



VERTICAL BLOCKING SIZE W/RESTRAINING JOINTS SOIL TYPE - COHESIVE GRANULAR [GC+SC] SAND, GRAVEL, CLAY MIXTURE					
PIPE SIZE	VERTICAL BEND	CU. FT	A	D	L
4"	11 1/4°	6			
	22 1/2°	12			
	45°	22			
	90°	50	2.5'	3/4"	2.0'
6"	11 1/4°	14			
	22 1/2°	27			
	45°	50	2.3'	3/4"	2.0'
	90°	89	3.5'	3/4"	2.0'
8"	11 1/4°	25			
	22 1/2°	48			
	45°	89	3.2'	3/4"	2.0'
	90°	139	4.4'	3/4"	2.0'
10"	11 1/4°	38			
	22 1/2°	75	2.3'	3/4"	2.0'
	45°	139	4.0'	3/4"	2.0'
	90°	200	5.2'	1"	3.5'
12"	11 1/4°	55			
	22 1/2°	108	2.7'	3/4"	2.0'
	45°	200	4.8'	3/4"	2.0'
	90°	272	5.9'	1 1/8"	4.0'

**GENERAL NOTES:**

1. CONCRETE BLOCKING SIZING BASED ON MINIMUM 3 FEET OF COVER.  
PIPE THRUST BASED ON 225 PSI PRESSURE.  
PIPE ENCASED IN POLYETHYLENE.  
VERTICAL BLOCK SIZE BASED ON CONCRETE WEIGHT OF 150 POUNDS PER CUBIC FOOT.  
TRENCH CONDITIONS BASED ON TYPE 2, FLAT BOTTOM TRENCH WITH LIGHTLY CONSOLIDATED BACKFILL, PER ANSI/AWWA C150.A21.50.  
FACTOR OF SAFETY IS 1.5.  
SOIL FRICTIONAL RESISTANCE BASED ON COHESIVE GRANULAR SOIL TYPE (GC+SC). SAND, GRAVEL, CLAY MIXTURE.
2. BLOCKING DESIGN MUST BE ADJUSTED FOR OTHER SIZE PIPE, PRESSURES AND SOIL CONDITIONS.
3. PIPE CLAMP (STAINLESS STEEL TOLCO 4H 316SS).  
RODS (STAINLESS STEEL ALL-THREAD 316SS).
4. LINE SHALL NOT BE PRESSURIZED UNTIL ALL TRENCHING WITHIN 100 FEET OF VERTICAL BENDS IS BACKFILLED AND COMPACTED TO A MINIMUM COVER OF 3 FEET OVER PIPE.
5. 90° VERTICAL BENDS SHALL ONLY BE INSTALLED WHERE GIVEN PRIOR APPROVAL BY THE UTILITY.
6. BACKFILL TRENCH BEYOND 90° VERTICAL BLOCK WITH CRUSHED SURFACING TOP COURSE MATERIAL COMPACTED TO 95% MAXIMUM DENSITY. CRUSHED BACKFILL SHALL EXTEND 20 FEET BEYOND BLOCK OR TO FIRM BEARING TRENCH WALL, WHICHEVER IS LESS.
7. LEAVE BLOCK OPEN OR SHEETED 24 HOURS MINIMUM.
8. MEGA-LUG FITTINGS.

CITY OF TUMWATER, WASHINGTON  
DEPT. OF PUBLIC WORKS

**VERTICAL BLOCKING WITH  
RESTRAINED JOINTS FOR  
NEW LINES**

APPROVED BY:				DWG. NO.
CITY ENGINEER				<b>WA-3</b>
DES. PW	DWG. BY PW	CK'D BY KMC	DATE JUNE 2014	NOT TO SCALE