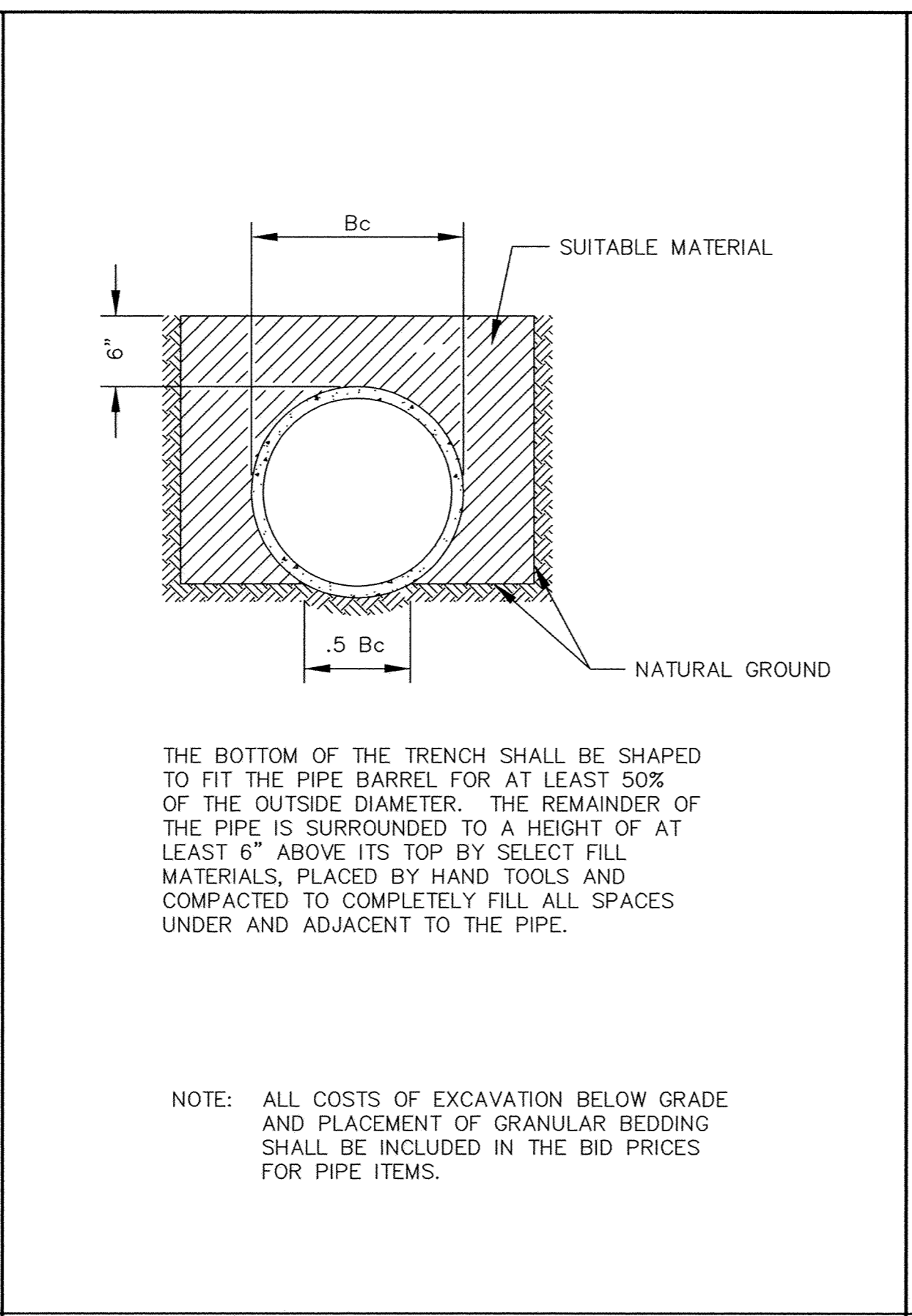


NOTE: ALL COSTS OF EXCAVATION BELOW GRADE AND PLACEMENT OF GRANULAR BEDDING SHALL BE INCLUDED IN THE BID PRICES FOR PIPE ITEMS.

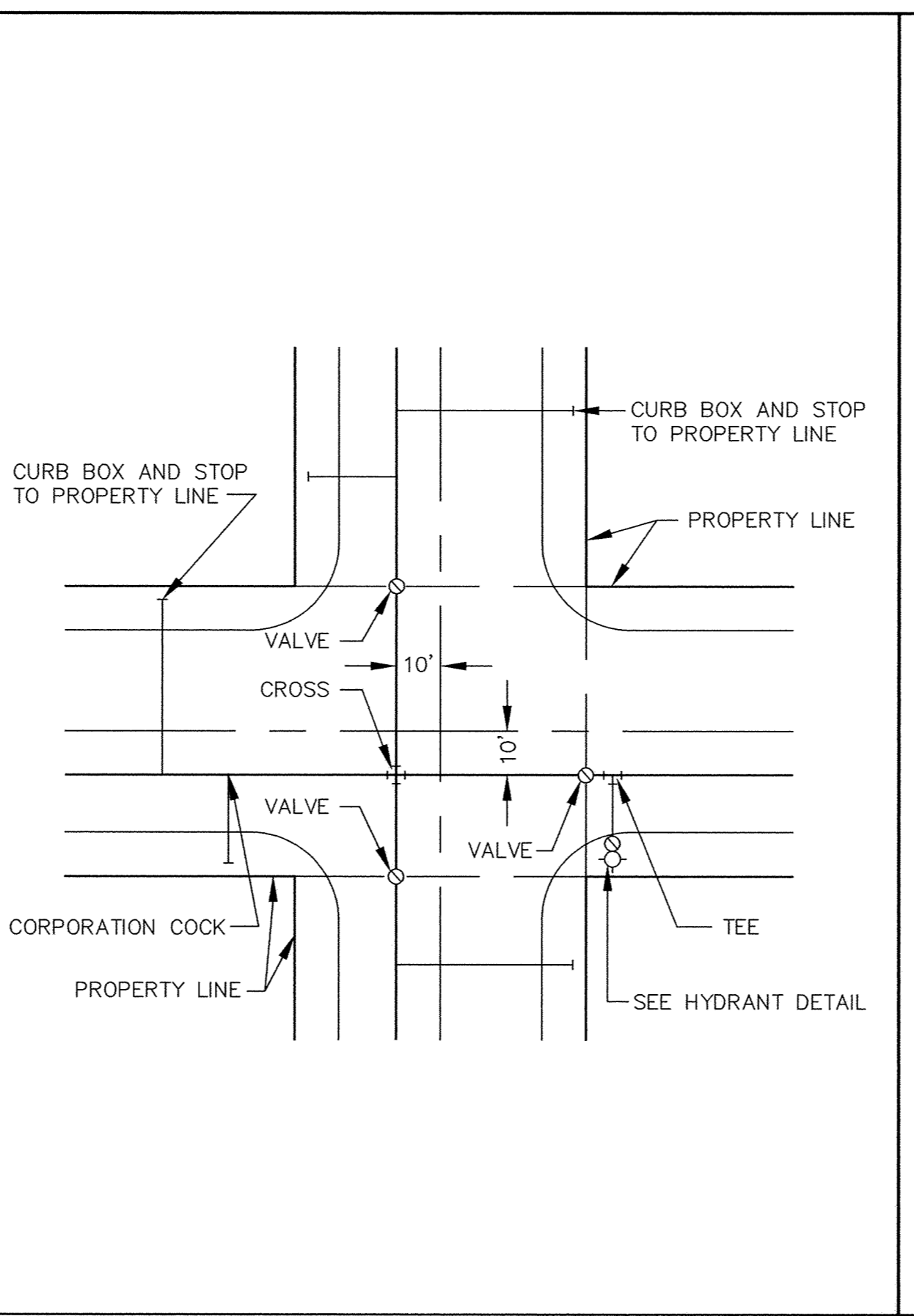
CLASS B PIPE BEDDING



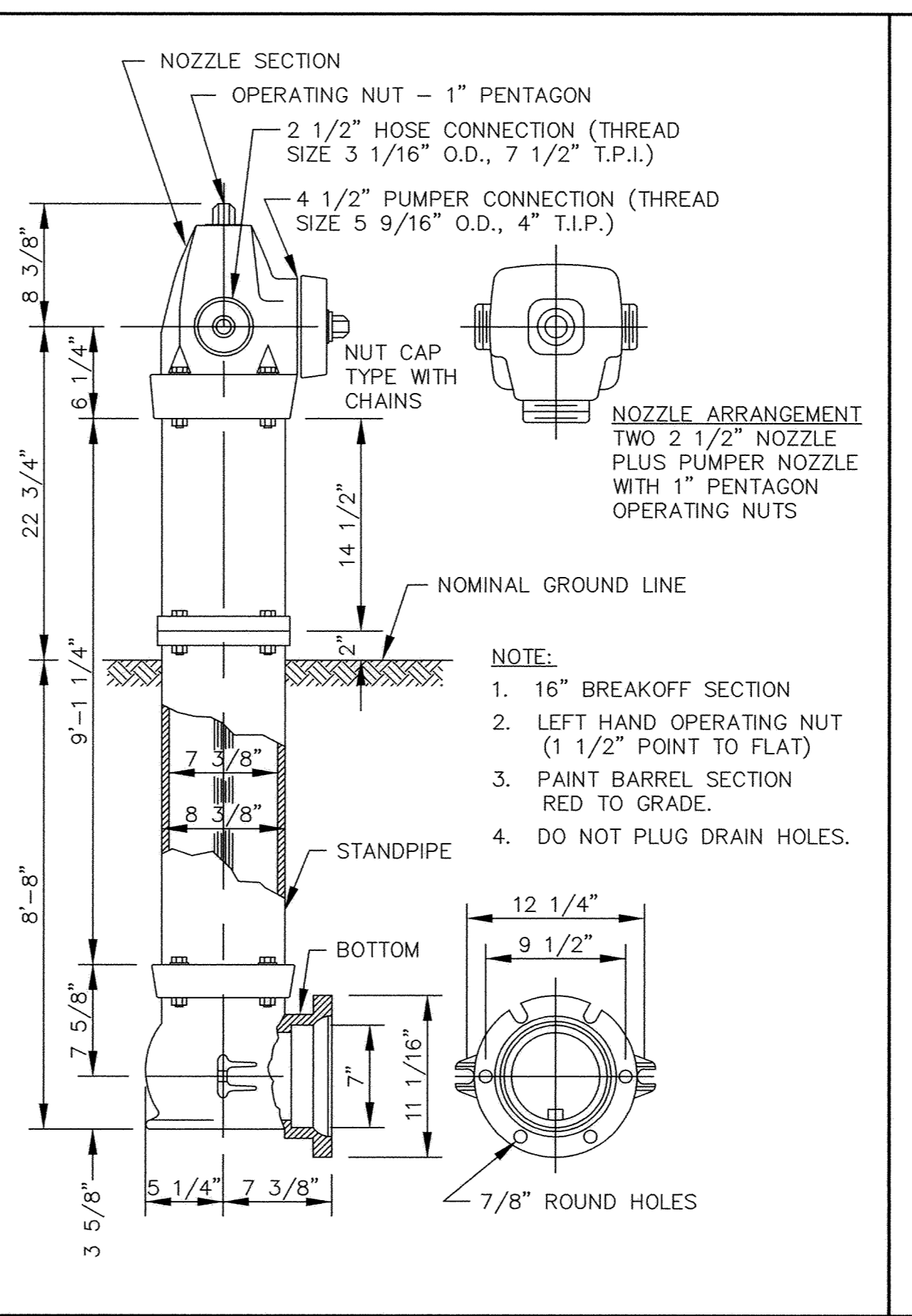
THE BOTTOM OF THE TRENCH SHALL BE SHAPED TO FIT THE PIPE BARREL FOR AT LEAST 50% OF THE OUTSIDE DIAMETER. THE REMAINDER OF THE PIPE IS SURROUNDED TO A HEIGHT OF AT LEAST 6" ABOVE ITS TOP BY SELECT FILL MATERIALS, PLACED BY HAND TOOLS AND COMPACTED TO COMPLETELY FILL ALL SPACES UNDER AND ADJACENT TO THE PIPE.

NOTE: ALL COSTS OF EXCAVATION BELOW GRADE AND PLACEMENT OF GRANULAR BEDDING SHALL BE INCLUDED IN THE BID PRICES FOR PIPE ITEMS.

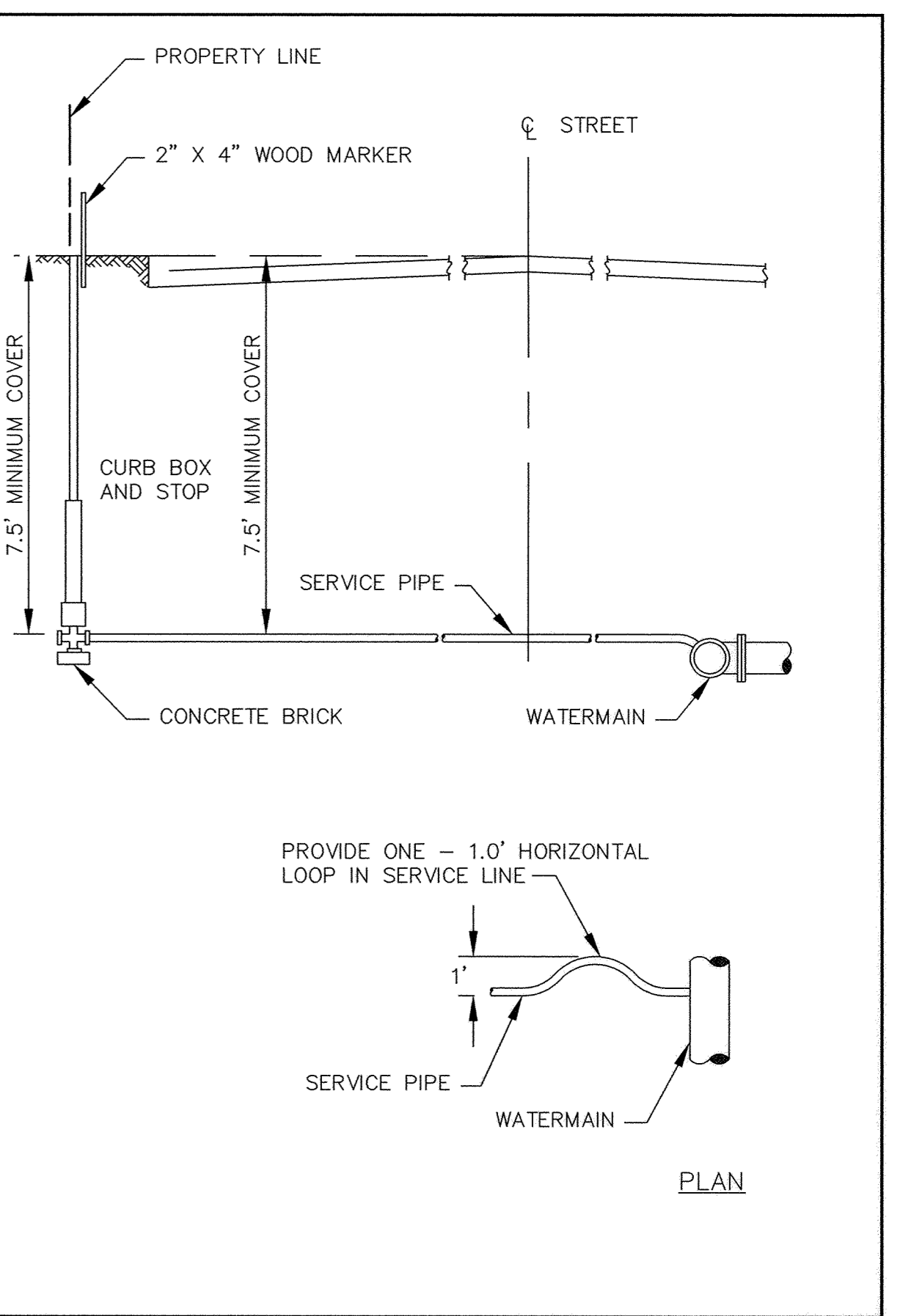
CLASS C PIPE BEDDING



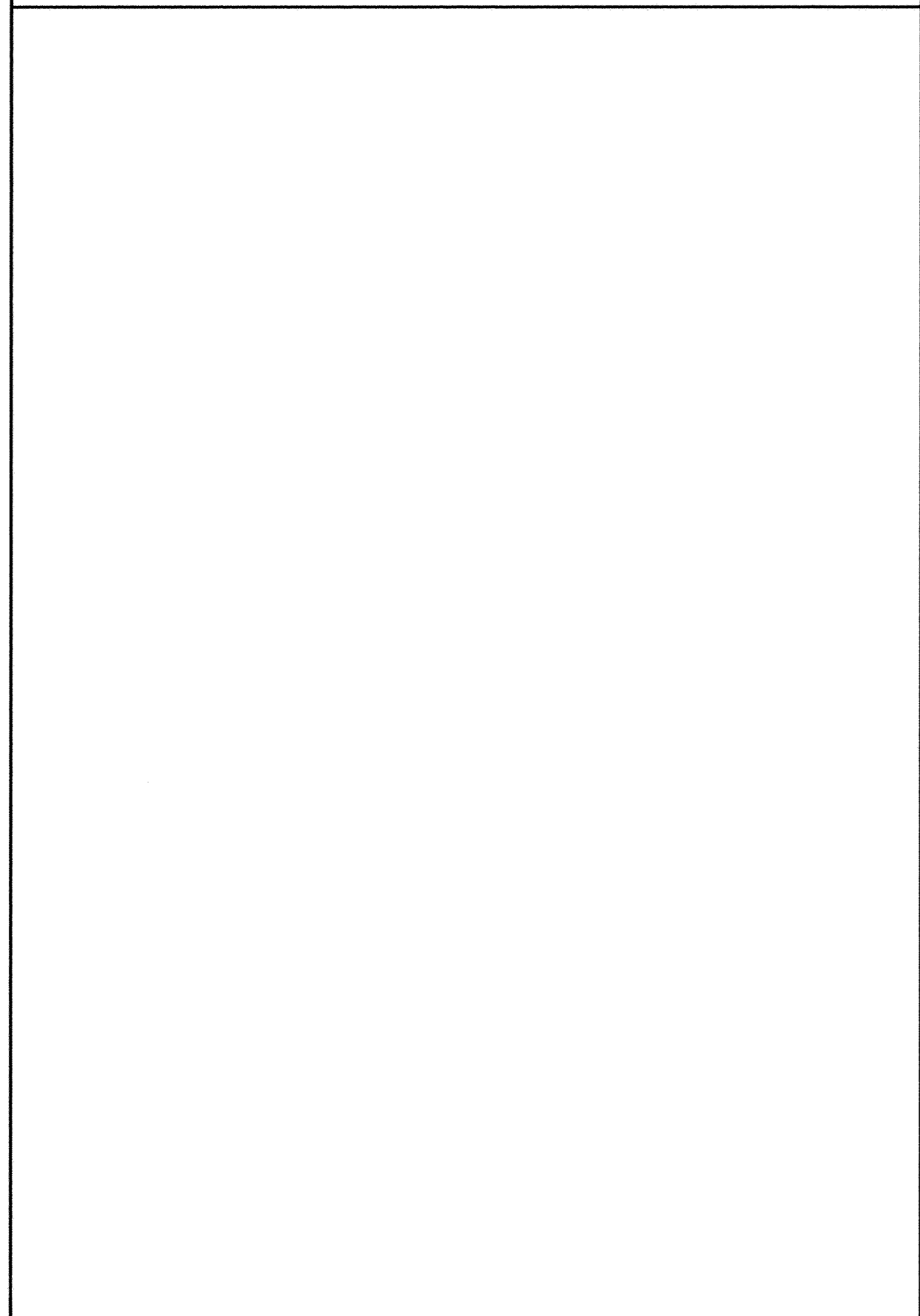
TYPICAL WATER LAYOUT



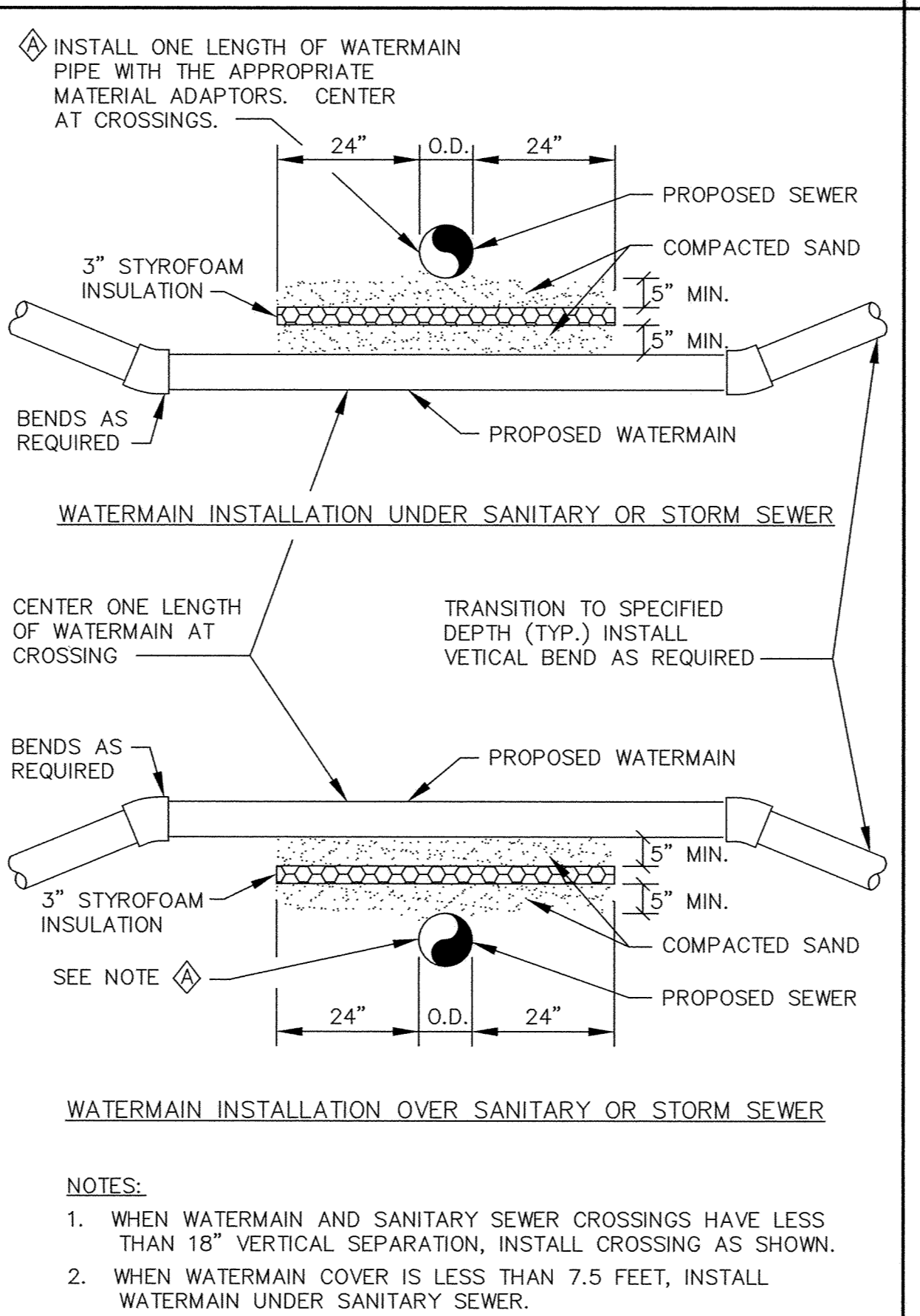
PACER HYDRANT DETAIL



TYPICAL SERVICE DETAIL



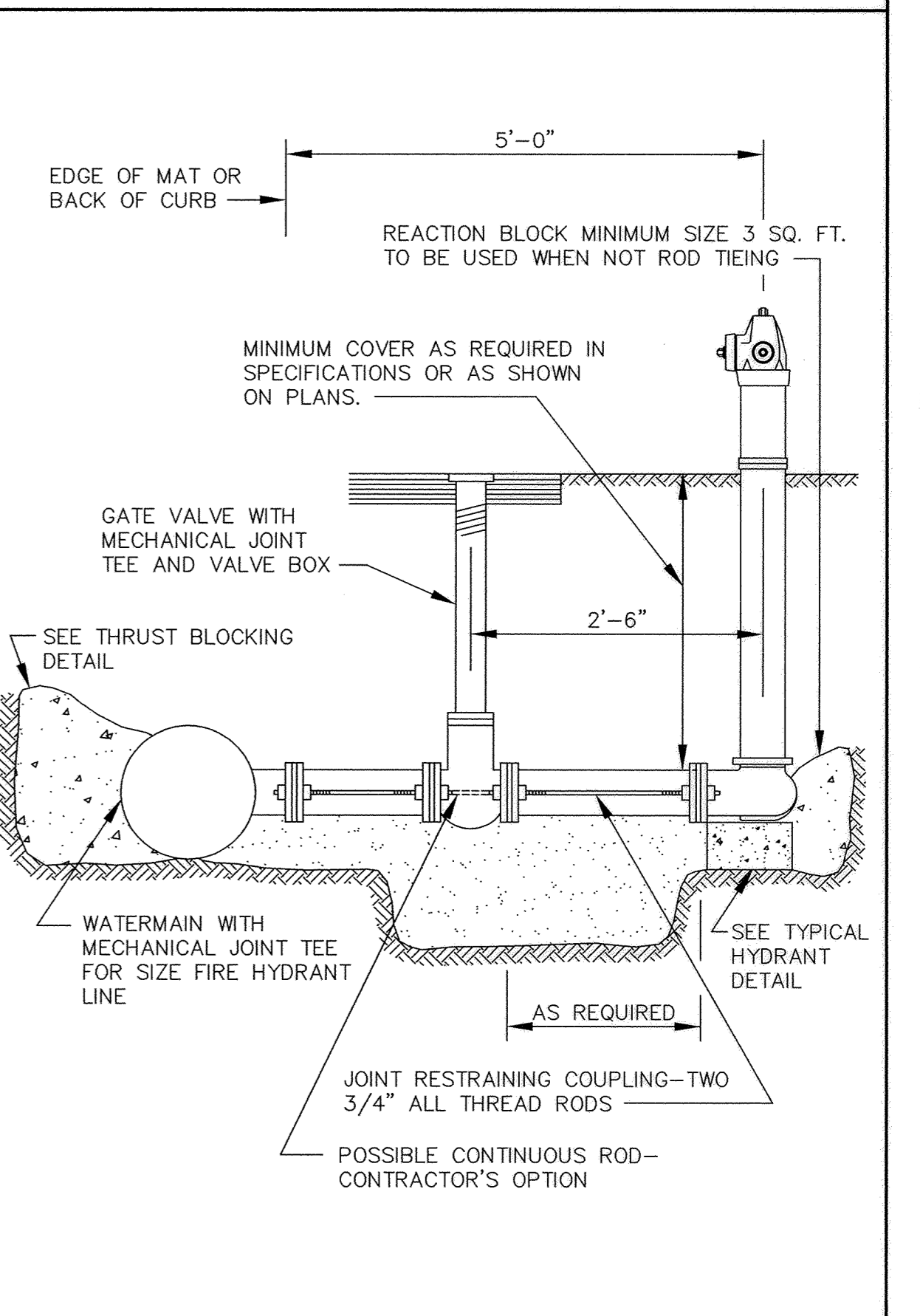
PIPE INSULATION DETAIL



WATERMAIN CROSSING

NOMINAL FITTING SIZE (INCHES)	TEE, WYE, PLUG OR CAP	90° BEND, PLUGGED CROSS	TEE PLUGGED ON RUN	45° BEND	22 1/2° BEND	11 1/4° BEND
4	1.0	1.4	1.9	1.4	1.0	---
6	2.1	3.0	4.3	3.0	1.6	1.0
8	3.8	5.3	7.6	5.4	2.9	1.5
10	5.9	8.4	11.8	8.4	4.6	2.6
12	8.5	12.0	17.0	12.0	6.6	3.4
14	11.5	16.3	23.0	16.3	8.9	4.6
16	15.0	21.3	30.0	21.3	11.6	6.0
18	19.0	27.0	38.0	27.0	14.6	7.6
20	23.5	33.3	47.0	33.3	18.1	9.4
24	34.0	48.0	68.0	48.0	26.2	13.6

THRUST BLOCKING DETAIL



RODDING DETAIL

RECORD DRAWING  
OCTOBER 1997

ER277-02

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

*Kevin J. Mauer*  
DATE: 10/27/97 REG. NO. 15316

MSA CONSULTING ENGINEERS

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ST. PAUL, MINNESOTA 55108  
(612) 644-4389

5075 WAYZATA BLVD. SUITE #225  
MINNEAPOLIS, MINNESOTA 55416  
(612) 546-0432

DATE	DESCRIPTION	DESIGNED

GRAPHIC SCALE  
HORIZ. N/A  
VERT. 5

CITY OF ELK RIVER  
185TH AVENUE / T.H. 10 TURN LANES

WATERMAIN DETAILS

DATE JAN 1996 SHEET 39 OF 41 SHEETS PROJECT NO. 230-277