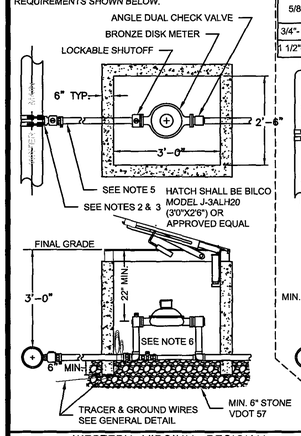
1. ALL METERS ARE TO BE PROVIDED AND INSTALLED BY PARTICIPATING UTILITY AT OWNER/DEVELOPER'S EXPENSE. METER BOX, SERVICE, AND SETTER *TO BE FURNISHED AND INSTALLED BY OWNER/DEVELOPER* IN ACCORDANCE WITH THE MINIMUM REQUIREMENTS SHOWN BELOW.
2. SADDLES *MUST BE USED* WITH ALL PLASTIC & DUCTILE IRON PIPE. 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. CORPORATION STOP SHALL BE FORD FB1000-4-G-NL, MUELLER B-25008 OR APPROVED EQUAL.
4. METER BOXES LOCATED IN AREAS SUBJECT TO VEHICULAR TRAFFIC *SHALL BE CONCRETE* WITH H-20 RATED TRAFFIC BEARING HATCH. ALL OTHER METER BOXES SHALL BE CARSONITE, PLASTICS, INC. PLASTIC BOX, ADS CORRUGATED *HDPE BOX, OR APPROVED EQUAL*. MINIMUM METER BOX & LID DIAMETERS SHALL BE IN ACCORDANCE WITH SIZING CHART BELOW.
5. SERVICE SHALL BE "K" TYPE COPPER OR P.E. 4710 ,CTS O.D., MINIMUM CELL CLASS 445474E AND 445474D.
6. COPPER METER SETTER TO BE FORD, A.Y. MCDONALD OR APPROVED EQUAL WITH ANGLE DUAL CHECK VALVE AND BYPASS HAVING LOCKABLE SHUTOFF VALVE.
7. SERVICES REQUIRING METERS LARGER THAN 2-INCH SHALL BE REVIEWED BY THE *PARTICIPATING UTILITY* ON A CASE BY CASE BASIS.

TRAFFIC BEARING LOCATION

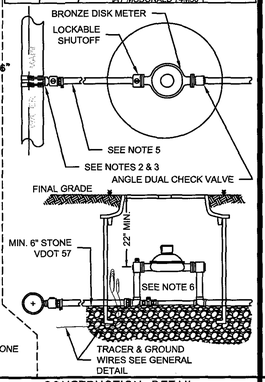
TRAFFIC BEARING VAULT AND H-20 RATED HATCH SHALL BE SIZED IN ACCORDANCE WITH DIMENSIONAL *REQUIREMENTS SHOWN BELOW.*



NON TRAFFIC BEARING LOCATION

SIZING CHART LID

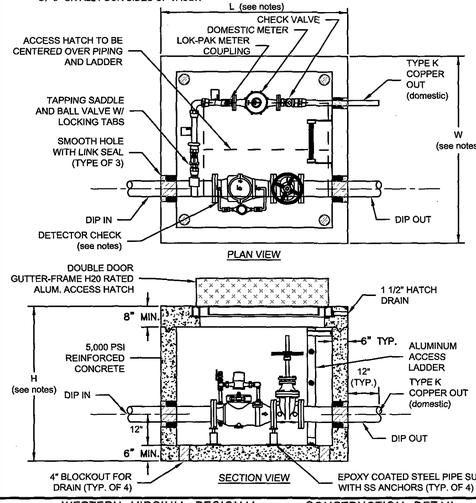
METER SIZE	BOX DIA (MIN.)	LID DIA (MIN.)	COVER & LID MODEL (OR APPROVED EQUAL)
5/8"	18"	11½"	FORD "A" SERIES FRAME & NICOR DOMESTIC 12.26 CX LID WITH SENSUS RECESS
3/4"- 1"	24"	20"	FORD MC-24-T OR AY MCDONALD 74M24 T
1 1/2"-2"	30"	20"	FORD MC-30-T OR AY MCDONALD 74M30 T



WESTERN VIRGINIA REGIONAL – CONSTRUCTION DETAIL

COMMERCIAL WATER SERVICE METER SIZES 5/8" – 2" — W–5 — 02/17/17

1. FOR 6" FIRE LINE, EXTERIOR VAULT DIMENSIONS SHALL BE (L x W x H) 6' X 6' X 5' WITH DOMESTIC TAP MADE INSIDE VAULT AS SHOWN BELOW.
2. FOR 8" FIRE LINE EXTERIOR VAULT DIMENSIONS SHALL BE (L X W X H) 6' X 6' X 6' WITH *DOMESTIC* TAP MADE OUTSIDE VAULT. BALL VALVE WITH LOCKING TABS SHALL BE PROVIDED INSIDE VAULT TO ALLOW FOR ISOLATION OF DOMESTIC METER.
3. SINGLE DETECTOR CHECK VALVE SHALL BE WILKINS 310 DALM , WATTS ES-SS07F - BP, OR APPROVED EQUAL WITH FLANGED END CONNECTIONS, BYPASS ASSEMBLY, AND ONE OS&Y GATE VALVE.
4. BYPASS ASSEMBLY SHALL INCLUDE 2 BALL VALVES TO ISOLATE METER.
5. DOMESTIC SHALL BE TYPE K COPPER WITH GRIP JOINT FITTINGS, BALL VALVE AT TAPPING SADDLE (WITH LOCKING TABS) AND CHECK VALVE ON OUTLET.
6. DOMESTIC METER AND BYPASS METER TO BE SUPPLIED BY OWNER AND INSTALLED BY VENDOR.
7. "UNI FLANGE" ADAPTOR FLANGE, OR APPROVED EQUAL, OR FLANGED - PLAIN END PIPING REQUIRED FOR INLET AND OUTLET PIPING.
8. VAULT TO BE INSTALLED ON MIN. 6" COMPACTED VDOT #57 STONE WITH FILTER FABRIC PLACED BETWEEN BOTTOM OF VAULT AND STONE BEDDING. FILTER FABRIC TO EXTEND VERTICALLY A MINIMUM OF 6" ON ALL FOUR SIDES OF VAULT.

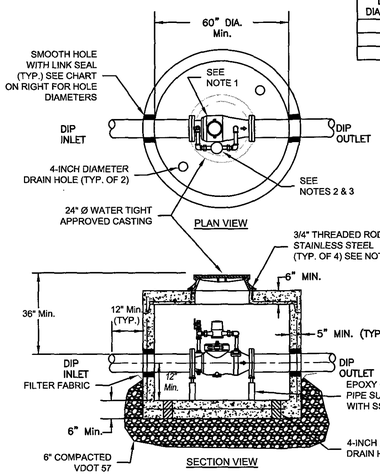


WESTERN VIRGINIA REGIONAL – CONSTRUCTION DETAIL

COMMERCIAL METER VAULT — W–7 — 02/10/15

1. SINGLE DETECTOR CHECK VALVE SHALL BE WILKINS MODEL 310 DALM, WATTS ES-SS07F-BP, OR APPROVED EQUAL WITH FLANGED END CONNECTIONS AND BYPASS ASSEMBLY.
2. BYPASS ASSEMBLY SHALL INCLUDE 2 BALL VALVES TO ISOLATE METER.
3. BYPASS METER TO BE SUPPLIED BY OWNER AND INSTALLED BY VENDOR.
4. MANHOLE SECTIONS MUST MEET ASTM C478, AASHTO M-199 REQUIREMENTS.
5. "UNI FLANGE" ADAPTOR FLANGE, OR APPROVED EQUAL, OR FLANGED – PLAIN END PIPING REQUIRED FOR INLET AND OUTLET PIPING
6. 3/4" THREADED ROD TO BE EMBEDDED A MINIMUM OF 4" INTO CONCRETE AND TO BE FIRMLY SECURED WITH EPOXY.

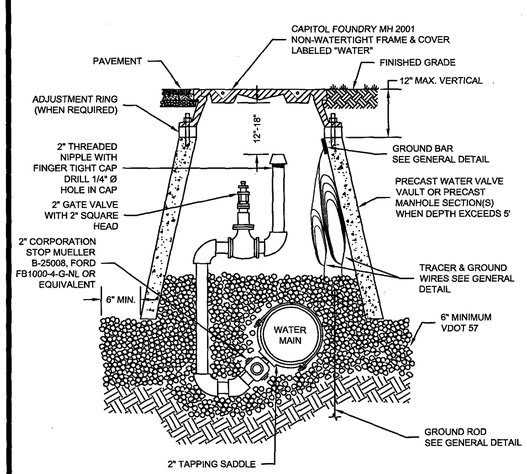
SERVICE LINE DIAMETER	HOLE I.D.
4"	8"
6"	10"
8"	12"



WESTERN VIRGINIA REGIONAL – CONSTRUCTION DETAIL

FIRE SERVICE VAULT FOR PRIVATE HYDRANT — W–8 — 02/10/15

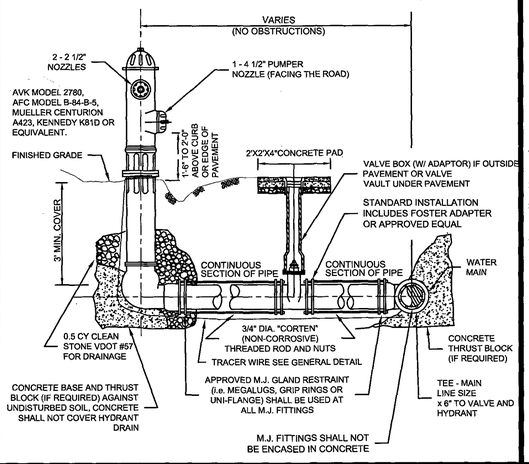
1. FIRE HYDRANTS MAY BE USED AT LOW POINTS IN PLACE OF BLOW-OFFS.
2. THE PIPING AND "STREET ELS" BETWEEN CORPORATION STOP AND 2" GATE VALVE SHALL BE LEAD FREE BRASS OR *DUCTILE IRON PIPE*.
3. THE POINT OF CONNECTION TO THE WATER MAIN SHALL BE LOCATED NEAR THE BOTTOM OF THE MAIN (AS SHOWN) TO FACILITATE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



WESTERN VIRGINIA REGIONAL – CONSTRUCTION DETAIL

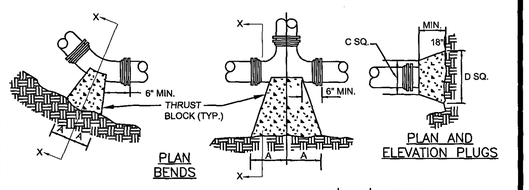
IN-LINE BLOW-OFF ASSEMBLY — W–12 — 02/10/15

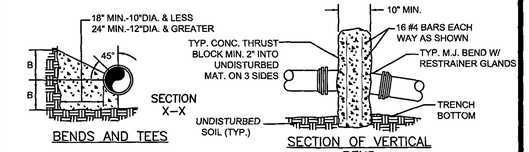
1. PUBLIC HYDRANTS SHALL BE PAINTED SILVER WITH AN OIL-BASED PAINT. PRIVATE HYDRANTS SHALL ALSO BE PAINTED SILVER WITH AN OIL-BASED PAINT UNLESS OTHERWISE SPECIFIED BY THE JURISDICTIONAL FIRE MARSHALL.
2. FIRE HYDRANT SHALL BE INSTALLED 2' MIN. AND 4' MAX. FROM BACK OF CURB OR 8' MIN. AND 12' MAX. FROM EDGE OF PAVEMENT WHEN CURB IS NOT *PRESENT. FIRE HYDRANT* TO BE INSTALLED WITHIN RIGHT-OF-WAY OR EASEMENT LINE.
3. AREA AROUND HYDRANT AT A RADIUS OF 4' TO BE LEVEL AND UNOBSTRUCTED.
4. WATERPROOF BAGS OR OUT OF SERVICE RINGS SHALL BE PLACED OVER ALL NEWLY INSTALLED FIRE HYDRANTS.
5. HYDRANT ASSEMBLIES SHALL BE RODDED AND RESTRAINED WITH APPROVED M.J. GLAND RESTRAINTS. HIGH PRESSURE (OVER 150 PSI) *ALSO REQUIRES* CONCRETE THRUST BLOCKS AS SHOWN BELOW.
6. IF DURING CONSTRUCTION THE SEASONAL WATER LEVEL IS NOTED TO BE ABOVE THE DRAIN OUTLETS OF THE PROPOSED HYDRANT. THE PARTICIPATING UTILITY WILL BE NOTIFIED IMMEDIATELY SO THAT THE HYDRANT CAN BE RELOCATED TO A SUITABLE LOCATION, OMITTED, OR THE DRAIN HOLE PLUGGED.
7. TWO WRAPS OF TRACER WIRE SHALL BE WRAPPED AROUND BASE OF HYDRANT.
8. APPROVED MODELS - AVK MODEL 2780, AFC MODEL B-84-B-5, MUELLER CENTURION A423, KENNEDY K81D OR EQUIVALENT.
9. WHERE HYDRANT LATERAL(S) IS APPROVED BY THE PARTICIPATING UTILITY TO BE LONGER IN LENGTH, MAKING THE CONTINUOUS SECTION OF PIPE ON EACH SIDE OF THE GATE VALVE UNFEASIBLE, RESTRAINED *PIPE* JOINTS SHALL BE INSTALLED BETWEEN THE TEE AND GATE VALVE IN LIEU OF RODDING. HOWEVER, A RODDED CONTINUOUS SECTION OF *PIPE* SHALL ALWAYS BE INSTALLED BETWEEN THE GATE VALVE AND HYDRANT.



WESTERN VIRGINIA REGIONAL – CONSTRUCTION DETAIL

FIRE HYDRANT ASSEMBLY — W–17 — 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 HORZ. 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 A	90° BEND B	45° BEND A	45° BEND B	22 ½° BEND A	22 ½° BEND B	11 ¼° BEND A	11 ¼° BEND B	TEE A	TEE B	PLUG C	PLUG 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"	22"	16"	82"	42"	82"	42"
30"	185"	42"	100"	42"	52"	42"	40"	30"	185"	42"	185"	42"

WESTERN VIRGINIA REGIONAL – CONSTRUCTION DETAIL

THRUST BLOCK REQUIREMENTS — W–18 — 02/10/15

INSTALLATION OF DUCTILE IRON WATER MAINS
TABLE 3 AWWA C600-05
Maximum Joint Deflection Full Length of Pipe - Push on Type Joint

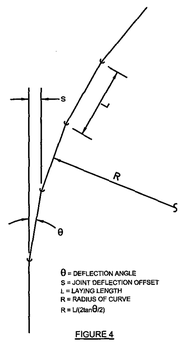
Nominal Pipe Size (inches)	Deflection Angle - θ (degree)	Maximum Offset - S* (Inches) Joint Length 18-Feet	Maximum Offset - S* (Inches) Joint Length 20-Feet	Approximate Radius of Curve - R* Produced by Succession of Joints Joint Length 18-Feet	Approximate Radius of Curve - R* Produced by Succession of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

* SEE FIGURE 4.
For 14-inch and larger push-on joints, maximum deflection angle may be larger than shown above. Consult the *manufacturer.*

INSTALLATION OF DUCTILE IRON WATER MAINS
TABLE 4 AWWA C600-05
Maximum Joint Deflection Full Length of Pipe - Mechanical Joint Pipe

Nominal Pipe Size (inches)	Deflection Angle - θ (degree)	Maximum Offset - S* (Inches) Joint Length 18-Feet	Maximum Offset - S* (Inches) Joint Length 20-Feet	Approximate Radius of Curve - R* Produced by Succession of Joints Joint Length 18-Feet	Approximate Radius of Curve - R* Produced by Succession of Joints Joint Length 20-Feet
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.

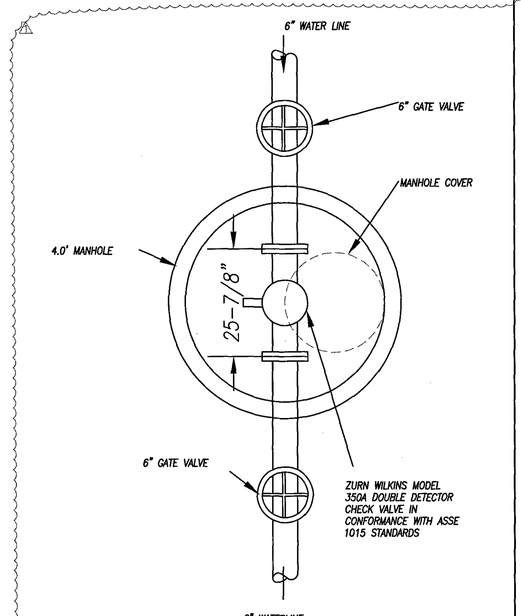


θ = DEFLECTION ANGLE
S = JOINT DEFLECTION OFFSET
L = LAYING LENGTH
R = RADIUS OF CURVE
R = L/(2sin θ/2)

FIGURE 4

WESTERN VIRGINIA REGIONAL – CONSTRUCTION DETAIL

DUCTILE IRON PIPE DEFLECTION ALLOWANCE TABLES — W–22 — 01/01/14



NOTE: CONTRACTOR SHALL INSTALL 4" DRAIN IN BOTTOM OF MANHOLE TO DAYLIGHT. BOTTOM OF VALVE SHALL BE A MINIMUM OF 12" AND A MAXIMUM OF 30" ABOVE THE BOTTOM OF MANHOLE. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

DOUBLE DETECTOR CHECK VALVE DETAIL
NOT TO SCALE

COMMONWEALTH OF VIRGINIA
ROBERT H. WAMPLER, JR.
Lic. No. 34713
2/7/18
PROFESSIONAL ENGINEER

ENGINEERING CONCEPTS, INC.
94 GREEENFIELD STREET
DALEVILLE, VIRGINIA 24083
540.473.1253

No.	Revision	By	Appd.	Date
1	WVWA REVIEW 10/31/17	MsM	RHW	1/30/18

Drawn MsMj
Designed ECI
Checked RHW
Approved RHW

WATER DETAILS
DTC MULTIFAMILY – PHASE 2
DALEVILLE TOWN CENTER
BOTETOURT COUNTY, VIRGINIA

SCALE: NONE
DATE: FEB 7, 2018
PROJECT: 17055
C9