEVE SHALL BE A304 STAINLESS STEEL WITH CARBON STEEL FLANGE, ROMAC'S MODEL SST III, FORD MODEL FTSS WITH CARBON STEEL FLANGE OR APPROVED EQUIVALENT. SLEEVE SHALL BE RATED AT 100 PSI OVER WORKING PRESSURE AND MUST HAVE A TEST PLUG.
2. TAPPING VALVE SHALL BE A316 RESILIENT SEATED GATE VALVE SERIES 25 MFL, MUELLER T-2360 RESILIENT WEDGE TAPPING VALVE WITH MFL, OR AFC SERIES 2500 RESILIENT WEDGE TAPPING VALVE WITH MFL. VALVE SHALL BE RATED AT 250 PSI.
3. TAPPING SLEEVE AND VALVE SHALL BE FULL PORT TO ACCEPT FULL SIZE SHELL OUTTER.
4. STEEL FLANGE SHALL MEET AWWA C207.
5. SIZE-ON-SIZE TAPPING NOT ALLOWED UNLESS APPROVED BY PARTICIPATING UTILITY.

CONTRACTOR TO EXPOSE  
& CLEAN PIPE IN  
ACCORDANCE WITH  
MANUFACTURERS  
RECOMMENDATIONS

A 1" DRAIN WILL BE REQUIRED ON THE LOWER END OF THE CASING PIPE.  
 2. SPACERS SHALL BE RACI HOPE SPACERS OR EQUIVALENT. STAINLESS STEEL SPACERS MAY BE USED IF IN COMPLIANCE WITH THE FOLLOWING CRITERIA:  
     • INTERIOR SURFACES OF THE CIRCULAR STAINLESS STEEL BAND SHALL BE UNDED WITH EPDM OR NEOPRENE MATERIAL.  
     • ABRASION RESISTANT RUNNERS/KIDDS SHALL BE POLYMER MATERIAL WITH EACH END BEVELED TO FACILITATE EASE OF INSTALLATION INTO CASING PIPE.  
 3. CARRIER PIPE SHALL BE SPACED 6" 1/2 ON SEWER PIPE.  
 4. SPACER PIPE SHALL BE DUCTILE OR HOPE IN ACCORDANCE WITH REGIONAL STANDARDS.  
 5. IF HOPE CARRIER PIPE IS USED AND PRECISE GRADES ARE NOT REQUIRED THROUGH CASING, SPACERS MAY BE OMITTED.  
 6. CASING PIPE TO BE STEEL IN ACCORDANCE WITH VDOT STANDARD DETAIL EP-1 OR HOPE AS SPECIFIED IN THE STANDARDS IF APPROVED BY THE PARTICIPATING UTILITY.  
 7. CONCRETE CASING PIPE WILL NOT BE ALLOWED.  
 8. DIAMETER OF CASING PIPE SHALL BE AS SHOWN IN THE TABLE BELOW UNLESS OTHERWISE SPECIFIED BY THE PARTICIPATING UTILITY. WHERE SPACERS ARE NOT REQUIRED, CASING PIPE SHALL BE MINIMUM DIAMETER TO ADEQUATELY INSTALL AND PASS CARRIER PIPE THROUGH AND MINIMIZE VOID SPACE BETWEEN CARRIER AND CASING PIPES.

CASING PIPE SIZE CHART		TWO SPACERS PLACED AT EACH END OF CASING (TYP)	
CARRIER PIPE (NOMINAL DIAMETER)	CASING PIPE (DIAMETER)	CARRIER PIPE (NOMINAL DIAMETER)	CASING PIPE (DIAMETER)
6"	12"	6"	16"
10"	24"	10"	24"
12"	24"	14"	24"
14"	24"	18"	30"
18"	30"	18"	30"
24"	42"	24"	42"
30"	42"	30"	42"

\* ADDITIONAL CASING ALLOWED AS RECOMMENDED BY PIPE MANUFACTURER.

CASING PIPE  
 RESTRAINED JOINTS  
 6.5" BETWEEN SPACERS  
 2" FROM BELL END  
 CARRIER PIPE  
 CASING SPACERS SHALL BE SPACED A MAXIMUM OF 1' FROM EACH SIDE OF THE PIPE JOINT  
 RUBBER END SEAL WITH STAINLESS STEEL BANDS, PIPELINE SEAL & INSULATOR INC., MODEL "C", "R", "S" OR APPROVED EQUAL.

CASING PIPE  
 CARRIER PIPE  
 CASING SPACER (SPIDER)  
 POLYETHYLENE RUNNER  
 CARRIER PIPE

HOPE CASING SPACER

**Asphalt Pavement Restoration Detail for Open Cut Utility Installation**

Mill & resurface\*\*\*

Saw-cut existing pavement to the full depth of asphalt.

Asphalt Concrete Surface Material\*

12' min.

6' min.

15' min.

Asphalt Concrete Base, Type BM-25.5A

Hot Rolled Stone Material, Type 1  
See No. 22A or 21B

6' Bench Min.

6' Bench Min.

Selected Material

Class 1 base with Sectional Specification No. 20 or according to the Roadway

\*\*\* 12 inches minimum beyond the edge of the trench on longitudinal open cuts, or 25 feet minimum beyond the trench centerline on perpendicular open cuts, or as determined by the district administrator's designee.

**NOTES:**

\* Asphalt Concrete Surface Material:  
SM-9.5A for ADT < 10,000  
SM-9.5D for ADT < 10,000

\*\* Trench width and side bedding shall be in accordance with VDOT Std. PG-1.

**Date: August 27, 2014**

[illegible]

BLU = TRACE SAFE TRACER WIRE  
BLACK = GROUND WIRE & GROUND BAR  
TS19H-LC-C = TRACE SAFE LOCATING CLIP AT GROUND BAR  
TS19-C = SERVICE LATERAL TRACE SAFE CONNECTOR  
GROUND WIRE = #6 AWG COPPER WIRE  
NOTE: LEAVE FIVE FEET (5') OF EXCESS TRACER WIRE COILED UP IN VAULT

The drawing consists of three parts: a front view, a side view, and a detail of the locating clip. The front view shows a central vertical rod with three circular components (TS19-C) attached to it. The side view shows the rod passing through a circular component (TS19-IL-LC-C) which is mounted on a ground bar. A detail of the locating clip (TS19-IL-LC-C) is shown, which is a circular component with a central rod and a clip mechanism. The clip is shown in a cross-section view, highlighting its internal structure and the way it is attached to the ground bar.

TS19-C

TS19-C

GROUND BAR (TYP.)

LOCATING CLIP FROM FRONT VIEW  
(TS19-IL-LC-C)

LOCATING CLIP (TYP.)  
(TS19-IL-LC-C)

WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

OWNER: BRUCE KAMPE  
DESIGNER: INFRA-TECH

[illegible][illegible][illegible][illegible]