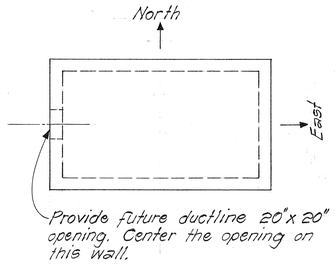
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	163A	258

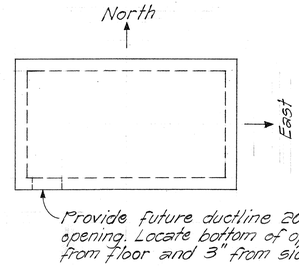
TRANS-PACIFIC CABLE ~ GENERAL NOTES

1. 4" galvanized steel pipes shall be placed at a minimum depth of 4'-0" from top of pavement or finished grade.
2. Both ends of each length of pipe shall be reamed before joining to insure no burrs or sharp edges exist.
3. Where it is necessary to cut and join pipe, either threaded or welded connection may be employed.
4. Where pipe is joined by welding, a 4-6 inch snug fitting length of steel sleeving shall be centered over the butt ends. The butt ends of the pipe shall be true and placed flush together. The weld shall be made at the junction of the sleeve end and pipe. In no case shall an attempt be made to weld the butt ends of the pipe together.
5. Welded joints and other areas on the pipe where galvanizing has been damaged shall be covered with two half lapped layers of tapecoat or equal.
6. Change in grade shall be gradual and bends shall have a radius of not less than 4 feet, preferably more.
7. At cable splice locations, where the cable is placed in steel pipe, the pipes shall have a six(6) feet separation between pipe sections. Pipes entering and leaving splicing pits shall be in alignment and at the same level.
8. Splice pits will be dug at locations indicated on drawings. The minimum size of splice pit shall be 7'-0" in length, 6'-0" in width and to a depth 1'-0" below existing transpac cable. Where necessary, adequate shoring shall be provided to insure safe working conditions for the splicing crews.
9. Backfilling of the pipe sections shall be at the direction of H.T.Co. and state inspectors. Splice pits will be backfilled at the direction of Hawaiian Telephone Company's inspector. Backfill, in general shall consist of the earth removed from the trench. It shall not include logs, stumps, tin cans, or other debris. Where rock is removed from the trench, special care shall be exercised in backfilling.
10. The trench and splice pit shall be thoroughly compacted from bottom to top and shall meet the standard specification of the State of Hawaii, Highways Div.
11. Tamping of backfill materials shall be done in such manner that will not cause any damage to transpac cable and other utilities.
12. Refer to H.T.Co. standard drawings 34047 & 34046 for details of splice, supports, and pits, and trenching required for placing of T.P. land cable.
13. All trenching, backfilling, digging of splice pits and installation of the 4" galvanized steel pipe will be done by the state highway contractor. Hawaiian Telephone Co. will furnish the material.
14. Hawaiian Telephone Co. will furnish, place and do all the necessary splicing of the transpacific land cable.
15. Existing transpacific land cable to remain in place until relocated section is cut over.
16. Any temporary relocation or connection to the existing cable before the relocated section is cut-over will be performed by H.T.Co. at the expense of the contractor.
17. Direct Buried T.P. cable shall be placed after all other utilities are installed.

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



ELECTRIC M.H. #2



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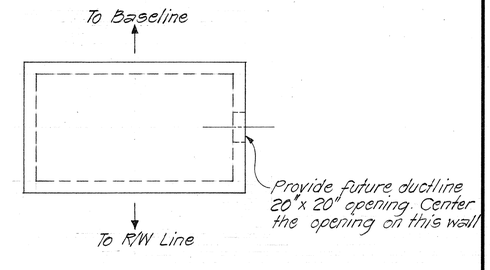

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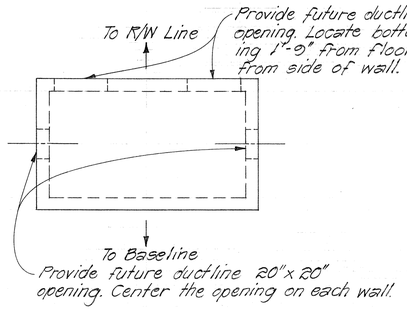

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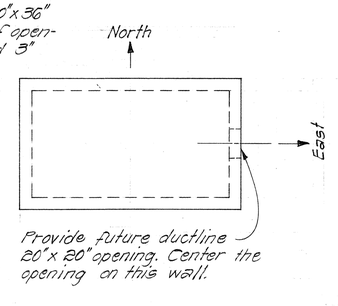
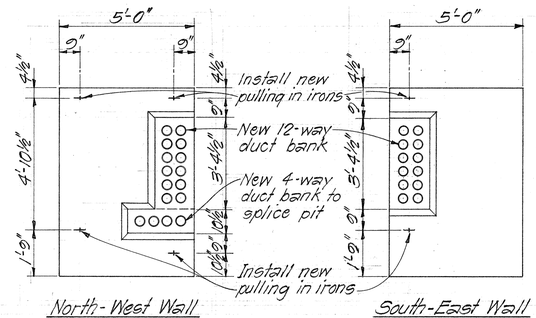
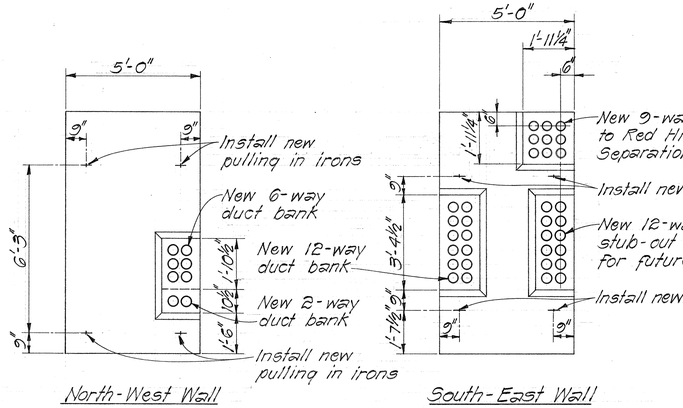


ELECTRIC H.H. #24



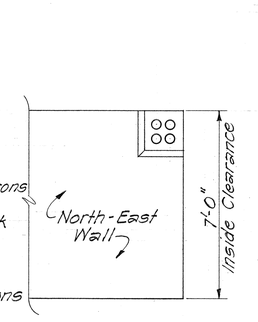
ELEVATION OF H.T.M.H. WALLS AT S.F. RD. STA. 4+35 (FROM WITHIN MANHOLE)

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



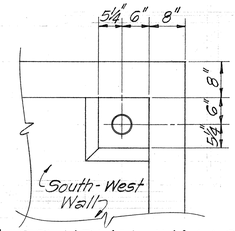
ELEV. OF H.T.M.H. WALLS AT RAMP RH-1 STA. 15+14 (FROM WITHIN MANHOLE)

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



ELEV. OF H.T.M.H. WALLS AT S.F. RD. STA. 10+21 (FROM WITHIN MANHOLE)

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



ELEV. OF H.T.M.H. WALLS AT S.F. RD. STA. 8+10 (FROM WITHIN MANHOLE)

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

APPROVED:

HAWAIIAN ELECTRIC Co. Inc. — 9/4/70 DATE

HAWAIIAN TELEPHONE Co. Ltd. — 9-4-70 DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRANSPAC GENERAL NOTES & DETAIL OF DUCT OPENINGS FOR HECO & HTCO MANHOLES

MOANALUA ROAD
F.A.I.P. Proj. No. F-078-1(11)

Not to Scale — Date: July, 1970

SHEET No. 1A OF 8 SHEETS

K+E CRYSTALENE® LA 2920 TRACING PAPER

163A

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1 (11)	1969	160	258

Revised: April 15, 1971
Oct. 29, 1971

SEWER ~ GENERAL NOTES

1. Contractor shall notify the Division of Sewers two (2) days prior to commencement of sewer work.
2. Existing Sewer Lines shown on the plans are based on existing records of varing degrees of accuracy and completeness, verified whenever possible by field surveys. The Contractor shall verify location and inverts of existing lines, and shall be required to make adjustment to any new or existing sewer system wherever directed by the Engineer.
3. All sewer work shall be performed in accordance with City and County Standard Specifications approved by the Chief Engineer, Nov. 1968, and the latest Department of Public Works Standard Details, July 1965 and the Revised Ordinance of Honolulu, Sept. 28, 1961.
4. Services shall be maintained at all times during construction. Alterations to service lines shall be done with the least amount of disturbance to the existing services.
5. If laterals other than those shown on the plans are exposed during construction, the same shall be cut and plugged, lowered or extended and reconnected as required after consultation with the Sewer Division Inspector.
6. All services connected to existing sewer mains which are to be abandoned or removed shall be reconnected to new sewer mains if services are required.
7. Adjust existing sewer manholes and manhole frames and covers as noted in plans.
8. Existing sewer manhole frames and covers designated as "Salvage" shall be removed, cleaned reinstalled at new manholes shown on the plans, subject to approval by the Engineer.
9. Crushed rock cradle is permitted where the soil is stable. In areas of unstable soil, the Engineer and the Contractor will discuss and determine the pipe support required.
10. Where pumping is required on Line C and Line D, Contractor shall post a Custodian during entire pumping operation. Custodian must be knowledgeable in the operation of the type of pump being used in order to prevent prolonged delay during any breakdown that might occur.

GAS ~ GENERAL NOTES

1. On this project the relocation of the gas system will be done by the utility company's forces or its Contractor. The State's Contractor and the utility company shall mutually coordinate the work to minimize conflicts and delays to either party.
2. The existing gas lines shown on the plans are approximate only. The State Contractor shall use precaution when working in the vicinity of the gas lines.
3. Cutting, plugging and reconnecting of live gas lines will be done by the Honolulu Gas Company, Ltd.
4. There shall be at least 6" clearance between any gas line and any underground structure not used in conjunction with the gas line. If this clearance cannot be attained, the gas line shall be protected with a Honolulu Gas Co., Ltd., approved insulating material.

ELECTRIC & TELEPHONE ~ GENERAL NOTES

1. The Contractor shall notify each utility in writing 20 working days prior to commencing work on their respective utility system.
2. Existing electric and telephone facilities shown on these plans are approximate only. The Contractor shall verify their actual locations and shall make adjustments to any new or existing facility as directed by the Engineer.
3. The Contractor shall notify the affected property owners at least one week in advance as to the time and duration the trenching and installing of underground electric and telephone service will be performed in their property.
4. Where galvanized steel conduits, direct burial, are to be installed through retaining walls, standard weight galvanized steel pipe sleeves of appropriate diameter shall be installed through the wall extending at least 1'-0" beyond the wall faces.
5. Unless otherwise shown on the plans, the minimum depth of duct lines from finished grade to:
   (a.) Top of concrete jacket where ducts are concrete encased = 3'-0".
   (b.) Top of ducts not encased in concrete (direct-burial) - in property 1'-6" - In sidewalk 2'-0".
   (c.) Top of steel conduits (direct burial) = 1'-6".
6. Final depth of all pull boxes, service boxes, handholes and manholes shall be determined in the field by the Engineer.
7. For ducts encased in concrete jacket a 3" minimum clearance between H.E.Co. and H.T. Co. ducts shall be maintained.
8. Existing utility cables which are to remain in place during construction shall be handled by the utility company's men only. The Contractor shall exercise caution to avoid disturbances to the cables or temporary guards erected by the utility company.
9. Contractor to stake out proposed ductline, pole and anchor locations and H.E.Co. and H.T.Co. to check and verify locations before Contractor undertakes excavation.
10. All ducts and conduits called for installation in concrete jacket shall be inspected and approved by the respective Engineer of H.E.Co. or H.T.Co. before concrete placing. 24 hours (minimum) notice to respective utility shall be given before pouring concrete.
11. Excavation of HECO pole holes and anchor holes, installation of poles and anchors, and backfill of pole holes and anchors, by others. Depth of poles and anchor holes shall be taken from finish grade.
12. For future ductline openings, refer to Sheet No. 163A.

LEGEND

—S—8—	Existing Sewer Line
—S—8—	New Sewer Line
—g—8—	Existing Gas Lines
—G—8—	New Gas Lines
—G—(A)	Anode Installation
	Existing Duct Lines
	New Duct Lines
—tpc—	Existing Trans-Pac-Cable
—TPC—	New Trans-Pac-Cable
—jtc—	Existing Joint Trunking Cable
—JTC—	New Joint Trunking Cable
—//	Cut/Plug or Plug Existing Utility Line
○	Existing Electric or Telephone Pole
⊗	Exist Elec. or Tel. Pole to be removed
●	New Electric or Telephone Pole
⊢	Existing Anchor
◤	New Anchor
	Exist. Handhole or Service/Pull Box
	New Handhole or Service/Pull Box
	New Electric or Telephone Manhole
	Splice Pit
○ SMH	Existing Sewer Manhole
○ SMH	New or Reconstructed Sewer Manhole.

THIS SHEET SUPERSEDES SHT. NO. 163

APPROVED:

P. C. Jay Jr. — 6/4/70
HONOLULU GAS Co., Ltd. — DATE

[illegible] — 9/4/70
HAWAIIAN ELECTRIC Co., Inc. NHO JK — DATE

J. N. Judd — 9-14-70
HAWAIIAN TELEPHONE Co., Ltd. — DATE

K. Ross — 6/5/70
CHIEF, DIVISION OF SEWERS — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

UTILITY
GENERAL NOTES & LEGEND

MOANALUA ROAD
F.A.P. Proj. No. F-078-1(11)

Date: June, 1970

SHEET No. 1 OF 8 SHEETS

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

K&E CRYSTALENE® LA 2920 TRACING PAPER

163R

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(11)	1969	164	258

PLAN — SURVEYED, PLOTTED, NOTE BOOK, NO., BY, DATE, ALIGNMENT CHECKED, RT. OF WAY CHECKED

PROFILE — SURVEYED, PLOTTED, NOTE BOOK, NO., BY, DATE, GRADES CHECKED, ALIGNMENT CHECKED, STRUCTURE NOTATNS CHKD

1900 E

Exist. Top = 260.3
Exist. Inv. = 253.7

1000 N

Exist. Top = 248.0
Exist. Inlet Inv. = 239.8
Exist. Outlet Inv. = 239.5

Exist. Top = 223.5
Exist. Inv. = 215.88

2000 E

Exist. Top = 217.4
Exist. Inlet Inv. = 207.65
Exist. Outlet Inv. = 207.48

500 N

Provide 10" Stub
Inv. = 203.27

℄ of New 66" Culvert

Reinf. Conc. Jacket

SEWER LINE "B"

SEWER LINE "C"

Cut & Plug

Salvage M.H. Frame & Cover for Reuse

Demolish Exist. SMH
Exist. Top = 232.8
Exist. Inv. = 225.96

Demolish Exist. SMH
Exist. Top = 205.4
Exist. Inv. = 198.51

Demolish Exist. SMH
Exist. Top = 211.1
Exist. 12" Inv. = 203.84
Exist. 10" Stub Inv. = 204.0

Demolish Exist. & Raise Manhole By 2' (Use Std. 4 Conical Sec.)

Exist. Top = 197.0
Exist. Inlet Inv. = 190.01
Exist. Outlet Inv. = 185.20

NORTH FRONTAGE ROAD

OUTBOUND LANES

INBOUND LANES

SOUTH FRONTAGE ROAD

Match Line Sta. 227+00

Match Line Sta. 241+00

SMH B-7 (6+92)

Inv. Elev. = 253.7
Reconstruct Plain M.H.

Struct. Exc.	4	C.Y.
Class B Conc.	7	C.Y.
Reinf. Steel	305	LB.
Brick Wall	4	L.F.
Type SA Fr. & Cover	1	Ea.

SMH B-6 (4+60)

Inv. Elev. = 239.50
Reconstruct Plain M.H.

Struct. Exc.	175	C.Y.
Class B Conc.	11	C.Y.
Reinf. Steel	508	LB.
Brick Wall	4	L.F.
Type SA Fr. & Cover	1	Ea.
Plain Conc. Jacket for 10" V.C. Sewer Pipe	232	L.F.

SMH B-5 (3+76)

℄ Sta. 229+44± % 105' Lt.

Inv. Elev. = 234.76
Construct Plain M.H.

Struct. Exc.	86	C.Y.
Class B Conc.	11	C.Y.
Reinf. Steel	500	LB.
Brick Wall	4	L.F.
Type SA Fr. & Cover	1	Ea.
Plain Conc. Jacket for 10" V.C. Sewer Pipe	84	L.F.

SMH B-4 (3+67)

℄ Sta. 229+51± % 110' Lt.

Inv. Elev. = 234.20
Construct Plain M.H.

Struct. Exc.	18	C.Y.
Class B Conc.	11	C.Y.
Reinf. Steel	500	LB.
Brick Wall	4	L.F.
10" V.C. Pipe	9	L.F.
Plain Conc. Jacket for 10" V.C. Sewer Pipe	9	L.F.
Type SA Fr. & Cover	1	Ea.

SMH B-3 (1+17)

℄ Sta. 232+01± % 110' Lt.

Inv. Elev. = 221.32
Construct Plain M.H.

Struct. Exc.	198	C.Y.
Class B Conc.	10	C.Y.
Reinf. Steel	435	LB.
Brick Wall	4	L.F.
10" V.C. Pipe	250	L.F.
Plain Conc. Jacket for 10" V.C. Sewer Pipe	250	L.F.
Type SA Fr. & Cover	1	Ea.

SMH B-1 (0+00)

Inv. Elev. = 215.88
Reconstruct Plain M.H.

Struct. Exc.	103	C.Y.
Class B Conc.	9	C.Y.
Reinf. Steel	403	LB.
Brick Wall	4	L.F.
Type SA Fr. & Cover	1	Ea.
Plain Conc. Jacket for 10" V.C. Sewer Pipe	108	L.F.

SMH B-2 (1+08)

℄ Sta. 232+08± % 104.6' Lt.

Inv. Elev. = 220.85
Construct Plain M.H.

Struct. Exc.	10	C.Y.
Class B Conc.	10	C.Y.
Reinf. Steel	435	LB.
Brick Wall	4	L.F.
10" V.C. Pipe	9	L.F.
Plain Conc. Jacket for 10" V.C. Sewer Pipe	9	L.F.
Type SA Fr. & Cover	1	Ea.

SMH C-4 (3+93)

Inv. Elev. = 207.48
Reconstruct Plain M.H.
Adjust Frame & Cover to New Grade

Struct. Exc.	158	C.Y.
Class B Conc.	8	C.Y.
Reinf. Steel	338	LB.
Brick Wall	4	L.F.
Type SA Fr. & Cover	1	Ea.
Plain Conc. Jacket for 10" V.C. Sewer Pipe	180	L.F.

SMH C-3 (3+01)

℄ Sta. 235+82.5± % 110' Lt.

Inlet Inv Elev. = 204.90
Outlet Inv. Elev. = 203.10
Construct Shallow Drop M.H.

Struct. Exc.	112	C.Y.
Class B Conc.	7	C.Y.
Reinf. Steel	304	LB.
Brick Wall	4	L.F.
12" Shallow Drop Connection at SMH	1	Ea.
Type SA Fr. & Cover	1	Ea.
Plain Conc. Jacket for 12" V.C. Sewer Pipe	92	L.F.

SMH C-1 (0+00)

℄ Sta. 238+82.50± % 104' Lt.

Inv. Elev. = 196.25
Construct Plain M.H.

Struct. Exc.	10	C.Y.
Class B Conc.	3	C.Y.
Reinf. Steel	143	LB.
Brick Wall	4	L.F.
12" V.C. Pipe	10	L.F.
Plain Conc. Cradle for 12" V.C. Sewer Pipe	10	L.F.
Type SA Fr. & Cover	1	Ea.

SMH C-2 (0+10)

℄ Sta. 238+74± % 110' Lt.

Inv. Elev. = 197.16
Construct Plain M.H.

Struct. Exc.	168	C.Y.
Class B Conc.	5	C.Y.
Reinf. Steel	143	LB.
Brick Wall	4	L.F.
12" V.C. Pipe	291	L.F.
Plain Conc. Cradle for 12" V.C. Sewer Pipe	279	L.F.
Reinf. Conc. Jacket for 12" V.C. Sewer Pipe	12	L.F.
Type SA Fr. & Cover	1	Ea.

NOTE:

1. Manhole frame & cover of SMH B-7 shall be exposed 3" above ground. All others on Sewer Line "B" & "C" shall be flush to adjusted grades.
2. While constructing shallow drop MH structure at SMH C-3, pump from existing SMH to existing SMH. Payment incidental to various items of work.

SEWER UTILITY LAYOUT PLAN

MOANALUA ROAD

F.A.P. Proj. No. U-078-1(11)

Scale: 1" = 50' Date: May, 1970

260
250
240
230
220
210
200
190

251.42
249.33
246.52

Sta. 229+00 E.V.C.

1,500' V.C.

243.06

Finish Grade at Grade Control

Existing Ground at ℄

3.79 %

227 228 229 230+00 231 232 233 234 235 236 237 238 239 240+00 241

APPROVED:

R. Arona
CHIEF, DIV. OF SEWERS

K. Okajo
DATE

SHEET NO. 2 OF 8 SHEETS

K&E PLATE 1, PLAN-PROFILE KEUFFEL & ESSER CO.

48 7012 IMPERIAL™ TRACING CLOTH 26960

164

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL
HAWAII	HAW.	F-078-1(11)	1969	165	258

NOTE:
1. All sewer manhole frames & covers for Sewer Line "D" and branches shall be exposed 3" above ground.
2. ①, ②, ③ Denotes order of work for Contractor.
3. ~~While constructing drop MH structure at SMH D-5A, pump from existing SMH to existing SMH. Payment incidental to various items of work.~~

PLAN — SURVEYED, PLOTTED, ALIGNMENT CHECKED, RT. OF WAY CHECKED, NOTE BOOK NO., BY, DATE

PROFILE — SURVEYED, PLOTTED, GRADES CHECKED, B. M.'S NOTED, STRUCTURES, ROTATING CH'KD., NOTE BOOK NO., BY, DATE

Match Line Sta. 257+00

Match Line Sta. 272+50

3000E

3500E

1500S

2000S

2500S

OUTBOUND LANES

INBOUND LANES

RAMP (ML-O)

RAMP (ML-I)

WALKWAY~UTILITIES CORRIDOR

SMH D-5A (Eliminate)

New Drop SMH D-4A
Inv. Elev. 52.32

Exist. SMH D-5 (7+51)

SMH D-4 (6+20)
15"-Inv. Elev. 50.59
8"-Inv. Elev. 51.17

C.C.O. No. 12
Cut & Plug
Exist. SMH D-4B, Inv. Elev. 70.67

Demolish Exist. SMH and Salvage MH Frame & Cover for Reuse.

Cut & Plug

Proposed Sewer Line Connection

Exist. SMH D-2B
(Br. Sta. 1+38)

8" Sewer

Cut & Plug

Demolish Exist. SMH and Salvage MH Frame & Cover for Reuse.

Cut & Plug

Exist. SMH (0+00)
Sewer Line "D"

Delete SMH D-2A
(Br. Sta. 1+26)

Delete Original Sewer Line Configuration shown on plans

SMH D-1 (0+75)
℄ Sta. 267+15
℘ 152'± Lt.

C.C.O. No. 12

Exist. SMH D-5 (7+51)
15" Inv. Elev. = 52.68
8" Inv. Elev. = 53.26
Connect to Exist. S.M.H.

Struct. Exc.	184 C.Y.
8" V.C. Pipe	120 L.F.
Reinf. Conc. Jacket for 8" V.C. Pipe	120 L.F.
Connection to Exist. M.H.	1 Ea.

Bedcourse Material

~~SMH D-5A (Br Sta. 1+20)~~
~~Inv. Elev. = 54.46~~
~~Inv. Elev. = 81.64~~
~~Construct Drop M.H.~~

~~Struct. Exc.~~	~~81 C.Y.~~
~~Class B Conc.~~	~~12 C.Y.~~
~~Reinf. Steel~~	~~536 LB.~~
~~Brick Wall~~	~~4 L.F.~~
~~8" Drop Connection at SMH 27~~	~~1 L.F.~~
~~Type SA Fr. & Cover~~	~~1 Ea.~~

SMH D-4 (6+20)
Corr. ℄ Sta. 5+32 % 38.25' Lt.
Inv. Elev. = 50.59
Construct Plain M.H.

Struct. Exc.	123 C.Y.
Class B Conc.	17 C.Y.
Reinf. Steel	760 LB.
Brick Wall	4 L.F.
15" V.C. Pipe	122 L.F.
Reinf. Conc. Jacket for 15" V.C. Pipe	90 L.F.
Connection to Exist. M.H.	1 Ea.
Type SA Fr. & Cover	1 Ea.

Bedcourse Material

SMH D-3 (4+20)
Corr. ℄ Sta. 7+37 % 38.25' Lt.
Inv. Elev. = 47.15
Construct Plain M.H.

Struct. Exc.	168 C.Y.
Class B Conc.	14 C.Y.
Reinf. Steel	646 LB.
Brick Wall	4 L.F.
15" V.C. Pipe	200 L.F.
Reinf. Conc. Jacket for 15" V.C. Pipe	200 L.F.
Type SA Fr. & Cover	1 Ea.

Bedcourse Material

~~SMH D-2A (Br. Sta. 1+26)~~
~~Inv. Elev. = 45.55~~
~~Inv. Elev. = 62.70~~
~~Construct Drop M.H.~~

~~Struct. Exc.~~	~~53 C.Y.~~
~~Class B Conc.~~	~~8 C.Y.~~
~~Reinf Steel~~	~~341 LB.~~
~~Brick Wall~~	~~4 L.F.~~
~~8" V.C. Pipe~~	~~12 L.F.~~
~~Plain Conc. Cradle for 8" V.C. Pipe~~	~~12 L.F.~~
~~Connection to Exist. M.H.~~	~~1 Ea.~~
~~8" Drop Connection at M.H.~~	~~17 L.F.~~
~~Type SA Fr. & Cover~~	~~1 Ea.~~

SMH D-2 (2+20)
Corr. ℄ Sta. 9+45 % 38.25' Lt.
15" Inv. Elev. = 43.71
8" Inv. Elev. = 44.29
Construct Plain M.H.

Struct. Exc.	295 C.Y.
Class B Conc.	12 C.Y.
Reinf. Steel	516 LB.
Brick Wall	4 L.F.
15" V.C. Pipe	200 L.F.
Reinf. Conc. Jacket for 15" V.C. Pipe	200 L.F.
~~8" V.C. Pipe~~	~~126 L.F.~~
~~Reinf. Conc. Jacket for 8" V.C. Pipe~~	~~126 L.F.~~
Type SA Fr. & Cover	1 Ea.

Bedcourse Material

Exist. SMH (0+00)
Exist. Inv. Elev. = 40.41
Connect to Exist. M.H.

Struct. Exc.	135 C.Y.
15" V.C. Pipe	75 L.F.
Reinf. Conc. Jacket for 15" V.C. Pipe	75 L.F.
Connection to Exist. M.H.	1 Ea.

Bedcourse Material

SMH D-1 (0+75)
℄ Sta. 267+15.0 % 152'± Lt.
Inv. Elev. = 41.49
Construct Plain M.H.

Struct Exc.	301 C.Y.
Class B Conc.	10 C.Y.
Reinf. Steel	434 LB.
Brick Wall	4 L.F.
15" V.C. Pipe	154 L.F.
Reinf. Conc. Jacket for 15" V.C. Pipe	154 L.F.
Type SA fr. & Cover	1 Ea.

Bedcourse Material

① Existing 8 inch & 15 inch Sewer Line Between SMH (0+00) Line "D" & Existing SMH D-25 To be kept in service.

PROFILE — SURVEYED, PLOTTED, GRADES CHECKED, B. M.'S NOTED, STRUCTURES, ROTATING CH'KD., NOTE BOOK NO., BY, DATE

120 110 100 90 80 70 60 50

257 258 259 260+00 261 262 263 264 265 266 267 268 269 270+00 271 272

-5.00%

Finish Grade at Grade Control

B.V.C. Sta. 266+00
81.00

78.52
76.35
74.28
72.32
70.47
68.15
67.75

E.V.C. Sta. 270+00
66.55

400' V.C.

C.C. Sta. 268+00
71.00

-2.22%

SEWER UTILITY LAYOUT PLAN

MOANALUA ROAD

F.A.P. Proj. No. U-078-1(11)

Scale: 1" = 50' Date: May, 1970

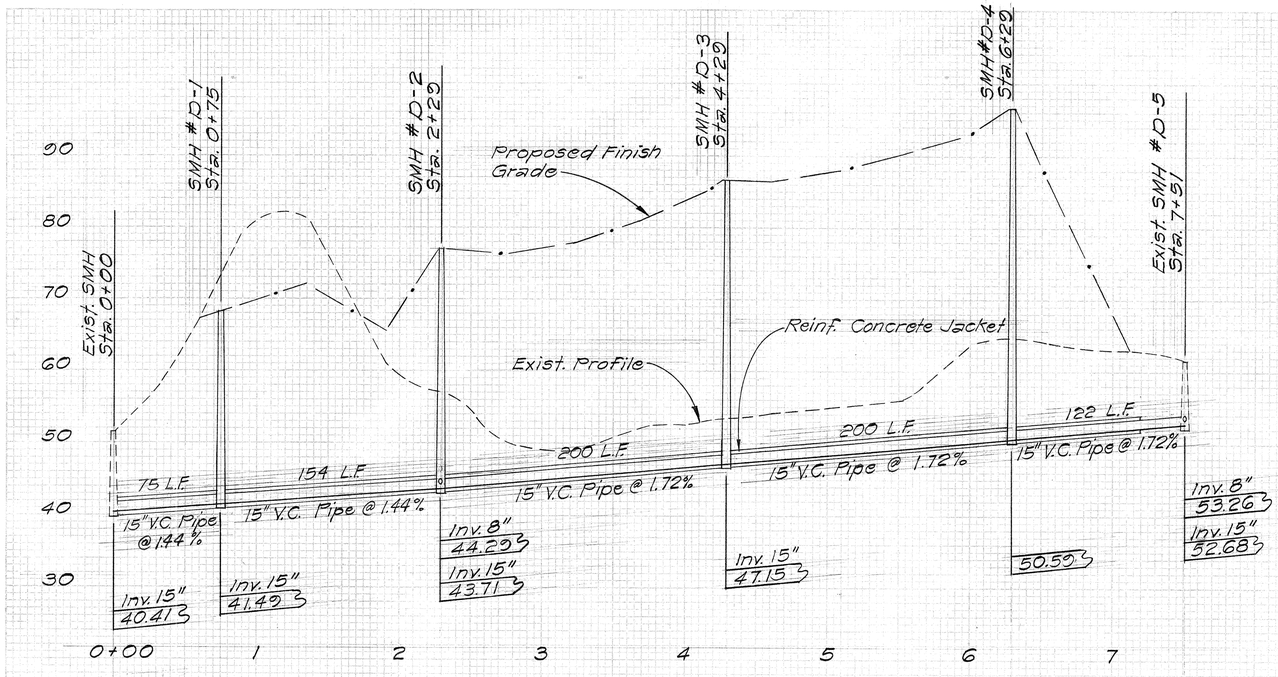
SHEET NO. 3 OF 8 SHEETS

APPROVED:

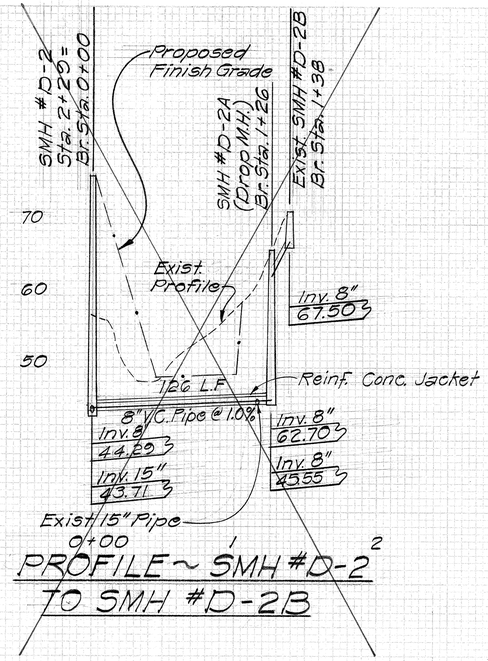
CHIEF, DIV. OF SEWERS — DATE 6/8/70

PLATE 1—PLAN PROFILE B. P. R. STANDARD
THE FREDERICK POST CO., CHICAGO

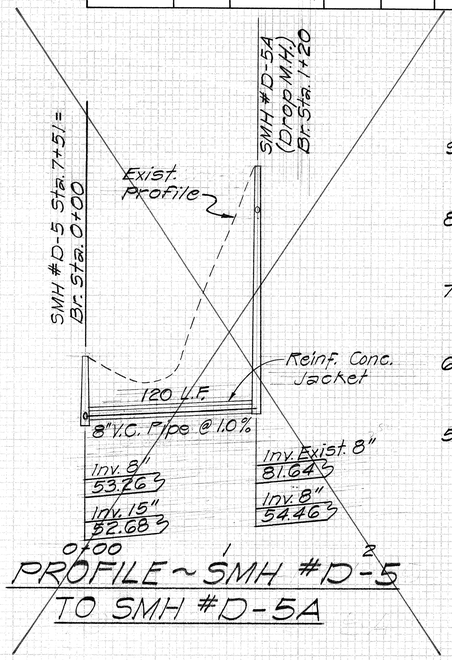
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1 (11)	1969	166	258



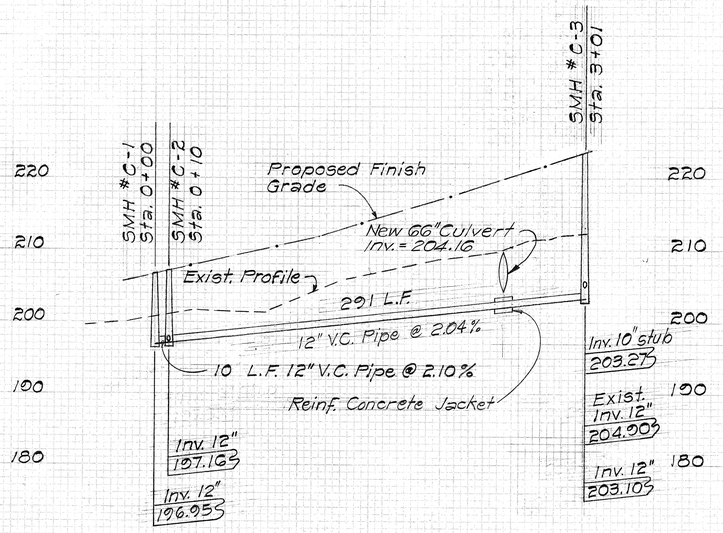
PROFILE ~ SEWER LINE "D"



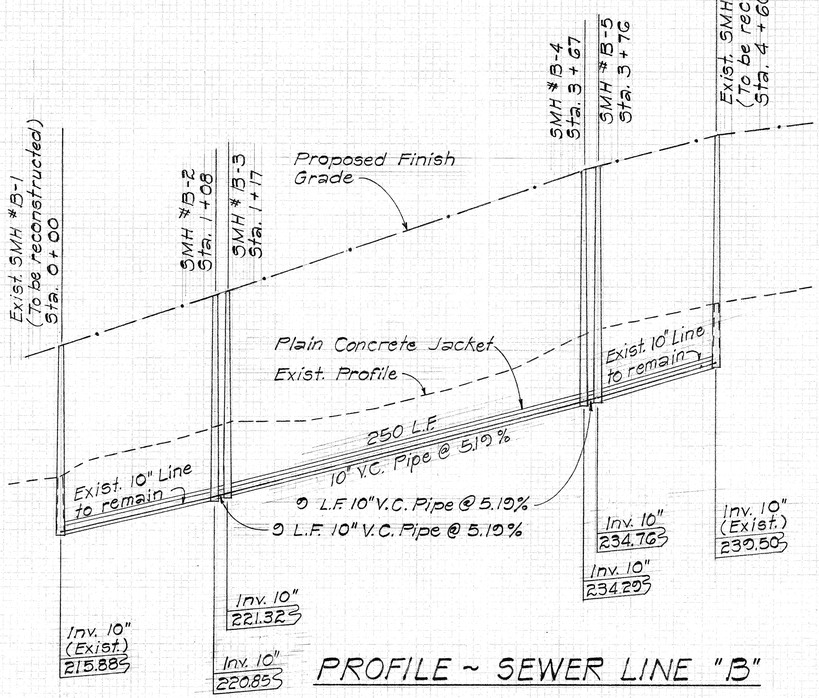
PROFILE ~ SMH #D-2
TO SMH #D-2B



PROFILE ~ SMH #D-5
TO SMH #D-5A



PROFILE ~ SEWER LINE "C"



PROFILE ~ SEWER LINE "B"

APPROVED:

Z. Clous — CHIEF, DIV. OF SEWERS — 6/26/70 — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SEWER PROFILES

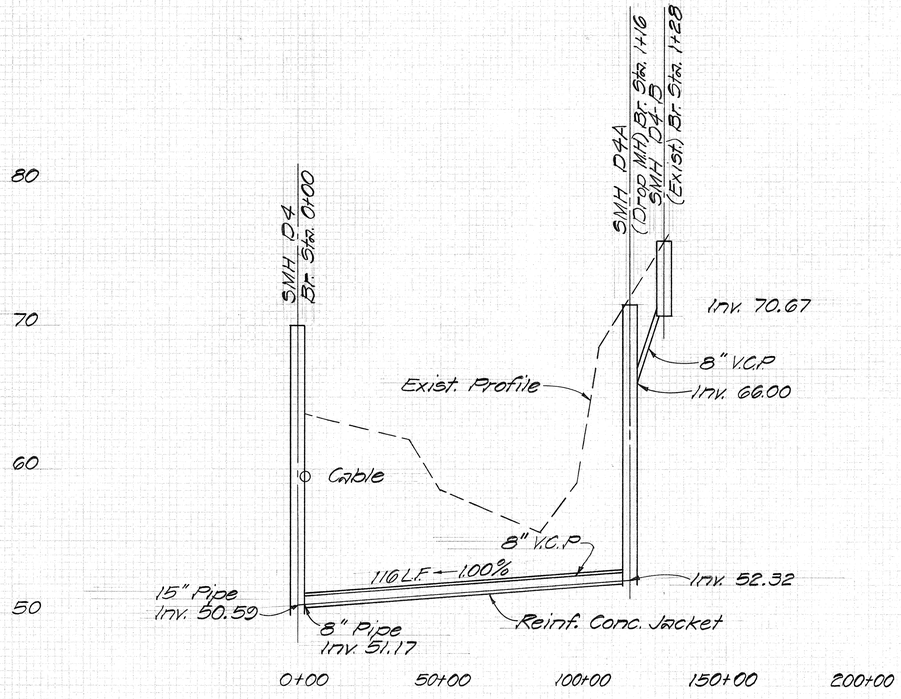
MOANALUA ROAD

F.A.P. Proj. No. F-078-1(11)

Scale: Horiz. = 1"=50'
Vert. = 1"=10'
Date: June, 1970

SHEET No. 4 OF 8 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	1665-1	258



PROFILE ~ SMH D-4 TO SMH D-4B

Scale: Hor. 1"= 25'
Vert. 1"= 5'

CONTRACT CHANGE ORDER NO. 12

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SEWER PROFILES

MOANALUA ROAD

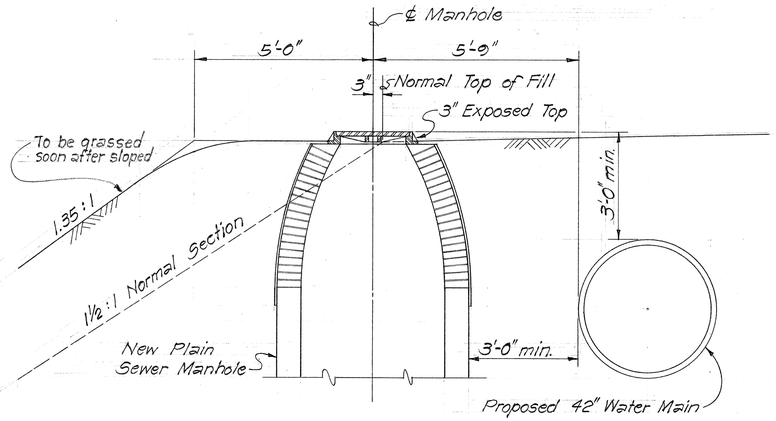
F.A.P. Proj. No. F-078-1(11)

Scale: As Shown Date: Jan, 1975

SHEET No. OF SHEETS

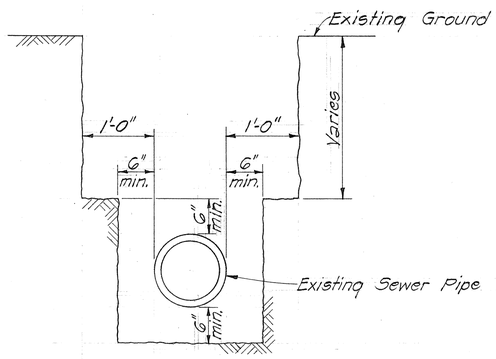
166 S-1

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(11)	1969	167	258



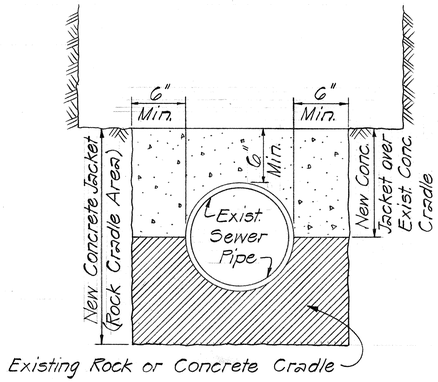
SEWER M.H. ALONG WALKWAY-UTILITIES CORRIDOR

Scale: ½"=1'-0"



TYPICAL PAYMENT TRENCH WIDTH FOR PLAIN CONCRETE JACKETING OF EXISTING SEWER LINES

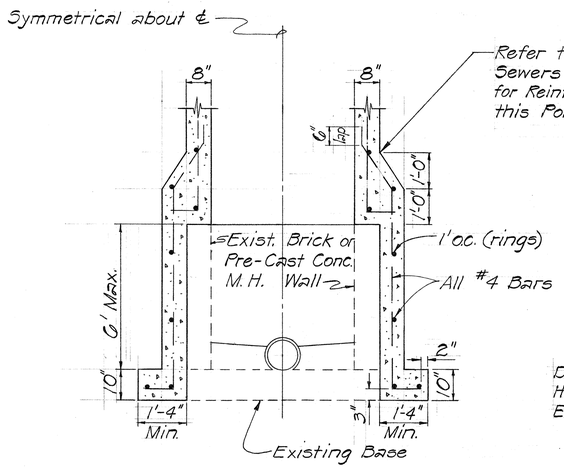
Scale: 1"=1'-0"



Note:
Where rock cradle is encountered, Contractor shall remove rock, clean existing pipe and install full jacket. Where concrete cradle is encountered, Contractor shall clean pipe and exposed concrete, and jacket upper portion of the pipe.

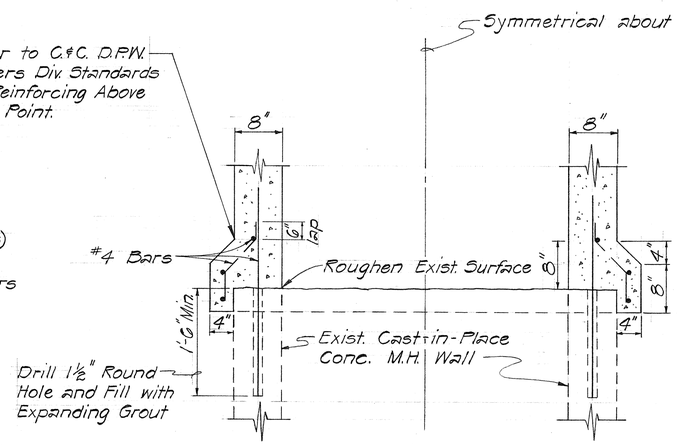
DETAIL OF CONCRETE JACKETING OF EXISTING SEWER PIPE

Not to Scale



CONNECTION DETAIL FOR EXTENDING EXISTING BRICK OR PRE-CAST CONCRETE M.H. WALL

Scale: ½"=1'-0"



CONNECTION DETAIL FOR EXTENDING EXISTING CAST-IN-PLACE CONCRETE M.H. WALL

Scale: 1"=1'-0"

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

APPROVED:

Z. Alona — CHIEF, DIV. OF SEWERS — 6/2/70 DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SPECIAL SEWER DETAILS

MOANALUA ROAD

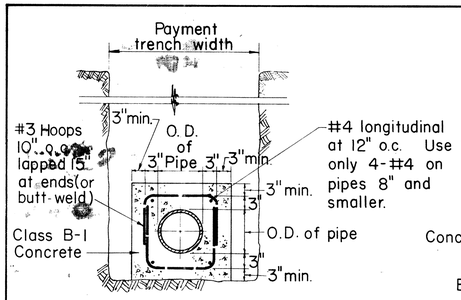
F.A.P. Proj. No. F-078-1(11)

Scale: As Shown Date: June, 1970

SHEET No. 5 OF 8 SHEETS

K&E CRYSTALENE® LA 2920 TRACING PAPER

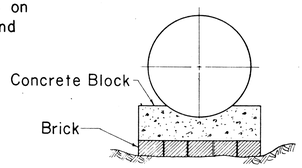
FED. ROAD DIST. NO	STATE	FED AID PROJ NO	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F-078-(11)	1969	168	258



DETAIL OF CONCRETE JACKET

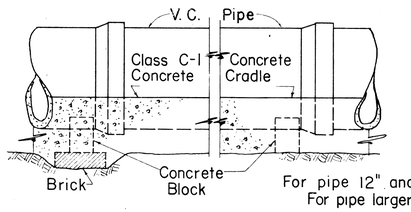
Scale: 3/4" = 1'-0"

Contractor shall set Concrete Blocks on undisturbed ground. Where ground is too low, the contractor shall not heap up dirt under the Concrete Block but use Concrete Bricks to take up the deficiency, scraping away beneath Concrete Block to give sufficient room for Brick.



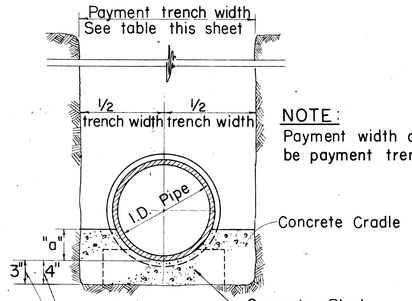
METHOD OF USING BRICKS UNDER CONCRETE BLOCKS

Not To Scale



ELEVATION SHOWING METHOD OF LAYING PIPE

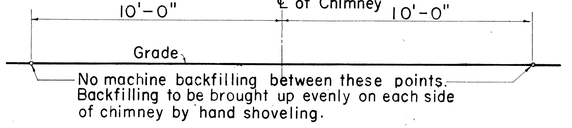
Not To Scale

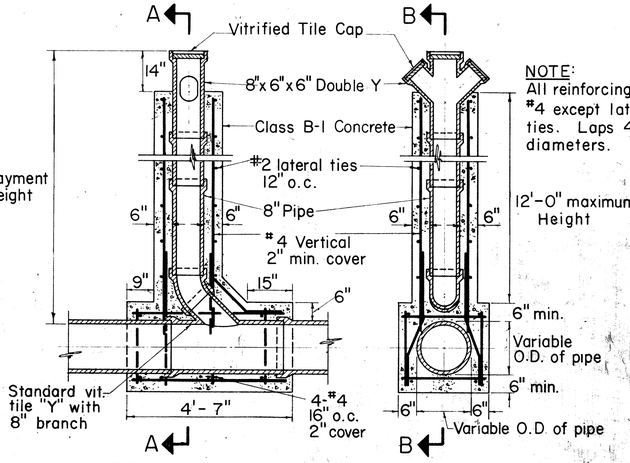


NOTE:
Payment width of cradle shall be payment trench width.

CONCRETE CRADLE FOR VITRIFIED CLAY PIPE

Not To Scale





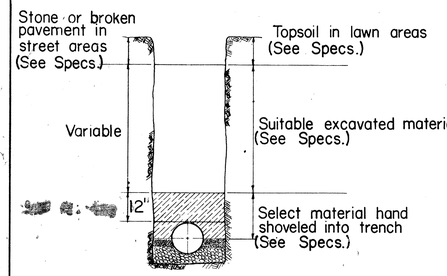
NOTE:
All reinforcing rods #4 except lateral ties. Laps 40 diameters.

SECTION B-B SECTION A-A

DETAILS OF CHIMNEY

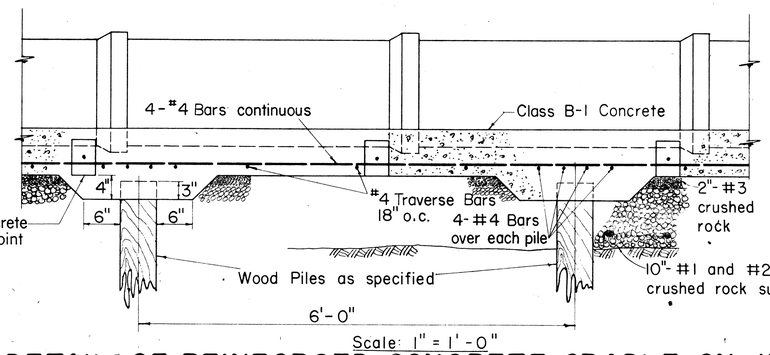
Scale: 1/2" = 1'-0"

Payment quantities for trench excavation, crushed rock fill, crushed rock cradle, and crushed rock sub-base shall be computed using payment trench widths as shown in the table of "Trench Widths". No payment shall be made for excess quantities resulting from trench widths greater than the payment trench widths shown.

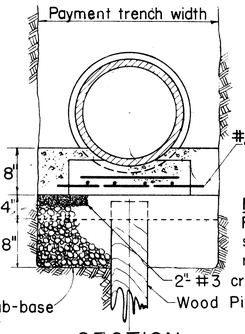


METHOD OF BACKFILL

Not To Scale



Scale: 1" = 1'-0"

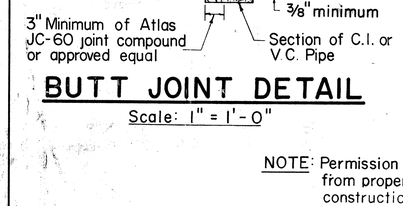


SECTION

NOTE:
Reinforcing bars of laterals shall be lapped 40 dia. to reinf bars of mains.

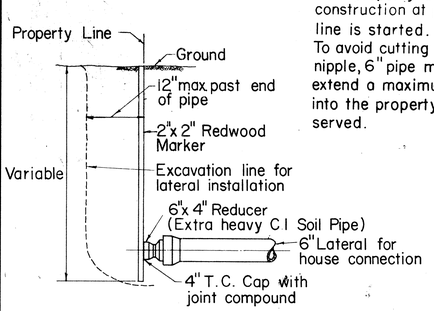
DETAIL OF REINFORCED CONCRETE CRADLE ON WOOD PILES (FOR 6, 8, 10 & 12 IN. V.C. PIPE)

DETAIL OF REINFORCED CONCRETE CRADLE WITHOUT PILES SIMILAR EXCEPT FOR WOOD PILES AND PILE CAPS



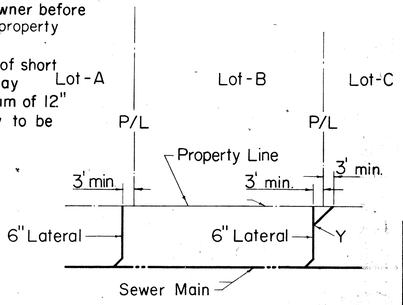
BUTT JOINT DETAIL

Scale: 1" = 1'-0"



NOTE: Permission is to be secured from property owner before construction at property line is started. To avoid cutting of short nipple, 6" pipe may extend a maximum of 12" into the property to be served.

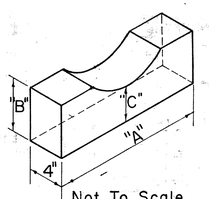
DETAIL AT PROPERTY LINE



LAYOUT

CONSTRUCTION OF LATERALS

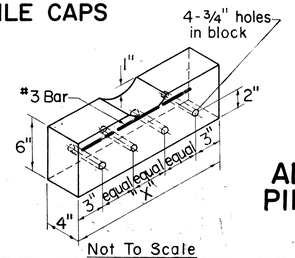
Not To Scale



Not To Scale

DETAIL OF PRECAST CONC. PIPE BLOCK

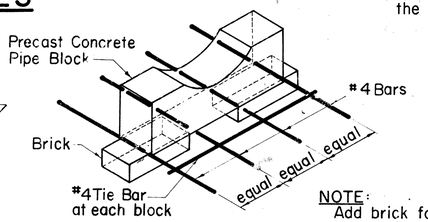
CONCRETE BLOCK DIMENSIONS			
PIPE SIZE	"A"	"B"	"C"
6"	1'-2"	6"	3"
8"	1'-5"	6"	3"
10"	1'-7"	6"	3"
12"	1'-7"	6"	3"
15"	1'-8"	6"	4"
18"	1'-9"	6"	4"
21"	1'-10"	6"	4"
24"	1'-11"	6"	4"
27"	2'-0"	6"	4"
30"	2'-3"	6"	4"



Not To Scale

DETAIL OF CONC. PIPE BLOCK FOR REINF. CRADLE

DIM. OF REINF. CONC. BLOCK	
PIPE SIZE	"X"
6"	1'-6"
8"	1'-6"
10"	1'-8"
12"	1'-8"
15"	1'-10"
18"	1'-10"
21"	1'-10"
24"	2'-0"
27"	2'-0"
30"	2'-0"



NOTE:
Add brick for larger size pipe

Not To Scale

ALTERNATE DETAIL OF CONC. PIPE BLOCK FOR REINF. CRADLE

VITRIFIED CLAY PIPE TABLE				
TRENCH WIDTHS		DIM. OF CONC. CRADLE		
PIPE SIZE	PAY. WIDTH	PIPE SIZE	"a"	WIDTH
6"	24"	6"	3"	24"
8"	24"	8"	3"	24"
10"	24"	10"	3"	24"
12"	30"	12"	3"	30"
15"	38"	15"	4"	38"
18"	41"	18"	5"	41"
21"	45"	21"	5"	45"
24"	50"	24"	6"	50"
27"	53"	27"	7"	53"
30"	57"	30"	7"	57"

APPROVED:

CHIEF, DIVISION OF SEWERS

6/8/70
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DIVISION OF SEWERS
CITY & COUNTY OF HONOLULU

STANDARD DETAILS

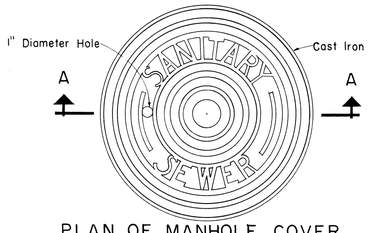
SEWERS - CONCRETE JACKET & MISCELLANEOUS DETAILS

Scales: As Noted Date: June, 1970

SHEET NO. 6 OF 8 SHEETS

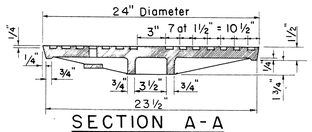
IMPERIAL TM K & E CO., N.Y. TRADE MARK

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO	TOTAL SHEETS
HAWAII	HAWAII	F-078-1(11)	1969	169	258



PLAN OF MANHOLE COVER

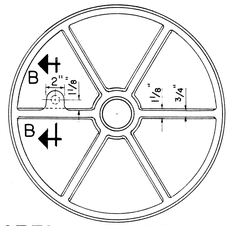
Scale: 1 1/2" = 1'-0"



SECTION A-A

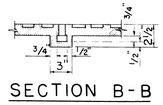
Scale: 1 1/2" = 1'-0"

NOTE:
This cover is used with the "SA" or "SD" frame

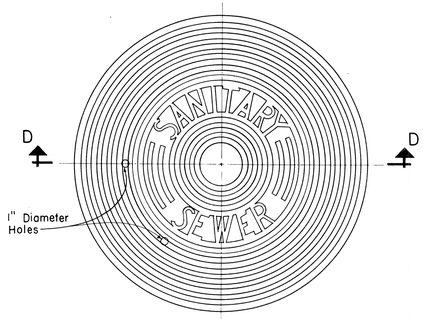


BOTTOM VIEW OF COVER

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



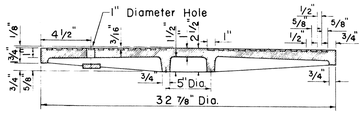
SECTION B-B



PLAN

SPECIAL MANHOLE COVER

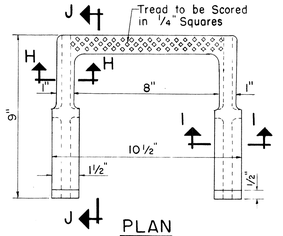
Scale: 1 1/2" = 1'-0"



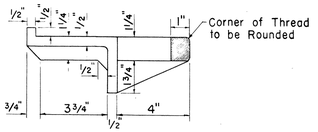
SECTION D-D

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

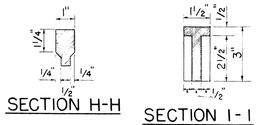
Approx. Weight 260 Pounds



PLAN

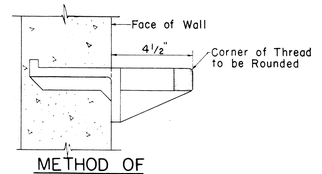


SECTION J-J



SECTION H-H

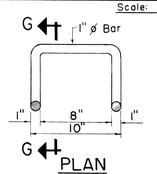
SECTION I-I



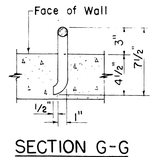
METHOD OF INSTALLATION

TYPE "SB" MANHOLE RUNGS (CAST IRON)

Scale: 3" = 1'-0"



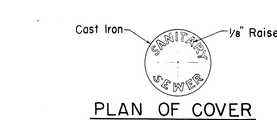
PLAN



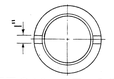
SECTION G-G

TYPE "SA" MANHOLE RUNGS (WROUGHT IRON)

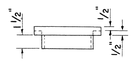
Scale: 1 1/2" = 1'-0"



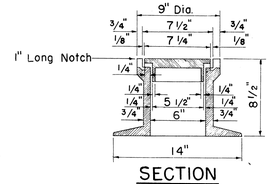
PLAN OF COVER



BOTTOM OF COVER



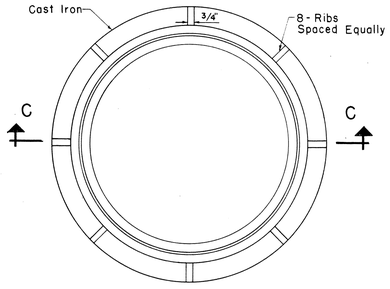
ELEVATION



SECTION

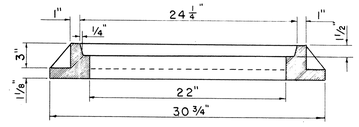
DROP MANHOLE CHIMNEY CASTINGS

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



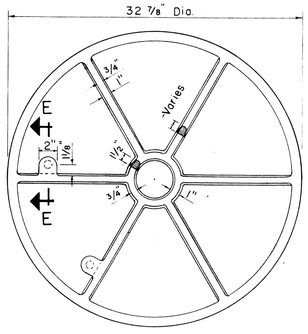
PLAN OF MANHOLE FRAME

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



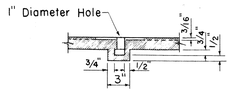
SECTION C-C

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



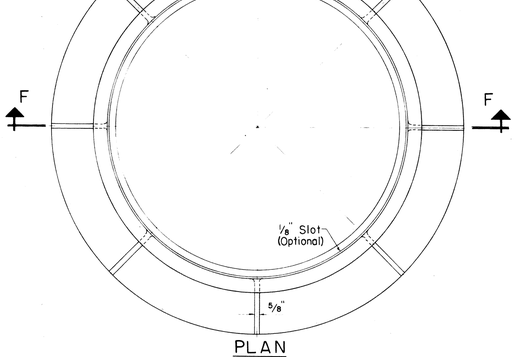
BOTTOM VIEW OF COVER

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



SECTION E-E

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

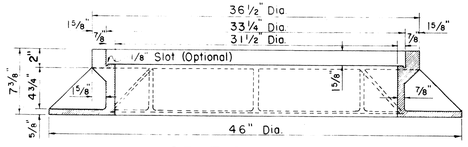


PLAN

SPECIAL MANHOLE FRAME

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

Approx. Weight 437 Pounds



SECTION F-F

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

TYPE "SA" SEWER MANHOLE FRAME AND COVER

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

TYPE "SB" SEWER MANHOLE FRAME AND COVER

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

APPROVED:

L. Ona 6/2/70

CHIEF, DIVISION OF SEWERS — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DIVISION OF SEWERS
CITY & COUNTY OF HONOLULU

STANDARD DETAILS

SEWERS - MANHOLE RUNGS, CHIMNEY CASTINGS AND FRAME AND COVER DETAILS

Scales: As Noted — Date: June, 1970

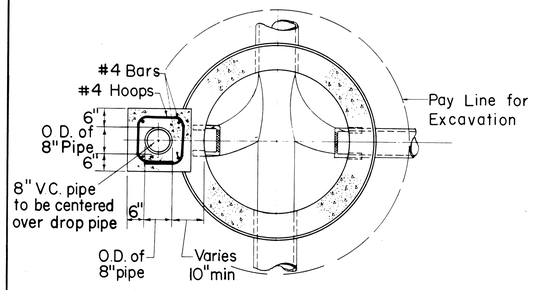
SHEET NO. 7 OF 8 SHEETS

ORIGINAL PLAN
NOTE BOOK
No.

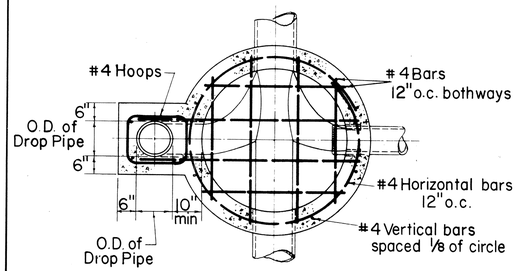
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

0125 IMPERIAL TRACING CLOTH 10-62

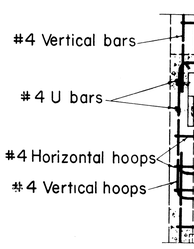
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F078-1(11)	1969	170	258



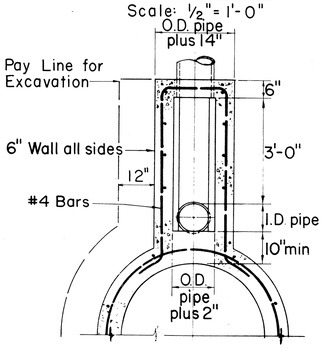
SECTION A-A
Scale: ½"=1'-0"



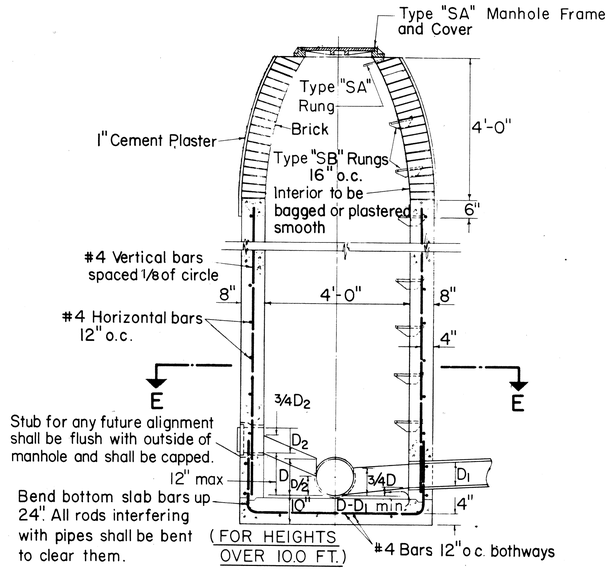
SECTION B-B
Scale: ½"=1'-0"



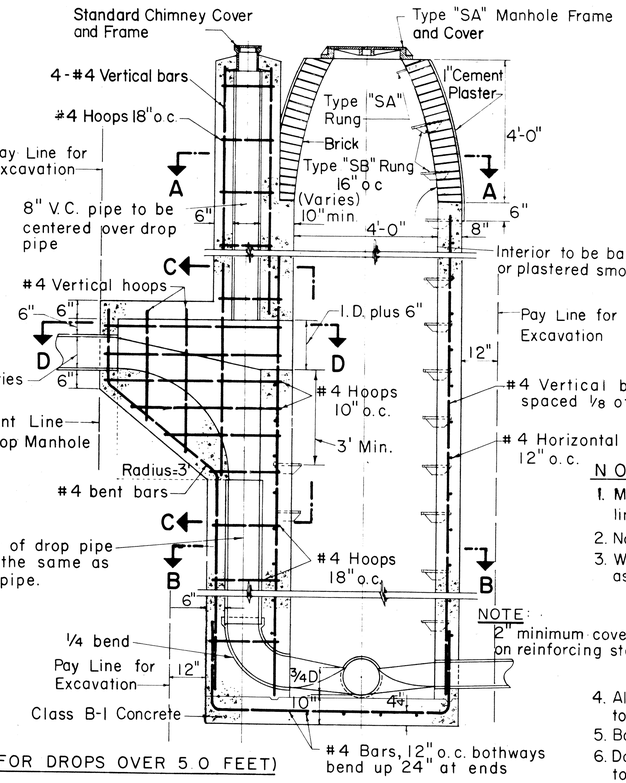
SECTION C-C
Scale: ½"=1'-0"



SECTION D-D
Scale: ½"=1'-0"

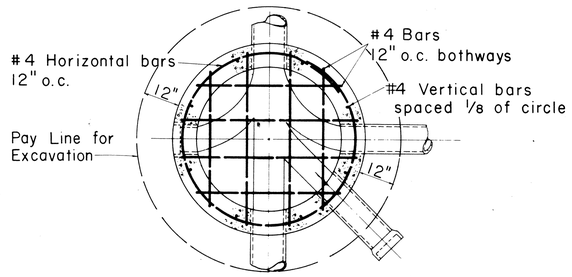


PLAIN MANHOLE
Scale: ½"=1'-0"

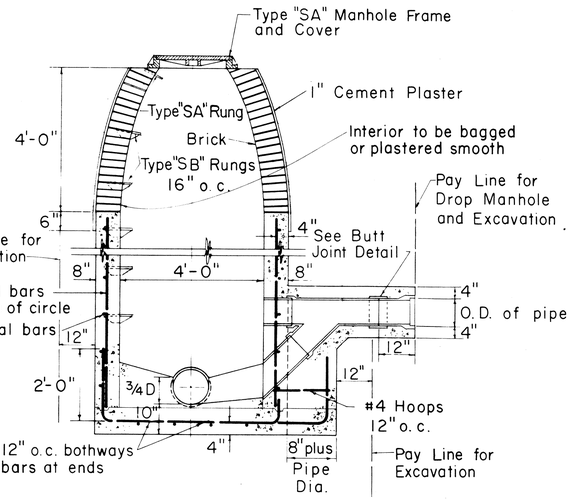


(FOR DROPS OVER 5.0 FEET)

DROP MANHOLE
Scale: ½"=1'-0"



SECTION E-E
Scale: ½"=1'-0"



(FOR DROPS UNDER 5.0 FEET)

SHALLOW DROP MANHOLE
Scale: ½"=1'-0"

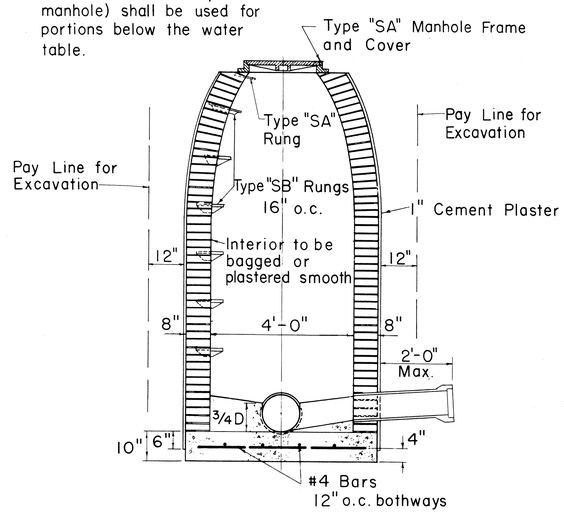
NOTE:

1. Manhole rungs shall not be aligned above any flow line except in drop manhole.
2. No rungs shall be installed in manholes less than 3' high.
3. When not otherwise noted, manhole stubs shall be sloped as follows:

Pipe Size	Rise Per Foot
6"	⅛"
8"	3/32"
10"	1/16"
12"	1/16"

4. All reinforcing rods interfering with pipes shall be bent to clear them.
5. Bar lap to be 40 diameters in length.
6. Data for special manholes not shown shall be similar to that for plain manholes.
7. Size of drop pipe in all Drop Manholes shall be same as influent line.
8. Manhole wall to be of reinforced concrete to height 1' above normal ground water table.
9. All pipes entering or leaving manholes shall have a joint within 2'-0" of the manhole wall.

NOTE:
Reinforced concrete manhole walls (See detail of plain manhole) shall be used for portions below the water table.



(MAXIMUM HEIGHT - 10.0 FEET)

BRICK MANHOLE
Scale: ½"=1'-0"

Payment for excavation for manholes shall be made under unit price for trench excavation and shall be measured to one foot outside of walls from original ground elevation to authorized bottom elevation.

Payment for manhole walls (brick, or cast-in-place concrete) shall include brick, mortar, concrete, reinforcing steel, cast-iron steps, galvanized wrought iron rungs, and plastering.

APPROVED:

CHIEF, DIVISION OF SEWERS

6/8/70
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DIVISION OF SEWERS
CITY & COUNTY OF HONOLULU

STANDARD DETAILS

SEWERS - DROP MANHOLE AND BRICK MANHOLE DETAILS

Scales: As Noted Date: June, 1970

SHEET NO. 8 OF 8 SHEETS

IMPERIAL 156 K & E CO., N.Y. ® TRADE MARK

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	171	258

Revised: Oct. 16, 1970
April 15, 1971
Oct. 29, 1971

NOTE:
For HECo and HTCo Manhole ductline opening detail see sheet no. 163A. The Contractor shall verify with the Engineer as to the exact location of the ductline opening on any manhole.

1000W

2000N

⇦ OUTBOUND LANES

INBOUND LANES ⇨

Coast Guard Utility Lines. (For detail see sht. no. 135.)

Splice Pit #1 for T.P. (H.T. Drwg. 34047)

No-Blo Valve

Cut

70 L.F. of 2-4" GSC

Construct MH no. 2 (H.E. Drwg. 18775)

~~Dig splice Pit #2 for proposed T.P. Harden MH relocation~~

Trench and backfill 134 l.f. for T.P. cable. Place 2 shield v See Typical

Relocated P42T (by HTCo.)

P42T (by HTCo.)
Place 2-1¼"x8' Anchor (H.T.Co)
2-4" ID Conduit Bend

Sta. 2+08+50

~~Construct new Harden type M.H. for TP cable with 2-4" I.D. G.S.P. (For detail see sheet no. 197.)~~

P. 64R (by HECo.)
Remove Stub and Anchor (By H.E.Co.)

P. 64 (By H.E.Co.)
1-3/4" Anchor, Lead = 10'

Corner
Construct H.T. M.H. Type "A-3-6"
Type MH, For Detail See HTCO Drawing No. 34034

Sta. 1+40 95' 72' Rt.
1 - 40' Temp. Pole (H.T.Co.)

Navy Electric Duct Line (For detail see sht. no. 137.)

~~P. 62x 45' Pole (by H.E.Co.) 1" Anchor, Lead=5' 1-5" G.S. Conduit, 8'-0" Long Radius Bend~~

P. 63 (By H.E.Co.)
~~1¼" Anchor, Lead = 25'~~

Sta. 2+11+75

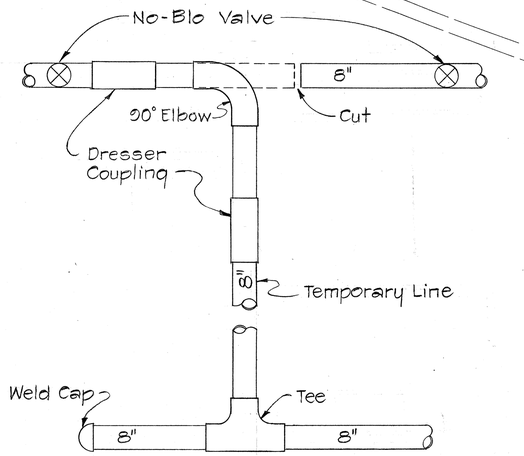
Match Line

TRUE NORTH

C.C.O. No. 16

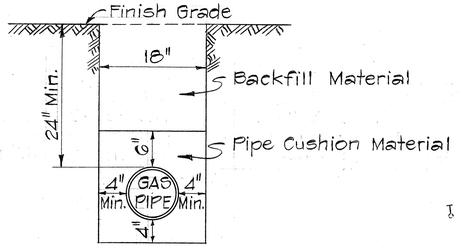
TYPICAL TEMPORARY CONNECTIONS OF GAS MAIN AT ENDS OF PROJECT

Not to Scale



TYPICAL GAS LINE TRENCH DETAIL

Scale: 1"=1'-0"



P. 65

500W

Sta. 208+00

Existing Ground at ℄

Finish Grade at Grade Control

190.60

+6.00%

208 209 210+00 211 212

230 220 210 200 190 180 170

THIS SHEET SUPERSEDES SHT. NO. 171

APPROVED:

Hawaiian Electric Co., Inc. NMD JK	9/4/70 Date
Hawaiian Telephone Co., Ltd.	9-14-70 Date
Honolulu Gas Co., Ltd.	6/12/70 Date

UTILITY LAYOUT PLAN ELECTRIC, TELEPHONE, TRANS-PAC, JOINT TRUNKING AND GAS

MOANALUA ROAD
F.A.P. PROJECT NO. F-078-1(11)

Scale: 1"=50' Date: May, 1970

SHEET No. 1 OF 38 SHEETS

PLAN: SURVEYED, PLOTTED, NOTE BOOK, NO., ALIGNMENT CHECKED, RT. OF WAY CHECKED, BY, DATE

PROFILE: SURVEYED, PLOTTED, NOTE BOOK, GRADES CHECKED, B.M.'S NOTED, STRUCTURE NOTATIONS CHKD, NO., BY, DATE

K&E PLATE 1, PLAN-PROFILE KEUFFEL & ESSER CO.

48 7012 IMPERIAL™ TRACING CLOTH 26960

171R

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	172	258

Revised: Oct. 16, 1970
April 15, 1971
Oct. 29, 1971

TRUE NORTH

500E 2000N 500E 1F 1500N

Const. HH #27 over exist. duct line (HE Dwg. #18841)
Const. HH #26 over exist. duct line (HE Dwg. #18841)

Temporary 40' Pole (By HECo) and 3/4" Anchor, Lead = 12'
Construct HH No. 25A (HE Dwg. No. 18841)
Construct 3'x5' HH #25 (HE Dwg. No. 18841)

RAMP RH-O
OUTBOUND LANES
INBOUND LANES
RAMP RH-I
RED HILL GRADE SEPARATION STRUCTURE
H.T. Ducts
H.E. Ducts
2-4" Gas Lines
Construct 6'x11' HH #24 (HE Dwg. No. 18844)
Dresser Coupling (Gas Co) at both ends of structure.
4" Flanged Valve in Rdwy Valve Box.
Match Line
Sta. 2+27
1000N 1500E

Construct M.H. No. 4 (H.E. Dwg. No. 18775)
Construct H.T. M.H. Type A-3-6
Sta. 8+10
Splice Pit No. 3 for T.P. (H.T. Dwg. No. 34047)
Construct M.H. No. 5 (H.E. Dwg. No. 18775)
Sta. 11+93
Construct H.T. M.H. Type A-3-6
Construct 1-435T-B Pull Box
1-4' condulet bend to pole
Sta. 7+30 % 113' Rt. 1-40' pole (HTCo)
1-1"x8' Anchor Lead = 15'
Trench and backfill 875 L.F. for T.P. Cable, Place 2 shield wires. See Typical
Sta. 4+97 % 83' Rt. (by HECo)
Temporary 50' Pole, Lead = 15'
3/4" Anchor (HECo)
2-1" Anchor (HTCo) Lead = 15'
Sta. 14+60
Beginning of 4" GSP Conduit for T.P. Cable
Trench and backfill 570 L.F. for T.P. cable. Place 2 shield wires. See Typical.
Sta. 14+78 % 60' Rt.
Place 50' temp. pole. (By HECo) with 1" Anchor and 4-4" C-Bend (L.R.B.)
SEE "ENLARGED PARTIAL PLAN VIEW" THIS SHT.
Sta. 15+14
Construct H.T. M.H. Type A-3-9
New 12 way Duct Bank stub-out 15 L.F. long in tiers for future
R=1500.00 P.T. Sta. 222+19.30
Sta. 0+58
Construct M.H. No. 6 (HE Dwg. No. 18775)
30" Gas Valve Manhole with 3-way cock valve. Insulate-install jumper wire in manhole. C.C.O. No. 27
Sta. 2+75 % 84' Rt.
Place 40' Temp. Pole (H.T. Co.)
Construct M.H. No. 3 (HE Dwg. No. 18775)
Construct H.T. M.H. Type A-3-6B
Sta. 3+10
Construct 6'x11' HH No 28 (HE Dwg. No. 18849)
Sta. 2+90 % 112' Rt.
45' Pole (By H.E.Co.)
1" Anchor, Lead = 30'
1-5" G.S. Conduit 8'-0" Long Radius Bend

(A) 30' I 9F-3 Reinforced Concrete Jacket
(B) 15' I 9F-3 G.S.C. Concrete Jacket
(C) 30' I 9F-3 G.S.C. Concrete Jacket
(D) 30' I 9F-3 Reinforced Concrete Jacket
For H.T.Co. Standard Duct Formations Details, See Sheet No. 192

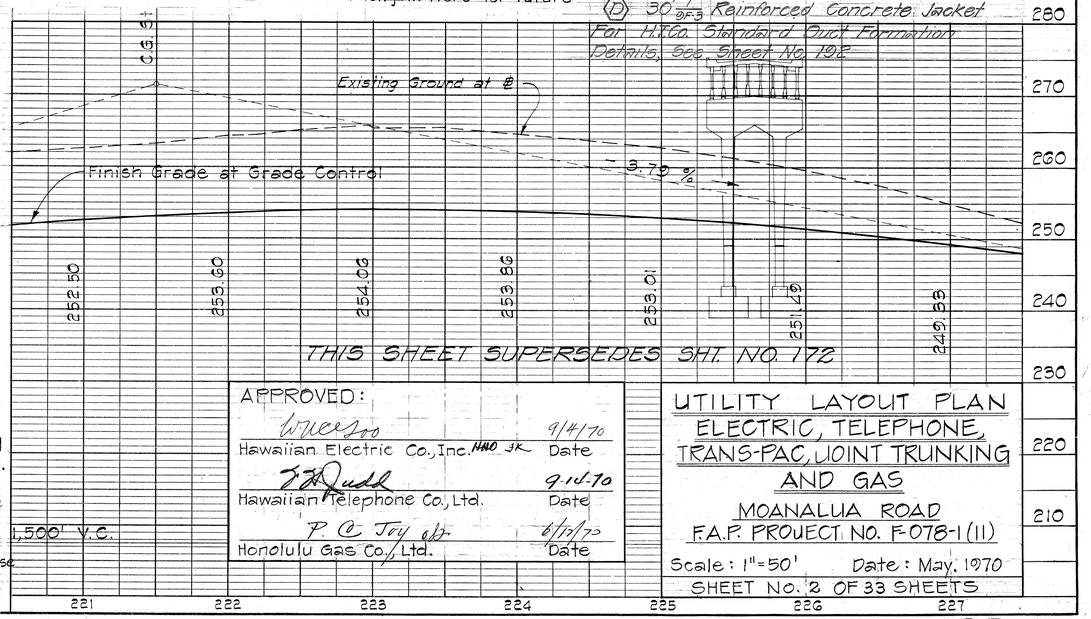
NOTE
1. For details of utilities duct lines through Red Hill Separation Structure, see sheets 204 through 212.
2. For utilities in upper portion of Ala Kapuna St., see sheet 175.

℄ Sta. 224+69
H.E.Co. Ducts
Maintain 2'-0" min. cover over Temporary Ductline
1'x6"x3'-6" Service Box (H.E.Co. Drwg. 011310, 011311, 011312)
Contractor to install 2-4" G.S. Conduits, direct buried, with Long Radius Bends at duct line and pole.
HTCo
Temporary Riser Pole (HECo)
Temporary Anchor (HECo)
R/W Line
NOTE: Contractor to return and restore the 10'-0" portion of the duct-line as required for the ultimate ductline at ℄ Sta. 224+69 when permanent service is installed to Coast Guard Vault and Damon Estate.

TEMPORARY DUCT CONNECTION AT ℄ STA. 224+69 RT.
SEE CONSTRUCTION PHASING
ENLARGED PARTIAL PLAN VIEW
Scale: 1/8"=1'-0"

℄ Sta. 224+69
1'-0" 10'-0" 6"
5" Ducts
2-4" G.S. Radius Bend
5" Ducts
Support with Blocks
Contractor to plug the two bott. ducts on Ewa side.
Contractor to fill empty spaces between 4" G.I. Conduit and 5" Duct with Duct Seal.
SECTION "X-X"
Scale: 1/2"=1'-0"

CONSTRUCTION PHASING FOR TEMPORARY DUCT CONNECTIONS:
PHASE-I
Contractor is to make connections as shown per Section "X-X" and install steel plate over temporary ductline connections after H.E.Co. has installed cables.
PHASE-II
H.E.Co. is to install cables, make temporary electrical connections and remove existing cables
PHASE-III
(A) Contractor is to remove temporary G.S. Conduits & return to HECo Warehouse.
(B) Contractor is to make permanent duct connections and encase in concrete.



THIS SHEET SUPERSEDES SHT. NO. 172

APPROVED:
Hawaiian Electric Co., Inc. 9/14/70 Date
Hawaiian Telephone Co., Ltd. 9.15.70 Date
Honolulu Gas Co., Ltd. 8/17/70 Date

UTILITY LAYOUT PLAN
ELECTRIC, TELEPHONE, TRANS-PAC, JOINT TRUNKING AND GAS
MOANALUA ROAD
F.A.P. PROJECT NO. F-078-1(11)

Scale: 1"=50' Date: May, 1970
SHEET NO. 2 OF 33 SHEETS

PLAN: SURVEYED, PLOTTED, GRADES CHECKED, NOTE BOOK, ALIGNMENT CHECKED, R/T. OF WAY CHECKED, NO., BY, DATE
PROFILE: SURVEYED, PLOTTED, GRADES CHECKED, NOTE BOOK, STRUCTURE NOTATNS CH'KD, NO., BY, DATE

K&E PLATE 1, PLAN-PROFILE KEUFFEL & ESSER CO.
48 7012 IMPERIAL™ TRACING CLOTH 26960

172R

Revised: Oct. 16, 1970
April 15, 1971
Oct. 20, 1971

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(11)	1969	173	258

PLAN — SURVEYED, PLOTTED, NOTE BOOK, ALIGNMENT CHECKED, RT. OF WAY CHECKED, NO. — BY, DATE

PROFILE — SURVEYED, PLOTTED, NOTE BOOK, GRADES CHECKED, B. M.'S NOTED, NO., STRUCTURE NOTATIONS CHKD. — BY, DATE

1500 E
1000 N
2000 E
500 N
N.F. Rd. Sta. 10+00
000
Construct M.H. No. 23 (H.E. Drwg. 18775)
Construct H.T. M.H. Type "A-1-16"
For Details See Sht. Nos. 1735-1 & 192R
NORTH FRONTAGE ROAD
OUTBOUND LANES
INBOUND LANES
TRUE NORTH
Match Line Sta. 227+00
Match Line Sta. 241+00
Construct EMH 8A (HECo. Dwg. 18776) For Details See Sht. No. 1735-1
For Details See Sht. No. 1735-1
Splice Pit #4 for T.P. (H.T. Drwg. 34047)
Splice Pit #5 for T.P. (H.T. Drwg. 34047)
Anode
SOUTH FRONTAGE ROAD
Construct M.H. No. 8 (H.E. Drwg. 15587) 18775
Construct H.T. M.H. Type "A-3-7"
MILITARY ACCESS ROAD "B"
For Splice Pit Locations See Sht. No. 138
S.F. Rd. Sta. 4+35
S.F. Rd. Sta. 5+35
S.F. Rd. Sta. 10+21
Stub out beyond 48" Drain
Construct H.T. M.H. Type "A-3-7"
Construct M.H. No. 7 (H.E. Drwg. 18775)

227 228 229 230+00 231 232 233 234 235 236 237 238 239 240+00 241

260 250 240 230 220 210 200 190

251.49
249.33
246.52
E.V.C. Sta. 229+00
243.06
1,500' V.C.
3.70 %
Finish Grade at Grade Control
Existing Ground at ℄

THIS SHEET SUPERSEDES SHT. NO. 173

APPROVED:

Hawaiian Electric Co, Inc. — 9/4/70 Date

Hawaiian Telephone Co, Ltd. — 9-14-70 Date

Honolulu Gas Co., Ltd. — 6/17/70 Date

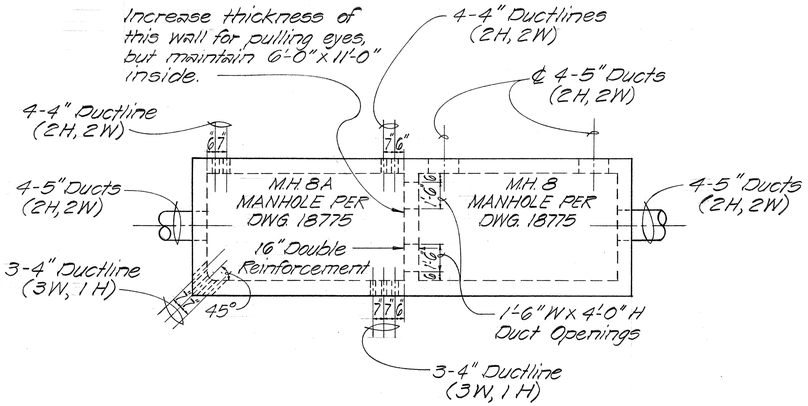
UTILITY LAYOUT PLAN
ELECTRIC, TELEPHONE TRANS-PAC, JOINT TRUNKING AND GAS

MOANALUA ROAD
F.A.P. PROJECT, F-078-1(11)
Scale: 1"=50' Date: May, 1970
SHEET No. 3 OF 38 SHEETS

K+E PLATE 1, PLAN-PROFILE KEUFFEL & ESSER CO.
48 7012 IMPERIAL™ TRACING CLOTH 26960

C.O. 173R

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	1735-1	258

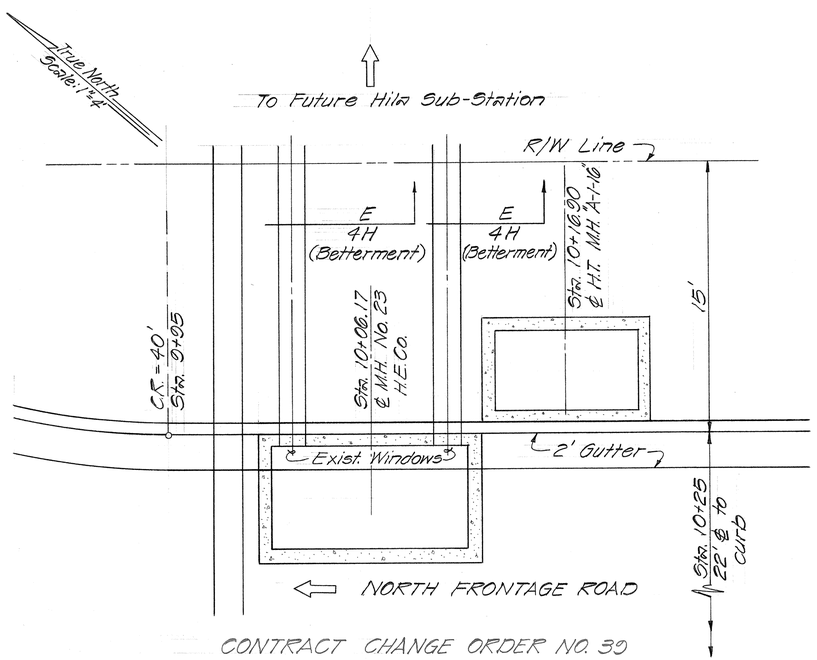


MH-8 AND MH-8A CONSTRUCTION REQUIREMENTS MOANALUA RD. UP GRADING

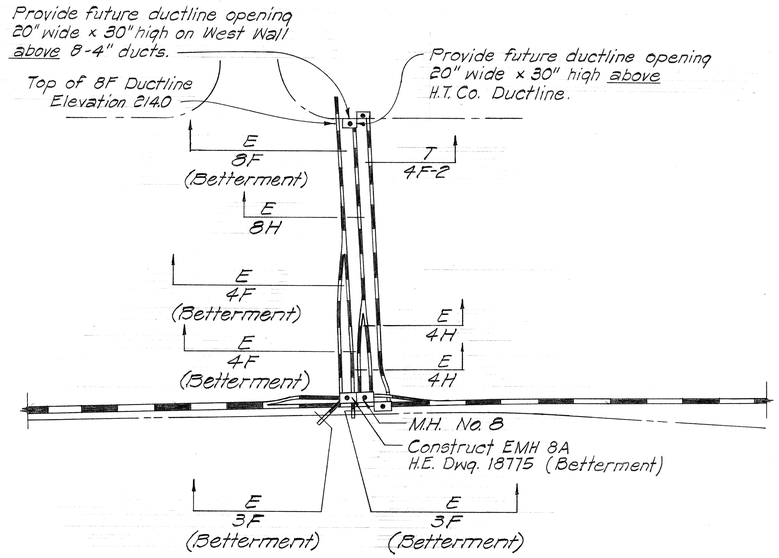
Not To Scale

NOTES:

1. Manhole to consist of 2 - Standard 6'x11' Manholes. (Dwg. No. 18775)
2. Duct across Moanalua Road to be at same elevation as those previously given for E.M.H. 8. (Sheet 177)
3. Height of duct openings between manholes to be as shown on profiles.
4. Install 3F (3-4" Ducts) vertically at EMH 8A if there is adequate room for ducts to past between 48" drain and H.T.Co. ductline.

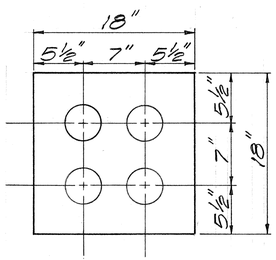


CONTRACT CHANGE ORDER NO. 39



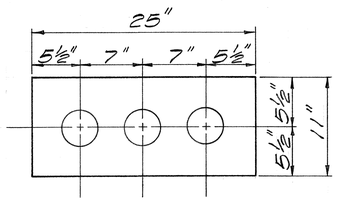
PROPOSED DUCTLINE CROSSING (BETTERMENT) AT ℄ STATION 235+55±

Not To Scale



E / 4F BETTERMENT

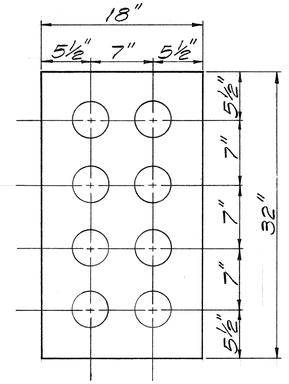
Not To Scale



E / 3F BETTERMENT

Not To Scale

(Install Under H.T.Co. Ducts and Over 48" Drain.)



E / 8F BETTERMENT

Not To Scale

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRIC MISC. DETAILS

MOANALUA ROAD
F.A.P. PROJECT No. F-078-1(11)

Scale: As Shown Date: Jan. 1975

SHEET No. OF SHEETS

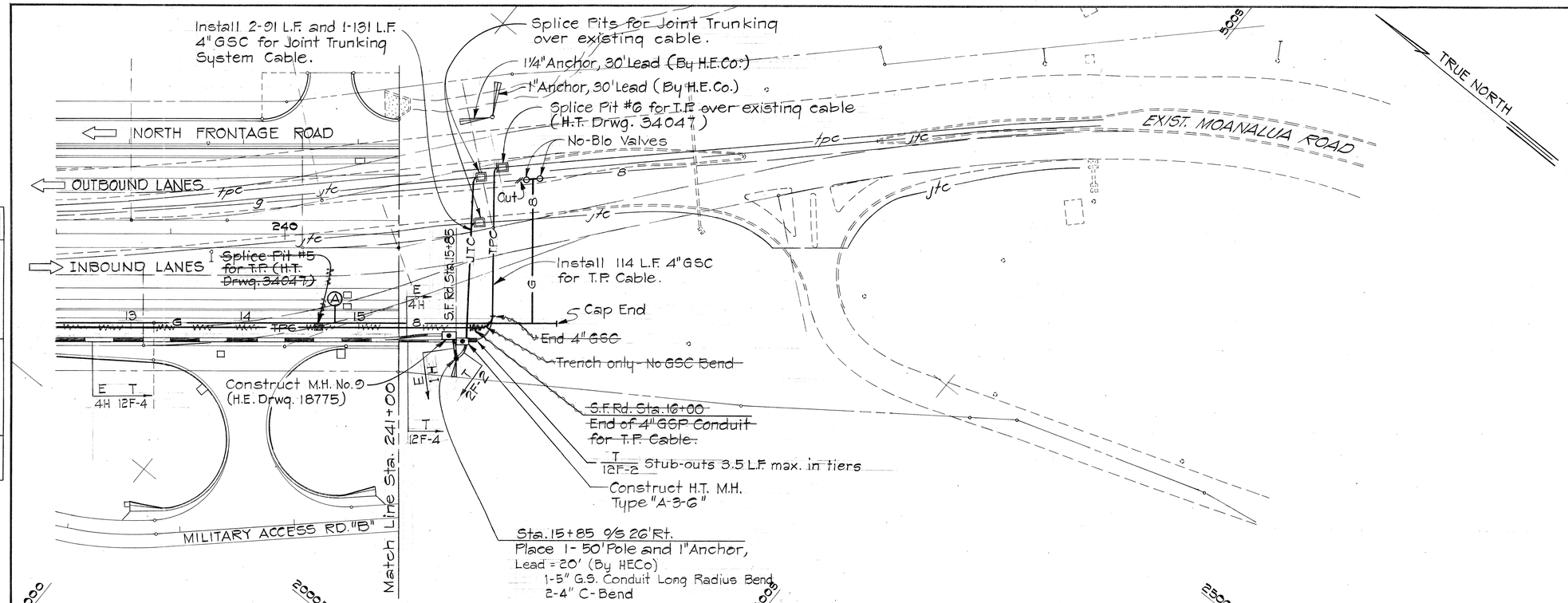
173 S-1

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

K+E ◎ TRACING PAPER

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(11)	1969	174	258

Revised: Oct. 16, 1970
April 15, 1971
Oct. 29, 1971



PLAN — SURVEYED, PLOTTED, ALIGNMENT CHECKED, RT. OF WAY CHECKED, NOTE BOOK, NO., BY, DATE

PROFILE — SURVEYED, PLOTTED, GRADES CHECKED, BASIS ADJUSTED, STRUCTURE NOTATIONS CHKD., NOTE BOOK, NO., BY, DATE

THIS SHEET SUPERSEDES SHT. NO. 174

APPROVED:

W. Arcisso — 9/14/70
Hawaiian Electric Co., Inc. M.H.O. JK — Date

T. H. Rudd — 9-16-70
Hawaiian Telephone Co., Ltd. — Date

P. C. Joy AP — 6/12/70
Honolulu Gas Co., Ltd. — Date

UTILITY LAYOUT PLAN
ELECTRIC, TELEPHONE, TRANS-PAC, JOINT TRUNKING AND GAS
MOANALUA ROAD
F.A.P. PROJECT NO. F-078-1(11)

Scale: 1"=50' Date: May, 1970
SHEET NO. 4 OF 33 SHEETS

PLATE 1—PLAN PROFILE B. P. R. STANDARD
THE FREDERICK POST CO., CHICAGO

174R

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	175	258

Revised: April 15, 1971
Oct. 29, 1971

PLAN — SURVEYED: PLOTTED: NOTE BOOK: ALIGNMENT CHECKED: NO.: RT. OF WAY CHECKED: BY: DATE:

NOTE:
1. Contractor shall coordinate construction of new catch basin at Sta. 1+50 Rt. and electric ducts in order not to disrupt services.
2. The duct lines between handhole 24 and 25 and the line along Ala Kapuna St. including handhole 25 to be constructed after portion of Ala Kapuna St. is brought up to new grades.

2000 E · 1000 N · 1500 E · 1000 E · 1500 N · 2000 E · 1000 E

Ala Kapuna St. Sta. 4+48.50
Red Hill Access Rd Sta. 0+00

R.H. Sta. 1+25± Rt.
See "Profile of ductlines and handholes," this sheet for final ductline connection from new to existing.

Exist. Ductline to be abandoned

R.H. Sta. 1+24± Rt.
Construct New Type I Handhole over existing H.T. Pullbox and 2-way duct bank to pole. 2-4" C-Bends
R. H. Sta. 3+75 Lt.
Construct 6'x11', HH #24
(HE Dwg. No. 18844)

R.H. Sta. 0+82 ½ 36' Rt.±
Place 45' temp. pole (By HECo)
1-Anchor, Lead = 20'
1-4" G.S. Conduit
Long Radius Bend

ALA KAPUNA STREET

Exist. 3'x5' Handhole to remain

4" G.S. Ductlines to be removed with removal of poles & returned to H.E.Co. warehouse.

R.H. Sta. 1+99 Rt.
Construct Type A-2-G Manhole to meet finish grade.

Place 435 TB Pull Box at revised new grade over existing ductlines. Contractor to determine existing ductline in field.

R.H. Sta. 1+31 ½ 38' Rt. ±
Place 45' temp. pole (By HECo)
1-4" G.S. Conduit Long Radius Bend

Forward St.

Gas line to drop under H.E. ducts

2-4" Gas Lines

H.E. Ducts

RED HILL GRADE SEPARATION

H.T. Ducts

H.E. ducts to drop under H.T. ducts

To Koko Head

To Ewa

R.H. Sta. 3+80 Rt.
Construct Handhole # 25

R.H. Sta. 3+50± Rt.
Construct Type A-2-G M.H. to meet finish grade

R.H. Sta. 3+18 ½ 55' Rt.
Place 40' temp. pole (by HECo)
¾" Anchor, Lead = 12'

(A) R.H. Sta. 1+35±
Connect 4" Gas Line. No-blow bottom out. Cut off existing line and cap end.

(B) Gas line to drop under H.E. ducts. Minimum clearance 6". Minimum cover for 4" Gas Line = 2'-0".

True North

No-blow valves · Cut · A.I.P. · 2F · 4F-2 · 6F-3 · 2F-1 · 2F-2 · 3 · 4 · 6 · 10 · 12 · 15 · 25 · G · E · T · GH · DH

PROFILE — SURVEYED: PLOTTED: NOTE BOOK: GRADES CHECKED: ALIGNMENT: NO.: STRUCTURE NOTATNS CH'KD: BY: DATE:

Sta. 2+49.07 Red Hill
Sta. 0+00 Beg. Forward St.
270.87 · 270.27 B.V.C. · 100' V.C. · 275.00 E.V.C.
Existing Duct line
Place 435 TB P.B. over exist. duct
New H.T. Duct Line Profile
Type A-2-G M.H.
C.G. 269.52
FORWARD STREET

R.H. Sta. 1+24 H.T. Type I Handhole
R.H. Sta. 1+99 Construct H.T. M.H. Type A-2-G
R.H. Sta. 3+30± Rt. C.G. Construct H.T. M.H. Type A-2-G
R.H. Sta. 3+80 Construct H.E. H.H. No. 25
274.52
H.E. Ductline
+4.27%
H.T. Ductline
H.E. & H.T. Duct Profile
Exist. HECo H.H.
Existing to be abandoned in place
288.12
B.V.C. 270.25 · 200' V.C. · E.V.C. 275
RED HILL ACCESS ROAD

275.30 C.G. Sta 5+00
+0.5% · -0.338%
South Frontage St. Sta. 6+15.44
275.00
B.V.C. Sta. 4+50 · 275.14 · 100 V.C. · 275.20 · E.V.C. Sta. 5+50

280 · 270 · 260 · 300 · 290 · 280 · 270 · 260 · 250 · 240 · 230

0 1 2 0 1 2 3 4 5 6 7

THIS SHEET SUPERSEDES SHT. NO 175

APPROVED:
Hawaiian Electric Co., Inc. — 9/14/70 — Date
Hawaiian Telephone Co., Ltd. — 9-14-70 — Date
Honolulu Gas Co., Ltd. — 6/12/70 — Date

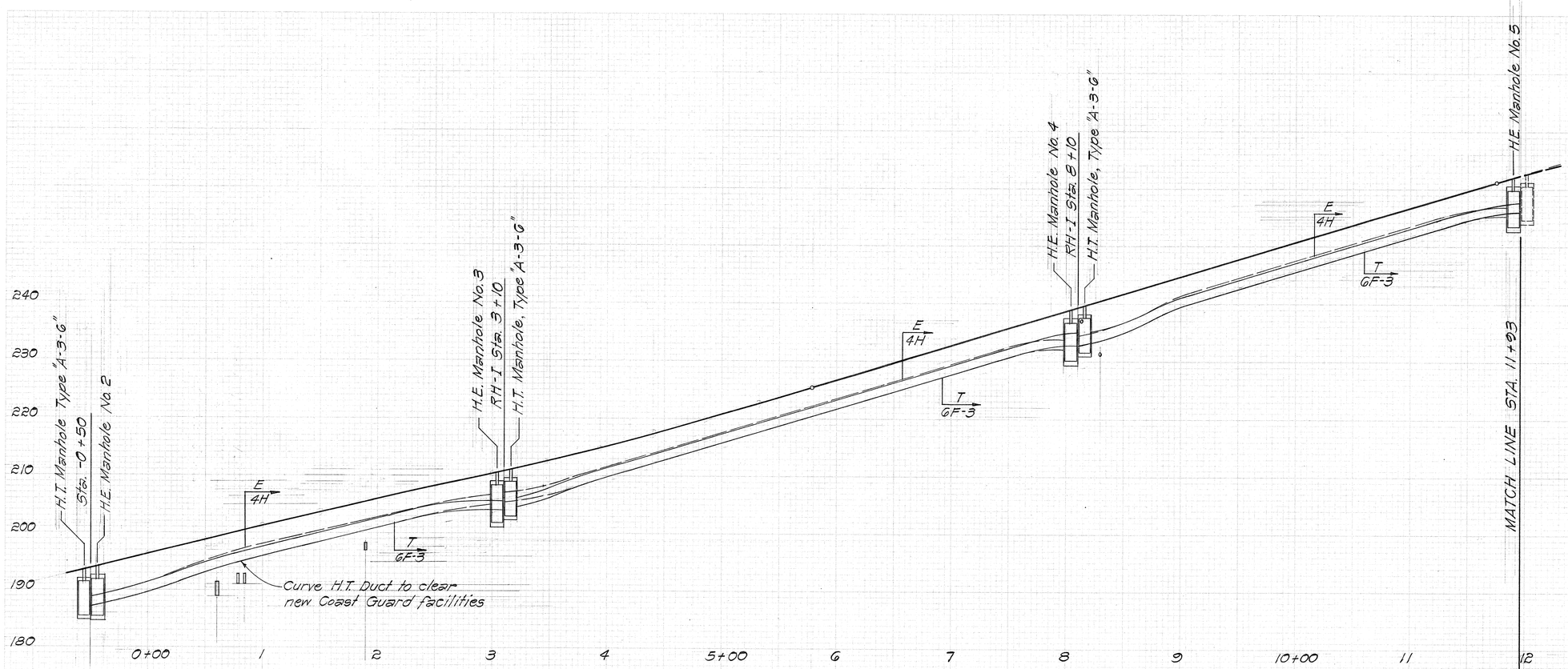
UTILITY LAYOUT PLAN ELECTRIC, TELEPHONE, AND GAS

MOANALUA ROAD
F.A.P. PROJ. NO. F-078-1(11)

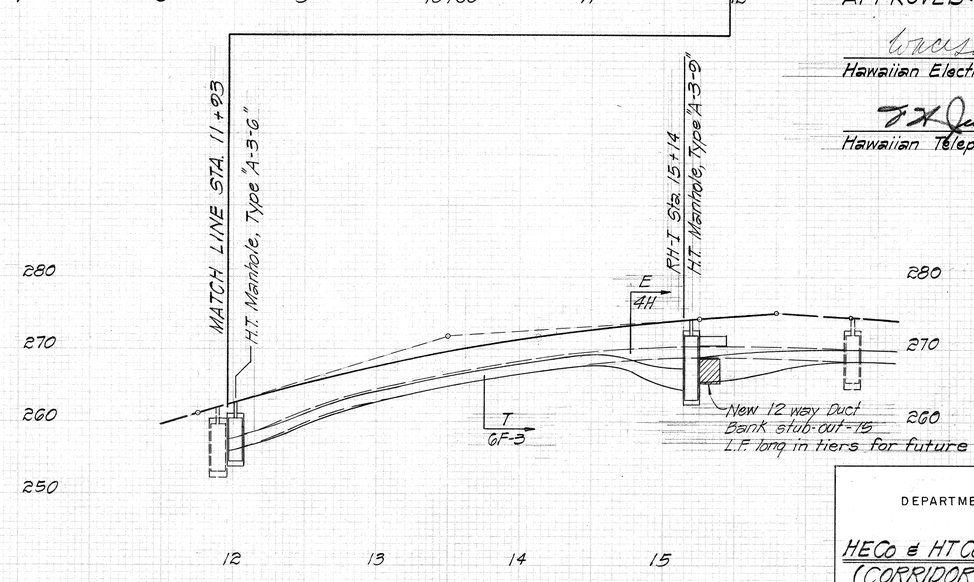
Scale: 1"=50' Date: May, 1970
SHEET No. 5 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	176	258

Revised: Oct. 16, 1970 Oct. 29, 1971
April 15, 1971



NOTE:
For Transpacific and Gas line profile refer to Typical Corridor Sections. Minimum depths may be revised at the descretion of the Engineer.



APPROVED:

Hawaiian Electric Co., Inc. HHO JK — 9/4/70 Date

F X Judd — 9-14-70 Date
Hawaiian Telephone Co., Ltd.

HECo & HTCo. DUCTLINE PROFILE IN CORRIDOR ALONG RAMP RH-I

THIS SHEET SUPERSEDES SHT. NO. 176

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

HECo & HTCo DUCTLINE PROFILES
(CORRIDOR ALONG RAMP RH-I)

MOANALUA ROAD
F.A.P. Proj. No. F-078-1(11)

Scale: Horiz. 1"=50'
Vert. 1"=10'
Date: June, 1970

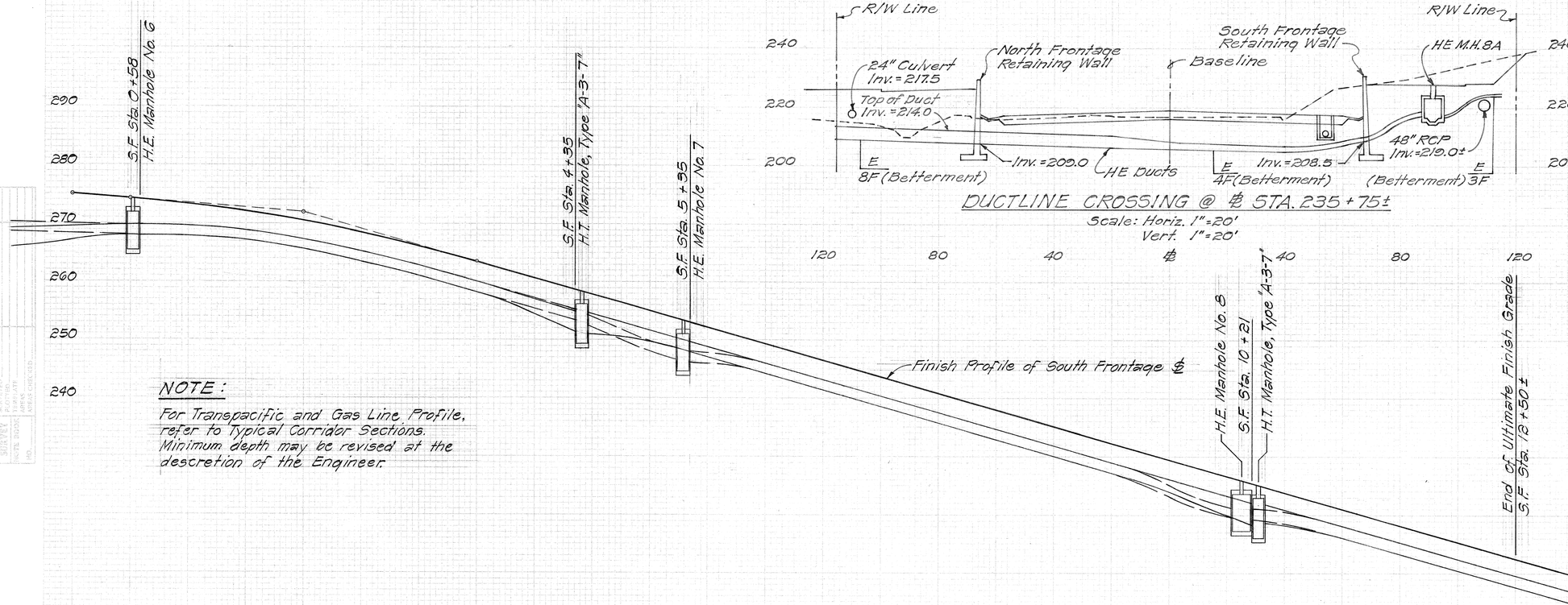
SHEET No. 6 OF 33 SHEETS

176R

PLATE 3-CROSS SECTION, F.A.S.
CLEARPRINT PAPER CO., S. F. CAL.
NO. 1020M-3

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	177	258

Revised: Oct. 16, 1970
April 15, 1971
Oct. 29, 1971



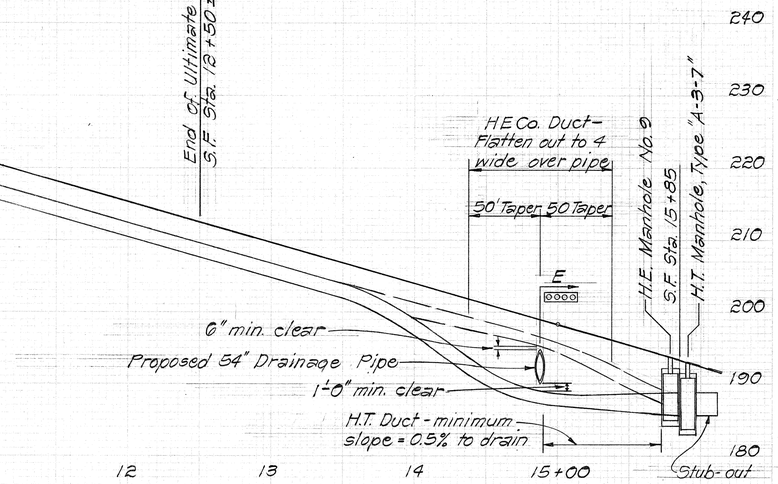
NOTE:

For Transpacific and Gas Line Profile, refer to Typical Corridor Sections. Minimum depth may be revised at the descretion of the Engineer.

DUCTLINE CROSSING @ ℄ STA. 235+75±

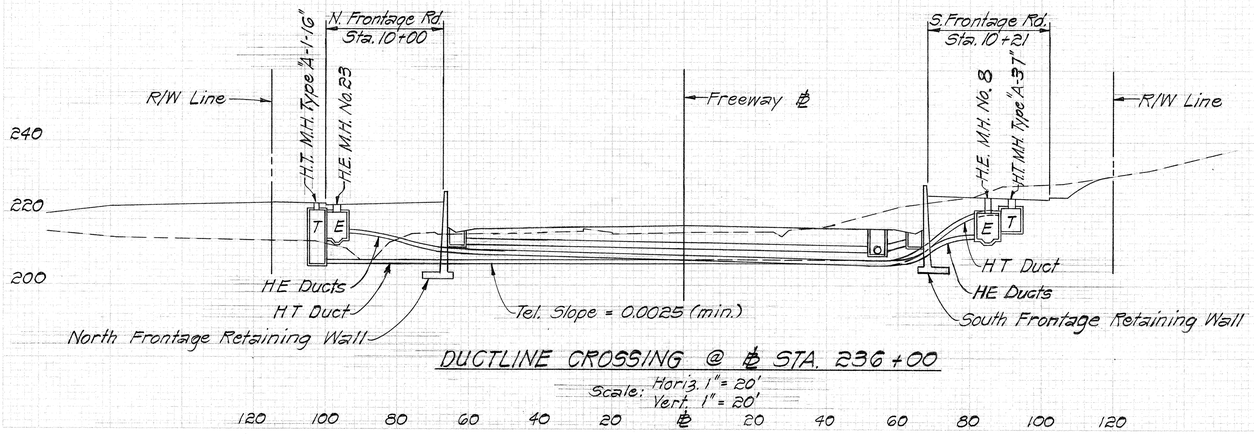
Scale: Horiz. 1" = 20'
Vert. 1" = 20'

South Frontage Road beyond sta. 12+50 to sta. 16+00± shall be rough graded sufficiently in order that the utility manholes at sta. 15+85 can be constructed to the ultimate grade.



HECo. & HTCo. DUCTLINE PROFILES ALONG SOUTH FRONTAGE ROAD

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



DUCTLINE CROSSING @ ℄ STA. 236+00

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

NOTE:

Contractor shall be responsible for constructing the manholes to align with the holes provided for the ductlines in the North and South Frontage Retaining Walls.
The holes shall be as perpendicular as possible to the ductlines.

THIS SHEET SUPERSEDES SHT. NO. 177

APPROVED:

W. T. Chee Soo 9/14/70
Hawaiian Electric Co., Inc. 1440 SK Date

F. H. Quill 9-14-70
Hawaiian Telephone Co., Ltd. Date

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

HECo. & HTCo. DUCTLINE PROFILES
(CORRIDOR - SOUTH FRONTAGE RD.)

MOANALUA ROAD
F.A.P. Proj. No. F-078-1(11)

Scale: As Noted Date: June, 1970

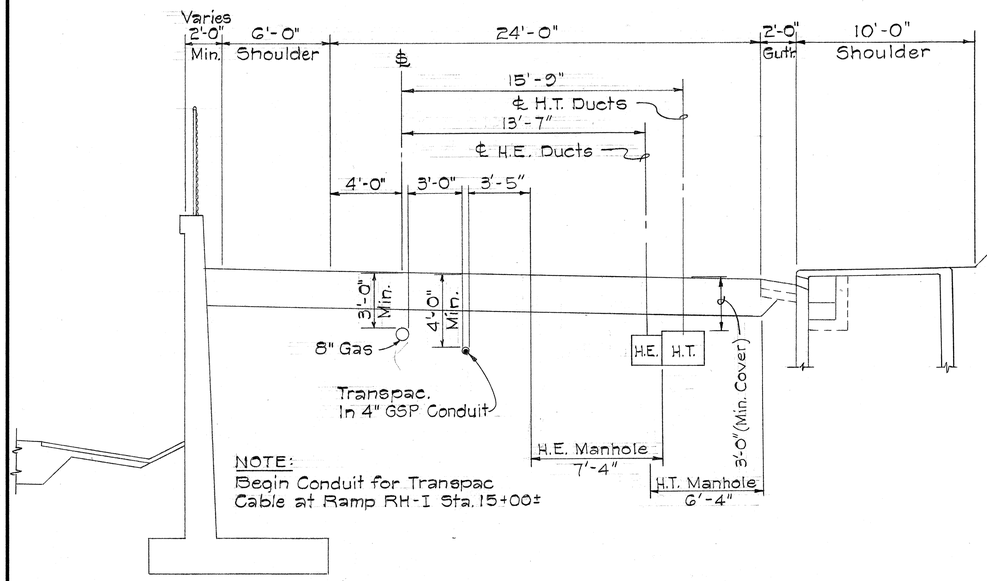
SHEET No. 7 OF 33 SHEETS

177R

PLATE 3 - CROSS SECTION, F.A.S.
CLEARPRINT PAPER CO., S. F. CAL.
NO. 1000R-1

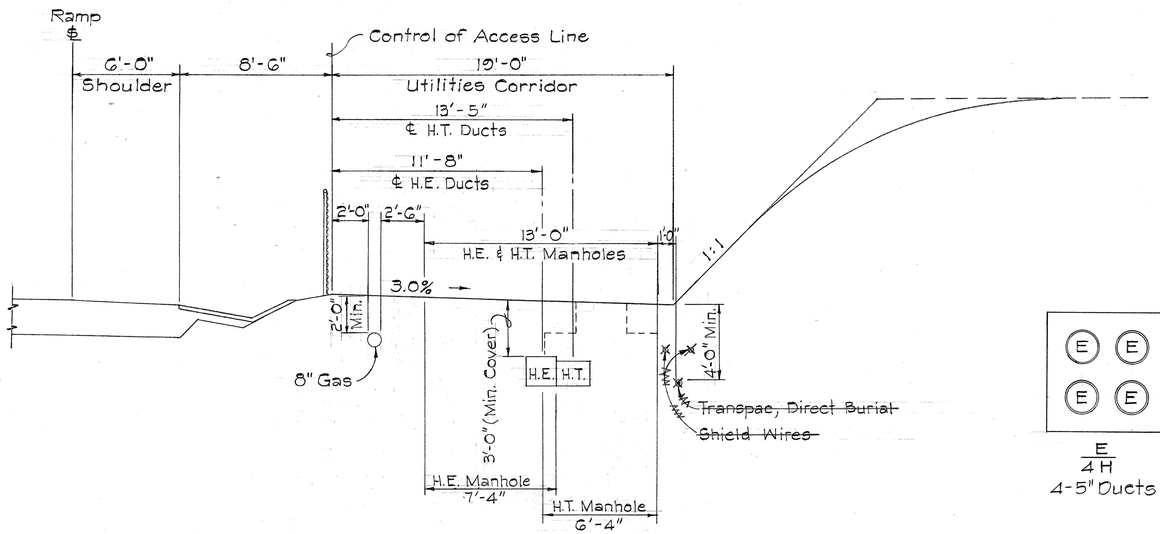
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	178	258

Revised: Oct. 16, 1970 Oct. 29, 1971
April 15, 1971



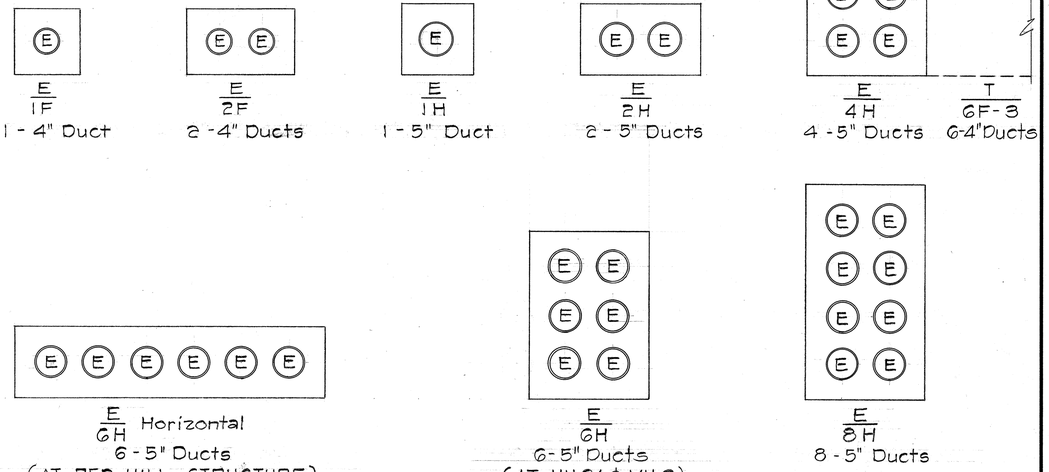
TYPICAL SECTION OF UTILITIES ALONG SOUTH FRONTAGE ROAD

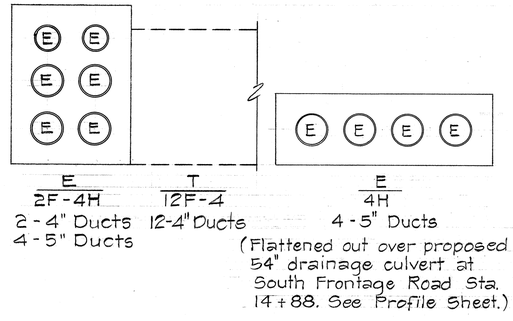
Scale: 1/4" = 1'-0"

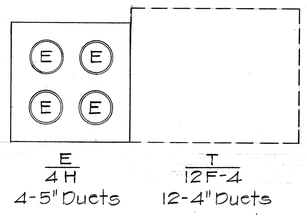


TYPICAL SECTION OF UTILITIES CORRIDOR ALONG RAMP RH-I

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







NOTE: For H.T. Co. Standard Duct Formation Details, See Sheet No. 192

LEGEND OF CONDUIT	
Conduit Size	Symbol
3/4"	A
1"	B
2"	C
3"	D
3 1/2"	E
4"	F
4 1/2"	G
5	H

THIS SHEET SUPERSEDES SHT. NO. 178

APPROVED:

Hawaiian Electric Co., Inc. — Date 9/14/70

Hawaiian Telephone Co., Ltd. — Date 9-14-70

Honolulu Gas Co., Ltd. — Date 6/12/70

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL CORRIDOR SECTION AND DUCT SECTIONS

MOANALUA ROAD
F.A.P. Proj. No. F-078-1(11)

Scale: As Shown Date: May, 1970

SHEET No. 8 OF 33 SHEETS

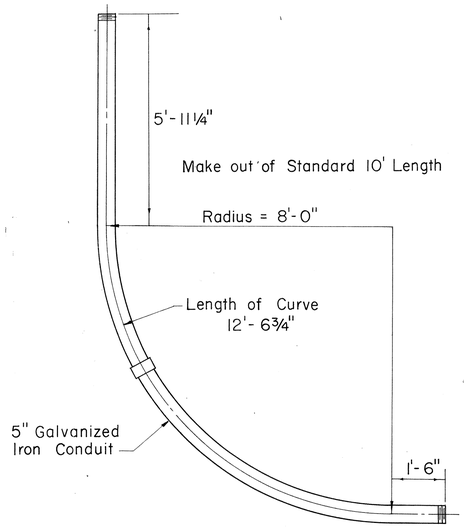
ORIGINAL PLAN	NOTE BOOK	No.	SURVEY PLOTTED BY	DRAWN BY	TRACED BY	DESIGNED BY	QUANTITIES BY	CHECKED BY	DATE

K+E CRYSTALENE® LA 2920 TRACING PAPER

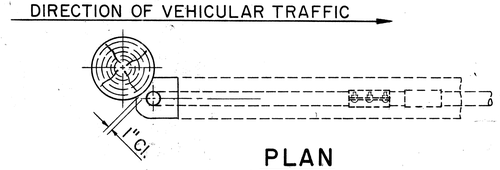
178R

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F-078-1(11)	1969	179	258

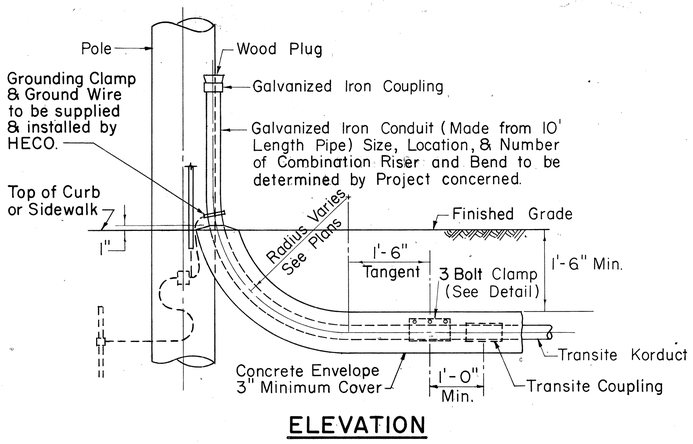
Revised: April 15, 1971
Oct. 29, 1971



46 KV COMBINATION RISER AND BEND
(8'-0" RADIUS)
Not to Scale

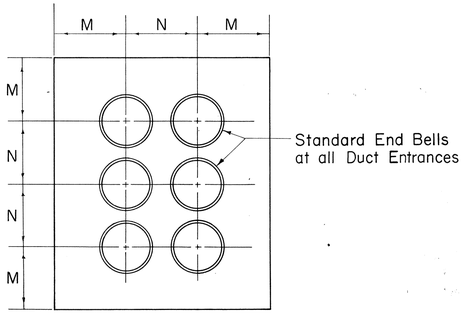


PLAN



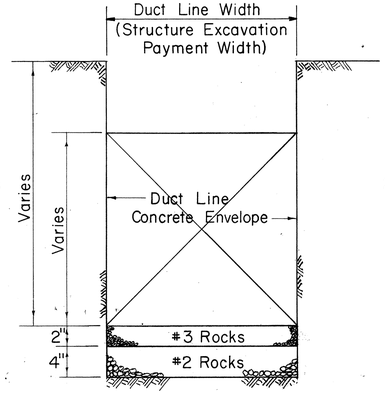
ELEVATION

TYPICAL DETAIL COMBINATION RISER AND BEND
Scale: ¾" = 1'-0"



TYPICAL DUCT DETAIL AT MANHOLE WALL
Not to Scale

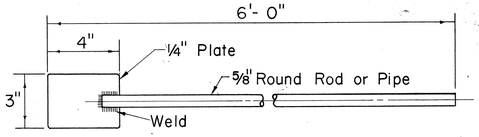
SIZE	M	N
3"	5"	6"
4"	5½"	7"
4½"	5½"	7½"
5"	6"	8"



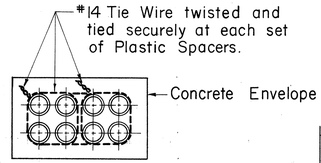
TYPICAL EXCAVATION DETAIL
Not to Scale

NOTES

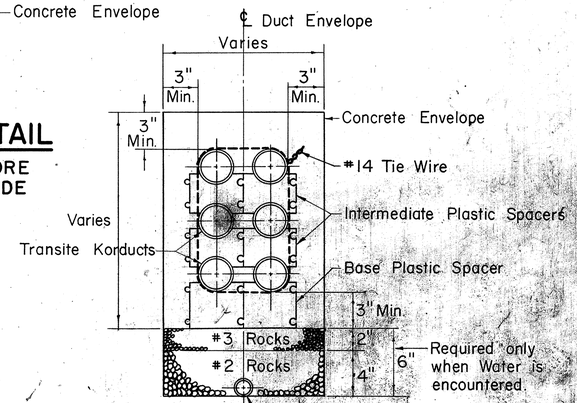
1. Size of Concrete Envelope and Depth of Excavation to be determined by Project concerned.
2. Rock Foundation required only when Water is encountered



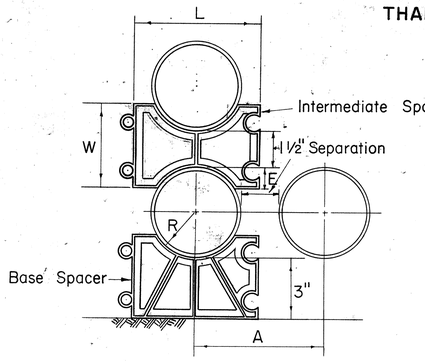
CONCRETE DUCT ENVELOPE TAMPING ROD
Scale: 3" = 1'-0"



TIE WIRE DETAIL
FOR DUCT LINE MORE THAN 4 DUCTS WIDE
Not to Scale



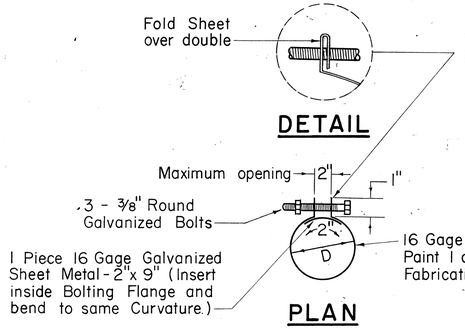
TYPICAL DUCT PLASTIC SPACERS & DRAINAGE SECTION
(6 WAY DUCT SHOWN - 3 HIGH - 2 WIDE)
Not to Scale



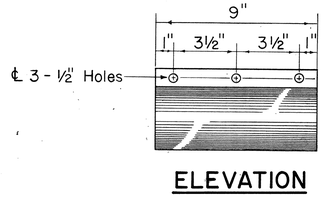
TYPICAL PLASTIC SPACERS
Not to Scale

SIZE	R	E	W	A	L
3"	$1\frac{27}{32}$"	⅞"	$3\frac{1}{4}$"	$5\frac{1}{8}$"	5"
4"	$2\frac{13}{32}$"	$1\frac{1}{8}$"	$3\frac{3}{4}$"	$6\frac{1}{4}$"	$6\frac{1}{8}$"
$4\frac{1}{2}$"	$2\frac{23}{32}$"	$1\frac{1}{4}$"	4"	$6\frac{7}{8}$"	$6\frac{3}{4}$"
5"	$3\frac{1}{16}$"	$1\frac{3}{8}$"	$4\frac{1}{4}$"	$7\frac{5}{8}$"	$7\frac{1}{2}$"

For 1½" Separation



PLAN



ELEVATION

3 BOLT CLAMP DETAIL
Scale: 3" = 1'-0"

APPROVED:
9/4/70
HAWAIIAN ELECTRIC CO., INC. DATE

THIS SHEET SUPERSEDES SHT. NO. 179

HECo., Inc. Drawing Number	
18585	SHEET No. 1 OF 2 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

CONSTRUCTION STANDARDS
TRANSITE KORDUCTS
UNDERGROUND DUCT LINES

Scales: As Noted Date May, 1970

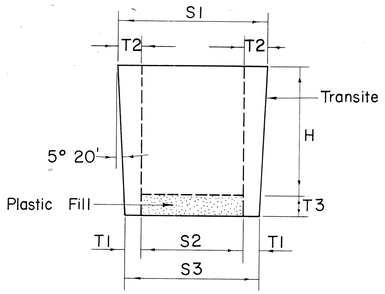
SHEET NO. 9 OF 33 SHEETS

179R

LIETZ 1103 ARKWRIGHT TRACING CLOTH 10-60 200P

Revised: April 15, 1971
Oct. 29, 1971

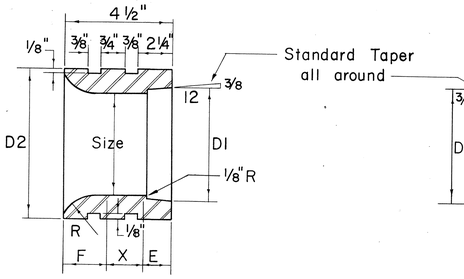
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F-078-1(11)	1969	180	258



PLUGS FOR TRANSITE KORDUCTS

Not to Scale

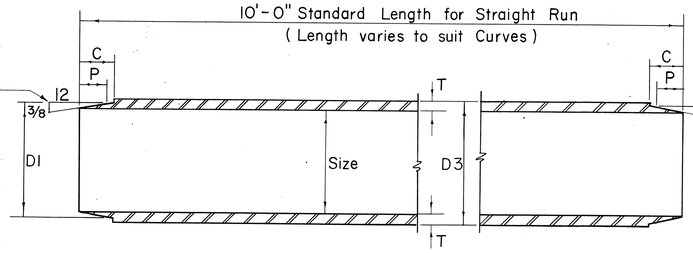
SIZE	H	S1	S2	S3	T1	T2	T3
3"	4"	3 3/8"	2"	2 5/8"	5/16"	11/16"	3/4"
4"	4 1/2"	4 27/64"	2 3/4"	3 37/64"	13/32"	27/32"	3/4"
4 1/2"	4 1/2"	4 59/64"	3"	4 5/64"	35/64"	31/32"	3/4"
5"	4 1/2"	5 27/64"	3 1/2"	4 37/64"	35/64"	31/32"	3/4"



STANDARD END BELLS

Not to Scale

SIZE	DI	D2	F	X	E	R
3"	3 25/64"	4 1/2"	1 11/32"	1 29/32"	1 1/4"	1 3/4"
4"	4 25/64"	5 3/4"	1 9/16"	1 9/16"	1 3/8"	2"
4 1/2"	4 57/64"	6 1/4"	1 9/16"	1 9/16"	1 3/8"	2"
5"	5 29/64"	7"	1 9/16"	1 7/16"	1 1/2"	2"



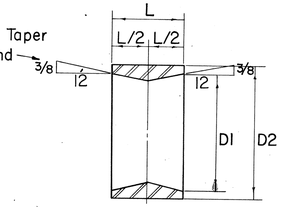
TRANSITE KORDUCTS

Not to Scale

SIZE	DI	D3	C	P	T
3"	3 25/64"	3 35/64"	1 1/8"	7/8"	17/64"
4"	4 25/64"	4 35/64"	1 1/4"	1"	17/64"
4 1/2"	4 57/64"	5 3/64"	1 1/4"	1"	17/64"
5"	5 29/64"	5 39/64"	1 25/64"	1 1/8"	19/64"

Note "X"

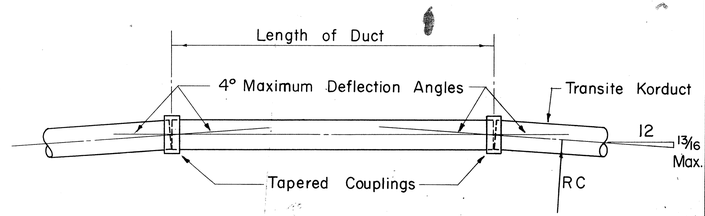
Provide one set of Spacers
(a) 10 Ft. straight run for 4 Ducts high or less.
(b) 5 Ft. straight run for 5 Ducts high or more.



SIZE	DI	D2	L
3"	3 25/32"	4 11/64"	2 1/4"
4"	4 25/64"	5 3/16"	2 1/2"
4 1/2"	4 57/64"	5 49/64"	2 1/2"
5"	5 29/64"	6 21/64"	2 3/4"

TAPERED COUPLINGS

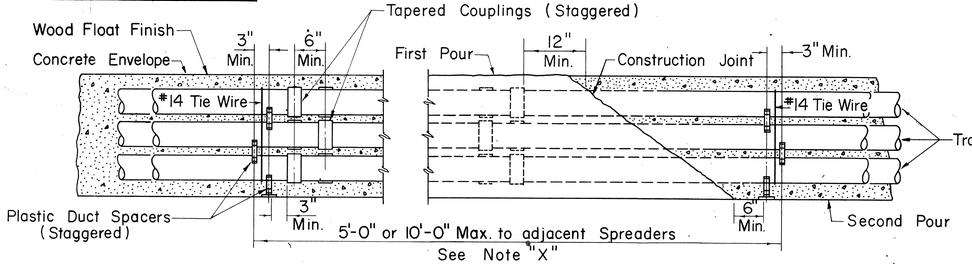
Not to Scale



METHOD OF FORMING CURVES

Not to Scale

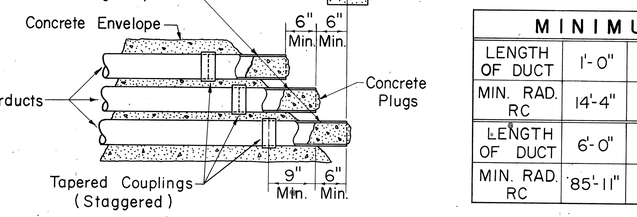
MINIMUM RADIUS TO FORM CURVES									
LENGTH OF DUCT	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"
MIN. RAD. RC	14'-4"	21'-6"	28'-8"	35'-10"	42'-11"	50'-1"	57'-3"	64'-5"	71'-7"	78'-9"
LENGTH OF DUCT	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	
MIN. RAD. RC	85'-11"	93'-1"	100'-3"	107'-5"	114'-7"	121'-8"	128'-10"	136'-0"	143'-2"	



TYPICAL DUCT ENVELOPE ELEVATION

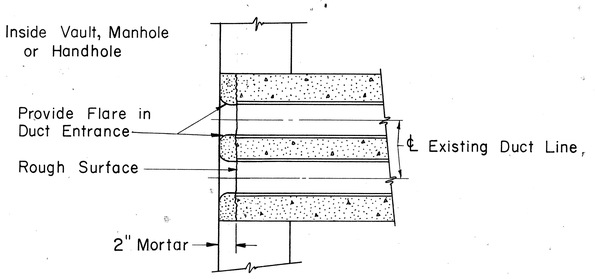
(6 WAY DUCT LINE SHOWN)

Not to Scale



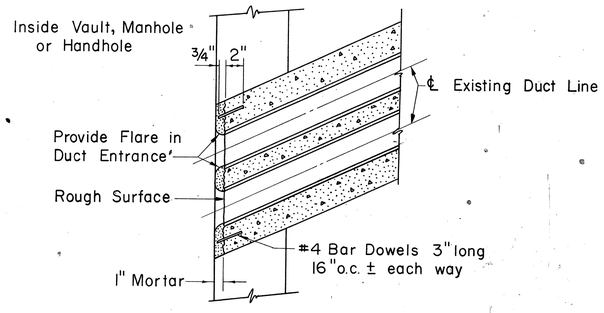
TYPICAL STUB OUT DETAIL

Not to Scale



DUCT LINE ENTRANCE AT EXISTING DUCT LINE

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



DUCT LINE DIAGONAL ENTRANCE

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

APPROVED:

HAWAIIAN ELECTRIC CO., INC. 9/4/70 DATE

THIS SHEET SUPERSEDES SHT. NO. 180

HECo., Inc. Drawing Number

18585 SHEET No. 2 OF 2 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

CONSTRUCTION STANDARDS
TRANSITE KORDUCTS
UNDERGROUND DUCT LINES

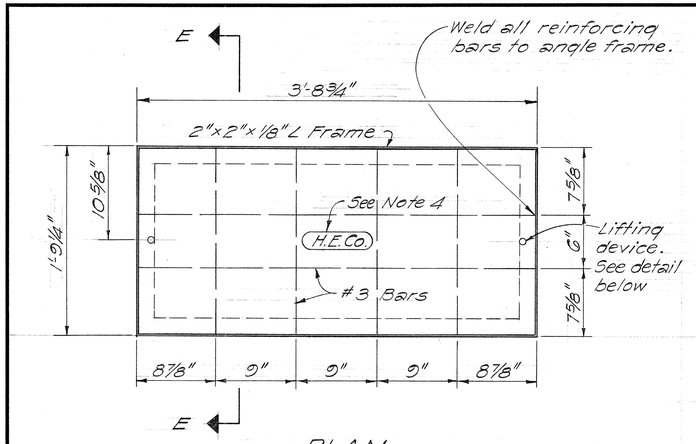
Scales: As Noted Date

SHEET NO. 10 OF 33 SHEETS

180R

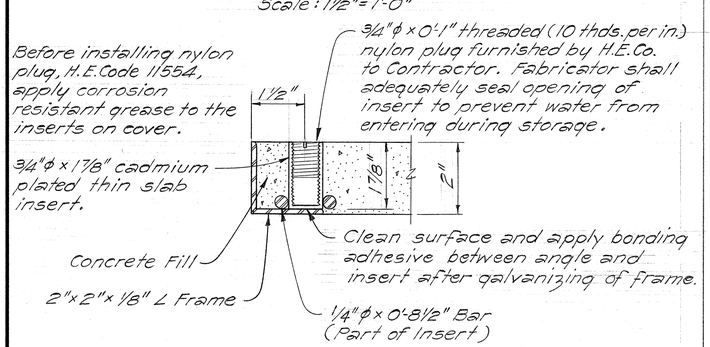
LIETZ 1103 ARKWRIGHT TRACING CLOTH 10-60 200P

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	181	258



PLAN
Scale: 1½"=1'-0"

SECTION E-E
Scale: 1½"=1'-0"

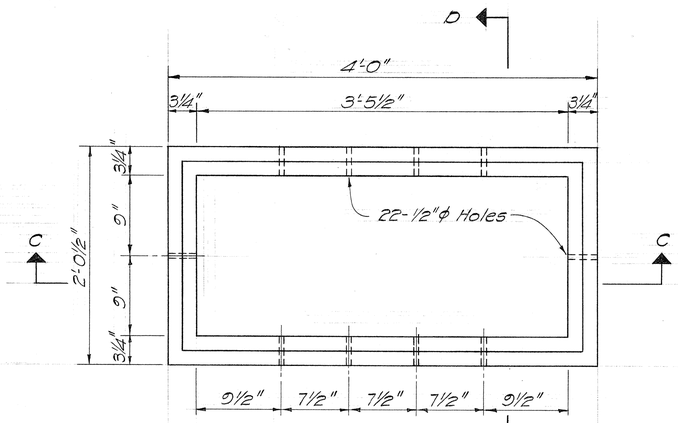


LIFTING DEVICE DETAIL
Scale: 1/2 Actual Size

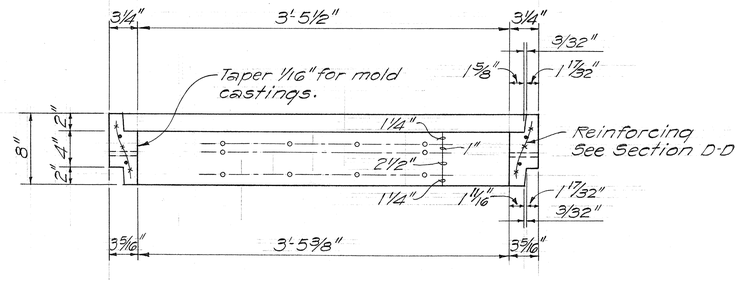
CONCRETE COVER FOR 1'-6"x 3'-5½" SERVICE BOX

NOTES:
1. Galvanize Angle Frame per ASTM 153 (as amended to date) after fabrication.
2. Concrete compressive strength = 3,000 psi in 28 days.
3. Finished surface shall be broomed or roughened per City & County or State Standards for sidewalks.
4. Company identification marking stamped on Cover.
5. "Contractor Furnished" item.

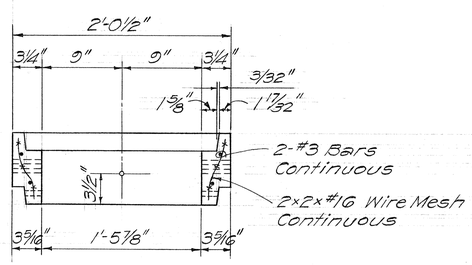
H.E.Co. DWG. NO. 011312



PLAN



SECTION C-C



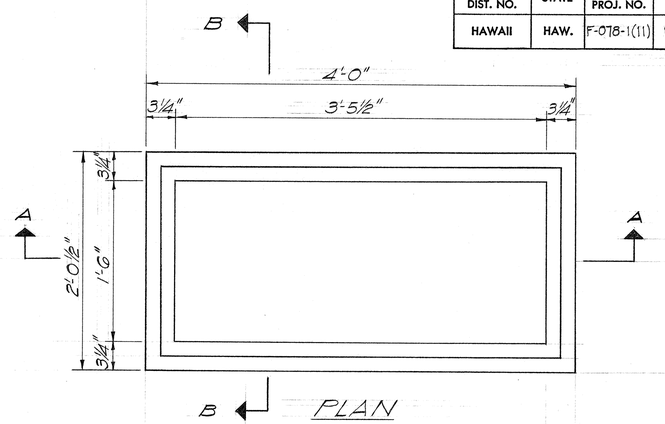
SECTION D-D

CONCRETE SERVICE BOX EXTENSION 1'-6"x 3'-5½"x 0'-8" DEPTH

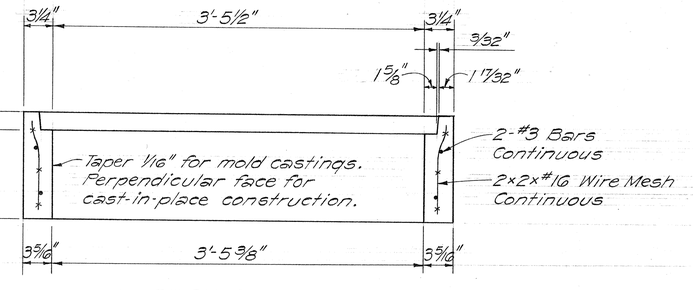
Scale: 1½"=1'-0"

NOTES:
1. Concrete compressive strength = 3,000 psi in 28 days.
2. Weight per section = 200 Lbs.±.
3. See Drawing 011312 for Concrete Cover.
4. "Contractor Furnished" item.

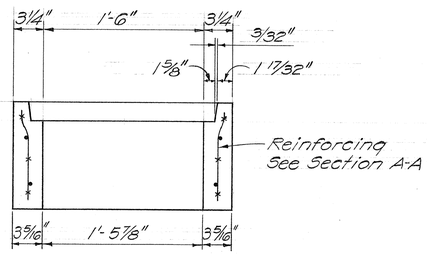
H.E.Co. DWG. NO. 011311



PLAN



SECTION A-A



SECTION B-B

CONCRETE SERVICE BOX BODY 1'-6"x 3'-5½"x 1'-0" DEPTH

Scale: 1½"=1'-0"

NOTE:
1. Concrete compressive strength = 3,000 psi @ 28 days.
2. Weight of box = 412 Lbs.±.
3. See Drawing 011312 for Concrete Cover.
4. "Contractor Furnished" item.

H.E.CO. DWG. NO. 011310

APPROVED:
WMS 9/4/70
Hawaiian Electric Co., Inc. HHO JK Date

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS CONCRETE SERVICE BOX BODY, EXTENSION AND COVER

Scale: As Noted Date: May, 1970

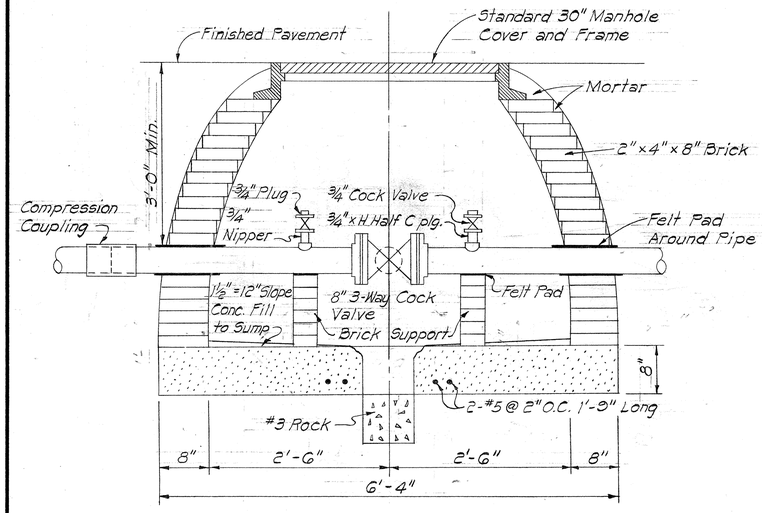
SHEET No. 11 OF 33 SHEETS

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

K&E CRYSTALENE® LA 2920 TRACING PAPER

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	182	258

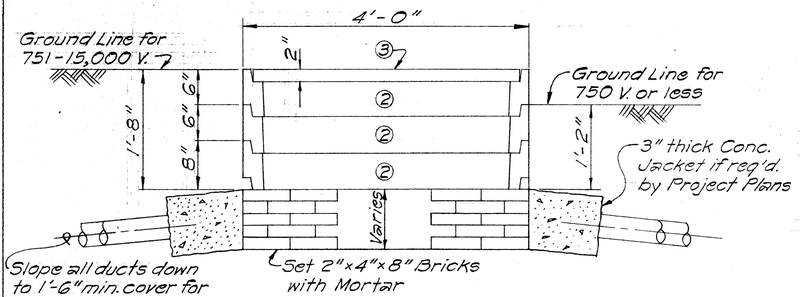
Revised - July 9, 1971



30" GAS VALVE MANHOLE AT ALA KAPUNA & SOUTH FRONTAGE INTERSECTION

Not To Scale

OUTSIDE DIMENSIONS OF BOX = 4'-0" x 2'-0 1/2"



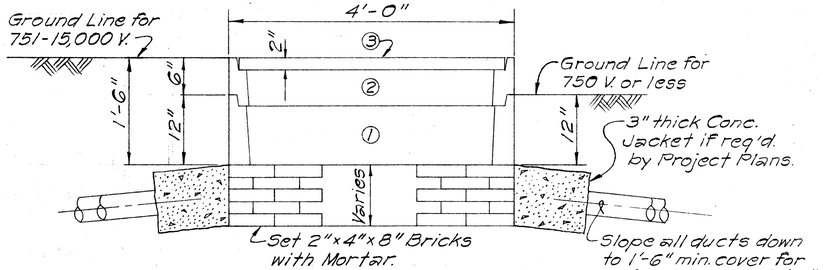
TYPICAL INSTALLATION USING SERVICE BOX EXTENSIONS

OPTIONAL ARRANGEMENT

NOTES:

1. Refer to "Guide for Handhole Applications - 12 KV" for proper application of Service Box with type and size of 12 KV cable.
2. Contractor may either install the Preferred or Optional arrangements of Service Box units.

OUTSIDE DIMENSIONS OF BOX = 4'-0" x 2'-0 1/2"



TYPICAL INSTALLATION USING SERVICE BOX BODY & EXTENSION

PREFERRED ARRANGEMENT

VOLTAGE CLASS	No. OF UNITS REQUIRED	
	PREFERRED	OPTIONAL
750 V. or Less	1 Body	2 Extensions
751 to 15,000 V. (See Note 2)	1 Body and 1 Extension	3 Extensions

ITEM No.	DESCRIPTION	H.E. CODE No.
1	Body	11310
2	Extension	11311
3	Cover, Non Traffic Type	11312

SERVICE BOX (1'-6"x3'-6") INSTALLATION DETAILS UNDERGROUND

Scale: 1" = 1'-0"

APPROVED:

Hawaiian Electric Co., Inc. — Date 9/4/70

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

SERVICE BOX INSTALLATION

Scale: As Noted Date: May, 1970

SHEET No. 12 OF 33 SHEETS

H.E. CO. DWG. NO. 13-5010

THIS SHEET SUPERSEDES SHEET NO. 182

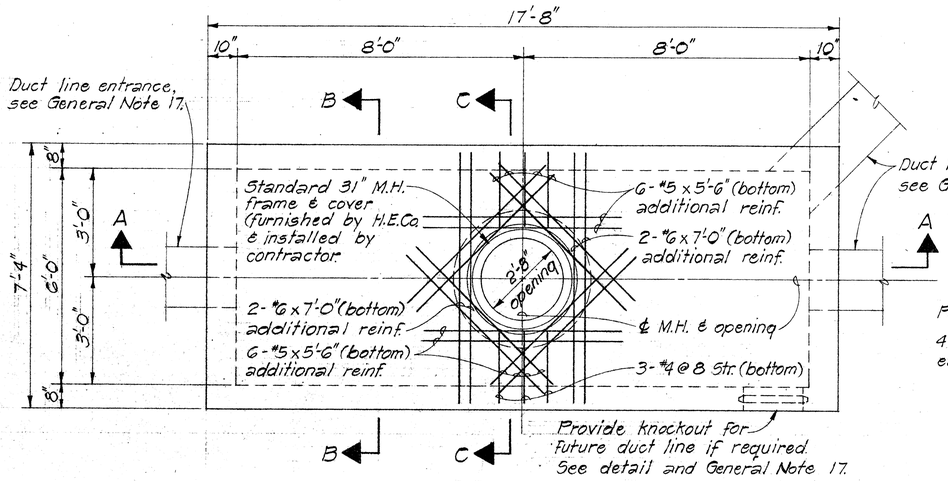
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
NOTE BOOK No.	TRACED BY	
	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

K+E CRYSTALENE® LA 2920 TRACING PAPER

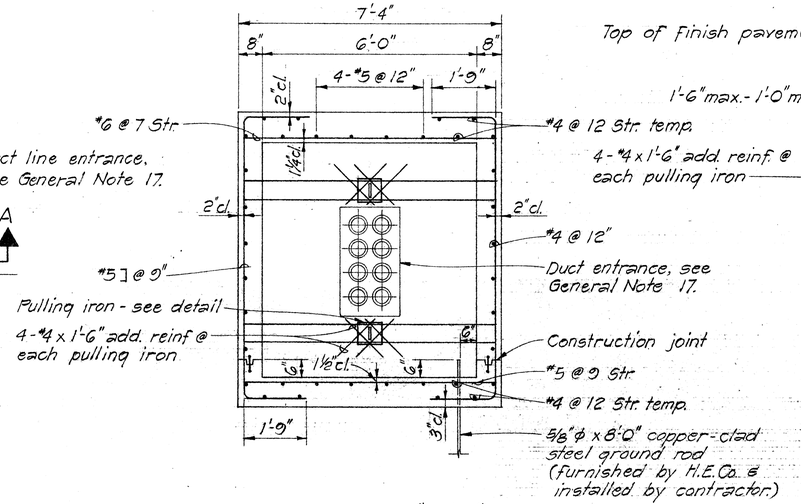
C.O. 182

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(11)	1969	183	258

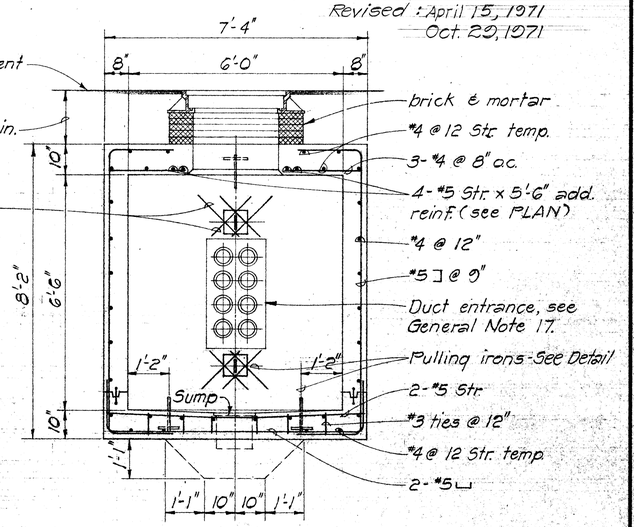
Revised : April 15, 1971
Oct. 22, 1971



PLAN



SECTION "B-B"

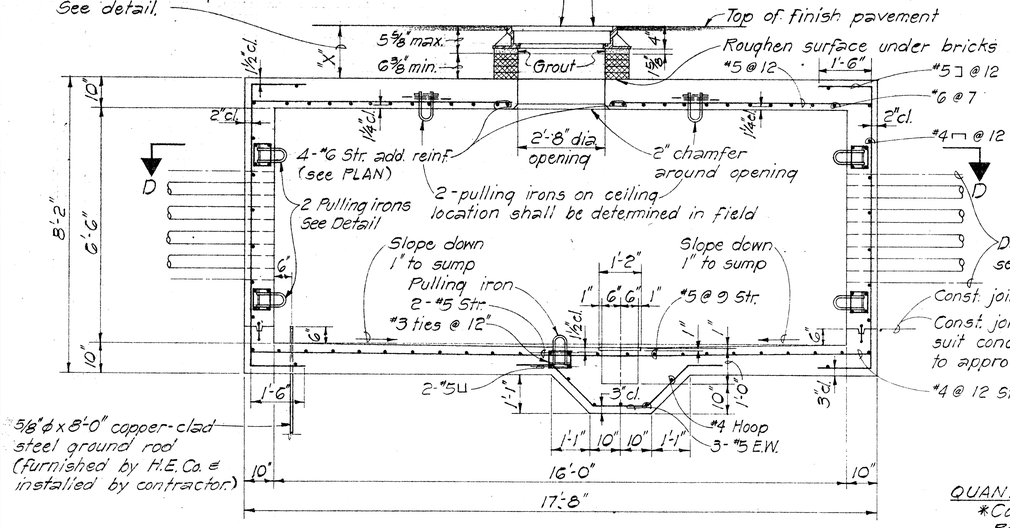


SECTION "C-C"

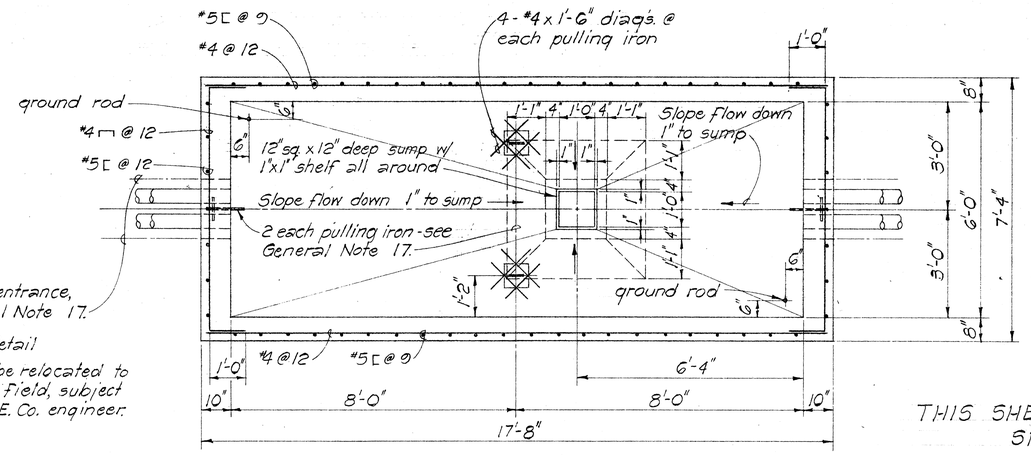
NOTE :
Use alternate M.H. neck only when dimension "X" is greater than 1'-6". See detail.

Note : If non-standard 20" M.H. Frame and cover are used, see Dwg. no. 16688 for neck details

Standard 31" M.H. frame & cover (Furnished by H.E.Co. and installed by contractor), see Dwg. no. 11327 & 0-11328 for details of cover & frame. When M.H. frame & cover are subjected to heavy traffic, use anchor bolts per M.H. neck detail.



SECTION "A-A"



SECTION "D-D"

THIS SHEET SUPERSEDES SHT. NO. 183

QUANTITY OF MATERIALS - MANHOLE ONLY

*Concrete	= 16.13 Cu. Yds.
Reinf. Steel	= 2094 Lbs.
Misc. Steel (Pulling Iron, ea.)	= 10.9 Lbs.

ADD. QUANT. OF MATERIALS FOR ALT. NECK (Dim. "X" = 2'-0")

Concrete	= 0.50 Cu. Yds.
Reinf. Steel	= 42.51 Lbs.

*NOTE : Concrete for M.H. necks when used in lieu of bricks (for dim. "X" < 1'-6") for anchor bolt installation is not included in the above totals.

FOR USE IN AREAS SUBJECT TO VEHICULAR TRAFFIC

APPROVED:

HAWAIIAN ELECTRIC Co., Inc. HHD JK 9/9/70 DATE

HECo., Inc. Drawing Number

15587 SHEET No. 1 OF 2 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
MANHOLE TYPE NO. 3
6'-0" x 16'-0"
STRUCTURE PLANS, SECTIONS AND DETAILS
UNDERGROUND STANDARDS

Scale: ½"=1'-0" Date: May, 1970

SHEET No. 13 OF 33 SHEETS

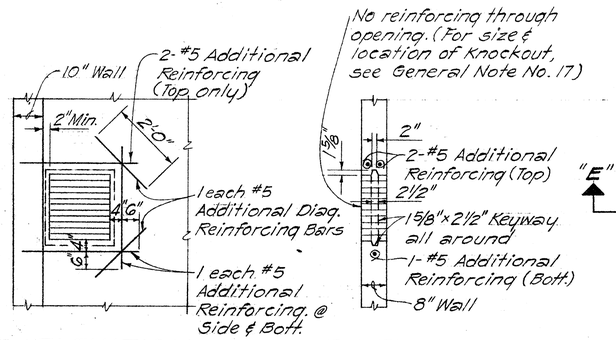
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
NOTE BOOK	DESIGNED BY	
No.	QUANTITIES BY	
	CHECKED BY	

K&E CRYSTALENE® LA 2920 TRACING PAPER

183R

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(1)	1969	184	258

Revised: April 15, 1971
Oct. 29, 1971

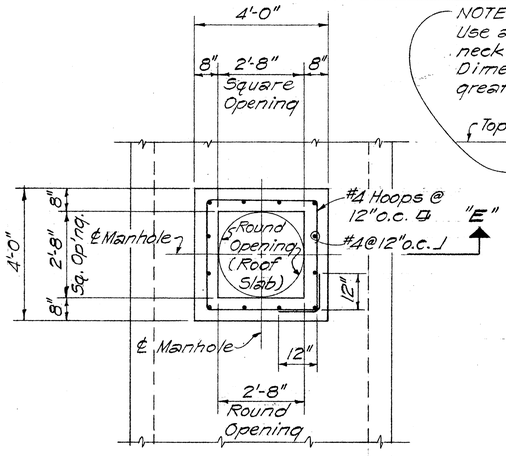


ELEVATION SECTION

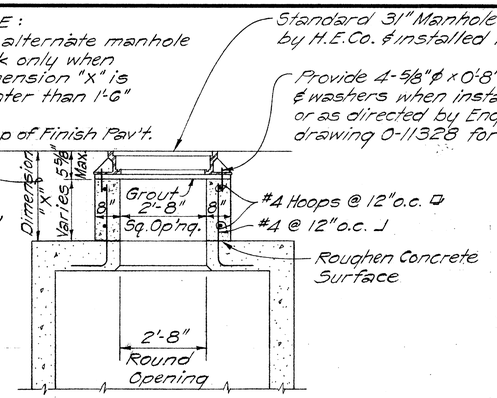
NOTE:
Provide opening for future duct line.
Fill opening with bricks with mortar joints as required. (See project drawings)

KNOCKOUT FOR FUTURE DUCT LINE

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



PLAN



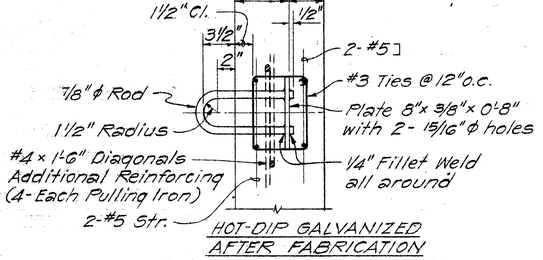
SECTION E-E

ALTERNATE MANHOLE NECK

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

GENERAL NOTES

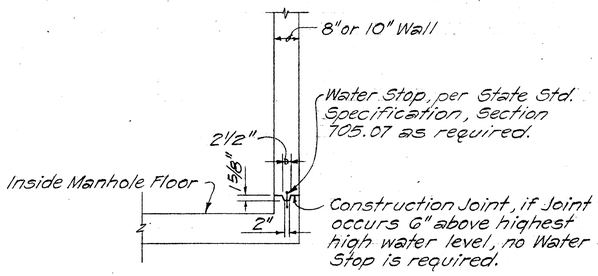
1. Excavation: Excavate for manhole to accurate alignment grades and dimensions as shown on drawings. All excavation must be approved by the Engineering Dept., H.E.Co., before any concrete is poured. All excess cut shall be backfilled with concrete or rocks.
2. Backfill: Remove all debris before backfilling. Backfill in accordance with latest specifications of Division of Highways, State of Hawaii or Division of Engineering, City and County of Honolulu, whichever agency has authority over the work.
3. All work to be done in dry.
4. Concrete compressive strength: 3,000 p.s.i. in 28 days.
5. Mixing: Ready-mixed A.S.T.M. C-94
6. Reinforcing: Round deformed bars (clean & new) per A.S.T.M. A615, grade 40.
7. Splice: Lap 30 bar diameters unless otherwise shown.
8. Curing: Keep concrete moist at least 7 days after pouring. (by approved method)
9. Finish: All surfaces smooth and free from defects. Top of manhole - wood floated. Manhole floor - steel trowelled. Inside walls and ceilings - cement washed.
10. Install all inserts, including pulling irons, ground rods, etc., before pouring concrete.
11. Pouring: Notify the H.E.Co. Contracting & Inspection Div., Phone 548-7771, local 294, 24 hours before pouring any concrete. All concrete pouring shall be done in the presence of an H.E.Co. Engineer or Inspector.
12. Forms: Made of good sound lumber, of sufficient strength, water tight and conforming to shape and dimensions indicated on drawings.
13. The Hawn Electric Co., Inc. to furnish and Contractor to install for each Manhole:
    A. 2-5/8" ϕ x 8'-0" Copper-clad steel ground rods.
    B. Standard (H.E.Co.) 31" Manhole frame & cover.
14. Slope manhole floor down 1" toward's sump.
15. All work shall be subject to inspection by the Hawn Electric Co., Inc., and/or Division of Highways, State of Hawaii, or Division of Engineering, City & County of Honolulu.
16. All materials shall be new and manufactured in the United States of America.
17. For number, size, and exact location of duct entrances and pulling irons, refer to project drawings.



HOT-DIP GALVANIZED AFTER FABRICATION

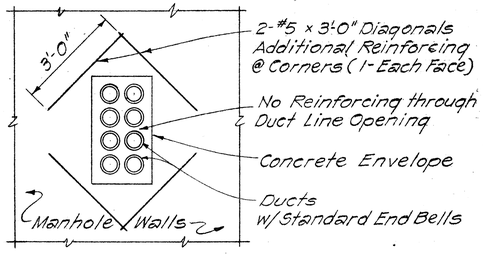
PULLING IRON DETAIL

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



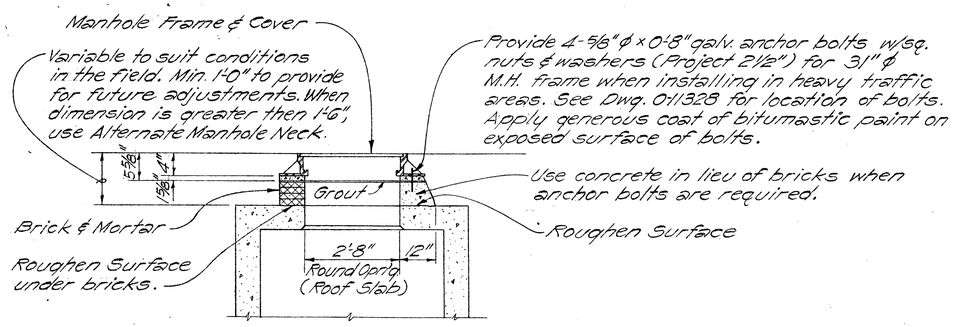
CONSTRUCTION JOINT TYPICAL DETAIL

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



REINFORCING AT DUCT LINE ENTRANCES

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



31" ϕ MANHOLE FRAME NECK DETAIL

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

REFERENCE DRAWINGS & SPECIFS.

0-11328 — Standard H.E.Co. 31" Manhole Frame.
20191 & 18585 — Underground duct line construction standard's.
0-11327 — Standard H.E.Co. 31" Manhole Cover.
CS 7001-0 — Construction of underground facilities specifications.

FOR USE IN AREAS SUBJECT TO VEHICULAR TRAFFIC

THIS SHEET SUPERSEDES SHT. NO. 184

APPROVED:
9/4/70
HAWAIIAN ELECTRIC Co., Inc. DATE

HECo., Inc. Drawing Number
15587
SHEET No. 2 OF 2 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
MANHOLE TYPE NO. 3
6'-0" x 16'-0"
STRUCTURE PLANS, SECTIONS AND DETAILS
UNDERGROUND STANDARDS

Scale: As Noted Date: May, 1970

SHEET No. 14 OF 33 SHEETS

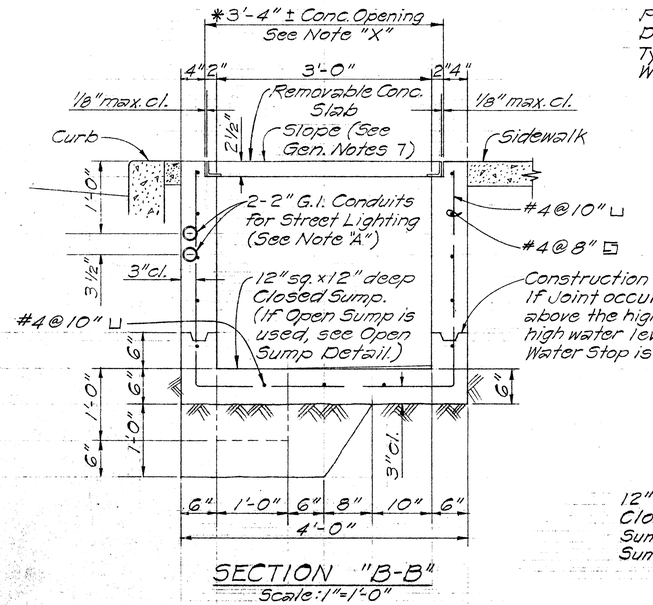
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
NOTE BOOK	TRACED BY	
No.	QUANTITIES BY	
	CHECKED BY	

K&E CRYSTALENE LA 2920 TRACING PAPER

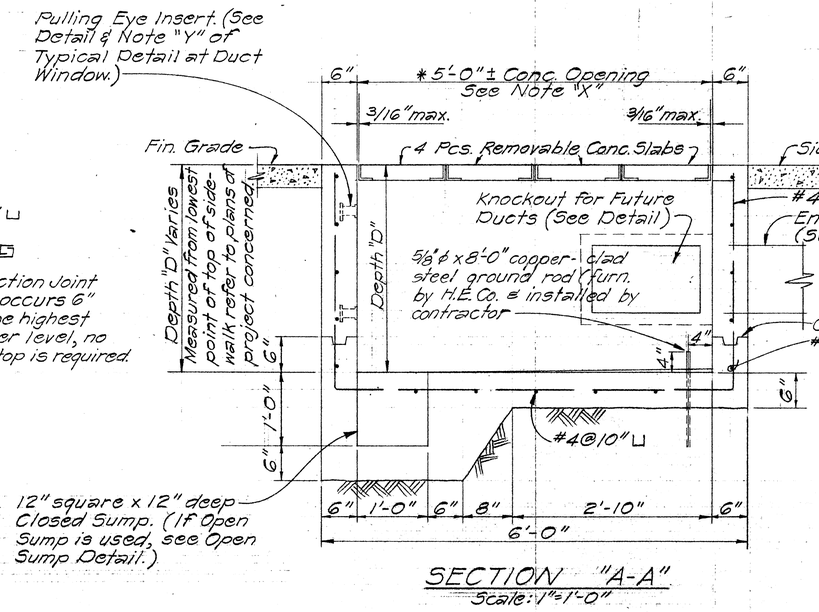
184R

Revised : April 15, 1971
Oct. 29, 1971

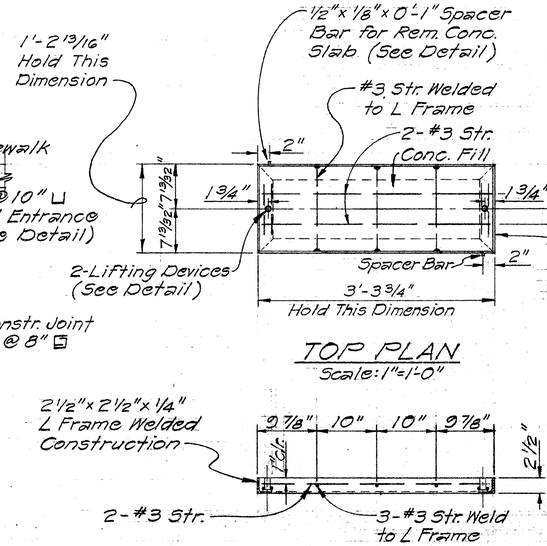
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	185	258



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

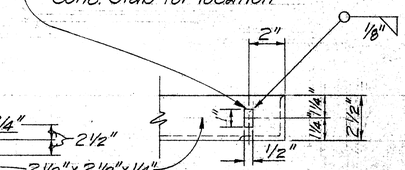


SECTION "A-A"
Scale: 1"=1'-0"



TOP PLAN
Scale: 1"=1'-0"

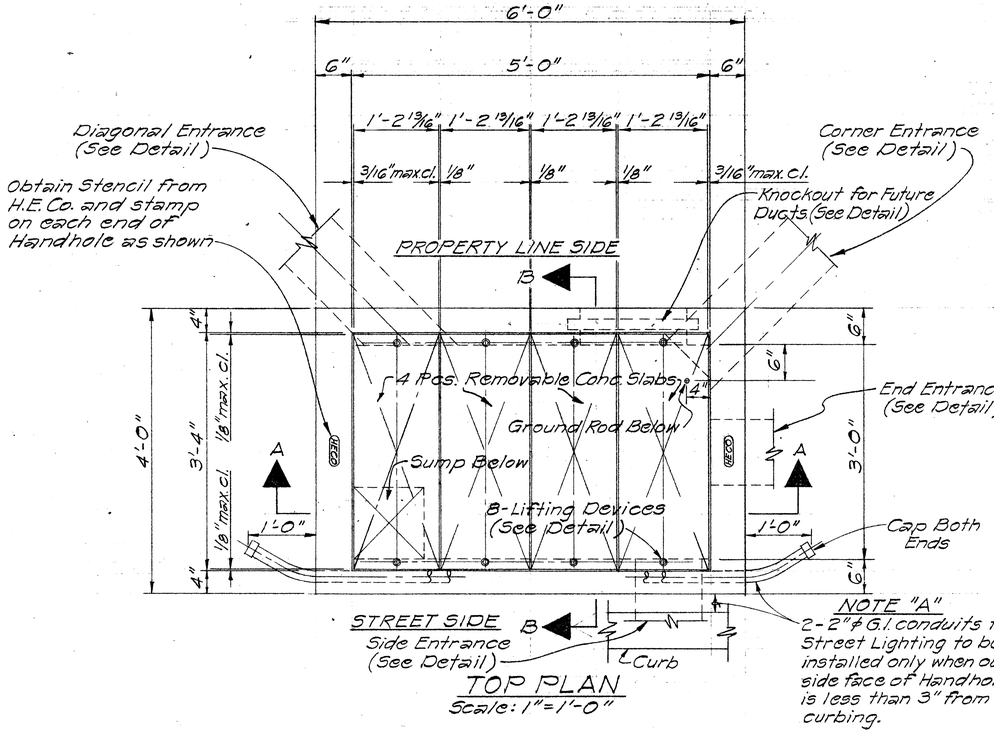
SECTION
Scale: 1"=1'-0"



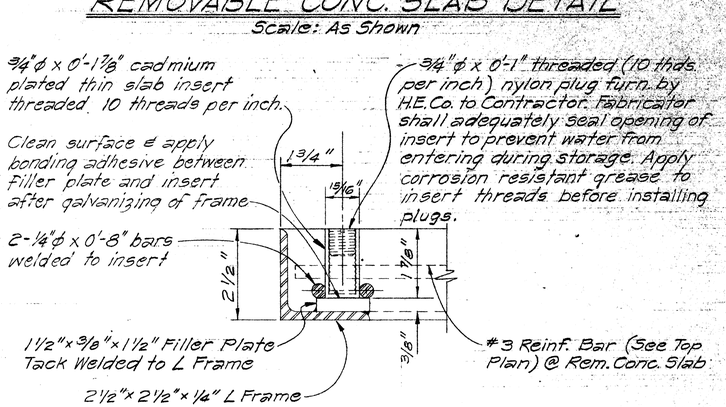
PART ELEV.
SPACER BAR FOR REMOV. CONC. SLAB
Scale: 3"=1'-0"

REMOVABLE CONC. SLAB DETAIL
Scale: As Shown

***NOTE "X" IMPORTANT**
Maximum clearances between removable concrete cover slabs and concrete opening at the supports must be kept. Concrete Contractor shall measure cover slab steel frame after fabrication to obtain proper clearances. Any variation in clearances shall be corrected to the satisfaction of the Engineer at Contractor's expense.



TOP PLAN
Scale: 1"=1'-0"



PART SECTION
LIFTING DEVICE DETAIL
Scale: ½ Full Size

REINFORCED CONCRETE QUANTITIES

QUANTITY OF MATERIALS FOR DEPTH "D"=4'-0"
- Total concrete = 205 cu. yds.
- Total reinf. steel = 300 lbs.
- Total misc. steel = 157 lbs.

WEIGHT PER REMOVABLE CONCRETE SLAB,

Concrete	=	119 lbs.
Reinf. steel	=	7 lbs.
Misc. steel	=	39 lbs.
Total		165 lbs.

MATERIALS FOR 6" DEPTH OF 6" THICK WALL,
- Concrete = 0.17 cu. yds.
- Reinf. steel = 19 lbs.

FOR USE IN AREAS NOT SUBJECT TO VEHICULAR TRAFFIC.

APPROVED:
[signature] 9/4/70
HAWAIIAN ELECTRIC Co., Inc. HHD JK DATE

THIS SHEET SUPERSEDES SHT. NO. 185

HECo., Inc. Drawing Number
18841
SHEET No. 1 OF 2 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
HANDHOLE TYPE 35
(3'-0" x 5'-0")
UNDERGROUND STANDARDS

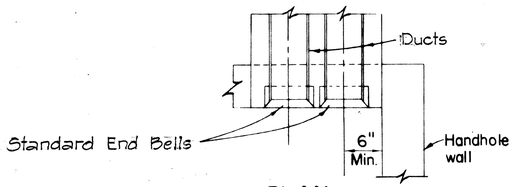
SCALE: AS NOTED DATE: MAY, 1970
SHEET No. 15 OF 33 SHEETS

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

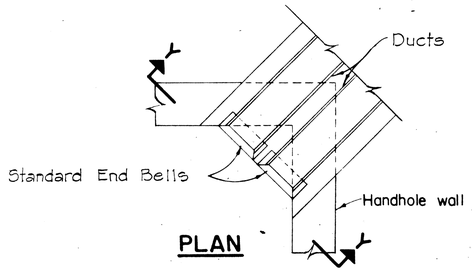
185R

Revised: April 15, 1971
Oct. 29, 1971

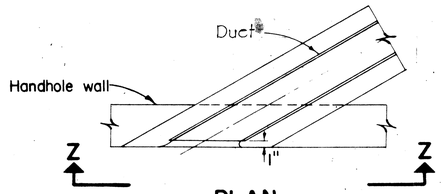
FED. AID DIST. NO.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F-078-1(11)	1969	186	258



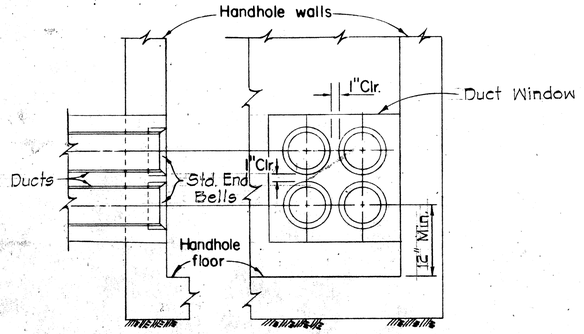
PLAN



PLAN



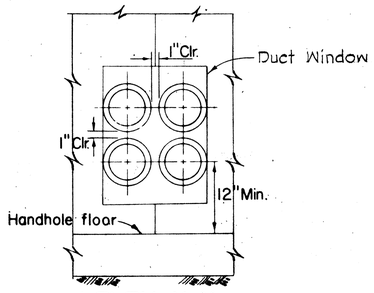
PLAN



SIDE ELEV. FRONT ELEV.

END & SIDE ENTRANCES

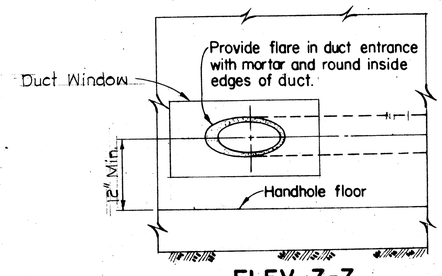
(FOUR WAY DUCT)



ELEV. Y-Y

CORNER ENTRANCE

(FOUR WAY DUCT)



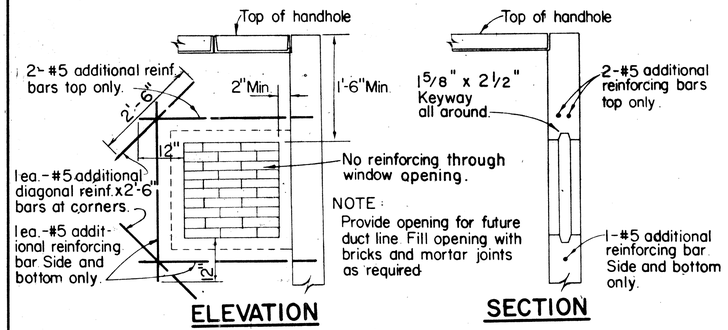
ELEV. Z-Z

DIAGONAL ENTRANCE

(ONE WAY DUCT)

TYPICAL DUCT LINE ENTRANCE DETAIL

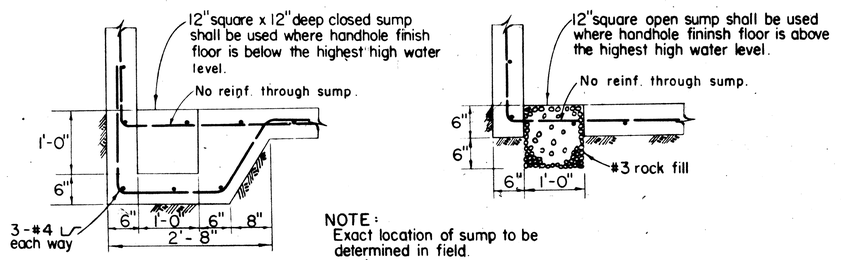
NOT TO SCALE



ELEVATION SECTION

KNOCKOUT FOR FUTURE DUCT LINE

NOT TO SCALE



NOTE:
Exact location of sump to be determined in field.

SECTION ELEV.

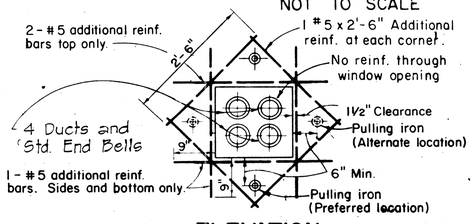
CLOSED SUMP

NOT TO SCALE

SECTION ELEV.

OPEN SUMP

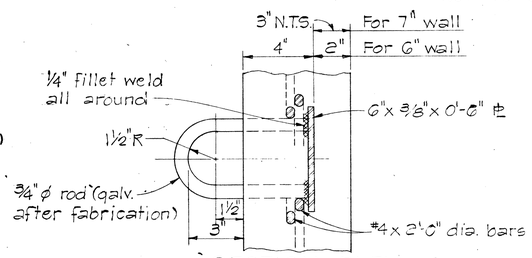
NOT TO SCALE



ELEVATION

TYPICAL DETAIL AT DUCT WINDOW

NOT TO SCALE



SECTION-ELEV.

PULLING IRON

NOT TO SCALE

NOTE "Y":

Generally 2 pulling irons are required and located on opposite wall of each duct entrance unless otherwise shown or noted. H.E.Co. engineer shall determine number required.

GENERAL NOTES

1. Concrete to develop compressive cylinder strength of 3000 PSI in 28 days.
2. CONCRETE FINISH:
   Top of Handhole - Woodfloated (sidewalk finish) according to Highways Division, State of Hawaii or Division of Engineering, City & County of Honolulu specification whichever Agency has authority over the work.
   Floor - Smooth metal trowelled.
   Exposed Wall Surfaces, and Edges - Smooth and free from defects.
   CONCRETE POURING:
   Notify the Hawaiian Electric Co. Contracting & Inspection Div., 24 hours before pouring any concrete. All concrete pouring shall be done in the presence of an H.E.CO. Engineer or Inspector.
3. REINFORCING: round deformed bars, new billet stock grade 40, ASTM A615. All hooked bars shall have ACI Std. hook unless otherwise shown.
4. FORMS: form handhole to size and shape as shown. Exterior face of handhole wall shall be formed except:
   A) Excavation in solid material such as coral or rock, neat cut, no forms required.
   B) Excavation in solid material other than coral or rock, lining such as salvaged corrugated iron, canec etc. may be used.
5. PULLING IRONS
   For location and number required, see duct entrance plan of project concerned.
6. DRAINAGE: Slope floor down ½" to sump.
7. Slope top of handhole. See plan of project concerned.
8. FINISH STEEL WORK:
   Angle Iron frames for remov. conc. slabs and pulling irons shall be HOT DIP GALVANIZED AFTER FABRICATION.
9. EXCAVATION:
   Excavate for handhole to accurate alignment grades and dimensions as shown on drawing. All excavation must be approved by the Engineering Department, the Hawaiian Electric Co., Inc., before any concrete is poured. All excess cut shall be backfilled with concrete or approved aggregate.
10. BACKFILL:
    Remove all debris before backfilling. Backfill in accordance with latest specifications of and subject to approval of Highways Division, State of Hawaii or Division of Engineering, City and County of Honolulu whichever Agency has authority over the work.
11. For duct line construction standards see H.E.CO. Dwgs. 18585.
12. DUCTS: For number, size, and exact location of duct entrances, refer to project drawings.
13. ALL MATERIALS SHALL BE NEW AND SHALL BE MANUFACTURED IN THE UNITED STATES OF AMERICA

THIS SHEET SUPERSEDES SHT. NO. 186

FOR USE IN AREAS NOT SUBJECT TO VEHICULAR TRAFFIC.

APPROVED:

9/4/70

HAWAIIAN ELECTRIC Co., Inc. H.A.D. JK DATE

HECo., Inc. Drawing Number	
18841	SHEET No. 2 OF 2 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

HANDHOLE TYPE 35
(3'-0" x 5'-0")
UNDERGROUND STANDARDS

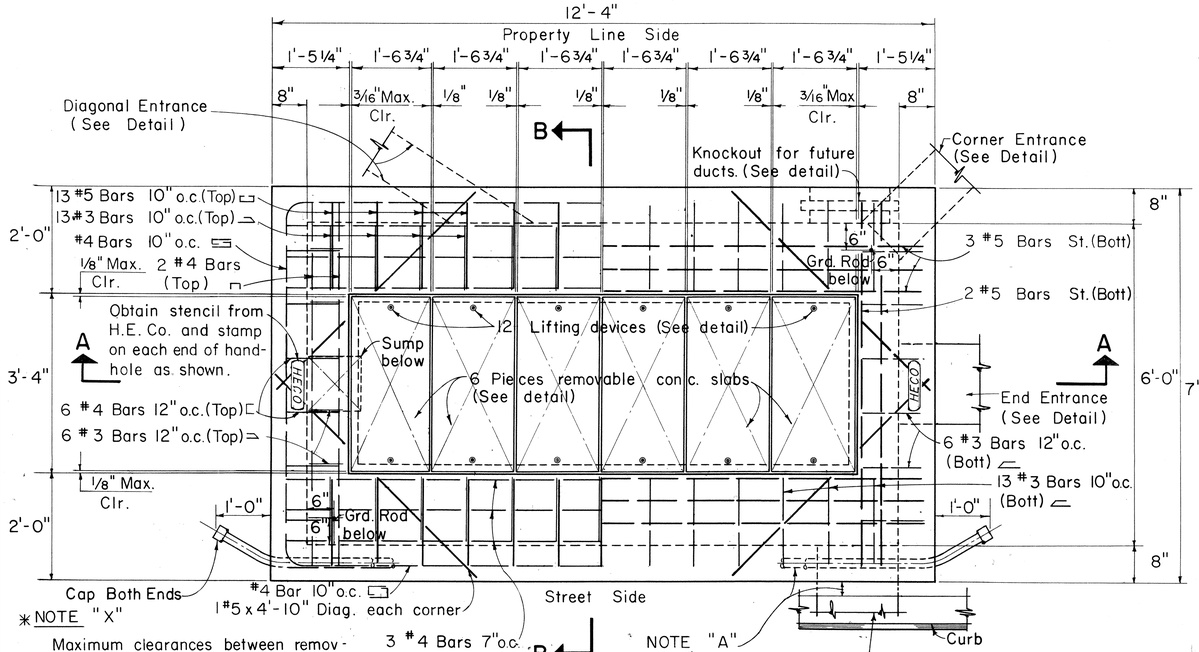
Scales As Noted Date: May, 1970

SHEET NO. 16 OF 33 SHEETS

186R

LIETZ 1103 ARKWRIGHT TRACING CLOTH 10-60 200P

FED. AID DIST. NO.	STATE	FED AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F078-1(11)	1969	187	258

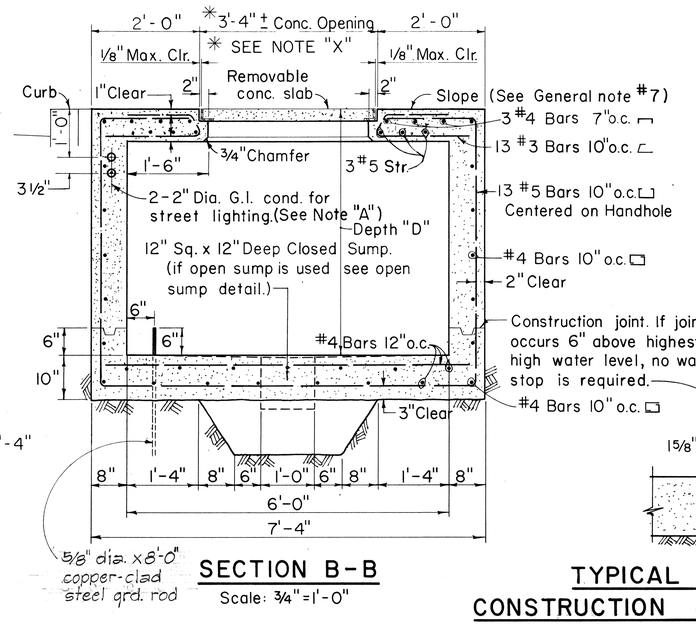


PLAN

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

* NOTE "X"

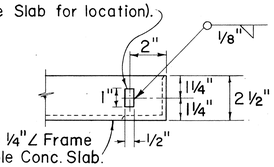
Maximum clearances between removable concrete cover slabs and concrete opening at the supports must be kept. Concrete Contractor shall measure cover slab steel frame after fabrication to obtain proper clearances. Any variation in clearances shall be corrected to the satisfaction of the Engineer at Contractor's expense.



SECTION B-B

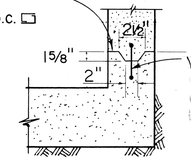
Scale: 3/4" = 1'-0"

½"x⅛"x 0'-1" Spacer bar (See Plan, Removable Concrete Slab for location).



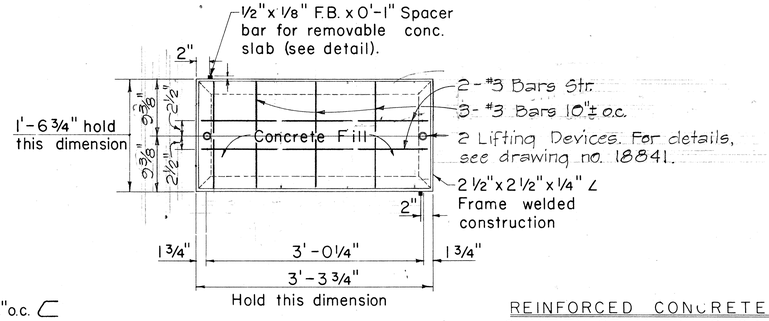
PARTIAL ELEVATION
SPACER BAR FOR
REMOVABLE CONCRETE SLAB

Scale: 3" = 1'-0"

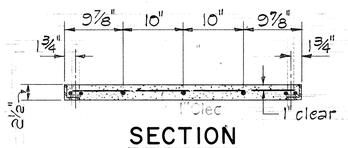


TYPICAL DETAIL OF
CONSTRUCTION JOINT AND KEYWAY

Scale: 1" = 1'-0"

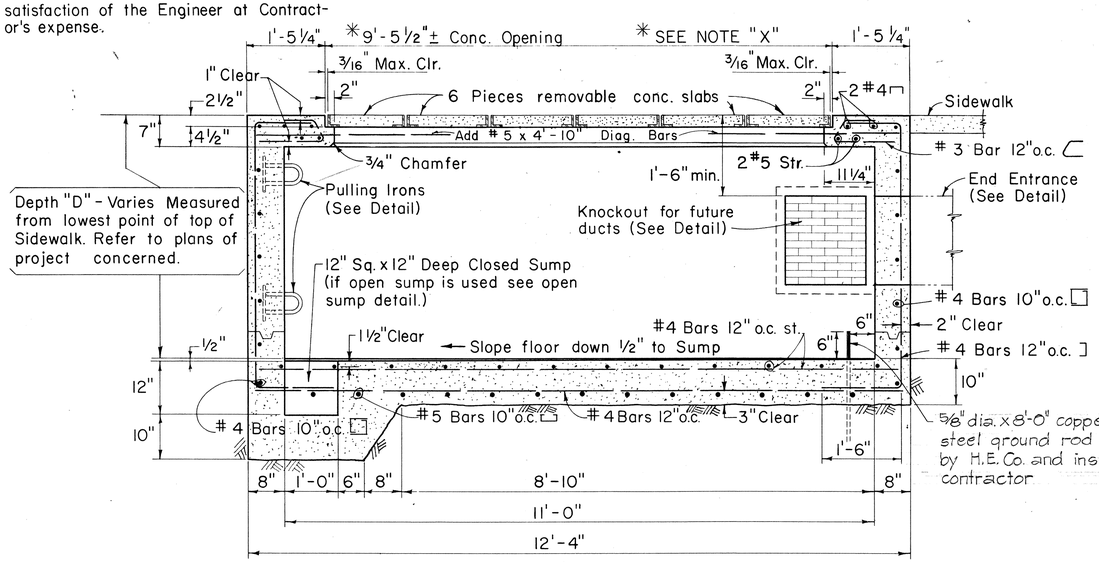


PLAN



SECTION
REMOVABLE CONCRETE SLAB

Scale: 1" = 1'-0"



SECTION A-A

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

REINFORCED CONCRETE QUANTITIES

QUANTITY OF MATERIALS FOR DEPTH "D"=5'-0"

Total Concrete	= 8.51 Cu. Yds.
Total Reinf. Steel	= 1,094 Lbs.
Total Misc. Steel	= 291 Lbs.

WEIGHT PER REMOVABLE CONCRETE SLAB

Concrete	= 150 Lbs.
Reinf. Steel	= 7 Lbs.
Misc. Steel	= 42 Lbs.
Total	199 Lbs.

MATERIALS FOR 6" DEPTH OF 8" THICK WALL

Concrete	= 0.45 Cu. Yds.
Reinf. Steel	= 45 Lbs.

FOR USE IN AREAS NOT SUBJECT TO VEHICULAR TRAFFIC.

APPROVED:

HAWAIIAN ELECTRIC Co., Inc. NHO JK 9/4/70 Date

HECo., Inc. Drawing Number

18844

SHEET No. 1 OF 2 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

HANDHOLE TYPE 611 (6'-0" x 11'-0") UNDERGROUND STANDARDS

Scales: As Noted Date: May, 1970

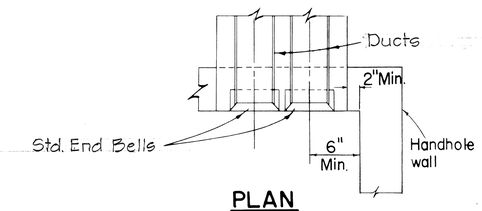
SHEET NO. 17 OF 33 SHEETS

187

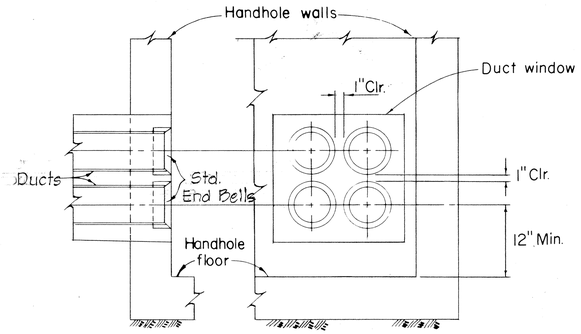
LIETZ 1103 ARKWRIGHT TRACING CLOTH 10-60 200P

Revised: April 15, 1971
Oct. 29, 1971

FED. AID DIST. NO.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET N.	TOTAL SHEETS
HAWAII	HAWAII	F-078-1(11)	1969	188	258



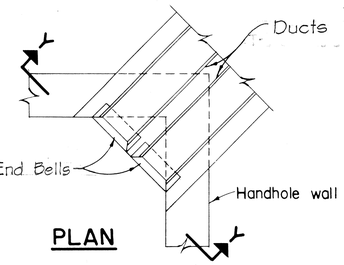
PLAN



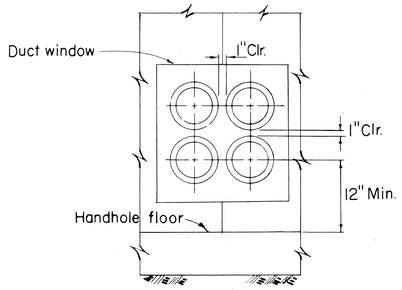
SIDE ELEV. FRONT ELEV.

END & SIDE ENTRANCES

(FOUR WAY DUCT)



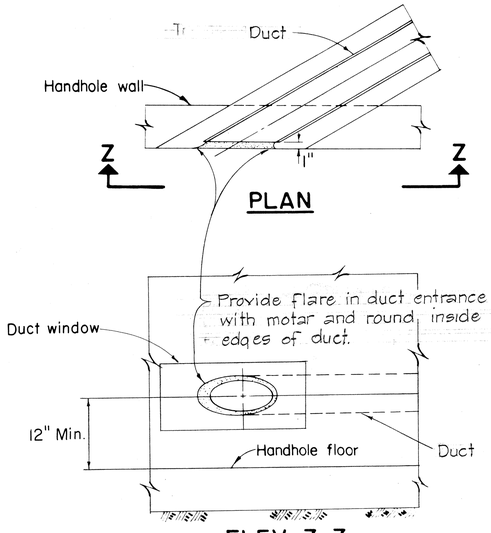
PLAN



ELEV. Y-Y

CORNER ENTRANCE

(FOUR WAY DUCT)



PLAN

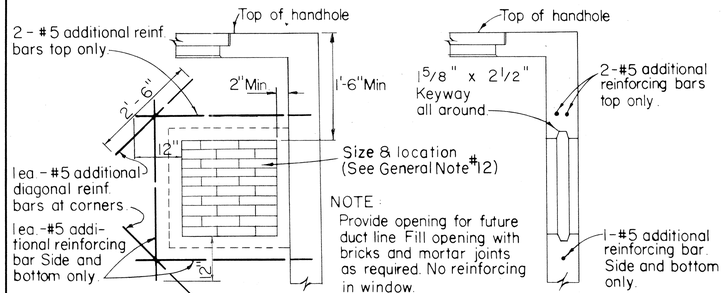
ELEV. Z-Z

DIAGONAL ENTRANCE

(ONE WAY DUCT)

TYPICAL DUCT LINE ENTRANCE DETAILS

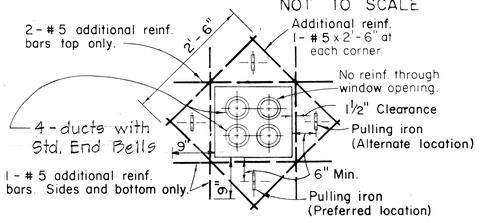
NOT TO SCALE



ELEVATION SECTION

KNOCKOUT FOR FUTURE DUCT LINE

NOT TO SCALE

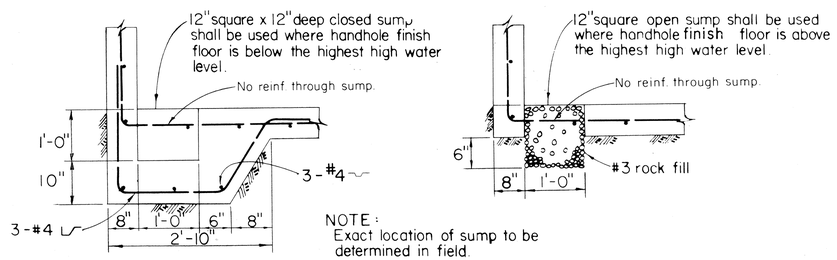


ELEVATION

TYPICAL DETAIL AT DUCT WINDOW

NOT TO SCALE

NOTE:
Generally 2 Pulling Irons are required and located on opposite wall of each duct window unless otherwise shown or noted. H.E. Co. Engineer shall determine number required.



SECTION ELEV.

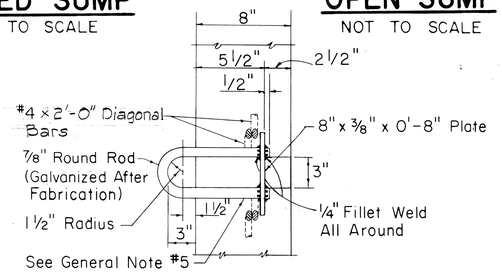
CLOSED SUMP

NOT TO SCALE

SECTION ELEV.

OPEN SUMP

NOT TO SCALE



SECTION ELEV.

PULLING IRON

NOT TO SCALE

GENERAL NOTES

1. Concrete to develop compressive cylinder strength of 3000 PSI in 28 days.
2. CONCRETE FINISH:
   Top of Handhole - Woodfloated (sidewalk finish) according to Highways Division, State of Hawaii or Division of Engineering, City & County of Honolulu specification whichever Agency has authority over the work.
   Floor - Smooth metal trowelled.
   Exposed Wall Surfaces, and Edges - Smooth and free from defects.
   CONCRETE POURING:
   Notify the Hawaiian Electric Co. Contracting & Inspection Div. 24 hours before pouring any concrete. All concrete pouring shall be done in the presence of an H.E. CO. Engineer or Inspector.
3. REINFORCING: Round deformed bars, new billet stock grade 40, ASTM A615. All hooked bars shall have ACI std. hook unless otherwise shown.
4. FORMS: Form handhole to size and shape as shown. Exterior face of handhole wall shall be formed except:
   A) Excavation in solid material such as coral or rock, neat cut, no forms required.
   B) Excavation in solid material other than coral or rock, lining such as salvaged corrugated iron, canec etc. may be used.
5. PULLING IRONS:
   For location and number required, see duct entrance plan of project concerned.
6. DRAINAGE: Slope floor down 1/2" to sump.
7. For slope of top of handhole, see plan of project concerned.
8. FINISH STEEL WORK:
   Angle iron frames for remov. conc. slabs and pulling irons shall be HOT DIP. GALVANIZED AFTER FABRICATION.
9. EXCAVATION:
   Excavate for handhole to accurate alignment grades and dimensions as shown on drawing. All excavation must be approved by the Engineering Department, the Hawaiian Electric Co., Inc., before any concrete is poured. All excess cut shall be backfilled with concrete or rock.
10. BACKFILL:
    Remove all debris before backfilling. Backfill in accordance with latest specifications of and subject to approval of Highways Division, State of Hawaii or Division of Engineering, City & County of Honolulu whichever Agency has authority over the work.
11. For duct line construction standards see H.E.CO. Dwgs. 18585.
12. DUCTS: For number, size, and exact location of duct entrances, refer to project drawings.
13. ALL MATERIALS SHALL BE NEW AND SHALL BE MANUFACTURED IN THE UNITED STATES OF AMERICA

THIS SHEET SUPERSEDES SHT. NO. 188

FOR USE IN AREAS NOT SUBJECT TO VEHICULAR TRAFFIC.

APPROVED:

W K C Jno 9/4/70

HAWAIIAN ELECTRIC Co., Inc HHO JK DATE

HECo., Inc. Drawing Number	
18844	SHEET No. 2 OF 2 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

HANDHOLE TYPE 611 (6'-0 x 11'-0)
UNDERGROUND STANDARDS

Scales: As Noted Date: May, 1970

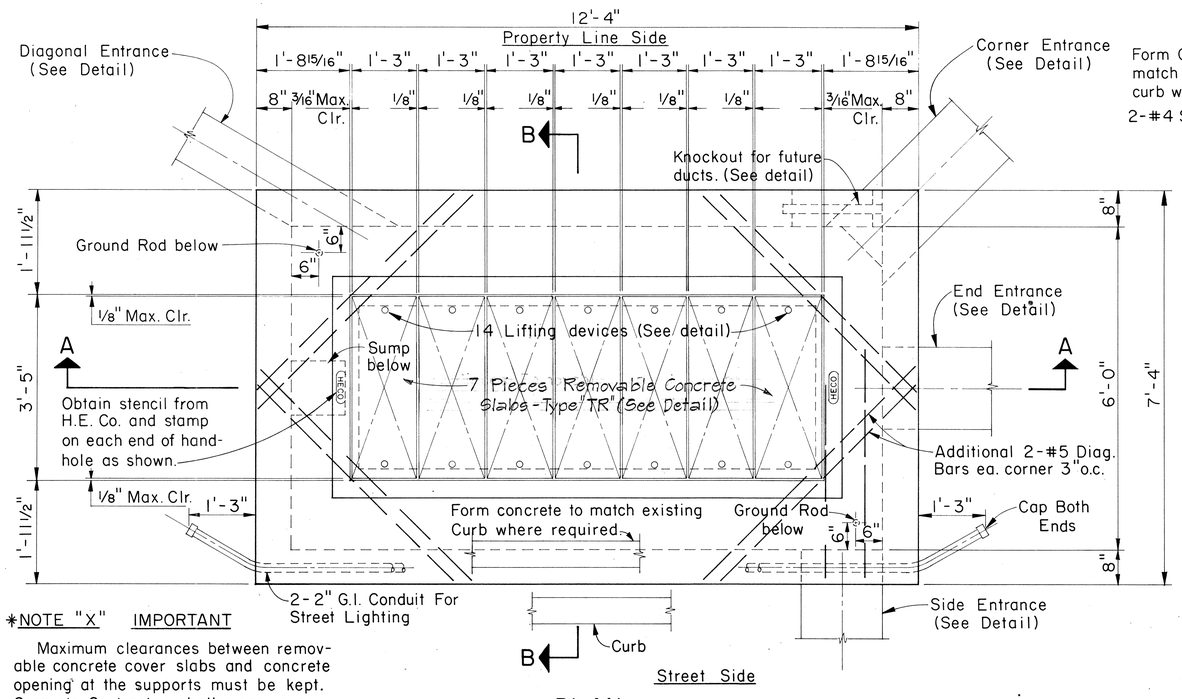
SHEET NO. 18 OF 33 SHEETS

188R

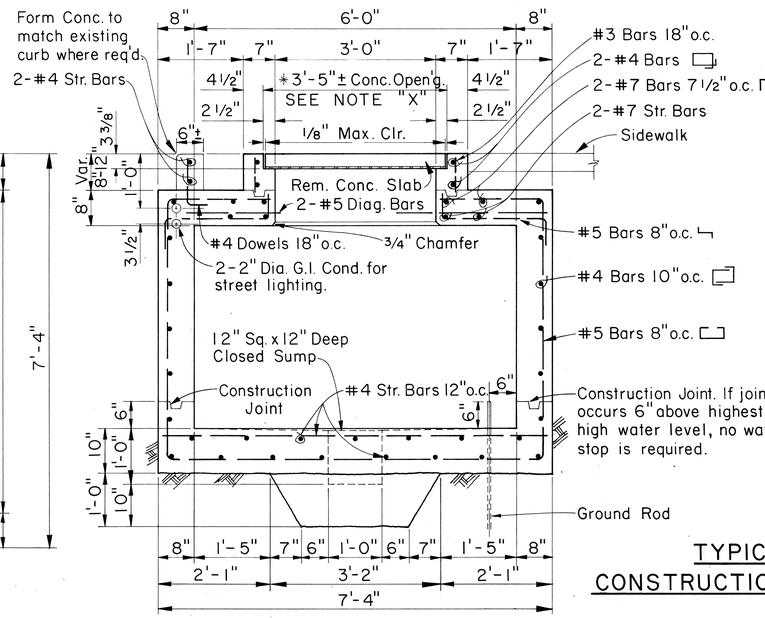
LIETZ 1103 ARKWRIGHT TRACING CLOTH 10-60 200P

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(11)	1969	189	258

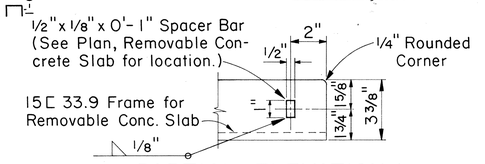
Revised: April 15, 1971
Oct. 29, 1971



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



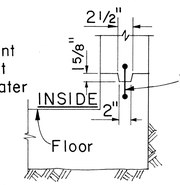
SECTION B-B
Scale: 3/4" = 1'-0"



PARTIAL ELEVATION

SPACER BAR FOR REMOVABLE CONCRETE SLAB

Scale: 3"= 1'-0"

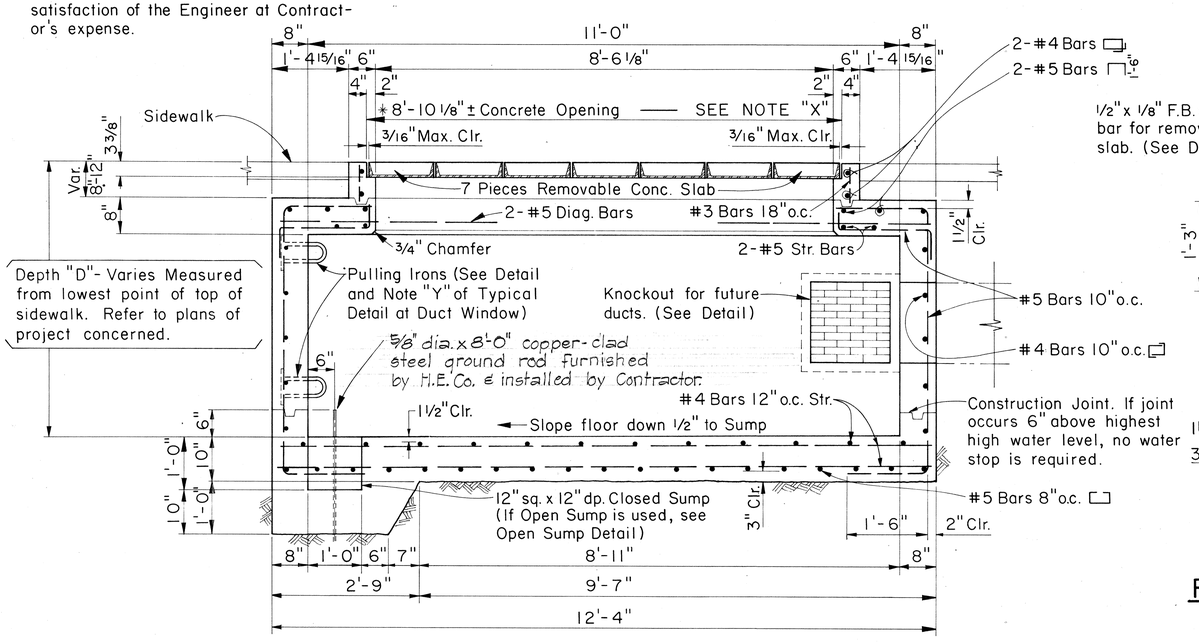


TYPICAL DETAIL OF CONSTRUCTION JOINT AND KEYWAY

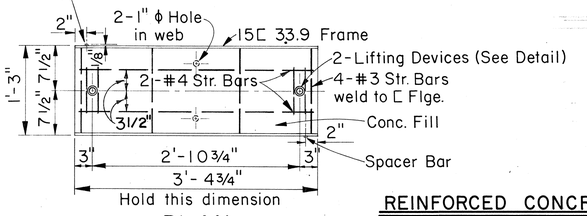
Scale: 1"= 1'-0"

*NOTE "X" IMPORTANT

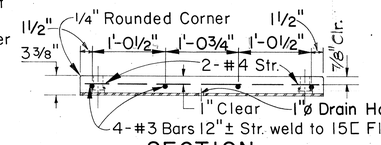
Maximum clearances between removable concrete cover slabs and concrete opening at the supports must be kept. Concrete Contractor shall measure cover slab steel frame after fabrication to obtain proper clearances. Any variation in clearances shall be corrected to the satisfaction of the Engineer at Contractor's expense.



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



PLAN

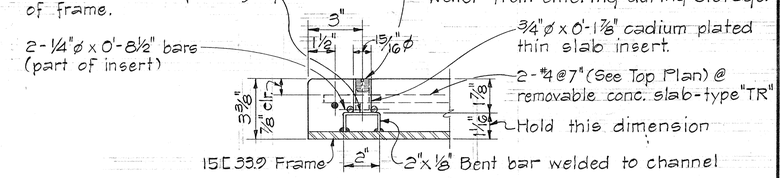


SECTION

REMOVABLE CONCRETE SLAB (TYPE "TR")

Scale: 1"=1'-0"

THIS SHEET SUPERSEDES SHT. NO. 189



PART. SECTION

LIFTING DEVICE (FOR TYPE "TR" SLAB)

Scale: 3"=1'-0"

REINFORCED CONCRETE QUANTITIES

QUANTITY OF MATERIALS FOR DEPTH "D"= 5'-0"

Total Concrete	=	8.5 Cu. Yds.
Total Rein. Steel	=	1,634 Lbs.
Total Misc. Steel	=	845 Lbs.

WEIGHT PER REMOVABLE CONCRETE SLAB

Concrete	=	149 Lbs.
Reinf. Steel	=	6 Lbs.
Misc. Steel	=	118 Lbs.
Total	=	273 Lbs.

MATERIALS FOR 6" DEPTH OF 8" THICK WALL

Concrete	=	0.45 Cu. Yds.
Reinf. Steel	=	56 Lbs.

APPROVED:

9/4/70
HAWAIIAN ELECTRIC Co., Inc. DATE

FOR USE IN AREAS SUBJECT TO LIGHT VEHICULAR TRAFFIC

HECo., Inc. Drawing Number
18849
SHEET No. 1 OF 2 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

HANDHOLE TYPE 611V (6'-0"x 11'-0") UNDERGROUND STANDARDS

Scales: As Noted Date: May, 1970

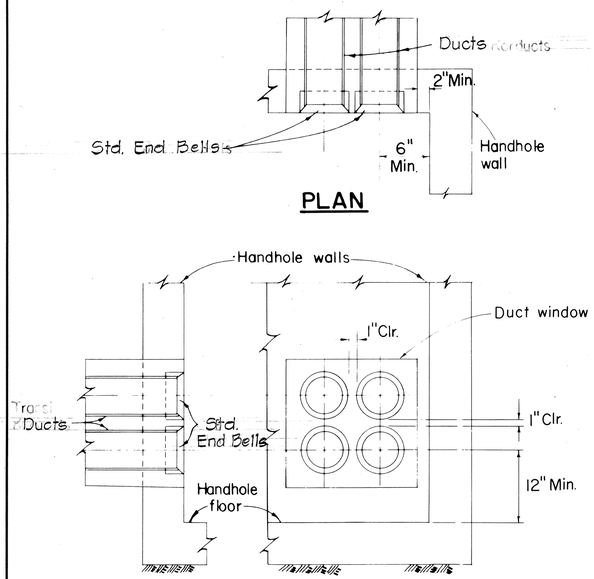
SHEET No. 19 OF 33 SHEETS

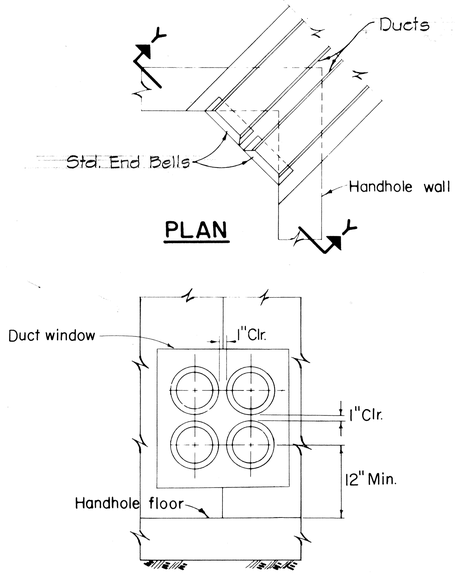
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
NOTE BOOK	DESIGNED BY	
	QUANTITIES BY	
No.	CHECKED BY	

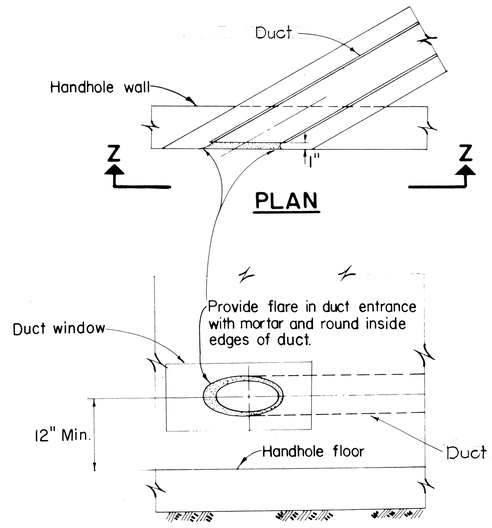
189R

Revised: April 15, 1971
Oct. 29, 1971

FED. AID DIST. NO.	STATE	FED. AID. PROJECT	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F078-1(11)	1969	190	258

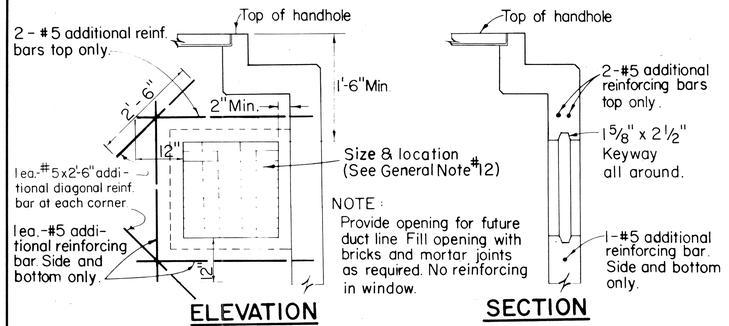


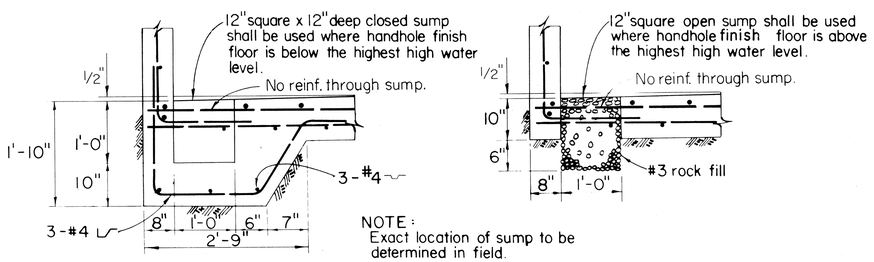


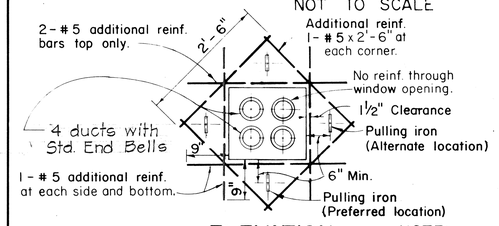


TYPICAL DUCT LINE ENTRANCE DETAILS

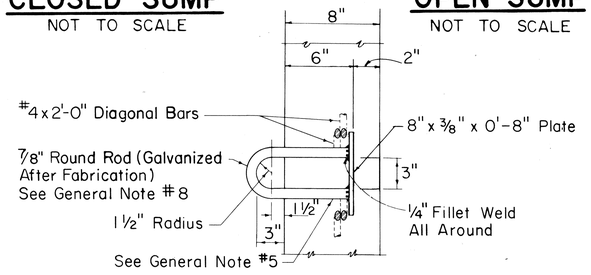
NOT TO SCALE







NOTE:
Generally 2 Pulling Irons are required and located on opposite wall of each duct window unless otherwise shown or noted. H.E.Co. Engineer shall determine number required.



GENERAL NOTES

1. Concrete to develop compressive cylinder strength of 3000 PSI in 28 days.
2. CONCRETE FINISH:
   Top of Handhole - Woodfloated (sidewalk finish) according to Highways Division, State of Hawaii or Division of Engineering, City and County of Honolulu specifications whichever Agency has authority over the work.
   Floor - Smooth metal trowelled.
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3. REINFORCING: Round deformed bars, new billet stock grade 40, ASTM A615. All hooked bars shall have ACI std. hook unless otherwise shown.
4. FORMS: Form handhole to size and shape as shown. Exterior face of handhole wall shall be formed except:
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   B) Excavation in solid material other than coral or rock, lining such as salvaged corrugated iron, canec etc. may be used.
5. PULLING IRONS:
   For location and number required, see duct entrance plan of project concerned.
6. DRAINAGE: Slope floor down 1/2" to sump.
7. For slope of top of handhole, see plan of project concerned.
8. FINISH STEEL WORK:
   Channel iron frames for removable concrete slabs and pulling irons shall be HOT DIP GALVANIZED AFTER FABRICATION.
9. EXCAVATION:
   Excavate for handhole to accurate alignment, grades and dimensions as shown on drawing. All excavation must be approved by the Engineering Department, the Hawaiian Electric Co., Inc., before any concrete is poured. All excess cut shall be backfilled with concrete or rock.
10. BACKFILL:
    Remove all debris before backfilling. Backfill in accordance with latest specifications of and subject to approval of Highways Division, State of Hawaii or Division of Engineering, City & County of Honolulu whichever Agency has authority over the work.
11. For duct line construction standards see H.E.CO. Dwg. 18585.
12. DUCTS: For number, size, and exact location of duct entrances, refer to project drawings.
13. ALL MATERIALS SHALL BE NEW AND SHALL BE MANUFACTURED IN THE UNITED STATES OF AMERICA.

THIS SHEET SUPERSEDES SHT. NO. 190

FOR USE IN AREAS SUBJECT TO LIGHT VEHICULAR TRAFFIC.

APPROVED:

HAWAIIAN ELECTRIC Co., Inc. NHO. JK 9/4/70 DATE

HECo., Inc. Drawing Number	
18849	SHEET No. 2 OF 2 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

HANDHOLE TYPE 611V (6'-0 x 11'-0)
UNDERGROUND STANDARDS

Scales: As Noted Date: May, 1970

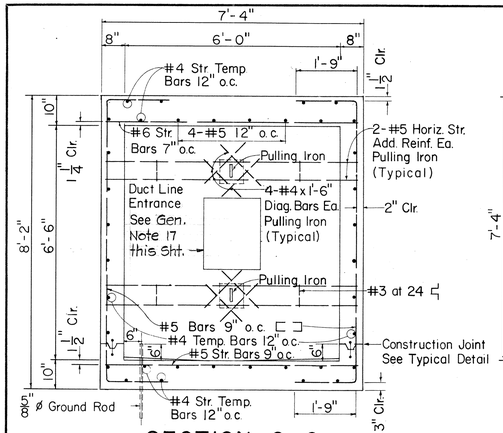
SHEET NO. 20 OF 33 SHEETS

190R

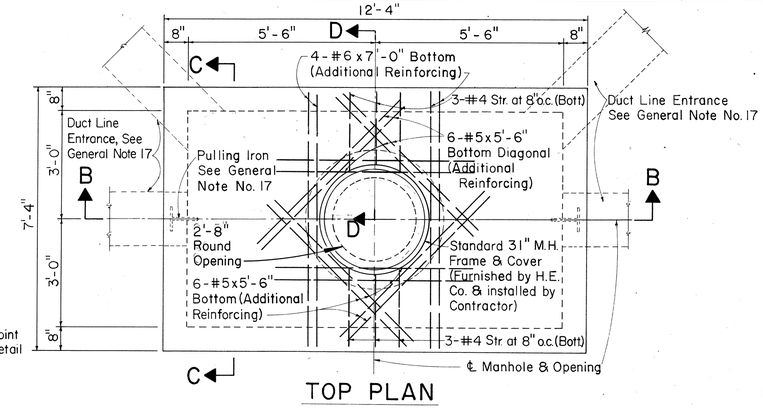
LIETZ 1103 ARKWRIGHT TRACING CLOTH 10-60 200P

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F-078-1(11)	1969	191	258

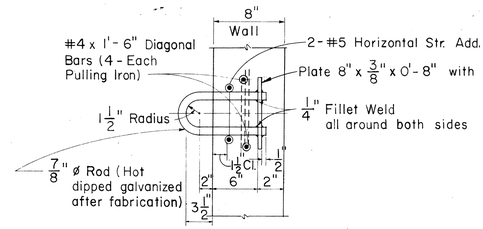
Revised: April 15, 1971
Oct. 22, 1971



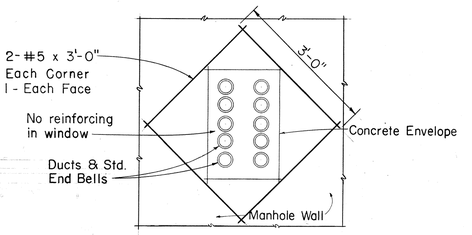
SECTION C-C



TOP PLAN

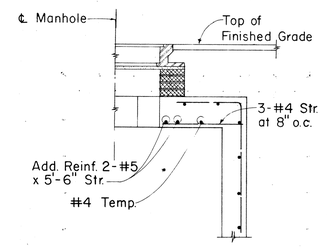


PULLING IRON DETAIL

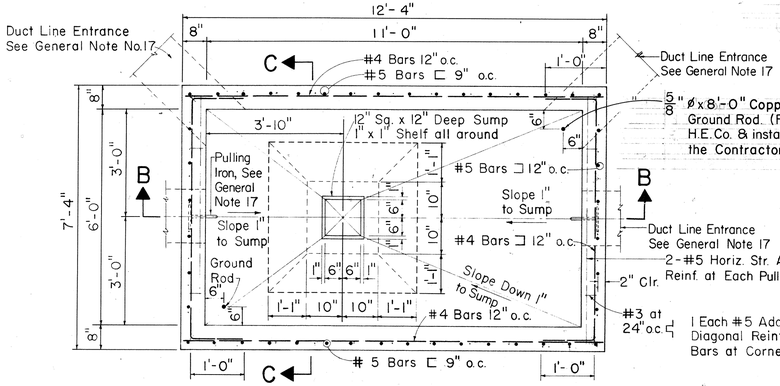


ELEVATION

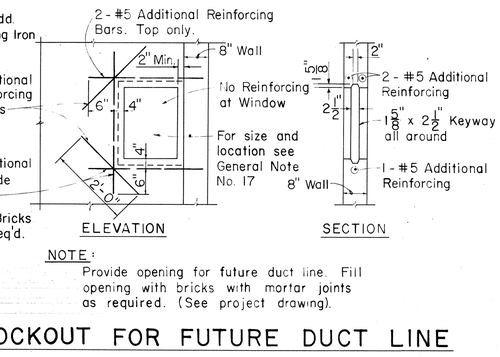
REINFORCING AT DUCT WINDOW



SECTION D-D

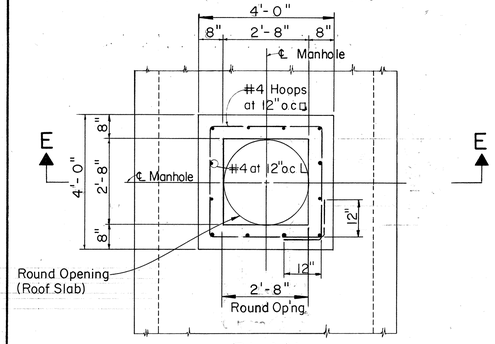


SECTIONAL PLAN A-A

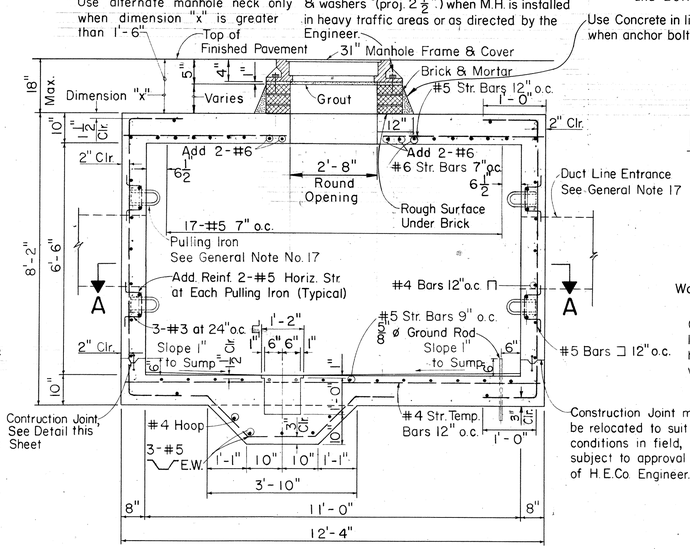


NOTE:
Provide opening for future duct line. Fill opening with bricks with mortar joints as required. (See project drawing).

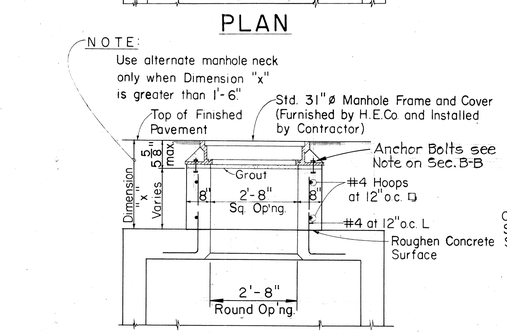
KNOCKOUT FOR FUTURE DUCT LINE



PLAN

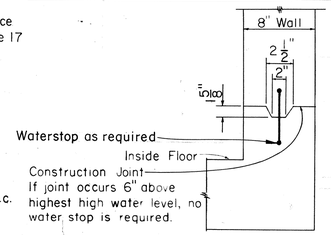


SECTION B-B



SECTION E-E

ALTERNATE MANHOLE NECK



TYPICAL DETAIL OF CONSTRUCTION JOINT AND KEYWAY

QUANTITY OF MATERIALS, (M.H. only)

* Concrete	= 11.52 Cu. Yds.
Reinf. Steel	= 1444.61 lbs.
Misc. Steel (Pulling Irons, ea.)	= 10.90 lbs.

ADDITIONAL QUANTITY OF MATERIALS FOR ALTERNATE NECK (Dim. "X" = 2'-0")

Concrete	= 0.50 Cu. Yds.
Reinf. Steel	= 40.0 lbs.

* Note: Conc. for M.H. necks when used in lieu of bricks (for dim. "x" < 1'-6") for anchor bolt installation is not included in above totals.

APPROVED:

HAWAIIAN ELECTRIC Co., Inc. — DATE 9/4/70

THIS SHEET SUPERSEDES SHT. NO. 191

GENERAL NOTES

1. EXCAVATION: Excavate for manhole to accurate alignment, grades and dimensions as shown on drawings.
   All excavation must be approved by Engineering Dept. H.E. Co. before any concrete is poured.
   All excess cut shall be backfilled with concrete or approved aggregate.
2. BACKFILL: Remove all debris before backfilling. Backfill in accordance with latest specifications of Division of Highways, State of Hawaii.
3. All work to be done in dry.
4. Concrete shall be Class A conforming to the requirements of Section 601 of the State Standard Specifications.
5. MIXING: Ready-Mixed A.S.T.M. C-94.
6. REINFORCING: Round deformed bars (clean and new), Grade 40 Billet Steel per ASTM A615.
7. SPLICE: Lap 30 bar diameters unless otherwise shown.
8. CURING: Keep concrete moist at least 7 days after pouring. (By approved method).
9. FINISH: All surfaces smooth and free from defects.
   Top of manhole - wood floated. Manhole floor - steel troweled.
   Inside walls and ceiling - cement washed.
10. Install all inserts, including pulling irons, ground rods, etc, before pouring concrete.
11. POURING: Notify the H.E.Co. Contracting and Inspection Division, 24 hours before pouring any concrete. All concrete pouring shall be done in the presence of an H.E.Co. Engineer or Inspector.
12. FORMS: Make of good sound lumber, of sufficient strength, water tight and conforming to shape and dimensions indicated on drawings.
13. The Hawaiian Electric Co. Inc. to furnish and Contractor to install, for each manhole
    A - 2-⅝" ø x 8'-0" copper-clad steel ground rods.
    B - Standard 31" manhole frame and cover. (H.E. Standard)
14. Slope manhole floor down 1" toward sump.
15. All work shall be subject to inspection by the Hawaiian Electric Co. Inc.; and/or Division of Highways, State of Hawaii; and/or Division of Engineering, City & County of Honolulu.
16. All materials shall be new and shall be manufactured in the United States of America.
17. For number, size, and exact location of ducts entrances and pulling irons, refer to project drawings.
18. Waterstop shall conform to the requirements of Section 705.07 of the State Standard Specifications for Road & Bridge Construction.

REFERENCE DRAWINGS AND SPECIF.

011327 & 011328 - Standard H.E.Co. 31" Manhole Frame and Cover.
18585 - Underground Ductline Construction Standards - Details.
CS 7001-0 - Construction of Underground Facilities - Specifications.

FOR USE IN AREAS SUBJECT TO VEHICULAR TRAFFIC

HECo., Inc. Drawing Number

18775

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

MANHOLE TYPE No. 1 (6'-0" x 11'-0") UNDERGROUND STANDARDS

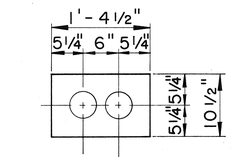
Scales: Not to Scale — Date: May 1970

SHEET NO. 21 OF 33 SHEETS

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

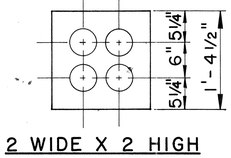
191R

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-(01)	1969	192	258



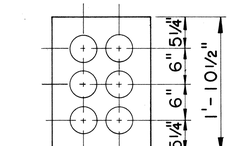
2 DUCTS

$\left(\frac{T}{2F-2}\right)$



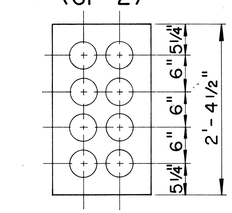
2 WIDE X 2 HIGH

$\left(\frac{T}{4F-2}\right)$



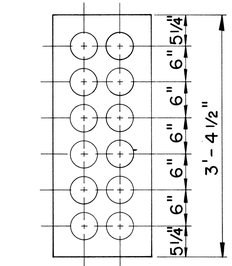
2 WIDE X 3 HIGH

$\left(\frac{T}{6F-2}\right)$



2 WIDE X 4 HIGH

$\left(\frac{T}{8F-2}\right)$



2 WIDE X 6 HIGH

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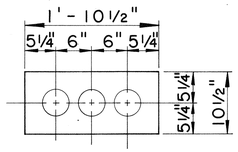

3 DUCTS

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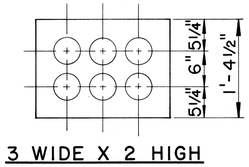
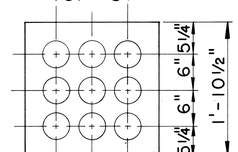


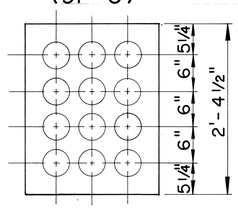
3 WIDE X 2 HIGH

$\left(\frac{T}{6F-3}\right)$



3 WIDE X 3 HIGH

$\left(\frac{T}{9F-3}\right)$



3 WIDE X 4 HIGH

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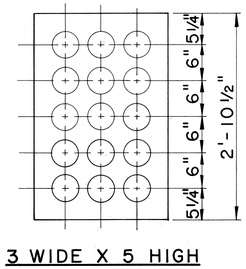
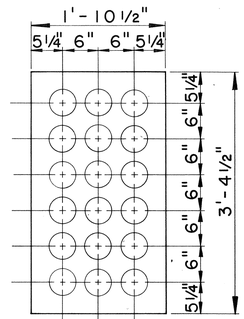


3 WIDE X 5 HIGH

$\left(\frac{T}{15F-3}\right)$



3 WIDE X 6 HIGH

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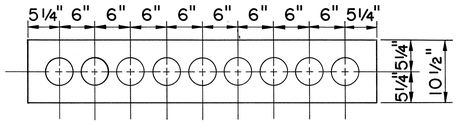
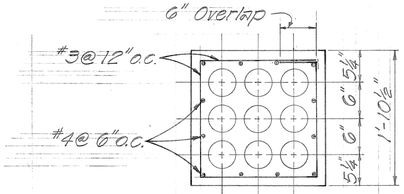


9 DUCTS

$\left(\frac{T}{9F-9}\right)$

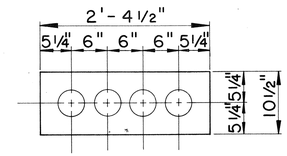
(AT RED HILL STRUCTURE)



3 WIDE X 3 HIGH

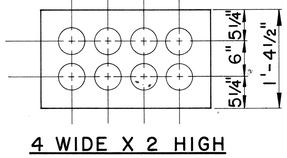
$\left(\frac{T}{9F-3}\right)$

REINFORCED CONC. JACKET



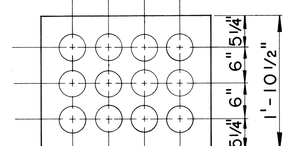
4 DUCTS

$\left(\frac{T}{4F-4}\right)$



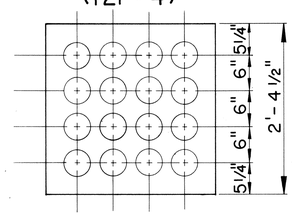
4 WIDE X 2 HIGH

$\left(\frac{T}{8F-4}\right)$



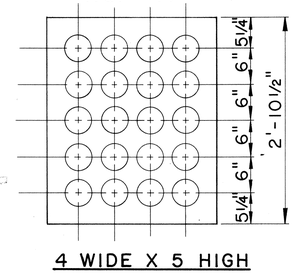
4 WIDE X 3 HIGH

$\left(\frac{T}{12F-4}\right)$



4 WIDE X 4 HIGH

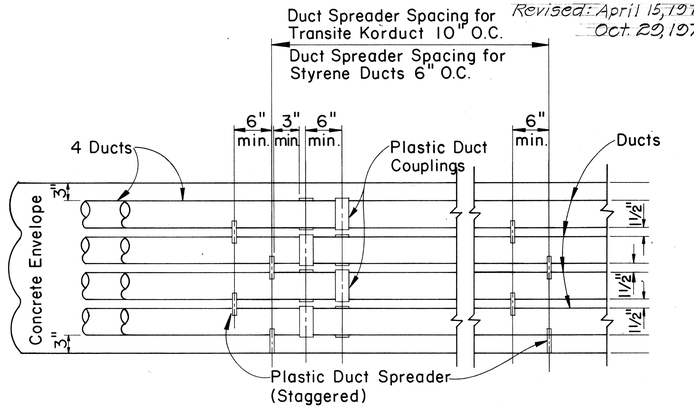
$\left(\frac{T}{16F-4}\right)$



4 WIDE X 5 HIGH

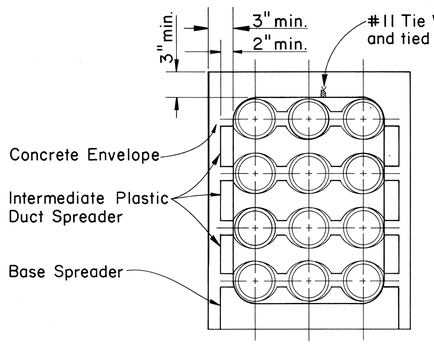
$\left(\frac{T}{20F-4}\right)$

Revised: April 15, 1971
Oct. 29, 1971



TYPICAL DUCT ENVELOPE ELEVATION ARRANGEMENT OF COUPLING & PLASTIC SPACERS

Scale: 1"=1'-0"



NOTE:

1. The Contractor shall place #12 Fish Wire in designated duct throughout its entire length with protrusions of 2 feet in manholes & handholes at each end and 1 foot in pullboxes.

SECTION SHOWING SPACERS

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

$\left(\frac{T}{20F-4}\right)$

- Denotes H.T. Co.
- Denotes Number of ducts bottom layer
- Denotes 4 inch ducts
- Denotes Total Number Of Ducts

SYMBOL IDENTIFICATION

THIS SHEET SUPERSEDES SHT. NO. 192

APPROVED:
F. H. Judd
Hawaiian Telephone Co., Ltd.
9-14-70
Date

H.T. Co., Ltd. Drawing No. 34028

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DUCT FORMATIONS

Scale: As Shown Date: May, 1970

SHEET No. 22 OF 33 SHEETS

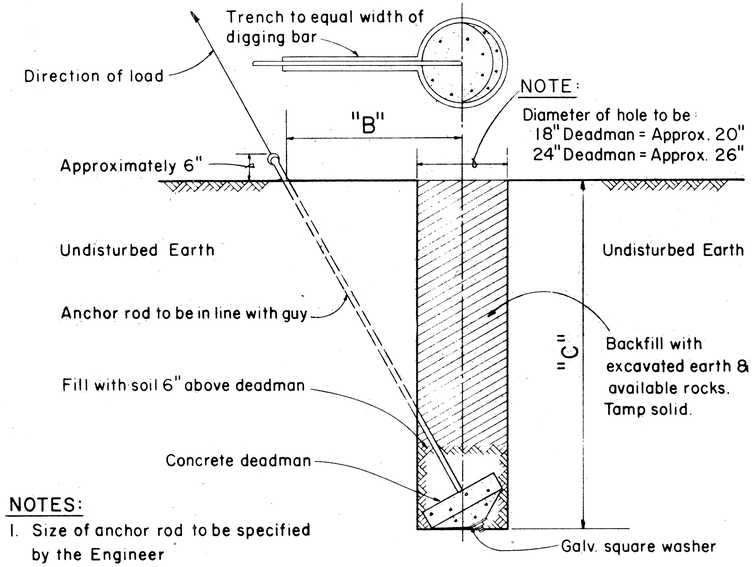
STANDARD DUCT FORMATIONS

Scale: 1"=1'-0"

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

192R

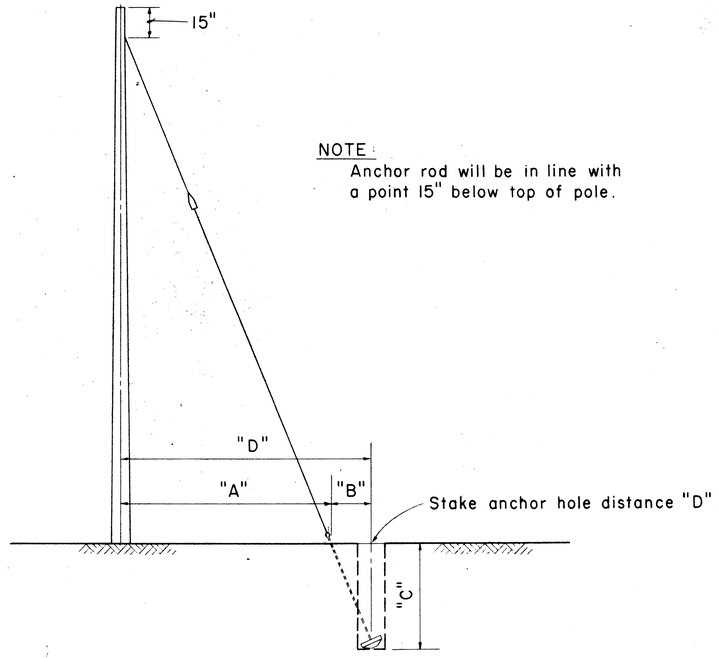
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F-078-1(11)	1969	193	258



NOTES:
1. Size of anchor rod to be specified by the Engineer
2. Use Anchoring Data.

GUY ANCHOR DEADMAN

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



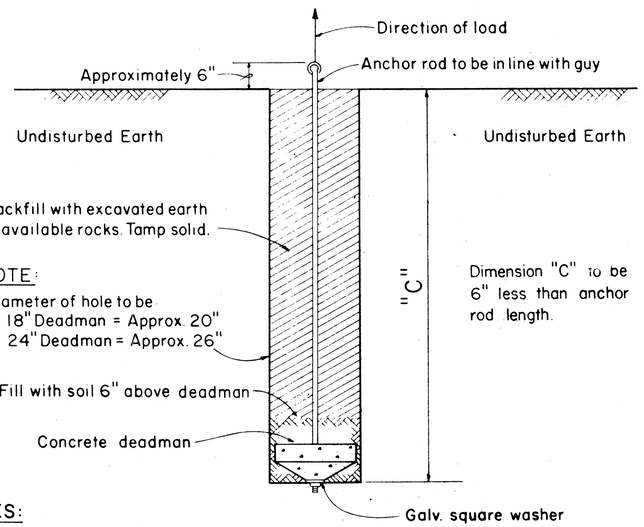
Not to Scale

FOR 25', & 30' POLES WITH 8'-0" ANCHOR RODS				
"A"	"B"	"C"		"D" = ("A" + "B")
LEAD-ANCHOR ROD TO ℄ OF POLE	ANCHOR ROD TO ℄ OF HOLE	VERTICAL DEPTH 18" D.M.	VERTICAL DEPTH 24" D.M.	TOTAL DISTANCE POLE TO HOLE
5'-0"	1'-8"	7'-1"	7'-4"	6'-8"
10'-0"	3'-0"	6'-7"	7'-0"	13'-0"
15'-0"	4'-0"	6'-1"	6'-6"	19'-0"
20'-0"	4'-8"	5'-6"	5'-10"	24'-8"
25'-0"	5'-2"	4'-11"	5'-4"	30'-2"
FOR 35' THRU 70' POLES WITH 8'-0" ANCHOR RODS				
5'-0"	1'-0"	7'-3"	7'-4"	6'-0"
10'-0"	1'-11"	7'-1"	7'-3"	11'-11"
15'-0"	2'-8"	6'-9"	7'-1"	17'-8"
20'-0"	3'-3"	6'-6"	6'-10"	23'-3"
25'-0	3'-10"	6'-2"	6'-7"	28'-10"
FOR 40' THRU 70' POLES WITH 1 1/4" x 10'-0" ANCHOR RODS				
5'-0"	1'-7"		9'-4"	6'-7"
10'-0"	3'-0"		9'-0"	13'-0"
15'-0"	4'-2"		8'-6"	19'-2"
20'-0"	5'-3"		7'-11"	25'-3"
25'-0"	6'-2"		7'-3"	31'-2"

D.M. = Deadman

TABLE 2 ANCHOR ROD - ANCHOR SLUG - SQUARE WASHER COMBINATION							
H.E. CODE NO.	ANCHOR ROD	WORKING TENSION 1/2 ULT (LBS.)	H.E. CODE NO.	CONC. ANC. (IN.)	H.E. CODE NO.	WASHER SIZE	QTY.
617	5/8" x 8'-0" Steel	8,000	518	18	2320	4" x 4" x 3/16"	2
615	5/8" x 8'-0" Cu Cov Stl	9,250	518	18	**	3" x 3" x 1/8"	2
618	3/4" x 8'-0" Steel	11,500	518	18	2330	6" x 6" x 3/8"	1
619	1" x 8'-0" Steel	18,000	524	24	2331	6" x 6" x 1/2"	1
616	1" x 8'-0" Cu Cov Stl	22,500	524	24	**	4" x 4" x 3/16"	2
613	1 1/4" x 10'-0" Steel	29,000	524	24	2330	6" x 6" x 3/8"	2

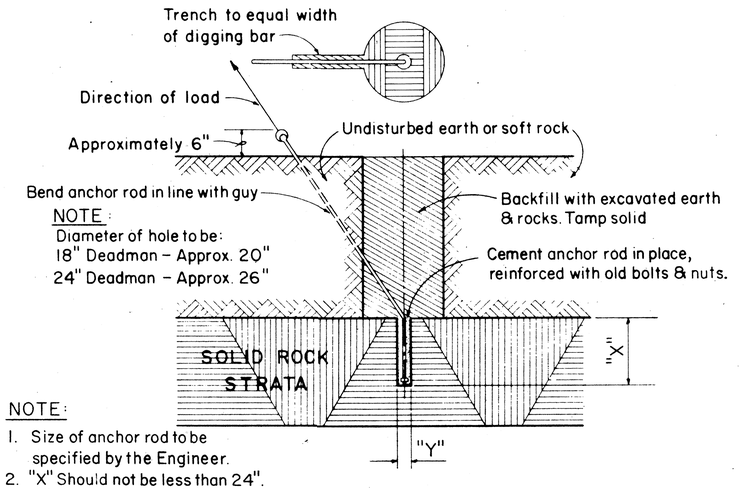
** Use bronze square washers included in anchor rod assembly on copper covered steel (Cu Cov Stl) anchor rods.



NOTES:
1. Size of anchor rod to be specified by the Engineer.
2. Use Anchoring Data.

SIDE - WALK ANCHOR

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



NOTE:
1. Size of anchor rod to be specified by the Engineer.
2. "X" Should not be less than 24". If "X" is less than 24" complete hole & install anchor.
3. "Y" 5/8" Anchor rod drill 2" hole
   3/4" Anchor rod drill 2" hole
   1" Anchor rod drill 2 1/2" hole
   1 1/4" Anchor rod drill 3" hole
4. Use Anchoring Data.

ROCK ANCHOR

Not to Scale

ANCHORING DATA

APPROVED:

HAWAIIAN TELEPHONE CO.

9-14-70
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
H.E.Co. AND H.T.Co.
ANCHOR DETAILS AND ANCHORING DATA

Scales: As Noted Date

SHEET No. 23 OF 33 SHEETS

193

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	F-078-1(11)	1960	194	258

CREOSOTED DOUGLAS FIR & YELLOW PINE POLE DATA

LENGTH IN FEET	CLASS	APPROX MINIMUM DIMENSIONS (INCHES) AT TOP DIA.	AT TOP CIR.	6' FROM BUTT DIA.	6' FROM BUTT CIR.	AVERAGE WEIGHT (LBS.) DOUGLAS FIR	POLE SETTING DEPTH (FT.) IN SOIL	IN ROCK	BREAKING LOAD 2'-0" BELOW TOP OF POLE (LBS.)
25	5	6.04	19	8.26	26	525	4.5	3	1900
30	3	7.32	23	10.32	32.5	810	5	3.5	3000
	5	6.04	19	8.90	28	600	5	3.5	1900
35	2	7.96	25	12.23	37.5	1260	5	3.5	3700
	5	6.04	19	9.55	30	770	5	3.5	1900
40	3	7.32	23	11.77	37	1320	5.5	3.5	3000
45	2	7.96	25	13.20	41.5	1845	6	4.	3700
	3	7.32	23	12.25	38.5	1575	6	4	3000
50	2	7.96	25	13.70	43.	2150	6.5	4	3700
	3	7.32	23	12.70	40	1850	6.5	4	3000
55	1	8.59	27	15.11	47.5	2860	7	4.5	4500
	2	7.96	25	14.15	44.5	2475	7	4.5	3700
	3	7.32	23	13.20	41.5	2145	7	4.5	3000
60	1	8.59	27	15.75	49.5	3360	7	4.5	4500
	2	7.96	25	14.62	46	2820	7	4.5	3700
65	1	8.59	27	16.20	51	3835	7.5	5	4500
	2	7.96	25	15.11	47.5	3250	7.5	5	3700
70	1	8.59	27	16.70	52.5	4340	7.5	5	4500
	2	7.96	25	15.60	49	3640	7.5	5	3700
75	1	8.59	27	17.20	54	4800	8	5.5	4500
	2	7.96	25	16.05	50.5	4050	8	5.5	3700
80	1	8.59	27	17.50	55	5240	8	6	4500
	2	7.96	25	16.40	51.5	4400	8	6	3700
85	1	8.59	27	18.00	56.5	5780	8.5	6.5	4500
	2	7.96	25	16.88	53	4930	8.5	6.5	3700
90	1	8.59	27	18.30	57.5	6300	8.5	6.5	4500
	2	7.96	25	17.20	54	5400	8.5	6.5	3700

NOTE:

The ultimate fiber stress for creosoted Southern Yellow Pine & Douglas Fir is 7,400 Lbs. per square inch.

Weights are for untreated poles. Add 5% as estimate of added weight of creosote treatment.

REFERENCES:

American Standards Association 05.4-1941, 05.6-1945.
Standard Handbook for Electrical Engineers, Eighth Edition
H. E. Co. Specification for Poles.

WOOD POLE DATA

APPROVED:

F. J. Judd — HAWAIIAN TELEPHONE CO.

9-14-70 — DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAIL
WOOD POLE DATA

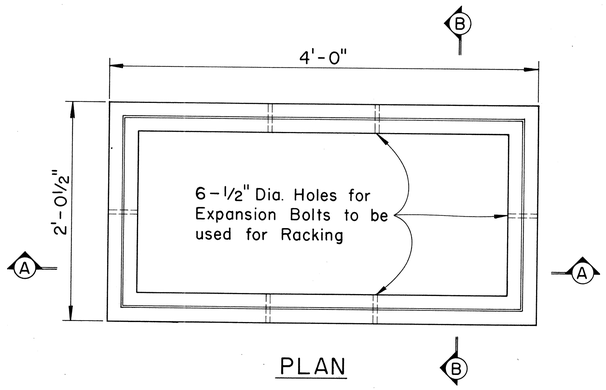
Scales: As Noted — Date

SHEET NO. 24 OF 33 SHEETS

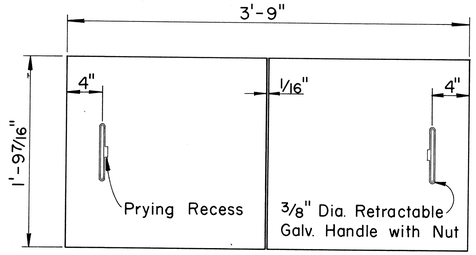
194

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

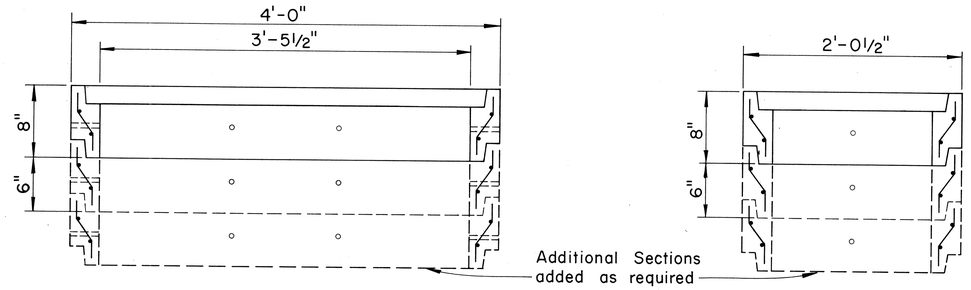
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(1)	1969	195	258



PLAN



COVER

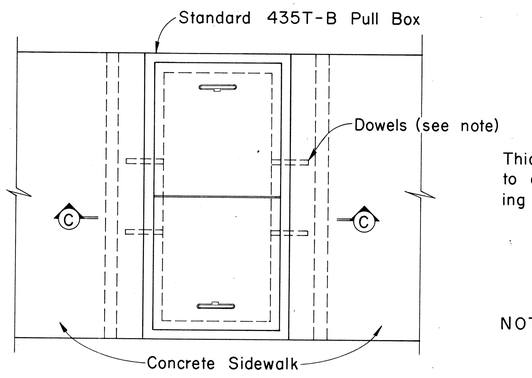


SECTION "A-A"

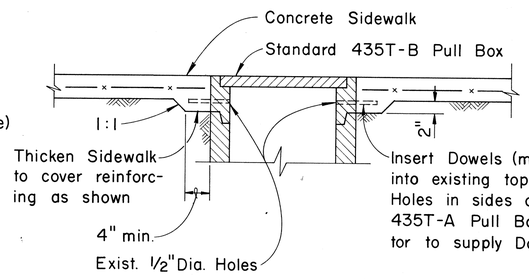
SECTION "B-B"

DETAIL OF LARGE PULL BOX NO. 435T-B

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



PLAN

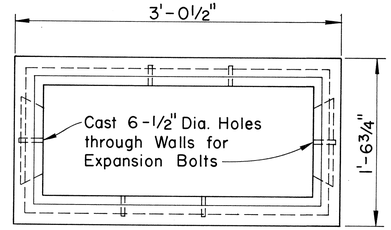


NOTE: Dowels shall be used only where the Sidewalk is as wide or narrower than the Pull Box.

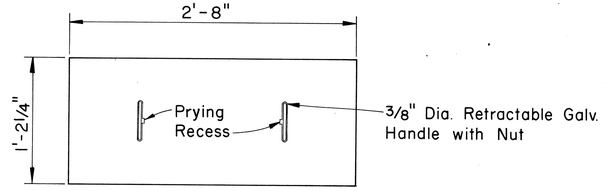
SECTION "C-C"

INSTALLATION DETAIL OF PULL BOX NO. 435T-B IN SIDEWALK AREAS

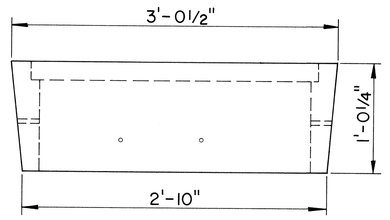
Scale: 1" = 1'-0"



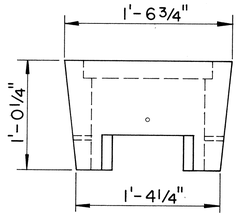
PLAN



COVER



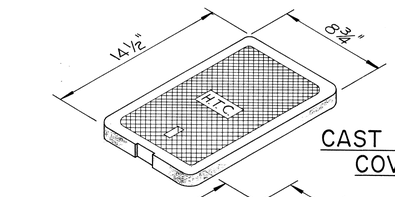
SIDE ELEVATION



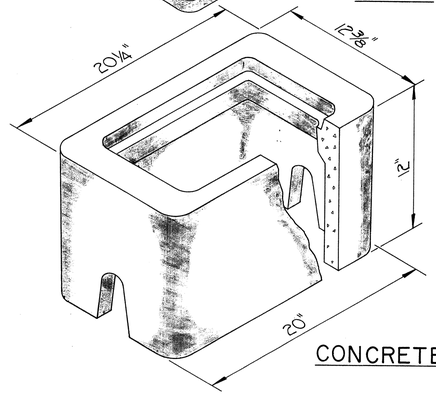
END ELEVATION

DETAIL OF SMALL PULL BOX NO. 434T

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



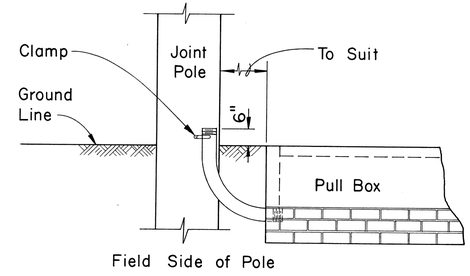
CAST IRON COVER



CONCRETE BOX

TYPE "B" METER BOX, NO. 436T

Not to Scale



TYPICAL 90° CONDUIT BEND TO POLE

Not to Scale

APPROVED:

F. T. Judd 9-14-70

Hawaiian Telephone Co., Ltd. Date

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

TELEPHONE PULL BOXES NOS. 435T-B, 434T, & 436T

Scale: As Shown Date: May, 1970

SHEET No. 25 OF 33 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-078-1(11)	1969	195 S-1	258

GENERAL NOTES:

1 Design Data
- fs = 20,000 psi
- f'c = 3,000 psi
- fc = 12,000 psi
- n = 10
- w = Equiv. Fluid Pressure 30 #/Ft²

2 Minimum overlap for a Lapped Splice shall be 24 Bar Dia. but not less than 12". Lap of Adjacent Bars shall not be in same location.

3 Unless otherwise indicated, for Vertical Location of Duct Windows see Profile Sheet.

4 Manhole Walls shall be Doubled Formed.

5 All Concrete shall be cured by an Impervious Liquid Membrane Compound.

6 Concrete shall not be loaded, except by its own weight, until 28 Days have passed since placement

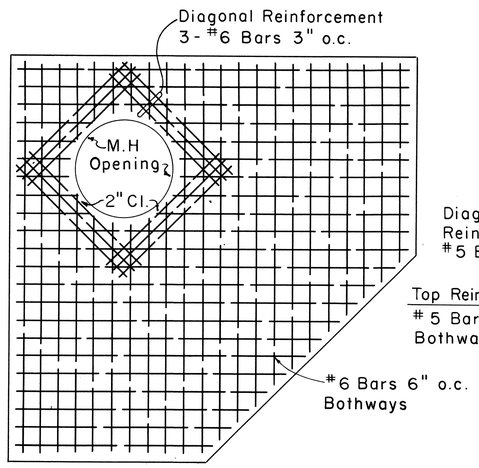
7 All Construction Joints shall be Waterproofed with Two Applications of Thoro-Seal or equal.

8 Cap all Ducts and Stubouts.

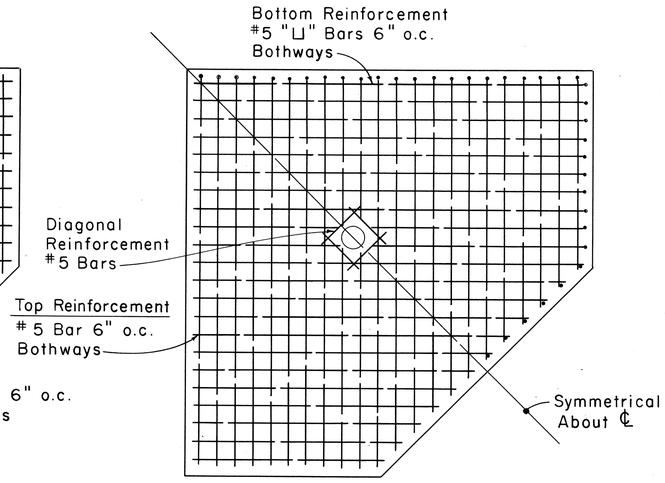
9 Concrete shall be Class A and shall have a Compressive Strength of 3000 psi in 28 Days with a Slump of 3".

10 Concrete Admixture shall be 2½ Lbs. "Tricosol Normal" per Cubic Yard.

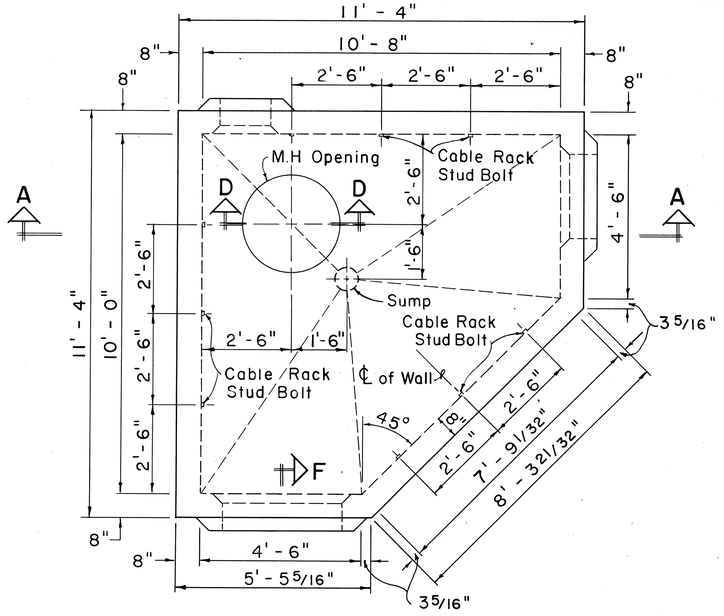
11 For Details "A", "B", "C", Sections "D-D", "E-E", "F-F" and other Miscellaneous Manhole Construction Details see Supplement Sheet to A-1, A-2, and A-3 Telephone Manholes.



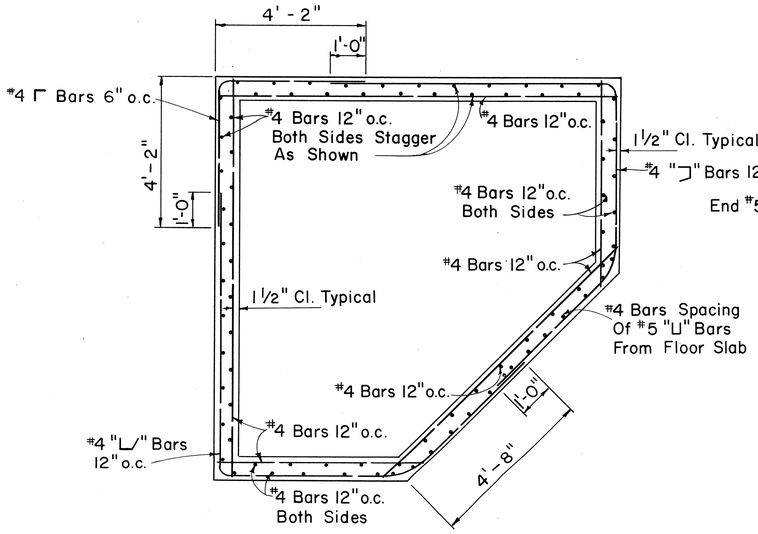
ROOF SLAB REINF. PLAN
Scale: 1/2" = 1'-0"



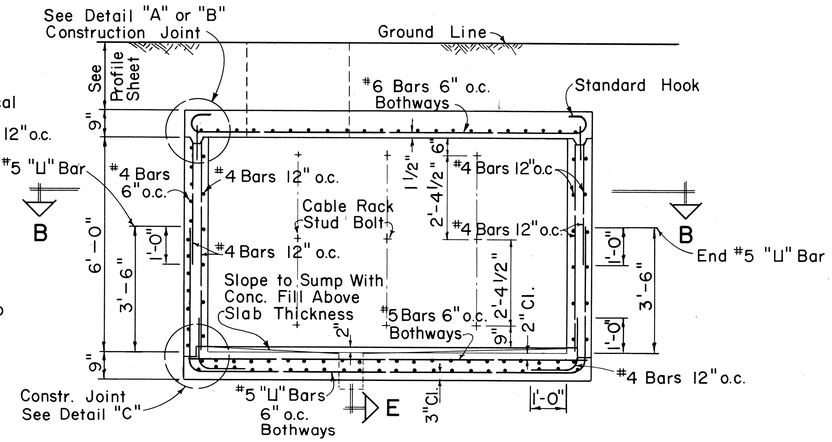
FLOOR SLAB REINF. PLAN
(Showing Top & Bottom Reinf.)
Scale: 1/2" = 1'-0"



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



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



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

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

APPROVED:

Hawaiian Telephone Co., Ltd. Date

H. T. Co., Ltd. Drawing No. 34034

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD CORNER LARGE TYPE MANHOLE

Scale: As Noted Date:

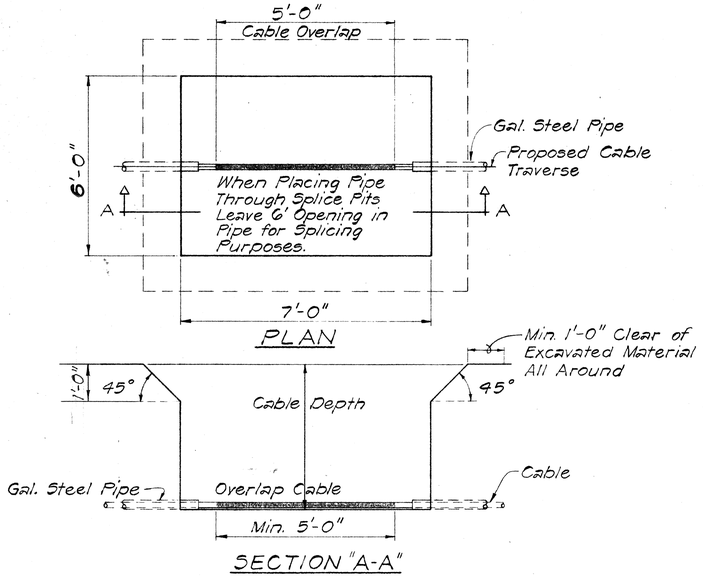
SHEET No. 25A OF 33 SHEETS

195S-1

HT-3

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(1)	1969	196	258

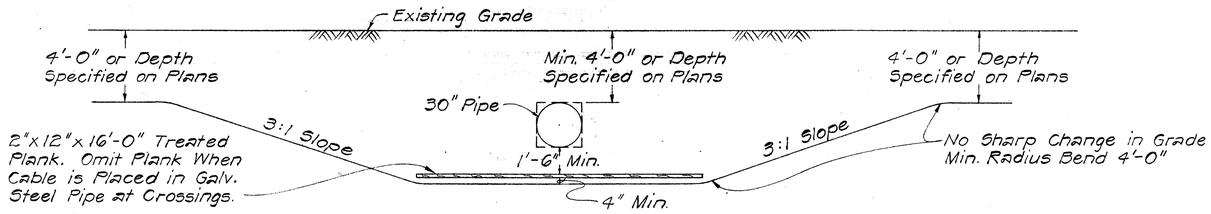
Revised: Oct. 16, 1970



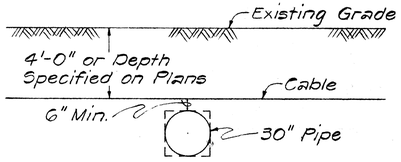
TYPICAL SPLICING PITS FOR BURIED CABLE

NOTES:

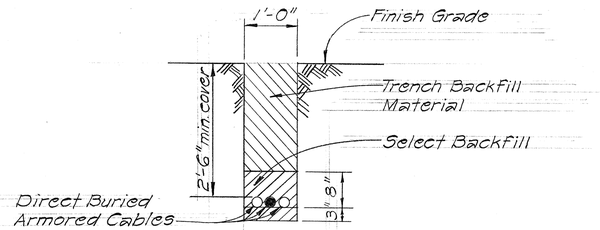
1. The Contractor shall dig pits at specified locations.
2. One face of pit shall be kept free of excavated material.
3. Where pits are located on sloping or irregular ground. The excavated material shall be placed in such a manner as to prevent surface water from draining into the pit.
4. Provide a fence around the pit at any location where stock have access to the route, and pits near farm homes to keep out small animals and pets.



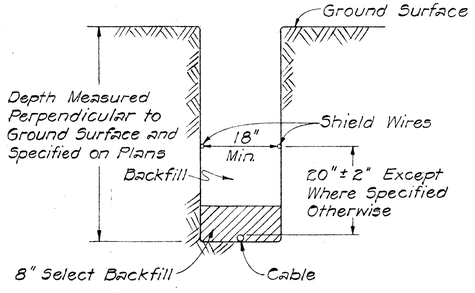
DETAIL OF CABLE CROSSINGS UNDER STORM CULVERTS - IRRIGATION PIPES, OTHER UTILITIES, OR FOREIGN PIPES



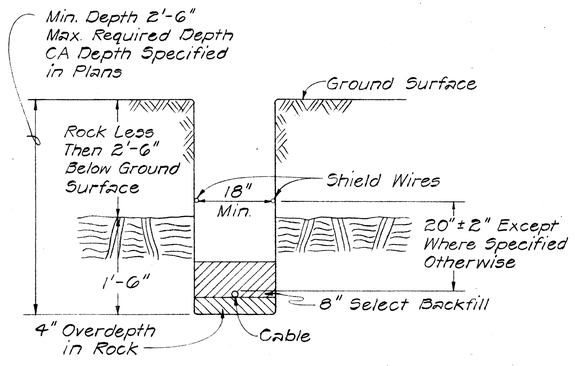
DETAIL OF CABLE CROSSINGS OVER STORM CULVERTS - IRRIGATION PIPES, OTHER UTILITIES, OR FOREIGN PIPES



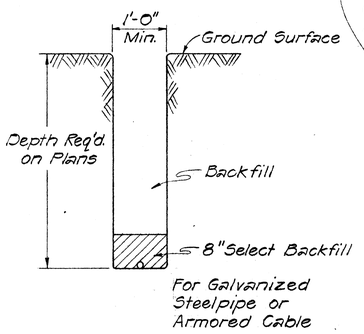
TYPICAL SECTION FOR DIRECT BURIED JOINT TRUNKING CABLE



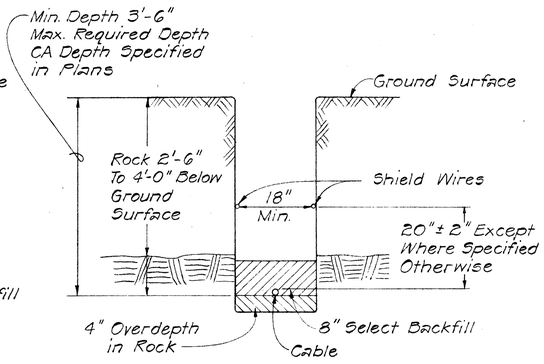
TYPICAL SECTION THROUGH NORMAL TRENCH



TYPICAL SECTION THROUGH TRENCH WITH ROCK LESS THAN 2'-6" BELOW SURFACE



TYPICAL SECTION FOR TRENCH WHERE NO SHIELD WIRE IS REQUIRED



TYPICAL SECTION THROUGH TRENCH WITH ROCK 2'-6" TO 4'-0" BELOW SURFACE

APPROVED:
F. H. Judd
Hawaiian Telephone Co., Ltd. 9-14-70 Date

H. T. Co., Ltd. Drawing Nos. 34047 34048

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS SPLICING PITS AND STANDARD TRENCHING DETAILS FOR BURIED COAXIAL CABLE

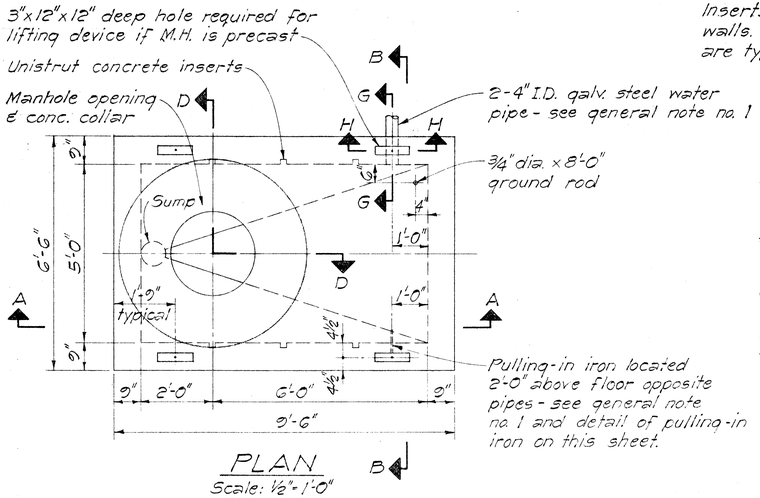
Scale: Not to Scale Date: May, 1970

SHEET No. 26 OF 33 SHEETS

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

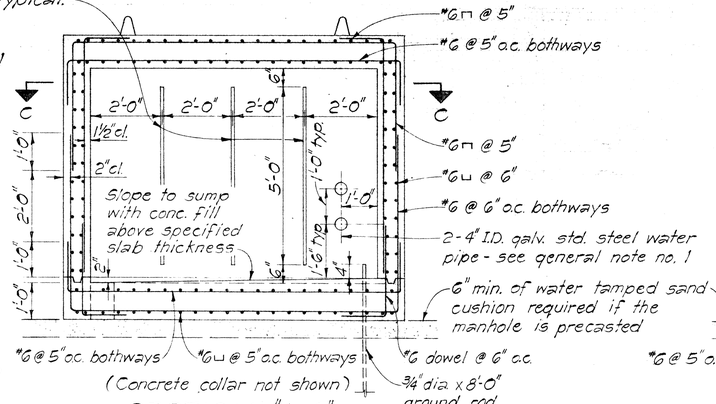
K&E CRYSTALENE® LA 2920 TRACING PAPER

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	197	258

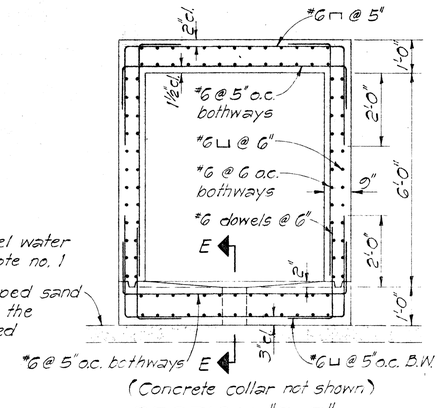


PLAN
Scale: 1/2" = 1'-0"

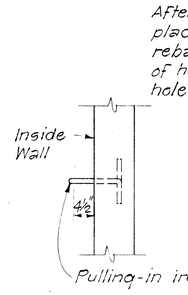
Install struts - to be furnished by H.T.Co. After the pour remove the cardboard filler from the inserts. Inserts are required on both 8'-0" walls. Dimension showing locations are typical.



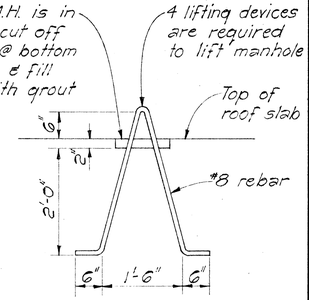
SECTION "A-A"
Scale: 1/2" = 1'-0"



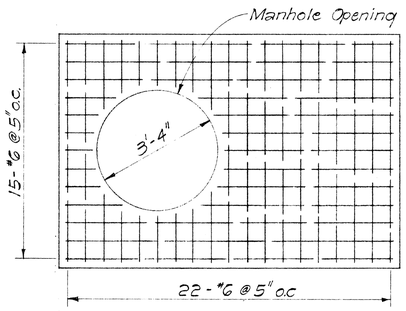
SECTION "B-B"
Scale: 1/2" = 1'-0"



DETAIL OF PULLING-IN IRON
Scale: 3/4" = 1'-0"

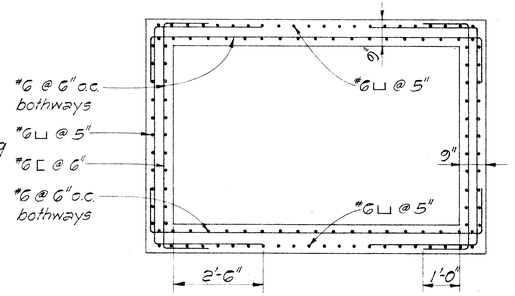


SECTION "H-H"
Scale: 3/4" = 1'-0"

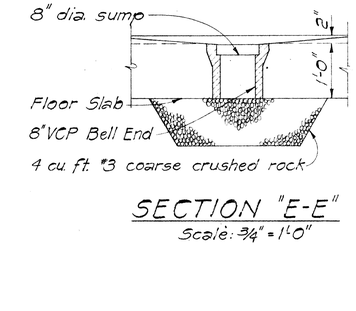


NOTE
See section F-F for additional reinforcing for M.H. opening

ROOF REINF. PLAN
Top & Bottom Reinf.
Scale: 1/2" = 1'-0"

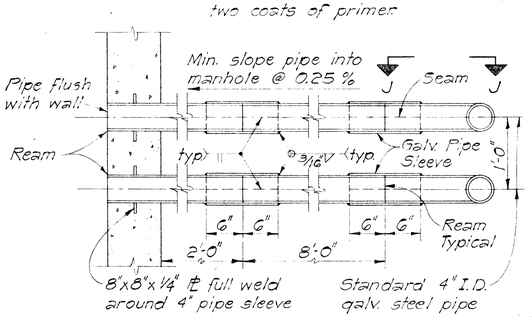


SECTION "C-C"
Scale: 1/2" = 1'-0"

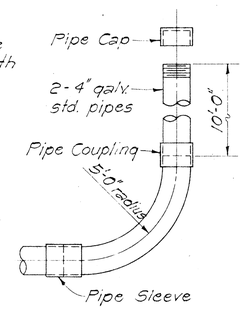


SECTION "E-E"
Scale: 3/4" = 1'-0"

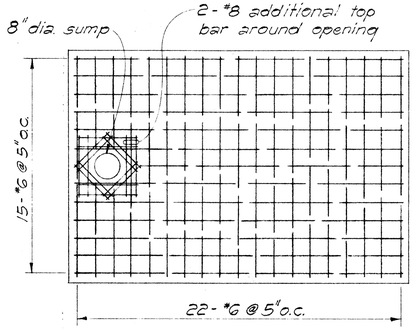
Notes:
1. Pipes shall be hot dipped galv.
2. Paint all welds except when the item is embedded in concrete with two coats of primer.



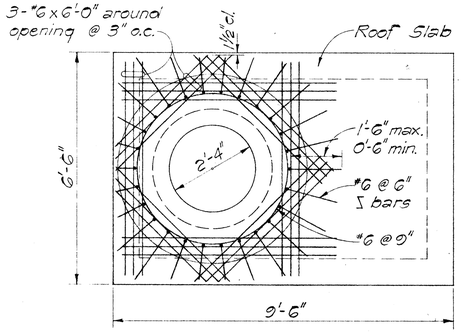
SECTION "G-G"
Scale: 1" = 1'-0"



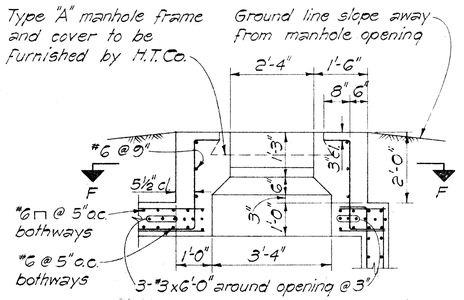
SECTION "J-J"
Not to Scale



FLOOR REINF. PLAN
Top & Bottom Reinf.
Scale: 1/2" = 1'-0"



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



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

DESIGN DATA

1. Reinforcing - intermediate grade, deform bars.
2. Concrete compressive strength required: 4,000 psi in 28 days, slump 3" ± 1."

GENERAL NOTES

1. The galv. 4" I.D. standard steel water pipes maybe located on the opposite wall than that shown to determine which 8" wall the pipes are located in, see plan.
2. Manholes may be "precast" or "cast-in-place" at the contractors option. Contractor to notify engineer of method of construction before starting construction.

APPROVED:
D.T. Judd 9-14-70
Hawaiian Telephone Co., Ltd. Date
H. T. Co., Ltd. Drawing No. 34058

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
HARDENED MANHOLE 5'-0" x 8'-0" x 6'-0" INSIDE DIMENSION

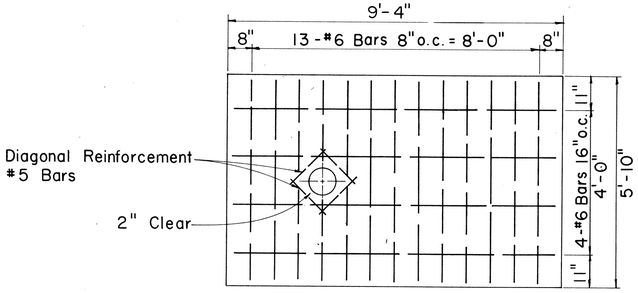
Scale: As Shown Date: May, 1970

SHEET No. 27 OF 33 SHEETS

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

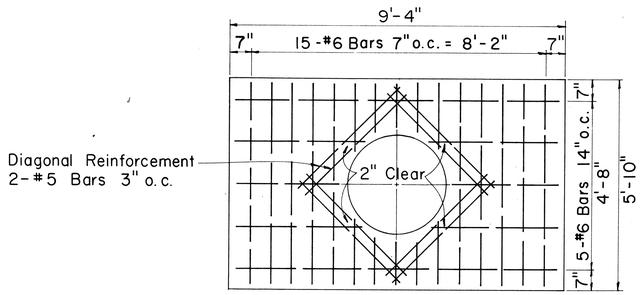
K+E CRYSTALKEM® LA 2020 TRACING PAPER

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(11)	1969	198	258



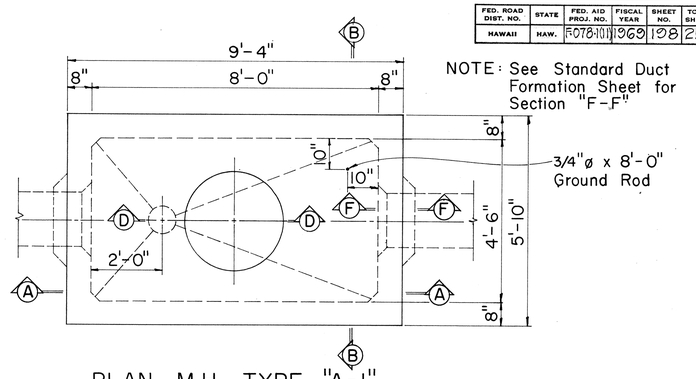
FLOOR SLAB REINF. PLAN

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



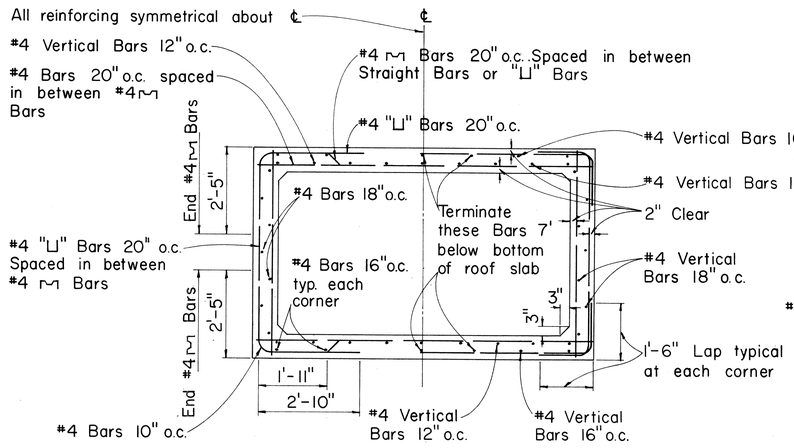
ROOF SLAB REINF. PLAN

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



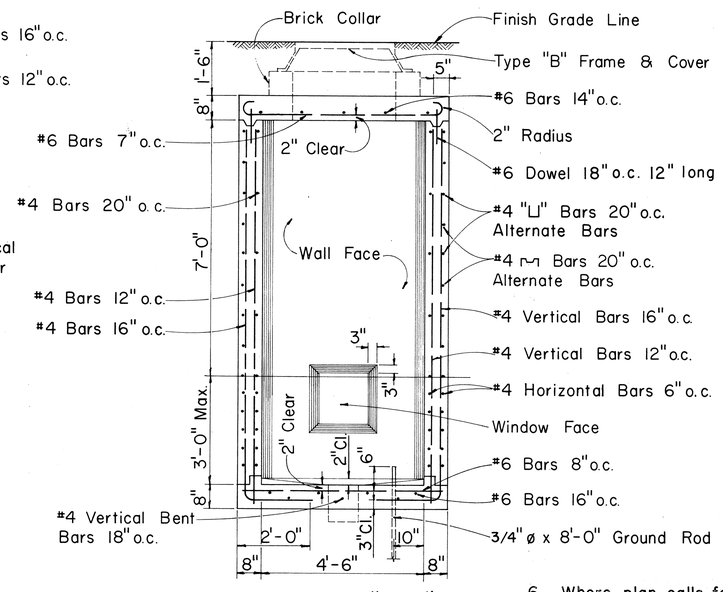
PLAN M.H. TYPE "A-1"
FOR ROADWAY & SIDEWALK AREAS

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



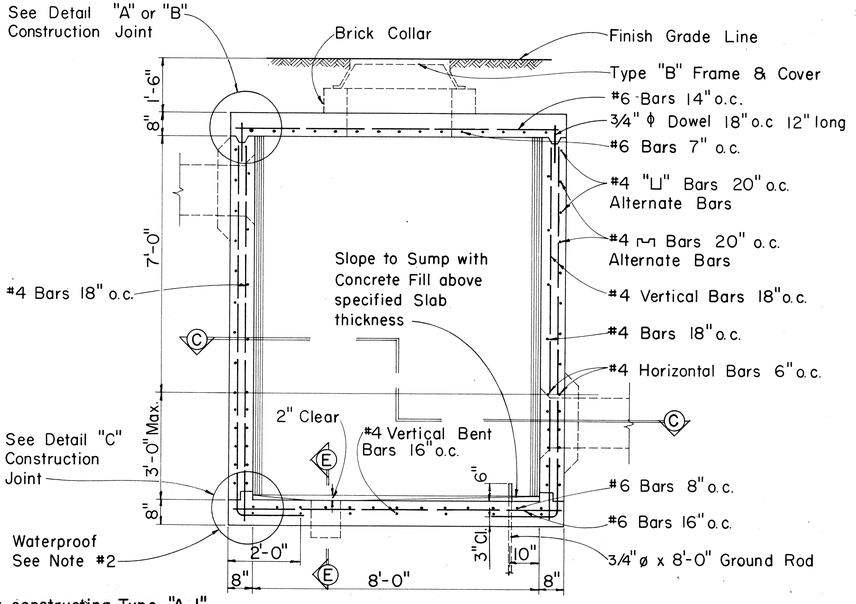
SECTION "C-C"

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



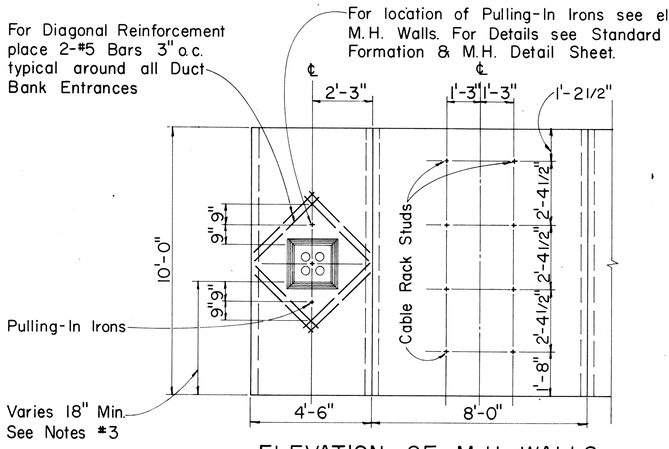
SECTION "B-B"

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



SECTION "A-A"

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



ELEVATION OF M.H. WALLS
(OPPOSITE FACES SIMILAR)

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

GENERAL NOTES

1. Design Data:
   f_s = 20,000 psi; f'_c = 3000 psi; f_c = 1,350 psi; n = 10
   w = Equivalent Fluid Pressure: 30#/FT2
2. All Construction Joints shall be water proofed with two applications of Thoro Seal or equal.
3. For Duct Window location see Plan Profile Sheets for Elevations.
4. Duct Window to suit-See Plan & Profile & Standard Detail Sheets for Location & Details.
5. For Details "A", "B", "C", Sections "D-D", "E-E", "F-F" and other miscellaneous Manhole Construction Details see Supplement Sheet to Type A-1, A-2, and A-3 Telephone Manholes.
6. **Where plan calls for constructing Type "A-1" manhole with headroom in excess of 10.0' the wall thickness and floor slab shall be increased from 8 inches to 9 inches. The one inch increase for the wall section shall be one-half inch on the inside and one-half inch on the outside.**

TYPE "A-1"-7.5'
8.0
8.5
9.0
9.5
10.0

Manhole Classification
Width & Length Designation "1" = 4'-6" x 8'-0"
Manhole Headroom

NOTE:
SEE GENERAL NOTE 6 FOR HEADROOM EXCEEDING 10.0'.

APPROVED:

F. T. Judd 9-16-70

Hawaiian Telephone Co., Ltd. Date

H. T. Co., Ltd. Drawing No. 34061

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

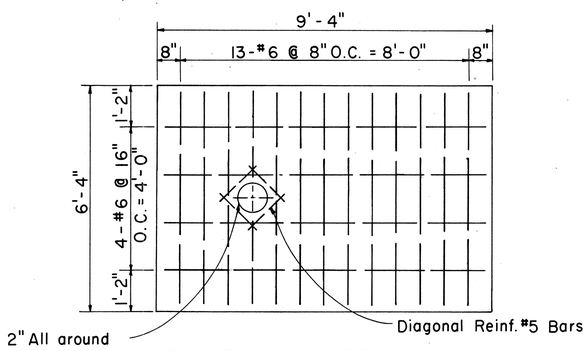
TYPE "A-1" MANHOLES FOR 7.5' TO 10.0' HEADROOM

Scale: As Noted Date: May, 1970

SHEET No. 28 OF 33 SHEETS

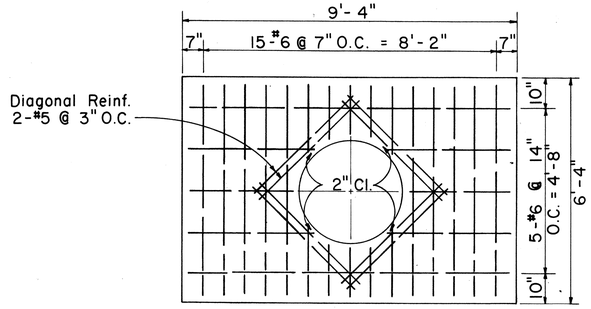
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	" " "
No.	TRACED BY	" " "
	DESIGNED BY	" " "
	QUANTITIES BY	" " "
	CHECKED BY	" " "

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	199	27



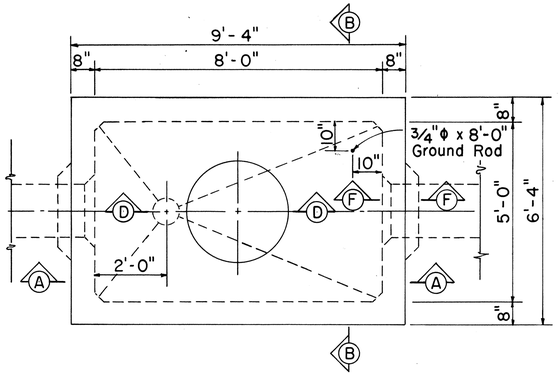
FLOOR SLAB REINF. PLAN

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



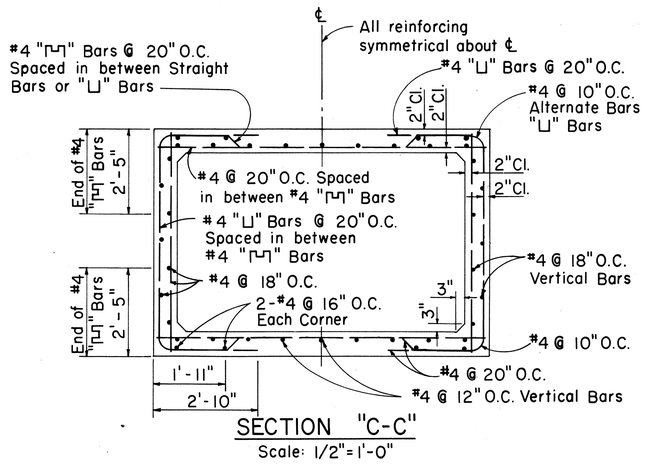
ROOF SLAB REINF. PLAN

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



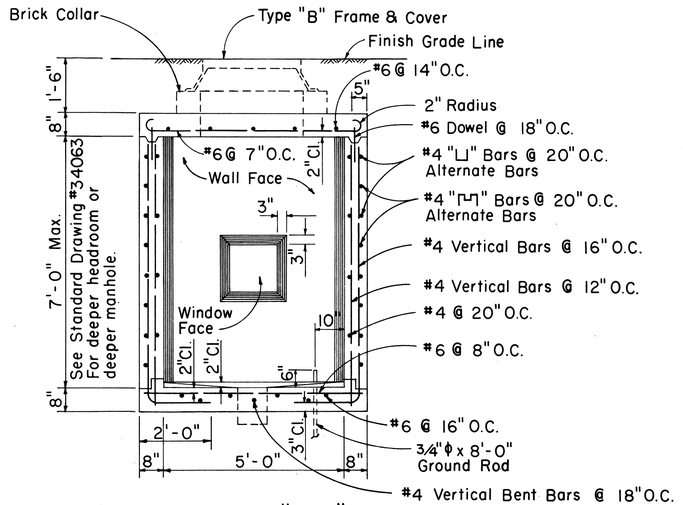
PLAN - M.H. TYPE "A-2" SERIES
FOR ROADWAY & SIDEWALK AREAS

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



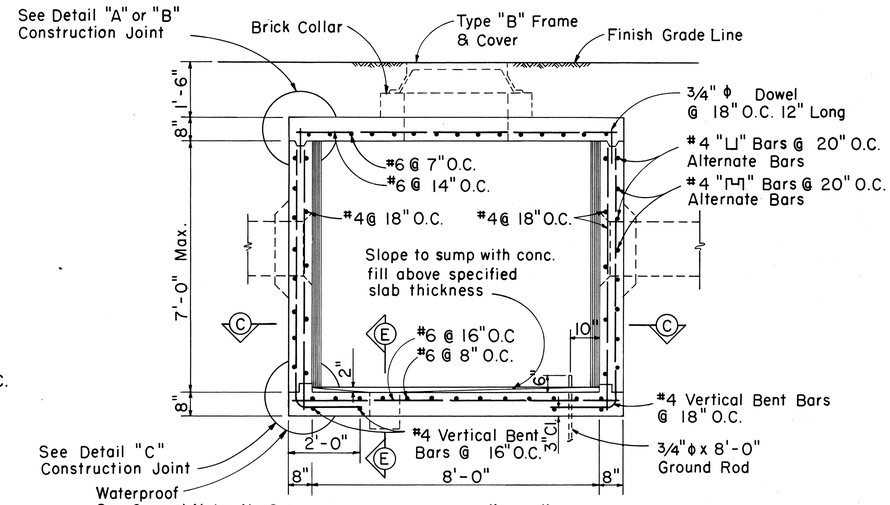
SECTION "C-C"

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



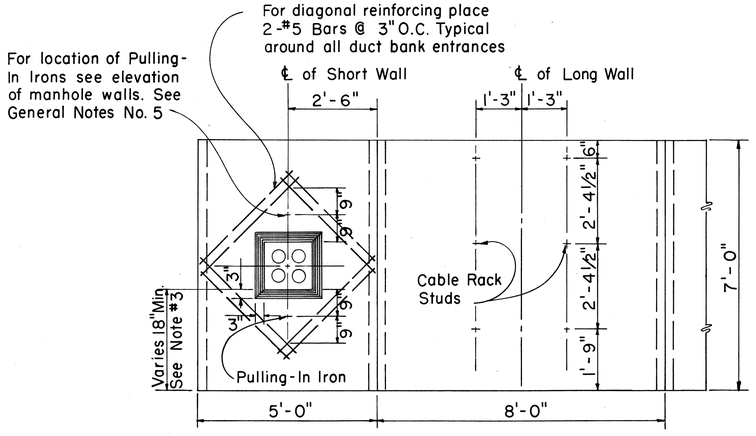
SECTION "B-B"

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



SECTION "A-A"

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



ELEVATION OF M.H. WALLS - TYPE "A-2" SERIES

(OPPOSITE FACES SIMILAR)

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

GENERAL NOTES:

1. Design Data:
   fs= 20,000 psi; f'c= 3,000 psi; fc= 1,350 psi; n=10
   w= Equivalent Fluid Pressure: 30#/ft²
2. All Construction Joints shall be waterproofed with two applications of Thoro Seal or equal.
3. For Duct Window location see Plan Profile Sheets for Elevations.
4. Duct Window to suit - See Plan & Profile & Standard Detail Sheets for Location & Details.
5. For Details "A", "B", "C," Sections "D-D", "E-E," "F-F" and other miscellaneous Manhole Construction Details see Supplement Sheet to Type "A-1," "A-2" and "A-3" Telephone Manholes.

Manhole Classification
Width & Length Designation "2" = 5.0' x 8.0'
Manhole Headroom

TYPE "A-2"-6.0'
6.5'
7.0'

APPROVED:

F. H. Judd 9-14-70

Hawaiian Telephone Co., Ltd. Date

H.T. Co., Ltd. Drawing No. 34062

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

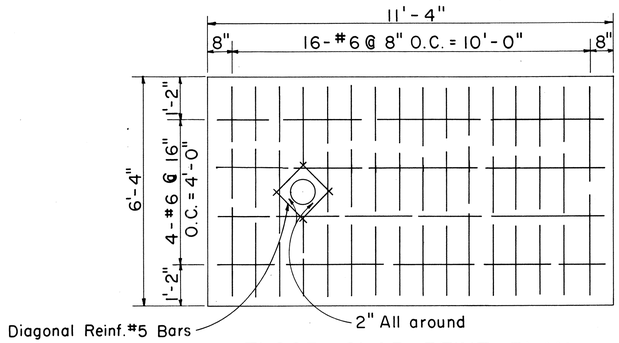
TYPE "A-2" MANHOLES FOR 6.0' TO 7.0' HEADROOM

Scale: As Noted Date:

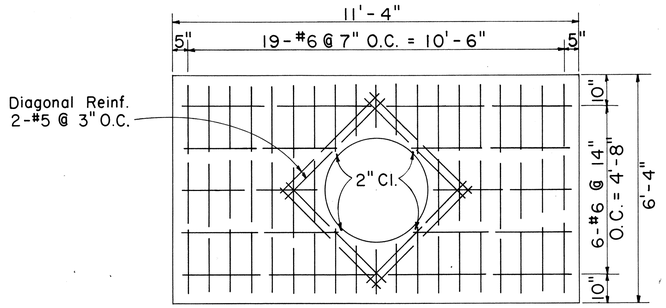
SHEET No. 20 OF 33 SHEETS

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

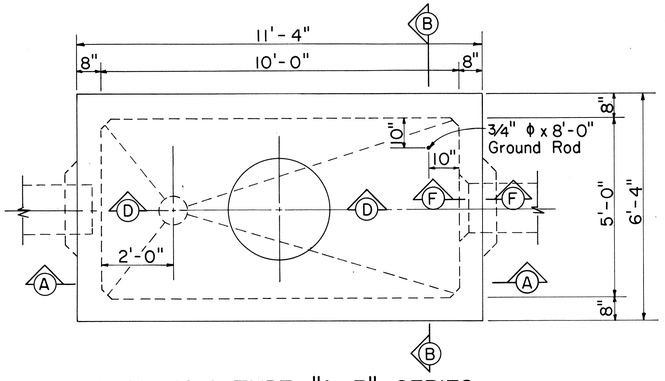
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(11)	1969	200	258



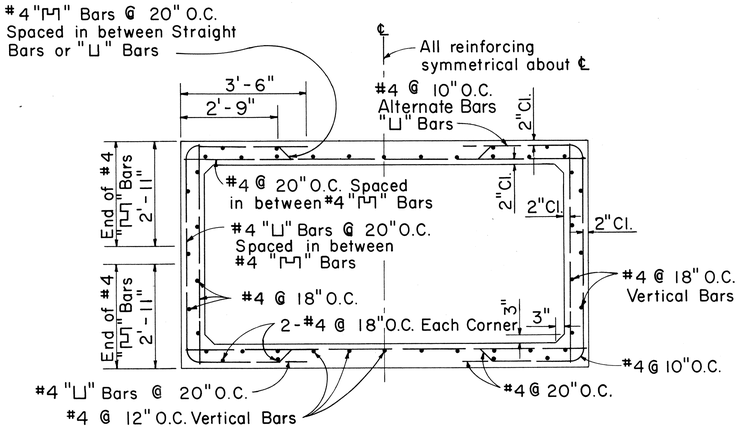
FLOOR SLAB REINF. PLAN
Scale: 1/2"=1'-0"



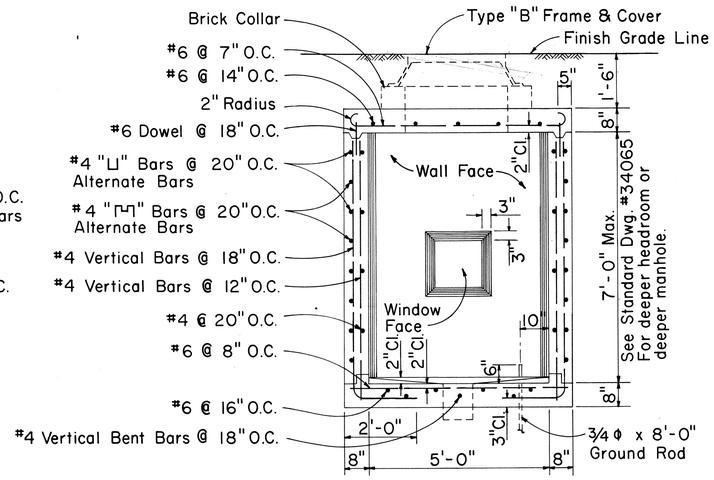
ROOF SLAB REINF. PLAN
Scale: 1/2"=1'-0"



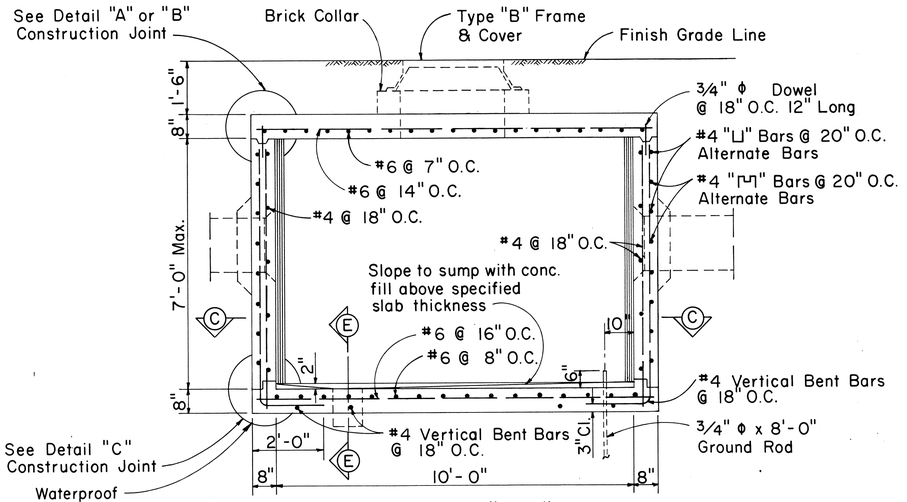
PLAN - M.H. TYPE "A-3" SERIES
FOR ROADWAY & SIDEWALK AREAS
Scale: 1/2"=1'-0"



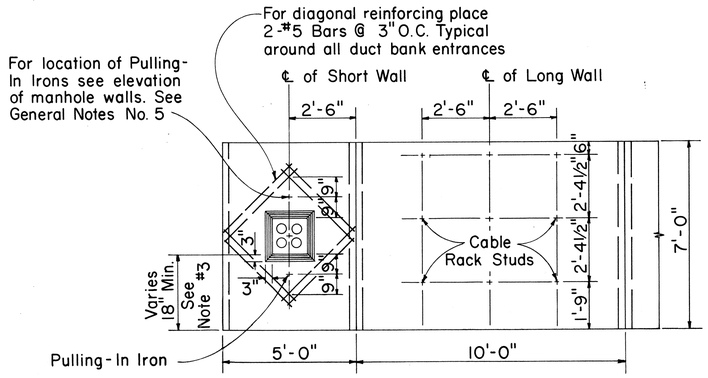
SECTION "C-C"
Scale: 1/2"=1'-0"



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



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



ELEVATION OF M.H. WALLS - TYPE "A-3" SERIES
(OPPOSITE FACES SIMILAR)
Scale: 3/8"=1'-0"

GENERAL NOTES:

1. Design Data:
   fs= 20,000 psi; fc= 3,000 psi; fc= 1,350 psi; n=10
   w= Equivalent Fluid Pressure: 30#/ft²
2. All Construction Joints shall be waterproofed with two applications of Thoro Seal or equal.
3. For Duct Window location see Plan Profile Sheets for Elevations.
4. Duct Window to suit - See Plan & Profile & Standard Detail Sheets for Location & Details.
5. For Details "A," "B," "C," Sections "D-D," "E-E," "F-F" and other miscellaneous Manhole Construction Details see Supplement Sheet to Type "A-1," "A-2" and "A-3" Telephone Manholes.

TYPE "A-3"-6.0'
6.5'
7.0'
Manhole Classification
Width & Length Designation "3" = 5.0' x 10.0'
Manhole Headroom

APPROVED:
F. H. Judd 9-14-70
Hawaiian Telephone Co., Ltd. Date

H.T. Co., Ltd. Drawing No. 34064

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A-3" MANHOLES FOR 6.0' TO 7.0' HEADROOM

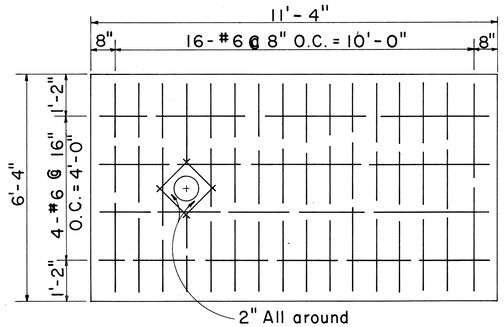
Scale: As Noted Date: May, 1970

SHEET No. 30 OF 33 SHEETS

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

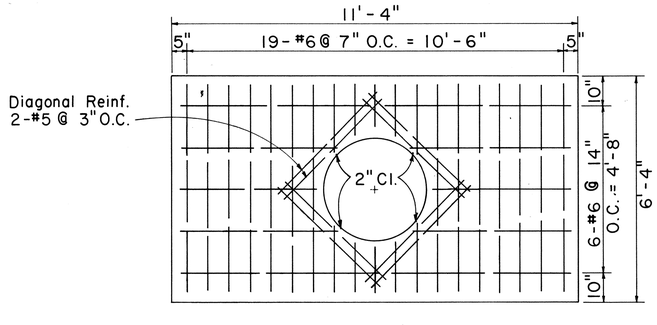
200

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	201	258



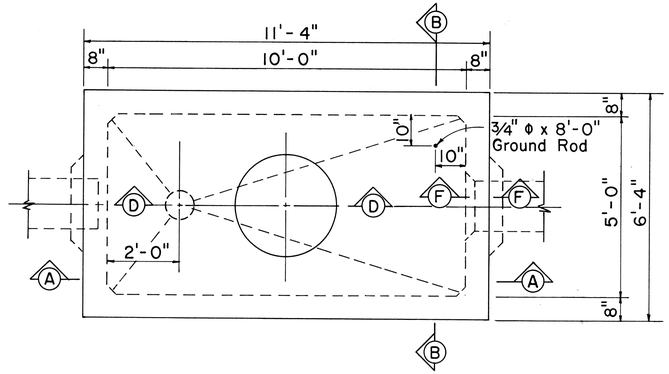
FLOOR SLAB REINF. PLAN

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



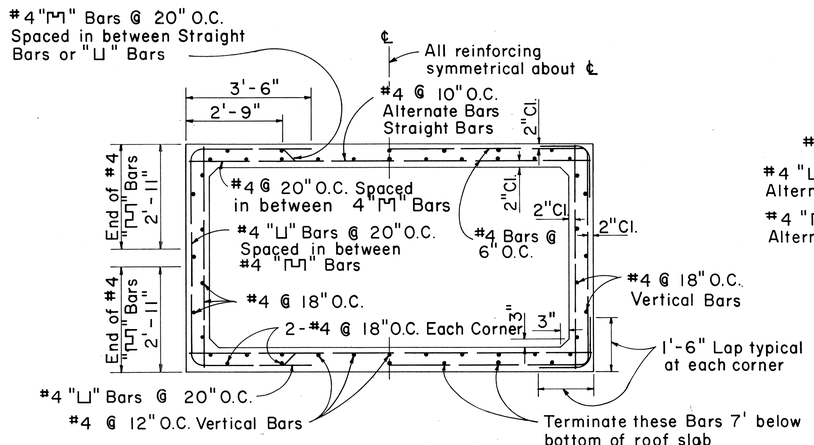
ROOF SLAB REINF. PLAN

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



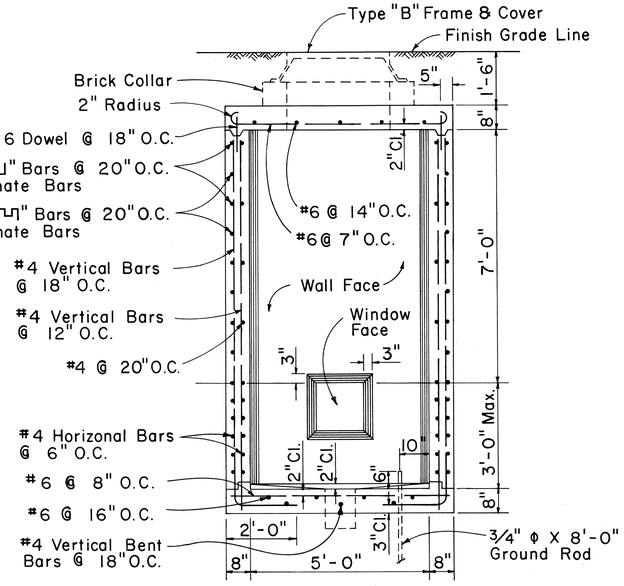
PLAN - M.H. TYPE "A-3" SERIES
FOR ROADWAY & SIDEWALK AREAS

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



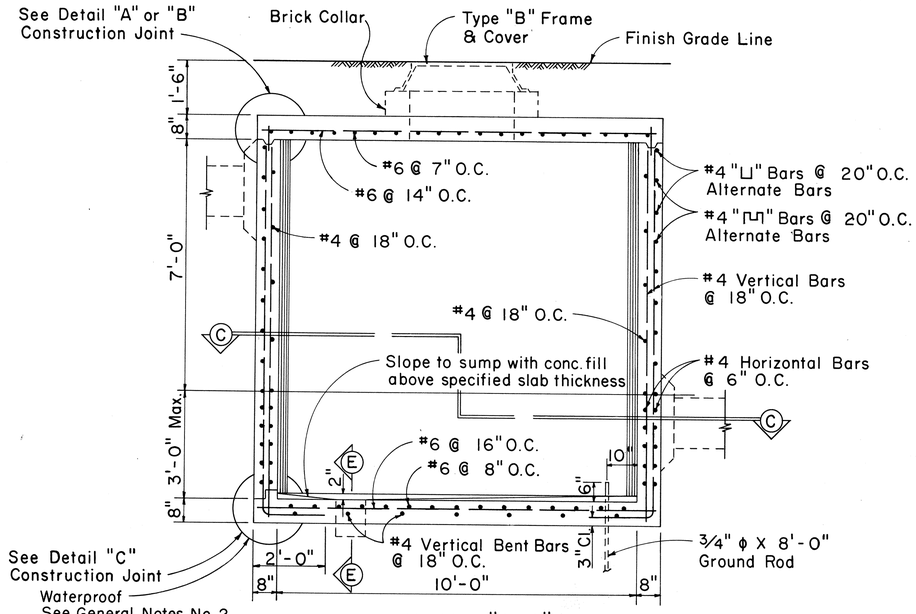
SECTION "C-C"

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



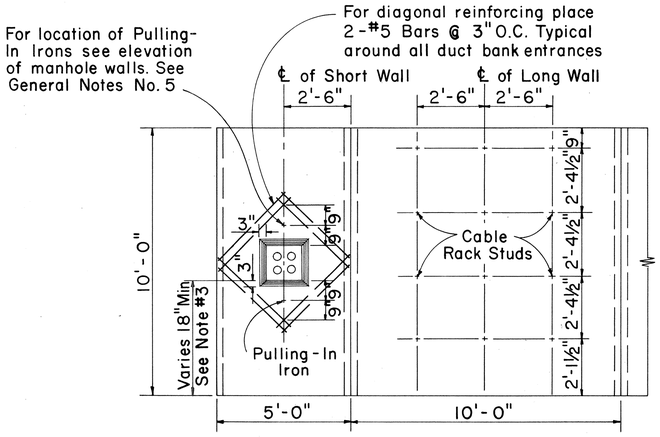
SECTION "B-B"

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



SECTION "A-A"

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



ELEVATION OF M.H. WALLS - TYPE "A-3" SERIES

(OPPOSITE FACES SIMILAR)

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

GENERAL NOTES:

1. Design Data:
   fs= 20,000 psi; fc= 3,000 psi; fc= 1,350 psi; n=10
   w= Equivalent Fluid Pressure: 30#/ft²
2. All Construction Joints shall be waterproofed with two applications of Thoro Seal or equal.
3. For Duct Window location see Plan Profile Sheets for Elevations.
4. Duct Window to suit - See Plan & Profile & Standard Detail Sheets for Location & Details.
5. For Details "A", "B", "C", Sections "D-D", "E-E", "F-F" and other miscellaneous Manhole Construction Details see Supplement Sheet to Type "A-1", "A-2" and "A-3" Telephone Manholes.

Manhole Classification
Width & Length Designation "3" = 5.0' x 10.0'
Manhole Headroom

TYPE "A-3"-7.5'
8.0
8.5
9.0
9.5
10.0

APPROVED:

F.H. Judd 9.14.70

Hawaiian Telephone Co., Ltd. Date

H.T. Co., Ltd. Drawing No. 34065

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPE "A-3" MANHOLES FOR 7.5' TO 10.0' HEADROOM

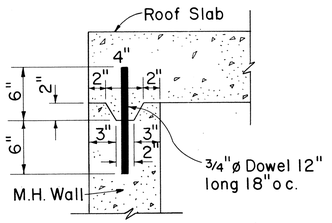
Scale: As Noted Date: May, 1970

SHEET No. 31 OF 33 SHEETS

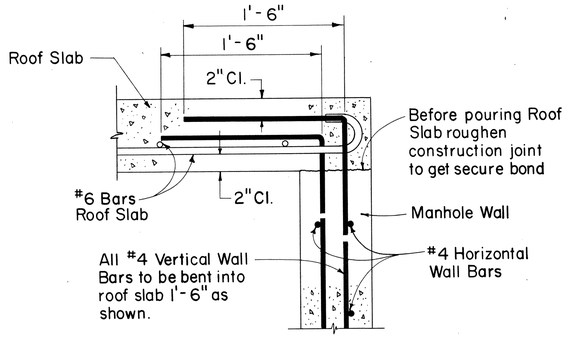
ORIGINAL PLAN	SURVEY PLOTTED BY:	DATE
	DRAWN BY:	
NOTE BOOK	TRACED BY:	
	DESIGNED BY:	
No.	QUANTITIES BY:	
	CHECKED BY:	

201

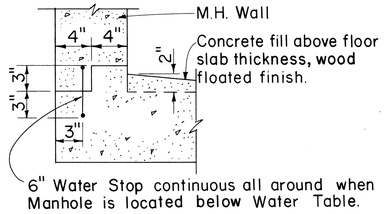
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F078-1(11)	1969	202	258



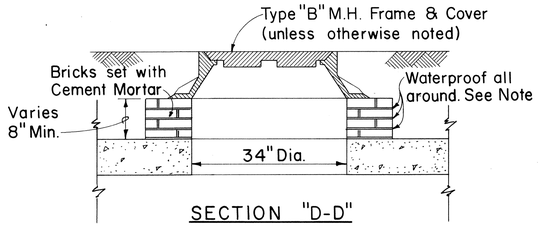
DETAIL "A"
TOP CONSTRUCTION JOINT
Scale: 1 1/2" = 1'-0"
(Optional for cast-in-place construction
Required for precast construction)



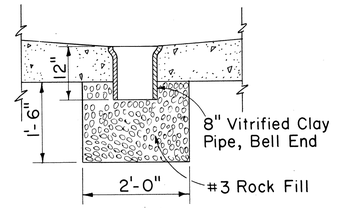
DETAIL "B"
(USED FOR CAST-IN-PLACE CONSTRUCTION)
Scale: 1 1/2" = 1'-0"



DETAIL "C"
BOTTOM CONSTRUCTION JOINT
Scale: 1 1/2" = 1'-0"

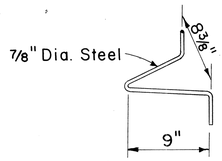


SECTION "D-D"
M.H. COVER DETAIL
Scale: 3/4" = 1'-0"

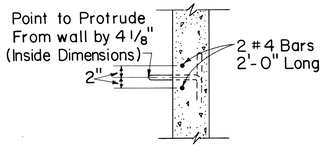


SECTION "E-E"
M.H. SUMP DETAIL
Scale: 3/4" = 1'-0"

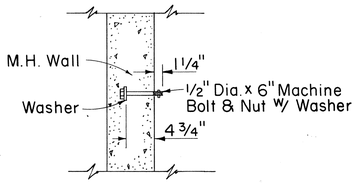
Note:
See Section "E1-E1" Below



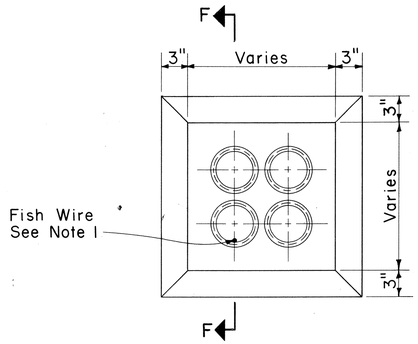
PULLING-IN IRON



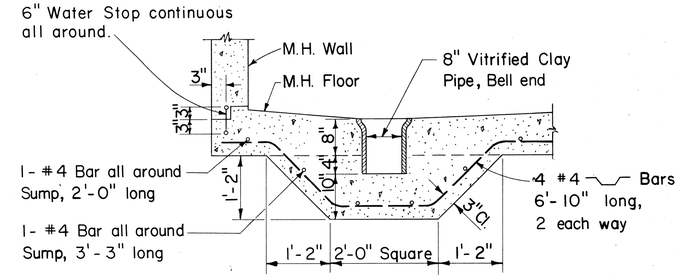
SECTIONAL VIEW OF PULLING-IN IRON
Scale: 3/4" = 1'-0"



CABLE RACK STUD BOLT DETAIL
Scale: 1" = 1'-0"



TYPICAL MANHOLE DUCT WINDOW
Scale: 1 1/2" = 1'-0"

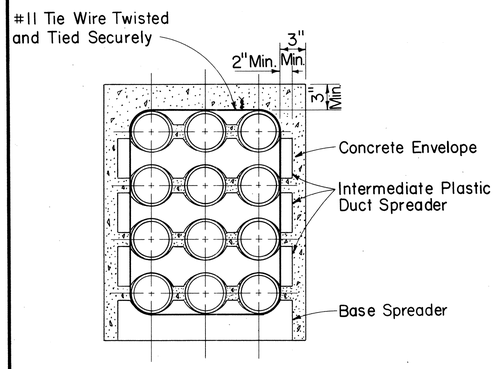


Note: Only for manholes located below water table

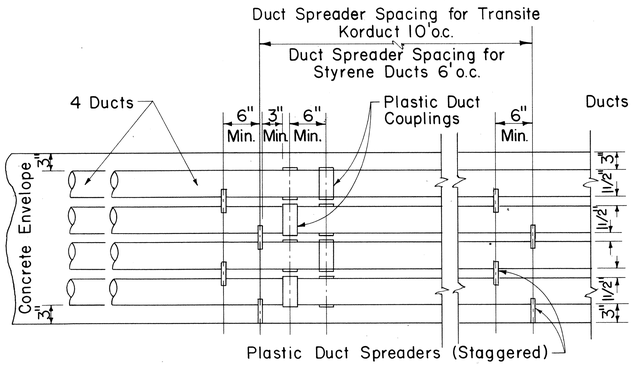
SECTION "E1-E1"
MANHOLE SUMP DETAIL
Scale: 3/4" = 1'-0"

NOTE

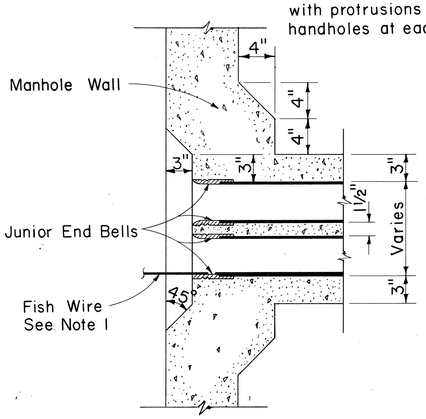
1. The Contractor shall place #12 Fish Wire in designated duct throughout its entire length with protrusions of 2 feet in manholes & handholes at each end and 1 foot in pullboxes.



SECTION SHOWING SPACERS



TYPICAL DUCT ENVELOPE ELEVATION
ARRANGEMENT OF COUPLING & PLASTIC SPACERS
Scale: 1" = 1'-0"



SECTION "F-F"
TYPICAL WINDOW DETAIL & JUNIOR END BELL
Scale: 1 1/2" = 1'-0"

Supplement Sheet to Type "A-1" (Drawing Nos. 34060 & 34061), Type "A-2" (Drwg. Nos. 34062 & 34063) and Type "A-3" (Drwg. Nos. 34064 & 34065) Telephone M.H.

APPROVED:

D. K. Judd 9-14-70

Hawaiian Telephone Co., Ltd. Date

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS

TYPE "A" MANHOLE AND MISCELLANEOUS TELEPHONE DETAILS

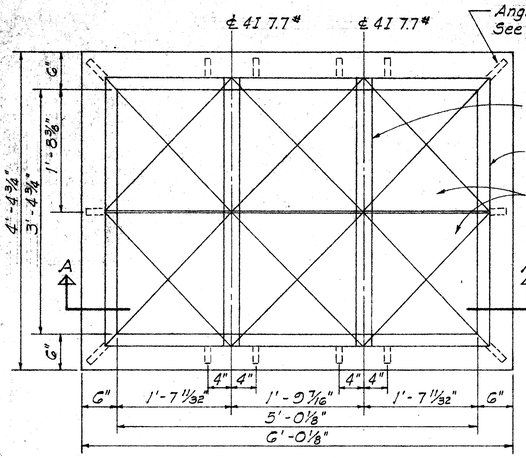
Scale: As Noted Date: May, 1970

SHEET No. 32 OF 33 SHEETS

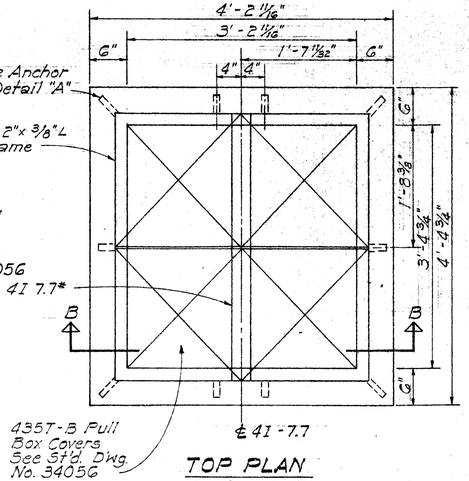
ORIGINAL PLAN
NOTE BOOK No.
SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

202

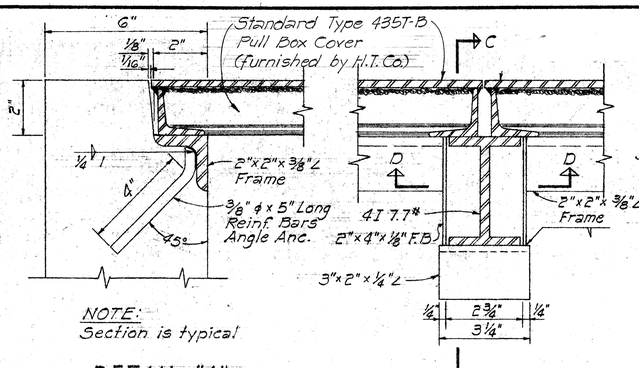
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	F-078-1(11)	1969	203	258



TOP PLAN
Scale: 1"=1'-0"



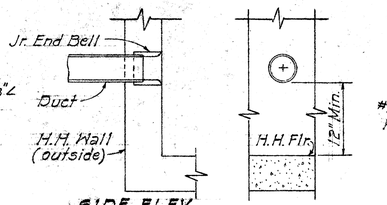
TOP PLAN
Scale: 1"=1'-0"



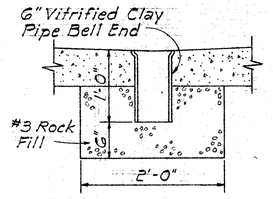
NOTE:
Section is typical

DETAIL "A"
Scale: 3/8"=1"

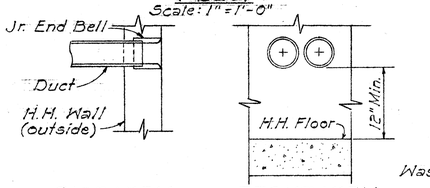
DETAIL "B"
Scale: 3/8"=1"



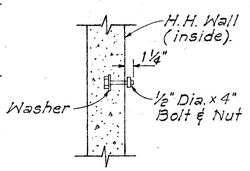
SIDE ELEV. OR TOP PLAN — FRONT VIEW
1 DUCT
Scale: 1"=1'-0"



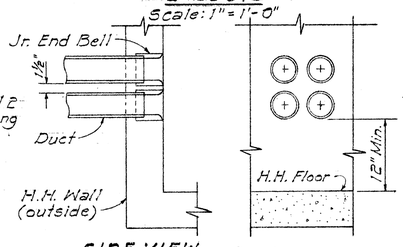
DETAIL OF SUMP
Scale: 1"=1'-0"



SIDE VIEW — FRONT VIEW
2 DUCTS
Scale: 1"=1'-0"

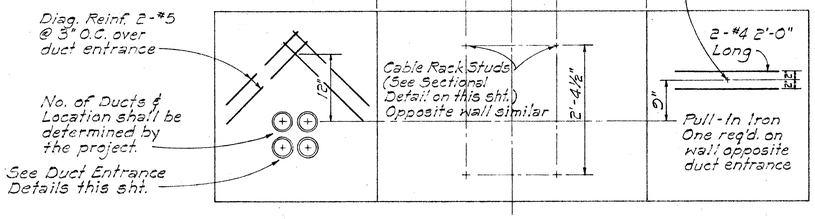


CABLE RACK STUD BOLT DETAIL
Scale: 1"=1'-0"

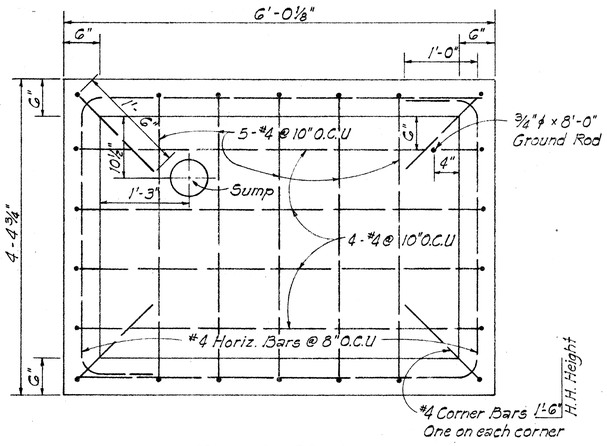


SIDE VIEW — FRONT VIEW
OR TOP PLAN
4 DUCTS
Scale: 1"=1'-0"

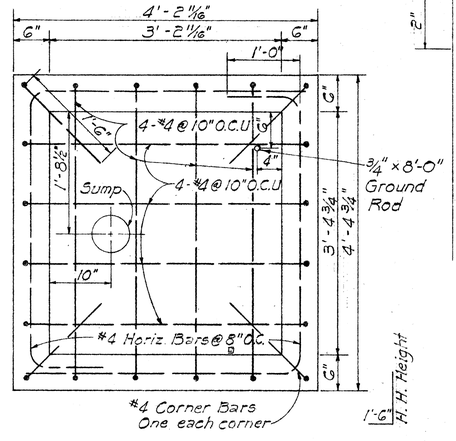
DUCT ENTRANCE DETAILS



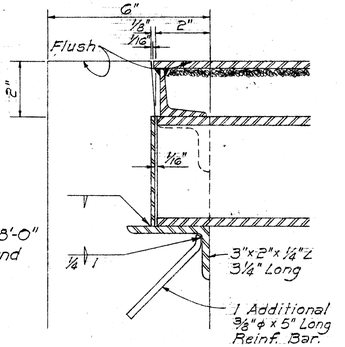
ELEV. OF INSIDE WALLS - H.H. TYPE 1 & 2
Scale: 3/4"=1'-0"



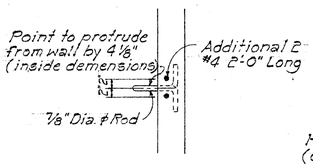
FLOOR PLAN
Scale: 1"=1'-0"



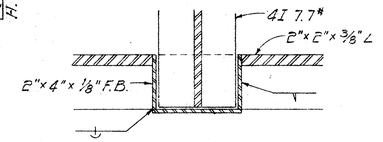
FLOOR PLAN
Scale: 1"=1'-0"



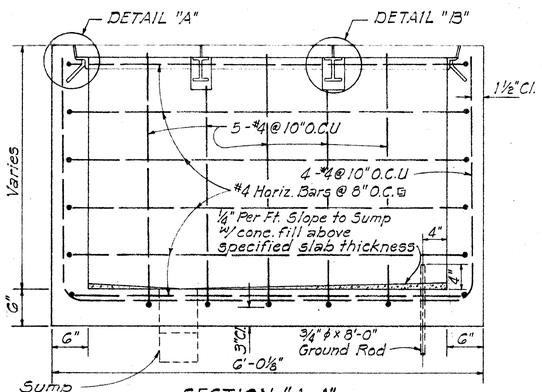
SECTION "C-C"
Scale: 3/8"=1"



SECTIONAL ELEV. OF PULL-IN IRON
Scale: 3/4"=1'-0"

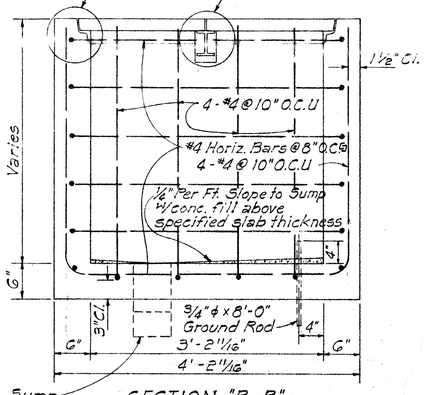


SECTION "D-D"
Scale: 3/8"=1"



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

HANDHOLE TYPE #1
(3'-4 3/4" x 5'-0 1/8" inside)



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

HANDHOLE TYPE #2
(3'x4 3/4" x 3'-2 1/16" inside)

GENERAL NOTES:

1. Concrete finish: floors - wood floated finish - exposed wall surfaces and edges - smooth and free from defects.
2. Concrete to develop compressive strength - 3000 p.s.i in 28 days.
3. Steel work all structural steel shall be hot dip galvanized after fabrication.
4. For duct line construction standards, see st'd. dwg. No. 34028.
5. These handholes are designed for installation in areas other than roadways.

APPROVED:
F.T. Dell
HAWAIIAN TELEPHONE CO, LTD.
9-14-70
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD HANDHOLE TYPE #1 & 2 USING TYPE 435T-B PULLBOX COVERS

Scale: As Shown
Date: June, 1970

SHEET No. 33 OF 33 SHEETS

DESIGNED BY	DRAWN BY	TRACED BY	CHECKED BY

NOTE BOOK	DATE	No.

PRINTED ON NO. 1000H CLEARPRINT

203