

- NOTES**
- FOR VERT. BEND DOWN IN EXCESS OF 11 1/4\"/>

2000psi  
BEARING =

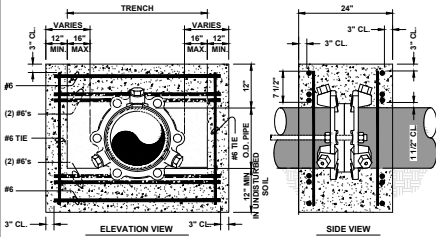
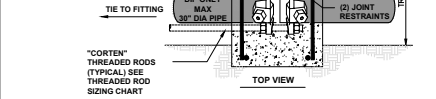
PIPE SIZE	90° BEND				45° BEND				22 1/2° BEND				11 1/2° BEND				TEE				PLUG
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	
3"	8"	12"	8"	8"	8"	6"	6"	6"	6"	8"	8"	11"	12"	12"	18"	10"	10"	8"	8"	8"	8"
4"	8"	12"	8"	8"	8"	6"	6"	6"	6"	8"	8"	11"	12"	12"	18"	10"	10"	8"	8"	8"	8"
6"	18"	12"	10"	10"	8"	8"	8"	8"	8"	12"	14"	16"	16"	30"	18"	18"	13"	11"	13"	18"	20"
8"	18"	12"	10"	10"	8"	8"	8"	8"	8"	12"	14"	16"	16"	30"	18"	18"	13"	11"	13"	18"	20"
10"	20"	16"	12"	14"	8"	12"	8"	12"	14"	16"	16"	30"	18"	18"	13"	11"	13"	18"	20"	36"	42"
12"	20"	16"	12"	14"	8"	12"	8"	12"	14"	16"	16"	30"	18"	18"	13"	11"	13"	18"	20"	36"	42"
16"	26"	20"	16"	18"	11"	13"	11"	13"	18"	20"	20"	36"	42"	42"	42"	42"	42"	42"	42"	42"	42"
24"	82"	42"	62"	30"	44"	22"	22"	16"	82"	42"	42"	42"	42"	42"	42"	42"	42"	42"	42"	42"	42"
30"	185"	42"	100"	42"	52"	42"	40"	30"	185"	42"	185"	42"	185"	42"	185"	42"	185"	42"	185"	42"	185"

WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL  
THRUST BLOCK REQUIREMENTS  
W-18  
02/10/15

- CONCRETE SHALL BE 3000 P.S.I. READY MIX CONCRETE.
- REINFORCING BARS SHALL BE DEFORMED, AND TIED TOGETHER.
- TRENCH BOTTOM WIDTH IN VICINITY OF THRUST COLLAR INSTALLATION SHALL BE THE MINIMUM WIDTH.
- BACKFILL AND COMPACT IN 6" LAYERS.
- PLACE THRUST COLLAR ON ONE FULL JOINT OF PIPE.
- LAST JOINT OF PIPE WITH THRUST COLLAR TO BE MECHANICAL JOINT PIPE.
- PLACE RESTRAINED JOINT THRUST RING 4' FROM FITTING END OF PIPE.
- FORMS SHALL BE USED WHEN PLACING CONCRETE TO PREVENT CONCRETE FROM INFILTRATING JOINTS.
- ALLOW MINIMUM OF 3 DAYS FOR CONCRETE TO OBTAIN STRENGTH BEFORE WATERLINE BECOMES ACTIVE.
- JOINT RESTRAINTS SHALL BE INSTALLED TO LIP AND WRAPPED WITH POLYETHYLENE TO PREVENT CONCRETE INTRUSION INTO WEDGE POCKET.

THREADED ROD SIZING CHART

PIPE SIZE (INCHES)	ROD DIAMETER (INCHES)	NUMBER OF RODS REQUIRED
6"	3/4"	4
8"	3/4"	4
10"	3/4"	4
12"	3/4"	4
16"	3/4"	12
20"	3/4"	16
24"	1"	16
30"	1"	20



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL  
THRUST COLLAR DETAIL  
W-23  
01/01/14

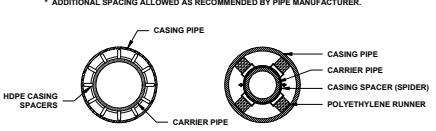
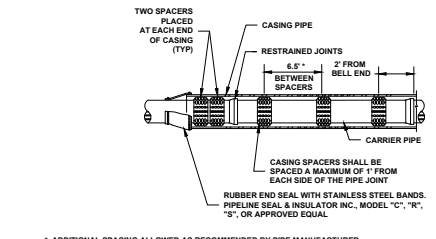
FACTOR OF SAFETY = 1.5

PIPE SIZE	PIPE MAT'L	90° BEND	45° BEND	22 1/2° BEND	11 1/2° BEND	VALVE/ PLUG (NOTE 4)	TEE BRANCH (NOTE 4)	REDUCER (NOTE 4)	45° VERT.	22 1/2° VERT.	11 1/2° VERT.
6"	D.I.	28"	21"	6"	3"	50"	26"	26"	21"	10"	5"
8"	D.I.	36"	21"	6"	4"	65"	41"	27"	27"	13"	7"
10"	D.I.	43"	21"	6"	5"	77"	53"	26"	32"	16"	8"
12"	D.I.	51"	21"	10"	5"	91"	67"	27"	38"	18"	9"
4"	PVC	28"	21"	6"	3"	78"	25"	40"	32"	16"	8"
6"	PVC	37"	21"	6"	4"	102"	49"	43"	42"	21"	10"
8"	PVC	44"	21"	9"	5"	122"	68"	41"	51"	25"	12"
10"	PVC	51"	21"	11"	6"	143"	89"	42"	60"	29"	15"

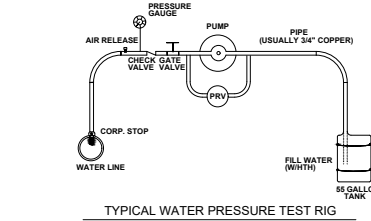
- ALL JOINTS SHALL BE RESTRAINED ON BOTH SIDES OF THE FITTING AND DOCUMENTED BY THE INSPECTOR FOR THE LENGTH SHOWN UNLESS OTHERWISE INDICATED.
- RESTRAINED LENGTH SHOWN REFERS TO ANY DESIGNED OR POTENTIAL LINE STOP, INCLUDING ALL GATE VALVES.
- RESTRAINED LENGTH SHOWN REFERS TO THE BRANCH LINE ONLY. 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 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. OTHERWISE APPROVED 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 SPIGOT DIMENSIONS.

WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL  
MINIMUM THRUST RESTRAINT  
OF PIPE JOINTS  
DESIGN LENGTHS  
W-19  
02/10/15

- A 1" DRAIN WILL BE REQUIRED ON THE LOWER END OF THE CASING PIPE.
- SPACERS SHALL BE RAGI 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 LINED WITH EPDM OR NEOPRENE MATERIAL.
  - ABRASION RESISTANT RUNNERS/SKIDS SHALL BE POLYMER MATERIAL WITH EACH END BEVELED TO FACILITATE EASE OF INSTALLATION INTO CASING PIPE.
- SPACERS SHALL BE SPACED 16" ON SEWER PIPE.
- CARRIER PIPE SHALL BE DUCTILE OR HOPE IN ACCORDANCE WITH REGIONAL STANDARDS.
- IF HOPE CARRIER PIPE IS USED AND PRECISE GRADES ARE NOT REQUIRED THROUGH CASING, SPACERS MAY BE OMITTED.
- 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.
- CONCRETE CASING PIPE WILL NOT BE ALLOWED.
- 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 TO MINIMIZE VOID SPACE BETWEEN CARRIER AND CASING PIPES.



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL  
PIPE SUPPORT  
IN CASING PIPE  
G-6  
05/05/15



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL  
TYPICAL WATER  
PRESSURE TEST RIG  
W-20  
01/01/14

CASING PIPE SIZE CHART

CARRIER PIPE (NOMINAL DIAMETER)	CASING PIPE (DIAMETER)
6"	12"
8"	16"
10"	24"
12"	24"
14"	24"
16"	30"
18"	30"
24"	42"
30"	42"

INSTALLATION OF DUCTILE IRON WATER MAINS  
TABLE 3 AWWA C500-05  
Maximum Joint Deflection Full Length of Pipe - Push on Type Joint

Nominal Pipe Size (inches)	Deflection Angle - θ (degrees)	Approximate Radius of Curve - R* Produced by Succession of Joints			
		Joint Length 18-Foot	Joint Length 20-Foot	Joint Length 18-Foot	Joint Length 20-Foot
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.

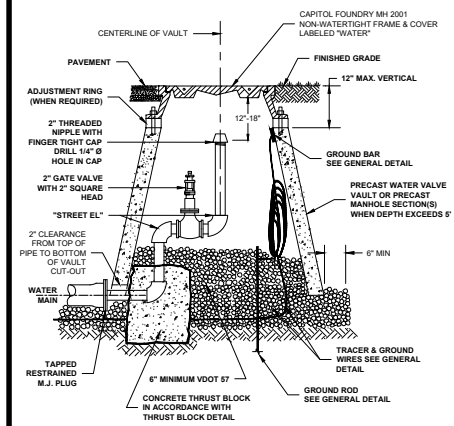
INSTALLATION OF DUCTILE IRON WATER MAINS  
TABLE 4 AWWA C500-05  
Maximum Joint Deflection Full Length of Pipe - Mechanical Joint Pipe

Nominal Pipe Size (inches)	Deflection Angle - θ (degrees)	Approximate Radius of Curve - R* Produced by Succession of Joints			
		Joint Length 18-Foot	Joint Length 20-Foot	Joint Length 18-Foot	Joint Length 20-Foot
3"	8°-18"	31	35	125	140
4"	8°-18"	31	35	125	140
6"	7°-07"	27	30	145	160
8"	8°-21"	20	22	195	220
10"	8°-21"	20	22	195	220
12"	8°-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.

WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL  
DUCTILE IRON PIPE  
DEFLECTION ALLOWANCE TABLES  
W-22  
01/01/14

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



WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL  
PERMANENT END  
OF LINE BLOW-OFF ASSEMBLY  
W-10  
02/10/15

**HURT & PROFFITT**  
INSPIRED / RESPONSIVE / TRUSTED

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WWA DETAILS  
SOUTH WASHINGTON HEIGHTS  
WATER SYSTEM IMPROVEMENTS  
ROANOKE, VA.

PROJECT NO: 20221865  
LAT: 36.911436  
LONG: -80.318494  
DATE: 20 MAR 23  
DRAWN BY: CBO  
CHECKED BY: DAA



WWA DETAILS  
**HURT & PROFFITT**  
SHEET NO. G008  
REV.