



**City Utilities
Design Standards
Manual**

Exhibit W5-12

Length of Restraint – Polywrapped Ductile Iron Pipe

Created: June 10, 2014

Revised:

POLYWRAPPED DIP NON-ENCROACHING THRUST RESTRAINT CALCULATIONS

PIPE DIA.	HORIZONTAL BENDS AND VERTICAL UP BENDS				VERTICAL DOWN BENDS			DEAD ENDS	PIPE DIA.
	11.25°	22.5°	45°	90°	22.5°	45°			
4"	2	3	7	17	8	16	20	4"	
6"	2	5	10	25	11	23	28	6"	
8"	3	6	13	33	14	30	27	8"	
10"	4	8	16	40	18	37	45	10"	
12"	5	9	20	47	21	44	53	12"	
16"	6	12	26	62	28	58	70	16"	
20"	7	15	31	76	35	72	87	20"	
24"	9	18	37	90	41	86	104	24"	
30"	11	22	46	110	51	107	129	30"	
36"	13	26	54	131	61	127	154	36"	

CITY OF FORT WAYNE

Assumptions

Polywrapped Ductile Iron Pipe
 Design/Test Pressure=150 psi
 Safety Factor = 1.5 (recommended by DIPRA)
 Type 3 laying condition (representative of actual field conditions)
 5' Cover
 Soil/Backfill Conditions = Clay 2 (DIPRA Chart)

CALCULATED RESTRAINT LENGTHS ARE FOR EACH SIDE OF THE FITTING. ALL FITTINGS SHALL BE RESTRAINED THE CALCULATED LENGTH AT A

NOTE: IF FITTINGS ARE IN CLOSE PROXIMITY TO EACH OTHER AND THE CALCULATED RESTRAINED LENGTHS OVERLAP, THIS TABLE IS NOT APPLICABLE. REFER TO THE DIPRA DESIGN MANUAL FOR RESTRAINED LENGTH CALCULATIONS FOR ENCROACHMENT APPLICATIONS.

Tee Branch Restraint (Assumed Restraint of "Run" Pipe is 20ft each side of Tee)

Tee Run Dia.	Tee Branch Diameter										Tee Run Dia.
	4"	6"	8"	10"	12"	16"	20"	24"	30"	36"	
4"	0										4"
6"	0	0									6"
8"	0	0	0								8"
10"	0	0	0	7							10"
12"	0	0	0	0	16						12"
16"	0	0	0	0	4	32					16"
20"	0	0	0	0	0	23	48				20"
24"	0	0	0	0	0	14	41	65			24"
30"	0	0	0	0	0	0	30	55	89		30"
36"	0	0	0	0	0	0	18	46	81	113	36"