

ORIGINAL PLAN

NOTE BOOK

No.

SURVEY PLOTTED BY

DRAWN BY

DESIGNED BY

QUANTITIES BY

CHECKED BY

DATE

LAST SAVE: 06/10/99 @ 10:27:04 BY: 22 ADD PROJECTS\2225\2225.DWG

GENERAL NOTES:

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE "HAWAII STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND PUBLIC WORKS CONSTRUCTION", 1994, STATE OF HAWAII DEPARTMENT OF TRANSPORTATION, HIGHWAYS DIVISION, EXCEPT AS MODIFIED HEREIN OR IN THE SPECIAL PROVISIONS.
2. THE CONTRACTOR SHALL VERIFY WITH THE RESPECTIVE UTILITY COMPANIES AND GOVERNMENT AGENCIES, THE LOCATIONS OF ALL ELECTRIC, TELEPHONE, TRAFFIC SIGNAL, STREET LIGHT, FIRE ALARM, GAS, WATER, SEWER, DRAIN, AND OTHER LINES CROSSING THE EXCAVATION PATH OR IN EXCAVATION AREAS.
3. THE LOCATIONS OF ALL NEW TRAFFIC SIGNAL STANDARDS AND CONTROLLERS ON THE DRAWINGS ARE APPROXIMATE. EXACT LOCATION WILL BE DETERMINED IN THE FIELD BY THE ENGINEER. CONFLICTS BETWEEN STANDARDS AND CROSSWALK LOCATIONS SHALL BE AVOIDED WHEREVER POSSIBLE. THE LOCATIONS OF TRAFFIC SIGNAL STANDARDS, CONTROLLERS, PULLBOXES AND CONDUITS SHALL BE STAKED OUT BY THE CONTRACTOR AND APPROVED BY THE ENGINEER PRIOR TO ANY EXCAVATION.
4. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED UTILITY COMPANIES AND GOVERNMENT AGENCIES OF THEIR INTENT TO BEGIN CONSTRUCTION ON ANY INTERSECTION OR STREET AT LEAST TWO (2) WEEKS PRIOR TO THE START OF SUCH CONSTRUCTION.
5. THE CONTRACTOR SHALL SUBMIT COMPUTERIZED POINT TO POINT FOOT-CANDLE LEVEL FOR APPROVAL.
6. THE CONTRACTOR SHALL INSTALL ALL HIGHWAY LIGHTING LUMINAIRES, POLES, IN-GRADE HIGHWAY LIGHTING POLE FOUNDATIONS, RISERS FROM PULLBOXES TO FOUNDATIONS, METERING REQUIREMENTS, AND WIRING AS SPECIFIED IN THESE PLANS AND ITS SPECIFICATIONS.
7. THE CONTRACTOR SHALL INSTALL HIGHWAY LIGHTING CONDUCTORS AND MAKE CONNECTIONS TO EXISTING CONDUCTORS AT OR PAST PROJECT INTERFACES AS REQUIRED.
8. THE CONTRACTOR SHALL COORDINATE WITH THE STATE HANDLING OF ALL SALVAGEABLE MATERIALS INDICATED TO BE REMOVED
9. ALL EXISTING HIGHWAY LIGHT STANDARDS WHICH ARE INDICATED TO BE RELOCATED SHALL BE TESTED TO INSURE PROPER OPERATION PRIOR TO REMOVAL AND RELOCATION. ANY LIGHT STANDARD FOUND TO BE INOPERABLE SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO REMOVAL. UNLESS INFORMED BY THE CONTRACTOR, ANY HIGHWAY LIGHT STANDARD THAT IS REMOVED SHALL BE CONSIDERED IN OPERABLE CONDITION AND SHALL BE MADE OPERATIONAL AFTER RELOCATION COMPLETED.
10. PERMANENT HIGHWAY LIGHTING CRITERIA:

a. MINIMUM AVERAGE MAINTAINED ILLUMINATION LEVEL: COLLECTOR - INTERMEDIATE - 0.8 FC

b. MAXIMUM (AVERAGE TO MINIMUM MAINTAINED FOOTCANDLE) UNIFORMITY RATIO: 4 TO 1

c. MAINTENANCE FACTOR: 0.76

d. PROVIDE HIGHWAY ILLUMINATION CALCULATIONS (PER AASHTO RECOMMENDATIONS) CERTIFYING CONFORMANCE WITH MINIMIM AVERAGE MAINTAINED ILLUMINATION LEVELS AND MAXIMUM (AVERAGE TO MINIMUM MAINTAINED FOOTCANDLES) UNIFORMITY RATIO

HTCO NOTES:

1. THE CONTRACTOR SHALL OBTAIN AN EXCAVATION PERMIT CLEARANCE FROM HAWAIIAN TELEPHONE COMPANY (HTCO) RECORDS SECTION LOCATED AT 3239 UALENA STREET, 3RD FLOOR (ABY-3) TWO WEEKS PRIOR TO START OF CONSTRUCTION. HOURS OF BUSINESS ARE 7:00 A.M. TO 10:30 A.M. AND 11:30 A.M. TO 3:00 P.M., MONDAY THRU FRIDAY, EXCEPT HOLIDAYS.
2. SHOULD IT BECOME NECESSARY, ANY WORK REQUIRED TO RELOCATE HTCO FACILITIES SHALL BE DONE BY HTCO. THE CONTRACTOR SHALL PROVIDE THE NECESSARY EXCAVATION AND BACKFILL, ARRANGE FOR TRAFFIC PERMITS AND RESTORE SIDE WALK, PAVEMENT OR OTHER FACILITIES AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COORDINATION. FOR RELOCATION OF ANY TELEPHONE CABLES AND/OR DUCT LINES, THE CONTRACTOR SHALL NOTIFY HTCO FIVE DAYS BEFORE STARTING WORK.
3. THE CONTRACTOR SHALL NOTIFY HTCO AT 546-1599 72-HOURS BEFORE STARTING EXCAVATION TO TONE AND MARK LOCATION OF ALL EXISTING TELEPHONE CABLES AND/OR DUCT LINES.
4. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN THE EXCAVATION AND CONSTRUCTION CROSSES OR IS IN CLOSE PROXIMITY TO TELEPHONE FACILITIES.
5. ALL EXCAVATION WITHIN TWO FEET OF TELEPHONE CABLES SHALL BE DONE BY HAND.
6. PROVIDE ADEQUATE SUPPORT AND PROTECTION FOR TELEPHONE CABLES AND/OR DUCT LINES EXPOSED IN THE TRENCH. SUCH SUPPORT AND PROTECTION SHALL BE APPROVED BY HTCO INSPECTOR.
7. THE CONTRACTOR SHALL NOTIFY HTCO IMMEDIATELY AT 611-"0" AFTER ANY DAMAGES TO HTCO CABLES, DUCT LINES, PULLBOXES, MANHOLES, HANDHOLES, POLES AND GUYS. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL DAMAGES TO HTCO FACILITIES SHOWN ON THE PLANS OR MADE KNOWN TO HIM BY FIELD LOCATION.
8. REPAIR WORK ON DAMAGED CABLES SHALL BE DONE BY HTCO AND ANY OTHER WORK INVOLVING EXISTING UNDERGROUND FACILITIES SHALL BE DONE BY THE CONTRACTOR IN THE PRESENCE OF HTCO ENGINEER OR HIS REPRESENTATIVE. COST FOR ALL REPAIR WORK SHALL BE DONE BY THE CONTRACTOR.
9. THE COST OF ANY RELOCATION OF HTCO FACILITIES DONE FOR THE CONVENIENCE OF THE CONTRACTOR SHALL BE BORNE BY THE CONTRACTOR, UNLESS OTHERWISE NOTED.

FED. ROAD DIST. NO.

STATE

FED. AID PROJ. NO.

FISCAL YEAR

SHEET NO.

TOTAL SHEETS

HAWAII

HAW.

STP-099-1(18)

1999

54

71

ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	HIGHWAY LIGHT BRACKET ARM AND 250 WATT HPS LUMINAIRE, MOUNTED ON UTILITY COMPANY WOOD POLE, SEE SHEET E-9		TRAFFIC SIGNAL PULLBOX, TYPE "C", SEE SHEET E-11
	HIGHWAY LIGHT WOOD POLE, BRACKET ARM, AND 250 WATT HPS LUMINAIRE, SEE SHEET E-9		TRAFFIC SIGNAL PULLBOX, TYPE "A", SEE SHEET E-11
	HIGHWAY LIGHT BRACKET ARM AND 250 WATT HPS LUMINAIRE, MOUNTED ON EXISTING HIGHWAY LIGHT WOOD POLE, SEE SHEET E-9		TRAFFIC SIGNAL PULLBOX, TYPE "B", SEE SHEET E-11
	DOWN GUY AND ANCHOR, SEE SHEET E-9		STREET LIGHT PULLBOX, TYPE A, SEE SHEET E-11
			HTCO 2' X 4' PULLBOX, TYPE 435TB, PER HTCO STANDARD DWG NO. 34056 WITH 5/8" X 8' GROUND ROD
			ELECTRIC/TRAFFIC SIGNAL DUCTLINE AND WIRES
			EXISTING OVERHEAD HIGHWAY LIGHT CIRCUIT
			OVERHEAD HIGHWAY LIGHT CIRCUIT
			EXISTING UNDERGROUND TELEPHONE CONDUITS
	EXISTING HIGHWAY LIGHT MOUNTED ON EXISTING HIGHWAY LIGHT WOOD POLE		
	STANDARD TRAFFIC SIGNAL HEAD MOUNTED ON 10'-0" SIGNAL STANDARD, SEE SHEET E-15		
	TRAFFIC SIGNAL HEADS MOUNTED ON MAST ARM STANDARD SEE SHEET E-13		DUCT SECTION DESIGNATOR, SECTION "A" INDICATED, SEE DETAILS ON SHEET E-7
	VEHICLE LOOP DETECTOR, FOR DETAILS SEE SHEET E-16		INDICATES "PHASE"
	VEHICULAR SIGNAL HEAD, FOR DETAILS SEE SHEETS E-15 & E-17		INDICATES "WEATHERPROOF" ITEM
			NOTE INDICATOR, INDICATES "SEE PLAN NOTE NO. 1"
	OPTICOM DETECTOR, ARROW INDICATES DIRECTION DETECTOR FACES, FOR DETAILS SEE SHEET E-14		

SYMBOL NOTES:

1. "X" THROUGH DASHED ITEM INDICATES EXISTING ITEM TO BE REMOVED.

APPROVED:

06-29-99

GTE HAWAIIAN TEL

DATE

6/14/99

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL SYMBOLS,
GENERAL NOTES, HTCO NOTES

WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

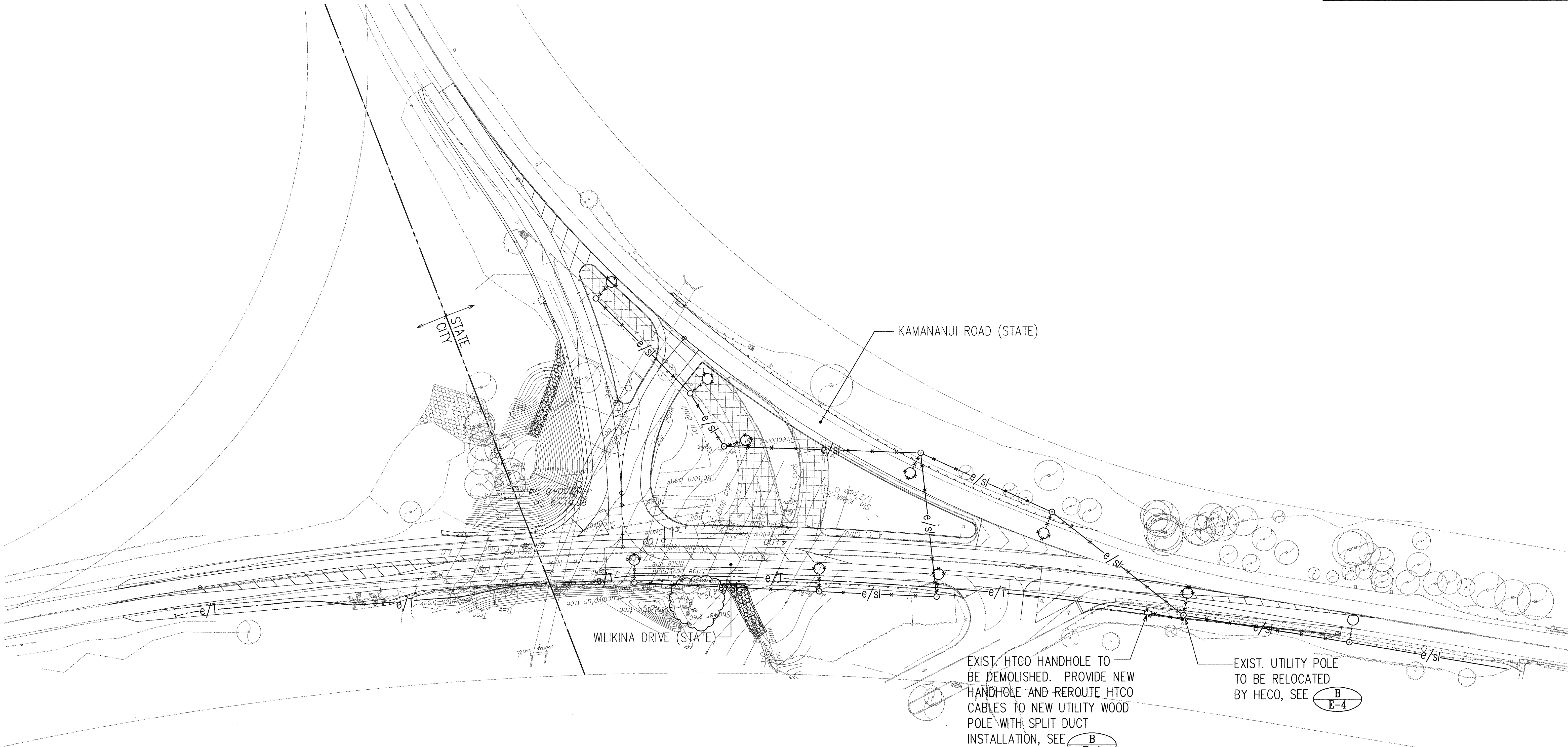
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DATE: JUNE 1999

SHEET No. E-1 OF 18 SHEETS

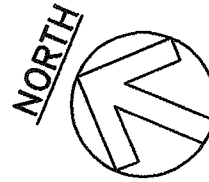
54

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	55	71

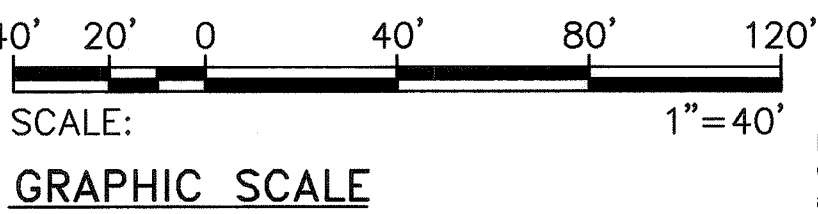


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NO.	

LAST SAVE: 06/10/99 @ 10:26:18 BY: AM PLOT SIZE: 11x17
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HIGHWAY LIGHTING DEMOLITION PLAN
SCALE: 1"=40'



DRAWING REVIEW
Reviewed for HECO's Facilities Only
Date 6/21/99 By [Signature]
Engineering Department
Hawaiian Electric Company, Inc.
HECO's review of these drawings shall in no way relieve the Customer, its Consultant, its Contractor or anyone acting on the Customer's behalf from the responsibility for engineering, design, materials and any other liability associated with this project.

APPROVED:
[Signature] 7/6/99
CHIEF, CIVIL ENGINEERING BRANCH, DPP SW DATE
[Signature] 06-29-99
GTE HAWAIIAN TEL DATE
HAWAIIAN ELECTRIC COMPANY DATE



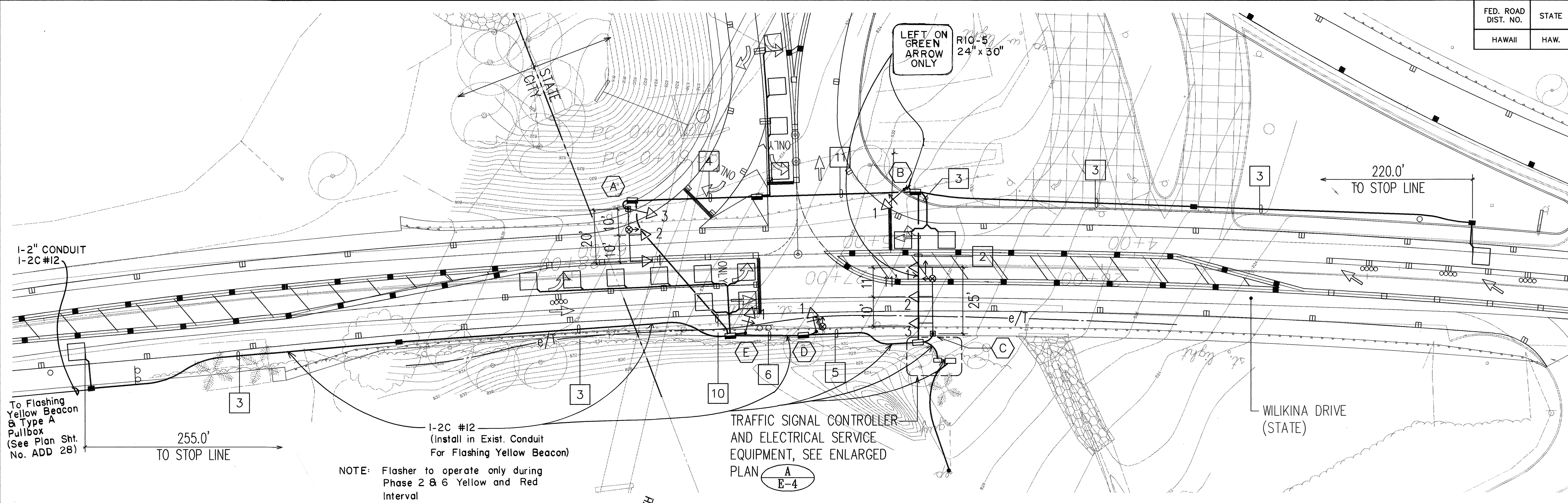
6/14/99
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION.
[Signature]
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

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

WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

SCALE: AS NOTED DATE: JUNE 1999
SHEET No. E-2 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	58	71



TRAFFIC SIGNAL PLAN
SCALE: 1"=20'

TRAFFIC SIGNAL SYSTEM CONDUIT AND CABLE SCHEDULE

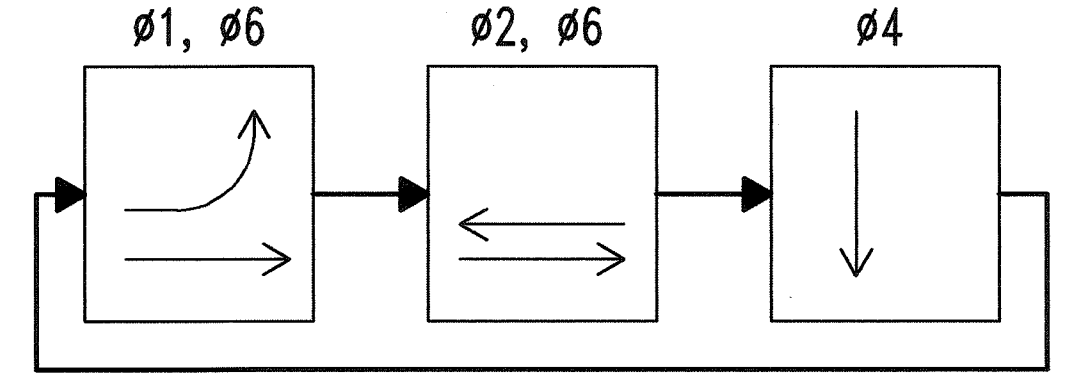
ITEM NO.	1	2	3	4	5	6	7	8	9	10	11	12		
2"C, 1-TYPE 1 TRAFFIC SIGNAL CABLE		1		1	1	1	2			1	1			
2"C, 3-TYPE 2 TRAFFIC SIGNAL CABLE		1			1	1	2							
2"C, 1-TYPE 2 TRAFFIC SIGNAL CABLE			1								1			
2"C, 3-TYPE 7 TRAFFIC SIGNAL CABLE							1							
2"C, 2-TYPE 7 TRAFFIC SIGNAL CABLE					1									
2"C, 1-TYPE 7 TRAFFIC SIGNAL CABLE						1				1				
2"C, 1-TYPE 6 POWER CABLE								1						
2"C WITH PULLCORD (TELEPHONE)														
2"C WITH PULLCORD (SPARE)		2		2	1	1	2			2	2			
DUCT SECTION TYPE	○	F	D	F	G	G	J	H	○	F	F	○		

- NOTE:
- ALL CONDUITS SHALL BE PVC SCHEDULE 40, UNLESS OTHERWISE NOTED
 - FOR ALL DUCT SECTION DETAILS, SEE SHEET E-7

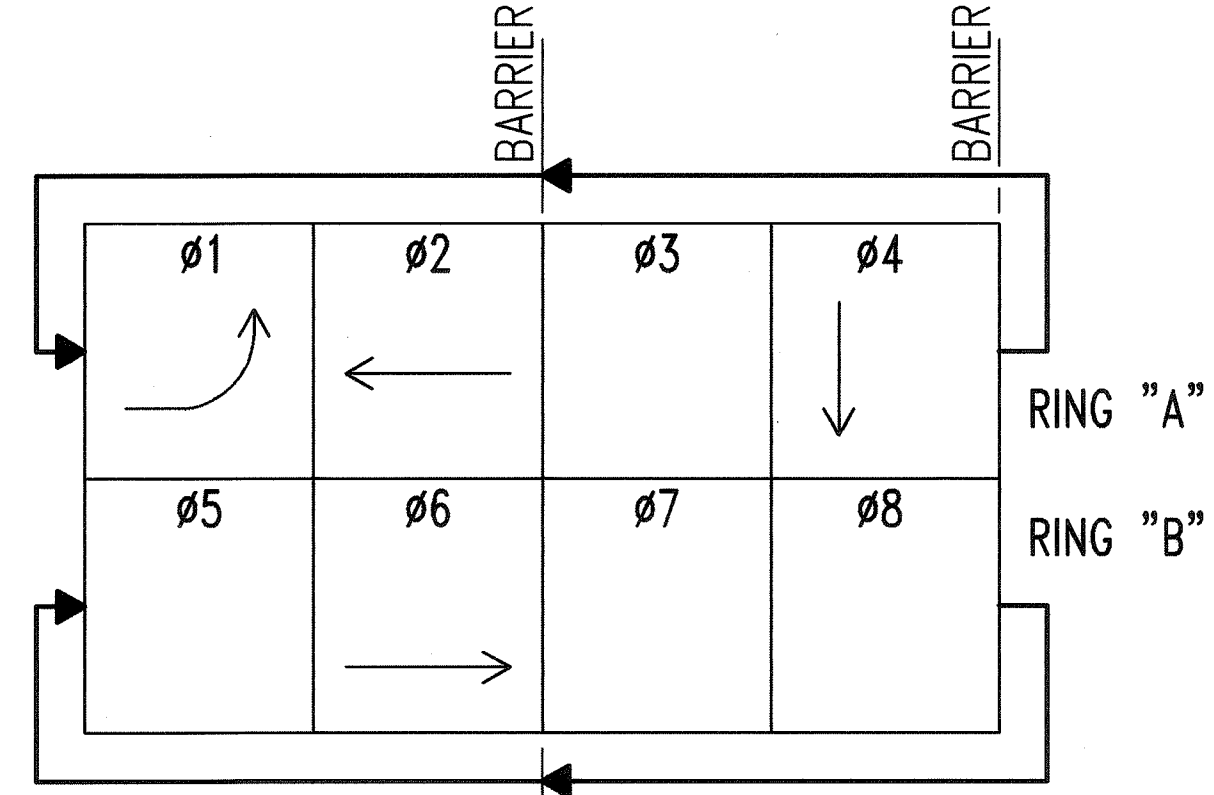
SIGNAL INDICATION	<div><div>R</div><div>Y</div><div>G</div></div>	<div><div>R</div><div>Y</div><div>←</div></div>	<div><div>R</div><div>Y</div><div>↑</div></div>
DESCRIPTION	12" RYG TRAFFIC SIGNAL HEAD	* 12" RY G TRAFFIC SIGNAL HEAD	12" RYG ↑ TRAFFIC SIGNAL HEAD
POLE LETTER-SIGNAL HEAD NUMBER	A-2 A-3	B-1 C-1 * D-1 E-1	A-1 C-2 C-3

* PROGRAMMABLE VISIBILITY HEAD

SIGNAL HEAD SCHEDULE

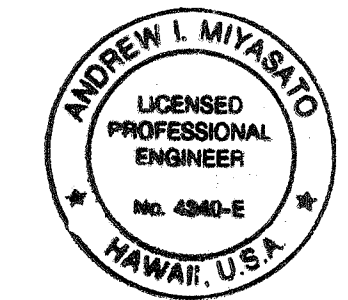


PHASING DIAGRAM



PHASE ASSIGNMENT DIAGRAM

SURVEY PLOTTED BY: DATE: 6/1/99
DRAWN BY: TRACED BY: DESIGNED BY: CHECKED BY: NO. 2
LAST SAVE: 06/09/99 @ 14:51:19 BY: TE PLOT SIZE: 11x20
Z:\CAD\PROJECTS\97038\T020NTHP.XREFS: WASHIR2, T020NTHP, WILKINA

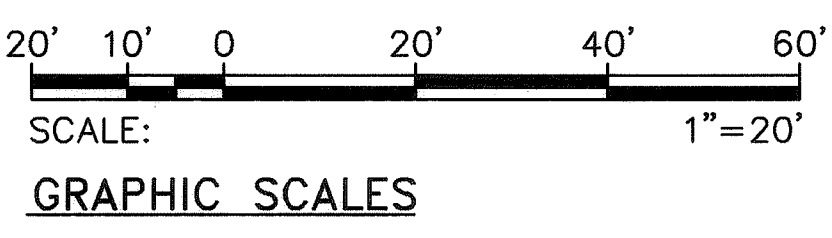


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Andrew I. Miyasato
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

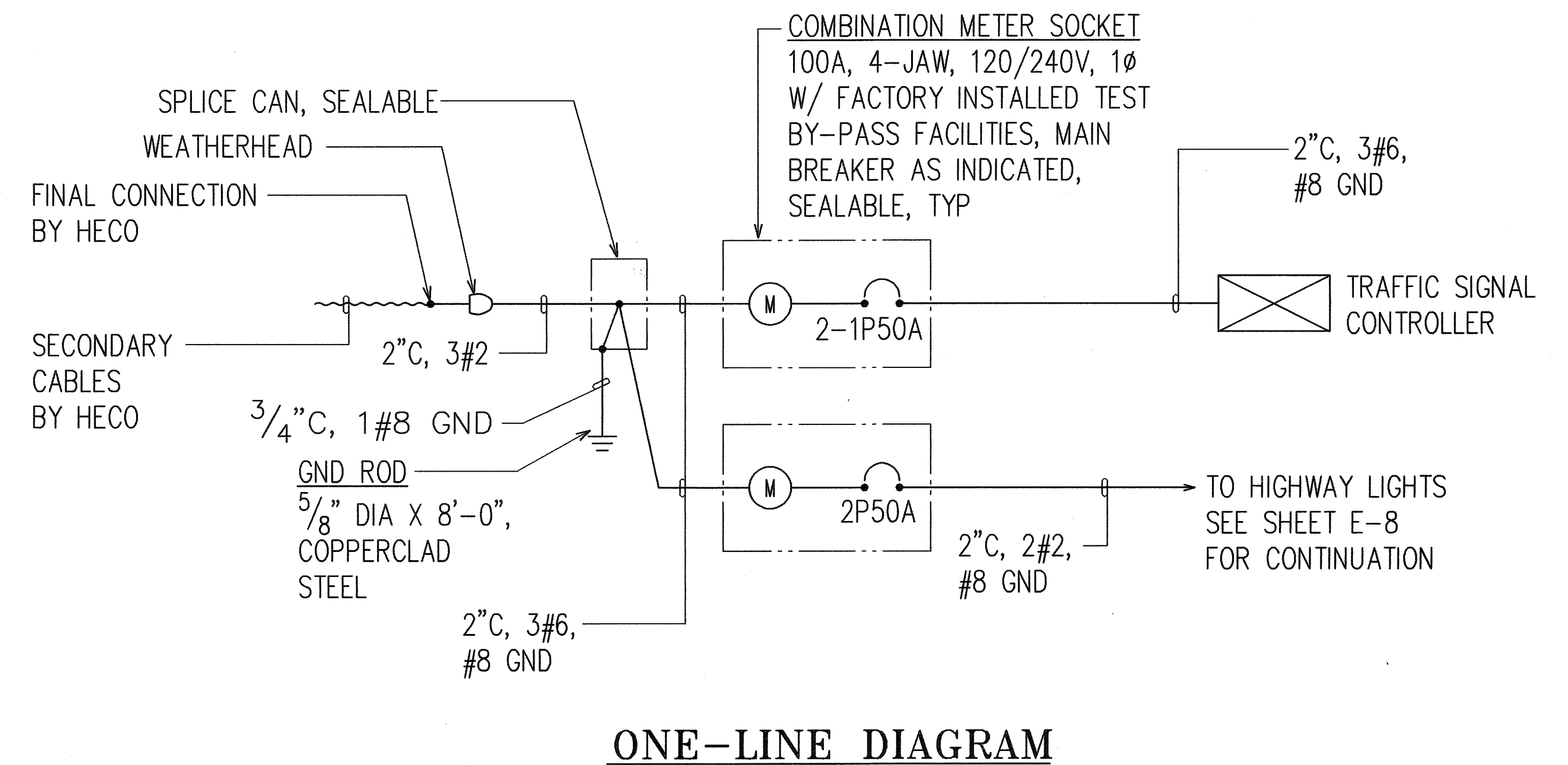
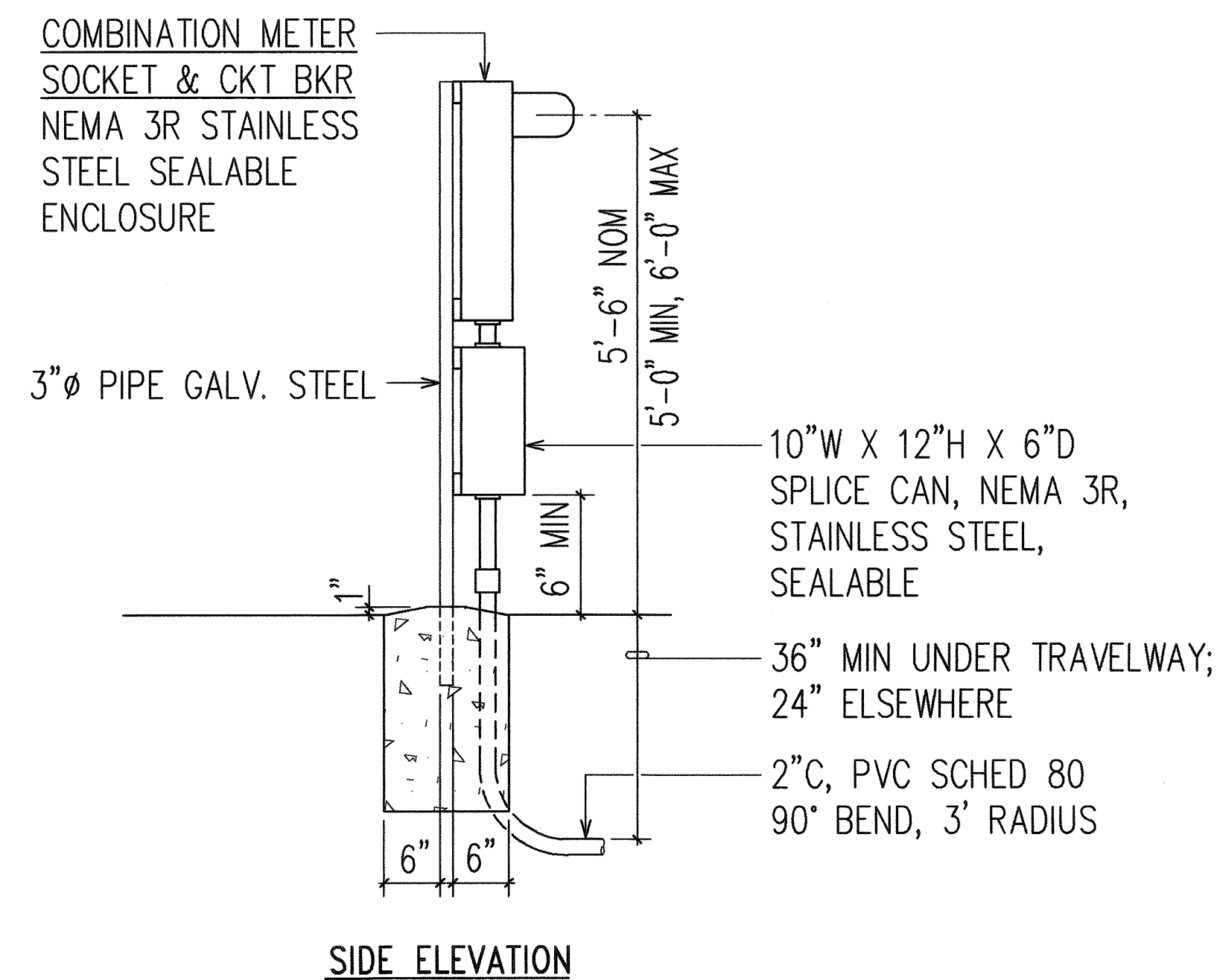
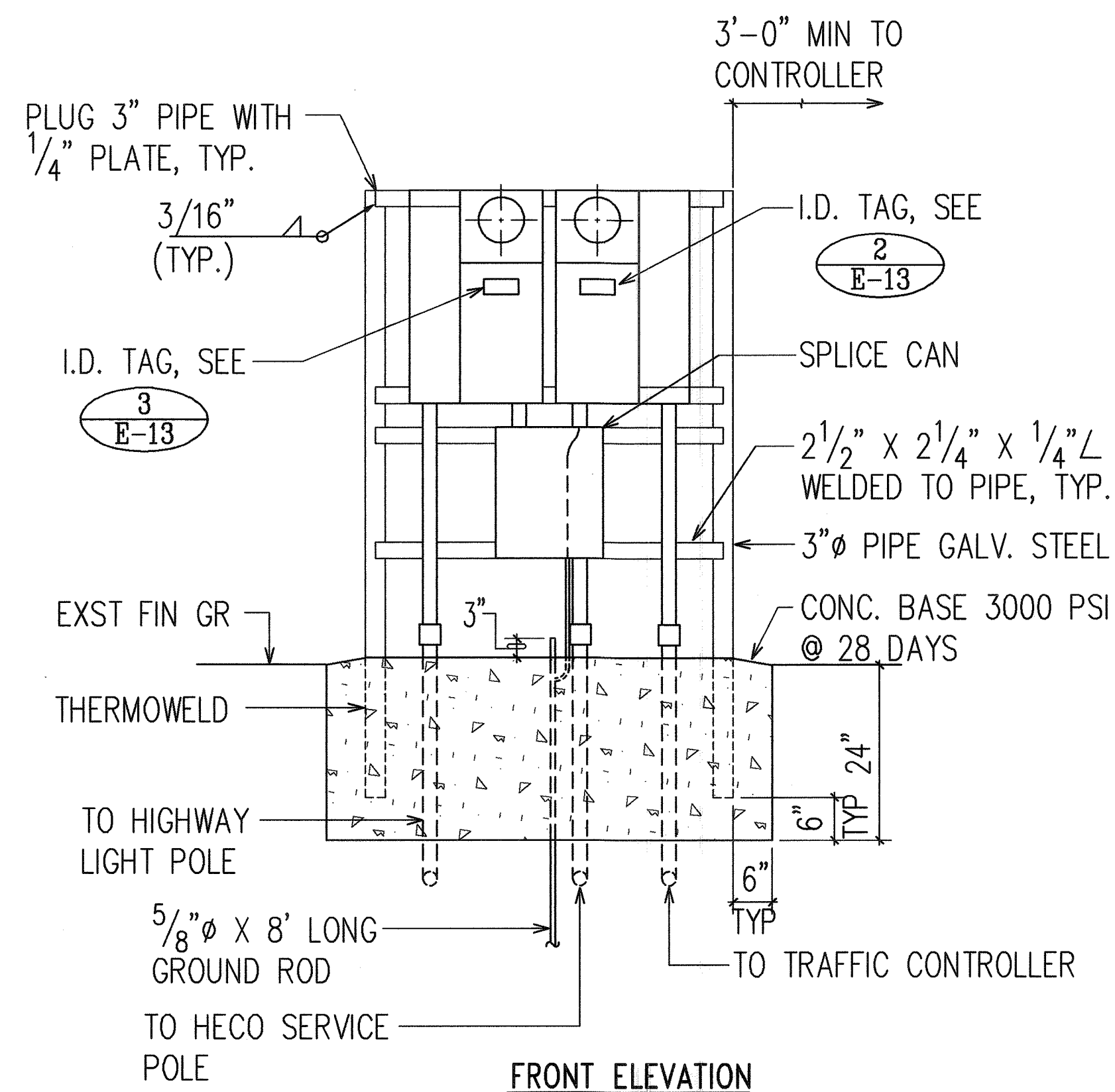
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL PLANS

WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

SCALE: AS NOTED DATE: JUNE 1999
SHEET No. E-5 OF 18 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	59	71



NOTES:

1. CONTRACTOR SHALL MAKE ALL ELECTRICAL CONNECTION TO CONTROLLER, PROVIDE 2-1P50A BREAKERS, GROUND AND 2" CONDUIT.
2. ALL CONDUITS TO CONTAIN A POLYOLEFIN PULL LINE. (JET LINE CAT #232 OR EQUIV)
3. PEDESTAL SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION.
4. ALL FASTENING BOLTS, NUTS & WASHERS SHALL BE STAINLESS STEEL. PROVIDE ONE COAT SHOP PRIMER & TWO COATS OF ACRYLIC ENAMEL FINISH, COLOR TO MATCH CONTROLLER CABINET.
5. PROVIDE 4 FT CLEARANCE IN FRONT OF METER.

1 E-6 ELECTRICAL SERVICE DETAIL NOT TO SCALE

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

LAST SAVE: 06/10/99 @ 10:31:20 BY: AM PLOT SC 1'-0"=1'
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DRAWING REVIEW:
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Facilities Only

Date 6/21/99 By [Signature]

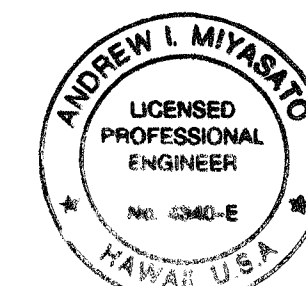
Customer Installations Department
Hawaiian Electric Company, Inc.

HECO's review of these drawings shall in no way relieve the Customer, its Consultant, its Contractor or anyone acting on the Customer's behalf from the responsibility for Engineering, design, materials and any liability associated with this project

APPROVED:

HAWAIIAN ELECTRIC COMPANY

DATE _____



6/14/99
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION.
Andrew J. Migasch
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL SERVICE EQUIPMENT DETAILS

WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

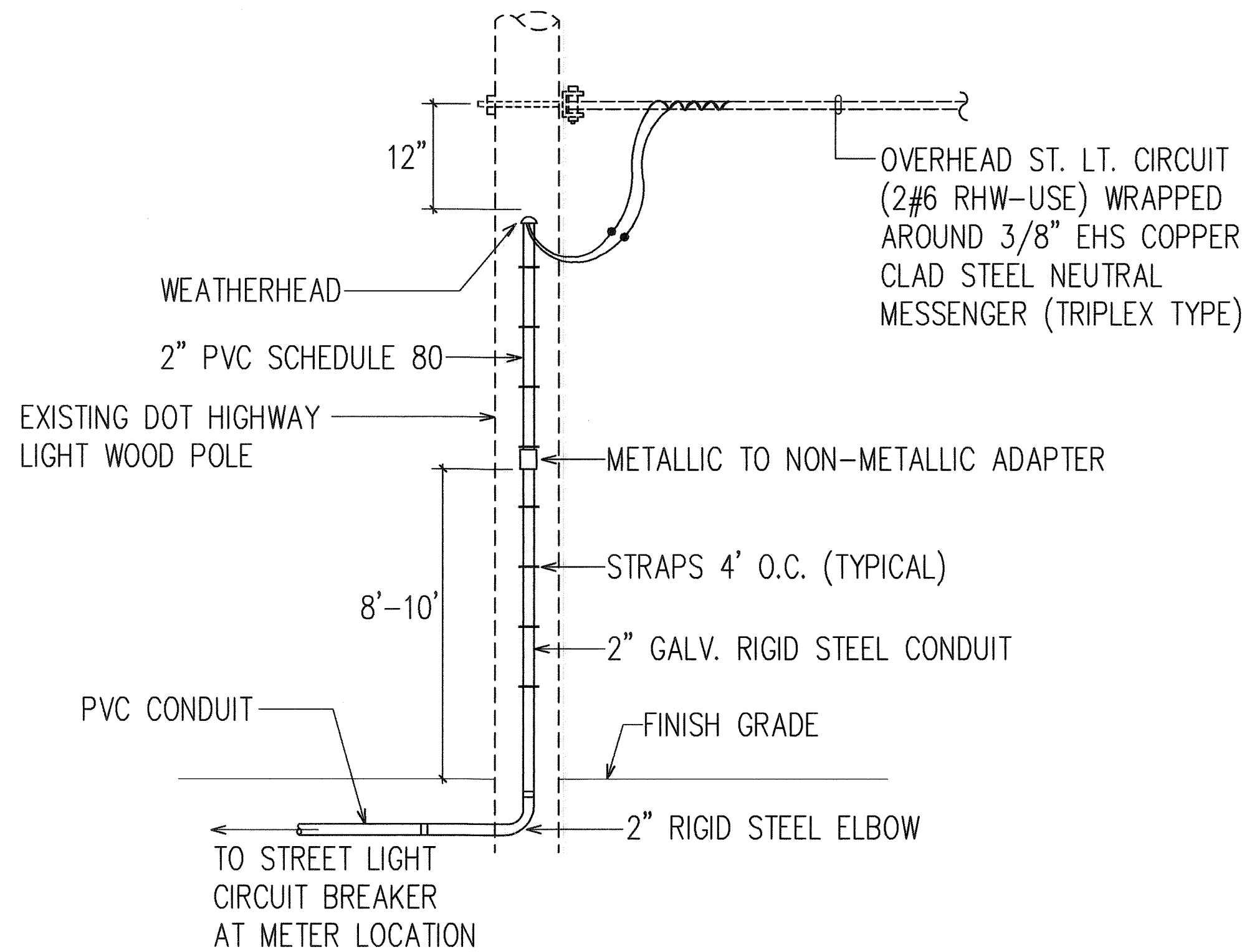
SCALE: AS NOTED DATE: JUNE 1999

SHEET No. E-6 OF 18 SHEETS

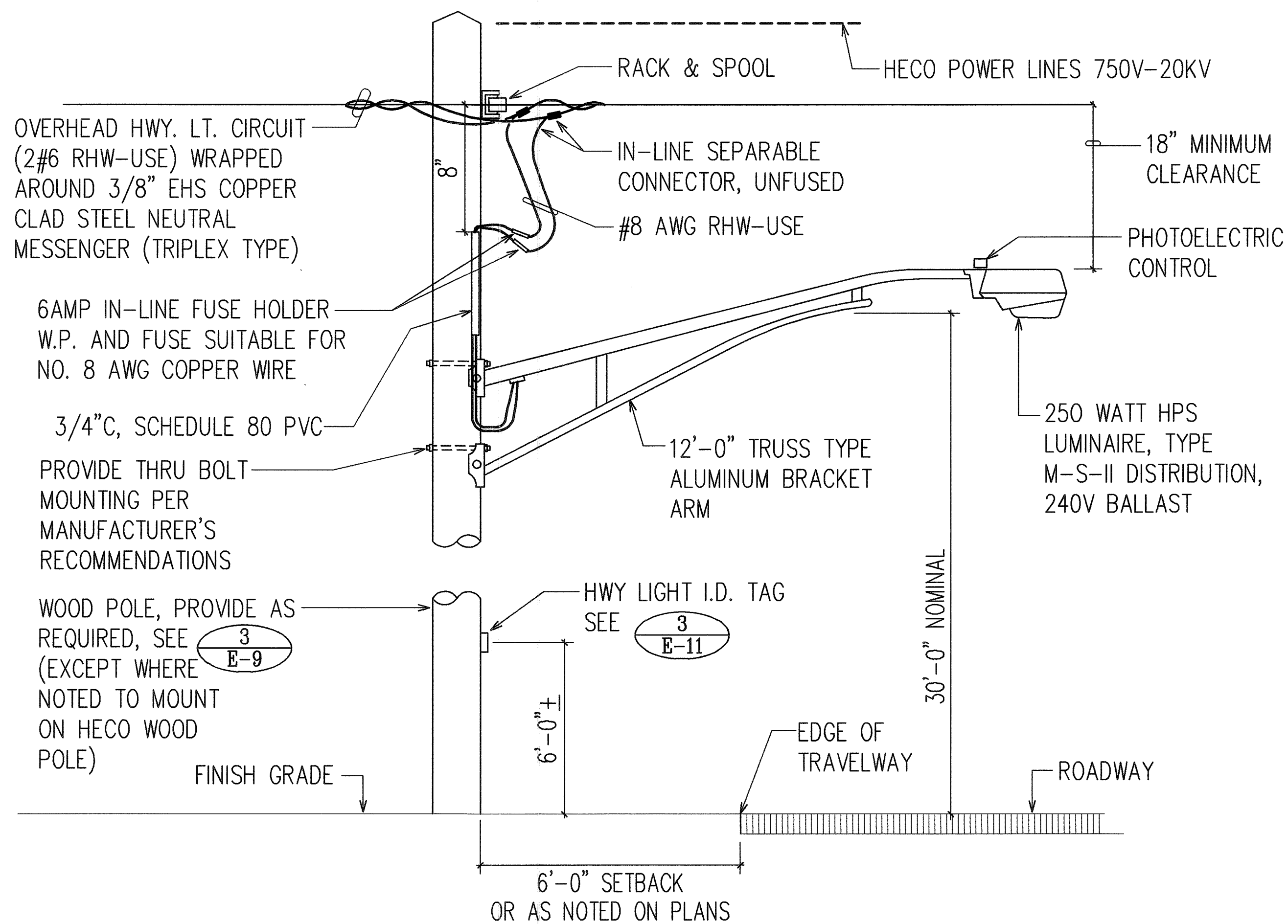
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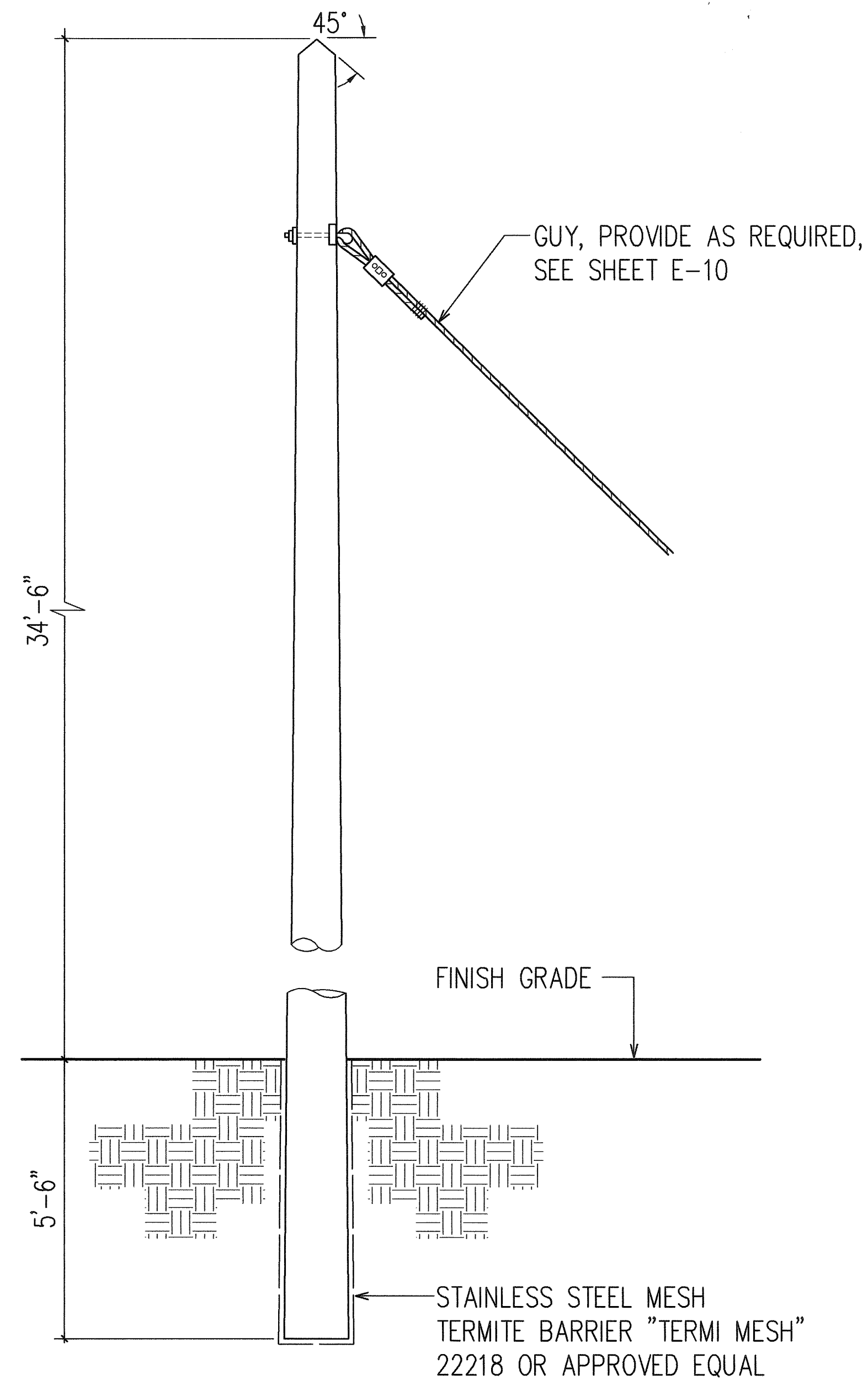
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	62	71



1
E-9
HIGHWAY LIGHT RISER DETAIL
N.T.S.



2
E-9
TYPICAL WOOD POLE LUMINAIRE MOUNTING DETAIL
N.T.S.



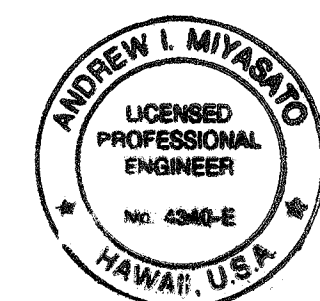
3
E-9
HIGHWAY LIGHTING WOOD POLE DETAIL
N.T.S.

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% DURSBAN. 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.

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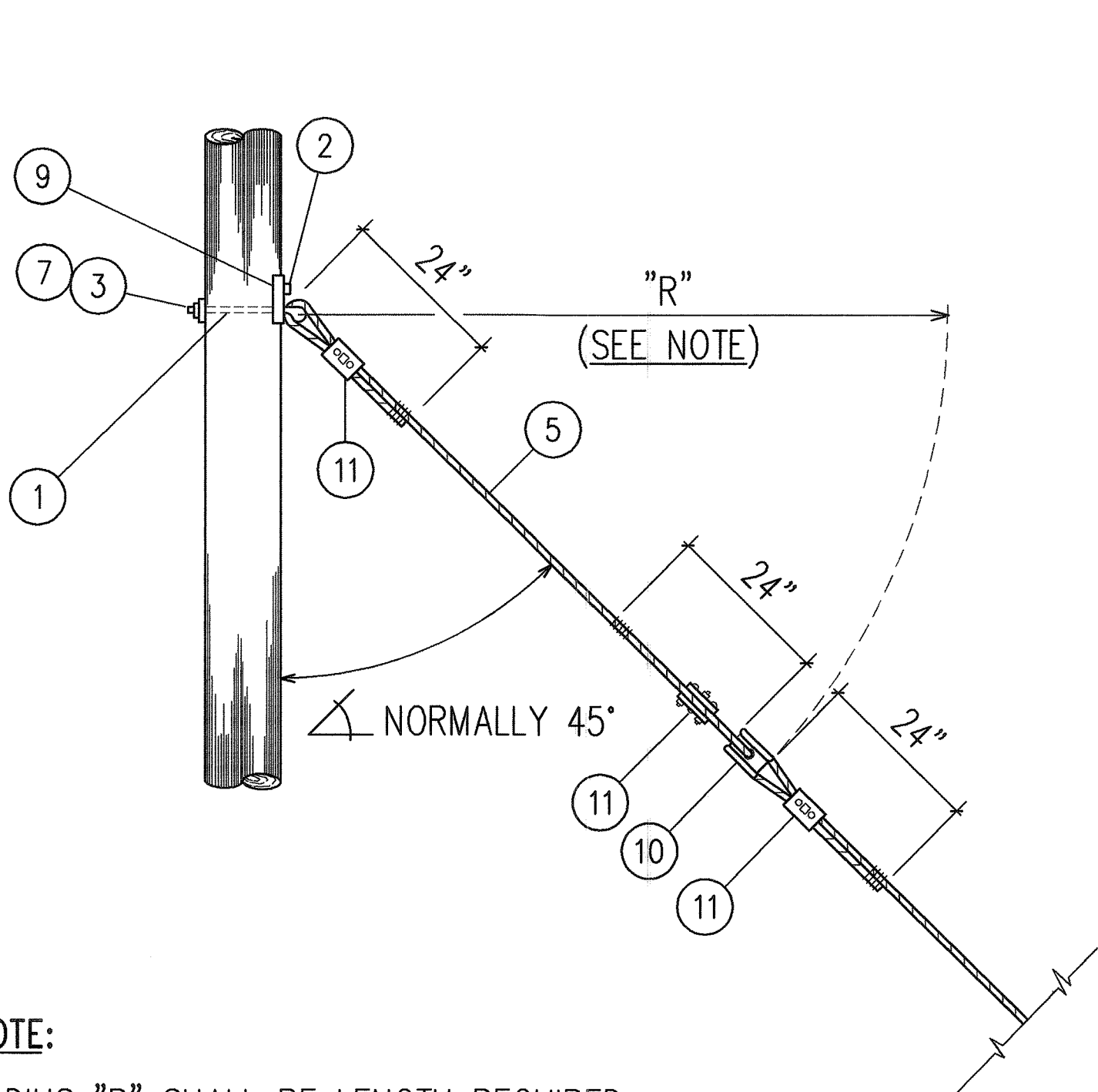
6/18/99
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OR UNDER MY SUPERVISION.
Andrew I. Miyasato
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING DETAILS

**WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD**
Federal Aid Project No. STP-099-1(18)

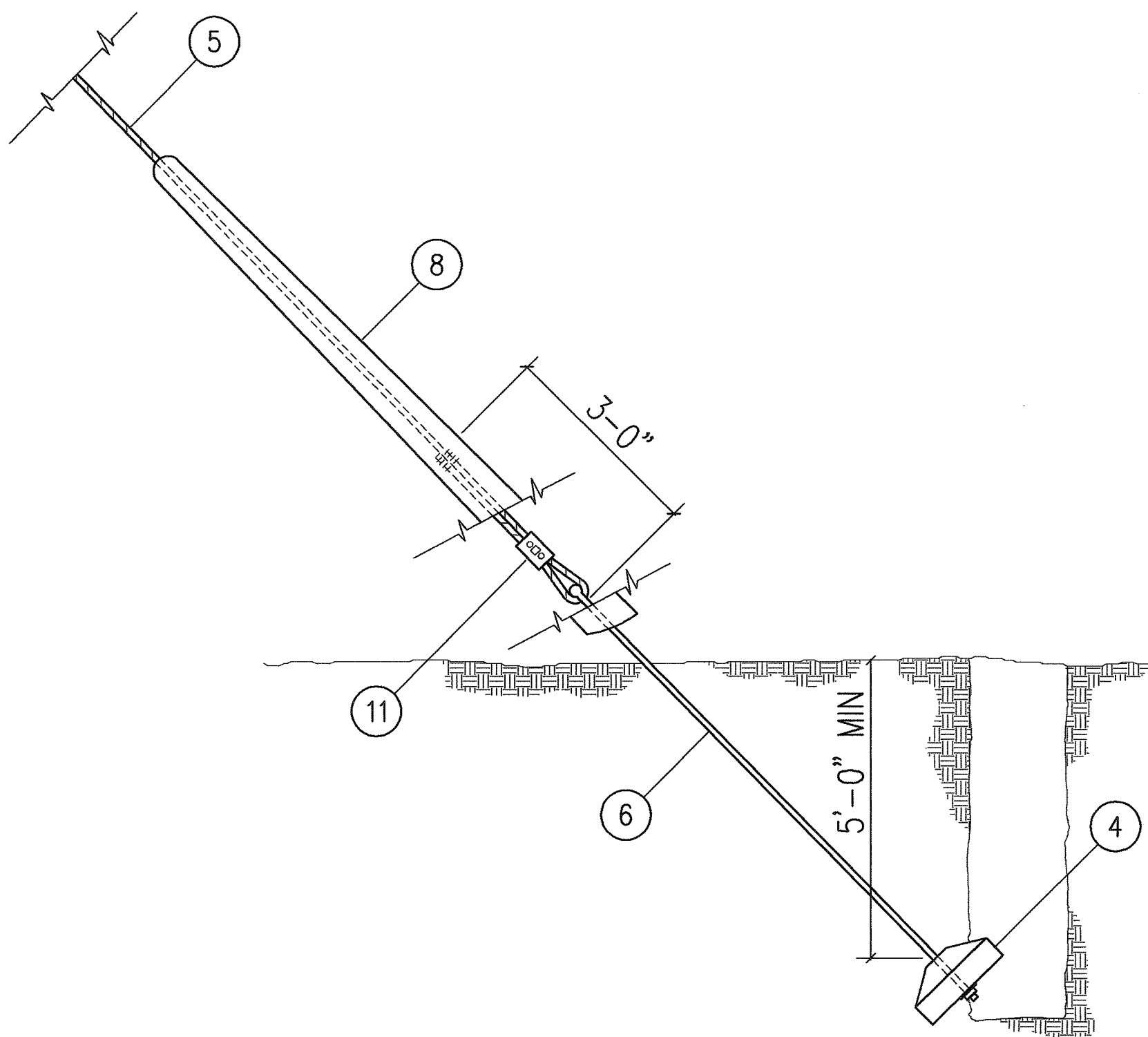
SCALE: AS NOTED
DATE: JUNE 1999
SHEET No. E-9 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	63	71



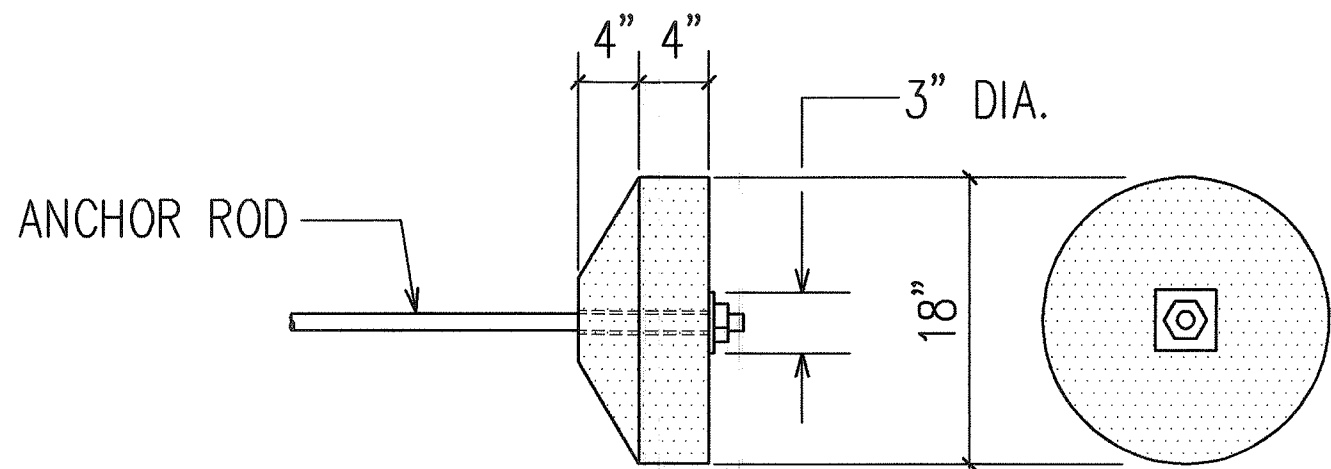
NOTE:

RADIUS "R" SHALL BE LENGTH REQUIRED TO LOCATE GUY INSULATOR 4 FEET BELOW TEL CONDUCTOR LEVEL, MINIMUM "R" EQUAL TO 6 FEET.



TYPICAL GUY AND ANCHOR ASSY
N.T.S.

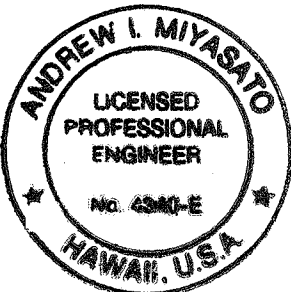
LIST OF MATERIALS	
PART NO.	DESCRIPTION
1	THIMBLEYE BOLT, 5/8" X 10"
2	LAG SCREW, 1/2" X 4" (FETTER DRIVE)
3	WASHERS, SQUARE, 2 1/4" X 2 1/4" X 3/16", 11/16 " DIA. HOLE
4	CONCRETE ANCHOR, SEE DETAIL
5	GALVANIZED GUY WIRE, 7 STRAND UTILITIES, GRADE, 7/16" SIZE.
6	ANCHOR ROD, THREADED THIMBLEYE 5/8" X 8'-0", TWINEYE 3/4" X 8'-0"
7	SQUARE M-F LOCKNUT, FOR 5/8" DIA. BOLT
8	GUY PROTECTOR, 8 FEET, 16 GAGE STEEL
9	LIFT PLATE, 3-HOLE, 1/4" STEEL PLATE
10	GUY STRAIN INSULATOR
11	GUY CLAMP, 6" 3-BOLT, 5/8" BOLT



CONCRETE ANCHOR
N.T.S.

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NOTE BOOK	
No.	

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6/4/99
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Andrew I. Miyasato
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

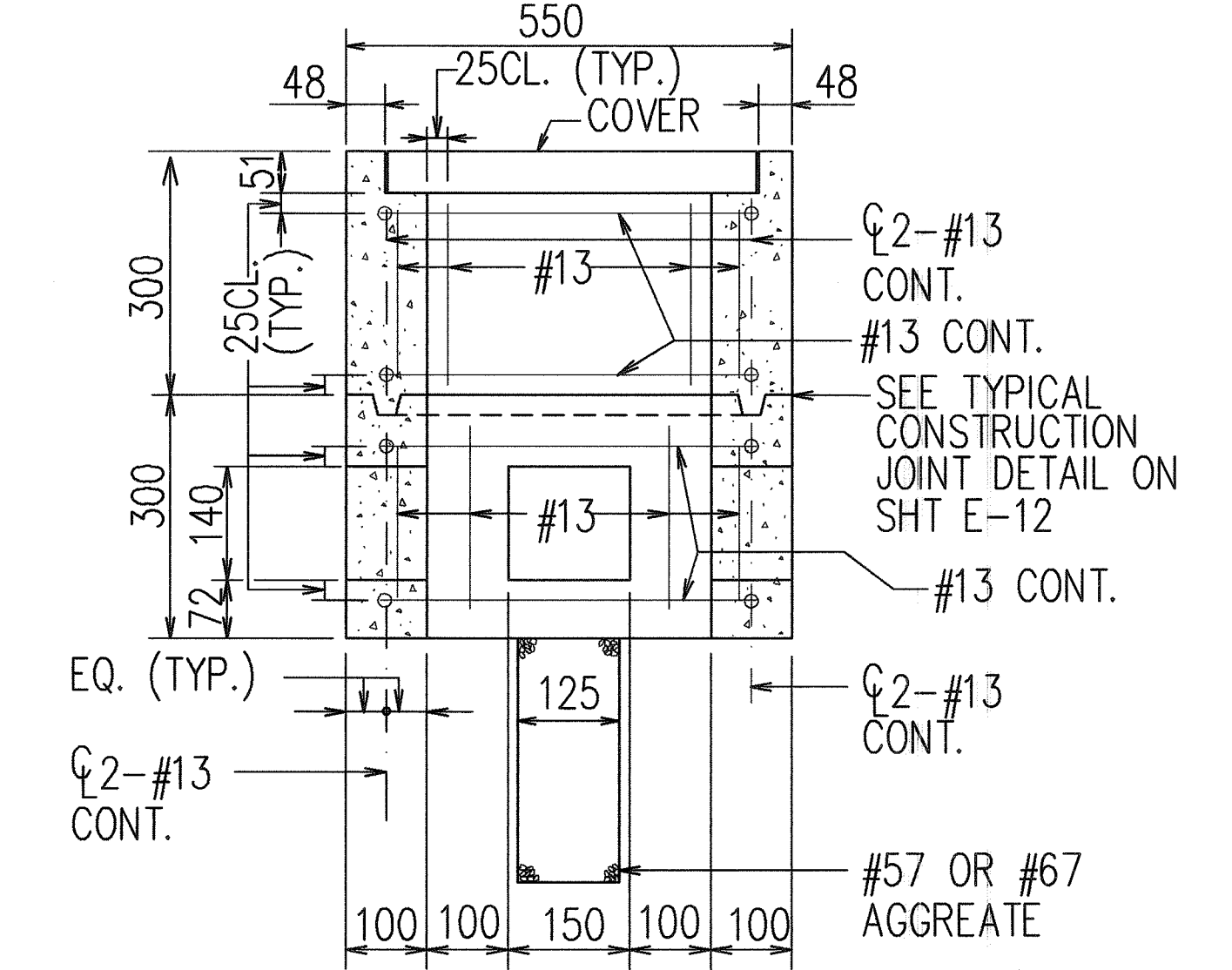
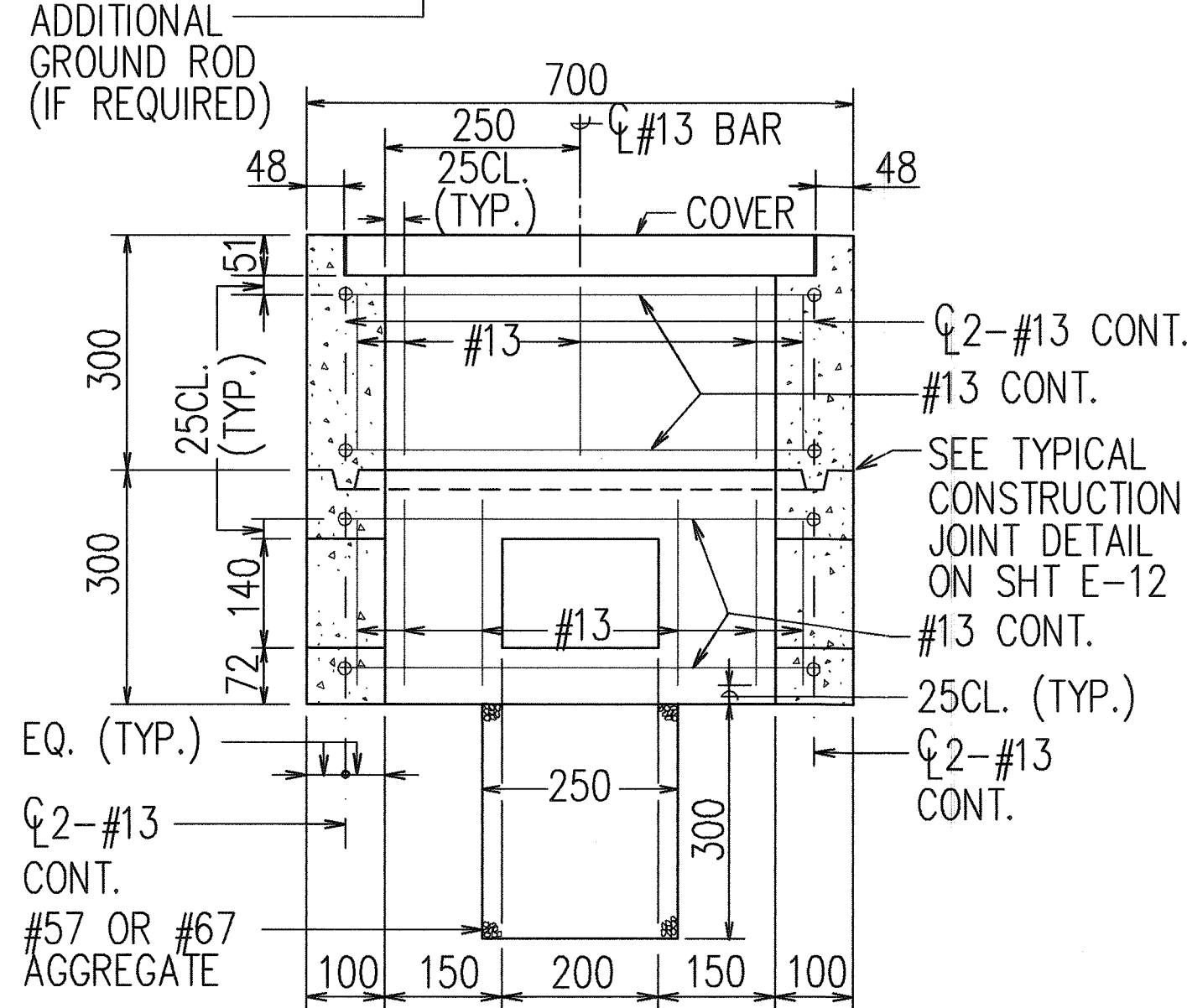
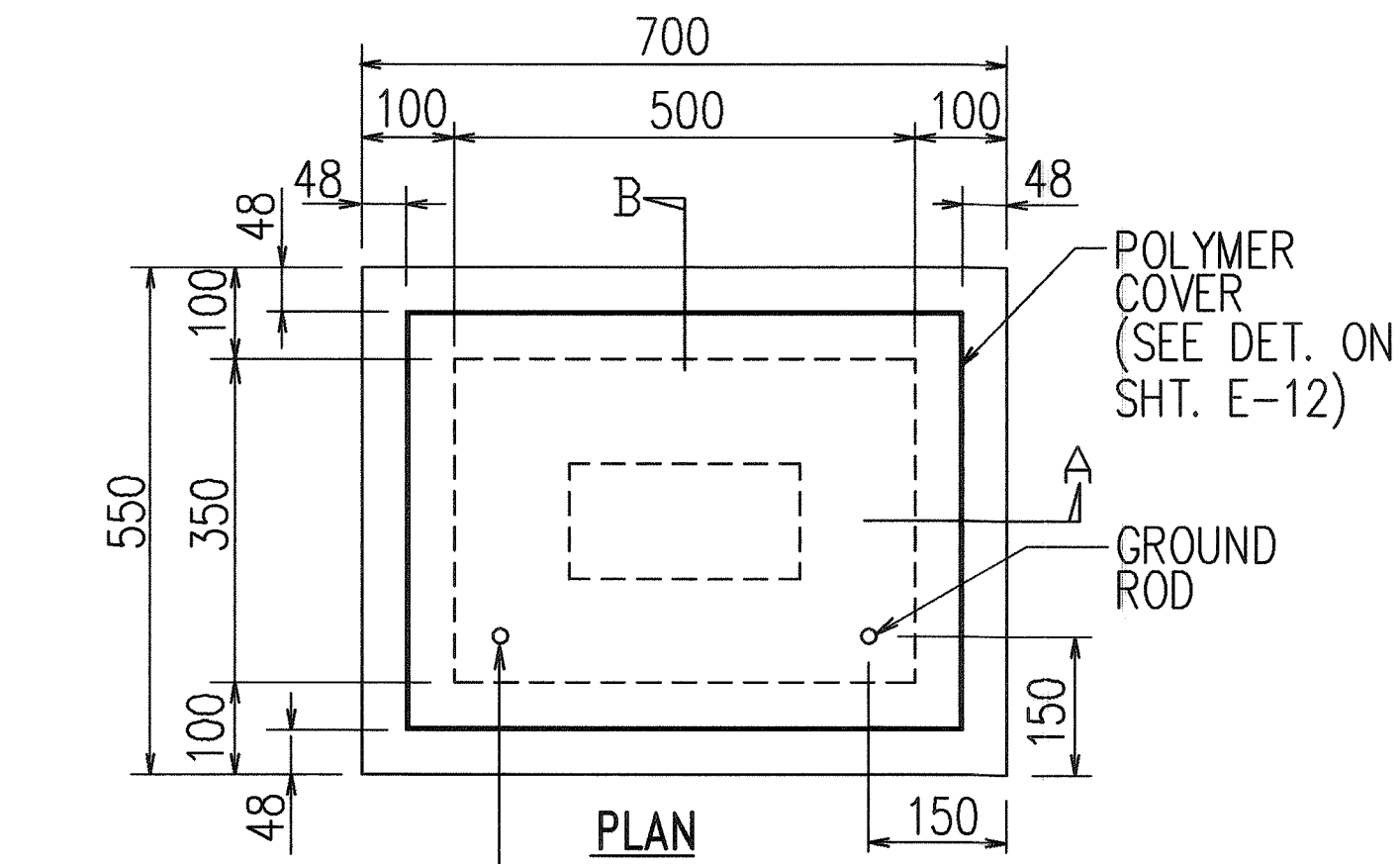
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUY AND ANCHOR DETAILS

WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

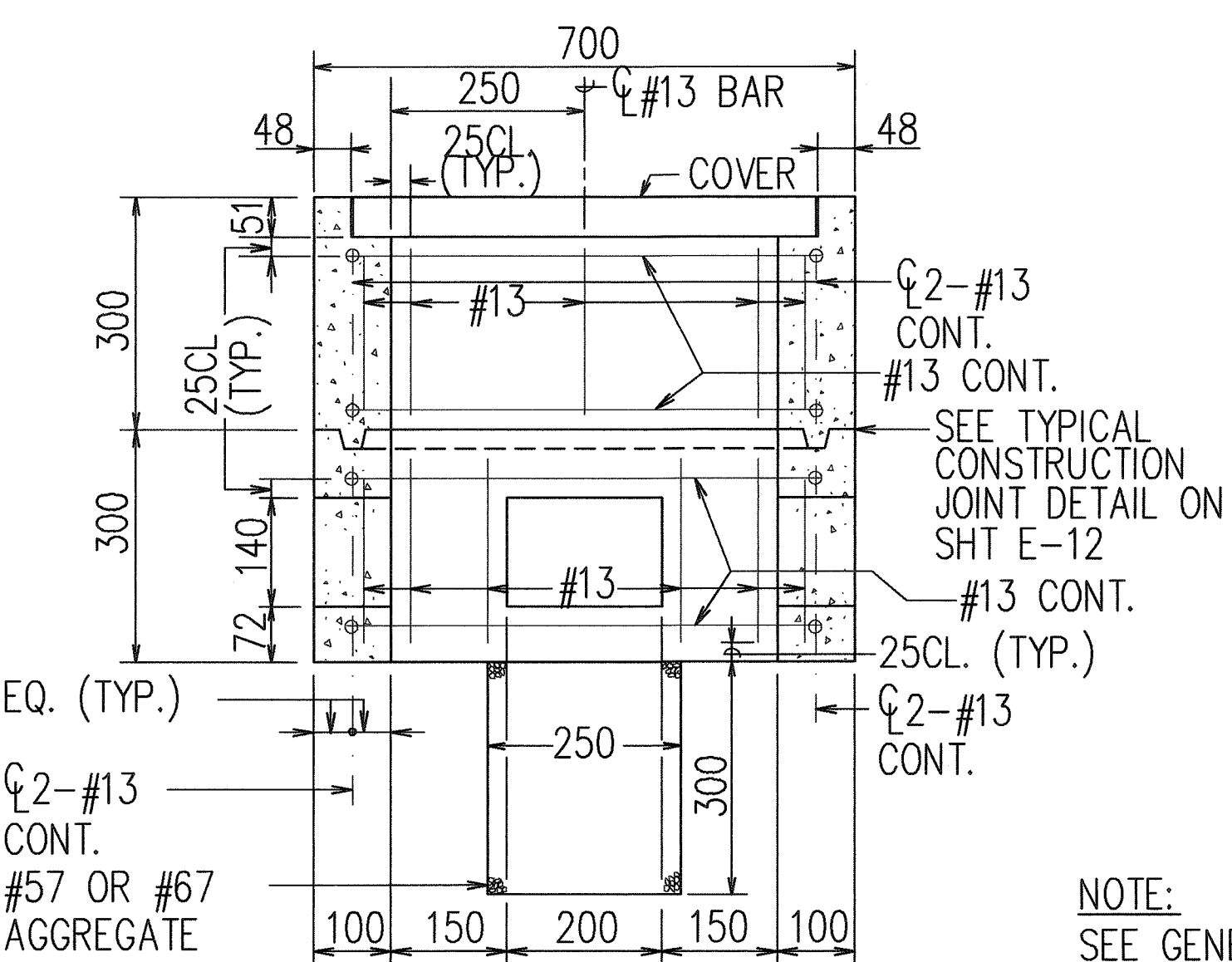
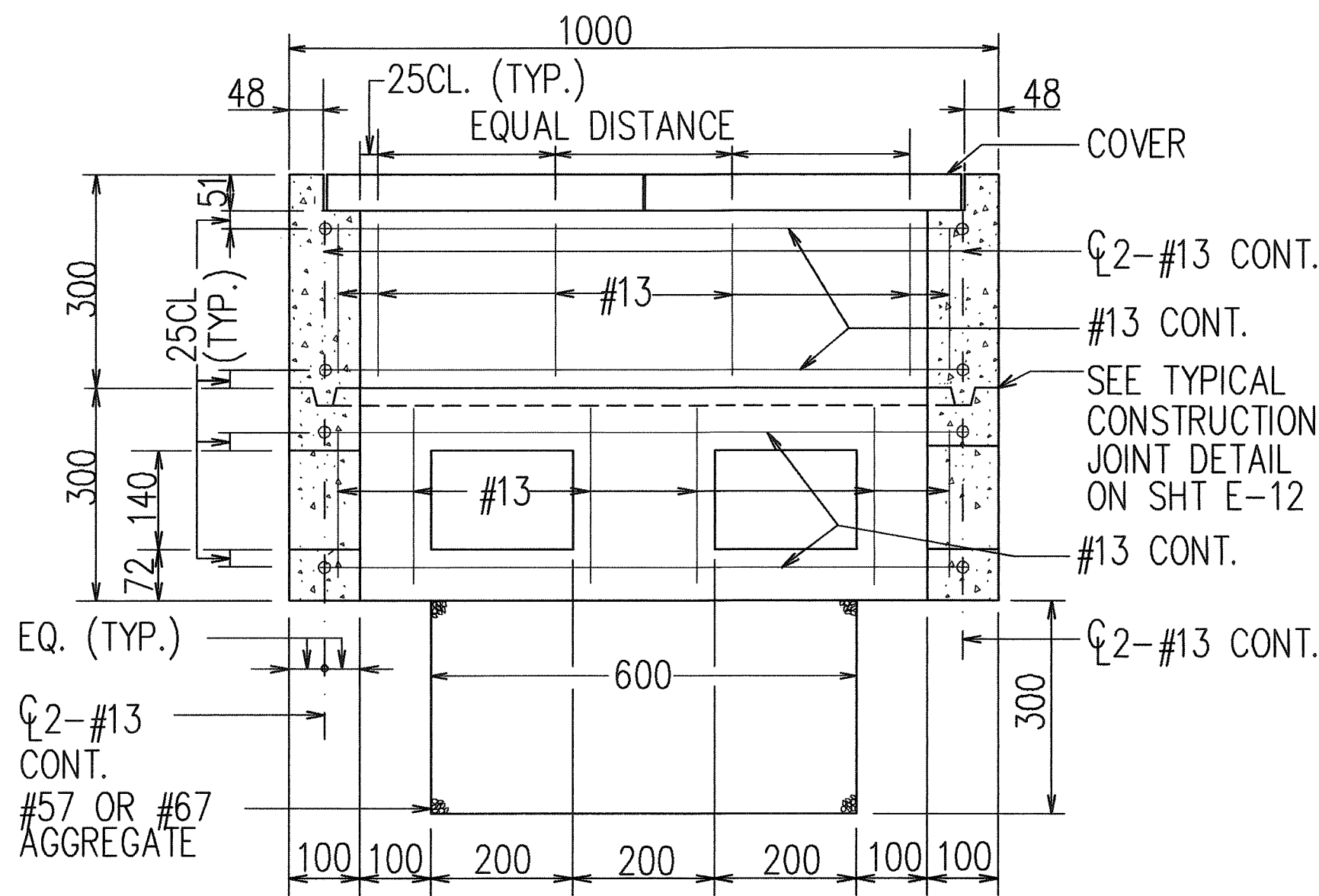
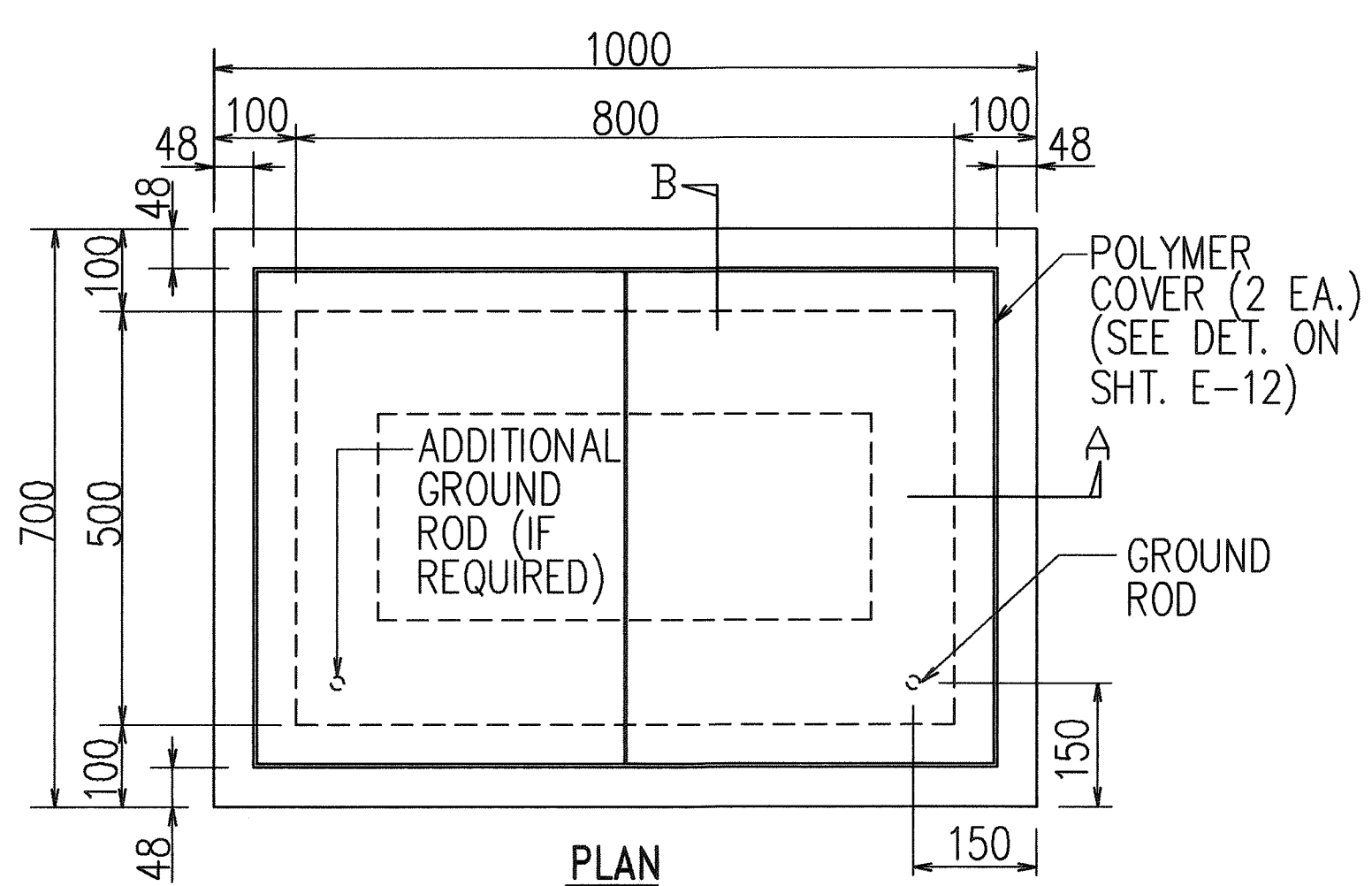
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DATE: JUNE 1999
SHEET No. E-10 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	64	71



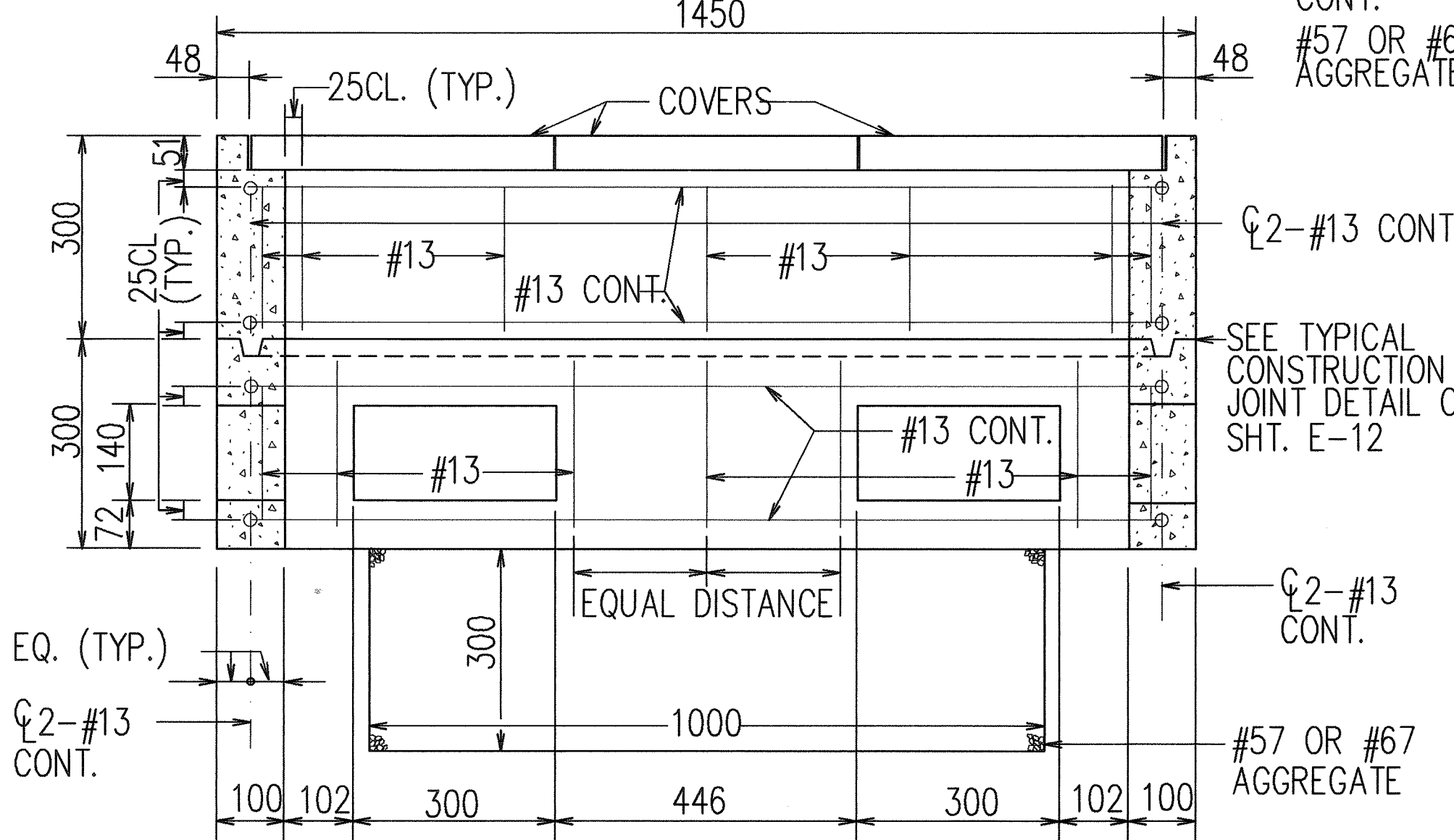
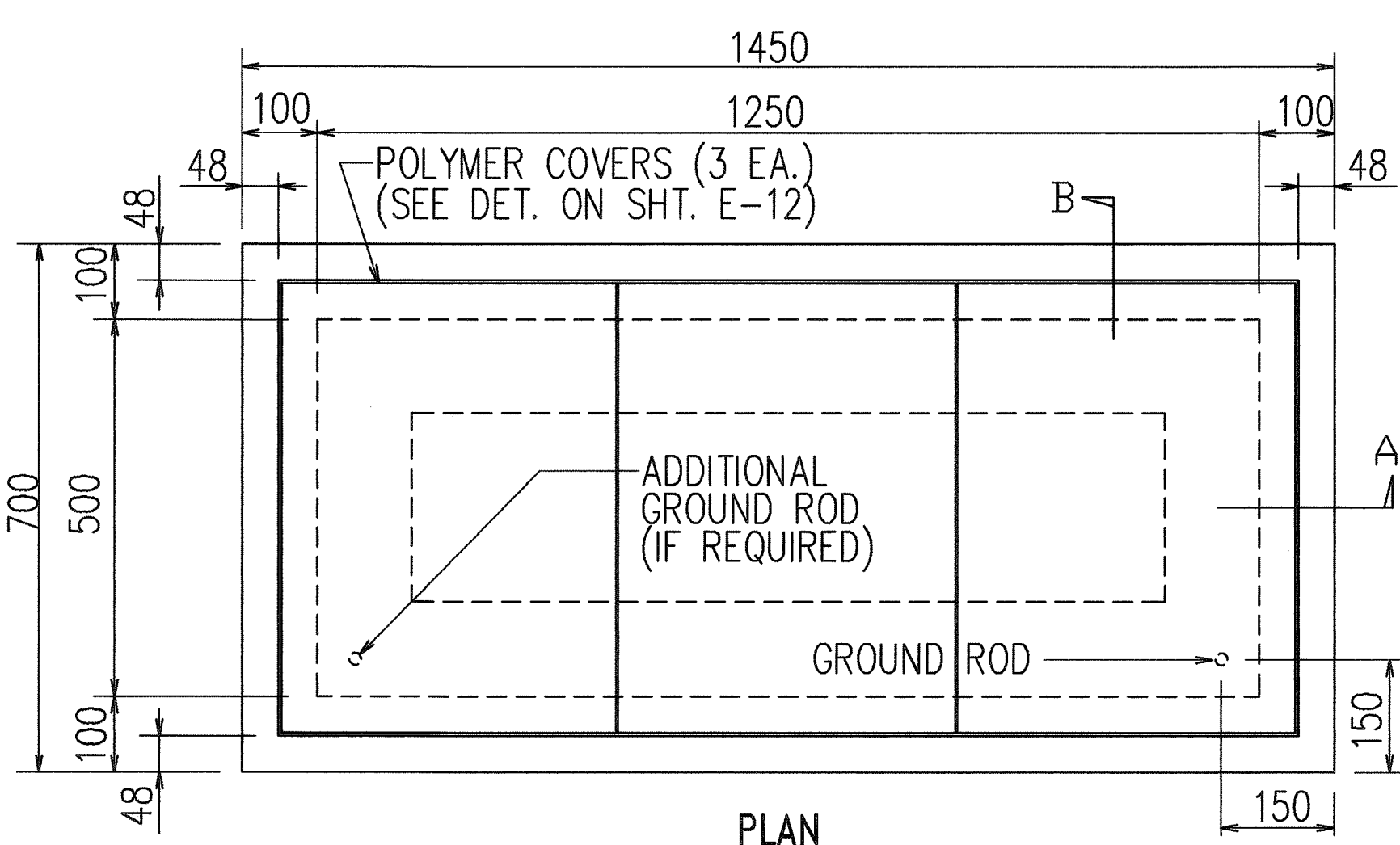
TYPE "A" PULLBOX
(OLD TYPE "B")
NOT TO SCALE

NOTE:
SEE GENERAL
NOTES ON
SHT E-12

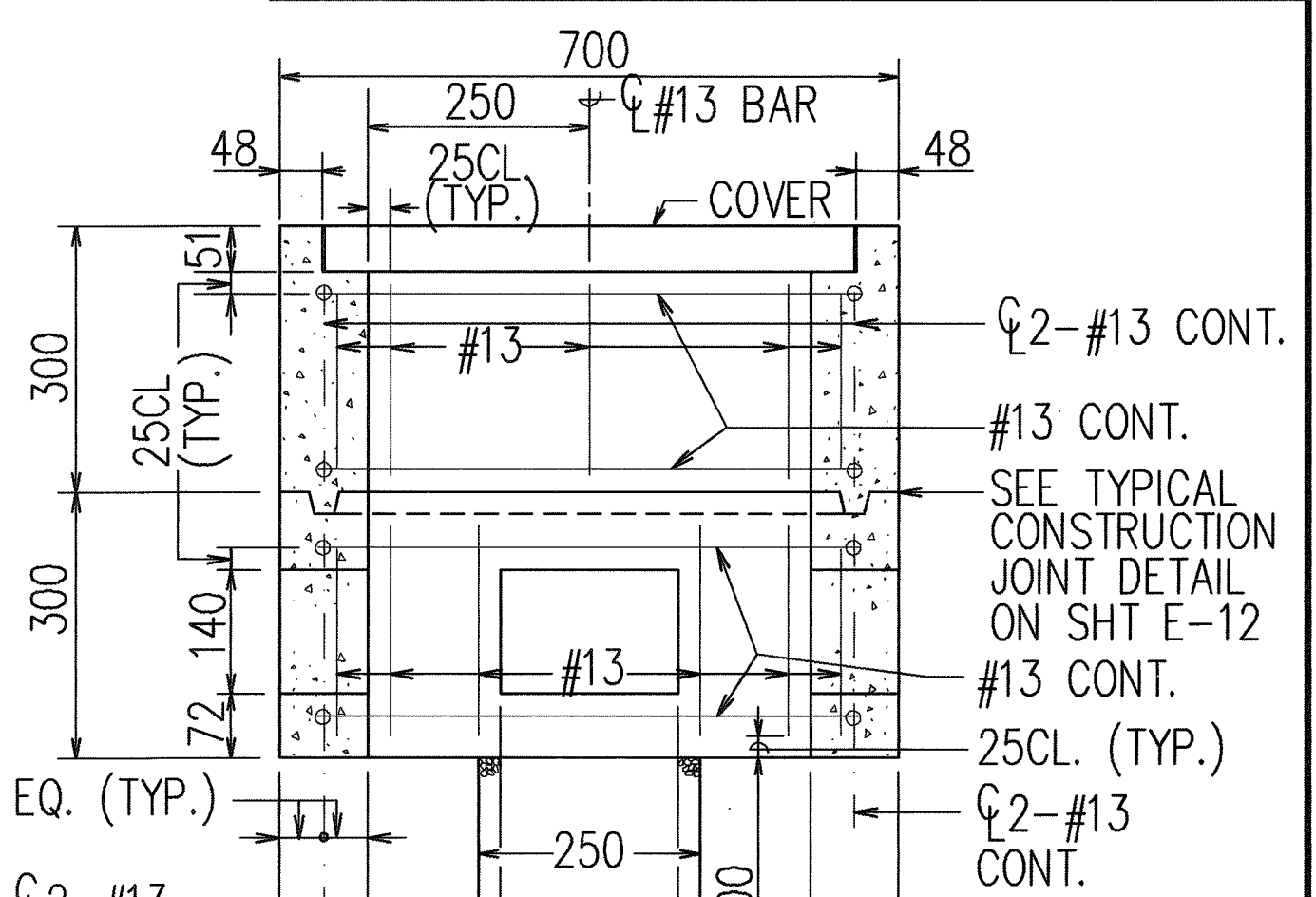


TYPE "B" PULLBOX (OLD TYPE "C")
NOT TO SCALE

NOTE:
SEE GENERAL
NOTES ON
SHT E-12

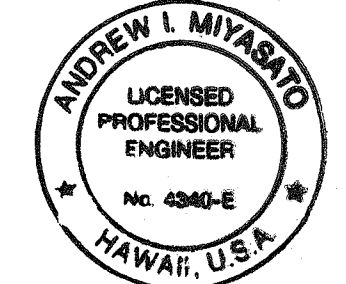


TYPE "C" PULLBOX (OLD TYPE "D")
NOT TO SCALE



NOTE:
SEE GENERAL
NOTES ON
SHT E-12

ALL DIMENSIONS ON THIS
SHEET ARE IN MILLIMETERS



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

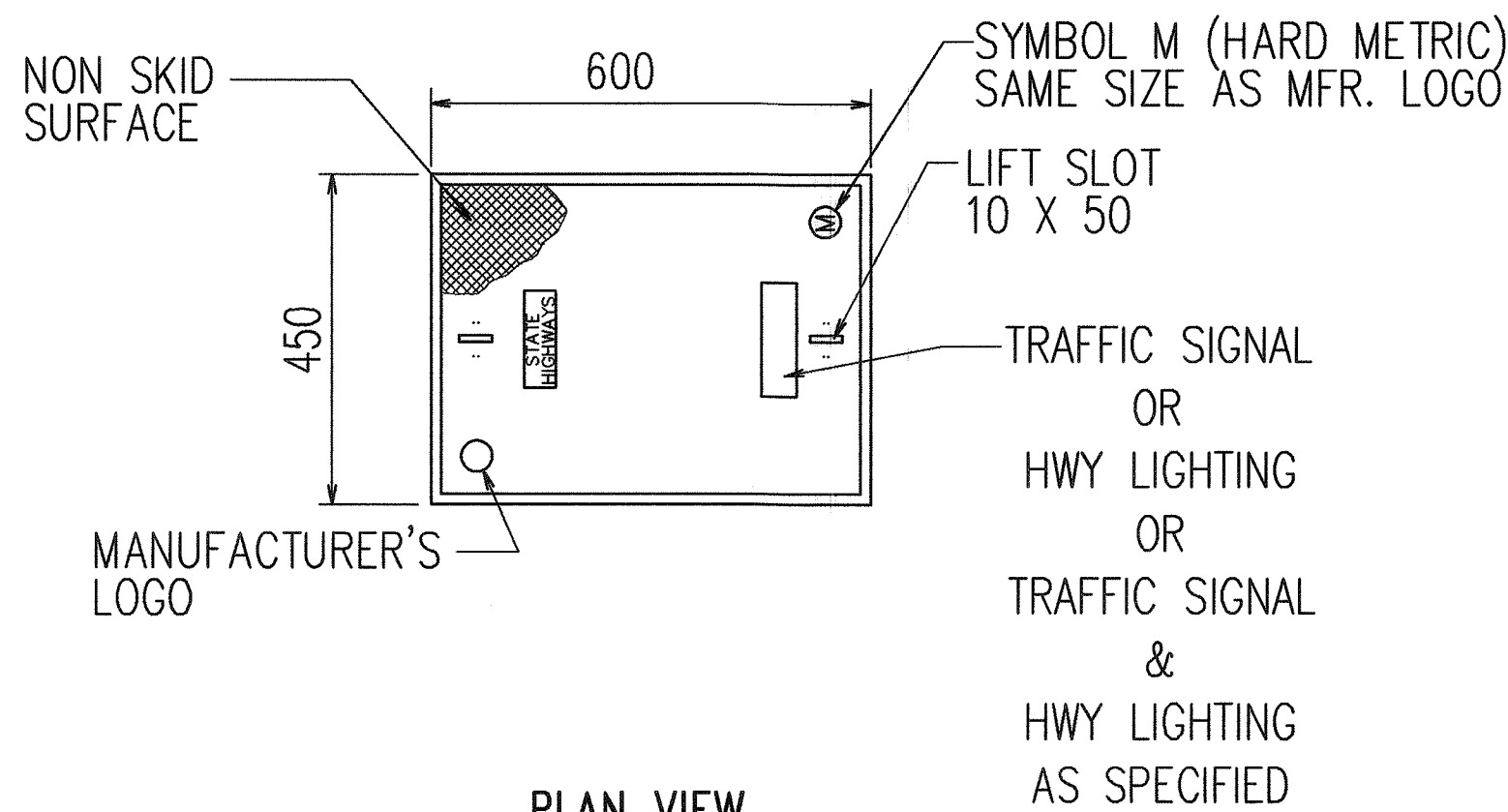
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING DETAILS I

WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

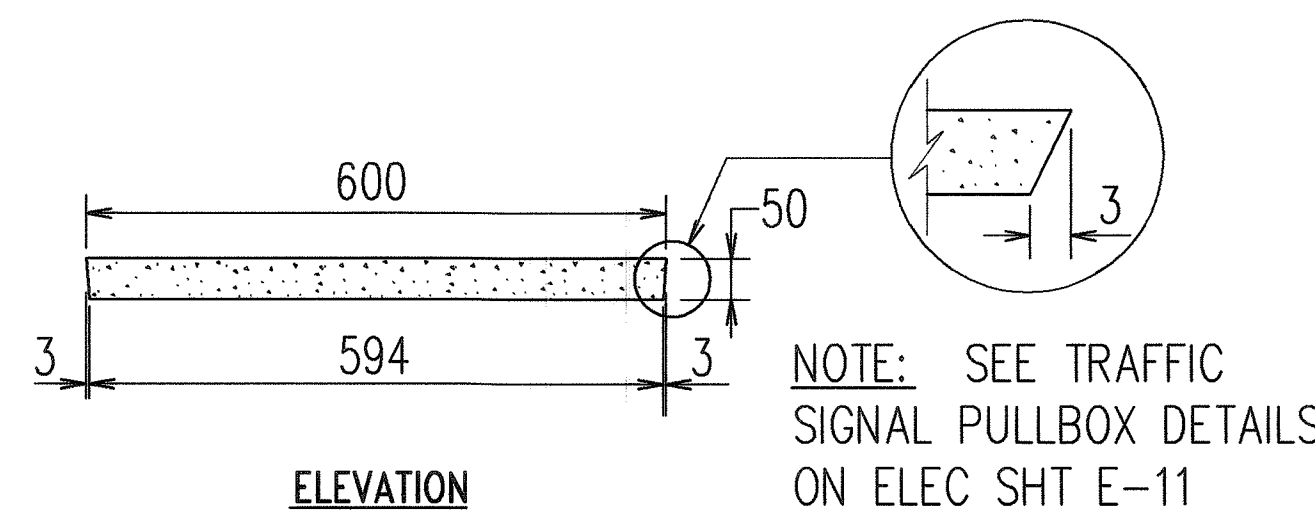
SCALE: AS NOTED
DATE: JUNE 1999
SHEET No. E-11 OF 18 SHEETS

64

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	65	71

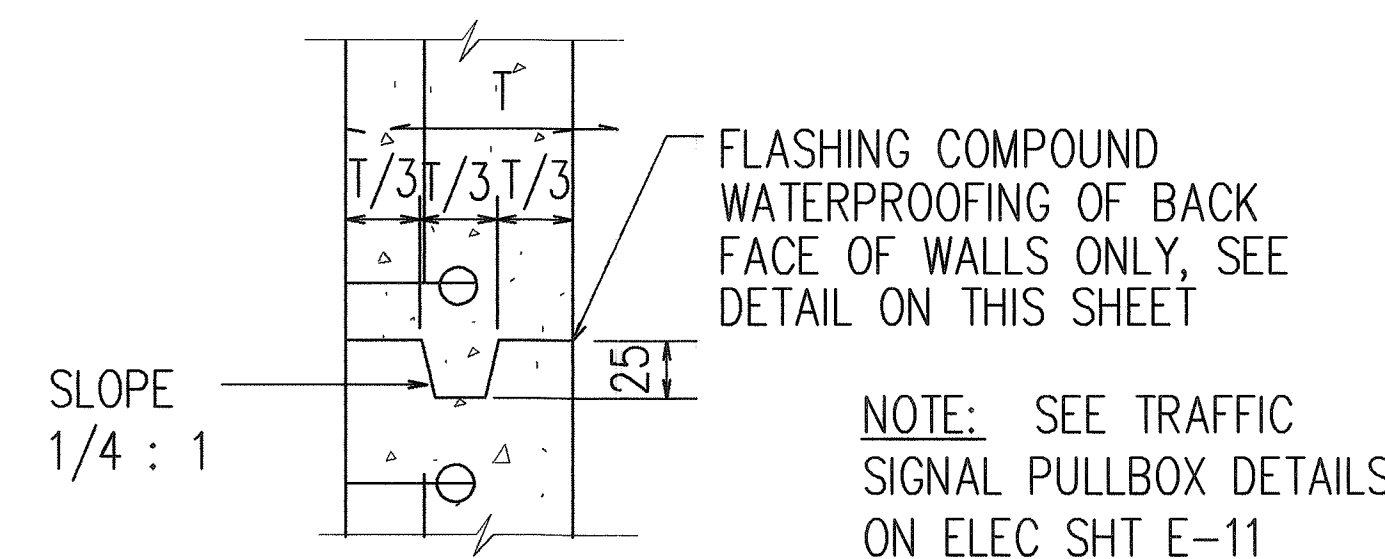


PLAN VIEW



ELEVATION

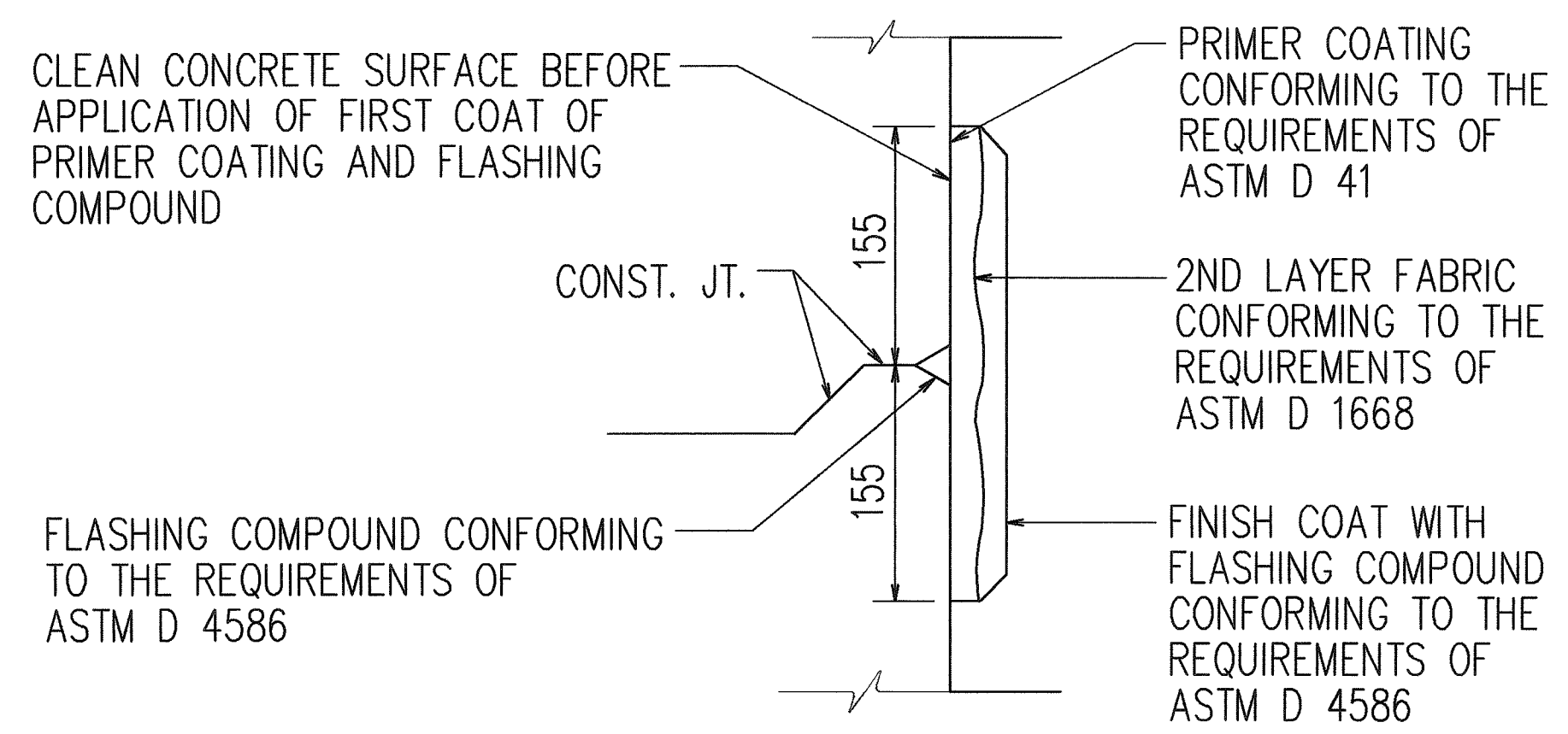
POLYMER CONCRETE COVER
NOT TO SCALE



TYPICAL CONSTRUCTION JOINT DETAIL
NOT TO SCALE

GENERAL NOTES FOR TRAFFIC SIGNAL PULLBOX
DETAILS ON ELEC SHEET E-11

1. PROVIDE A MINIMUM OF ONE 16 X 2.5M COPPERWELD GROUND ROD IN EACH PULLBOX. WHEN DIRECTED BY THE TRAFFIC SIGNAL INSPECTOR/ENGINEER, INSTALL ADDITIONAL GROUND RODS. COST OF GROUND RODS SHALL BE INCIDENTAL TO THE PULLBOXES.
2. ALL PRE-CAST CONCRETE PULLBOXES SHALL BE MANUFACTURED IN TWO PIECES.
3. THE PULLBOX WITH COVER SHALL BE CAPABLE OF SUPPORTING AN MS 18 LOADING.
4. THE MAXIMUM WEIGHT OF THE PULLBOX COVER SHALL NOT EXCEED 27 KILOGRAMS.
5. THE OPENINGS FOR THE CONDUITS ON ALL PULLBOXES SHALL BE PRE-CAST CONCRETE KNOCKOUTS.
6. AFTER INSTALLING THE CONDUITS IN THE OPENINGS OF THE PULLBOXES, THE CONTRACTOR SHALL FILL THE EXCESS OPENING IN THE PRE-CAST KNOCKOUTS WITH CONCRETE MORTAR.
7. PRIOR TO INSTALLING THE PULLBOXES, THE CONTRACTOR SHALL LEVEL THE BOTTOM OF THE TRENCH AND ACHIEVE A MINIMUM OF 95% RELATIVE COMPACTION OF THE BOTTOM OF THE TRENCH.
8. ALL CONCRETE SHALL BE CLASS A (25MPA, MIN.)
9. REBARS SHALL BE GRADE 300 AND ALL LAPPED SPLICES SHALL BE 360MM MINIMUM.
10. THE #57 OR #67 SIZE AGGREGATE SHALL CONFORM TO LATEST VERSION OF AASHTO M43 (ASTM D 448).
11. TYPE "C" PULLBOX SHALL BE INSTALLED IN A LOCATION PROTECTED FROM VEHICULAR TRAFFIC (I.E. RAISED SIDEWALK, BEHIND A.C. CURBS, TRAFFIC SIGNAL STANDARD OR PIPE GUARDS).

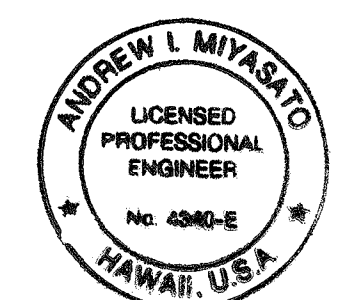


TYPICAL FLASHING COMPOUND
WATERPROOFING DETAILS
NOT TO SCALE

ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

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

LAST SAVE: 06/09/99 @ 15:02:07 BY: E:\PROJECTS\1805\1805018



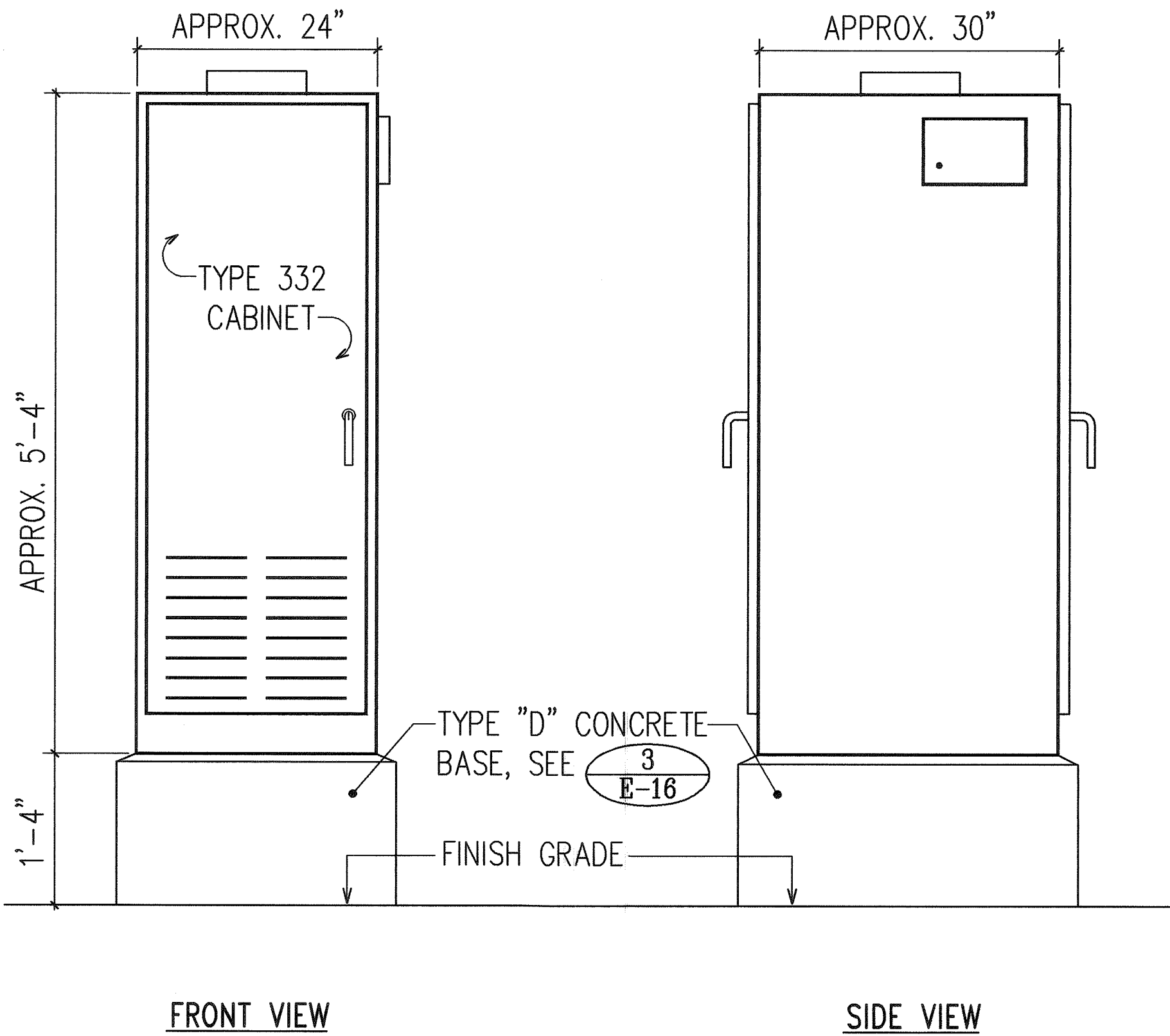
6/9/99
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Andrew I. Miyasato
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
PULLBOX DETAILS II

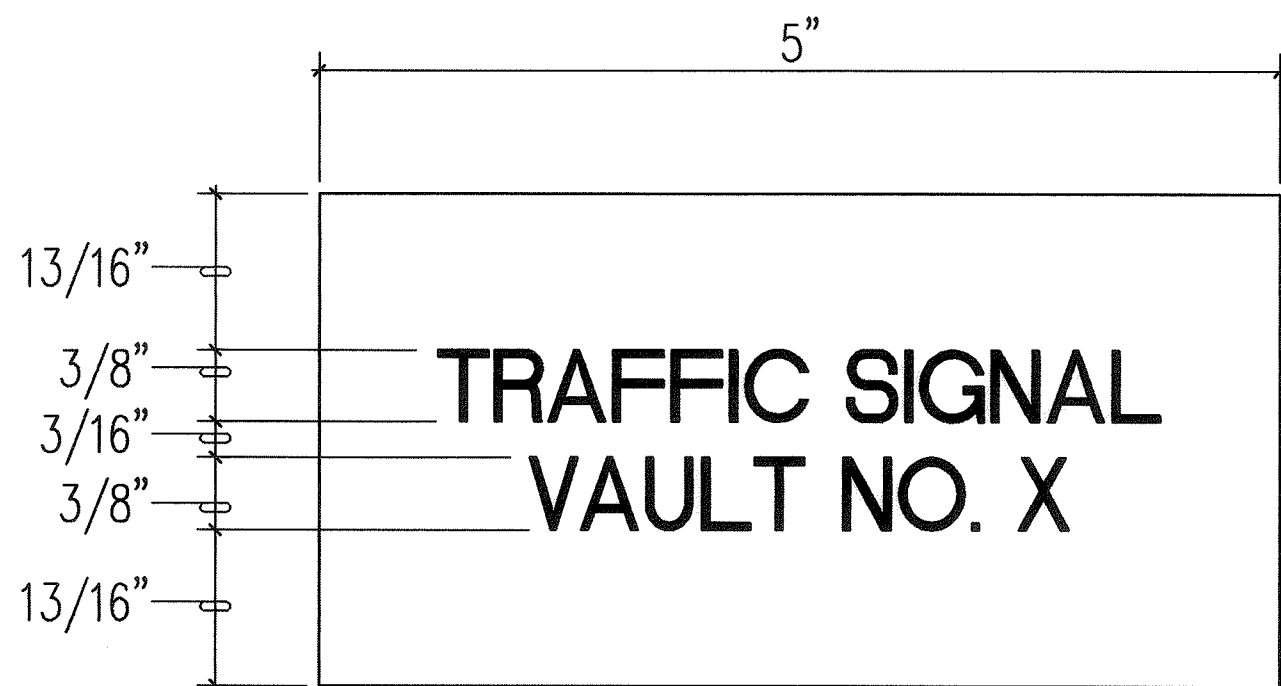
WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

SCALE: AS NOTED
DATE: JUNE 1999
SHEET No. E-12 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	66	71



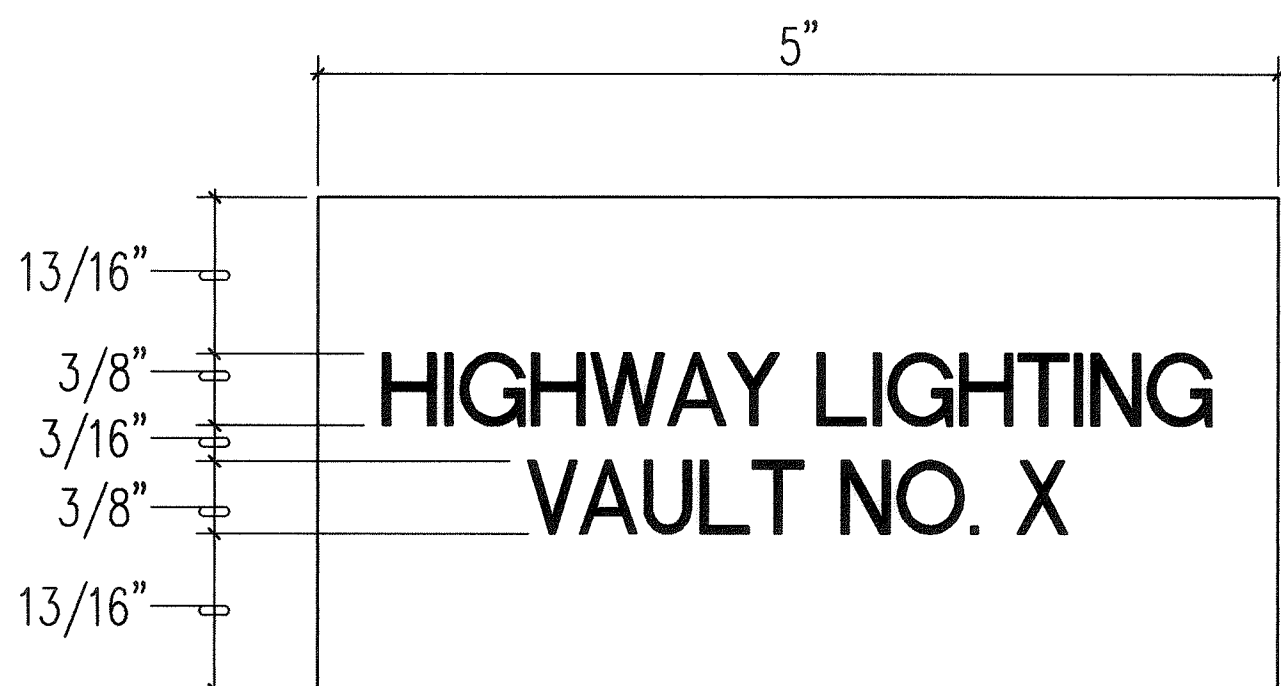
1
E-13 TYPE 332A TRAFFIC SIGNAL
CONTROLLER CABINET DETAIL
N.T.S.



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.
- COORDINATE VAULT NO. WITH THE STATE, HIGHWAY DIVISION.

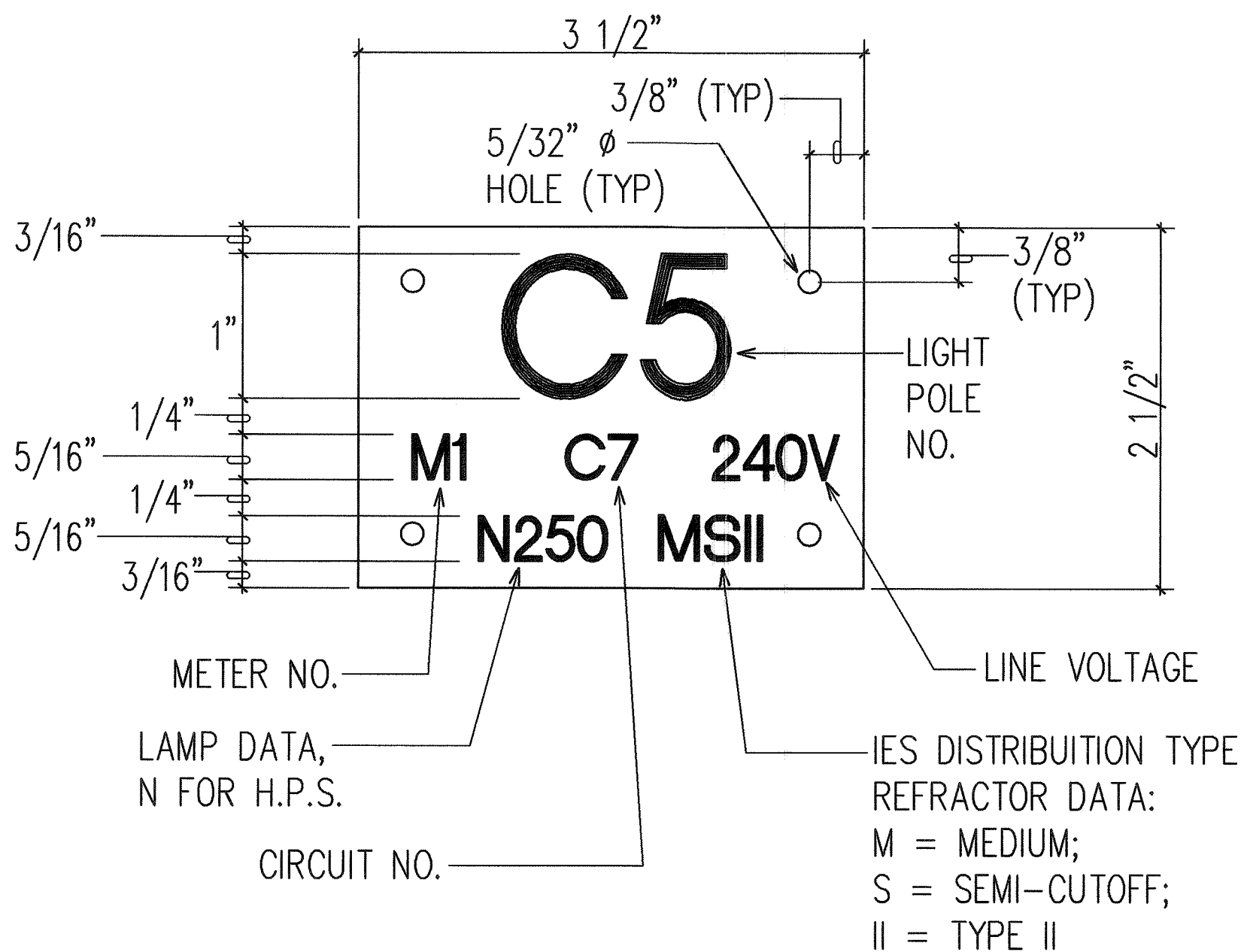
2
E-13 T. S. METER I.D. TAG DETAIL
NOT TO SCALE



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.
- COORDINATE VAULT NO. WITH THE STATE, HIGHWAY DIVISION.

3
E-13 HIGHWAY LIGHTING METER I.D. TAG DETAIL
NOT TO SCALE



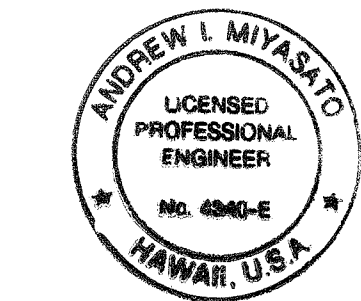
NOTES:

- 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".
- LIGHT POLE NUMBER SIZE SHALL BE 1" HIGH AND ENGRAVED 1/8" WIDE, WHITE IN COLOR (NUMBER AS REQUIRED).
- NOMENCLATURE SIZE SHALL BE 5/16" HIGH AND ENGRAVED 1/32" WIDE, WHITE IN COLOR (METER NUMBER, CIRCUIT NUMBER, LINE VOLTAGE, LAMP DATA AND REFRACTOR DATA AS REQUIRED).
- ATTACH TO ALUMINUM AND STEEL POLE WITH NO. 8 STAINLESS STEEL, 1/2" LONG DRIVE SCREWS IN 1/8" DRILL HOLE. ATTACH TO WOOD POLES WITH 4D ALUMINUM NAILS.
- NUMBERS AND LETTERS ARE INSCRIBED BY CUTTING THROUGH "BLACK CAP SHEET" TO EXPOSE "WHITE LETTERS".
- ASSIGN CIRCUIT NUMBER (LETTER INDICATES PANELBOARD, NUMBER INDICATES CIRCUIT).
- CONTRACTOR TO VERIFY ALL ITEMS OF ID TAG WITH STATE D.O.T. PRIOR TO FABRICATION.

4
E-13 HIGHWAY LIGHT I.D. TAG DETAIL
NOT TO SCALE

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

LAST SAVE: 06/09/99 @ 15:03:18 BY: E PLAT SC 1-0-01
P:\VAD\PROJECTS\STP099\STP099.DWG



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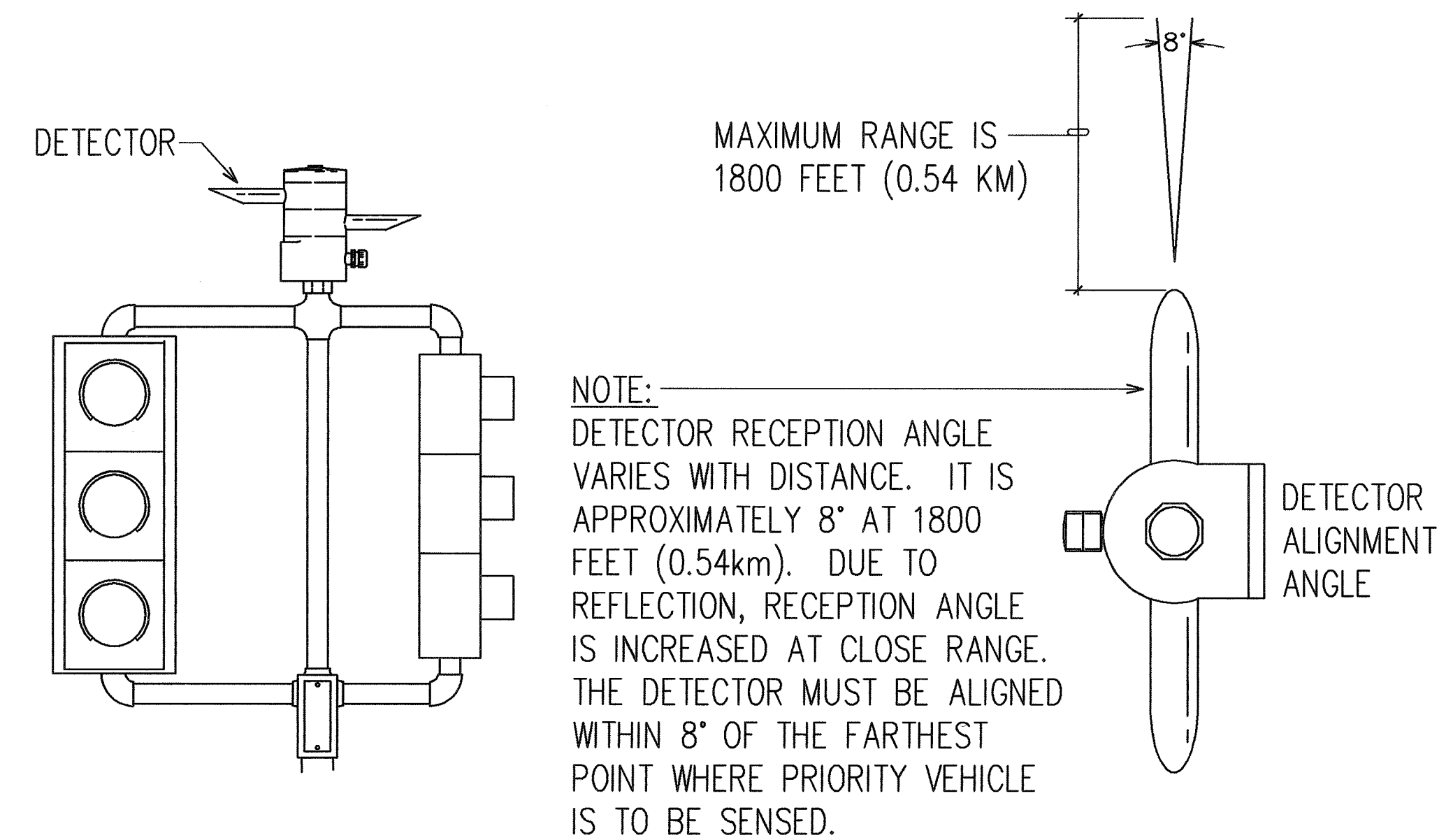
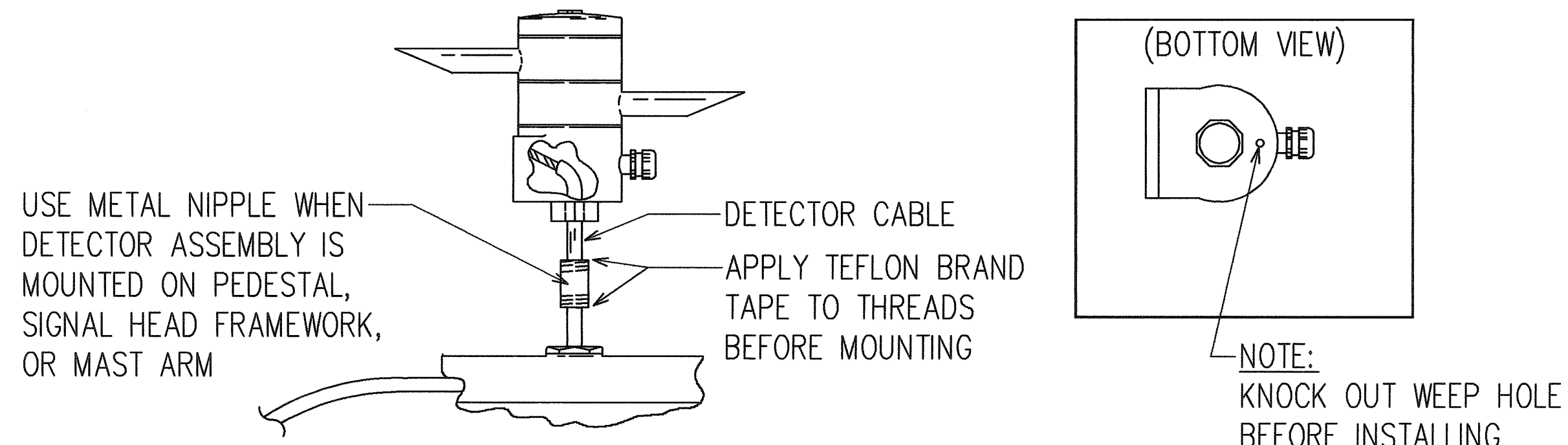
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL DETAILS I

WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

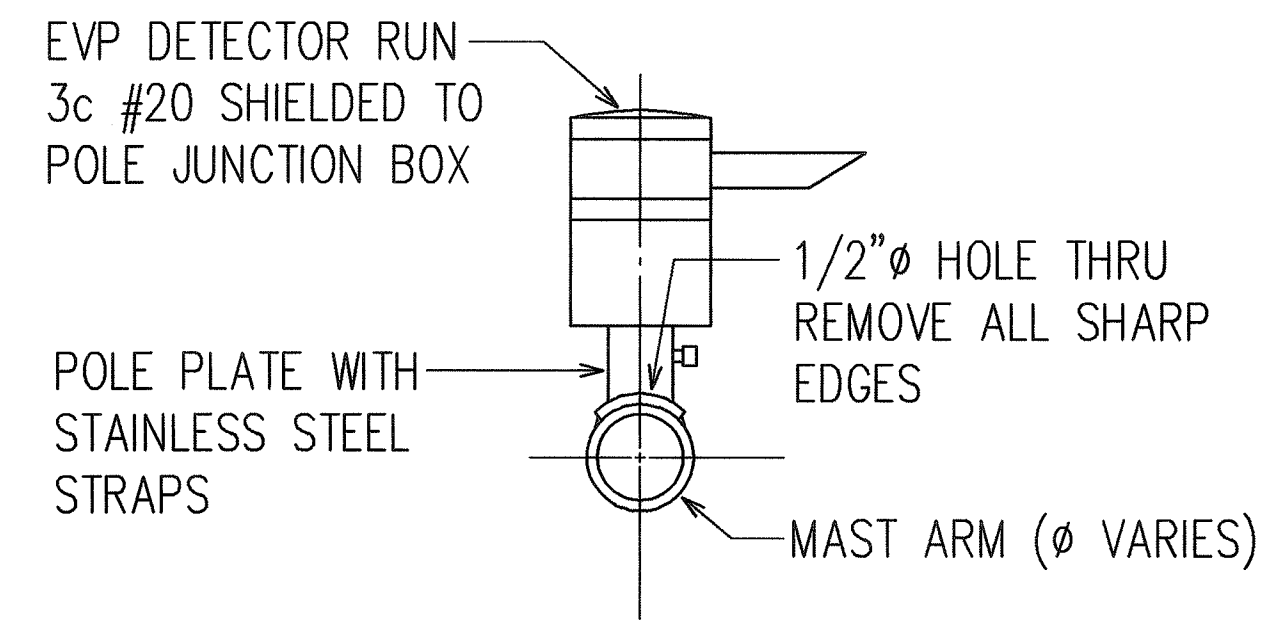
SCALE: AS NOTED
DATE: JUNE 1999
SHEET No. E-13 OF 18 SHEETS

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 \rightarrow AND WILL REMAIN G OR \rightarrow DURING THE NEXT PHASE, IT SHALL BE G OR \rightarrow DURING THE CLEARANCE INTERVAL.
 - B. IF A SIGNAL IS G OR \rightarrow AND WILL BECOME R OR EXTINGUISHED DURING THE NEXT PHASE, IT SHALL BE Y OR \rightarrow 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



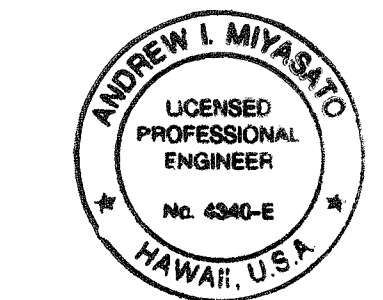
**TYPICAL PEDESTAL/MAST ARM
INSTALLATION OF EVP DETECTOR**
NOT TO SCALE



**TYPICAL HORIZONTAL MOUNT
OF EVP DETECTOR**
NOT TO SCALE

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	67	71

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
	TRACED BY	
	DESIGNED BY	
	QUANTITIES BY	
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	No.	
	DATE	
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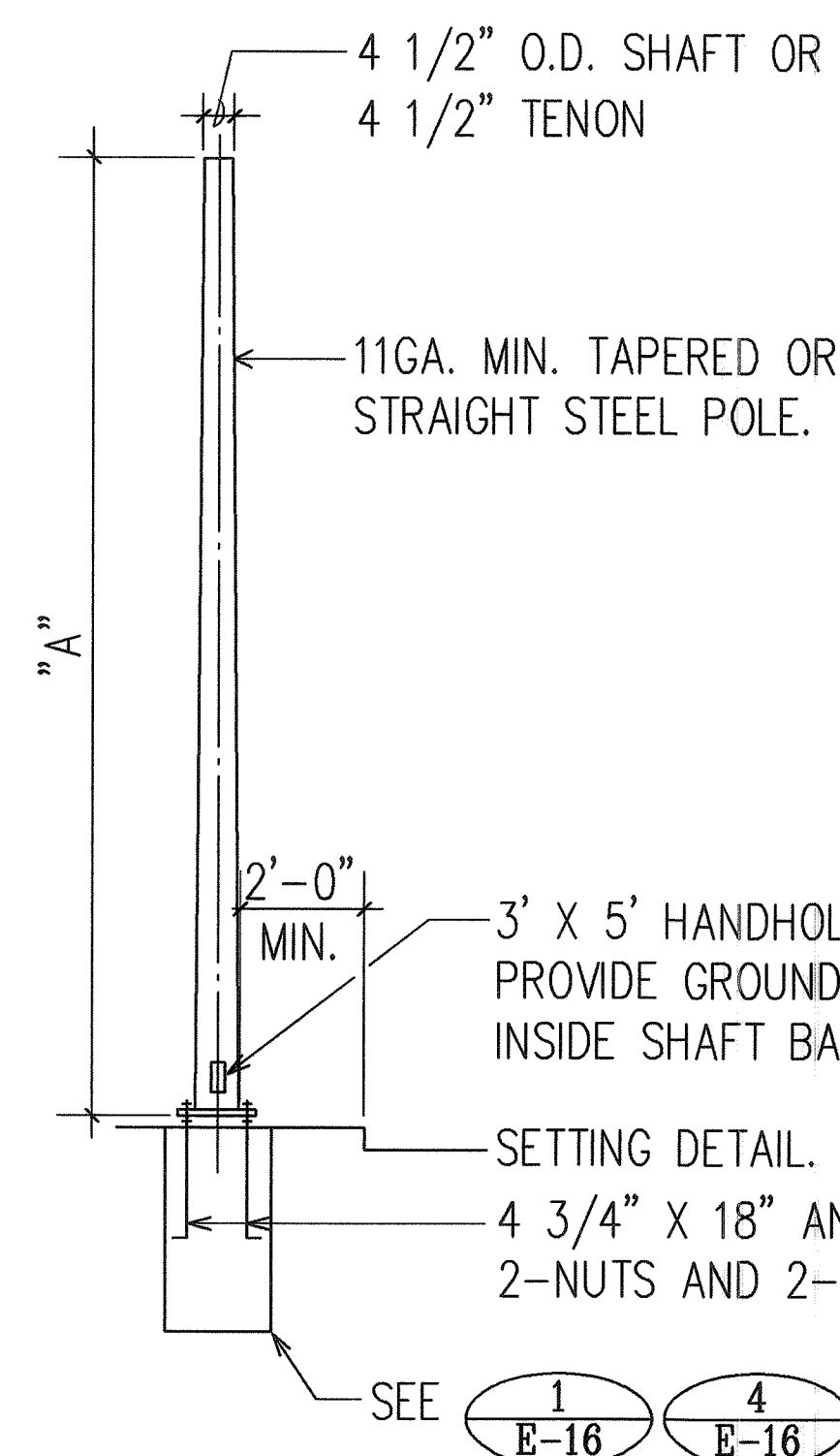
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Andrew L. Miyasato
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

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

**WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD**
Federal Aid Project No. STP-099-1(18)

SCALE: AS NOTED
DATE: JUNE 1999
SHEET No. E-14 OF 18 SHEETS

Diagram illustrating the Type I Traffic Signal Standard. The diagram shows a circular signal housing with a central lens. A label "TYPE I TRAFFIC SIGNAL STANDARD" points to the top of the housing. A label "HANDHOLE" points to the bottom of the housing. A label "PLAN" is at the bottom left. A label "DIRECTION OF TRAFFIC" with a downward arrow indicates the traffic flow direction.



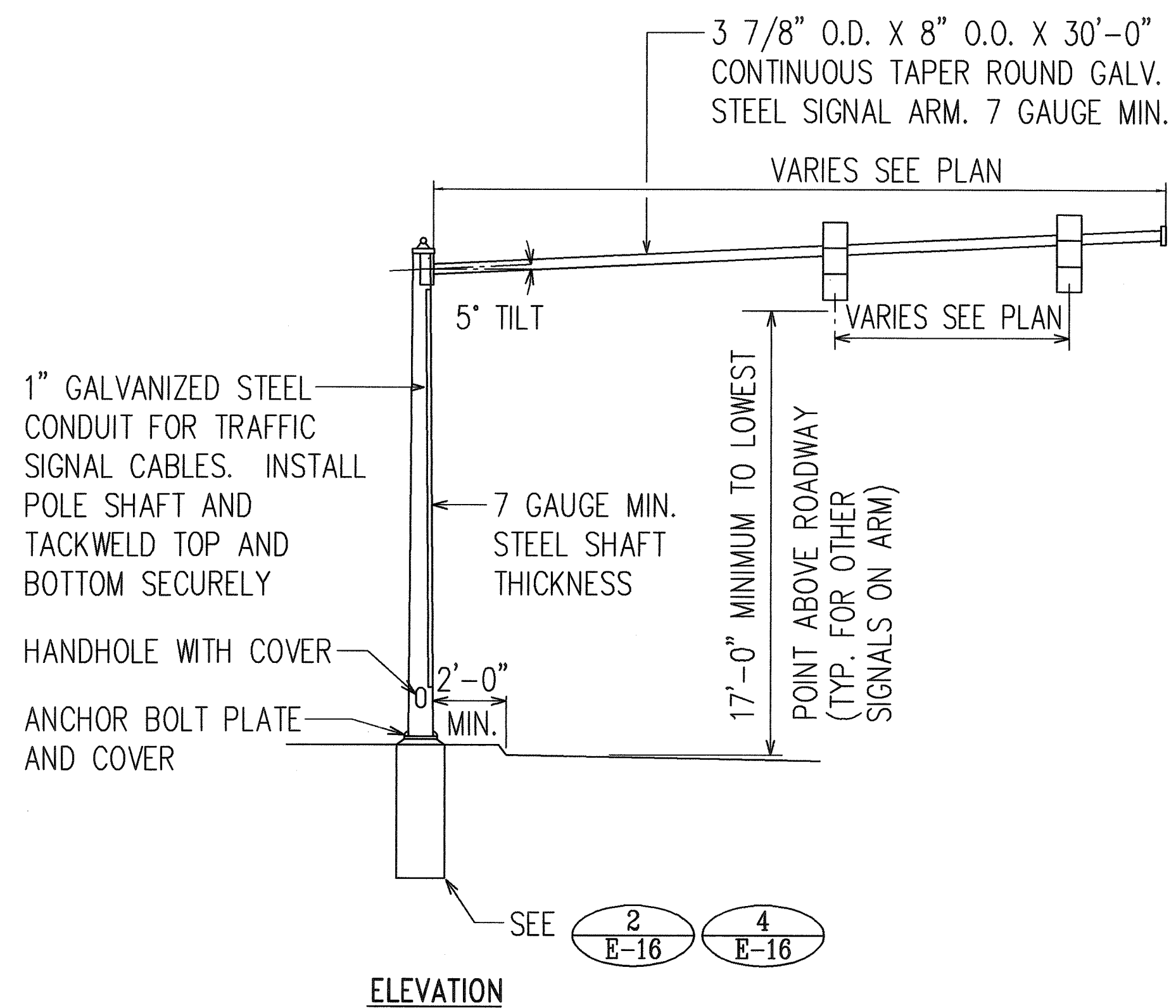
TYPE —
TYPICAL DESIGNATION: 1-7
HEIGHT "A" —



NOT TO SCALE

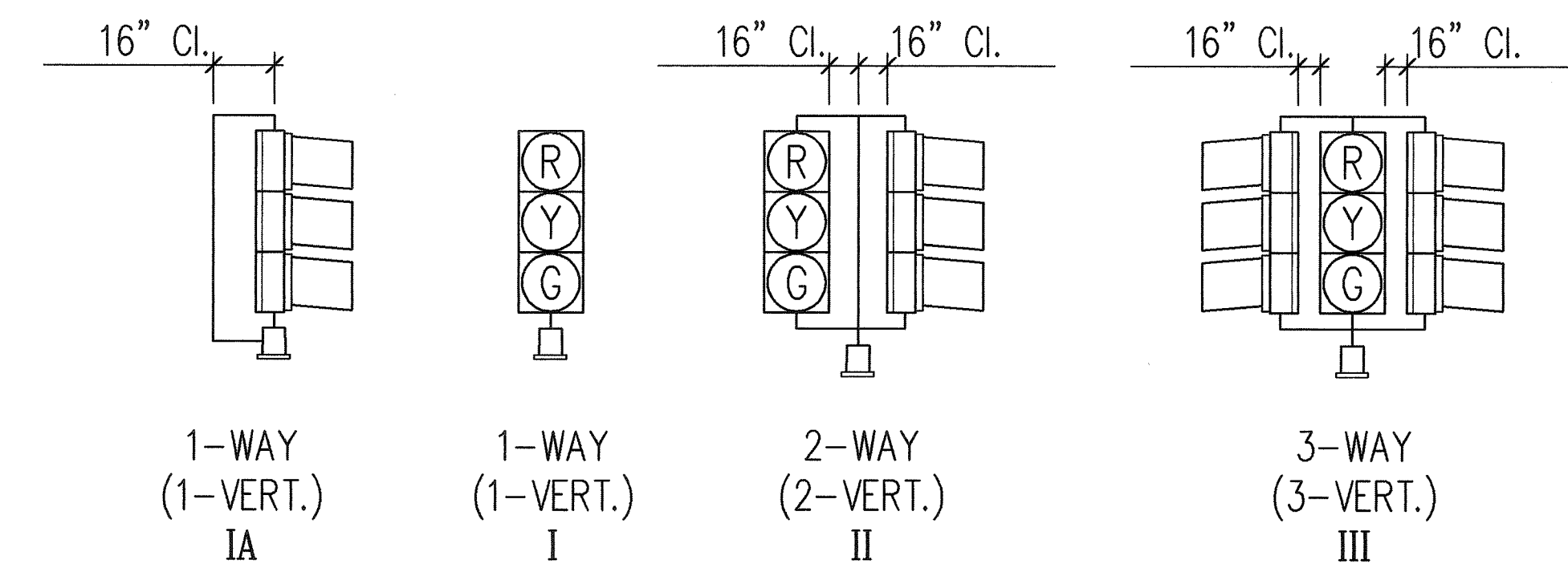
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NOTE BOOK	DRAWN BY _____	_____
	TRACED BY _____	_____
	DESIGNED BY _____	_____
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NO. _____	CHECKED BY _____	_____

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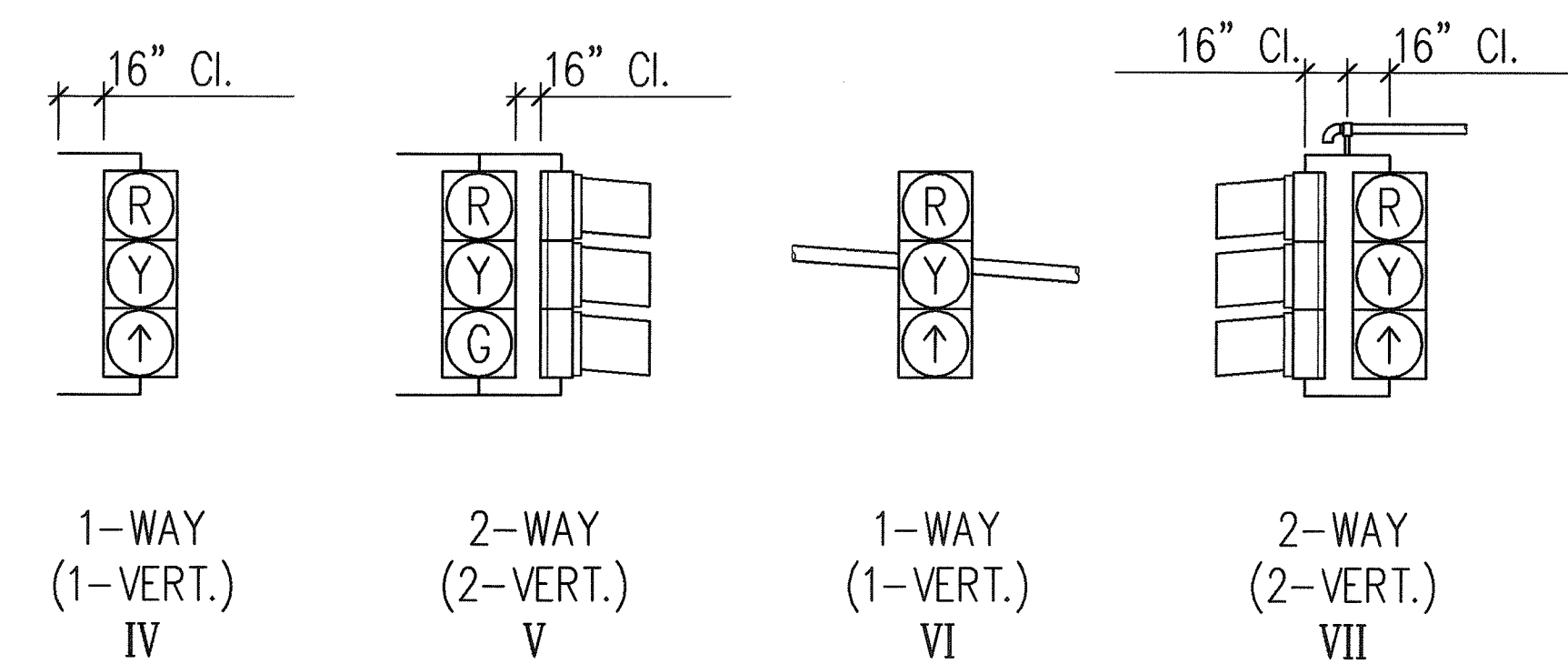


1. STANDARD SHALL BE DESIGNED IN ACCORDANCE WITH "STANDARD STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS".
2. MOUNTING FOR SIGNALS AT INTERMEDIATE POINTS OF MAST ARM SHALL BE OF THE ADJUSTABLE TYPE.
3. SUBMIT SHOP DRAWINGS FOR APPROVAL.

NOT TO SCALE



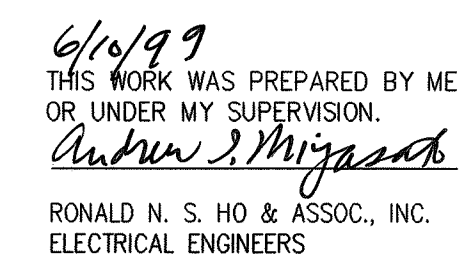
SLIPFITTER MOUNTINGS



BRACKET MOUNTINGS

MAST ARM MOUNTINGS

NOT TO SCALE



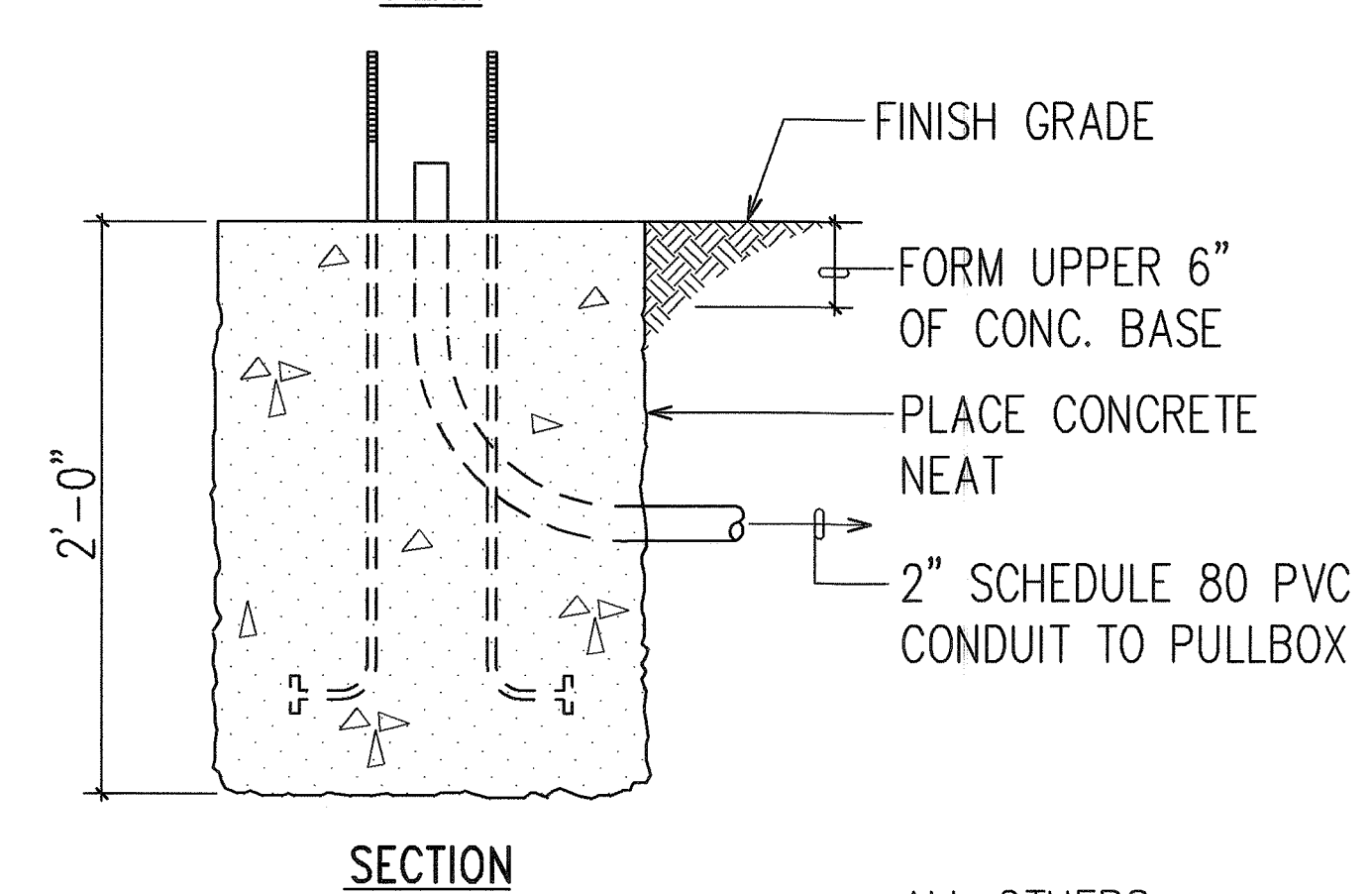
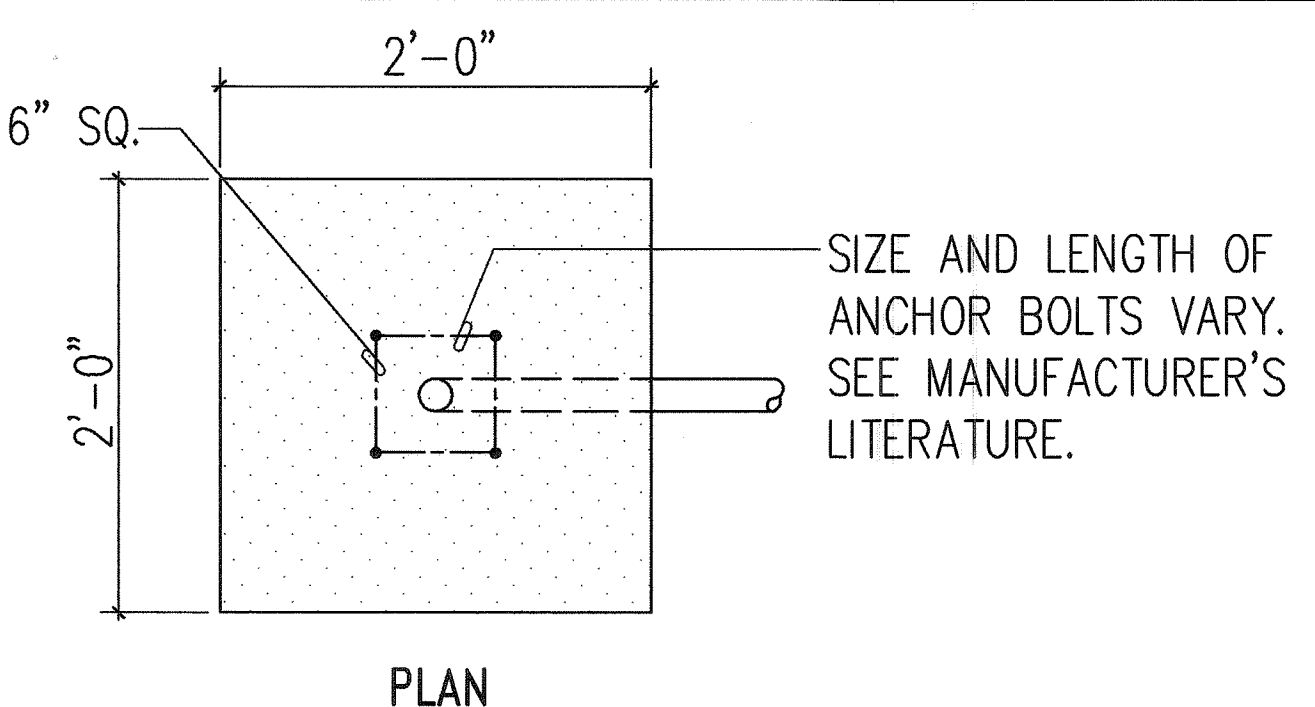
TRAFFIC SIGNAL DETAILS III

WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

SCALE: AS NOTED

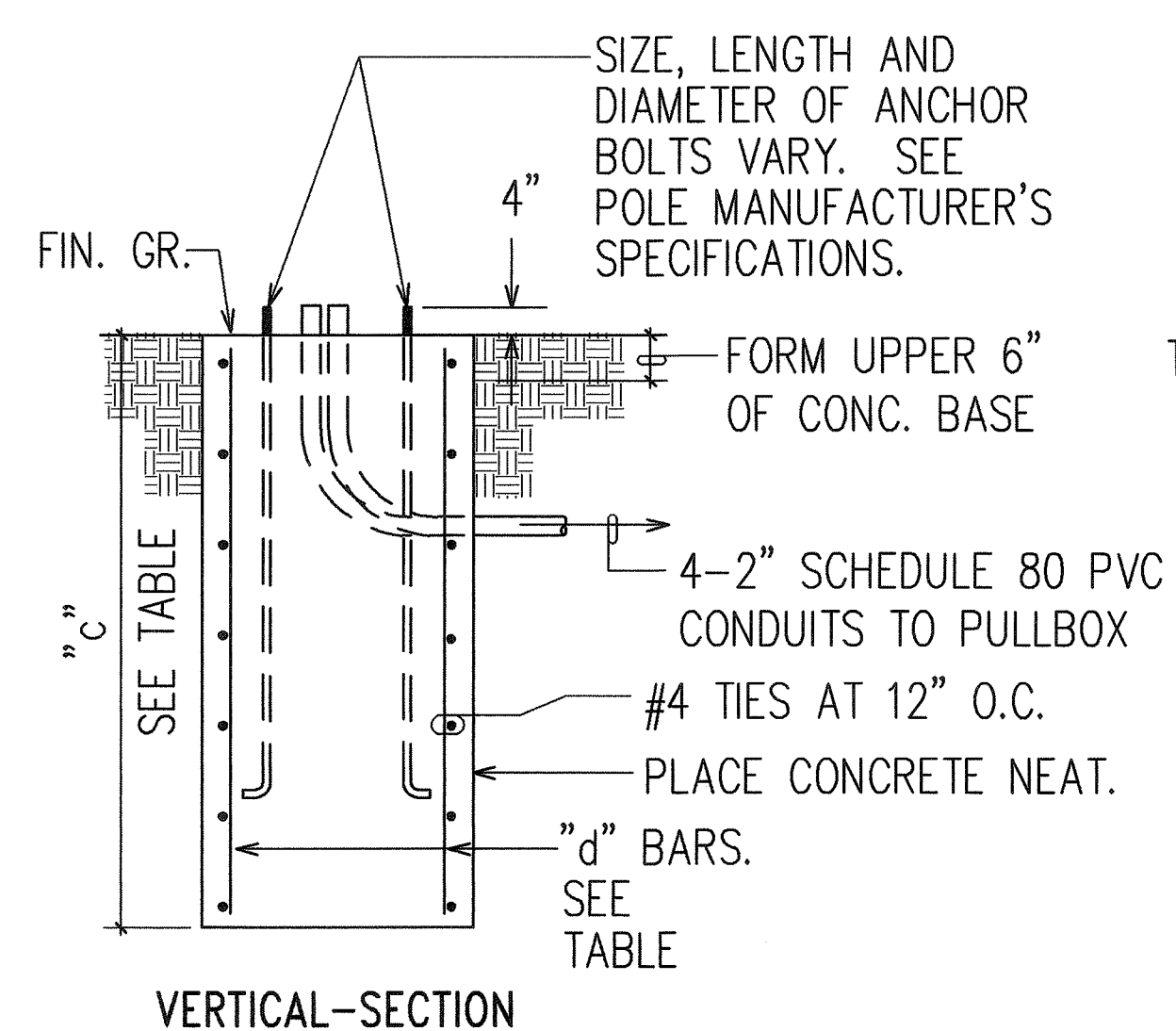
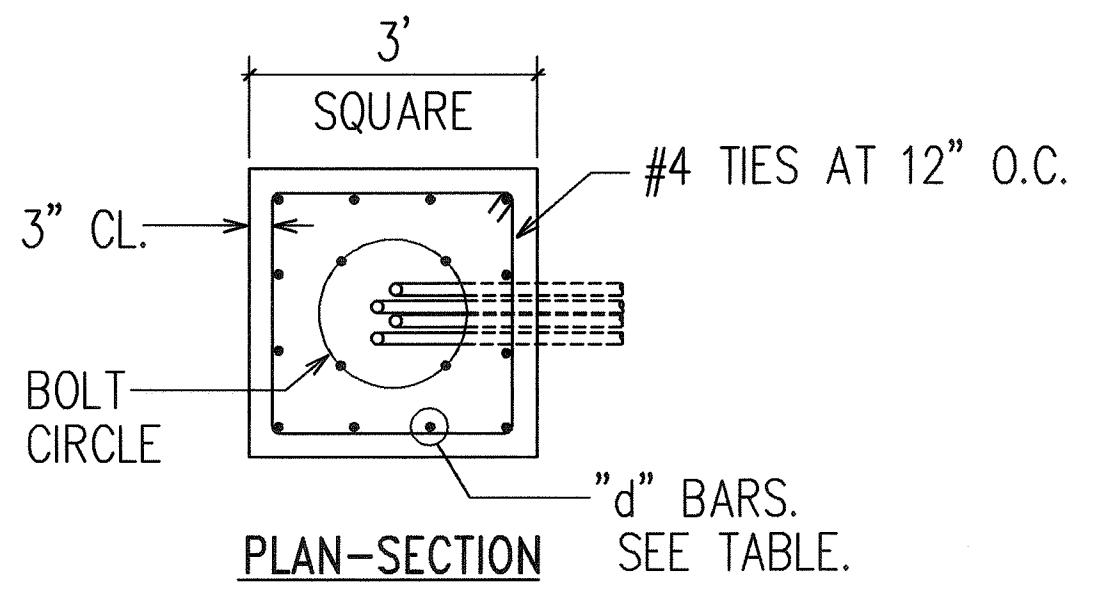
DATE: JUNE 1999

SHEET No. E-15 OF 18 SHEETS



- 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.

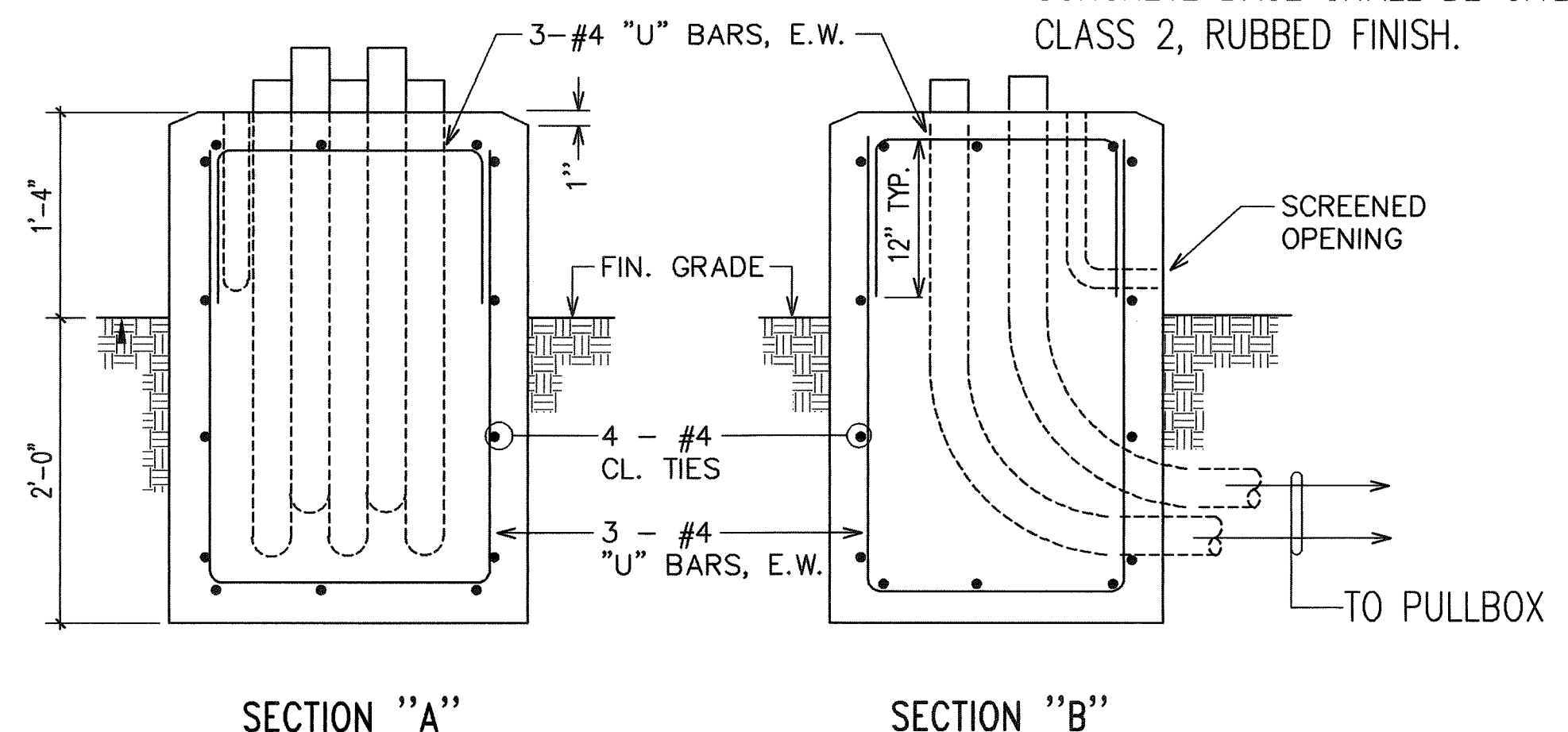
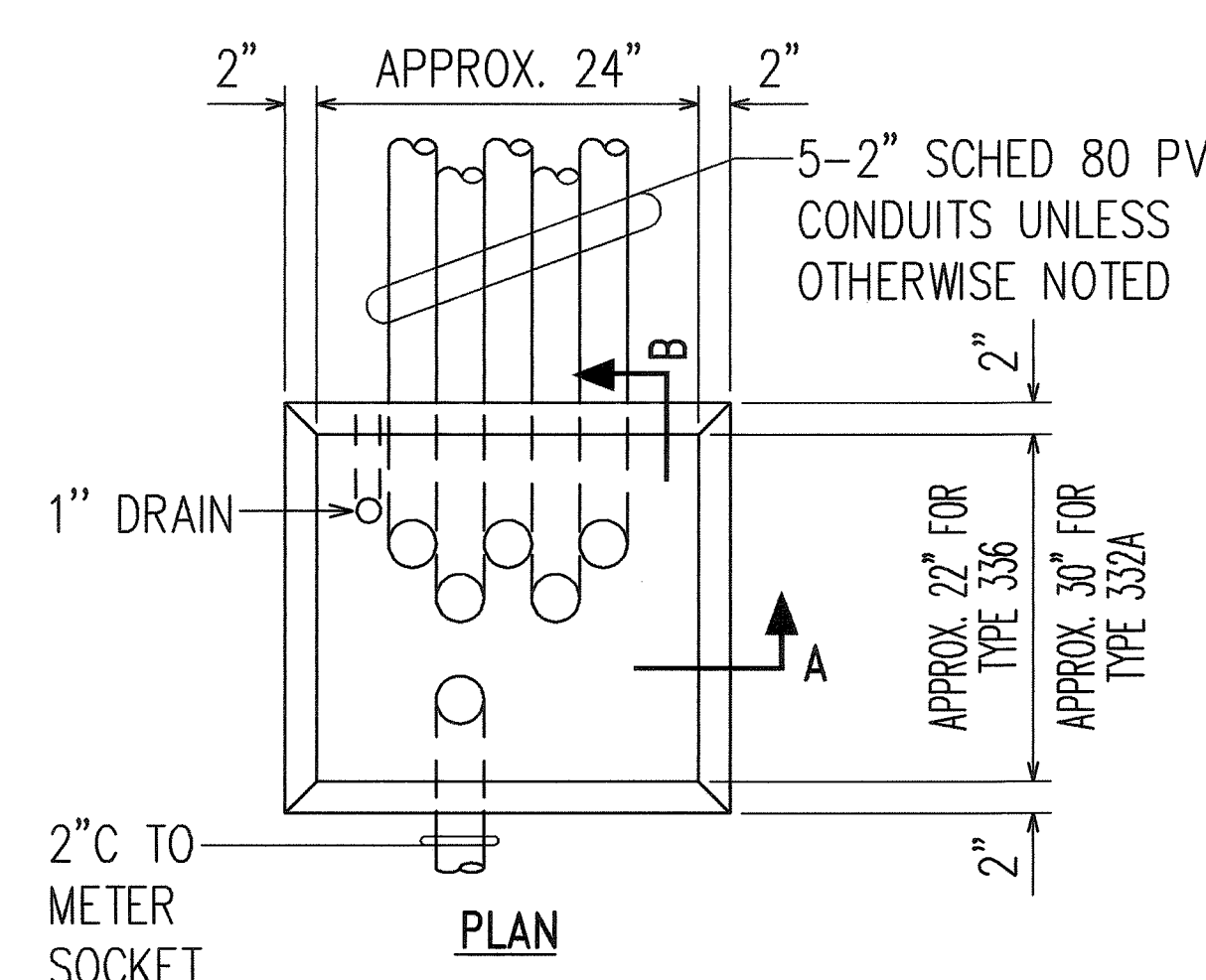
1 TYPE "A" CONCRETE BASE DETAIL
E-16 NOT TO SCALE



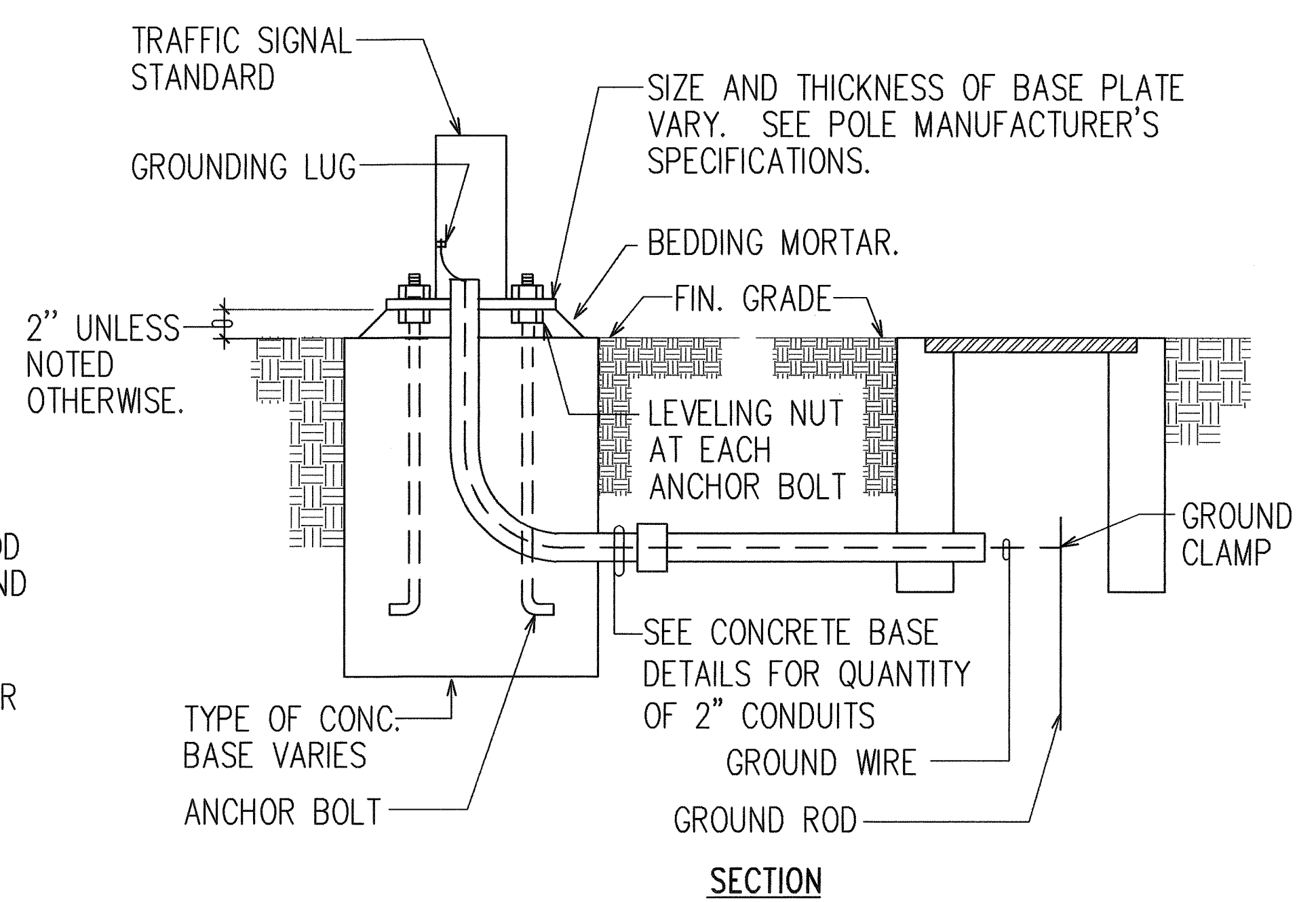
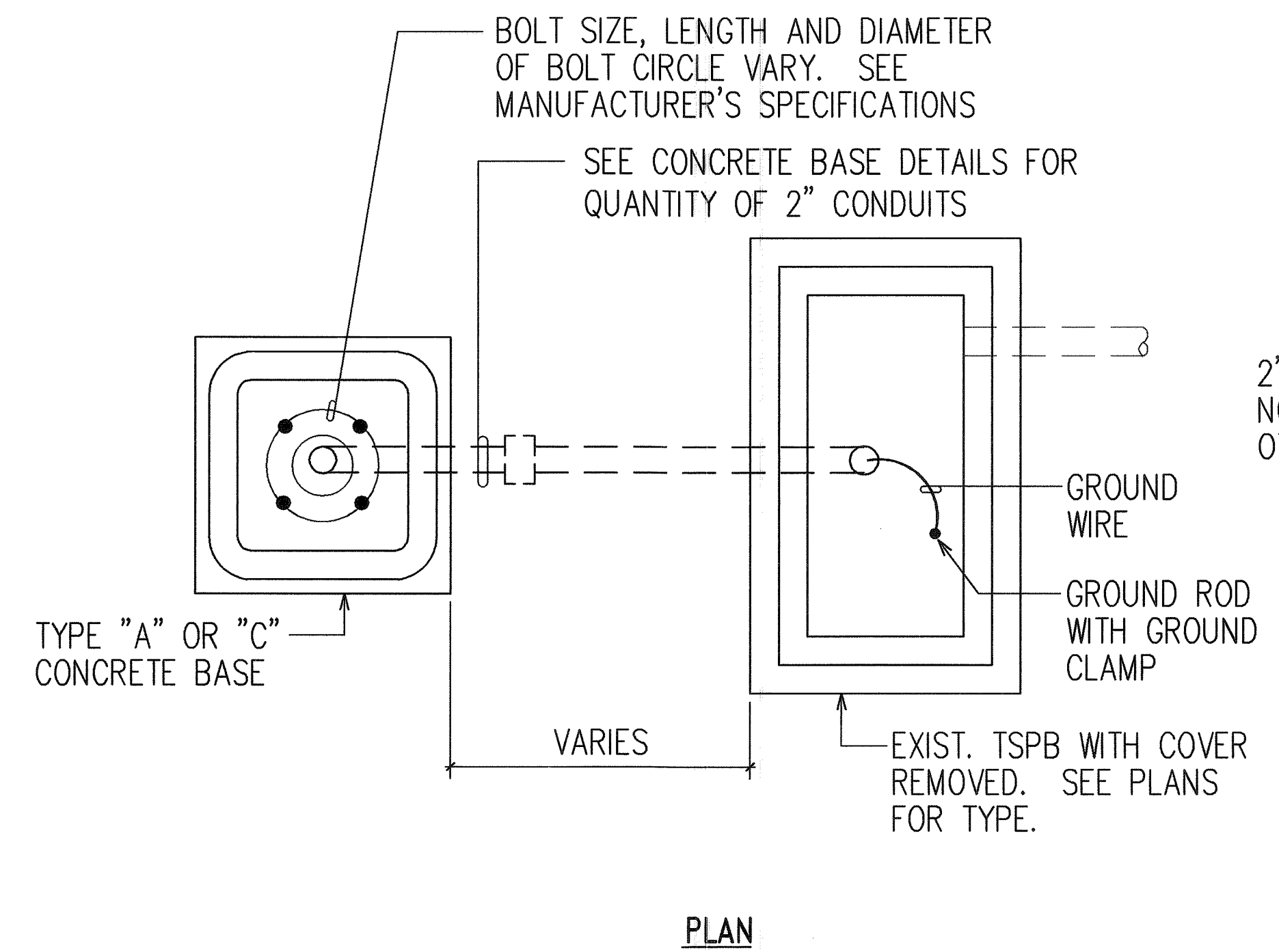
TYPICAL STANDARD DESIGNATION: II - 25
MAST ARM LENGTH

- 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-16 NOT TO SCALE

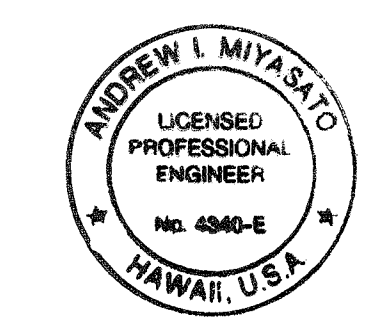


3 TYPE "D" CONCRETE BASE DETAIL
E-16 NOT TO SCALE



4 TYPICAL STANDARD & PEDESTAL DETAIL
E-16 NOT TO SCALE

SURVEY PLOTTED BY: DATE: _____
DRAWN BY: _____
DESIGNED BY: _____
CHECKED BY: _____
No. _____
LAST SAVE: 06/09/99 @ 10:08:28 BY: E PLT SC 1'-0"=1'
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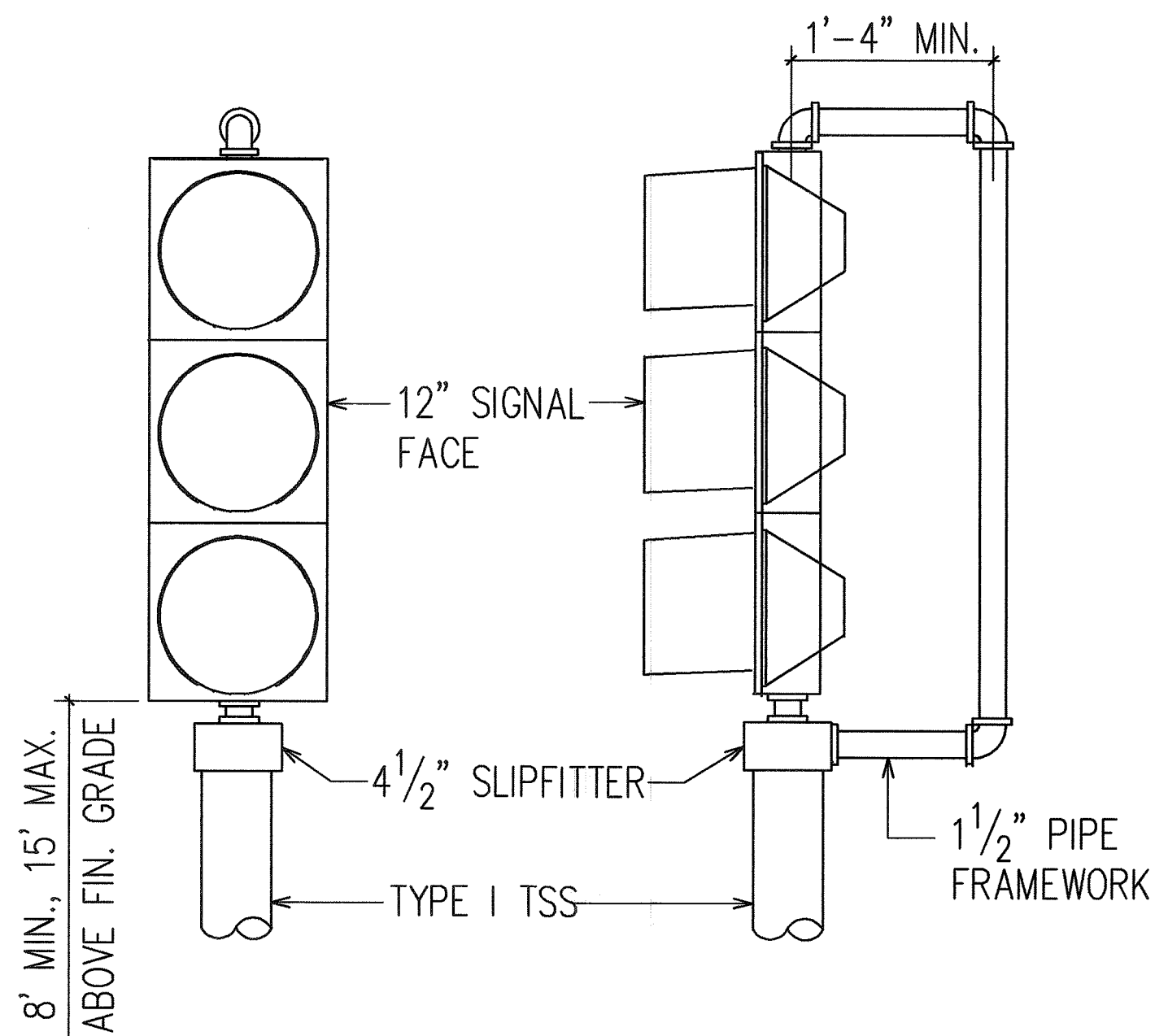
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RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL DETAILS IV

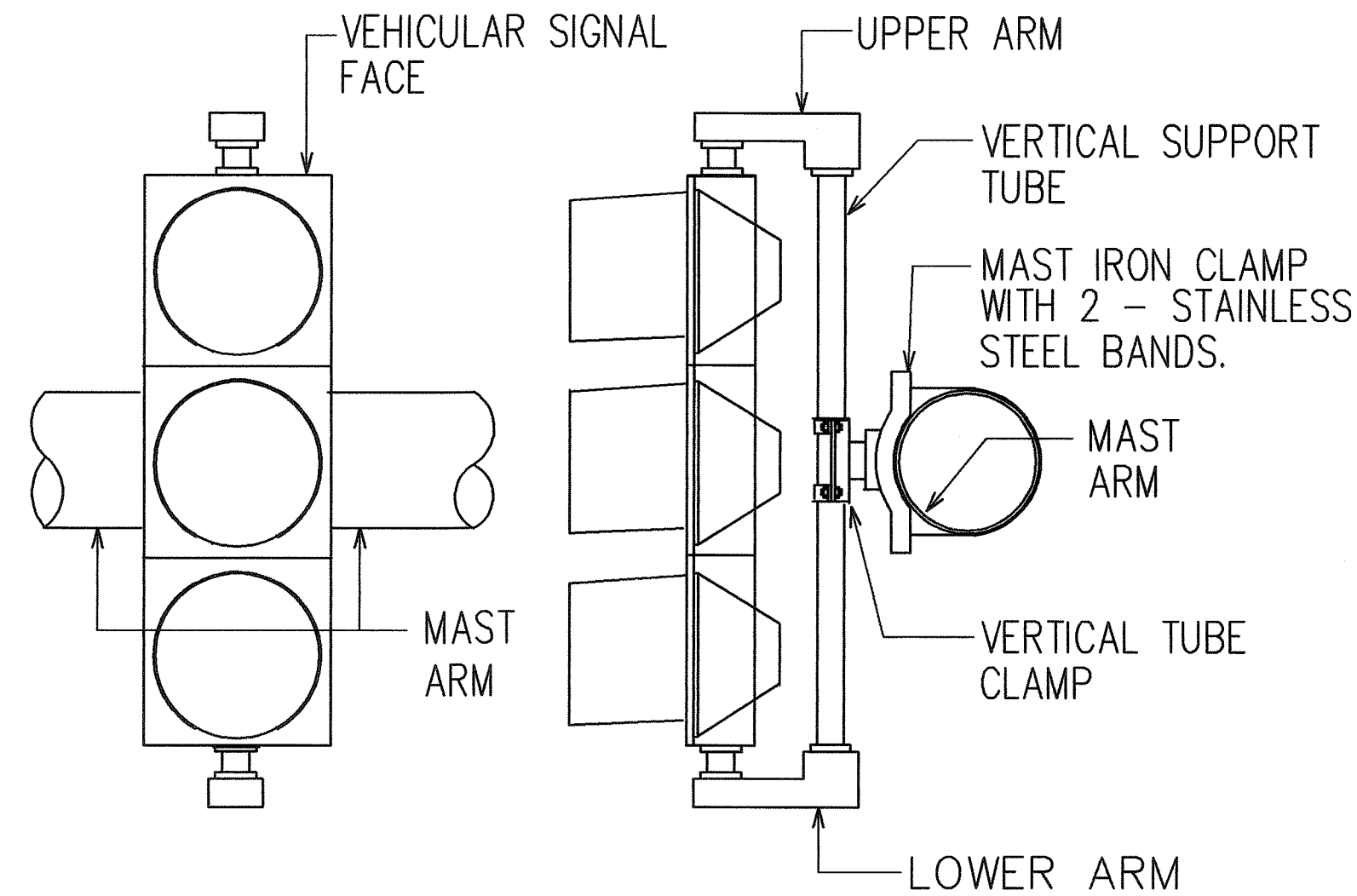
WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

SCALE: AS NOTED
DATE: JUNE 1999
SHEET No. E-16 OF 18 SHEETS

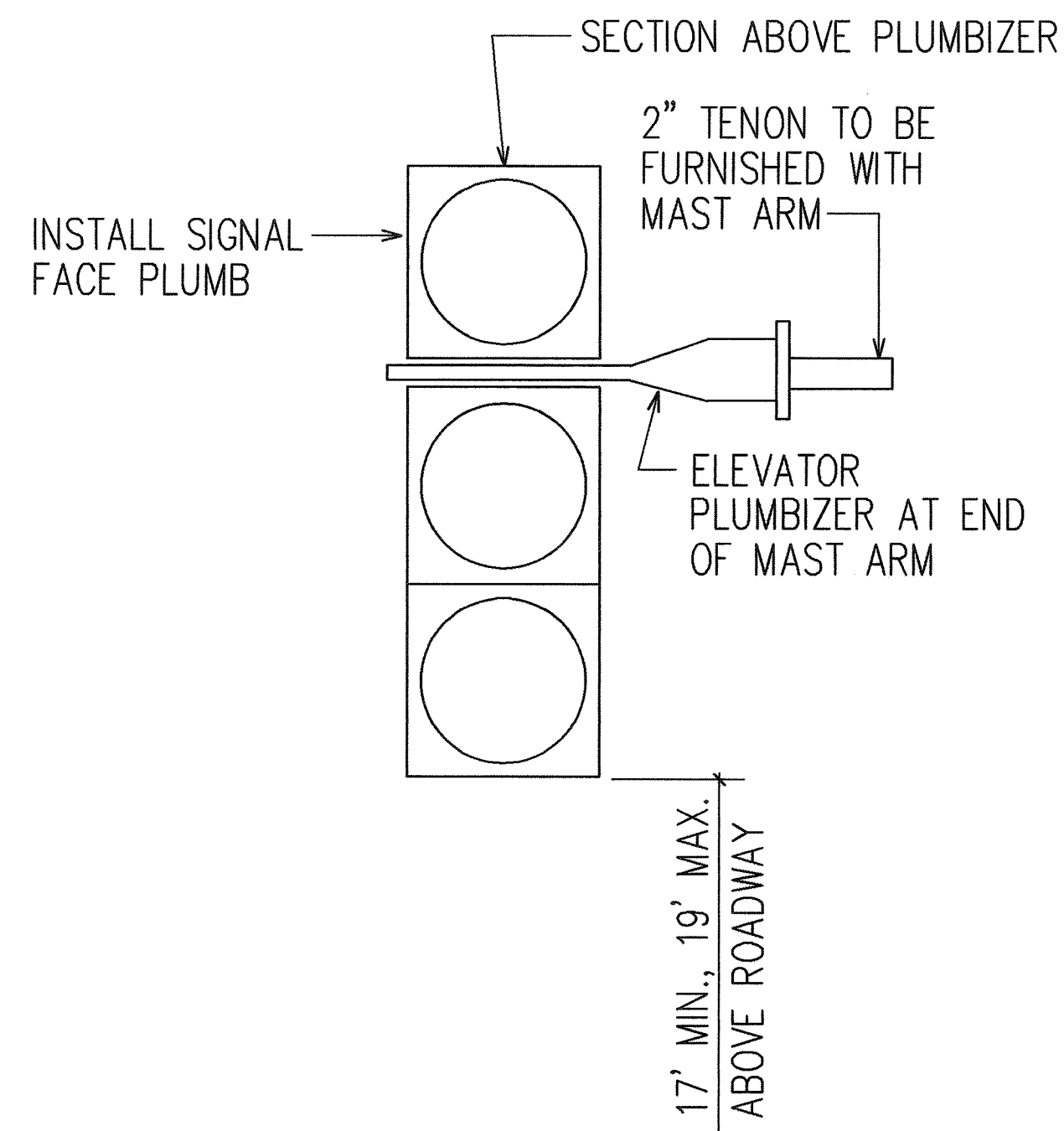
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	70	71



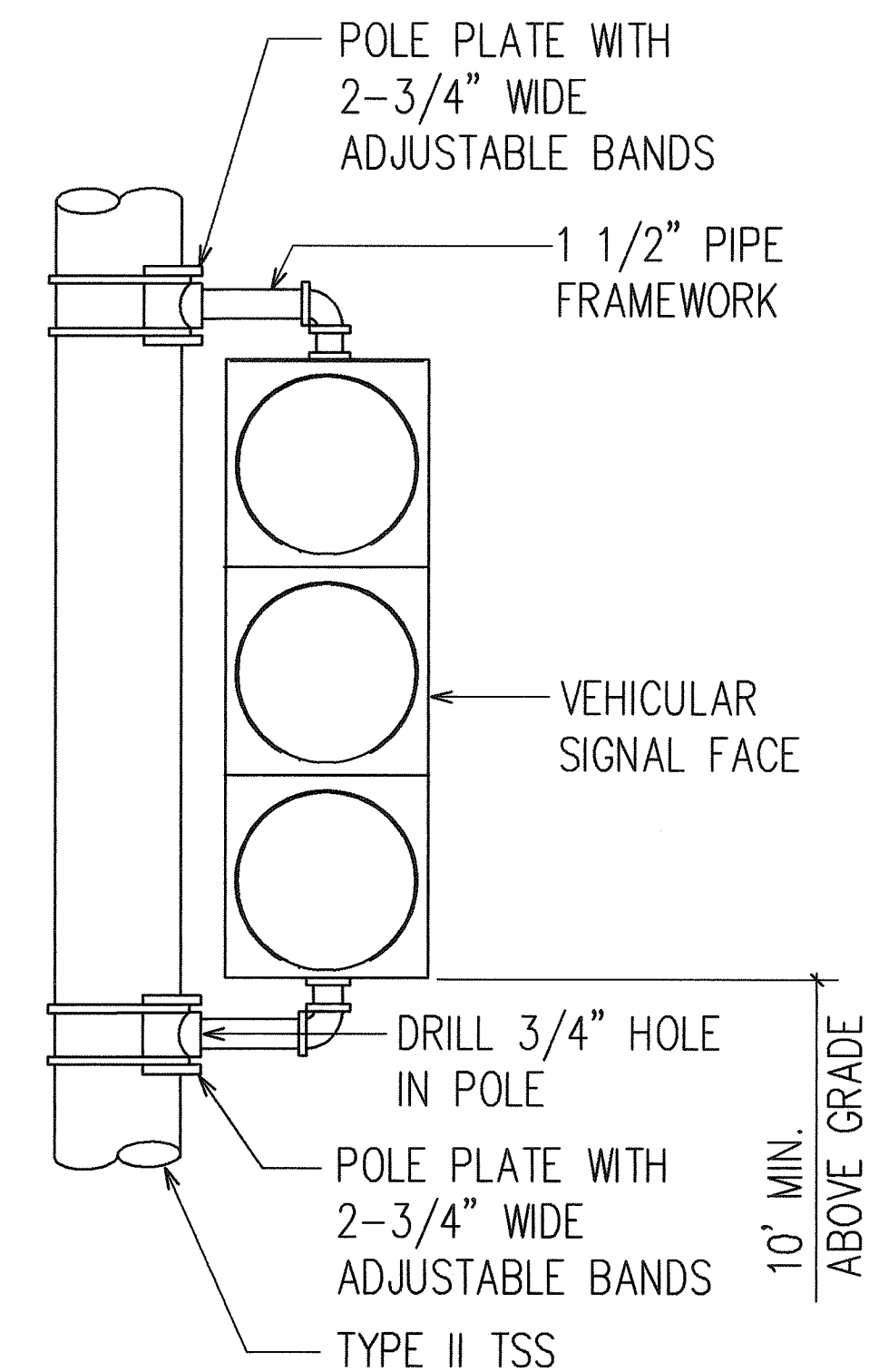
TOP OF POLE - ONE WAY MOUNTING



ADJUSTABLE MAST ARM ONE WAY MOUNTING AT INTERMEDIATE POINT



MAST ARM - ONE WAY MOUNTING AT ENDS



BRACKET ARM - ONE WAY

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.

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

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6/10/99
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OR UNDER MY SUPERVISION.
Andrew I. Miyasato
RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL DETAILS V

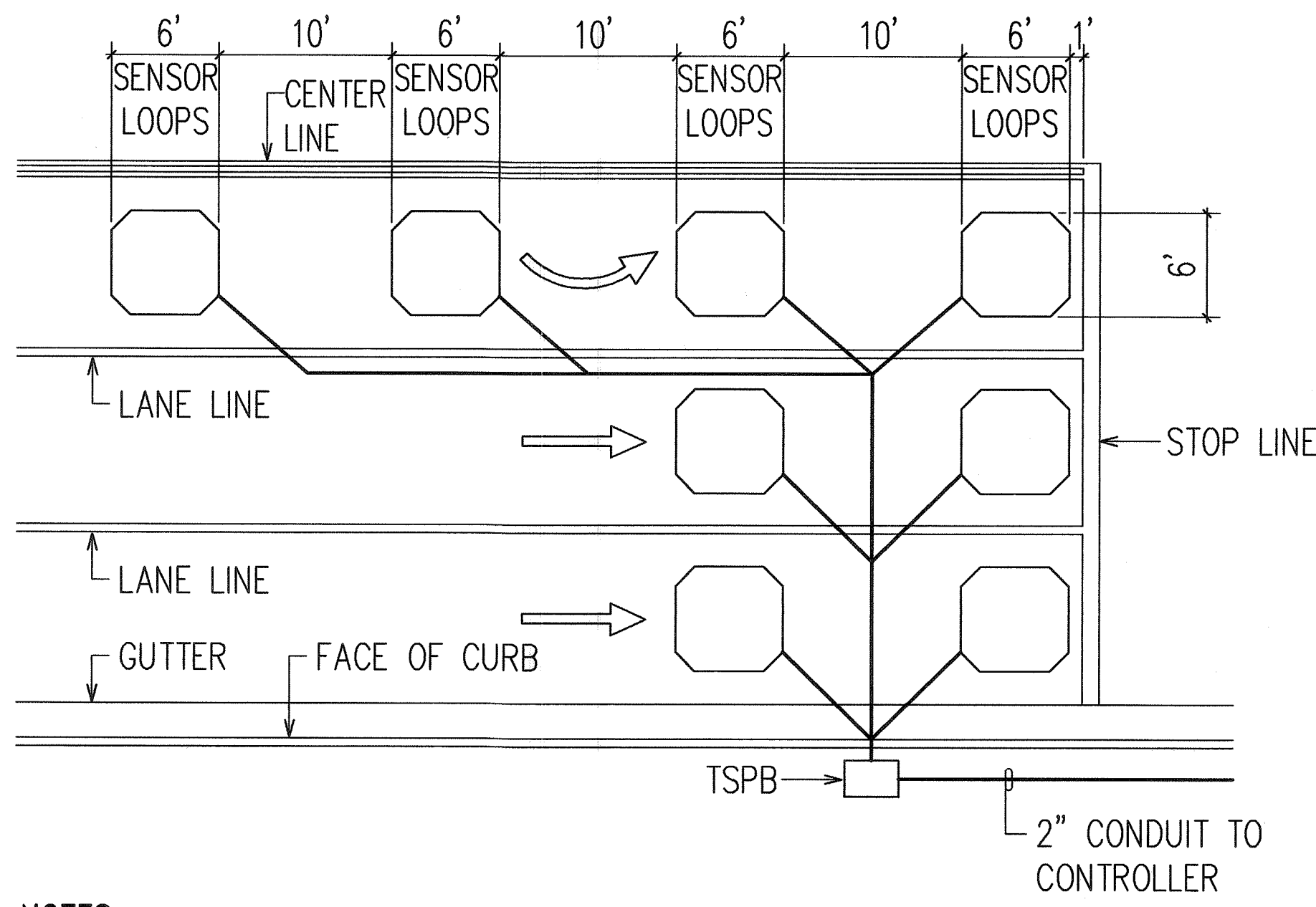
WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

SCALE: AS NOTED

DATE: JUNE 1999

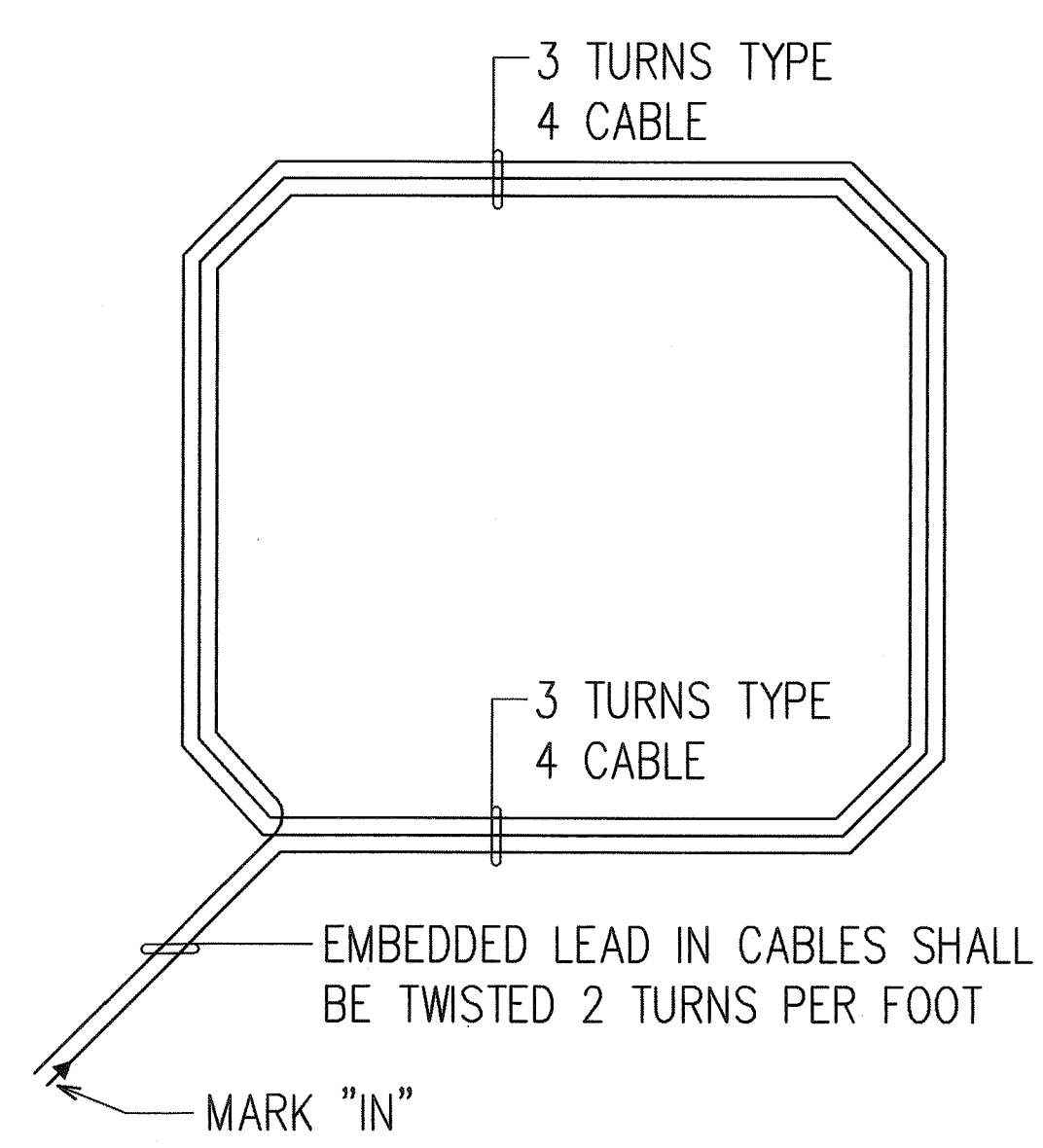
SHEET No. E-17 OF 18 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-099-1(18)	1999	71	71



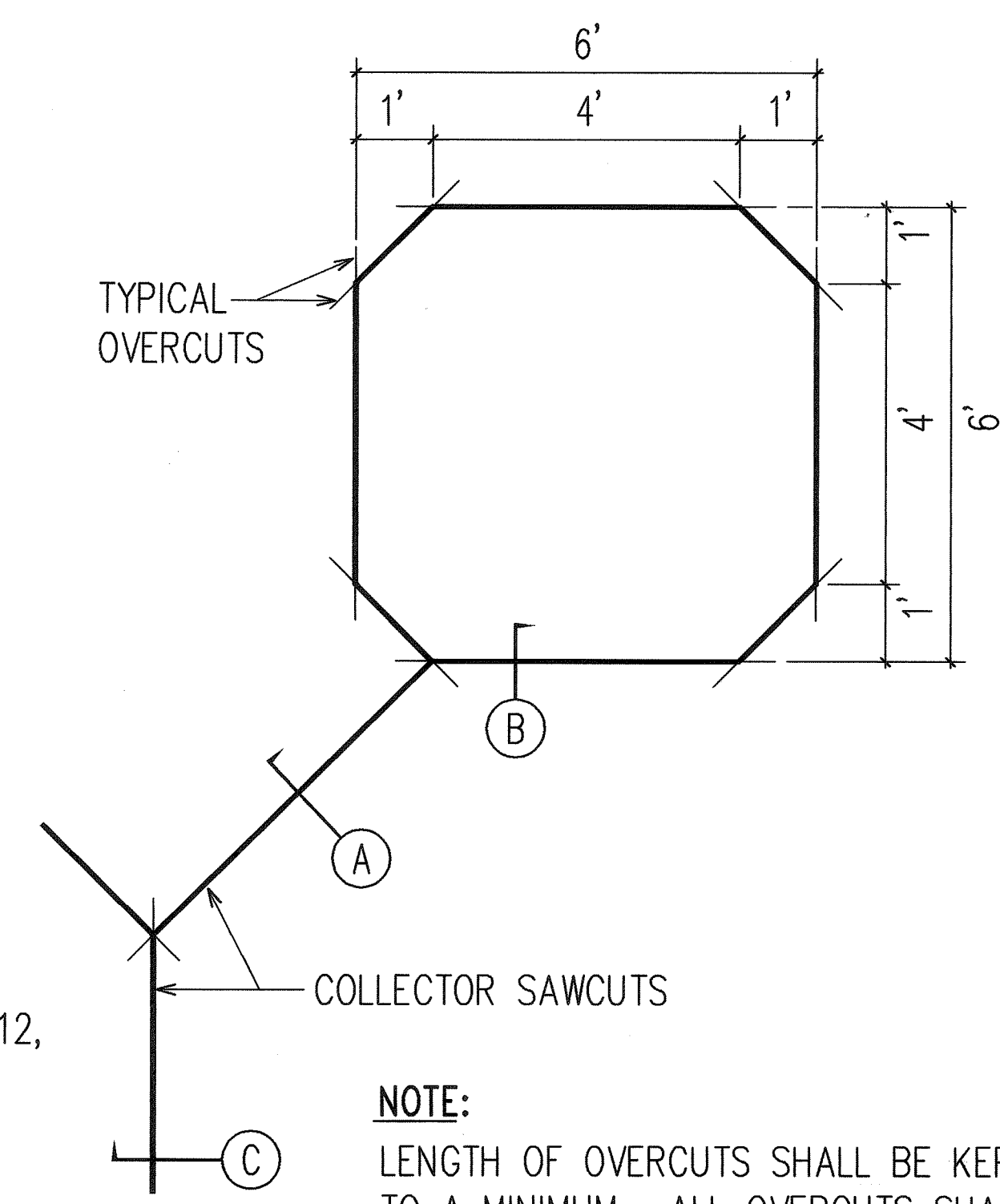
- NOTES:**
1. CENTER SENSOR LOOPS IN LANES.
 2. COLLECTOR CABLES SHALL BE TWISTED 2 TURNS PER FOOT.
 3. NUMBER OF LOOPS AND LOCATIONS VARY. SEE PROJECT PLANS.
 4. NUMBER AND LOCATIONS OF COLLECTOR SAWCUTS MAY BE VARIED IN THE FIELD TO SUIT.

TYPICAL SENSOR LOOP LAYOUT
N.T.S.



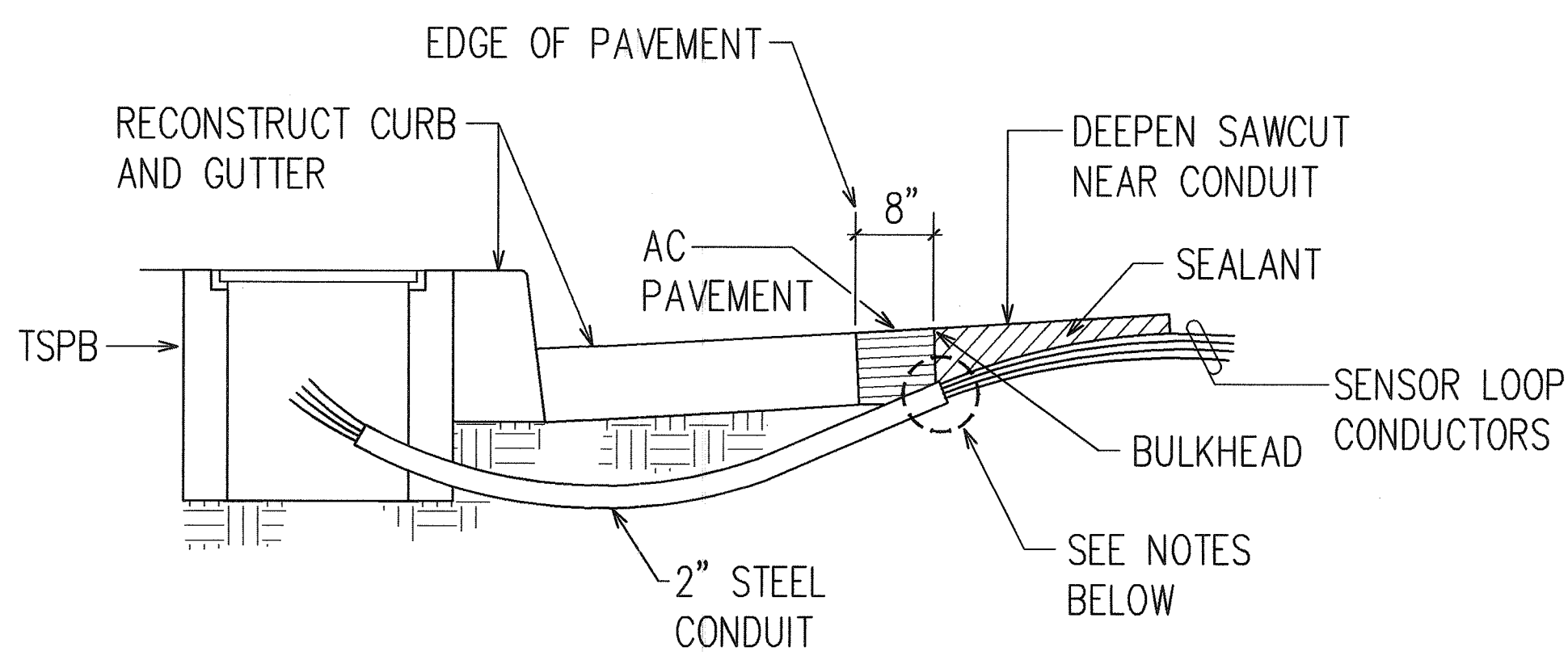
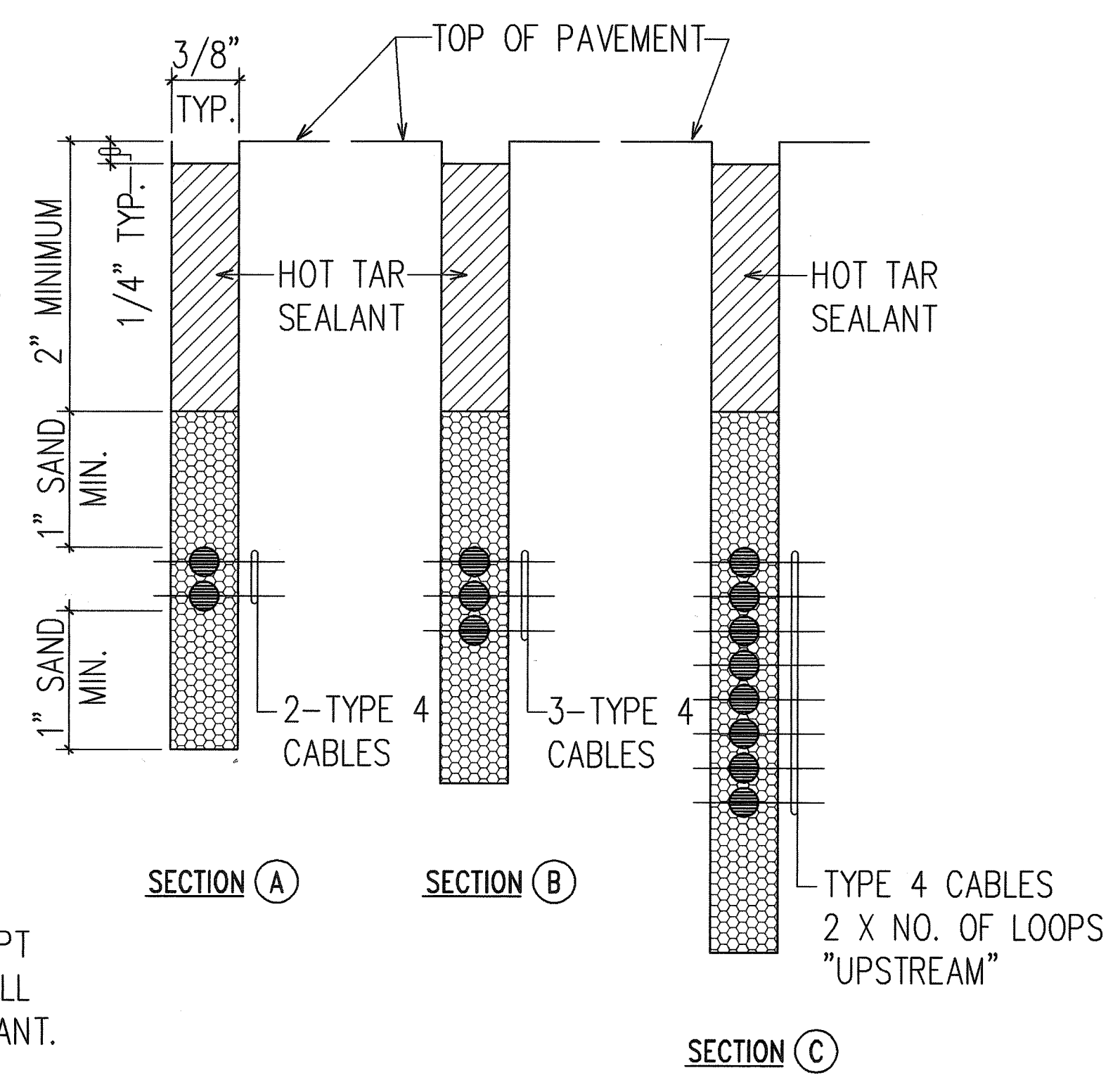
- PLAN**
- NOTE:** TYPE 4 CABLE – LOOP SENSOR CABLE: SOLID NO. 12, SINGLE CONDUCTOR TO IMSA SPEC 51-5

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.

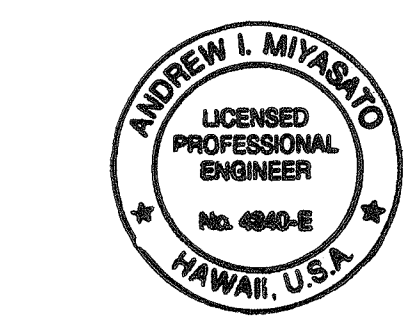
TYPICAL SENSOR LOOP SAWCUT DETAIL
N.T.S.



- 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.

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2: VARIOUS PROJECTS 970387038710	



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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL DETAILS VI

WILIKINA DR. INTERSECTION IMPROVEMENTS
AT KAMANANUI ROAD
Federal Aid Project No. STP-099-1(18)

SCALE: AS NOTED
DATE: JUNE 1999
SHEET No. E-18 OF 18 SHEETS

71