

DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY THE CITY OF WACO FOR ANY PURPOSE WHATSOEVER. THE CITY OF WACO ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

$\Delta = 11.25^\circ$										$\Delta = 22.50^\circ$									
I.D. (IN.)	G.FT.	THRUST TONS	EARTH			ROCK			I.D. (IN.)	G.FT.	THRUST TONS	EARTH			ROCK			I.D. (IN.)	
			A.FT.	B.FT.	VOLUME C.Y.	A.FT.	B.FT.	VOLUME C.Y.				A.FT.	B.FT.	VOLUME C.Y.	A.FT.	B.FT.	VOLUME C.Y.		
4,6,8	0.4	1.0	1.0	1.5	0.1	1.0	1.0	0.1	4,6,8	0.8	2.0	1.5	1.5	0.1	1.0	1.0	0.1	4,6,8	
10,12	0.6	2.2	1.5	1.5	0.1	1.0	1.5	0.1	10,12	1.1	4.4	2.0	2.5	0.3	1.5	1.5	0.1	10,12	
16,18	0.8	5.0	2.0	2.5	0.3	1.5	2.0	0.2	16,18	1.6	9.9	2.0	3.5	0.6	2.0	2.5	0.3	16,18	
20	0.9	6.2	2.0	3.5	0.4	1.5	3.0	0.3	20	1.8	12.6	3.5	3.5	0.7	2.0	3.5	0.4	20	
24	1.1	8.9	3.0	3.0	0.5	1.5	3.0	0.3	24	2.2	17.7	4.0	4.5	1.0	3.0	3.0	0.5	24	
30	1.4	10.4	3.0	4.5	0.6	2.0	3.5	0.4	30	2.7	20.7	5.0	4.5	1.5	3.0	4.0	0.8	30	
36	1.7	15.0	3.5	5.0	0.9	2.0	4.0	0.5	36	3.3	29.8	5.5	5.5	2.3	4.0	4.0	1.3	36	
42	1.9	20.4	4.5	6.0	1.5	2.5	5.0	0.8	42	3.8	40.5	7.0	6.0	3.9	4.5	5.0	2.1	42	
48	2.2	26.6	4.5	6.0	2.0	2.5	6.0	1.1	48	4.4	52.9	8.0	7.0	5.7	4.5	6.0	2.8	48	
54	2.5	33.7	6.0	7.0	3.0	3.0	6.0	1.4	54	4.9	67.0	9.0	8.0	8.0	6.0	6.0	4.1	54	
60	2.7	41.6	6.0	8.0	3.8	3.0	7.0	1.8	60	5.5	82.7	9.5	9.0	10.6	6.0	7.0	5.3	60	
66	3.0	50.3	6.5	8.0	5.1	3.5	8.0	2.7	66	6.0	100.1	10.5	10.0	14.1	6.5	8.0	7.2	66	
72	3.3	59.9	7.5	9.0	6.3	4.0	8.0	3.3	72	6.6	119.1	11.0	11.0	17.6	7.5	8.0	9.1	72	
78	3.6	40.2	8.0	10.0	8.1	4.0	9.0	3.9	78	7.1	139.8	12.0	12.0	22.5	8.0	9.0	11.7	78	
84	3.9	81.5	8.5	10.0	10.3	4.5	10.0	5.3	84	7.6	162.1	13.0	12.5	27.2	8.5	10.0	14.8	84	
90	4.1	93.5	9.5	10.0	12.2	5.0	10.0	6.3	90	8.2	186.1	14.0	13.5	33.7	9.5	10.0	17.7	90	
96	4.4	106.4	10.0	11.0	15.0	5.0	11.0	7.4	96	8.7	211.7	15.0	14.5	41.2	10.0	11.0	21.8	96	

$\Delta = 30^\circ$										$\Delta = 45^\circ$									
I.D. (IN.)	G.FT.	THRUST TONS	EARTH			ROCK			I.D. (IN.)	G.FT.	THRUST TONS	EARTH			ROCK			I.D. (IN.)	
			A.FT.	B.FT.	VOLUME C.Y.	A.FT.	B.FT.	VOLUME C.Y.				A.FT.	B.FT.	VOLUME C.Y.	A.FT.	B.FT.	VOLUME C.Y.		
4,6,8	1.0	2.6	2.0	1.5	0.2	1.0	1.5	0.1	4,6,8	1.5	3.9	2.0	2.0	0.2	1.5	1.5	0.1	4,6,8	
10,12	1.5	5.9	2.5	2.5	0.3	2.0	1.5	0.2	10,12	2.2	8.7	3.5	2.5	0.5	2.0	2.5	0.3	10,12	
16,18	2.2	13.2	3.5	4.0	0.8	2.5	3.0	0.4	16,18	3.2	19.5	4.5	4.5	1.2	3.0	3.5	0.6	16,18	
20	2.4	16.3	4.5	4.0	1.0	3.0	3.0	0.5	20	3.6	24.1	5.5	4.5	1.5	3.5	3.5	0.7	20	
24	2.9	23.4	6.0	4.0	1.4	3.5	3.5	0.7	24	4.3	34.6	8.0	4.5	2.3	4.5	4.0	1.1	24	
30	3.6	27.5	5.5	5.0	1.9	3.5	4.0	0.9	30	5.4	40.6	8.5	5.0	3.2	5.5	4.0	1.6	30	
36	4.4	39.5	7.0	6.0	3.4	4.5	4.5	1.6	36	6.5	58.5	10.0	6.0	5.3	6.5	4.5	2.6	36	
42	51.0	53.8	8.0	7.0	5.1	5.5	5.0	2.5	42	7.5	79.6	11.5	7.0	8.1	8.0	5.0	4.2	42	
48	5.8	70.3	9.0	8.0	7.4	6.0	6.0	3.7	48	8.6	104.0	13.0	8.0	11.9	9.0	6.0	6.3	48	
54	6.5	89.0	10.0	9.0	10.3	7.0	6.5	5.3	54	9.7	131.5	15.0	9.0	17.1	10.5	6.5	8.9	54	
60	7.3	110.0	11.0	10.0	13.9	7.5	7.5	7.3	60	10.7	162.4	16.5	10.0	23.1	11.0	7.5	12.0	60	
66	8.0	132.9	12.5	11.0	18.9	8.5	8.0	9.6	66	11.8	196.5	18.0	11.0	30.1	12.0	8.5	16.2	66	
72	8.7	158.2	13.5	12.0	24.0	9.0	9.0	12.3	72	12.9	233.9	19.5	12.0	38.6	14.0	8.5	20.7	72	
78	9.4	185.6	14.5	13.0	30.0	10.0	9.5	15.6	78	13.9	274.5	21.5	13.0	49.8	14.5	9.5	25.9	78	
84	10.1	215.3	15.5	14.0	37.1	10.5	10.5	19.5	84	15.0	318.4	23.0	14.0	61.2	15.5	10.5	32.6	84	
90	10.9	247.1	16.5	15.0	45.0	11.5	11.0	23.9	90	16.1	365.5	24.5	15.0	74.5	17.5	10.5	39.6	90	
96	11.6	281.2	18.0	16.0	55.0	12.5	11.5	28.9	96	17.1	415.6	26.0	16.0	89.5	18.5	11.5	48.5	96	

$\Delta = 67.5^\circ$										$\Delta = 90^\circ$									
I.D. (IN.)	G.FT.	THRUST TONS	EARTH			ROCK			I.D. (IN.)	G.FT.	THRUST TONS	EARTH			ROCK			I.D. (IN.)	
			A.FT.	B.FT.	VOLUME C.Y.	A.FT.	B.FT.	VOLUME C.Y.				A.FT.	B.FT.	VOLUME C.Y.	A.FT.	B.FT.	VOLUME C.Y.		
4,6,8	2.1	5.6	3.0	2.0	0.3	2.0	1.5	0.2	4,6,8	2.7	7.1	5.0	1.5	0.4	2.0	2.0	0.2	4,6,8	
10,12	3.1	12.6	5.5	2.5	0.8	3.5	2.0	0.4	10,12	4.0	16.0	6.5	2.5	1.0	3.5	2.5	0.5	10,12	
16,18	4.7	28.3	7.5	4.0	1.9	5.0	3.0	0.9	16,18	6.0	36.0	9.0	4.0	2.4	4.5	4.0	1.0	16,18	
20	5.2	34.9	9.0	4.0	2.3	5.5	3.5	1.2	20	6.6	44.4	10.0	4.5	3.1	6.0	4.0	1.5	20	
24	6.2	50.3	11.5	4.5	3.2	6.5	4.0	1.6	24	7.9	64.0	14.5	4.5	5.0	8.0	4.0	2.1	24	
30	7.8	58.9	12.0	5.0	4.8	7.5	4.0	2.2	30	9.9	75.0	15.0	5.0	6.7	10.0	4.0	3.3	30	
36	9.4	84.9	14.5	6.0	5.2	9.5	4.5	3.8	36	11.9	108.0	18.0	6.0	11.4	12.0	4.5	5.3	36	
42	10.9	115.5	17.0	7.0	12.8	11.0	5.5	6.3	42	13.9	147.0	21.0	7.0	17.8	17.0	5.5	8.7	42	
48	12.5	150.9	19.0	8.0	18.4	13.0	6.0	9.2	48	15.9	192.0	24.0	8.0	23.2	16.0	6.0	12.4	48	
54	14.0	191.0	21.5	9.0	26.0	15.0	6.5	12.9	54	17.9	243.0	27.0	9.0	36.9	18.0	7.0	18.1	54	
60	15.6	235.8	24.0	10.0	35.6	16.0	7.5	17.6	60	19.9	299.8	30.0	10.0	50.3	20.0	7.5	21.0	60	
66	17.1	285.3	26.0	11.0	46.0	18.0	8.0	23.0	66	21.8	362.8	33.0	11.0	66.2	22.0	8.5	32.5	66	
72	18.7	339.5	28.5	12.0	57.8	19.0	9.0	28.4	72	23.8	431.8	36.0	12.0	85.6	24.0	9.0	41.0	72	
78	20.2	398.5	31.0	13.0	75.7	21.0	9.5	37.4	78	25.7	506.7	39.0	13.0	128.2	26.0	10.0	53.2	78	
84	21.8	462.1	33.5	14.0	94.7	22.0	10.5	46.5	84	28.8	587.7	42.0	14.0	134.4	28.0	10.5	64.8	84	
90	23.3	530.5	35.5	15.0	114.4	24.5	11.0	58.2	90	29.0	674.6	45.0	15.0	164.9	30.0	11.5	81.2	90	
96	24.9	603.5	38.0	16.0	138.9	25.5	12.0	71.0	96	31.6	707.5	48.0	16.0	199.0	32.0	12.0	95.1	96	

TYPICAL HORIZONTAL THRUST BLOCK

SEE W-3A FOR GENERAL NOTES

(NO SCALE)

SEE W-3B FOR
ADDITIONAL DETAILS



ENGINEERING
DIVISION



REVISIONS			
NO.	COMMENTS	BY	DATE
##	DESCRIPTION	FL	MO/DY/YEAR

DATE
8/25/2021

W-3C