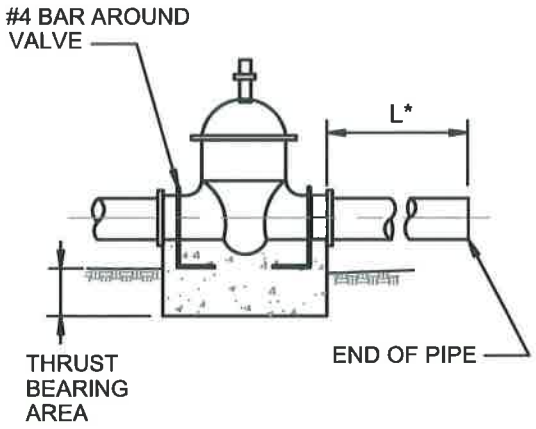
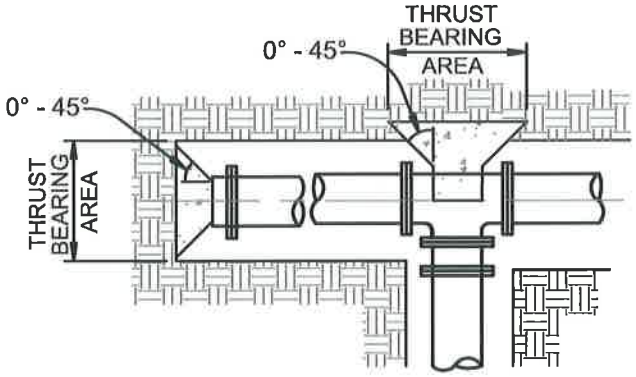
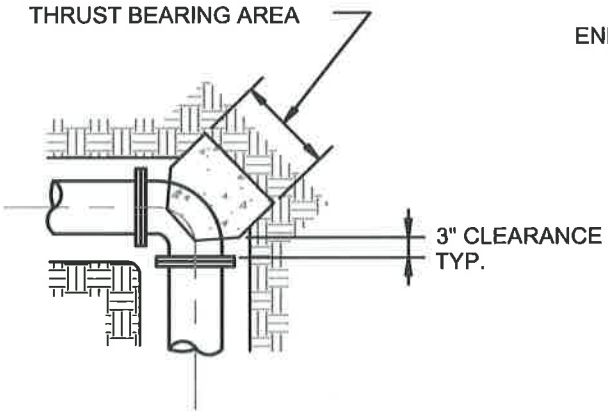


VALVE

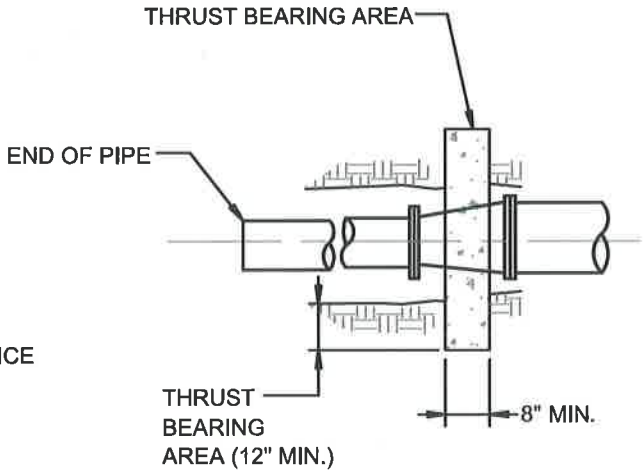


TEE OR CAP
PLAN VIEW

* THRUST BLOCK IS NOT REQUIRED IF "L" MINIMUM LENGTH FOR "L1" 90° UPPER BEND IS PER SHEET 3.



BEND



REDUCER
PLAN VIEW

* THRUST BLOCK IS NOT REQUIRED IF "L" MINIMUM LENGTH OF "L1" IS PER SHEET 3.

NOTES: SEE SHEET 2

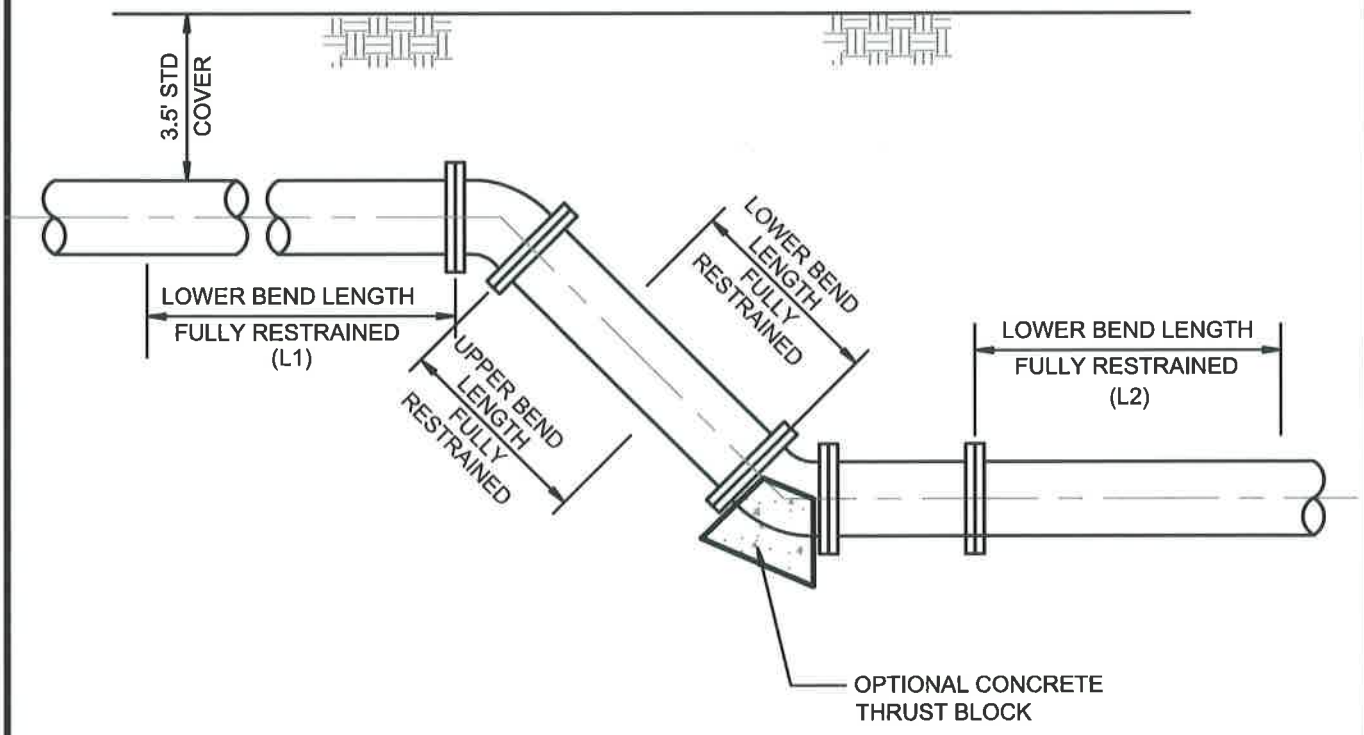
CITY OF BREA

THRUST BLOCK AND RESTRAINT

APPROVED: _____ CITY ENGINEER

DATE: 10-15-2013

STD. PLAN NUMBER 312-0



VERTICAL BEND

NOTES:

1. ALL FITTING OR PIPE JOINTS WITHIN LENGTH INDICATED ON SHEET 3 SHALL BE FULLY RESTRAINED.
2. LOWER BEND CAN BE RESTRAINED USING A THRUST BREARING CONCRETE BLOCK PER SHEET 3.
3. PAINT THE POST AND CONCRETE FOUNDATION WITH SIGNAL YELLOW COLOR PAINT.

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THRUST BEARING AREA (SF)

PIPE SIZE		4"	6"	8"	10"	12"
TEST PRESSURE (PSI)		225				
BENDS	90°	4	8	*	*	*
	45°	2	5	8	*	*
	22.5°	2	3	4	6	8
	11.25°	2	2	2	3	4
	TEE	3	6	10	*	*
	VALVE/CAP	3	6	10	*	*
	REDUCER	AREA = TEE DIA.1 -TEE DIA.2				

TABLES BASED ARE ON SOIL BEARING VALUE OF 1500 PSF AND SOIL DENSITY OF 120 PCF AND 3.5' (FEET) COVER.

TEST PRESSURE = 150% OF MAXIMUM DESIGN PRESSURE OF 150 PSI = 225 PSI

CALCULATIONS MUST BE APPROVED BY CITY ENGINEER FOR OTHER SOIL BEARING VALUES OR DESIGN PRESSURES.

* USE RESTRAINED JOINTS, SEE NOTE 4 BELOW

VERTICAL ANCHOR (FT)

UPPER BEND LENGTH (L1)

LOWER BEND LENGTH (L2)

PIPE SIZE		4"	6"	8"	10"	12"	4"	6"	8"	10"	12"
TEST PRESSURE (PSI)		225					225				
BENDS	90°	46	66	85	105	122	15	22	28	35	41
	45°	19	27	35	43	51	6	9	12	14	17
	22.5°	9	13	17	21	24	3	4	6	7	8
	11.25°	5	7	8	10	12	2	2	3	4	4

LENGTH "L" EQUALS RESTRAINED LENGTH FOR 90° UPPER BEND

NOTES:

1. THRUST BLOCKS MUST BE POURED AGAINST FIRM, UNDISTURBED NATIVE SOIL.
2. CONCRETE FOR THRUST BLOCKS SHALL BE OF CLASS 380-C-2000. CONCRETE SHALL HAVE A MINIMUM THICKNESS OF 8". CONCRETE SHALL NOT BE POURED WITHIN 3" OF ANY JOINT.
3. EXPOSED REINFORCING STEEL SHALL BE COVERED IN KOPPERS, BITUMASTIC OR EQUAL.
4. RESTRAINED JOINTS CAN BE USED IN LIEU OF THRUST BLOCKS AS FOLLOWS:
   A) HORIZONTAL BEND RESTRAINT AS INDICATED BY LOWER BEND LENGTH.
   B) VALVE, DEAD-END, OR TEE BRANCH RESTRAINT AS INDICATED BY 90° UPPER BEND LENGTH.

BREA CALIFORNIA
CITY OF BREA

THRUST BLOCK AND RESTRAINT

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SHEET 3 OF 3