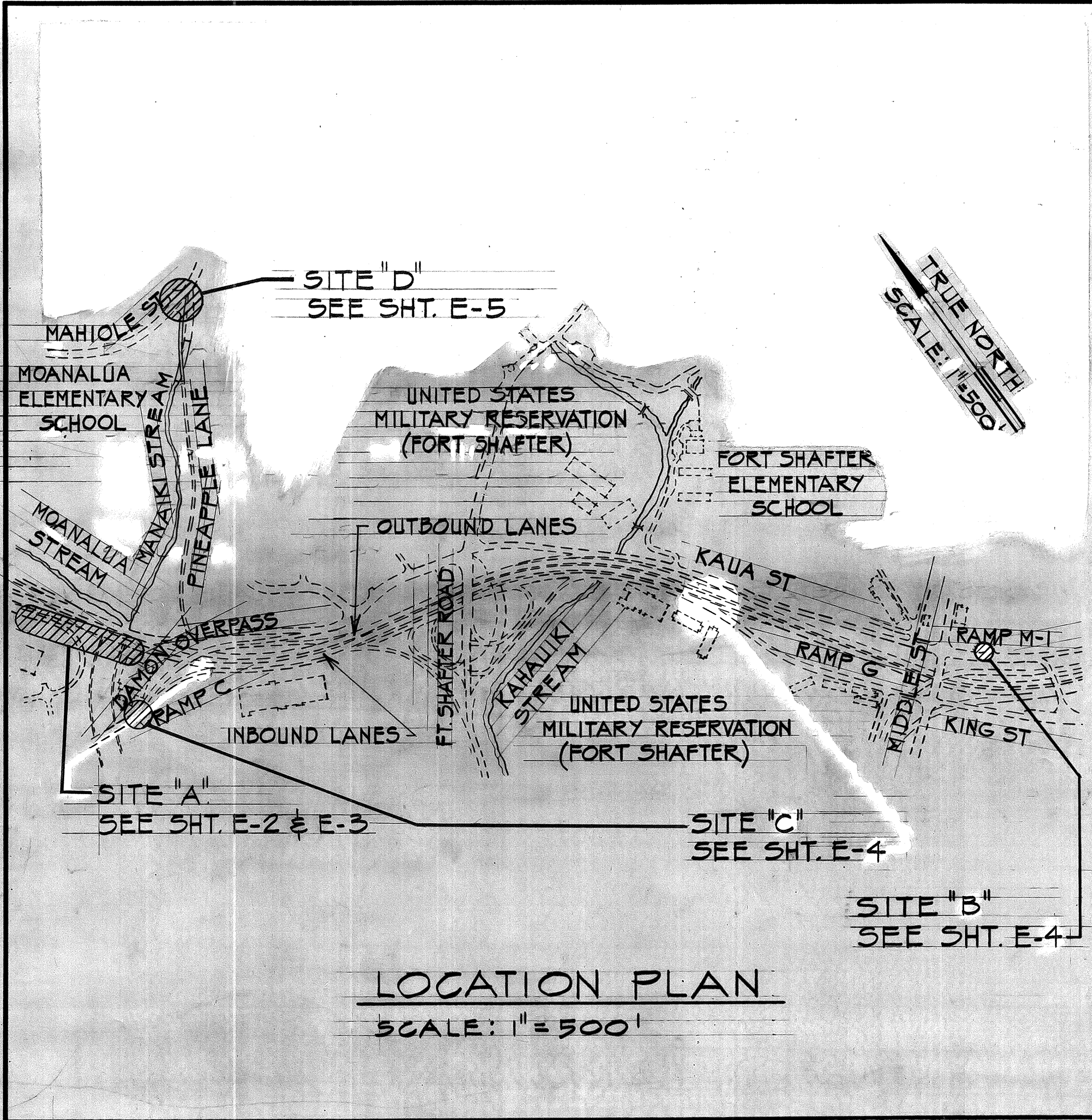


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	89	164



LOCATION PLAN
SCALE: 1"=500'

HAWAIIAN ELECTRIC CO. GENERAL NOTES

- HECO WILL REMOVE ALL EXISTING HECO OR JOINT POLES AND CABLES UNLESS OTHERWISE NOTED ON THE PLANS.
- HECO WILL FURNISH AND INSTALL NEW POLES AS NOTED ON THE PLANS.
- ALL NEW HECO POLE AND ANCHOR LOCATIONS TO BE STAKED OUT BY THE CONTRACTOR AND VERIFIED BY HECO. (INCLUDING TEMP. POLES)
- EXCAVATION OF HECO WOOD POLE HOLES AND ANCHORS, INSTALLATION OF WOOD POLES AND ANCHORS AND BACKFILL OF POLE HOLES AND ANCHORS TO BE DONE BY HECO AND/OR ITS CONTRACTOR.
- STAKE OUT AND INSTALLATION OF HECO'S MANHOLES, HANDHOLES, PULL AND SERVICE BOXES, TRANSFORMER AND SWITCH CABINET PADS AND DUCT LINES BY THE STATE'S CONTRACTOR AND VERIFIED BY HECO, EXCEPT AS NOTED.
- BREAKING INTO EXISTING HECO ENERGIZED UNDERGROUND FACILITIES SHALL BE DONE BY HECO.
- HECO SHALL COORDINATE ITS WORK WITH THE STATE'S CONTRACTOR IN SUCH A MANNER AS NOT TO IMPEDE CONSTRUCTION.
- ALL EXISTING HECO FACILITIES SHALL REMAIN IN PLACE UNTIL PROPOSED PERMANENT FACILITIES ARE IN SERVICE.

HAWAIIAN TELEPHONE CO. GENERAL NOTES

- MANHOLE DEPTHS SHOWN ON PLANS REFER TO INSIDE DEPTH OF MANHOLES.
- ALL DUCTLINES SHALL BE RE-TERMINATED BY THE CONTRACTOR.
- HTCO SHALL COORDINATE ITS WORK WITH THE STATES CONTRACTOR IN SUCH A MANNER AS NOT TO IMPEDE CONSTRUCTION.
- CONTRACTOR SHALL INSTALL 1/8" POLYOLEFIN PULL LINE IN ALL DUCT LINES.

FIRE ALARM GENERAL NOTES

- EXISTING FIRE ALARM CIRCUIT SHALL NOT BE INTERRUPTED AT ANY TIME.
- THE CONTRACTOR SHALL BE RESPONSIBLE TO FURNISH ALL NECESSARY MATERIAL AND EQUIPMENT AND INSTALL THE UNDERGROUND AND OVERHEAD FIRE ALARM SYSTEM COMPLETE, EXCEPT FINAL CONNECTION OF CABLES TO EXISTING FIRE ALARM CIRCUITS SHALL BE DONE BY CITY.
- CABLE SPLICES, IF REQUIRED, SHALL BE LOCATED IN FA PULLBOXES. SPLICING OF CABLES TO BE DONE BY CITY. SPLICES SHALL BE KEPT TO A MINIMUM.
- FA CONDUITS SHALL BE 2" GALVANIZED RIGID STEEL. NUMBER OF CONDUITS SHALL BE ONE UNLESS OTHERWISE INDICATED.
- EXISTING OVERHEAD OPEN WIRES AND CABLES SHALL BE REMOVED AFTER THE NEW CIRCUIT IS IN OPERATION AND ACCEPTED BY THE CITY. CABLES AND WIRES SHALL BE DISPOSED OF OR SALVAGED AND DELIVERED C&C CORPORATION YARD 160 KOULA STREET AS DIRECTED BY THE CITY.
- SPARE CONDUITS SHALL BE INSTALLED WITH 1/8" POLYOLEFIN PULL LINE AND SHALL BE CAPPED AT BOTH ENDS.
- AFTER CABLES ARE INSTALLED, SEAL CONDUITS WITH DUCT SEAL IN ALL PULL BOXES.
- NOTIFY AND COORDINATE WORK WITH ELECTRICAL AND MAINTENANCE SERVICES DIVISION, DEPT. OF TRANSPORTATION SERVICES, CITY AND COUNTY OF HONOLULU (PHONE 523-4905), THREE (3) WORKING DAYS PRIOR TO START OF CONSTRUCTION.
- FIRE ALARM PULL BOXES SHALL NOT BE BUILT ON ROADWAYS OR DRIVEWAYS.
- NATIONAL ELECTRIC CODE, NATIONAL FIRE CODE AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION MAY 1975 SHALL BE COMPLIED WITH.
- DIRECT BURIED CONDUITS SHALL BE PAINTED WITH TWO (2) COATS OF ANTI-CORROSION ASPHALT BASE COMPOUND.
- LEAVE FOUR (4) FEET MINIMUM SLACK IN EACH PULL BOX.
- FA CONDUITS SHALL BE 24" UNDER ROADWAYS AND 18" UNDER SIDEWALKS.

ELECTRICAL LEGEND

- EXISTING OVERHEAD POLE LINE TYPE AS DESIGNATED.
- EXISTING OVERHEAD POLE LINE TO BE REMOVED
- TEMPORARY OVERHEAD POLE LINE TYPE AS DESIGNATED.
- EXISTING DUCT SYSTEM TYPE AS DESIGNATED.
- UNDERGROUND DUCT SYSTEM TYPE AS DESIGNATED.
- EXISTING DUCT SYSTEM TO BE ABANDONED OR REMOVED.
- STUB OUTS, CAP AND MARK.
- DUCT SECTION INDICATOR, NUMBER IS ASSIGNMENT. DETAIL INDICATOR
- FIRE ALARM PULLBOX. 17"X25" PRECAST CONCRETE, C&C SLD-1 PULLBOX.

ABBREVIATIONS*

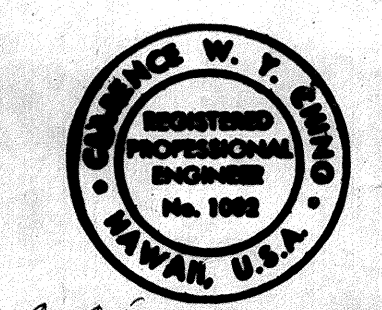
- e ELECTRICAL
- T, + TELEPHONE
- FA, fa FIRE ALARM
- DATS, data DEFENSE ADMINISTRATIVE TELEPHONE SYSTEM
- JTS, jt JOINT TRUNKING SYSTEM CABLE (DIRECT BURIED)
- AV, av AUTOVON
- TPC, tpc TRANSPACIFIC LANDLINE CABLE (DIRECT BURIED)
- sl OVERHEAD STREET LIGHTING SYSTEM

* LOWER CASE INDICATES EXISTING

APPROVED BY:

Ired Karimot 3-30-77
HAWAIIAN ELECTRIC CO. INC. DATE

H. G. New
DEPT. OF TRANSPORTATION SERVICES DATE
CITY & COUNTY OF HONOLULU
MUNICIPAL FIRE ALARM CIRCUIT RELOCATION CLEARANCE



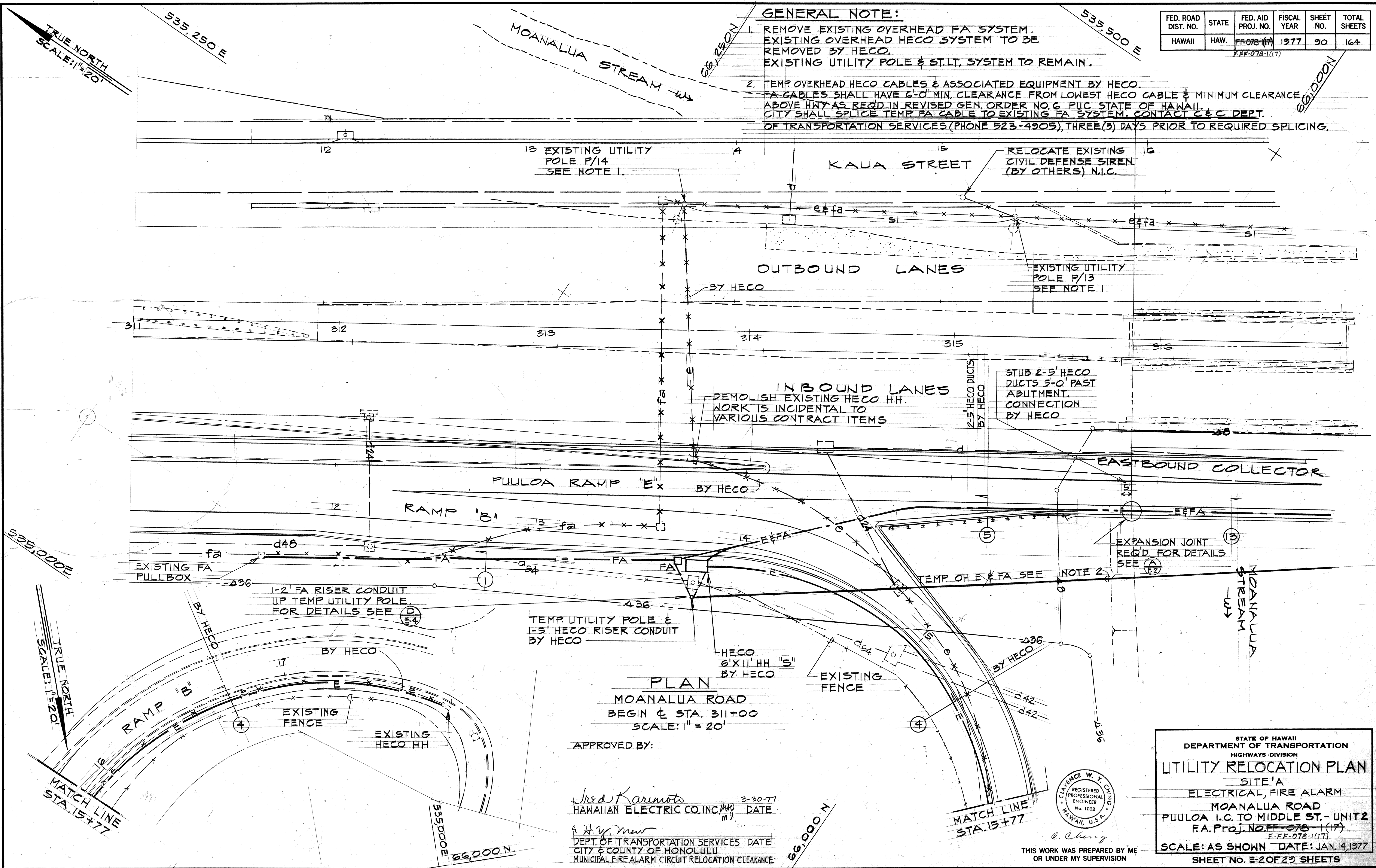
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GENERAL UTILITY NOTES

MOANALUA ROAD

PHUOIA I.C. TO MIDDLE ST. - UNIT 2
FA. Proj. No. FF-078-1(17)
SCALE: AS SHOWN DATE: JAN. 14, 1977
SHEET No. E-1 OF 29 SHEETS



GENERAL NOTE:

1. REMOVE EXISTING OVERHEAD FA SYSTEM. EXISTING OVERHEAD HECO SYSTEM TO BE REMOVED BY HECO. EXISTING UTILITY POLE & ST.LT. SYSTEM TO REMAIN.
2. TEMP OVERHEAD HECO CABLES & ASSOCIATED EQUIPMENT BY HECO. FA CABLES SHALL HAVE 6'-0" MIN. CLEARANCE FROM LOWEST HECO CABLE & MINIMUM CLEARANCE ABOVE HWY AS REQ'D IN REVISED GEN. ORDER NO. 6 PUC STATE OF HAWAII. CITY SHALL SPLICE TEMP FA CABLE TO EXISTING FA SYSTEM. CONTACT C & C DEPT. OF TRANSPORTATION SERVICES (PHONE 523-4905), THREE (3) DAYS PRIOR TO REQUIRED SPLICING.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	90	164

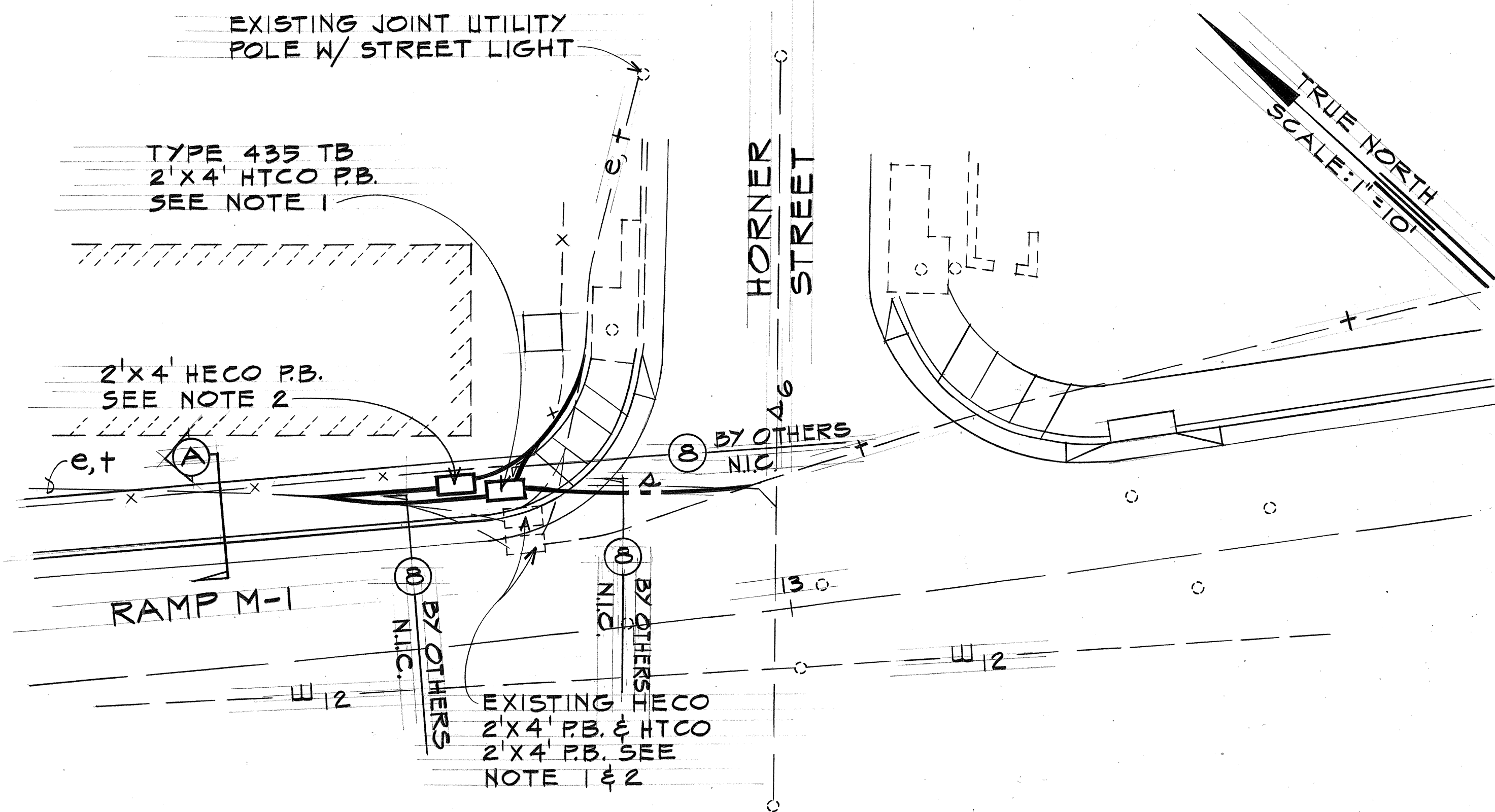
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
UTILITY RELOCATION PLAN
SITE "A"
ELECTRICAL, FIRE ALARM
MOANALUA ROAD
PUULOLO I.C. TO MIDDLE ST. - UNIT 2
F.A. Proj. No. FF-078-1(17)
SCALE: AS SHOWN DATE: JAN. 14, 1977
SHEET No. E-2 OF 29 SHEETS

APPROVED BY:
Ired Karimots 3-30-77
HAWAIIAN ELECTRIC CO. INC. DATE
A. H. Y. Maw
DEPT. OF TRANSPORTATION SERVICES DATE
CITY & COUNTY OF HONOLULU
MUNICIPAL FIRE ALARM CIRCUIT RELOCATION CLEARANCE

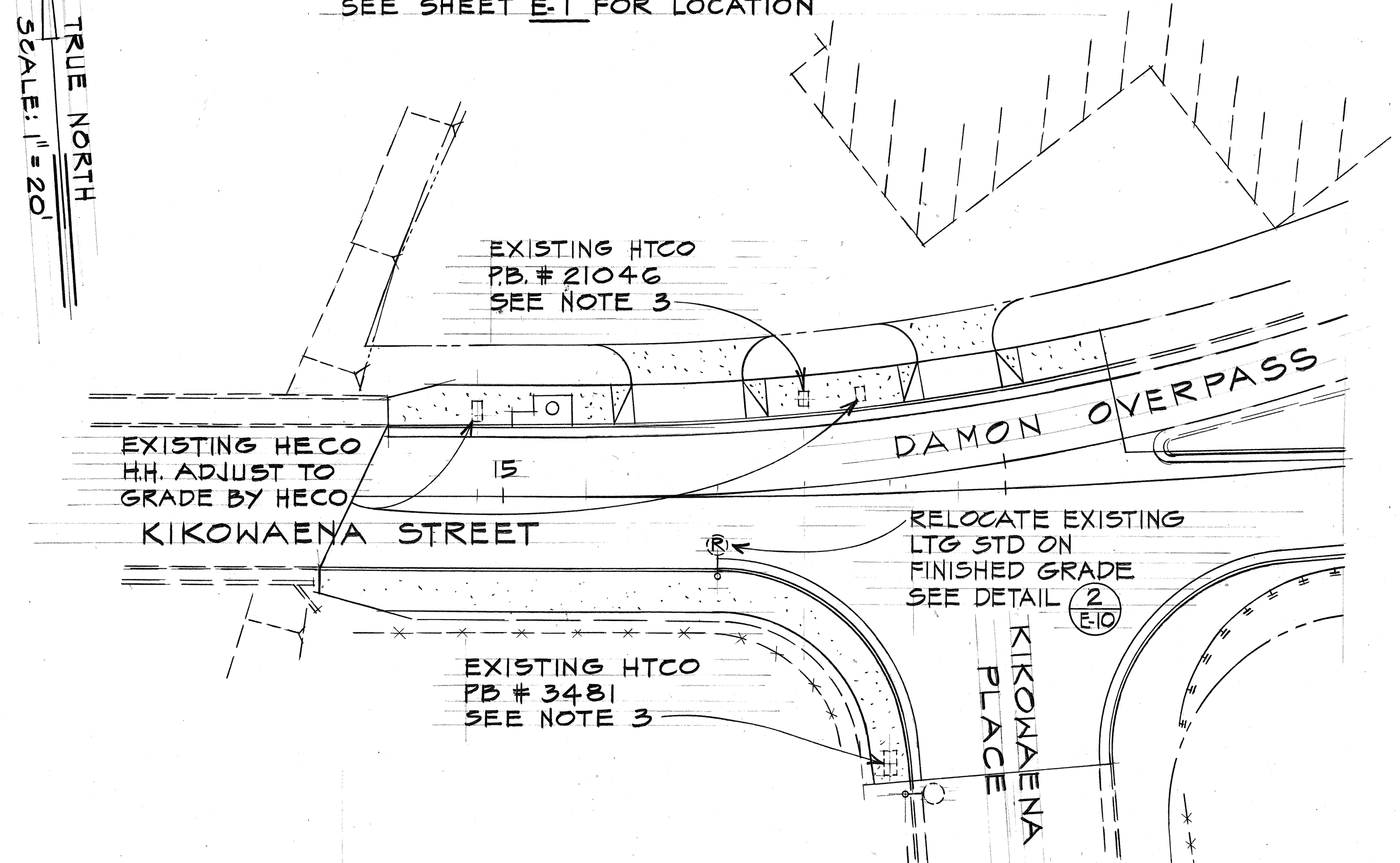
CLARENCE W. Y. CHING
REGISTERED PROFESSIONAL ENGINEER
No. 1002
HAWAII, U.S.A.
C. Ching
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION

ORIGINAL PLAN	DATE
DRAWN BY	
DESIGNED BY	
NOTED BY	
CHECKED BY	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17) FF-078-1(17)	1977	92	164



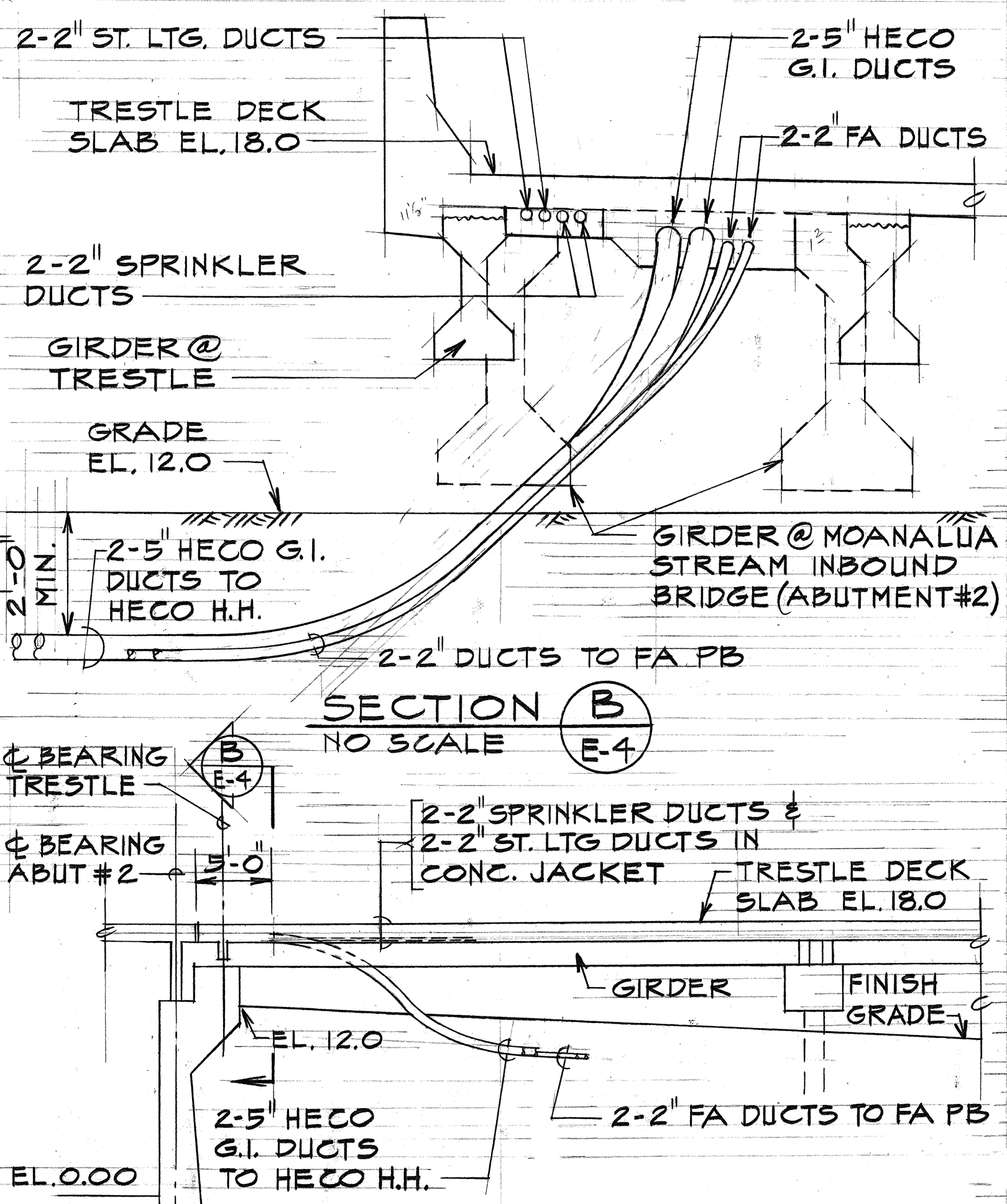
PARTIAL UTILITY RELOCATION PLAN RAMP M-1-SITE B
SCALE: 1"=10'
SEE SHEET E-1 FOR LOCATION



PARTIAL UTILITY RELOCATION PLAN RAMP C-SITE C
SCALE: 1"=20'
SEE SHEET E-7 FOR LOCATION

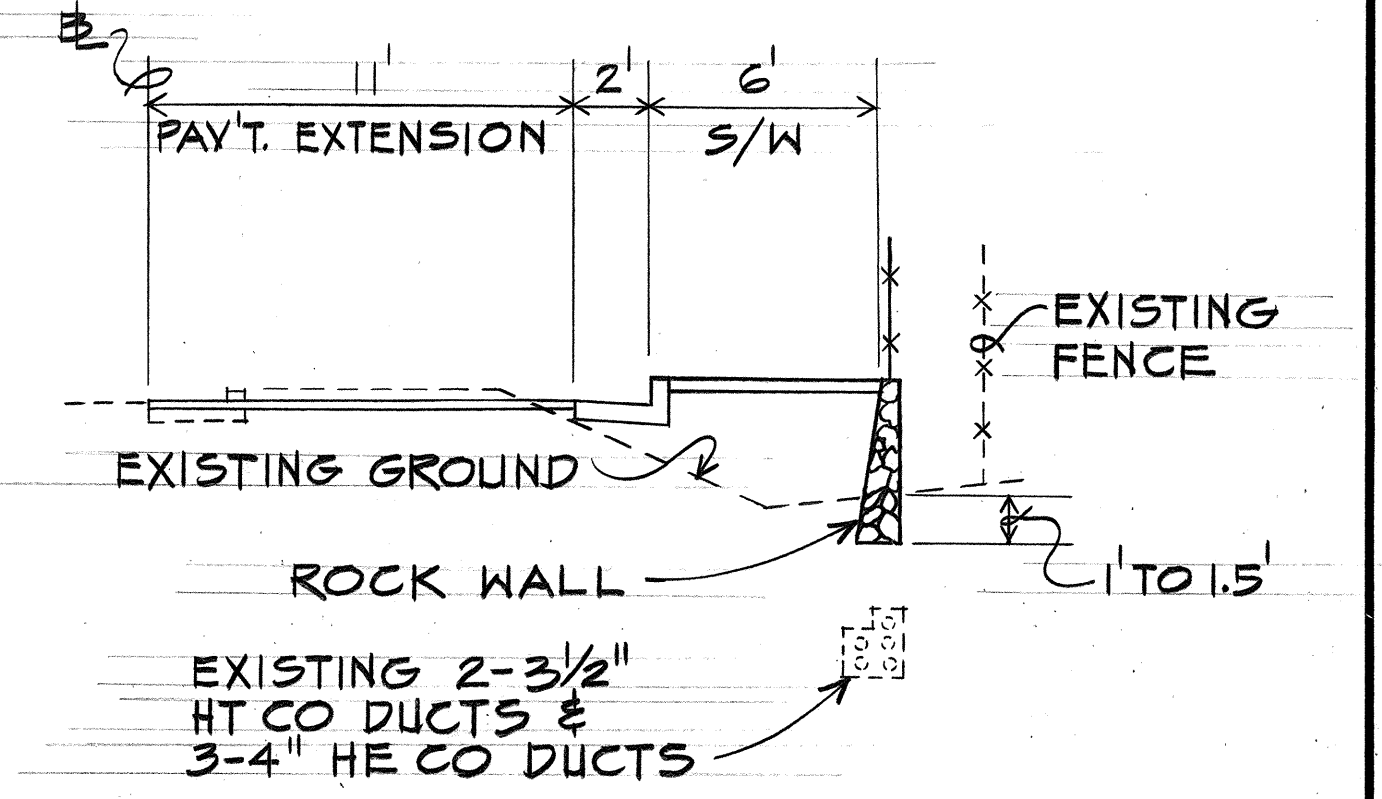
NOTES:

1. EXTEND EXISTING DUCT SYSTEM INTO RELOCATED HTCO 2'x4' PB AS SHOWN. SPLIT DUCT REQ'D. SEE HTCO GEN. NOTE 13, SHT. E-1 (BY OTHERS) N.I.C.
2. RELOCATION OF EXISTING HECO 2'x4' P.B. AND 3-4" DUCT SYSTEM BY HECO.
3. ADJUST EXISTING HTCO PULLBOXES AND COVERS TO FINISH SIDEWALK GRADE. PAYMENT SHALL BE INCIDENTAL TO UTILITY RELOCATION.

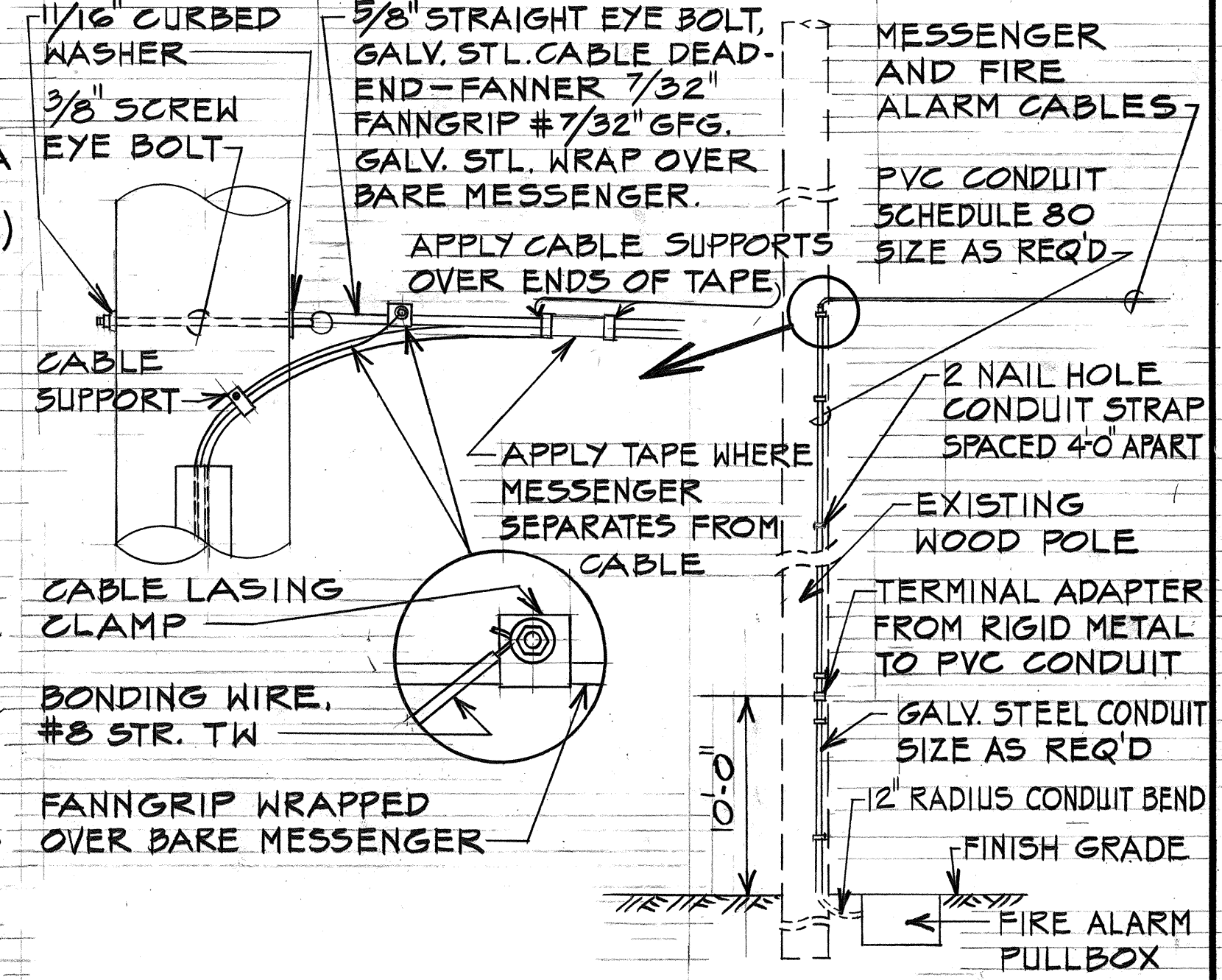


SECTION B
NO SCALE
E-4

LONGITUDINAL SECTION C
NO SCALE
E-4



SECTION A
SCALE: 1"=5'
E-4



MESSENGER ANCHOR DETAIL
NO SCALE
E-4

FIRE ALARM CONDUIT RISER DETAIL D
NO SCALE
E-4

APPROVED BY:
Ired Karimoto 3-30-77
HAWAIIAN ELECTRIC CO., INC. DATE
for K. Yoshikawa 4-4-77
HAWAIIAN TELEPHONE CO. DATE
H. Y. Maw 4-4-77
DEPT. OF TRANSPORTATION SERVICES DATE
CITY & COUNTY OF HONOLULU
MUNICIPAL FIRE ALARM CIRCUIT RELOCATION CLEARANCE



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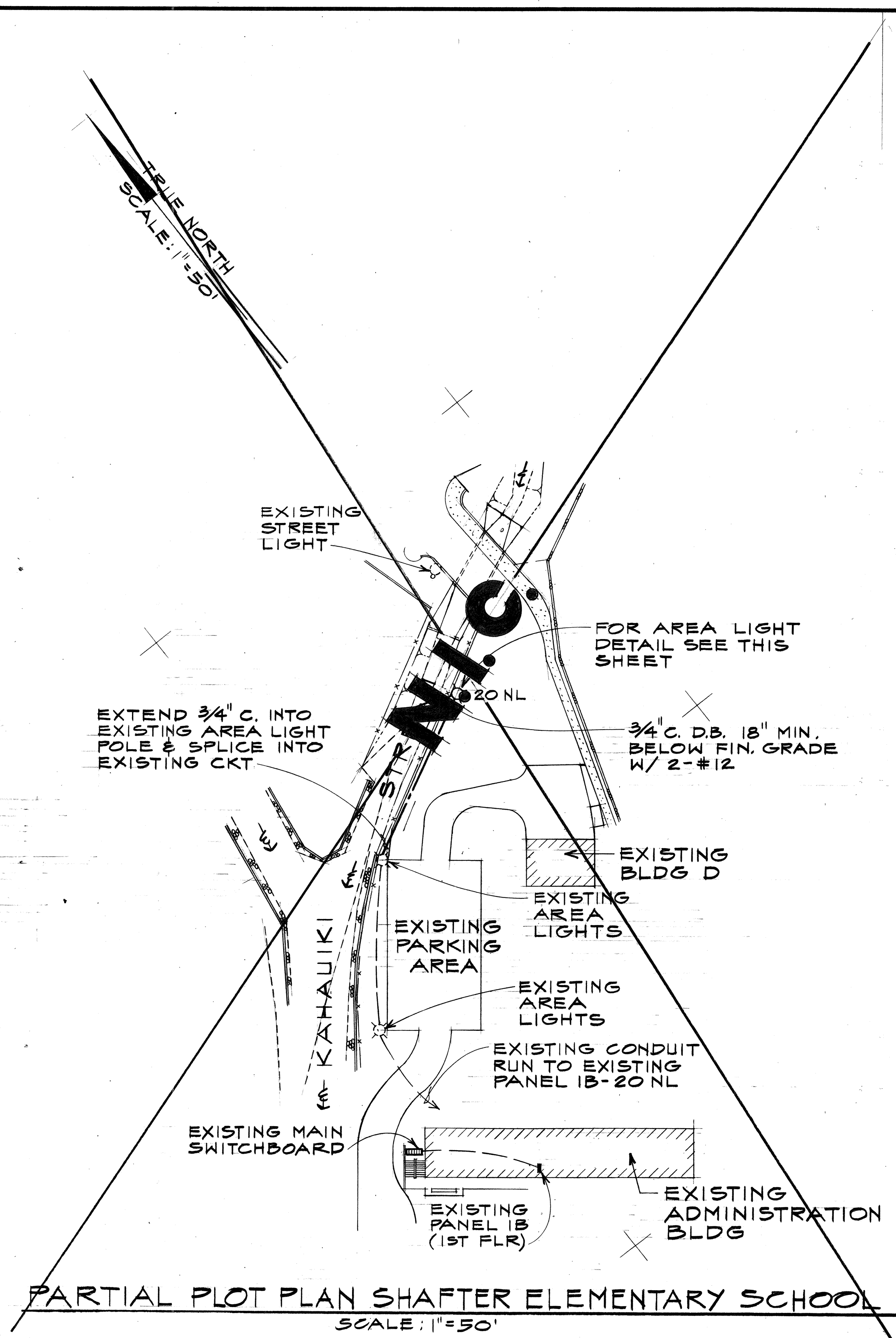
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

UTILITY RELOCATION PLAN

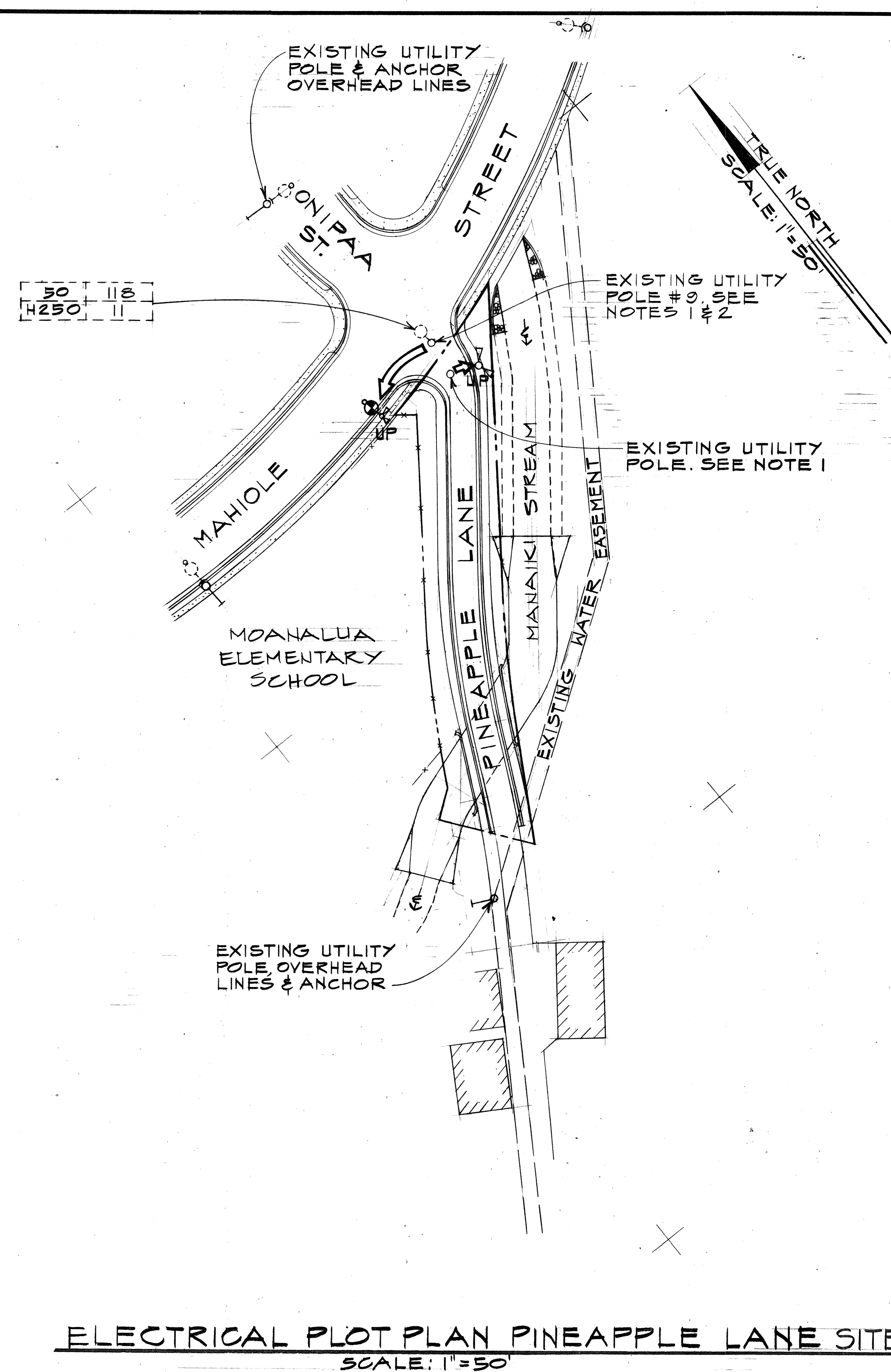
MOANALUA ROAD
PUULOA I.C. TO MIDDLE ST.-UNIT 2
F.A. Proj. No. FF-078-1(17)
SCALE: AS SHOWN DATE: JAN. 14, 1977
SHEET NO. E-4 OF 29 SHEETS

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

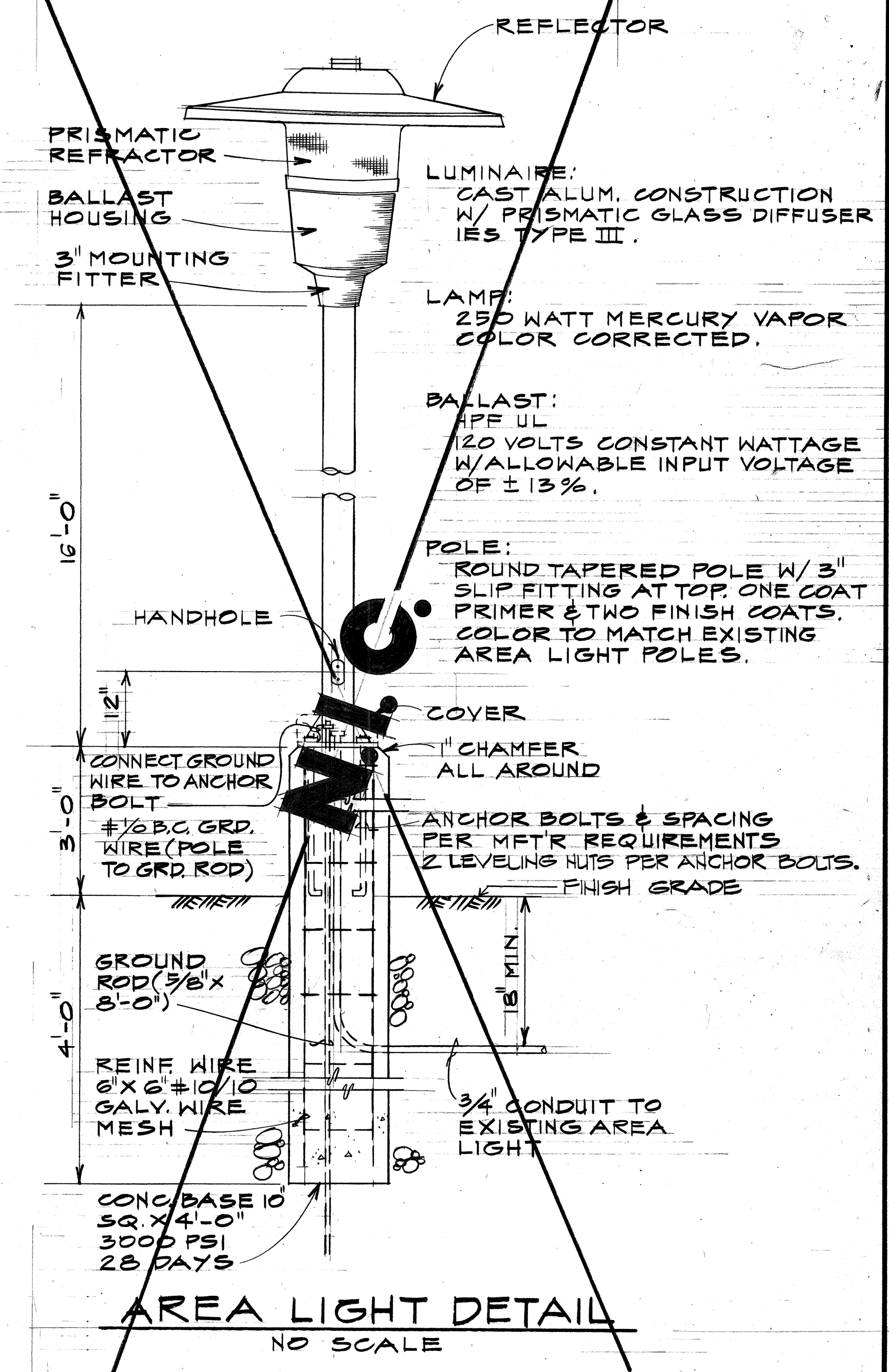
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	93	164



PARTIAL PLOT PLAN SHAFTER ELEMENTARY SCHOOL
SCALE: 1"=50'

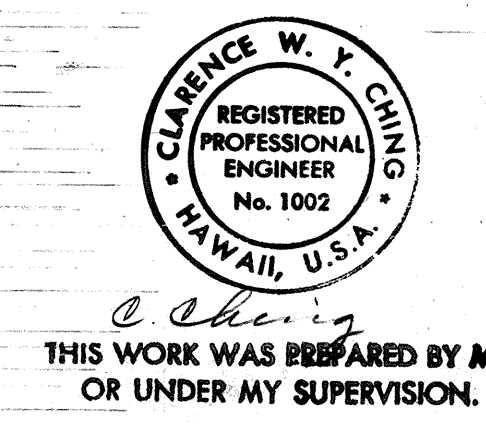


ELECTRICAL PLOT PLAN PINEAPPLE LANE SITE-D
SCALE: 1"=50'



NOTES:

- EXISTING UTILITY POLE, OVERHEAD HECO LINES AND ASSOCIATED EQUIPMENT TO BE RELOCATED BY HECO. EXT'G OVERHEAD HECO LINES AND ASSOC. EQUIP TO BE RELOCATED BY HECO (N.I.C.)
- EXISTING STREET LIGHT AND NAMEPLATE TO BE RELOCATED ON JOINT UTILITY POLE. COIL SLACK CABLE NEATLY FOR FINAL CONNECTION TO HECO SECONDARY SVC BY HECO.
- STREET LIGHTING SHALL BE RELOCATED AND IN SERVICE IN ONE WORKING DAY. NOTIFY AND COORDINATE WORK WITH ENGINEER AT ELECTRICAL AND MAINTENANCE SERVICES DIVISION, DEPT. OF TRANSPORTATION SERVICES, CITY AND COUNTY OF HONOLULU (PHONE 523-4305), THREE (3) WORKING DAYS PRIOR TO START OF RELOCATION.



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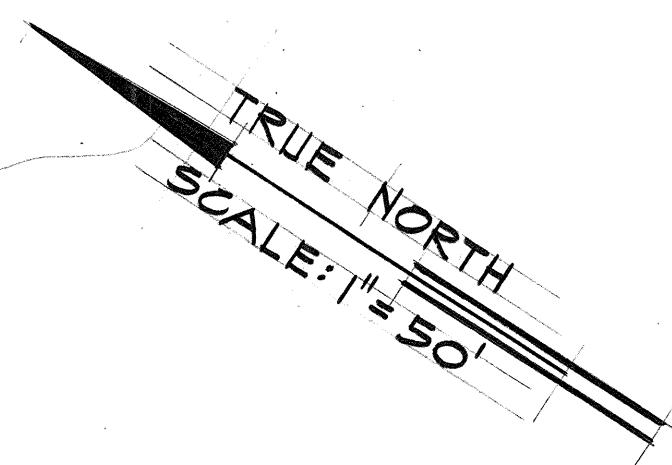
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

UTILITY RELOCATION PLAN
SITE "D"

MOANALUA ROAD
PUULOA I.C. TO MIDDLE ST. - UNIT 2
F.A. Proj. No. FF-078-1(17)
SCALE: AS SHOWN DATE: JAN. 14, 1977
SHEET NO. E-5 OF 29 SHEETS

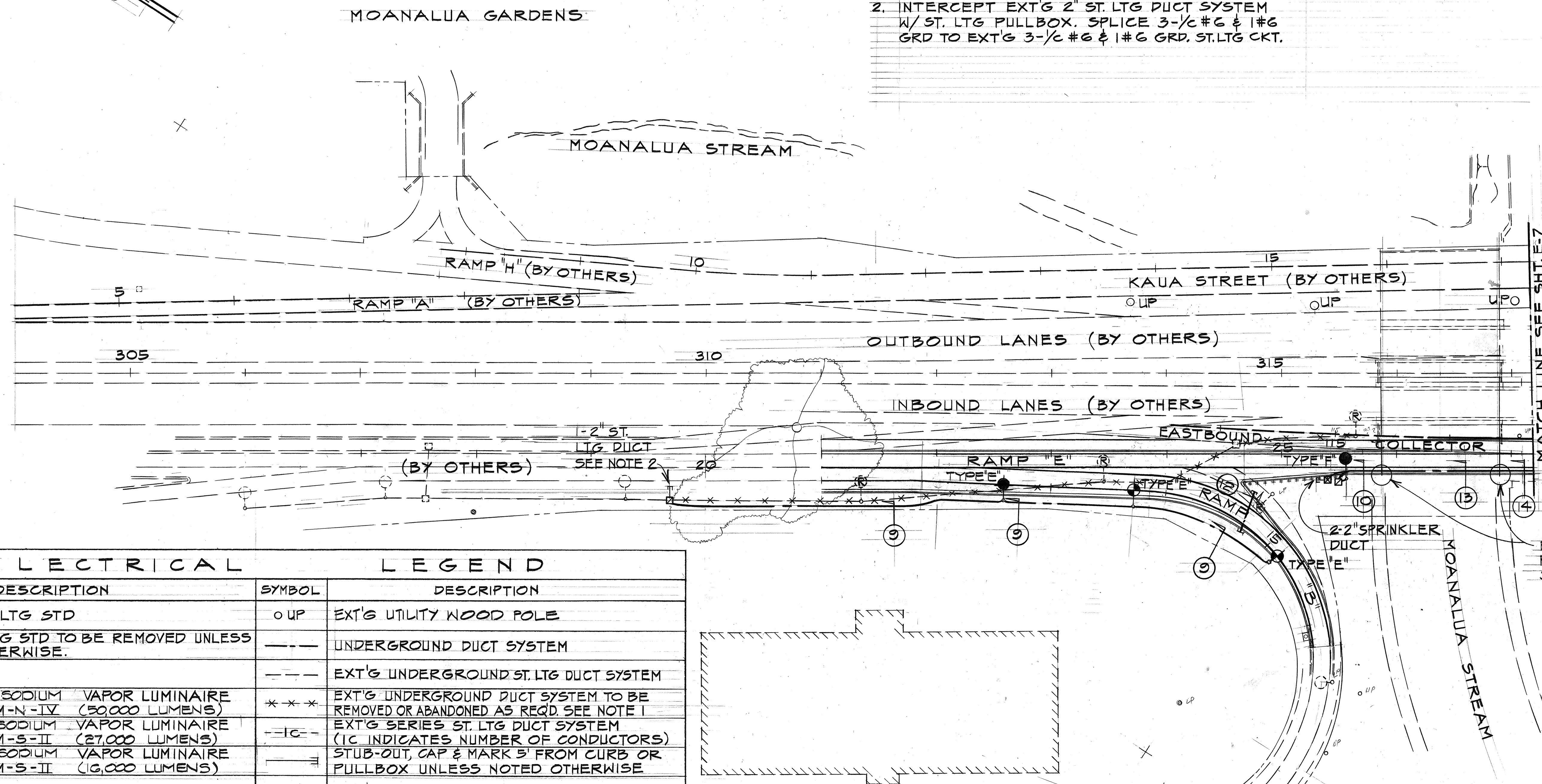
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	94	164

F-FF-078-1(17)



NOTES:

1. REMOVE OR ABANDON EXT'G ST. LTG DUCTS, CABLES AND OTHER EQUIPMENT AS REQ'D.
2. INTERCEPT EXT'G 2" ST. LTG DUCT SYSTEM W/ ST. LTG PULLBOX. SPLICE 3-1/2" #6 & 1#6 GRD TO EXT'G 3-1/2" #6 & 1#6 GRD. ST. LTG CKT.



ELECTRICAL		LEGEND	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
○	EXT'G ST. LTG STD	o UP	EXT'G UTILITY WOOD POLE
⊗	EXT'G ST. LTG STD TO BE REMOVED UNLESS NOTED OTHERWISE.	---	UNDERGROUND DUCT SYSTEM
		---	EXT'G UNDERGROUND ST. LTG DUCT SYSTEM
●	400 WATT SODIUM VAPOR LUMINAIRE IES TYPE M-N-IV (50,000 LUMENS)	* * *	EXT'G UNDERGROUND DUCT SYSTEM TO BE REMOVED OR ABANDONED AS REQ'D. SEE NOTE 1
●	250 WATT SODIUM VAPOR LUMINAIRE IES TYPE M-S-II (27,000 LUMENS)	-IC-	EXT'G SERIES ST. LTG DUCT SYSTEM (IC INDICATES NUMBER OF CONDUCTORS)
●	150 WATT SODIUM VAPOR LUMINAIRE IES TYPE M-S-II (16,000 LUMENS)	---	STUB-OUT, CAP & MARK 5' FROM CURB OR PULLBOX UNLESS NOTED OTHERWISE
		M	EXT'G ST. LTG MARKER
		②	DUCT SECTION INDICATOR, NUMBER IS DETAIL ASSIGNMENT
⊠	SPRINKLER SYSTEM PULLBOX - 19" x 28" PRECAST CONCRETE, D.O.T. STD TYPE "B"	⊠	DETAIL INDICATOR TOP HALF DET. ASSIGNMENT BOTTOM HALF SHT ASSIGNMENT
⊠	ST. LTG PULLBOX - 19" x 28" PRECAST CONCRETE, D.O.T. STD TYPE "B"	—OH—	TEMPORARY OVERHEAD ST. LT CKT
JB	JUNCTION BOX CAST METAL		
□	EXT'G PULLBOX		

EXPANSION COUPLINGS REQ'D. FOR DETAILS SEE (A) E-12

12/28/78 ADDED SPRINKLER DUCT
DATE REVISION

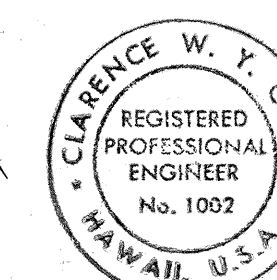
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STREET LIGHTING PLAN

MOANALUA ROAD
PUULO A.I.C. TO MIDDLE ST. - UNIT 2
F.A. Proj. No. FF-078-1(17)

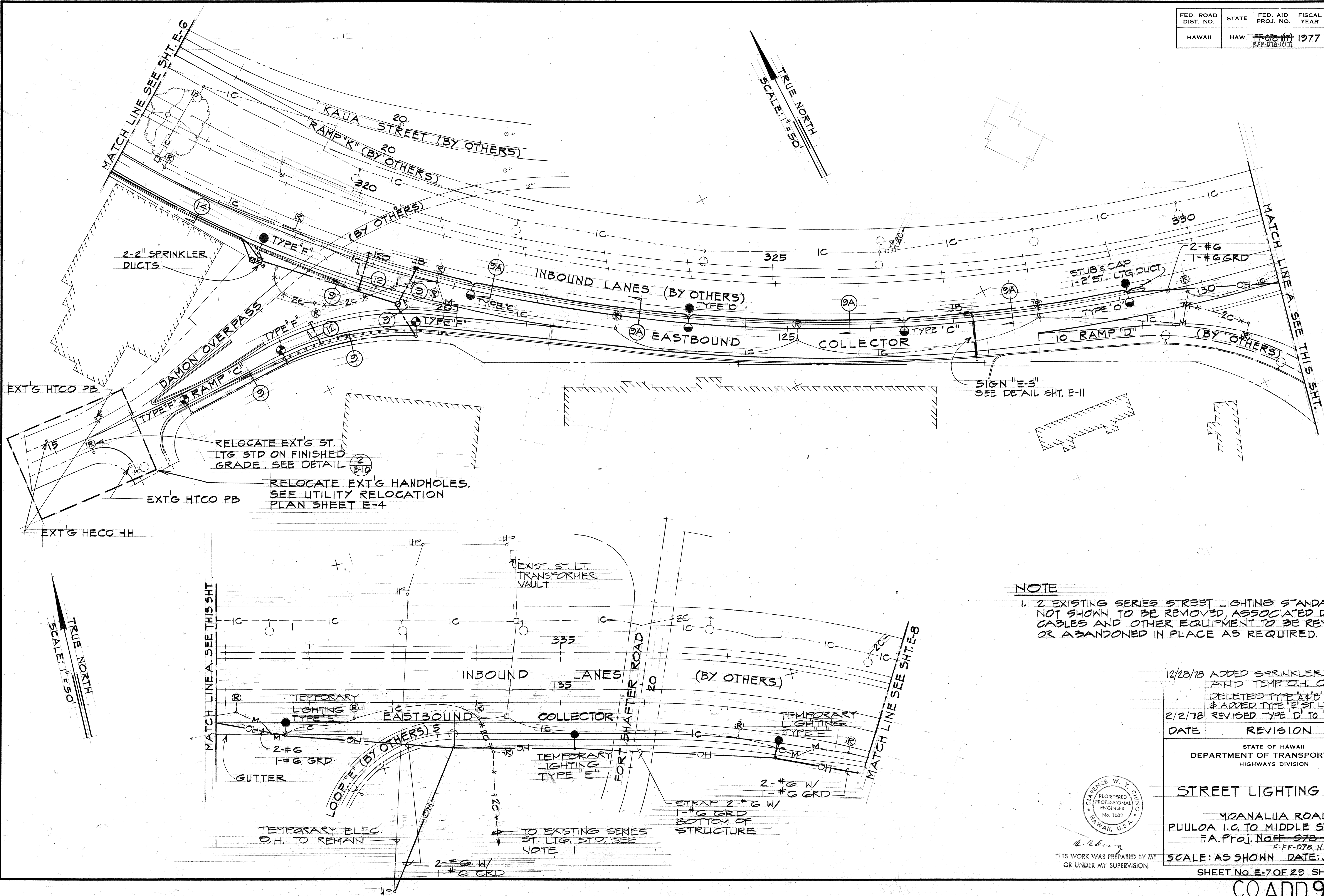
SCALE: AS SHOWN DATE: JAN. 14, 1977

SHEET NO. E-6 OF 29 SHEETS



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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	95	164

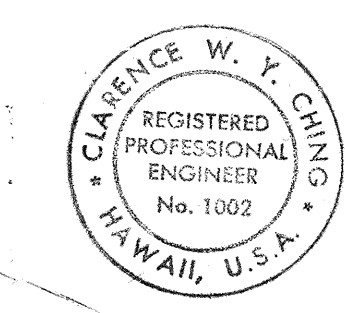


NOTE

1. 2 EXISTING SERIES STREET LIGHTING STANDARD NOT SHOWN TO BE REMOVED, ASSOCIATED DUCTS, CABLES AND OTHER EQUIPMENT TO BE REMOVED OR ABANDONED IN PLACE AS REQUIRED.

12/28/78	ADDED SPRINKLER DUCT AND TEMP O.H. CABLES. DELETED TYPE 'A' & 'B' ST. LG. STD. & ADDED TYPE 'E' ST. LG. STD.
2/2/78	REVISED TYPE 'D' TO 'C'

DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
STREET LIGHTING PLAN	
MOANALUA ROAD PUULO A I.C. TO MIDDLE ST. UNIT 2 F.A. Proj. No. FF-078-1(17) F-F-078-1(17)	
SCALE: AS SHOWN DATE: JAN. 14, 1977	
SHEET NO. E-7 OF 20 SHEETS	

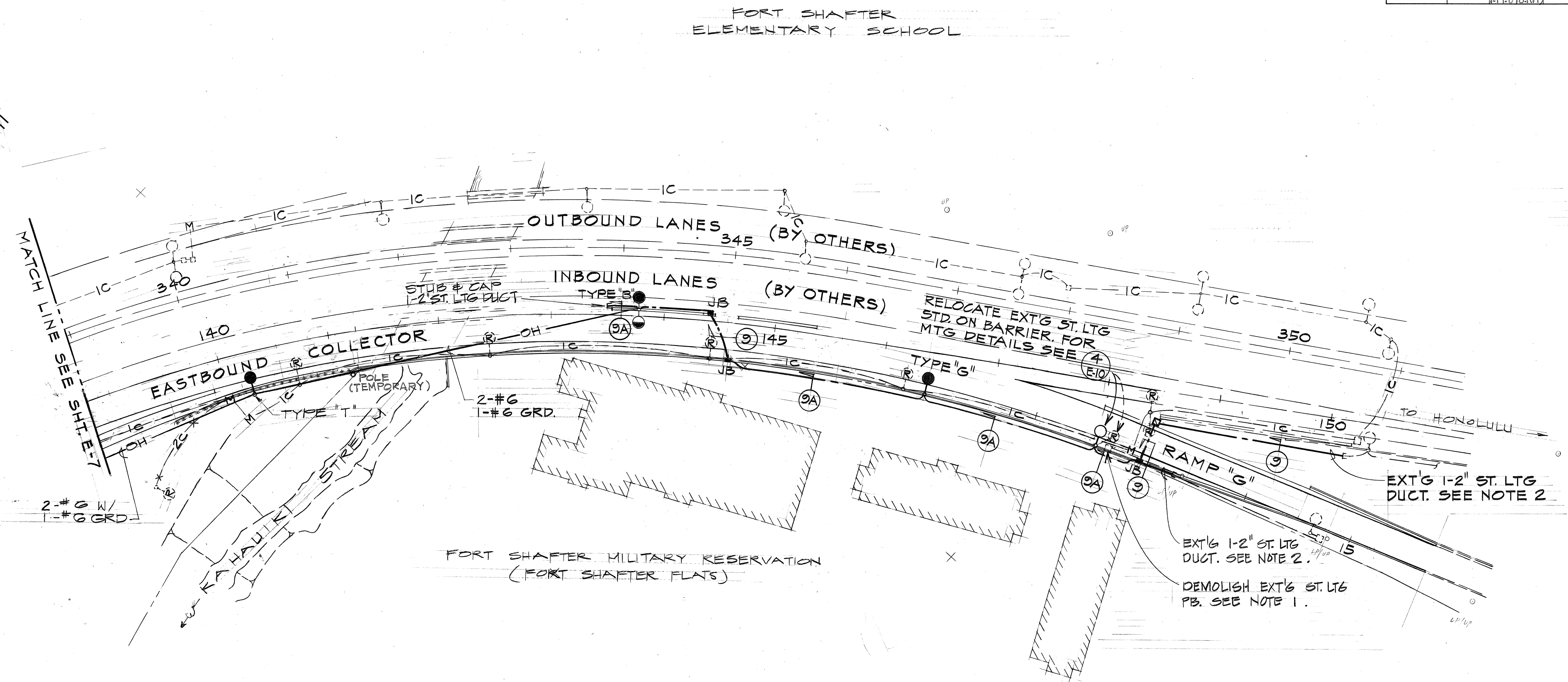


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C.O. ADD 95

ORIGINAL PLAN	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17) EFFECT 8/1/77	1977	96	164



- NOTE:**
1. DEMOLISH EXT'G ST. LTG PB. CUT & REMOVE EXT'G ST. LTG DUCT & CABLE AS REQD AND EXTEND 1-2" ST. LTG DUCT TO JB IN BARRIER AS SHOWN ON PLAN.
 2. EXTEND 1-2" ST. LTG DUCT TO EXT'G 1-2" ST. LTG DUCT AS SHOWN ON PLANS.

PLAN
SCALE: 1"=50'

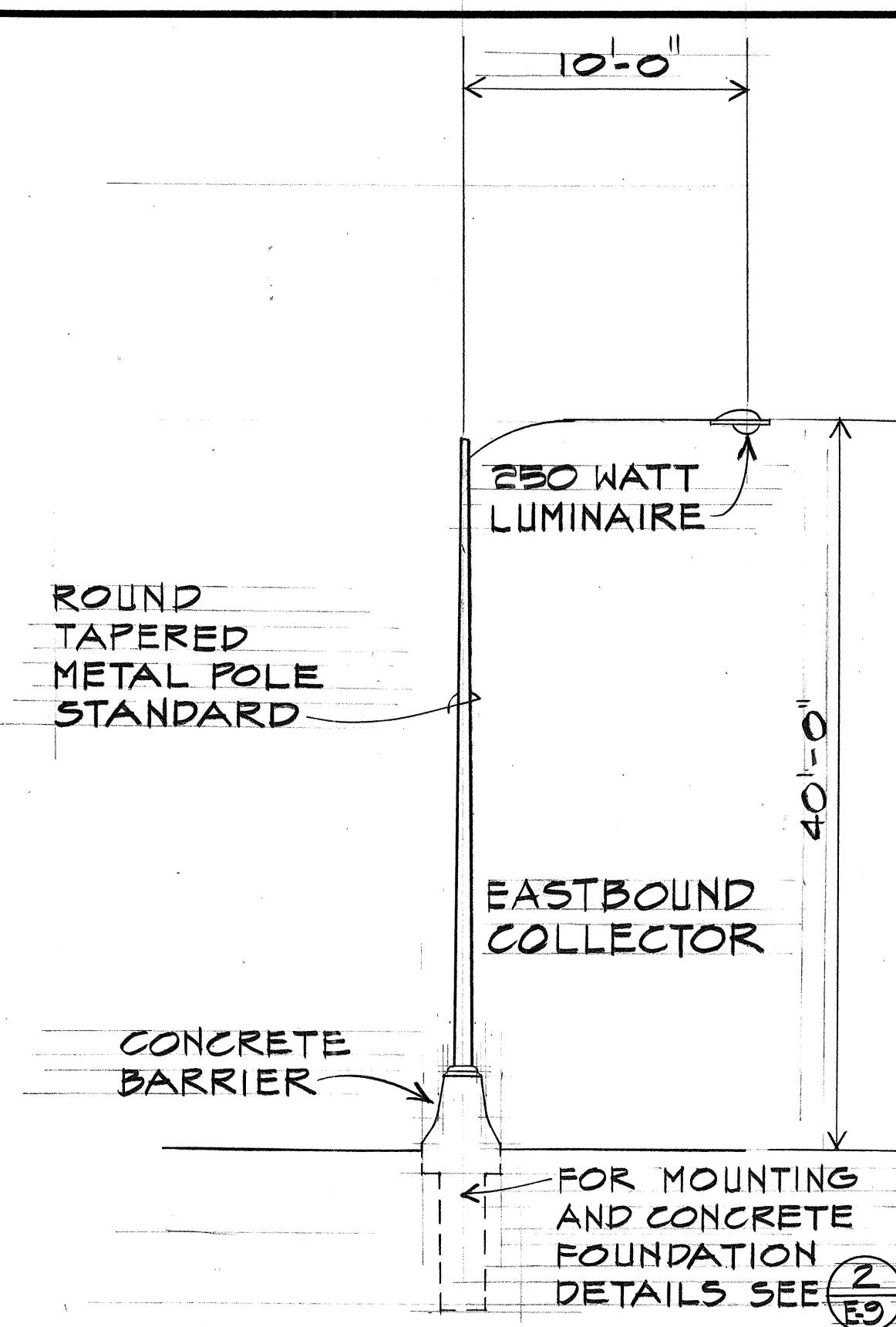
DATE	_____
SURVEY PLOTTED BY	_____
DRAWN BY	_____
DESIGNED BY	_____
CHECKED BY	_____
ORIGINAL PLAN	_____
NOTE BOOK	_____
NO.	_____



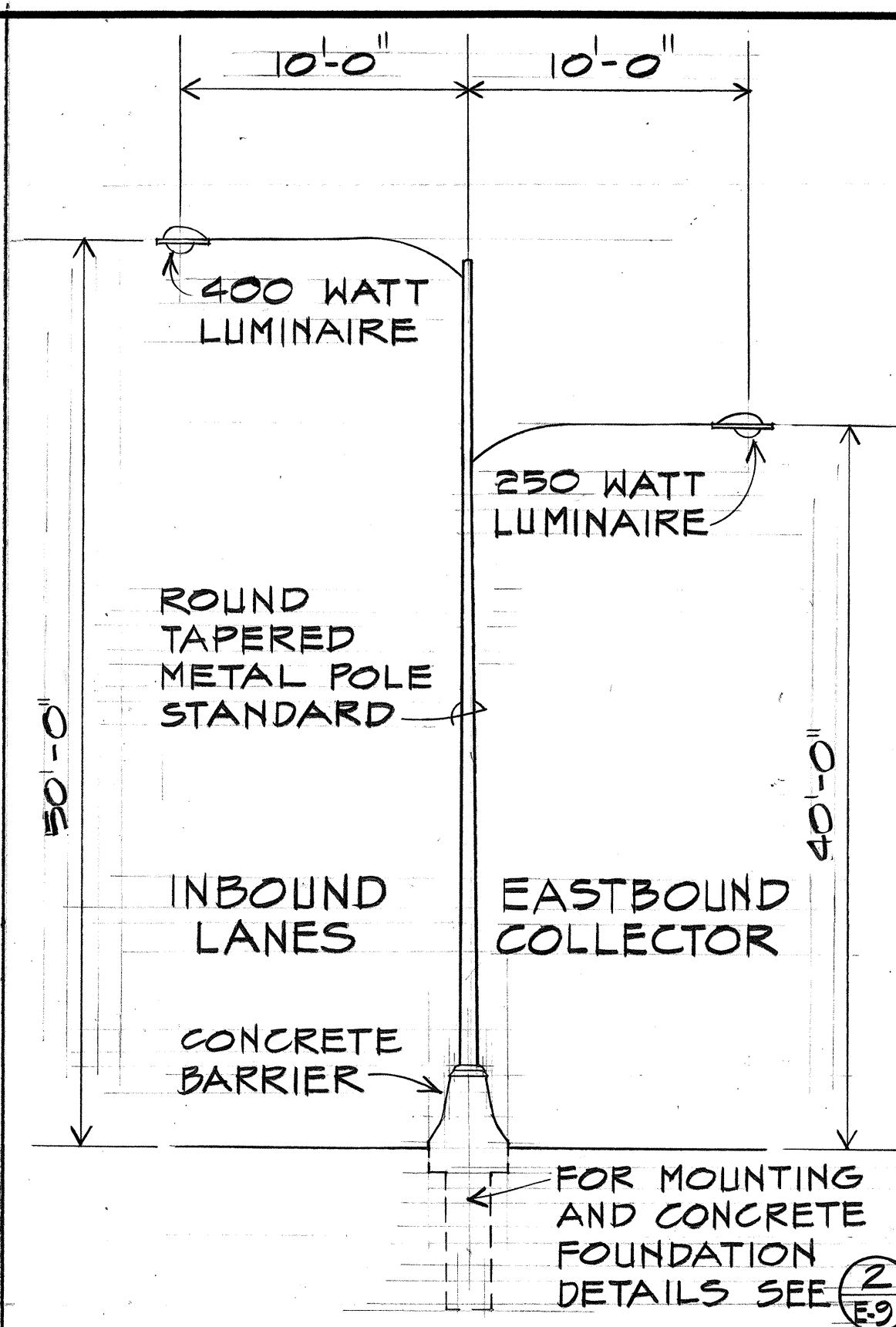
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OR UNDER MY SUPERVISION.

12/28/78	ADDED TEMP. OH. CABLES DELETED TYPE "A" #8 ST. LTG. STD. & ADDED TYPE T ST. LTG. STD.
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
STREET LIGHTING PLAN	
MOANALUA ROAD PUULOA I.C. TO MIDDLE ST. - UNIT 2 F.A. Proj. No. FF-078-1(17) EFFECT 8/1/77	
SCALE: AS SHOWN DATE: JAN. 14, 1977	
SHEET No. E-8 OF 29 SHEETS	

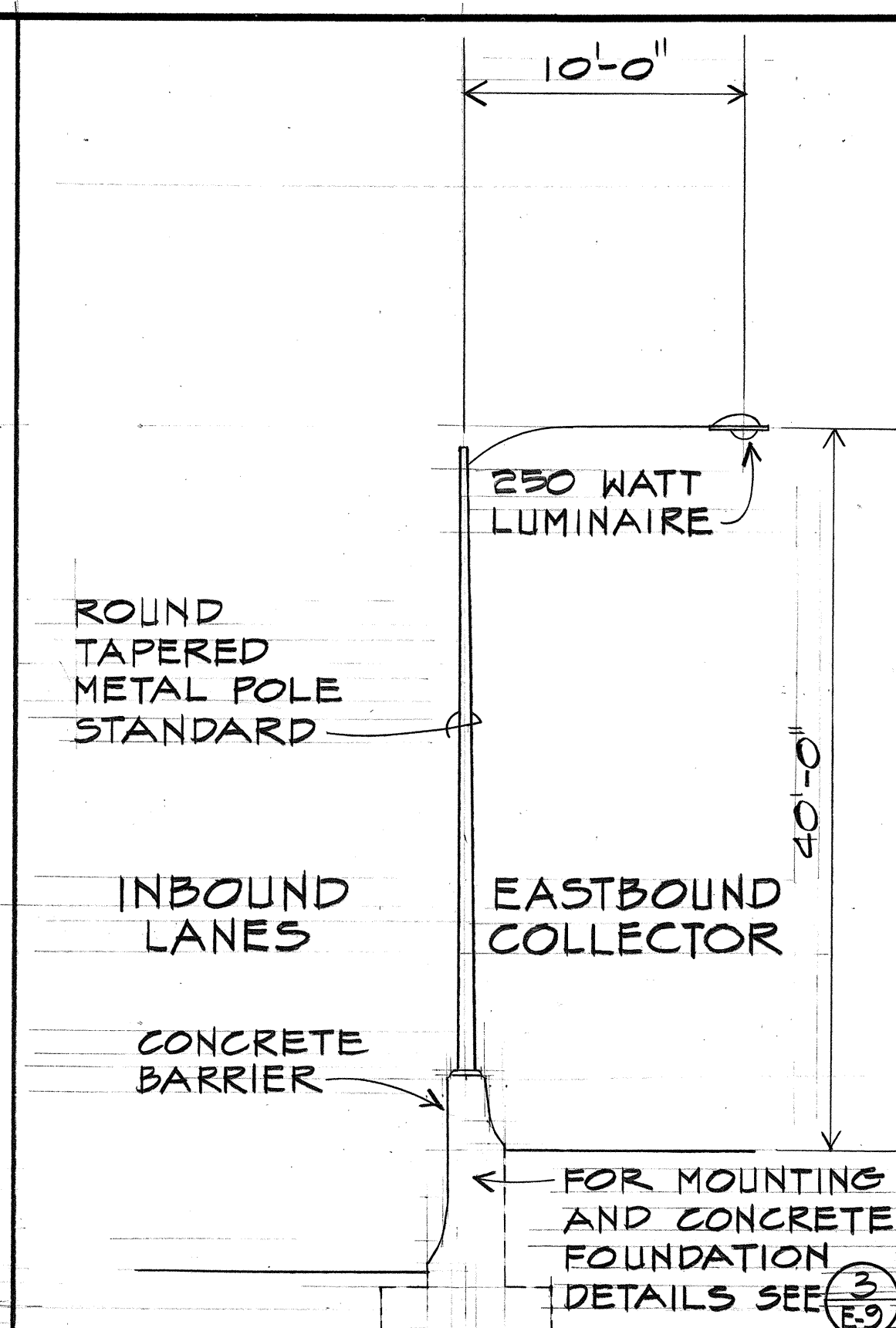
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	97	164



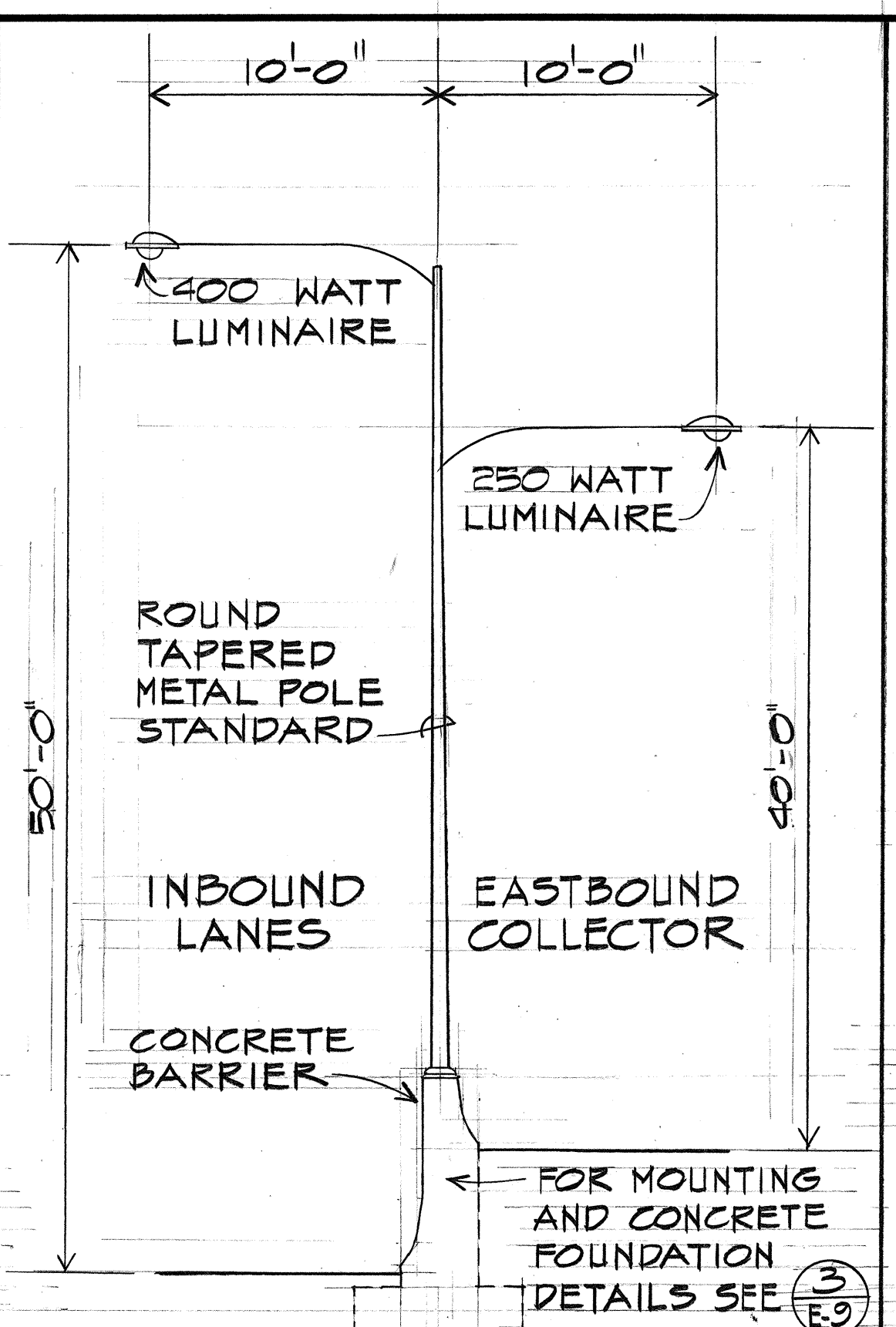
TYPE "A" ST. LTG. STD. DETAIL (A) E-9
NO SCALE



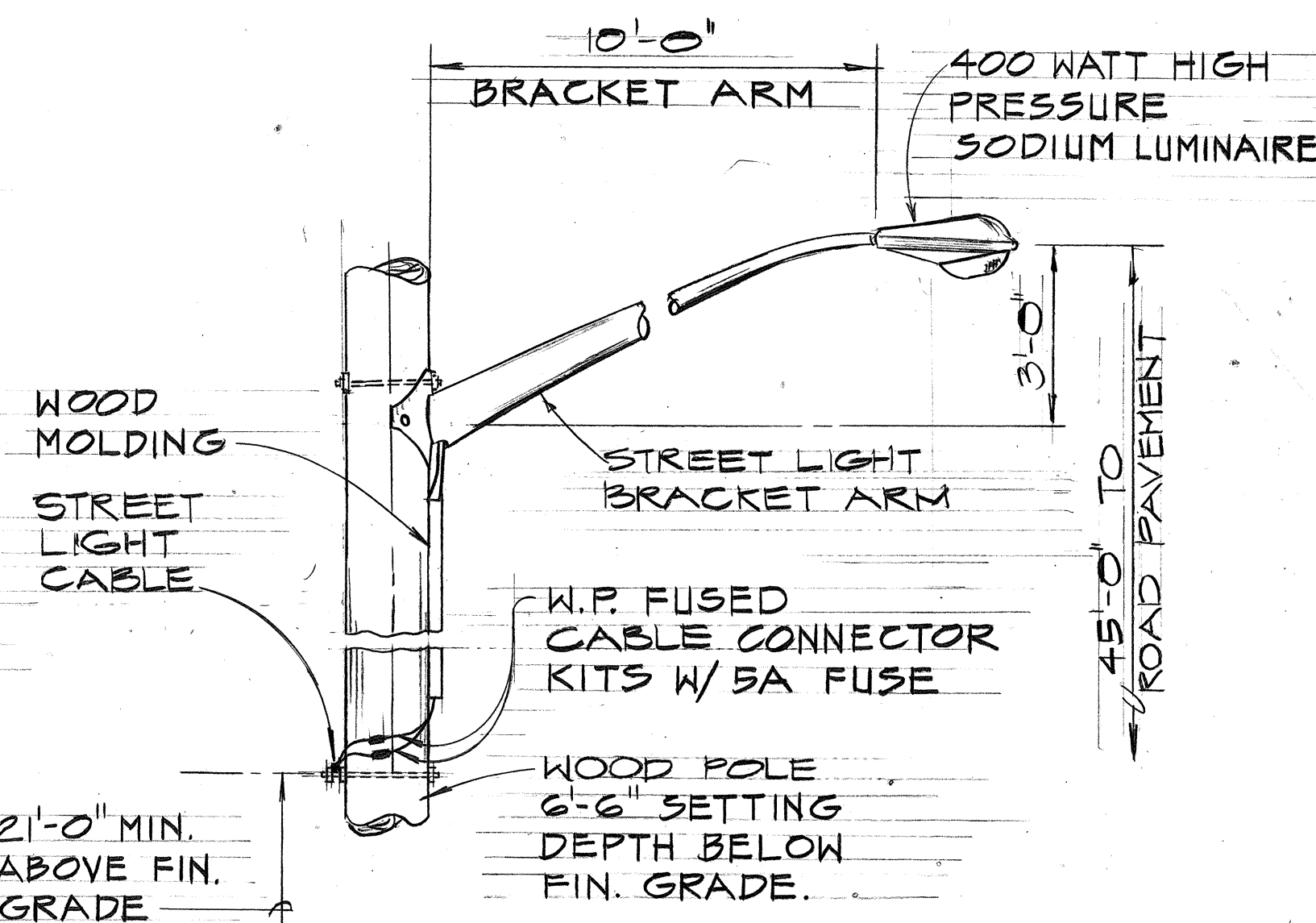
TYPE "B" ST. LTG. STD. DETAIL (B) E-9
NO SCALE



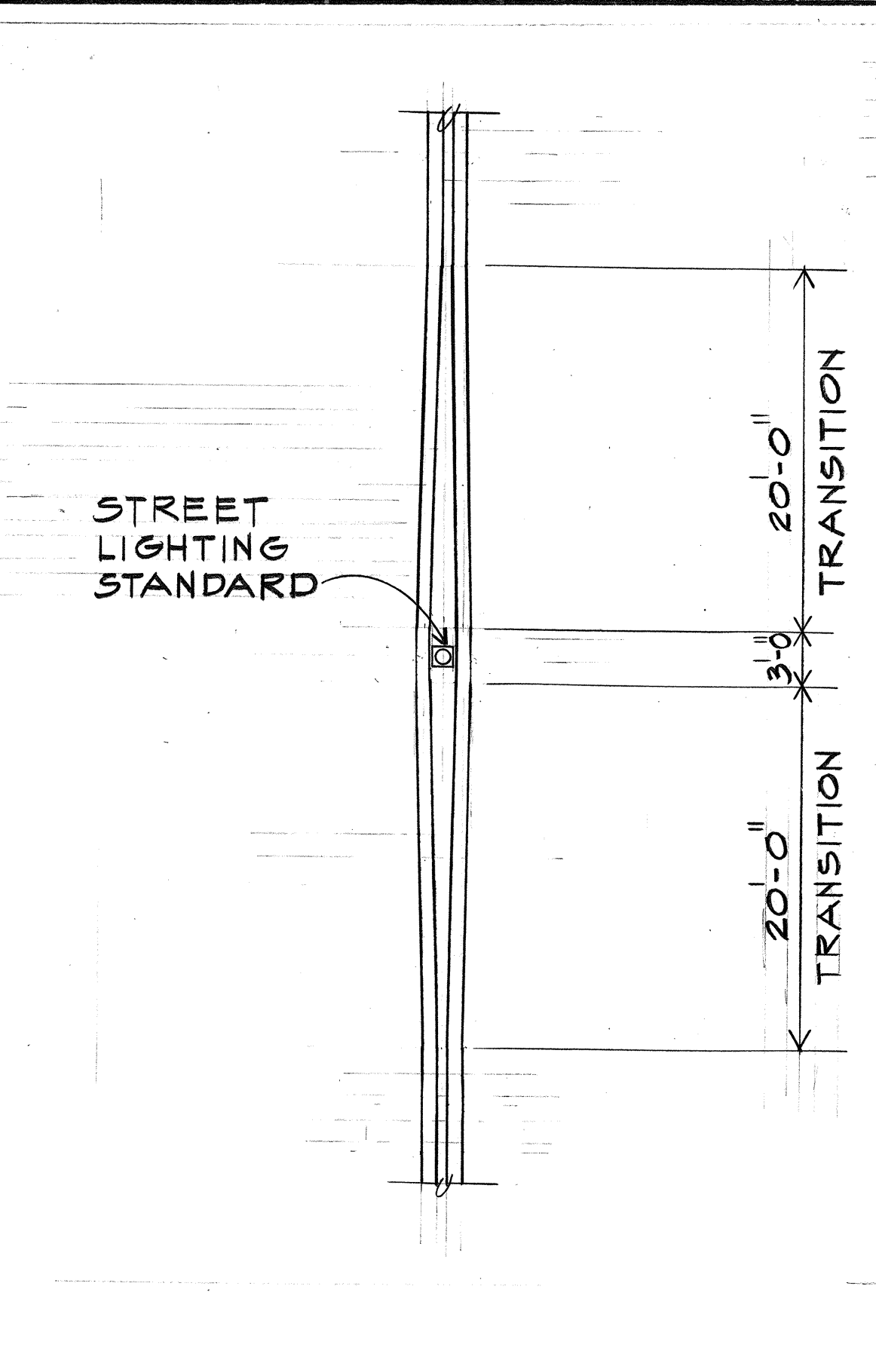
TYPE "C" ST. LTG. STD. DETAIL (C) E-9
NO SCALE



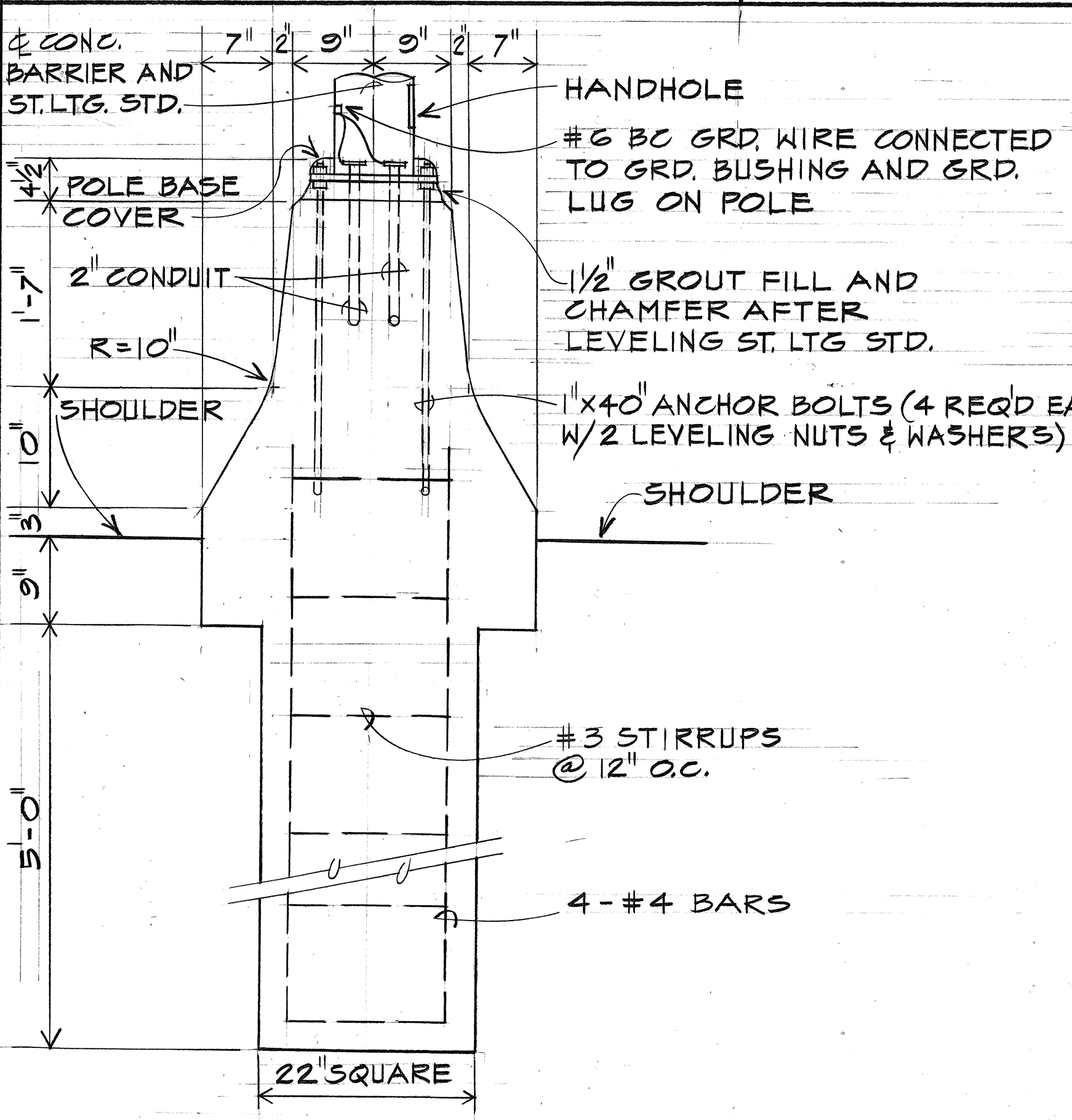
TYPE "D" ST. LTG. STD. DETAIL (D) E-9
NO SCALE



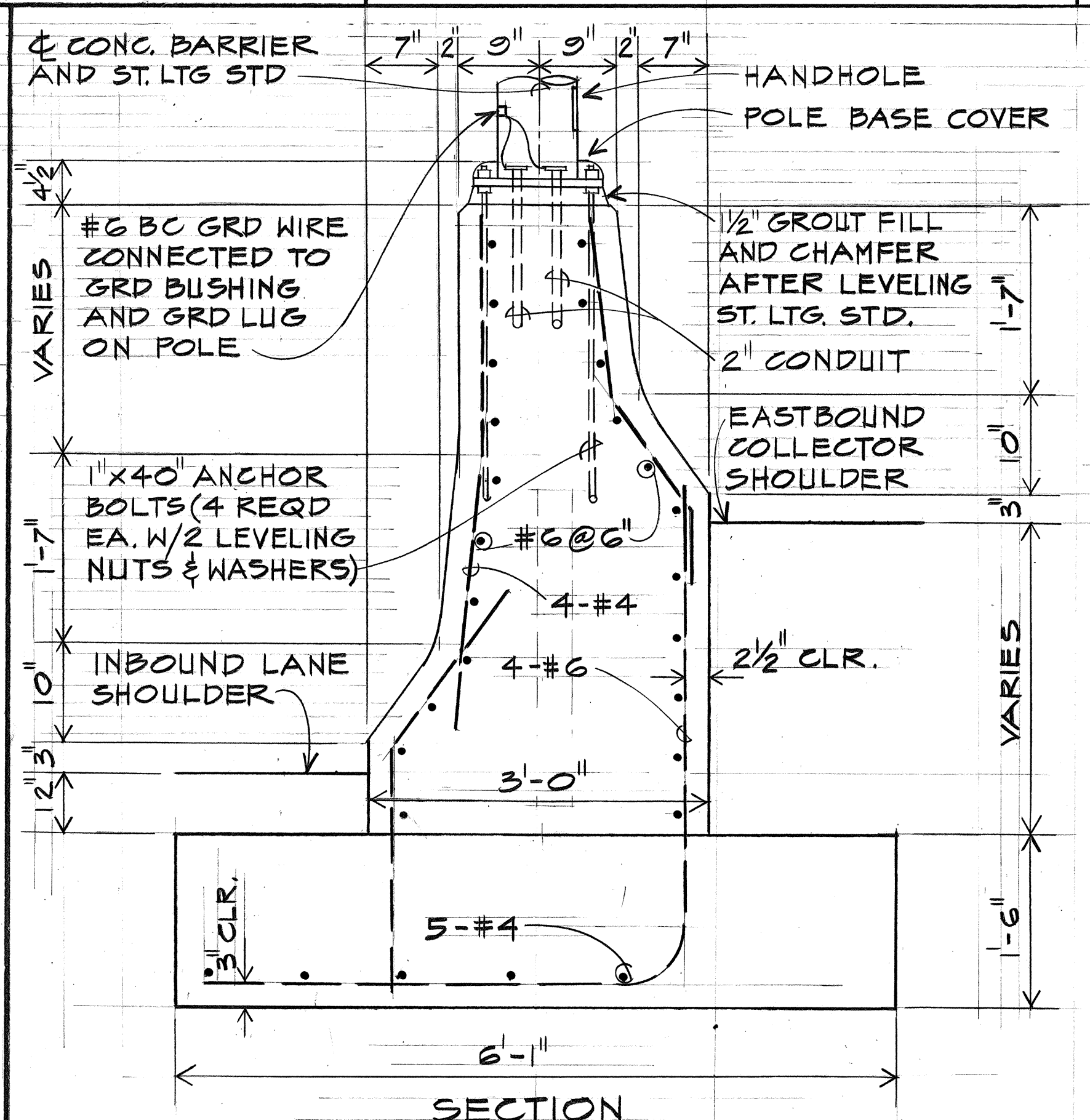
TYPE "T" TEMPORARY STREET LIGHTING DETAIL (E) E-9
NO SCALE



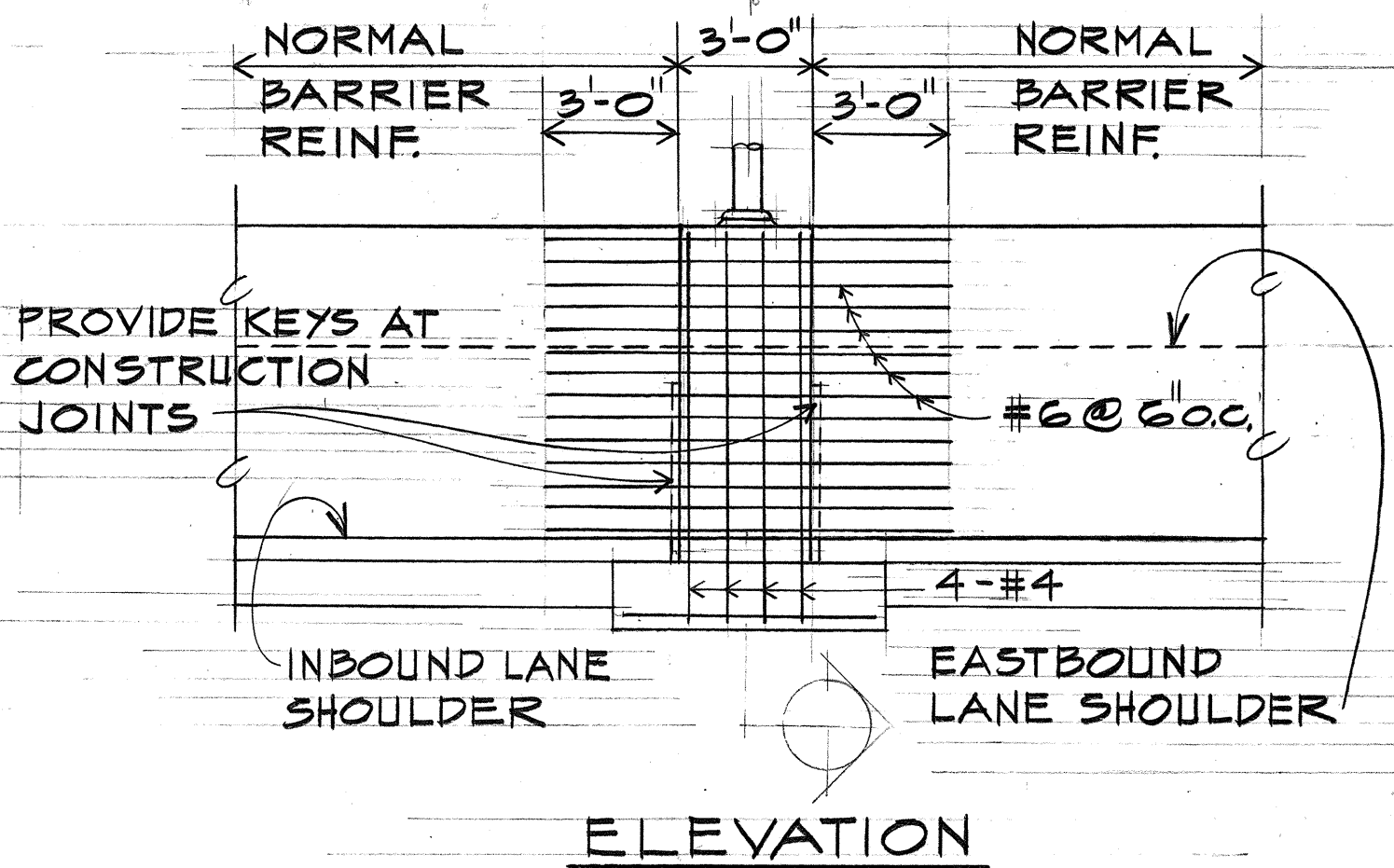
TYPICAL MEDIAN CONCRETE BARRIER TRANSITION (1) E-9
NO SCALE



MOUNTING DET. FOR TYPE "A" & "B" ST. LTG. STD (2) E-9
NO SCALE



MOUNTING DET. FOR TYPE "C" & "D" ST. LTG. STD (3) E-9
NO SCALE



12/28/78	ADDED DETAIL E
DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STREET LIGHTING STANDARD DETAILS

MOANALUA ROAD
PUULOA I.C. TO MIDDLE ST.-UNIT 2
F.A. Proj. No. FF-078-1(17)
FF-078-1(17)

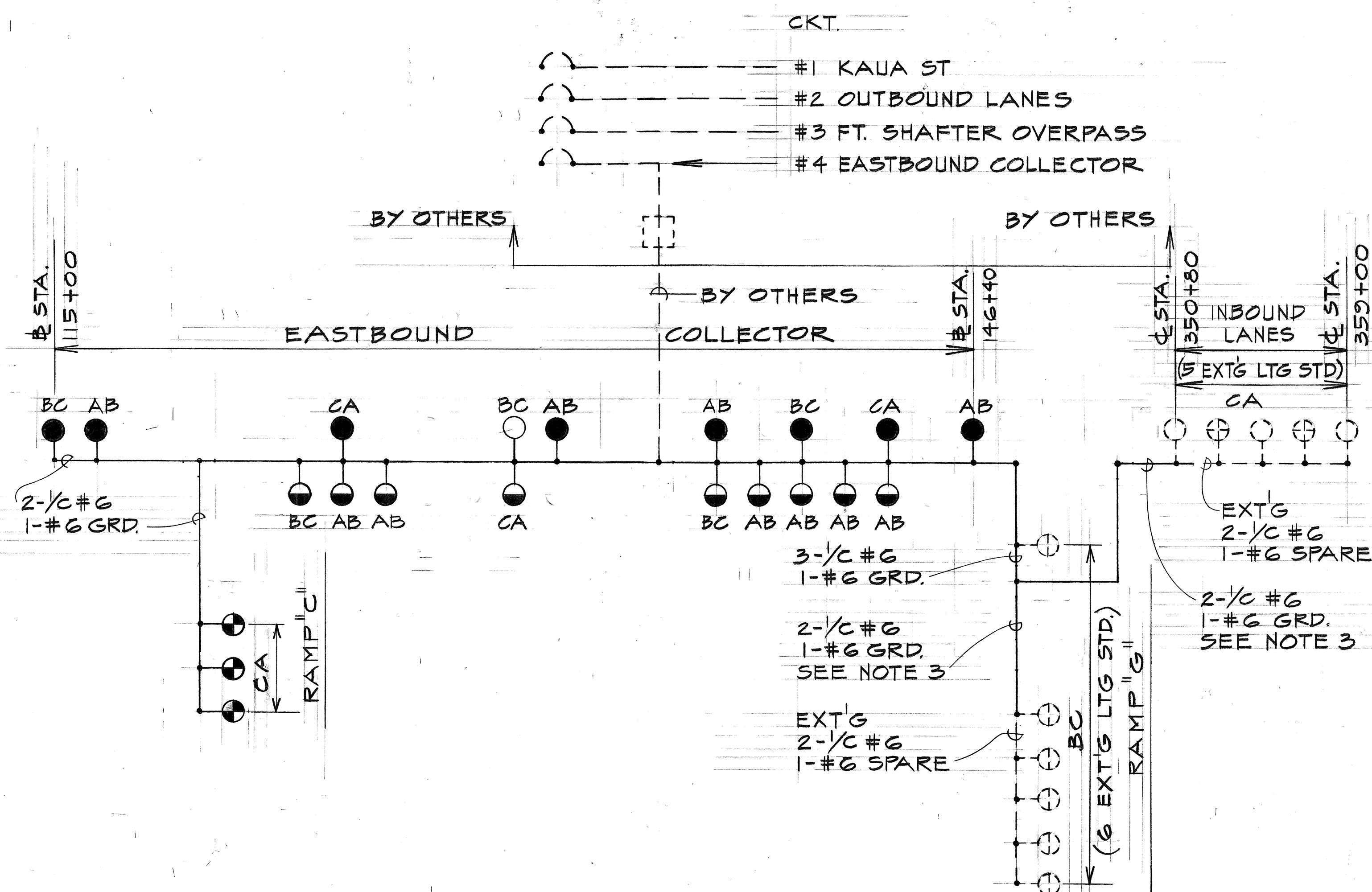
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SHEET No. E-9 OF 29 SHEETS



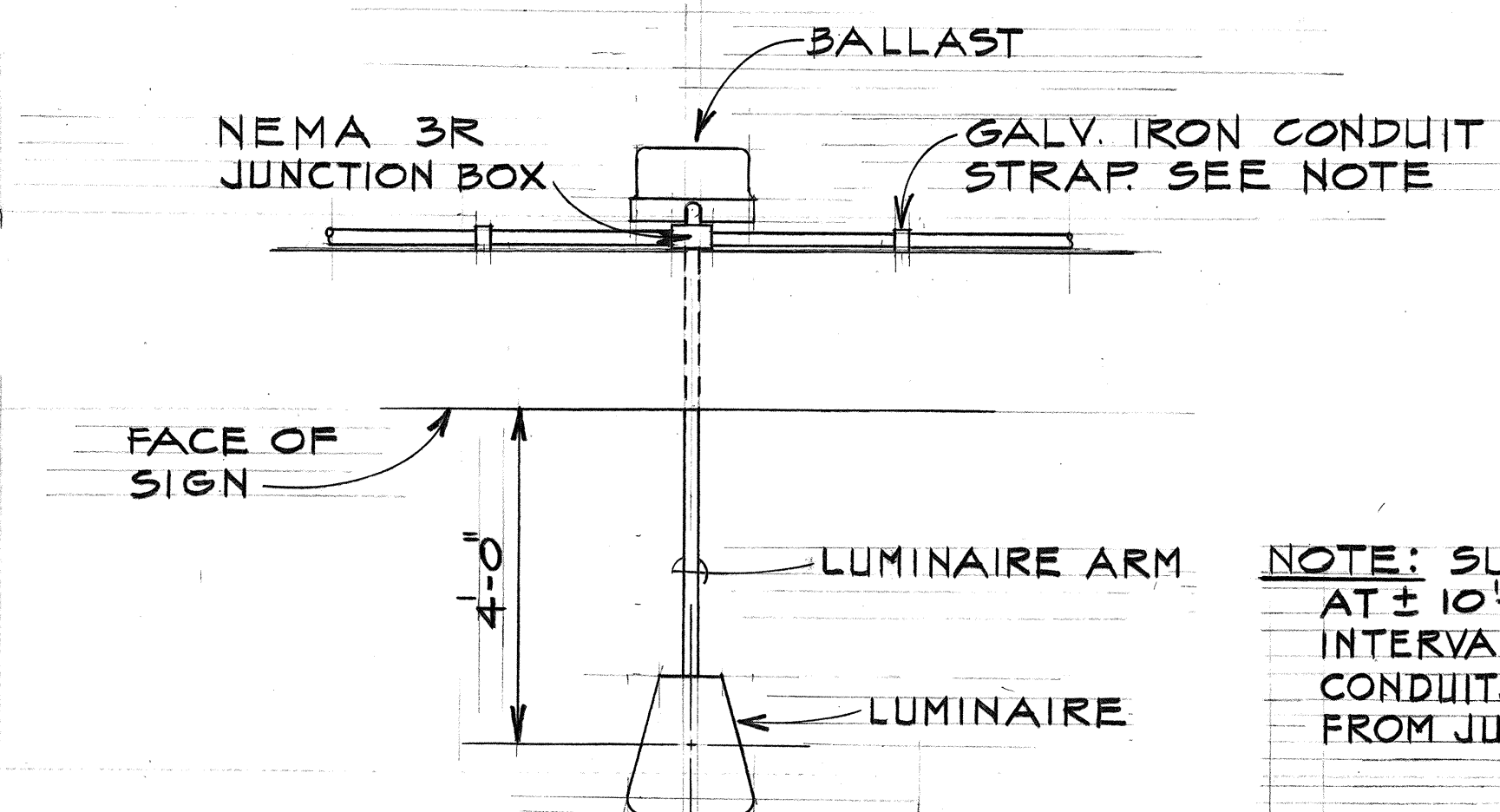
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FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	99	164



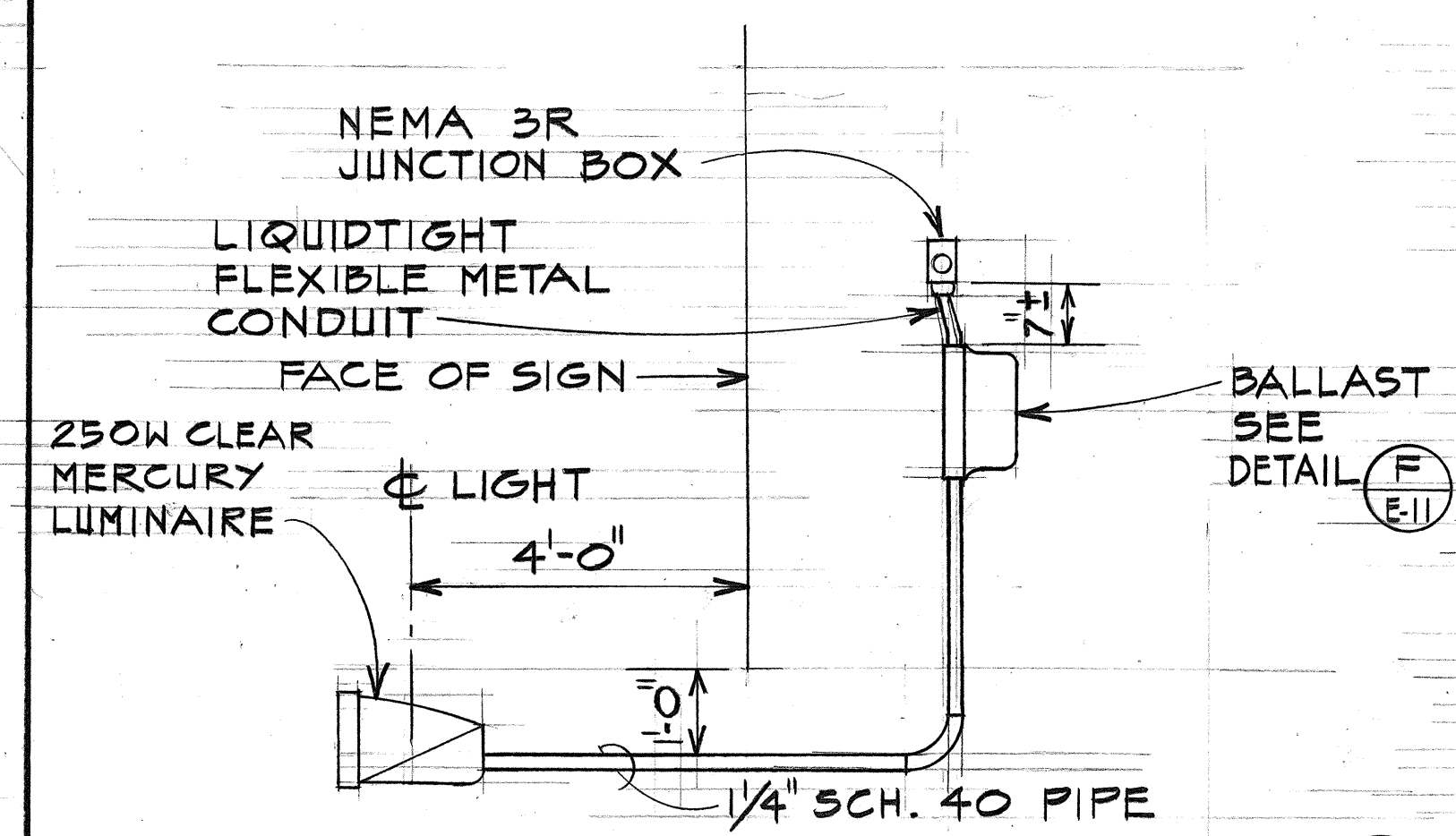
STREET LIGHTING WIRING DIAGRAM (A)
NO SCALE

- NOTES:**
1. ST. LTG CKT 3-1/2 #6, 1 #6 GRD UNLESS NOTED OTHERWISE.
 2. "AB", "BC", "CA" INDICATE ST. LTG CKT CONNECTION TO 480 V, 3 ϕ , 3W SYSTEM.
 3. CONNECT 2-1/2 #6, 1 #6 GRD TO EXT'G 2-1/2 #6, AND CONNECT EXT'G #6 SPARE WIRE TO GRD AT EXT'G LIGHTS AS SHOWN ON PLAN.

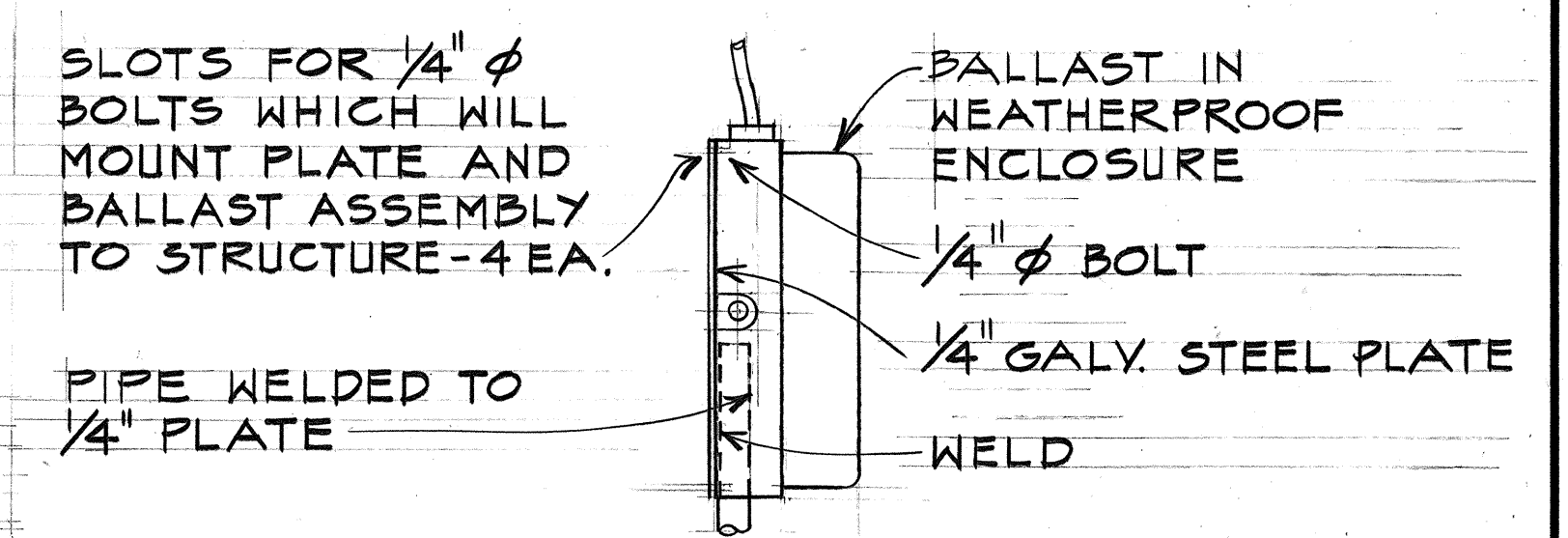


CONDUIT MOUNTING DETAIL (D)
E-II

NOTE: SUPPORT CONDUITS AT $\pm 10'-0"$ MAX. INTERVALS SUPPORT CONDUITS 3'-0" MAX. FROM JUNCTION BOX.

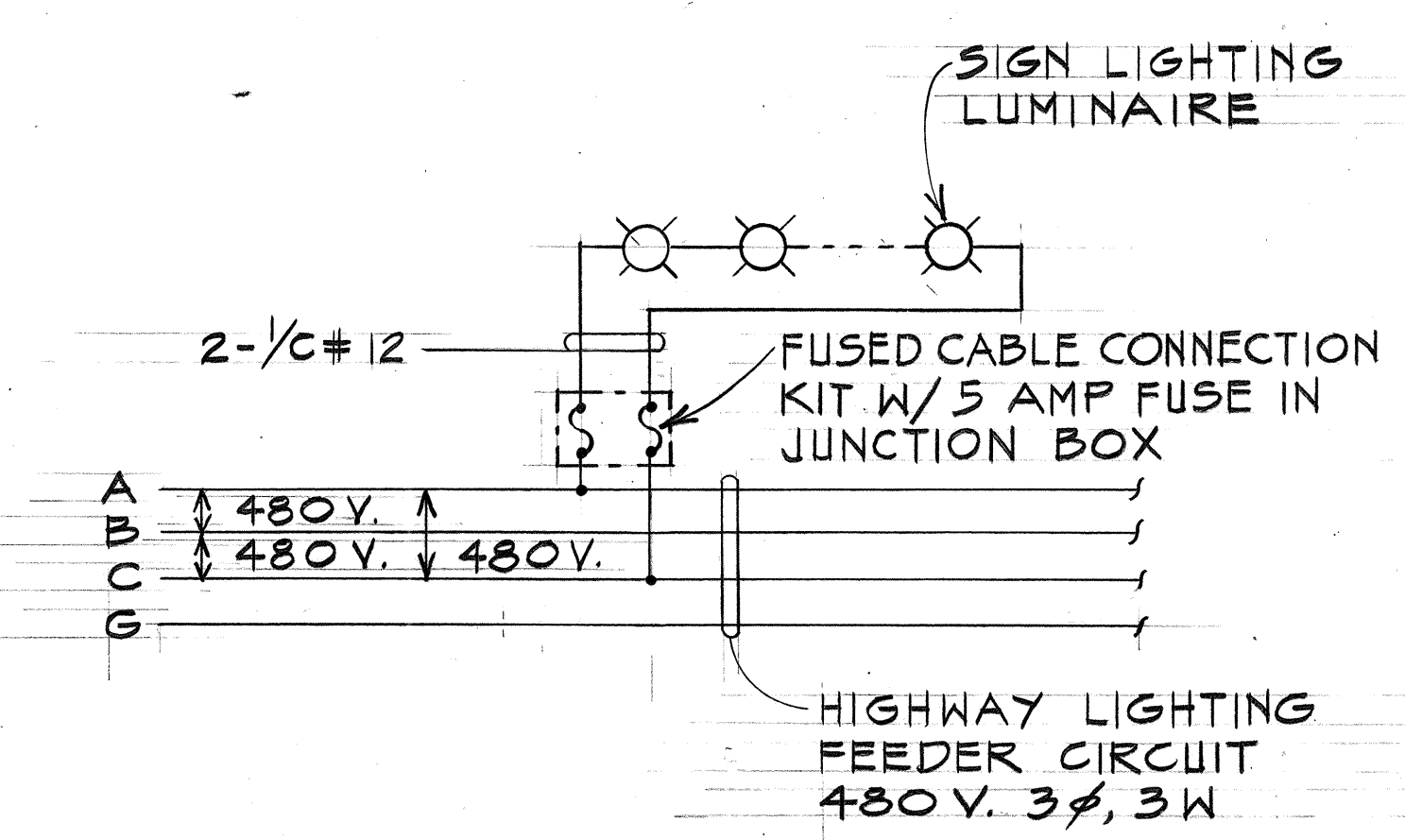


LUMINAIRE MOUNTING DETAIL (E)
E-II

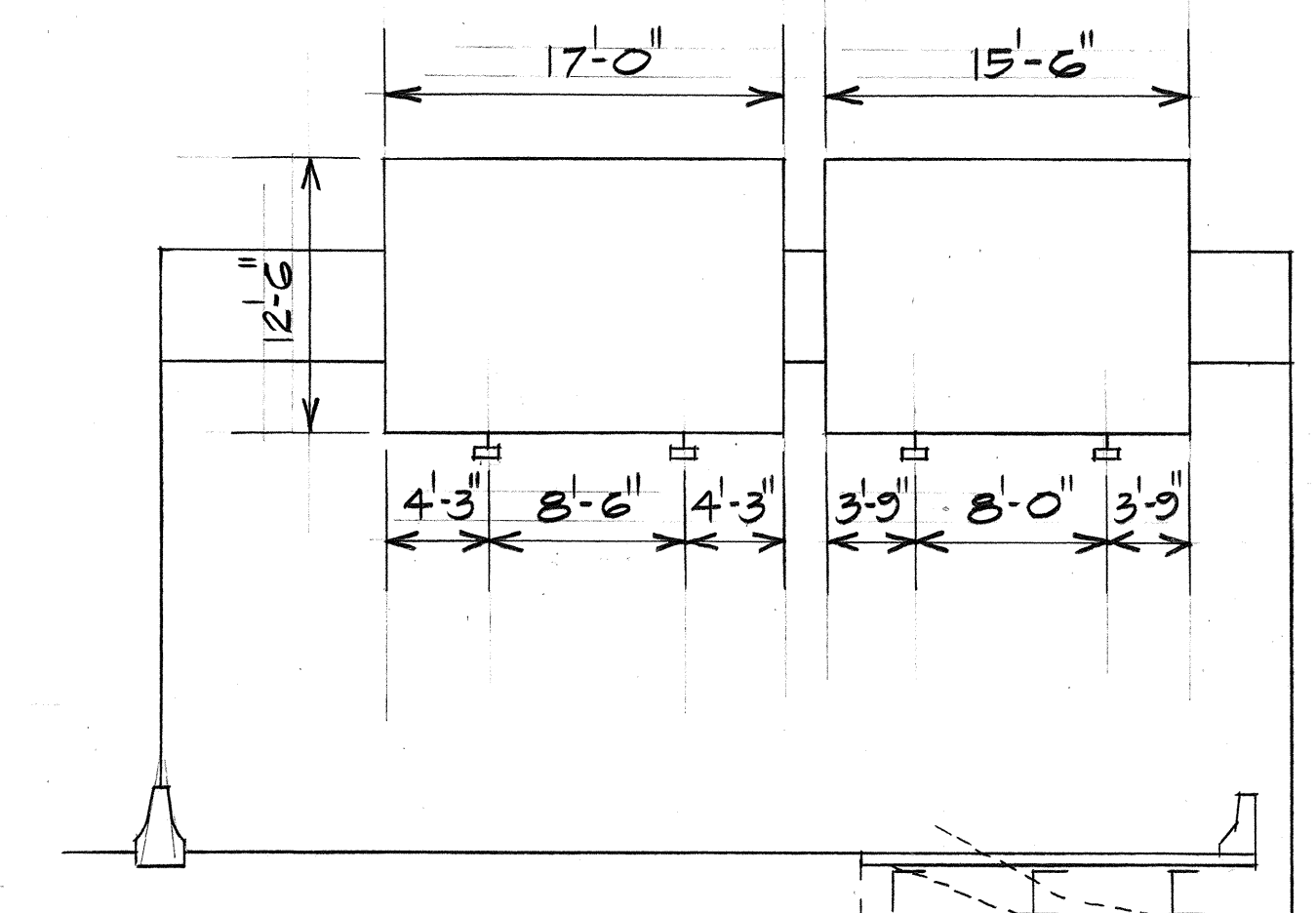


BALLAST-STEEL PLATE DETAIL (F)
E-II

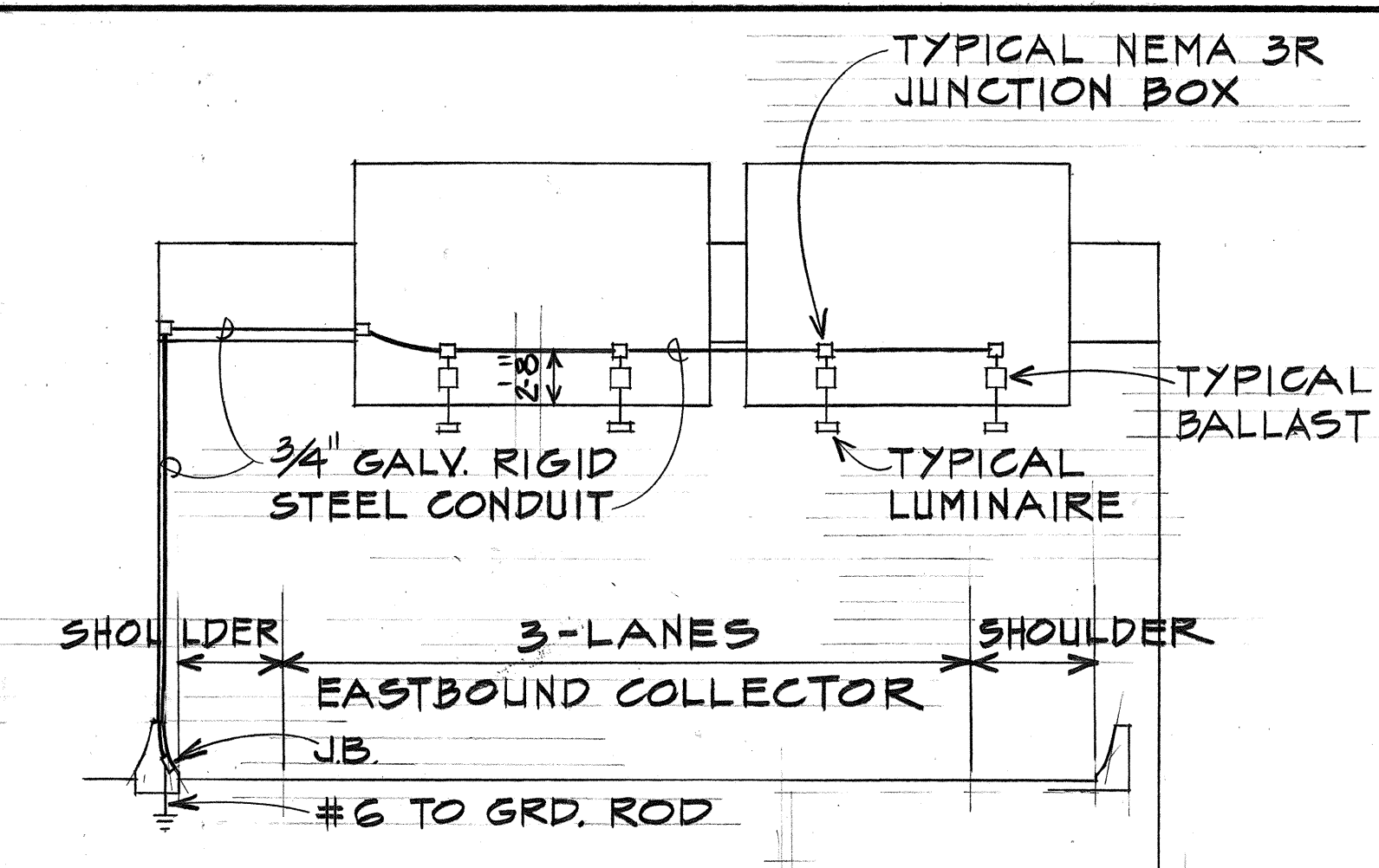
NOTE: PIPE & STEEL PLATE ASSEMBLY SHALL BE CAPABLE OF SUPPORTING LUMINAIRE AND BALLAST WITHOUT DAMAGE AGAINST 100 MPH WINDS. BOLTS ATTACHING BALLAST TO STEEL AND STEEL PLATE TO STRUCTURE SHALL BE PER MANUFACTURER'S RECOMMENDATIONS AND SHALL SUPPORT THE LUMINAIRE, BALLAST PIPE AND STEEL PLATE ASSEMBLY WITHOUT DAMAGE AGAINST 100 MPH WINDS.



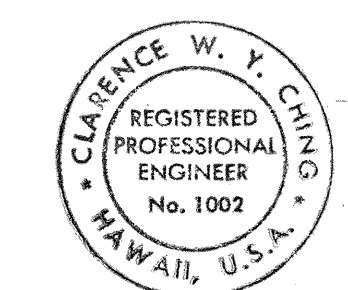
SIGN LTG WIRING DIAGRAM (B)
NO SCALE



SIGN E-3 LUMINAIRE SPACING DETAIL (C)
NO SCALE
E.C. STA. 127+23



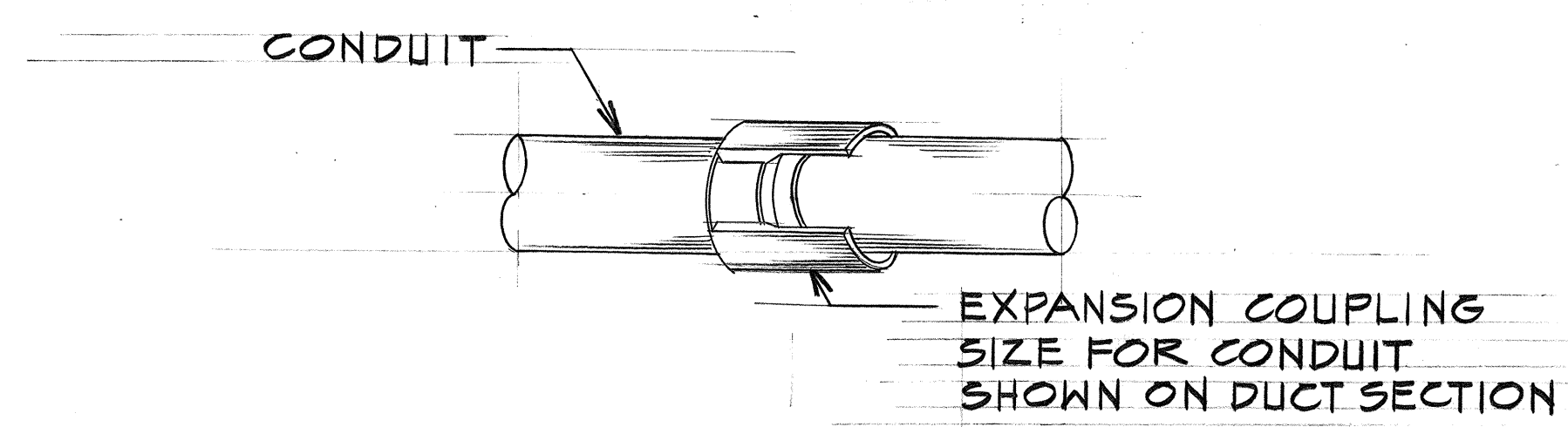
SIGN E-3 CONDUIT DETAIL (G)
NO SCALE



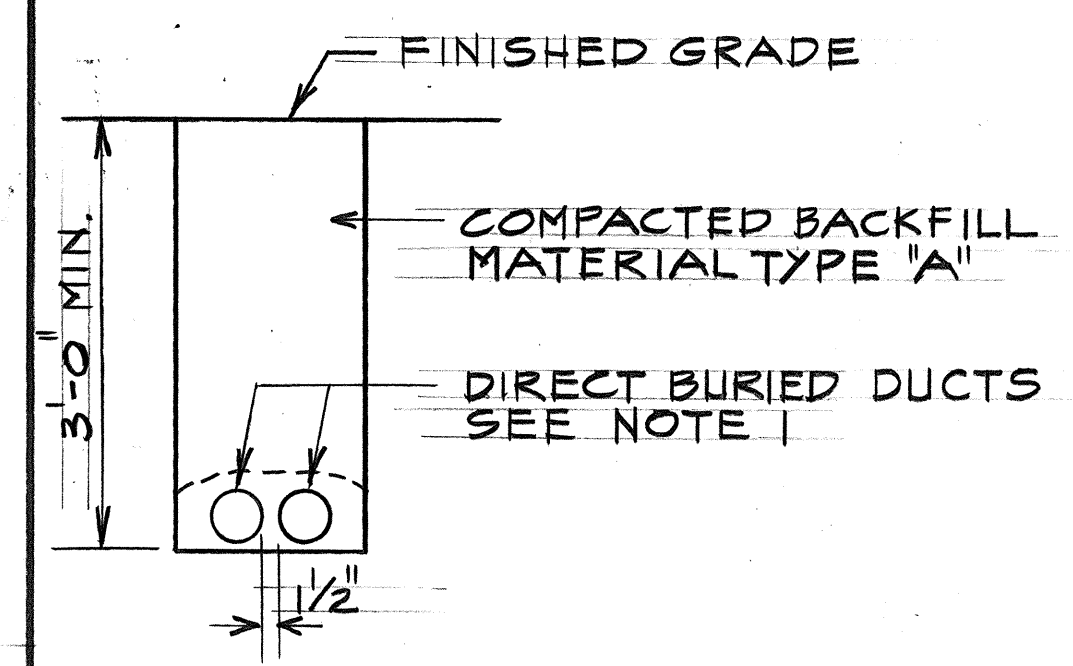
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

2/2/78	REVISED DET. A/E-II
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION SIGN LIGHTING DETAILS & ONE LINE DIAGRAMS MOANALUA ROAD PUULOA I.C. TO MIDDLE ST.-UNIT 2 F.A. Proj. No. FF-078-1(17) FFF078-1(17)	
SCALE: AS SHOWN DATE: JAN. 14, 1977 SHEET NO. E-II OF 29 SHEETS	

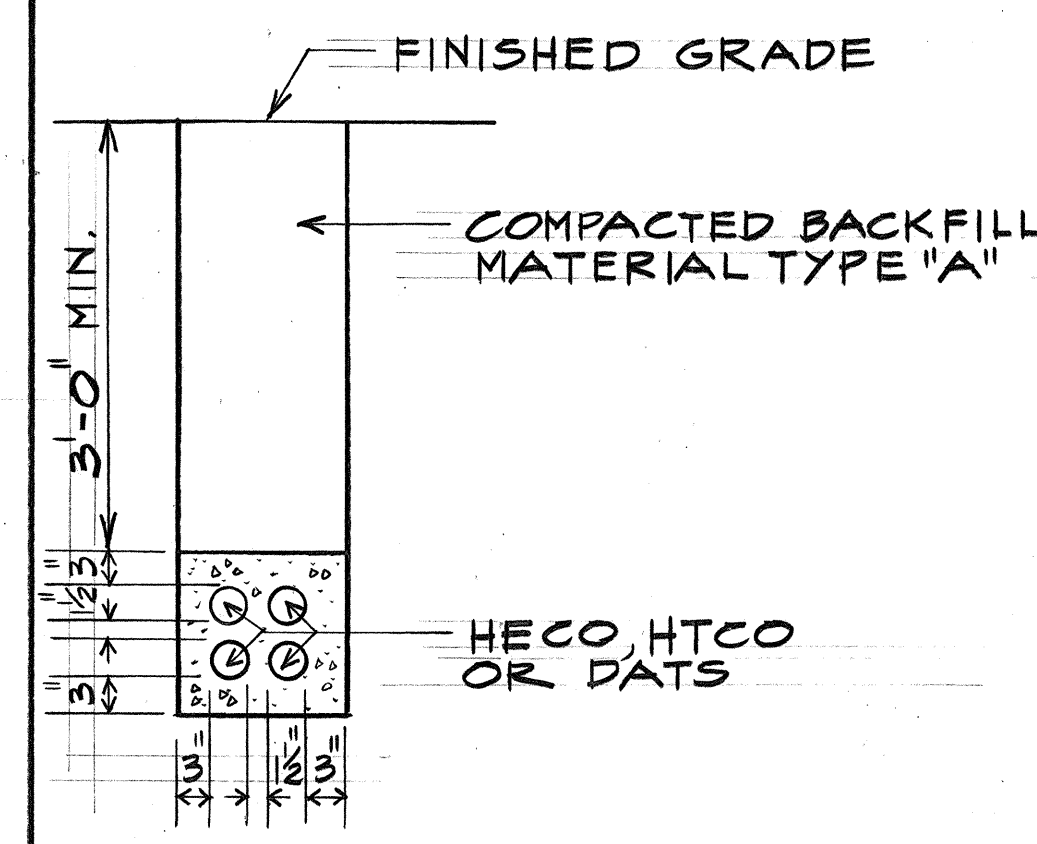
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	100	164



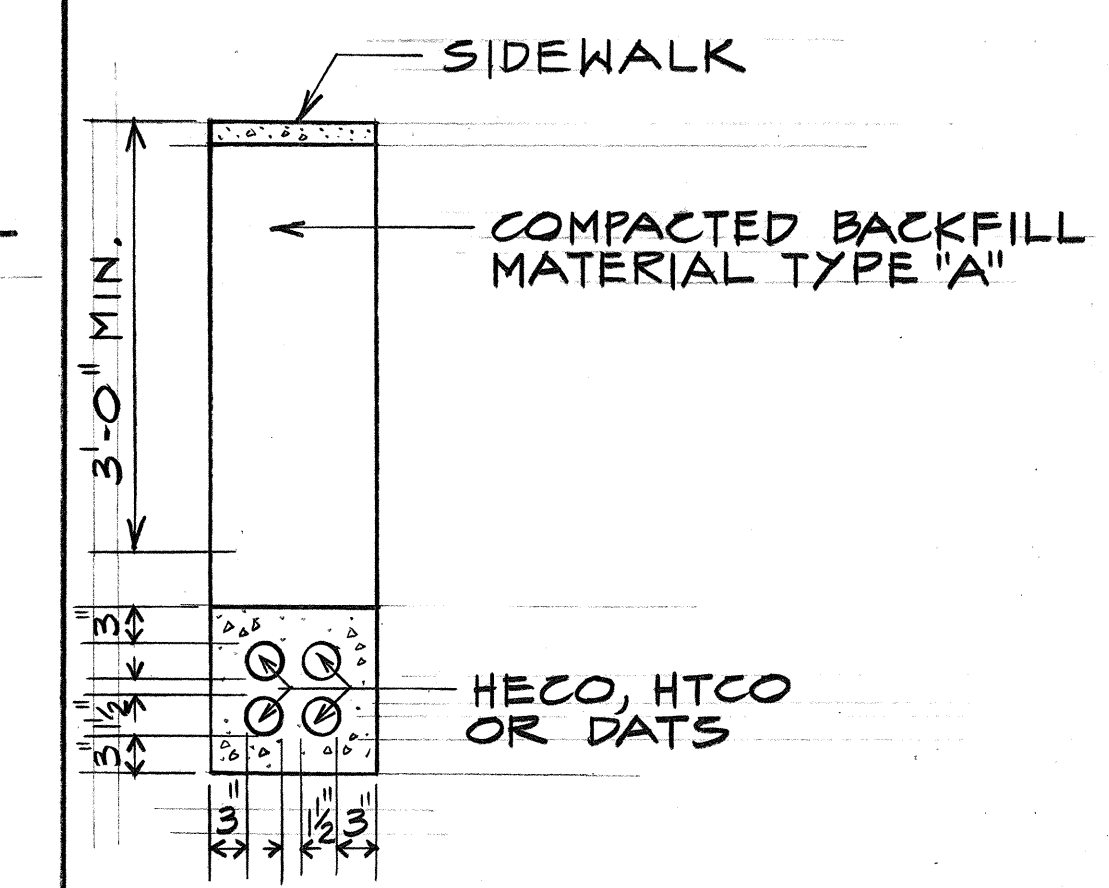
EXPANSION COUPLING DETAIL (A)
N.T.S. (E-12)



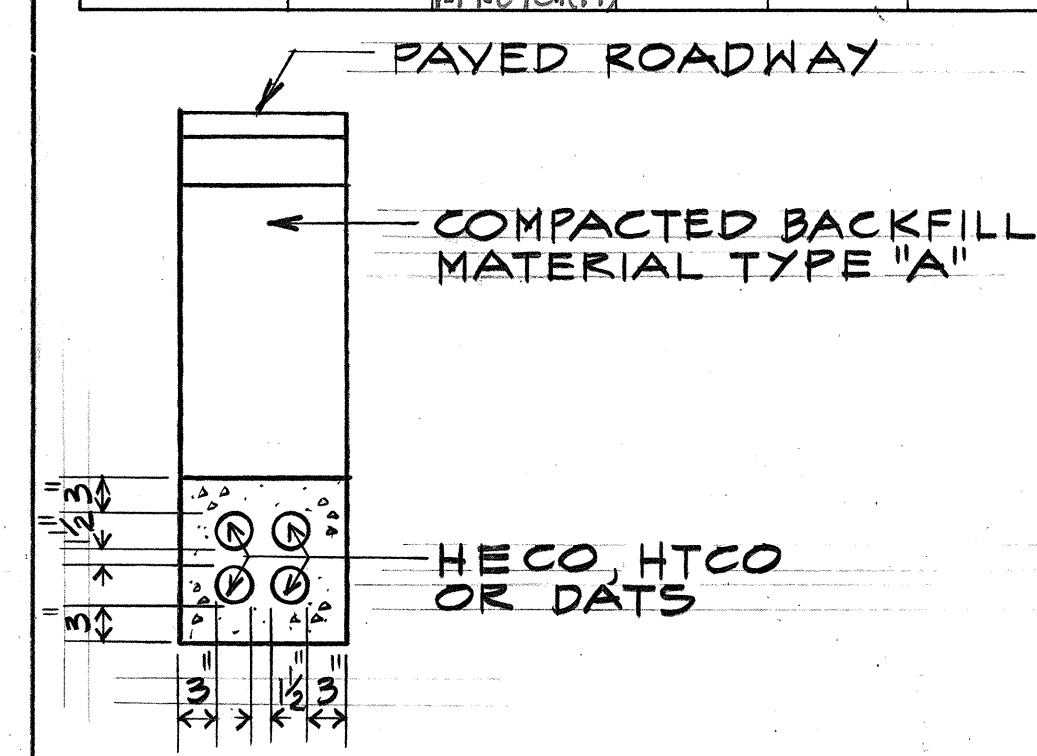
TYPICAL RACEWAY SECTION FOR STREETLIGHT & POWER CKT (B)
N.T.S. (E-12)



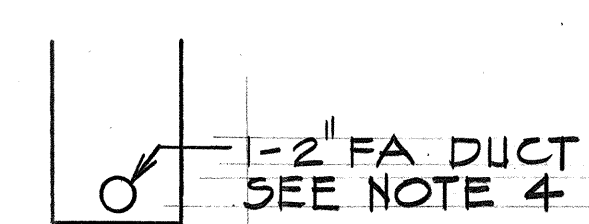
TYPICAL CONCRETE ENCASED RACEWAY SECTION (C)
N.T.S. (E-12)



TYPICAL CONCRETE ENCASED RACEWAY SECTION (D)
N.T.S. (E-12)



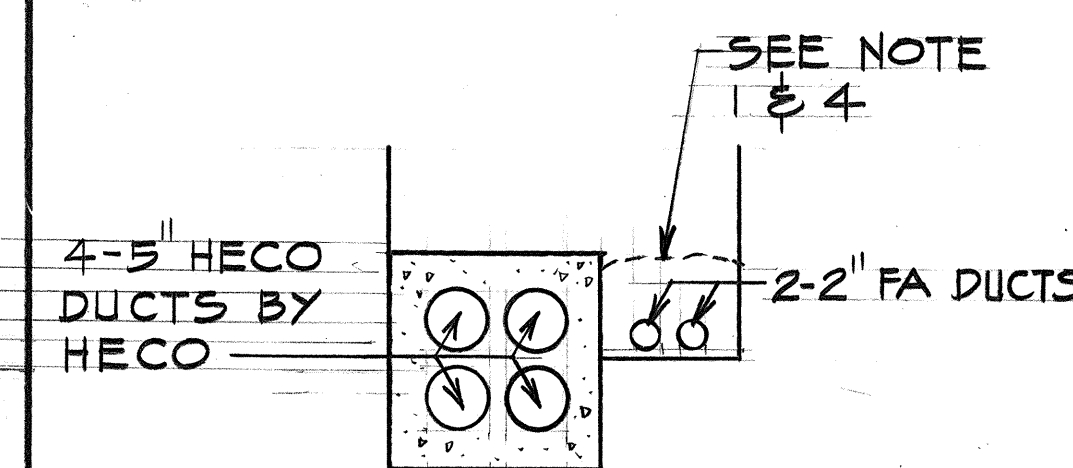
TYPICAL CONCRETE ENCASED RACEWAY SECTION (E)
N.T.S. (E-12)



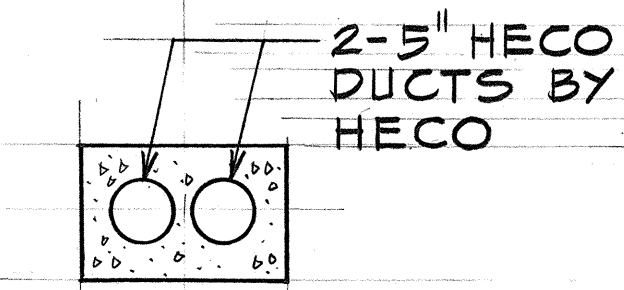
DUCT SECTION 1
N.T.S.



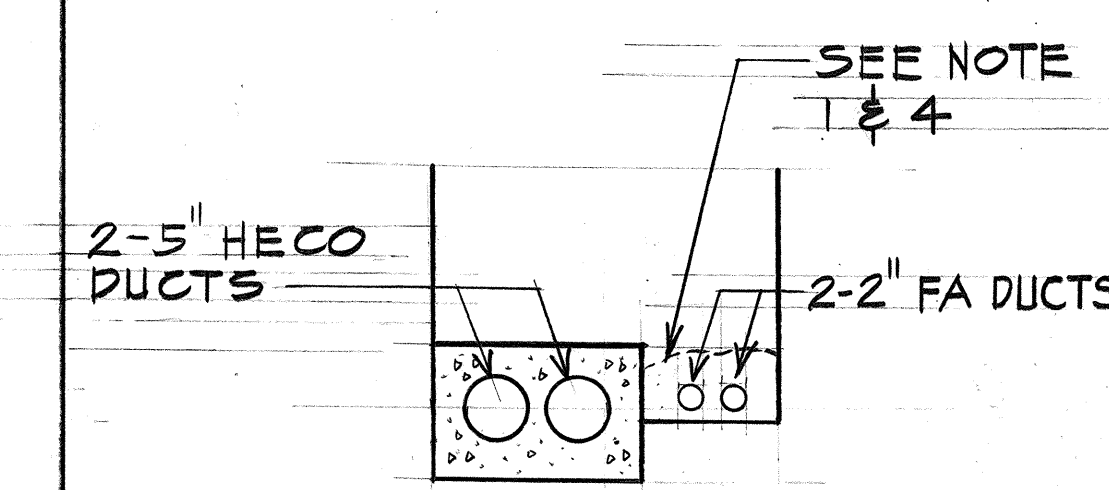
DUCT SECTION 2
N.T.S.



DUCT SECTION 3
N.T.S.

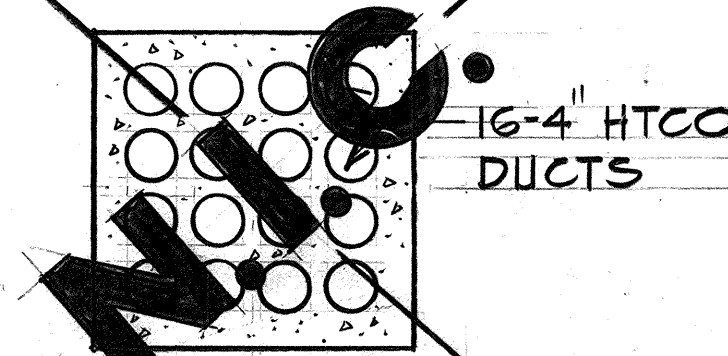


DUCT SECTION 4
N.T.S.

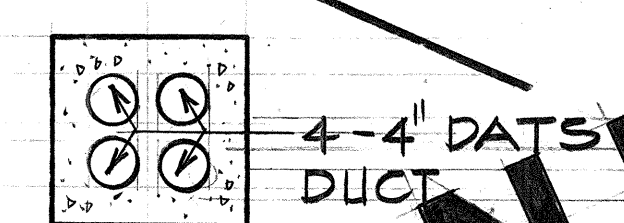


NOTE: FOR CONTINUATION OF ST. LTG & SPRINKLER DUCTS SEE ST. LTG PLANS

DUCT SECTION 5
N.T.S.

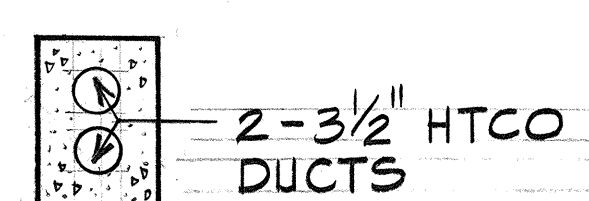


DUCT SECTION 6
N.T.S.

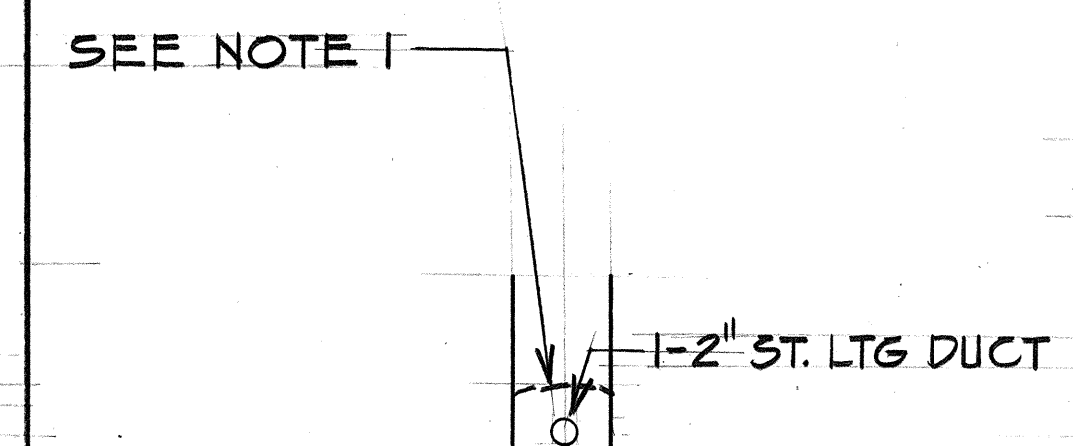


NOTE: (7A) SIMILAR EXCEPT 4-4 HTCO DUCTS

DUCT SECTION 7
N.T.S.

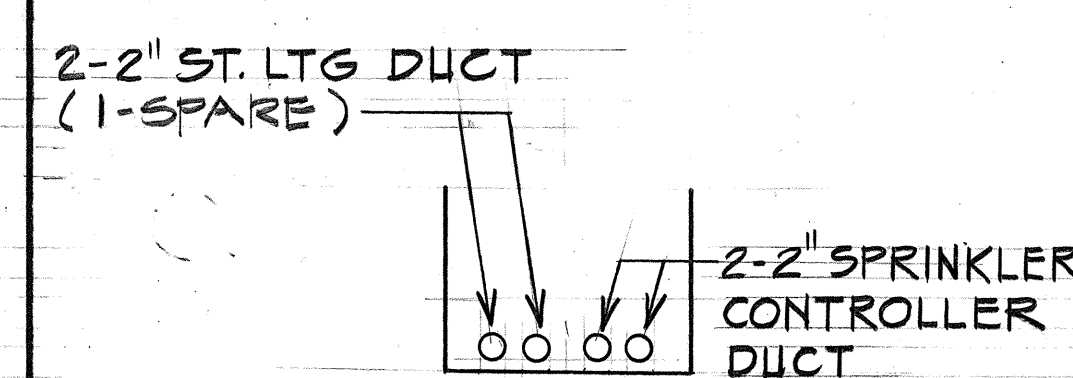


DUCT SECTION 8
N.T.S.

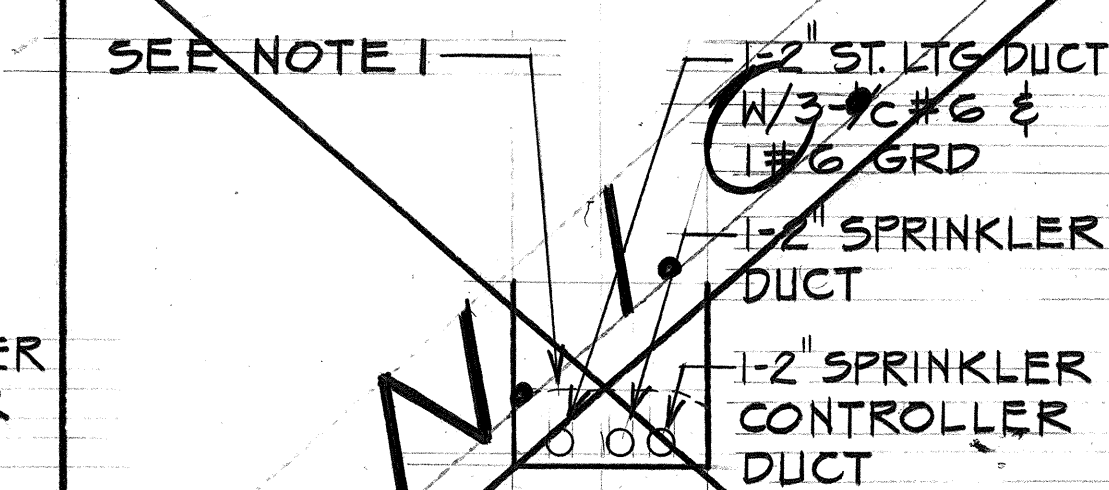


NOTE: (9A) SIMILAR EXCEPT IN CONCRETE BARRIER

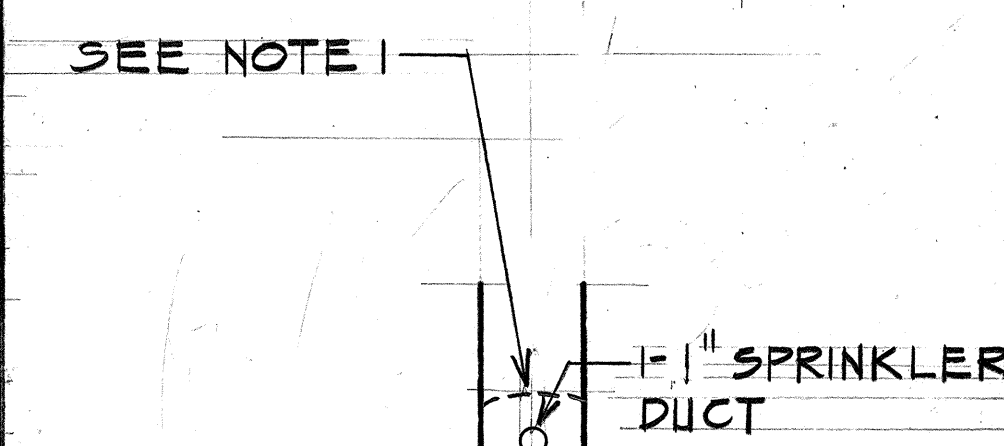
DUCT SECTION 9
N.T.S.



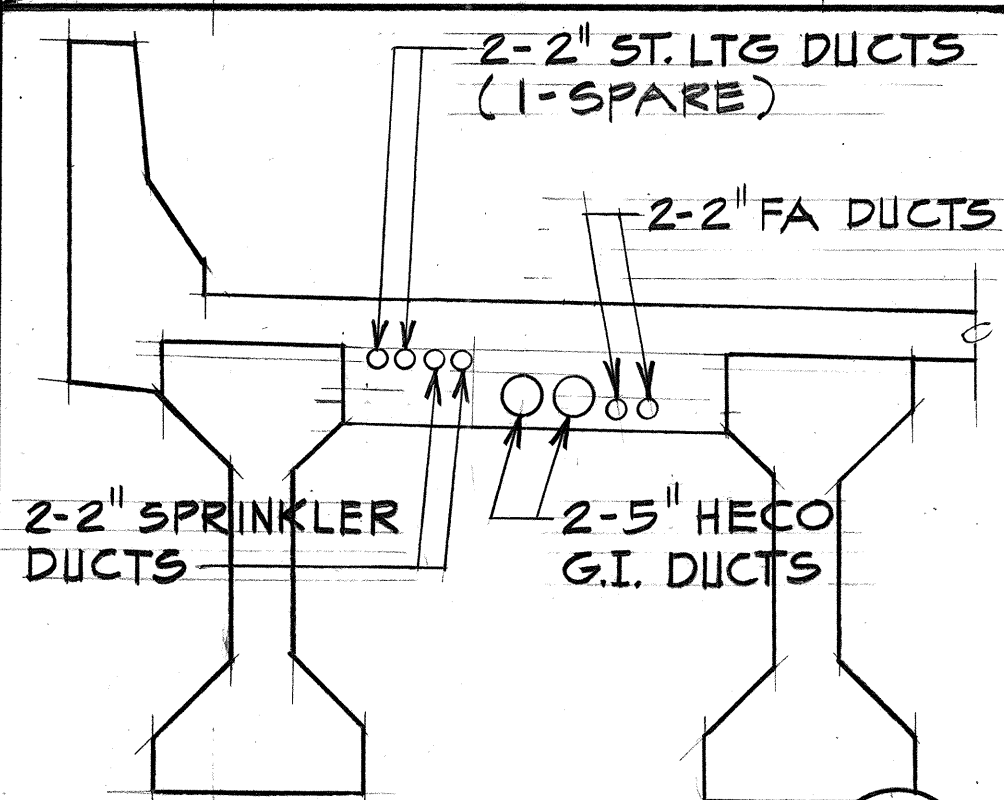
DUCT SECTION 10
N.T.S.



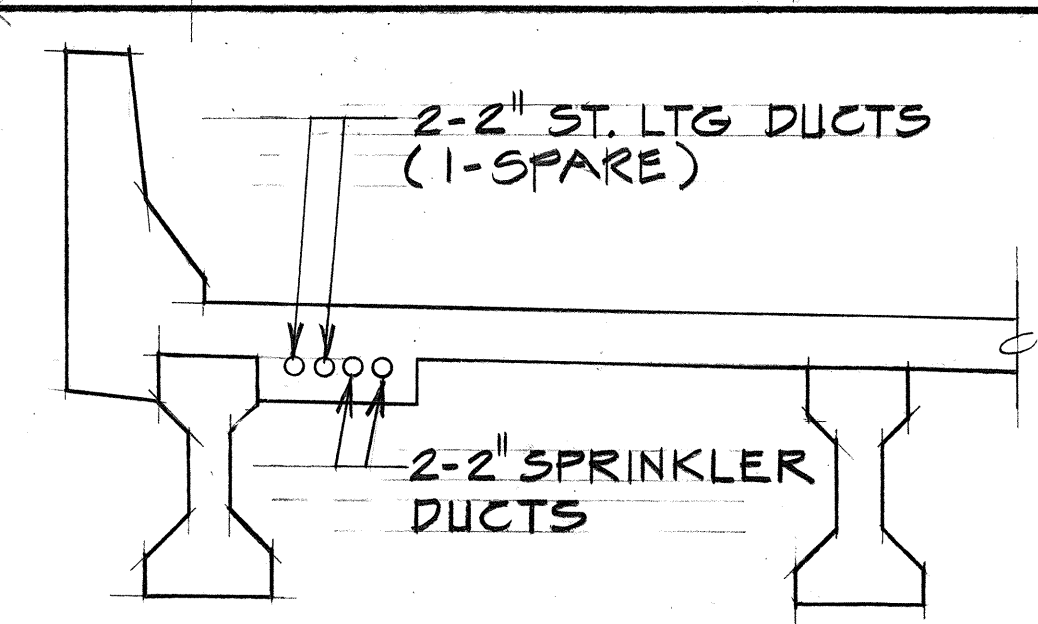
DUCT SECTION 11
N.T.S.



DUCT SECTION 12
N.T.S.



DUCT SECTION 13
N.T.S.



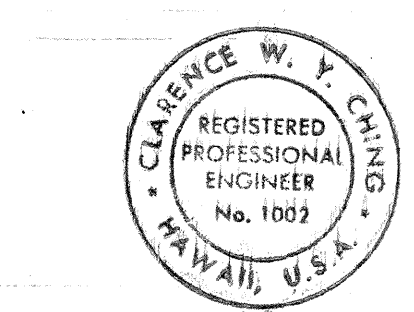
DUCT SECTION 14
N.T.S.

- NOTES:**
1. CONCRETE JACKET REQUIRED AT ALL ROAD CROSSINGS
 2. CONCRETE ENCASED DUCTS SHALL HAVE 3" AROUND ENCASUREMENT 1/2" BETWEEN DUCTS AND 3" MIN. SEPARATION BETWEEN ELECTRICAL AND COMMUNICATION DUCTS.
 3. SPRINKLER DUCT SYSTEM SHALL BE INCIDENTAL TO THIS PROJECT
 4. FA DUCTS SHALL BE A MINIMUM OF 24" UNDER ROADWAYS AND 18" UNDER SIDEWALK AREA.

APPROVED BY:

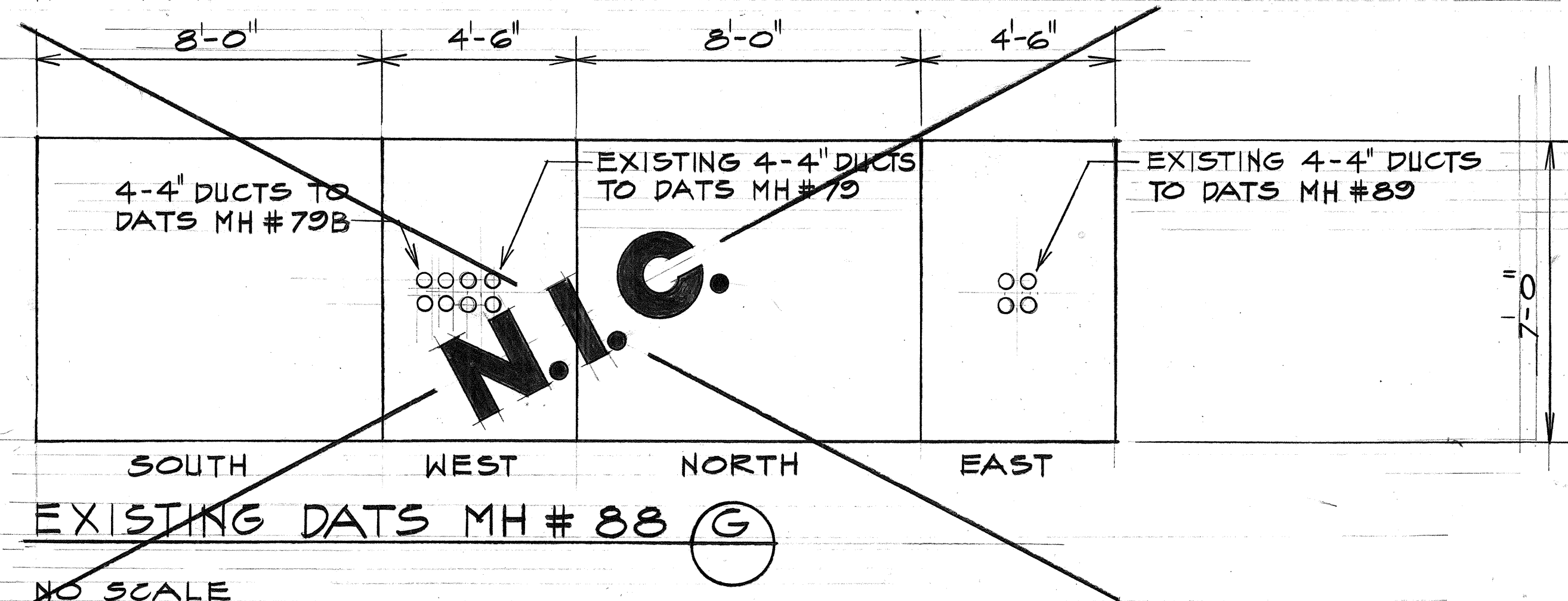
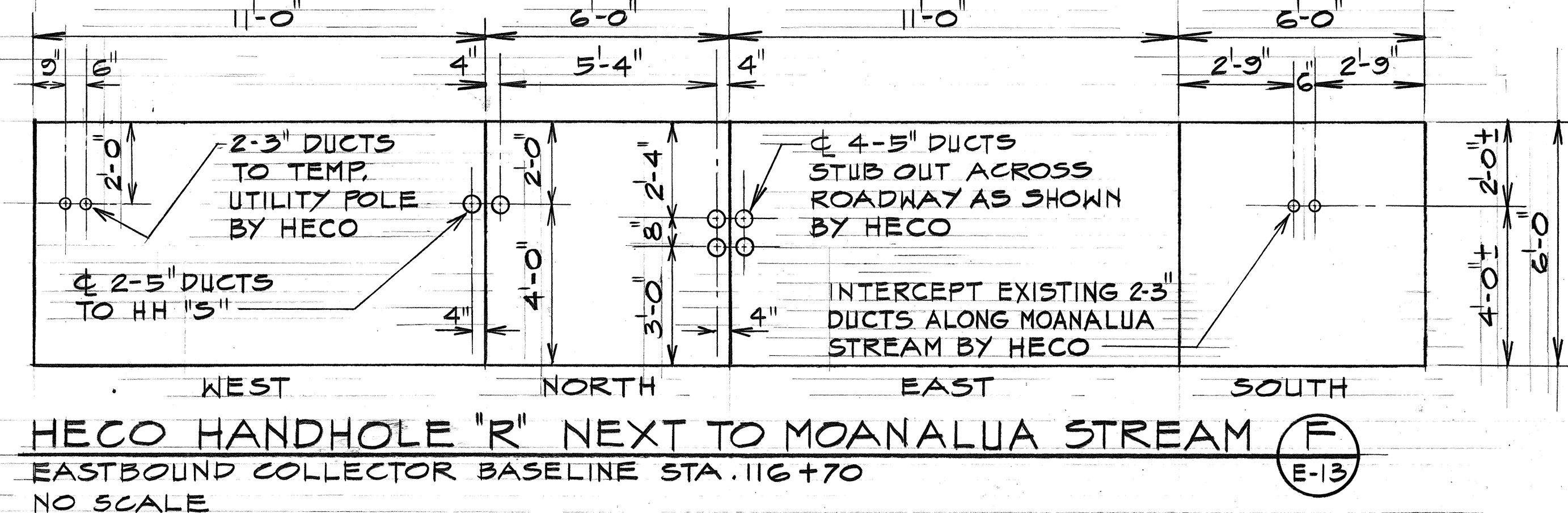
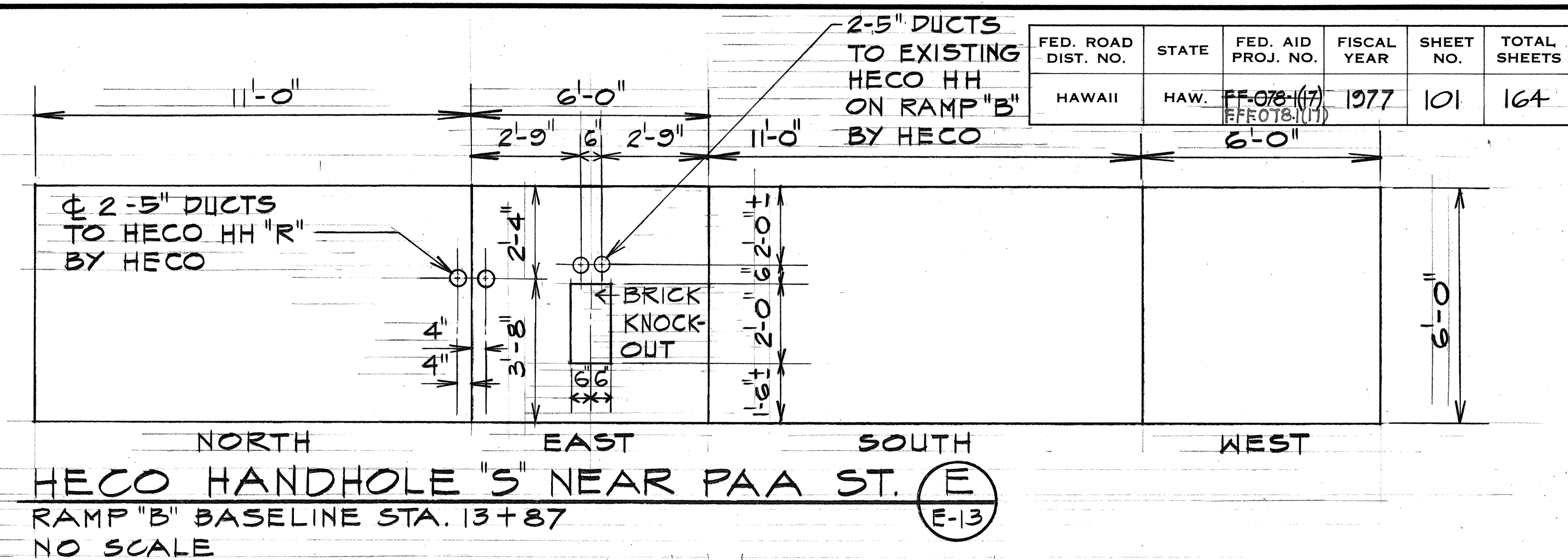
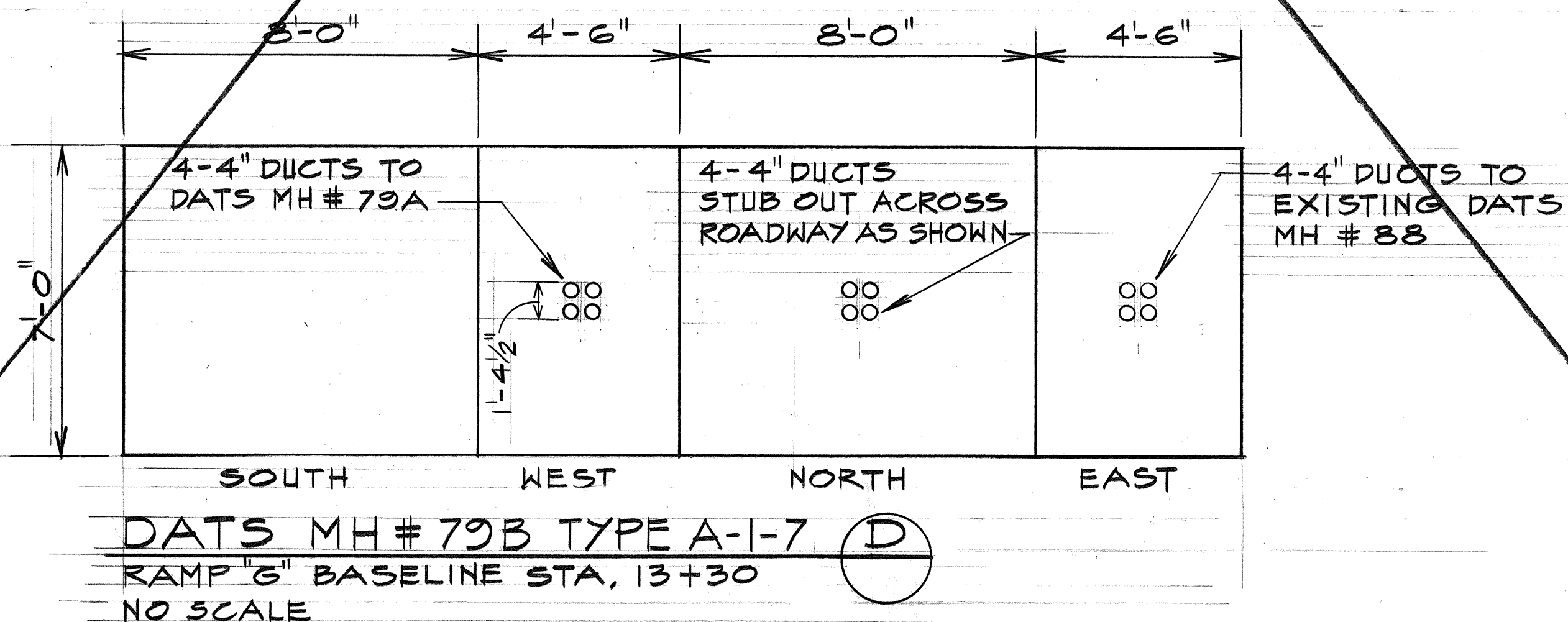
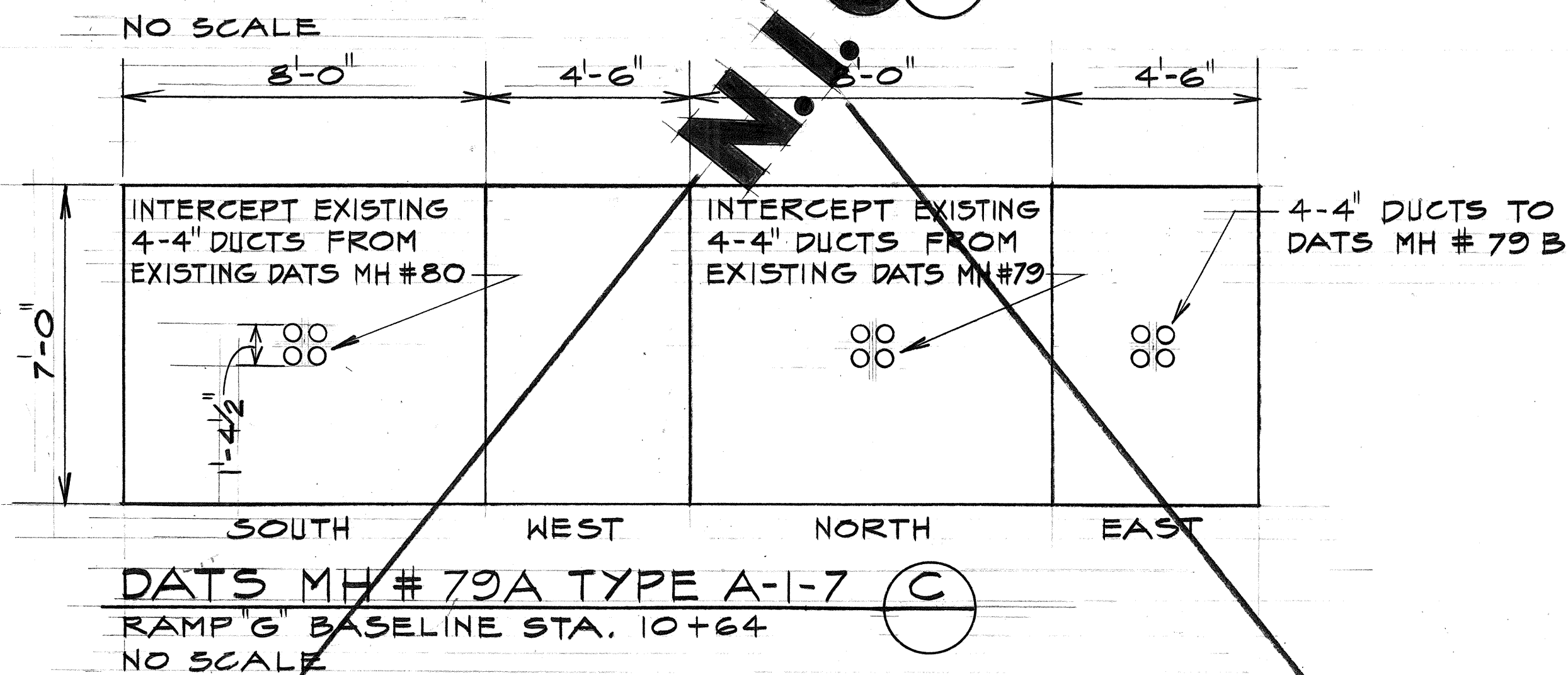
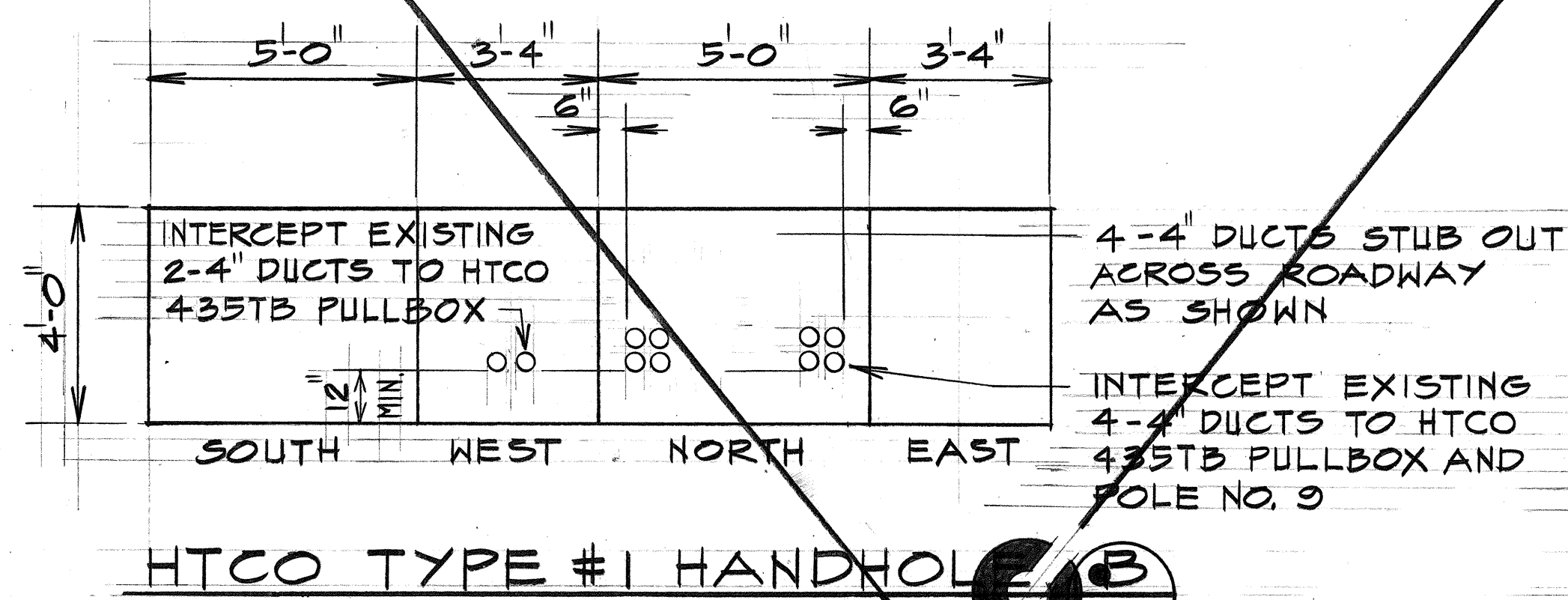
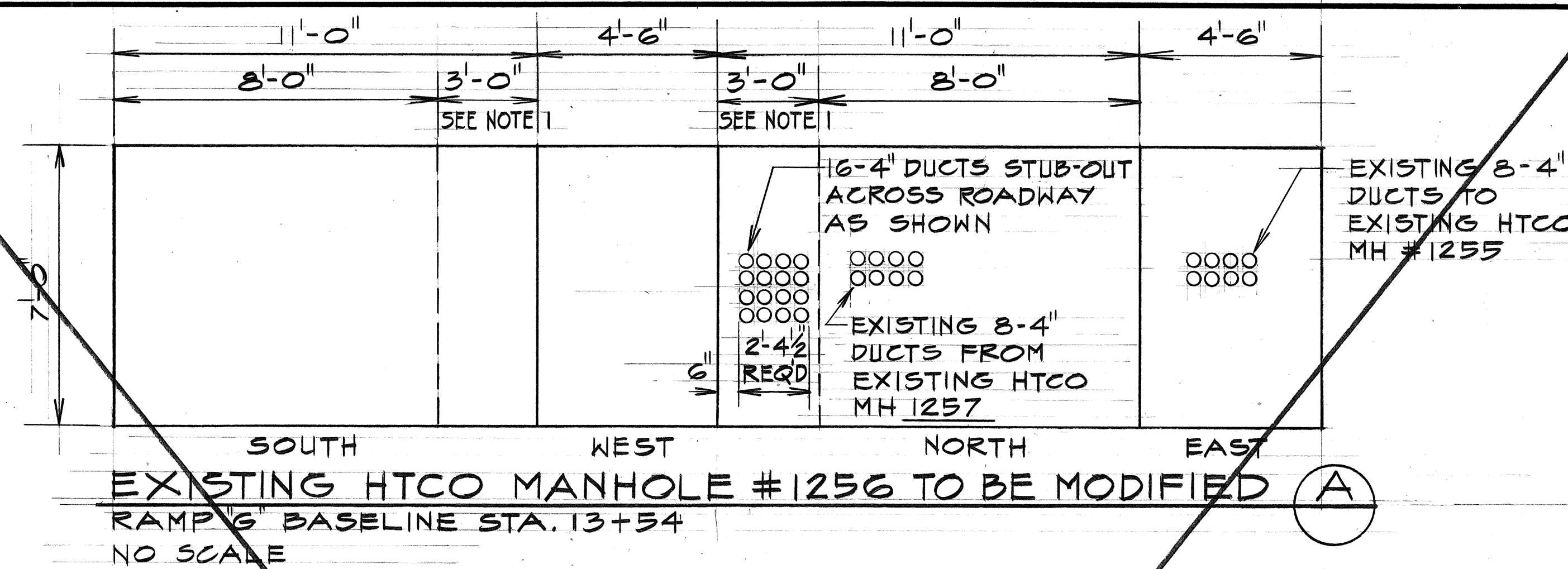
Fred Karimats 3-30-77
HAWAIIAN ELECTRIC CO. INC. DATE

H. Y. Mew
DEPT. OF TRANSPORTATION SERVICES DATE
CITY & COUNTY OF HONOLULU
MUNICIPAL FIRE ALARM CIRCUIT RELOCATION CLEARANCE



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12/28/78	ADDED DUCT SECTION 12
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
DUCT SECTION DETAILS	
MOANALUA ROAD	
PUULOA I.C. TO MIDDLE ST. - UNIT 2	
F.A. Proj. No. FF-078-1(17)	
SCALE: AS SHOWN DATE: JAN. 14, 1977	
SHEET NO. E-12 OF 29 SHEETS	

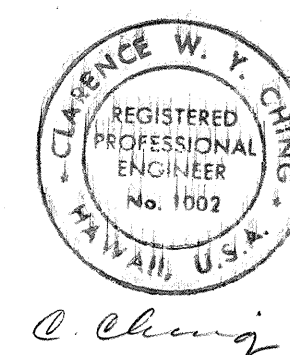


NOTE:

1. EXTEND EXISTING HTCO MANHOLE #1256 AS SHOWN. BREAK EWA END TO INSURE 8" MINIMUM OVERLAP OF EXISTING AND NEW REINFORCEMENT BARS. REF. TO STD. STANDARD DRAWING 34060 FOR TYPE "A" MANHOLE CONSTRUCTION DETAILS AND HTCO STANDARD DRAWING 34028 FOR DUCT FORMATION DETAILS.

APPROVED BY:

Fred Karimots 3-30-77
HAWAIIAN ELECTRIC CO. INC. DATE



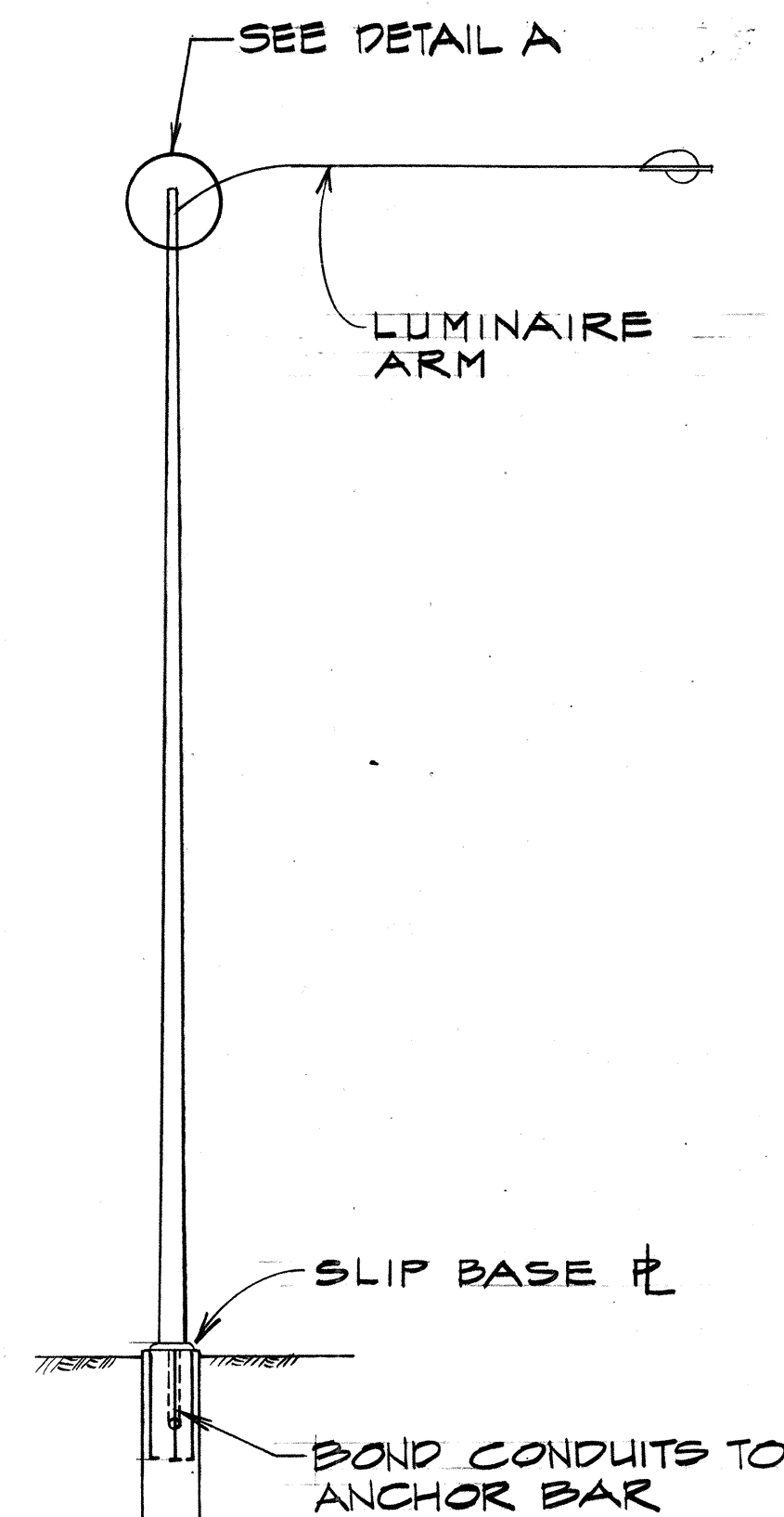
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

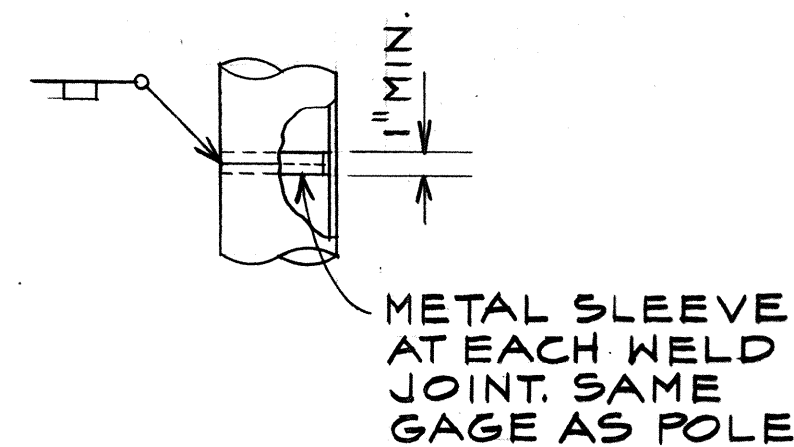
MANHOLE AND HANDHOLE DETAILS

MOANALUA ROAD
PULLOA I.C. TO MIDDLE ST. - UNIT 2
F.A. Proj. No. FF-078-1(17)
SCALE: AS SHOWN DATE: JAN. 14, 1977
SHEET NO. E-13 OF 29 SHEETS

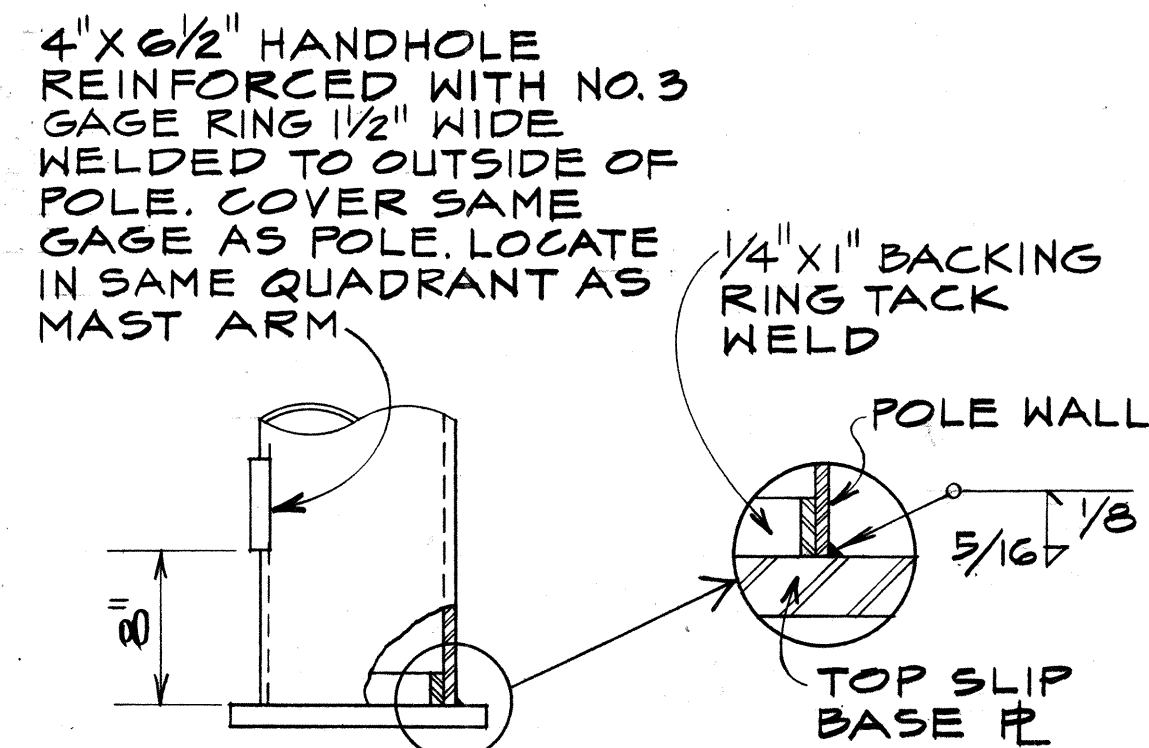
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	102	164



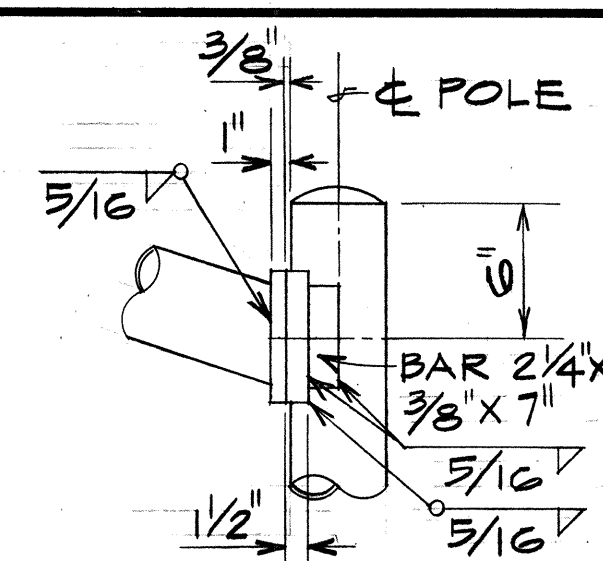
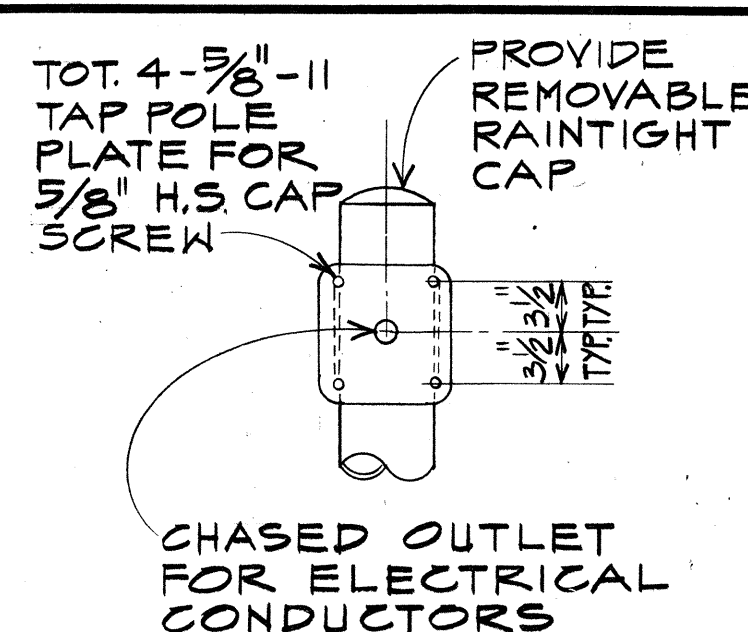
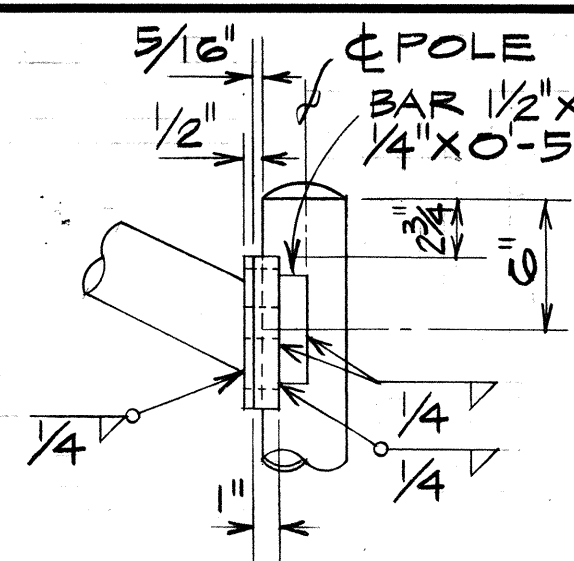
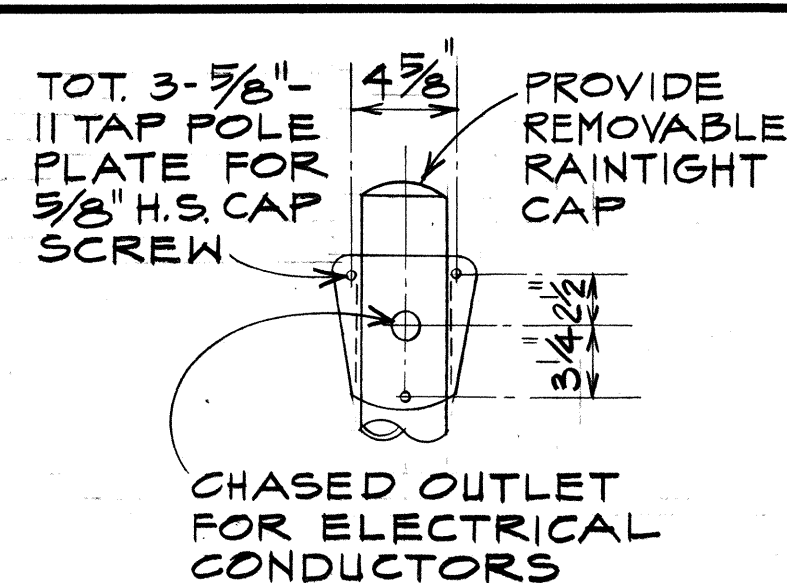
ELEVATION



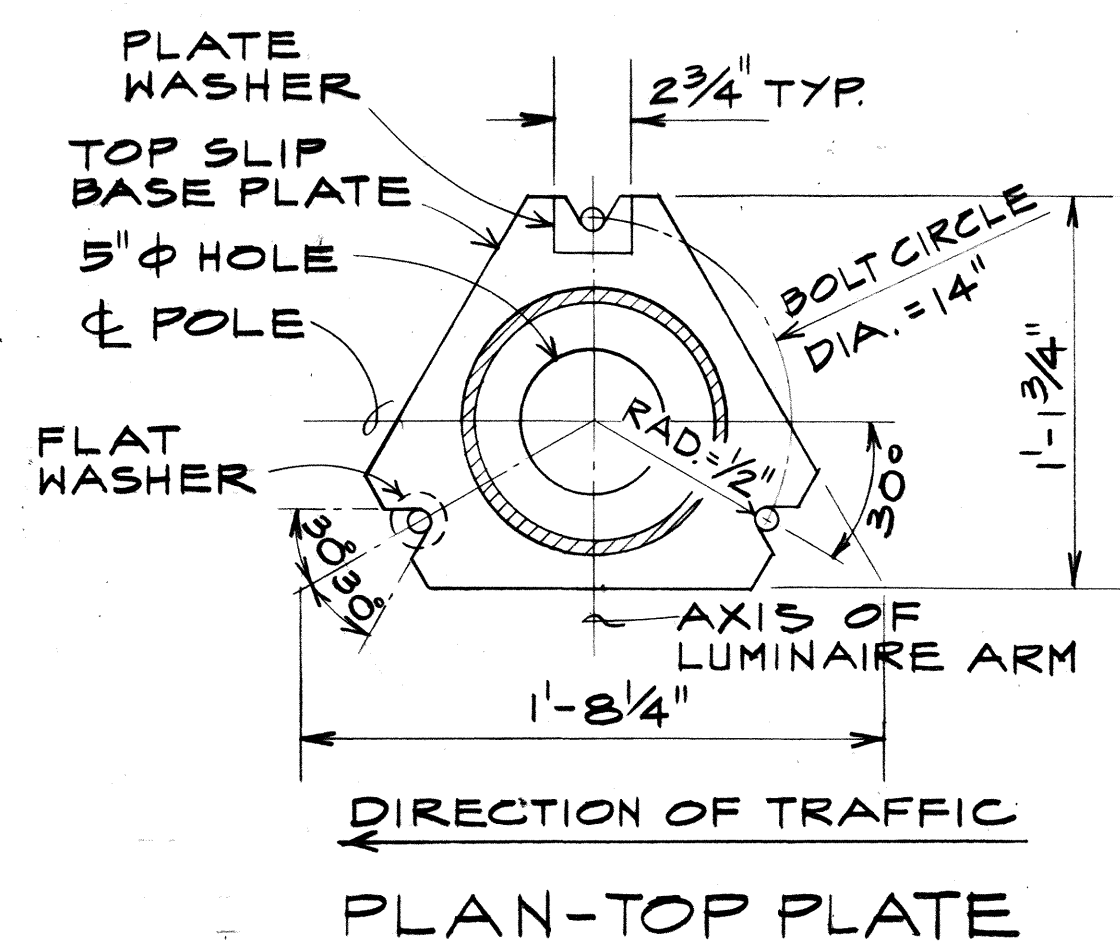
POLE SPLICE



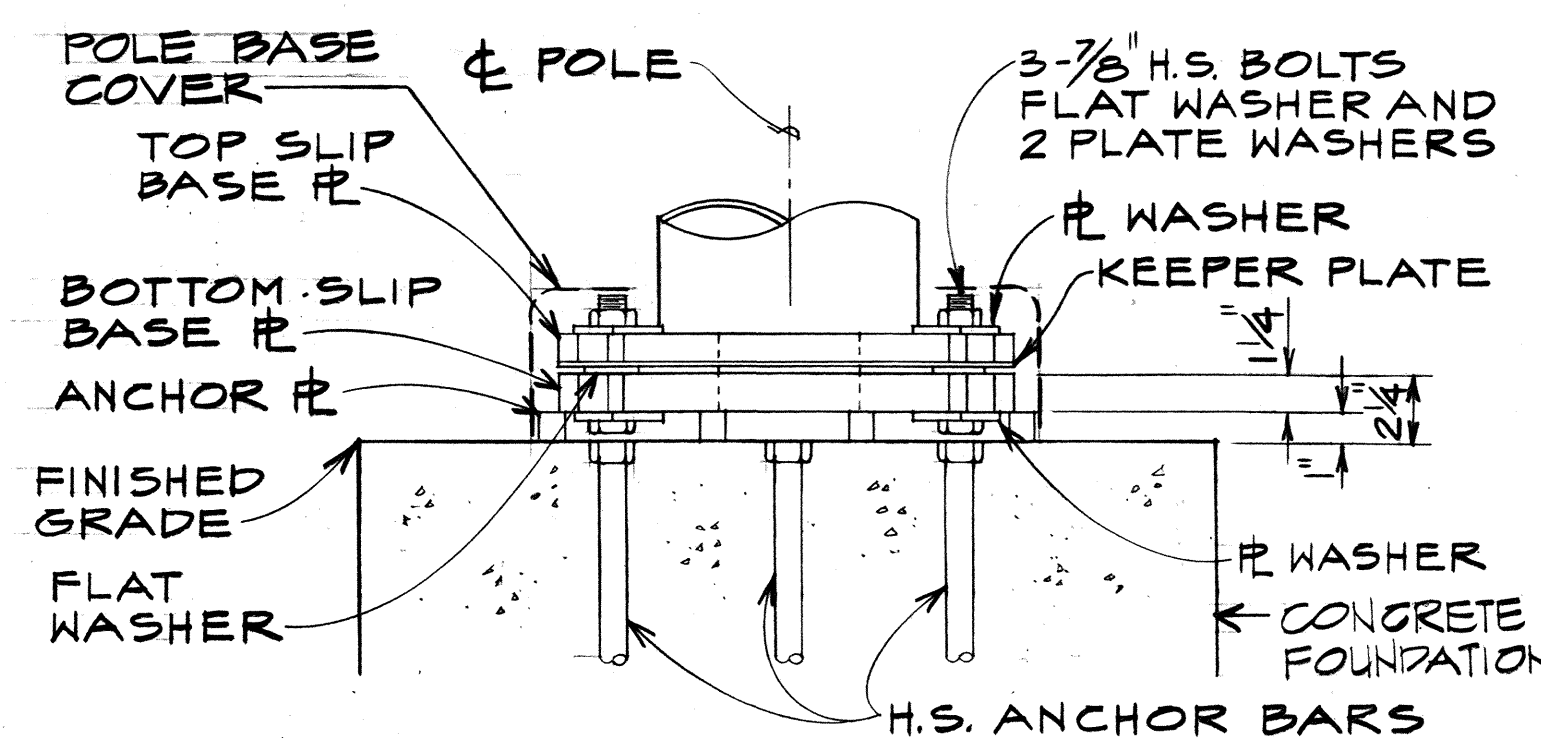
DETAIL B



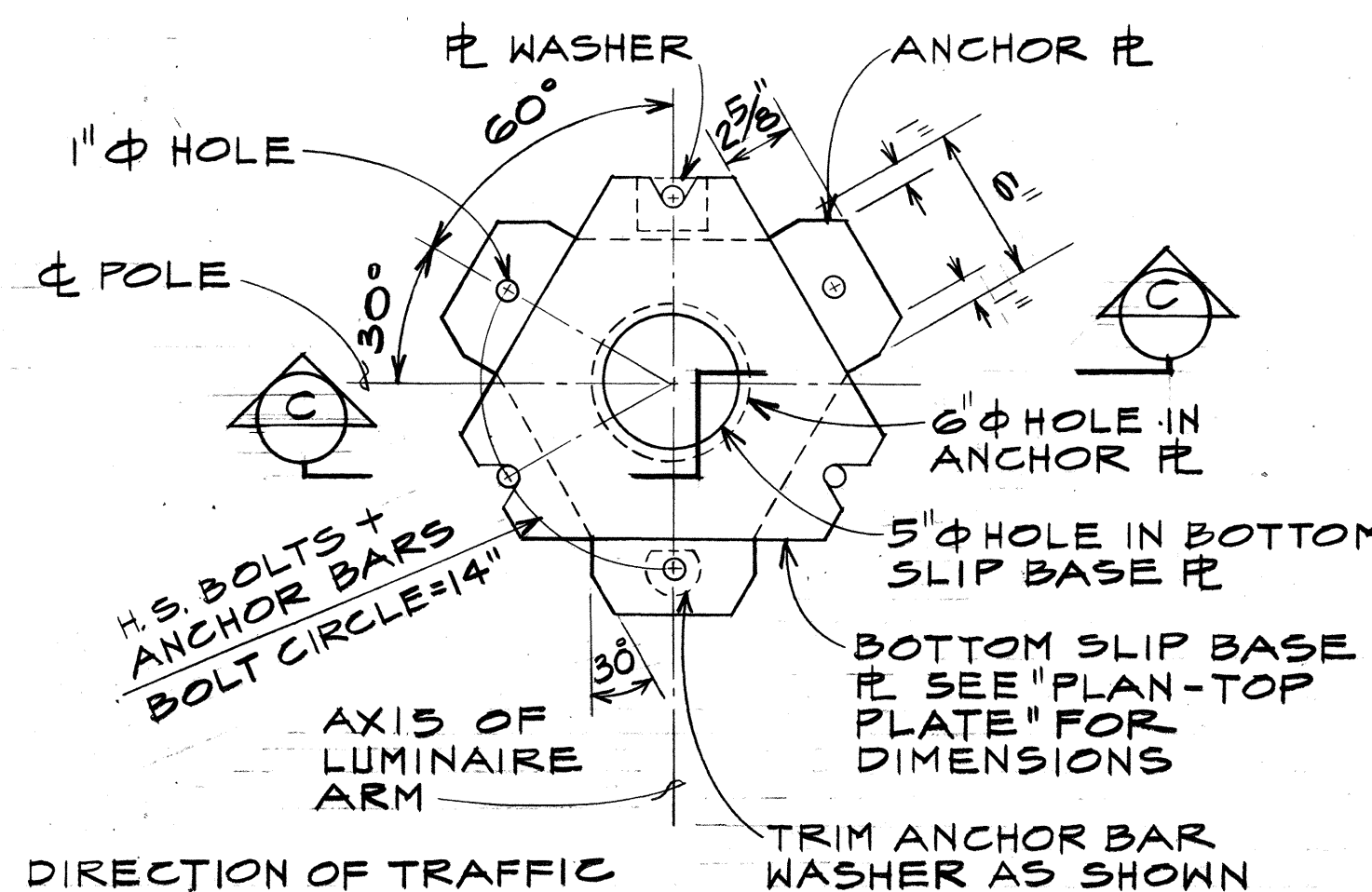
DETAIL A



PLAN-TOP PLATE



ELEVATION



PLAN-BOTTOM PLATES
TYPICAL SLIP BASE INSERT DETAIL
FOR HIGHWAY LIGHTING STANDARDS

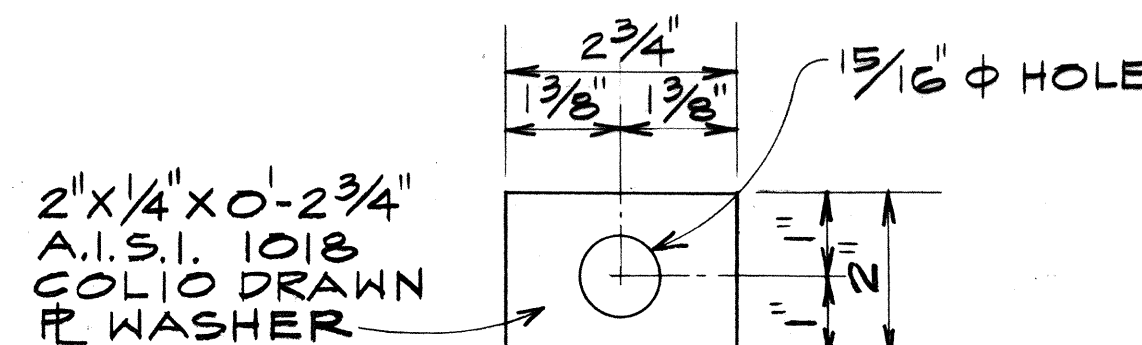
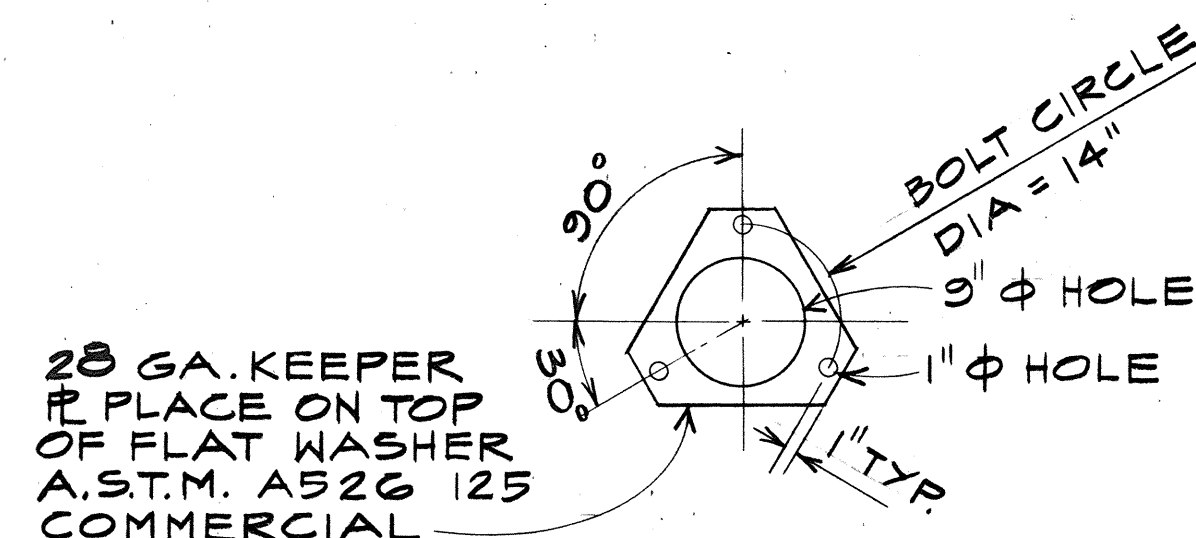
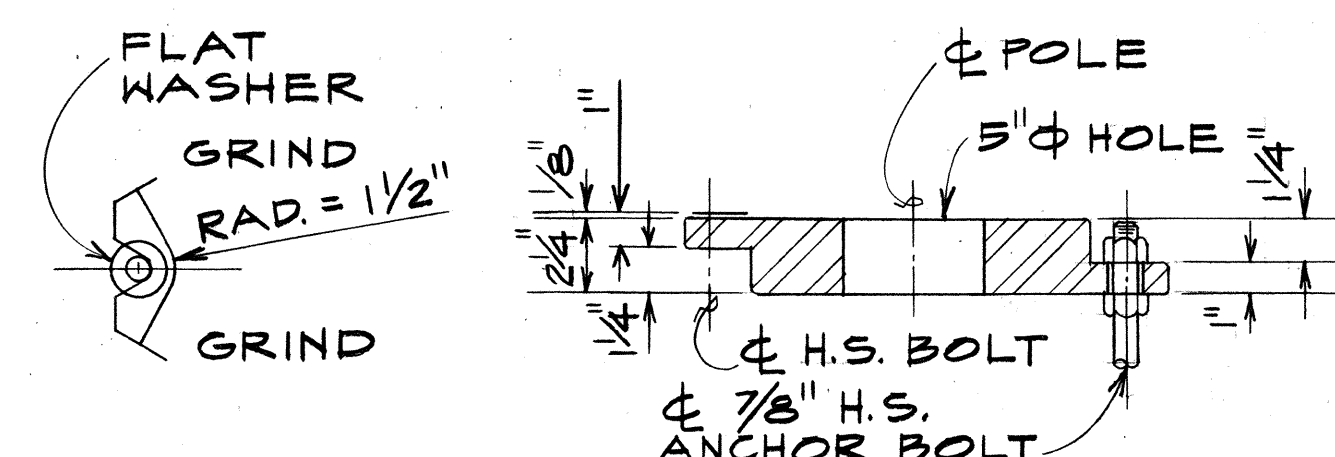


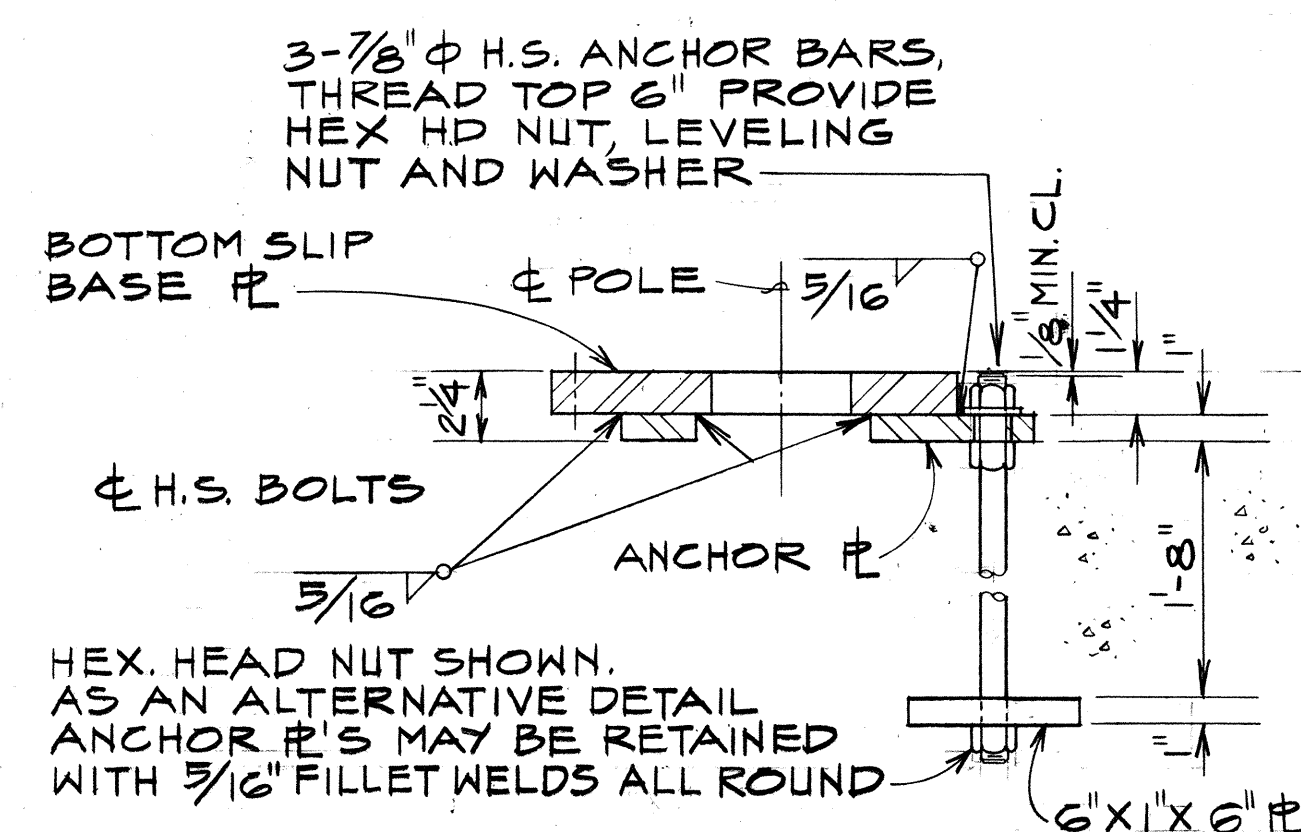
PLATE WASHER



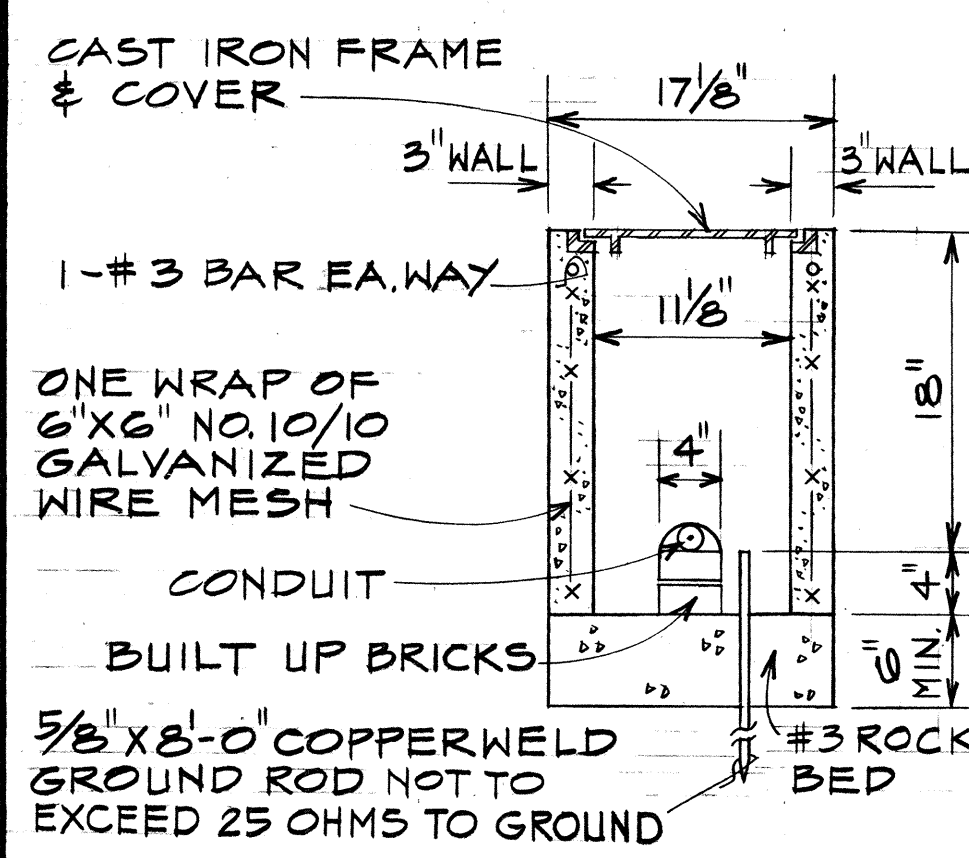
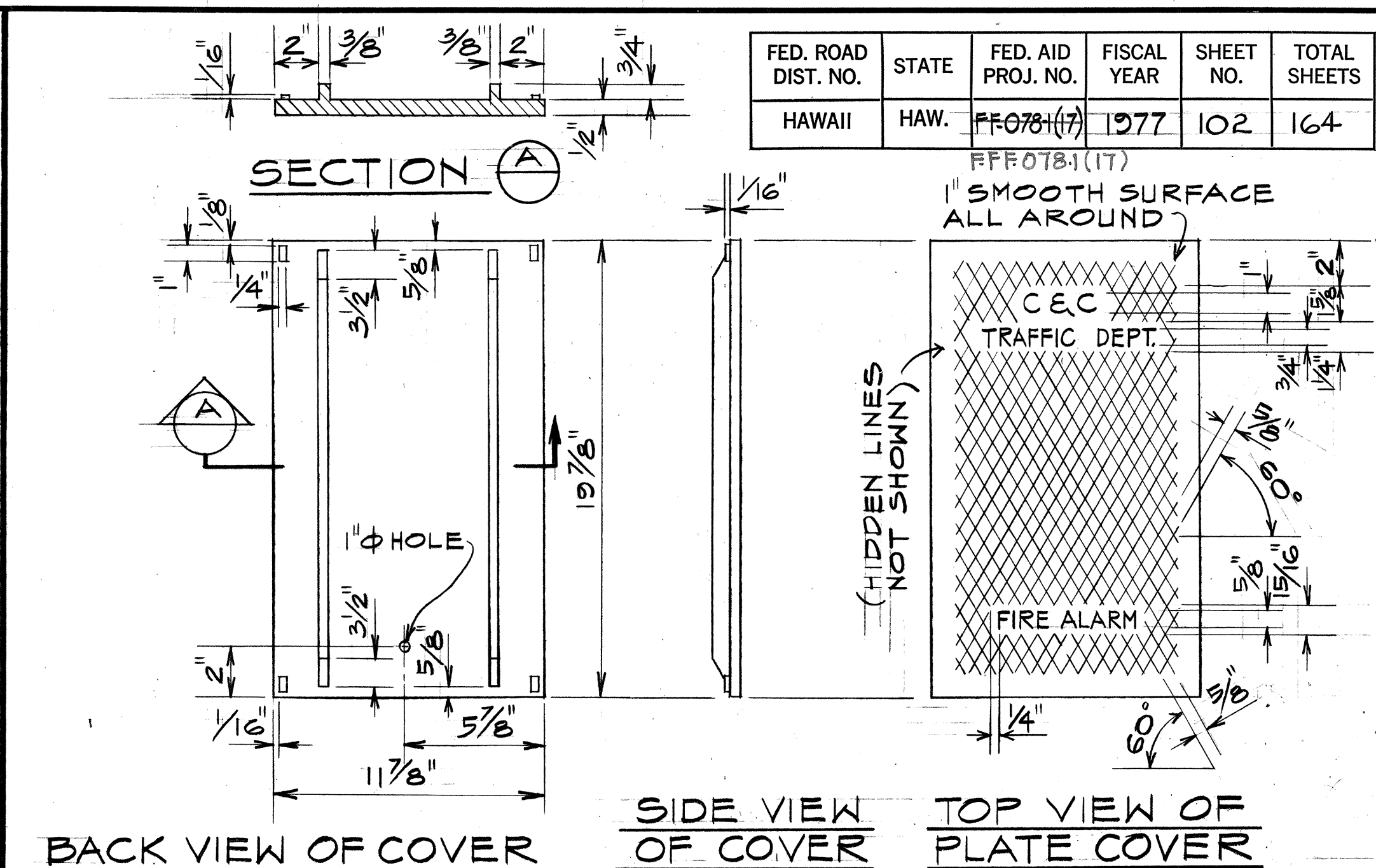
KEEPER PLATE



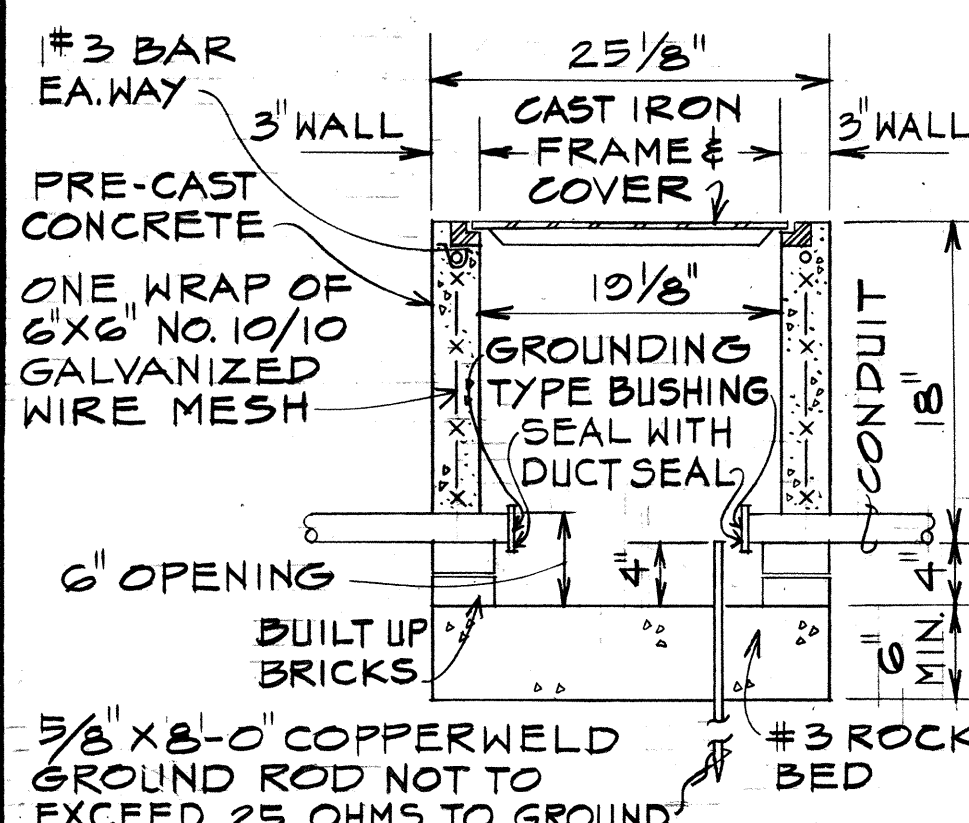
CAST OPTION



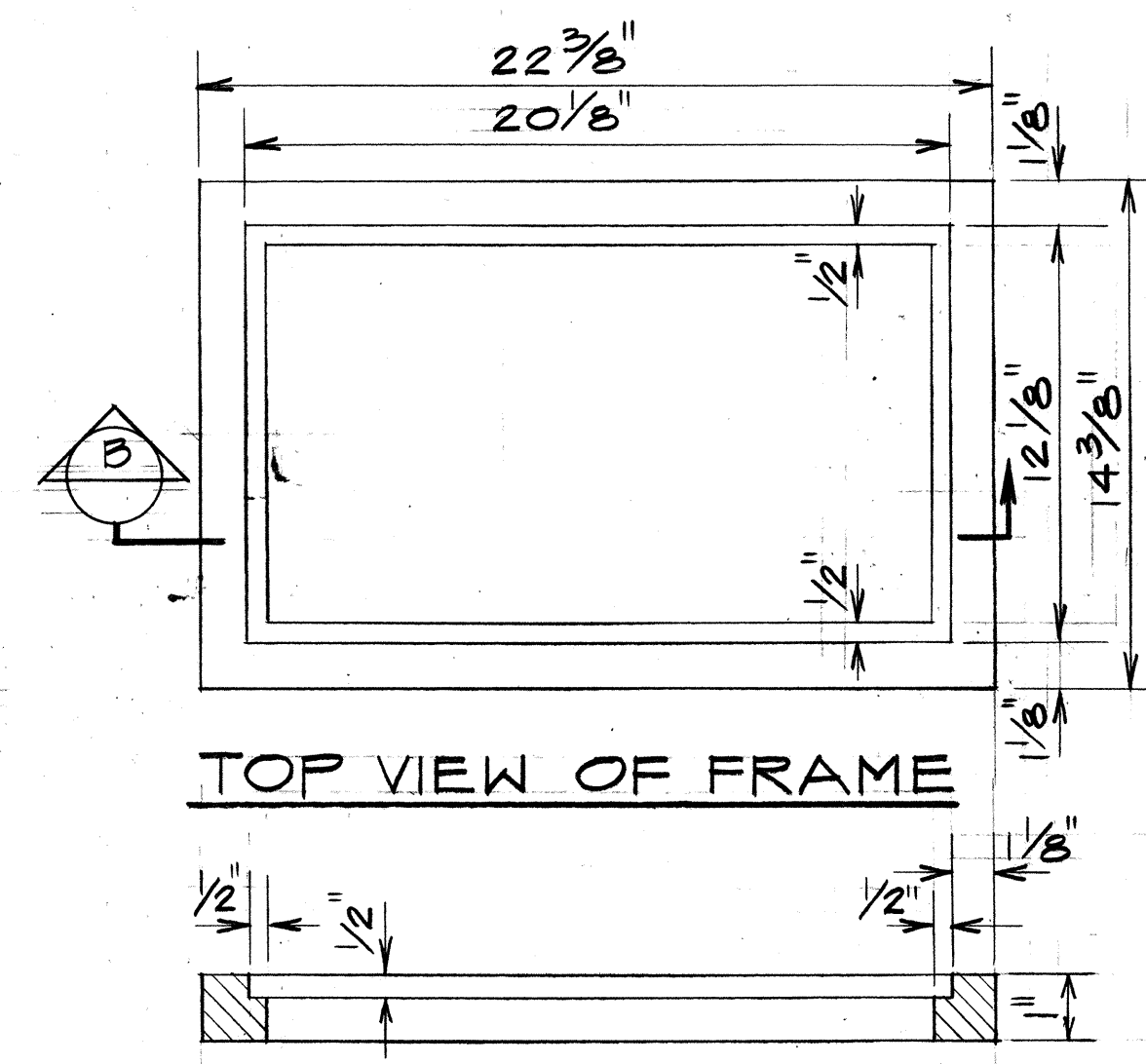
WELDED OPTION
SECTION C



PRECAST PULLBOX



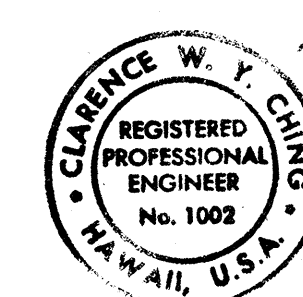
PRECAST PULLBOX
SLD-1 FIRE ALARM PULLBOX & COVER



TOP VIEW OF FRAME

- NOTES:
1. SIDES OF COVER ARE SLIGHTLY BEVELED TO FACILITATE INSTALLATION. BEVEL IS INWARD FROM FRONT TO BACK.
 2. TO BE CAST FROM GRAY IRON
 3. TO COVER SLD-1 FIRE ALARM

APPROVED BY:
H. J. New
DEPT. OF TRANSPORTATION SERVICES
CITY & COUNTY OF HONOLULU
MUNICIPAL FIRE ALARM CIRCUIT RELOCATION CLEARANCE

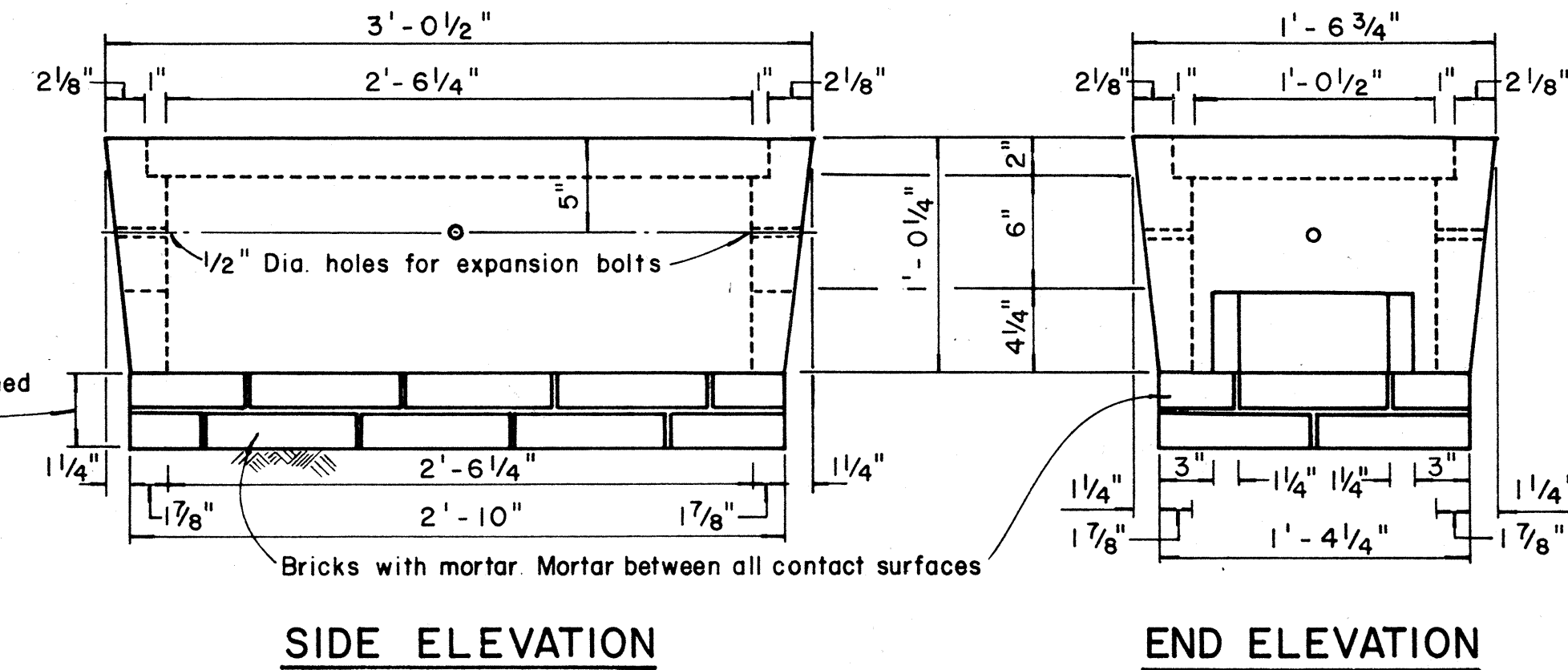
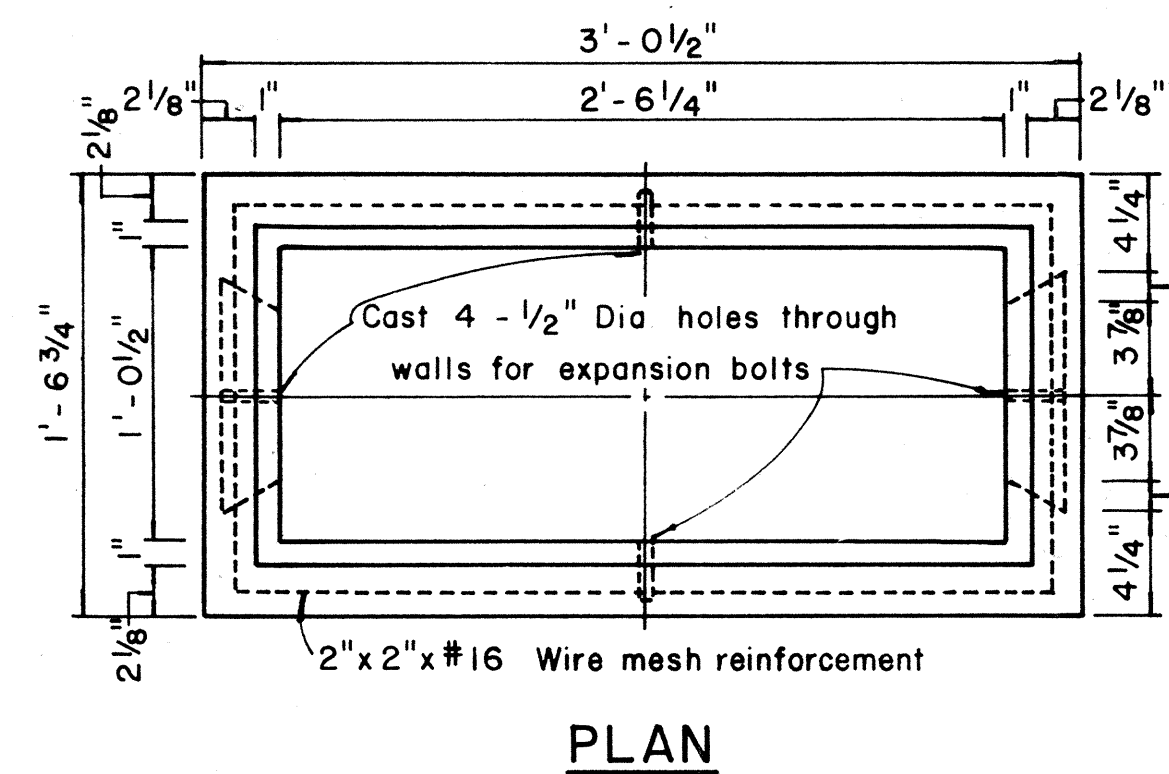
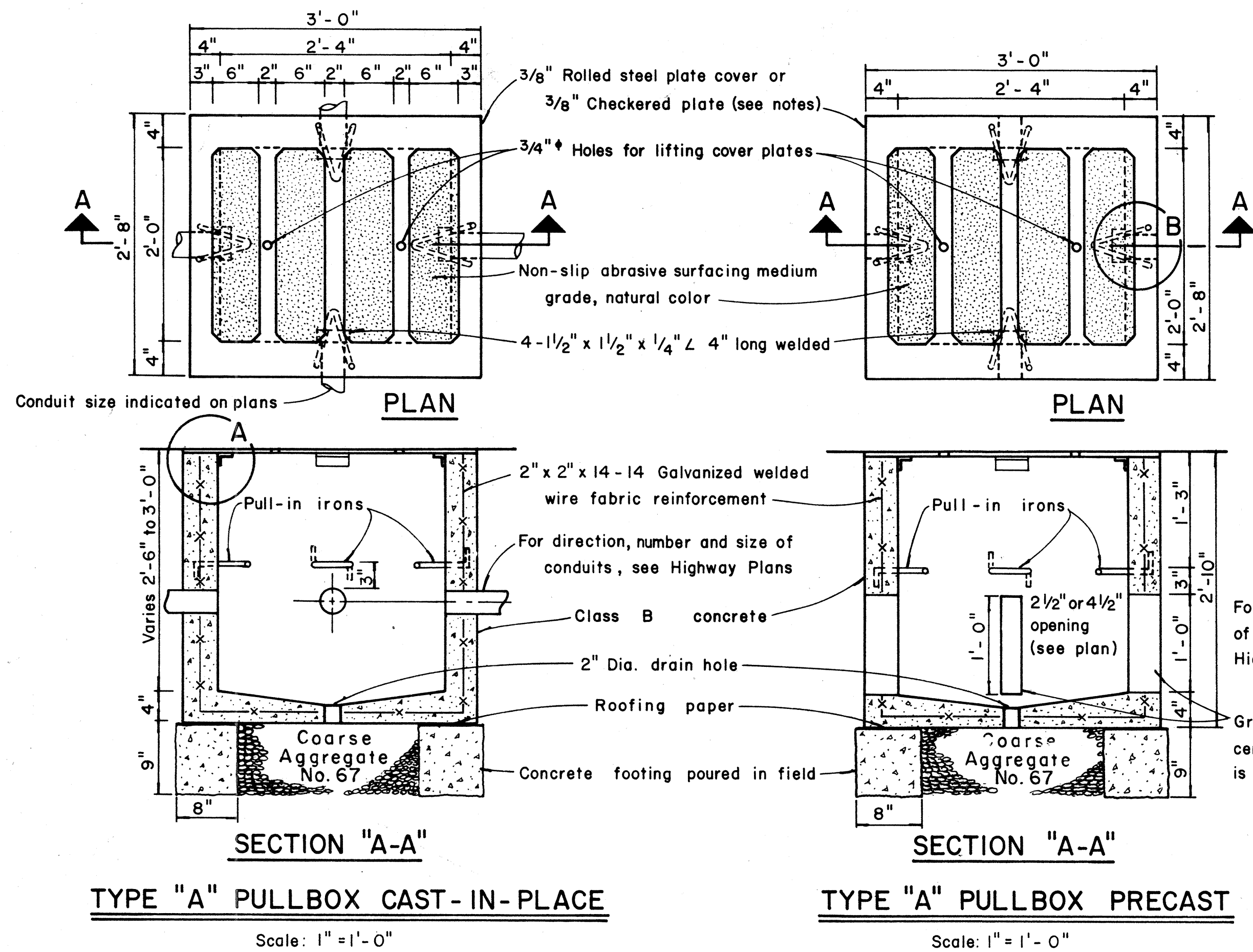


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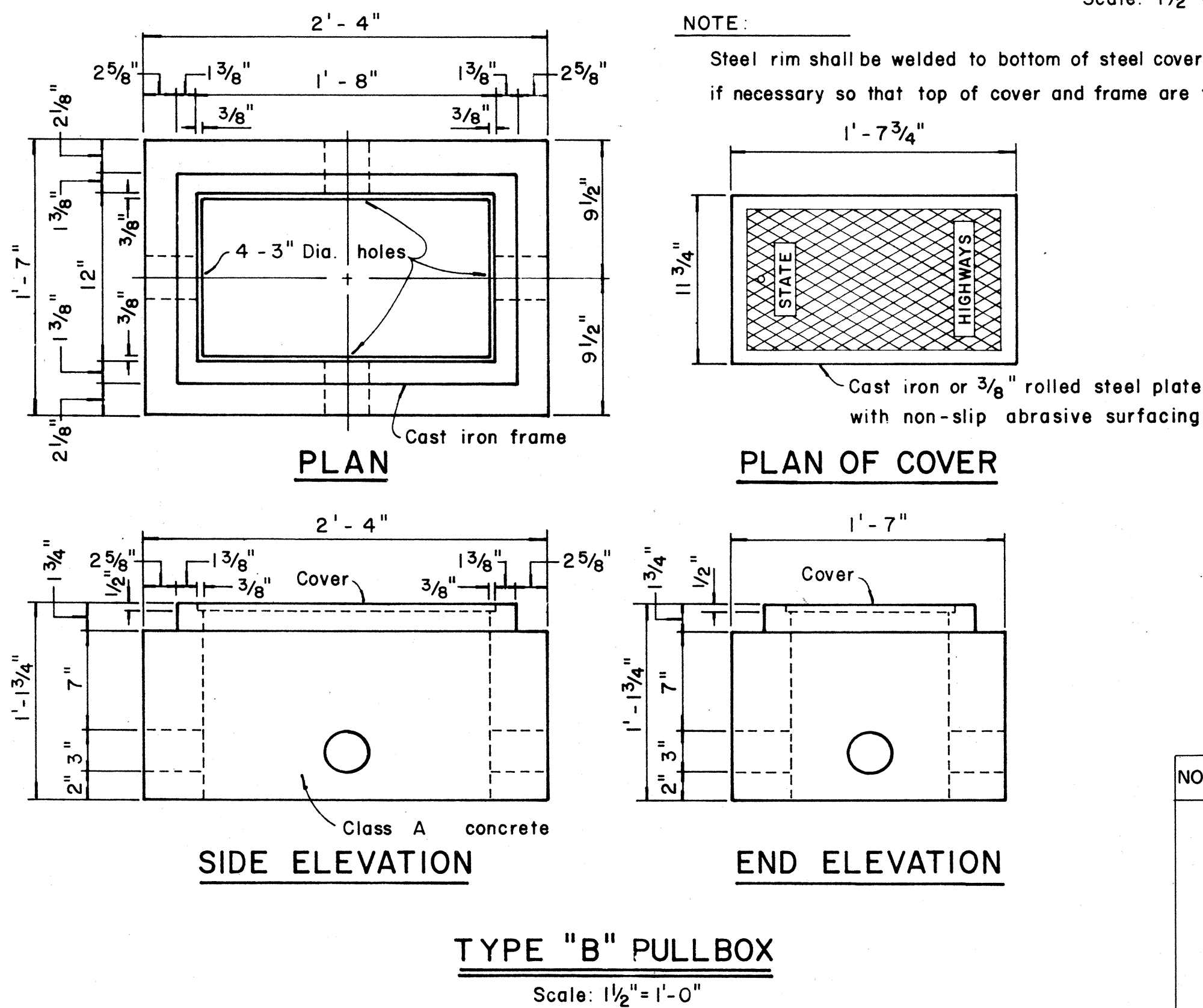
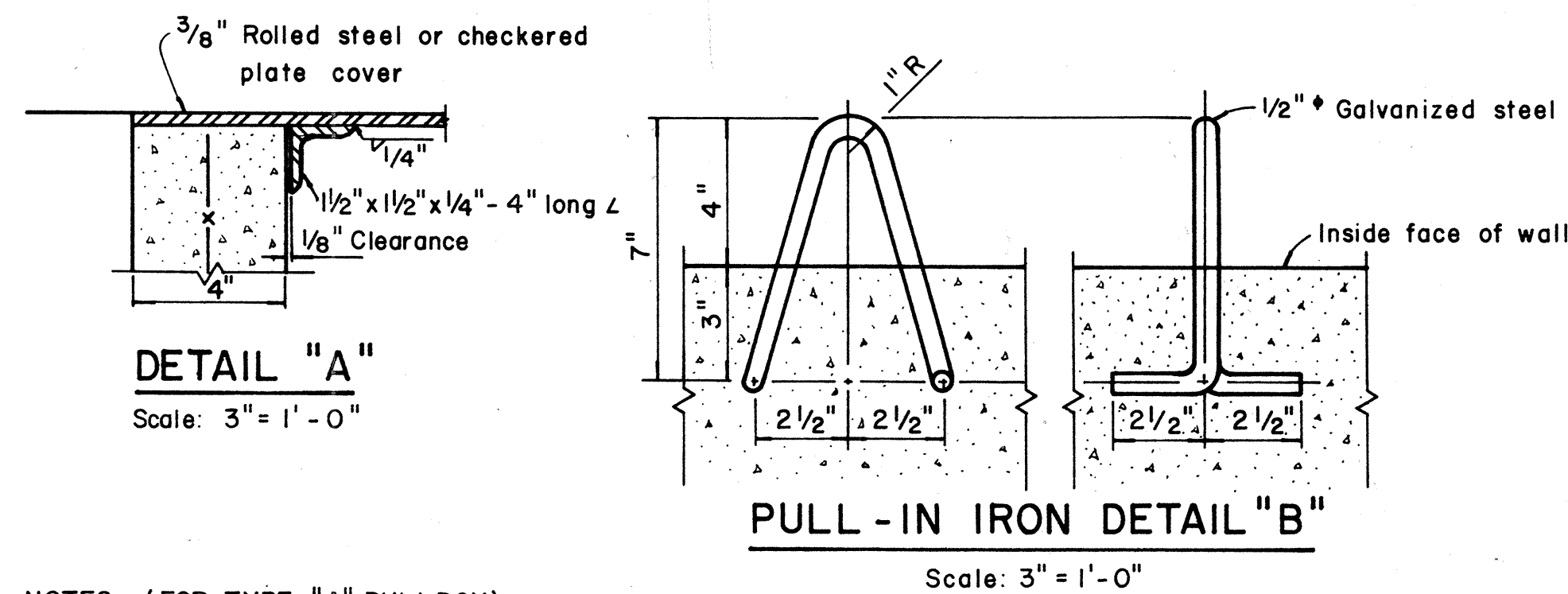
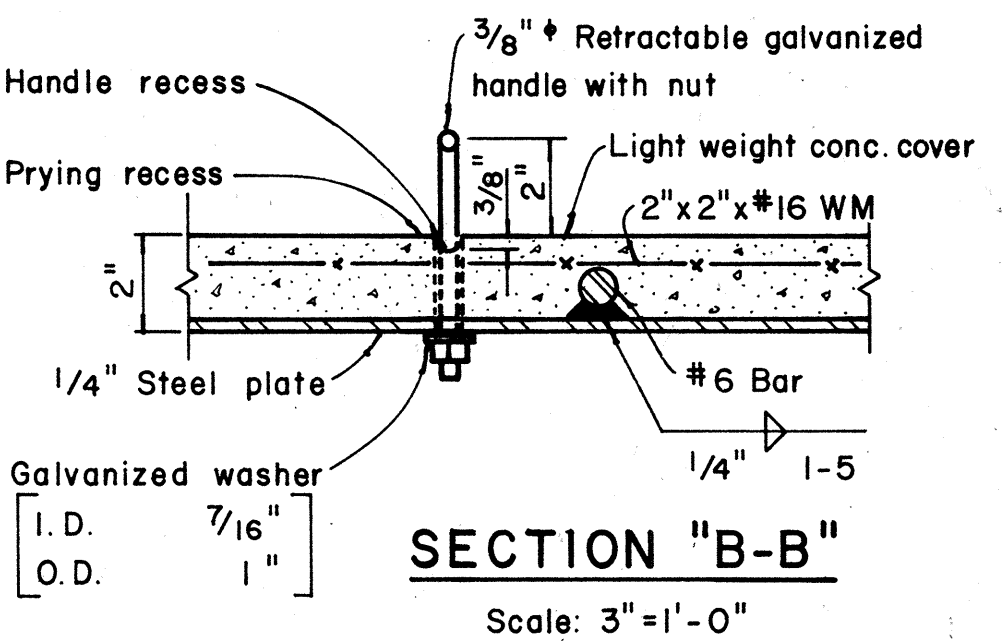
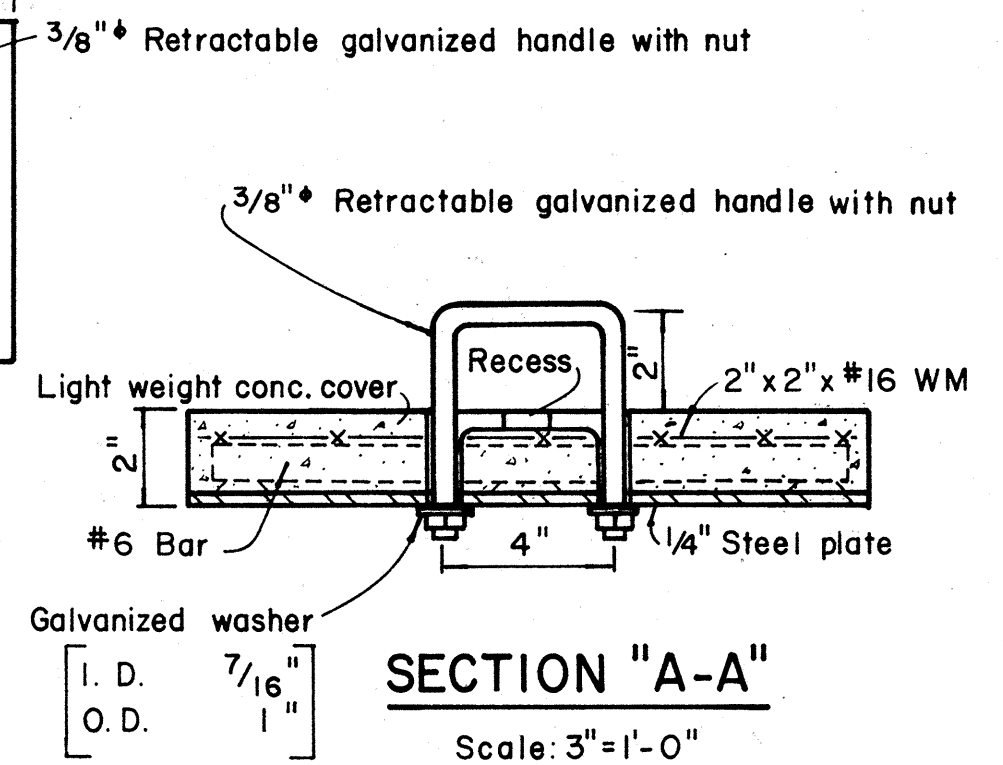
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
SLIP BASE AND FIRE ALARM
PULLBOX DETAIL
MOANALUA ROAD
PUULOA I.C. TO MIDDLE ST. - UNIT 2
F.A. Proj. No. FF-078-1(17)
SCALE: AS SHOWN
DATE: JAN. 14, 1977
SHEET NO. E-14 OF 29 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(11)	1977	103	164

FF-078-1(11)



TYPE "C" PULLBOX
Scale: 1/2" = 1'-0"



TYPE "B" PULLBOX
Scale: 1/2" = 1'-0"

- NOTES: (FOR TYPE "A" PULLBOX)
- 3/8" Rolled steel plate cover with non-slip abrasive surfacing medium grade, natural color shall be used on all pullboxes located on sidewalk areas where pedestrians are walking.
 - 3/8" Checkered plate cover shall be used on all pullboxes located in median areas and other locations where there are no pedestrians walking.
 - Pull irons shall be placed opposite each conduit slot.
 - Covers on all pullboxes located in sidewalk areas shall be set flush with the concrete sidewalk.
 - Each pullbox shall have a pair of pull irons opposite each other for lifting purposes.

APPROVAL RECOMMENDED:
Eiichi Tanaka 12/29/22
TRAFFIC ENGINEER DATE

APPROVED:
[Signature] 12-30-29
ASSISTANT CHIEF, ENGINEERING DATE

NO.	REVISION	APPROVED BY	DATE

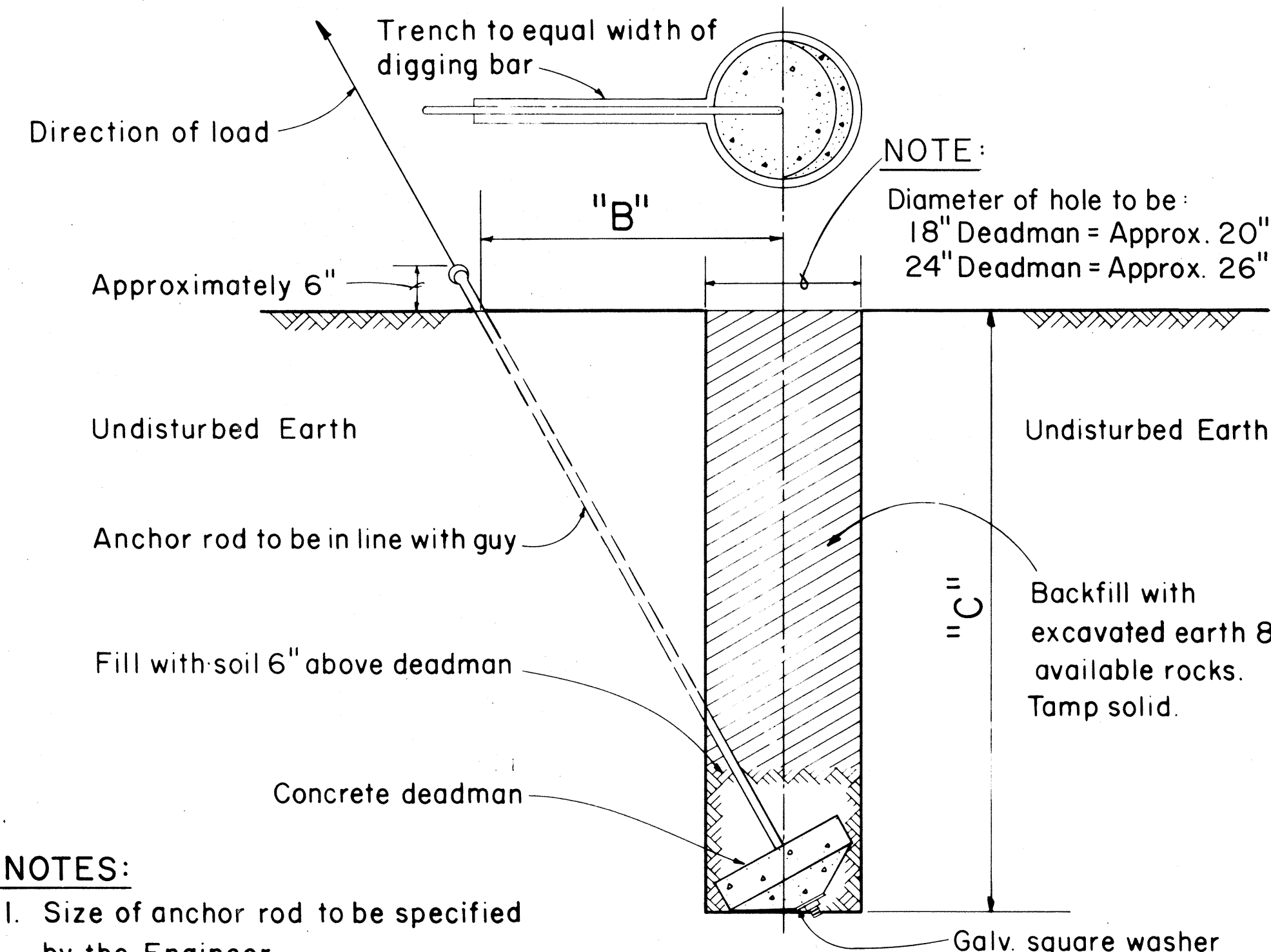
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
PULLBOXES

Scale as noted Date

SHEET No. 15 OF 22 SHEETS DT 401

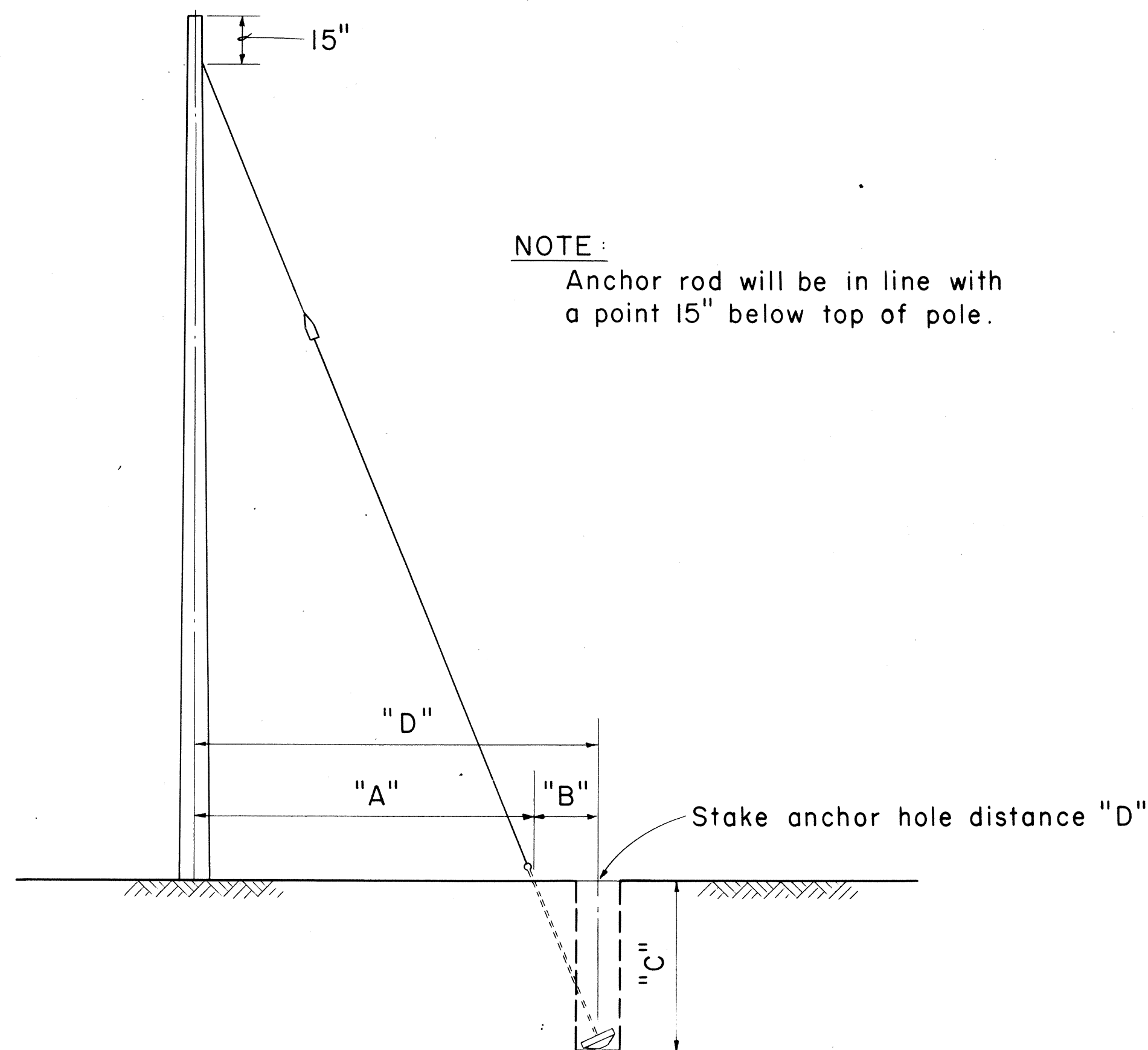
DATE	
SURVEY PLOTTED BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	



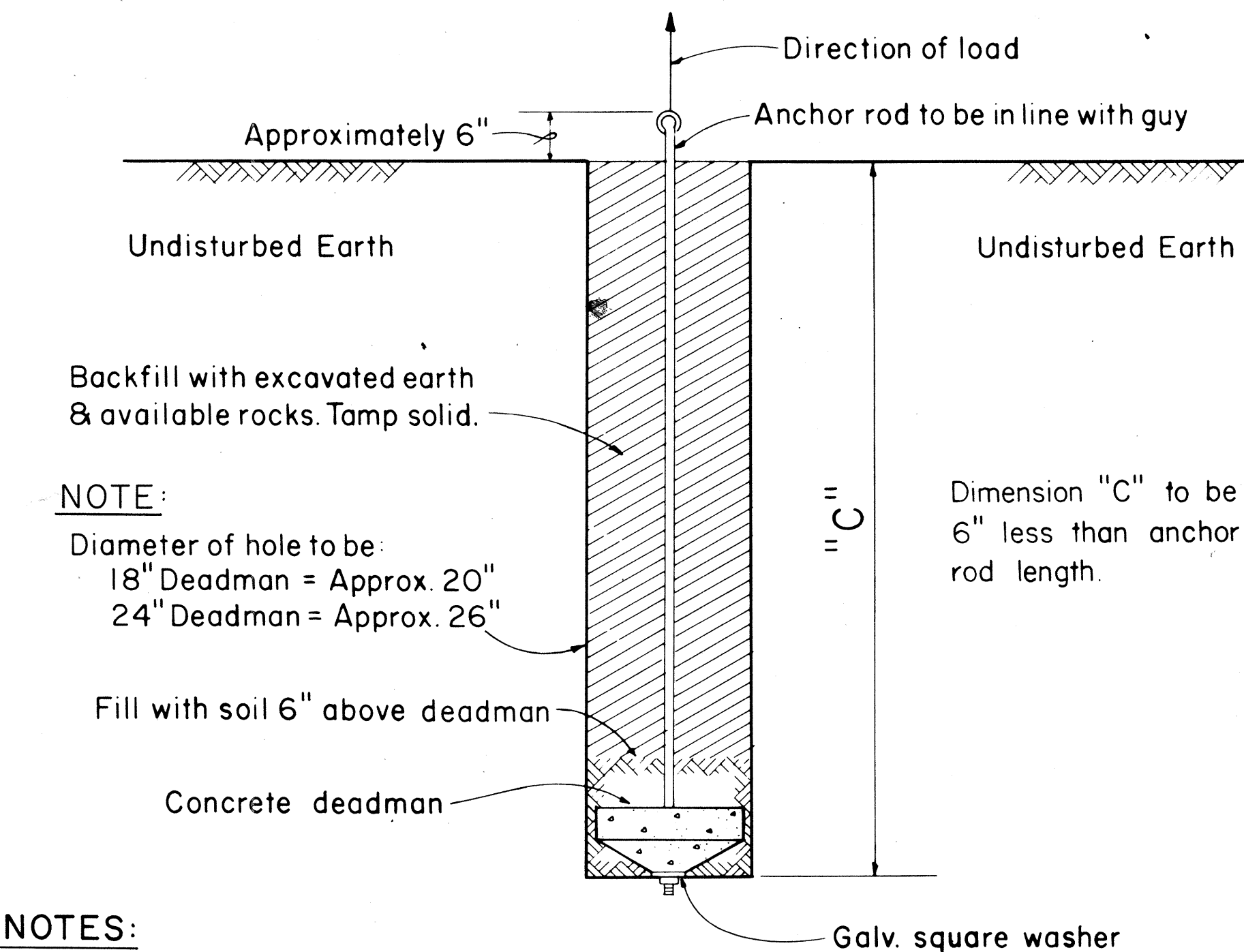
- NOTES:**
1. Size of anchor rod to be specified by the Engineer
 2. Use Anchoring Data.

GUY ANCHOR DEADMAN

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



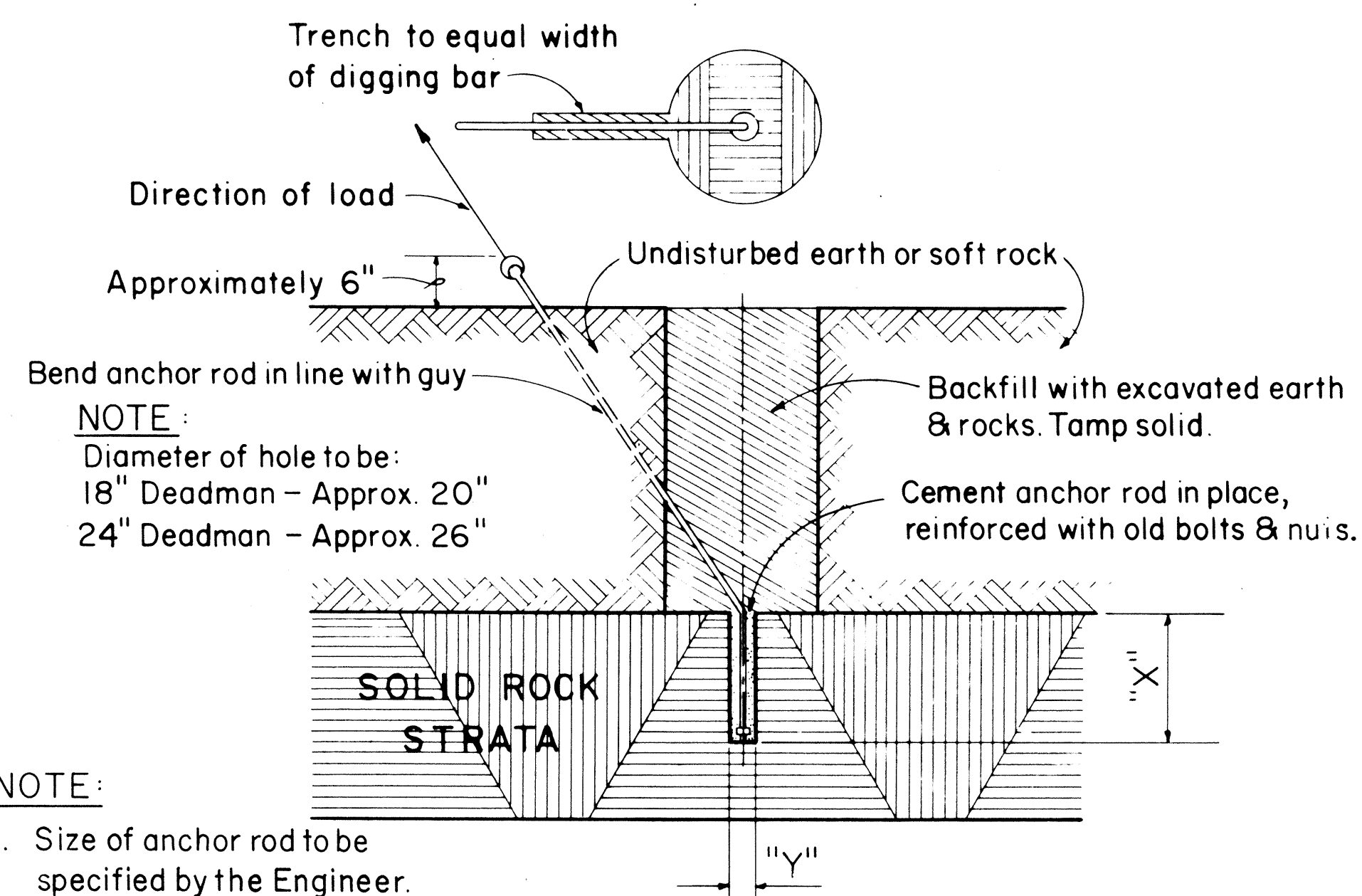
Not to Scale



- 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

FOR 25' & 30' POLES WITH 8'-0" ANCHOR RODS				
"A"	"B"	"C"		"D" = ("A" + "B")
LEAD-ANCHOR ROD TO ϕ OF POLE	ANCHOR ROD TO ϕ OF 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:

Fred Karamoto 3-30-77
HAWAIIAN ELECTRIC Co., Inc. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
H.E. Co. AND H.T. Co.
ANCHORING DETAILS AND
ANCHORING DATA

Scales: As Noted

Date

SHEET No. E-16 OF 29 SHEETS

CREOSOTED DOUGLAS FIR & YELLOW PINE POLE DATA									
LENGTH IN FEET	CLASS	APPROX. MINIMUM DIMENSIONS (INCHES)				AVERAGE WEIGHT (LBS.)	POLE SETTING DEPTH (FT.)		BREAKING LOAD 2'-0" BELOW TOP OF POLE (LBS.)
		AT TOP		6' FROM BUTT		DOUGLAS FIR	IN SOIL	IN ROCK	
		DIA.	CIR.	DIA.	CIR.				
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

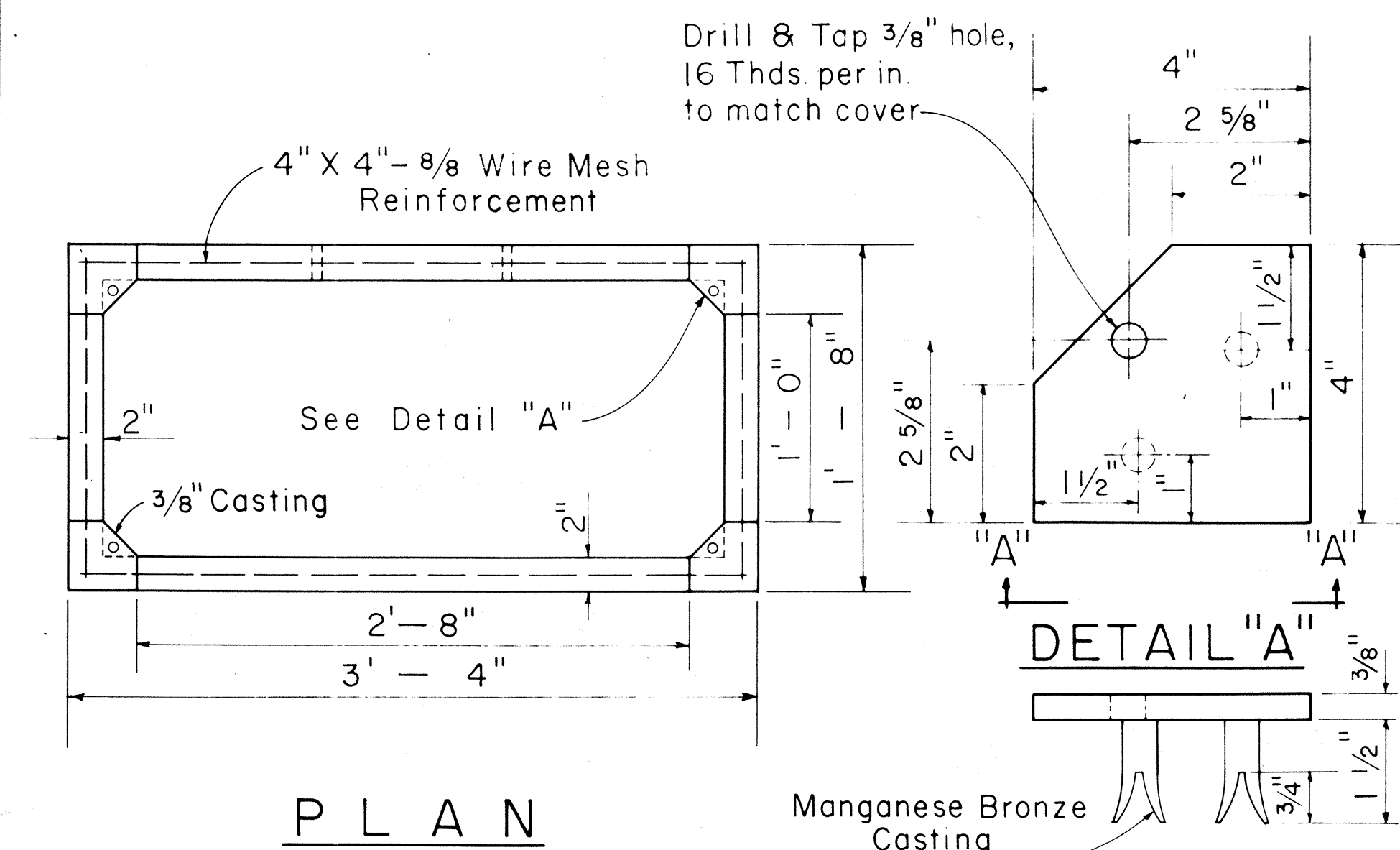
APPROVED:

Fred Karim 3-30-77
HAWAIIAN ELECTRIC Co., Inc. 11/10/77 DATE

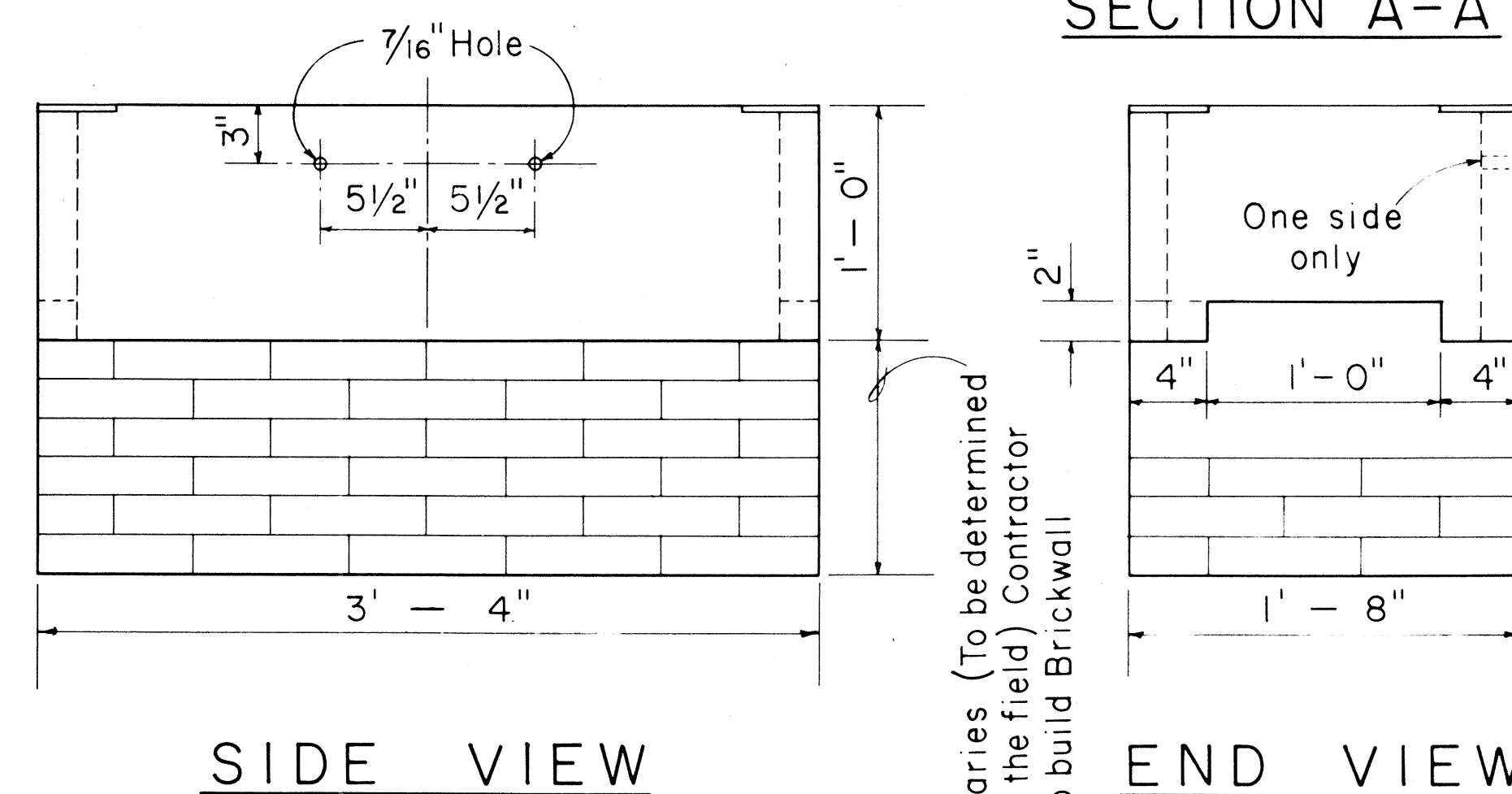
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
H.E. Co. AND H.T. Co.
SERVICE BOX DETAILS
AND WOOD POLE DATA

Scales: As Noted Date

SHEET NO. E-17 OF 29 SHEETS



SECTION "A-A"



END VIEW

NOTES:

Use 3/8" Plate for driveways.
Concrete Box 225 Lbs.
1/4" Checker Plate 62 Lbs.
Secure cover with 3/8" x 1" flat head brass machine screws.

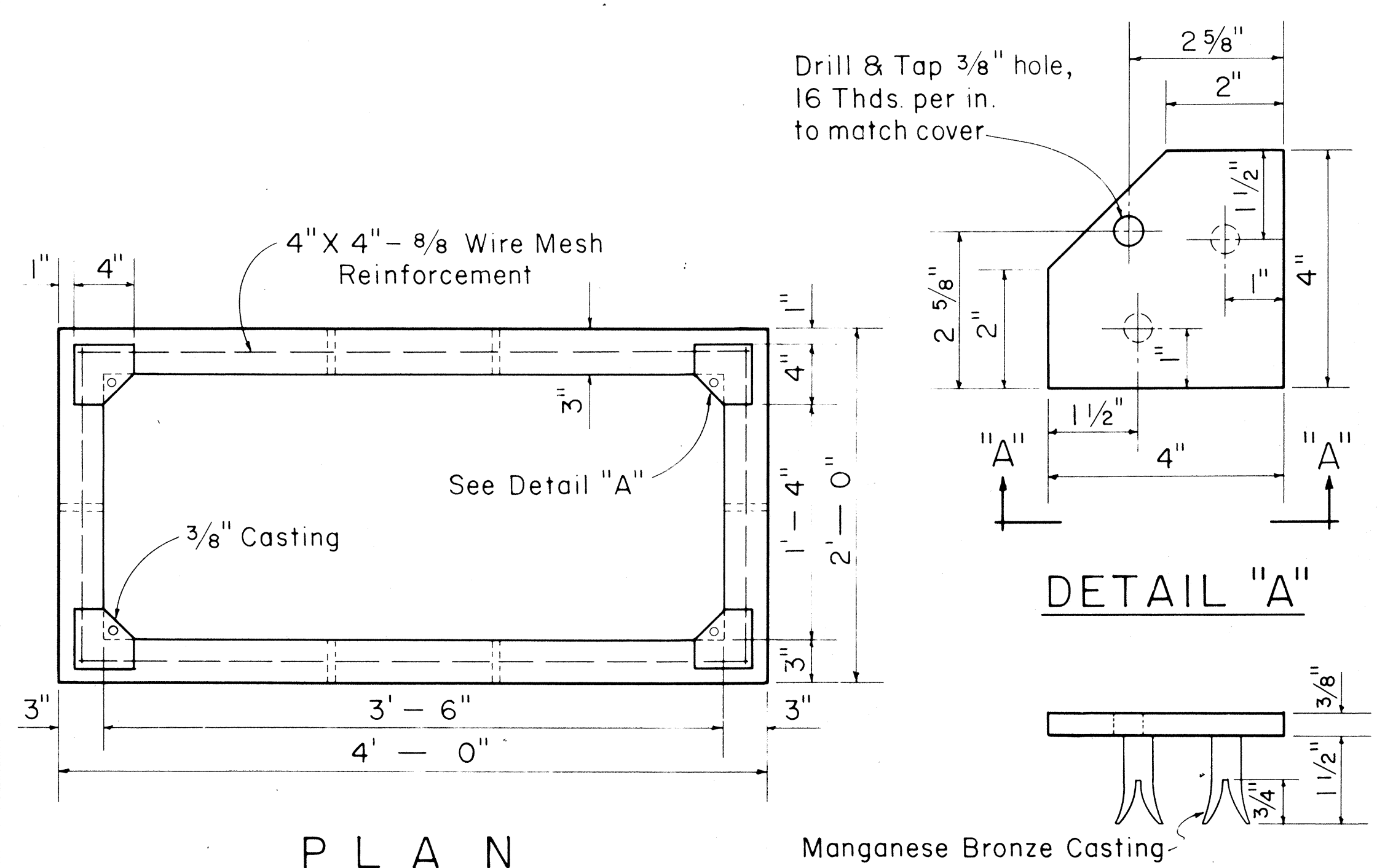
1/4" CHECKER PLATE COVER

(Hot dip galvanize checkered plate after drilling, countersinking, and grinding edge)

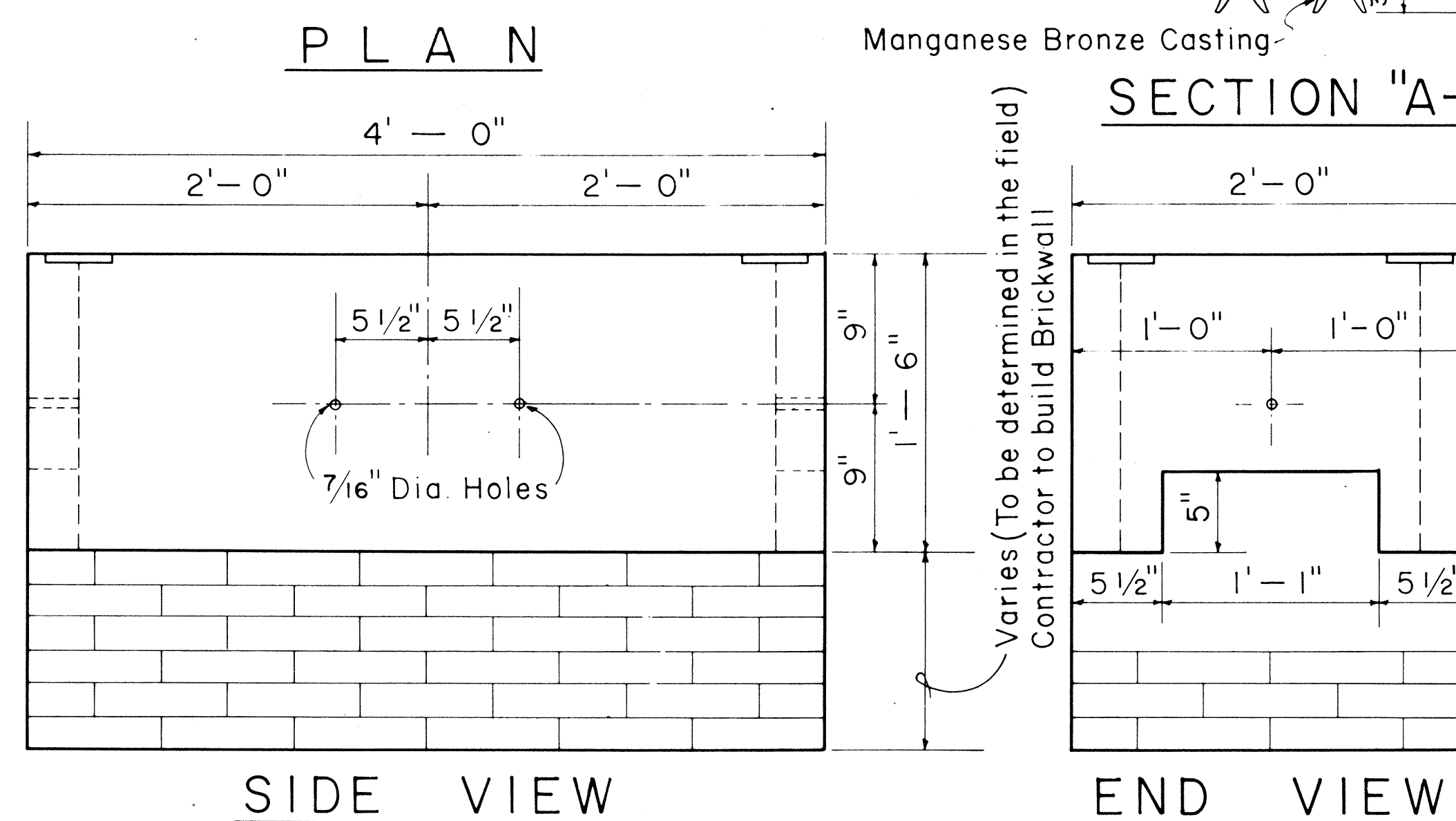
1'-4" X 3'-0" CONCRETE SERVICE BOX

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

011250



SECTION "A-A"



END VIEW

NOTES:

Use 3/8" Plate for driveway.
Concrete Box 575 Lbs.
1/4" Checker Plate 130 Lbs.
Secure cover with 3/8" x 1" flat head brass machine screws.

1/4" CHECKER PLATE COVER

(Hot dip galvanize checkered plate after drilling, countersinking, and grinding edge)

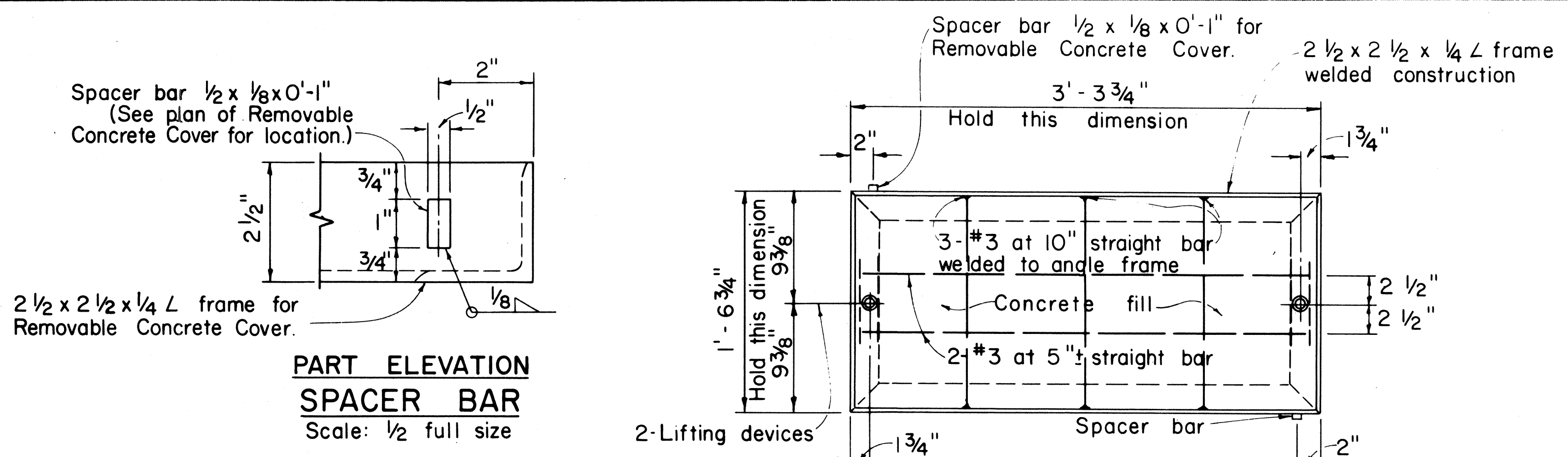
1'-6" X 3'-6" CONCRETE SERVICE BOX

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

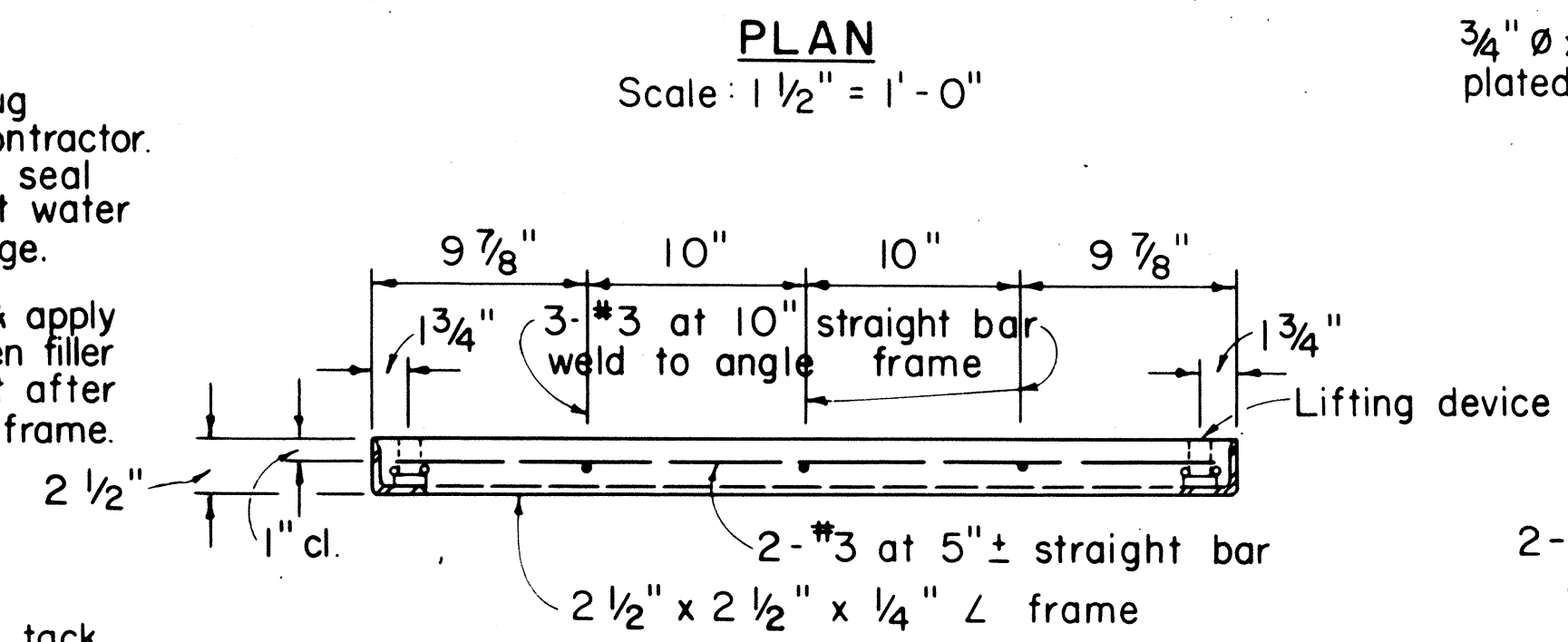
011255

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078 (17)	1977	106	164

F-FF-078-1(17)

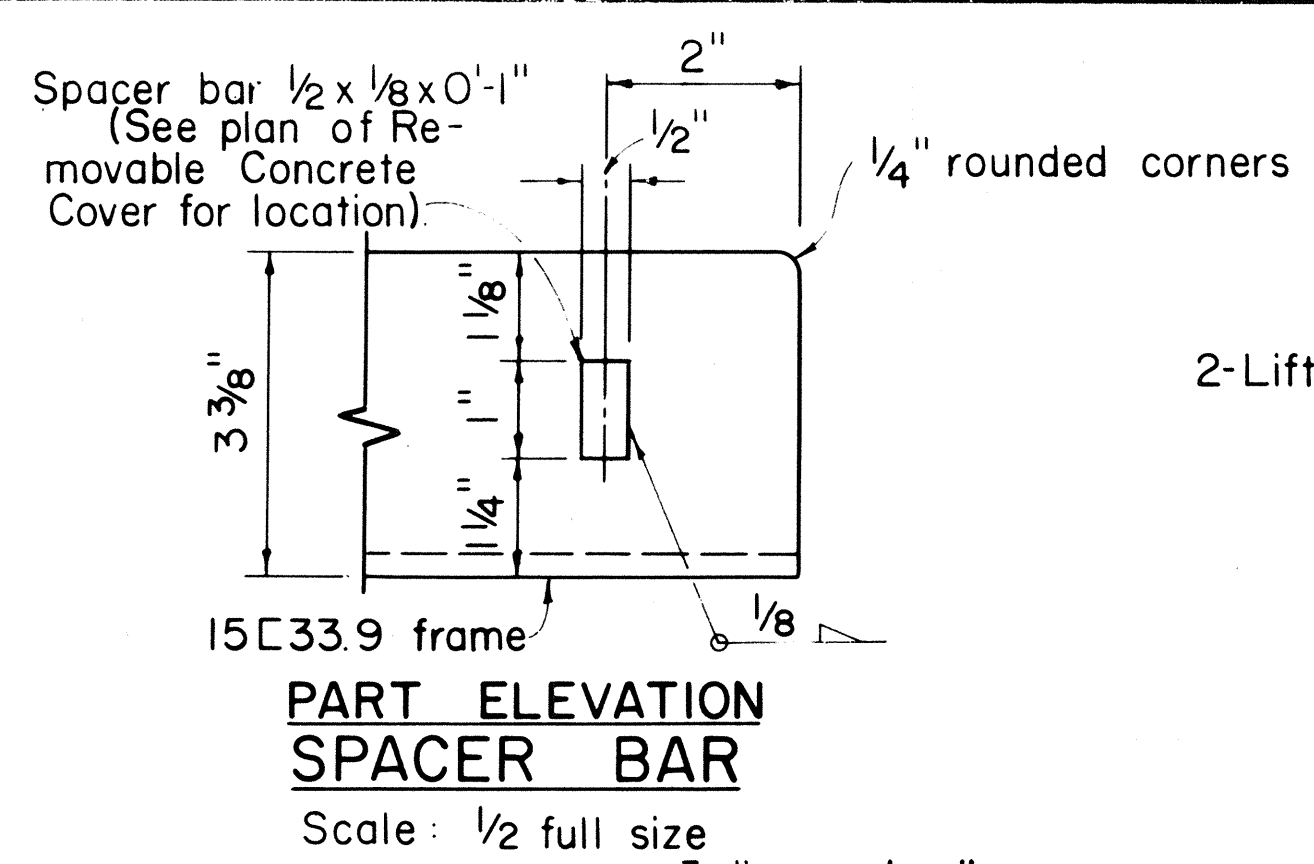


PLAN
Scale: $1 \frac{1}{2}" = 1' - 0"$

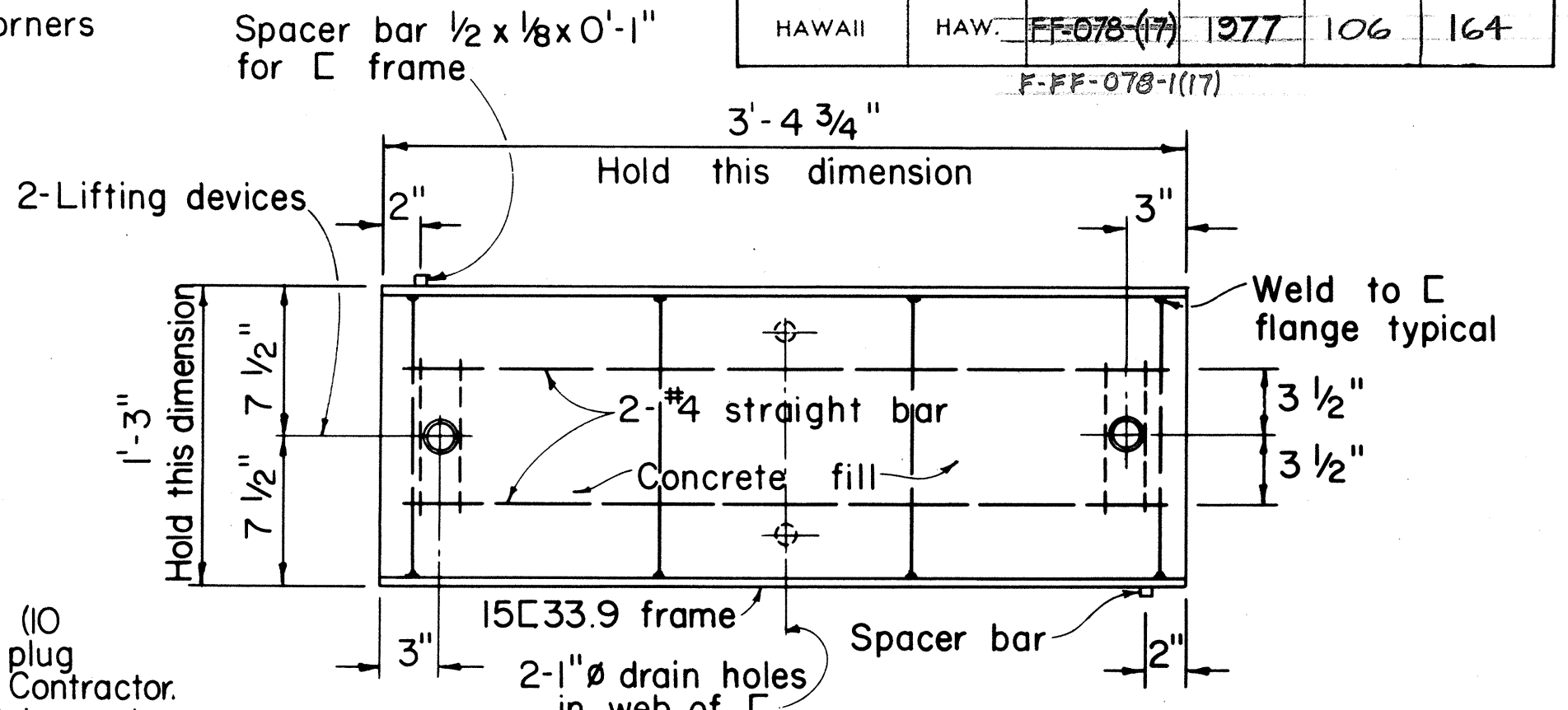


SECTION
Scale: $1 \frac{1}{2}" = 1' - 0"$

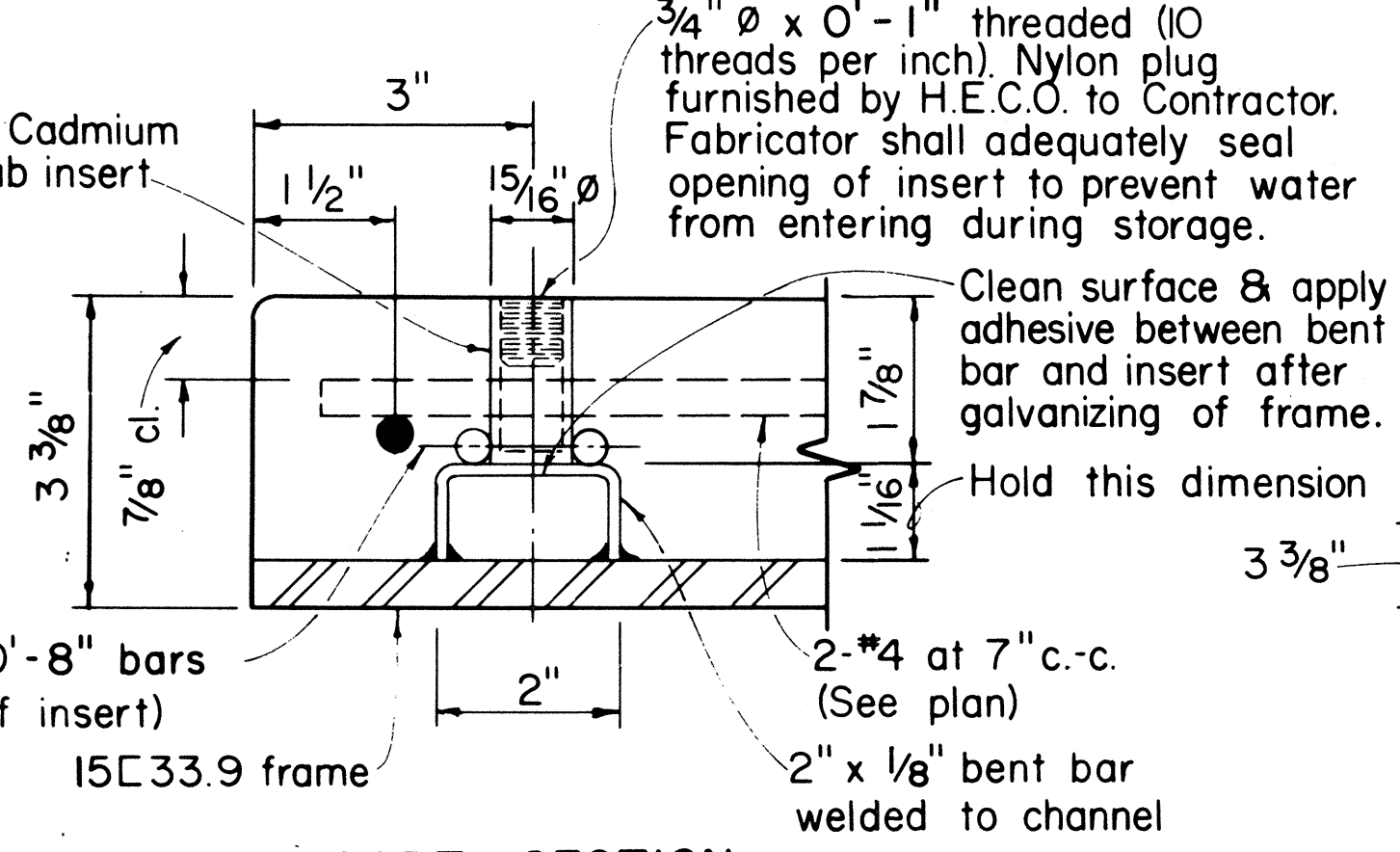
NOTE: Galvanize L frame or C frame, steel rods, and spacer bars after fabrication.



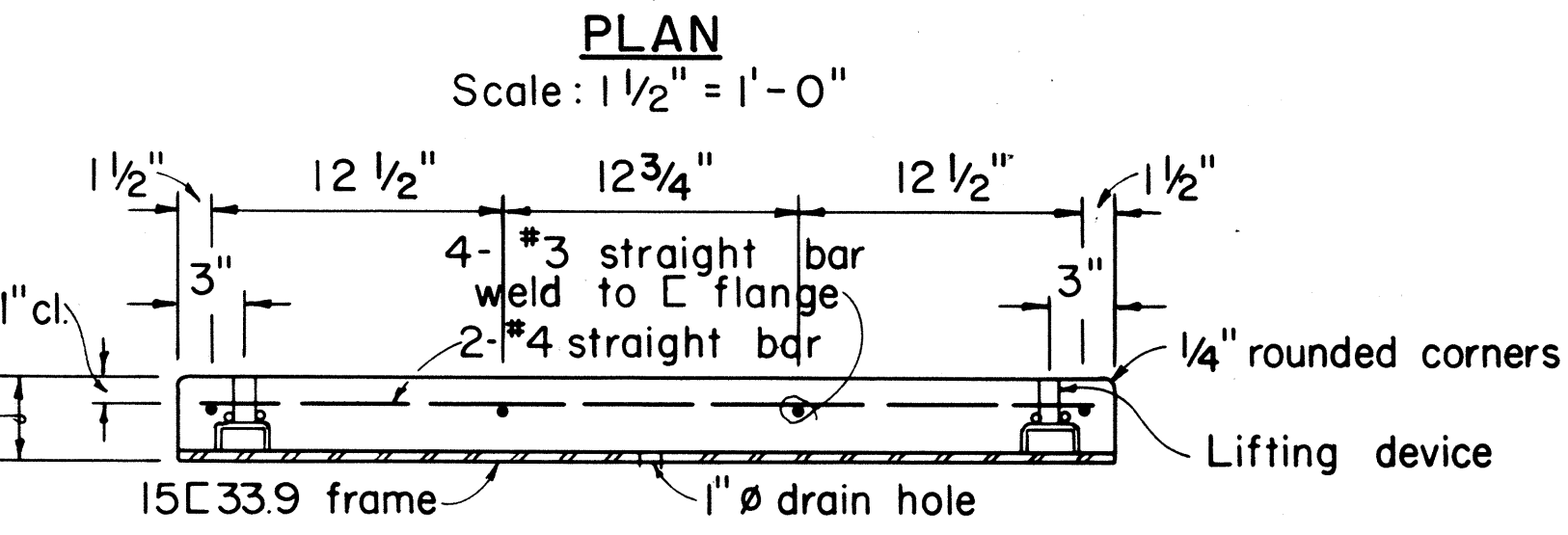
PART ELEVATION
SPACER BAR
Scale: $\frac{1}{2}$ full size



PLAN
Scale: $1 \frac{1}{2}" = 1' - 0"$



PART SECTION
LIFTING DEVICE
Scale: $\frac{1}{2}$ full size



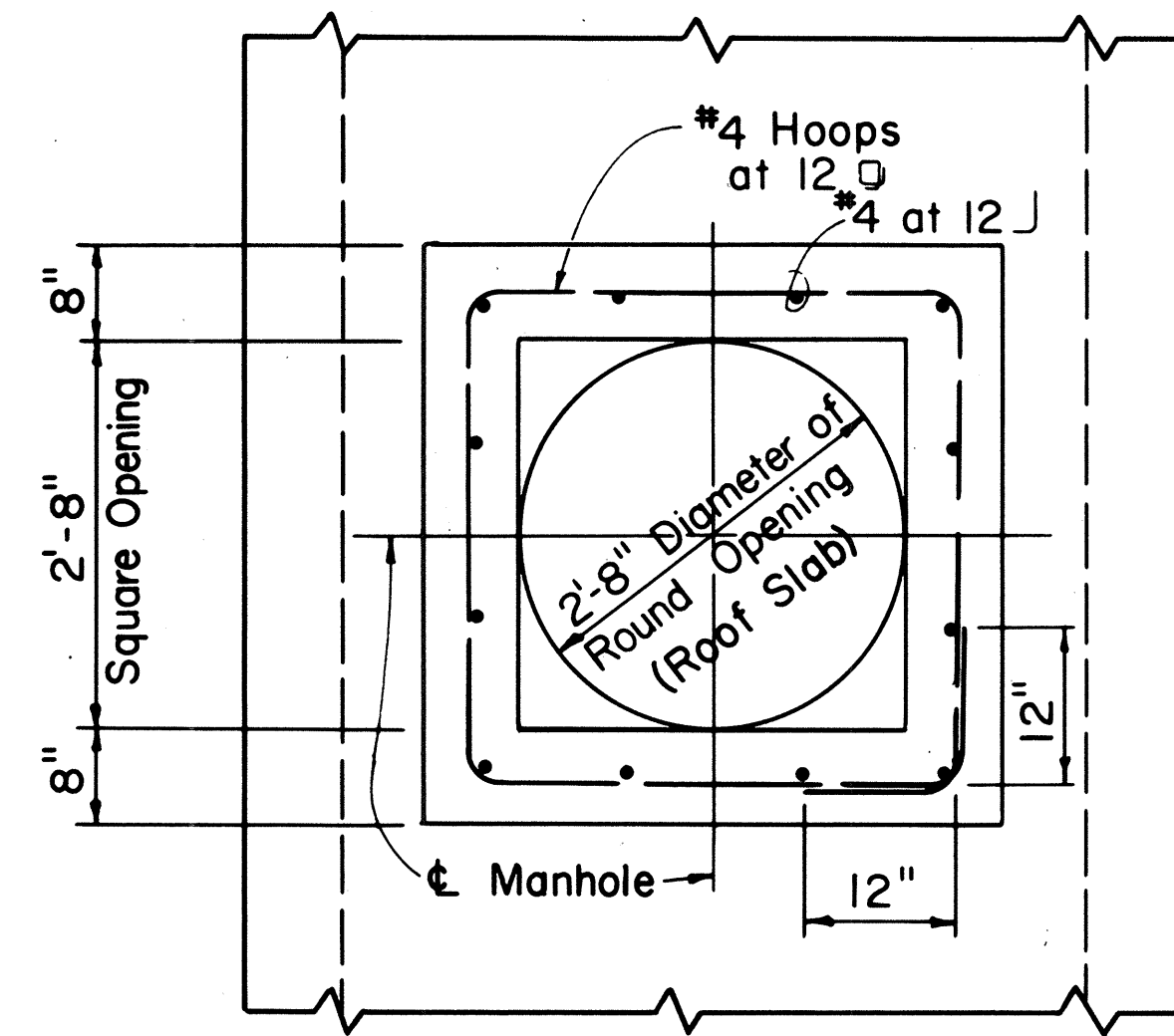
SECTION
Scale: $1 \frac{1}{2}" = 1' - 0"$

TYPE "SW" REMOVABLE CONCRETE COVER

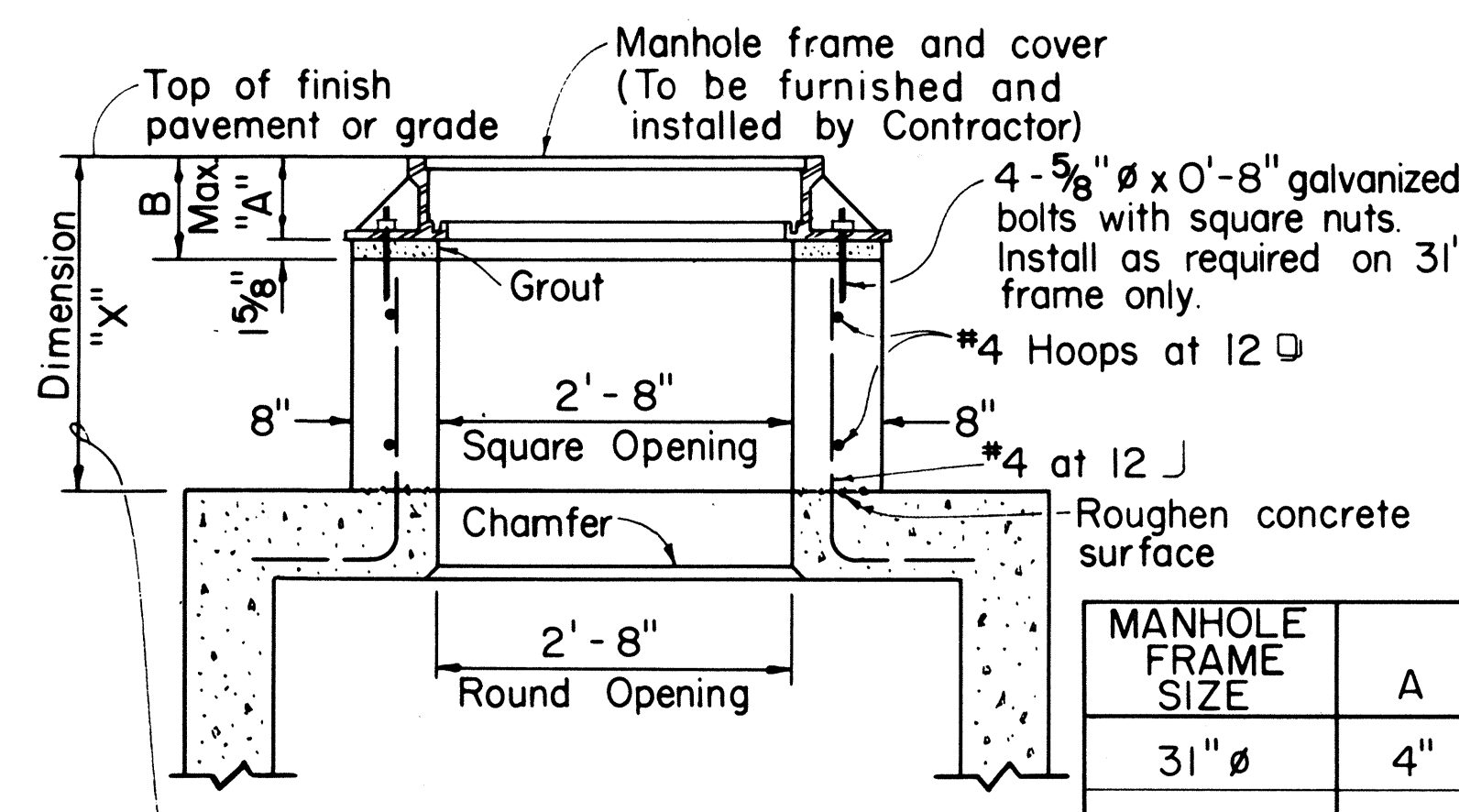
TYPE "TR" REMOVABLE CONCRETE COVER

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 a Hawaiian Electric Co., Inc. Engineer or Inspector.
- All materials shall be new and manufactured in the United States of America.



PLAN

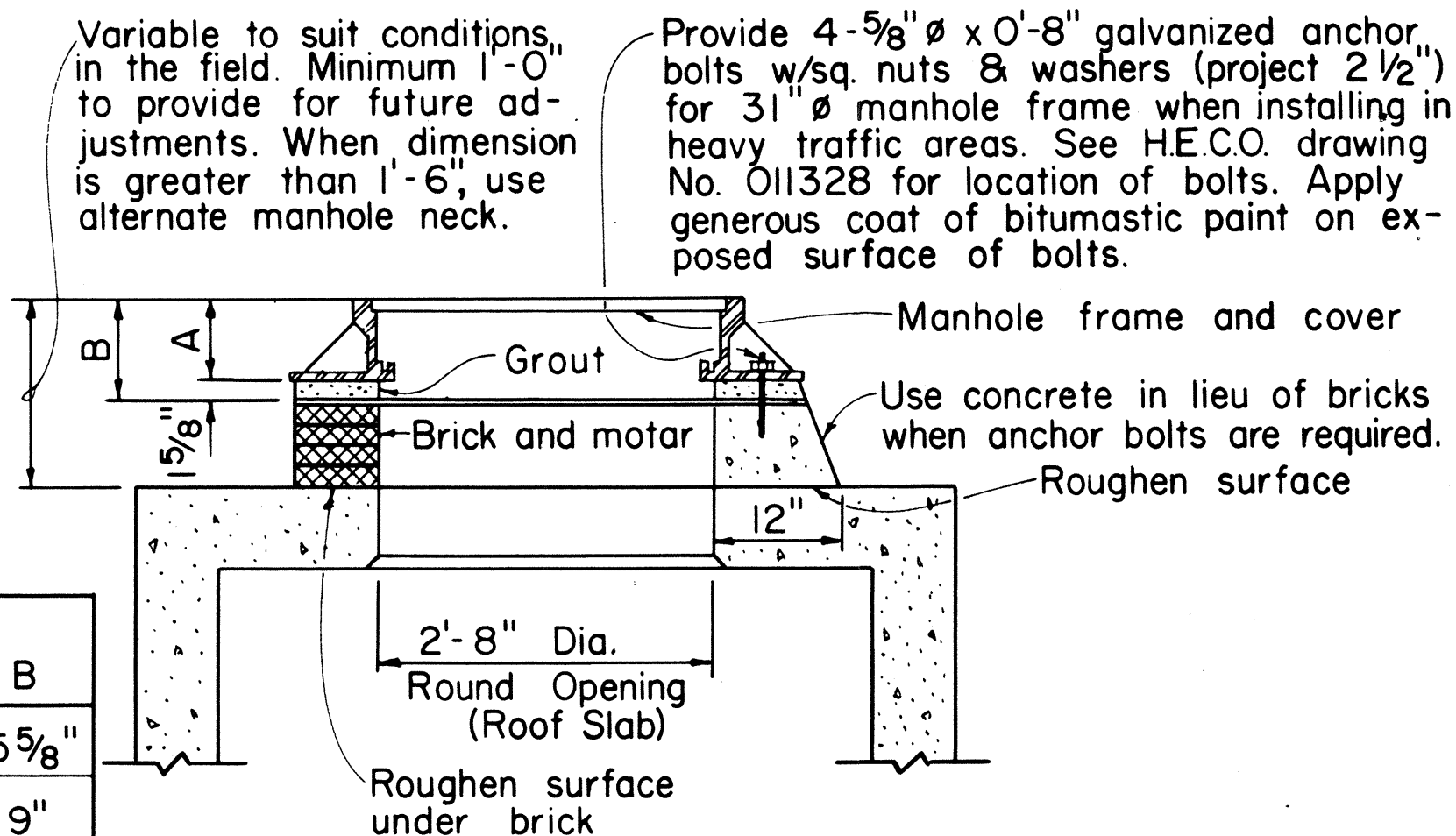


NOTE: Use alternate manhole neck only when dimension "X" is greater than 1'-6".

SECTION

ALTERNATE MANHOLE NECK

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



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

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

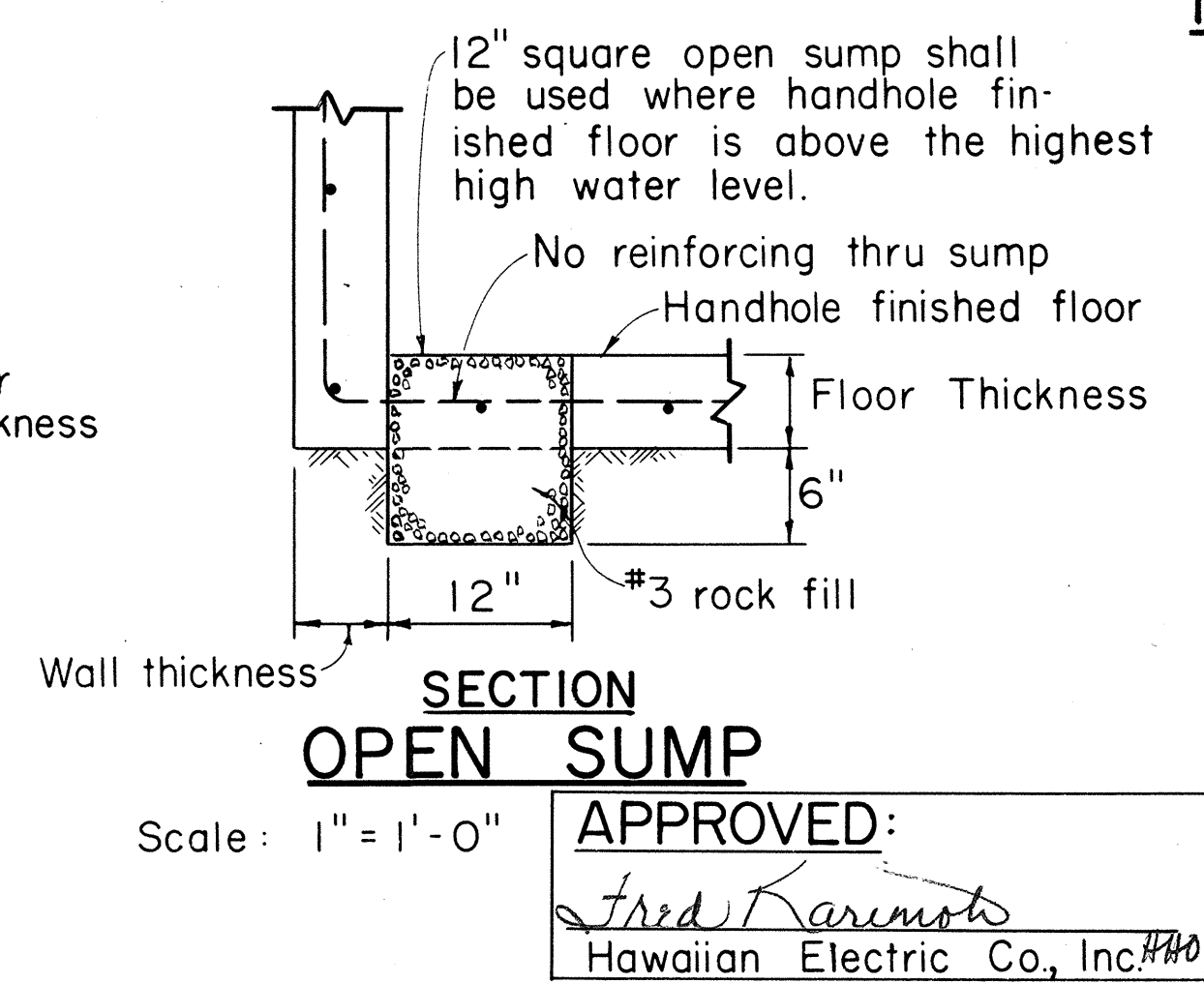
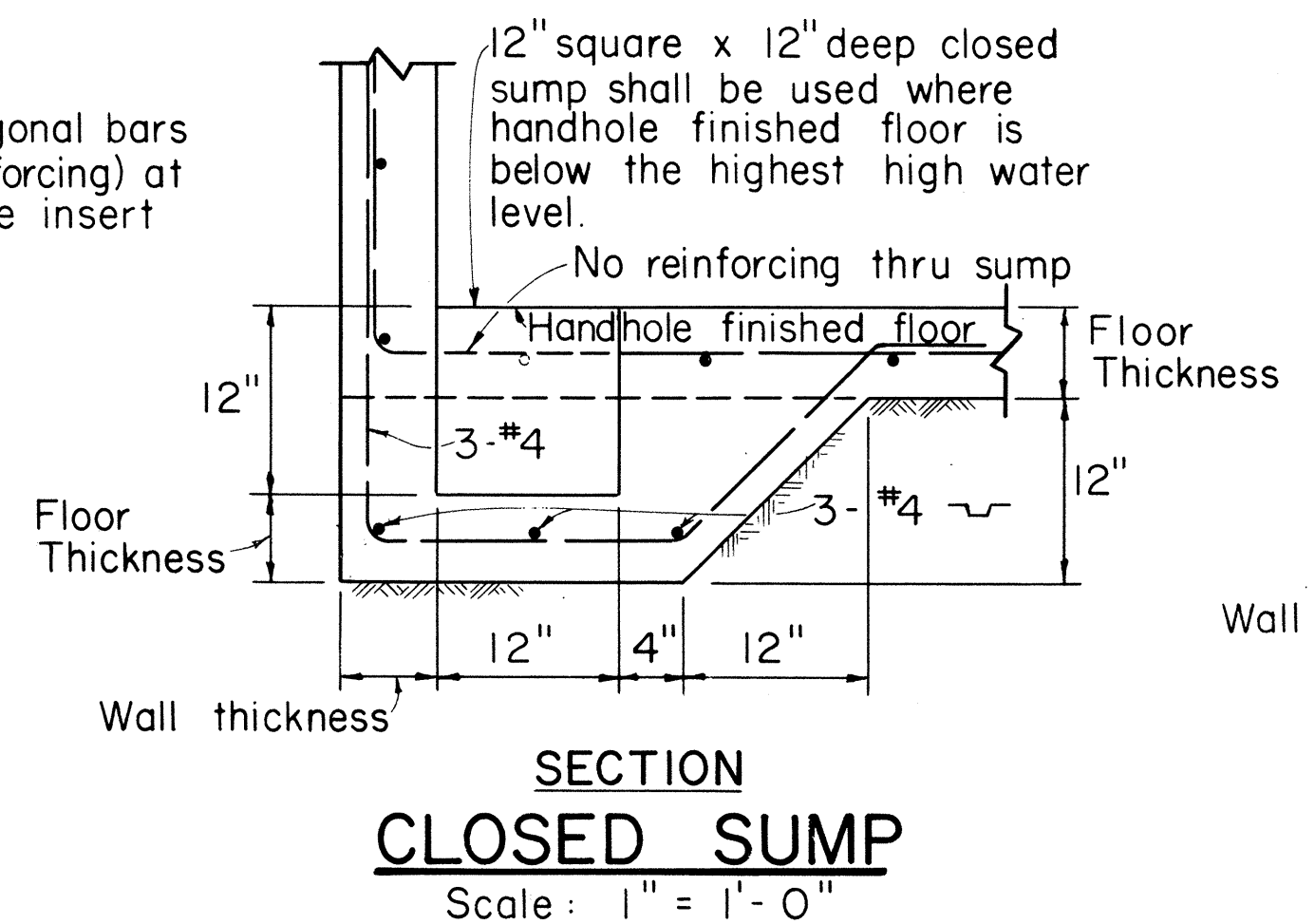
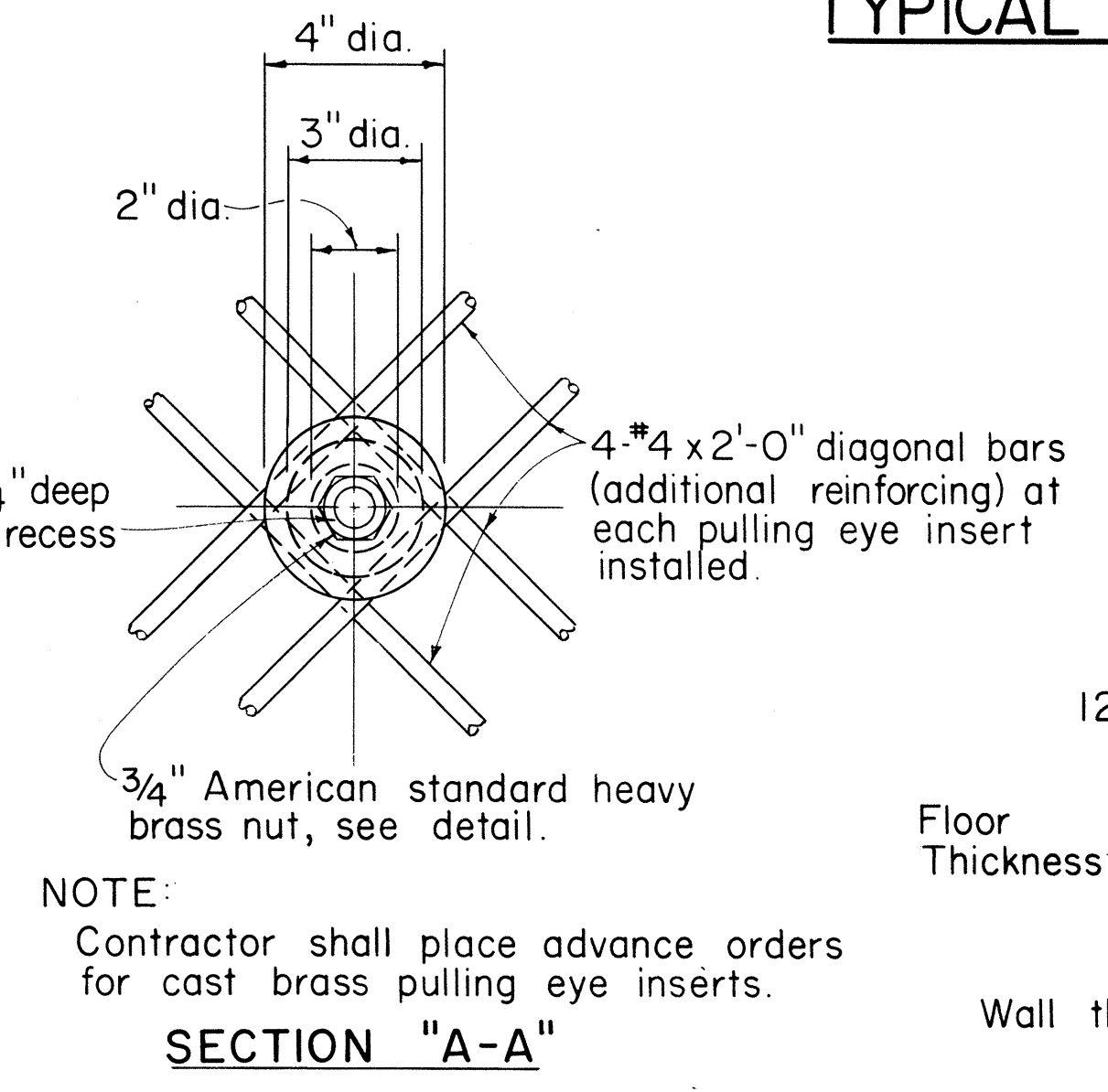
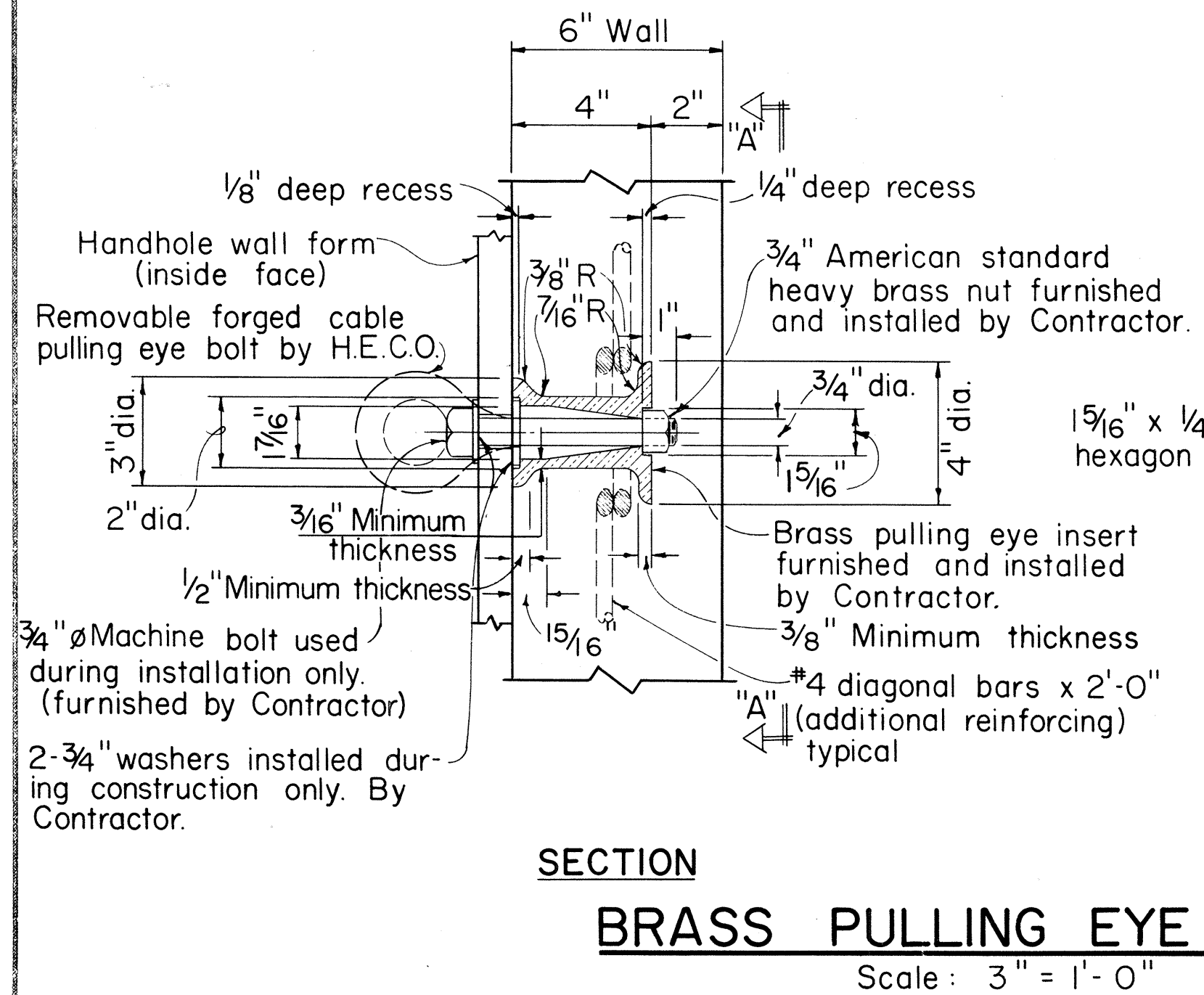
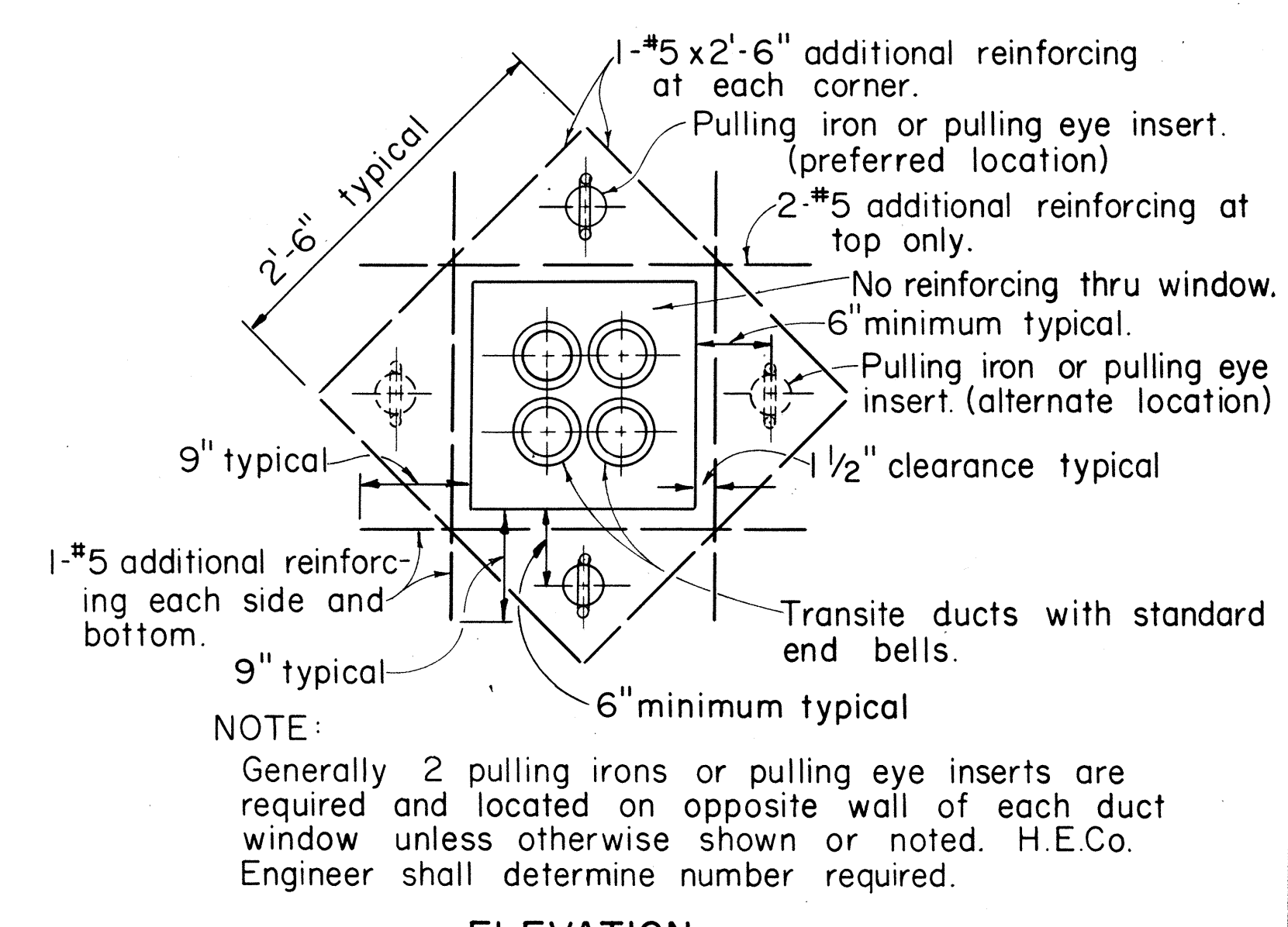
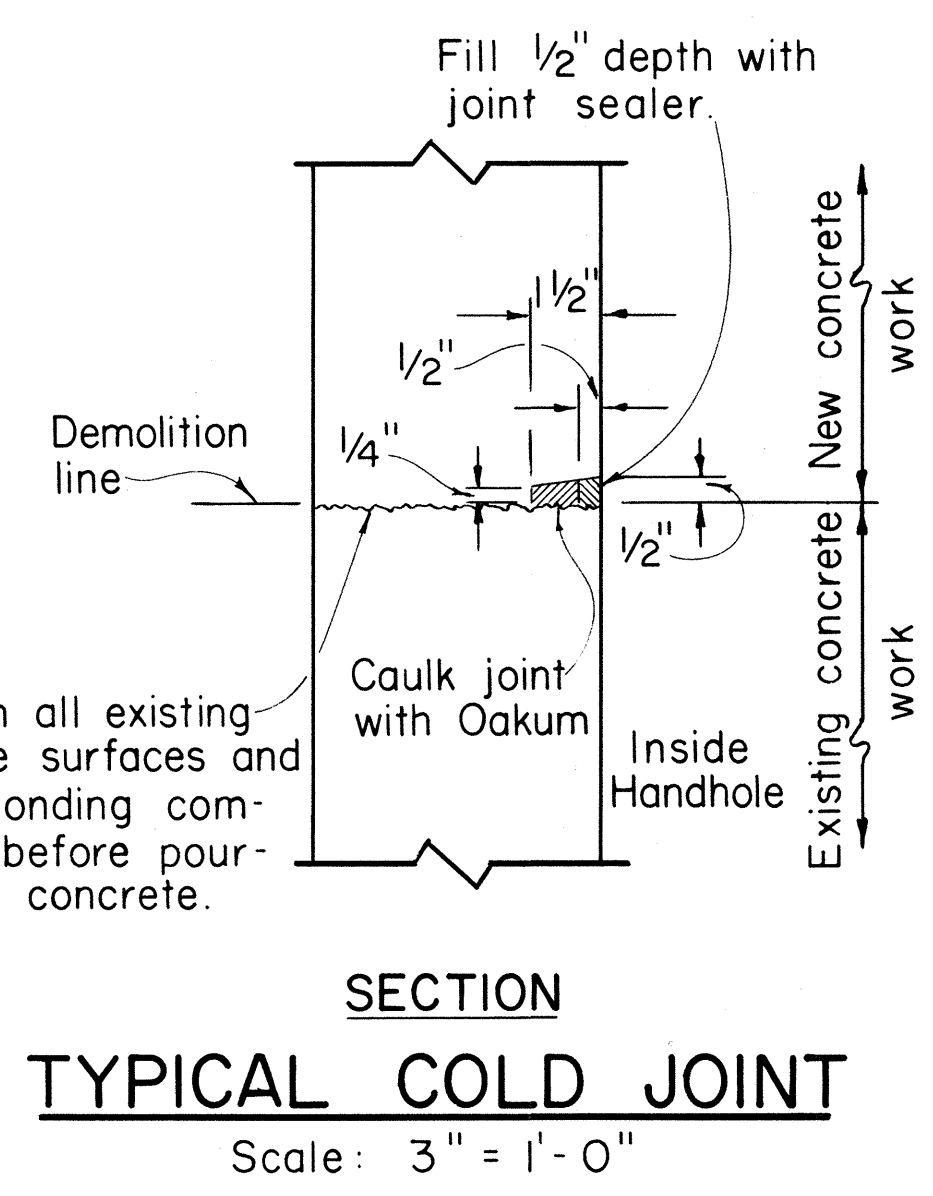
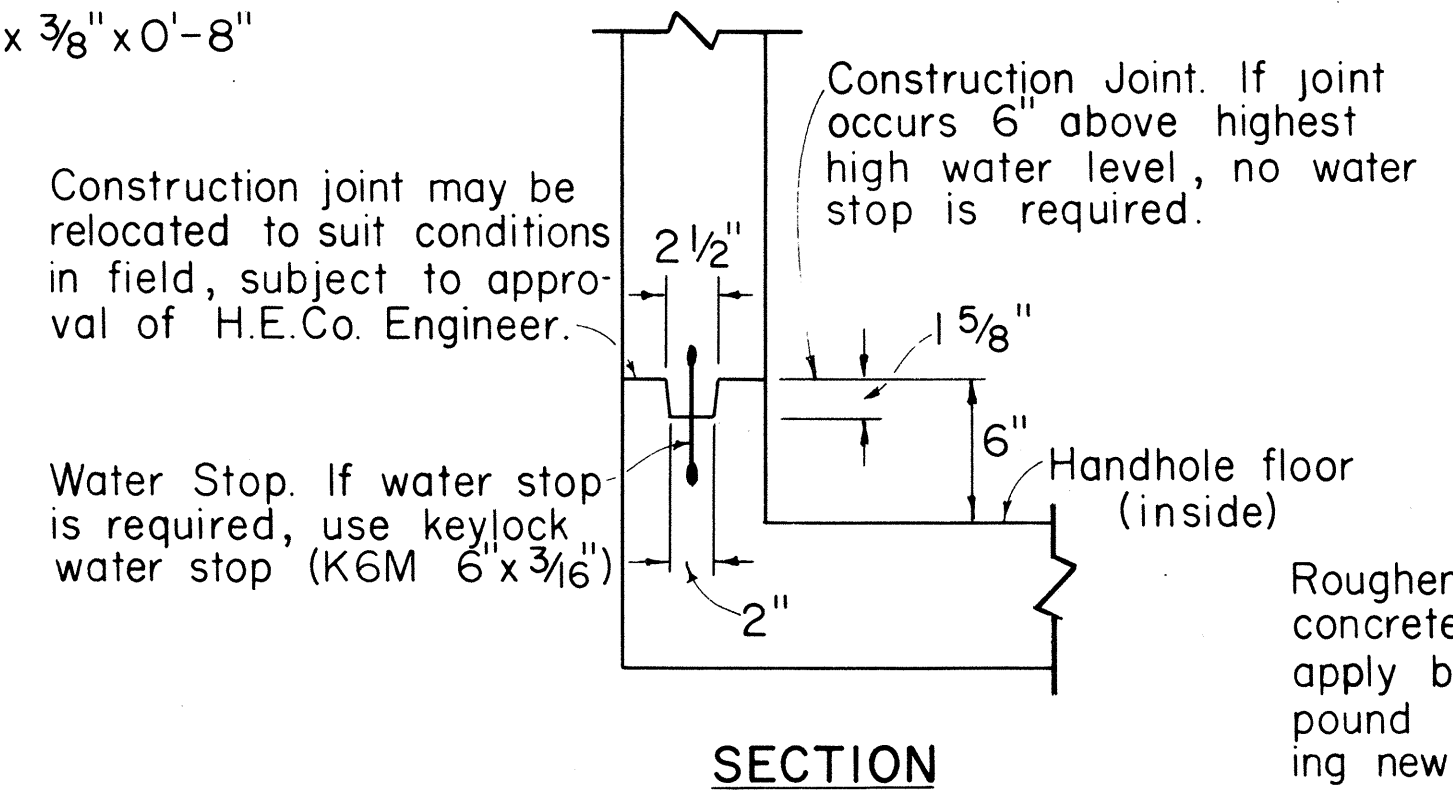
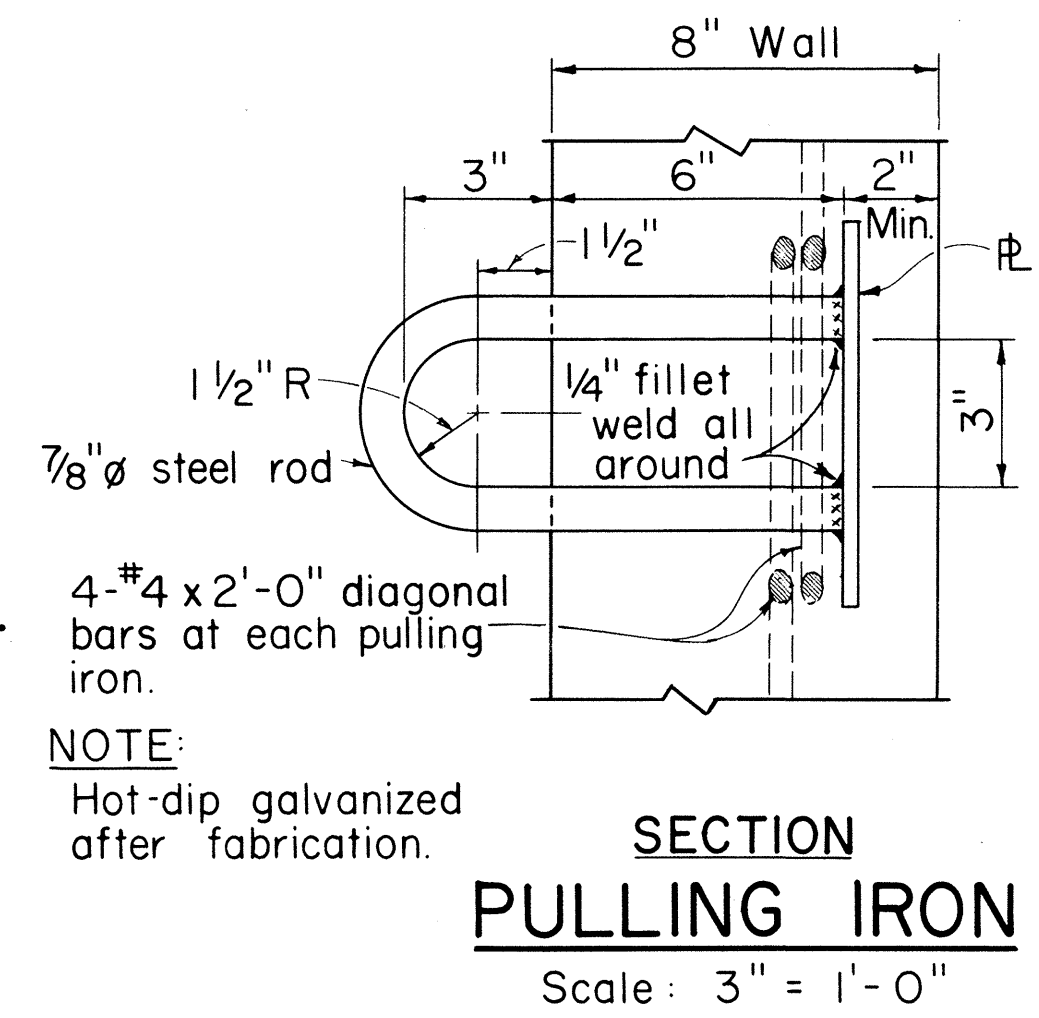
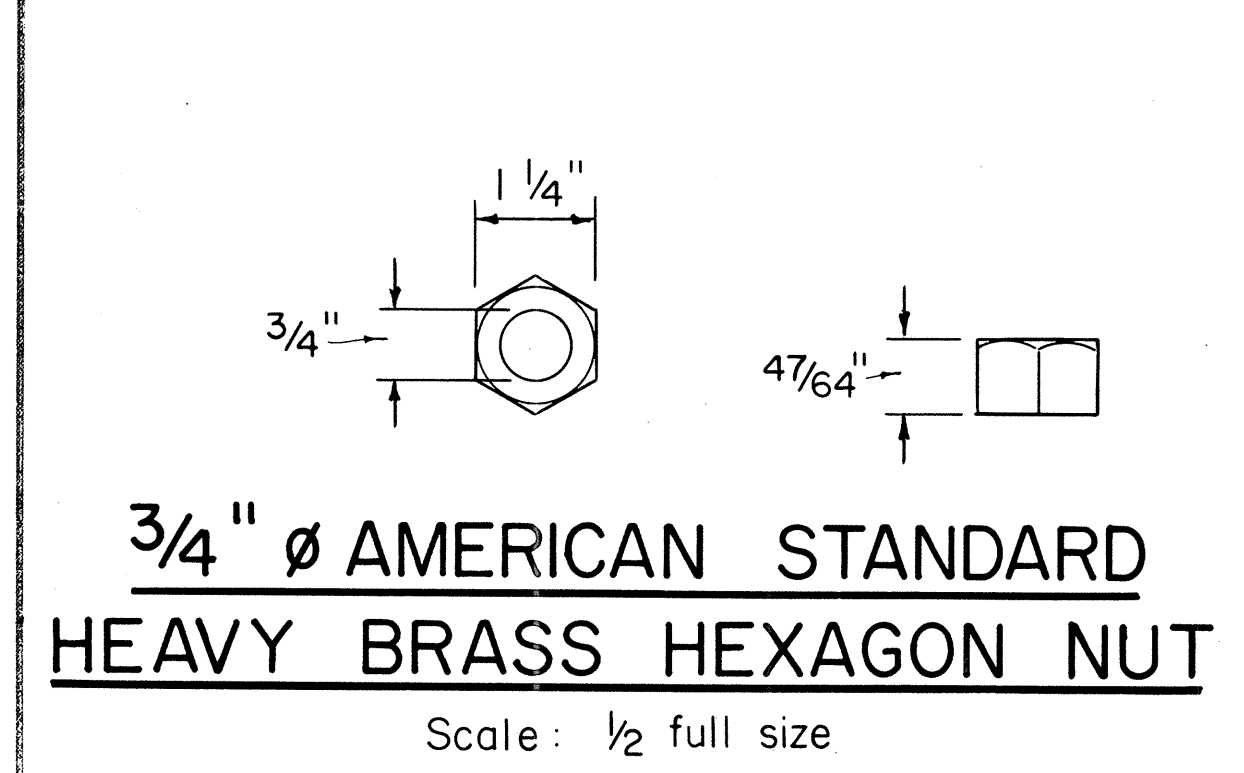
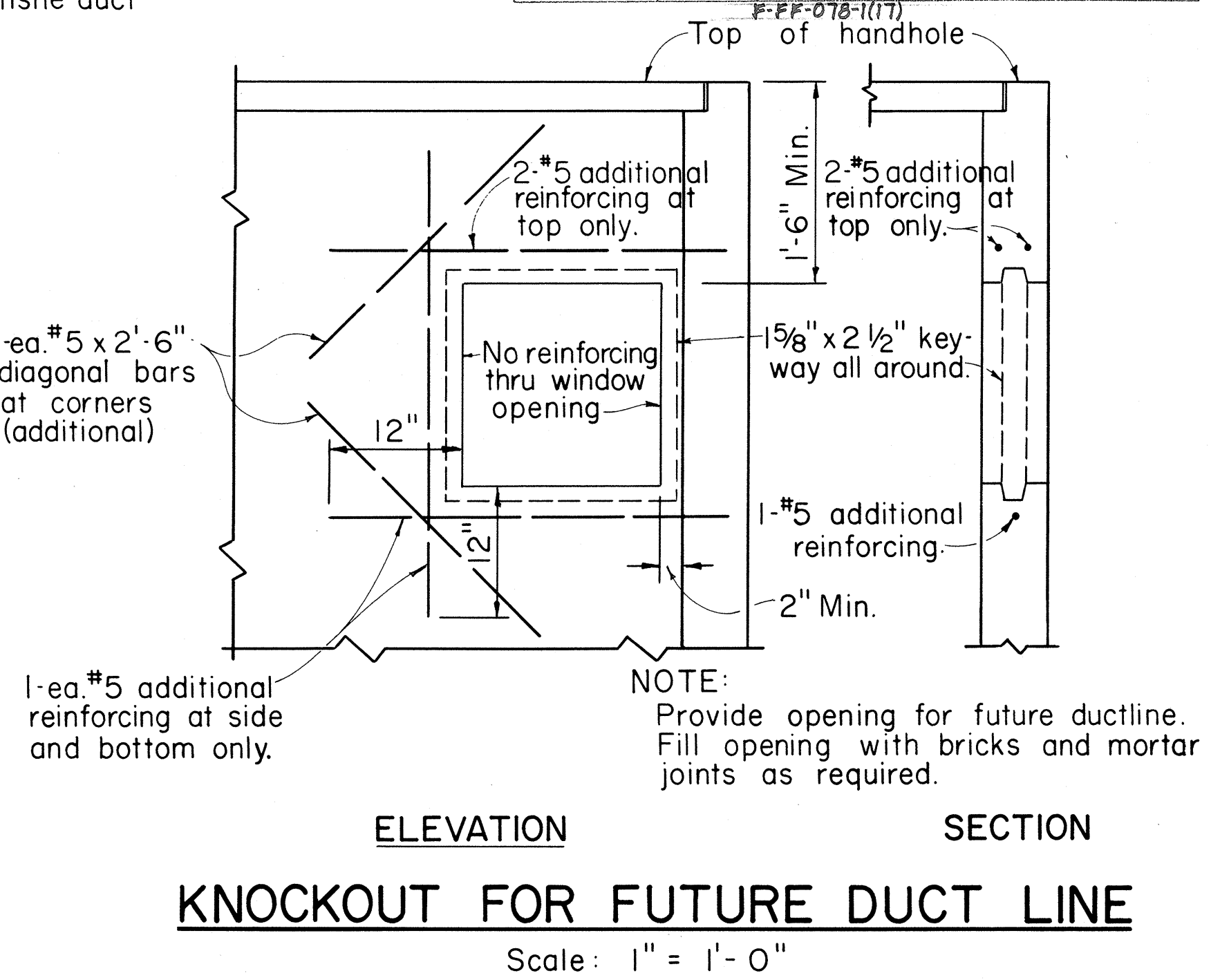
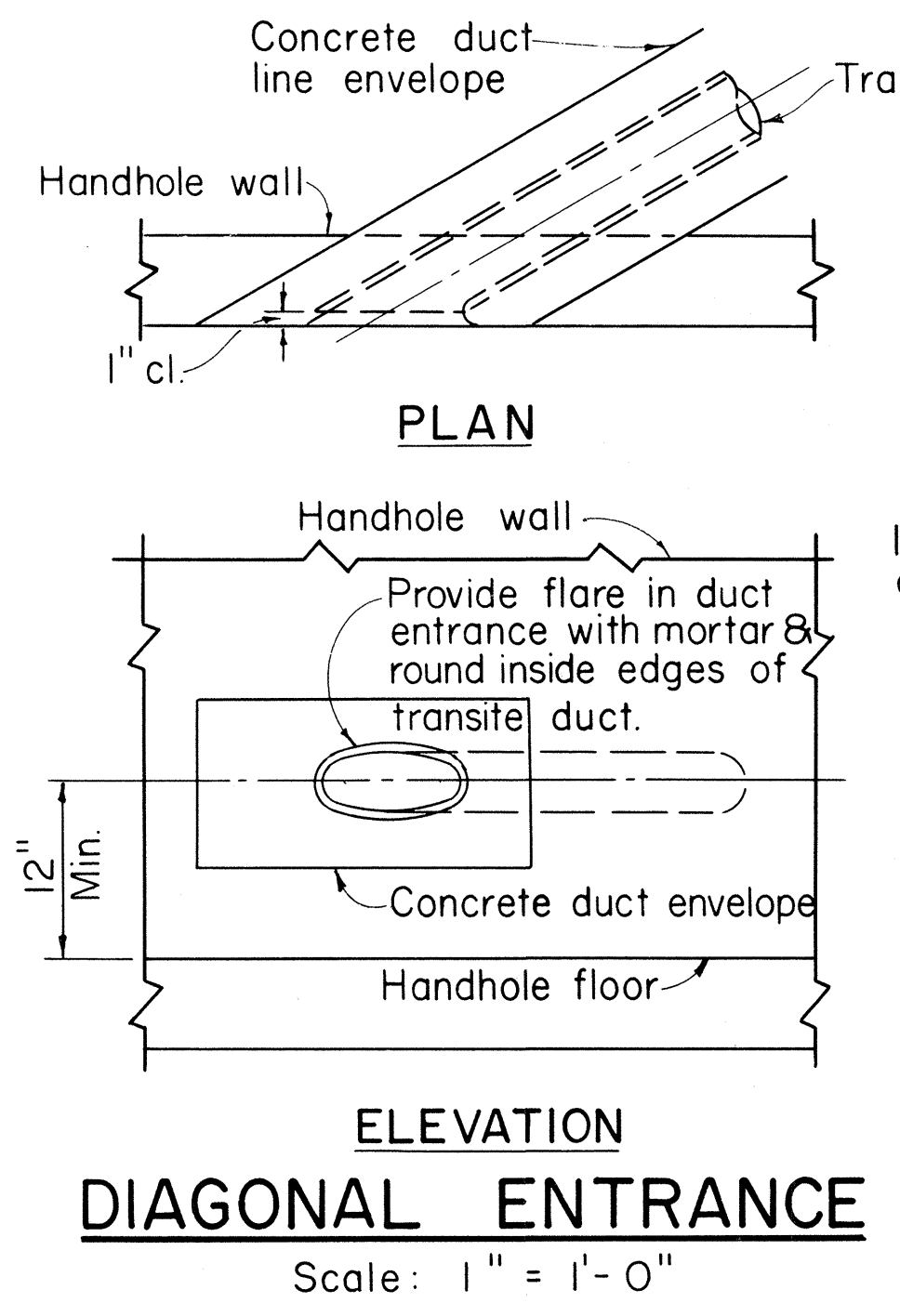
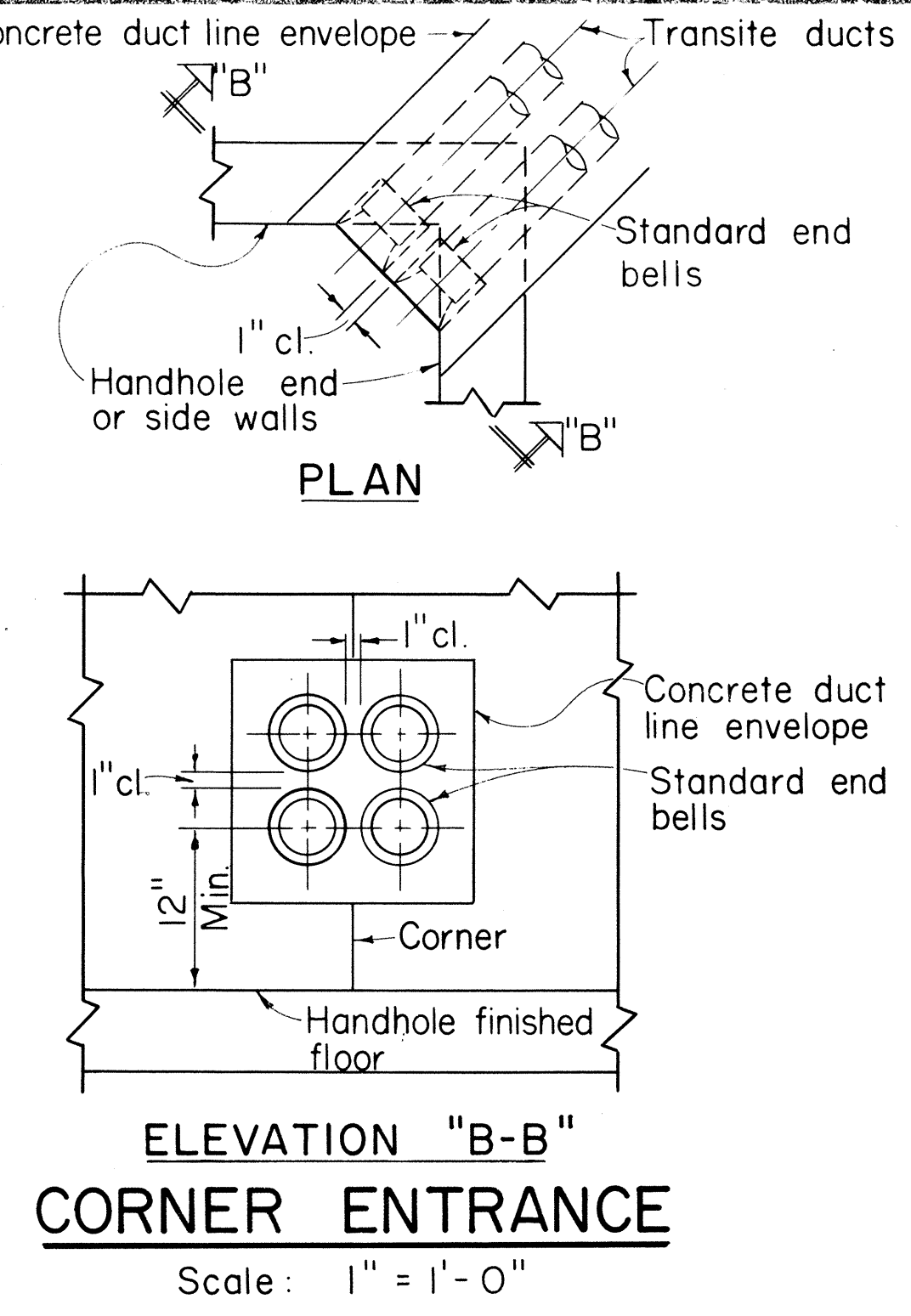
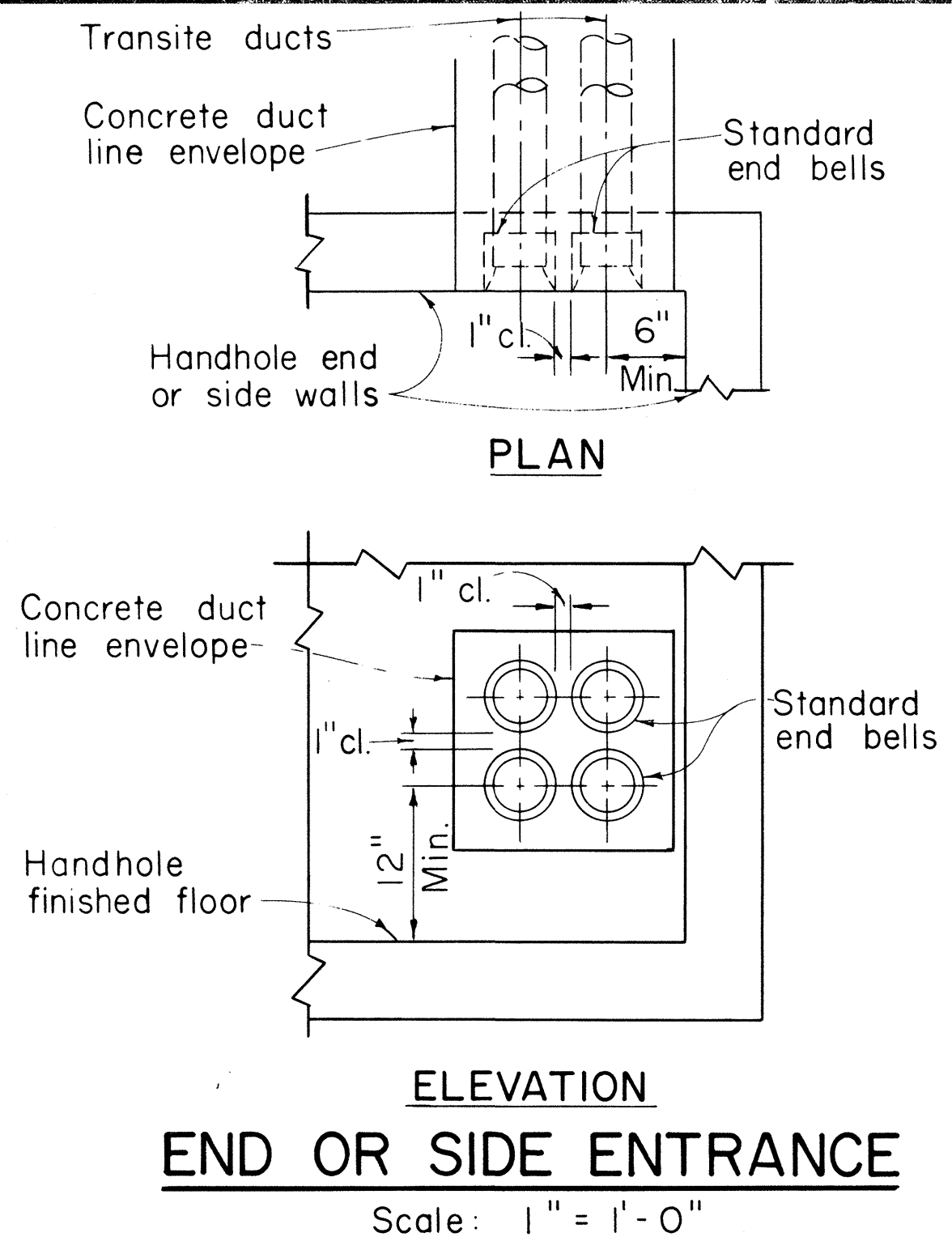
31" & 28" MANHOLE FRAME NECK DETAIL

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

APPROVED:
Fred Karimoth
Hawaiian Electric Co., Inc. 3-30-77 Date

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. E-18 OF 29 SHEETS	

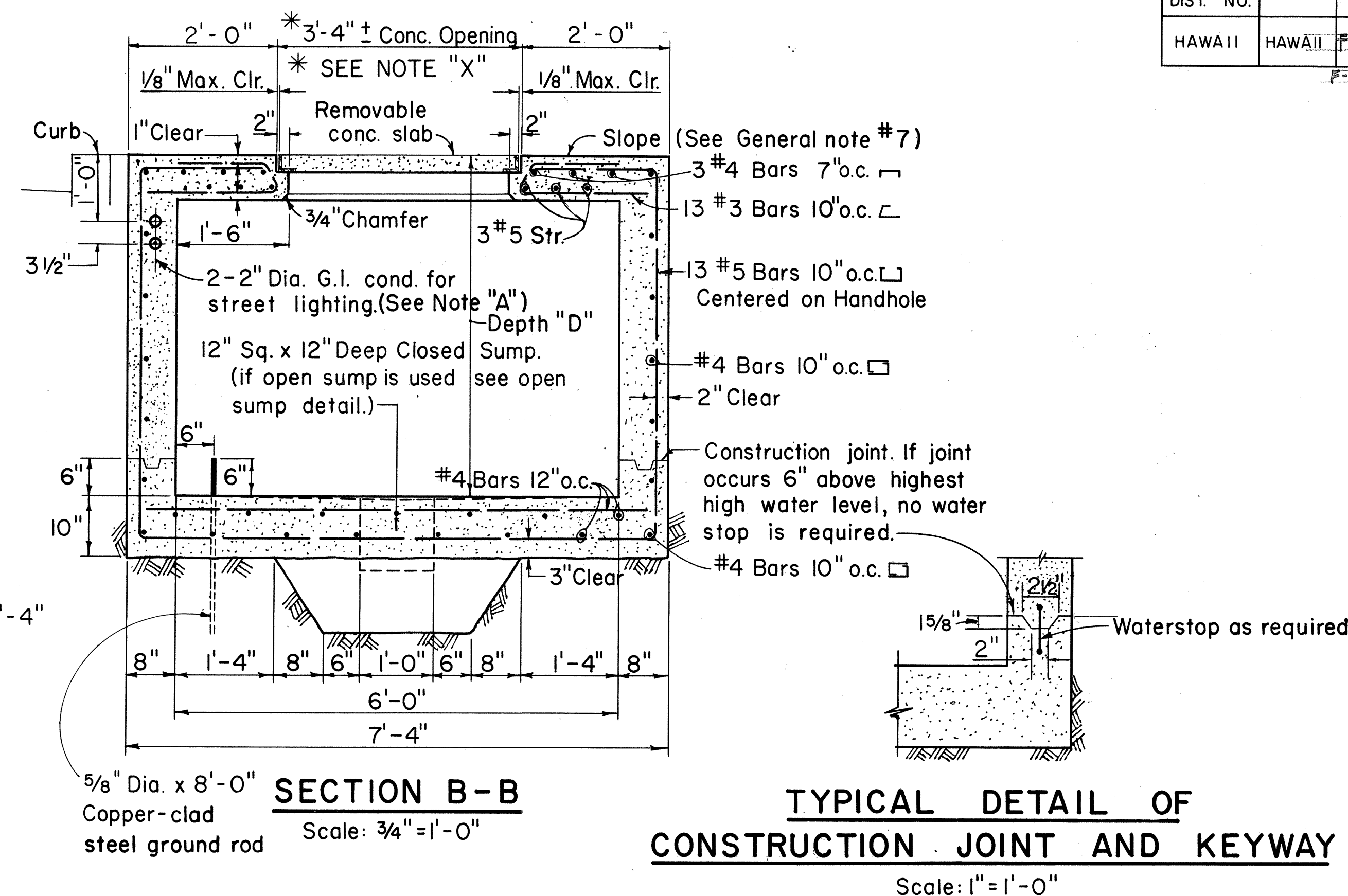
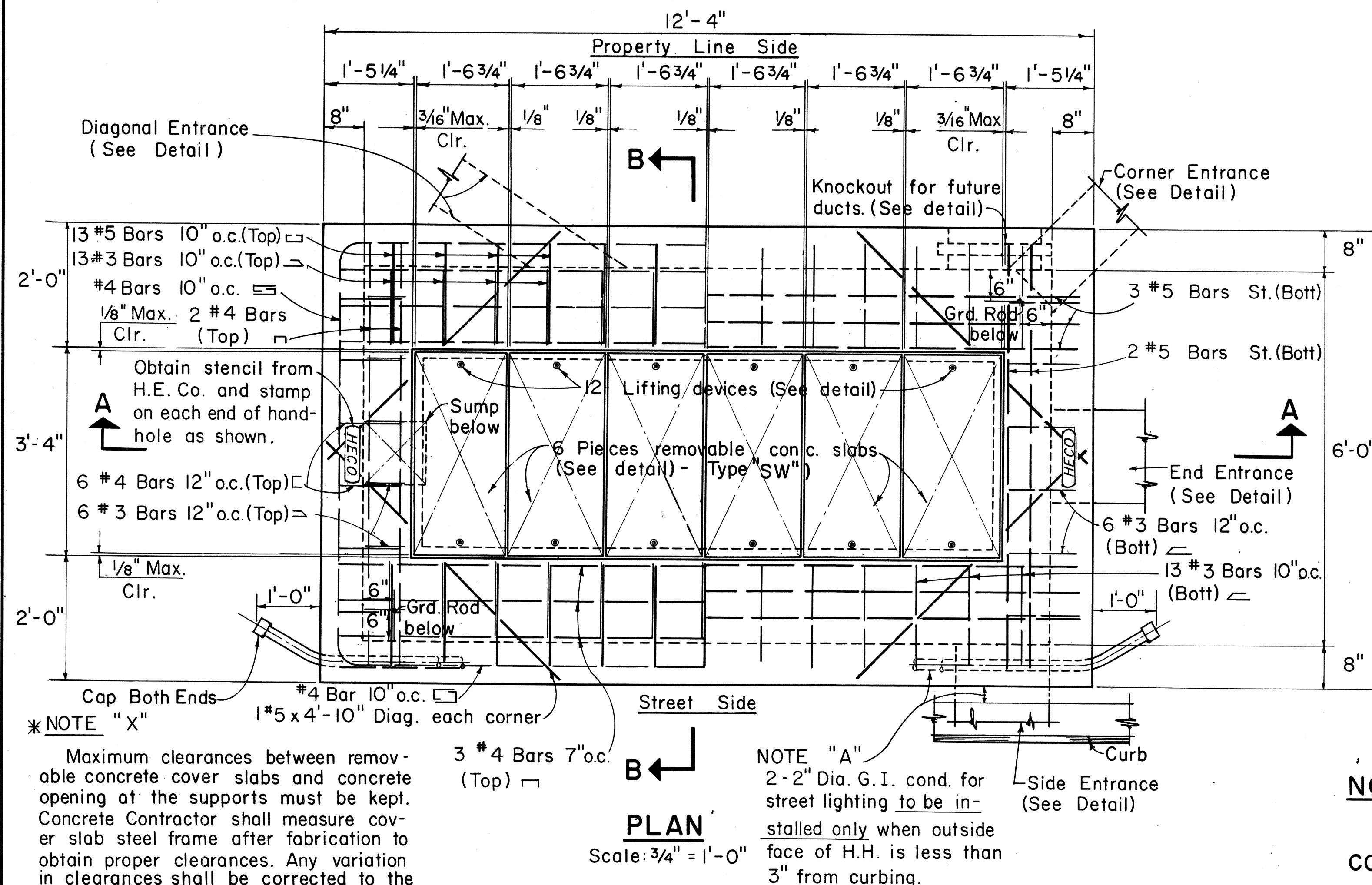
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	107	164



APPROVED:
Fred Karim
Hawaiian Electric Co., Inc. 3-30-77
Date

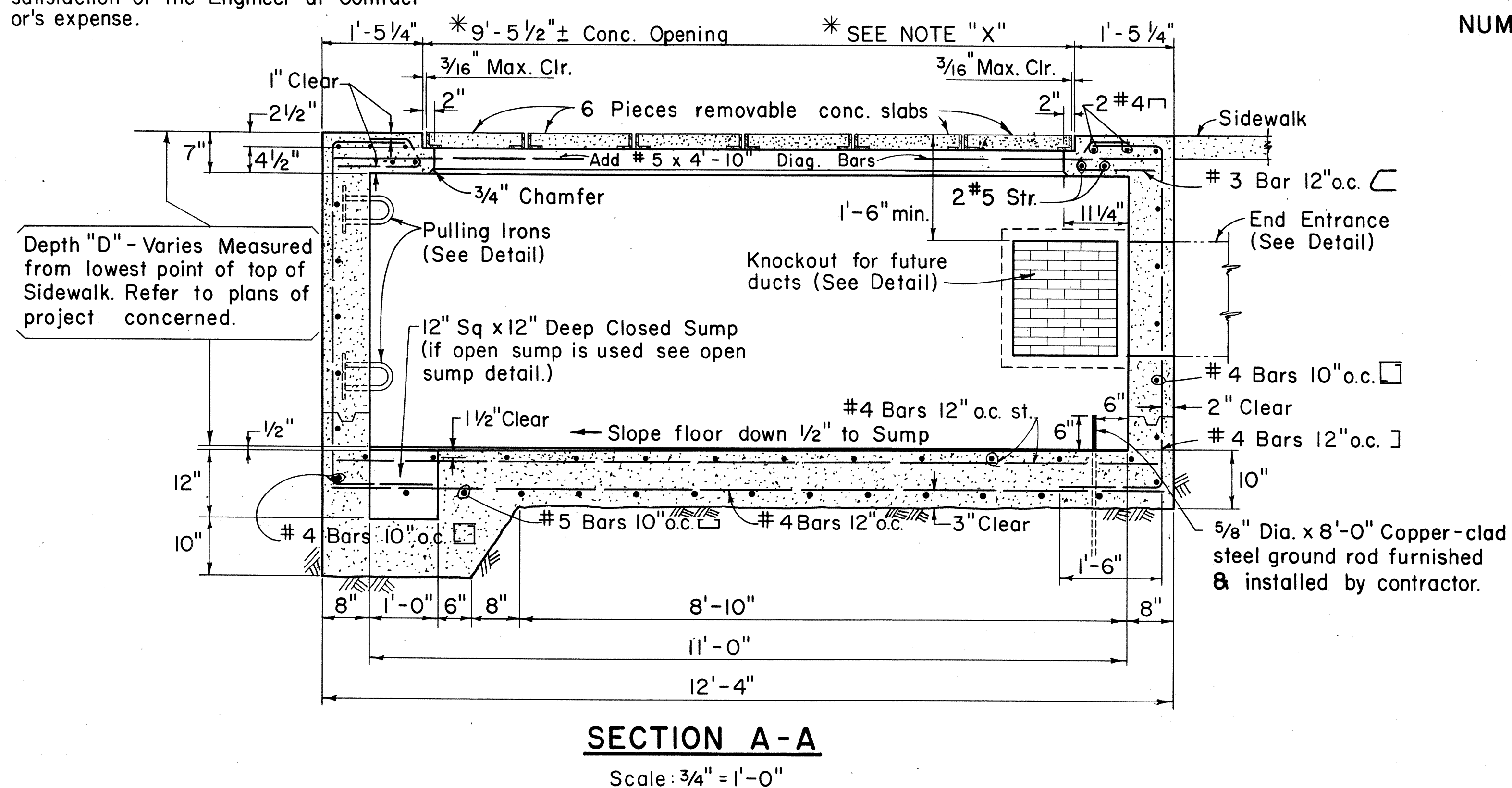
HECo., Inc.	Drawing Number
16688	SHEET NO. 2 OF 2 SHEETS
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
MISCELLANEOUS DETAILS HANDHOLES & MANHOLES UNDERGROUND STANDARDS	
Scale as noted	SHEET No. E-19 OF 29 SHEETS

FED. AID DIST. NO.	STATE	FED AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEET
HAWAII	HAWAII	FF-078-1(1)	1977	108	164



NOTE :

FOR DETAILS OF TYPE "SW" REMOVABLE
CONCRETE COVERS, LIFTING DEVICE AND
SPACER BAR SEE HEC_o, INC. DRAWING
NUMBER 16688, Sheet No. 1 of 2 Sheets.



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	= <u>42 Lbs.</u>
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.

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

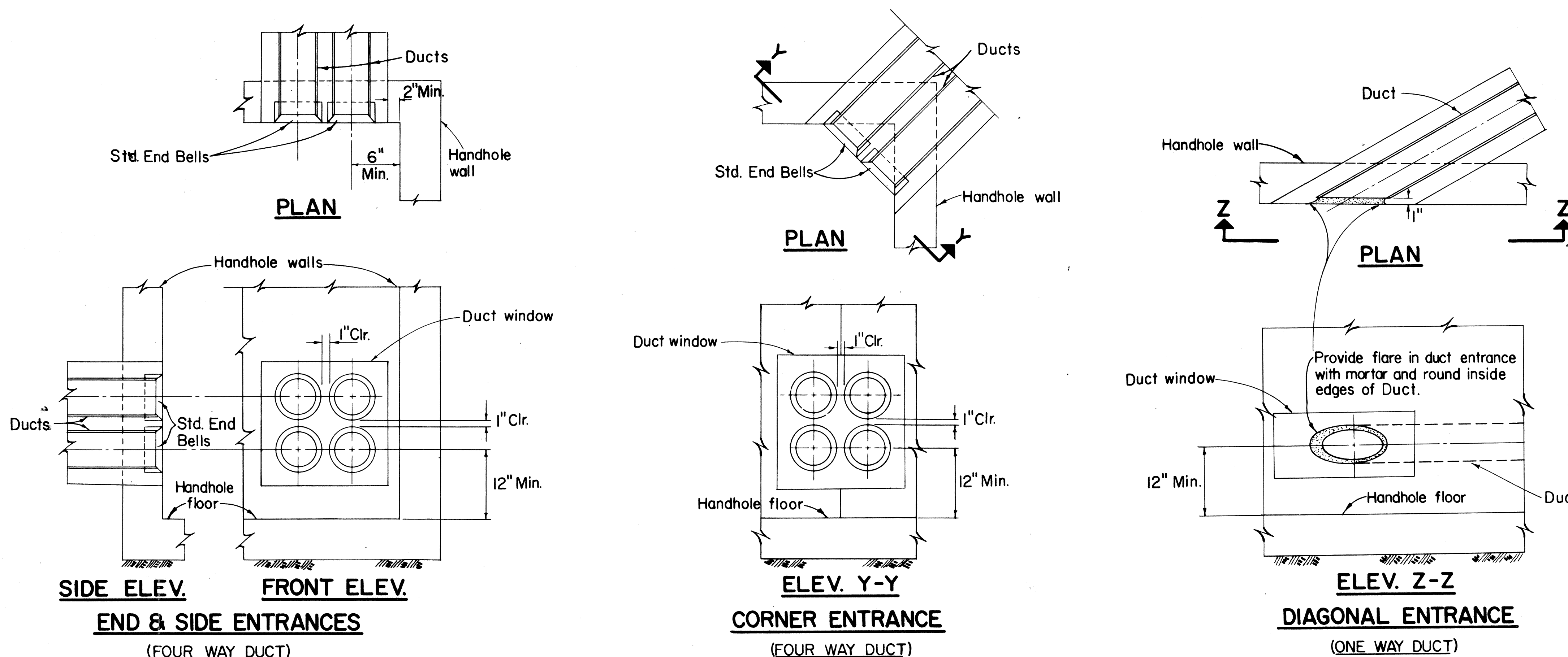
SHEET NO E-200F 29 SHEETS

Fred Karamots 3-30-77
HAWAIIAN ELECTRIC Co., Inc. 1110 Date

FED. AID DIST. NO.	STATE	FED. AID PROJECT	FISCAL YEAR	SHEET N	TOTAL SHEETS
HAWAII	HAWAII	FF-078-1(17)	1977	109	164

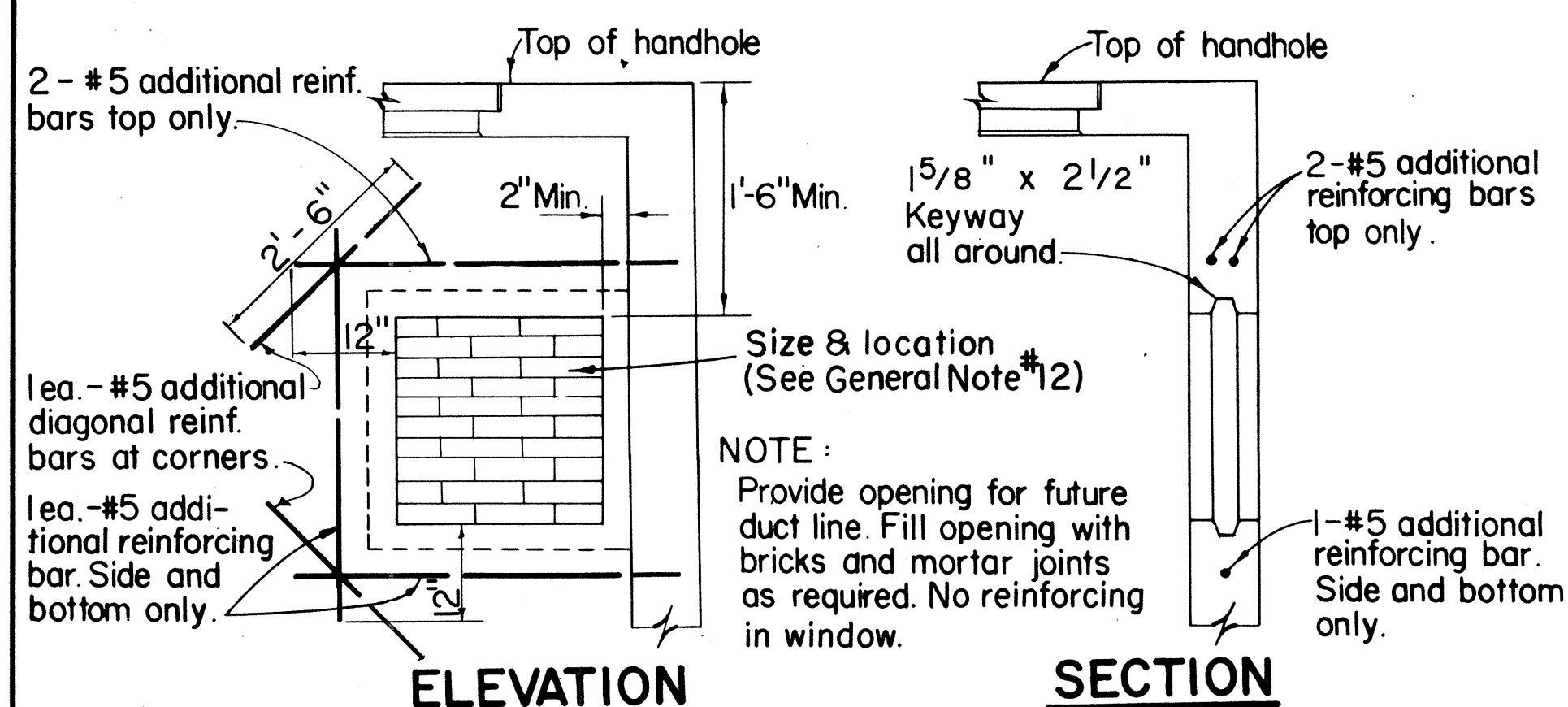
GENERAL NOTES

- 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 and County of Honolulu specifications 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~~ ^{grade 60, 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.
- For slope of top of handhole, see plan of project concerned.
- FINISH STEEL WORK:
 - Angle iron frames for removable 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 rock.
- 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.
- For duct line construction standards see H.E.CO. Dwgs. 18585 and 20191 and specification sheets 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.



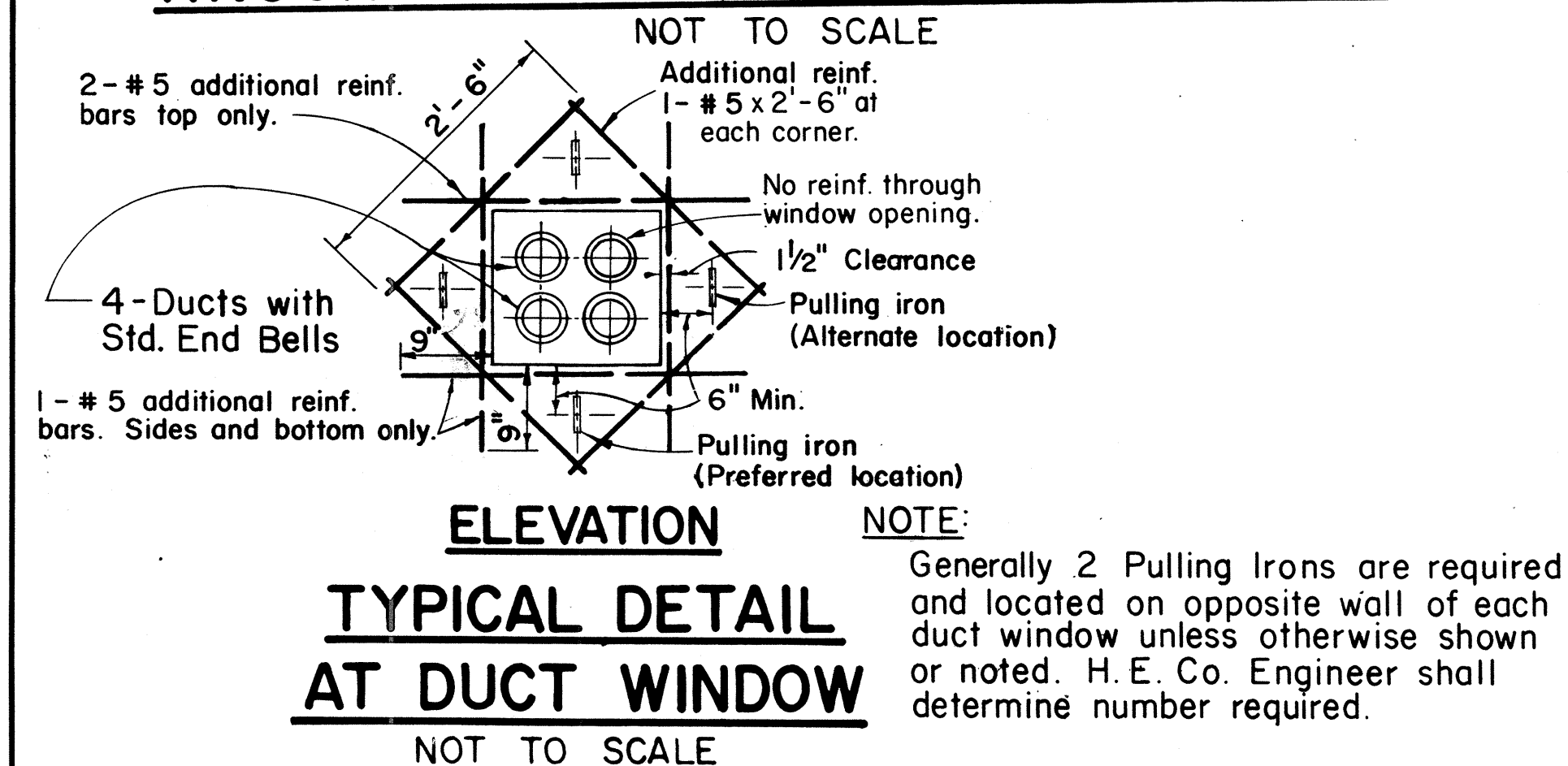
TYPICAL DUCT LINE ENTRANCE DETAILS

NOT TO SCALE



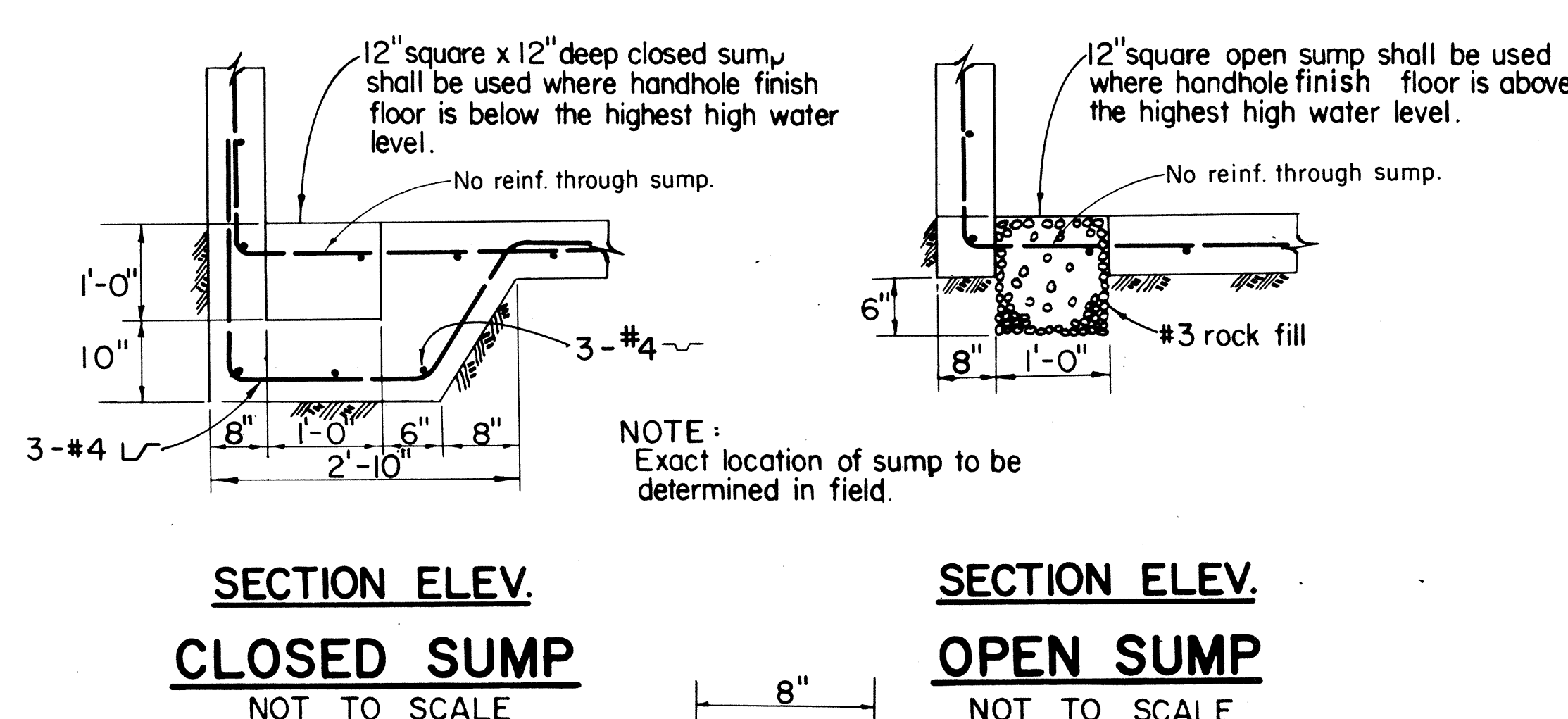
KNOCKOUT FOR FUTURE DUCT LINE

NOT TO SCALE



TYPICAL DETAIL AT DUCT WINDOW

NOT TO SCALE

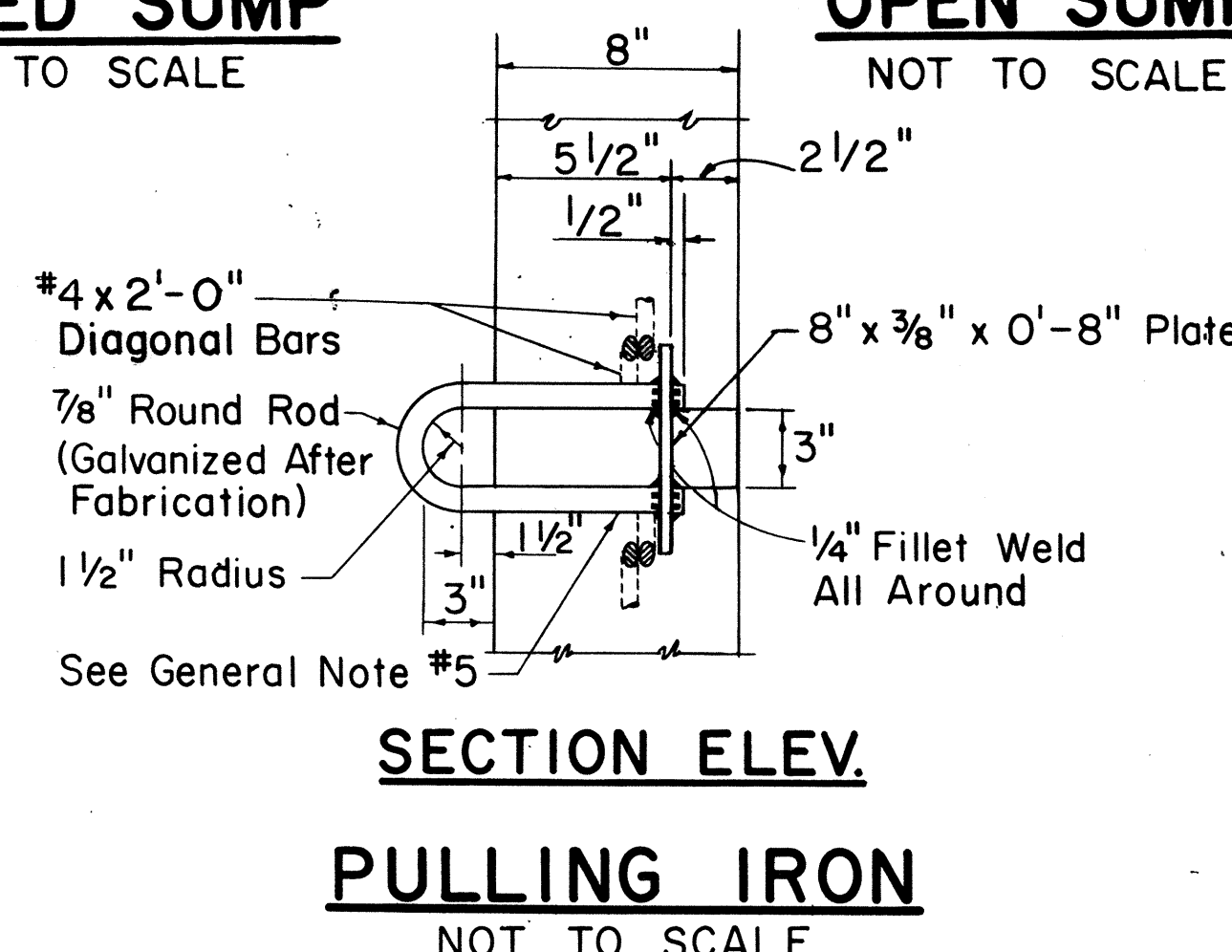


SECTION ELEV. CLOSED SUMP

NOT TO SCALE

SECTION ELEV. OPEN SUMP

NOT TO SCALE



SECTION ELEV. PULLING IRON

NOT TO SCALE

FOR USE IN AREAS NOT
SUBJECT TO VEHICULAR
TRAFFIC.

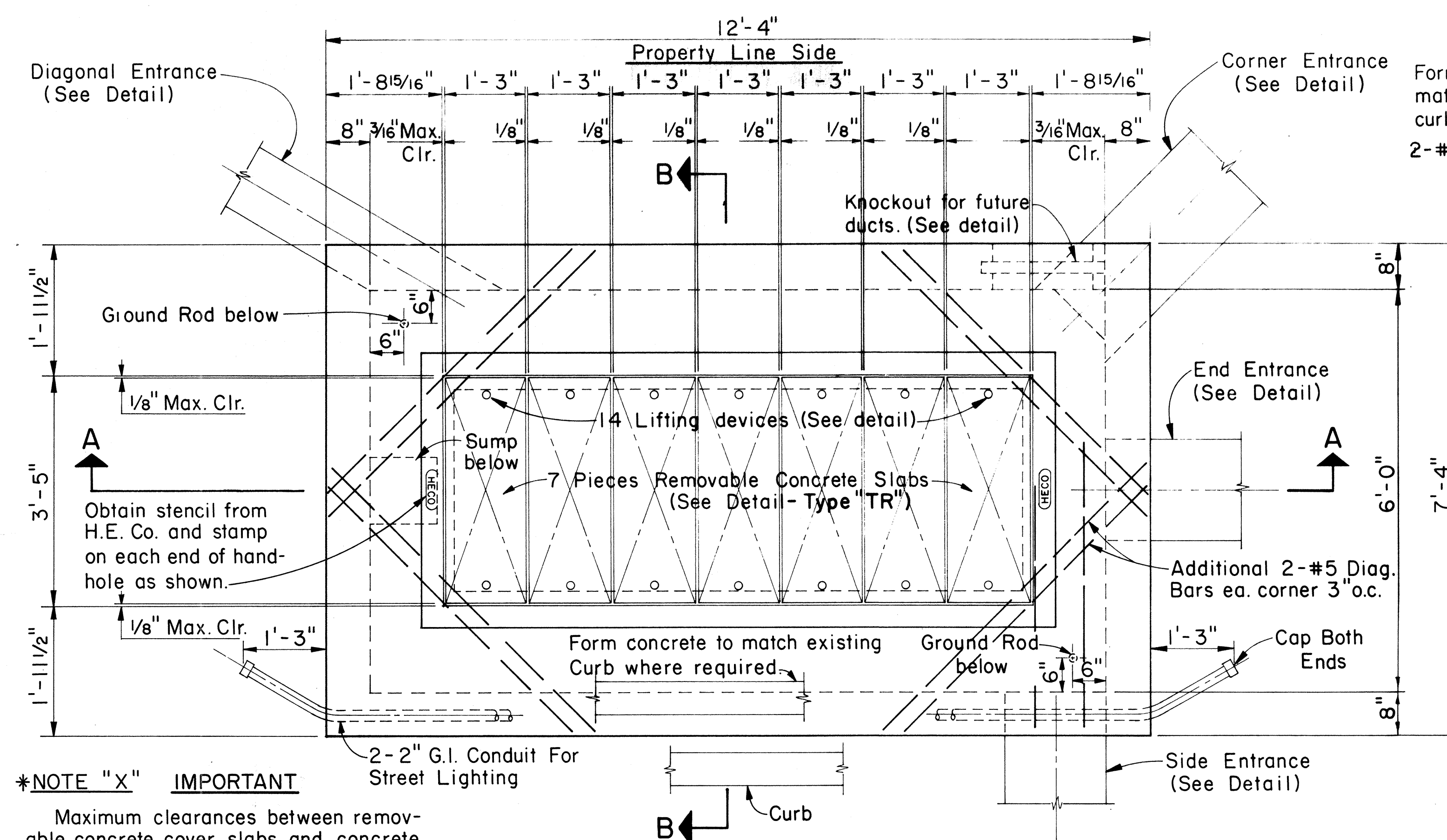
APPROVED:

Fred Karim 3-30-77
HAWAIIAN ELECTRIC Co., Inc. 1140 DATE

HECo., Inc. Drawing Number	SHEET No. 2 OF 2 SHEETS
18844	
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
STANDARD DETAILS HANDHOLE TYPE 611 (6'-0" x 11'-0") UNDERGROUND STANDARDS	
Scales: As Noted	Date
SHEET NO. 21 OF 29 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	110	164

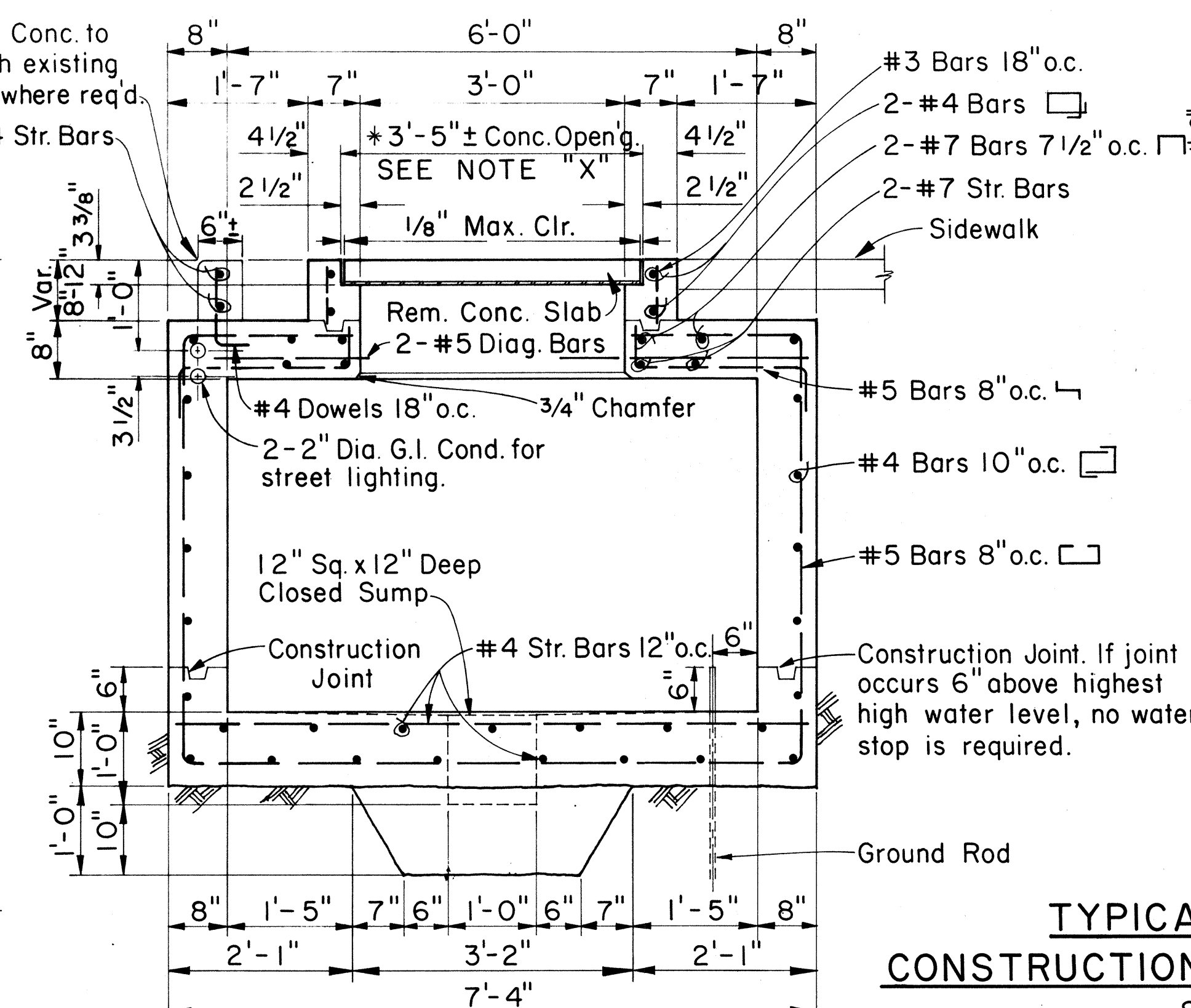
FF-078-1(17)



***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.

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

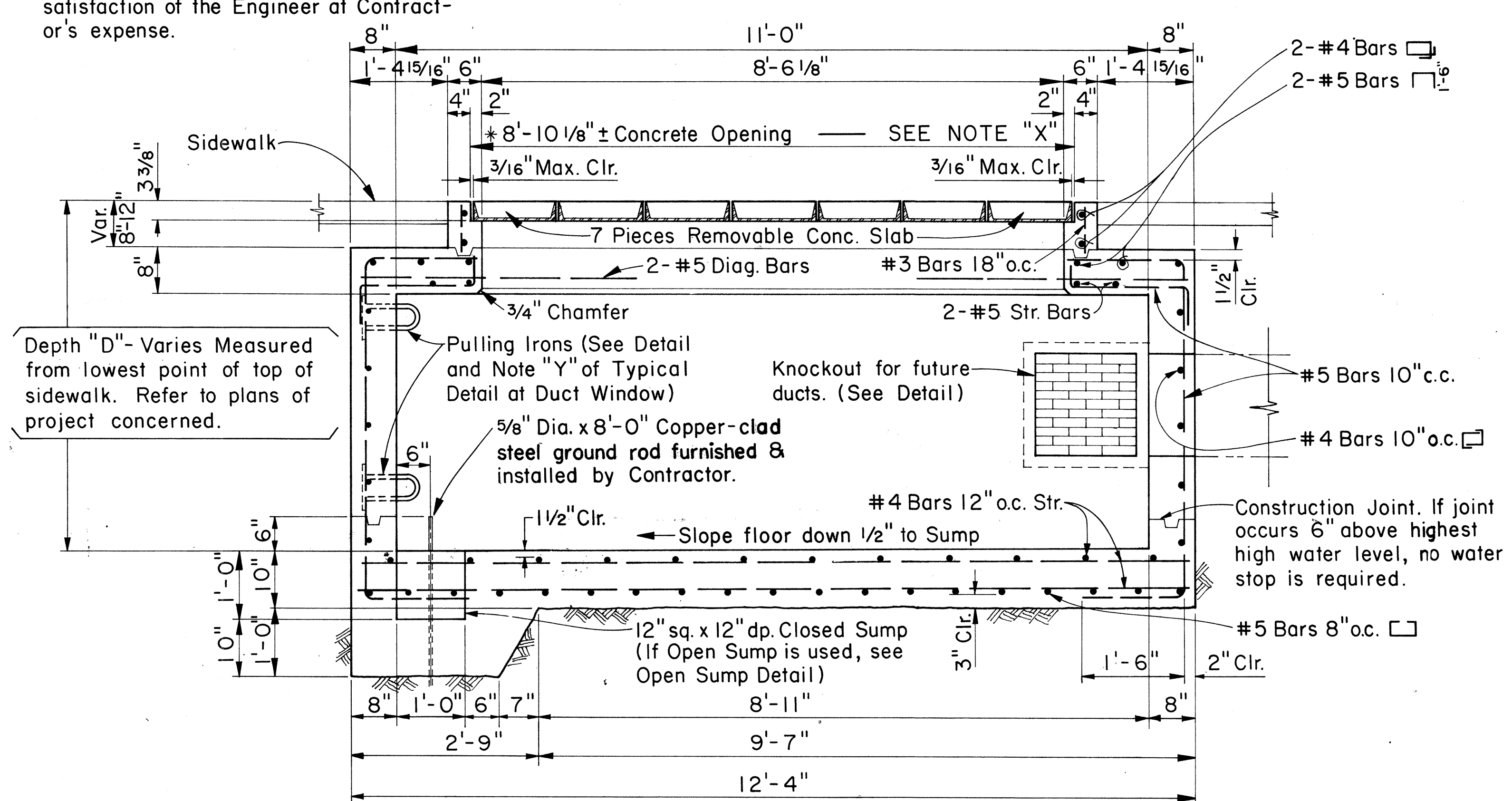


SECTION B-B
Scale: 3/4" = 1'-0"

TYPICAL DETAIL OF CONSTRUCTION JOINT AND KEYWAY
Scale: 1" = 1'-0"

NOTE :

FOR DETAILS OF TYPE "TR" REMOVABLE CONCRETE COVERS, LIFTING DEVICE AND SPACER BAR, SEE HECO., INC. DRAWING NUMBER 16688, Sheet No. 1 of 2 Sheets.



SECTION A-A
Scale: 3/4" = 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:

Fred Karimoti 3-30-77
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

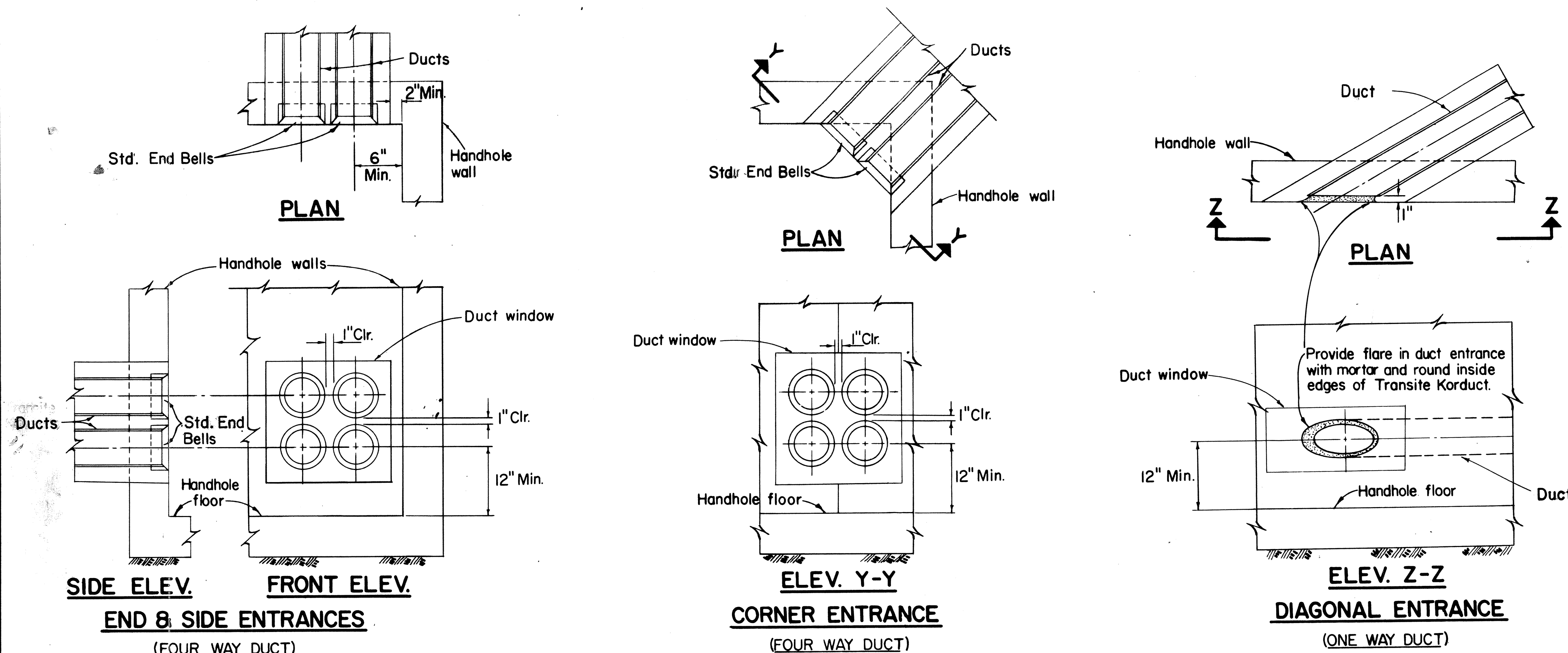
Scales: As Noted Date: **SHEET No. 110 OF 23 SHEETS**

DESIGNED BY	DATE
DRIVEN BY	
TRACED BY	
QUANTITIES BY	
NOTED BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
No.	

FED. AID DIST. NO.	STATE	FED. AID PROJECT YEAR	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	FF-078-1(7)	1977	III	164

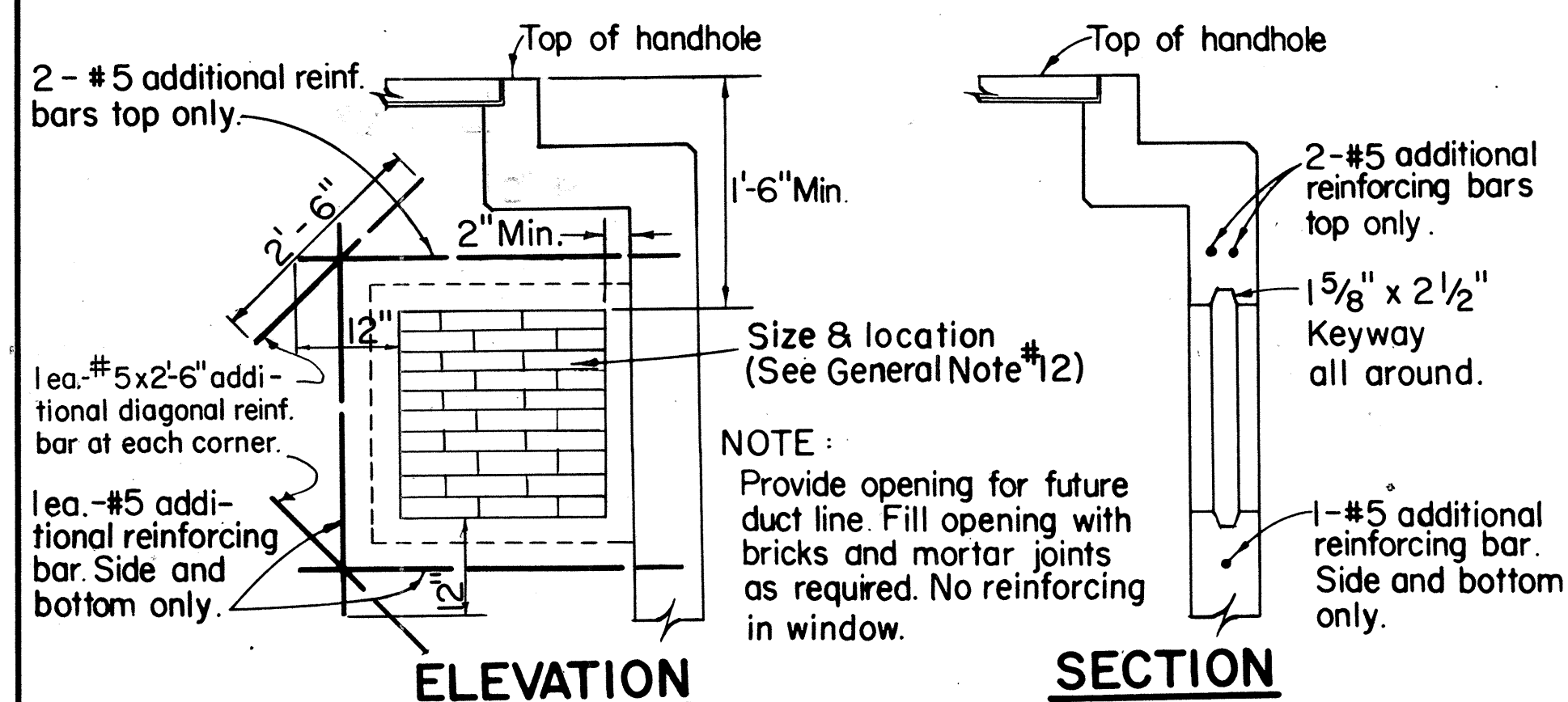
GENERAL NOTES

- 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 and County of Honolulu specifications 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.
- For slope of top of handhole, see plan of project concerned.
- FINISH STEEL WORK:
 - Channel iron frames for removable 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 rock.
- 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.
- For duct line construction standards see H.E.CO. Dwg. 18585 & 20191 and specification sheets 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.



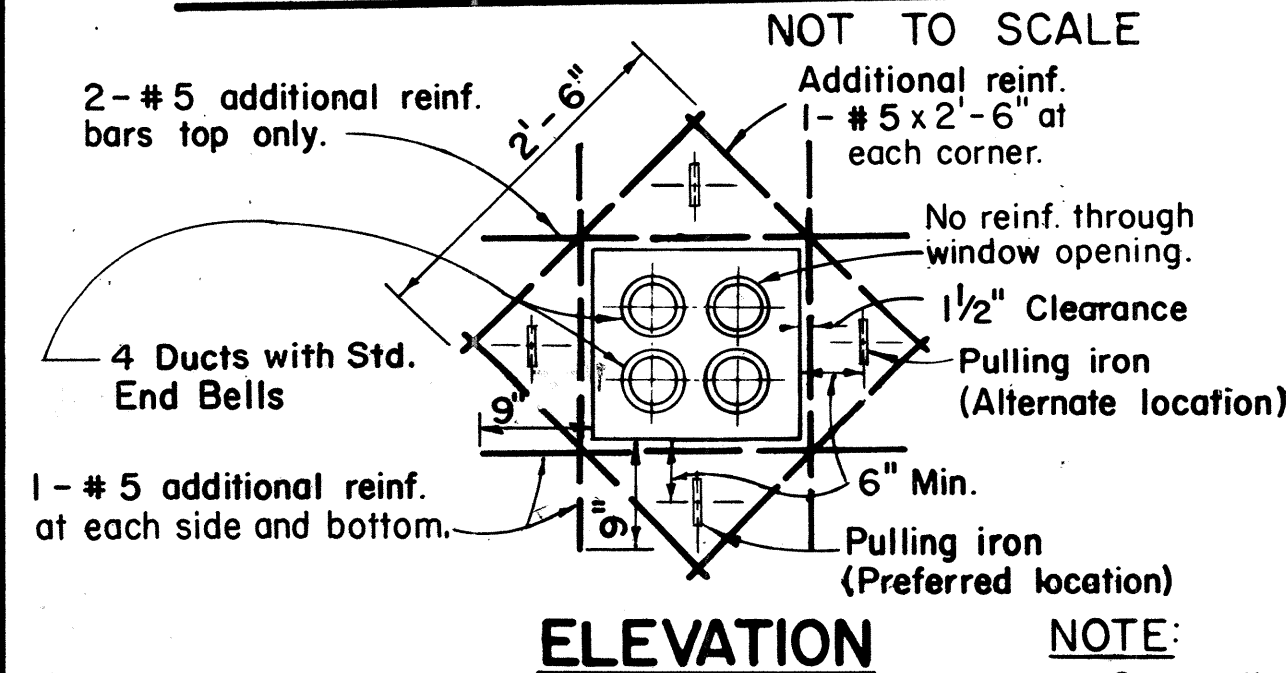
TYPICAL DUCT LINE ENTRANCE DETAILS

NOT TO SCALE



KNOCKOUT FOR FUTURE DUCT LINE

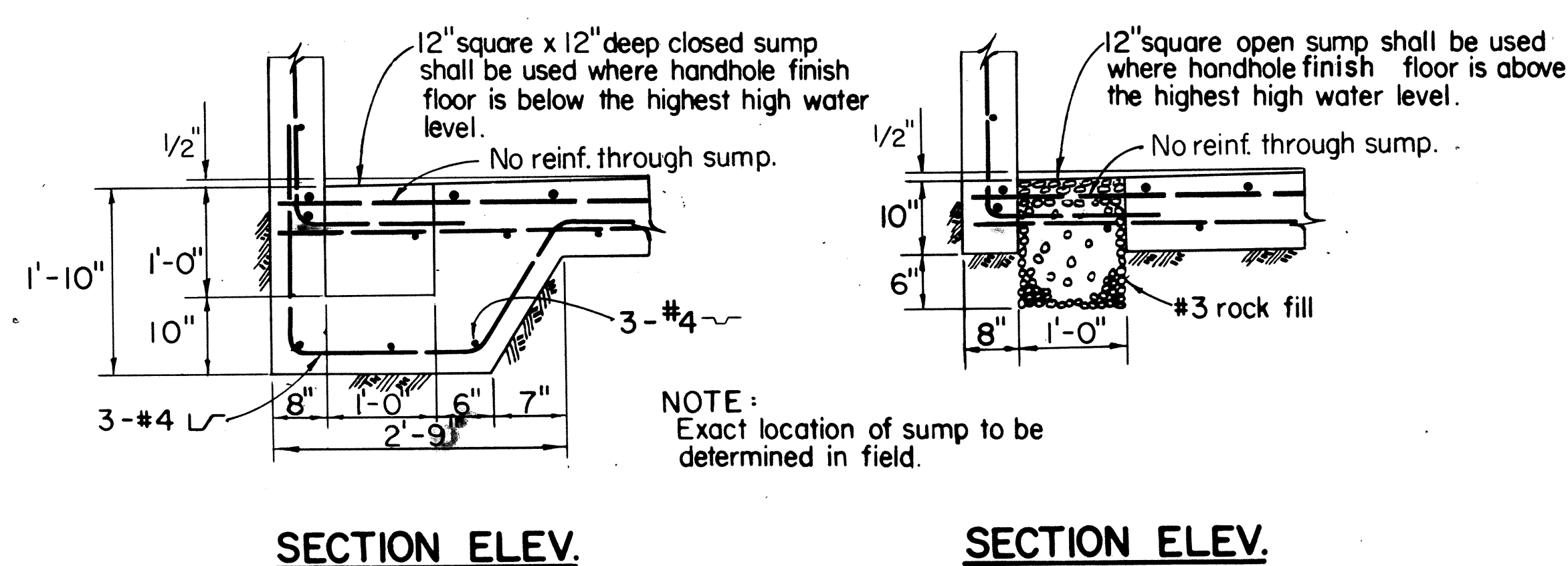
NOT TO SCALE



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.

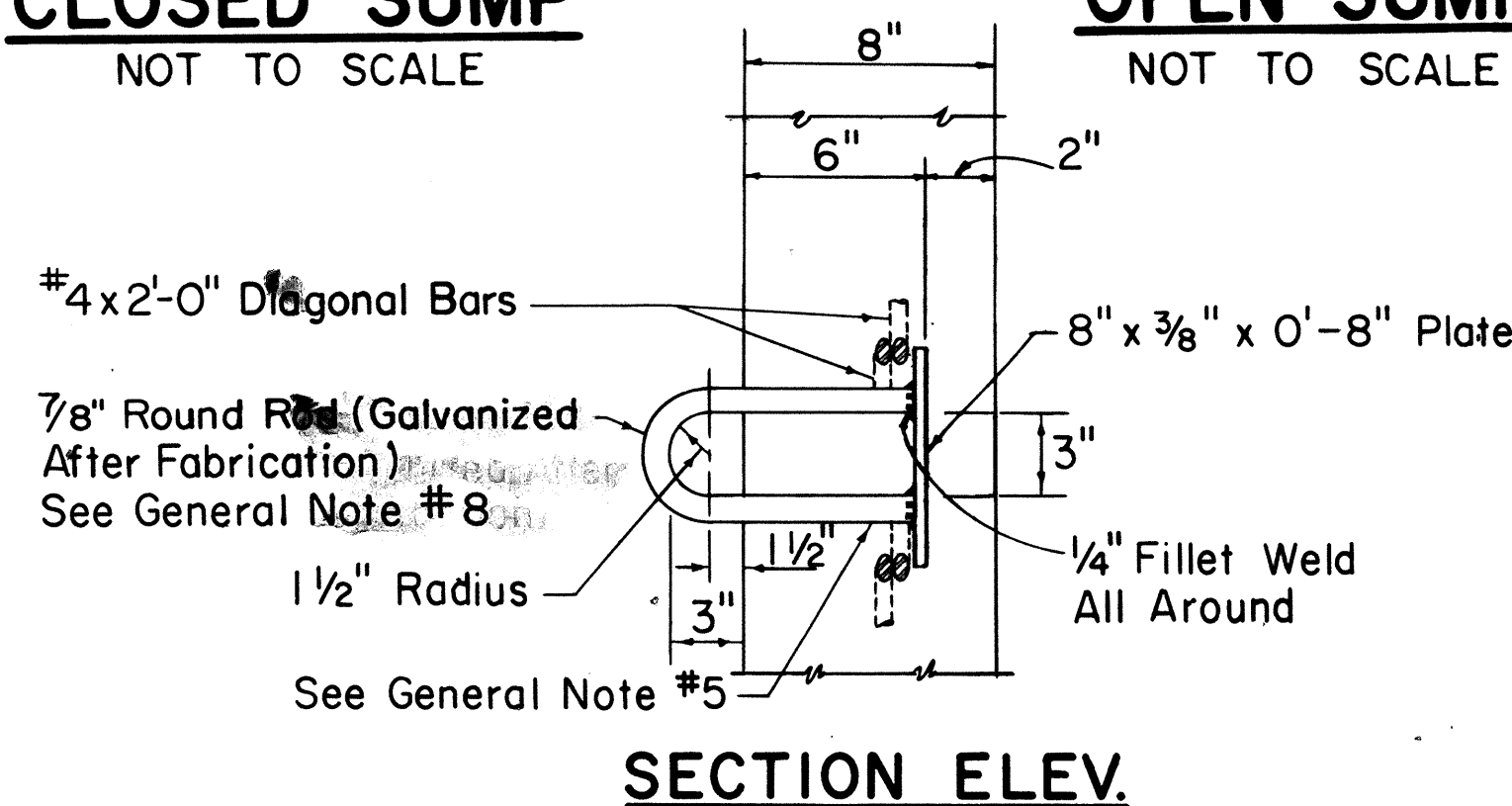


SECTION ELEV. CLOSED SUMP

NOT TO SCALE

SECTION ELEV. OPEN SUMP

NOT TO SCALE



FOR USE IN AREAS SUBJECT TO LIGHT VEHICULAR TRAFFIC

APPROVED:

Ired Karimato 3-30-77
HAWAIIAN ELECTRIC Co., Inc. 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
SHEET NOE-23 OF 29 SHEETS	

F-FF-078-1(17)



- (TYPICAL)

CROSS-SECTION OF SEWER LINE

NOTE:

DUCT LINE WIDTH

LENGTH OF SEWER LINE TO BE COVERED

5'

CONCRETE CRADLE FOR
SANITARY SEWER LINE CROSSING

Scale: $1\frac{1}{2}'' = 1' - 0''$



HAND SPADE

PLAN



TYPICAL CONDUIT ENTRANCE INTO HANDHOLE, MANHOLE OR VAULT WALLS

(6 WAY DUCT LINE SHOWN)

APPROVED:

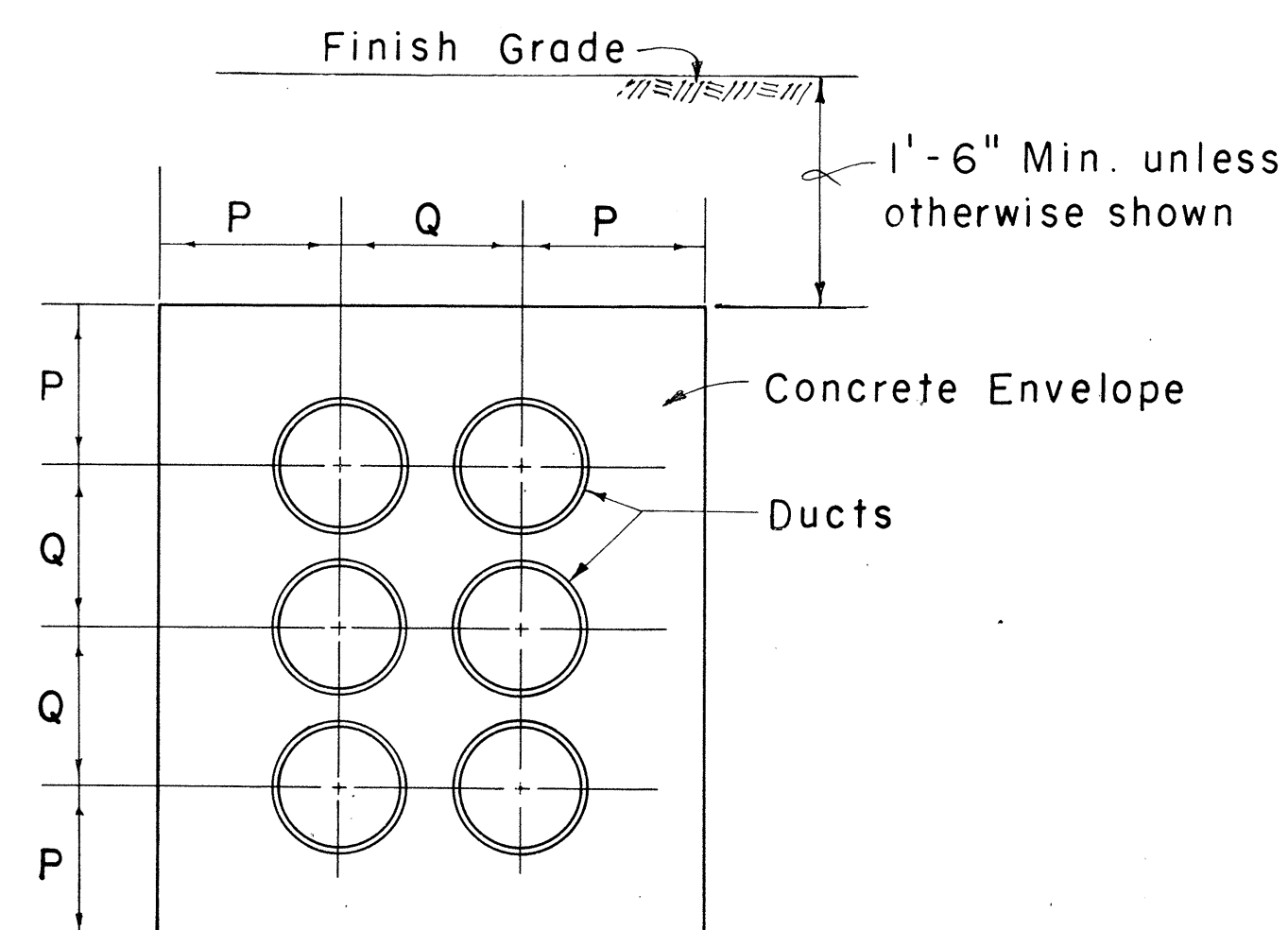
HECo., Inc.	Drawing	Number
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

Scale as noted

SHEET No.E-24 OF 29 SHEETS

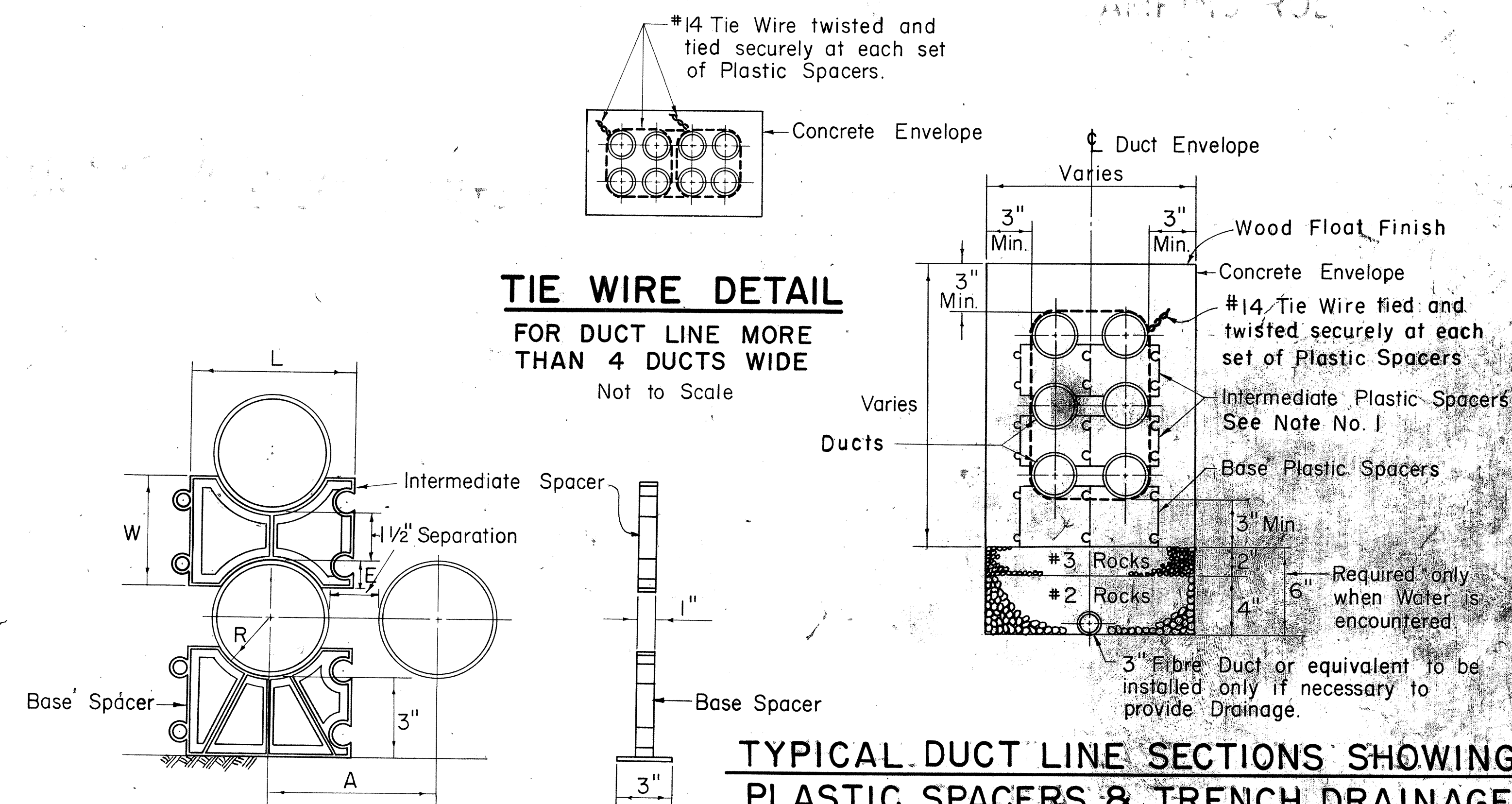
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAWAII	FF-078 (17)	1977	113	164



TYPICAL DUCT LINE SECTION

(6 WAY DUCT LINE SHOWN)
Not to Scale

SIZE	P	Q
3"	5"	5 1/8"
4"	5 1/2"	6 1/4"
5"	6"	7 5/8"



SIZE	R	E	W	A	L
3"	1.83	.87	3.25	5.12	5.0
4"	2.40	1.12	3.75	6.25	6.1
5"	3.06	1.37	4.25	7.62	7.5

For 1 1/2" Separation

REFERENCE SPECIFICATION SHEETS

- CS 7202 General Conditions
- CS 7001 Construction of U.G. Facilities
- CS 7003 Construction of Electrical Facilities.

APPROVED:

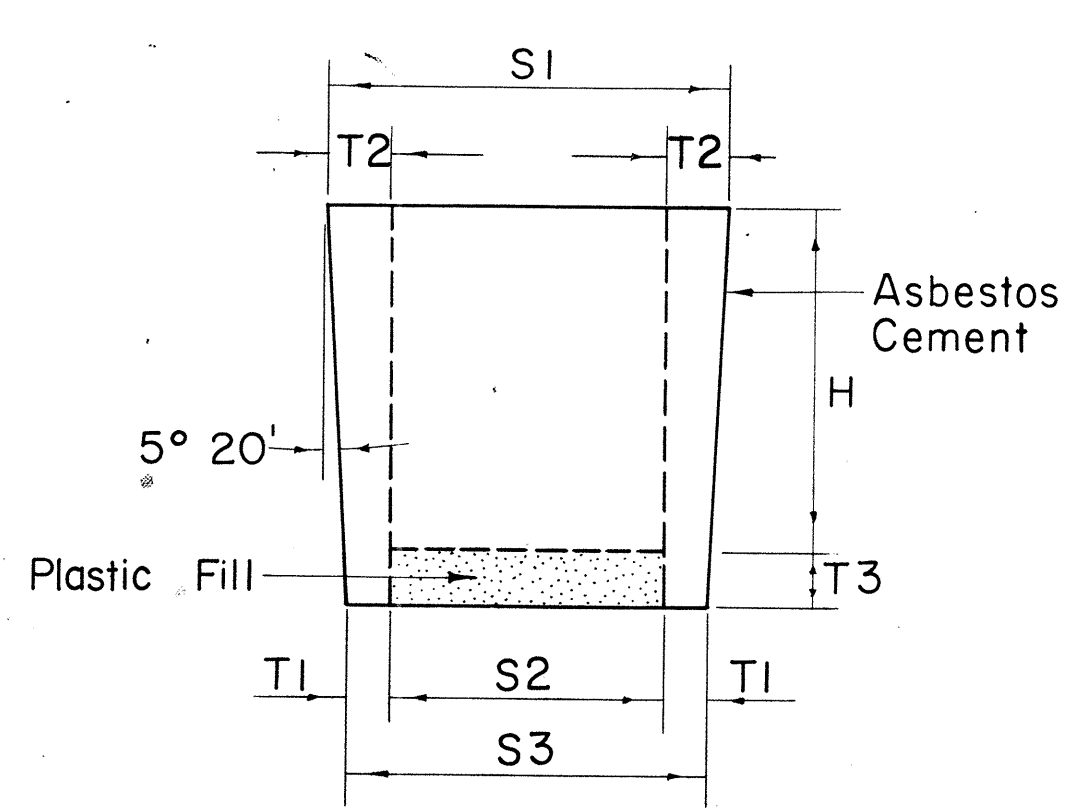
Fred Karimots 3-30-77
HAWAIIAN ELECTRIC CO., INC. #42 on a DATE

HECo., Inc. Drawing Number
30-1033 SHEET No. 1
OF 2 SHEETS

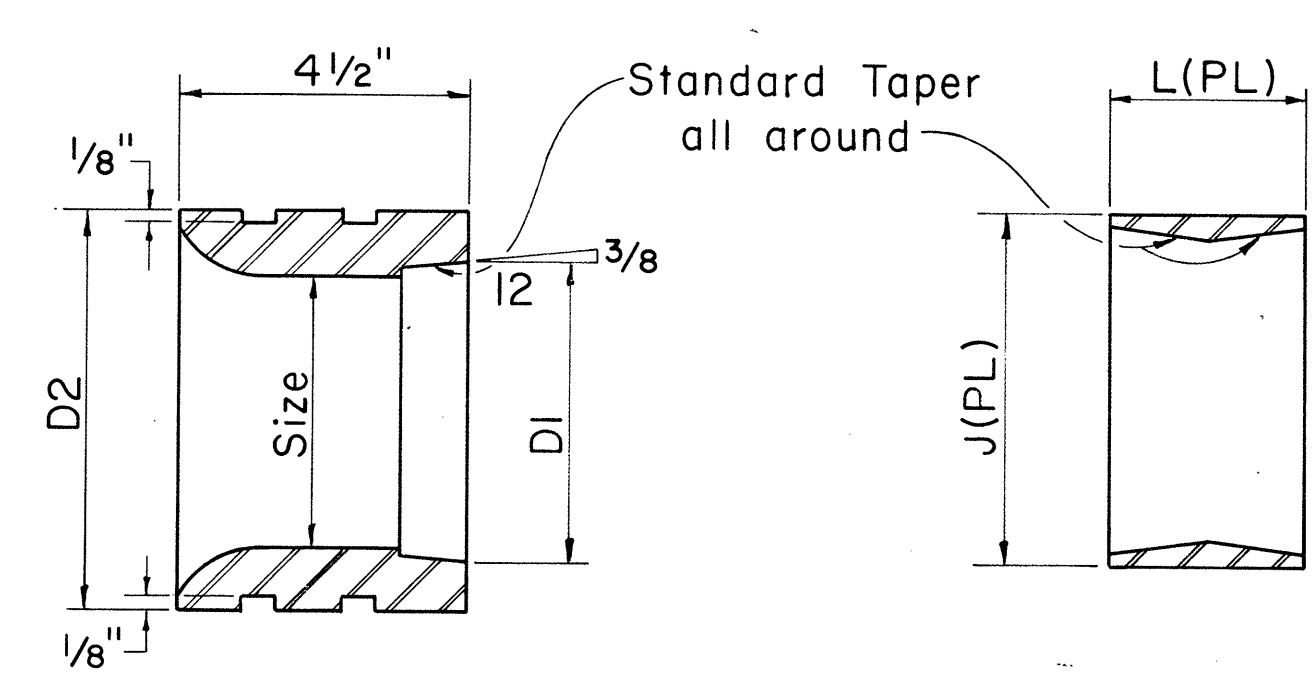
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
CONSTRUCTION STANDARDS
ASBESTOS CEMENT DUCTS
INSTALLATION DETAILS
UNDERGROUND STRUCTURES

SHEET NO. E-25 OF 29 SHEETS

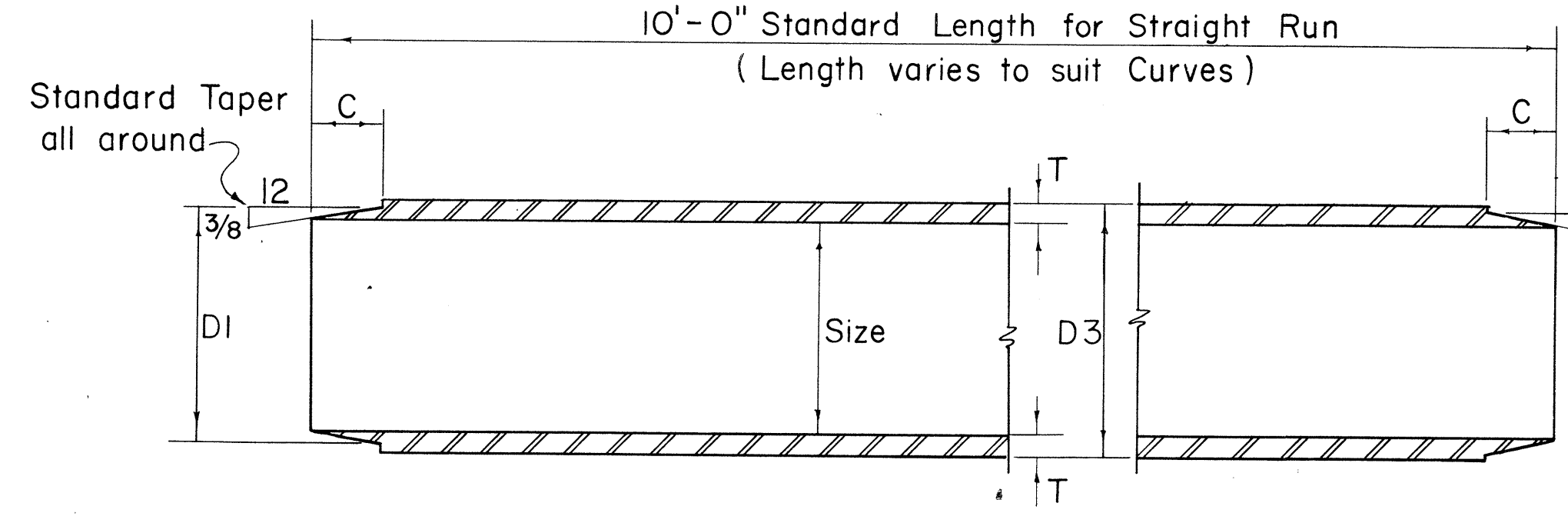


SIZE	H	S1	S2	S3	T1	T2	T3
3"	4.00	3.37	2.00	2.63	.32	.69	.75
4"	4.50	4.42	2.75	3.58	.42	.84	.75
5"	4.50	5.42	3.50	4.58	.54	.96	.75



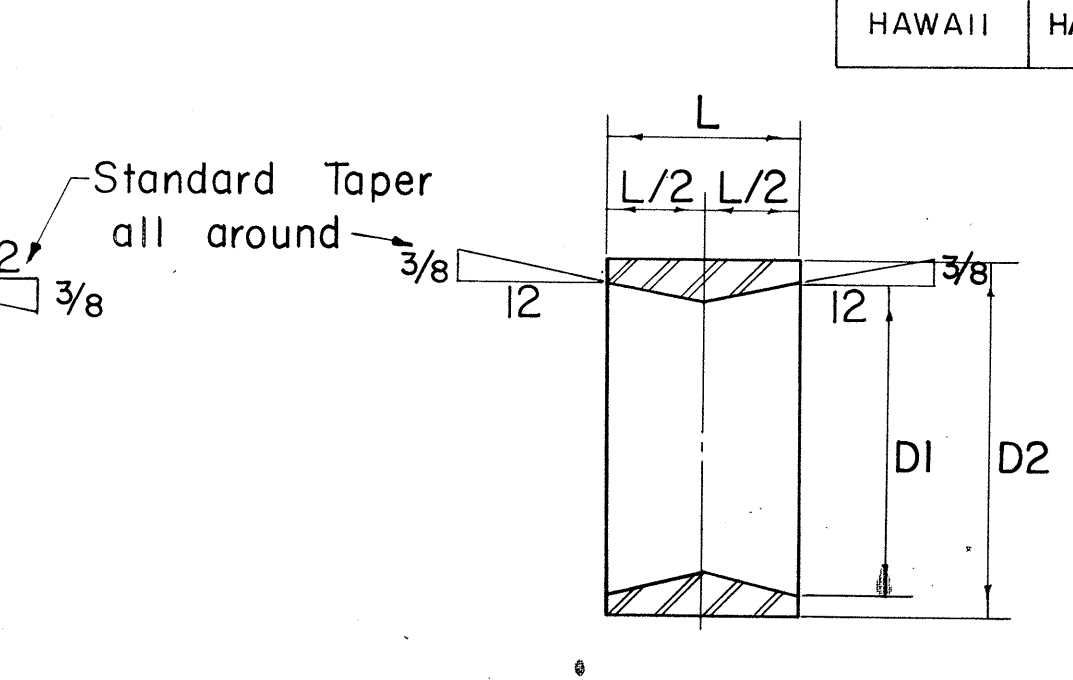
SIZE	D1	D2
3"	3.45	4.50
4"	4.46	5.75
5"	5.46	7.00

STANDARD END BELL



SIZE	J(PL)	L(PL)
3"	3.60	2.25
4"	4.61	2.50
5"	5.61	2.50

TAPERED COUPLING



SIZE	D1	D2	L
3"	3.45	4.23	2.25
4"	4.46	5.26	2.50
5"	5.46	6.34	2.50

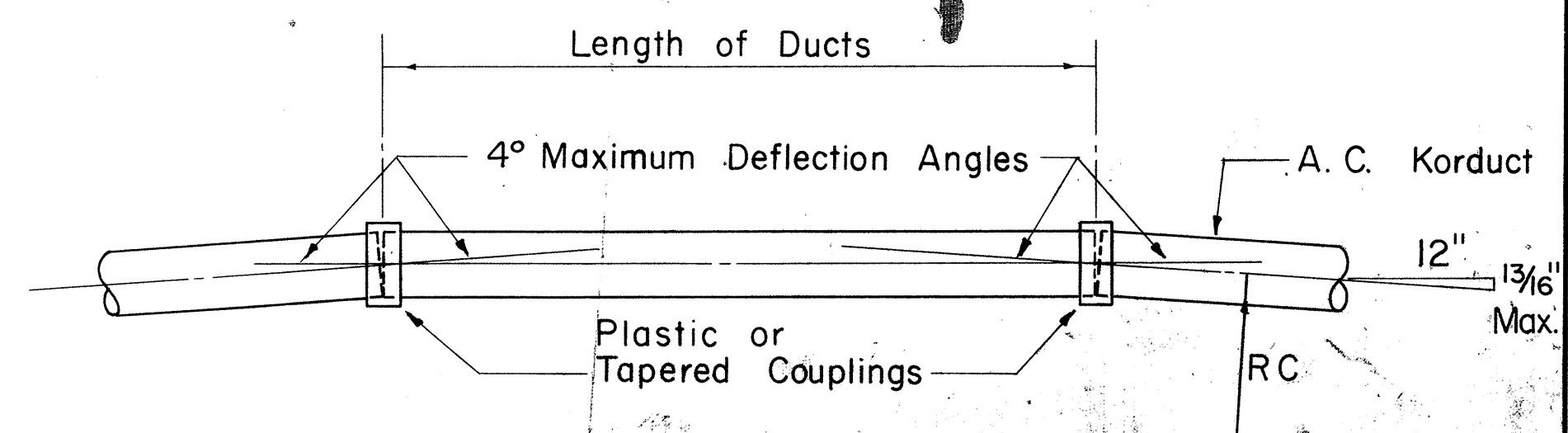
TAPERED COUPLING

PLASTIC COUPLING

Not to Scale

ASBESTOS CEMENT TYPE I

Not to Scale



METHOD OF FORMING CURVES

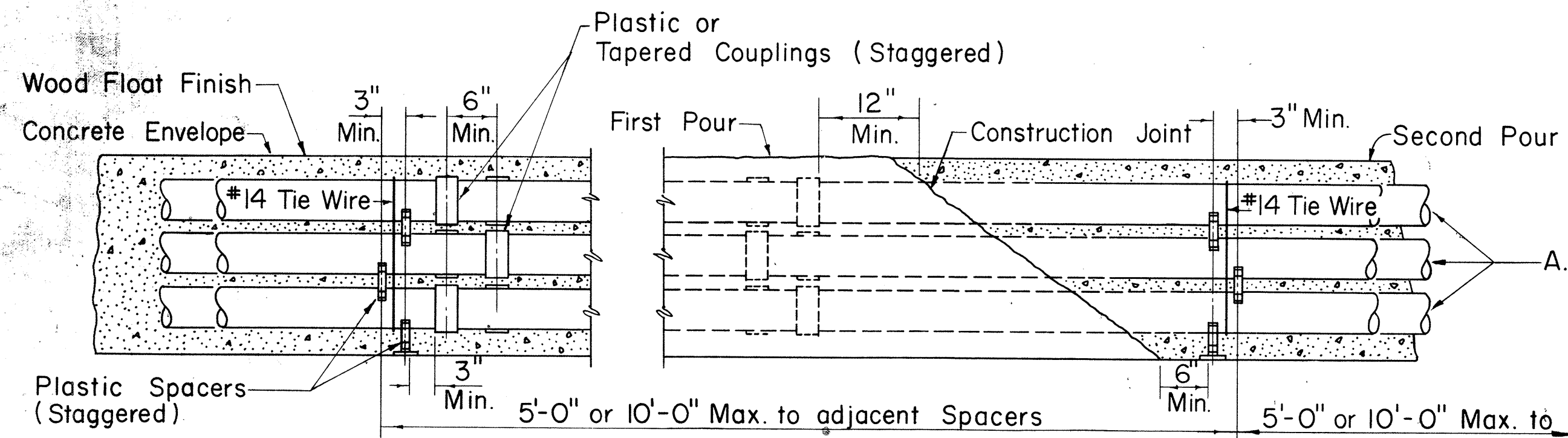
Not to Scale

ASBESTOS CEMENT PLUG

Not to Scale

PLASTIC COUPLING

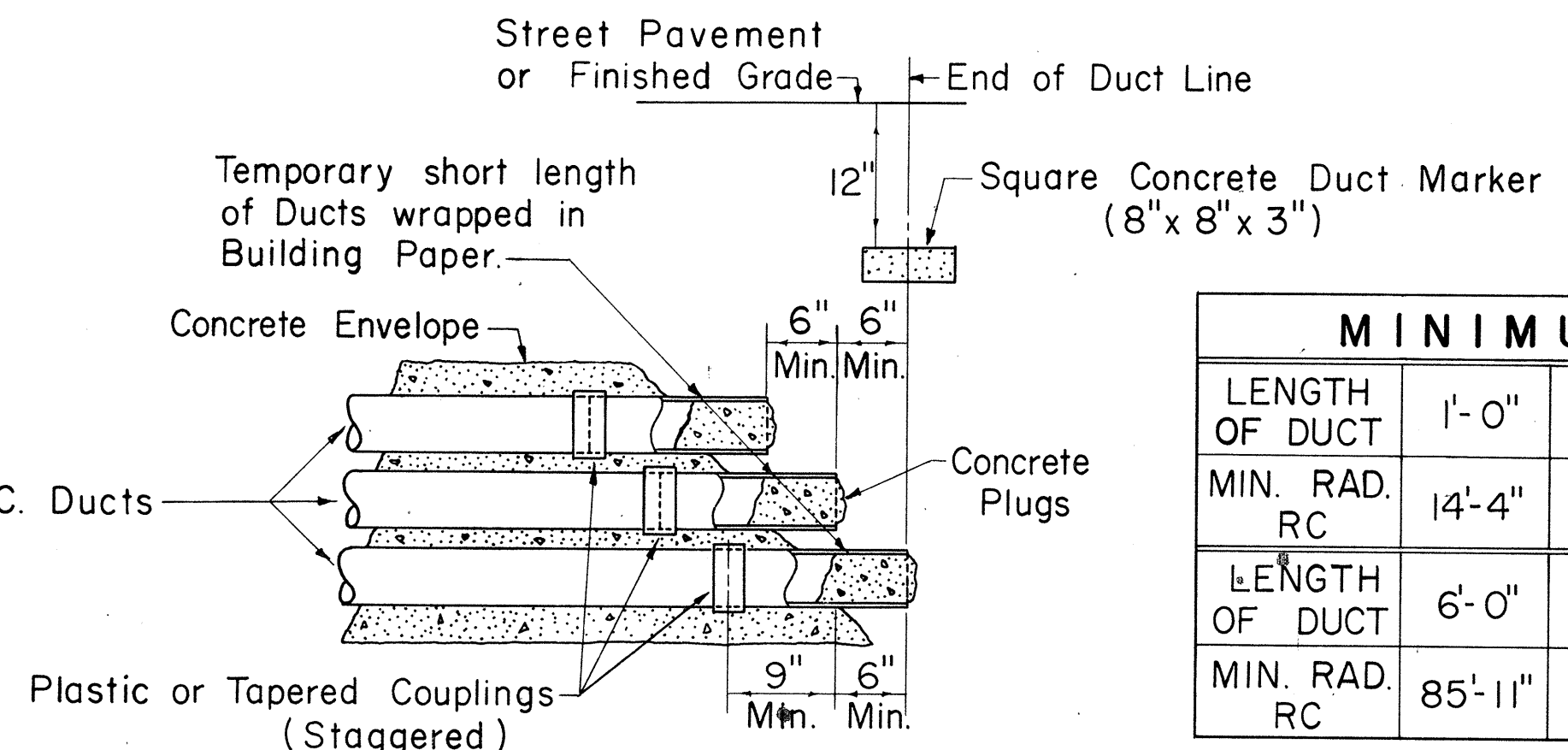
Not to Scale



TYPICAL DUCT ENVELOPE ELEVATION

(6 WAY DUCT LINE SHOWN)

Not to Scale

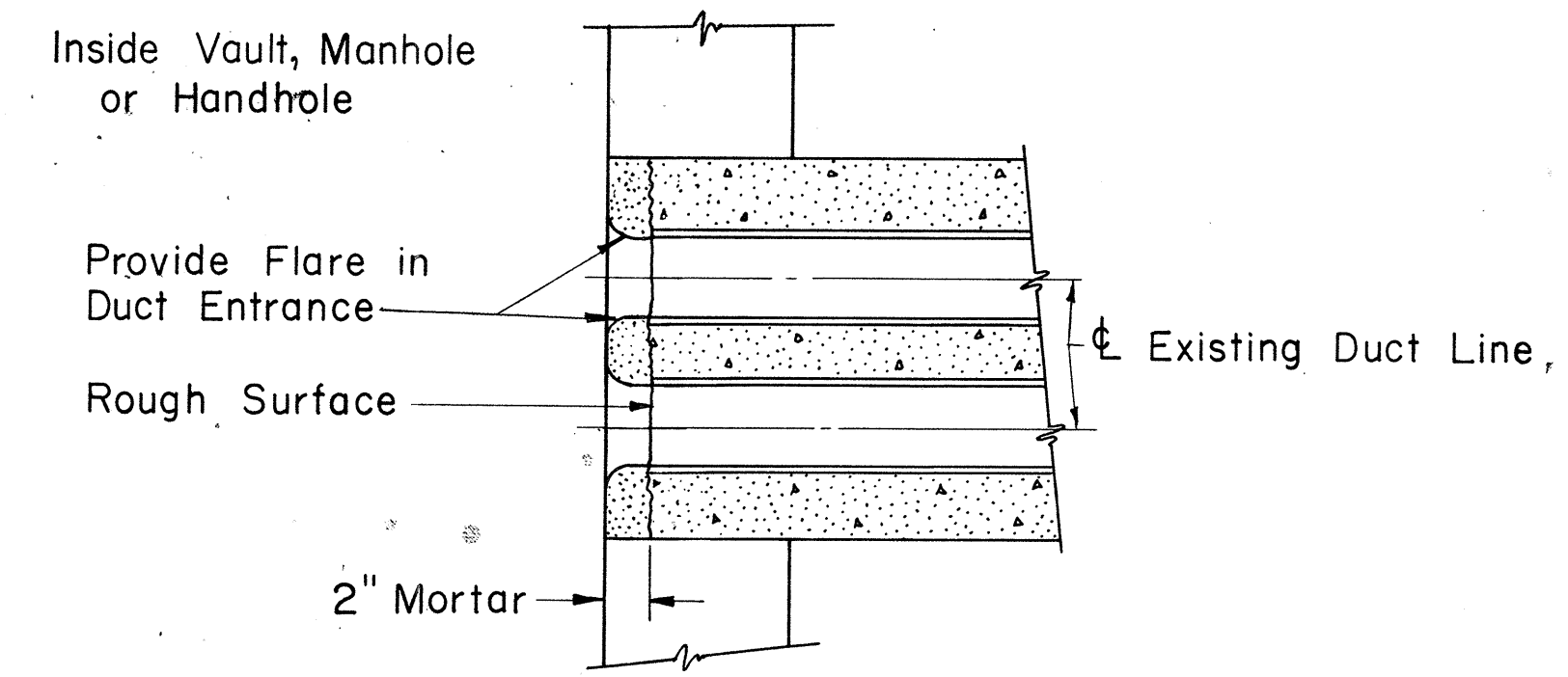


TYPICAL STUB OUT DETAIL

Not to Scale

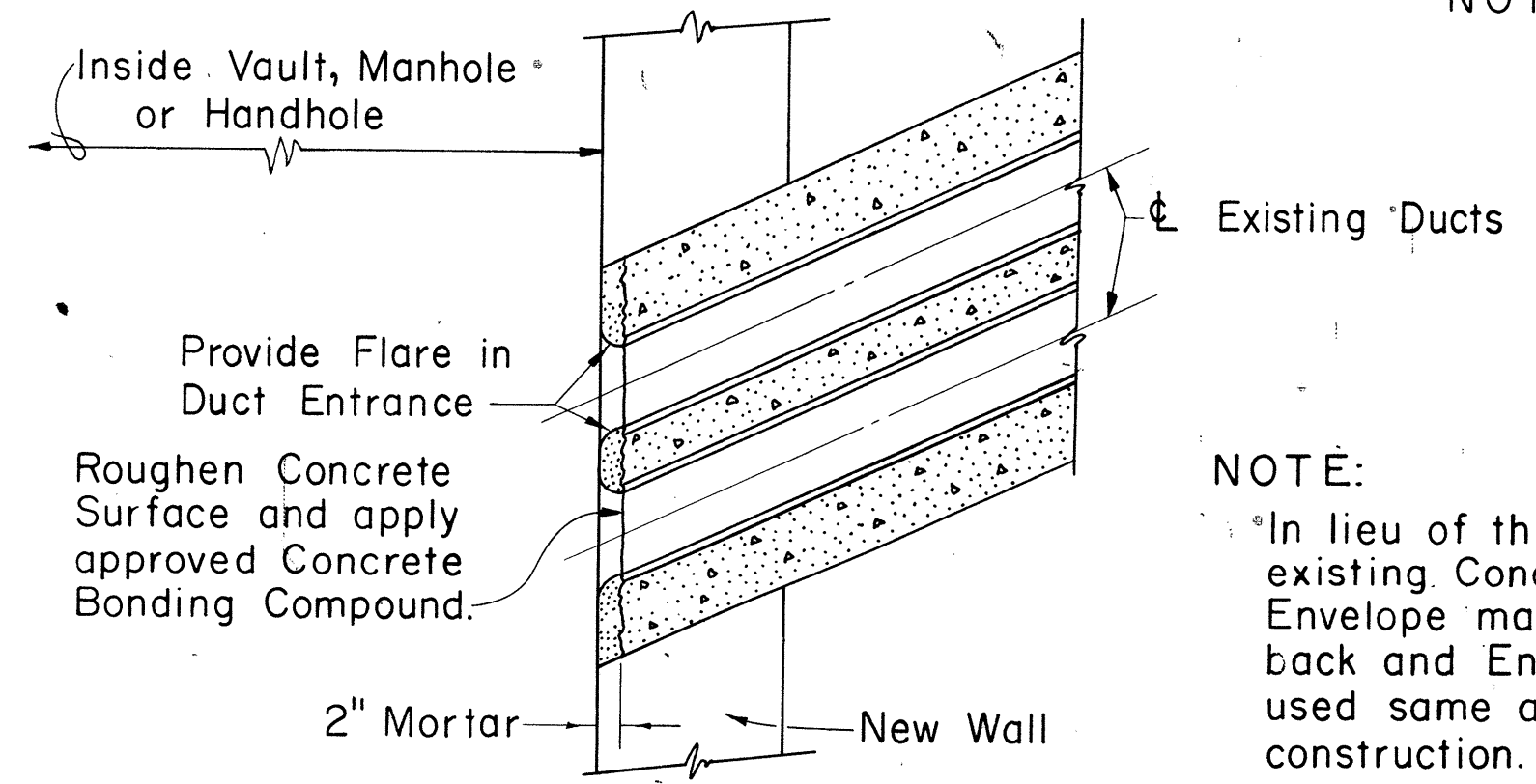
NOTE: Asbestos Cement or Plastic Plugs may be used if approved by H.E.Co. Engineer.

	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'-1"	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"	



DUCT LINE ENTRANCE AT EXISTING DUCT LINE

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



RIGHT ANGLE OR DIAGONAL ENTRANCE METHOD OF TERMINATING EXISTING DUCT LINE

Not to Scale

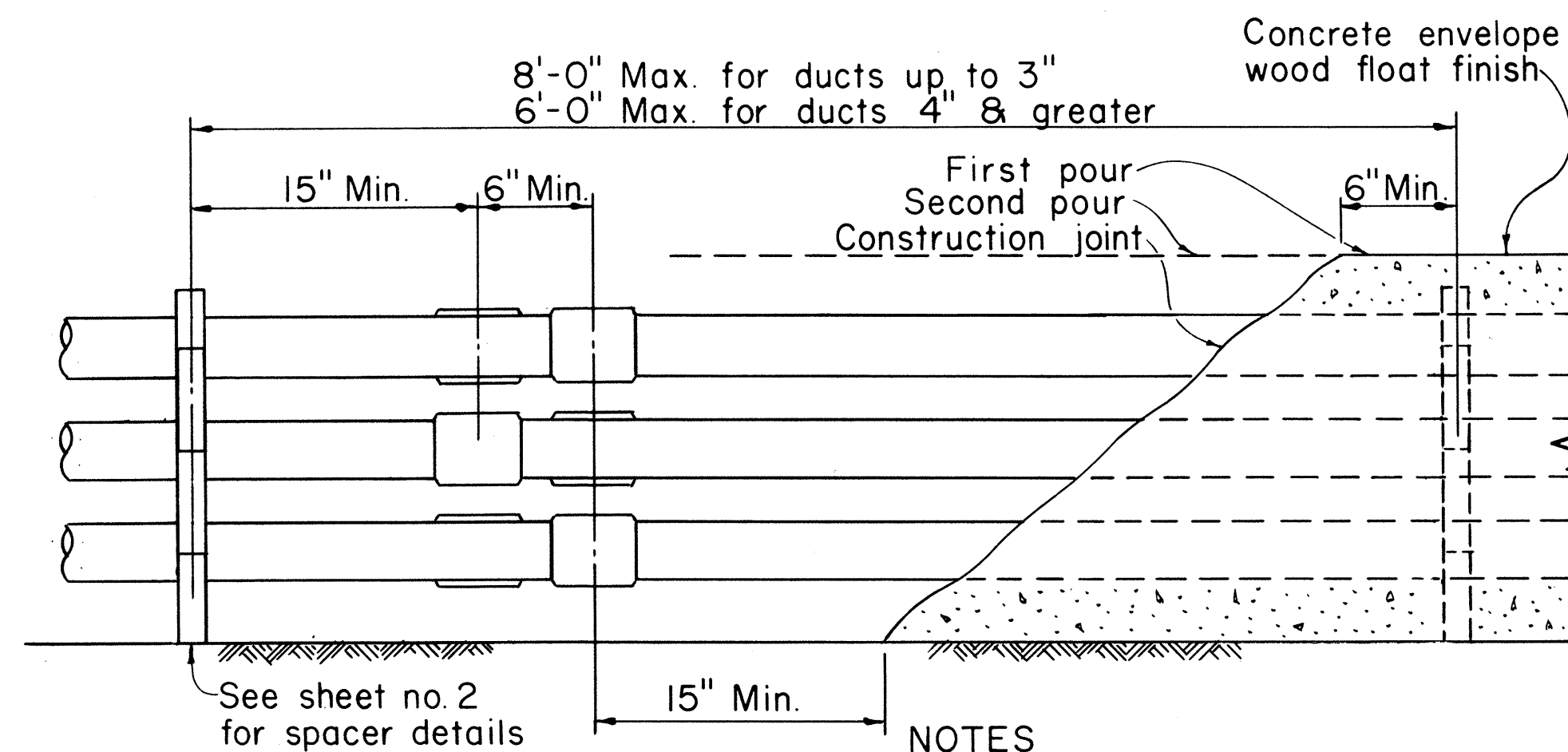
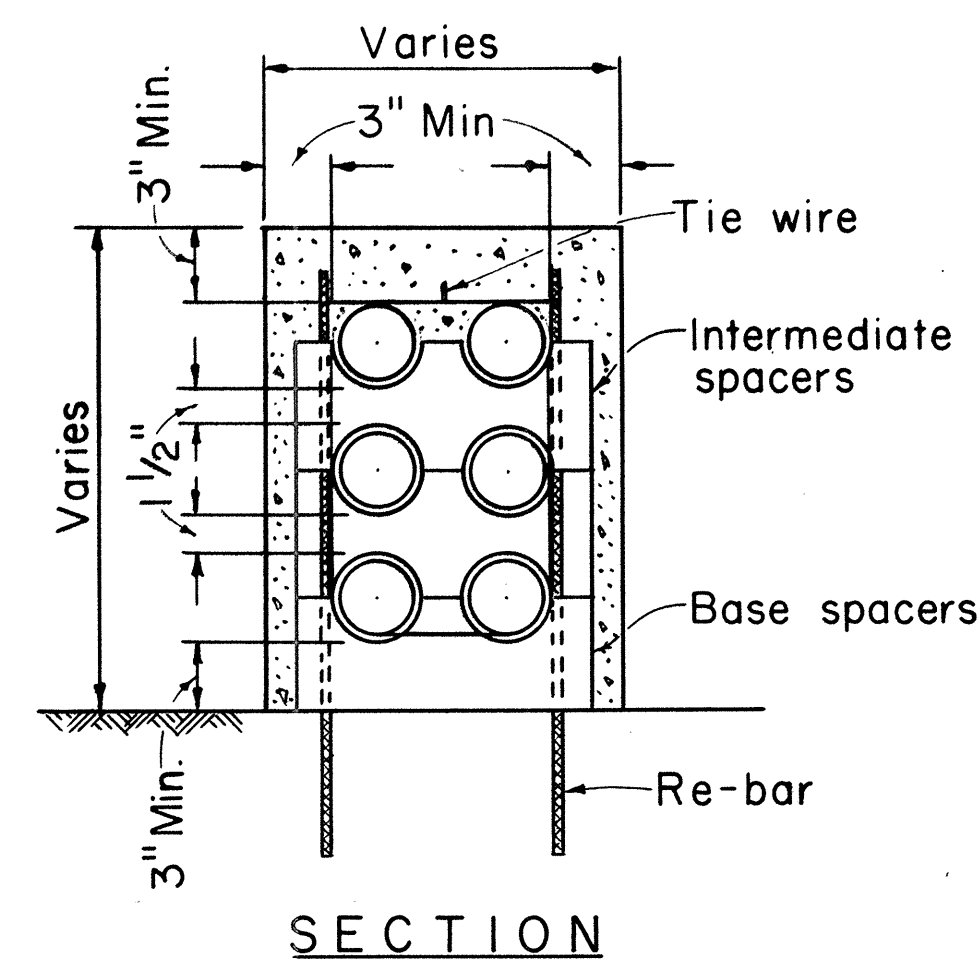
APPROVED:

Frederick Karam 3-29-77
HAWAIIAN ELECTRIC CO., INC. #40119 DATE

HECo., Inc. Drawing Number	30-1033
SHEET No. 2 OF 2 SHEETS	
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
STANDARD DETAILS	
CONSTRUCTION STANDARDS ASBESTOS CEMENT DUCTS INSTALLATION DETAILS UNDERGROUND STRUCTURES	
Scales: As Noted	

SHEET NO. 26 OF 29 SHEETS

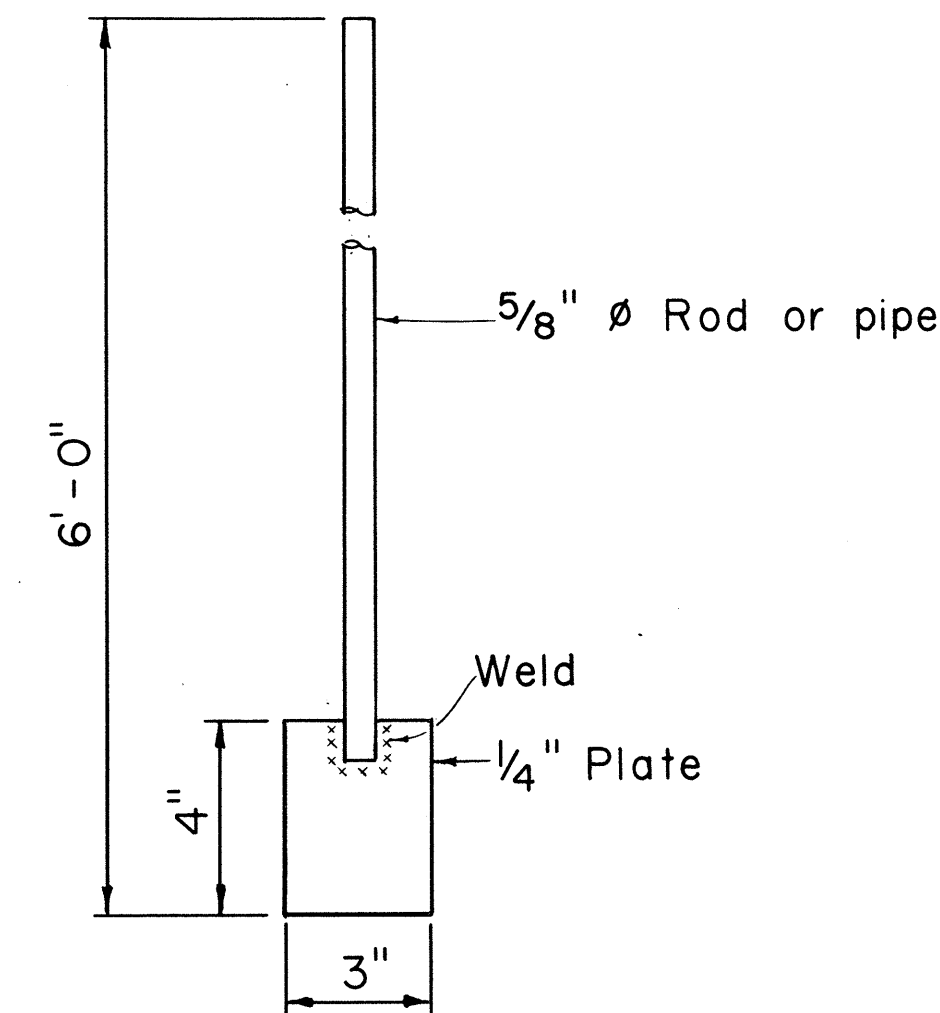
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	115	164



TYPICAL DUCT LINE

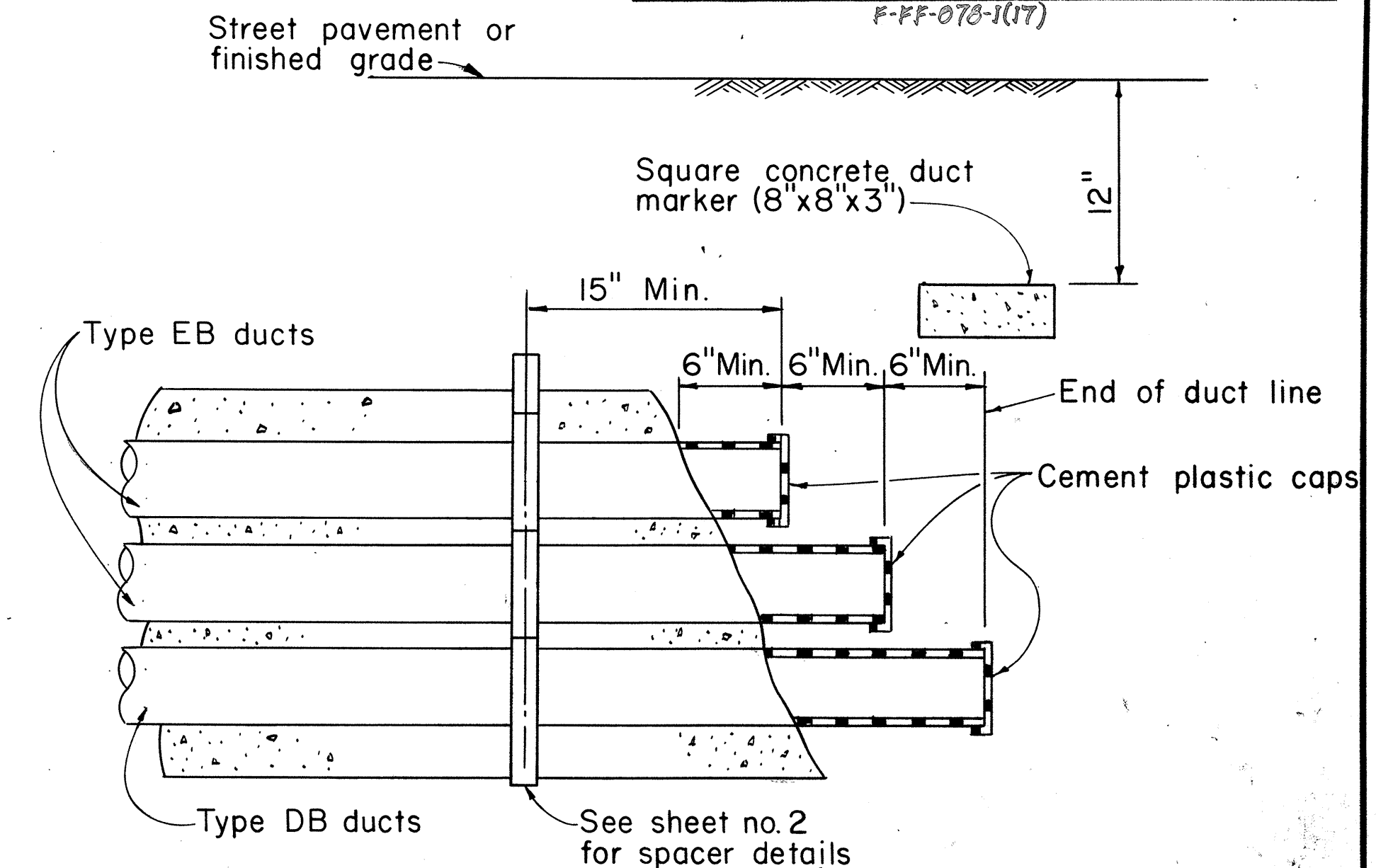
(6-WAY DUCT SHOWN)

Scale: $1\frac{1}{2}" = 1' - 0"$



HAND SPADE

Scale: 3" = 1'-0"



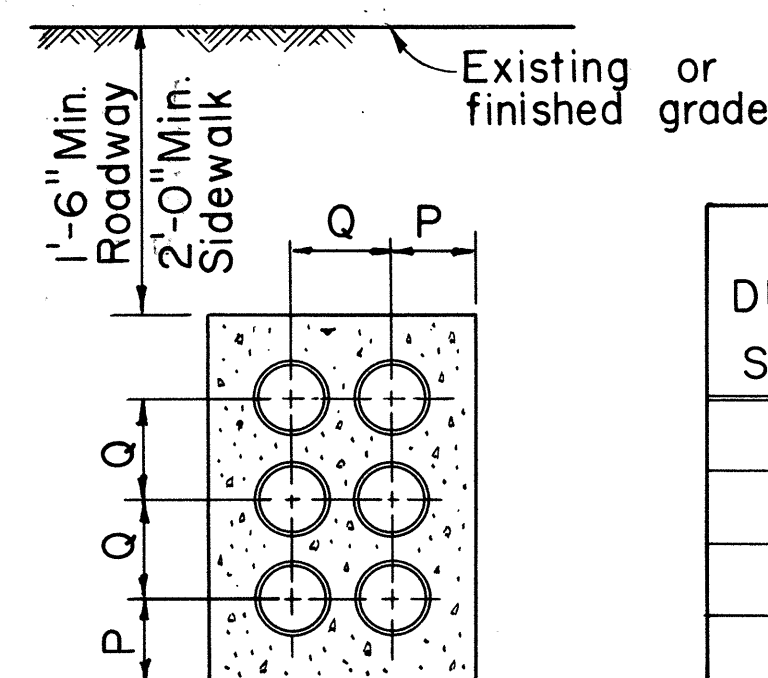
TYPICAL STUB OUT DETAIL

(6-WAY DUCT SHOWN)

Scale: $1\frac{1}{2}" = 1' - 0"$

NOTE:

1. Maintain 1 1/2" minimum spacing between conduit, 3" minimum concrete envelope around top, bottom & sides.
2. Dimensions are minimum dimensions.
3. The bottom row in an encased duct bank of three or more layers shall be Type DB ducts. The remaining ducts shall be Type EB.

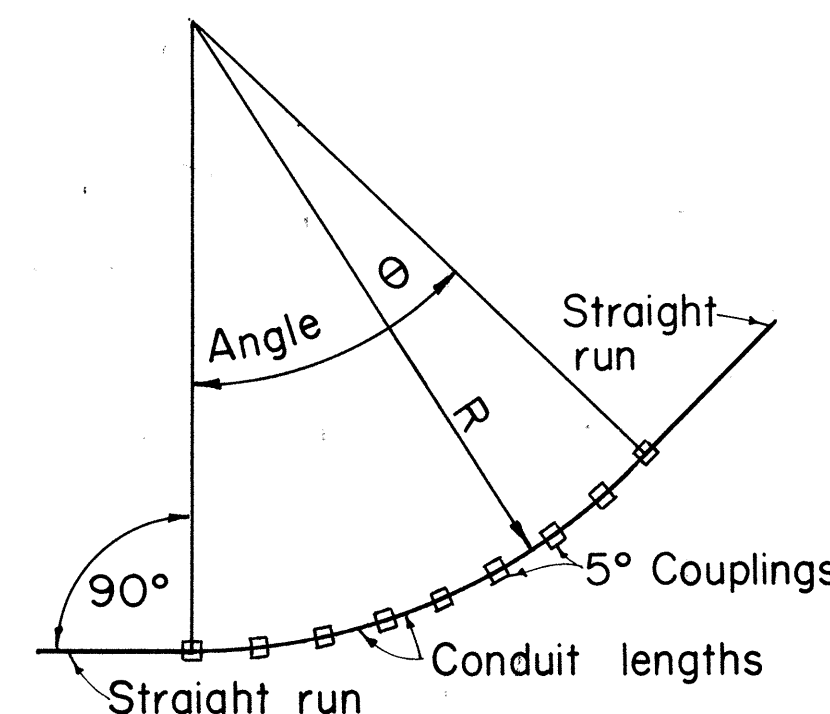


EB TYPICAL DUCT SECTION

(6-WAY DUCT SHOWN)

Scale: $1'' = 1'-0''$

DUCT SIZE	DIMENSIONS (INCHES)	
	P	Q
2	4 ¹ / ₄	4 ¹ / ₈
3	4 ³ / ₄	5 ¹ / ₈
4	5 ¹ / ₄	6 ¹ / ₄
5	5 ⁷ / ₈	7 ⁵ / ₈
6	6 ⁵ / ₁₆	8 ⁵ / ₈



EXAMPLE:

Radius of bend (R) = 60'

Angle of bend (θ) = 45°

From Table A, the nearest value to 60' radius is 57'-6". Length of conduit = 5'.

From Table B, for 45° angle.
 Number of couplings required = 9
 Number of conduit lengths required = 8

METHOD OF FORMING CURVES:

There are 4 methods of forming curves with plastic conduit.

1. "Cold" bending: Limit trench formed radius sweeps to 25' minimum radius.
2. "Heat" bending: Do not heat bend conduit.
3. 5° angle couplings may be used as shown.
4. Factory made elbows and sweeps may be used only when specified by Engineer.

APPLICATION OF 5° COUPLING FOR LONG RADIUS BENDS

APPROX. RADIUS OF BEND, R	LENGTH OF EA. CONDUIT-F USING 5° BEND AT COUPL
11' - 6"	1
17' - 3"	1.5
23' - 0"	2
28' - 9"	2.5
34' - 6"	3
40' - 3"	3.5
46' - 0"	4
51' - 9"	4.5
57' - 6"	5
69' - 0"	6
80' - 6"	7
92' - 0"	8

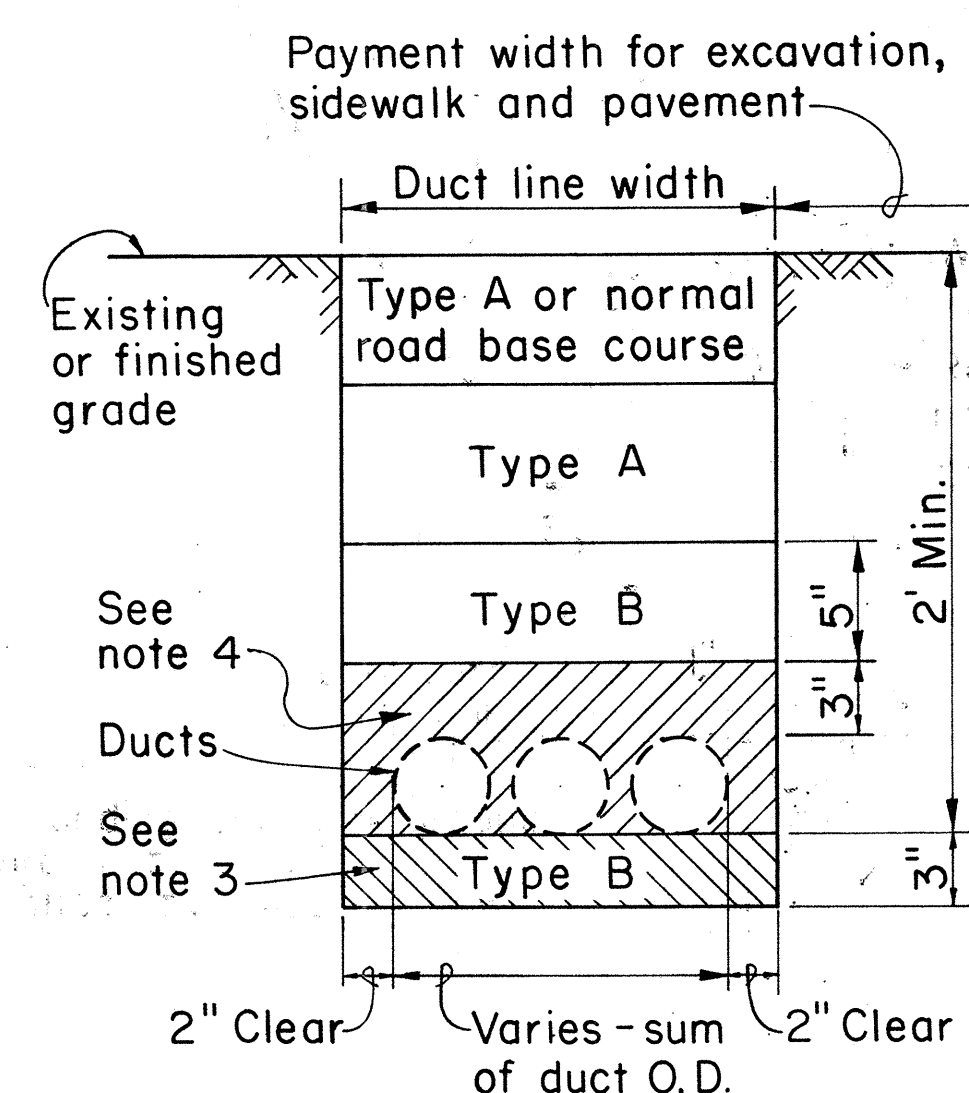
ANGLE OF BEND θ	NO. OF COUPLINGS	LENGTH OF CONDUIT
15°	3	2
30°	6	5
45°	9	8
60°	12	11
75°	15	14
90°	18	17

GENERAL NOTES

A. APPROVED CONDUIT MATERIALS

- | SPECIFICATION | |
|---|-------|
| 1. Encased Burial (EB) Conduit | |
| a) Asbestos Cement, Type I | M7005 |
| b) ABS (Acrylonitrile-Butadiene-Styrene) Plastic Conduit, Type EB | M7001 |
| c) PVC (Polyvinyl Chloride) Plastic Conduit, Type EB | M7001 |
| d) PVC Plastic Conduit, Schedule 40 | 116 |
| See note 3 EB Typical Duct Section | |
| 2. Direct Burial (DB) Conduit | |
| a) ABS Plastic Conduit, Type DB | M7001 |
| b) PVC Plastic Conduit | M7001 |
| c) PVC Plastic Conduit, Schedule 40 | 116 |

B. This drawing provides details for installing Plastic Ducts (ABS & PVC) only. Refer to drawing 30-1030 & 30-1033



D.B. EXCAVATION & BACKFILL DETAILS (TYPICAL)

Scale $1\frac{1}{2}'' = 1' - 0''$

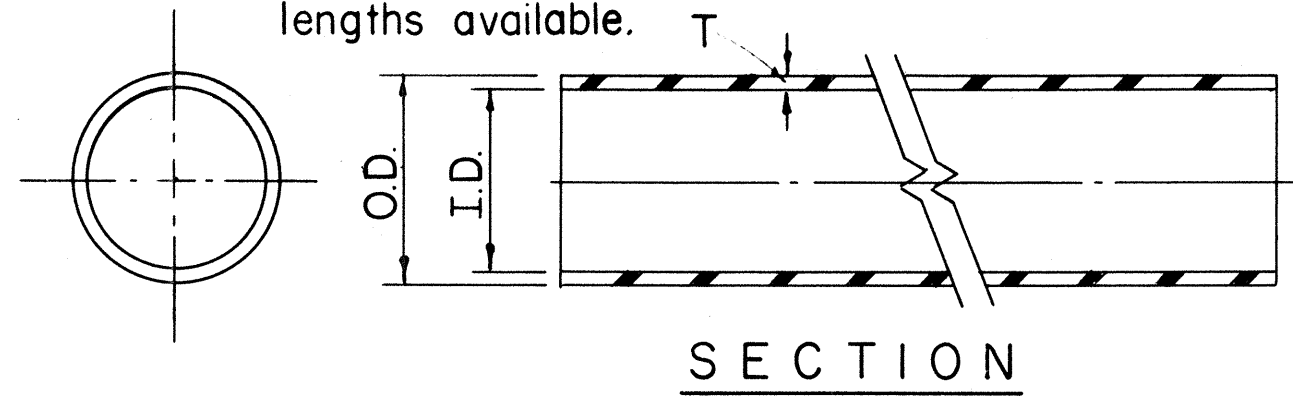
<u>REFERENCE</u>	<u>SPECIFICATION</u>
CS 7202	General Conditions
CS 7001	Construction of U.G. Facilities
CS 7003	Construction of Electrical Facilities

APPROVED:

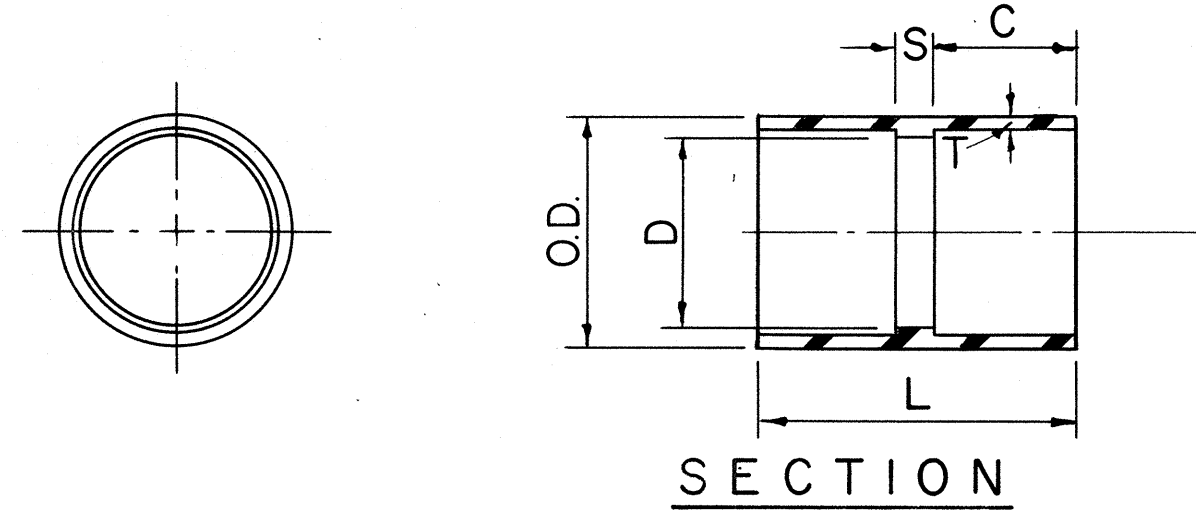
Fred Karimoh 3-30-77
Hawaiian Electric Co., Inc. ^{THD} Date

HECo., Inc.	Drawing	Number
30-1035	19	SHEET No. 1 OF 2 SHEETS
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD DETAILS PLASTIC DUCTS INSTALLATION DETAILS UNDERGROUND STRUCTURES Scale as noted SHEET No. 27 OF 29 SHEETS		

10, 20 & 30 Ft.
lengths available.

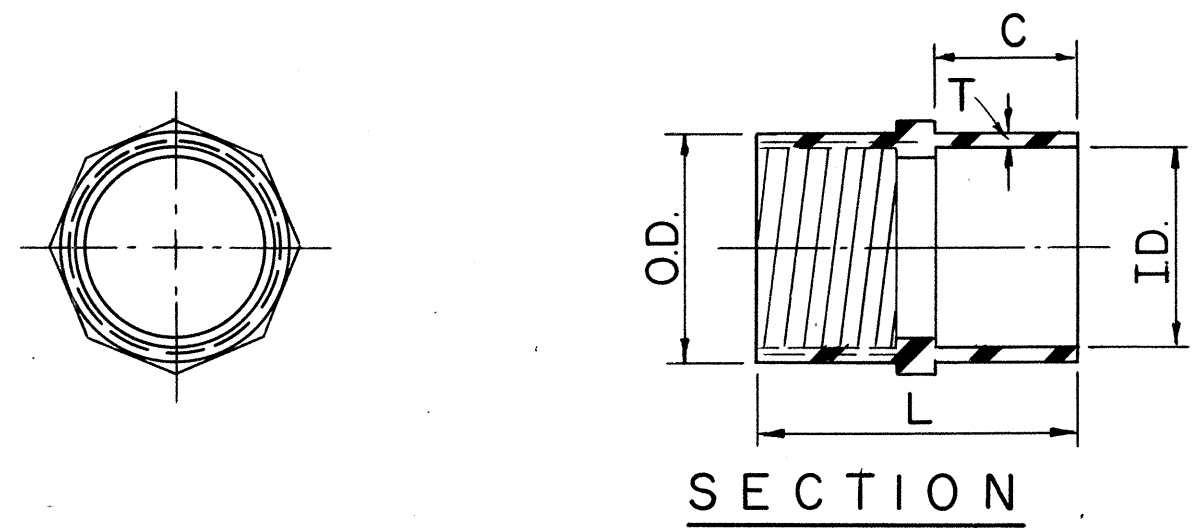


CONDUIT



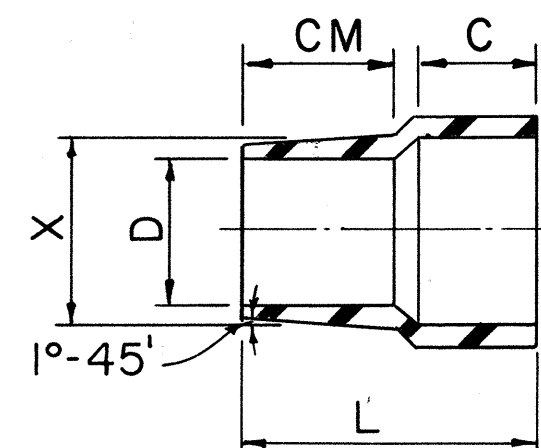
SECTION

COUPLING (ASTM D-2750)

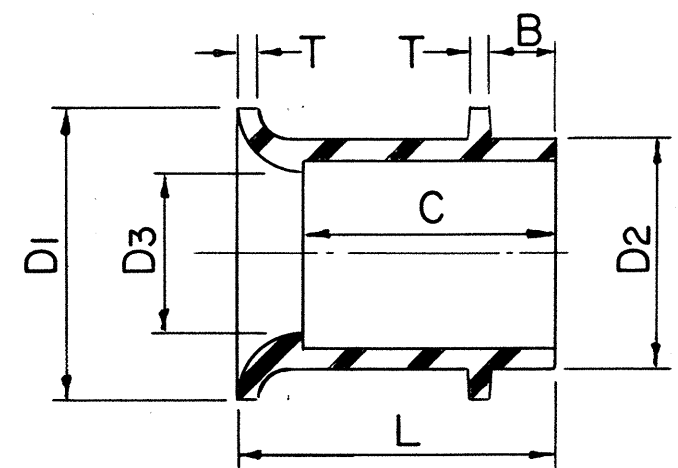


SECTION

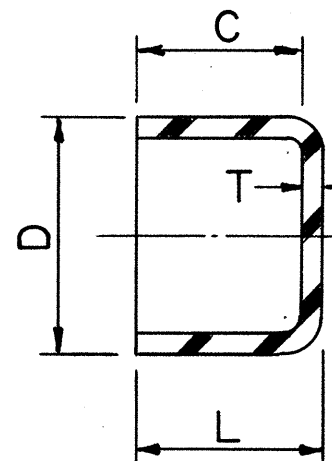
ADAPTER - PLASTIC TO STEEL



ADAPTER - PLASTIC TO ASBESTOS CEMENT



END BELL (ASTM D-2750)



CAP (RIGID) - FOR SEMI-PERMANENT USE (ASTM D-2750)

SIZE	HECO CODE	D	C	L	T
2		2.52	.59	.65	.060
3		3.68	.81	.89	.075
4		4.725	.91	1.01	.095
5		5.805	1.00	1.10	.100
6		6.920	1.13	1.25	.125

	E B (ENCASED BURIAL)					DB (DIRECT BURIAL)				
CONDUIT SIZE	HECO CODE	O.D.	I.D.	T (MIN.)	WEIGHT #/10 ² FT.	HECO CODE	O.D.	I.D.	T (MIN.)	WEIGHT #/10 ² FT.
2		2.375	2.25	.060	21	29010	2.375	2.15	.110	38
3		3.500	3.35	.075	39	29012	3.500	3.25	.125	64
4		4.500	4.31	.095	63	29014	4.500	4.18	.160	104
5		5.563	5.36	.100	82	29016	5.563	5.20	.180	146
6		6.625	6.375	.125	121		6.625	6.25	.190	182

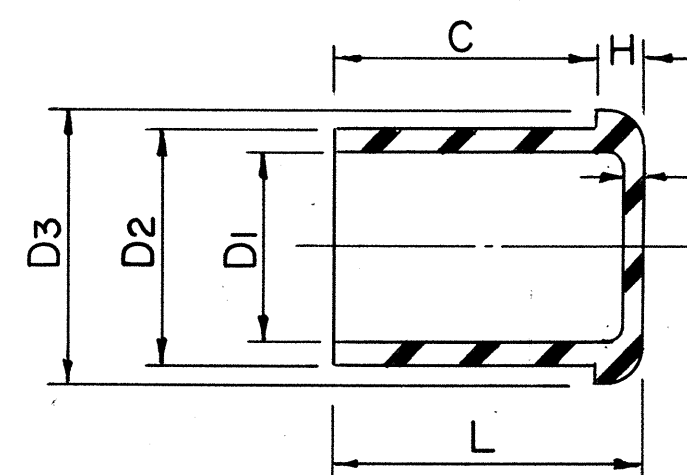
NOTE: Type EB & DB Conduits have same O.D. for a given size. All fittings which go over Conduits are DB type & fit both types of Conduits.

SIZE	HECO CODE	O.D.	D	L	C	S	T
2		2.620	2.255	2 7/16	1.16	.110	.110
3		3.780	3.350	3 3/8	1.63	.120	.125
4		4.855	4.310	3 11/16	1.78	.120	.160
5		5.965	5.363	4 3/32	1.97	.160	.180
6		7.050	6.375	4 15/32	2.16	.160	.190

SIZE	HECO CODE	O.D.	I.D.	L	T	C
2				2 15/16	1 1/16	1.16
3				3 7/16	1 5/8	1.63
4				3 11/16	1 23/32	1.78
5				4 1/16	1 27/32	1.97
6				4 5/8	1 11/16	3.44

SIZE	HECO CODE	L	X	C.M.	D	C
2		3 1/16	2.580	1 3/4	2.18	1.16
3		3 19/32	3.620	1 3/4	3.09	1.63
4		4 1/32	4.620	2	4.03	1.78
5						

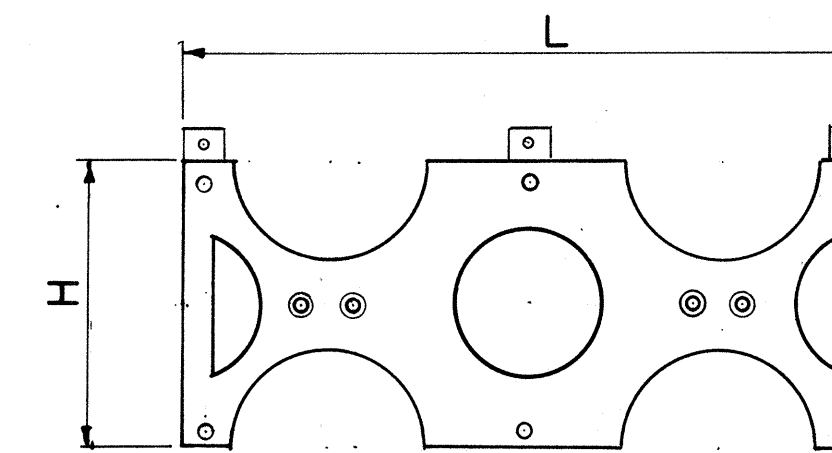
SIZE	HECO CODE	D1	D2	D3	B	C	L	T
2		3.01	2.520	2.255	.50	1.16	1.54	.060
3		4.10	3.680	3.350	.75	1.63	2.00	.075
4		5.31	4.725	4.310	.75	1.78	2.28	.095
5		6.36	5.805	5.363	1.00	1.97	2.47	.100
6		7.38	6.920	6.375	1.00	2.16	2.66	.125



CAP (TEMPORARY) (ASTM D-2750)

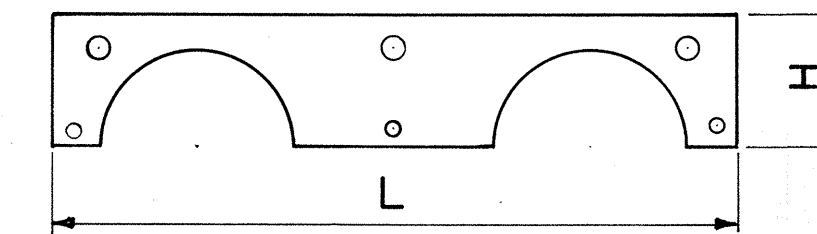
SIZE	HECO CODE	D1	D2	D3	C	H	L	T
2		2.260	2.375	2.500	.593	.125	.718	.060
3		3.360	3.500	3.656	.812	.156	.968	.075
4		4.320	4.500	4.687	.906	.187	1.092	.095
5		5.375	5.638	5.760	1.000	.218	1.218	.100
6		6.390	6.625	6.875	1.093	.250	1.343	.125

NOTE: Cap will go over conduit or "plug" the coupling.



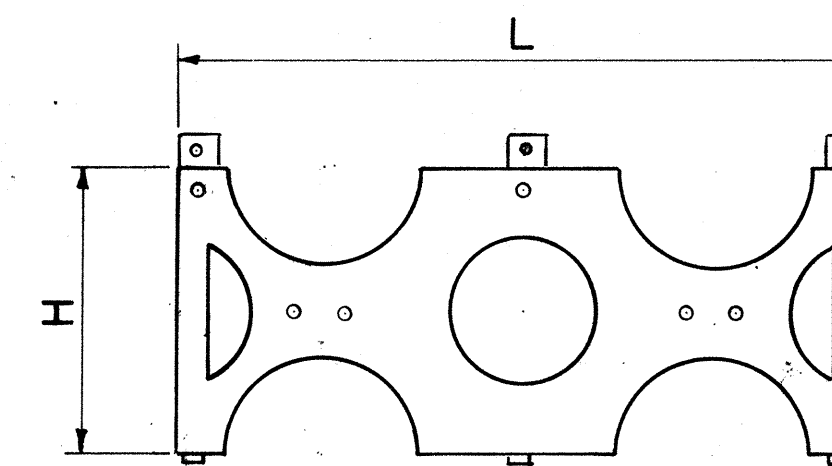
INTERMEDIATE SPACER

SIZE	HECO CODE	L	H	W
2		9.50	3.94	
3		11.25	5.06	
4		13.75	6.06	
5		15.97	7.06	
6		18.0	8.19	



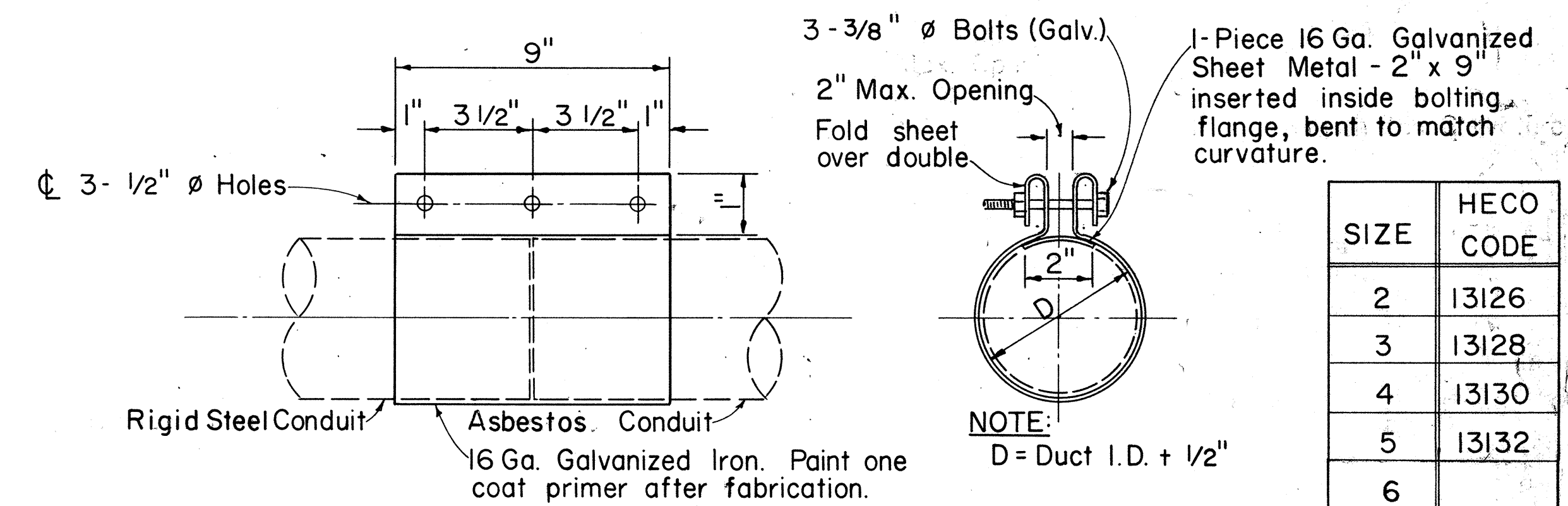
CAP SPACER

SIZE	HECO CODE	L	H
2		9.50	1.75
3		11.25	2.25
4		13.75	3.13
5		15.87	3.63
6		18.0	4.25



BASE SPACER

DUCT SPACER COMPONENTS (FORMEX SPACER OR EQUIVALENT)



3 - BOLT CLAMP

GENERAL NOTES:

- All dimensions in inches.
- Spacers shown are different than that used for Asbestos Cement Type.
- These accessories are to be used with ABS (Acrylonitrile-Butadiene-Styrene), or PVC (Poly-Vinyl Chloride) Plastic Conduit, per HECO purchase specification M7001-O.

APPROVED:

Ira Karamoto 3-30-77
Hawaiian Electric Co., Inc. Date

HECO, Inc. Drawing Number

30-1035276 SHEET NO. 2
OF 2 SHEETS

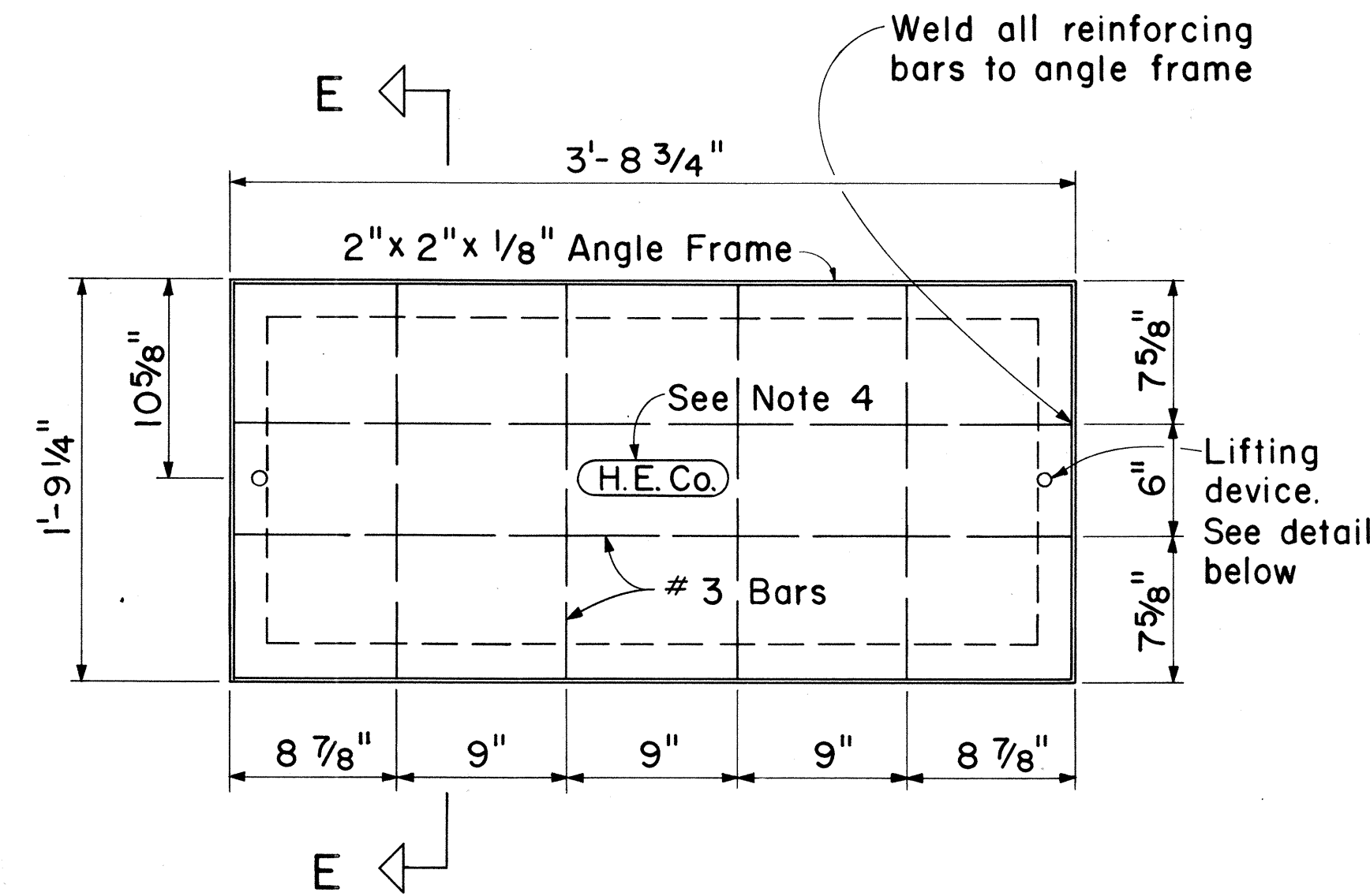
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD DETAILS
PLASTIC DUCTS
INSTALLATION DETAILS
UNDERGROUND STRUCTURES

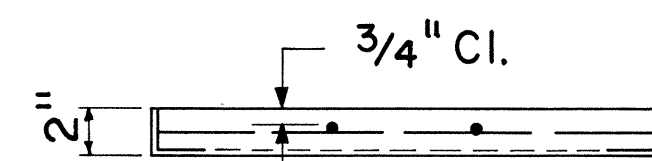
Scales: Not to Scale

SHEET NO. 28 OF 29 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	FF-078-1(17)	1977	117	164



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



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

Before installing nylon plug, H. E. Code 11554, apply corrosion resistant grease to the inserts on cover.

3/4" ϕ x 1 7/8" cadmium plated thin slab insert.

Concrete Fill

2" x 2" x 1/8" Angle Frame

1/4" ϕ x 0'-8 1/2" Bar (Part of insert)

Clean surface and apply bonding adhesive between angle and insert after galvanizing of frame.

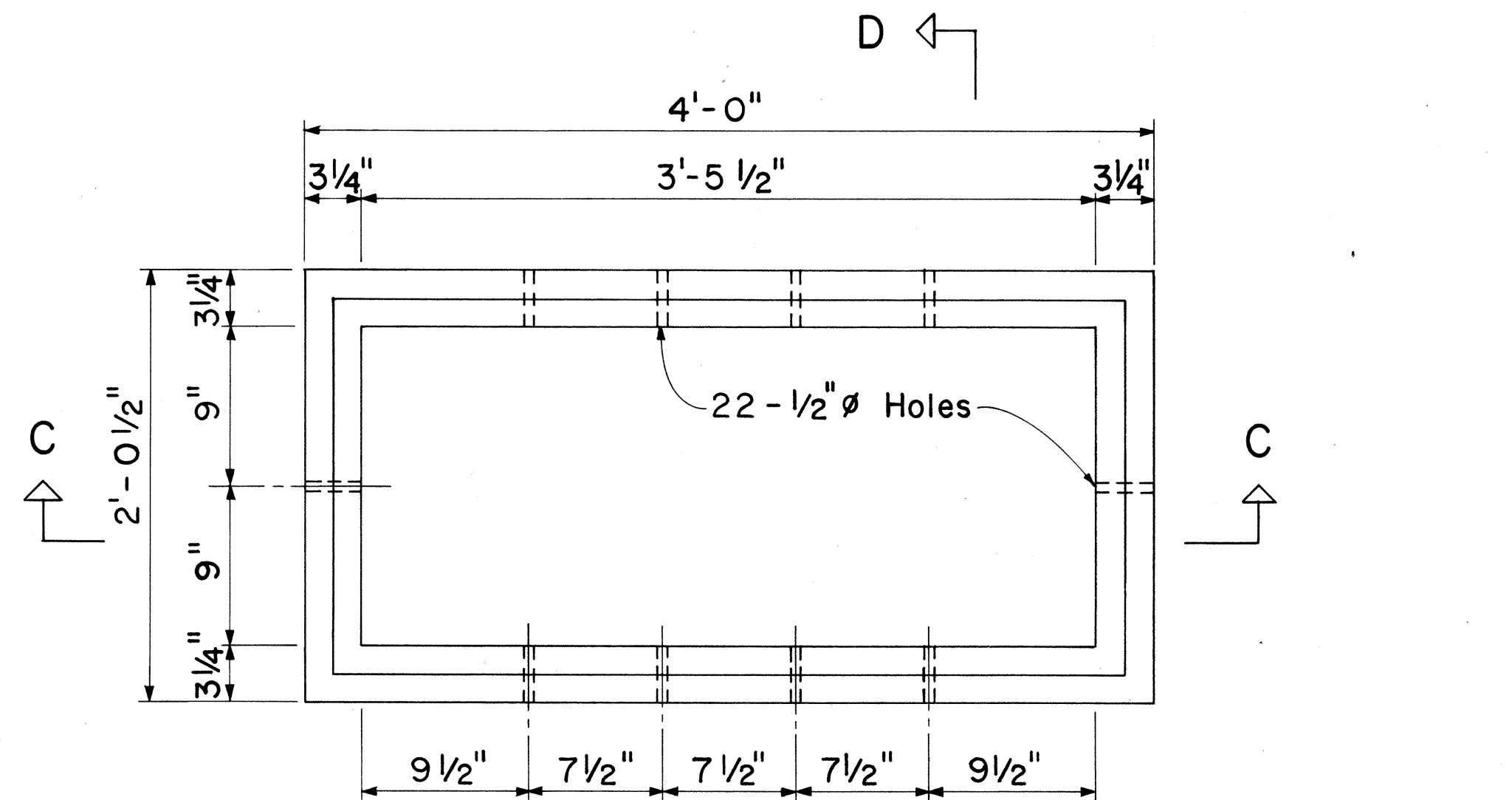
3/4" ϕ x 0'-1" threaded (10 thds. per in.) nylon plug furnished by H. E. Co. to Contractor. Fabricator shall adequately seal opening of insert to prevent water from entering during storage.

LIFTING DEVICE DETAIL
Scale: 1/2 Actual Size

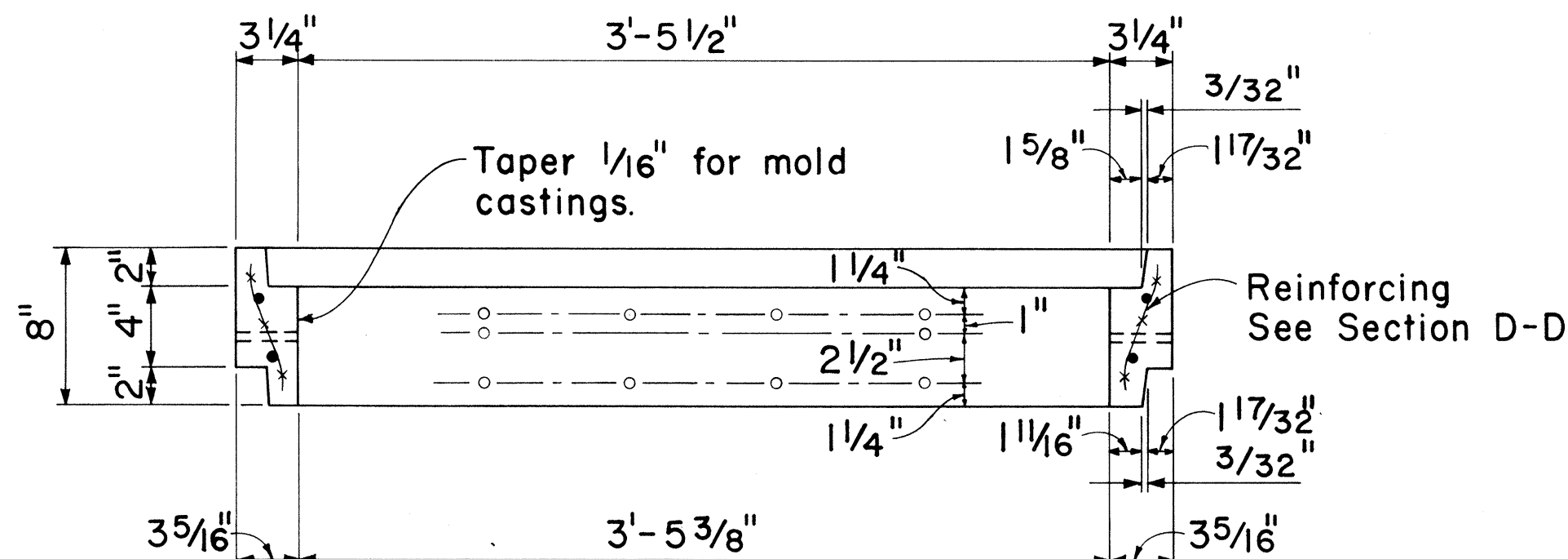
CONCRETE COVER FOR 1'-6" x 3'-5 1/2" SERVICE BOX

- 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.

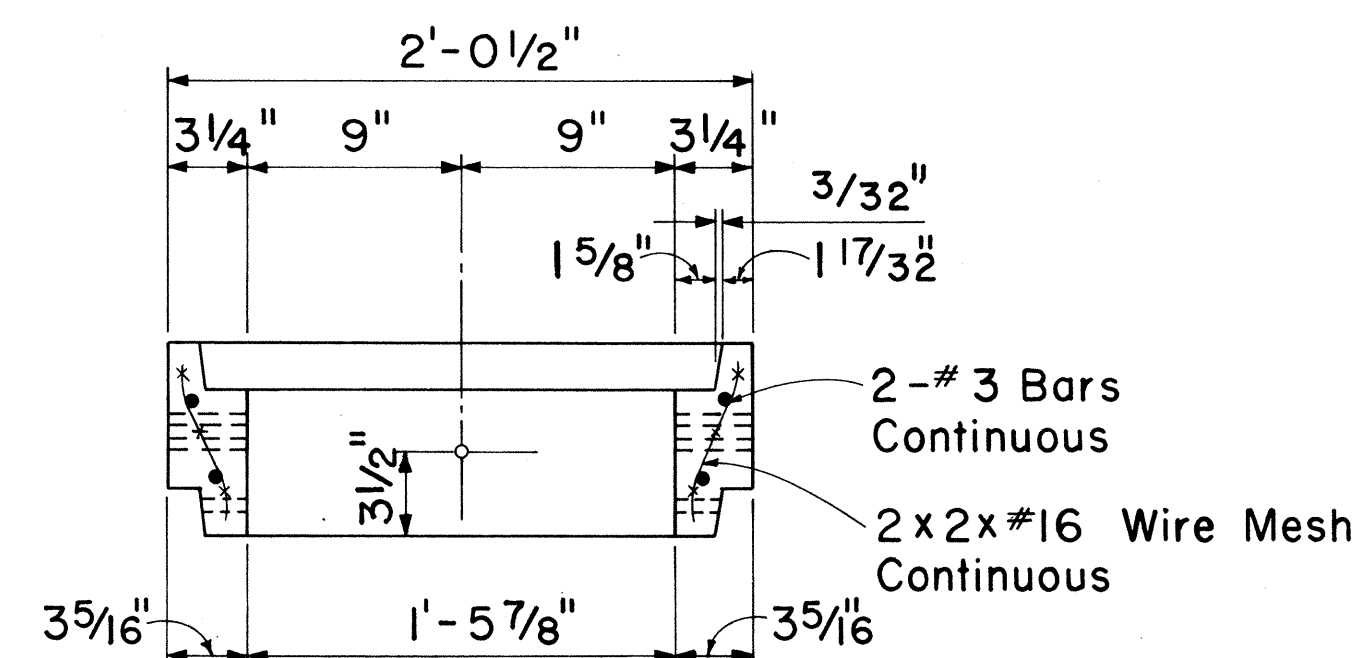
H.E. Co. DWG. NO.
011312



PLAN D



SECTION C-C

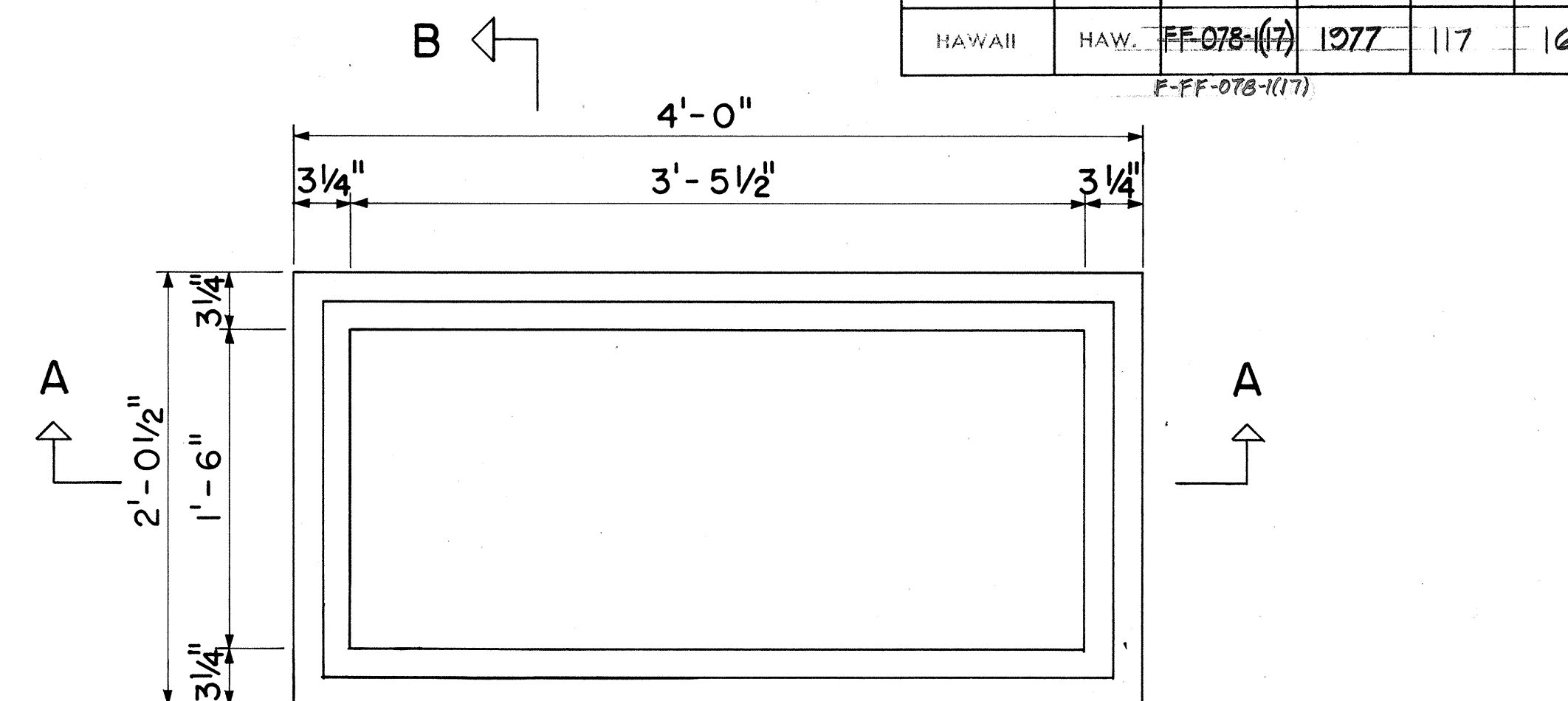


SECTION D-D

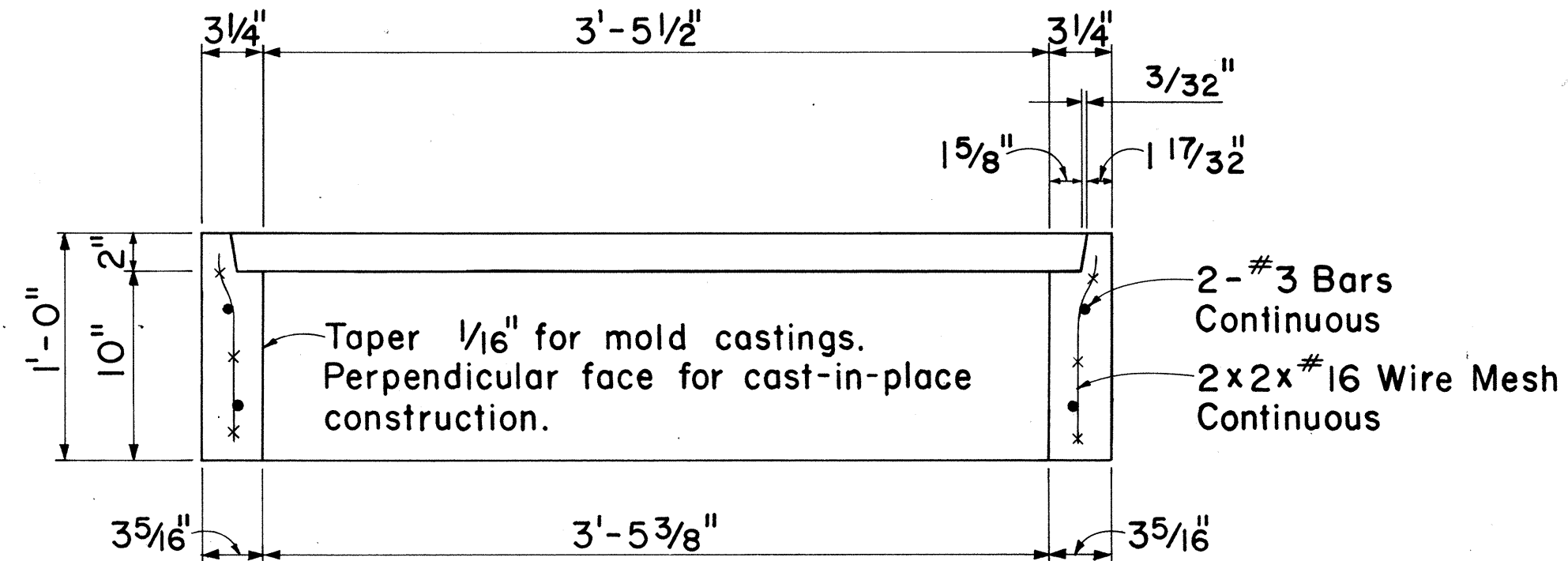
CONCRETE SERVICE BOX EXTENSION 1'-6" x 3'-5 1/2" x 0'-8" DEPTH

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

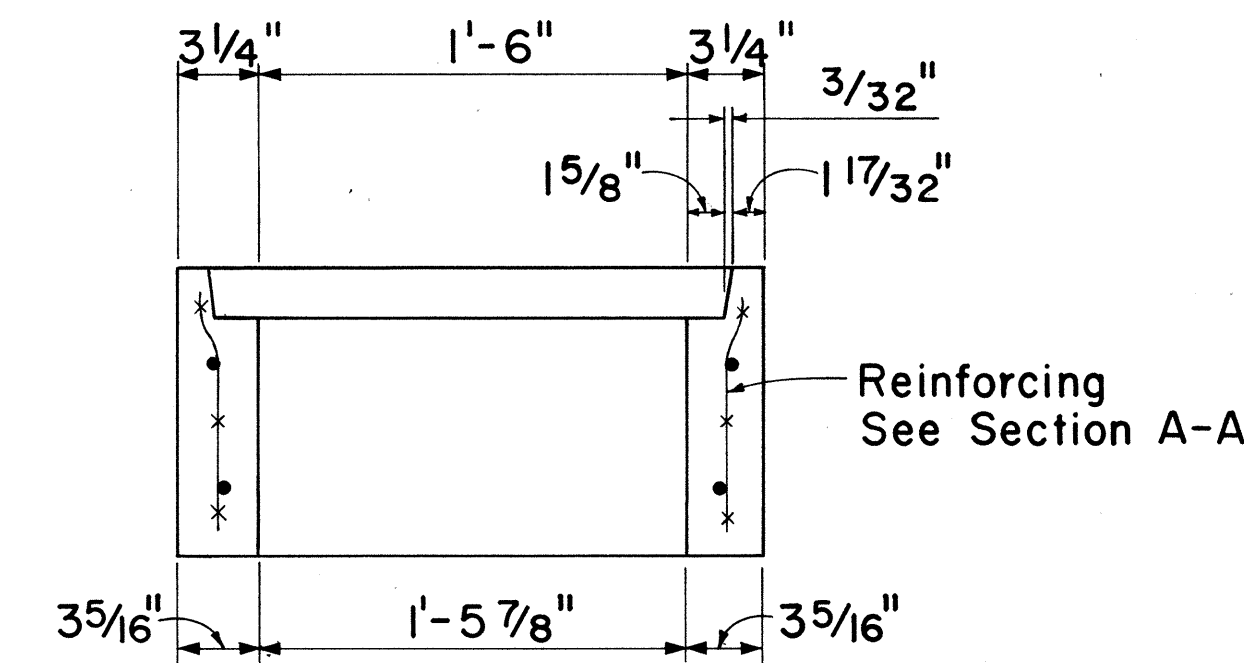
H.E. Co. DWG. NO.
011311



PLAN



SECTION A-A



SECTION B-B

CONCRETE SERVICE BOX BODY 1'-6" x 3'-5 1/2" x 1'-0" DEPTH

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

- NOTES:
1. Concrete compressive strength = 3,000 psi in 28 days.
 2. Weight of box = 412 lbs. $\pm$.
 3. See Drawing 011312 for Concrete Cover.
 4. "Contractor Furnished" item.

H.E. Co. DWG. NO.
011310

APPROVED:

Fred Karamits
HAWAIIAN ELECTRIC Co., Inc. 3-30-77
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DETAILS
CONCRETE SERVICE BOX
BODY, EXTENSION AND COVER

Scale: As Noted Date:
SHEET No. E-29 OF 29 SHEETS