

MECHANICAL RESTRAINT NOTES:

- ALL TEES, BENDS, DEAD ENDS, VALVES AND REDUCERS ARE TO BE RESTRAINED WITH MECHANICAL JOINT RETAINER GLANDS AND BELL RESTRAINT HARNESSSES, FIELD LOCK GASKETS OR OTHER ENGINEER APPROVED METHODS IN ACCORDANCE WITH THE APPROPRIATE TABLE 1 OR 2.
- THRUST BLOCKS AS A METHOD OF RESTRAINT WILL BE USED ONLY AT THE DIRECTION OF THE ENGINEER. UNLESS DIRECTED OTHERWISE, ALL RESTRAINED JOINTS SHALL BE MECHANICAL.
- TABLES 1 AND 2 HAVE BEEN DEVELOPED BASED UPON THE FOLLOWING CRITERIA:
 - * INTERNAL PRESSURE: 150 PSI
 - * PIPE DEPTH: 4.5 DEPTH
 - * BEDDING MATERIAL: SAND
 - * SAFETY FACTOR: 1.5
 - * TRENCH TYPE: 5
- SEE FIGURES 1 THROUGH 5 FOR GRAPHIC DEFINITION OF THE 'R' (LENGTH OF PIPE RESTRAINT) VALUE GIVEN IN TABLES 1 AND 2.
- PIPE RESTRAINT FOR VALVES SHALL BE A MINIMUM OF THE FOLLOWING:
 - * RESTRAINED TO THE NEAREST FITTING (BEND, TEE OR CROSS)
 - * RESTRAINED TO A DISTANCE EQUAL TO THAT FOR A DEAD END (IF REQUIRED TO WITHSTAND TEST PRESSURE).
 - * RESTRAINED TO A DISTANCE 2/3 (0.67) OF THAT FOR A DEAD END FOR VALVES THAT ARE NOT TO BE TESTED AGAINST. (BASED ON AN INTERNAL DESIGN PRESSURE OF 100 PSI)
 - * RESTRAINED TO THE LIMITS OF THE PROJECT

THRUST BLOCK RESTRAINT NOTES:

- ALL TEES, DEAD ENDS, VALVES AND REDUCERS ARE TO BE RESTRAINED WITH MECHANICAL JOINT RETAINER GLANDS AND BELL HARNESSSES OR OTHER ENGINEER APPROVED METHODS. THRUST BLOCKS AS A METHOD OF RESTRAINT WILL BE USED ONLY AT THE DIRECTION OF THE ENGINEER.
- WHEN DIRECTED BY THE ENGINEER, THRUST BLOCKS SHALL BE CONSTRUCTED OF POURED-IN-PLACE CONCRETE AND INSTALLED AT DEAD ENDS, TEES, BENDS AND REDUCERS. THE AREA IN SQUARE FEET OF CONCRETE THRUSTING AGAINST UNDISTURBED EARTH SHALL BE COMPUTED BY DIVIDING THE TOTAL THRUST GIVEN ON TABLE 3 BY THE SAFE BEARING LOAD OF THE SOIL GIVEN ON TABLE 4.
- THE THRUST BLOCK WIDTH SHALL BE TWICE THE HEIGHT. HEIGHT SHALL NOT BE LESS THAN THE DIAMETER OF THE PIPE.
- TABLE 3 HAS BEEN DEVELOPED BASED UPON AN INTERNAL PRESSURE OF 150 PSI.
- SEE FIGURES 6 AND 7 FOR A GRAPHIC DEFINITION OF THE 'A' (THRUST BLOCK THICKNESS) VALUE GIVEN IN TABLE 3.
- 3000 PSI CONCRETE SHALL BE USED FOR ALL THRUST BLOCKS.
- THRUST BLOCKS SHALL BE POURED SO THAT CONCRETE IS NOT IN CONTACT WITH BOLTS, FITTINGS AND JOINTS. A LAYER OF PLASTIC SHEETING SHALL BE PLACED OVER FITTINGS BEFORE CONCRETE IS POURED.

TABLE 3: THRUST TABLE

PIPE DIAMETER	TOTAL THRUST, LBS						'A' (FEET)
	PLUG OR TEE	90° BEND	45° BEND	22 1/2° BEND	11 1/2° BEND		
4"	4070	5760	3110	1590	800	2.0	
6"	8410	11890	6440	3280	1650	2.0	
8"	14470	20460	11070	5640	2840	2.5	
10"	21760	30780	16660	8490	4270	2.5	
12"	30780	43520	23550	12010	6030	3.0	
16"	53470	75630	40930	20860	10480	3.0	
18"	67160	94980	51400	26210	13170	3.5	
20"	82410	116540	63070	32150	16150	4.0	

TABLE 4: SAFE BEARING LOADS FOR SOILS (HORIZONTAL THRUST)

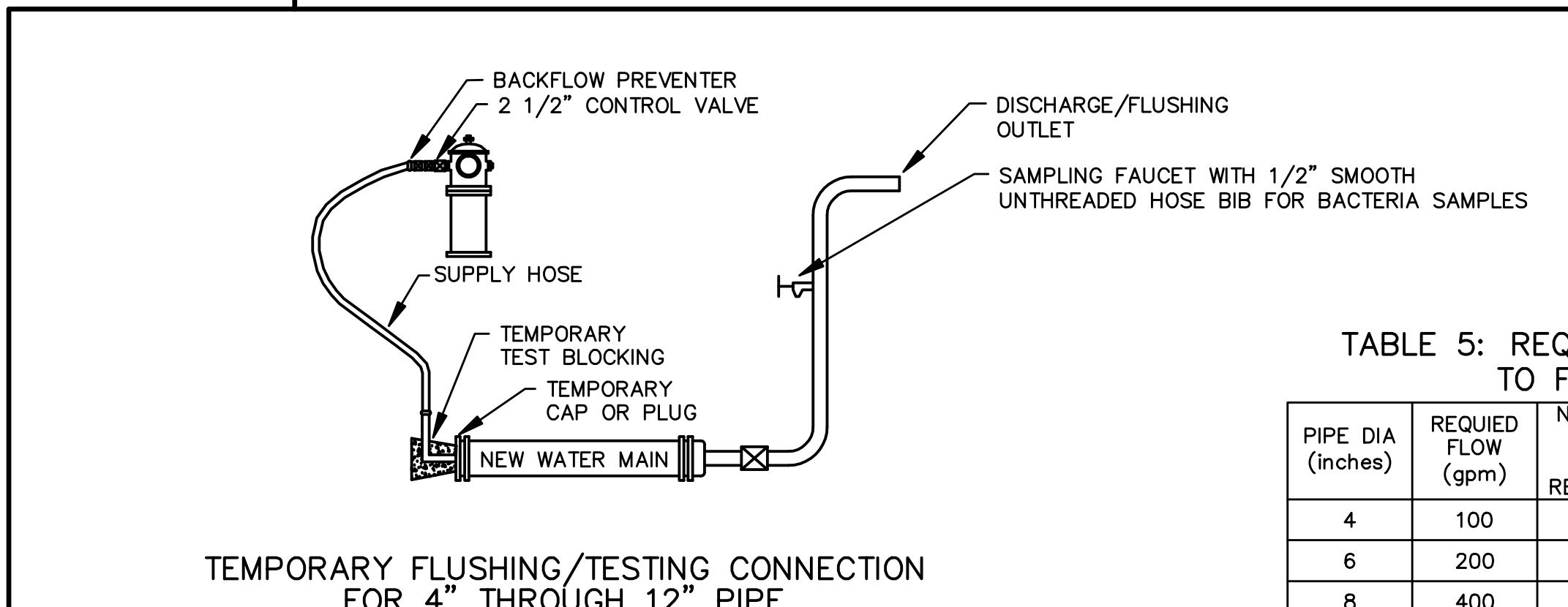
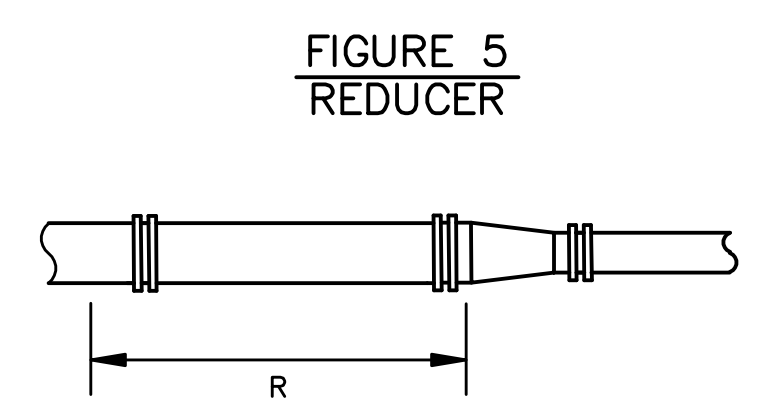
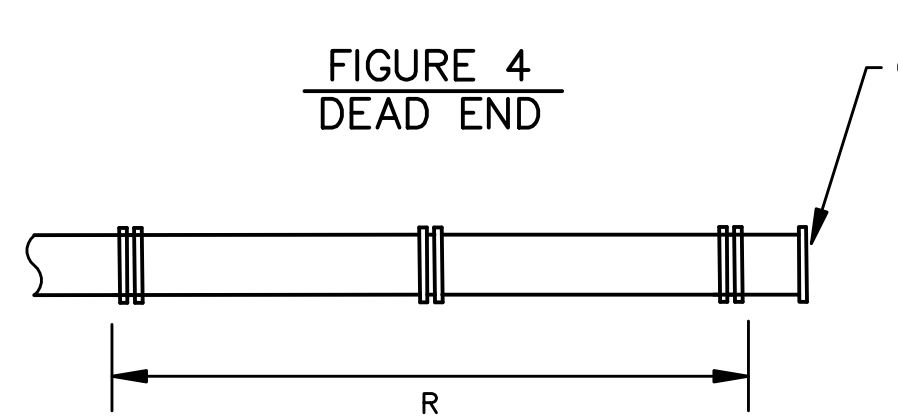
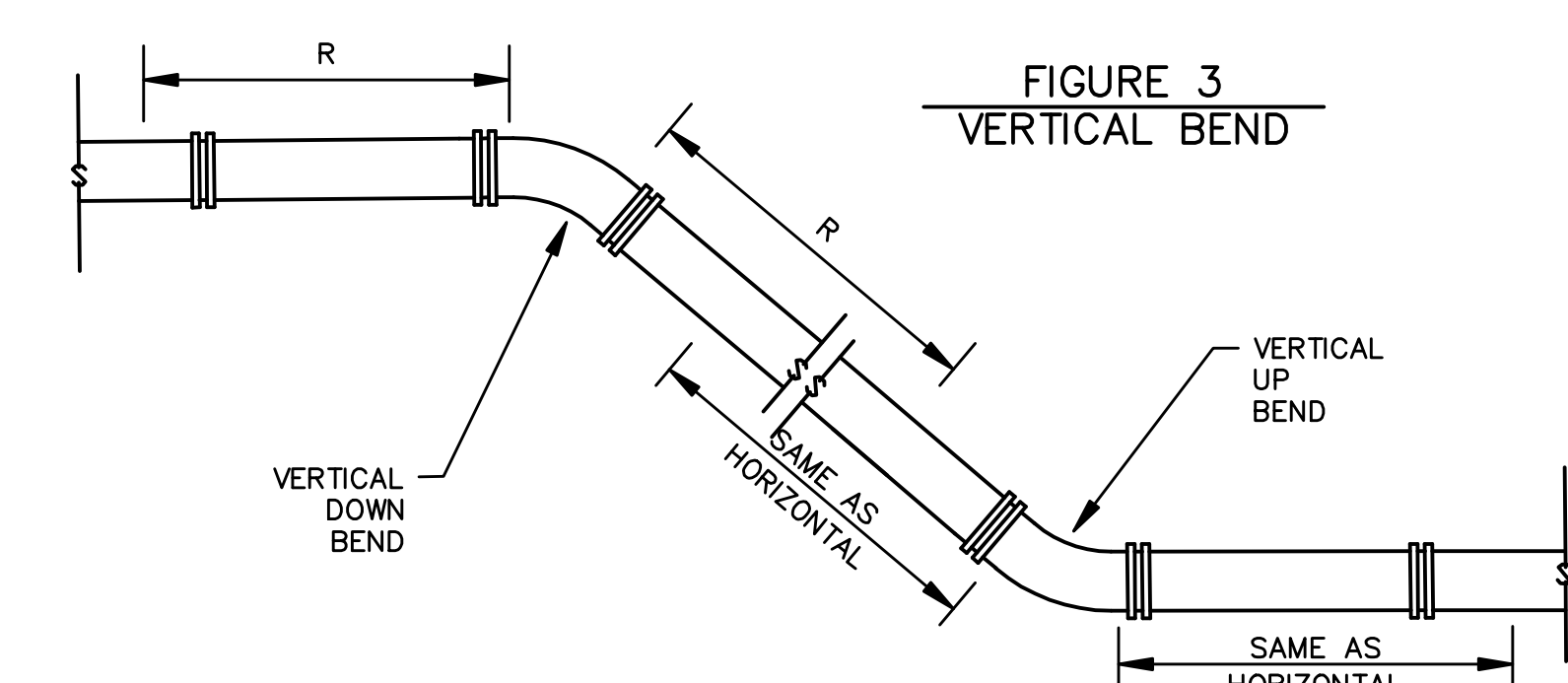
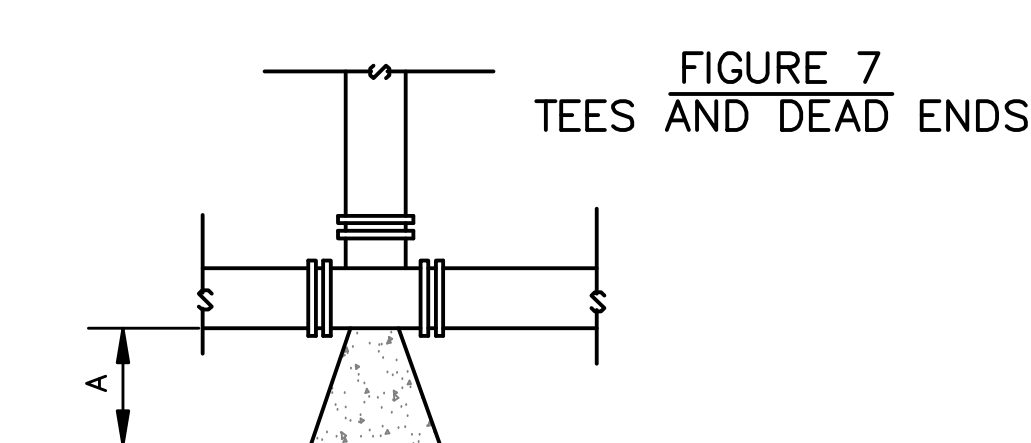
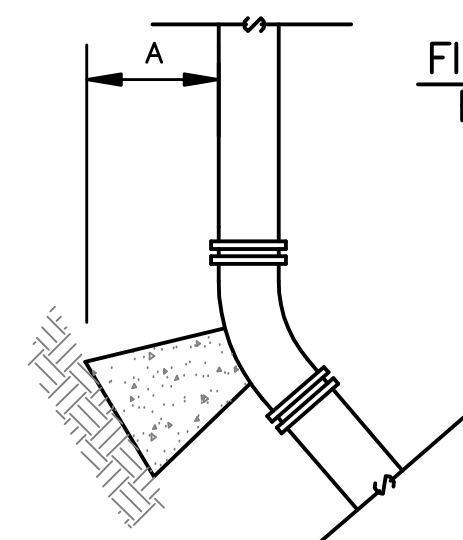
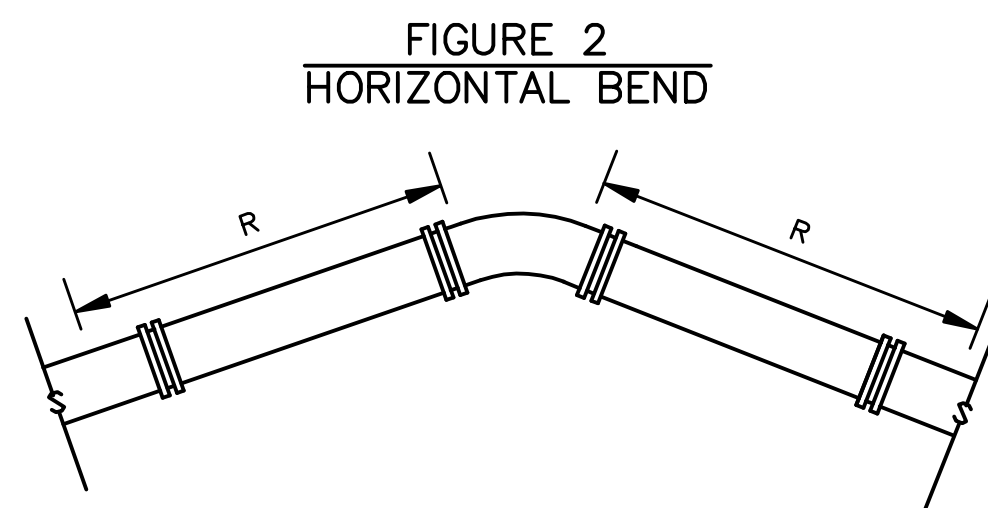
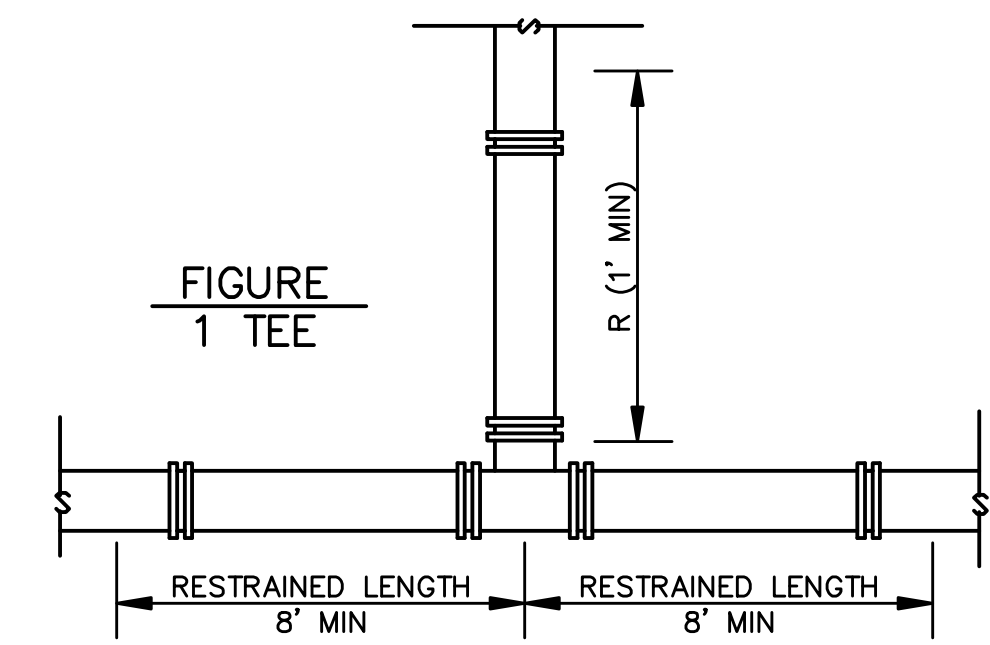
SOIL TYPE	SAFE BEARING LOAD (LBS/SF)
SOFT CLAY	2000
SILT	3000
SAND AND/OR GRAVEL	4000
HARD CLAY	5000

TABLE 1: PIPE RESTRAINT SCHEDULE FOR DUCTILE IRON PIPE WITH POLYETHYLENE WRAP

PIPE DIAMETER	LENGTH (FT) 'R' OF PIPE RESTRAINT											
	TEE	HOR. & VERT. UP BEND				VERTICAL DOWN BEND				DEAD END	REDUCER (ONE SIZE REDUCTION)	REDUCER (TWO SIZE REDUCTION)
		90°	45°	22 1/2°	11 1/2°	45°	22 1/2°	11 1/2°				
4"	1	10	4	2	1	24	12	6	40	-	-	
6"	1	14	6	3	2	34	17	9	56	29	-	
8"	1	18	8	4	2	45	22	11	74	31	53	
10"	12	21	9	5	3	53	26	13	89	31	55	
12"	27	25	11	5	3	63	30	15	105	31	56	

TABLE 2: PIPE RESTRAINT SCHEDULE FOR PVC PIPE

PIPE DIAMETER	LENGTH (FT) 'R' OF PIPE RESTRAINT											
	TEE	HOR. & VERT. UP BEND				VERTICAL DOWN BEND				DEAD END	REDUCER (ONE SIZE REDUCTION)	REDUCER (TWO SIZE REDUCTION)
		90°	45°	22 1/2°	11 1/2°	45°	22 1/2°	11 1/2°				
4"	1	9	4	2	1	16	8	4	26	-	-	
6"	1	12	5	3	2	22	11	6	36	19	-	
8"	1	16	7	4	2	29	14	7	48	20	34	
10"	7	19	8	4	2	35	17	9	57	20	35	
12"	17	22	10	5	3	41	20	10	68	20	36	



TEMPORARY FLUSHING/TESTING CONNECTION FOR 4" THROUGH 12" PIPE

NOTES:
THIS METHOD OF FILLING THE WATER MAIN MAY NOT RESULT IN A WATER VELOCITY GREAT ENOUGH TO FLUSH OUT LARGE OBJECTS OR CLUMPS OF DIRT. IT IS IMPORTANT TO USE GOOD SANITARY INSTALLATION PRACTICES TO ENSURE A CLEAN WATER MAIN THAT WILL PASS THE BACTERIOLOGICAL TEST. LARGE CLUMPS OF DIRT MAY CONTAIN A LARGE ENOUGH QUANTITY OF BACTERIA TO PREVENT THE WATER MAIN FROM PASSING.

THIS FIGURE APPLIES TO PIPES UP TO AND INCLUDING 12" DIAMETER. ALL LARGER SIZES MUST BE HANDLED ON A CASE BY CASE BASIS.

SUPPLY HOSE - CLEAN POTABLE WATER HOSE ONLY. SIZE AND NUMBER OF TAPS PER TABLE "REQUIRED FLOW & OPENINGS TO FLUSH PIPELINES". THIS HOSE SHALL BE REMOVED DURING HYDROSTATIC TEST.

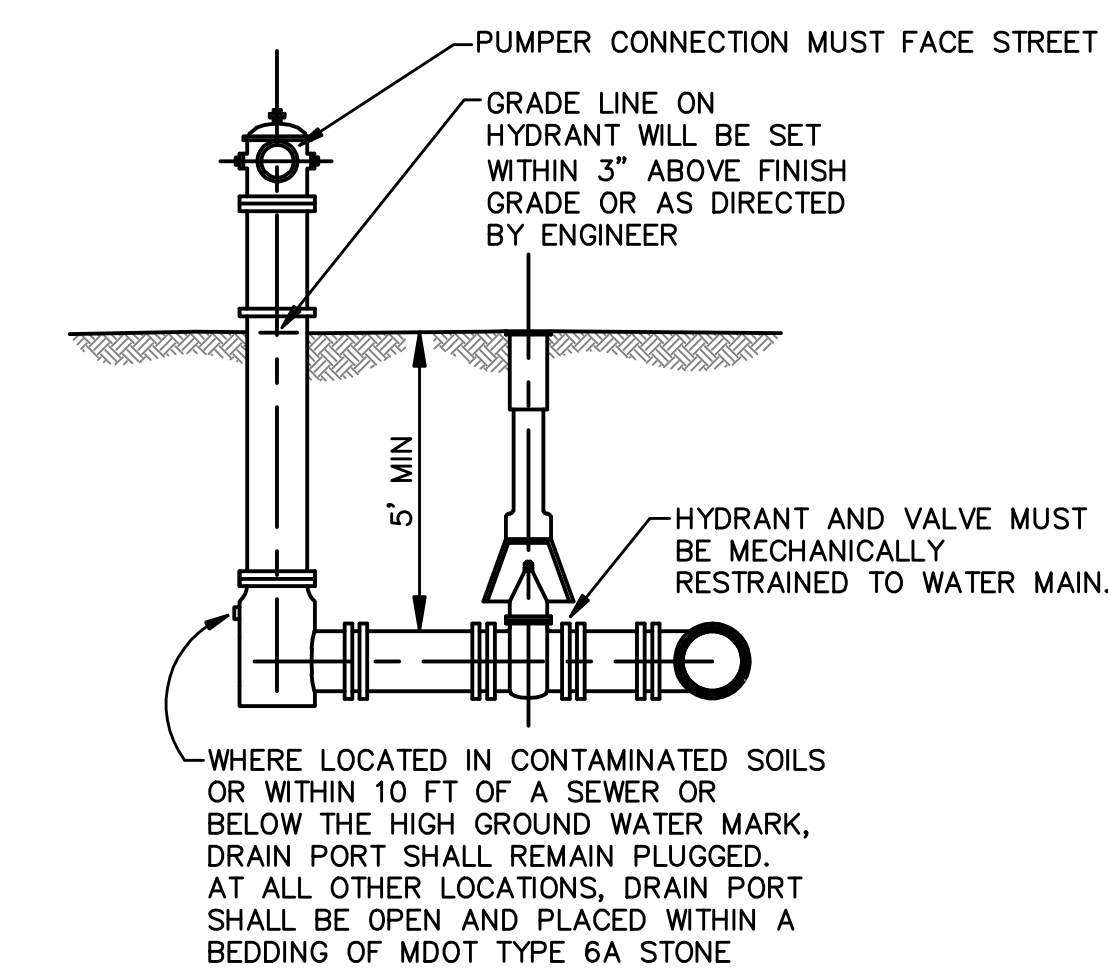
A TEMPORARY HYDRANT SHALL BE USED AS A BLOW OFF FOR 12" & LARGER WATER MAINS.

TABLE 5: REQUIRED FLOW & OPENINGS TO FLUSH PIPELINES

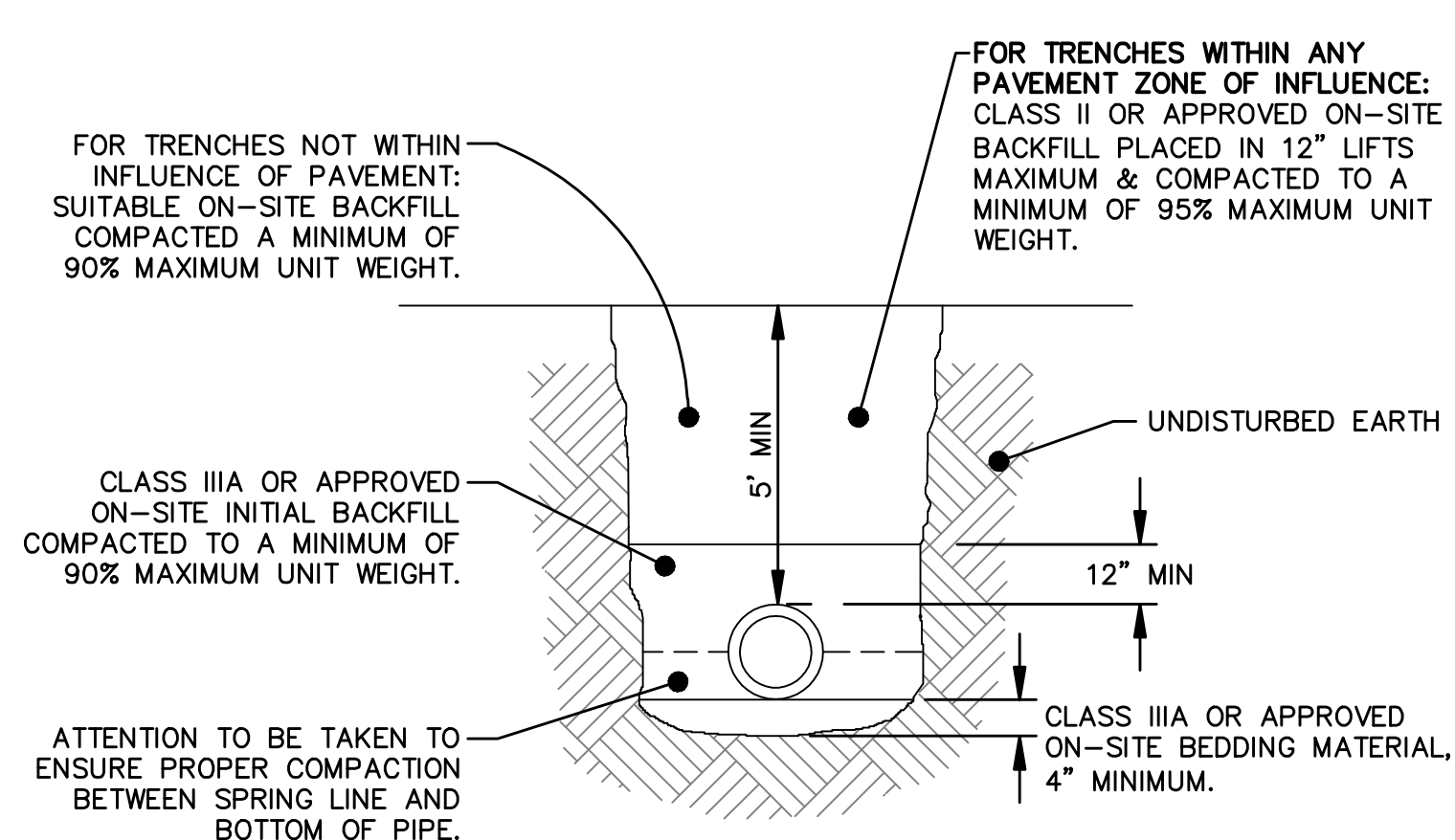
PIPE DIA (inches)	REQUIRED FLOW (gpm)	NUMBER OF 1" TAPS REQUIRED	NUMBER OF 1 1/2" TAPS REQUIRED	NUMBER OF 2" TAPS REQUIRED	NUMBER OF 2 1/2" HYD OUTLETS
4	100	1	-	-	1
6	200	-	1	-	1
8	400	-	2	1	1
10	600	-	3	2	1
12	900	-	-	2	2
16	1600	-	-	4	2

NOTES:
NUMBER OF TAPS ON PIPE BASED ON DISCHARGE THROUGH 5 FEET OF GALVANIZED IRON PIPE WITH ONE 90° ELBOW.

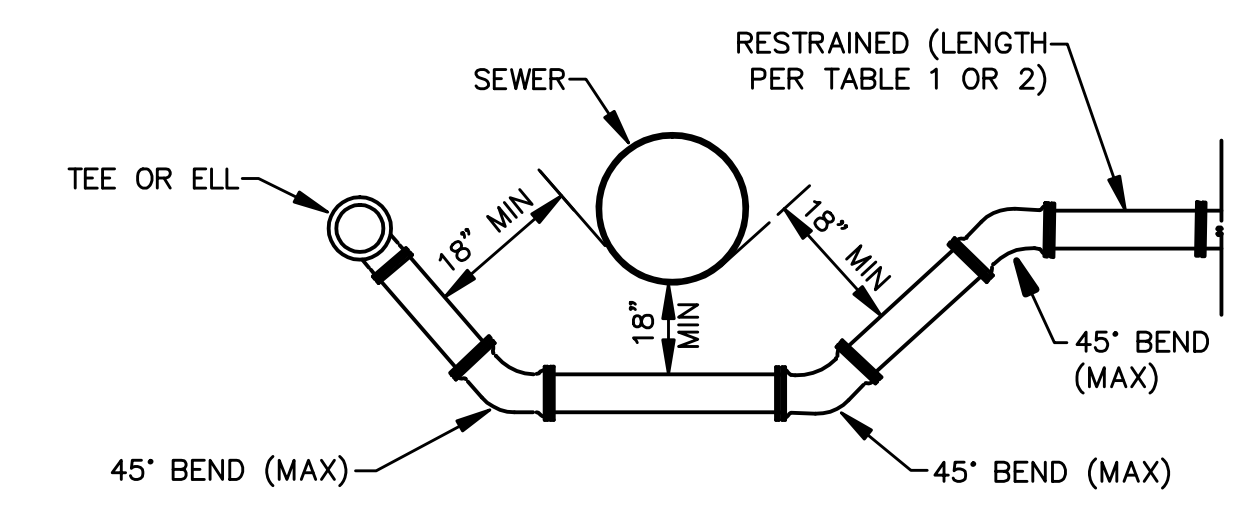
WITH A 40 PSI PRESSURE IN THE WATER MAIN AND THE HYDRANT FLOWING TO ATMOSPHERE, A 2 1/2" HYDRANT OUTLET WILL DISCHARGE APPROXIMATELY 2500 GPM.



STANDARD FIRE HYDRANT CONNECTION

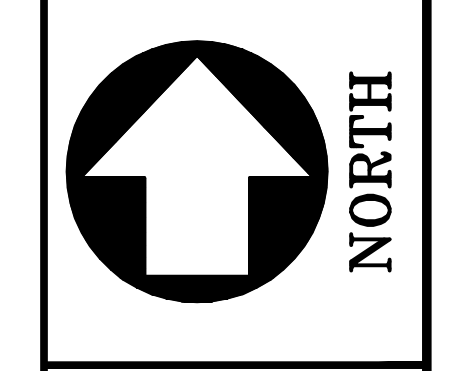


WATER MAIN TRENCH DETAIL EMBEDMENT TYPE 5 PER AWWA 600 AND 605



WATER MAIN CROSSING DETAIL (ALL JOINTS RESTRAINED)

NO.	DESCRIPTION (REVISIONS)	DATE	BY



CITY OF JACKSON
DEPARTMENT OF ENGINEERING

WATER MAIN REPLACEMENT
S. BROWN ST: HIGH ST TO MORRELL ST
WATER DETAILS

DATE:	06/05/2009
HOR SCALE:	N.T.S.
VERT SCALE:	NA
DRAWN BY:	DJD
DESIGN BY:	DJD
CHECKED BY:	RTM
APPROVED BY:	RTM
SHEET	8 OF 8