DRAINAGE SUMMARY

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65)10 I-HI-1(62)11	1969	79	185

Revised: July 30, 1969

STRUCTURES			PIPE CULVERTS		ESTIMATED QUANTITIES																					REMARKS
NUMBER	TYPE	STATION	ITEM	NO.	14.01	15.01	20A.01	46.101	46.201	46.200A1	48.01	54A.02	58B.050	58.124	58B.124	58B.200	58B.370	60.046	60.047	65.01	98.01	115.00A2	54A.03	54A.04	54A.05	
			FROM	TO	Structural Excavation other than at Bridges	Ditch & Channel Excavation	Untreated Base for Pipe Foundation	Class A-1 Concrete other than in Bridges	Class B-1 Concrete other than in Bridges	Class B-1 Concrete Ditches & Gutters	Reinforcing Steel other than in Bridges	Type "A-12" Steel Frame & Grate	36-inch Class III RCCP or ACCP	42-inch RCCP, Class III	24-inch CGMP (10ga) or 24-inch Class III RCCP or ACCP	30-inch CGMP (10ga) or 30-inch Class III RCCP or ACCP	36-inch CGMP (10ga.) or 36-inch Class III RCCP or ACCP	96-inch Sectional Pipe Pipe Culvert (10 ga.)	102-inch Sectional Pipe Pipe Culvert (10ga.)	Grouted Rubble Paving	Type "A" Cast Iron Frame & Cover	Shotcrete for Ditches & Gutters	Type "G1G13" Steel Frame & Grate	Type "G1G13" Steel Frame & Grate	Special Steel Grate for Inlet Structure @ Mosn. Rd Sta. 38+80	
			UNIT	USED	C.Y.	C.Y.	C.Y.	C.Y.	C.Y.	C.Y.	Lb.	Ea.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	C.Y.	Ea.	C.Y.	Ea.	Ea.	Ea.	
	OUTLET CHANNEL #1	8+50 (PIPE STA.) 10+50 (PIPE STA.)			1368			282			29000									160						REMOVED AND RELOCATED BY CONTRACTOR
	SECTIONAL PLATE PIPE CULVERT	38+80 (M-R)	38+80 (M-R)	8+50 (PIPE STA.)	6232		520	55			1257								850						6	CHANNEL #1 NOT INCLUDED
	MEDIAN DRAIN INLET	75+25 (H-1)	75+25 (H-1)	76+52 (A)	67			2			[illegible]	1			135						1					
	TYPE "2" C.D.I.	37+50 (M-R)	37+50 (M-R)	0+55 (Pipe Sta.)	67			2			62	1			140											
	TYPE "G1G13" DROP INTAKE	41+35 (M-R)	41+35 (M-R)	2+28 (Pipe Sta.)	57			3			41	[illegible]			75									1		
	TYPE "1-A" CATCH BASIN	16+75 (E)	16+75 (E)	1+75 (H)	68			8			510				85						1					
	TYPE "1-A" CATCH BASIN	1+75 (H)	1+75 (H)	43+50 (M-R)	433			8			510		280								1					
	TYPE "G1G13" DROP INTAKE	43+50 (M-R)	43+50 (M-R)	4+82 (Pipe Sta.)	173			5			41	[illegible]		125										1		
	TYPE "D" SHOULDER DROP INTAKE	0+68 (F)	0+68 (F)	43+50 (M-R)	41			4			82	2			72											
	TYPE "1-A" CATCH BASIN	5+65 (A)	5+65 (A)	40+10 (M-R)	104			8			510					180					1					
	TYPE "2" C.D.I.	40+10 (M-R)	40+10 (M-R)	40+55 (M-R)	55			2			62	1				66										
	TYPE "G1G13" DROP INTAKE	40+55 (M-R)	40+55 (M-R)	5+70 (G)	35			3			41	[illegible]				42								1		
	TYPE "1-B" CATCH BASIN	5+70 (G)	5+70 (G)	52+50 (M-R)	230			8			480						255				1					
	TYPE "1" C.D.I.	52+50 (M-R)	52+50 (M-R)	18+75 (C)	88			4			62	1					85									
	TYPE "G1G13" DROP INTAKE	18+75 (C)	16+75 (C)	4+60 (Pipe Sta.)	280			3			41	[illegible]	134											1		
	SECTIONAL PLATE PIPE CULVERT	57+87.60 (M-R)	57+87.60 (M-R)	7+85 (Pipe Sta.)	4433		475	10			350							800			1					
	OUTLET CHANNEL #2	7+85 (Pipe Sta.)			535			123			10,075									5						
	CUT-OFF DITCH	34+18 (M-R) Lt. to 38+80 (M-R) Lt.				160				43	730											43				
	CUT-OFF DITCH	83+05 (H-1) Lt. to 88+80 (M-R) Lt.				1245				242	2180											242				
	MEDIAN DRAIN INLET	77+50 (H-1)	77+50 (H-1)	75+25 (H-1)	105			2			[illegible]	1			220											
	TYPE "1-F" CATCH BASIN	72+40 (H-1)	72+50 (H-1)	[illegible]	72			5			[illegible]	[illegible]			[illegible]											
	SPECIAL SPILLWAY	76+13 (H-1) Rt.				350				80	[illegible]											80				
	CONCRETE FROSE WALL	50+41 (M-R) Lt.			[illegible]																					
	[illegible]	[illegible]																								

TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY

NOTE BOOK
No.

SHEET No. 1 OF 27 SHEETS

79

DRAINAGE SUMMARY

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(60):11	1969	80	185

Revised: July 30, 1969
Oct. 23, 1969

STRUCTURES			PIPE CULVERTS		ESTIMATED QUANTITIES																								REMARKS
NUMBER	TYPE	STATION	ITEM	NO.	14.01	15.01	20A.01	46.101	46.122	46.201	46.200A1	48.01	48.22	131.04	54A.02			60.046	60.057	60.002		97.11	98.01	119.00A2	502.124	54A.03	14.G1	65.01	
			FROM	TO	Structural Excavation other than at Bridges	Ditch & channel Excavation	Untreated Base for Pipe Foundation	Class A-1 Concrete other than in Bridges	Class A-1 Concrete in Culvert @ 106+47	Class B-1 Concrete other than in Bridges	Class B-1 Concrete for Ditches & Gutters	Reinforcing Steel other than in Bridges	Reinforcing Steel in Culvert @ 106+47	Structural Steel for Debris Barrier	Type "A-12" Steel Frame & Grate			30-inch Sectional Plate Pipe Culvert (10ga.)	132-inch Sectional Plate Pipe Culvert (10 ga.)	192-inch Sectional Plate Pipe Culvert (8ga.)		Brick Wall for Type "D" or "E" S.D.M.H.	Type "A" Cast Iron Frame & Cover	Shotcrete for Ditches & Gutters	24-inch CAMP (10ga.) or 24-inch Class III RCDP or ACCP	Type "G-16/12" Steel Frame & Grate	Structure Excavation for Culvert at 106+47	Grouted Rubble Paving	
			UNIT	USED	C.Y.	C.Y.	C.Y.	C.Y.	L.S.	C.Y.	C.Y.	Lb.	L.S.	Lb.	Ea.			L.F.	L.F.	L.F.		L.F.	Ea.	C.Y.	L.F.	Ea.	C.Y.	C.Y.	
	SWALE TRANSITION	55+50 (M-R) Lt.				7					7													7					
	SPILLWAY	56+00 (M-R) Lt.				12					3													3					
	SPILLWAY	77+00 (H-1) Rt.				31					8													8					
	SECTIONAL PLATE PIPE	88+69.38 (H-1)			4224		310	20				900						830					1							
	CUT-OFF DITCH	89+03 (H-1) Lt. to 84+75 (H-1) Lt.				437					68													68					
	CUT-OFF DITCH	85+75 (H-1) Lt. to 103+50 (H-1) Lt.				400					77													77					
	MEDIAN DRAIN INLET	97+50 (H-1)	97+50 (H-1)	99+00 (H-1)	71			2							1										150				
	MEDIAN DRAIN INLET	99+00 (H-1)	99+00 (H-1)	100+20 (H-1)	57			2							1										120				
	TYPE "D" S.D.M.H.	100+20 (H-1)	100+20 (H-1)	102+15 (H-1)	91					1		29										5	1		190				
	TYPE "D" S.D.M.H.	102+15 (H-1)	102+15 (H-1)	102+40 (H-1)	85					1		29										5	1		120				
	SPILLWAY	102+15 (H-1) Rt.				35					9													9					
	SPILLWAY	103+28 (H-1) Lt.				20					5													5					
	CONCRETE DROP BOX	102+02 (H-1) Rt.			5					3																			
	CONCRETE DROP BOX	103+60 (H-1) Lt.			5					3																			
	SECTIONAL PLATE PIPE	106+47 (H-1)					2140		(280cy)				(37,000)	18,000					216	540						10,000	112			
	[illegible]	[illegible]			[illegible]																								
	TYPE "G16/12" DROP INTAKE	68+20 (H-1)	68+20 (H-1)	8+90 (Channel Sta.)	39			3				35													65	1			
	TYPE "G16/12" DROP INTAKE	60+87 (H-1)	60+87 (H-1)	7+20 (Pipe Sta.)	39			3				35													62	1			
	TYPE "G16/12" DROP INTAKE	11+75 (F)	11+75 (F)	5+87 (Pipe Sta.)	45			3				35													75	1			
	ROADWAY LINED SWALE	37+85 (M-R) Rt. to 39+75 (M-R) Rt.									10													10					
	ROADWAY LINED SWALE	42+00 (M-R) Rt. to 5+51.87 (A) 96 Rt.				58					58													58					
	ROADWAY LINED SWALE	45+00 (M-R) Lt. to 55+50 (M-R) Lt.				114					114													114					
	ROADWAY LINED SWALE	0+00 (F) Rt. to (+01.10 (F) Rt.				10					10													10					
	ROADWAY LINED SWALE	10+37.19 (C) Rt. to 50+51.61 (M-R) Rt.									23													23					

ORIGINAL PLAN
NOTE BOOK No.

DATE
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY

THIS SHEET SUPERSEDES SHEET NO. 80

SO IR

DRAINAGE SUMMARY

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1960	81	185

STRUCTURES			PIPE CULVERTS		ESTIMATED QUANTITIES									REMARKS
			ITEM	NO.	14.01	46.101	48.01	54A.02	54A.03	55B.104	54A.04			
NUMBER	TYPE	STATION	FROM	TO	Structural Excavation other than at Bridges	Class A-1 Concrete other than at Bridges	Reinforcing Steel other than at Bridges	Type "A-12" Steel Frame & Grate	Type "G1G2" Steel Frame & Grate	24-inch CGMP(10ga.) or 24-inch Class III RCCP or ACCP.	Type "G1G3" Steel Frame & Grate			
			UNIT	USED	C.Y.	C.Y.	Lb.	Ea.	Ea.	L.F.	Ea.			
	TYPE "G1G12" DROP INTAKE	35+75 (M-R)	35+75 (M-R)	1+62 (Pipe Sta.)	20	3	35		1	32				
	TYPE "G1G12" DROP INTAKE	16+52 (A)	16+52 (A)	76+18 (H-1)	21	3	35		1	35				
	TYPE "G1G13" DROP INTAKE	13+00 (A)	13+00 (A)	5+65 (A)	108	3	41			170	1			
	TYPE "G1G13" DROP INTAKE	3+50 (G)	3+50 (G)	5+70 (G)	138	3	41			220	1			
	TYPE "G1G13" DROP INTAKE	16+45 (C)	16+45 (C)	18+75 (C)	144	3	41			230	1			
	TYPE "G1G12" DROP INTAKE	20+00 (C)	20+00 (C)	3+55 (Pipe Sta.)	44	3	35		1	65				
	TYPE "G1G12" DROP INTAKE	56+45 (M-R)	56+45 (M-R)	2+00 (Pipe Sta.)	8	3	35		1	5				
	TYPE "G1G12" DROP INTAKE	58+16 (M-R)	56+16 (M-R)	0+65 (Pipe Sta.)	42	3	35		1	82				
	TYPE "G1G12" DROP INTAKE	50+45 (M-R)	50+45 (M-R)	58+16 (M-R)	88	3	35		1	185				
	~~TYPE "G1G12" DROP INTAKE~~	~~62+35 (H-1)~~	~~62+35 (H-1)~~	~~14+70 (Channel Sta.)~~	~~20~~	~~3~~	~~35~~		~~2~~	~~80~~				
	~~TYPE "G1G12" DROP INTAKE~~	~~2+60 (C)~~	~~2+60 (C)~~	~~62+35 (H-1)~~	~~70~~	~~3~~	~~35~~		~~2~~	~~220~~				
	~~TYPE "G1G12" DROP INTAKE~~	~~4+85 (C)~~	~~4+85 (C)~~	~~4+75 (C)~~	~~16~~	~~3~~	~~35~~		~~2~~	~~35~~				
	~~TYPE "D" SHOULDER DROP INTAKE~~	~~4+75 (C)~~	~~4+75 (C)~~	~~65+20 (H-1)~~	~~61~~	~~4~~	~~82~~	~~2~~		~~175~~				
	~~TYPE "G1G12" DROP INTAKE~~	~~65+20 (H-1)~~	~~65+20 (H-1)~~	~~11+85 (Channel Sta.)~~	~~25~~	~~3~~	~~35~~		~~2~~	~~65~~				

DELETE

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(GS)10 I-HI-1(40)HI	1969	82	185

TRUE NORTH
Scale: 1"=50'

Moanalua Road Sta. 37+50 to H-1 ⊄ Sta. 66+54.95

Construct: 2-Type "I-A" Catch Basin
2-Type "G1G13" Drop Intake
1-Type "D" Shoulder Drop Intake
4-Type "G1G12" Drop Intake
1-Type "2" C.D.I.
1-Inlet Structure
1-Concrete Headwall

Install: 24"⌀ C.G.M.P. or 24"⌀ R.C.C.P. or A.C.C.P.
36"⌀ R.C.C.P. or A.C.C.P.
42"⌀ R.C.C.P.
102"⌀ Sectional Plate Pipe (No Option)
Lined Channel (Concrete)

ESTIMATED QUANTITIES

Class "A-1" Concrete	328 c.y.
Reinforcing Steel	28,207 Lbs.
Structural Excavation	8,551 c.y.
24" 10ga. C.G.M.P. or	
24" Cl. III R.C.C.P. or A.C.C.P.	602 L.F.
36" Cl. III R.C.C.P. or A.C.C.P.	280 L.F.
42" Cl. III R.C.C.P. or A.C.C.P.	125 L.F.
102" 10ga. Sectional Plate Pipe (5% Elongated)	850 L.F.
Untreated Base for Pipe Foundation	520 c.y.
Type "A" C.I. Frame & Cover	2 Ea.
Type "A-12" Steel Frame & Grating	5 Ea.
Type "G1G12" Steel Frame & Grating	4 Ea.
Special Steel Grating for Inlet Structure at Moanalua Station 38+80	6 Ea.
Type "G1G13" Steel Frame & Grating	2 Ea.

H-1 ⊄ Sta. 77+50 to H-1 ⊄ Sta. 76+13

Construct: 2-Median Drain Inlet
1-Type "G1G12" Drop Intake

Install: 24"⌀ C.G.M.P. or 24"⌀ R.C.C.P. or A.C.C.P.

ESTIMATED QUANTITIES

Class "A-1" Concrete	7 c.y.
Reinforcing Steel	35 Lbs.
Structural Excavation	308 c.y.
24" 10 ga. C.G.M.P. or	
24" Cl. III R.C.C.P. or A.C.C.P.	350 L.F.
Type "A-12" Steel Frame & Grating	2 Ea.
Type "G1G12" Steel Frame & Grating	1 Ea.

Ramp "A" Sta. 13+00 to Moanalua Road Sta. 52+50

Construct: 1-Type "I-A" Catch Basin
1-Type "I-B" Catch Basin
3-Type "G1G13" Drop Intake
1-Type "I" C.D.I.
1-Type "2" C.D.I.

Install: 24"⌀ C.G.M.P. or 24"⌀ R.C.C.P. or A.C.C.P.
30"⌀ C.G.M.P. or 30"⌀ R.C.C.P. or A.C.C.P.
36"⌀ C.G.M.P. or 36"⌀ R.C.C.P. or A.C.C.P.

ESTIMATED QUANTITIES

Class "A-1" Concrete	81 c.y.
Reinforcing Steel	1,237 Lbs.
Structural Excavation	758 c.y.
30" 10 ga. C.G.M.P. or	
30" Cl. III R.C.C.P. or A.C.C.P.	288 L.F.
36" 10 ga. C.G.M.P. or	
36" Cl. III R.C.C.P. or A.C.C.P.	350 L.F.
Type "A" C.I. Frame & Cover	2 Ea.
Type "A-12" Steel Frame & Grating	2 Ea.
Type "G1G13" Steel Frame & Grating	3 Ea.
24" 10 ga. C.G.M.P. or	
24" Cl. III R.C.C.P. or A.C.C.P.	390 L.F.

REFERENCE NOTES:

1. All pipes designated by ⌀ shall be 10 gauge C.G.M.P. or Class III, R.C.C.P. or A.C.C.P.
2. For profile and details of 102"⌀ Pipe at Moanalua Road Sta. 38+80 see Shts. 85, 86
3. For profile and details of 90" ⌀ Pipe and Outlet Channel #2 at Moanalua Road Sta. 57+85 see Shts. 85 & 87.
4. For details of Catch Basins Type "I-A" and "I-B" see Sht. 91.
5. For details of Median Drain Inlet see Sht. 93.
6. For details of Type "D" and "E" S.D.M.H.'s see Sht. 95.
7. For details of Type "D" Shoulder Drop Intake see Sht. 92.
8. For details of Type "I" and "2" C.D.I.'s see Sht. 94.
9. For details of Type "G1G12" & "G1G13" Drop Intake see Sht. 90.
10. For details of Manhole for 90" and 102"⌀ pipes see Sht. 88.
11. For profile and details of Channel #1 and #1a see Sht. 85.
12. For details of Headwall see Sht. 104.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETAILED DRAINAGE PLAN

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(GS):10

Scale: 1"=50' Date: 4-24-69

PAUL M. HIROTA
REGISTERED PROFESSIONAL ENGINEER
No. 1429
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SHEET No. 4 OF 27 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(GS):10 I-HI-1(40):11	1962	83	185

NOTES:

1. Where base course and pavement are to be installed under a separate contract (by others) resulting in the finished ground under this contract being lower than the inlets into the drainage structures, temporary inlets shall be provided as shown on Detail "A" this sheet.
2. Where inlet structures are called for in parabolic swale sections, provide 5' min. transition from the parabolic swale to inlet.
3. All work between Sta's. 10+50 to 18+10.81 (Channel #1 & 102"ϕ Pipe) and Sta. 0+00 to 5+55 (Channel #1a) shall be done by others, except that the channel from 10+50 to daylight shall be a part of this contract.

TRUE NORTH
Scale: 1"=50'

MATCH LINE - ℄ STA. 66+14.25 = ℄ PIPE STA. 10+55 ⅋ LT.
(For Continuation See Sht. 82)

Sta. 59+40.55
P.T. Sta. 58+38.84

CHANNEL #1 CURVE DATA
Δ = 11°25'12"
½ = 5°34'38"
R = 100.00'
T = 10.06'
Lc = 20.05'
Ch = 20.02'

Sta. 18+10.81
End 102"ϕ Pipe (18+10.81)
Begin Channel #1a (0+00) (By others)
Top Head Wall = 54.0
Invert = 24.0

Sta. 15+40.85
End Channel #1
Begin 102"ϕ Pipe (By Others)
Top Head Wall = 42.5
Invert = 32.0

Sta. 14+70
Inv. = 39.5

Sta. 11+85
Inv. = 47.0

CC° 21'40" → 202.07' (P.T. to P.C.)

CHANNEL #1a CURVE DATA
Δ = 27°26'37"
½ = 13°43'18.5"
R = 50.00'
T = 12.21'
Lc = 23.95'
Ch = 23.72'

82,500 N

54°52'24" 65.72

54°58'24" → 260.06 (P.T. to End Pipe)

102"ϕ Pipe (By Others)

P.T. Sta. 13+47.88

P.C. Sta. 13+29.80

24"ϕ (By Others)

(By Others) H-1 ℄ Sta. 62+38 Type "G1G12" Drop Intake Inv. = 64.3

(By Others) Sta. 65+20 Type "G1G12" Drop Intake Inv. = 71.6

Channel #1 (By Others)

P.C. Sta. 0+65.72

Channel #1a (By Others)

OUTBOUND LANES

INBOUND LANES

H-1 Baseline

PEARL CITY VIADUCT (By Others)

BEGIN PROJ. NO. I-HI-1(65):10
H-1 ℄ STA. 62+71.09 = END PEARL CITY VIADUCT

60+00

65+00

246° 21'40" →

Ramp "C" Sta. 2+20 Type "G1G12" Drop Intake (By Others) Inv. = 68.7

RAMP "C"

Ramp "C" Sta. 4+75 Type "D" Shoulder Drop Intake (By Others) Inv. = 72.5

Ramp "C" Sta. 4+85 Type "G1G12" Drop Intake (By Others) Inv. = 73.0

KAMEHAMEHA HIGHWAY

Exist. 36" Sewer

Chain Link Fence (By Others)

Sta. 3+40 End Conc. Channel
Begin G.R.F. Channel (By Others)

Drainage Easement

Watercress Farm

Exist. Channel

27°25'47" → 465.39 (Ft. to Outlet)

Exist. Banana Grove

Sta. 5+00 Inv. 8.05'

35'

End Channel #1a (By Others) Sta. 5+55 Inv. = 2.0'

2' Min. G.R.F. (By Others)

5' Min.

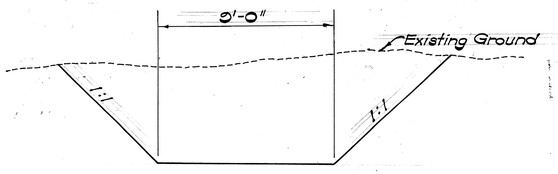
Top - Inlet Structure

Finish Ground (by others)

℄ Swale

Provide 4" C.I. Pipe for drainage (1 - req'd. per inlet) Pipe to be incidental to Class A-1 conc.

TYPICAL SECTION DETAIL "A"
Not to Scale



TYPICAL SECTION END CHANNEL #1 (Sta. 10+50) TO DAYLIGHT
Not to Scale

See Proj. No. I-HI-1(66):10 Plan Sht. No. 82

VOID

SEE REVISED SHT.

PAUL M. HIROTA REGISTERED PROFESSIONAL ENGINEER No. 1444 HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETAILED DRAINAGE PLAN

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(GS):10

Scale: 1"=50' Date: 4-24-69

SHEET No. 5 OF 27 SHEETS

S 83

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65)10 I-HI-1(40)11	1969	84	185

Revised: July 30, 1969
Oct. 23, 1969

H-1 @ Sta. 76+13 9⅛ 134' Right to Moanalua Road Sta. 57+60 9⅛ 85' Left

Construct: 1-Swale Transition
Install: 988 L.F. Concrete or Shotcrete Spillway *

ESTIMATED QUANTITIES

Class "B-1" Concrete or Shotcrete	107 c.y.
Channel Excavation	400 c.y.

* Special Spillway Included

TRUE NORTH
Scale: 1"=50'

KAMEHAMEHA HIGHWAY

EXIST. MOANALUA ROAD

KULEANA PLACE

RAMP "B"

RAMP "C"

RAMP "G"

REALIGNED MOANALUA ROAD

SPECIAL SPILLWAY
(See Note 4, Sheet 89)

Swale Transition

Spillway

Moanalua Road
Sta. 40+55
Type "G1G13" Drop Intake
Inv. = 60.1

Ramp "G" Sta. 3+50
Type "G1G13" Drop Intake
Inv. = 67.0

Ramp "G" Sta. 5+70
Type "B" Catch Basin
Inv. = 55.5

Ramp "C" Sta. 16+45
Type G1G13" Drop Intake
Inv. = 60.0

Moanalua Road
Sta. 52+50
Type "B" C.D.I.
Inv. = 55.5

Ramp "C" Sta. 18+75
Type G1G13" Drop Intake
Inv. = 54.5

Sta. 4+00
Inv. = 34.0

Ramp "C" Sta. 20+00
Type "G1G12"
Drop Intake
Inv. = 52.1

Sta. 3+55
Inv. = 36.0

Manhole
Sta. 3+50

Sta. 2+00
Inv. = 39.0

Moanalua Road
Sta. 56+44
Type "G1G12"
Drop Intake
Inv. = 50.7

Sta. 0+35
Inv. = 43.8

Moanalua Road
Sta. 58+17
Type "G1G12"
Drop Intake
Inv. = 49.6

Moanalua Road Sta. 59+48
Type "G1G12" Drop Intake
Inv. = 50.1

Moanalua Road
Sta. 56+25 9⅛ 85' Lt.
Spillway "Y" Connection

Moanalua Road
Sta. 57+87.09 o/s 83.08' Lt.
Inlet (-0+14)
Inv. = 35.02

96" Pipe see Sht. 101

MOANALUA ROAD
STA. 59+51 G.I. PROJECT
END PROJECT
STA. 60+00
I-HI-1(G5):10

End 96"ϕ Pipe Sta. 7+85=
Begin Channel #2
Type Head Wall = 30.0
Invert = 20.0

96"ϕ Pipe

PIPE CURVE DATA
Tangent Method
Δ = 74°23'16" = 358.95' (Ft. to FC)
Δ = 50°15'16"
R = 410.00'
t = 198.33'
Lt = 359.48'
Δ = 100°44'44"
Rc = 75.00'
t = 92.02'
Lc = 131.84'
Δ = 23°40'00"
R = 180.00'
t = 37.73'
Lt = 74.39'
Δ = 19°51'08"
R = 180.00'
t = 31.54'
Lc = 62.37'
Δ = 5°46'06"
R = 180.00'
t = 9.06'
Lc = 18.12'
Δ = 52°05'04"
R = 180.00'
t = 88.52'
Lc = 163.62'
Δ = 358°22'02"
R = 180.00'
t = 9.02'
Lc = 1125.66'
Δ = 55°14'10"
R = 180.00'
t = 95.62'
Lc = 173.51'
Δ = 46°57'12"
R = 180.00'
t = 77.19'
Lc = 147.51'
Δ = 74°23'16"
R = 410.00'
t = 298.95'
Lc = 532.19'
Δ = 50°15'16"
R = 410.00'
t = 189.33'
Lt = 359.48'
Δ = 100°44'44"
Rc = 75.00'
t = 92.02'
Lc = 131.84'
Δ = 23°40'00"
R = 180.00'
t = 37.73'
Lt = 74.39'
Δ = 19°51'08"
R = 180.00'
t = 31.54'
Lc = 62.37'
Δ = 5°46'06"
R = 180.00'
t = 9.06'
Lc = 18.12'
Δ = 52°05'04"
R = 180.00'
t = 88.52'
Lc = 163.62'
Δ = 358°22'02"
R = 180.00'
t = 9.02'
Lc = 1125.66'
Δ = 55°14'10"
R = 180.00'
t = 95.62'
Lc = 173.51'
Δ = 46°57'12"
R = 180.00'
t = 77.19'
Lc = 147.51'

Existing Pond

P.C. Sta. 9+46.50
P.T. Sta. 10+25.04
R = 50'
10' 20'
5'
Drainage Easement

End Channel #2
Sta. 10+45.04
Inv. = 11.5
For Details See Sht. 87.

Moanalua Road Sta. 57+87.09 Lt. to Exist. Pond
Construct: 4-Type "G1G12" Drop Intake
2-Type "G1G13" Drop Intake
1-Inlet Structure
1-Concrete Headwall
Install: 96"ϕ Sectional Plate Pipe (No Option)
24"ϕ C.G.M.P. or 24"ϕ R.C.C.P. or A.C.C.P.
36"ϕ R.C.C.P. or A.C.C.P.
Concrete Lined Channel

ESTIMATED QUANTITIES

Class "A-1" Concrete	151 c.y.
Reinforcing Steel	10,647 Lbs.
Structural Excavation	5,524 c.y.
24" 10 ga. C.G.M.P. or 24" Cl. III R.C.C.P. or A.C.C.P.	527 L.F.
36" Class III R.C.C.P. or A.C.C.P.	134 L.F.
96" 10 ga. Sectional Plate Pipe (5% Elongated)	800 L.F.
Untreated Base for Pipe Foundation	475 c.y.
Type "A" C.I. Frame & Cover	1 Ea.
Type "G1G13" Steel Frame & Grating	2 Ea.
Type "G1G12" Steel Frame & Grating	4 Ea.
Grouted Rubble Paving	5 c.y.

Moanalua Road Sta. 37+85 % Rt. to 30+75 % Rt.
Moanalua Road Sta. 42+00 % Rt. to 3+51.87 Ramp "A" % Rt.
Moanalua Road Sta. 45+00 % Lt. to 35+50 % Lt.
Ramp "F" Sta. 0+00 % Rt. to 1+01.10 % Rt.
Ramp "C" Sta. 10+37.10 % Rt. to Moanalua Rd. Sta. 50+51.61 % Rt.
Construct Type 2 or 3 Conc. Swale (For Details see Sht. 89)

THIS SHEET SUPERSEDES SHEET NO. 84

CHANNEL #2
CURVE DATA
Δ = 90°00'00"
½ = 45°00'00"
R = 50.00'
T = 50.00'
Lc = 78.54'
Oh = 70.71'

(By Others)
Type "E" S.D.M.H.
Construct over Exist. 24" Pipe Culvert
Inv. = 10.13 (Exist. S.D.24)

Limits Added R/W
Install: 1-24"ϕ Pipe
3-72"x44" C.G.M.P. Arch
(By Others)

Exist. Type "B" Catch Basin
Inv. = 16.19

Exist. 24" Pipe Culvert
Exist. Grated C.D.I.
Exist. S.D.M.H.
Exist. Grated C.D.I.
Inv. = 10.55±

Exist. 24" Pipe Culvert

Exist. 9'x5' Box Culvert

Exist. Type "C" Catch Basin
Inv. = 16.44

S.D.M.H.
8.4'

Monument Line

KAULIKE DRIVE

KAUHIAU PLACE

PAUL M. HIROTA
REGISTERED PROFESSIONAL ENGINEER
No. 1419
HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

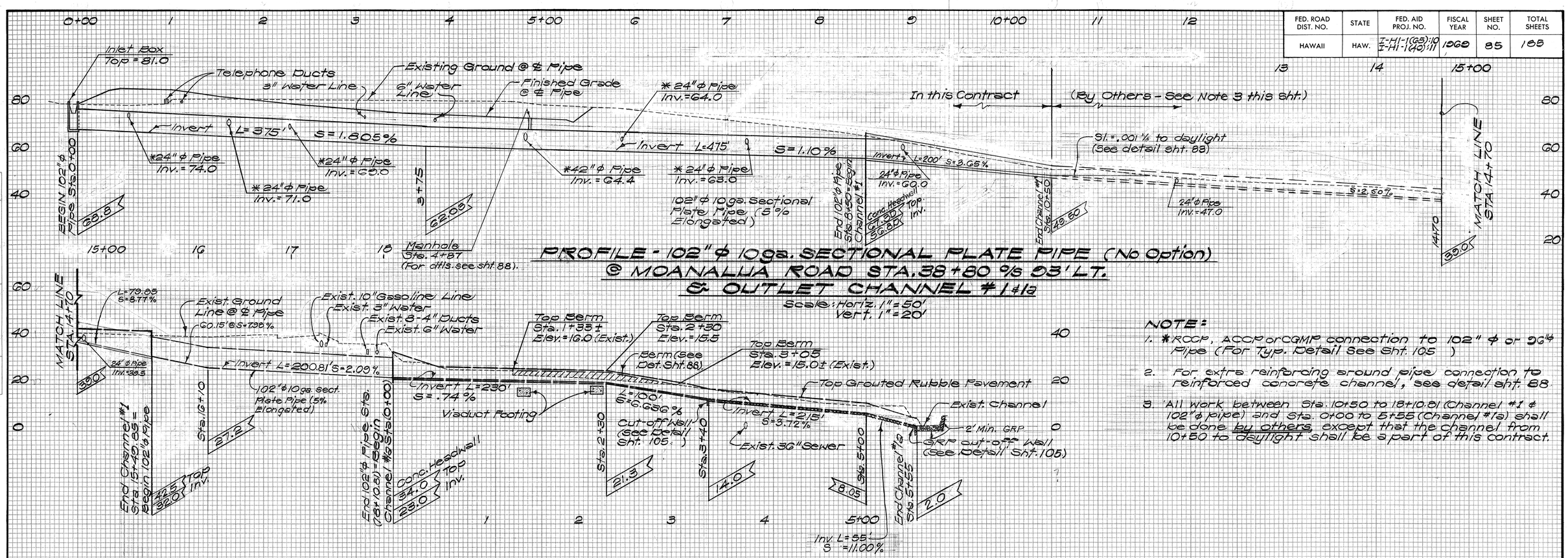
DETAILED DRAINAGE PLAN

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(G5):10

Scale: 1"=50' Date: 4-24-69

SHEET No. 6 OF 27 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 F-HI-1(42):11	1969	85	105



Revised: July 30, 1969
Oct. 23, 1969

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

102" & 96" SECTIONAL PLATE PIPE @ MOANALUA RD. & OUTLET CHANNELS #1, #1a & #2

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date: 4-24-69

SHEET No. 7 OF 27 SHEETS

THIS SHEET SUPERSEDES SHEET NO. 85

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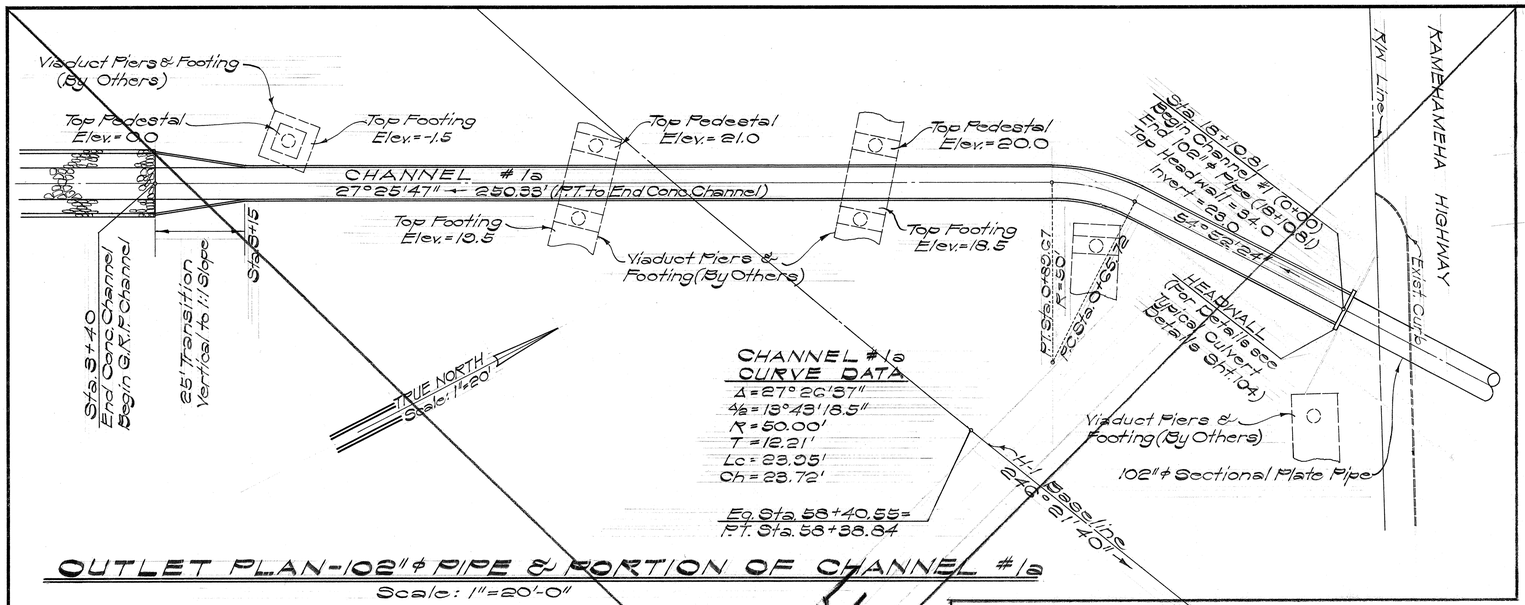
RAIN M. HIROTA
REGISTERED PROFESSIONAL ENGINEER
No. 1446
HONOLULU, HAWAII, U.S.A.

FINAL SURVEY / ORIGINAL SURVEY — SURVEYED, PLOTTED, TEMPLATE, AREAS, AREAS CHECKED — NOTE BOOK — NO. — BY — DATE

PLATE 3 - CROSS SECTION, F.A.S.
CLEARPRINT PAPER CO., S.F. CAL. NO. 1000H-3

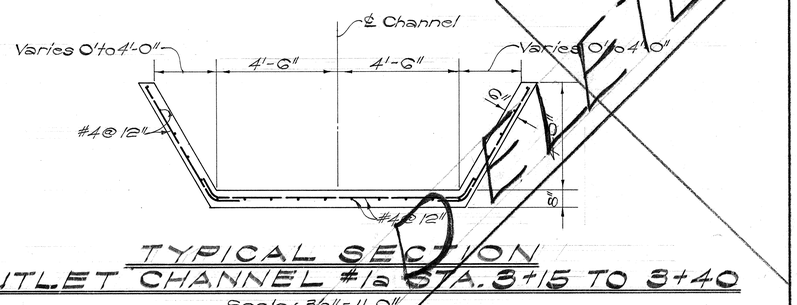
S 5 R

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1969	86	185



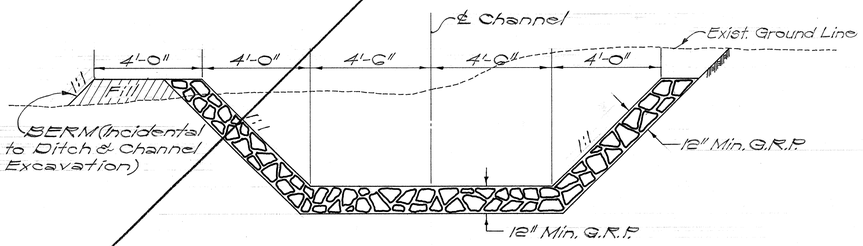
OUTLET PLAN-102" ϕ PIPE & PORTION OF CHANNEL #1a

Scale: 1"=20'-0"



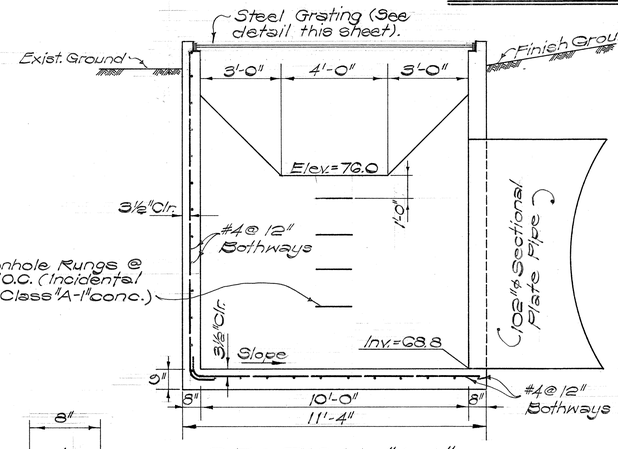
TYPICAL SECTION OUTLET CHANNEL #1a STA. 3+15 TO 3+40

Scale: 3/8"=1'-0"



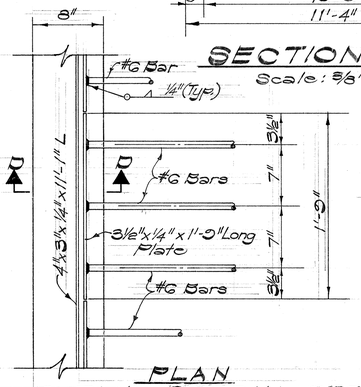
TYPICAL SECTION OUTLET CHANNEL #1a STA. 3+40 TO 5+55

Scale: 3/8"=1'-0"



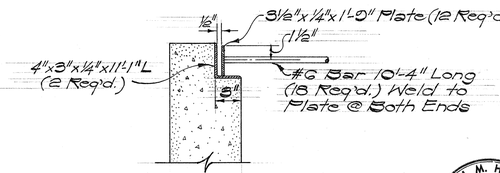
SECTION "A-A"

Scale: 3/8"=1'-0"

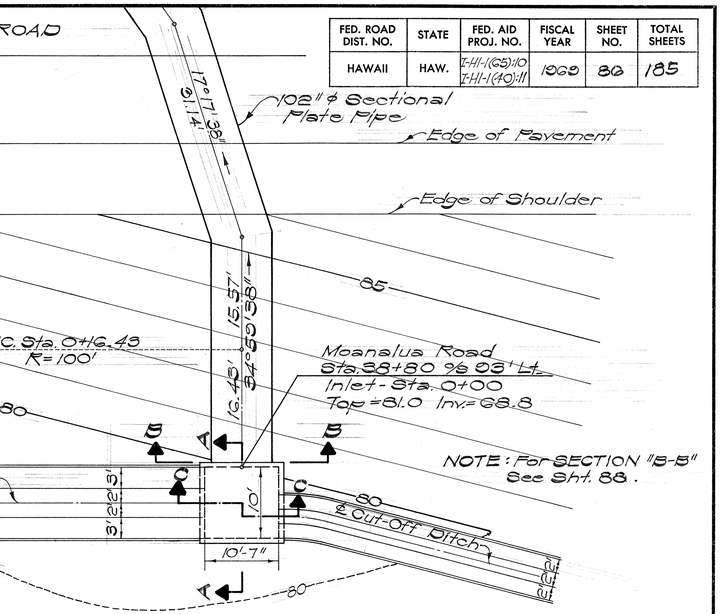


PLAN DETAIL - SPECIAL STEEL FRAME & GRATING

Scale: 1½"=1'-0"

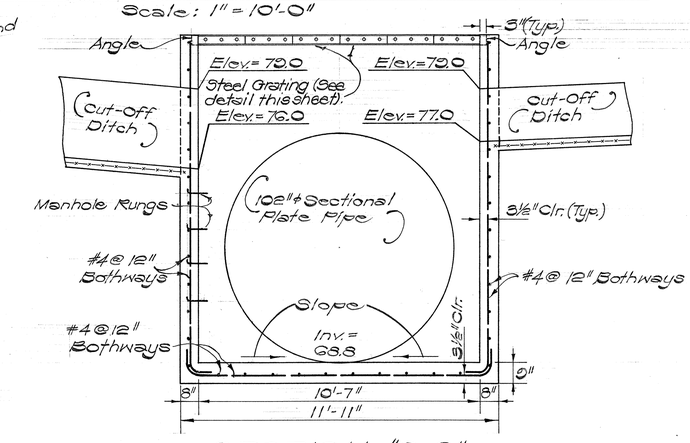


SECTION "D-D"



INLET PLAN 102" ϕ PIPE @ MOANALUA RD. STA. 38+80

Scale: 1" = 10'-0"



SECTION "C-C"

Scale: 3/8"=1'-0"

Note:

Steel Frames, shall not be paid for directly, but shall be considered incidental to the steel grates.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

102" ϕ SECTIONAL PLATE PIPE @ MOANALUA RD. STA. 38+80

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date: 4-24-69

SHEET No. 8 OF 27 SHEETS

PAUL M. HIROTA REGISTERED PROFESSIONAL ENGINEER No. 1249 HAWAII, U.S.A.

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

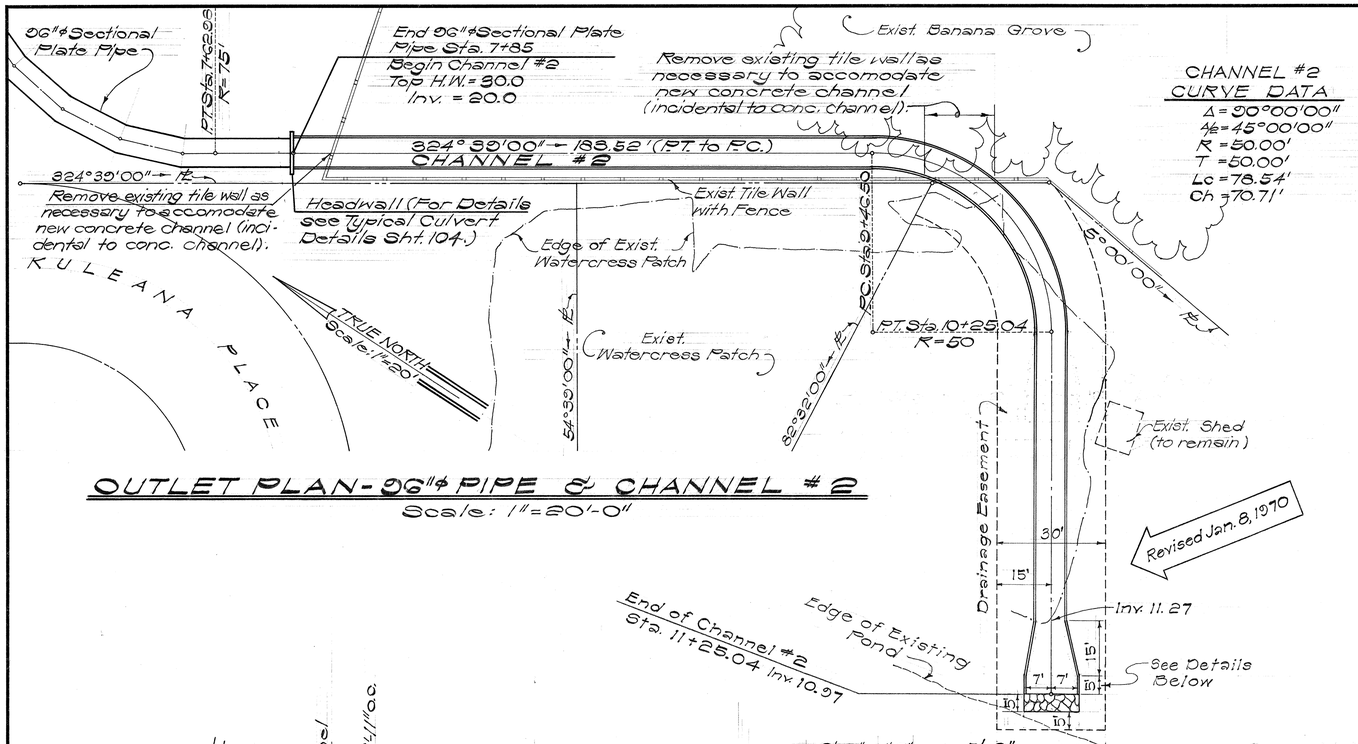
DELETE

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86

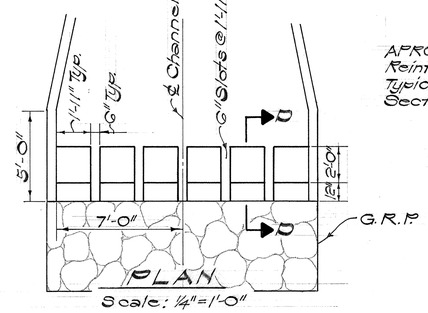
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(64):11	1969	87	185

Revised: July 30, 1969
Oct 23, 1969
Jan. 8, 1970

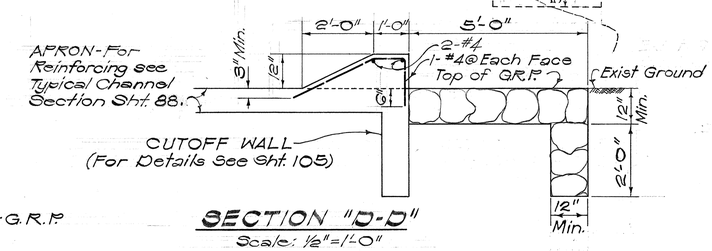


OUTLET PLAN-96"ϕ PIPE & CHANNEL #2

Scale: 1"=20'-0"



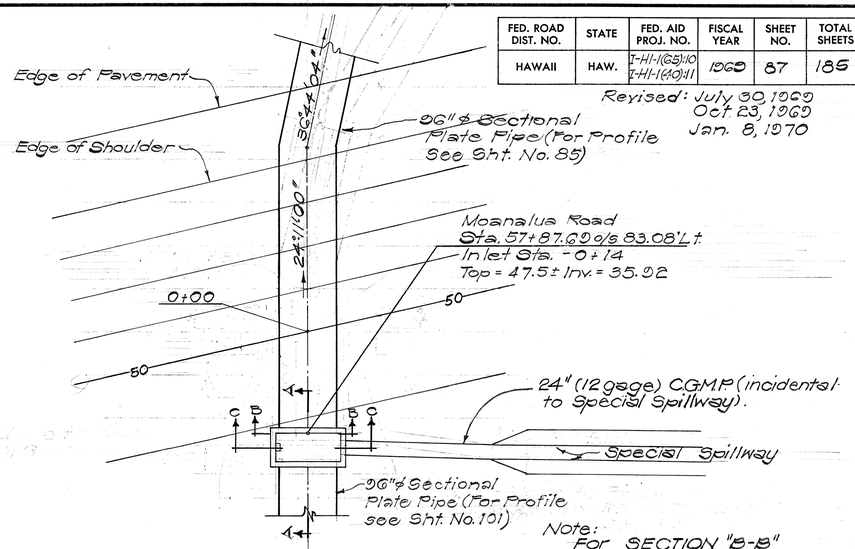
Scale: ¼"=1'-0"



SECTION "D-D"

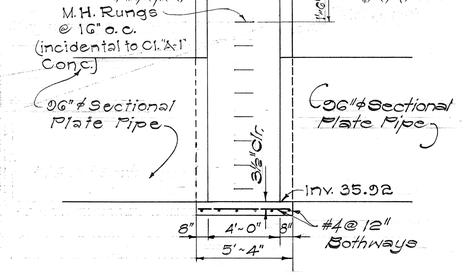
Scale: ½"=1'-0"

CHANNEL #2 OUTLET DETAIL



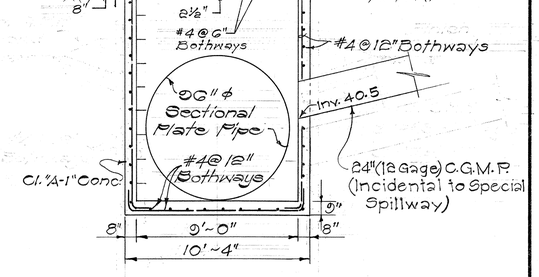
INLET PLAN
96"ϕ PIPE @ MOANALUA RD. STA. 57+87.69

Scale: 1"=10'-0"



SECTION "A-A"

Scale: ¼"=1'-0"



SECTION "C-C"

Scale: ¼"=1'-0"

THIS SHEET SUPERSEDES SHEET NO. 87R

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PAUL M. HIROTA REGISTERED PROFESSIONAL ENGINEER No. 4268 HAWAII, U.S.A.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

96"ϕ SECTIONAL PLATE PIPE & CHANNEL #2 @ MOANALUA RD. STA. 57+87.69

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date: 4-24-69

SHEET No. 9 OF 27 SHEETS

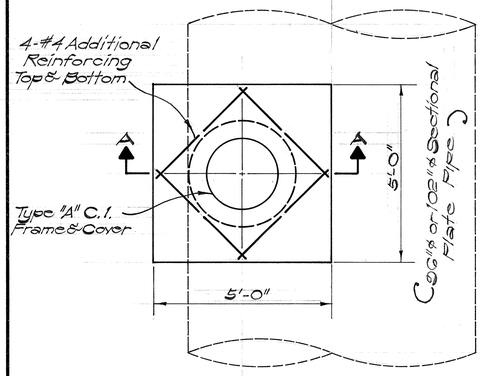
ORIGINAL PLAN
NOTE BOOK
No.
DRAWN PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

PRINTED ON NO. 1000H CLEARPRINT

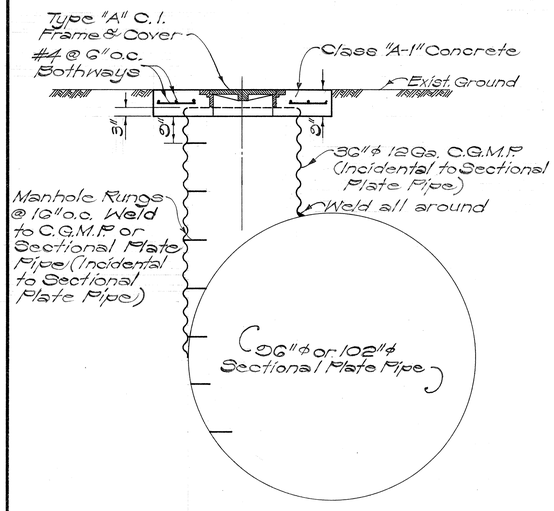
COST IR

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(60):11	1969	88	185

Revised: July 30, 1969



PLAN



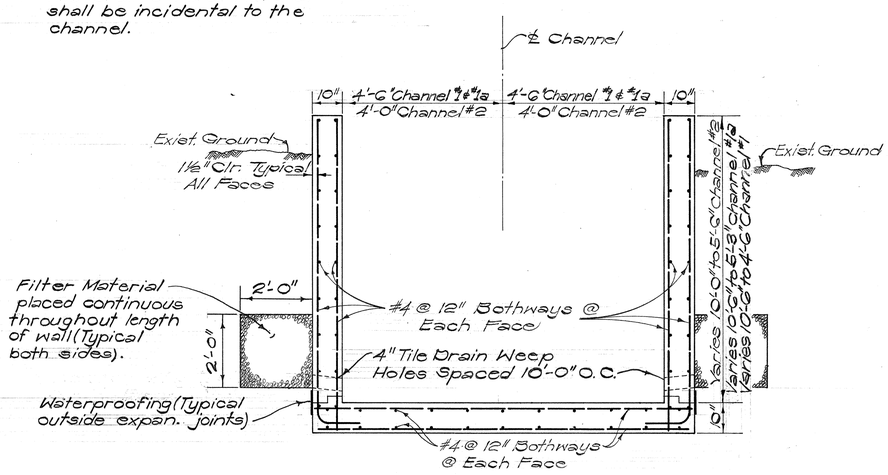
SECTION "A-A"

MANHOLE FOR 96" ϕ & 102" ϕ SECTIONAL PLATE PIPE

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

NOTE:
1. Manhole rungs shall be cut off at the wall line before welding. (See Standard Manhole Rung Detail Sht. 37)

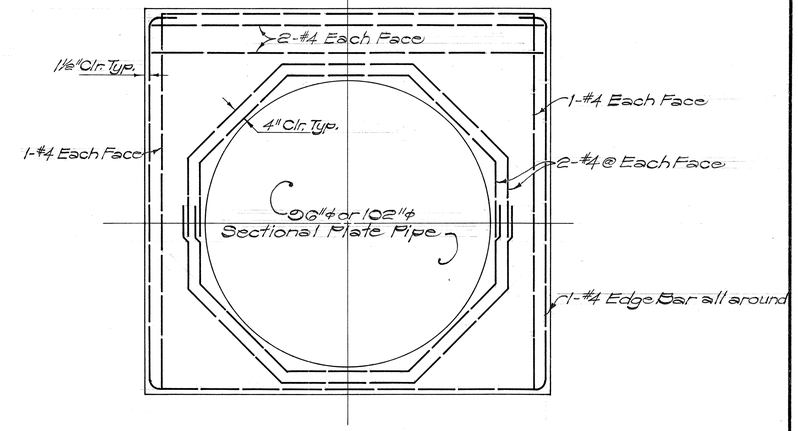
NOTE:
The Drain & Filter Material shall be incidental to the channel.



TYPICAL SECTION

~~CHANNEL #1 STA. 8+50 TO 10+50 STA. 14+70 TO 15+40.85~~
~~OUTLET CHANNEL #1a STA. 0+00 TO 0+50~~
OUTLET CHANNEL #2 STA. 7+85 TO 8+45

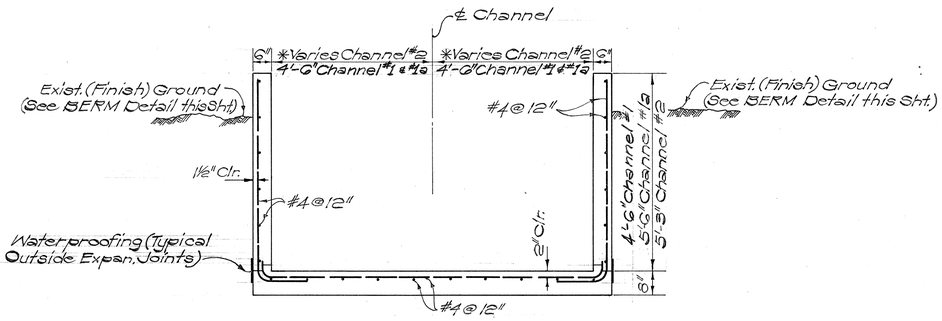
Scale: 1/2" = 1'-0"



SECTION "B-B" FOR INLET STRUCTURES @ MOANALUA ROAD STA's. 38+80 & 57+87.69

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

* 4'-0" Sta. 8+40 to Sta. 10+25.04
4'-0" to 7'-0" Sta. 10+25.04 to Sta. 10+40.04
7'-0" Sta. 10+40.04 to 10+45.04

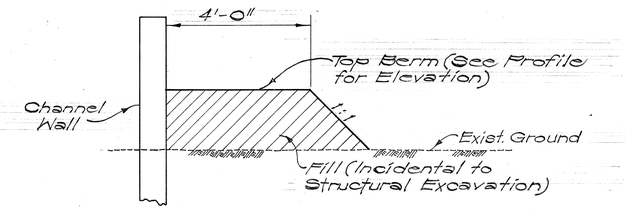


TYPICAL SECTION

~~CHANNEL #1 STA. 10+50 TO 14+70~~
~~OUTLET CHANNEL #1a STA. 0+50 TO 3+15~~
OUTLET CHANNEL #2 STA. 8+45 TO 10+45.04

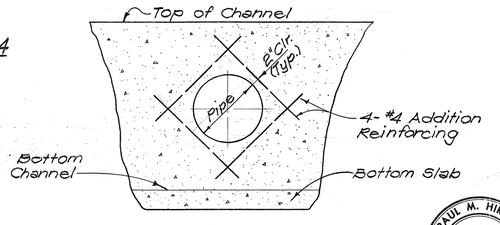
Scale: 1/2" = 1'-0"

Note:
Expansion Joints spaced at 30'-0" Max. (Continue reinforcing through joint-no roofing paper at joint). See Standard Bridge Detail Sht. 143 for Details.



BERM DETAIL

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



TYPICAL CONNECTION DETAIL OF PIPE TO CHANNEL

NOT TO SCALE

PAUL M. HIROTA REGISTERED PROFESSIONAL ENGINEER No. 7449 HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1 (65):10

Scale: As Shown Date: 4-24-69

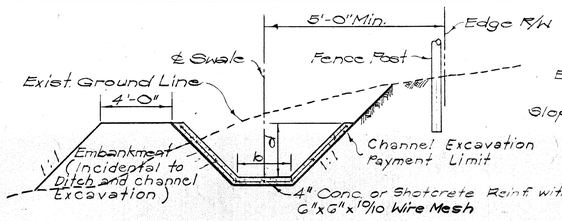
SHEET No. 10 OF 27 SHEETS

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

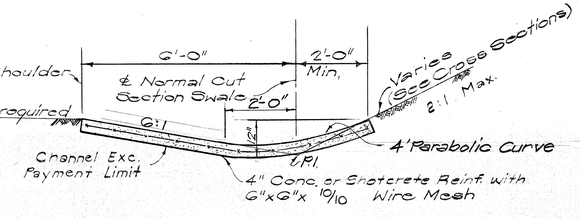
PRINTED ON NO. 1000H CLEARPRINT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(63):10 I-HI-1(60):11	1969	80	188

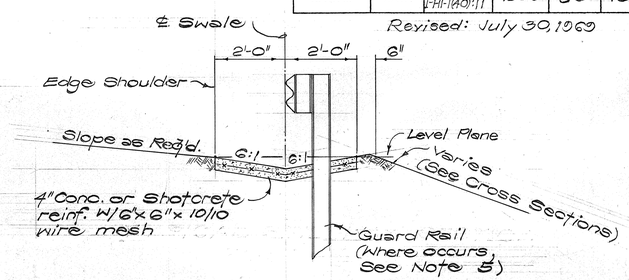
Revised: July 30, 1969



TYPE 1 TYPICAL SECTION
CUT-OFF DITCH (LINED)
Not to Scale



TYPE 2 TYPICAL SECTION
ROADWAY LINED SWALE
Not to Scale



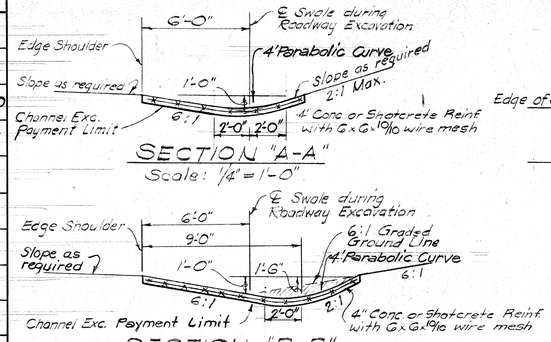
TYPE 3 TYPICAL SECTION
ROADWAY LINED SWALE
Not to Scale

SCHEDULE OF ROADWAY LINED SWALES & CUT-OFF DITCHES

LOCATION	TYPE	MINIMUM "b"	MINIMUM "d"	SLOPE FT/FT.	ESTIMATED QUANTITIES: DITCH & CHANNEL EXCAVATION (C.Y.)	ESTIMATED QUANTITIES: CLASS B-1 CONC OR SHOTCRETE (C.Y.)	ESTIMATED QUANTITIES: REINFORCING STEEL (lb.)	REMARKS
34+18 (M-R) % Lt. to 38+80 (M-R) % Lt.	1	2.0'	2.0'	.01 (Min)	160	43	780	Inlet @ 38+80
37+85 (M-R) % Rt. to 39+75 (M-R) % Rt.	3					10	160	Inlet @ 39+75
103+50 (H-1) % Lt. to 105+75 (H-1) % Lt.	1	2.0'	2.0'	.01 (Min)	400	77	1300	Spillway "y" Connection @ 103+50
104+75 (H-1) % Lt. to 101+00 (H-1) % Lt.	1	2.0'	2.0'	.01 (Min)	202	39	655	Transition 101+00 to 100+75
100+75 (H-1) % Lt. to 88+09 (H-1) % Lt.	1	3.0'	3.0'	.012 (Min)	235	29	900	Inlet @ 88+69.93
88+09 (H-1) % Lt. to 3+25 (E) % Rt.	1	3.0'	3.0'	.01 (Min)	245	42	2321	Inlet @ 88+69.93
3+50 (E) % Rt. to 5+50 (E) % Rt.	1	2.5'	2.5'	.015 (Min)	120	24	410	Transition 3+25 to 3+50
5+75 (E) % Rt. to 8+50 (E) % Rt.	1	2.0'	2.0'	.010 (Min)	110	28	484	Transition 5+50 to 5+75
8+50 (E) % Rt. to 14+25 (E) % Rt.	1	2.0'	2.0'	.005 (Min)	230	58	1008	Transition 14+25 to 14+50
14+50 (E) % Rt. to 38+80 (M-R) % Lt.	1	4.0'	3.0'	.025 (Min)	540	90	3180	Inlet @ 38+80
42+00 (M-R) % Rt. to ℄ +51.67 (A) % Rt.	2				58	58	955	
45+00 (M-R) % Lt. to 55+50 (M-R) % Lt.	2				114	114	1940	Swale Transition @ 55+50
0+00 (F) % Rt. to 1+01.10 (F) % Rt.	2				10	10	168	
19+37.19 (C) % Rt. to 50+51.61 (M-R) % Rt.	3					23	378	

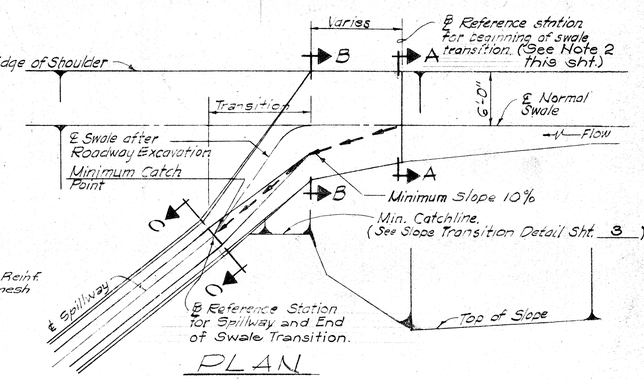
SPILLWAY REFERENCE	
STATION	LOCATION
56+00 (M-R)	LEFT
77+00 (H-1)	RIGHT
102+15 (H-1)	RIGHT
103+28 (H-1)	LEFT

SWALE TRANSITION REFERENCE	
STATION	LOCATION
55+50 (M-R)	LEFT

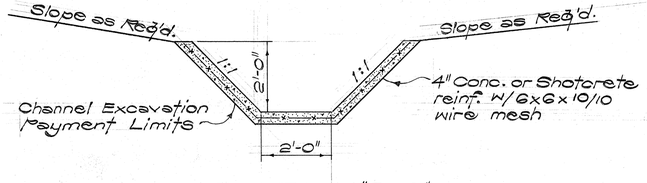


SECTION "A-A"
Scale: 1/4" = 1'-0"

SECTION "B-B"
Scale: 1/4" = 1'-0"



PLAN
SWALE TRANSITION
Scale: 1/8" = 1'-0"



SECTION "C-C"
TYPICAL SPILLWAY SECTION
Scale: 1/2" = 1'-0"

NOTES:

1. Reverse plan view when flow is in direction opposite to that shown.
2. The plan view and sections for the swale transition apply only to Moanalua Road. The swale transition on H-1 is by others.
3. The spillway shall be a part of this contract.
4. The Special spillway (H-1 ℄ Sta. 76+18 to Moanalua Rd. Sta. 57+67) is similar to the Type "I" Cut-Off Ditch.
5. Where Guard Rail is to be installed in the swale section a 10"x10" size opening shall be provided in the slab at the Guard Rail Post location. After the Guard Rail Post has been placed the remaining portion of the opening shall be filled with asphaltic concrete. (Asphaltic Concrete to be incidental to Class B-1 concrete).
6. Where Inlet Structures are called for in Parabolic Swale Sections, provide 5' min. transition from the Parabolic Swale to the inlet.
7. Wire Mesh shall be incidental to Class "B-1" Concrete or Shotcrete.

PAUL M. HIROTA REGISTERED PROFESSIONAL ENGINEER No. 1109 HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS SWALES & CUT-OFF DITCHES

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date 4-24-69

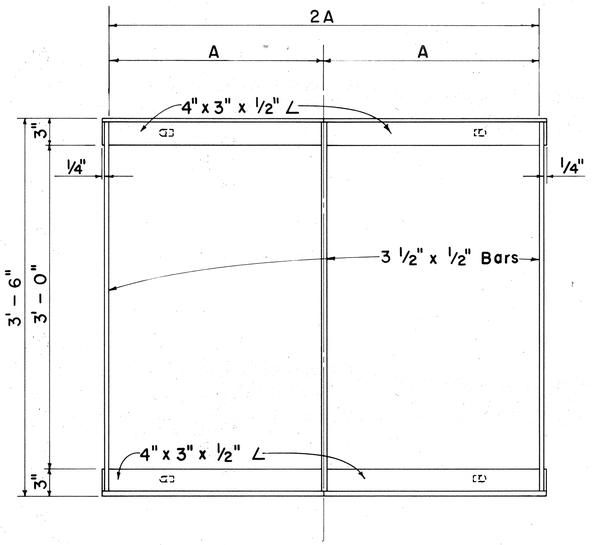
SHEET No. 11 OF 27 SHEETS

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

PRINTED ON NO. 1000H CLEARPRINT

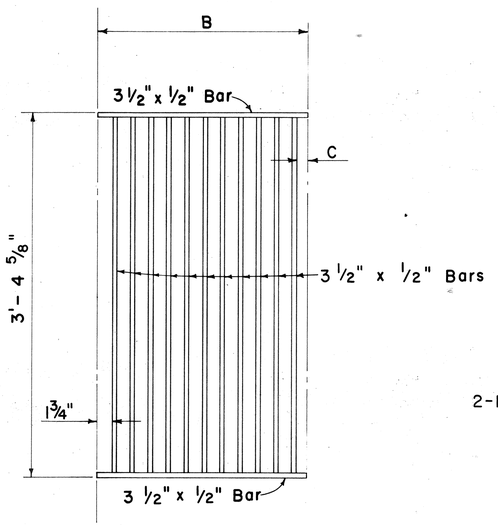
S 9

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65)-10 I-HI-1(40)-11	1969	90	185



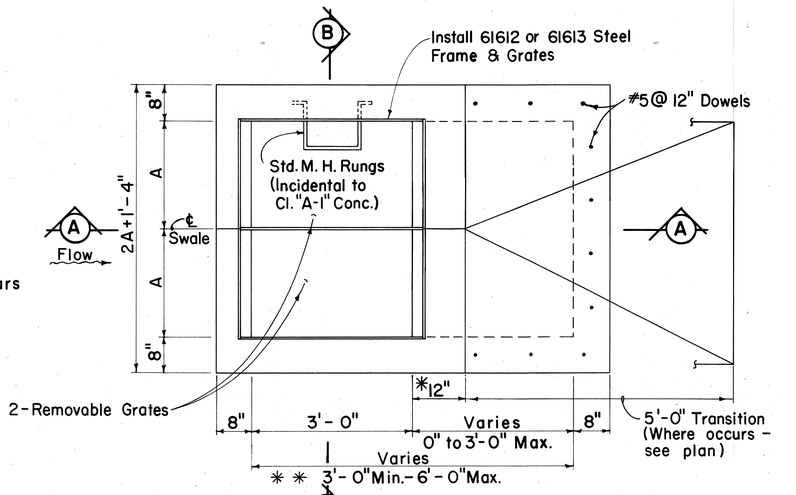
PLAN

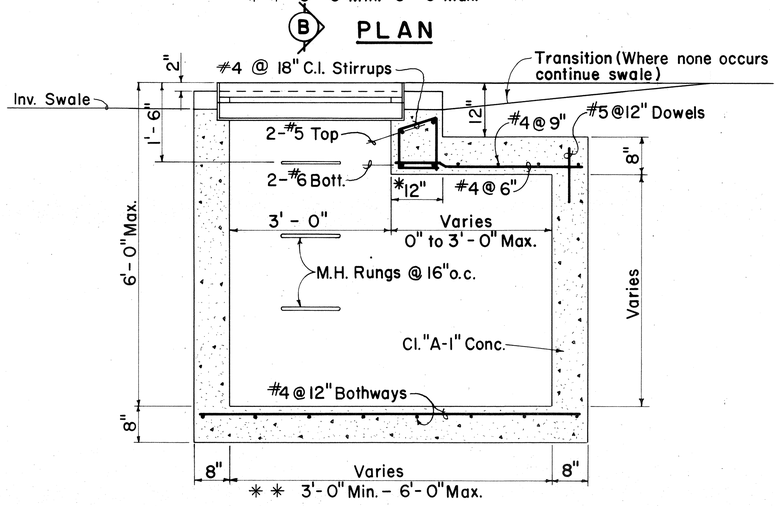
Scale: 1 1/2" = 1'-0"



PLAN

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

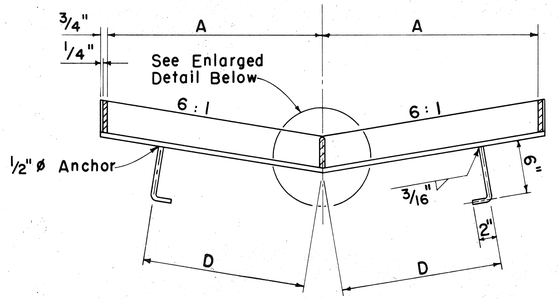




SECTION A - A

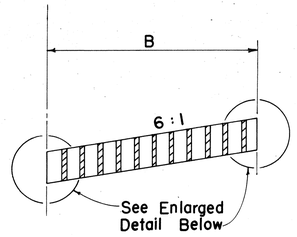
GENERAL NOTES

1. Grates and Frames shall be hot dip galvanized after fabrication, see specifications.
2. All welds 3/8" unless otherwise noted.
3. Refer to "Spacing Table" for Types 61612 & 61613 Drop Intake and Frame & Grates dimensions.
4. The Frame & Grate materials shall conform to the specifications of ASTM Designation Structural Steel A283, Grade D and the Standard Specifications.
5. Culvert shall leave Drop Intake from any position and any direction indicated by plans or ordered by the Engineer. Culverts may both enter and leave Drop Intake so that Drop Intake will act as manhole.



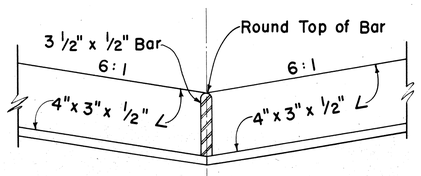
SECTION

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



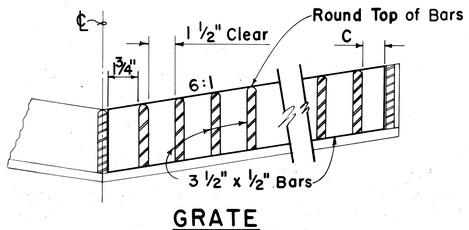
SECTION

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



FRAME

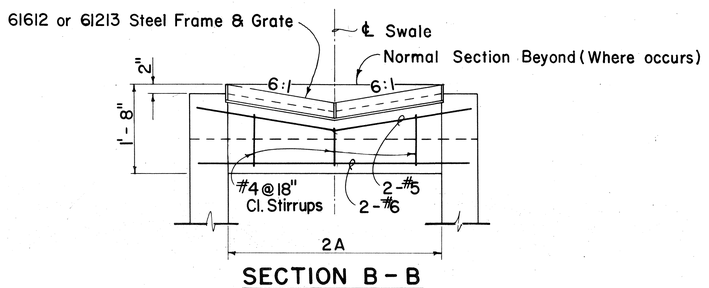
Scale: 3" = 1'-0"



GRATE

Scale: 3" = 1'-0"

DETAILS OF TYPE 61612 OR 61613 STEEL FRAME AND GRATES



SECTION B - B

DETAIL OF 61612 OR 61613 DROP INTAKE

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

*For Minimum size box of 3'-0" use 8" and eliminate reinforcing steel shown in the top portion.

* *For Culverts larger than 30", minimum dimension shall be D'.

SPACING TABLE					
TYPE	NO. BARS	A	B	C	D
61612	11	2'- 0"	1'- 11 1/2"	1 1/4"	1'- 6"
61613	17	3'- 0"	2'- 11 1/2"	1 1/8"	2'- 0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAIL

DETAILS OF 61612 & 61613 DROP INTAKE

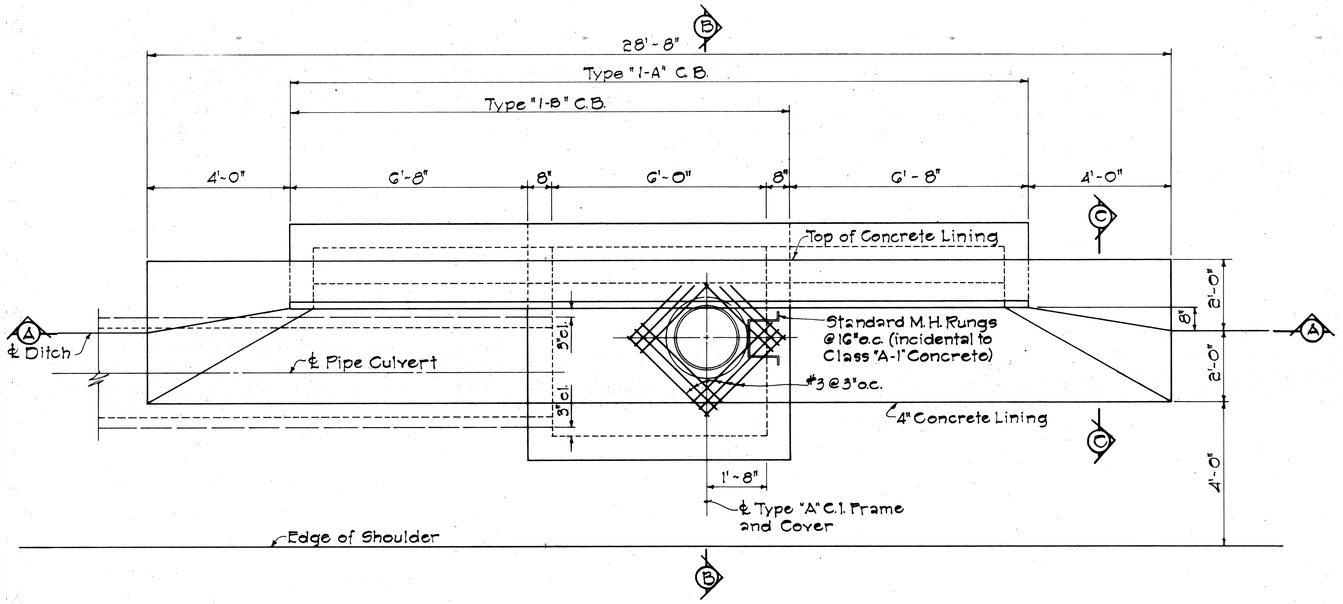
INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scales: As Noted Date: Feb. 1969

SHEET No. 12 OF 27 SHEETS

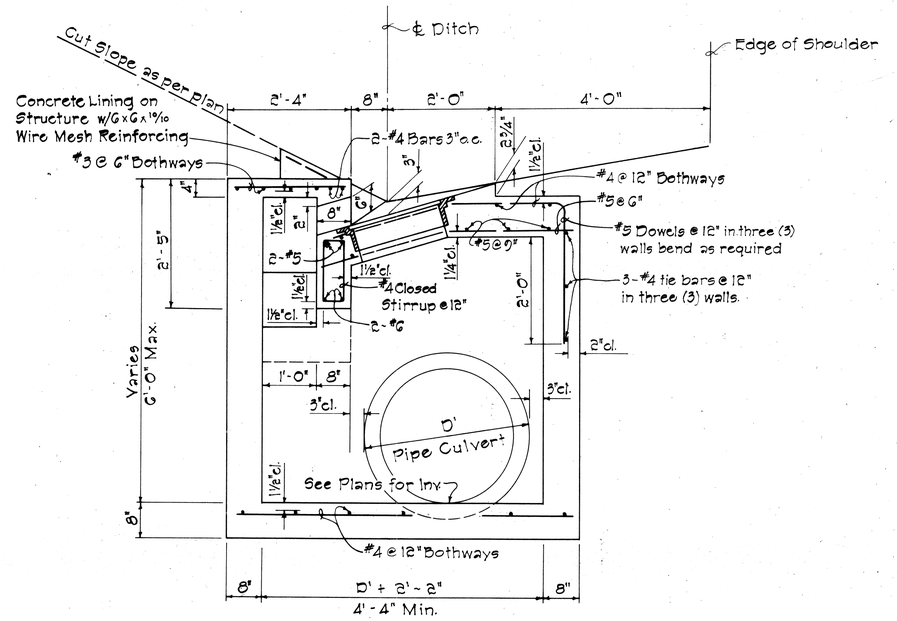
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
No.	TRACED BY	
	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1969	91	185



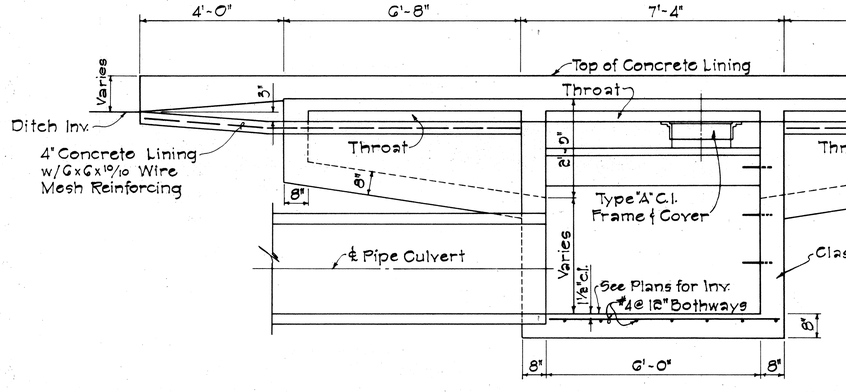
PLAN

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



SECTION "B-B"

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

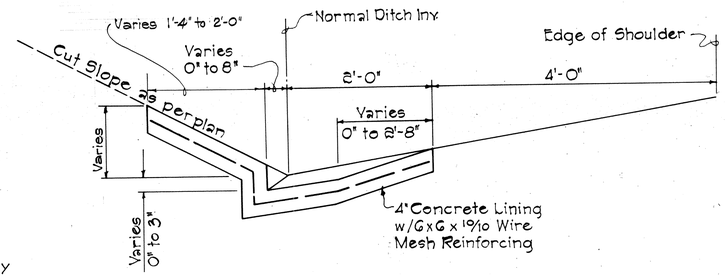


SECTION "A-A"

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

NOTES:

1. Pipe 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 pipe culvert at the C.B. wall.
3. Type "A" C.I. Frame & Cover and Standard Manhole Rungs may be placed at opposite wall if ordered by the Engineer.



SECTION "C-C"

Scale: 1" = 1'-0"

DETAILS OF TYPE "I-A" AND "I-B" CATCH BASIN

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE STRUCTURE DETAILS

TYPE "I-A" AND "I-B" CATCH BASIN

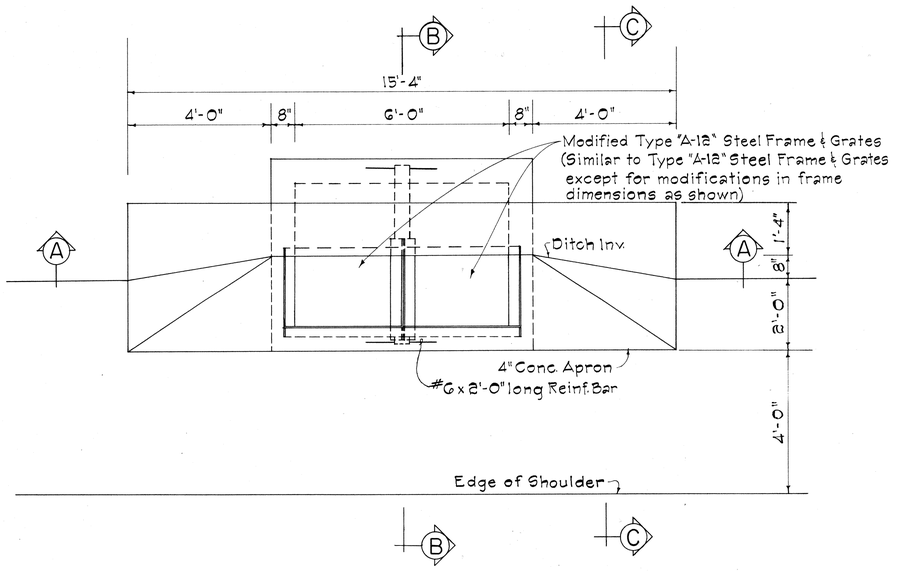
INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date: 4-24-69

SHEET No. 13 OF 27 SHEETS

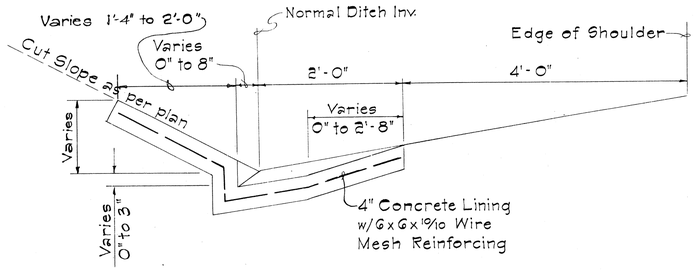
91

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1969	92	185



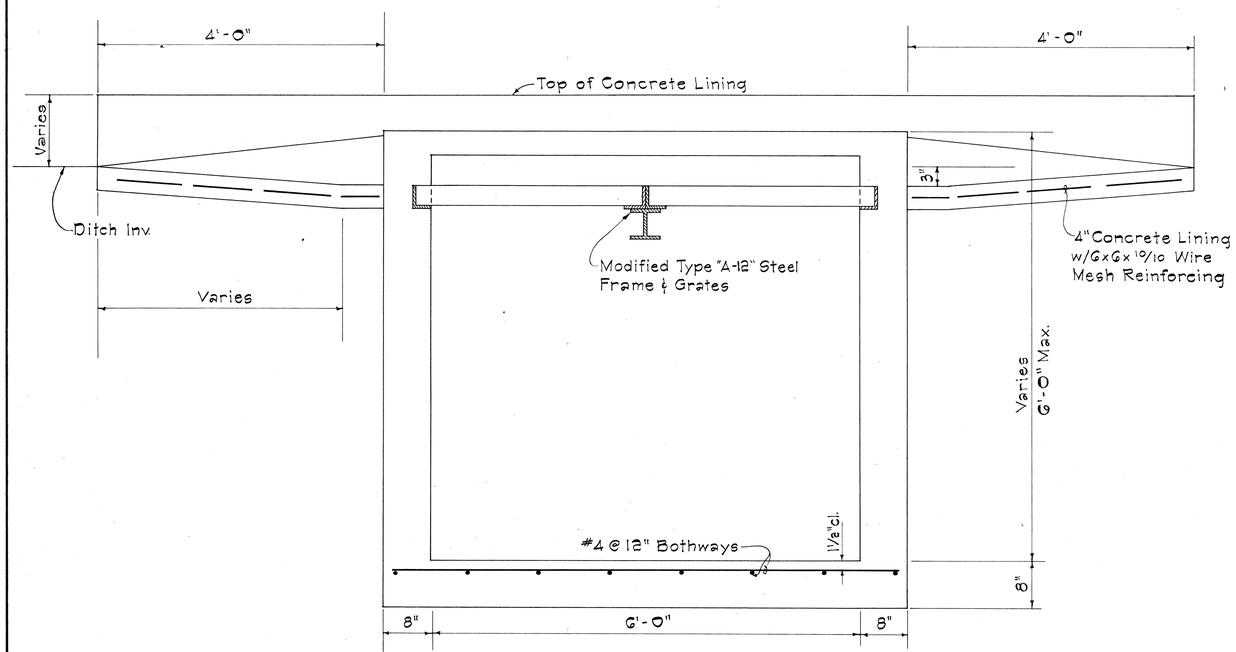
PLAN

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



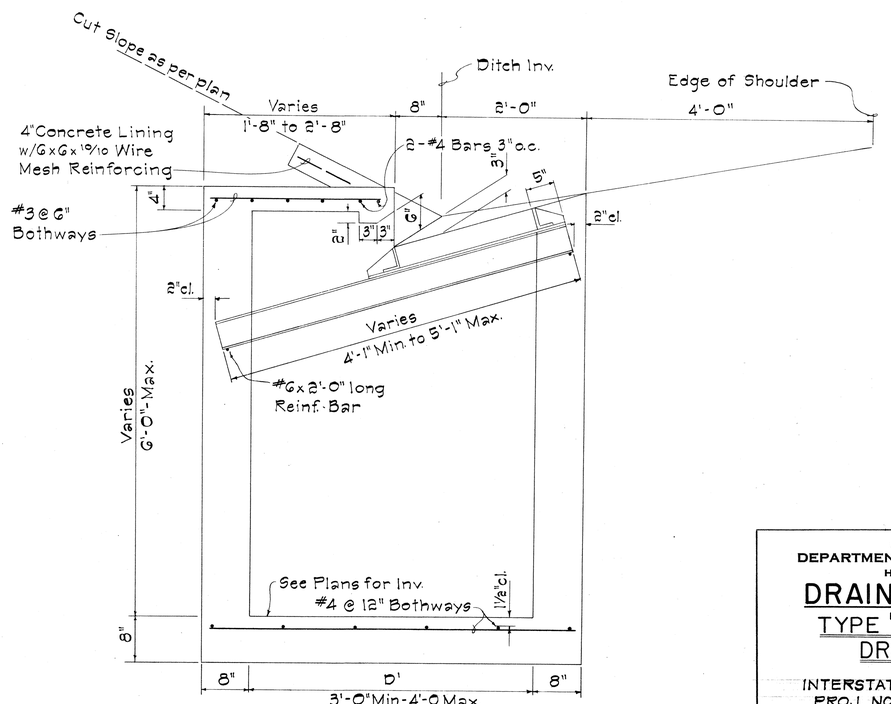
SECTION C-C

Scale: 1" = 1'-0"



SECTION A-A

Scale: 1" = 1'-0"



SECTION B-B

Scale: 1" = 1'-0"

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS
TYPE "D" SHOULDER DROP INTAKE

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

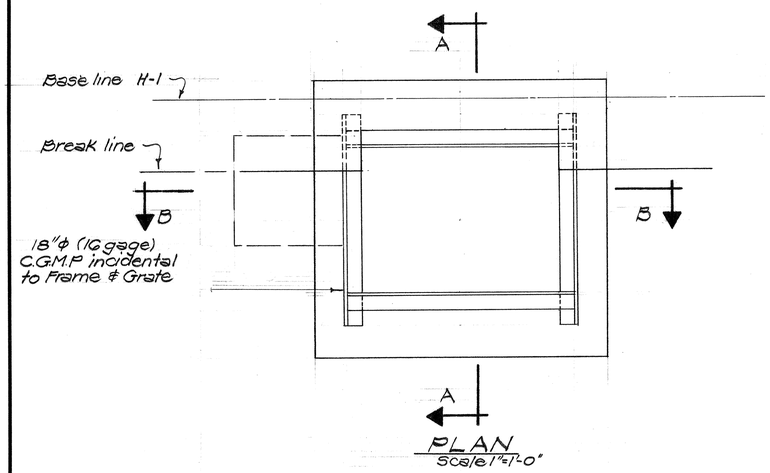
Scale: As Shown Date: 4-24-69

SHEET No. 14 OF 27 SHEETS

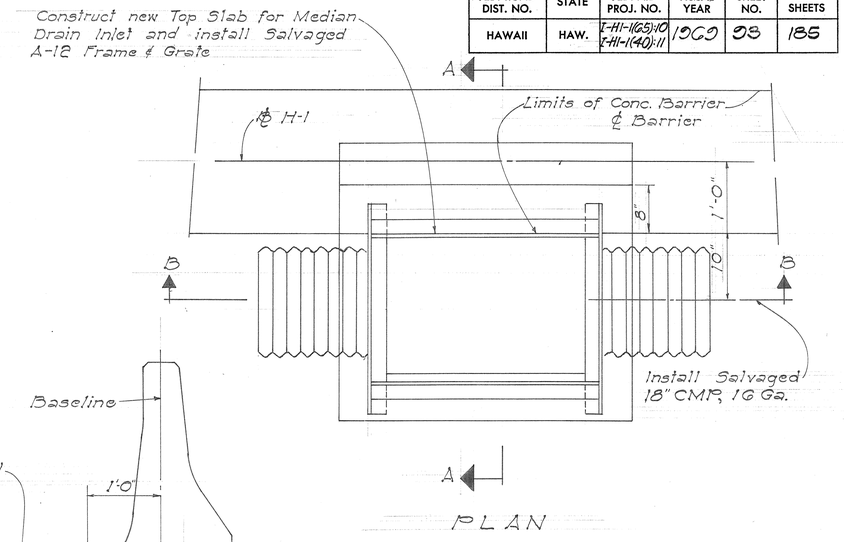
92

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65)40 I-HI-1(40)-11	1969	98	185

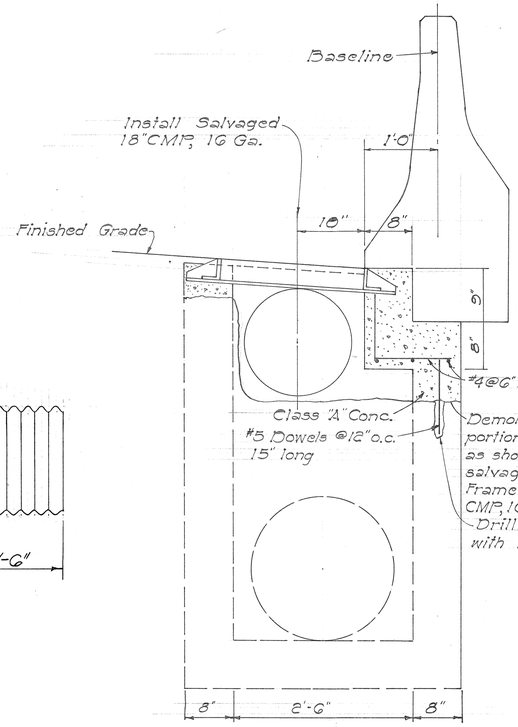
NOTES:
1. Culvert shall leave Median Drain Inlet from any position and any direction indicated by plans or ordered by the Engineer. Culverts may both enter and leave Median Drain Inlet so that the inlet will serve as a Manhole.
2. For details of Type "A-12" Frame & Grate see sht. 96.
3. 18" ϕ (16 gage) C.G.M.P. on both sides @ H-1 ℄ sta. 77+50 & Sta. 57+50.



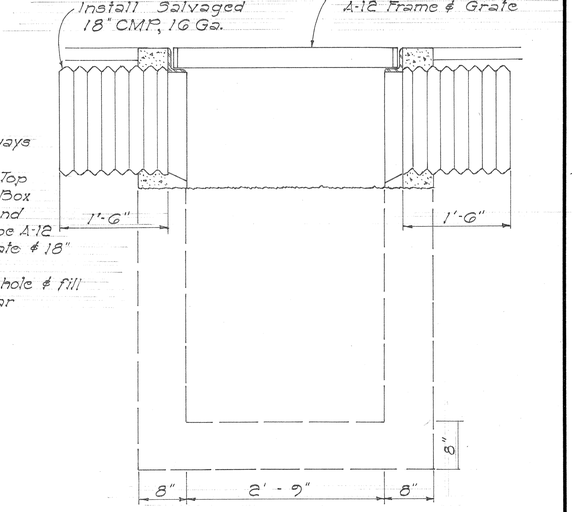
PLAN
Scale 1"=1'-0"



PLAN

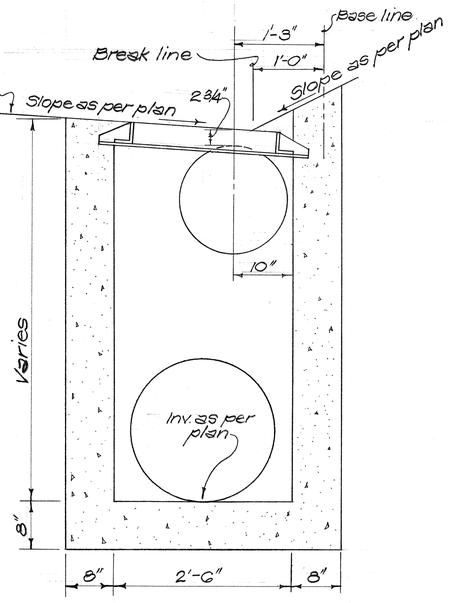


SECTION "A-A"

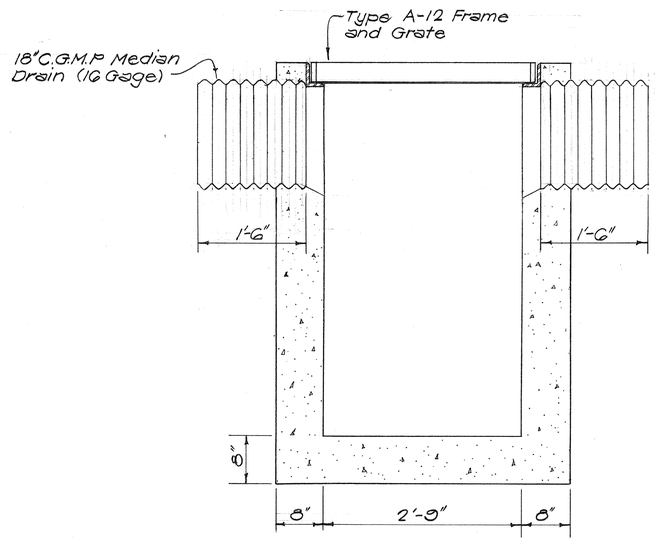


SECTION "B-B"

MODIFICATION TO EXISTING MEDIAN DRAIAN INLET STRUCTURE (C.C.O. #15)
Scale: 1"=1'-0"



SECTION "A-A"
Scale 1"=1'-0"



SECTION "B-B"
Scale 1"=1'0"

PAUL M. HIROTA
REGISTERED PROFESSIONAL ENGINEER
No. 7446
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS
MEDIAN DRAIN INLET STRUCTURE

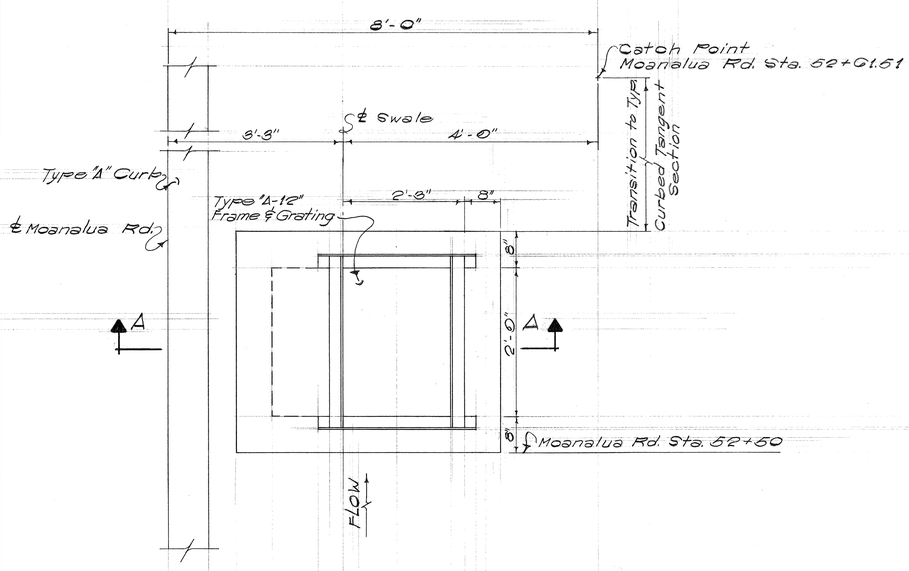
Interstate Route H-1
Project No. I-HI-1(65):10
Scale as Shown Date: June 1969

SHEET No. 15 OF 27 SHEETS

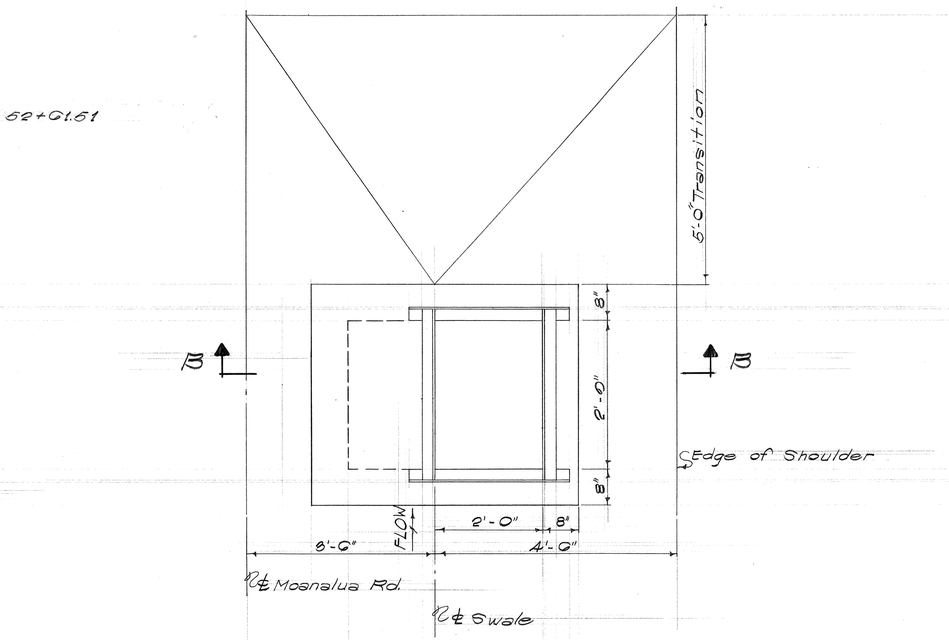
ORIGINAL PLAN	SHEET PLOTTED BY DATE
	DRAWN BY " "
	TRACED BY " "
NOTE BOOK	DESIGNED BY " "
	QUANTITIES BY " "
No.	CHECKED BY " "

PRINTED ON NO. 1000H CLEARPRINT

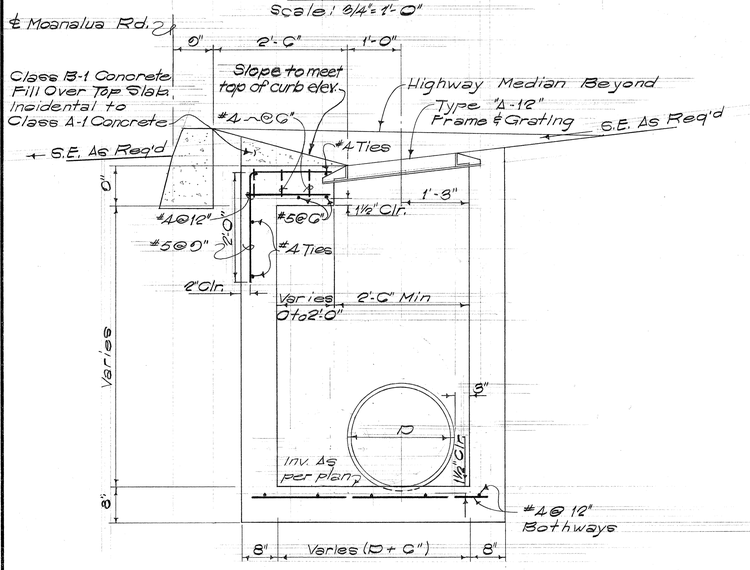
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(49):11	1969	94	185



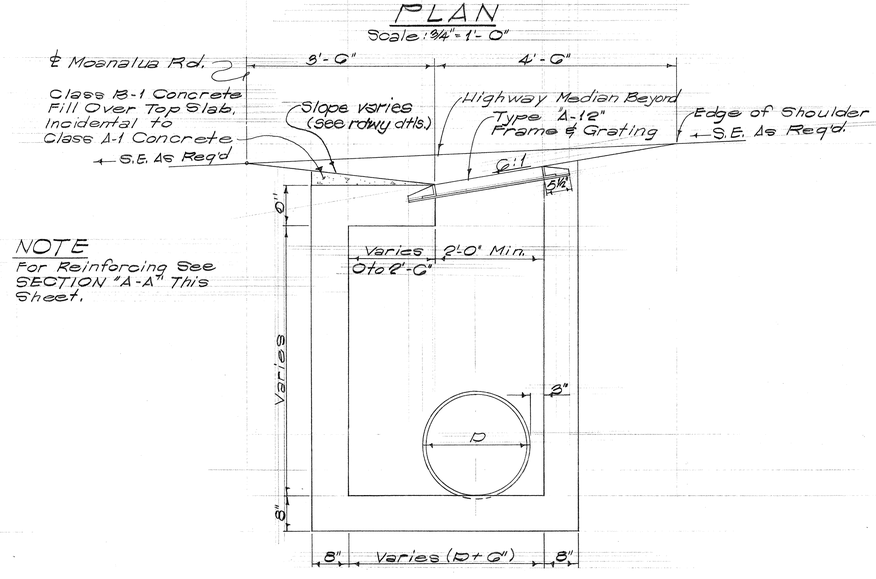
PLAN
Scale: 3/4" = 1'-0"



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



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



NOTE
For Reinforcing See SECTION "A-A" This Sheet.

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

TYPE 1 C.D.I. @ MOANALUA RD. STA. 52+50
Scale: 3/4" = 1'-0"

TYPE 2 C.D.I.
Scale: 3/4" = 1'-0"

ORIGINAL PLAN
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
NOTE BOOK
No.

PAUL M. HIROTA REGISTERED PROFESSIONAL ENGINEER NO. 1249 HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS
TYPE 1 & 2 C.D.I.

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date: 4-24-64

SHEET No. 16 OF 27 SHEETS

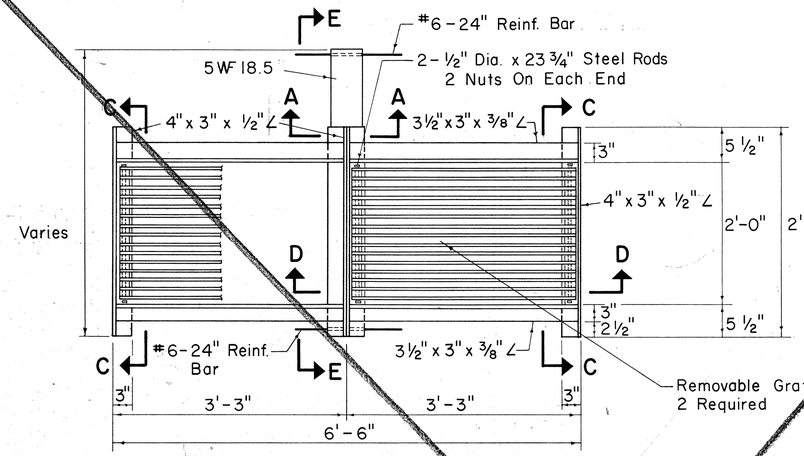
PRINTED ON NO. 1000H CLEARPRINT

94

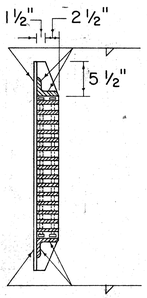
FED. ROAD DIST. NO.	STATE	FED. AID. PROJECT	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	I-HI-1(25):10 I-HI-1(40):11	1969	95	185

Revised: Jan. 25, 1967

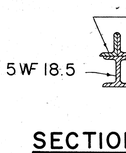
NOTE:
1. All welds 3/8" unless otherwise noted.
2. All steel shall be structural grade.
3. Grates and Frame shall be hot dip galvanized after fabrication in accordance with Section 44(H) of the Standard Specifications.
4. Detail of Types "A-1" and "A-2" Steel Frame and Grates are identical except for the thickness of end spacers and number of grate bars. See Table of End Spacer Thickness.



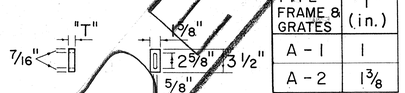
PLAN



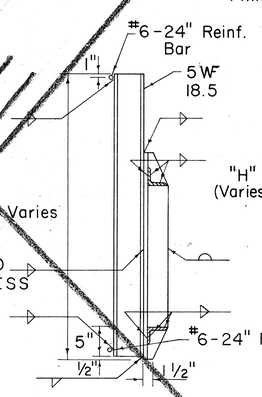
SECTION C-C



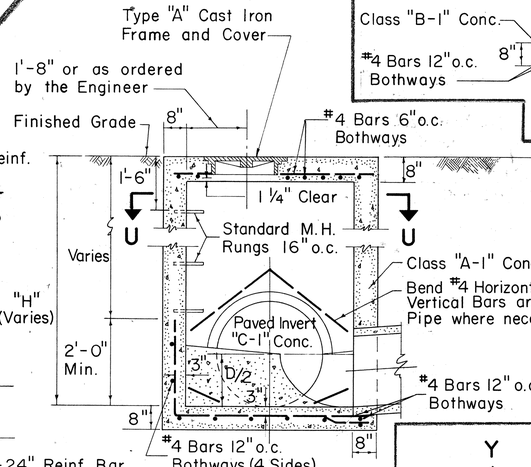
SECTION A-A



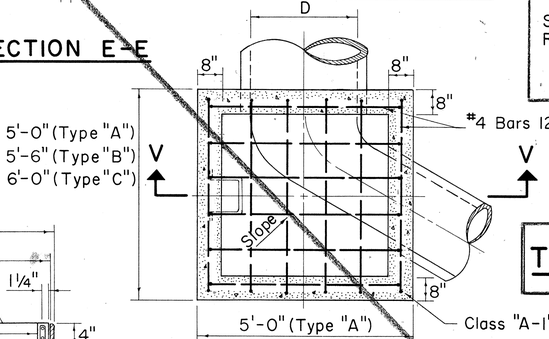
END SPACER



SECTION E-E



SECTION V-V

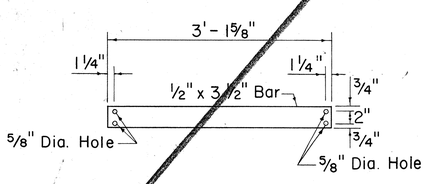


SECTION U-U

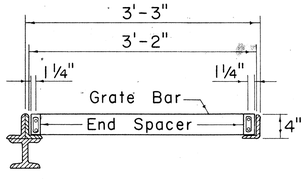
TYPE "A", "B", & "C"

S.D.M.H.

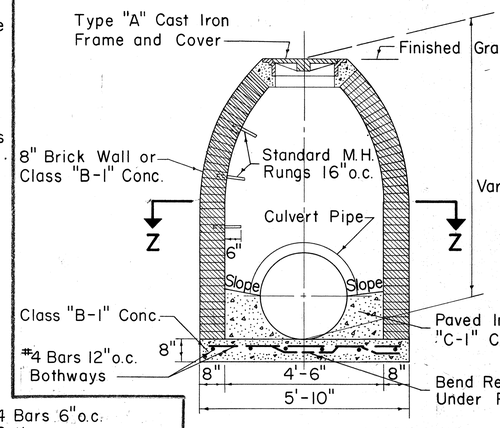
Scale: ½"= 1'-0"



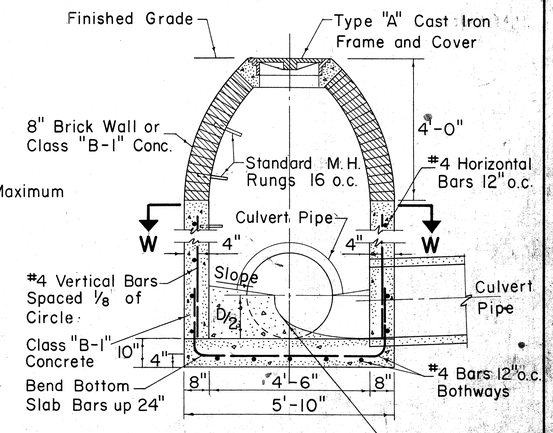
GRATE BARS



SECTION D-D

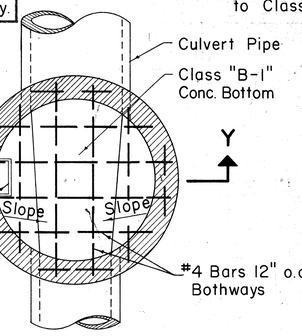


SECTION Y-Y

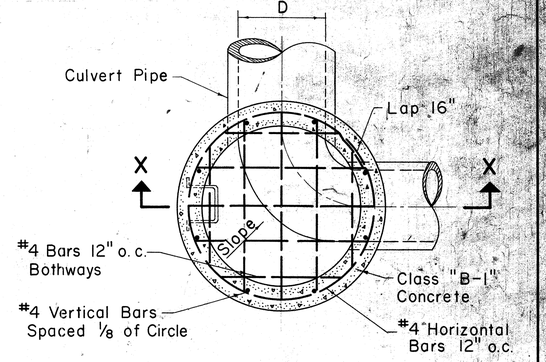


SECTION X-X

NOTE:
1. Exterior surface of brick wall shall be plastered with 1" thickness of 1:2 Cement Mortar.
2. Number size and direction of culvert pipes at manhole to be as shown on plans.
3. Paved invert not required at drop manholes.
4. All Class "C-1" Concrete to be incidental to Class "B-1" Concrete.



SECTION Z-Z



SECTION W-W

TYPE "D" STORM DRAIN MANHOLE

Scale: ½"= 1'-0"

TYPE "E" STORM DRAIN MANHOLE

Scale: ½"= 1'-0"

DETAIL OF TYPE "A-1" & "A-2" STEEL FRAME AND GRATES

Scale: 1"= 1'-0"

APPROVED:

DIRECTOR OF TRANSPORTATION DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

STEEL FRAME AND GRATES AND STORM DRAIN MANHOLES

Scales: As Noted Date 4-24-69

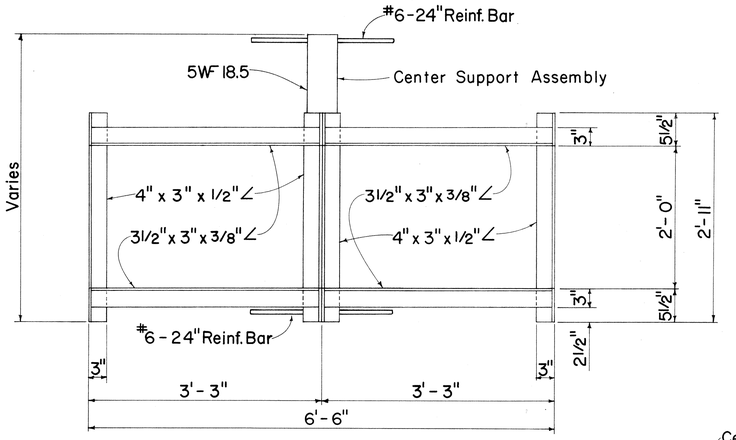
SHEET NO. 17 OF 27 SHEETS

95

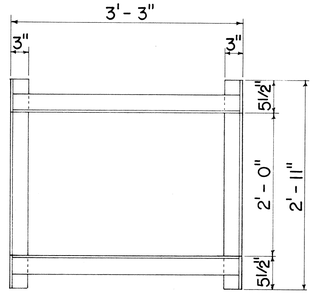
D-1-A

LIETZ 1103 AIRWRIGHT TRACING CLOTH 10-60 200P

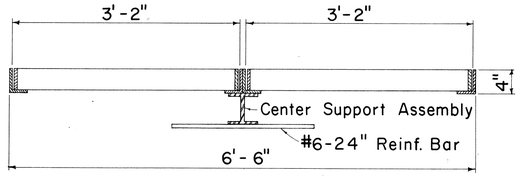
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1969	96	185



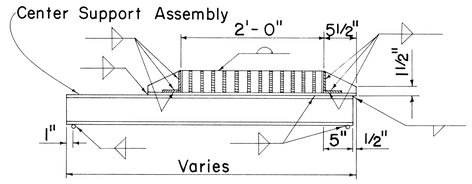
PLAN
(Two or More Grates)



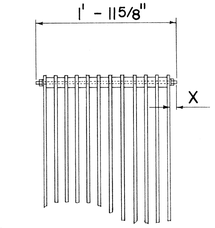
PLAN
(Single Grate)



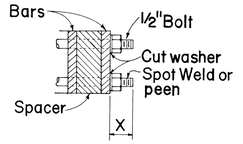
LONGITUDINAL SECTION
(Thru Frame & Grate)



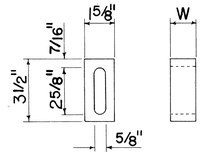
CROSS SECTION
(Thru Frame & Grate)



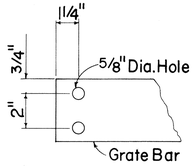
BOLTED END BLOCK
Scale: 1"= 1'-0"



BOLTING DETAIL
Scale: 3"= 1'-0"

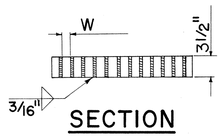


BAR SPACER
Scale: 3"= 1'-0"



END OF BAR
Scale: 3"= 1'-0"

ALTERNATIVE BOLTED GRATE



SECTION

GENERAL NOTES

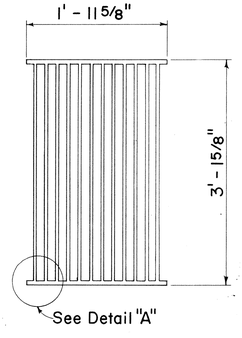
1. Contractor has the option of using cast malleable iron, cast steel, welded, bolted or cast steel end block grate.
2. Grates and Frames shall be hot dip galvanized after fabrication, see specifications.
3. All welds 3/8" unless otherwise noted.
4. Center support assembly shall be used when two or more grates are specified. Incidental to Types A-9 or A-12 Frame and Grates.
5. Refer to "Grate Bar Spacing Table" for Types A-9 and A-12 Grate dimensions.
6. 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

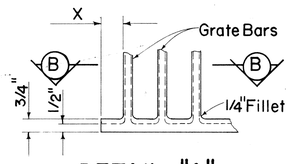
GRATE BAR SPACING TABLE			
TYPE	NO. BARS	CLEAR BAR SPACING - W	X
A-9	9	2"	1 9/16"
A-12	12	1 3/8"	1 1/4"

NOTE:
1. Type A-9 – Use in locations off the roadbed on all types of highways.
2. Type A-12 – Use within the roadbed on all types of highways.

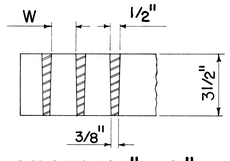
FRAME DETAILS
Scale: 1"= 1'-0"



PLAN
Scale: 1"= 1'-0"

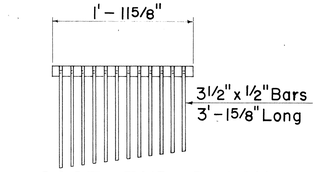


DETAIL "A"
Scale: 3"= 1'-0"

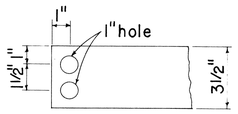


SECTION "B-B"
Scale: 3"= 1'-0"

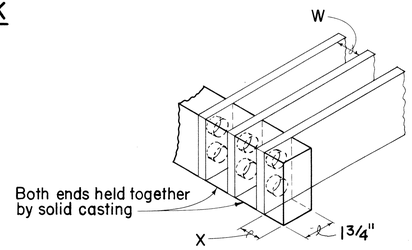
ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL GRATE



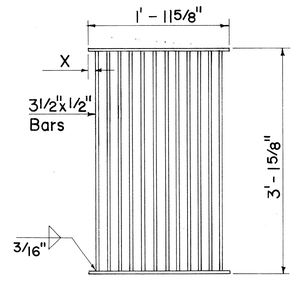
CAST END BLOCK
Scale: 1"= 1'-0"



END OF BAR
Scale: 3"= 1'-0"



ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL END BLOCK GRATE



PLAN

ALTERNATIVE WELDED GRATE
Scale: 1"= 1'-0"

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE 7/68
	DRAWN BY E.C.A.M.	8/68
	TRACED BY E.C.A.M.	8/68
	DESIGNED BY H.K.M.	7/68
NOTE BOOK	QUANTITIES BY "	"
No.	CHECKED BY H.K.M.	8/68

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

TYPES A-9 AND A-12
FRAMES AND GRATES

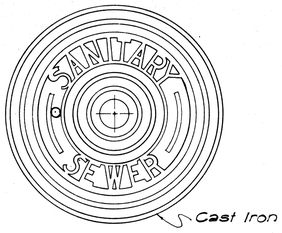
Scales: As Noted Date: 4-24-69

SHEET No. 18 OF 27 SHEETS

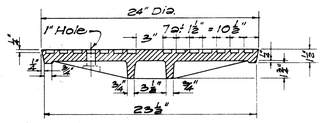
96

2/17/59
8:14:30

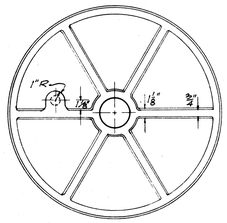
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(23)10 I-HI-1(40)11	1960	97	185



TOP VIEW OF COVER

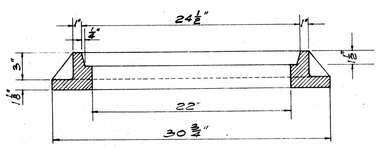


SECTION



BOTTOM VIEW OF COVER

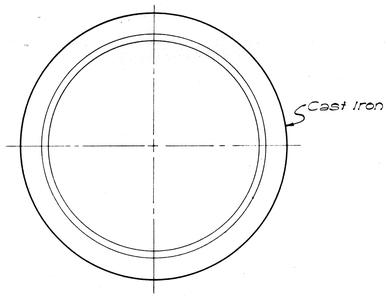
PLAN OF RIM



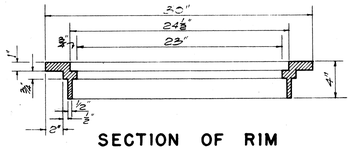
SECTION OF RIM

DETAILS OF TYPE "S" CAST IRON FRAME AND COVER

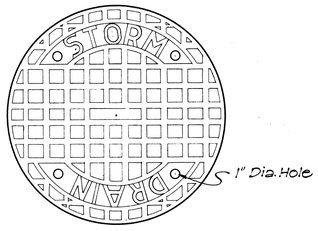
SCALE: 1-1/2" = 1'-0"



PLAN OF RIM

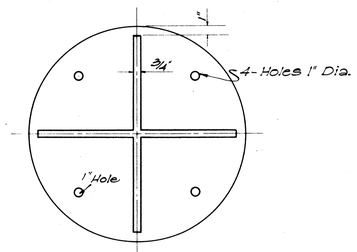


SECTION OF RIM



TOP VIEW OF COVER

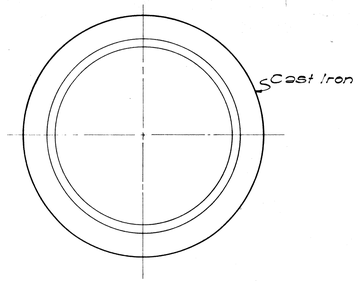
SECTION



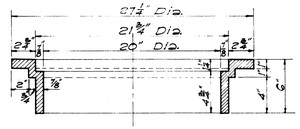
BOTTOM VIEW OF COVER

DETAILS OF TYPE "B" CAST IRON FRAME AND COVER

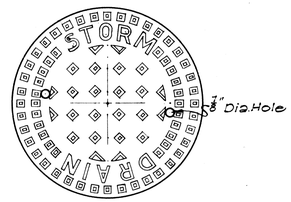
SCALE: 1-1/2" = 1'-0"



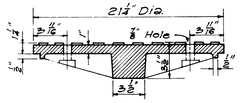
PLAN OF RIM



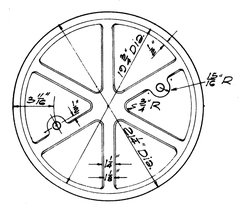
SECTION OF RIM



TOP VIEW OF COVER



SECTION

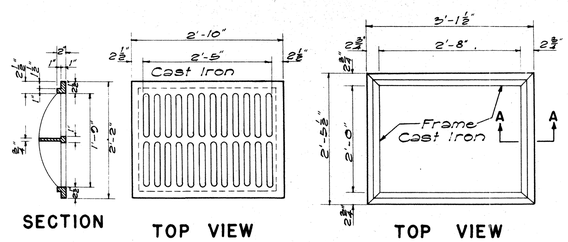


BOTTOM VIEW OF COVER

DETAILS OF TYPE "A" CAST IRON FRAME AND COVER

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

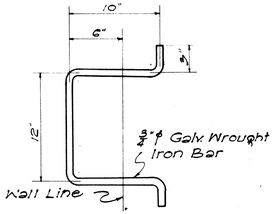
NOTE: Stock Pattern From Novelty Foundry



SECTION TOP VIEW TOP VIEW

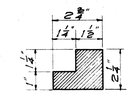
TYPE C C.I. FRAME AND GRATING

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

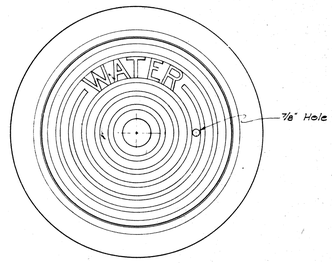


MANHOLE RUNG

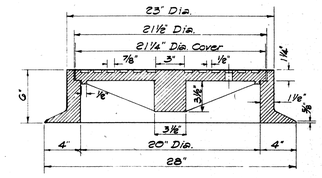
SCALE: 1-1/2" = 1'-0"



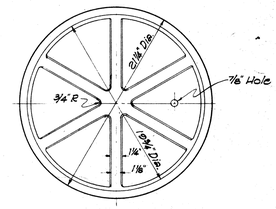
SECTION "A-A"
SCALE 3" = 1'-0"



PLAN OF FRAME AND COVER



SECTION OF FRAME AND COVER



BOTTOM VIEW OF COVER

DETAILS OF TYPE "W" CAST IRON FRAME AND COVER

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

NOTE:

THE TYPE "S" CAST IRON FRAME AND COVER SHOWN ON THIS SHEET IS EQUIVALENT TO THE CITY AND COUNTY OF HONOLULU, DIVISION OF SEWERS' TYPE "SA" CAST IRON MANHOLE FRAME AND COVER.

THE TYPE "W" CAST IRON FRAME AND COVER SHOWN ON THIS SHEET IS EQUIVALENT TO THE CITY AND COUNTY OF HONOLULU, BOARD OF WATER SUPPLY'S CAST IRON MANHOLE FRAME AND COVER, 20" SIZE.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

CATCH BASIN AND MANHOLE CASTINGS

SCALES AS NOTED

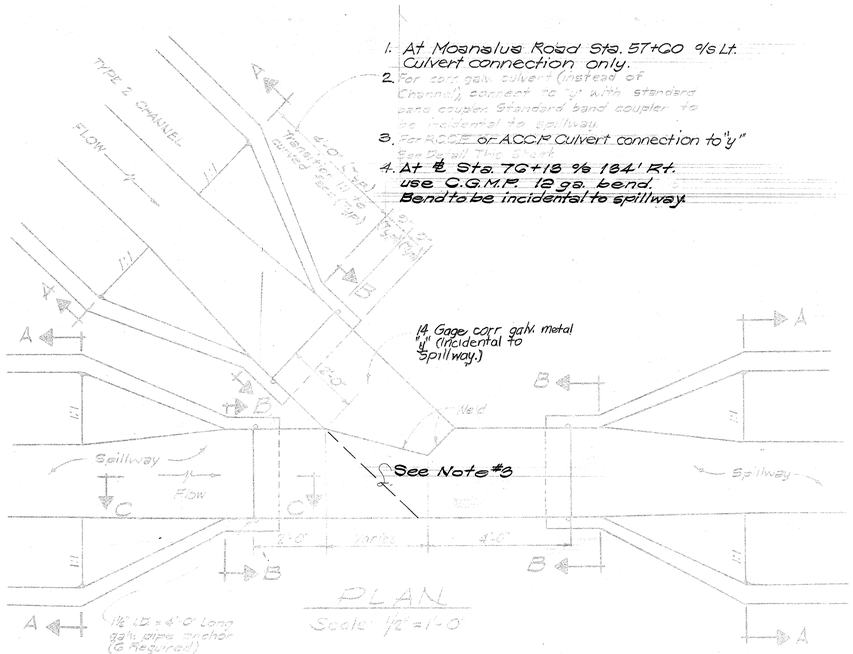
SHEET Nº 19 OF 27 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY:	DATE:
	DESIGNED BY:	" "
	DRAWN BY:	" "
NOTE BOOK	TRACED BY: J. Calisto	" "
	QUANTITIES BY:	" "
No.	CHECKED BY:	

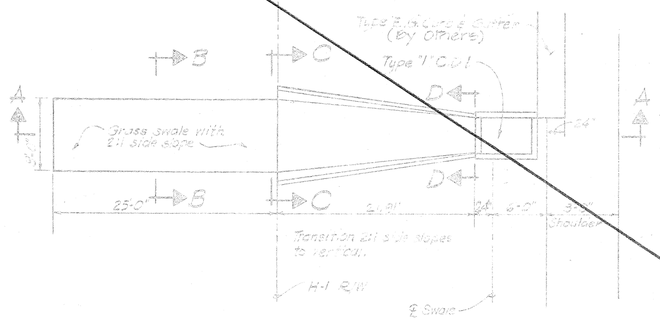
95

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1969	98	185

1. At Moanalua Road Sta. 57+00 9/s Lt. Culvert connection only.
2. For corr. galv. culvert (instead of Channel), connect "c" to "y" with standard band coupler. Standard band coupler to be incidental to spillway.
3. For RCCP or ACCP Culvert connection to "y" See Detail This Sheet.
4. At ℄ Sta. 76+18 9/s 184.1' Rt. use C.G.M.P. 12 ga. bend. Bend to be incidental to spillway.

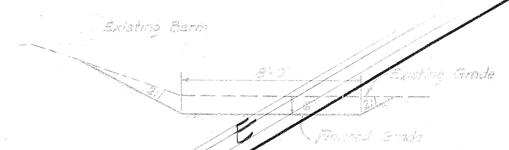


PLAN
Scale: 1/2" = 1'-0"

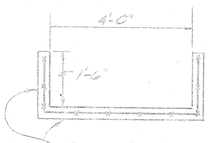


PLAN
Scale: 1/8" = 1'-0"

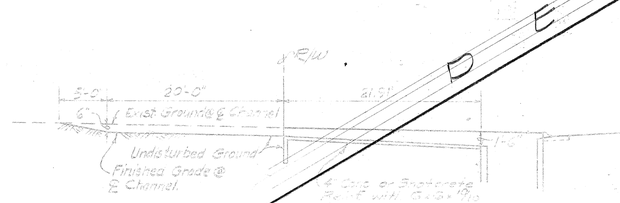
Note:
1. Grass for grass swale to be incidental to ditch & channelers.
2. Grass to be planted shall match existing.
3. Planting shall be in accordance with Section 105 "Sodding Surfaces" of the specifications.



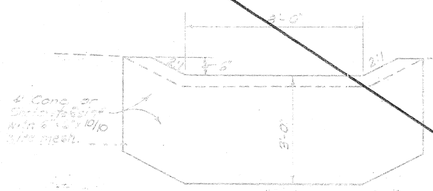
SECTION B-B
Scale: 1/2" = 1'-0"



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



SECTION A-A
Scale: 1/8" = 1'-0"



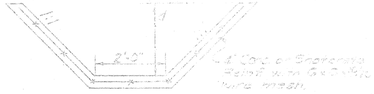
SECTION C-C
Scale: 1/2" = 1'-0"

ESTIMATED QUANTITIES

Ditch & Channel Exc.	11	c.y
Class B-1 Concrete or Shotcrete	27	c.y
Reinforcing Steel	100	lbs.

DETAIL OF CHANNEL @ BASELINE STATION 179+345 9/S LT.

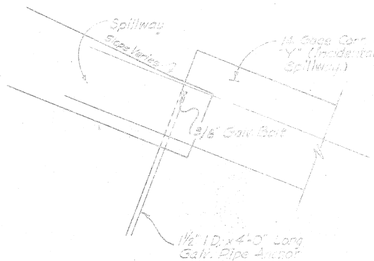
* Type 2 Channel Shown only d=2' For Spillway



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



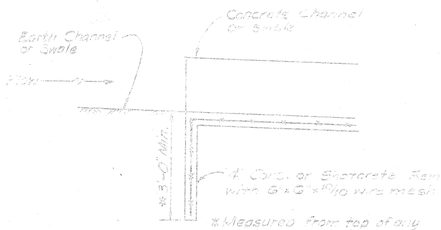
SECTION B-B
Scale: 1/2" = 1'-0"



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

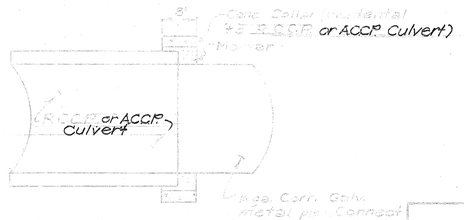
LOCATION	TYPE	d	D
5G+25(M-R) Lt.	"Y" Connection	2.0'	24"
7G+18(H-1)Rt.	Culvert Connection & Bend	———	24"
7G+33(H-1)Rt.	"Y" Connection	2.0'	24"
103+50(H-1) Lt.	"Y" Connection	2.0'	24"
57+00(M-R)Lt.	Culvert Connection	2.0'	24"

DETAIL OF CULVERT TO "Y" OR CHANNEL TO "Y" CONNECTION



ELEVATION
Not to Scale

TYPICAL EARTH SWALE TO CONCRETE SWALE CONNECTION



DETAIL OF CONNECTION OF R.C.C.P. OR A.C.C.P. CULVERT TO C.G.M.P.
Not to Scale

PAUL A. HIROTA
REGISTERED PROFESSIONAL
ENGINEER
HAWAII, U.S.A.
Paul M. Hirota

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MISCELLANEOUS DRAINAGE DETAILS

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date: 4-24-69

SHEET No. 20 OF 27 SHEETS

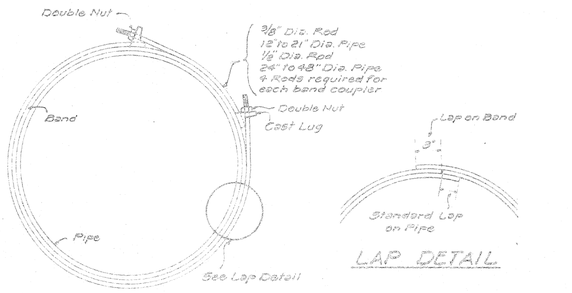
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
PLAN
JOINT ROAD

PRINTED ON NO. 1000H CLEARPRINT

98

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	TH-1(65):10 TH-1(40):11	1970	89	185

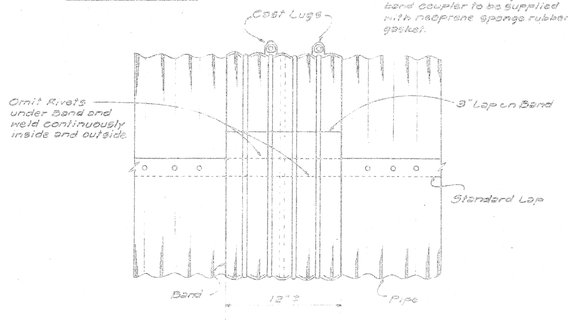
Revised : Oct. 1969



END VIEW

LAP DETAIL

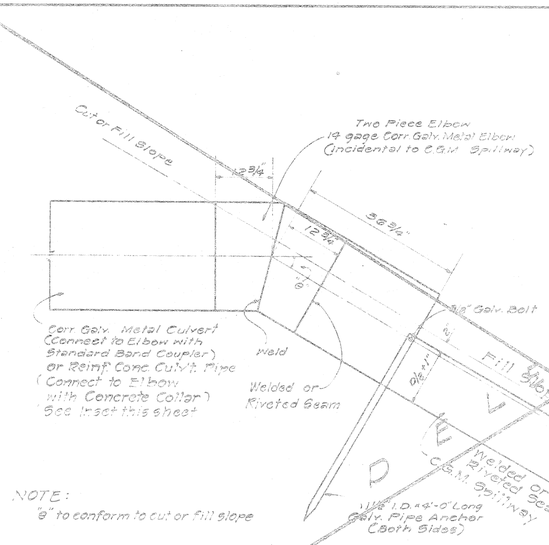
NOTE:
Each watertight band coupler to be supplied with neoprene sponge rubber gasket.



SIDE VIEW

DETAIL OF WATERTIGHT BAND COUPLER

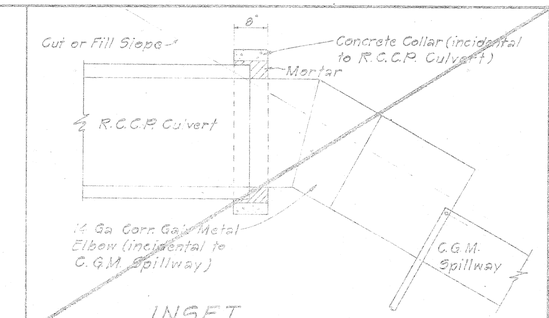
NOT TO SCALE



NOTE:
"B" to conform to cut or fill slope

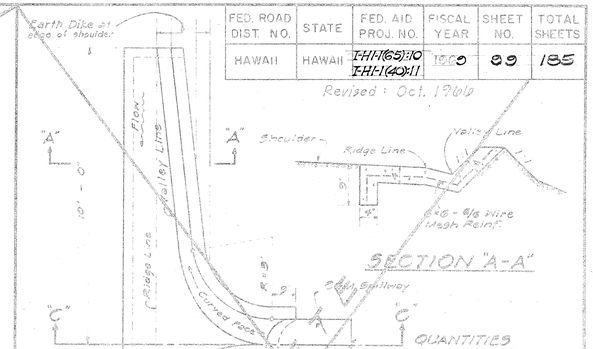
DETAIL OF CULVERT TO SPILLWAY CONNECTION

Not to Scale



INSET

Not to Scale



PLAN

SECTION "A-A"

SECTION "B-B"

SECTION "C-C"

QUANTITIES

D=	15"	24"	30"
Struc. Exc. Cu. Yds.	1.4	1.6	1.8
Cl. B-1 Conc. Cu. Yds.	0.78	0.84	0.93
Reinf. Steel Lbs.	26	29	31

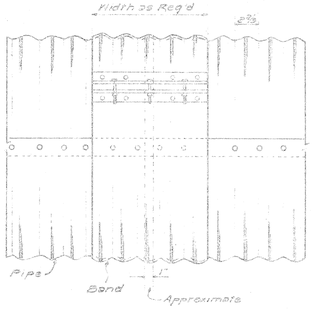
NOTE
1. Reverse Plan View when flow is in direction opposite to that shown.
2. All Conc. to be Cl. B-1

DETAIL OF SPILLWAY INLET

NOT TO SCALE



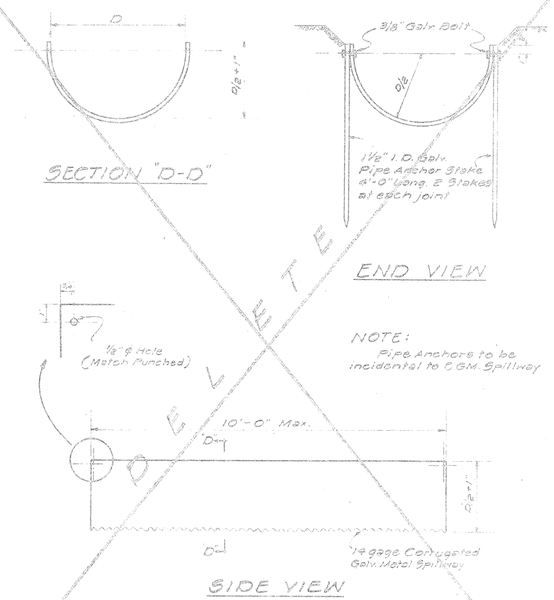
BAND DETAIL



SIDE VIEW

DETAIL OF STANDARD BAND COUPLER

NOT TO SCALE



SECTION "D-D"

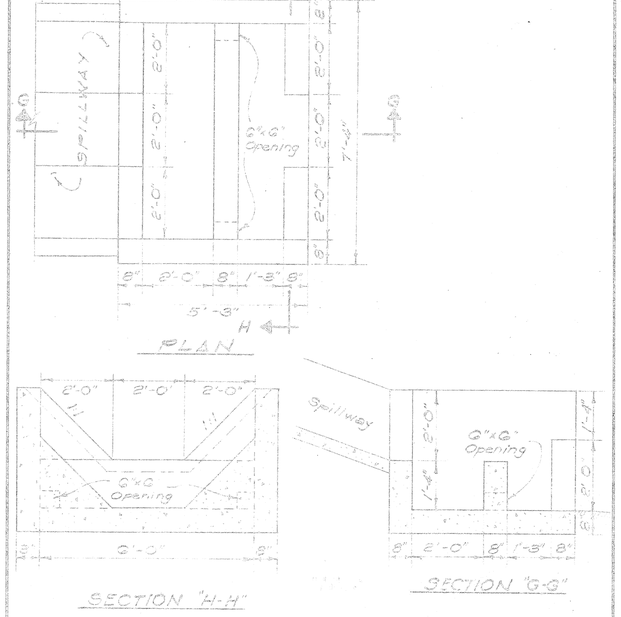
END VIEW

NOTE:
Pipe Anchors to be incidental to C.G.M. Spillway

SIDE VIEW

C.G.M. SPILLWAY

NOT TO SCALE

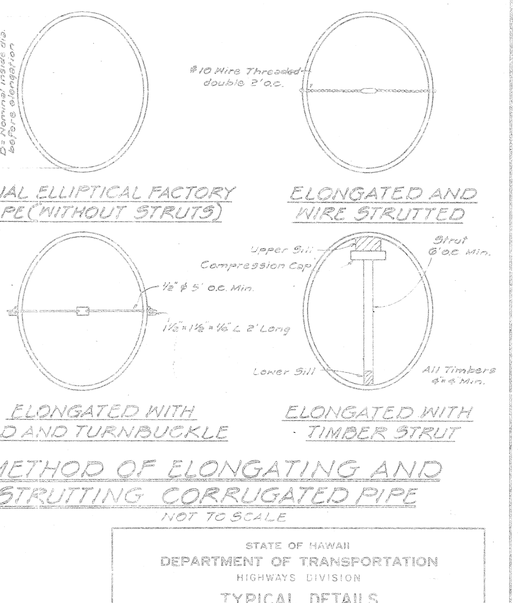


PLAN

SECTION "H-H"

SECTION "G-G"

DETAILS OF CONC. DROP BOX AT OUTLET OF SPILLWAY



SPECIAL ELLIPTICAL FACTORY SHAPE (WITHOUT STRUTS)

ELONGATED AND WIRE STRUTTED

ELONGATED WITH ROD AND TURNBUCKLE

ELONGATED WITH TIMBER STRUT

METHOD OF ELONGATING AND STRUTTING CORRUGATED PIPE

NOT TO SCALE

APPROVED: DATE 5-4-70
DIRECTOR OF TRANSPORTATION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL DETAILS CORRUGATED GALVANIZED METAL CULVERTS, SPILLWAYS, AND SPECIAL DETAILS

SCALES AS NOTED

SHEET No. 21 OF 27 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	5-24-70
NOTE BOOK	TRACED BY	" "
	DESIGNED BY C.M.A.	" "
	QUANTITIES BY	" "
No.	CHECKED BY	" "

99

LIETZ 1102 ARAWRIGHT TRACING CLOTH 1046 20SP

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1969	CO 100	185

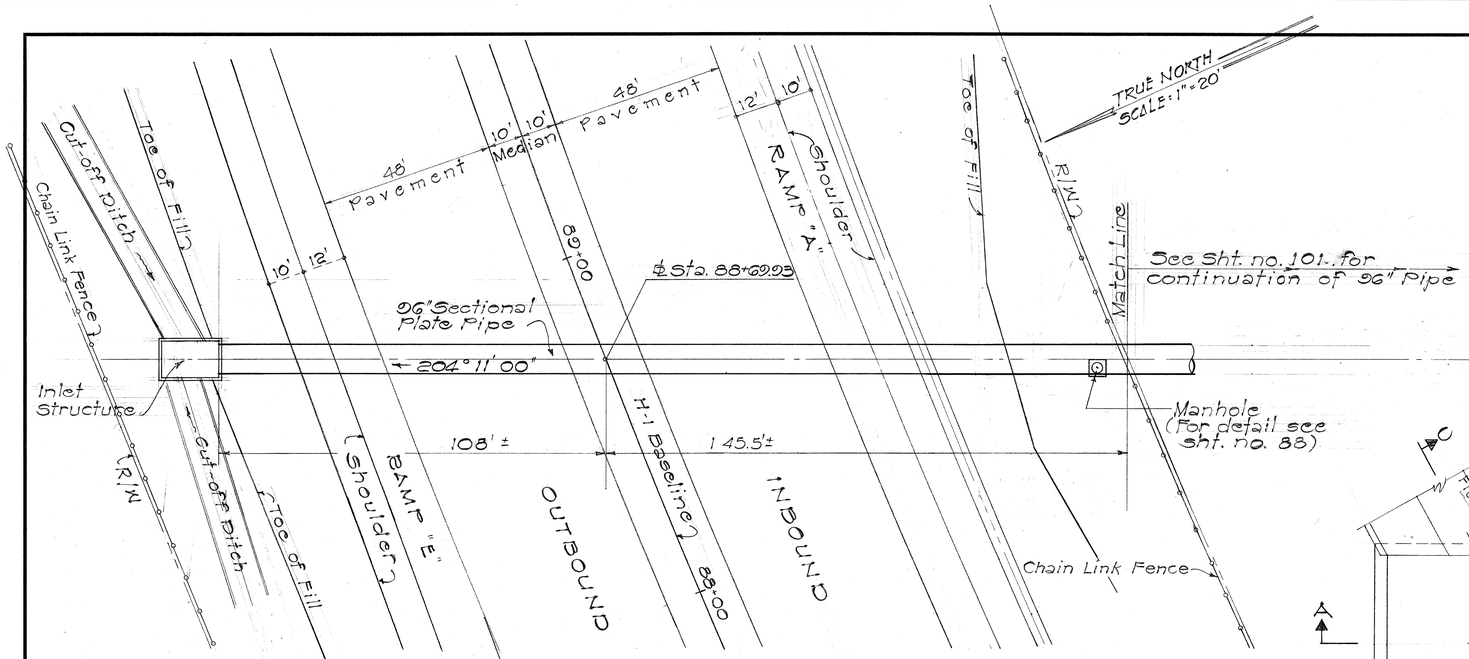
Revised: July 30, 1969
Oct. 23, 1969

S.D. Sta. 0+00 to S.D. Sta. 8+25.88

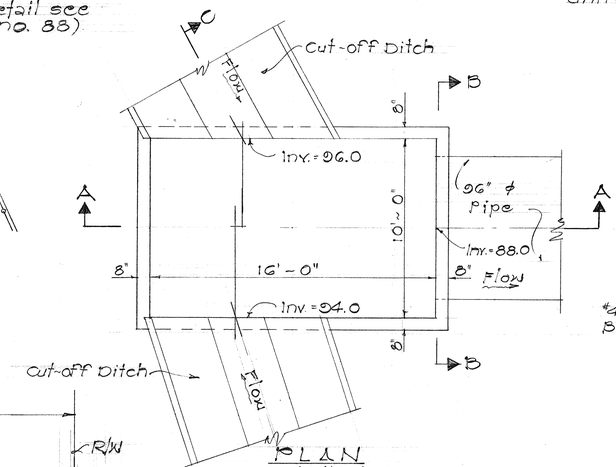
Construct: Inlet Structure and Manhole
Install: 96" ϕ Sectional Plate Pipe 10 Ga.
(See this sht. and sht. no. 101)

ESTIMATED QUANTITIES

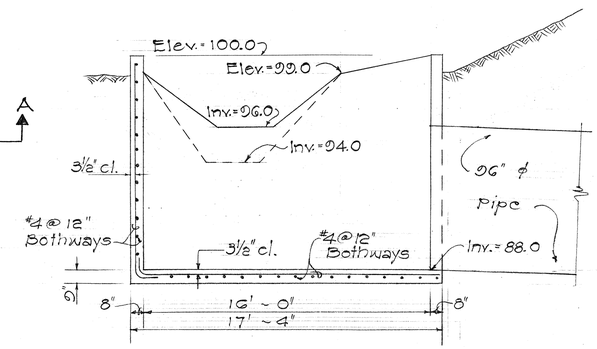
Struc. Exc.	4224	C.Y.
Class A-1 Conc.	20	C.Y.
Reinf. Steel	900	Lbs.
96" ϕ Sectional Plate Pipe 10 Ga. (5% Elongation)	830	L.F.
Type "A" C.I. Frame and Cover	1	Ea.
Untreated Base for Pipe Foundation	310	C.Y.



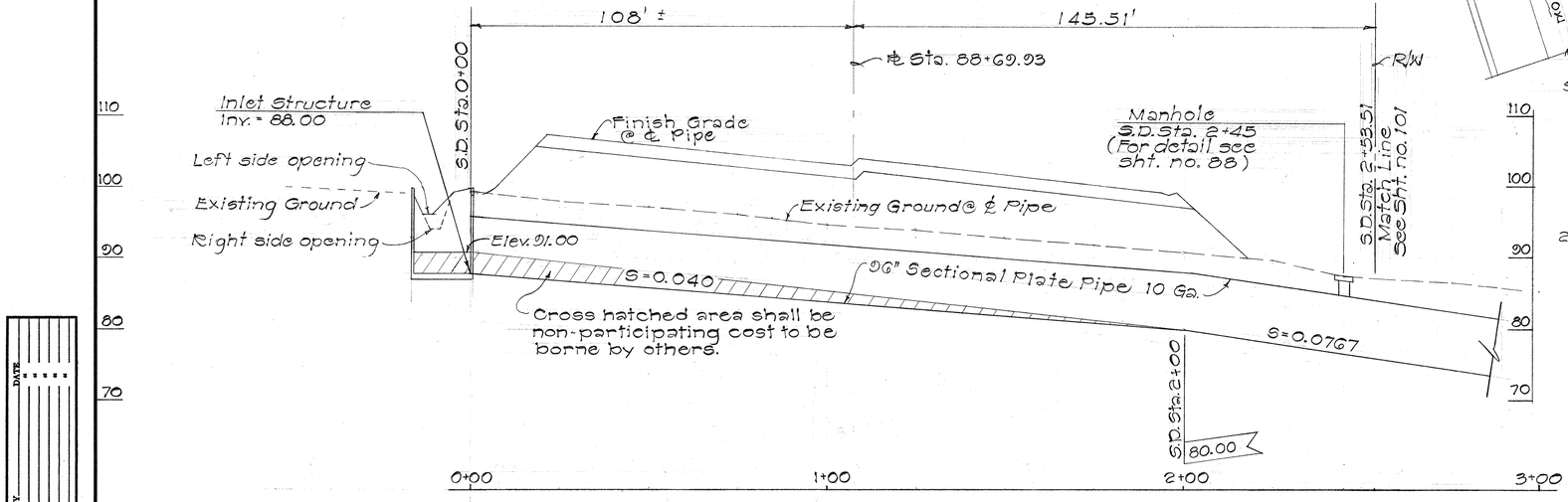
PLAN ~ 96" ϕ SECTIONAL PLATE PIPE 10 Ga. (NO OPTION)
@ ℄ STA. 88+69.93



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

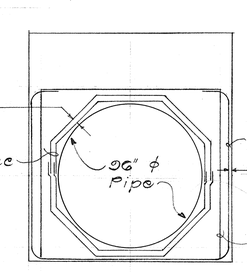


SECTION "A-A"
Scale: 1/4" = 1'-0"

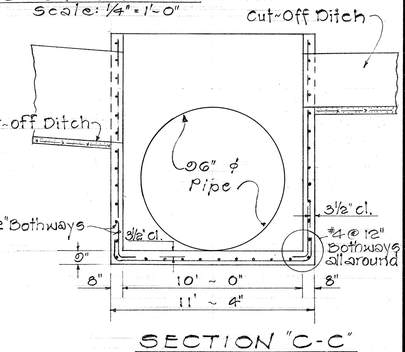


PROFILE ~ 96" SECTIONAL PLATE PIPE @ ℄ STA. 88+69.93

Scale: Horiz.: 1" = 20'
Vert.: 1" = 10'



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



SECTION "C-C"
Scale: 1/4" = 1'-0"

DETAILS OF INLET STRUCTURE
Scale: As Shown

THIS SHEET SUPERSEDES SHEET NO. 100

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

96" ϕ SECTIONAL PLATE PIPE CULVERT @ ℄ STA. 88+69.93

INTERSTATE ROUTE H-1
PROJECT NO. I-HI-1(65):10

Scale: As Shown Date: July 1969

SHEET No. 22 OF 27 SHEETS

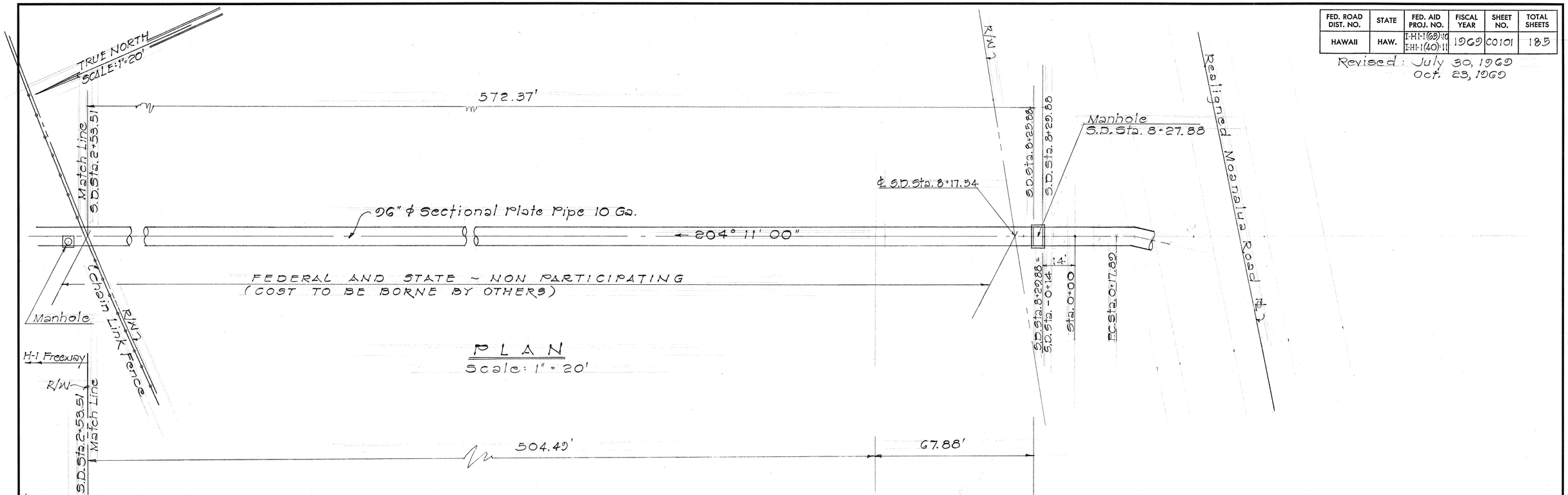
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
No.	TRACED BY	
	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

K+E CRYSTALENE® LA 2920 TRACING PAPER

100 R

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1969	C0101	185

Revised: July 30, 1969
Oct. 23, 1969



96" ϕ SECTIONAL PLATE PIPE @ ℄ STA. 88+69.03

THIS SHEET SUPERSEDES SHEET NO. 101

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

96" ϕ SECTIONAL PLATE PIPE CULVERT @ ℄ STA. 88+69.03

INTERSTATE ROUTE H-1
PROJECT NO. I-HI-1 (65):10

Scale: As Shown Date: July 1969

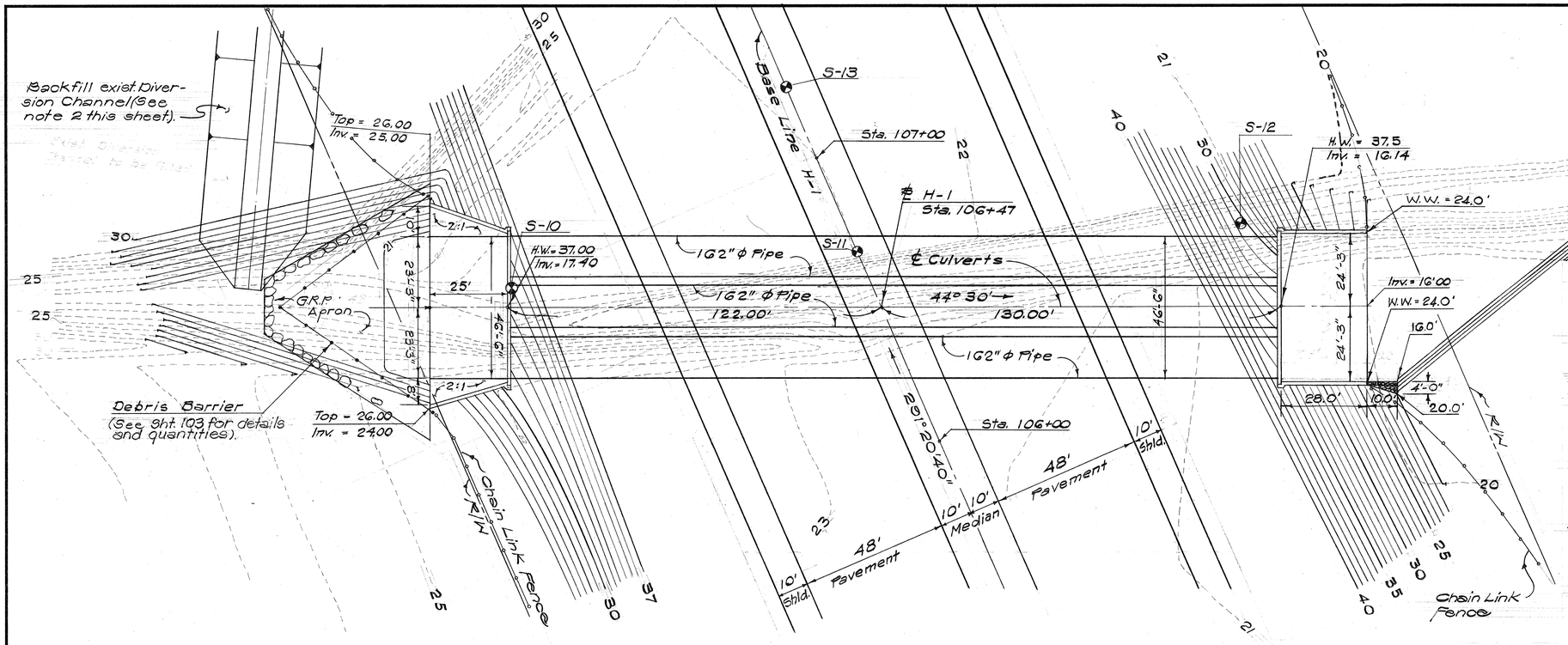
SHEET No. 23 OF 27 SHEETS

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

K+E CRYSTALENE® LA 2920 TRACING PAPER

101 R

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1969	102	185



ESTIMATED QUANTITIES

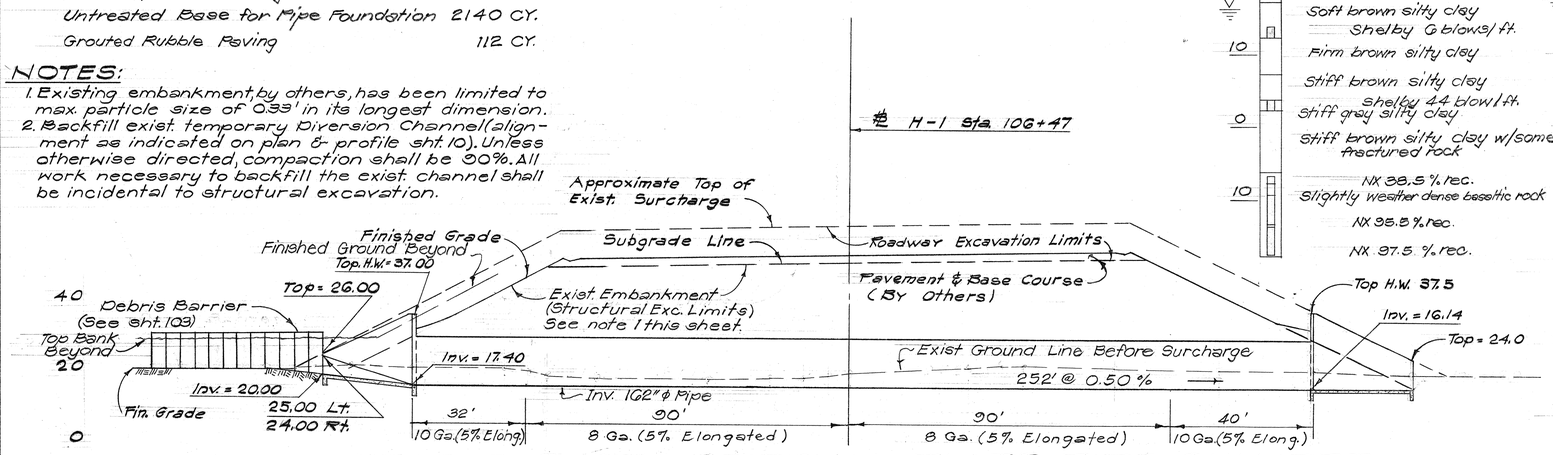
Class A-1 Concrete (L.S)	280 CY.
Reinforcing Steel (L.S)	37,000 LBS.
Structural Excavation	16,000 CY.
162" ϕ Pipe (5% Elongation)	756 LF.
Untreated Base for Pipe Foundation	2140 CY.
Grouted Rubble Paving	112 CY.

NOTES:

1. Existing embankment, by others, has been limited to max. particle size of 0.33' in its longest dimension.
2. Backfill exist. temporary Diversion Channel (alignment as indicated on plan & profile sht. 10). Unless otherwise directed, compaction shall be 90%. All work necessary to backfill the exist. channel shall be incidental to structural excavation.

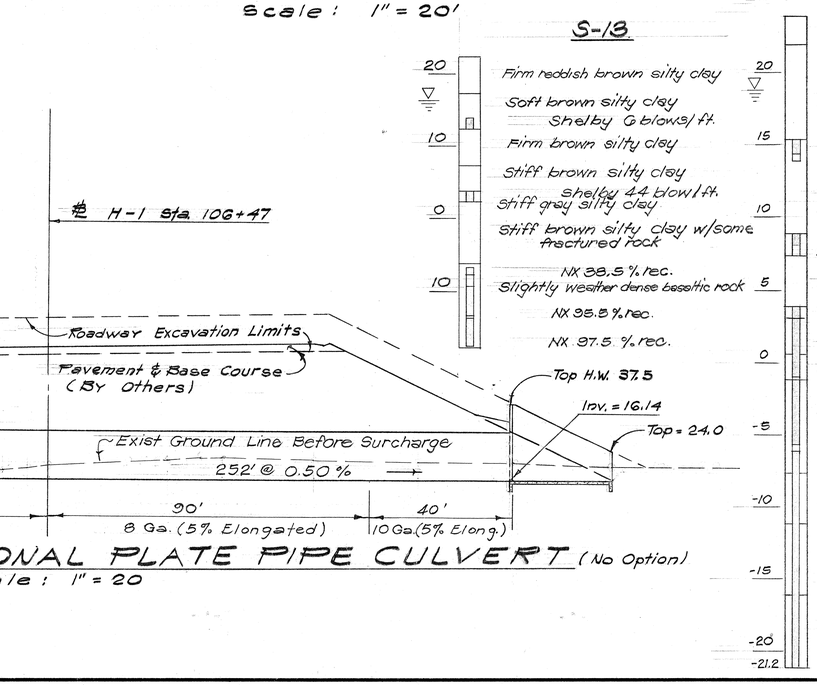
PLAN 3-162" ϕ SECTIONAL PLATE PIPE CULVERT ℄ STA. 106+47

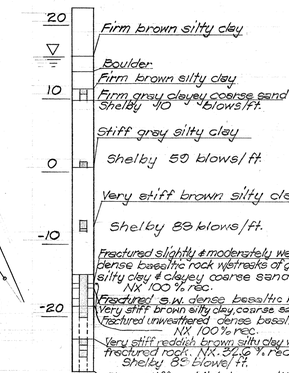
Scale: 1" = 20'

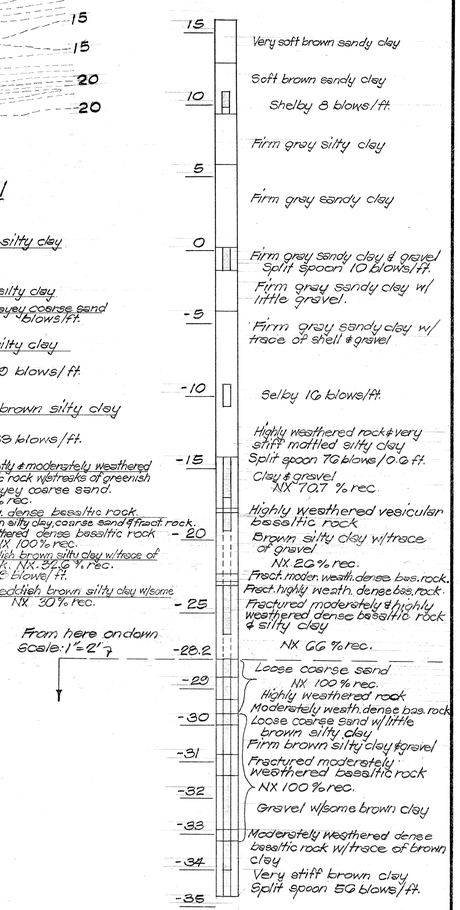


PROFILE: 3-162" ϕ SECTIONAL PLATE PIPE CULVERT (No Option)

Scale: 1" = 20







PAUL M. HIROTA REGISTERED PROFESSIONAL ENGINEER No. 1439 HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

3-162" ϕ SECTIONAL PLATE PIPE CULVERT @ ℄ STA. 106+47

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(63):10

Scale: As Shown Date: 4-24-69

SHEET No. 24 OF 27 SHEETS

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

PRINTED ON NO. 1000H CLEARPRINT

102

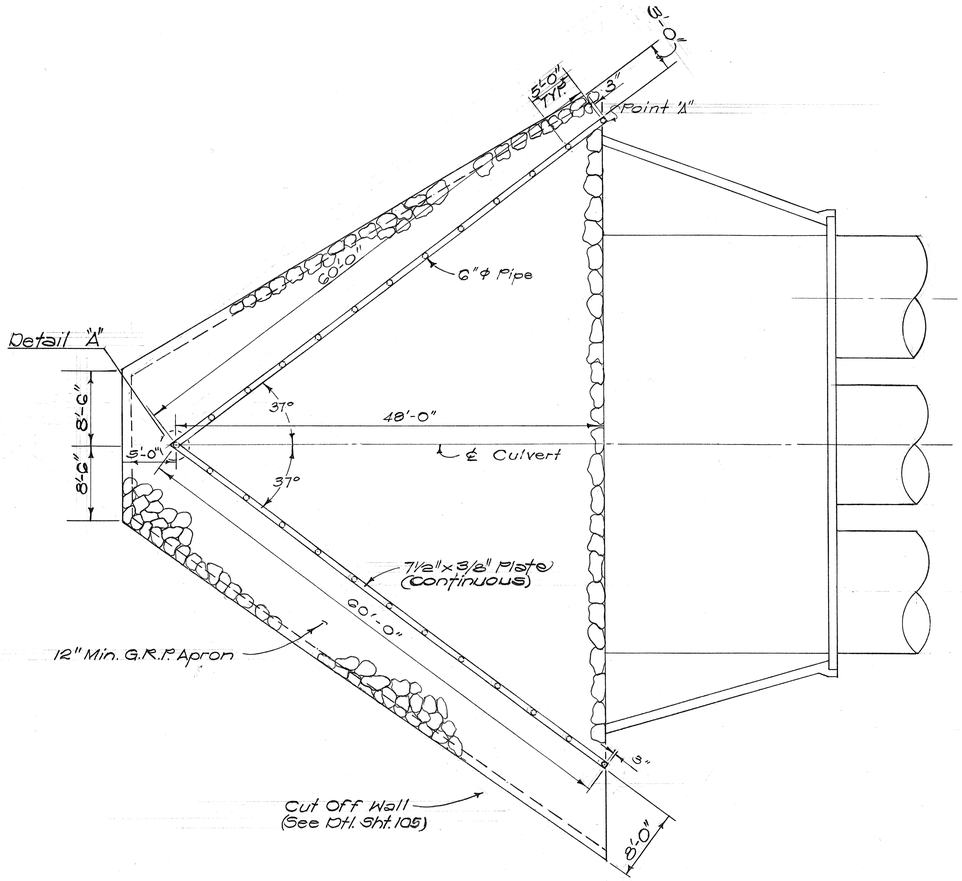
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1969	103	185

NOTES

1. All structural steel members to be galvanized.
2. Break in footing elevation shall be midway between pipes.
3. Extend footing 2'-6" beyond last pipe.

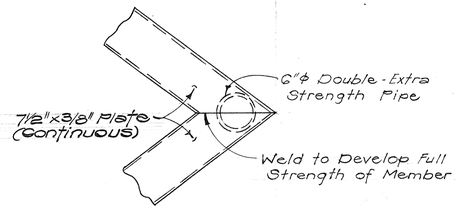
ESTIMATED QUANTITIES

Structural Steel	(L.S.)	18,200 LB.
Reinforcing Steel	(L.S.)	700 LB.
Class A-1 Concrete	(L.S.)	20 CY.
Structural Excavation	(L.S.)	62 CY.



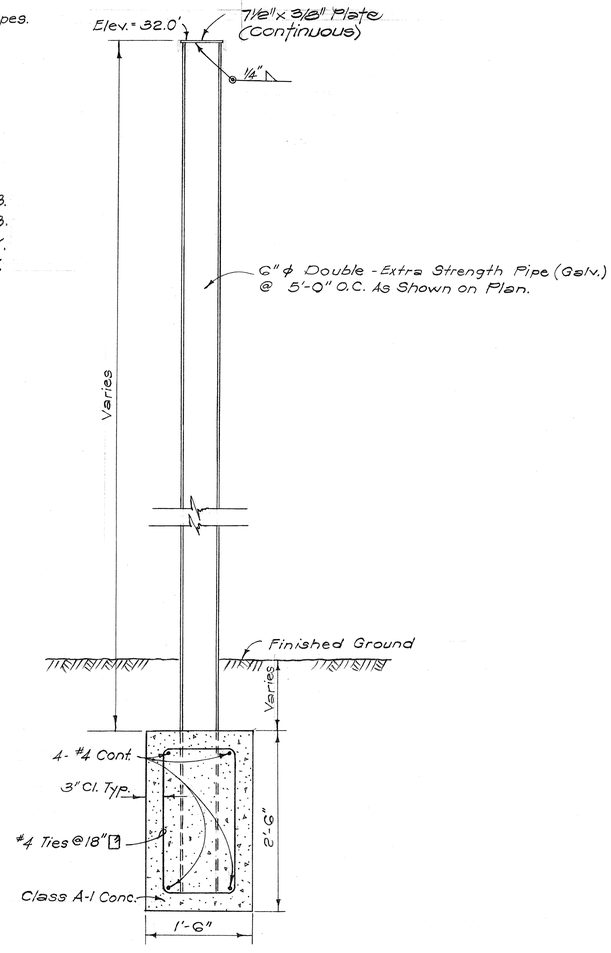
PLAN - DEBRIS BARRIER

Scale: 1/8"=1'-0"



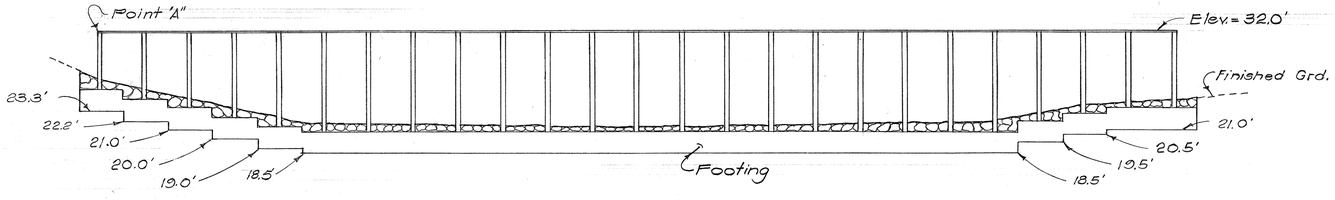
DETAIL "A"

Scale: 1"=1'-0"



TYPICAL SECTION - DEBRIS BARRIER

Scale: 1"=1'-0"



DEVELOPED ELEVATION

Scale: 1/8"=1'-0"

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

PAUL M. HIROTA
REGISTERED PROFESSIONAL ENGINEER
No. 1447
HAWAII, U.S.A.

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DEBRIS BARRIER
FOR PIPE CULVERT
@ ℄ STA. 106+47

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date: 4-24-69

SHEET No. 25 OF 27 SHEETS

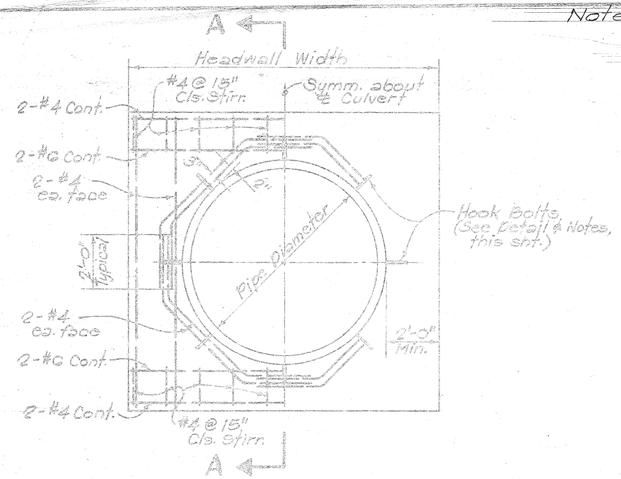
103

PRINTED ON NO. 1000H CLEARPRINT

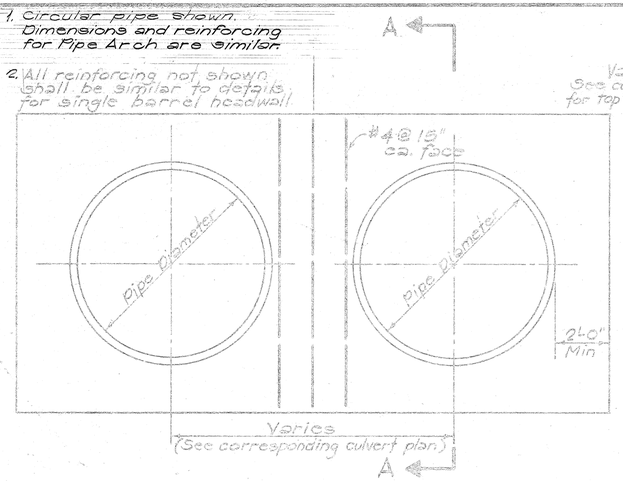
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1969	104	185

Note: 1. Circular pipe shown. Dimensions and reinforcing for Pipe Arch are similar.

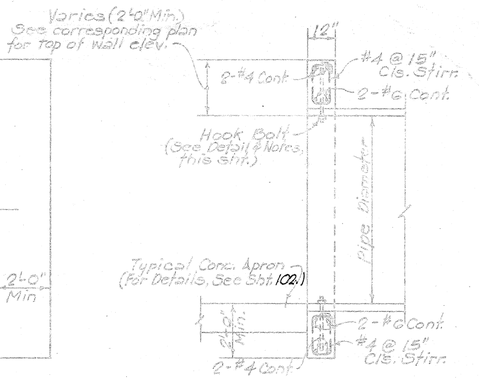
2. All reinforcing not shown shall be similar to details for single barrel headwall.



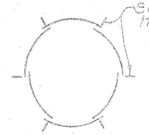
FRONT ELEVATION - SINGLE BARREL



FRONT ELEVATION - MULTIPLE BARREL

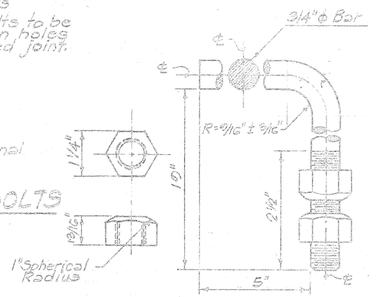


SECTION "A-A"



Note: Hook bolts shall be used only with Sectional Plate Pipe Culverts.

LOCATION OF HOOK BOLTS AT HEADWALL



HOOK BOLT DETAIL

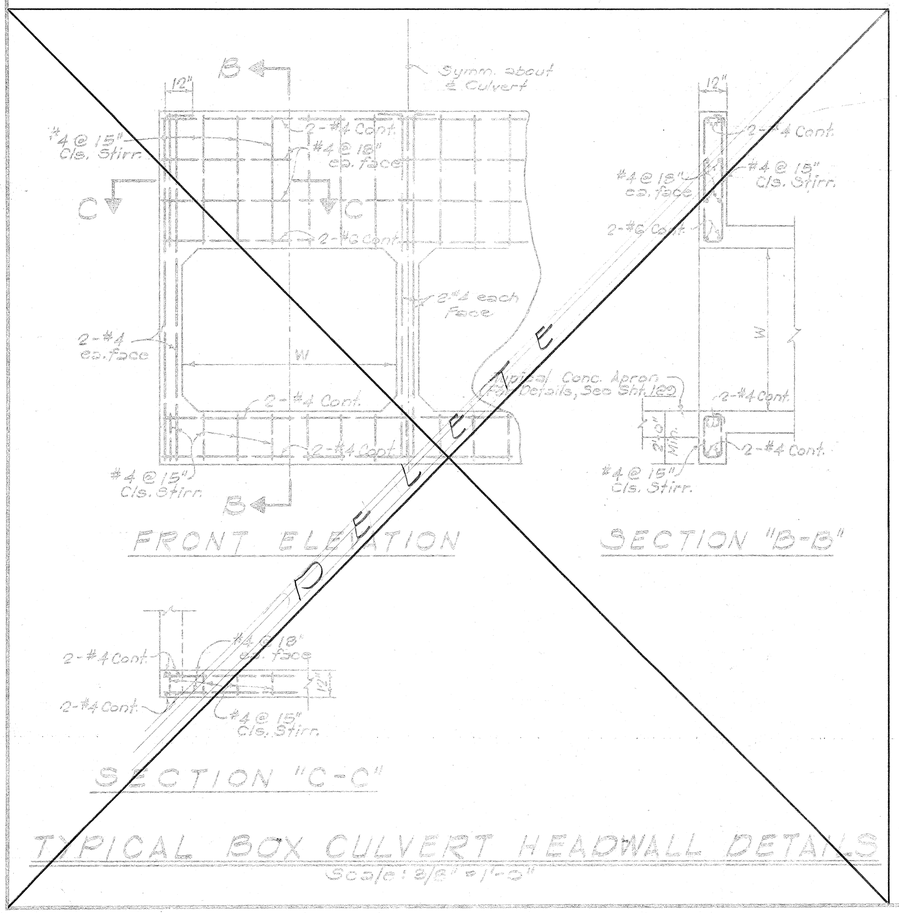
Not to Scale

NOTE:

Hook Bolt material shall meet the current ASTM A-307. Thread shall be American Standard Coarse Thread Series, Class 2, Free Fit. Bolts shall be galvanized to meet current ASTM Specification A-153. The galvanizing on thread portion shall not prevent turning the nut by hand. Nuts shall be carbon steel hot dip galvanized to meet ASTM Specification A-153. Nut threads shall be American Standard Coarse Thread Series (1/64 maximum oversize), cleaned after galvanizing to provide a free running fit on the Class 2 bolt. Nuts shall be 1 1/4" across flats, 13/16" thick, curve crowned to approximately 1" radius.

TYPICAL PIPE CULVERT HEADWALL DETAILS

Scale: 3/8" = 1'-0"



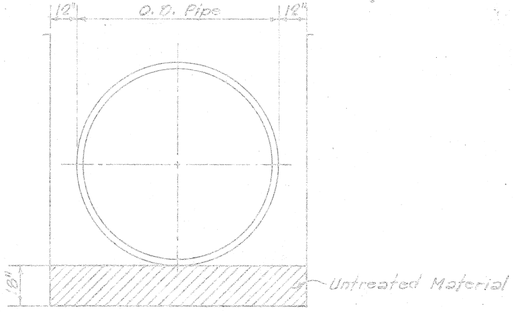
FRONT ELEVATION

SECTION "B-B"

SECTION "C-C"

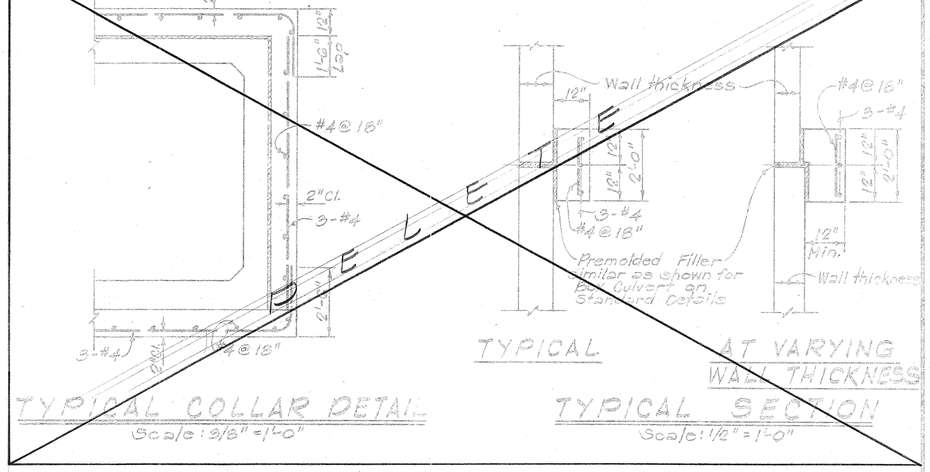
TYPICAL BOX CULVERT HEADWALL DETAILS

Scale: 2/8" = 1'-0"



TYPICAL SECTION
UNTREATED BASE FOR PIPE FOUNDATION

Scale: 3/8" = 1'-0"



TYPICAL COLLAR DETAIL

Scale: 2/8" = 1'-0"

TYPICAL SECTION AT VARYING WALL THICKNESS

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

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Paul M. Hirata

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL CULVERT DETAILS

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date: 4-24-69

SHEET No. 26 OF 27 SHEETS

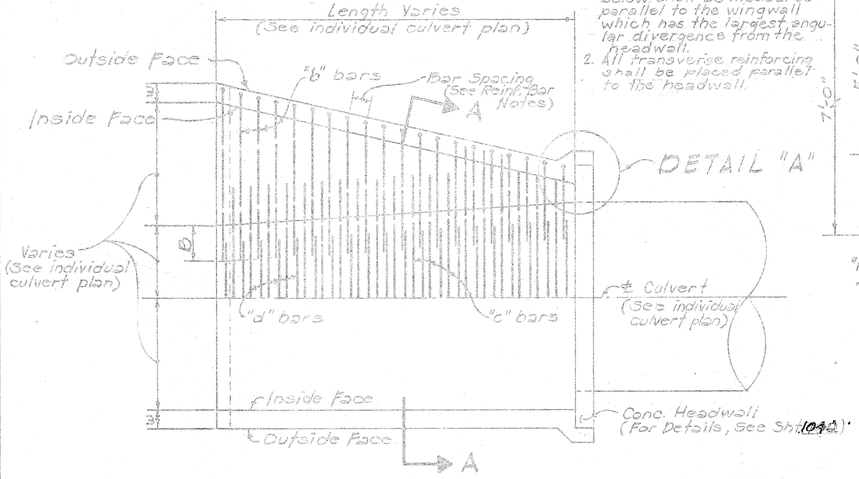
104

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	
NO.	REVISED SHEET NO.	

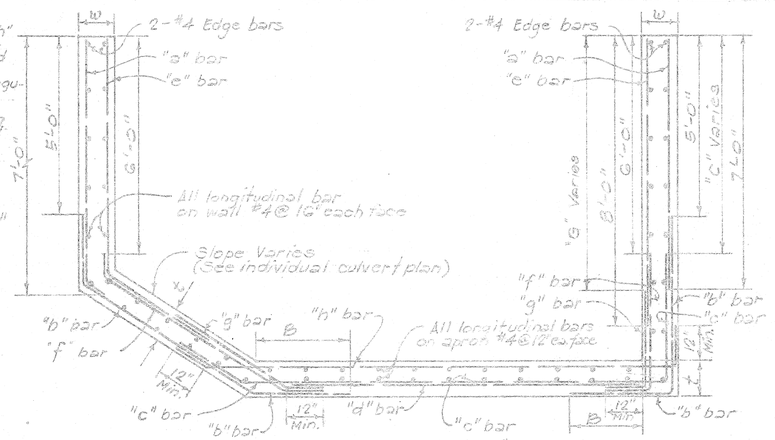
PRINTED ON NO. 1000R CLEARPRINT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(40):11	1979	105	185

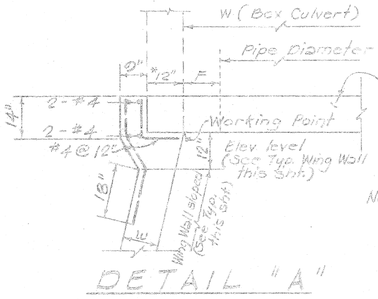
Reinf. Bar Notes:
1. Bar spacing, except for "h" bars, in the steel schedule below, shall be measured parallel to the wingwall which has the largest angular divergence from the headwall.
2. All transverse reinforcing shall be placed parallel to the headwall.



PLAN - TYPICAL CONCRETE APRON
Scale: 1/4" = 1'-0"



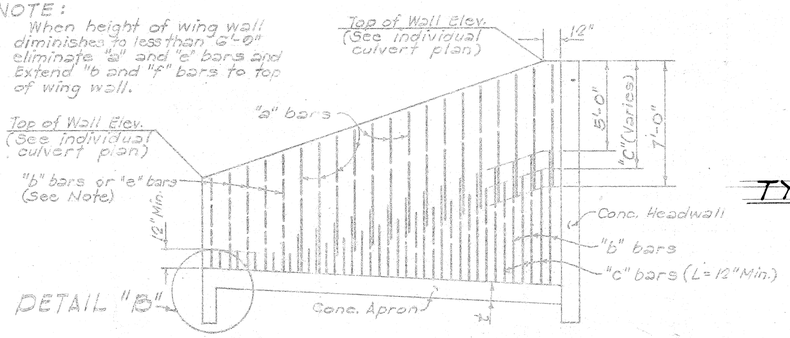
SECTION "A-A"
TYPICAL REINFORCING
Scale: 1/2" = 1'-0"



Note: For reinforcing not shown see wing wall details and schedule, this sht.
* Dimension when no Box Culvert occurs.

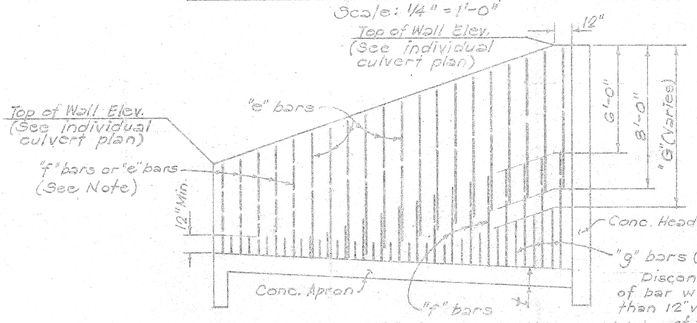
DETAIL "A"

NOTE:
When height of wing wall diminishes to less than 6'-0" eliminate "a" and "e" bars and Extend "b and "f" bars to top of wing wall.



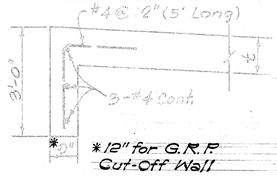
DETAIL "B"

TYPICAL SECTION WING WALL
WITH OUTSIDE FACE REINFORCING
Scale: 1/4" = 1'-0"



Discontinue when top of bar would become less than 12" vertically from top of apron slab.

TYPICAL SECTION WING WALL
WITH INSIDE FACE REINFORCING
Scale: 1/4" = 1'-0"



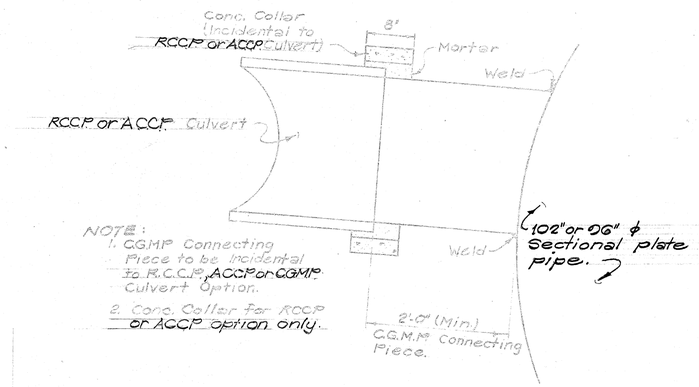
NOTES:
1. For reinforcing not shown see concrete apron detail and schedule, this sheet or typical channel sections sht 87.
2. Delete reinforcing for G.R.P. cut-off wall.

DETAIL "B"
TYPICAL APRON CUT OFF WALL
Scale: 1/2" = 1'-0"

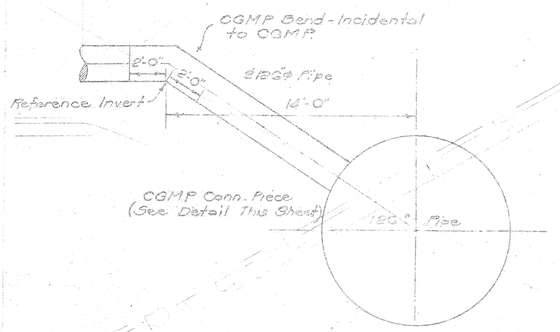
STEEL SCHEDULE

Item	Pipe Culvert Sta. 87+00 Outlet	Pipe Culvert Sta. 106+47 Inlet	Pipe Culvert Sta. 106+47 Outlet
W	0"	14"	14"
t	10"	16"	16"
"a" bar	#4@12"	#4@12"	#4@12"
"b" bar	#5@12"	#7@12"	#7@12"
"c" bar	#6@12"	#7@12"	#8@12"
"d" bar		#5@12"	#5@12"
"e" bar	#4@12"	#6@12"	#6@12"
"f" bar	#4@12"	#6@12"	#7@12"
"g" bar	#5@12"	#7@12"	#8@12"
"h" bar	#6@4"	#8@4"	#10@4"
"B"	3'-0"	5'-0"	6'-0"
"C"	5'-0"	10'-0"	11'-0"
"G"	5'-0"	11'-0"	11'-0"
"F"	1'-0"	1'-0"	1'-0"

TYPICAL END STRUCTURE DETAILS



TYPICAL DETAIL OF RCCP, ACCP OR CGMP CULVERT
CONNECTION TO SECTIONAL PLATE PIPE
N.T.S.
RETAIN THIS DETAIL



DETAIL NO. 1
Scale: 1/4" = 1'-0"

PAUL M. HIROTA
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Paul M. Hirota

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL CULVERT DETAILS

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date: 4-24-69

SHEET No. 27 OF 27 SHEETS

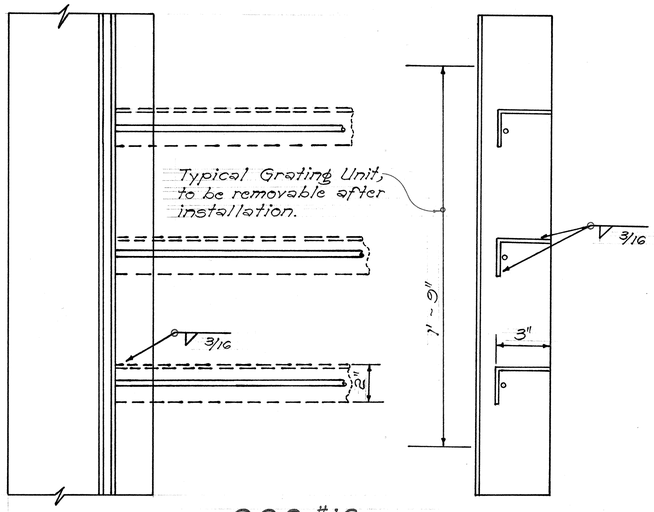
105

NOTE BOOK | DESIGNED BY | QUANTITIES BY | CHECKED BY | No.

PRINTED ON NO. 1660M CLEARPRINT

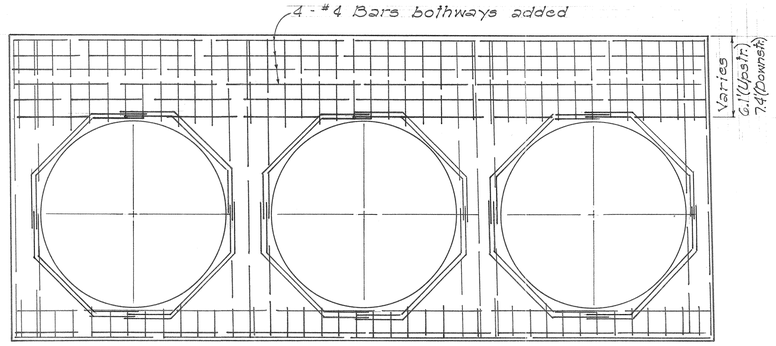
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(65):10 I-HI-1(60):11	1969	105 S-1	185

10'-0" × 10'-7" DROP INTAKE GRATING
(Sta. 38 + 60 M.R.)
(See Ref. Plan Sheet 86)



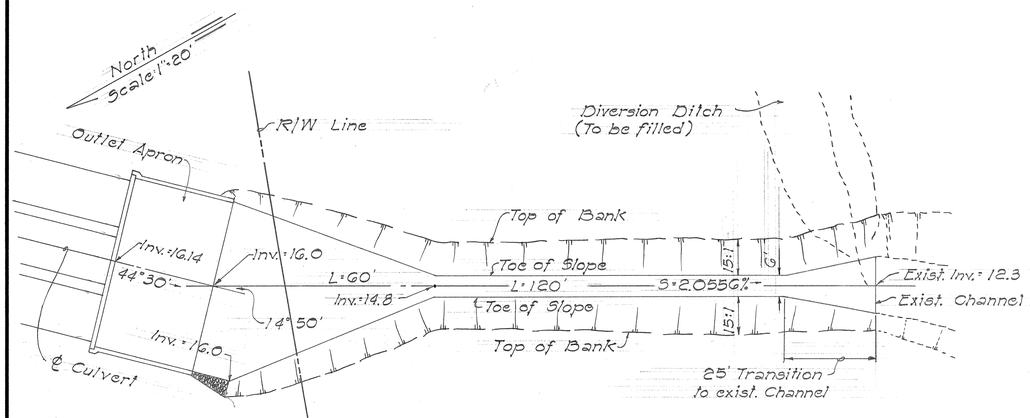
C.C.O. #16
Aug. 25, 1970

NOTE:
Add 3" × 2" × ¼" L over each existing #6 Bar weld to plate only at each end. New angles to be galvanized. Estimated Quantity = (18)(10.33)(4.1) = 762 lb.



Prepared by: BC&A
Date: 12-4-69

HEADWALL ELEVATION
3 - 162" ϕ SECTIONAL PLATE PIPE CULVERT
AT ℄ STA. 106 + 47 - C.C.O. #6
Scale: 3/16" = 1'-0"
(SEE REF. PLAN SHEET 104)



CONNECTION BETWEEN 162" ϕ PIPE OUTLET AND C&C CHANNEL
(SEE REF. PLAN SHEET 102)

This sheet is a supplement sheet incorporated into the plans at the time of the "As-Built" postings.

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(65):10

Scale: As Shown Date: Nov., 1972

SHEET No. OF SHEETS

105S-1

K&E CRYSTALENE TRACING PAPER