


GENERAL NOTES

- 

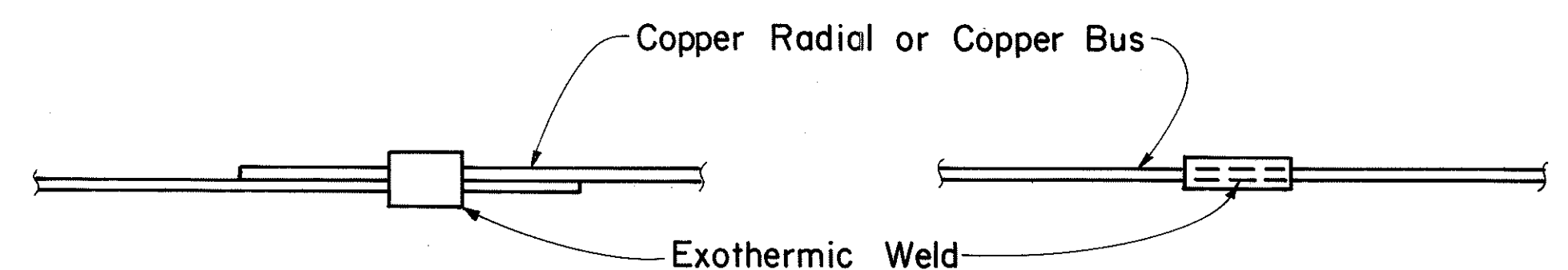
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GROUND SYSTEM MODIFICATION - 1

SCALE: AS NOTED DATE: JUN. 1992

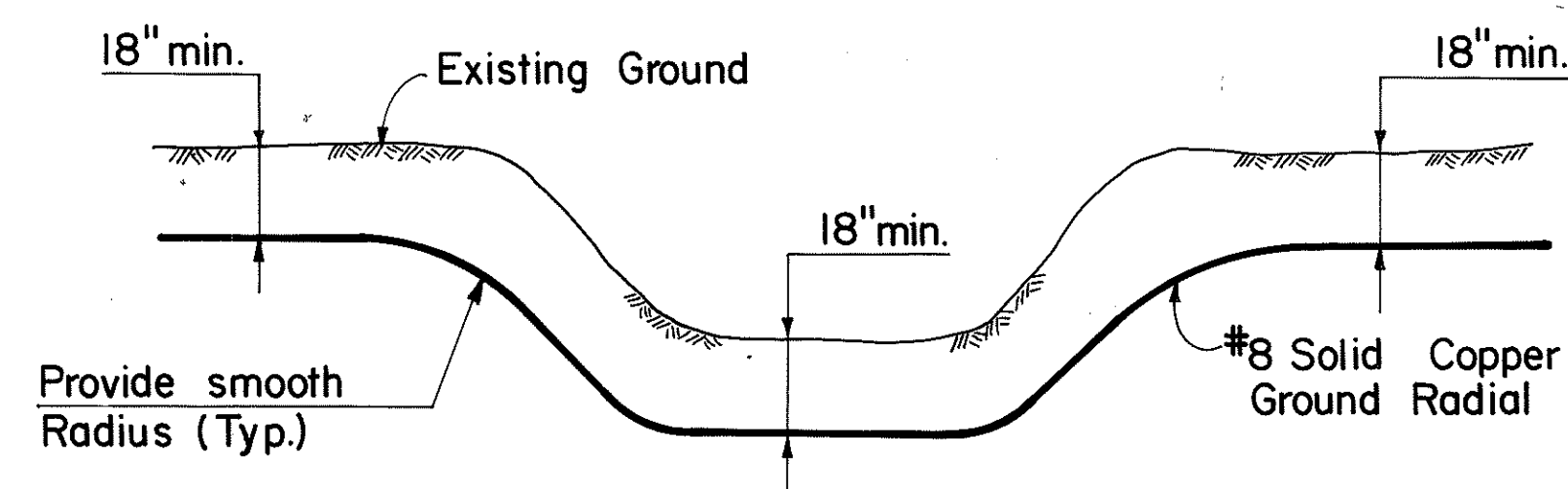
SHEET No. 0B1 OF 2 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H3-1(66)	1992	440	440

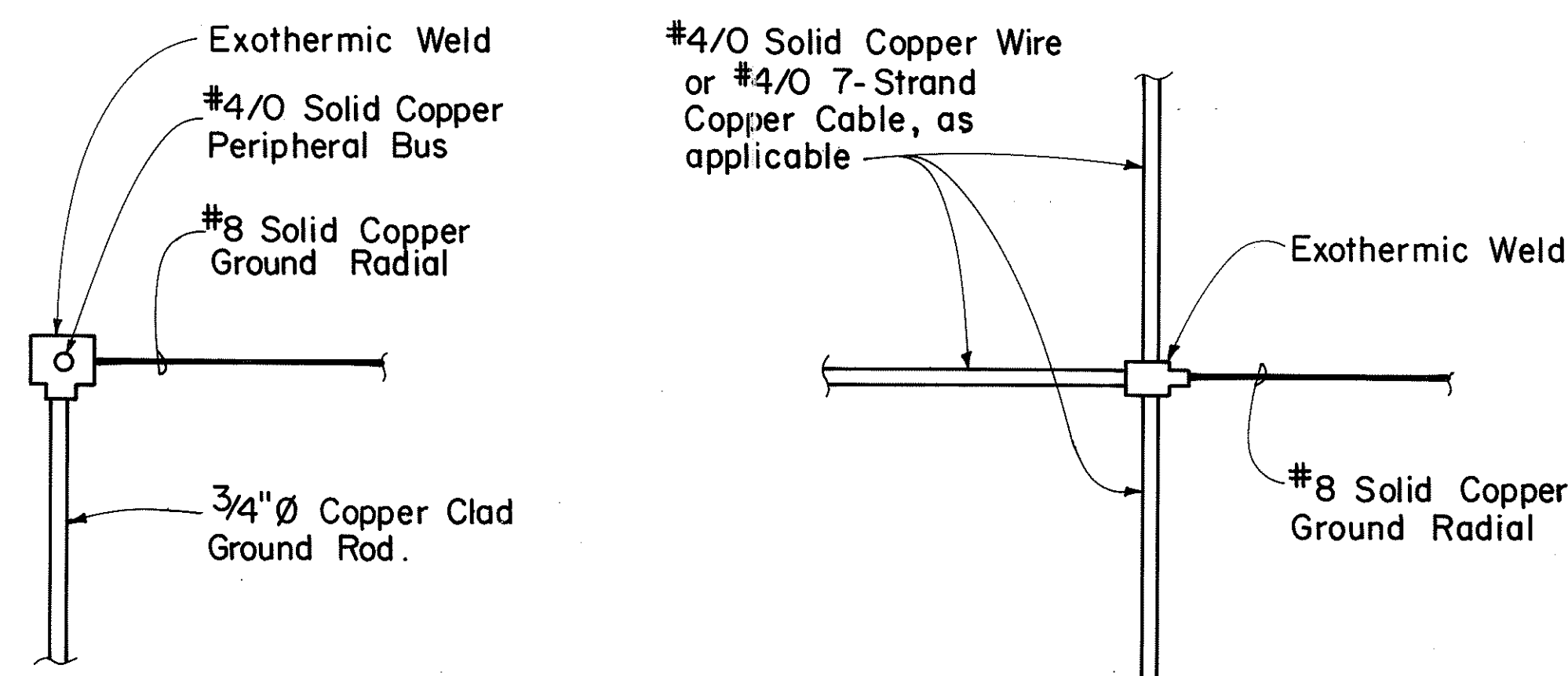


LAP SPLICE BUTT SPLICE (ALTERNATIVE)

TYPICAL BUS OR RADIAL SPLICE DETAIL



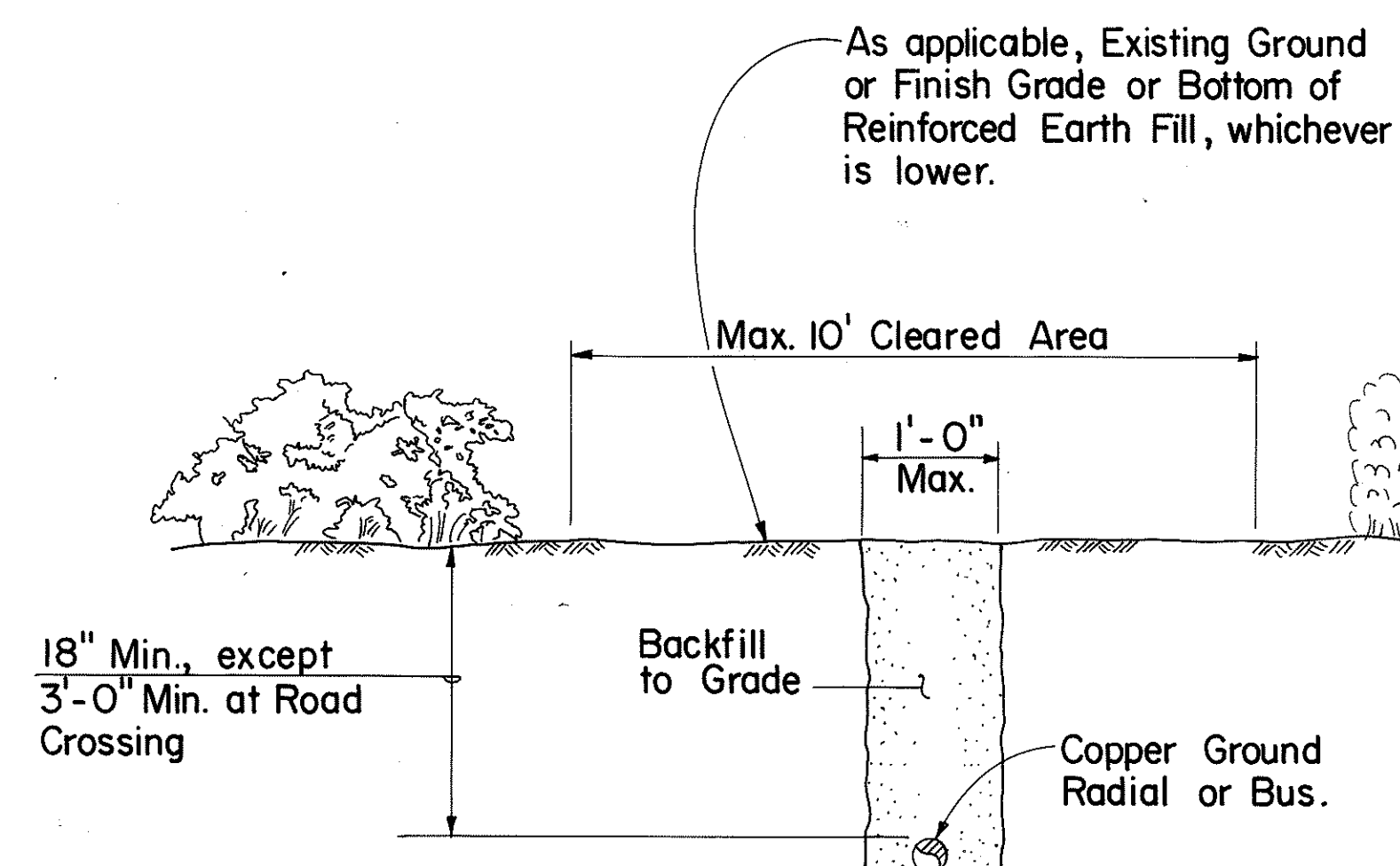
TYPICAL GROUND RADIAL INSTALLATION UNDER EXISTING DITCH OR SWALE



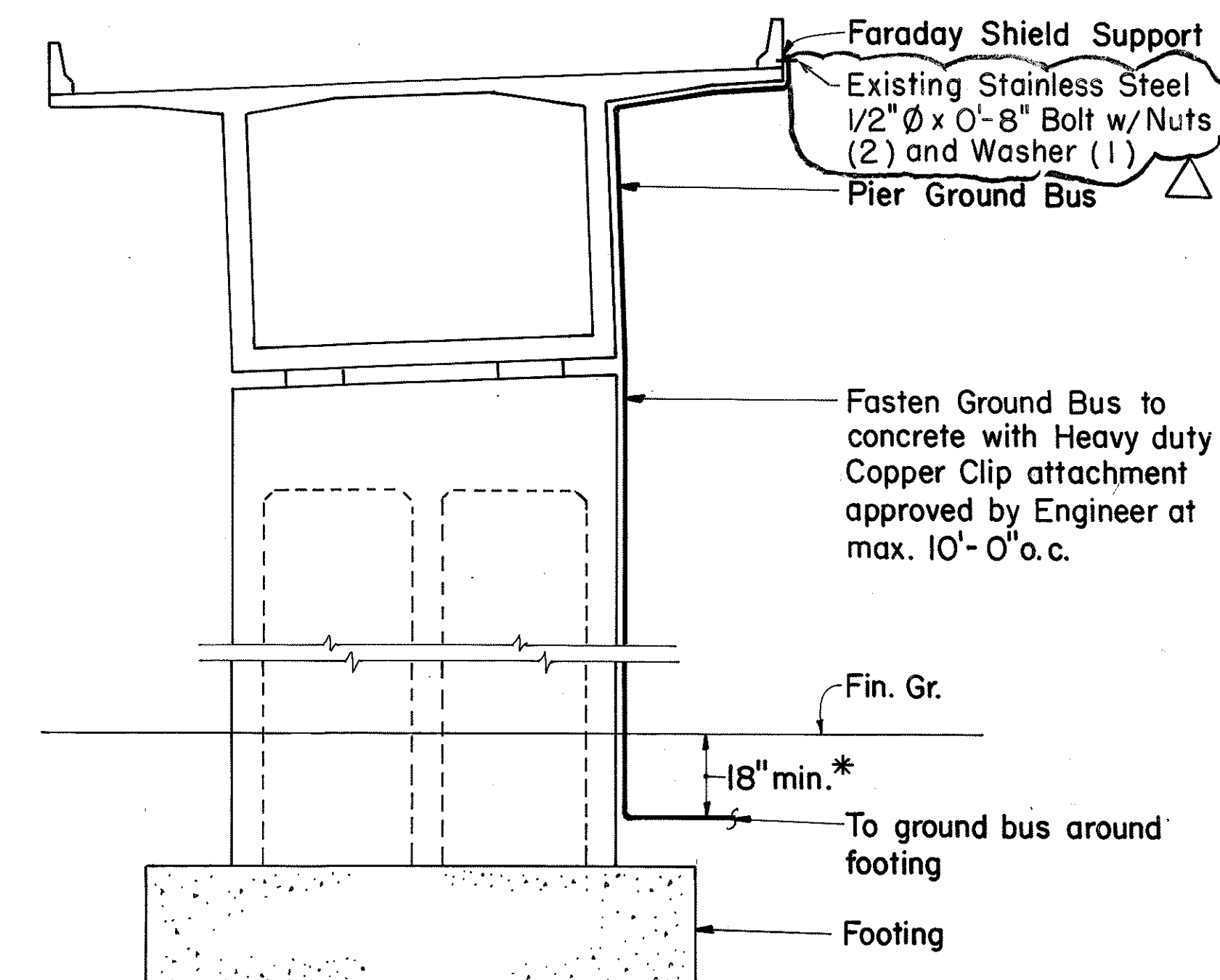
OUTER PERIPHERAL BUS CONNECTION (ELEVATION VIEW)

CONNECTION AT INTERSECTION OF GROUND WIRES (PLAN VIEW)

TYPICAL WELDS FOR GROUND SYSTEM CONNECTION

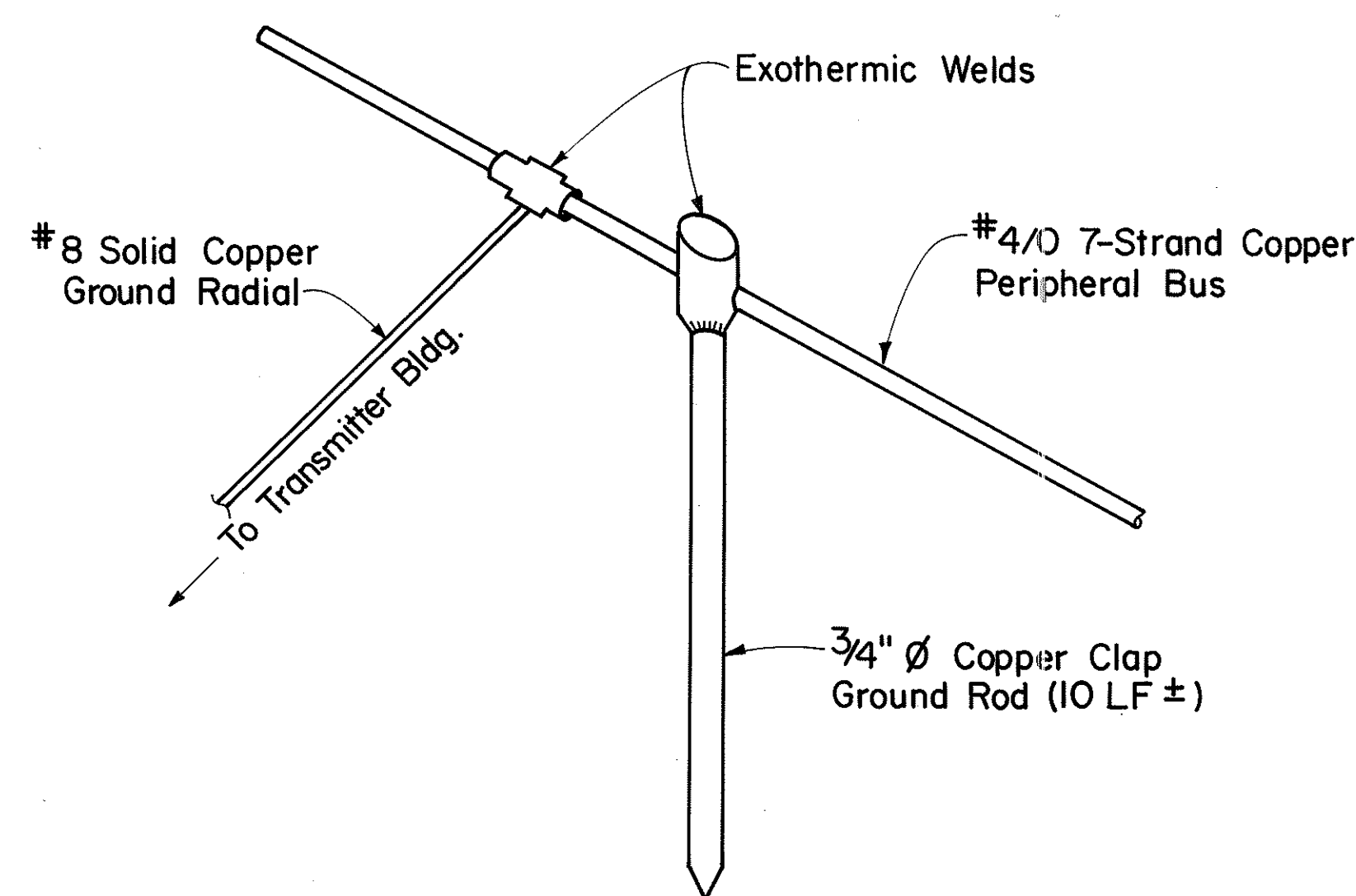


TYPICAL TRENCH DETAIL



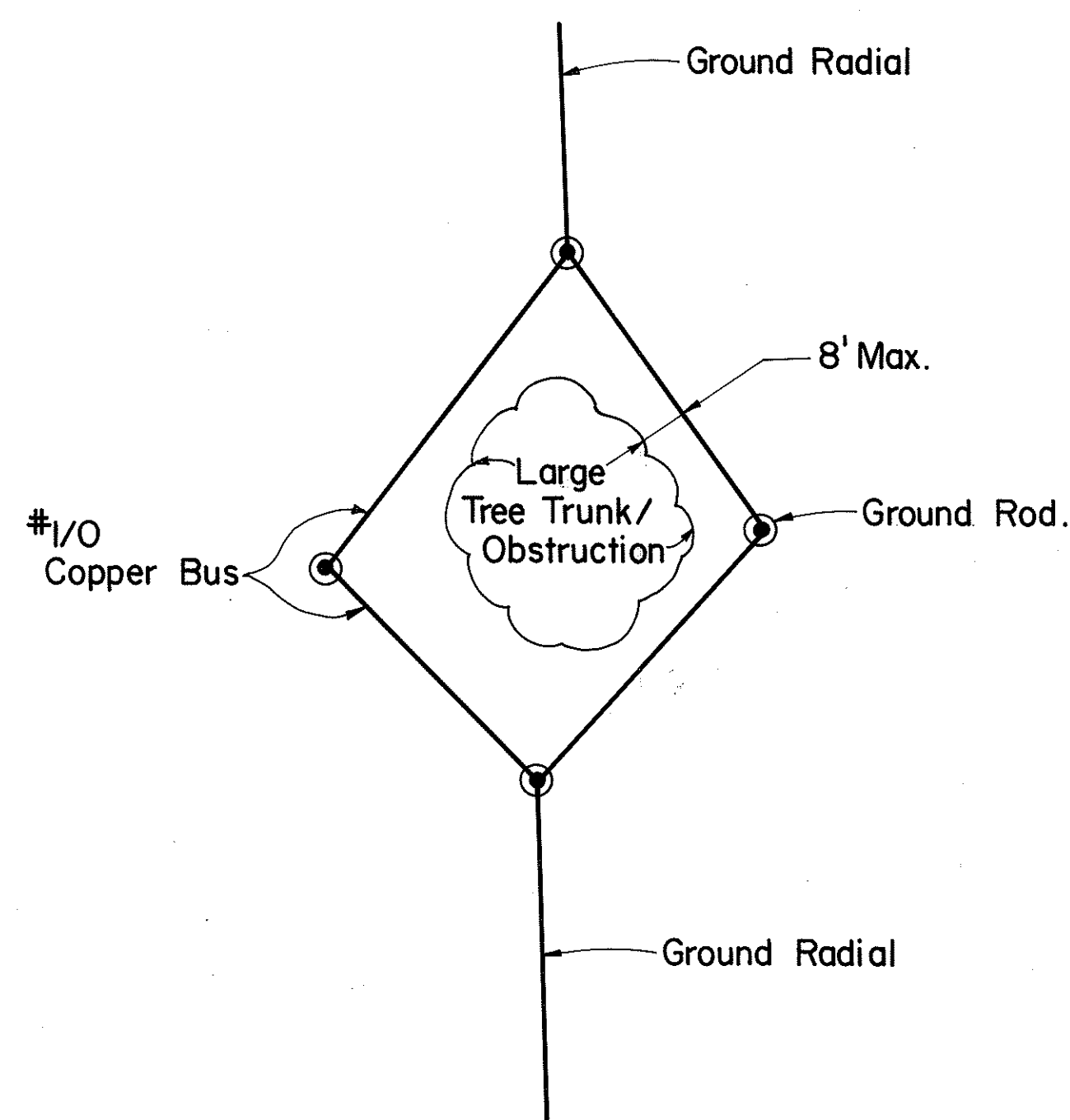
PIER GROUNDING BUS

* At Piers 1, 8 & 9, install over GRP where applicable.

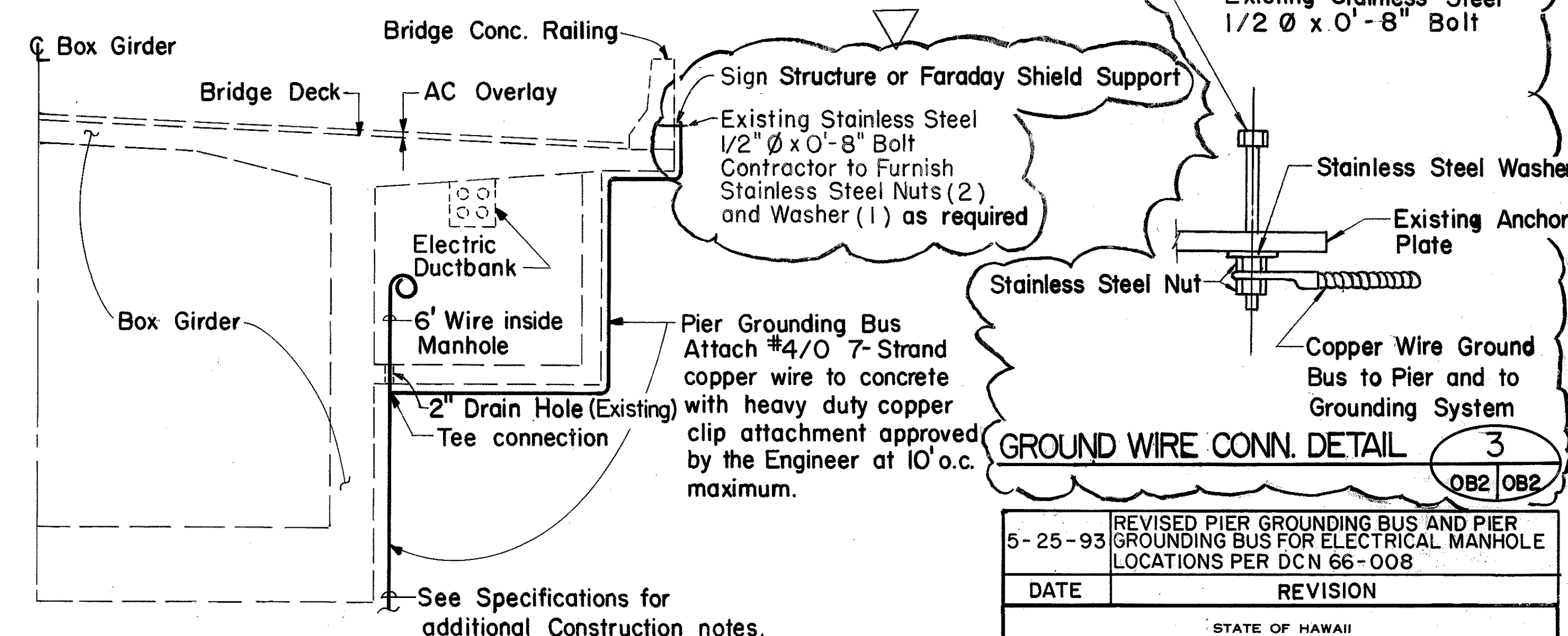


DETAIL 2
OB1 OB2

TYPICAL DETAIL OF GROUND RADIAL CONNECTION TO PERIPHERAL BUS



TYPICAL GROUND SYSTEM CONFIGURATION AROUND LARGE TREE/OBSTRUCTION



PIER GROUNDING BUS FOR ELECTRIC MANHOLE LOCATIONS

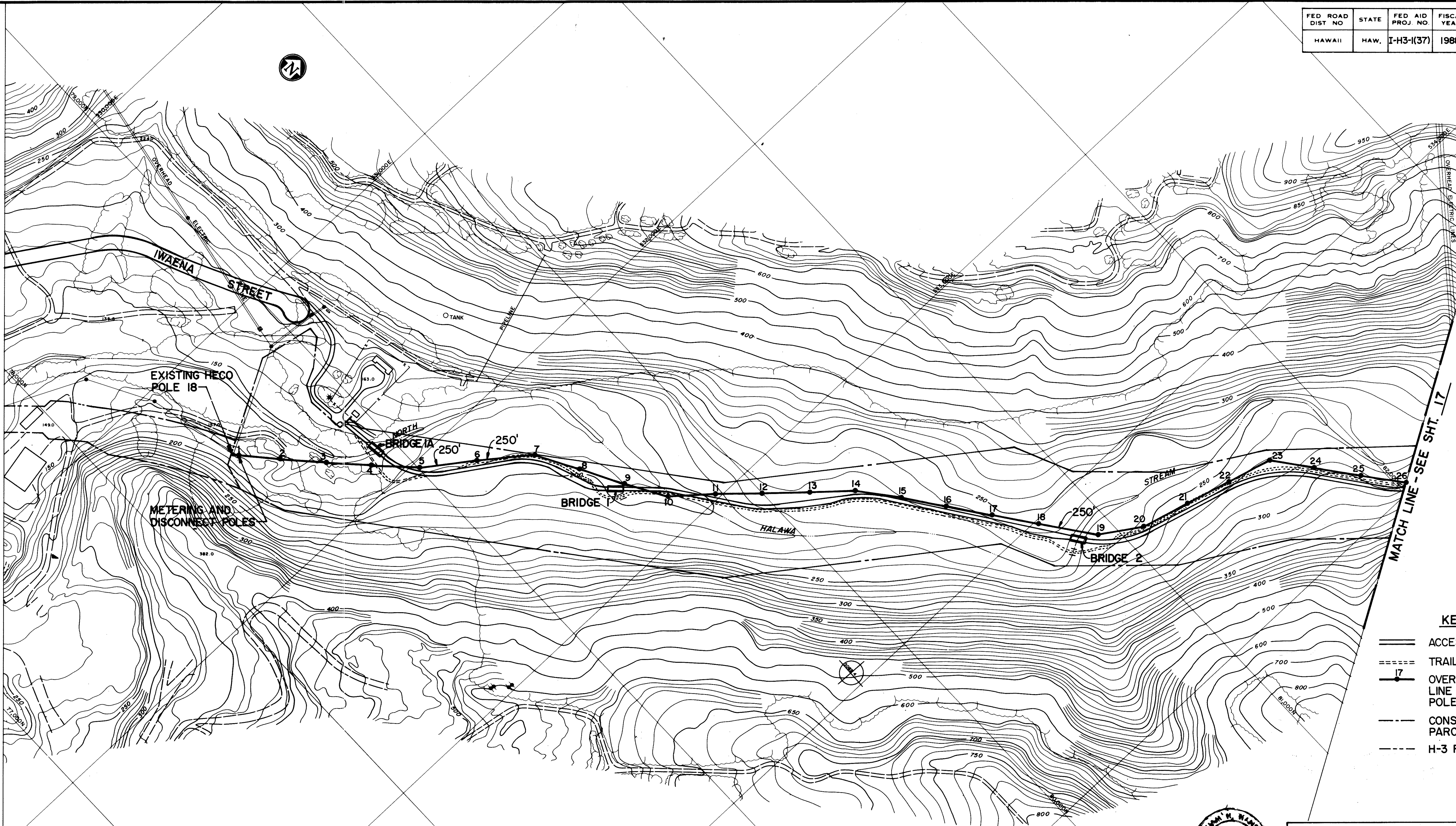


THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

5-25-93	REVISED PIER GROUNDING BUS AND PIER GROUNDING BUS FOR ELECTRICAL MANHOLE LOCATIONS PER DCN 66-008
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
GROUND SYSTEM MODIFICATION - 2	
HAIKU OMEGA TRANSMITTER FACILITY	
INTERSTATE ROUTE H-3 F.A.I. PROJECT NO. I-H3-1(66)	
SCALE: NOT TO SCALE	DATE: JUNE 1992
SHEET No. 0B2 OF 2 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H3-1(37)	1988	16	26

SURVEY PLOTTED BY	DATE
ORIGINAL PLAN	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	

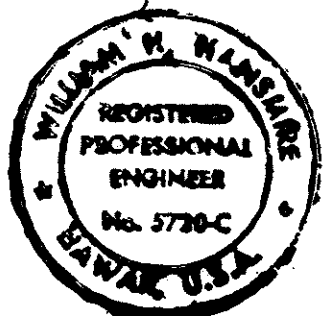
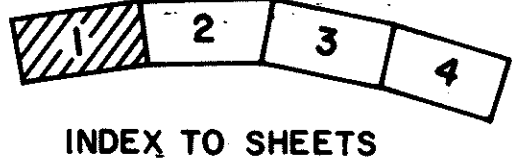
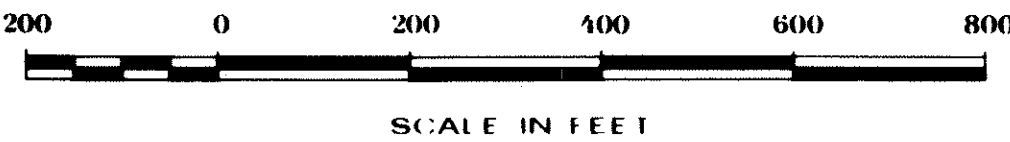


- KEY**
- ACCESS ROAD
 - TRAILBLAZER ROAD
 - OVERHEAD POWER LINE INDICATING POLE NUMBER
 - CONSTRUCTION PARCEL LIMIT
 - H-3 RIGHT-OF-WAY

- NOTES:**
- Scale: 1"=200'
 - Contour Interval: 10'
 - Elevation based on Mean Sea Level.
 - Hawaiian plane coordinate system zone III.
 - Sheets 1,2,3 & 4 were compiled by photogrammetric methods from photography taken October 6, 1969 at 8,500 ASL.
 - All contours in areas where the height of the vegetation exceeds five feet are to be interpreted as form lines only and as such may be substandard.

- Final location of Poles & Guy Anchors shall be determined in the field by the Contractor and approved by the Engineer.
- Pole spacing 200' unless otherwise noted.

REFERENCE PLAN - CONTENTS FOR CONTRACT INTERFACE INFORMATION ONLY.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

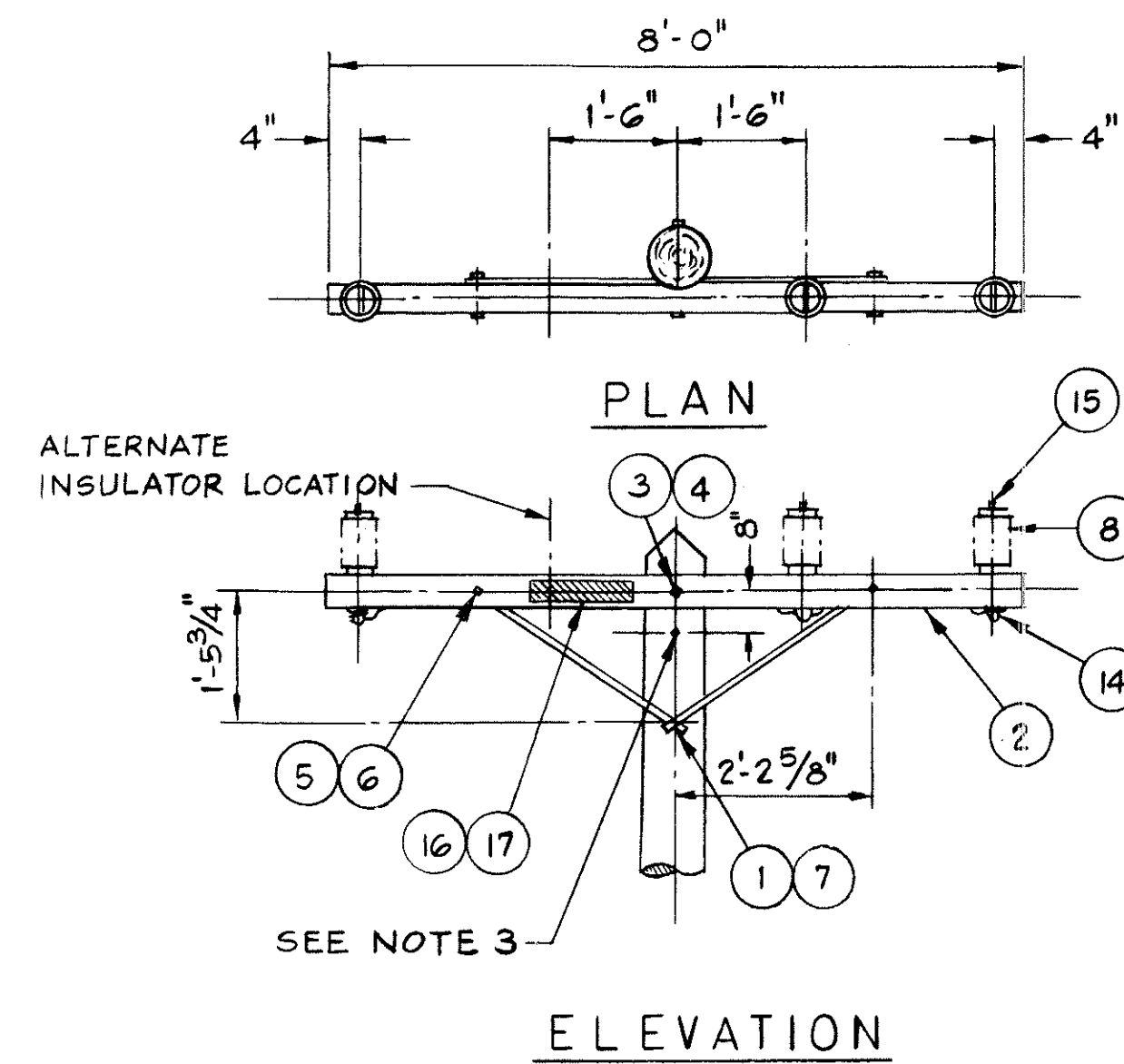
OVERHEAD POWER LINE
11.5 KV LAYOUT-HALAWA
EXPLORATORY TUNNEL
INTERSTATE ROUTE H-3
F.A.I. PROJECT NO. I-H3-1(37)

SCALE: 1"=200' DATE: AUG. 1988
SHEET No. 1 OF 4 SHEETS

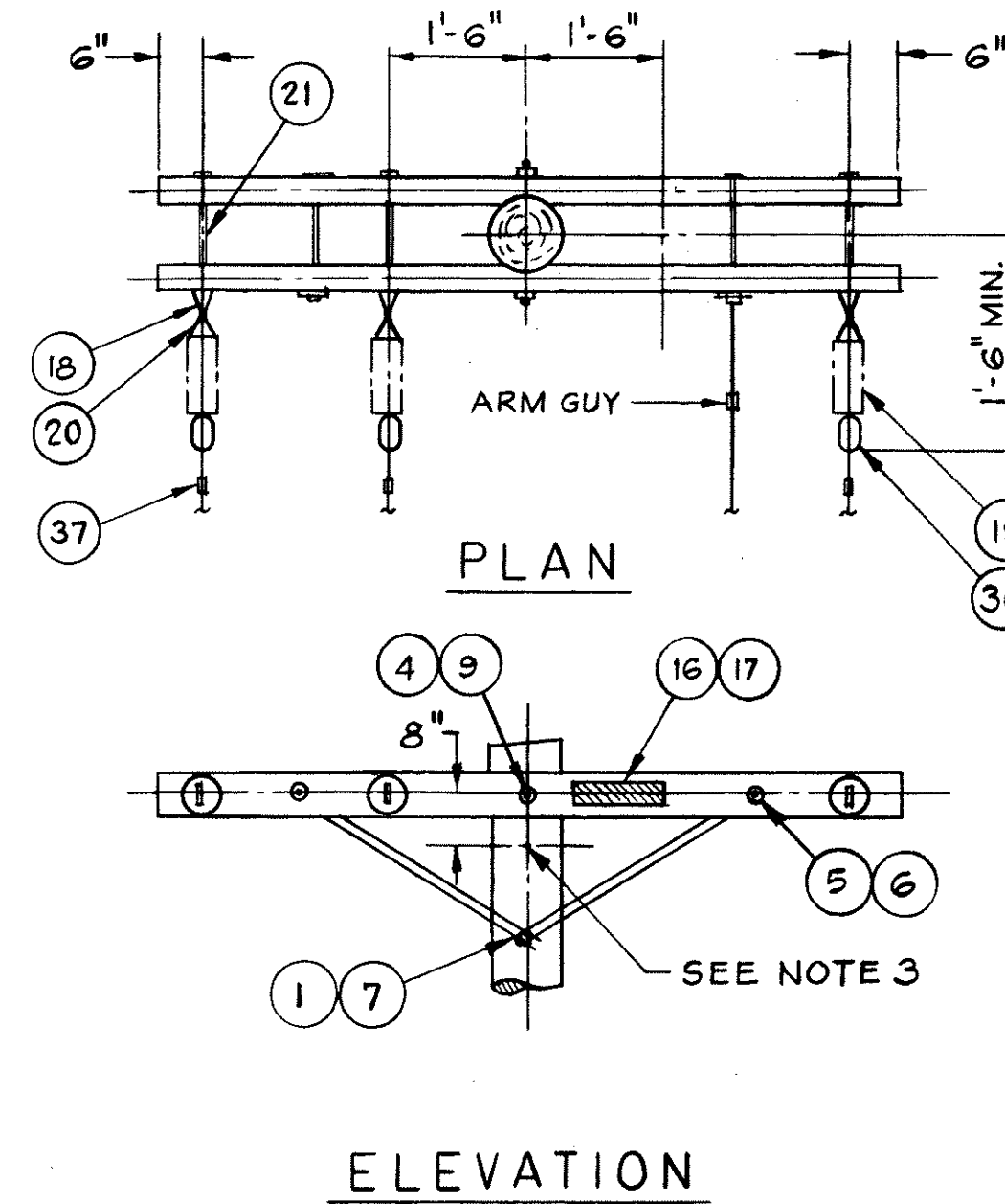
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H3-1 (37)	1988	25	26

NOTES:

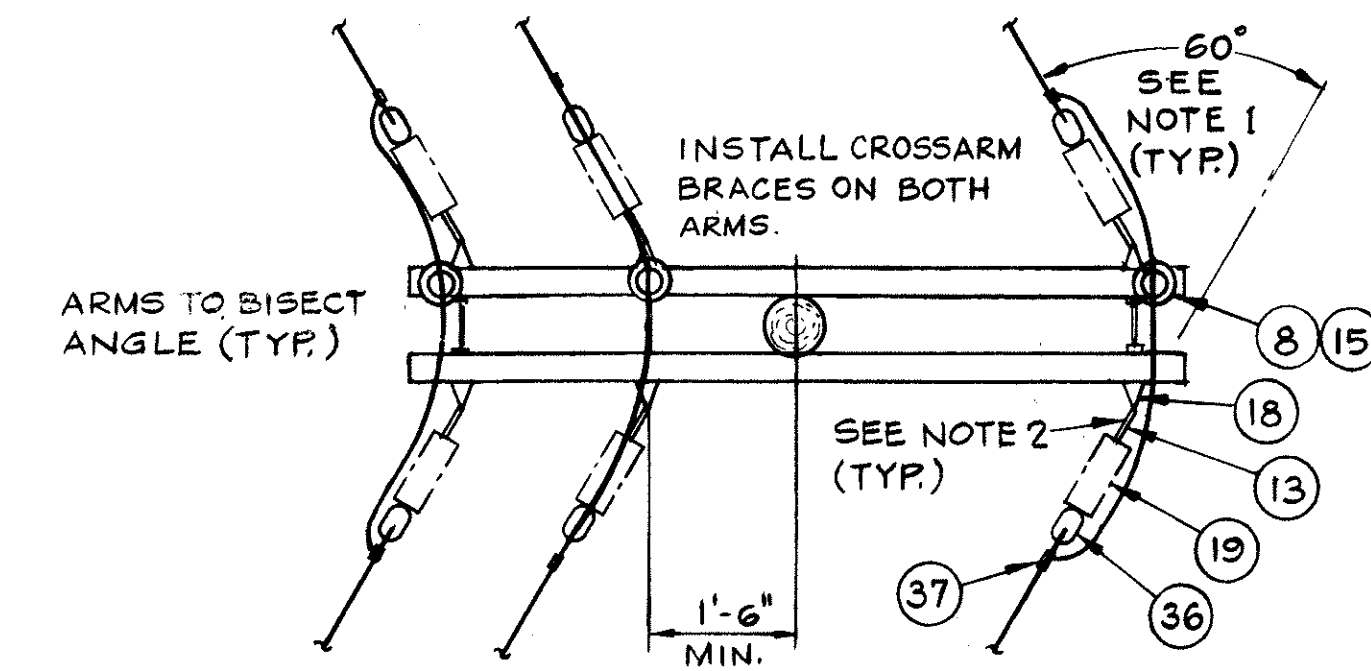
1. THIS CONSTRUCTION SHALL BE LIMITED TO A DEVIATION ANGLE OF 60°.
2. INSTALL GALV. DROP FORGED CLEVIS BETWEEN EYELET AND INSULATOR WHERE THE DEVIATION ANGLE OF THE POLES IS LESS THAN 60°.
3. POINT OF GUY ATTACHMENT WHEN REQUIRED.
4. MAXIMUM POLE SPAN SHALL BE 270' USING #3/0 (AAAG). THE RESULTANT TENSION SHALL NOT EXCEED 400 LBS. WITH A SINGLE INSULATOR AND 800 LBS. WITH A DOUBLE INSULATOR.



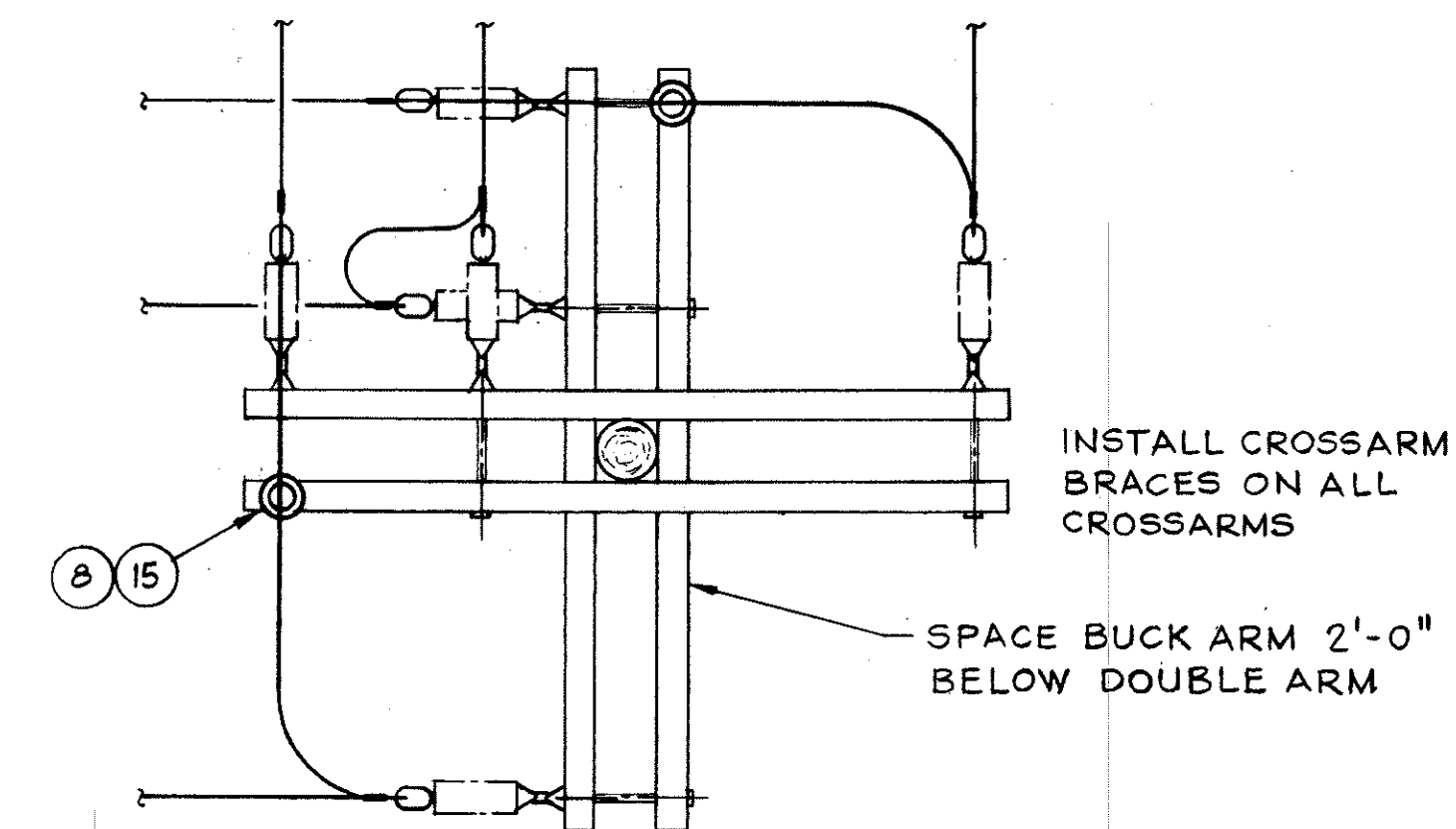
STAGGERING OF CENTER CONDUCTOR



DOUBLE ARM DEADEND DETAIL

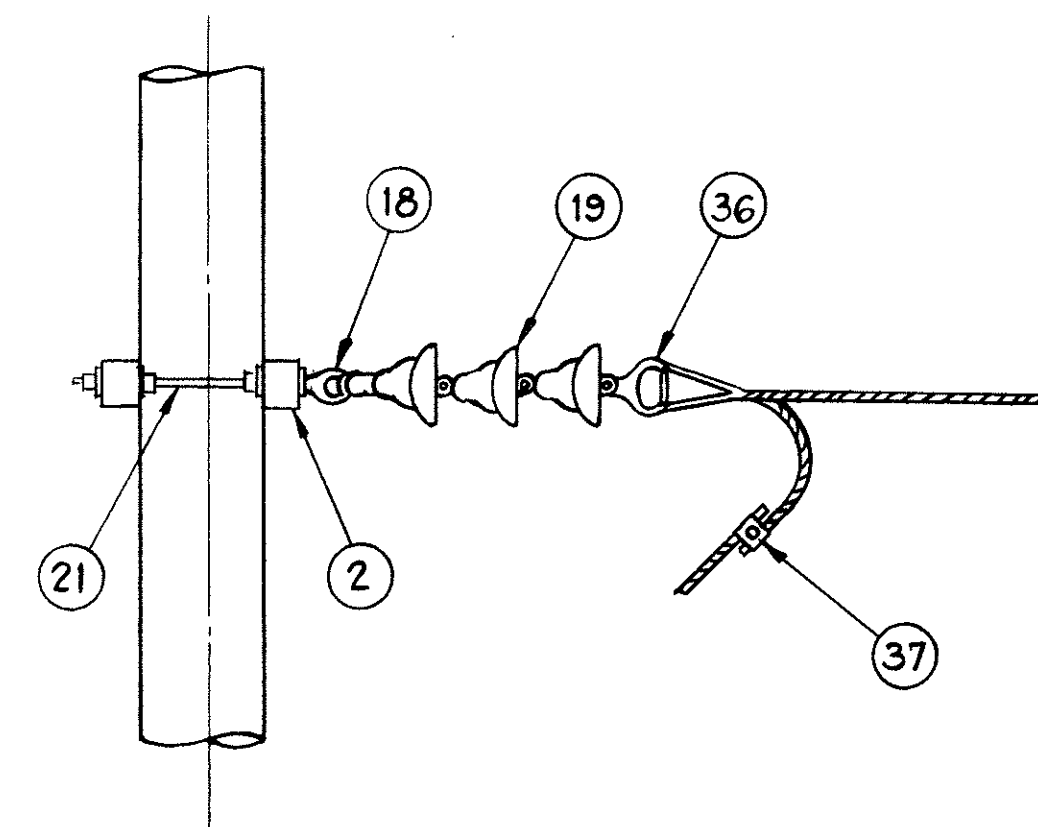


PLAN - POLE LINE DEVIATION TO 60°

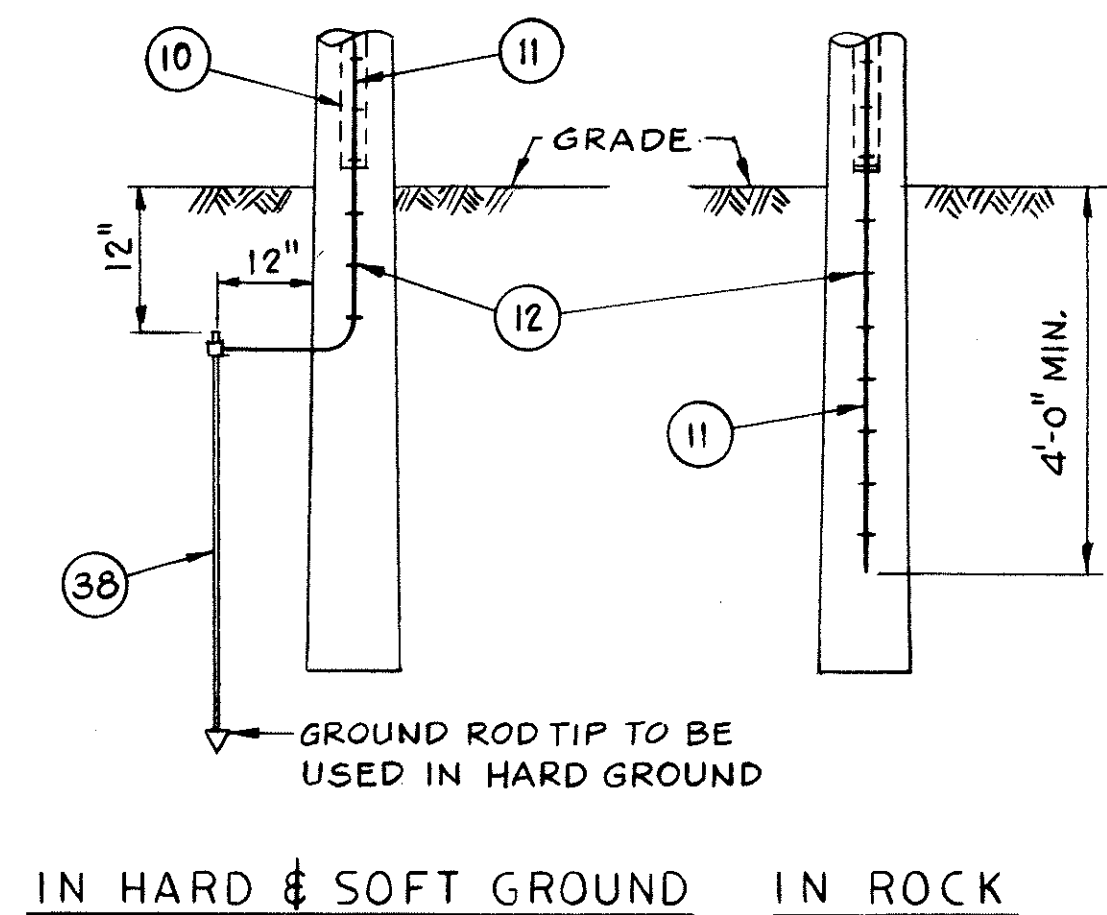


PLAN - BUCK ARM

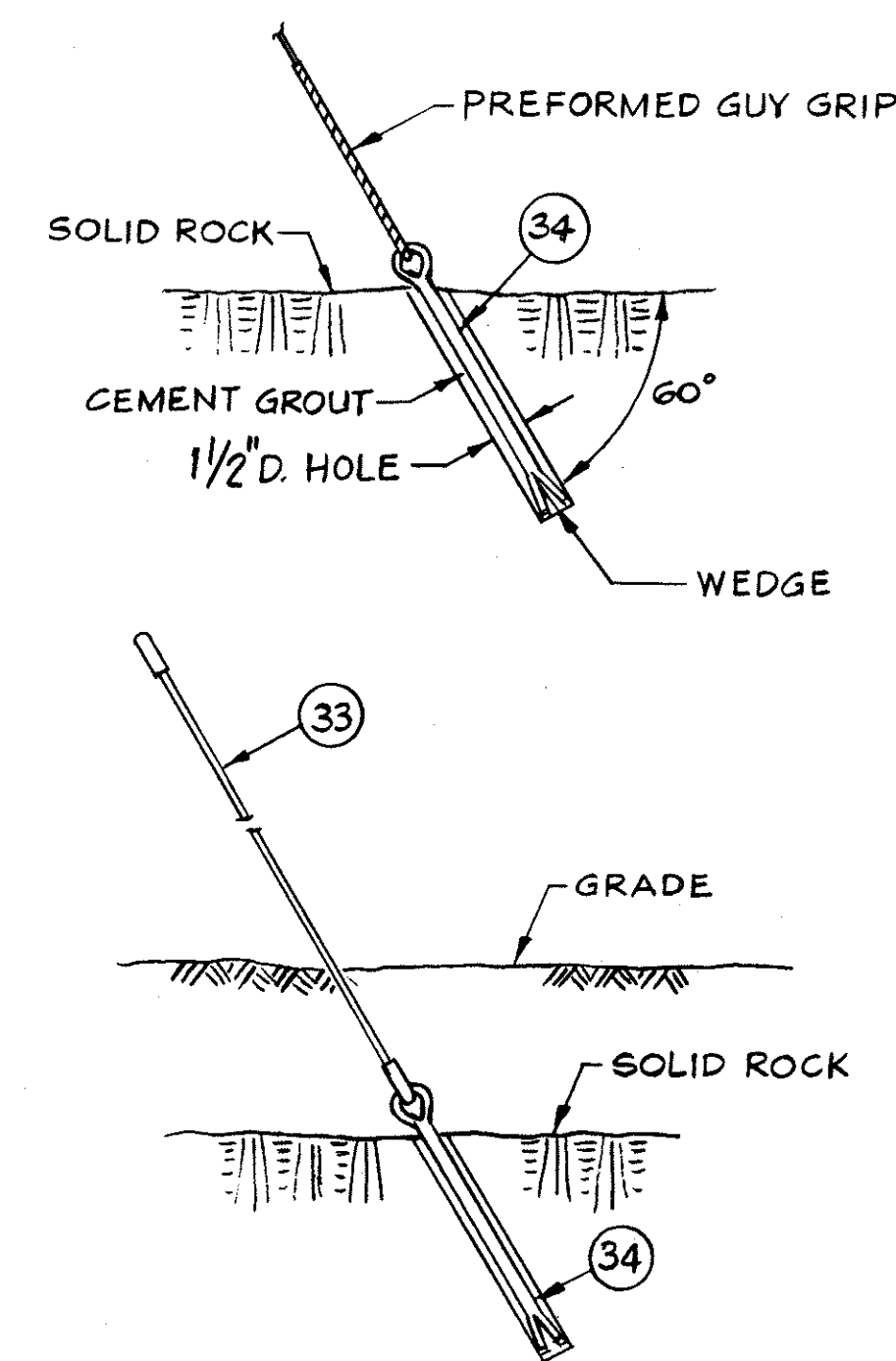
POLE LINE DEVIATION DETAILS



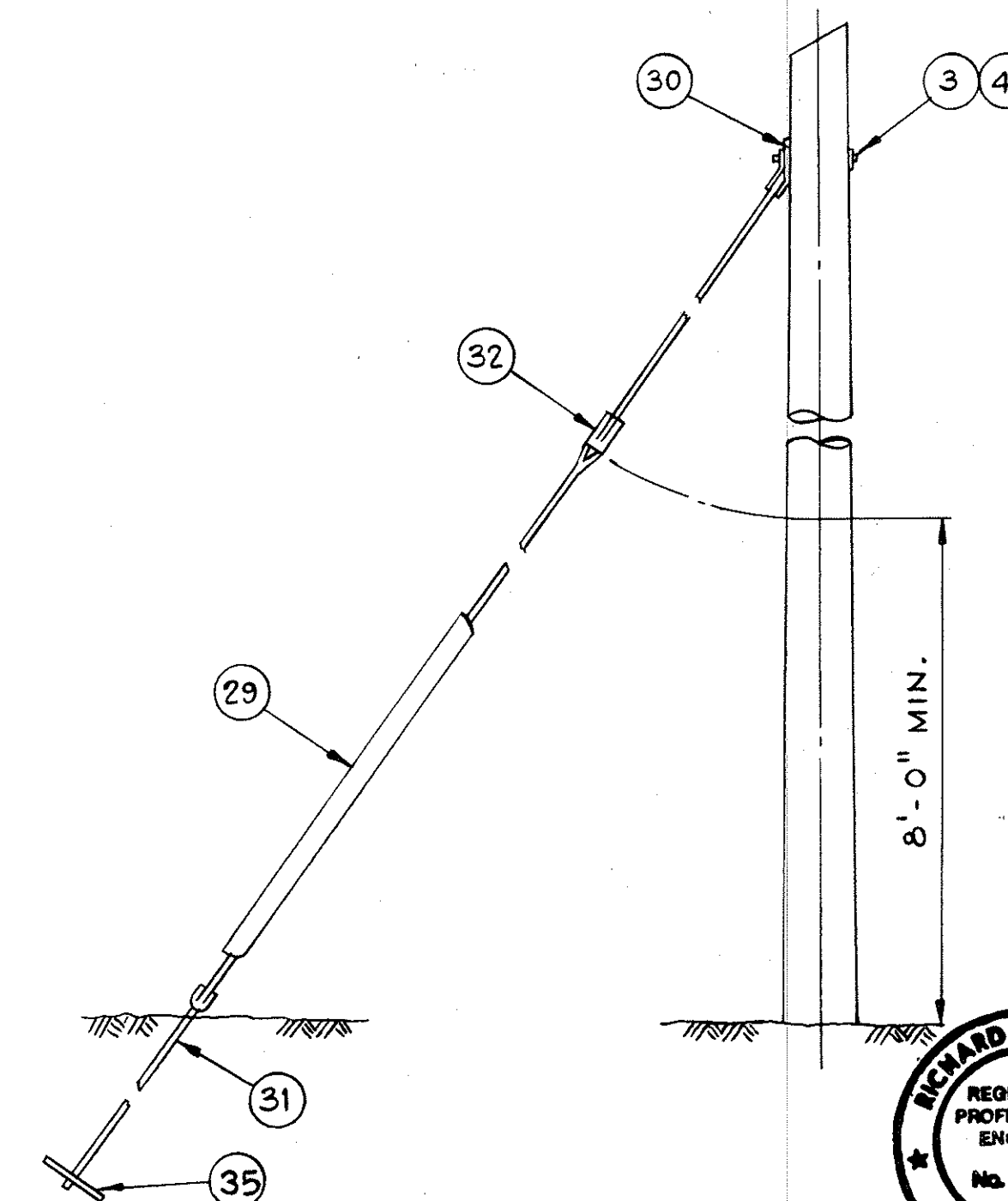
DEADEND DETAIL



GROUNDING DETAILS



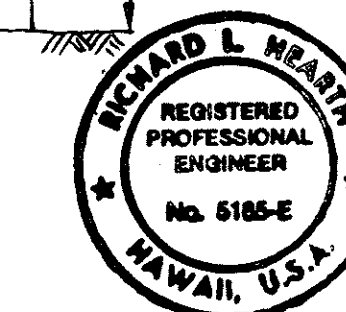
ROCK ANCHOR DETAILS



DOWN GUY DETAIL - IN SOIL

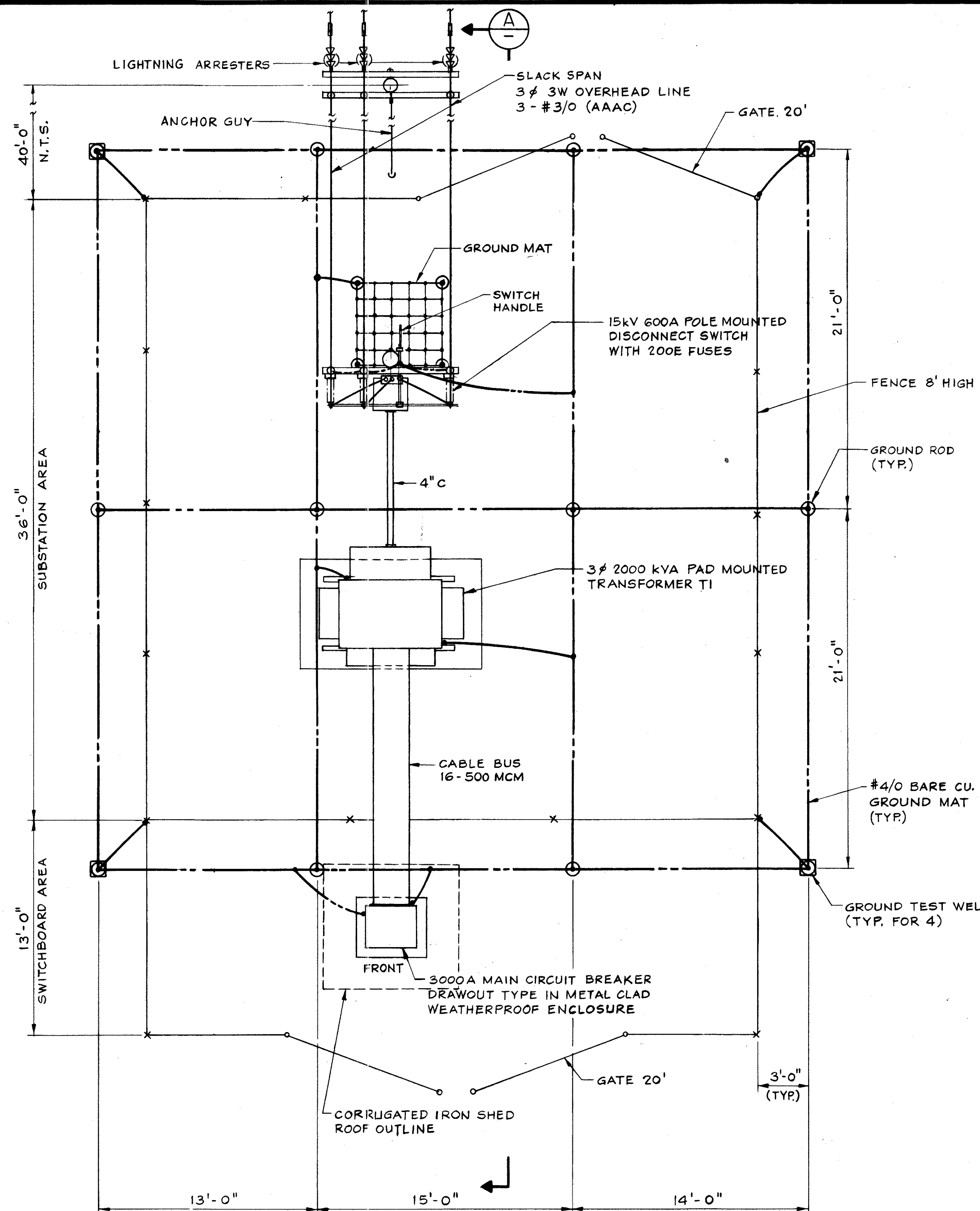
REFERENCE PLAN - CONTENTS FOR CONTRACT INTERFACE INFORMATION ONLY.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**OVERHEAD POWER LINE
POWER LINE DETAILS
HALAWA AND HAIKU
EXPLORATORY TUNNEL
INTERSTATE ROUTE H-3
F.A.I. PROJECT NO. I-H3-1(37)**
SCALE: NONE DATE: AUG. 1988
SHEET OF SHEETS

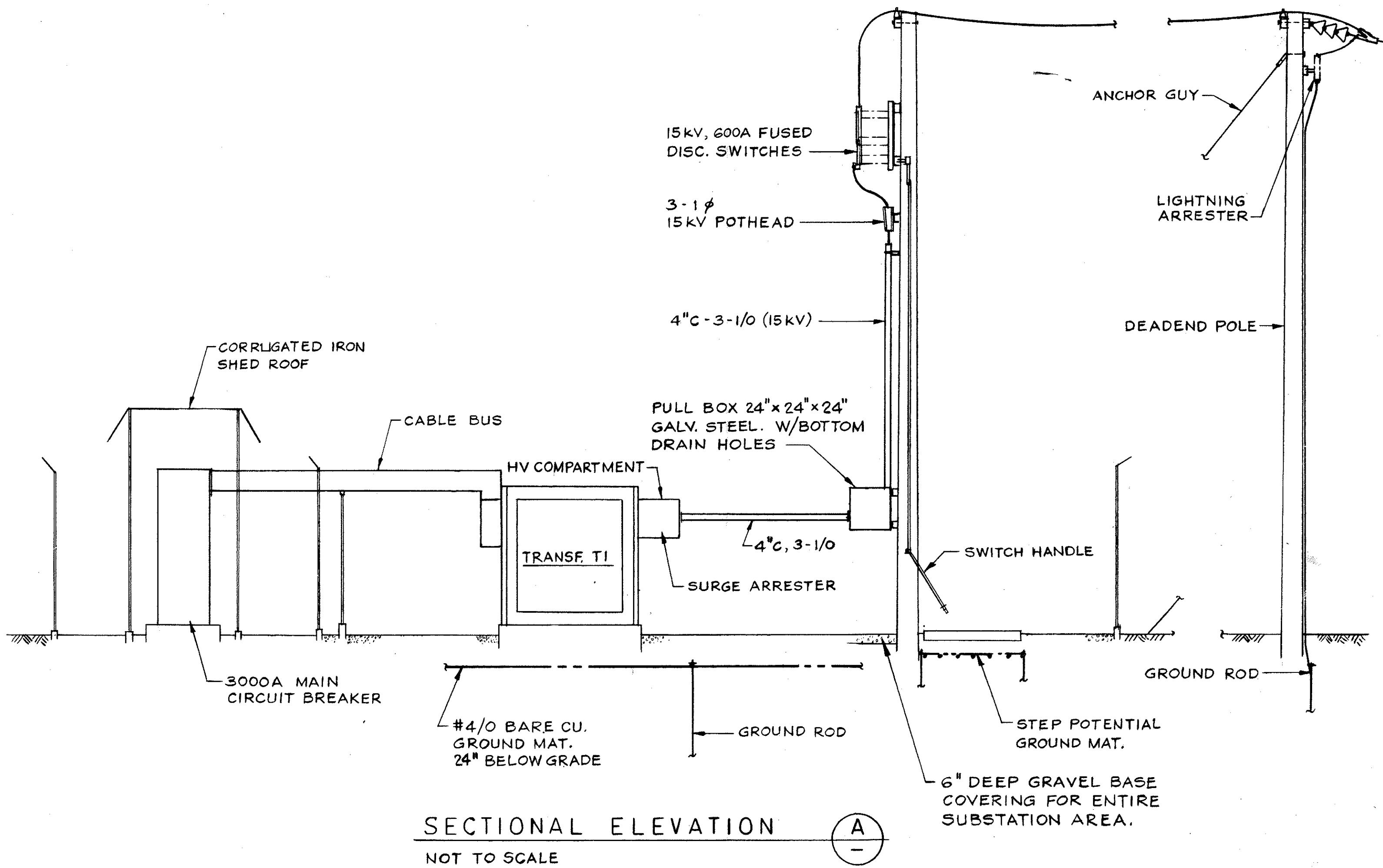


THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION
Richard L. Heath

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H3-1 (37)	1988	26	26

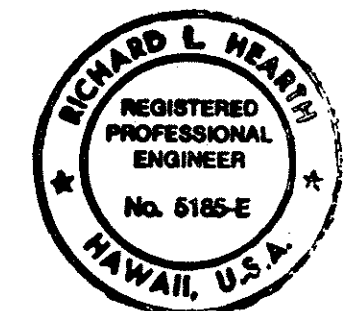


PLAN
SCALE: 1/4" = 1'-0"



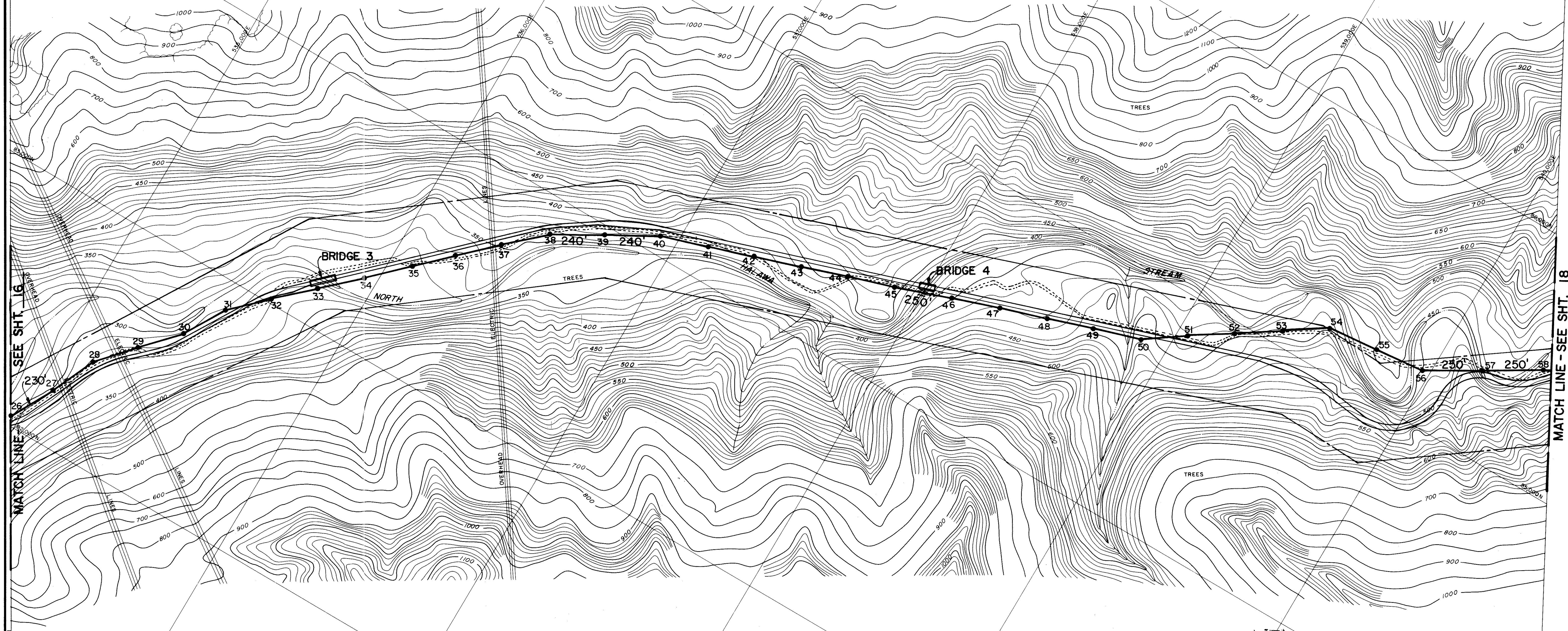
SECTIONAL ELEVATION
NOT TO SCALE

REFERENCE PLAN - CONTENTS FOR CONTRACT INTERFACE INFORMATION ONLY.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**OVERHEAD POWER LINE
SUBSTATION LAYOUT
HALAWA AND HAIKU**
EXPLORATORY TUNNEL
INTERSTATE ROUTE H-3
F.A.I. PROJECT NO. I-H3-1 (37)
SCALE: AS NOTED DATE: AUG. 1988
SHEET OF SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H3-(37)	1988	17	26



DATE _____
 SURVEY PLOTTED BY _____
 DRAWN BY _____
 TRACED BY _____
 QUANTITIES BY _____
 CHECKED BY _____
 NO. _____

NOTES:

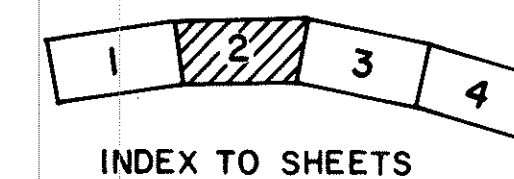
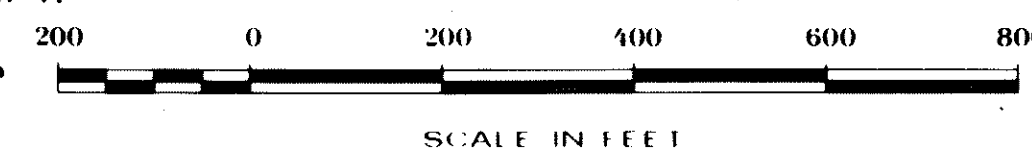
- Scale: 1"=200'
- Contour Interval: 10'
- Elevation based on Mean Sea Level.
- Hawaiian plane coordinate system zone III.

- Sheets 1,2,3 & 4 were compiled by photogrammetric methods from photography taken October 6, 1969 at 8,500 ASL.

- All contours in areas where the height of the vegetation exceeds five feet are to be interpreted as form lines only and as such may be substandard.

- See Key, Sheet 1 of 4.
- See Notes 7 & 8, Sheet 1 of 4.

REFERENCE PLAN - CONTENTS FOR
 CONTRACT INTERFACE INFORMATION ONLY.



THIS PLAN WAS PREPARED BY ME
 OR UNDER MY SUPERVISION
 WILLIAM H. WILLIAMS
 PROFESSIONAL ENGINEER
 No. 5720-C
 STATE OF HAWAII

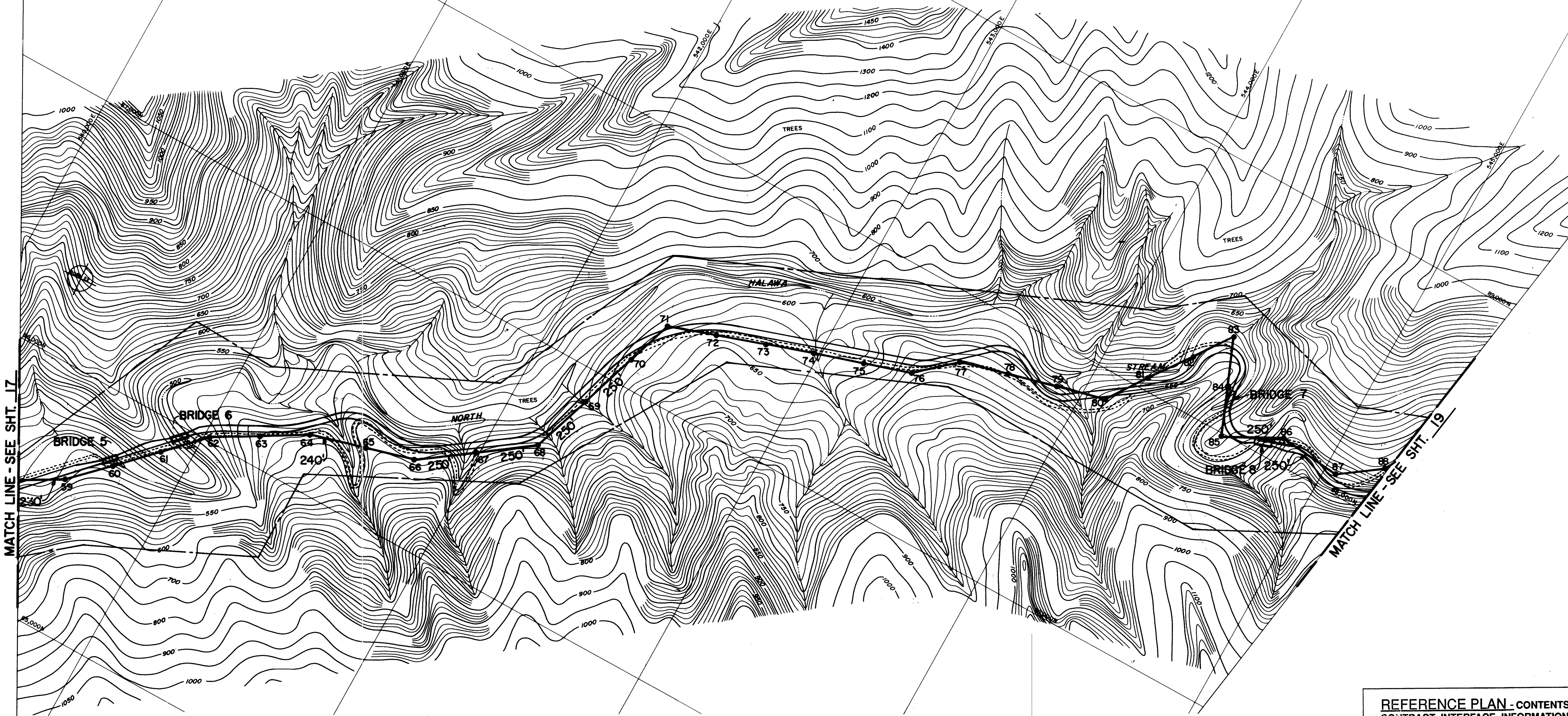
STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

OVERHEAD POWER LINE
11.5 KV LAYOUT - HALAWA
EXPLORATORY TUNNEL
 INTERSTATE ROUTE H-3
 F.A.I. PROJECT NO. I-H3-1(37)

SCALE: 1"=200' DATE: AUG. 1988
 SHEET NO. 2 OF 4 SHEETS

440S-2

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H3-1(37)	1988	18	26

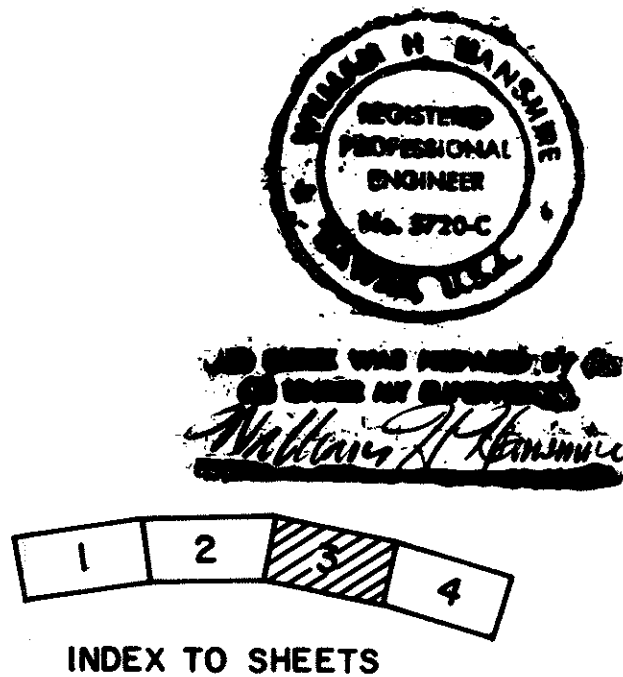
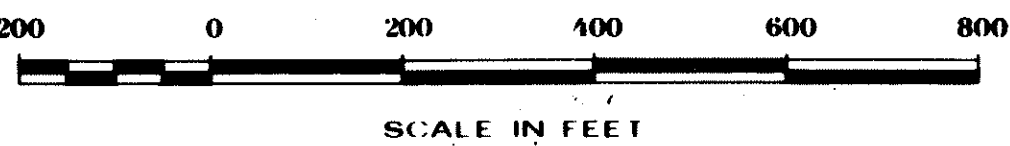


SURVEY PLOTTED BY	DATE
DESIGNED BY	
TRACED BY	
QUANTITIES BY	
CHECKED BY	
ORIGINAL PLAN	
NOTE BOOK	
NO.	

- NOTES:
- Scale: 1"=200'
 - Contour Interval: 10'
 - Elevation based on Mean Sea Level.
 - Hawaiian plane coordinate system zone III.

- Sheets 1,2,3 & 4 were compiled by photogrammetric methods from photography taken October 6, 1969 at 8,500 ASL.
- All contours in areas where the height of the vegetation exceeds five feet are to be interpreted as form lines only and as such may be substandard.

- See Key, Sheet 1 of 4.
- See notes 7 & 8, Sheet 1 of 4.



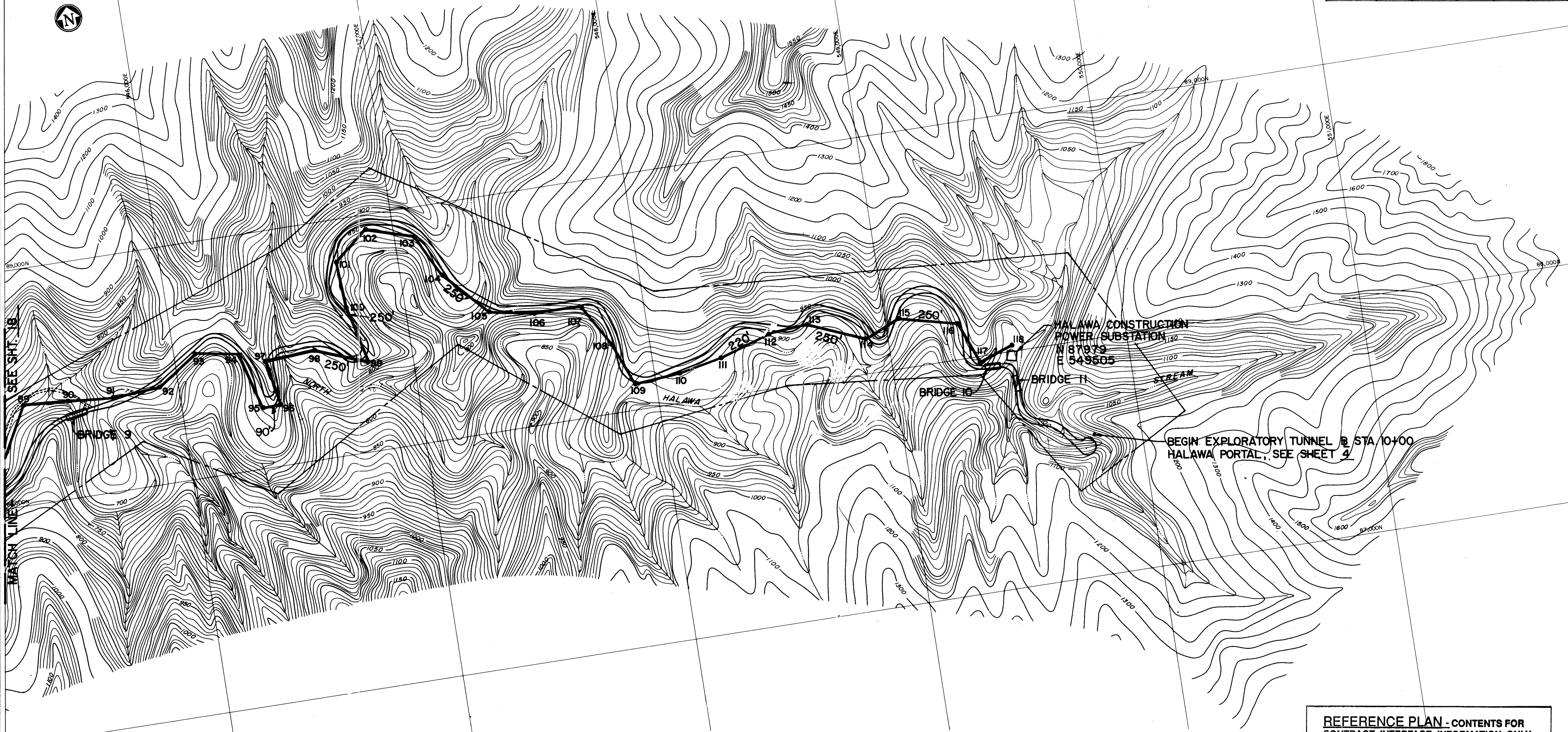
REFERENCE PLAN - CONTENTS FOR CONTRACT INTERFACE INFORMATION ONLY.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

OVERHEAD POWER LINE
11.5 KV LAYOUT - HALAWA
EXPLORATORY TUNNEL
INTERSTATE ROUTE H-3
F.A.I. PROJECT NO. I-H3-1(37)

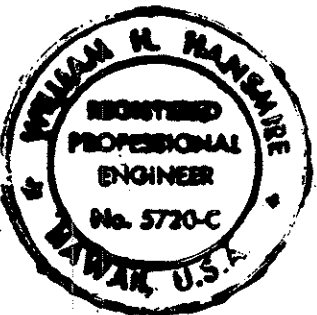
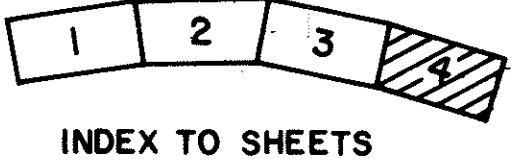
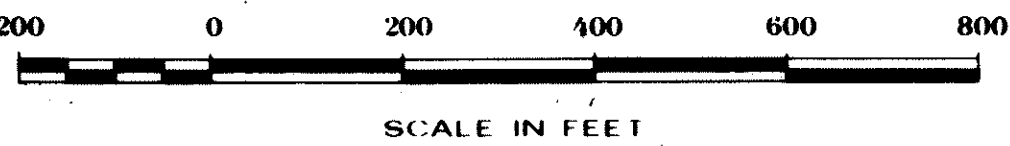
SCALE: 1"=200' DATE: AUG. 1988
SHEET No. 3 OF 4 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H3-1(37)	1988	19	26



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

- NOTES:
1. Scale: 1"=200'
 2. Contour Interval: 10'
 3. Elevation based on Mean Sea Level.
 4. Hawaiian plane coordinate system zone III.
 5. Sheets 1,2,3 & 4 were compiled by photogrammetric methods from photography taken October 6, 1969 at 8,500 ASL.
 6. All contours in areas where the height of the vegetation exceeds five feet are to be interpreted as form lines only and as such may be substandard.
 7. See Key, Sheet 4 of 4.
 8. See notes 7 & 8, Sheet 1 of 4.



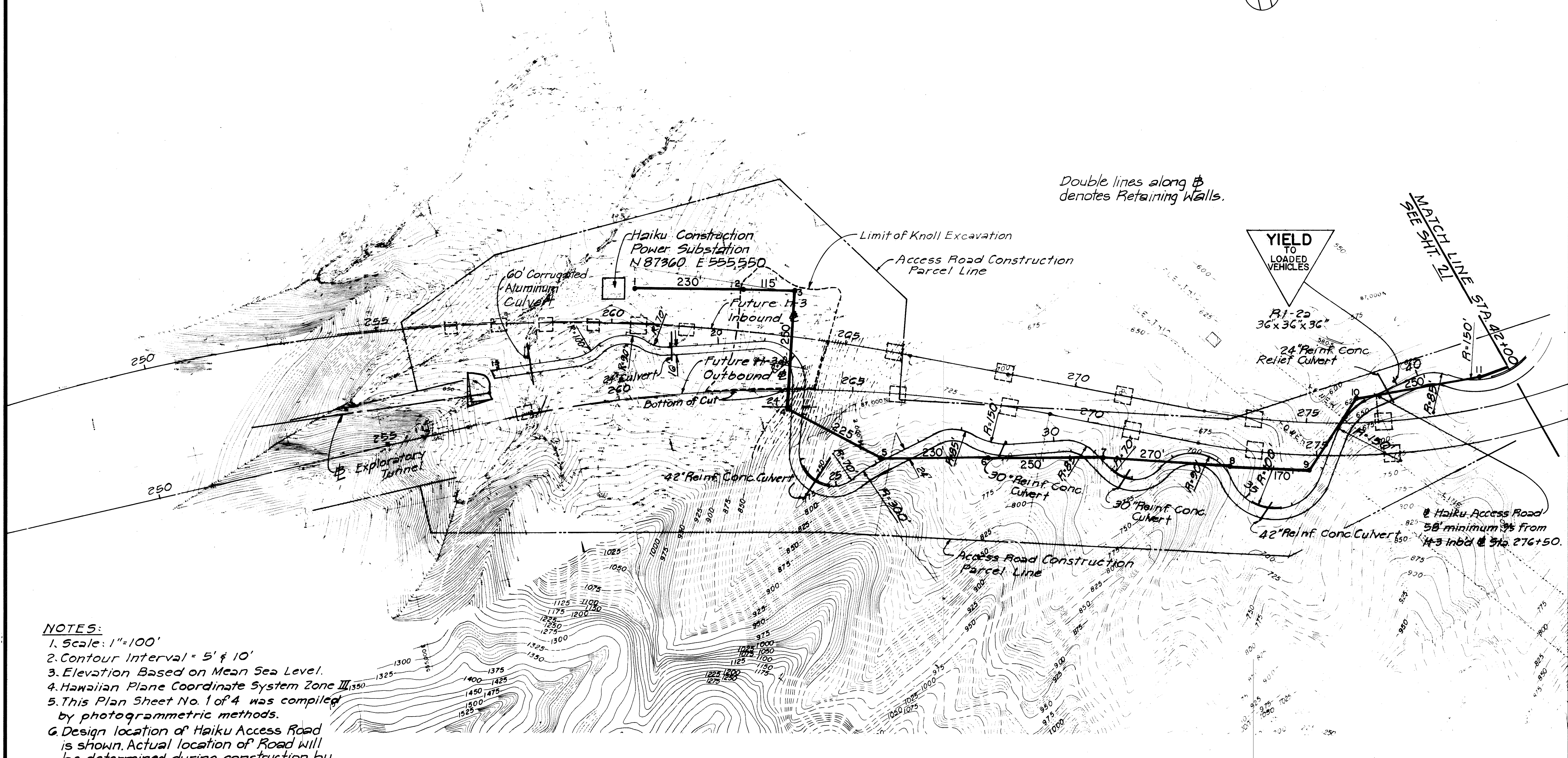
REFERENCE PLAN - CONTENTS FOR CONTRACT INTERFACE INFORMATION ONLY.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

OVERHEAD POWER LINE
11.5 KV LAYOUT - HALAWA
EXPLORATORY TUNNEL
INTERSTATE ROUTE H-3
F.A.I. PROJECT NO. I-H3-1(37)

SCALE: 1"=200'
DATE: AUG. 1988
SHEET No. 4 OF 4 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H3-1(37)	1988	20	26



NOTES:

1. Scale: 1"=100'
2. Contour Interval = 5' & 10'
3. Elevation Based on Mean Sea Level.
4. Hawaiian Plane Coordinate System Zone III
5. This Plan Sheet No. 1 of 4 was compiled by photogrammetric methods.
6. Design location of Haiku Access Road is shown. Actual location of Road will be determined during construction by others. Final location of Poles and Guy Anchors shall be as determined in the field by the Contractor and approved by the Engineer.
7. Pole spacing 200' unless otherwise noted.

REFERENCE PLAN - CONTENTS FOR
CONTRACT INTERFACE INFORMATION ONLY.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

**OVERHEAD POWER LINE
12.47 KV LAYOUT - HAIKU**

EXPLORATORY TUNNEL
INTERSTATE ROUTE H-3
F.A.I. PROJECT NO. I-H3-1(37)

SCALE: 1"=100' DATE: AUG. 1988

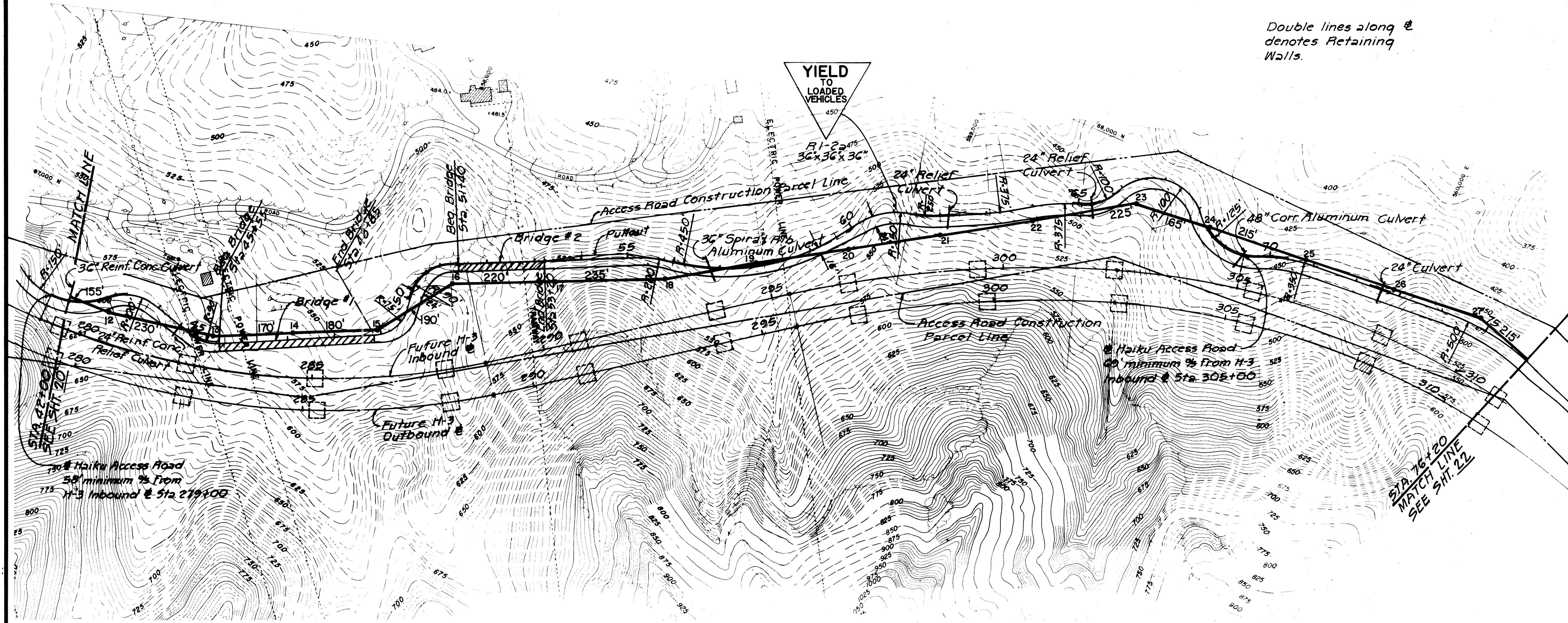
SHEET NO. 1 OF 4 SHEETS

DATE
SURVEY PLOTTED BY
DRAWN BY
DESIGNED 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.	I-H3-1(37)	1988	21	26



Double lines along Φ denotes Retaining Walls.



- NOTES:**
1. Scale: 1"=100'
 2. Contour Interval=5'
 3. Elevation Based on Mean Sea Level.
 4. Hawaiian Plane Coordinate System Zone III.
 5. This Plan Sheet No. 2 of 4 was compiled by photogrammetric methods.
 6. See Notes 6 & 7, Sheet 1 of 4.

REFERENCE PLAN - CONTENTS FOR CONTRACT INTERFACE INFORMATION ONLY.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

OVERHEAD POWER LINE
12.47 KV LAYOUT-HAIKU

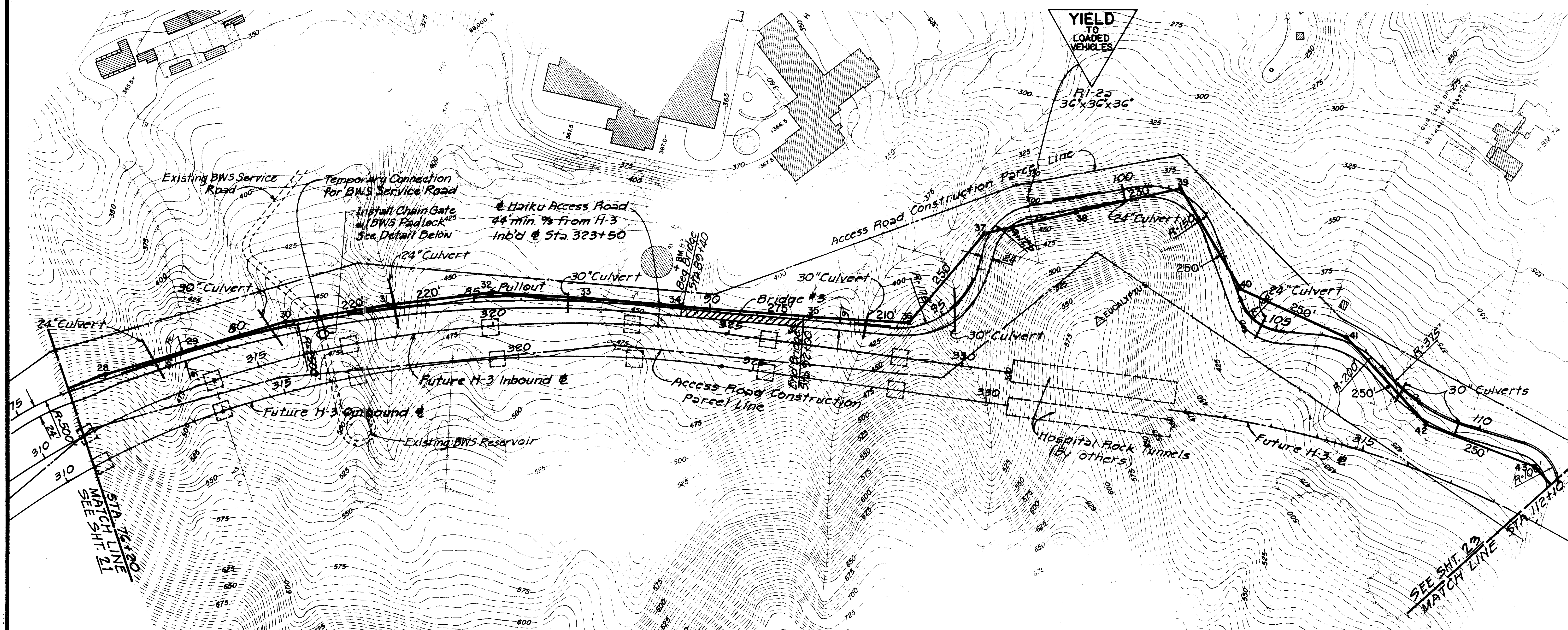
EXPLORATORY TUNNEL
INTERSTATE ROUTE H-3
F.A.I. PROJECT NO. I-H3-1(37)
SCALE: 1"=100' DATE: AUG. 1988
SHEET No. 2 OF 4 SHEETS

DATE:	
SURVEY PLOTTED BY:	
DRAWN BY:	
DESIGNED BY:	
CHECKED BY:	
ORIGINAL PLAN No.	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H3-(137)	1988	22	26

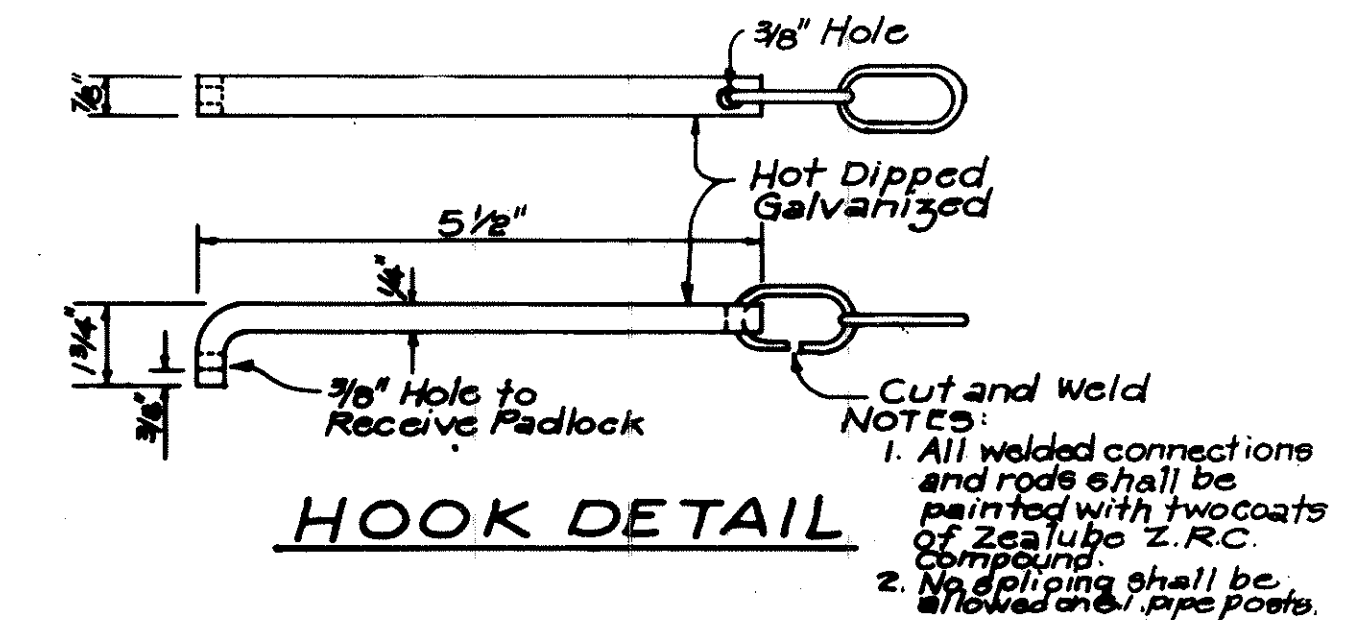
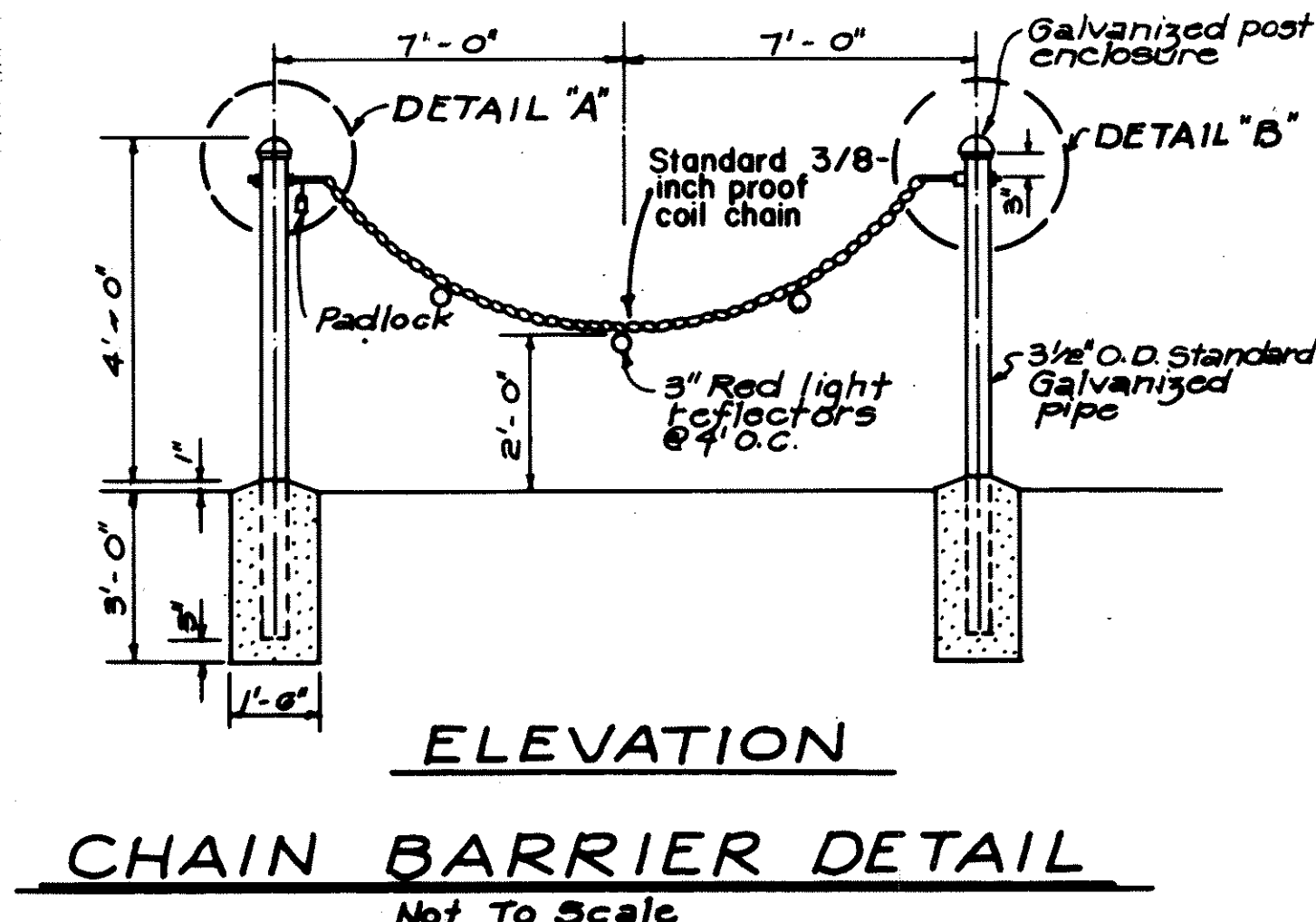
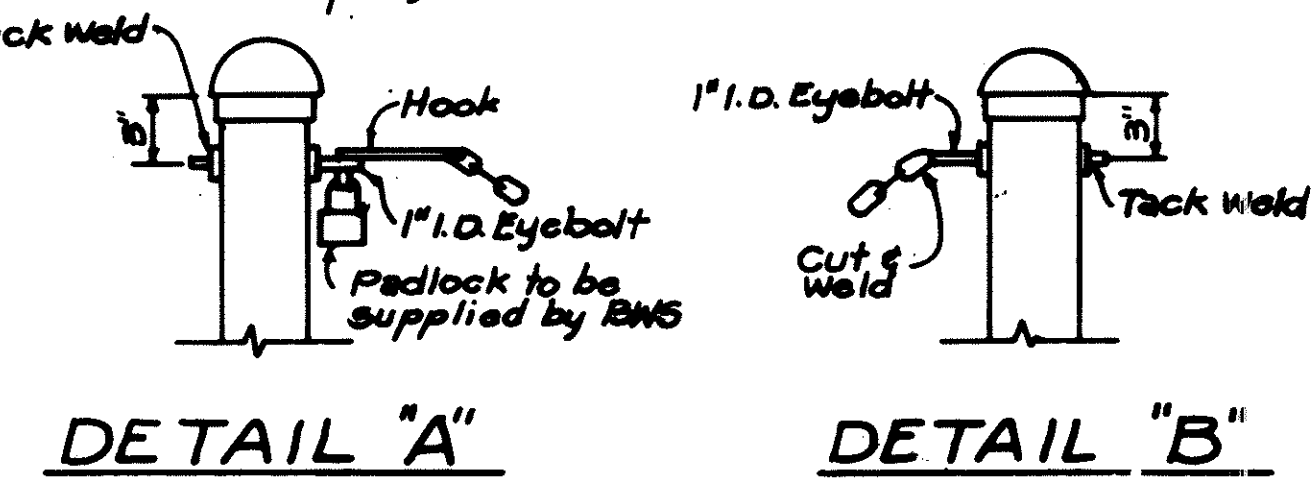


Double lines along \oplus denotes Retaining Walls.



- NOTES:**
1. Scale: 1"=100'
 2. Contour Interval = 5'
 3. Elevation based on Mean Sea Level.
 4. Hawaiian Plane Coordinate System Zone II.
 5. This Plan Sheet No. 3 of 4 was compiled by photogrammetric methods.
 6. See Notes 6 & 7, Sheet 1 of 4.

DATE	
DESIGNED BY	
DRAWN BY	
CHECKED BY	
NOTED BY	
ORIGINAL PLAN	



REFERENCE PLAN - CONTENTS FOR CONTRACT INTERFACE INFORMATION ONLY.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

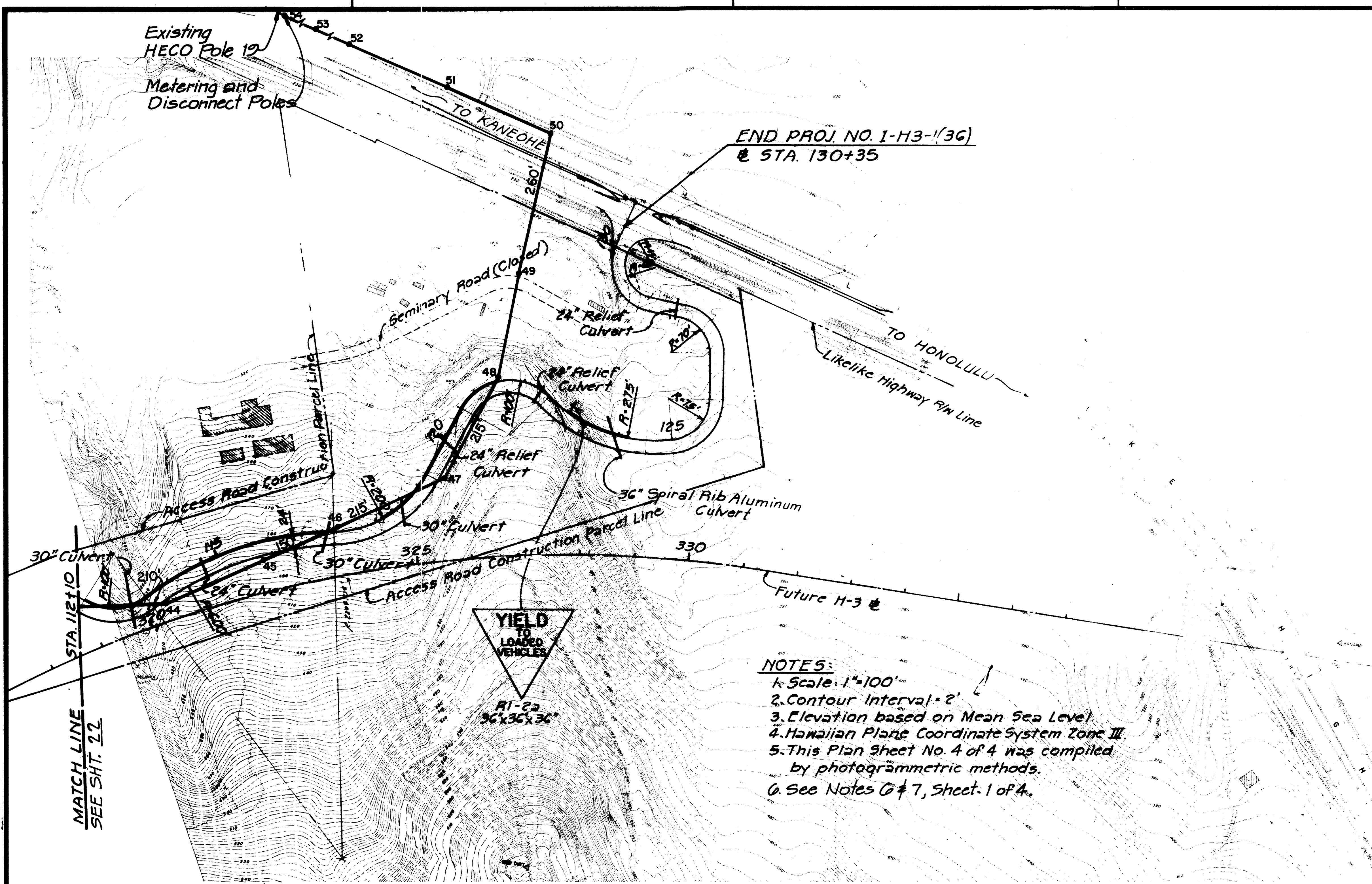
OVERHEAD POWER LINE
12.47 KV LAYOUT - HAIKU

EXPLORATORY TUNNEL
INTERSTATE ROUTE H-3
F.A.I. PROJECT NO. I-H3-1(137)

SCALE: 1"=100' DATE: AUG. 1988
SHEET NO. 3 OF 4 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
WAI	HA	I-H3-1(37)	1988	23	26



- NOTES:**
1. Scale: 1"=100'
 2. Contour Interval: 2'
 3. Elevation based on Mean Sea Level
 4. Hawaiian Plane Coordinate System Zone III
 5. This Plan Sheet No. 4 of 4 was compiled by photogrammetric methods.
 6. See Notes 6 & 7, Sheet 1 of 4.

DATE	_____
SURVEY PLANNED BY	_____
DRAWN BY	_____
TRACED BY	_____
DESIGNED BY	_____
QUANTITIES BY	_____
CHECKED BY	_____
ORIGINAL PLAN	_____
NOTE BOOK	_____
NO.	_____

REFERENCE PLAN - CONTENTS FOR CONTRACT INTERFACE INFORMATION ONLY.



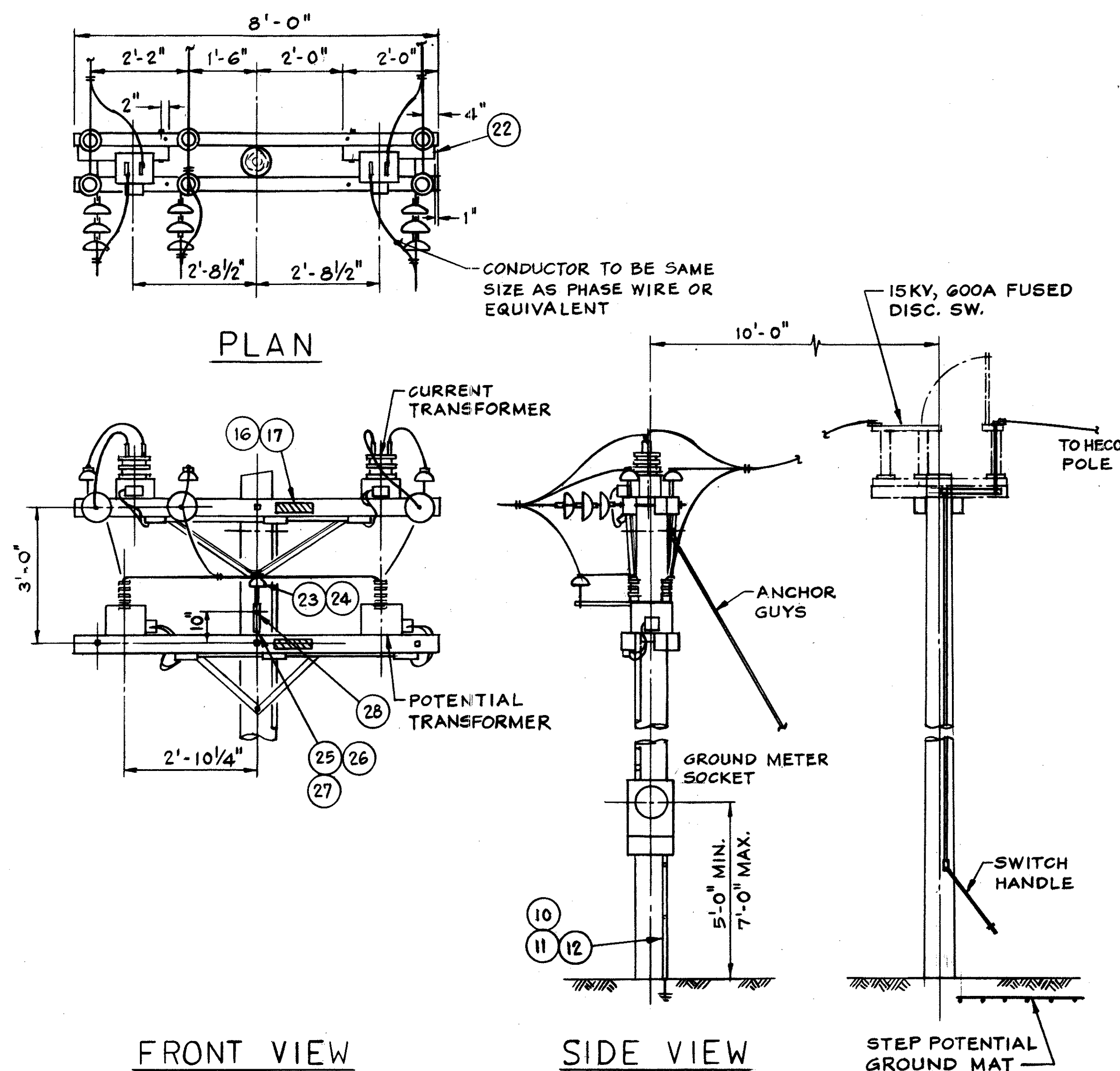
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
William A. Spencer

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

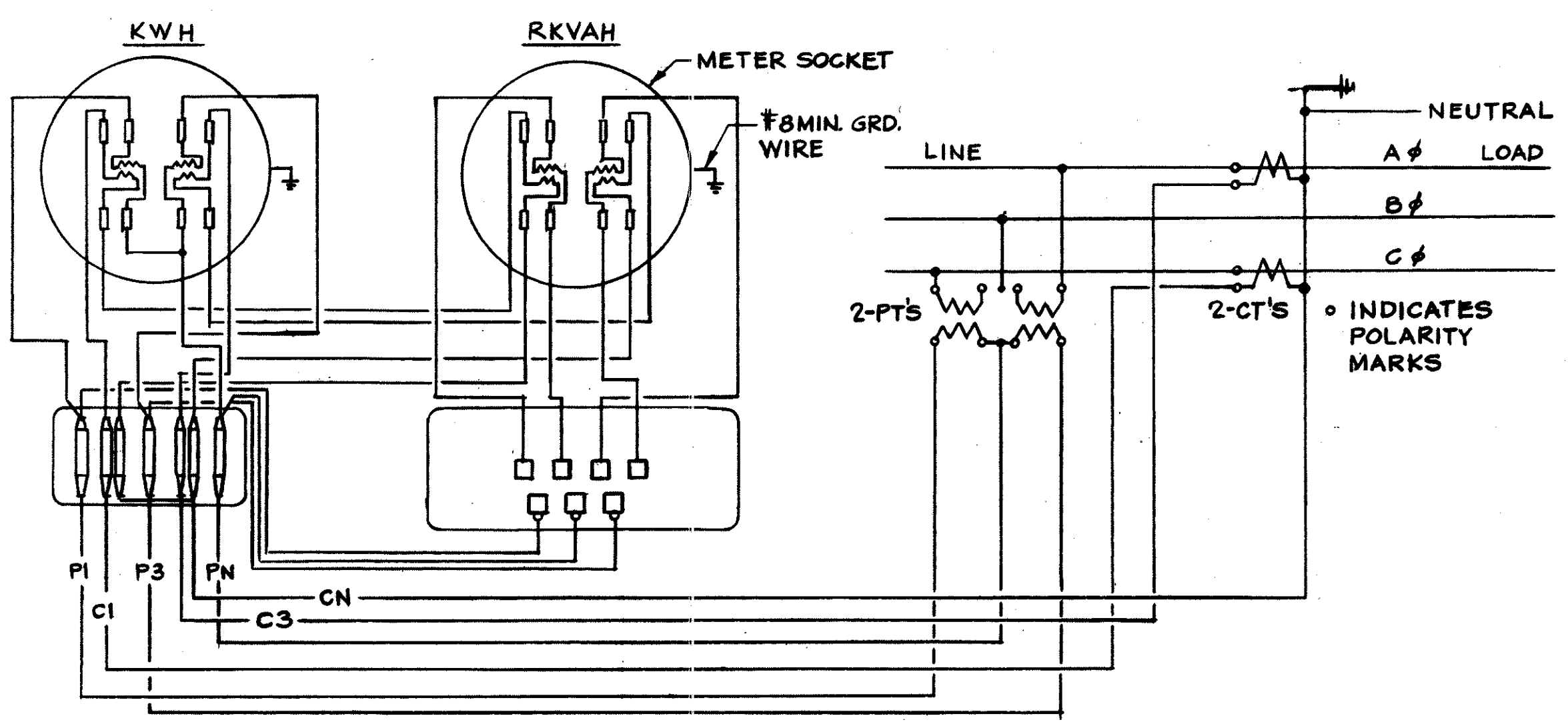
**OVERHEAD POWER LINE
12.47 KV LAYOUT - HAIKU**

EXPLORATORY TUNNEL
INTERSTATE ROUTE H-3
F.A.I. PROJECT NO. I-H3-1(37)
SCALE: 1"=100' DATE: AUG. 1988

SHEET NO. 4 OF 4 SHEETS



3Ø 3 WIRE 11.5 KV & 12.47 KV



POLE LINE MATERIAL LIST (NOTE 6)

ITEM NO	DESCRIPTION
1	ANGLE BRACE - GALV., 6'-3/2" L
2	CROSSARM - DOUGLAS FIR, 4"x5"x8'-0"
3	MACHINE BOLT - GALV, SQ HEAD #NUT 5/8"x18"
4	WASHER - 2" SQUARE, GALV., 1/16" HOLE
5	MACHINE BOLT - GALV, SQ HEAD #NUT 1/2"x8"
6	WASHER - 2" SQUARE, GALV, 5/8" HOLE
7	LAG SCREW - GALV., FETTER, 5/8"x5"
8	POST TOP INSULATOR
9	MACHINE BOLT - GALV, SQ HEAD #NUT 5/8"x24"
10	1 1/2" REDWOOD MOLDING
11	№ 6 AWG BARE CU. SOLID GROUND WIRE
12	STAPLES, 11 GAUGE, 1 1/4"
13	GALV. DROP-FORGED CLEVIS
14	STUD FOR POST INSULATOR
15	CONDUCTOR CLAMP FOR INSULATOR
16	SIGN "HIGH VOLTAGE" - PLASTIC YELLOW
17	NAIL, SHINGLE, AL. 1 1/4"x3D STD.
18	EYELET, CLEVIS, GALV., 1/16" HOLE
19	INSULATOR, SUSPENSION, PORC, 4 1/4" GALV. CAP
20	THIMBLE, DEADEND, AL. W/GALV. COTTER BOLT & STAINLESS STEEL PIN
21	BOLT, DOUBLE ARMING, GALV. 5/8"x24"
22	BLOCK ARM 3 1/2"x4 1/2"x2'-0"
23	INST. POST, PIN TYPE 12KV
24	PIN, INS., SSH GALV. 7/2", 1" LEAD THD.
25	SUPPORT BUS, GALV. 16"
26	BOLT, M GALV. 1/2"x10"
27	WASHER, RND., GALV. 16"
28	SCREW, LAG GALV. 1/2"x4"
29	GUY GUARD, ROUND, PLASTIC, 8'-0" COLORED YELLOW
30	GUY POLE ATTACHMENT
31	ANCHOR ROD-DOUBLE EYE, 3/4"x8'-0"
32	3-BOLT GUY CLAMP
33	ROCK ANCHOR EXTENTION 1"x5'-11"
34	ROCK ANCHOR & WEDGE 1"x1'-6"
35	SCREW TYPE ANCHOR, THIMBLE-EYE, 3/4" DIA. x 8' LONG & HOT DIP GALVANIZED
36	STRAIGHT BIGHT DEADEND
37	PARALLEL GROOVE CLAMP
38	GROUND ROD, COPPER-ENCASED, STEEL ROD 3/4" DIA. x 10' LONG & HOT DIP GALVANIZED

SYMBOL LIST

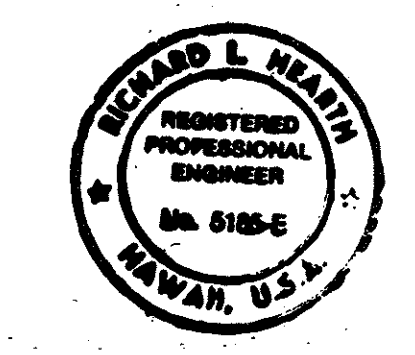
- ⊙ GROUND ROD
- ⊗ GROUND TEST WELL
- GROUND CONDUCTOR
- GROUND CONNECTION, WELDED
- OVERHEAD POLE & POWER LINE
- POLE ANCHOR
- FENCE, 8' HIGH

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	I-H3-1(37)	1988	24	26

NOTES:

- PRIMARY METERING EQUIPMENT SHALL NOT BE INSTALLED ON JOINTLY USED POLES OR ON HECO LINE POLES.
- THE SECONDARY WINDINGS OF POTENTIAL AND CURRENT TRANSFORMERS SHALL BE GROUNDED. THE MINIMUM SIZE GROUNDING CONDUCTOR SHALL BE NO. 6 BARE COPPER.
- METER EQUIPMENT SHALL BE RAIN-TIGHT.
- MAINTAIN 4'-0" CLEARANCE IN FRONT OF METER SOCKET.
- METERING EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH HECO REQUIREMENTS. REFER TO HECO ELECTRICAL SERVICE INSTALLATION MANUAL PP 55-58 FOR ADDITIONAL METERING REQUIREMENTS.
- ONLY MAJOR ITEMS ARE DESCRIBED. FURNISH & INSTALL HARDWARE & EQUIPMENT NECESSARY TO PROVIDE A COMPLETE OVER-HEAD POWER LINE.

REFERENCE PLAN - CONTENTS FOR CONTRACT INTERFACE INFORMATION ONLY.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
Richard L. Heath

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**OVERHEAD POWER LINE
POLE METERING DETAILS**

HALAWA AND HAIKU
EXPLORATORY TUNNEL
INTERSTATE ROUTE H-3
F.A.I. PROJECT NO. I-H3-1(37)

SCALE: NONE DATE: AUG. 1988

SHEET OF SHEETS

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