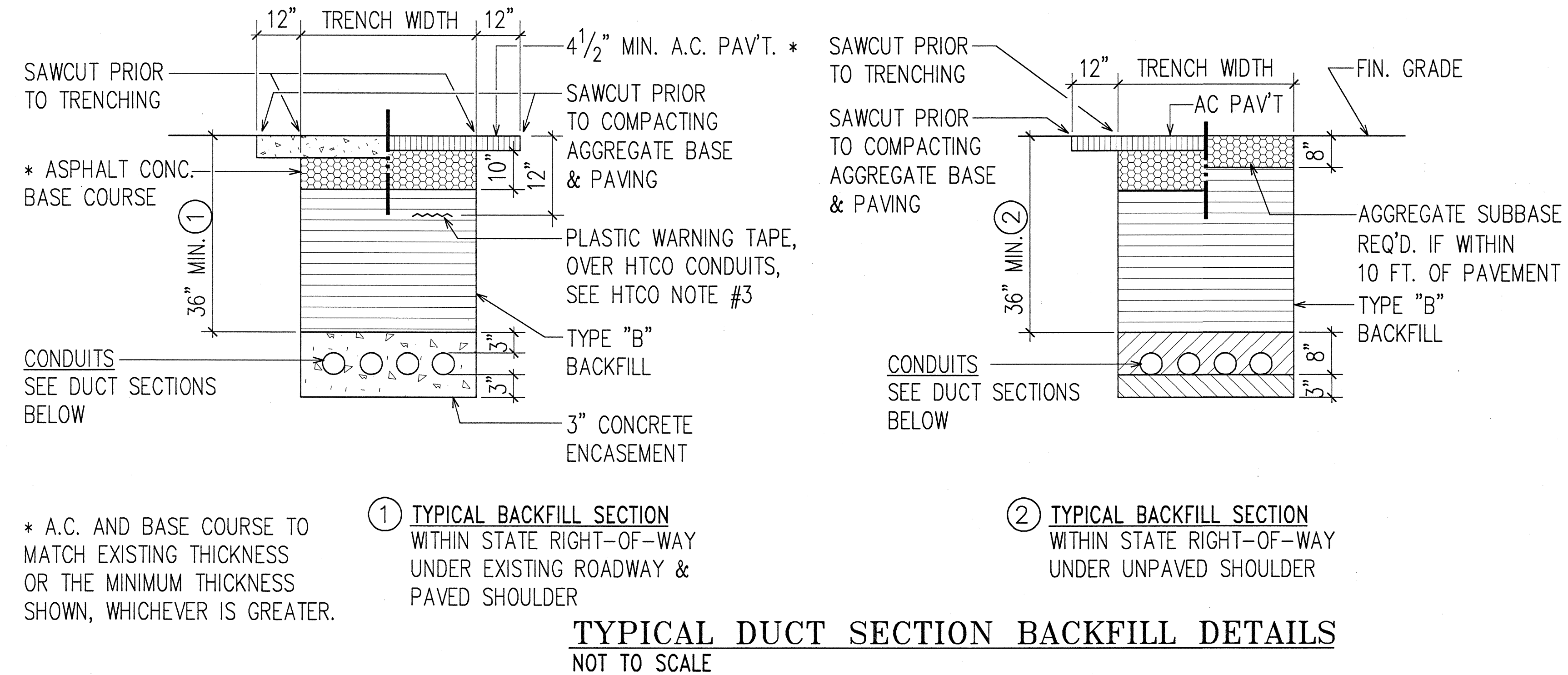


STATE RIGHT-OF-WAY BACKFILL NOTES

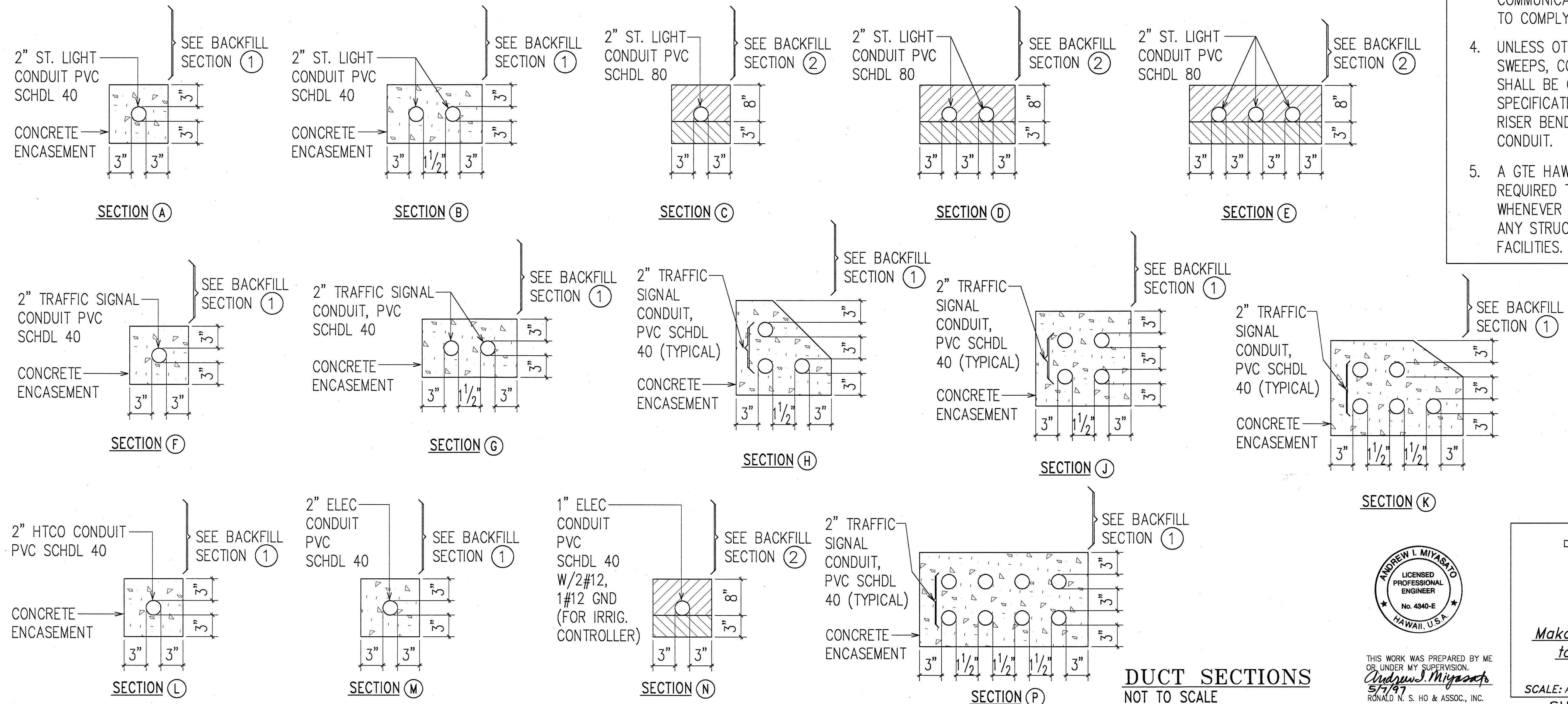
- TRENCH BACKFILL MATERIAL "B"
1. SAND EQUIVALENT ≥ 2
2. 8" MAX. LIFT LOOSE
3. 95% COMPACTION
- TRENCH BACKFILL MATERIAL "A"
1. SAND EQUIVALENT ≥ 20
2. 8" MAX. LIFT LOOSE
3. 95% COMPACTION
- IF MATERIAL BELOW DUCT IS NOT EQUIVALENT TO BACKFILL MATERIAL "A", EXCAVATE MATERIAL & PROVIDE 3" BACKFILL MATERIAL "A". SEE ABOVE
- CONCRETE - 3" ENCASEMENT, 3000 PSI COMPRESSIVE STRENGTH @ 28 DAYS.

NOTE: BASE COURSE & SUB-BASE COURSE PER 1985 STATE STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.



HTCO NOTES:

- CONTRACTOR SHALL CLOSELY COORDINATE ALL WORK WITH GTE HAWAIIAN TEL. ALL TRENCHES MUST BE INSPECTED BY HAWAIIAN TEL PRIOR TO BACKFILLING AND CONCRETE-ENCASING. CONTRACTOR SHALL NOTIFY INSPECTOR AT LEAST 72 HOURS PRIOR TO POURING OF CONCRETE.
- CONTRACTOR SHALL PLACE MULETAPE (WP1800P) IN EACH DUCT THROUGHOUT ITS ENTIRE LENGTH WITH PROTRUSIONS OF 2 FEET IN MANHOLES AND HANDHOLES AT EACH END, AND 2 FOOT IN PULL-BOXES. MULETAPE IS RATED FOR 1800LB. PULL AND HAS FOOTAGE MARKINGS FOR MEASURING DUCT LENGTHS.
- CONTRACTOR SHALL PLACE 8-MIL ORANGE COLORED PLASTIC WARNING TAPE, NOT LESS THAN 4" WIDE, IN ENTIRE LENGTH OF TRENCH FOR ALL UNDERGROUND INSTALLATIONS. TAPE SHOULD READ "WARNING-STOP DIGGING-CALL GTE, COMMUNICATIONS CABLE BURIED BELOW, FAILURE TO COMPLY COULD RESULT IN LEGAL ACTION".
- UNLESS OTHERWISE INDICATED, ALL CONDUITS, SWEEPS, COUPLING, ADAPTERS AND BELL ENDS SHALL BE CARLON GT42 CONDUIT MEETING GTE SPECIFICATION GTS-8342. ALL RISERS AND RISER BENDS SHALL BE PVC SCHEDULE 80 CONDUIT.
- A GTE HAWAIIAN TEL INSPECTOR SHALL BE REQUIRED TO BE PRESENT AT THE JOB SITE WHENEVER THERE WILL BE A BREAKAGE INTO ANY STRUCTURE CONTAINING GTE HAWAIIAN TEL FACILITIES.



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
Andrew I. Miyazaki
5/7/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DUCT SECTIONS

INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps

SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-3 OF 33 SHEETS

DATE: _____
SURVEY PLOTTED BY: _____
DRAWN BY: _____
DESIGNED BY: _____
CHECKED BY: _____
NOTED BY: _____
LAST SAVE: 05/07/97 @ 09:24:45 BY: AMT/ST-12-97
H:\ACAD\PROJECTS\9606\DUCT2A

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	C.O. 65	104

1	M. DR 12+40
2	C1, CKT #7
3	8'
4	12'
5	WOOD POLE
6	29'

1	MC 2+30
2	C4, CKT #7
3	10'
4	15'
5	SB
6	35'

1	MC 2+30
2	C5, CKT #7
3	10'
4	15'
5	SB
6	35'

1	MC 4+30
2	C7, CKT #7
3	BGR
4	15'
5	AB
6	35'

1	MC 0+70
2	C3, CKT #7
3	6'
4	15'
5	SB
6	35'

1	MC 0+63
2	C2, CKT #7
3	10'
4	15'
5	SB
6	35'

1	MC 4+30
2	C6, CKT #7
3	BGR
4	15'
5	AB
6	35'

1	H-1 100+45
2	H1, CKT #3
3	BGR
4	15'
5	AB
6	35'

1	H-1 101+90
2	H2, CKT #4
3	BGR
4	15'
5	AB
6	35'

1	H-1 103+35
2	H3, CKT #3
3	BGR
4	15'
5	AB
6	35'

1	H-1 104+45
2	H5, CKT #4
3	BGR
4	15'
5	AB
6	35'

PROVIDE NEW WOOD POLE AND BRACKET ARM, AND INSTALL LUMINAIRE, SEE DETAILS ON SHEET E-17A

SEE SERVICE EQUIPMENT SITE PLAN, SHEET E-9
EPB3, SEE NOTE #1

EXIST. 2" C W/EXIST. HWY LTG CKT WIRES. REMOVE WIRES TO EXIST HWY LTG PULLBOX AT H-1 STA 131+40 OUTBOUND, ABANDON CONDUITS BELOW GRADE & REMOVE ALL PULLBOXES

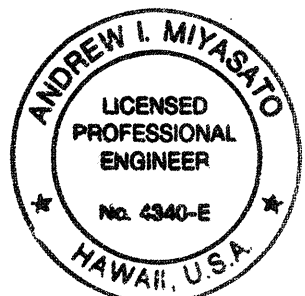
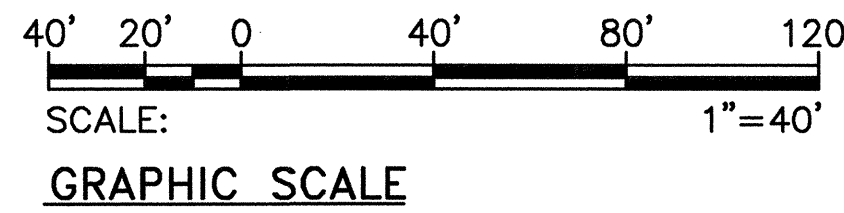
EXIST. 2" C W/EXIST HWY LTG CKT WIRES. REMOVE WIRES TO EXIST HWY LTG PULLBOX AT H-1 STA 125+10 INBOUND, ABANDON CONDUITS BELOW GRADE & REMOVE ALL PULLBOXES

NOTES:

- BREAK INTO EXISTING PULLBOXES AS REQUIRED TO INSTALL NEW CONDUIT PATCH TO MATCH EXISTING.
- FOR GRADING AROUND HIGHWAY LIGHT STANDARD AND PULLBOX, SEE SHEET E-14
- REMOVE EXISTING HIGHWAY LIGHT STANDARDS, PULLBOXES, CONCRETE BASES AND CIRCUIT CONDUCTORS. ABANDON CONDUITS BELOW GRADE.

HIGHWAY LIGHTING PLAN I

SCALE: 1"=40'-0"



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
6/24/99
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

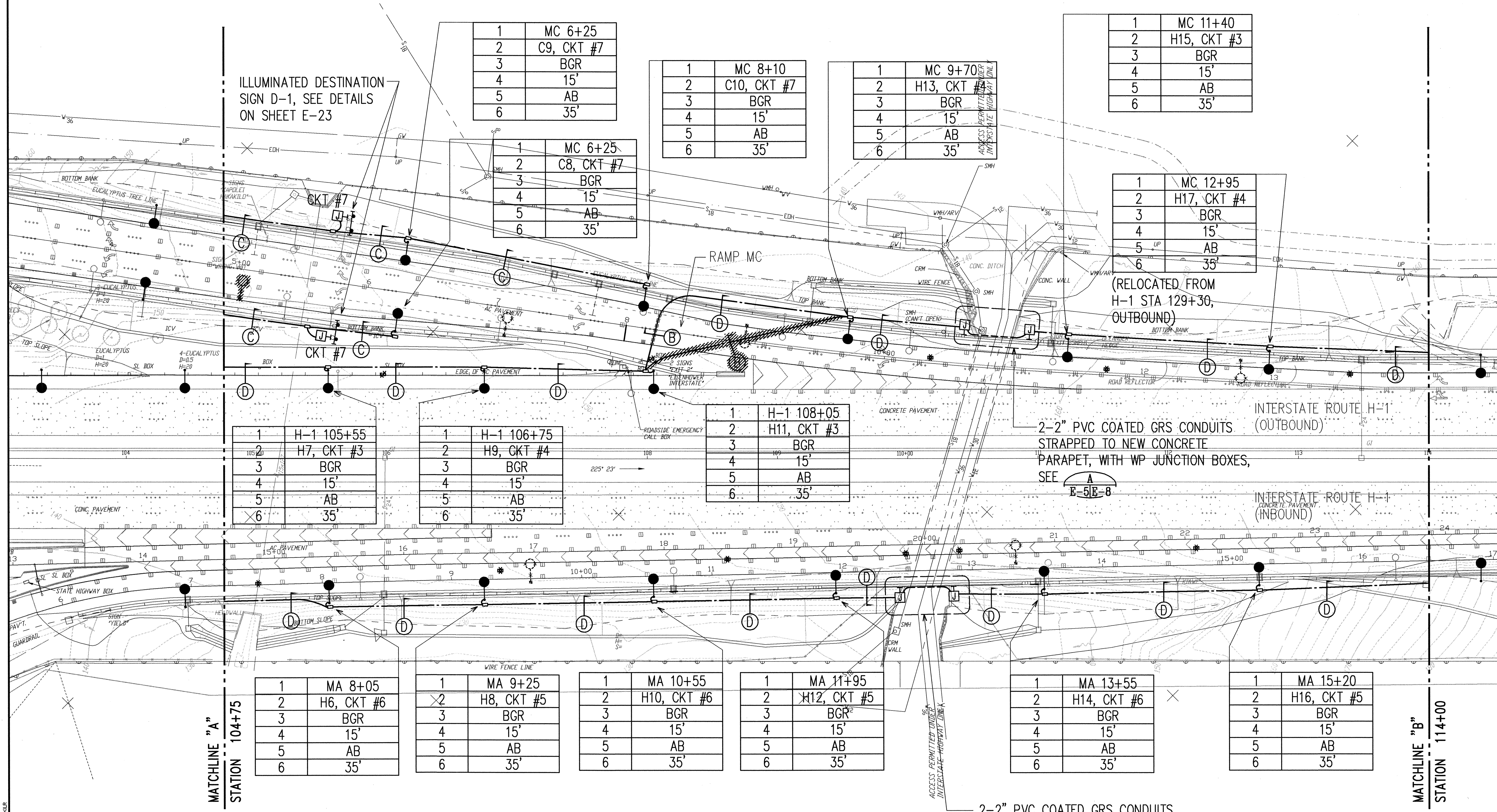
DATE	REVISION
7/23/98	REPLACE LIGHT STANDARD WITH NEW WOOD POLE AND BRACKET ARM

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION HIGHWAY LIGHTING PLAN I

INTERSTATE ROUTE H-1 Makakilo Interchange Improvements to Westbound Off-Ramp and Eastbound On-Ramps

SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-4 OF 33 SHEETS

C.O. 65



ILLUMINATED DESTINATION SIGN D-1, SEE DETAILS ON SHEET E-23

1	MC 6+25
2	C9, CKT #7
3	BGR
4	15'
5	AB
6	35'

1	MC 8+10
2	C10, CKT #7
3	BGR
4	15'
5	AB
6	35'

1	MC 9+70
2	H13, CKT #4
3	BGR
4	15'
5	AB
6	35'

1	MC 11+40
2	H15, CKT #3
3	BGR
4	15'
5	AB
6	35'

1	MC 12+95
2	H17, CKT #4
3	BGR
4	15'
5	AB
6	35'

(RELOCATED FROM H-1 STA 129+30, OUTBOUND)

1	H-1 105+55
2	H7, CKT #3
3	BGR
4	15'
5	AB
6	35'

1	H-1 106+75
2	H9, CKT #4
3	BGR
4	15'
5	AB
6	35'

1	H-1 108+05
2	H11, CKT #3
3	BGR
4	15'
5	AB
6	35'

2-2" PVC COATED GRS CONDUITS STRAPPED TO NEW CONCRETE PARAPET, WITH WP JUNCTION BOXES, SEE E-5E-8

MATCHLINE "A" STATION 104+75

1	MA 8+05
2	H6, CKT #6
3	BGR
4	15'
5	AB
6	35'

1	MA 9+25
2	H8, CKT #5
3	BGR
4	15'
5	AB
6	35'

1	MA 10+55
2	H10, CKT #6
3	BGR
4	15'
5	AB
6	35'

1	MA 11+95
2	H12, CKT #5
3	BGR
4	15'
5	AB
6	35'

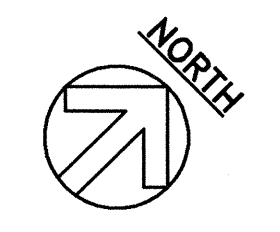
1	MA 13+55
2	H14, CKT #6
3	BGR
4	15'
5	AB
6	35'

1	MA 15+20
2	H16, CKT #5
3	BGR
4	15'
5	AB
6	35'

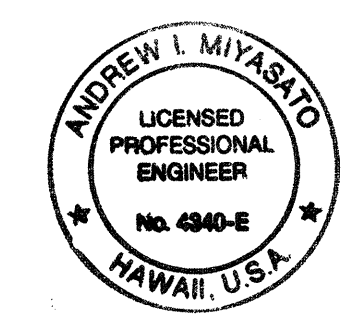
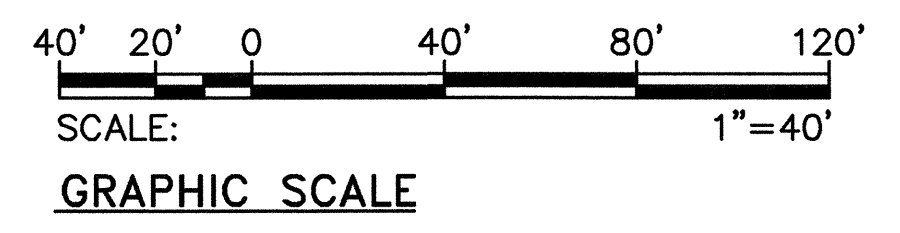
MATCHLINE "B" STATION 114+00

NOTES:

- BREAK INTO EXISTING PULLBOXES AS REQUIRED TO INSTALL NEW CONDUIT PATCH TO MATCH EXISTING.
- FOR GRADING AROUND HIGHWAY LIGHT STANDARD AND PULLBOX, SEE SHEET E-14.
- REMOVE EXISTING HIGHWAY LIGHT STANDARDS, PULLBOXES, CONCRETE BASES AND CIRCUIT CONDUCTORS. ABANDON CONDUITS BELOW GRADE.



HIGHWAY LIGHTING PLAN II
SCALE: 1"=40'-0"



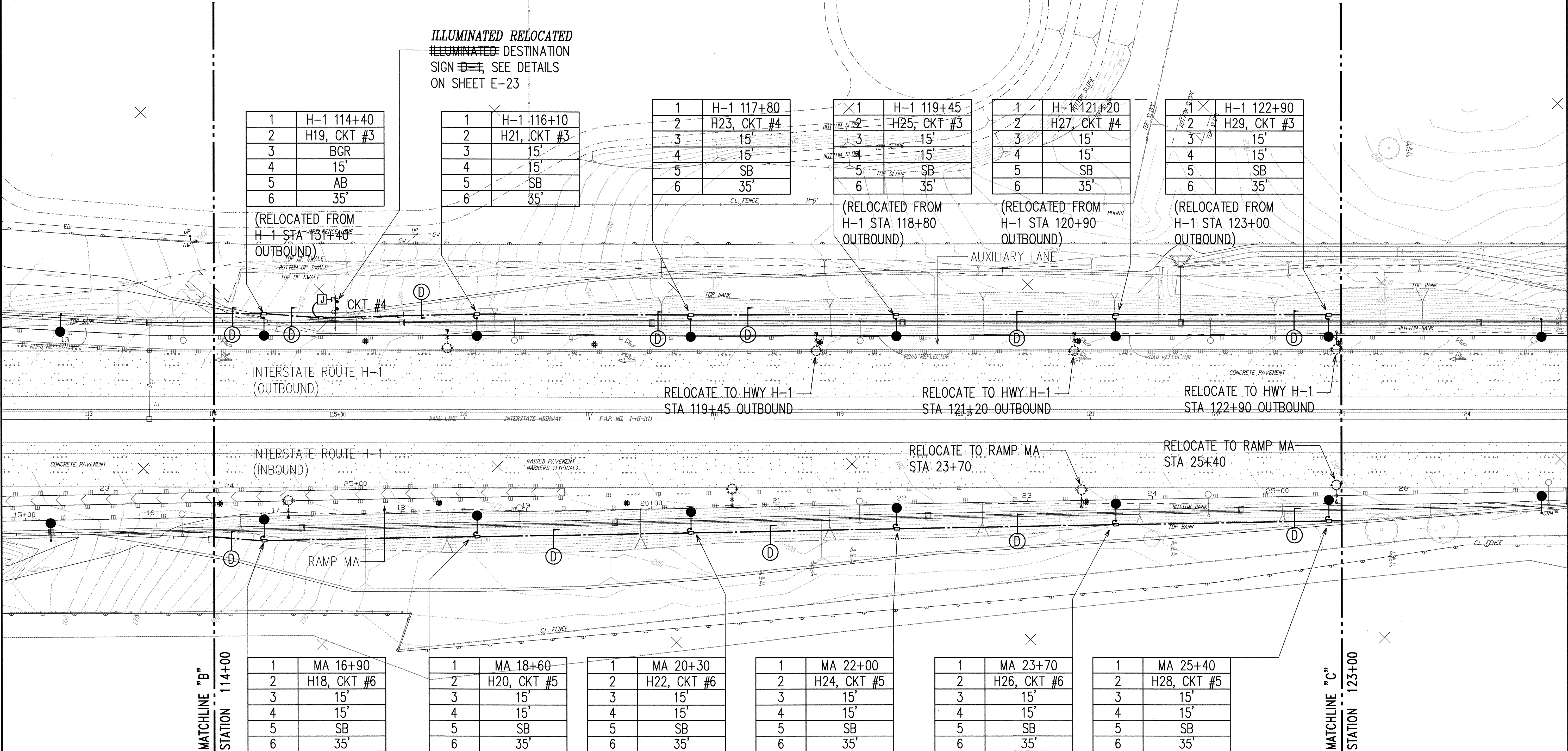
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
Andrew I. Miyasato
6/29/99
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING PLAN II

**INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps**

SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-5 OF 33 SHEETS

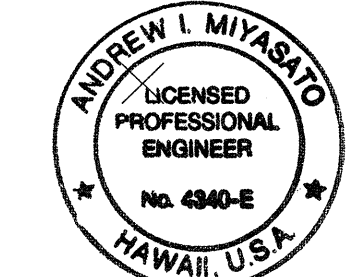
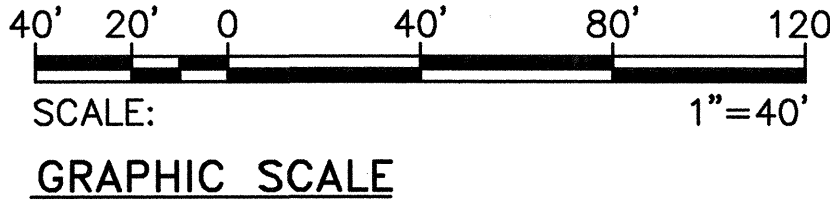
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	67	104



- NOTES:**
1. BREAK INTO EXISTING PULLBOXES AS REQUIRED TO INSTALL NEW CONDUIT PATCH TO MATCH EXISTING.
 2. FOR GRADING AROUND HIGHWAY LIGHT STANDARD AND PULLBOX, SEE SHEET E-14.
 3. REMOVE EXISTING HIGHWAY LIGHT STANDARDS, PULLBOXES, CONCRETE BASES AND CIRCUIT CONDUCTORS. ABANDON CONDUITS BELOW GRADE.



HIGHWAY LIGHTING PLAN III SCALE: 1"=40'-0"



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.
Andrew I. Miyasato
6/24/99
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING PLAN III

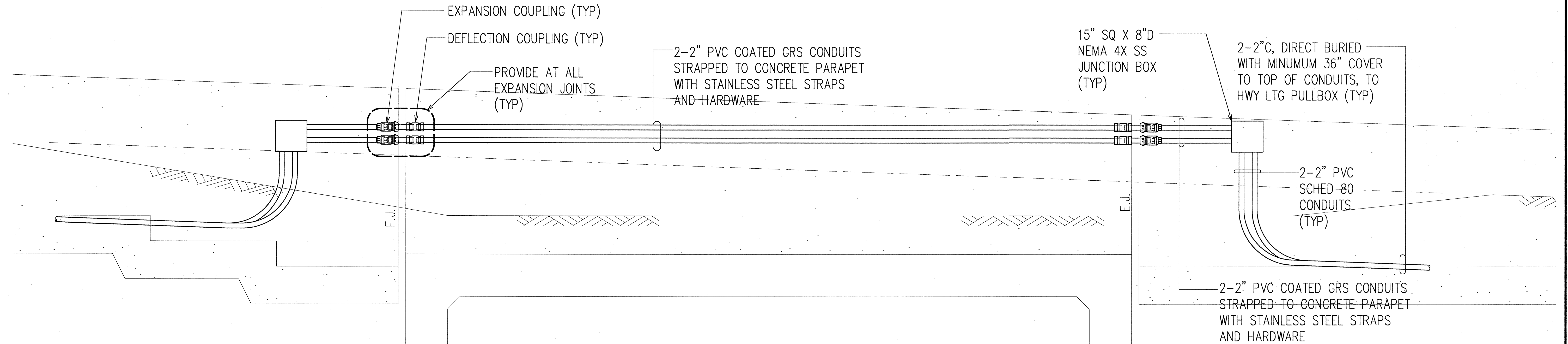
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps

SCALE: AS NOTED
DATE: APRIL 30, 1997
SHEET No. E-6 OF 33 SHEETS

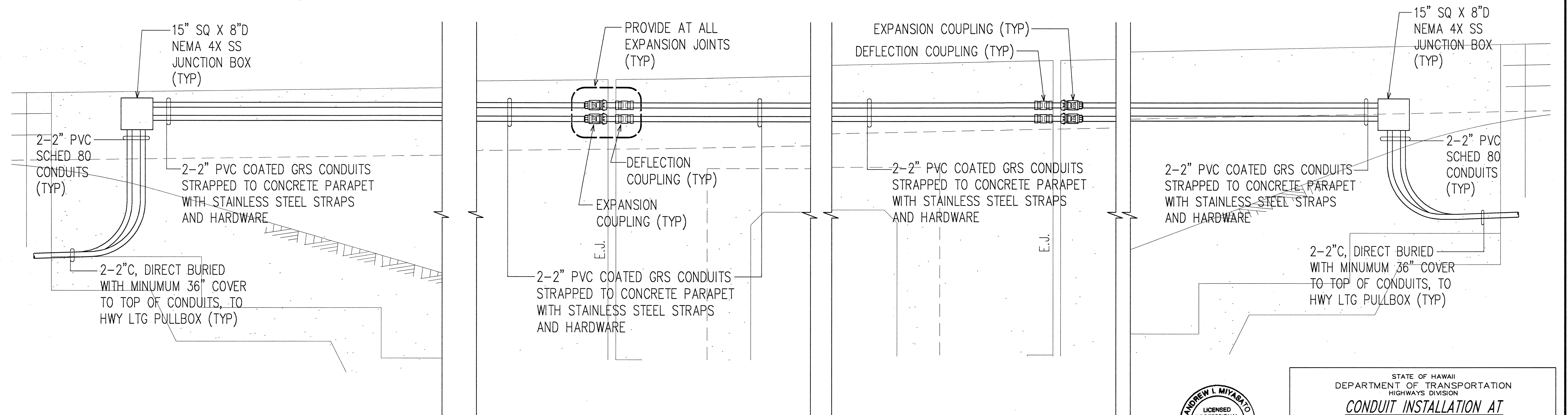
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
DRAWN BY		
DESIGNED BY		
QUANTITIES BY		
NO.		

LAST SAVE: 06/22/99 @ 2:12:58 PM BY: AMI PLOT SIZE: 11x17
2: VARIOUS PROJECTS (950001) (950002) (950003) (950004) (950005) (950006) (950007) (950008) (950009) (950010) (950011) (950012) (950013) (950014) (950015) (950016) (950017) (950018) (950019) (950020) (950021) (950022) (950023) (950024) (950025) (950026) (950027) (950028) (950029) (950030) (950031) (950032) (950033) (950034) (950035) (950036) (950037) (950038) (950039) (950040) (950041) (950042) (950043) (950044) (950045) (950046) (950047) (950048) (950049) (950050) (950051) (950052) (950053) (950054) (950055) (950056) (950057) (950058) (950059) (950060) (950061) (950062) (950063) (950064) (950065) (950066) (950067) (950068) (950069) (950070) (950071) (950072) (950073) (950074) (950075) (950076) (950077) (950078) (950079) (950080) (950081) (950082) (950083) (950084) (950085) (950086) (950087) (950088) (950089) (950090) (950091) (950092) (950093) (950094) (950095) (950096) (950097) (950098) (950099) (950100) (950101) (950102) (950103) (950104) (950105) (950106) (950107) (950108) (950109) 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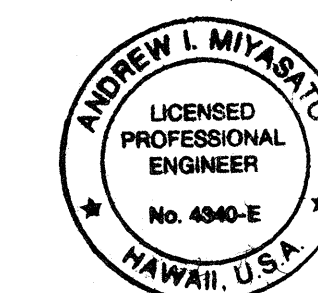
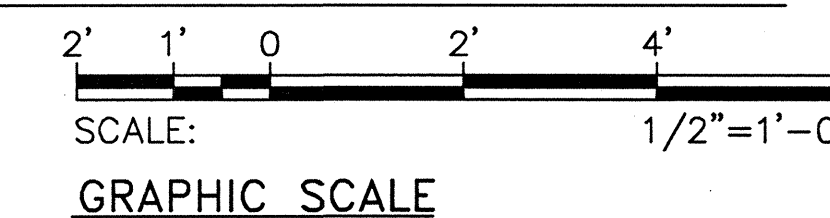
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	69	104



A CONDUIT INSTALLATION AT CULVERT MODIFICATION - HWY H-1 STA 110+67 OUTBOUND
E-5E-8 SCALE: 1/2"=1'-0"



B CONDUIT INSTALLATION AT CULVERT MODIFICATION - HWY H-1 STA 110+15 INBOUND
E-5E-8 SCALE: 1/2"=1'-0"



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OR UNDER MY SUPERVISION.
Andrew L. Miyasato
4/25/97
RONALD A. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

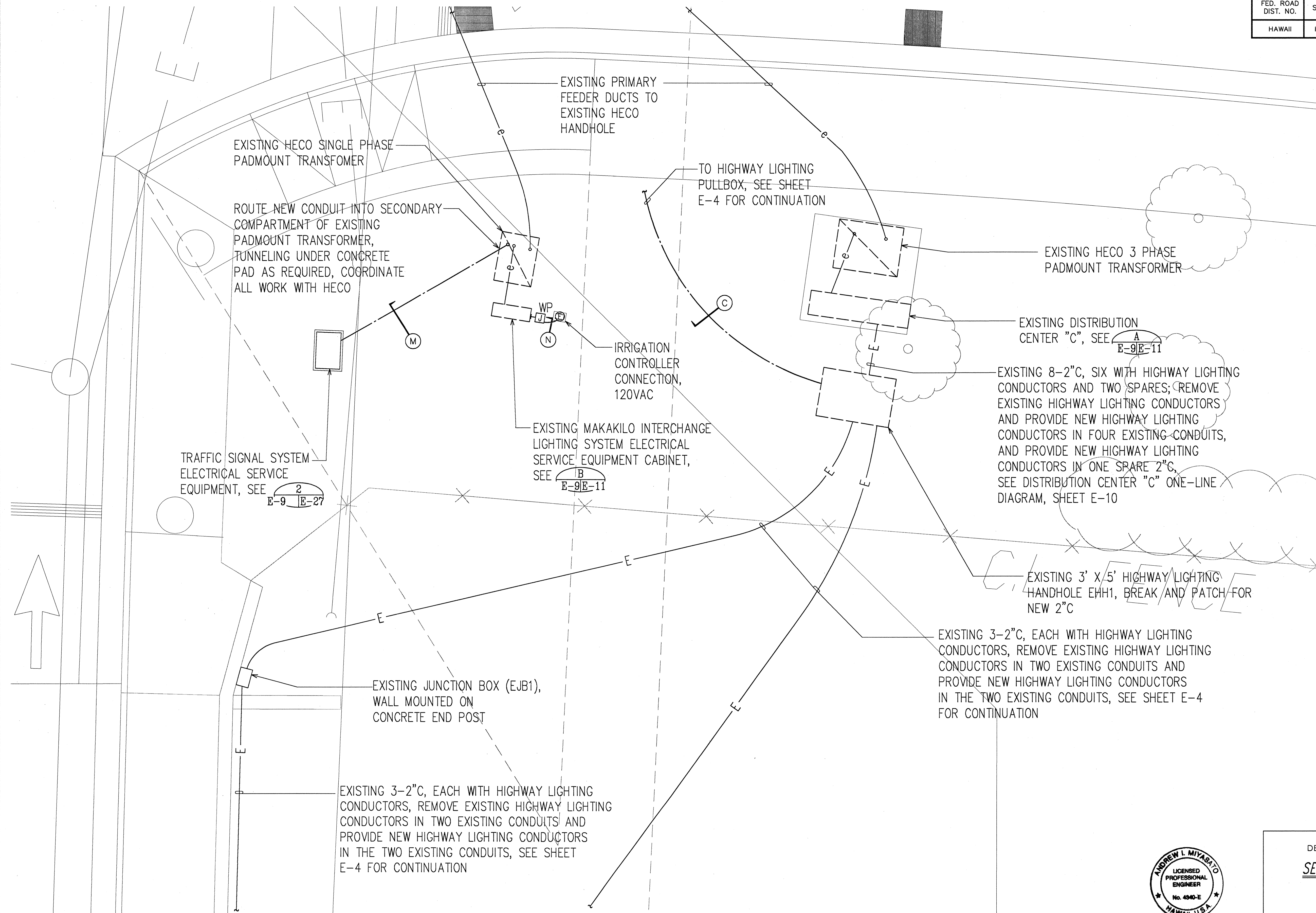
**CONDUIT INSTALLATION AT
CULVERT MODIFICATIONS
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps**

SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-8 OF 33 SHEETS

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

NOT FOR CONSTRUCTION
HAWAIIAN ENGINEERING ASSOCIATION, INC. 10/12/97

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	70	104

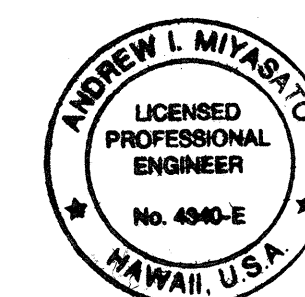
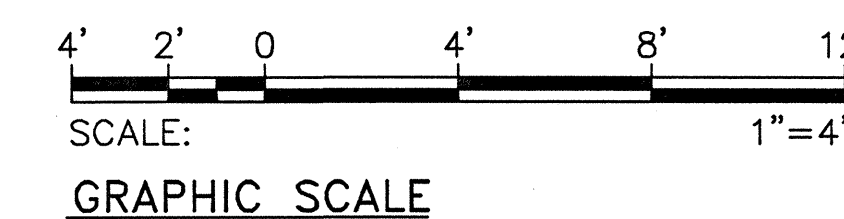


ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
NO. OF SHEETS	
DATE	

LAST ONE OF TWO SHEETS OF
HAWAIIAN PROJECTS GROUP, INC.



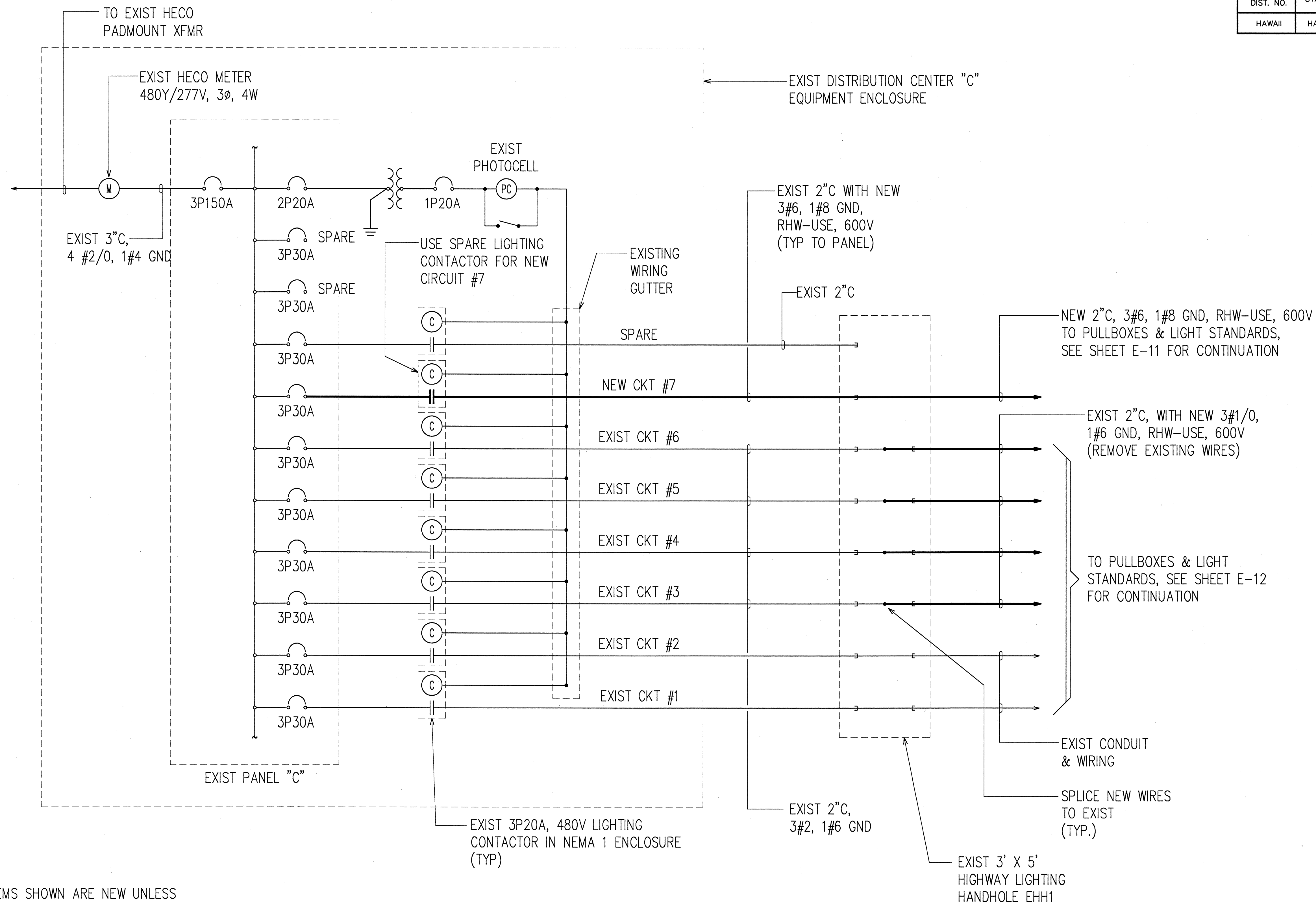
SERVICE EQUIPMENT SITE PLAN SCALE: 1"=4'-0"



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OR UNDER MY SUPERVISION.
Andrew L. Miyasaka
4/25/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
SERVICE EQUIPMENT SITE PLAN	
INTERSTATE ROUTE H-1 Makakilo Interchange Improvements to Westbound Off-Ramp and Eastbound On-Ramps	
SCALE: AS NOTED	DATE: APRIL 30, 1997
SHEET No. E-9 OF 33 SHEETS	

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	71	104



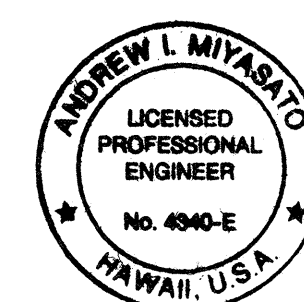
NOTES:

1. ALL ITEMS SHOWN ARE NEW UNLESS OTHERWISE INDICATED.

DISTRIBUTION CENTER "C" ONE-LINE DIAGRAM WITH MODIFICATIONS

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

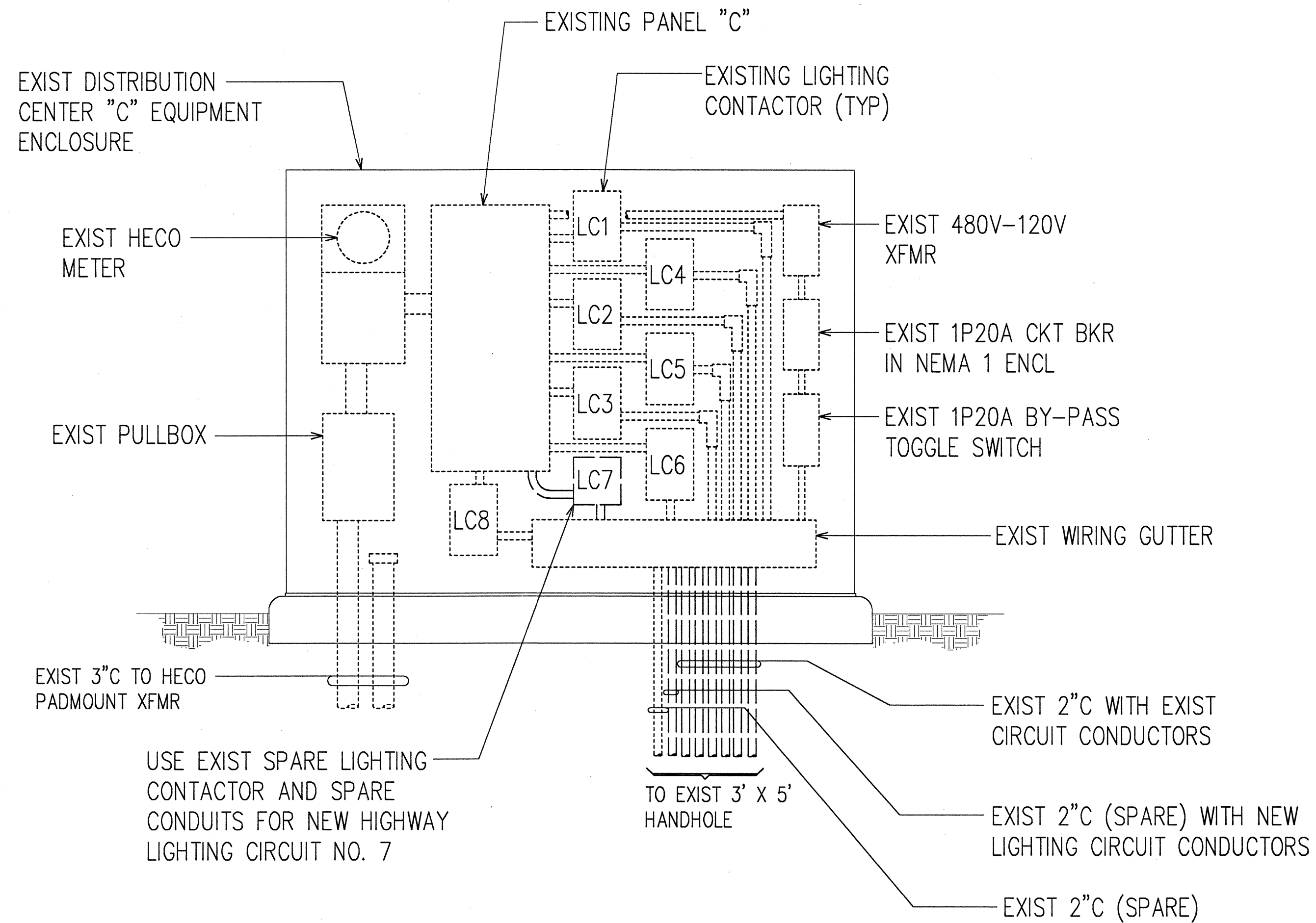
LAST SAVE: 04/24/97 09:57:38 BY: EN 101 SC 1-0-01
H:\PROJECTS\1997\HAWAII\HAWAII.DWG



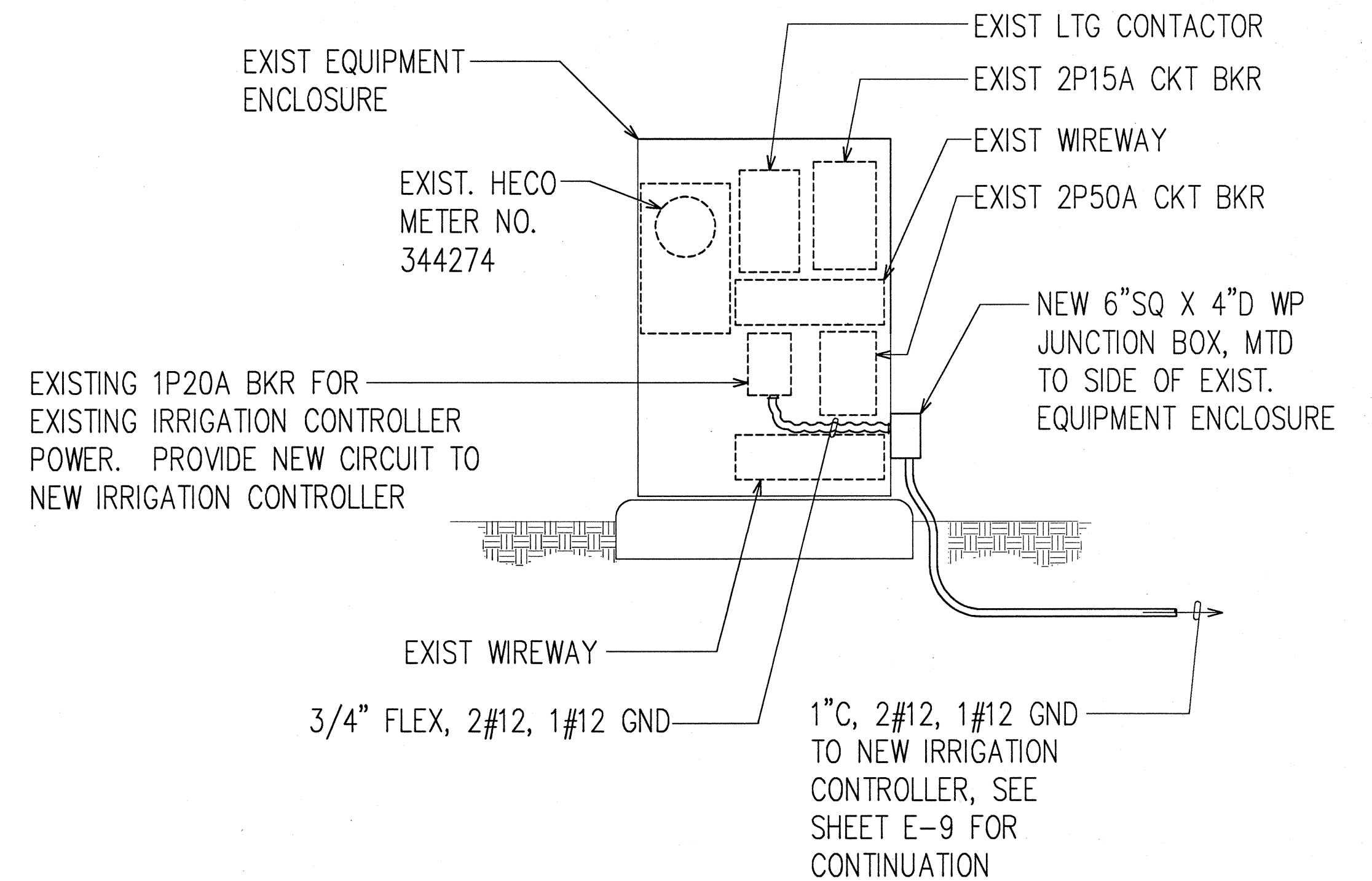
THIS WORK WAS PREPARED BY ME
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Andrew L. Miyasato
4/25/97
RONALD A. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
EXISTING DISTRIBUTION CENTER "C"
ONE-LINE DIAGRAM
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps
SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-10 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	72	104



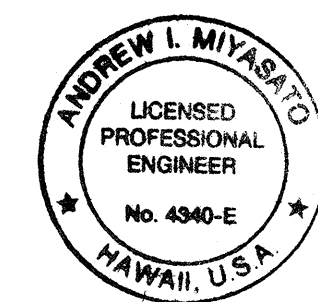
EXISTING DISTRIBUTION CENTER "C" EQUIPMENT ELEVATION
E-9 | E-11 NOT TO SCALE



EXISTING MAKAKILO INTERCHANGE ELECTRICAL EQUIPMENT ELEVATION
E-9 | E-11 NOT TO SCALE

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

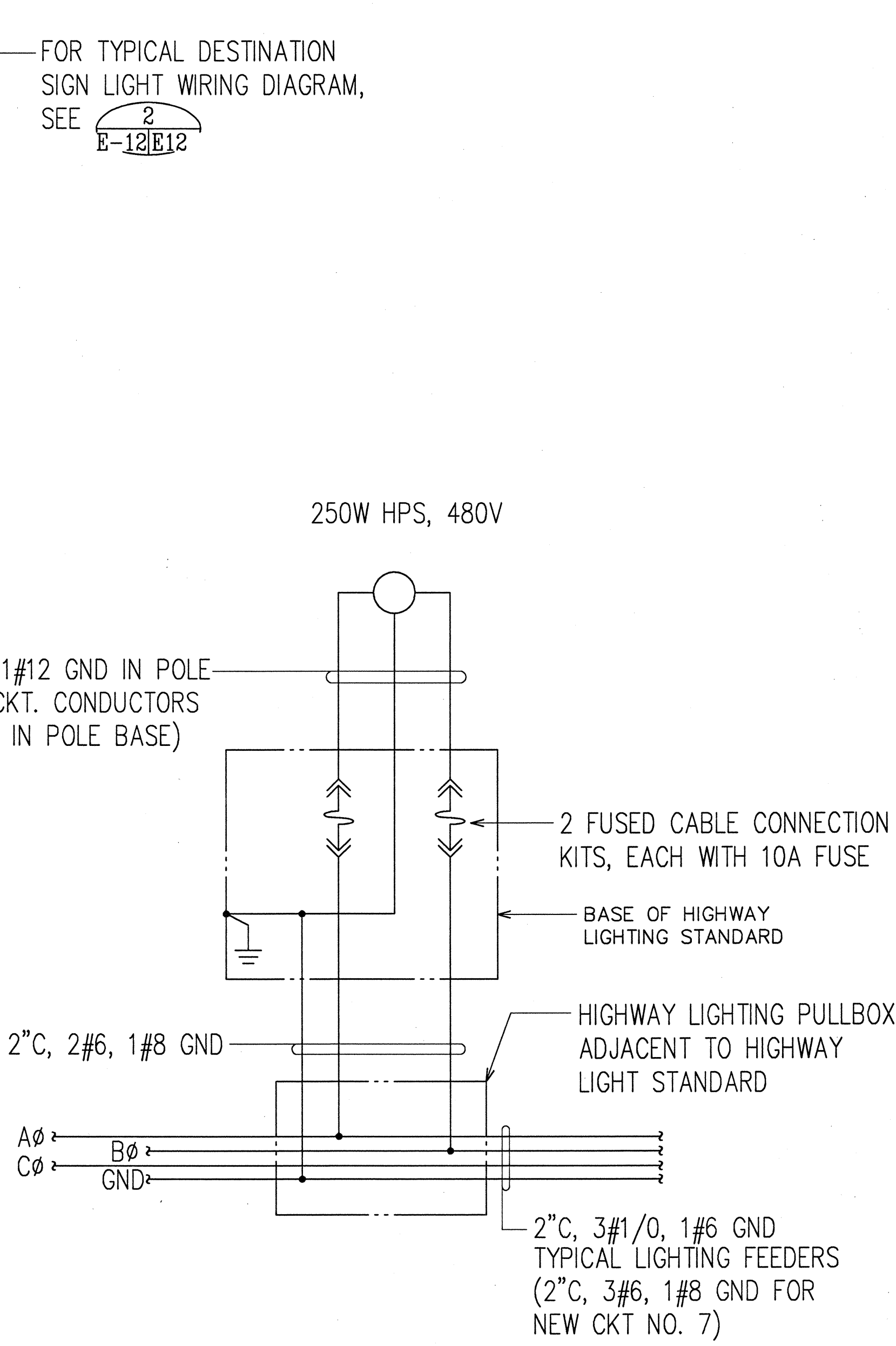
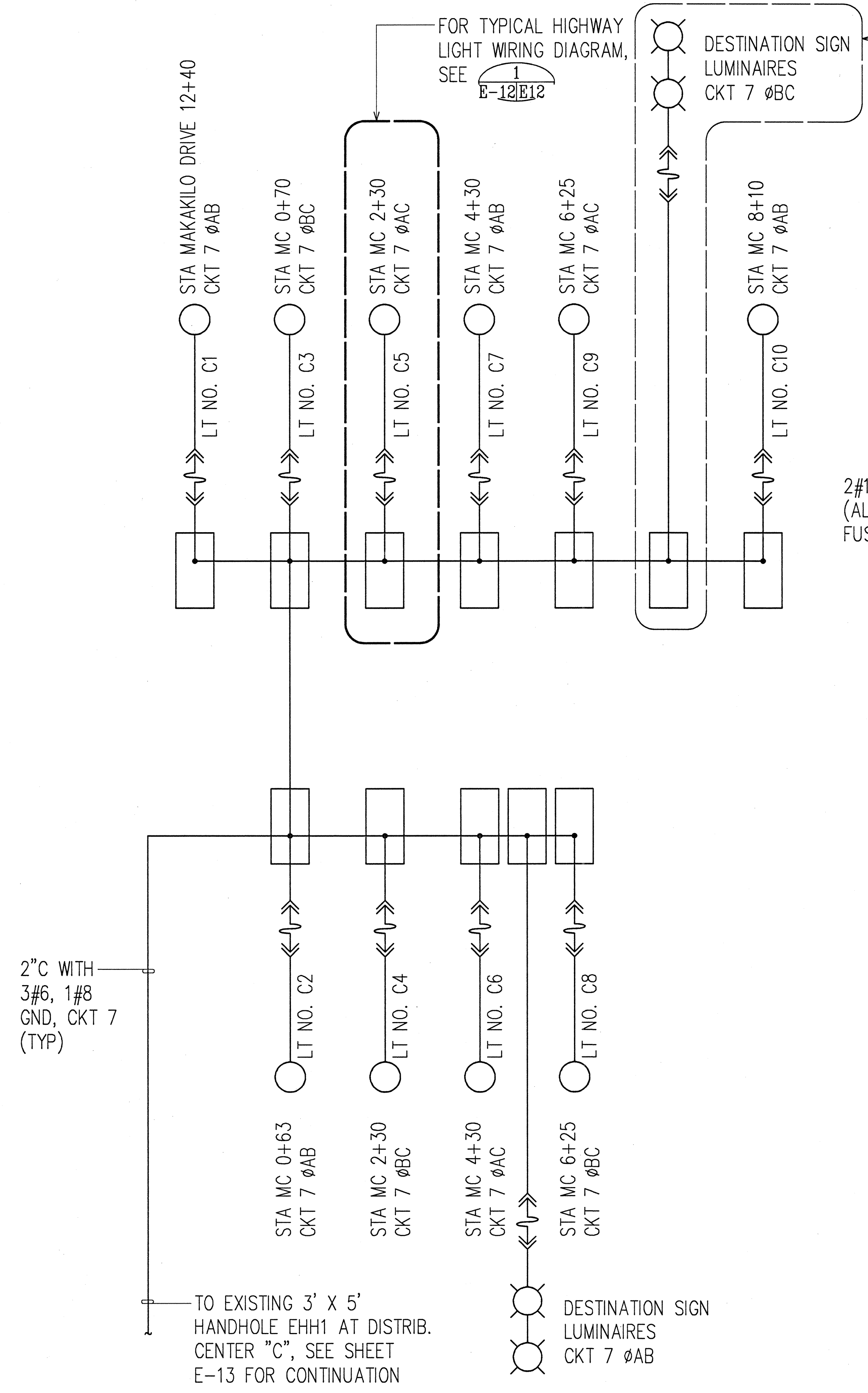
LAST SAVE: 04/23/97 BY: RYAN PLOT SC 3/4"-1"
DRAWN: 04/23/97 BY: RYAN PLOT SC 3/4"-1"



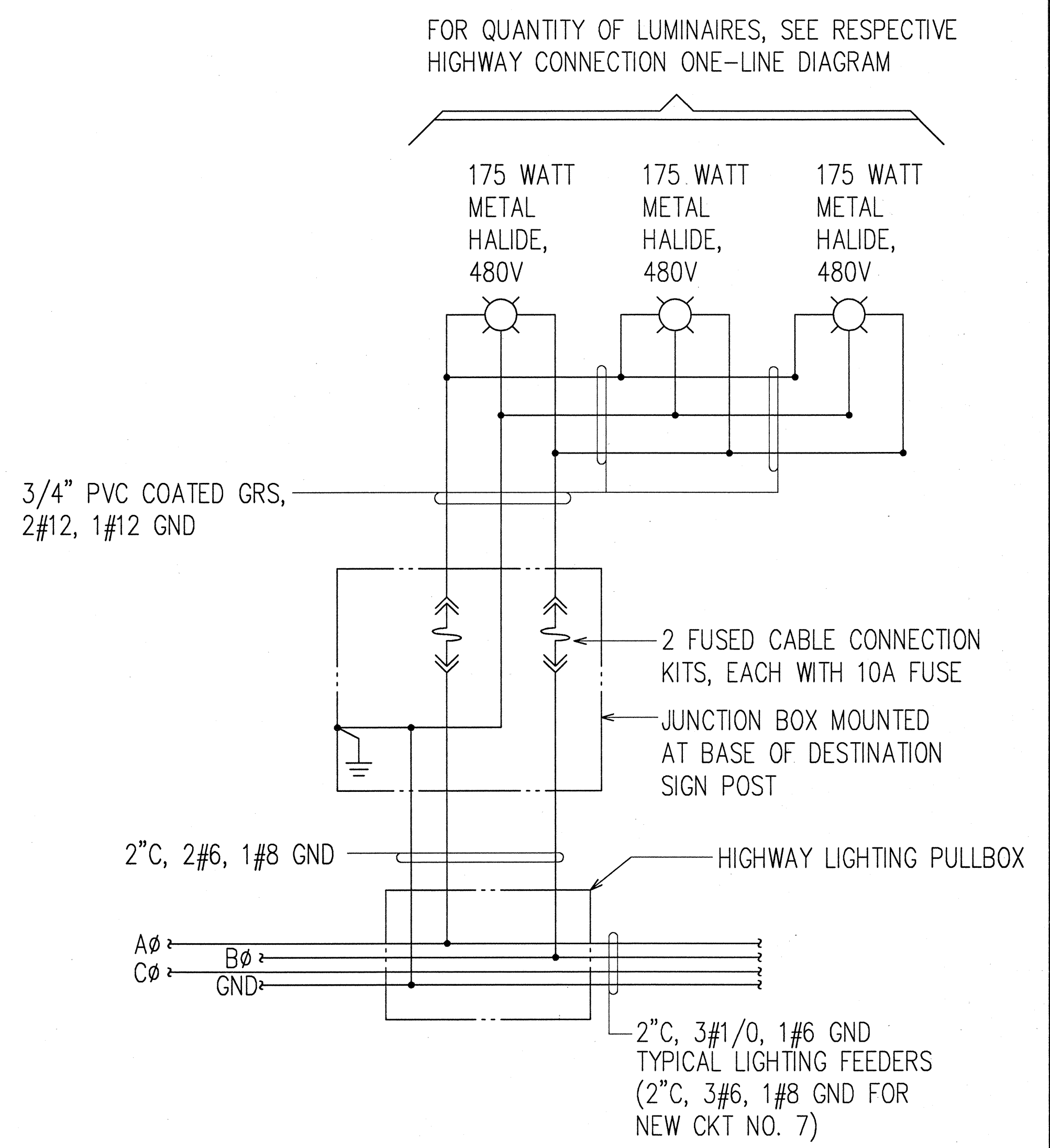
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION.
Andrew L. Miyasato
4/25/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
EXISTING DISTRIBUTION CENTER "C"
EQUIPMENT ELEVATION
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps
SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-11 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	73	104



1
E-12
E-13
TYPICAL WIRING DIAGRAM OF
HIGHWAY LIGHT STANDARD



2
E-12
E-13
TYPICAL WIRING DIAGRAM OF
DESTINATION SIGN LUMINAIRES

HIGHWAY LIGHTING CONNECTION ONE-LINE DIAGRAM I

SURVEY PLOTTED BY	DATE
DESIGNED BY	
NOTED BY	
QUANTITIES BY	
CHECKED BY	
NO.	

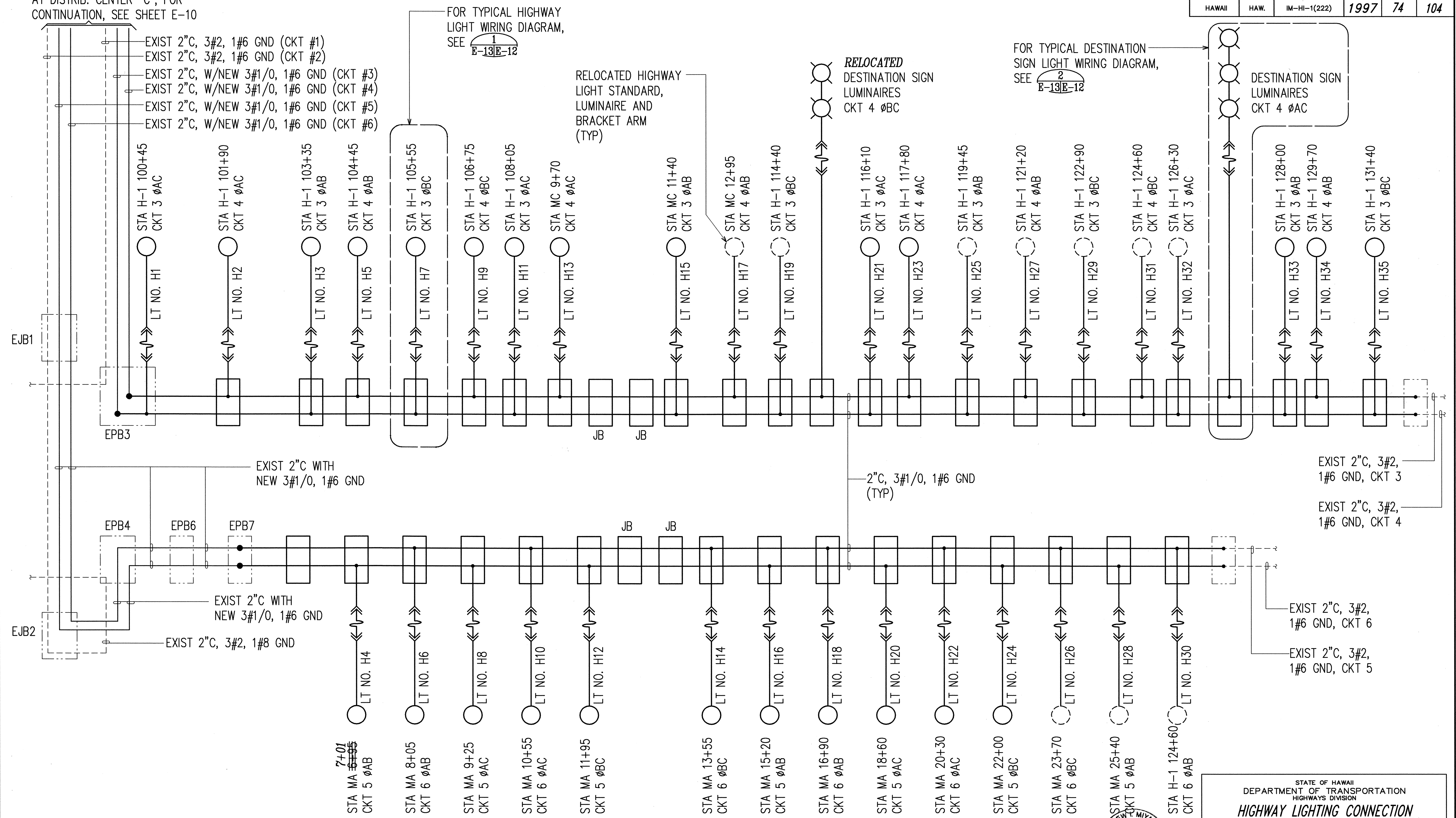


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Andrew I. Miyamoto
4/25/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

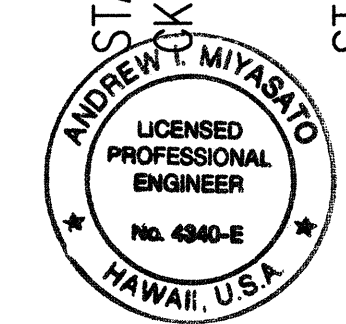
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING CONNECTION
ONE-LINE DIAGRAM I
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps
SCALE: AS NOTED
DATE: APRIL 30, 1997
SHEET No. E-12 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	74	104

TO EXISTING 3' X 5' HANDHOLE EHH1
AT DISTRIBUTION CENTER "C", FOR
CONTINUATION, SEE SHEET E-10



HIGHWAY LIGHTING CONNECTION ONE-LINE DIAGRAM II



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Andrew T. Miyasato
6/24/99
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

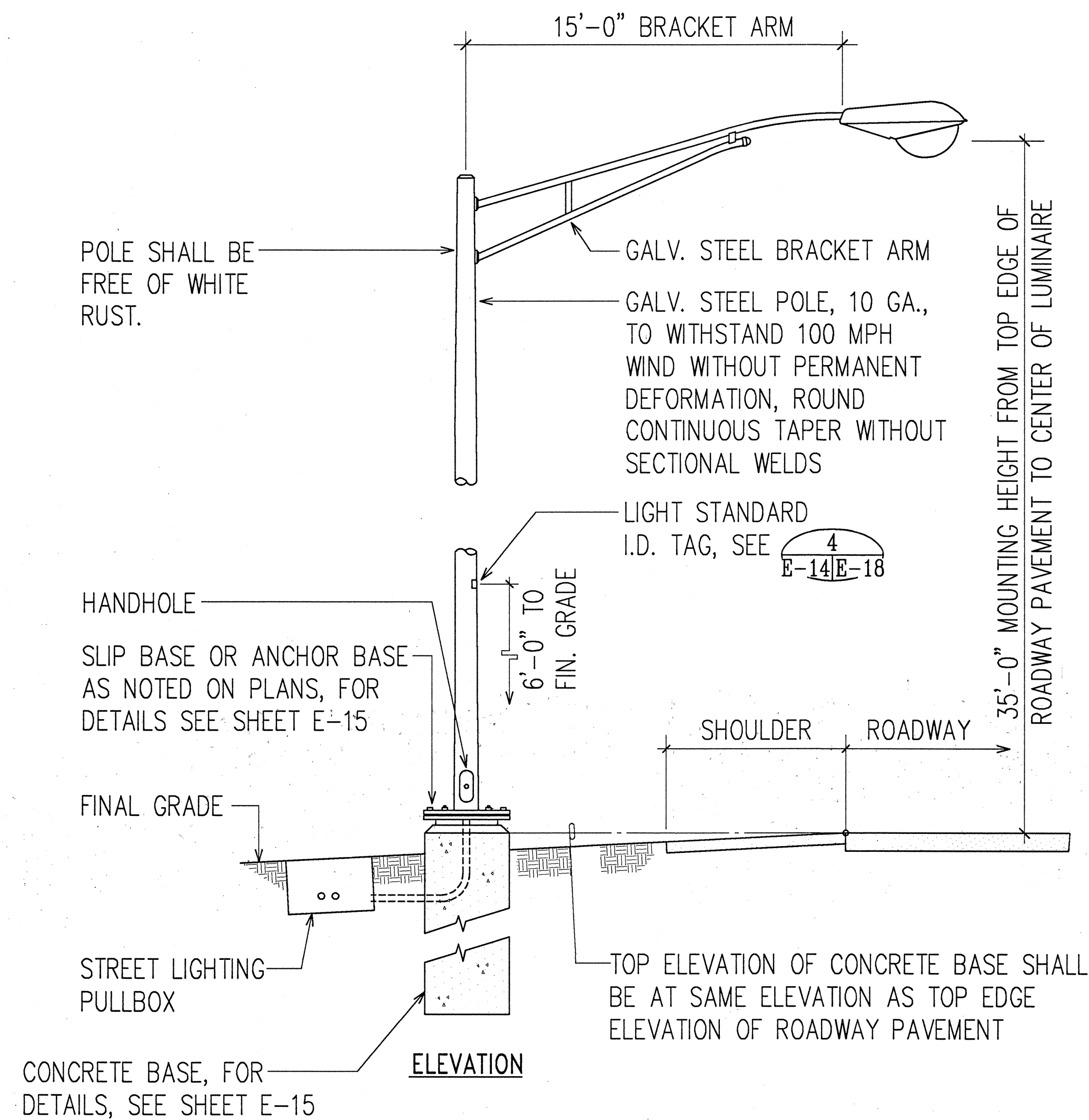
HIGHWAY LIGHTING CONNECTION
ONE-LINE DIAGRAM II
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps

SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-13 OF 33 SHEETS

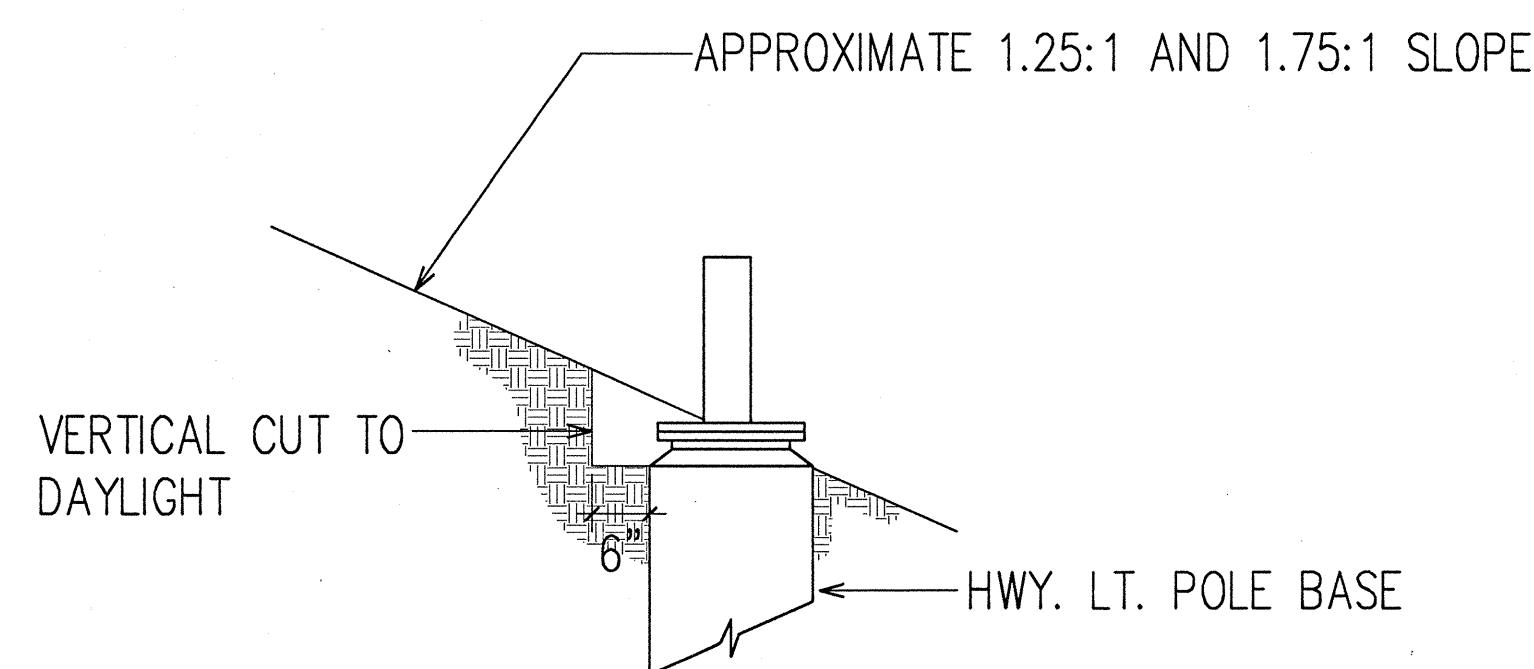
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
	DESIGNED BY	
	CHECKED BY	
	IN CHARGE	

LAST SAVE: 06/22/99 @ 11:42:33 BY: AM PLOT: 501-0-1
2: V:\AD\PROJECTS\05000\05000\SUBMIT\05000SH74

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	75	104

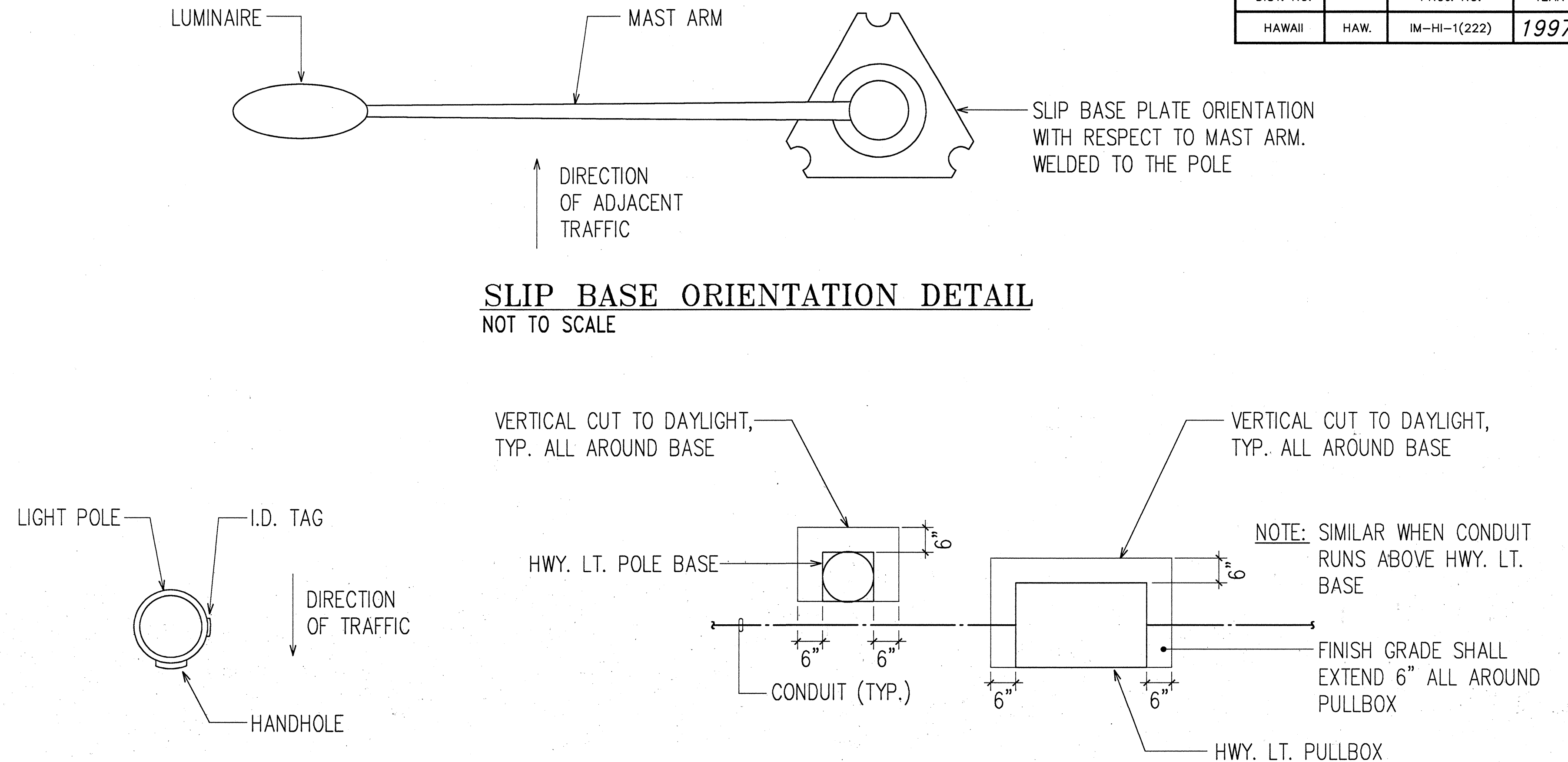


IN-GRADE HIGHWAY LIGHT STANDARD DETAIL
NOT TO SCALE

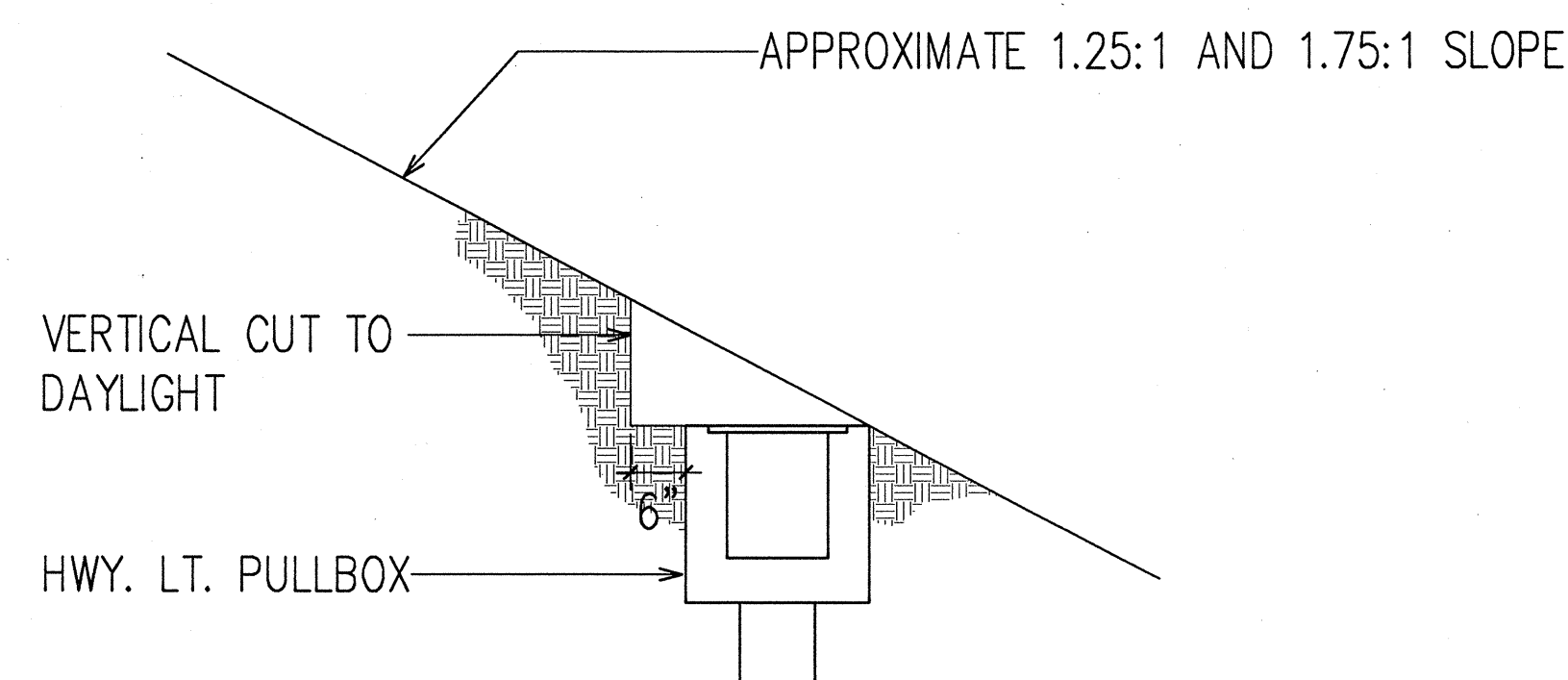


NOTE: IF LOOSE MATERIAL IS ENCOUNTERED WITHIN THE STREET LIGHT CUT SLOPE, THE CONTRACTOR SHALL STABILIZE THE AREA OF LOOSE MATERIAL WITH SHOTCRETE OR OTHER APPROVED METHOD.

TYPICAL GRADING SECTION THRU HIGHWAY
LIGHT POLE BASE AT 1.25:1 AND 1.75:1 SLOPE
NOT TO SCALE



TYPICAL GRADING PLAN AROUND HIGHWAY LIGHT
BASE AND PULLBOX AT 1.25:1 AND 1.75:1 SLOPE
NOT TO SCALE

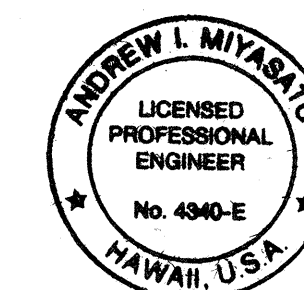


NOTE: IF LOOSE MATERIAL IS ENCOUNTERED WITHIN THE STREET LIGHT CUT SLOPE, THE CONTRACTOR SHALL STABILIZE THE AREA OF LOOSE MATERIAL WITH SHOTCRETE OR OTHER APPROVED METHOD.

TYPICAL GRADING SECTION THRU HIGHWAY
LIGHT PULLBOX AT 1.25:1 AND 1.75:1 SLOPE
NOT TO SCALE

ORIGINAL PLAN	SURVEY PLOTTED BY _____	DATE _____
	DRAWN BY _____	" _____
	TRACED BY _____	" _____
NOTE BOOK	DESIGNED BY _____	" _____
	QUANTITIES BY _____	" _____
	CHECKED BY _____	" _____
No. _____		
14-07-20 BY: RN PLOT SC 1-0=1		

NO. _____ CHECKED BY _____
AST SAVE: 04/23/97 @ 14:07:20 BY: RN PLOT SC 1'-0"=1'



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OR UNDER MY SUPERVISION.
Andrew J. Miyasaka
4/25/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

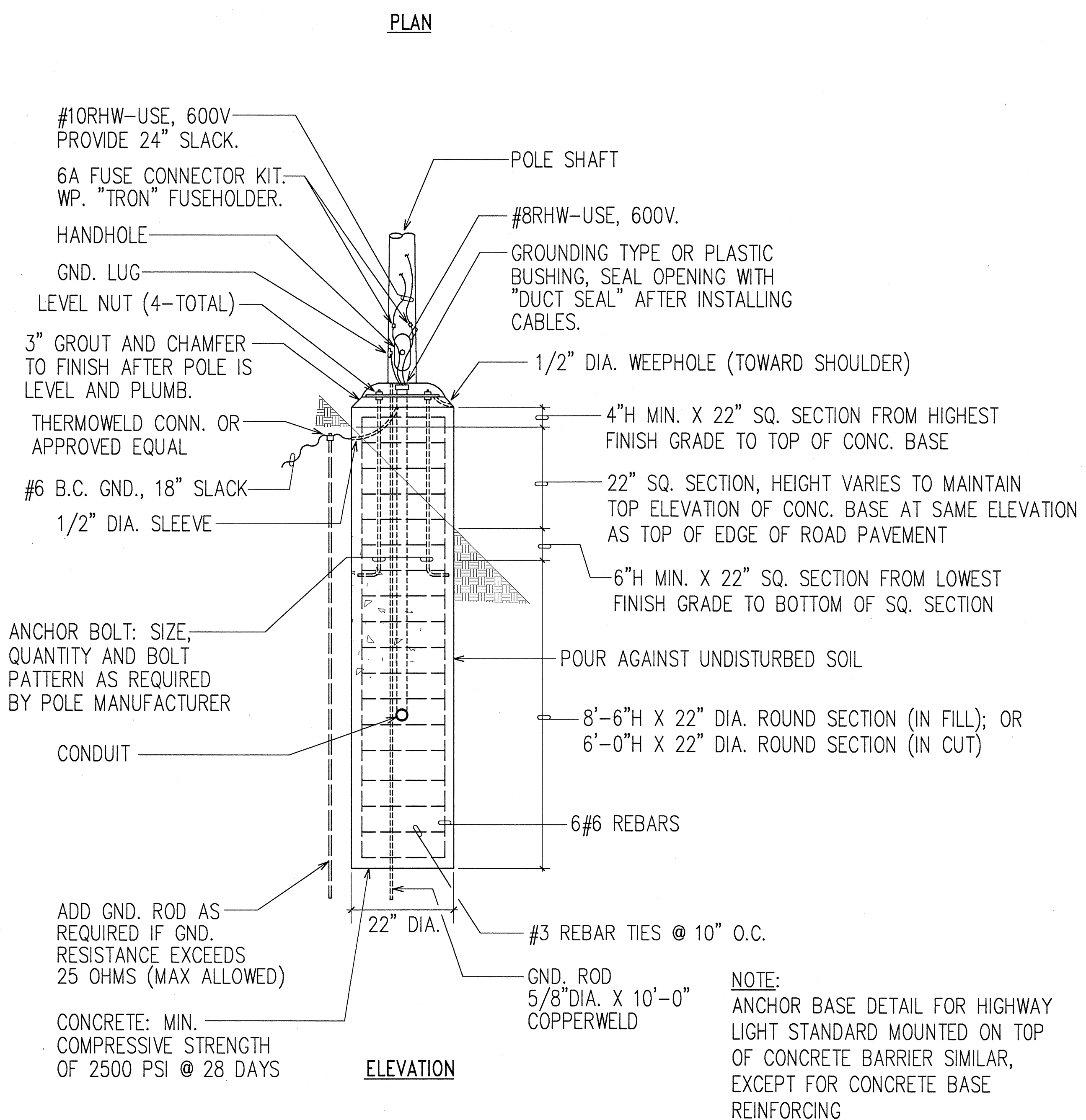
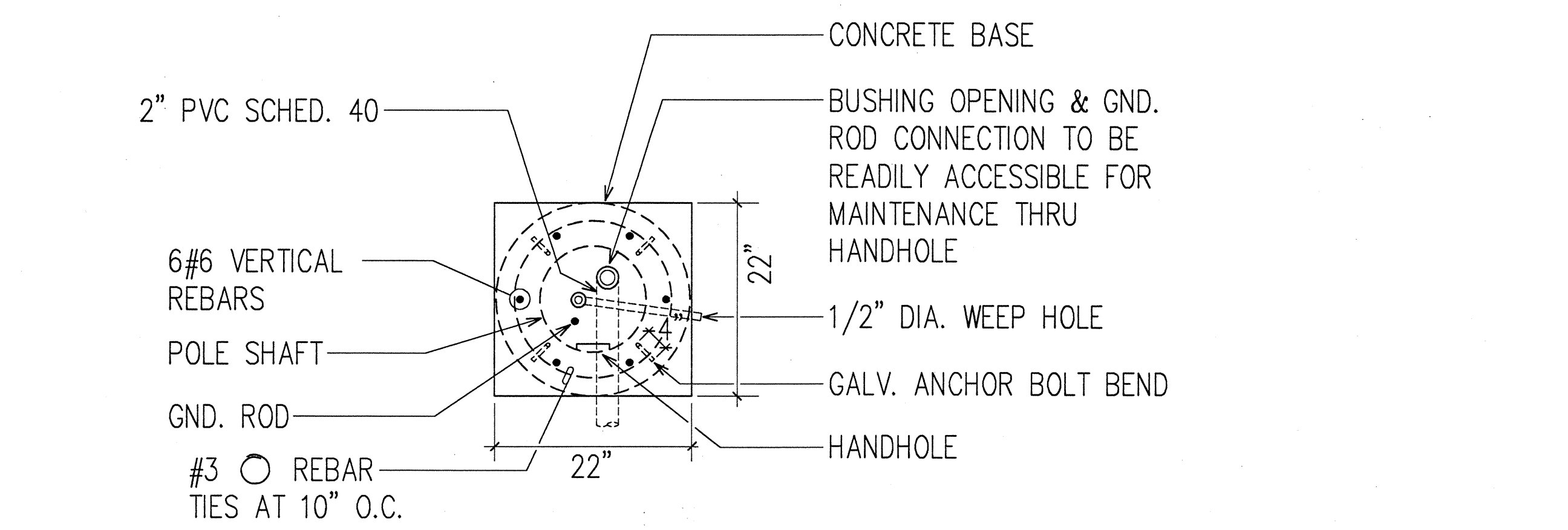
HIGHWAY LIGHTING DETAILS I

INTERSTATE ROUTE H-1
Makilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps

SCALE: AS NOTED DATE: APRIL 30, 1997

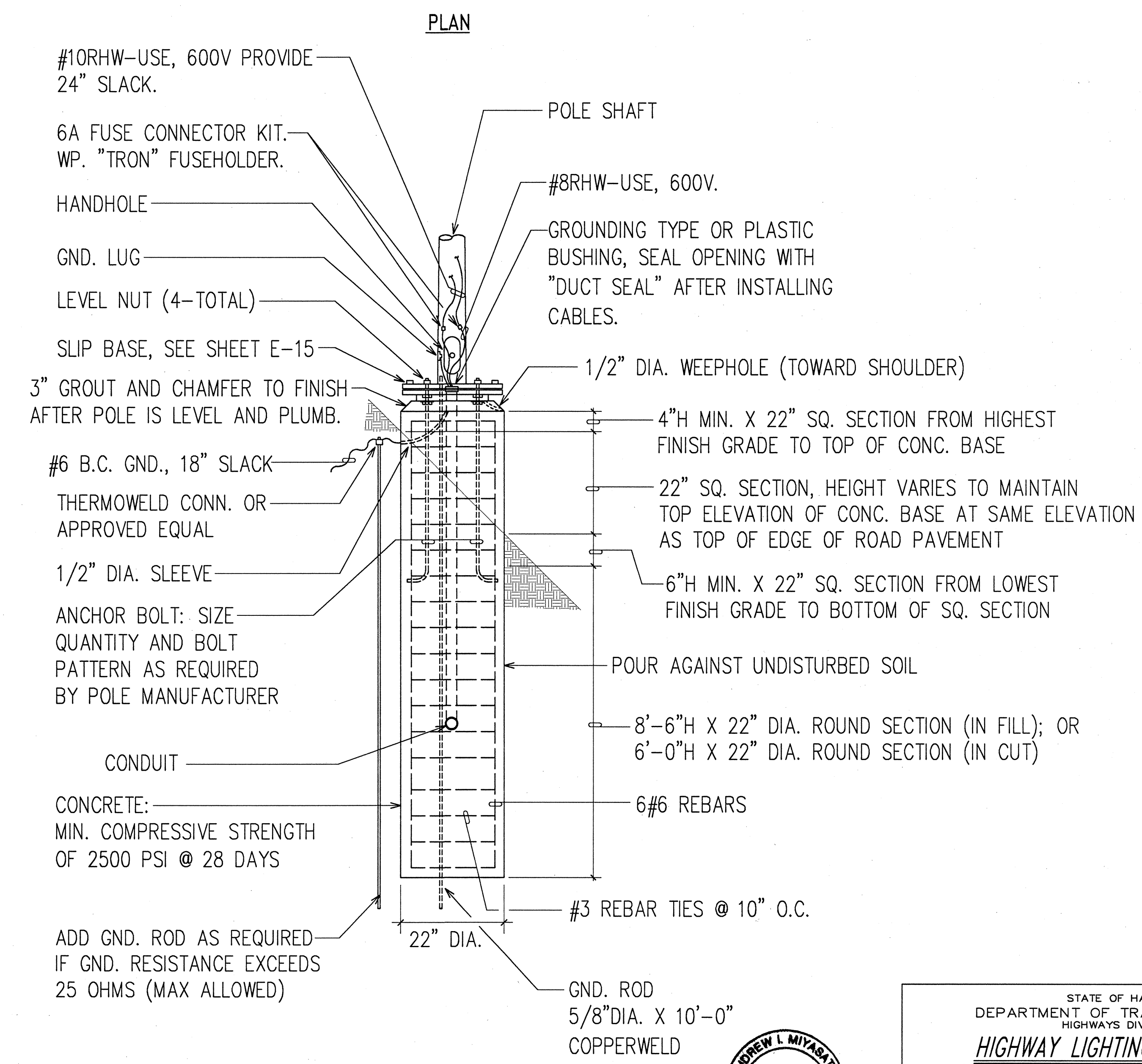
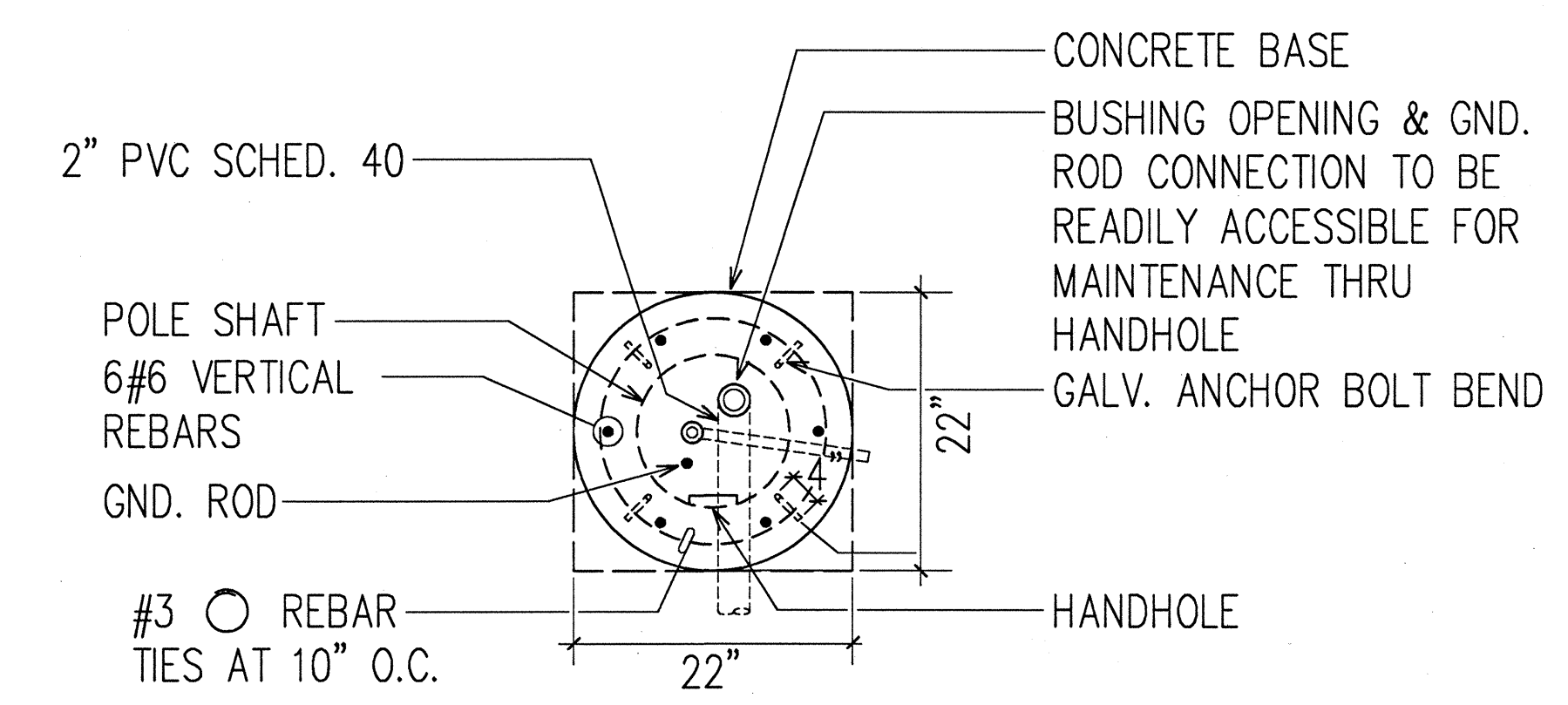
SHEET No. E-14 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	76	104



ANCHOR BASE DETAIL
NOT TO SCALE

NOTE:
ANCHOR BASE DETAIL FOR HIGHWAY LIGHT STANDARD MOUNTED ON TOP OF CONCRETE BARRIER SIMILAR, EXCEPT FOR CONCRETE BASE REINFORCING



SLIP BASE DETAIL
NOT TO SCALE



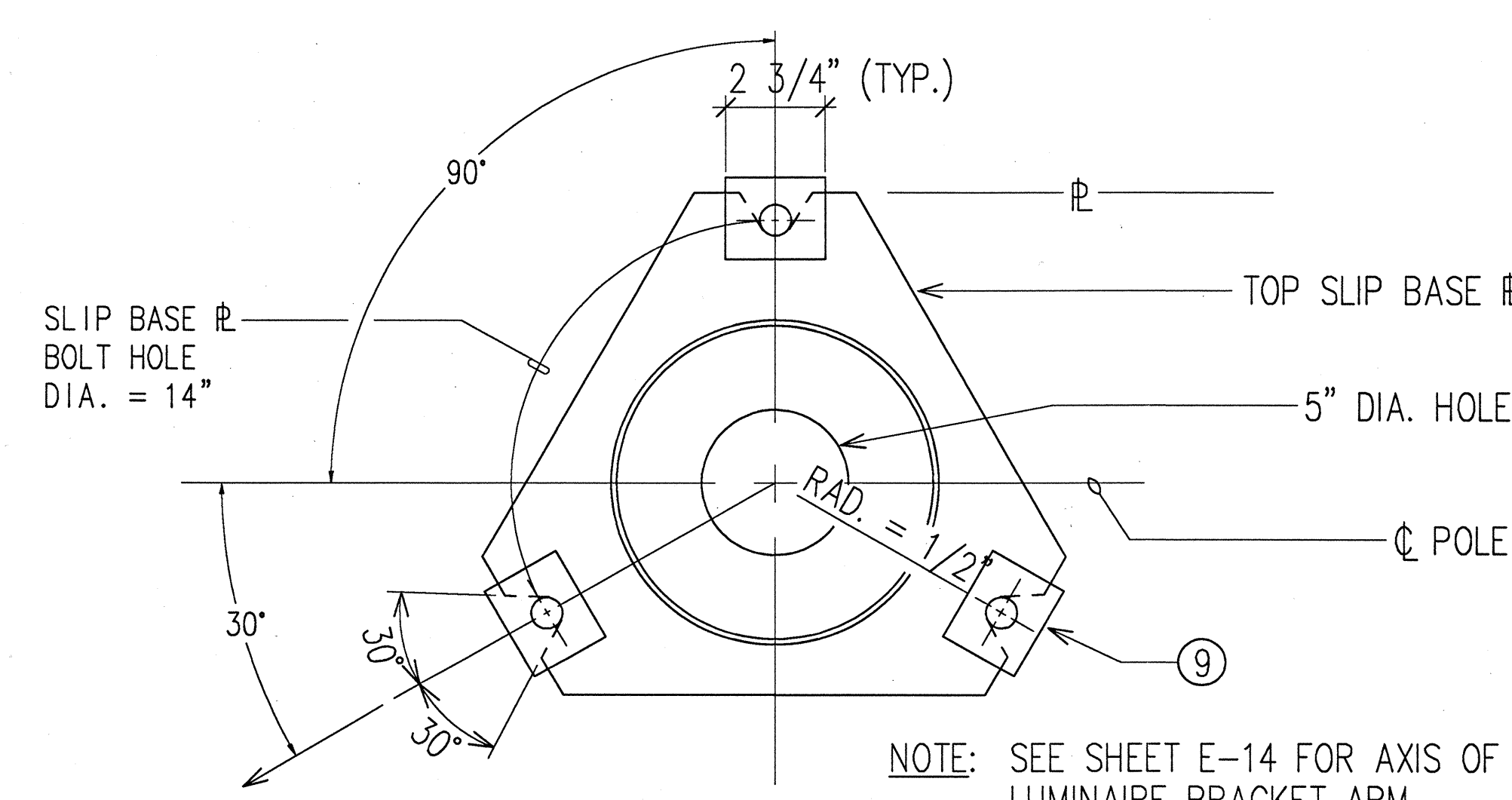
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Andrew L. Miyasato
4/25/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING DETAILS II

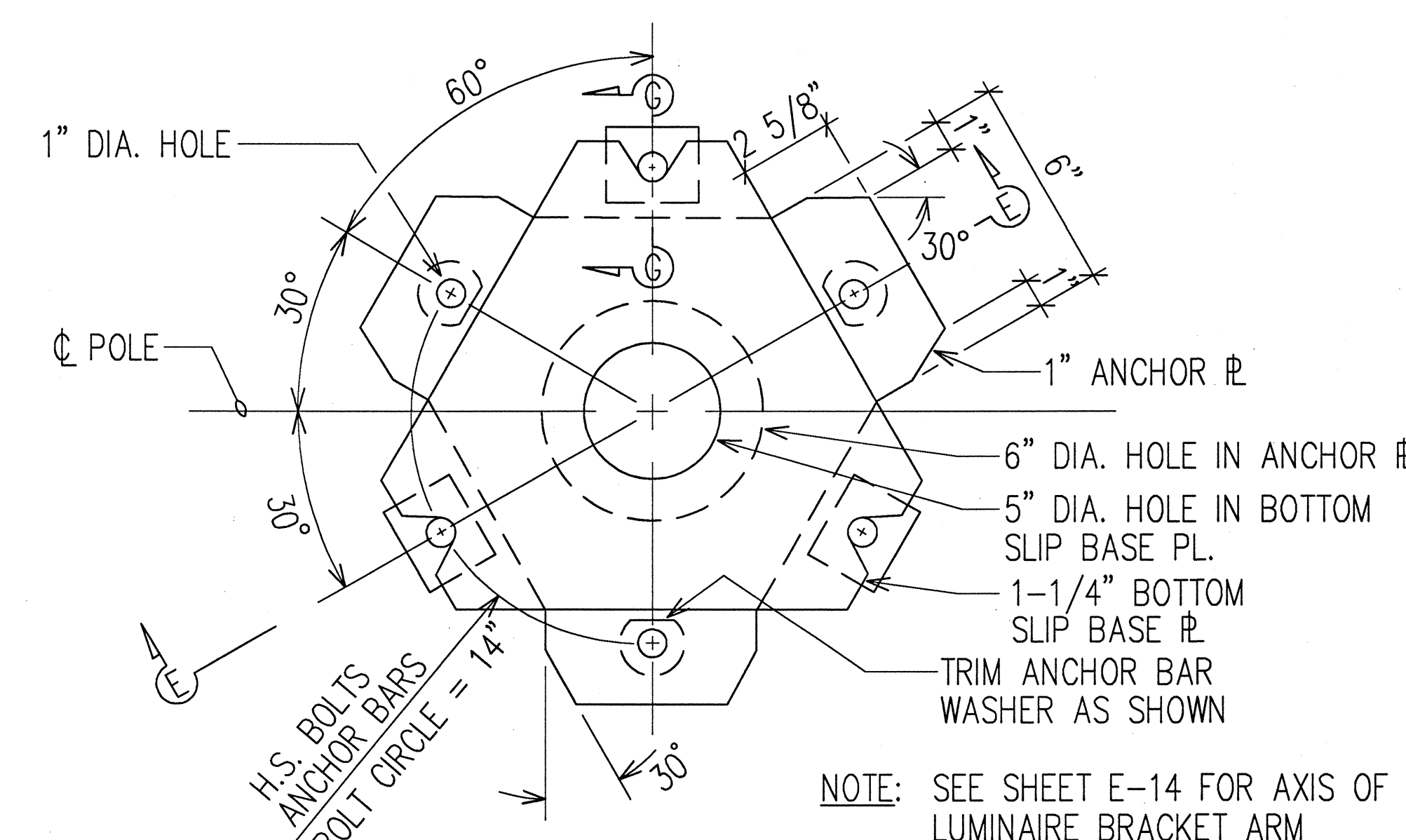
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps
SCALE: AS NOTED
DATE: APRIL 30, 1997
SHEET No. E-15 OF 33 SHEETS

DATE: 4/25/97
DESIGNED BY: [blank]
CHECKED BY: [blank]
NOTED BY: [blank]
ORIGINAL PLAN: [blank]
NO. 104 OF 104 SHEETS
HAWAII PROJECT NO. 1997-01

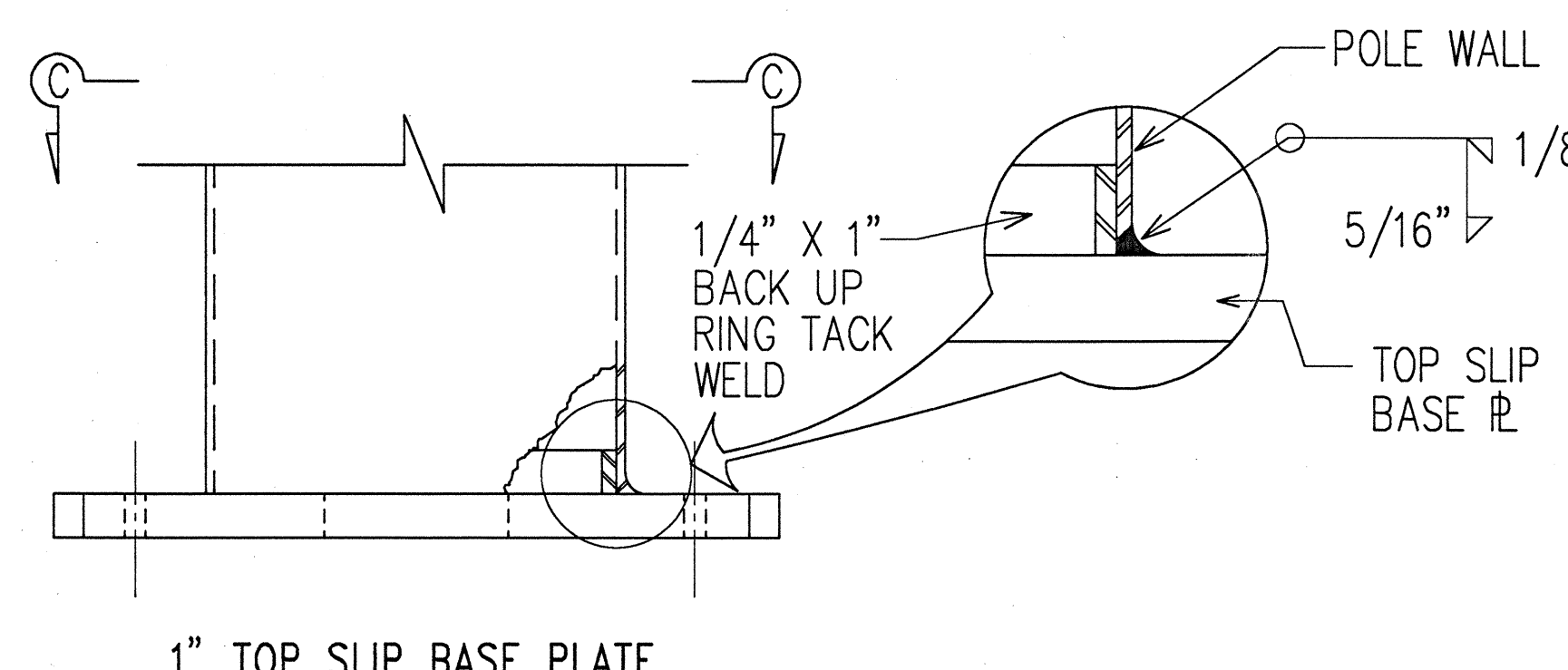
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	77	104



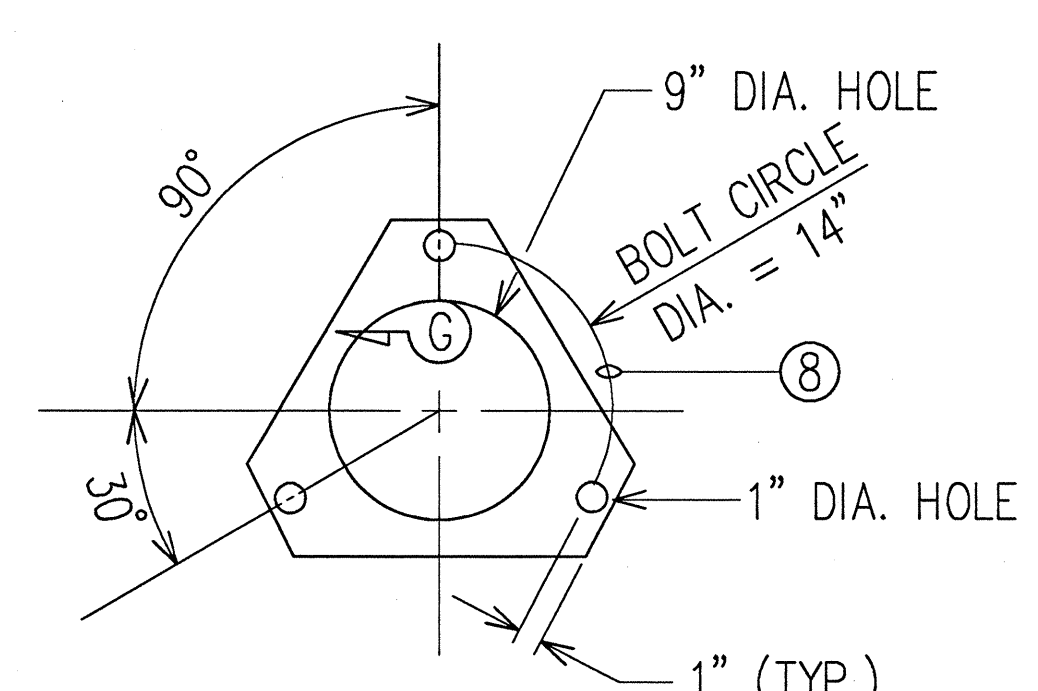
VIEW "C-C"



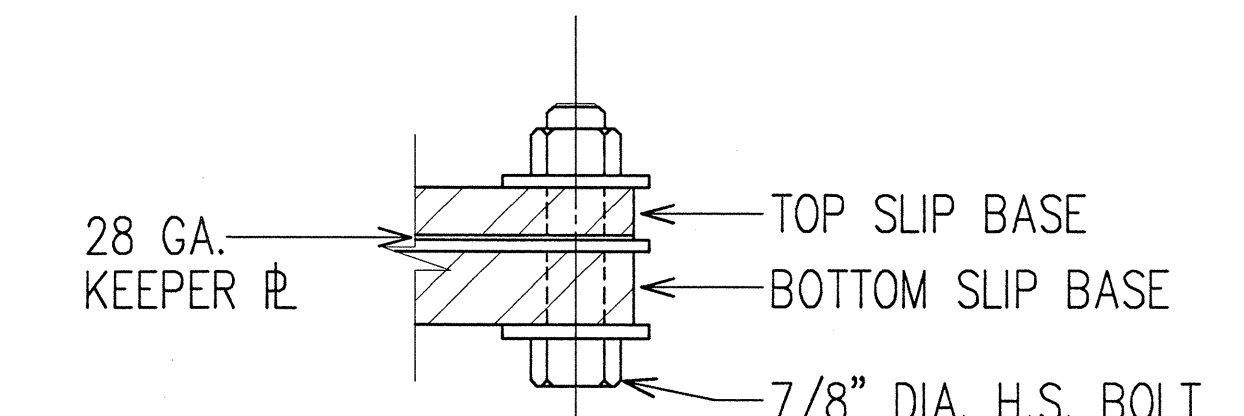
PLAN - BOTTOM PLATES



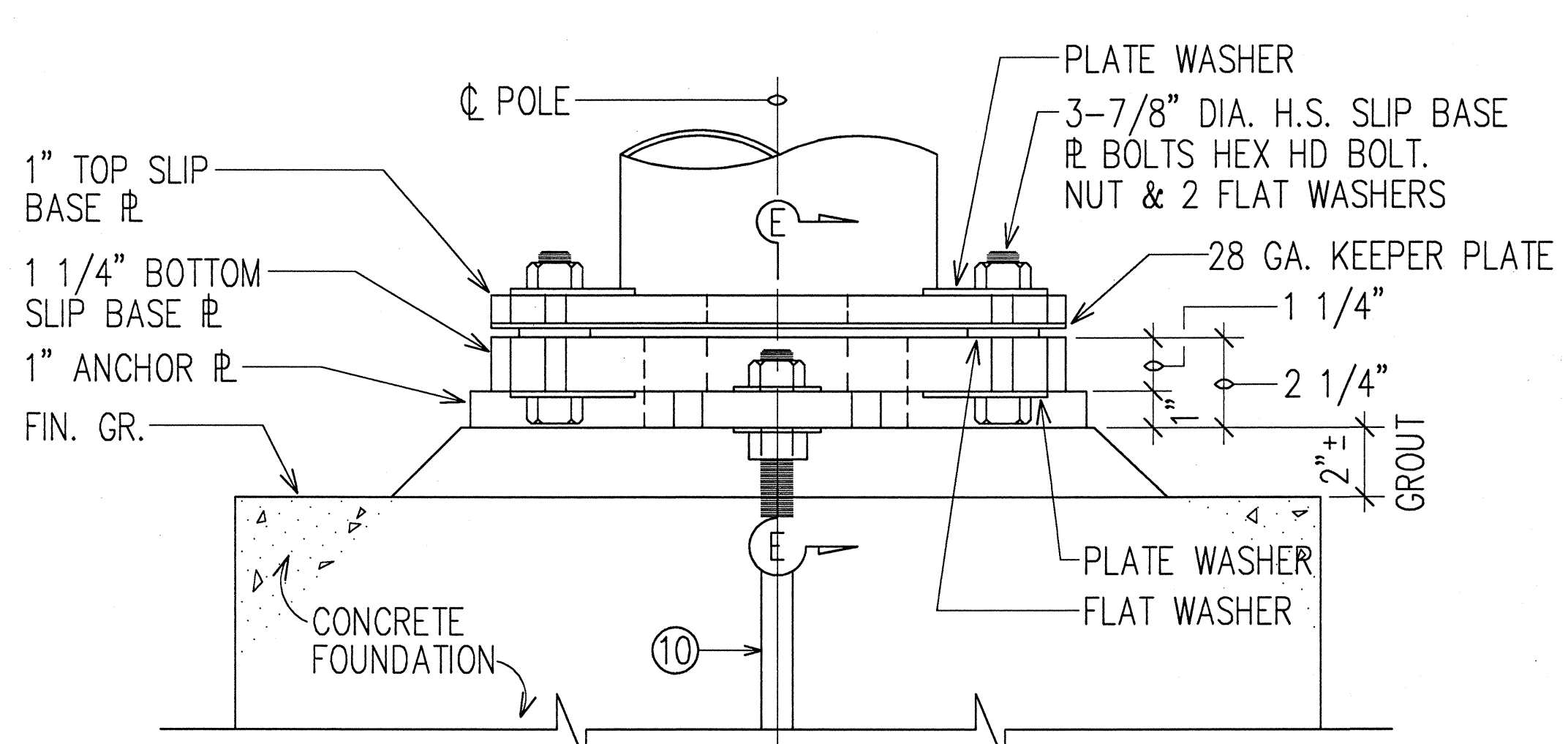
1" TOP SLIP BASE PLATE



28 GA. KEEPER PLATE



SECTION "G-G"



BOTTOM SLIP BASE PLATE

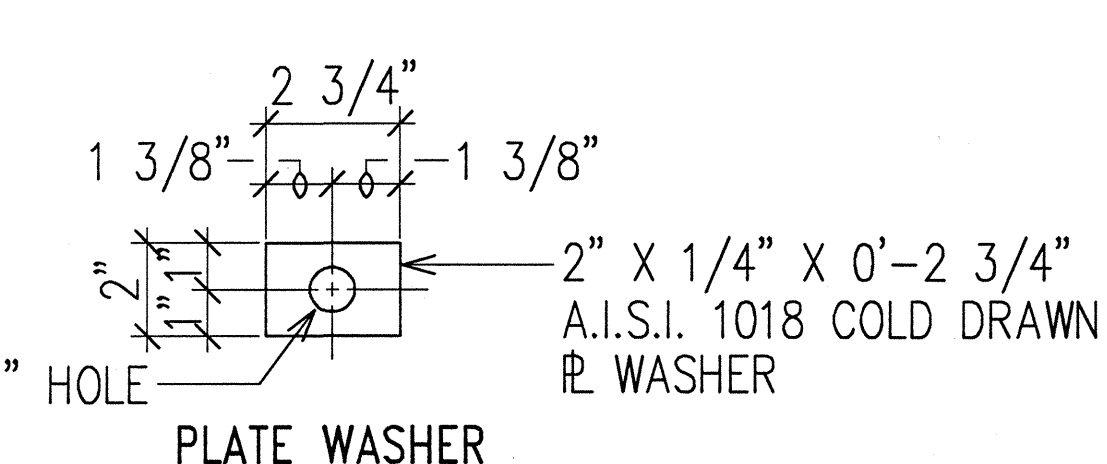
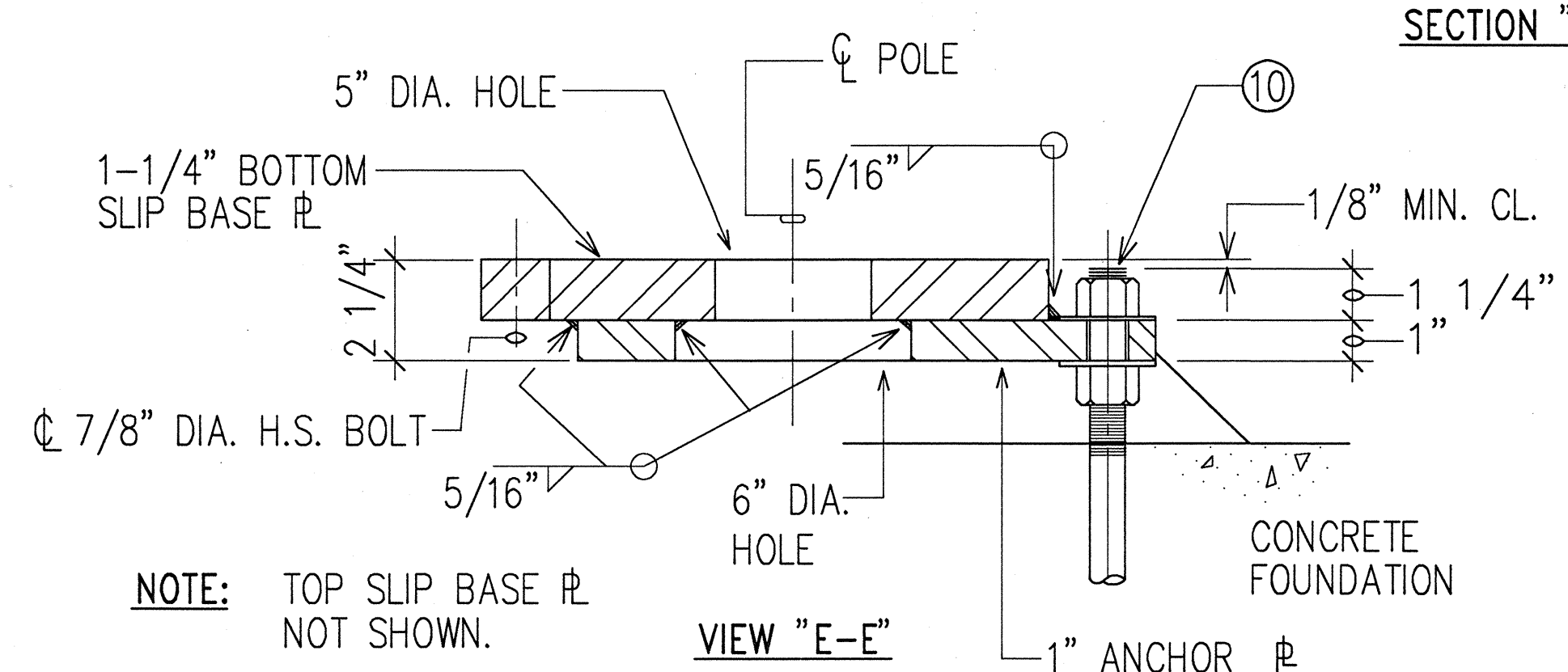
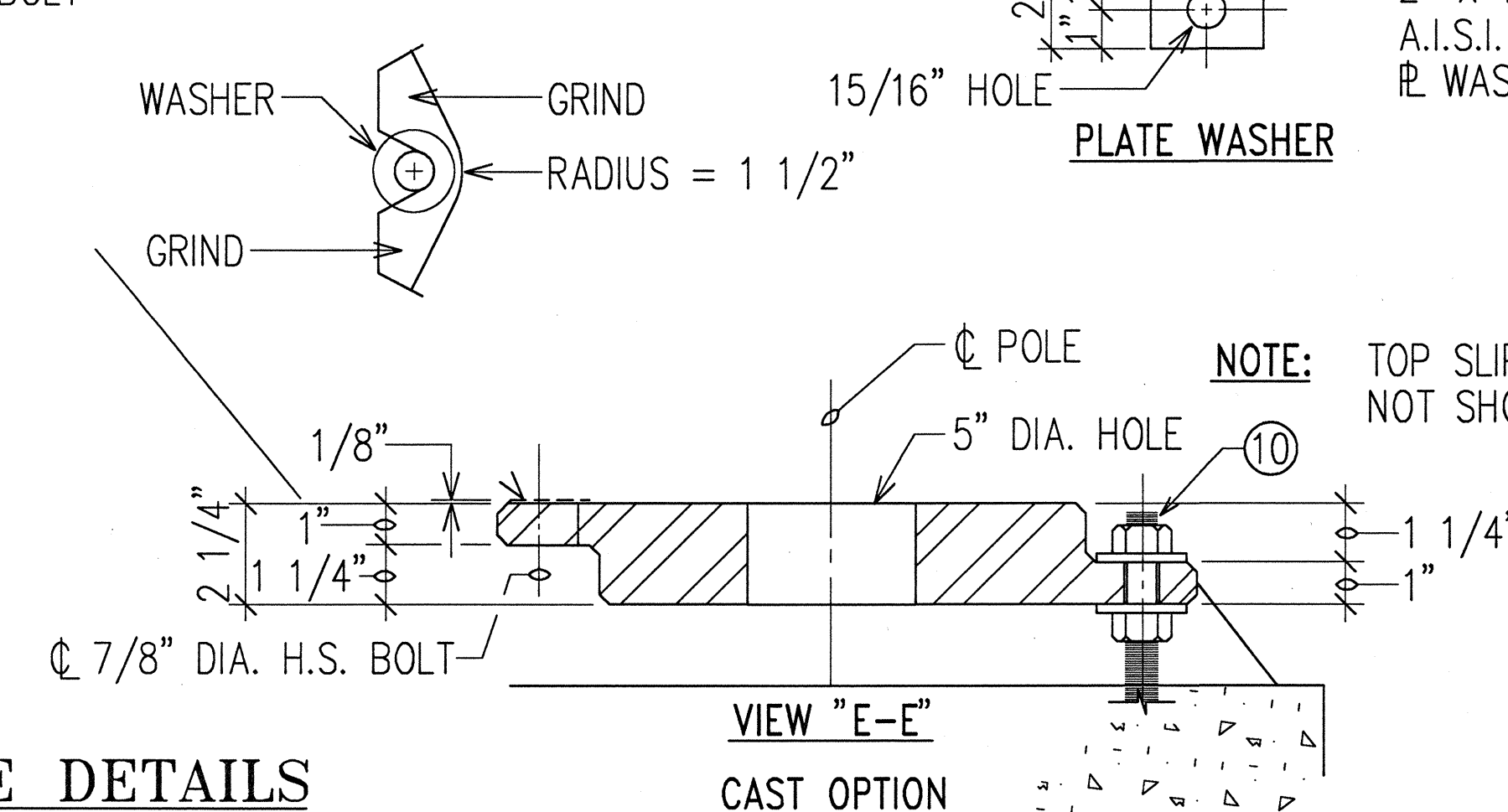


PLATE WASHER



VIEW "E-E"
WELDED OPTION



VIEW "E-E"
CAST OPTION

NOTES:

- ① ALL STEEL SHAFTS, PLATES, MAST ARMS, BOLTS, SCREWS, NUTS & WASHERS TO BE GALVANIZED AFTER FABRICATION OR MODIFICATION.
- ② PLATES TO CONFORM TO ASTM A-36.
- ③ CAST OPTION TO CONFORM TO ASTM A-486 CL. 90.
- ④ TORQUE 7/8" DIAMETER H.S. SLIP BASE PLATE BOLTS TO 84 FEET PER POUND.
- ⑤ 7/8" DIAMETER H.S. ANCHOR BARS, WRENCH TIGHTEN - TORQUE REQUIREMENT WAIVED.
- ⑥ FABRICATORS ELECTING LARGER THAN MINIMUM ARM DIAMETERS MUST ADJUST DETAILS AS REQUIRED TO PERMIT SOLID SEATING OF CAP SCREWS. IN LIEU OF TORQUE REQUIREMENTS FOR H.S. BOLTS, CAP SCREWS SHALL BE TIGHTENED BY THE TURN OF NUT METHOD 1/6 TURN FROM SNUG CONDITION. NO WASHER WILL BE REQUIRED.
- ⑦ 4" X 6 1/2" HANDHOLE REINFORCED WITH #3 GAUGE RING 1/2" WIDE WELDED TO OUTSIDE OF POLE COVER OF 10 GAUGE PLATE LOCATE 90 DEGREES OF MAST ARM UNLESS SHOWN OTHERWISE.
- ⑧ 28 GAUGE KEEPER PLATE, PLACE ON TOP OF MIDDLE FLAT WASHER, ASTM A-526 125 COMMERCIAL.
- ⑨ PLATE WASHER.
- ⑩ 3 - 7/8" DIAMETER H.S. BARS, THREAD 6" & GALVANIZED 10", WITH HEX. HEAD, NUT, LEVELING NUT & WASHER.
- ⑪ HEX. HEAD NUT SHOWN OR AS AN ALTERNATE DETAIL ANCHOR PLATES MAY BE RETAINED WITH 5/16" FILLET WELDS ALL AROUND OR FORMED HEADS.
- ⑫ ROUND TAPERED STEEL TUBE WITH MAXIMUM TAPER OF 0.15"/FOOT.
- ⑬ NO. 11 GAUGE SHEET STEEL OF WELDABLE GRADE ACCEPTABLE IF STEEL AFTER FABRICATION HAS A MINIMUM YIELD STRENGTH OF 40,000 P.S.I.

SURVEY PLOTTED BY: DATE: _____
 DESIGNED BY: _____
 CHECKED BY: _____
 NO. _____
 HAWAIIAN ELECTRIC ENGINEERS, INC.

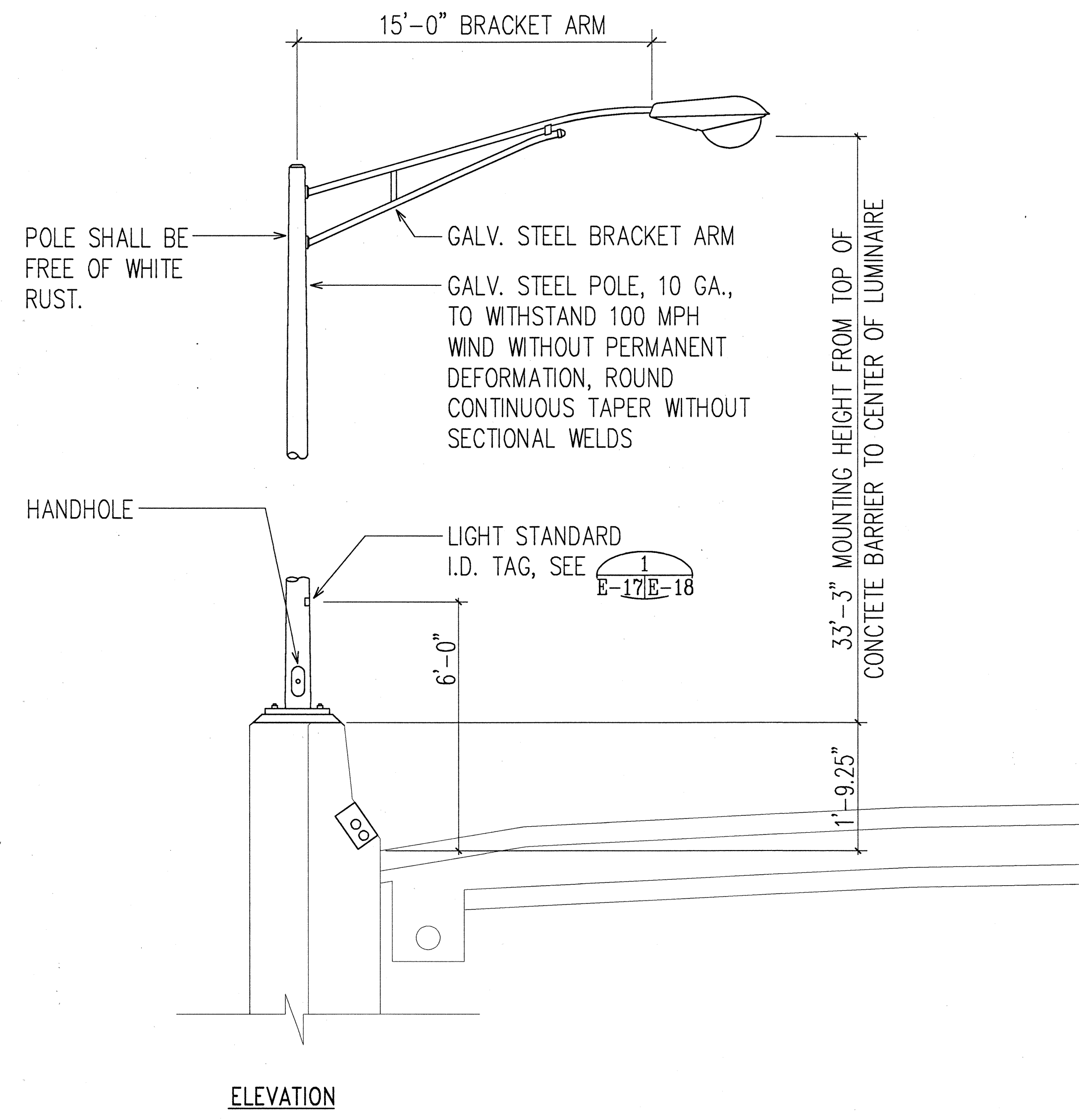
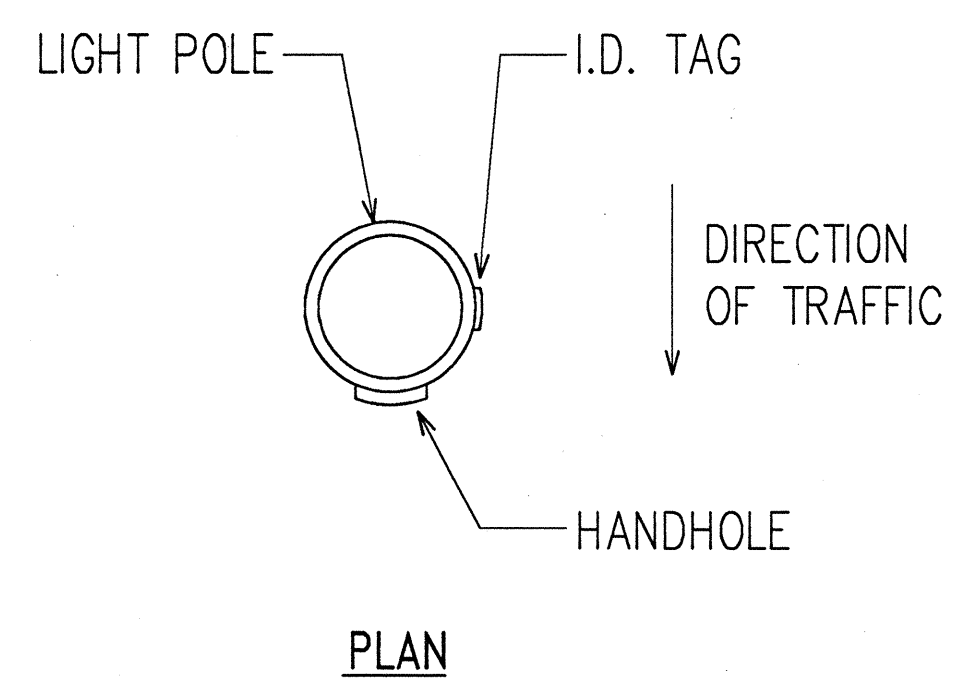
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 OR UNDER MY SUPERVISION.
 Andrew I. Miyamoto
 4/25/97
 RONALD N. S. HO & ASSOC., INC.
 ELECTRICAL ENGINEERS

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION
HIGHWAY LIGHTING DETAILS III
 INTERSTATE ROUTE H-1
 Makakilo Interchange Improvements
 to Westbound Off-Ramp and
 Eastbound On-Ramps
 SCALE: AS NOTED DATE: APRIL 30, 1997
 SHEET No. E-16 OF 33 SHEETS

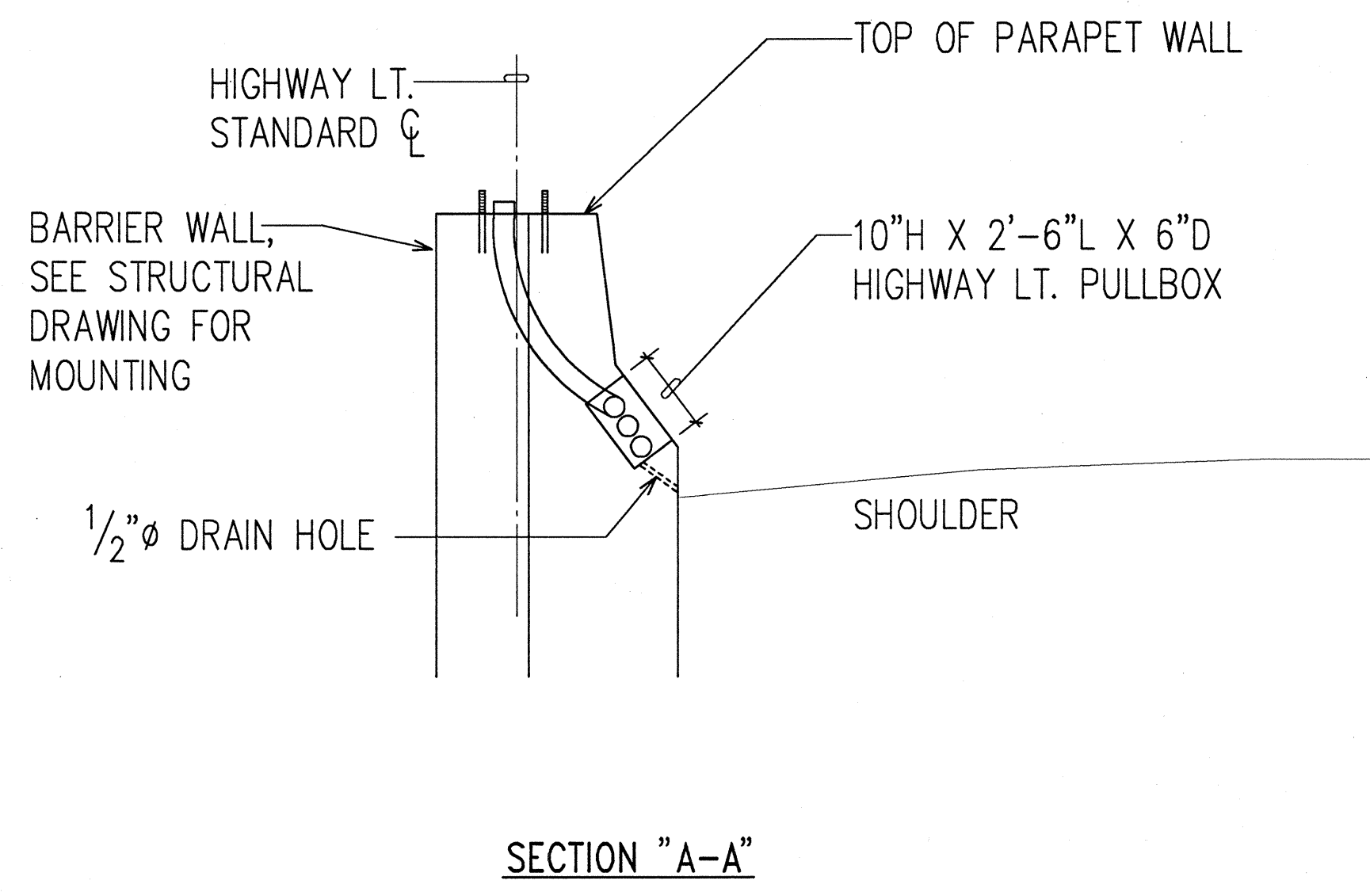
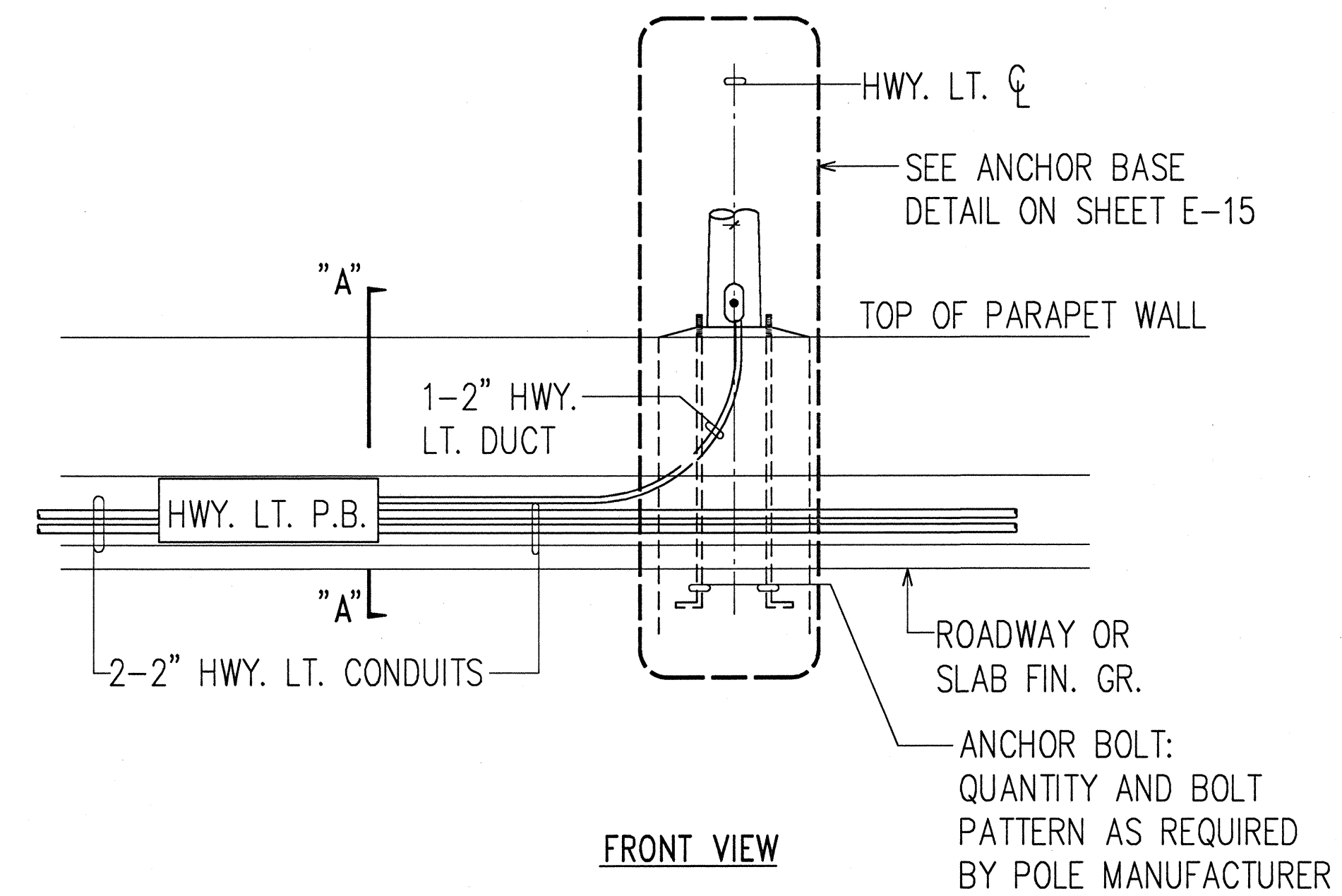
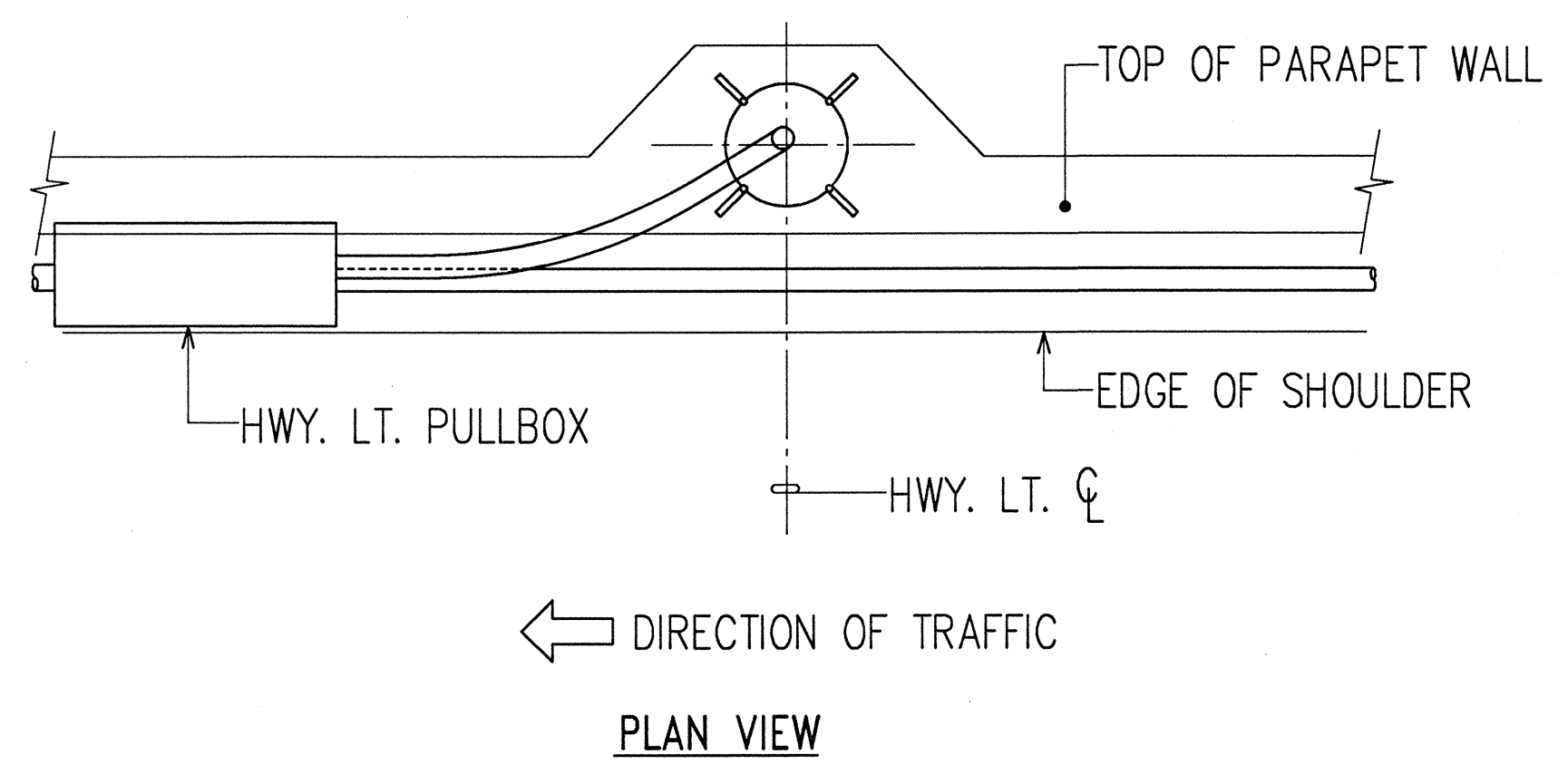
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	78	104

HARDWARE NOTES

1. ALL PLATES, BOLTS, AND NUTS TO BE HOT-DIPPED GALVANIZED AFTER FABRICATION.
2. ALL ANCHOR BOLTS SHALL BE SET AND PLACED BY MEANS OF LIGHT STANDARD SHOP DRAWING TEMPLATE.
3. REFER TO STRUCTURAL DRAWINGS FOR REINFORCING DETAILS.

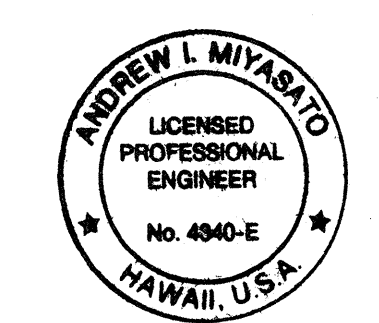


**CONCRETE BARRIER MOUNTED
HIGHWAY LIGHT STANDARD DETAIL**
NOT TO SCALE



**CONCRETE BARRIER MOUNTED HIGHWAY LIGHT
CONDUITS AND PULLBOX DETAILS**
NOT TO SCALE

DATE	_____
SURVEY PLOTTED BY	_____
DESIGNED BY	_____
NOTED BY	_____
CHECKED BY	_____
IN CHARGE	_____
PROJECT NO.	_____
SHEET NO.	78
TOTAL SHEETS	104

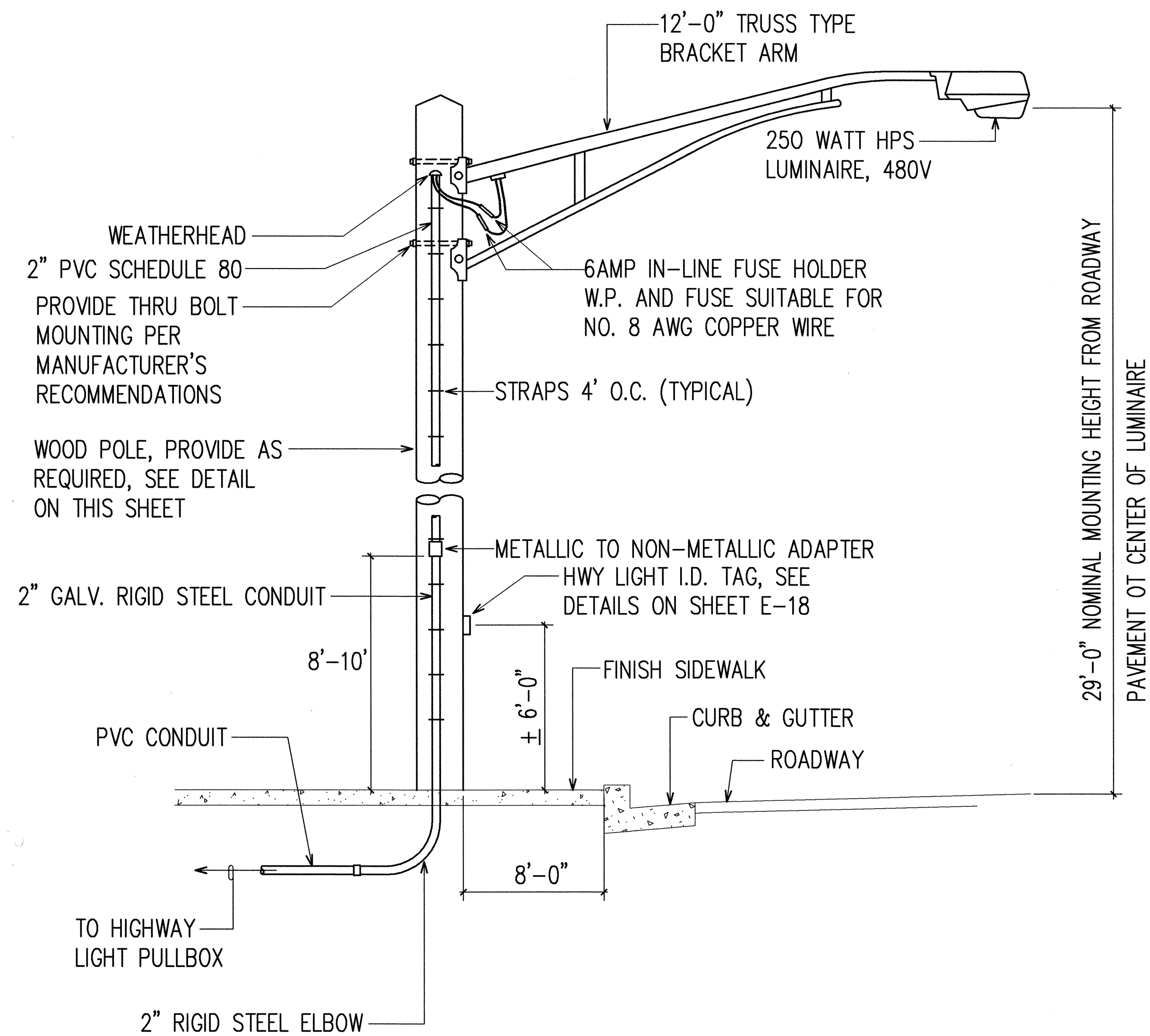


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4/25/97
RONALD R. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

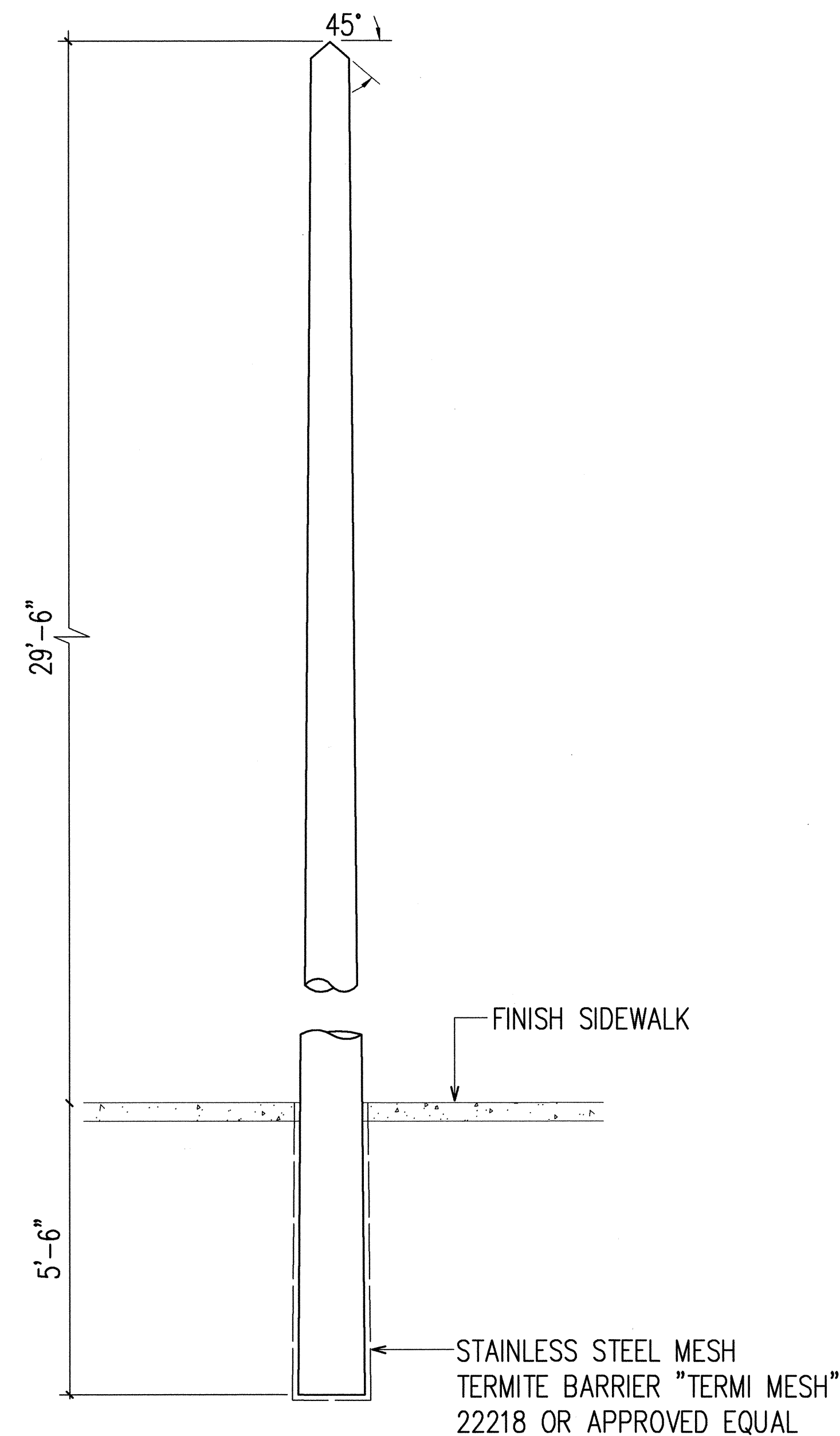
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING DETAILS IV

INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps
SCALE: AS NOTED
DATE: APRIL 30, 1997
SHEET No. E-17 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	C.O. 78S1	104A



WOOD POLE LUMINAIRE MOUNTING DETAIL
N.T.S.



NOTES:

1. MINIMUM TOP CIRCUMFERENCE IS 23" MINIMUM CIRCUMFERENCE AT 6'-0" FROM BUTT IS 37".
2. POLE SHALL BE TREATED WITH PENTACHLOROPHENOL USING THE "CELON" PROCESS. BY LICENSED TERMITE TREATMENT COMPANY.
3. TERMITE TREAT THE BOTTOM OF THE HOLE AND BACKFILL MATERIAL WITH AQUEOUS CHEMICAL SOLUTION CONSISTING OF 0.5% ALDRIN OR 0.5% DURSBN. MINIMUM 5 GALLONS OF THE SOLUTION SHALL BE USED FOR EACH HOLE. APPLICATION SHALL BE PERFORMED BY CONTRACTOR LICENSED FOR THIS TYPE OF WORK. TREATMENT SHALL BE DONE AS THE HOLE IS BEING BACKFILLED.

HIGHWAY LIGHTING WOOD POLE DETAIL
N.T.S.



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Andrew L. Miyasato
6/24/99
RONALD R. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

7/23/98	ADDED NEW SHEET
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION WOOD POLE MOUNTED HIGHWAY LIGHT DETAILS INTERSTATE ROUTE H-1 Makakilo Interchange Improvements to Westbound Off-Ramp and Eastbound On-Ramps SCALE: AS NOTED DATE: JULY 23, 1998 SHEET No.E-17A OF 33 SHEETS	

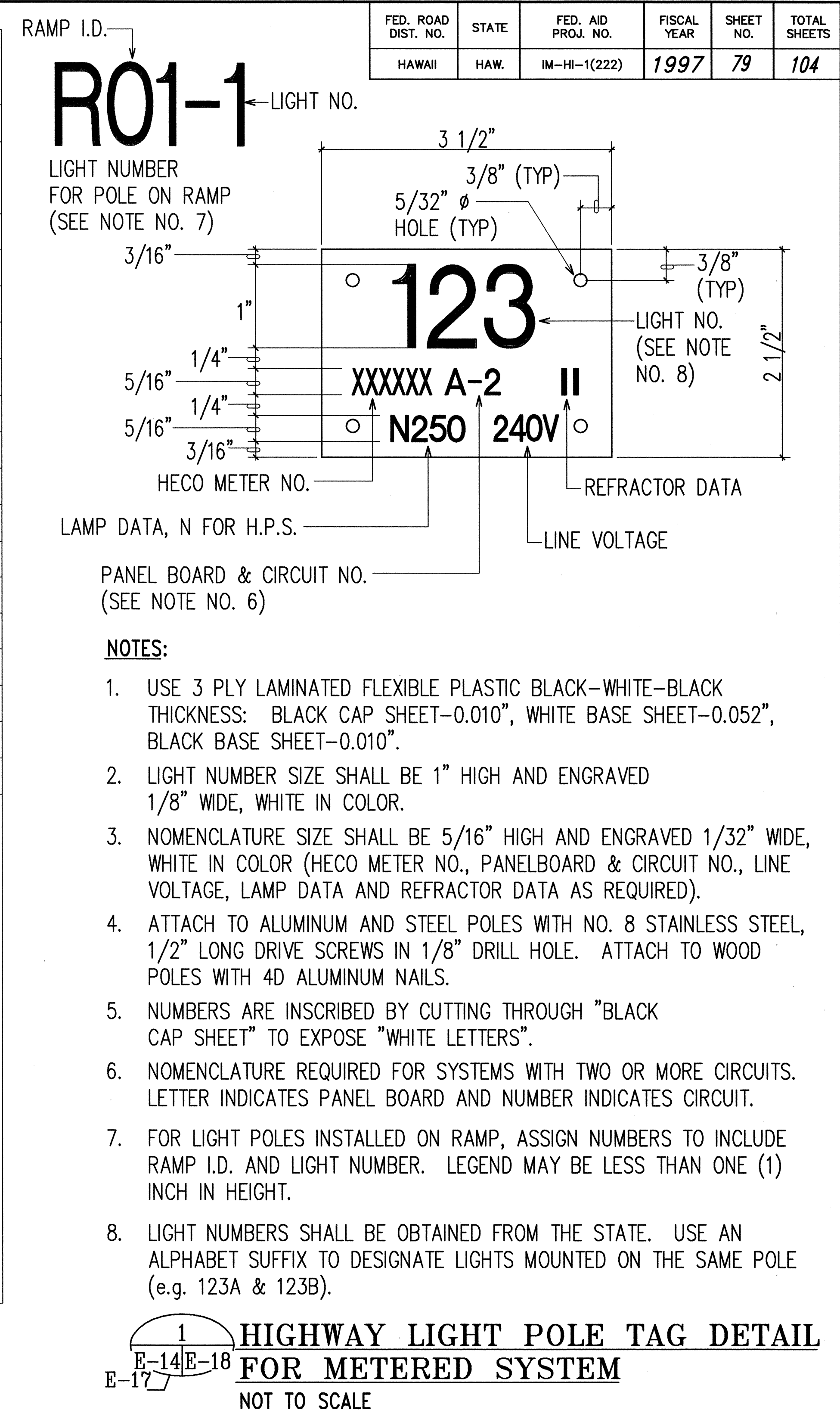
C.O. 78S1

ORIGINAL PLAN	DATE
DRAWN BY	
TRACED BY	
NOTED BY	
CHECKED BY	
APPROVED BY	
DATE	

LAST SAVE: 07/23/98 @ 10:00:02 BY: AM PLOT SC: 1'-0"=1'

ORIGINAL PLAN
DRAWN BY
DESIGNED BY
CHECKED BY
DATE
No. 1
LAST SAVE: 07/08/99
E:\VADO\PROJECTS\0000\001\070299A\00000178

HIGHWAY LIGHT ID TAG SCHEDULE													
HIGHWAY LIGHT STA. NUMBER	ID TAG ITEMS						HIGHWAY LIGHT STA. NUMBER	ID TAG ITEMS					
	LIGHT POLE NO.	METER NO.	CIRCUIT NO.	LINE VOLTAGE	LAMP DATA	REFRACTOR DATA		LIGHT POLE NO.	METER NO.	CIRCUIT NO.	LINE VOLTAGE	LAMP DATA	REFRACTOR DATA
M. DR 12+40	C1	441081	C7øAB	480V	N250	MSIII	MA 18+60	H20	441081	C5øAC	480V	N250	MSIII
MC 0+63	C2	441081	C7øAB	480V	N250	MSIII	H-1 116+10	H21	441081	C3øAC	480V	N250	MSIII
MC 0+70	C3	441081	C7øBC	480V	N250	MSIII	MA 20+30	H22	441081	C6øAC	480V	N250	MSIII
MC 2+30	C4	441081	C7øBC	480V	N250	MSIII	H-1 117+80	H23	441081	C4øAC	480V	N250	MSIII
MC 2+30	C5	441081	C7øAC	480V	N250	MSIII	MA 22+00	H24	441081	C5øBC	480V	N250	MSIII
MC 4+30	C6	441081	C7øAC	480V	N250	MSIII	H-1 119+45	H25	441081	C3øAB	480V	N250	MSIII
MC 4+30	C7	441081	C7øAB	480V	N250	MSIII	MA 23+70	H26	441081	C6øBC	480V	N250	MSIII
MC 6+25	C8	441081	C7øBC	480V	N250	MSIII	H-1 121+20	H27	441081	C4øAB	480V	N250	MSIII
MC 6+25	C9	441081	C7øAC	480V	N250	MSIII	MA 25+40	H28	441081	C5øAB	480V	N250	MSIII
MC 8+10	C10	441081	C7øAB	480V	N250	MSIII	H-1 122+90	H29	441081	C3øBC	480V	N250	MSIII
H-1 100+45	H1	441081	C3øAC	480V	N250	MSIII	H-1 124+60	H30	441081	C6øAB	480V	N250	MSIII
H-1 101+90	H2	441081	C4øAC	480V	N250	MSIII	H-1 124+60	H31	441081	C4øBC	480V	N250	MSIII
H-1 103+35	H3	441081	C3øAB	480V	N250	MSIII	H-1 126+30	H32	441081	C3øAC	480V	N250	MSIII
MA 6+95	H4	441081	C5øAB	480V	N250	MSIII	H-1 128+00	H33	441081	C3øAB	480V	N250	MSIII
H-1 104+45	H5	441081	C4øAB	480V	N250	MSIII	H-1 129+70	H34	441081	C4øAB	480V	N250	MSIII
MA 8+05	H6	441081	C6øAB	480V	N250	MSIII	H-1 131+40	H35	441081	C3øBC	480V	N250	MSIII
H-1 105+55	H7	441081	C3øBC	480V	N250	MSIII	<div>NOTES:</div> <div>1. VERIFY RAMP I.D. AND LIGHT POLE NUMBER WITH STATE D.O.T. PRIOR TO FABRICATION OF I.D. TAGS.</div> <div>2. VERIFY METER NUMBER WITH STATE D.O.T. PRIOR TO FABRICATION OF I.D. TAGS.</div>						
MA 9+25	H8	441081	C5øAC	480V	N250	MSIII							
H-1 106+75	H9	441081	C4øBC	480V	N250	MSIII							
MA 10+55	H10	441081	C6øAC	480V	N250	MSIII							
H-1 108+05	H11	441081	C3øAC	480V	N250	MSIII							
MA 11+95	H12	441081	C5øBC	480V	N250	MSIII							
MC 9+70	H13	441081	C4øAC	480V	N250	MSIII							
MA 13+55	H14	441081	C6øBC	480V	N250	MSIII							
MC 11+40	H15	441081	C3øAB	480V	N250	MSIII							
MA 15+20	H16	441081	C5øAB	480V	N250	MSIII							
MC 12+95	H17	441081	C4øAB	480V	N250	MSIII							
MA 16+90	H18	441081	C6øAB	480V	N250	MSIII							
H-1 114+40	H19	441081	C3øBC	480V	N250	MSIII							



ANDREW L. MIYASATO

LICENSED PROFESSIONAL ENGINEER

No. 4340-E

HAWAII, U.S.A.

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Andrew L. Miyasato

7/8/99

RONALD N. S. HO & ASSOC., INC.

ELECTRICAL ENGINEERS

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

HIGHWAY LIGHTING DETAILS V

INTERSTATE ROUTE H-1

Makilo Interchange Improvements

to Westbound Off-Ramp and

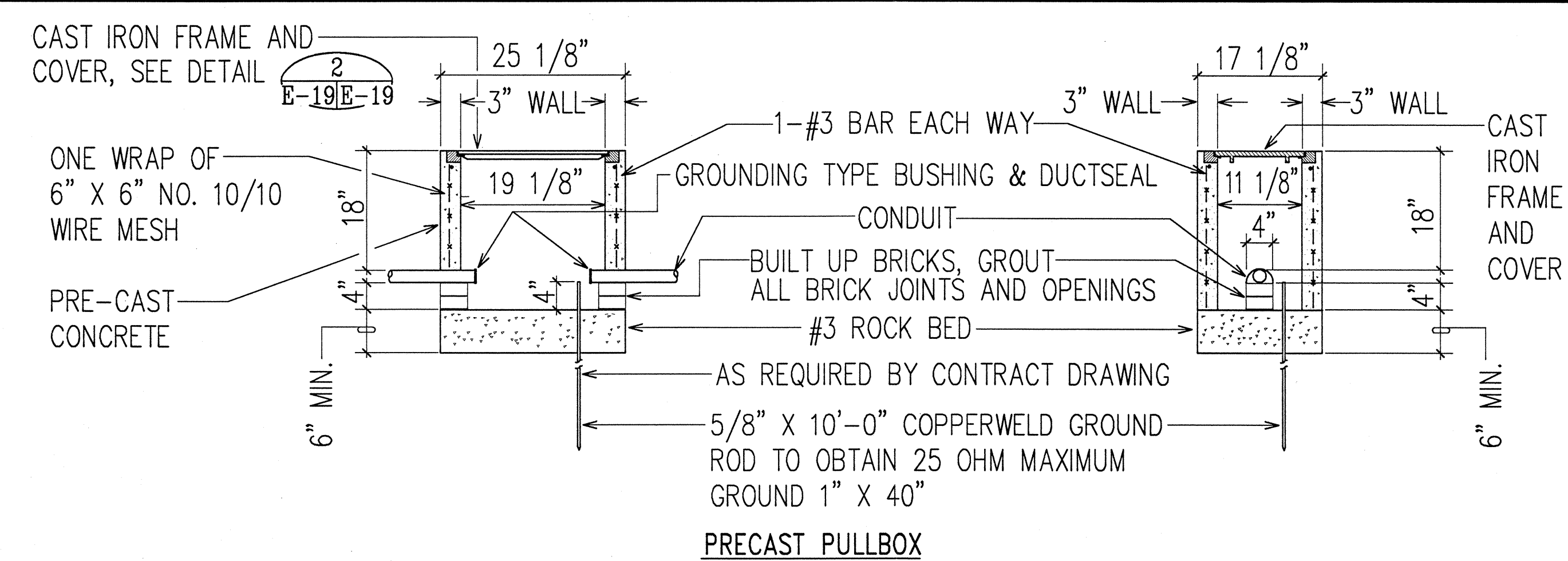
Eastbound On-Ramps

SCALE: AS NOTED

DATE: APRIL 30, 1997

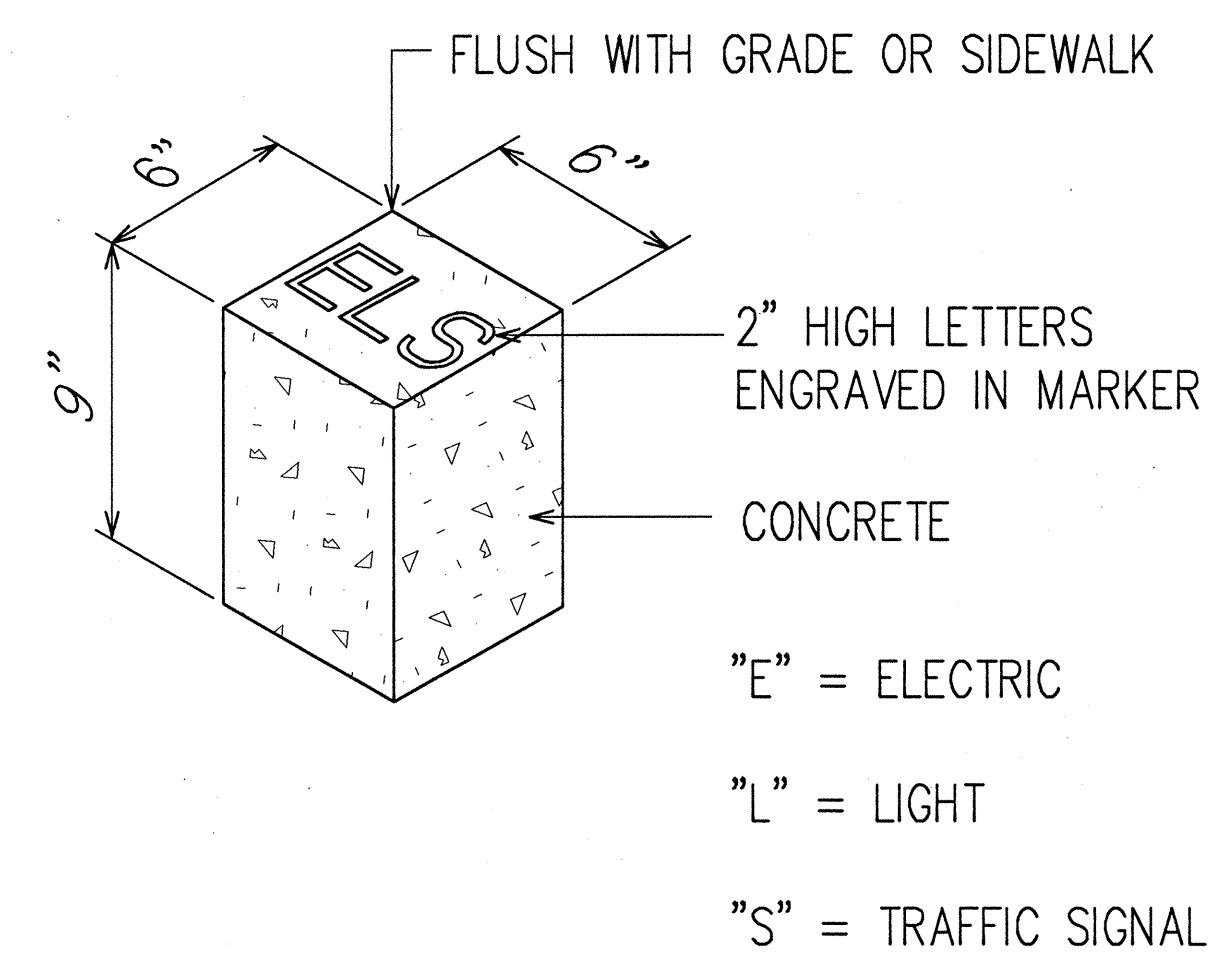
SHEET No. E-18 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	80	104

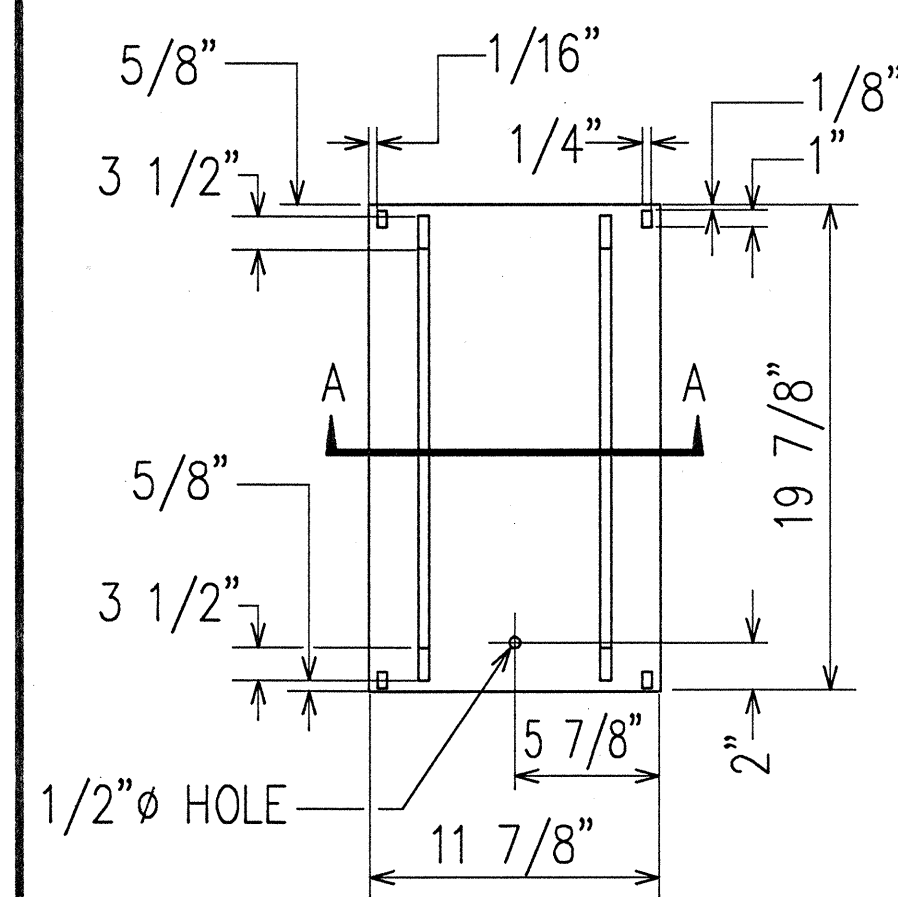


NOTE: SUBMIT SHOP DRAWINGS FOR BOX, FRAME AND COVER FOR MATERIAL APPROVAL.

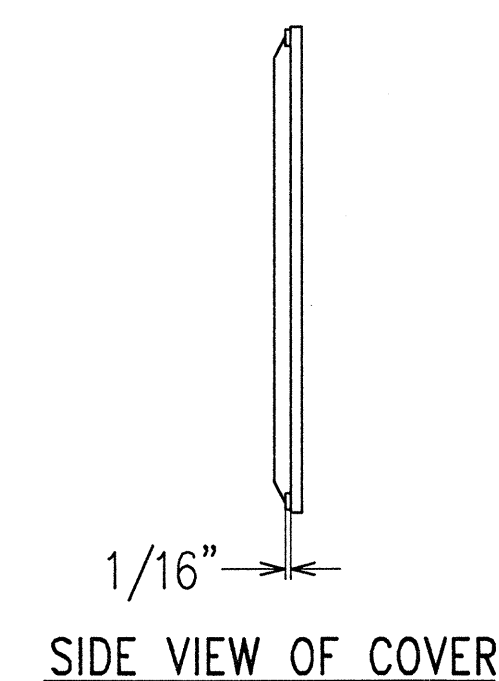
1 SLD-1 STREET LIGHT PULLBOX DETAIL
E-19E-19 NOT TO SCALE



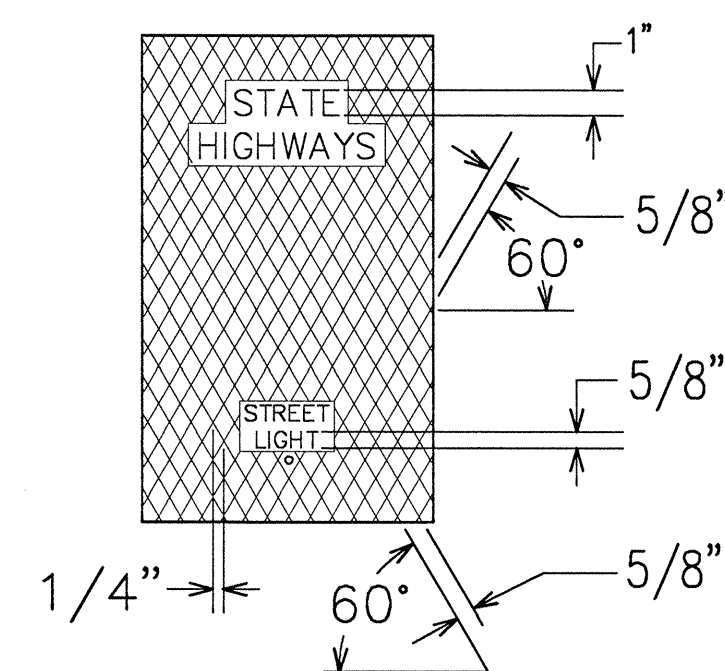
3 CONDUIT STUB-OUT MARKER
E-24E-19 NOT TO SCALE



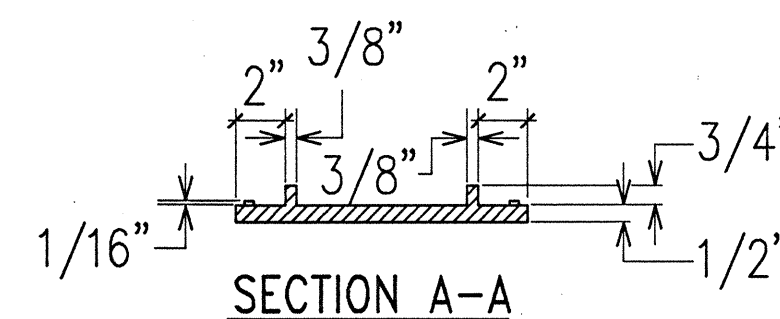
BACK VIEW OF COVER



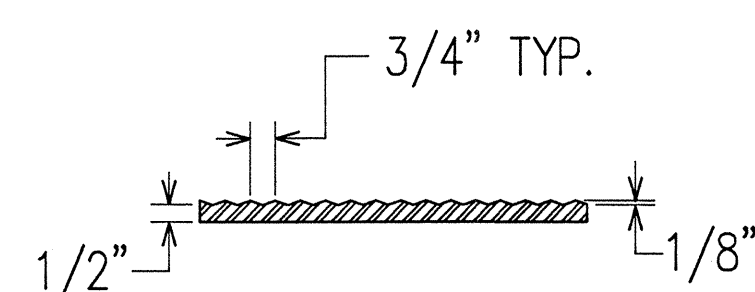
SIDE VIEW OF COVER



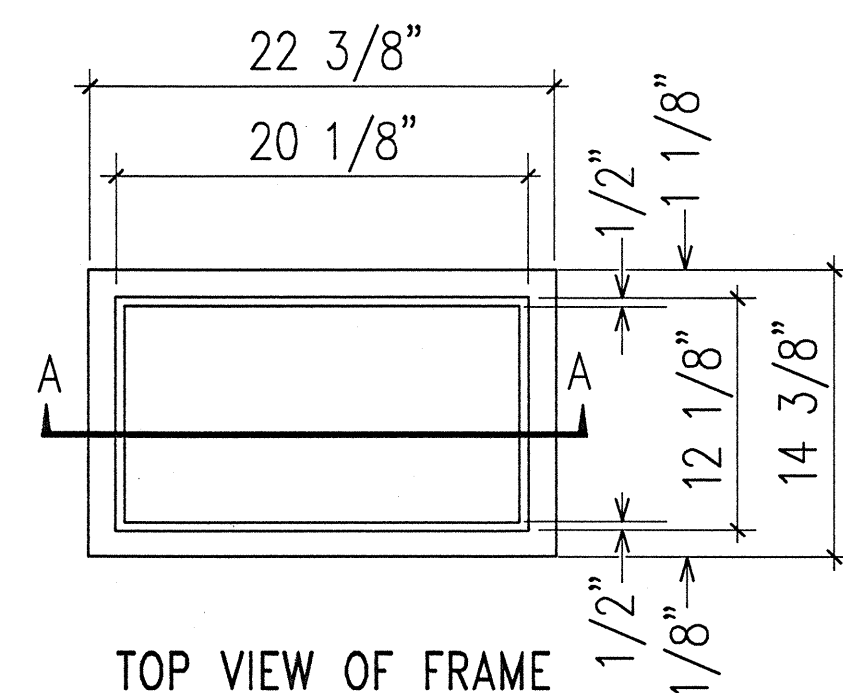
TOP VIEW OF PLATE COVER



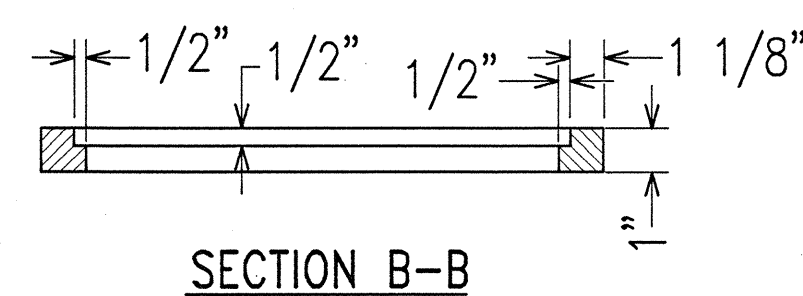
SECTION A-A



SECTION THROUGH COVER



TOP VIEW OF FRAME



SECTION B-B

NOTE:

1. SIDES OF COVER ARE SLIGHTLY BEVELED TO FACILITATE INSTALLATION. BEVEL IS INWARD FROM TOP TO BOTTOM.
2. TO BE CAST FROM GREY IRON.
3. TO COVER SLD-1 STREET LIGHT PULLBOX: SEE DETAIL E-19E-19

2 CAST IRON FRAME AND COVER (SLD-1) DETAIL
E-19E-19 NOT TO SCALE

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

LAST SAVE: 04/23/97 09:14:52 BY: RY PLOT SC 1'-0"=1'



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4/25/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

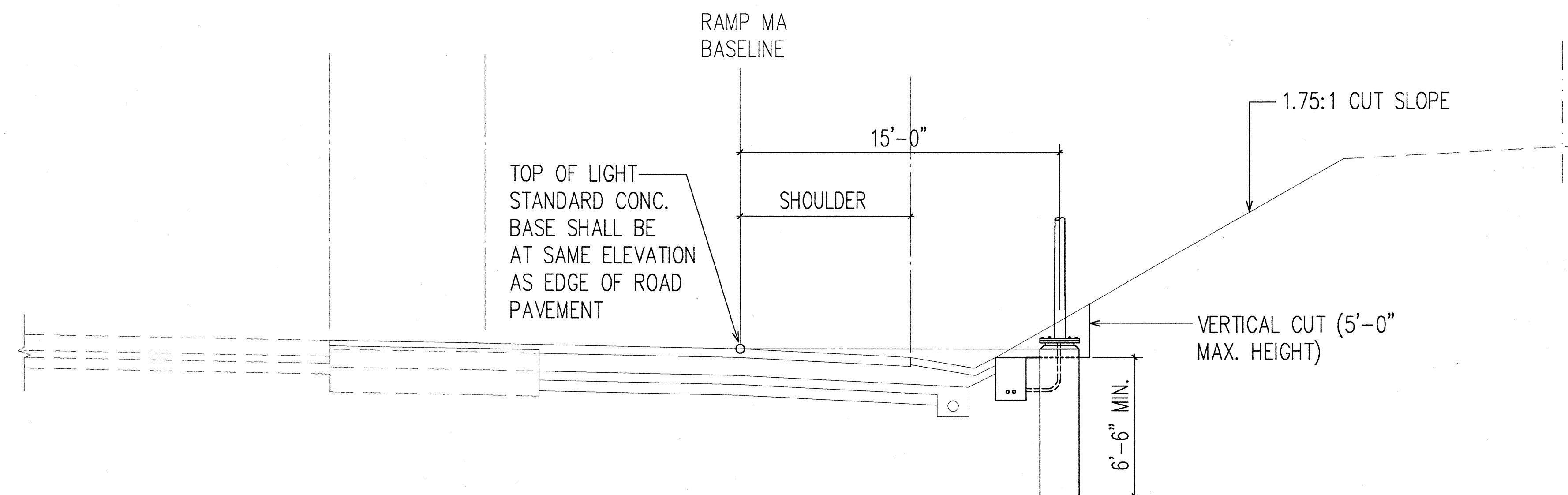
HIGHWAY LIGHTING DETAILS VI

INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps

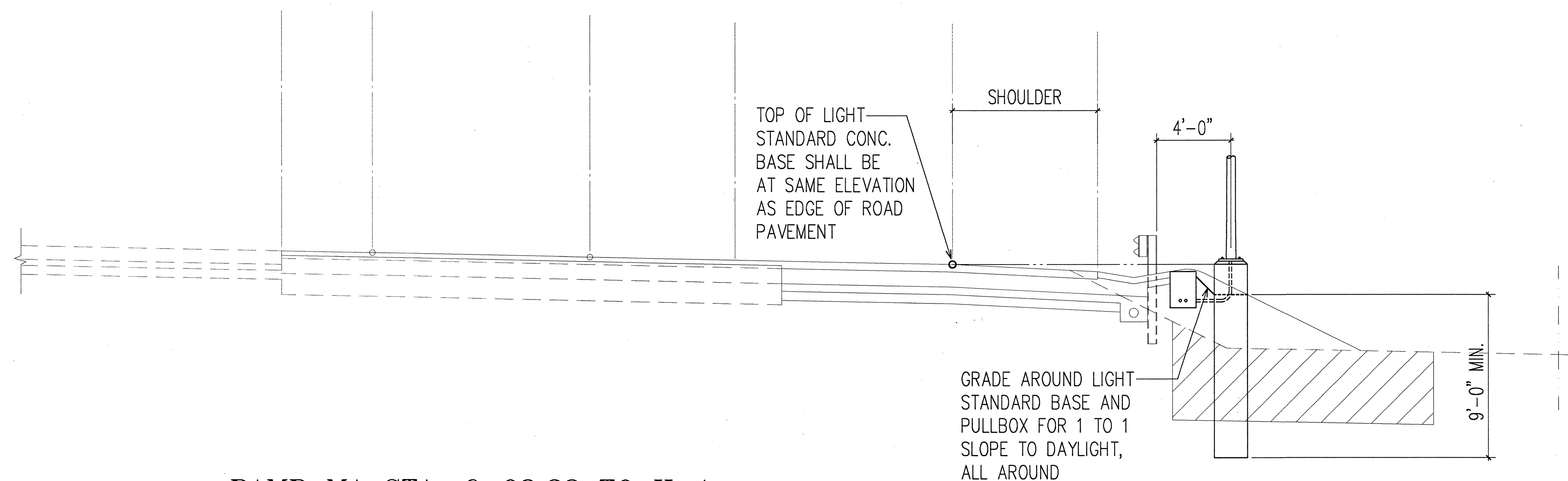
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SHEET No. E-19 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	81	104



H-1 STA. 113+00 TO STA. 124+80



RAMP MA STA. 6+98.32 TO H-1

TYPICAL ROAD SECTIONS WITH POLE AND PULLBOX LOCATION DETAILS I
NOT TO SCALE

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DESIGNED BY	" "
QUANTITIES BY	CHECKED BY	" "
No. 1000		

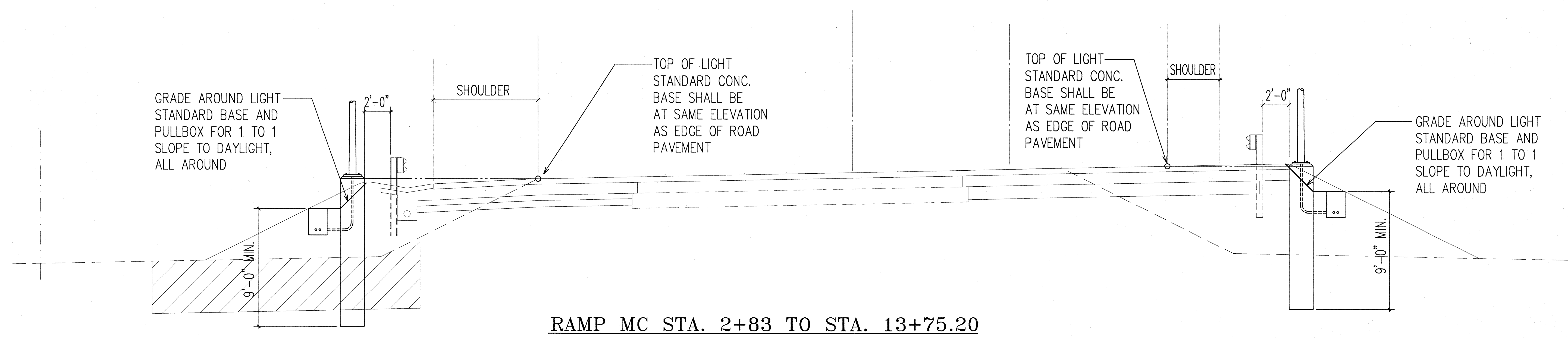
LAST REV. 04/20/97
BY: ANDREW L. MIYASATO
HAWAIIAN ENGINEERING ASSOCIATES, INC.



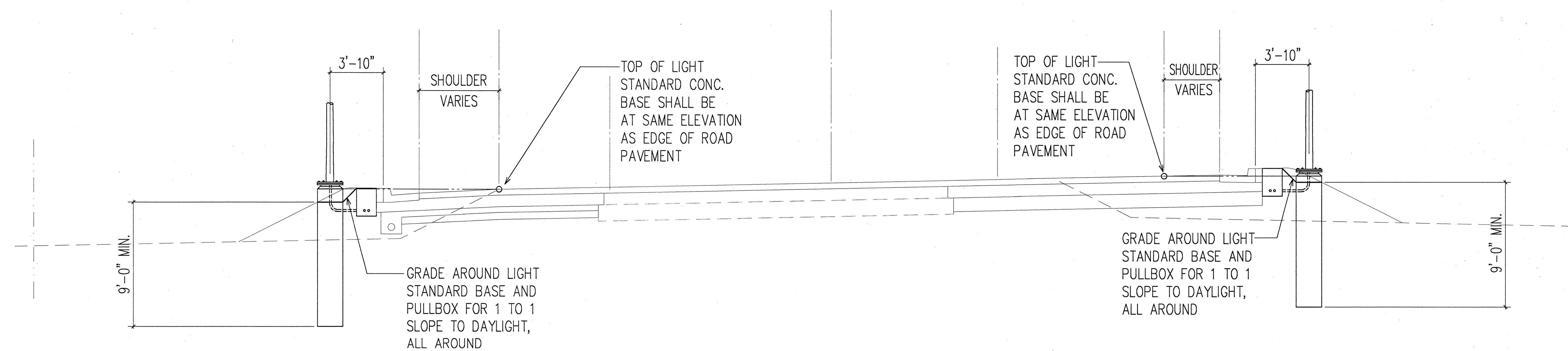
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Andrew L. Miyasato
4/25/97
RONALD A. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**ROAD SECTIONS WITH POLE AND
PULLBOX LOCATION DETAILS I**
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps
SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-20 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	82	104



RAMP MC STA. 2+83 TO STA. 13+75.20

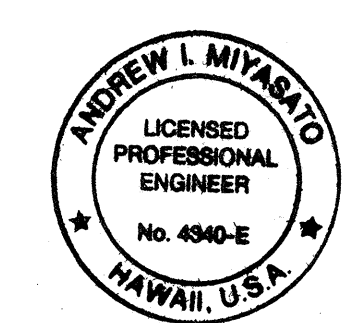


RAMP MC STA. 0+27 TO STA. 2+83

TYPICAL ROAD SECTIONS WITH POLE AND PULLBOX LOCATION DETAILS II
NOT TO SCALE

ORIGINAL PLAN	DATE
DRAWN BY	
DESIGNED BY	
NOTED BY	
CHECKED BY	
NO.	

LAST SAVE: 04/23/97 14:18:23 BY: RHP/SC/143
L:\PROJECTS\HAWAII\HAWAIIAN\HAWAIIAN.DWG



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4/25/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ROAD SECTIONS WITH POLE AND PULLBOX LOCATION DETAILS II

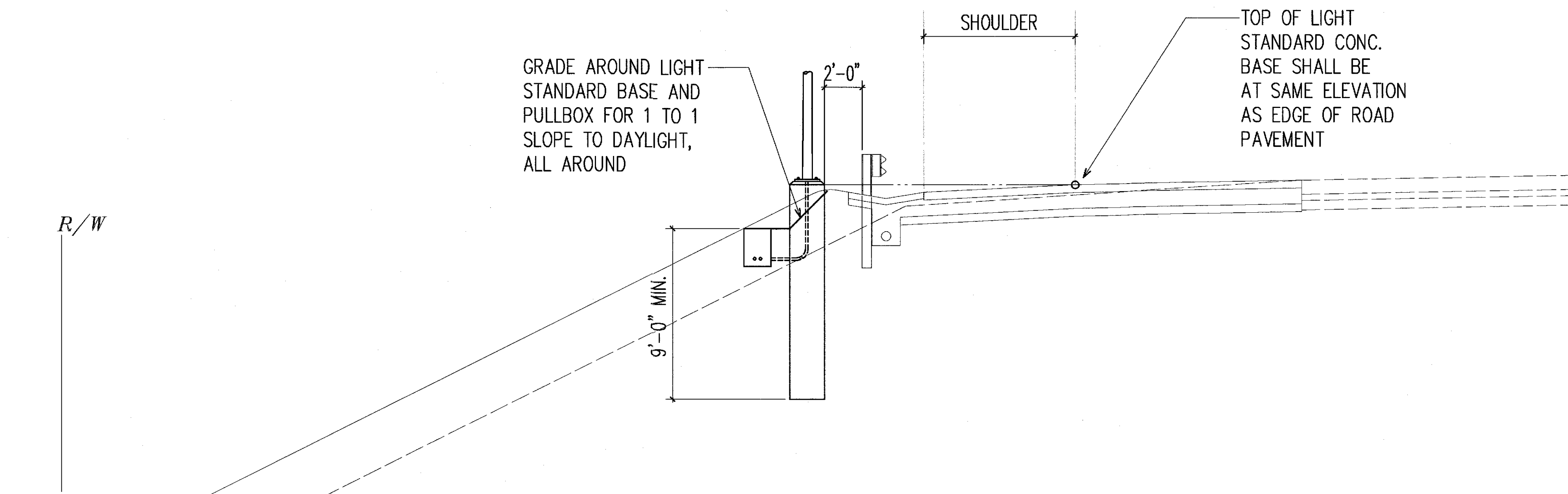
INTERSTATE ROUTE H-1

Makakilo Interchange Improvements to Westbound Off-Ramp and Eastbound On-Ramps

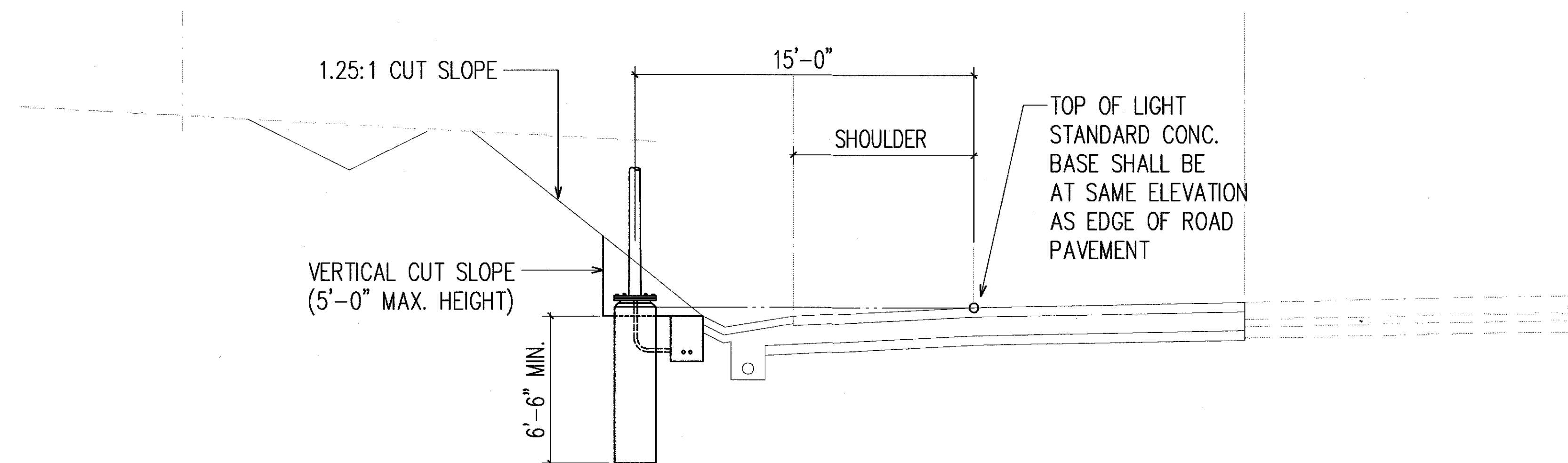
SCALE: AS NOTED DATE: APRIL 30, 1997

SHEET No. E-21 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	083	104



AUXILIARY LANE H-1 STA. 126+84 TO STA. 132+07



AUXILIARY LANE H-1 STA. 113+57 TO STA. 126+84

TYPICAL ROAD SECTIONS WITH POLE AND PULLBOX INSTALLATION DETAILS III

NOT TO SCALE

2/9/98 REVISED LIGHT STANDARD MOUNTING
FROM ON TOP OF RETAINING WALL
TO IN GRADE MOUNTING BEHIND
GUARD RAIL

DATE	REVISION
------	----------

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION

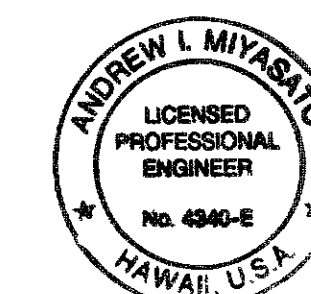
ROAD SECTIONS WITH POLE AND PULLBOX LOCATION DETAILS III

INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps

SCALE: AS NOTED

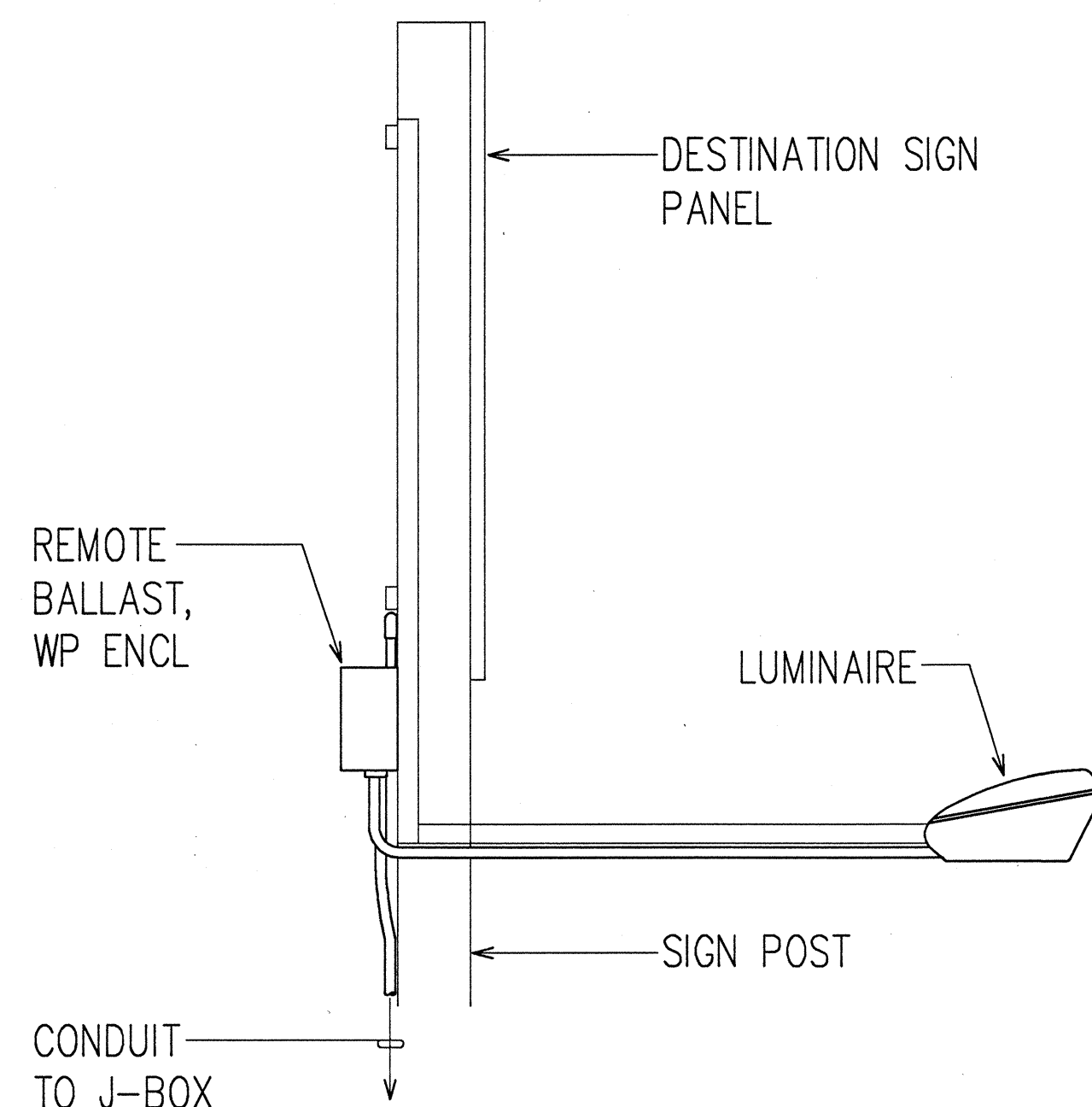
DATE: APRIL 30, 1997

SHEET No. E-22 OF 33 SHEETS

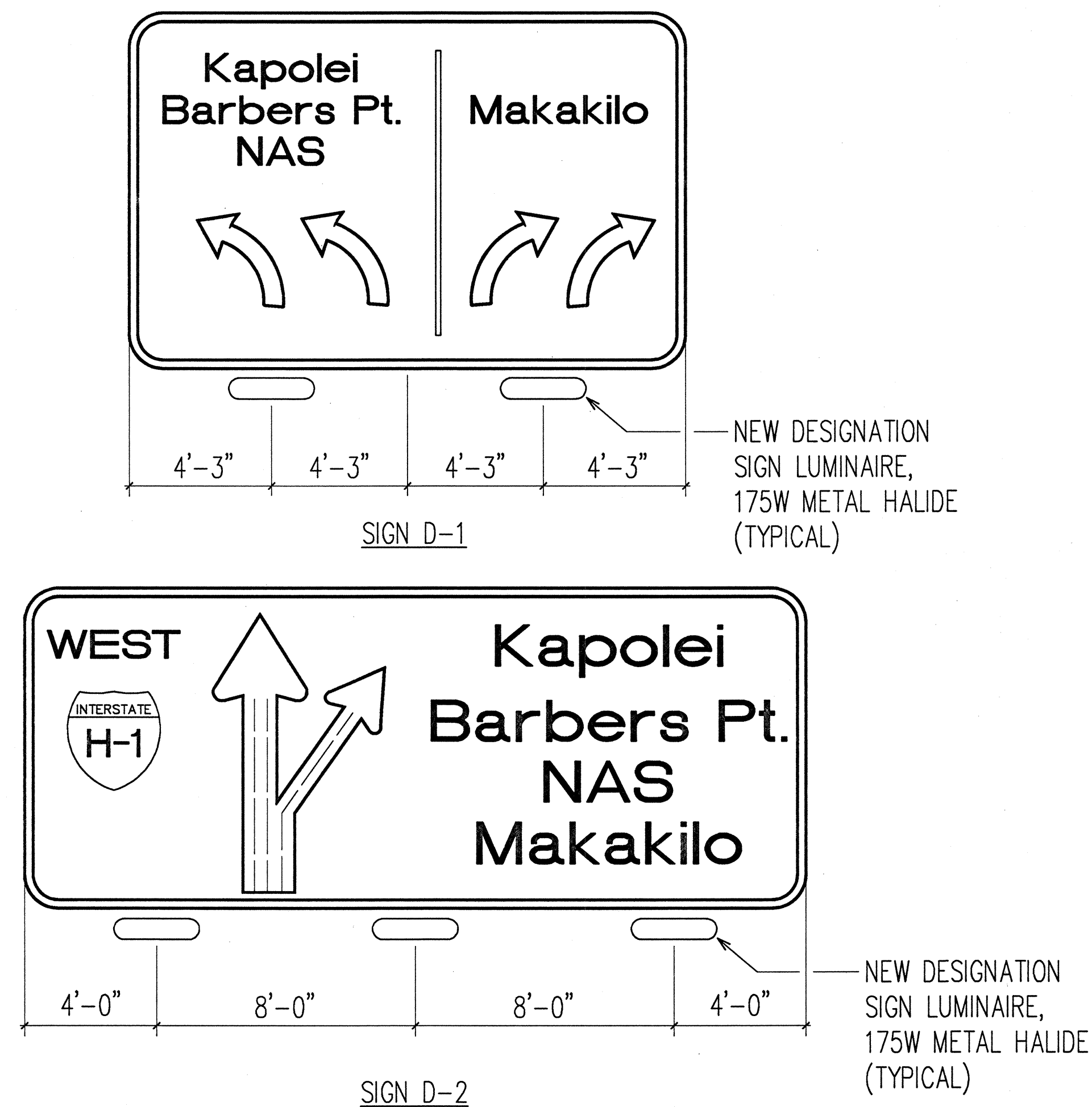


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Andrew J. Miyasaka
6/24/99
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

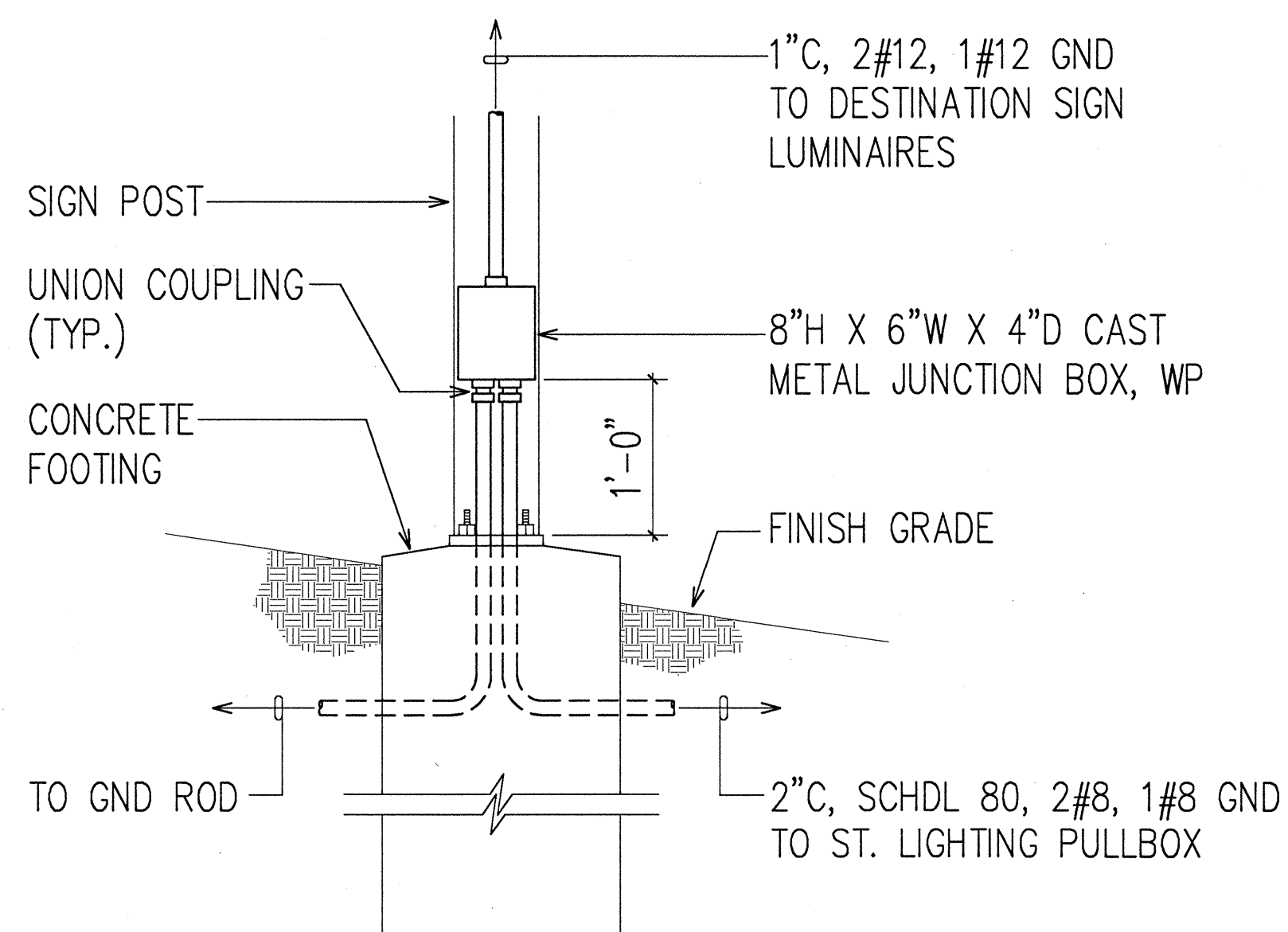
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	84	104



DESTINATION SIGN LUMINAIRE DETAIL
NOT TO SCALE



DESTINATION SIGN LIGHTING DETAILS
NOT TO SCALE



DESTINATION SIGN J-BOX MOUNTING DETAIL
NOT TO SCALE

NOTES:

1. PROVIDE ALL EQUIPMENT AND HARDWARE AS REQUIRED FOR A COMPLETE DESTINATION SIGN LIGHTING SYSTEM.
2. ALL PARTS OF THE LUMINAIRE MOUNTING, INCLUDING CONDUIT, J-BOXES, AND BALLAST ENCLOSURES, SHALL BE HOT-DIP GALVANIZED, PRIME COATED WITH A SUITABLE PRIMER AND PAINTED WITH THREE COATS OF DARK GREEN ENAMEL.
3. LUMINAIRE MOUNTING SHALL BE ADJUSTED AS RECOMMENDED BY THE MANUFACTURER TO PROVIDE OPTIMUM SIGN ILLUMINATION.
4. THE CONTRACTOR SHALL ENSURE THAT THE LUMINAIRE SUPPORTS DO NOT CONFLICT WITH THE SIGN SUPPORTS (SEE SUPPORT SPACING TABLES ON STANDARD PLANS TE-25 & TE-26). FINAL SPACING SHALL BE APPROVED BY THE ENGINEER.
5. THE MAXIMUM SPACING OF LUMINAIRES SHALL BE 10 FEET ON CENTERS AND THE MAXIMUM HEIGHT AND WIDTH ILLUMINATED BY A SINGLE LUMINAIRE SHALL BE 10 FEET BY 10 FEET, RESPECTIVELY.
6. DESTINATION SIGN ILLUMINATION INSTALLATION SHALL CONFORM TO STANDARD PLANS TE-23 & TE-28.

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

LAST CHK. 04/23/97 BY: R. H. HO & ASSOC., INC.
DATE: 04/23/97



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Andrew L. Miyamoto
4/23/97
RONALD A. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DESTINATION SIGN LIGHTING DETAILS

*INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps*

SCALE: AS NOTED DATE: APRIL 30, 1997

SHEET No. E-23 OF 33 SHEETS

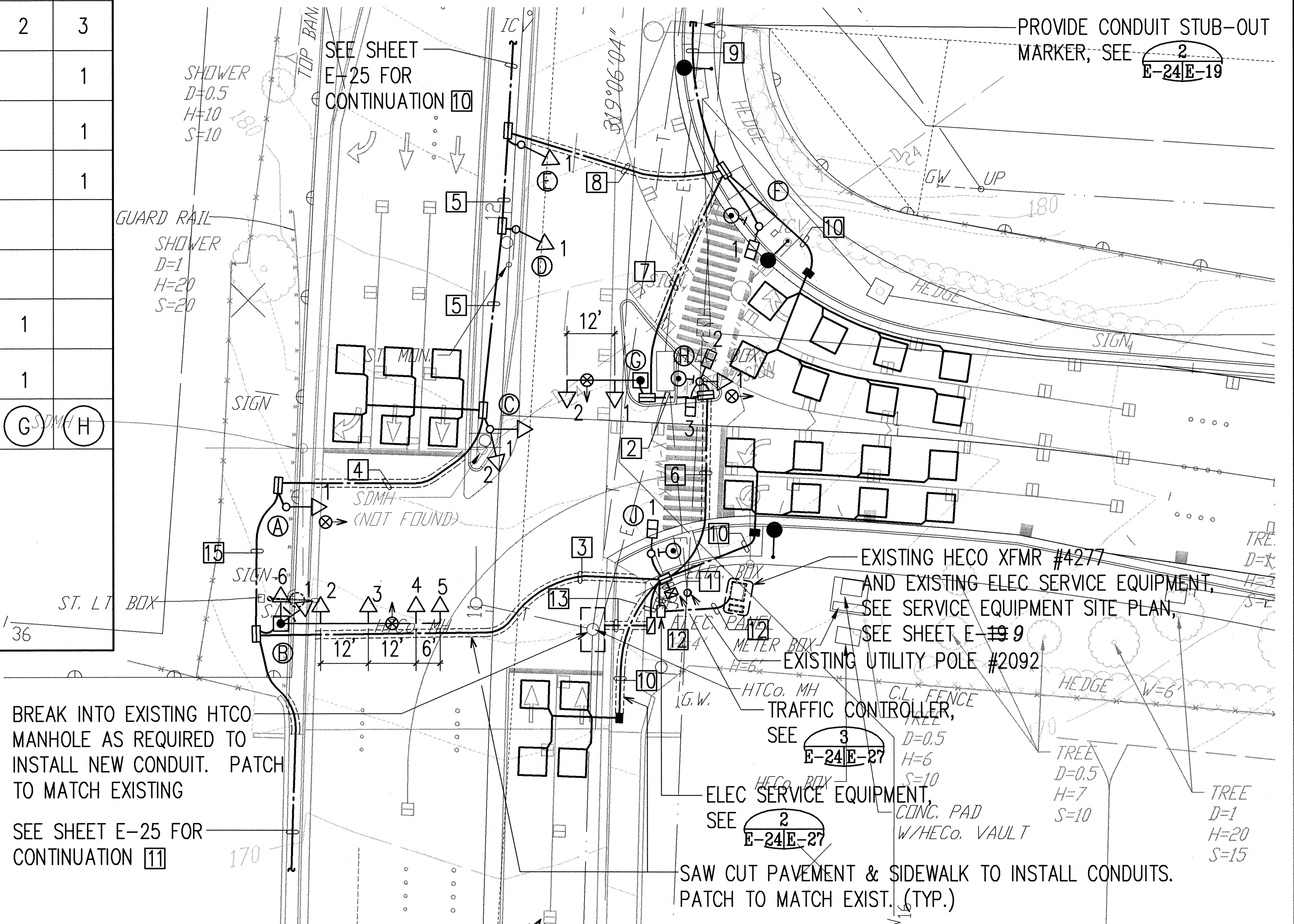
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	85	104

TRAFFIC SIGNAL SYSTEM CONDUIT AND CABLE SCHEDULE

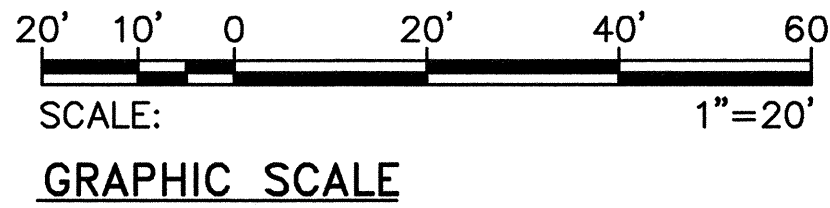
ITEM NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
TOTAL QUANTITY OF 2" C FOR TRAFFIC SIGNAL SYSTEM, SEE NOTE NO. 1	8	5	5	3	2	5	4	4	1	1	3	1	1	2	3
QUANTITY OF 26/C #14 CONTROL CABLE, SEE NOTE NO. 1	2	1	1	1	1	1	1	1							1
QUANTITY OF 2/C #14 SHIELDED LOOP DETECTOR AND PEDESTRIAN PB CABLE	7	3	2	1		3	3	1		1	1				1
QUANTITY OF 3/C #20 SHIELDED OPTICOM HEAD CABLE	3	1	2			1									1
QUANTITY OF 2" C, 3#6, 1#6 GND SECONDARY POWER CABLE (SEE SHEET E-27)	1									1					
QUANTITY OF 2" C TELEPHONE WITH PULLWIRE	1										1				
QUANTITY OF 12 PAIR #19 INTERCONNECT CABLE	2		1								1			1	
QUANTITY OF SPARE CONDUIT WITH PULLWIRE (PART OF TOTAL 2" C QTY)	2	2	1	1	1	2	2	2	1		1			1	
DUCT SECTION TYPE	(P)	(K)	(K)	(H)	(G)	(K)	(J)	(J)	(F)	(F)	(H)	(M)	(L)	(G)	(H)

NOTE:

- ALL CONDUITS SHALL BE PVC SCHEDULE 40, UNLESS OTHERWISE NOTED
- FOR ALL DUCT SECTION DETAILS, SEE SHEET E-3

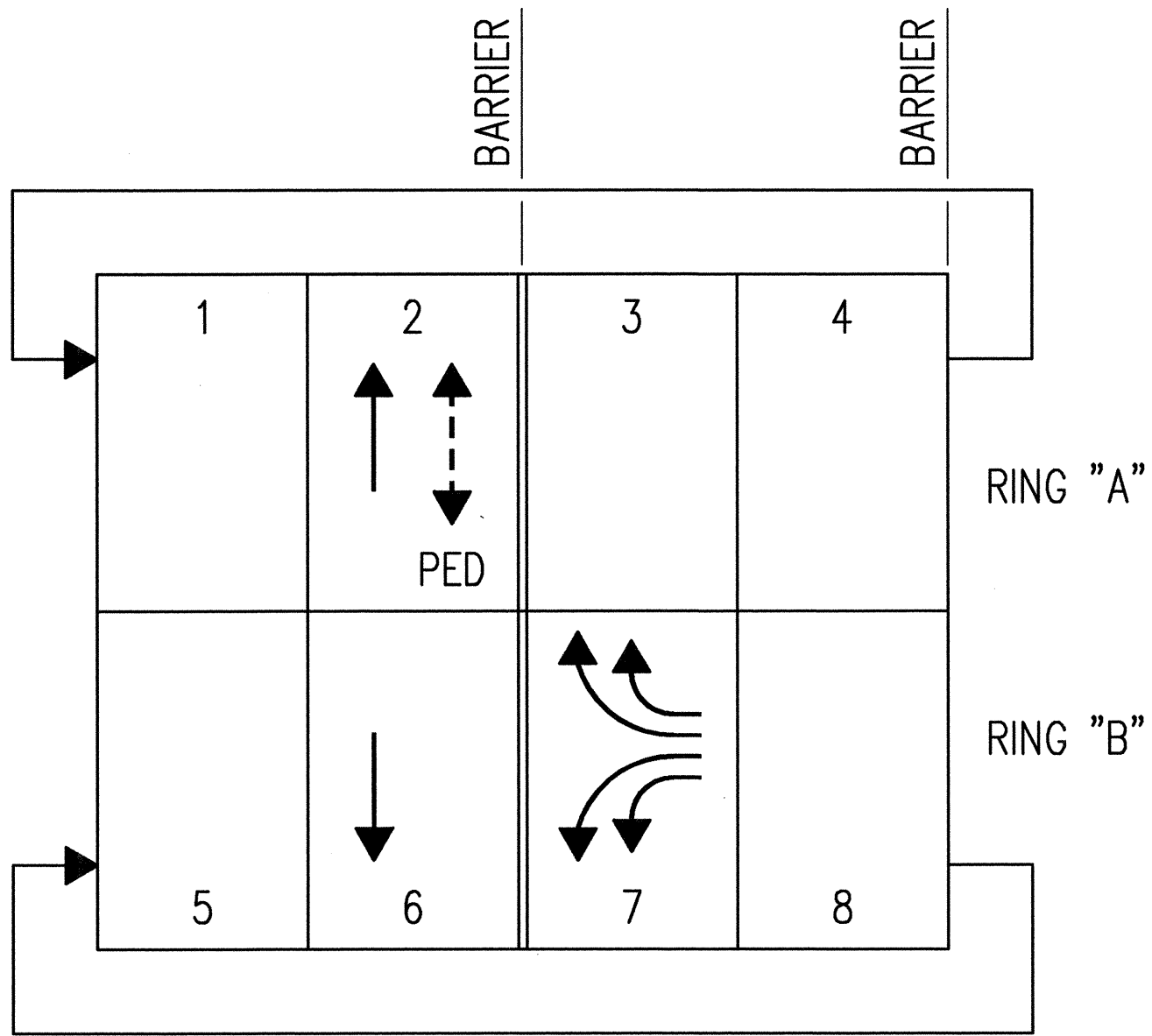


TRAFFIC SIGNAL PLAN I
SCALE: 1"=20'-0"

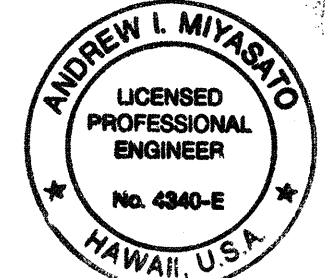


SIGNAL INDICATION	 (RIGHT)	 (LEFT)	 (RIGHT)		 (FORWARD)
DESCRIPTION	12" RYGA(LEFT) TRAFFIC SIGNAL HEAD	12" RYGA(RIGHT) TRAFFIC SIGNAL HEAD	12" RYG TRAFFIC SIGNAL HEAD	PEDESTRIAN SIGNAL HEAD	12" RYGA(FORWARD) TRAFFIC SIGNAL HEAD
POLE LETTER-SIGNAL HEAD NUMBER	D-1 E-1	A-1 B-1 C-1	H-1	F-1 H-2 H-3 J-1	B-2 B-3 B-4 B-5 B-6 C-2 G-1 G-2

SIGNAL HEAD SCHEDULE



PHASE DIAGRAM

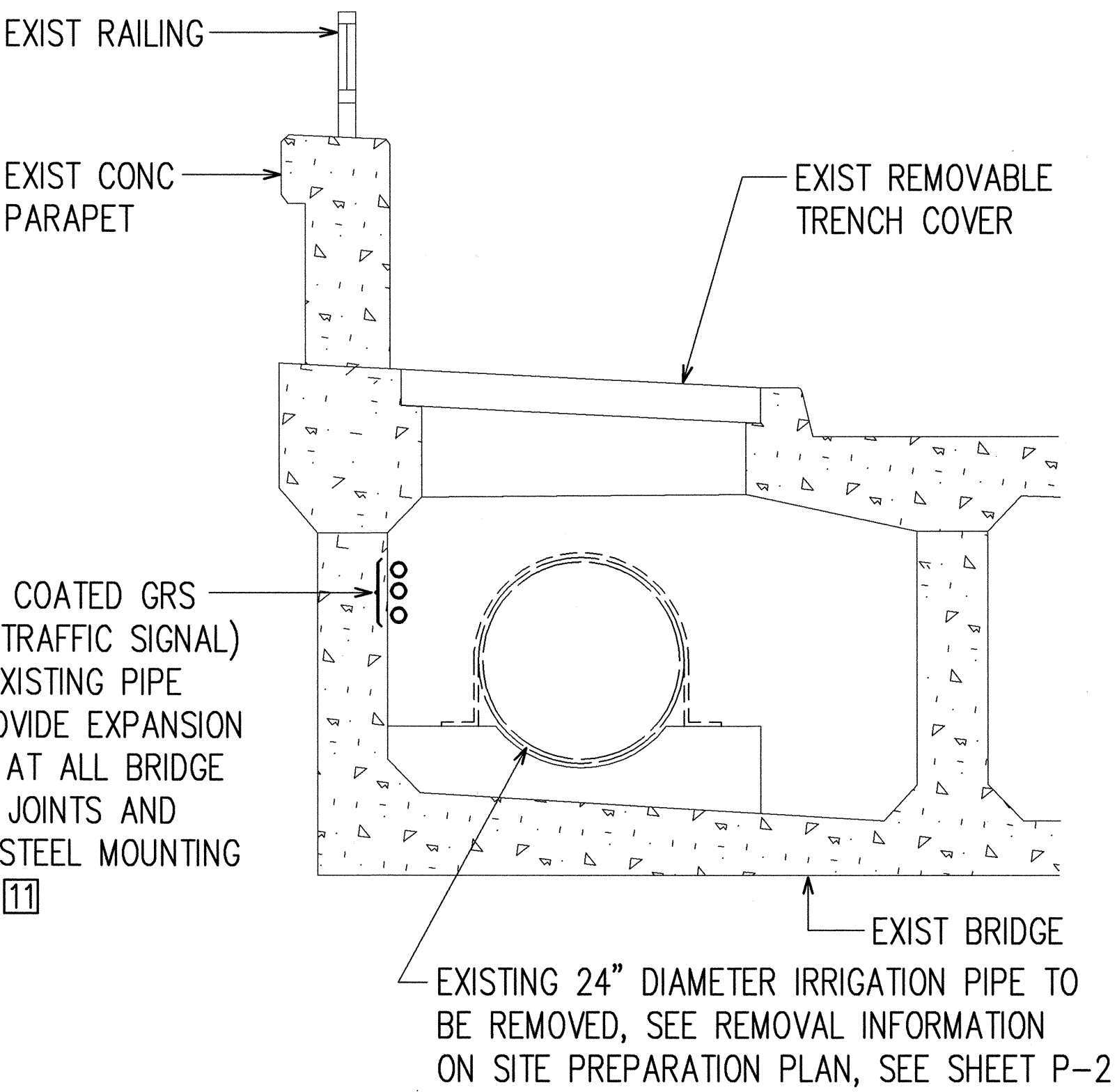
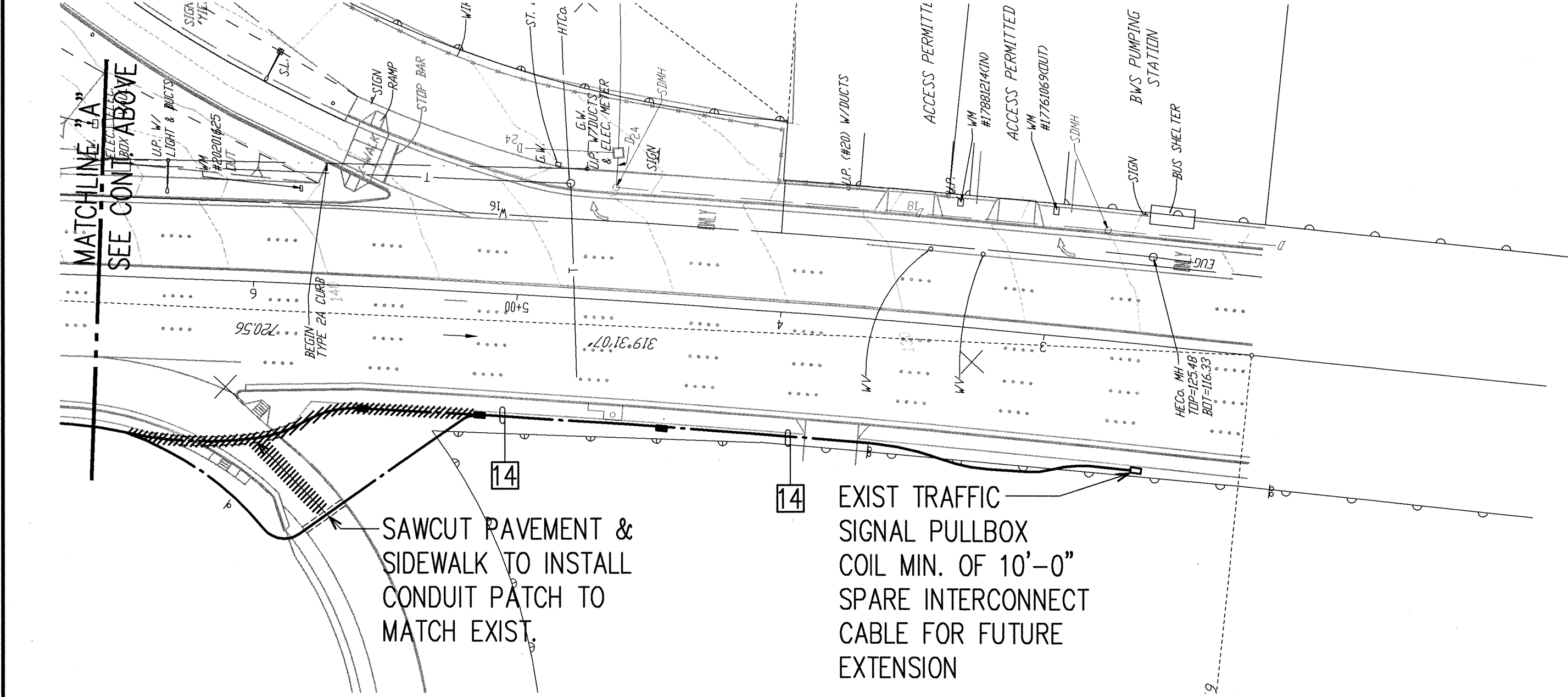
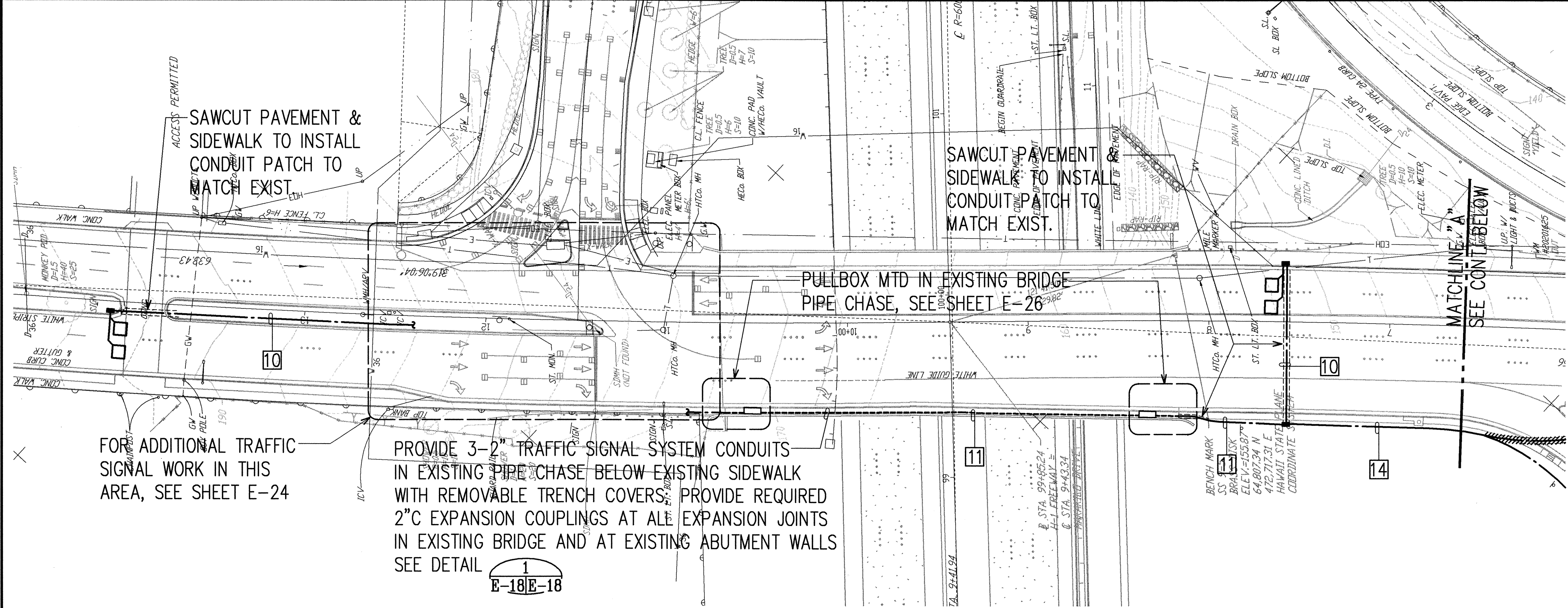


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Andrew L. Miyasato
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL PLAN I

**INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps**
SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-24 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	86	104

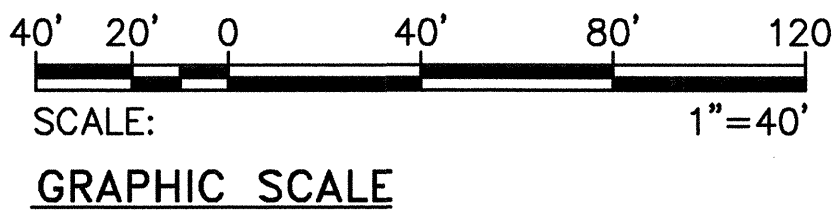


NOTE: SEE SHEET E-26 FOR DETAILS AT EXISTING ABUTMENT WALL

1
E-18/E-18 **EXISTING BRIDGE STRUCTURE DETAIL**
NOT TO SCALE

- NOTE:
- FOR CONDUIT & CABLE SCHEDULE, SEE SHEET E-24.
 - SAWCUT AND REPAIR ALL ROAD PAVEMENTS AND CONCRETE SIDEWALKS PER STATE DOT STANDARDS AND REQUIREMENTS.

TRAFFIC SIGNAL PLAN II
SCALE: 1"=40'-0"



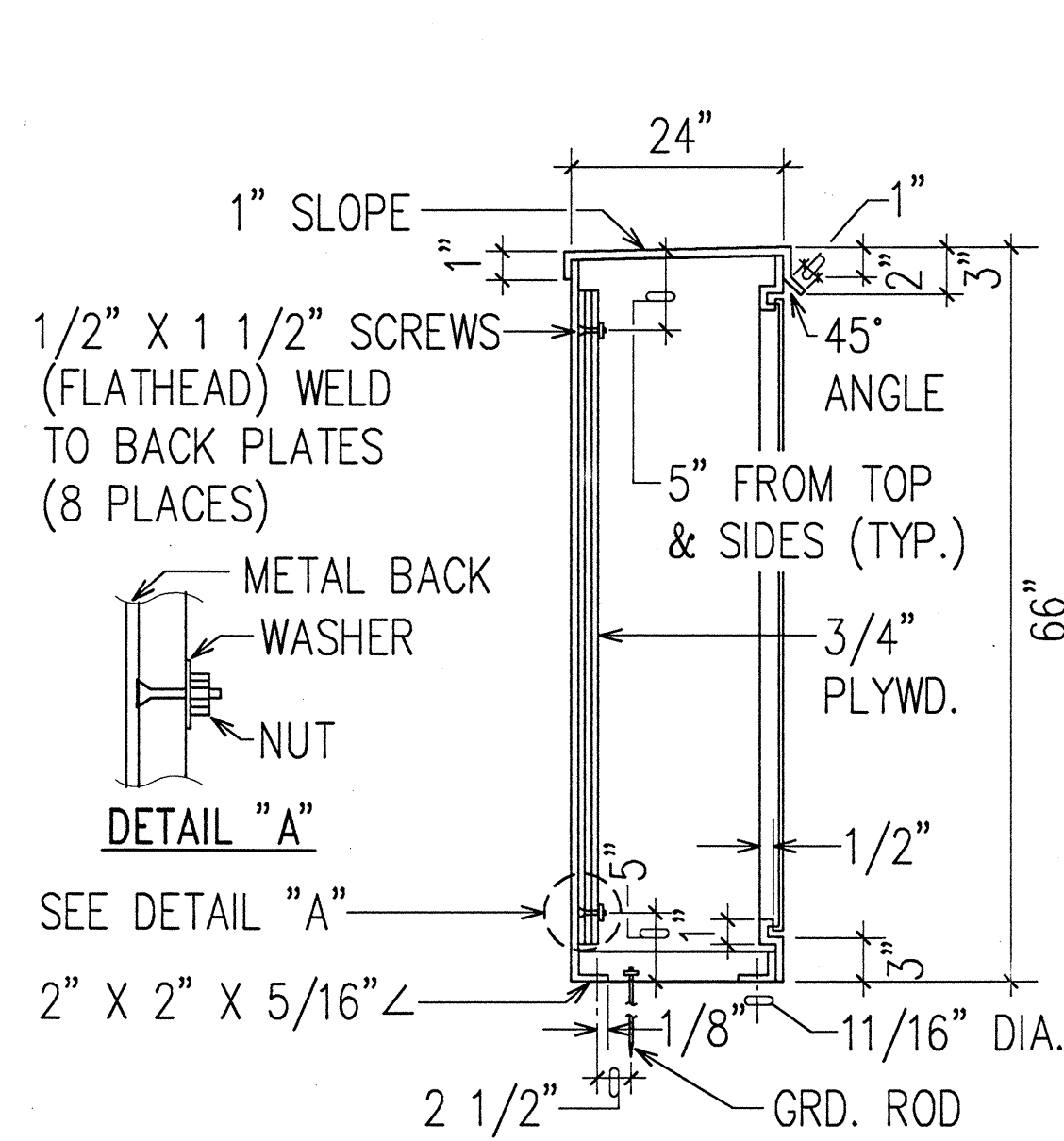
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL PLAN II

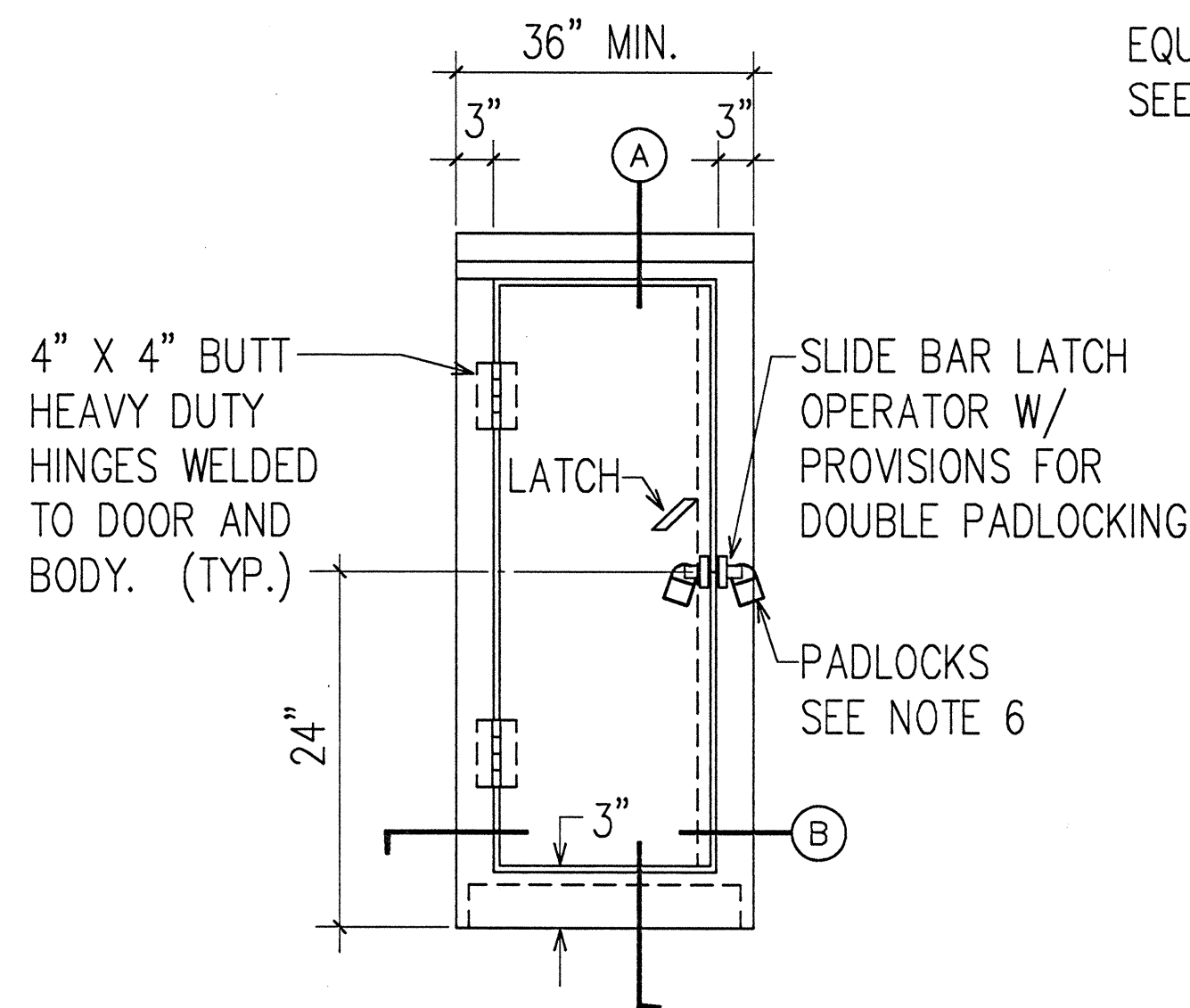
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps
SCALE: AS NOTED
DATE: APRIL 30, 1997
SHEET No. E-25 OF 33 SHEETS

86

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	88	104



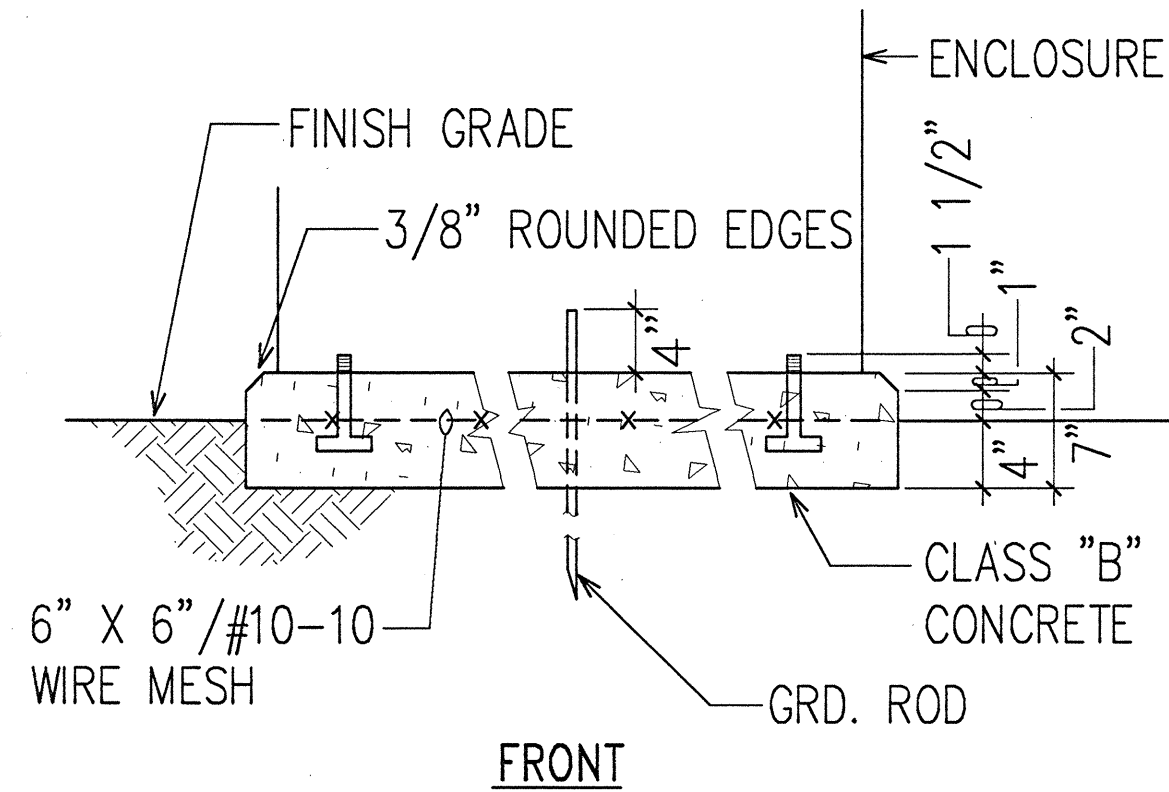
SECTION "A"



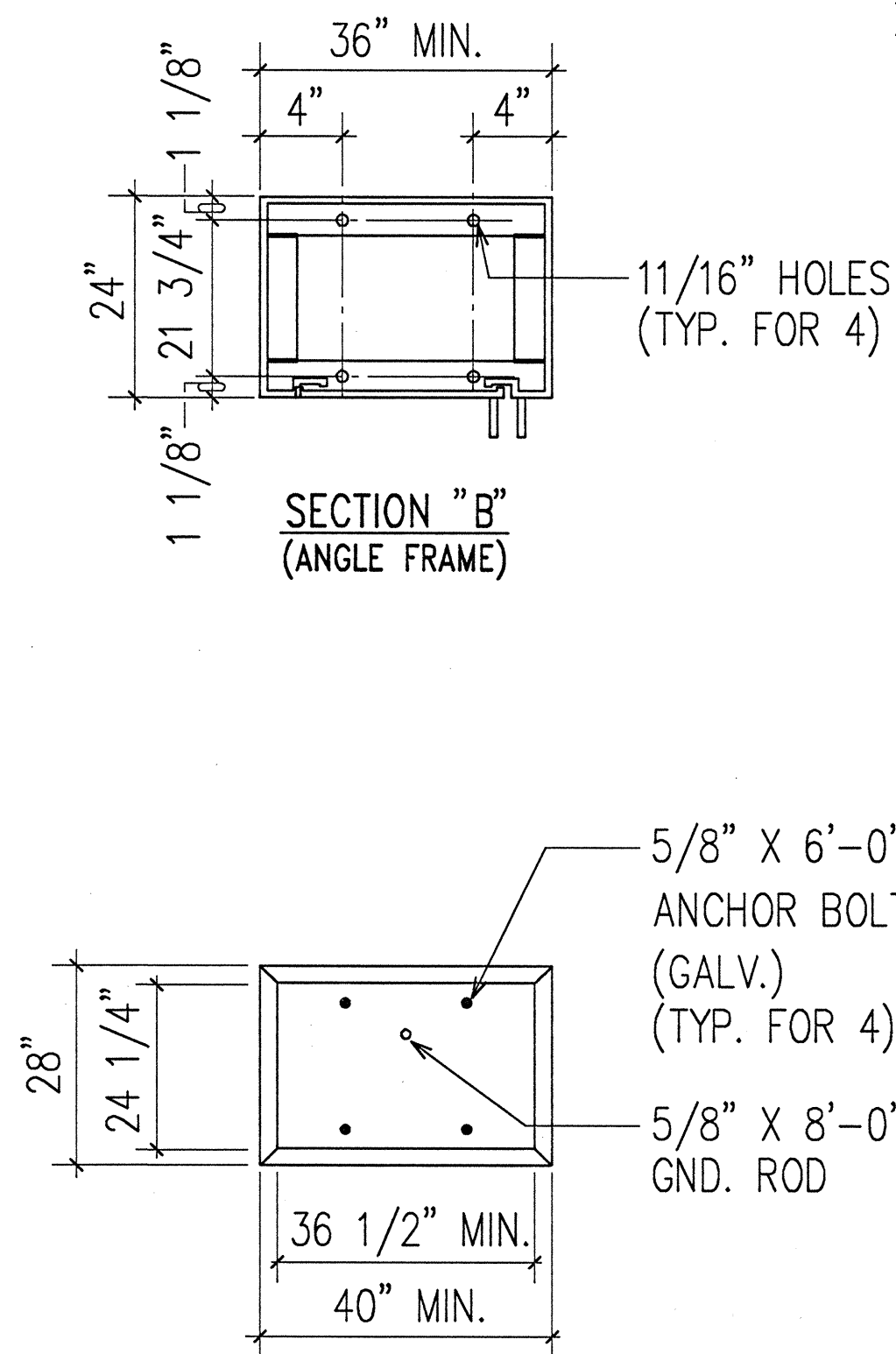
ELEVATION

NOTES:

- CABINET TO BE PRIMED WITH ONE COAT SHOP PRIMER.
- PLYWOOD TO BE TREATED (WOLMANIZED) PLYWOOD.
- MADE FROM 10 GA. GALV. SHEET STEEL.
- PROVIDE EPOXY ENAMEL FINISH.
- ENCLOSURE SHALL BE NEMA 3R WITH NEOPRENE GASKETING.
- PADLOCKS:
1 - CONTRACTOR FURNISHED
1 - HECO FURNISHED
- SHOP FABRICATION DRAWINGS SHALL BE SUBMITTED FOR APPROVAL.

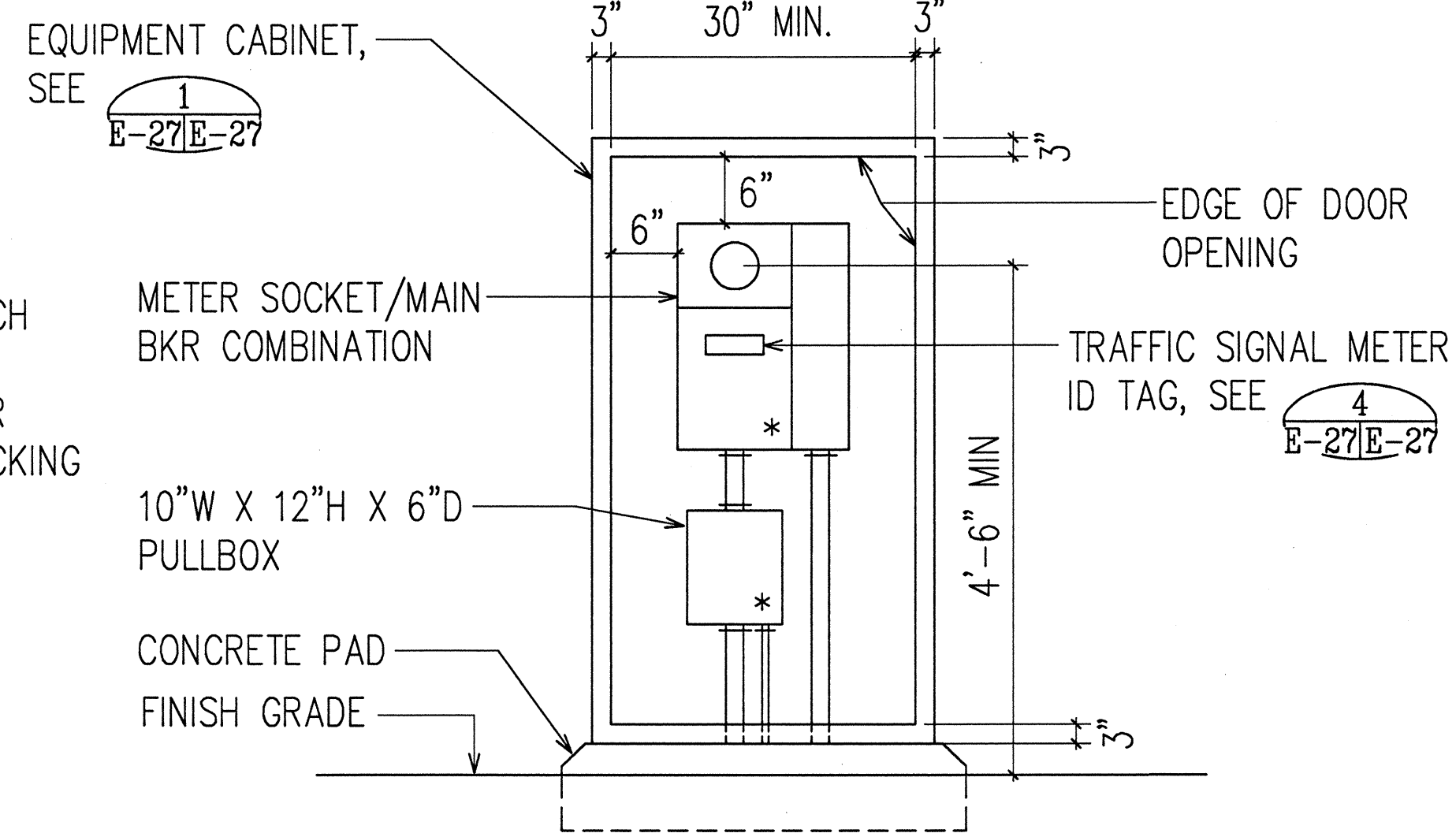


FRONT



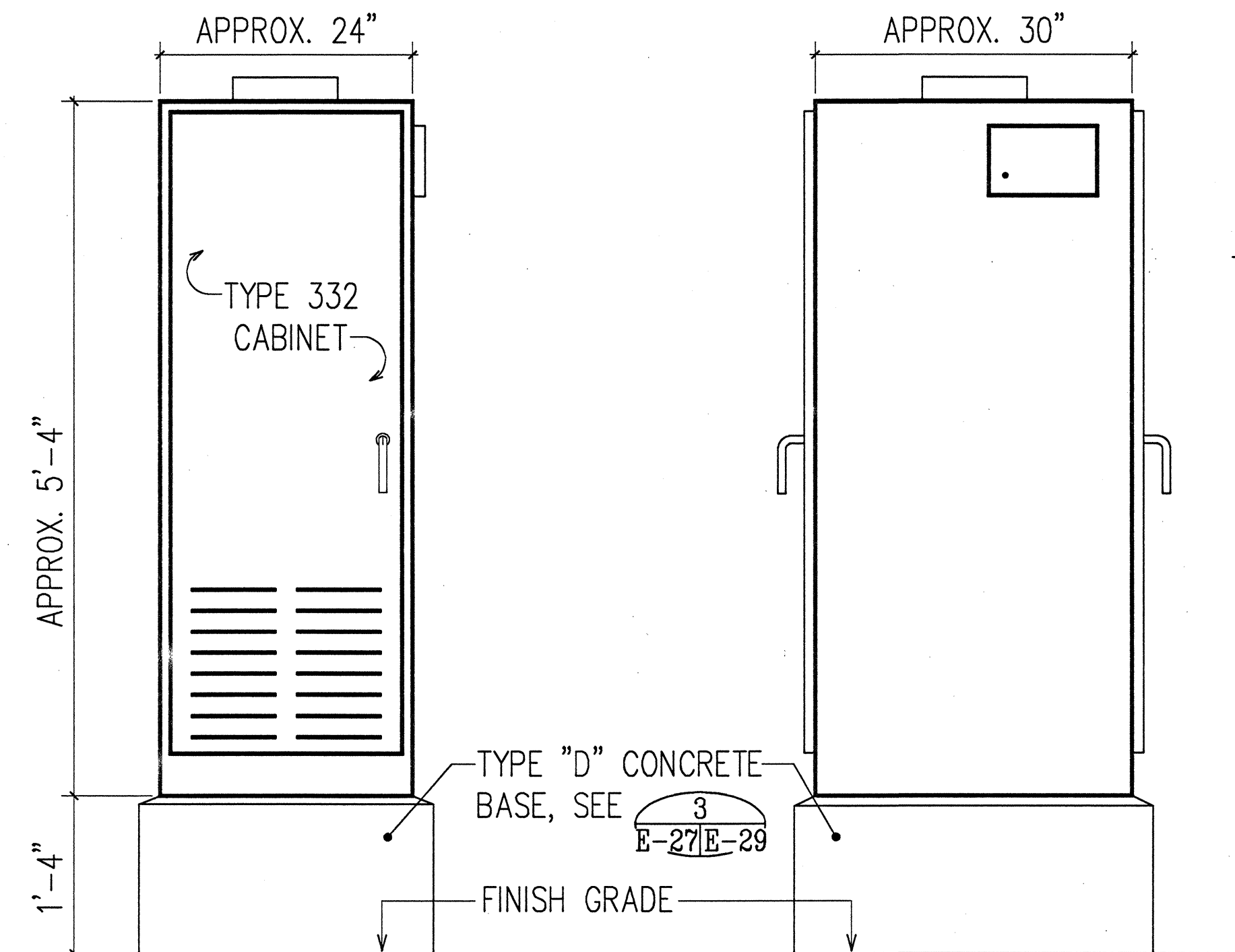
PLAN

1
E-27E-27 N.T.S. TRAFFIC SIGNAL ELEC. EQUIP. CABINET DETAILS



- NOTES:
- EQUIPMENT SHALL BE PROVIDE PER HECO REQUIREMENTS AND APPROVAL.
 - "*" INDICATES PROVISIONS FOR HECO SEALS.

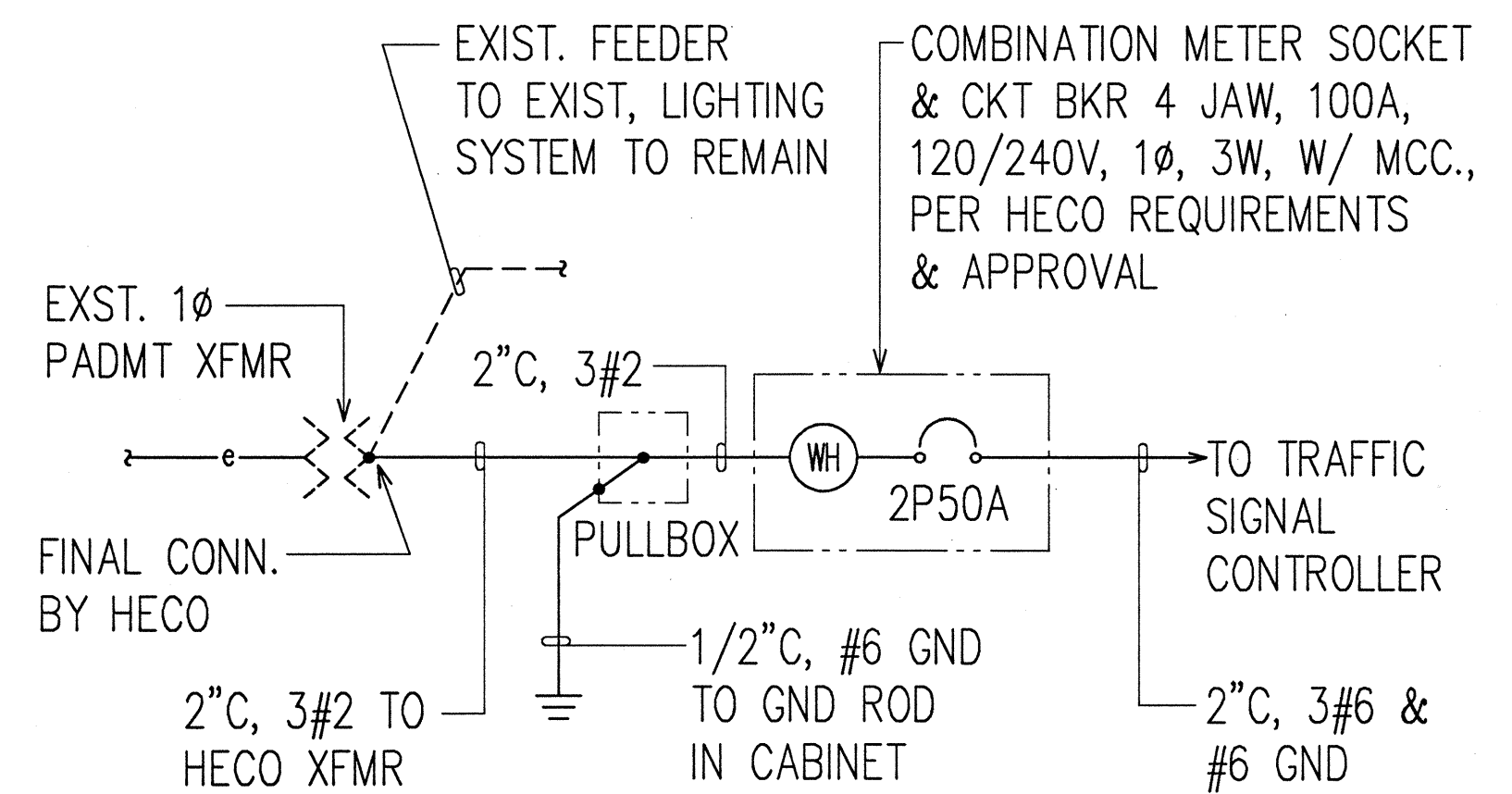
2
E-9E-27 N.T.S. ELECTRICAL EQUIPMENT ELEVATION



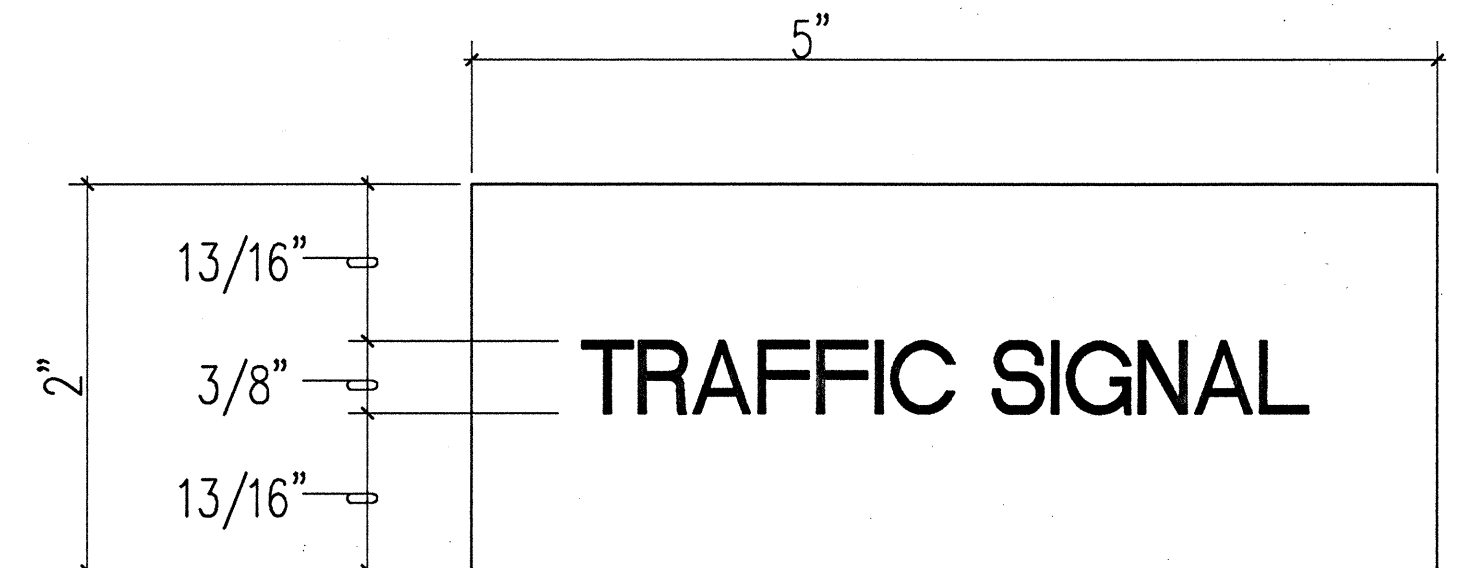
FRONT VIEW

SIDE VIEW

3
E-24E-27 N.T.S. TYPE 332 TRAFFIC SIGNAL CONTROLLER CABINET DETAIL



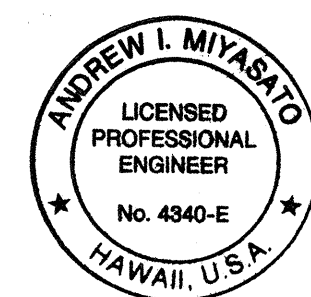
TRAFFIC SIGNAL SYSTEM
ONE-LINE DIAGRAM
N.T.S.



NOTES:

- USE 3 PLY LAMINATED FLEXIBLE PLASTIC, BLACK-WHITE-BLACK. THICKNESS: BLACK CAP SHEET-0.010", WHITE BASE SHEET-0.052", BLACK BASE SHEET-0.010".
- ATTACH TO METER SOCKET USING SCOTCH 3M BRAND VERY HIGH BOND (VHB) DOUBLE COATED ACRYLIC FOAM TAPE OR EQUIVALENT.
- LETTERS/NUMBERS SHALL BE 3/8" HIGH, 1/16" STROKE, (WHITE IN COLOR).
- LETTERS/NUMBERS ARE INSCRIBED BY CUTTING THROUGH "BLACK CAP SHEET" TO EXPOSE WHITE LETTERS/NUMBERS.

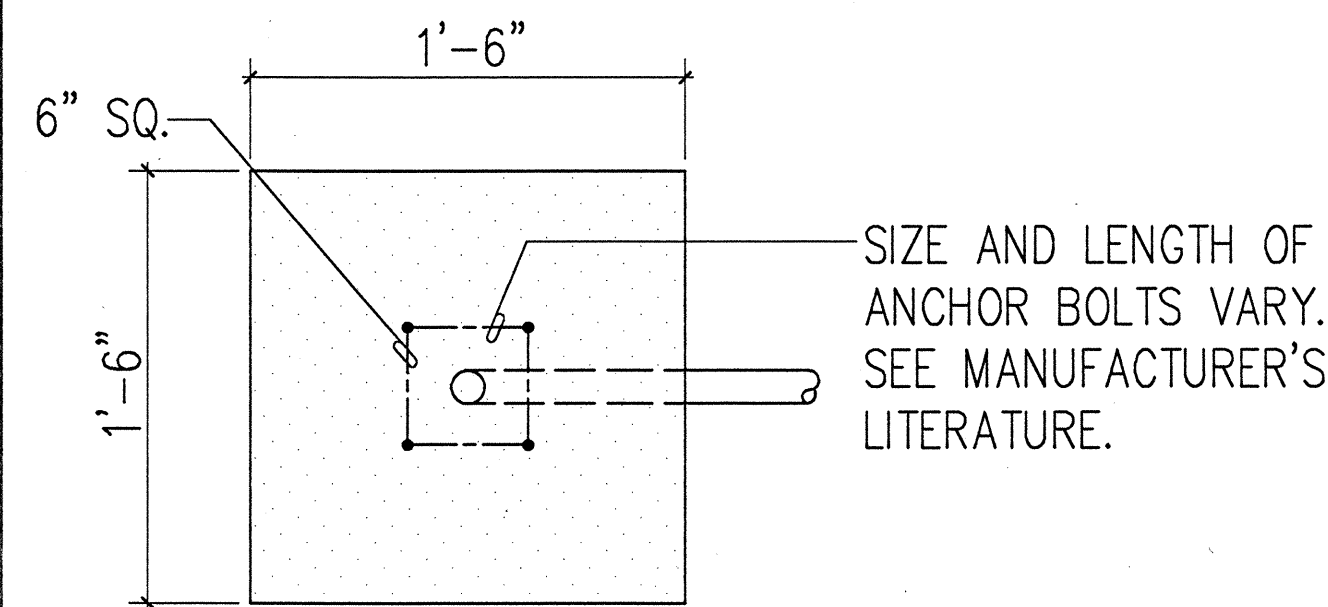
4
E-27E-27 NOT TO SCALE T. S. METER I.D. TAG DETAIL



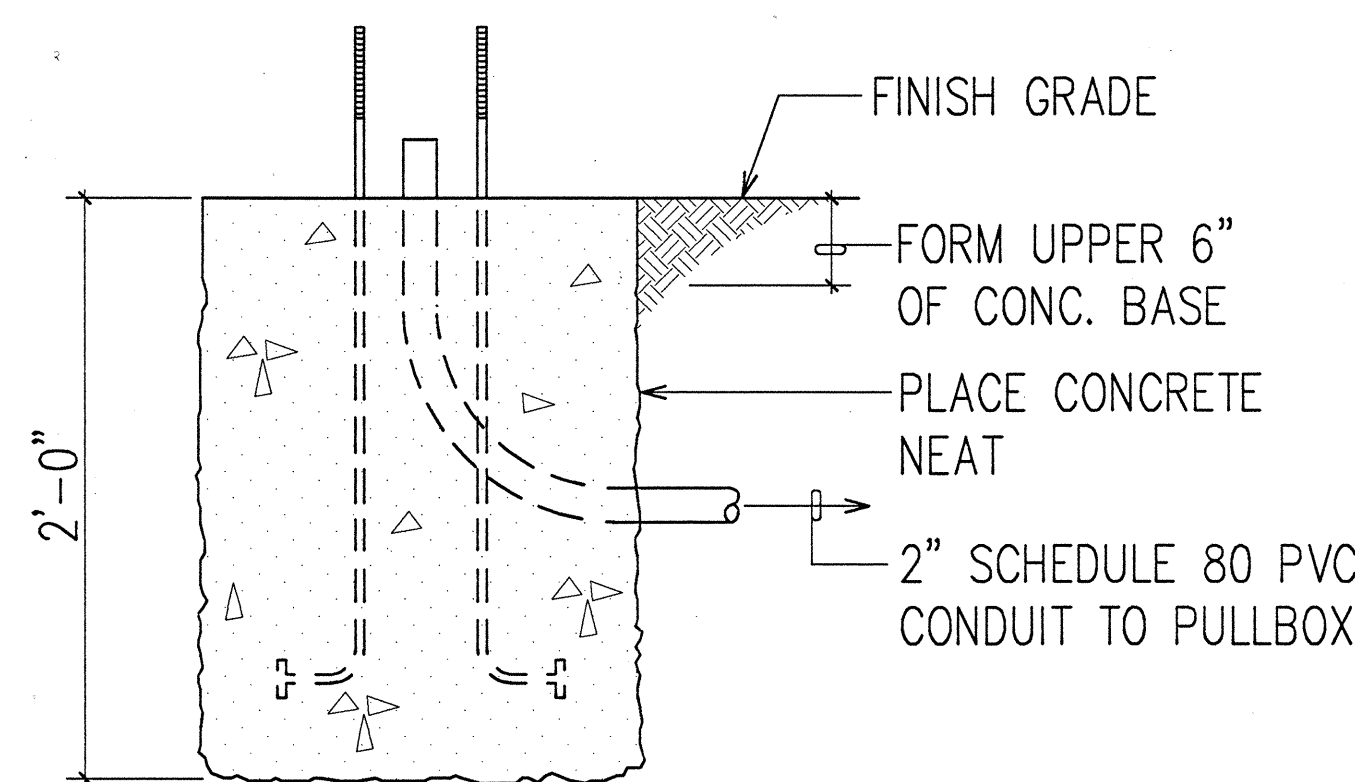
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5/7/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL SYSTEM DETAILS I

**INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps**
SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-27 OF 33 SHEETS



PLAN

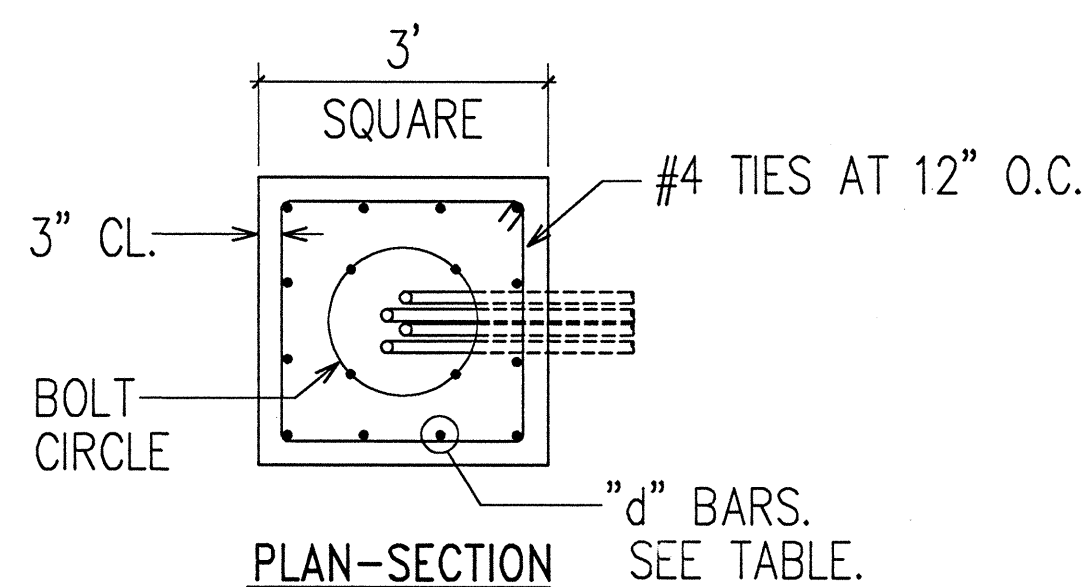


SECTION

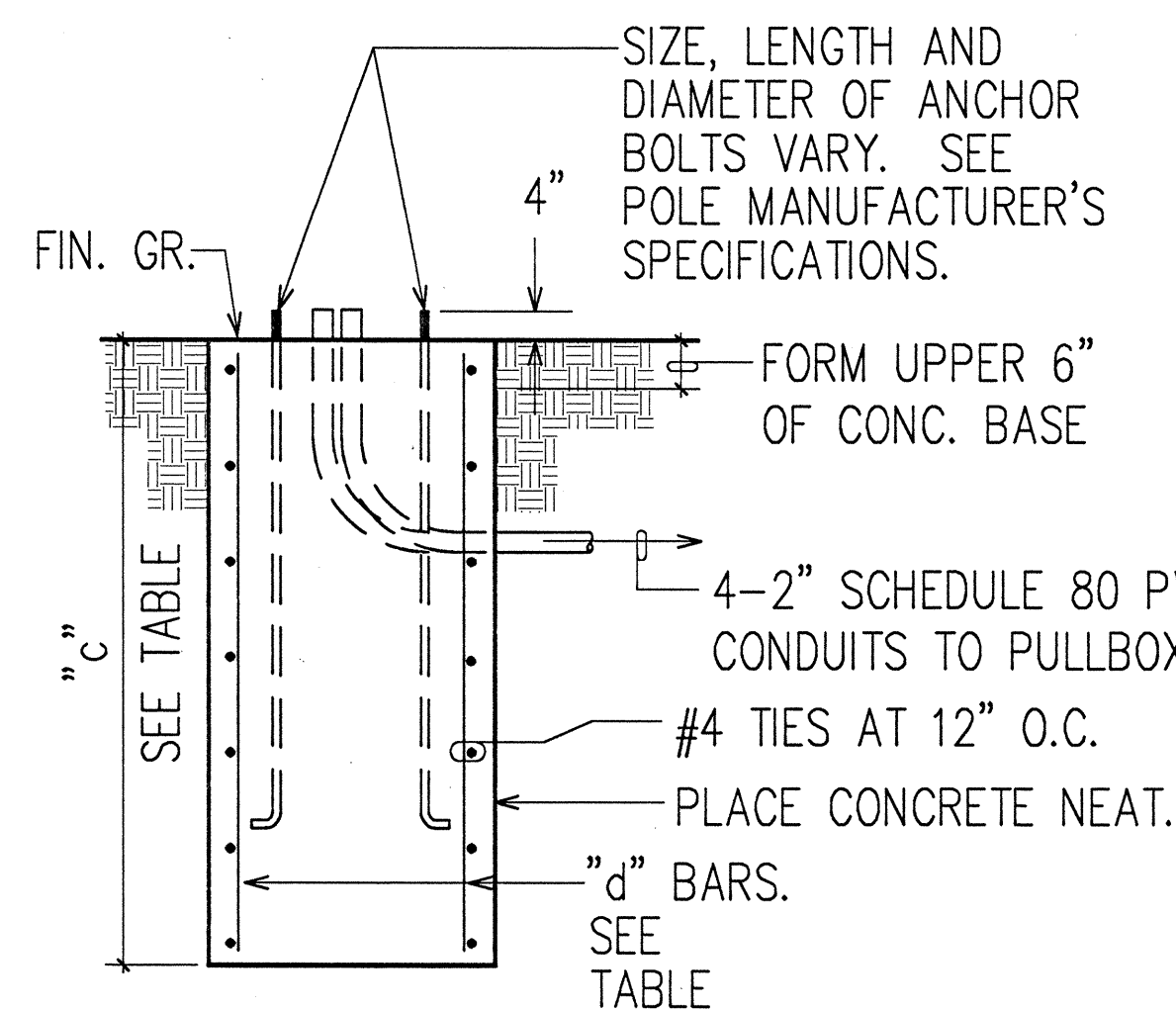
NOTES:

1. CONCRETE SHALL BE CLASS "B".
2. TYPE "A" CONCRETE BASE SHALL BE USED FOR TYPE I-10 STANDARDS.
3. CONDUIT BEND IS INCIDENTAL TO CONCRETE BASE CONSTRUCTION.

1 TYPE "A" CONCRETE BASE DETAIL
E-28/E-29 N.T.S.



PLAN-SECTION



VERTICAL-SECTION

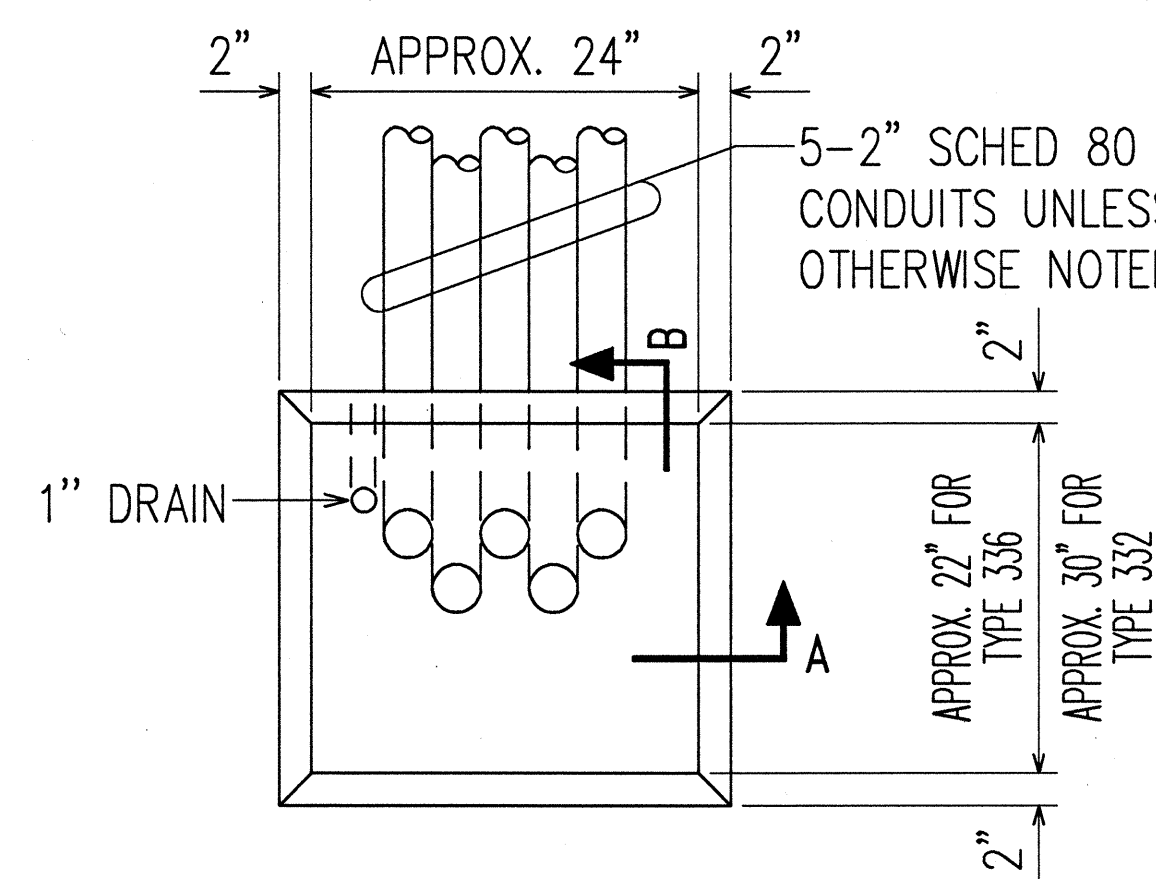
TYPE "C" CONCRETE BASE		
TYPE OF STANDARD	"c" BARS	"d" BARS
II - 18	5'-0"	12 - #6
II - 20	5'-6"	12 - #6
II - 25	6'-0"	12 - #6
II - 30	6'-6"	12 - #8
II - 35	7'-0"	12 - #8
II - 40	8'-0"	12 - #8
III - 18	5'-6"	12 - #6
III - 20	6'-0"	12 - #6
III - 25	6'-6"	12 - #8
III - 30	6'-6"	12 - #8
III - 35	7'-0"	12 - #8
III - 40	8'-0"	12 - #8

TYPICAL STANDARD DESIGNATION: II - 25
MAST ARM LENGTH

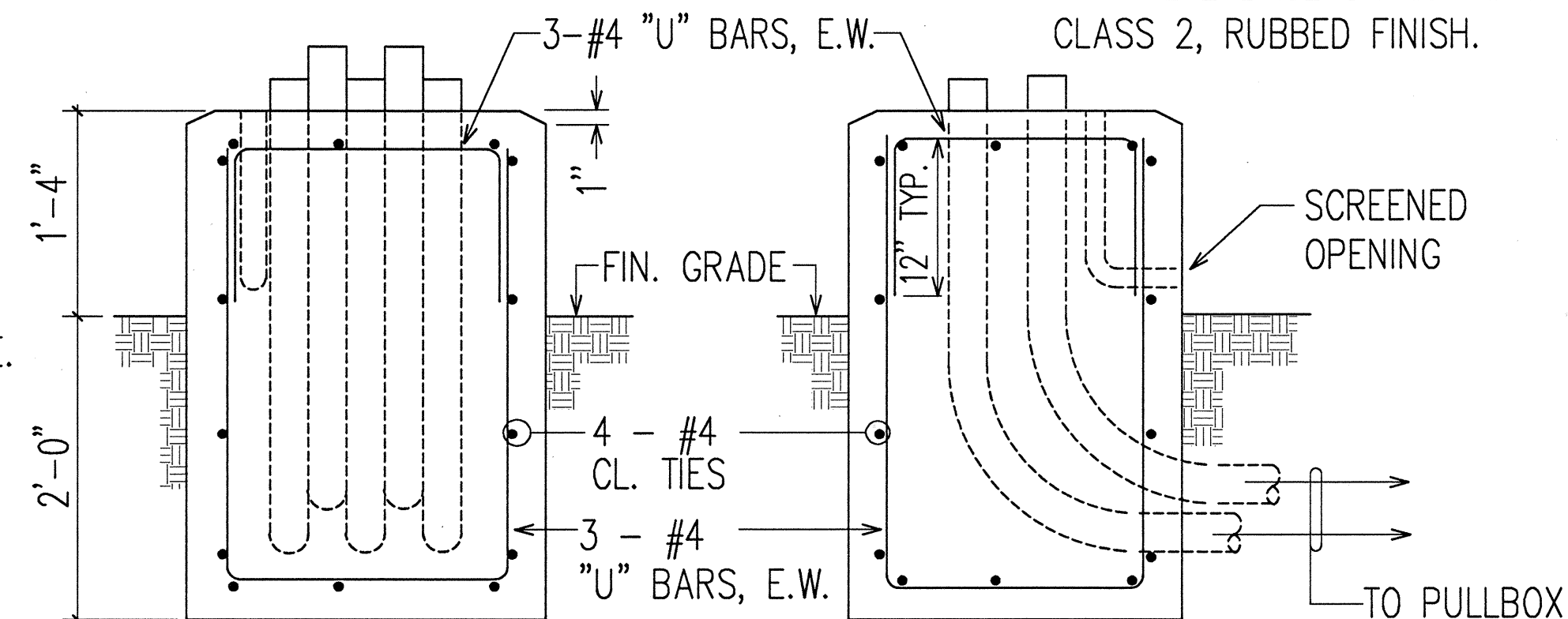
NOTES:

1. CONCRETE SHALL BE CLASS "B".
2. TYPE "C" CONCRETE BASE SHALL BE USED FOR TYPES II AND III TRAFFIC SIGNAL STANDARDS.
3. DESIGN LATERAL PRESSURE: 1,500 PSF.
4. CONDUIT BEND IS INCIDENTAL TO CONCRETE BASE.

2 TYPE "C" CONCRETE BASE DETAIL
E-28/E-29 N.T.S.



PLAN

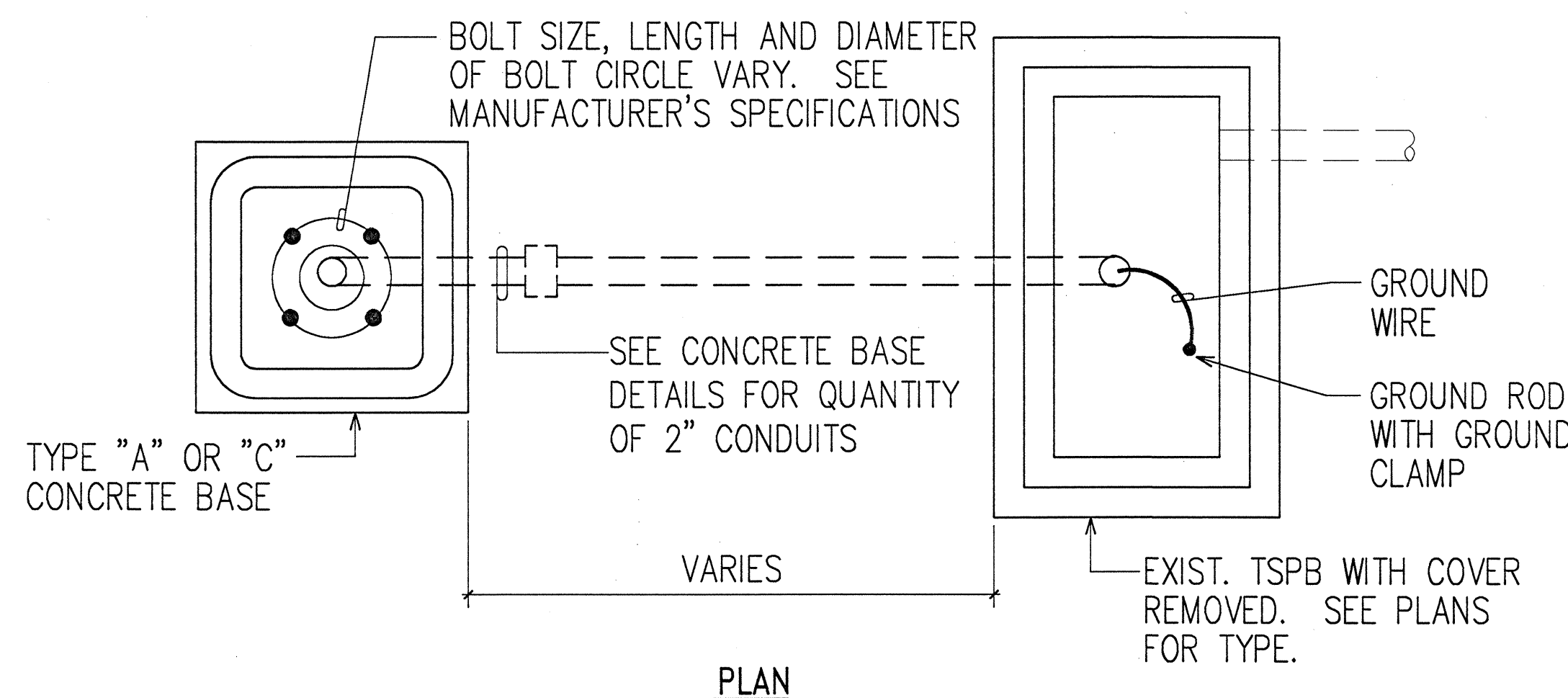


SECTION "A"

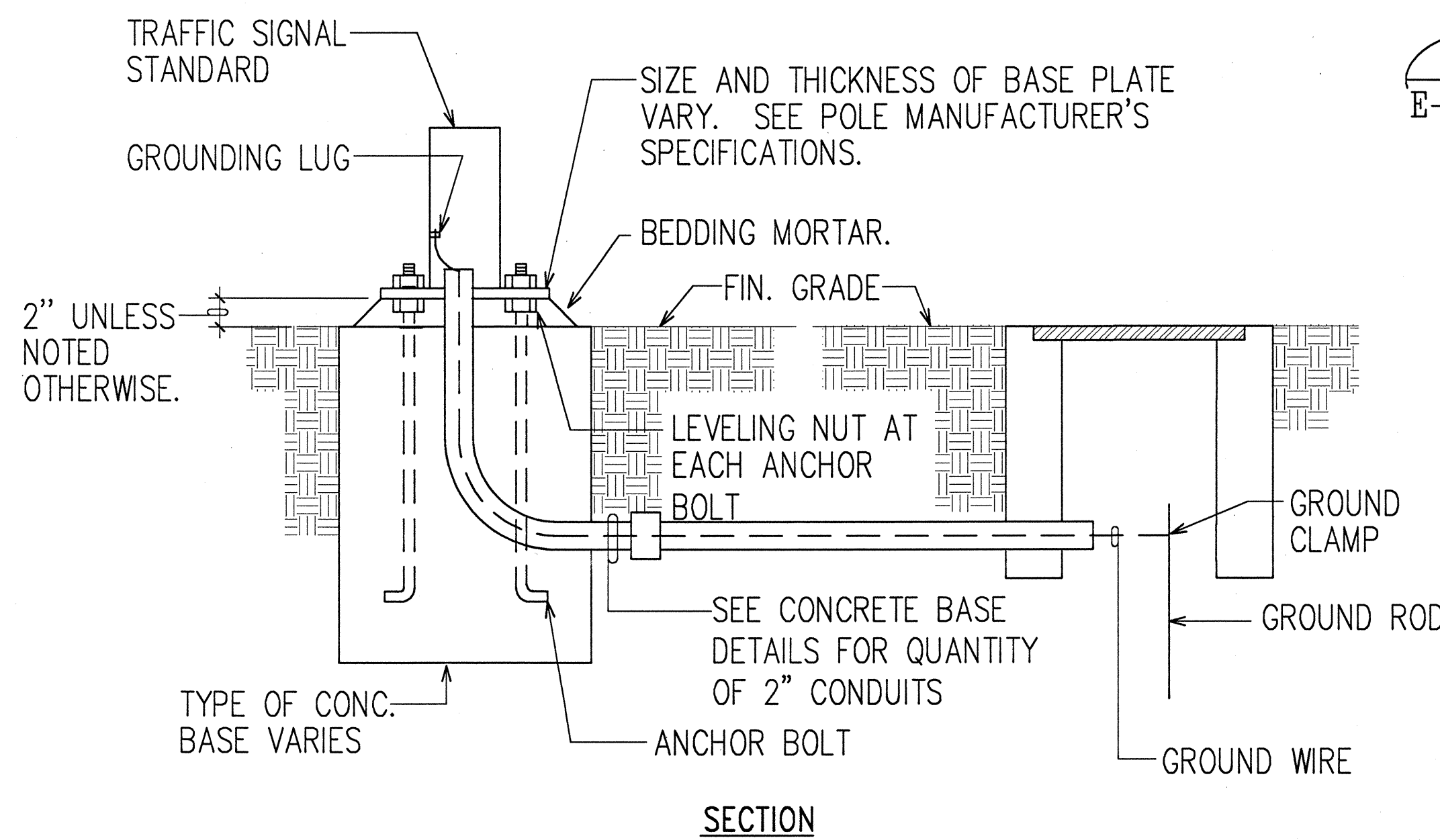
SECTION "B"

NOTES:

1. CONCRETE SHALL BE CLASS "B".
2. DIMENSIONS SHALL BE ALTERED TO SUIT CONTROLLER CABINET ACTUALLY FURNISHED.
3. CONDUIT BENDS AND DRAIN ARE INCIDENTAL TO CONCRETE BASE.
4. REFER TO CABINET MANUFACTURER'S SPECIFICATIONS FOR DETAILS OF ANCHOR BOLTS AND BASE SETTING.
5. ALL EXPOSED SURFACES OF CONCRETE BASE SHALL BE GIVEN A CLASS 2, RUBBED FINISH.



PLAN



SECTION

3 TYPE "D" CONCRETE BASE DETAIL
E-27/E-29 N.T.S.

4 TYPICAL STANDARD & PEDESTAL DETAIL
E-28/E-29 N.T.S.



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5/7/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL SYSTEM DETAILS III

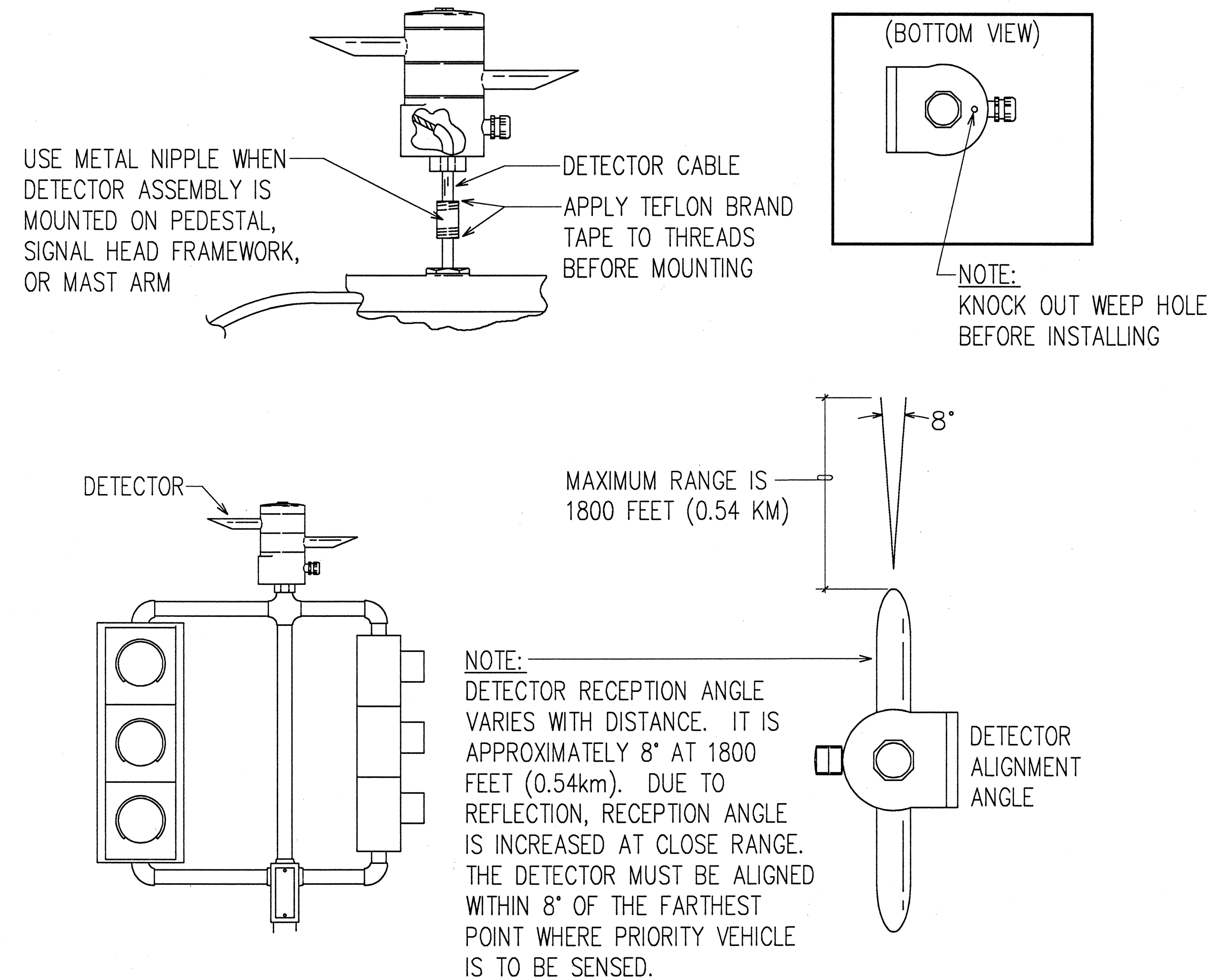
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps

SCALE: AS NOTED DATE: APRIL 30, 1997
SHEET No. E-29 OF 33 SHEETS

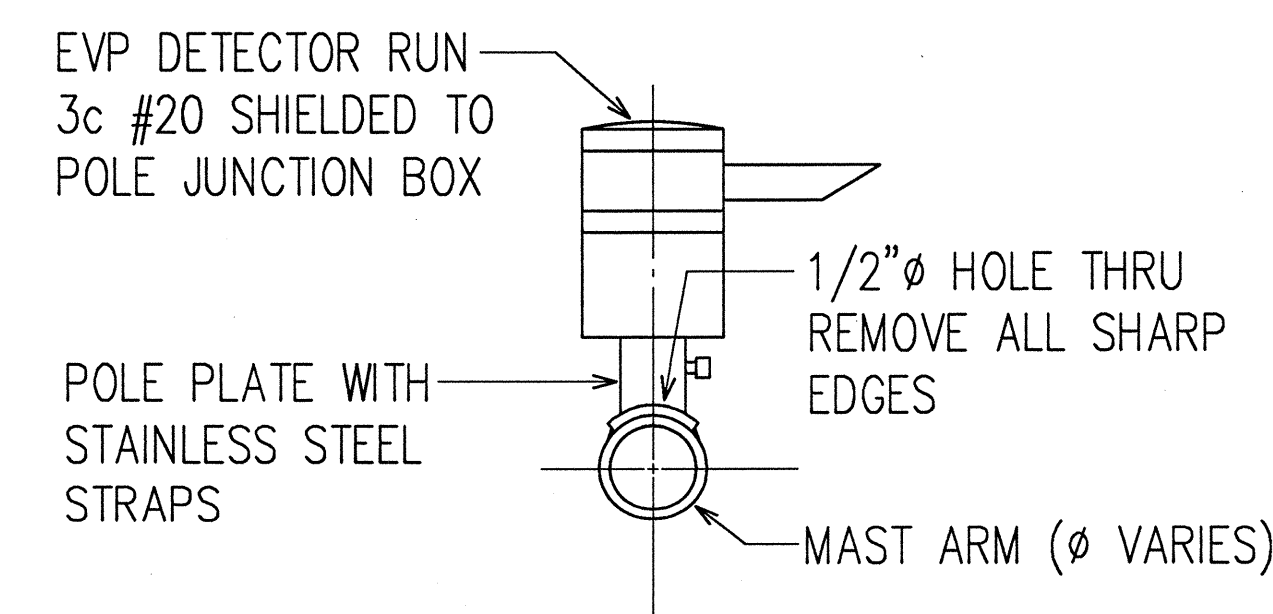
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	91	104

TRAFFIC SIGNAL NOTES:

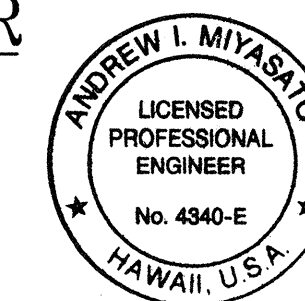
1. LOCATIONS OF EXISTING UNDERGROUND STRUCTURES AND UTILITIES SUCH AS PIPE-LINES, CONDUITS, CABLES, ETC., SHOWN ON PLANS ARE APPROXIMATE ONLY. IT IS NOT THE INTENT OF THESE PLANS TO SHOW THE EXACT LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES WITH THE RESPECTIVE OWNERS. EXISTING UTILITIES DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT HIS OWN COST.
2. THE LOCATIONS OF THE TRAFFIC SIGNAL STANDARDS, TRAFFIC SIGNAL STANDARDS WITH MAST-ARM, PEDESTRIAN PUSH BUTTONS, TRAFFIC CONTROLLER CABINET, PULL-BOXES, CONDUITS AND LOOP DETECTORS SHALL BE STAKED OUT IN THE FIELD BY THE CONTRACTOR AND APPROVAL OF THE LOCATIONS SHALL BE OBTAINED FROM THE ENGINEER PRIOR TO CONSTRUCTION AND INSTALLATION.
3. ALL TRAFFIC SIGNAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", FEDERAL HIGHWAY ADMINISTRATION (1984) AND AMENDMENTS.
4. LOCATIONS OF TRAFFIC MARKINGS AND MARKERS (LANE LINES, STOP LINES, CROSS-WALK, ETC.) SHOWN ON THE PLANS SHALL BE VERIFIED WITH THE ENGINEER PRIOR TO THE INSTALLATION OF THE TRAFFIC SIGNAL SYSTEM.
5. MAINTENANCE OF TRAFFIC THROUGH THE CONSTRUCTION AREA SHALL BE IN ACCORDANCE WITH PART VI OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", FEDERAL HIGHWAY ADMINISTRATION (1984) AND AS SPECIFIED IN THE SPECIAL PROVISIONS. THE CONTRACTOR SHALL FURNISH AND MAINTAIN ADEQUATE BARRICADES, BLINKERS, CONSTRUCTION SIGNS, ETC., FOR THE SAFETY OF THE PUBLIC.
6. ALL TRAFFIC SIGNAL CONTROLLER EQUIPMENT SHALL BE COMPLETELY WIRED IN THE CABINET AND SHALL CONTROL THE TRAFFIC SIGNALS AS CALLED FOR IN THE PLANS.
7. SIGNAL INDICATIONS DURING CLEARANCE INTERVAL:
 - A. IF A SIGNAL IS G OR ~~G~~ AND WILL REMAIN G OR ~~G~~ DURING THE NEXT PHASE, IT SHALL BE G OR ~~G~~ DURING THE CLEARANCE INTERVAL.
 - B. IF A SIGNAL IS G OR ~~G~~ AND WILL BECOME R OR EXTINGUISHED DURING THE NEXT PHASE, IT SHALL BE Y OR ~~Y~~ DURING THE CLEARANCE INTERVAL.
 - C. IF THE SIGNAL IS R AND WILL REMAIN R OR BECOMES G DURING THE NEXT PHASE, IT SHALL REMAIN R DURING THE CLEARANCE INTERVAL.
8. A SOLID #8 BARE COPPER WIRE SHALL BE PULLED WITH THE TRAFFIC CONTROL CABLE FOR EQUIPMENT GROUND. COST SHALL BE INCIDENTAL TO THE INSTALLATION OF THE CONTROL CABLE.
9. THE FOLLOWING STATE STANDARD DETAILS SHALL BE USED:
TE-38, TE-39, TE-41, TE-42



TYPICAL PEDESTAL/MAST ARM
INSTALLATION OF EVP DETECTOR
NOT TO SCALE



TYPICAL HORIZONTAL MOUNT OF EVP DETECTOR
NOT TO SCALE



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Andrew J. Myasaka
5/7/97
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

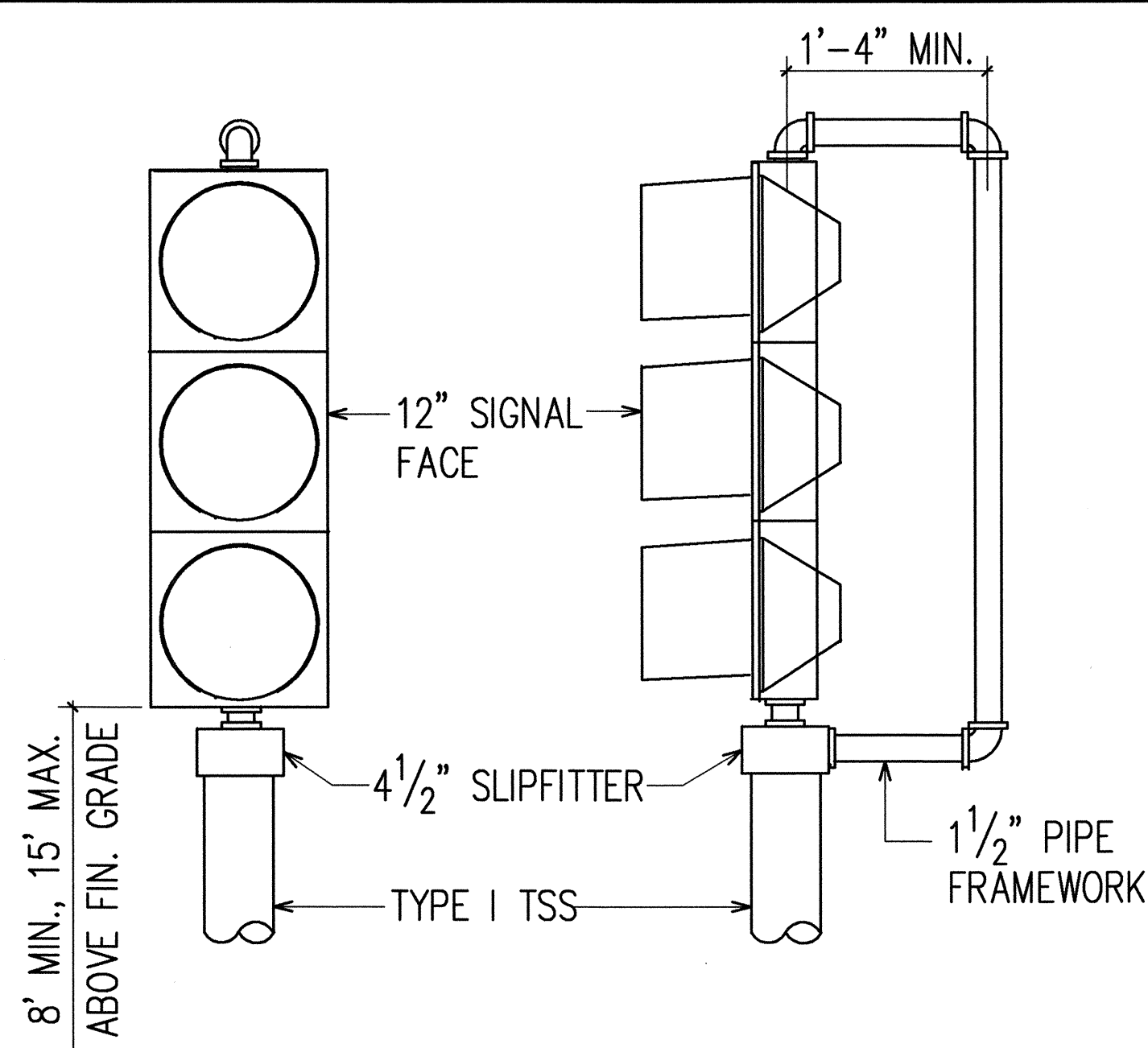
TRAFFIC SIGNAL SYSTEM DETAILS IV

INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps

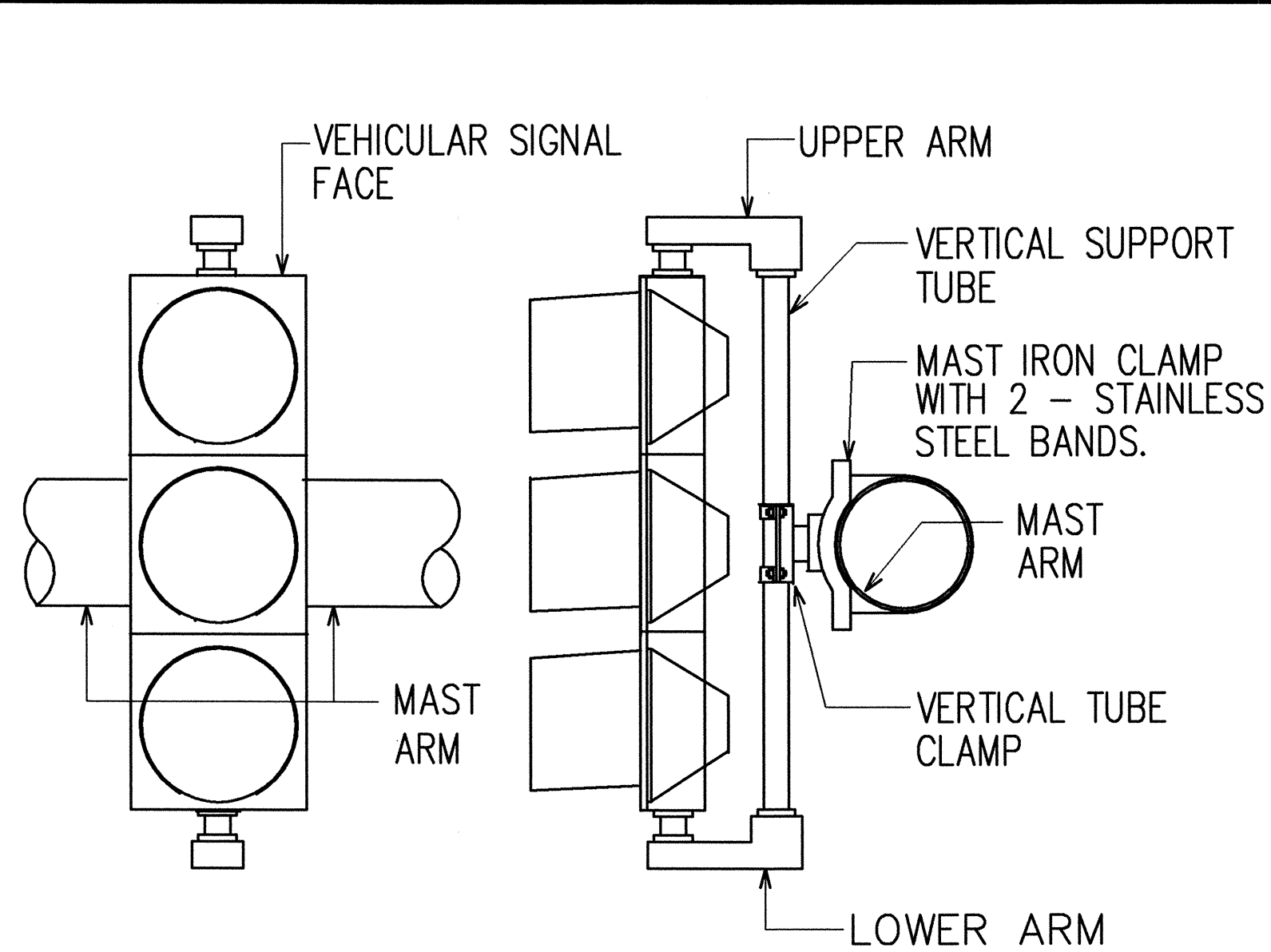
SCALE: AS NOTED DATE: APRIL 30, 1997

SHEET No. E-30 OF 33 SHEETS

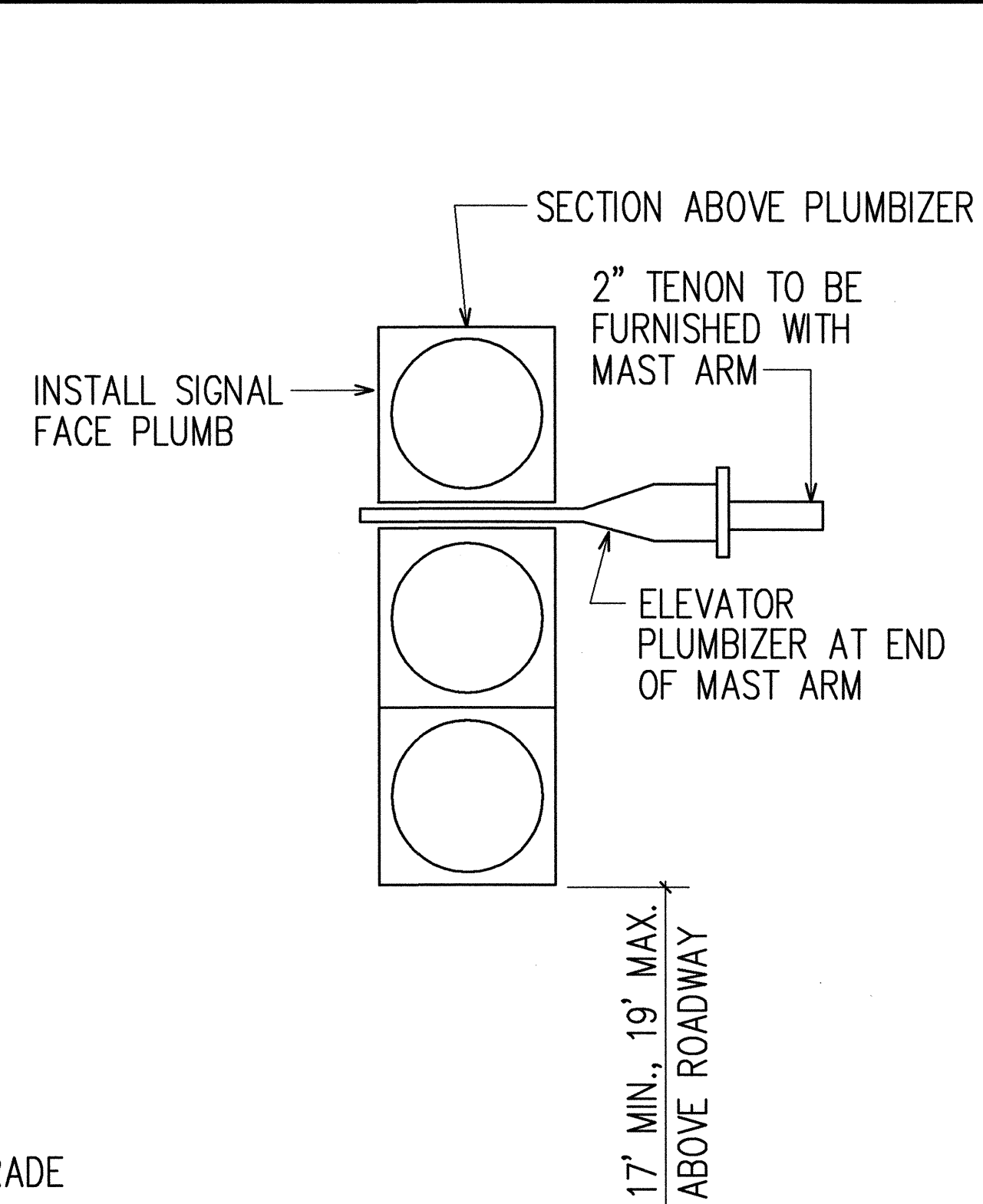
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	92	104



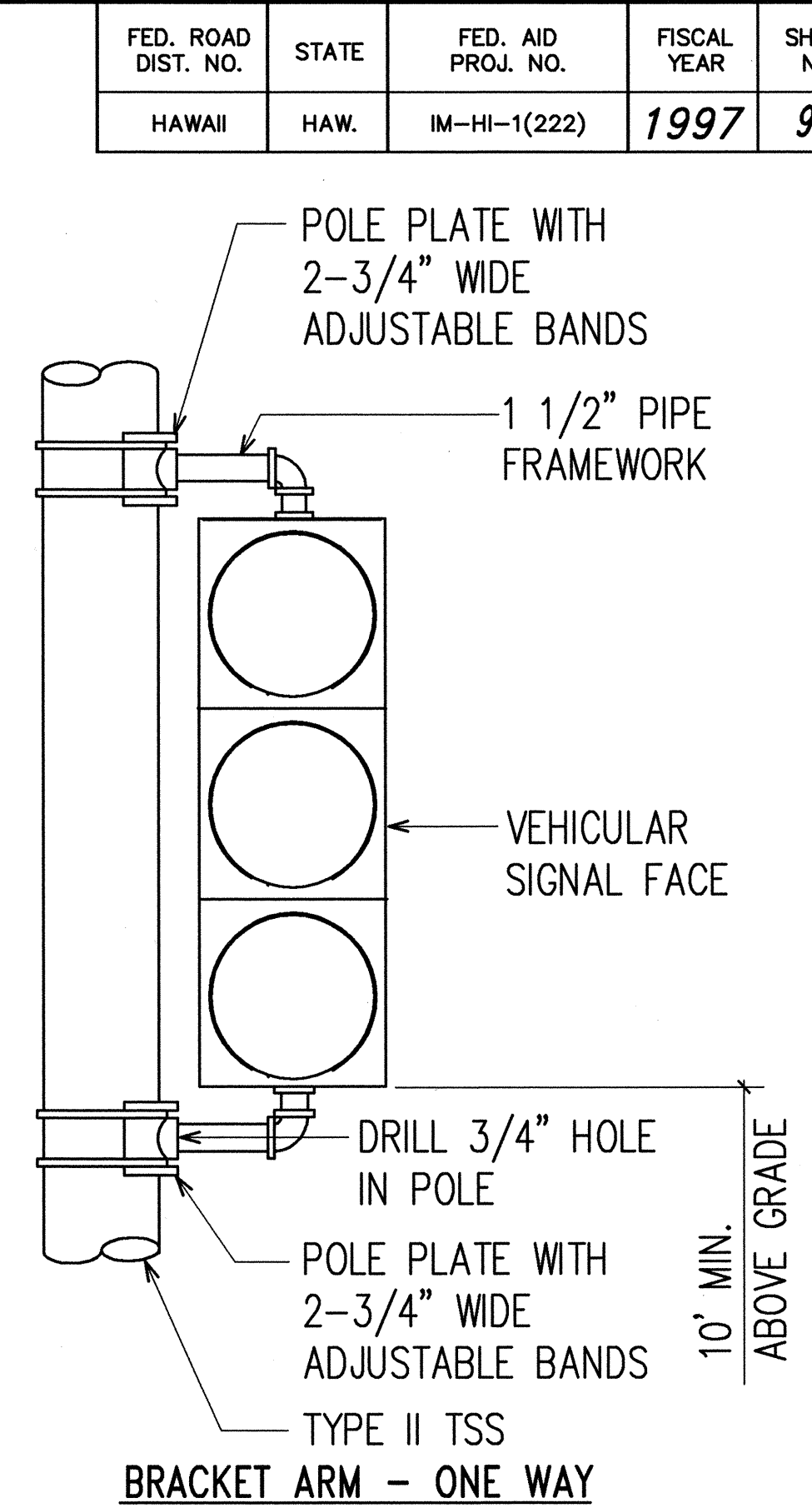
TOP OF POLE - ONE WAY MOUNTING



ADJUSTABLE MAST ARM ONE WAY MOUNTING AT INTERMEDIATE POINT



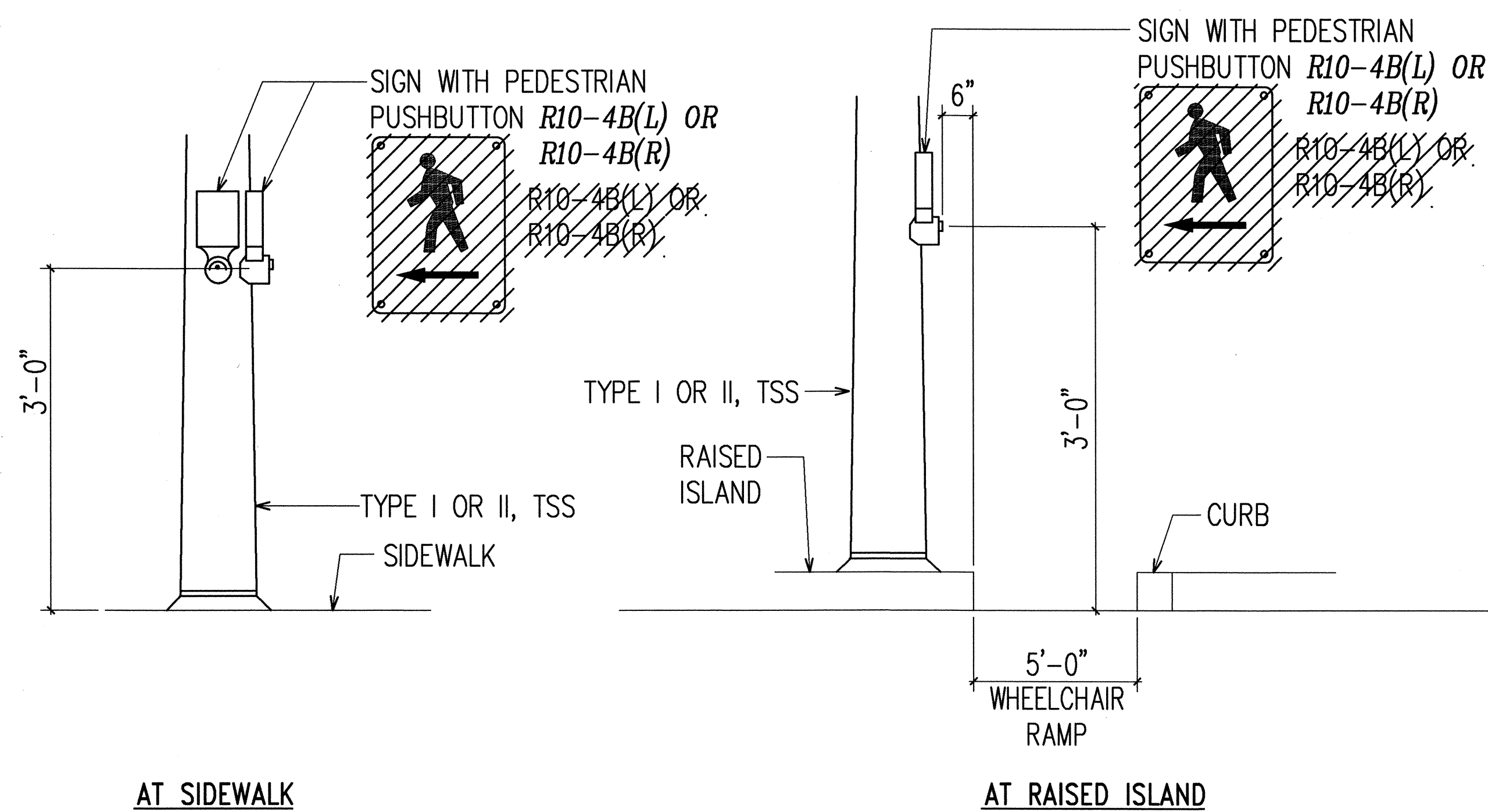
MAST ARM - ONE WAY MOUNTING AT ENDS



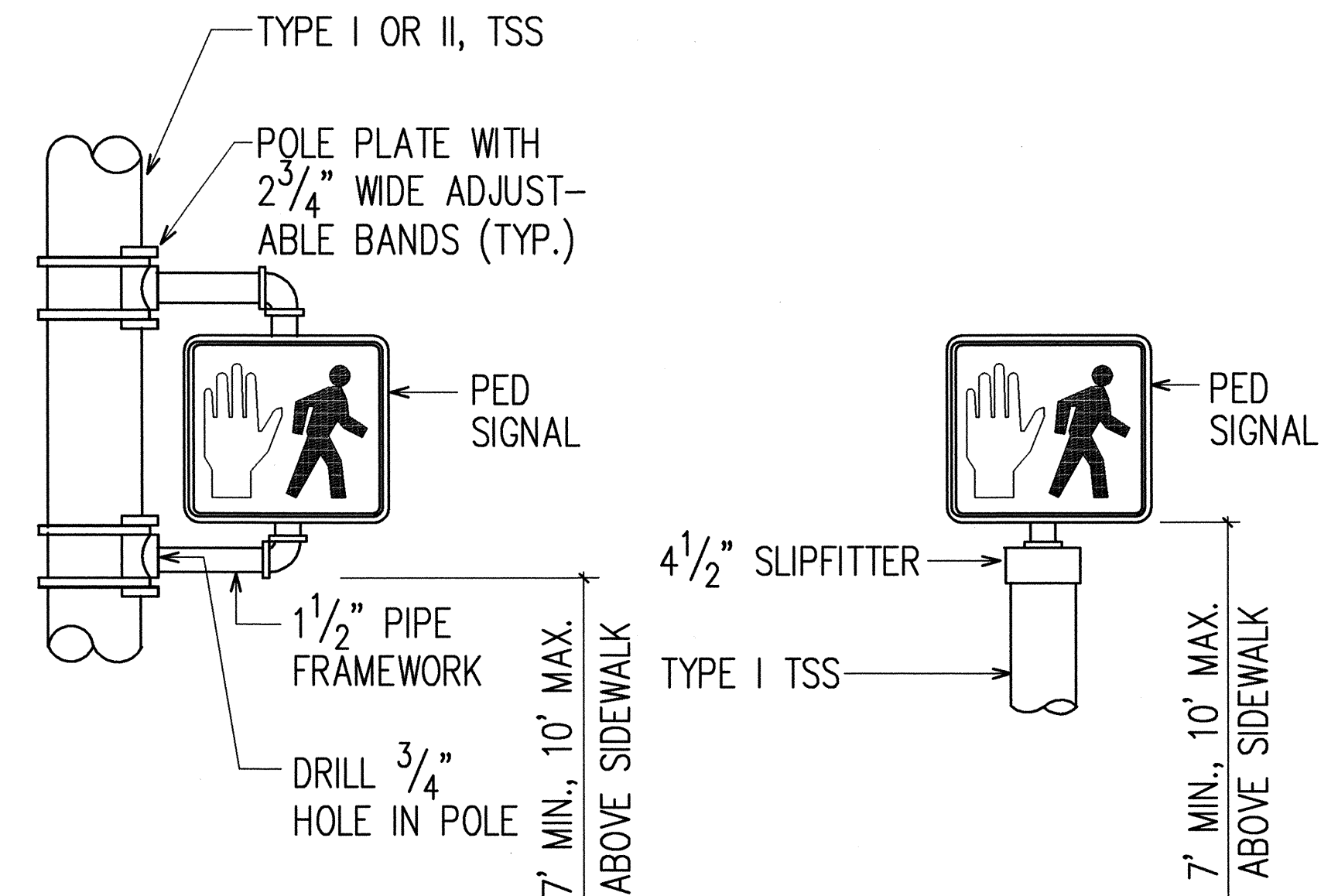
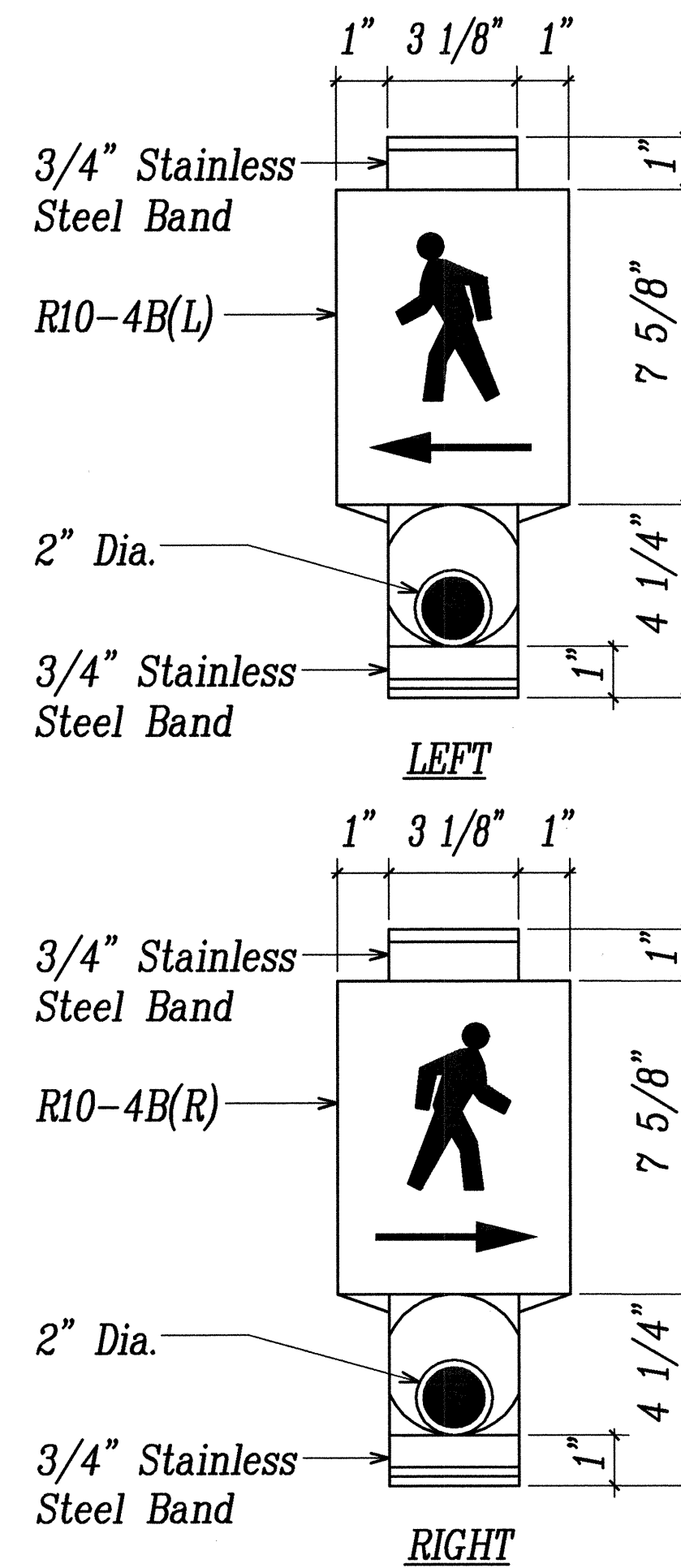
NOTES:

1. STAINLESS STEEL BANDS SHALL BE 1/2" WIDE X .050" THICK, MINIMUM. TENSILE STRENGTH SHALL BE 100,000 PSI MINIMUM.
2. UPPER ARM, LOWER ARM AND VERTICAL SUPPORT TUBE SHALL BE OF 356 CAST ALUMINUM.
3. ALL WIRING SHALL BE CONCEALED.
4. VERTICAL TUBE CLAMP SHALL BE OF MALLEABLE IRON, GRADE 32510.
5. ALL ALUMINUM PARTS SHALL HAVE AN ALODINE 1200 FINISH.

VEHICULAR SIGNAL MOUNTING DETAILS
N.T.S.



PEDESTRIAN PUSHBUTTON DETAILS
N.T.S.



BRACKET MOUNT - ONE WAY
TOP OF POLE - ONE WAY
PEDESTRIAN SIGNAL MOUNTING DETAILS
N.T.S.



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OR UNDER MY SUPERVISION.
Ronald N. S. Ho & Assoc., Inc.
ELECTRICAL ENGINEERS

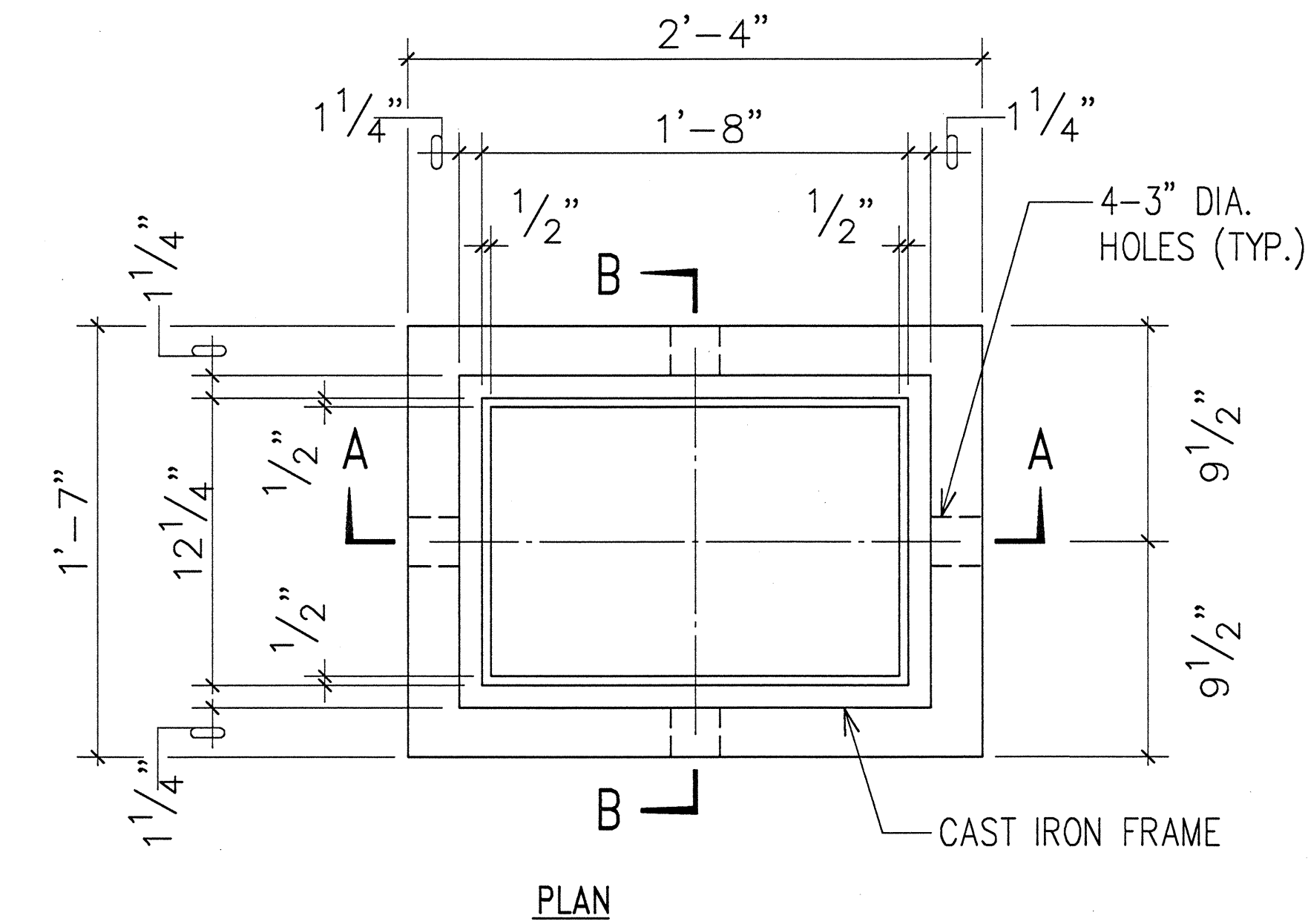
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL SYSTEM DETAILS V

INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps

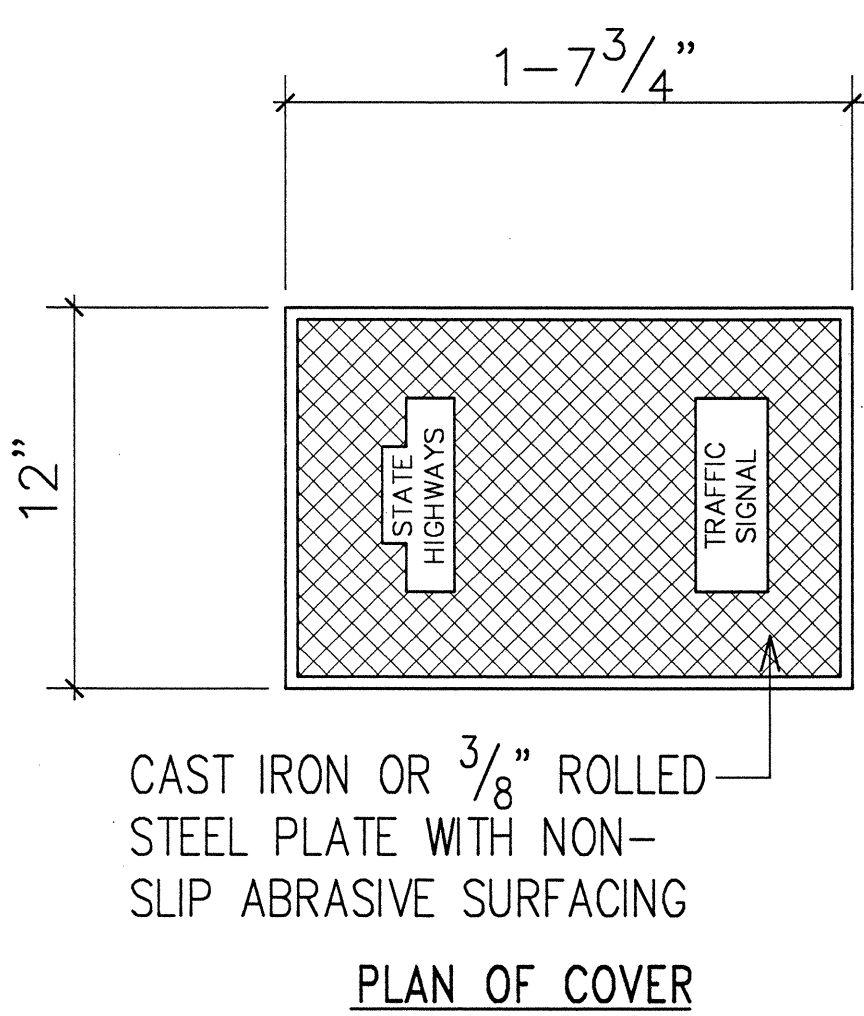
SCALE: AS NOTED
DATE: APRIL 30, 1997
SHEET No. E-31 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	93	104

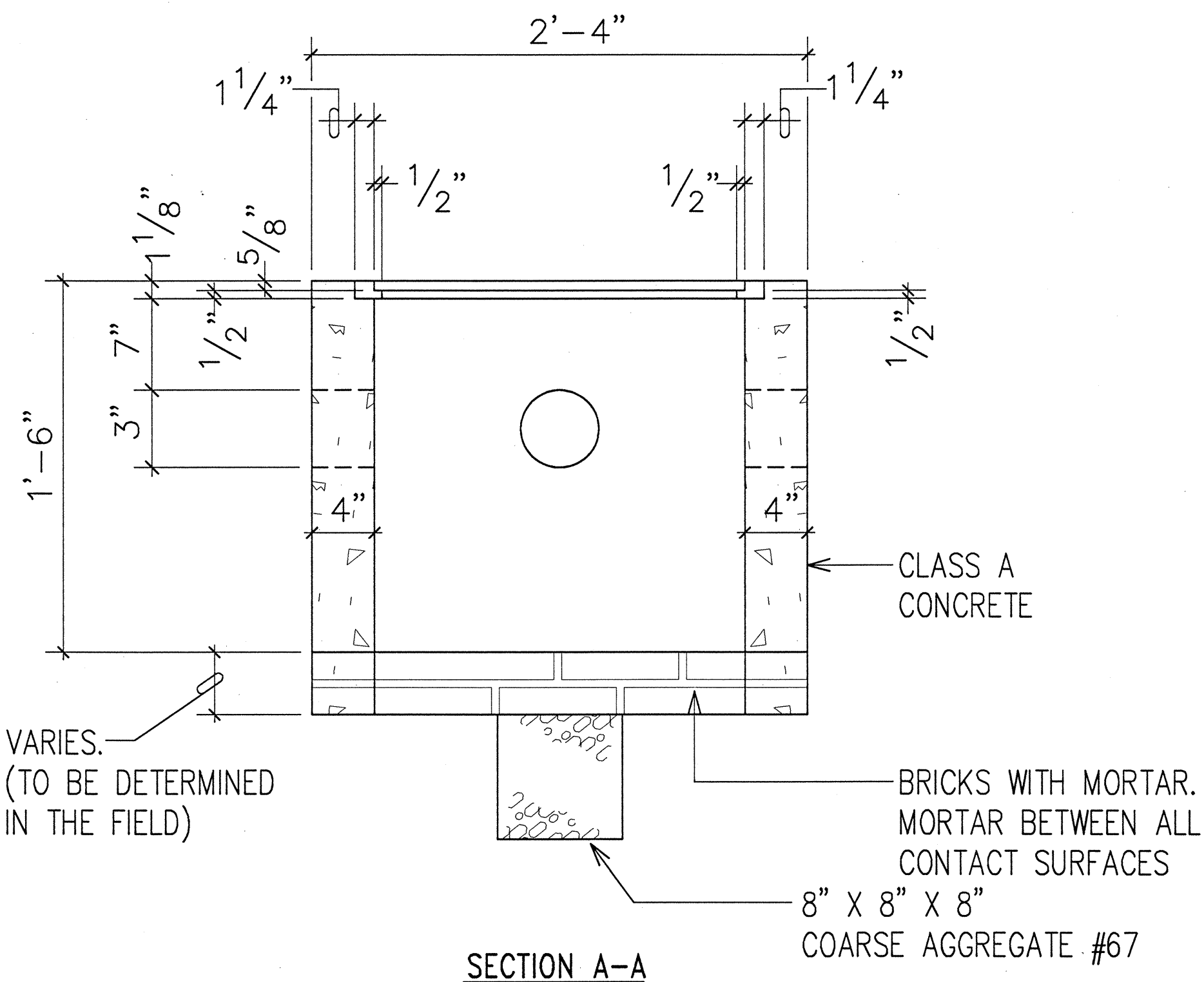
NOTE: STEEL RIM SHALL BE WELDED TO BOTTOM OF STEEL COVER IF NECESSARY SO THAT TOP OF COVER AND FRAME ARE FLUSH.



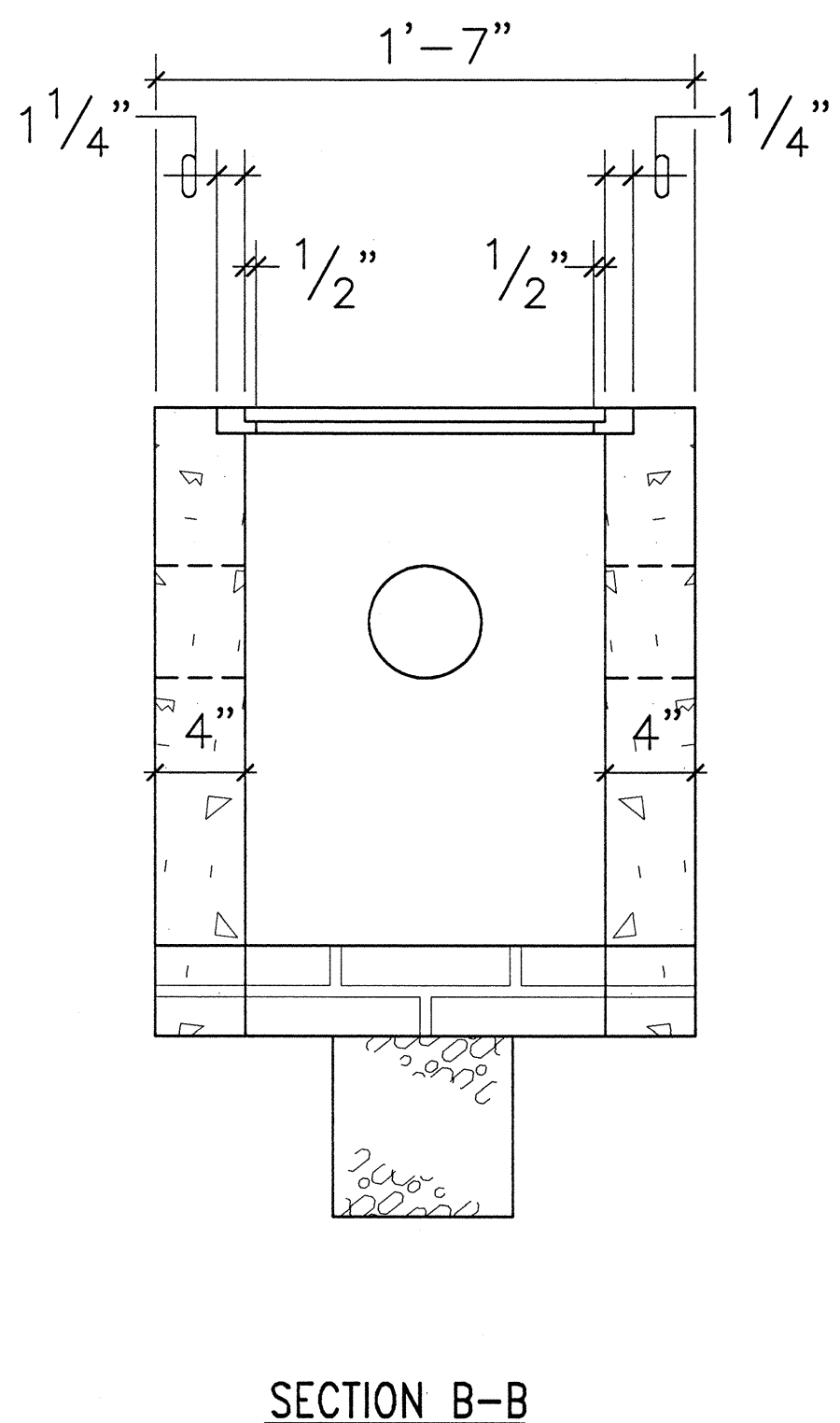
PLAN



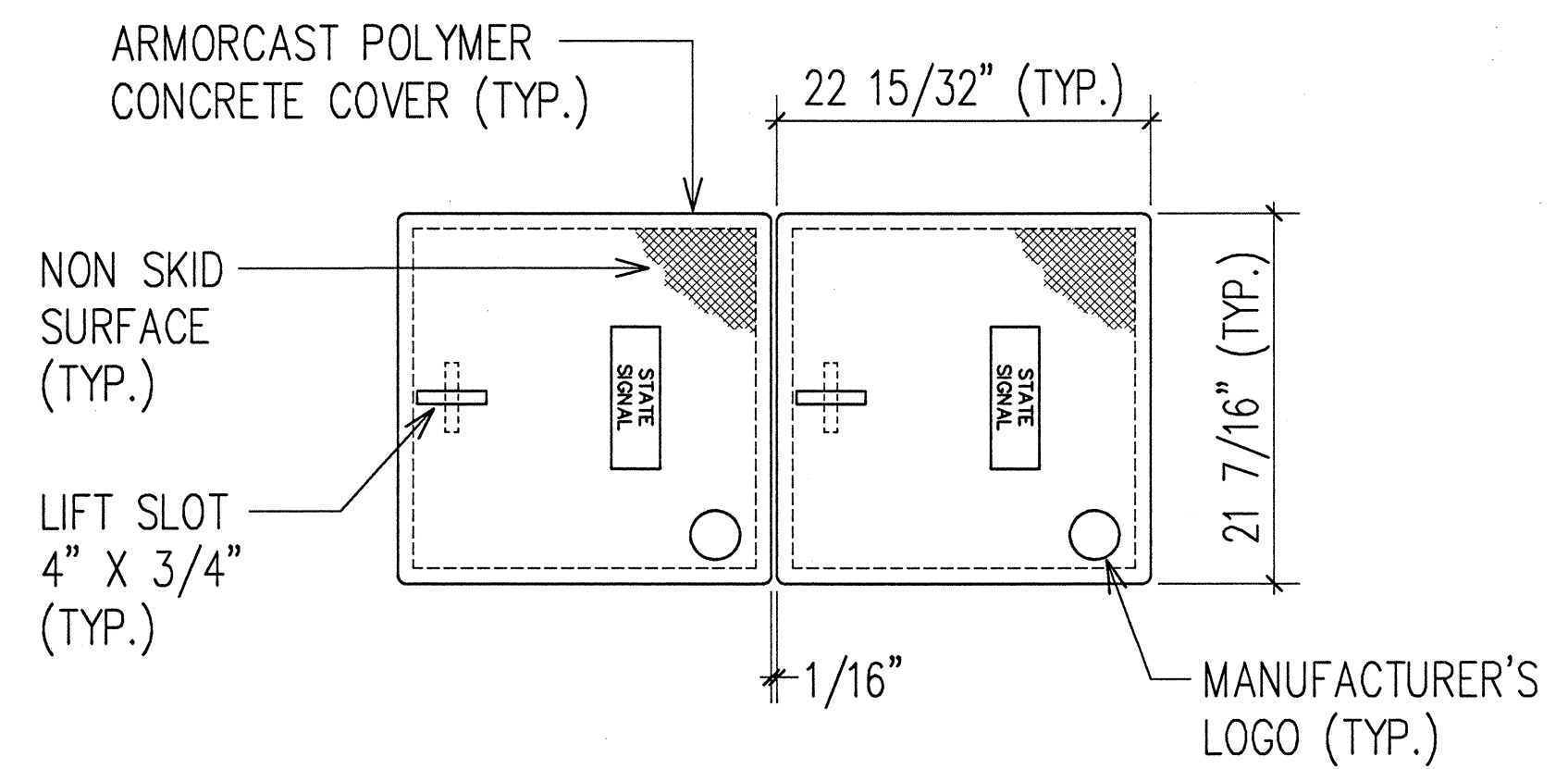
PLAN OF COVER



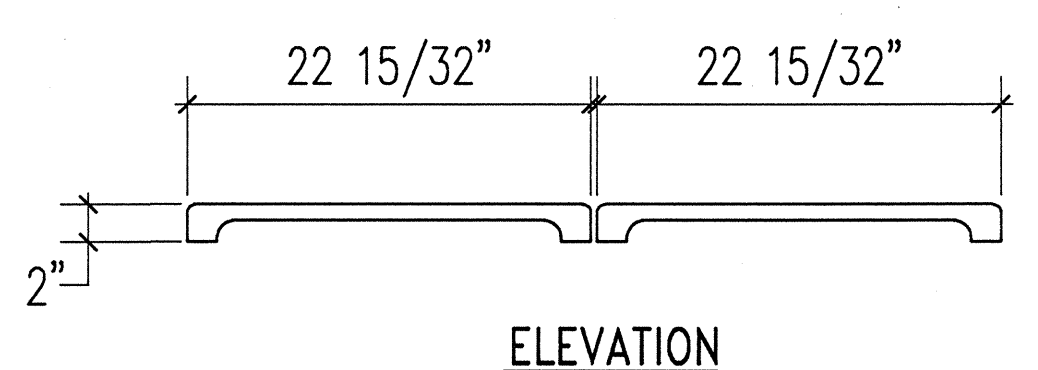
SECTION A-A



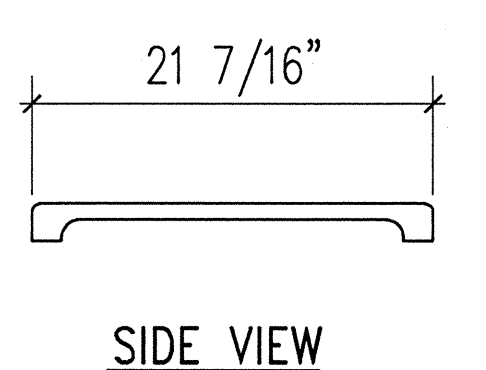
SECTION B-B



PLAN VIEW

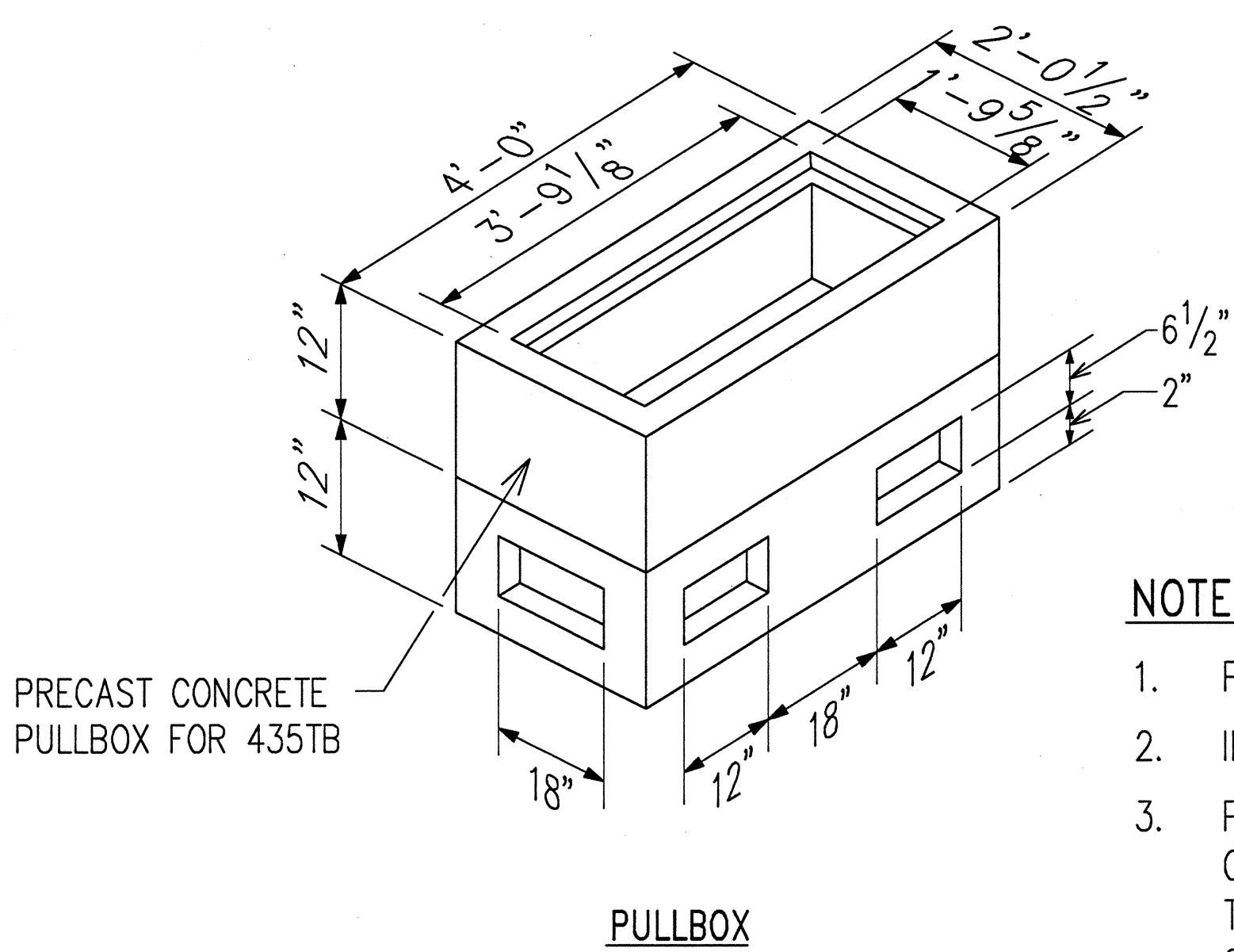


ELEVATION



SIDE VIEW

ELEVATION



PULLBOX

NOTES:

1. PROVIDE ARMORCAST POLYMER CONCRETE COVER.
2. INSTALL ON 6" BED OF #3 CRUSHED ROCK.
3. PROVIDE SUFFICIENT AMOUNT OF 5/8" X 8' COPPERWELD GROUND RODS AS DIRECTED BY THE TRAFFIC SIGNAL INSPECTOR/ENGINEER. COST SHALL BE INCIDENTAL TO THE VARIOUS TRAFFIC SIGNAL ITEMS.

TYPE "D" TRAFFIC SIGNAL PULLBOX DETAILS
NOT TO SCALE

TYPE "B" TRAFFIC SIGNAL PULLBOX DETAILS
NOT TO SCALE

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	
	IN CHARGE	



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Andrew I. Miyasato
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

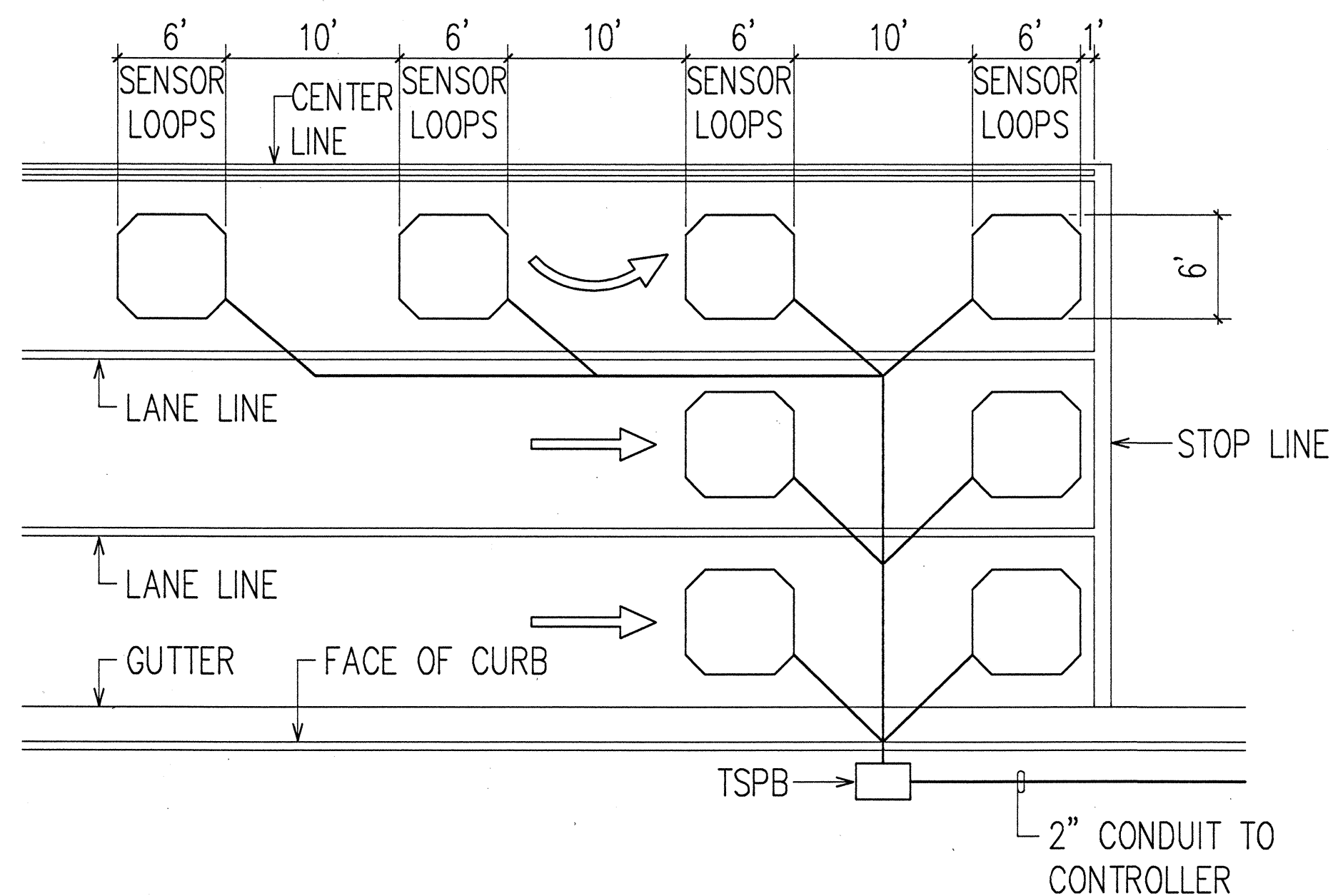
TRAFFIC SIGNAL SYSTEM DETAILS VI

*INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
to Westbound Off-Ramp and
Eastbound On-Ramps*

SCALE: AS NOTED DATE: APRIL 30, 1997

SHEET No. E-32 OF 33 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-HI-1(222)	1997	94	104

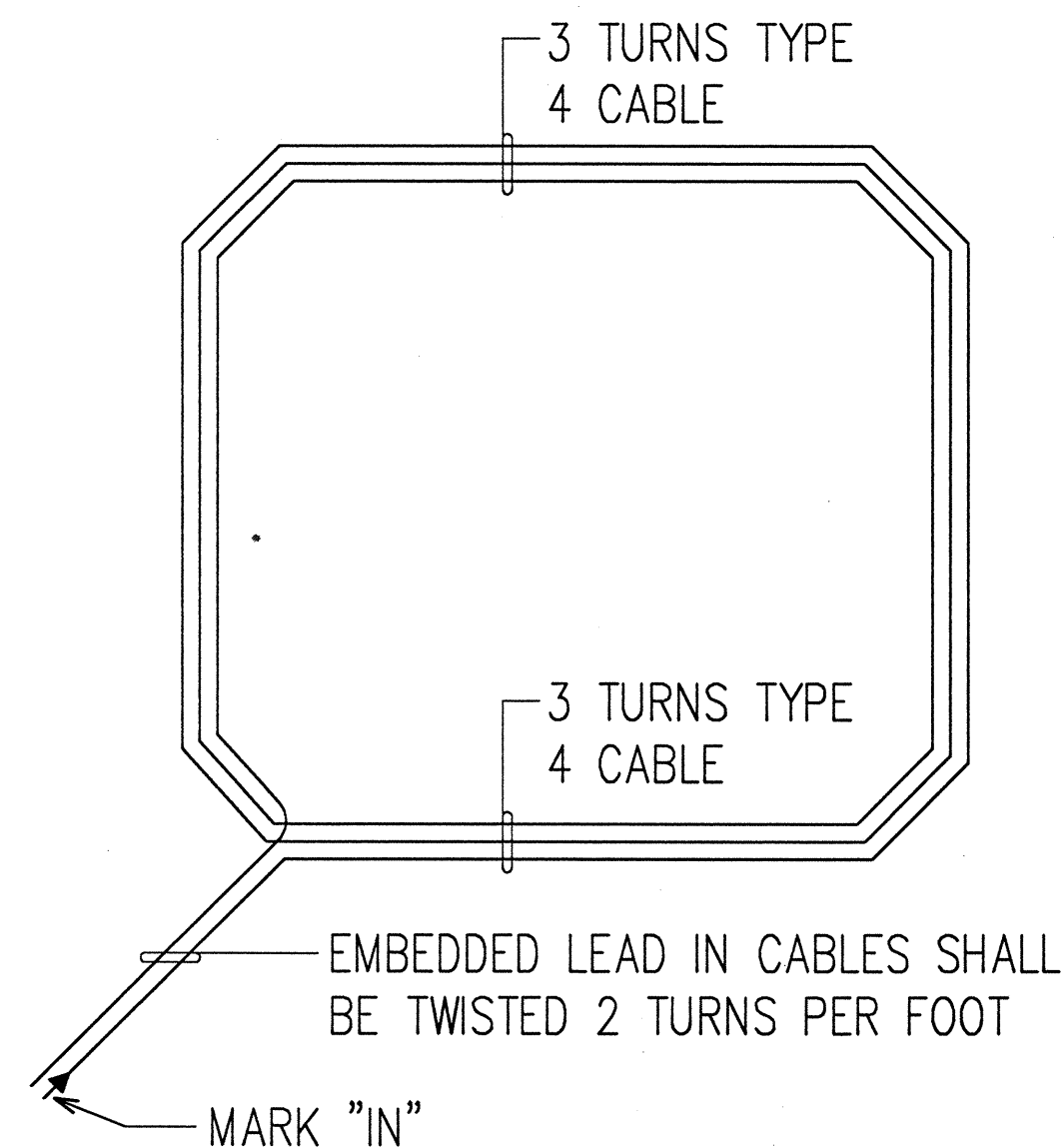


NOTES:

1. CENTER SENSOR LOOPS IN LANES.
2. COLLECTOR CABLES SHALL BE TWISTED 2 TURNS PER FOOT.
3. NUMBER OF LOOPS AND LOCATIONS VARY. SEE PROJECT PLANS.
4. NUMBER AND LOCATIONS OF COLLECTOR SAWCUTS MAY BE VARIED IN THE FIELD TO SUIT.

TYPICAL SENSOR LOOP LAYOUT

N.T.S.

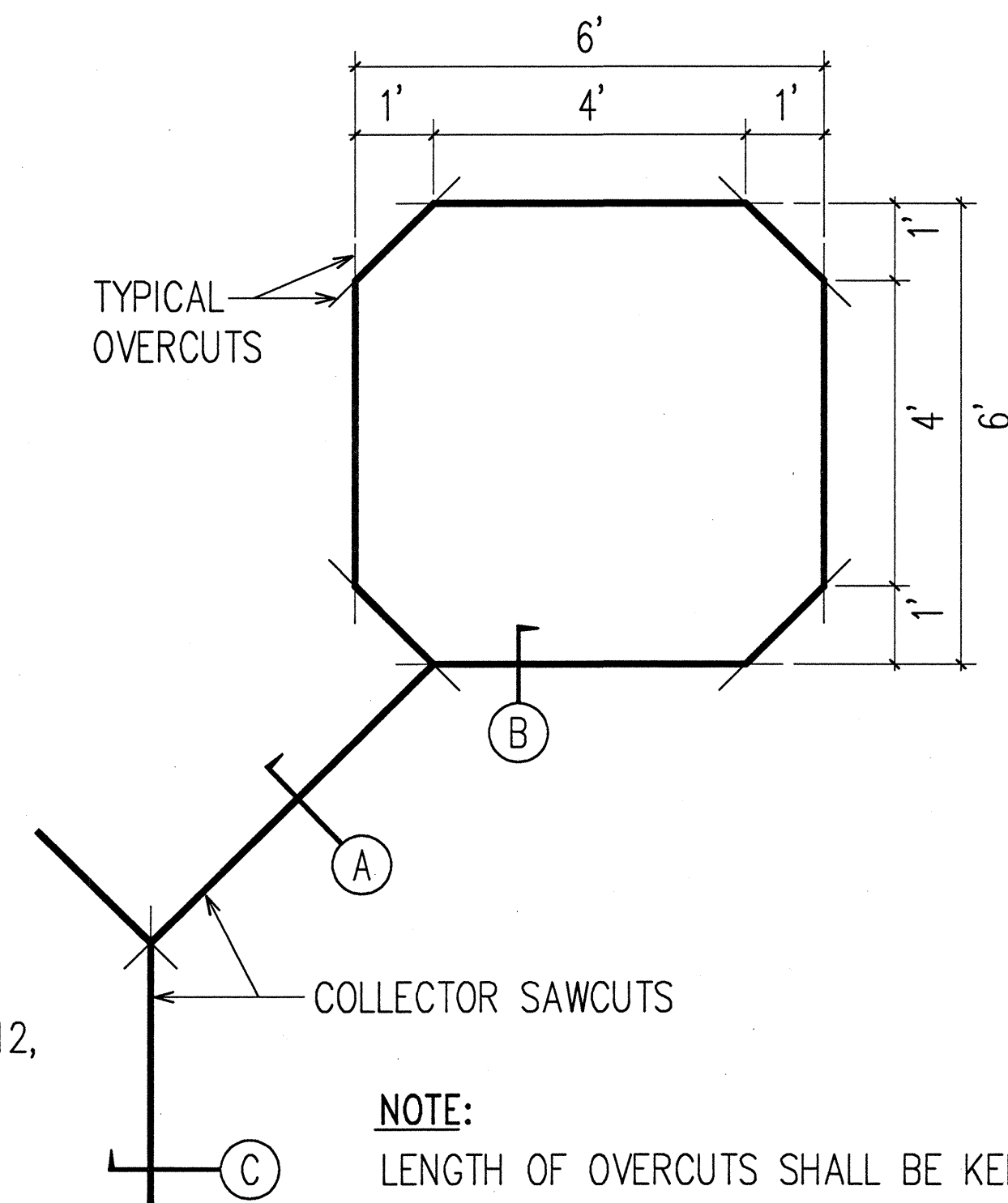


PLAN

NOTE: TYPE 4 CABLE - LOOP SENSOR CABLE: SOLID NO. 12, SINGLE CONDUCTOR TO IMSA SPEC 51-5

TYPICAL SENSOR LOOP WIRING DIAGRAM

N.T.S.

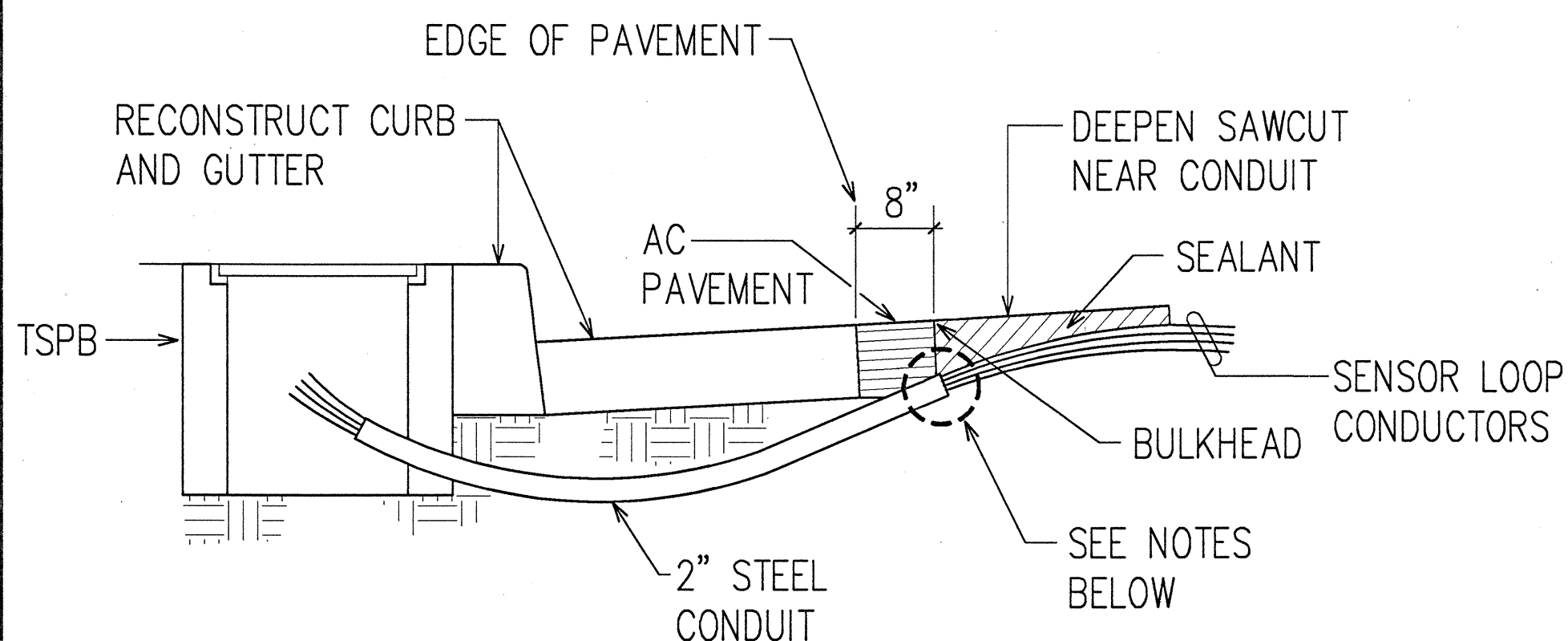
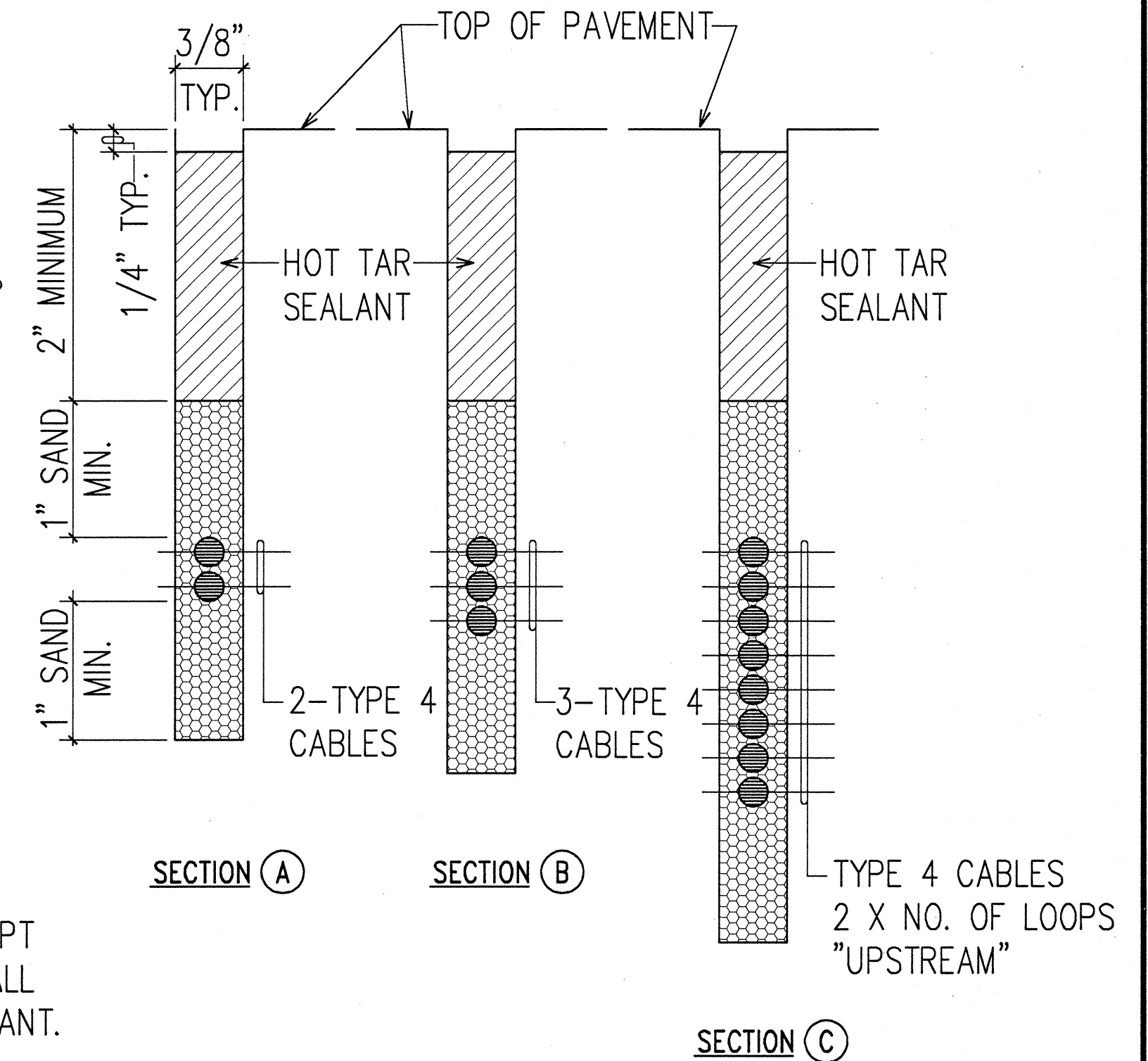


NOTE:

LENGTH OF OVERCUTS SHALL BE KEPT TO A MINIMUM. ALL OVERCUTS SHALL BE BACKFILLED WITH HOT TAR SEALANT.

TYPICAL SENSOR LOOP SAWCUT DETAIL

N.T.S.



NOTES:

1. SEAL ROADWAY END OF CONDUIT AFTER INSTALLATION OF CONDUCTORS.
2. INSTALL BULKHEAD ACROSS CONDUIT TRENCH.
3. PLACE HOT TAR IN SAWCUT.
4. BACKFILL OVER CONDUIT WITH NEW A.C.
5. RECONSTRUCT CURB AND GUTTER AS REQUIRED.

DETAIL OF SENSOR LOOP INSTALLATION AT EDGE OF ROADWAY

N.T.S.

DATE	_____
SURVEY PLOTTED BY	_____
DRAWN BY	_____
DESIGNED BY	_____
QUANTITIES BY	_____
NOTE BOOK	_____
NO.	_____
LAST SAVE: 05/07/97	05/07/97
FILE: V:\PROJECTS\940601\DET-10A	



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Andrew I. Miyamoto
 5/7/97
 RONALD N. S. HO & ASSOC., INC.
 ELECTRICAL ENGINEERS

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION
TRAFFIC SIGNAL SYSTEM DETAILS VII
INTERSTATE ROUTE H-1
Makakilo Interchange Improvements
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Eastbound On-Ramps
 SCALE: AS NOTED DATE: APRIL 30, 1997
 SHEET No. E-33 OF 33 SHEETS