FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	52	362

DRAINAGE SUMMARY

STRUCTURES			PIPE CULVERTS		ESTIMATED QUANTITIES																												REMARKS
			ITEM	NO.	206.01	206.80	206.83	207.01	503.001	503.201	602.101			603.6060	603.7200	603.7380			604.202	604.229	604.232	604.401	604.236			605.006	605.200	609.700	609.701	609.702	618.01	640.010	640.026	640.030	
INLET NUMBER	TYPE	STATION	FROM	TO	STRUCTURAL EXCAVATION OTHER THAN IN BRIDGES	FILTER MATERIAL	FILTER MATERIAL FOR UNDERDRAIN	DITCH & CHANNEL EXCAVATION	CONCRETE OTHER THAN IN BRIDGES	CLASS B CONCRETE OTHER THAN IN BRIDGES	REINFORCING STEEL OTHER THAN IN BRIDGES			48" CMP 0.1084 in. THK 42" RCP CL III	24" CMP 0.0785 in THK. 24" RCP CL III 24" ACP CL III	36" CMP 0.1084 in. THK 30" RCP CL III 30" ACP CL III			TYPE B CAST IRON FRAME & COVER	SALVAGING & INSTALLING TYPE 6121A STEEL FRAME & GRATE	TYPE A-12 STEEL FRAME & GRATE	ADJUSTING MH FRAME & COVER	TYPE G1624 STEEL FRAME & GRATE			6" PERFORATED UNDERDRAIN PIPE	CLEANOUTS	BITUMINOUS GUTTER TYPE 7A	BITUMINOUS GUTTER TYPE 7B	BITUMINOUS GUTTER TYPE 7C	GROUTED RUBBLE PAVING	LINED DRAINAGE DITCH, VEE SHAPE	LINED DRAINAGE DITCH, TRAPEZOIDAL SHAPE	LINED DRAINAGE DITCH, RECTANGULAR SHAPE	
			UNIT	USE	CY	CY	CY	CY	CY	CY	LB			LF	LF	LF			EA	EA	EA	EA	EA.			LF	EA	LF	LF	LF	CY	L.F.	L.F.	L.F	
1	DI TYPE 6121A	MF 172+00, 63'LT.	MF 172+00, LT.	MF 171+85, 63'LT	25				2.8		30				15					1														
2	DI TYPE B	MF 176+40, 85'LT.	MF 176+40, LT.	MF 175+85, 62'RT.	80					2.2	0					158																		
3	MH TYPE E	MF 175+85, 62'RT	MF 175+85, RT.	MF 173+97, 90'RT.	53					5.3	175					189			1															
4	HEADWALL	MF 173+97, 90'RT.			1					2.4	50																			2				
5	CB TYPE SA-2	MF 200+50, ℄	MF 200+50 ℄	MF 200+05 ℄	25				4.1		210				45						2													
6	CB TYPE SA-2	MF 200+05 ℄	MF 200+05 ℄	MF 199+50 ℄	25				3.9		220				55						2													
7	CB TYPE SA-1	MF 199+50 ℄	MF 199+50 ℄	MF 199+00 ℄	25				3.1		180				50						1													
8	CB TYPE SA-2	MF 199+00 ℄	MF 199+00 ℄	MF 198+85, 78'RT.	45				3.9		220				80						2													
9	MH TYPE D	MF 198+85, 78'RT	MF 198+85, RT.	MF 196+45, 85'RT.	125					2.9	55				237				1															
10	MH TYPE D	MF 196+45, 85'RT.	MF 196+45, RT.	MF 195+72, 117'RT.	15					2.5	55				80				1															
11	HEADWALL	MF 195+72, 117'RT.			1					1.5	40																							
12	EXISTING MH	MF 209+61, 65'LT.	MF 209+61, LT.	MF 209+61, 110'LT	160					0	0			45								1												
13	MH TYPE E	MF 209+61, 110'LT.	MF 209+61, LT	MF 208+60, 120'LT.	245					7.1	270			102					1															
14	HEADWALL	MF 208+60, 120'LT.			1					4.2	70																							
15	OUTLET STRUCT.	UE 19+184, 63'RT.			10					2.4																								
~~17~~	~~HEADWALL~~	~~H-3 240+18, 187'LT~~			~~0~~					~~2.4~~	~~50~~					~~10~~																		NIC
	NORTH & SOUTH HALAWA STREAMS					1340		17501																					55					
	UNDERDRAINS	MOANALUA FREEWAY, ULUNE EXTENSION & H-3			380		350																	3080	9								
	"	RAMPS F, M & N			120		110																	1180	4								
			SUBTOTAL SHEET 2D, 3D & 4D		140			1204	23.5	3.1	755				627				1				9				4421		2480		1192	1625	308	
			TOTAL		1476	1340	460	18705	41.3	33.6	2330			147	1189	347			5	1	7	1	9			4260	13	4421		2480	57	1192	1625	308	
			ROUNDED TOTAL		1480	1340	460	18710	42	34	2330			150	1190	350			5	1	7	1	9			4260	13	4430		2480	57	1192	1625	310	

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE ESTIMATED QUANTITIES

INTERSTATE ROUTE H-1
PROJECT No. I-HI-1(89):13

SCALE: 1"=50' DATE: Oct. 30, 1970

SHEET No. 10 OF 28 SHEETS

52

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89)13	1971	52A	362

DRAINAGE SUMMARY

STRUCTURES			PIPE CULVERTS		ESTIMATED QUANTITIES																													REMARKS
			ITEM	NO.	206.01	206.80	206.83	207.01	503.001	503.201	602.101			603.6060	603.7200	603.7380			604.202	604.223	604.232	604.401	604.236			605.006	605.200	609.700	609.701	609.702	612.01	GA0.010	GA0.020	GA0.030	
INLET NUMBER	TYPE	STATION	FROM	TO	STRUCTURAL EXCAVATION OTHER THAN IN BRIDGES	FILTER MATERIAL	FILTER MATERIAL FOR UNDERDRAINS	DITCH & CHANNEL EXCAVATION	CONCRETE OTHER THAN IN BRIDGES	CLASS B CONCRETE OTHER THAN IN BRIDGES	REINFORCING STEEL OTHER THAN IN BRIDGES			48" CMP 0.1084" THICK 42" RCP CL III	84" CMP 0.0785" THICK 24" RCP CL III 24" ACP CL III	36" CMP 0.1084" THICK 30" RCP CL III 30" ACP CL III			TYPE B CAST IRON FRAME & COVER	SALVAGING & INSTALLING TYPE G1814 STEEL FRAME & GRATE	TYPE A-12 STEEL FRAME & GRATE	ADJUSTING MH FRAME & COVER	TYPE G1G14 STEEL FRAME & GRATE			6" PERFORATED UNDERDRAIN PIPE	CLEANOUTS	BITUMINOUS GUTTER TYPE 7A		BITUMINOUS GUTTER TYPE 7C	GROUTED RUBBLE PAVING	LINED DRAINAGE DITCH VEE SHAPE	LINED DRAINAGE DITCH TRAPEZOIDAL SHAPE	LINED DRAINAGE DITCH RECTANGULAR SHAPE	
			UNIT	USE	CY	CY	CY	CY	CY	CY	LB			LF	LF	LF			EA	EA	EA	EA	EA			LF	EA	LF		LF	CY	LF	LF	LF	
18	DI TYPE G1G14	MF185+98.5,60'LT	MF185+98.5,60'LT	MF186+23.5,60'LT	6				2.7		35				25								1												
19	DI TYPE G1G14	MF186+23.5,60'LT	MF186+23.5,60'LT	NHS 9+82,17.5'LT	24				3.0		225				115								1												
20	DI TYPE G1G14	MF191+29, 60'LT	MF191+29, 60'LT	MF190+79,60'LT	11				2.7		35				50								1												
21	DI TYPE G1G14	MF190+79, 60'LT	MF190+79, 60'LT	MF190+25,60'RT	28				2.8		225				130								1												
22	DI TYPE G1G14	MF190+25,60'RT	MF190+25,60'RT	MF189+75,60'RT	11				2.4		35				50								1												
23	DI TYPE G1G14	MF189+75,60'RT	MF189+75,60'RT	MF189+09,84'RT	15				2.4		35				70								1												
24	MH TYPE D	MF189+09,84'RT	MF189+09,84.RT	NHS 7+55,17.5'RT	24					2.5	55				110				1																
~~25~~	~~DI TYPE G1G14~~	~~M-18+00,12'-RT~~	~~M-18+00,12'-RT~~	~~M-18+40,12'-RT~~	~~0~~				~~2.3~~		~~35~~				~~40~~								~~1~~											NIC
~~26~~	~~DI TYPE G1G14~~	~~M-18+40,12'-RT~~	~~M-18+40,12'-RT~~	~~M-18+40,35'-RT~~	~~0~~				~~3.0~~		~~225~~				~~23~~								~~1~~											NIC
27	DI TYPE G1G14	MF171+15,68'RT	MF171+15,68'RT	MF171+15,90'RT	6				2.5		35				22								1												
28	HALF HEADWALL	MF171+15,90'RT			1					0.3	20																							OUTLET STRUCTURE FOR CULVERT
29	DI TYPE G1G14	MF184+30,72'RT	MF184+30,72'RT	MF184+30'85'RT	4				2.5		35				15								1												
30	HALF HEADWALL	MF184+30,85'RT			1					0.3	20																							OUTLET STRUCTURE FOR CULVERT
31	DI TYPE G1G14	UE19+18.4,23'RT	UE19+18.4,23'RT	UE19+18.4,63'RT	9				2.5						40								1												
			SUBTOTAL	THIS SHEET	140				23.5	3.1	755				627				1				9												

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE ESTIMATED QUANTITIES
INTERSTATE ROUTE H-1
PROJECT NO. I-HI-1 (89):13

DATE: Oct. 30, 1970

SHEET No. 20 OF 28 SHEETS

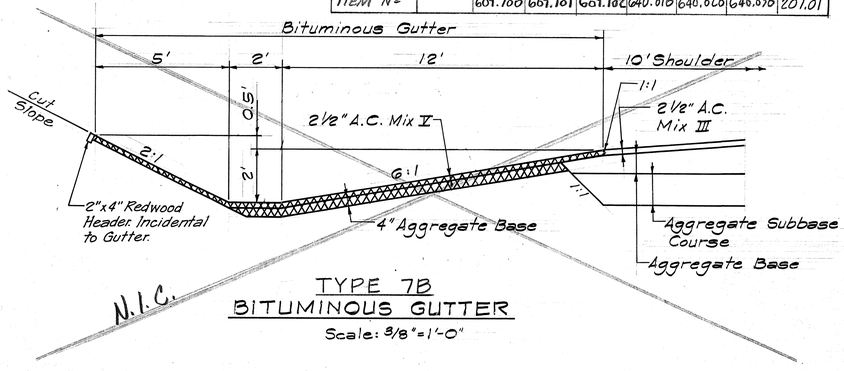
52A1

SCHEDULE OF ROADWAY LINED SWALES & DITCHES

LOCATION	TYPE	BITUMINOUS GUTTER TYPE 7A	BITUMINOUS GUTTER TYPE 7B	BITUMINOUS GUTTER TYPE 7C	LINED DITCHES (VEE)	LINED DITCHES (TRAPEZOIDAL)	LINED DITCHES (RECTANGULAR)	DITCH & CHANNEL EXCAVATION
MF STA 179+85, 85'Lt. To MF STA 176+40, 85'Lt.	1				345			40
MF STA 182+50, 76'Rt. To MF STA 176+20, 95'Rt.	7A	635						
UE STA 36+65, 16'Rt. To UE STA 28+20, 16'Rt.	7A	845						
UE STA 28+20, 16'Rt To UE STA 27+90, 17'Rt	7D	30						
UE STA 27+90, 17'Rt. To NHS STA 11+05, 17.5'Lt.	3				358			63
M STA 24+75, 16'Rt. To M STA 23+42, 16'Rt.	7A	133						
M STA 23+42, 16'Rt. To M STA 23+12, 28'Rt.	7D	30						
M STA 23+12, 28'Rt. To NHS STA 10+72, 17.5 Lt.	1				105			12
~~H-3 STA 298+00, 84'Lt. To M STA 14+50, 23'Rt.~~	~~7B~~		~~2100~~	~~N.I.C.~~				
~~M STA 14+50, 23'Rt. To M STA 15+60, 37'Rt.~~	~~7B-1C~~			~~N.I.C.~~	~~110~~			~~145~~
M STA 19+45, 42'Rt. To NHS STA 11+13, 17.5'Rt	1C				190			250
~~H-3 STA 298+00, 65'Rt. To H-3 STA 287+68, 77'Rt.~~	~~7A~~	~~1032~~		~~N.I.C.~~				
~~H-3 STA 287+68, 77'Rt. To H-3 STA 287+32, 82'Rt~~	~~7A *~~	~~36~~		~~N.I.C.~~				
~~H-3 STA 287+32, 82'Rt. To SHS STA 23+20, 23'Lt.~~	~~8~~			~~N.I.C.~~	~~60~~			~~16~~
MF STA 201+00, 64'Lt. To MF STA 194+00, 64'Lt	7A	700						
MF STA 194+00, 64'Lt. To MF STA 193+60, 70'Lt.	7E	40						
MF STA 193+60, 70'Lt. To MF STA 191+34, 114'Lt	1				230			27
MF STA 191+34, 114'Lt To MF STA 191+14, 118'Lt	1-2				20			3
MF STA 191+14, 118'Lt. To H-3 STA 272+20, 69'Rt.	2				45			10
H-3 STA 272+20, 69'Rt. To H-3 STA 272+00, 65'Rt	2-7A				20			4
MF STA 208+61, 76'Rt. To P STA 34+90, 28'Rt	7A	1231						
P STA 34+90, 28'Rt To P STA 34+26, 32'Rt.	7A *	64						
MF STA 195+72, 117'Rt. To P STA 33+65, 61'Rt	8				58			15
P STA 33+65, 61'Rt. To MF STA 194+40, 196'Rt	9				100			28
MF STA 194+40, 196'Rt To MF STA 194+25, 207'Rt.	9-4					20		7
MF STA 194+25, 207'Rt. To SHS STA 7+50, 12'Rt	4					97		38
MF STA 208+60, 120'Lt. To MF STA 208+40, 120'Lt	10-11				20			13
MF STA 208+40, 120'Lt To N STA 18+35, 69'Rt	11				843			486
N STA 18+35, 69'Rt To STA 18+55, 65'Rt	11-5					20		9
N STA 18+55, 65'Rt To SHS STA 15+35, 12'Rt	5				305			113
H-3 STA 272+58, 65'Rt. To H-3 STA 271+93, 65'Rt	7A	65						
H-3 STA 269+63. 64'Rt. To H-3 STA 269+53, 65.2'Rt.	0-6					10		2
H-3 STA 269+53, 65.2'Rt. To NHS STA 8+11.5, 17.5'Rt.	6					53		9
MF STA 183+00, 72'Rt. To MF STA 182+50, 76'Rt.	7C-7A	50						
M STA 23+12, 12'Rt. To M STA 22+64, 12'Rt	7C			48				
M STA 22+64, 12'Rt. To M STA 22+19, 12'Rt	7H			45				

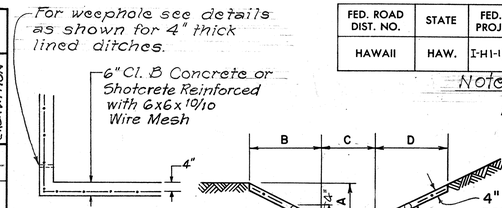
SCHEDULE OF ROADWAY LINED SWALES & DITCHES

LOCATION	TYPE	BITUMINOUS GUTTER TYPE 7A	BITUMINOUS GUTTER TYPE 7B	BITUMINOUS GUTTER TYPE 7C	LINED DITCHES (VEE)	LINED DITCHES (TRAPEZOIDAL)	LINED DITCHES (RECTANGULAR)	DITCH & CHANNEL EXCAVATION
~~H-3 STA 266+32, 65'Lt. To H-3 STA 265+40, 65'Lt~~	7A	92	N.I.C.					
NHS STA 11+86, 32'Lt. To NHS STA 11+93, 17.5'Lt	12					16		21
~~H-3 STA 271+37, 65'Lt To H-3 STA 270+12, 65'Lt~~	~~7A~~	~~125~~	~~N.I.C.~~					
~~H-3 STA 270+12, 65'Lt. To H-3 STA 269+82, 78'Lt~~	~~7D~~	~~30~~	~~N.I.C.~~					
~~H-3 STA 269+82, 78'Lt. To NHS STA 9+76, 17.5'Rt~~	~~1~~		~~N.I.C.~~	~~20~~				~~2~~
F STA 16+50, 10'Lt. To F STA 13+25, 10'Lt.	7A	325						
F STA 13+25, 10'Lt To F STA 12+95, 18'Lt.	7D	30						
F STA 12+95, 18'Lt. To NHS STA 9+71, 17.5'Lt.	1			42				5
~~SHS STA 35+70, 60'Lt. To SHS STA 35+80, 15'Rt.~~	~~11~~		~~N.I.C.~~		~~65~~			~~37~~
M STA 22+24, 15.5'Rt. To NHS STA 10+72, 17.5'Lt.	6				25'			4
P STA 34+26, 12'Rt To P STA 33+56, 12'Rt	7C			70				
MF STA 193+60, 60'Lt. To MF STA 190+75, 60'Lt	7C			285				
P STA 34+26, 32, Rt To P STA 33+65, 61'Rt.	8				68			19
~~H-3 STA 290+18, 127'Lt To H-3 289+85, 84'Lt.~~	~~13~~		~~N.I.C.~~		~~60~~			~~38~~
~~N STA 20+50, 8'Rt. To P STA 26+50, 8'Rt.~~	~~7C~~		~~600~~	~~N.I.C.~~				
~~N STA 26+50, 8'Rt To N STA 27+50, 8'Rt~~	~~7F~~		~~100~~	~~N.I.C.~~				
~~N STA 27+50, 8'Rt. To N STA 28+50, 8'Rt~~	~~7C~~		~~100~~	~~N.I.C.~~				
~~N STA 27+00, 12'Rt To SHS STA 19+38. 23'Lt~~	~~14~~			~~43~~	~~N.I.C.~~			~~12~~
MF STA 194+50, 60'Rt To MF STA 189+70, 60'Rt.	7C		480					
SHEET SUBTOTAL		4178	- 928	1165	1625	200		1178
ITEM Nº		609.700	609.701	609.702	640.010	640.020	640.030	207.01



N.I.C.

TYPE 7B
BITUMINOUS GUTTER
Scale: 3/8"=1'-0"

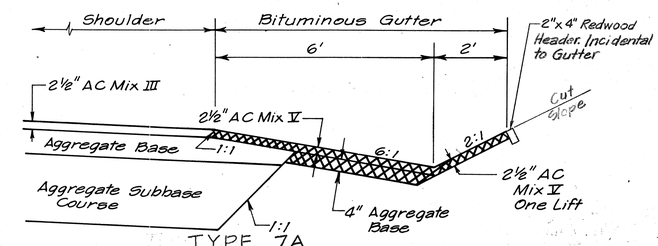


DETAIL OF
RECTANGULAR DITCHES
ONLY [A(depth) ≥ 3'-0"]

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89)13	1971	53	362

Note:
4"ϕ Drain 10'-0" o.c.
For Ditch Types 4, 5, 10, 11 & 12

TYPE	A	B	C	D	CONCRETE	REINFORCING	EXCAVATION
1	1	2	0	2	0.0607 C.Y./L.F.	1.0209 #/L.F.	0.1152 C.Y./L.F.
2	1.5	3	0	3	0.0883 C.Y./L.F.	1.4845 #/L.F.	0.2263 C.Y./L.F.
3	1.5	2.25	0	2.25	0.0724 C.Y./L.F.	1.2179 #/L.F.	0.1754 C.Y./L.F.
4	3	0	2	0	0.1667 C.Y./L.F.	1.8667 #/L.F.	0.3889 C.Y./L.F.
5	2	0	3	0	0.1482 C.Y./L.F.	1.6592 #/L.F.	0.3704 C.Y./L.F.
6	1	0	2	0	0.0926 C.Y./L.F.	1.0370 #/L.F.	0.1667 C.Y./L.F.
8	1.5	1.5	1.5	1.5			0.2735 C.Y./L.F.
9	1.5	1.5	2	1.5	0.0828 C.Y./L.F.	1.3927 #/L.F.	0.2829 C.Y./L.F.
10	3.5	3.5	2	3.5	0.1526 C.Y./L.F.	2.5659 #/L.F.	0.7335 C.Y./L.F.
11	2	4	2	4	0.1405 C.Y./L.F.	2.3630 #/L.F.	0.5761 C.Y./L.F.
12	3	6	4	6	0.2203 C.Y./L.F.	3.7053 #/L.F.	1.3168 C.Y./L.F.
N.I.C. 13	~~2.5~~	~~5~~	~~1~~	~~5~~			~~0.6350 C.Y./L.F.~~ N.I.C.
14	1	6	0	6			0.2890 C.Y./L.F.



TYPE 7A
BITUMINOUS GUTTER
Scale: ½" = 1'-0"

NOTES:
1. Contractor may substitute Ditches of other shapes & of greater capacities if approved by the Engineer. Payment will be on the original Ditch as shown on Plans.
2. Expansion & Construction Joints are Incidental to Lined Drainage Ditches. For Detail See Sheet*68.
3. Type 7A* is a State Standard Spillway Inlet.
4. For Joint Details See Sheet No. 68.

J. ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2220
HAWAII, U.S.A.

I HEREBY CERTIFY THAT THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
J. Andrew Schuchardt

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE ESTIMATED QUANTITIES

INTERSTATE ROUTE H-1
PROJECT No. I-HI-1(89):13

SCALE: AS SHOWN DATE: Oct. 30, 1970

SHEET No. 3D OF 28 SHEETS

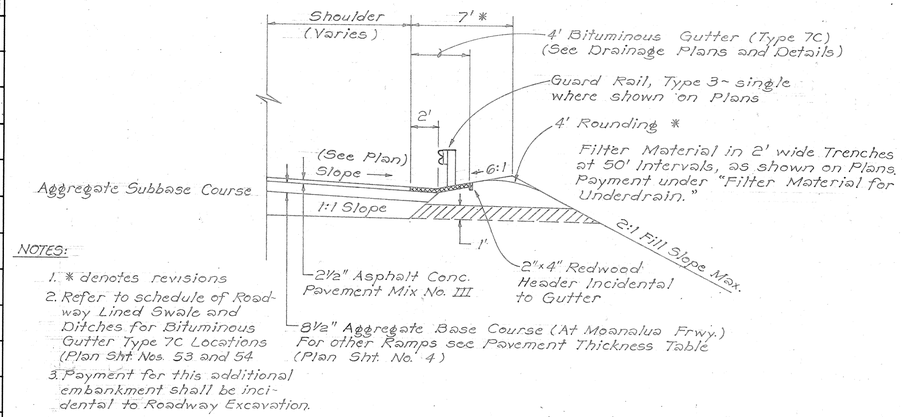
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
NOTE BOOK	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

53

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	54	362

SCHEDULE OF ROADWAY LINED SWALES & DITCHES

LOCATION	TYPE	BITUMINOUS GUTTER TYPE 7A	BITUMINOUS GUTTER TYPE 7B	BITUMINOUS GUTTER TYPE 7C	LINED DITCHES (VEE)	LINED DITCHES (TRAPEZOIDAL)	LINED DITCHES (RECTANGULAR)	DITCH & CHANNEL EXCAVATION
MF STA 184+30, 85' Rt. To H-3 265+20' 69' Lt	6						90	15
MF STA 184+70, 72' Rt To MF STA 183+00, 72' Rt	7C			170				
MF STA 186+65, 60' Lt. To MF STA 183+50, 60' Lt	7C			315				
MF STA 183+50, 60' Lt To MF STA 183+12, 60' Lt	SEE DETAIL SHT 67	38						
M STA 19+50, 12' Rt. To M STA 20+00, 12' Rt	7C			50				
M STA 20+00, 12' Rt To M STA 21+00, 12' Rt	7F			100				
M STA 20+50, 16' Rt. To M STA 20+50, 43' Rt	14				27			8
M STA 21+00, 12' Rt. To M STA 21+62, 12' Lt	7C			62				
UE STA 14+50, 23' Rt To UE STA 19+15, 23' Rt.	7C			465				
MF STA 175+00, 60' Rt. To MF STA 171+10, 68' Rt	7C			390				
MF STA 171+15, 90' Rt. To MF STA 171+15, 110' Rt	6						18	3
MF STA 174+00, 64' Lt. To MF 171+97, 64' Lt.	7A	205						
~~H-3 STA 268+50, 62' Rt. To H-3 STA 265+53, 74' Rt.~~	~~7C~~			304	N.I.C.			
SUBTOTAL SHEET Nº 3D		4178	-	928	1165	1625	200	1178
SUBTOTAL SHEET Nº 3D & 4D		4421	-	2480	1192	1625	308	1204
ITEM NO.		609.700	609.701	609.702	640.010	640.020	640.030	207.01
		L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	C.Y.

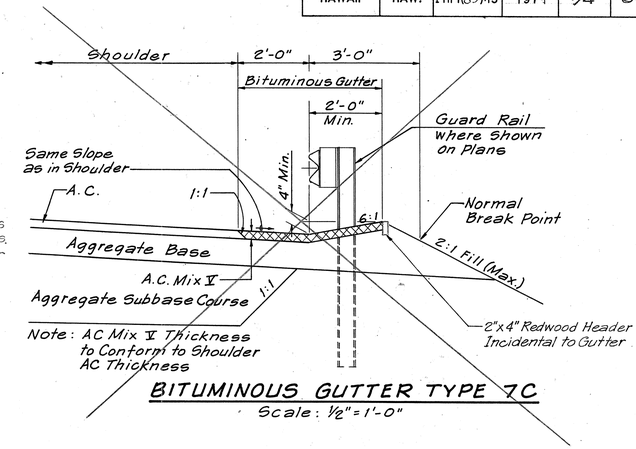


NOTES:

1. * denotes revisions
2. Refer to schedule of Roadway Lined Swale and Ditches for Bituminous Gutter Type 7C Locations (Plan Sht Nos. 53 and 54
3. Payment for this additional embankment shall be incidental to Roadway Excavation.

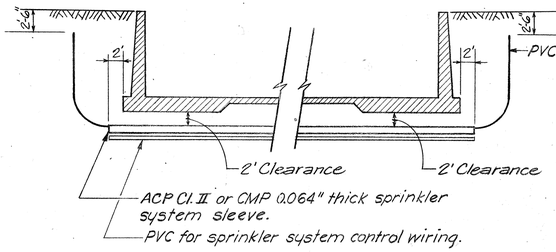
REVISED TYPICAL SECTION AT SHOULDER WITH TYPE 7C BITUMINOUS GUTTER

Scale: 1" = 5'



BITUMINOUS GUTTER TYPE 7C

Scale: ½" = 1'-0"



NOTES:

1. Temporary Plugs approved by the Engineer will be included and installed and be incidental to the cost of the pipes.
2. Location of Pipes to be marked in a fashion approved by the Engineer.

TYPICAL PROFILE FOR SPRINKLER SYSTEM SLEEVE UNDER NORTH HALAWA STREAM CHANNEL

NOT TO SCALE

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

J. ANDREW SCHUCHARDT REGISTERED PROFESSIONAL ENGINEER No. 2229 HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

J. Andrew Schuchardt

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE ESTIMATED QUANTITIES

INTERSTATE ROUTE H-1
PROJECT NO. I-HI-1 (89):13

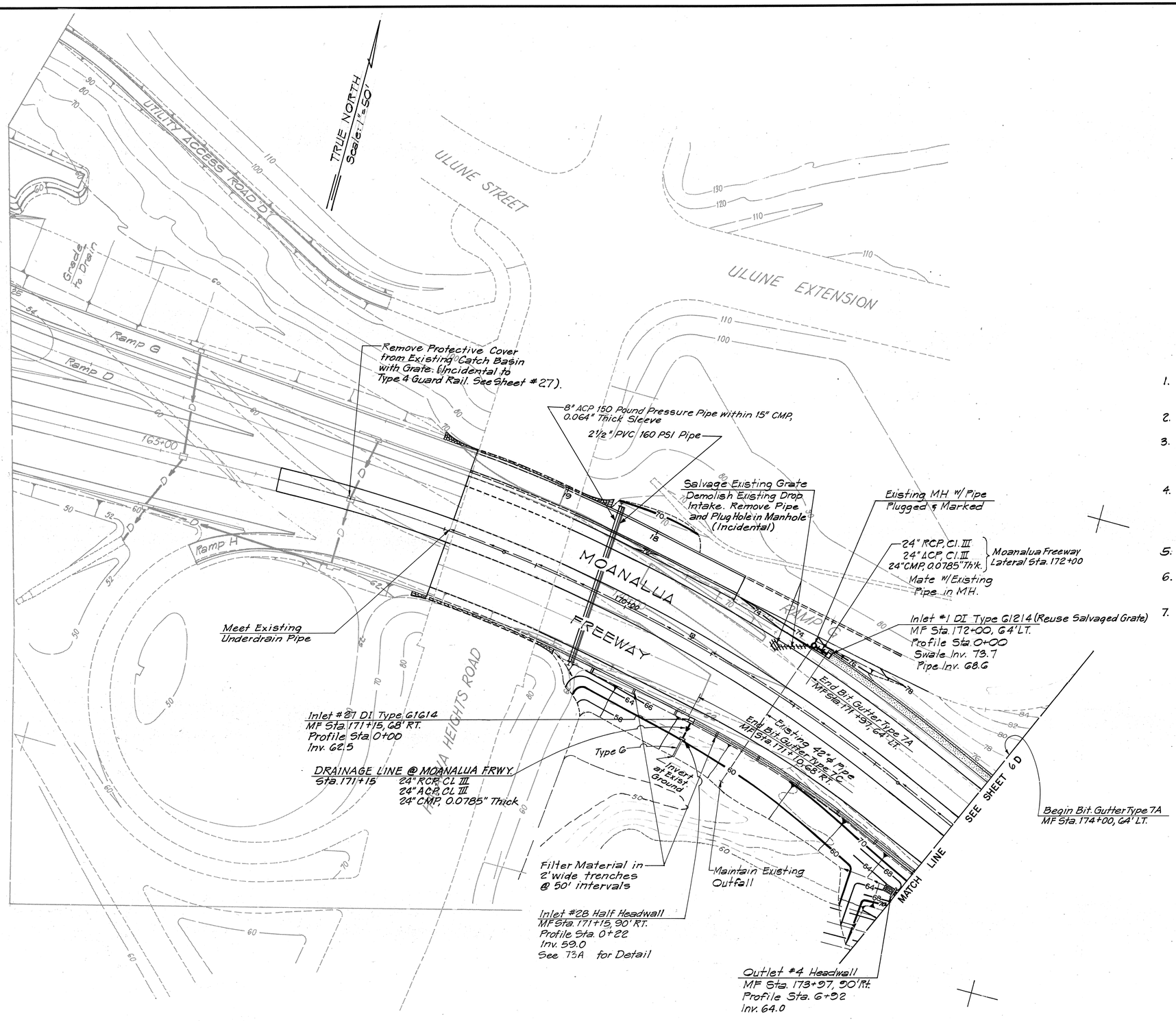
SCALE: AS SHOWN DATE: Oct. 30, 1970

SHEET No. 4D OF 28 SHEETS

PRINTED ON NO. 1000H CLEARPRINT

54

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	55	362



GRADING & DRAINAGE LEGEND

- Storm Drain Pipe
- Underdrain Pipe
- Swales
- Recently Adjusted Contours
- Paved Ditches & Channels
- Cleanouts
- Grouted Rubble Pavement (9" Thick)
- PVC 160 PSI Pipe for Sprinkler System Control Wiring
- PVC 160 PSI Pipe or ACP Cl 150 Type II within ACP or CMP, 0.064" Thick Sleeve for Sprinkler System.

GENERAL NOTES

1. All Paved Ditch & Channel Excavation is limited to the Width and Depth of Paved Area.
2. All Pipes Exiting Inlets are to be Groove Ended or Rounded.
3. All Paved Ditches Paralleling & Adjacent to Roadways are to be Bituminous Gutters, all other Ditches & Channels are Reinforced Concrete unless otherwise noted.
4. Rocks, Broken Concrete, other Solid Material and Hard Lumps shall not be placed in the embankment areas, as designated by the Engineer, where future piling for Bridges is to be placed or driven.
5. All Regraded Areas are to have Slope Control Planting.
6. Spillway Inlets Type 7H have Rectangular Ditch Type 6 2' Wide 1' Deep as Spillways.
7. The Pipes and Sleeves for the Sprinkler System shall be placed under Proposed Roadways at a minimum of 12" below Sub-Base. PVC Pipe within Sleeves shall project a minimum of 2 feet from each End of Sleeve. All Pipes shall be Plugged. Plugs shall be approved by the Engineer and shall be Incidental to the Cost of the Pipe. Locations of Pipes shall be marked in a fashion approved by the Engineer. PVC Pipe shall be PVC 1120 (SDR 26) 160 PSI Ring Type. 8" Water Pipe shall be Asbestos Cement Pressure Pipe, Class 150, Type II, Ring Type conforming to ASTM Designation C-296. 12" and 15" Pipe Sleeves shall be Corrugated Metal Pipe, 0.064" Thick. ACP Sleeves shall be Class II. All Pipes and Sleeves shall be Installed in accordance with the Manufacturers Recommendations.

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

J. ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

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J. Andrew Schuchardt

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING AND DRAINAGE PLAN

INTERSTATE ROUTE H-1
PROJECT No. I-HI-1 (89):13

SCALE: 1"=50' DATE: Oct. 30, 1970

SHEET No. 5 OF 28 SHEETS

55

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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	56	362

TRUE NORTH
Scale: 1"=50'

MATCH LINE SEE THIS SHEET

MATCH LINE SEE SHEET 5D

MATCH LINE SEE SHEET 7D

Begin Bit. Gutter Type 7C
M.F. Sta. 175+00, 60' RT.

Inlet #3 MH Type E
M.F. Sta. 175+85, 62' Rt.
Profile Sta. 5+03
Inv. 65.0

Moanalua Freeway & Ramp F Drainage Line
30" RCP CL III
30" ACP CL III
36" CMP, 0.1084 In. Thk.

Existing 30" RCP to be Demolished or Removed prior to Constructing Moanalua Freeway

Filter Material in 2' wide Trenches @ 50' Intervals

Inlet #201 Type B
M.F. Sta. 176+40, 85' Lt.
Profile Sta. 3+45
Swale Inv. 70.0
Pipe Inv. 66.0

Type "I"

Begin Bituminous Gutter Type 7A UE 36+65, 16' Rt.

4" PVC 160 PSI within 10" ACP Class II Sleeve

2" PVC 160 PSI Pipe

Type 7A

Begin Bituminous Gutter Type 7A
M.F. Sta. 182+50, 76' Rt.

Bit. Gutter 50' Transition Type 7C to Type 7A

Begin Paved Ditch
M.F. Sta. 179+85, 85' Lt.
Profile Sta. 0+00
Inv. 81.0

Bit. Gutter Type 7A

LEGEND:

CONTRACT CHANGE ORDER NO. 2
Reduced Slope Control Planting Area & Grading

RAMP K
RAMP L
RAMP R
RAMP F
RAMP M
INTERSTATE ROUTE H-1 EASTBOUND
INTERSTATE ROUTE H-1 WESTBOUND
MOANALUA FREEWAY
ULULINE AVENUE EXTENSION
ROAD

ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

J. Andrew Schuchardt

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING AND DRAINAGE PLAN

INTERSTATE ROUTE H-1
PROJECT No. I-HI-1(89):13

SCALE: 1"=50' DATE: Oct. 30, 1970

SHEET No. 6 OF 28 SHEETS

56

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	57	362

MATCH LINE SEE SHEET 6 D

MATCH LINE SEE SHEET 8D

Filter Material in 2' wide Trenches @ 50' Intervals

Inv. 86.5 for Detail See Sheet 18D

Inv. 82.6

Spillway Inlet Type 7D

End Bituminous Gutter Type 7A

Begin Ulune Extension & Service Road Open Channel
UE Sta. 28+20, 16' Rt.
Profile Sta. 0+00
Inv. 82.0

DRAINAGE LINE @ MOANALUA FREEWAY STA. 184+30
24" RCP, CL III
24" ACP, CL III
24" CMP, 0.0785" Thick

Inv. 64.0

Type G

Bituminous Gutter Type 7A

Bit. Gutter Type 7C

Inlet #30 Half Headwall
MF Sta. 184+30, 85' RT.
Profile Sta. 0+15
Inv. 83.3
See 73A for Detail

Inlet #29 DI Type G1G14
MF Sta. 184+30, 72' RT.
Profile Sta. 0+00
Inv. 84.5

Outfall
N.H.S. Sta. 7+55, 17.5' RT.
Profile Sta. 4+10
Inv. 58.0

Inlet #24 MH Type D
MF Sta. 189+09, 84' RT.
Profile Sta. 3+00
Inv. 90.0

Inlet #23 DI Type G1G14
MF Sta. 189+75, 60' RT.
Profile Sta. 2+30
Inv. 92.0

Inlet #22 DI Type G1G14
MF Sta. 190+25, 60' RT.
Profile Sta. 1+80
Inv. 92.5

MOANALUA FREEWAY & RAMP O DRAINAGE LINE
24" RCP CL III
24" ACP CL III
24" CMP 0.0785" Thick

End Bit. Gutter Type 7C
MF Sta. 190+75, 60' LT.

Inlet #21 DI Type G1G14
MF Sta. 190+79, 60' LT.
Profile Sta. 0+50
Inv. 93.0

Inlet #20 DI Type G1G14
MF Sta. 191+29, 60' LT.
Profile Sta. 0+00
Inv. 93.5

Moanalua Freeway & Ulune Extension Open Channel

Filter Material in 2' wide Trenches @ 50' Intervals
NIC

Outfall North Halawa Stream
N.H.S. Sta. 9+15, 17.5' Rt.
Profile Sta. 0+63
Inv. 66.0

Outfall North Halawa Stream
N.H.S. Sta. 9+76, 17.5' Rt.
Inv. 68.0

Outfall North Halawa Stream
N.H.S. Sta. 10+72, 17.5' LT.
Inv. 65.0

Outfall
N.H.S. Sta. 9+82, 17.5' LT.
Profile Sta. 1+40
Inv. 67.0

Outfall North Halawa Stream
N.H.S. Sta. 11+05, 17.5' LT.
Profile Sta. 3+88
Inv. 65.4

Outfall North Halawa Stream
N.H.S. Sta. 11+13, 17.5' RT.
Profile Sta. 6+90
Inv. 61.47

Outfall NIC
M Sta. 18+40, 35' RT.
Profile Sta. 0+63
Inv. 65.7

Outfall North Halawa Stream
N.H.S. Sta. 11+93, 17.5' LT.
Inv. 62.5
Type 12 Ditch 16' Long

Inlet #26 DI Type G1G14
M Sta. 18+40, 12' RT.
Profile Sta. 0+40
Inv. 67.0

RAMP M DRAINAGE LINE
24" RCP CL III
24" ACP CL III
24" CMP 0.0785" Thick

Inlet #25 DI Type G1G14
M Sta. 18+00, 12' RT.
Profile Sta. 0+00, Inv. 71.0

Ramp M Open Channel Type 12

Inlet #18 DI Type G1G14
MF Sta. 185+38.5, 60' LT.
Profile Sta. 0+00, Inv. 86.0

Inlet #19 DI Type G1G14
MF Sta. 186+23.5, 60' LT.
Profile Sta. 0+85, Inv. 85.5

Type 3

Spillway Inlet Type 7H

MOANALUA FREEWAY & RAMP F DRAINAGE LINE
24" RCP CL III
24" ACP CL III
24" CMP 0.0785" Thick

2" PVC 160 PSI Pipe

3" PVC 160 PSI Pipe within 8" ACP Class II Sleeve

6" PVC 160 PSI Pipe within 12" CMP, 0.064" Thick Sleeve

2½" PVC 160 PSI Pipe
Detail See Sheet # 54

2" PVC 160 PSI Pipe

3" PVC 160 PSI Pipe within 8" ACP Class II Sleeve

Type 12

Type 2

Type 1

Spillway Inlet Type 7F

Bituminous Gutter Type 7A

Bit. Gutter Type 7C

Access Road

Ramp F

Ramp M

Ramp O

Ramp P

Ramp N

Ulune Extension

Moanalua Freeway

Interstate Route H-1

Interstate NIC

Moanalua Stream

South Halawa Stream

North Halawa Stream # 1

Pipeline

Power Line

Road

Service

Guard Rail

Curb

Gutter

Ditch

Fence

Bridge

Concrete Lined Channel

Reinforced Concrete Box Culvert

Spillway Inlet Type 7F

Bituminous Gutter Type 7A

Bit. Gutter Type 7C

Spillway Inlet Type 7H

Bituminous Gutter Type 7A

Spillway Inlet Type 7D

End Bituminous Gutter Type 7A

Bituminous Gutter Type 7A

Bit. Gutter Type 7C

Spillway Inlet Type 7F

Bituminous Gutter Type 7A

Bit. Gutter Type 7C

Bituminous Gutter Type 7A

Bituminous Gutter Type 7A

Bituminous Gutter Type 7A

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	58	362

MATCH LINE SEE SHEET 7D

MATCH LINE SEE SHEET 9D

MATCH LINE SEE SHEET 10D

Begin Bit. Gutter Type 7C
MF Sta. 193+60, 60' LT.

ULUNE EXTENSION DRAINAGE LINE

Inlet #15 Outlet Str.
UE Sta. 19+18.4 23' RT.
Profile Sta. 0+40
Inv. 78.0

24" RCP CL III
24" ACP CL III
24" CMP, 0.0785" Thick

Type 12

℄ of 10' wide Navy Av Gas easement

Begin Ramp M Open Channel
M Sta. 14+50, 23' Rt.
Profile Sta. 0+00
Inv. 70.76

Bituminous Gutter Type 7B

N.I.C.

TRUE NORTH
Scale: 1" = 50'

RAMP P

MOANALUA FREEWAY

Begin Moanalua Freeway & Ulune Extension Open Channel
MF Sta. 194+00, 64' Lt.
Profile Sta. 0+00
Inv. 104.19

Begin Bit. Gutter Type 7C
MF Sta. 194+55, 60' Rt.

Type 1

ULUNE EXTENSION

Bit. Gutter Type 7C

Bituminous Gutter Type 7A

24" RCP Cl. III
24" ACP Cl. III
24" CMP, 0.0785" Thk.

Begin Bituminous Gutter Type 7A
MF Sta. 201+00, 64' Lt.

Begin Bit. Gutter Type 7C
MF Sta. 201+00, 64' Rt.

INTERSTATE ROUTE H-3 OUTBOUND

HALAWA

Spillway Inlet Type 7E

Filter Material in 2' wide Trenches @ 50' Intervals

ABANDONED BRIDGE

Inlet #31 DI Type GXG14
UE Sta. 19+18.4, 23' Rt.
Profile Sta. 0+00
Inv. 96.0

INBOUND

RAMP M

N.I.C.

Bituminous Gutter Type 7B

Access Road

RAMP N

Type 5

R=150'

Outfall Ramp N
Drainage Line
SHS Sta. 15+35, 12' Rt.
Profile Sta. 13+05
Inv. 73.0

UTILITY ACCESS ROAD

South Halawa Stream Channel

South Halawa Stream

ROAD K

Type 11

Ramp N
Drainage Line

Outfall to South Halawa Stream
SHS Sta. 7+50, 12' Rt.
Profile Sta. 8+17
Inv. 60.5

R=50'
Type 4

1½" PVC 160 PSI Pipe

3" PVC 160 PSI Pipe within 8" ACP Class II Sleeve

Type 9
R=250'

Type 8

Outlet #1 Headwall
MF Sta. 195+72, 117' Rt.
Profile Sta. 5+47
Inv. = 97.0

Ramp P Spillway (STATE Std.)

Inlet #10 MH Type D
MF Sta. 196+46, 65' Rt.
Profile Sta. 4+67
Inv. 110.0

Moanalua Freeway & Ramp P Drainage Line

Inlet #9 MH Type D
MF Sta. 198+85, 78' Rt.
Profile Sta. 2+30
Inv. 126.5

Inlet #8 CB Type SA-2
MF Sta. 199+00
Profile Sta. 1+50
Inv. 128.0

Inlet #7 CB Type SA-1
MF Sta. 199+50
Profile Sta. 1+00
Inv. 131.0

Inlet #6 CB Type SA-2
MF Sta. 200+05
Profile Sta. 0+45
Inv. 134.3

Inlet #5 CB Type SA-2
MF Sta. 200+50
Profile Sta. 0+00
Inv. 137.0

Type 1A

Bituminous Gutter

CONCRETE LINED DITCH

ROAD

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING AND DRAINAGE PLAN

INTERSTATE ROUTE H-1
PROJECT No. I-HI-1(89):13

SCALE: 1" = 50' DATE: Oct. 30, 1970

SHEET No. 8D OF 28 SHEETS

DREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

58

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(69):13	1971	59	362

42" RCP, Cl. III
42" CMP, 0.109 IN THK.

Outlet #14 Headwall
M.F. Sta. 208+60, 120' Lt.
Profile Sta. 1+47
Inv. 180.0

Inlet #13 MH Type E
M.F. Sta 209+61, 110' Lt.
Profile Sta. 0+45
Inv. 180.5

42" RCP, Cl. III
36" CMP, 0.109 IN. THK.

42" RCP Cl. III
48" CMP, 0.1084 In Th'k.

Existing Inlet #12 MH Type E
M.F. Sta. 209+61, 65' Lt.
Profile Sta. 0+00
Inv. 182.0

Ramp N
Drainage Line
Type 11

R = 750'

RAMP N

MOANALUA FREEWAY

MOANALUA ROAD

Bituminous Gutter
Type 7A

MATCH LINE SEE SHEET 8D

TRUE NORTH
Scale: 1" = 50'

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

J. ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

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J. Andrew Schuchardt

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING AND DRAINAGE PLAN

INTERSTATE ROUTE H-1
PROJECT No. I-HI-1(69):13

SCALE: 1" = 50' DATE: Oct. 30, 1970

SHEET No. 9D OF 28 SHEETS

59

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	60	362

TRUE NORTH
Scale: 1"=50'

MATCH LINE SEE SHEET 8D

RAMP N

℄ South Halawa Stream

TEMPORARY INLET STRUCTURE
*For Revision, see sht. no. C.O. 60 G-1
INSERT

NIC
Outlet #17 Headwall
H-3 Sta. 280+18, 127' LT.
Profile Sta. 0+10
Inv. 102.0

NIC
Existing D.I.
H-3 Sta. 280+18, 137' LT.
Profile Sta. 0+06
Inv. 102.3

NIC
QUARANTINE STATION LATERAL
For Profile See Sheet No. 11 D
30" RCP CL III
30" ACP CL III
36" CMP, 0.1084 in. Th'k.

NIC
Bituminous Gutter Type 7B

N.I.C.
Type 13
R=40'

NIC
Outfall NIC
H-3 Sta. 283+85.84 LT.
Profile Sta. 0+70
Inv. 100.5

INTERSTATE ROUTE H-3

HALAWA

NIC
Ramp N Spillway Inlet Type 7F

NIC
Filter Material in 2' wide Trenches @ 50' Intervals

Bituminous Gutter Type 7C N.I.C.

Type 8 N.I.C.

Bituminous Gutter Type 7A NIC

RAMP N

NIC
H-3 Spillway Inlet Str.

Inv. 101.0

Inv. 87.0

℄ South Halawa Stream

NIC
V-Vee Ditch Spillway
c.f. Side Slopes

NIC
Outfall Ramp N Spillway
S.H.S. Sta. 13+38.23' LT.
Inv. 87.0

NIC
Outfall H-3 Spillway
S.H.S. Sta. 23+20.21' LT.
Inv. 95.0

SEE INSERT ABOVE

UTILITY ACCESS RD. K

Existing Swale to be Maintained

MATCH LINE SEE SHEET 8D

MATCH LINE SEE SHEET 11D

STREAM

ROAD

SOUTH

Date	REVISION
9-24-71	Revised South Halawa Stream temporary inlet structure

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

J. ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

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J. Andrew Schuchardt

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING AND DRAINAGE PLAN

INTERSTATE ROUTE H-1
PROJECT No. I-HI-1(89):13

SCALE: 1"=50' DATE: Oct. 30, 1970

SHEET No. 10D OF 28 SHEETS

C.O. 60

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	C.O. 60 S-1	

CURVE DATA				
	N. Coordinate	E. Coordinate	Data	
PCC	75330.1056	529976.1585	Δ	46°-30'-00"
PT	75531.6072	530219.3120	R	400.00
CC	75713.8339	529863.2314	L	324.63
PI	75378.6229	530141.0212	T	171.85

NOTES:

1. Demolish existing lined channel from SHS Sta. 21+00 to SHS Sta. 22+00.
2. For details of new lined trapezoidal channel, see sht. 239 of original plans.

529,500 E

530,000 E

530,500 E

TRUE NORTH
Scale: 1" = 50'

PT SHS Sta. 23+28.15

PC SHS Sta. 22+52.78

75,500 N

MATCH LINE SEE SHT. 2 D

MATCH LINE SEE SHT. 1 D

R/W Line

(FUTURE) INTERSTATE ROUTE H-3 INBOUND

(FUTURE) INTERSTATE ROUTE H-3 OUTBOUND

(FUTURE) RAMP N

285+00

290+00

28+00

29+00

25+00

20+00

21+00

22+00

Sta. 28+00

Conform to existing stream

Trapezoidal Channel
For detail see this sheet

Lined Trapezoidal Channel
For details see sht. 239

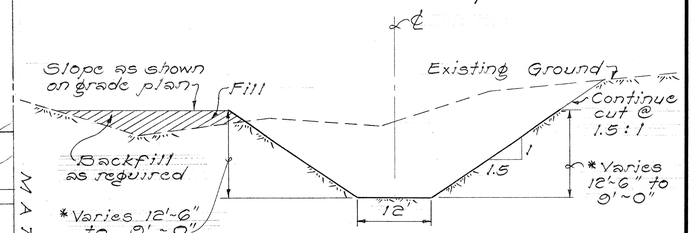
℄

P L A N

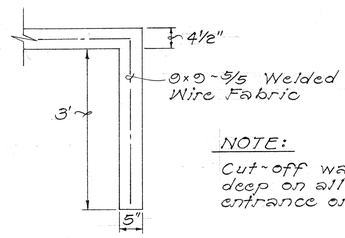
Construct Temporary Trapezoidal Channel

Estimated Quantities

Struc. Exc. for South Halawa Stream Channel	11 c.y.
Ditch & Channel Exc.	6,245 c.y.
Conc. in S. Halawa Strm. Channel	95 c.y.
Filter Material	28 c.y.



Typical Trapezoidal Channel
South Halawa Stream Sta. 22+00 to 28+00
*Sta. 22+00 to Sta. 26+50 H = 12'-6"
Sta. 26+50 to Sta. 28+00 H = 9'-0"
Scale: 1" = 10'



NOTE:
Cut-off walls 5" thick & 3' deep on all sides of the entrance on the lined channel.

Cut-Off Wall Detail
Scale: 3/4" = 1'-0"

P R O F I L E A L O N G ℄
Hor. = 1" = 20'
Vert. = 1" = 10'

75,000 N

Top of Wall

Top of Left Wall

11.5' R.W.

13.0' L.W.

14.5'

S=0.0125

Existing Ground

Inv.

Flow

SHS Sta. 21+00

76.85

Lined Trapezoidal Channel

Trapezoidal Channel (South Halawa Stream)

S=0.0885

SHS Sta. 26+50

85.73

SHS Sta. 29+50

100.00

20+00 21+00 22+00 23+00 24+00 25+00

25+00 26+00 27+00 28+00 29+00

Date	REVISION
9-30-74	Realignment of South Halawa Stream Channel Sta. 21+00± to Sta. 28+00±

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING AND DRAINAGE PLAN
PLAN AND PROFILE OF
REALIGNED SOUTH HALAWA
STREAM STA. 21+00 TO 28+00±

INTERSTATE ROUTE H-1
PROJ NO. I-H1-1(89):13

SCALE: AS SHOWN DATE: SEPT. 1974

SHEET No. OF SHEETS

C O 60 S-1

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

K&E CRYSTALENE TRACING PAPER

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	G1	362

TRUE NORTH
Scale: 1"=50'

MATCH LINE SEE SHEET 10D

INTERSTATE ROUTE H-3

Bituminous Gutter Type 7B

Bituminous Gutter Type 7A

205+00

30+00 ℄ South Halawa Stream

SOUTH HALAWA STREAM

N.I.C.

Outfall S.H.S. Sta. 35+20
Inv. 123.7

Type 11 Ditch
65' ± Long

Warp Ditch to Meet Existing Headwall

Existing Headwall
Inv. 124.0 ±

Existing Drainage Pipe

JAIL

ROAD

BM CANEFIELD

75,500N

52,500E

J. ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

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J. Andrew Schuchardt

ORIGINAL PLAT
SENT PLOTTED BY: DATE
DRAWN BY:
TRACED BY:
NOTE BOOK DESIGNED BY:
QUANTITIES BY:
No. CHECKED BY:

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING AND DRAINAGE PLAN

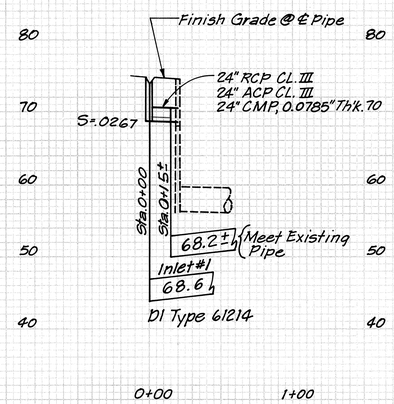
INTERSTATE ROUTE H-1
PROJECT No. I-HI-1 (89):13

SCALE: 1"=50' DATE: Oct. 30, 1970

SHEET No. 11D OF 28 SHEETS

G1

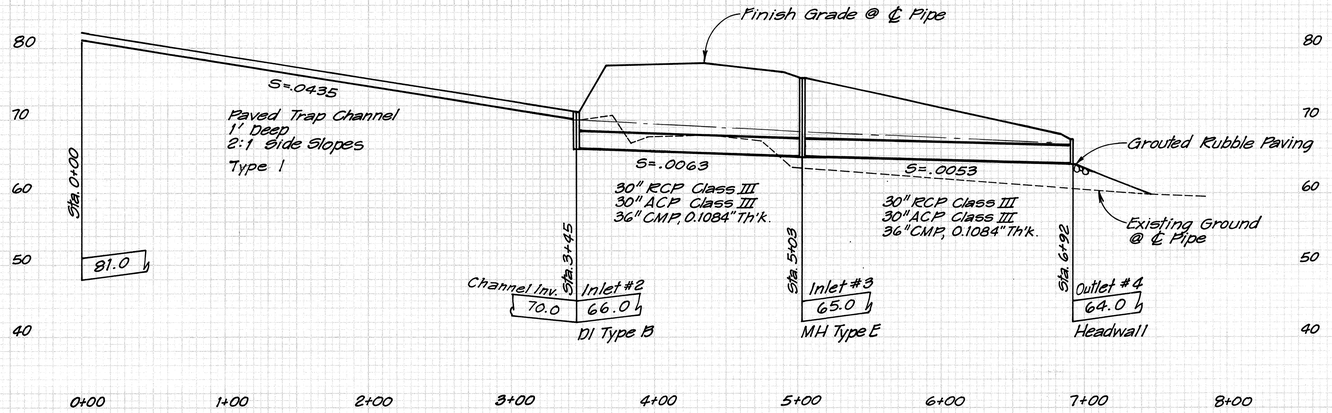
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	G2	362



MOANALUA FREEWAY LATERAL

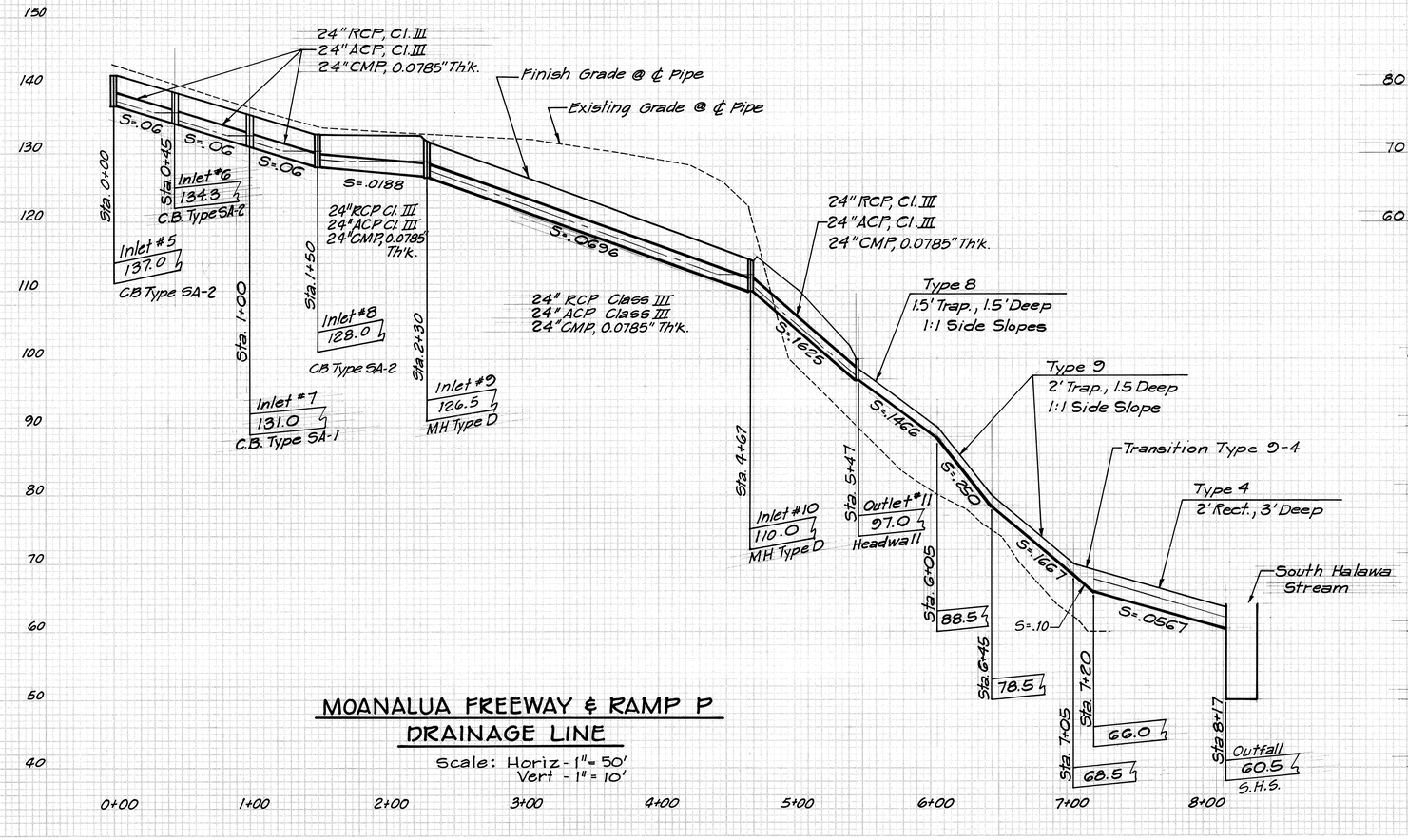
STA. 172+00

Scale: Horiz - 1" = 50'
Vert - 1" = 10'



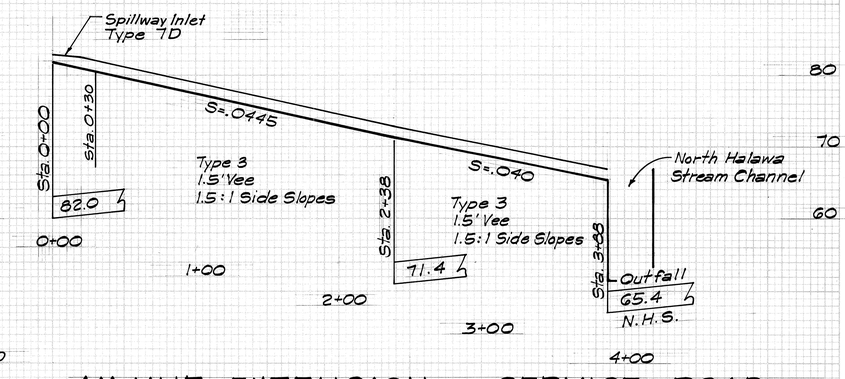
MOANALUA FREEWAY & RAMP F DRAINAGE LINE

Scale: Horiz - 1" = 50'
Vert. - 1" = 10'



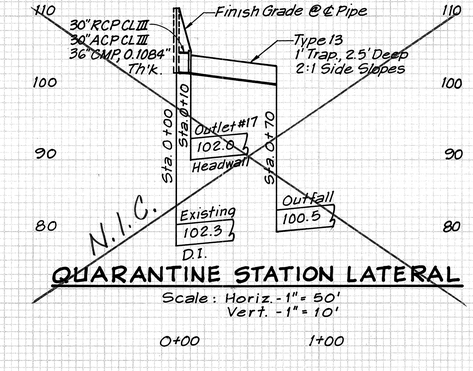
MOANALUA FREEWAY & RAMP P DRAINAGE LINE

Scale: Horiz - 1" = 50'
Vert - 1" = 10'



ULUNE EXTENSION & SERVICE ROAD OPEN CHANNEL

Scale: Horiz. - 1" = 50'
Vert. - 1" = 10'



QUARANTINE STATION LATERAL

Scale: Horiz. - 1" = 50'
Vert. - 1" = 10'

J. ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

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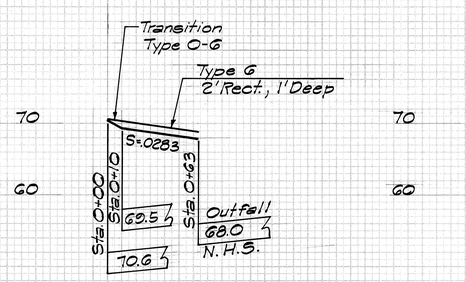
SHEET NO. 12D OF 28 SHEETS

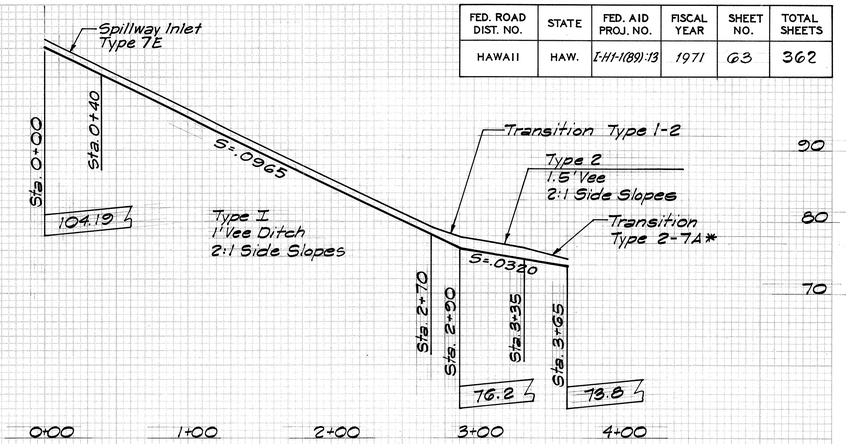
PLATE 3 —CROSS SECTION O. P. R. & R. E. STANDARD
THE FREDERICK POST CO., CHICAGO

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	G3	362



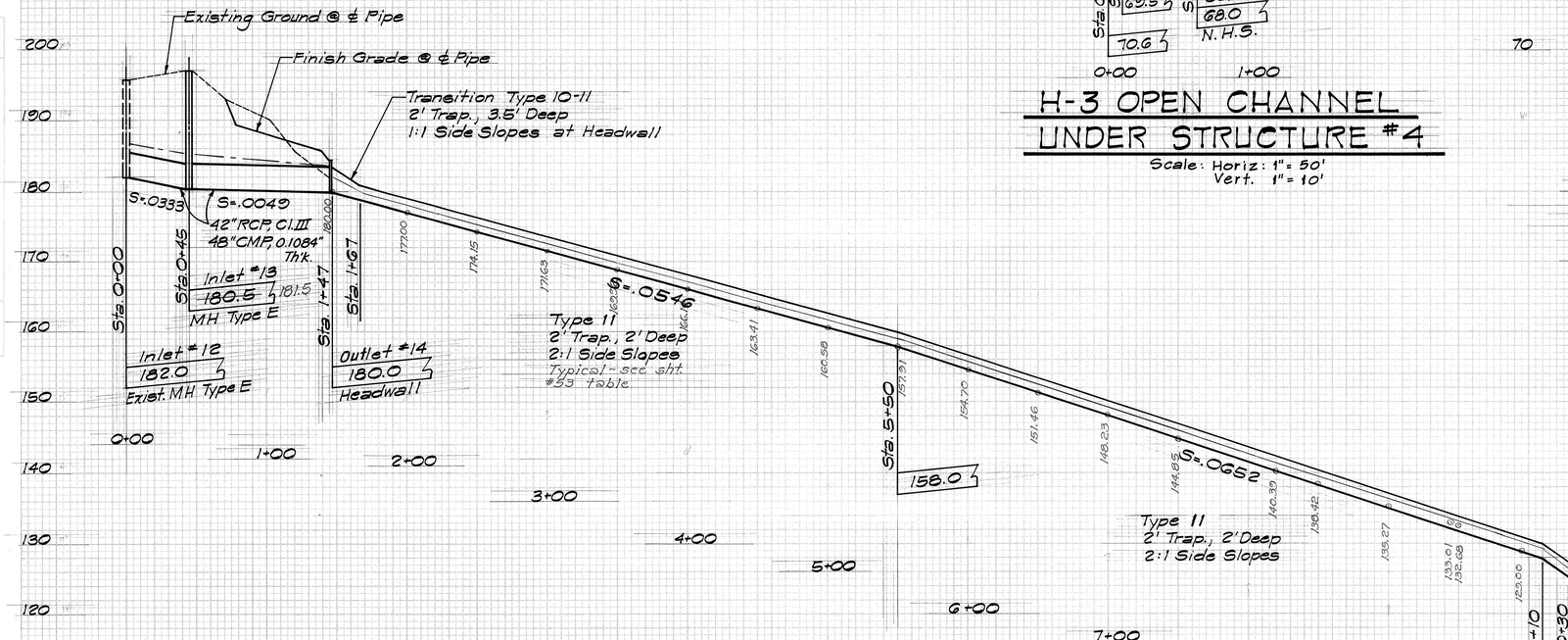
H-3 OPEN CHANNEL UNDER STRUCTURE #4

Scale: Horiz: 1" = 50'
Vert. 1" = 10'



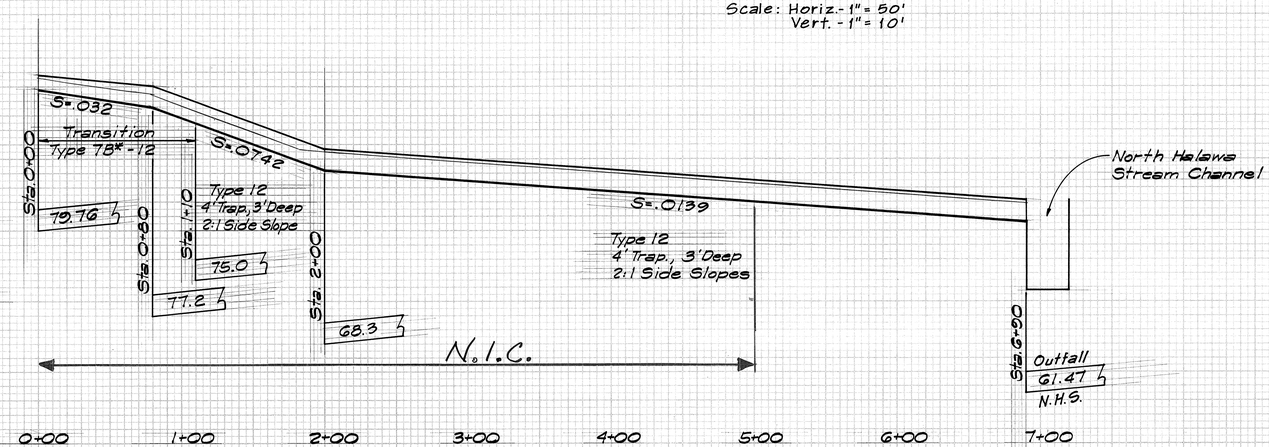
MOANALUA FREEWAY & ULUNE EXTENSION OPEN CHANNEL

Scale: Horiz.- 1" = 50'
Vert. - 1" = 10'



RAMP N DRAINAGE LINE

Scale: Horiz.- 1" = 50'
Vert. - 1" = 10'



RAMP M OPEN CHANNEL

Scale: Horiz.- 1" = 50'
Vert. - 1" = 10'

ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

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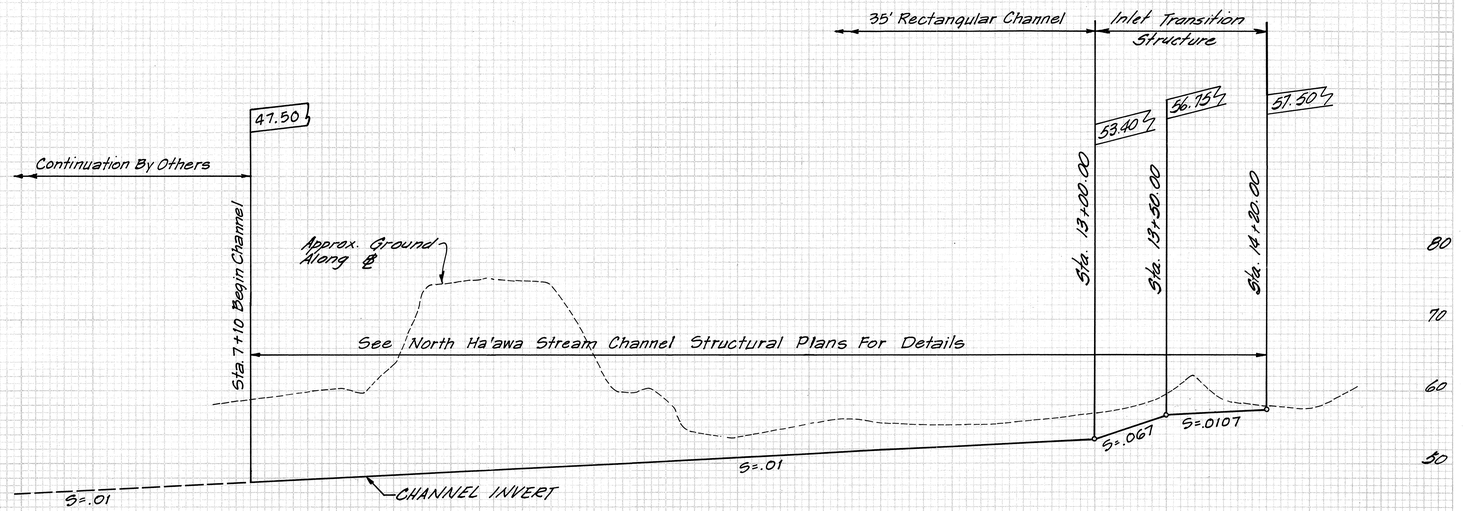
G 3

SHEET NO. 130 OF 28 SHEETS

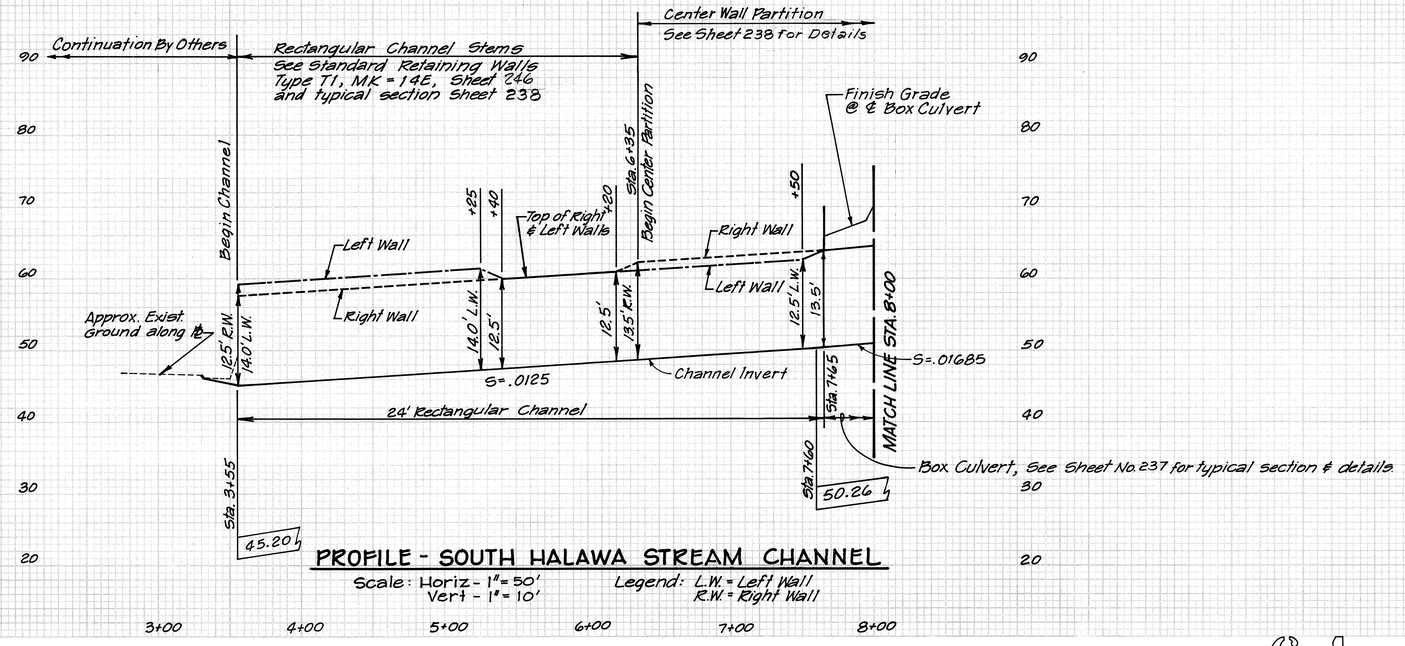
PLATE 3 —CROSS SECTION G. P. R. & R. E. STANDARD
THE FREDERICK POST CO., CHICAGO

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89)-13	1971	64	362



PROFILE - NORTH HALAWA STREAM

Scales: Horiz. 1"=50'
Vert. 1"=10'



PROFILE - SOUTH HALAWA STREAM CHANNEL

Scale: Horiz - 1"=50'
Vert - 1"=10'

Legend: L.W. = Left Wall
R.W. = Right Wall

ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

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J. Andrew Schuchardt

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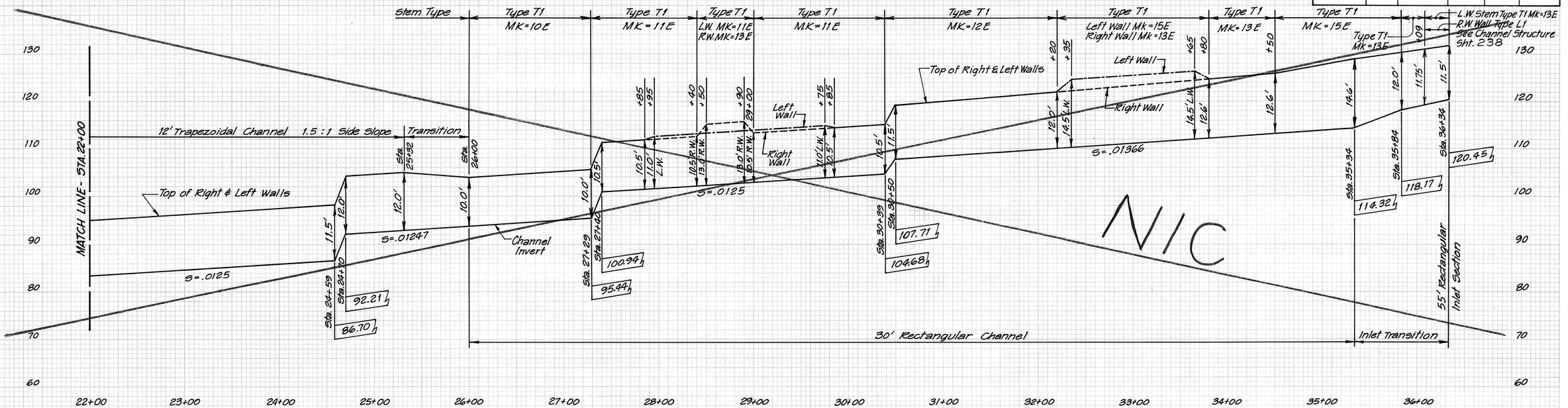
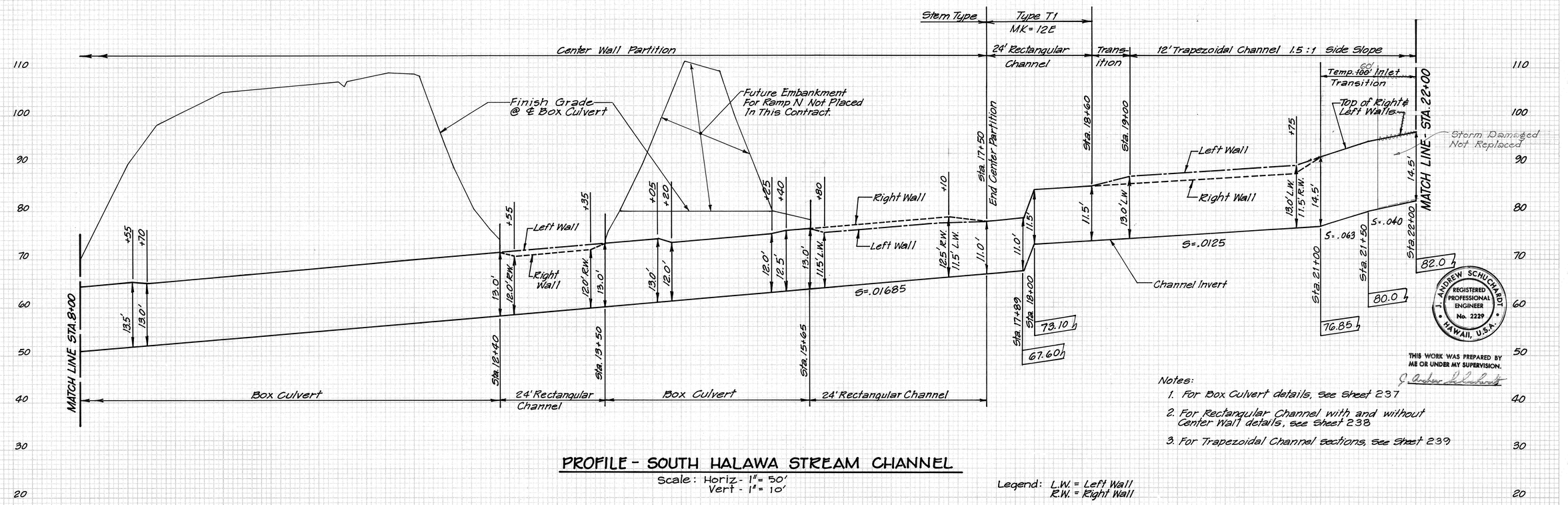
SHEET NO. 140 OF 28 SHEETS

PLATE 3 —CROSS SECTION A.P.W.A.&S.E. STANDARD
THE FREDERICK POST CO., CHICAGO

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	G5	362





J. ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

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Notes:

1. For Box Culvert details, see Sheet 237
2. For Rectangular Channel with and without Center Wall details, see Sheet 238
3. For Trapezoidal Channel Sections, see Sheet 239

PROFILE - SOUTH HALAWA STREAM CHANNEL

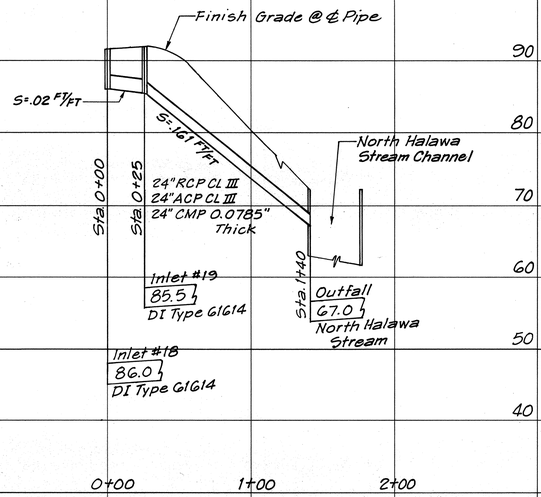
Scale: Horiz - 1" = 50'
Vert - 1" = 10'

Legend: L.W. = Left Wall
R.W. = Right Wall

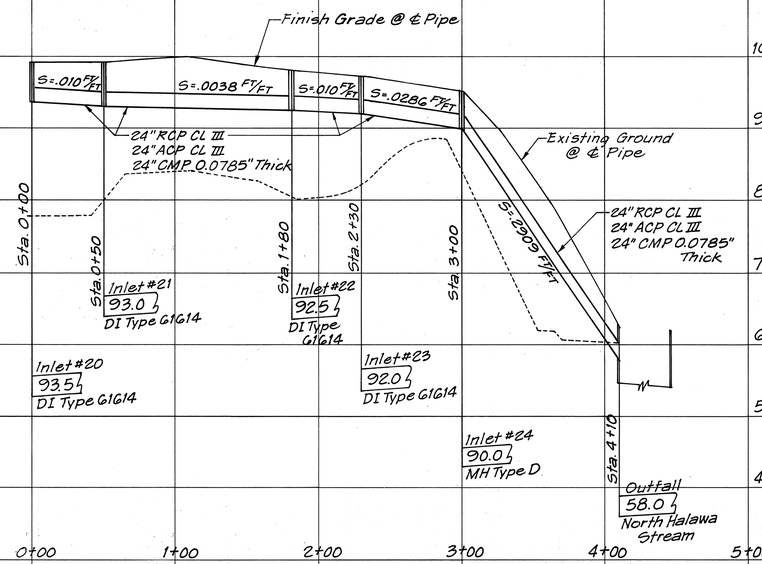
G5 SHEET NO. 150 OF 28 SHEETS

PLATE 3 —CROSS SECTION C. P. & S. & E. STANDARD
THE FREDERICK POST CO., CHICAGO

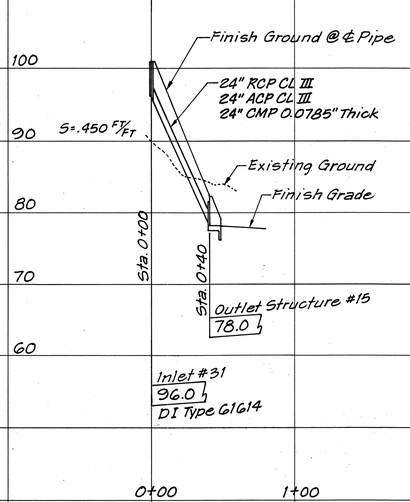
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	65A	362



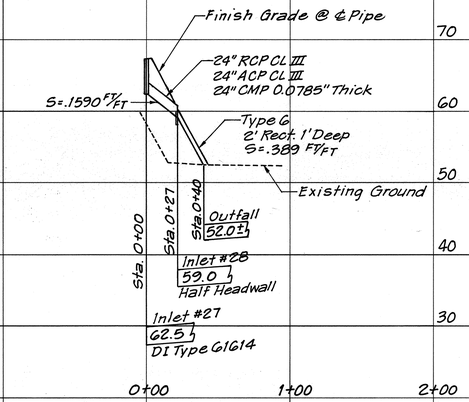
MOANALUA FREEWAY & RAMP F DRAINAGE LINE



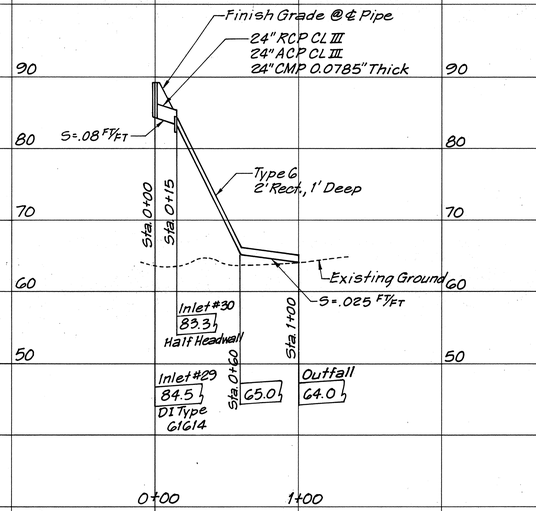
MOANALUA FREEWAY & RAMP O DRAINAGE LINE



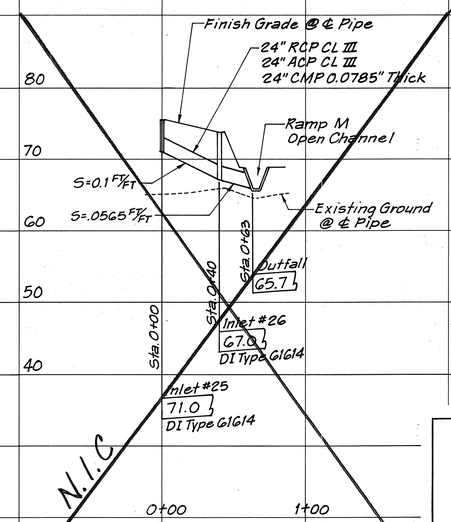
ULUNE EXTENSION DRAINAGE LINE



DRAINAGE LINE @ MOANALUA FREEWAY STA. 171+15



DRAINAGE LINE @ MOANALUA FREEWAY STA. 184+30



RAMP M DRAINAGE LINE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE PROFILES

INTERSTATE ROUTE H-1
PROJ. NO. I-HI-1(89):13

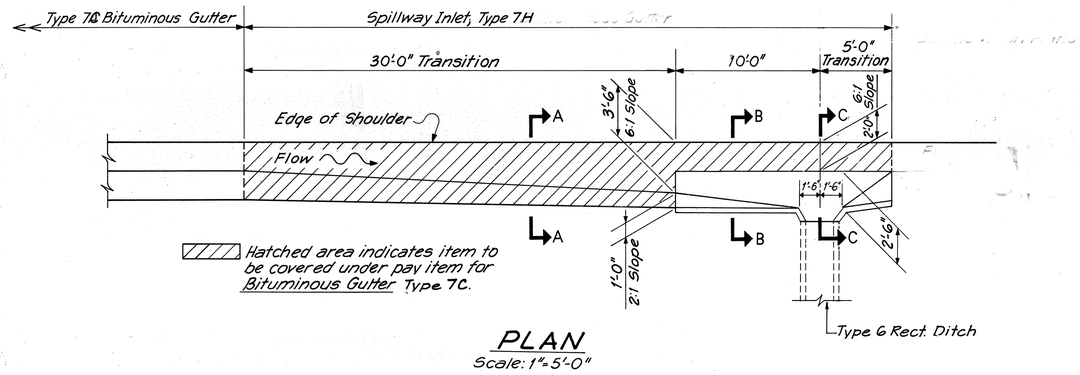
SCALE: Horiz. 1" = 50'
Vert. 1" = 10'
DATE: Oct. 30, 1970

SHEET No. 16D OF 28 SHEETS

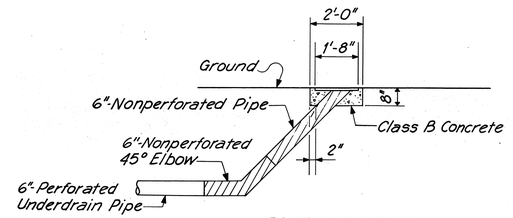
ORIGINAL PLAN
NOTE BOOK No.
SURVEY PLOTTED BY DATE
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY

65A

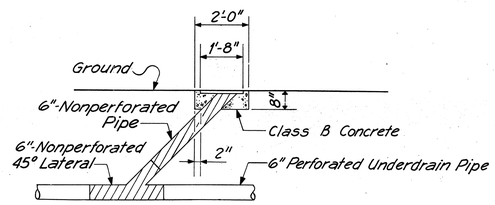
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H1-1(89):13	1971	~~66~~	362



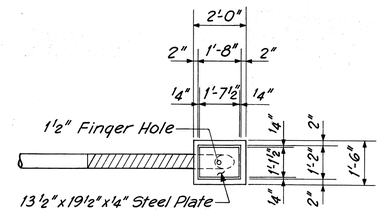
PLAN
Scale: 1"=5'-0"



ELEVATION

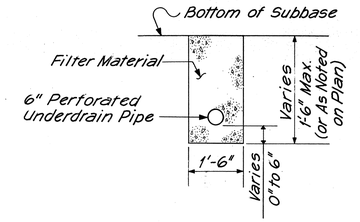


ELEVATION

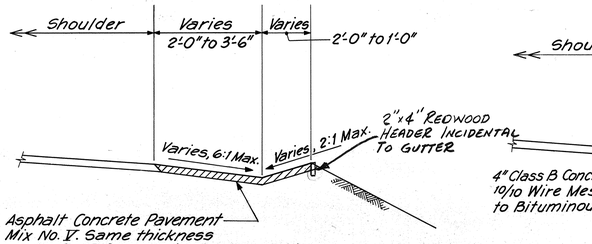


PLAN

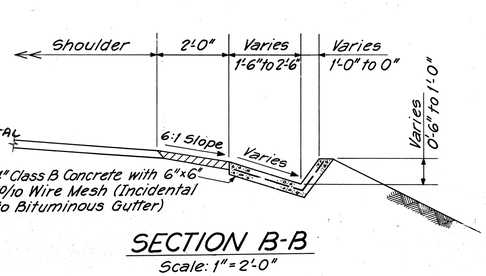
UNDERDRAIN CLEANOUT DETAILS
Scale: 3/8"=1'-0"



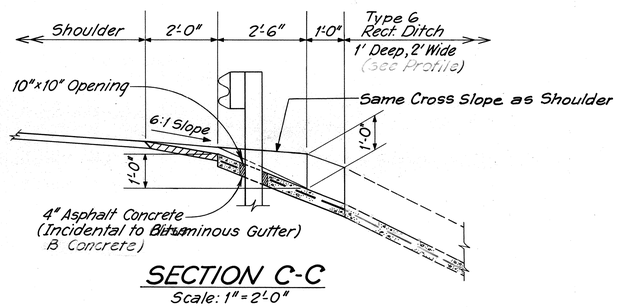
TYPICAL UNDERDRAIN SECTION
Scale: 1/2"=1'-0"



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

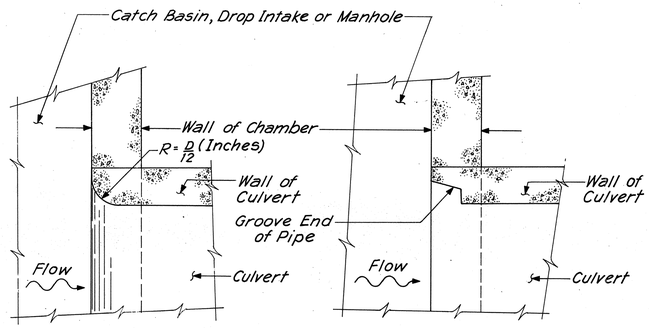


SECTION B-B
Scale: 1"=2'-0"



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

SPILLWAY INLET DETAILS FOR TYPE 7H



TYPICAL DETAILS FOR CULVERTS EXITING A CATCH BASIN, DROP INTAKE OR MANHOLE
N.T.S.

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

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J. Andrew Schuchardt

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

INTERSTATE ROUTE H-1
PROJ. NO. I-H1-1(89):13

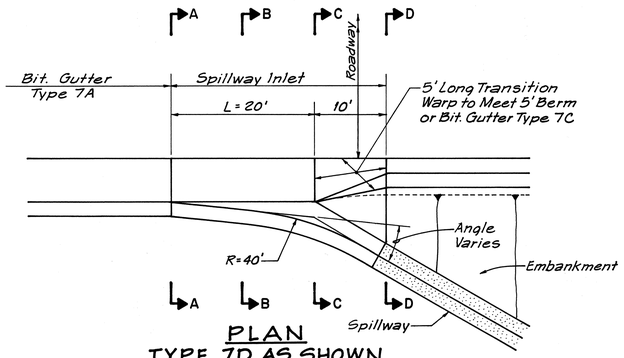
SCALE: AS SHOWN DATE: APR 15, 1971

SHEET No. 17 OF 28 SHEETS

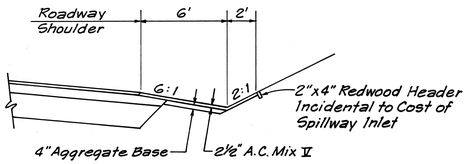
PRINTED ON NO. 1000H CLEARPRINT

66

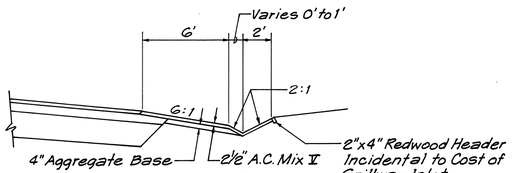
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	G7	362



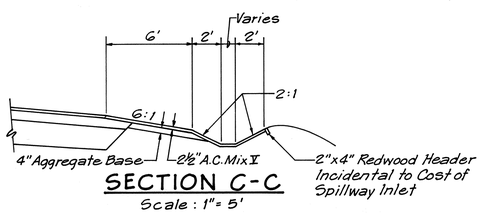
PLAN
TYPE 7D AS SHOWN
TYPE 7E L = 30'
Scale: 1" = 10'



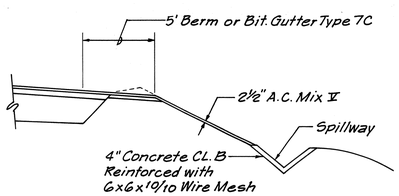
SECTION A-A
Scale: 1" = 5'



SECTION B-B
Scale: 1" = 5'

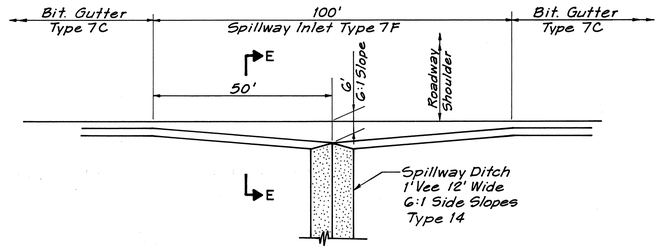


SECTION C-C
Scale: 1" = 5'

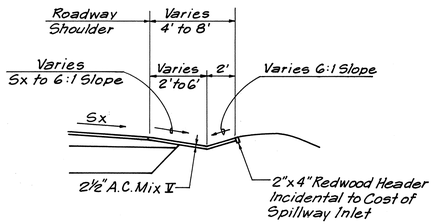


SECTION D-D
Scale: 1" = 5'

SPILLWAY INLET DETAILS
TYPE 7D & TYPE 7E



PLAN
Scale: 1" = 20'

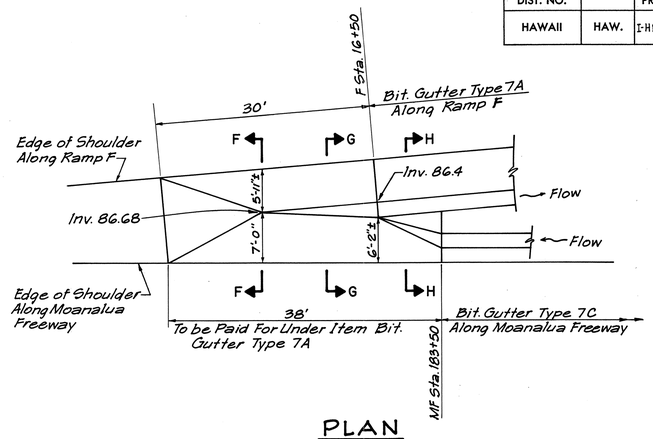


SECTION E-E
Scale: 1" = 5'

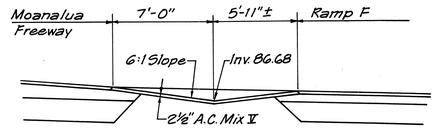
SPILLWAY INLET DETAILS
TYPE 7F

NOTES:

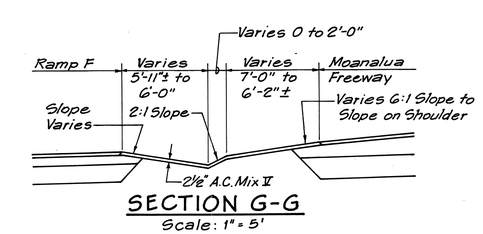
1. Spillway Inlet Types 7D & 7E are to be Paid for Under Item Bituminous Gutter Type 7A.
2. Spillway Inlet Type 7F is to be Paid Under Item Bituminous Gutter Type 7C.



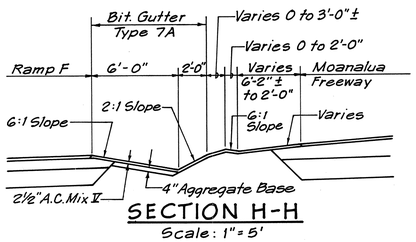
PLAN
WARPED GUTTER BETWEEN RAMP F & MOANALUA FREEWAY
Scale: 1" = 10'



SECTION F-F
Scale: 1" = 5'



SECTION G-G
Scale: 1" = 5'



SECTION H-H
Scale: 1" = 5'

J. ANDREW SCHUCHARDT
REGISTERED PROFESSIONAL ENGINEER
No. 2229
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

INTERSTATE ROUTE H-1
PROJ. NO. I-H1-1(89):13

SCALE: AS SHOWN DATE: Oct. 30, 1970

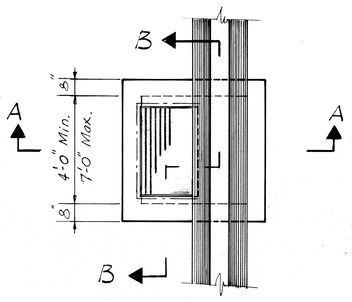
SHEET No. 18 D OF 28 SHEETS

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

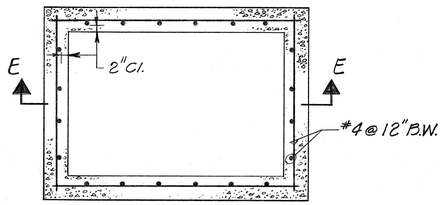
PRINTED ON NO. 1000H CLEARPRINT

67

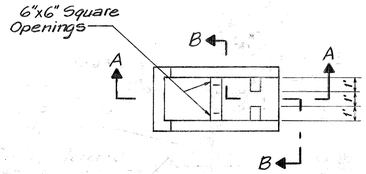
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89):13	1971	68	362



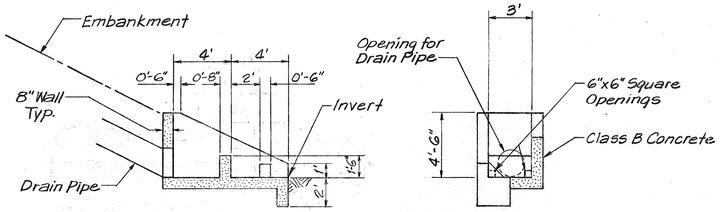
PLAN
3/8" = 1'-0"



PLAN SECTION
1/2" = 1'-0"



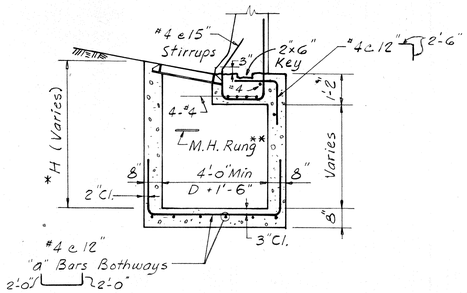
PLAN
Scale: 1" = 5'



SECTION A-A
Scale: 1" = 5'

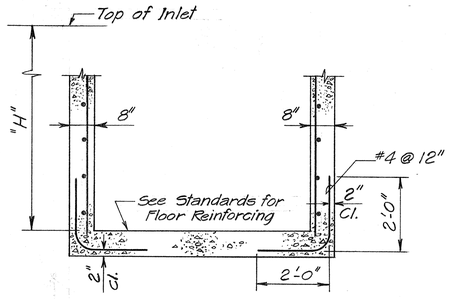
SECTION B-B
Scale: 1" = 5'

INLET #15 OUTLET STRUCTURE



SECTION A-A
3/8" = 1'-0"

* Reinforce Vert. Walls when H exceeds 6'-0".

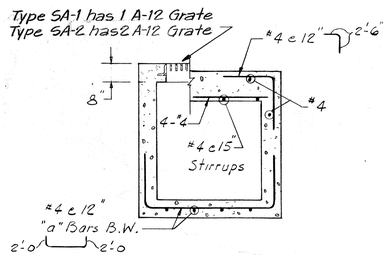


SECTION E-E
1/2" = 1'-0"

TYPICAL WALL REINFORCING FOR CATCH BASINS AND DROP INTAKES WHEN "H" EXCEEDS 6'-0"

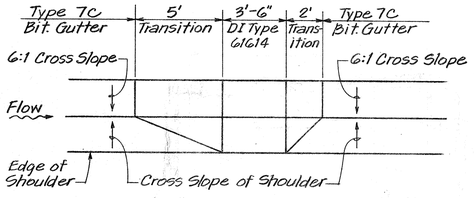
GENERAL NOTES

1. The lateral limits for Payment of Structural Excavation for Drainage Structures shall be the vertical surface one foot outside the exterior face of walls.
2. Standard Manhole (M.H.) Rungs typical for all inlet, to be incidental to Class A Concrete. See See Sheet 70 for Details.
3. Provide 2-#4 bent bars each Face, top & bottom around culvert pipes.
4. Manhole Rungs (16"o.c.) are required when "H" is greater than 4'-6". Only one Rung (12" from the bottom) is required if "H" is 4'-6" or less. Manhole Rungs may be placed at any location as Ordered by the Engineer.

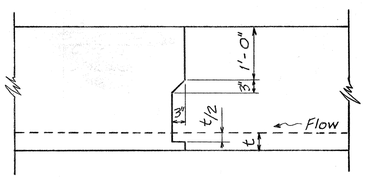


SECTION B-B
3/8" = 1'-0"

CATCH BASIN TYPE SA

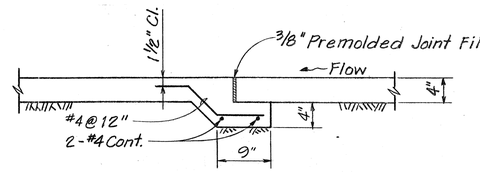


TYPICAL GUTTER TRANSITION TO DI TYPE G1614



ELEVATION VIEW

TYPICAL CONSTRUCTION JOINT @ 30' o.c.
FOR LINED DITCHES OF 2' DEPTH OR GREATER
Scale: 3/4" = 1'-0"



TYPICAL EXPANSION JOINT @ 90' o.c.
FOR LINED DITCHES OF 2' DEPTH OR GREATER
Scale: 1" = 1'-0"

ANDREW SCHUCHARDT REGISTERED PROFESSIONAL ENGINEER No. 2229 HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

J. Andrew Schuchardt

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE DETAILS

INTERSTATE ROUTE H-1
PROJECT No. I-H1-1 (89) : 13

SCALE: AS SHOWN DATE: 10-30-70

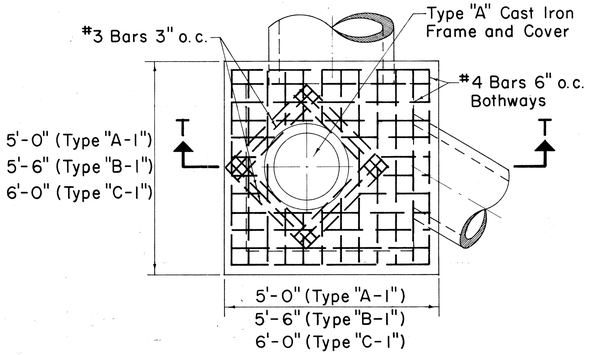
SHEET No. 19 OF 28 SHEETS

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

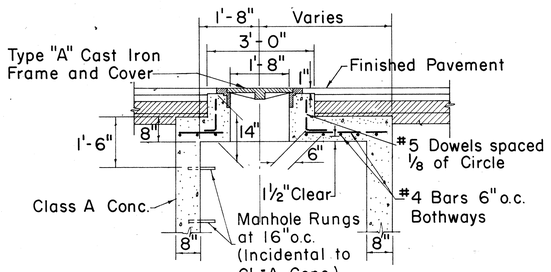
68

68

FED. ROAD DIST. NO.	STATE	FED. AID. PROJECT	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	I-HI-1(89):13	1971	69	362



PLAN

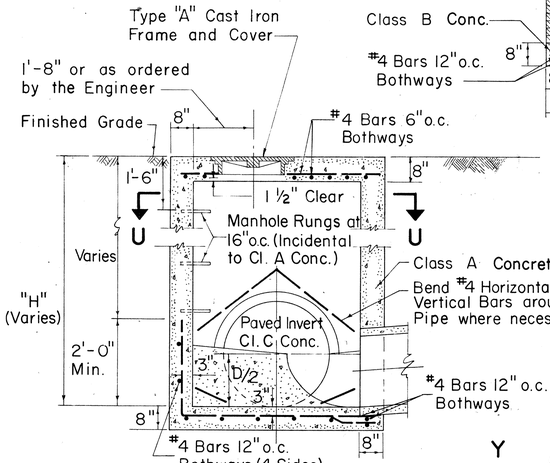


Note:
Bottom detail similar to Type "A", "B", & "C".

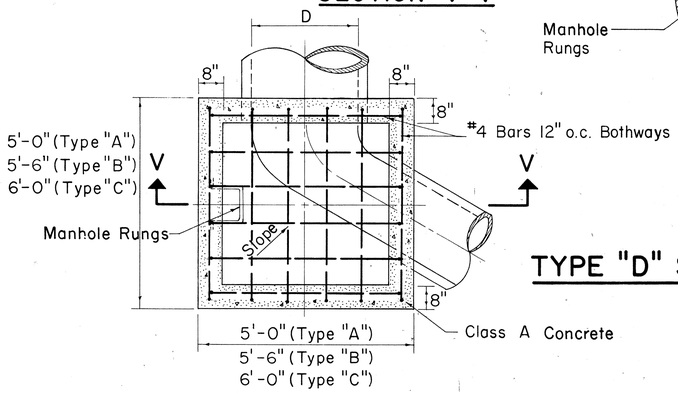
SECTION T-T

TYPE "A-1", "B-1", & "C-1" STORM DRAIN MANHOLE TOP DETAIL UNDER PAVEMENT

Scale: ½" = 1'-0"



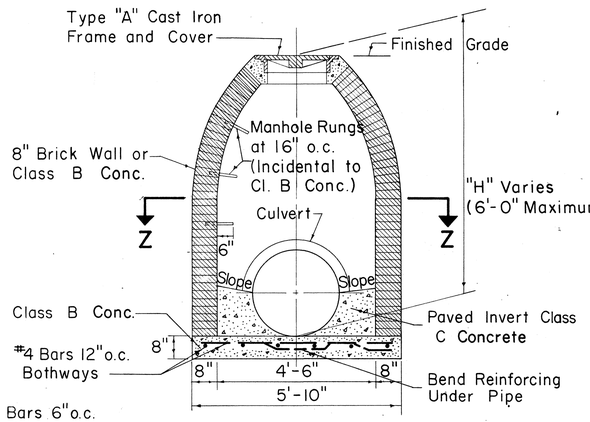
SECTION V-V



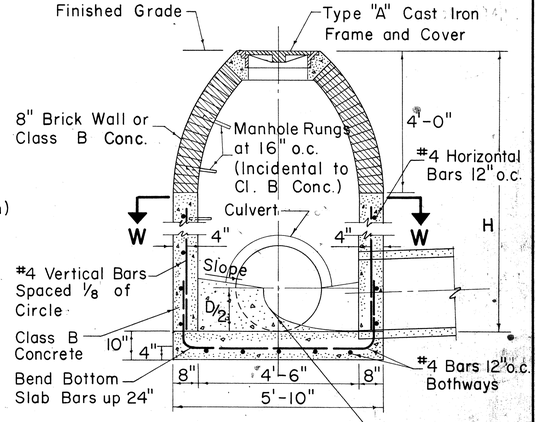
SECTION U-U

TYPE "A", "B", & "C" S.D.M.H.

Scale: ½" = 1'-0"



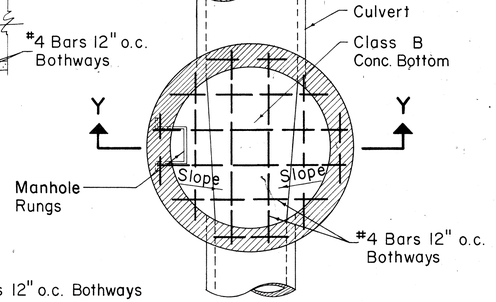
SECTION Y-Y



SECTION X-X

NOTE:

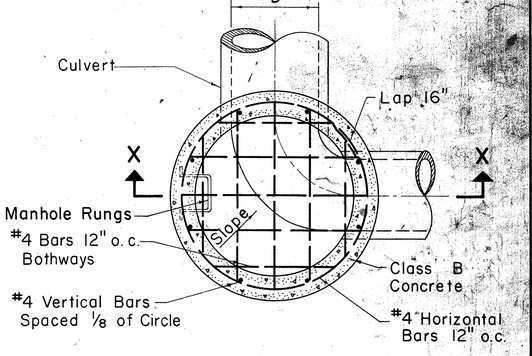
1. Exterior surface of brick wall shall be plastered with 1" thickness of 1:2 Cement Mortar.
2. Number, size and direction of culvert at manhole to be as shown on plans.
3. Paved invert not required at drop manholes.
4. All Class C Concrete to be incidental to Class B Concrete.



SECTION Z-Z

TYPE "D" STORM DRAIN MANHOLE

Scale: ½"= 1'-0"



SECTION W-W

TYPE "E" STORM DRAIN MANHOLE

Scale: ½"= 1'-0"

GENERAL NOTES

1. Culvert shall enter and leave S.D.M.H. from any position and in the direction indicated by the plans or ordered by the Engineer.
2. Manhole Rungs (16"o.c.) are required when "H" is greater than 4'-6". Only one rung (12" from the bottom) is required if "H" is 4'-6" or less. Type "A" C.I. Frame and Cover and Manhole Rungs may be placed at any location as ordered by the Engineer.

APPROVAL RECOMMENDED: G. Takano — HYDRAULIC DESIGN ENGINEER — DATE 12-17-69

APPROVED: [signature] — ASS'T. CHIEF, ENGINEERING — DATE 12-17-69

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

STORM DRAIN MANHOLES

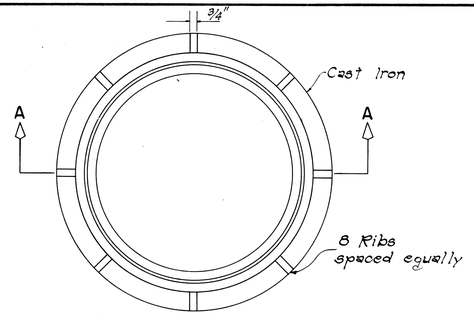
Scales: As Noted — Date: July 1969

SHEET NO. 200 OF 28 SHEETS DH 5

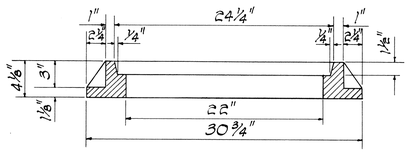
(69)

LIETZ 1103 ARKWRIGHT TRACING CLOTH 10-60 200P

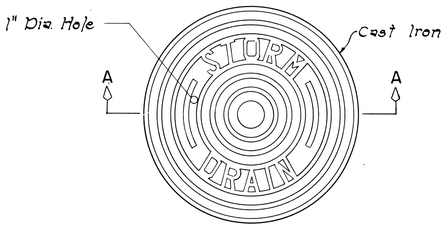
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(69)13	1971	70	362



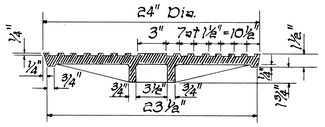
PLAN



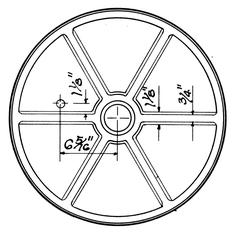
SECTION A-A



PLAN



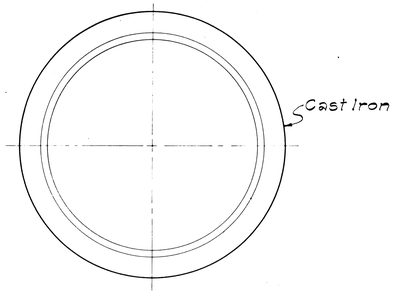
SECTION A - A



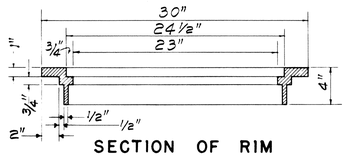
BOTTOM VIEW OF COVER

DETAILS OF TYPE "P" CAST IRON FRAME AND COVER

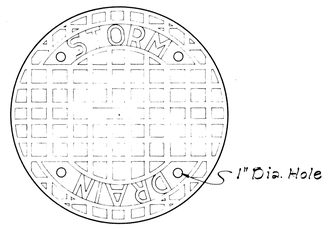
SCALE: 1-1/2" = 1'-0"



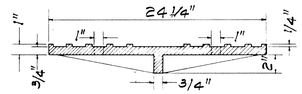
PLAN OF RIM



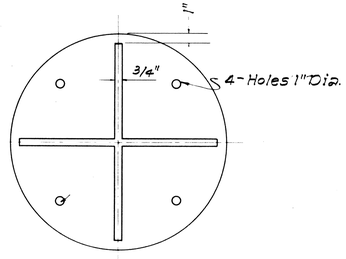
SECTION OF RIM



TOP VIEW OF COVER



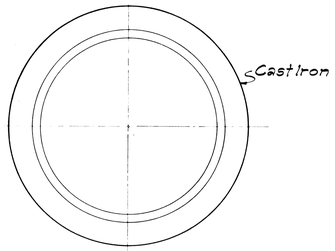
SECTION



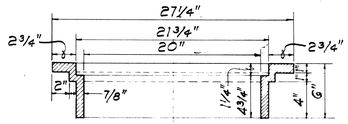
BOTTOM VIEW OF COVER

DETAILS OF TYPE "B" CAST IRON FRAME AND COVER

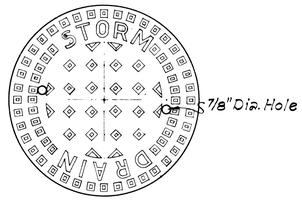
SCALE: 1-1/2" = 1'-0"



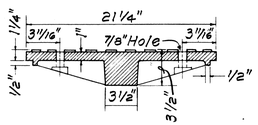
PLAN OF RIM



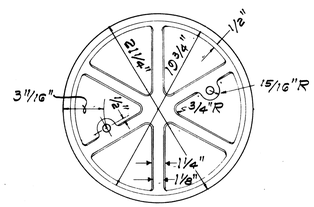
SECTION OF RIM



TOP VIEW OF COVER



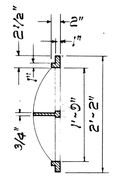
SECTION



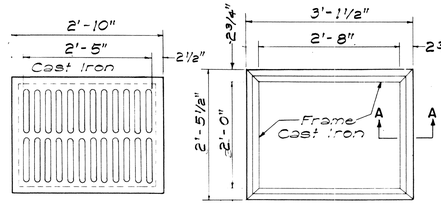
BOTTOM VIEW OF COVER

DETAILS OF TYPE "A" CAST IRON FRAME AND COVER

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

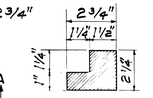


SECTION



TOP VIEW

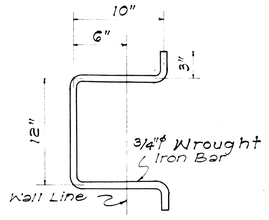
TOP VIEW



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

TYPE C C.I. FRAME AND GRATE

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



MANHOLE RUNG

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

APPROVAL RECOMMENDED:

G. Takano — 12-17-69

HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:

Richard R. Robinson — 12-17-69

ASSISTANT CHIEF, ENGINEERING — DATE

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
CATCH BASIN AND MANHOLE CASTINGS

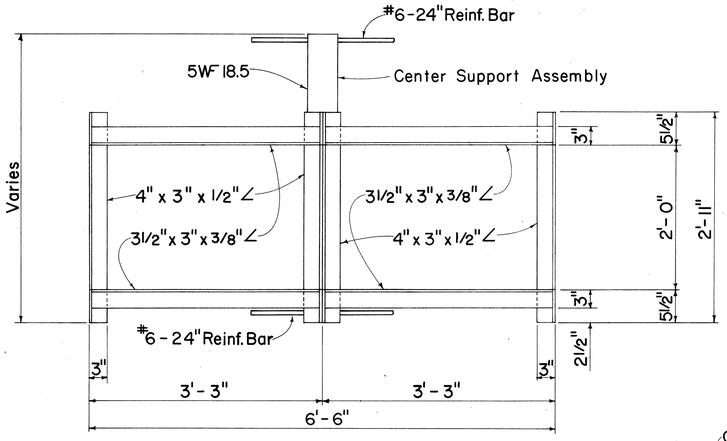
Scale: As Noted — Date: July, 1969

SHEET Nº 210 OF 28 SHEETS DH 6.

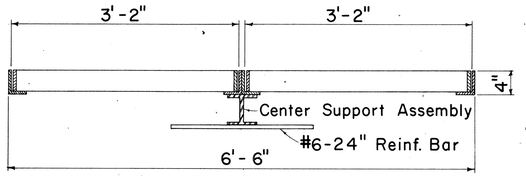
ORIGINAL PLAN	SURVEY PLOTTED BY: DESIGNED BY: DRAWN BY: TRACED BY: L. Castro QUANTITIES BY: CHECKED BY: DATE:
NOTE BOOK	
No.	

70

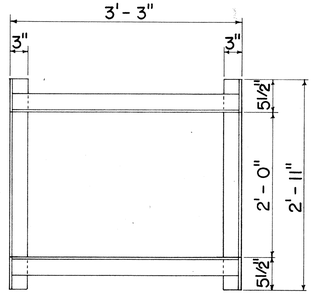
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-HI-1(89);13	1971	71	362



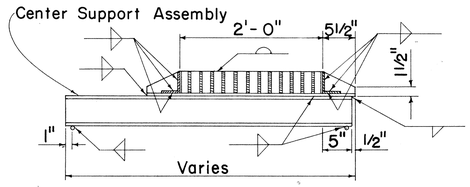
PLAN
(Two or More Grates)



LONGITUDINAL SECTION
(Thru Frame & Grate)

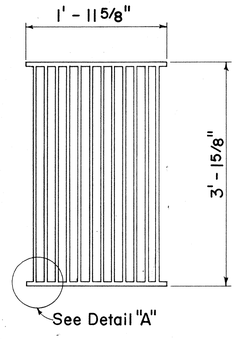


PLAN
(Single Grate)

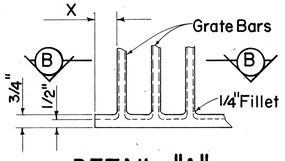


CROSS SECTION
(Thru Frame & Grate)

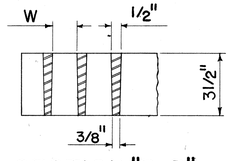
FRAME DETAILS
Scale: 1"= 1'-0"



PLAN
Scale: 1"= 1'-0"

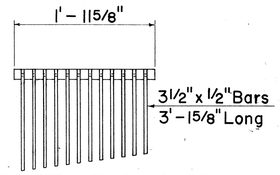


DETAIL "A"
Scale: 3"= 1'-0"

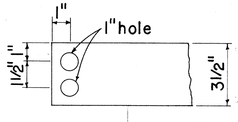


SECTION "B-B"
Scale: 3"= 1'-0"

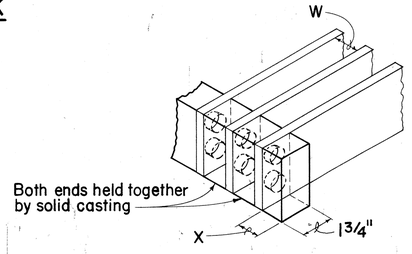
ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL GRATE



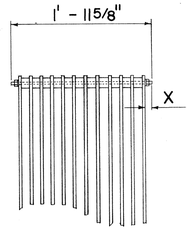
CAST END BLOCK
Scale: 1"= 1'-0"



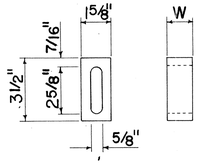
END OF BAR
Scale: 3"= 1'-0"



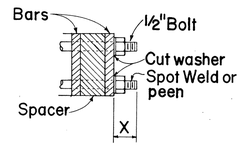
ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL END BLOCK GRATE



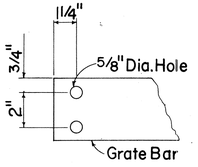
BOLTED END BLOCK
Scale: 1"= 1'-0"



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

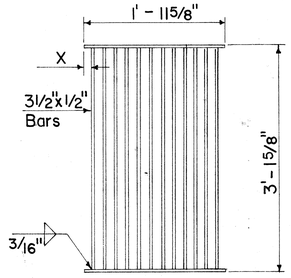


BOLTING DETAIL
Scale: 3"= 1'-0"

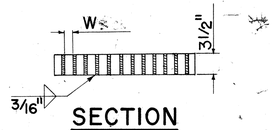


END OF BAR
Scale: 3"= 1'-0"

ALTERNATIVE BOLTED GRATE



PLAN



SECTION

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

GENERAL NOTES

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

APPROVAL RECOMMENDED:
T. Takano — 12-17-69
HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:
Andrew S. Sakai — 12-17-69
ASSISTANT CHIEF, ENGINEERING — DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

TYPE A-9 AND A-12 FRAMES AND GRATES

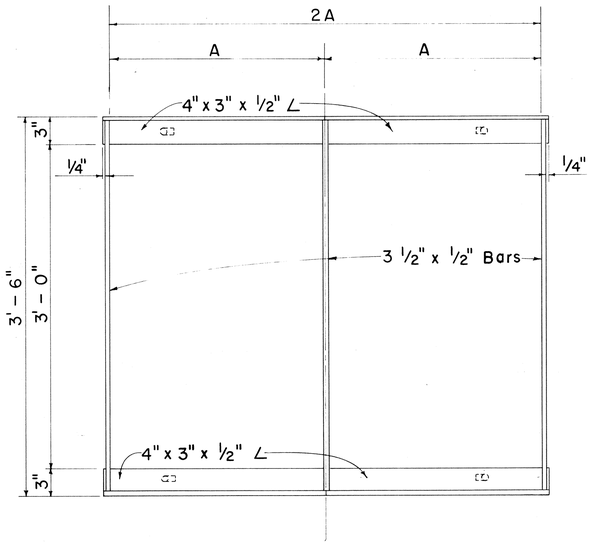
Scales: As Noted — Date: Aug. 1968

SHEET No. 220 OF 28 SHEETS DH 7

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

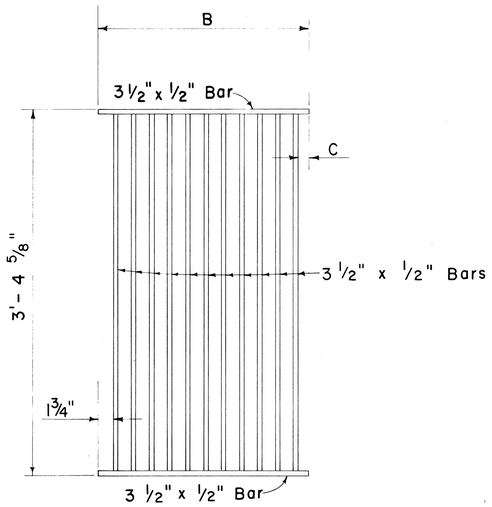
71

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89)13	1971	71A	362



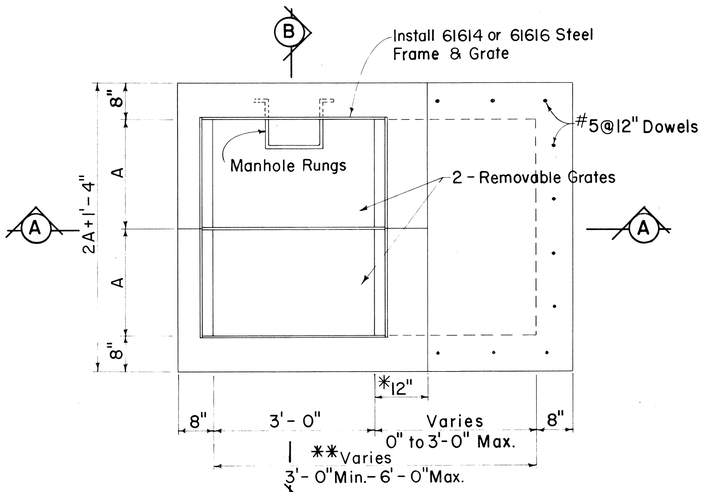
PLAN

Scale: 1½" = 1'-0"

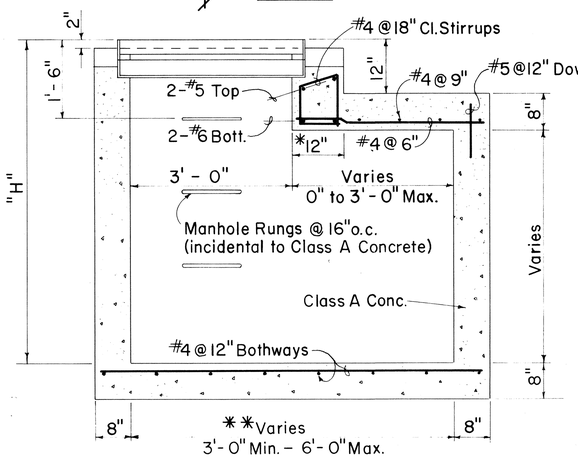


PLAN

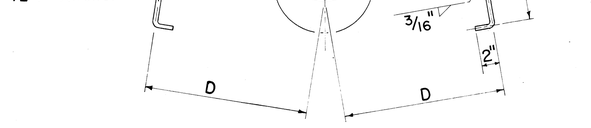
Scale: 1½" = 1'-0"



PLAN



SECTION A - A



SECTION

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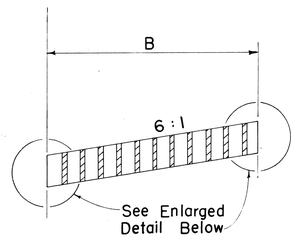

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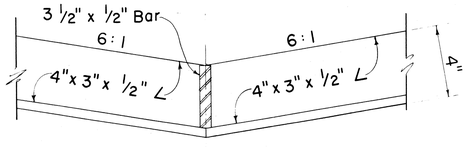
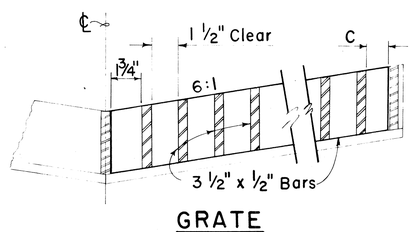


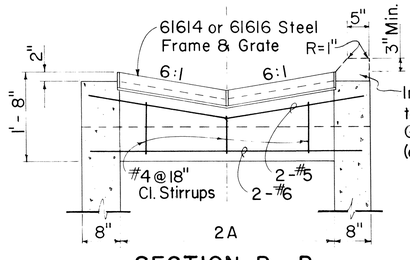
FRAME

Scale: 3" = 1'-0"



GRATE

Scale: 3" = 1'-0"



SECTION B - B

Install curb when Drop Intake is used to drain Top of Fill Gutters. Provide Gutter Transitions of 25 ft. (entering and leaving D.I.)

DETAILS OF 61614 OR 61616 DROP INTAKE

Scale: ¾" = 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", the minimum dimension shall be D'.

DETAILS OF TYPE 61614 OR 61616 STEEL FRAME AND GRATE

GENERAL NOTES

1. Grates and Frames shall be hot dip galvanized after fabrication, see specifications.
2. All welds ⅜" unless otherwise noted.
3. Refer to "Spacing Table" for Types 61614 & 61616 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.
6. Manhole Rungs (16"o.c.) are required when "H" is greater than 4 feet 6 inches. Only one rung (12 inches from the bottom) is required if "H" is 4 feet 6 inches or less. Manhole Rungs may be placed at any location as ordered by the Engineer.

SPACING TABLE

TYPE	NO. BARS	A	B	C	D
61614	11	2'- 0"	1'- 11½"	1¼"	1' - 6"
61616	17	3'- 0"	2' -11⅜"	1⅛"	2' - 0"

NO.	REVISION	APPROVED BY	DATE
1	Curb for Top of Fill Gutters	H.I.	65-11

APPROVAL RECOMMENDED:

HYDRAULIC DESIGN ENGINEER — DATE 12-17-69

APPROVED:

ASSISTANT CHIEF, ENGINEERING — DATE 12-17-69

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

TYPE 61614 & 61616 GRATED DROP INTAKES

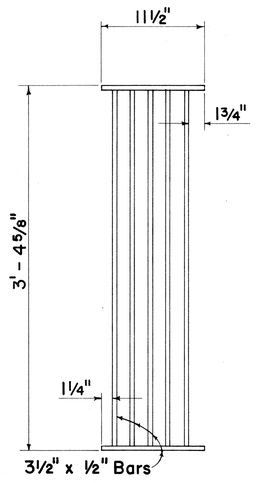
Scales: As Noted — Date: Feb. 1969

SHEET No. 23D OF 28 SHEETS DH 8

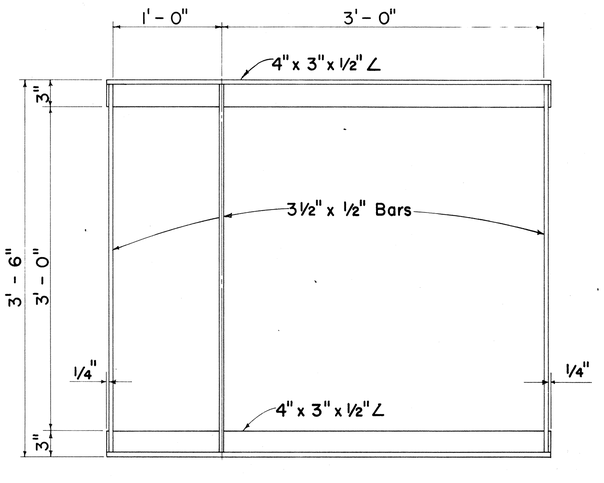
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
NOTE BOOK	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

71A

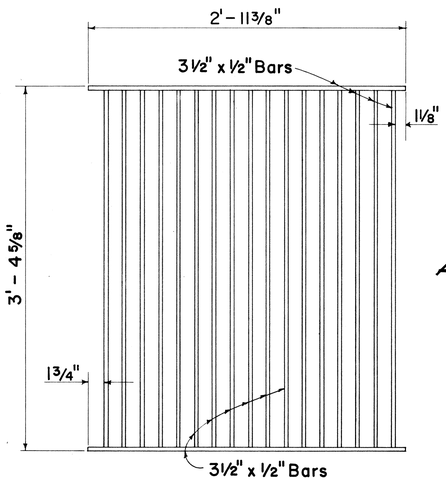
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-HI-1(89):13	1971	72	362



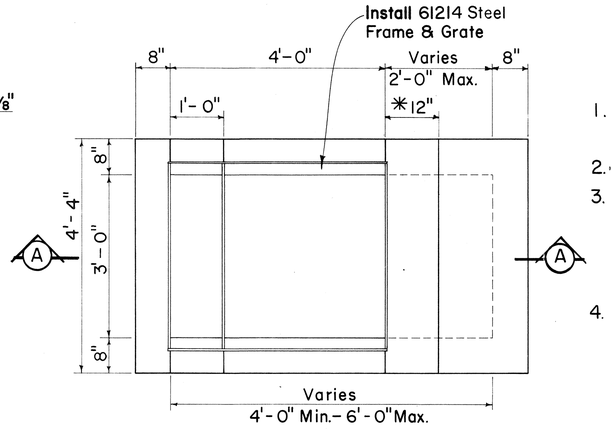
PLAN
Scale: 1 1/2" = 1' - 0"



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



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



PLAN

GENERAL NOTES

1. Grates and Frames shall be hot dip galvanized after fabrication, see specifications.
2. All welds 3/8" unless otherwise noted.
3. The Frame & Grate materials shall conform to the specifications of ASTM Designation Structural Steel A283, Grade D and the Standard Specifications.
4. 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.
5. Manhole Rungs (16"o.c.) are required when "H" is greater than 4 feet 6inches. Only one rung (12 inches from the bottom) is required if "H" is 4 feet 6 inches or less. The Manhole Rungs may be placed at any location as ordered by the Engineer.

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

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

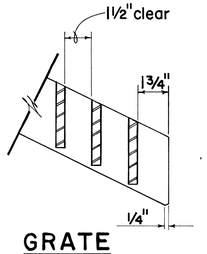
SECTION
Scale: 1 1/2" = 1' - 0"

SECTION A - A

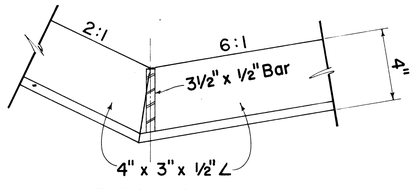
DETAIL OF 61214 DROP INTAKE

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

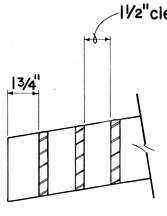
*For Minimum size box of 4'-0" only, use 8" and eliminate reinforcing steel shown in top portion.



GRATE
Scale: 3" = 1' - 0"



FRAME
Scale: 3" = 1' - 0"



GRATE
Scale: 3" = 1' - 0"

DETAILS OF TYPE 61214 STEEL FRAME AND GRATES

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:
P. Takano — 12-17-69
HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:
[signature] — 12-17-69
ASSISTANT CHIEF, ENGINEERING — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
TYPE 61214
GRATED DROP INTAKE

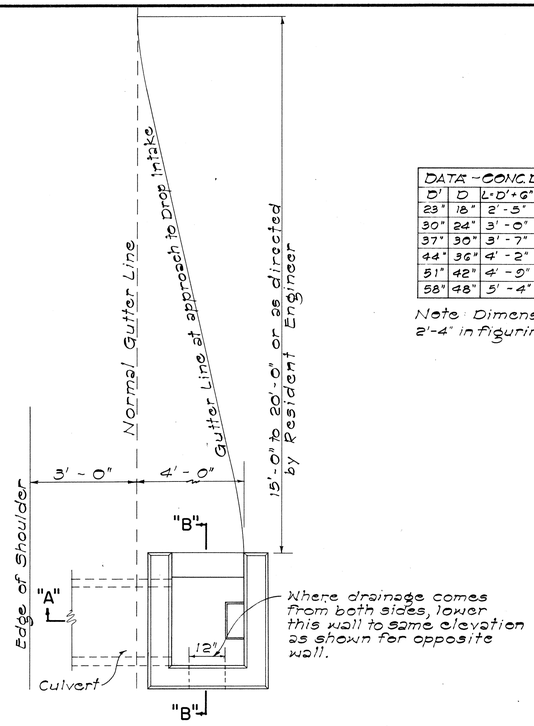
Scales: As Noted — Date: July 1969

SHEET No. 24D OF 28 SHEETS DH 9

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

72

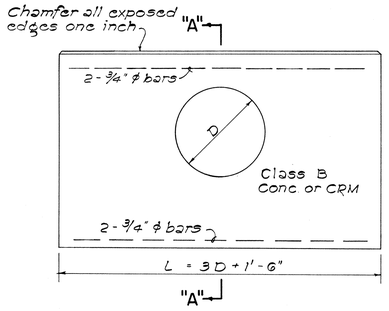
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89)13	1971	73	362



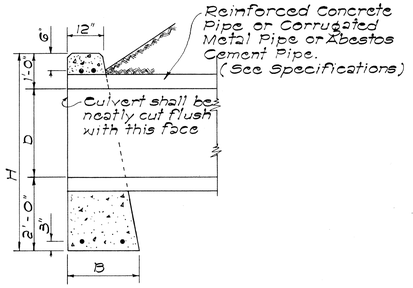
PLAN

DATA - CONC. DROP INTAKE					Where Variable Equals
D'	D	L=D'+6"	S	Cu. Yds.	
23"	18"	2'-5"	8"	1.41	4'-6"
30"	24"	3'-0"	8"	1.72	5'-0"
37"	30"	3'-7"	9"	2.32	5'-6"
44"	36"	4'-2"	9"	2.73	6'-0"
51"	42"	4'-9"	10"	3.54	6'-6"
58"	48"	5'-4"	10"	4.01	7'-0"

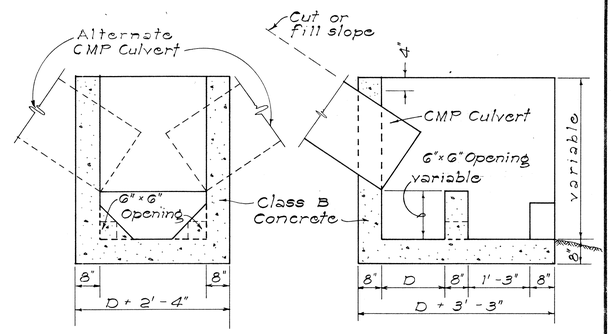
Note: Dimension "X" is assumed as 2'-4" in figuring the above quantities.



ELEVATION



SECTION "A-A"



SECTION "C-C"

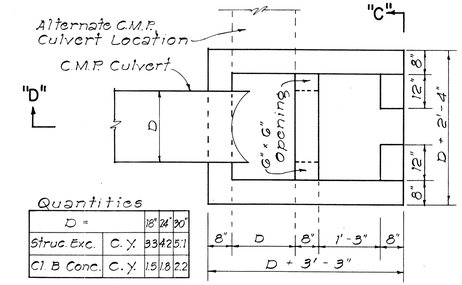
SECTION "D-D"

DATA FOR CONC. HEADWALL				Cl B CONC FOR R C P	Cl B CONC FOR C M P	Steel For One Headwall			
D	B	L	H	Cu. Yd.		No. of Bars	Size	Length	Lbs.
18"	1'-6"	6'-0"	4'-6"	1.12	1.17	4	¾" ϕ	5'-6"	33
24"	1'-6"	7'-6"	5'-6"	1.52	1.60	4	¾" ϕ	7'-0"	42
30"	2'-0"	9'-0"	5'-6"	2.36	2.49	4	¾" ϕ	8'-2"	51
36"	2'-0"	10'-6"	6'-0"	2.94	3.13	4	¾" ϕ	10'-0"	60
42"	2'-6"	12'-0"	6'-6"	4.19	4.47	4	¾" ϕ	11'-6"	69
48"	2'-6"	13'-6"	7'-0"	5.01	5.36	4	¾" ϕ	13'-0"	78

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

DETAIL OF HEADWALL

Scale: ½" = 1'-0"



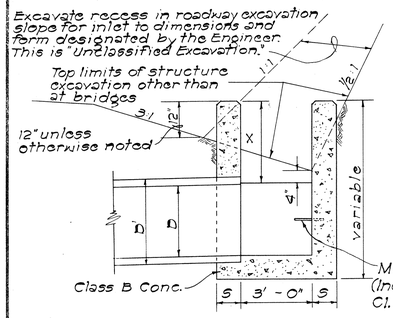
Quantities

D =		18"	24"	30"
Struc. Exc.	C.Y.	3.3	4.2	5.1
Cl. B Conc.	C.Y.	1.5	1.8	2.2

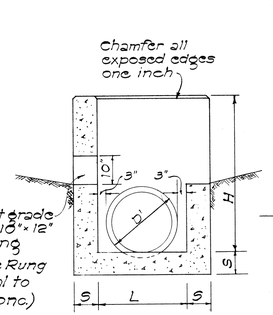
PLAN

DETAILS OF CONC. DROP BOX AT OUTLET OF CULVERT PIPE

NOT TO SCALE



SECTION "A-A"



SECTION "B-B"

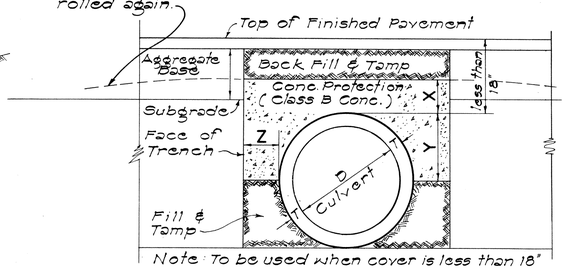
DETAIL OF CONCRETE DROP INTAKE

Scale: ½" = 1'-0"

GENERAL NOTES

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

Note: When subgrade is below top of jacket, it shall be fully compacted to this line and then re-excavated (struc. exc.) to proper subgrade. This surface shall be rolled again.



Note: To be used when cover is less than 18"

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

SECT. OF CULVERT WITH CONC. PROTECTION

Scale: 1" = 1'-0"

APPROVAL RECOMMENDED:

L. Takamo — 12-17-69

HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:

Charles E. Dale — 12-17-69

ASSISTANT CHIEF, ENGINEERING — DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

DROP INTAKE, HEADWALL & CONCRETE PROTECTION

Scale: As Noted — Date: Aug. 1967

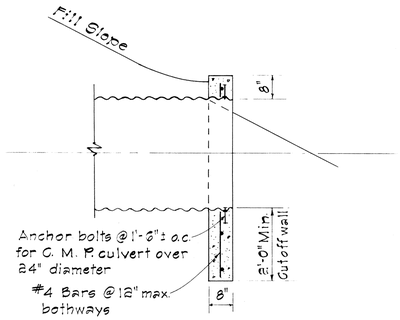
SHEET No. 250 OF 28 SHEETS DH 10

ORIGINAL PLAN | NOTE BOOK | No.

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

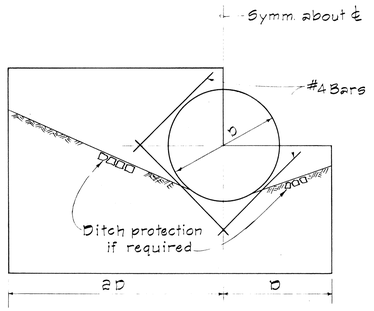
5 33

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89)13	1971	73A	362

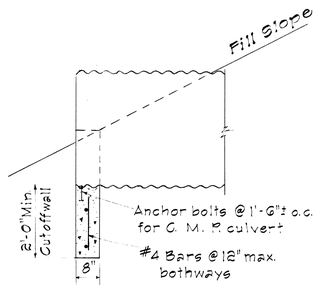


SECTION

FULL HEADWALL



HALF ELEVATION



HALF ELEVATION

SECTION

HALF HEADWALL

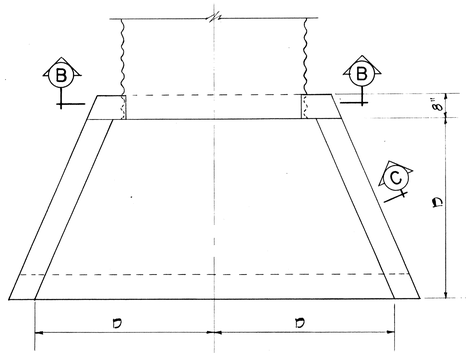
SUMMARY OF QUANTITIES				
Culvert Dia. (inches)	Full Headwall		Half Headwall	
	Concrete (Cu. Yd)	Reinf. Steel (Lbs)	Concrete (Cu. Yd)	Reinf. Steel (Lbs)
18	0.57	45	0.18	15
24	0.85	65	0.26	20
30	1.15	85	0.34	25
36	1.50	115	0.43	35

Note: Quantities shown are for C.M.P. culvert.

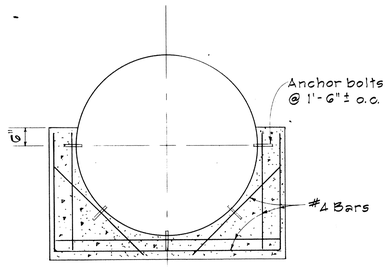
GENERAL NOTES

1. Concrete: All concrete shall be Class A.
2. Cutoff Wall: The depth of wall shown on the plan may be reduced if rock is encountered at a higher elevation.
3. Multiple Pipe Installations: To permit careful placing and tamping of back fill material, clear spacing for multiple pipe installations shall be not less than one-half the diameter of the larger pipe between sides of adjacent pipes, but not required to exceed three feet, and in no case less than one foot.
4. Anchor Bolts: Anchor Bolts are not required for concrete pipe.

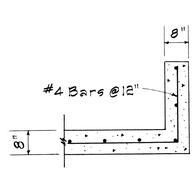
OUTLET STRUCTURE FOR CULVERT SIZES 18 IN. TO 36 IN. DIAMETER



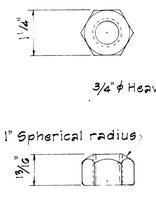
PLAN

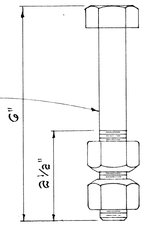


SECTION B-B



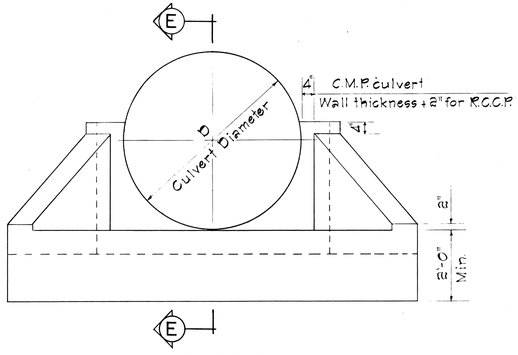
PARTIAL SECTION C



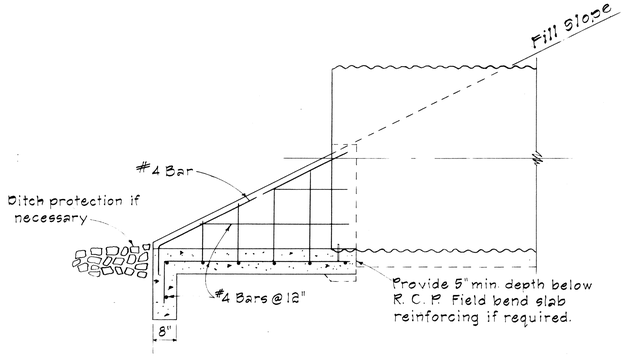


Bolt and nut to be cleaned after galvanizing to provide a free running fit.

ANCHOR BOLT DETAIL



ELEVATION



SECTION E-E

SUMMARY OF QUANTITIES		
Culvert Dia. (inches)	Concrete (Cu. Yd)	Reinf. Steel (Lbs)
36	1.0	70
42	1.2	90
48	1.5	100
54	1.7	125
60	2.1	140

Note: Quantities shown are for C.M.P. culvert.

OUTLET STRUCTURE FOR CULVERT SIZES 36 IN. TO 60 IN. DIAMETER

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:

H. Takano — 12-17-69

HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:

Alvin T. Belai — 12-17-69

ASSISTANT CHIEF, ENGINEERING — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

OUTLET STRUCTURES

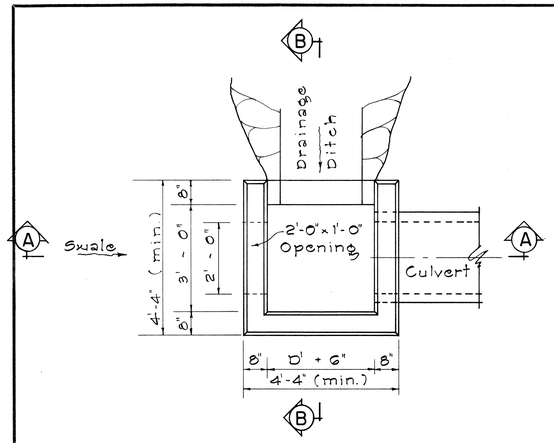
Not To Scale — Date: July, 1969

SHEET No. 26D OF 28 SHEETS DH 14

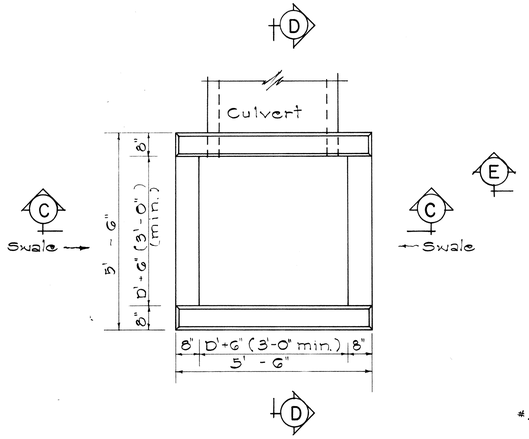
ORIGINAL PLAN
SURVEY PLOTTED BY ____ DATE
DRAWN BY "
TRACED BY "
NOTE BOOK DESIGNED BY "
QUANTITIES BY "
No. CHECKED BY "

733 13

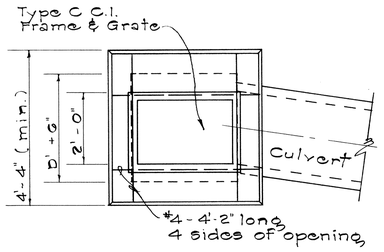
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(89)13	1971	74	362



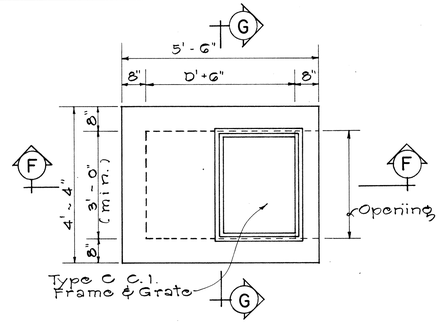
PLAN



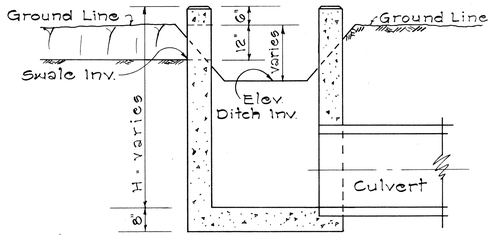
PLAN



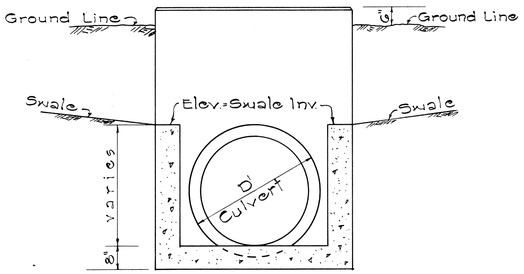
PLAN



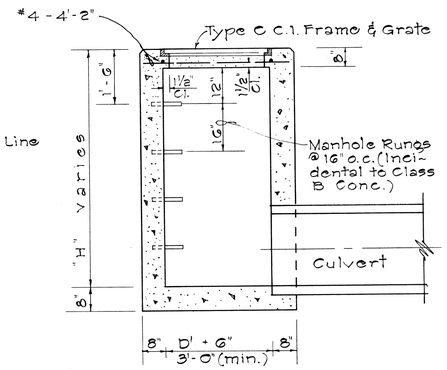
PLAN



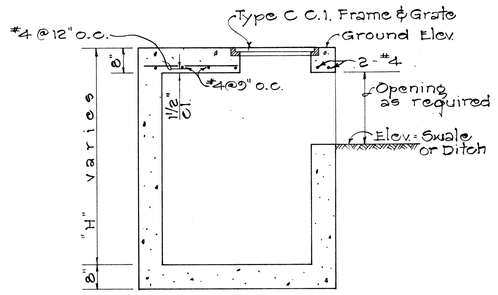
SECTION "A-A"



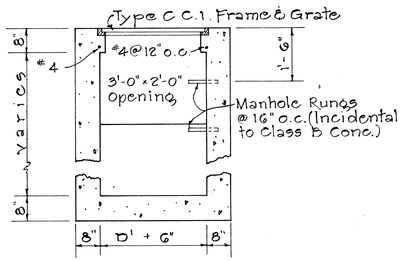
SECTION "C-C"



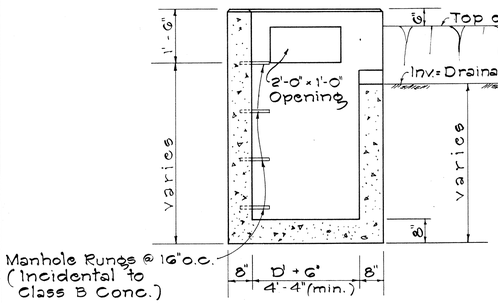
SECTION "E-E"



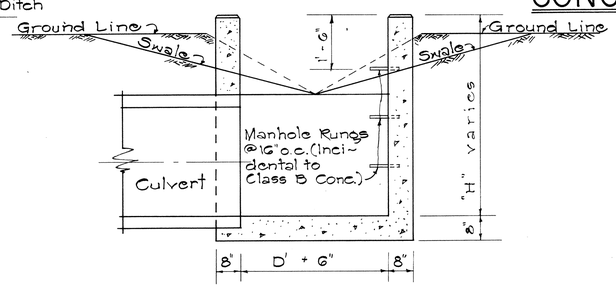
SECTION "F-F"



SECTION "G-G"



SECTION "B-B"



SECTION "D-D"

GENERAL NOTES

1. All concrete shall be Class "B" unless otherwise noted.
2. Exposed edges of all drainage structures shall be chamfered one inch.
3. Culvert shall enter and leave Drop Intake from any position and in the direction indicated by the plans or ordered by the Engineer.
4. Manhole Rungs (16" o.c.) are req'd. when "H" is greater than 4'-6". Only one rung (12 inches from the bottom) is required if "H" is 4'-6" or less. Manhole Rungs may be placed at any location as ordered by the Engineer.

TYPE "A" CONCRETE DROP INTAKE

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

TYPE "B" CONCRETE DROP INTAKE

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

TYPE "C" GRATED CONCRETE DROP INTAKE

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

TYPE "D" GRATED CONCRETE DROP INTAKE

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

APPROVAL RECOMMENDED:
H. Takano — HYDRAULIC DESIGN ENGINEER — 12-17-69 DATE

APPROVED:
[signature] — ASSISTANT CHIEF, ENGINEERING — 12-17-69 DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
TYPE "A", "B", "C", AND "D" CONCRETE DROP INTAKE

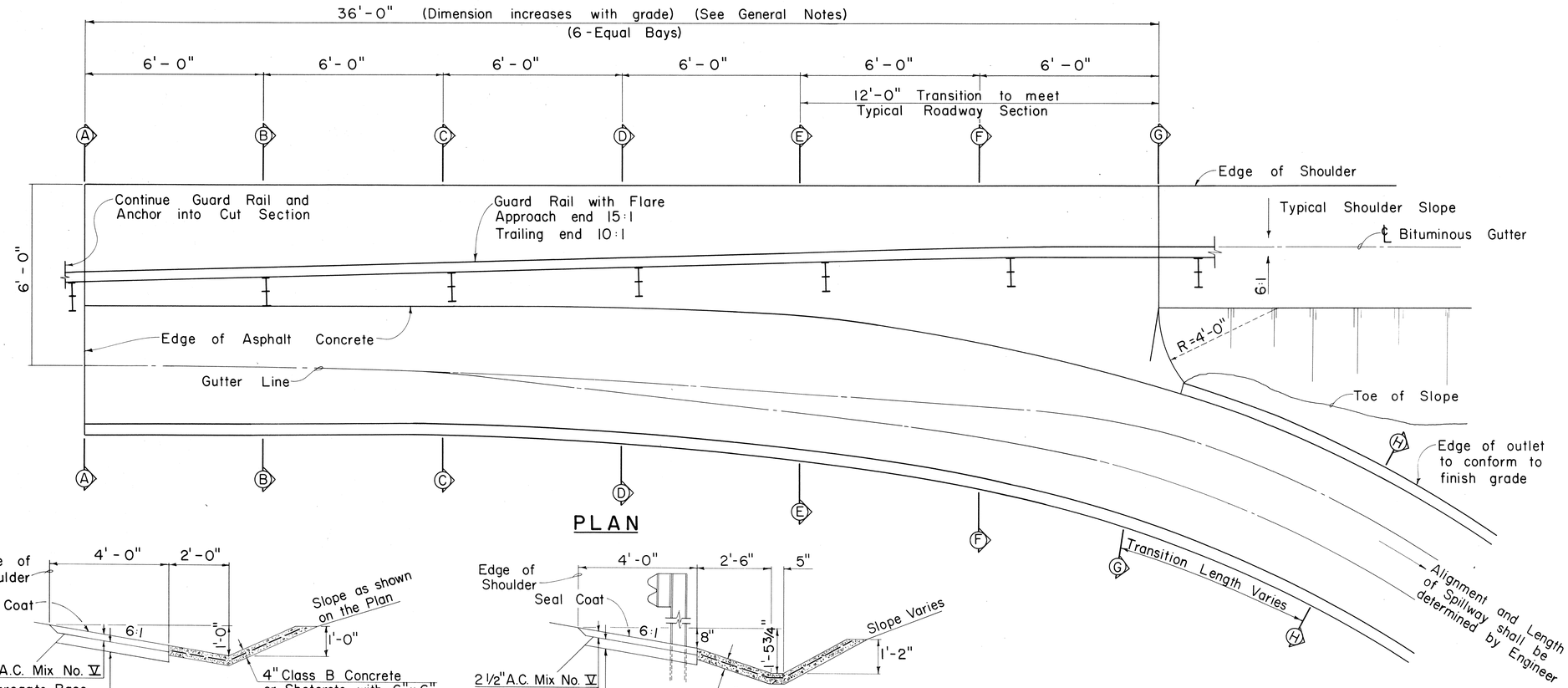
Scale: As Noted — Date: July, 1969

SHEET No. 27D OF 28 SHEETS DH19

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

74

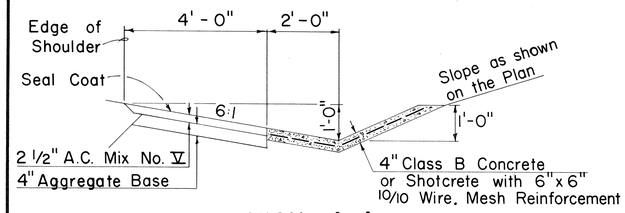
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(69)13	1971	75	362



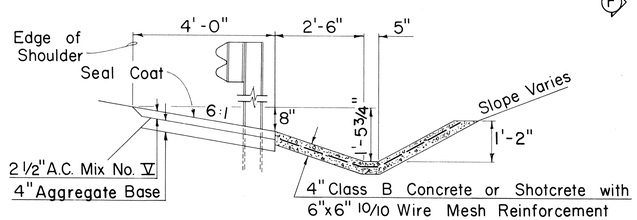
PLAN

GENERAL NOTES

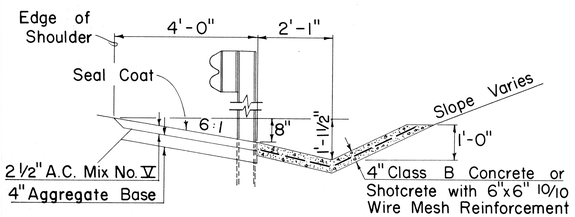
1. If the average grade of pavement for the distance from Section A-A to Section G-G exceeds 2% this distance shall be increased 6' for each 1% increase in grade.
2. Wire Mesh Reinforcement to be incidental to Class B Concrete or Shotcrete.
3. The gutter will be paid for at the contract unit price per linear foot for Asphalt Concrete Gutter, Type 7.
4. 4" Aggregate Base to be incidental to Asphalt Concrete Gutter.



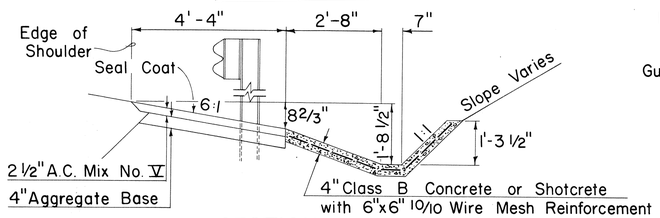
SECTION A-A



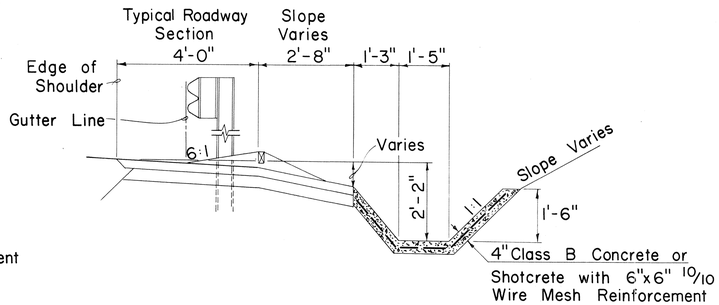
SECTION D-D



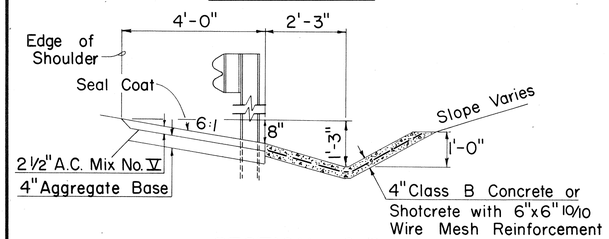
SECTION B-B



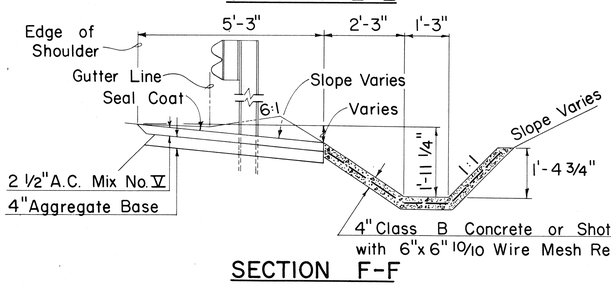
SECTION E-E



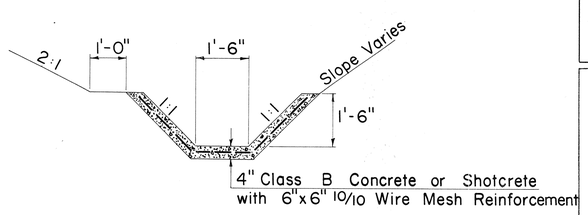
SECTION G-G



SECTION C-C



SECTION F-F



SECTION H-H

APPROVAL RECOMMENDED:

HYDRAULIC DESIGN ENGINEER — DATE 2-2-71

APPROVED:

ASSISTANT CHIEF, ENGINEERING — DATE 2-25-71

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

CONCRETE SPILLWAY INLET

Scale: 1/2" = 1'-0" Date: January, 1971

SHEET No. 28D OF 28 SHEETS DH 20

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