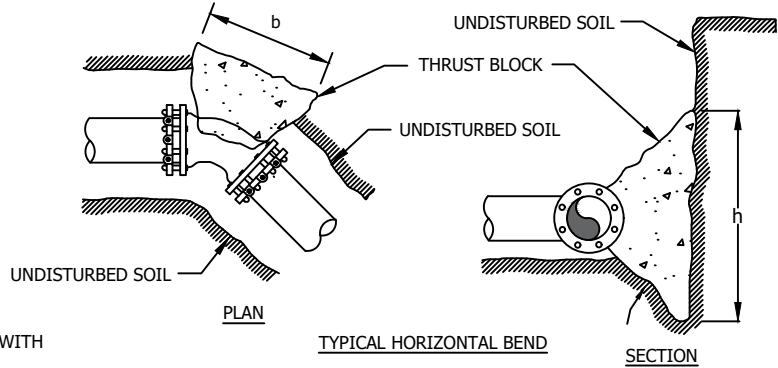


TABLE 1.1 - CALCULATION ASSUMPTIONS

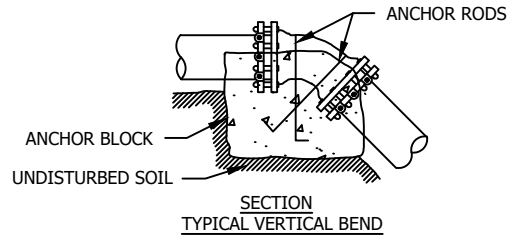
CONDITION	VALUE
LAYING CONDITION	TYPE 4
SOIL CLASSIFICATION	GOOD SAND (GW)
DEPTH OF COVER	3 FEET
DESIGN/TEST PRESSURE	200 PSI ¹
OPERATING PRESSURE	VARIABLES PER PLAN
ALLOWABLE SOIL BEARING, S _b	1000 PSF ²
MATERIAL DENSITY, W _m	150 PCF
SAFETY FACTOR	1.0 ³



1. BEARING AREAS AND ANCHOR VOLUMES INCREASE DIRECTLY WITH INCREASED PRESSURE.
2. FOR SOIL BEARING VALUE OF 2000 PSF USE: 1/2 x BEARING AREA SHOWN; FOR SOIL BEARING VALUE OF 500 USE 2 x BEARING AREA SHOWN.
3. CALCULATIONS BASED ON SAFETY FACTOR = 1.0. IF A DIFFERENT SAFETY FACTOR IS TO BE USED, MULTIPLY VALUES BY THAT SAFETY FACTOR.

NOTES:

1. ALL THRUST BLOCKS SHALL BE PORTLAND CEMENT CONCRETE MIX 560-C-3250, ATTAIN 2,000 PSI STRENGTH, AND BE PLACED AGAINST UNDISTURBED SOIL.
2. THRUST BLOCKS ON REDUCERS SHALL BE KEYED INTO THE TRENCH BOTTOM AS SHOWN.
3. CONCRETE SHALL NOT EXTEND ONTO FLANGE OR ADJOINING PIPE.
4. DO NOT COVER FITTING BOLTS WITH CONCRETE.
5. AVOID PLACING CONCRETE ON ANY PART OF THE VALVE BONNET OR VALVE OPERATOR WHEN VALVES ARE FLANGED TO FITTINGS.
6. THE RATIO OF WIDTH (b) TO HEIGHT (h) OF THRUST BLOCK AREA SHALL NOT EXCEED 1 1/2 TO 1.
7. ALL ANCHOR RODS SHALL BE:
FOR PIPE SIZES < 12": #4 BARS
16": #5 BARS
18": #6 BARS
8. COAT REBAR WITH 80 MILS OF COLD-APPLIED BITUMASTIC WATER-PROOFING COMPOUND. WRAP EXTERIOR OF PIPE VALVE, ACTUATOR AND REBAR WITH 8 MIL POLYETHYLENE SHEETING AND TAPE.
9. MINIMUM CONCRETE COVER OVER REBAR SHALL BE 3".
10. NO CONCRETE SHALL BE POURED ON VALVE OR PIPE JOINT.
11. YIELD STRENGTH OF STEEL BARS IS ASSUMED TO BE 36 KSI.
12. ANCHOR BLOCKS SHALL BE USED AT VERTICAL BENDS WHEN PIPE IS ABOVE OR BELOW GROUND AS SHOWN ON THE PLANS.
13. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE THE SOIL BEARING CONFIRMED PRIOR TO CONSTRUCTION.
14. WHEN RESTRAINED JOINTS ARE PROVIDED FOR THE REQUIRED PIPE LENGTH, PER MBWS-709A, THE THRUST BLOCK SIZE CAN BE REDUCED TO 25% OF ITS SIZE.
15. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (THE GREEN BOOK) MOST RECENT EDITION, AND ALL SUPPLEMENTS THERETO OR AS MODIFIED BY THE ENGINEER.



$$\text{BEARING AREA (SF)} = \frac{S_f \times T}{S_b}$$

$$\text{THRUST (LBS), } T = 2PA \sin \frac{\theta}{2}$$

$$\text{ANCHOR VOLUME (CY)} = \left(\frac{1}{27}\right) \times \frac{S_f \times T}{W_m}$$

TABLE 1.3 - VERTICAL ANCHOR BLOCK VOLUMES

PIPE SIZE (IN)	22.5 BEND		45 BEND	
	THRUST (LBS)	VOLUME (CY)	THRUST (LBS)	VOLUME (CY)
4	981	0.2	1,924	0.5
6	2,206	0.5	4,328	1.1
8	3,923	1.0	7,694	1.9
10	6,129	1.5	12,022	3.0
12	8,826	2.2	17,312	4.3
16	15,690	3.9	30,777	7.6
18	19,858	4.9	38,952	9.6

TABLE 1.2 - HORIZONTAL THRUST BLOCK BEARING AREAS

PIPE SIZE (IN)	11.25 BEND		22.5 BEND		45 BEND		90 BEND		DEADEND / TEE	
	THRUST (LBS)	BEARING AREA (SF)	THRUST (LBS)	BEARING AREA (SF)	THRUST (LBS)	BEARING AREA (SF)	THRUST (LBS)	BEARING AREA (SF)	THRUST (LBS)	BEARING AREA (SF)
4	493	0.5	981	1.0	1,924	1.9	3,554	3.6	2,513	2.5
6	1,109	1.1	2,206	2.2	4,328	4.3	7,997	8.0	5,655	5.7
8	1,971	2.0	3,923	3.9	7,694	7.7	14,217	14.2	10,053	10.1
10	3,079	3.1	6,129	6.1	12,022	12.0	22,214	22.2	15,708	15.7
12	4,434	4.4	8,826	8.8	17,312	17.3	31,989	32.0	22,619	22.6
16	7,883	7.9	15,690	15.7	30,777	30.8	56,869	56.9	40,212	40.2
18	9,977	10.0	19,858	19.9	38,952	39.0	71,975	72.0	50,894	50.9

NOT TO SCALE



DATE REVISED

11-24-2021

**CITY OF MANHATTAN BEACH
DEPARTMENT OF PUBLIC WORKS**

THRUST AND ANCHOR BLOCK FOR WATER MAIN AND IRRIGATION

APPROVED BY

PREM KUMAR, CITY ENGINEER

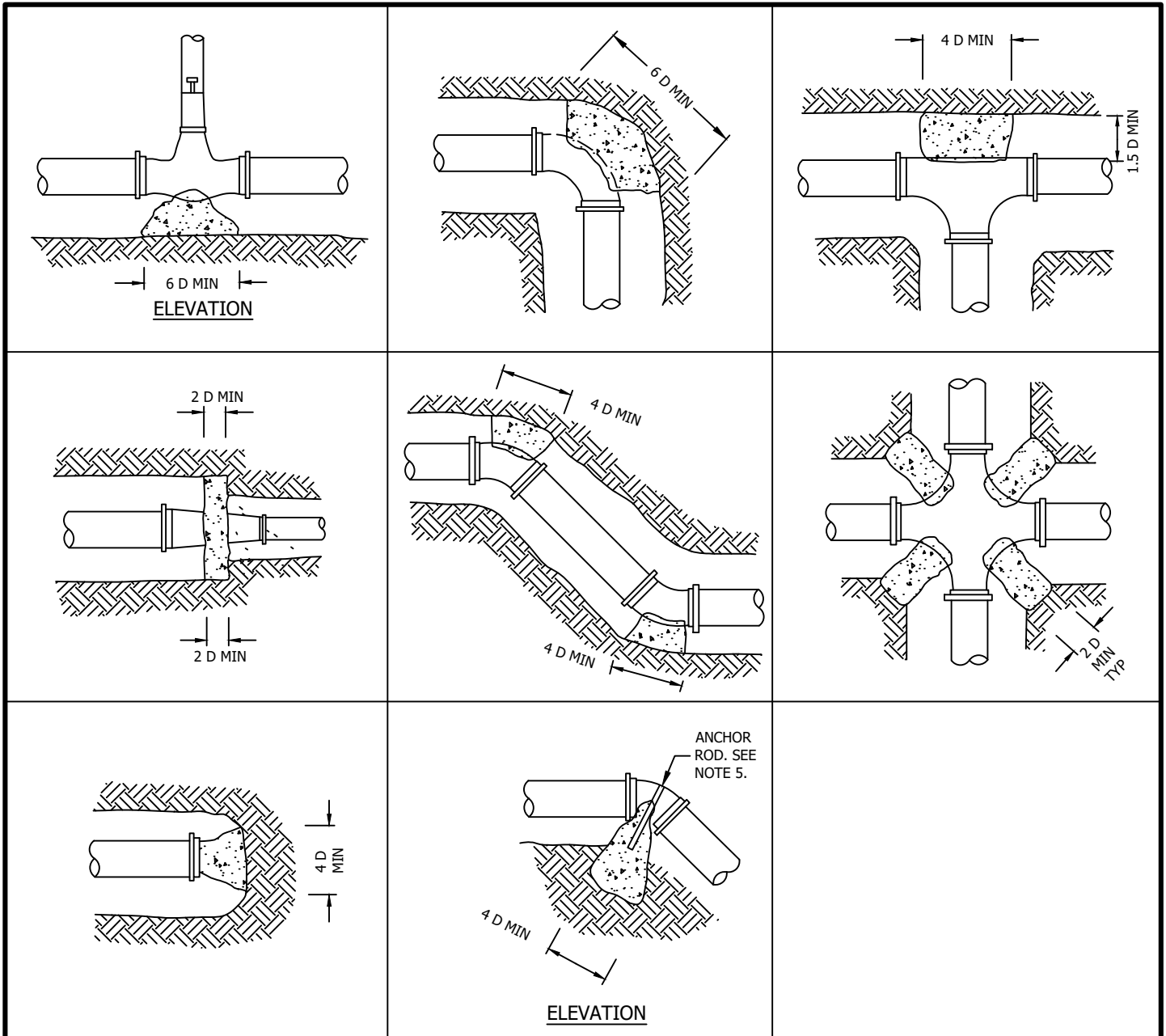
12/02/2021

DATE

STANDARD PLAN NUMBER

MBWS-704A-0 (ST-20)

SHEET 1 OF 2



DATE REVISED
11-24-2021

**CITY OF MANHATTAN BEACH
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 SHEET 2 OF 2

12/02/2021
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