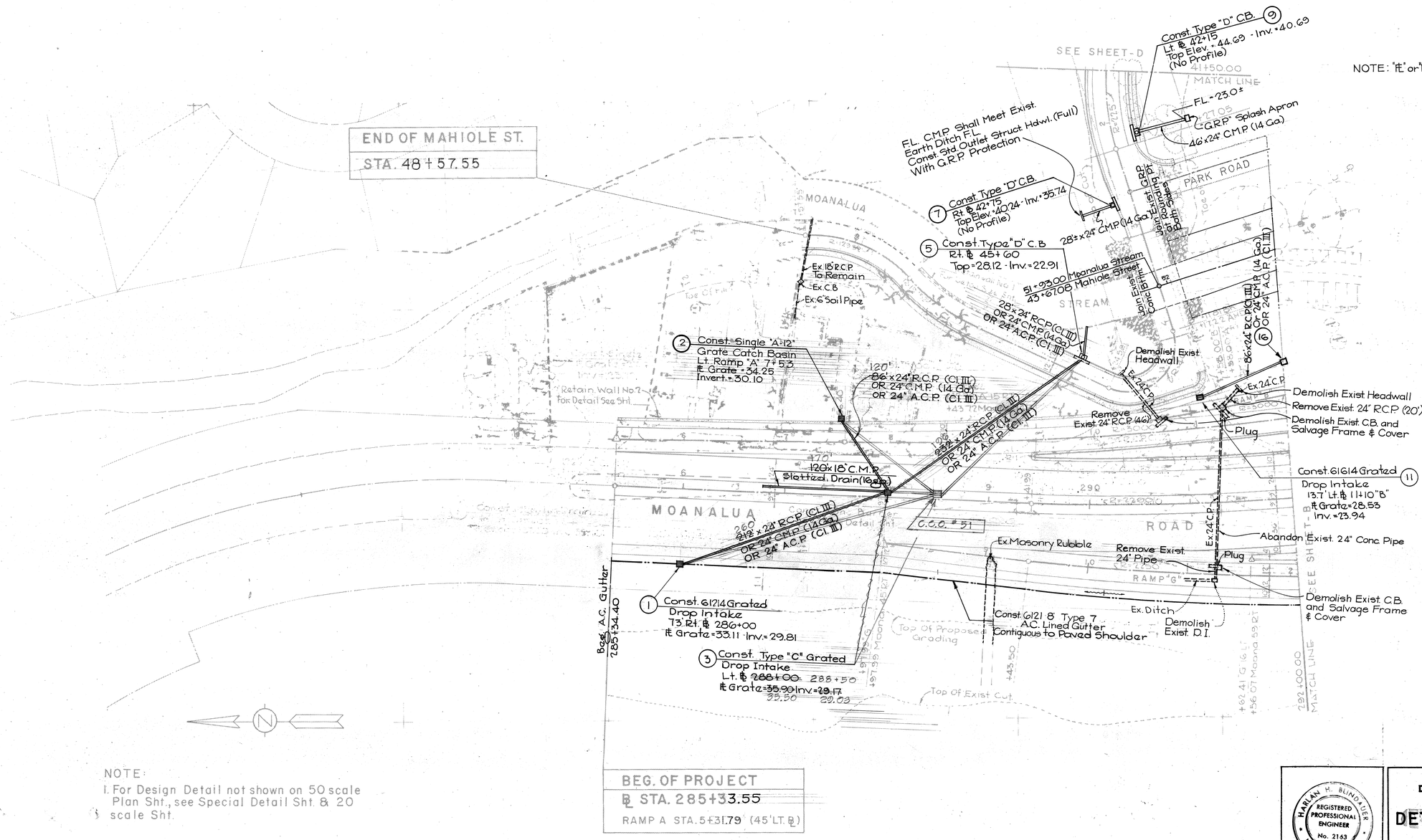
NOTE: Whenever gages for Corrugated Metal Pipe are called for on the plans, the equivalent thickness in inches shall be used. The equivalents are as follows: 14 Gage = 0.0785" ± 0.007"
12 Gage = 0.1084" ± 0.008"

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	66	418

NOTE: "℄" or "F.L." indicate Flow Line


END OF MAHIOLE ST.
STA. 48+57.55
SEE SHEET-D
MATCH LINE
MOANALUA
PARK ROAD
ROAD
STREAM
Top Of Hill
Toe Of Hill
Retain. Wall No.2 for Detail See Sht.
Ex. 18" R.C.P. To Remain
Ex. C.B.
Ex. 6" Soil Pipe
Ex. 24" C.P.
Ex. Masonry Rubble
Ex. Ditch
Top Of Proposed Grading
Top Of Exist Cut
Bgn. Exist. Concrete Lining
Moanalua Stream
51+93.00 Mahiole Street
45+67.08
Bgn. Exist. Masonry Lining
Bgn. Exist. Concrete Lining
Bag. A.C. Gutter 285+34.40
RAMP "G"
C.C.C. # 51
1 Const. 6'2'4 Grated Drop Intake 73' Rt. ℄ 286+00 ℄ Grate=33.11 Inv.=29.81
2 Const. Single "A"-12" Grate Catch Basin Lt. Ramp "A" 7+53 ℄ Grate=34.25 Invert=30.10
3 Const. Type "C" Grated Drop Intake Lt. ℄ 288+00 288+50 ℄ Grate=35.90 Inv.=29.17 35.50 20.03
5 Const. Type "D" C.B. Rt. ℄ 45+60 Top=28.12 · Inv.=22.91
7 Const. Type "D" C.B. Rt. ℄ 42+75 Top Elev.=40.24 · Inv.=35.74 (No Profile)
9 Const. Type "D" C.B. Lt. ℄ 42+75 Top Elev.=44.69 · Inv.=40.69 (No Profile)
11 Const. 6'6'4 Grated Drop Intake 13.7' Lt. ℄ 11+10 "B" ℄ Grate=28.53 Inv.=23.94
16 Const. 6'6'4 Grated Drop Intake 13.7' Lt. ℄ 11+10 "B" ℄ Grate=28.53 Inv.=23.94
F.L. C.M.P. Shall Meet Exist. Earth Ditch F.L. Const. Std. Outlet Struct. Hdwl. (Full) With G.R.P. Protection
F.L.=23.0±
G.R.P. Splash Apron
46'x24" C.M.P. (14 Ga.)
28'± x 24" C.M.P. (14 Ga.)
120' 86'x24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)
120' 86'x24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)
120'x18" C.M.P. Slotted Drain (16 Gal.)
260' 212'x24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)
28'± x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)
86'x24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)
Demolish Exist. Headwall
Remove Exist. 24" R.C.P. (40')
Demolish Exist Headwall
Remove Exist. 24" R.C.P. (20')
Demolish Exist. C.B. and Salvage Frame & Cover
Plug
Abandon Exist. 24" Conc. Pipe
Remove Exist. 24" Pipe
Demolish Exist. C.B. and Salvage Frame & Cover
Const. 6'x18" C.M.P. Slotted Drain (16 Gal.)
Const. 6'x12" C.M.P. Slotted Drain (16 Gal.)
Const. 6121.8 Type 7 A.C. Lined Gutter Contiguous to Paved Shoulder
Demolish Exist. D.I.
Ex. 24" C.P.
Ex. 24" R.C.P. (Cl. III) Or 24" C.M.P. (14 Ga.) Or 24" A.C.P. (Cl. III)
Ex. 24" C.P.
Ex. 24" C.P.
Ex. 24" C.P.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	67	418

NOTE: "F.L." indicates Flow Line.

Trapezoidal Chnl. b=8', D=7.5', s:s=1:1
G.R.P. Sides, CL "A" Conc. Bttm.

Exist. M.H. 61+94.41 Mahiole Channel 10+18.41 Park Road

Exist. 21" Culv.

Remove Riprap as Required and Connect 24" to Exist 21" Pipe w/ Conc. Jacket 4'-0" Long (See Sewer Details, Sht. 19)

F.L. 10.00

32' Trans.

60+65

60+97

206' x 10' x 6'-TYPE "B" R.C.B. (74)

Conc. Headwall

63+82.50 Mahiole Channel
63+84.51 Moanalua Channel

150' x 24" R.C.P (Cl. III) (72)
OR 24" C.M.P (14 Ga)
OR 24" A.C.P. (Cl. III)
(No Profile)
C.C.O. #3 - 194' x 30" R.C.P. (Cl. III)
OR 30" A.C.P. Cl. III)
(Profile)

63+03

MAHIOLE CHANNEL

Toe of Fill

SEE SHEET-D

62+50.00 MATCH LINE

58+50.00 MATCH LINE

G.R.P. Ditch 4 Wide "V" With 2:1 Side Slopes

Std. C.R.M. Hdwl.

F.L. 14.00

PARK ROAD

54'

F.L. Pipe = 8.95

MOANALUA CHANNEL

71 Park Rd. 8+50
74 x 24" R.C.P. (Cl. III)
OR 24" C.M.P (14 Ga)
OR 24" A.C.P (Cl. III)
(No Profile)

F.L. PIPE = F.L. CHNL.

175 L.F. Guard Rail

80' Trans.

62+60

E 4600

61+61 Earth Ditch S=0.006

Face of Parapet Curve Data
Δ = 13° 58' 04"
R = 1067.64'
T = 261.54'
L = 169.56'
L.C. = 257.80'

PUULOA

50' Trans. (Top)

61+21 Earth Ditch (See x-Sections)

71A Moanalua Channel 61+50
24" x 24" RCP (Cl. III) or
24" A.C.P (Cl. III) or 24" CMP
(14 Ga.) (No Profile)

F.L. 15.00
Std. C.R.M. Hdwl.

RAMP "C"

Grade to Drain (See X-sections)

175 L.F. Guard Rail

SEE SHEET-C

140' x 18" C.M.P Median Slot Drain (16 Ga.)

Const. 61+14 Drop Intake (29)
25' Rt. ℄ "J" 13+50
Fl. Grate = 20.10 - Inv. = 15.67

3+06.42 P.C.

Std. C.R.M. Hdwl.

F.L. 18.50

Rt. Park Rd. 4+50
24" x 24" R.C.P. (Cl. III) (70) OR 24" A.C.P (Cl. III)
OR 24" C.M.P. (14 Ga.)
(No Profile)

F.L. = 18.00

40' Trans.

E 4400

F.L. 21.00

G.R.P. Splash Apron

C.M. OR Conc. Flared End Section

F.L. = 16.09

82' x 24" R.C.P. (Cl. III)
OR 24" C.M.P (14 Ga.)
OR 24" A.C.P (Cl. III)

Grade to Drain (See X-sections)

21 Const. Single "A-12" Grate C.B.
Rt. ℄ 301+90
Fl. Grate = 22.94 Inv. = 17.11

Demolish Exist. Headwall
Remove Exist. 24" Conc. Pipe
Demolish Exist. C.B. & Salvage Frame & Cover
Remove 10' of Exist. 24" Conc. Pipe
Plug & Abandon Remainder Pipe

55+84.01 P.T.

50' Guard Rail Type 'G' Flare

Toe of Fill

RAMP "J"

2 AGM Curb and Gutter

46' x 24" R.C.P. (Cl. III)
OR 24" C.M.P (14 Ga)
OR 24" A.C.P. (Cl. III)

Const. Type "C" C.B. (28)
Rt. ℄ 13+50
Top = 21.01 - Inv. = 14.20 13.70

C.C.O. #5.5
112' x 42" R.C.P. (Cl. III)
DELETE
TYPE B S.D.M.H
Inv. = 15.8 (27B)
TYPE B S.D.M.H
Top = 21.5 Inv. = 16.2 (27A)
DELETE

Invert ~~19.78~~ 16.25

E 4200

C.C.O. #24

16 Const. Type "A" S.D.M.H.
35' Lt. ℄ 12+00 "B"
Top = 28.00 - Inv. = ~~20.37~~ 17.25

90' 84' x 30" R.C.P. (Cl. III)
OR 30" A.C.P. (Cl. III)
OR 30" C.M.P. (14 Ga.)
Class "B" Bedding

C.M. or Conc. Flared End Section

G.R.P. Splash Apron

F.L. = 18.62

17 Const. Single "A-12" Grate C.B.
With "2 AG" Curb
Lt. ℄ 293+90
Fl. Grate = 28.27 - Inv. = 24.07

80' x 24" R.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga.)
OR 24" A.C.P. (Cl. III)

72' x 24" R.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga.)
OR 24" A.C.P. (Cl. III)

Demolish Exist. C.B.'s (4) & C.I. to 3' Below Finish Grade & Fill With Sand. Salvage Frames & Covers

88' x 24" R.C.P. (Cl. III)
OR 24" A.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga)

Const. Type "D" C.B. (24)
Rt. ℄ 54+00
Top = 49.16 - Inv. = 41.53

18' - 42" R.C.P. (Cl. III)

C.C.O. #10.3

152' x 42" R.C.P. (Cl. III)

90' 94' x 24" R.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga.)
OR 24" A.C.P. (Cl. III)

15 Const. Single "A-12" Grate C.B.
With "2AG" Curb
Lt. ℄ 292+35
Fl. Grate = 29.81 - Inv. = 23.30

152' x 24" R.C.P. (Cl. III)
OR 24" A.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga.)

20 Const. Single "A-12" Grate C.B.
Rt. ℄ 293+25
Fl. Grate = 26.59
Inv. = 21.81

23 Const. Type "D" C.B.
Lt. ℄ 54+40
Top = 50.28 - Inv. = 42.04

96' x 24" R.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga.)
OR 24" A.C.P. (Cl. III)

Const. Type "A" Storm Drain M.H. (27A)
Top = 22.20 Inv. = 15.83

170'
150' x 42" R.C.P. (Cl. III)

R/W
DAMON TRUST ESTATE PROPERTY

26+50.00 MATCH LINE

SEE SHEET-E

50' x 24" R.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga.)
OR 24" A.C.P. (Cl. III)

MOANALUA

150' Taper

19 Const. 61+14 Grated Drop Intake
74' Rt. ℄ 297+75
Fl. Grate = 28.60 - Inv. = 24.17

100' x 24" R.C.P.
OR 24" C.M.P.
OR 24" A.C.P.
(See Profile)

9+14.20 "E"
20+12.69 "H"
53+88.10 Fill 100

120' - 24" R.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga.)
OR 24" A.C.P. (Cl. III)

88' x 24" C.M.P. (14 Ga.)
or 24" RCP (Cl. III)
or 24" ACP (Cl. III)

Const. Type "A" S.D.M.H. (27)
58' Rt. ℄ "F" 9+95
Top = 23.25 - Inv. = 17.41
16.01

SEE SHEET-E

14 Const. Double "A-12" Grate C.B.
Rt. ℄ 292+10
Fl. Grate = 32.74 - Inv. = 28.00

E 4000

Const. Single "A-12" Grate C.B. (18)
Rt. ℄ 295+75
F.L. Grate = 29.09 - Inv. = 24.50

RAMP "K"

25 Const. Type "D" C.B.
Rt. ℄ 52+75
Top = 45.50 - Inv. = 40.24

52' x 24" R.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga.)
OR 24" A.C.P. (Cl. III)

100' x 24" R.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga.)
OR 24" A.C.P. (Cl. III)

72' x 24" R.C.P. (Cl. III)
OR 24" C.M.P. (14 Ga.)
OR 24" A.C.P. (Cl. III)

RAMP "G"

22 Const. Type "D" C.B.
Rt. ℄ 18+50 "H"
Top = 46.22 - Inv. = 42.56

26 Const. Type "D" C.B.
Lt. ℄ 52+50
Top = 45.65 - Inv. = 40.62

13 Const. 61+14 Grated Drop Intake
28' Rt. ℄ 12+25 "G"
Fl. Grate = 35.11 - Inv. = 30.47

Const. 61+14 Grated Drop Intake 28' Rt. ℄ 13+00 "G" F.L. Grate = 35.55 - Inv. = 30.86 (12)

Const. 61+21 & Type 7 A.C. Lined Gutter Contiguous to Paved Shldr.

End A.C. Gutter Begin Earth Ditch

292+00.00 MATCH LINE

Top of Proposed Grading

Proposed Residential Tract

Top of Cut

Top of existing cut

E 3800

51+30.00 MATCH LINE

SEE SHEET-E

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

HARLAN H. BLINDAUER
REGISTERED PROFESSIONAL ENGINEER
No. 2163
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETAIL PLAN OF DRAINAGE SHEET B

F.A. Proj No. F-078-1(10)

Scale: 1" = 50' Date: JAN. 1971

SHEET No. 2 OF 12 SHEETS

67

PRINTED ON NO. 1000H CLEARPRINT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	68	418

C.C.O. # 25
Profile

Rebuild exist. CRM Headwall w/same rock, Inv. = 8.69
Rebuild exist. C.D.1 Inv. = 8.51
Reuse exist. Grates & Frame

11+70.03 P.C.
63+84.51 Moanalua Channel
63+82.50 Manhole
63+91.17 P.C.
13+25.01 P.T.
13+36.59 Edge Parking Lot

PARK ROAD R=250'

Relocate exist 24" RCP Approx. 28' w/conc. cap & cradle
Rebuild inlet inv. = 8.23
hold exist. outlet invert
Remove CRM Outlet & Portion of Exist. 24" R.C.P. Slope End of R.C.P. to Match Channel.
Exist. C.B.
Exist. 24" R.C.P.

MOANALUA CHANNEL R=1000'

67+54.97 Moanalua Channel
11+08.17 Park Road

Guard Rail W Type "B" 7:1 Flare
14+67.00 P.T.
150' Taper (Ultimate)
Demolish Exist. Headwall
Top of Cut
RAMP "C"
PARK ROAD
Gold Tree
17+69.35
0+00

END PERMANENT CONST. RAMP "C"
STA. 19+45.00

19+00.60
150' Taper (Temporary)
Toe of Fill

END TEMPORARY CONN.
℄ STA. 315+00

NOTE: "F.L." indicates Flow Line.

MANAIKI STREAM

Const. Type "C" Grated Drop Intake (31)
Rt. ℄ 304+45
F.L. Grate = 20.33 - Inv. = 15.00

130' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) Or 24" A.C.P. (Cl. III)

Demolish Exist. C.B. to 3' Below Fin. Grade, Fill With Sand & Salvage Frame & Cover (35)

Const. Dbl. "A-12" Grate C.B.
Rt. ℄ 309+50
F.L. Grate = 15.79 - Inv. = 8.92

Plug & Abandon Exist. 24" Conc. Pipe

Const. 61614 Grate Drop Intake (38A)
55' Lt. Moanalua 309+50
F.L. Grate = 14.10 Inv. = 10.00

Exist. C.B.

Const. Type "D" Catch Basin (37)
With 16'-8" Type 2 DG Curb & Gutter
Rt. ℄ 312+15
Top = 14.42 Inv. = 9.00

MOANALUA ROAD
Const. Single "A-12 Grate C.B. (33)
Rt. ℄ 15+40 Ramp "J"
F.L. Grate = 17.18 - Inv. = 12.50
Demolish Exist. Headwall

Const. Conc. Barrier See Std. Detail Sht.

62'-6" Temp. Guard Rail W/ 1:15 Flare (See 1" = 20' Dwg. - Sht.)

87'-6" Temp. Guard Rail W/ 1:15 Flare (See 1" = 20' Dwg. - Sht.)

108' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)

46' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)

66' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)

Exist. C.B.

SEE SHEET-B

RAMP "J" R=2200'

2 Ag. Curb and Gutter

RAMP

2 R.M. Curb and Gutter

6" A.C. Curb

Edge of A.C. Curb

Class "B" Bedding

Future Conc. Curb Face

331° 58' 50"

Future Conc. Curb Face

Top of Cut

Exist. C.B.

C.C.O. # 40
5 D.M.H. with Grated C.I. Cover
Top = 7.51 ± - Inv. = 1.48
2-120' x 42" R.C.P. Cl. III
Class B Bedding

196' x 42" R.C.P. (Cl. III) Class "B" Bedding

30' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)

Const. Type "D" C.B. (32)
Rt. ℄ "E" 15+50
Top = 17.40 - Inv. = ~~11.77~~ 11.27

396' x 48" R.C.P. (Cl. III) Class "B" Bedding

Toe of Fill

202' x 48" R.C.P. (Cl. III)
21+87.99 Future Paa Ramp Curb F.L.
103' Rt. ℄ - 311+87.99 Moanalua
S 6300.94
E 4761.34

Const. Type "D" C.B. (34)
Rt. ℄ "J" 19+50
Top = 15.46 - Inv. = 8.03

156' x 54" R.C.P. (Cl. III) Class "B" Bedding

Const. Type "D" C.B. (36)
Rt. 22+15 Future Paa Ramp
Top = 13.45 - Inv. = ~~6.62~~ 6.22

Modified

END PERMANENT CONST. MOANALUA ROAD & RAMP "J"
℄ STA. 311+00
RAMP J STA. 21+00 (81' RT. ℄)

Const. Type "C" S.D.M.H. (38)
With Grated C.I. Cover (See Detail, Sht. 69)
2.5 Rt. -23+77.99 Future Paa Ramp Curb F.L.
Top = 9.50 - Inv. = 3.00
⊕ Of Drainage Det. & Summary

230' x 54" R.C.P. (Cl. III) Class "B" Bedding

Groove End Entrance

Groove End Entrance

Modified to accommodate 54" R.C.P.

Top View dimension 7.0' x 6.25' (field change)

T: 7.5±
Inv. = 1.48

1.40

F.L. = 0.70

Ramps "E" and "J" 17+00 Moanalua Rd. 81 and 93 Rt.

304+00.00 Match Line

50' Taper

15+49.49 "E" 15 Lt.
15+49.86 "J" 11 Rt.

307+00 Moanalua Rd. 81 and 93 Rt.

6000 S / 4200 E
6000 S
6600 S
6400 S / 4600 E
6200 S / 4400 E
6800 S / 4800 E
5200 E
5000 E

PARK ST.
MOANALUA STREET

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

PRINTED ON NO. 1000H CLEARPRINT

HARLAN H. BLINDAUER
REGISTERED PROFESSIONAL ENGINEER
No. 2163
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETAIL PLAN OF DRAINAGE
SHEET C

F.A. Proj. No. F-078-1(10)

Scale: 1" = 50' Date: JAN 1971

SHEET No. 3 OF 12 SHEETS

68

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	69	418

NOTE : "℄" indicates Flow Line.

END OF PROJECT
℄ STA. 70+01.15

BEG. OF MAHIOLE ST.
STA. 33+81.81

END TEMPORARY CONN.
℄ STA. 74+58.63

52+84.89 ℄ Mahiole Stream
54+93.29 ℄ Mahiole Street
4,527.50 S
5,038.64 E

Exist. Conc. Trapezoidal Chnl. b=5', d=3.5, s:s=1:1

50+73.21 - Join Exist. Chnl.

Top Chnl Trans 20

Trapezoidal Chnl b=5', D=6.5', s:s=1:1 Class 'A' Conc.

Grade To Drain

CURVE DATA
Δ = 100°00'
R = 90.00
L = 95.82
T = 53.01
Lc = 91.36

Leave Non-interfering Portions of Exist. Paved Channel in Place Remove Portion of Exist. Conc. Chnl. As Required For New Const.

Conc. Headwall

Trans 52+33

(3) 12'-0"x6'-0" Type 'B'

Const. Earth "V" Ditch s:s=2:1, d=1.0'

Const. G.R.P. "V" Ditch s:s=1:1, d=1.0

Const. G.R.P. Cut-off Wall

Const. Grouted Rubble Paving Trap. Ditch s:s=1:1, d=3.0', b=2.0'

Const. G.R.P. Trap. Ditch s:s=1:1, d=1.0', b=1.5'

Const. Std. CRM Headwall

(66) Const. Type 'D' C.B. OR 24" A.C.P. (Cl. III)
℄ Rt. ℄ 35+50
Top = 37.41
Inv. = 32.74

52'x24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga)

Ex. 6" C.I.P.

(65) Const. Type 'C' C.B.
Lt. ℄ 35+37
Top = 35.90 - Inv. = 27.00
R = 53+34.91 P.C.
D = 100.0 Service Dr.

8'x24" R.C.P. (Cl. III) OR 24" A.C.P. (Cl. III) OR 24" C.M.P. (14 Ga) Conc. Headwall

Trans 24

R = 265'

See Drain Details

Remove Ex. Culvert

56'x24" C.M.P. (14 GA.) OR 24" R.C.P. (Cl. III) OR 24" A.C.P. (Cl. III)

Inv. 49.00

154'x24" R.C.P. (Cl. III) OR 24" A.C.P. (Cl. III) OR 30" C.M.P. (14 GA.)

(67) Const. Type 'D' C.B.
℄ Rt. ℄ 66+20
Top = 65.27
Inv. = 58.77

(69)

82'x24" R.C.P. (Cl. IV) OR 24" C.M.P. (14 Ga) OR 24" A.C.P. (Cl. IV)

54+79.65 P.T.

55+63.98 P.C.

100' of Trapezoidal Chnl. D=6.0', s:s=1:1 Sides, R Conc. Bttm.

R = 265'

57+43.82 P.T.

Top Chnl Trans 56.18

Trapezoidal Chnl. b=10', D=7.5', s:s=1:1 Sides Class 'A' Conc. Bttm.

MATCH LINE 58+50

MAHIOLE STREAM CHANNEL

(63) Const. Type 'C' C.B.
℄ Rt. ℄ 68+15
Top = 81.30
Inv. = 76.50

Ex. 15" V.C.P.

Ex. 12" V.C.P.

Ex. C.B.

Ex. 24" R.C.P.

Top Of Cut

AC Curb

A.C. Sidewalk

Toe of Fill

Top of Cut

(62) Const. Double "A-12" Grate C.B.
Lt. ℄ 69+05
℄ Grate = 82.08
Inv. = 81.50

96"x24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)

74"x24" R.C.P. (Cl. IV) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. IV)

Const. Cl. 'B' Conc. or Shotcrete Trap. Chnl. on 100'± Radius (See Misc. Details)

Join Exist. Chnl.

Ex. Conc. Ditch

(68) Const. Type 'D' C.B.
Lt. ℄ 66+00
Top = 63.73
Inv. = 59.24

65'135.00 PUULOA
38'11.23 MAHIOLE

Ex. 18" R.C.P.

Ex. C.B.

(Ex. 18" R.C.P.)

Exist. Pipe

F.L. 23.5 ±
G.R.P. Splash Apron
74" x 24" C.M.P. (14 Ga.)

(10) Const. Type "D" C.B.
Lt. ℄ 40+72.65
Top Elev. = 55.42, Inv. = 51.42
(No Profile)

SEE SHEET-A

SEE SHEET-B

MATCH LINE

MAHANOE STREET

AINAPUA STREET

HAKU STREET

PUULOA ROAD

MAHAOO PLACE

KALANIANAOLE STREET

MAHIOLE STREET

MOANALUA SCHOOL

RAMP 'B'

ORIGINAL PLAN

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

NOTE BOOK
No.

HARLAN H. BLINDAUER
REGISTERED PROFESSIONAL ENGINEER
No. 2163
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

Harlan H Blindauer

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETAIL PLAN OF DRAINAGE
SHEET D

F.A. Proj. No. F-078-1(10)

Scale: 1" = 50' Date: JAN. 1971

SHEET No. 4 OF 12 SHEETS

69

PRINTED ON NO. 1000H CLEARPRINT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	70	418

NOTE: "F.L." or "IE" indicates Flow Line

MAPUNAPUNA STREET

PAA STREET

PUKOLOA STREET

BEG. OF PROJECT
℄ STA. 37+25.00

36+75.24 PUULOA RD.
0+00 PUKOLOA ST.

SEE SHEET-B

SEE SHEET-A

26+50.00 MATCH LINE

35+50.00 MATCH LINE

Const. Type "A" S.D.M.H. 58' Rt. 7+75 "F" (39) Top=24.25 - Inv.=18.50

Const. Type "D" C.B. Rt. ℄ 48+65 (41A) Top 33.50, Inv. 24.10

(44) Const. Type "D" C.B. Rt. ℄ 47+00 Top 30.27 - Inv.=22.10

Const. Type "A" S.D.M.H. TO Rt. ℄ 48+75 Puuloa (41) Top=26.50 - Inv.=19.59

168' x 42" R.C.P. (Cl. III)

Remove Ex. 24" Pipe

168' x 36" R.C.P. (Cl. III) OR 36" A.C.P. (Cl. III)

22" x 24" R.C.P. (Cl. III) or 24" C.M.P. (14 Ga.) or 24" A.C.P. (Cl. III)

174' x 36" R.C.P. (Cl. III) OR 36" A.C.P. (Cl. III)

110' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga) OR 24" A.C.P. (Cl. III)

48' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)

(42) Const. Type "B" C.B. Lt. ℄ 48+50 Top=34.06 - Inv.=25.66

72' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga) OR 24" A.C.P. (Cl. III)

Const. Type "B" C.B. (40) Lt. ℄ 50+25 Top=39.77 - Inv.=34.50

(43) Const. Modif. Type B Conc. Drop Intake 79' Lt. ℄ 48+50 Top=33.77 Inv.=26.00

(46) Const. Modified Type A Conc. Drop Intake 67' Lt. ℄ 46+75 Top=30.92 - Inv.=26.21 (No Profile)

110' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga) OR 24" A.C.P. (Cl. III)

6' x 18" R.C.P. (Cl. III) OR 18" C.M.P. (14 Ga) OR 18" A.C.P. (Cl. III)

Const. Type 1 D C.B. (45) Lt ℄ 46+75 Top=30.05 - Inv.=24.61

Const. Modif. Type B Conc. Drop Intake 67' Lt. ℄ 46+27 Top=30.77 - Inv.=26.07 (No Profile) (48)

72" x 24" R.C.P. (Cl. III) OR 24" A.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.)

(504) Const. Type "A" S.D.M.H. Lt. ℄ "A" 32+63 Top = 30.52 Inv. = 24.15

Const. Type "B" C.B. Lt. ℄ 31+06 "A" (50) Top = 28.01 - Inv. = 22.44

Toe Of Fill

152' x 24" R.C.P. (Cl. III) OR 24" A.C.P. (CL. III)

58" x 30" R.C.P. (Cl. III) OR 30" A.C.P. (CL. III)

Const. Type "1 D" C.B. (47) Lt. ℄ 46+27 Top=29.91 - Inv.=24.86

Const. Type "1-D" C.B. (49) Lt. ℄ 45+50 Top=30.31 - Inv.=25.75

Const. 6121-4' A.C. Lined Gutter Type 7 Contiguous to Sidewalk

Const. Modif. Type A Concrete Drop Intake (49A) 67' Lt. ℄ 45+50 Top 31.17, Inv. = 26.47

44' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga) OR 24" A.C.P. (Cl. III)

Note: See Misc. Drainage Details, Sht 6 for Modified Type A & B Concrete Drop Intake

Const. Type "1 D" C.B. (51) Rt. ℄ 43+40 Top = 32.17 - Inv. = 25.89

Const. Type "A-1" S.D.M.H. (51A) ℄ 52' Rt. ℄ 41+45 M.H. Rim = 35.29 Inv. = 26.50

(54) Const. Type 1 D" C.B Rt ℄ 39+50 Top=32.87 - Inv.=27.08

190' x 24" R.C.P. (Cl. III) OR 24" A.C.P. (CL. III)

Top Of Cut

118' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga) OR 24" A.C.P. (Cl. III)

130' x 24 R.C.P. (Cl. III) OR 24" A.C.P. (CL. III)

Const. Type "1 D" C.B. (52) Lt. ℄ 43+40 Top = 32.40 - Inv. = 27.83

(TRAFFIC STRIPE ONLY)

6' x 18" R.C.P. (Cl. III) OR 18" A.C.P. (Cl. III) OR 18" CMP (14 Ga)

Const. Modified Type A Conc. Drop Intake 67' Lt ℄ 43+40 Top = 33.26 - Inv. = 28.56 (53)

Const. Type "1 D" C.B. (55) Lt ℄ - 39+50 Top = 32.84 - Inv. = 28.22

(57) Const. Type "1 D" C.B. Rt. ℄ 37+75 Top = 31.28 - Inv. = 27.61

170' x 24" R.C.P. (Cl. IV) OR 24" A.C.P (CL. IV)

112' x 24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)

(61A) Const. Std. Conc. Drop Box W/O Interior Baffle Outlet Elev. = 24.80 Top Elev. = 30.22

Const. G.R.P. Ditch Transition to Box Sec. in 20'

(59) Const. Type "A" Conc. Drop Intake 124' Lt. 37+50 Puuloa Top = 61.00 - Inv. = 54.00

(61) Const. Type "1 D" C.B. @ 4½ - See 1" = 20' Plan Top = 30.80 - Inv. = 25.20

80' x 36" R.C.P. (Cl. III) OR 36" A.C.P. (Cl. III)

Remove Ex. 24" Pipe

6' x 18" R.C.P. (Cl. III) OR 18" C.M.P. (14 Ga.) OR 18" A.C.P. (Cl. III)

FL = 24.55 G.R.P. Ditch Demolish Exist. Inlets

Const. 6121 8 A.C. Gutter Type 7 (here only)

Form Channel @ Back of Box to Intercept A.C. Gutter FL = 29.22 See Misc. Drainage Det. Sht. 5

56' x 24" C.M.P. (14 Ga.)

10' x 24" R.C.P. (Cl. III) OR 24" A.C.P. (Cl. III) (Azimuth 121° 00')

Inv. 55.00

6' x 30" R.C.P. (Cl. IV) OR 30" A.C.P. (Cl. IV)

60' x 30" R.C.P. (Cl. IV) OR 30" A.C.P. (Cl. IV)

(60) Const. 61214 Grate Drop Intake (See Misc. Drain Details) ℄ Grate = 30.00 Inv. = 25.76

125' Trans.

(58A) Const. 61214 Grate Drop Intake Lt. ℄ 35+50 Peltier ℄ Grate = 31.17 Inv = 26.06

C.C.O. #46 50' x 4' GRP on CUT ROCK SLOPE

Const. 4111-5' A.C. Gutter Type 7 to Sta. 33+00 Both Sides

(58) Const. 61214 Grate Drop Intake Lt. ℄ 35+41 Peltier ℄ Grate = 31.83 Inv. = 26.42

Const. 61214 A.C. Lined Gutter Type 7 Contiguous to Sidewalk

Const. Class "B" Conc. or Shotcrete Ditch (See Misc. Drainage Details) & Ditch 7' From R/W

(56) Const. Modified Type A Conc. Drop Intake 67' Lt ℄ 39+50 Top = 33.71 - Inv. = 29.02

PROPOSED RESIDENTIAL TRACT

Top of exist Cut

Beg. Conc. Gutter

47+50 Begin Ditch

Top Of Cut

PUULOA ROAD

MOKUMOA ST.

Ex. Type "E" Box Culvert Drain

Const. G.R.P. Ditch

End G.R.P. Ditch 34+50

Join Exist F.L. 34+00

Ex. Tunnel Drain

END TEMPORARY CONN. ℄ STA. 29+80.02

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

HARLAN H. BLINN, JR. REGISTERED PROFESSIONAL ENGINEER No. 2163 HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Harlan H. Blinn Jr.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DETAIL PLAN OF DRAINAGE
SHEET E

F.A. Proj. No. F-078-1(10)

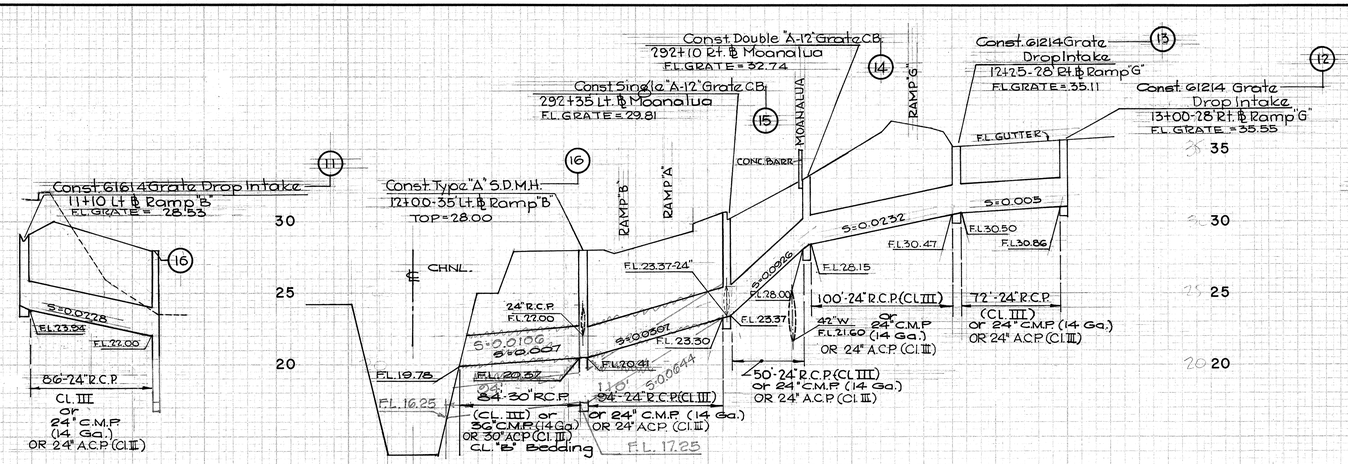
Scale: 1" = 50' Date: JAN 1971

SHEET No. 5 OF 12 SHEETS

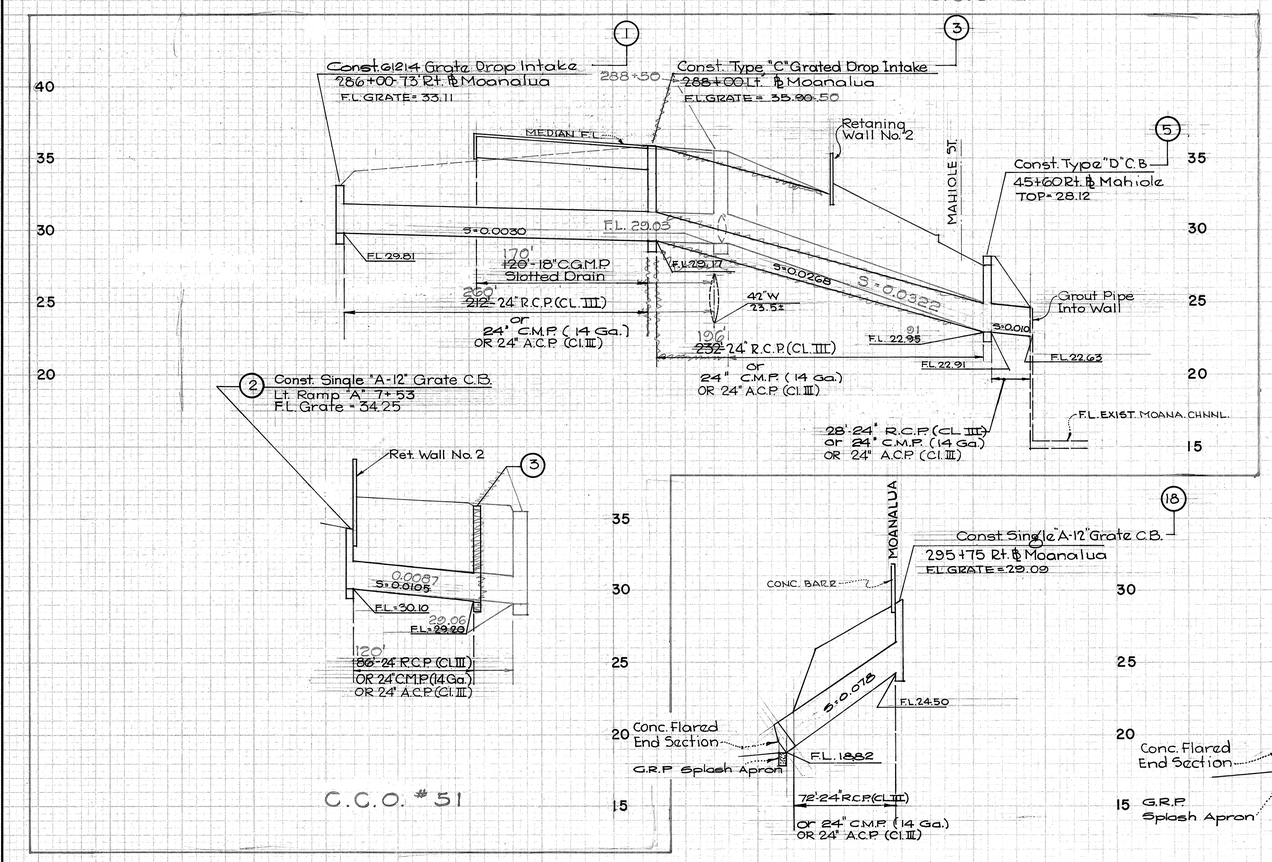
PRINTED ON NO. 1000H CLEARPRINT

70

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	71	418



C.C.O. #24



C.C.O. #51

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STORM DRAIN PROFILES

F. A. Proj. No. F-078-1(10)

Scale - Horiz. - 1"=50' Vert. - 1"=5'

Date: JAN 1971

HAWAII, U.S.A. REGISTERED PROFESSIONAL ENGINEER No. 2163

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

SHEET NO. 6 OF 12 SHEETS

71

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

Printed in U.S.A. On MATERIAL Tracing Cloth

PLATE 3 GAUGE SECTION IS F.H.R. STANDARD

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	72	418

Const. Type "I D" C.B.
46+27 Lt. ℄ Puuloa
TOP = 29.91

Const. Type "I D" C.B.
45+50 Lt. ℄ Puuloa
TOP = 30.31

Const. Modif. "A" C.D.I.
45+50 Lt. ℄ Puuloa
Top = 31.17

Const. Type "I D" C.B.
46+75 Lt. ℄ Puuloa
TOP = 30.05

PUULOA

FL. 26.47
S=0.012
6'-18" R.C.P.(Cl. III) OR
18" A.C.P.(Cl. III) OR
18" C.M.P.(14 Ga.)
72'-24" R.C.P. (CL. III) OR 24" A.C.P.(Cl III) OR 24" C.M.P.(14 Ga)
18" FL 25.77
18" FL 25.71
S=0.005
S=0.0043
FL 25.75
FL 24.69
FL 24.56
FL 24.64
FL 24.61
FL 24.14
110'-24" R.C.P. (Cl. III) OR 24" A.C.P. (CL III) OR 24" C.M.P. (14 Ga) OR 24" R.C.P. (Cl. III)
44-24" R.C.P.-CL III OR 24" C.M.P. (14 Ga) OR 24" R.C.P. (Cl. III)

Const. Type "I D" C.B.
39+50 Lt. ℄ Puuloa
TOP = 32.84

Const. Modified Type "A" Conc. Drop Intake
38+50 Lt. ℄ Puuloa
TOP 33.71

PUULOA

S=0.005
FL 29.02
FL 28.22
FL 27.66
112'-24" R.C.P.(Cl. III) OR 24" A.C.P.-(CL III) OR 24" C.M.P. (14 Ga) 6'-18 R.C.P.(CL III) OR 18" C.M.P. (14 Ga) OR 18" A.C.P. (Cl. III)
24" W.
FL 25.00

Const. Type "I D" C.B.
43+40 Lt. ℄ Puuloa
TOP = 32.40

Const. Modified Type "A" Conc. Drop Intake
43+40 Lt. ℄ Puuloa
TOP 33.26

PUULOA

S=0.0049
FL 28.56
FL 27.83
FL 27.25
118'-24" RCP(Cl. III) OR 24" A.C.P.(CL III) OR 24" CMP.(14 Ga) 6-18 R.C.P.(CL. III) OR 18" C.M.P. (14 Ga) OR 18" A.C.P. (Cl. III)
24" W
FL 25.50

Const. Type "D" C.B.
52+50 Rt. ℄ Puuloa
TOP = 45.65

PUULOA

S=0.005
FL 40.62
FL 40.36
52'-24" R.C.P. (C.L. III) OR 24" A.C.P.(Cl. III) OR 24" CMP (14 Ga)

Const. Type "D" C.B.
54+40 Lt. ℄ Puuloa
TOP = 50.28

Const. Type "D" C.B.
18+50 Rt. ℄ "H"
TOP = 46.22

PUULOA

RAMP "H"

35' CL. "B" Conc Encase See Std. Details

S=0.005
S=0.005
S=0.0084
FL = 42.56
FL = 42.06
FL = 42.04
FL = 41.56
FL = 41.53
FL 40.52
FL = 40.24
FL 40.36
24"
36"x24" R.C.P. CL. IV OR 24" CMP (14 Ga) OR 24" ACP (Cl. IV)
64-24" RCP-CL III OR 24" C.M.P. (14 Ga.) OR 24" ACP (Cl. III)
96"x24" RCP-CL III OR 24" CMP (14 Ga.) OR 24" ACP (Cl. III)
120"x24" R.C.P.-CL III OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)

Const. Type "D" C.B.
54+00 Rt. ℄ Puuloa
TOP = 49.16

Const. Type "D" C.B.
52+75 Rt. ℄ Puuloa
TOP = 45.50

℄ RAMP "F"

S=0.005
FL 40.36
24"
FL = 18.73
88"x24" C.M.P.(14Ga) or 24" R.C.P.(Cl. III) or 24" A.C.P.(Cl. III)

Const. 6'6'4 Drop Intake
25' Rt. ℄ "J" 13+50
FL. GRATE = 20.10

℄ RAMP "E"

28
FL = 15.67
S=0.0030
FL = 15.53
46"x24" RCP-CL III OR 24" C.M.P. (14 Ga) OR 24" A.C.P. (Cl. III)

Const. Type "C" Grated Drop Intake
304+45 Rt. ℄ Moanalua
FL. GRATE = 20.33

CONC. BARR.

MEDIAN F.L.

Const. Single "A-12" Grate C.B.
15+40 Rt. ℄ "J"
FL. GRATE = 17.18

RAMP "E"

S=0.0192
S=0.005
FL 15.00
FL 12.50
FL 12.35
140' 18" C.M.P.G. Mad Drain
130'x24" R.C.P. (CL III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)
30'x24" R.C.P. (CL III) OR 24" C.M.P. (14 Ga) OR 24" A.C.P. (Cl. III)

PARK ROAD

Rebuild Exist. CDI Adjust invert
Rebuild Existing C.R.M. Headwall
Exist. 24" R.C.P.
Inv. = 8.23
S=0.010
Inv. = 8.51
S=0.0113
Inv. = 8.69
28'-Relocate Existing 24" RCP with conc. cap & cradle
16'- Existing 24" RCP

Scale: Horiz. 1" = 10'
Vert. 1" = 5'

C. C. O. # 23

Const. Modif. Type "B" Conc. Drop Intake 48+50 79' Lt. ℄ Puuloa
Top = 33.77

Const. Type "B" C.B.
48+50 Lt. ℄ Puuloa
TOP = 34.06

Const. Type "B" C.B.
50+25 Lt. ℄ Puuloa
TOP = 38.27

Const. Type "D" C.B.
48+65 Rt. ℄ Puuloa
Top = 33.50

PUULOA

RAMP "F"

F.L. 34.50
FL = 26.00
S=0.00048
S=0.030
S=0.0086
72"x24" RCP (CL. III) OR 24" C.M.P (14 Ga) OR 24" A.C.P. (Cl. III)
FL = 25.66
FL 24.22
FL 24.10
FL 22.26
24" W
FL 20.0
S=0.1392
FL 19.19
24" W
FL 18.0
FL 18.50
FL 18.00
48"x24" R.C.P.(Cl. III) OR 24" C.M.P.(14Ga) OR 24" A.C.P. (Cl. III)
22'x24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga.) OR 24" A.C.P. (Cl. III)
110'-24" R.C.P.-CL III OR 24" C.M.P. (14 Ga) OR 24" A.C.P. (Cl. III)

35A Const. 6'6'4 Grate Drop Intake
55' Lt. ℄ Moanalua 309+50
FL. GRATE = 14.10

Const. Dbl. "A-12" Grate C.B.
309+50 Rt. ℄ Moanalua
F.L. GRATE = 15.79

MOANALUA

RAMP "J"

S=0.010
S=0.010
FL = 10.00
FL = 8.92
FL = 8.46
108'-24" R.C.P. (Cl. III) OR 24" C.M.P. (14 Ga) OR 24" A.C.P. (Cl. III)
46'-24" R.C.P. (CL. III) OR 24" A.C.P. (Cl. III) OR 24" CMP (14 Ga)
EXIST. 36" SEWER MAIN TO BE ABAND.

Const. Type "I D" C.B.
312+15 Rt. ℄ Moanalua
TOP = 14.42

RAMP "J" ℄ PAA

S=0.0152
FL 9.00
FL 8.00
66'-24" R.C.P. (CL. III) OR 24" A.C.P. (Cl. III) OR 24" C.M.P. (14 Ga)

HAWAIIAN H. BISHOP
REGISTERED PROFESSIONAL ENGINEER
No. 2143
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STORM DRAIN PROFILES

F. A. Proj. No. F-078-1(10)

Scale-Horiz.-1"=50' Vert.-1"=5'

Date: JAN 1971

SHEET NO. 7 OF 12 SHEETS

72

PLATE D CROSS SECTION OF F.A. STANDARD

Printed in U.S.A.
On IMPERIAL Tracing Cloth

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	73	418

Const. Type "A" S.D.M.H. 58' Rt. ℄ "F" 0+95 TOP = 23.25 (27)
Const. Type "A" S.D.M.H. 58' Rt. ℄ "F" 7+75 TOP = 24.25 (39)
Const. Type "A" S.D.M.H. 70' Rt. ℄ Puuloa 48+75 TOP = 26.50 (41)
Const. Type "D" C.B. 47+00 Rt. ℄ Puuloa TOP = 30.27 (44)
RAMP "A"
Const. Type "B" C.B. 31+06 Lt. ℄ "A" TOP = 28.01 (50)
Const. Type "A" S.D.M.H. Lt. ℄ "A" 32+63 Top = 30.52 (50A)
Const. Type "I D" C.B. 43+40 Rt. ℄ Puuloa TOP = 32.17 (51)
Const. Type "A-1" S.D.M.H. 41+45 Rt. ℄ Puuloa M.H. Rim = 33.29 (51A)
Const. Type "I D" C.B. 39+50 Rt. ℄ Puuloa TOP = 32.87 (54)
Const. Type "I D" C.B. 37+75 Rt. ℄ Puuloa TOP = 31.26 (57)
Exist. Ground

24" S.D. FL. 18.73
24" S.D. FL. 19.19
24" S.D. FL. 22.26
24" S.D. FL. 24.14
24" S.D. FL. 27.25
24" S.D. FL. 27.66
30" Cl. "B" Conc Encase

S=0.0063 S=0.0093 S=0.0093 S=0.00142 S=0.0005 S=0.0111 S=0.003 S=0.003 S=0.003

F.L. 16.91 F.L. 16.94 F.L. 18.00 F.L. 18.53 F.L. 19.59 F.L. 19.63 F.L. 22.10 EL=22.44 EL=22.15 EL=22.46 FL 24.15 FL 24.20 FL=25.89 FL=25.93 FL 26.50 FL 26.51 FL=27.08 FL=27.10 FL=27.61

170' 150'x42" RCP (CL III)
168'x42" RCP (CL III)
168'x36" RCP (CL III) OR 36" A.C.P (Cl. III)
174'x36" RCP (CL III) OR 36" A.C.P (Cl. III)
58"x30" RCP CL III
OR 30" A.C.P (Cl. III)
152'x24" RCP (Cl III) OR 24" A.C.P (Cl. III)
152'x24" RCP (Cl III) OR 24" A.C.P (Cl. III)
190'x24" R.C.P (Cl. III) OR 24" A.C.P (Cl. III)
190'x24" R.C.P (Cl. III) OR 24" A.C.P (Cl. III)
170'x24" R.C.P (CL IV) OR 24" A.C.P (CL IV)

Continue

"B" Const. Type "A" Storm Drain M.H. Top = ~~22.20~~ 21.50 (27A)
Const. Type "B" S.D.M.H (27B) Top = 21.50
Const. Type "C" C.B. 13+50 - Rt. ℄ "E" TOP = 21.01 (28)
Const. Type "D" C.B. 15+50 - Rt. ℄ "E" TOP = 17.40 (32)
Const. Type "D" Catch Basin Rt. ℄ Ramp "J" 19+50 TOP = 15.46 (34)
Const. Type "D" Catch Basin Rt. 22+15 Future Paa Ramp TOP = 13.45 (36)
Const. S.D.M.H. with Grated C.I. Cover Sta. 1+00 Top = 7.50 (38)
Const Type "C" S.D.M.H. (Locked Cover) 23+77.99 Future Paa Ramp (2.5 Rt.) TOP = 9.50
Paa Ramp
℄ Exist. Moanalua Stream Chnl.

S=0.0042 S=0.0222 S=0.0175 S=0.0122 S=0.0081 S=0.0050 S=0.0200 S=0.0152 S=0.0100 S=0.0006

16.20 FL 15.37 FL 15.33 FL. 15.55 FL. 13.8 FL. 13.76 FL. 13.70 FL. 11.31 FL. 11.27 FL. 8.46 FL. 8.05 FL. 8.03 FL. 6.72 FL. 6.22 FL. 3.10 FL. 3.00 FL. 1.43 FL. 1.41 FL. 1.40 FL. 0.70

18'x42" RCP (CL. III)
110'x42" RCP (CL. III)
152'x42" RCP (CL III)
196'x42" RCP (CL III) Class "B" Bedding
396'x48" RCP (CL III) Class "B" Bedding
262'x48" RCP (CL III) Class "B" Bedding
156'x54" RCP (CL III) Class "B" Bedding
36" SEWER
230'x54" RCP (CL III) Class "B" Bedding
100'x54" RCP (CL. III.) Class "B" Bedding
2-130'x42" R.C.P. (CL. III)
SILTED CHNL.
1½:1
EXIST. RIP RAP

C.C.O. # 55
C.C.O. # 40

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STORM DRAIN PROFILES

F. A. Proj. No. F-078-1(10)
Scale- Horiz.- 1"=50' Date:
Vert. - 1"=5'

SHEET NO. 8 OF 12 SHEETS

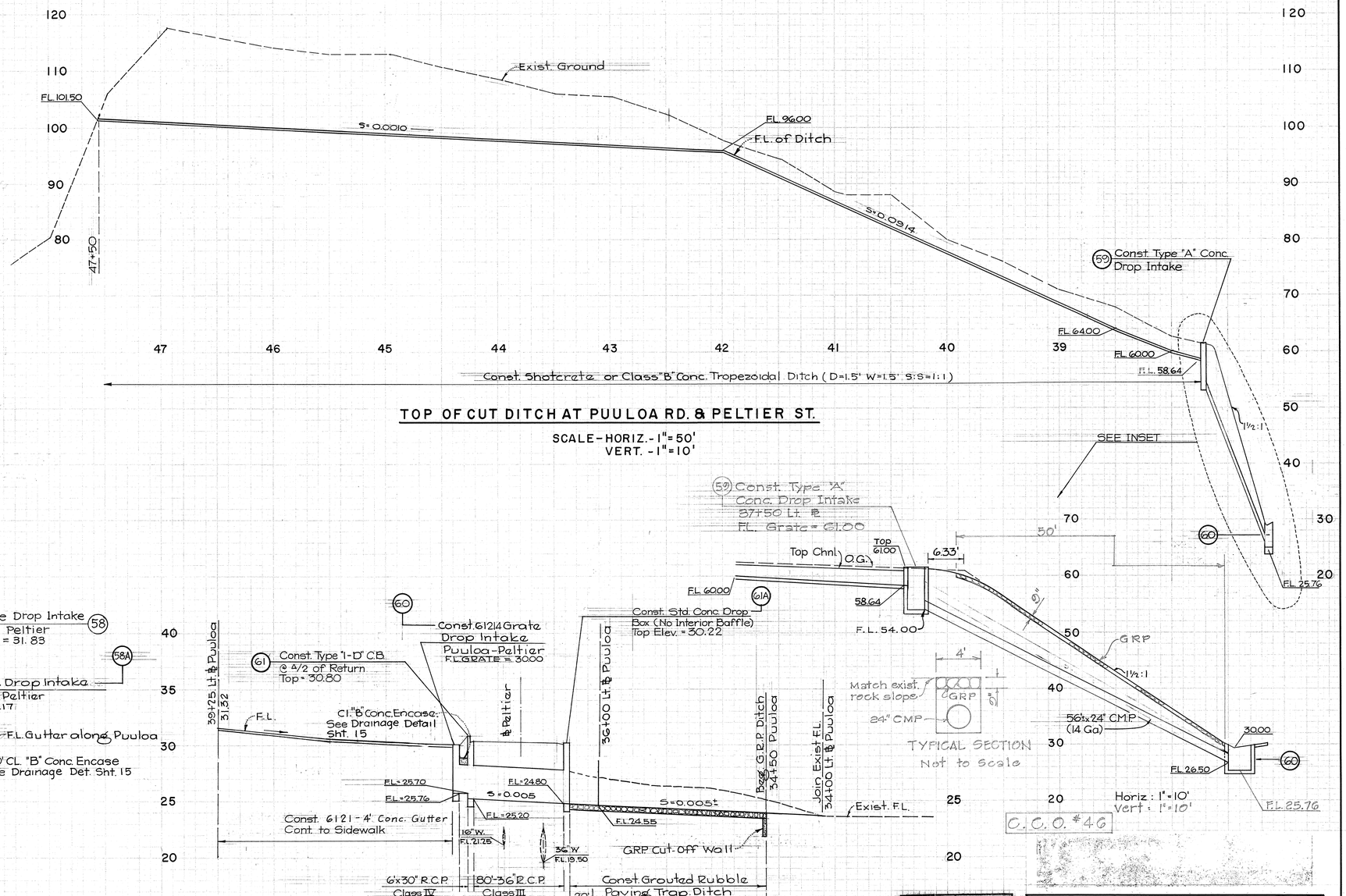
73

T. HARADA REGISTERED PROFESSIONAL ENGINEER No. 2163 HAWAII, U.S.A.
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

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

Printed in U.S.A. On HARRIMAN Tracing Cloth

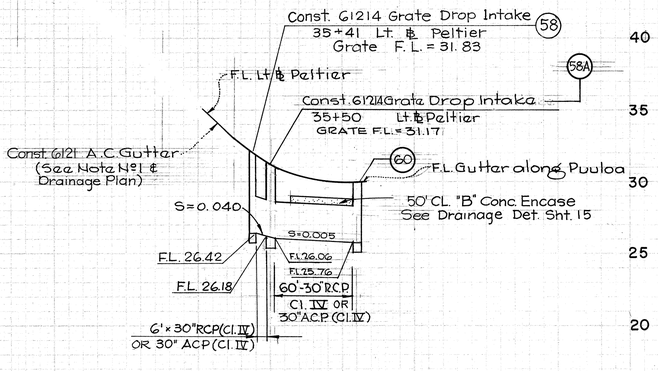
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	74	418

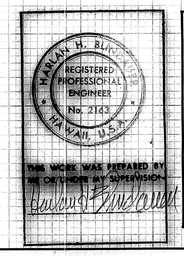


TOP OF CUT DITCH AT PUULOA RD. & PELTIER ST.

SCALE-HORIZ.-1"=50'
VERT. -1"=10'

General Notes:
1. Const A.C. Gutter from Sta 33+00 Lt ℄ Rt. ℄ Peltier As Shown on Drainage Plan.
2. Join Existing Flow Lines at end of Gutter Construction.





STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

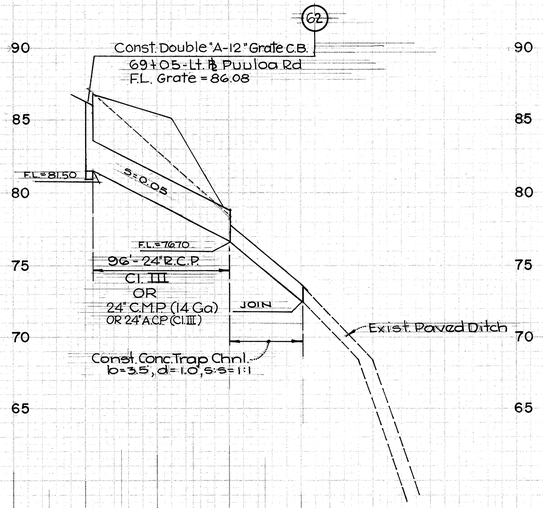
STORM DRAIN PROFILES

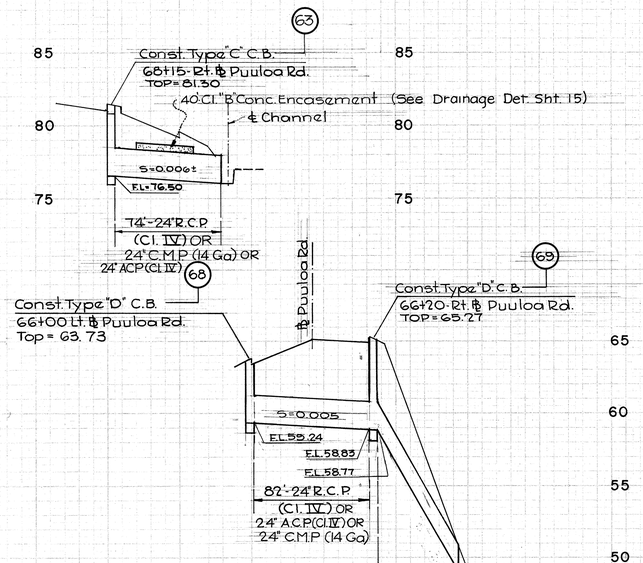
F. A. Proj. No. F-078-1(10)
Scale- Horiz.-1"=50' Date:
Vert.-1"=5'
or as shown

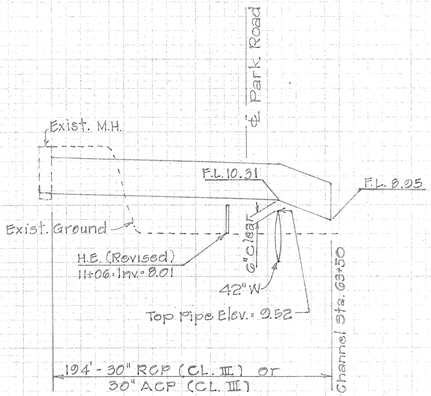
SHEET NO. 9 OF 12 SHEETS

74

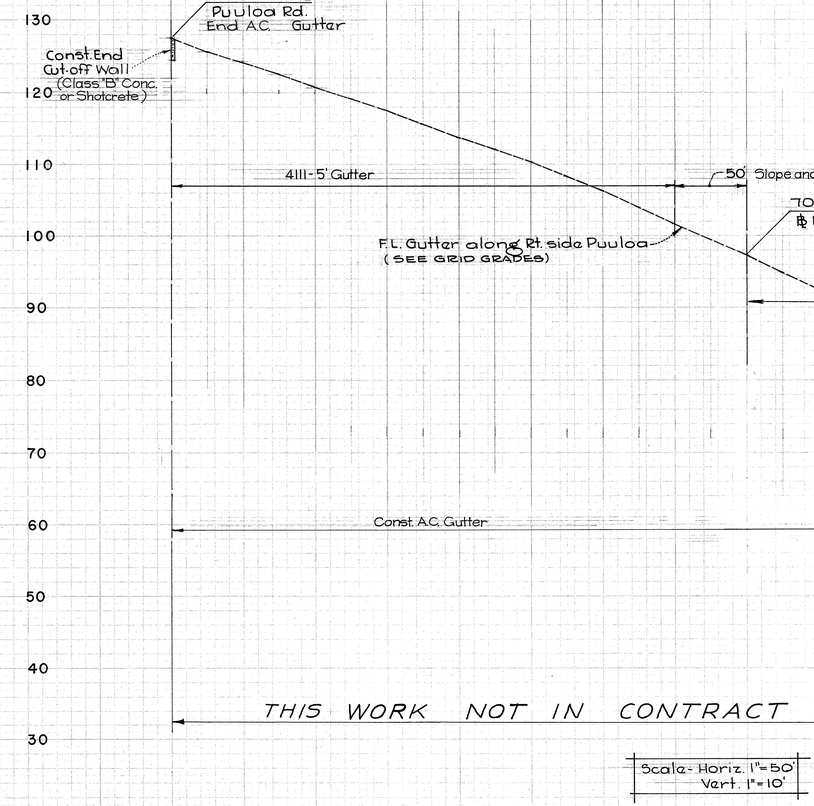
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	75	418

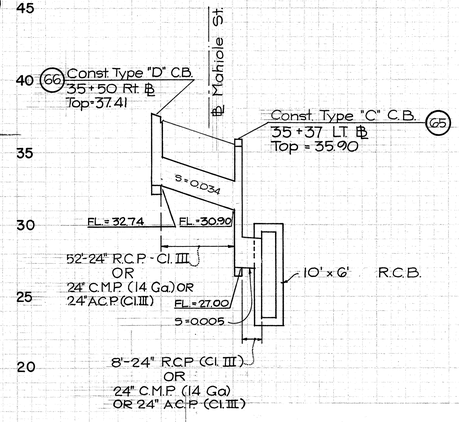






C. C. O. # 8





HARLAN H. BLINDAUER
REGISTERED PROFESSIONAL ENGINEER
No. 2163
HAWAII, U.S.A.
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STORM DRAIN PROFILES

F. A. Proj. No. F-078-1(10)

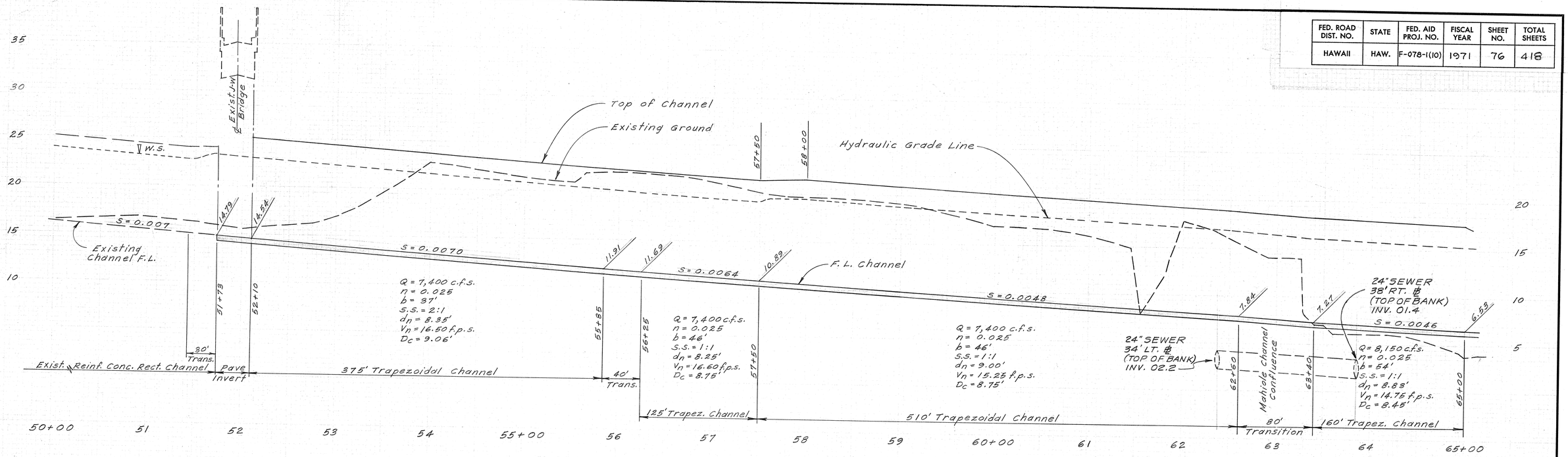
Scale - Horiz. - 1"= 50'
Vert. - 1"= 5'
or as shown

Date: JAN

SHEET NO. 10 OF 12 SHEETS

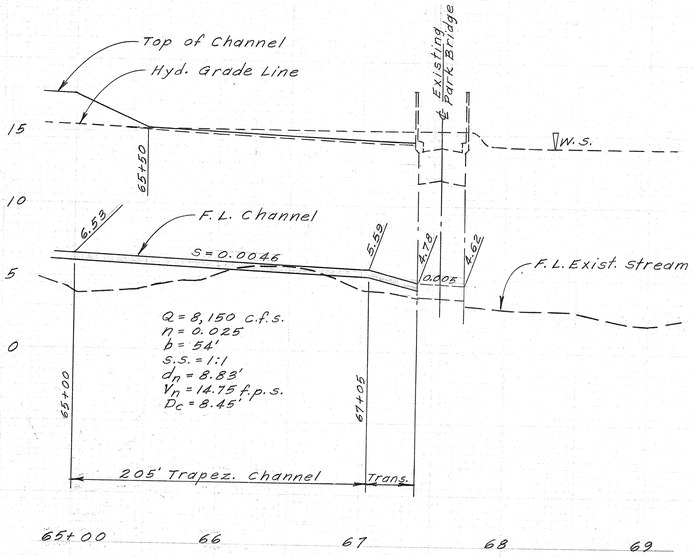
75

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	76	418



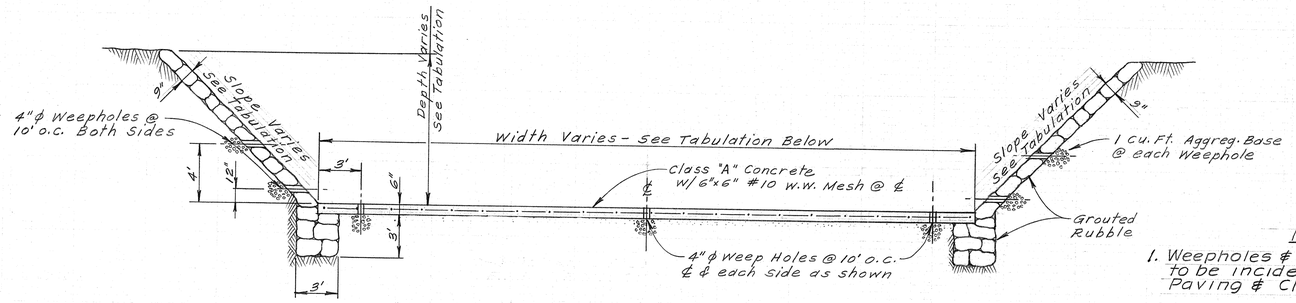
MOANALUA CHANNEL PROFILE

Scale: 1" = 50' Horiz.
1" = 5' Vert.



MOANALUA CHANNEL PROFILE (CONTIN.)

Scale: 1" = 50' Horiz.
1" = 5' Vert.



1. Exist. J-W Bridge to Sta. 55+85
   Bottom Width 37'
   Total Depth 10.50'
   Side Slopes 2:1

2. Sta. 56+25 to 57+50
   Bottom Width 46'
   Total Depth 10.50'
   S.S. 1:1

3. Sta. 58+00 to 62+60
   Bottom Width 46'
   Total Depth 11.00'
   S.S. 1:1

4. Sta. 63+40 to 65+00
   Bottom Width 54'
   Total Depth 11.00'
   S.S. 1:1

5. Sta. 65+50 to 67+05
   Bottom Width 54'
   Total Depth 9.00'
   S.S. 1:1

MOANALUA CHANNEL TYPICAL SECTIONS

No Scale

NOTE

1. Weepholes & Aggregate Base at Weepholes to be incidental to Grouted Rubble Paving & Class "A" Concrete.
2. Excavation for Grouted Rubble Footings and Pavement to be incidental to Grouted Rubble Paving.
3. Use natural boulders without chipped edges on exposed faces of Grouted Rubble Paving. Furnishing & placing of natural boulders to be incidental to Grouted Rubble Paving.

HARLAN H. BLINDAUER
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MOANALUA CHANNEL TYP. SEC & PROFILE

F. A. Proj. No. F-078-1(10)

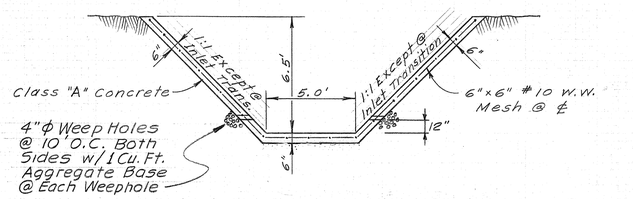
Scale: as shown Date: JAN 1971

SHEET No. 11 OF 12 SHEETS

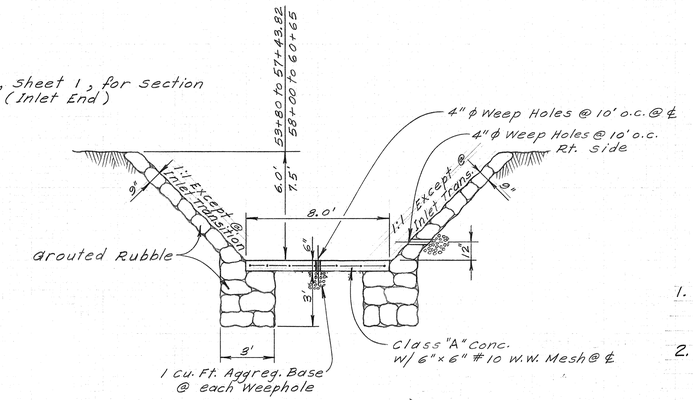
76

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	77	418

Note: See Misc. Drainage Details, Sheet 1, for section at Transition to R.C. Box (Inlet End)



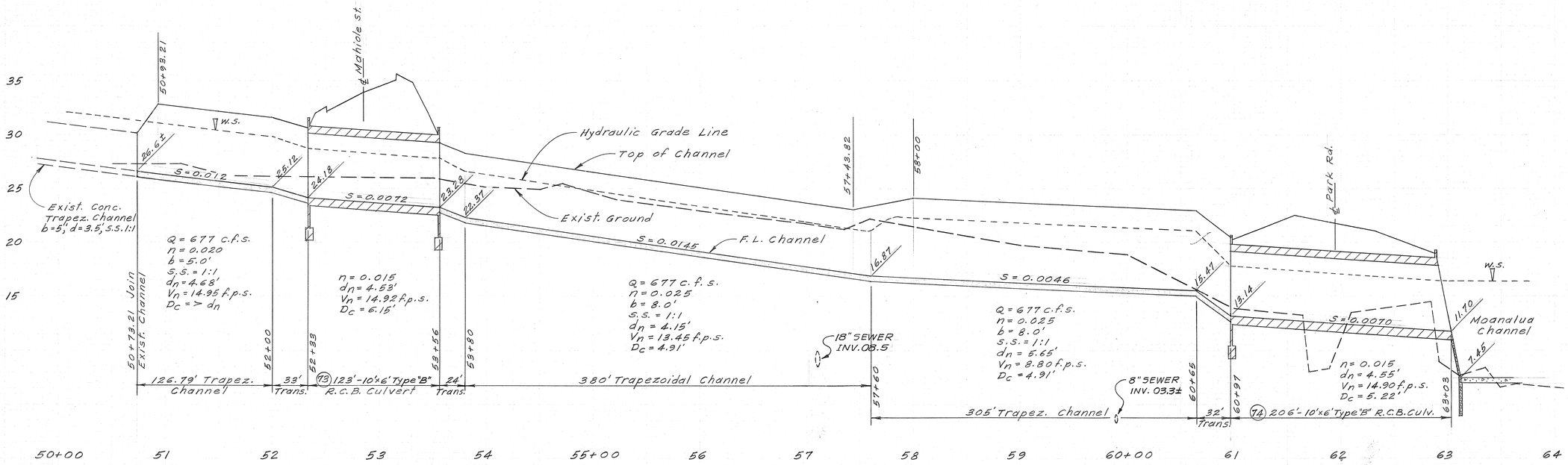
CHANNEL SECTION
ABOVE MAHIOLE STREET
No Scale



CHANNEL SECTION
BELOW MAHIOLE STREET
No Scale

NOTE

1. Weepholes & Aggregate Base at Weepholes to be incidental to Grouted Rubble Paving & Class "A" Concrete.
2. Excavation for Grouted Rubble Footings & Paving to be incidental to Grouted Rubble Paving.
3. Use natural boulders without chipped edges on exposed faces of Grouted Rubble Paving. Furnishing & placing of natural boulders to be incidental to Grouted Rubble Paving.



MAHIOLE CHANNEL PROFILE
Scale: 1"=50' Horiz.
1"=5' Vert.



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Marian H. Blindauer

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MAHIOLE STREAM
TYP. SEC. & PROFILE

F.A. Proj. No. F-078-1(10)

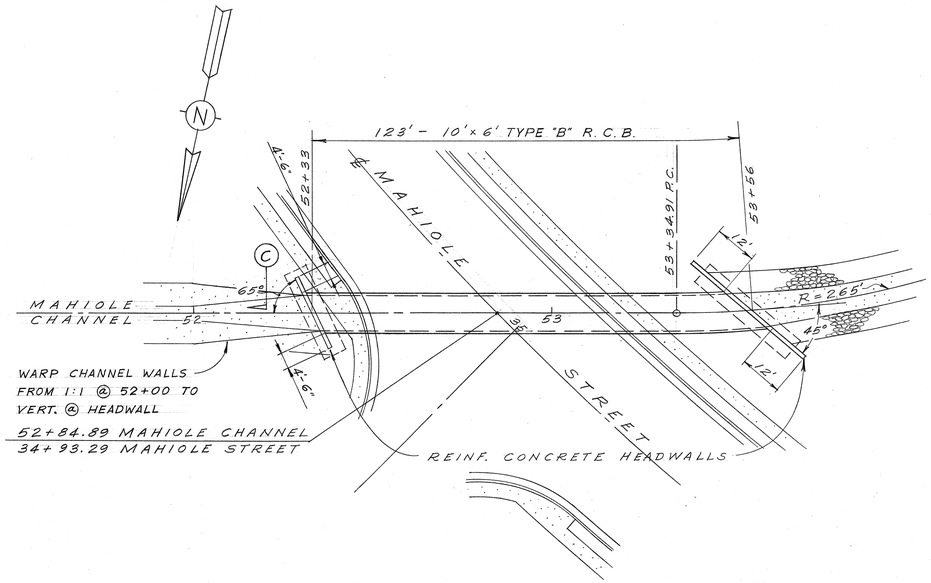
Scale: as shown Date: JAN 1971

SHEET No. 12 OF 12 SHEETS

77

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	78	418

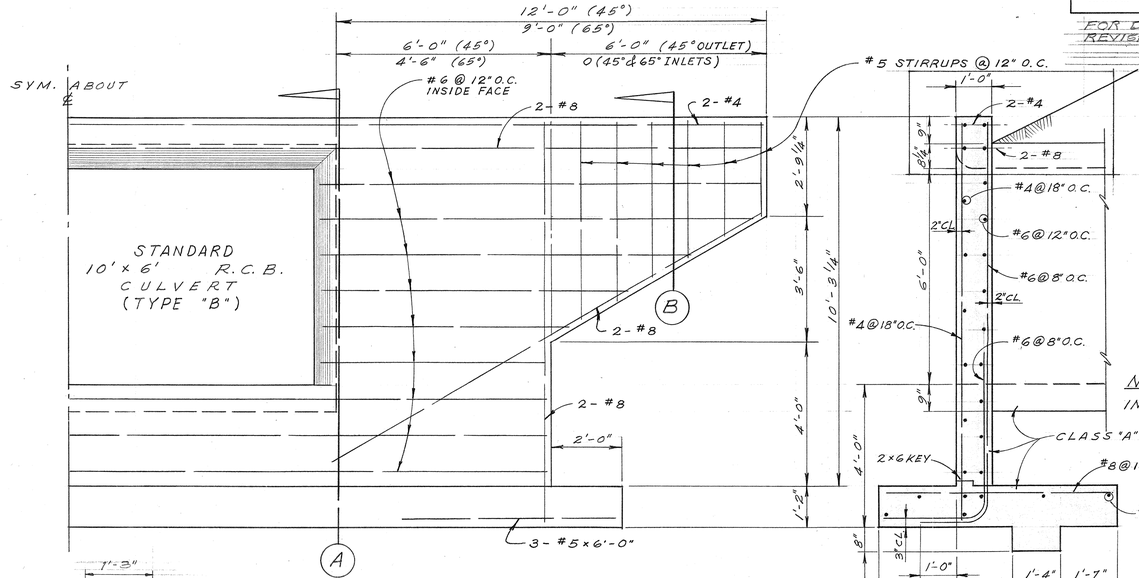
FOR DETAILS OF C.C.O. #10 REVISIONS SEE SHT. NO.



STRUCTURE NO. 73

SCALE: 1" = 20'

NOTE: ELEVATIONS, LENGTHS & ANGLE OF FLARE OF STRUCTURE HEADWALLS MAY BE MODIFIED BY THE ENGINEER TO SUIT FIELD CONDITIONS.



NOTE: HORIZ. REINFORCING @ INSIDE FACE OF WING SHOWN. SEE SEC. (A) FOR BALANCE OF REINF.

NOTE EXTEND ALL LONGIT. BARS IN BOX WALLS 2'-0" INTO WINGS.

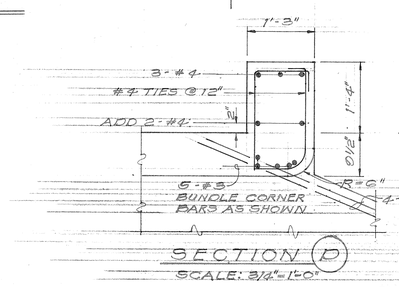
SECTION (B)

SECTION (A)

ELEVATION

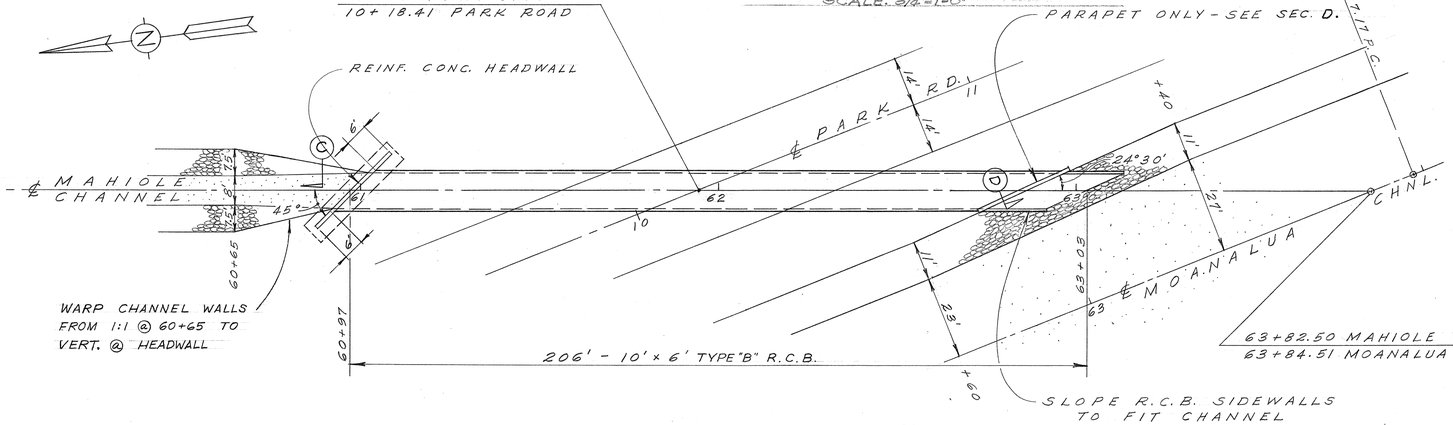
BOX CULVERT HEADWALLS

SCALE: 1" = 2'



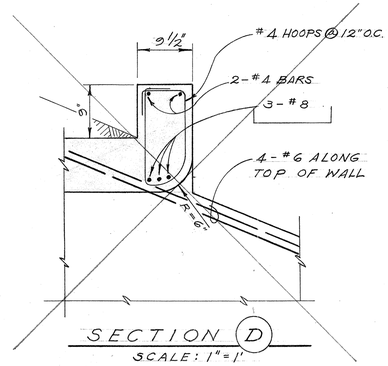
SECTION (D)

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



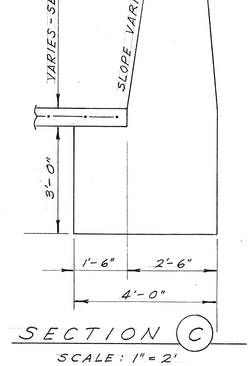
STRUCTURE NO. 74

SCALE: 1" = 20'



SECTION (D)

SCALE: 1"=1'



SECTION (C)

SCALE: 1" = 2'

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

HERMAN H. BLINDAUER REGISTERED PROFESSIONAL ENGINEER No. 2163 HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Herman H. Blindauer

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MISC. DRAINAGE DETAILS

F.A. Proj. No. F-078-1(10)

Scale-as shown Date- JAN 1971

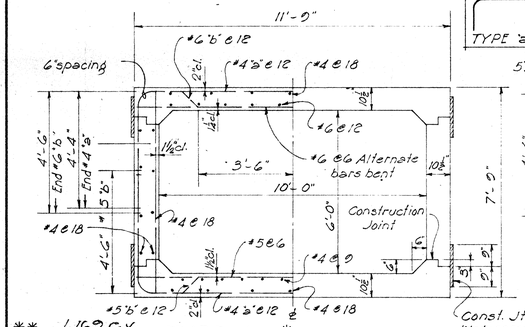
SHEET No. 1 OF 23 SHEETS

PRINTED ON NO. 1000H CLEARPRINT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	79	418

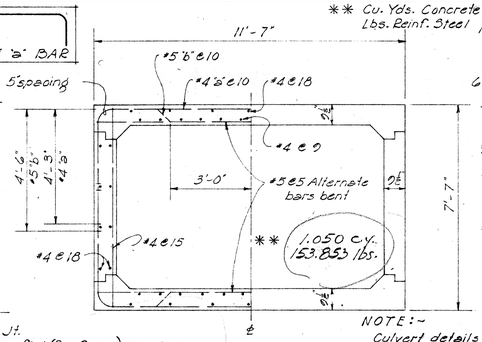
** Cu. Yds. Concrete per Lin. Ft.
Lbs. Reinf. Steel per Lin. Ft.

* Fill Height above top of slab.



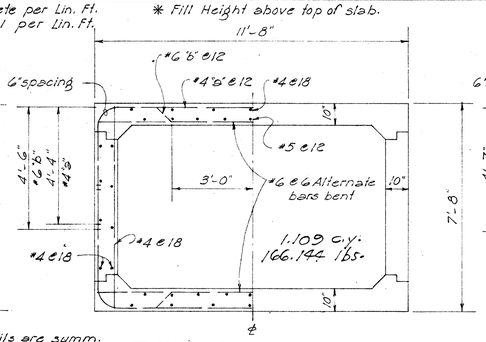
** 1.169 c.y.
157.164 lbs.

TYPE A ~ * 0' TO 2'-0"

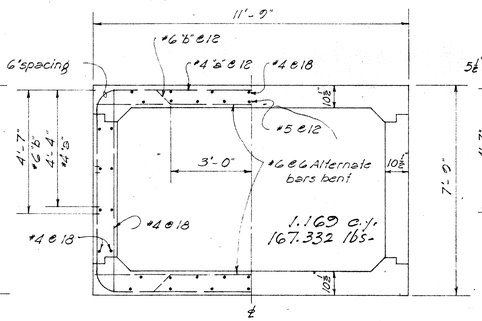


TYPE B ~ 2'-1" TO 7'-6"

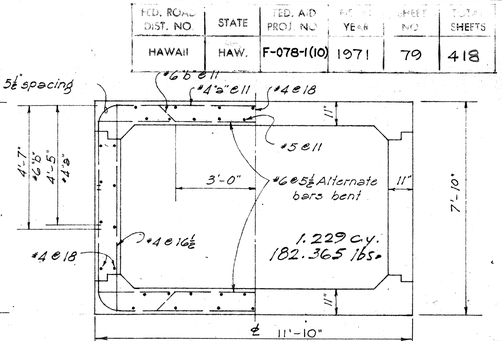
NOTE :~
Culvert details are symm. about the vert. & horiz. axis at center of culvert except where shown otherwise.



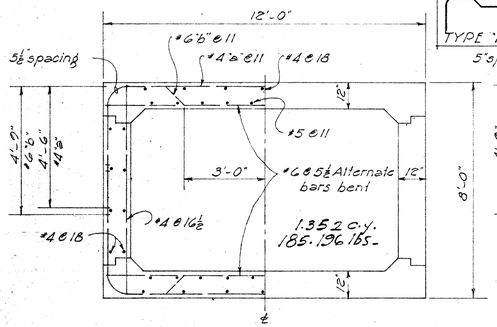
TYPE C ~ 7'-7" TO 10'-0"



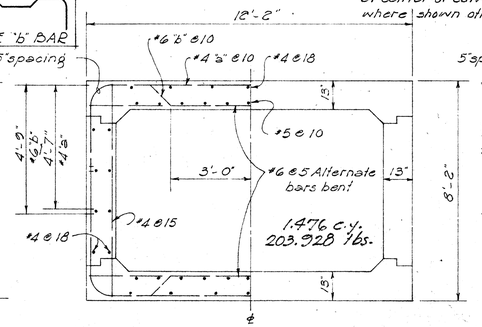
TYPE D ~ 10'-1" TO 12'-6"



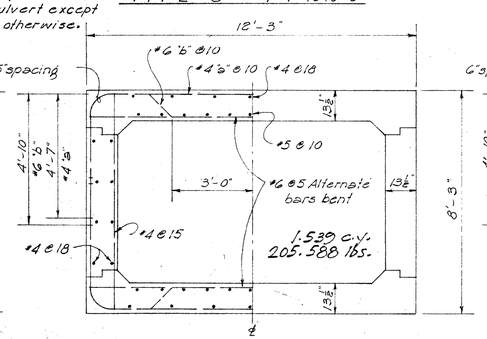
TYPE E ~ 12'-7" TO 15'-0"



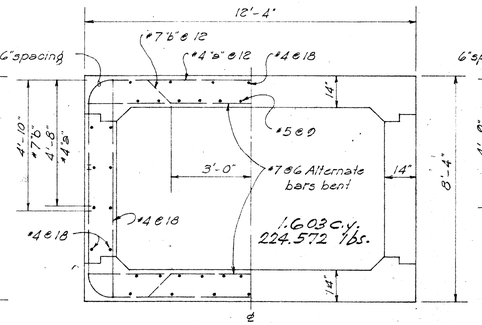
TYPE F ~ 15'-1" TO 17'-6"



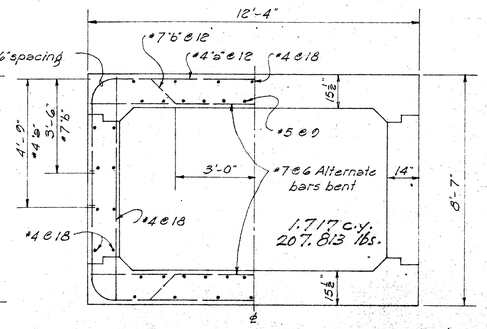
TYPE G ~ 17'-7" TO 20'-0"



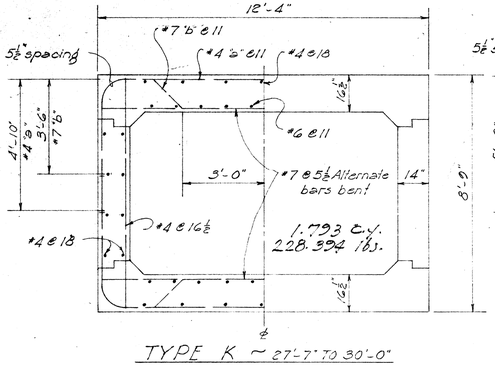
TYPE H ~ 20'-1" TO 22'-6"



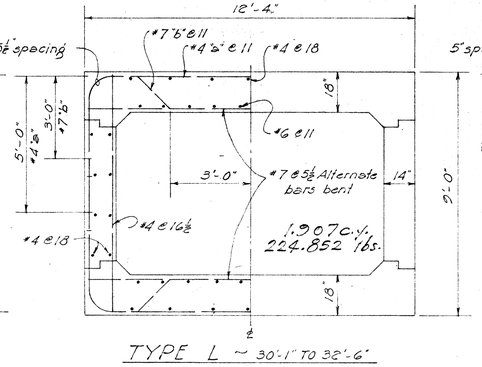
TYPE I ~ 22'-7" TO 25'-0"



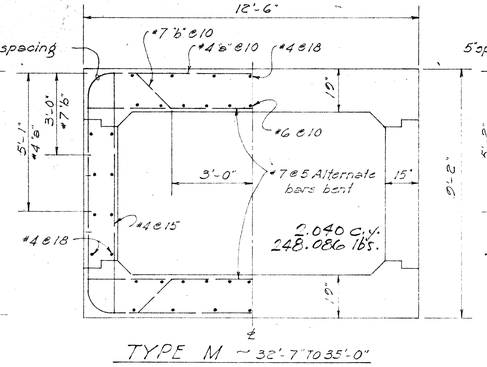
TYPE J ~ 25'-1" TO 27'-6"



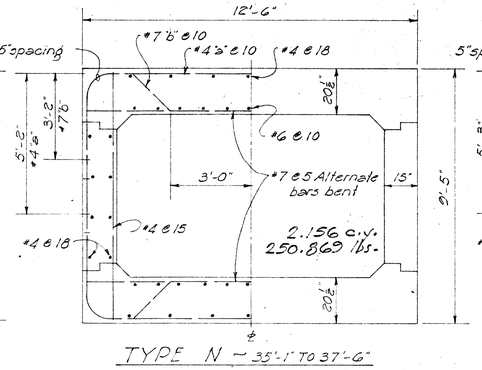
TYPE K ~ 27'-7" TO 30'-0"



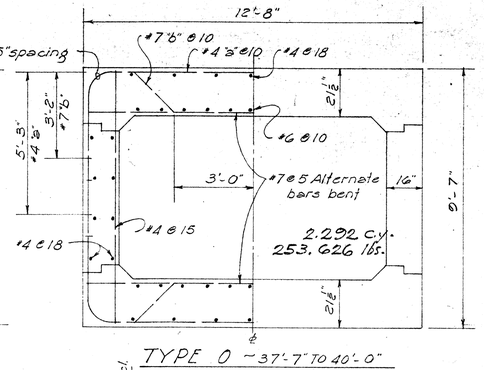
TYPE L ~ 30'-1" TO 32'-6"



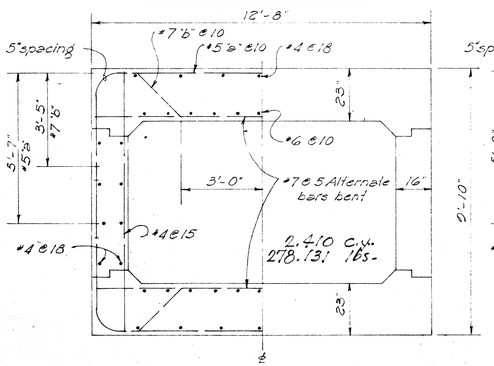
TYPE M ~ 32'-7" TO 35'-0"



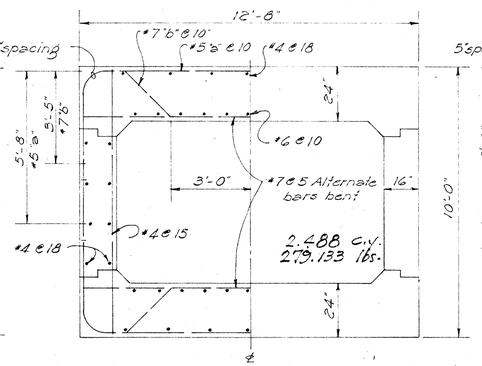
TYPE N ~ 35'-1" TO 37'-6"



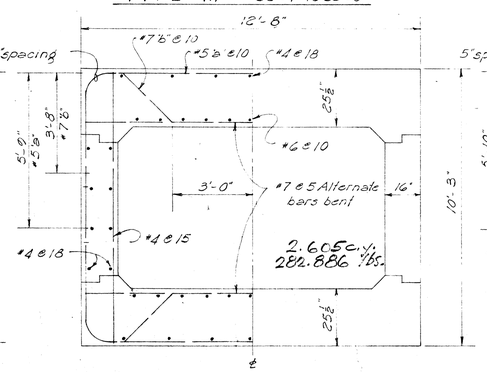
TYPE O ~ 37'-7" TO 40'-0"



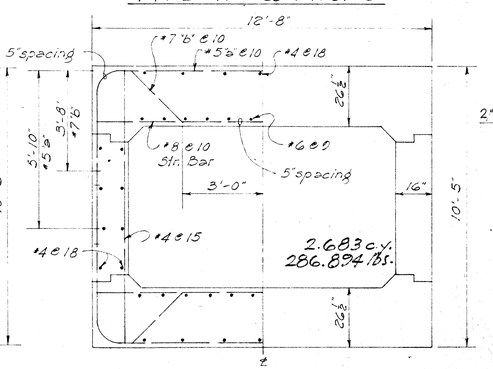
TYPE P ~ 40'-1" TO 42'-6"



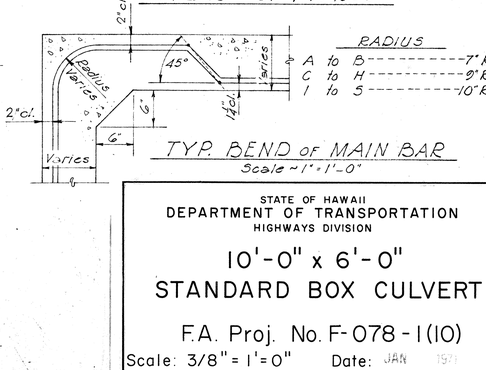
TYPE Q ~ 42'-7" TO 45'-0"



TYPE R ~ 45'-1" TO 47'-6"



TYPE S ~ 47'-6" TO 50'-0"



TYP. BEND OF MAIN BAR
Scale ~ 1" = 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

10'-0" x 6'-0" STANDARD BOX CULVERT

F.A. Proj. No. F-078-1(10)

Scale: 3/8" = 1'-0" Date: JAN 1971

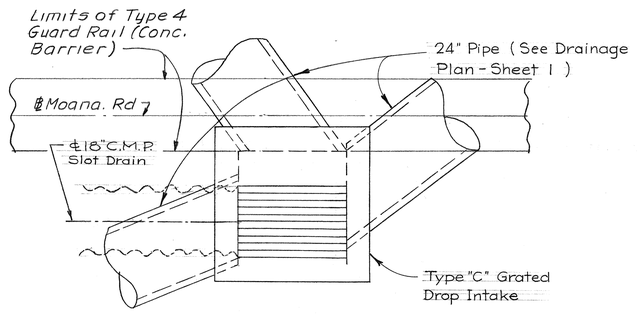
SHEET No. 2 OF 23 SHEETS

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

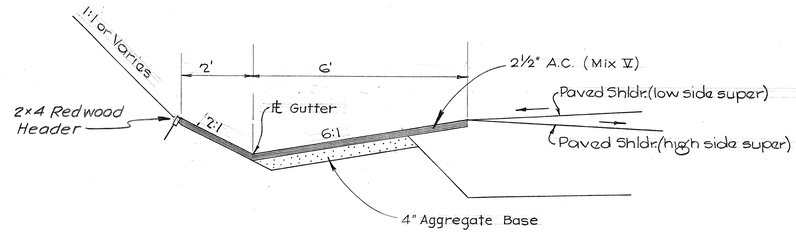
PRINTED ON DIEPO 1000R CLEARPRINT

79

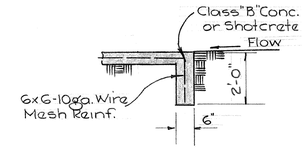
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	80	418



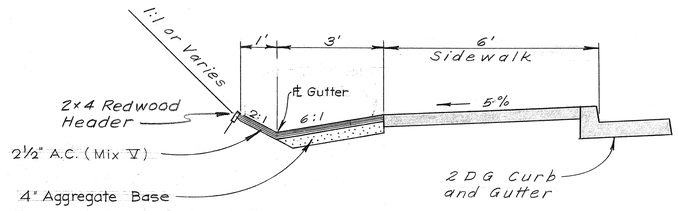
DETAIL DRAINAGE STRUCT. NO. (3)
Scale - ½"=1'-0"



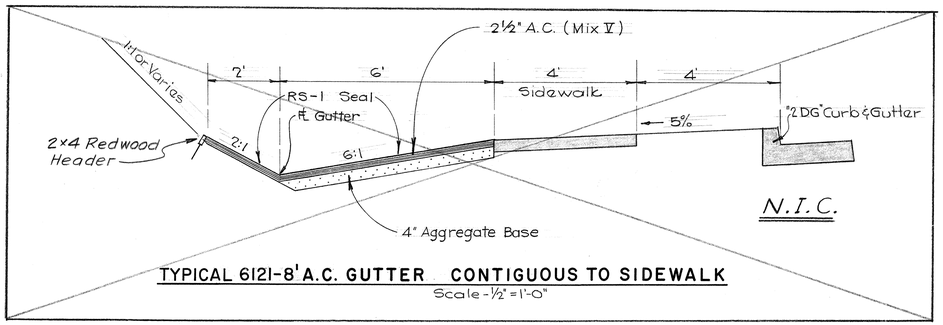
TYPICAL 6121 8 A.C. GUTTER CONTIGUOUS TO PAVED SHLDR.
Scale - ½"=1'-0"



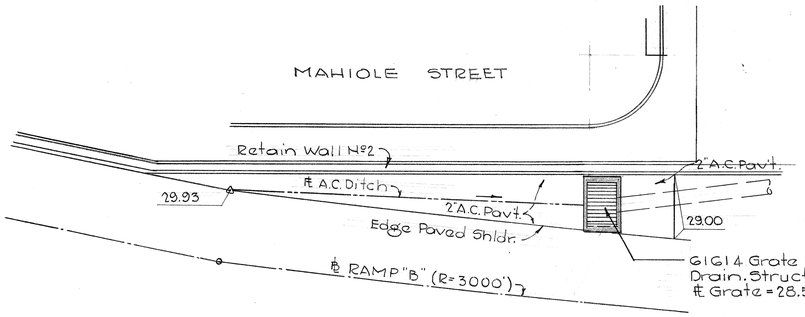
TYP. CUT-OFF WALL
Scale - ½"=1'-0"



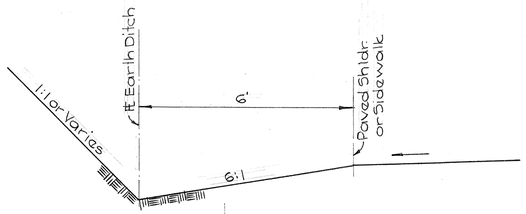
TYPICAL 6121 4 A.C. GUTTER CONTIGUOUS TO SIDEWALK
Scale - ½"=1'-0"



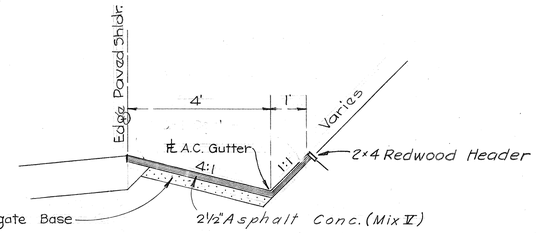
TYPICAL 6121-8' A.C. GUTTER CONTIGUOUS TO SIDEWALK
Scale - ½"=1'-0"



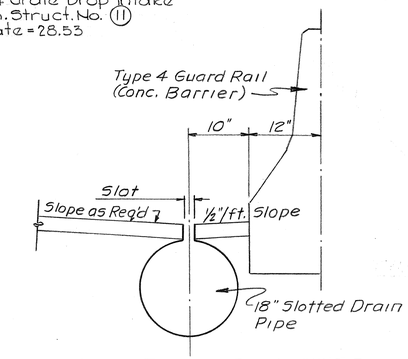
DETAIL DRAINAGE STRUCT NO. (11)
Scale - 1"=10'



TYPICAL EARTH DITCH CONTIGUOUS PAVED SHLDR. OR SIDEWALK
(SEE CROSS SECTIONS FOR LOC'S.)
Scale : ½" = 1'-0"



4111 5 A.C. GUTTER CONTIGUOUS TO SHOULDER
~~(ONLY BTWN. 70+50 & 74+00 Rt. ℄ PUULOA~~
~~&~~ BOTH SIDES PELTIER PER PLAN)
Scale : ½" = 1'-0"



TYPICAL SECTION OF SLOTTED DRAIN ALONG CONC. BARRIER
Scale 1"= 1'-0"

NOTES
1. Redwood Headers shall be incidental to Bituminous Gutter.

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

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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MISC. DRAINAGE DETAILS

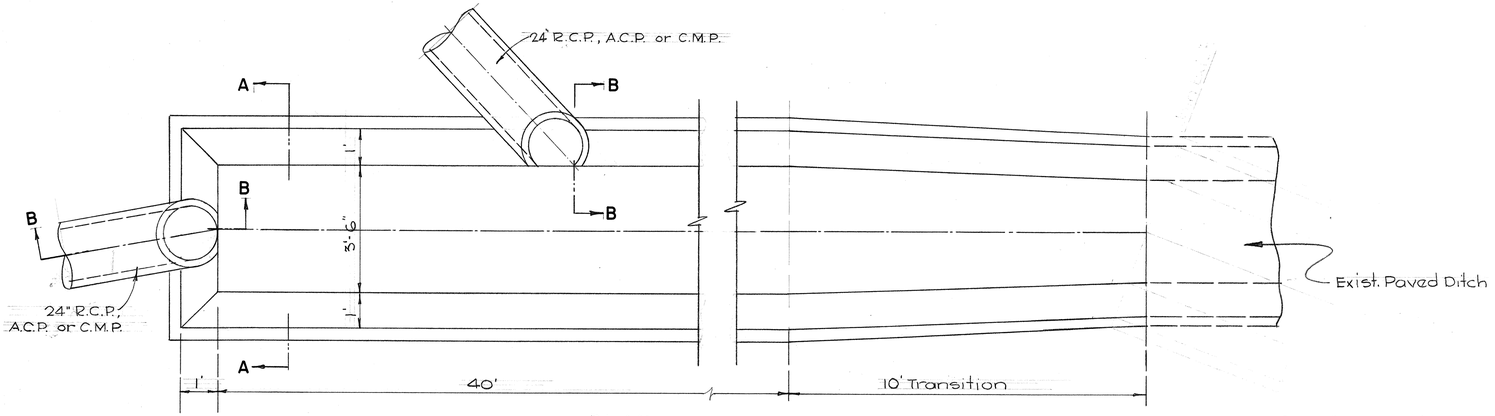
F.A. Proj. No. F-078-1(10)

Scale - as shown Date: JAN 1971

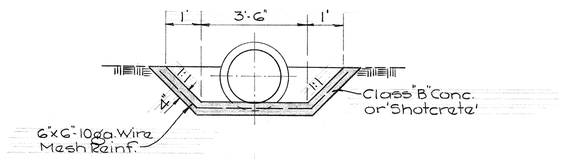
SHEET No. 3 OF 23 SHEETS

PRINTED ON NO. 1000H CLEARPRINT

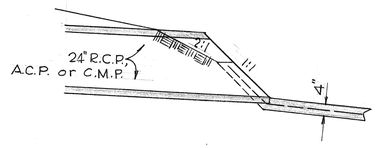
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	81	418



PLAN



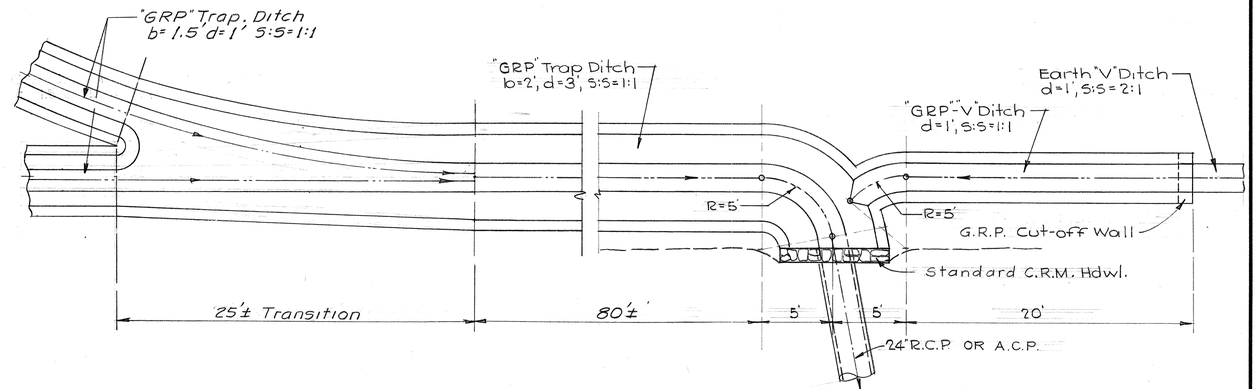
SECTION-A-A



SECTION-B-B

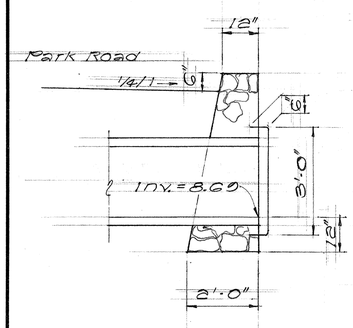
CONCRETE DITCH DETAIL AT STRUCT. NOS. (62) & (63)

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



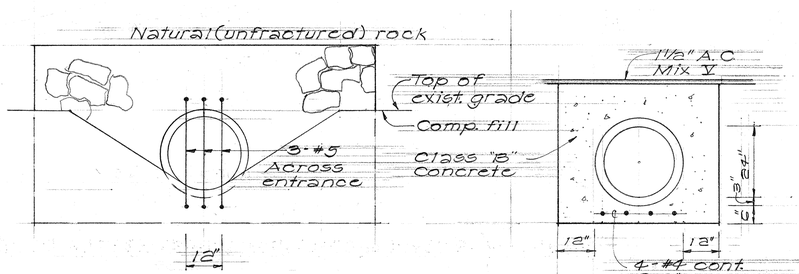
DETAIL AT DRAINAGE STRUCT. NO. (67)

Scale-1"=5'



CRM HEADWALL

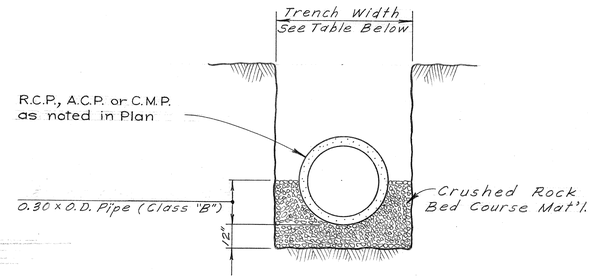
Scale: 1/2"=1'-0"



DRAIN CAP AND CRADLE DETAILS

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

C.C.O. #23



PIPE SIZE	PAYMENT TRENCH WIDTH
30"	57"
36"	69"
42"	76"
48"	84"
54"	91"

CLASS "B" BEDDING FOR STORM DRAINS

Not To Scale

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HIGHWAYS DIVISION

MISC. DRAINAGE DETAILS

F.A. Proj. No. F-078-1(10)

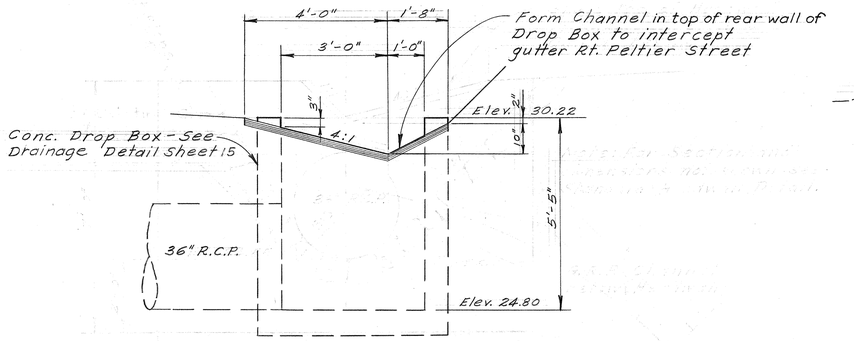
Scale-as shown Date: JAN 1971

SHEET No. 4 OF 23 SHEETS

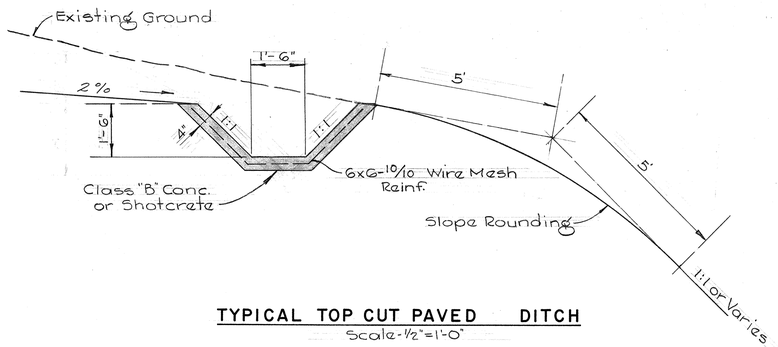
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
NOTE BOOK	TRACED BY	
	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

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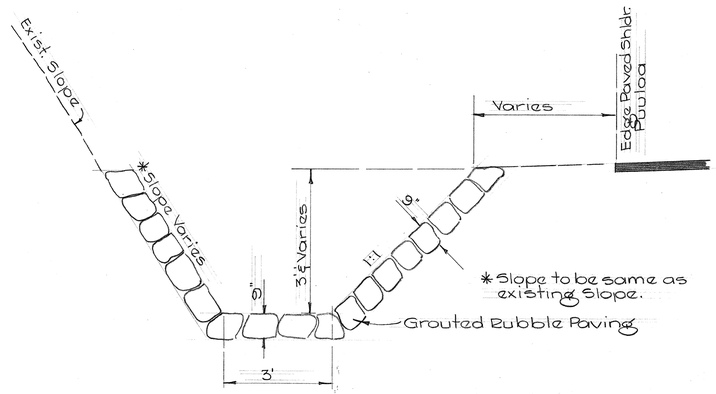
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	82	418



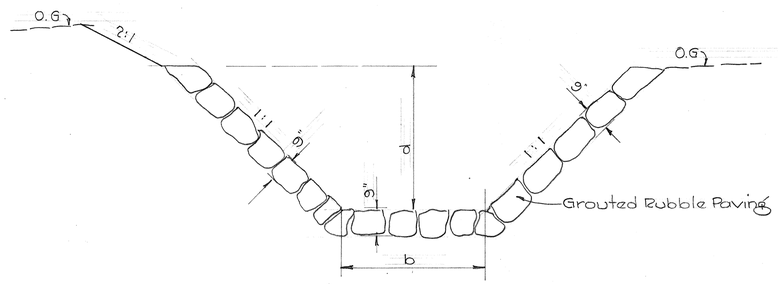
DRAINAGE STRUCTURE NO. (61A)
LT. PUULOA STA. 36 + 40 ±
Scale - 1/2" = 1'-0"



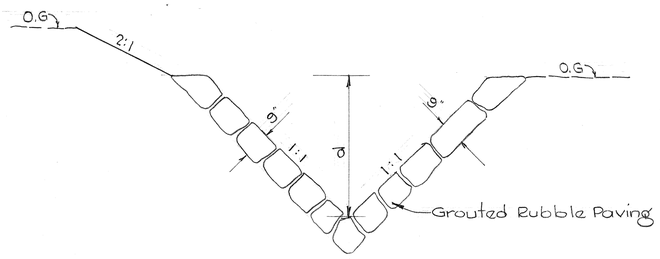
TYPICAL TOP CUT PAVED DITCH
Scale - 1/2" = 1'-0"



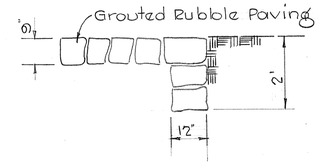
CHANNEL SECTION 34+50 to 36+35±PUULOA
Scale - 1/2" = 1'-0"



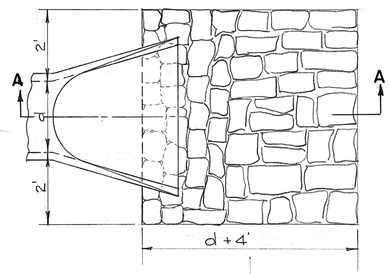
TYPICAL "GRP" TRAP. CHANNEL
Scale - 1/2" = 1'-0"



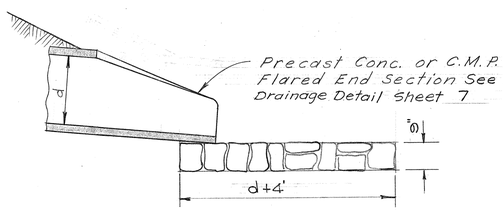
TYPICAL "GRP" - "V" CHANNEL
Scale - 1/2" = 1'-0"



TYPICAL RUBBLE MASONRY CUT-OFF WALL
Scale - 1/2" = 1'-0"



PLAN



SECTION - A-A

TYPICAL "GRP" SPLASH APRON
Scale - 1/2" = 1'-0"

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

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REGISTERED PROFESSIONAL ENGINEER
No. 2163
HAWAII, U.S.A.

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Harlan H. Blindauer

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MISC. DRAINAGE DETAILS

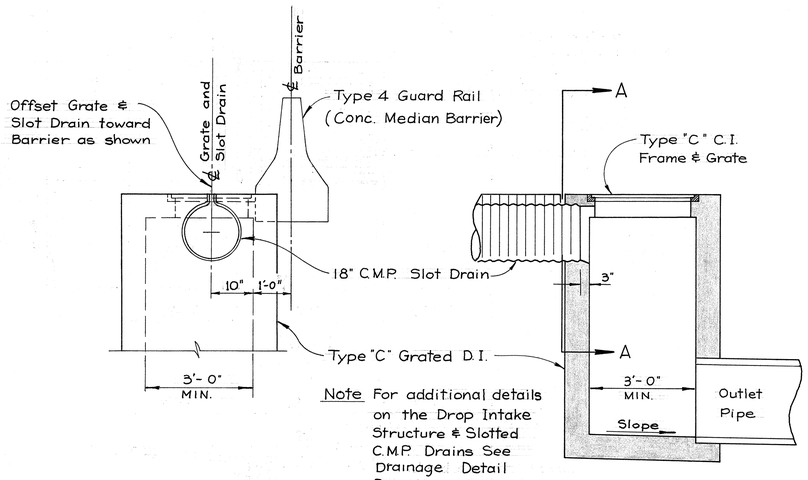
F.A. Proj. No. F-078-1(10)
Scale - as shown Date: JAN 1971

SHEET No. 5 OF 23 SHEETS

PRINTED ON NO. 1000H CLEARPRINT

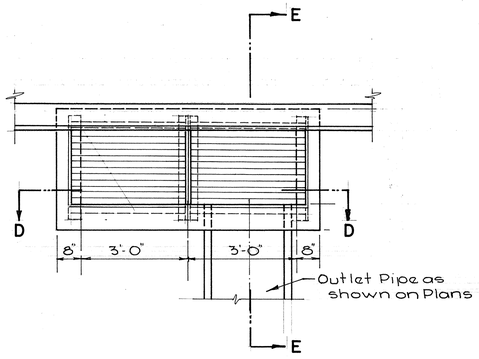
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	83	418

Note: See Sheet 3 for typical section of slotted drain along concrete barrier.

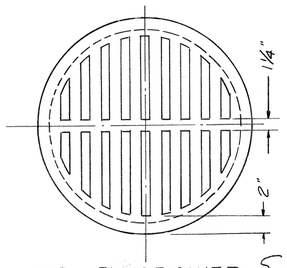


Note For additional details on the Drop Intake Structure & Slotted C.M.P. Drains See Drainage Detail Drawings.

SECTION A-A
Scale: ½"=1'-0"

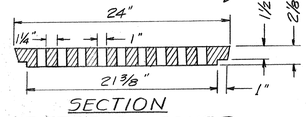


PLAN
Scale-½"=1'-0"



TOP VIEW OF COVER

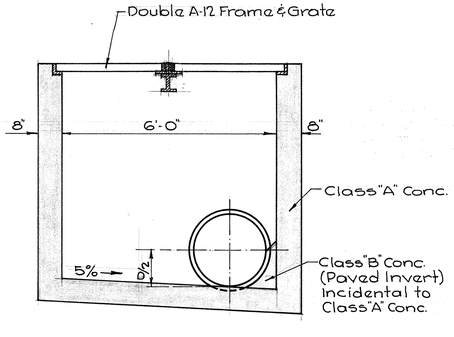
Note: Use Type "P" Frame



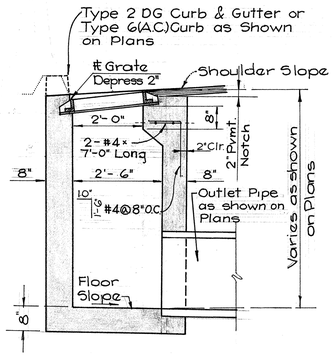
SECTION
GRATED C.I. COVER
Scale ½"=1'-0"

GENERAL NOTES:

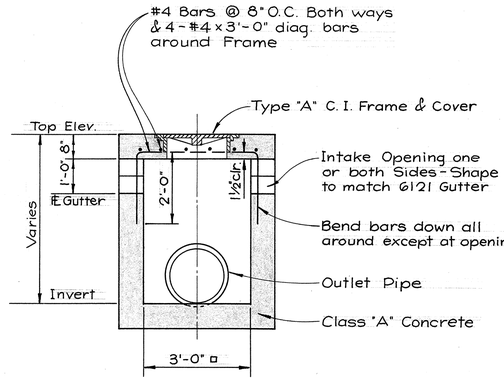
1. The entrance end of R.C.P. pipes in structures shall be groove-edged as noted on the drainage plans.



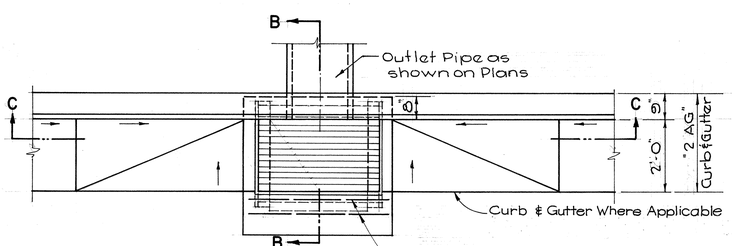
SECTION D-D
Scale-½"=1'-0"



SECTION E-E
Scale ½"=1'-0"

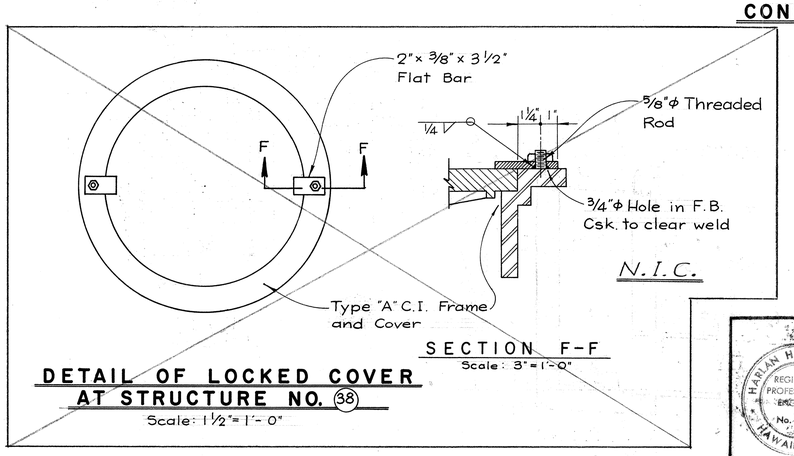


MODIFIED TYPE "A" OR "B"
CONCRETE DROP INTAKE
STANDARD DETAILS APPLY EXCEPT AS SHOWN
Scale: ½"=1'-0"



PLAN
Scale-½"=1'-0"

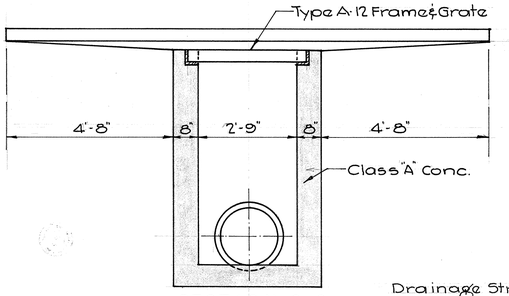
DOUBLE "A-12" GRATE C.B.
Drainage Structure



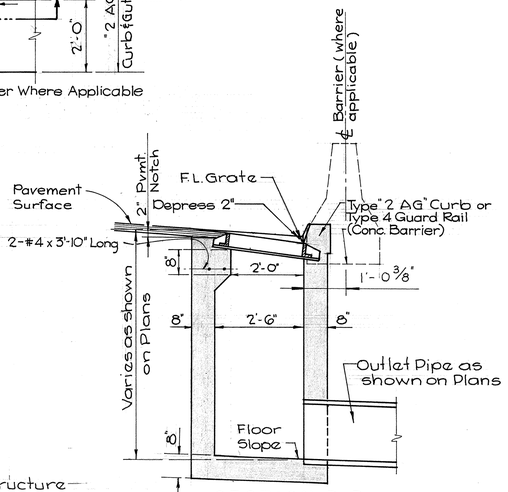
N. I. C.

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

DETAIL OF LOCKED COVER
AT STRUCTURE NO. (38)
Scale: 1½"=1'-0"



SECTION C-C
Scale-½"=1'-0"



Drainage Structure
SINGLE "A-12" GRATE C.B.

SECTION B-B
Scale ½"=1'-0"

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

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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MISC. DRAINAGE DETAILS

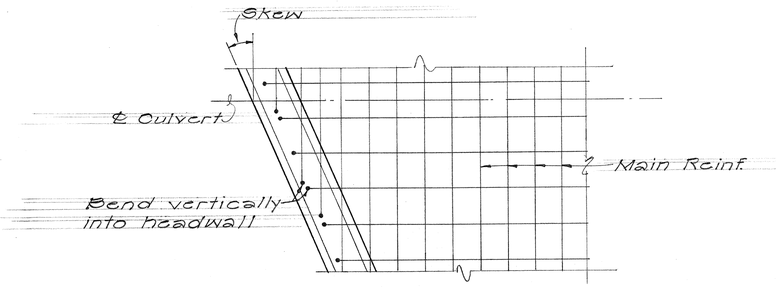
F.A. Proj No. F-078-1(10)

Scale-as shown Date: JAN 1971

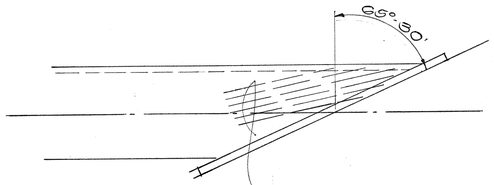
SHEET No. 6 OF 23 SHEETS

PRINTED ON NO. 1000H CLEARPRINT

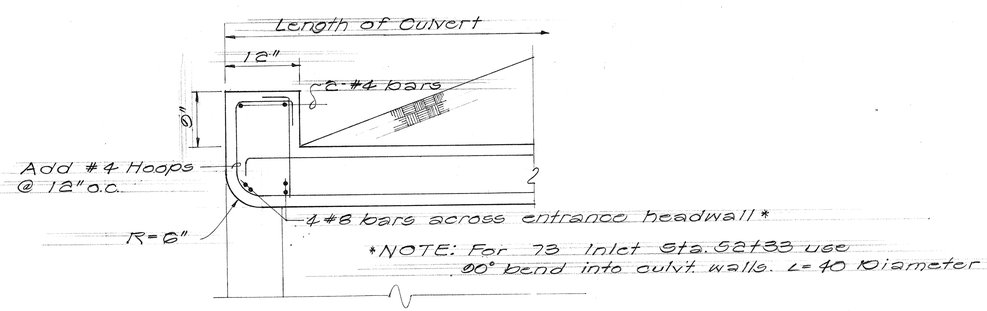
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1977	C.O. 83S-1	418



PART PLAN - SKEWED
Structure #73 & 74
Not to Scale



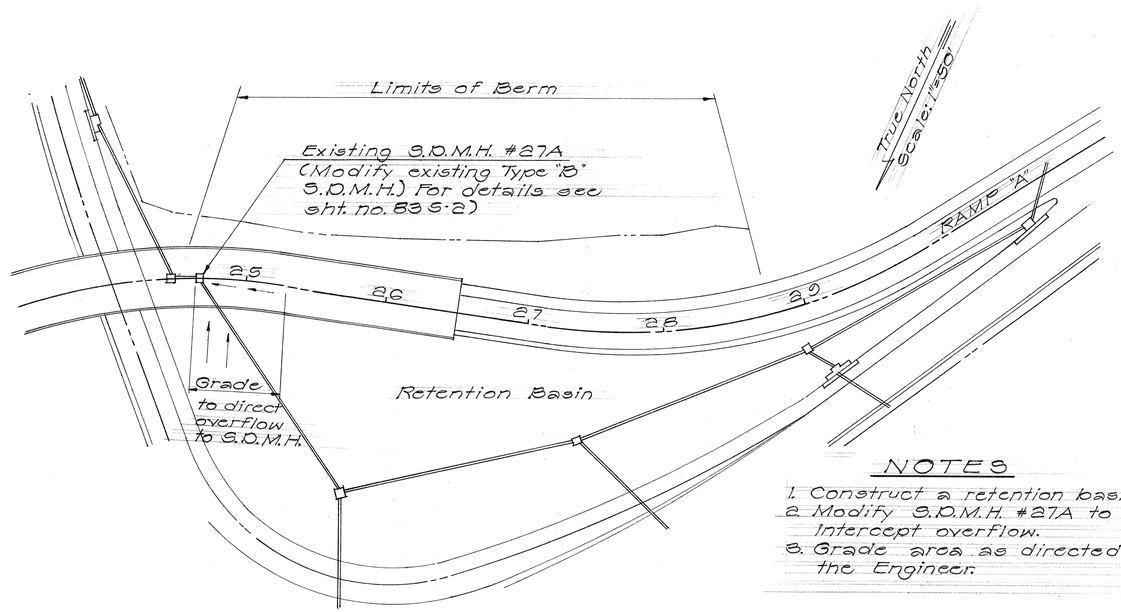
ADDITIONAL REINFORCEMENT
Not to Scale



PART SECTION
Structure #73
Not to Scale

REINFORCING DETAILS
STRUCTURE #73
(Sta. 52+33 & Sta. 53+56)
STRUCTURE #74
(Sta. 60+07)

C.C.O. #10



NOTES
1. Construct a retention basin.
2. Modify S.D.M.H. #27A to intercept overflow.
3. Grade area as directed by the Engineer.

PLAN

RETENTION BASIN

C.C.O. #103
(For additional C.C.O. #103 details see sht. no. 83 S-2)

82-52

NOTE:
This Supplement Sht. prepared during As-Built Posting

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CHANGE ORDER DETAILS

F.A.I. Proj. No. F-078-1(10)

Scale: As Shown Date: Jan. 1977

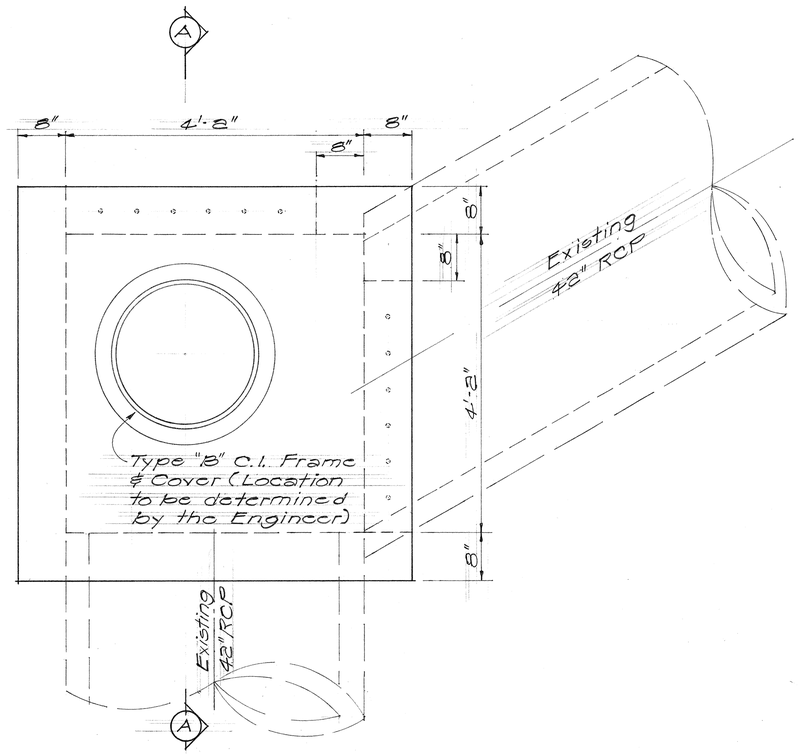
SHEET No. OF SHEETS

83S-1

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

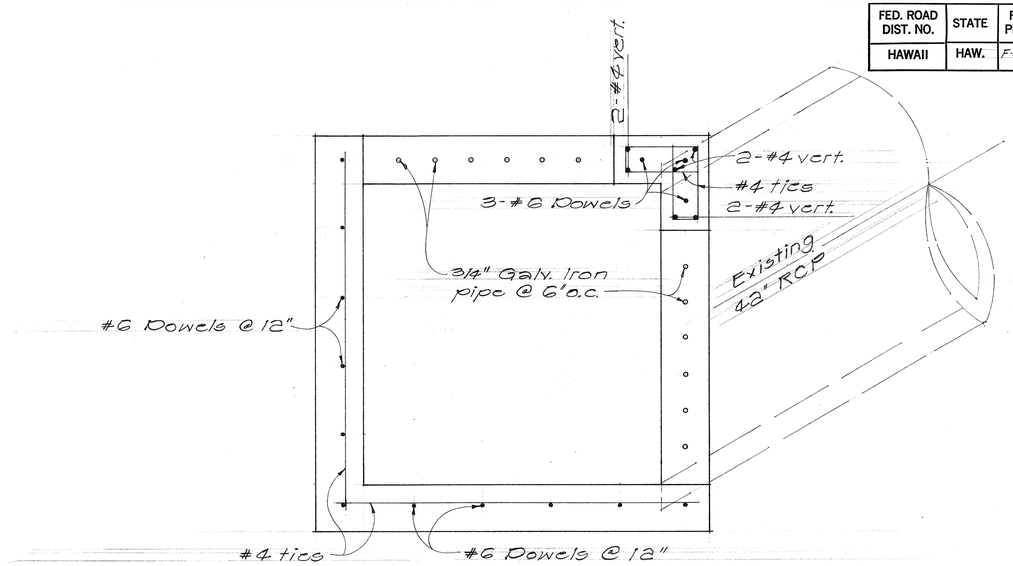
K&E TRACING PAPER

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1977	C.O. 83S2	4/8



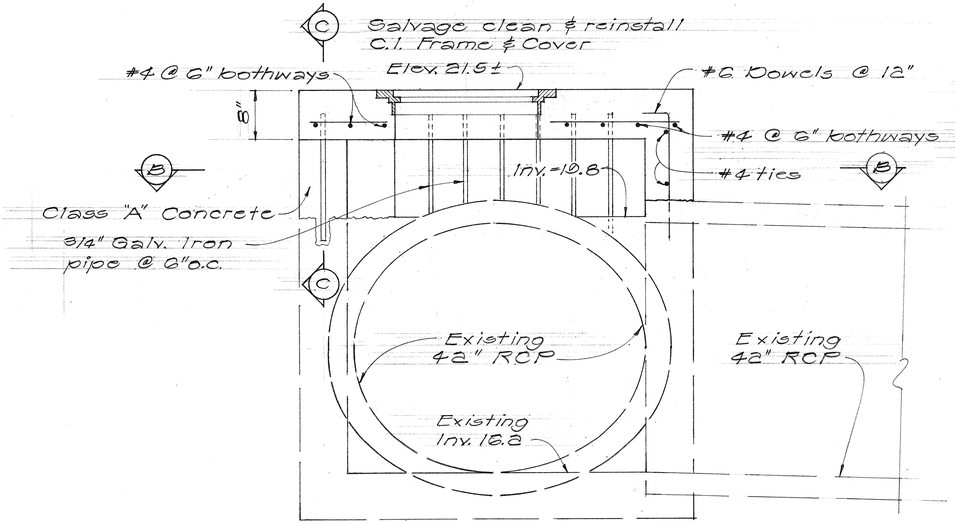
PLAN

Scale: 1"=1'-0"



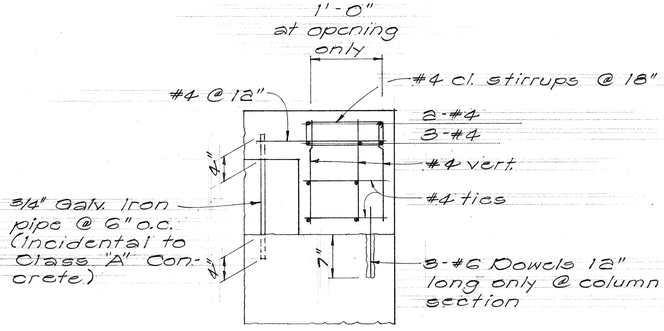
SECTION "B-B"

Scale: 1"=1'-0"



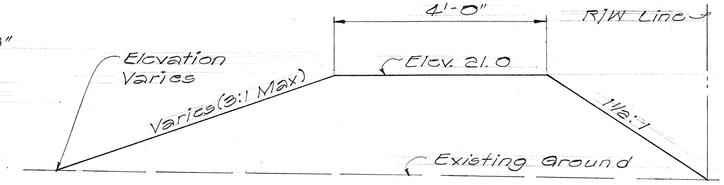
SECTION "A-A"

Scale: 1"=1'-0"



SECTION "C-C"

Scale: 1"=1'-0"



TYPICAL BERM SECTION

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

TYPE B S.D.M.H. #27A AT RAMP "A" STA. 24+70±

C.C.O. #103

NOTE:
This supplement. Sht. prepared during As-Built Posting.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CHANGE ORDER DETAILS

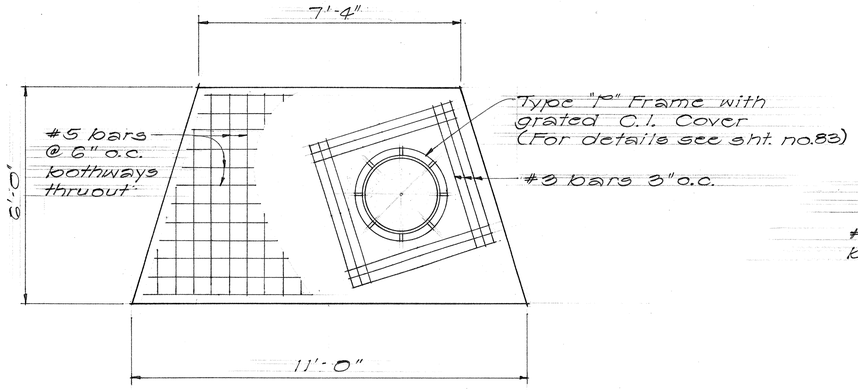
F.A. Proj. No. F-078-1(10)

Scale: As Shown Date: Jan. 1077

SHEET No. OF SHEETS

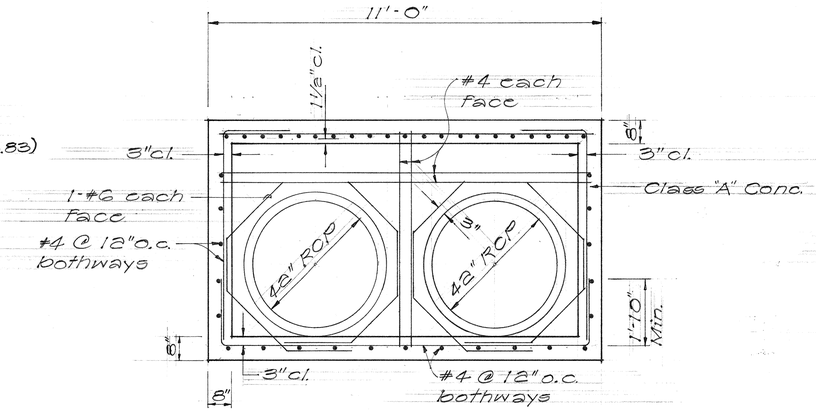
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
NOTE BOOK	TRACED BY	
	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078(10)	1977	C.O. 8353	418



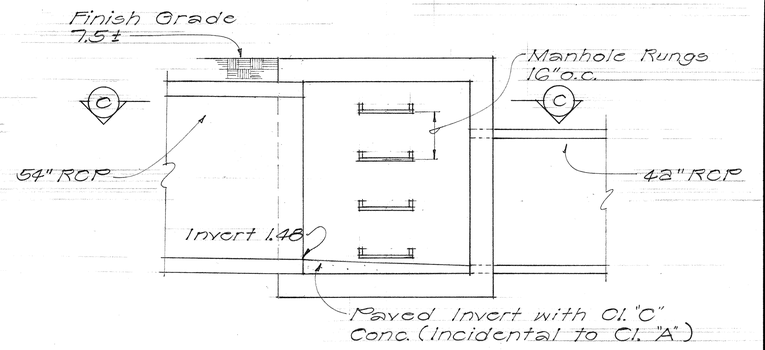
TOP REINFORCEMENT

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



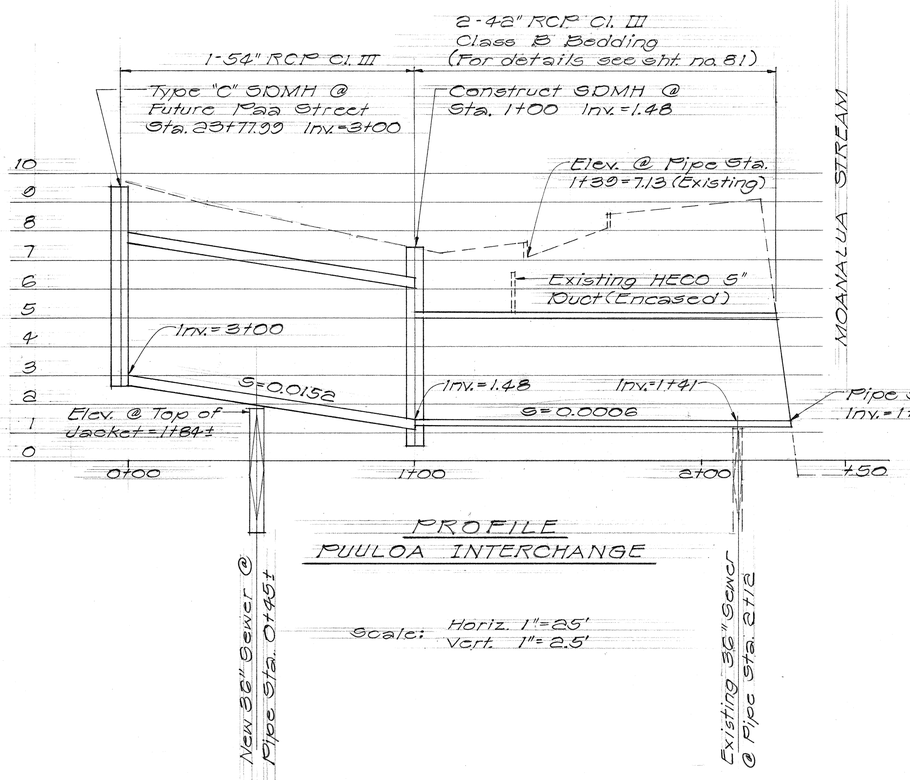
2-42" INLET

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



SECTION A-A

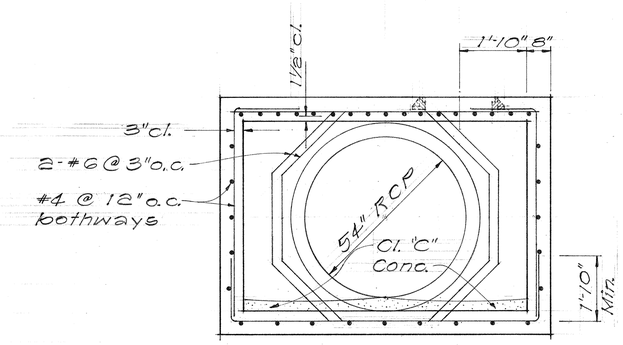
Scale: 1/2"=1'-0"



PROFILE

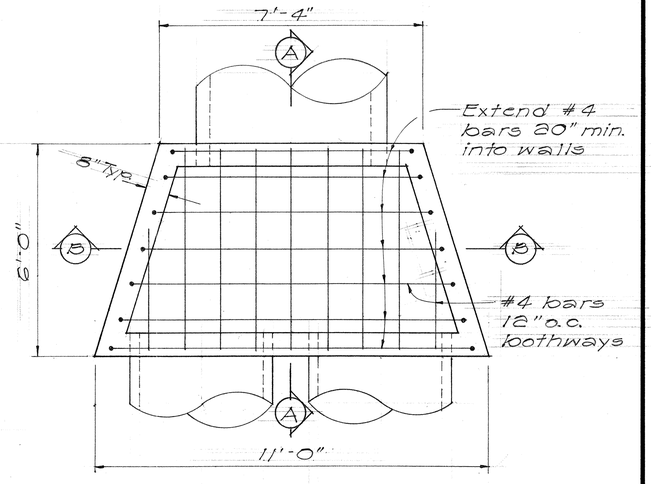
PUULOA INTERCHANGE

Scale: Horiz. 1"=25'
Vert. 1"=2.5'



SECTION B-B

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



SECTION C-C

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

S.D.M.H. W/ GRATED C.I. COVER

NOTE:
This Supplement Sht. prepared during As-Built Posting

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CHANGE ORDER DETAILS

F.A. Proj. No. F-078-1(10)

Scale: As Shown Date: Jan. 1977

SHEET No. OF SHEETS

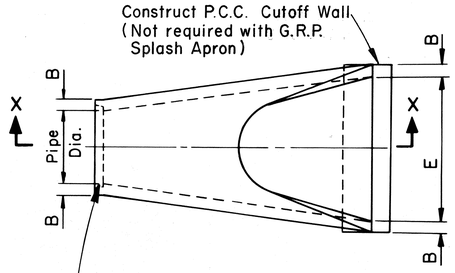
C.C.O. #40

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

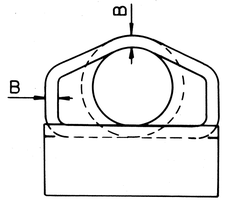
K+E ® TRACING PAPER

83S-3

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	84	418



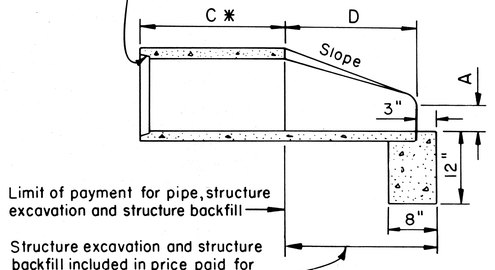
PLAN



END VIEW

Tongue end on inlet section.
Groove end on outlet section.

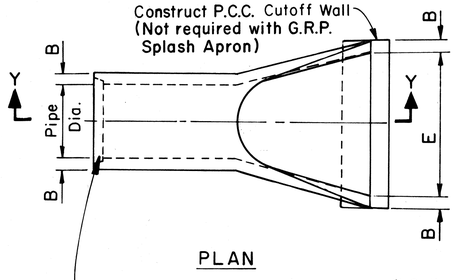
* C dimension shall be as desired by manufacturer and will be paid for at the price paid for concrete pipe.



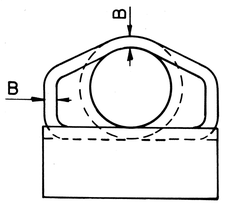
SECTION X-X

MINIMUM DIMENSIONS						
PIPE DIA.	A	B	C*	D	E	Slope
12"	4"	2"		2'-0"	2'-0"	3:1
18"	9"	2½"		2'-3"	3'-0"	"
24"	9½"	3"		3'-7½"	4'-0"	"
30"	1'-0"	3½"		4'-6"	5'-0"	"
36"	1'-3"	4"		5'-3"	6'-0"	"
42"	1'-9"	4½"		5'-3"	6'-6"	"
48"	2'-0"	5"		6'-0"	7'-0"	"
54"	2'-3"	5½"		5'-5"	7'-6"	2.4:1
60"	2'-6"	6"		5'-0"	8'-0"	2:1
72"	2'-0"	7"		6'-6"	9'-0"	"
84"	2'-0"	8"		6'-6"	10'-0"	"

ALTERNATIVE PRECAST CONCRETE FLARED END SECTION



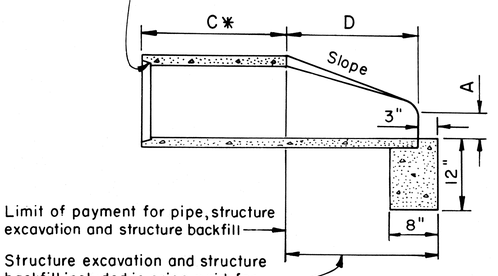
PLAN



END VIEW

Tongue end on inlet section.
Groove end on outlet section.

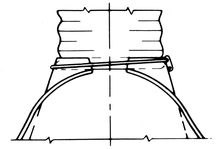
* C dimension shall be as desired by manufacturer and will be paid for at the price paid for concrete pipe.

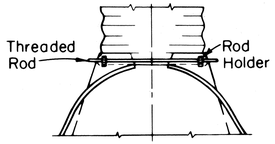


SECTION Y-Y

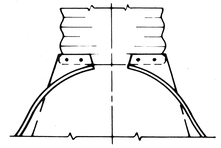
MINIMUM DIMENSIONS						
PIPE DIA.	A	B	C*	D	E	Slope
12"	4"	1¾"		1'-10"	2'-0"	2:1 or flatter
18"	9"	2"		2'-1"	3'-0"	
24"	9½"	2½"		3'-6"	4'-0"	
30"	1'-0"	3"		4'-5"	5'-0"	
36"	1'-3"	3⅜"		5'-2"	6'-0"	
42"	1'-9"	3¾"		5'-3"	6'-6"	
48"	2'-0"	4¼"		6'-0"	7'-0"	
54"	2'-3"	4⅝"		5'-6"	6'-10"	

PRECAST CONCRETE FLARED END SECTION

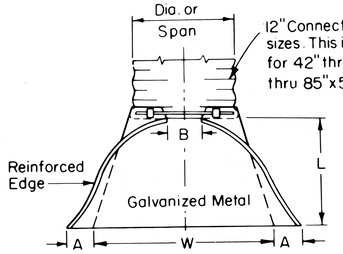




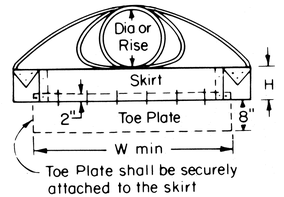
CONNECTIONS WITH ANNULAR CORRUGATIONS



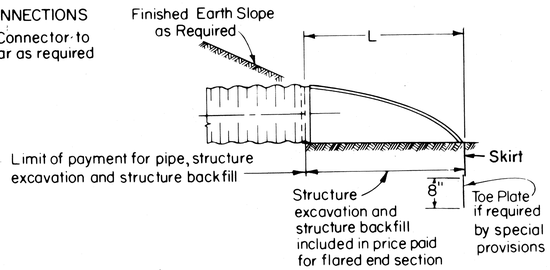
ALTERNATIVE CONNECTIONS
Minimum 1' stub - Connector to be helical or annular as required



PLAN



ELEVATION



TYPICAL CROSS-SECTION

NOTES

1. All 3 pc bodies to have 12 Ga sides and 10Ga center panels. Width of center panels to be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams which are to be tightly joined by ⅜" ø galvanized rivets or bolts.
2. Reinforced edges to be supplemented with galvanized stiffener angles for the 60" thru 84" round, 79" x 49" and 85" x 54" pipe-arch sizes. The angles will be 2" x 2" x ¼" for the 60" thru 72" round, 79" x 49" and 85" x 54" pipe-arch sizes and 2½" x 2½" x ¼" for 78" and 84" round. The angles to be attached by ⅜" ø galvanized, nuts and bolts.
3. Angle reinforcement will be placed under the center panel seams on the 79" x 49" and 85" x 54" pipe-arch sizes.
4. Galvanized toe plate to be available as an accessory when specified.
5. End of pipe to be finished with annular corrugations to conform to flared end section so that no leakage results from the connection. Other designs may be used with approval of the Engineer.

CIRCULAR PIPES							
PIPE DIA.	Ga.	DIMENSIONS - INCHES					
		A	B	H	L	W	
		1" ±	Max	1" ±	1½" ±	2" ±	
12"	16	6	6	6	21	24	
15	16	7	8	6	26	30	
18	16	8	10	6	31	36	
21	16	9	12	6	36	42	
24	16	10	13	6	41	48	
30	14	12	16	8	51	60	
36	14	14	19	9	60	72	
42	12	16	22	11	69	84	
48	12	18	27	12	78	90	
54	12	18	30	12	84	102	
60	12	18	33	12	87	114	
66	12	18	36	12	87	120	
72	12	18	39	12	87	126	
78	12	18	42	12	87	132	
84	12	18	45	12	87	138	

PIPE-ARCHES								
INCHES		Ga.	DIMENSIONS - INCHES					
Span	Rise		A	B	H	L	W	
			1" ±	Max	1" ±	1½" ±	2" ±	
18	11	16	7	9	6	19	30	
22	13	16	7	10	6	23	36	
25	16	16	8	12	6	28	42	
29	18	16	9	14	6	32	48	
36	22	14	10	16	6	39	60	
43	27	14	12	18	8	46	75	
50	31	12	13	21	9	53	85	
58	36	12	18	26	12	63	90	
65	40	12	18	30	12	70	102	
72	44	12	18	33	12	77	114	
79	49	12	18	36	12	77	126	
85	54	12	18	39	12	77	138	

FLARED END SECTIONS FOR C.M.P. CULVERTS

HARLAN H. BLINDAUER
REGISTERED PROFESSIONAL ENGINEER
No. 2163
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

FLARED END SECTIONS

F.A. Proj No. F-078-1(10)

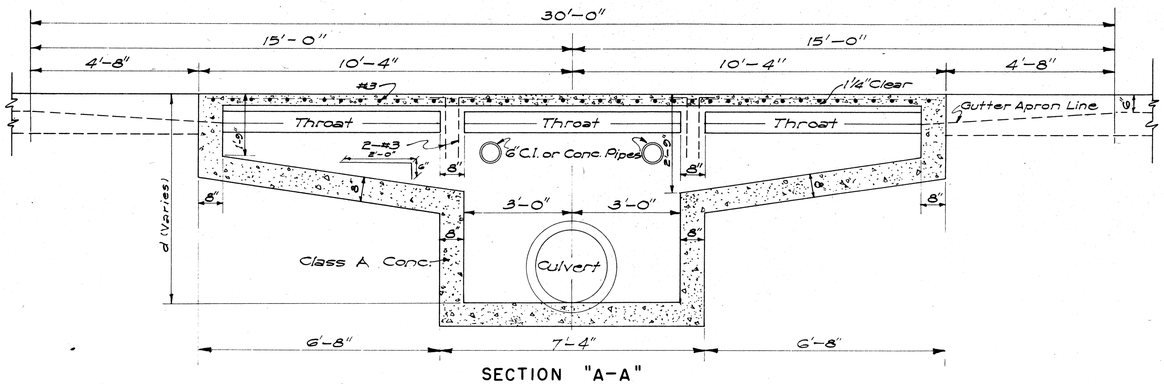
Scale: no scale Date: JAN 1971

SHEET No. 7 OF 23 SHEETS

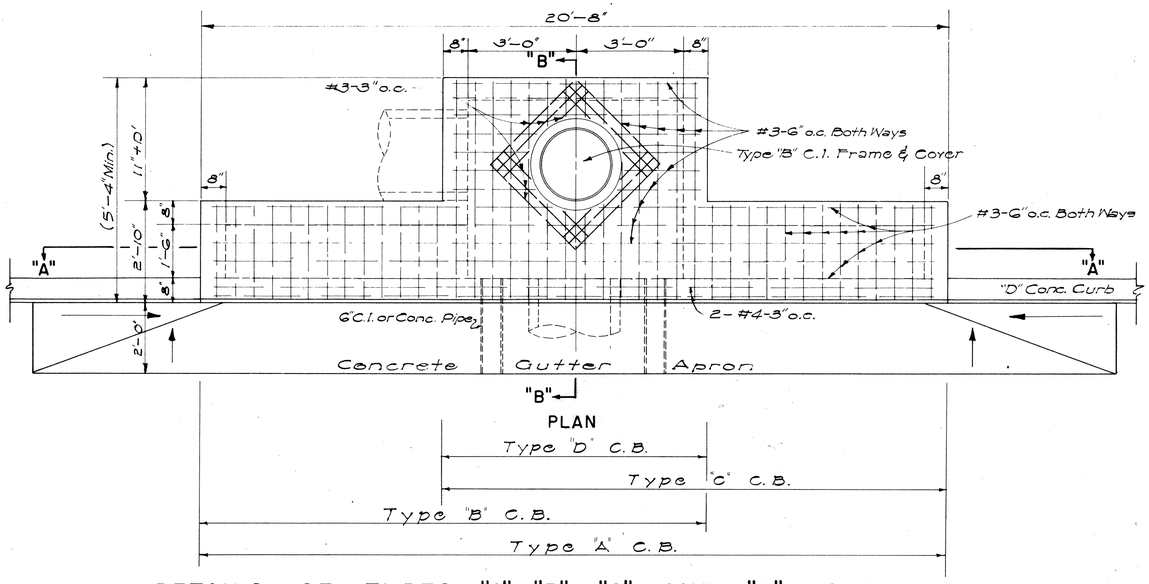
84

2/17/59

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	85	418



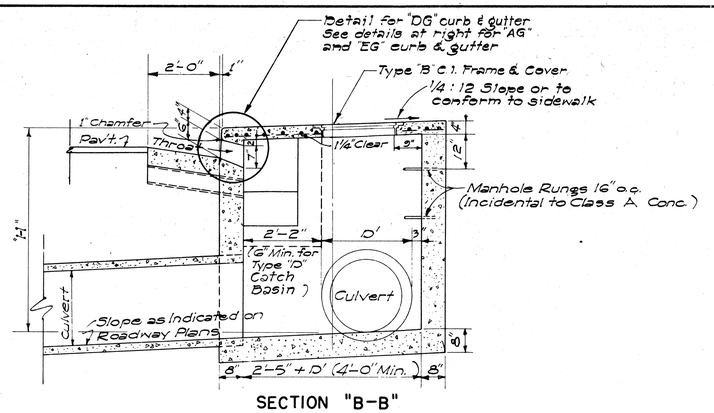
SECTION "A-A"



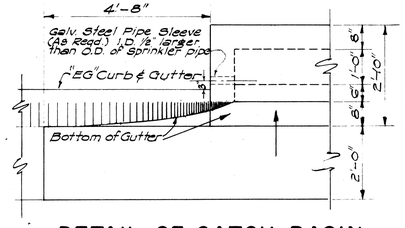
PLAN

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

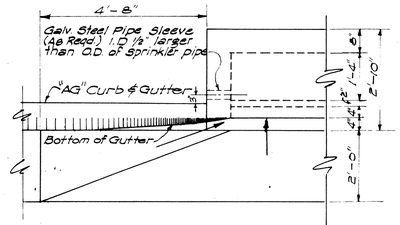
SCALE: 1/2" = 1'-0"



SECTION "B-B"

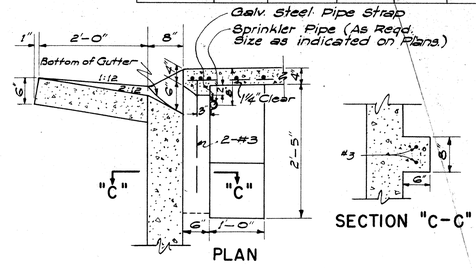


DETAIL OF CATCH BASIN WITH "EG" CURB & GUTTER



DETAIL OF CATCH BASIN WITH "AG" CURB & GUTTER

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

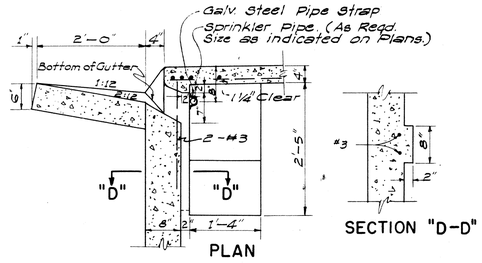


SECTION "C-C"

PLAN

THROAT DETAIL FOR "EG" CURB & GUTTER

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



SECTION "D-D"

PLAN

THROAT DETAIL FOR "AG" CURB & GUTTER

SCALE: 3/4" = 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:

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

CATCH BASINS

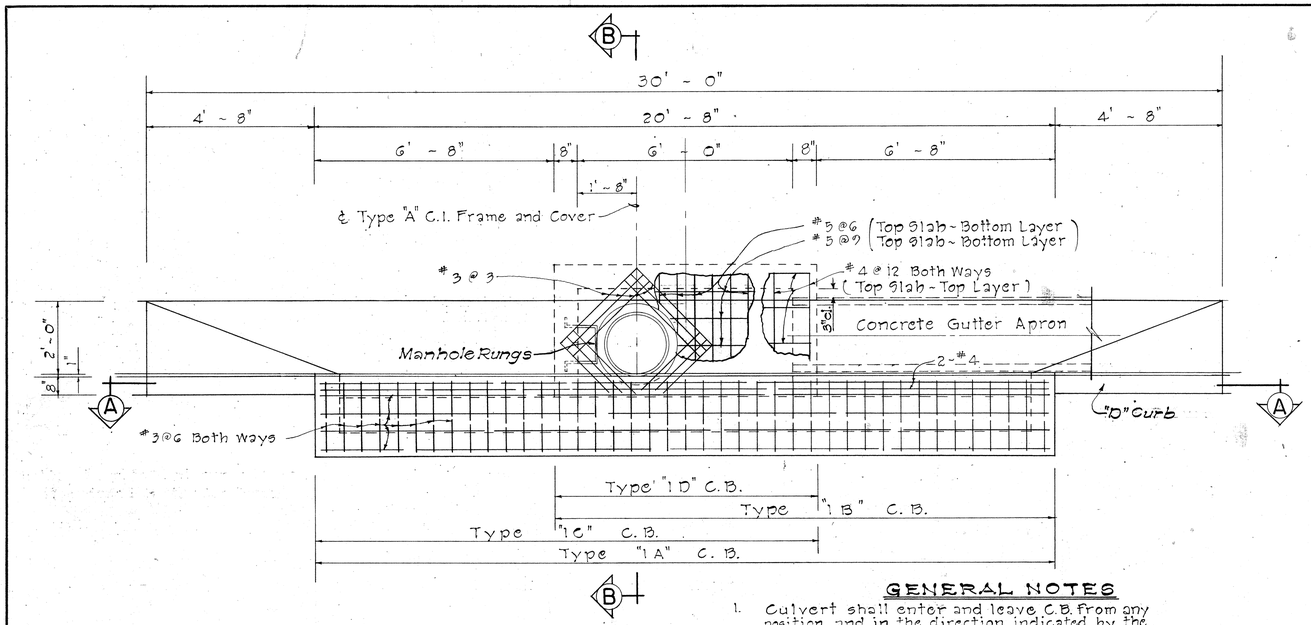
Scale: As Noted — Date: July, 1969

SHEET Nº 8 OF 23 SHEETS DH 1

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

85

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	86	418

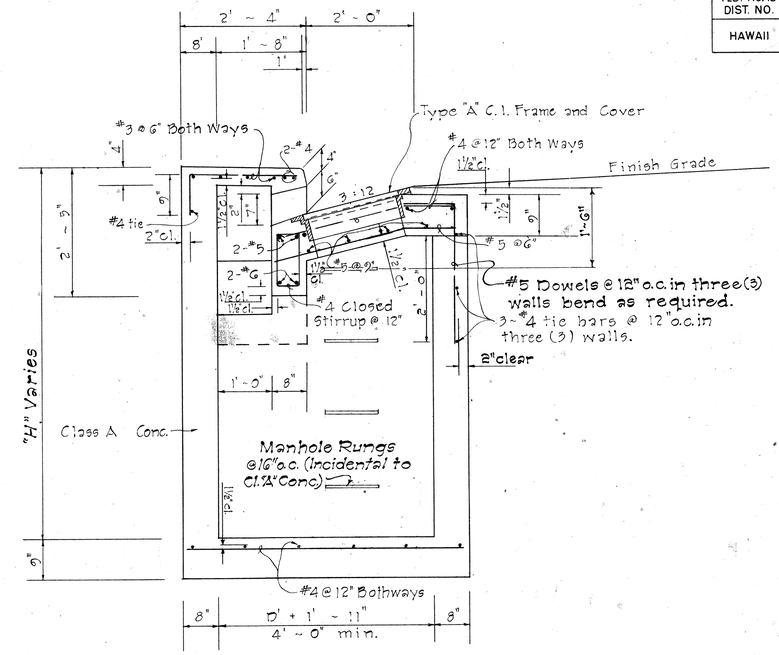


PLAN

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

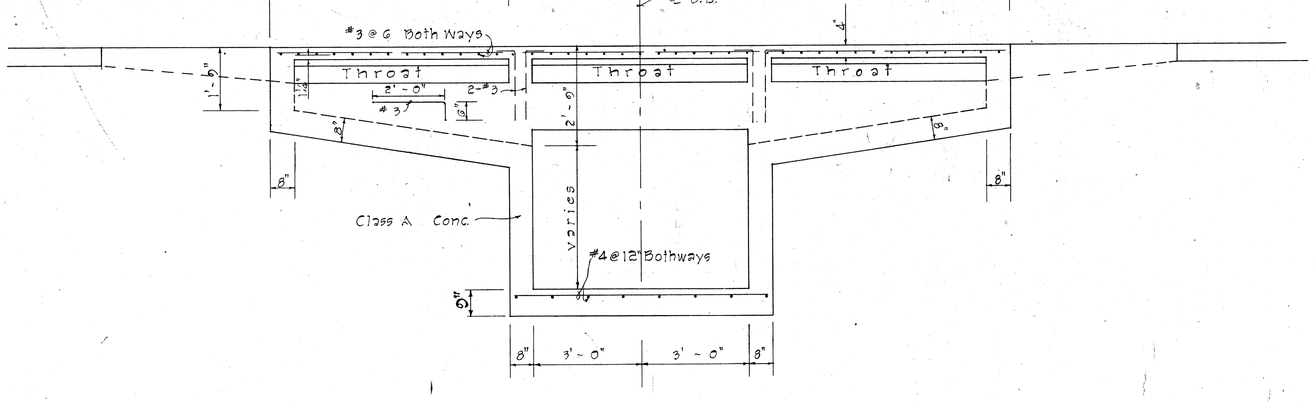
GENERAL NOTES

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 "B-B"

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



SECTION "A-A"

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

DETAILS OF TYPE "IA", "IB", "IC" AND "ID" CATCH BASIN

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

APPROVAL RECOMMENDED:
G. 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

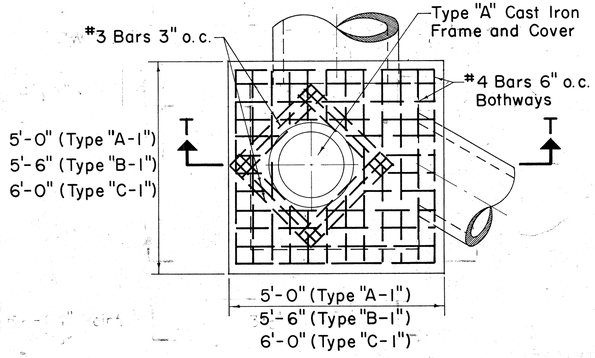
TYPE "IA", "IB", "IC", AND "ID" CATCH BASINS

Scale: As Noted Date: July, 1969

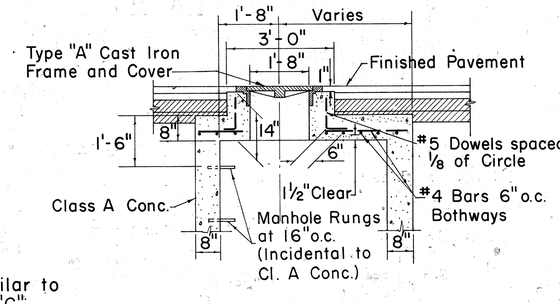
SHEET No. 9 OF 23 SHEETS DH 3

86

FED. ROAD DIST. NO.	STATE	FED. AID. PROJECT	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F-078-1(10)	1971	87	418



PLAN

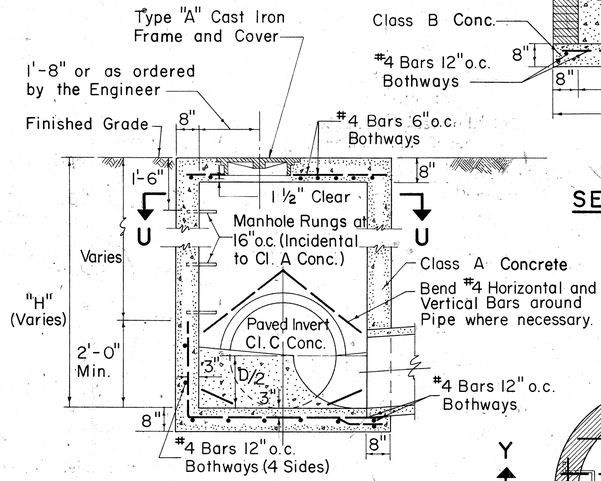


Note:
Bottom detail similar to Type "A", "B", & "C".

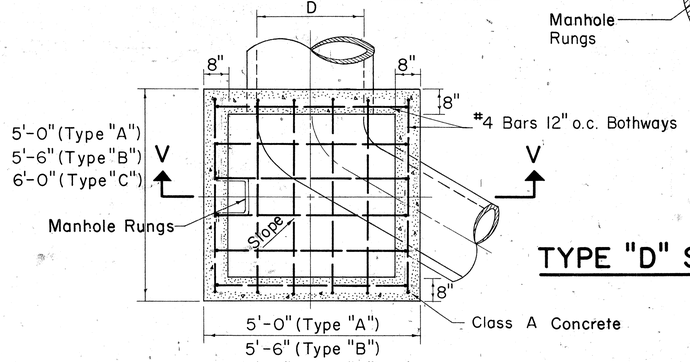
SECTION T-T

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

Scale: ½" = 1'-0"



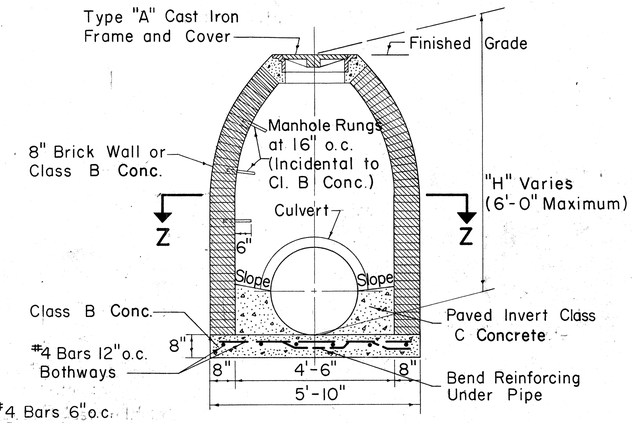
SECTION V-V



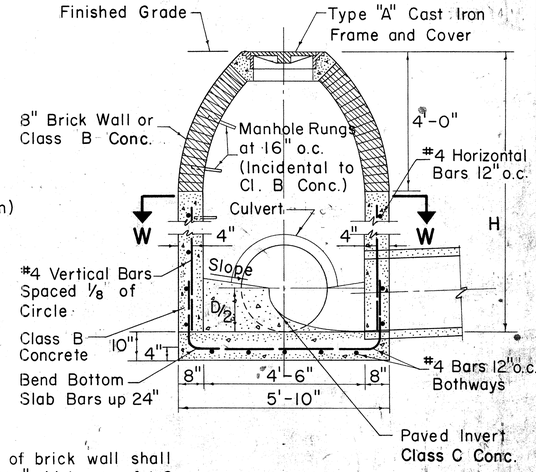
SECTION U-U

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

Scale: ½" = 1'-0"



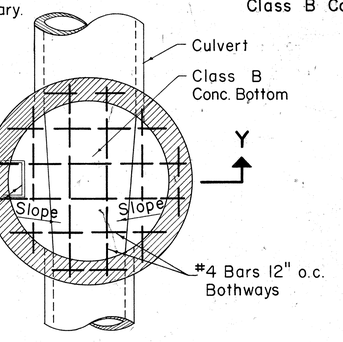
SECTION Z-Z



SECTION X-X

NOTE:

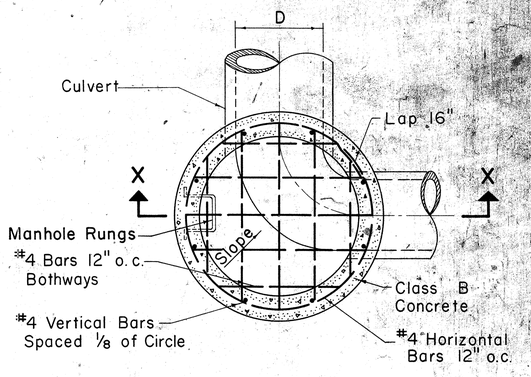
1. Exterior surface of brick wall shall be plastered with 1" thickness of 1:2 Cement Mortar.
2. Number, size and direction of culvert at manhole to be as shown on plans.
3. Paved invert not required at drop manholes.
4. All Class C Concrete to be incidental to Class B Concrete.



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: J. 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

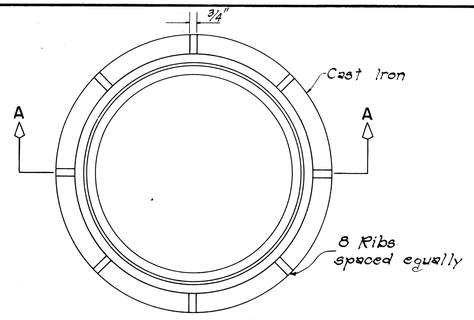
STORM DRAIN MANHOLES

Scales: As Noted — Date: July, 1969

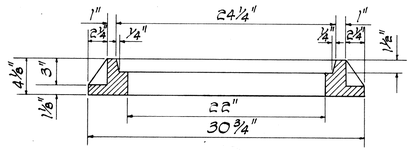
SHEET NO. 10 OF 23 SHEETS DH 5

87

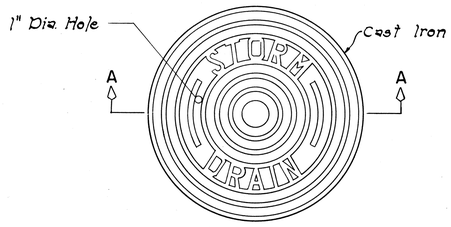
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	88	418



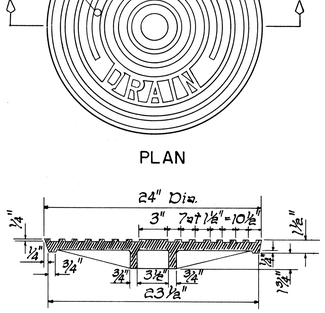
PLAN



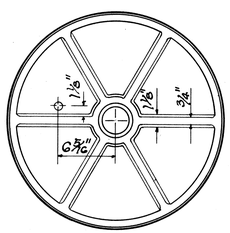
SECTION A-A



PLAN



SECTION A-A

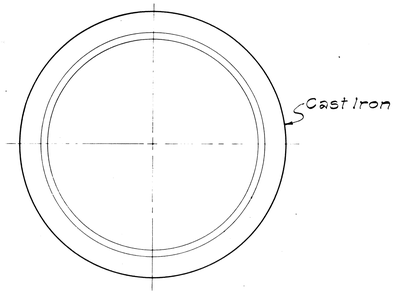


BOTTOM VIEW OF COVER

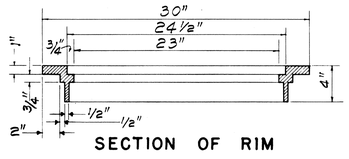
DETAILS OF TYPE "P"

CAST IRON FRAME AND COVER

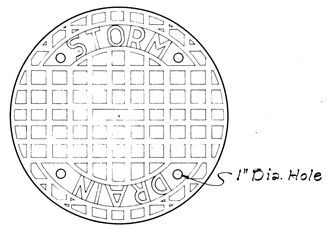
SCALE: 1-1/2" = 1'-0"



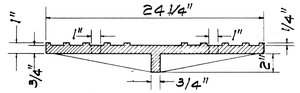
PLAN OF RIM



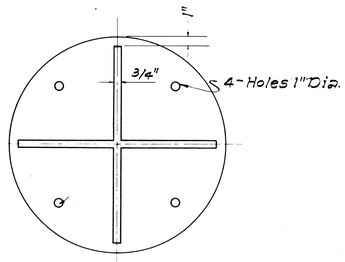
SECTION OF RIM



TOP VIEW OF COVER



SECTION

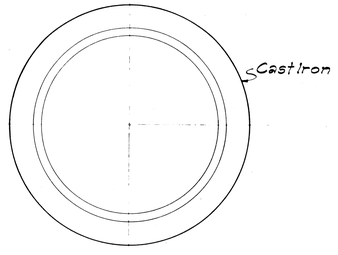


BOTTOM VIEW OF COVER

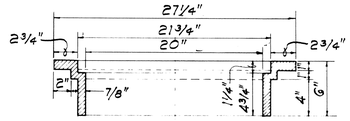
DETAILS OF TYPE "B"

CAST IRON FRAME AND COVER

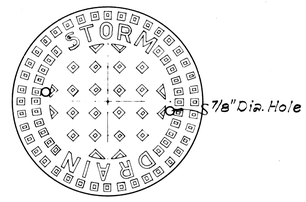
SCALE: 1-1/2" = 1'-0"



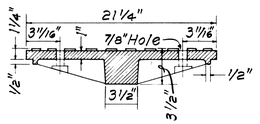
PLAN OF RIM



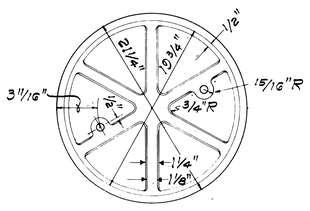
SECTION OF RIM



TOP VIEW OF COVER



SECTION

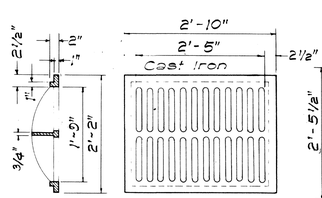


BOTTOM VIEW OF COVER

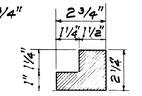
DETAILS OF TYPE "A"

CAST IRON FRAME AND COVER

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



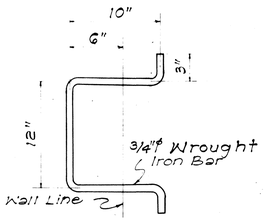
SECTION TOP VIEW TOP VIEW



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:

R. Takano — 12-17-69

HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:

[signature] — 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

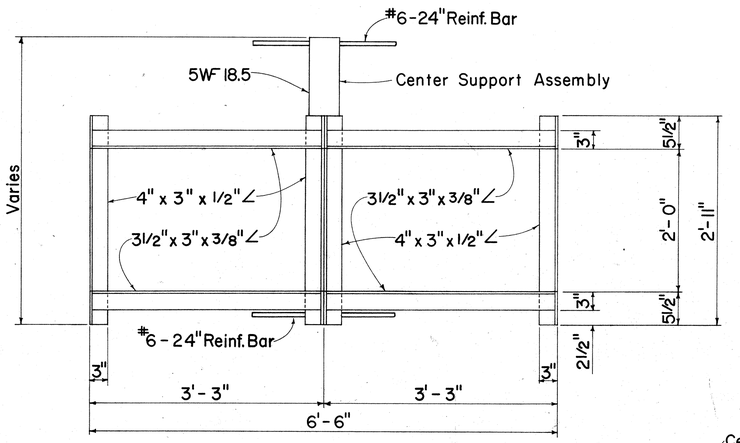
Scale: As Noted — Date: July, 1969

SHEET Nº 11 OF 23 SHEETS DH 6.

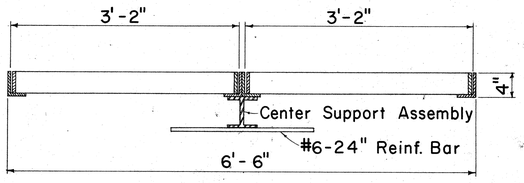
ORIGINAL PLAN	SURVEY PLOTTED BY:	DATE:
	DESIGNED BY:	
	DRAWN BY:	
NOTE BOOK	TRACED BY: Calisto	
No.	QUANTITIES BY:	
	CHECKED BY:	

RACING CLOTH 884

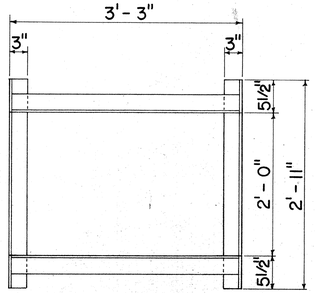
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	89	418



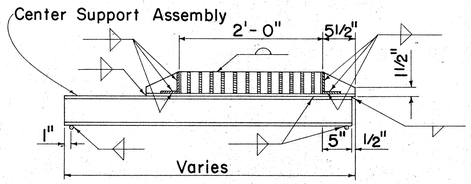
PLAN
(Two or More Grates)



LONGITUDINAL SECTION
(Thru Frame & Grate)

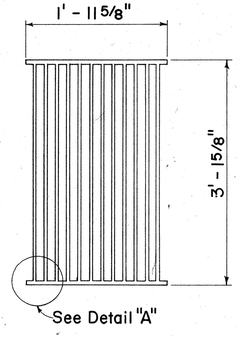


PLAN
(Single Grate)

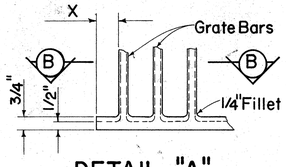


CROSS SECTION
(Thru Frame & Grate)

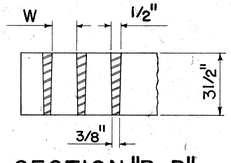
FRAME DETAILS
Scale: 1"= 1'-0"



PLAN
Scale: 1"= 1'-0"

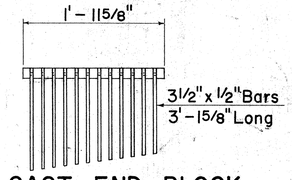


DETAIL "A"
Scale: 3"= 1'-0"

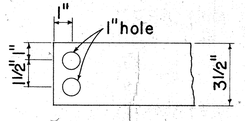


SECTION "B-B"
Scale: 3"= 1'-0"

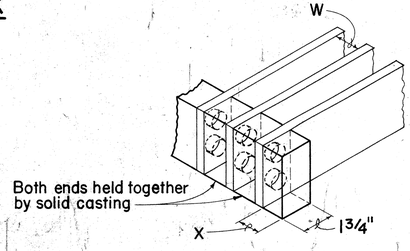
ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL GRATE



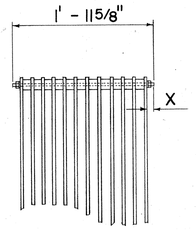
CAST END BLOCK
Scale: 1"= 1'-0"



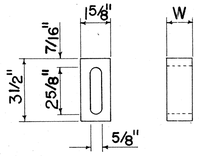
END OF BAR
Scale: 3"= 1'-0"



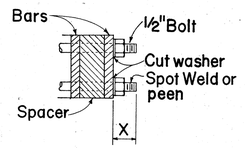
ALTERNATIVE CAST MALLEABLE IRON OR CAST STEEL END BLOCK GRATE



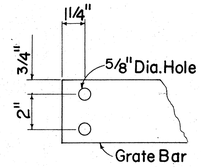
BOLTED END BLOCK
Scale: 1"= 1'-0"



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

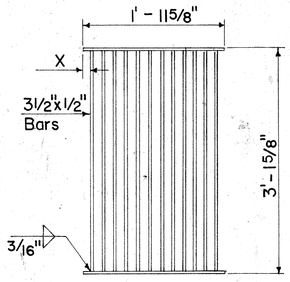


BOLTING DETAIL
Scale: 3"= 1'-0"



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

ALTERNATIVE BOLTED GRATE



SECTION

PLAN
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:
Rudy G. Salas — 12-17-69
ASSISTANT CHIEF, ENGINEERING — DATE

NO.	REVISION	APPROVED BY	DATE

Scale: 1"= 1'-0"

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

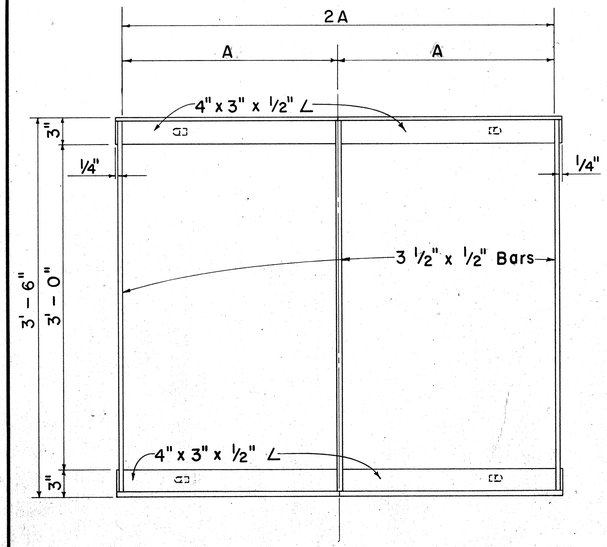
TYPE A-9 AND A-12 FRAMES AND GRATES

Scales: As Noted — Date: Aug. 1968

SHEET No. 12 OF 23 SHEETS DH 7

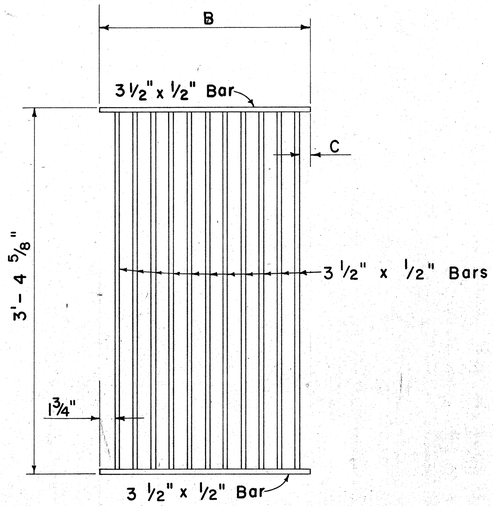
ORIGINAL PLAN		DATE
SURVEY PLOTTED BY		
DRAWN BY	L.C.L.A.Y.	7/68
TRACED BY	L.C.L.A.Y.	8/68
DESIGNED BY	L.C.L.A.Y.	7/68
QUANTITIES BY		
CHECKED BY	H.K.M.	8/68
NOTE BOOK		
No.		

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	90	418



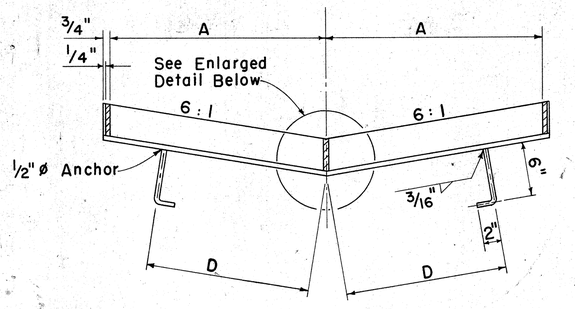
PLAN

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



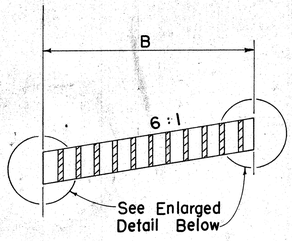
PLAN

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



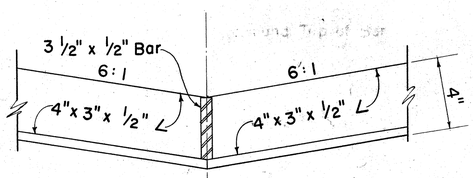
SECTION

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



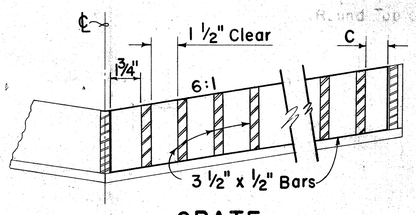
SECTION

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



FRAME

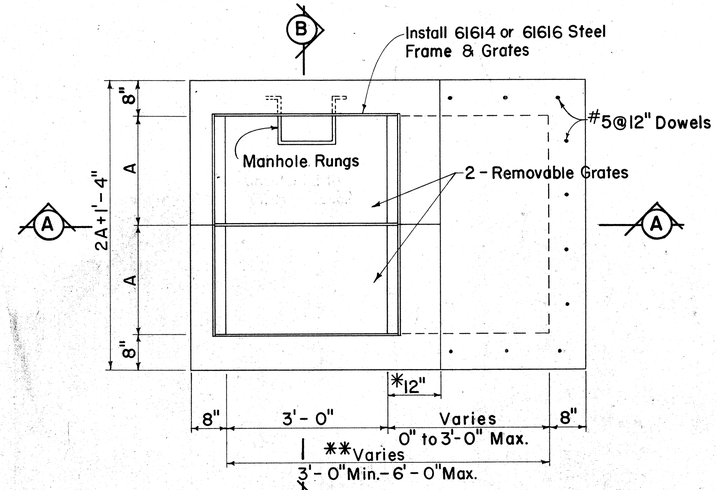
Scale: 3" = 1'-0"



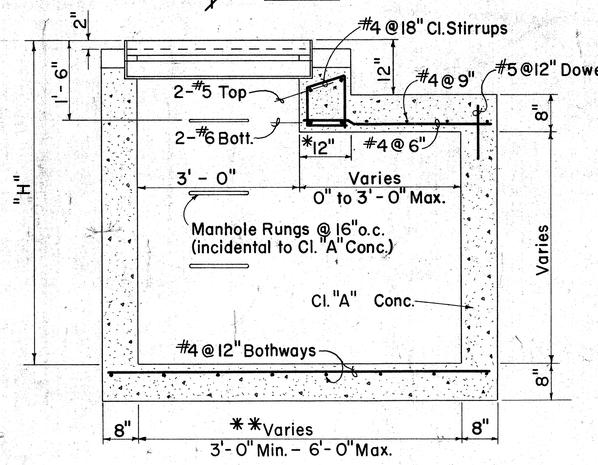
GRATE

Scale: 3" = 1'-0"

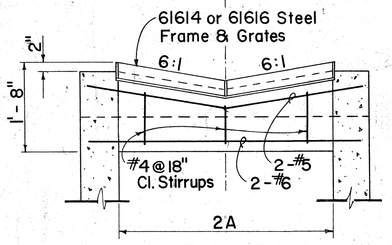
DETAILS OF TYPE 61614 OR 61616 STEEL FRAME AND GRATES



B PLAN



SECTION A - A



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:

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

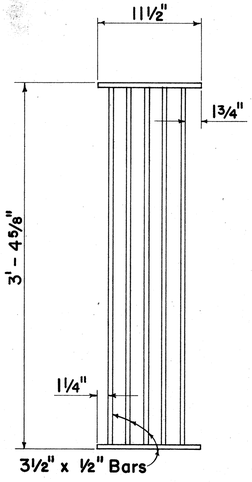
Scales: As Noted — Date: Feb. 1969

SHEET No. 13 OF 23 SHEETS DH 8

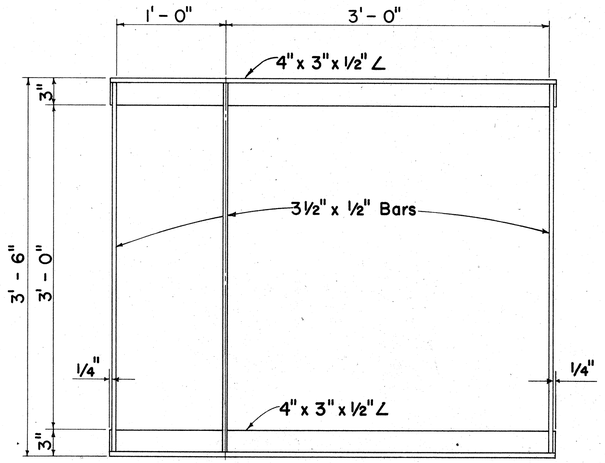
90

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

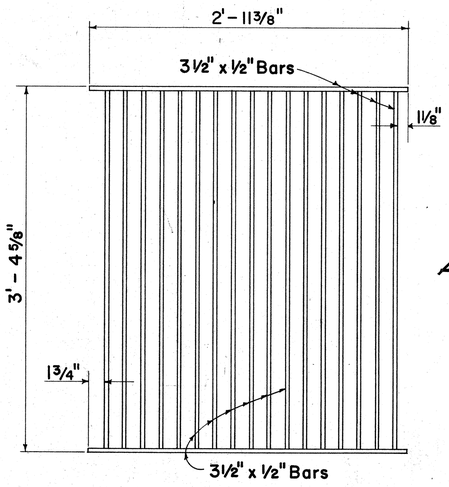
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	91	418



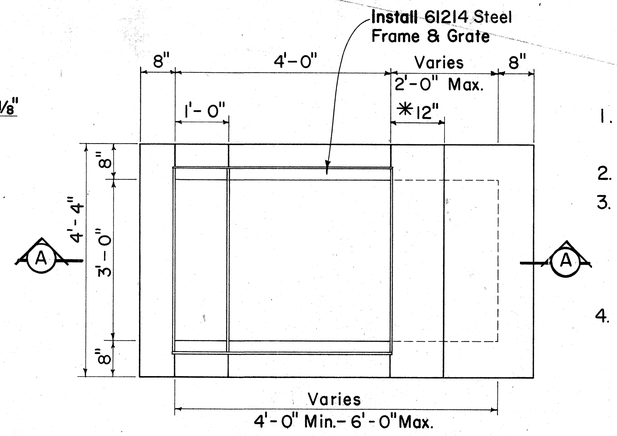
PLAN
Scale: 1½" = 1' - 0"



PLAN
Scale: 1½" = 1' - 0"



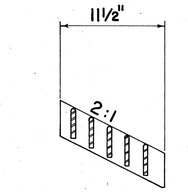
PLAN
Scale: 1½" = 1' - 0"



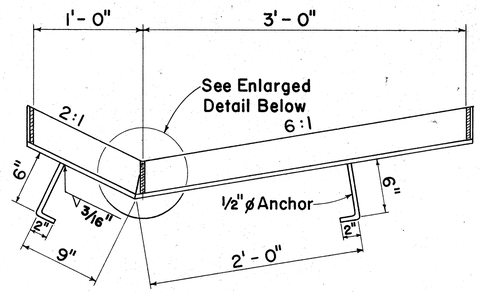
PLAN

GENERAL NOTES

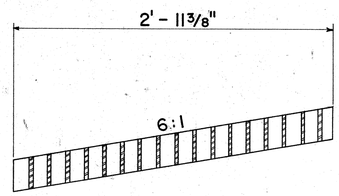
1. Grates and Frames shall be hot dip galvanized after fabrication, see specifications.
2. All welds ⅜" unless otherwise noted.
3. The Frame & Grate materials shall conform to the specifications of ASTM Desigination Structural Steel A283, Grade D and the Standard Specifications.
4. Culvert shall leave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



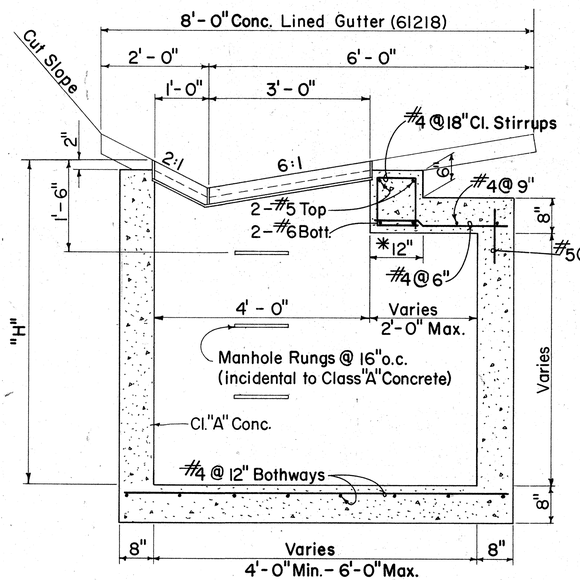
SECTION
Scale: 1½" = 1' - 0"



SECTION
Scale: 1½" = 1' - 0"



SECTION
Scale: 1½" = 1' - 0"

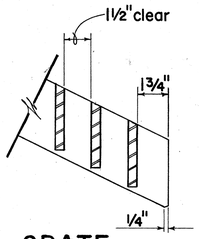


SECTION A - A

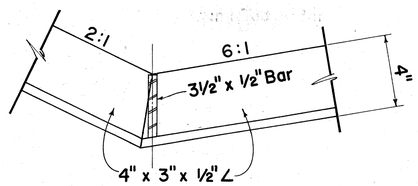
DETAIL OF 61214 DROP INTAKE

Scale: ¾" = 1' - 0"

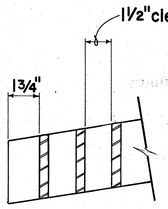
*For Minimum size box of 4'-0" only, use 8" and eliminate reinforcing steel shown in top portion.



GRATE
Scale: 3" = 1' - 0"



FRAME
Scale: 3" = 1' - 0"



GRATE
Scale: 3" = 1' - 0"

DETAILS OF TYPE 61214 STEEL FRAME AND GRATES

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

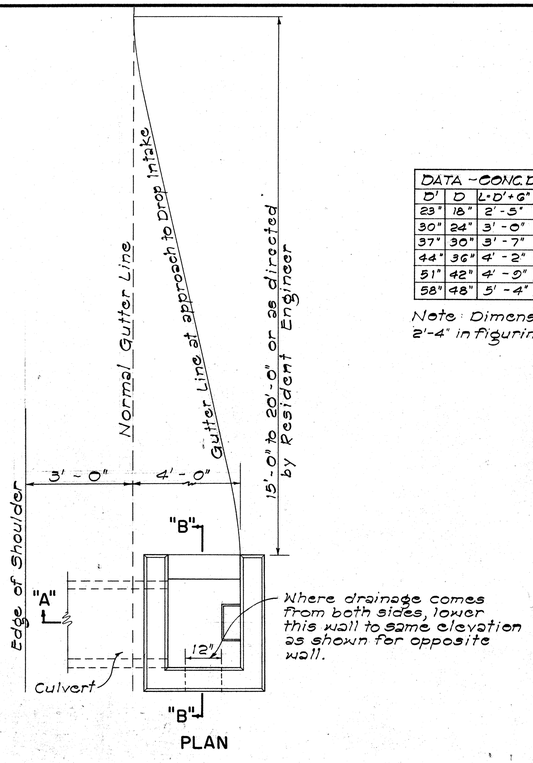
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
TYPE 61214
GRATED DROP INTAKE

Scales: As Noted — Date: July 1969

SHEET No. 14 OF 23 SHEETS DH 9

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

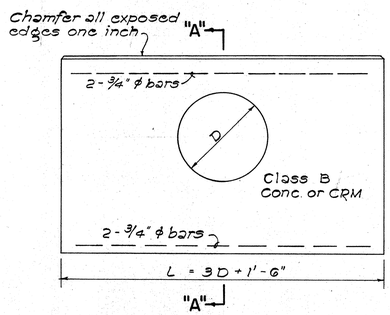
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	92	418



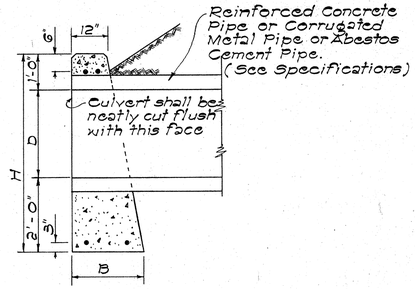
PLAN

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"

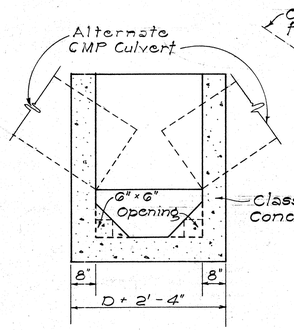
Note: Dimension "X" is assumed as 2'-4" in figuring the above quantities.



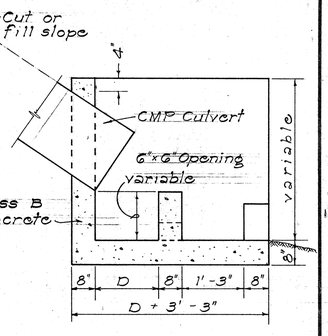
ELEVATION



SECTION "A-A"



SECTION "C-C"



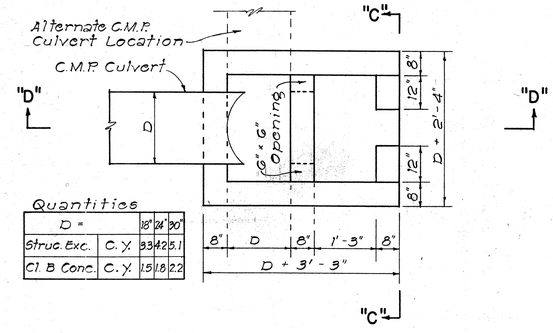
SECTION "D-D"

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.	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'-0"	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'-6"	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"

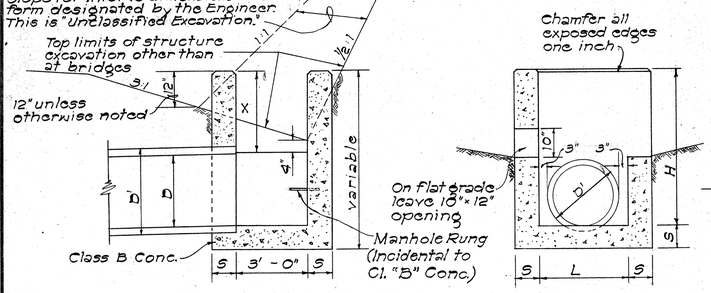


Quantities				
D =		18"	24"	30"
Struc. Exc.	C.Y.	9.3	14.2	5.1
Cl. B Conc.	C.Y.	1.5	1.8	2.2

PLAN

DETAILS OF CONC. DROP BOX AT OUTLET OF CULVERT PIPE

NOT TO SCALE



SECTION "A-A"

SECTION "B-B"

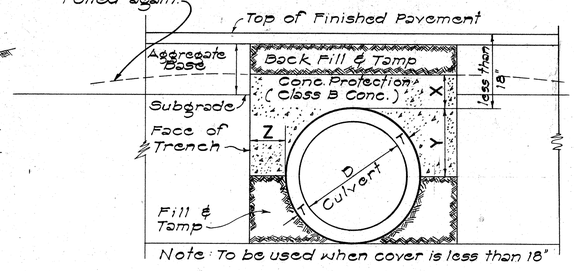
DETAIL OF CONCRETE DROP INTAKE

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.



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:
Y. Takamo
HYDRAULIC DESIGN ENGINEER — DATE 12-17-69

APPROVED:
Stanley Sakai
ASSISTANT CHIEF, ENGINEERING — DATE 12-17-69

NO.	REVISION	APPROVED BY	DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

DROP INTAKE, HEADWALL & CONCRETE PROTECTION

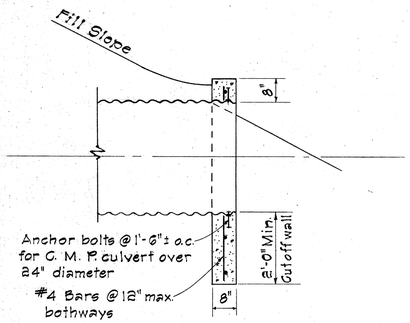
Scale: As Noted — Date: Aug. 1967

SHEET No. 15 OF 23 SHEETS DH 10

92

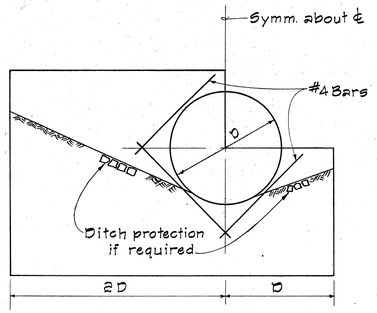
ORIGINAL PLAN | SURVEY PLOTTED BY | DRAWN BY | DESIGNED BY | NOTE BOOK | QUANTITIES BY | CHECKED BY | No. | DATE

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	93	418

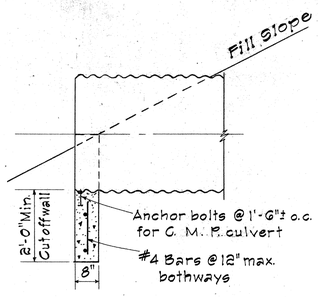


SECTION

FULL HEADWALL



HALF ELEVATION



HALF ELEVATION

SECTION

HALF HEADWALL

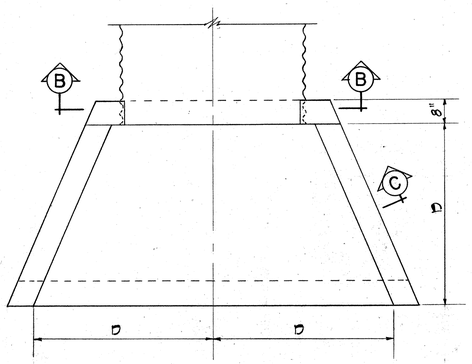
SUMMARY OF QUANTITIES				
Culvert Dia. (inches)	Full Headwall		Half Headwall	
	Concrete (Cu. Yd)	Reinf. Steel (Lbs)	Concrete (Cu. Yd)	Reinf. Steel (Lbs)
18	0.57	45	0.18	15
24	0.85	65	0.26	20
30	1.15	85	0.34	25
36	1.50	115	0.43	35

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

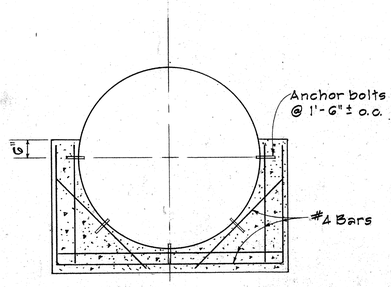
GENERAL NOTES

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.

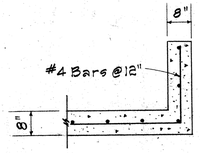
OUTLET STRUCTURE FOR CULVERT SIZES 18 IN. TO 36 IN. DIAMETER



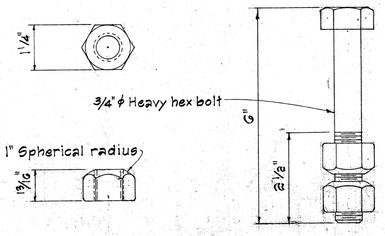
PLAN



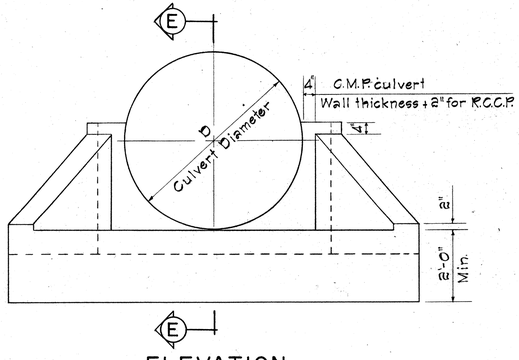
SECTION B-B



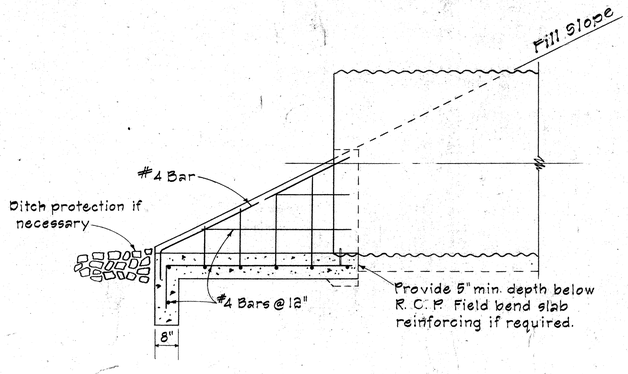
PARTIAL SECTION C



ANCHOR BOLT DETAIL



ELEVATION



SECTION E-E

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

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.

NO.	REVISION	APPROVED BY	DATE

APPROVAL RECOMMENDED:

H. Takasu — 12-17-69

HYDRAULIC DESIGN ENGINEER — DATE

APPROVED:

[illegible] — 12-17-69

ASSISTANT CHIEF, ENGINEERING — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

OUTLET STRUCTURES

FOR CULVERT AND PIPE

SIZES 18" TO 60" DIAMETER

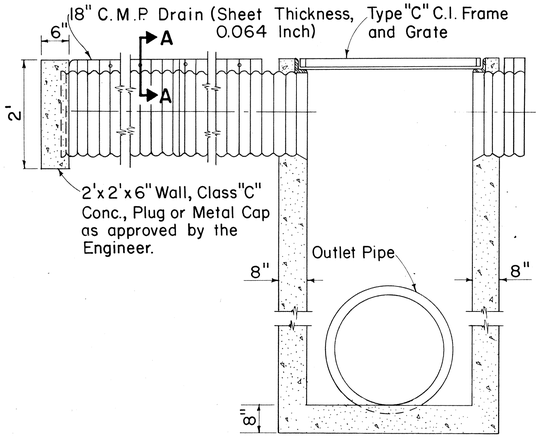
Not To Scale — Date: July, 1969

SHEET No. 16 OF 23 SHEETS DH 14

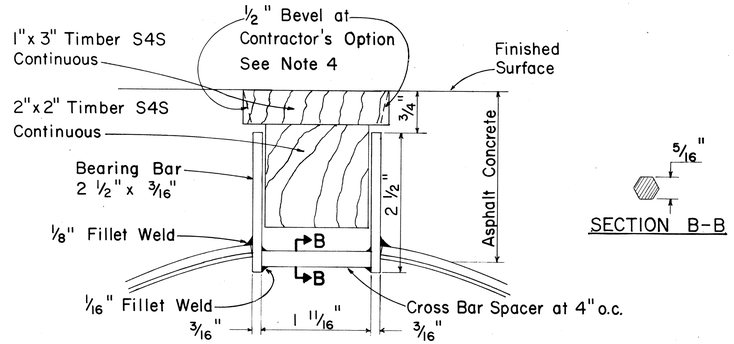
93

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	94	418



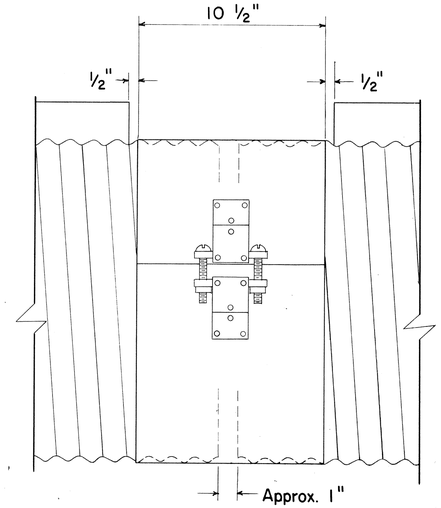
MEDIAN DRAIN INLET STRUCTURE



SECTION A-A

WELDED SLOT DRAIN

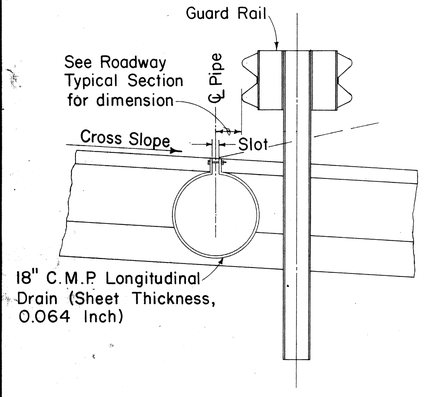
SECTION B-B



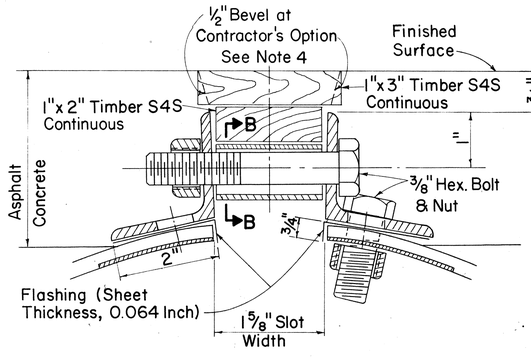
TYPICAL COUPLING BAND FOR WELDED SLOT DRAIN

GENERAL NOTES

1. All bolts, nuts, angles, pipe spacers and welded connections to be galvanized.
2. 1"x 2", 1"x 3" and 2"x 2" S4S timber to remain in place until final clean-up operations are complete.
3. Angle Slot and Flanged Slot Drain sections shall be assembled with flange slot coupling band and bolted through drain section flange.
4. If the Contractor elects to use bevel, a 1"x 4" S4S timber shall be used in lieu of 1"x 3" S4S timber.
5. 20' units of 18" slotted C.M.P. drain shall be fabricated and all nuts and bolts tightened prior to beginning field installation.
6. The Contractor shall take precaution to prevent adhesion between timber placed in the slotted drain as shown on Section A-A and the asphalt concrete paving.
7. The Contractor has the option of using the angle, flanged, or welded slotted method of fabrication.
8. The slotted C.M.P. shall not be installed until after any adjacent P.C.C. pavement has been completed.

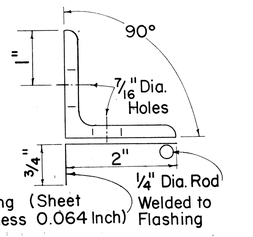


TYPICAL CROSS SECTION

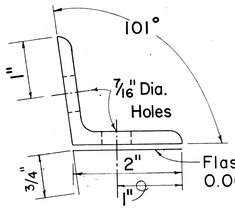


SECTION A-A

ANGLE SLOT DETAIL

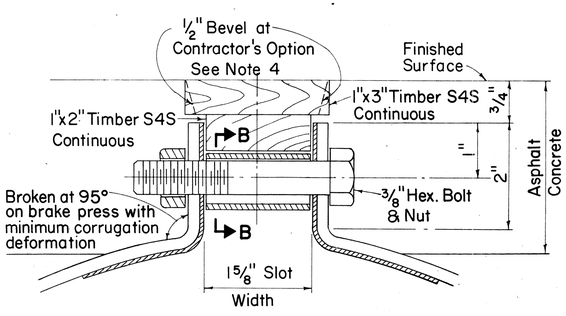


ALTERNATIVE SLOT ANGLE



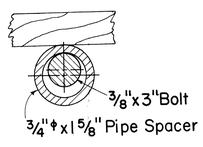
SLOT ANGLE

2"x 2"x 3/16" ANGLE DETAILS

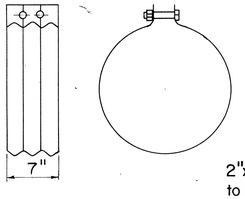


SECTION A-A

FLANGED SLOT DETAIL

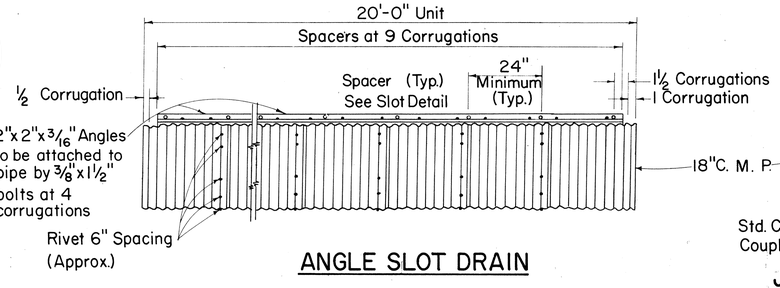


SECTION B-B

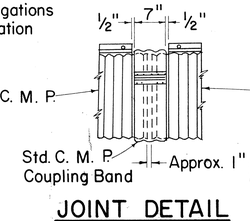


FLANGE SLOT COUPLING BAND

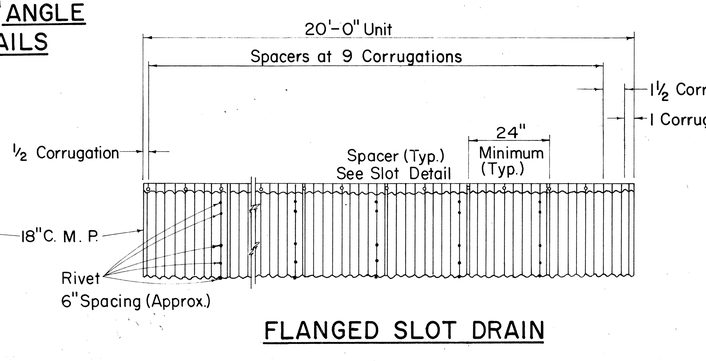
See Note 3



ANGLE SLOT DRAIN



JOINT DETAIL



FLANGED SLOT DRAIN

NO.	REVISION	APPROVED BY	DATE
1	a. Spacing of Pipe Spacers b. Conversion to Sheet Thickness	H.T.	9-25-70 9-23-70
2	a. Addition of Welded Slot Details b. Revision to General Notes	H.T.	1-26-71

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

APPROVED:
Shelden E. Dodd — ASSISTANT CHIEF, ENGINEERING — 12-17-69 DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

18" SLOTTED C. M. P. DRAINS

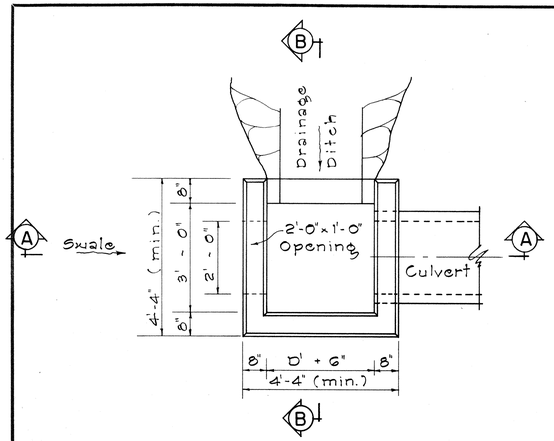
Not To Scale — Date: July, 1969

SHEET No. 17 OF 23 SHEETS DH 17

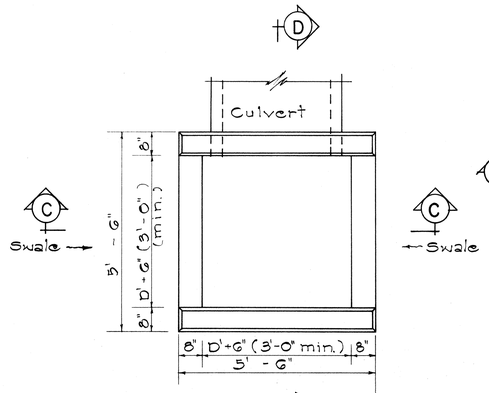
94

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

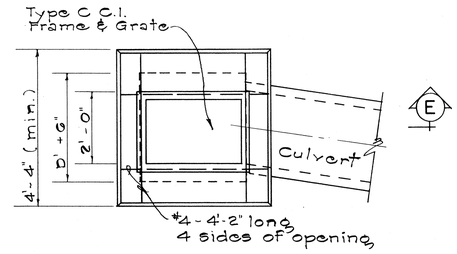
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	95	418



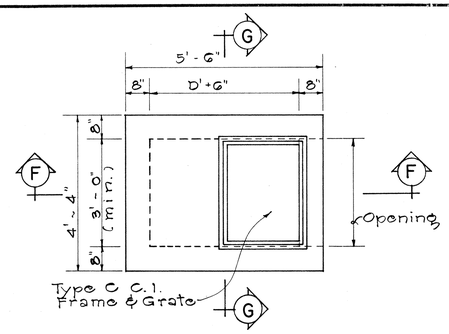
PLAN



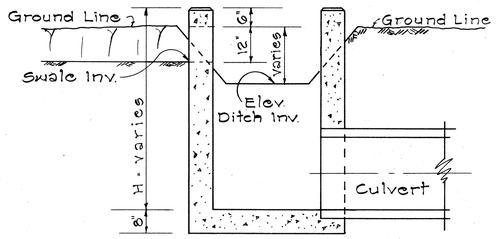
PLAN



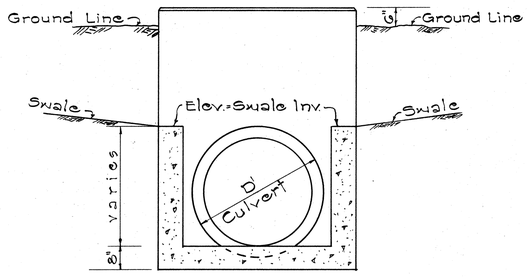
PLAN



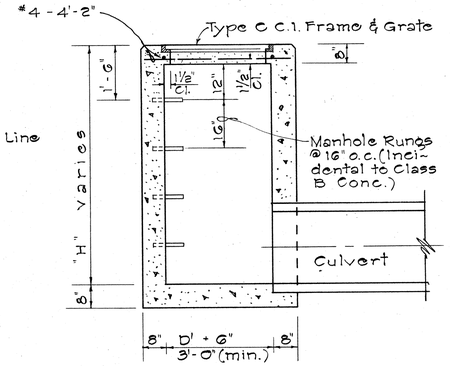
PLAN



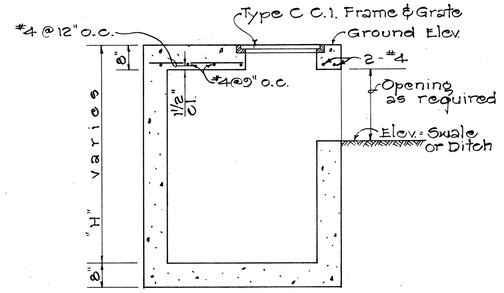
SECTION "A-A"



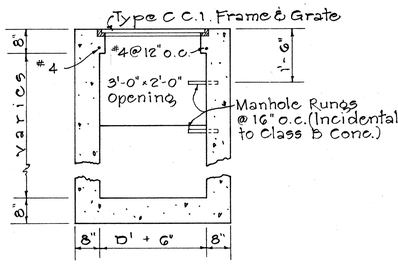
SECTION "C-C"



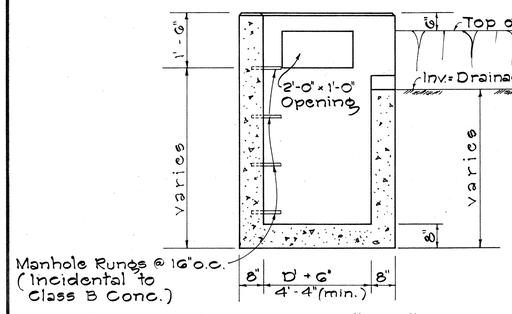
SECTION "E-E"



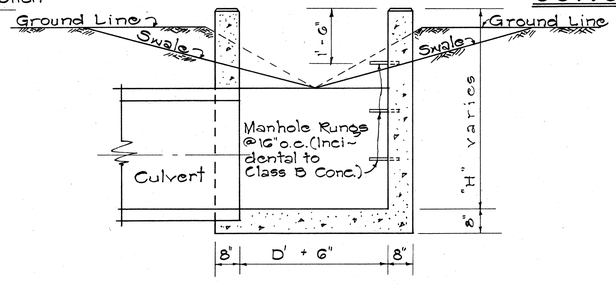
SECTION "F-F"



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 maybe 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: R. 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. 18 OF 23 SHEETS DH19

95

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

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	96	418

DRAINAGE QUANTITY SUMMARY

Note: Whenever gages for Corrugated Metal Pipes are called for on the plans, the equivalent thickness in inches shall be used. The equivalents are as follows:
14 Gage = 0.0785" ± 0.007"
12 Gage = 0.1084" ± 0.008"

DRAINAGE SHEET NO.	DRAINAGE STRUCTURE NO.	STRUCTURE TYPE	202.11 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	206.01 STRUCTURE EXC. OTHER THAN AT BRIDGE	207.01 DITCH AND CHANNEL EXC.	640.01 LINED DRAINAGE DITCH	503.001 CONCRETE OTHER THAN IN BRIDGES	503.201 CLASS "B" CONCRETE OTHER THAN IN BRIDGES	508.01 CEMENT RUBBLE MASONRY	602.101 REINFORCING STEEL OTHER THAN IN BRIDGES	603.0010 BED COURSE MATERIAL FOR CULVERT	REINFORCED CONCRETE PIPE (OR ASBESTOS CEMENT FOR PIPES 24" THRU 36" DIA.) CLASS III 603.5040 24"	603.5060 30"	603.1016 36"	603.1018 42"	603.1020 48"	603.5054 54"	CLASS IV 24"	CLASS IV 30"	603.2031 24"C.M.P.(14 GAGE) OR 24" REINF. CONCRETE END SECTION	637.01 18" C.M.P. SLOT DRAIN (16 GAGE)	603.2066 24" C.M.P. (14 GAGE)	603.7020 18" C.M.P. (14 GAGE) OR 18" R.C.P. (CLASS III) OR 18" A.C.P. (CLASS III)	604.204 Type "P" Frame with Grated Cast Iron Cover	603.7200 24" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS III) OR 24" A.C.P. (CLASS III)	603.7202 24" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS IV) OR 24" A.C.P. (CLASS IV)	603.7260 30" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS III) OR 24" A.C.P. (CLASS III)	603.7380 36" C.M.P. (12 GAGE) OR 30" R.C.P. (CLASS III) OR 30" A.C.P. (CLASS III)	604.201 TYPE "A" CAST IRON FRAME AND COVER	604.202 TYPE "B" CAST IRON FRAME AND COVER	604.232 TYPE A-12 STEEL FRAME AND GRATE	604.235 TYPE 6121 STEEL FRAME AND GRATE	604.236 TYPE 61614 STEEL FRAME AND GRATE	604.243 TYPE "C" CAST IRON FRAME AND GRATE	604.302 REMOVING, CLEANING, PAINTING, AND REINSTALLING TYPE B C.I. FRAME AND COVER	612.01 GROUTED RUBBLE PAVING	609.700 GUTTER TYPE 7 (61214)	609.709 GUTTER TYPE 7 (41115)	609.704 GUTTER TYPE 7 (61218)
			L.S.	C.Y.	C.Y.	L.F.	C.Y.	C.Y.	C.Y.	Lbs.	C.Y.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	Each	L.F.	L.F.	Each	L.F.	Each	L.F.	L.F.	L.F.	L.F.	Each	Each	Each	Each	Each	Each	Each	C.Y.	L.F.	L.F.	L.F.
A&B		GUTTER RT. MOANA & RAMP "G"			—																																		1,310
A	①	61214 G.D.I.		8			2.1			34																														
				122																						212												
	②	SINGLE A-12 GRATE C.B.		4			1.7			6																						1							
				43																						86												
	③	"C" G.D.I. W/ SLOT DRAIN		* 7			2.6			12												120											1					
				206																						232												
	⑤	"D" CATCH BASIN		15			3.9			77																					**						1			
				17																						28												
	⑦	"D" CATCH BASIN		19			3.4			77																					**						1			
		CMP W/ OUTLET STRUC. HDWL.		20			0.9			65														28												1			
	⑨	"D" CATCH BASIN		8			3.4			77																					**						1			
A		CMP W/ SPLASH APRON		32																				46												1			
D	⑩	"D" CATCH BASIN		8			3.4			77																					1									
D		CMP W/ SPLASH APRON		50																				74												1			
A	⑪	61614 G.D.I.	LT & RT STA 291+MOANA @ 350.00	9			2.3			34																							1						
A				55																						86												
B	⑫	61214 G.D.I.		9			2.3			34																											1			
				48																						72												
	⑬	61214 G.D.I.		9			2.5			34																											1			
				91																						100												
	⑭	DOUBLE A-12 GRATE C.B.		6			2.8			27																										2			
				33																						50												
	⑮	SINGLE A-12 GRATE C.B.		6			2.2			6																										1			
				35																						94												
	⑯	TYPE "A" S.D.M.H.		12			4.1			160																								1						
				63							26 (CLASS "B")																						84							
	⑰	SINGLE A-12 GRATE C.B.		4			1.7			6																										1			
				135																						152												
	⑱	SINGLE A-12 GRATE C.B.		4			1.8			6																										1			
B		PIPE W/ SPLASH APRON		32																		1				72										1			
SHEET TOTALS			$350.00	1,110			41.1			732	26											1	120	148	—	1,184			84	1	1	6	3	1	1	3	4			1,310

* STRUCTURE EXCAV. FOR SLOT DRAIN IS INCIDENTAL.
** USE SALVAGED FRAMES AND COVERS.

DATE
SURVEY PLOTTED BY
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QUANTITIES BY
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ORIGINAL PLAN
NOTE BOOK
No.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	97	418

DRAINAGE QUANTITY SUMMARY

DRAINAGE SHEET NO.	DRAINAGE STRUCTURE NO.	STRUCTURE TYPE	202.11 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	206.01 STRUCTURE EXC. OTHER THAN AT BRIDGE	207.01 DITCH AND CHANNEL EXC.	G40.01 LINED DRAINAGE DITCH		503.001 CONCRETE OTHER THAN IN BRIDGES	503.201 CLASS "B" CONCRETE OTHER THAN IN BRIDGES	508.01 CEMENT RUBBLE MASONRY	602.101 REINFORCING STEEL OTHER THAN IN BRIDGES	603.0010 BED COURSE MATERIAL FOR CULVERT	REINFORCED CONCRETE PIPE (OR ASBESTOS CEMENT FOR PIPES 24" THRU 36" DIA.)							
													CLASS III						CLASS IV	
													603.5040 24"	603.5050 30"	603.5060 36"	603.1016 42"	603.1018 48"	603.1020 54"	603.5044 24"	603.5054 30"
			L.S.	C.Y.	C.Y.	L.F.		C.Y.	C.Y.	C.Y.	Lbs.	C.Y.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.
B	(19)	61614 G.D.I.		6				1.5			34									
				30																
	(20)	SINGLE A-12 GRATE C.B.		4				1.8			6									
		PIPE W/ SPLASH APRON		36																
	(21)	SINGLE A-12 GRATE C.B.		5				2.2			6									
		PIPE W/ SPLASH APRON	LT & RT STA. 300+30± MOANA @ 700.00	27					7.1											
	(22)	"D" CATCH BASIN		15				3.2			77									
				58					7.1											
	(23)	"D" CATCH BASIN		—				5.7			77									
				56																
	(24)	"D" CATCH BASIN		—				6.0			77									
				70																
	(25)	"D" CATCH BASIN		—				3.9			77									
				51																
	(26)	"D" CATCH BASIN		—				4.0			77									
				30																
	(27)	TYPE "A" S.D.M.H.		11				2.9			160									
				115												150				
	(27A)	TYPE "A" S.D.M.H.		2				3.1			160									
				116												152				
	(28)	"C" CATCH BASIN		27				6.7			125									
				26																
	(29)	61614 G. D. I.		—				2.3			34									
B				*																
C	(31)	TYPE "C" G. D. I.		6				2.3			12									
				35																
				175								80 (CLASS "B")				196				
	(32)	"D" CATCH BASIN		20				5.6			96									
			LT & RT STA. 306+MOANA @ 350.00	14																
	(33)	SINGLE A-12 GRATE C.B.		1				1.7			6									
C			LT. STA. 17± RAMP "C" @ 200.00	390								181 (CLASS "B")					396			
SHEET TOTALS			$1,250.00	1,335				52.9	14.2		1,024	261	—	—	—	498	396		—	—

603.2031 24" C.M.P. (14 GAGE) OR 24" REINF. CONCRETE END SECTION	637.01 18" C.M.P. SLOT DRAIN (16 GAGE)	603.2066 24" C.M.P. (14 GAGE)	603.7020 18" C.M.P. (14 GAGE) OR 18" R.C.P. (CLASS III) OR 18" A.C.P. (CLASS III)	604.204 Type "P" Frame with Grated Cast Iron Cover	603.7200 24" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS III) OR 24" A.C.P. (CLASS III)	603.7202 24" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS IV) OR 24" A.C.P. (CLASS IV)	603.7260 30" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS III) OR 24" A.C.P. (CLASS III)	603.7380 36" C.M.P. (12 GAGE) OR 30" R.C.P. (CLASS III) OR 30" A.C.P. (CLASS III)	604.201 TYPE "A" CAST IRON FRAME AND COVER	604.202 TYPE "B" CAST IRON FRAME AND COVER	604.232 TYPE A-12 STEEL FRAME AND GRATE	604.235 TYPE 6121 STEEL FRAME AND GRATE	604.236 TYPE 61614 STEEL FRAME AND GRATE	604.243 TYPE "C" CAST IRON FRAME AND GRATE	604.302 REMOVING, CLEANING, PAINTING, AND REINSTALLING TYPE B C.I. FRAME AND COVER	612.01 GROUTED RUBBLE PAVING	609.700 GUTTER TYPE 7 (61214)	609.709 GUTTER TYPE 7 (41115)	609.704 GUTTER TYPE 7 (61218)
Each	L.F.	L.F.	L.F.	Each	L.F.	L.F.	L.F.	L.F.	Each	Each	Each	Each	Each	Each	Each	Each	C.Y.	L.F.	L.F.	L.F.
												1							
					88														
											1								
1					80												1		
											1								
1					82												1		
								**								1			
					64	36													
								**								1			
					96														
								**								1			
					120														
								**								1			
					52														
								**								1			
					88														
				1															
				1															
					46														
												1							
	140																		
																	1		
					130														
								**								1			
					30														
																	1		
2	140	—	—	—	876	36			2	1	3		2	1	6	2			

* STRUCTURE EXCAV. FOR SLOT DRAIN IS INCIDENTAL.
** USE SALVAGED FRAMES AND COVERS.

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

PRINTED ON NO. 1000H CLEARPRINT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	98	418

DRAINAGE QUANTITY SUMMARY

DRAINAGE SHEET NO.	DRAINAGE STRUCTURE NO.	STRUCTURE TYPE	202.11 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	206.01 STRUCTURE EXC. OTHER THAN AT BRIDGE	207.01 DITCH AND CHANNEL EXC.	640.01 LINED DRAINAGE DITCH	503.001 CONCRETE OTHER THAN IN BRIDGES	503.201 CLASS "B" CONCRETE OTHER THAN IN BRIDGES	508.01 CEMENT RUBBLE MASONRY	602.101 REINFORCING STEEL OTHER THAN IN BRIDGES	603.0010 BED COURSE MATERIAL FOR CULVERT	REINFORCED CONCRETE PIPE (OR ASBESTOS CEMENT FOR PIPES 24" THRU 36" DIA.)								603.2031 24"C.M.P.(14 GAGE) OR 24" REINF. CONCRETE END SECTION	637.01 18" C.M.P. SLOT DRAIN (16 GAGE)	603.2066 24" C.M.P. (14 GAGE)	603.7020 18" C.M.P. (14 GAGE) OR 18" R.C.P. (CLASS III) OR 18" A.C.P. (CLASS III)	604.204 Type "P" Frame with Grated Cast Iron Cover	603.7200 24" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS III) OR 24" A.C.P. (CLASS III)	603.7202 24" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS IV) OR 24" A.C.P. (CLASS IV)	603.7260 30" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS III) OR 24" A.C.P. (CLASS III)	603.7380 36" C.M.P. (12 GAGE) OR 30" R.C.P. (CLASS III) OR 30" A.C.P. (CLASS III)	604.201 TYPE "A" CAST IRON FRAME AND COVER	604.202 TYPE "B" CAST IRON FRAME AND COVER	604.232 TYPE A-12 STEEL FRAME AND GRATE	604.235 TYPE 6121 STEEL FRAME AND GRATE	604.236 TYPE 61614 STEEL FRAME AND GRATE	604.243 TYPE "C" CAST IRON FRAME AND GRATE	604.302 REMOVING, CLEANING, PAINTING, AND REINSTALLING TYPE B C.I. FRAME AND COVER	612.01 GROUTED RUBBLE PAVING	609.700 GUTTER TYPE 7 (61214)	609.709 GUTTER TYPE 7 (41115)	609.704 GUTTER TYPE 7 (61218)
												CLASS III						CLASS IV																												
												24"	30"	36"	42"	48"	54"	24"	30"																														
			L.S.	C.Y.	C.Y.	L.F.	C.Y.	C.Y.	C.Y.	Lbs.	C.Y.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	Each	L.F.	L.F.	L.F.	Each	L.F.	L.F.	L.F.	Each	Each	Each	Each	Each	Each	Each	C.Y.	L.F.	L.F.	L.F.
C	(34)	"D" CATCH BASIN		17			6.8			100																		1											
				26																					46															
	(35)	DOUBLE A-12 GRATE C.B.		3			3.9			27																			2										
				61																					108														
	(35A)	61614 G.D.I.		8			2.1			34																							1						
				315							144 (CLASS "B")					262																								
	(36)	"D" CATCH BASIN		8			5.7			100																		1											
				38																					66														
	(37)	"ID" CATCH BASIN		12			4.1			128																			1										
				240							86 (CLASS "B")						156																							
	(38)	TYPE "C" S.D.M.H.		17			4.1			215																1													
C				420							142 (CLASS "B")						230																							
E				185											168																									
	(39)	TYPE "A" S.D.M.H.		1			2.8			160																			1										
			FRT. STA. 51+ PUULOA @ 500.00	64																					110														
	(40)	"B" CATCH BASIN		—			5.4			110																							1						
				185									168																											
	(41)	TYPE "A" S.D.M.H.		4			3.4			160																			1										
				25																					22														
	(41A)	"D" CATCH BASIN		25			6.2			77																							1						
				55																					48														
	(42)	"B" CATCH BASIN		23			6.3			110																							1						
				76																					72														
	(43)	MODIF. "B" CONC. D.I.		11			3.2			48																			1										
				202									174																											
	(44)	"D" CATCH BASIN		19			5.5			96																							1						
				68																					110														
	(45)	"ID" CATCH BASIN		11			4.0			128																			1										
				2																							6												
	(46)	MODIF. "A" CONC. D.I.		7			4.1			54																			1										
				38																					44														
E	(47)	"ID" CATCH BASIN		10			4.1			128																			1										
	SHEET TOTALS		#500.00	2,176			71.7			1,675	372			342	168	262	386				6	1	626				7	6	2		1							

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

PRINTED ON NO. 100911 CLEARPRINT

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	99	418

DRAINAGE QUANTITY SUMMARY

DRAINAGE SHEET NO.	DRAINAGE STRUCTURE NO.	STRUCTURE TYPE	202.11 REMOVAL OF STRUCTURES AND OBSTRUCTIONS	206.01 STRUCTURE EXC. OTHER THAN AT BRIDGE	207.01 DITCH AND CHANNEL EXC.	640.01 LINED DRAINAGE DITCH		503.001 CONCRETE OTHER THAN IN BRIDGES	503.201 CLASS "B" CONCRETE OTHER THAN IN BRIDGES	508.01 CEMENT RUBBLE MASONRY	602.101 REINFORCING STEEL OTHER THAN IN BRIDGES	603.0010 BED COURSE MATERIAL FOR CULVERT	REINFORCED CONCRETE PIPE (OR ASBESTOS CEMENT FOR PIPES 24" THRU 36" DIA.)							
													CLASS III						CLASS IV	
													603.5040 24"	603.5050 30"	603.5060 36"	603.1016 42"	603.1018 48"	603.1020 54"	603.5044 24"	603.5054 30"
			L.S.	C.Y.	C.Y.	L.F.		C.Y.	C.Y.	C.Y.	Lbs.	C.Y.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.
E				2																
	(48)	MODIF. "B" CONC. D.I.		7				4.1			48									
				59																
	(49)	"1D" CATCH BASIN		9				3.6			128									
				2																
	(49A)	MODIF. "A" CONC. D.I.		7				4.1			54									
				44										58						
	(50)	"B" CATCH BASIN		—				5.8			115									
				102									152							
	(50A)	TYPE "A" S.D.M.H.		—				3.6			160									
				102									152							
	(51)	"1D" CATCH BASIN		11				4.4			128									
				225									190							
	(51A)	TYPE A-1 S.D.M.H.		9				4.5			165									
				51																
	(52)	"1D" CATCH BASIN		6				3.6			128									
				2																
	(53)	MODIF. "A" CONC. D.I.		7				4.1			54									
				225									190							
	(54)	"1D" CATCH BASIN		9				4.1			128									
				43																
	(55)	"1D" CATCH BASIN		6				3.6			128									
				2																
	(56)	MODIF. "A" CONC. D.I.		7				4.1			54									
				108					6.0										170	
	(57)	"1D" CATCH BASIN		4				3.1			128									
	(58)	G1214 G.D.I.		11				2.5			34									
				5																6
	(58A)	G1214 G.D.I.		10				2.4			34									
				48					13.6											60
		DITCH AT TOP OF CUT		3	325	1000							10							
	(59)	TYPE "A" CONC. D.I.		7				1.9			—									
E				60																
SHEET TOTAL				1,193	325	1000		59.5	19.6		1,486		694	58					170	66

603.2031 24"CMP(14 GAGE) OR 24" REINF. CONCRETE END SECTION	637.01 18" C.M.P. SLOT DRAIN (16 GAGE)	603.2066 24" C.M.P. (14 GAGE)	603.7020 18" C.M.P. (14 GAGE) OR 18" R.C.P. (CLASS III) OR 18" A.C.P. (CLASS III)	604.204 "P" Frame with Grated Cast Iron Cover	603.7200 24" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS III) OR 24" A.C.P. (CLASS III)	603.7202 24" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS IV) OR 24" A.C.P. (CLASS IV)	603.7260 30" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS III) OR 24" A.C.P. (CLASS III)	603.7380 36" C.M.P. ('2 GAGE) OR 30" R.C.P. (CLASS III) OR 30" A.C.P. (CLASS III)	604.201 TYPE "A" CAST IRON FRAME AND COVER	604.202 TYPE "B" CAST IRON FRAME AND COVER	604.232 TYPE A-12 STEEL FRAME AND GRATE	604.235 TYPE 6121 STEEL FRAME AND GRATE	604.236 TYPE 61614 STEEL FRAME AND GRATE	604.243 TYPE "C" CAST IRON FRAME AND GRATE	604.302 REMOVING, CLEANING, PAINTING, AND REINSTALLING TYPE B C.I. FRAME AND COVER	612.01 GROUTED RUBBLE PAVING	609.700 GUTTER TYPE 7 (6124)	609.709 GUTTER TYPE 7 (4111S)	609.704 GUTTER TYPE 7 (6128)
Each	L.F.	L.F.	L.F.	Each	L.F.	L.F.	L.F.	L.F.	Each	Each	Each	Each	Each	Each	Each	C.Y.	L.F.	L.F.	L.F.
			6																
									1										
					72														
									1										
			6																
									1										
										1									
									1										

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(10)	1971	100	418

DRAINAGE QUANTITY SUMMARY

DRAINAGE SHEET NO.	DRAINAGE STRUCTURE NO.	STRUCTURE TYPE	202.11 REMOVAL OF STRUCTURES AND OBSTRUCTIONS L.S.	206.01 STRUCTURE EXC. OTHER THAN AT BRIDGE C.Y.	207.01 DITCH AND CHANNEL EXC. C.Y.	640.01 LINED DRAINAGE DITCH L.F.		503.001 CONCRETE OTHER THAN IN BRIDGES C.Y.	503.201 CLASS "B" CONCRETE OTHER THAN IN BRIDGES C.Y.	508.01 CEMENT RUBBLE MASONRY C.Y.	602.101 REINFORCING STEEL OTHER THAN IN BRIDGES Lbs.	603.0010 BED COURSE MATERIAL FOR CULVERT C.Y.	REINFORCED CONCRETE PIPE (OR ASBESTOS CEMENT FOR PIPES 24" THRU 36" DIA.) CLASS III 603.5040 24" L.F.	603.5050 30" L.F.	603.5060 36" L.F.	603.1016 42" L.F.	603.1018 48" L.F.	603.1020 54" L.F.	CLASS IV 603.5044 24" L.F.	603.5054 30" L.F.		603.2031 24" C.M.P. (14 GAGE) OR 24" REINF. CONCRETE END SECTION Each	637.01 18" C.M.P. SLOT DRAIN (16 GAGE) L.F.		603.2066 24" C.M.P. (14 GAGE) L.F.	603.7020 18" C.M.P. (14 GAGE) OR 18" R.C.P. (CLASS III) OR 18" A.C.P. (CLASS III) L.F.	604.204 Type "P" Frame with Grated Cast Iron Cover Each	603.7200 24" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS III) OR 24" A.C.P. (CLASS III) L.F.	603.7202 24" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS IV) OR 24" A.C.P. (CLASS IV) L.F.	603.7260 30" C.M.P. (14 GAGE) OR 24" R.C.P. (CLASS III) OR 24" A.C.P. (CLASS III) L.F.	603.7380 36" C.M.P. (12 GAGE) OR 30" R.C.P. (CLASS III) OR 30" A.C.P. (CLASS III) L.F.	604.201 TYPE "A" CAST IRON FRAME AND COVER Each	604.202 TYPE "B" CAST IRON FRAME AND COVER Each	604.232 TYPE A-12 STEEL FRAME AND GRATE Each	604.235 TYPE 6121 STEEL FRAME AND GRATE Each	604.236 TYPE 6164 STEEL FRAME AND GRATE Each	604.243 TYPE "C" CAST IRON FRAME AND GRATE Each	604.302 REMOVING, CLEANING, PAINTING, AND REINSTALLING TYPE B C I FRAME AND COVER Each	612.01 GROUTED RUBBLE PAVING C.Y.	609.700 GUTTER TYPE 7 (6124) L.F.	609.709 GUTTER TYPE 7 (4115) L.F.	609.704 GUTTER TYPE 7 (6128) L.F.
E		GUTTER LT. SIDE PUULOA			—																																						
	(60)	G1214 G.D.I.		9				1.9			34																															1,100		
				3					1.3																																			
	(61)	"I D" CATCH BASIN		9				3.9			128																																		
		PIPE AND G.R.P. OUTLET DITCH	PELTIER 36+15± @350.00	72	180											80																								52			
	(61A)	CONCRETE DROP BOX		10				2.8			—																																	
E		GUTTER LT. & RT. PELTIER			—																																					497	108	
D	(62)	DOUBLE A-12 GRATE C.B.		7				3.0			27																														2				
		PIPE & TRAPEZ. CHANNEL		72	13	45																																					
	(63)	"C" CATCH BASIN		17				5.0			110																														1				
				14					8.6																																			
		G.R.P. DITCH	MAHIOLE RT 36+40± @100.00		54																																				37			
	(65)	"C" CATCH BASIN		5				7.2			112																														1				
				4																																							
	(66)	"D" CATCH BASIN		—				3.7			77																														1				
				32																																				52				
	(67)	RCP W/ HEADWALL		9.4						2.1																																154			
	(68)	"D" CATCH BASIN		—				3.6			77																														1				
				50																																				82				
	(69)	"D" CATCH BASIN		—				4.6			77																														1				
D				48	21																																				13			
B	(70)	PIPE W/ HEADWALL		20						1.3																																24			
B	(71)	PIPE W/ HDWL (INCL. DITCH)		53	180					1.9																																74			
B	(72)	PIPE W/ CONC. COLLAR		84				1.0			56																																150			
D	(73)	123'x10'x6' RCB W/ HDWLS.		285				165.0			22,500																																			
B	(74)	206'x10'x6' RCB W/ HDWL.		295				230.0			32,500																																			
D&B		MAHIOLE CHANNEL	EXIST. CHNL STA. 15+ @500.00	—	2,000			185.0																																		670			
A, B & C		MOANALUA CHANNEL			(ROADWAY EXCAV.)			1,350.0																																			2,100			
B	(71A)	PIPE W/ HDWL		8						1.3																																24			
SHEET TOTALS			$950.00	1191	2448	45		1066.7	9.9	6.6	55,698	—	—	—	80	—	—	—		6		—	—		—	—	—	484	156	154	—	1	5	2	1	—	—	—	2880	1,100	497	108
GRAND TOTALS			$3050.00	7005	2773	1045		2101.9	43.7	6.6	60,615	659	694	58	422	666	658	386	170	72		3	260		204	30	1	3472	192	154	84	23	14	13	6	4	2	9	2886	1,100	497	1418

ORIGINAL PLAN

NOTE BOOK No.

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

PRINTED ON NO. 10001 CLEARPRINT

SHEET No. 23 OF 23 SHEETS

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