

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72A-01-71	1975	9	42

SUMMARY OF DRAINAGE STRUCTURES

STRUCTURE		LOCATION			FLOOR INVERT		ITEMS																												REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
NUMBER	TYPE	ROAD	STATION	OFFSET			206.02 Structure Excavation	307.01 Ditch/Channel Excavation	509.002 8"x4" Box Culvert Drainage System	509.031 8"x4" Box Culvert	509.202 8"x4" Box Culvert Drainage System	506.01 Cement Masonry		602.021 Reinforced in 8' x 4' Box Culvert	602.103 Reinforced in Drainage System		603.0010 Bed Course Material			604.201 Type A Frame & Cover	609.50 Type 7 Bituminous Gutter	640.005 15"x125' Lined Drainage Ditch																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

SUMMARY OF PIPE CULVERTS

STRUCTURE		INVERT ELEVATION		OPTIONS														NO OPTION				ITEMS				REMARKS
				CORRUGATED GALVANIZED METAL PIPE (LENGTH IN LINEAL FEET)								REINFORCED CONCRETE PIPE CULVERTS (LENGTH IN LINEAL FEET)						C.C.M.P. (LENGTH IN LINEAL FT.)		R.C.C.P. (LENGTH IN LINEAL FT.)		Structure Excavation	Bed Course Material			
FROM	TO	INLET	OUTLET	24" C.I. III	30" C.I. III	42" C.I. III	48" C.I. III					24" C.I. III	30" C.I. III	36" C.I. III	42" C.I. III					18" C.I. III	30" C.I. III	C.Y.	C.Y.			
Exist. 30"	CB #2	39.97	38.81																	4		5	1			
CB #2	CB #1	47.78	30.07	302								302										155	80			
CB #2	Intake #1	44.47	30.07	15								15										10	10			
Headwall #1	CB #3	29.00	28.65	60								60										150	25			
CB #3	CB #2	30.07	33.90	280								280										245	98			
Headwall #2	CB #4	31.01	28.51																11			10	3			
8'x4' Box Drain	CB #5	24.74	23.50				115								115							230	58			
CB #5	Intake #2	31.80	24.74			275								275								180	114			

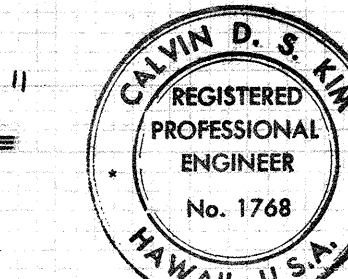
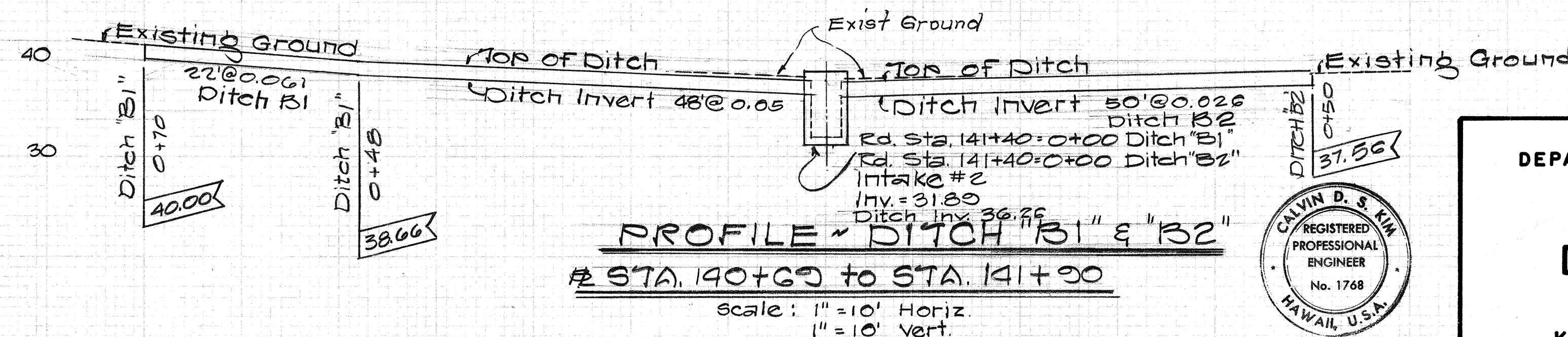
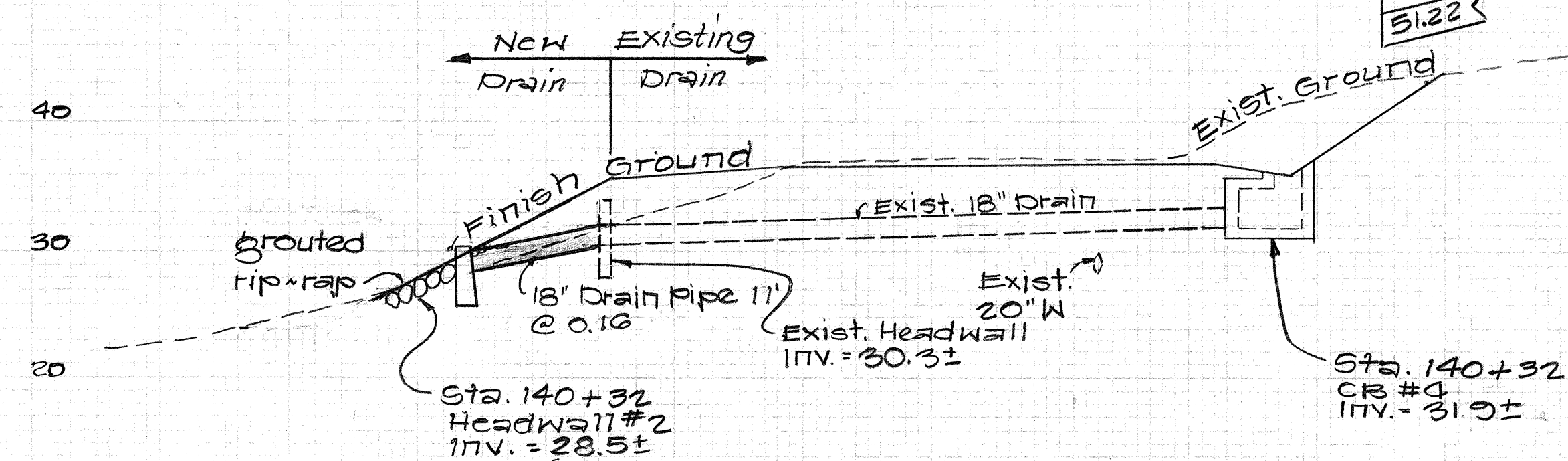
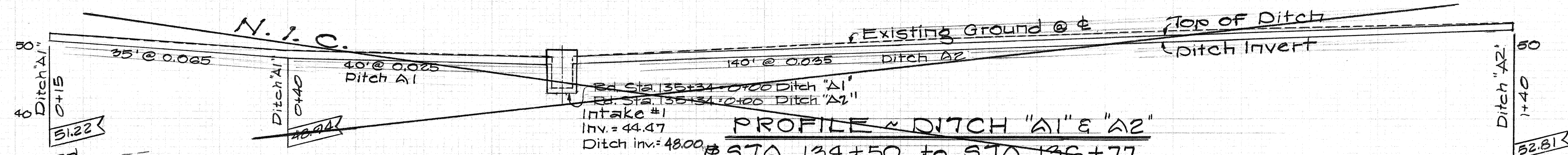
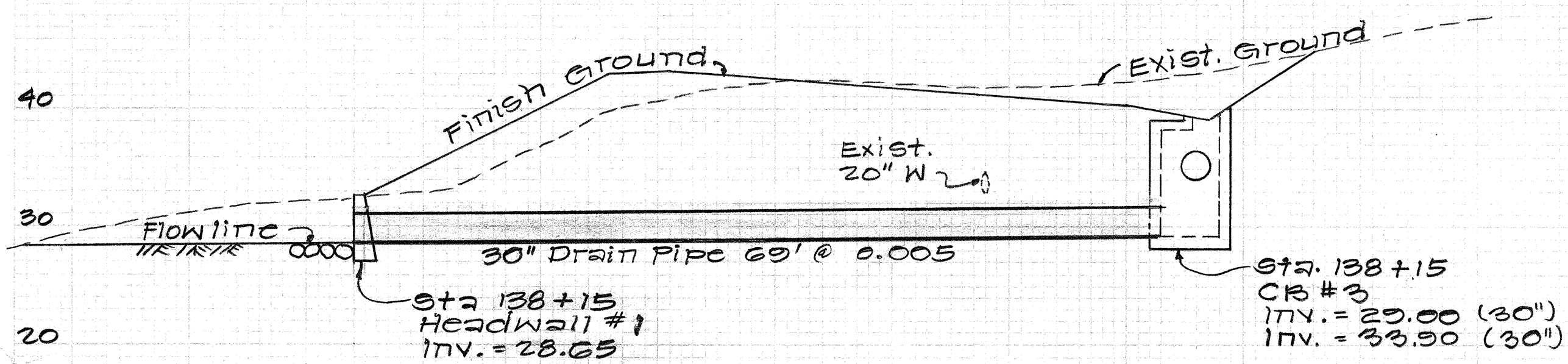
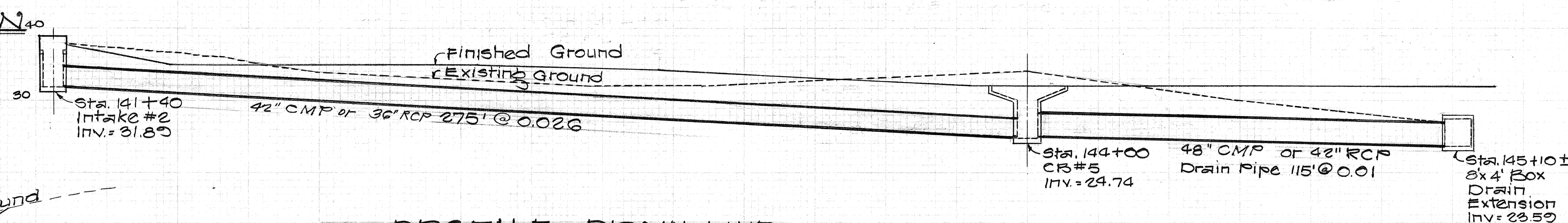
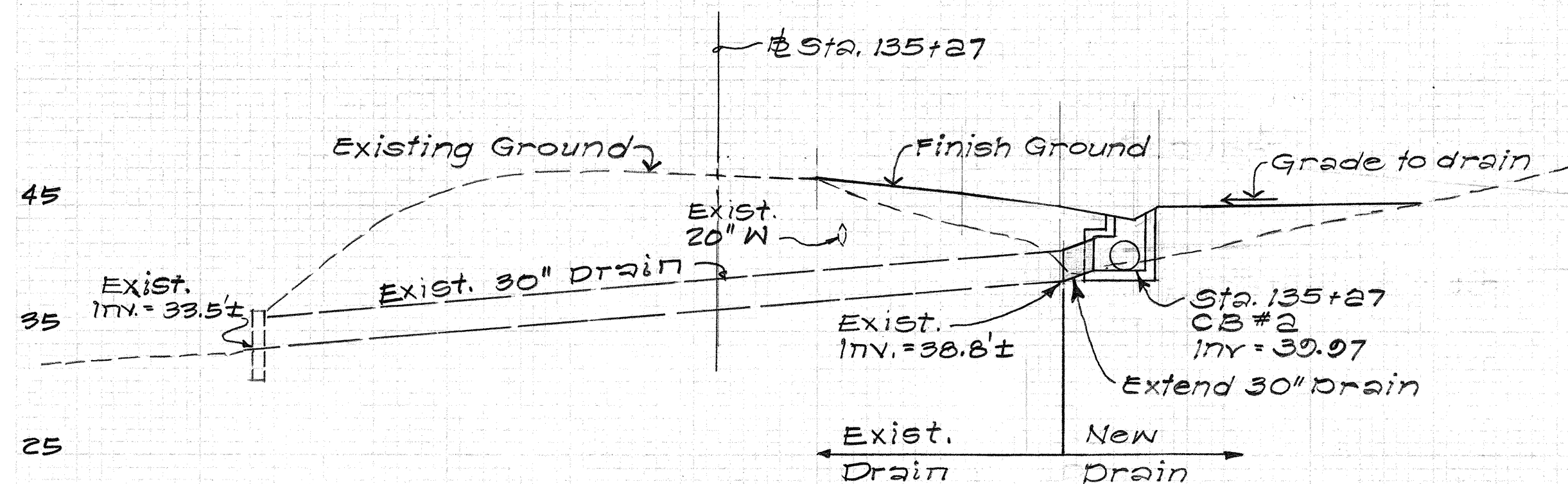
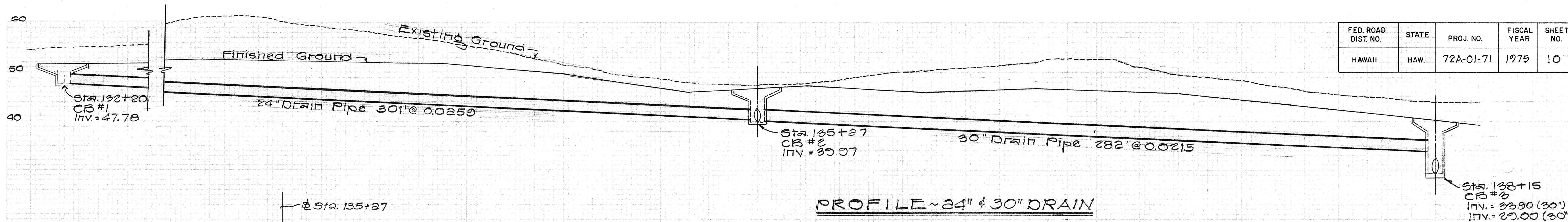
NOTE : Asterisk (*) denotes that equivalent Asbestos Cement Pipe may also be used as an option.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

ORIGINAL PLAN
DRAWN BY
NOTE BOOK
CHECKED BY

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72A-01-71	1975	10	42



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Calvin D. S. Kim

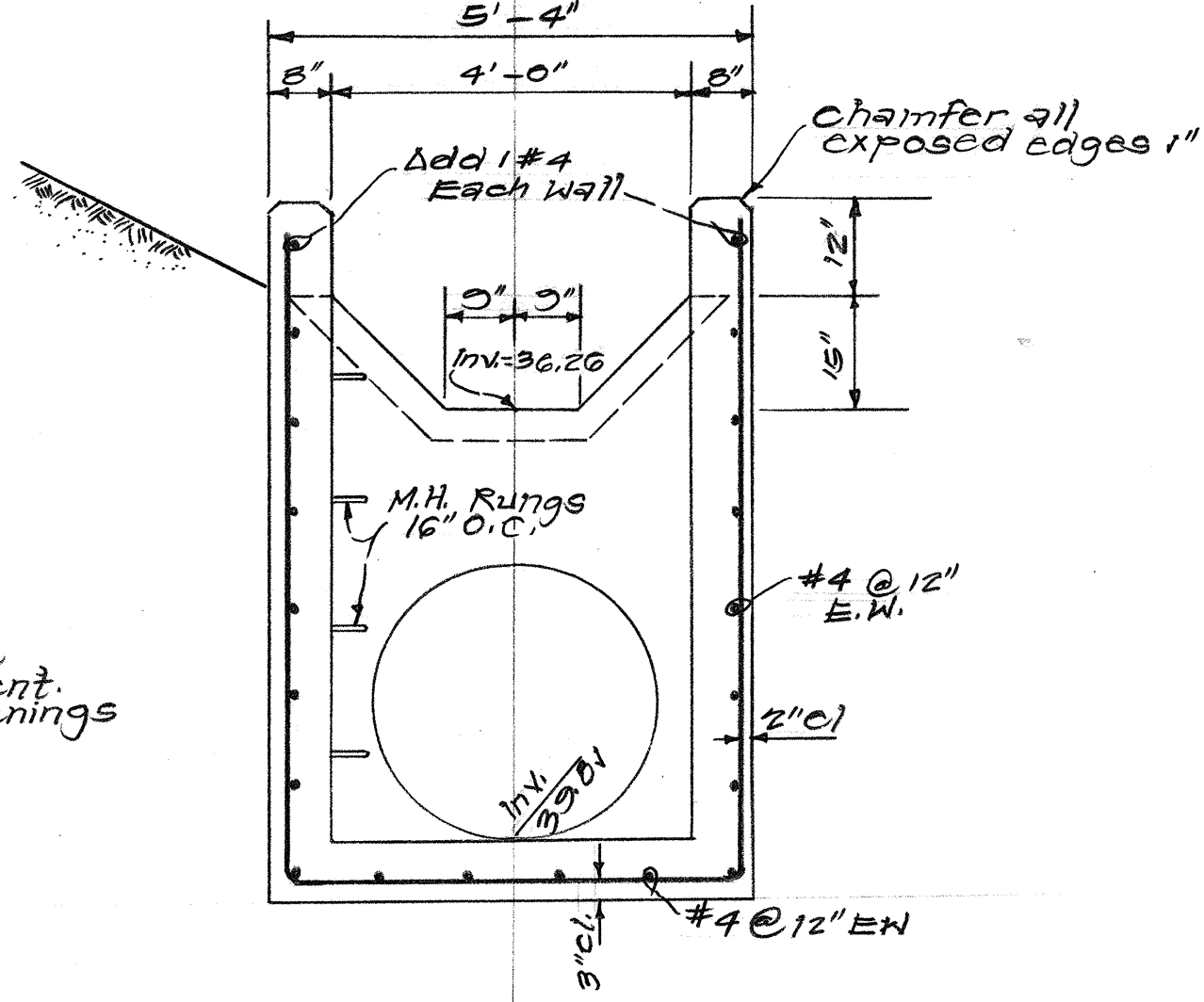
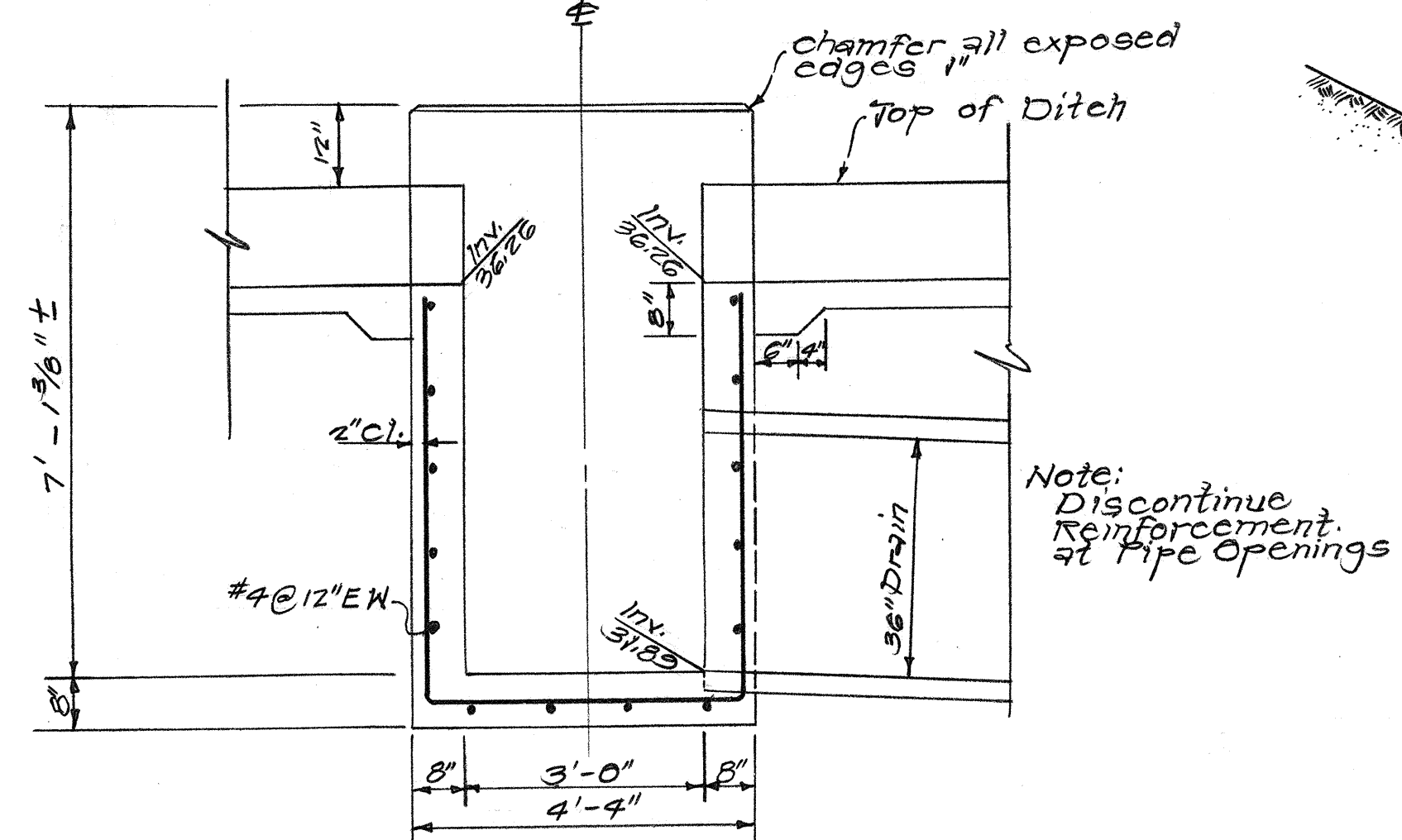
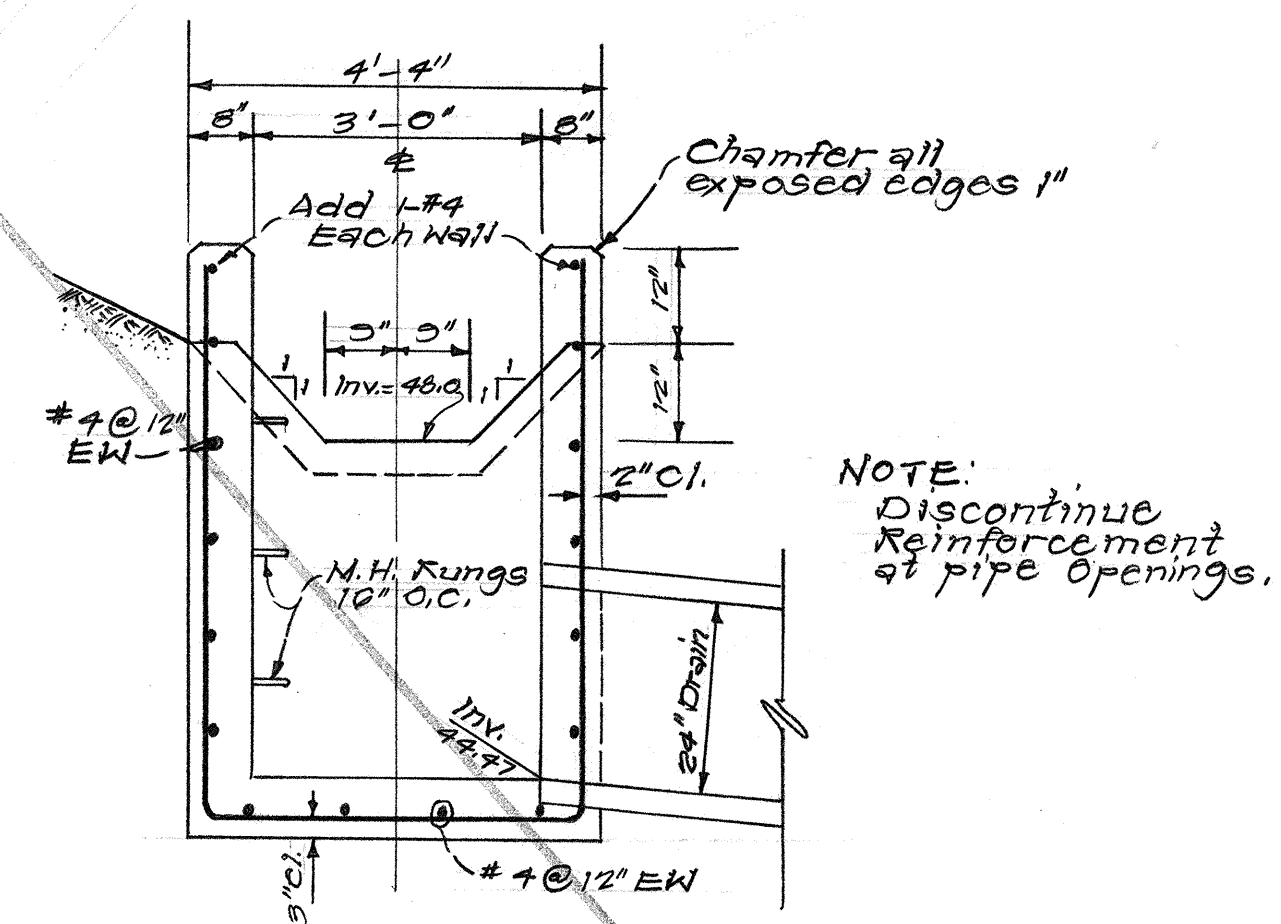
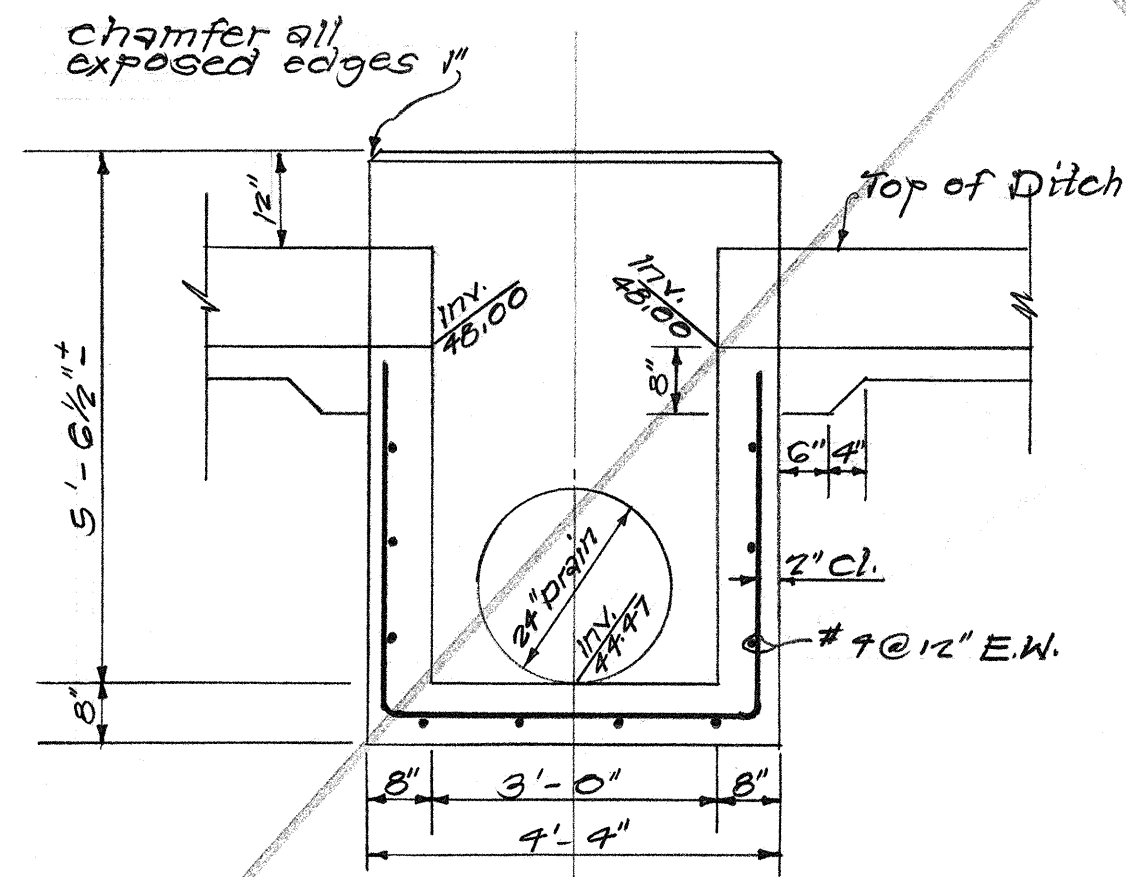
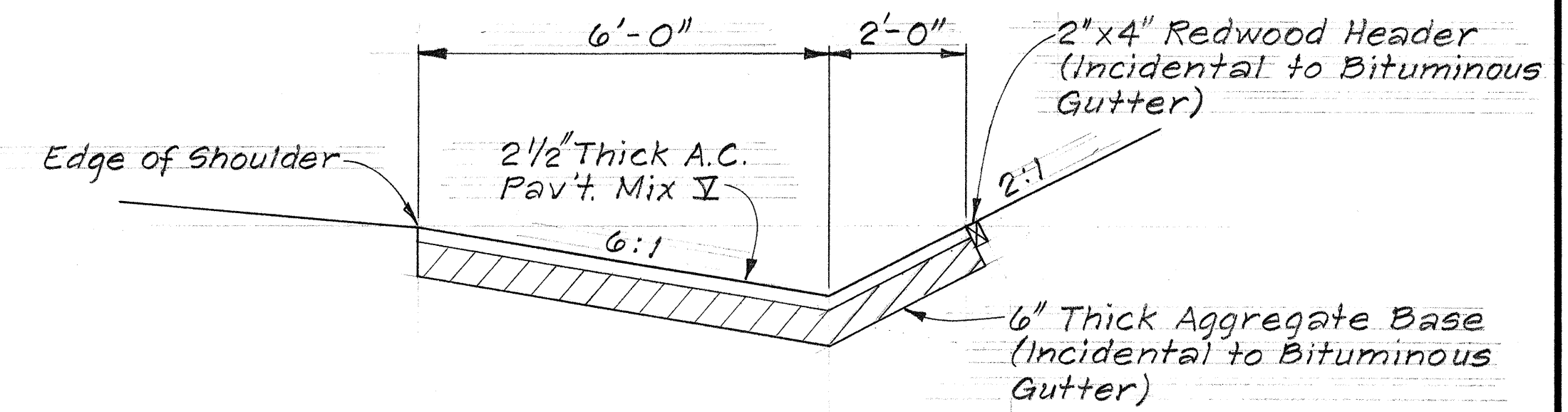
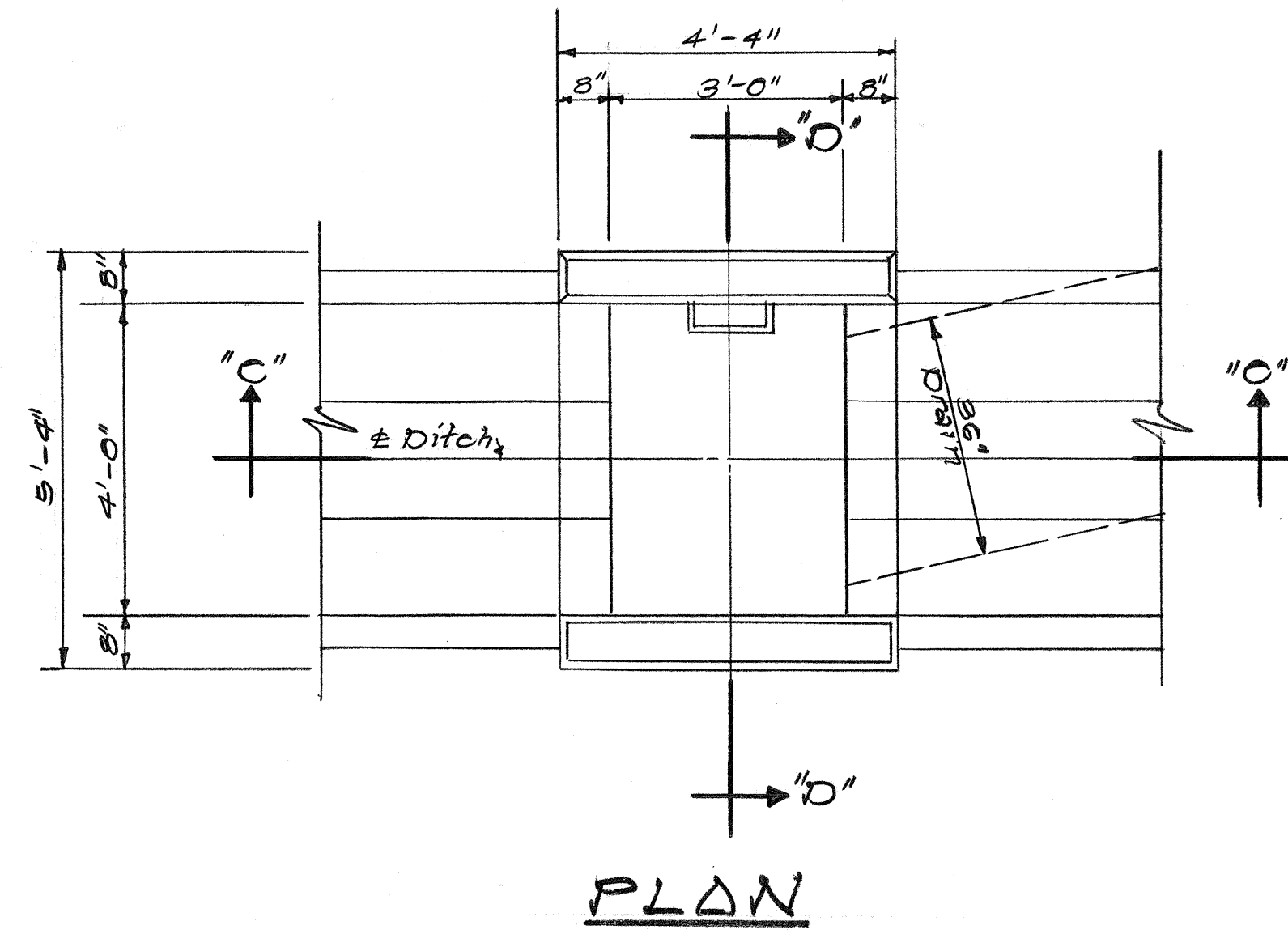
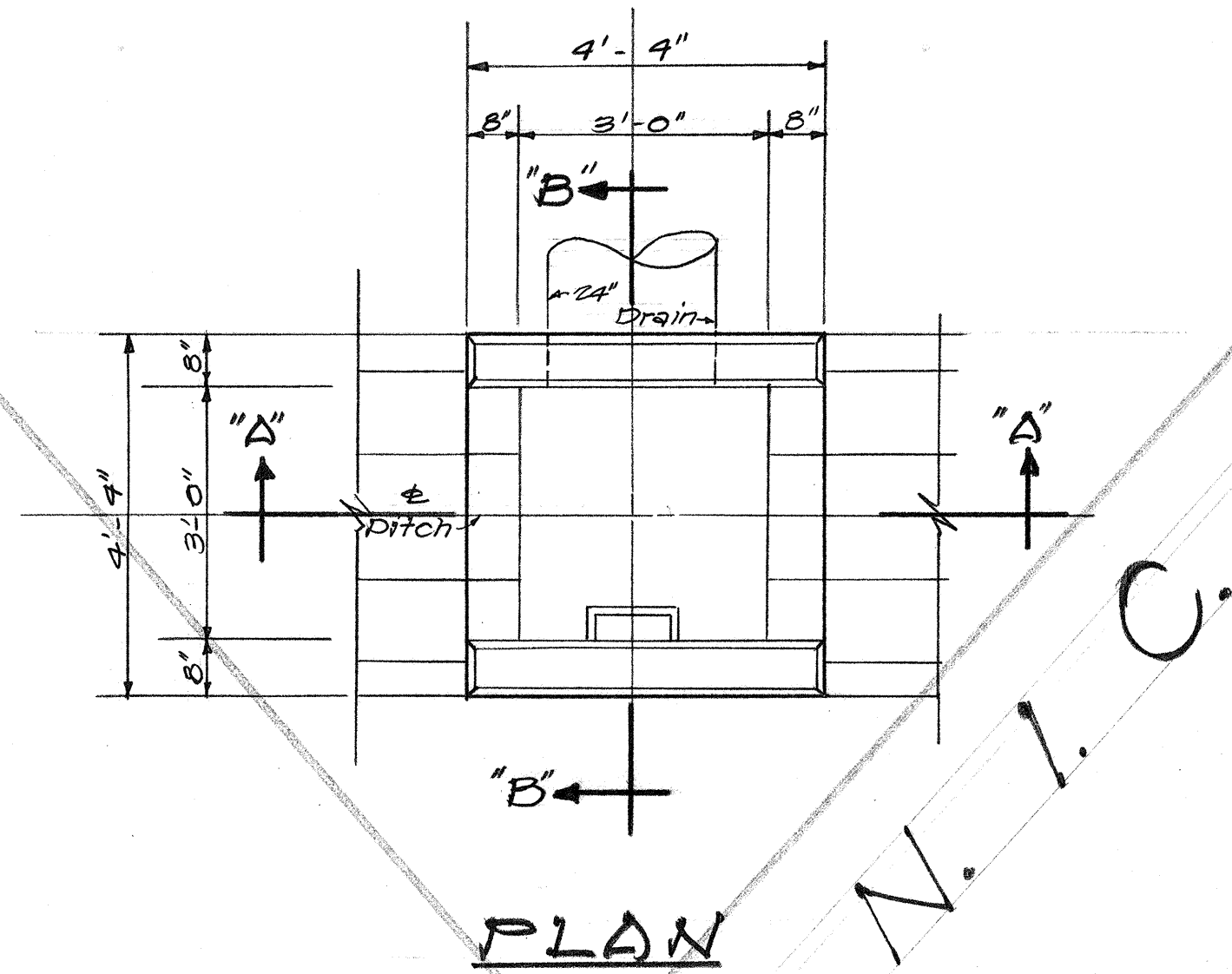
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAIN PROFILE

KALANIANA'OLE HIGHWAY
PROJECT NO. 72A-01-71

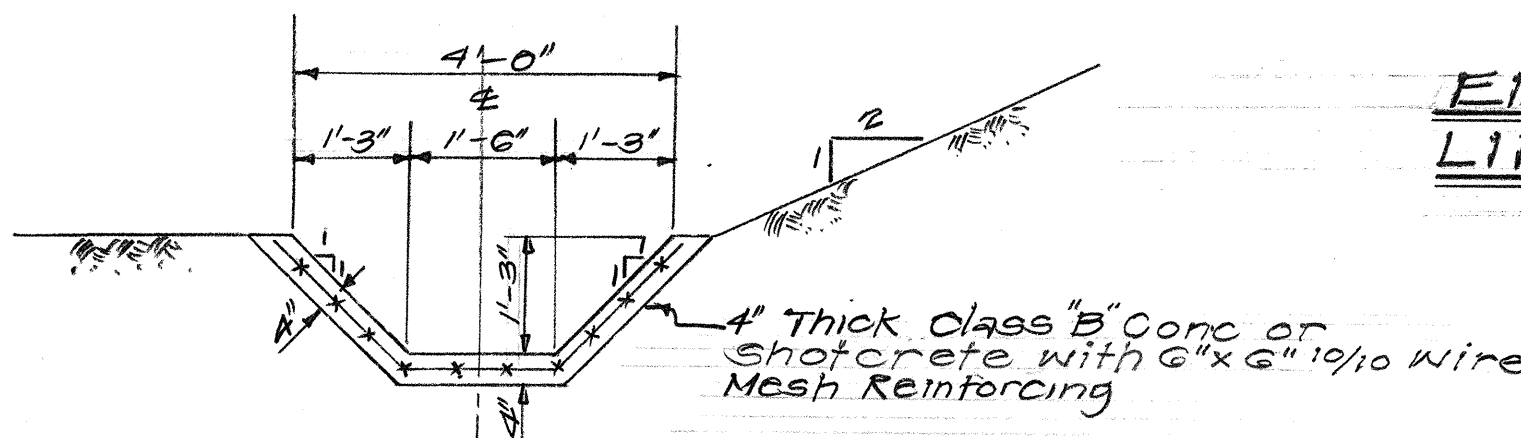
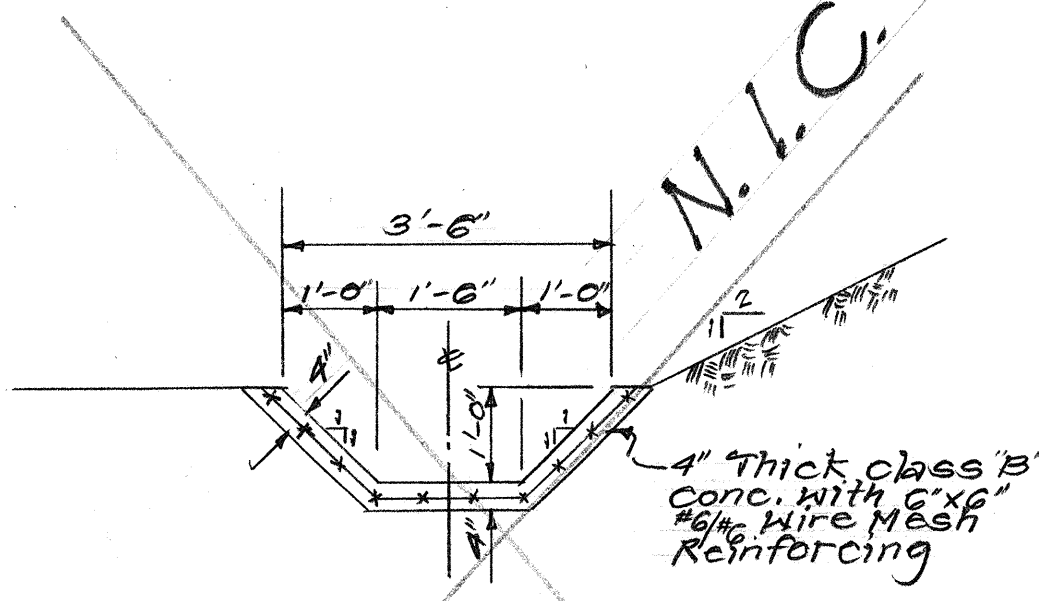
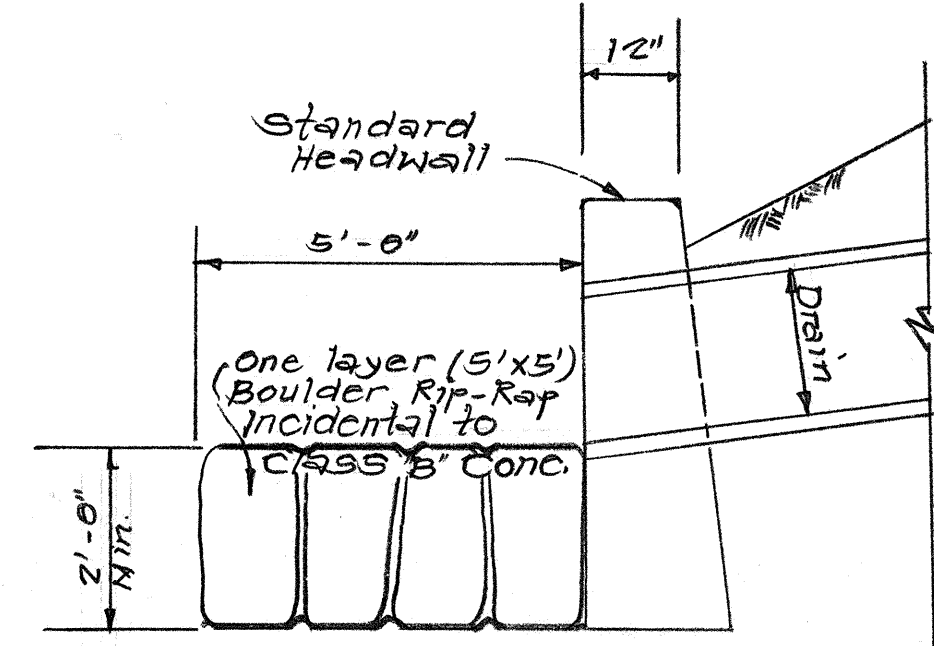
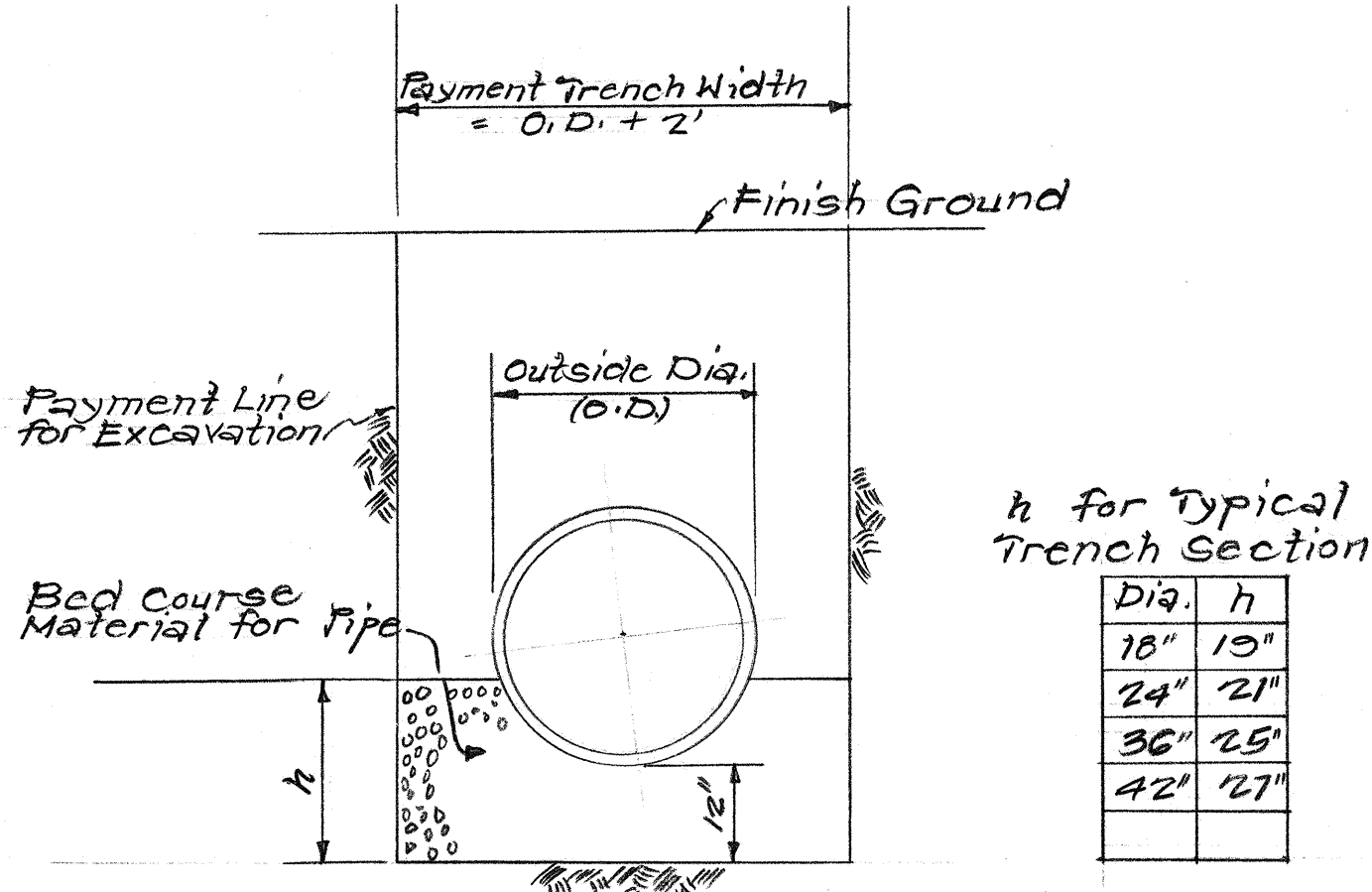
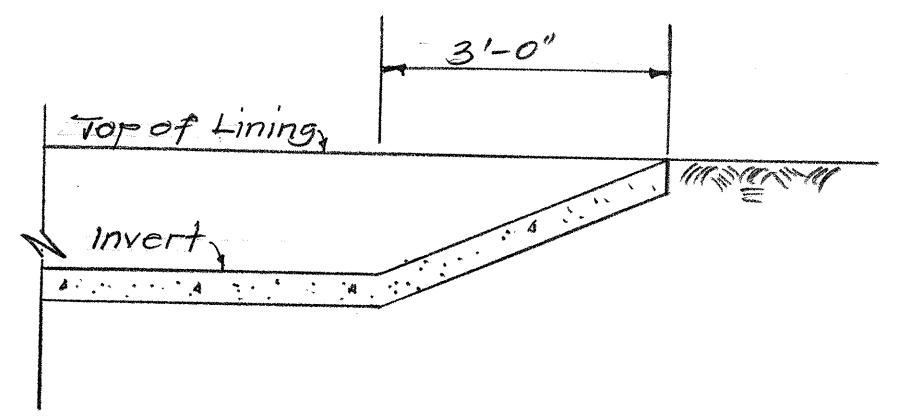
SHEET NO. 2 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72A-01-71	1975	11	42



DETAILS - CONC. DROP INTAKE #1
SCALE: 1/2" = 1'-0"

DETAILS - CONC. DROP INTAKE #2
SCALE: 1/2" = 1'-0"



END CONDITION - LINED DITCHES
SCALE: 1/2" = 1'-0"

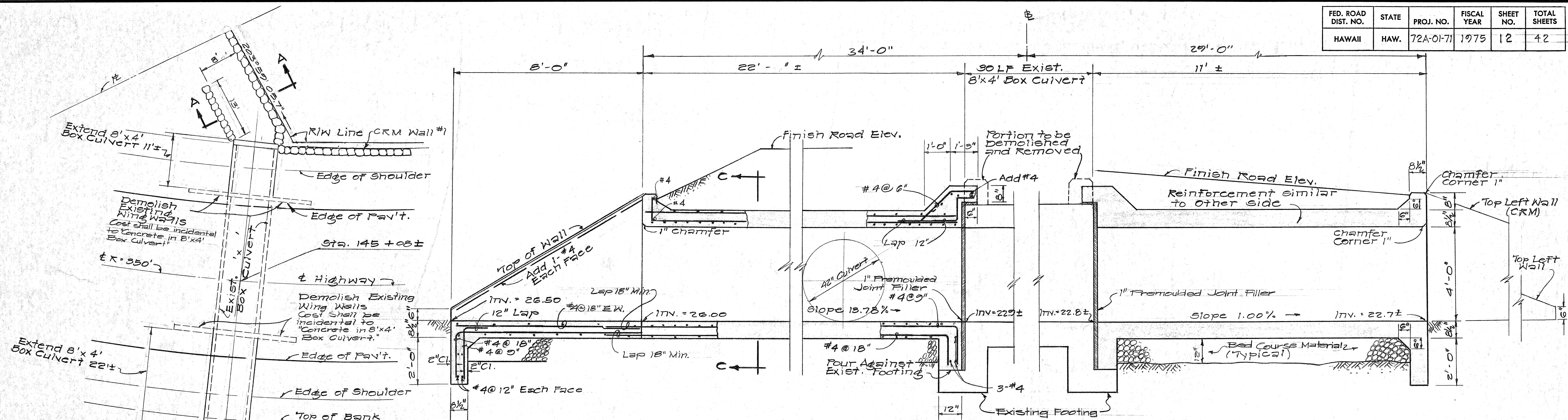
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

KALANIANA'OLE HIGHWAY
PROJECT NO. 72A-01-71

SHEET NO. 3 OF 7 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72A-01-71	1975	12	42

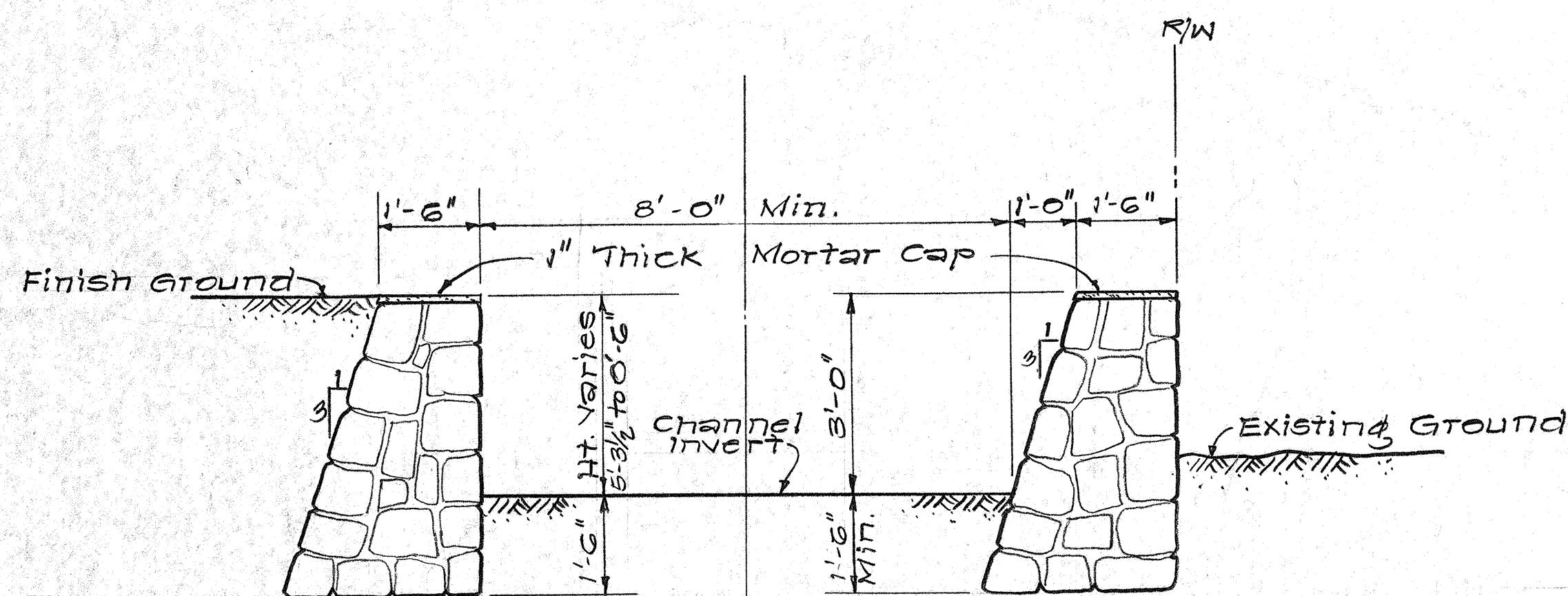


LONGITUDINAL SECTION ~ BOX CULVERT

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

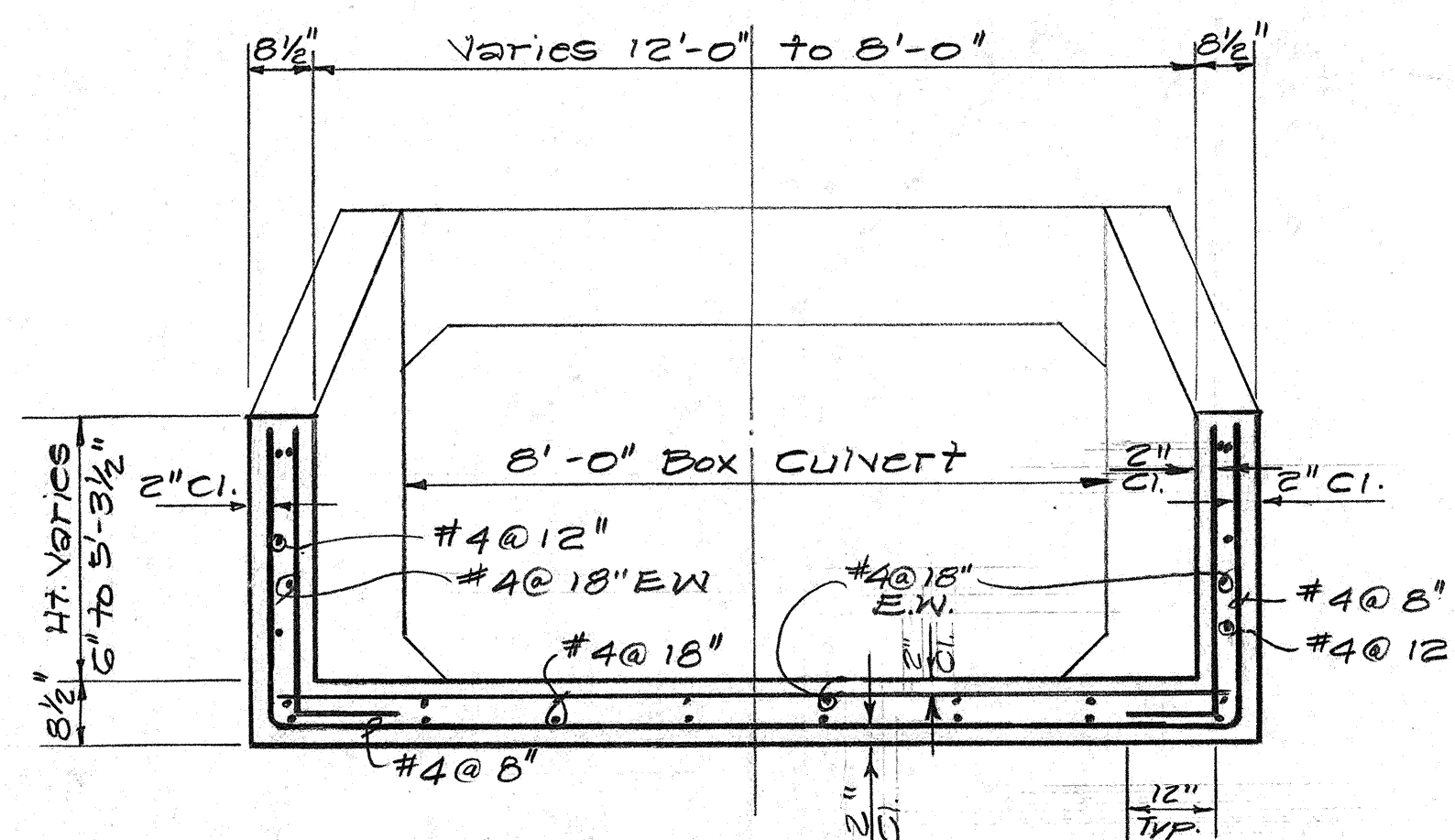
PLAN ~ 8'x4' BOX CULVERT EXTENSION

Scale: 1" = 10'



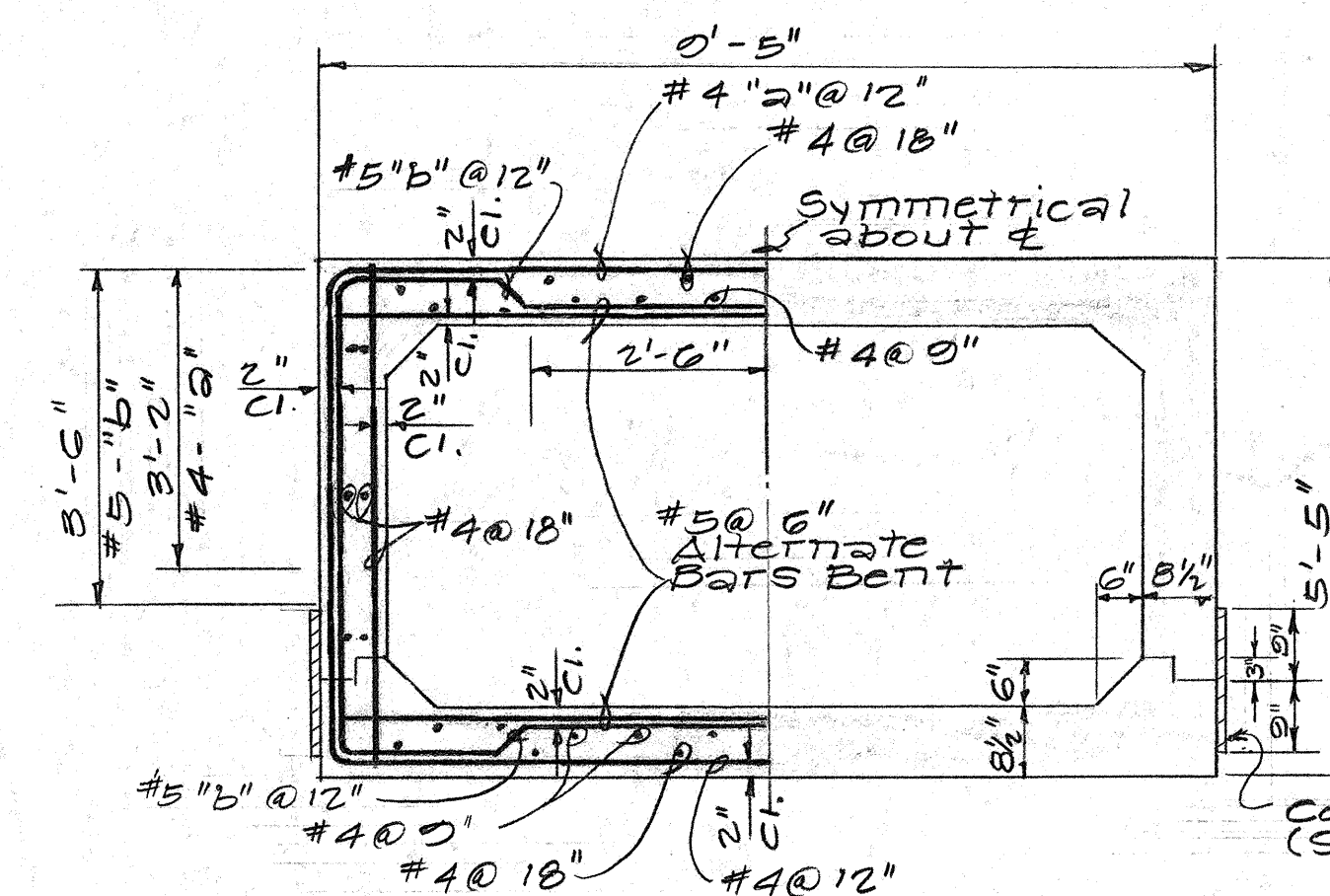
SECTION "A~A"

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



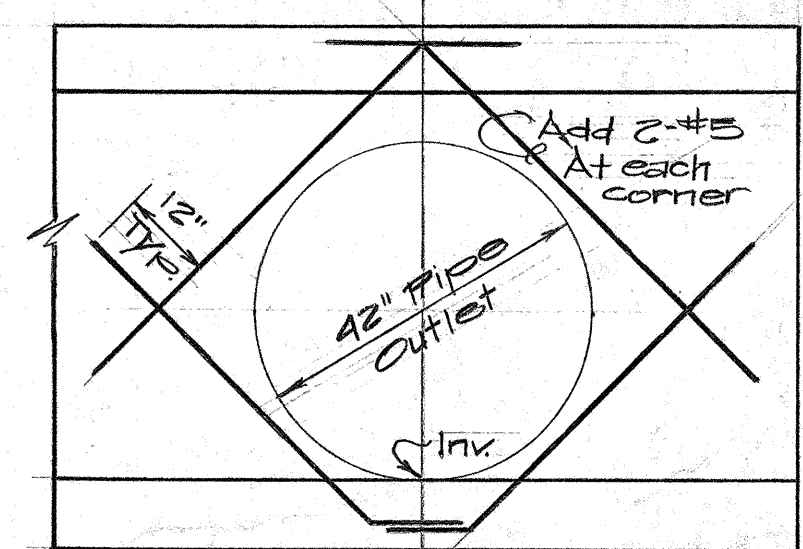
SECTION "B~B"

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

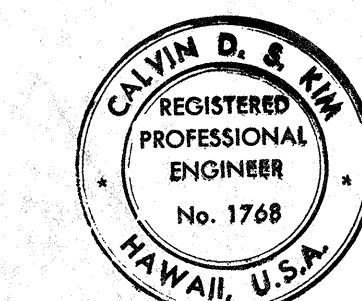
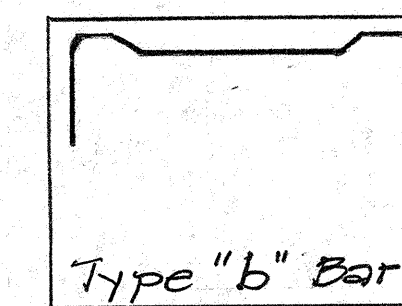
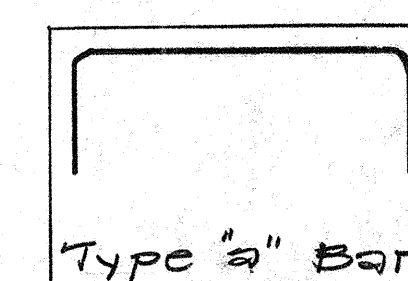


SECTION "C~C"

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



ADDITIONAL REINFORCEMENT AT PIPE OPENING



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETAILS
8'x4' BOX CULVERT
EXTENSION

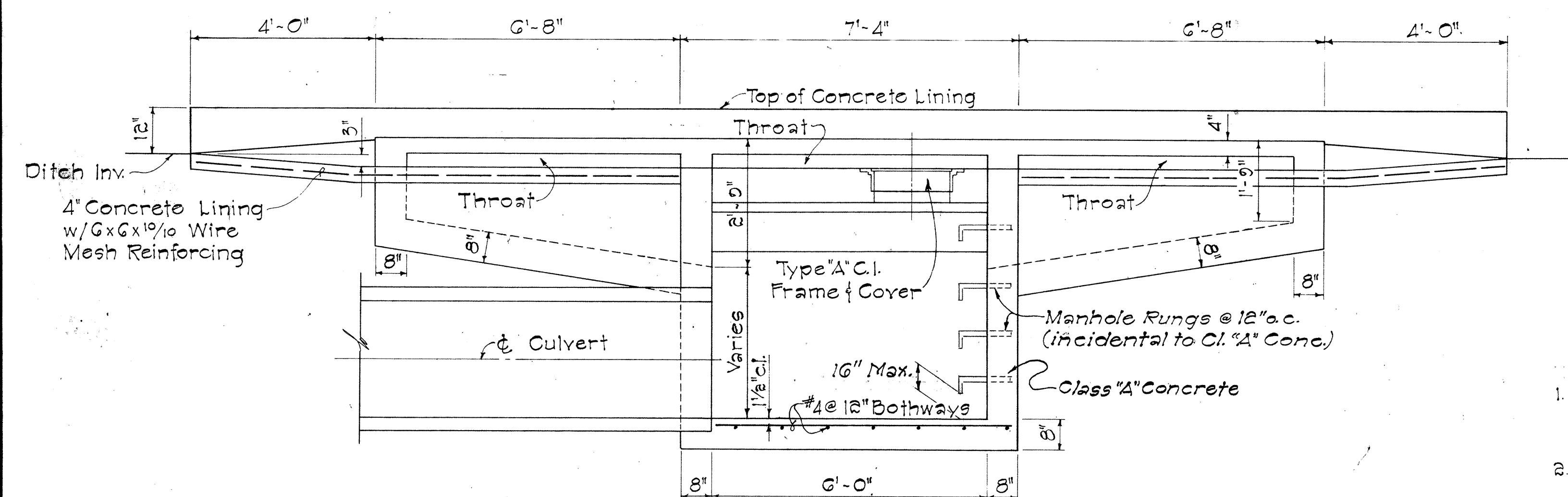
KALANIANA'OLE HIGHWAY
PROJECT NO. 72A-01-71

SCALE: AS SHOWN

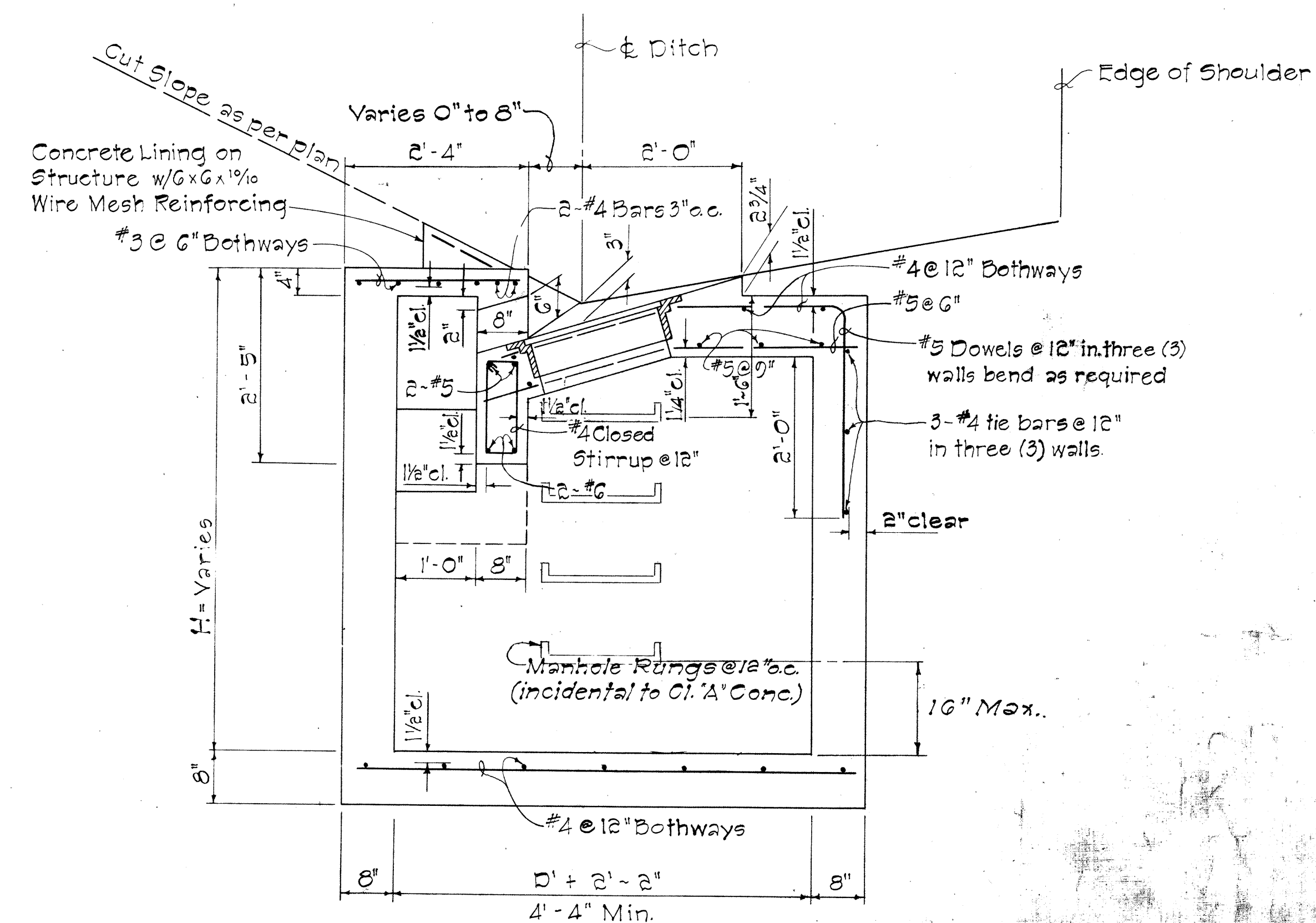
SHEET No. 4 OF 7 SHEETS

[illegible]

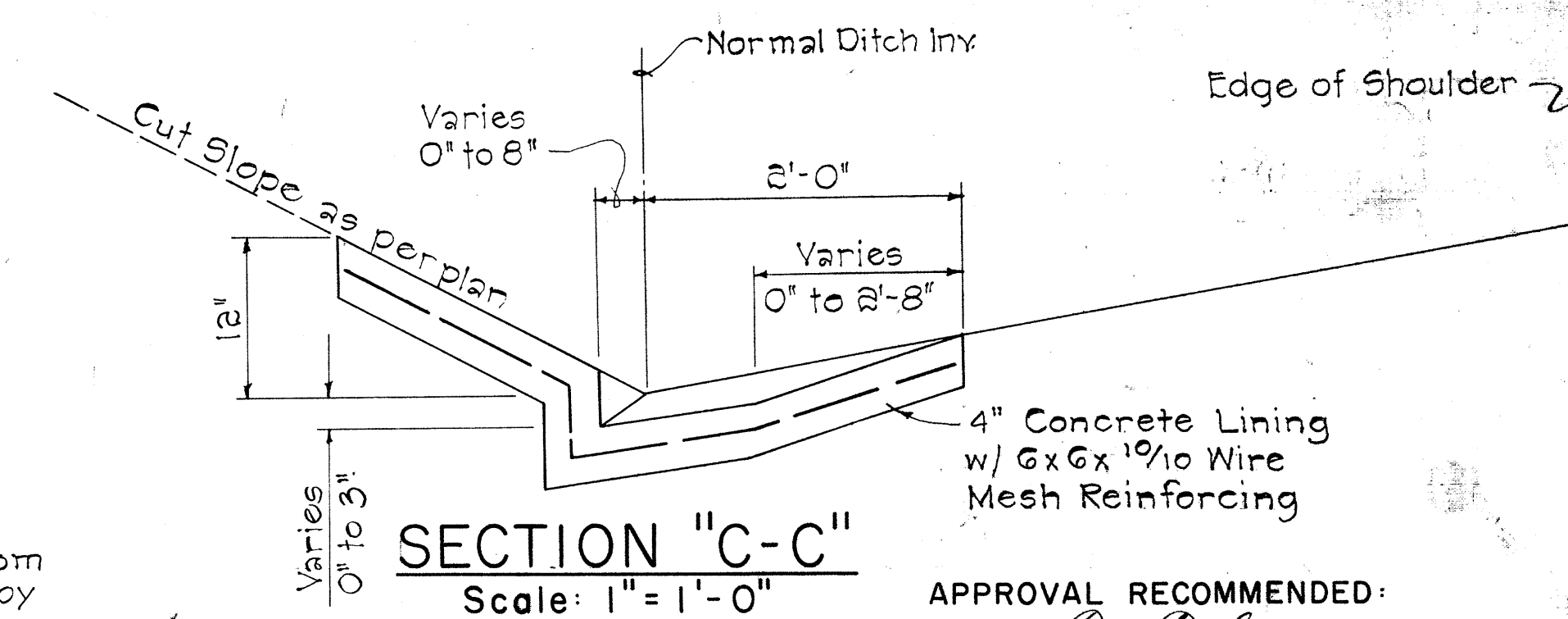
Scale: $1/2'' = 1' - 0''$



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



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



Scale: 1" = 1'-0"

1. Culvert shall enter and leave C.B. from any position and in the direction indicated by the plans or ordered by the Engineer.
2. D shall be the maximum outside dimension of the culvert at the C.B. wall
3. Manhole Rungs (12" oc) are required when "H" is greater than 4 feet 6 inches. Only one rung (16 inches from the bottom) is required if "H" is 4 feet 6 inches or less.
4. Type "A" C.I. Frame, Cover and Manhole Rungs may be placed at any location as ordered by the Engineer.

12-17-6
DATE

12-17-6
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

TYPE "A2", "B2", "C2", AND "D2"
CATCH BASINS

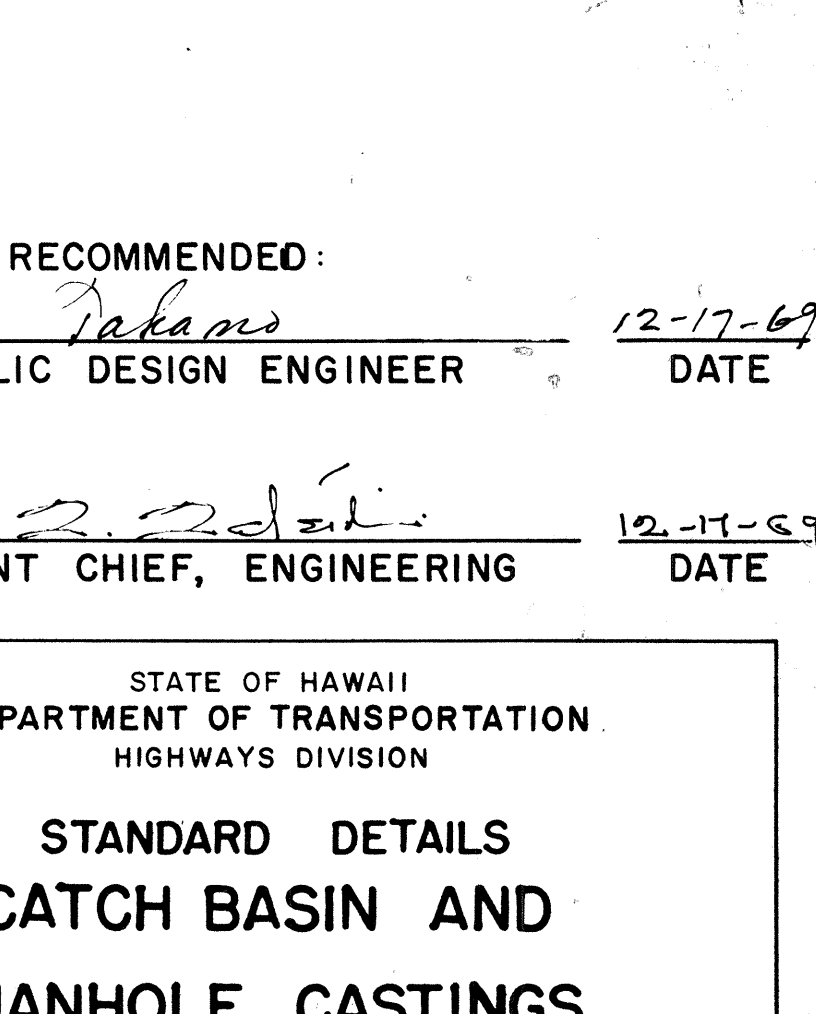
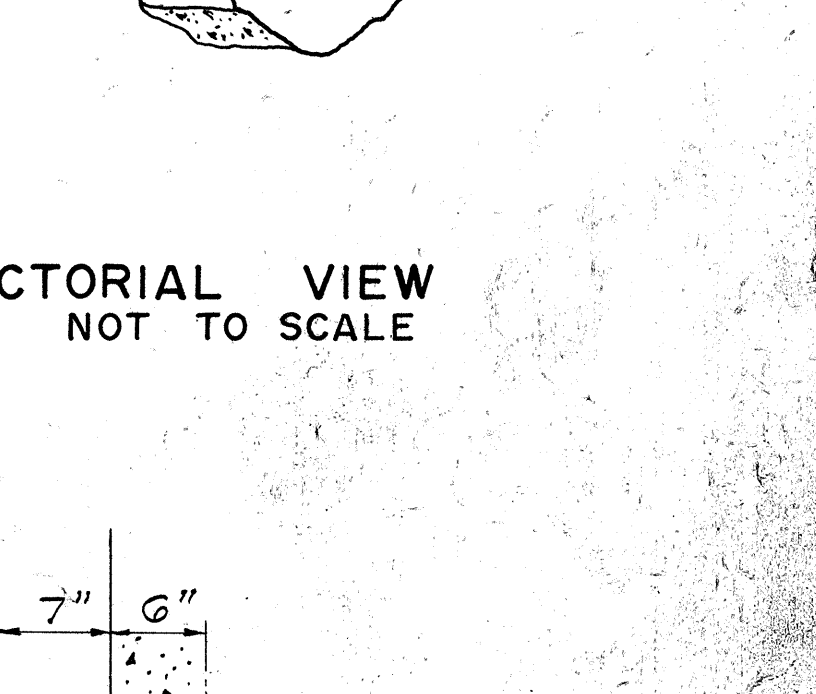
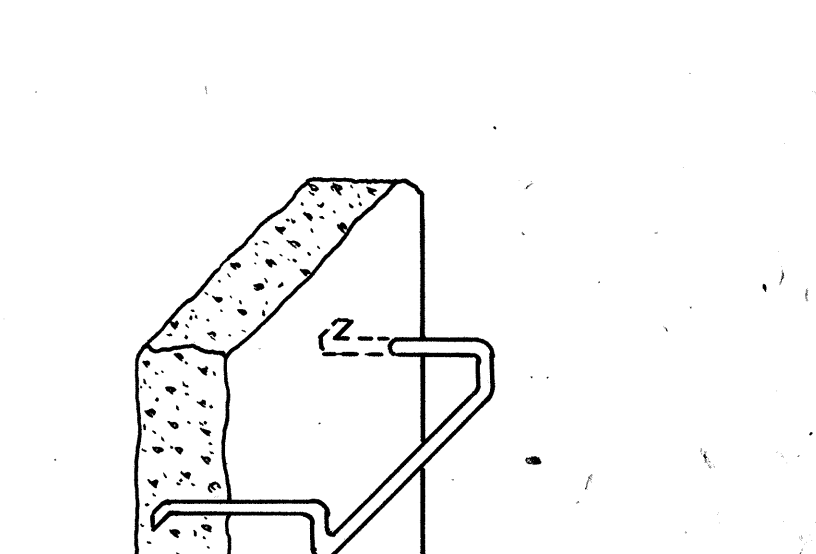
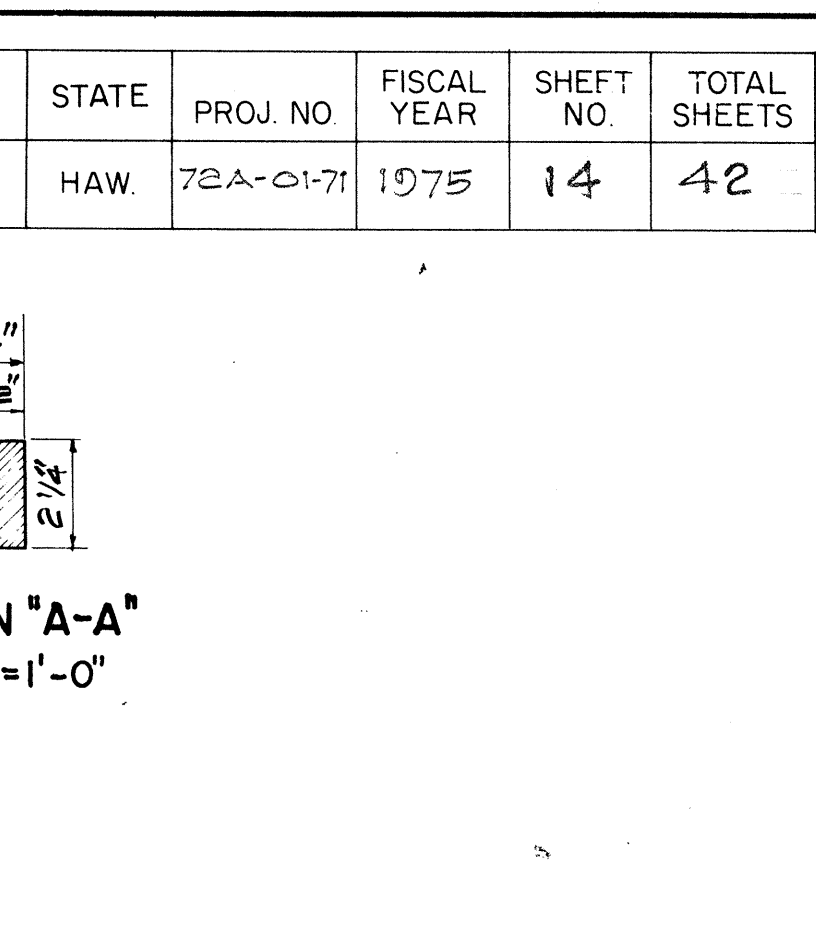
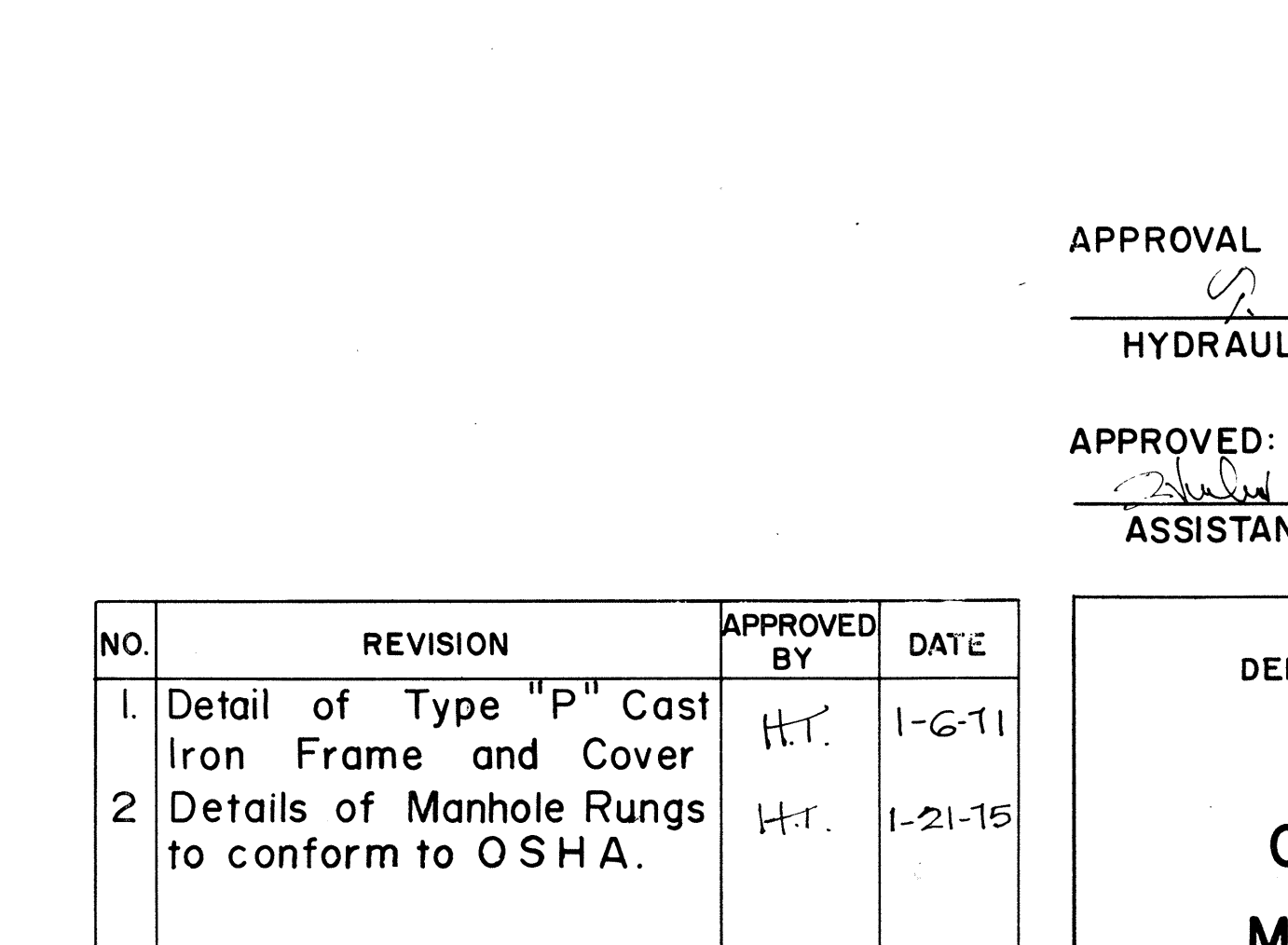
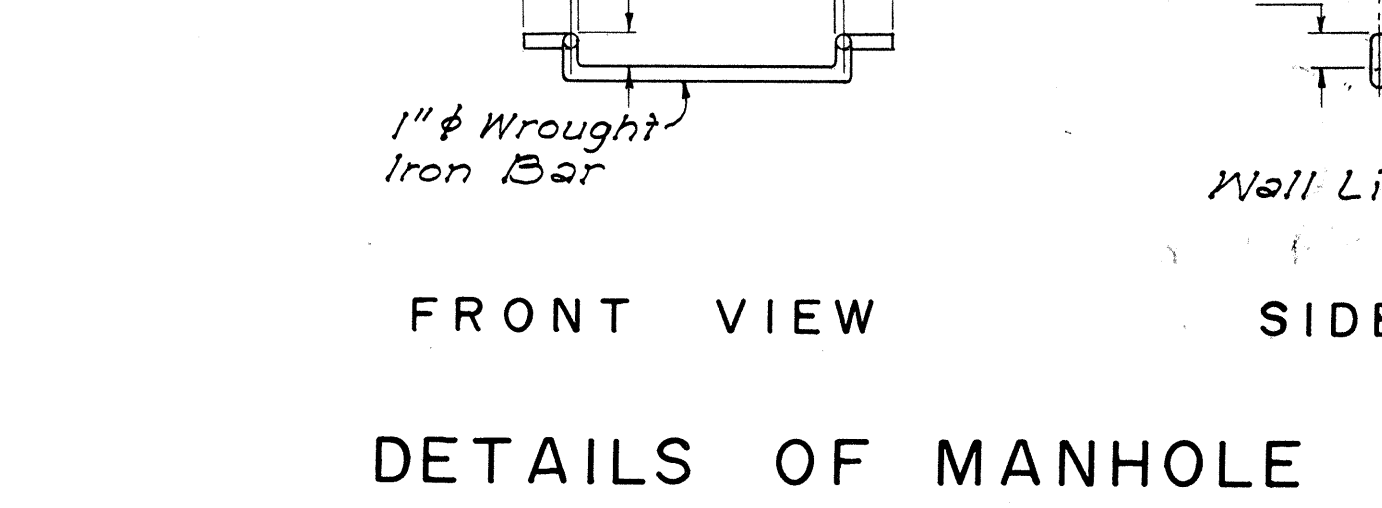
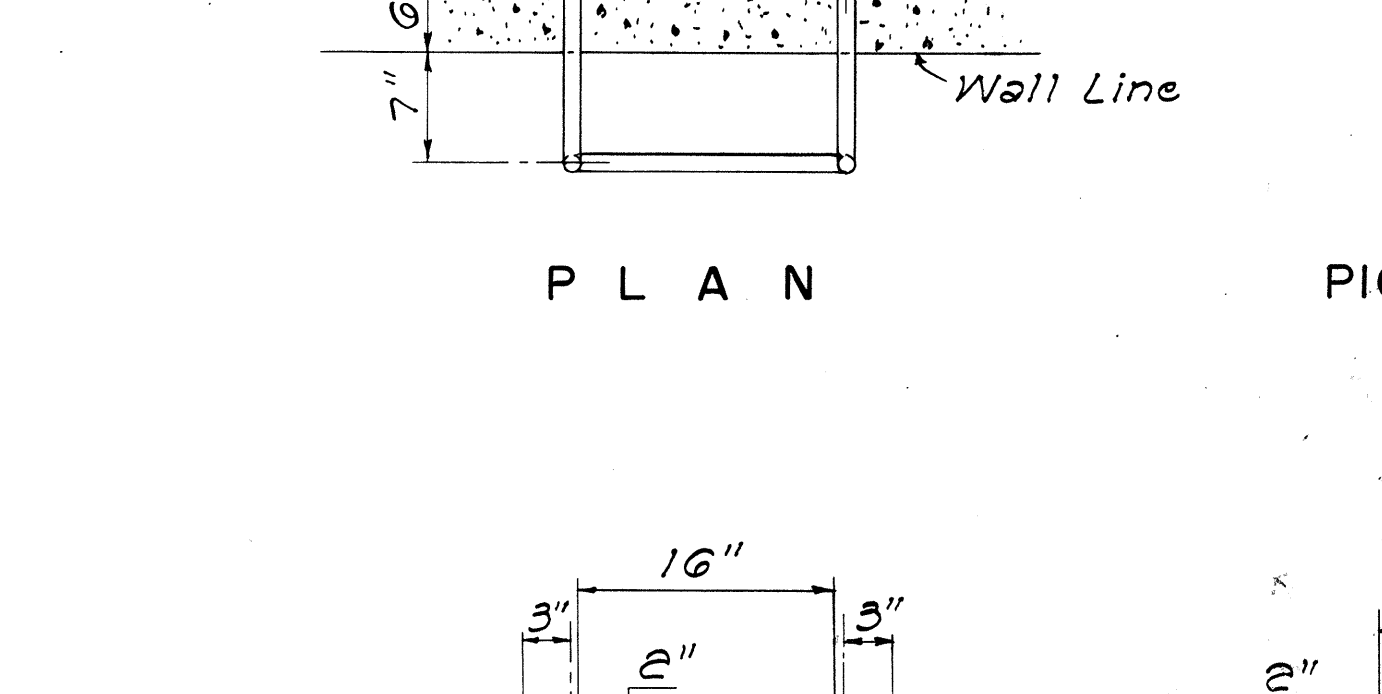
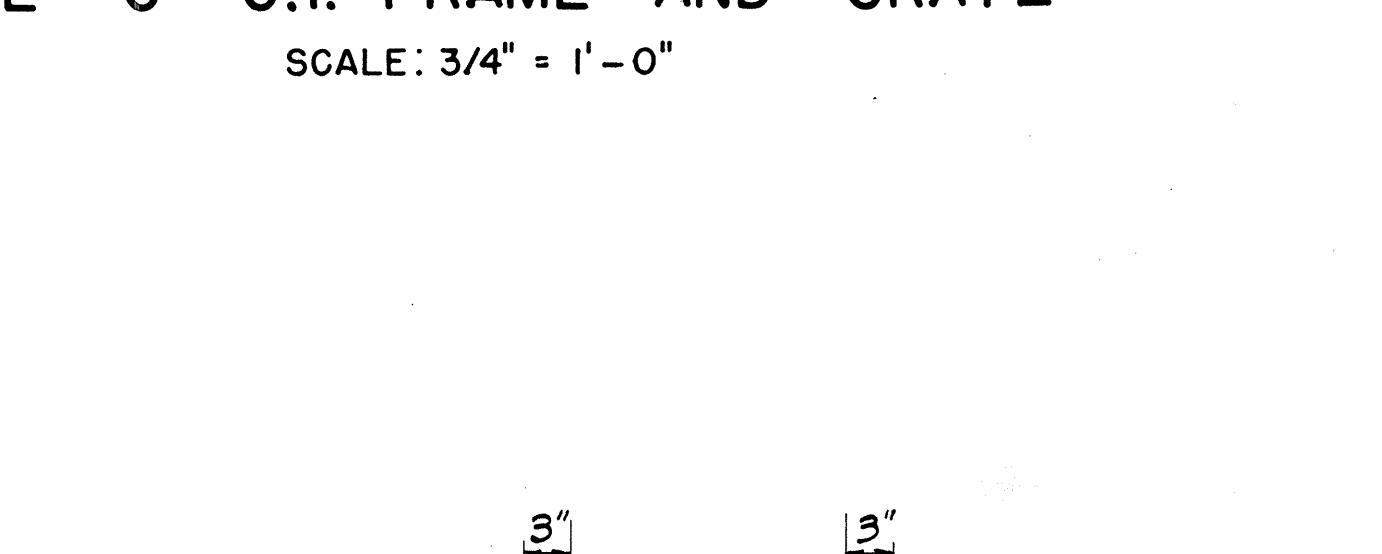
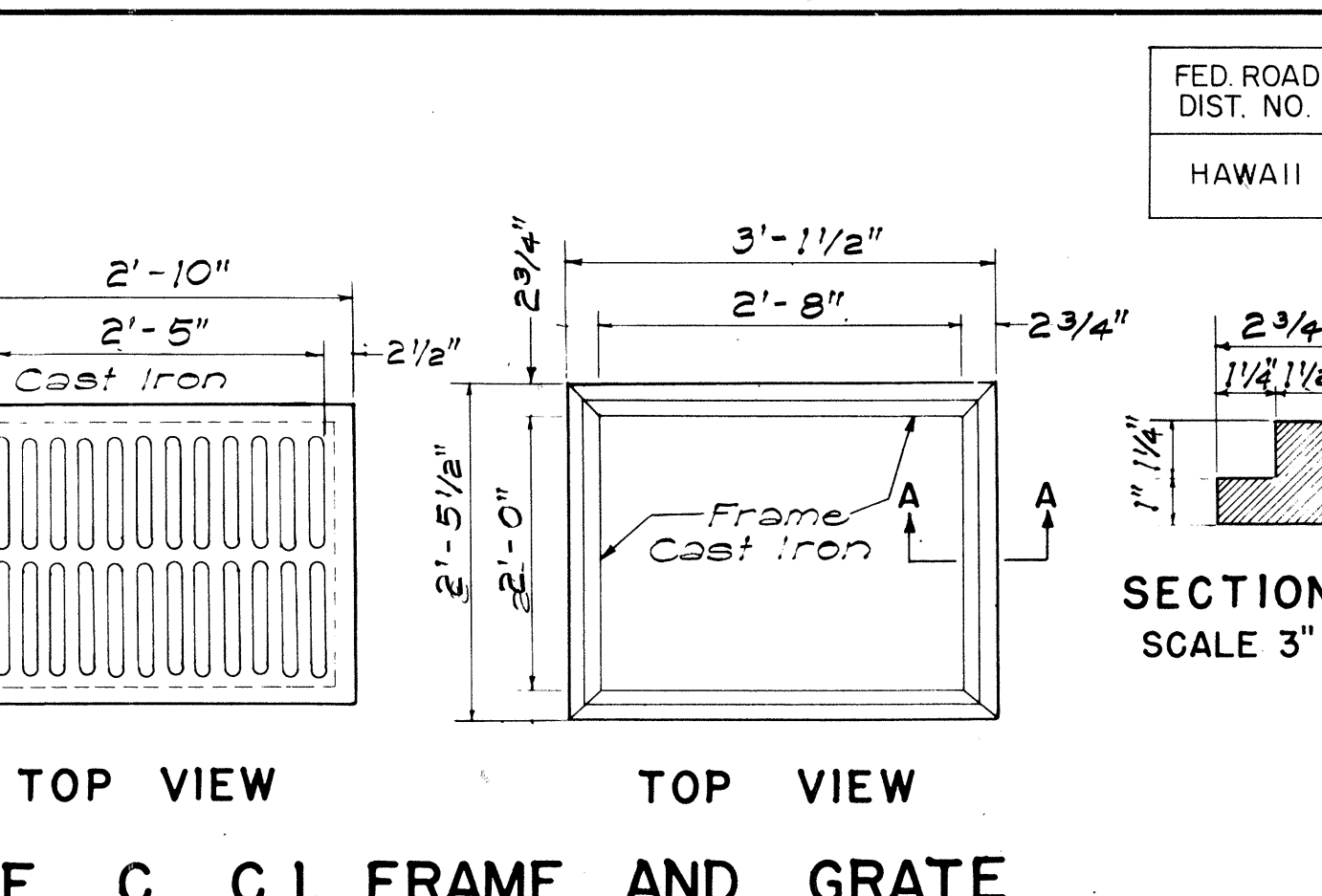
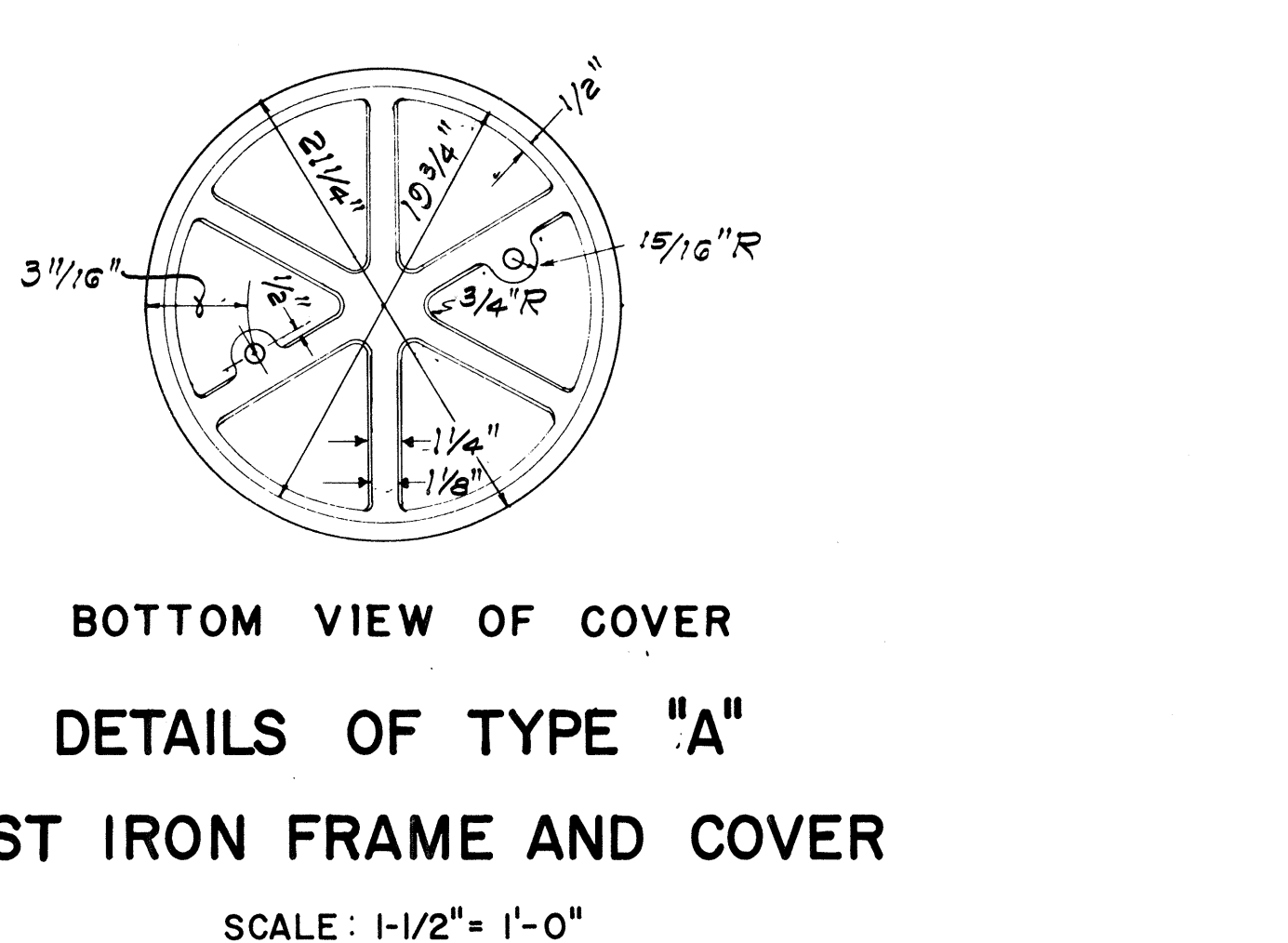
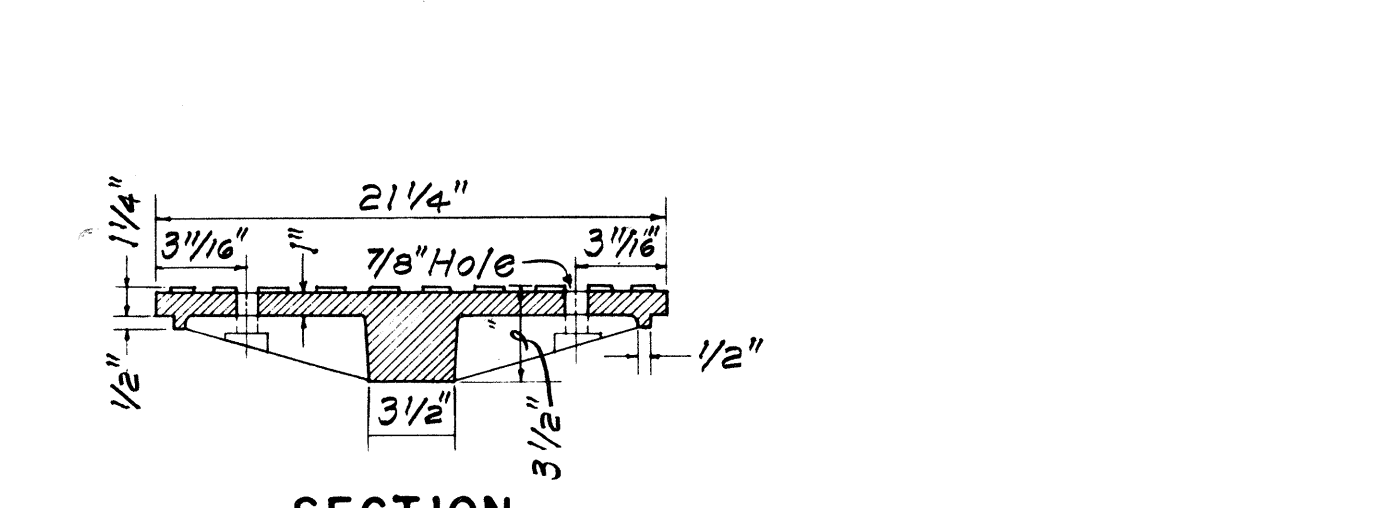
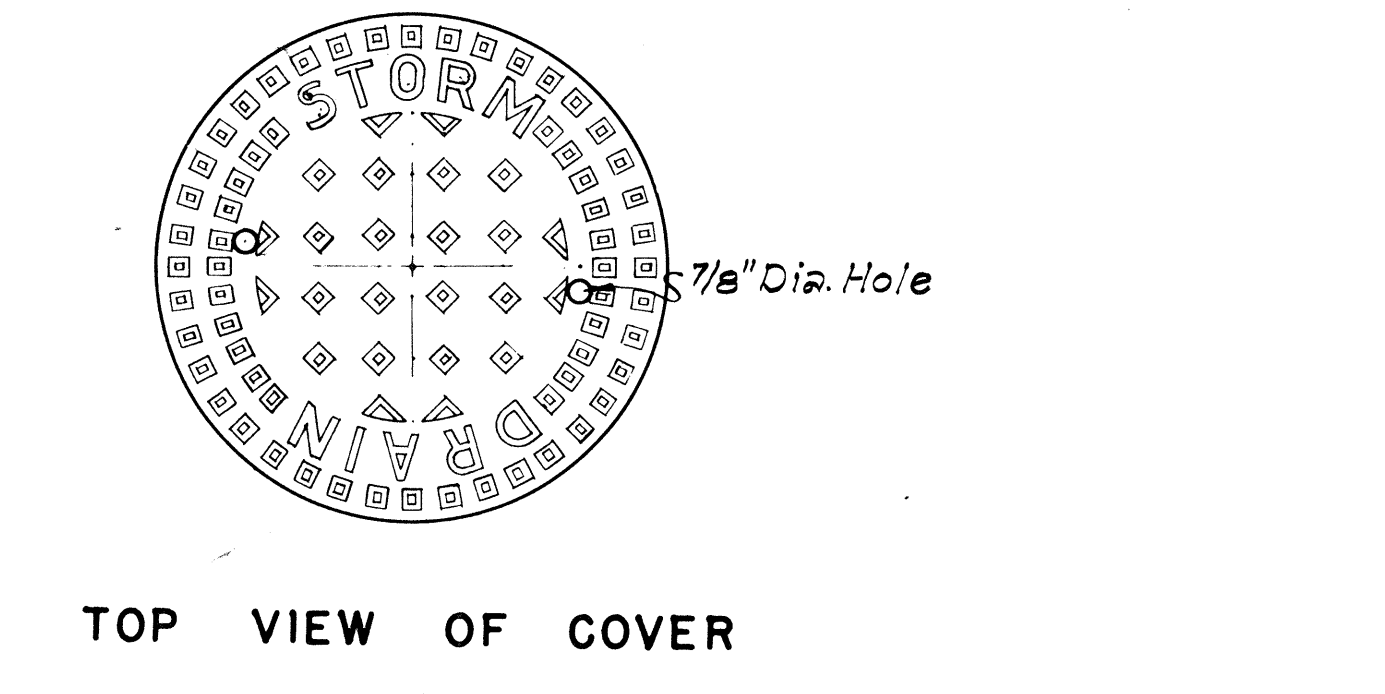
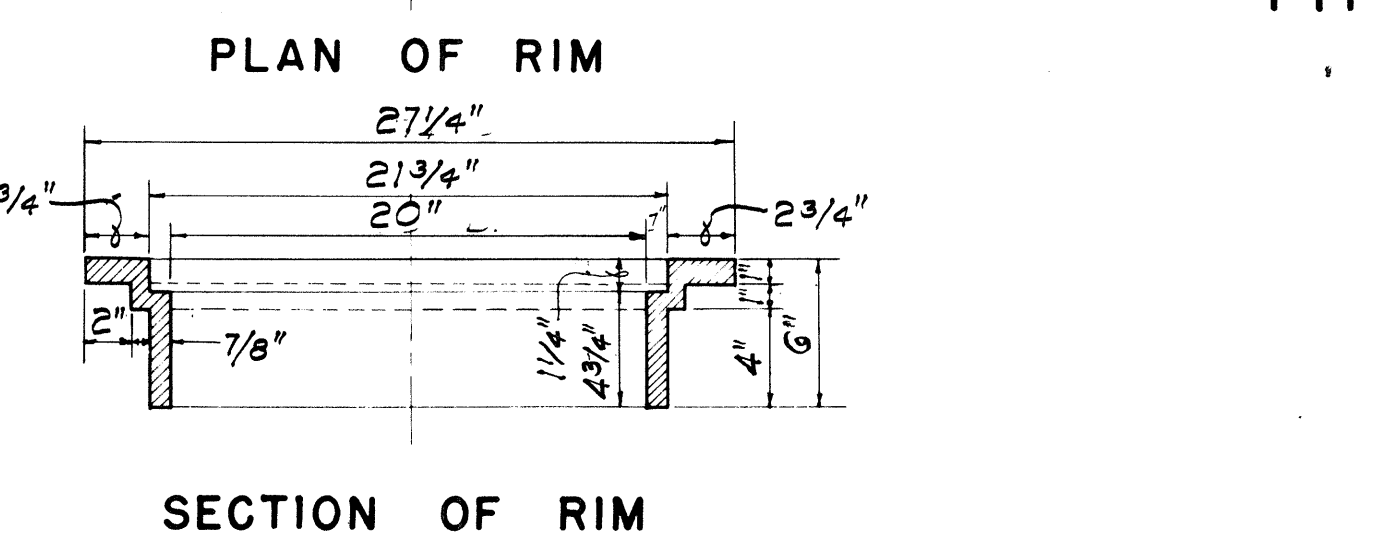
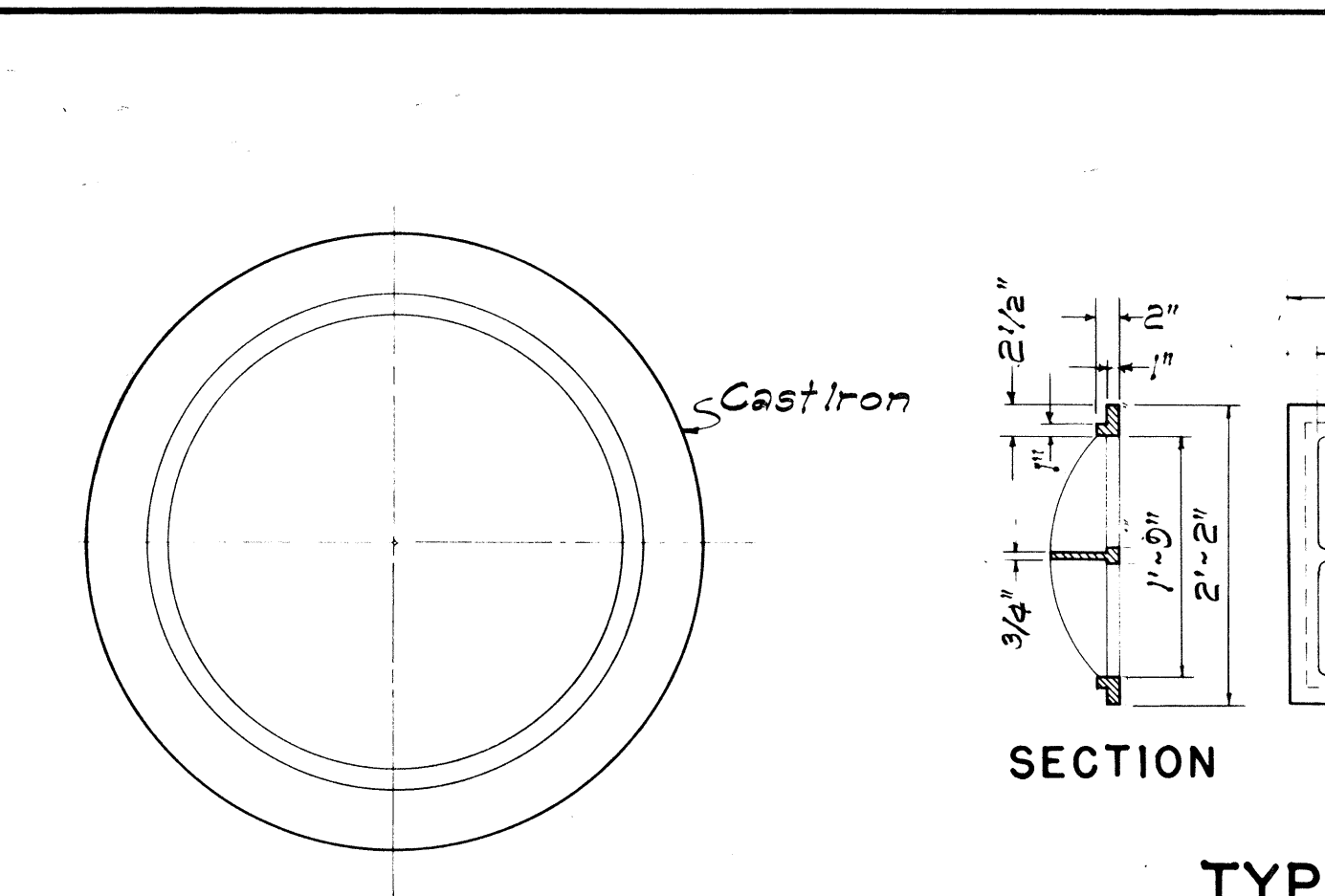
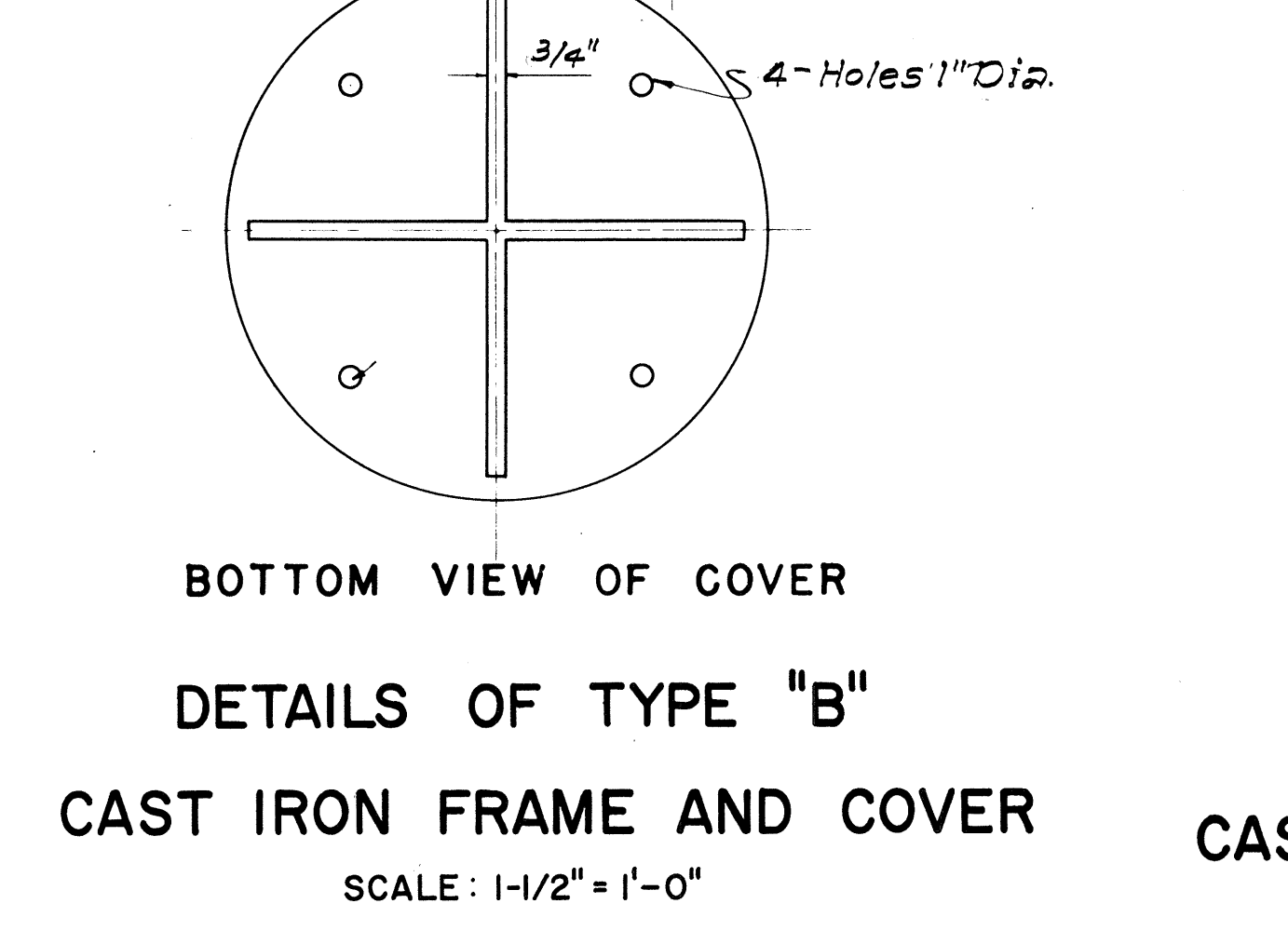
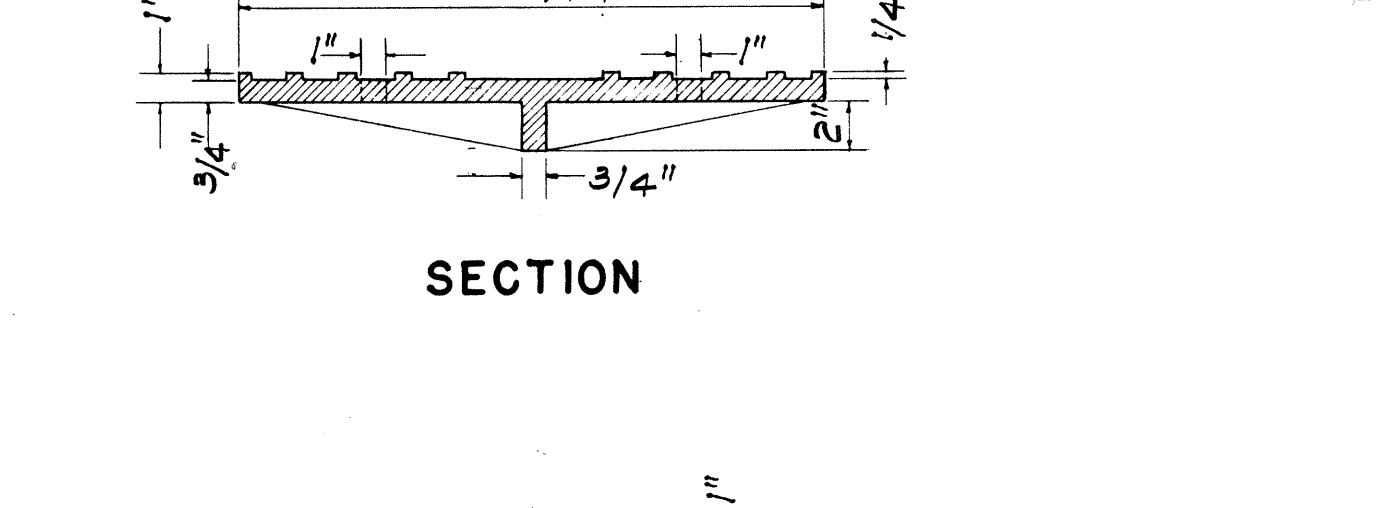
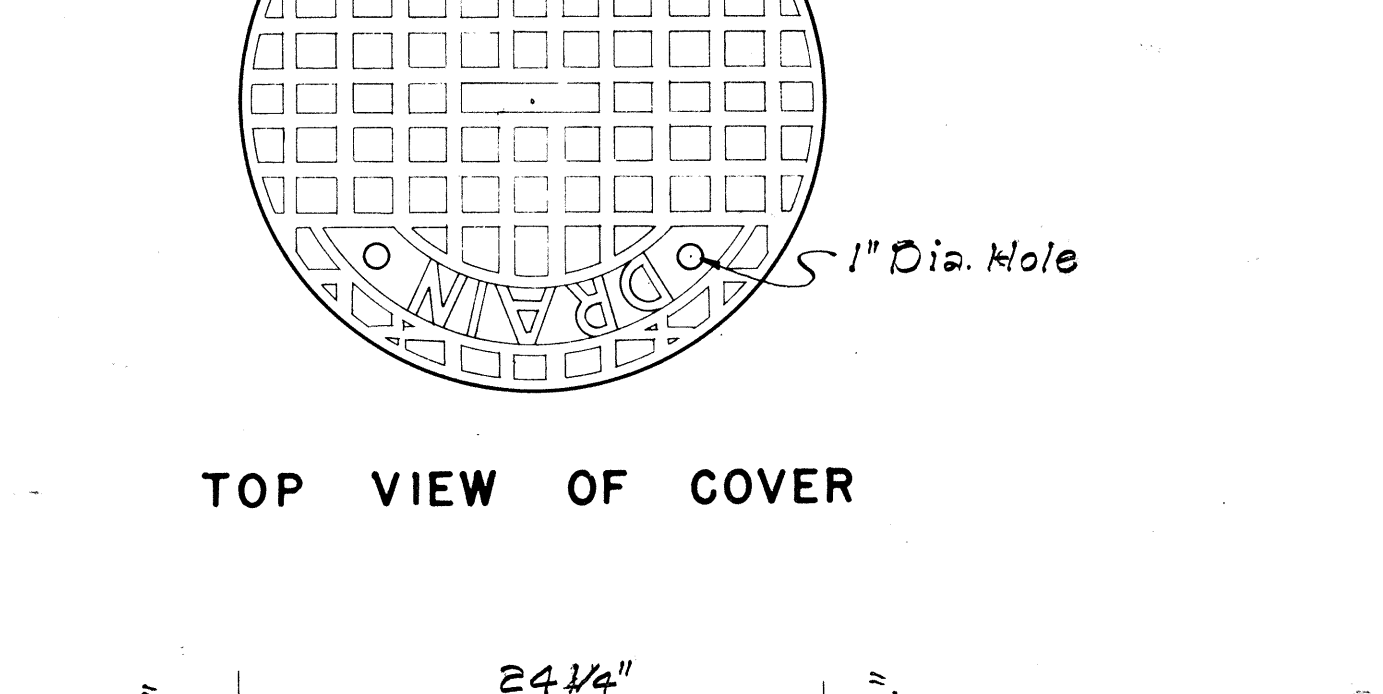
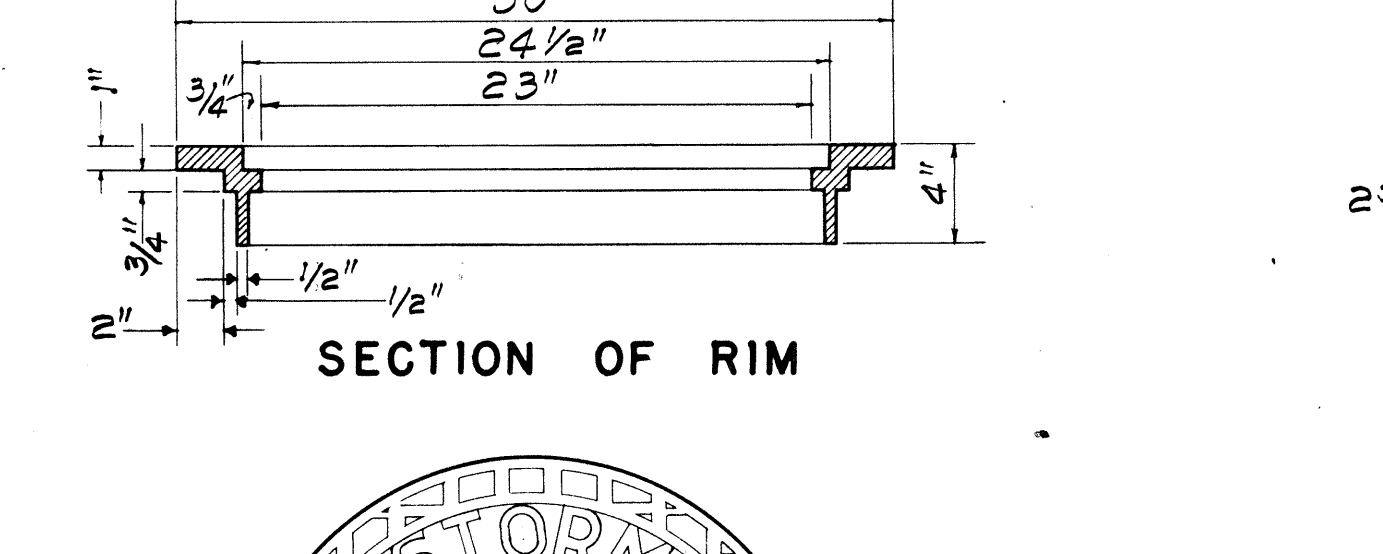
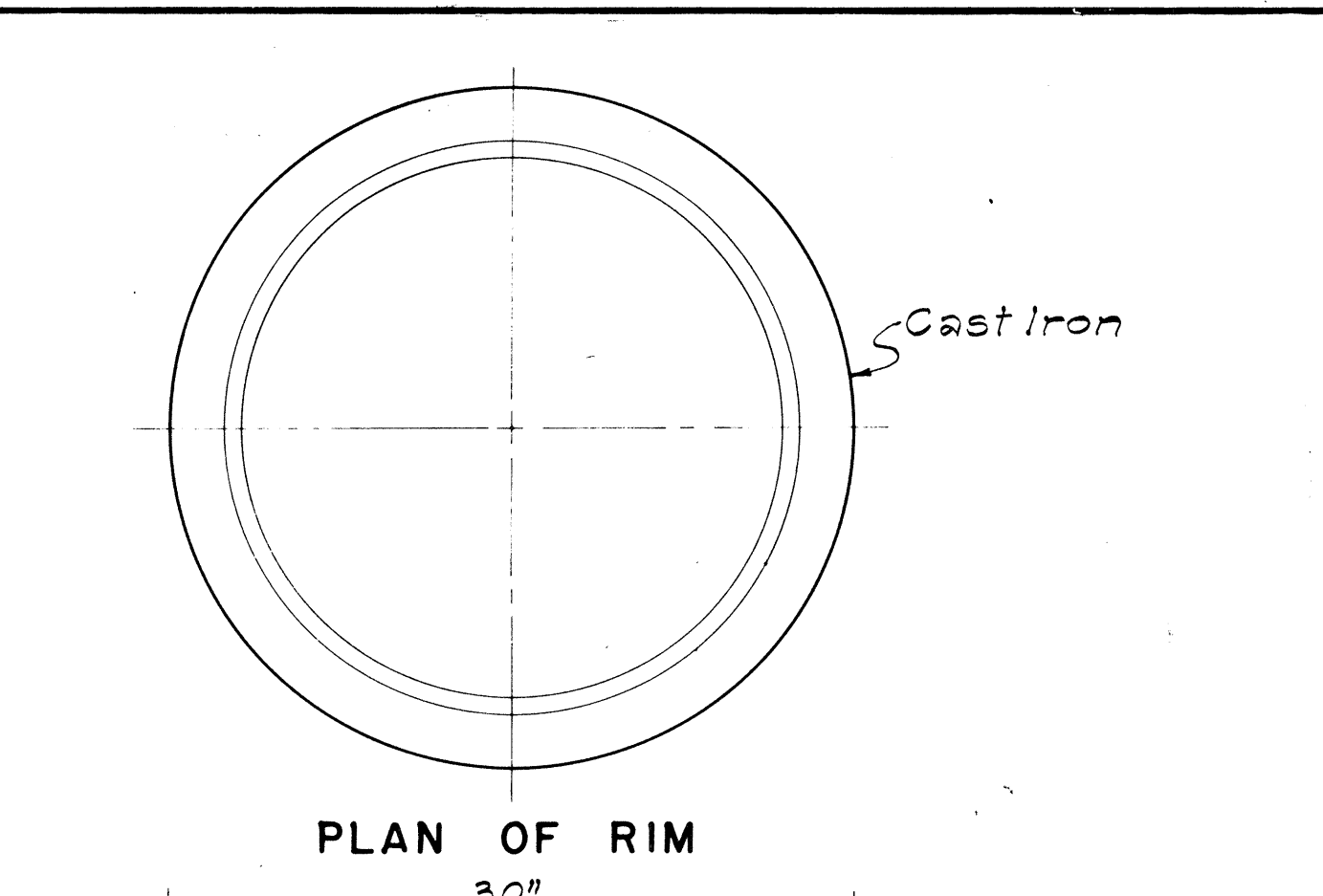
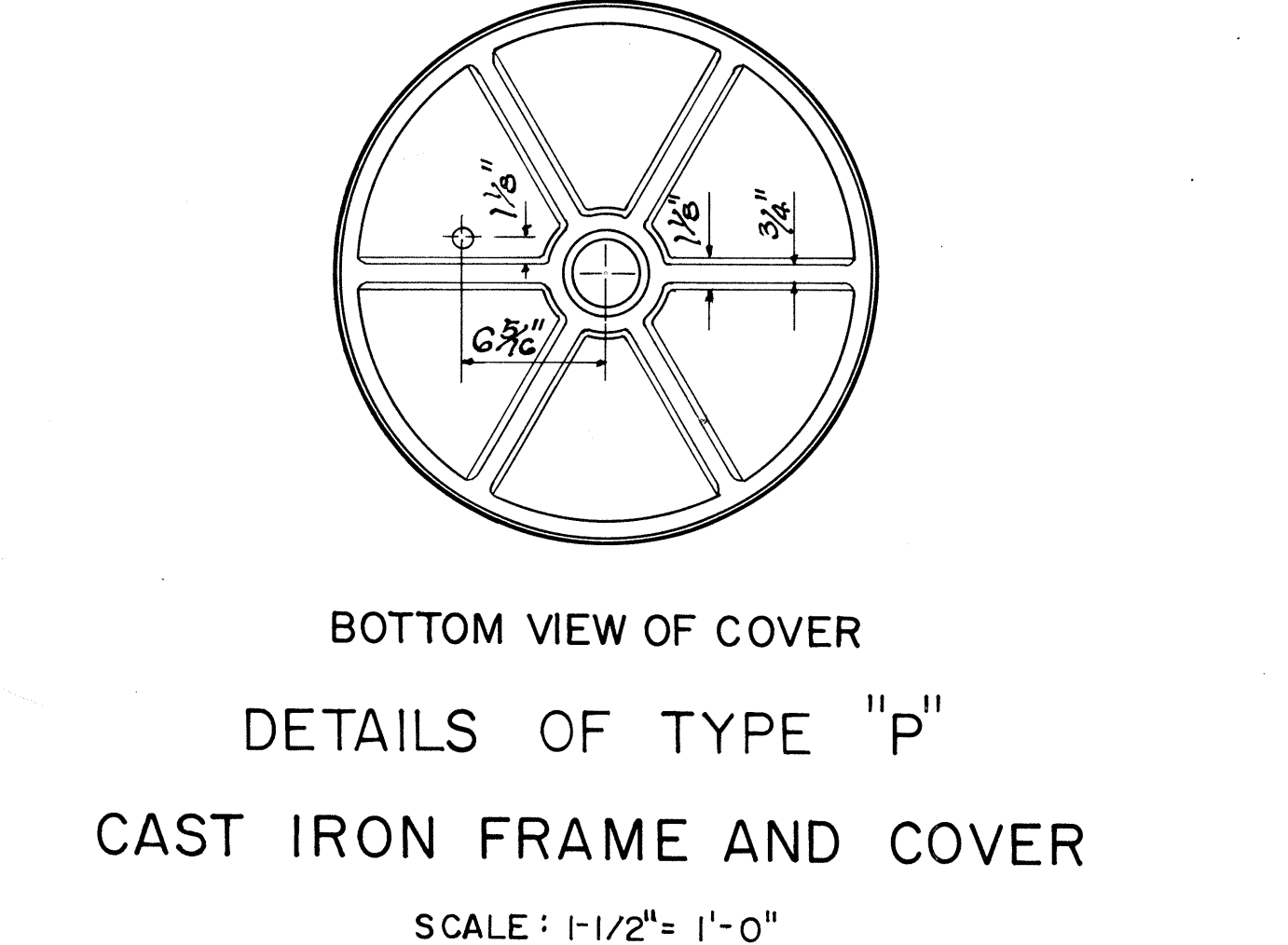
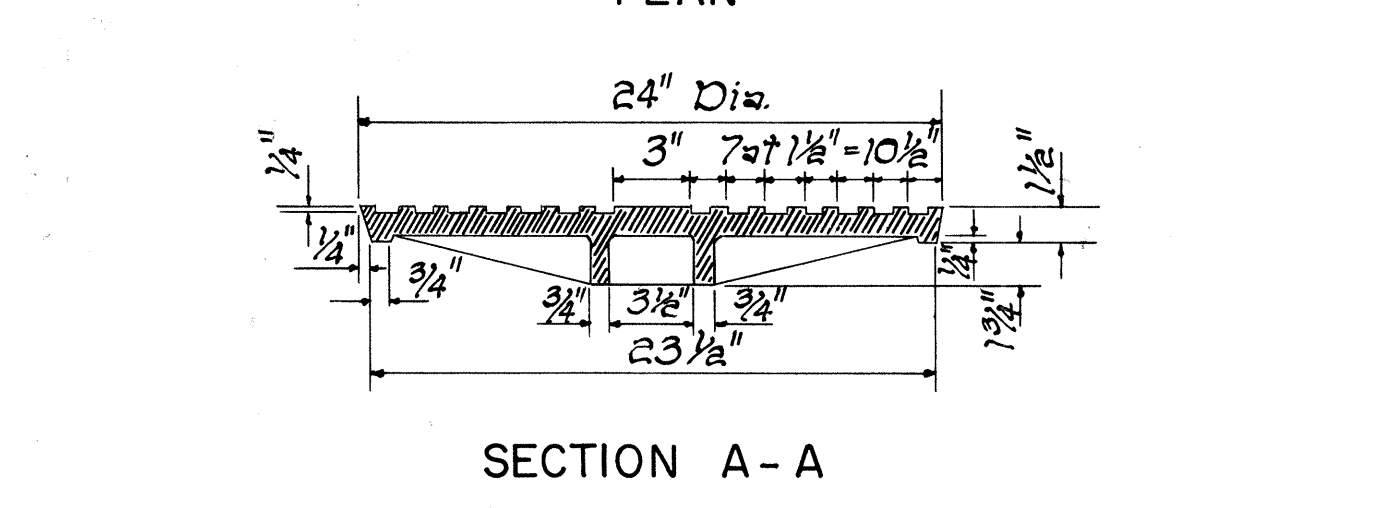
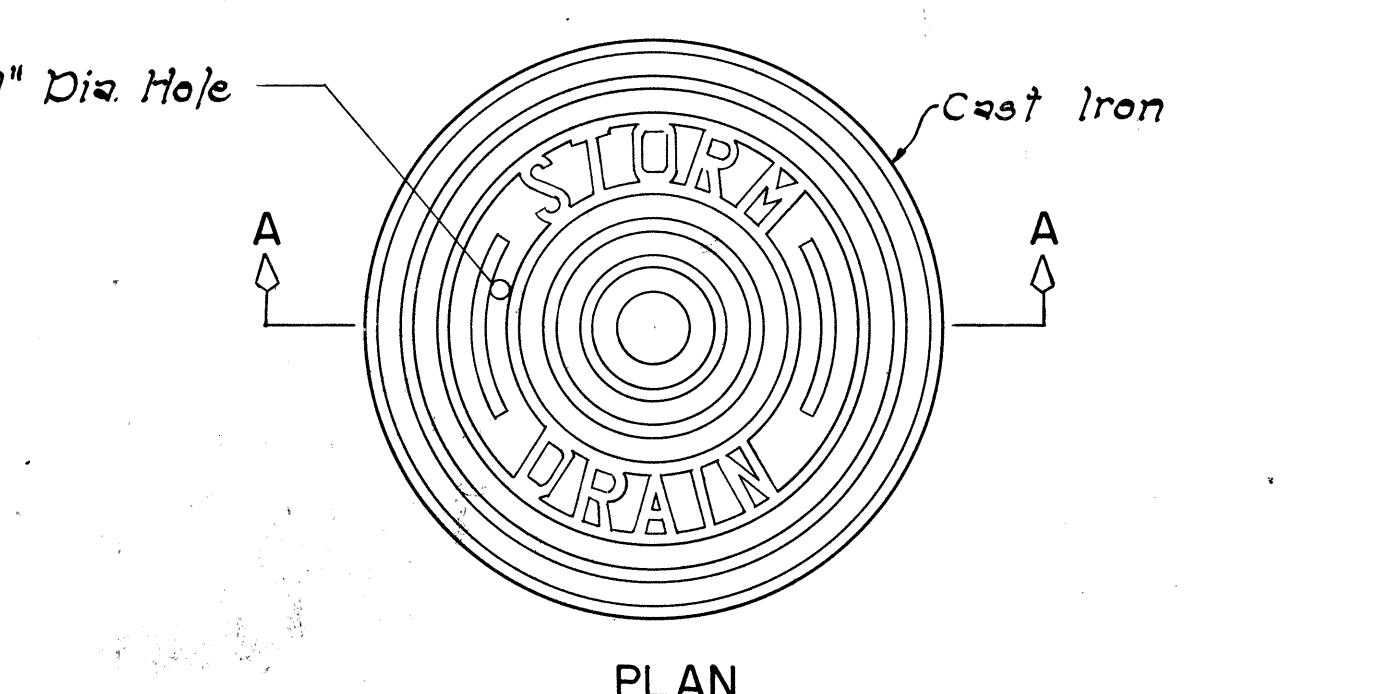
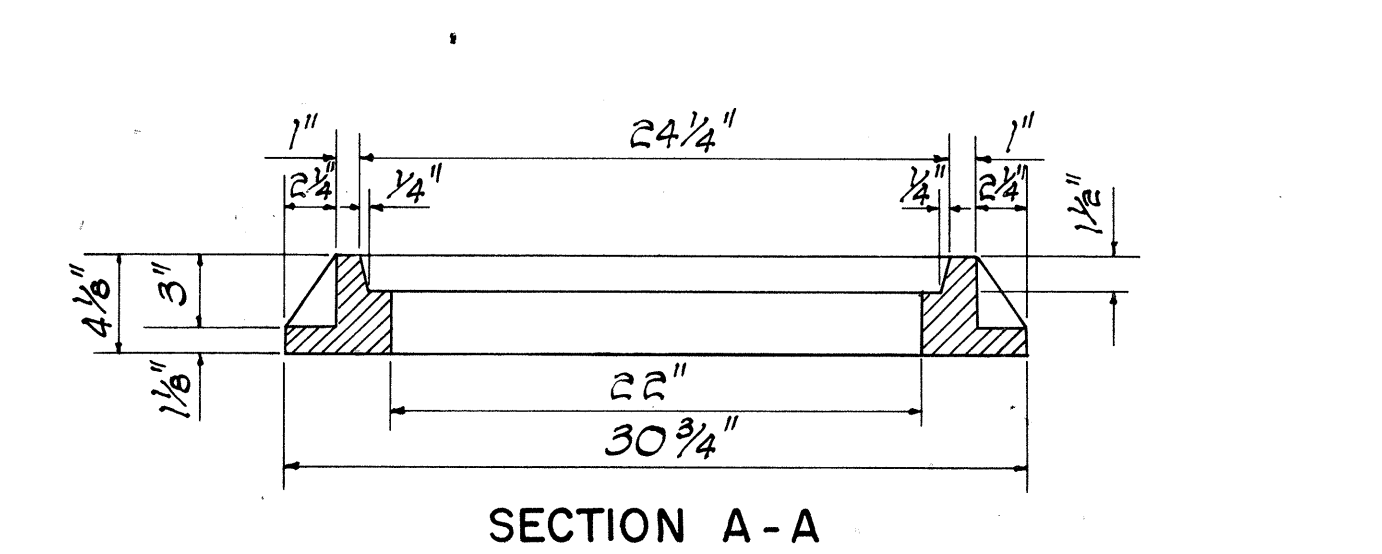
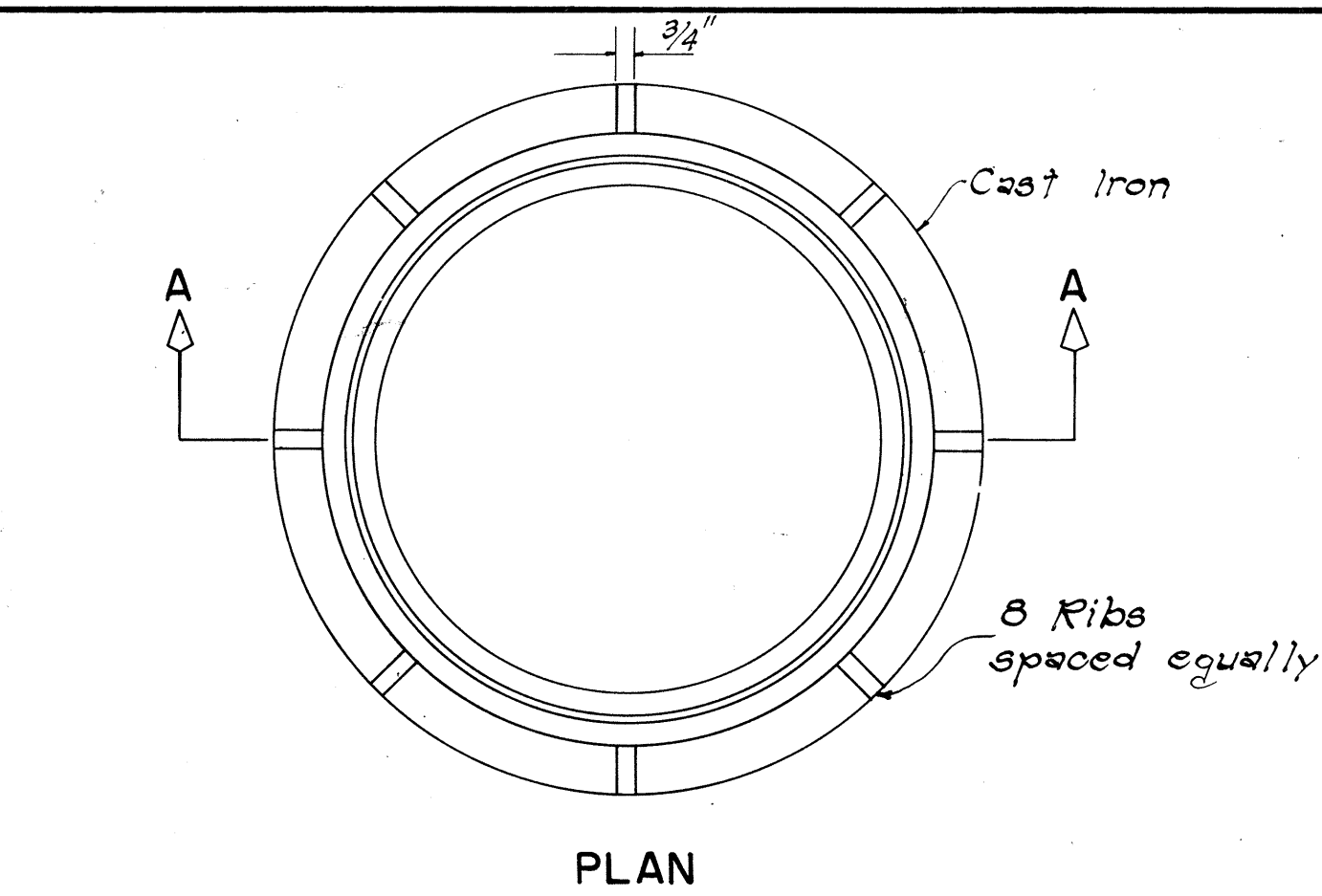
Scale: As Noted Date: July, 1969

Date: July, 1969

SHEET No. 5 OF 7 SHEETS

DETAILS OF TYPE "A2", "B2", "C2" AND "D2" CATCH BASIN

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72A-01-71	1975	14	42



DETAILS OF TYPE "P"
CAST IRON FRAME AND COVER
SCALE: 1-1/2" = 1'-0"

DETAILS OF TYPE "B"
CAST IRON FRAME AND COVER
SCALE: 1-1/2" = 1'-0"

DETAILS OF TYPE "A"
CAST IRON FRAME AND COVER
SCALE: 1-1/2" = 1'-0"

TYPE C C.I. FRAME AND GRATE
SCALE: 3/4" = 1'-0"

DETAILS OF MANHOLE RUNG
SCALE: 1" = 1'-0"

APPROVAL RECOMMENDED:
[Signature]
HYDRAULIC DESIGN ENGINEER
DATE: 12-17-69

APPROVED:
[Signature]
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
2.	Details of Manhole Rungs to conform to OSHA.	H.T.	1-21-75

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

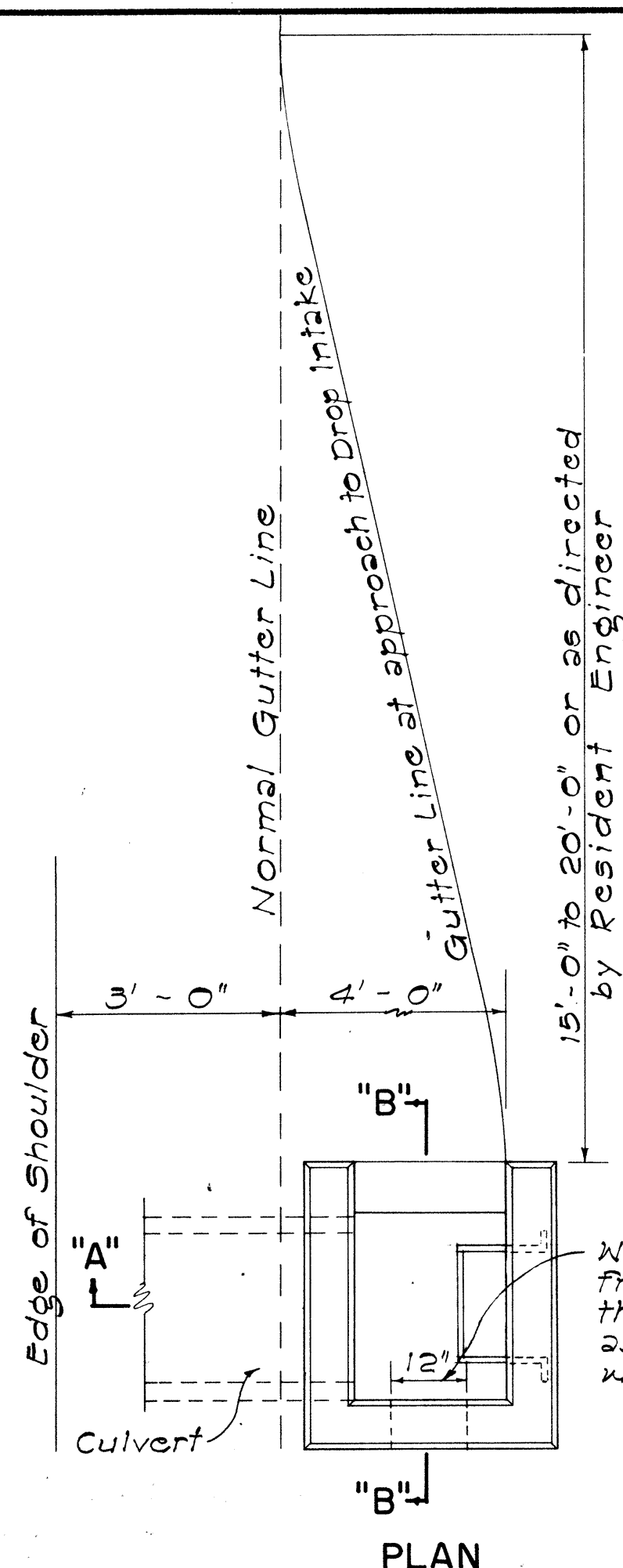
STANDARD DETAILS
CATCH BASIN AND
MANHOLE CASTINGS

Scale: As Noted Date: July, 1969

SHEET NO 6 OF 7 SHEETS DH 6

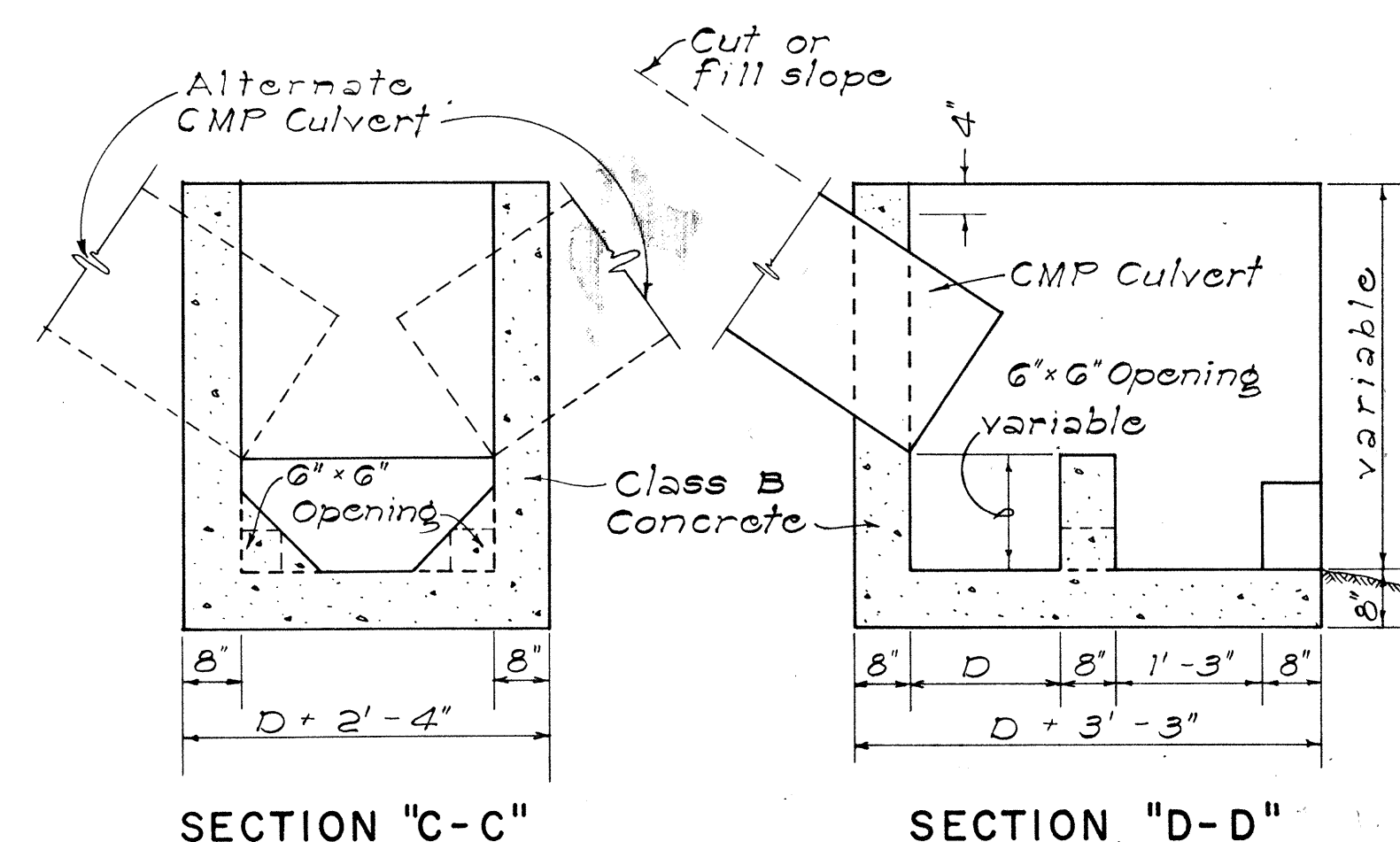
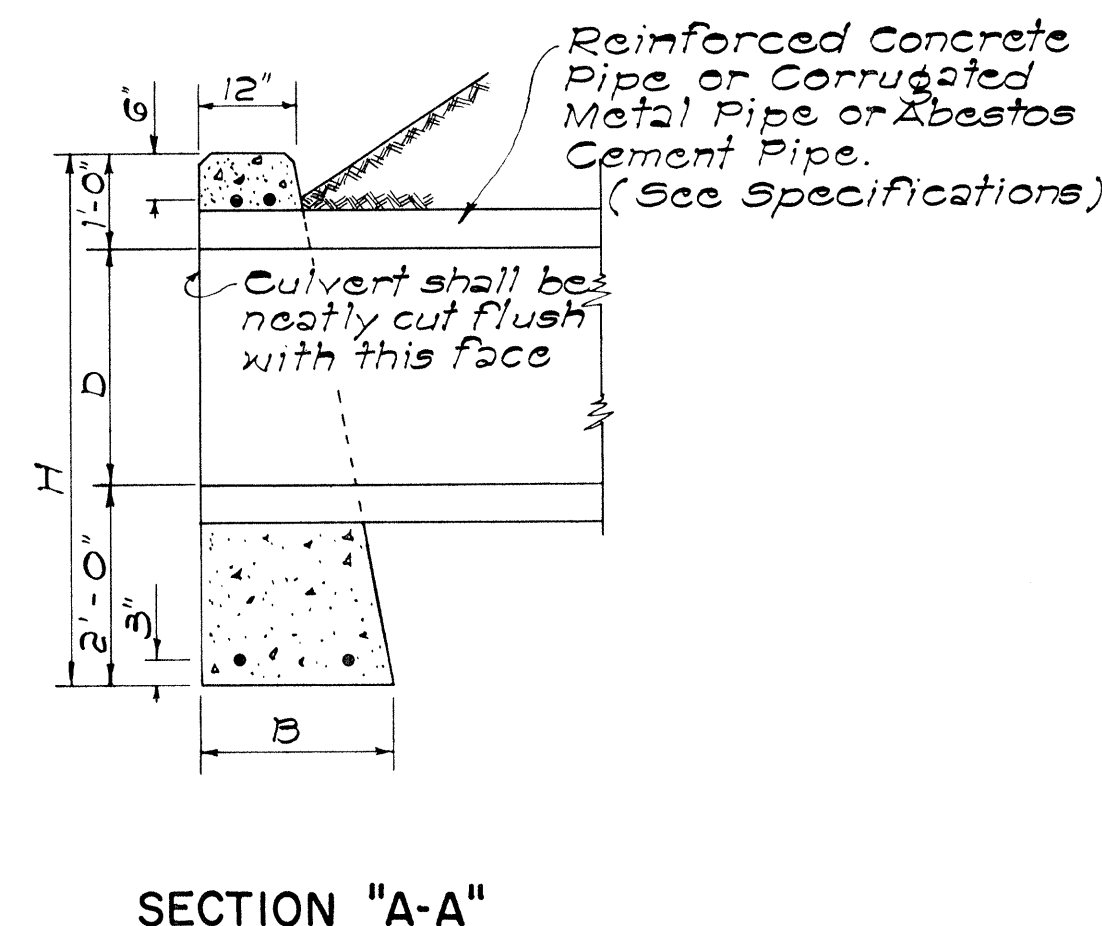
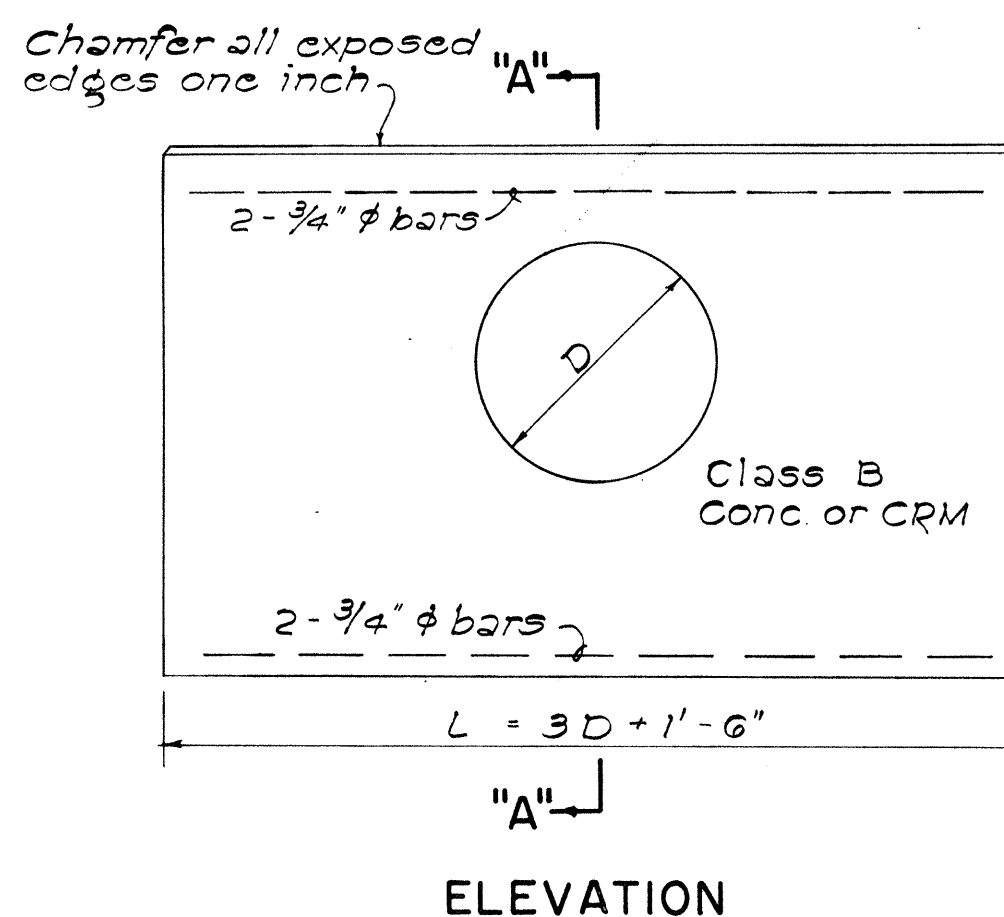
ORIGINAL PLAN
DESIGNED BY: *[Signature]*
NOTED BY: *[Signature]*
CHECKED BY: *[Signature]*
DATE: *[Signature]*

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	72A-01-71	1975	15	42



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"

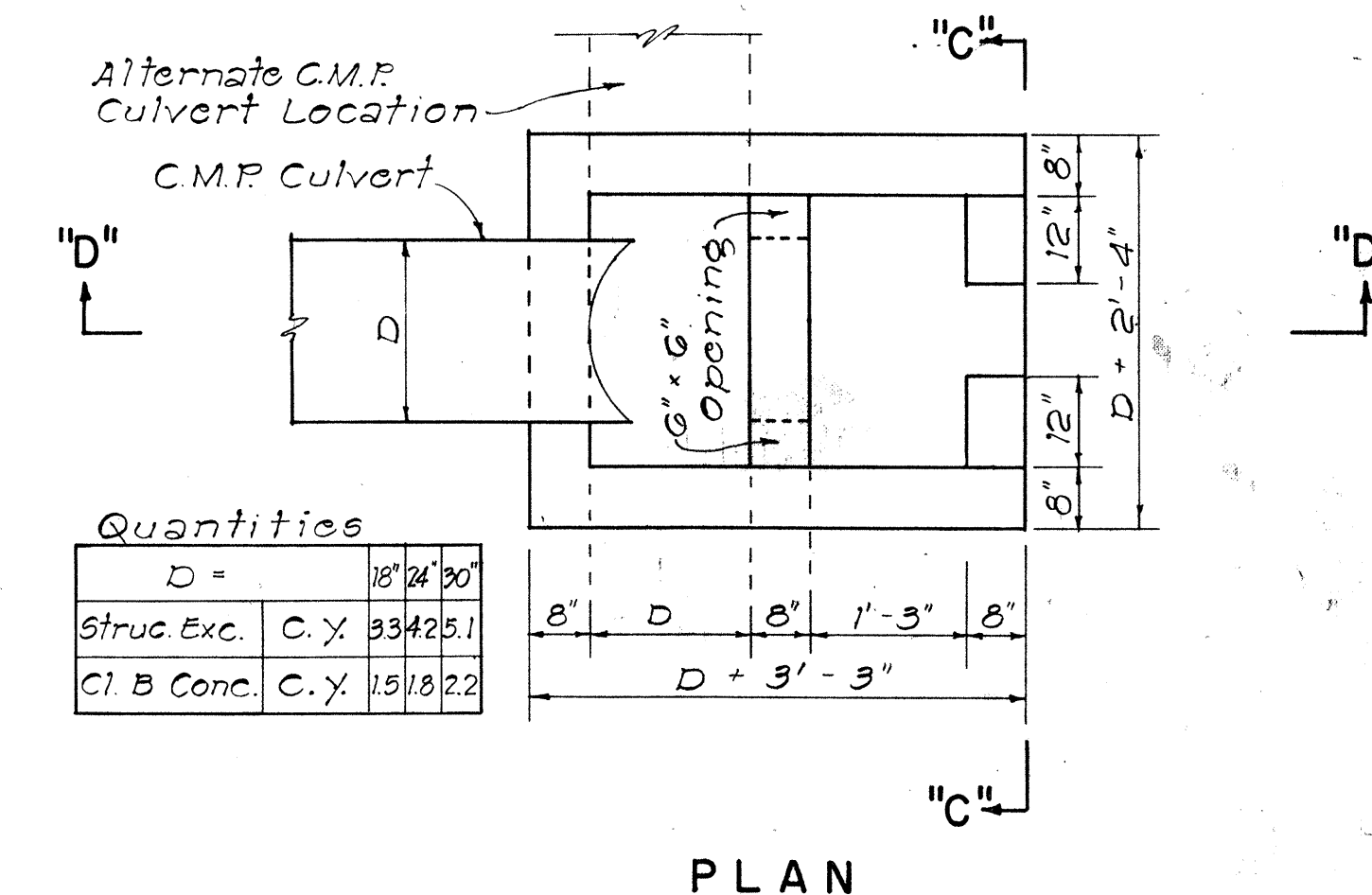
Note: Dimension "X" is assumed as 2'-4" in figuring the above quantities.



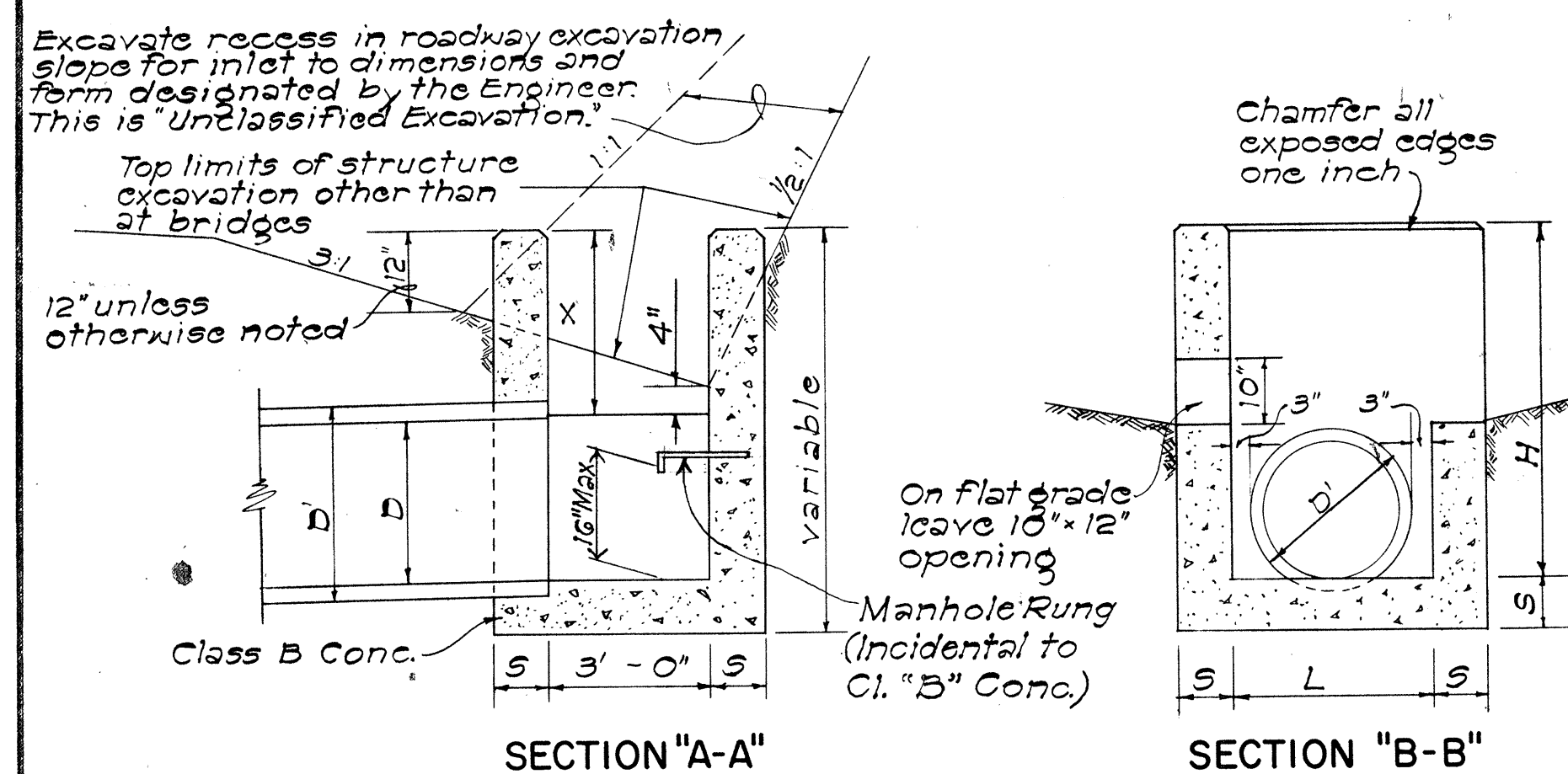
DATA FOR CONC. HEADWALL	Cl. B CONC. FOR R.C.P.	Cl. B CONC. FOR C.M.F.	Steel For One Headwall
D B L H Cu. Yd.	Cu. Yd.	Cu. Yd.	No. of Bars Size Length Lbs.
18" 1'-6" 6'-0" 4'-6" 1.12	1.17	4	3/4" 5'-6" 33
24" 1'-6" 7'-6" 5'-0" 1.52	1.60	4	3/4" 7'-0" 42
30" 2'-0" 9'-0" 5'-6" 2.36	2.49	4	3/4" 8'-6" 51
36" 2'-0" 10'-6" 6'-0" 2.94	3.13	4	3/4" 10'-0" 60
42" 2'-6" 12'-0" 6'-6" 4.19	4.47	4	3/4" 11'-6" 69
48" 2'-6" 13'-6" 7'-0" 5.01	5.36	4	3/4" 13'-0" 78

DATA - MASONRY HEADWALL	CRM FOR R.C.P.	CRM FOR C.M.F.
D B L H Cu. Yd.	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" 3.43	3.66	

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



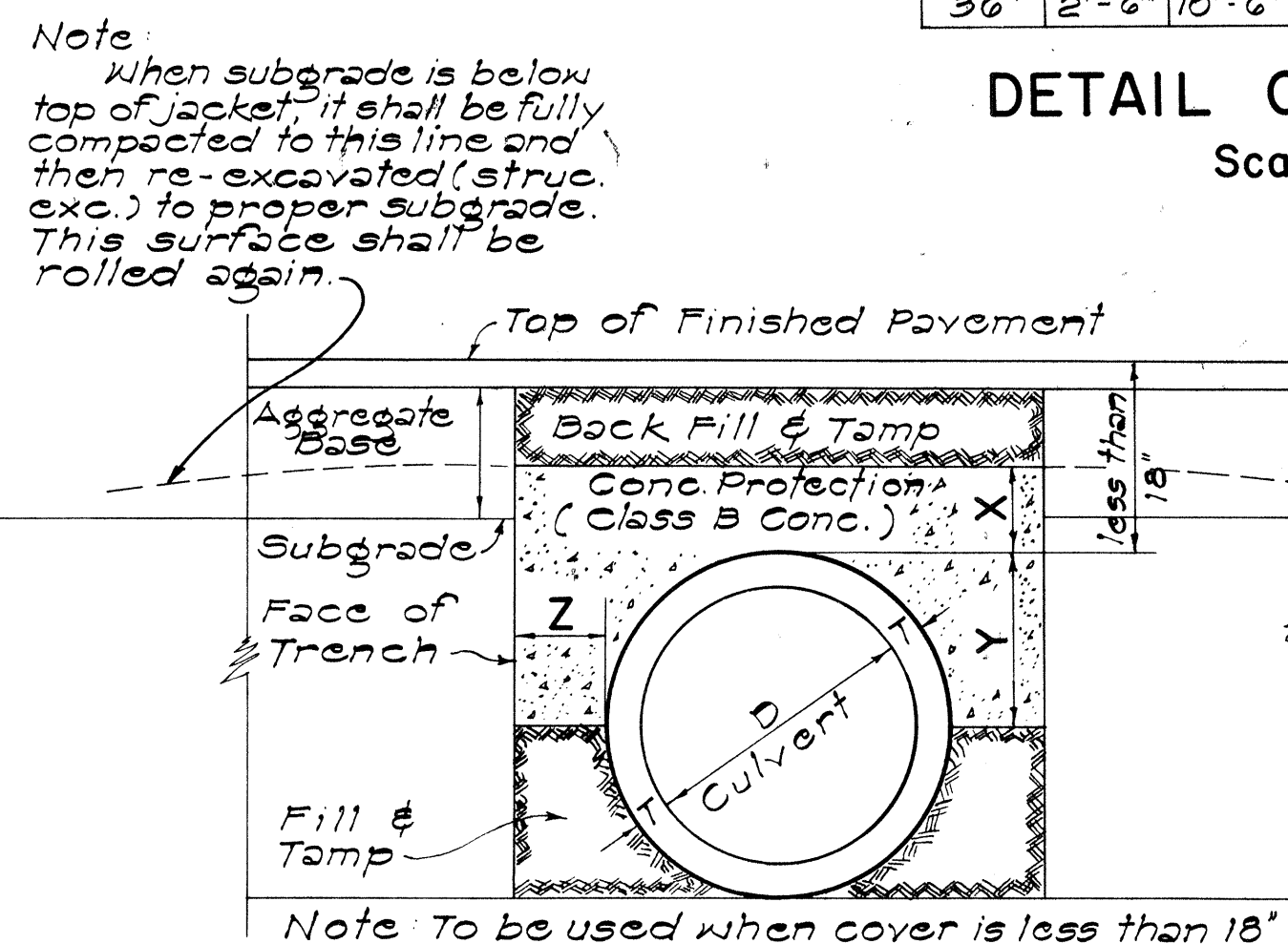
DETAILS OF CONC. DROP BOX AT
OUTLET OF CULVERT PIPE
NOT TO SCALE



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

GENERAL NOTES

- Culvert shall enter and leave Drop Intake from any position and in the direction indicated by the plans or ordered by the Engineer.
- D' shall be the maximum outside dimension of the culvert at the Drop Intake wall.
- Manhole Rungs (12" o.c.) are required when "H" is greater than 4 feet 6 inches. Only one rung (16 inches from the bottom) is required if "H" is 4 feet 6 inches or less. Manhole Rungs may be placed at any location as ordered by the Engineer.



DATA FOR CONCRETE PROTECTION OVER CULVERTS	X	Y	Z
6" for 18" D.			Z must be from pipe to face of trench
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"

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

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

NO.	REVISION	APPROVED BY	DATE
1	Spacing on Manhole Rungs to conform to OSHA.	H.F.	1-21-75

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
DROP INTAKE, HEADWALL &
CONCRETE PROTECTION
Scale: As Noted. Date: Aug. 1967
SHEET No. 7 OF 7 SHEETS DH 10

DATE	
DESIGNED BY	
TRACED BY	
NOTE BOOK	
CHECKED BY	
NO.	