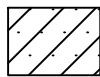


DUCTILE IRON PIPE (DIP) WRAPPED IN POLYETHYLENE

MINIMUM FEET OF RESTRAINED PIPE REQUIRED

PIPE SIZE	4.0' COVER				5.0' COVER				6.0' COVER			
	22.5°	45°	90°	DEAD END	22.5°	45°	90°	DEAD END	22.5°	45°	90°	DEAD END
4"					3	4	14	40	3	5	12	33
6"					4	8	20	56	4	7	17	47
8"					5	11	26	73	5	9	22	62
12"					8	15	36	104	6	13	30	88
16"	11	23	56	164	10	19	46	134	8	16	39	114
20"	14	28	67	199	11	23	55	164	10	20	47	139
24"	16	32	77	232	13	27	64	192	11	23	55	164
30"	19	38	92	280	16	32	77	232	14	28	66	199
36"	21	44	105	325	18	37	89	271	16	32	77	233
42"	24	49	117	367	20	42	100	307	18	36	87	265
48"	24	54	129	407	22	46	110	343	20	40	96	296



NOT ALLOWED

THE TABLE WAS DEVELOPED FROM CRITERIA IDENTIFIED IN THE *EBBA IRON INC.* RESTRAINED LENGTH CALCULATOR. THE TABLE ASSUMES 150 PSI, MH. GRANULAR SOILS AND TYPE 4 TRENCH CONDITIONS. FOR REDUCERS AND TEES REFER TO THE LENGTH CALCULATOR. [HTTPS://EBAA.COM/CALCULATOR](https://ebaa.com/calculator). USE A SAFETY FACTOR OF 1.5 TO 1.

DR. <i>AMB</i> DATE. 01/13/2020 CH. <i>TMJ</i> APPROVED <div style="text-align: right; font-size: 1.2em; font-weight: bold;"><i>RWH</i></div>	SAINT PAUL REGIONAL WATER SERVICES CITY OF ST. PAUL, MN RESTRAINED PIPE REQUIREMENT DIP 4.0' - 6.0' EARTH COVER	STANDARD PLATE D-11 1 of 4
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DUCTILE IRON PIPE (DIP) WRAPPED IN POLYETHYLENE

MINIMUM FEET OF RESTRAINED PIPE REQUIRED

PIPE SIZE	7.0' COVER				8.0' COVER			
	22.5°	45°	90°	DEAD END	22.5°	45°	90°	DEAD END
4"	2	5	10	29	2	4	9	25
6"	3	6	14	41	3	6	13	36
8"	4	8	19	53	4	7	17	47
12"	6	11	26	76	5	10	23	67
16"	7	14	34	99	6	13	30	87
20"	9	17	41	121	8	16	37	107
24"	10	20	48	142	9	18	43	126
30"	12	24	58	173	11	22	52	154
36"	14	28	68	204	12	25	61	181
42"	16	32	77	232	14	29	69	207
48"	17	36	85	261	16	32	77	233

THE TABLE WAS DEVELOPED FROM CRITERIA IDENTIFIED IN THE
EBBA IRON INC. RESTRAINED LENGTH CALCULATOR.
THE TABLE ASSUMES 150 PSI, MH. GRANULAR SOILS AND TYPE 4

DR. *AMB* DATE. 01/13/2020

CH. *TMJ*

APPROVED

RWH

SAINT PAUL REGIONAL WATER SERVICES
CITY OF ST. PAUL, MN

RESTRAINED PIPE REQUIREMENT
DIP 7.0' - 8.0' EARTH COVER

STANDARD
PLATE

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2 of 4

PVCO PIPE

MINIMUM FEET OF RESTRAINED PIPE REQUIRED

PIPE SIZE	4.0' COVER				5.0' COVER				6.0' COVER			
	22.5°	45°	90°	DEAD END	22.5°	45°	90°	DEAD END	22.5°	45°	90°	DEAD END
4"					3	5	12	26	2	4	10	21
6"					4	7	17	36	3	6	14	30
8"					5	9	22	47	4	8	18	40
12"					6	13	30	67	5	11	26	56
16"	10	20	47	106	8	16	39	87	7	14	33	73
20"	12	24	57	129	10	20	47	106	8	17	40	90
24"	13	28	66	151	11	23	55	124	10	20	47	105
30"	16	33	78	182	13	27	65	150	12	24	56	128



NOT ALLOWED

THE TABLE WAS DEVELOPED FROM CRITERIA IDENTIFIED IN THE **EBBA IRON INC.** RESTRAINED LENGTH CALCULATOR. THE TABLE ASSUMES 150 PSI, MH. GRANULAR SOILS AND TYPE 4 TRENCH CONDITIONS. FOR REDUCERS AND TEES REFER TO THE LENGTH CALCULATOR. [HTTPS://EBAA.COM/CALCULATOR](https://ebaa.com/calculator). USE A SAFETY FACTOR OF 1.5 TO 1.

DR. *AMB* DATE. 01/13/2020
 CH. *TMJ*
 APPROVED
RWH

SAINT PAUL REGIONAL WATER SERVICES
 CITY OF ST. PAUL, MN
RESTRAINED PIPE REQUIREMENTS
 PVCO PIPE 4.0' - 6.0' EARTH COVER

STANDARD
 PLATE
D-11
 3 of 4

PVCO PIPE

MINIMUM FEET OF RESTRAINED PIPE REQUIRED

PIPE SIZE	7.0' COVER				8.0' COVER			
	22.5°	45°	90°	DEAD END	22.5°	45°	90°	DEAD END
4"	2	4	9	19	2	3	8	16
6"	3	5	12	26	3	5	11	23
8"	4	7	16	34	3	6	14	30
12"	5	10	22	49	4	8	20	43
16"	6	12	29	63	5	11	25	56
20"	7	15	35	78	7	13	31	68
24"	9	17	41	91	8	15	36	81
30"	10	21	49	111	9	18	44	98

THE TABLE WAS DEVELOPED FROM CRITERIA IDENTIFIED IN THE **EBBA IRON INC.** RESTRAINED LENGTH CALCULATOR. THE TABLE ASSUMES 150 PSI, MH. GRANULAR SOILS AND TYPE 4 TRENCH CONDITIONS. FOR REDUCERS AND TEES REFER TO THE LENGTH CALCULATOR. [HTTPS://EBAA.COM/CALCULATOR](https://ebaa.com/calculator). USE A SAFETY FACTOR OF 1.5 TO 1.

DR. *AMB* DATE. 01/13/2020

CH. *TMJ*

APPROVED

RWH

SAINT PAUL REGIONAL WATER SERVICES
CITY OF ST. PAUL, MN

RESTRAINED PIPE REQUIREMENT
PVCO PIPE 7.0' - 8.0' EARTH COVER

STANDARD
PLATE

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