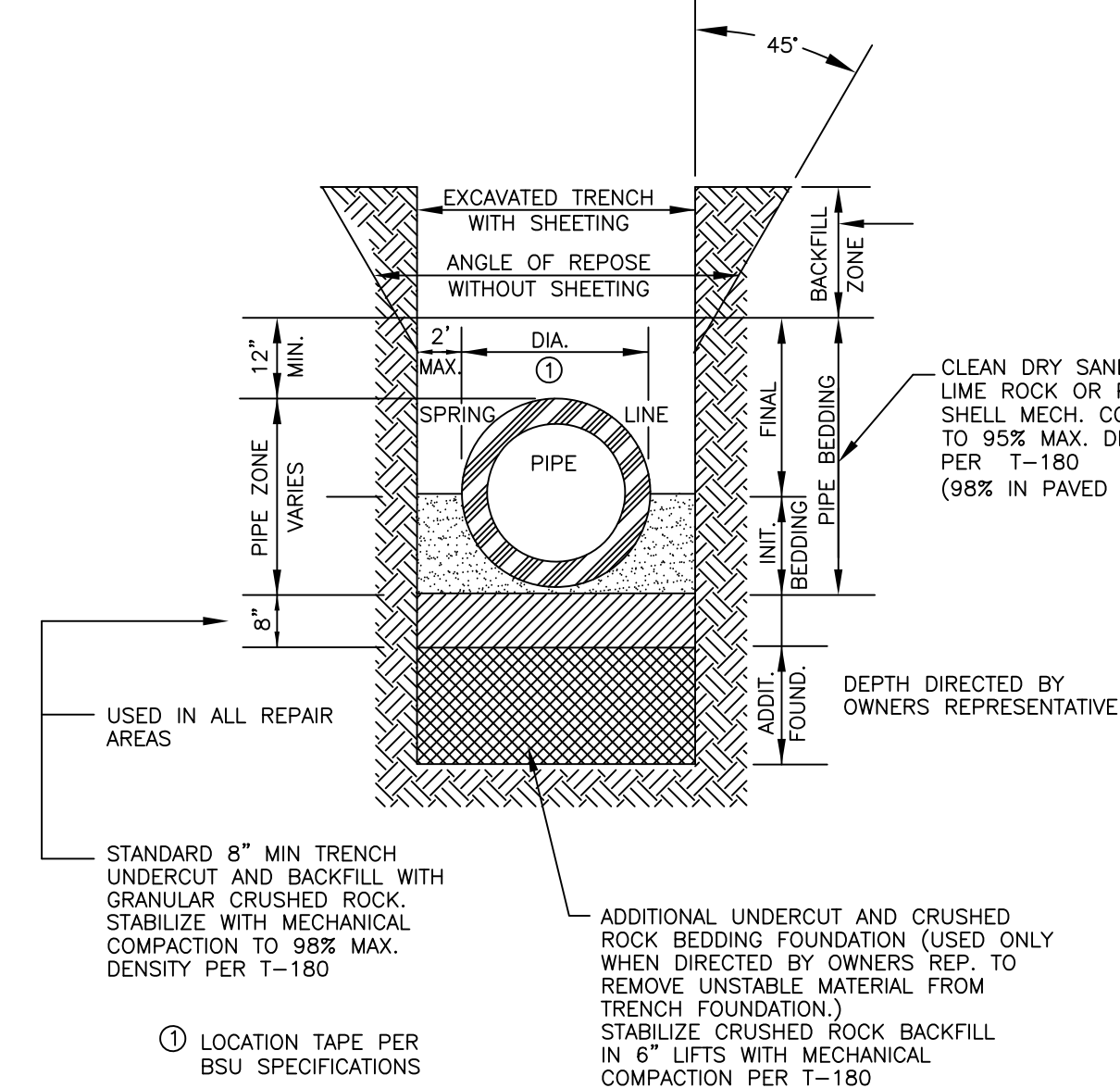


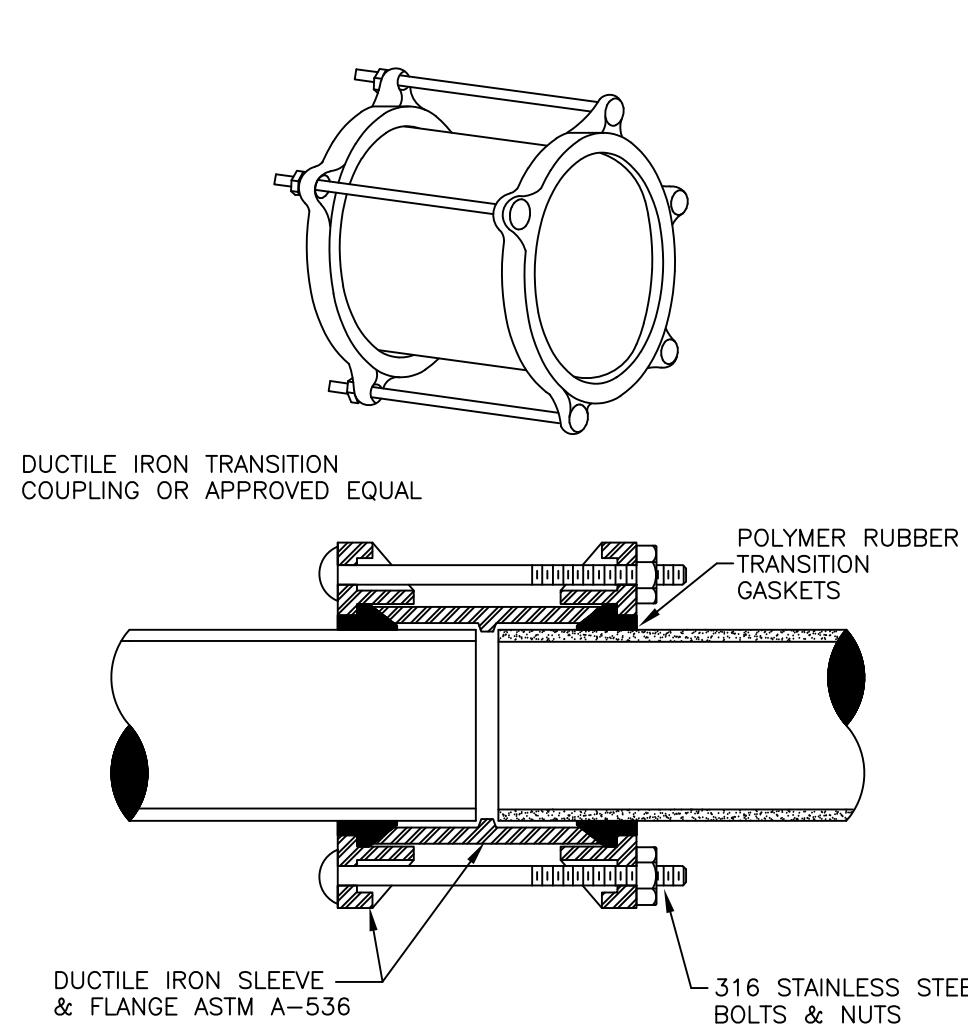
PIPE SIZE	HORIZONTAL BENDS			VERTICAL OFFSETS		DEAD ENDS Lr (FT.)	TEES				REDUCERS (SEE NOTES)			
	90° BENDS Lr (FT.)	45° BENDS Lr (FT.)	22.5° BENDS Lr (FT.)	45° BENDS (SEE NOTE 2) Lhs (FT.)	45° BENDS (SEE NOTE 2) Lrs (FT.)		RUN SIZE	BRANCH SIZE	Lr (FT.)	Lr (FT.)	SIZE	L(A) (FT.)	L(B) (FT.)	
4"	27	11	5	3	31	8	60	4"	4"	10	11	6 x 4	64	43
6"	37	15	7	4	43	11	84	6"	4" OR LESS	10	34	8 x 6	60	46
8"	48	20	10	5	57	15	110	8"	6" OR LESS	10	59	10 x 8	55	44
10"	57	24	11	6	68	17	131	10"	8" OR LESS	10	17	10 x 6	133	81
12"	57	24	11	6	68	19	131	10"	10" OR LESS	10	80	12 x 10	46	38
16"	58	24	12	6	55	19	106	10"	8" OR LESS	10	45	12 x 8	104	69
20"	70	29	14	7	67	23	129	12"	10" OR LESS	10	15	16 x 12	61	45
24"	81	33	16	8	78	27	150	12"	12" OR LESS	10	79	16 x 10	103	63
								12"	10" OR LESS	10	49	20 x 16	58	45
								12"	10" OR LESS	10	15	20 x 12	139	81
								16"	16" OR LESS	10	73	24 x 20	55	45
								16"	12" OR LESS	10	38	24 x 16	128	82
								20"	10" OR LESS	10	24	24 x 16	128	82
								24"	10" OR LESS	10	116	24 x 10	116	87
								24"	10" OR LESS	10	27	24 x 10	116	87
								24"	10" OR LESS	10	53	24 x 10	116	87
								24"	10" OR LESS	10	10	24 x 10	116	87
								24"	10" OR LESS	10	10	24 x 10	116	87

- NOTES:**
- LENGTHS SHOWN ON THIS TABLE ARE TO BE INTERPRETED AS FOLLOWS:  
 Lhs = RESTRAINED LENGTH FROM HIGH SIDE FITTING OF A VERT. BEND  
 Lrs = RESTRAINED LENGTH FROM LOW SIDE FITTING OF VERT. BEND  
 Lr = RESTRAINED LENGTH ON BOTH SIDES FROM FITTING  
 Lr = MINIMUM LENGTH TO FIRST JOINT OF RUN ON BOTH SIDES  
 Lbr = RESTRAINED LENGTH REQUIRED ON BRANCH FROM FITTING  
 L(A) = LENGTH OF PIPE ON SMALL SIDE FREE OF FITTING  
 L(B) = RESTRAINED LENGTH ON LARGE SIDE OF REDUCER
  - A SAFETY FACTOR = 2.5 IS USED FOR VERTICAL OFFSETS TO COMPENSATE FOR SATURATED SOIL CONDITIONS. A SAFETY FACTOR = 2.0 IS USED FOR ALL OTHER CASES.
  - L(A) AND L(B) ABOVE ARE TWO OPTIONS FOR PROVIDING THE REQUIRED TRUST RESTRAINT FOR THE FITTING. EITHER (A) LENGTH OF PIPE FREE OF FITTINGS (BENDS, TEES, REDUCERS OR VALVES) ON THE SMALL SIDE OF THE REDUCER WILL PROVIDE THE REQUIRED RESTRAINT OR L(B) LENGTH CAN BE RESTRAINED ON THE LARGE SIDE OF THE FITTING.
  - THE FOLLOWING ARE ASSUMED:  
 4" - 10" PIPE HAS 30" MIN. COVER  
 12" - 24" PIPE HAS 36" MIN. COVER  
 4" - 24" PIPE IS PVC
  - VALVES SHALL BE RESTRAINED ON EITHER SIDE OF THE FITTING AS A MINIMUM. IN LINE VALVES SHALL HAVE NO FITTINGS WITHIN THE LENGTHS SHOWN ON THIS TABLE FOR THE SAME SIZE DEAD END. IN CASES WHERE THIS LENGTH CAN NOT BE PROVIDED, FREE OF FITTINGS, ADDITIONAL RESTRAINT SHALL BE REQUIRED AS APPROVED BY ENGINEER.
  - ALL DEAD END LINES, PERMANENT OR TEMPORARY, SHALL BE RESTRAINED PER THE ABOVE RESTRAINT TABLE.
  - ALL VALVES SHALL BE RESTRAINED AS DEAD ENDS, IN BOTH FLOW DIRECTIONS, PER THIS TABLE.

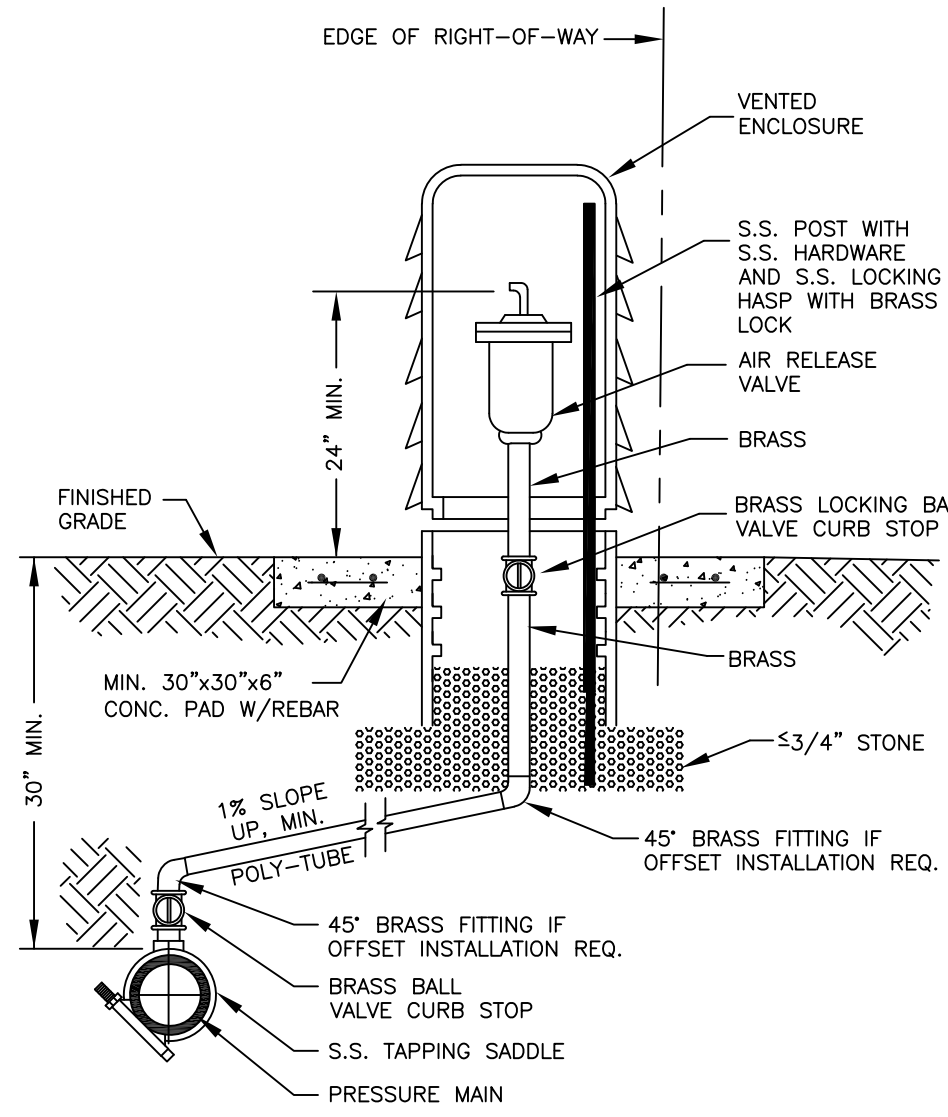
**RESTRAINT TABLE**  
CB-1



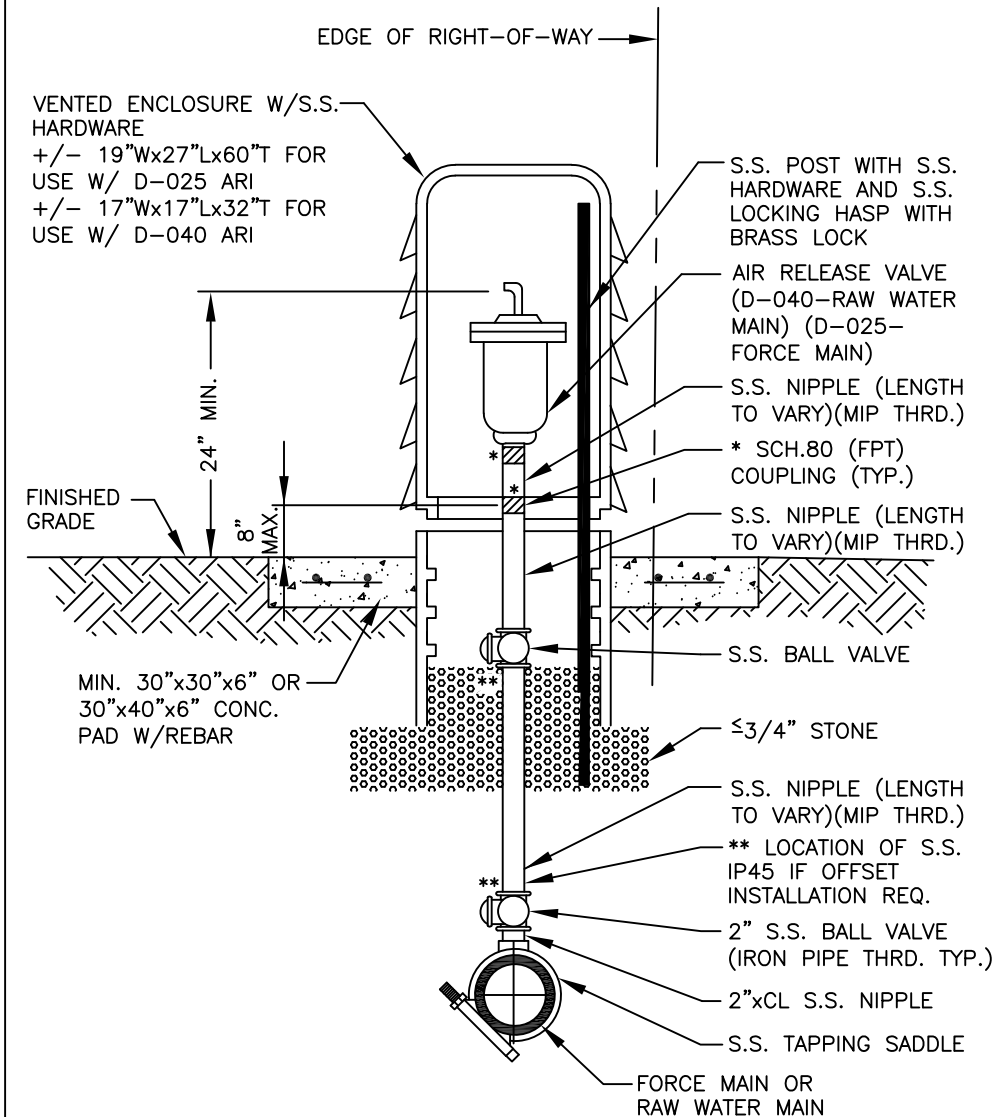
**TRENCH CROSS SECTION**  
CB-9



**DUCTILE IRON TRANSITION COUPLING**  
CB-5



**AIR RELEASE VALVE (WATER)**  
(2" ONLY)  
CB-4



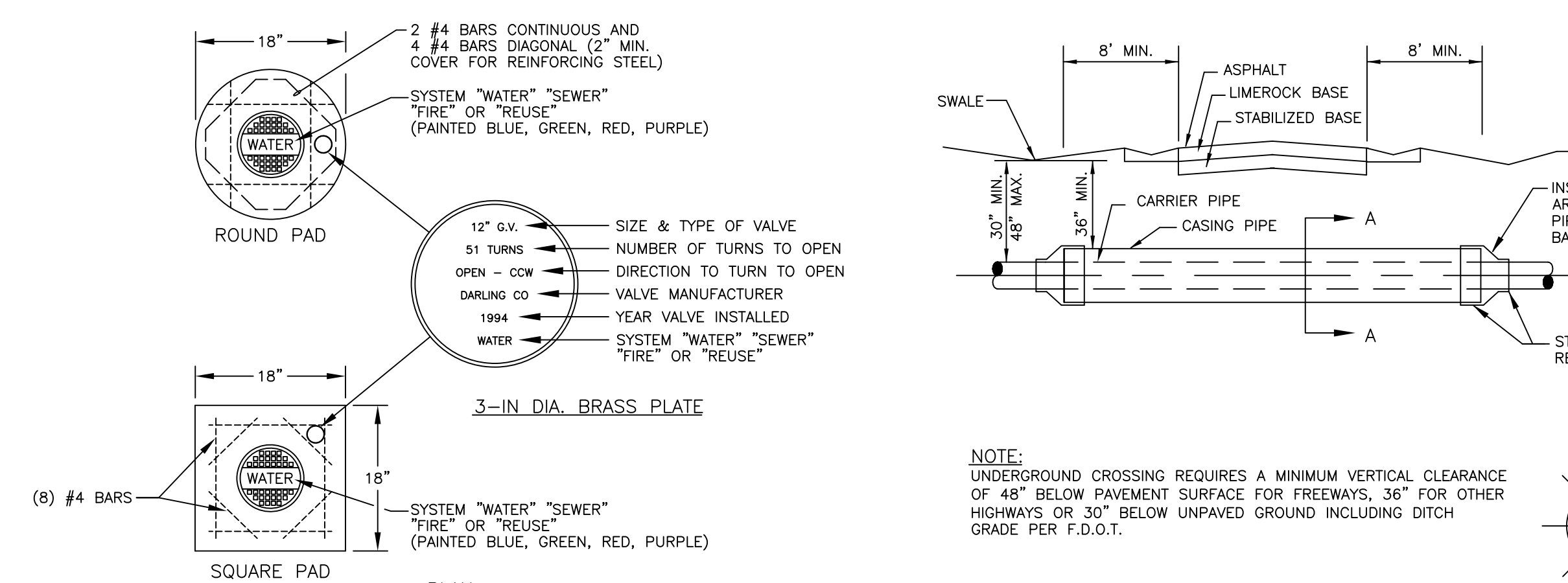
**AIR RELEASE VALVE (RAW WATER/SEWER)**  
(2" ONLY)  
CB-4

**LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH F.A.C. RULE 62-555.314**

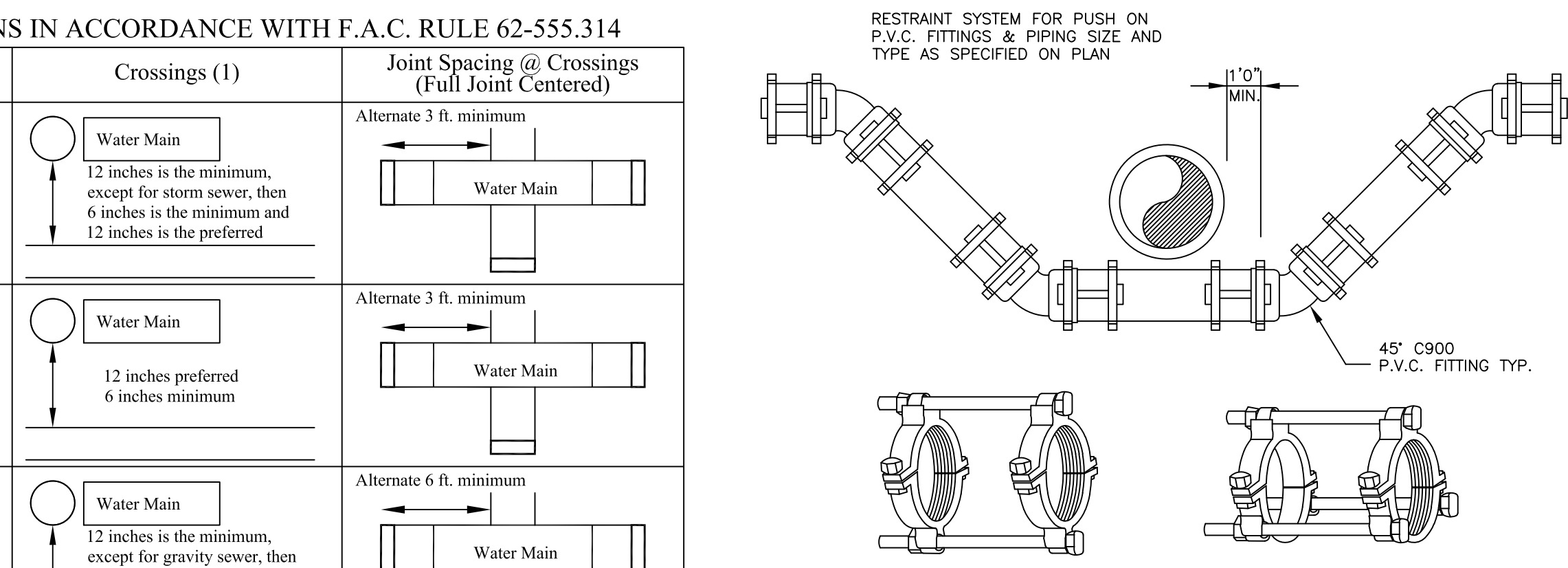
Other Pipe	Horizontal Separation	Crossings (1)	Joint Spacing @ Crossings (Full Joint Centered)
Storm Sewer, Stormwater Force Main, Reclaimed Water (2)	Water Main 3 ft. minimum	Water Main 12 inches is the minimum, except for storm sewer, then 6 inches is the minimum and 12 inches is the preferred	Alternate 3 ft. minimum
Vacuum Sanitary Sewer	Water Main 10 ft. preferred 3 ft. minimum	Water Main 12 inches preferred 6 inches minimum	Alternate 3 ft. minimum
Gravity or Pressure Sanitary Sewer, Sanitary Sewer Force Main, Reclaimed Water (4)	Water Main 10 ft. preferred 6 ft. minimum (3)	Water Main 12 inches is the minimum, except for gravity sewer, then 6 inches is the minimum and 12 inches is the preferred	Alternate 6 ft. minimum
Sanitary Sewer Force Main, Reclaimed Water (4)	10 ft. minimum	---	---

- Water main should cross above other pipe. When water main must be below other pipe, the minimum separation is 12 inches.
- Reclaimed water regulated under Part III of Chapter 62-610, F.A.C.
- 3 ft. for gravity sanitary sewer where the bottom of the water main is laid at least 6 inches above the top of the gravity sanitary sewer.
- Reclaimed water not regulated under Part III of Chapter 62-610, F.A.C.

**CROSSING DETAIL**  
CB-7

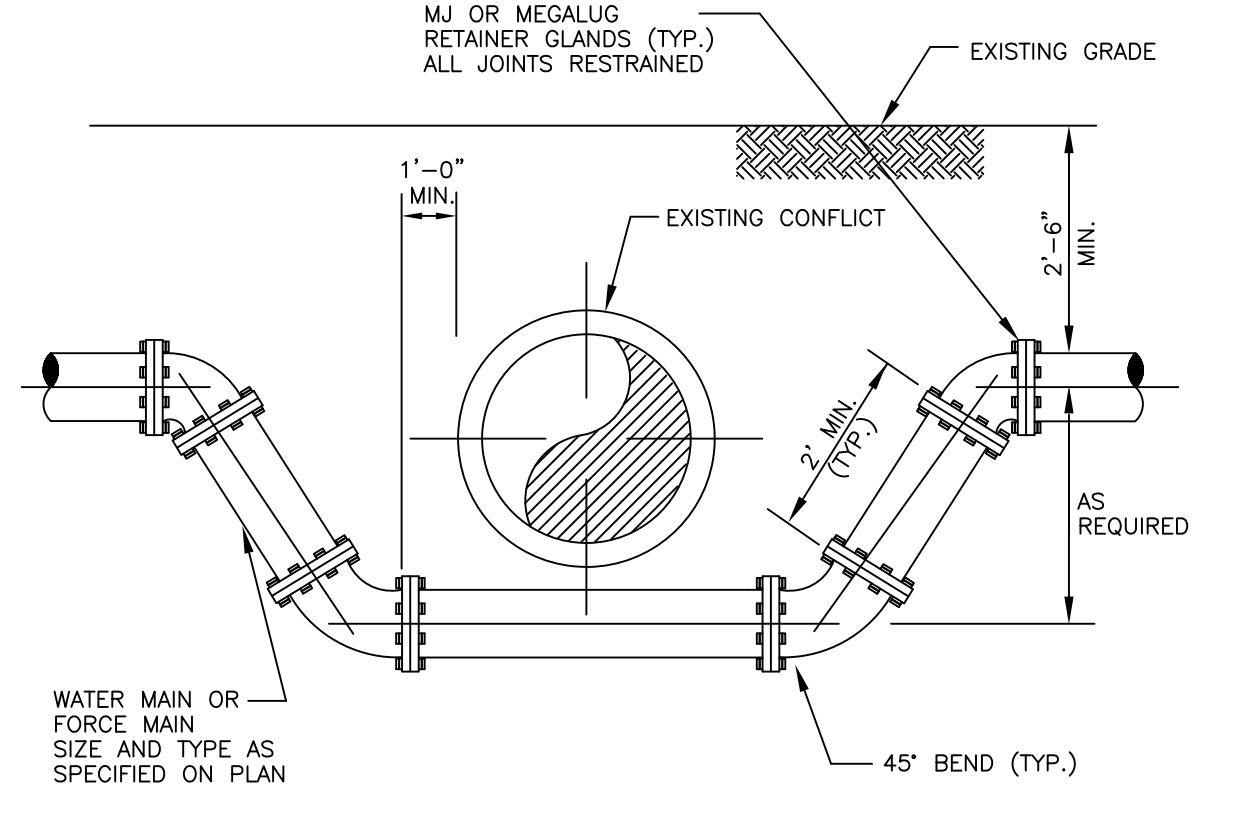


**VALVE PAD**  
CB-11

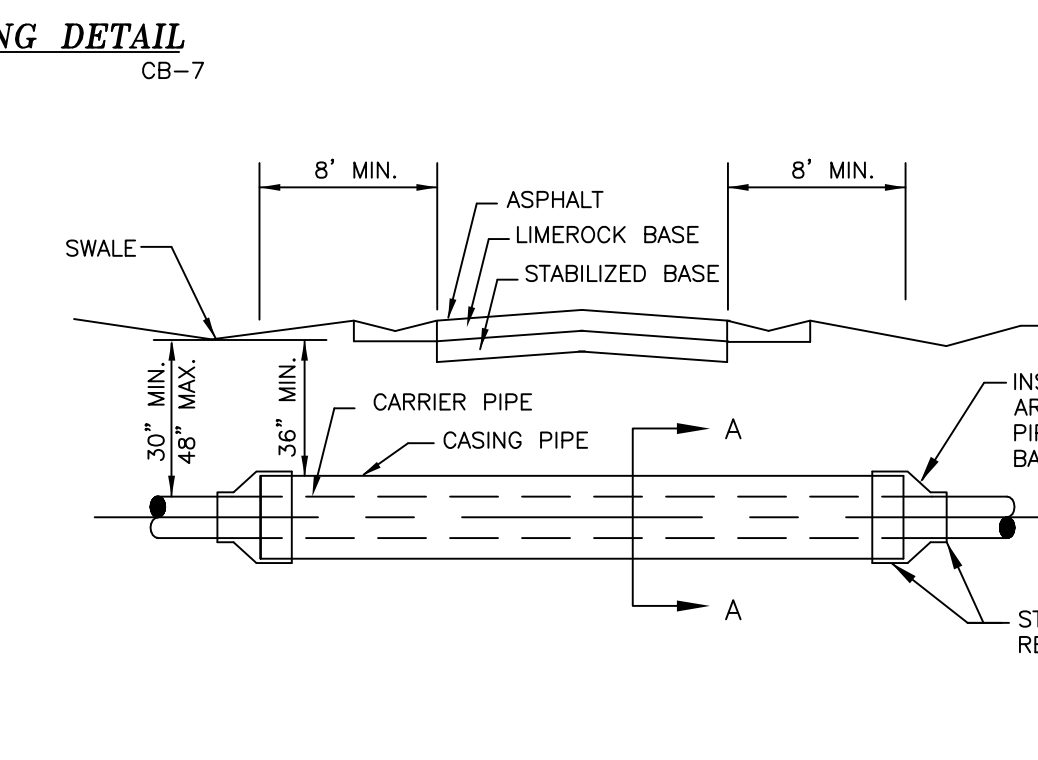


**RESTRAINT DETAIL FOR ADJUSTING PVC PRESSURE LINE DUE TO CONFLICTS**

**PVC PRESSURE LINE CONFLICT ADJUSTMENT FITTINGS**  
CB-6

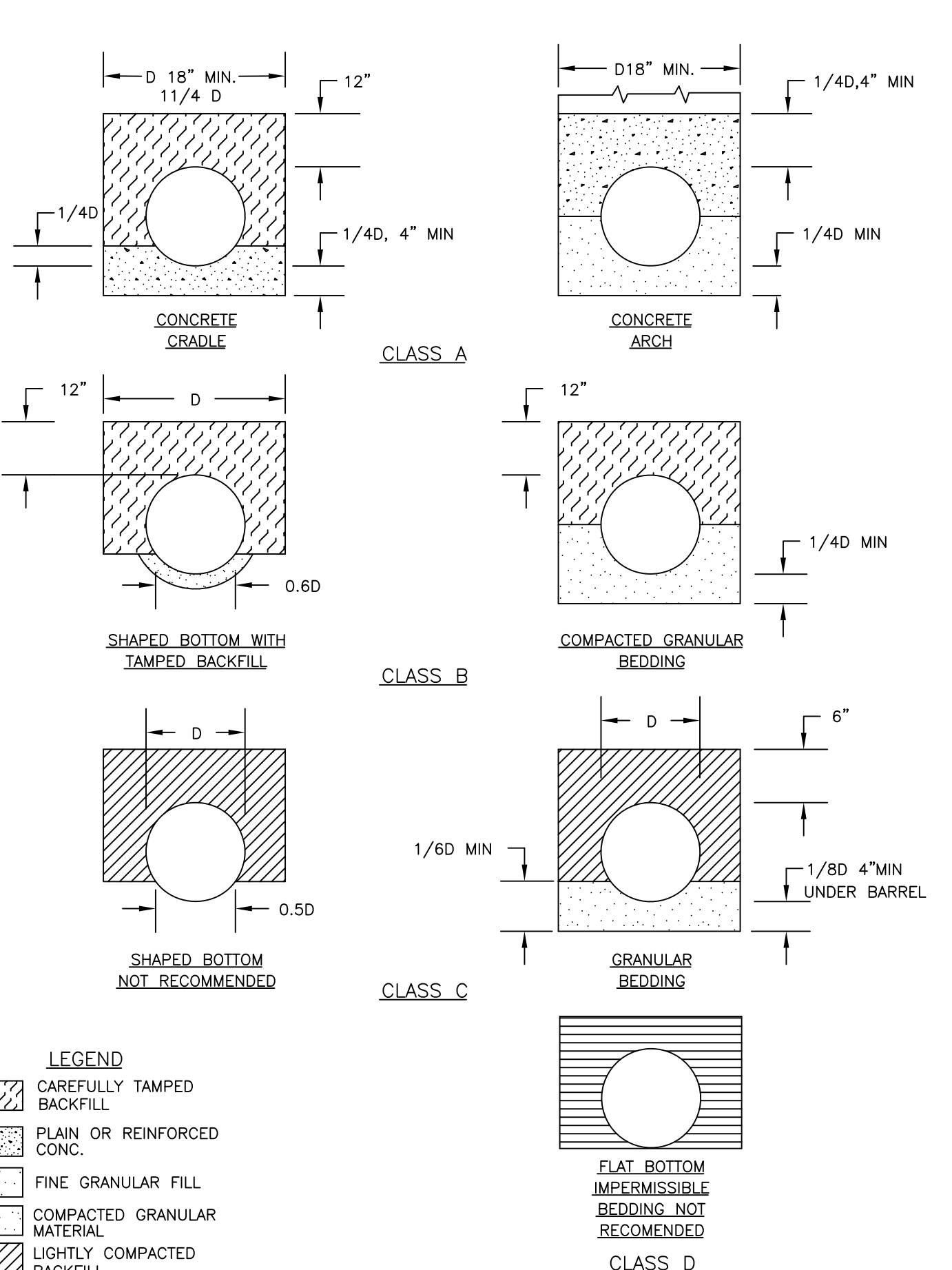


**CONFLICT ADJUSTMENT MJ**  
CB-8

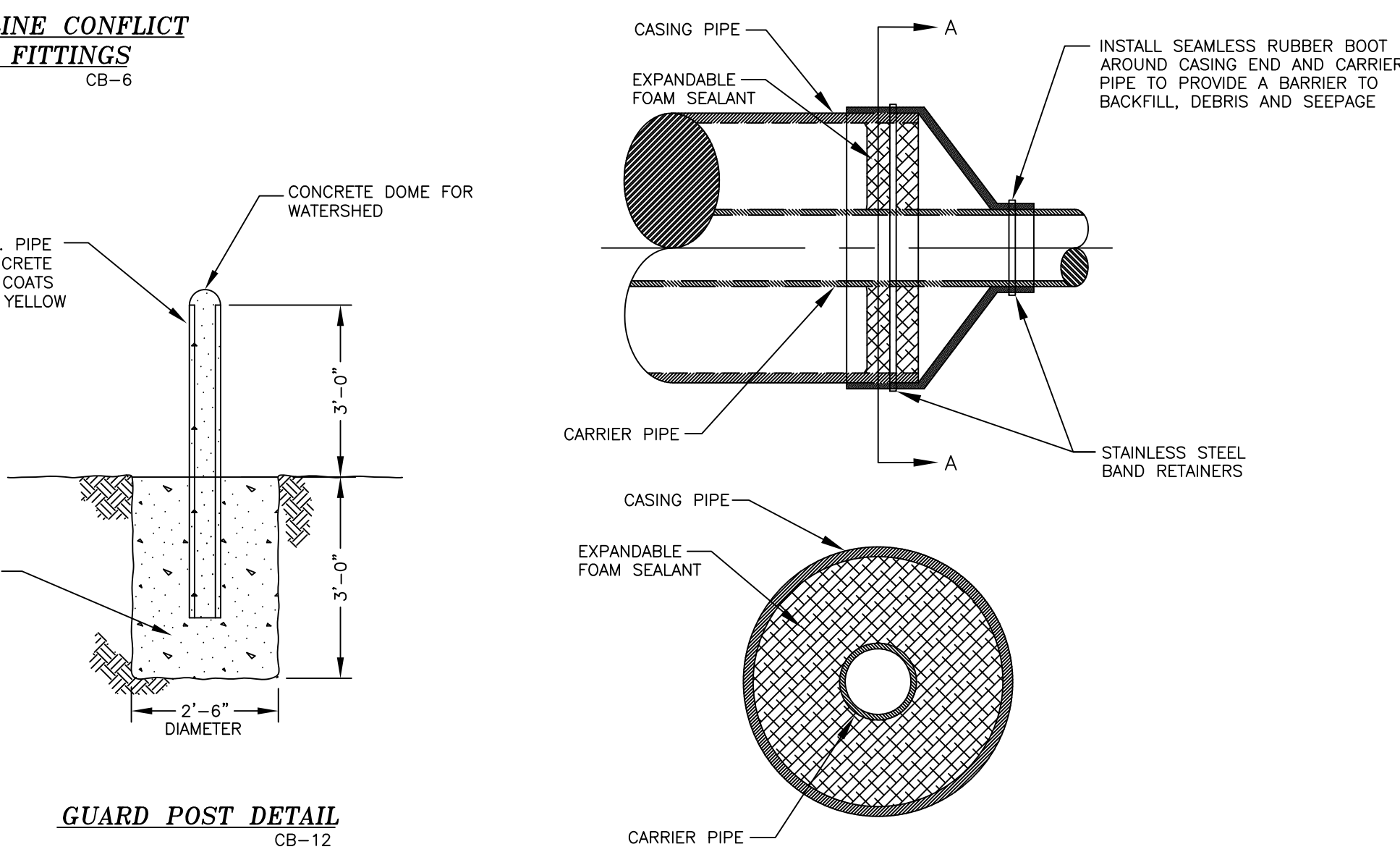


**GUARD POST DETAIL**  
CB-12

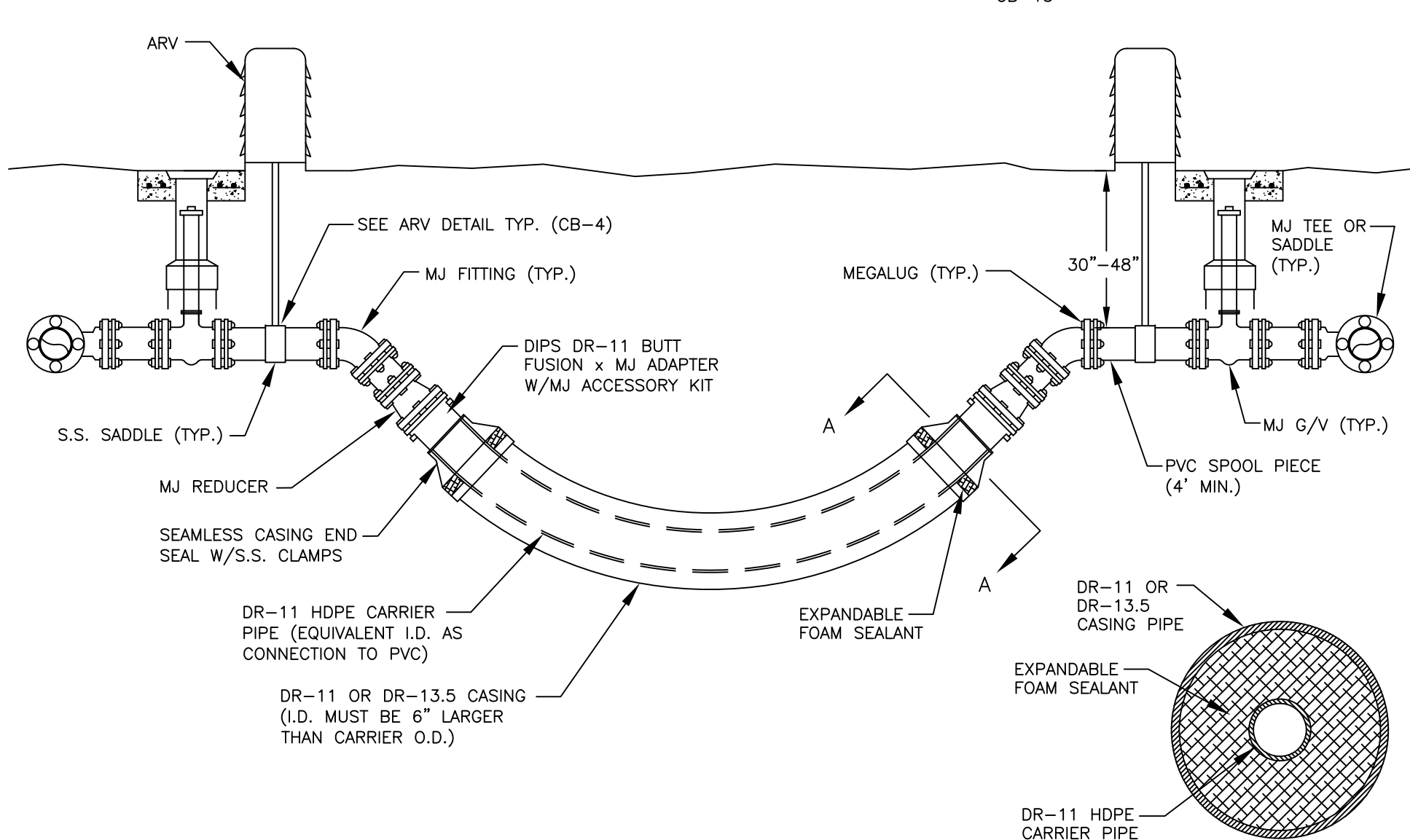
**JACK AND BORE**  
CB-10



**PIPE BEDDING**  
CB-3



**END SEAL/CASING PIPE**  
CB-13



**DIRECTIONAL DRILL**  
CB-14

CONSULTANT'S COMMENTS:

B.S.U. DETAIL SHEETS MUST REMAIN AS IS (NO ALTERATIONS) IF ADDITIONAL DETAILS ARE REQUIRED SUBMIT ON SEPARATE SHEET

CLIENT: PROJECT:

TITLE: **COMBINATION WATER/WASTEWATER DETAILS**

SCALE: NOT TO SCALE

DATE: APRIL 2019

11900 E. TERRY STREET  
 BONITA SPRINGS, FLORIDA 34135  
 PHONE: (239) 992-0711 FAX: (239) 992-9223

DWG #: COMBDET.DWG  
 SHEET OF

**Bonita Springs Utilities, Inc.**

DETAIL CB-2 DELETED