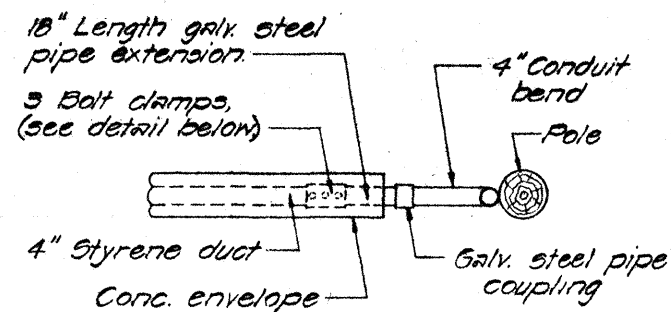
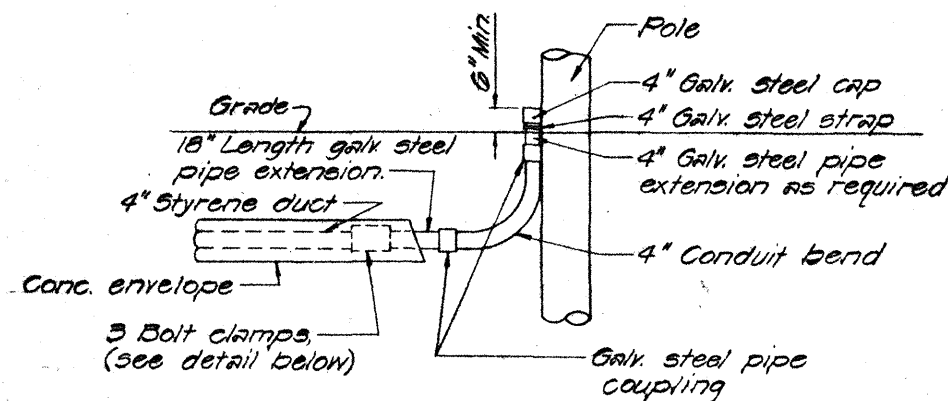


ELECTRIC & TELEPHONE ~ GENERAL NOTES

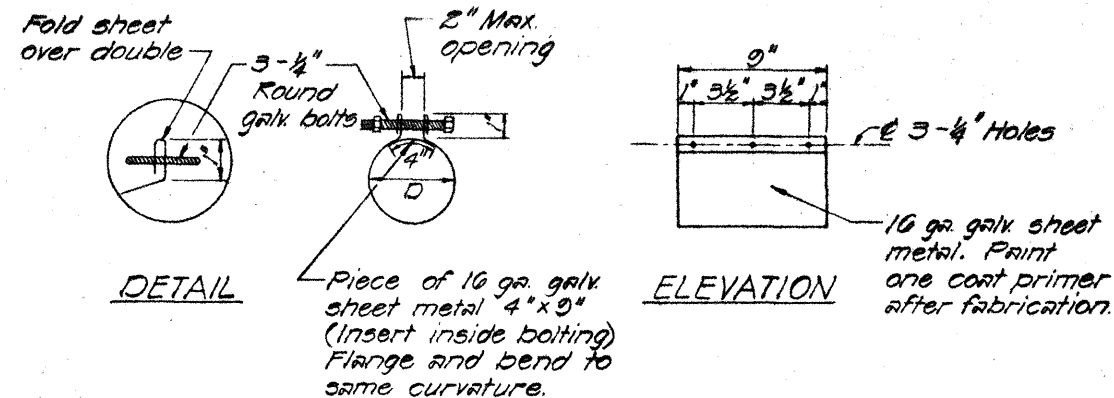
1. The contractor shall notify each utility in writing 20 working days prior to commencing work on their respective utility system.
2. Existing electric and telephone facilities shown on these plans are approximate only. The contractor shall verify their actual locations and shall make adjustments to any new or existing facility as directed by the engineer.
3. 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".
4. Final depth of all pull boxes, service boxes, handholes and manholes shall be determined in the field by the engineer.
5. Ducts encased in concrete jackets:
 - a. Normal distance from face of jacket to all ducts to be 3" minimum.
 - b. Clear distance of 1 1/2" minimum between ducts of same utility company.
 - c. Clear distance of 3" minimum between HECO ducts and HTCO ducts.
6. 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.
7. Contractor to stake out proposed ductline, pole and anchor locations and HECO and HTCO to check and verify locations before contractor undertakes excavation.
8. All ducts and conduits called for installation in concrete jacket shall be inspected and approved by the respective engineer of HECO or HTCO before concrete placing. Twenty-four (24) hours (min) notice to respective utility shall be given before pouring concrete.
9. Excavation of HECO pole holes and anchor holes, installation of poles and anchors, and backfill of pole holes and anchor holes, will be done by HECO and/or its Contractor.
10. Contractor shall refrain from running heavy construction equipment over new duct lines. Where falsework footing rests directly on the new duct line, the contractor shall provide a cushion or a platform over the duct line.



PLAN

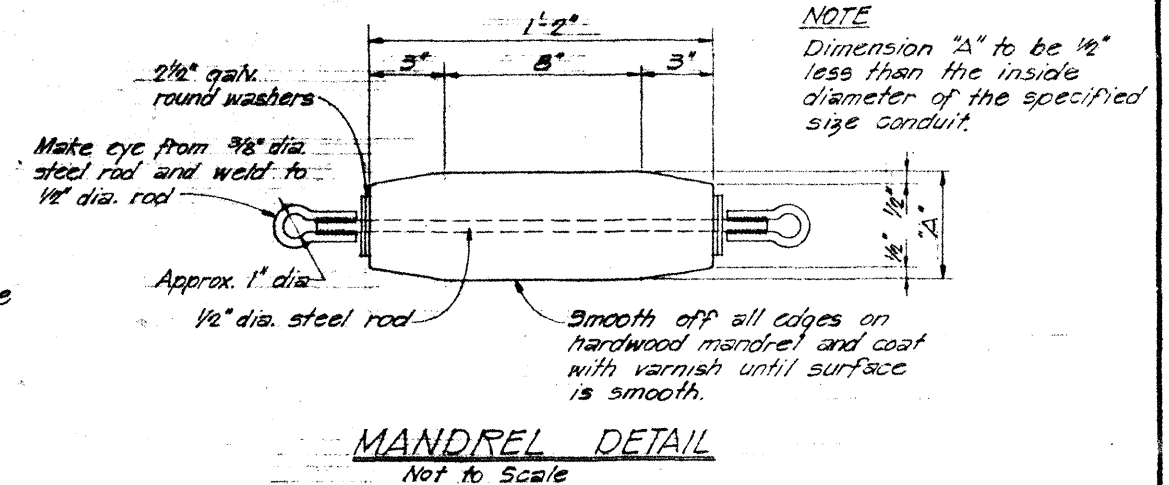


ELEVATION
TYPICAL INSTALLATION DETAILS
Not to Scale



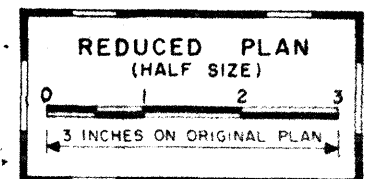
SECTION
3-BOLT CLAMP ADAPTOR DETAIL
Not to Scale

- NOTE:
1. The contractor shall place #12 fish wire in designated duct throughout its entire length with protrusions of 2 feet at each end.



MANDREL DETAIL
Not to Scale

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-42-1(2)4	1973	47	122



APPROVED:

J. Kaunaloa 6/16/73
Hawaiian Electric Co., Inc. Date

R. Mann 6/27/73
Hawaiian Telephone Co., Ltd. Date

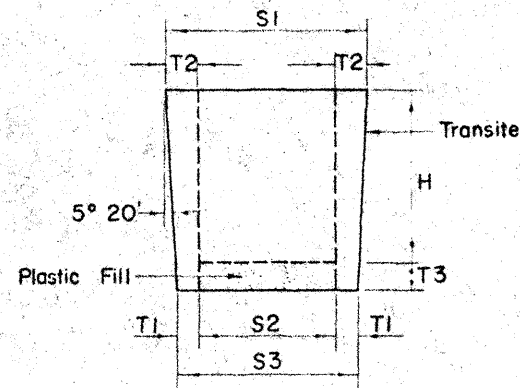
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GENERAL NOTES
ELECTRIC & TELEPHONE DETAILS

INTERSTATE ROUTE 4-2
KIPAPA STREAM BRIDGE
FAL PROJ NO. 345-1(2)4

Scale: As Noted Date: May 1973

SHEET No. 1 OF 11 SHEETS



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 1/16"	11 1/16"	3 3/4"
4"	4 1/2"	4 27/64"	2 3/4"	3 37/64"	13 3/32"	27 3/32"	3 3/4"
4 1/2"	4 1/2"	4 59/64"	3"	4 5/64"	35 3/64"	31 3/32"	3 3/4"
5"	4 1/2"	5 27/64"	3 1/2"	4 37/64"	35 3/64"	31 3/32"	3 3/4"

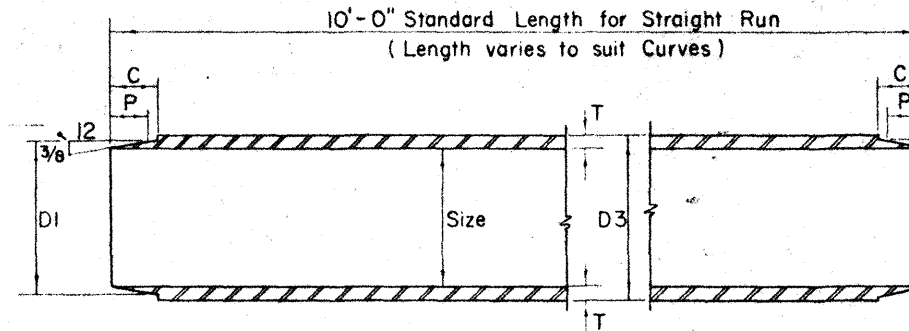
STANDARD END BELLS

Not to Scale

SIZE	DI	D2	F	X	E	R
3"	3 25/64"	4 1/2"	1 11/32"	29 3/32"	1 1/4"	3 3/4"
4"	4 25/64"	5 3/4"	1 9/16"	19 9/16"	3 3/8"	2"
4 1/2"	4 57/64"	6 1/4"	1 9/16"	19 9/16"	3 3/8"	2"
5"	5 29/64"	7"	1 9/16"	17 1/16"	1 1/2"	2"

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.



TRANSITE KORDUCTS

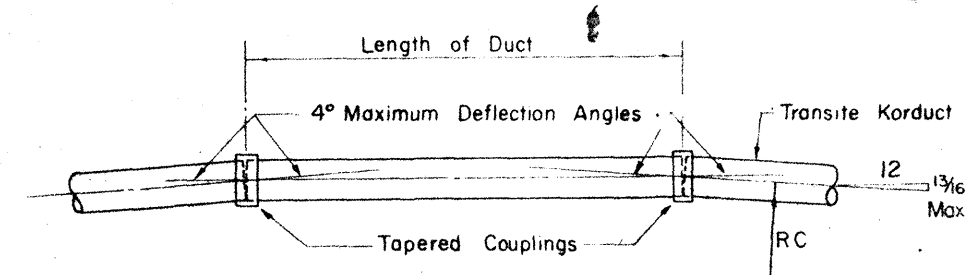
Not to Scale

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

TAPERED COUPLINGS

Not to Scale

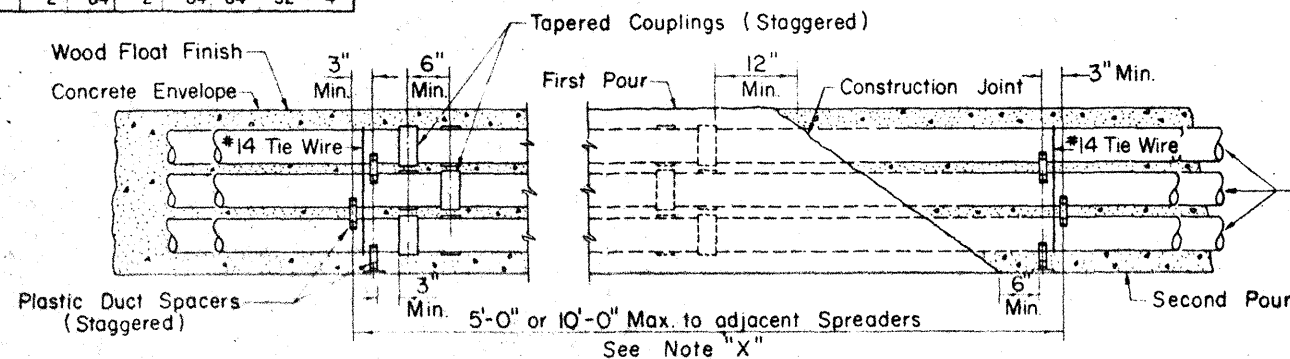
SIZE	DI	D2	L
3"	3 25/32"	4 11/64"	2 1/4"
4"	4 25/64"	5 3/16"	2 1/2"
4 1/2"	4 57/64"	5 49/64"	2 1/2"
5"	5 29/64"	6 21/64"	2 3/4"



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"	



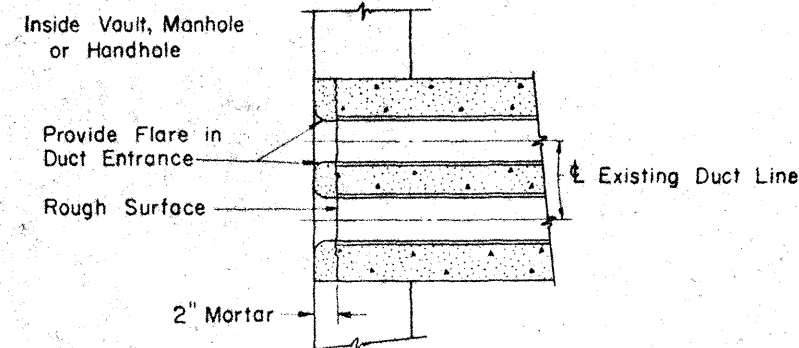
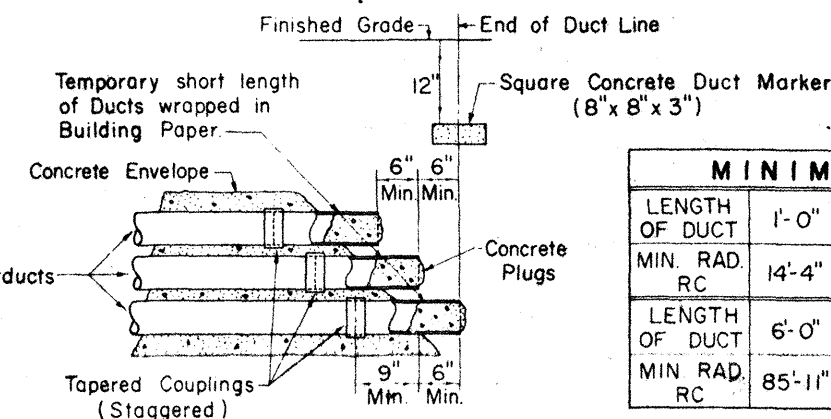
TYPICAL DUCT ENVELOPE ELEVATION

(6 WAY DUCT LINE SHOWN)

Not to Scale

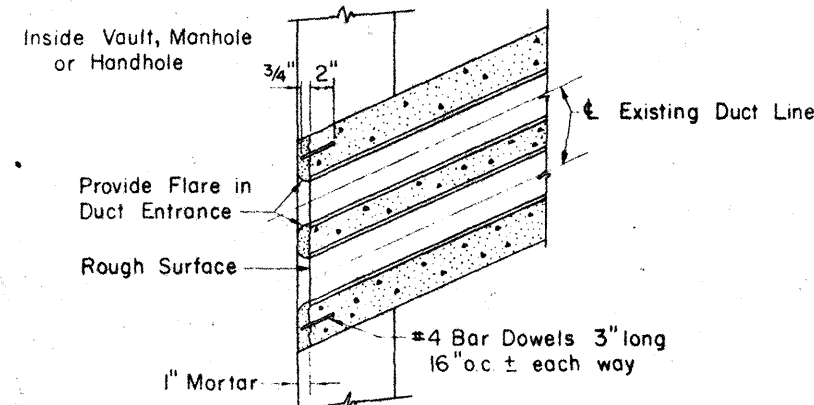
TYPICAL STUB OUT DETAIL

Not to Scale



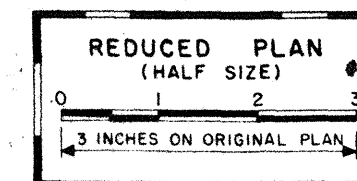
DUCT LINE ENTRANCE AT EXISTING DUCT LINE

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



DUCT LINE DIAGONAL ENTRANCE

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



APPROVED:

J. Karimots
HAWAIIAN ELECTRIC CO., INC.
6/26/78
DATE

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

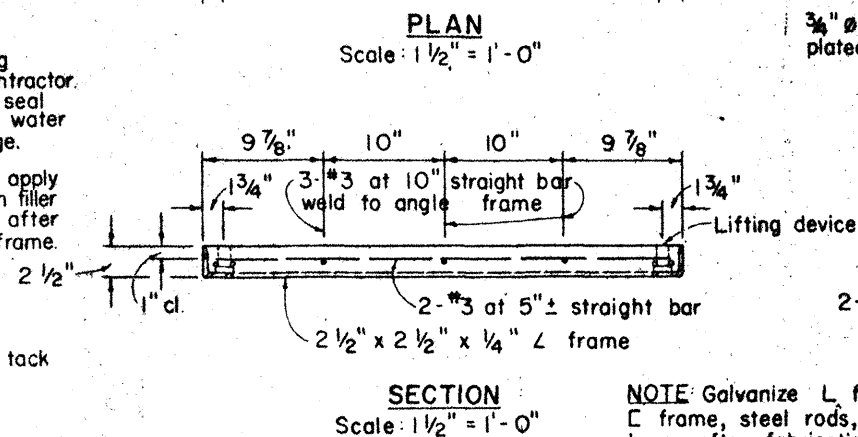
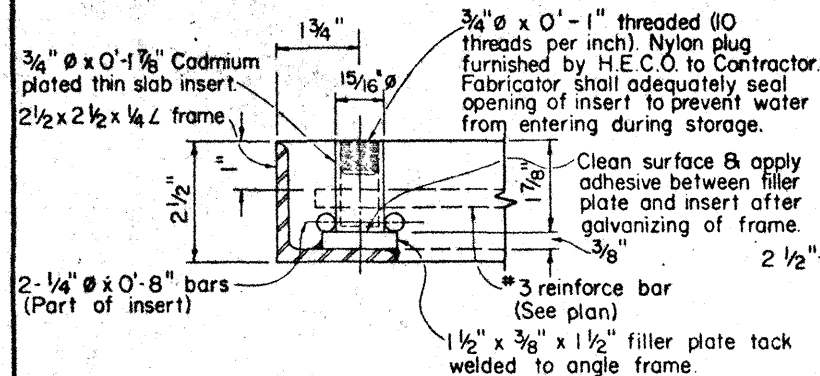
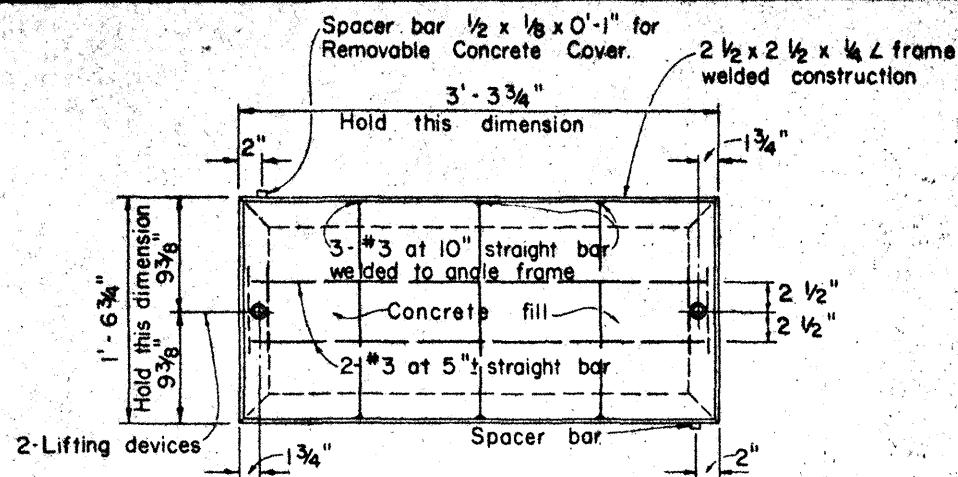
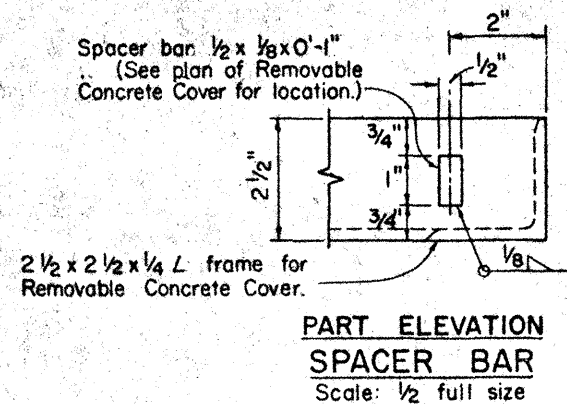
STANDARD DETAILS

CONSTRUCTION STANDARDS
TRANSITE KORDUCTS
UNDERGROUND DUCT LINES

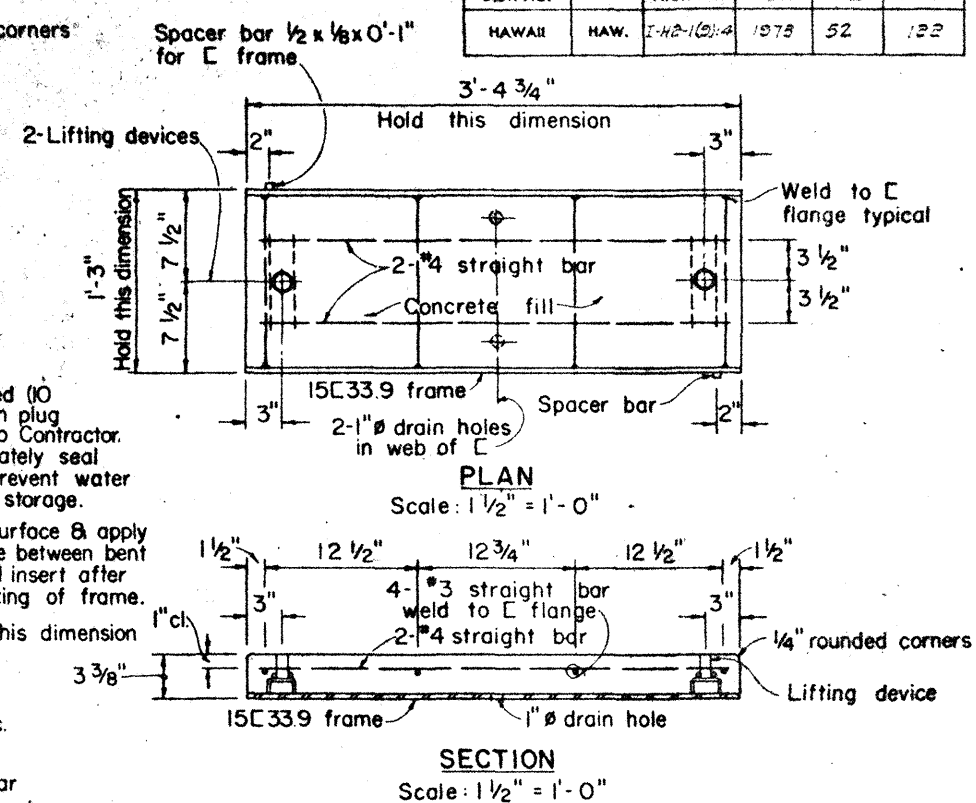
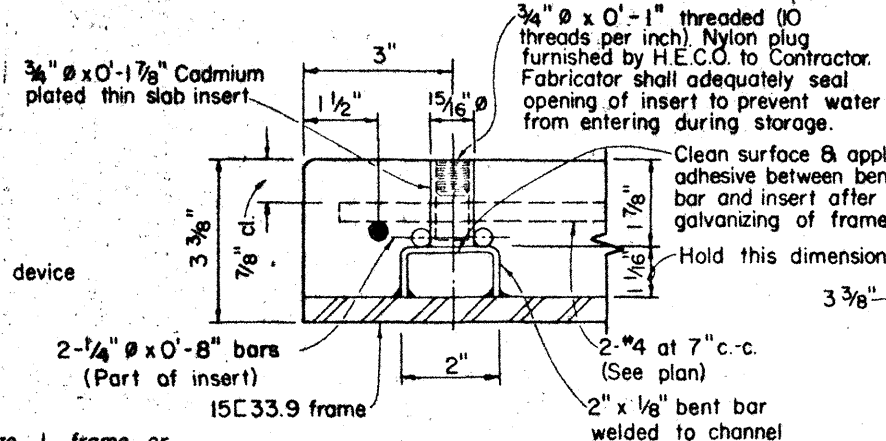
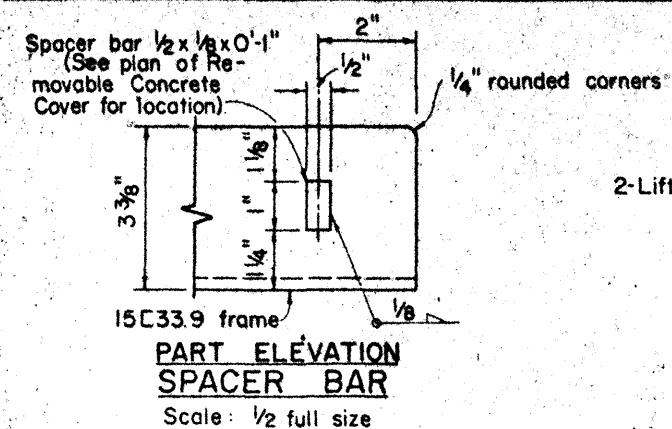
Scales: As Noted

SHEET NO. 4 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-42-1(2)-4	1975	52	122



NOTE: Galvanize L frame or C frame, steel rods, and spacer bars after fabrication.

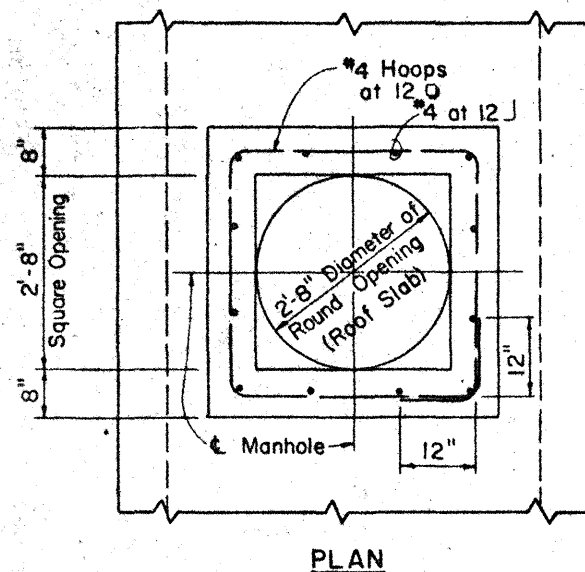


TYPE "SW" REMOVABLE CONCRETE COVER

TYPE "TR" REMOVABLE CONCRETE COVER

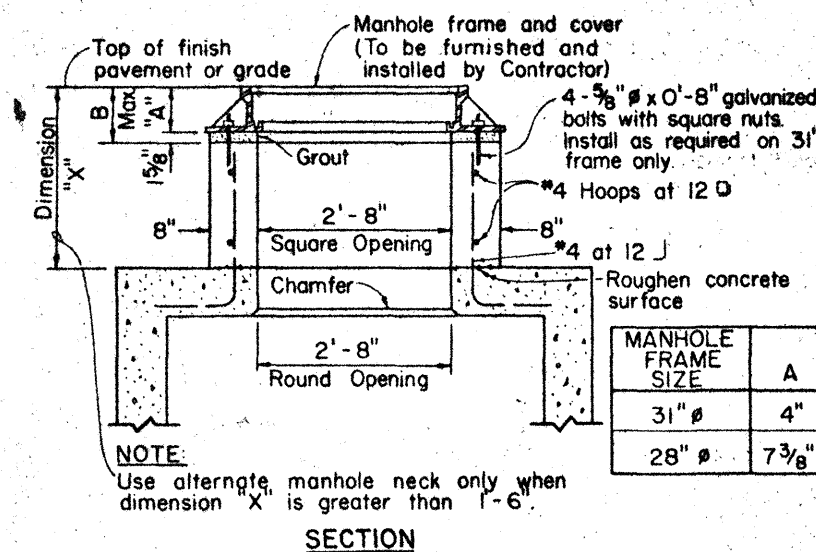
GENERAL NOTES

- On handhole covers, maximum clearances must be kept between removable concrete cover slabs and concrete openings at the supports. Contractor shall measure cover slabs steel frame after fabrication to obtain proper clearances. All covers after being installed shall be seated firmly and evenly and be free from rocking. Any variation in clearances and unevenness shall be corrected to the satisfaction of the Engineer at the Contractor's expense.
- Concrete Pouring: Notify the Hawaiian Electric Co., Inc. Contracting & Inspection Division, 24 hours before pouring concrete. All concrete pouring shall be done in the presence of an Hawaiian Electric Co., Inc. Engineer or Inspector.
- All materials shall be new and manufactured in the United States of America.



ALTERNATE MANHOLE NECK

Scale: $\frac{3}{4}" = 1'-0"$

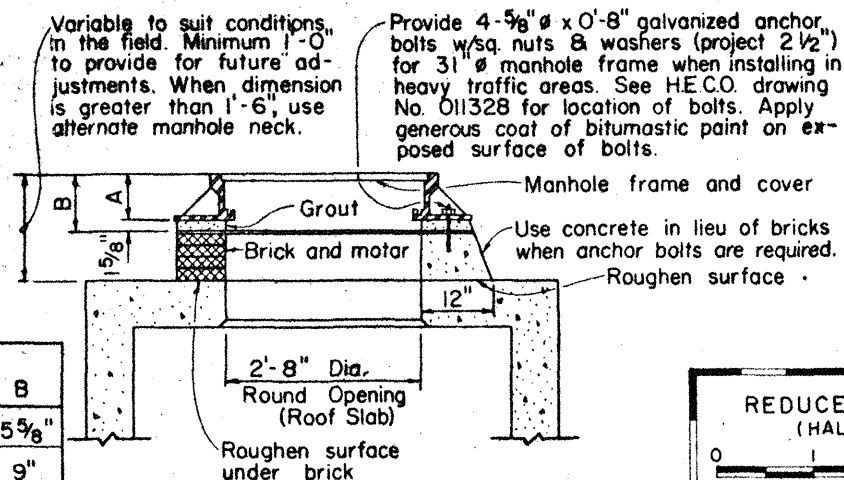


NOTE: Use alternate manhole neck only when dimension X is greater than 1'-6".

MANHOLE FRAME SIZE	A	B
31" ϕ	4"	5 $\frac{5}{8}$ "
28" ϕ	7 $\frac{3}{8}$ "	9"

31" ϕ & 28" ϕ MANHOLE FRAME NECK DETAIL

Scale: $\frac{3}{4}" = 1'-0"$



NOTE: See table alternate manhole neck detail for dimension A and B.



APPROVED:

J. Karamoto
Hawaiian Electric Co., Inc.
Date 6/26/73

HECo., Inc. Drawing Number
16688
SHEET NO. 1
OF 2 SHEETS

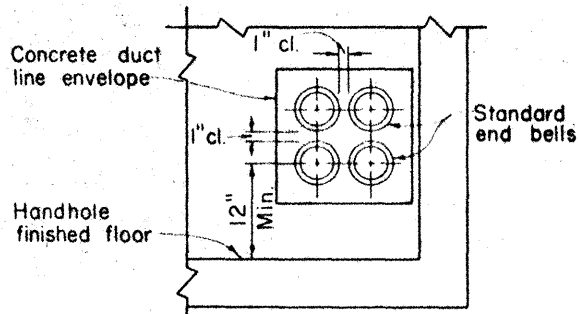
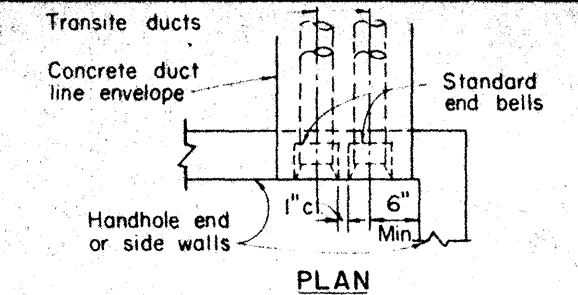
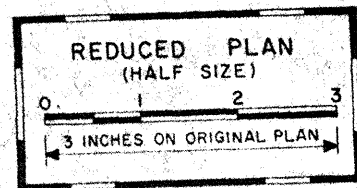
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MISCELLANEOUS DETAILS
HANDHOLES & MANHOLES
UNDERGROUND STANDARDS

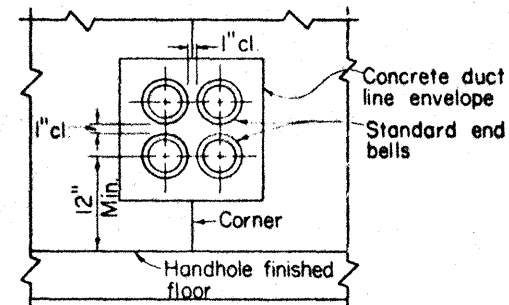
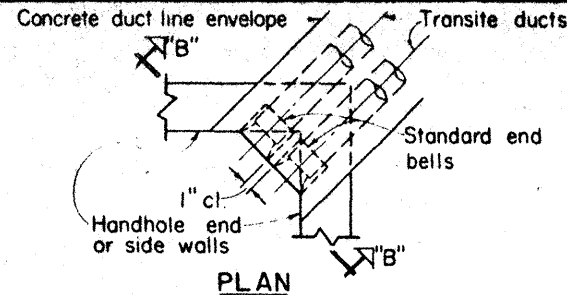
Scale as noted

SHEET No. 6 OF 11 SHEETS

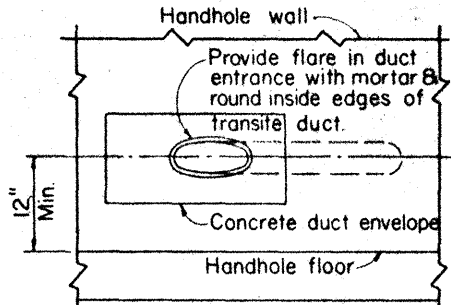
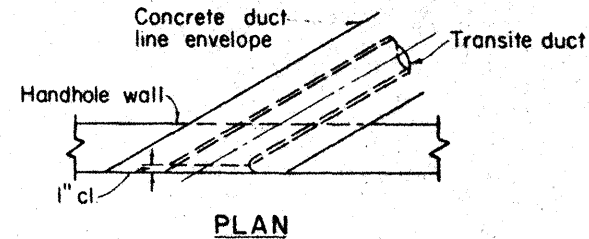
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-42-1(9)-4	1973	53	122



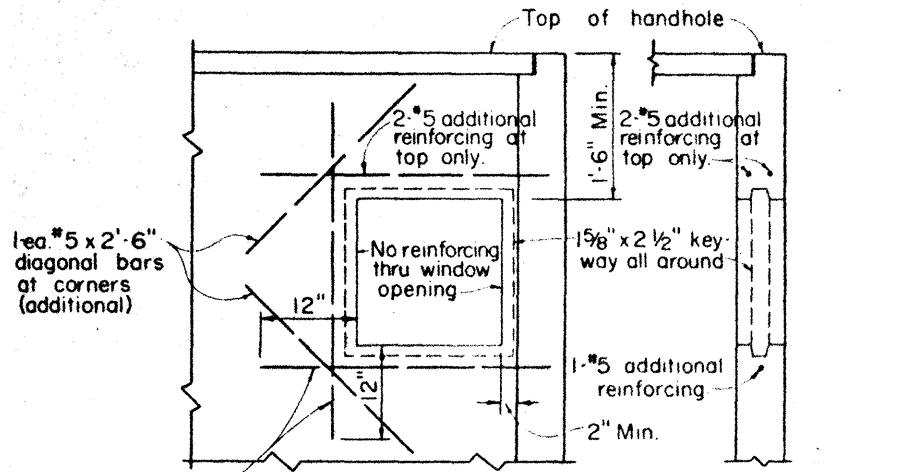
**ELEVATION
END OR SIDE ENTRANCE**
Scale: 1" = 1'-0"



**ELEVATION "B-B"
CORNER ENTRANCE**
Scale: 1" = 1'-0"

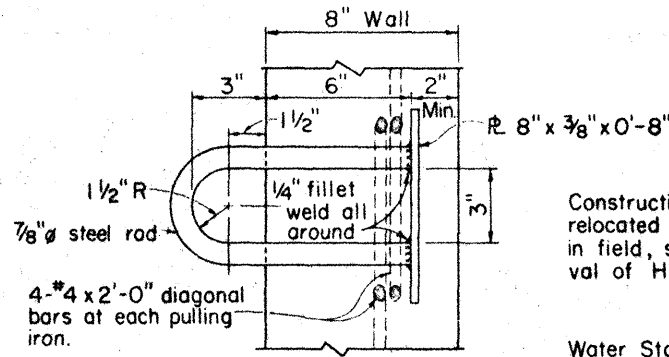
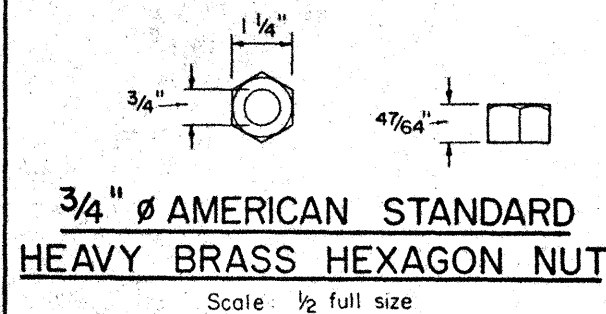


**ELEVATION
DIAGONAL ENTRANCE**
Scale: 1" = 1'-0"



NOTE: Provide opening for future ductline. Fill opening with bricks and mortar joints as required.

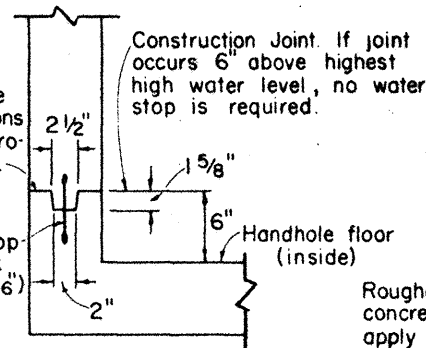
**ELEVATION
KNOCKOUT FOR FUTURE DUCT LINE**
Scale: 1" = 1'-0"



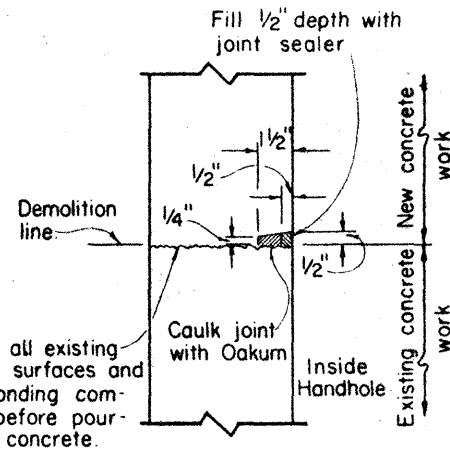
**SECTION
PULLING IRON**
Scale: 3" = 1'-0"

Construction joint may be relocated to suit conditions in field, subject to approval of H.E.Co. Engineer.

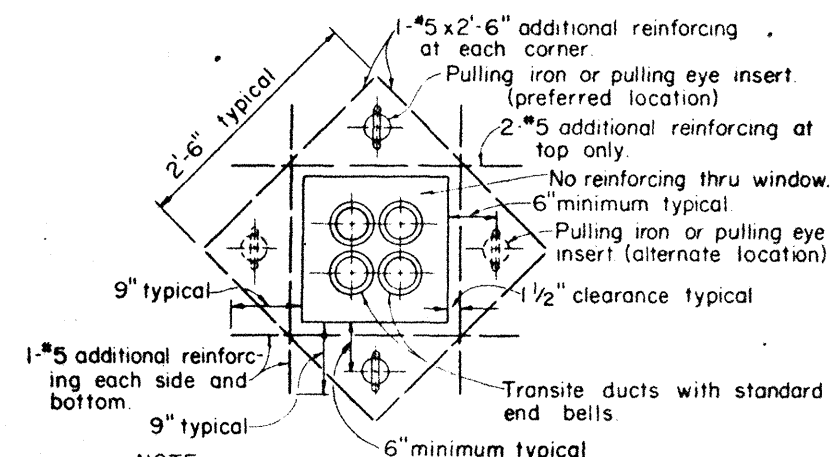
Water Stop. If water stop is required, use keylock water stop (K6M 6 x 3/16)



**SECTION
TYPICAL CONSTRUCTION JOINT**
Scale: 1 1/2" = 1'-0"

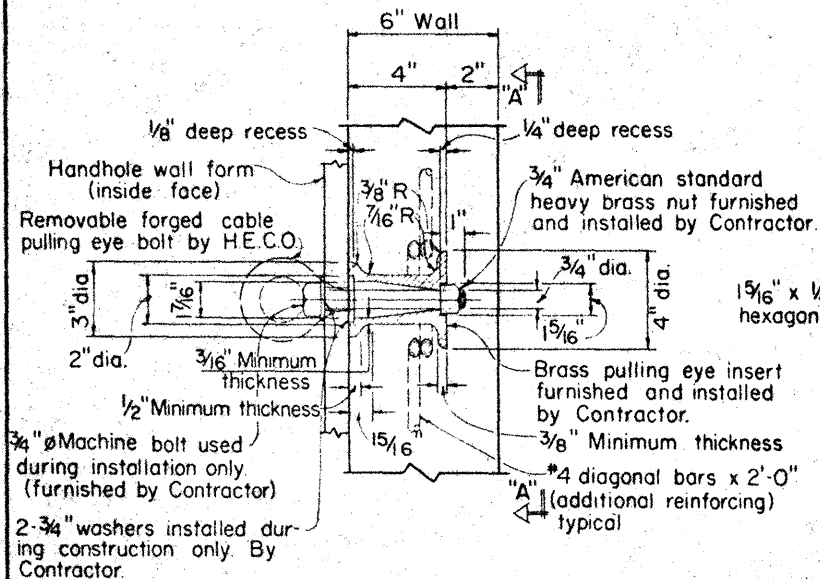


**SECTION
TYPICAL COLD JOINT**
Scale: 3" = 1'-0"

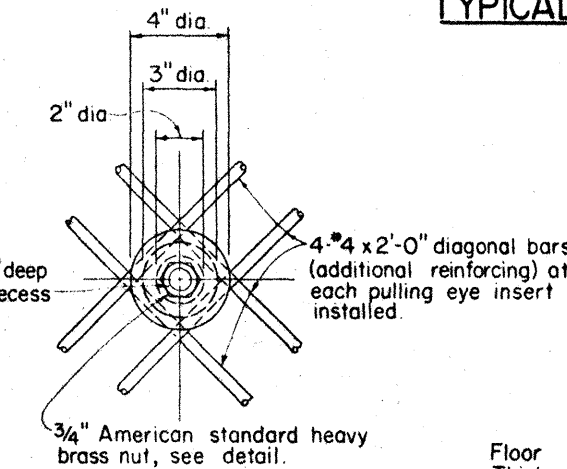


NOTE: Generally 2 pulling irons or pulling eye inserts are required and located on opposite wall of each duct window unless otherwise shown or noted. H.E.Co. Engineer shall determine number required.

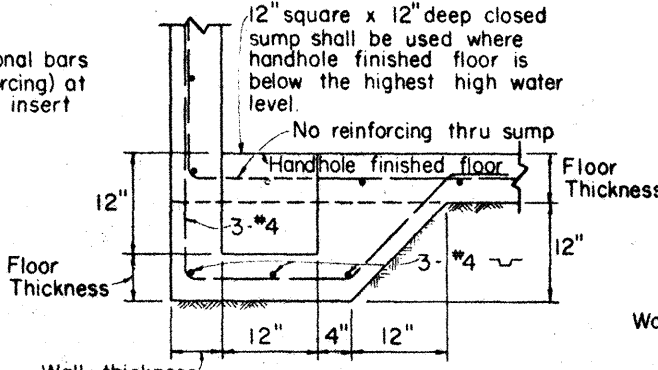
**ELEVATION
TYPICAL DUCT WINDOW**
Scale: 1" = 1'-0"



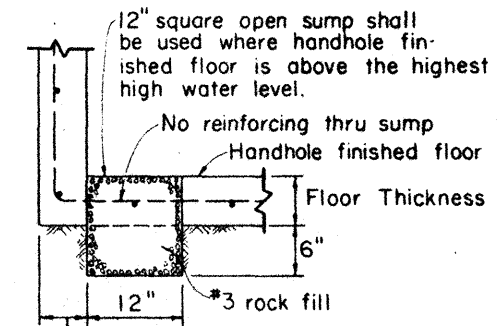
**SECTION
BRASS PULLING EYE INSERT**
Scale: 3" = 1'-0"



NOTE: Contractor shall place advance orders for cast brass pulling eye inserts.



**SECTION
CLOSED SUMP**
Scale: 1" = 1'-0"



**SECTION
OPEN SUMP**
Scale: 1" = 1'-0"

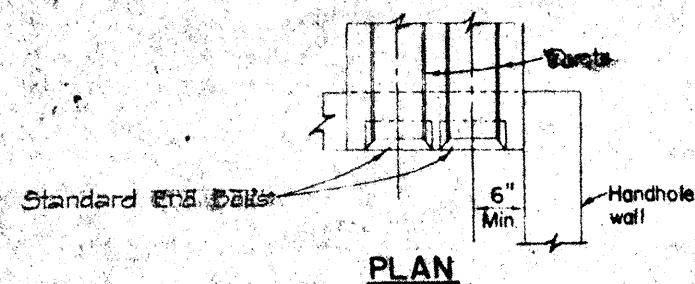
APPROVED: J. Karamet Date: 6/26/73
Hawaiian Electric Co., Inc.

HECo., Inc	Drawing	Number
16688		SHEET NO 2 OF 2 SHEETS
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION		
MISCELLANEOUS DETAILS HANDHOLES & MANHOLES UNDERGROUND STANDARDS		
Scale as noted		
SHEET No. 7 OF 11 SHEETS		

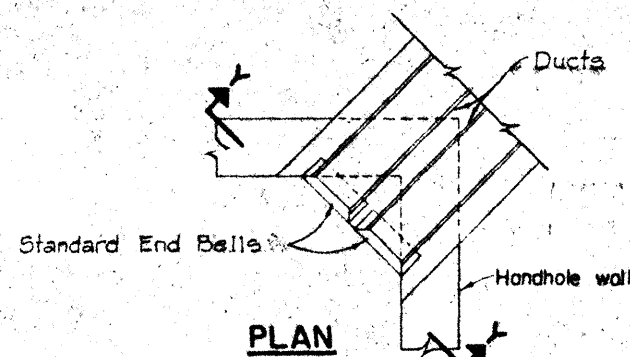
FED AID DIST NO	STATE	FED AID PROJECT	FISCAL YEAR	SHEET NO	TOTAL SHEETS
HAWAII	HAWAII	I-42-1(9) 4	1973	55	122

GENERAL NOTES

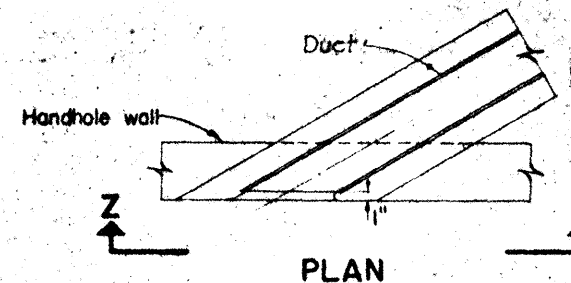
- Concrete to develop compressive cylinder strength of 3000 PSI in 28 days
- CONCRETE FINISH:
 - Top of Handhole - Woodfloated (sidewalk finish) according to Highways Division, State of Hawaii or Division of Engineering, City & County of Honolulu, specification whichever Agency has authority over the 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.
- REINFORCING: round deformed bars, new billet stock grade 40, ASTM A615. All hooked bars shall have ACI Std. hook unless otherwise shown.
- 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.
- PULLING IRONS
 - For location and number required, see duct entrance plan of project concerned.
- DRAINAGE: Slope floor down 1/2" to sump.
- Slope top of handhole. See plan of project concerned.
- FINISH STEEL WORK:
 - Angle iron frames for removal of concrete slabs and pulling irons shall be HOT DIP GALVANIZED AFTER FABRICATION.
- 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.
- 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.
- For duct line construction standards see H.E. CO. Dwg. 18585, 20191, and specs sheet CS 7001-0.
- DUCTS: For number, size, and exact location of duct entrances, refer to project drawings.
- ALL MATERIALS SHALL BE NEW AND SHALL BE MANUFACTURED IN THE UNITED STATES OF AMERICA.



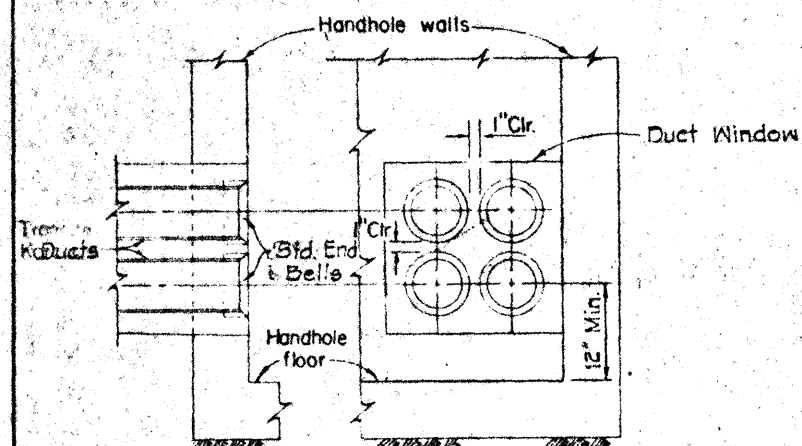
PLAN



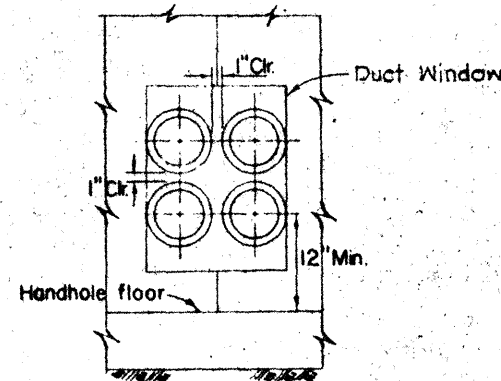
PLAN



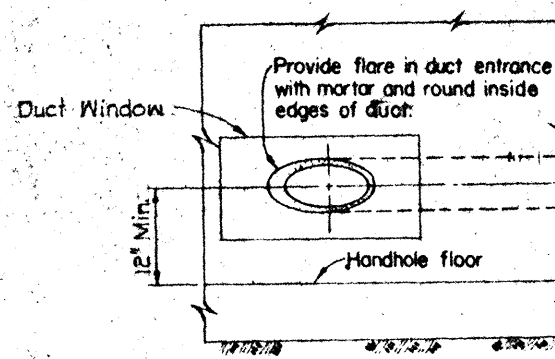
PLAN



SIDE ELEV. FRONT ELEV.
END & SIDE ENTRANCES
(FOUR WAY DUCT)



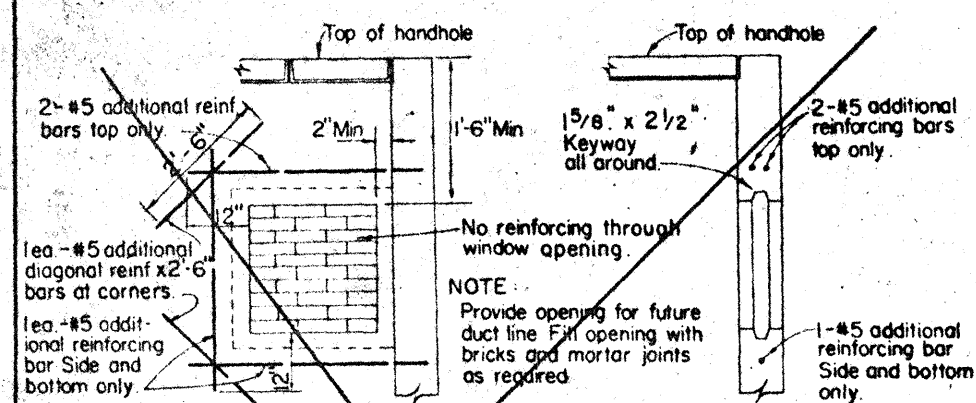
ELEV. Y-Y
CORNER ENTRANCE
(FOUR WAY DUCT)



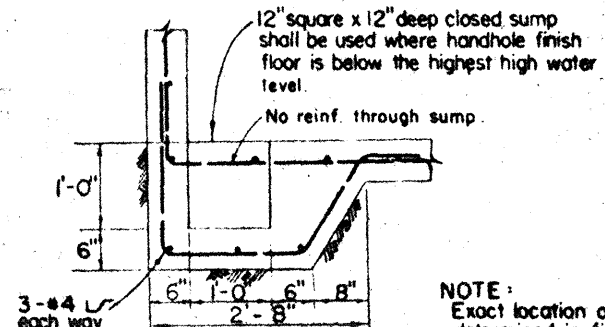
ELEV. Z-Z
DIAGONAL ENTRANCE
(ONE WAY DUCT)

TYPICAL DUCT LINE ENTRANCE DETAIL

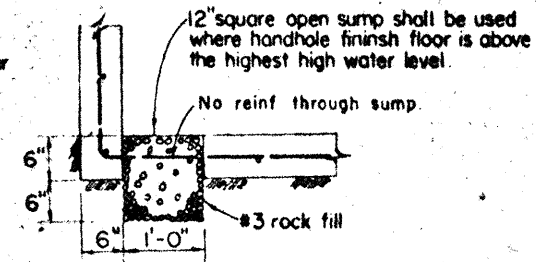
NOT TO SCALE



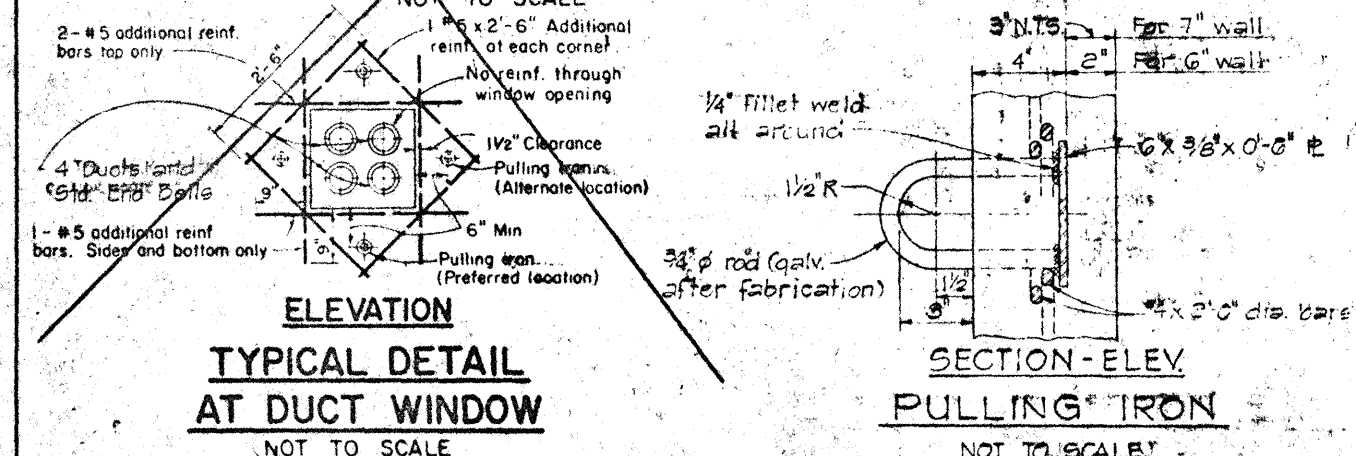
ELEVATION SECTION
KNOCKOUT FOR FUTURE DUCT LINE
NOT TO SCALE



SECTION ELEV.
CLOSED SUMP
NOT TO SCALE



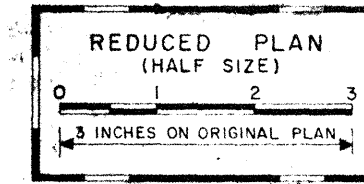
SECTION ELEV.
OPEN SUMP
NOT TO SCALE



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.



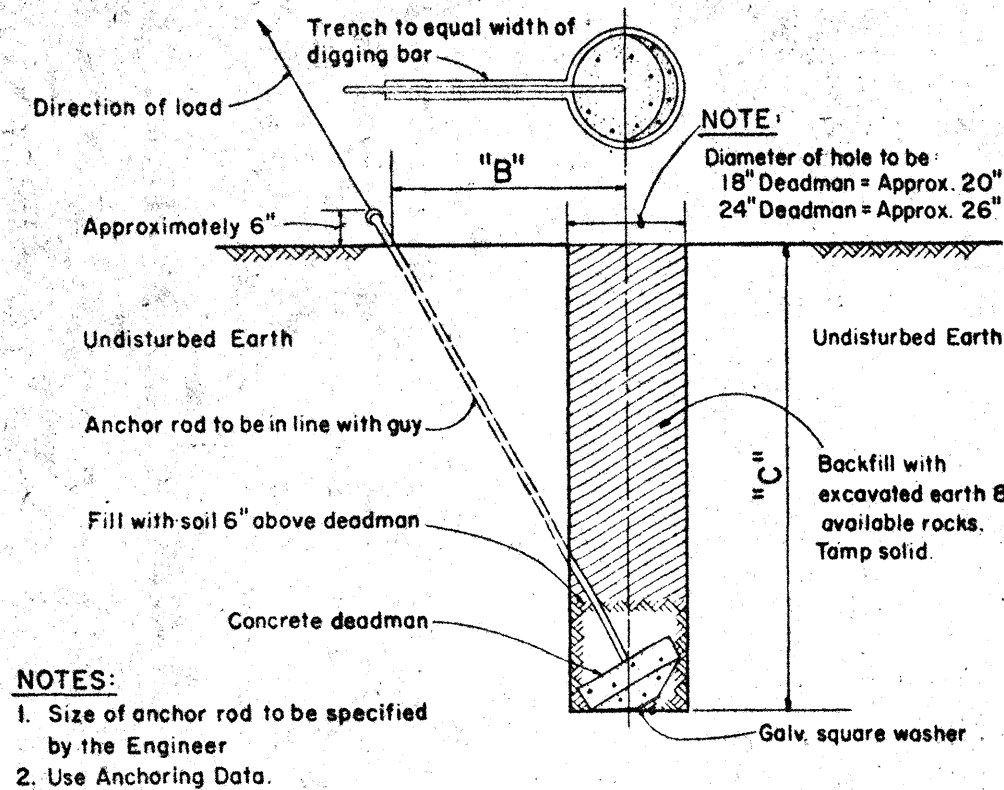
FOR USE IN AREAS NOT SUBJECT TO VEHICULAR TRAFFIC.

APPROVED:

J. K. Kaima
HAWAIIAN ELECTRIC Co., Inc.

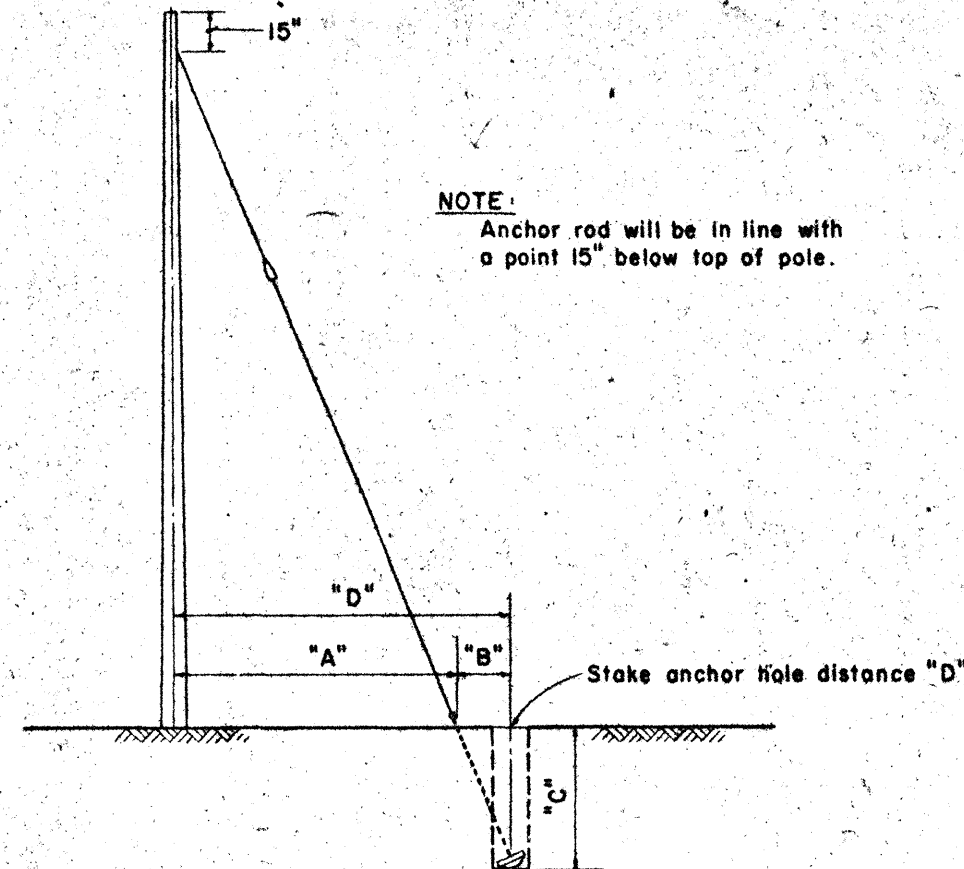
6/26/73
DATE

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	
Scale: As Noted	
SHEET NO. 9 OF 11 SHEETS	



GUY ANCHOR DEADMAN

Scale: $\frac{3}{4}" = 1' - 0"$



Not to Scale

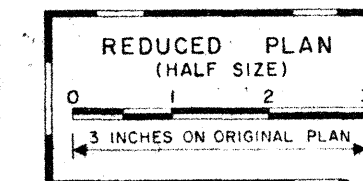
FOR 25' & 30' POLES WITH 8'-0" ANCHOR RODS				
"A"	"B"	"C"		"D" = ("A" + "B")
LEAD-ANCHOR ROD TO C.O.F. POLE	ANCHOR ROD TO C.O.F. HOLE	VERTICAL DEPTH 18" D.M.	24" D.M.	TOTAL DISTANCE POLE TO HOLE
5'-0"	1'-8"	7'-1"	7'-4"	6'-8"
10'-0"	3'-0"	6'-7"	7'-0"	13'-0"
15'-0"	4'-0"	6'-1"	6'-6"	19'-0"
20'-0"	4'-8"	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.

ANCHORING DATA



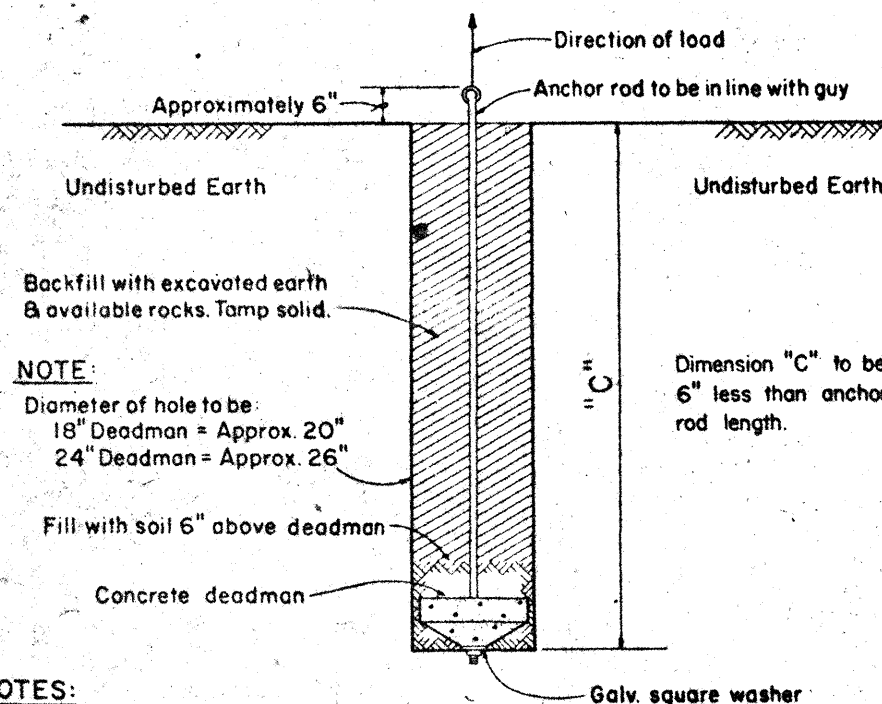
APPROVED:

J. Karam 6/26/73
HAWAIIAN ELECTRIC Co., Inc. DATE
R. Pham 6/27/73
HAWAIIAN TELEPHONE Co. 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

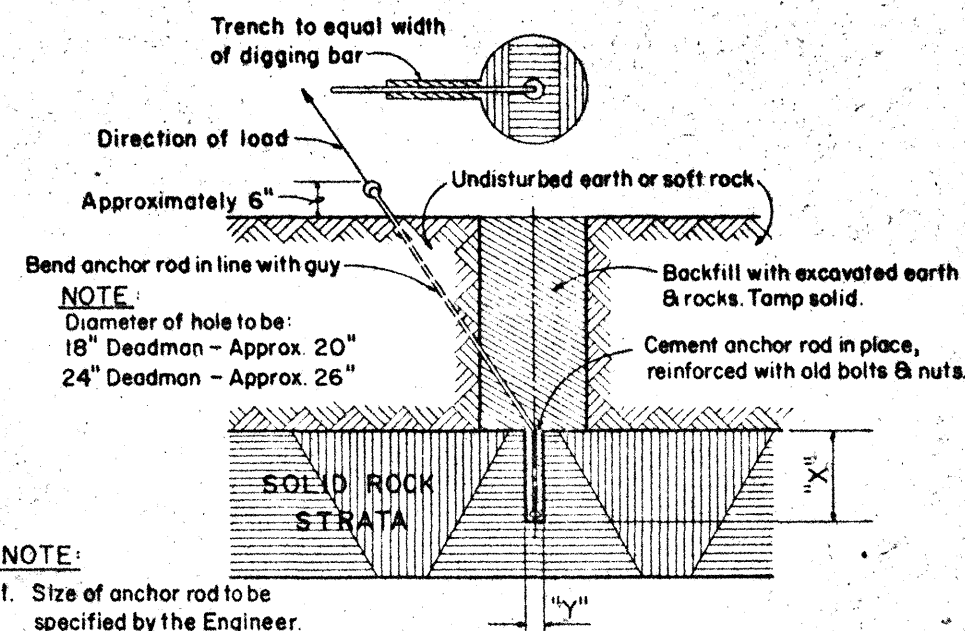
SHEET No. 10 OF 11 SHEETS



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

SIDE - WALK ANCHOR

Scale: $\frac{3}{4}" = 1' - 0"$

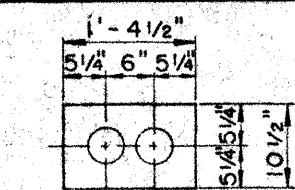


- NOTE:**
1. Size of anchor rod to be specified by the Engineer.
2. "X" Should not be less than 24".
If "X" is less than 24" complete hole & install anchor.
3. "Y" 5/8" Anchor rod drill 2" hole
3/4" Anchor rod drill 2" hole
1" Anchor rod drill 2 1/2" hole
1 1/4" Anchor rod drill 3" hole
4. Use Anchoring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

ROCK ANCHOR

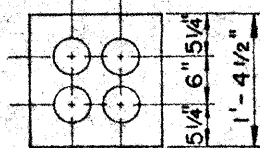
Not to Scale

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	T-42-1(2)-4	1973	57	122



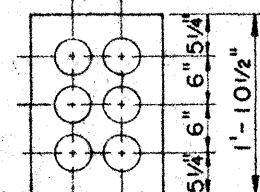
2 DUCTS

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



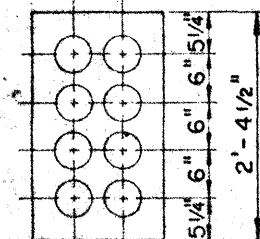
2 WIDE X 2 HIGH

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



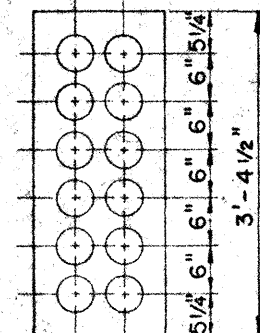
2 WIDE X 3 HIGH

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



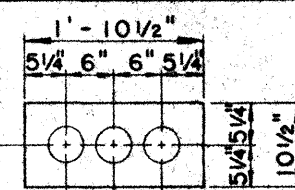
2 WIDE X 4 HIGH

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



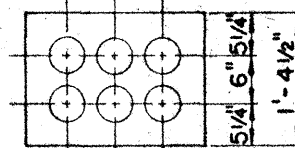
2 WIDE X 6 HIGH

$$\left(\frac{T}{12F-2}\right)$$



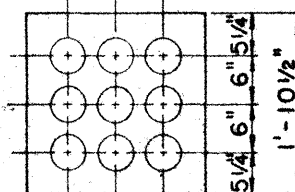
3 DUCTS

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



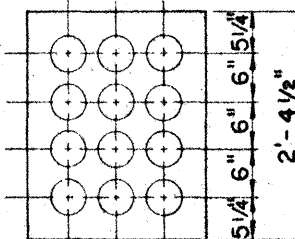
3 WIDE X 2 HIGH

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



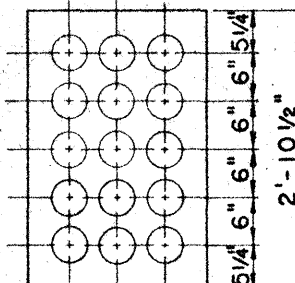
3 WIDE X 3 HIGH

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



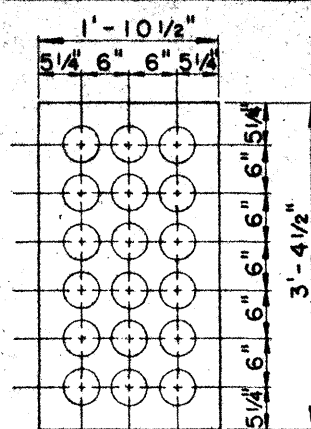
3 WIDE X 4 HIGH

$$\left(\frac{T}{12F-3}\right)$$



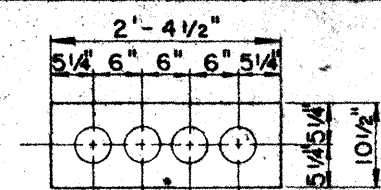
3 WIDE X 5 HIGH

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



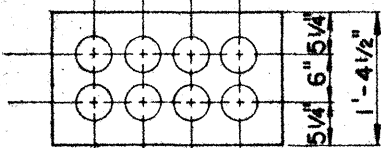
3 WIDE X 6 HIGH

$$\left(\frac{T}{18F-3}\right)$$



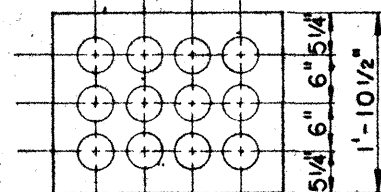
4 DUCTS

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



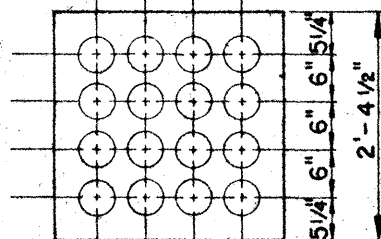
4 WIDE X 2 HIGH

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



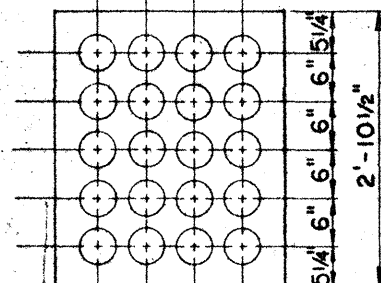
4 WIDE X 3 HIGH

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



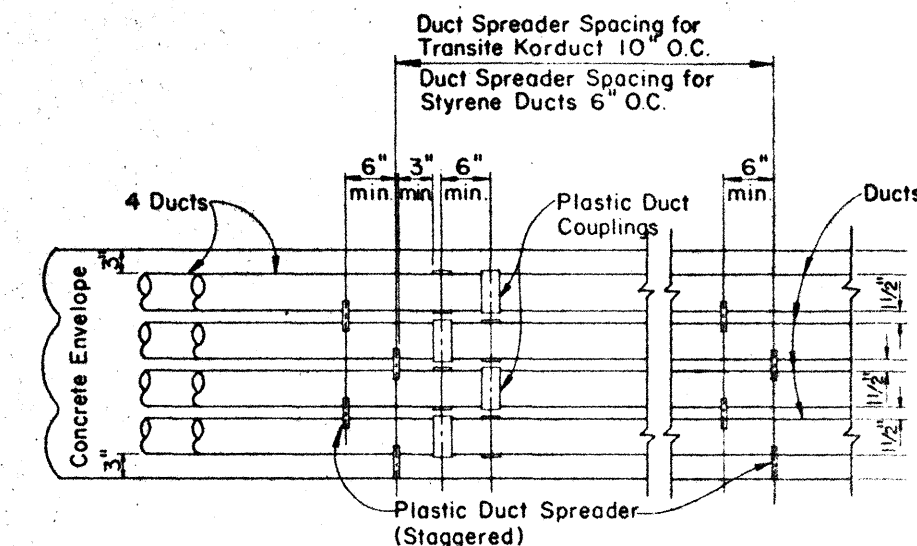
4 WIDE X 4 HIGH

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



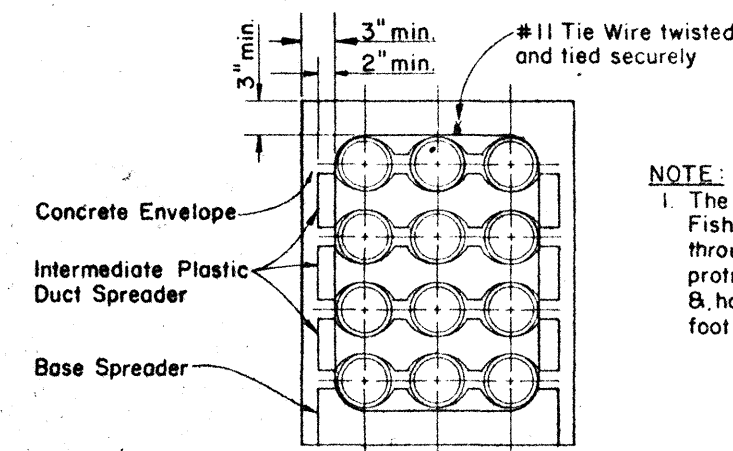
4 WIDE X 5 HIGH

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



**TYPICAL DUCT ENVELOPE ELEVATION
ARRANGEMENT OF COUPLING & PLASTIC SPACERS**

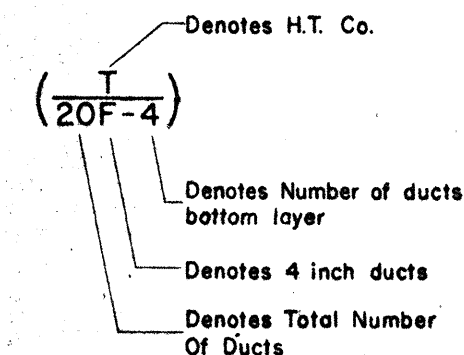
Scale: 1" = 1'-0"



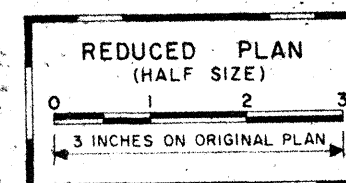
NOTE:
1. The Contractor shall place #12 Fish Wire in designated duct throughout its entire length with protrusions of 2 feet in manholes & handholes at each end and 1 foot in pullboxes.

SECTION SHOWING SPACERS

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



SYMBOL IDENTIFICATION



STANDARD DUCT FORMATIONS

Scale: 1" = 1'-0"

APPROVED:	
<i>[Signature]</i>	6/27/73
Hawaiian Telephone Co., Ltd.	Date
H.T. Co., Ltd.	Drawing No. 34028
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
STANDARD DUCT FORMATIONS	
Scale: As Shown	
SHEET No. // OF // SHEETS	