

S U M M A R Y

PROJECT: Route H 1: Palailai to Kunia, Safety Improvement

PROJECT NO.: F. A. I. PROJ. NO. 1-H-1-1(108)

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(108)	1975	28	100

[illegible]

S U M M A R Y

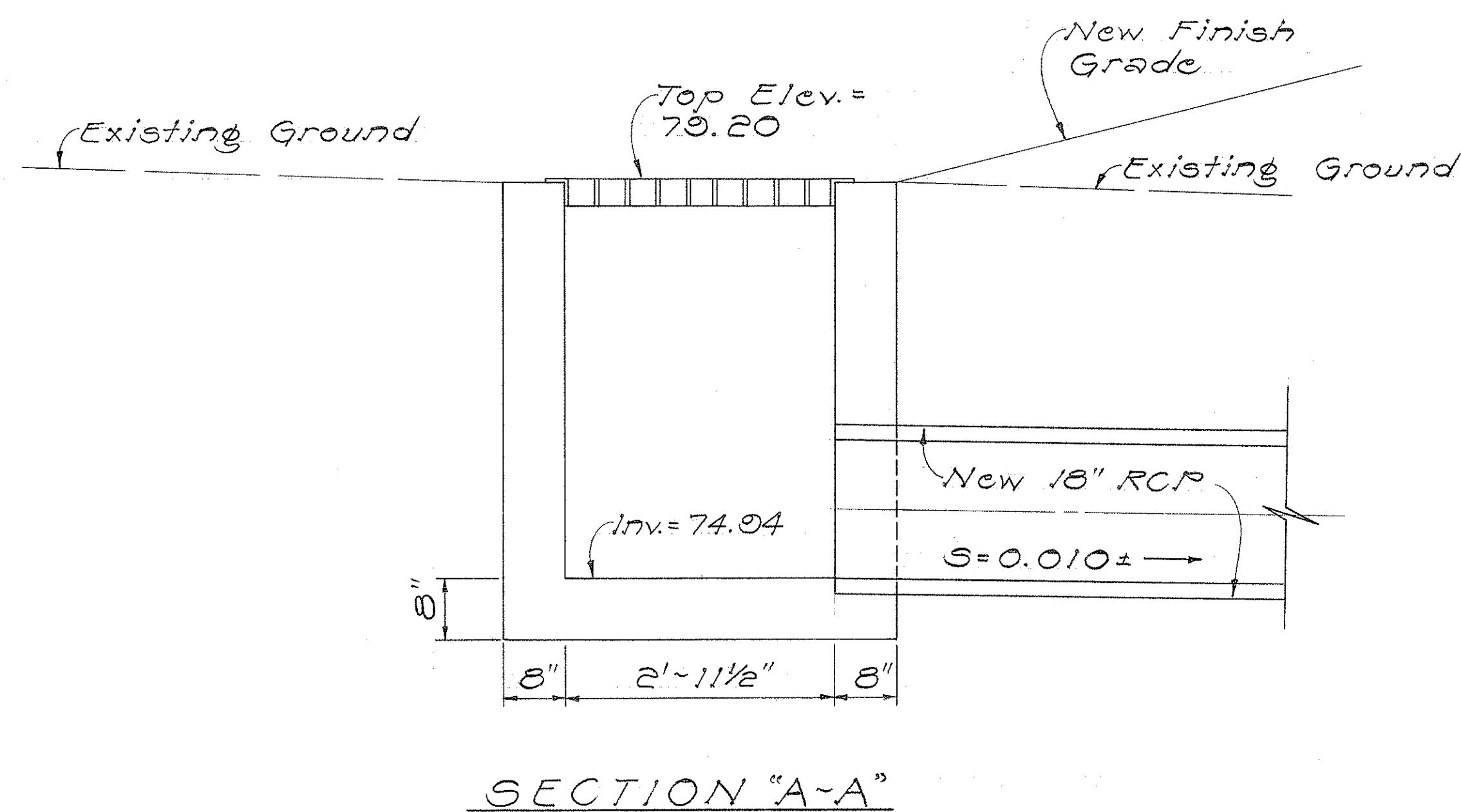
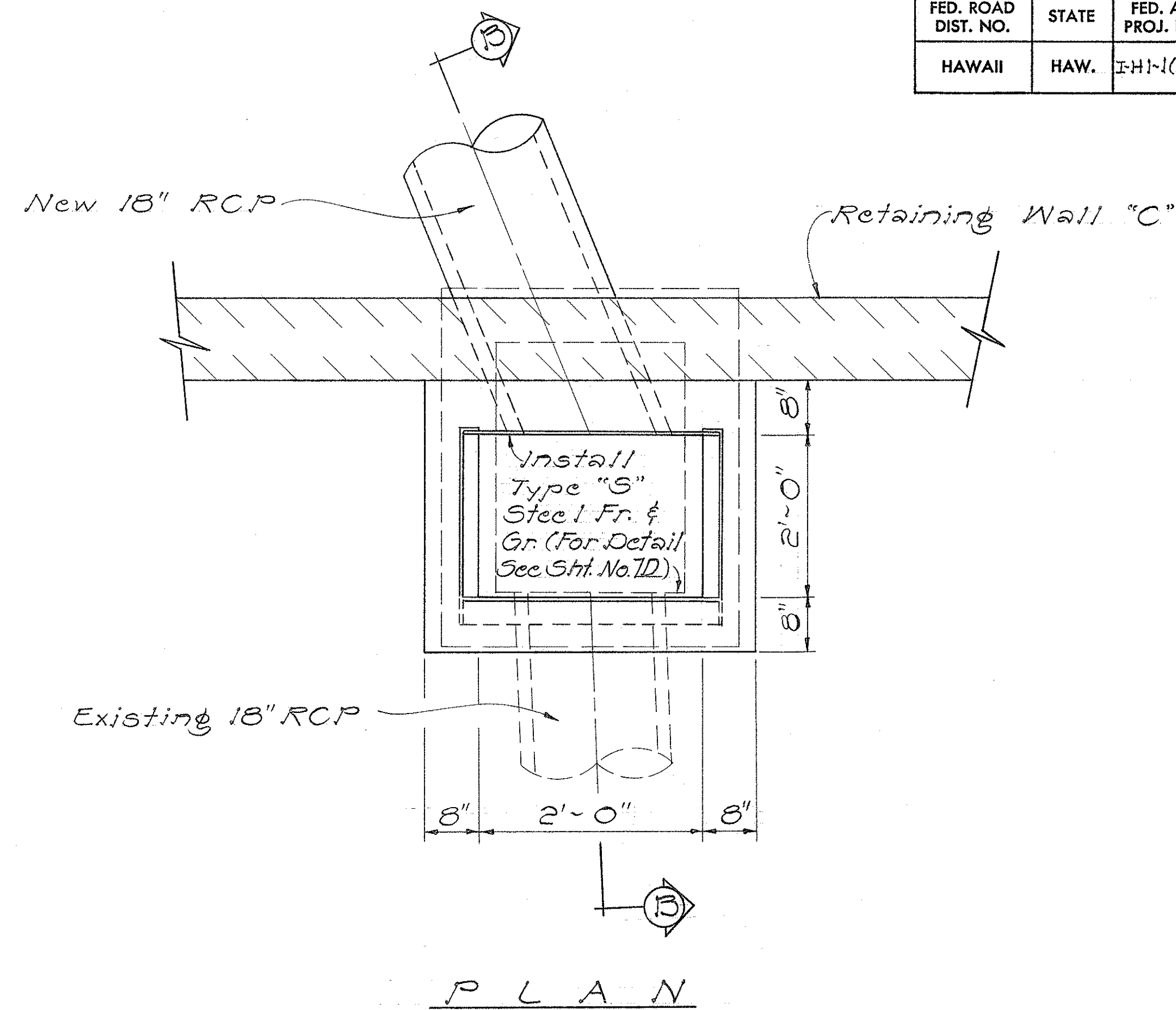
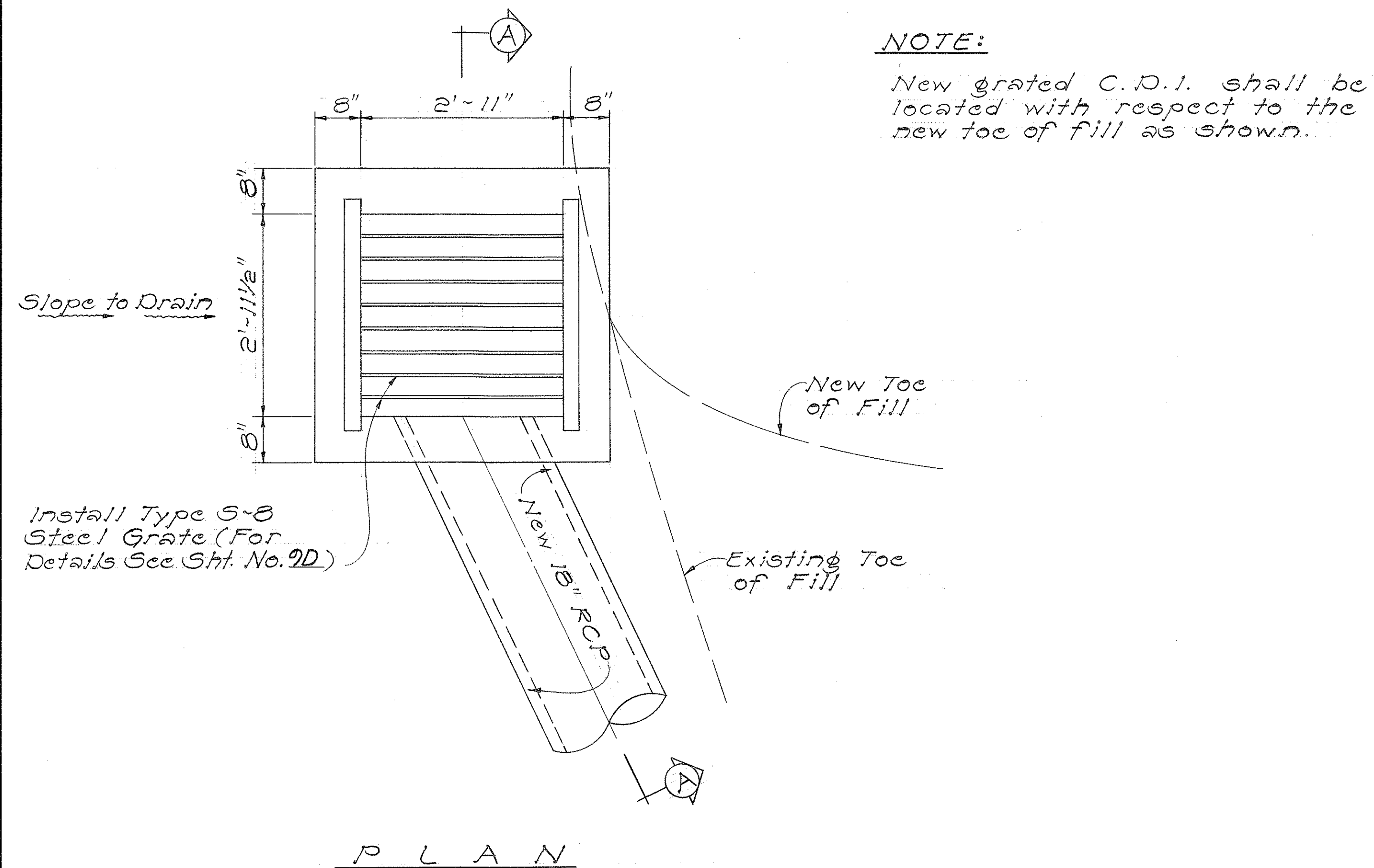
PROJECT: Route H I: Palailai to Kunia, Safety Improvement

PROJECT NO.: F. A. I. PROJ. NO. 1-H-1-1(108)

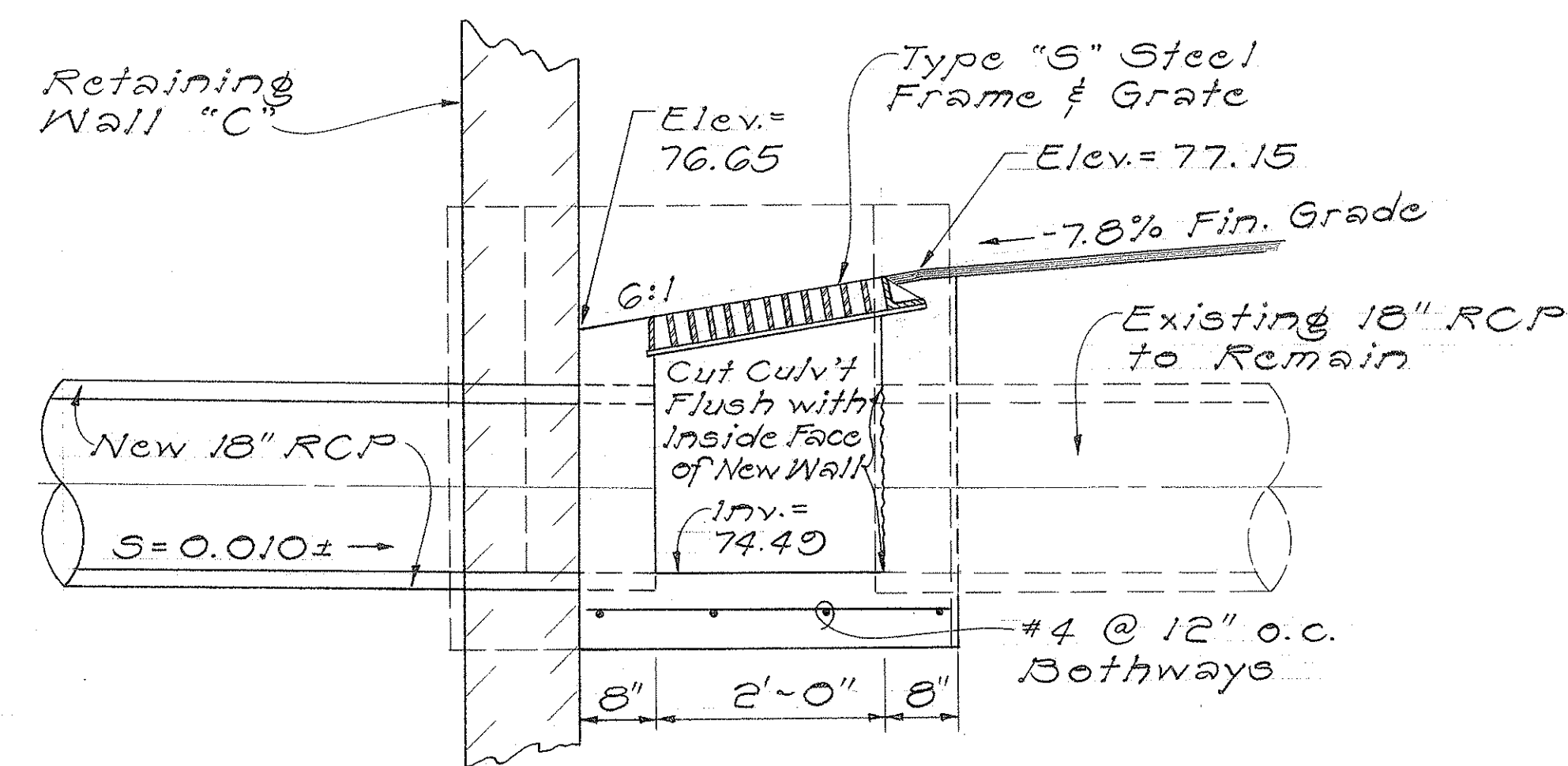
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(108)	1975	29	100

[illegible]

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(108)	1975	31	100



GRATED C.D.I. AT STA. 43+17±
9/6 106' ± LT.

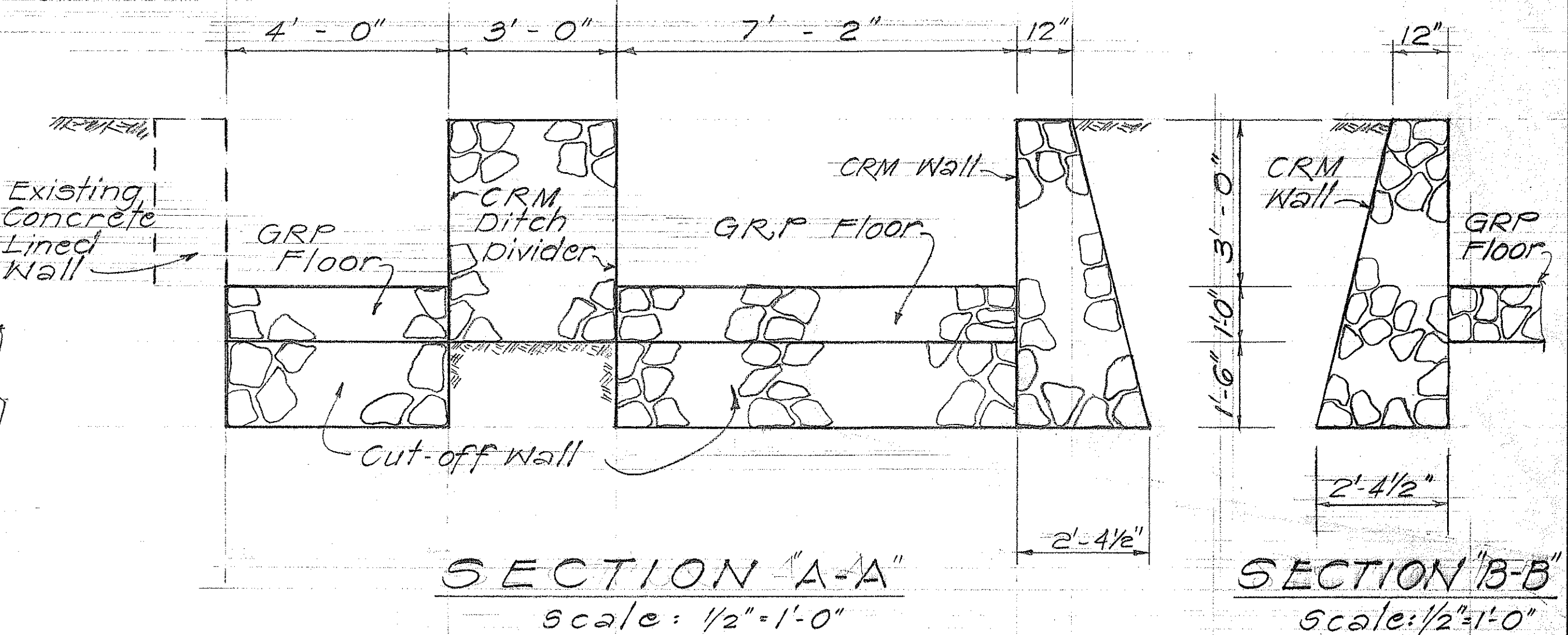
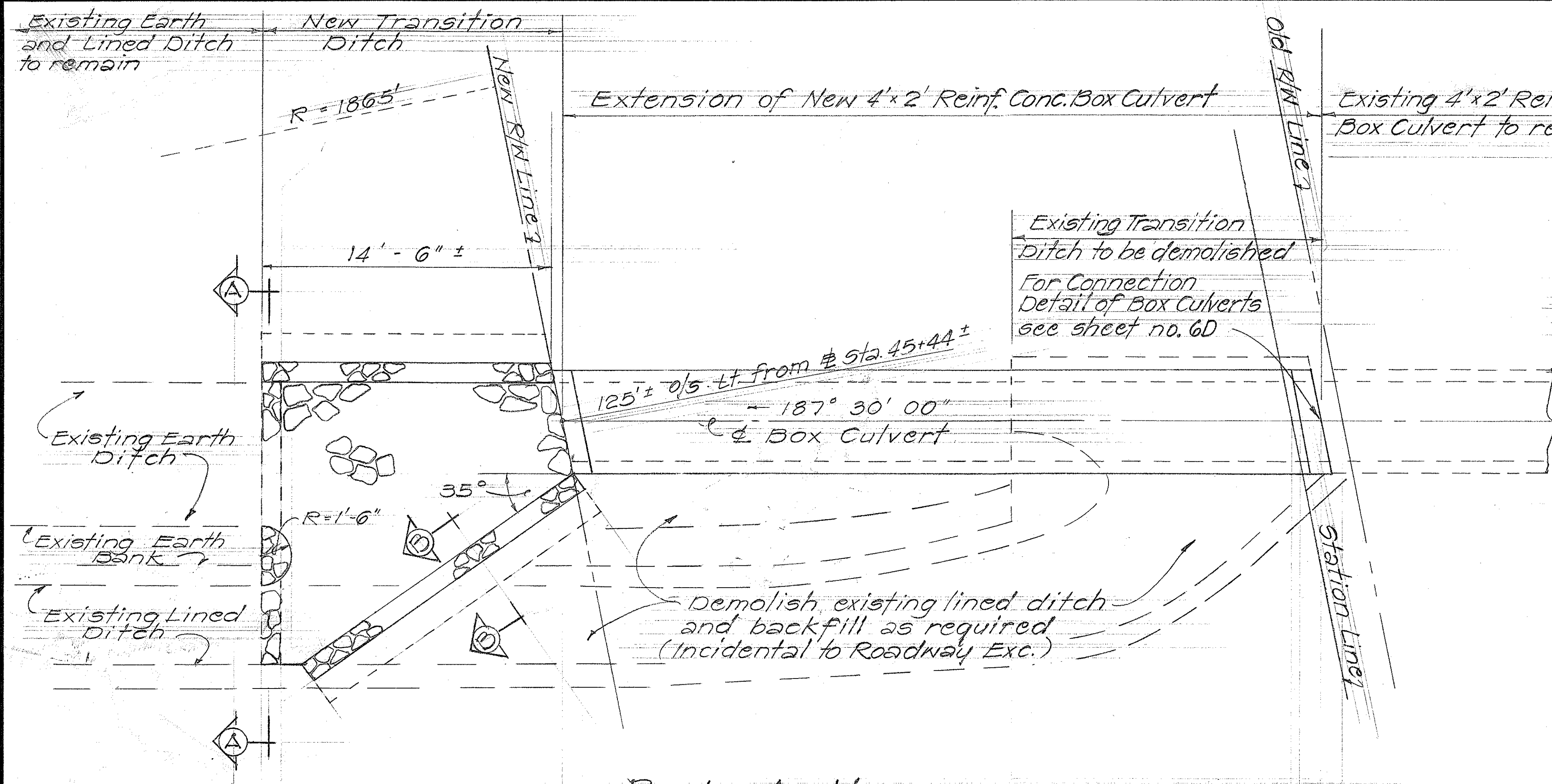


GRATED C.D.I. AT STA. 43+35±
9/6 64' ± LT.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DRAINAGE DETAILS
SAFETY IMPROVEMENTS
PALAILAI TO KUNIA
F.A.I. Proj. No. I-HI-1(108)
Scale: 1/2" = 1'-0" Date: Jan., 1974
SHEET No. 40 OF 120 SHEETS

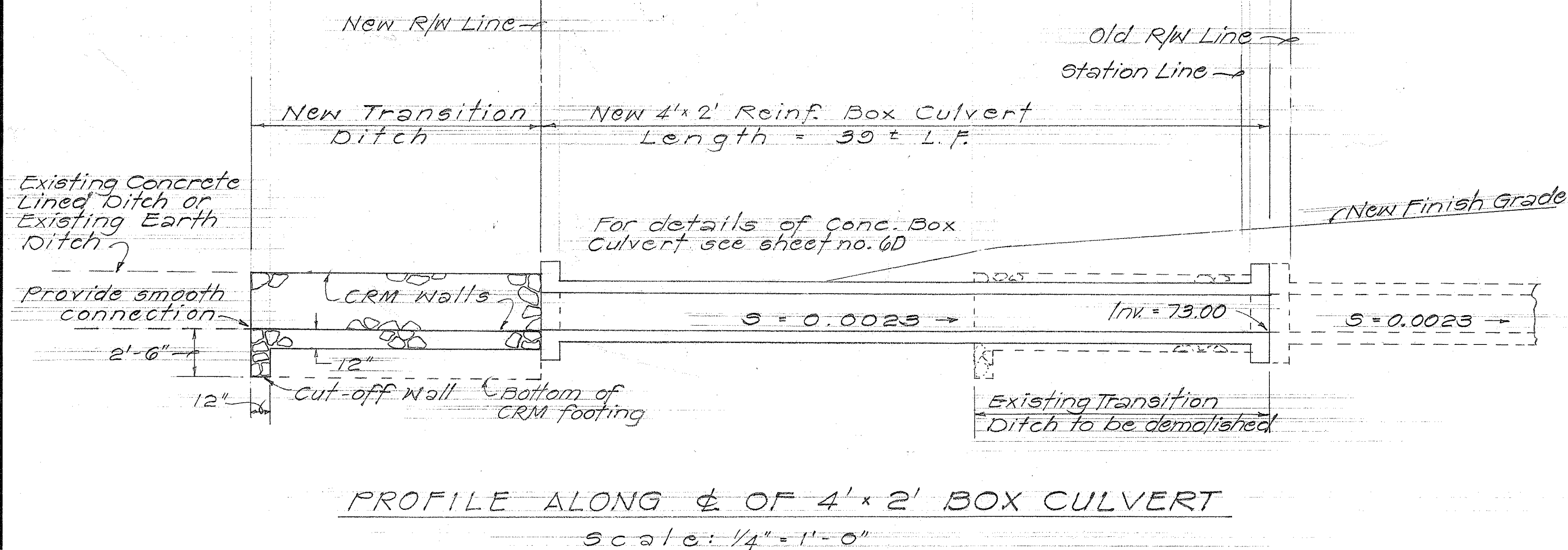
DATE	
SURVEY PLOTTED BY	
DRAWN BY	
CHECKED BY	
NOTED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(108)	1975	32	100



NOTE:

The Contractor shall keep the irrigation systems operational at all times. The Contractor shall notify Oahu Sugar Company at least five (5) working days prior to performing any work which will affect the operation of the company's existing irrigation system. The Contractor shall be responsible for coordinating his work with the irrigation schedule of Oahu Sugar Company to prevent any damage to the crops.



Approved: _____ Date: _____

Trustees under the Will and of the Estate of James Campbell, deceased

Approved: _____ Date: _____

Oahu Sugar Company, Limited

DETAILS OF NEW TRANSITION DITCH AND BOX CULVERT AT STA. 45+40 ± LEFT

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

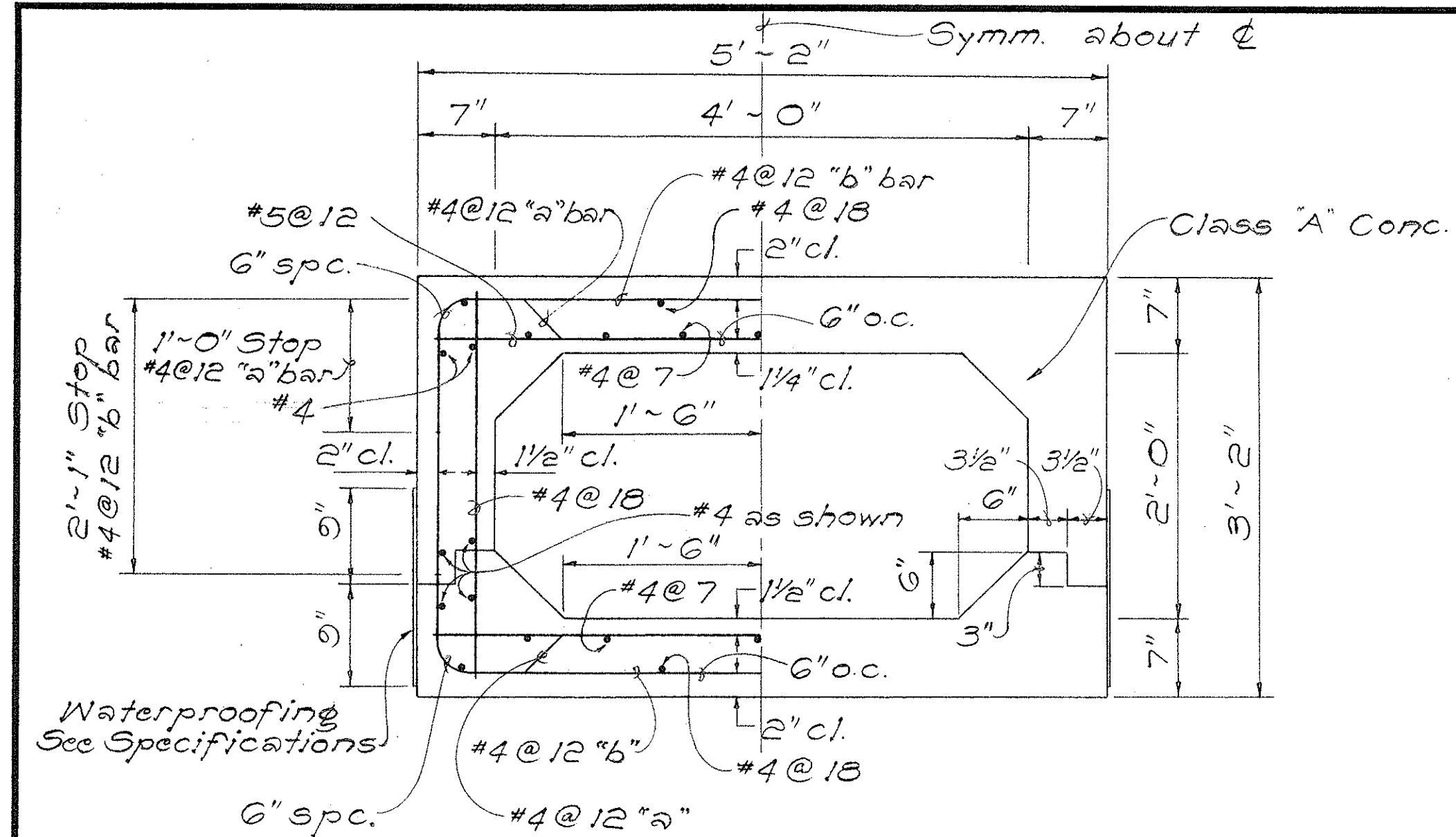
SAFETY IMPROVEMENTS
(Palalai to Kunia)
F.A.I. Proj. No. I-HI-1 (108)

Scale: As Shown Date: Feb, 1974

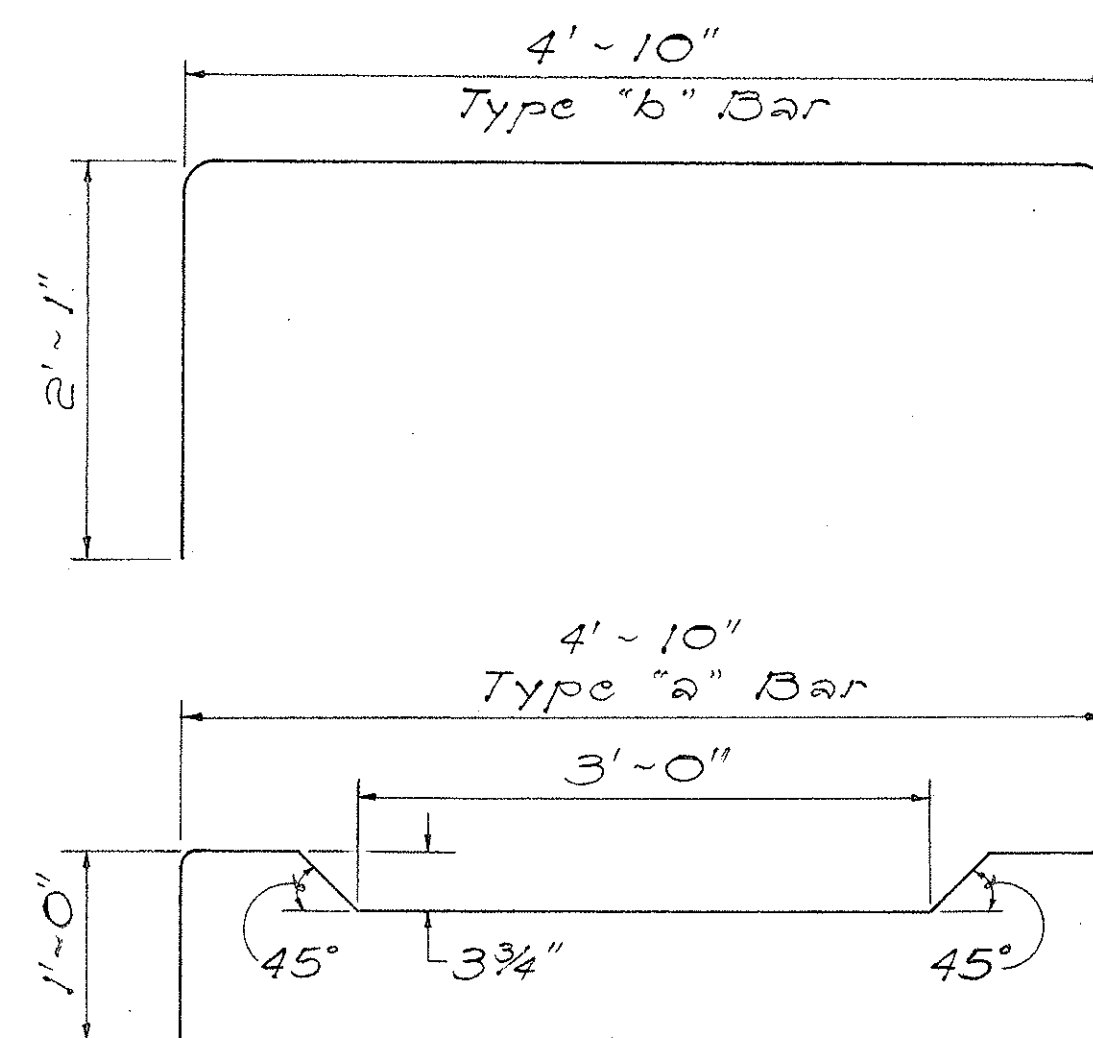
SHEET No. 5D OF 12D SHEETS

SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

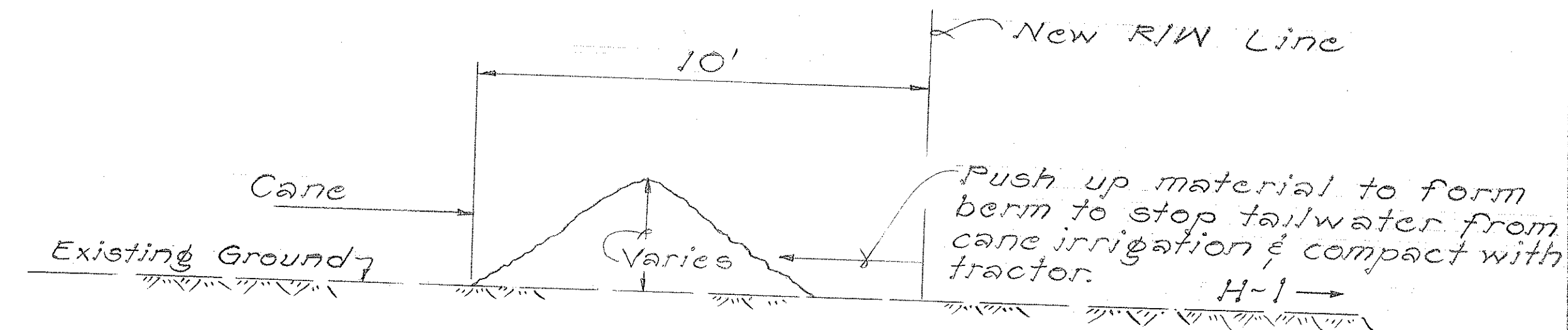
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(108)	1975	33	100



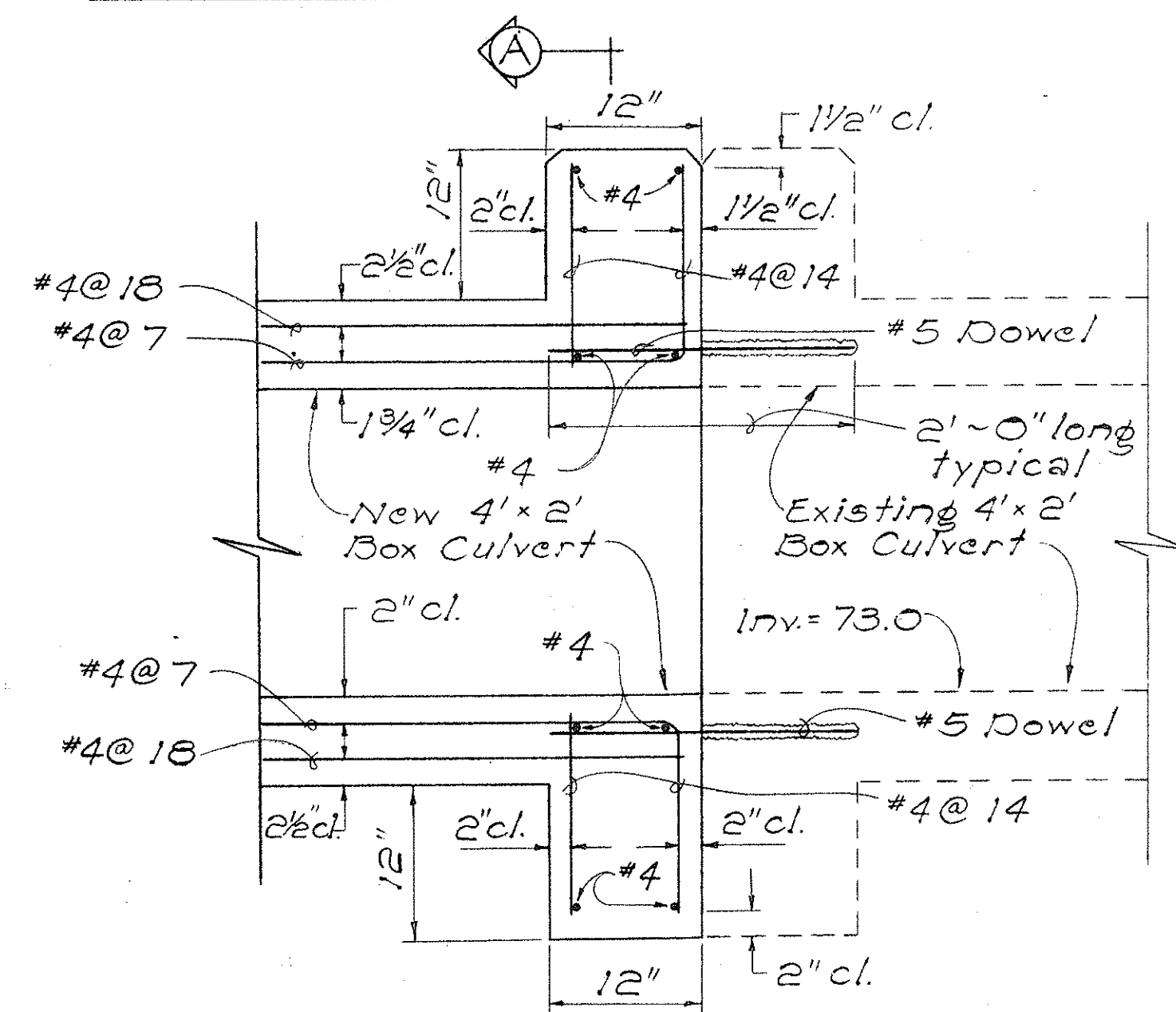
TYPICAL SECTION - 4' x 2' REINF. CONC. BOX CULVERT



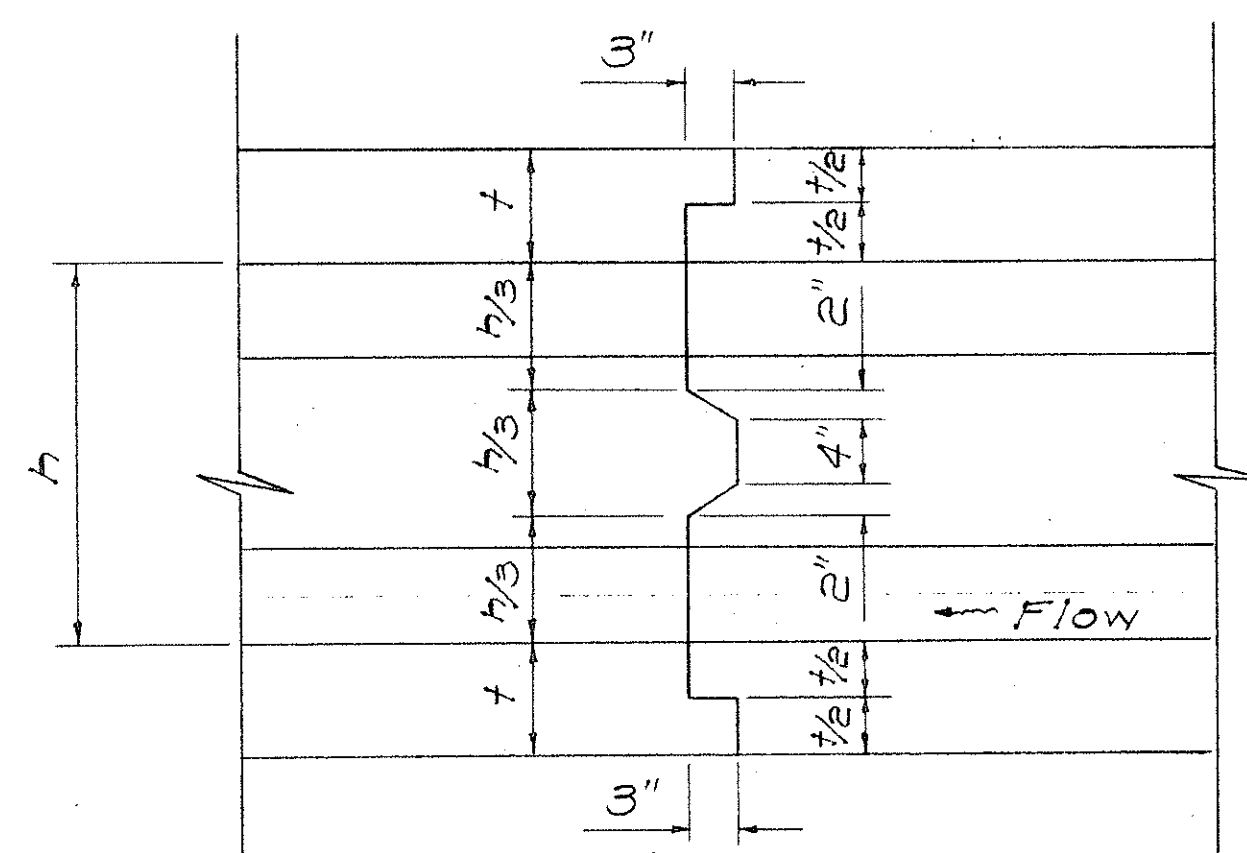
BAR DETAIL



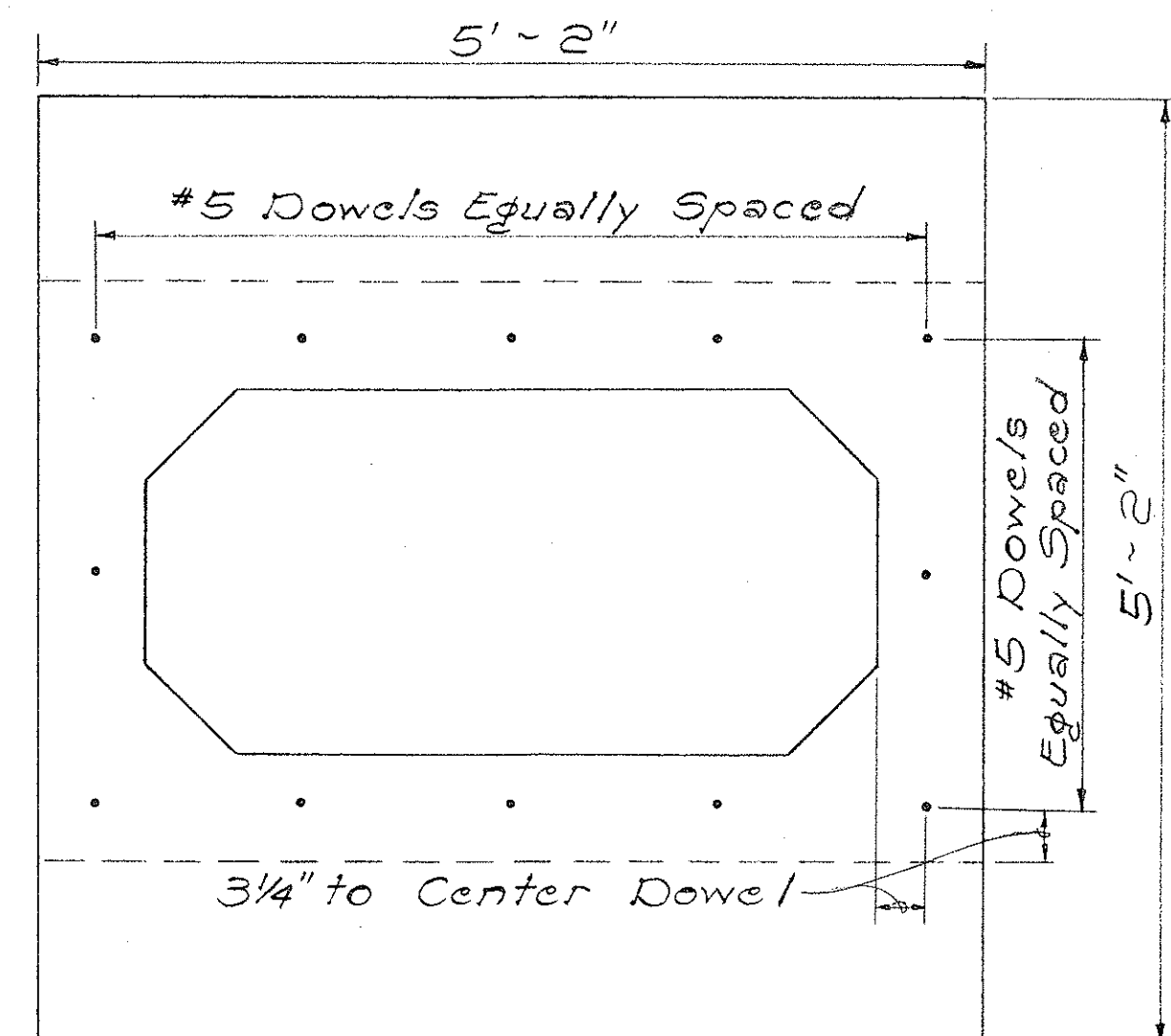
TYPICAL SECTION IRRIGATION BERM
FROM STA. 45+50± LT. TO STA. 56+25± LT.
Scale: 3/8" = 1'-0"



CONNECTION DETAIL OF 4' x 2' REINF. CONC. BOX CULVERT



TYPICAL ELEVATION VIEW OF CONSTRUCTION JOINT DETAIL



SECTION "A"

NOTES:

1. The Engineer shall determine the location of all joints. Maximum spacing of joints shall be 32' o.c.
2. Extend all longitudinal reinforcing bars through construction joints with a minimum of 32 x bar diameter.

Approved: _____ Date: _____
Trustees under the Will and of the Estate of
James Campbell, deceased

Approved: _____ Date: _____
Oahu Sugar Company, Limited

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

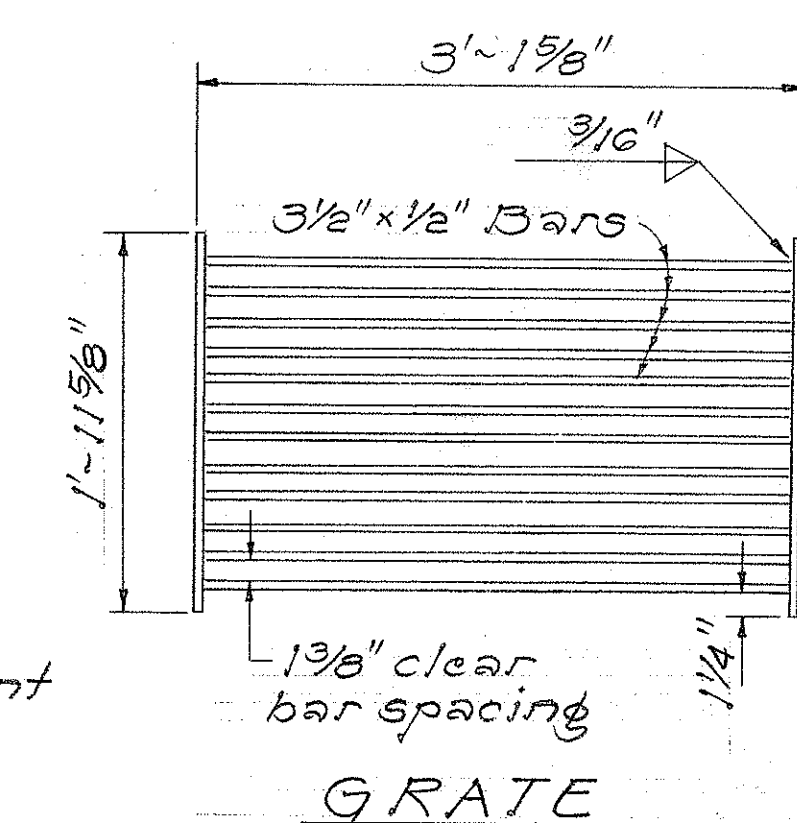
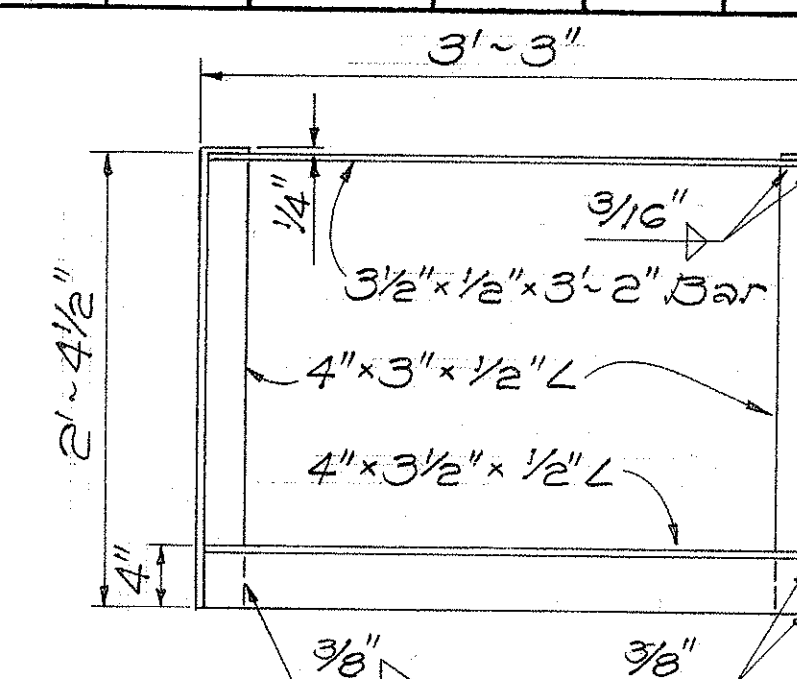
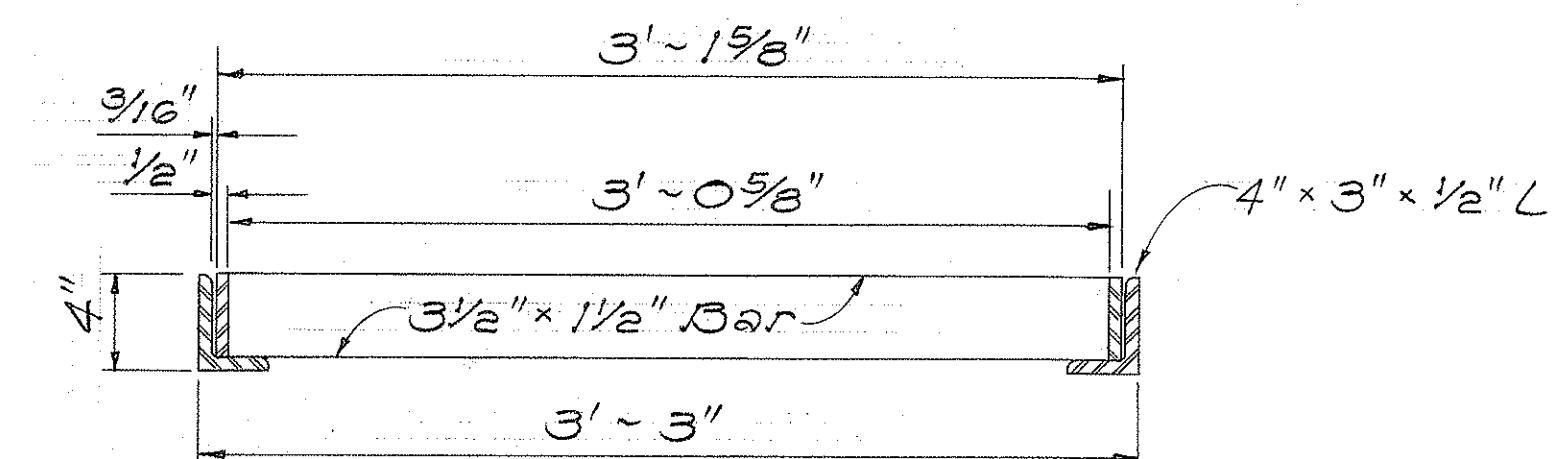
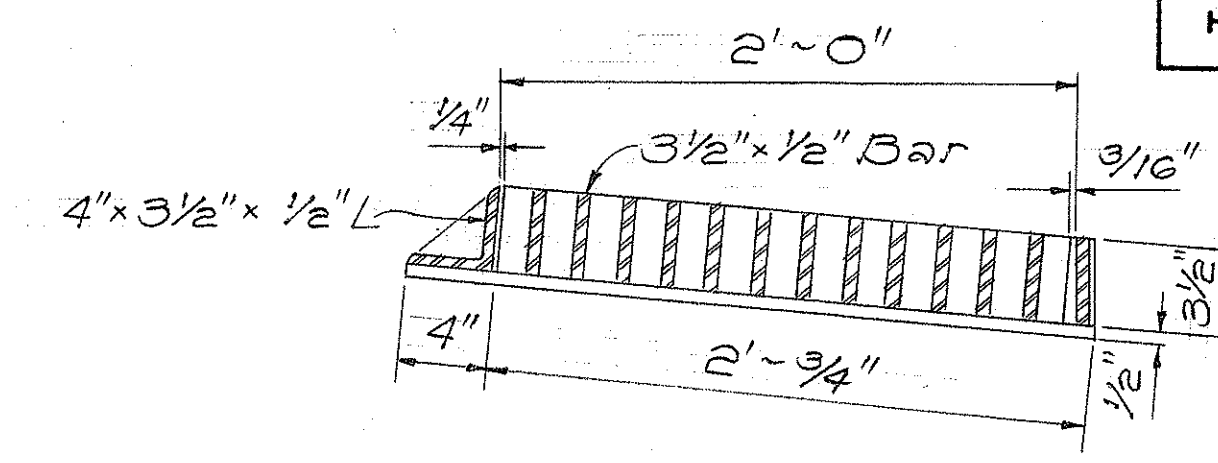
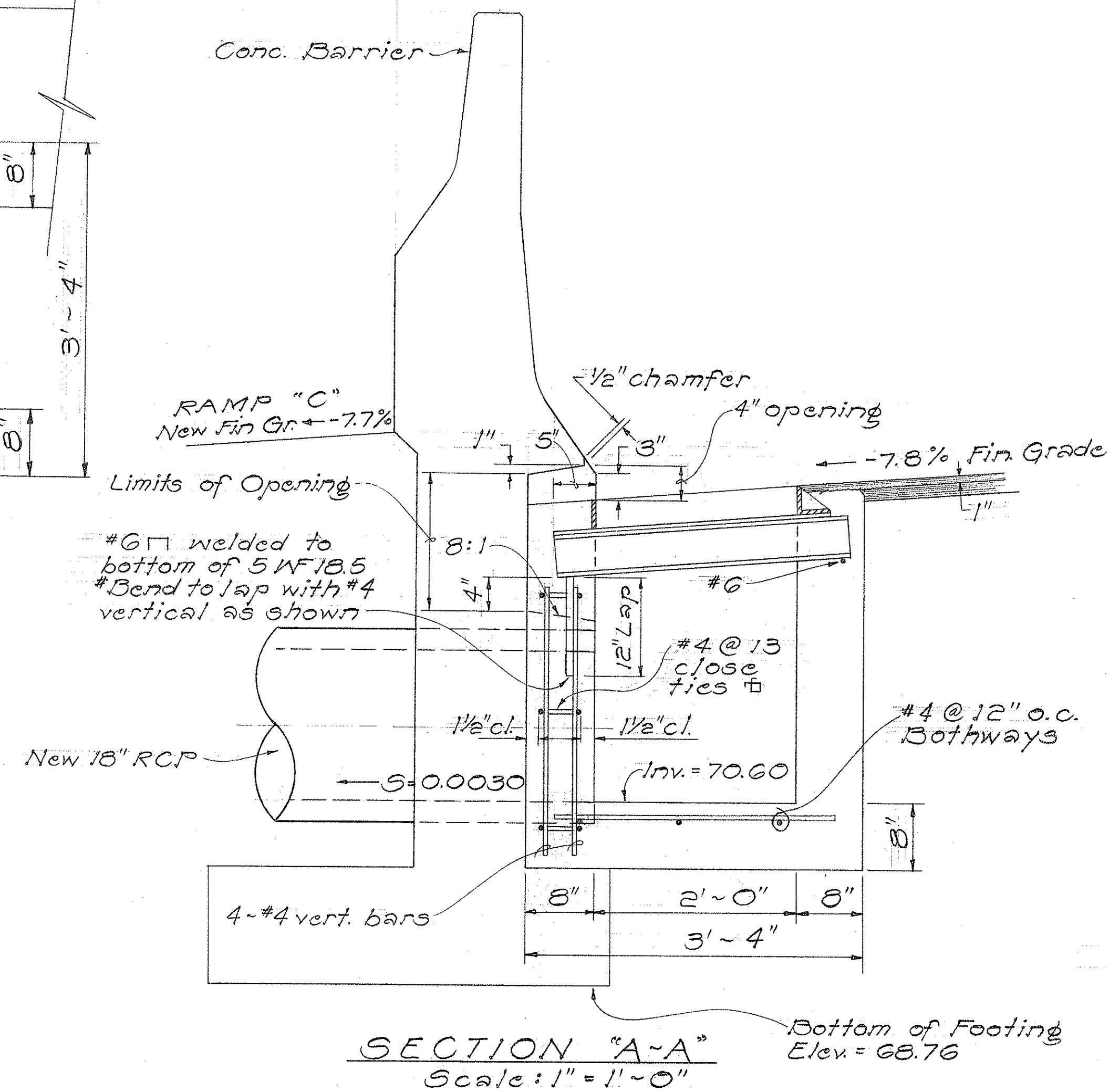
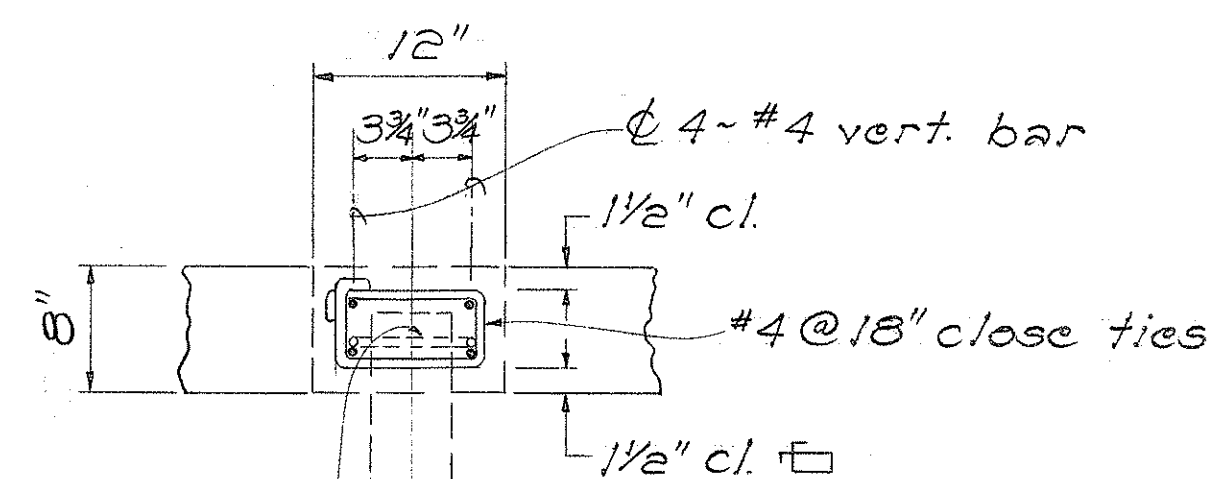
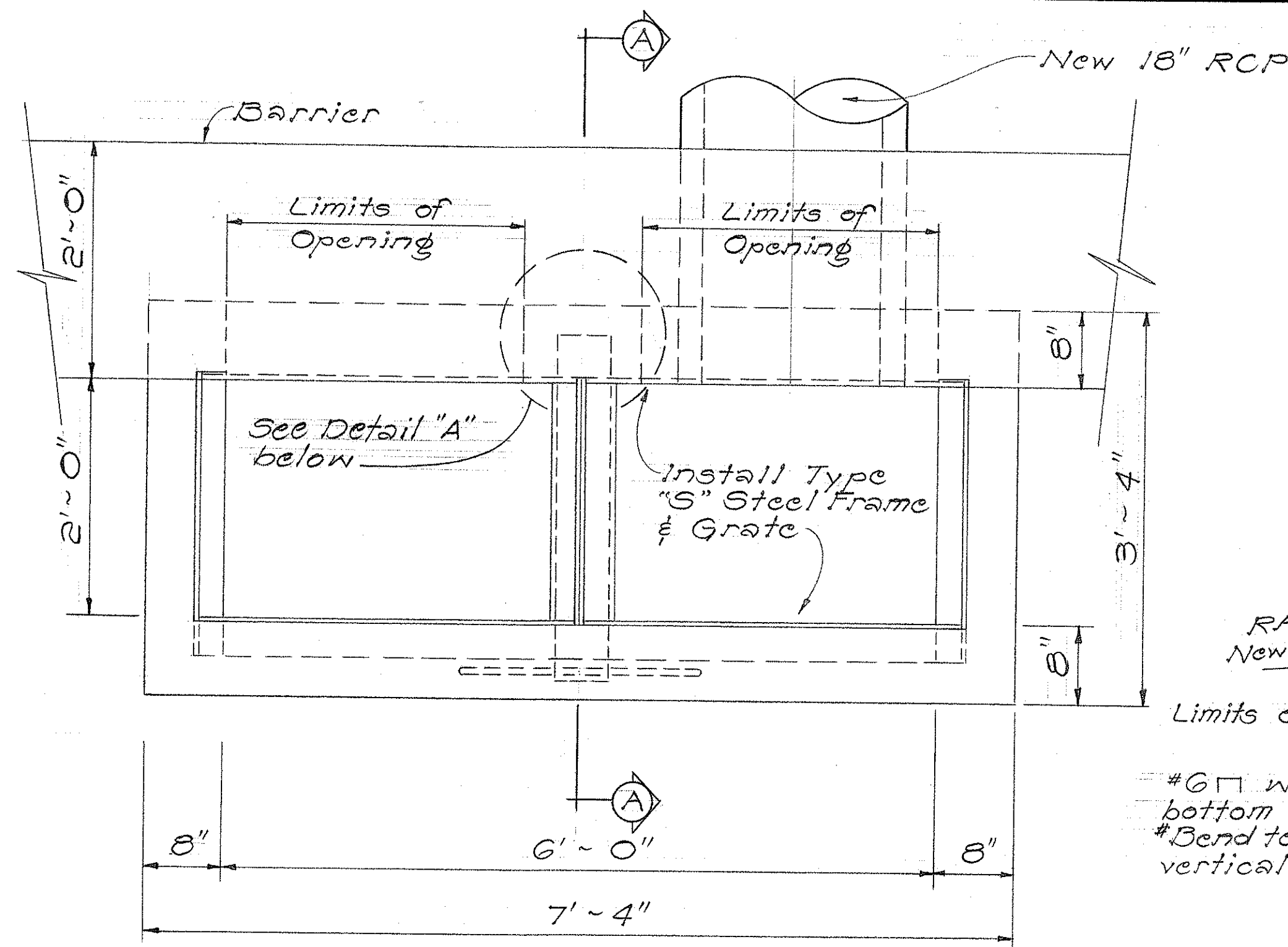
SAFETY IMPROVEMENTS
PALAILAI TO KUNIA
F.A.I. PROJ. NO. I-HI-1(108)

Scale: As Shown Date: Jan. 1974

SHEET No. 60 OF 120 SHEETS

ORIGINAL PLAN	DATE
NOTED BY	DESIGNED BY
QUANTITIES BY	CHECKED BY
NO.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(108)	1975	34	100

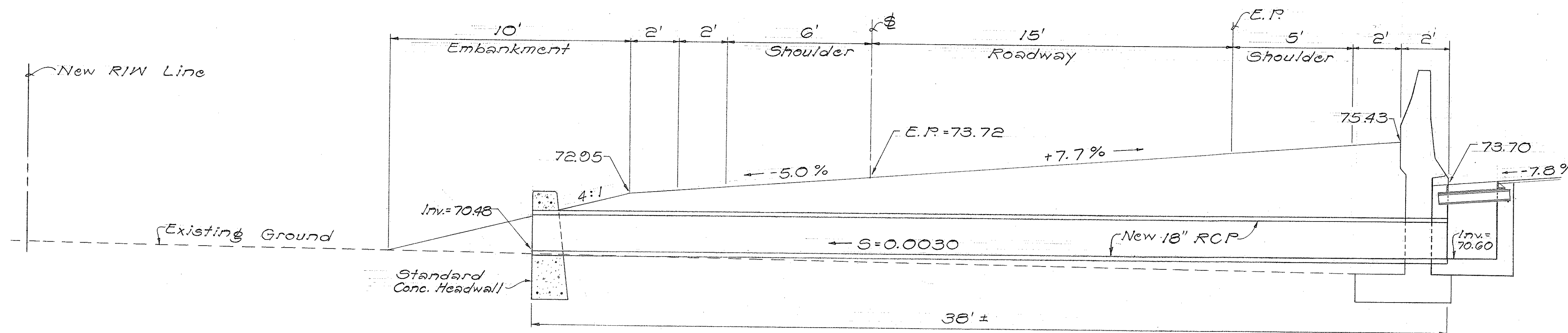


5" WF 18.5 #CENTER SUPPORT ASSEMBLY
Scale: 1 1/2" = 1'-0"

DETAIL OF TYPE "S" STEEL FRAME & GRATE
Scale: 1" = 1'-0"

NOTES:

- Center Support Assembly shall not be paid for separately but shall be considered as incidental to Type "S" Steel Frame and Grate.
- All welds 3/8" unless noted otherwise.
- Grate and Frame shall be hot dip galvanized after fabrication, see specifications.
- 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, Grade No. 35018
- Contractor has the option of using cast malleable iron, cast steel, welded, bolted, cast malleable iron and block or cast steel and block grate.
- Frames & Grates shall have edges ground smooth.



DETAILS OF GRATED C.D.I. AND CONC. HEADWALL AT "RAMP C" STA. 14+00 ±

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

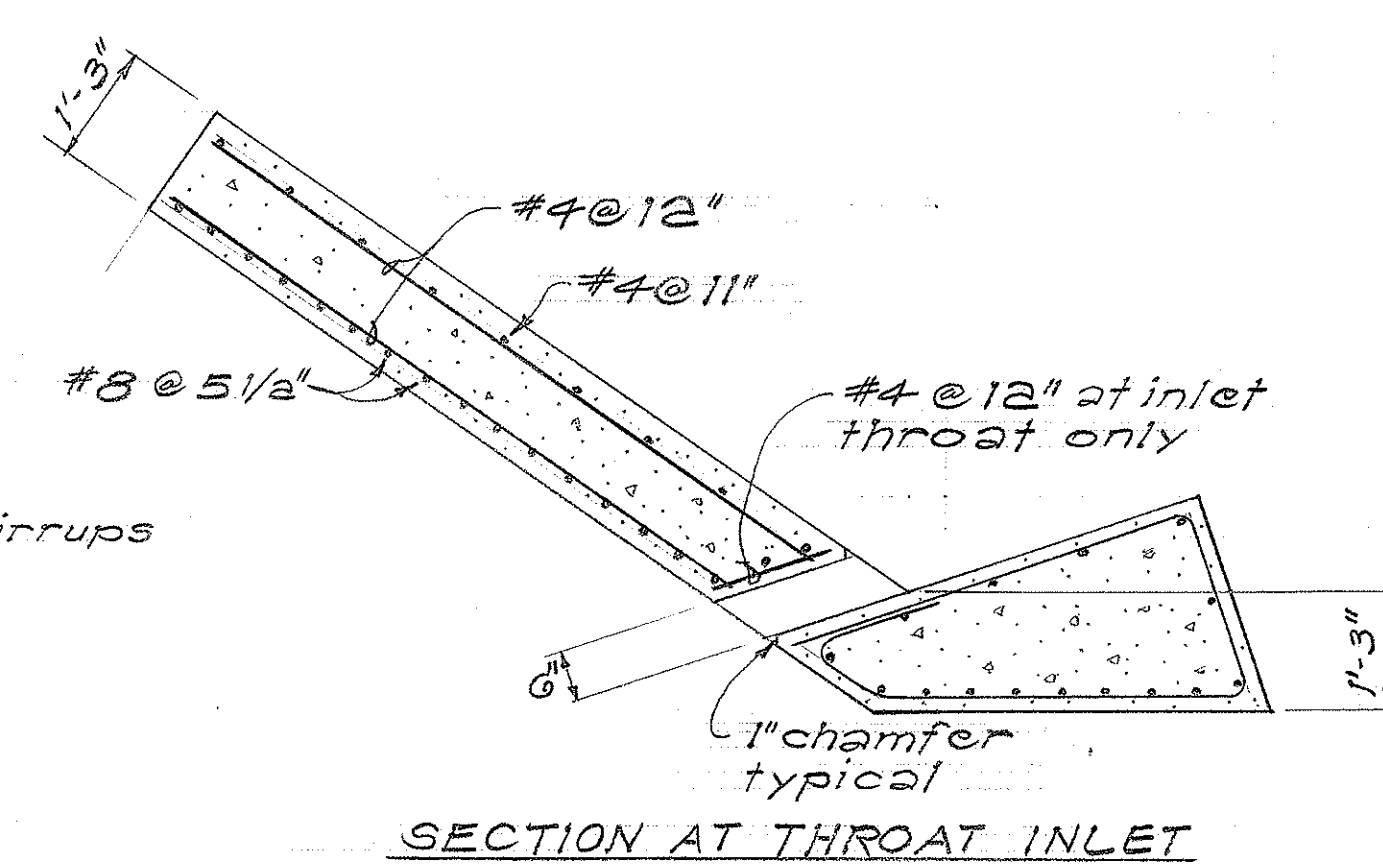
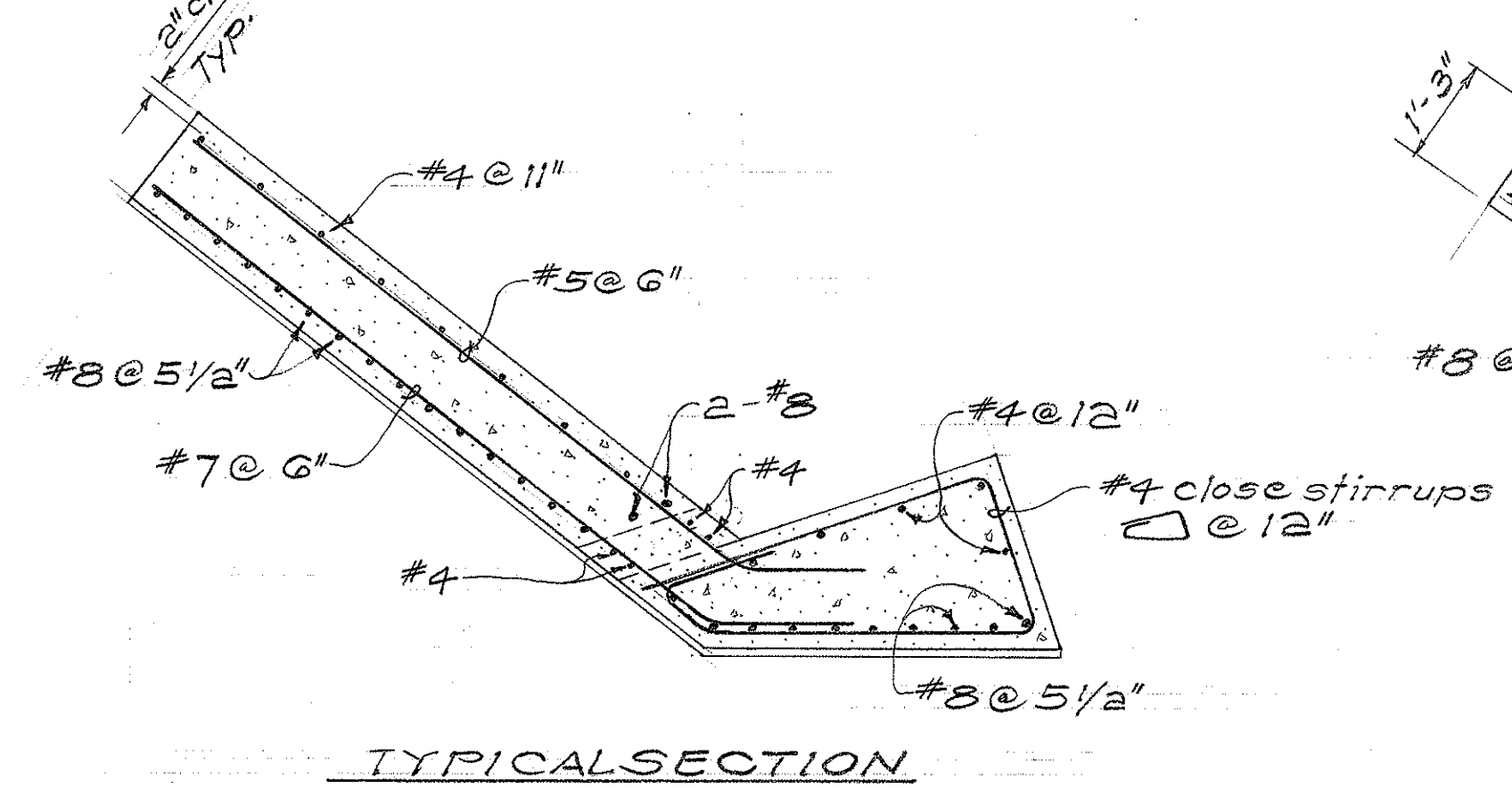
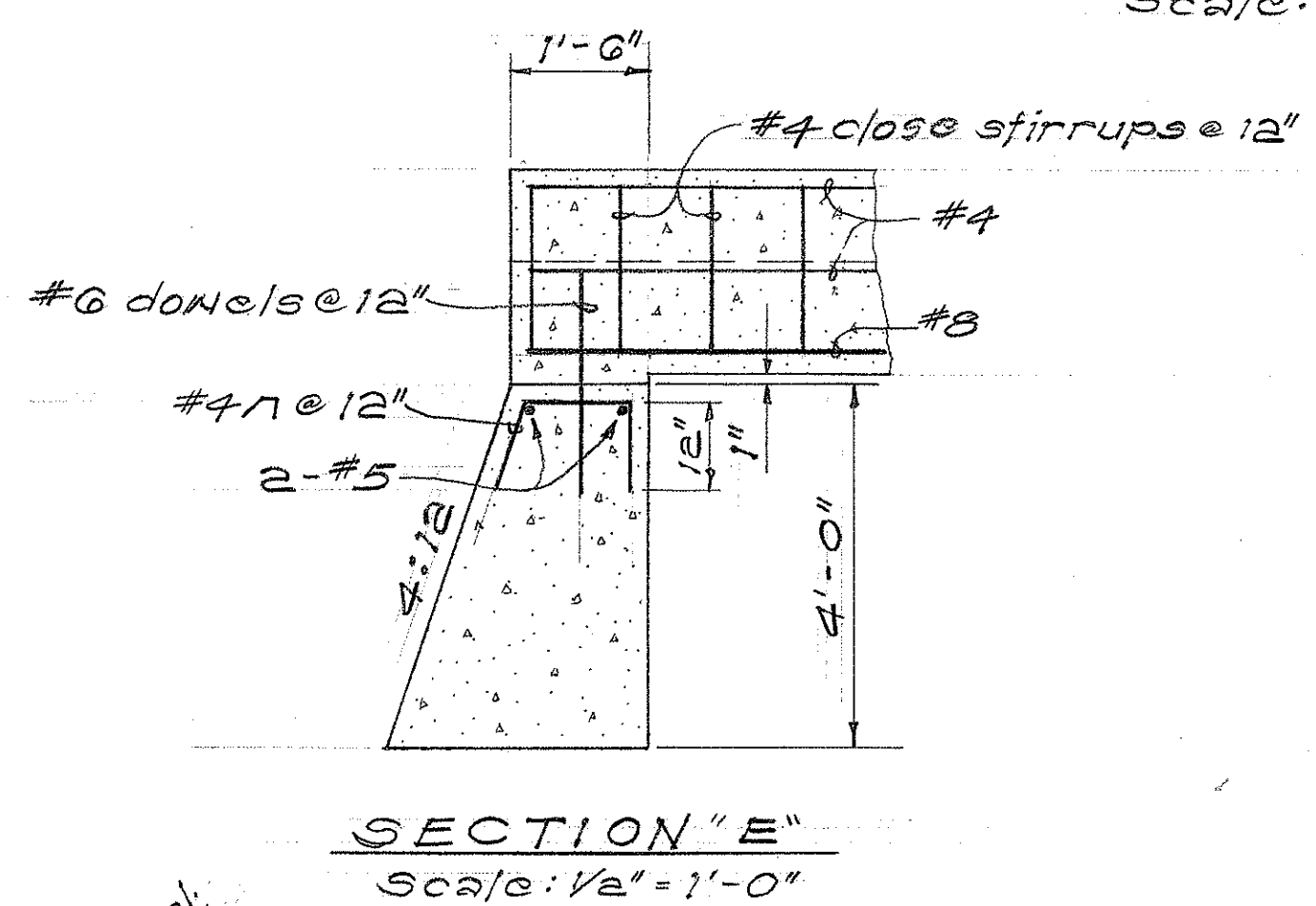
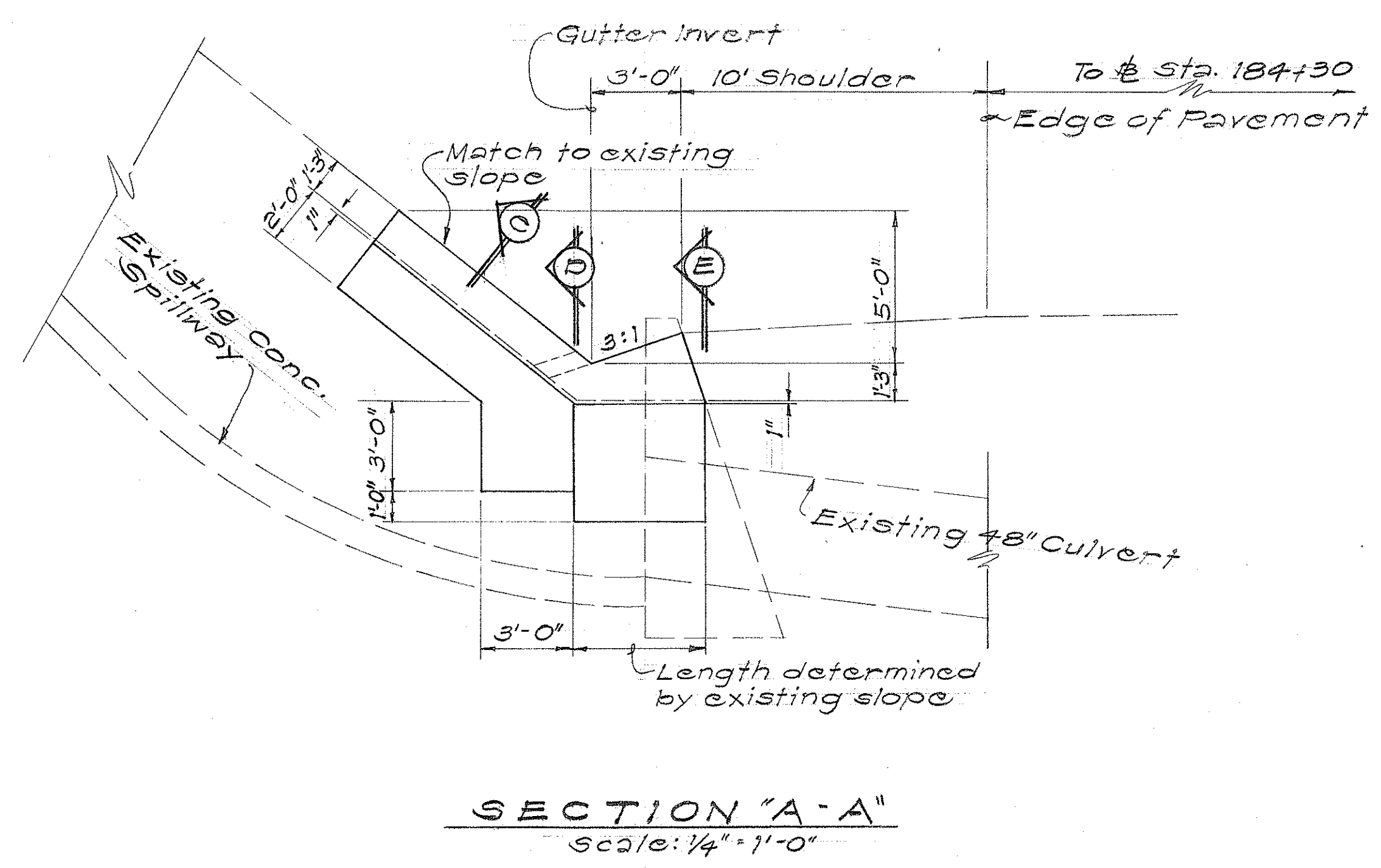
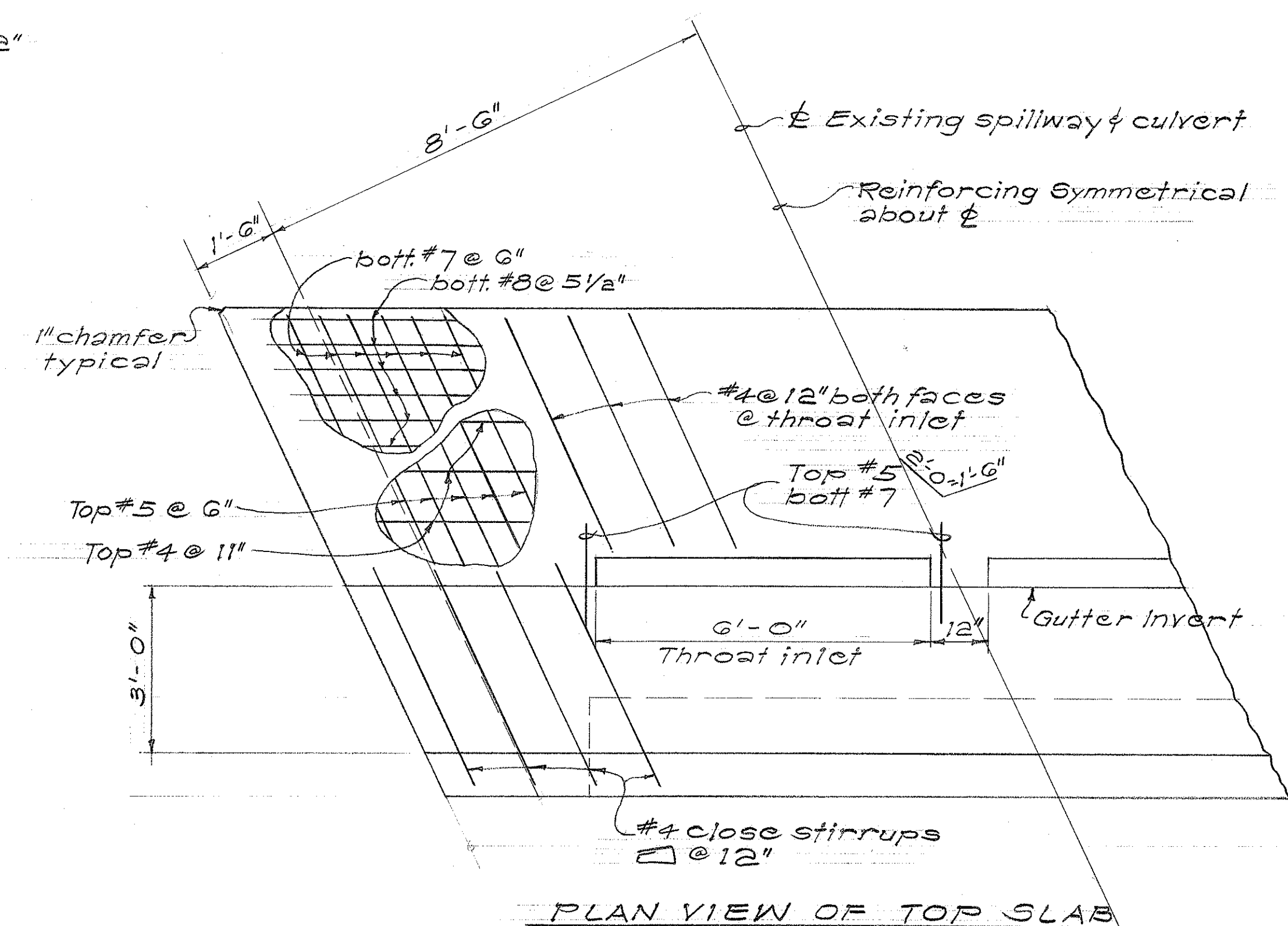
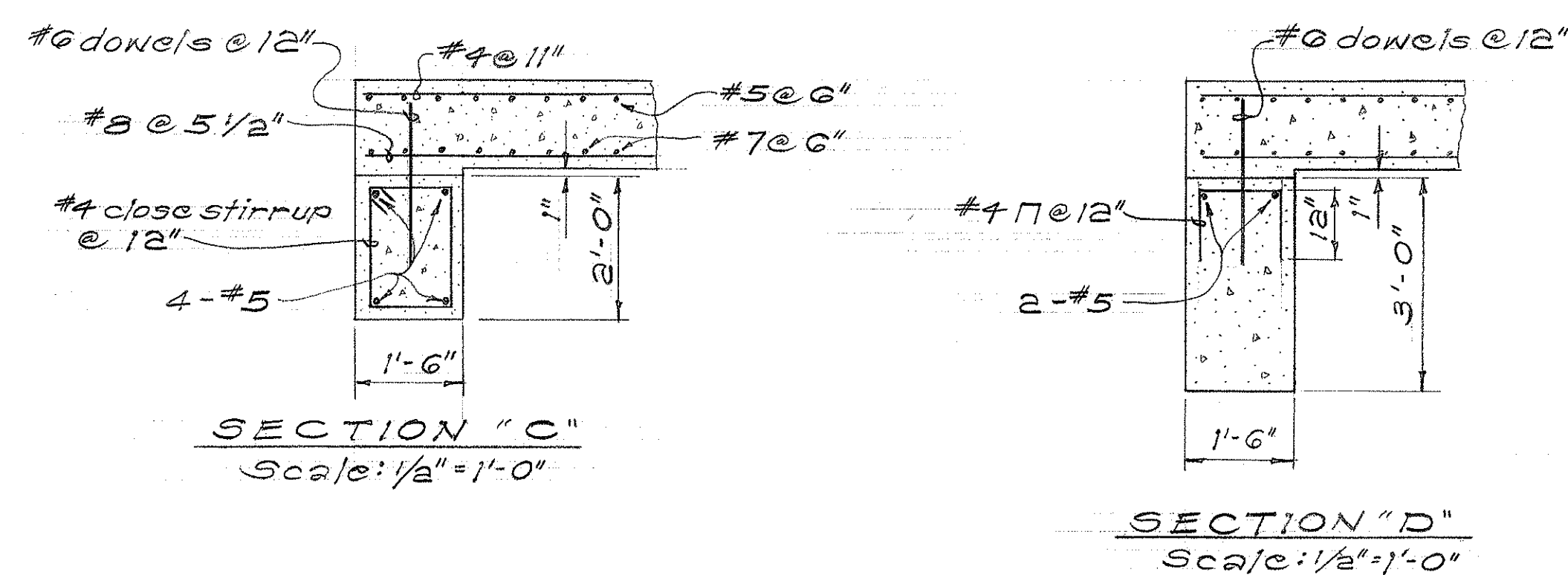
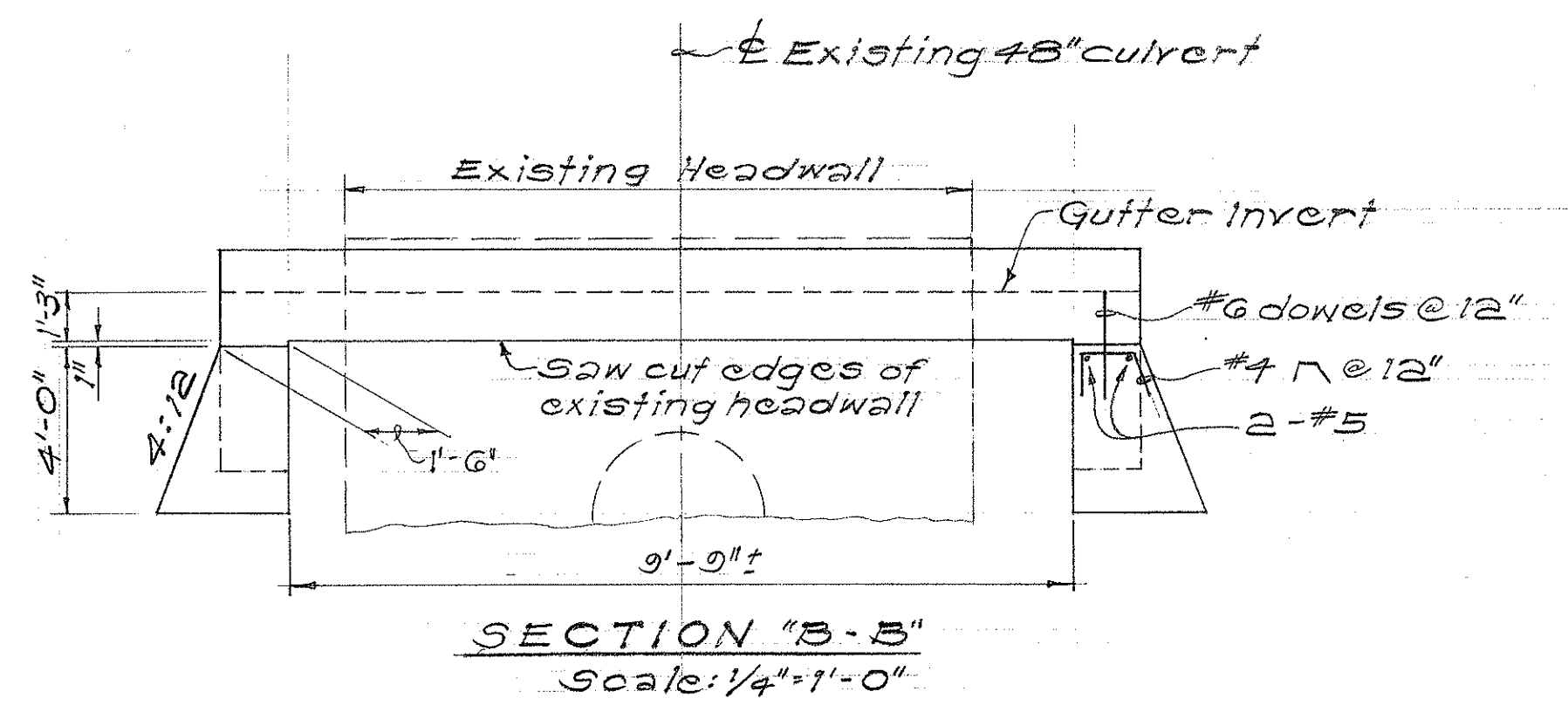
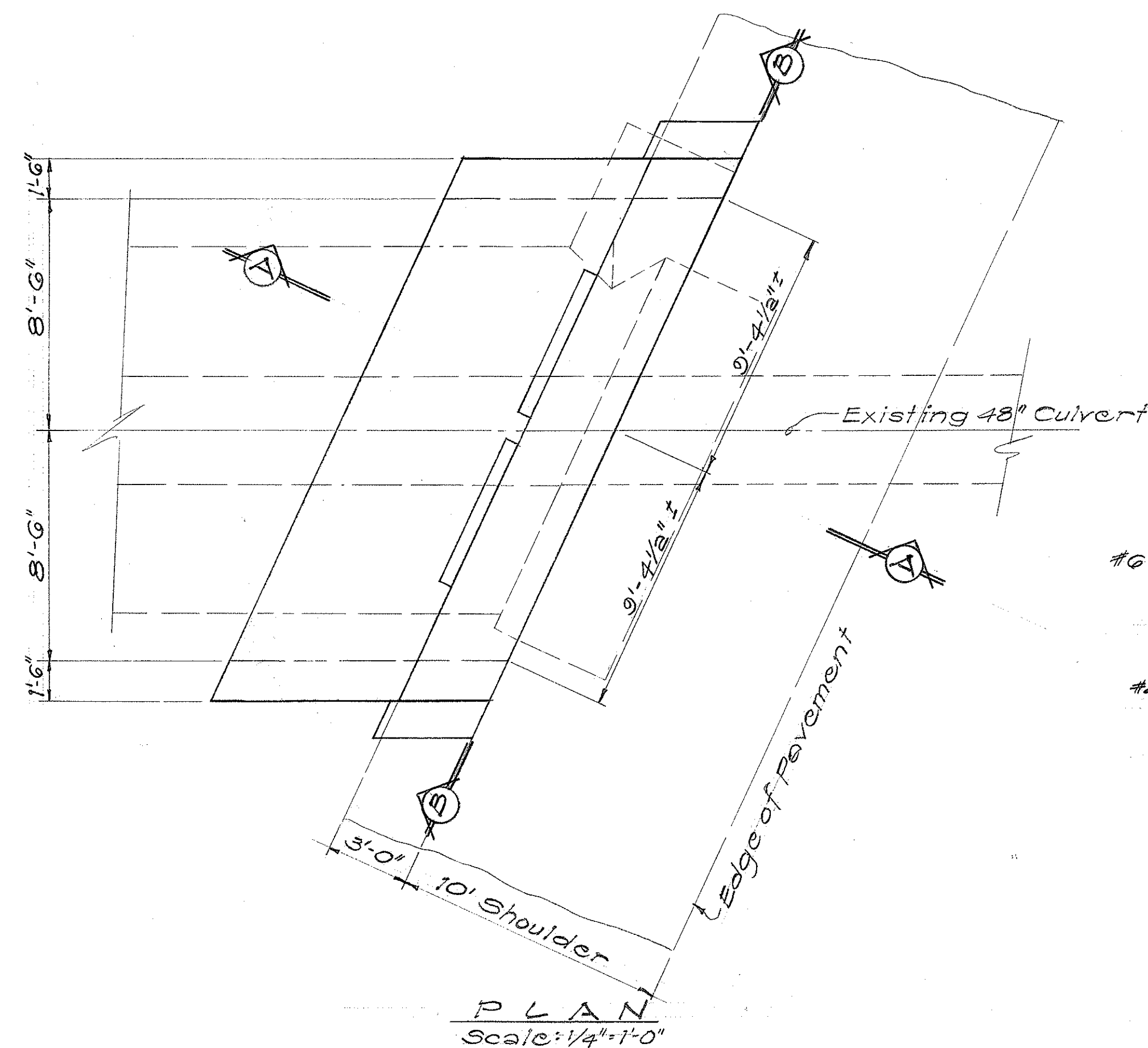
SAFETY IMPROVEMENTS
PALAILAI TO KUNIA
F.A.I. PROJ. NO. I-HI-1(108)

Scale: As Shown Date: Jan. 1974

SHEET No. 7D OF 12D SHEETS

DATE	_____
DESIGNED BY	_____
CHECKED BY	_____
NO.	_____

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(108)	1975	35	100



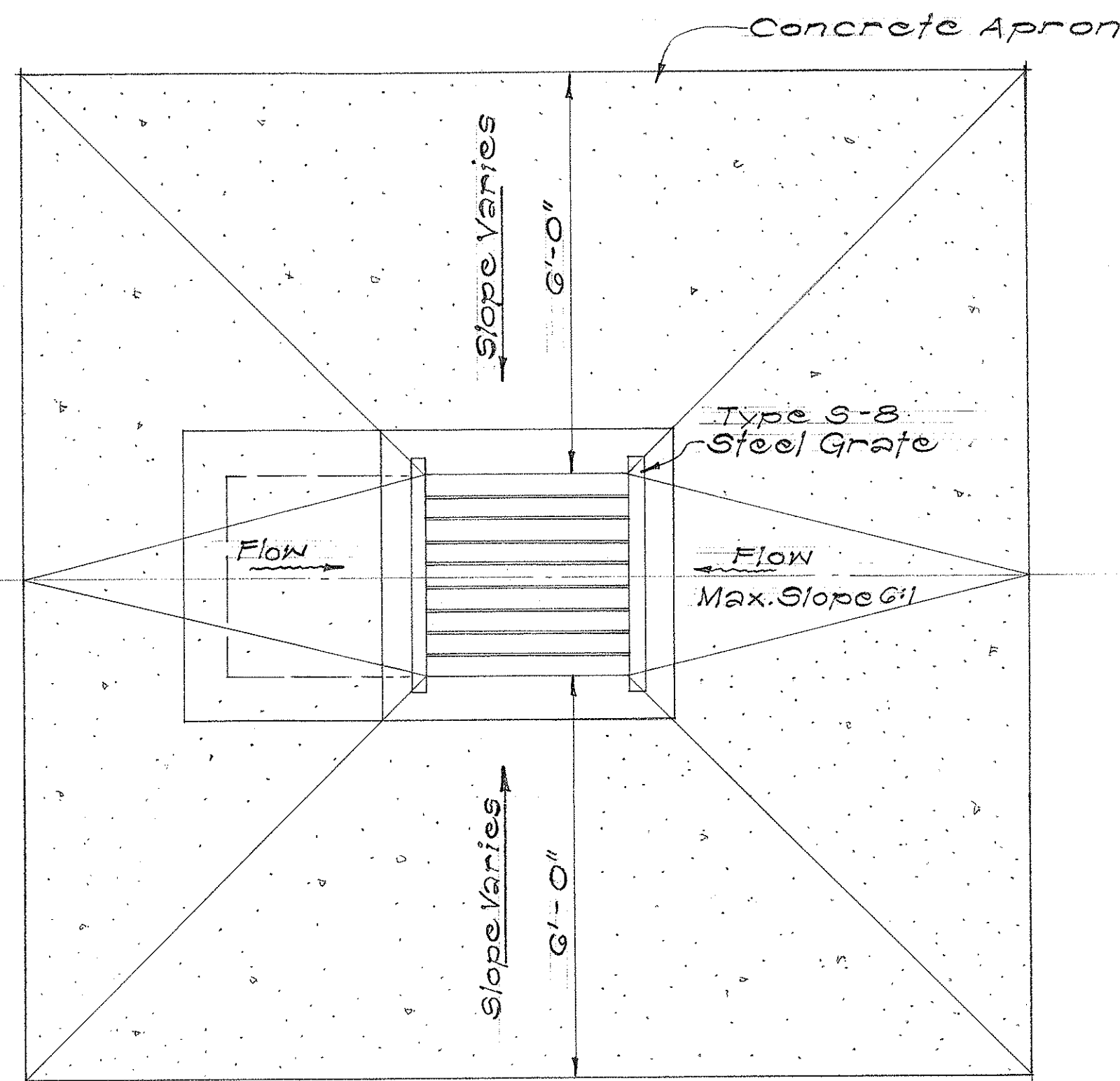
DETAILS OF STEEL REINFORCING FOR TOP SLAB
Scale: 1/2" = 1'-0"

MODIFICATION OF INLET FOR 48" CULVERT @ STA. 184+00

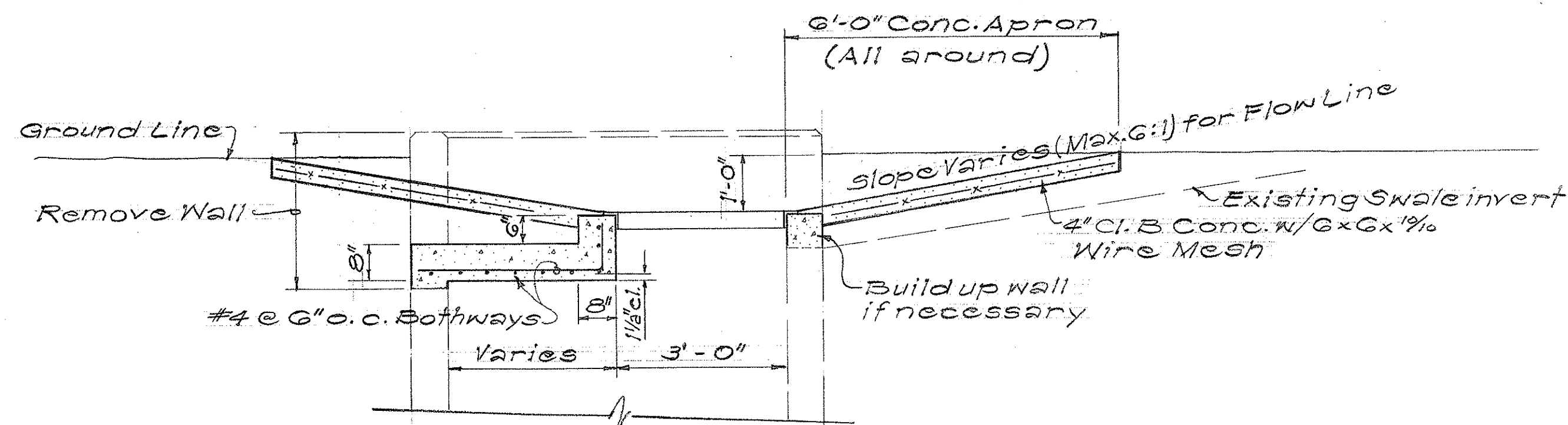
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DRAINAGE DETAILS
SAFETY IMPROVEMENTS
PALAILAI TO KUNIA
F.A.I. PROJECT NO. I-HI-1(108)
Scale: As Noted Date: Jan. 1974
SHEET No. 80 OF 120 SHEETS

DATE	
SURVEY PLOTTED BY	
DESIGNED BY	
NOTED BY	
CHECKED BY	
ORIGINAL	
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NOTE BOOK	
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1 (108)	1975	36	100

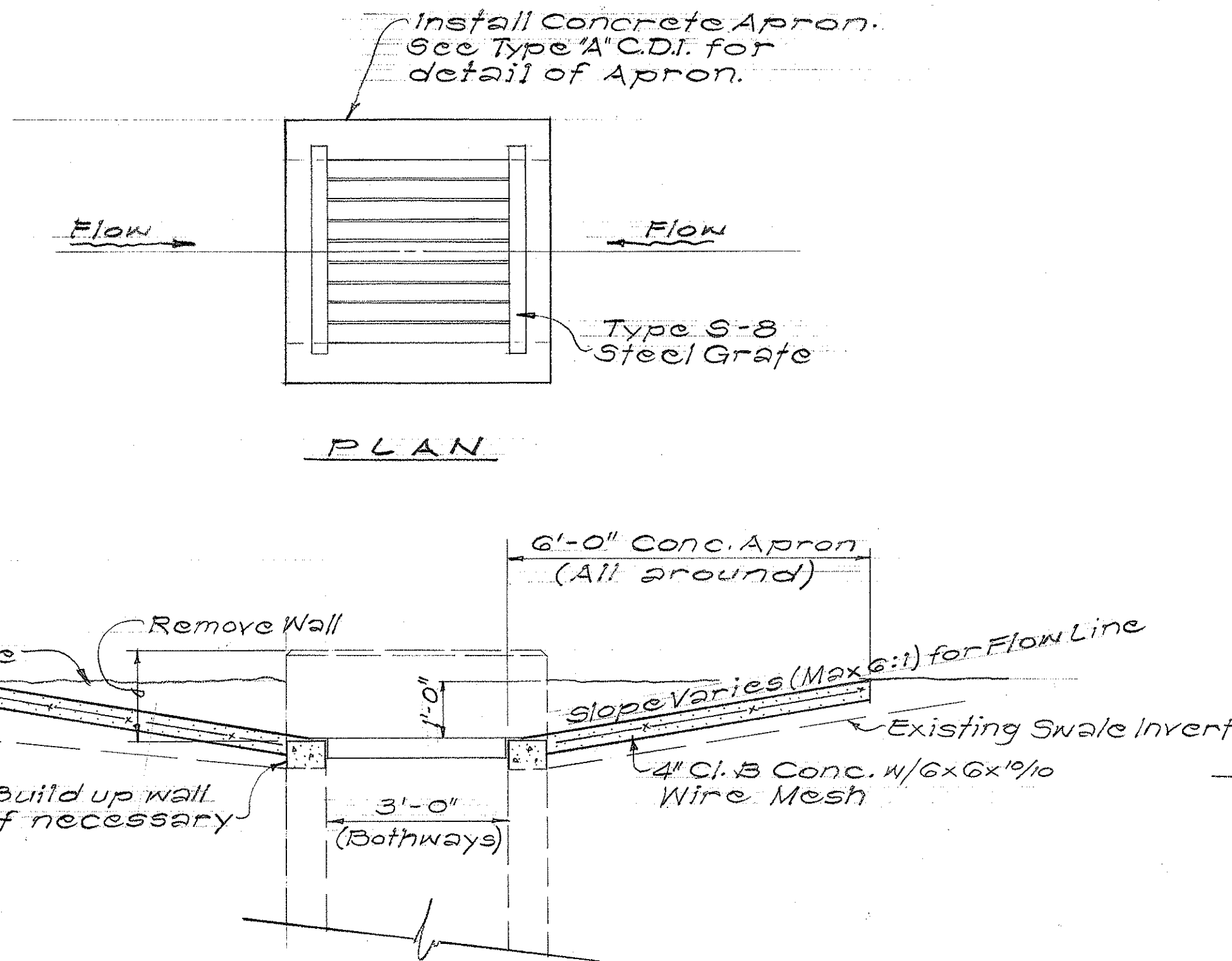


PLAN



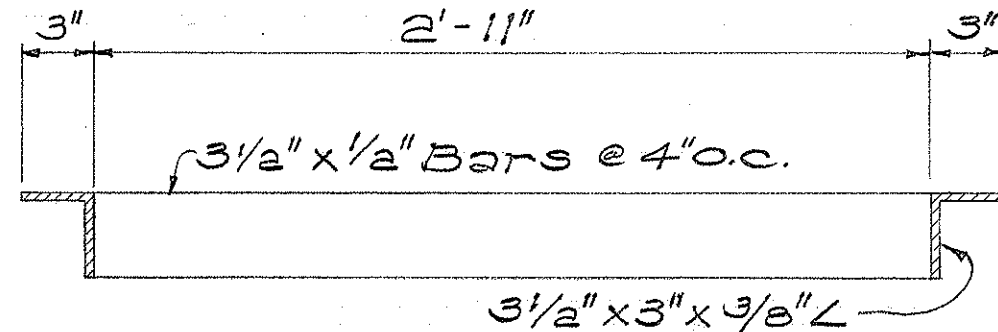
ELEVATION

MODIFICATION OF TYPE "A" C.D.I. @ STA. 64+35 & 207+25 & 184+30
Scale: 1/2" = 1'-0"

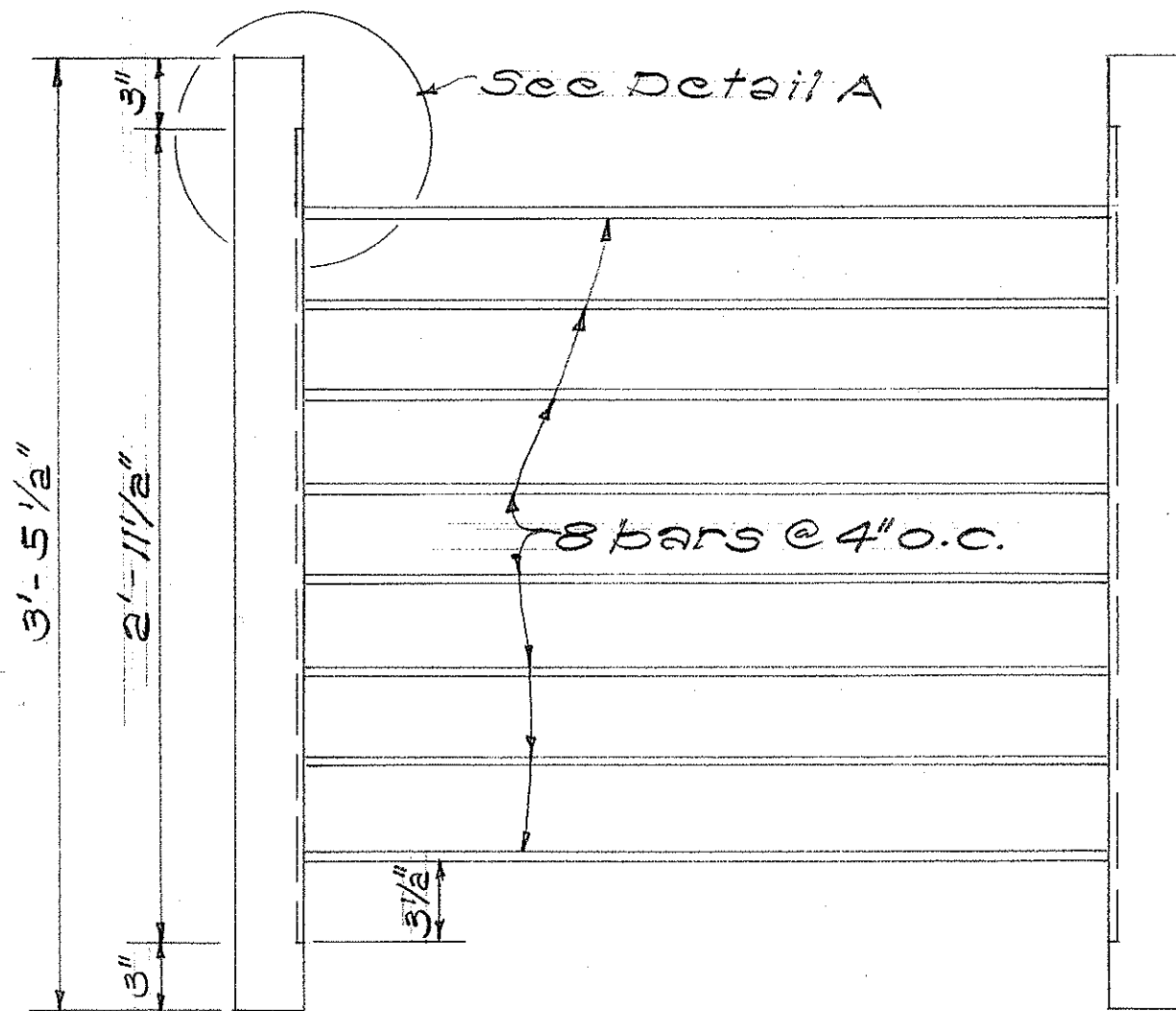


ELEVATION

MODIFICATION OF TYPES "A" & "B" C.D.I.
Scale: 1/2" = 1'-0"

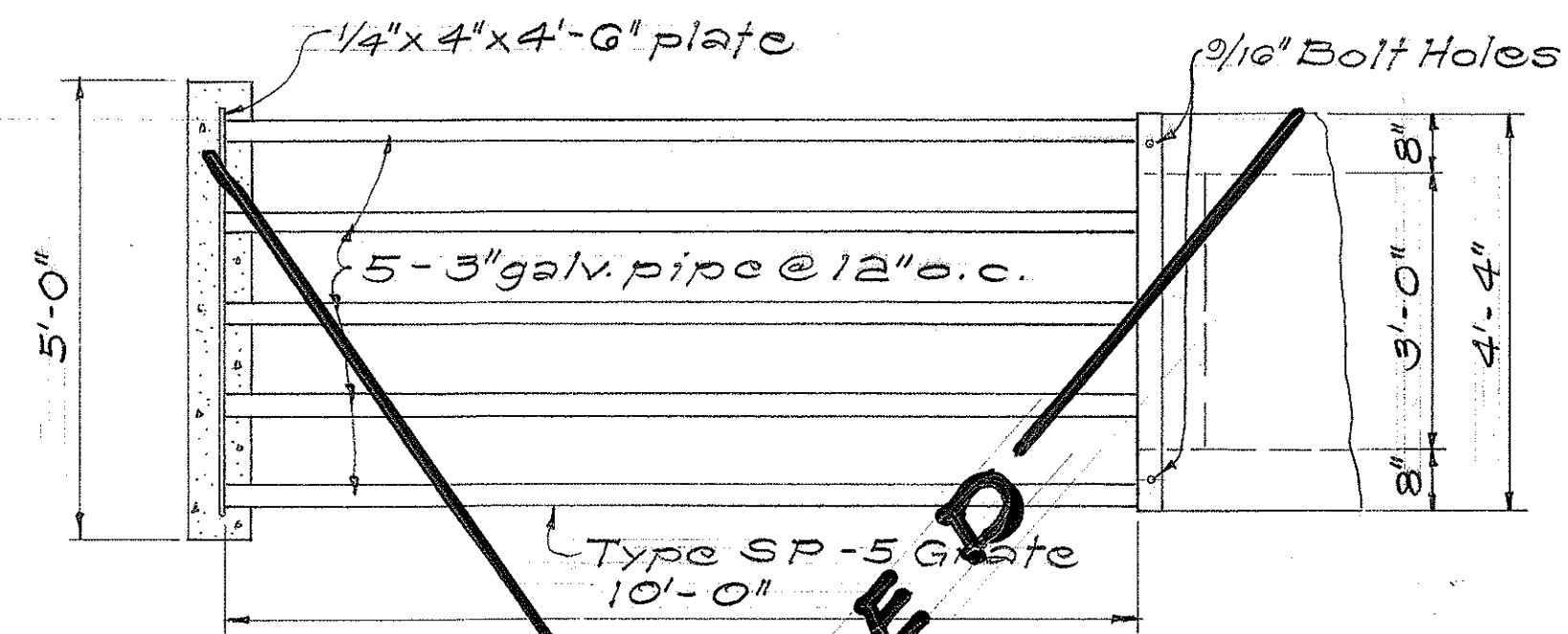


SECTION

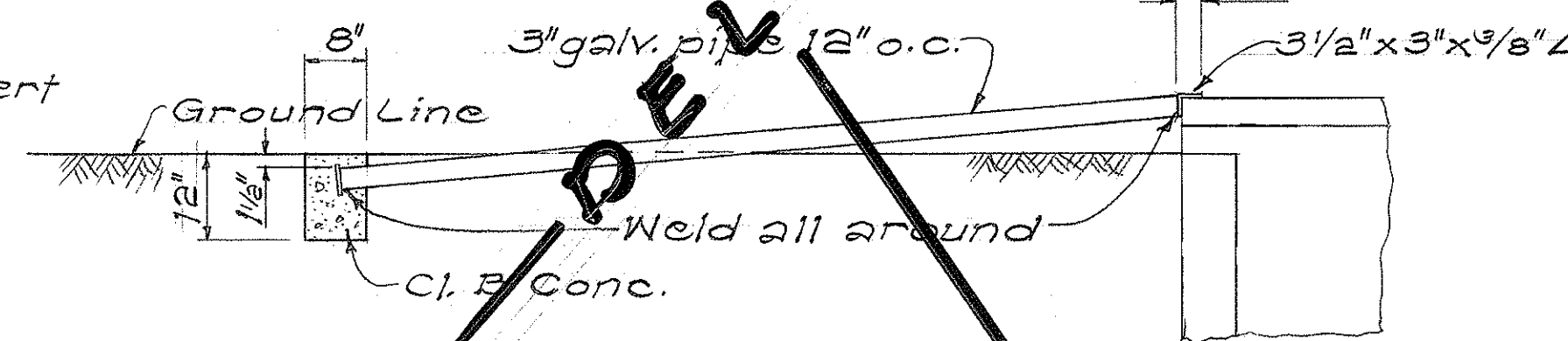


PLAN

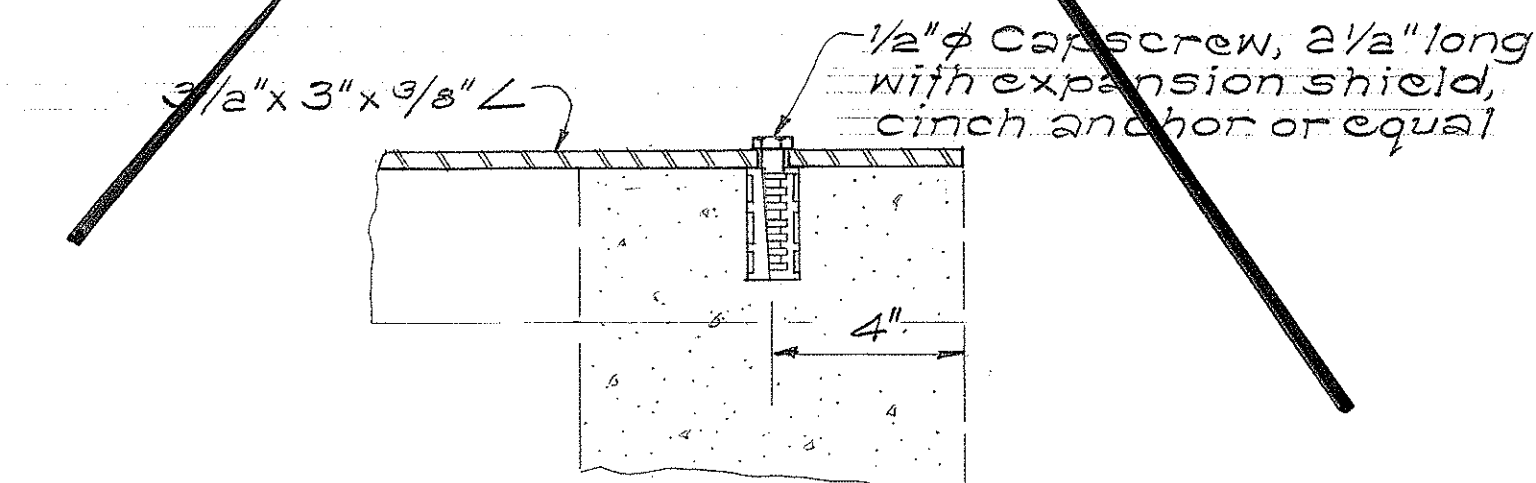
DETAIL OF TYPE S-8 STEEL GRATE
Scale: 1/2" = 1'-0"



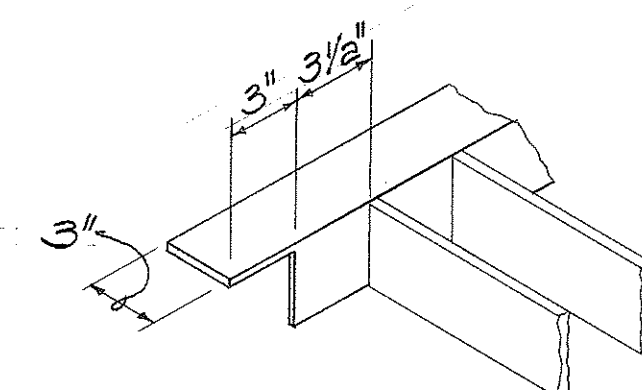
PLAN



ELEVATION



BOLT DETAIL
Scale: 3/4" = 1'-0"
MODIFICATION TO C.D.I. IN MEDIAN
AT STA. 184+30
Scale: 1/2" = 1'-0"



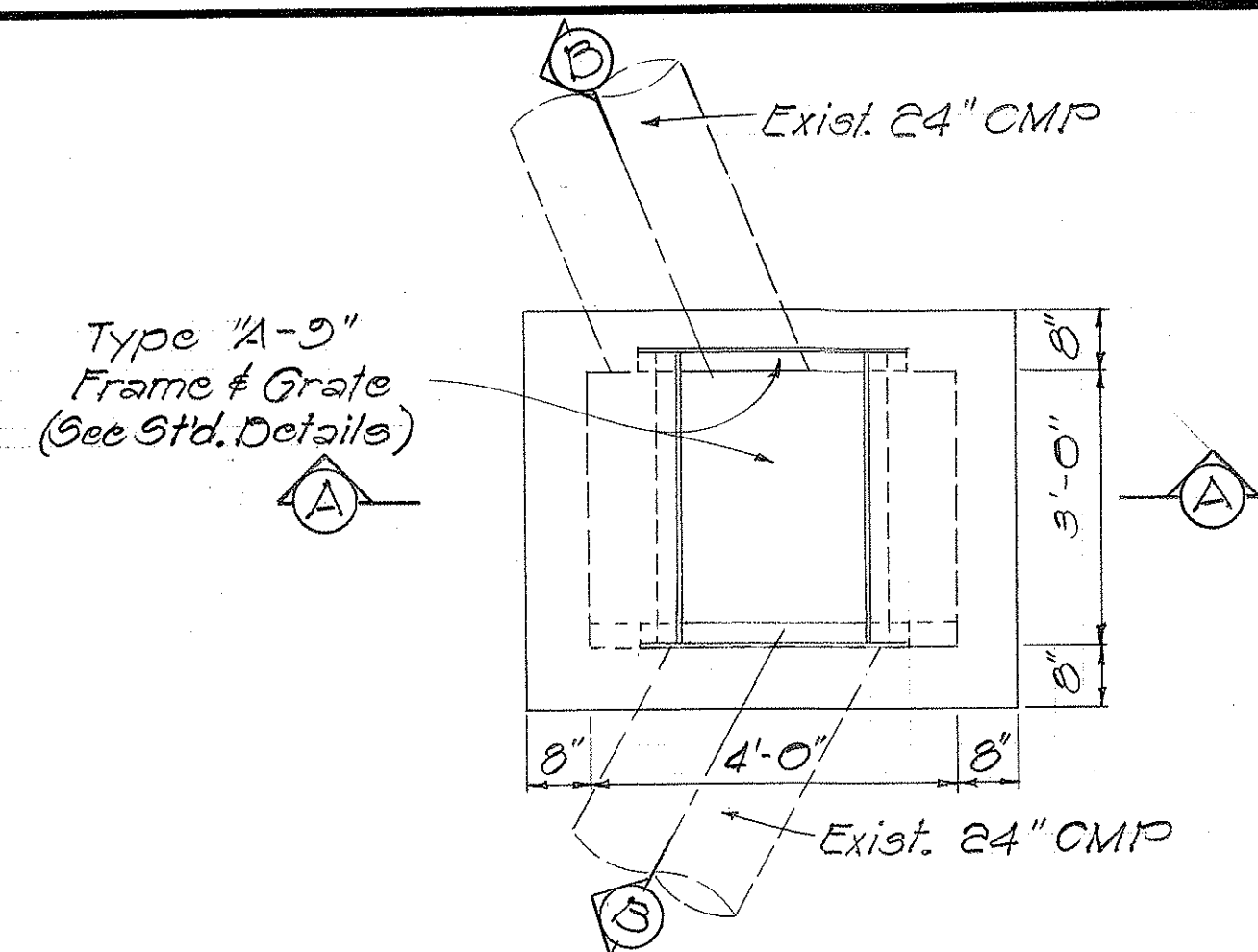
DETAIL "A"

- NOTE:
1. Grate shall be hot dip galvanized after fabrication, see specifications.
 2. All welds 3/8" unless otherwise noted.
 3. Grate materials shall conform to the specifications of ASTM Designation Structural Steel A283, Grade D and the Standard Specifications.

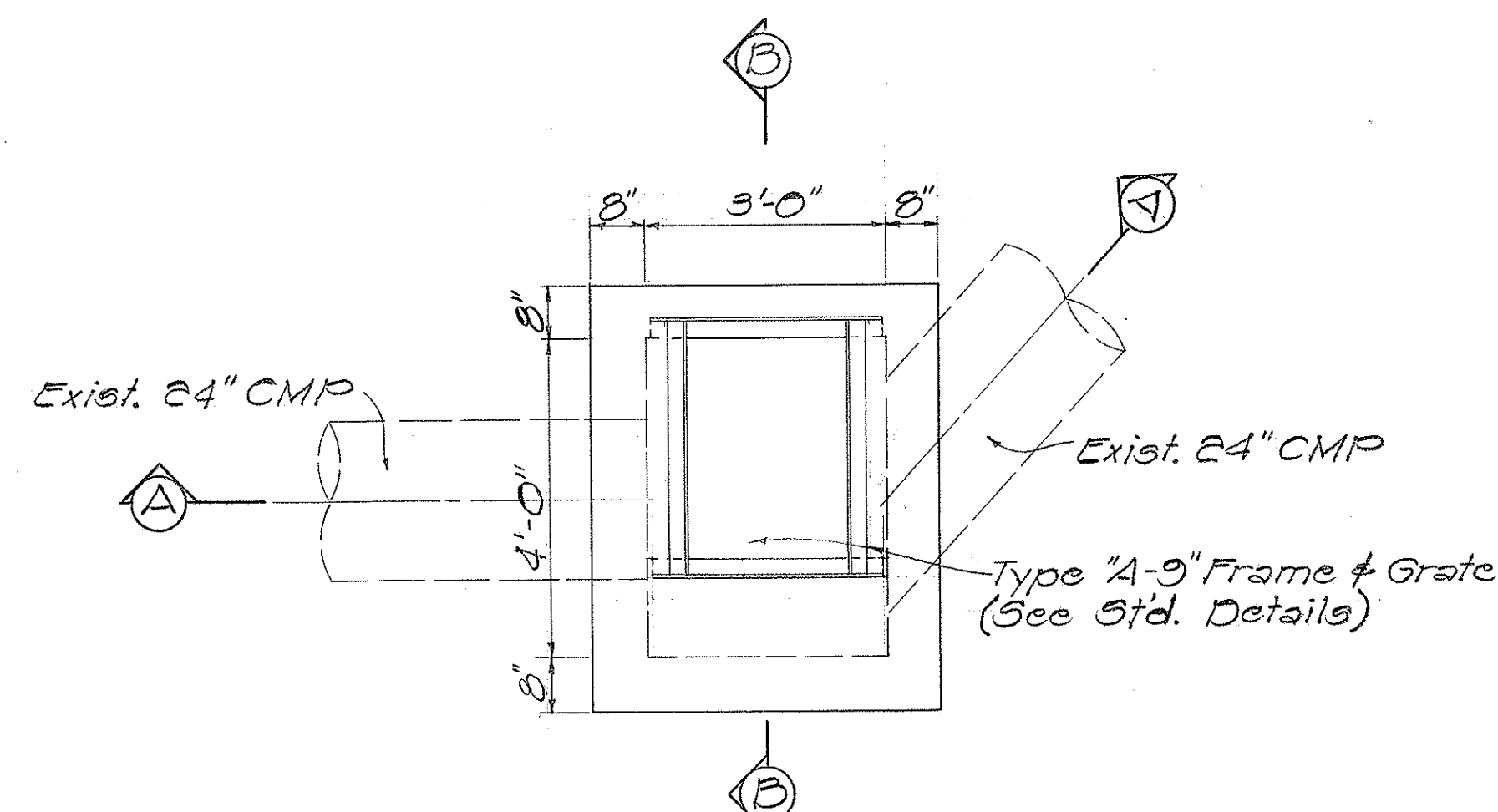
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
DRAINAGE DETAILS
SAFETY IMPROVEMENTS PALAILAI TO KUNIA F.A.I. PROJECT NO. I-HI-1(108)
Scale: As Noted Date: Jan. 1974
SHEET No. 20 OF 20 SHEETS

DESIGNED BY	DATE
TRACED BY	
NOTED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

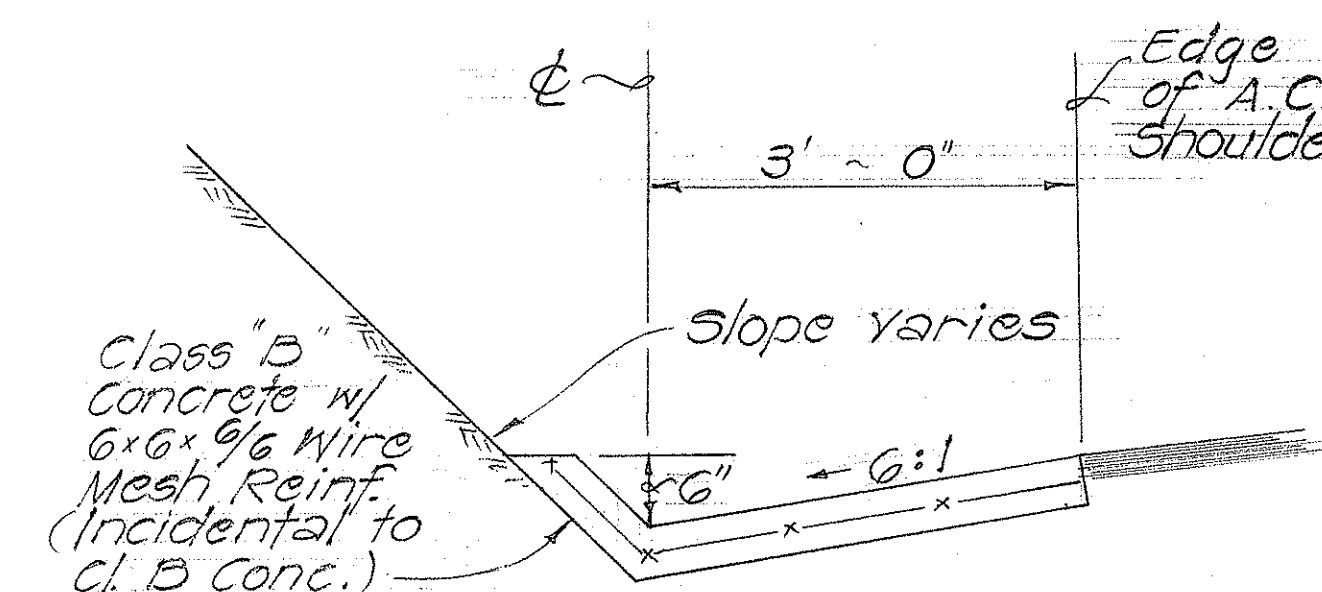
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IHI-1(108)	1975	37	100



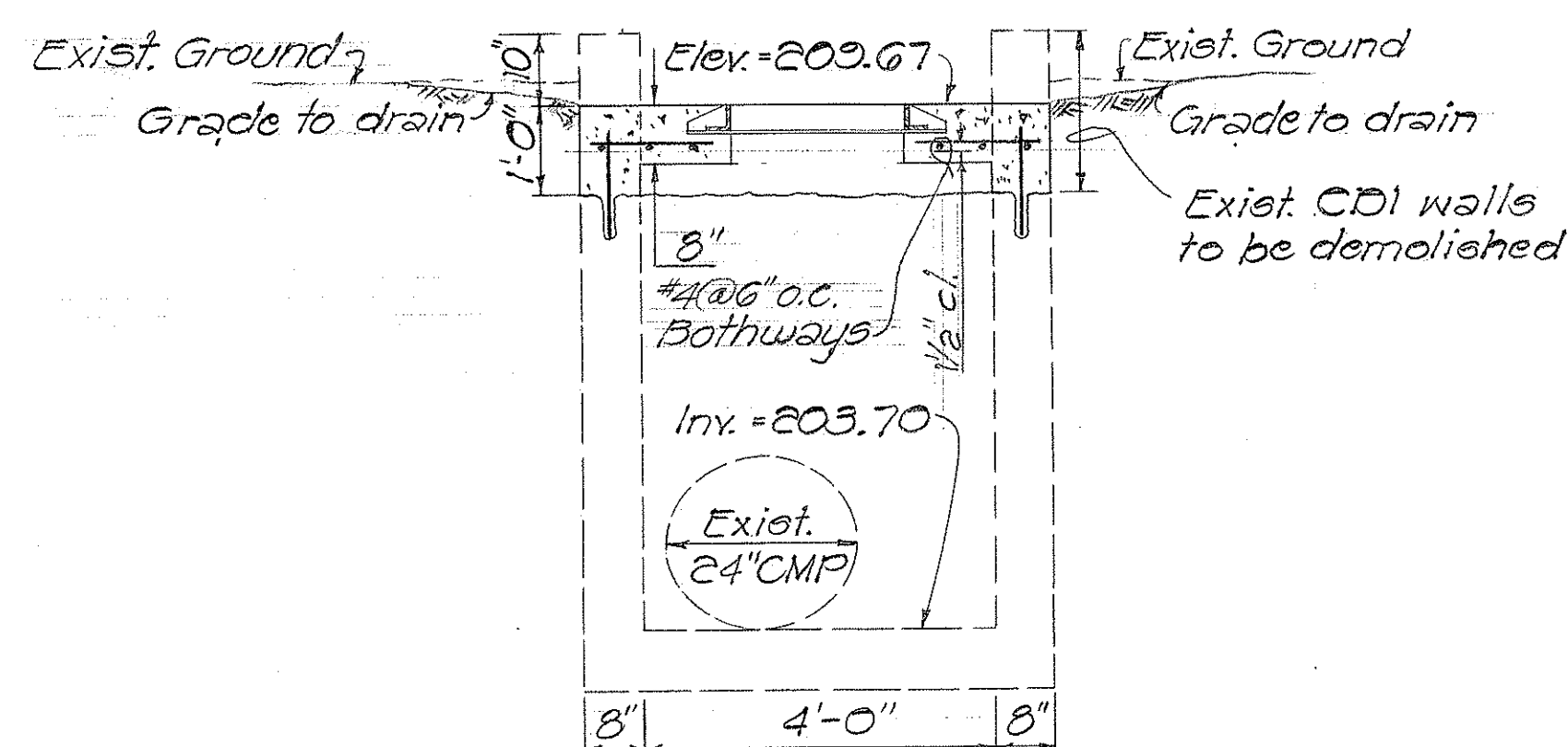
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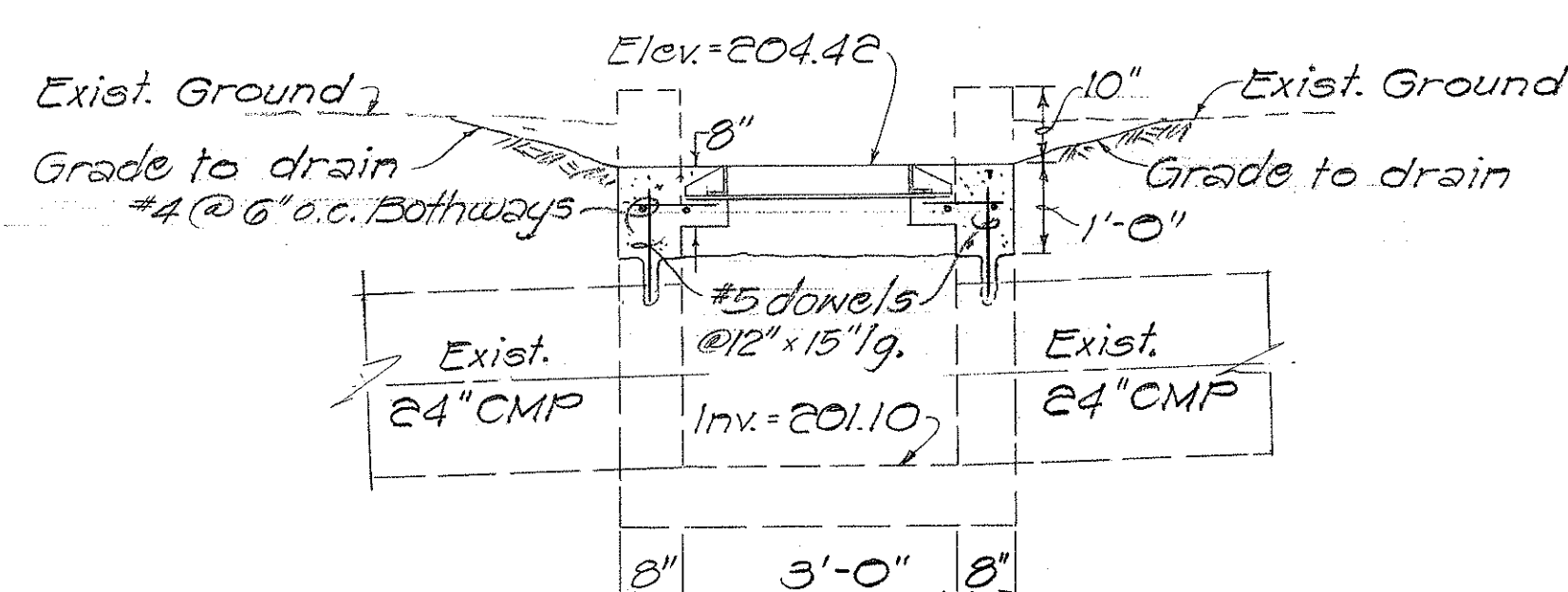
PLAN



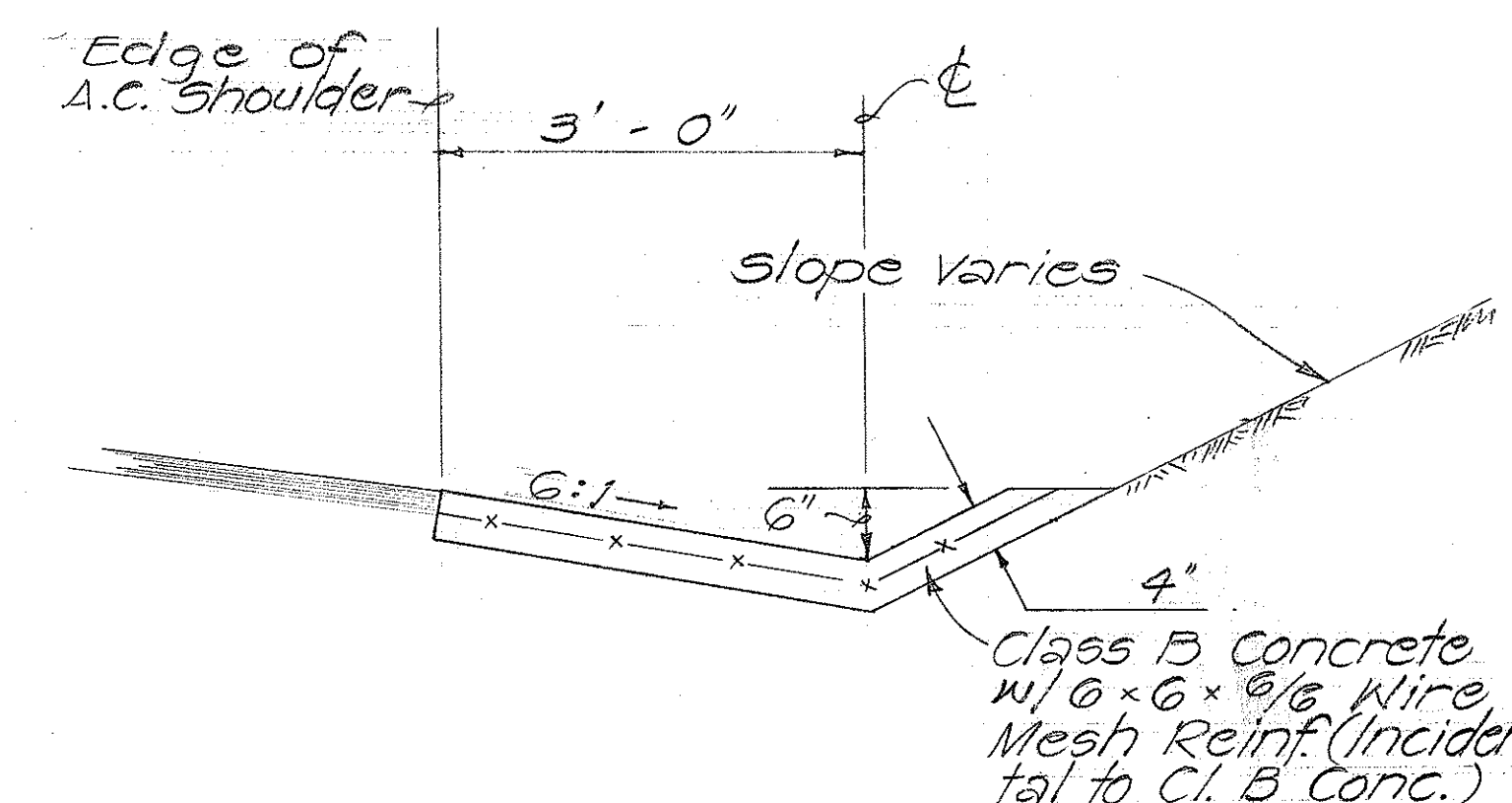
TYPICAL CONCRETE SWALE
STA. 115+00 ± LT. TO # STA. 117+70 ± LT.
Scale: 3/4" = 1'-0"



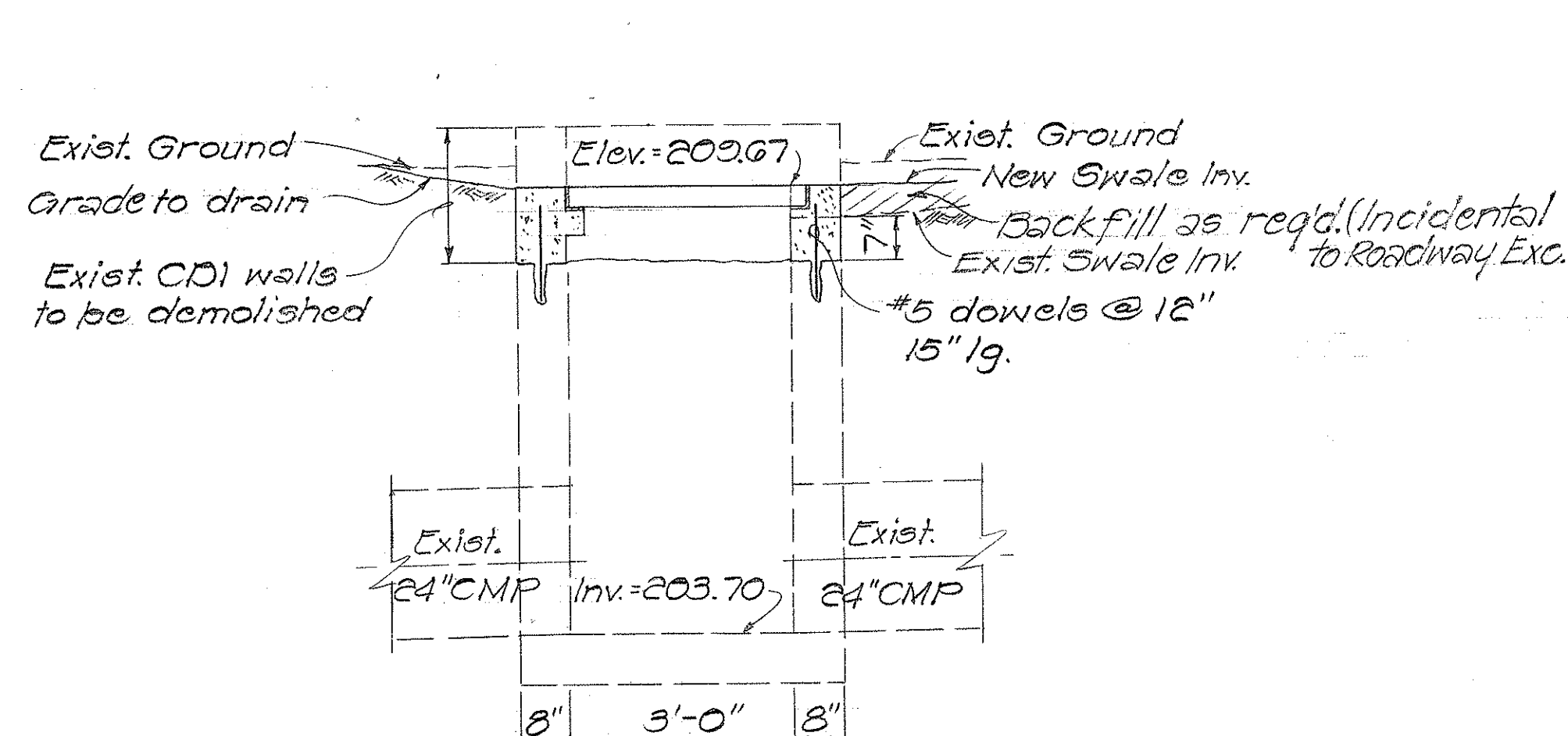
SECTION "A-A"



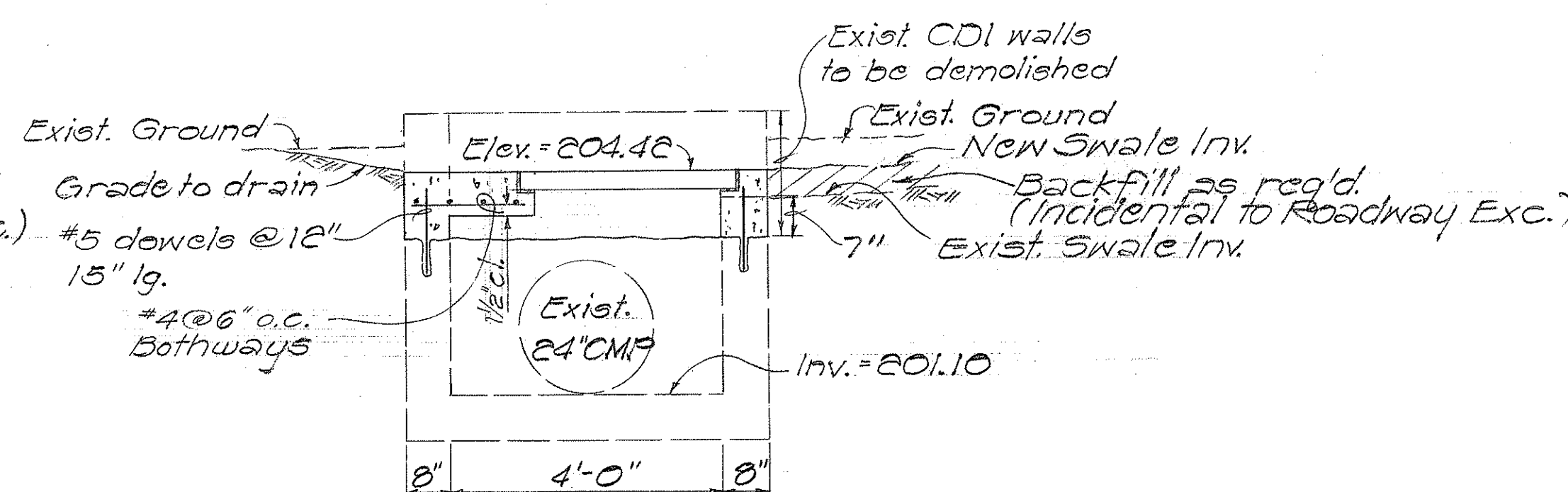
SECTION "A-A"



TYPICAL CONCRETE SWALE
STA. 66+50 ± RT. TO # STA. 68+00 ± RT.
Scale: 3/4" = 1'-0"



SECTION "B-B"



SECTION "B-B"

MODIFICATION OF C.D.I. AT
"RAMP KC" STA. 21+55 ± LT.
Scale: 1/2" = 1'-0"

MODIFICATION OF C.D.I. AT
"RAMP KB" STA. 2+83 ± Rt.
Scale: 1/2" = 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

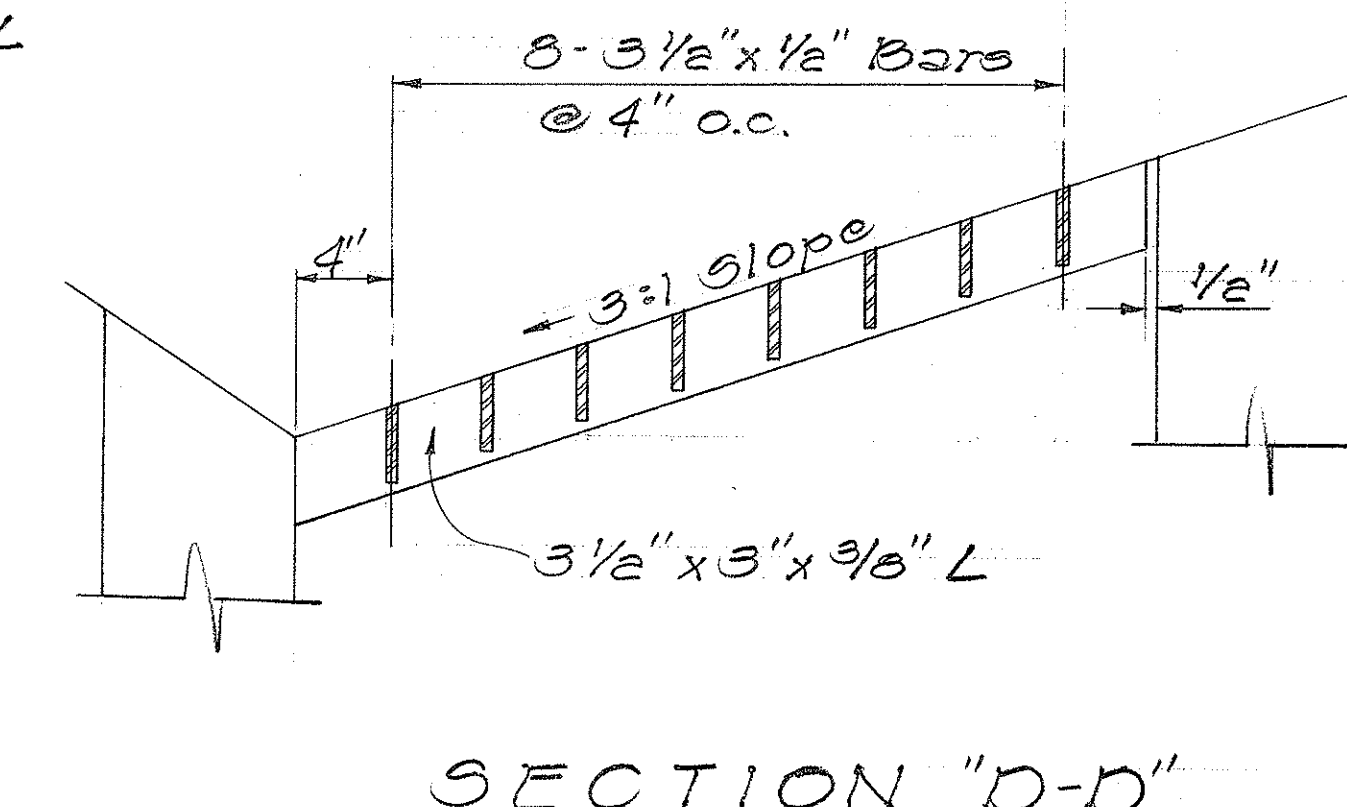
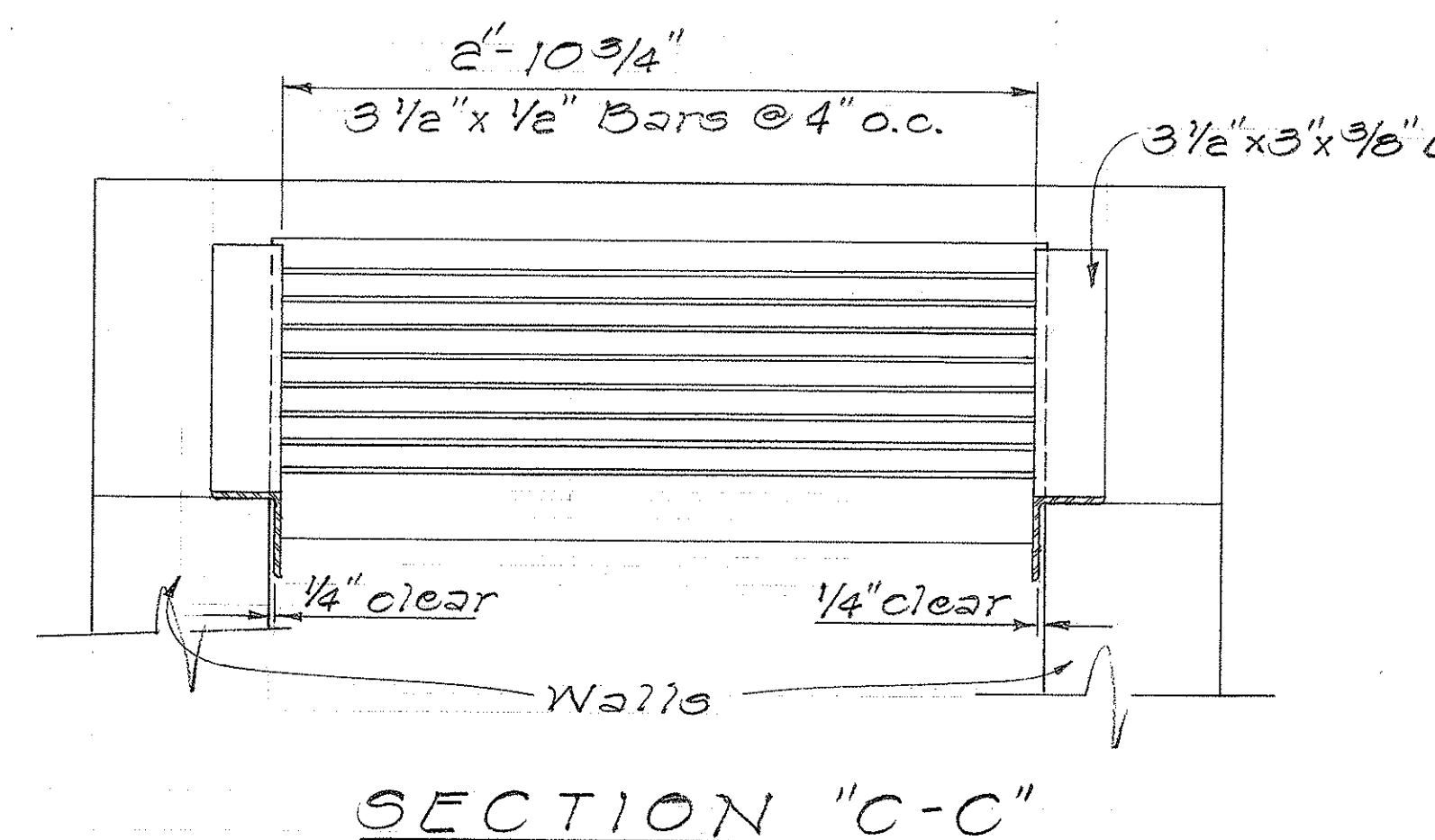
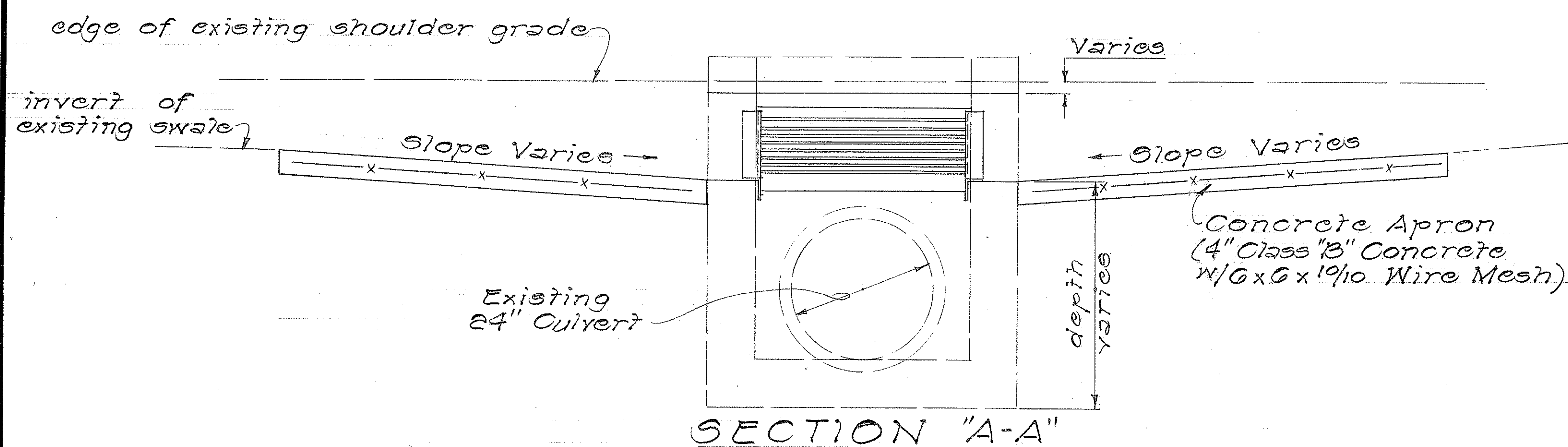
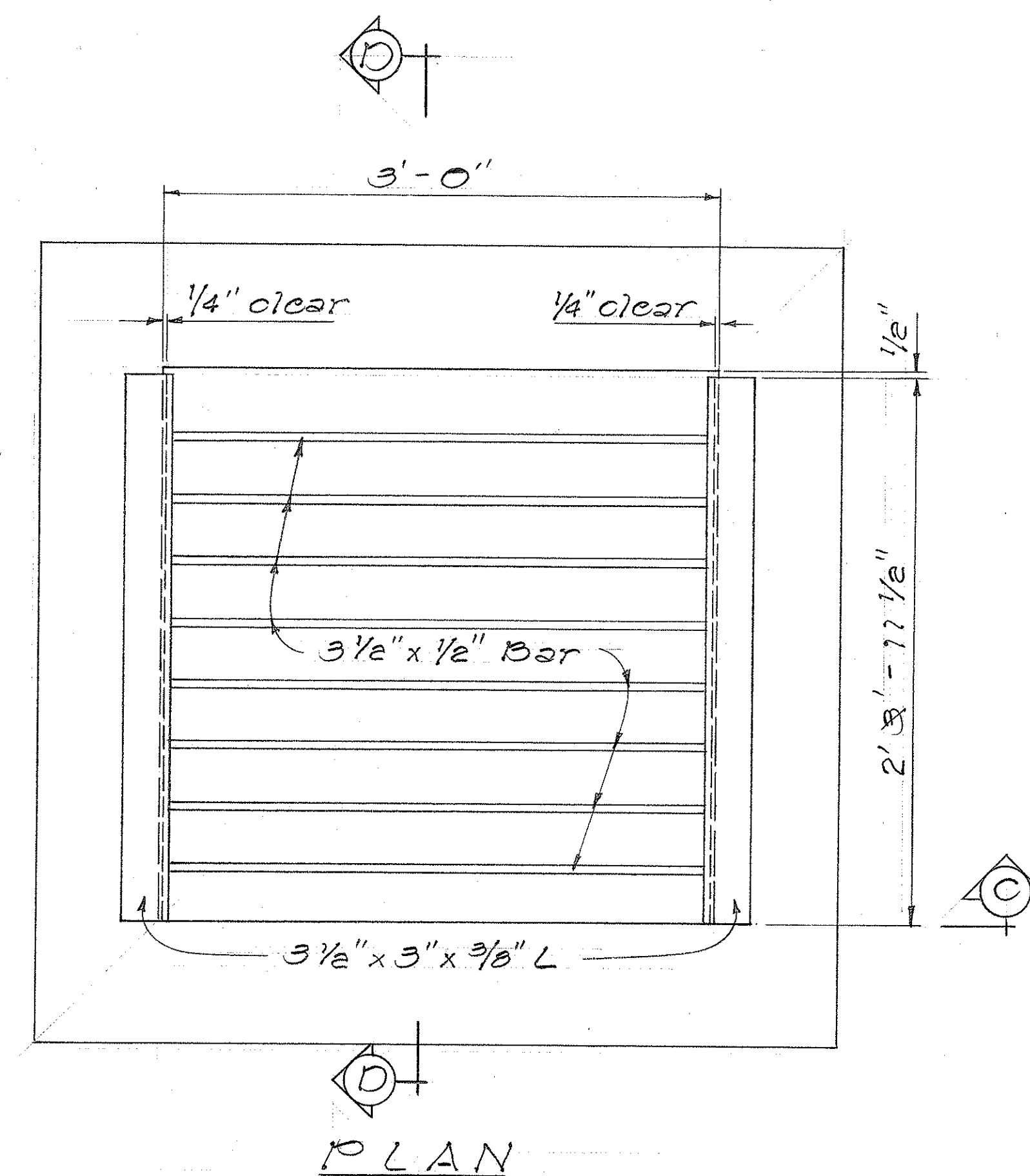
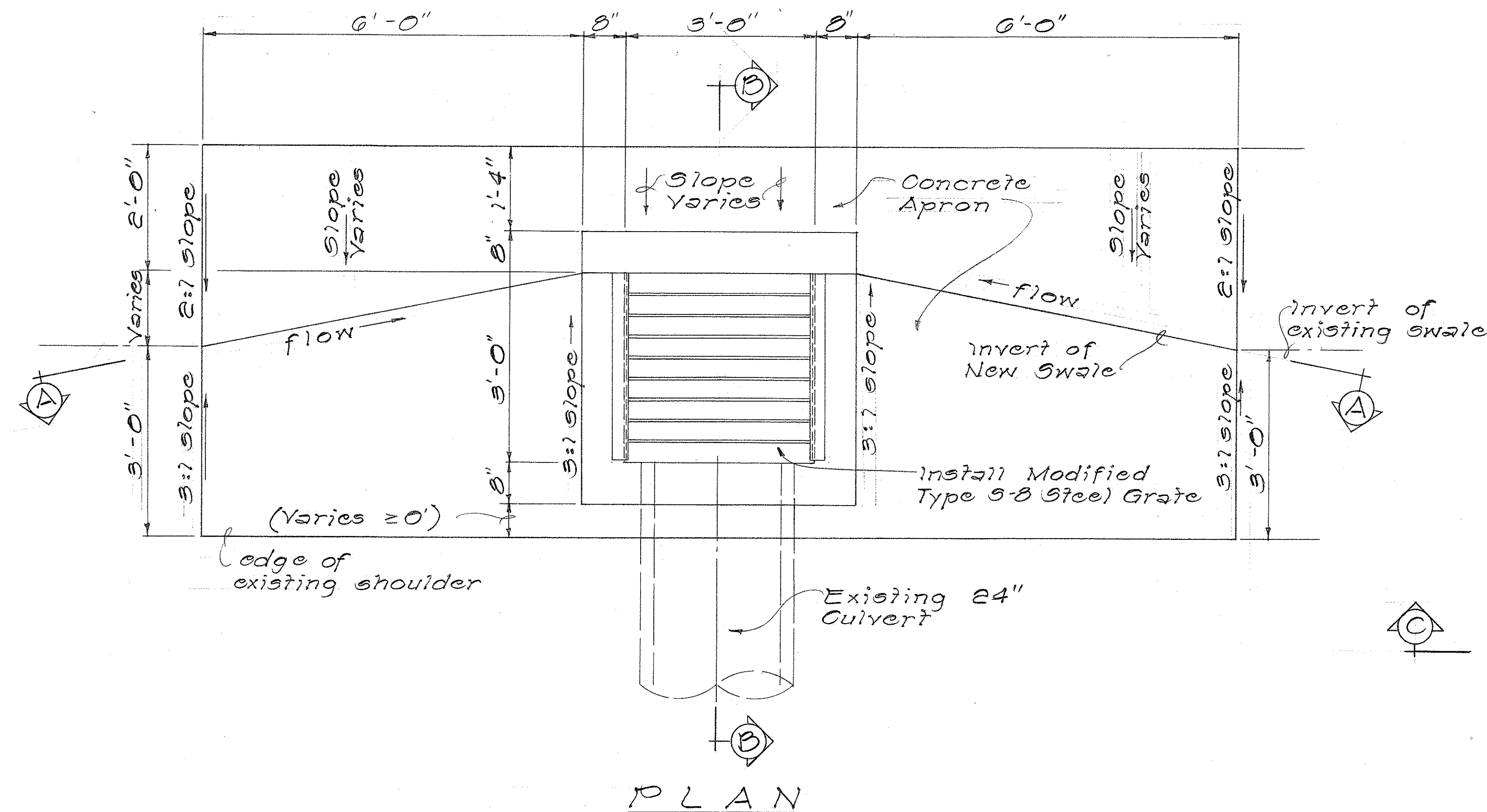
SAFETY IMPROVEMENTS
PALAILAI TO KUNIA
F.A.I. PROJ. NO. IHI-1(108)

Scale: As Shown Date: Jan. 1974

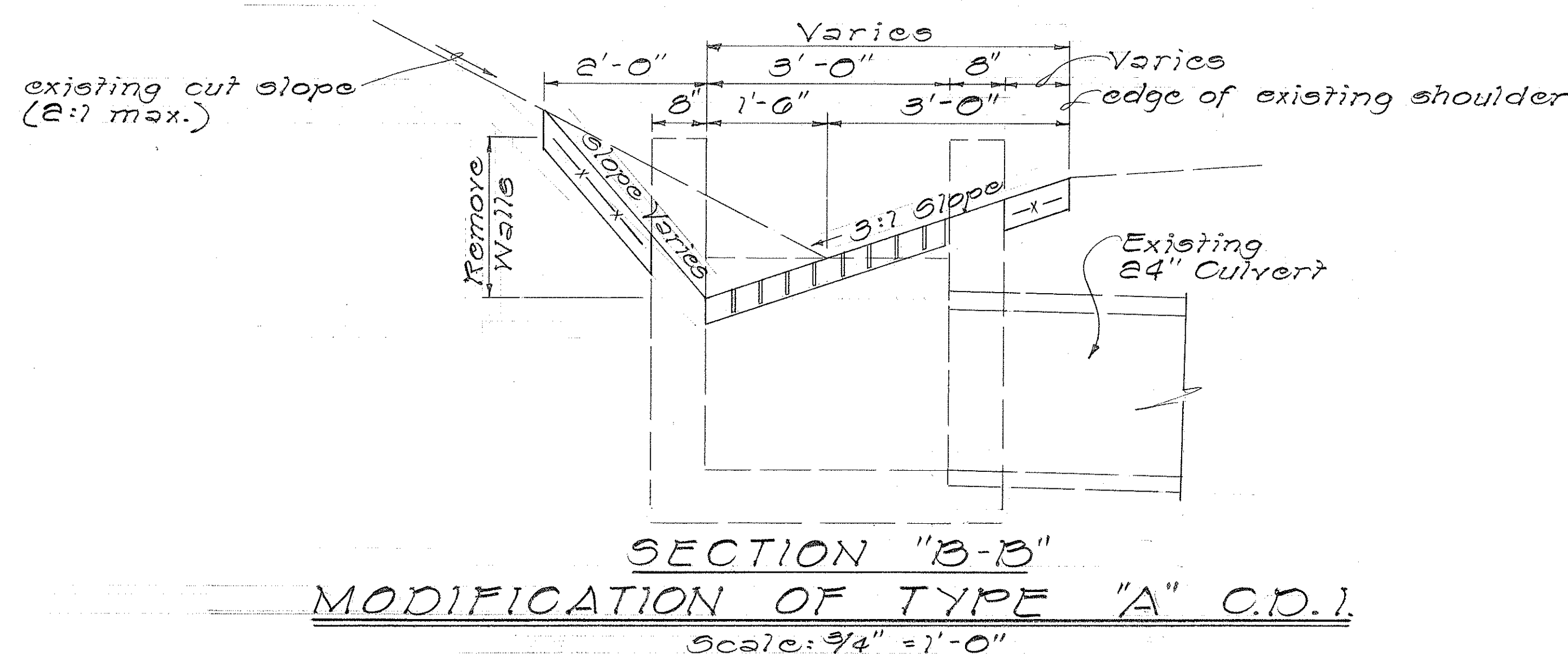
SHEET No. 100 OF 120 SHEETS

DATE	
SURVEY PLOTTED BY	
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CHECKED BY	
NOTE BOOK	
No.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-71-1 (108)	1975		



TYPE S-8 STEEL GRATE
Scale: 1 1/2" = 1'-0"



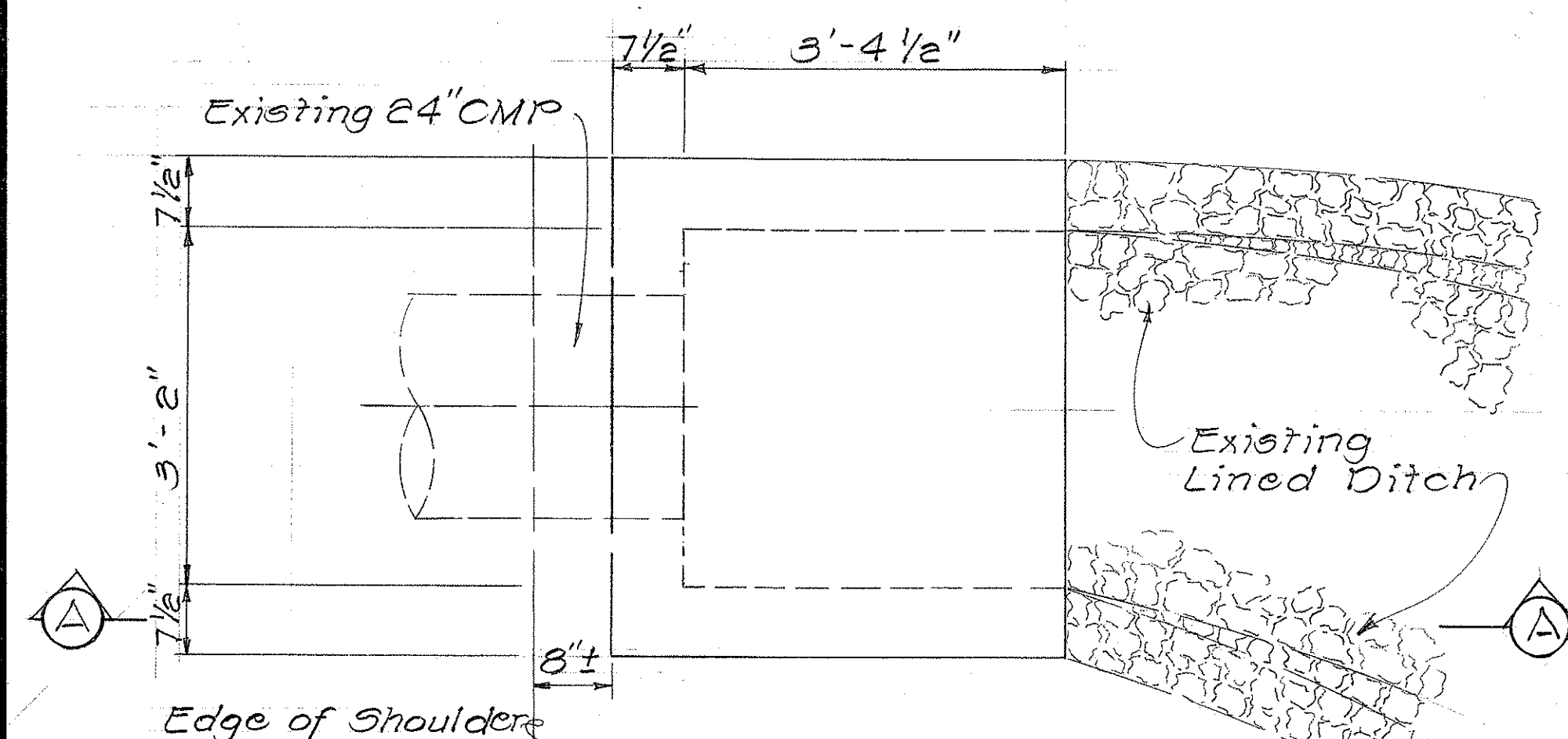
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DRAINAGE DETAILS

SAFETY IMPROVEMENTS
PALAIAI TO KUNIA
F.A.I. PROJ. NO. I-71-1 (108)

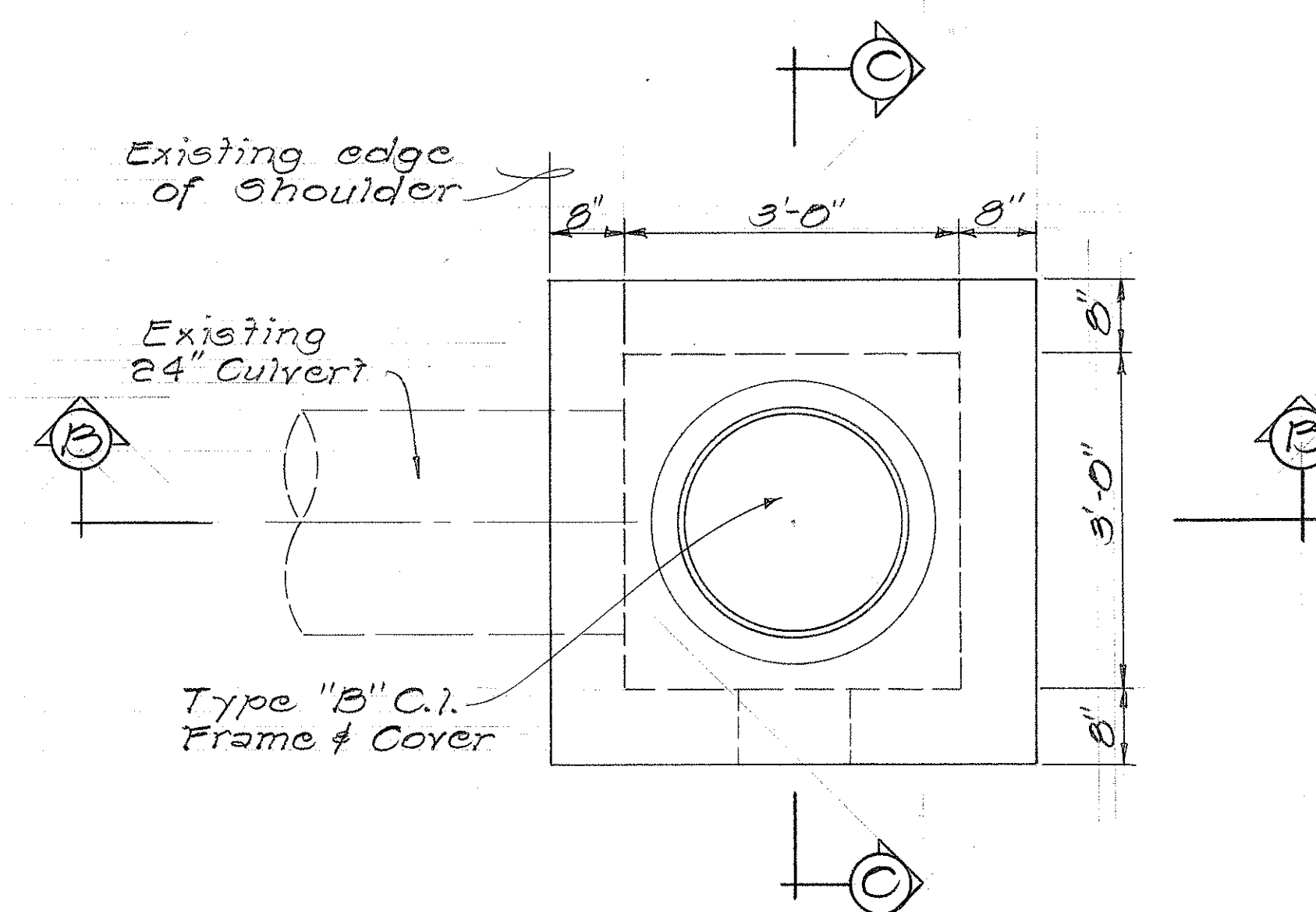
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SHEET NO. OF SHEETS
C.O. 37A

DATE	DESIGNED BY	CHECKED BY
PLAN	NOTE BOOK	NO.
DESIGNED BY	QUANTITIES BY	
CHECKED BY		

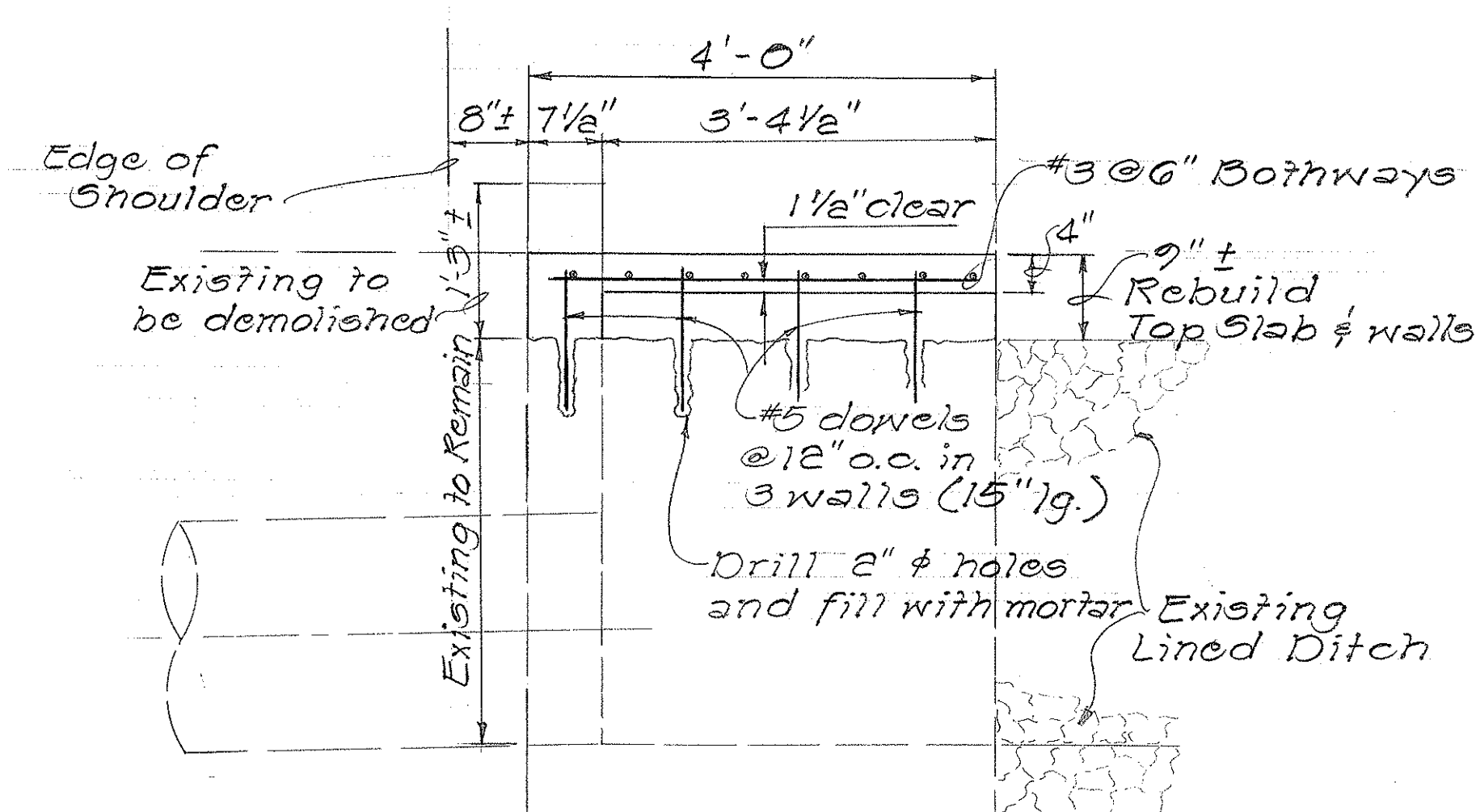
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1 (108)	1975		



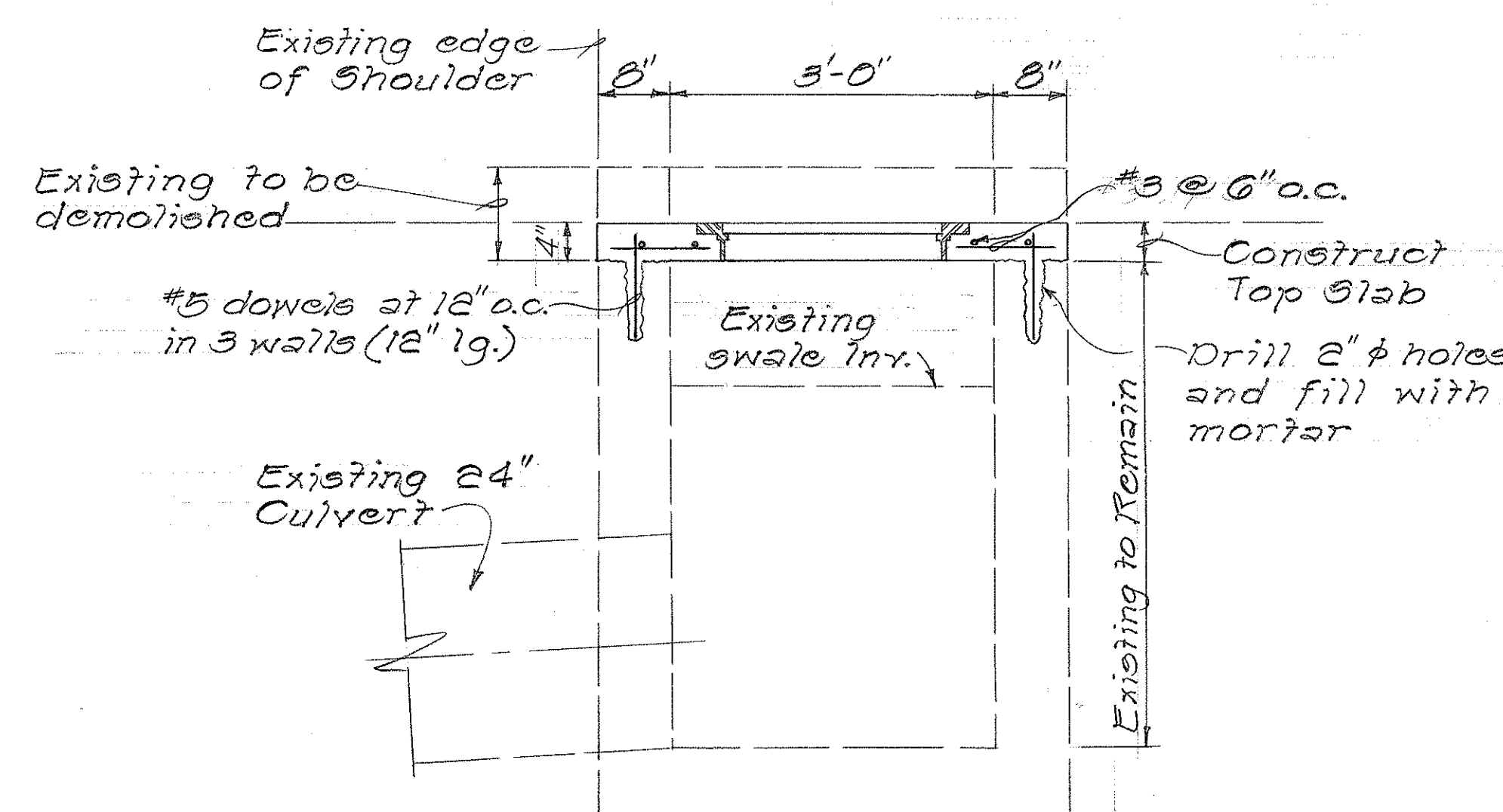
PLAN



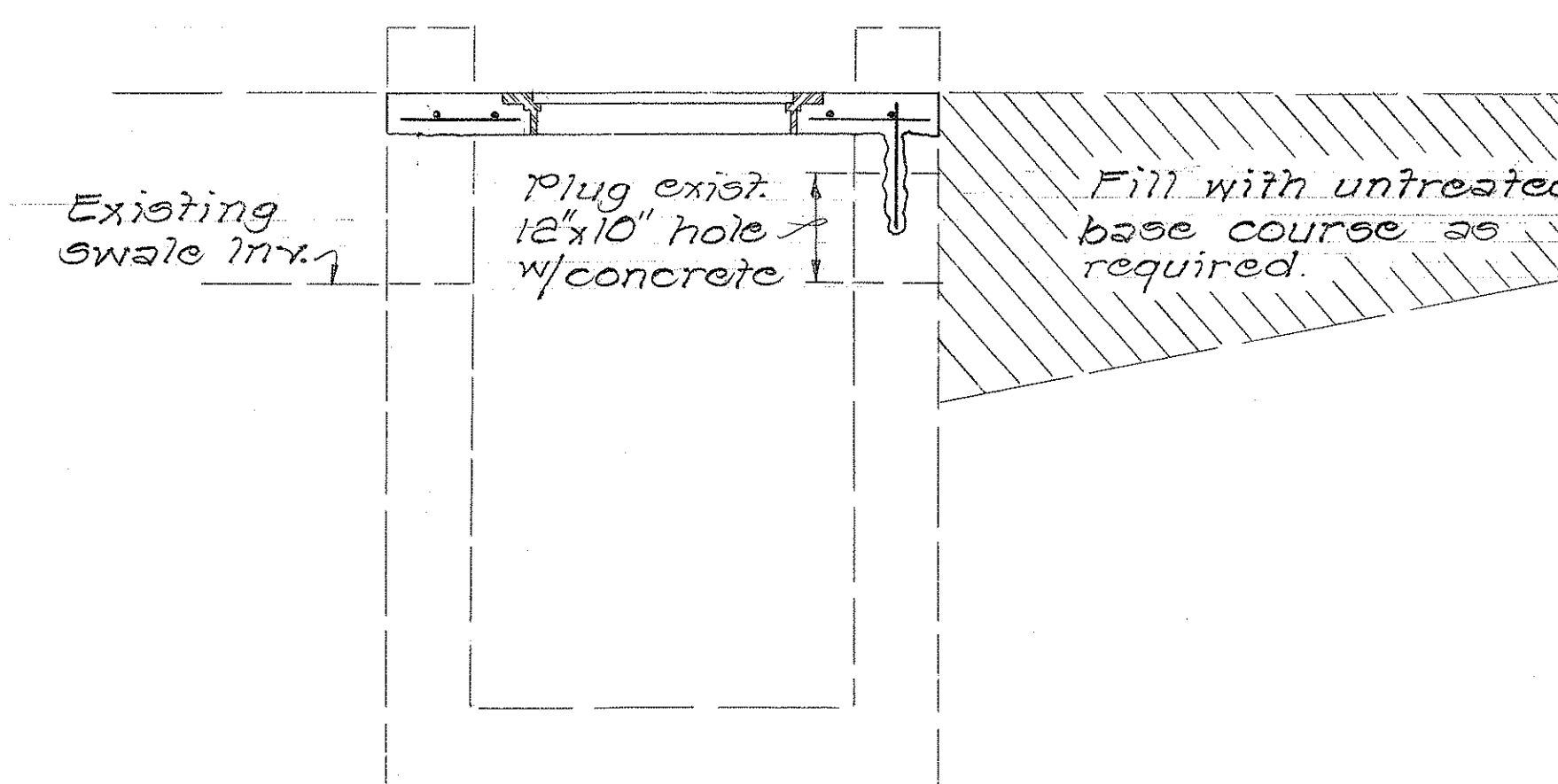
PLAN



SECTION "A-A"



SECTION "B-B"



SECTION "C-C"

MODIFICATION OF EXISTING C.D.I.

AT STA. 248+00, 1/8 RT. LT. & 297+25, 1/8 LT. & 278+25, 1/8 LT.

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

MODIFICATION OF EXISTING C.D.I.

AT STA. 278+25 ±, 1/8 LT.

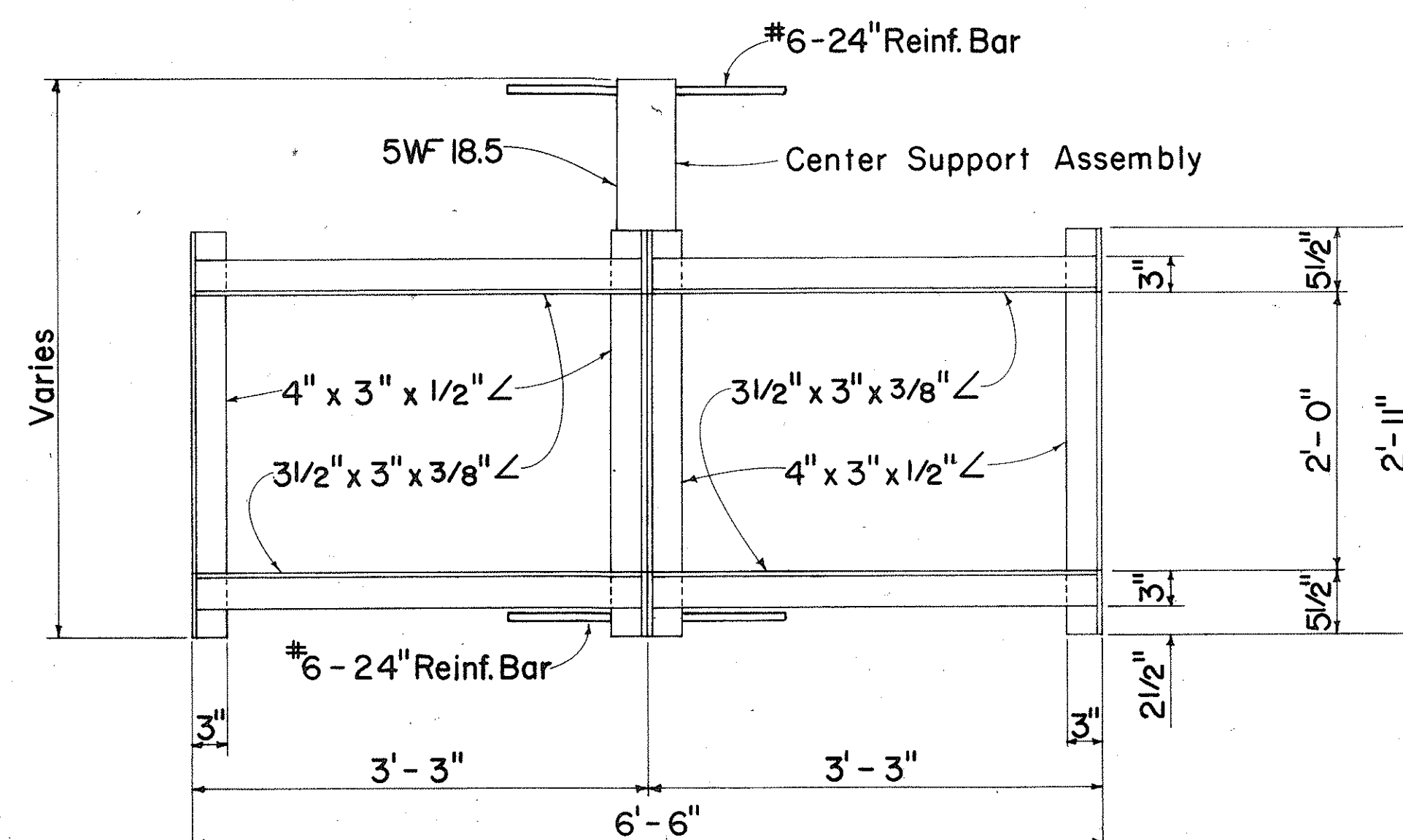
Scale: 3/4"=1'-0"

SURVEY PLOTTED BY	DATE
DRAWN BY	
TRACED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION DRAINAGE DETAILS
SAFETY IMPROVEMENTS PALAIALI TO KUNIA F.A.I. PROJ. NO. I-HI-1 (108)
Scale: As Shown Date: Sept, 1975
SHEET No. OF SHEETS

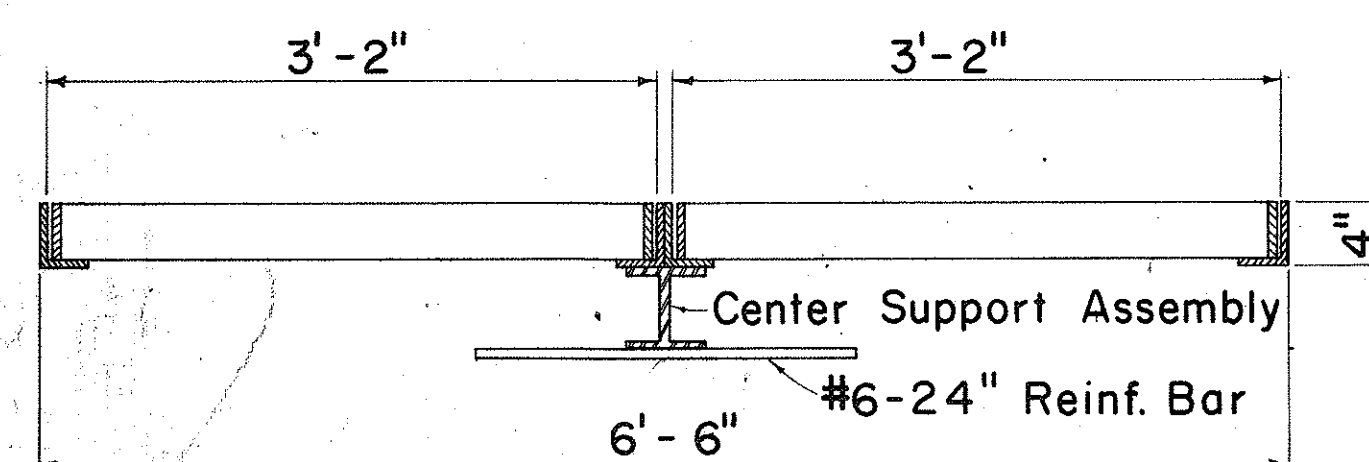
C.O. 37B

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IHI-1(108)	1975	38	100



PLAN

(Two or More Grates)

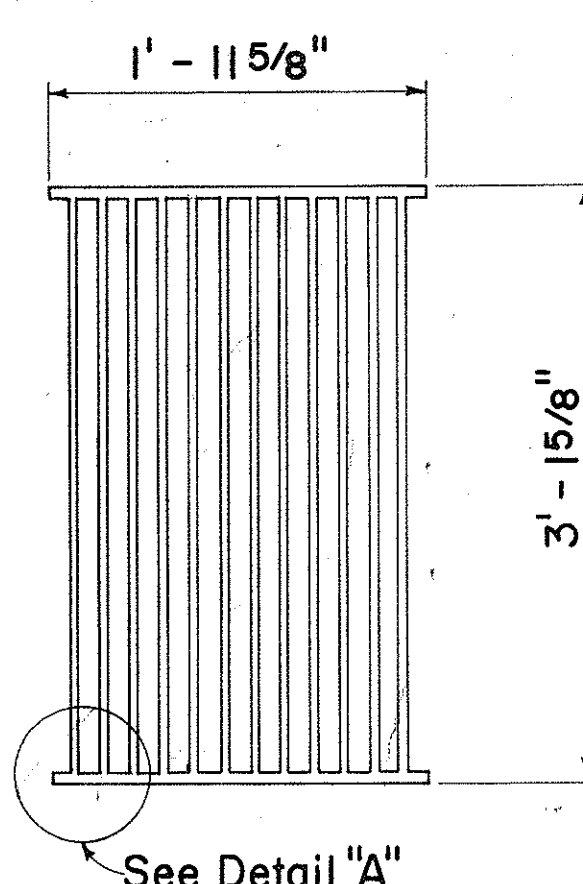


LONGITUDINAL SECTION

(Thru Frame & Grate)

FRAME DETAILS

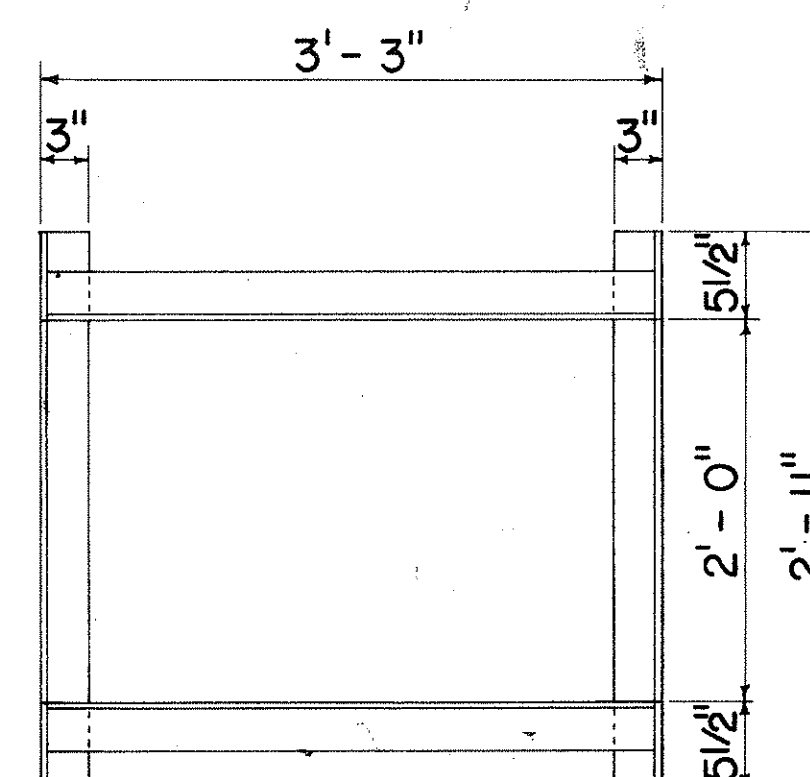
Scale: 1" = 1' - 0"



PLAN

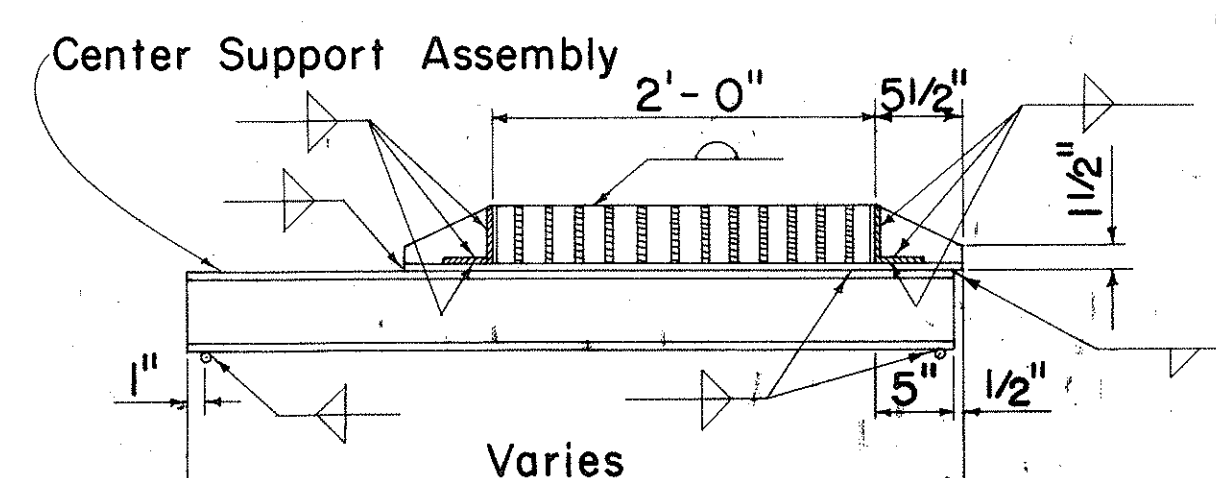
Scale: 1" = 1' - 0"

ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL GRATE



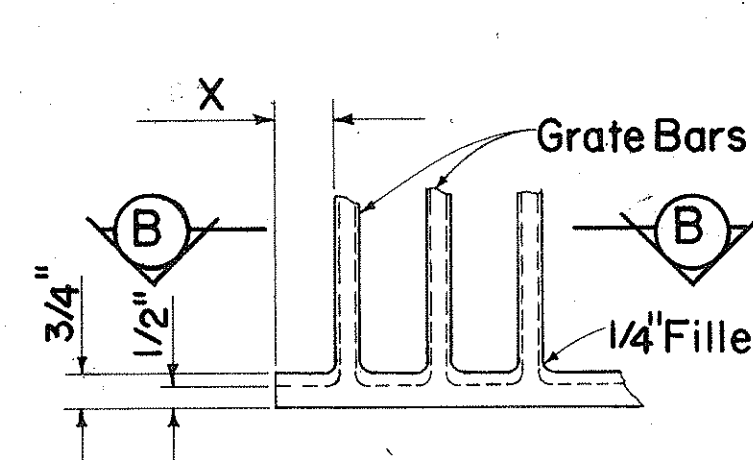
PLAN

(Single Grate)



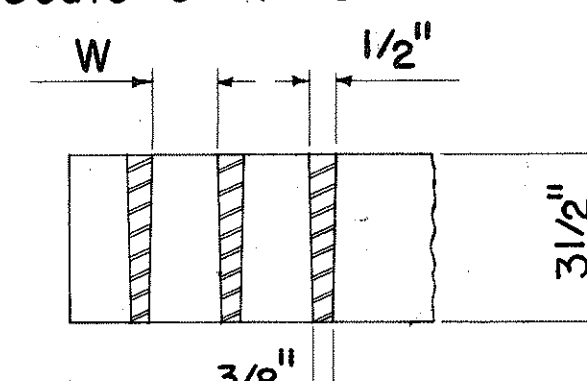
CROSS SECTION

(Thru Frame & Grate)



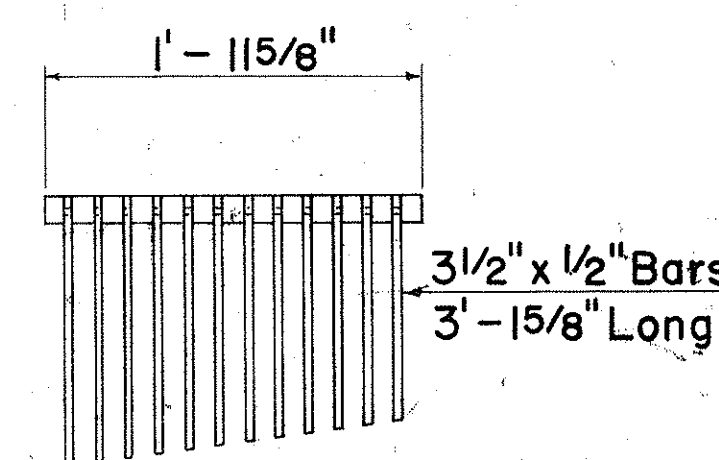
DETAIL "A"

Scale: 3" = 1' - 0"



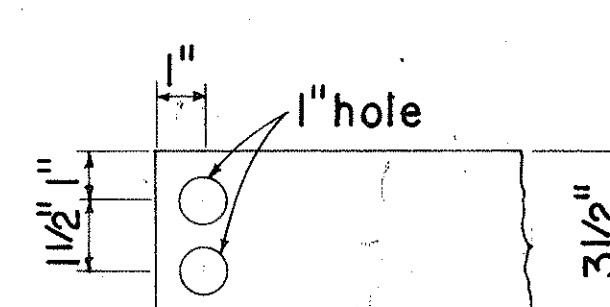
SECTION "B-B"

Scale: 3" = 1' - 0"



CAST END BLOCK

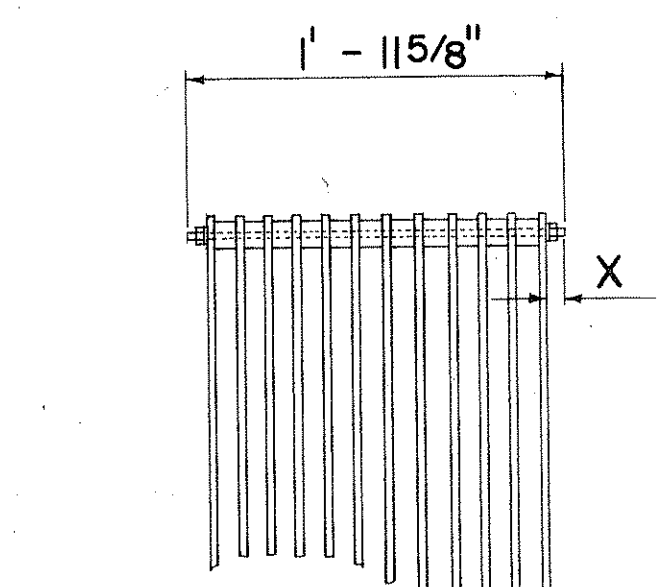
Scale: 1" = 1' - 0"



END OF BAR

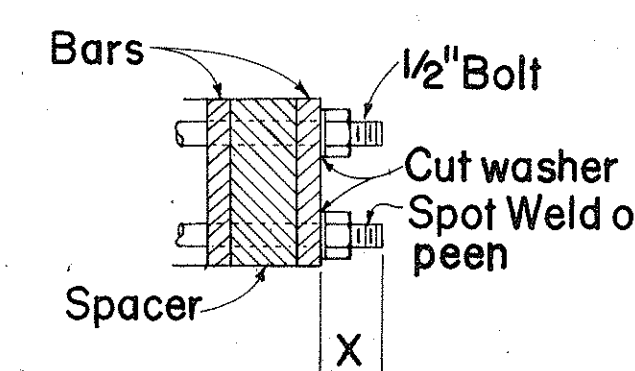
Scale: 3" = 1' - 0"

ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL END BLOCK GRATE



BOLTED END BLOCK

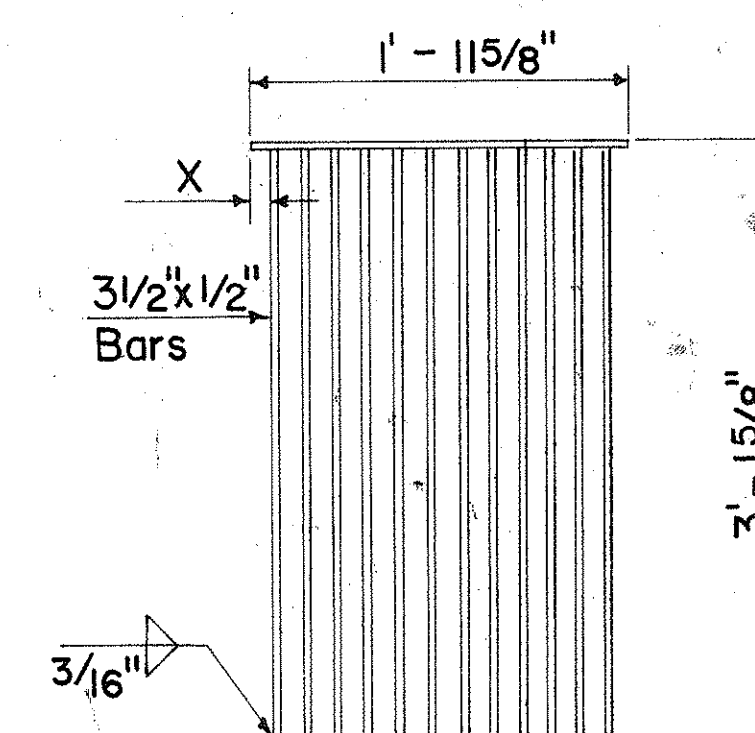
Scale: 1" = 1' - 0"



BOLTING DETAIL

Scale: 3" = 1' - 0"

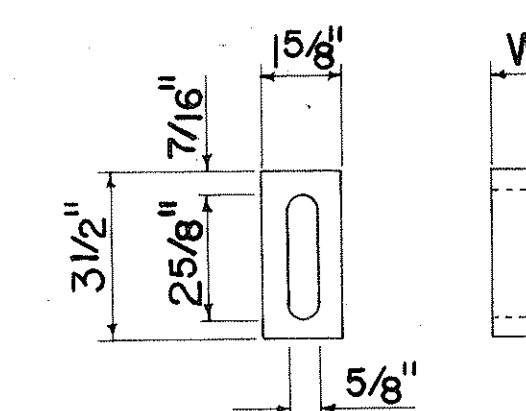
ALTERNATIVE BOLTED GRATE



PLAN

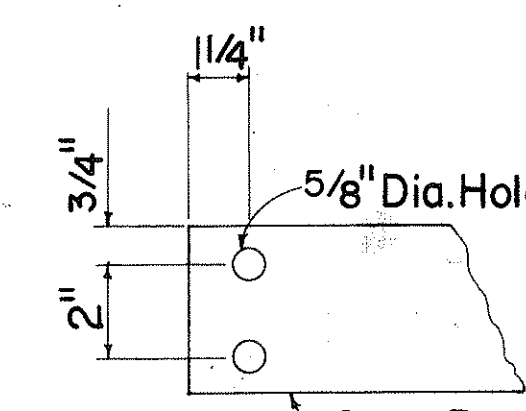
ALTERNATIVE WELDED GRATE

Scale: 1" = 1' - 0"



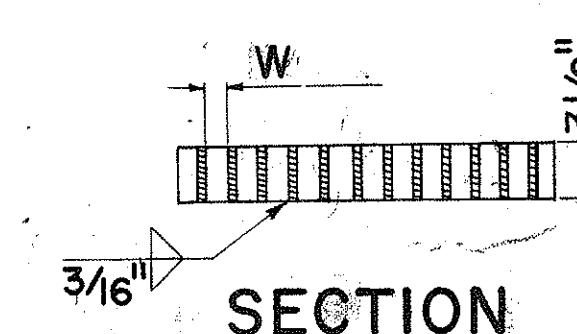
BAR SPACER

Scale: 3" = 1' - 0"



END OF BAR

Scale: 3" = 1' - 0"



SECTION

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 12-17-67 DATE

APPROVED:

ASSISTANT CHIEF, ENGINEERING 12-17-67 DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

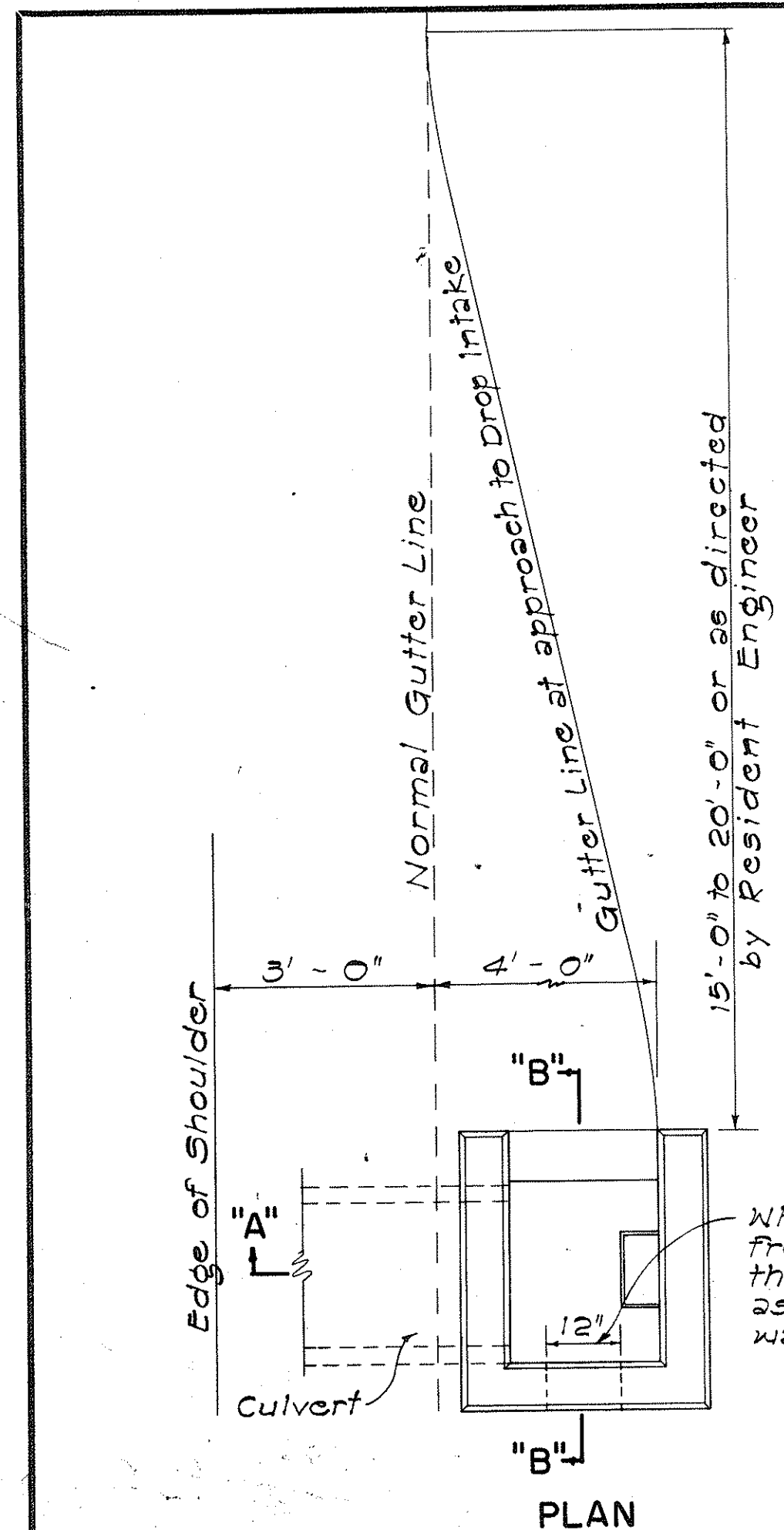
TYPE A-9 AND A-12 FRAMES AND GRATES

Scales: As Noted Date: Aug. 1968

SHEET No. 110 OF 120 SHEETS DW 7

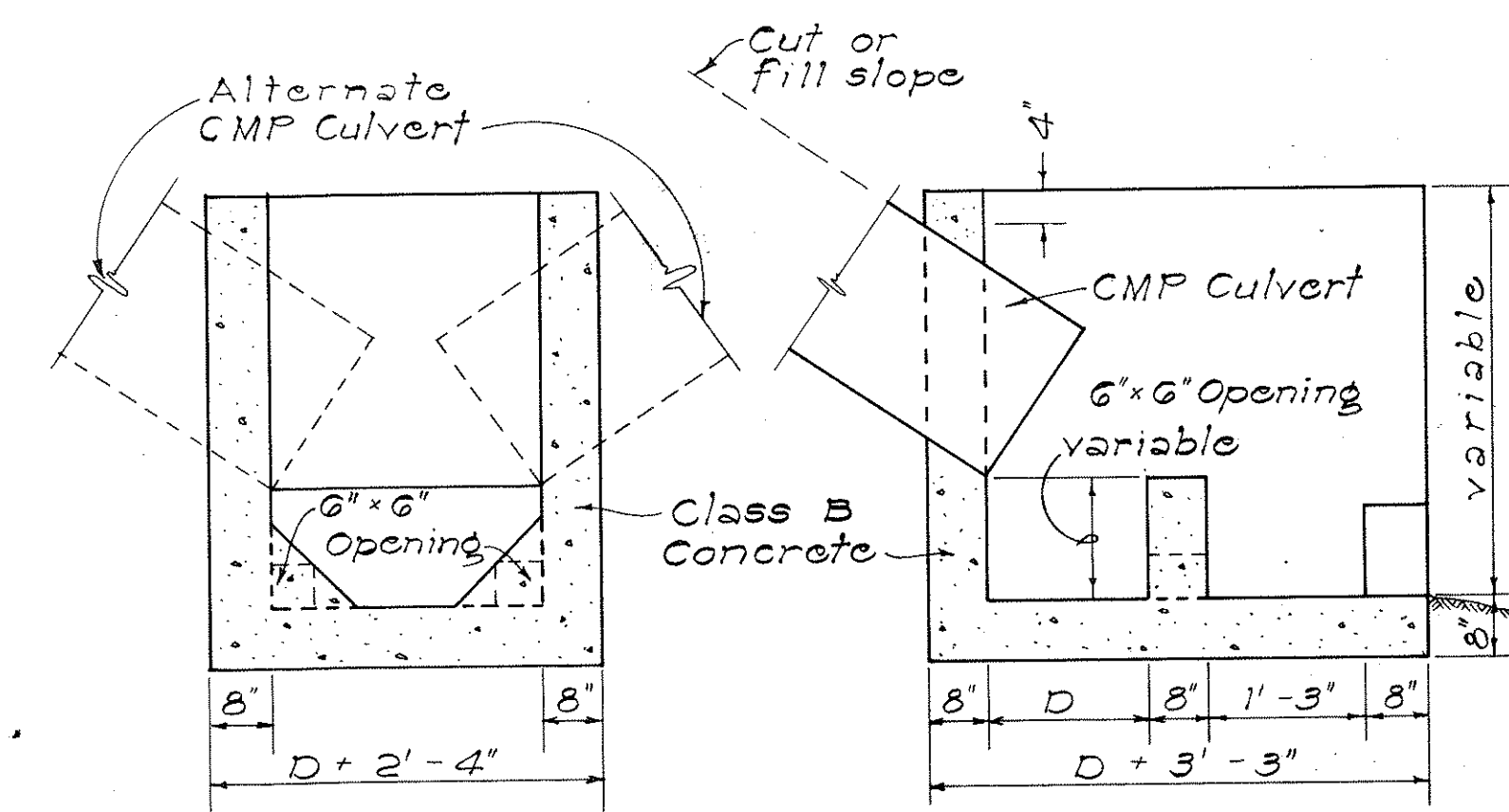
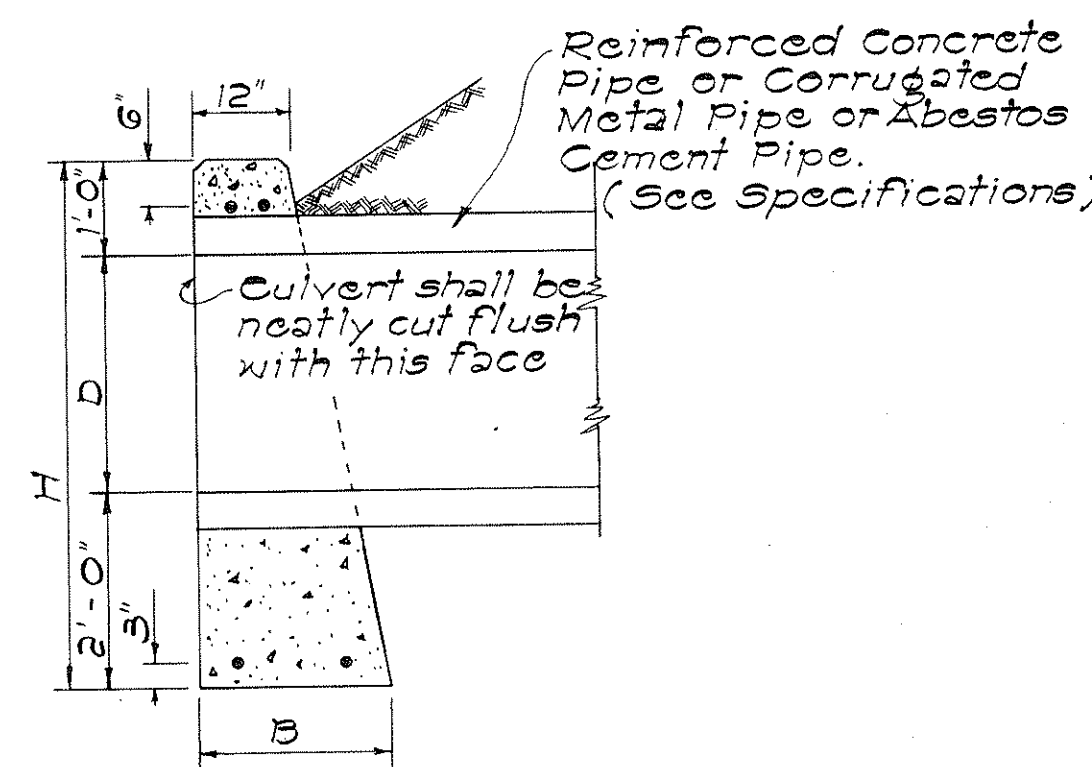
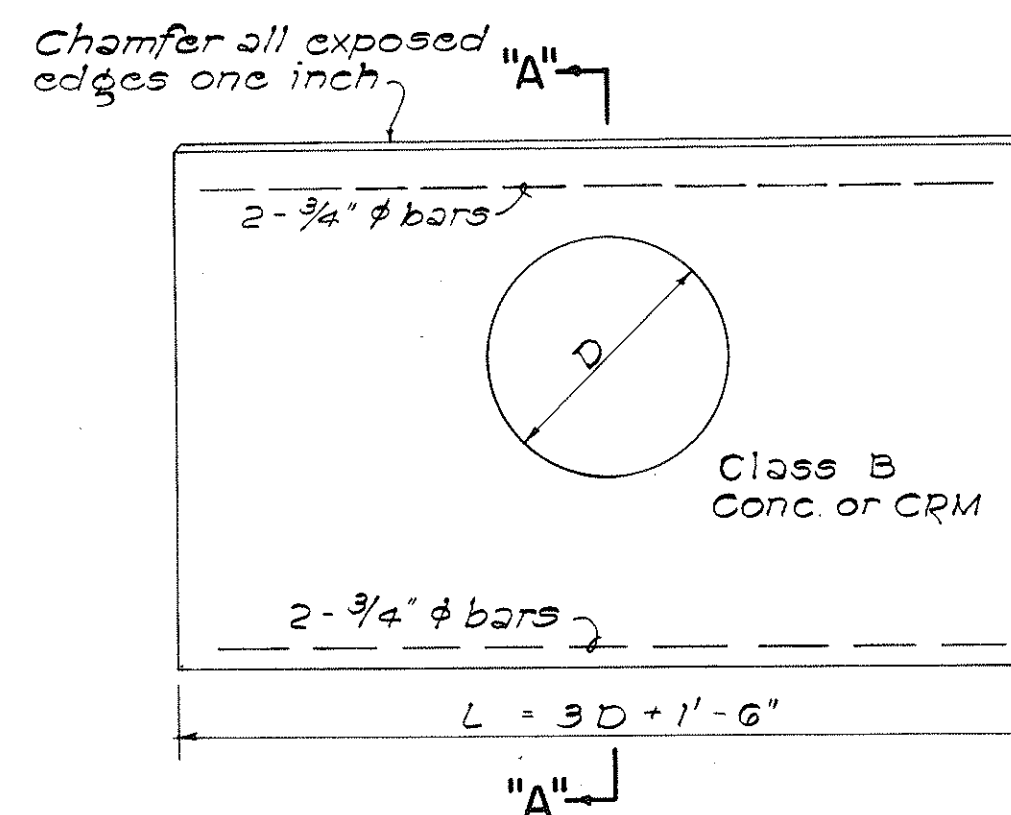
DESIGNED BY	DATE
7/68	7/68
TRACED BY	7/68
7/68	7/68
QUANTITIES BY	7/68
7/68	7/68
CHECKED BY	7/68
7/68	7/68

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H-1-1(108)	1975	39	100



DATA - CONC. DROP INTAKE						Where Variable Equals
D'	D	L-D'+6"	S	Cu. Yds.		
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"	

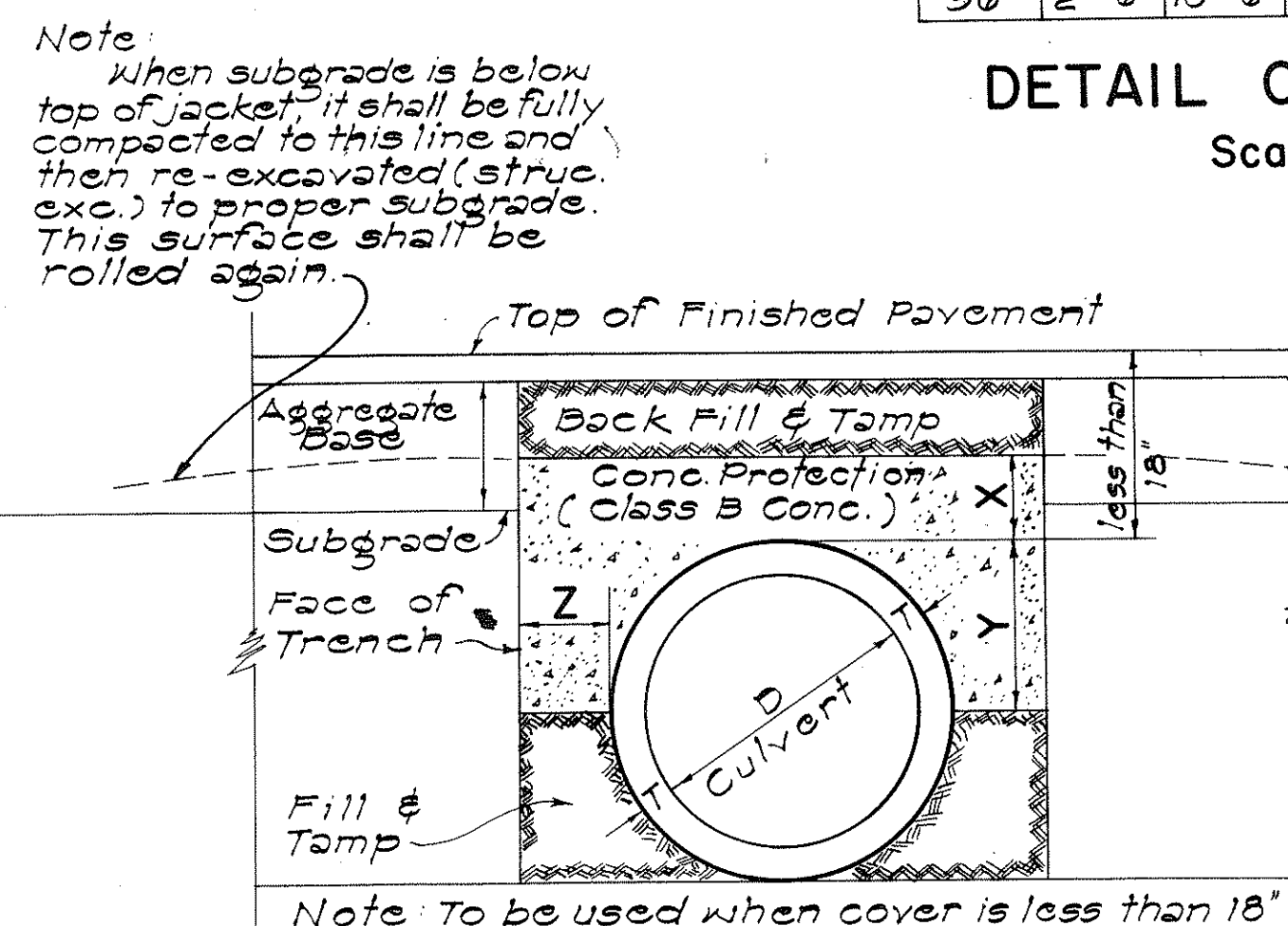
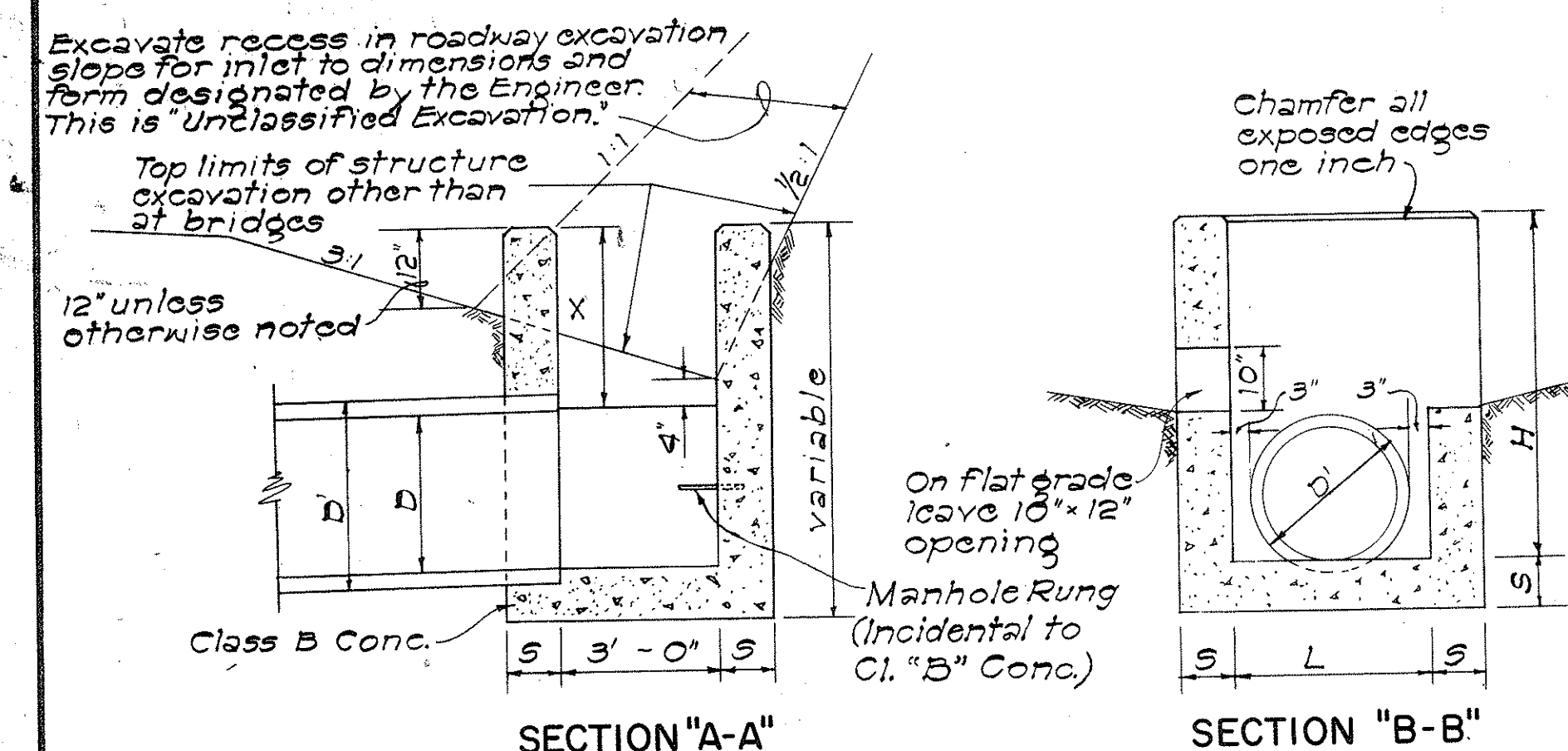
Note: Dimension "X" is assumed as 2'-4" in figuring the above quantities.



DATA FOR CONC. HEADWALL				Cl. B CONC. FOR R.C.P.	Cl. B CONC. FOR C.M.P.	Steel For One Headwall	
D	B	L	H	Cu. Yd.	Cu. Yd.	No. of Bars	Length Lbs.
18"	1'-6"	6'-0"	4'-6"	1.12	1.17	4	34' 5'-0" 33
24"	1'-6"	7'-6"	5'-0"	1.52	1.60	4	34' 7'-0" 42
30"	2'-0"	9'-0"	5'-6"	2.36	2.49	4	34' 8'-0" 51
36"	2'-0"	10'-6"	6'-0"	2.94	3.13	4	34' 10'-0" 60
42"	2'-6"	12'-0"	6'-6"	4.19	4.47	4	34' 11'-0" 69
48"	2'-6"	13'-6"	7'-0"	5.01	5.36	4	34' 13'-0" 78

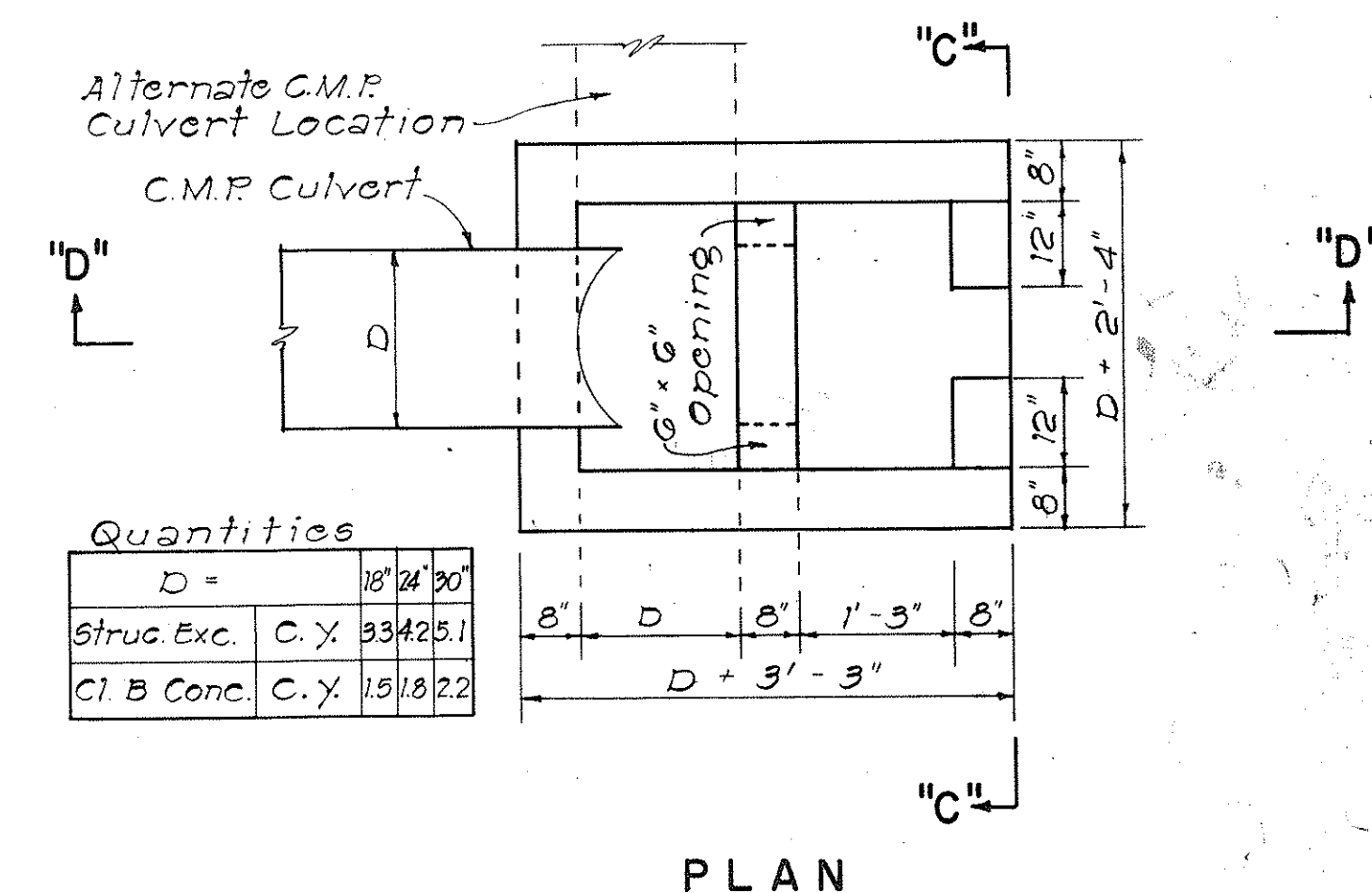
DATA - MASONRY HEADWALL				CRM FOR R.C.P.	CRM FOR C.M.P.
D	B	L	H	Cu. Yd.	Cu. Yd.
18"	1'-9"	6'-0"	4'-6"	1.24	1.29
24"	2'-0"	7'-6"	5'-0"	1.83	1.92
30"	2'-3"	9'-0"	5'-6"	2.56	2.70
36"	2'-6"	10'-6"	6'-0"	3.45	3.66

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



DATA FOR CONCRETE PROTECTION OVER CULVERTS		
X	Y	Z
6" for 18" D	2D + T	Z must be from pipe to face of trench Minimum = X Maximum pay quantity will be Z = 12"
7" for 24" D		
8" for 30" D		
9" for 36" D		
10" for 42" D		
11" for 48" D		
12 for 54" D		

SECT. OF CULVERT WITH CONC. PROTECTION
Scale: 1" = 1'-0"



DETAILS OF CONC. DROP BOX AT OUTLET OF CULVERT PIPE
NOT TO SCALE

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

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

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

DROP INTAKE, HEADWALL & CONCRETE PROTECTION

Scale: As Noted
Date: Aug. 1967
SHEET No. 120 OF 120 SHEETS
DH 10

DATE	
SURVEY PLOTTED BY	
DRAWN BY	
DESIGNED BY	
NOTE BOOK	
QUANTITIES BY	
CHECKED BY	
No.	