

FIGURE 1. HORIZONTAL BEND

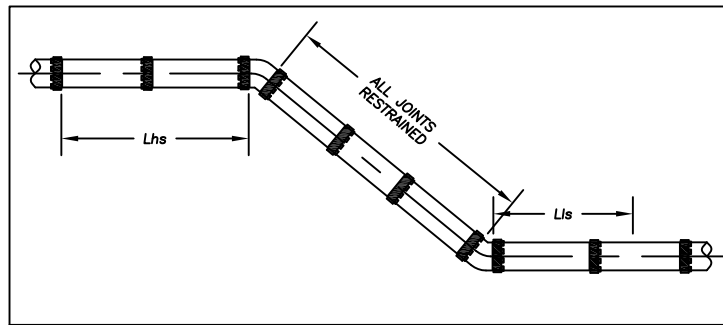


FIGURE 2. VERTICAL DOWN BEND AND OFFSET BEND

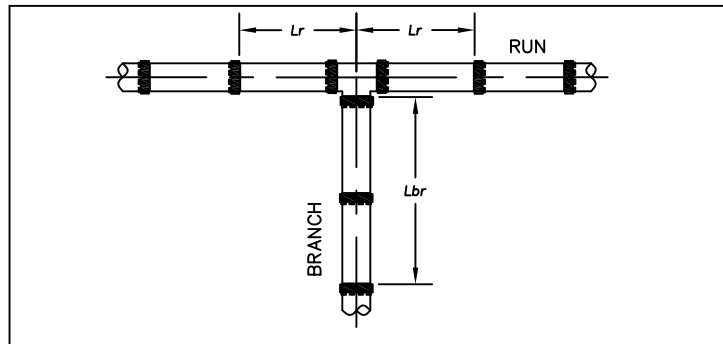


FIGURE 3. TEE

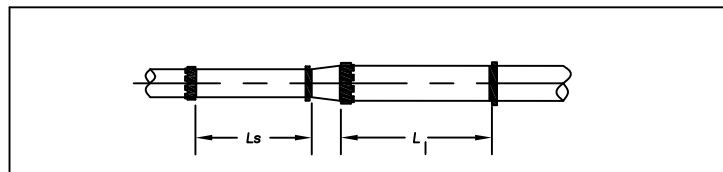


FIGURE 4. REDUCER

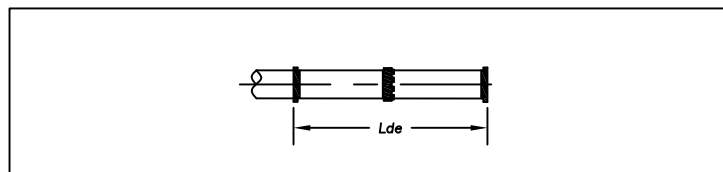


FIGURE 5. DEAD END

MINIMUM LENGTH OF PIPE RESTRAINED (FEET)

BRANCH SIZE	HORIZONTAL BENDS			VERTICAL BENDS				DEAD END
	90°	45°	22.5°	45°		22.5°		
	Lr	Lr	Lr	Lhs	Lls	Lhs	Lls	
6"	20	8	4	18	6	9	3	44
8"	26	11	5	24	8	11	4	58
10"	32	13	6	29	10	14	5	69
12"	37	16	7	34	12	16	6	82
14"	43	18	9	39	13	19	6	94
16"	48	20	10	44	15	21	7	106
20"	59	24	12	53	19	26	9	129
24"	69	29	14	62	22	30	11	151

PVC PIPE

BRANCH SIZE	HORIZONTAL BENDS			VERTICAL BENDS				DEAD END
	90°	45°	22.5°	45°		22.5°		
	Lr	Lr	Lr	Lhs	Lls	Lhs	Lls	
6"	21	9	4	12	6	6	3	28
8"	27	11	5	15	8	7	4	37
10"	33	14	7	18	10	9	5	44
12"	39	16	8	22	12	10	6	52
14"	44	18	9	25	13	12	6	60
16"	50	21	10	28	15	13	7	68
20"	61	25	12	34	18	16	9	82
24"	72	29	14	40	22	19	10	96

DUCTILE IRON

BRANCH SIZE	HORIZONTAL BENDS			VERTICAL BENDS				DEAD END
	90°	45°	22.5°	45°		22.5°		
	Lr	Lr	Lr	Lhs	Lls	Lhs	Lls	
6"	36	15	7	28	11	14	5	68
8"	48	20	10	37	15	18	7	89
10"	57	24	11	44	18	21	9	107
12"	68	28	13	52	21	25	10	126
14"	78	32	15	60	24	29	12	144
16"	88	36	17	67	27	32	13	163
20"	107	44	21	82	33	39	16	198
24"	125	52	25	96	39	46	19	232

DUCTILE IRON W/ POLYETHYLENE WRAP

ONLY THE CITY OF OREGON
MAY OPERATE VALVES.

RUN SIZE

BRANCH SIZE	6"	8"	10"	12"	14"	16"	20"	24"
6"	*	*	*	*	*	*	*	*
8"	8	*	*	*	*	*	*	*
10"	30	18	5	*	*	*	*	*
12"	49	39	28	18	7	*	*	*
14"	66	57	1	39	30	20	1	*
16"	81	74	66	58	50	42	25	8
20"	110	104	97	91	85	78	65	51
24"	135	130	125	120	115	109	98	87

Lbr

TEES
PVC PIPE

MINIMUM LENGTH OF PIPE RESTRAINED (FEET)(Lbr)

RUN SIZE

BRANCH SIZE	6"	8"	10"	12"	14"	16"	20"	24"
6"	9	3	*	*	*	*	*	*
8"	22	18	13	8	3	*	*	*
10"	33	29	25	21	17	13	5	*
12"	42	39	36	33	30	26	20	13
14"	51	49	46	43	41	38	32	26
16"	60	58	56	53	51	48	43	38
20"	76	75	73	71	69	67	63	59
24"	91	90	88	87	85	84	80	77

Lbr

TEES
DUCTILE IRON PIPE

MINIMUM LENGTH OF PIPE RESTRAINED (FEET)(Lbr)

RUN SIZE

BRANCH SIZE	6"	8"	10"	12"	14"	16"	20"	24"
6"	21	7	*	*	*	*	*	*
8"	53	42	31	19	7	*	*	*
10"	79	70	60	51	42	32	12	*
12"	102	95	87	80	72	64	47	30
14"	124	118	111	105	98	91	77	63
16"	145	140	134	128	122	116	104	92
20"	184	180	175	171	166	161	152	142
24"	220	217	213	209	205	202	194	186

Lbr

TEES

DUCTILE IRON PIPE W/ POLYETHYLENE WRAP
MINIMUM LENGTH OF PIPE RESTRAINED (FEET)(Lbr)

LARGE SIZE

REDUCTION SIZE	6"	8"	10"	12"	14"	16"	20"	24"
6"	X	32/24	70/43	117/60	172/75	236/89	387/116	570/140
8"		X	29/23	65/43	107/61	156/77	271/106	412/132
10"			X	29/24	62/44	101/63	193/95	306/123
12"				X	28/24	61/45	138/81	231/111
14"					X	28/24	93/64	173/98
16"						X	57/45	127/82
20"							X	55/45
24"								X

Ls L1

REDUCERS
PVC PIPE

MINIMUM LENGTH OF PIPE RESTRAINED (L)(FEET)

LARGE SIZE

REDUCTION SIZE	6"	8"	10"	12"	14"	16"	20"	24"
6"	X	20/16	45/27	75/38	111/48	151/57	248/74	366/89
8"		X	19/15	42/28	69/39	100/49	174/68	264/84
10"			X	18/15	40/28	65/40	124/60	196/78
12"				X	18/15	39/29	88/51	148/71
14"					X	18/15	59/41	110/62
16"						X	37/29	81/52
20"							X	35/29
24"								X

Ls L1

REDUCERS
DUCTILE IRON PIPE

MINIMUM LENGTH OF PIPE RESTRAINED (L)(FEET)

LARGE SIZE

REDUCTION SIZE	6"	8"	10"	12"	14"	16"	20"	24"
6"	X	49/37	108/66	181/92	266/115	365/137	599/178	883/215
8"		X	45/36	101/67	166/94	241/119	419/163	637/203
10"			X	44/37	96/68	156/97	299/146	472/189
12"				X	43/37	93/69	212/124	356/171
14"					X	42/37	143/99	266/150
16"						X	88/70	195/126
20"							X	84/69
24"								X

Ls L1

REDUCERS

DUCTILE IRON W/ POLYETHYLENE WRAP
MINIMUM LENGTH OF PIPE RESTRAINED (L)(FEET)

Ls: IF A SPECIFIED LENGTH OF PIPE, Ls (FEET), ON THE SMALL SIDE OF THE REDUCER IS FREE OF BENDS, VALVES, TEES OR OTHER FITTINGS, RESTRAINTS ARE NOT NECESSARY FOR THE REDUCER; OTHERWISE THE LARGER SIDE OF THE REDUCER SHALL BE RESTRAINED THE MINIMUM LENGTH (L1)(FEET).

SCALE AS SHOWN
DRAWN A.L.B.
CHECKED
DATE 09/30/15

WATERLINE
DETAILS

CITY OF OREGON