FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	42	244

DRAINAGE SUMMARY

STRUCTURES			PIPE CULVERTS		ESTIMATED QUANTITIES																					REMARKS
			ITEM	NO.	206.01	207.01	503.001	503.201		602.101		603.0010	603.7200	603.7260	603.7320	603.7380	603.7440			603.2066			604.201	604.202	604.230	604.243									
INLET NUMBER	TYPE	STATION	FROM	TO	STRUCTURE EXCAVATION OTHER THAN AT BRIDGES	DITCH & CHANNEL EXCAVATION	CONCRETE OTHER THAN IN BRIDGES	CLASS B CONCRETE OTHER THAN IN BRIDGES		REINFORCING STEEL OTHER THAN IN BRIDGES		BED COURSE MATERIAL FOR CULVERTS	24" RCP CL III 24" ACP CL III 24" CMP #14 GA.	24" RCP CL III 24" ACP CL III 24" CMP #14 GA	30" RCP CL III 30" ACP CL III 30" CMP #14 GA.	30" RCP CL III 30" ACP CL III 30" CMP #12 GA			24" CMP #14 GA			TYPE A CAST IRON FRAME & COVER	TYPE B CAST IRON FRAME & COVER	TYPE 6'/2'4' STEEL FRAME & GRATE	TYPE C CAST IRON FRAME & GRATE							
			UNIT	USE	CY	CY	CY	CY		LB		CY	LF	LF	LF	LF			LF			EA.	EA.	EA.	EA.							
1	CB TYPE D	HHR STA 120+97, 24'Rt.	HHR STA 120+97, Rt	HHR STA 12+75 Lt.	225		4.1			77		13	157										1									EXISTING HHR
2	CB TYPE D	HHR STA 12+06, 8'Rt.	HHR STA 12+06 Rt	HHR STA 12+75 Lt.	75		4.2			77		7	80										1									RELOCATED HHR
3	CB TYPE B	HHR STA 12+75, 38'Lt.	HHR STA 12+75 Lt.	HHR STA 15+00 Lt.	250		6.2			380		17	205										1									
4	CB TYPE B	HHR STA 15+00	HHR STA 15+00	HHR STA 15+00 Lt.	20		5.2			108		3	38										1									
5	CB TYPE B	HHR STA 15+00, 38'Lt.	HHR STA 15+00 Lt.	HHR STA 17+00 Lt	230		5.3			136		16	193										1									
6	CB TYPE B	HHR STA 17+00	HHR STA 17+00	HHR STA 17+00 Lt	20		5.9			108		3	38										1									
7	CB TYPE B	HHR STA 17+00, 38'Lt	HHR STA 17+00 Lt	UE STA 44+25, 20'Rt.	120		5.8			136		6	80										1									
8	CB TYPE S1C	HHR STA	HHR STA	HHR STA	55		5.7			158		10	102										1									
9	CB TYPE S1B	HHR STA	HHR STA	HHR STA	100		9.0			675		10								79			1									
10	CB TYPE S1A	HHR STA 22+50, 50'Lt	HHR STA 22+50 Lt	HHR STA 22+40 Rt	100		6.8			145		8	101										1									
11	CB TYPE S1A	HHR STA 22+40, 50'Rt	HHR STA 22+40 Rt	H STA 10+52	200		7.8			390		12	150										1									
12	CB TYPE D	H STA 10+52	H STA 10+52	HHR STA 24+45 Rt	60		4.9			105		5	56											1								
13	CB TYPE B	HHR STA 24+42	HHR STA 24+42	HHR STA 24+45 Rt	65		6.0			108		5	55											1								
14	MH TYPE D	HHR STA 24+45, 54'Rt	HHR STA 24+45 Rt	HHR STA 26+20 Rt	135			3.0		31		14	165											1								
15	CB TYPE D	HHR STA 26+20, 46'Rt	HHR STA 26+20 Rt	HHR STA 27+70 Rt	125		4.4			77		10	143											1								
16	CB TYPE D	HHR STA 27+70, 10'Lt.	HHR STA 27+70 Lt	HHR STA 27+70 Rt	60		4.9			77		5	55											1								
17	CB TYPE D	HHR STA 27+70, 46'Rt	HHR STA 27+70 Rt.	HHR STA 27+75 Rt	30		5.3			400		1	10											1								
18	INLET STRUCT.	HHR STA 27+04, 71'Rt	HHR STA 27+04 Rt.	HHR STA 27+75 Rt	110		.9			65		6	68																			
19	MH TYPE E	HHR STA 27+75, 54'Rt.	HHR STA 27+75 Rt.	HHR STA 28+27 Rt.	150			5.0		155		7	80											1								
20	HEADWALL	HHR STA 28+27, 120'Rt.	HHR STA 28+27 Rt	HHR STA 28+45 Rt				1.6		42																						SEE DITCH & CHANNEL ESTIMATE SHEET
			SHEET TOTAL		2130		92.4	9.6		3450		158	1776							79			4	14								

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

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

HALAWA INTERCHANGE
PROJECT NO. I-H1-1(87):13

DATE: JUNE 8, 1970

SHEET No. 1 OF 25 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	43	244

DRAINAGE SUMMARY

STRUCTURES			PIPE CULVERTS		ESTIMATED QUANTITIES																											REMARKS
			ITEM	NO.	206.01		503.001	503.201		602.101		603.2010	603.7200	603.7260	603.7320	603.7380	603.7440		603.6020	603.2066				604.201	604.202	604.230	604.243		612.01			605.106		
INLET NUMBER	TYPE	STATION	FROM	TO	Structure Excavation Other Than At Bridges		Concrete Other Than In Bridges	Class B Concrete Other Than In Bridges		Reinforcing Steel Other Than In Bridges		Bed Course Material For Culverts	24" RCP CL III 24" ACP CL III 24" CMP #14 GA	24" RCP CL IV 24" ACP CL IV 24" CMP #14 GA	30" RCP CL III 30" ACP CL III 30" CMP #14 GA	30" RCP CL IV 30" ACP CL IV 30" CMP #12 GA	36" RCP CL III 36" ACP CL III 36" CMP #12 GA		42" RCP CL III 42" CMP #10 GA	24" CMP #14 GA				Type A Cast Iron Frame & Cover	Type B Cast Iron Frame & Cover	Type G/G14 Steel Frame & Grate			Grouted Rubble Paving			6" Nonperforated Underdrain Pipe			
			UNIT	USE	CY		CY	CY		LB		CY	LF	LF	LF		LF		LF	LF				EA.	EA.	EA.			CY			L.F.			
20A	Outlet Struct.	HHR Sta 28+45, 134' Rt			5		.3			2																			1.9					
21	CB Type 6/24	D.C. Sta 12+75, 30' Lt.	D.C. Sta 12+75, Lt.	H Sta 15+58, Lt	290		2.5			37		16	196													1								
22	Headwall 24"	H Sta 15+58, 58' Lt	H Sta 15+58, Lt.	J Sta 13+75, 62' Lt.				1.6		42																								See Ditch & Channel Estimate Sheet
23	Headwall 24"	H Sta 14+59, 33' Rt.	H Sta 14+59 Rt	H Sta 14+70	45			1.6		42		3	31																					
24	CB Type D	H Sta 14+70	H Sta 14+70	J Sta 13+75, Lt.	210		8.7			650		10		111											1									
25	DI Type A	J Sta 13+75, 62' Lt.	J Sta 13+75, Lt.	J Sta 13+75, 31' Lt.	65			1.6				5					31																	
26	CB Type B	J Sta 13+75, 31' Lt	J Sta 13+75, Lt.	J Sta 13+75, 12' Rt	145		9.7			730		6							45						1									
27	Headwall 42"	J Sta 13+75, 35' Rt	J Sta 13+75 Lt	J Sta 13+75, 150' Rt.				4.2		69																								See Ditch & Channel Estimate Sheet
28	Outlet Struct.	J Sta 13+75, 150' Rt			5		.3			2																			1.9					
29	CB Type 1C	UE Sta 40+00	UE Sta 40+00	UE Sta 38+26	150		6.0			158		14	170											1										
30	CB Type C	UE Sta 38+26	UE Sta 38+26	UE Sta 37+96, Lt.	45		5.4			108		3	35												1									
31	CB Type 1D	UE Sta 37+96, 24' Lt	UE Sta 37+96 Lt	SR Sta 14+00, 24' Rt	70		4.8			127		5	65											1										
32	DI Type B	SR Sta 15+17, 97' Lt	SR Sta 15+17 Lt.	SR Sta 15+11, Lt.	45			2.5				4								50														
33	MH Type D	SR Sta 15+11, 51' Lt.	SR Sta 15+11, Lt.	SR Sta 15+02 Lt.	30			2.7		31		2	25												1									
34	CB Type D	SR Sta 15+02, 31' Lt.	SR Sta 15+02 Lt.	SR Sta 14+80	85		4.9			77		10	43												1							245		
35	CB Type D	SR Sta 14+91, 50' Rt.	SR Sta 14+91 Rt	SR Sta 14+80	55		4.1			77		4	50												1									
36	CB Type D	SR Sta 14+80	SR Sta 14+80	SR Sta 14+00, 24' Rt	95		4.9			105		7		85											1									
37	MH Type E	SR Sta 14+00, 24' Rt	SR Sta 14+00 Rt	G Sta 13+30, Lt.	190			3.4		90		13		160											1									
38	CB Type 6/24	G Sta 13+30, 26' Lt	G Sta 13+30 Lt	G Sta 14+25 Lt.	115		2.8			37		9		112												1								
39	CB Type 5ID	G Sta 14+25, 20' Lt.	G Sta 14+25	MF Sta 171+80, 62' Lt.	290		6.1			315		18				190									1									
			SHEET TOTAL		1930		60.5	17.6		2699		129	615	468		190	31		45	50				3	8	2			3.8			245		

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

HALAWA INTERCHANGE
PROJECT NO. I-HI-1(87):13

DATE: JUNE 8, 1970

SHEET No. 2 OF 25 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	44	244

DRAINAGE SUMMARY

STRUCTURES			PIPE CULVERTS		ESTIMATED QUANTITIES																										REMARKS
			ITEM	NO.	206.01		503.001	503.201		602.101		603.0010	603.7200	603.7260	603.7320	603.7380	603.7440	603.6062	603.6020	603.2066	603.6240	603.5056		604.201	604.202	604.230	604.243	604.236	612.01				
INLET NUMBER	TYPE	STATION	FROM	TO	STRUCTURAL EXCAVATION OTHER THAN AT BRIDGES		CONCRETE OTHER THAN IN BRIDGES	CLASS B CONCRETE OTHER THAN IN BRIDGES		REINFORCING STEEL OTHER THAN IN BRIDGES		BED COURSE MATERIAL FOR CULVERTS	24" RCP CL III 24" ALP CL III 24" CMP #14 GA	24" RCP CL III 24" ACP CL III 30" CMP #14 GA	30" RCP CL III 30" ACP CL III 36" CMP #12 GA	42" RCP CL III	48" CMP #12 GA 41" RCP CL III 42" CMP #10 GA		54" RCP CL III 54" CMP #12 GA.	30" RCP CL III 30" ACP CL III		TYPE A CAST IRON FRAME & COVER	TYPE B CAST IRON FRAME & COVER	TYPE G1614 STEEL	TYPE C CAST IRON FRAME & GRATE	TYPE G1614 STEEL FRAME & GRATE	GROUTED RUBBLE PAVING				
			UNIT	USE	CY		CY	CY		LB		CY	LF	LF		LF		LF	LF		LF	LF		EA	EA	EA	EA	EA	CY				
40	CB TYPE SA	G STA 14+30	G STA 14+30	G STA 14+25	36		6.5			370		2	22												1							
41	CB TYPE B	G STA 16+25	G STA 16+25	D.D STA 17+65, 6'LT.	60		6.0			370		3	40												1							
42	HEADWALL 24"	G STA 18+28, 46'RT.	G STA 18+28, RT	G STA 17+80, 30'RT				1.6		42																						SEE DITCH & CHANNEL ESTIMATE SHEET
43	CB TYPE G1214	G STA 17+80, 30'RT	G STA 17+80, RT	D.D STA 17+65, 6'LT.	360		2.5			37		18				187									1							
44	CB TYPE G1214	D.D STA 17+65, 6'LT.	D.D STA 17+65, LT.	MF STA 171+80, 62'LT	95		2.5			37		4	40												1							
45	CB TYPE ID	SR STA 19+20, 14'LT	SR STA 19+20, LT	SR STA 20+75, LT	170		4.4			127		13	152											1								
46	CB TYPE ID	SR STA 20+75, 14'LT.	SR STA 20+75, LT.	SR STA 22+50, LT	205		4.4			127		14	173											1								
47	CB TYPE ID	SR STA 22+50, 14'LT.	SR STA 22+50, LT	SR STA 25+25, LT	355		5.1			380		23	273											1								
48	CB TYPE ID	SR STA 25+25, 14'LT	SR STA 25+25, LT.	SR STA 25+40, 35'LT.	45		5.1			380		3	27											1								
49	DI TYPE A	SR STA 25+50, 40'LT.	SR STA 25+50 LT	SR STA 27+26, LT	485		5.7			424		36									180											
50	OUTLET STRUCT.	SR STA 27+26, 40'LT.	SR STA 27+26, LT.	SR STA 29+12, LT.	35			7.1		87																						SEE DITCH & CHANNEL ESTIMATE SHEETS
51	CB TYPE D	SR STA 27+90, 14'RT	SR STA 27+90, RT	SR STA 27+90, LT.	40		4.6			127		2	28											1								
52	CB TYPE D	SR STA 27+90, 14'LT.	SR STA 27+90 LT.	SR STA 28+55, 60'LT.	75		4.8			77		7	80												1							
53	DI TYPE C	US STA 47+00, 47'LT.	US STA 47+00 LT	US STA 46+75, LT.	50			2.4				4	50														1					
54	CB TYPE D	US STA 46+75, 4'LT	US STA 46+75 LT	US STA 46+90, 105'RT.	110		4.9			77		9	110												1				2.1			
55	DI TYPE B	D.A STA 12+58, 37'RT	D.A STA 12+58 RT	D.A STA 12+83, 11'LT	85			2.7		37		5										55										
44A	MH TYPE E	MF STA 171+80, 62'LT	MF STA 171+80 LT	DC. STA 17+64 88'RT	285		7.1			225		19						167						1					5.0			
26 A	DI TYPE G1614	J STA 13+75, 12'RT.	J STA 13+75 RT	J STA 13+75, 35'RT	60		5.3			400		3							24									1				
			SHEET TOTAL		2551		68.9	13.8		3324		165	995			187		167	24		180	55		6	4	2	1	1	7.1				

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



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J. Andrew Schuchardt

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE ESTIMATED QUANTITIES

HALAWA INTERCHANGE
PROJECT NO. I-H1-1(87):13

DATE: JUNE 8, 1970

SHEET No. 3 OF 25 SHEETS

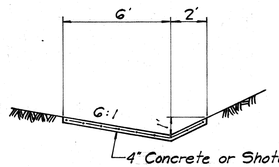
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	45	244

SCHEDULE OF ROADWAY LINED DITCHES & OPEN CHANNELS

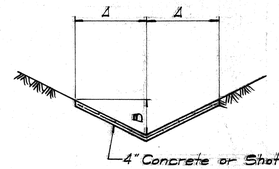
LOCATION	TYPE	LINED DRAINAGE DITCH LIN. FT.	DITCH & CHANNEL EXCAVATION 207.01 CY.	CL.'B' CONC. OR SHOTCRETE CY.	REINF. STEEL LB.
OUTLET #20 To INLET #20A	4-5	22'	12.6	2.8	40
OUTLET #22 To INLET #25	4	110'	58.0	13.5	190
" " " "	4-6	10'	4.7	1.1	16
OUTLET #27 To INLET #28	7-5	10'	7.5	1.4	20
" " " "	5	101'	62.5	13.7	192
OUTLET #42 To INLET #43	9	19'	3.8	1.3	18
" " " "	9-1	33'	7.3	2.8	42
UE STA 40+22,68'Rt To INLET #32	2	188'	27.1	10.4	146
SR STA 16+17,56'Lt To INLET #32	3	50'	4.7	2.1	30
" " " "	3-2	10'	1.2	.5	7
" " " "	2	137'	19.7	7.6	107
G STA 13+03,67'Rt. To INLET #43	2	350'	50.4	19.3	272
" " " " "	2-1	30'	5.9	2.3	35
HHR STA 13+18,76'Lt. To HHR STA 14+50,65'Lt.	3	110'	10.3	4.6	64
UE STA 43+95,51'Rt. To UE STA 43+57,56'Rt.	2	38'	5.5	2.1	30
UE STA 43+50,81'Rt To UE STA 43+57,56'Rt	2	27'	3.9	1.5	21
SR STA 16+17,56'Lt. To INLET #49	3	115'	10.8	4.8	67
" " "	3-2	5'	.6	.3	4
" " "	2	240'	34.5	13.3	187
" " "	2-5	25'	9.6	2.4	34
" " "	5	155'	95.9	20.9	295
" " "	5-8	25'	21.2	4.0	57
" " "	8	330'	355.6	61.8	872

SCHEDULE OF ROADWAY LINED DITCHES & OPEN CHANNELS

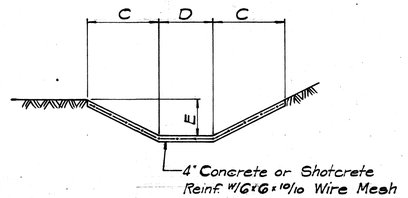
LOCATION	TYPE	LINED DRAINAGE DITCH LIN. FT.	DITCH & CHANNEL EXCAVATION 207.01 CY.	CL.'B' CONC. OR SHOTCRETE CY.	REINF. STEEL LB.
SR STA 16+17,56'Lt To INLET #49	8-10	50'	40.2	7.5	113.0
OUTLET #50 To SR STA 29+12,52'Lt	11-12	25'	30.7	4.7	67
" " " "	12	165'	229.4	35.5	500
J STA. 13+70, 12' RT TO J STA. 19+30, 12' RT	BIT. GUTTER	560' ← ITEM 609.700			
SHEET SUBTOTAL		2380'	1113.6	242.2	3426
USE SHEET TOTAL		2400'	1115		



TYPE	CONCRETE	REINF.	EXC.
1	0.0987G CY/LF	1.55G #/LF	0.2468 CY/LF



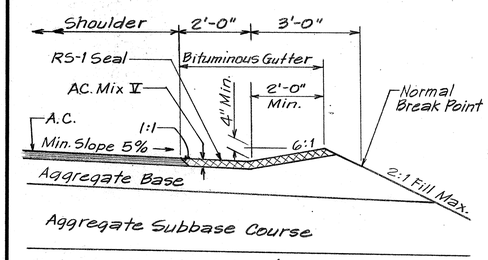
TYPE	Δ	B	CONCRETE	REINF.	EXC.
2	2'	1'	0.0552 CY/LF	0.777B #/LF	0.1435 CY/LF
3	1.5'	0.75'	0.0414 CY/LF	0.583G #/LF	0.0940 CY/LF



TYPE	C	D	E	CONCRETE	REINF.	EXC.
4	4	1	2	0.1228 CY/LF	1.729G #/LF	0.5273 CY/LF
5	4	2	2	0.1351 CY/LF	1.9035 #/LF	0.6189 CY/LF
6	0	4	2	0.0988 CY/LF	1.3914 #/LF	0.4032 CY/LF
7	3.5	2	3.5	0.1469 CY/LF	2.0696 #/LF	0.8699 CY/LF
8	5	4	2.5	0.1874 CY/LF	2.6403 #/LF	1.0775 CY/LF
9	2	1	1	0.0676 CY/LF	0.9518 #/LF	0.1983 CY/LF
10	2.5	2	2.5	0.1120 CY/LF	1.8813 #/LF	0.5287 CY/LF
11	4	2	4	0.1643 CY/LF	2.3156 #/LF	1.0633 CY/LF
12	6	4	3	0.2150 CY/LF	3.0292 #/LF	1.3902 CY/LF

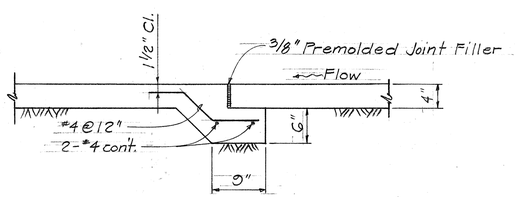
NOTE:

1. Contractor may substitute ditches of other shapes & of greater capacities if approved by the Engineer. Payment will be in the original ditch as shown on Plans.
2. Expansion and Construction Joints incidental to Lined Drainage Ditches.
3. Ditch & Channel Transitions are indicated by two numbers in the Column labeled Type.

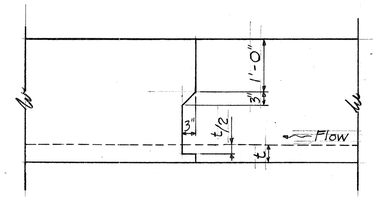


Note: AC Mix V thickness to conform to Shoulder AC thickness

BITUMINOUS GUTTER
(FILL SECTION)
Scale: 1½"=1'-0"



TYPICAL EXPANSION JOINT @ 90' o.c.
Scale: 1"=1'-0"



ELEVATION VIEW
TYPICAL CONSTRUCTION JOINT @ 30' o.c
FOR TRAPEZOIDAL LINED DITCH (MIN. DEPTH 2 FEET)
Scale: 3/4"=1'-0"

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

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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

HALAWA INTERCHANGE
PROJECT NO. I-HI-1(87):13

DATE: JUNE 8, 1970

SHEET No. 4 OF 25 SHEETS

PRINTED ON NO. 1000H CLEARPRINT

45

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	46	244

DRAINAGE SUMMARY

STRUCTURES			PIPE CULVERTS		ESTIMATED QUANTITIES																											REMARKS
INLET NUMBER	TYPE	STATION	ITEM	NO.	206.01	207.01	503.001	503.201		602.101		603.0010	603.7200	603.7260	603.7320	603.7380	603.7440	603.6062	603.6020	603.2066	603.6240	603.5050	609.700	604.201	604.202	604.230	604.243	604.236	612.01	206.83	605.006	605.106	605.206	640.01	
			FROM	TO	STRUCTURE EXCAVATION OTHER THAN AT BRIDGES	DITCH & CHANNEL EXCAVATION	CONCRETE OTHER THAN IN BRIDGES	CLASS B CONCRETE OTHER THAN IN BRIDGES		REINFORCING STEEL OTHER THAN IN BRIDGES		BED COURSE MATERIAL FOR CULVERTS	24" RCP CL III 24" ACP CL III 24" CMP #14 GA	24" RCP CL III 24" CMP #14 GA 30" RCP CL III	30" RCP CL III 30" ACP CL III 30" CMP #14 GA.	30" RCP CL III 30" ACP 30" CMP #12 GA	36" RCP CL III 36" ACP 36" CMP #12 GA	42" RCP CL III 42" ACP 42" CMP #12 GA	42" CMP #12 GA 42" RCP CL III 42" CMP #10 GA.	24" CMP #14 GA.	54" RCP CL III 54" CMP #12 GA.	30" RCP CL III 30" ACP CL III	BITUMINOUS GUTTER TYPE 1	TYPE A CAST IRON FRAME & COVER	TYPE B CAST IRON FRAME & COVER	TYPE G1214 STEEL FRAME & GRATE	TYPE C CAST IRON FRAME & GRATE	TYPE G1614 STEEL FRAME & GRATE	GROUTED RUBBLE PAVING	FILTER MATERIAL FOR UNDERDRAINS	6" PERFORATED UNDERDRAIN PIPE	6" NONPERFORATED UNDERDRAIN PIPE	CLEANOUTS	LINED DRAINAGE DITCH	
			UNIT	USE	CY	CY	CY	CY		LB		CY	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA.	EA.	EA	EA	EA	CY	CY	LF	LF	EA.	LF.	
	UNDERDRAINS & SUBBASE DRAINS	HALAWA HEIGHTS	ROAD		90																								105	830	10	4		
	"	RAMP I			60																								55	525	5	2		
	"	RAMP G			75																								70	685	5	3		
	"	SERVICE ROAD			255																								240	1520	15	7		
	"	ULUNE EXTENSION			10																								15	75	5	1	.	
	"	RAMPS H & J																											10					
	CONCRETE JACKET	HHR STA 14+70, 50' LT.	HHR STA 14+70 LT	HHR STA 15+07, 58' RT.	120			23		1130																								FOR EXISTING STORM DRAIN
	SLOPE PROTECTION	SR STA 20+00, 40' LT.																										12.5						
	"	SR STA 22+00, 40' LT.																										41.5						
	"	SR STA 27+12, 50' LT.																										4						
	"	SR STA 28+90, 80' LT.																										26.7						
			THIS SHEETS TOTAL		610			23.0		1130																		84.7	495	3635	40	17		
			SHEET #42 TOTAL		2130		92.4	9.6		3450		158	1776						79				4	14										
			SHEET #43 TOTAL		1930		60.5	17.6		2699		129	615	468		190	31		45	50			3	8	2			3.8			245			
			SHEET #44 TOTAL		2551		68.9	13.8		3324		165	995			187		167	24		180	55	6	4	2	1	1	7.1						
			SHEET #45 TOTAL			1115																	560										2400	
			TOTAL		7221	1115	221.8	64.0		10,603		452	3386	468		377	31	167	69	129	180	55	13	26	4	1		95.6	495	3635	285	17	2400	
			ROUNDED TOTAL		7220	1115	225	65		10,610		455	3385	470		380	35	170	70	130	180	55	560	13	26	4	1	1	95	495	3635	285	17	2400	

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
J. Andrew Schuchardt

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DRAINAGE ESTIMATED QUANTITIES

HALAWA INTERCHANGE
PROJECT NO. I-H1-1(87):13

DATE: JUNE 8, 1970

SHEET No. 5 OF 25 SHEETS

41 G

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	47	244

GRADING & DRAINAGE LEGEND

- Storm Drain Pipe
- Underdrain Pipe
- Swales
- Recently Adjusted Contours
- Paved Ditches & Channels
- Cleanouts
- Slope Control Planting
- Grouted Rubble Pavement
- PVC 160 PSI Pipe within ACP Class II Sleeve for Sprinkler System.
- PVC 160 PSI Pipe for Sprinkler System.

GENERAL NOTES

1. All Pipes exiting Inlets are to be grooved.
2. All Paved Ditch & Channel Excavation is limited to the Width and Depth of Paved Area.
3. Inlets prefixed with the Letter S ( ) are Standard Catch Basin Types ( ) modified by a Sawtooth Gutter Section adjacent to Slots. See Sheet No. 57 for Detail.
4. 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.
5. Drainage System between drainage structures #21, #22, #23, #24, #25, #26, #27 and #28 is to be constructed subsequent to preconsolidation in the area. Contractor is responsible for the maintenance of drainage during the preconsolidation period.
6. All Drainage Structures exceeding 6'-0" in height shall have reinforcing steel as shown in Detail on Sheet No. 57.

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

Sta. 0+00
Inlet #1 CB Type D
Exist. HHR Sta. 120+97, 24' RT.
Inv. 148.2

24" RCP CL III
24" ACP CL III
24" CMP #14 GA.

HALAWA 120+00

HEIGHTS 124+00

Sta. 1+05
Inlet #2 C.B Type D
HHR Sta. 12+84
Inv. = 147.1

Sta. 0+00
Inlet #4 CB Type B
HHR Sta. 15+00
Inv. 132.5

Sta. 2+00
Inv. 116.98

Existing 18" RCP
Reinforced Concrete
Jacket for Existing
Storm Drain

CRM Wall

6 CMP
Non-Reinforced Pipe

Inv. 129.0

MATCH LINE SEE SHEET 48

Type 3 Conc Lined Ditch
C.C.O. No. 6

Sta. 1+57
Inlet #3 CB Type B
HHR Sta. 12+75, 38' LT.
Inv. 146.6

24" RCP CL III
24" ACP CL III
24" CMP #14 GA.

Sta. 0+00
Inv. 128.0

Sta. 3+62 / Sta. 0+38
Inlet #5 CB Type B
HHR Sta. 15+00, 38' LT.
Inv. 130.0

Sta. 0+00
Begin Ditch III
HHR Sta. 13+18, 76' LT.
Inv. 143.3 (Meet Existing Ditch)

Sta. 1+10
End Ditch III
HHR Sta. 14+50, 65' LT.
Inv. 133.3 (Meet Existing Ditch)

HALAWA HEIGHTS ROAD
TRUNK LINE (NORTH)

24" RCP CL III
24" ACP CL III
24" CMP #14 GA.

CRM Wall

TRUE NORTH
Scale: 1" = 50'

POHUE STREET
HULUMANU STREET
ULUNE STREET
ULUNE PLACE
AUHAU PLACE
ROAD

77,000 N
76,500 N
76,000 N
525,500 E
526,000 E
526,500 E
527,000 E
525,000 E
525,500 E

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING AND DRAINAGE PLANS
HALAWA INTERCHANGE
PROJECT NO. I-HI-1(87):13

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

SCALE: 1" = 50' DATE: JUNE 8, 1970

SHEET No. 6 OF 25 SHEETS

July 26, 1971

C.O. 45

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	48	244

DETOUR C & RAMP J TRUNK LINE

Sta. 0+00 Inlet #21 DI Type G1214 Detour C & 12+75 ±, 30' LT. Swale Inv. 57.7 Pipe Inv. 53.0

Sta. 0+00 Inlet #6 CB Type B HHR Sta. 17+00 Inv. 115.5

Sta. 0+50 Inlet #54 CB Type D & US 46+75, 4' LT. Inv. 108.5

Sta. 0+00 Inlet #53 DI Type C & US 47+00, 47' LT. Inv. 109.0

Begin Ditch I Inv. 117.0 UE Sta. 43+95, 91' RT.

Begin Ditch II (Meet Existing Ditch) UE Sta. 43+50, 81' RT. Inv. 121.0

Sta. 5+55/Sta. 0+38 Inlet #7 CB Type B HHR Sta. 17+00, 38' LT. Inv. 115.0

Sta. 0+00 Begin Ulune Extension Open Channel UE Sta. 40+22, 68' RT. Inv. 116.89

Sta. 0+00 Inlet #29 CB Type 1 C UE Sta. 40+00 Inv. 96.5

Sta 1+70 Inlet #30 CB Type C UE Sta. 38+26 Inv. 90.5

Sta. 0+00/Sta. 1+88/Sta. 1+97 Inlet #32 DI Type B 5R Sta. 15+17, 97' LT. Ditch Inv. 113.0 Pipe Inv. 110.5

DETAIL A N.T.S. — Inv. 60.0, Inv. 68.0, Inv. 64.0, Inv. 58.0 — 24" Pipe and Plug, with Location Marker, Incidental to Manhole, for use in Future Contract.

ULUNE ST.

Ulune Street Box Culvert End Ditches T & II Inv. 114.0 UE Sta. 43+57, 56' RT. Sta. 2+33/Sta. 3+80 Inlet #43 CB Type G1214 G Sta. 17+80, 30' RT. Inv. 64.0

Sta. 1+81 Outlet #48 Headwall (24") G Sta. 16+28, 46' RT. Inv. 123

Sta. 1+02 Inlet #9 CB Type S1B HHR Sta. 19+78, 50' LT. Inv. 96.0

Sta. 1+60, Outfall & US 46+91, 105' RT. Inv. 107.4

Sta. 0+00 Inlet #8 CB Type S1C HHR Sta. 19+11, 50' RT. Inv. 101.0

Sta. 6+35 Connect to Box Culvert US Sta 44+25, 101' RT. Inv. 107.5 (Outfall)

Inv. 112.0 — Inv. 115.5 — Inv. 113.0

Sta. 0+00 Inlet #41 CB Type B G Sta. 16+25 Inv. 69.0 Ramp G Lateral

2½" PVC 160 PSI PIPE

6" PVC 160 PSI PIPE WITHIN 12" ACP CLASS II SLEEVE CMP 16 Ga.

Sta. 2+05 Inlet #31 CB Type ID UE Sta. 37+96, 24' LT. Inv. 89.0

24" RCP CL III, 24" ACP CL III, 24" CMP #14GA

24" CMP #14GA

Sta. 0+50 Inlet #33 MH Type D 5R Sta. 15+11, 51' LT. Inv. 91.0

Sta. 0+75 Inlet #34 CB Type D 5R Sta. 15+02, 31' LT. Inv. 90.5

Sta. 0+00 Begin Ulune Extension Open Channel 5R Sta. 16+17, 56' LT. Inv. 118.95

6" Nonperforated Underdrain Pipe (Also see Park Retaining Wall Details)

ULUNE EXTENSION & RAMP G TRUNK LINE

ULUNE EXTENSION

HALAWA HEIGHTS ROAD LATERAL

8" PVC 160 PSI PIPE WITHIN 14" ACP CLASS II SLEEVE

2½" PVC 160 PSI PIPE

8" Stainless Pipe 150 PSI within 24" SMLS 16 Ga. Sleeve 2½" PVC 160 PSI Pipe C.C.C. No. 16 Type 2 Conc. Lined Ditch C.C.C. No. 48

Hydromulch C.C.C. No. 29 "1st Suppl."

30" RCP CL III, 30" ACP CL III, 36" CMP #12 GA.

Sta. 0+00 Begin Ramp G Open Channel G Sta. 15+05, 61' RT. Inv. 99.0

MOANALUA

Top of Slope Sta. 1+96 Outlet #22 Headwall (24") H Sta. 15+58, 58' LT. Inv. 50.0

DETOUR D

DETOUR E

DETOUR C

DETOUR D LATERAL

RAMP H

RAMP I

RAMP J

RAMP G

HALAWA HTS. RD.

SERVICE ROAD

Sta. 3+16/Sta. 1+42 Inlet #25 DI Type A J Sta. 13+75, 62' LT. Inv. 44.0

Paved Trapezoidal Channel

24" RCP CL III, 24" ACP CL III, 24" CMP #14 GA

Sta. 1+01 Inlet #11 CB Type S1A HHR Sta. 22+40, 50' RT. Inv. 78.5

Sta. 0+31 Inlet #24 CB Type D H Sta. 14+70 Inv. 46.4

Hydromulch

6" PVC 160 PSI PIPE WITHIN 12" ACP CLASS II SLEEVE CMP 16 Ga.

Sta. 0+00 Inlet #23 Headwall (24") H Sta. 14+59, 33' RT. Inv. 47.0

2½" PVC 160 PSI PIPE

Sta. 2+51 Inlet #12 CB Type D H Sta. 10+52 Inv. 68.0

Sta. 3+07/Sta. 0+55 Inlet #14 MH Type D HHR Sta. 24+45, 54' RT. Inv. 67.0

Filter Material in 2' Wide Trenches @ 50' Intervals

Type 7 Bituminous Gutter

Sta. 0+00 Inlet #13 CB Type B HHR Sta. 24+42 Inv. 69.0

4" PVC 160 PSI PIPE WITHIN 10" ACP CLASS II SLEEVE

2½" PVC 160 PSI PIPE

Existing Swale

Sta. 0+00 Inlet #44 CB Type G1214 Detour D 17+65, 6' LT. Swale Inv. 69.7 Pipe Inv. 59.0 (Temporary Inlet to be removed in future contract - Reuse Grate)

Pvt. Sta. 2+56.23 Δ = 53°25'22" R = 122.29' T = 65.90'

HALAWA HEIGHTS ROAD TRUNK LINE (SOUTH)

30" RCP CL III, 30" ACP CL III, 36" CMP #12 GA

Inlet #10CB Type S1A HHR Sta. 22+50, 50' LT. Inv. 79.2

Deleted Outfall Detour C Sta. 8+92 Inv. 55.0 Sta. 17+61.88 RT.

Deleted 10 LF 24" CMP

24" RCP CL III, 24" ACP CL III, 24" CMP #14 GA

For Conc. Ditch Detail See Plan Sht. 29 C.C.C. No. 13

42" RCP CL IV, 48" CMP 12 GA.

Conc. Ditch Sta. 0+00 Conc. Headwall w/ 37.4 Bend 48" CMP

24" RCP CL III, 24" ACP CL III, 24" CMP #14GA

Sta. 0+00 Inlet #40 CB Type SA G Sta. 14+30 Inv. 76.0 Ramp G Lateral

24" RCP CL III, 24" ACP CL III, 24" CMP #14GA

Sta. 4+30 Inlet #38 CB Type G1214 G Sta. 13+30, 26' LT. Inv. 80.5

Sta. 5+42/Sta. 0+22 Inlet #39 CB Type S1D G Sta. 14+25, 20' LT. Inv. 75.0

Sta. 0+00 Inlet #35 CB Type D 5R Sta. 14+91, 50' RT. Inv. 89.5

Sta. 1+18/Sta. 0+50 Inlet #36 CB Type D 5R Sta. 14+80 Inv. 89.0

4" PVC 160 PSI PIPE WITHIN 10" ACP CLASS II SLEEVE

2" PVC 160 PSI PIPE

24" RCP CL III, 24" ACP CL III, 30" CMP #14 GA

Hydromulch (except for Future Widening) C.C.C. No. 45

Sta. 2+70/Sta. 2+03 Inlet #37 MH Type E 5R Sta. 14+00, 24' RT. Inv. 86.3/Inv. 87.5

24" RCP CL III, 24" ACP CL III, 30" CMP #14 GA

Inv. 93.0 — Inv. 92.0 — Inv. 94.2 — Inv. 87.5 — Inv. 88.6 — Inv. 76.5

MATCH LINE SEE SHEET 49 — MATCH LINE SEE SHEET 50 — MATCH LINE SEE SHEET 51 — MATCH LINE SEE SHEET 51 — MATCH LINE SEE SHEET 51

526,000 E — 526,500 E — 527,000 E — 527,500 E — 76,500 N — 76,000 N — 75,500 N

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 PLANS

HALAWA INTERCHANGE
PROJECT NO. I-HI-1(87):13

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

SCALE: 1"=50 DATE: JUNE 8, 1970

SHEET No. 7 OF 25 SHEETS

July 26, 1971

C.O. 45

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	49	244

10+00

76,000 N

CANE

TRENCH

STREAM

HALAWA

75,000 N

PIPELINE

CONCRETE

Inv. 53.0

SEE SHEET 48

MATCH LINE

Sand Blankets

℄ Moanalua Freeway

Top of Slope

60+00

10+00

Top of Slope

15+00 DETOUR "B"

MOANALUA

Sta. 3+92
Inlet #26 A DI Type C1C14
J Sta. 13+75, 12' RT.

Sta. 3+47
Inlet #26 CB Type B
J Sta. 13+75, 31' LT.
In Inv. 43.75
Out Inv. 43.25

36" RCP Cl III
36" ACP Cl III
36" CMP #12 GA

Sta. 4+16
Outlet #27 Headwall
J Sta. 13+75, 35' RT.
Inv. 42.6

Paved Trapezoidal Channel

RAMP "J"

25' Gutter Transition to meet Grate

DETOUR C & RAMP J TRUNK LINE

Type 7 Bituminous Gutter

Sta. 5+27
Outlet #28 Outfall St
J Sta. 13+75, 150' RT.
Inv. 36.5

42" RCP Cl III
42" CMP #10 GA

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

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GRADING AND DRAINAGE PLANS

HALAWA INTERCHANGE
PROJECT NO. I-HI-1(87):13

SCALE: 1"=50' DATE: JUNE 8, 1970

SHEET No. 8 OF 25 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	50	244

4" PVC 160 PSI PIPE WITHIN 10" ACP CLASS II SLEEVE
Type 7 Bituminous Gutter
2" PVC 160 PSI PIPE
Sta. 6+25 / Sta 0+68
Inlet #19 MH Type E
HHR Sta. 27+75, 54' RT.
Inv. 56.0
Sta. 7+05
Outlet #20 Headwall
HHR Sta. 28+27, 120' RT.
Inv. 41.5

Filter Material in 2' Wide Trenches @ 50' Intervals

Paved Channel

Sta. 7+27
Outlet #20A Outfall St.
HHR Sta. 28+45, 134' RT.
Inv. 41.3

24" RCP Cl III
24" ACP Cl III
24" CMP #14GA

Sta. 4+72
Inlet #15 CB Type D
HHR Sta. 26+20, 46 RT.
Inv. 64.0

HALAWA HEIGHTS ROAD
TRUNK LINE (SOUTH)

Sta. 0+00
Inlet #18 (Inlet Structure)
HHR Sta. 27+04, 71' RT.
Inv. 59.0

24" RCP Cl III
24" ACP Cl III
24" CMP #14GA
Sta. 6+15 / Sta. 0+66
Inlet #17 CB Type D
HHR Sta. 27+70, 46' RT.
Inv. 62.0

Sta. 0+00
Inlet #16 CB Type D
HHR Sta. 27+70, 10' LT.
Inv. 66.0

Excavation Area
Additional Excavation (C.C.O. No. 35)

Excavation Area

MATCH LINE A-A
MATCH LINE
SEE SHEET 48
SEE MATCH LINE A-A THIS SHEET

RAMP K
RAMP L
RAMP P
INTERSTATE ROUTE H-3
HALAWA
STREAM
CANE

H-3 Sta 251+50
H-3 Sta 252+00
H-3 Sta 252+50
H-3 Sta 253+00
H-3 Sta 253+50
H-3 Sta 254+00
H-3 Sta 254+50
H-3 Sta 255+00
H-3 Sta 255+50
H-3 Sta 256+00
H-3 Sta 256+50
H-3 Sta 257+00
H-3 Sta 257+50
H-3 Sta 258+00
H-3 Sta 258+50
H-3 Sta 259+00
H-3 Sta 259+50
H-3 Sta 260+00

140+00 EN RAMP
146+00 ES RAMP
240+00 WE RAMP
750+00
550+00
650+00
450+00
350+00
250+00
150+00
100+00
50+00
0+00

525,500 E
526,000 E
74,500 N
75,000 N

ORIGINAL PLAN
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
QUANTITIES BY
NOTE BOOK
No.
DATE
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING AND DRAINAGE PLANS

HALAWA INTERCHANGE
PROJECT NO. I-HI-1(87):13

SCALE: 1" = 50' DATE: JUNE 8, 1970

SHEET No. 9 OF 25 SHEETS

July 26, 1971

C 0 . 5 0

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	51	244

Service Road Open Channel

Sta 0+00
Inlet #45 CB Type 1D
SR Sta. 19+20, 14' LT.
Inv. 91.0

Grouted Rubble Pavement

Sta. 1+52
Inlet #46 CB Type 1D
SR Sta. 20+75, 14' LT.
Inv. 89.5

Sta 3+25
Inlet #47 CB Type 1D
SR Sta. 22+50, 14 LT.
Inv. 86.5

Sta 5+98
Inlet #48 CB Type 1D
SR Sta. 25+25, 14' LT.
Inv. 80.0

Sta 6+25 Outfall
SR Sta. 25+40, 35' LT.
Inv 79.5

Install Galvanized Trash Rack, C.C.O. No. 55

Sta. 9+45
Inlet #49 DI Type A
SR Sta. 25+50, 40' LT.
Inv. 73.0

SEE SHEET 48

MATCH LINE

20+00

25+00

SERVICE ROAD

Hydromulch (except for future Ulune Ext. roadway area)

SERVICE ROAD TRUNK LINE
Sta 0+00
Inlet #55 DI Type B
Detour A Sta. 12+58, 37' RT.
Inv. 62.0

Swale Inv. 67.0

DETOUR A

175+00

180+00

185+00

24" RCP Cl III
24" ACP Cl III
24" CMP #14 GA

30" RCP Cl III
30" ACP Cl III

Connect to Existing Pipe
Sta. 0+55

30" RCP (Existing)
Weld to 1/4" x 2" Steel Plate

℄ Future Moanalua Freeway

Service Road Open Channel

54" RCP Cl III
54" CMP #12 GA
Contractor to maintain existing pipe culvert and headwalls.

Sta 0+53
Inlet #52 CB Type D
SR Sta. 27+90, 14' LT.
Inv. 65.5

Sta 1+33 outfall
SR Sta. 28+55, 61' LT.
Inv. 65.0

Grouted Rubble Pavement

24" RCP Cl III
24" ACP Cl III
24" CMP #12 GA

Grade to Drain Openings in Curbs at SR Sta. 29+00± RT & LT.

Set Underdrain to Inv. 72.0 to Avoid Telephone Ducts

Set Underdrain to Inv. 72.5± to Avoid Av. Gas Line

Sta. 0+25
Inlet #51 CB Type I D
SR Sta. 27+90, 14' RT.
Inv. 66.0

Sta. 11+25
outlet #50 Headwall
SR Sta. 27+26, 40' LT.
Inv. 66.0

24" RCP Cl III
24" ACP Cl III
24" CMP #14 GA

MAG AZINE RD.

POWDER

PIPELINE

MANOA LUA

SOUTH

NORTH

GUARD RAIL

TRESTLE

BM H3-4

1/2" x 6" Bolt

1/2" Pipe 7 7/8" o.c.

Weld to 3/4" Pipe (Typ.)

1/2" x 6" Bolts

TOP VIEW TRASH RACK FOR INLET No. 49
Not to Scale

℄ 3/4" Pipe

4" from Top to ℄ 3/4" Pipe

1/2" Pipe 7 7/8" o.c.

1/8" Steel Pl.

2" from End Pipe

SECTION A-A

1/8" Rounding

R= 1/2" Hole

C.C.O. No. 55

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
J. Andrew Schuchardt

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GRADING AND DRAINAGE PLANS

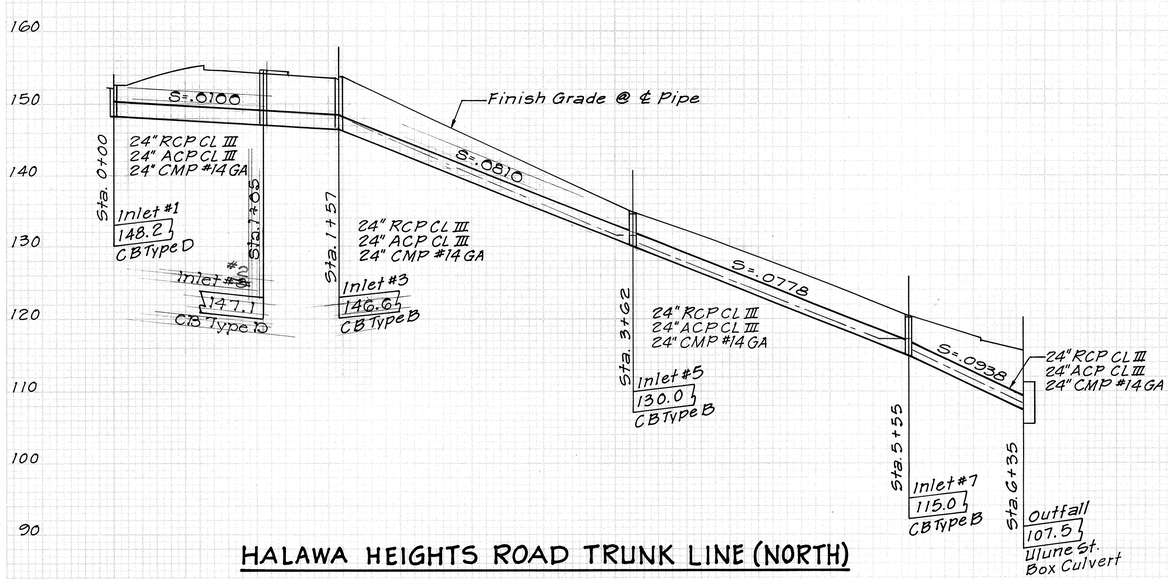
HALAWA INTERCHANGE
PROJECT NO. I-HI-1(87):13

SCALE: 1" = 50' DATE: JUNE 8, 1970

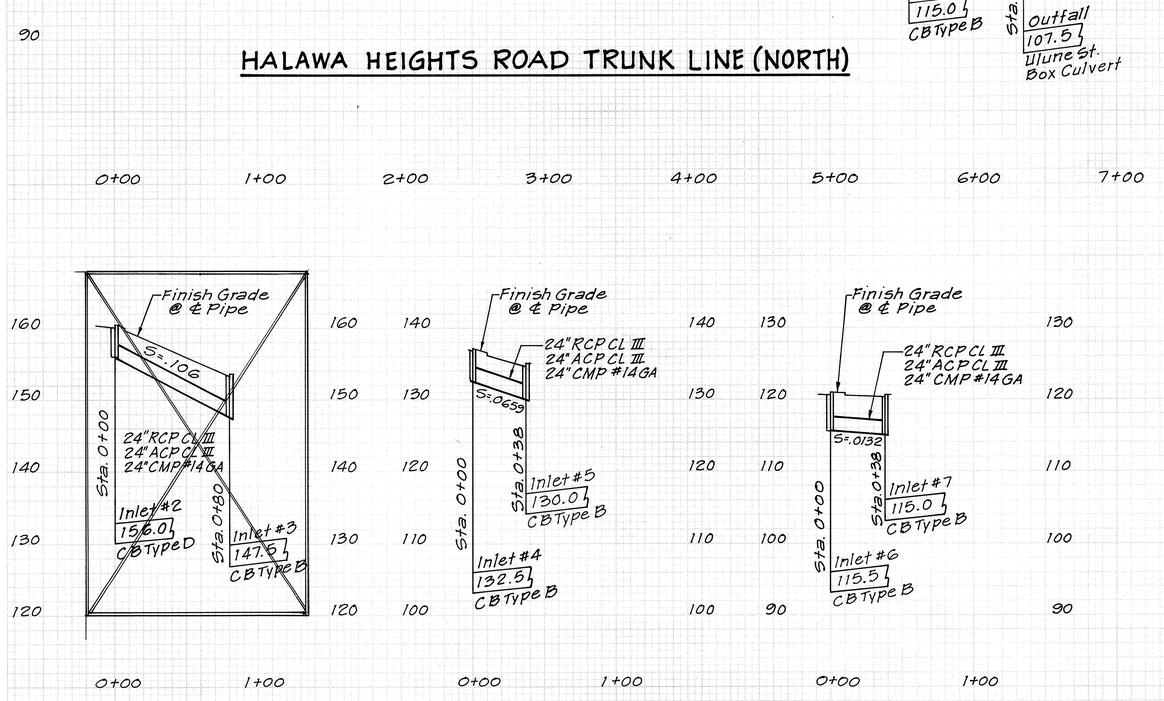
SHEET No. 10 OF 25 SHEETS

51

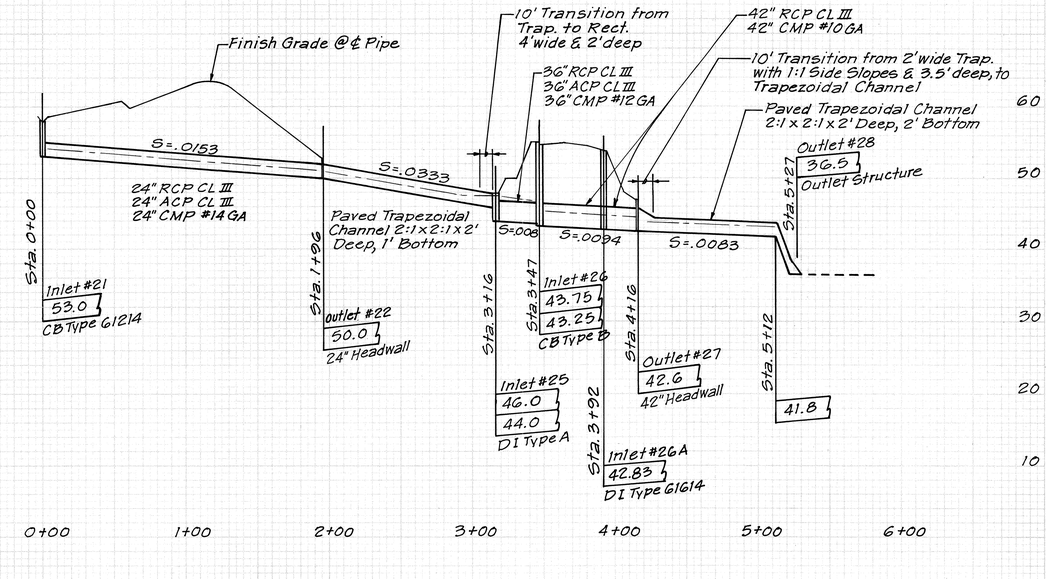
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	52	244



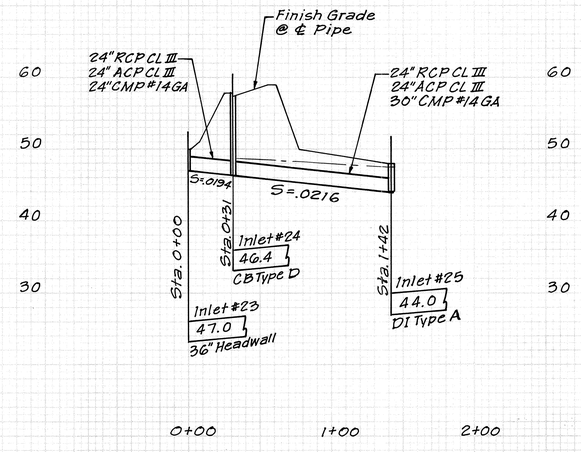
HALAWA HEIGHTS ROAD TRUNK LINE (NORTH)



HALAWA HEIGHTS ROAD LATERALS (NORTH)



DETOUR C & RAMP J TRUNK LINE



RAMP H LATERAL

J. ANDREW SCHUCHARDT
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No. 2229
HAWAII, U.S.A.

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J. Andrew Schuchardt

DRAINAGE PROFILES

SCALES: HORIZ. 1" = 50'
VERT. 1" = 10'

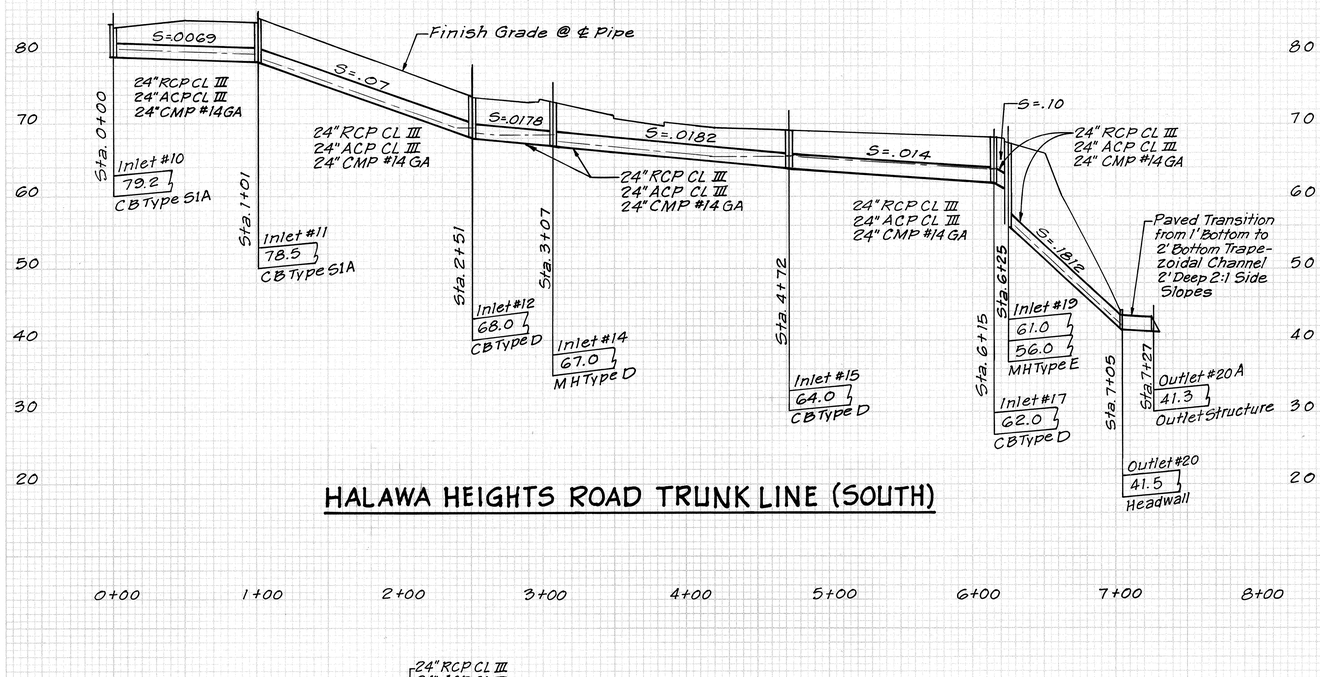
SHEET 11 OF 25 SHEETS

May 4, 1971

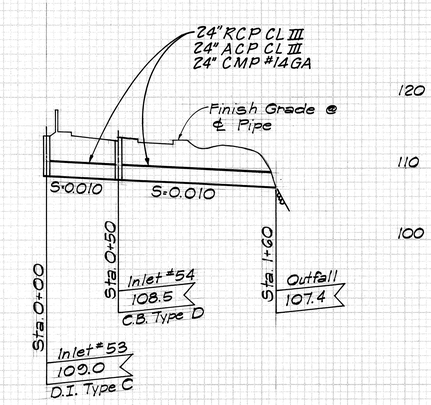
(C (I) o 52

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

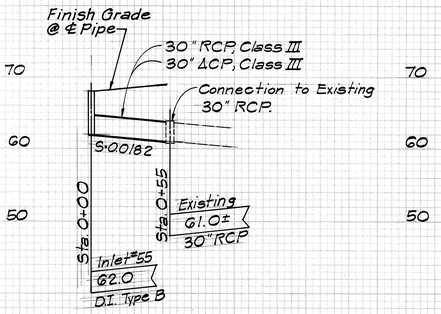
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	53	244



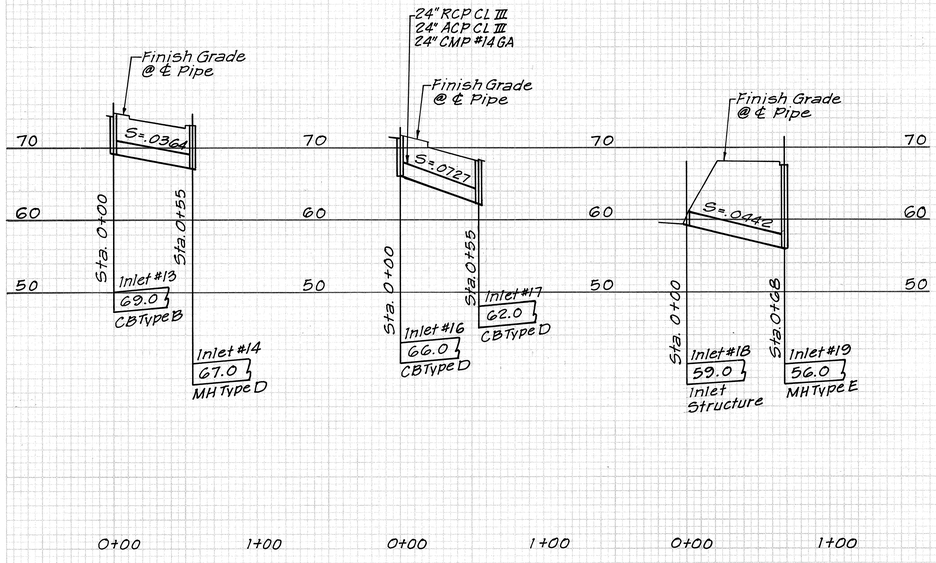
HALAWA HEIGHTS ROAD TRUNK LINE (SOUTH)



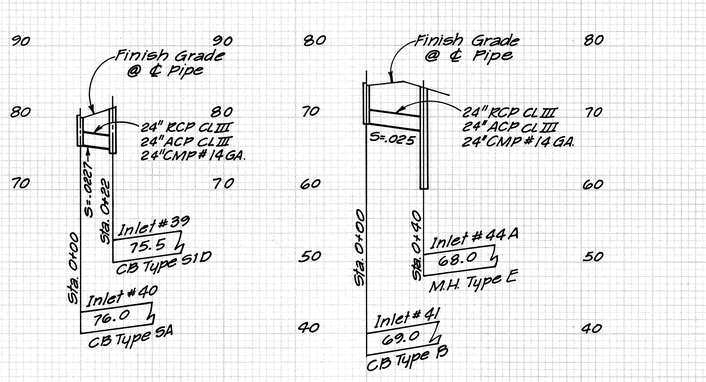
ULUNE STREET LATERAL



DETOUR A LATERAL



HALAWA HEIGHTS ROAD LATERALS (SOUTH)



RAMP G LATERALS TO ULUNE EXTENSION & RAMP G TRUNK LINE

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

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J. Andrew Schichardt

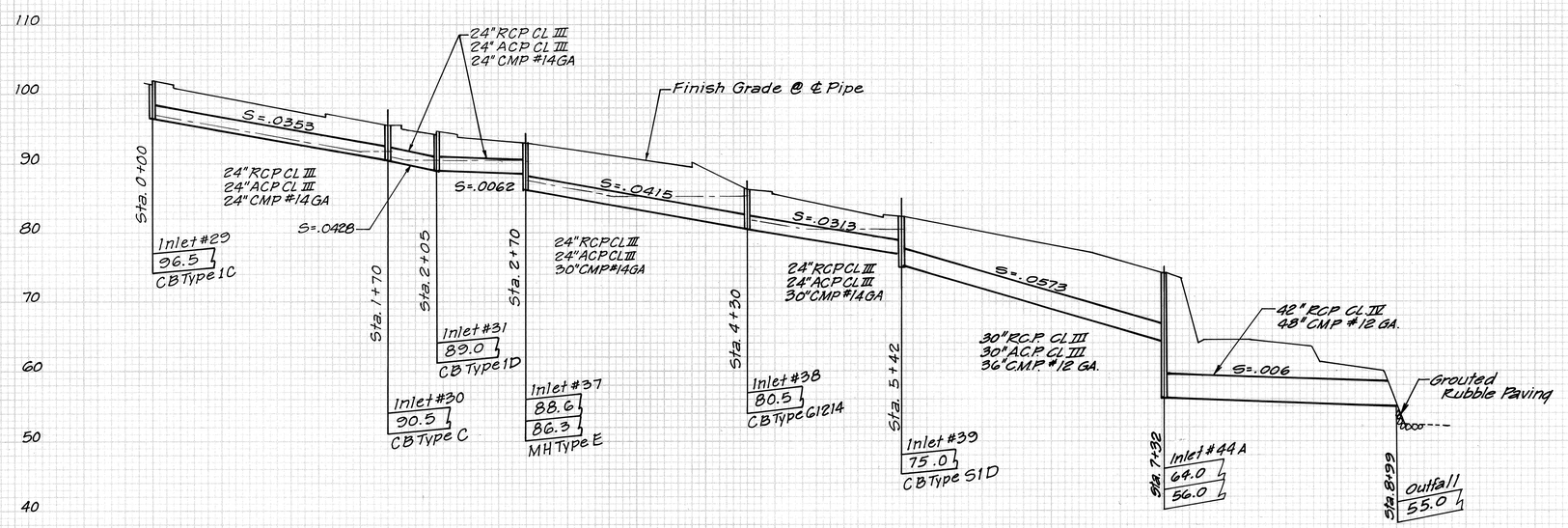
DRAINAGE PROFILES

SCALES: HORIZ. 1" = 50'
VERT. 1" = 10'
SHEET 12 OF 25 SHEETS

53

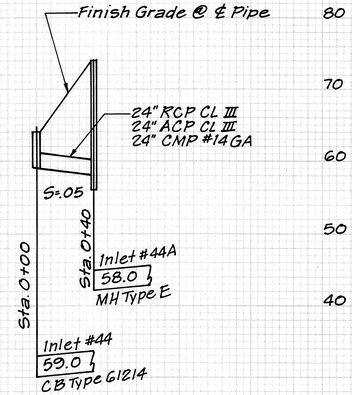
PLATE 3 —CROSS SECTION D. P. W. & W. S. STANDARD
THE FREDERICK POST CO., CHICAGO

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87)-13	1970	54	244

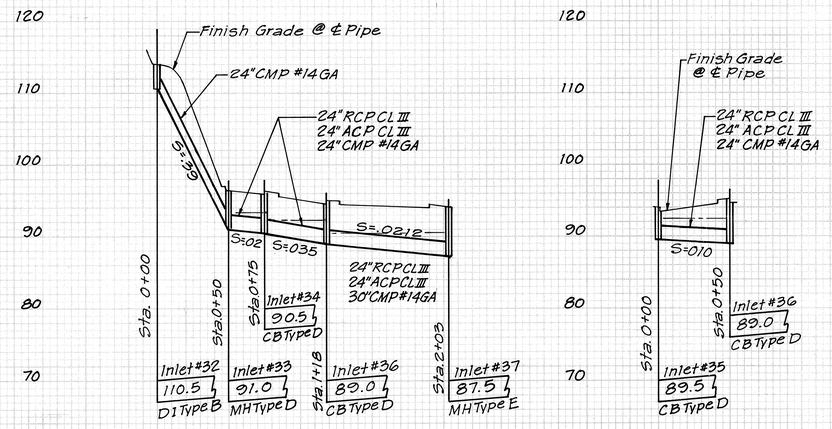


ULUNE EXTENSION & RAMP G TRUNK LINE

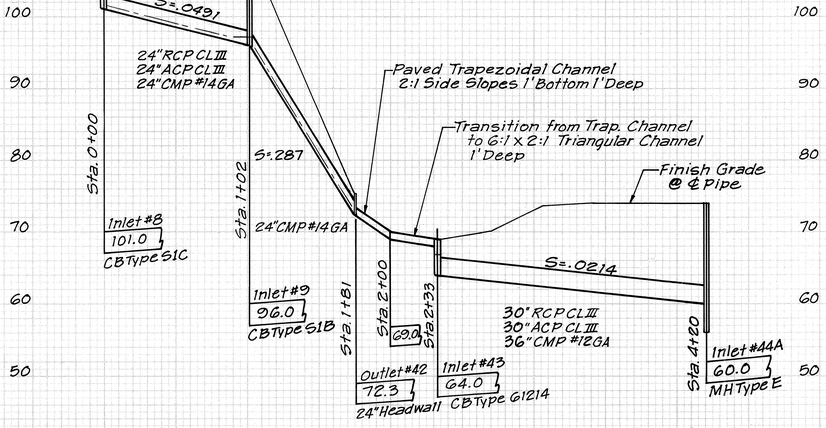
SEE SHEET NO. 53 FOR RAMP G LATERALS



DETOUR D LATERAL



SERVICE ROAD LATERALS



HALAWA HEIGHTS ROAD LATERAL

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

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J. Andrew Schuchardt

DRAINAGE PROFILES

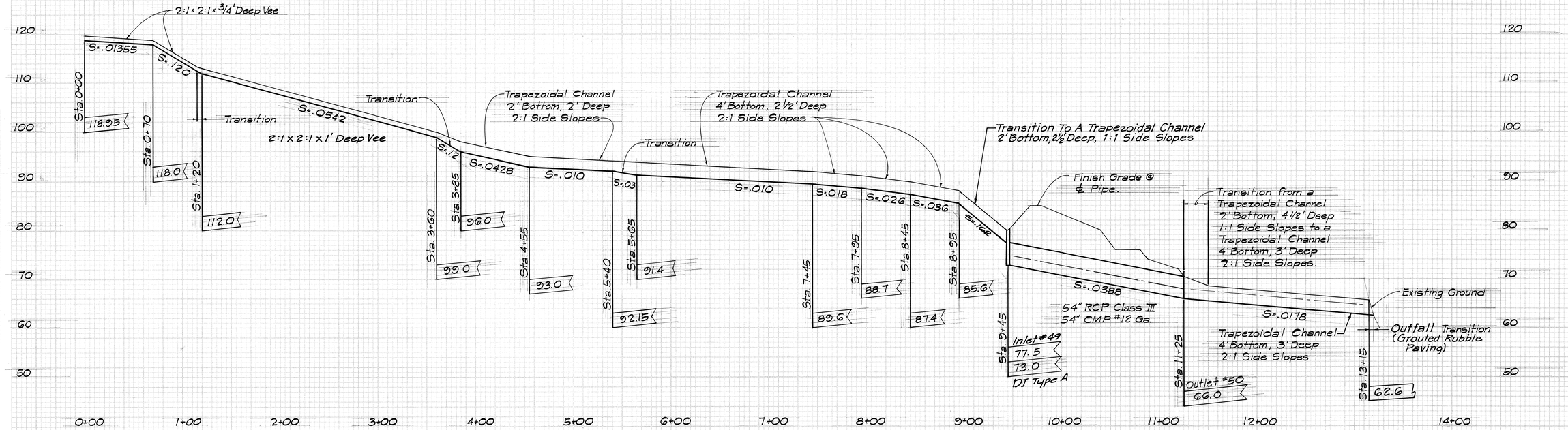
SCALES: HORIZ. 1" = 50'
VERT. 1" = 10'

SHEET 13 OF 25 SHEETS

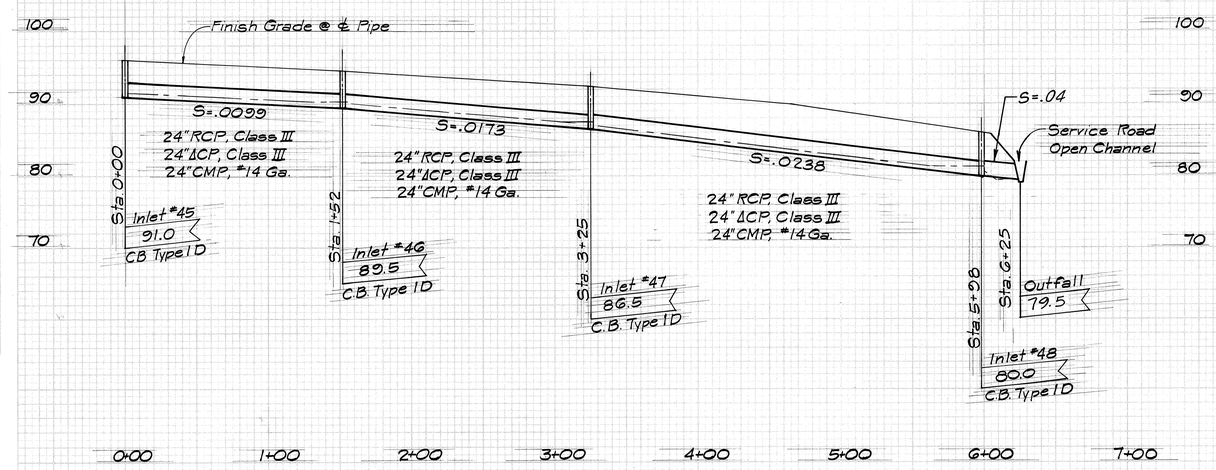
54

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

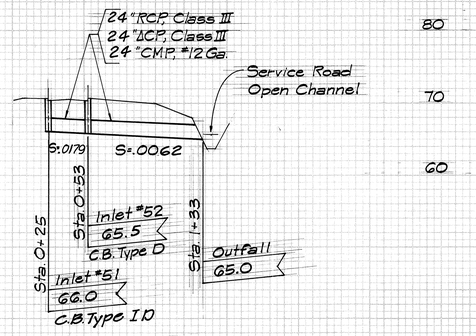
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	55	244



SERVICE ROAD OPEN CHANNEL



SERVICE ROAD TRUNK LINE



SERVICE ROAD LATERAL

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

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J. Andrew Schuchardt

DRAINAGE PROFILES

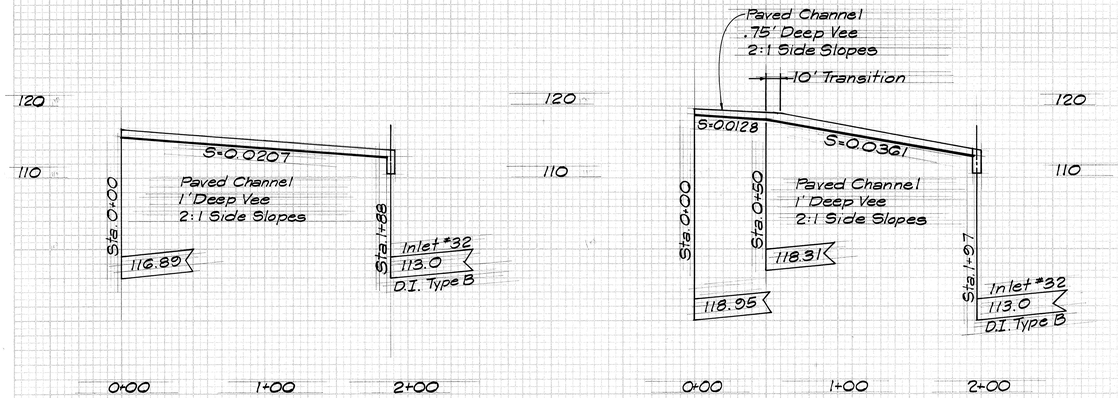
SCALES: HORIZ. 1" = 50'
VERT. 1" = 10'

SHEET 14 OF 25 SHEETS

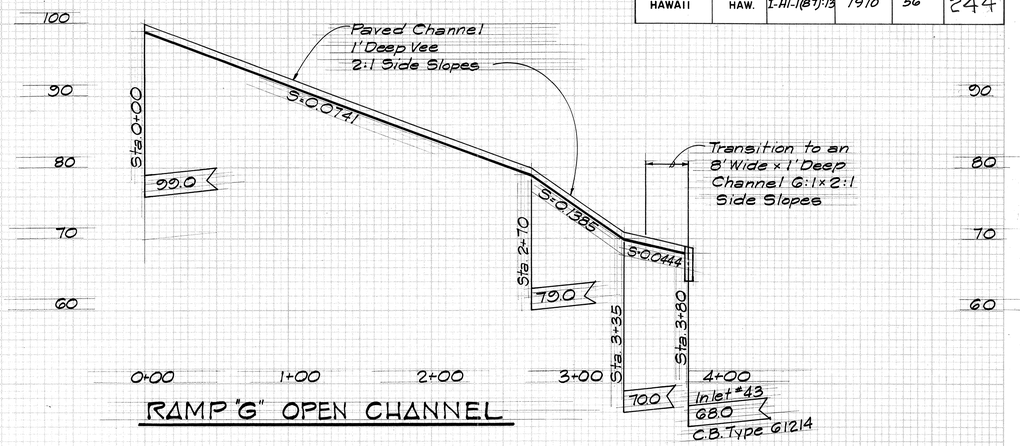
55

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

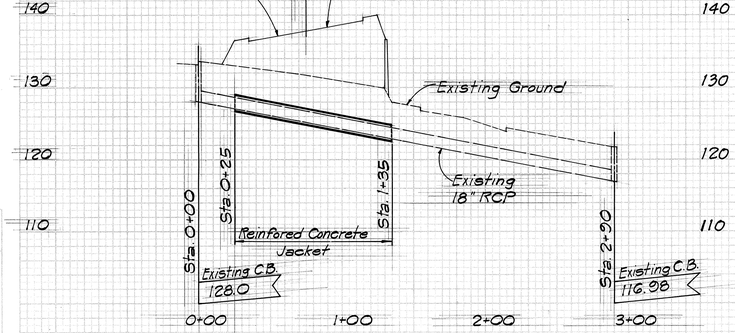
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87)-13	1970	56	244



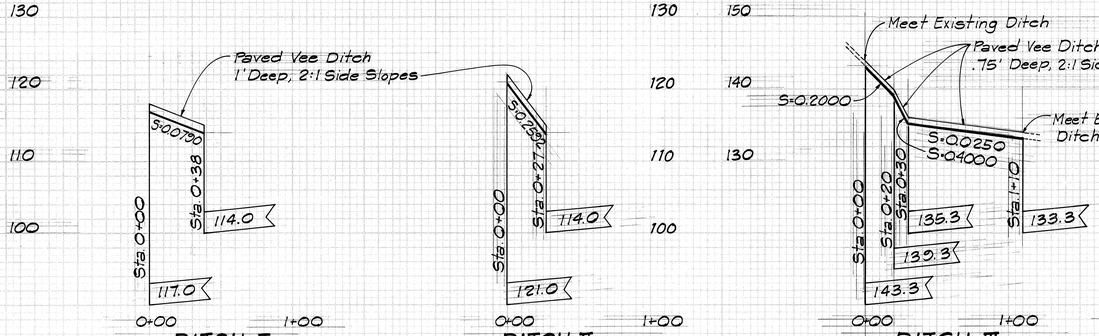
ULUNE EXTENSION OPEN CHANNEL



RAMP "G" OPEN CHANNEL



REINFORCED CONCRETE JACKET FOR EXISTING STORM DRAIN



HALAWA HEIGHTS ROAD (NORTH) DITCHES

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

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J. Andrew Schuchardt

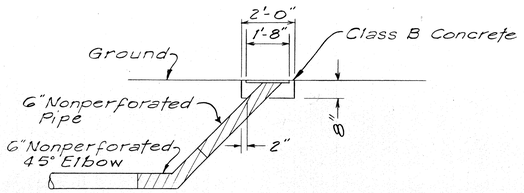
DRAINAGE PROFILES

SCALES: HORIZ. 1" = 50'
VERT. 1" = 10'
SHEET 15 OF 25 SHEETS

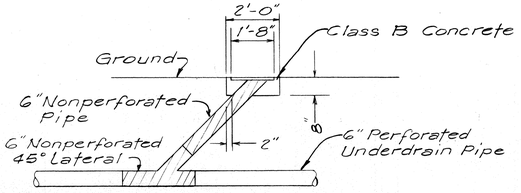
5 6

FINAL SURVEY — SURVEYED, PLOTTED, TEMPLATE, AREAS, MISC. CHECKED, NOTE BOOK, NO.
ORIGINAL SURVEY — SURVEYED, PLOTTED, TEMPLATE, AREAS, MISC. CHECKED, NOTE BOOK, NO.
DATE, BY
PLATE 3 —CROSS SECTION U. P. R. & R. E. STANDARD
THE FREDERICK POST CO., CHICAGO

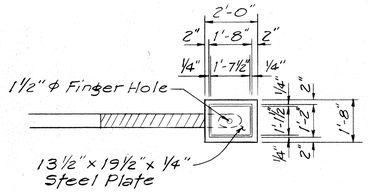
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87):13	1970	57	244



ELEVATION



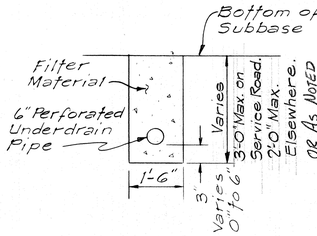
ELEVATION
SCALE: 3/8" = 1'-0"



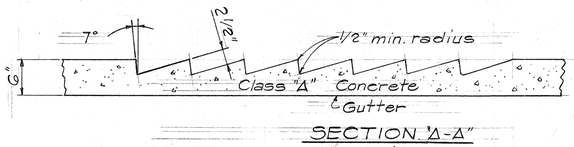
PLAN

UNDERDRAIN CLEANOUT DETAIL

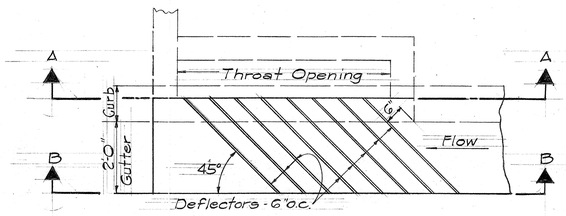
SCALE: 3/8" = 1'-0"



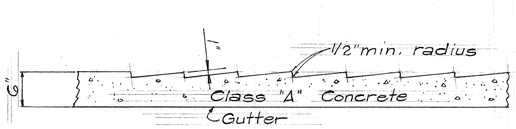
TYPICAL UNDERDRAIN SECTION
SCALE: 1/2" = 1'-0"



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



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

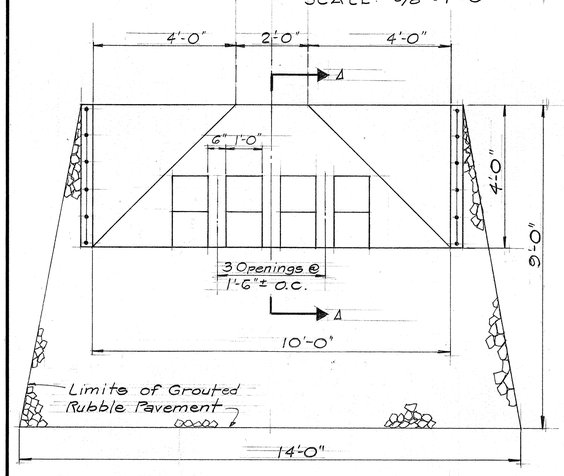


SECTION "B-B"
SCALE: 1" = 1'-0"

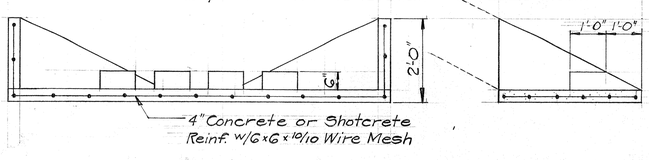
DETAIL OF SAWTOOTH TYPE CONC. GUTTER APRON

SCALE: AS SHOWN

TYPICAL DETAIL FOR TYPES
S1A, S1A, S1B, S1C & S1D CATCH BASINS



PLAN
0.24 c.y. Concrete
1.82 # Steel
1.9 c.y. Grouted Rubble Pavement



ELEVATION

SECTION "A-A"

OUTLET STRUCTURE OUTLET #20A & 28

SCALE: 1" = 2'-0"

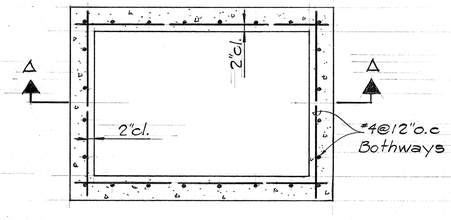
Refer to detail of Standard Headwall, Sheet G3.

DATA FOR CONCRETE HEADWALL			
D	B	L	H
54"	3'-0"	15'-0"	7'-6"

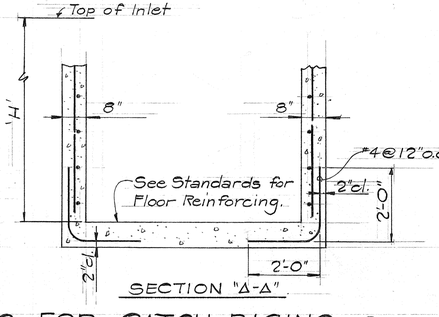
C.I. B CONC. FOR R.C.P.	C.I. B CONC. FOR C.M.P.
Cu. Yd.	Cu. Yd.
7.07	7.52

STEEL FOR ONE HEADWALL			
No. of Bars	Size	Length	Lbs.
4	3/4" ϕ	14'-6"	87

OUTLET STRUCTURE OUTLET #50



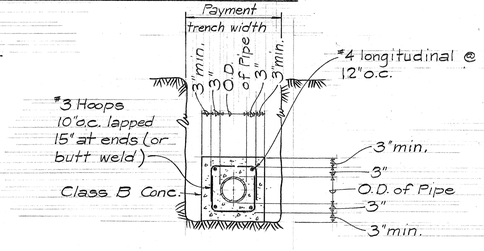
PLAN SECTION



SECTION "A-A"

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

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



DETAIL OF CONCRETE JACKET

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

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

DRAINAGE DETAILS

INTERSTATE ROUTE H-1
PROJECT No. I-HI-1 (87):13

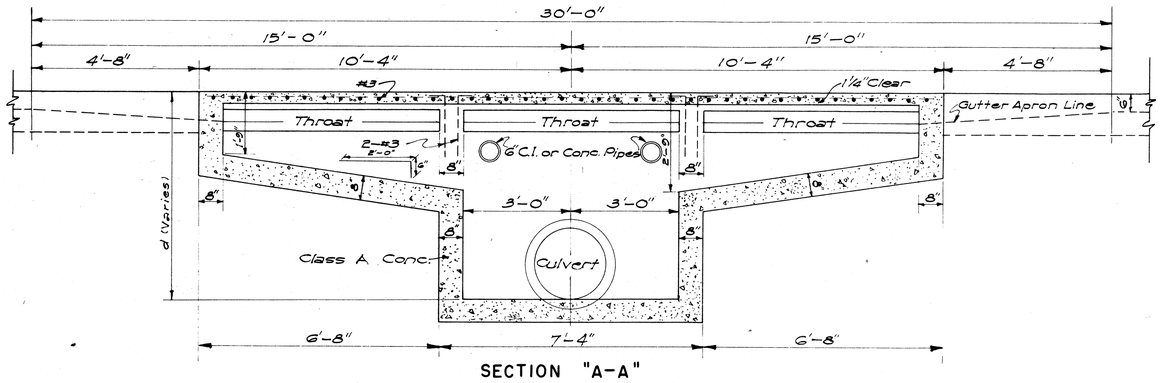
SCALE: AS SHOWN DATE: JUNE 8, 1970

SHEET No. 16 OF 25 SHEETS

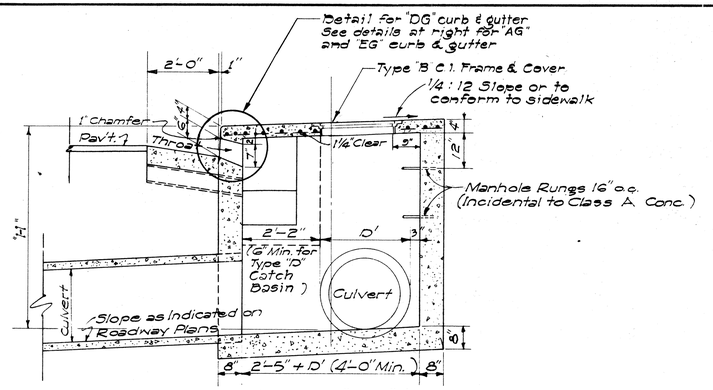
ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY | TRACED BY | DESIGNED BY | QUANTITIES BY | CHECKED BY | DATE | NOTE BOOK | No. | REVISED PLAN

2/17/59

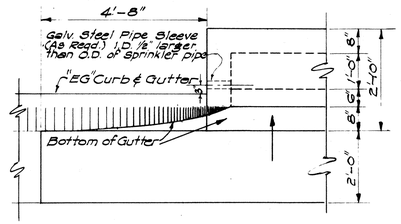
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87)13	1970	58	244



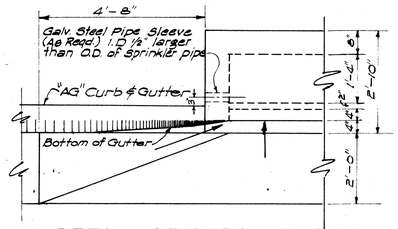
SECTION "A-A"



SECTION "B-B"

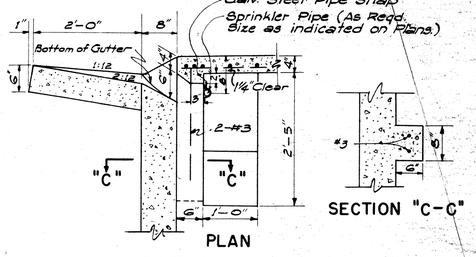


DETAIL OF CATCH BASIN WITH "EG" CURB & GUTTER



DETAIL OF CATCH BASIN WITH "AG" CURB & GUTTER

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

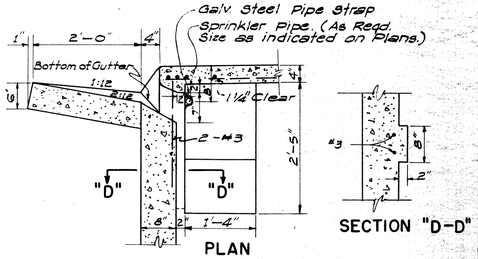


PLAN

SECTION "C-C"

THROAT DETAIL FOR "EG" CURB & GUTTER

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

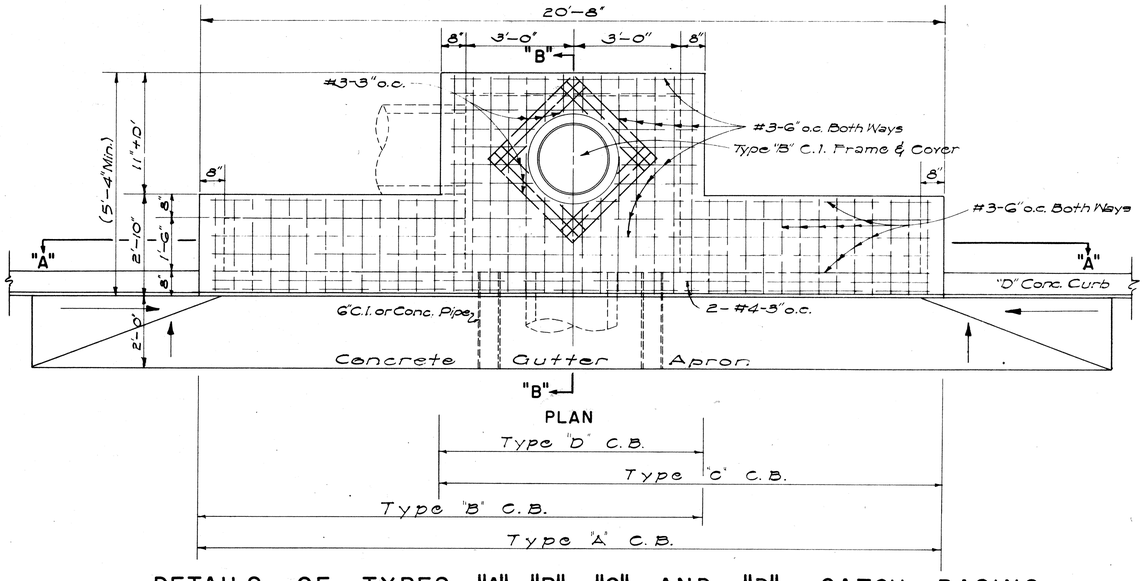


PLAN

SECTION "D-D"

THROAT DETAIL FOR "AG" CURB & GUTTER

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



PLAN

DETAILS OF TYPES "A", "B", "C" AND "D" CATCH BASINS

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

ESTIMATED QUANTITIES

Type	Class A Conc.	Struct. Exc.	Reinf. Steel	Gutter Length
"A"	7.5 c.y.	24.7 c.y.	145 lb.	30'-0"
"B"	6.0 c.y.	21.5 c.y.	108 lb.	23'-4"
"C"	6.0 c.y.	21.5 c.y.	108 lb.	23'-4"
"D"	4.9 c.y.	16.5 c.y.	77 lb.	16'-8"

GENERAL NOTES

1. Quantities based on d = 5.75' and D' = 30".
2. Quantities do not include concrete for Gutter Apron.
3. The Contractor shall install two 6" Cast Iron or Concrete Pipes as incidental to Class A Concrete for Construction Drainage. The Engineer shall determine the exact location in the field.
4. Culvert shall leave C.B. from any position and any direction indicated by plans or ordered by the Engineer. Culvert may both enter and leave C.B. so that C.B. will also act as Manhole.
5. The Contractor shall install Galvanized Steel Pipe Sleeves and Straps as incidental to Sprinkler System.
6. The type of curb and/or gutter (Type 1, 2, 3, etc.) shall conform to the type specified on the roadway plans.
7. 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. Type "B" Cast Iron Frame and Cover and Manhole Rungs may be placed at any location as ordered by the Engineer.

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:

G. Takano — 12-17-69

HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:

Shelton R. Baldwin — 12-17-69

ASSISTANT CHIEF, ENGINEERING — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS

CATCH BASINS

Scale: As Noted — Date: July, 1969

SHEET Nº 17 OF 25 SHEETS DH 1

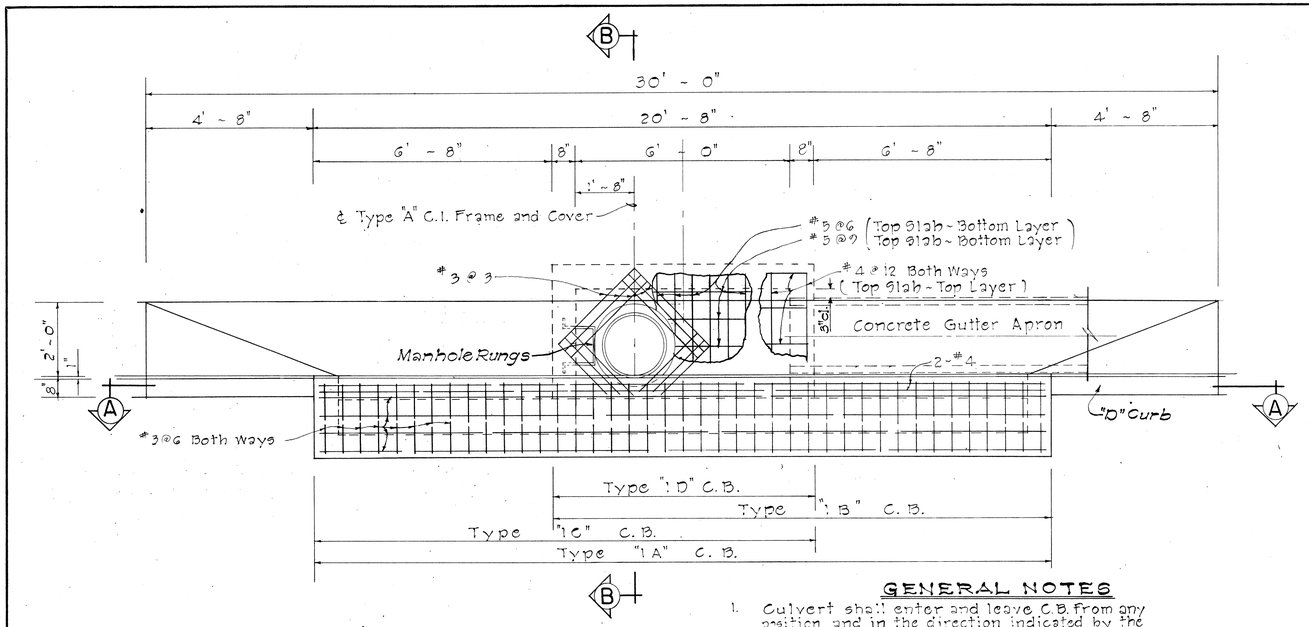
58

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

3

180 ARKWRIGHT TRACING CLOTH T.M. 18406

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(BT)13	1970	59	244

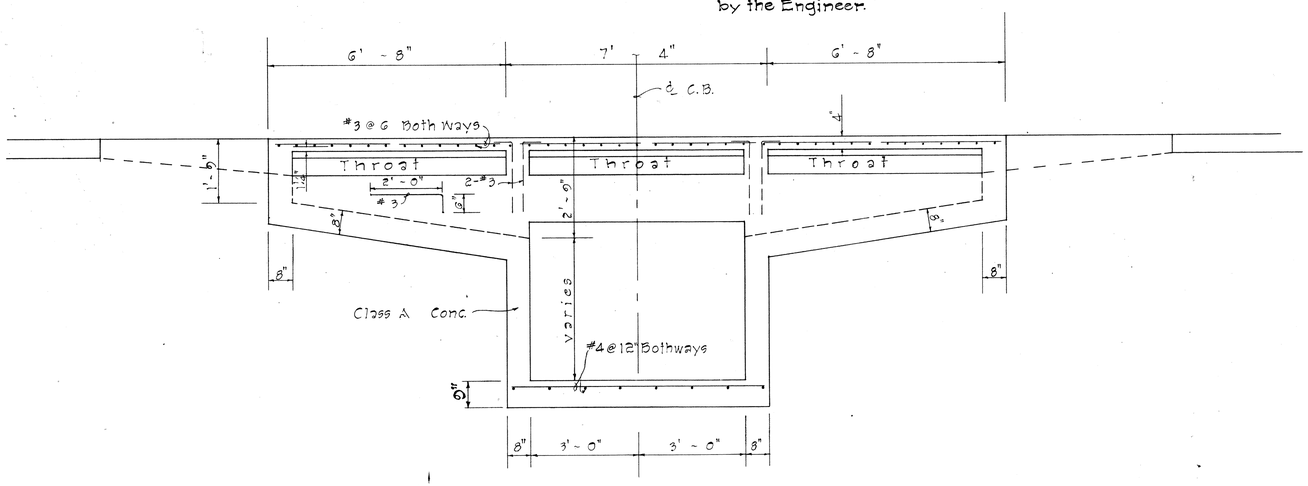


PLAN

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

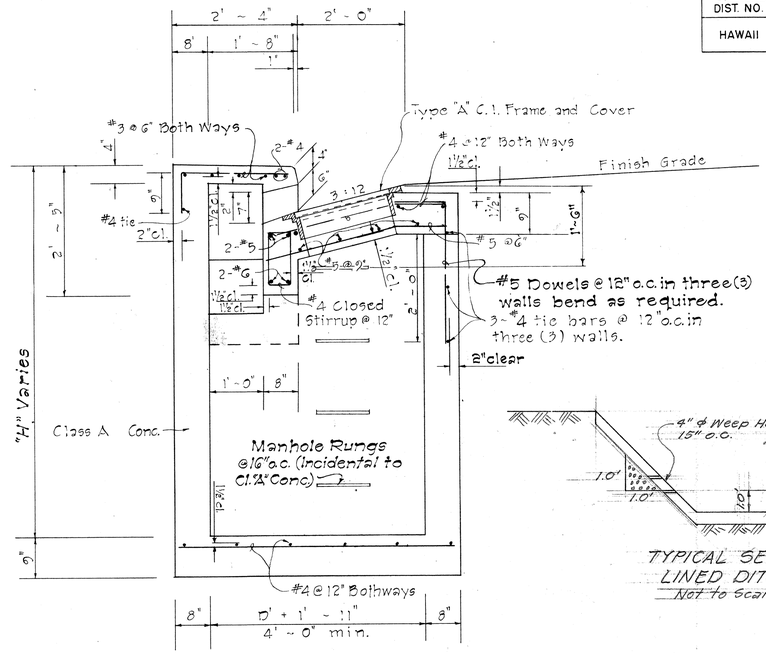
GENERAL NOTES

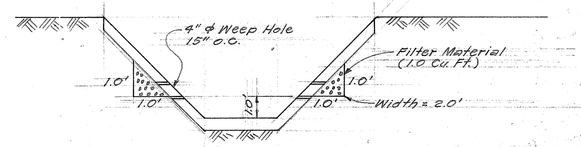
1. Culvert shall enter and leave C.B. from any position and in the direction indicated by the plans or ordered by the Engineer.
2. 'D' shall be the maximum outside dimension of the culvert at the C.B. wall.
3. The type of curb and/or gutter (Type 1, 2, 3, etc.) shall conform to the type specified on the roadway plans.
4. 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 6inches or less. Type "A" C.I. Frame & Cover and Manhole Rungs may be placed at any location as ordered by the Engineer.



SECTION "A-A"

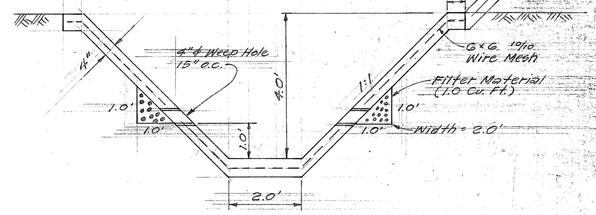
Scale: 1/2" = 1'-0"





TYPICAL SECTION
LINED DITCH
Not to Scale

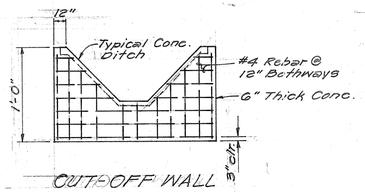
NOTE: Weep Holes not required for depths less than 2 Ft.



TYPICAL SECTION
CONCRETE DITCH
Not to Scale

SECTION "B-B"

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



CUT-OFF WALL
Not to Scale

C.C.O. NO. 13

APPROVAL RECOMMENDED:

R. Takano — 12-17-69

HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:

[signature] — 12-17-69

ASSISTANT CHIEF, ENGINEERING — DATE

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

TYPE "1A", "1B", "1C", AND "1D" CATCH BASINS

Scale: As Noted — Date: July, 1969

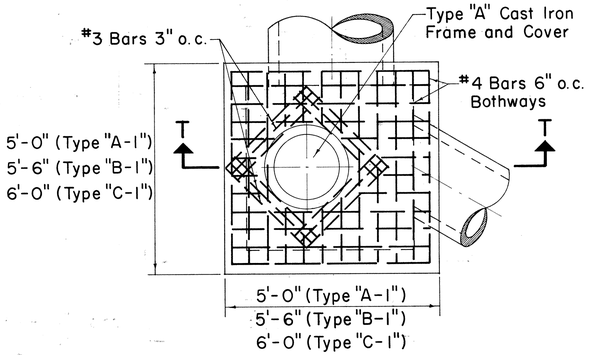
SHEET No. 18 OF 25 SHEETS DH 3

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

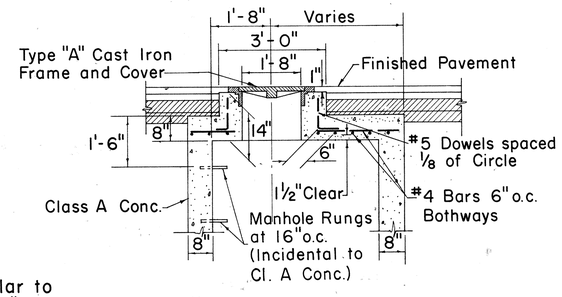
DETAILS OF TYPE "1A", "1B", "1C" AND "1D" CATCH BASIN

59

FED. ROAD DIST. NO.	STATE	FED. AID. PROJECT	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	I-HI-1(87)13	1970	60	244



PLAN

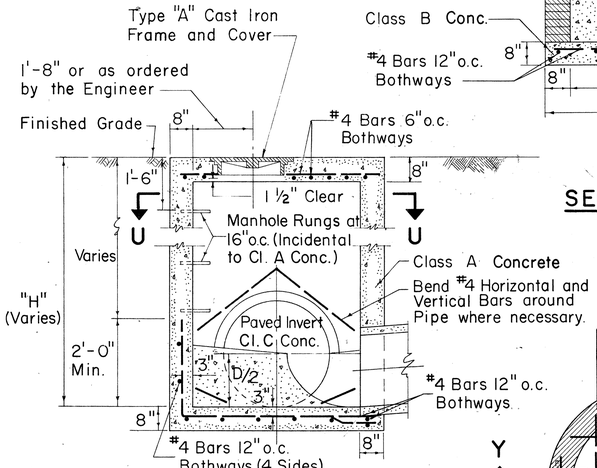


SECTION T-T

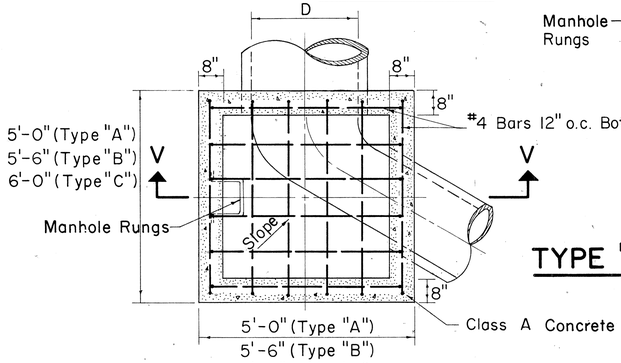
Note:
Bottom detail similar to Type "A", "B", & "C".

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

Scale: ½" = 1'-0"



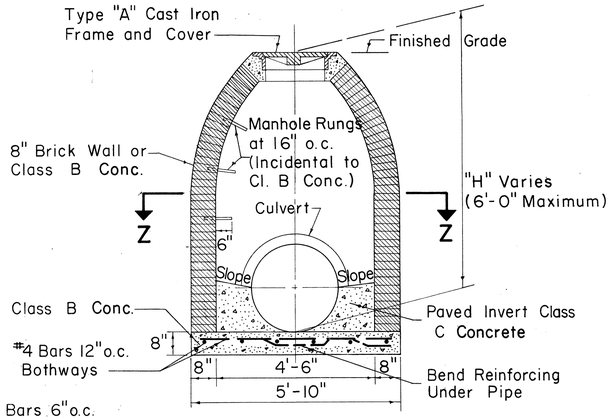
SECTION V-V



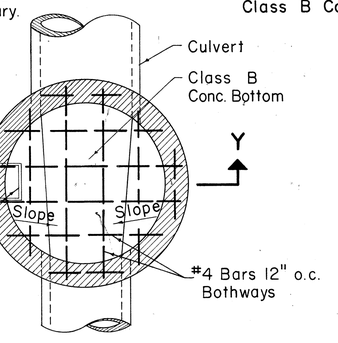
SECTION U-U

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

Scale: ½" = 1'-0"



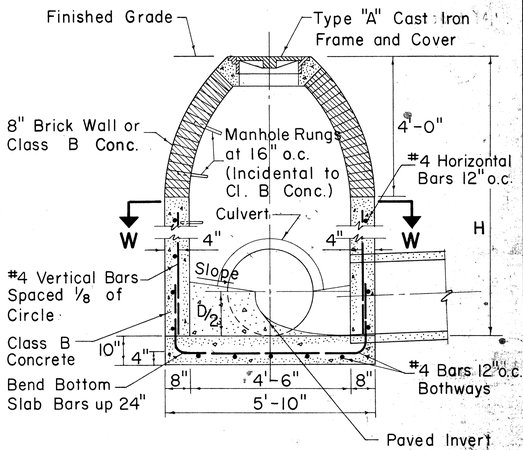
SECTION Y-Y



SECTION Z-Z

TYPE "D" STORM DRAIN MANHOLE

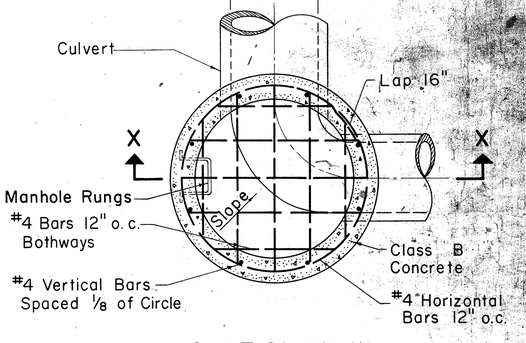
Scale: ½" = 1'-0"



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 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 — 12-17-69 DATE

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

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

STORM DRAIN MANHOLES

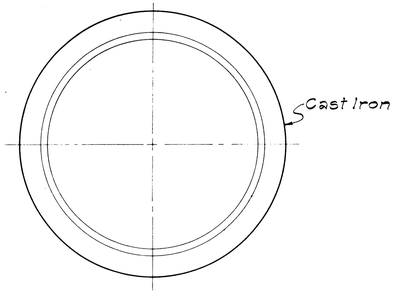
Scales: As Noted — Date: July, 1969

SHEET NO. 19 OF 25 SHEETS DH 5

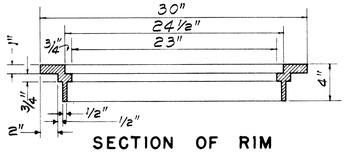
60

LIETZ 1103 ARKWRIGHT TRACING CLOTH 10-60 200P

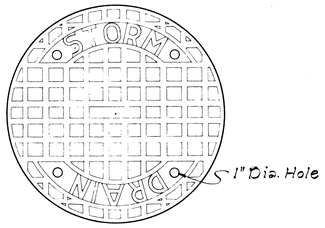
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HH-1(81):13	1970	61	244



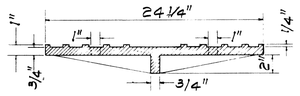
PLAN OF RIM



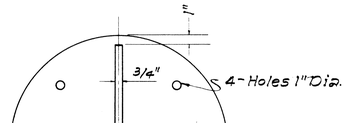
SECTION OF RIM



TOP VIEW OF COVER



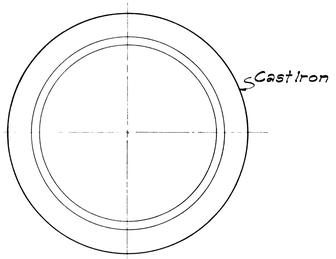
SECTION



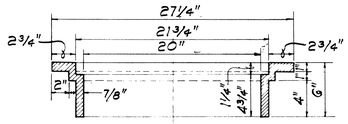
BOTTOM VIEW OF COVER

DETAILS OF TYPE "B"
CAST IRON FRAME AND COVER

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



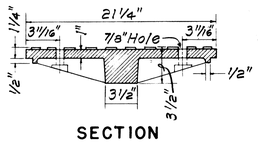
PLAN OF RIM



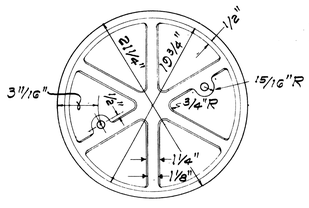
SECTION OF RIM



TOP VIEW OF COVER



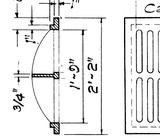
SECTION



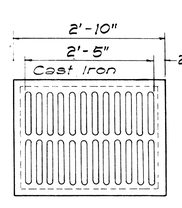
BOTTOM VIEW OF COVER

DETAILS OF TYPE "A"
CAST IRON FRAME AND COVER

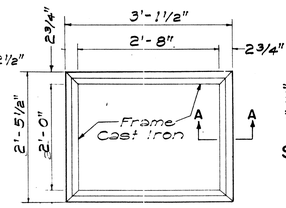
SCALE: 1-1/2" = 1'-0"



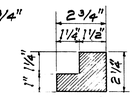
SECTION



TOP VIEW



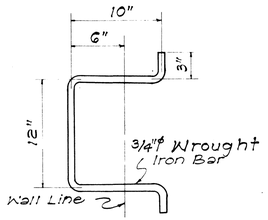
TOP VIEW



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

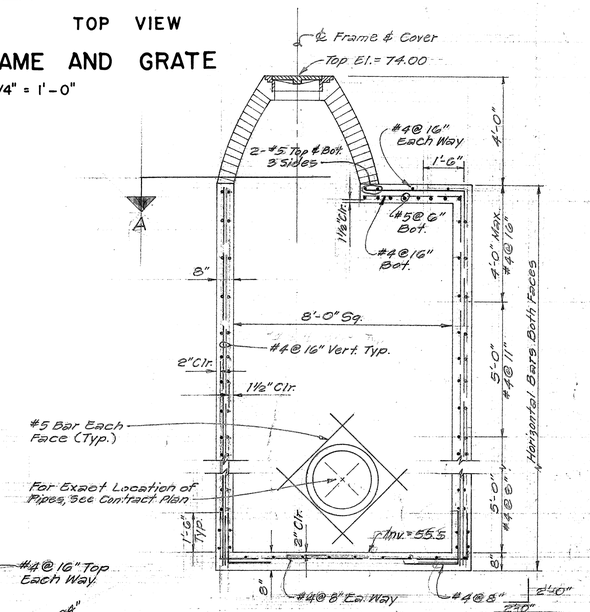
TYPE C C.I. FRAME AND GRATE

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



MANHOLE RUNG

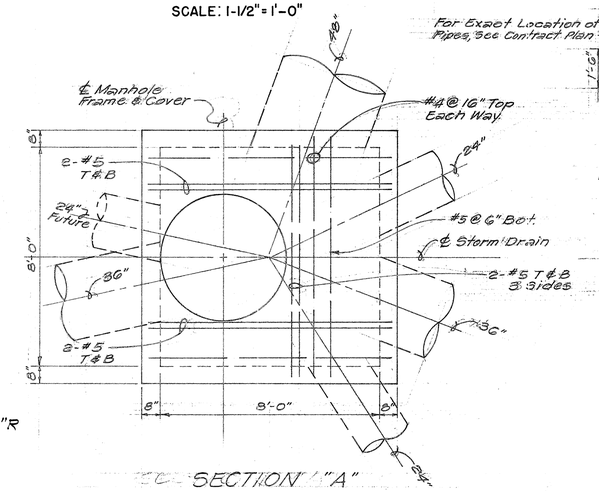
SCALE: 1-1/2" = 1'-0"



REVISED MANHOLE DETAIL
Not to Scale

FOR DETAILS NOT SHOWN SEE CONTRACT PLAN

C.C.O. No. 13



SECTION "A"
Not to Scale

APPROVAL RECOMMENDED:

S. 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
CATCH BASIN AND
MANHOLE CASTINGS

Scale: As Noted — Date: July, 1969

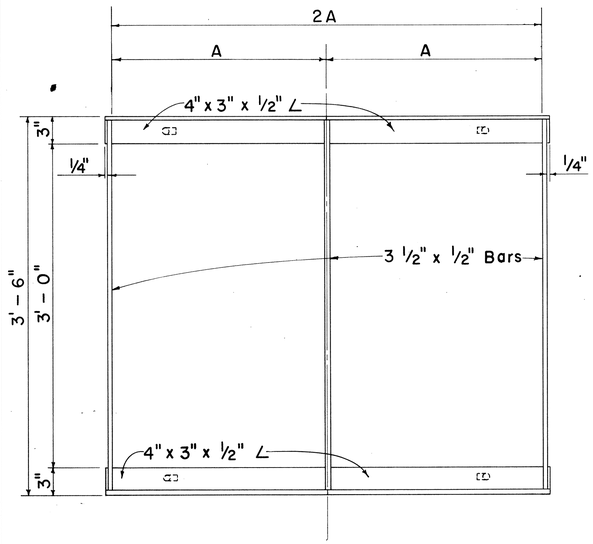
SHEET Nº 20 OF 25 SHEETS DH-6

61

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

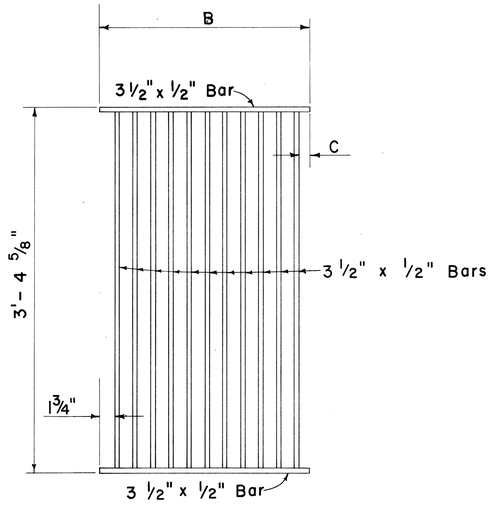
RIGHT TRACING CLOTH K & E CO., N.Y.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87)12	1970	61A	244



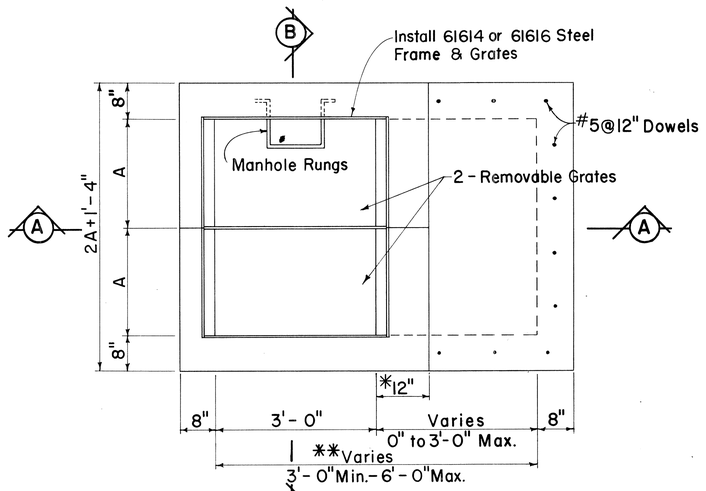
PLAN

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

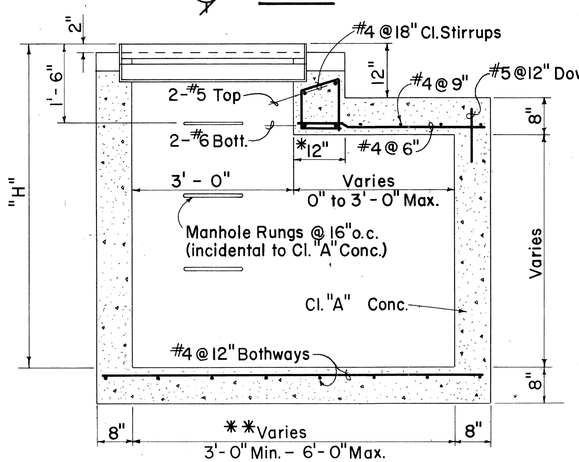


PLAN

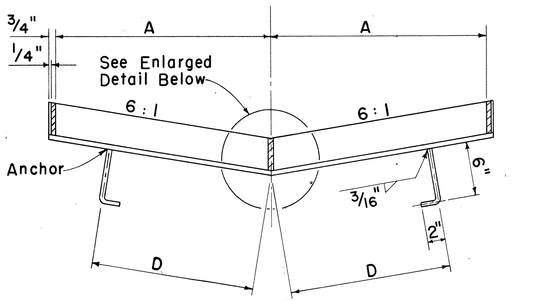
Scale: 1 1/2" = 1'-0"



B PLAN

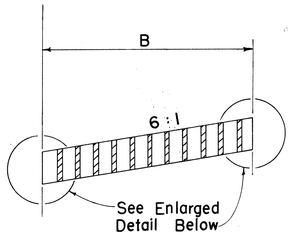


SECTION A - A



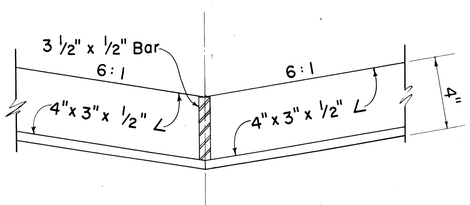
SECTION

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



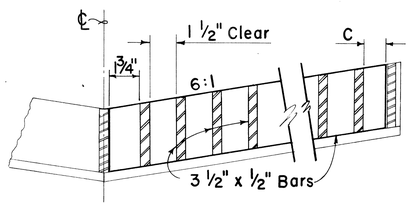
SECTION

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



FRAME

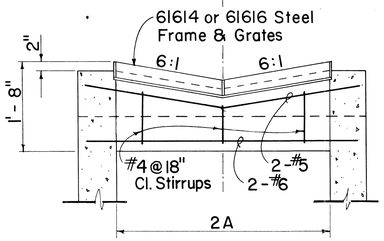
Scale: 3"= 1'-0"



GRATE

Scale: 3"= 1'-0"

DETAILS OF TYPE 61614 OR 61616 STEEL FRAME AND GRATES



SECTION B - B

DETAILS OF 61614 OR 61616 DROP INTAKE

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

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

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

GENERAL NOTES

1. Grates and Frames shall be hot dip galvanized after fabrication, see specifications.
2. All welds 3/8" unless otherwise noted.
3. Refer to "Spacing Table" for Types 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'- 11 1/2"	1 1/4"	1'- 6"
61616	17	3'- 0"	2'- 11 3/8"	1 1/8"	2'- 0"

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:

Y. 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 61614 & 61616 GRATED DROP INTAKES

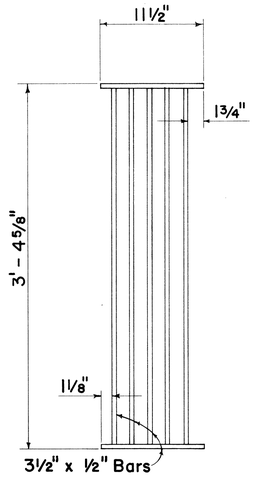
Scales: As Noted — Date: Feb. 1969

SHEET No. 21 OF 25 SHEETS DH 8

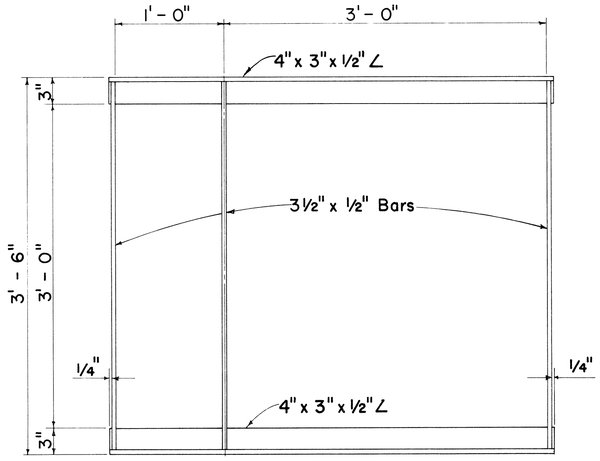
61A

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

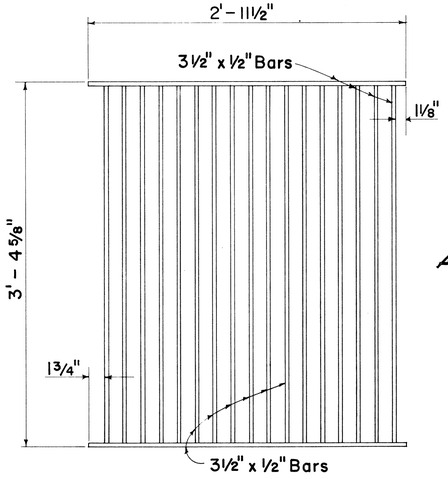
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IHF-1(87)13	1970	62	244



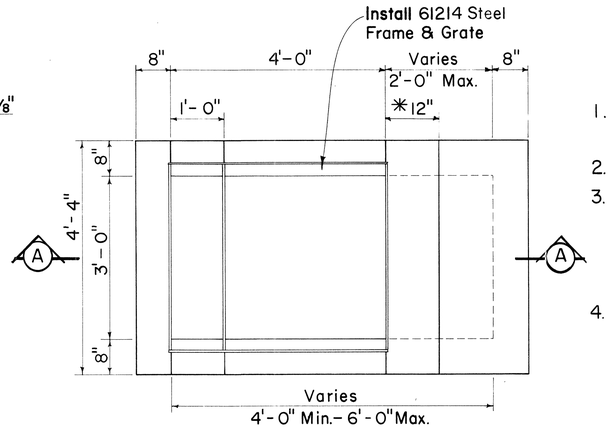
PLAN
Scale: 1½" = 1'-0"



PLAN
Scale: 1½" = 1'-0"



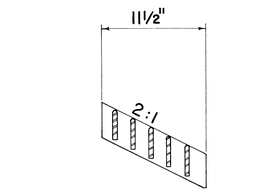
PLAN
Scale: 1½" = 1'-0"



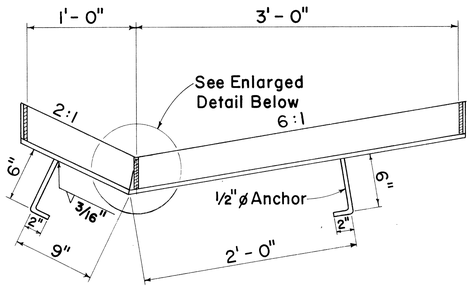
PLAN

GENERAL NOTES

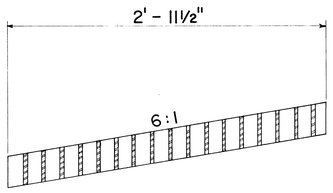
1. Grates and Frames shall be hot dip galvanized after fabrication, see specifications.
2. All welds ⅜" unless otherwise noted.
3. The Frame & Grate materials shall conform to the specifications of ASTM Designation Structural Steel A283, Grade D and the Standard Specifications.
4. Culvert shall leave 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.



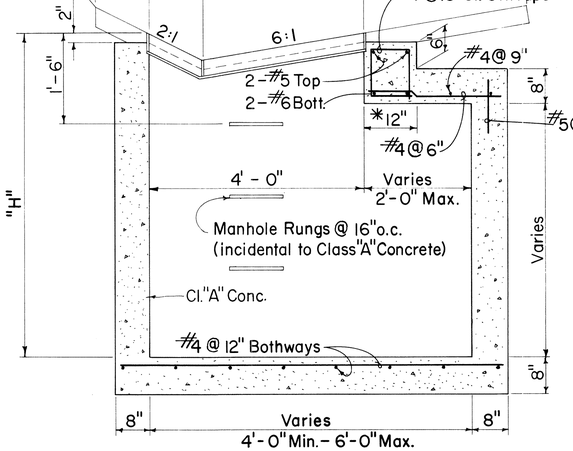
SECTION
Scale: 1½" = 1'-0"



SECTION
Scale: 1½" = 1'-0"



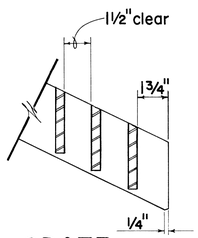
SECTION
Scale: 1½" = 1'-0"



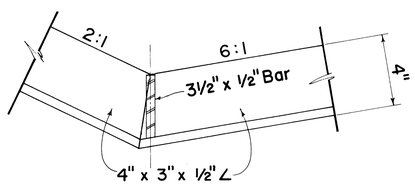
SECTION A - A

DETAIL OF 61214 DROP INTAKE
Scale: ¾" = 1'-0"

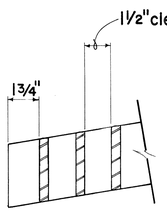
*For Minimum size box of 4'-0" only, use 8" and eliminate reinforcing steel shown in top portion.



GRATE
Scale: 3" = 1'-0"



FRAME
Scale: 3" = 1'-0"



GRATE
Scale: 3" = 1'-0"

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:
G. 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

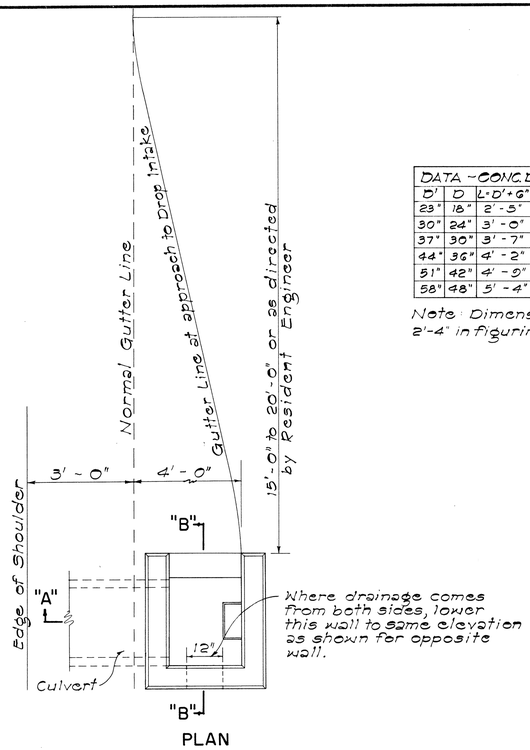
Scales: As Noted — Date: July 1969

SHEET No. 22 OF 25 SHEETS DH 9

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

DETAILS OF TYPE 61214 STEEL FRAME AND GRATES

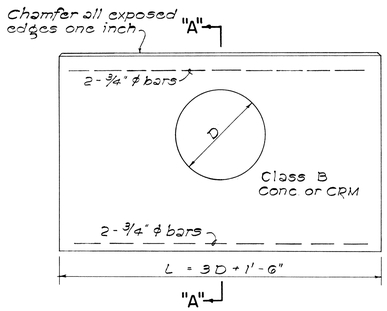
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87)13	1970	63	244



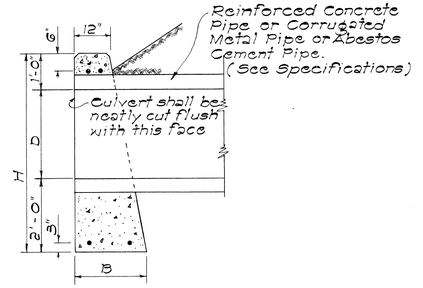
PLAN

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



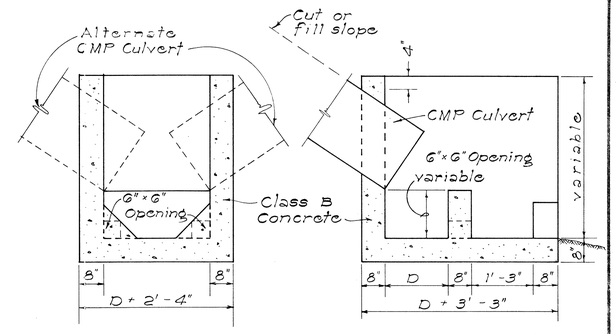
SECTION "A-A"

DATA FOR CONC. HEADWALL				Cl B CONC FOR R C P	Cl B CONC FOR C M P	Steel For One Headwall			
D	B	L	H	Cu. Yd.	Cu. Yd.	No. of Bars	Size	Length	Lbs.
18"	1'-9"	6'-0"	4'-6"	1.12	1.17	4	3/4" ϕ	5'-6"	33
24"	1'-6"	7'-6"	5'-0"	1.52	1.60	4	3/4" ϕ	7'-0"	42
30"	2'-0"	9'-0"	5'-6"	2.36	2.49	4	3/4" ϕ	8'-6"	51
36"	2'-0"	10'-6"	6'-0"	2.94	3.13	4	3/4" ϕ	10'-0"	60
42"	2'-0"	12'-0"	6'-6"	4.10	4.47	4	3/4" ϕ	11'-6"	69
48"	2'-0"	13'-6"	7'-0"	5.01	5.36	4	3/4" 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

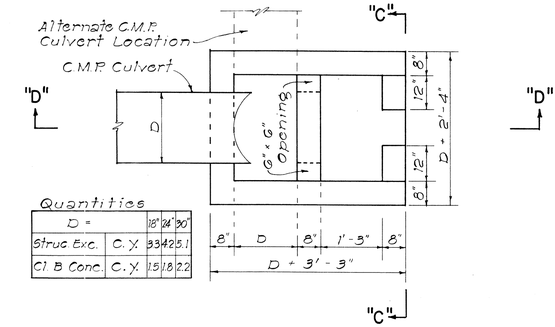
DETAIL OF HEADWALL

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



SECTION "C-C"

SECTION "D-D"



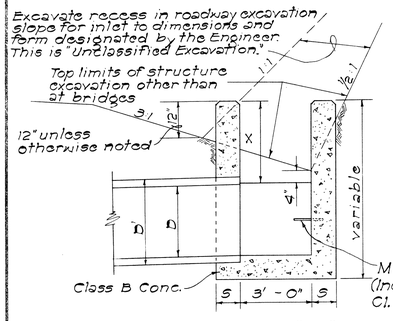
Quantities

D =		18"	24"	30"
Struc Exc.	C.Y.	33	42	51
Cl B Conc.	C.Y.	15	18	22

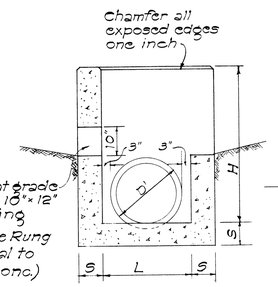
PLAN

DETAILS OF CONC. DROP BOX AT OUTLET OF CULVERT PIPE

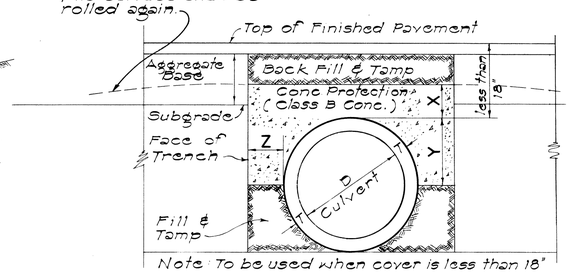
NOT TO SCALE



SECTION "A-A"



SECTION "B-B"



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

DETAIL OF CONCRETE DROP INTAKE

Scale: 1/2" = 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.

DATA FOR CONCRETE PROTECTION OVER CULVERTS		
X	Y	Z
6" for 18" D	$\frac{D}{2}$ + 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:

T. Takamoto — 12-17-69

HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:

Wesley Sakai — 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

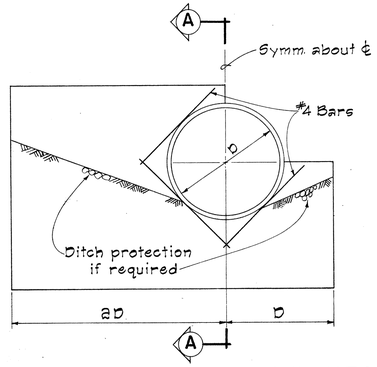
Scale: As Noted — Date: Aug. 1967

SHEET No. 23 OF 25 SHEETS DH 10

(63)

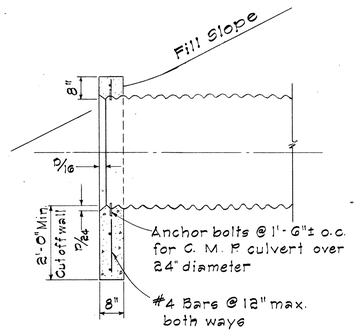
ORIGINAL PLAN | NOTE BOOK | No. | DATE
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87)13	1970	64	244

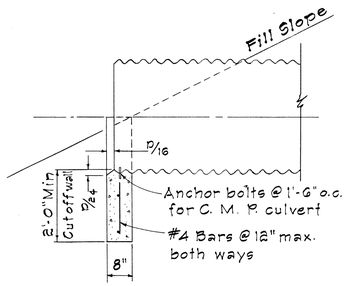


FULL HEADWALL HALF HEADWALL

HALF ELEVATION



FULL HEADWALL



HALF HEADWALL

SECTION A-A

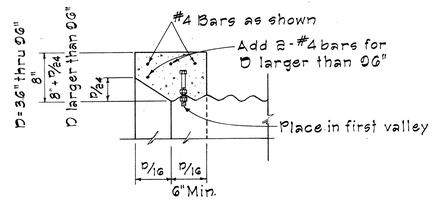
SUMMARY OF QUANTITIES				
Culvert Dia. (inches)	Full Headwall Concrete (Cu. Yd.)	Full Headwall Reinf. Steel (Lbs.)	Half Headwall Concrete (Cu. Yd.)	Half Headwall Reinf. Steel (Lbs.)
18	0.57	45	0.18	15
24	0.85	65	0.26	20
30	1.15	85	0.34	25
36	1.50	115	0.43	35

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

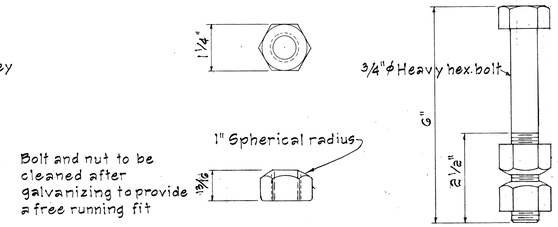
GENERAL NOTES

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.

INLET STRUCTURES FOR CULVERT SIZES 18 IN. TO 36 IN. DIAMETER



DETAIL C



ANCHOR BOLT DETAIL

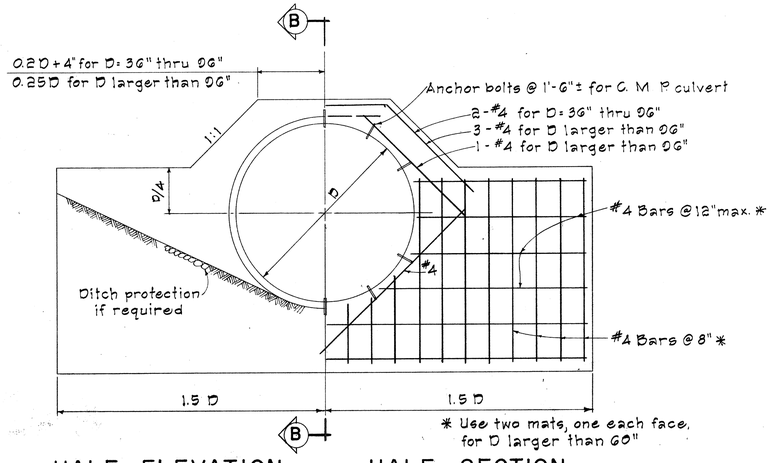
SUMMARY OF QUANTITIES		
Culvert Dia. (inches)	Concrete (Cu. Yd.)	Reinf. Steel (Lbs.)
36	1.0	75
42	1.3	90
48	1.5	105
54	2.0	125
60	2.4	145
72	4.1	435
84	5.6	535
96	6.8	640
108	9.8	795
120	12.4	955
144	20.1	1255
180	37.6	1820

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

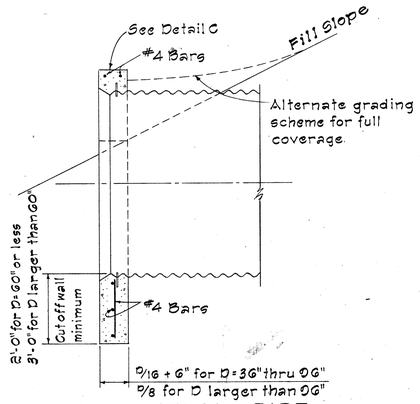
NO.	REVISION	APPROVED BY	DATE

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

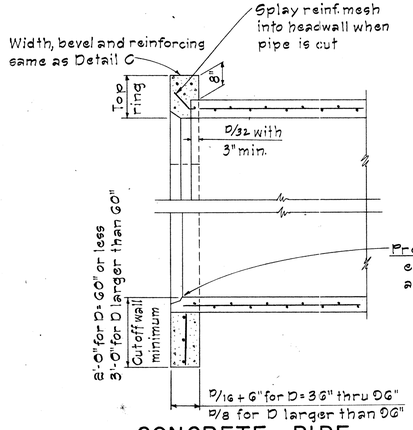
APPROVED:
Wm. M. Adachi — 12-17-69
ASSISTANT CHIEF, ENGINEERING — DATE



HALF ELEVATION HALF SECTION



CORR. METAL PIPE



CONCRETE PIPE

SECTION B-B

INLET STRUCTURE FOR CULVERT SIZES 36 IN. TO 180 IN. DIAMETER

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

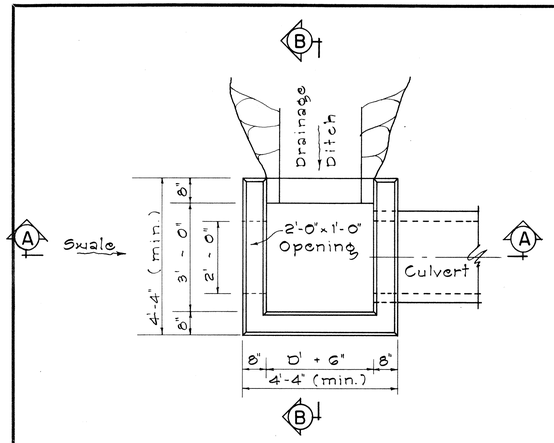
INLET STRUCTURES

Not To Scale — Date: July, 1969

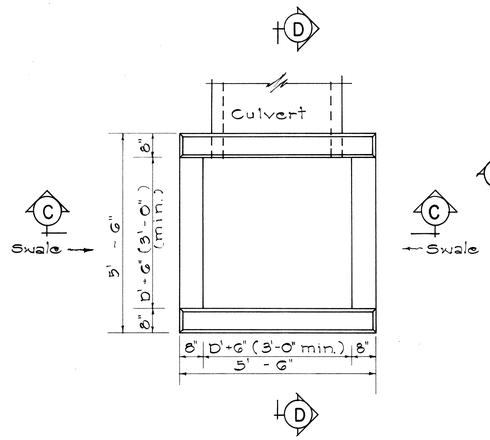
SHEET No. 24 OF 25 SHEETS DH 11

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

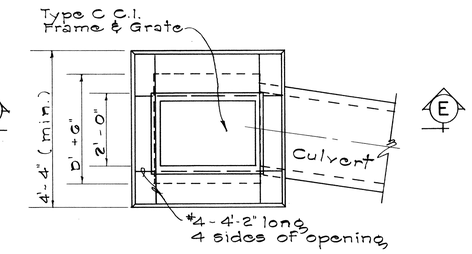
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-HI-1(87)13	1970	65	244



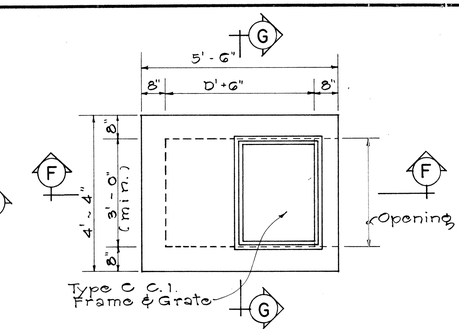
PLAN



PLAN



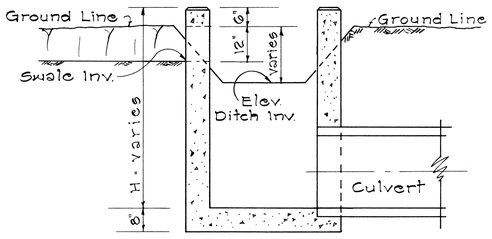
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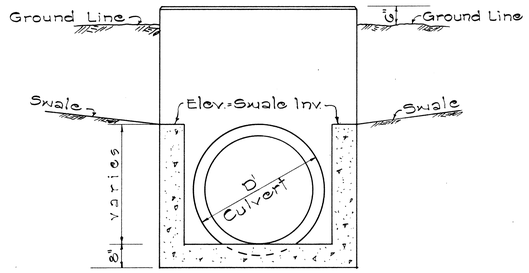
PLAN

GENERAL NOTES

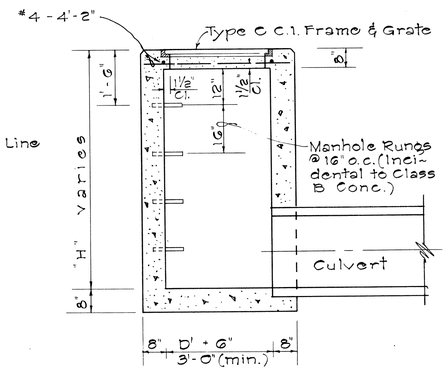
1. All concrete shall be Class "B" unless otherwise noted.
2. Exposed edges of all drainage structures shall be chamfered one inch.
3. Culvert shall enter and leave Drop Intake from any position and in the direction indicated by the plans or ordered by the Engineer.
4. Manhole Rungs (16"o.c.) are req'd. 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 maybe placed at any location as ordered by the Engineer.



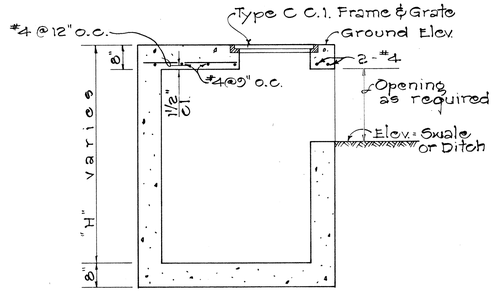
SECTION "A-A"



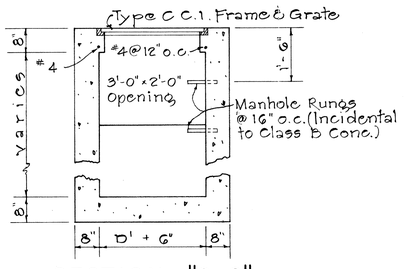
SECTION "C-C"



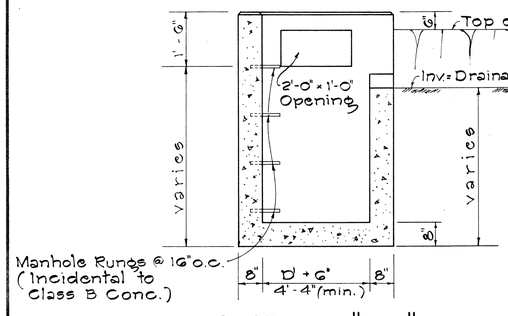
SECTION "E-E"



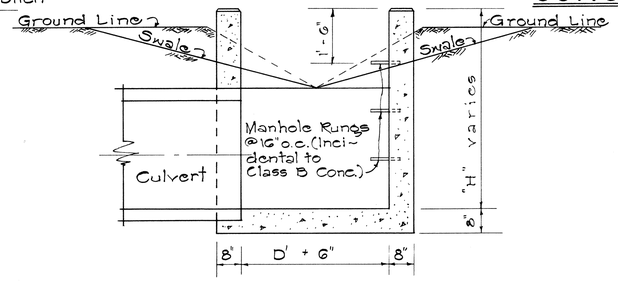
SECTION "F-F"



SECTION "G-G"



SECTION "B-B"



SECTION "D-D"

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:
R. Yakano — HYDRAULIC DESIGN ENGINEER — 12-17-69 DATE

APPROVED:
Hueu M Rabel — 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. 25 OF 25 SHEETS DH19

65

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