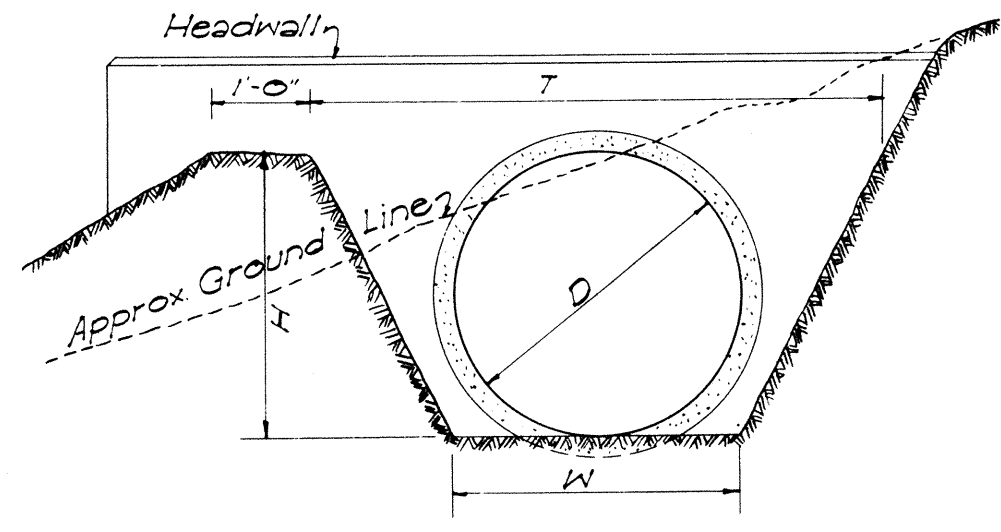


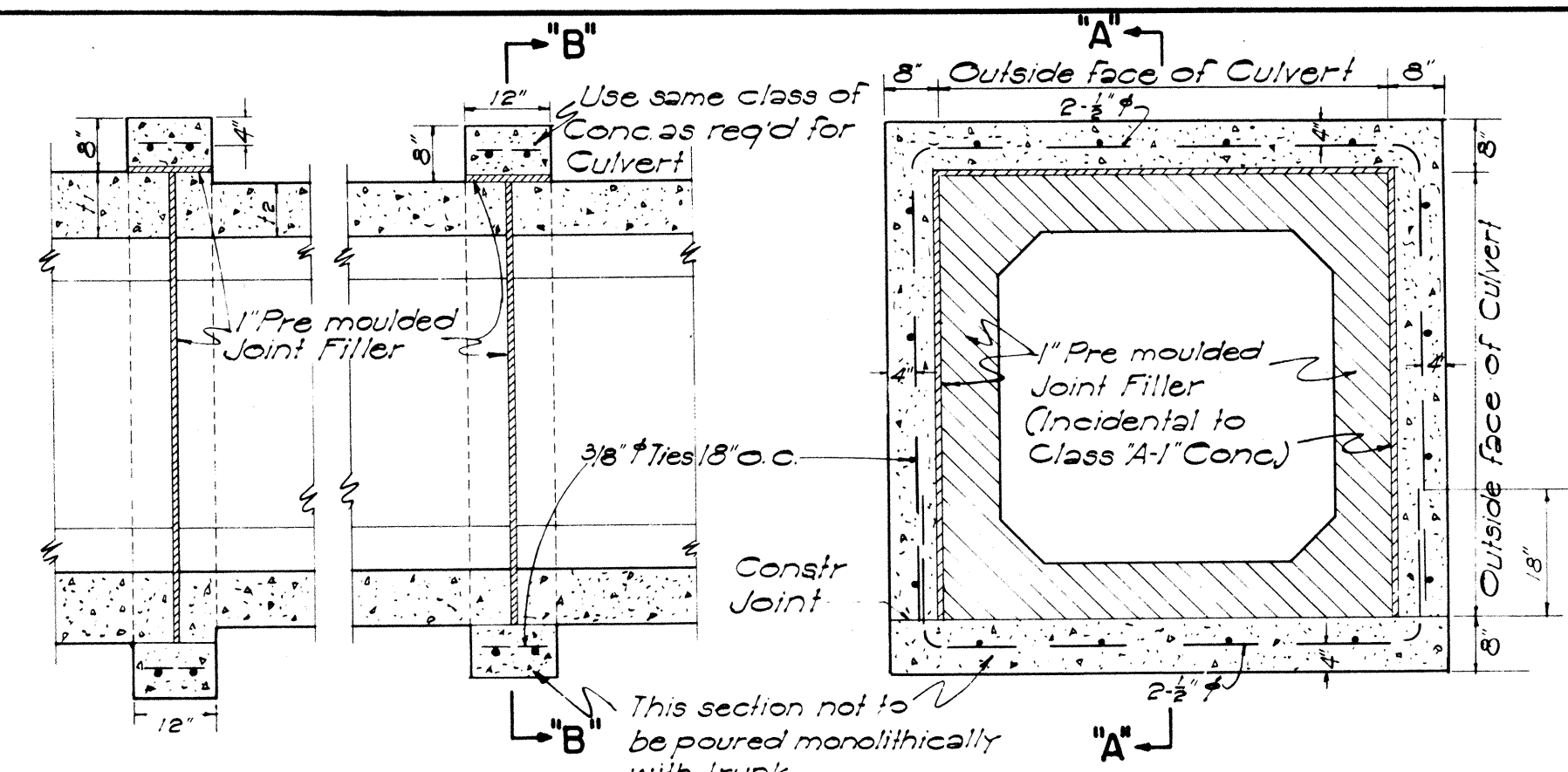
Revised: June 1965
Revised: August 1967

Note: To Resident Engineer
1) Consider economy of reinf. conc for high retaining walls which did not originate on plan layout.
2) Elevation of weep holes to be determined by Resident Engineer. Holes to be placed as close to the existing ground line as local conditions permit.

D	W	H	T+H+H
18"	24"	2'-0"	4'-0"
24"	30"	2'-0"	4'-6"
30"	30"	2'-6"	5'-0"
36"	36"	3'-0"	6'-0"



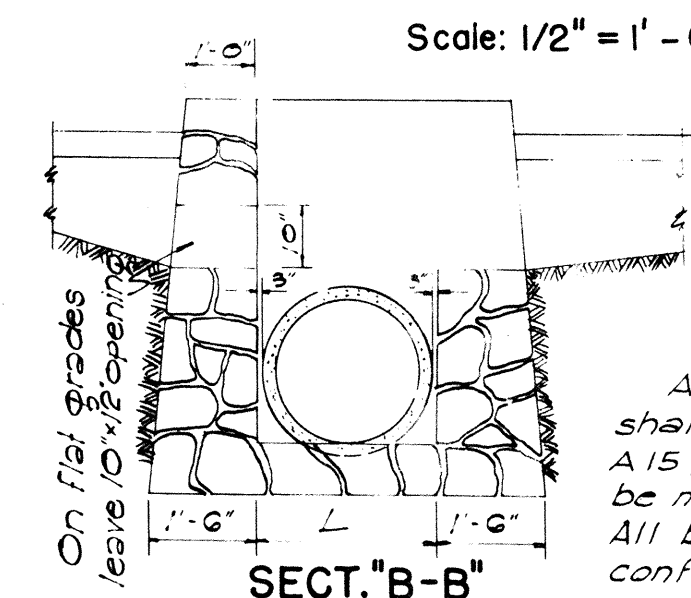
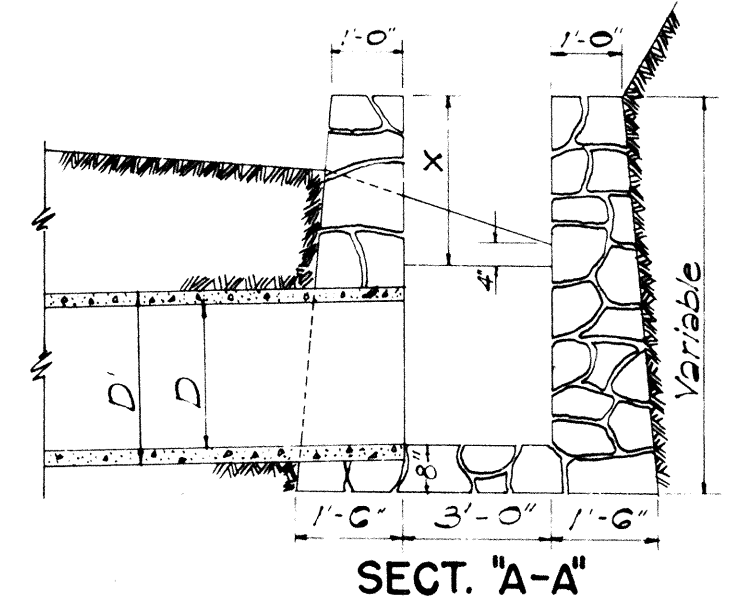
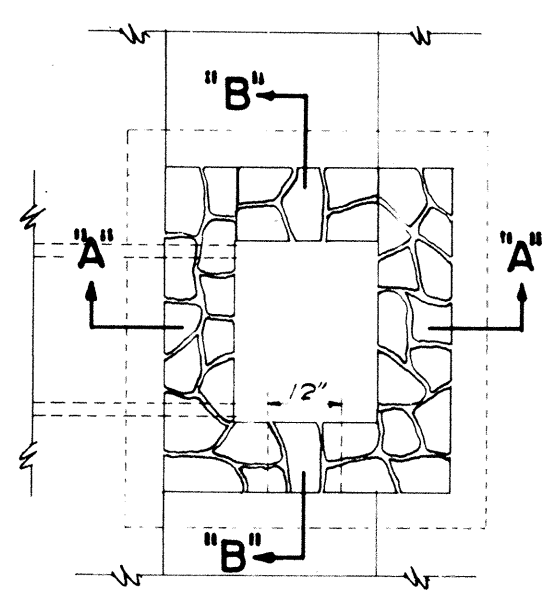
DETAIL OF OUTLET DITCH
Scale: 1/2" = 1' - 0"



SECTION "A-A" SECTION "B-B"
CONC. COLLAR FOR CONC. BOX CULVERT
Scale: 1/2" = 1' - 0"

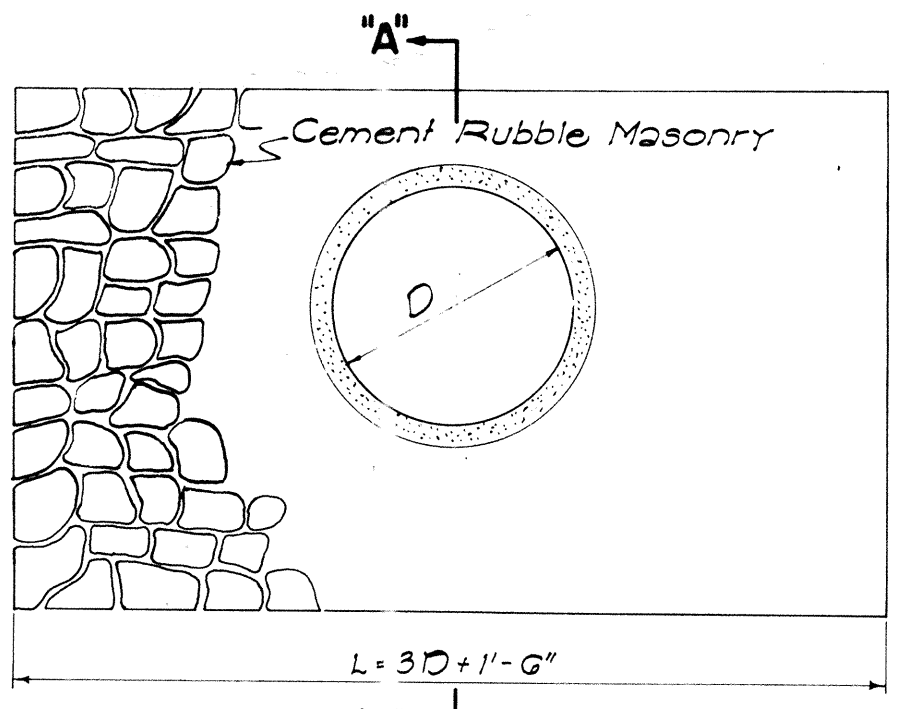
D	D	L+D+G	Cu Yds.	Where Variables Equal
23"	18"	2'-5"	3.02	4'-6"
30"	24"	3'-0"	3.61	5'-0"
37"	30"	3'-7"	4.21	5'-6"
44"	36"	4'-2"	4.85	6'-0"

NOTE: Dimension "X" is assumed as 2'-4" in figuring the above quantities.

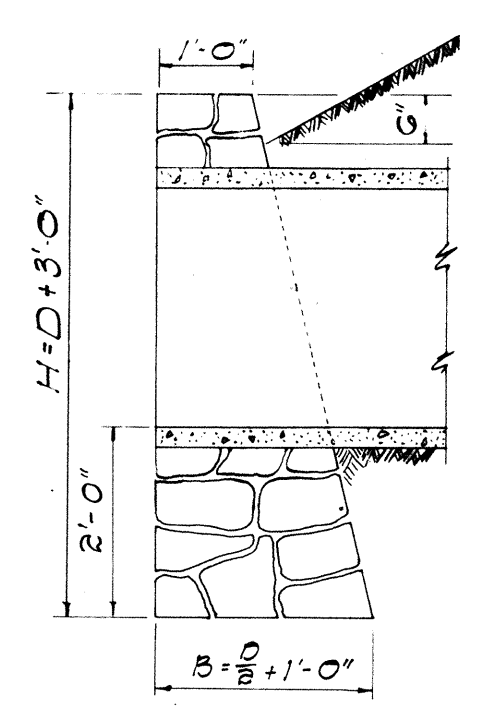


DETAIL OF MASONRY DROP INTAKE
Scale: 3/8" = 1' - 0"

D	H	B	L	CRM For RCCP	CRM For CGMP
18"	4'-6"	1'-0"	6'-0"	1.34	1.39
24"	5'-0"	2'-0"	7'-6"	1.83	1.92
30"	5'-6"	2'-3"	9'-0"	2.56	2.70
36"	6'-0"	2'-6"	10'-6"	3.45	3.66

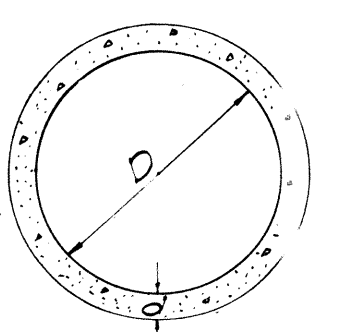


ELEVATION



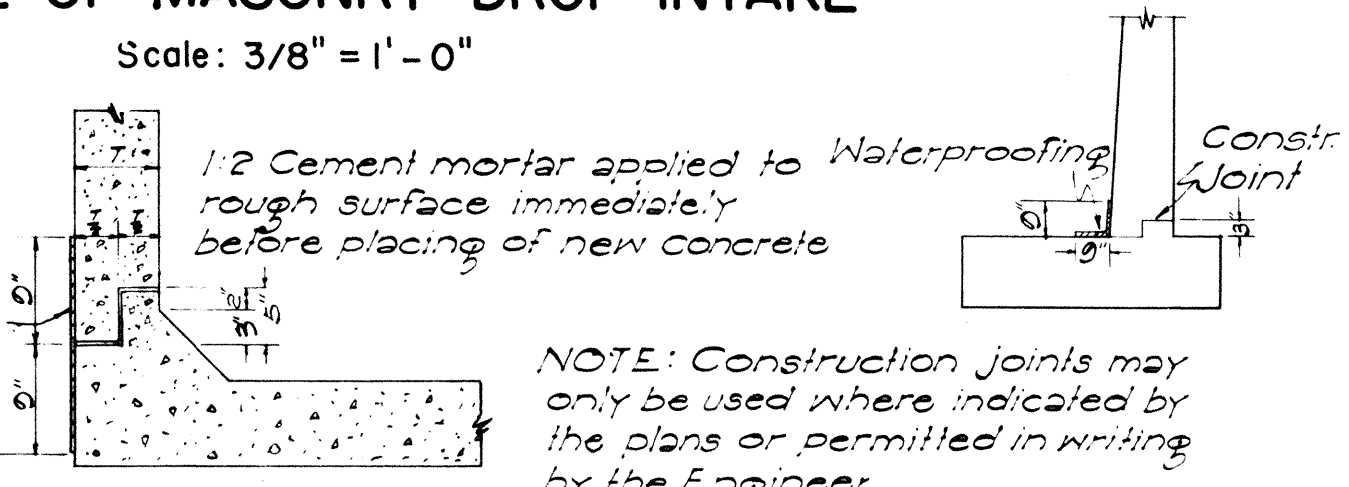
SECTION "A-A"

DETAIL OF MASONRY HEADWALL
Scale: 1/2" = 1' - 0"



SECTION
CONC. PIPE CULVERT

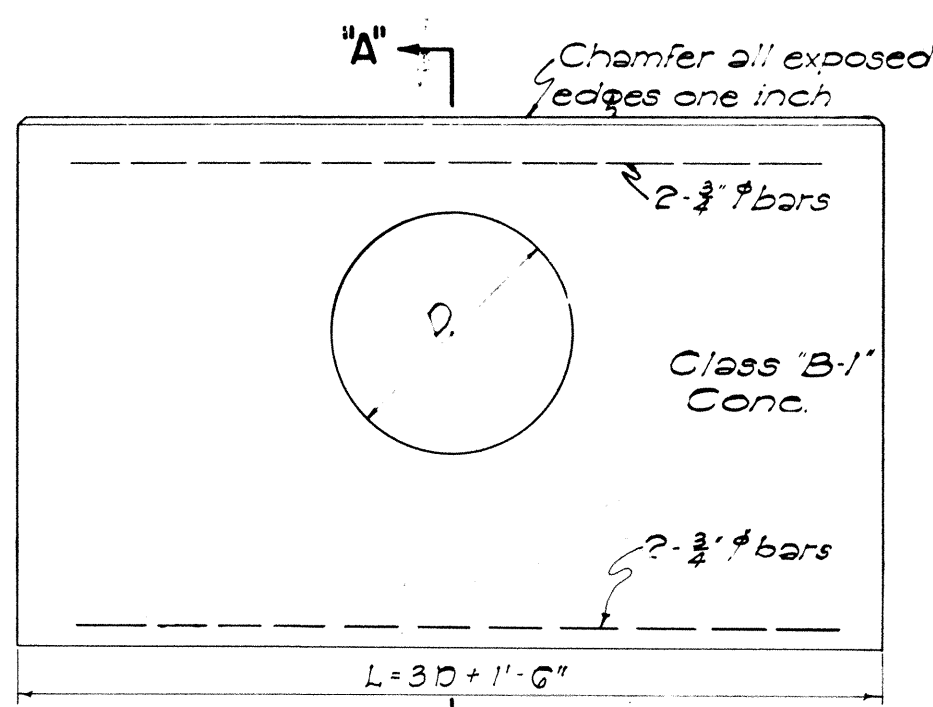
NOTE: Thickness of reforcing and concrete used are to conform with the approved design as provided by the Specifications.



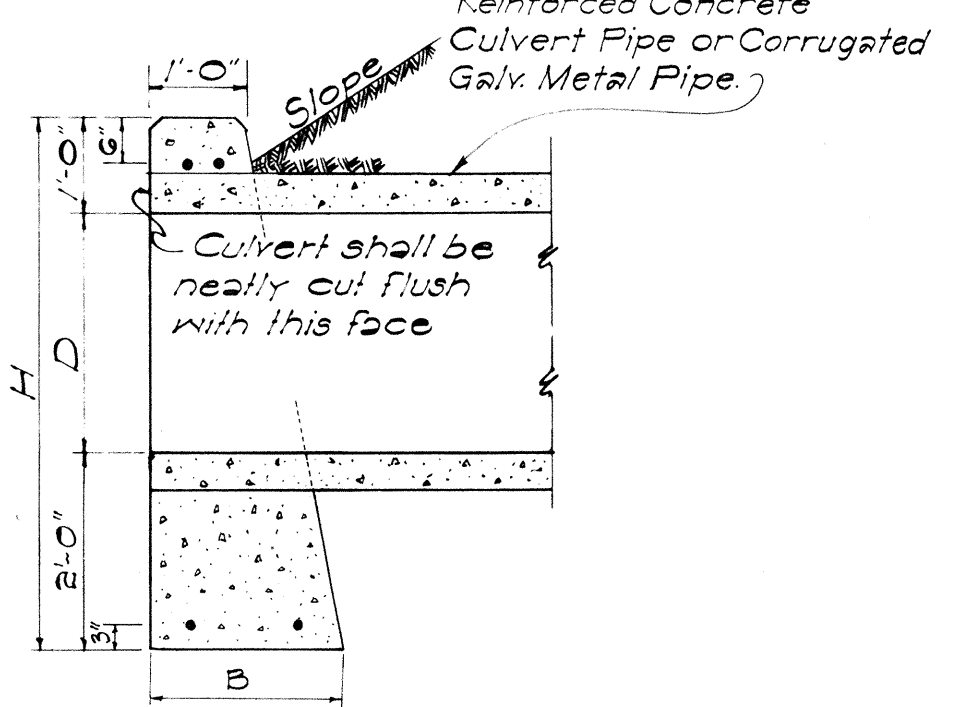
CONSTR. JOINT DETAILS

NOTE: Construction joints may only be used where indicated by the plans or permitted in writing by the Engineer.

Note: When subgrade is below top of jacket, it shall be fully compacted to this line and then re-excavated (struck) to proper subgrade. This surface shall be rolled again.



ELEVATION

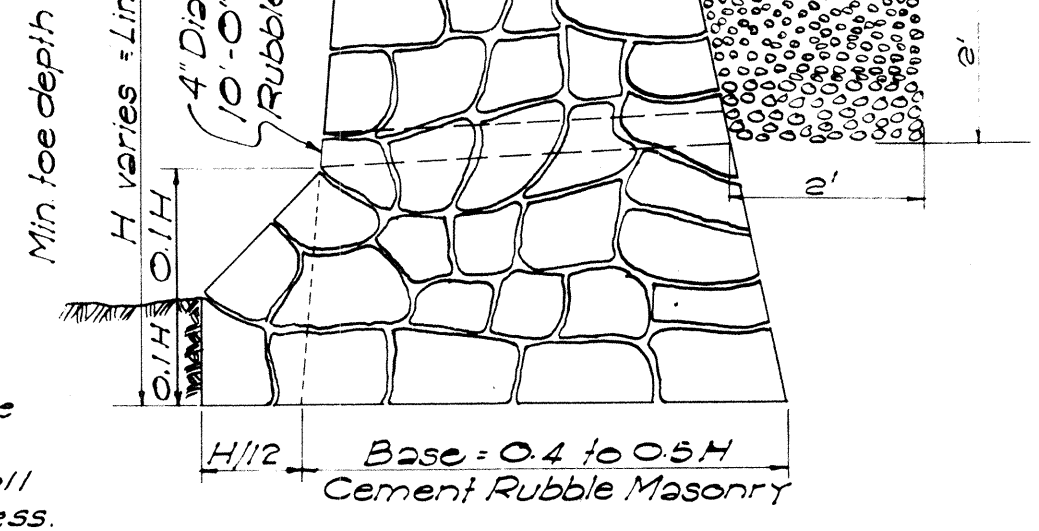


SECTION "A-A"

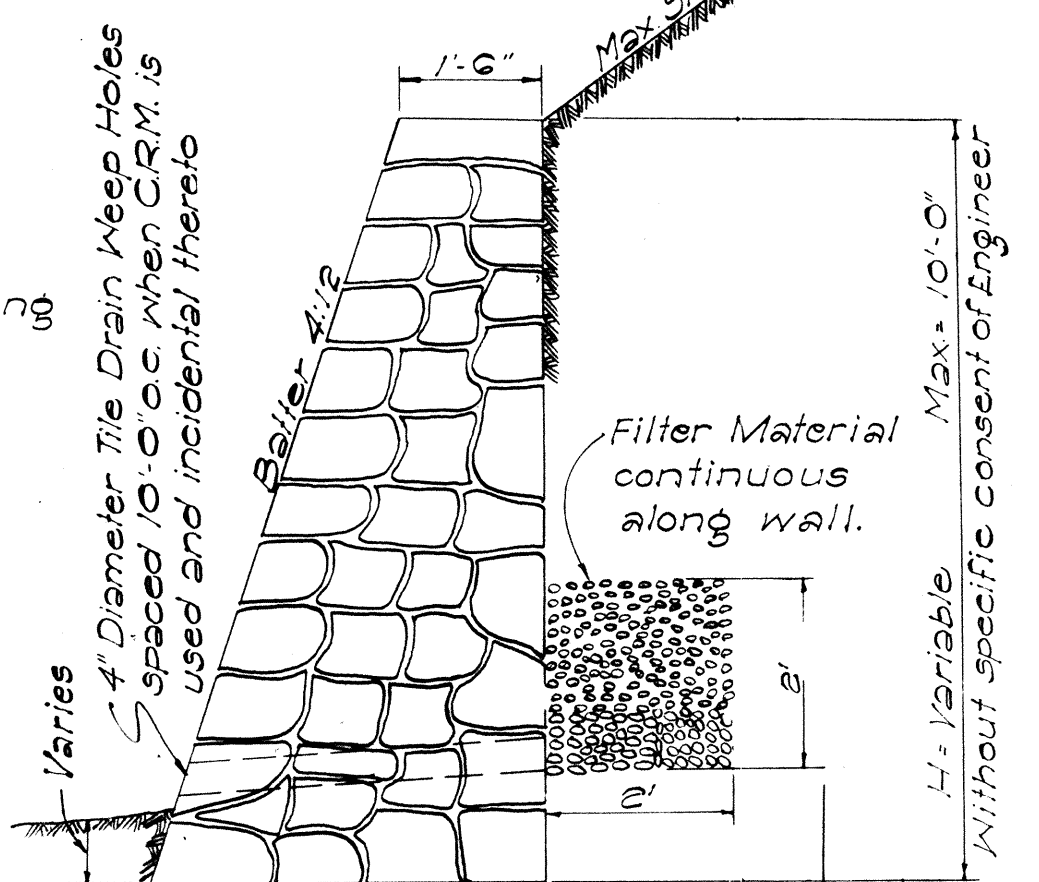
D	B	L	H	CRM For RCCP	CRM For CGMP	Steel For One Headwall
18"	1'-6"	6'-0"	4'-6"	1.12	1.17	4 #4's 5'-6" 33
24"	1'-6"	7'-6"	5'-0"	1.52	1.60	4 #4's 7'-0" 42
30"	2'-0"	9'-0"	5'-6"	2.36	2.49	4 #4's 8'-6" 51
36"	2'-0"	10'-6"	6'-0"	3.04	3.13	4 #4's 10'-0" 60
42"	2'-6"	12'-0"	6'-6"	4.19	4.47	4 #4's 11'-6" 69
48"	2'-6"	13'-6"	7'-0"	5.01	5.36	4 #4's 13'-0" 78

DETAIL OF CONCRETE HEADWALL

Scale: 1/2" = 1' - 0"



SECTION OF HIGH CEMENT
RUBBLE MASONRY RETAINING
WALL OR SEAWALL



SECTION OF LOW
MASONRY RETAINING
WALL OR SEAWALL

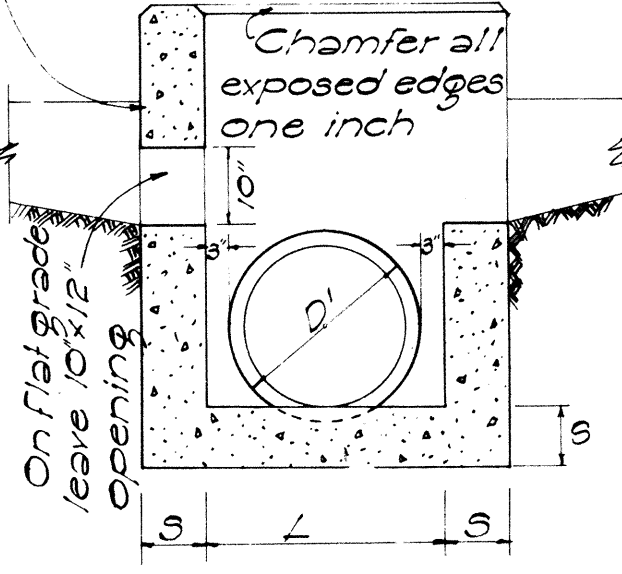
D	D	L+D+G	S	Cu Yds.	Where Variables Equal
23"	18"	2'-5"	8'	1.41	4'-6"
30"	24"	3'-0"	8'	1.72	5'-0"
37"	30"	3'-7"	9'	2.32	5'-6"
44"	36"	4'-2"	9'	2.73	6'-0"
51"	42"	4'-9"	10'	3.54	6'-6"
58"	48"	5'-4"	10'	4.01	7'-0"

Note: Dimension "X" is assumed as 2'-4" in figuring the above quantities.

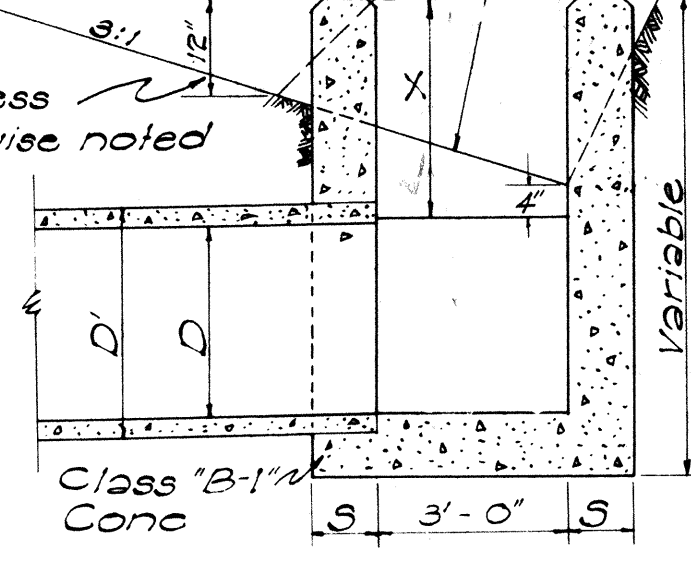
Where drainage comes from both sides, lower this wall to same elevation as shown for opposite wall.

Note: This type of structure shall also be used for the Drop Intakes of Siphons connected with Irrigation Ditches or Flumes with appropriate changes to dimensions. In this case all joints must be made water tight.

Excavate recess in roadway excavation slope for inlet to dimensions and form designated by Engineer. This is Unclassified Excavation.

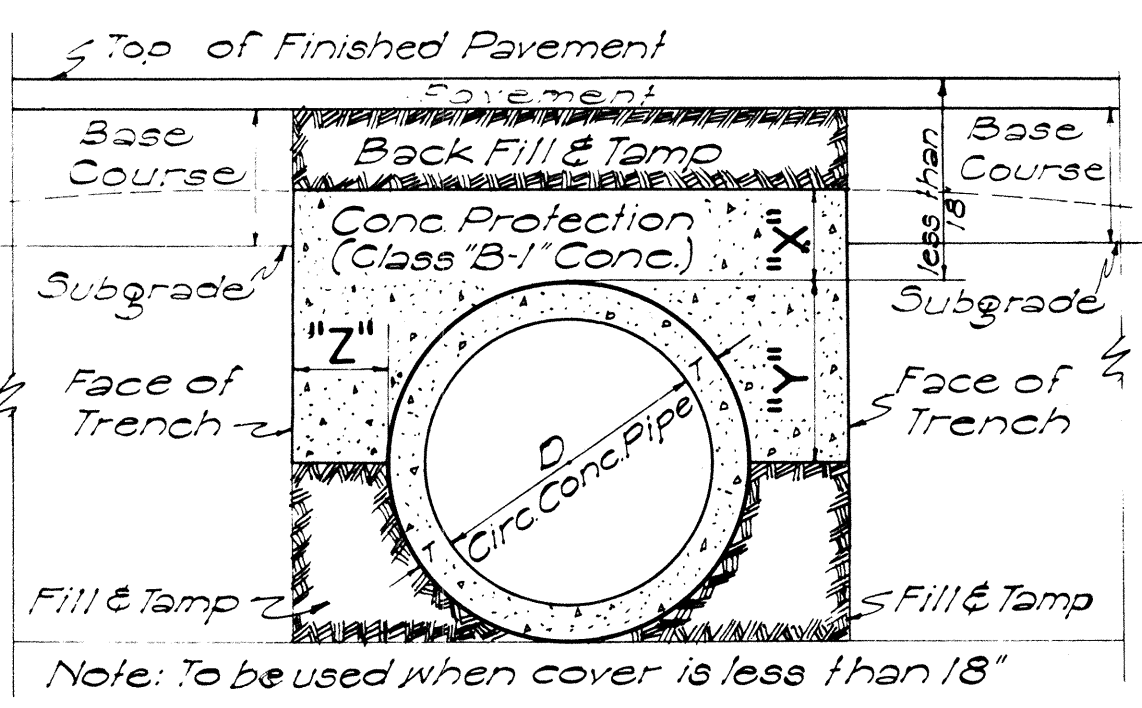


SECTION "B-B"



SECTION "A-A"

DETAIL OF CONCRETE DROP INTAKE
Scale: 1/2" = 1' - 0"



X	Y	Z
6" for 18"D		Z must be from pipe to face of trench
7" " 24"D		
8" " 30"D		
9" " 36"D		
10" " 42"D		
11" " 48"D		
12" " 54"D		

SECT. OF CULVERT WITH CONC. PROTECTION

Scale: 1" = 1' - 0"

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.		1969	37	73

PROJECT NO. 900B-02-68 UNIT 1

GENERAL NOTES

- Contractor has the option of using cast malleable iron, cast steel, welded, bolted or cast steel end block grate.
- Grates and Frames shall be hot dip galvanized after fabrication, see specifications.
- All welds 3/8" unless otherwise noted.
- Center support assembly shall be used when two or more grates are specified. Incidental to Types A-9 or A-12 Frame and Grates.
- Refer to "Grate Bar Spacing Table" for Types A-9 and A-12 Grate dimensions.
- The various materials shall conform to the specifications of ASTM as listed in the following tabulation and the Std. Specifications.

Material	ASTM Designation
Structural Steel	A283, Grade D
Cast Steel	A27, Grade 65-35
Malleable Iron Casting	A47, Gr. No. 35018

GRATE BAR SPACING TABLE

TYPE	NO. BARS	CLEAR BAR SPACING - W	X
A-9	9	2"	1 9/16"
A-12	12	1 3/8"	1 1/4"

NOTE:

- Type A-9 - Use in locations off the roadbed on all types of highways.
- Type A-12 - Use within the roadbed on all types of highways.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

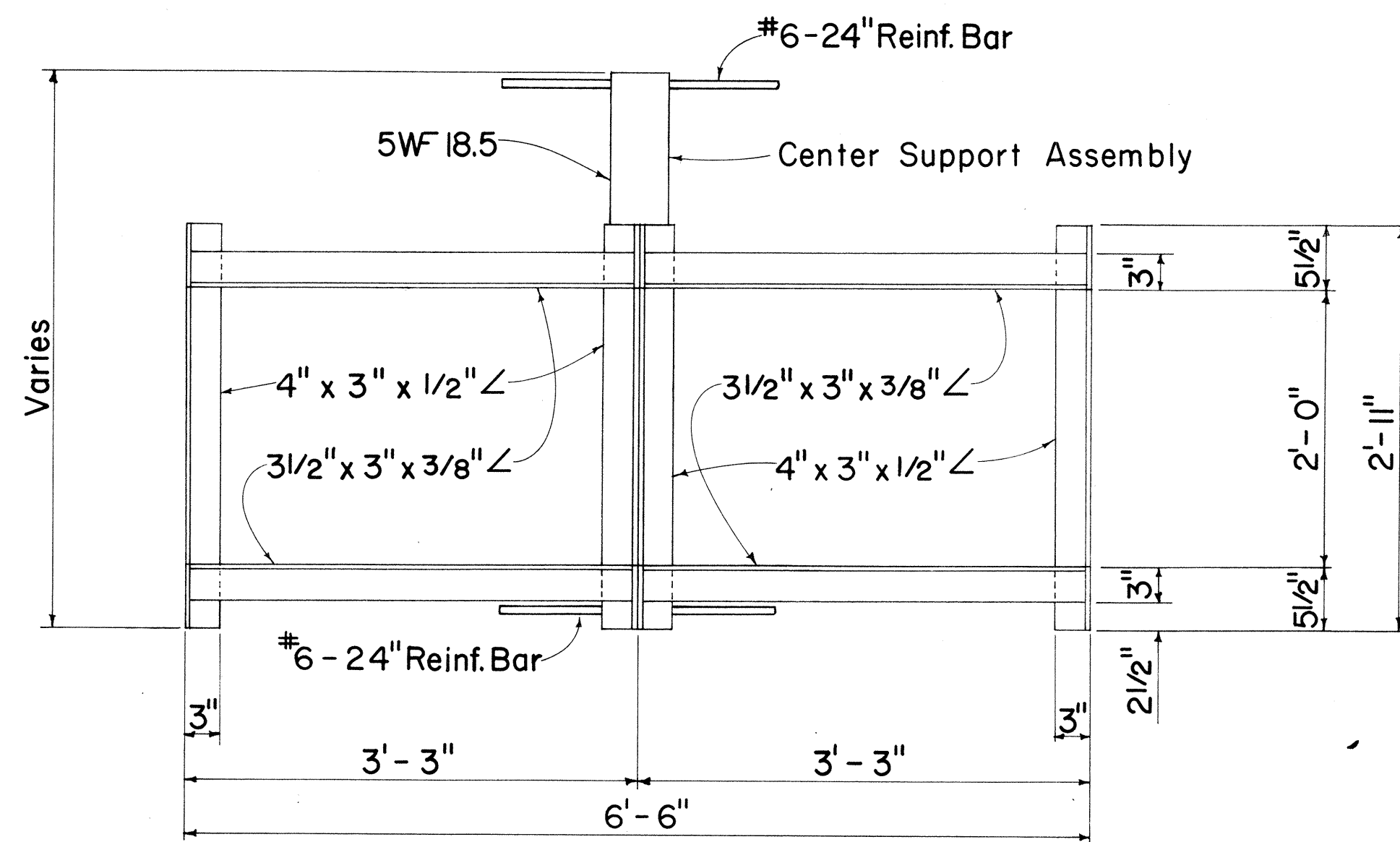
STANDARD DETAILS

TYPES A-9 AND A-12 FRAMES AND GRATES

Scales: As Noted

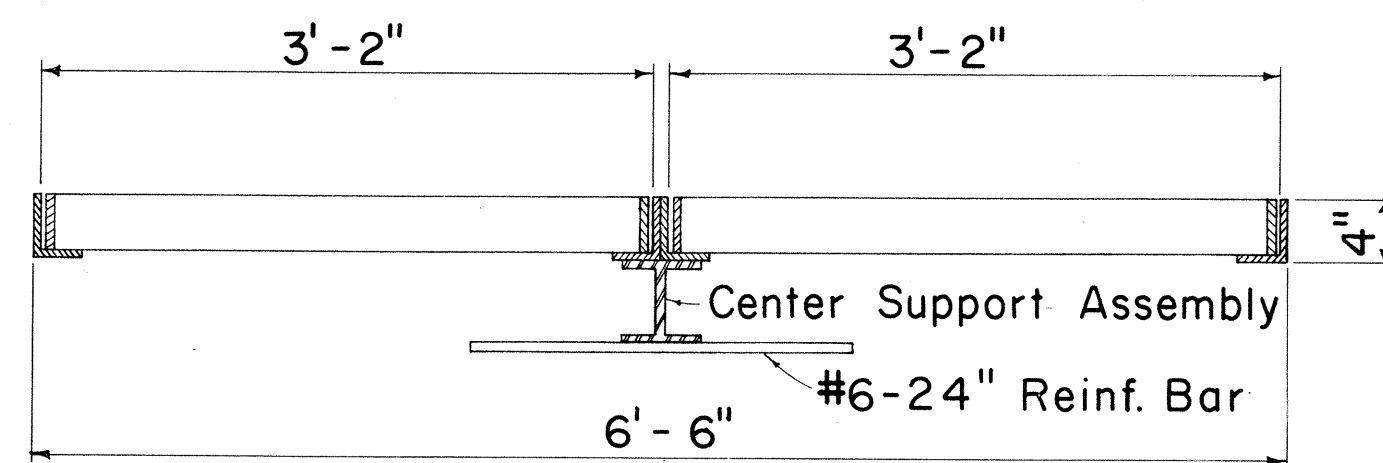
Date: Aug. 1968

SHEET No. 4 OF 5 SHEETS



PLAN

(Two or More Grates)

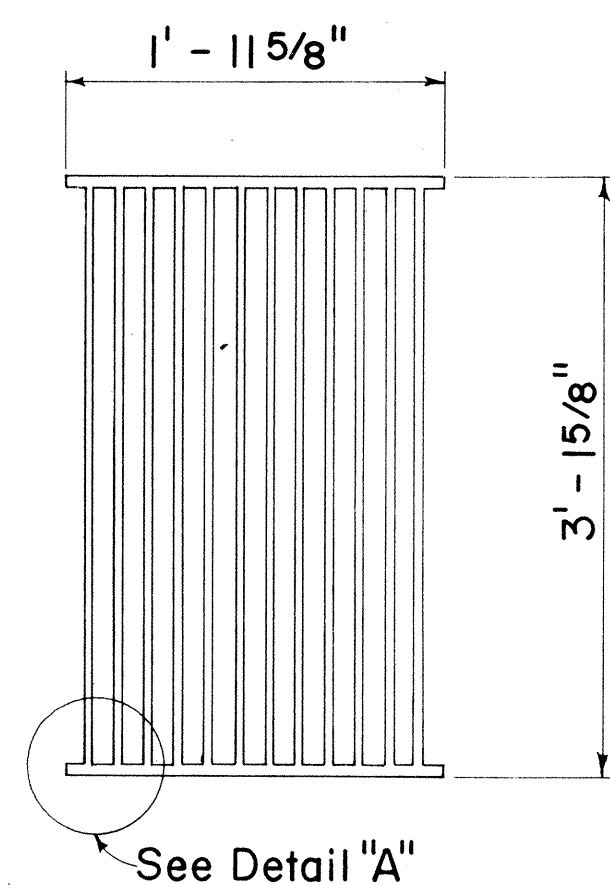


LONGITUDINAL SECTION

(Thru Frame & Grate)

FRAME DETAILS

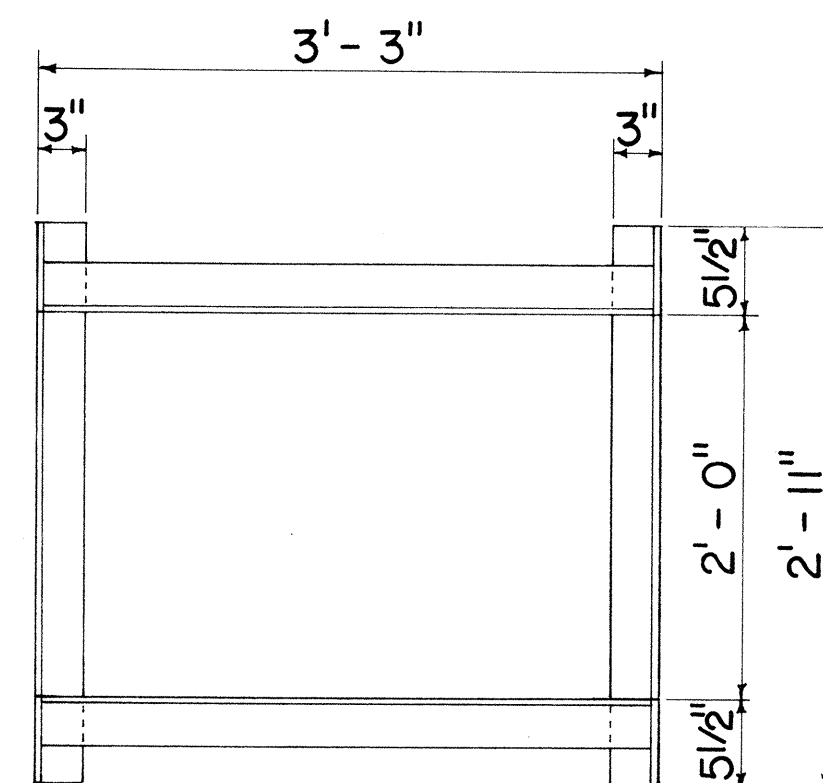
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PLAN

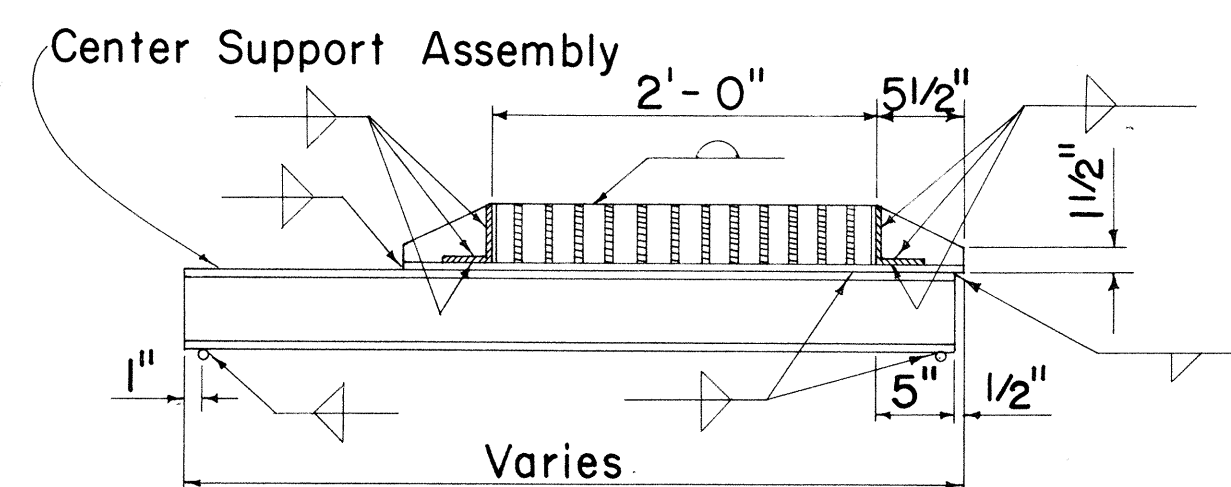
Scale: 1" = 1' - 0"

ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL GRATE



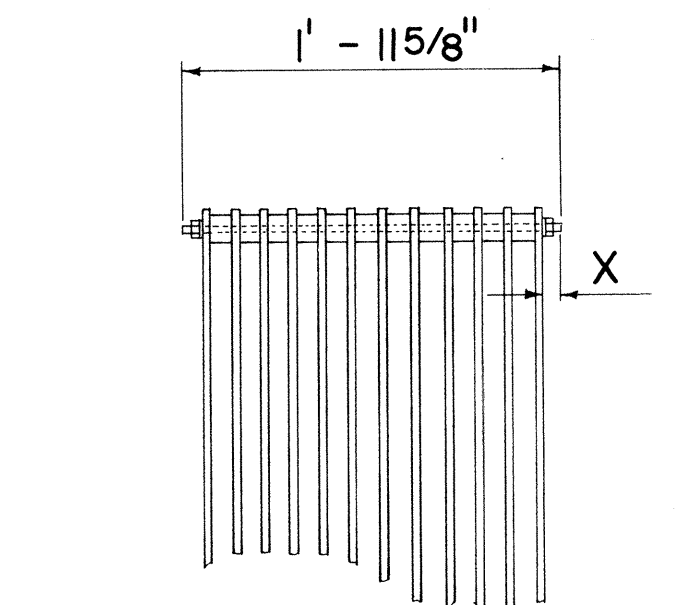
PLAN

(Single Grate)



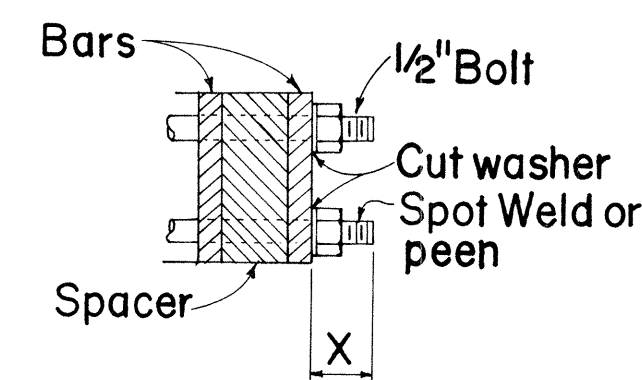
CROSS SECTION

(Thru Frame & Grate)



BOLTED END BLOCK

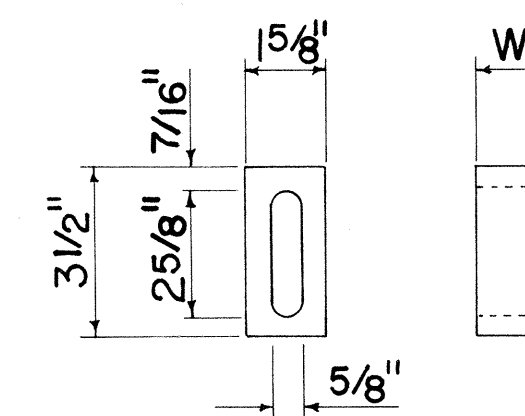
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BOLTING DETAIL

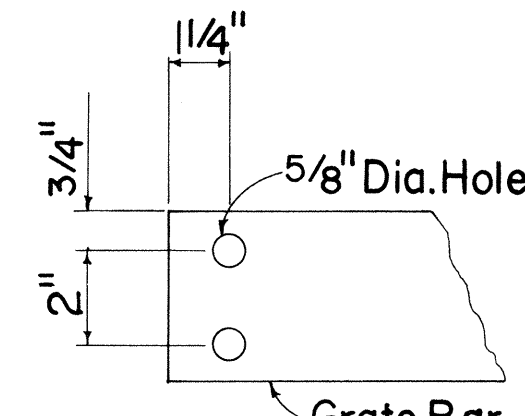
Scale: 3" = 1' - 0"

ALTERNATIVE BOLTED GRATE



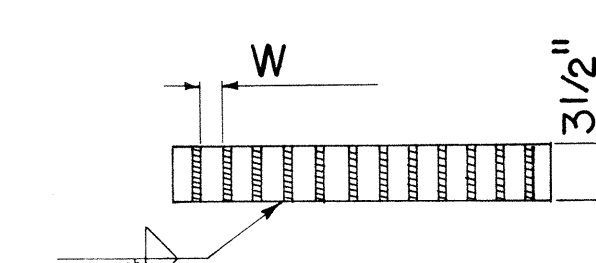
BAR SPACER

Scale: 3" = 1' - 0"

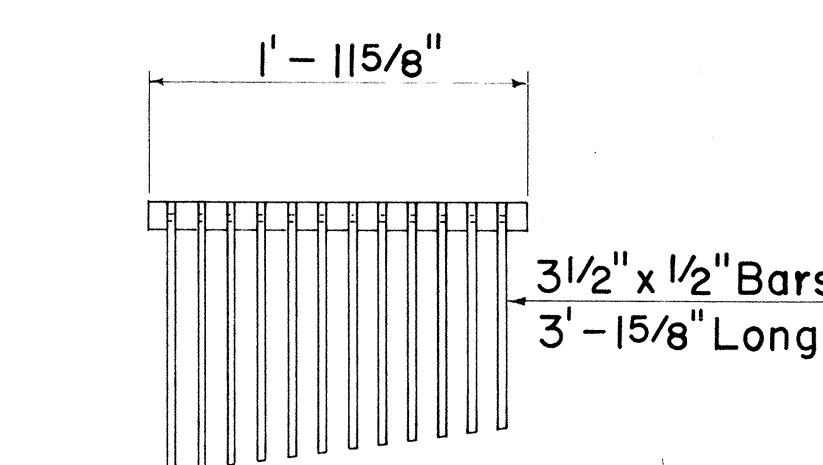


END OF BAR

Scale: 3" = 1' - 0"

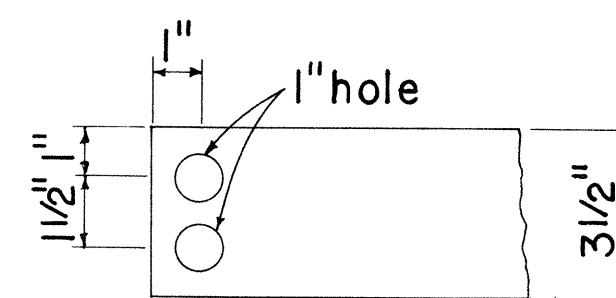


SECTION



CAST END BLOCK

Scale: 1" = 1' - 0"

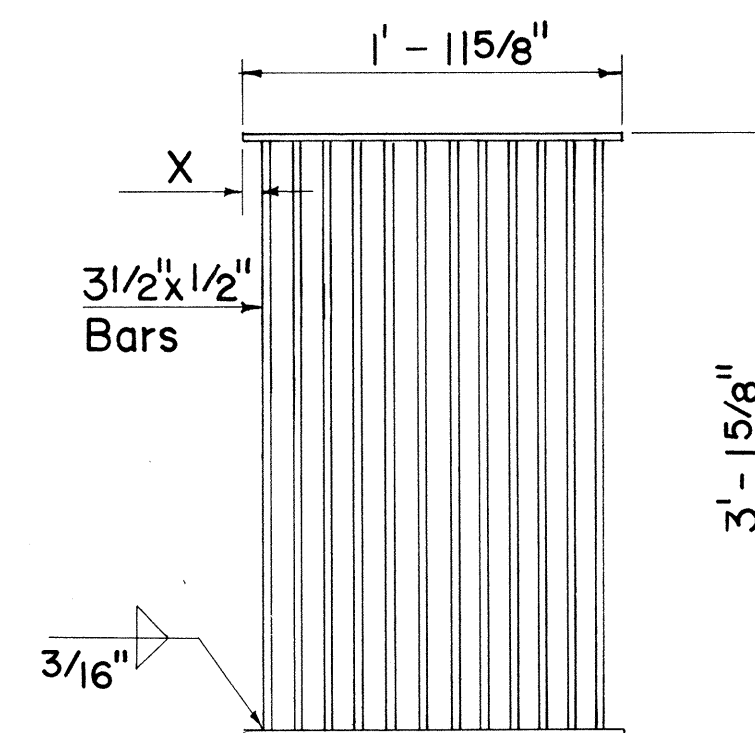
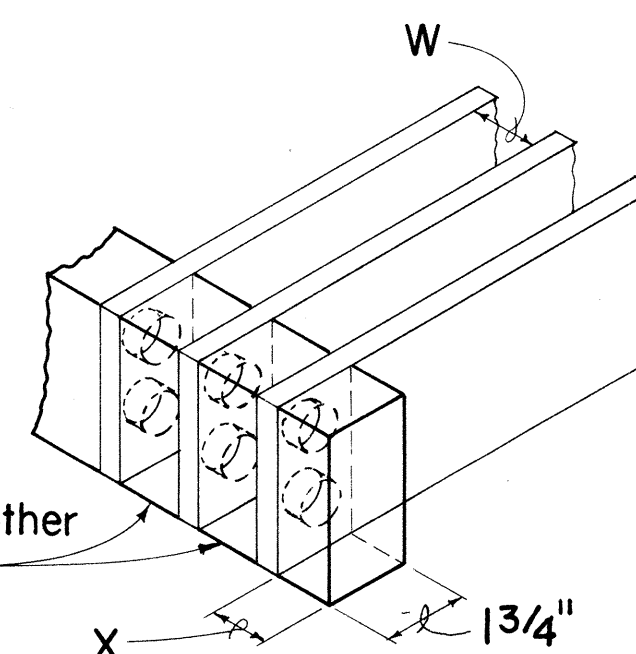


END OF BAR

Scale: 3" = 1' - 0"

ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL END BLOCK GRATE

Both ends held together by solid casting



PLAN

ALTERNATIVE WELDED GRATE

Scale: 1" = 1' - 0"

