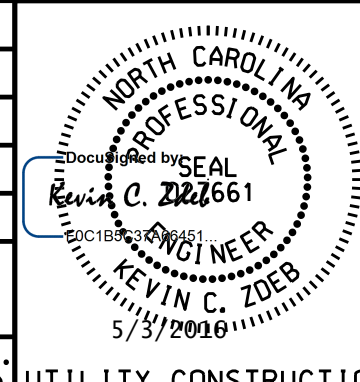
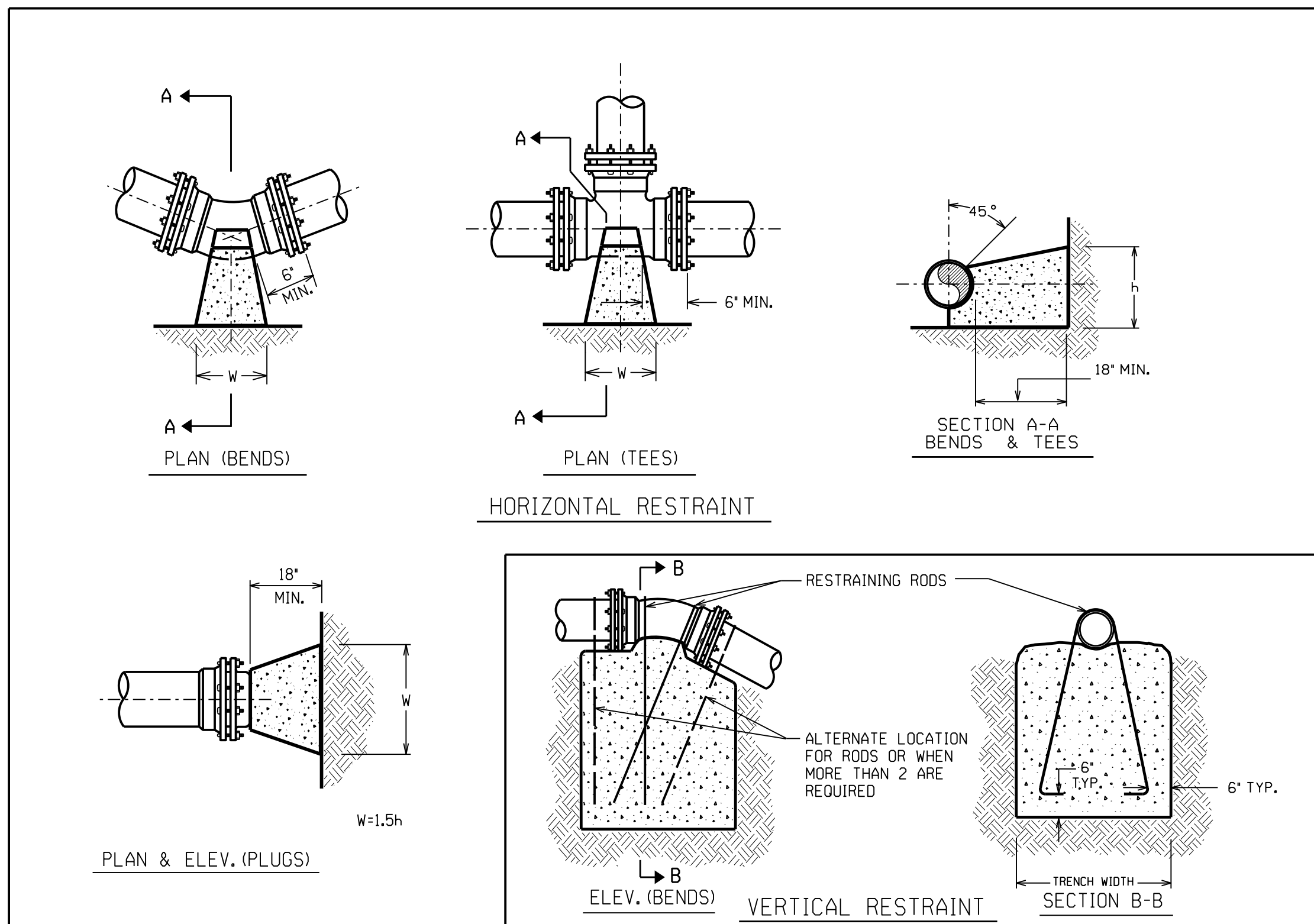


5/14/99

PROJECT REFERENCE NO.	SHEET NO.
B-4440	UC-3B
DESIGNED BY: KCZ	
DRAWN BY: KCZ	
CHECKED BY: KCZ	
APPROVED BY: KCZ	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

UTILITY CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



THRUST RESTRAINT FOR PIPE LINES

BASED ON TEST PRESSURE OF 200 P.S.I.

HORIZONTAL RESTRAINT (ALL AREAS GIVEN ARE IN SQUARE FEET)				VERTICAL RESTRAINT (ALL VOLUMES GIVEN ARE IN CUBIC YARDS)**										
PIPE SIZE	DEGREE OF BEND	LBS. STATIC THRUST *	ALLOWABLE SOIL BEARING (PSF)						PIPE SIZE	RESTRAINING RODS NO. REQ'D	DIA.	DEGREE OF BEND		
			1000	2000	3000	4000	5000	6000				7000	8000	11/4°
4"	11/4°	616	1	1	1	1	1	1	1	1	1	1	1	1
	22 1/2°	1,226	1	1	1	1	1	1	1	1	1	1	1	1
	45°	2,405	2	2	2	2	2	2	2	2	2	2	2	2
	90°	4,444	4	4	4	4	4	4	4	4	4	4	4	4
6"	TEE/PLUG	3,143	3	3	3	3	3	3	3	3	3	3	3	3
	11/4°	1,385	2	2	2	2	2	2	2	2	2	2	2	2
	22 1/2°	2,758	3	3	3	3	3	3	3	3	3	3	3	3
	45°	5,409	5	5	5	5	5	5	5	5	5	5	5	5
8"	90°	9,999	10	10	10	10	10	10	10	10	10	10	10	10
	TEE/PLUG	7,068	7	7	7	7	7	7	7	7	7	7	7	7
	11/4°	2,424	3	3	3	3	3	3	3	3	3	3	3	3
	22 1/2°	4,804	5	5	5	5	5	5	5	5	5	5	5	5
10"	45°	9,619	10	10	10	10	10	10	10	10	10	10	10	10
	90°	17,773	18	18	18	18	18	18	18	18	18	18	18	18
	TEE/PLUG	12,568	13	13	13	13	13	13	13	13	13	13	13	13
	11/4°	3,846	4	4	4	4	4	4	4	4	4	4	4	4
12"	22 1/2°	7,661	8	8	8	8	8	8	8	8	8	8	8	8
	45°	15,028	15	15	15	15	15	15	15	15	15	15	15	15
	90°	27,769	28	28	28	28	28	28	28	28	28	28	28	28
	TEE/PLUG	19,635	20	20	20	20	20	20	20	20	20	20	20	20
14"	11/4°	5,543	6	6	6	6	6	6	6	6	6	6	6	6
	22 1/2°	11,032	11	11	11	11	11	11	11	11	11	11	11	11
	45°	21,641	22	22	22	22	22	22	22	22	22	22	22	22
	90°	39,987	40	40	40	40	40	40	40	40	40	40	40	40
16"	TEE/PLUG	28,274	28	28	28	28	28	28	28	28	28	28	28	28
	11/4°	7,544	8	8	8	8	8	8	8	8	8	8	8	8
	22 1/2°	15,016	15	15	15	15	15	15	15	15	15	15	15	15
	45°	29,455	29	29	29	29	29	29	29	29	29	29	29	29
16"	90°	54,425	54	54	54	54	54	54	54	54	54	54	54	54
	TEE/PLUG	38,485	38	38	38	38	38	38	38	38	38	38	38	38
	11/4°	9,854	10	10	10	10	10	10	10	10	10	10	10	10
	22 1/2°	19,612	20	20	20	20	20	20	20	20	20	20	20	20
16"	45°	38,471	38	38	38	38	38	38	38	38	38	38	38	38
	90°	71,085	71	71	71	71	71	71	71	71	71	71	71	71
	TEE/PLUG	50,265	50	50	50	50	50	50	50	50	50	50	50	50

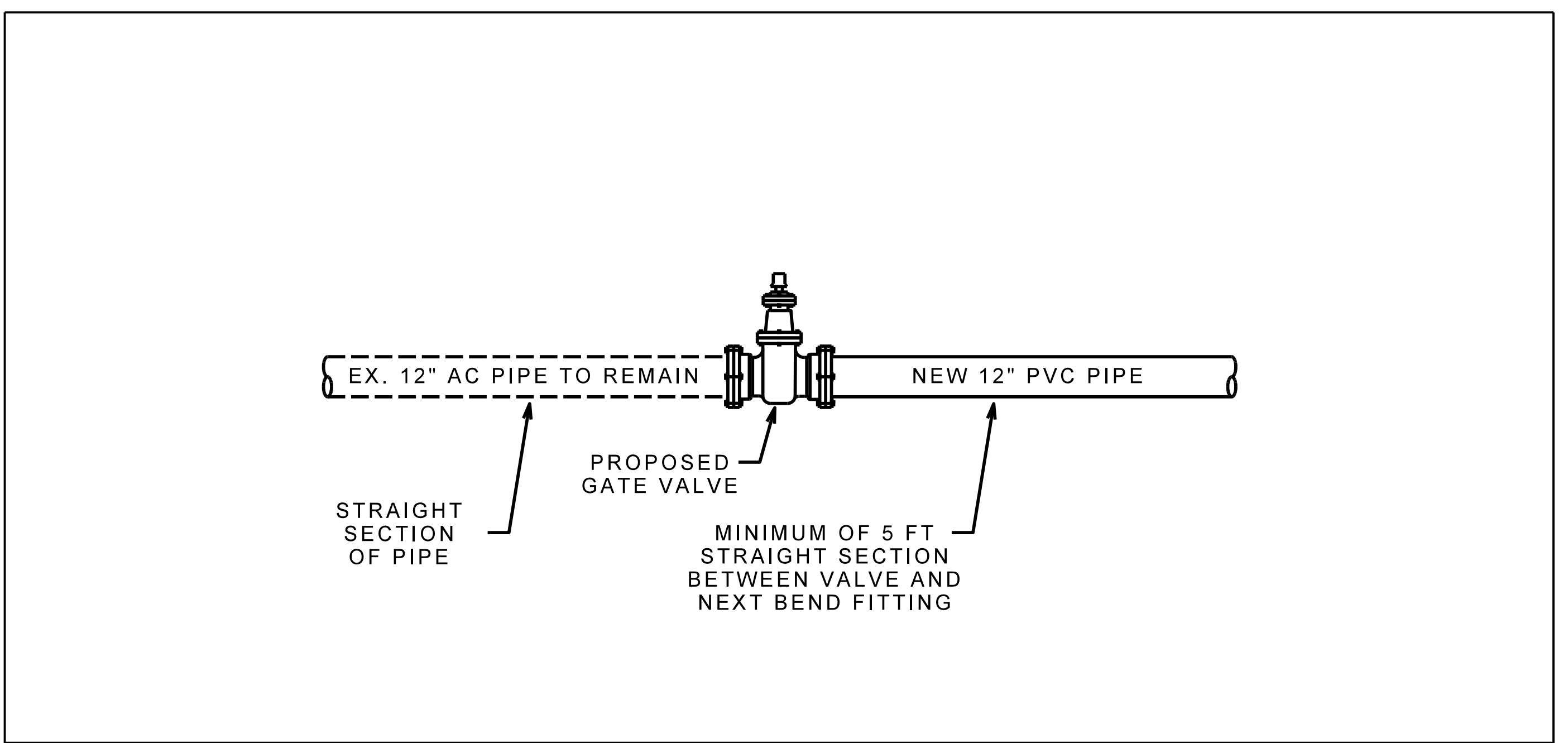
* INCLUDES 1.25 SAFETY FACTOR

GENERAL NOTES:
 1. CONCRETE SHALL BE CLASS "B".
 2. CONCRETE SHALL NOT CONTACT BOLTS ENDS OF MECHANICAL JOINT FITTINGS.
 3. CONSULT WITH ENGINEER FOR CONCRETE REQUIREMENTS ON MAINS LARGER THAN 16 INCHES. (FOR VERTICAL & HORIZONTAL BENDS)
 4. ALLOWABLE SOIL BEARING SHALL BE DETERMINED BY THE ENGINEER.

REVISIONS	
NO.	DESCRIPTION

SHEET 2 OF 2

THRUST RESTRAINT FOR WATER MAINS



PVC TO A.C. PIPE TRANSITION DETAIL