

ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	99C0172	1976	4	5

GENERAL NOTES

- Contractor has the option of using cast malleable iron, cast steel, welded, bolted, cast malleable iron end block 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

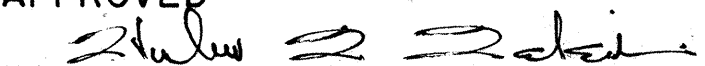
GRATE BAR SPACING TABLE

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.

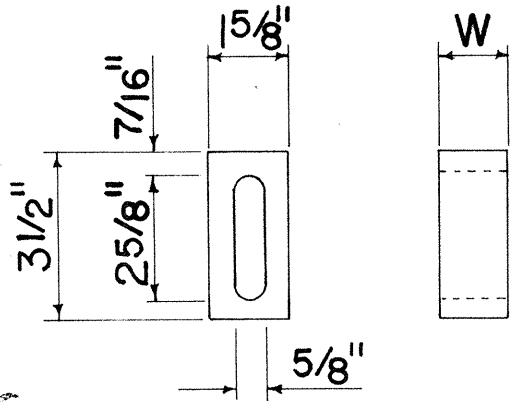
APPROVAL RECOMMENDED:

HYDRAULIC DESIGN ENGINEER DATE 12-17-69
 ASSISTANT CHIEF, ENGINEERING DATE 12-11-69

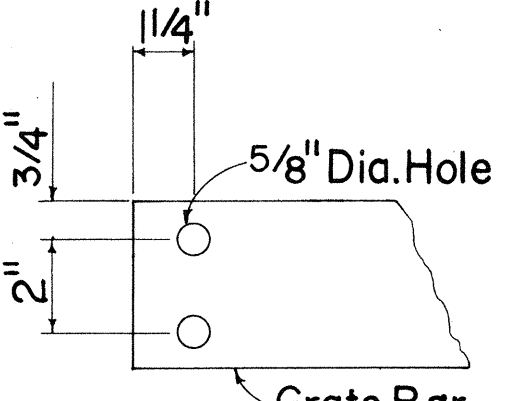
STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

STANDARD DETAILS
 TYPE A-9 AND A-12
 FRAMES AND GRATES
 Scales: As Noted Date: Aug. 1968



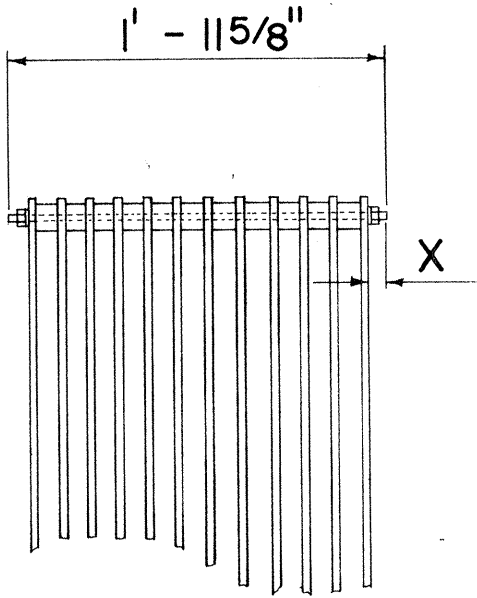
BAR SPACER

Scale: 3"= 1'- 0"



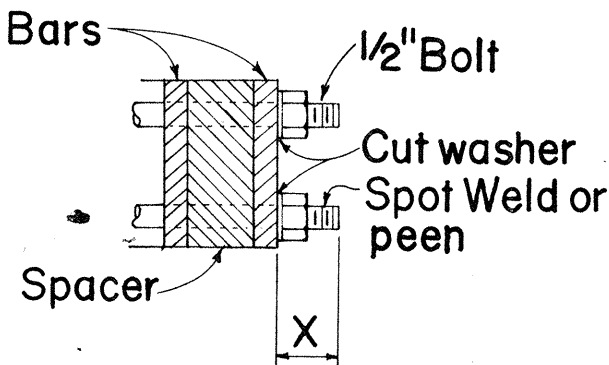
END OF BAR

Scale: 3"= 1'- 0"



BOLTED END BLOCK

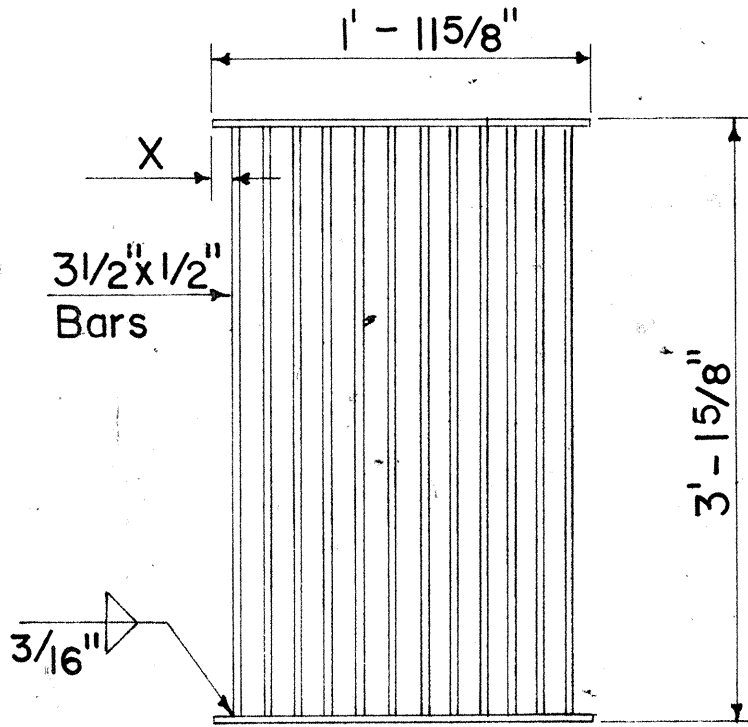
Scale: 1"= 1'- 0"



BOLTING DETAIL

Scale: 3"= 1'- 0"

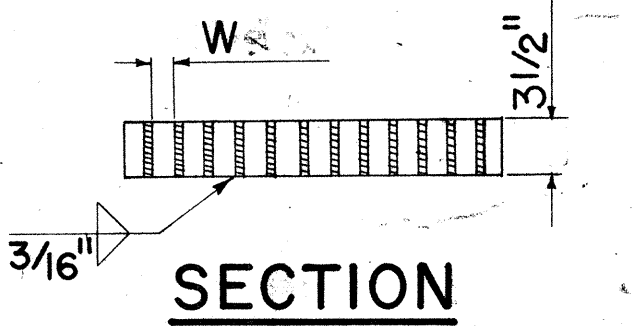
ALTERNATIVE BOLTED GRATE



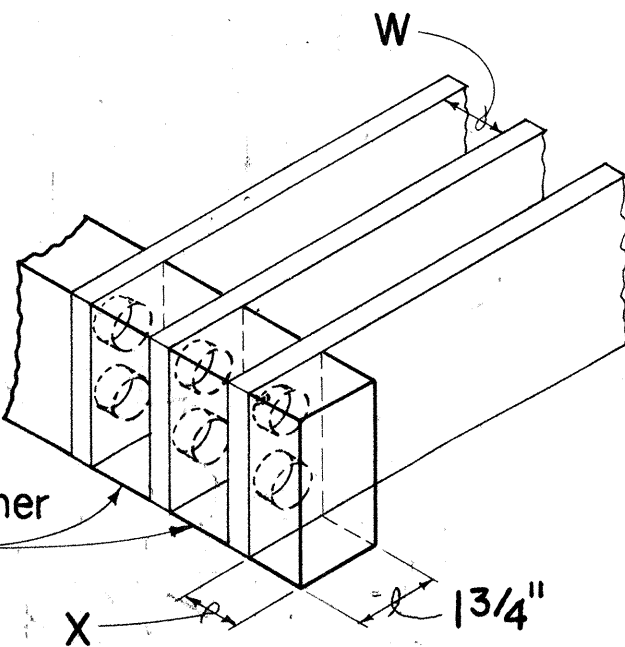
PLAN

ALTERNATIVE WELDED GRATE

Scale: 1"= 1'- 0"



SECTION

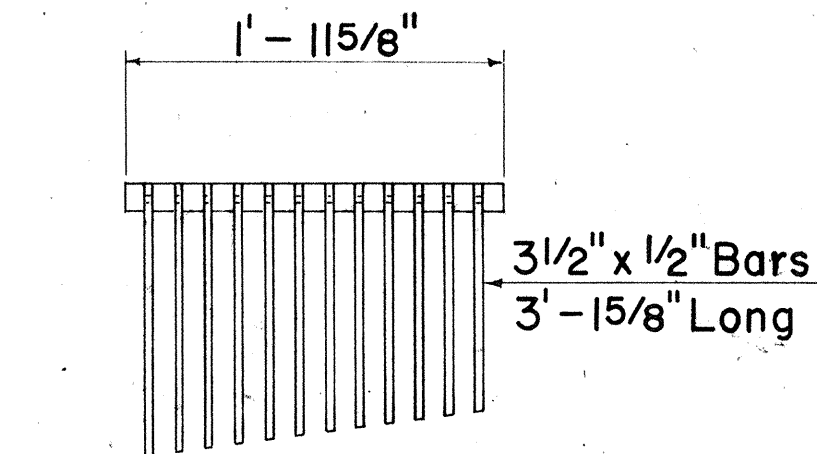


Both ends held together by solid casting

END OF BAR

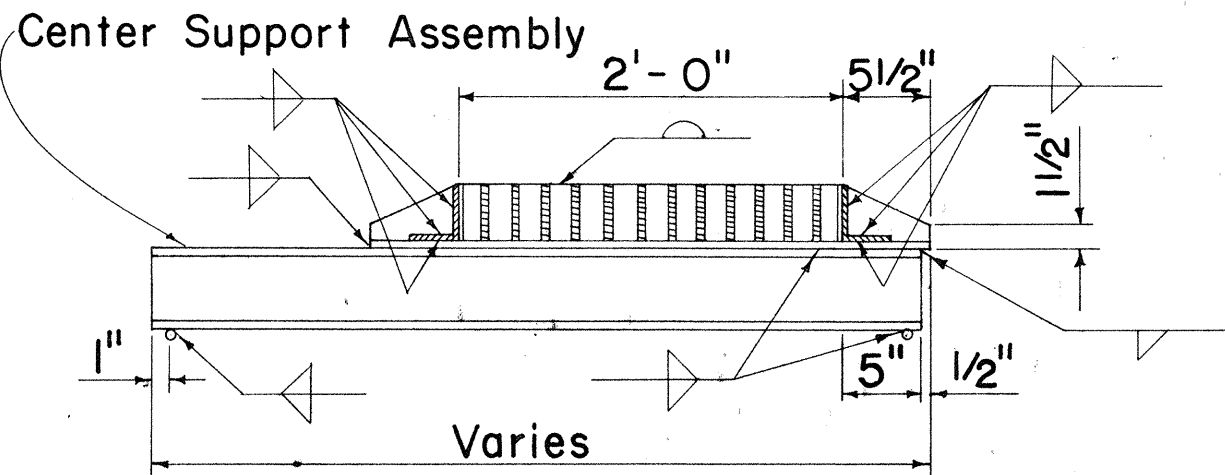
Scale: 3"= 1'- 0"

ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL END BLOCK GRATE



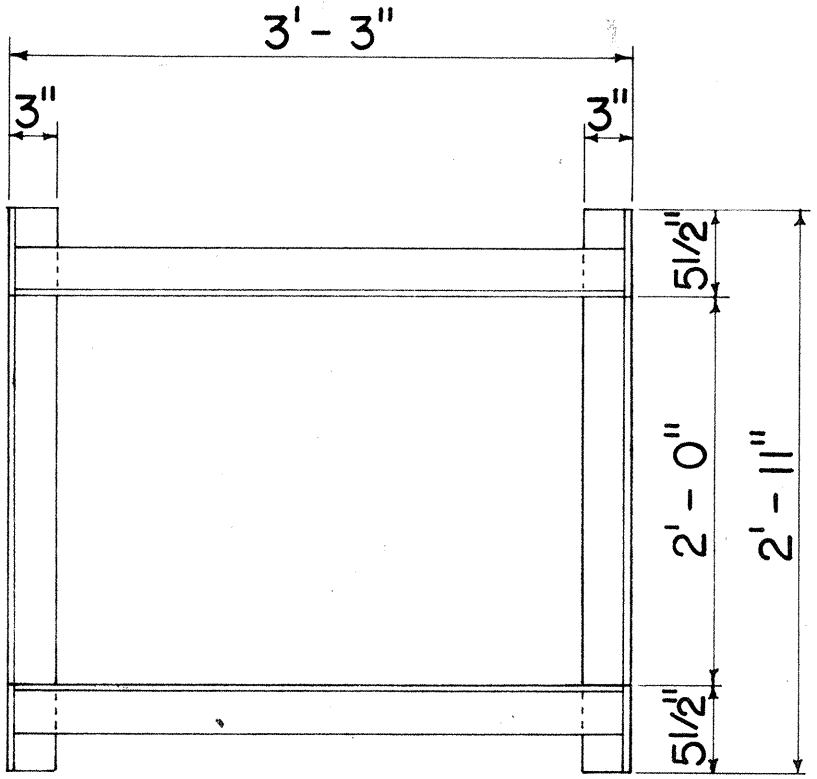
CAST END BLOCK

Scale: 1"= 1'- 0"



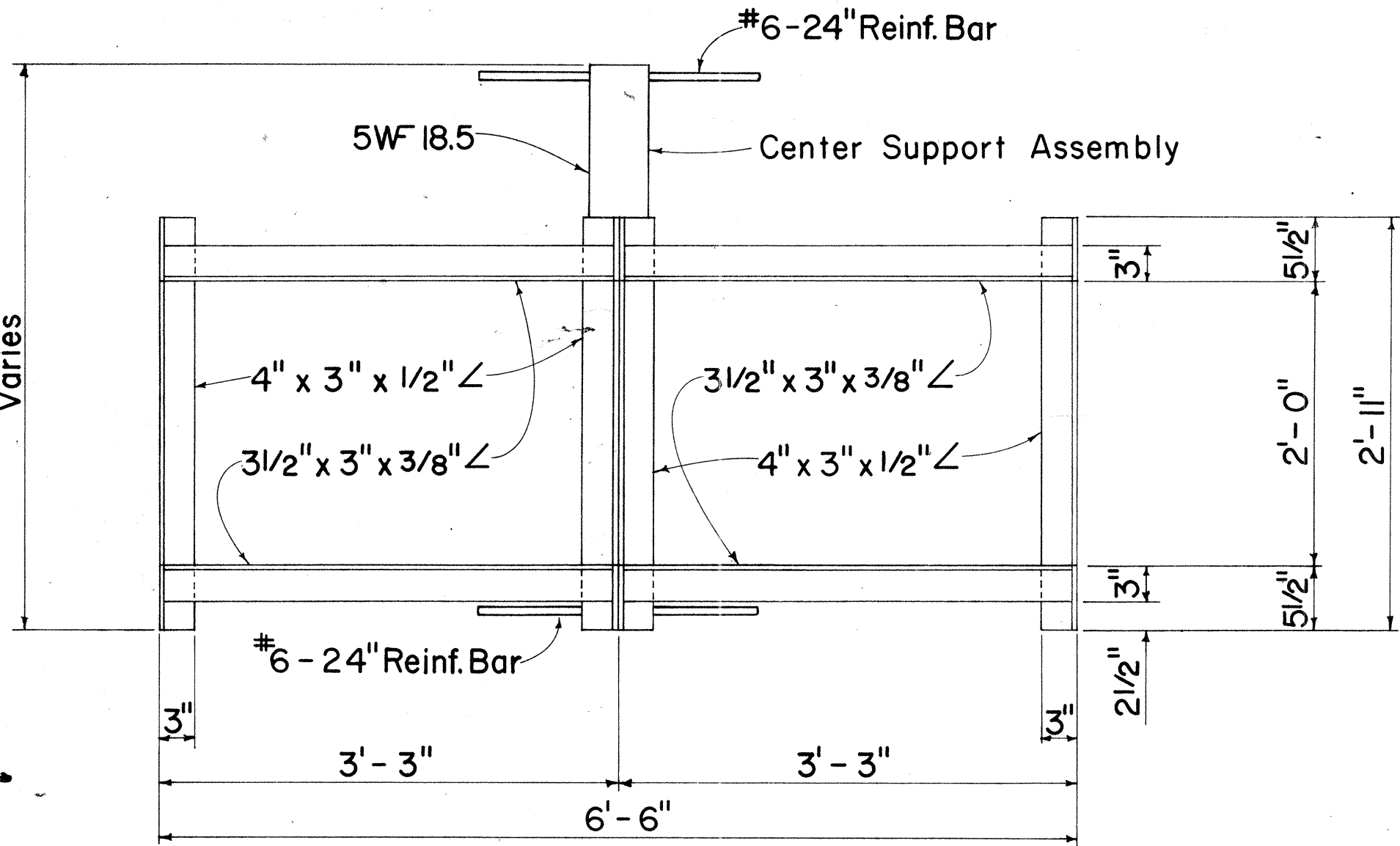
CROSS SECTION

(Thru Frame & Grate)



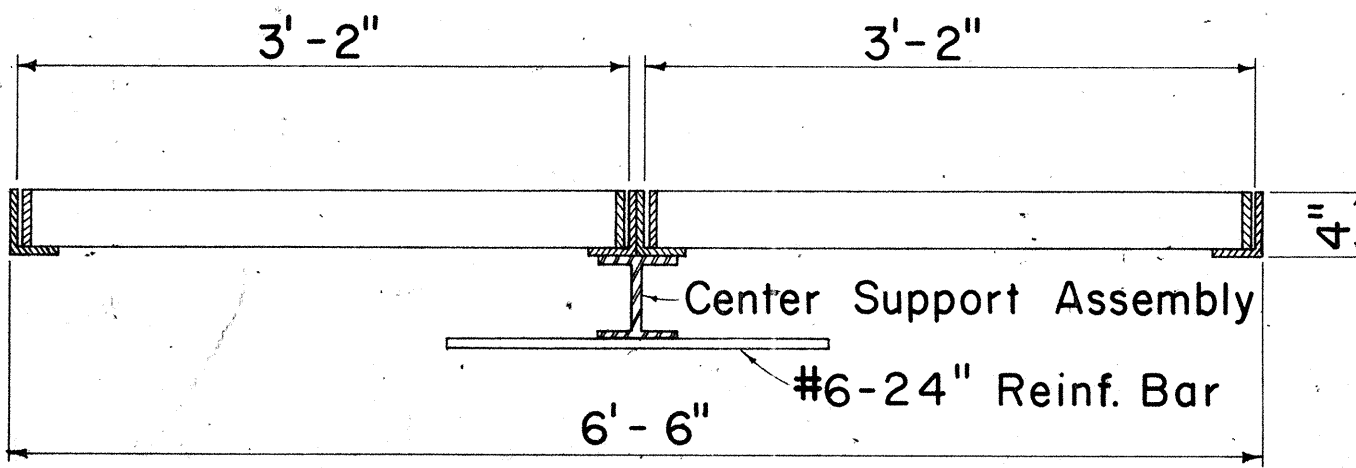
PLAN

(Single Grate)



PLAN

(Two or More Grates)

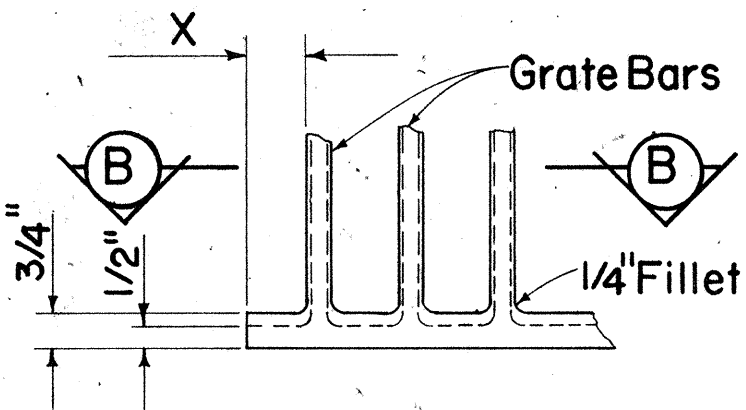


LONGITUDINAL SECTION

(Thru Frame & Grate)

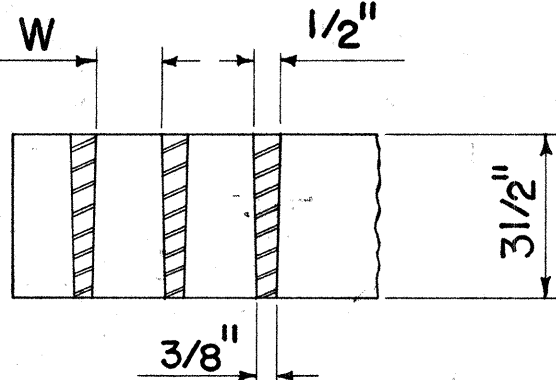
FRAME DETAILS

Scale: 1"= 1'- 0"



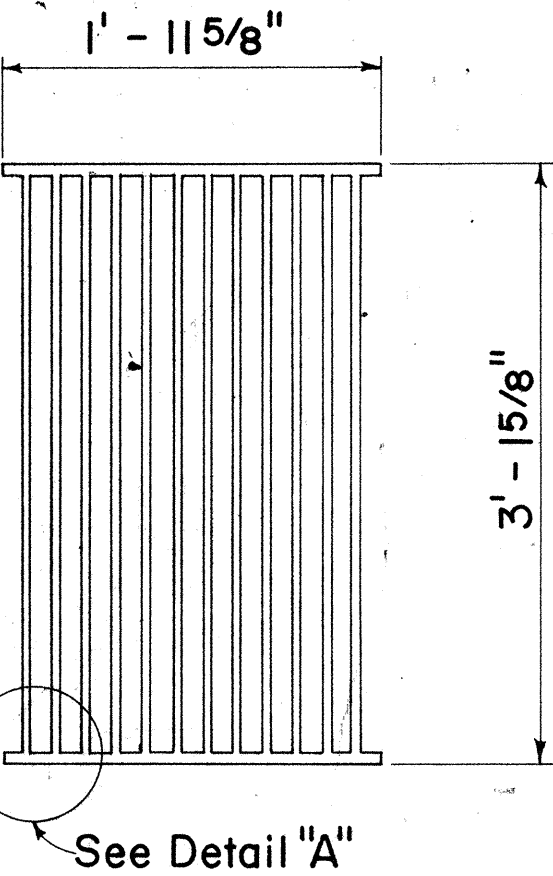
DETAIL "A"

Scale: 3"= 1'- 0"



SECTION "B-B"

Scale: 3"= 1'- 0"



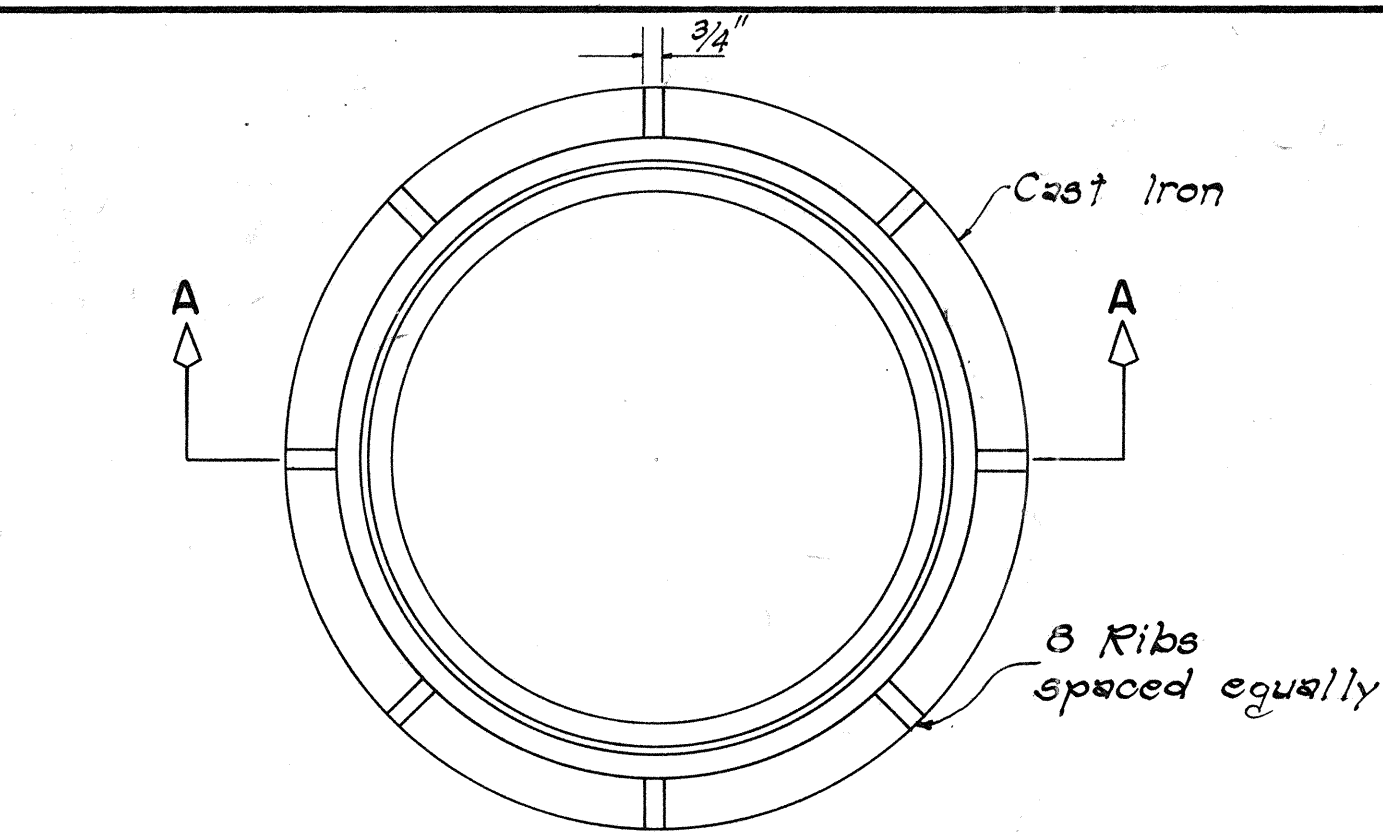
PLAN

Scale: 1"= 1'- 0"

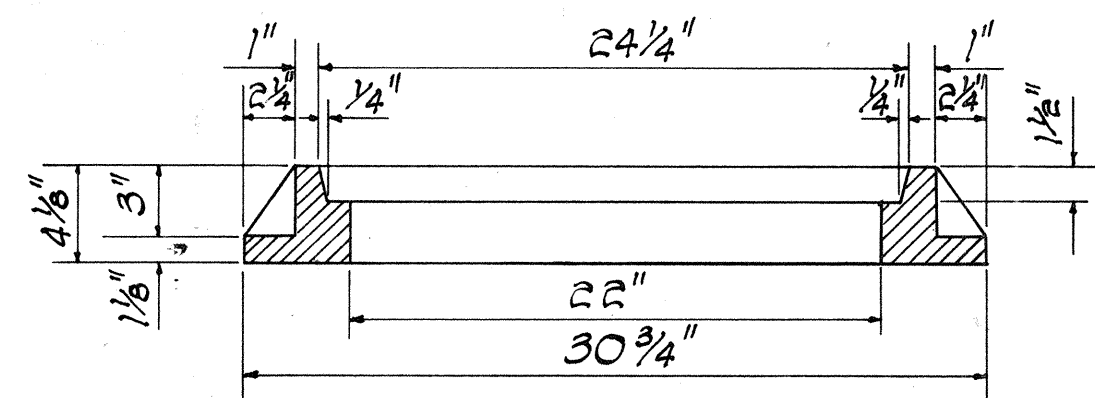
ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL GRATE

SURVEY PLOTTED BY	DATE
DRAWN BY	7/68
DESIGNED BY	8/68
QUANTITIES BY	7/68
CHECKED BY	8/68

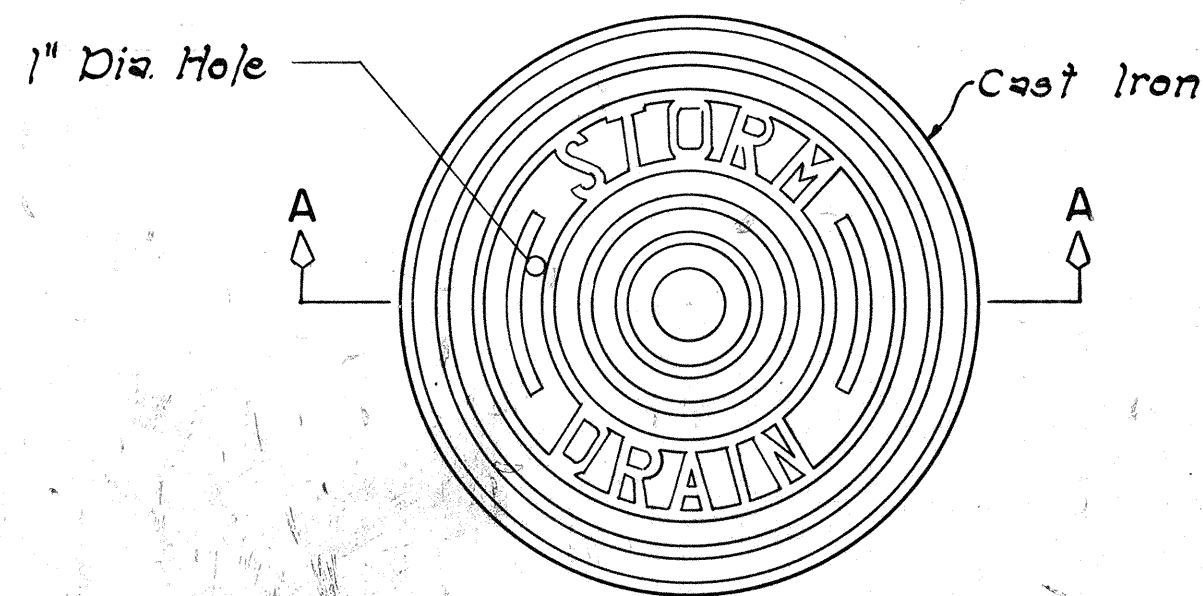
ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72001-72	1976	5	5



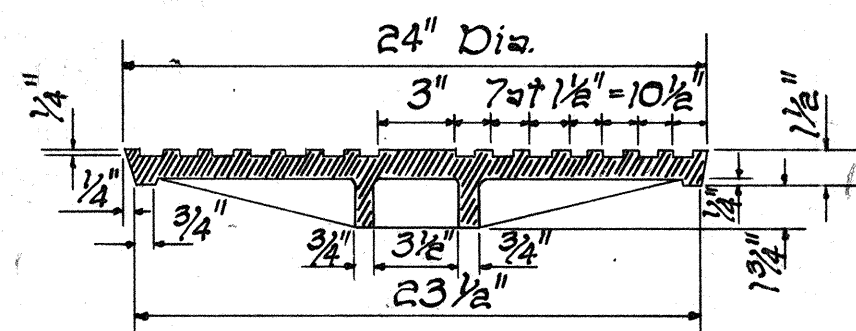
PLAN



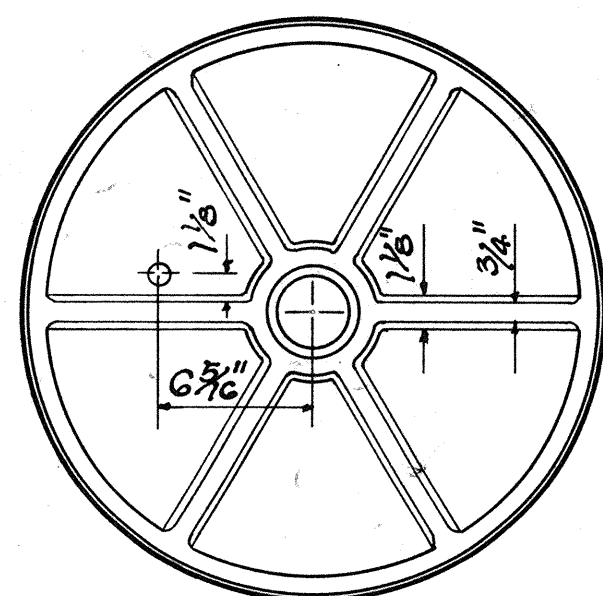
SECTION A-A



PLAN



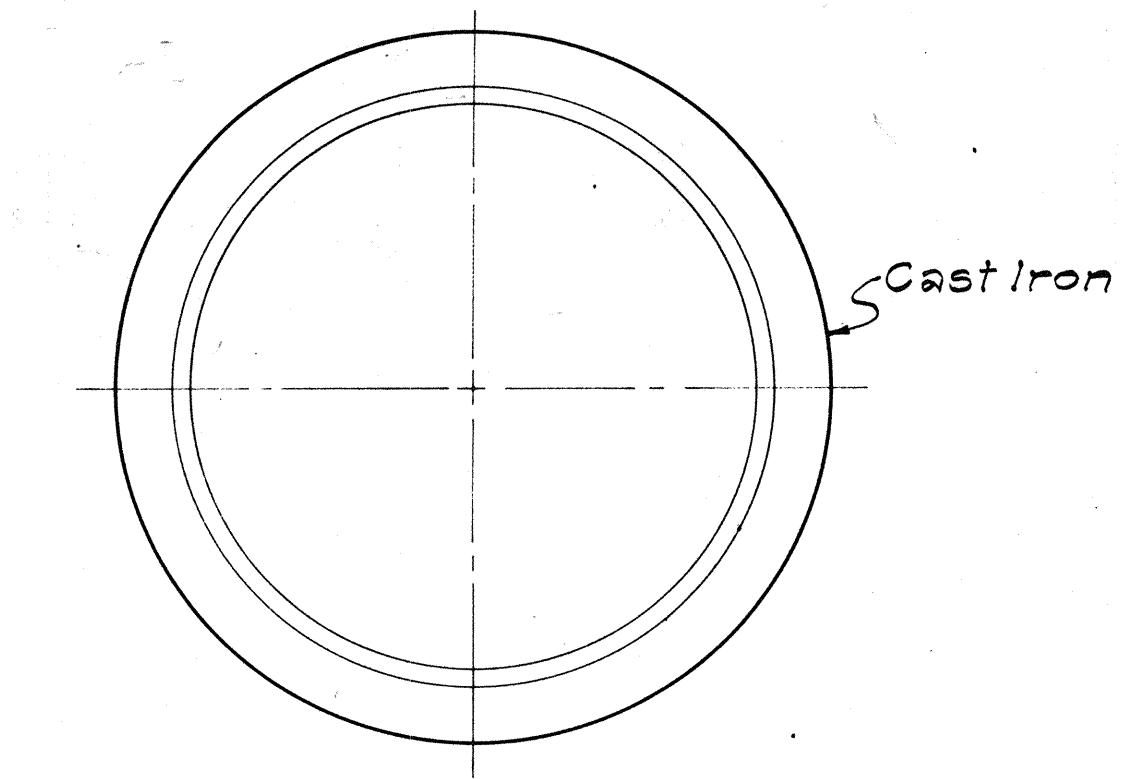
SECTION A-A



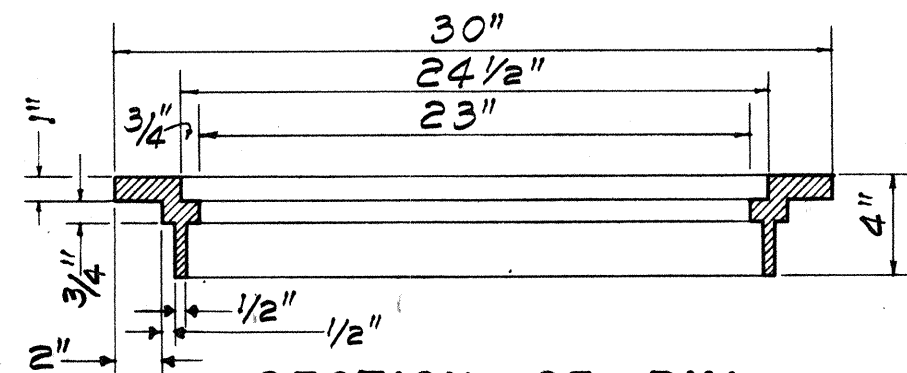
BOTTOM VIEW OF COVER

DETAILS OF TYPE "P"
CAST IRON FRAME AND COVER

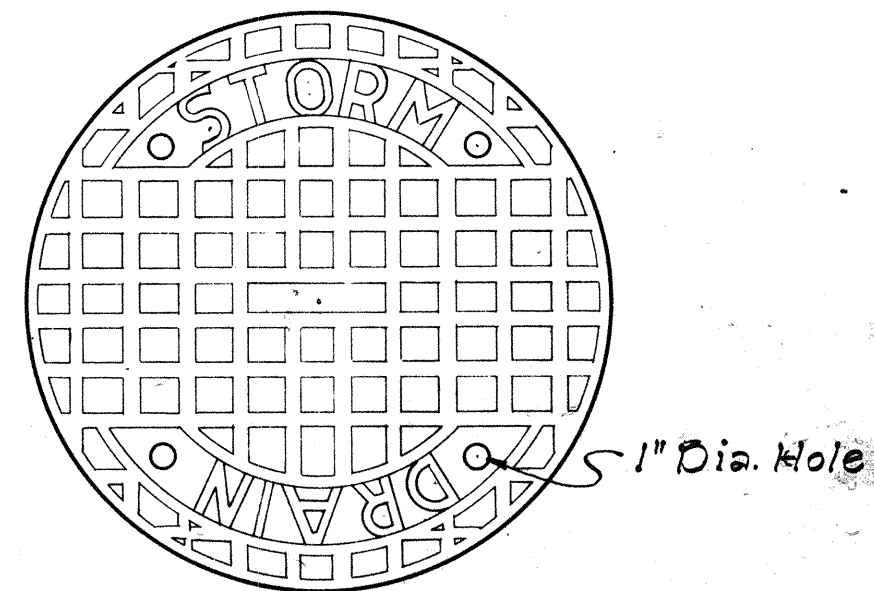
SCALE: 1-1/2" = 1'-0"



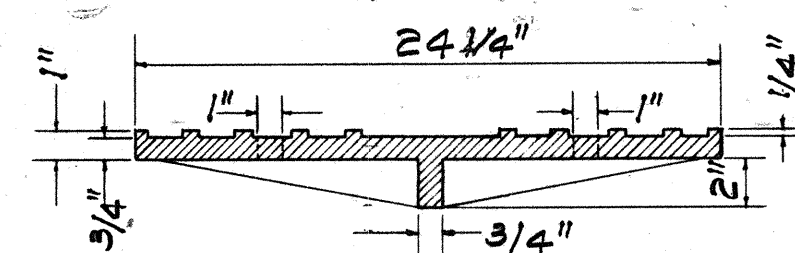
PLAN OF RIM



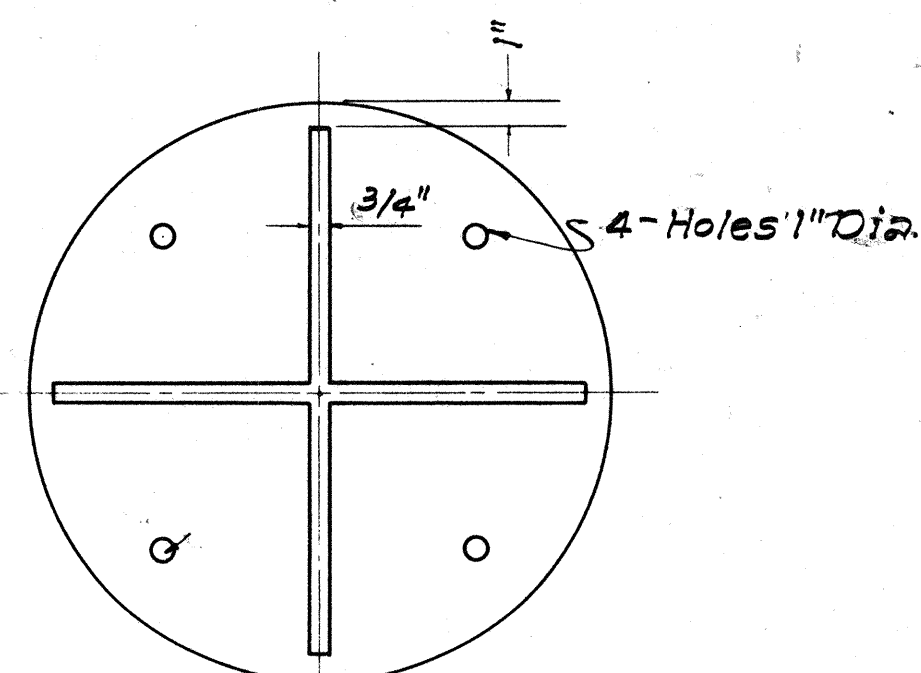
SECTION OF RIM



TOP VIEW OF COVER



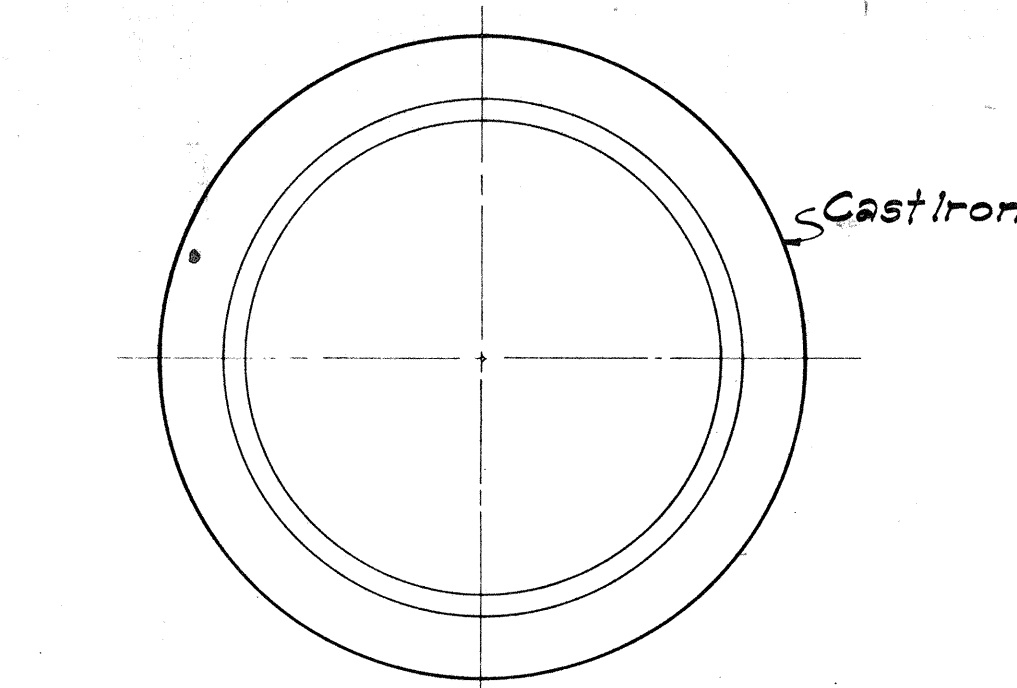
SECTION



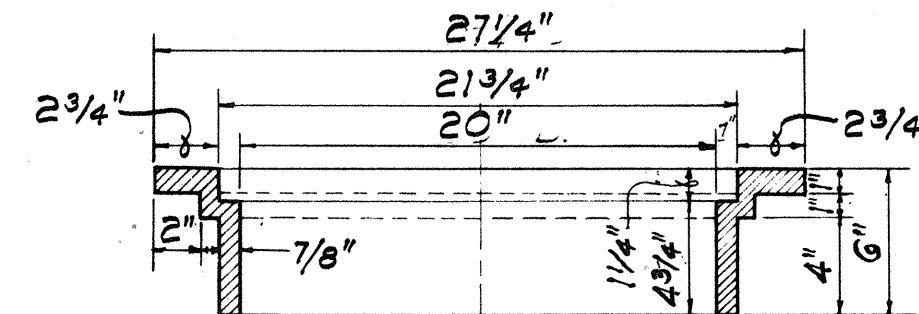
BOTTOM VIEW OF COVER

DETAILS OF TYPE "B"
CAST IRON FRAME AND COVER

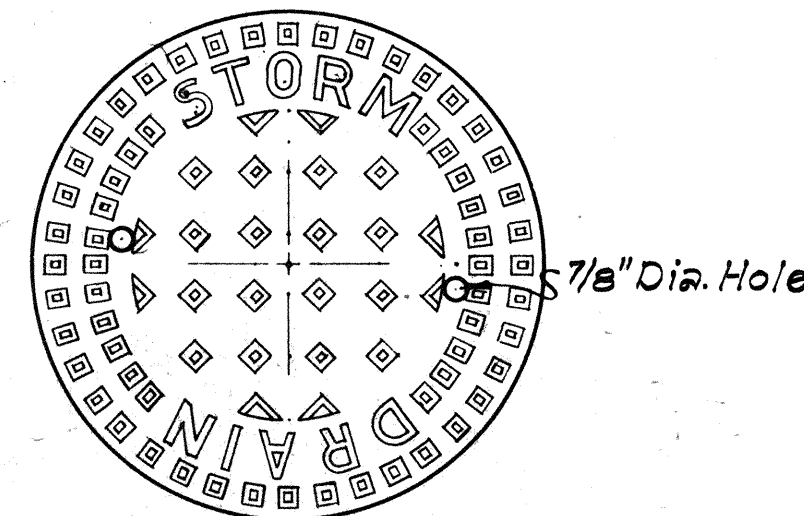
SCALE: 1-1/2" = 1'-0"



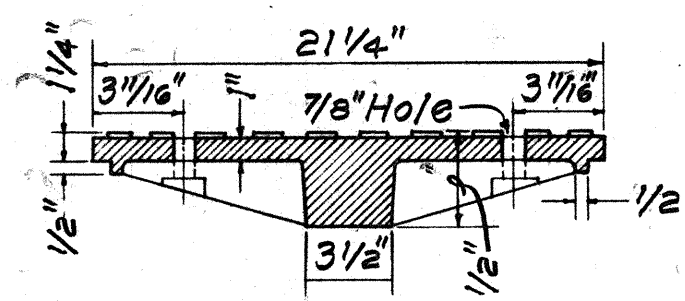
PLAN OF RIM



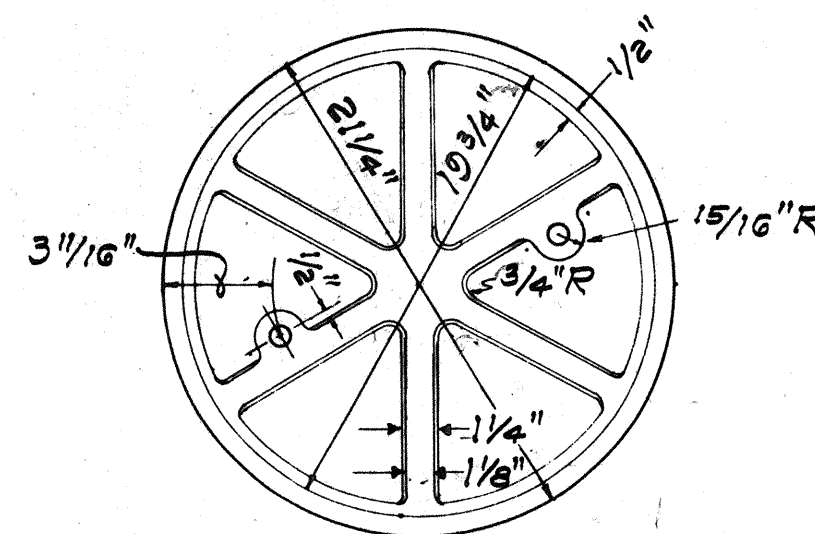
SECTION OF RIM



TOP VIEW OF COVER



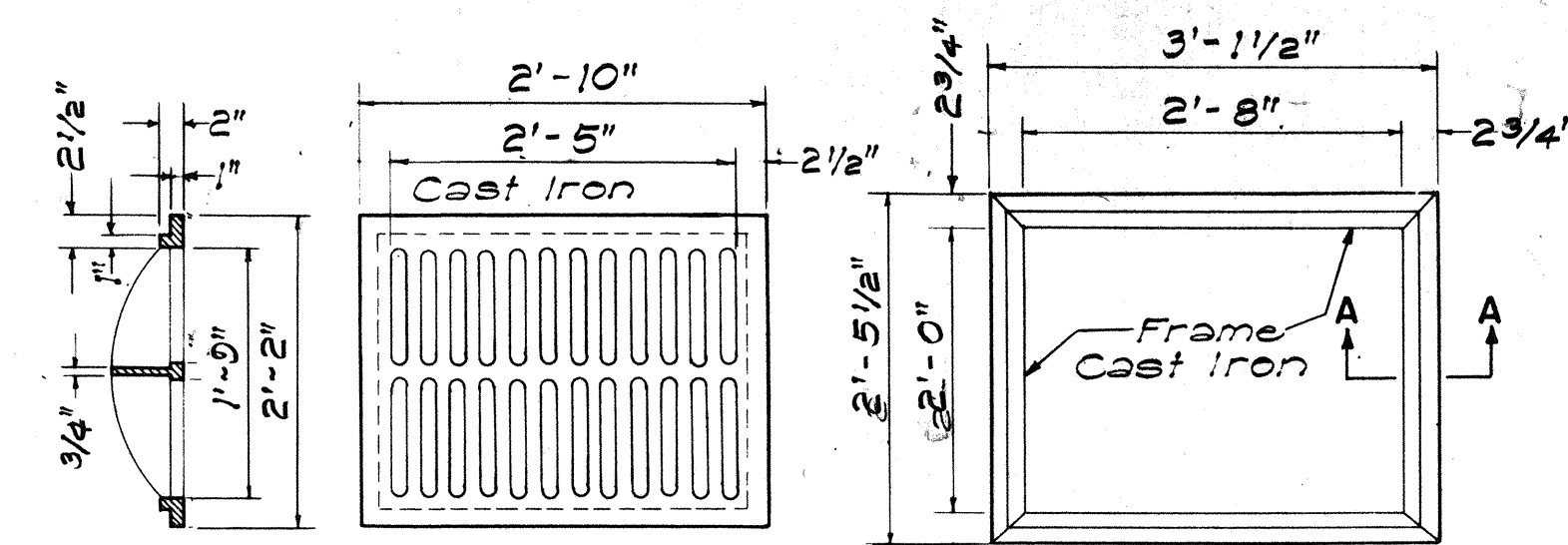
SECTION



BOTTOM VIEW OF COVER

DETAILS OF TYPE "A"
CAST IRON FRAME AND COVER

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



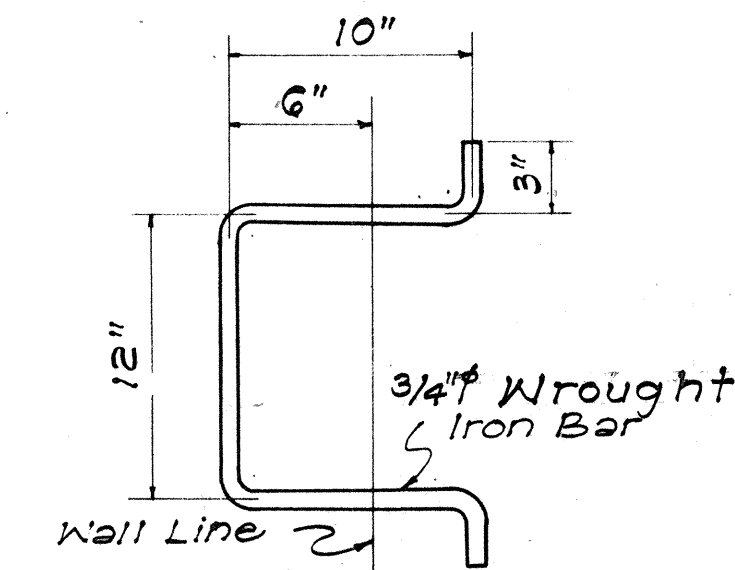
SECTION

TOP VIEW

TOP VIEW

TYPE C C.I. FRAME AND GRATE

SCALE: 3/4" = 1'-0"



MANHOLE RUNG

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

APPROVAL RECOMMENDED:
HYDRAULIC DESIGN ENGINEER
DATE: 12-17-69

APPROVED:
ASSISTANT CHIEF, ENGINEERING
DATE: 12-17-69

NO.	REVISION	APPROVED BY	DATE
1.	Detail of Type "P" Cast Iron Frame and Cover	H.T.	1-6-71

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
STANDARD DETAILS CATCH BASIN AND MANHOLE CASTINGS
Scale: As Noted Date: July, 1969

SHEET NO 2 OF 2 SHEETS