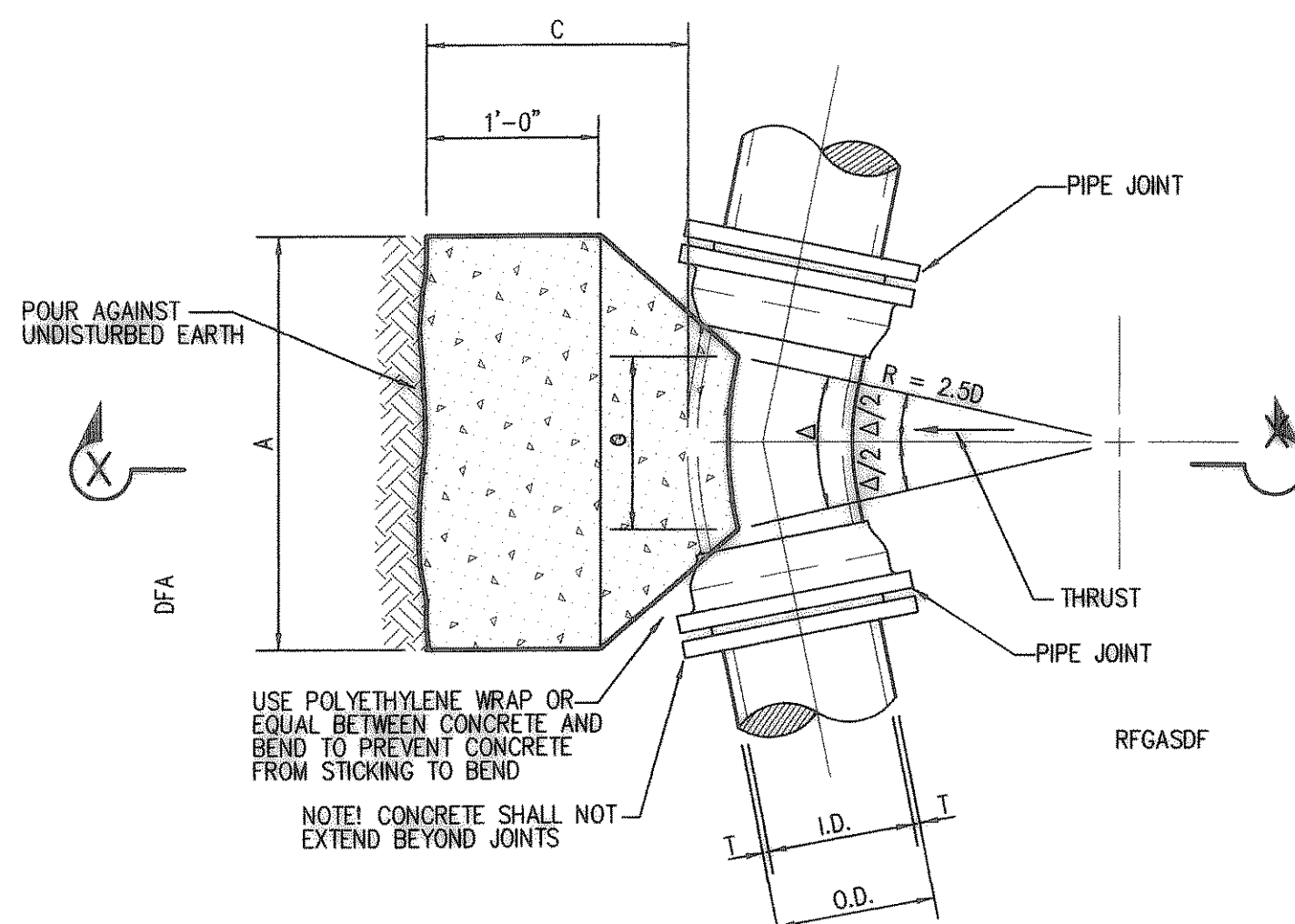


HORIZONTAL BENDS

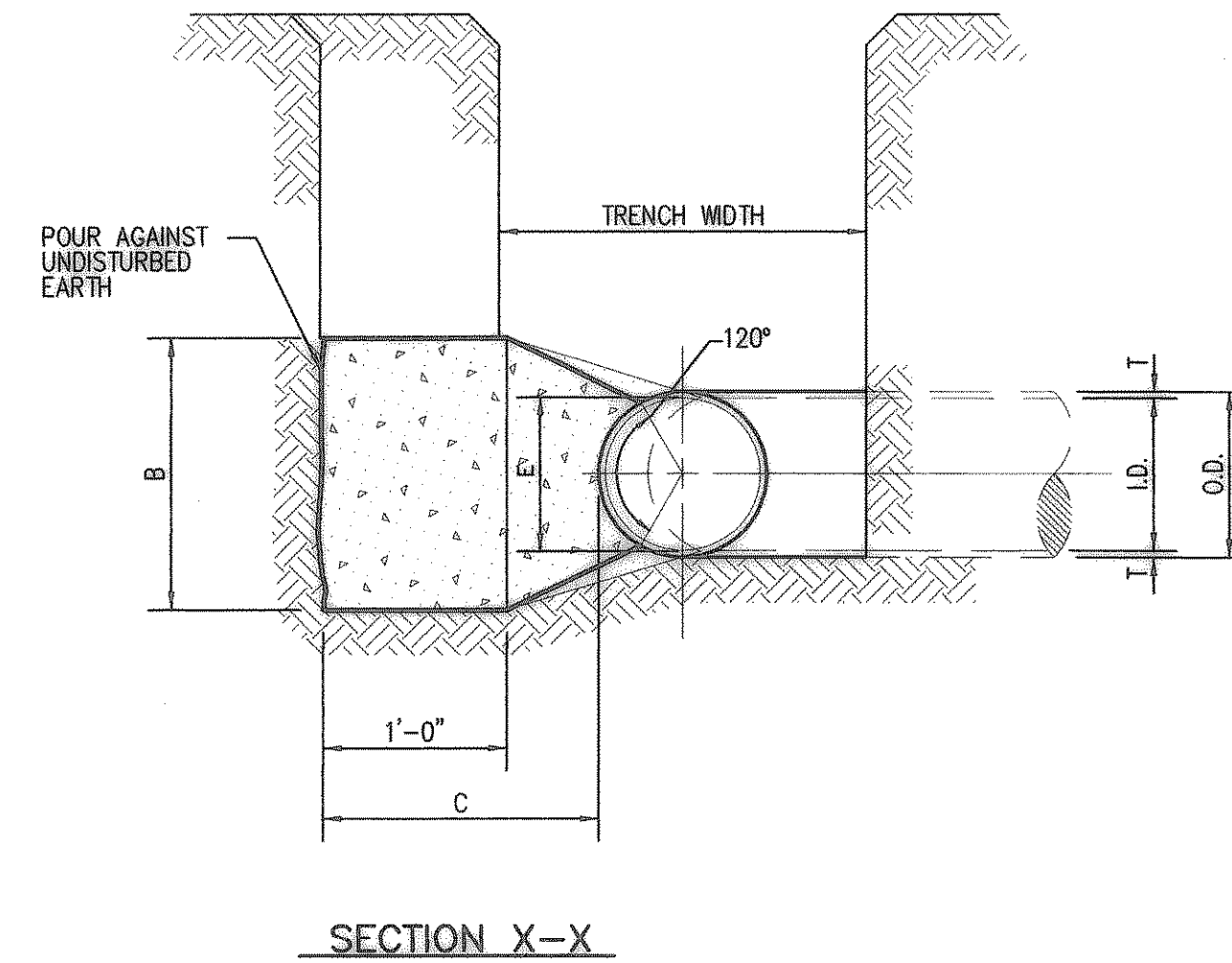
NEW VALVE VAULT					Δ = 11.25°					Δ = 22.50°					Δ = 30°					Δ = 45°					Δ = 67.50°					Δ = 90°								
I.D. in.	T in.	C ft.	22.50°+ ft.	E ft.	I.D. in.	G ft.	THRUST tons	EARTH VOLUME c.y.	ROCK VOLUME c.y.	I.D. in.	G ft.	THRUST tons	EARTH VOLUME c.y.	ROCK VOLUME c.y.	I.D. in.	G ft.	THRUST tons	EARTH VOLUME c.y.	ROCK VOLUME c.y.	I.D. in.	G ft.	THRUST tons	EARTH VOLUME c.y.	ROCK VOLUME c.y.	I.D. in.	G ft.	THRUST tons	EARTH VOLUME c.y.	ROCK VOLUME c.y.	I.D. in.	G ft.	THRUST tons	EARTH VOLUME c.y.	ROCK VOLUME c.y.				
4.6,8	0.4	1.5	1.5	0.9	4.6,8	0.4	1.0	1.0	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	1.5	3.9	2.0	2.0	0.2	1.5	1.5	0.1	4.6,8	2.7	7.1	5.0	1.5	0.4	2.0	2.0	0.2
10,12	0.5	1.5	1.5	1.2	10,12	0.8	2.2	1.5	1.5	0.1	10,12	1.1	4.4	2.0	2.5	0.3	1.5	1.5	0.1	10,12	2.2	8.7	3.5	2.5	0.5	2.0	2.5	0.3	10,12	4.0	16.0	6.5	2.5	1.0	3.5	2.5	0.5	
16,18	0.6	1.5	1.5	1.6	16,18	0.8	5.0	2.0	2.5	0.3	16,18	1.6	9.9	3.0	3.5	0.6	2.0	2.5	0.3	16,18	2.2	13.2	3.5	4.0	0.8	2.5	3.0	0.4	16,18	4.7	28.3	7.5	4.0	1.9	5.0	3.0	0.9	
20	0.7	1.5	1.5	1.8	20	0.9	6.2	2.0	3.5	0.4	20	1.8	12.3	3.5	3.5	0.7	2.0	3.5	0.4	20	2.4	16.3	4.5	4.0	1.0	3.0	3.0	0.5	20	5.2	34.9	9.0	4.0	2.3	5.5	3.5	1.2	
24	0.9	1.5	1.5	2.1	24	1.1	8.9	3.0	3.0	0.5	24	2.2	17.7	4.0	4.5	1.0	3.0	3.0	0.5	24	2.9	23.4	6.0	4.0	1.4	3.5	3.5	0.7	24	6.2	50.3	11.5	4.5	3.5	6.5	4.0	1.6	
30	1.2	1.5	1.5	2.6	30	1.4	10.4	3.0	3.5	0.6	30	2.7	20.7	5.0	4.5	1.5	3.0	4.0	0.8	30	3.6	27.5	5.5	5.0	1.9	3.5	4.0	0.9	30	7.8	58.9	12.0	5.0	4.8	7.5	4.0	2.2	
36	1.5	1.5	1.5	3.3	36	1.7	15.0	3.5	4.5	0.9	36	3.3	29.8	5.5	5.5	2.3	4.0	4.0	1.3	36	4.4	39.5	7.0	6.0	3.4	4.5	4.5	1.6	36	9.4	84.9	14.5	6.0	8.2	9.5	4.5	3.8	
42	1.8	1.8	1.8	4.2	42	1.9	20.4	4.5	5.0	1.5	42	3.8	40.5	7.0	6.0	3.9	4.5	5.0	2.1	42	5.1	53.8	8.0	7.0	5.1	5.5	5.0	2.5	42	10.9	115.3	17.0	7.0	12.9	11.0	5.5	6.3	
48	2.0	2.0	2.0	4.8	48	2.2	26.6	4.5	6.0	2.0	48	4.4	52.9	8.0	7.0	5.7	4.5	6.0	2.8	48	5.8	70.3	9.0	8.0	7.4	6.0	6.0	3.7	48	12.5	150.9	19.0	8.0	18.4	13.0	6.0	9.2	
54	2.3	3.4	4.8	5.4	54	2.5	33.7	6.0	3.0	3.0	6.0	1.4	54	4.9	67.0	9.0	8.0	8.0	6.0	4.1	54	6.5	89.0	10.0	9.0	10.3	7.0	6.5	5.3	54	14.0	191.0	21.5	9.0	26.0	15.0	6.5	12.9
60	2.5	3.8	5.3	6.0	60	2.7	41.6	6.0	7.0	3.8	60	5.5	82.7	9.5	9.0	10.6	6.0	7.0	5.3	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	
66	2.8	4.1	5.7	6.6	66	3.0	50.3	6.5	8.0	5.1	66	6.0	100.1	10.5	10.0	14.1	6.5	8.0	7.2	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	
72	3.0	4.5	6.3	7.2	72	3.3	59.9	7.5	8.0	6.3	72	6.6	119.1	11.0	11.0	17.6	7.5	8.0	9.1	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	
78	3.3	4.9	6.7	7.8	78	3.6	70.2	8.0	9.0	8.1	78	7.1	139.8	12.0	12.0	22.5	8.0	9.0	11.7	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	
84	3.5	5.3	7.2	8.4	84	3.8	81.5	8.5	10.0	10.3	84	7.6	162.1	13.0	12.5	27.2	8.5	10.0	14.8	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	32.8	
90	3.8	5.6	7.7	9.0	90	4.1	93.5	9.5	10.0	12.2	90	8.2	186.1	14.0	13.5	33.7	9.5	10.0	17.7	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	
96	4.0	6.0	8.2	9.6	96	4.4	106.4	10.0	11.0	15.0	96	8.7	211.7	15.0	14.5	41.2	10.0	11.0	21.8	96	11.6	281.2	18.0	16.0	55.5	12.5	11.5	28.9	96	17.1	415.6	26.0	16.0	89.5	18.5	11.5	48.5	

TEES & PLUGS

I.D. in.	THRUST tons	C ft.	EARTH VOLUME c.y.	ROCK VOLUME c.y.
4.6,8	5.1	1.5	2.5	2.0
10,12	11.3	1.5	3.5	2.5
16,18	25.5	2.0	5.5	4.0
20	31.5	2.0	6.0	4.0
24	45.2	2.5	7.0	5.0
30	53.0	3.0	7.5	5.5
36	76.3	4.0	9.0	6.5
42	104.0	4.5	10.5	7.5
48	136.0	5.0	12.0	8.5
54	172.0	5.5	13.5	9.5
60	212.0	6.0	15.0	10.5
66	257.0	6.5	16.5	11.5
72	305.0	7.5	17.5	12.5
78	358.0	8.0	19.0	13.5
84	416.0	8.5	20.5	14.5
90	477.0	9.0	22.0	15.5
96	543.0	9.5	23.5	16.5



TYPICAL HORIZONTAL THRUST BLOCK

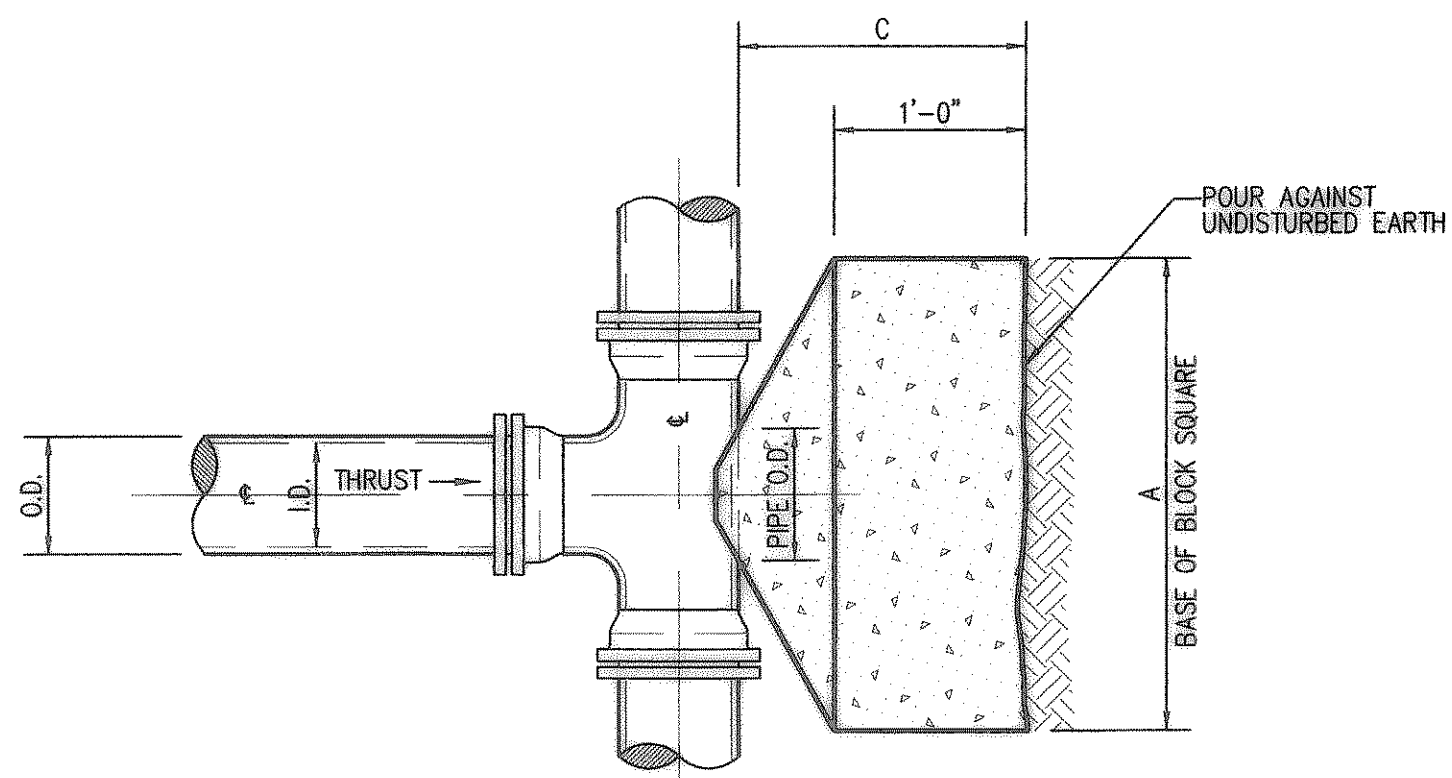


SECTION X-X

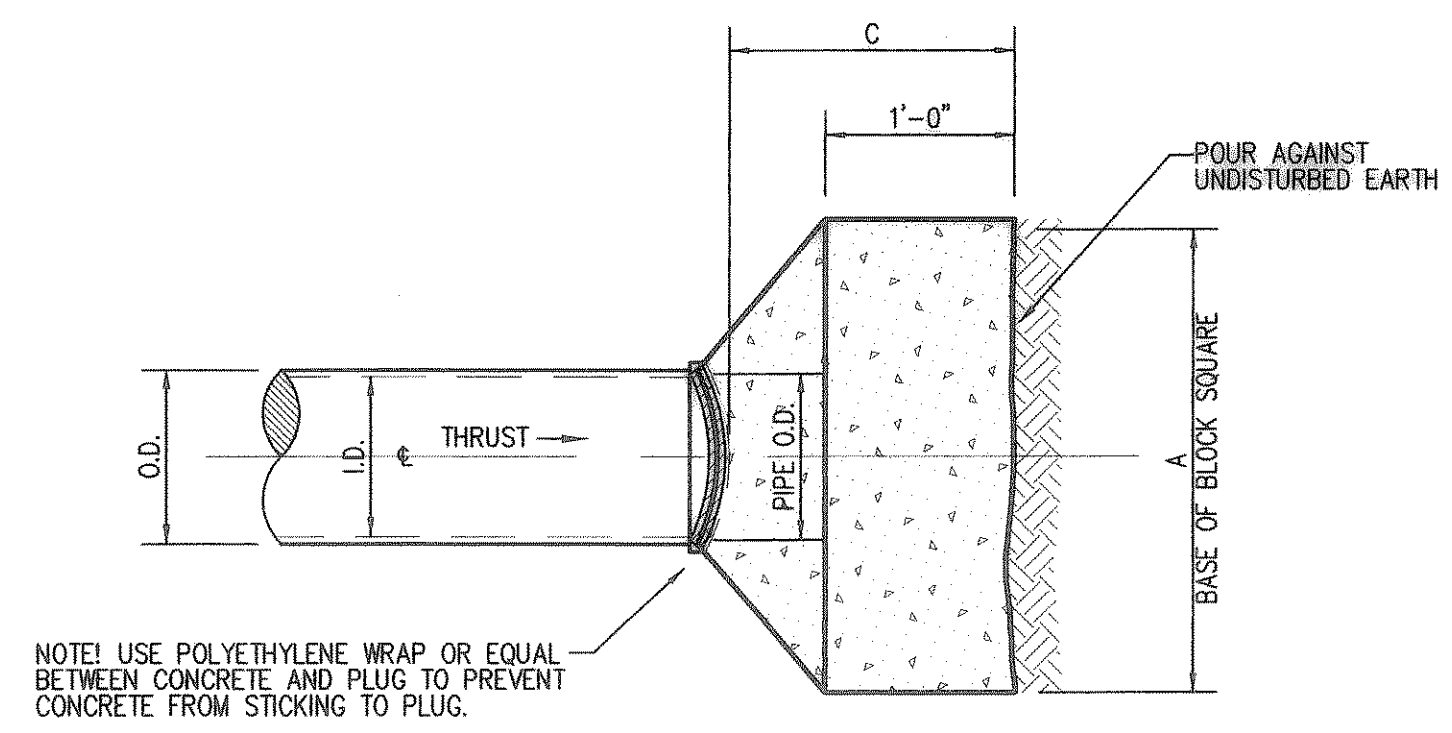
- GENERAL NOTES**
- ALL CALCULATIONS ARE BASED ON INTERNAL PRESSURE OF 200 p.s.i. FOR 24" I.D. PIPE AND SMALLER, AND 150 p.s.i. ON 30" I.D. AND LARGER.
 - VOLUMES OF VERTICAL BEND THRUST BLOCKS ARE NET VOLUMES OF CONCRETE TO BE FURNISHED. THE CORRESPONDING WEIGHT OF THE CONCRETE (4,000 lb/c.y.) IS EQUAL TO OR GREATER THAN THE VERTICAL BEND.
 - ALL BEARING SURFACES OF THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED EARTH OR ROCK.
 - WALL THICKNESS (T) ASSUMED HERE FOR ESTIMATING PURPOSES ONLY.
 - CONCRETE FOR BLOCKING SHALL BE 2,000 p.s.i. CONCRETE.
 - DIMENSIONS MAY BE VARIED AS REQUIRED BY FIELD CONDITIONS WHERE AND AS DIRECTED BY THE ENGINEER. THE VOLUME OF CONCRETE BLOCKING SHALL NOT BE LESS THAN SHOWN HERE.

CITY OF HEATH
PUMP STATION NO. 1
THRUST BLOCKING

VERTICAL BENDS

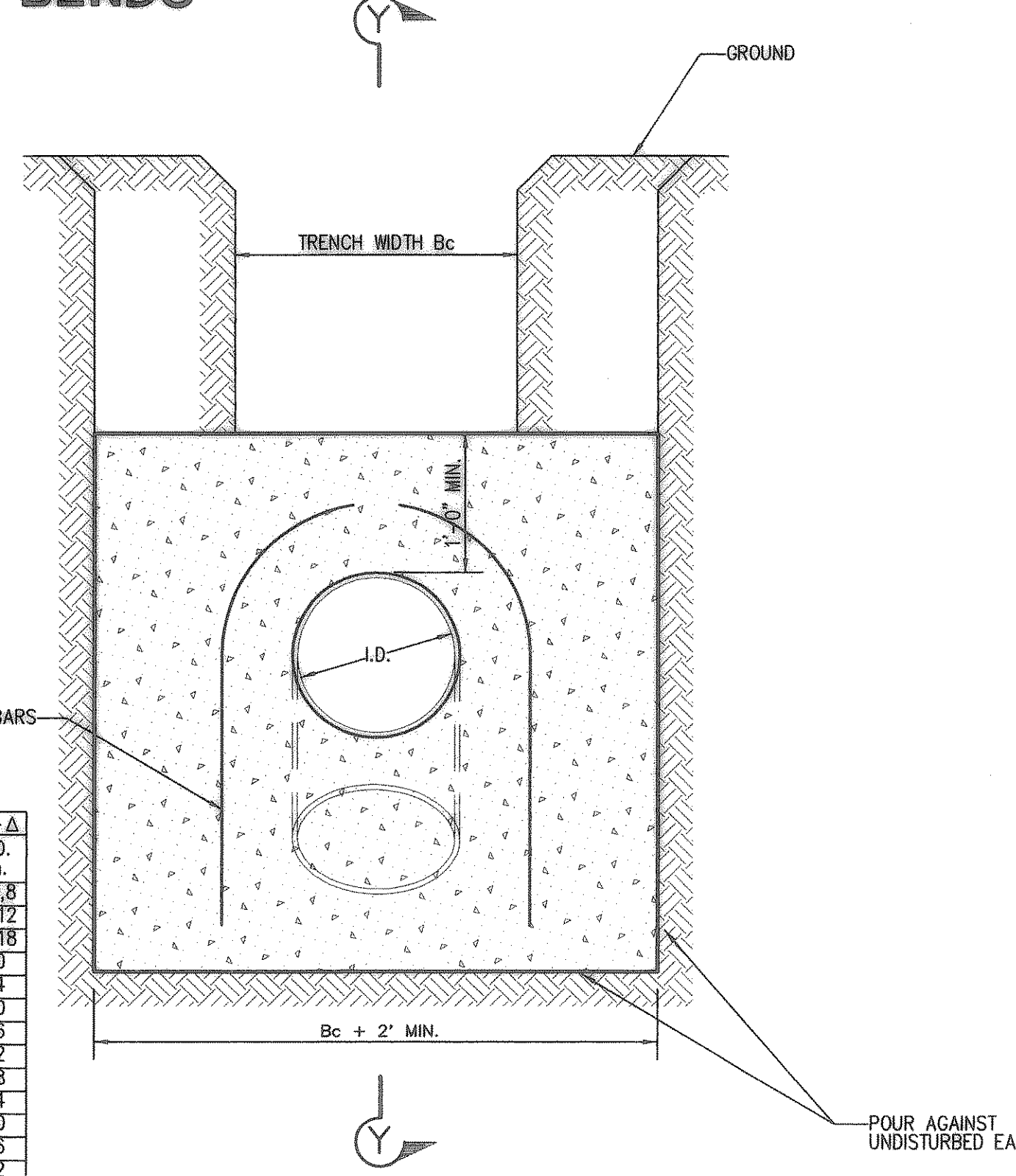


PLAN OF TEE THRUST BLOCK

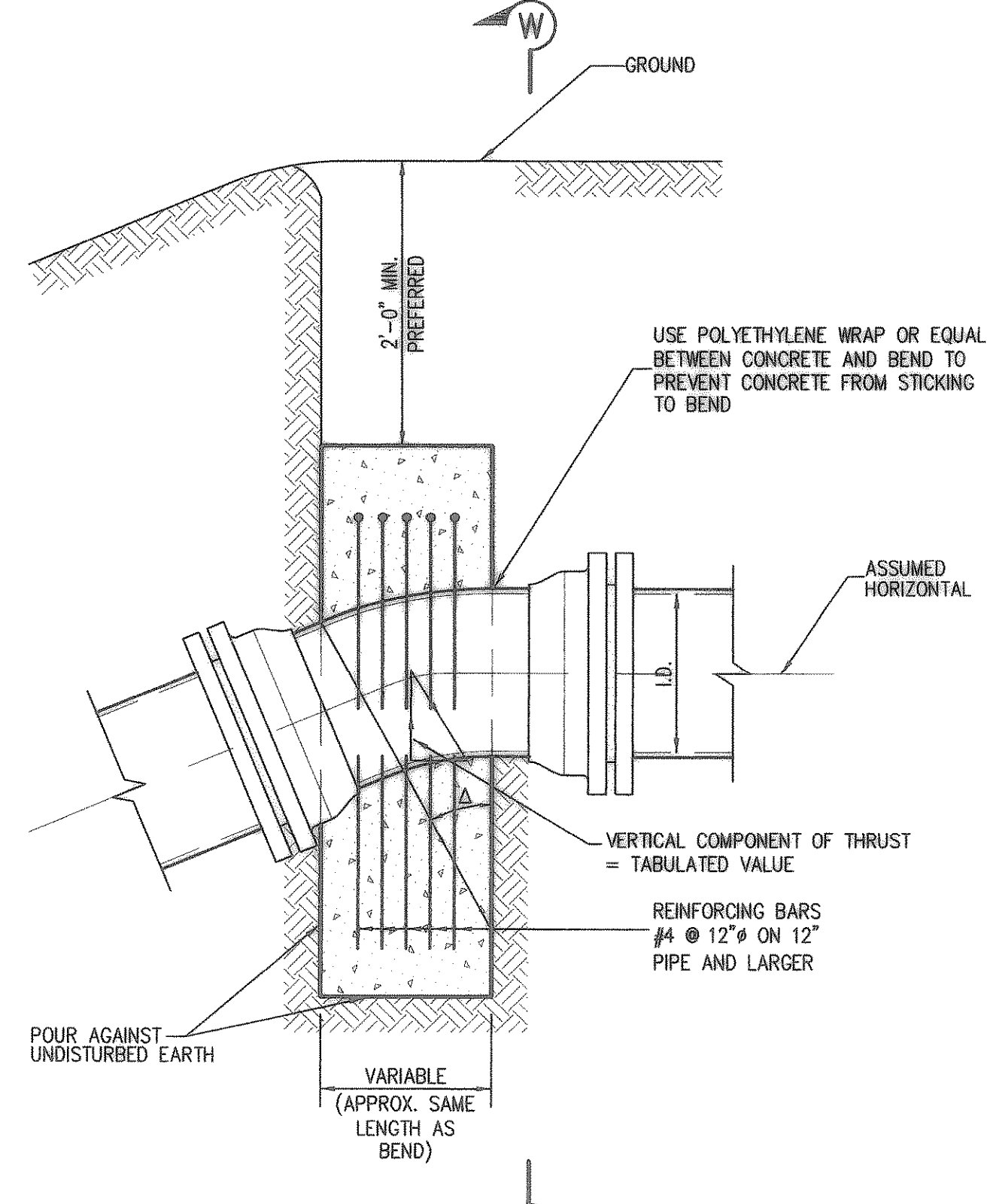


PLAN OF PLUG THRUST BLOCK

Δ	11.25°	22.50°	30°	45°	67.50°	90°
I.D. in.	4.6,8	10,12	16,18	20	24	30
THRUST tons	1.0	2.2	5.0	6.1	8.2	10.5
VOLUME c.y.	0.5	1.1	2.2	3.1	4.4	5.7
THRUST tons	2.5	4.3	9.7	12.7	17.3	23.5
VOLUME c.y.	2.0	2.2	5.7	8.4	11.3	15.7
THRUST tons	1.3	2.8	6.4	8.0	10.5	14.5
VOLUME c.y.	0.5	1.1	2.2	3.1	4.4	5.7
THRUST tons	3.6	8.0	18.0	23.5	31.4	41.6
VOLUME c.y.	2.5	2.5	6.4	8.0	10.5	14.5
THRUST tons	4.8	10.1	26.5	37.5	49.0	64.8
VOLUME c.y.	3.0	3.0	7.5	9.0	11.5	15.0
THRUST tons	14.9	39.8	96.0	126.0	162.0	212.0
VOLUME c.y.	9.5	9.5	23.0	27.0	35.0	46.0
THRUST tons	20.3	51.9	126.0	162.0	212.0	281.0
VOLUME c.y.	13.2	13.2	33.0	39.0	50.0	66.0
THRUST tons	33.5	85.9	208.0	279.0	365.0	477.0
VOLUME c.y.	16.8	16.8	41.0	49.0	63.0	82.0
THRUST tons	41.4	106.0	268.0	354.0	456.0	598.0
VOLUME c.y.	20.7	20.7	52.0	62.0	80.0	104.0
THRUST tons	50.1	128.0	316.0	416.0	538.0	707.0
VOLUME c.y.	25.0	25.0	63.0	76.0	98.0	129.0
THRUST tons	59.8	153.0	384.0	504.0	654.0	858.0
VOLUME c.y.	29.8	29.8	73.0	88.0	113.0	148.0
THRUST tons	69.9	179.0	444.0	584.0	754.0	990.0
VOLUME c.y.	35.0	35.0	88.0	106.0	137.0	181.0
THRUST tons	81.1	208.0	516.0	676.0	876.0	1144.0
VOLUME c.y.	40.5	40.5	101.0	122.0	157.0	207.0
THRUST tons	93.1	239.0	594.0	774.0	1004.0	1316.0
VOLUME c.y.	46.5	46.5	116.0	140.0	181.0	237.0
THRUST tons	106.0	272.0	676.0	884.0	1144.0	1500.0
VOLUME c.y.	53.0	53.0	130.0	156.0	201.0	264.0



SECTION W-W



SECTION Y-Y

TYPICAL VERTICAL BEND THRUST BLOCK

STATE OF TEXAS
DAMIEN LULO
90370
LICENSED PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY DAMIEN LULO, P.E. NO. 90370 ON 04/26/2005.

SCALE: AS SHOWN
IF SHEET IS IN 11"x17" FORMAT, DRAWINGS ARE AT 1/2" OF NOTED SCALE.

PROJECT No.: 02150
DATE: JAN. 2005
DESIGNED:
DRAWN:
CHECKED:

SHEET
M8
TOTAL SHEETS: 35

RECORD DRAWING
(ALL REVISIONS ARE BASED UPON CITY AND CONTRACTOR NOTES AND COMMENTS)

BY: _____
DATE: _____
REVISION: _____

Freeman-Millican, Inc.
ENGINEERS - ARCHITECTS - PLANNERS
9500 FOREST LN. DALLAS, TX 75243-0695