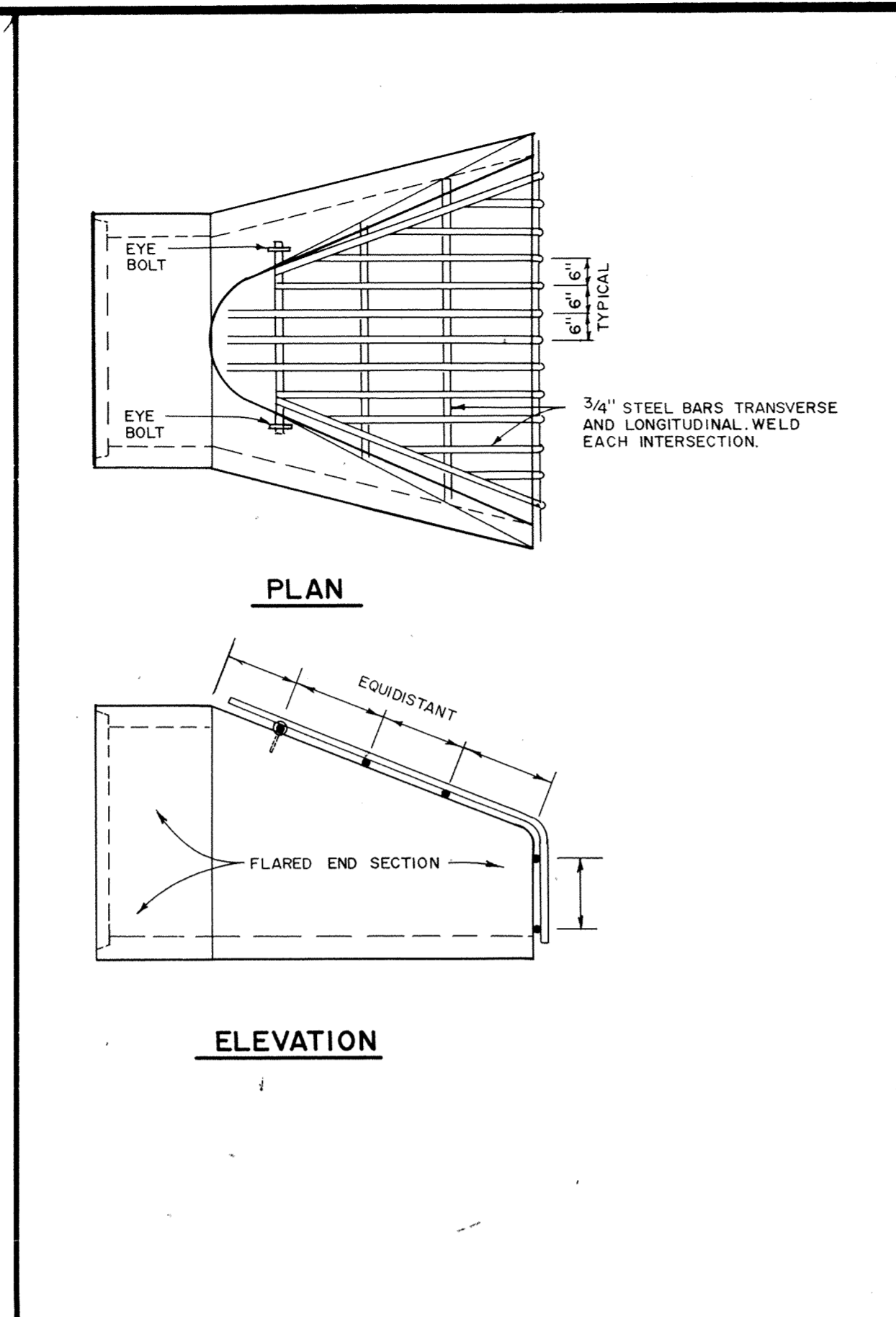
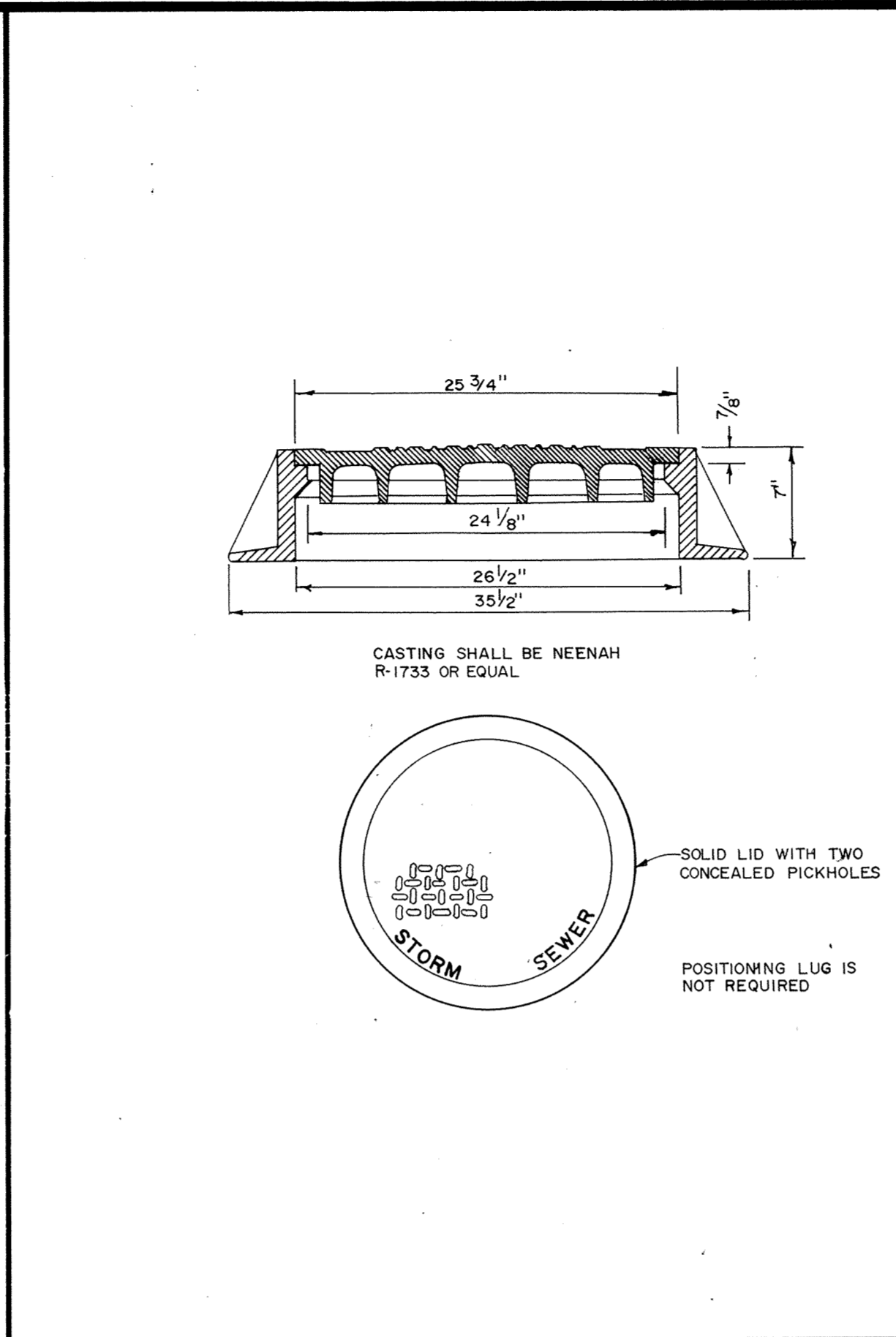


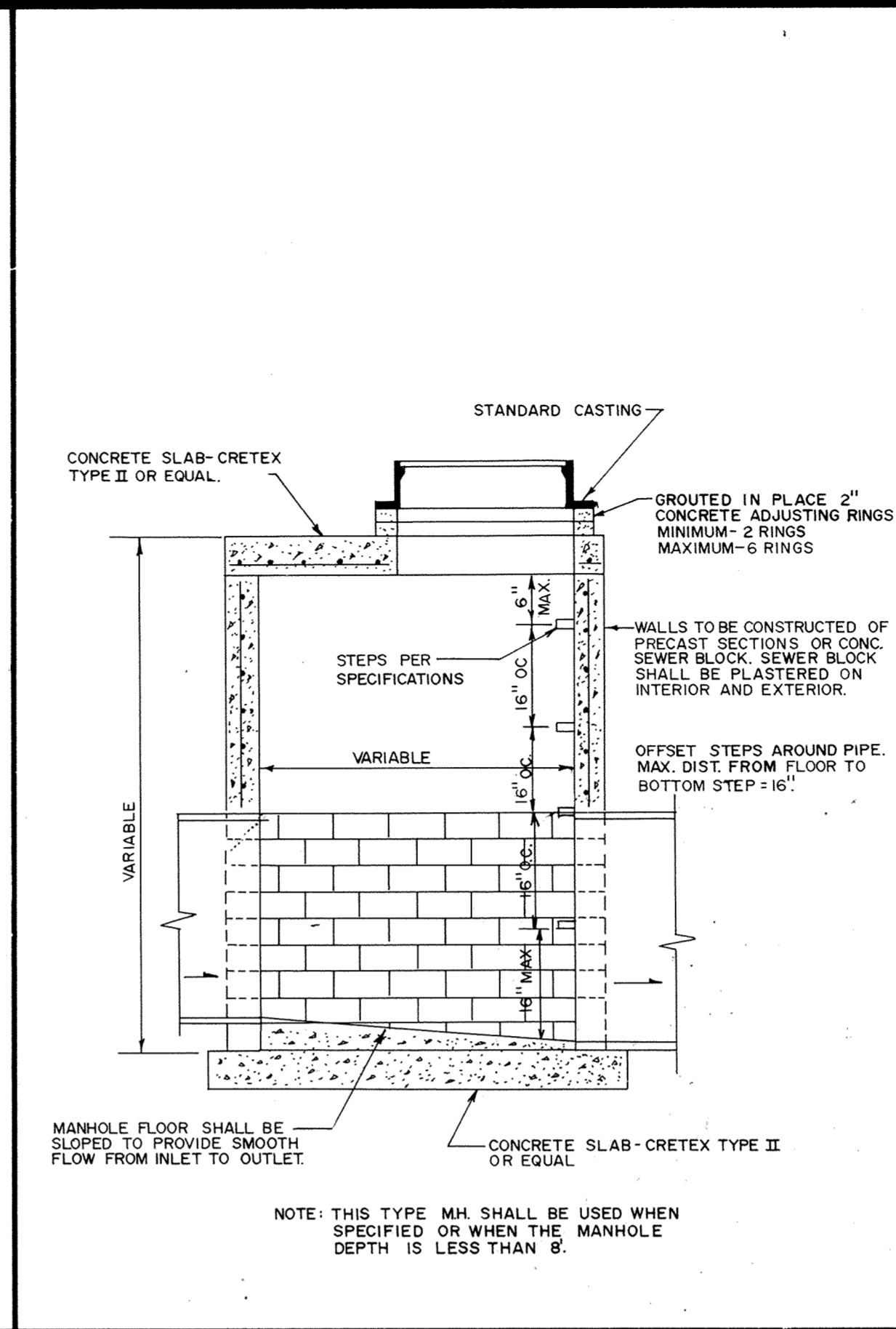
RIP-RAP INSTALLATION



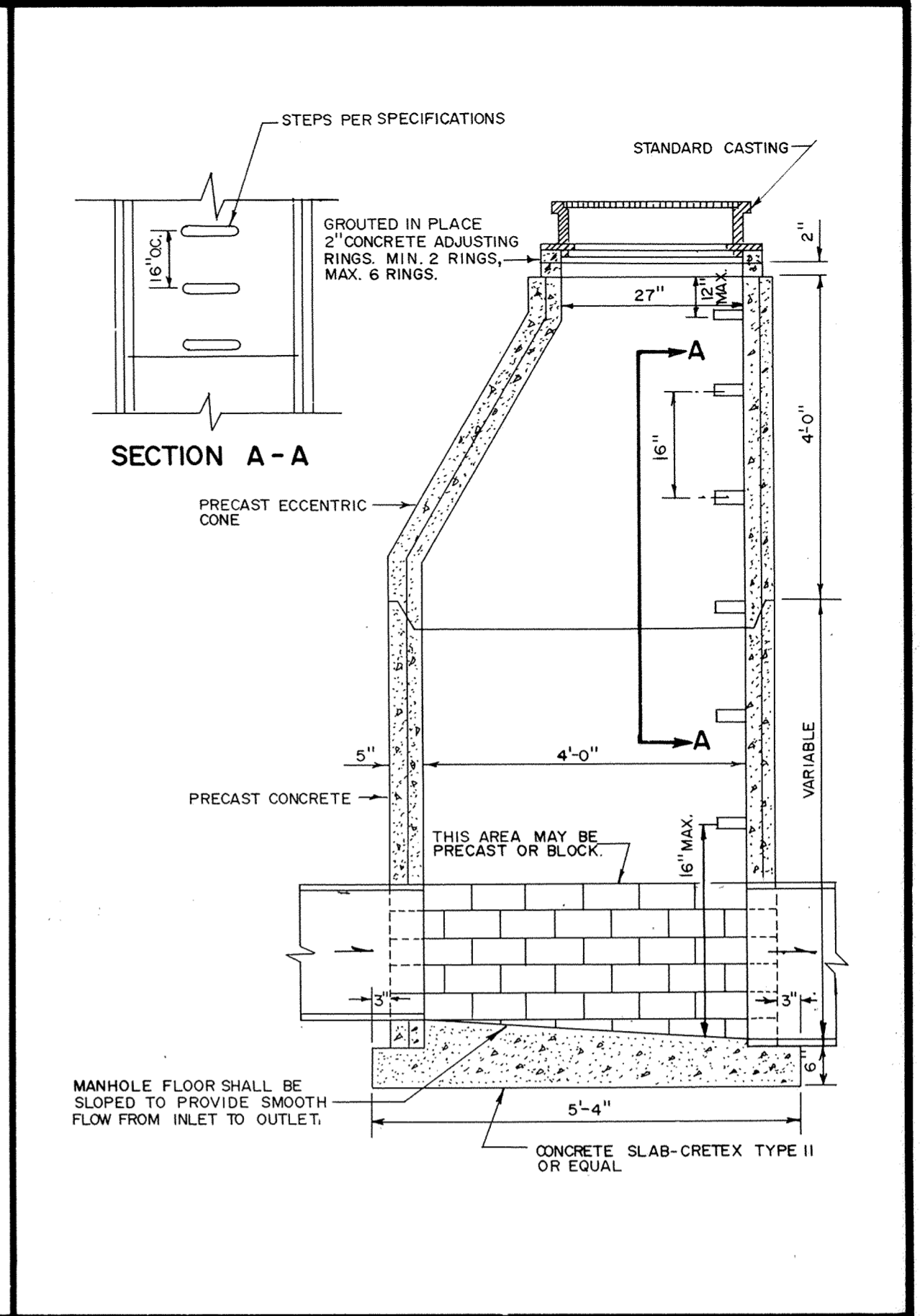
TRASH GUARD



STANDARD MANHOLE CASTING



SLAB-TOP MANHOLE



STANDARD MANHOLE

PLACEMENT OF HOLES

PIPE SIZE	THREAD DIAMETER
12	5/8"
15	
21	
24	
27	3/2"
30	
36	
42	
48	1"
54	
60	
66	
72	1"
78	
84	
90	
96	1"
102	
108	
120	
132	1"
132	

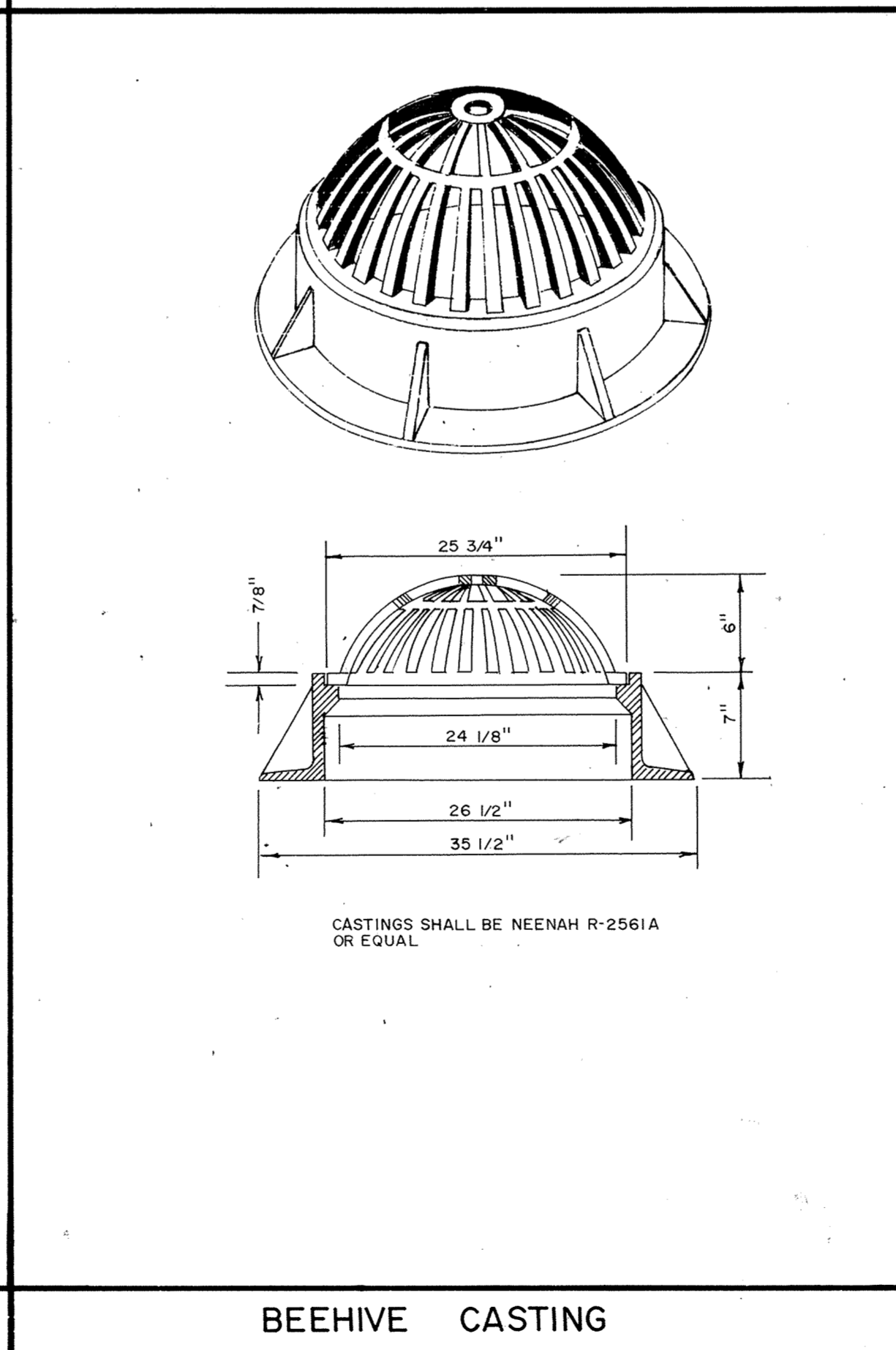
EYE BOLT TIE
WELDED EYE OR APPROVED EQUAL
2" MAX. 2" MAX. 32" (ADJ. ± 1-1/2" MIN.)

CANOPY TIE
2" MAX. 2" MAX. 32" (ADJ. ± 1-1/2" MIN.)

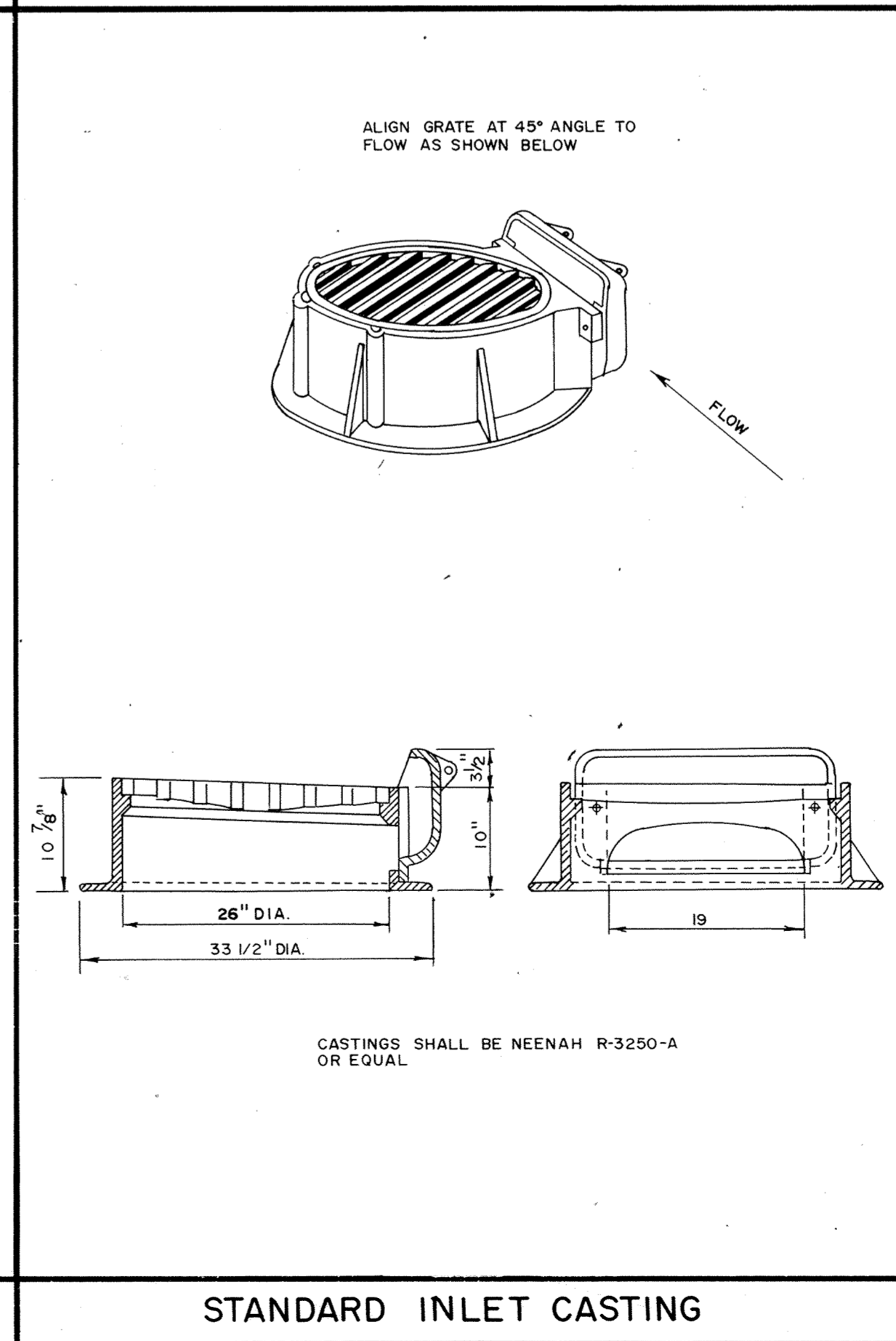
U BOLT TIE
2" MAX. 2" MAX. 32" (ADJ. ± 1-1/2" MIN.)

NOTES:
1. HOLES SHALL BE CAST-IN OR DRILLED 16" FROM OUTSIDE EDGE OF JOINT.
2. NUTS AND WASHERS ARE NOT REQUIRED ON INSIDE OF PIPE WITH 27" DIAM. OR LESS.
3. TIES ARE NOT REQUIRED FOR BELL PIPE 24" AND SMALLER. ON OTHER SIZES, TIE MAY BE INSERTED FROM INSIDE.
4. CUT THREADS MAY BE USED IF WASHER AND NUT ARE USED.
5. PIPE SIZES LISTED ARE INSIDE DIAM. OF ROUND PIPE OR EQUIVALENT DIAM. OF PIPE ARCH.

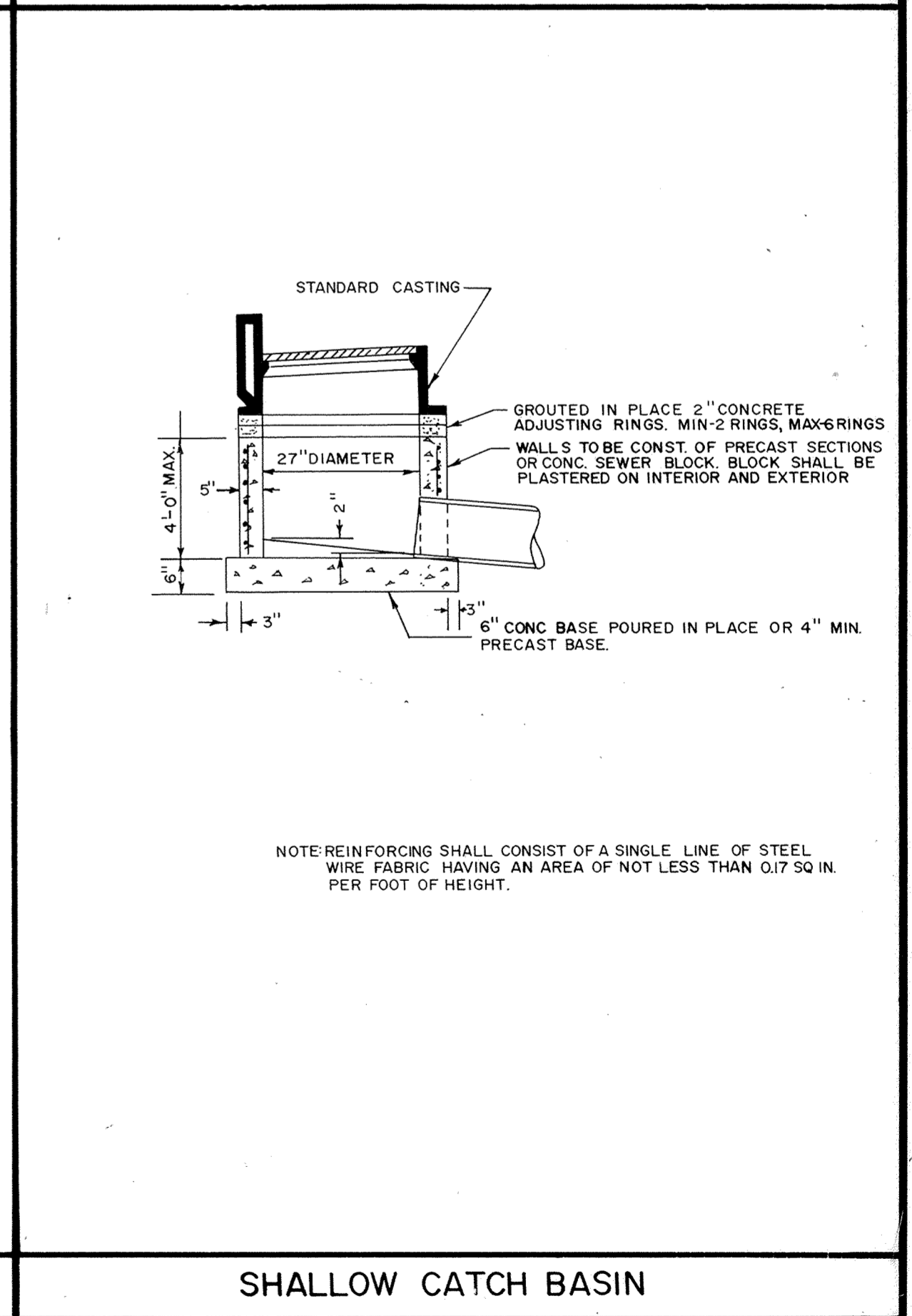
CONCRETE PIPE JOINT TIES



BEEHIVE CASTING



STANDARD INLET CASTING



SHALLOW CATCH BASIN

MSA CONSULTING ENGINEERS
Maier Stewart & Associates Inc.
1959 SLOAN PLACE (612) 774-6021 ST. PAUL, MINNESOTA 55117

DATE	DESCRIPTION	DESIGNED
		CHECKED
		DRAWN <i>MSL</i>
		GRAPHIC SCALE
		0 HORIZ. NONE
		0 VERT.

CITY OF ELK RIVER
THE CROSSROADS
STORM SEWER DETAILS

DATE *FEB/98B* SHEET *3* OF *3* SHEETS PROJECT NO. *230-05/11*

DRAWING NUMBER CROSS 88

DRAWING NUMBER 294

SAFECO PRODUCTS • NEW HAVEN, CONNECTICUT

SAFECO PRODUCTS • NEW HAVEN, CONNECTICUT

MINNESOTA BLUEPRINT