

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30A-0276	1976	3	4

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 $\frac{3}{8}$ " 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"	$1\frac{9}{16}$ "
A-12	12	$1\frac{3}{8}$ "	$1\frac{1}{4}$ "

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:

G. Palacios 12-17-69
HYDRAULIC DESIGN ENGINEER DATE

APPROVED:

W. S. S. S. 12-11-69
ASSISTANT CHIEF, ENGINEERING DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

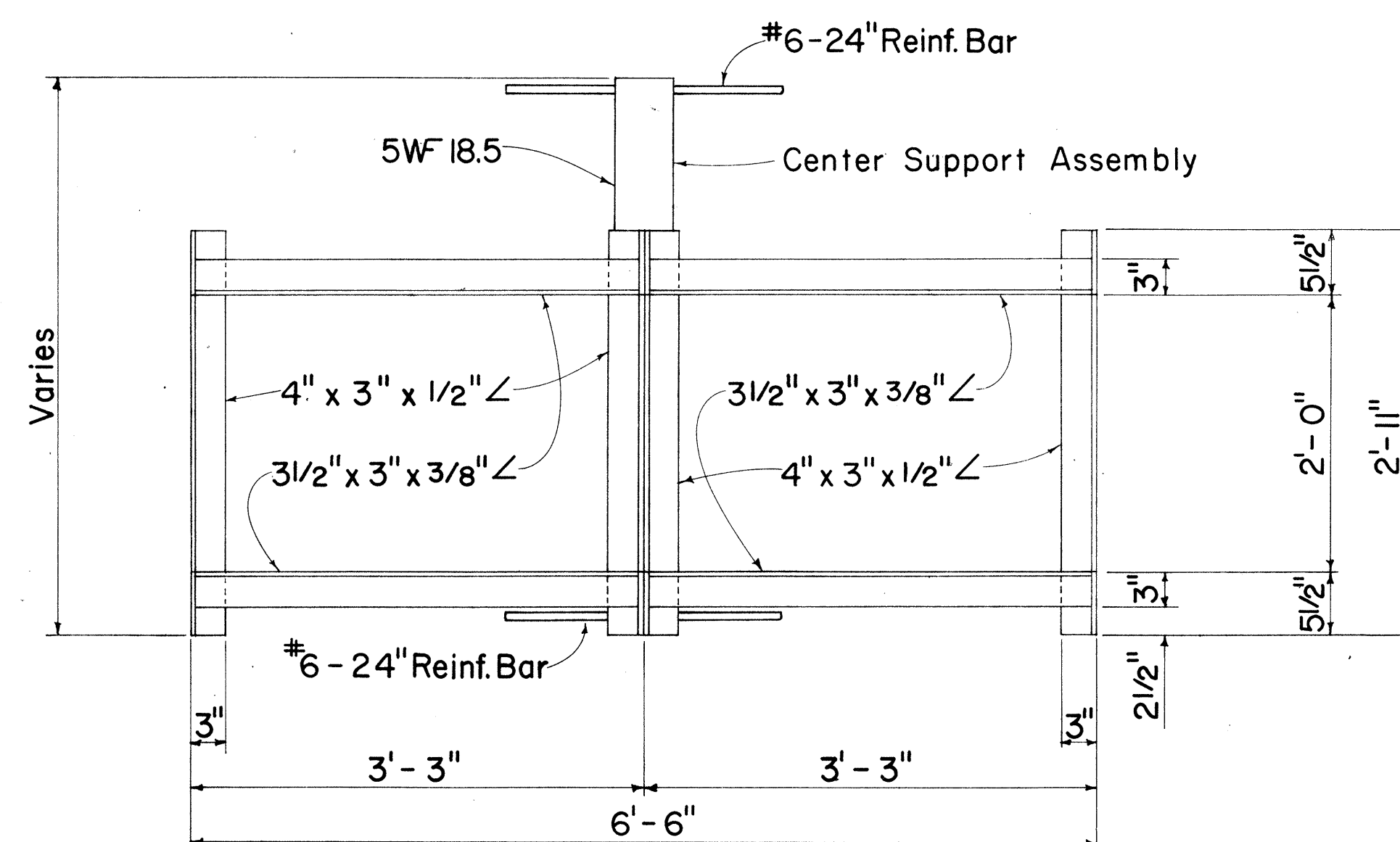
STANDARD DETAILS

TYPE A-9 AND A-12
FRAMES AND GRATES

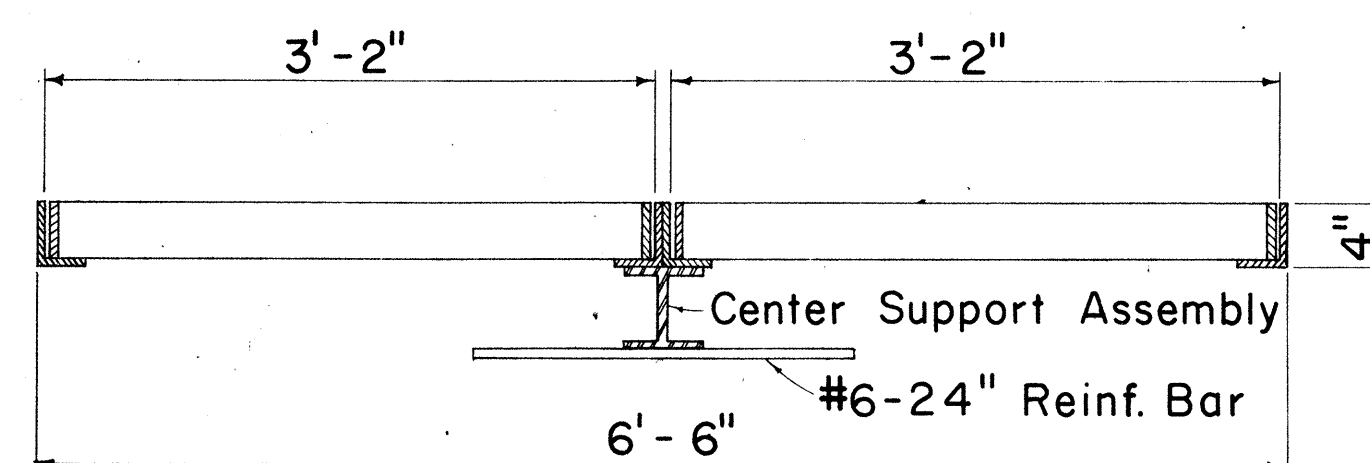
Scales: As Noted

Date: Aug. 1968

SHEET No. 3 OF 4 SHEETS DH 7



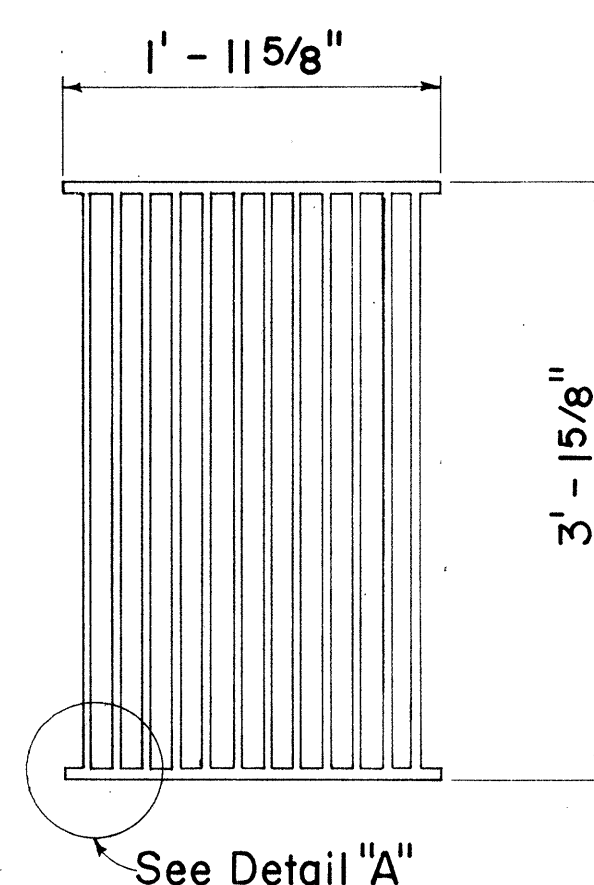
PLAN
(Two or More Grates)



LONGITUDINAL SECTION
(Thru Frame & Grate)

FRAME DETAILS

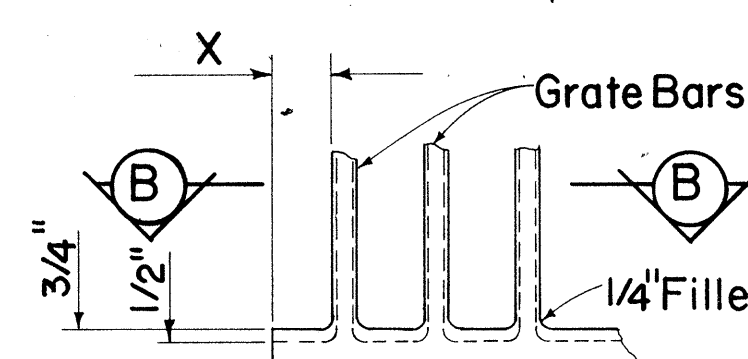
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PLAN

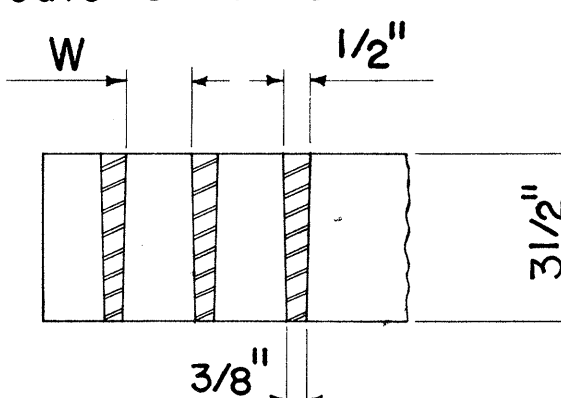
Scale: 1" = 1' - 0"

ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL GRATE



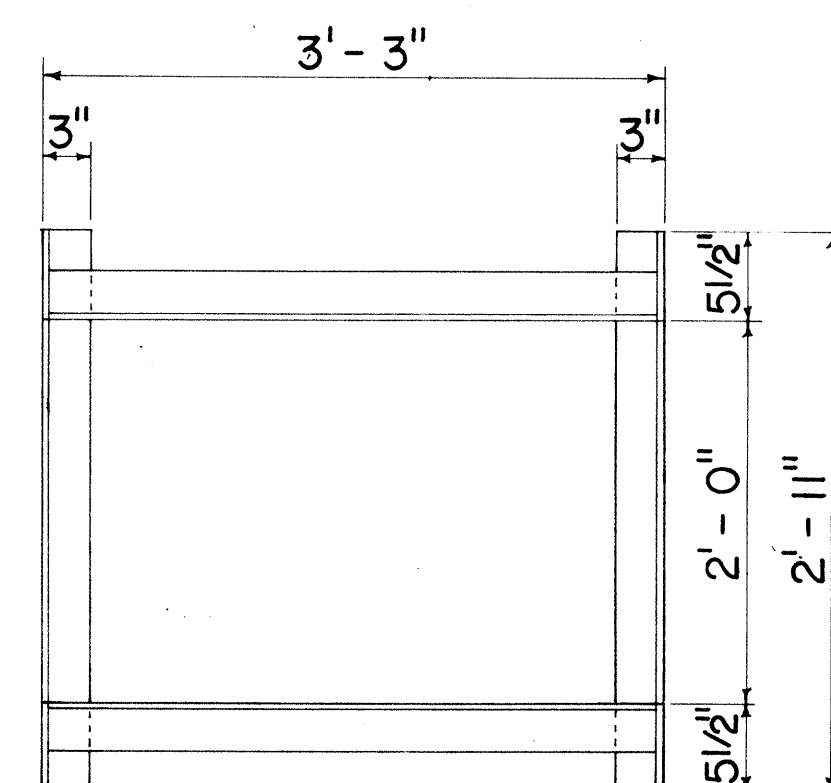
DETAIL "A"

Scale: 3" = 1' - 0"

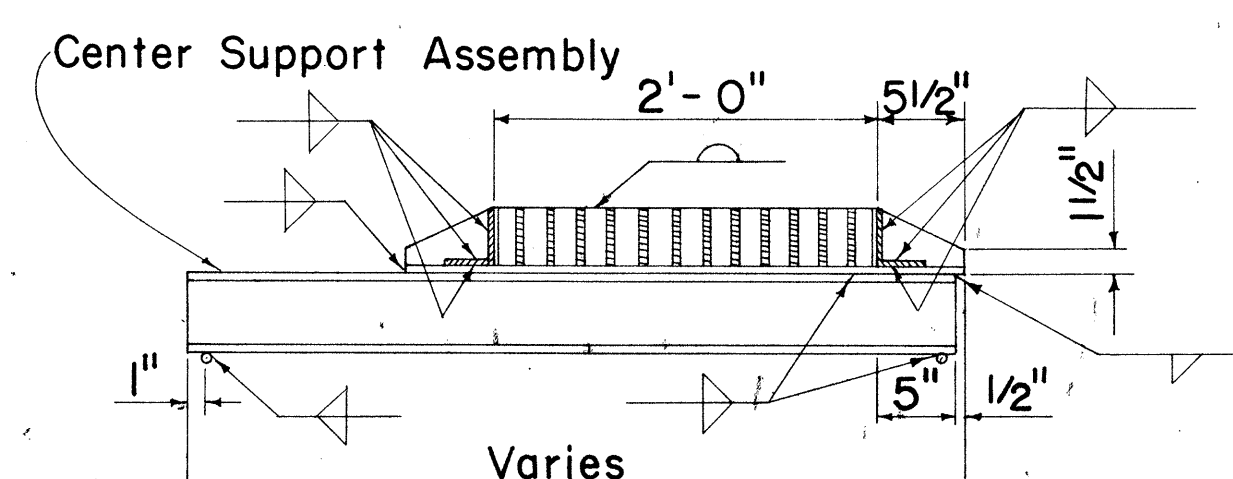


SECTION "B-B"

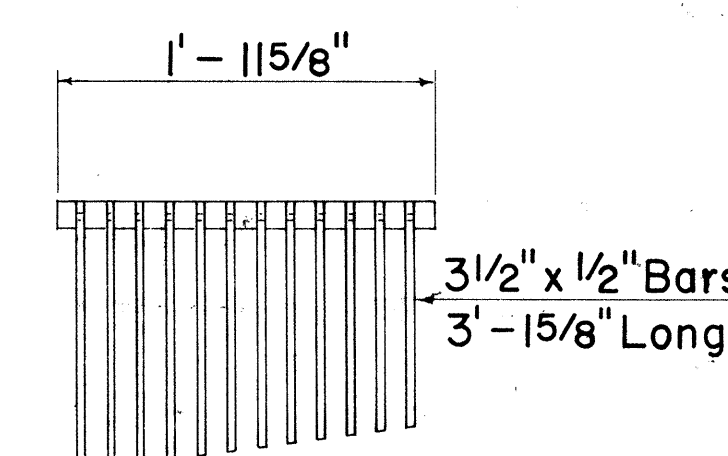
Scale: 3" = 1' - 0"



PLAN
(Single Grate)

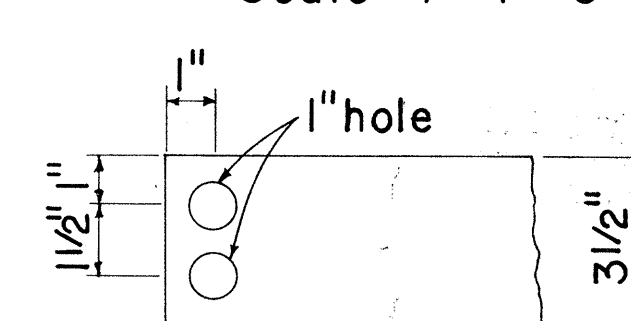


CROSS SECTION
(Thru Frame & Grate)



CAST END BLOCK

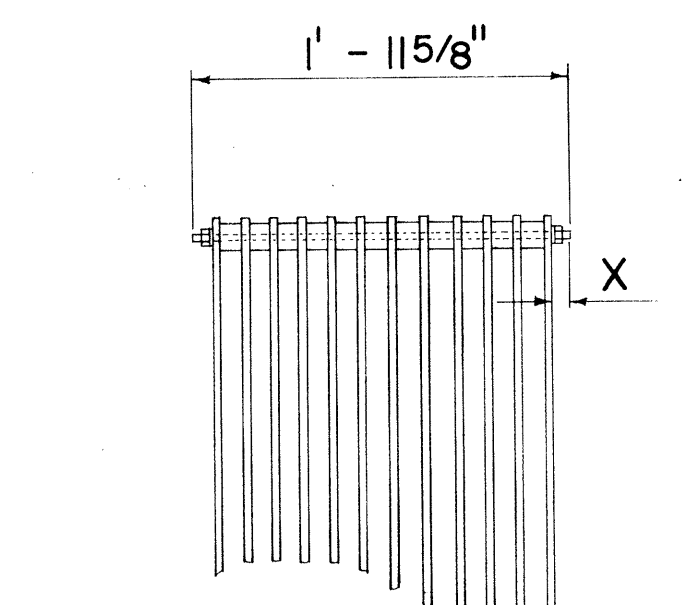
Scale: 1" = 1' - 0"



END OF BAR

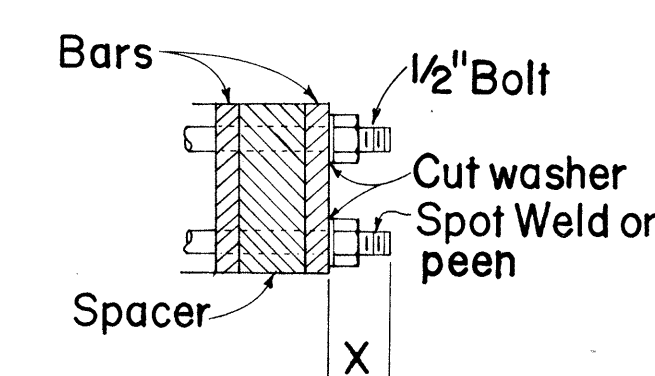
Scale: 3" = 1' - 0"

ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL END BLOCK GRATE



BOLTED END BLOCK

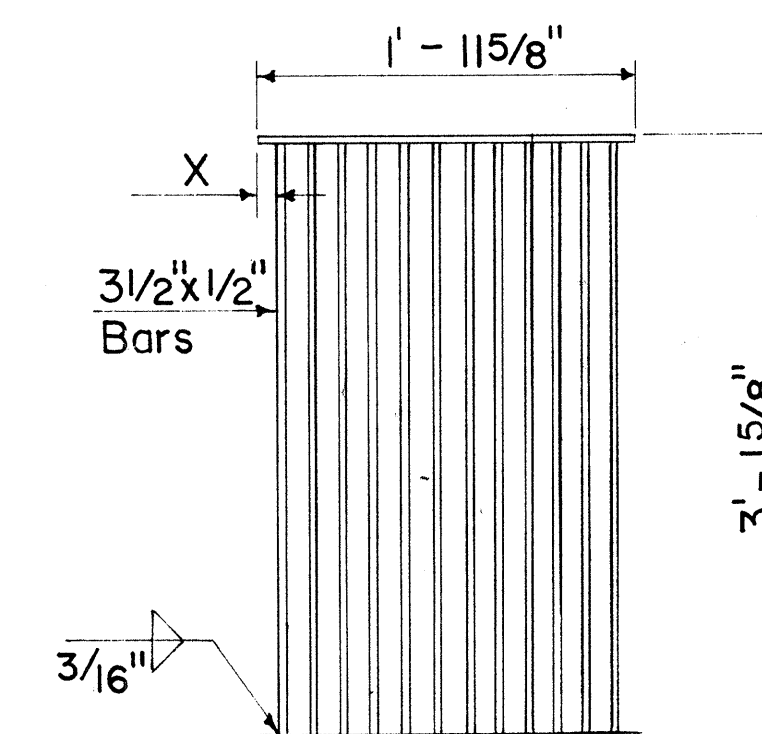
Scale: 1" = 1' - 0"



BOLTING DETAIL

Scale: 3" = 1' - 0"

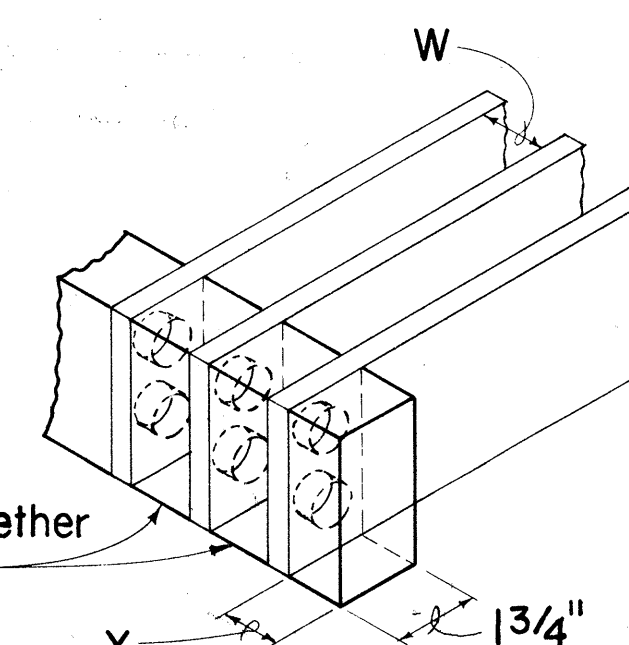
ALTERNATIVE BOLTED GRATE



PLAN

ALTERNATIVE WELDED GRATE

Scale: 1" = 1' - 0"



Both ends held together
by solid casting

NO.	REVISION	APPROVED BY	DATE

3/4"

Cast Iron

A A

8 Ribs spaced equally

Technical drawing of a beam with dimensions: 30", 24 1/2", 23", 1", 3/4", 3 3/4", 1/2", 1/2", 4", and 3".

A cross-sectional diagram of a cast iron pipe. It consists of two concentric circles. The outer circle represents the outside of the pipe, and the inner circle represents the inside bore. The material between the two circles is labeled 'Cast Iron' with a line pointing to it. A vertical dashed line passes through the center of the circles, representing the axis of symmetry.

Technical drawing of a cross-section of a roof structure. The drawing shows a central horizontal beam with a total width of $27\frac{1}{4}"$. The beam has a top flange of $2\frac{3}{4}"$ and a bottom flange of $2"$. The web thickness is $\frac{7}{8}"$. The beam is supported by a base with a total width of $6"$. The base has a top flange of $2\frac{3}{4}"$ and a bottom flange of $4"$. The web thickness of the base is $\frac{1}{4}"$. The distance from the centerline of the beam to the centerline of the base is $21\frac{3}{4}"$. The distance from the centerline of the beam to the outer edge of the base is $20"$. The distance from the centerline of the beam to the inner edge of the base is $4\frac{3}{4}"$.

Technical drawing of a mechanical part with dimensions:

- Overall width: $24\frac{1}{4}"$
- Overall height: $1\frac{1}{2}"$
- Top edge dimensions (from left to right): $1"$, $2\frac{1}{4}"$, $\frac{1}{4}"$, $2\frac{1}{4}"$, $1"$
- Bottom edge dimensions (from left to right): $1\frac{1}{8}"$, $22\frac{3}{4}"$, $30\frac{3}{4}"$
- Left side dimensions (from top to bottom): $4\frac{1}{8}"$, $3"$
- Right side dimensions (from top to bottom): $1\frac{1}{8}"$
- Internal features: Two hatched rectangular areas on the bottom edge, each with a width of $2\frac{1}{4}"$ and a height of $1\frac{1}{8}"$.

A technical drawing of a circular storm drain cover. The cover has concentric rings. The words "STORM" and "DRAIN" are embossed on the cover. A label "1" Dia. Hole" points to a small hole on the outer ring. A label "Cast Iron" points to the outer ring. Two labels "A" are placed on the left and right sides of the cover, with lines pointing to the outer ring.

Technical drawing of a mechanical part with dimensions:

- Overall width: 24" Dia.
- Top horizontal segment: 3"
- Top horizontal segment calculation: $7 + 1\frac{1}{2} = 10\frac{1}{2}"$
- Right vertical segment: $1\frac{1}{2}"$
- Left vertical segment: $\frac{1}{4}"$
- Bottom horizontal segment: $23\frac{1}{2}"$
- Bottom horizontal segment calculation: $3\frac{1}{4}" + 3\frac{1}{2}" + 3\frac{1}{4}"$
- Left vertical segment: $\frac{1}{4}"$
- Right vertical segment: $1\frac{1}{2}"$

12"

3/4"

1"

4-Holes 1" Dia.

TOP VIEW

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

SCALE : 1" = 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
CATCH BASIN AND
MANHOLE CASTINGS

Scale: As Noted Date: July, 1969

SHEET No 4 OF 4 SHEETS DH