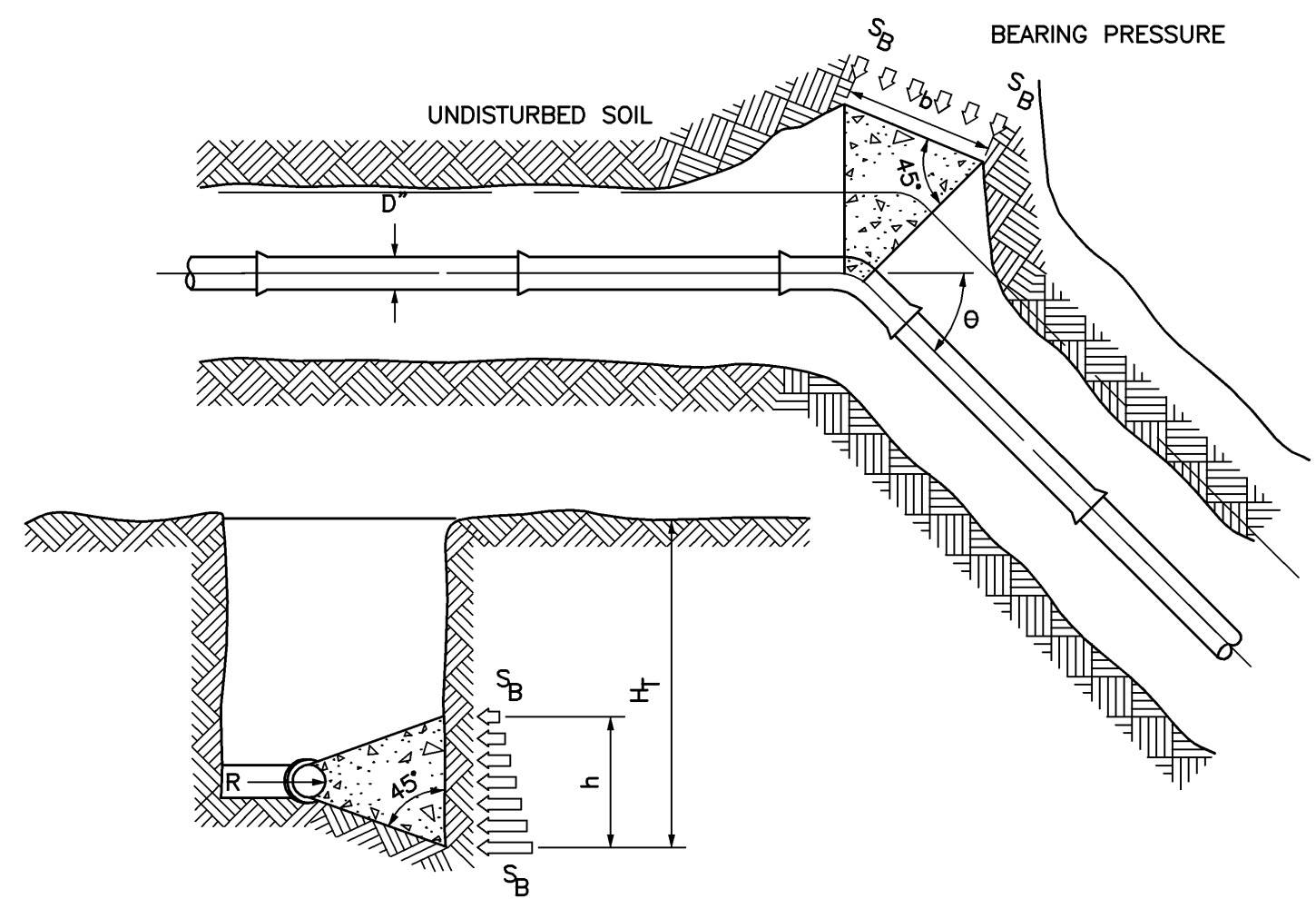


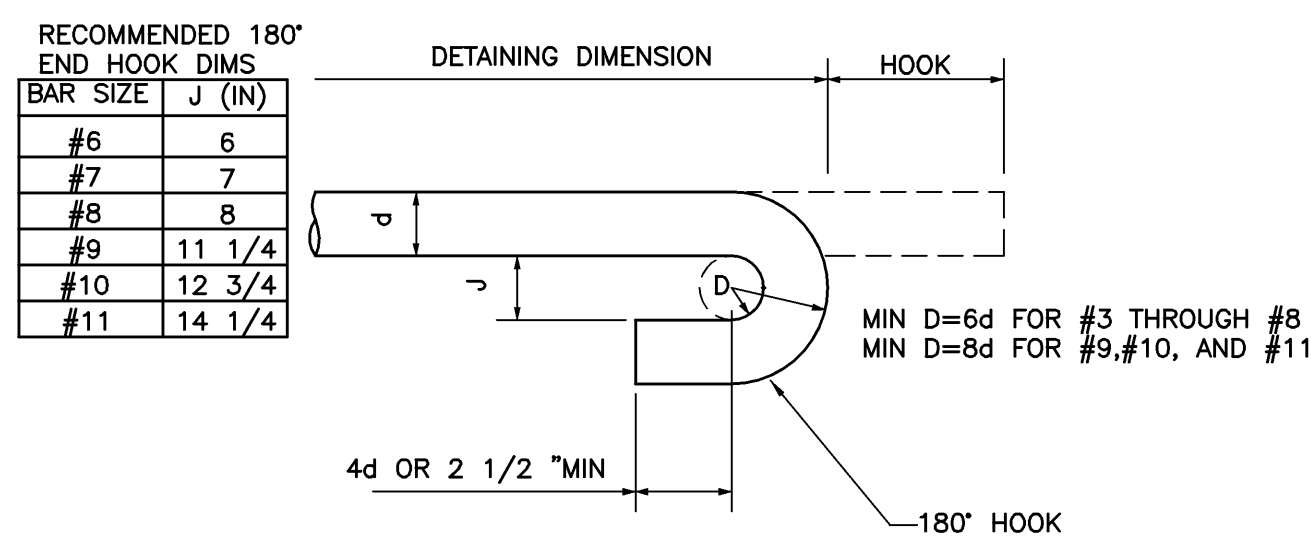
- NOTES:
1. CONCRETE NOT TO OVERLAP ANY JOINT.
  2. CONCRETE TO BE PLACED SO AS NOT TO INTERFERE WITH REMOVING OR INSTALLING ANY OF THE JOINTING HARDWARE.
  3. FOR REDUCERS USE MECHANICAL JOINT FITTINGS WITH RETAINER GLANDS.

**1 TYPICAL CONC THRUST BLOCK DETAILS**  
SCALE: NONE  
CROSS REFERENCE: NONE



- NOTES:
1. BEARING SURFACE SHOULD, WHERE POSSIBLE, BE PLACED AGAINST UNDISTURBED SOIL. WHERE IT IS NOT POSSIBLE, THE FILL BETWEEN THE BEARING SURFACE AND UNDISTURBED SOIL MUST BE COMPACTED TO AT LEAST 90% STANDARD PROCTOR DENSITY.
  2. BLOCK HEIGHT(h) SHOULD BE EQUAL TO OR LESS THAN ONE-HALF THE TOTAL DEPTH TO THE BOTTOM OF THE BLOCK, (HT), BUT NOT LESS THAN THE PIPE DIAMETER (D').
  3. BLOCK HEIGHT(h) SHOULD BE CHOSEN SUCH THAT THE CALCULATED BLOCK WIDTH(b) VARIES BETWEEN ONE AND TWO TIMES THE HEIGHT.

**2 BEARING BLOCK DETAILS**  
SCALE: NONE  
CROSS REFERENCE: NONE



**3 ACI STANDARD HOOKS**  
SCALE: NONE  
CROSS REFERENCE: NONE

**TYPE A BLOCKING**  
FOR 11 1/4 - 22 1/2 VERT BENDS

PIPE SIZE NOM DIA (INCHES)	VERTICAL BEND DEGREE	NO. OF CUTS OF CONC BLOCKING	SIDE OF CUBE (FEET)	DIA OF SHACKLE RODS (INCHES)	DEPTH OF RODS IN CONC (FEET)
4"	11 1/4	8	2.0	3/4"	1.6
	22 1/2	16	2.5		
6"	11 1/4	16	2.5	3/4"	1.6
	22 1/2	32	3.2		
8"	11 1/4	28	3.0	3/4"	1.6
	22 1/2	56	3.8		
10"	11 1/4	42	3.5	3/4"	1.6
	22 1/2	84	4.4		
12"	11 1/4	60	3.9	3/4"	1.6
	22 1/2	118	4.9		
16"	11 1/4	104	4.7	1/8"	3.7
	22 1/2	205	5.9		
20"	11 1/4	161	5.4	1/4"	4.6
	22 1/2	316	6.8		
24"	11 1/4	229	6.1	3/8"	5.7
	22 1/2	450	7.7		

\* FOR 60KSI THREADED REBAR

**TYPE B BLOCKING**  
FOR 45° VERTICAL BENDS

PIPE SIZE NOM DIA (INCHES)	NO. OF CUTS OF CONC BLOCKING	SIDE OF CUBE (FEET)	DIA OF SHACKLE RODS (INCHES)	DEPTH OF RODS IN CONC (FEET)
4"	29	3.1	3/4"	1.6
6"	59	3.9		
8"	102	4.7	3/4"	1.6
10"	154	5.4		
12"	218	6.0	1/8"	3.7
16"	378	7.2		
20"	583	8.3	1/4"	4.6
24"	832	9.4		

**4 GRAVITY THRUST BLOCK DETAILS**  
SCALE: NONE  
CROSS REFERENCE: NONE

**REQUIRED BEARING AREAS -b (SQFT) FOR BEARING BLOCKS\***

PIPE SIZE (INCHES)	TEE	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
4	2.0	2.8	1.5	0.8	0.4
6	4.2	5.9	3.2	1.6	0.8
8	7.2	10.1	5.5	2.8	1.4
10	10.9	15.4	8.3	4.2	2.1
12	15.4	21.8	11.8	6.0	3.0
16	26.8	37.9	20.5	10.4	5.2
20	41.2	58.2	31.5	16.1	8.1
24	58.8	83.1	45.0	22.9	11.5

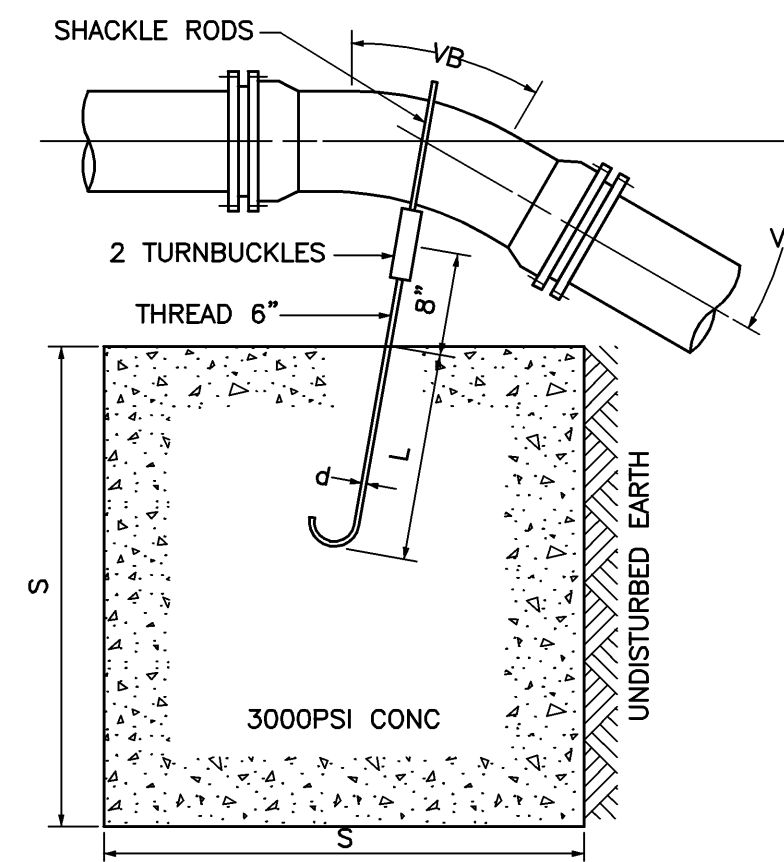
**THRUST REACTIONS-R(LB) PER 100PSI INTERNAL PRESSURE**

NOM PIPE DIA IN.	DEAD END	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
4	1,810	2,559	1,385	706	355
6	3,739	5,288	2,862	1,459	733
8	6,433	9,097	4,923	2,510	1,261
10	9,677	13,685	7,406	3,776	1,897
12	13,685	19,353	10,474	5,340	2,683
16	23,779	33,628	18,199	9,278	4,661
20	36,644	51,822	28,046	14,298	7,183
24	52,279	73,934	40,013	20,398	10,249

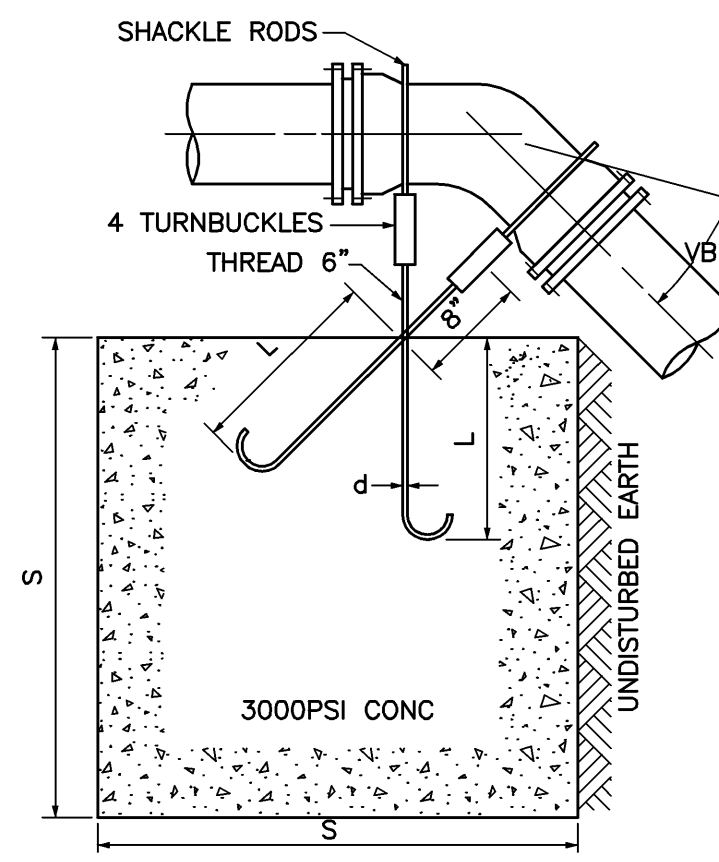
- \*FACTOR OF SAFETY=1.5  
SOIL BEARING OF 3,000 PSI  
225 PSI DESIGN PRESSURE
- NOTES:
1. VALUES FOR TEE APPLY TO TEES, END PLUGS, CAPS, AND TAPPING SLEEVES.
  2. REQUIRED BEARING AREAS ARE DUE TO THRUSTS CAUSED BY 150PSI WORKING PRESSURE PLUS 50%(75 PSI) SURGE ALLOWANCE RESULTING IN 225 PSI TOTAL INTERNAL PRESSURE.
  3. REQUIRED BEARING AREAS ARE BASED ON ALLOWABLE SOIL BEARING CAPACITY OF 3,000 POUNDS PER SQUARE FOOT. DUE TO OTHER SOIL CONDITIONS ENCOUNTERED, BEARING AREAS MAY BE MODIFIED BY THE ENGINEER.

SOIL	BEARING STRENGTH S <sub>B</sub> (LB/SQ FT)
MUCK	0
SOFT CLAY	1,000
SILT	1,500
SANDY SILT	3,000
SAND	4,000
SANDY CLAY	6,000
HARD CLAY	9,000

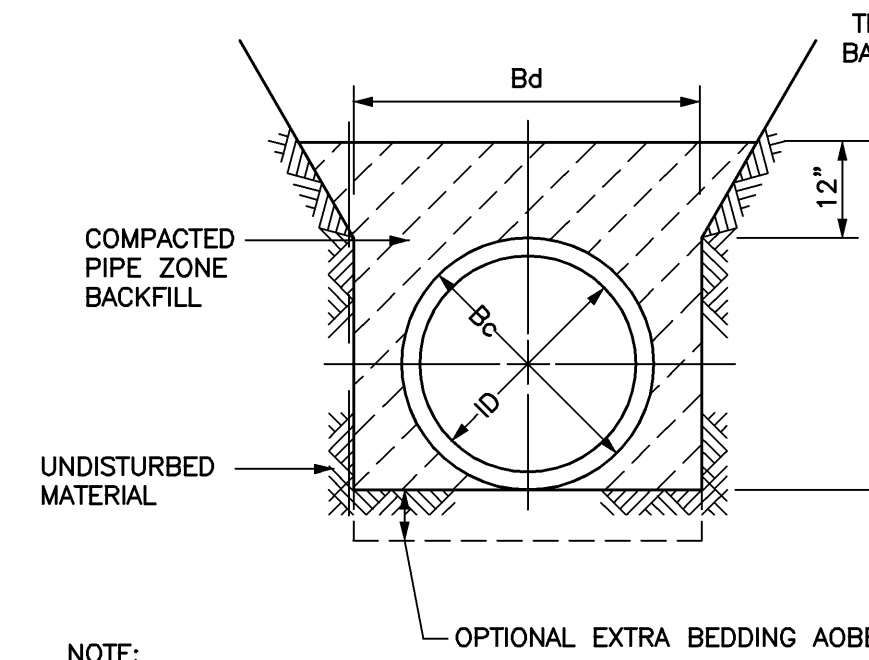
4. IN MUCK, PEAT, OR RECENTLY PLACED FILL ALL THRUSTS SHALL BE RESISTED BY PILES OR TIE RODS TO SOLID FOUNDATIONS, OR BY REMOVAL OF SUCH UNSTABLE MATERIAL AND REPLACEMENT WITH BALLAST OF SUFFICIENT STABILITY TO RESIST THE THRUSTS, ALL AS REQUIRED BY THE ENGINEER.



**TYPE A BLOCKING**  
FOR 11 1/4 - 22 1/2 VERTICAL BENDS



**TYPE B BLOCKING**  
FOR 45° VERTICAL BENDS



- NOTE:
1. AOB: AS ORDERED BY ENGINEER.
  2. OVEREXCAVATE FOR BELLS.

**6 LAYING CONDITION TYPE 2**  
SCALE: NONE  
CROSS REFERENCE: NONE

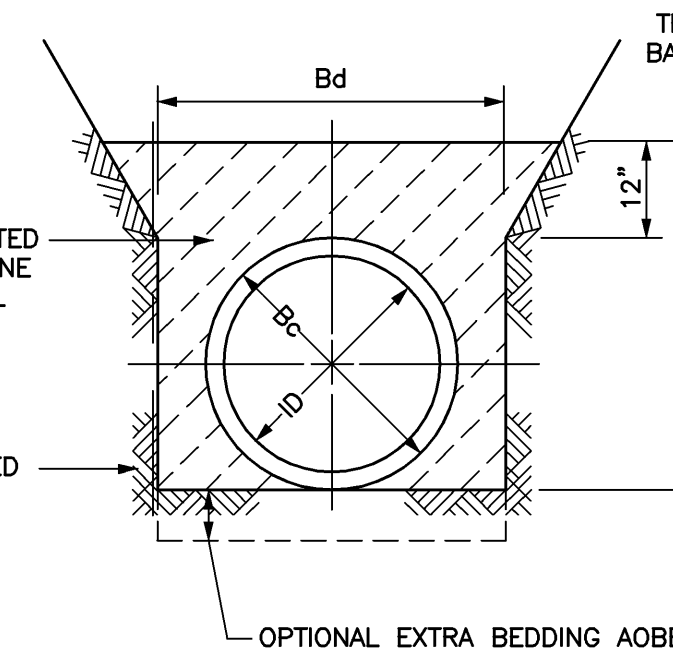
PIPE DIMENSIONS			TRENCH DIMENSIONS		
NOMINAL ID	DISPLACEMENT 1/2 PIPE OD (CY/LF)	BARREL OD (Bc)	BELL OD	Bd	ROCK* EXCAVATION BELOW PIPE(d)
6"	0.005	6.9"	8.75"	30"	6"
8"	0.008	9.1"	11.1"	32"	6"
10"	0.012	11.1"	13.2"	34"	6"
12"	0.018	13.2"	15.3"	36"	6"
16"	0.031	17.4"	20.0"	40"	6"
20"	0.047	21.6"	24.3"	44"	6"
24"	0.067	25.8"	28.5"	48"	6"

\*BELOW AND ON EACH SIDE OF ALL PIPE, VALVES & FITTINGS.

**5 LAYING CONDITION TYPE 4**  
SCALE: NONE  
CROSS REFERENCE: NONE

THIS IS THE STANDARD CONSTRUCTION METHOD AND SHOULD BE USED UNLESS OTHERWISE DIRECTED BY ENGINEER

5 SW2

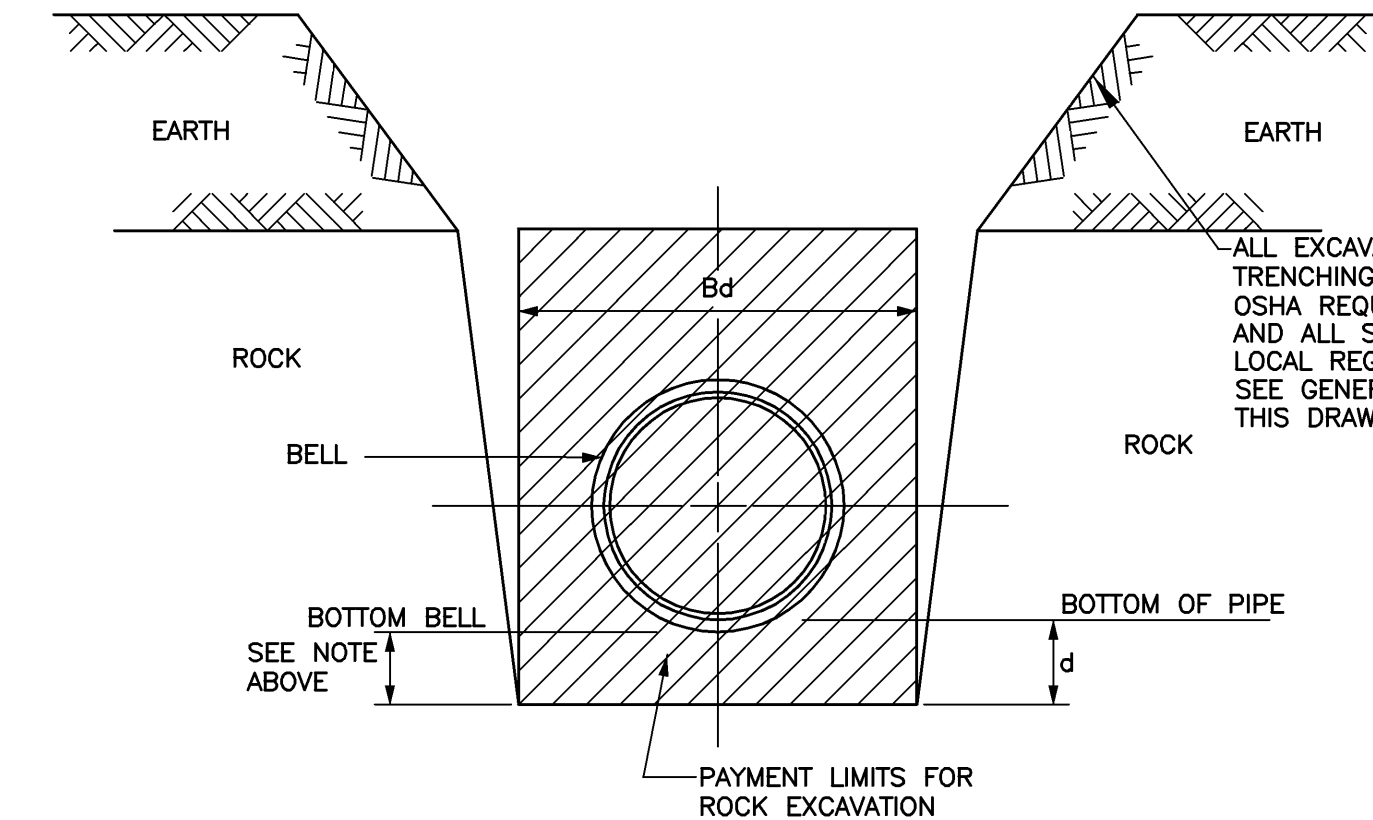


- NOTE:
1. OVEREXCAVATE AT BELLS TO PROVIDE 4" BEDDING BELOW BELLS.

**7 LAYING CONDITION TYPE 5**  
SCALE: NONE  
CROSS REFERENCE: NONE

- NOTE:
1. AOB: AS ORDERED BY ENGINEER.
  2. OVEREXCAVATE AT BELLS TO PROVIDE 4" BEDDING BELOW BELLS.

7 SW2



**8 TYPICAL TRENCH WITH ROCK EXCAVATION**  
SCALE: NONE  
CROSS REFERENCE: NONE

**GENERAL NOTES**

- EXCAVATION, TRENCHING, SHEETING AND SHORING REQUIREMENTS:
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADEQUACY OF ALL SHEETING AND SHORING USED AND FOR ALL DAMAGE RESULTING FROM ITS FAILURE OR FROM PLACING, MAINTAINING AND REMOVING IT.
- REQUIREMENTS OF REGULATORY AGENCIES:
    - SUBPART 23-4, "EXCAVATION OPERATIONS", OF NEW YORK STATE DEPARTMENT OF LABOR INDUSTRIAL CODE RULE 23.
    - SUBPART P, "EXCAVATIONS" OF UNITED STATES DEPARTMENT OF LABOR OSHA REGULATIONS FOR CONSTRUCTION.
    - THE MORE STRINGENT REQUIREMENT IN EACH OF THE ABOVE CODES SHALL APPLY. THESE REQUIREMENTS ARE MINIMUM REQUIREMENTS AND SHALL BE INCREASED IF NECESSARY TO PROVIDE SAFE WORKING CONDITIONS.
    - ALL MUNICIPAL, COUNTY, STATE, OR FEDERAL ORDINANCES, REGULATIONS, OR LAWS AND ALL NECESSARY PERMITS AND APPROVALS OBTAINED BY THE CONTRACTOR SHALL BE OBSERVED.

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PROJ. NO :  
SCALE : AS SHOWN  
DATE :

**STANDAR DETAILS**  
**THRUST RESTRAINT AND TRENCH DETAILS**

**CLIFTON PARK WATER AUTHORITY**

TOWN OF CLIFTON PARK SARATOGA COUNTY, NEW YORK

**C.T. MALE ASSOCIATES, P.C.**  
50 CENTURY HILL DRIVE, P.O. BOX 727, LATHAM, NY 12110  
518.786.7400 \* FAX 518.786.7299  
ARCHITECTURE & BUILDING SYSTEMS ENGINEERING \* CIVIL ENGINEERING  
ENVIRONMENTAL SERVICES \* SURVEY & LAND INFORMATION SERVICES

**SW2**  
SHEET 2 OF 2  
DWG. NO: