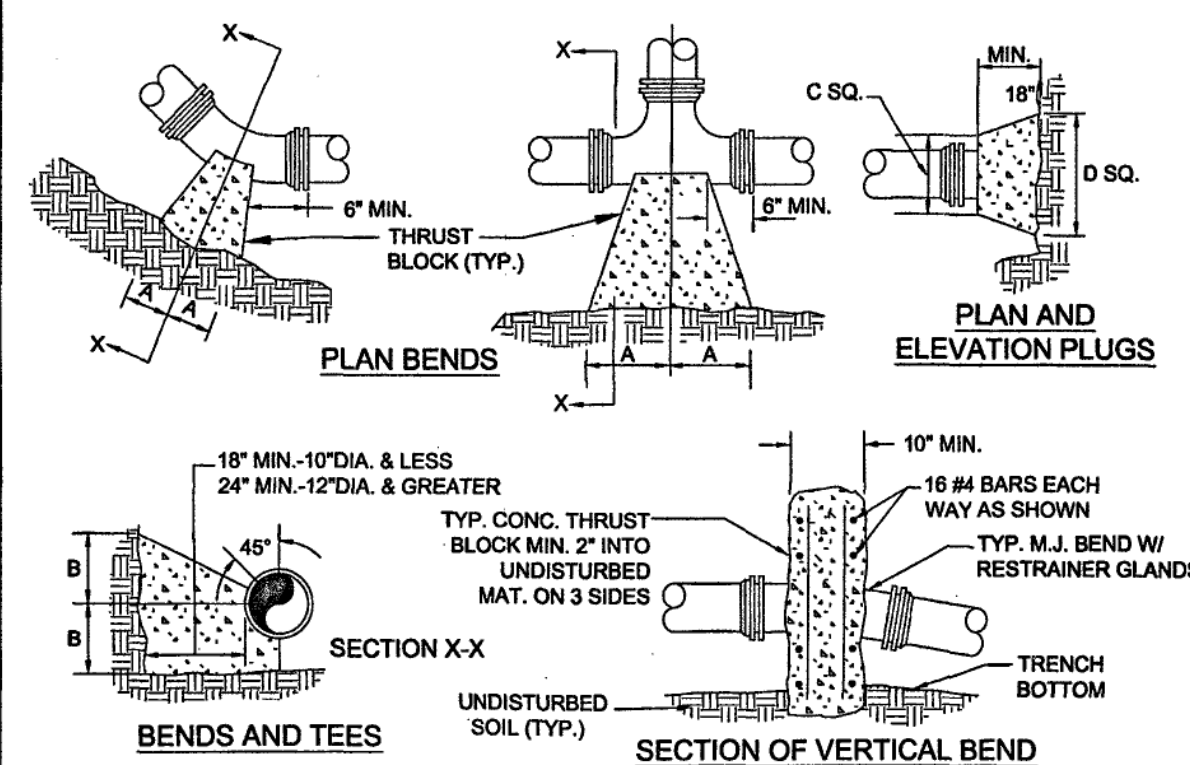


- 
- VARIES (NO OBSTRUCTIONS)
- 1 - 4 1/2" PUMPER NOZZLE (FACING THE ROAD)
- 2 - 2 1/2" NOZZLES
- AVI MODEL 2780, AFC MODEL 8-84-B, MUELLER CENTURION #423, KENNEDY K9SD EQUIVALENT.
- FINISHED GRADE
- 1/8" TO 20" MIN. CLEARANCE TO EDGE OF PAVEMENT
- 2'X2'X4" CONCRETE PAD
- VALVE BOX OUTSIDE PAVEMENT OR VALVE VAULT UNDER PAVEMENT
- STANDARD INSTALLATION INCLUDES FOSTER ADAPTER OR APPROVED EQUAL
- 37" MIN. COVER
- CONTINUOUS SECTION OF PIPE
- CONTINUOUS SECTION OF PIPE
- WATER MAIN
- CONCRETE BASE AND THRUST BLOCK AGAINST UNDISTURBED SOIL. CONCRETE SHALL NOT COVER HYDRANT DRAIN
- 5.5 CY CLEAN STONE VDOT #57 FOR DRAINAGE
- 3/8" DIA. "CORTEN" THREADED ROD AND NUTS
- TRACER WIRE SEE GENERAL DETAIL
- APPROVED M.J. GLAND RESTRAINT (i.e. MEGALUGS, GRIP RINGS OR UNI-FLANGE) MAY BE SUBSTITUTED FOR CONCRETE THRUST BLOCKS
- CONCRETE THRUST BLOCK
- TEE - MAIN LINE SIZE BY 6"
- M.J. FITTINGS SHALL NOT BE ENCASED IN CONCRETE

## FIRE HYDRANT ASSEMBLY

01/01/14



## ES

1. FORM, BEND DOWN IN EXCESS OF 11 1/4" BEND, ANCHORAGE SHALL BE DESIGNED BY ENGINEER.
2. UNDER TENSURE, BLOCKING TO BE SIMILAR TO THAT FOR HORIZ. BEND.
3. GLANDS & BOLTS SHALL BE PROTECTED FROM PLASTIC SHEETING WHEN POURING THRU BLOCKS.
4. ALL THRU 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. UNDER 100 PSI BOTH THRU & RESTRAINED JOINTS MUST BE USED. IF EQUAL OR GREATER THAN 100 PSI, BOTH THRU & RESTRAINED JOINTS ARE REQUIRED.
7. WHEN THRUST BLOCK IS REQUIRED BUT NOT CONSIDERABLE TO CONSIDERABLE COLLAR SHALL BE USED. SEE THRU COLLAR DETAIL.

PRESSURE = 200psi  
BEARING = 2000psi  
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"	8"
6"	18"	12"	8"	10"	6"	8"	8"	8"	11"	10"	12"	16"
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"

## THRUST BLOCK REQUIREMENTS

01/01/14

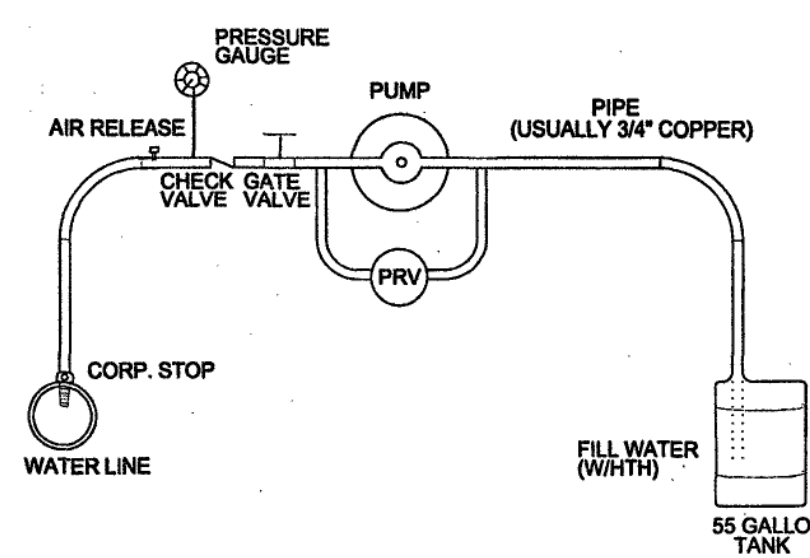
FACTOR OF SAFETY = 1.5											
PIPE SIZE	PIPE MAT'L	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND	VALVE /PLUG	TEE BRANCH	REDUCER (NOTE 2)	VERT. 45°	VERT. 22 1/2°	VERT. 11 1/4°
6"	D.I.L.	28'	21'	6'	3'	38'	34'	20'	23'	11'	5'
8"	D.I.L.	37'	21'	7'	4'	51'	47'	21'	30'	15'	7'
10"	D.I.L.	45'	21'	9'	4'	61'	57'	20'	37'	18'	9'
12"	D.I.L.	53'	22'	11'	5'	73'	69'	38'	43'	21'	10'
6"	PVC	30'	21'	6'	3'	98'	38'	29'	35'	17'	8'
8"	PVC	40'	21'	8'	4'	74'	56'	31'	46'	22'	11'
10"	PVC	47'	21'	9'	5'	89'	82'	30'	56'	27'	13'
12"	PVC	56'	23'	11'	6'	106'	88'	56'	66'	32'	16'

1. ALL JOINTS SHALL BE RESTRAINED ON BOTH SIDES OF THE FITTING AND DOCUMENTED BY THE INSPECTOR FOR THE LENGTH SHOWN UNLESS OTHERWISE INDICATED.
2. REDUCER IS ONE SIZE SMALLER THAN PIPE LISTED. RESTRAINED LENGTH IS UPSTREAM ON THE SMALLER SIZE OF PIPE.
3. 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 AND RESTRAINED JOINTS SHALL BE USED.
4. FOR RESTRAINED JOINT PIPING REQUIREMENTS AT FITTING R.J. PVC AND R.J. DIP MAY BE USED INTERCHANGEABLY.
5. FOR A TEST PRESSURE OF 225 PSI, THE TABLE BELOW SHALL BE USED.

TEST PRESSURE = 225 PSI										FACTOR OF SAFETY = 1.5		
PIPE SIZE	PIPE MAT'L	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND	VALVE /PLUG	TEE BRANCH	REDUCER (NOTE 2)	VERT. 45°	VERT. 22 1/2°	VERT. 11 1/4°	
12"	D.I.	6'	28'	14'	7'	103'	73'	55'	43'	21'	11'	
12"	PVC	8'	36'	18'	9'	160'	113'	85'	67'	32'	16'	

### MINIMUM THRUST RESTRAINT OF PIPE JOINTS DESIGN LENGTHS

W.



## TYPICAL WATER PRESSURE TEST RIG

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-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

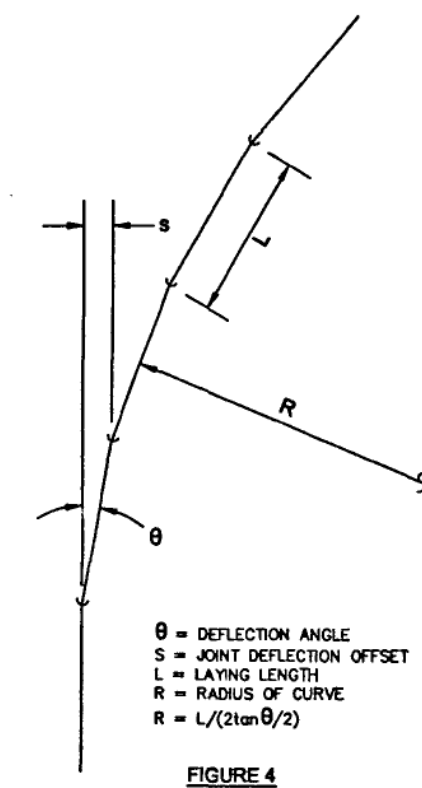
\* SEE FIGURE 4.  
For 14-inch and larger push-on joints, maximum deflection angle may be larger than shown above. Consult the manufacturer.

Nominal Pipe Size (inches)	Deflection Angle - $\theta$ (degree)	Maximum Offset - 5" (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.

### DUCTILE IRON PIPE DEFLECTION ALLOWANCE TABLES

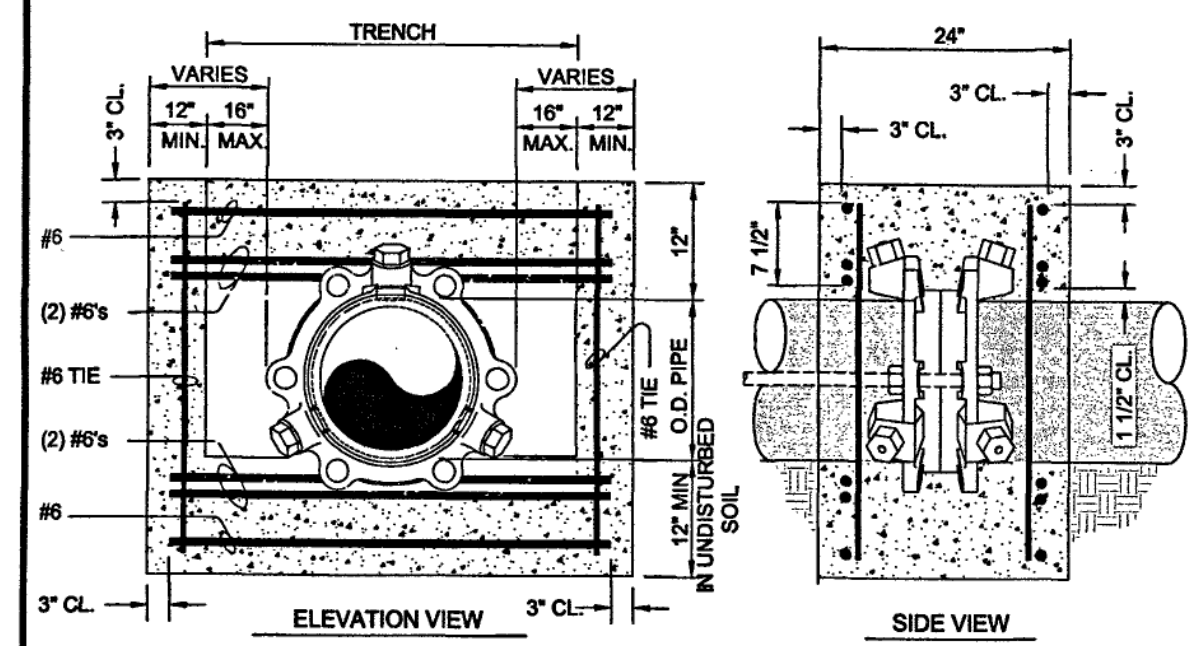
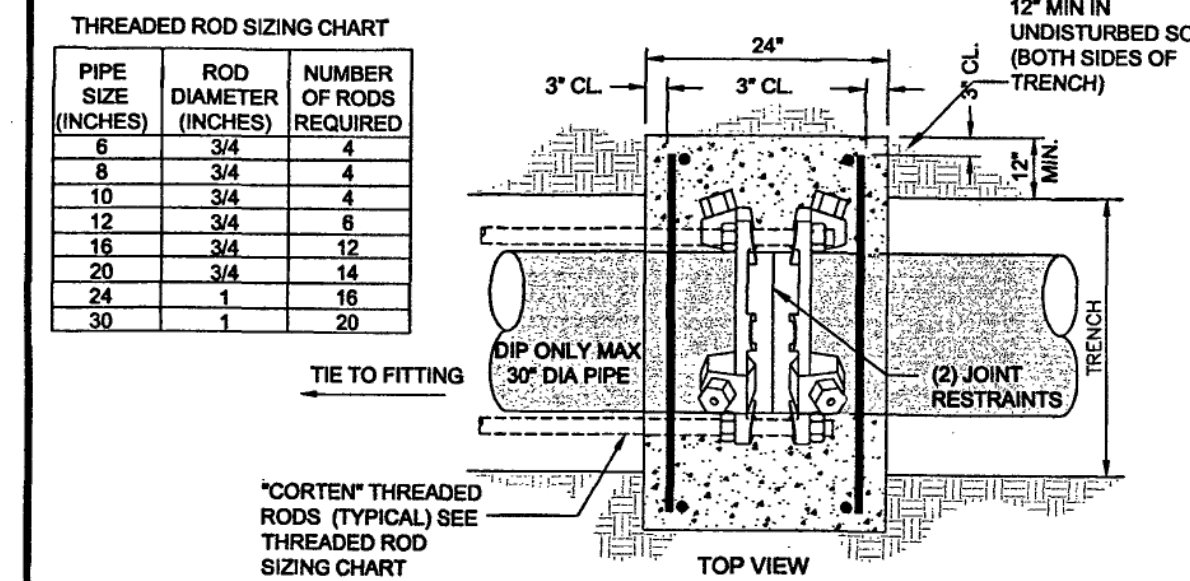
W-2



**FIGURE 4**

1. CONCRETE SHALL BE 3000 P.S.I. READY MIX CONCRETE.
2. REINFORCING BARS SHALL BE DEFORMED, AND TIED TOGETHER.
3. TRENCH BOTTOM WIDTH IN VICINITY OF THRUST COLLAR INSTALLATION SHALL BE THE MINIMUM WIDTH.
4. BACKFILL AND COMPACT IN 6" LAYERS.
5. PLACE THRUST COLLAR ON ONE FULL JOINT OF PIPE.
6. LAST JOINT OF PIPE WITH THRUST COLLAR TO BE MECHANICAL JOINT PIPE.
7. JOINTS UNGRAINED JOINT THRUST RING AND GASKET ENDING END OF PIPE.
8. FORMS SHALL BE USED WHEN PLACING CONCRETE TO PREVENT CONCRETE FROM INFILTRATING JOINTS.
9. ALLOW MINIMUM OF 3 DAYS FOR CONCRETE TO OBTAIN STRENGTH BEFORE WATERLINE BECOMES ACTIVE.
10. JOINT RESTRAINT SHALL BE PLACED TO TOP AND WRAPPED WITH POLYETHYLENE TC PREVENT CONCRETE INTRUSION INTO WEDGE POCKET.

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	6
16	3/4	12
20	3/4	14
24	1	16
30	1	20



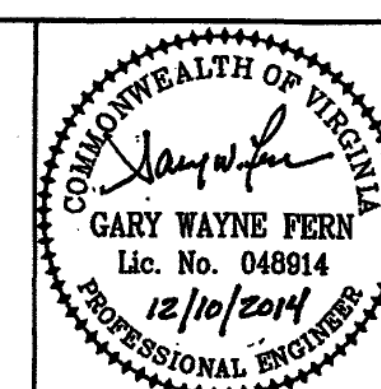
THRUST COLLAR DETAIL

w.

[illegible]

N:\46607-000\CADD\Civil\Sheets\46607000C-12.dwg Dec 09, 2014 - 6:07pm

**WR&A**  
**WHITMAN, REQUARDT AND ASSOCIATES, LLP**  
*Engineers, Architects and Planners*  
 1700 Kraft Drive, Suite 1200  
 BLACKSBURG, VIRGINIA  
 (540) 951-3727 FAX: (540)-951-3741  
[www.wrallp.com](http://www.wrallp.com)



SCALE: \_\_\_\_\_  
HORIZ: NA  
VERT.: NA  
DATE: DECEMBER 2014  
DESIGNED: P.J.M.  
DRAWN: L.W.C.  
CHECKED: G.W.F.  
PROJECT NO.: 46807-000

# Western Virginia Water Authority

601 South Jefferson Street, Suite 300 Roanoke, Va. 24011

---

## GARDEN CITY BOULEVARD WATER MAIN REPLACEMENT

### Phase 1

### DETAILS

SHEET  
12  
OF  
12