	ELECTRICAL	SYMBO	<u>DLS</u>
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
		$\bowtie$	HELCO Pullbox, 2' x 4', per HELCO Std. Dwg. No. C-3154
<b>→</b>	New Traffic Signal Head R—Y—G, Provide Necessary Mounting Bracket and Accessories		Type "C" Traffic Signal Pullbox, See Sheet E-18
<b>→</b> ↓	New R—Y—G Arrow, See Plan for Arrow Direction, Programmed Visibility Traffic Signal Head, Provide Necessary Mounting Brackets and Accessories		Type "A" Traffic Signal Pullbox, See Sheets E-17 and E-18
<b>─</b> >↓	New R—Y—G Arrow, See Plan for Arrow Direction, Provide Necessary Mounting Brackets and Accessories	)	Existing LPS Roadway Light and Bracket Arm Mounted on Existing Utility Pole
-⊗→	New Opticom Detector, Provide Necessary Mounting Brackets and Accessories, See Sheet E-23	2	New 180W LPS Roadway Light with New 15'-0" Truss Tyhpe Bracket Arm and Wood Pole, See Details on Sheet E-8, with Connection to HELCo Secondary Conductors
———	New Pedestrian Traffic Signal Head, Provide Necessary Mounting Brackets and Accessories, See Sheet E-22	2	New 180W LPS Roadway Light with New 15'-0" Truss Type Bracket Arm for Mounting on Existing Utility Wood Pole, See
	New Loop Detector, See Sheet E-24		Details on Sheet E—8, with Connection to HELCo Secondary Conductors
V-70-A	New Pedestrian Pushbutton Mounted on Traffic Signal Standard,	S	New Traffic Signal Conduit and Wiring
⊦⊙↓	See Sheet E-21		New Underground Electric Ductline
	New Pedestrian Pushbutton and Post, See Sheet E-21		New Underground Roadway Lighting Ductline
+⊙↓			New Underground Telephone Ductline
	Type III Traffic Signal Standard, with 8'-0" Bracket Arm and		New Underground CATV Ductline  Eviating Utility Overhead Lines
	180W Low Pressure Sodium Luminaire and with Traffic Signal		Existing Utility Overhead Lines  2' V 4' HTCo Pullbox Por HTCo Poquiroments and Approval
	Heads and Necessary Mounting Brackets, and Accessories (with 30' Mast Arm Indicated), See Details on Sheets E-19 and		2' X 4' HTCo Pullbox, Per HTCo Requirements and Approval
1/ype	Standard Plan Sheets TE-38, TE-38A.1 and TE-38A.2	$\int_{\Lambda}$	Electric / Signal Ductline with Designators; Items in Circle Indicates Duct Section Type, with Duct Complements noted Below (Type "A" Duct with 2-2"S Ducts Indicated); (E=Electric,
•	New Type I Traffic Signal Standard, See Plan for Height, See Detail on Sheets E-20 and Standard Plan Sheet TE-32	2-2S	T=Telephone, V=CATV, L=Roadway Lighting, S=Traffic Signal), See Sheet E-3 for Duct Section Details
-@>	CCTV Video Camera and Mounting Hardware, See Sheet E-25		
<b>-(€)</b> →	Video Detection Camera and Mounting Hardware, See Sheet E-26		
$\overline{} \triangleright$	New R-Y-G-G Arrow, See Plan for Arrow Direction, Provide Necessary Mounting Brackets and Accessories		

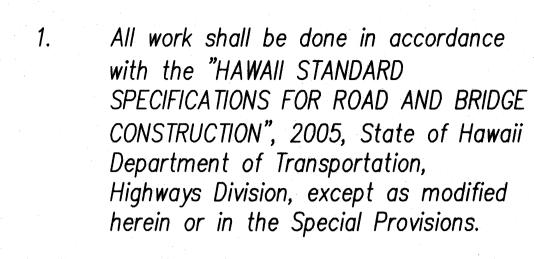
		LIAN
1	= Roadway Light & Pole Number	HA
2	= Pole Location, Station Number	
3	= Luminaire Arm Span in Feet	
4	= Pole Type, See Note Below	. /
5	= Light Circuit Voltage & Phase Connection	
6	= Luminaire Mounting Height above Pavement	
7	= Wattage	

<u>le Type Notes:</u>

pe A = Roadway Light Wood Pole

pe B = Utility Wood Pole

# TATE HIGHWAY LIGHT ID TAG INDICATOR LEGEND



FED. AID PROJ. NO.

HAW. HS-STP-011-2(38) 2010

FED. ROAD DIST. NO.

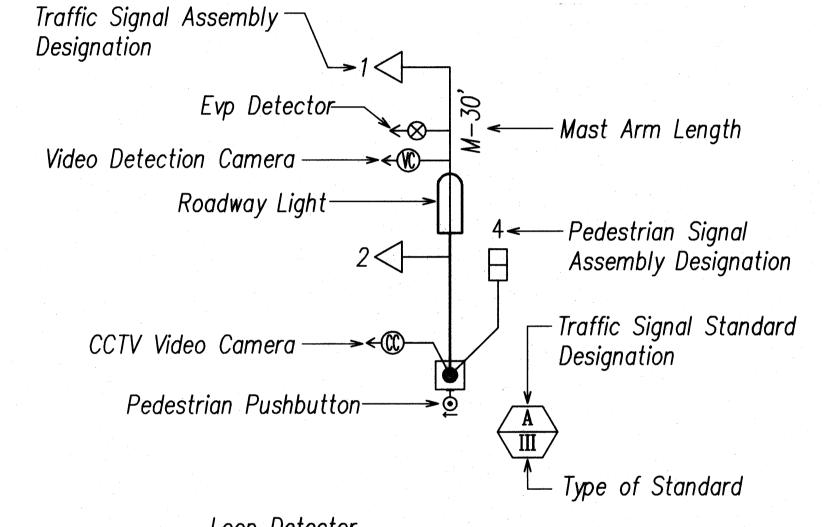
STATE

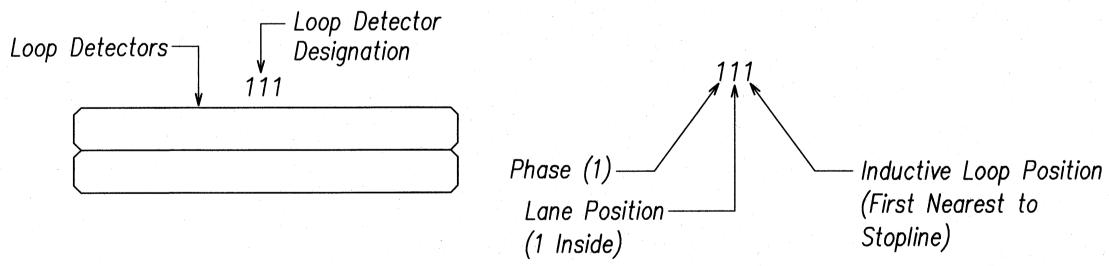
**GENERAL NOTES:** 

Contractor shall coordinate all work with Hawaii Electric Light Company.

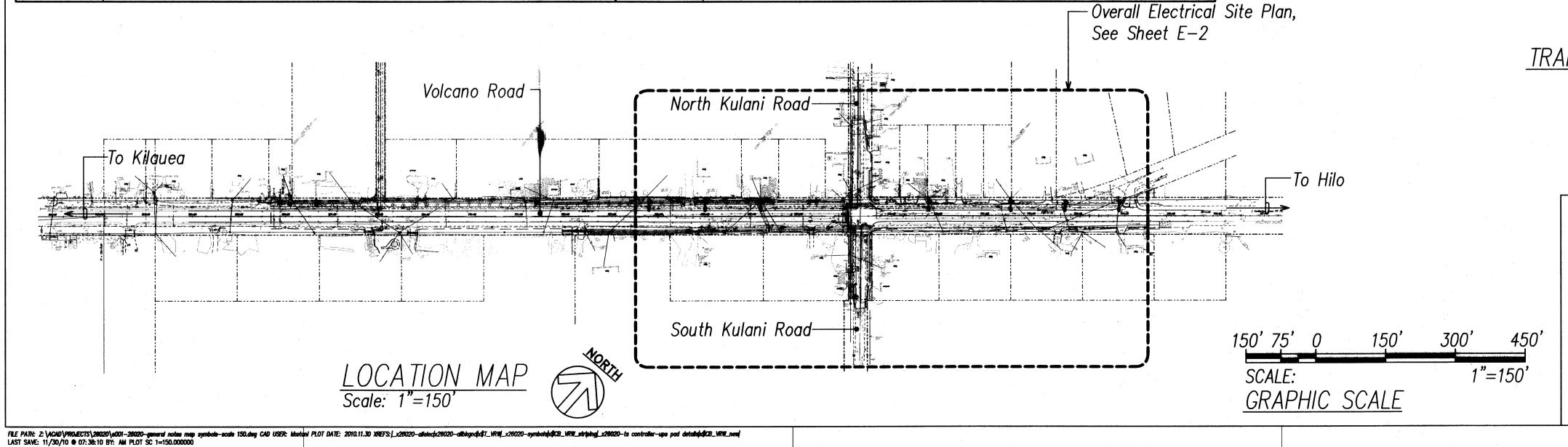
FISCAL SHEET TOTAL YEAR NO. SHEETS

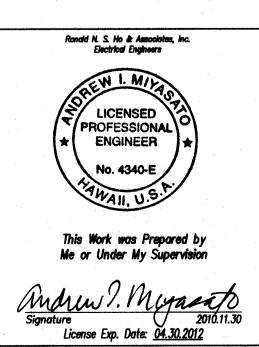
Provide polyolefin 200lb test pullcord in all empty condiuts, unless otherwise noted.





TRAFFIC SIGNAL SYSTEM LEGEND





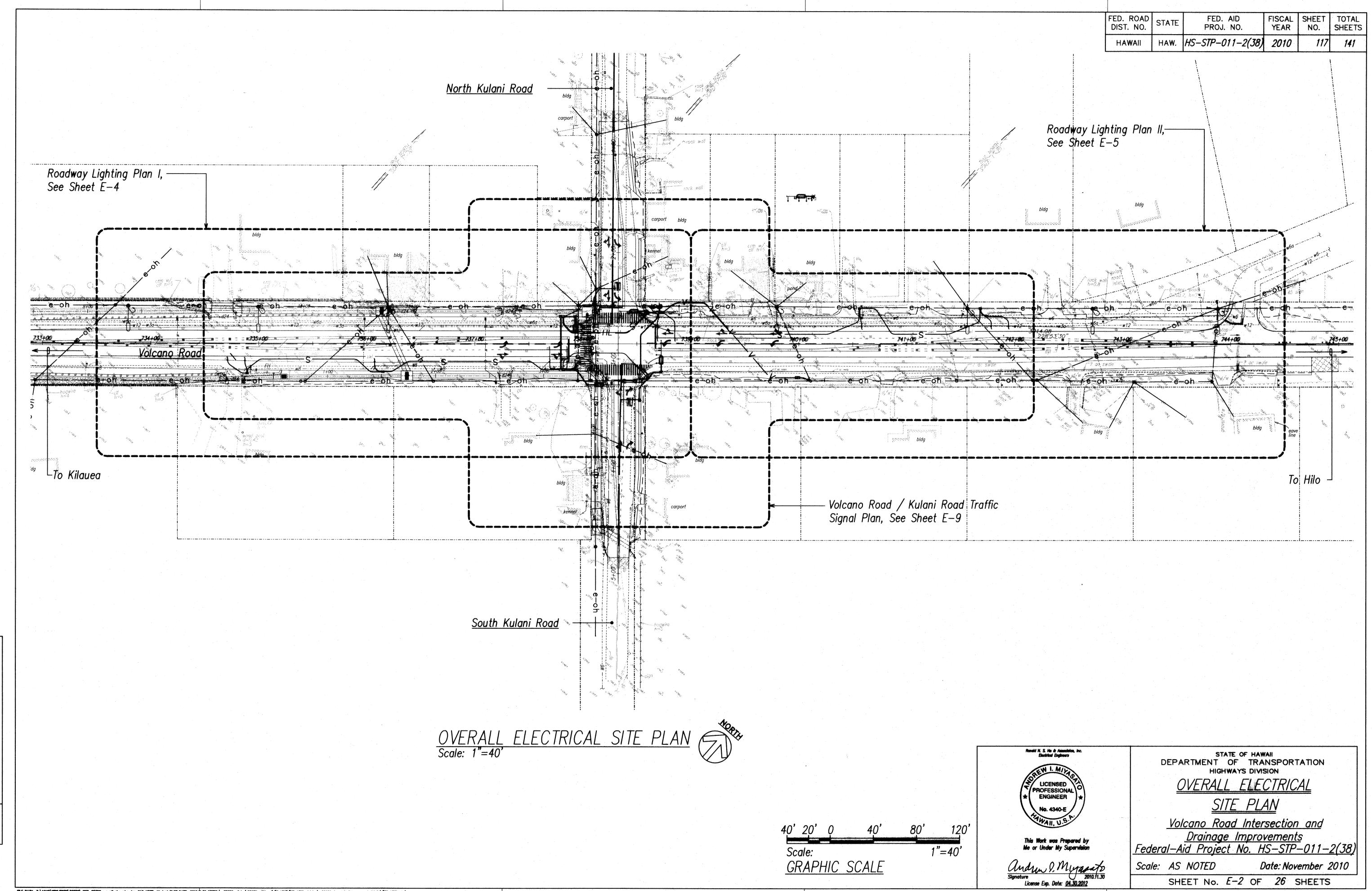
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION SYMBOLS, LOCATION MAP

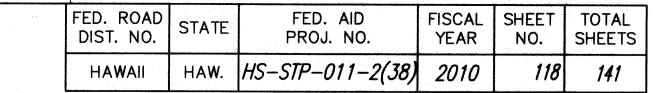
AND GENERAL NOTES

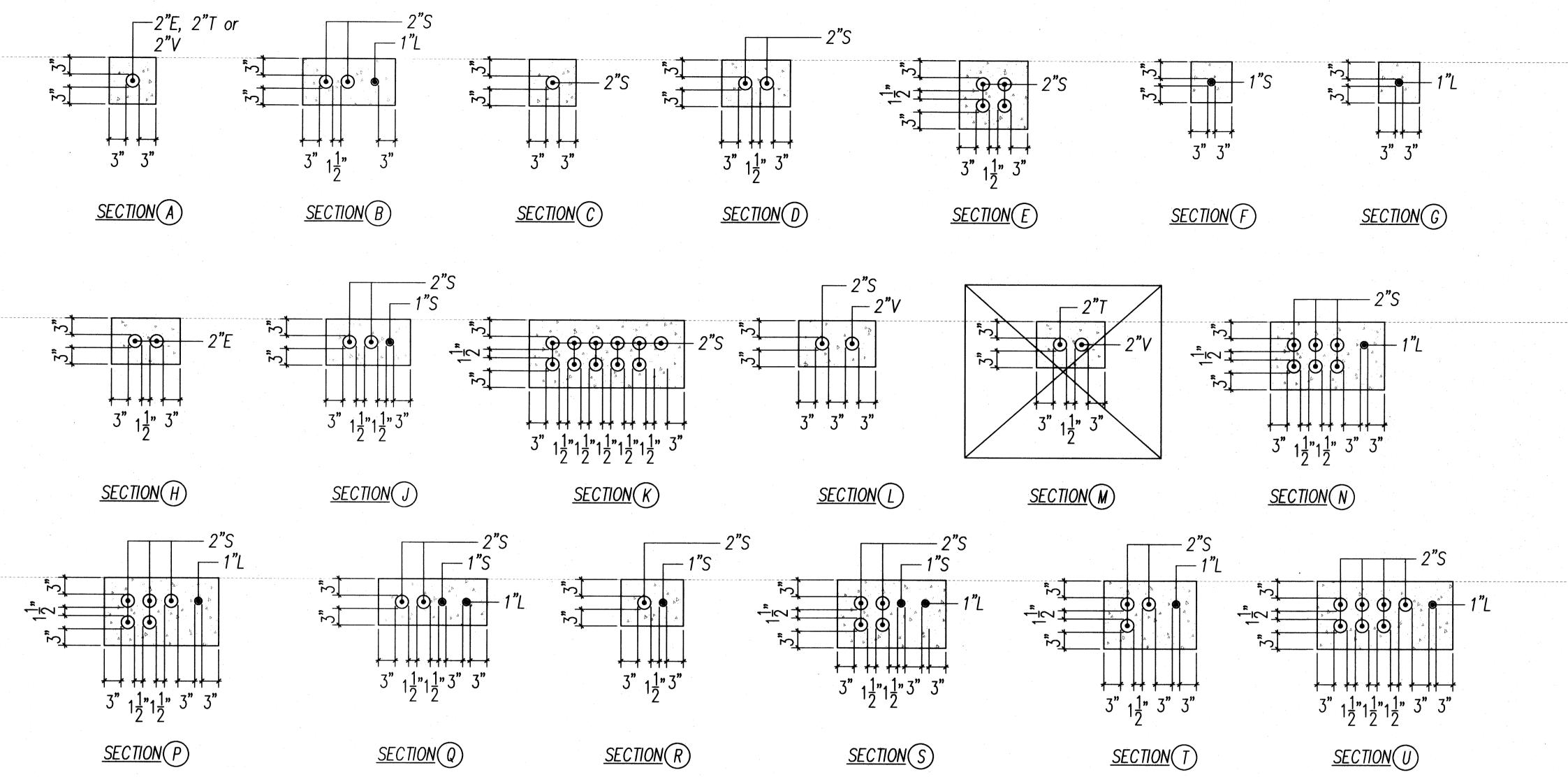
Volcano Road Intersection and <u>Drainage Improvements</u> <u>Federal-Aid Project No. HS-STP-011-2(38)</u>

Scale: AS NOTED

Date: November 2010 SHEET No. E-1 OF 26 SHEETS





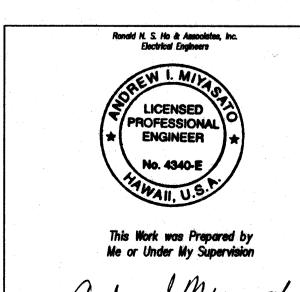


#### NOTES:

FILE PATH: 2:\ACAD\PROJECTS\28020\e003-28020-duct\_sections.dug CAD USER: Identumi PLOT DATE: 2010.11.30 XREFS:\\_x26020-duct\_sections\( \) LAST SAVE: 11/22/10 ● 08:20:49 BY: AM PLOT SC 1"=1"

- For Cable Data, See Sheet E-12.
- E=Electric, S=Traffic Signal, L=Roadway Light.
- 3. For Typical Duct Section Detail Requirements, See Standard Plan TE-36.
- Concrete Shall be 3000 PSI Compressive Strength @ 3 days.

DUCT SECTION DETAILS (CONCRETE ENCASED)
Not to Scale

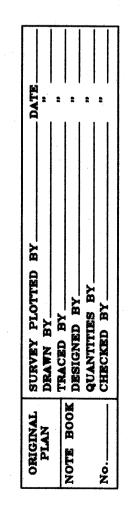


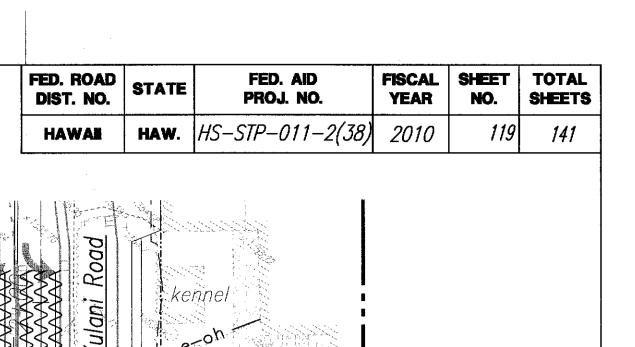
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION DUCT SECTION DETAILS AND REQUIREMENTS

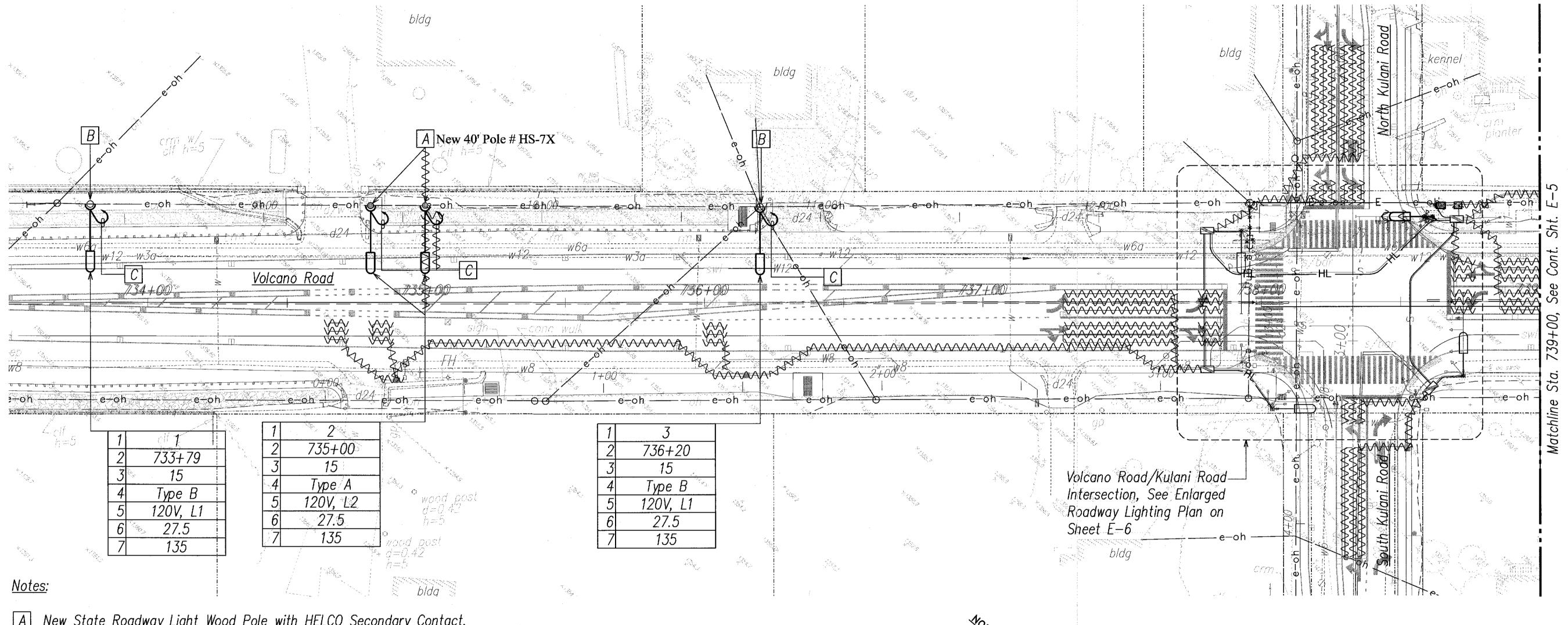
Volcano Road Intersection and

<u>Drainage Improvements</u> <u>Federal-Aid Project No. HS-STP-011-2(38)</u> Date: November 2010 Scale: AS NOTED

SHEET No. E-3 OF 26 SHEETS







A New State Roadway Light Wood Pole with HELCO Secondary Contact. Provide Roadway Light I.D. Tag per Detail 4/E-7.

B Existing Utility Wood Pole. Provide Roadway Light I.D. Tag per Detail 4/E-7.

 $\boxed{C}$  Connection to HELCO Secondary (Unmetered); See Diagram 3/E-7.

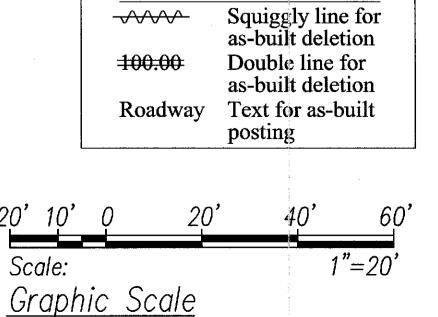
D Disconnect and Remove Existing Roadway Light Bracket Arm and Luminaire from Existing Utility Wood Pole, and Salvage.

E New State Roadway Light Luminaire and Bracket Arm Mounted on Type III Traffic Signal Standard per Detail 3/E—16.

F Underground Roadway Lighting Circuit, See Schedule on Sheet E-11 and One-Line Diagram on Sheet E-7.

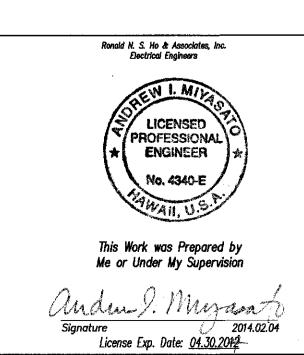






LEGEND FOR

**AS-BUILT POSTINGS** 



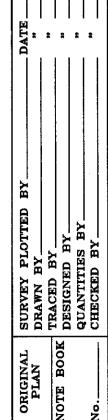
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ROADWAY LIGHTING PLAN

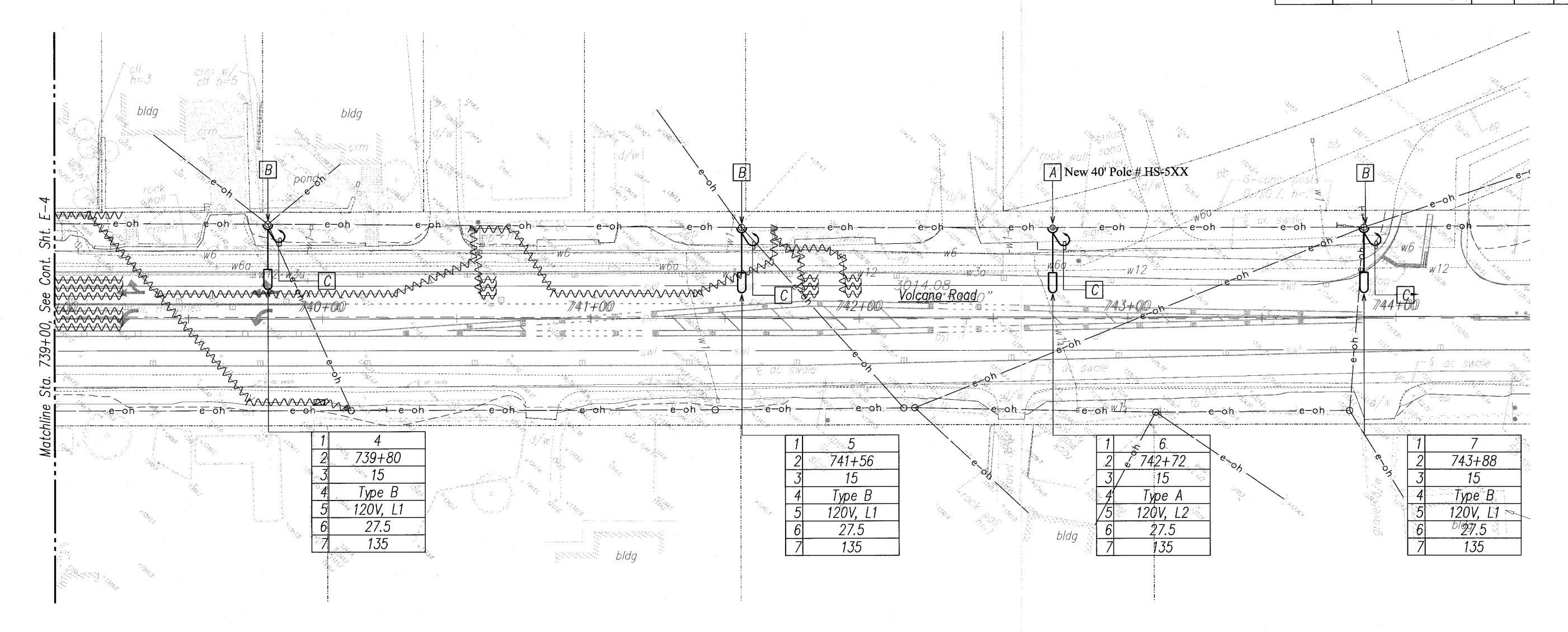
<u>Volcano Road Intersection and</u> <u>Drainage Improvements</u> <u>Federal—Aid Project No. HS—STP—011—2(38)</u>

Scale: AS NOTED Date: November 2010

SHEET No. E-4 OF 26 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HS-STP-011-2(38)	2010	120	141



#### <u>Notes:</u>

- A New State Roadway Light Wood Pole with HELCO Secondary Contact. Provide Roadway Light I.D. Tag per Detail 4/E-7.
- B Existing Utility Wood Pole. Provide Roadway Loght I.D. Tag per Detail 4/E-7.
- C Connection to HELCO Secondary (Unmetered); See Diagram 3/E-7.

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ROADWAY LIGHTING PLAN II Scale: 1"=20'

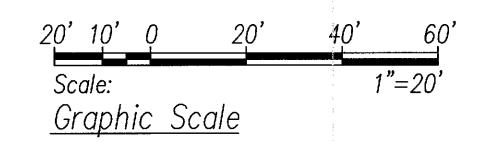


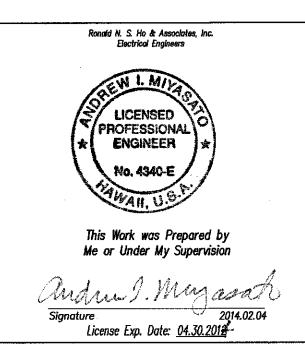
# LEGEND FOR AS-BUILT POSTINGS

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100.00
Double line for as-built deletion

Roadway
Text for as-built posting





STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ROADWAY LIGHTING PLAN //

Volcano Road Intersection and

<u>Drainage Improvements</u>

<u>Federal-Aid Project No. HS-STP-011-2(38)</u>

Scale: AS NOTED Date: November 2010 SHEET No. E-5 OF 26 SHEETS

"AS-BUILT"

PLAN

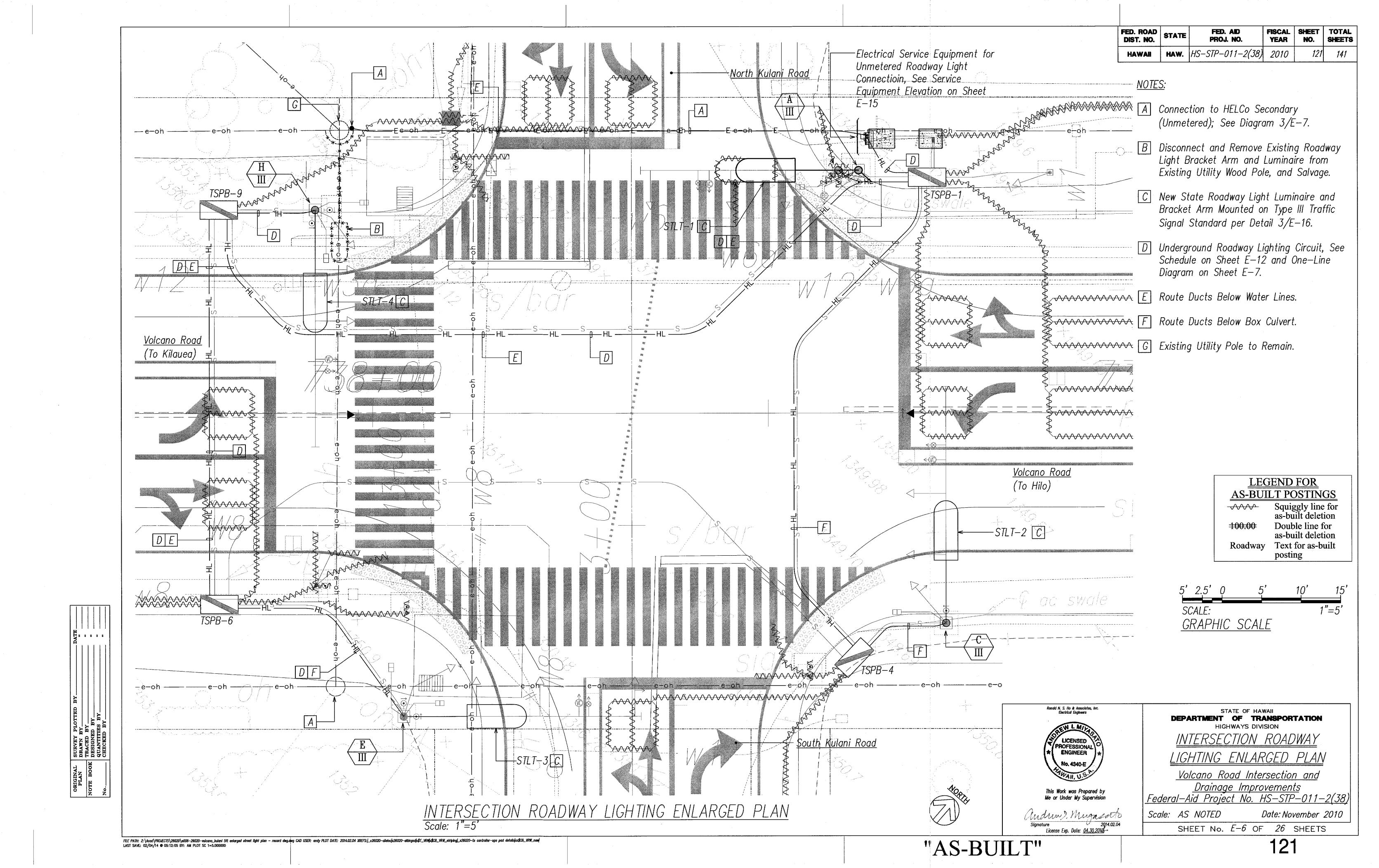
OTE BOOK

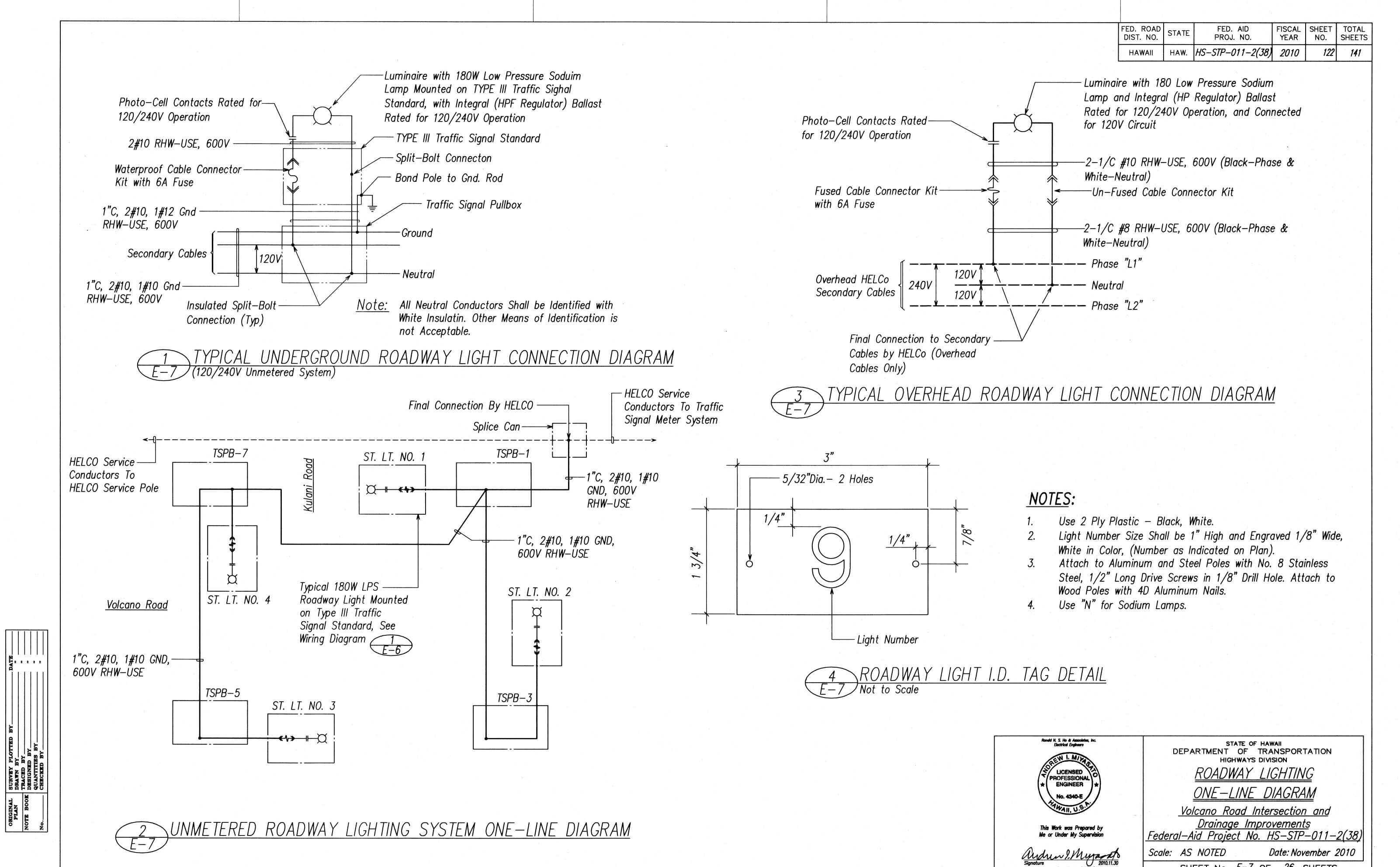
PESIGNED BY

QUANTITIES BY

CHECKED BY

CHECKED BY

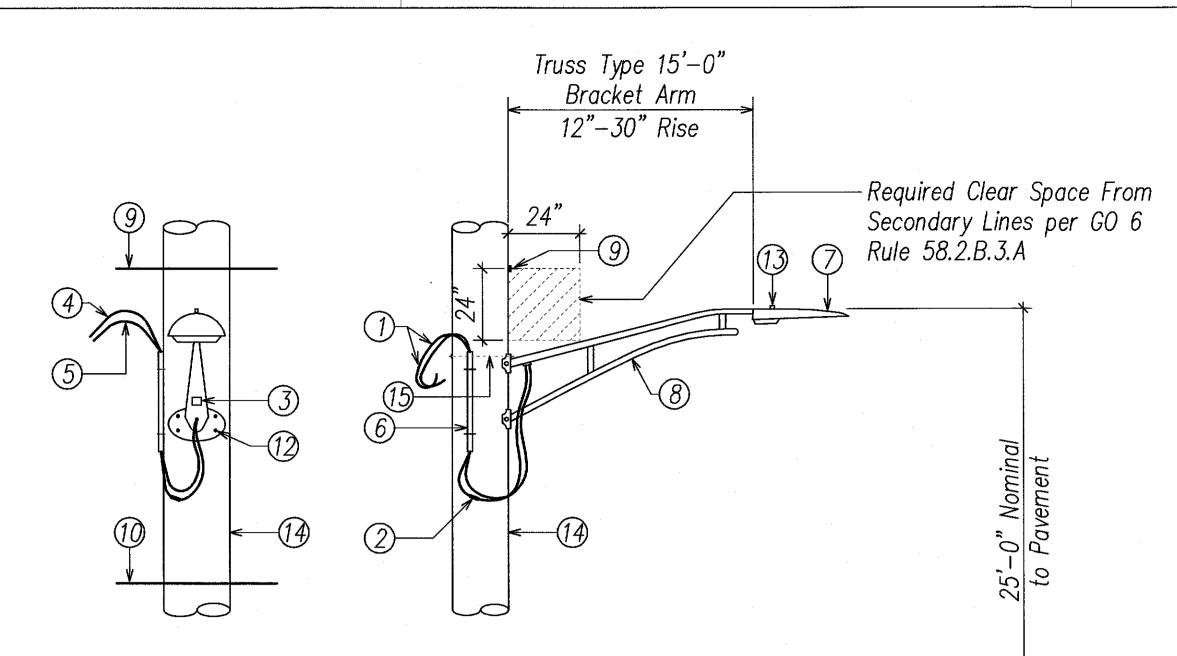




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122

SHEET No. E-7 OF 26 SHEETS

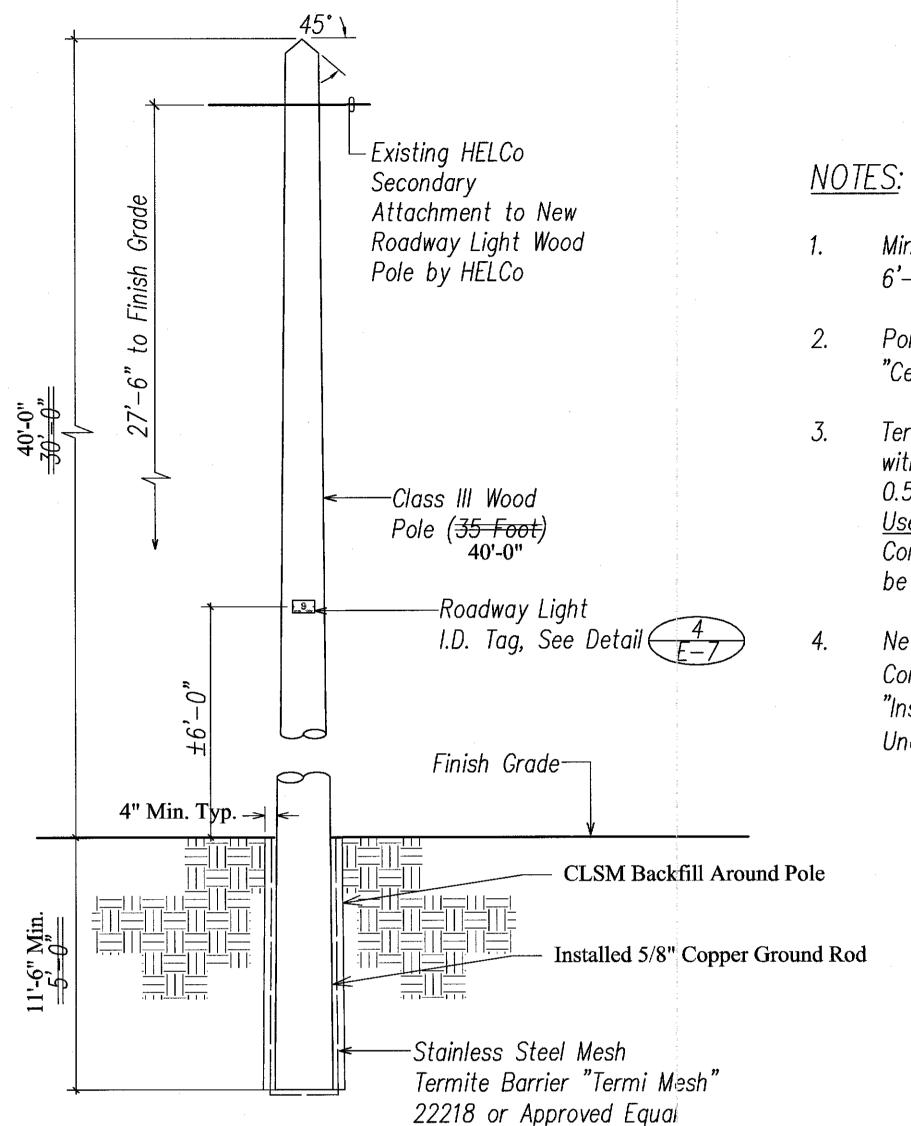


- No. 12 AWG-RHW, Black and White Copper Wire.
- In-Line Fuse Holder and Fuse (6 Amp) for No. 12 AWG Copper Wire on Load Side.
- 2" x 2" Reflectorized Green Sticker, Signifying that Street Lights are Bonded.
- No. 10 AWG-RHW Black, Single Conductor Copper Wire, Minimum 3'.
- No. 10 AWG-RHW White, Single Conductor Copper Wire, Minimum 3'.
- 3/4" Schedule 80 PVC with Conduit Straps.
- 180W Low Pressure Sodium Luminaire.
- 15'-0" Tapered Elliptical Alluminum Truss Arm.
- Secondary by HELCo on Existing HELCo Wood Utility Pole or New Roadway Light Wood Pole.
- HTCo Lines.
- Machine Bolt, 5/8" x Required Length.
- Lag Screw, 1/2" x 4".

FILE PATH: Z:\Acad\PROJECTS\26020\8008-26020-highway light details i - record dwg.dwg CAD USER: andy PLOT DATE: 2014.02.04 XREFS:\\_x26020-st It details LAST SAVE: 02/04/14 0 05:12:33 BY: AM PLOT SC 1'-0"=1'

- Photocell.
- Existing Joint Utility Pole or New Roadway Light Pole. Provide Roadway Light I.D. Tag Per Detail 4/E-7.
- Thru Bolt Mounting per Truss Arm Manufacturer's Recommendation.

1	ROADWAY	LIGHTING	OVERHEAD	WIRING	INSTALLATION
E-8	Not to Scale				



FISCAL SHEET TOTAL YEAR NO. SHEETS FED. ROAD STATE FED. AID PROJ. NO. HAWAII HAW. HS-STP-011-2(38) 2010

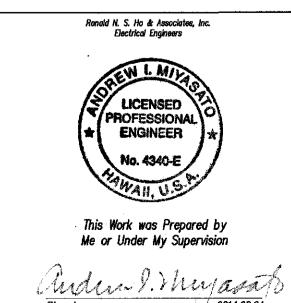
- Minimum Top Circumference is 23" Minimum Circumference at 6'-0" from Butt is 34".
- Pole Shall be Treated with Pentachlorophenol Using the "Celon" Process, by a Licensed Termite Treatment Company.
- Termite Treat the Bottom of the Hole and Backfill Material with Aqueous Chemical Solution Consisting of 0.5% Aldrin or 0.5% Dursban. Minimum <u>5 Gallons of the Solution shall be</u> <u>Used</u> 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.
- New and Existing Wood Poles Affected by This Project Shall Comply with "Hawaii Administrative Rules Chapter 6-73 "Installation, Operation, and Maintenance of Overhead and Underground Electrical Supply and Communication Lines".

ROADWAY LIGHTING WOOD POLE INSTALLATION DETAIL

#### LEGEND FOR AS-BUILT POSTINGS

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as-built deletion Roadway Text for as-built posting



ture 2014.02.04 License Exp. Date: <u>04.30.2012</u>

STATE OF HAWAII

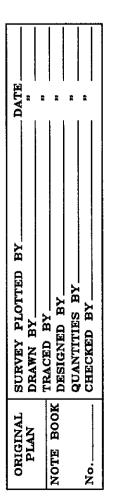
DEPARTMENT OF TRANSPORTATION

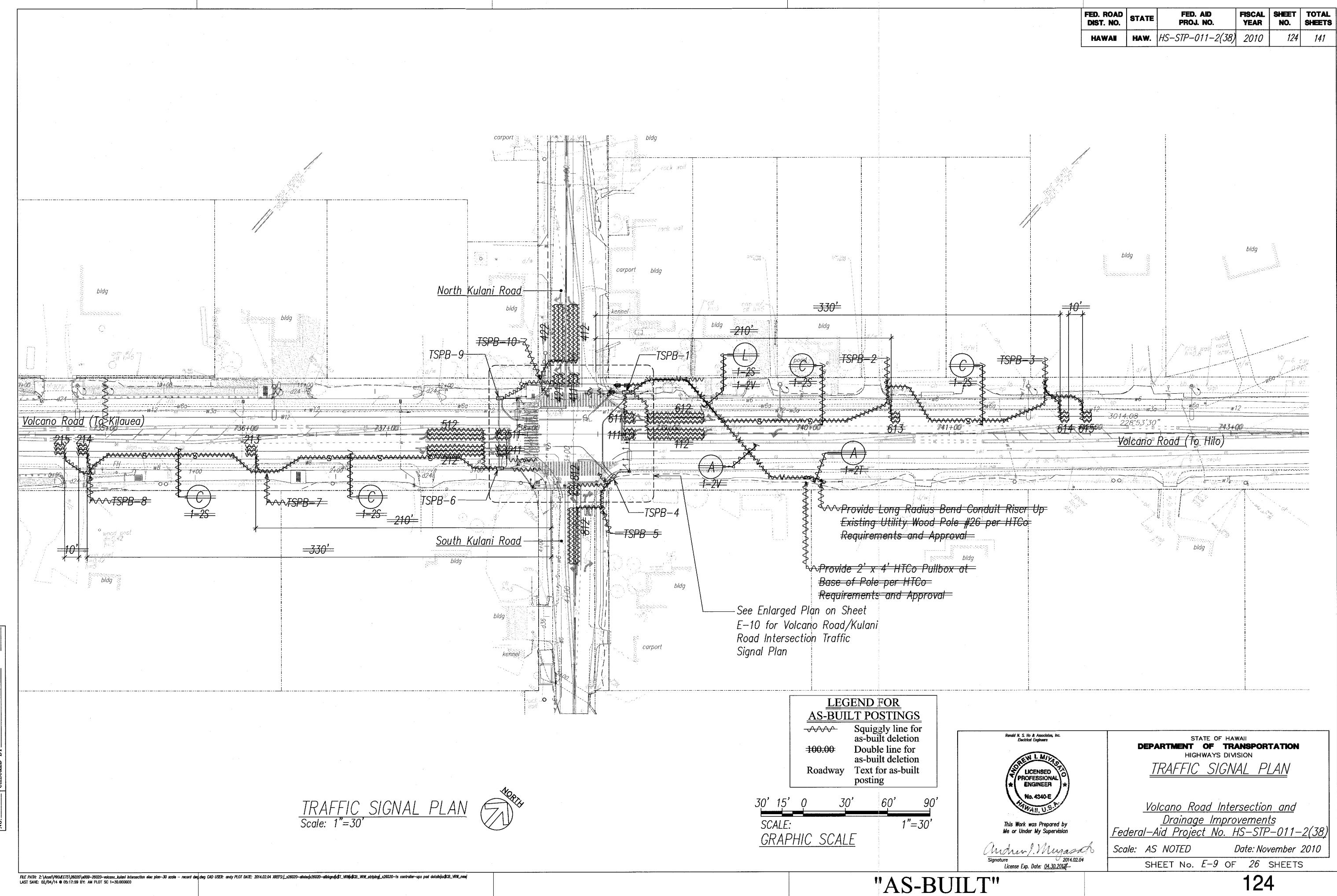
HIGHWAYS DIVISION ROADWAY LIGHTING <u>DETAILS</u> [

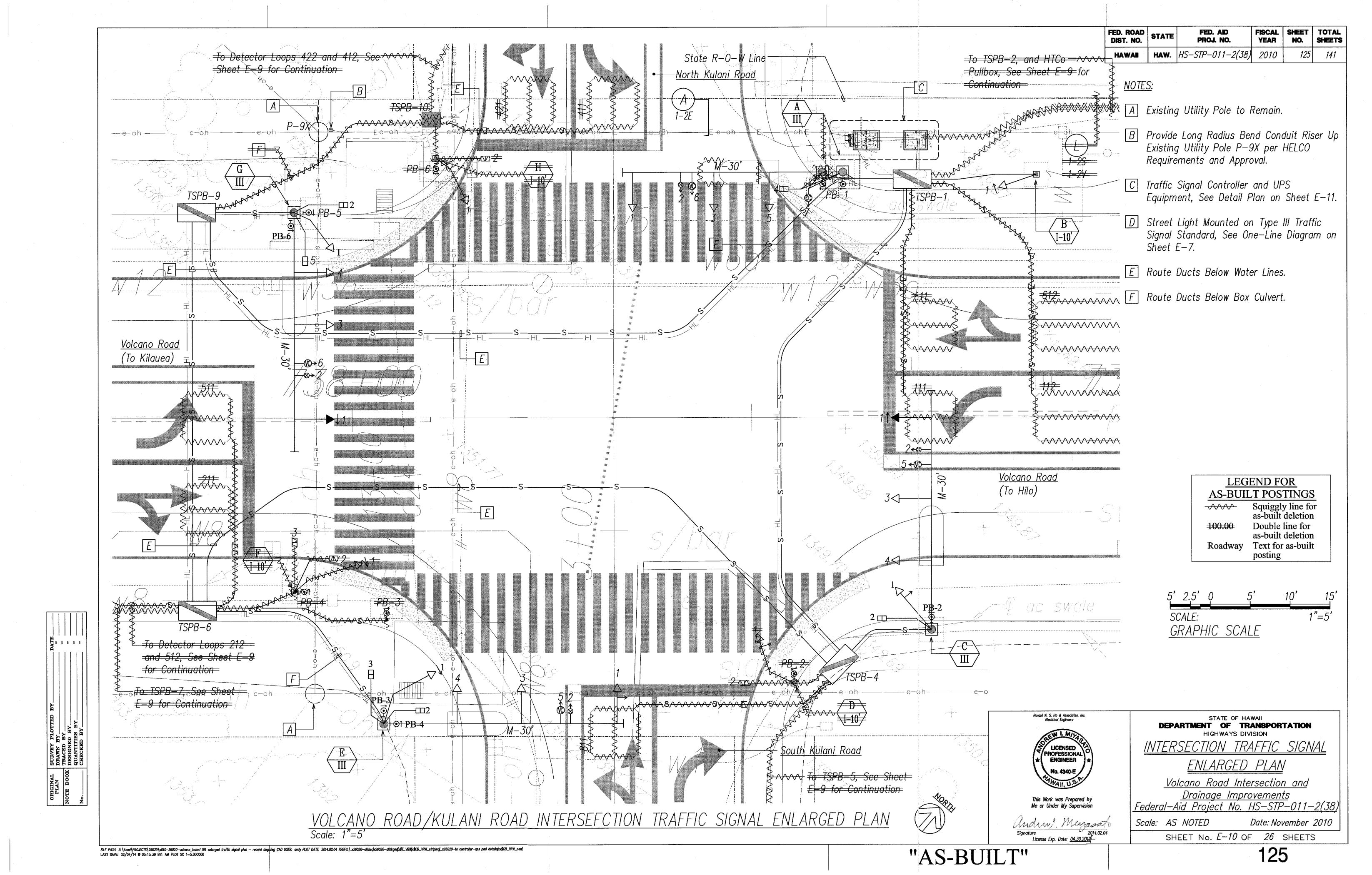
Volcano Road Intersection and <u>Drainage Improvements</u> Federal-Aid Project No. HS-STP-011-2(38)

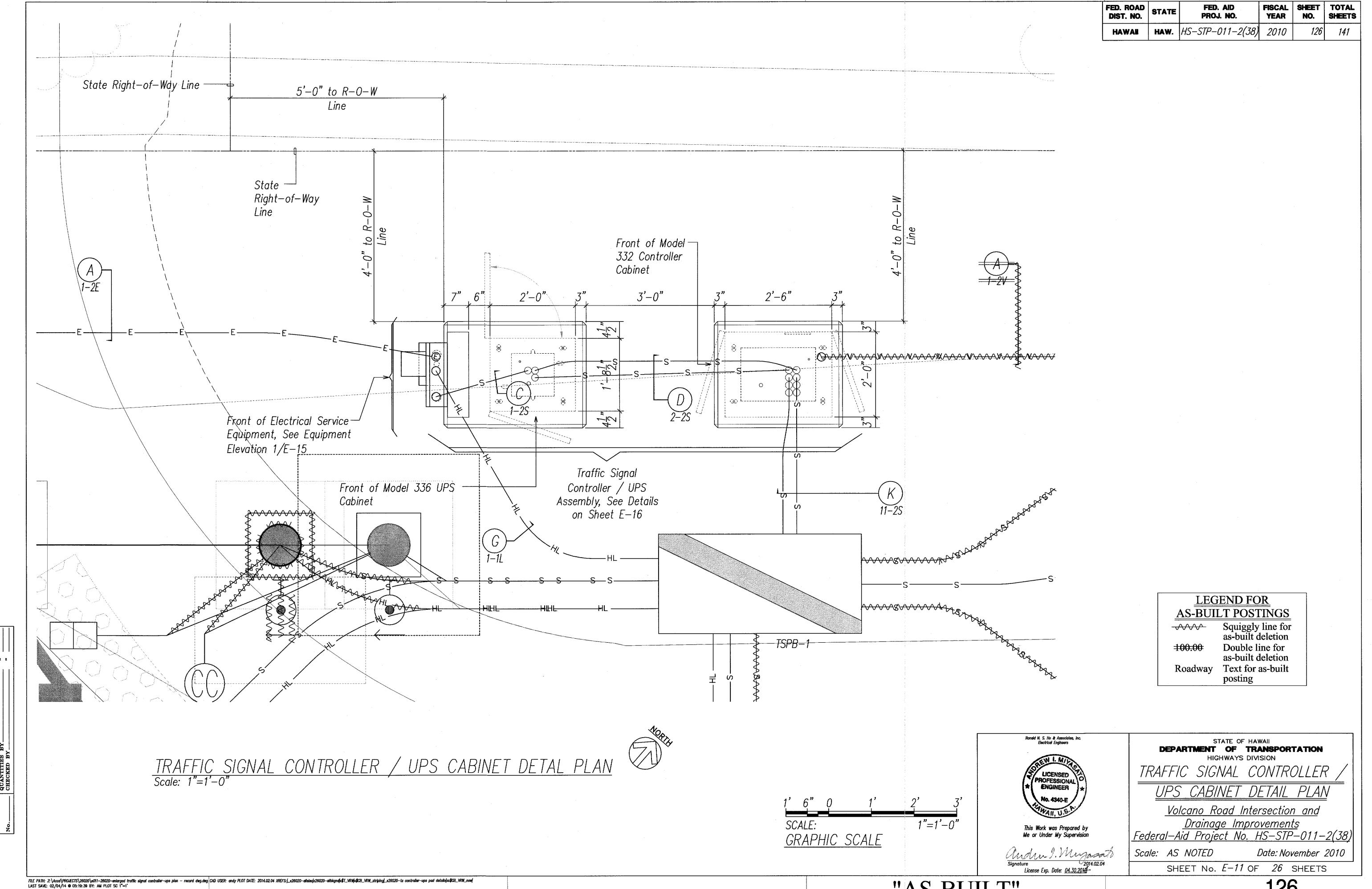
Scale: AS NOTED Date: November 2010

SHEET No. E-8 OF 26 SHEETS





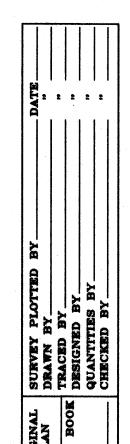




"AS-BUILT"

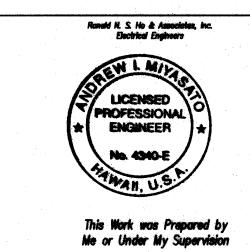
 FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR		
HAWAII	HAW.	HS-STP-011-2(38)	2010	127	141

			Main (	Control	Signal	Control			Dete	ctors		0pt	icom	HELC	O Svc.	Po	wer	High	way Light	CA	TV Svc	Video D	et. Camera	CCTV	Camera	-#-		
	T	0"0	Ca	bles	0"0	Cables		Condui	it .	Cond	luctors	0"0		0"0		0"0								-"-		2"C	Duct	
From	То	2 C	26/C	bles 9/C	2 C	Cables 4/C	1"C		2"C			2°C	Pre- Empt	2°C	Cond.	2°C	Cond.	1"0	C Cond.	2"C	Cables	2"C	Cables	2"C	Cables (S	pare)		Remarks
						/	PED	2"C PED	VEH.	2/C #16	VEH. 2/C #16		Empt		3#2			,									Туре	
P-9X	Splice Can			-						<i>, , , ,</i> , , , , , , , , , , , ,	' "			1				1								-	A	HELCO Service
Splice Can	Meter															1	3#2											HELCO Service
Meter	UPS	<del>(n. 111)</del>				1										1	3#4,1#4G	,									Δ	UPS Power
UPS	Controller	· · · · · · · · · · · · · · · · · · ·											:				3#4,1#4G							2.0		d de la companya de	H	Controller Power/Comm. Power
Controller	TSPB-1	1	1	1				1	7	7	20	1	1			<u> </u>						2	1	1	1	2	K	Controller Towery Continue Tower
Splice Can	TSPB-1	· · · · · · · · · · · · · · · · · · ·						1		J	20		7			·		1	2#10,1#10G				7	<i>,</i>			^	
TSPB-1	TSPB-2					<u> </u>			1		7								2#10,1#100	Karan ( * ) yangan						····	<i>C</i>	
TSPB-1	TSPB-4	1	1	1				1	2	4	9	1	2					1	2#10,1#10G			1	2			1	11	
	<del> </del>	1	1 1	1				1	1	7	9	1	1			· · · · · · · · · · · · · · · · · · ·		1	2#10,1#100			1	1			1	U	
TSPB-1	TSPB-9			1	4	7	1	<u> </u>	• 1		4	1	1					1	2#10,1#10G	·	<b>.</b>	1	1		1	1	N	
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	LD-612&112								1		2																C	
TSPB-4	TSPB-5								1		1									. , , .							C	
	TSPB-6	1	1	1				1.	1	1	7	1	1					1	2#10,1#10G			1	1			1	N	
TSPB-4	С	N tanker with a transfer			1	2						1	1					1	2#10,1#10G			1	1				T	
TSPB-4	D				1	2	1			1																	R	
TSPB-4	LD-811	la bia Evina				,			1		1														kan na mana na		С	
TSPB-6	TSPB-7								1		3			-													С	
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TSPB-6	Ε				1	2						1	1			· · · · · · · · · · · · · · · · · · ·		1	2#10,1#10G	<del></del>		1	1	-		- <u> </u>	T	
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TSPB-7	LD-213								1		1																U	
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TSPB-8	LD-214	· · · · · · · · · · · · · · · · · · ·							1		1					1											C	
TSPB-8	LD-215								1		1																C	
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		ing the state of t						-																	,	• •		
Utility Pole	<del> </del>																			1	Pullcord						A	For Oceanic Time Warner Cable Svc
Pullbox	Controller									-										1	Pullcord						A	For Oceanic Time Warner Cable Svc
																				<del>a a a a a a a a a a a a a a a a a a a </del>								



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TRAFFIC SIGNAL CABLE SCHEDULE



Signature 2010.11.30
License Exp. Date: 04.30.2012

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION CABLE SCHEDULE

Volcano Road Intersection and

<u>Drainage Improvements</u>

Federal-Aid Project No. HS-STP-011-2(38)

Scale: AS NOTED SHEET No. E-12 OF 26 SHEETS

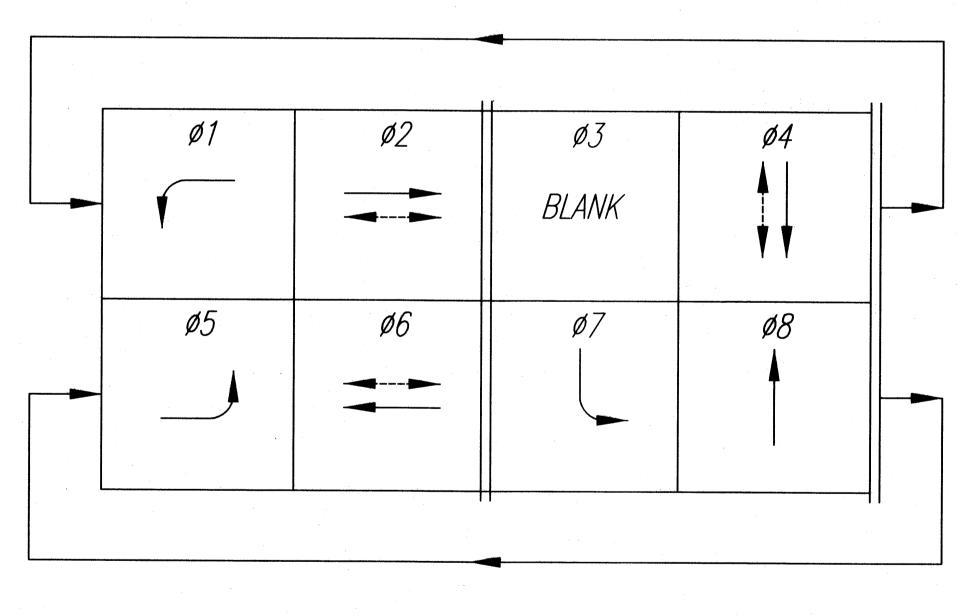
Date: November 2010

FED. ROAD DIST. NO.	STATE		FISCAL YEAR		TOTAL SHEETS
HAWAII	HAW.	HS-STP-011-2(38)	2010	128	141

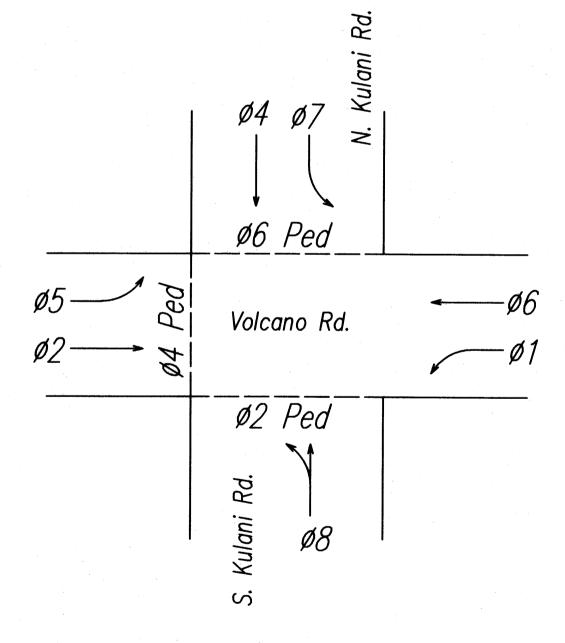
TRA	FFIC SIGNAL	HEAD SCHEL	DULE							
SYMBOL		<b>─</b>	<b>→</b>	<b>→</b>		<b>—</b> ₩	Ŭ,		<b>-</b> ₩→	<b>-</b> ₩>
SIGNAL HEAD TYPE	R *** Y *** G ***	*** *** **	* *** *** *** ***	R ***  Y ***  G ***  ***	Pedestrian Signal Head	Opticom Head	Pedestrian Push Button	Pedestrian Push Button	CCTV Camera	Video Detection Camera
DESIGNATOR	A-1 A-3 E-3 A-5 E-4 C-3 G-3 C-4 G-4 H-1	B-1 F-1	C-1 G-1	D-1 E-1	A-4 G-5 D-2 H-2 F-2 F-3	A-2 C-2 E-2 G-2	PB-1 PB-3 PB-5	PB-2 PB-4 PB-6	A-7	A-6 C-5 E-5 G-6

#### <u>Traffic Signal Head Schedule Notes:</u>

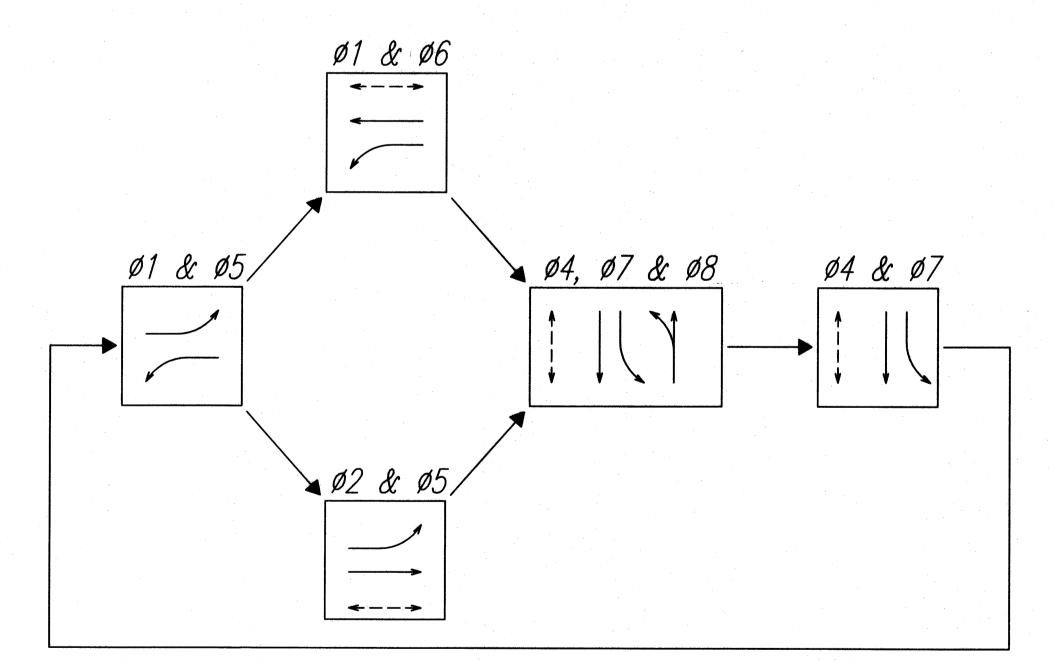
- Programmed Visibility Head
- Fiber Optic Arrow
- LED Ped Signal with Countdown Timer







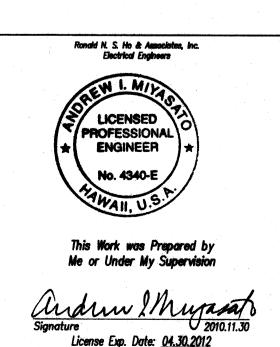
PHASE ASSIGNMENTS



PHASING SEQUENCE DIAGRAM

# NEW PHASE SEQUENCE DIAGRAMS

Model 170 Controller Model 332 Cabinet



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL HEAD SCHEDULE,

LEGEND, PHASE DIAGRAM

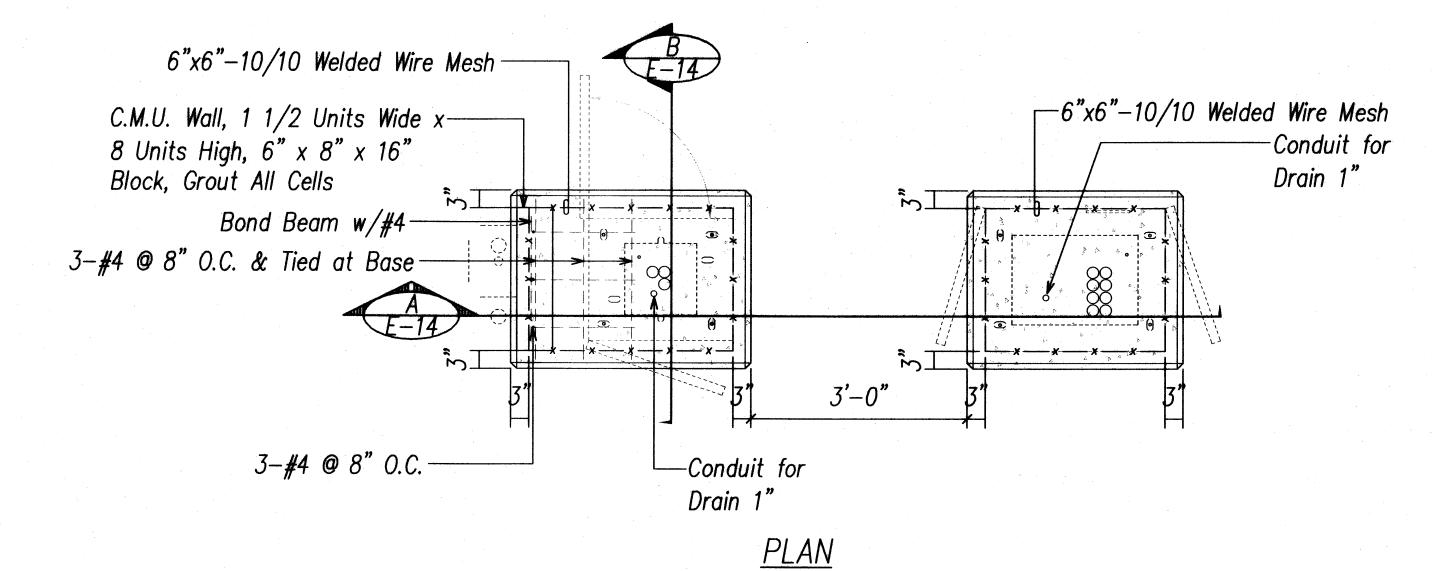
Volcano Road Intersection and <u>Drainage Improvements</u> Federal-Aid Project No. HS-STP-011-2(38)

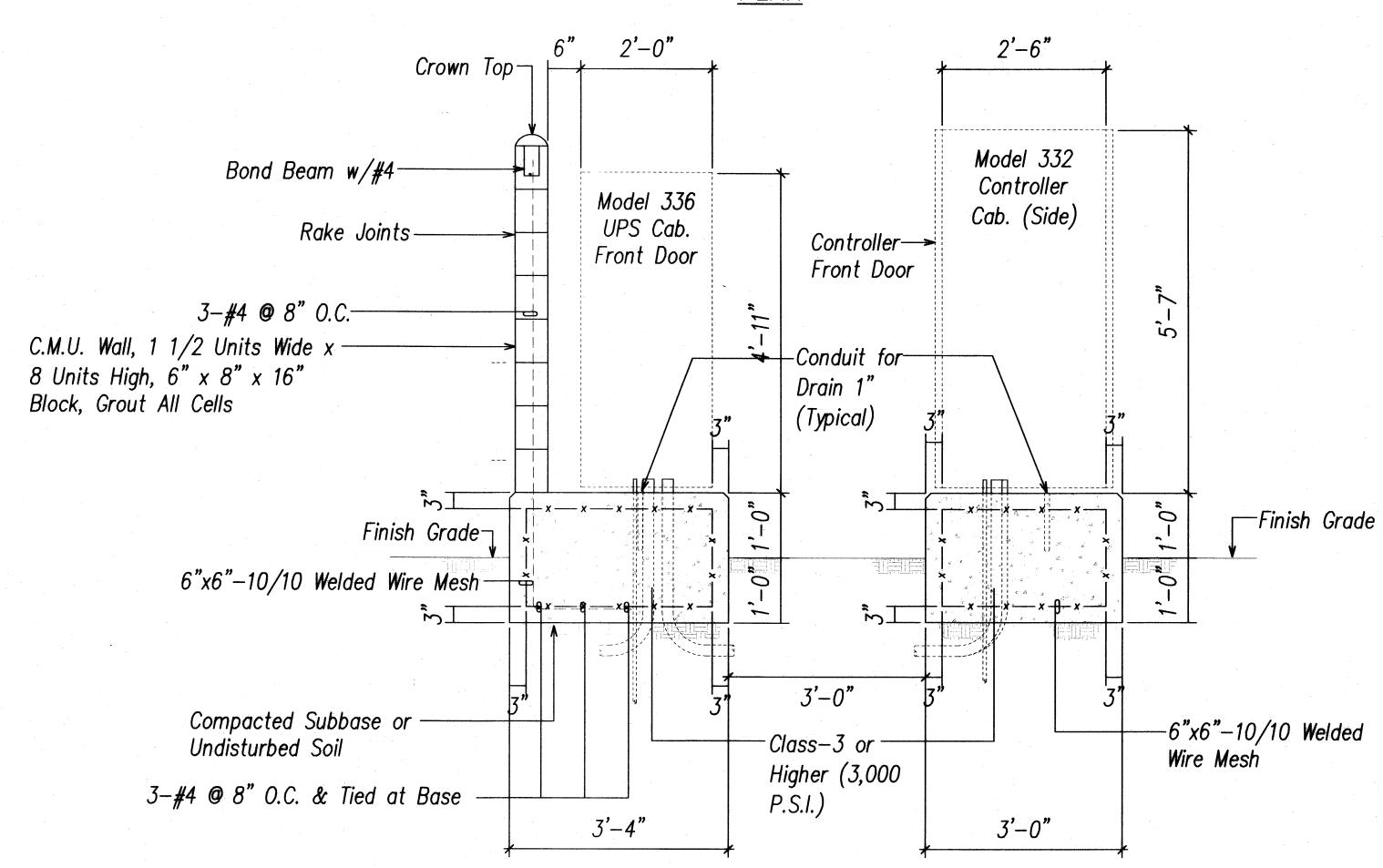
Scale: AS NOTED

Date: November 2010

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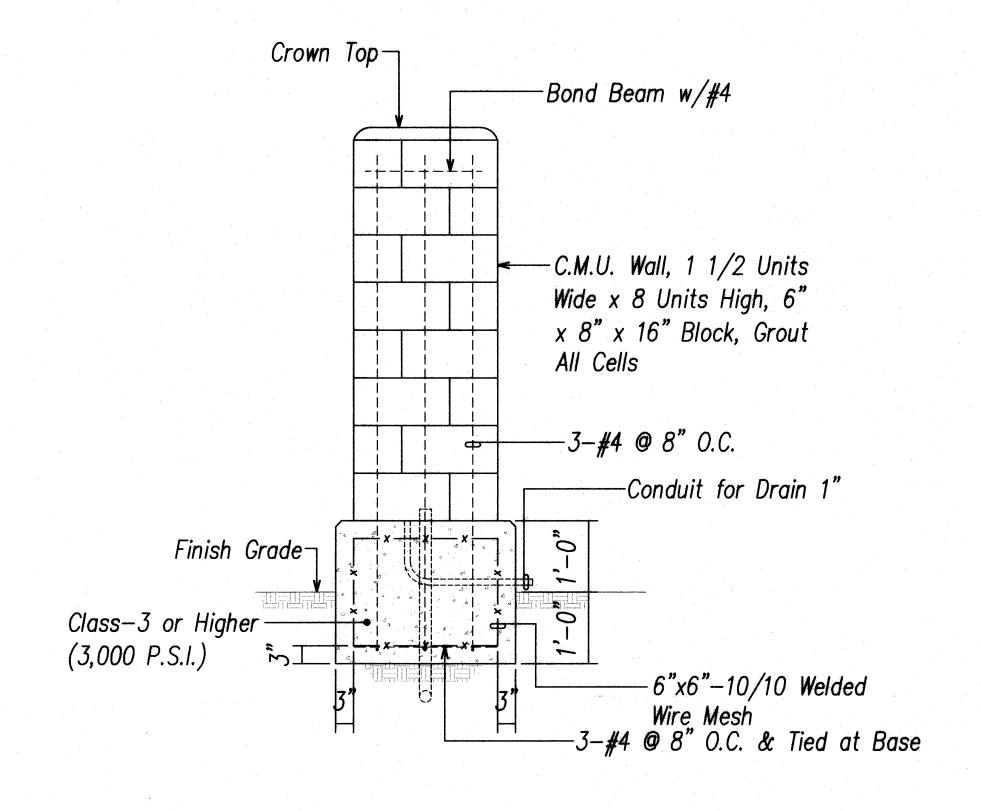
FISCAL SHEET TOTAL YEAR NO. SHEETS FED. ROAD DIST. NO. FED. AID PROJ. NO. HAW. HS-STP-011-2(38) 2010







1 CONTROLLER/UPS ASSEMBLY FOUNDATION DETAILS E-14 Not To Scale







Signature 2010.11.30

License Exp. Date: <u>04.30.2012</u>

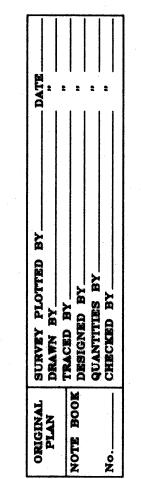
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION TRAFFIC SIGNAL

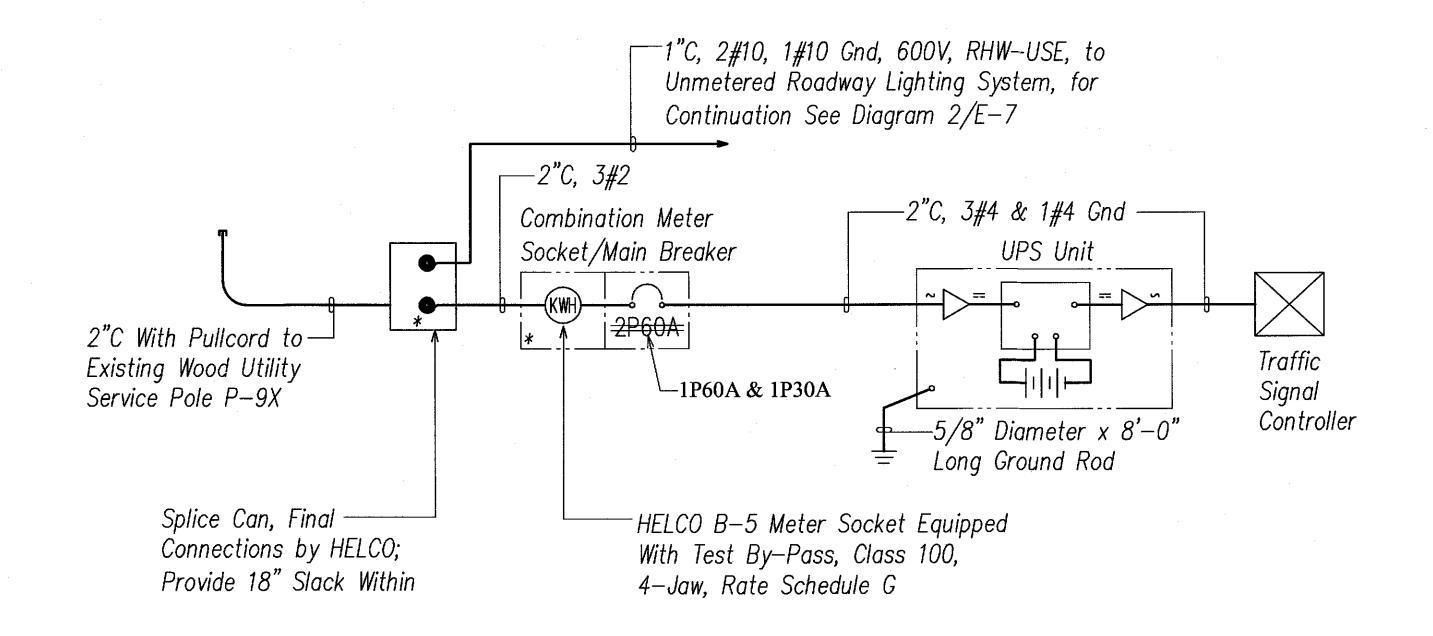
DETAILS I

Volcano Road Intersection and

<u>Drainage Improvements</u> Federal-Aid Project No. HS-STP-011-2(38) Scale: AS NOTED Date: November 2010

SHEET No. E-14 OF 26 SHEETS





### <u>Note:</u>

\* Indicates Provisions for HELCo Seal.

# SERVICE DATA:

Service Voltage:

120 / 240 Volts; Single Phase; Three Wire

Load Data:

Connected = 10 KVAEstimated Demand = 10 KVA

Service Conductors:

3 No. 2

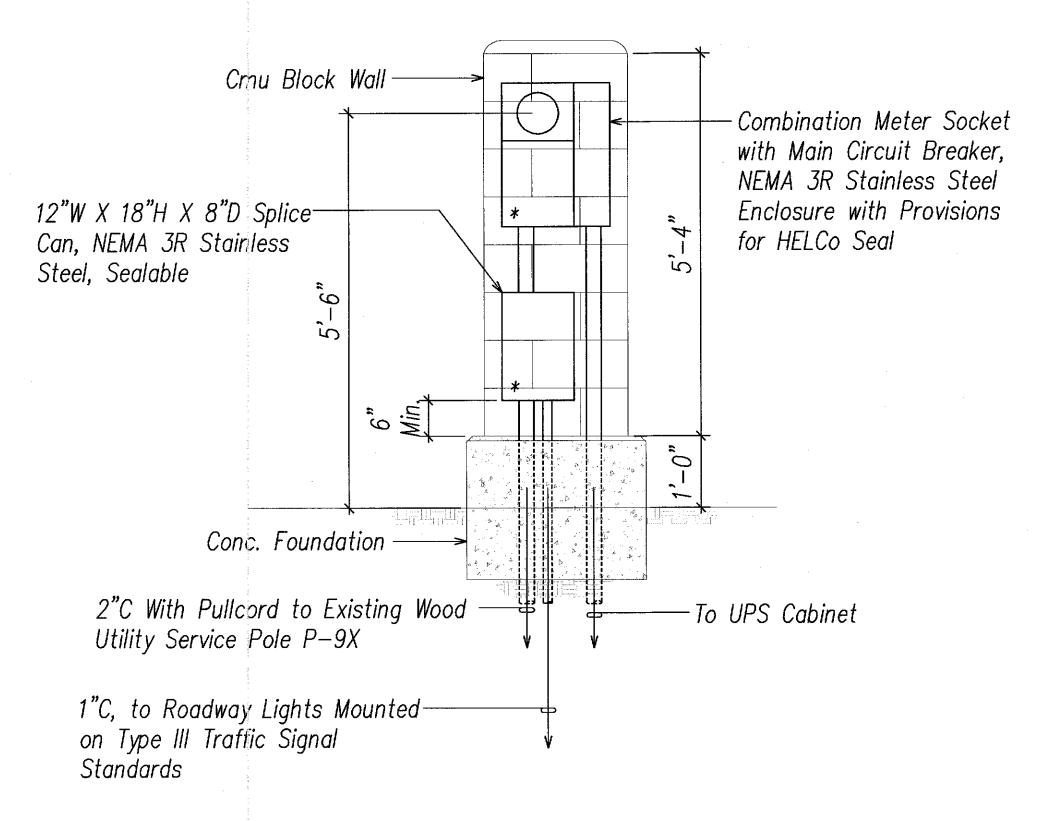
Metering:

HELCO Std. B-5; RATE G

Billing Information:

Underground Hawaii State Department of Transportation

TRAFFIC SIGNAL SYSTEM ONE-LINE DIAGRAM

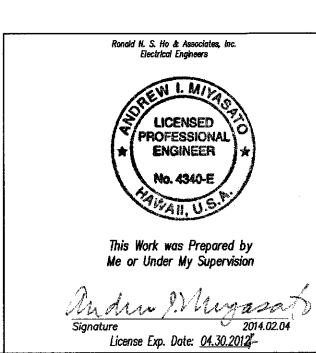




#### **LEGEND FOR** AS-BUILT POSTINGS

Squiggly line for as-built deletion Double line for as-built deletion

Roadway Text for as-built posting



STATE OF HAWAII

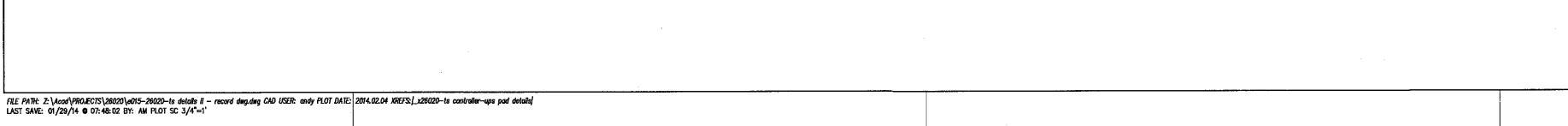
DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

TRAFFIC SIGNAL <u>DETAILS II</u>

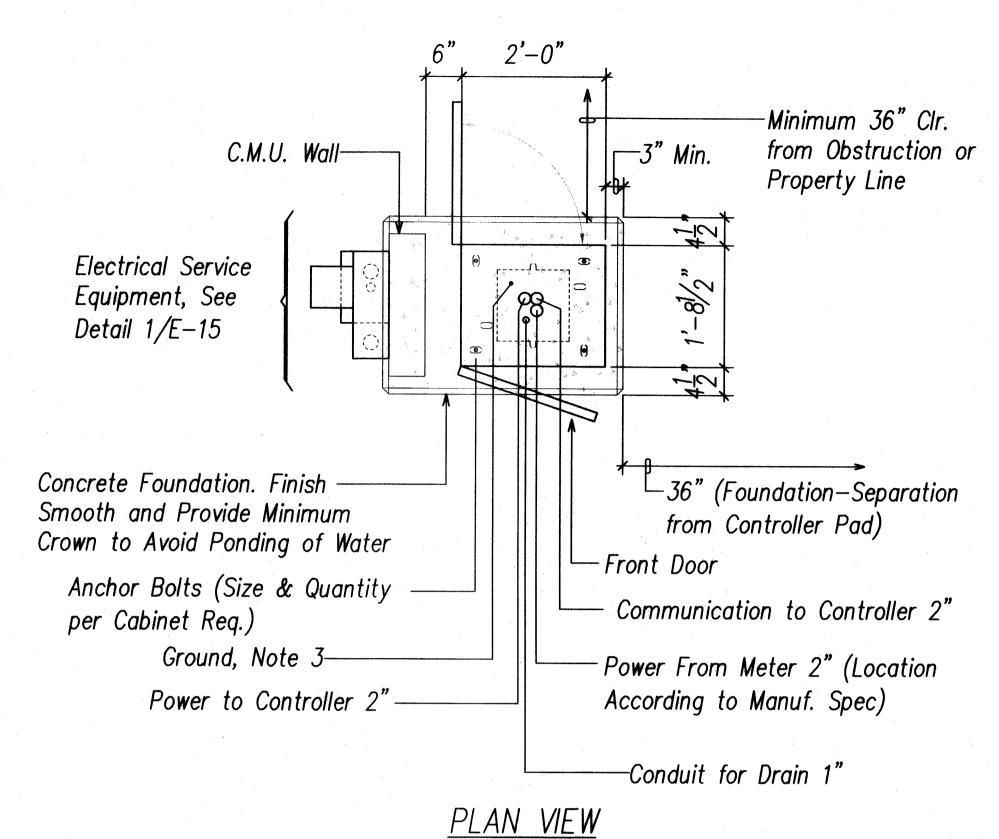
Volcano Road Intersection and <u>Drainage Improvements</u> <u>Federal-Aid Project No. HS-STP-011-2(38)</u>

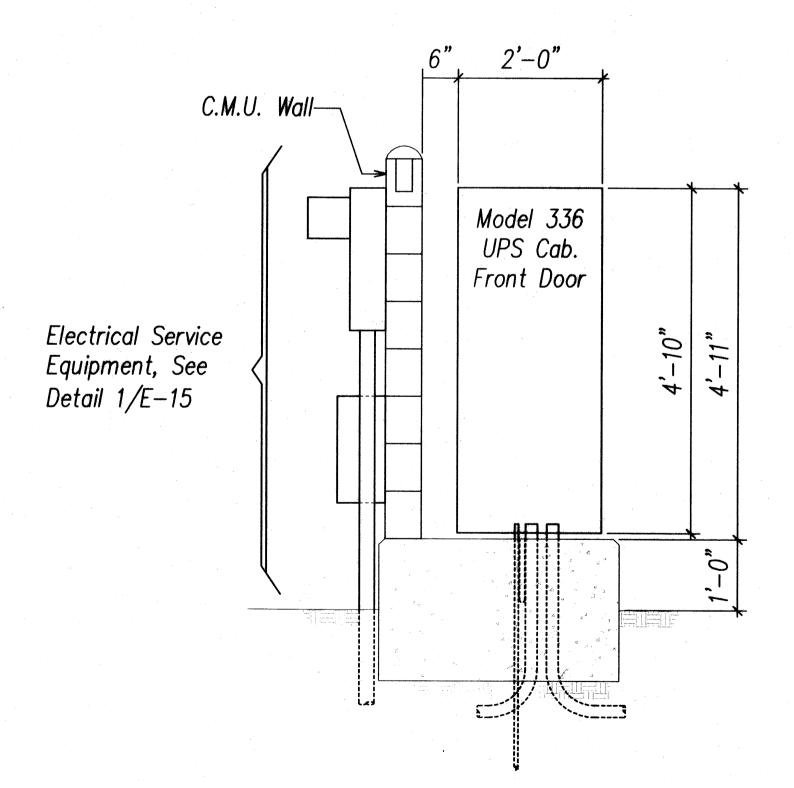
Scale: AS NOTED

Date: November 2010 SHEET No. E-15 OF 26 SHEETS



FED. ROAD DIST. NO. FED. AID PROJ. NO. FISCAL SHEET TOTAL YEAR NO. SHEETS STATE HAW. HS-STP-011-2(38) 2010

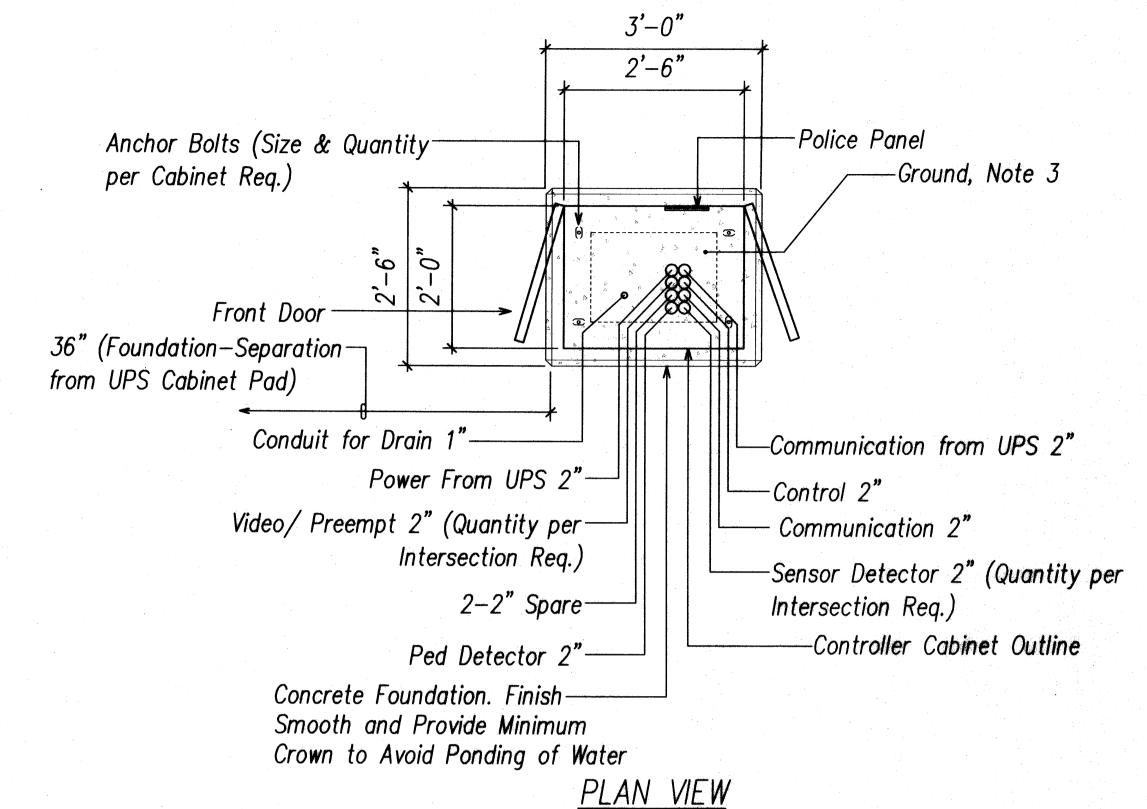


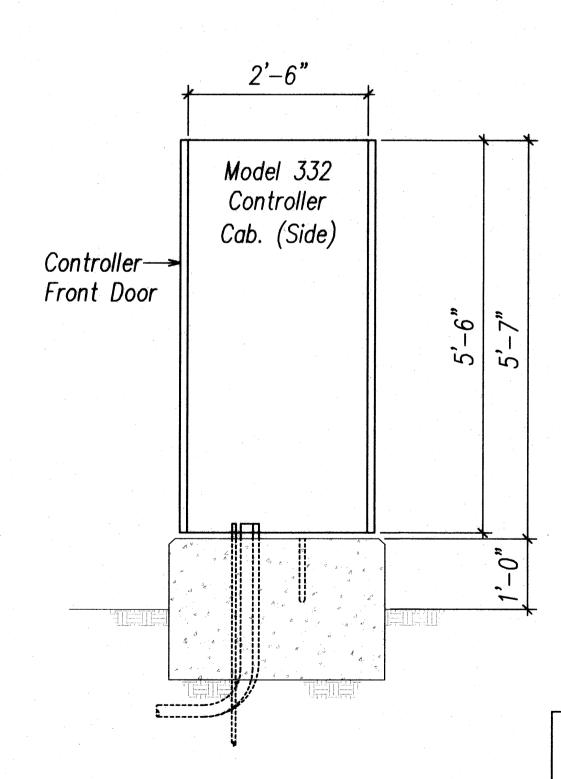


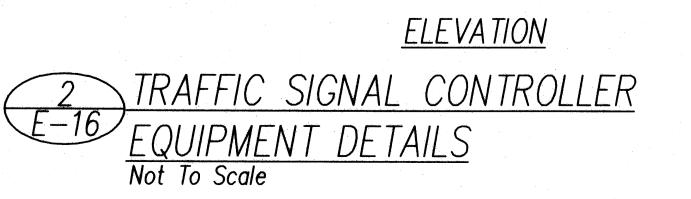
E-16 Not To Scale

<u>ELEVATION</u>

TRAFFIC SIGNAL UPS EQUIPMENT DETAILS









This Work was Prepared by Me or Under My Supervision

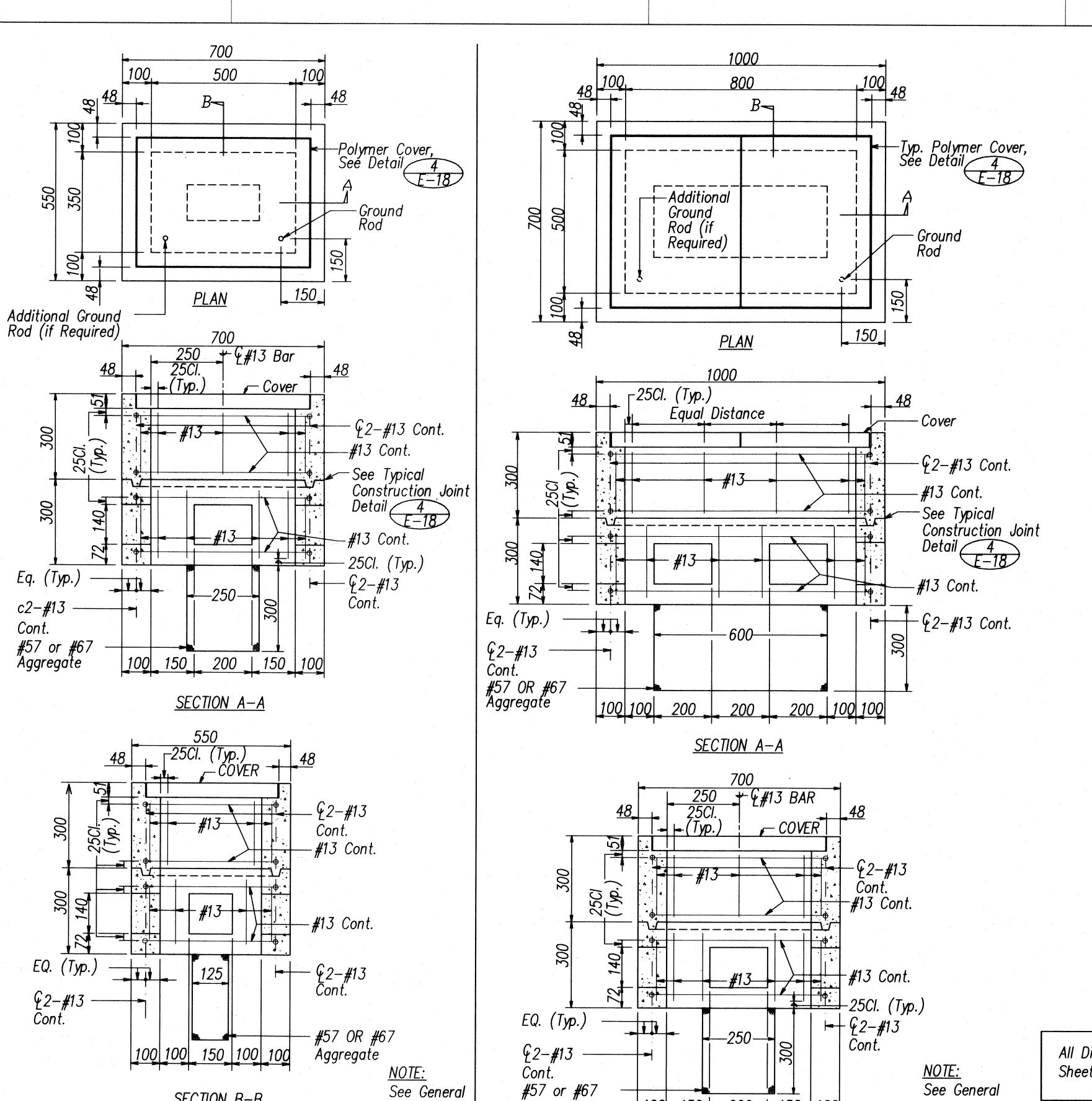
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION TRAFFIC SIGNAL

DETAILS III

Volcano Road Intersection and

<u>Drainage Improvements</u> Federal-Aid Project No. HS-STP-011-2(38) Scale: AS NOTED

Date: November 2010 SHEET No. E-16 OF 26 SHEETS



Aggregate

Notes on

Sheet E-18

100 150 200 150 100

SECTION B-B

NOT TO SCALE

TYPE "B" PULLBOX (OLD TYPE "C")

Notes on

Sheet E-18

SECTION B-B

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TYPE "A" PULLBOX (OLD TYPE "B")

All Dimensions on this Sheet are in Millimeters



FED. ROAD DIST. NO.

FED. AID PROJ. NO.

HAW. HS-STP-011-2(38)

FISCAL YEAR

2010

SHEET NO.

SHEETS

Gudur I. Miyasafo Signature 2010.11.30

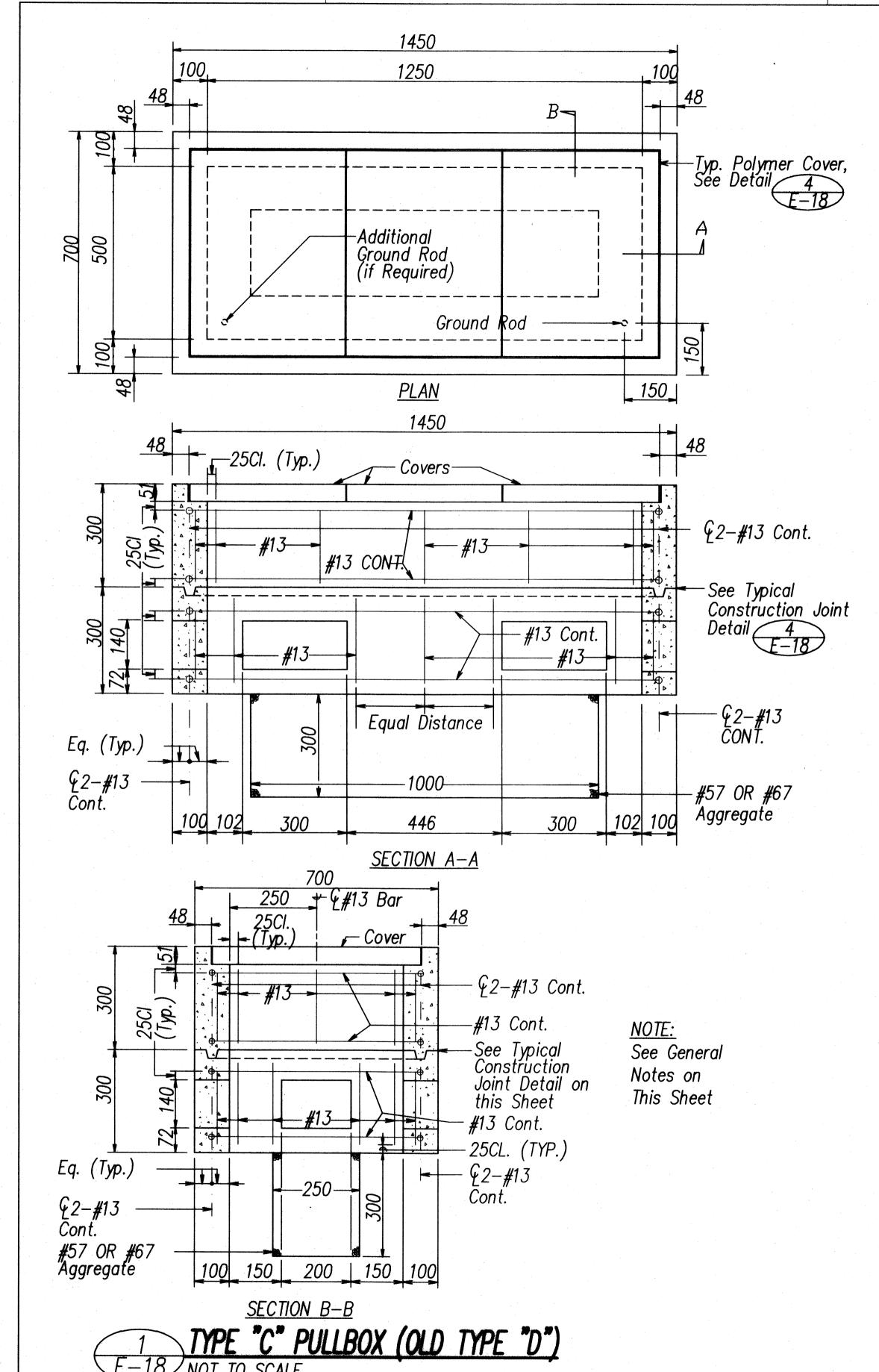
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION TRAFFIC SIGNAL

DETAILS IV

Volcano Road Intersection and <u>Drainage Improvements</u> <u>Federal-Aid Project No. HS-STP-011-2(38)</u>

Scale: AS NOTED Date: November 2010

SHEET No. E-17 OF 26 SHEETS

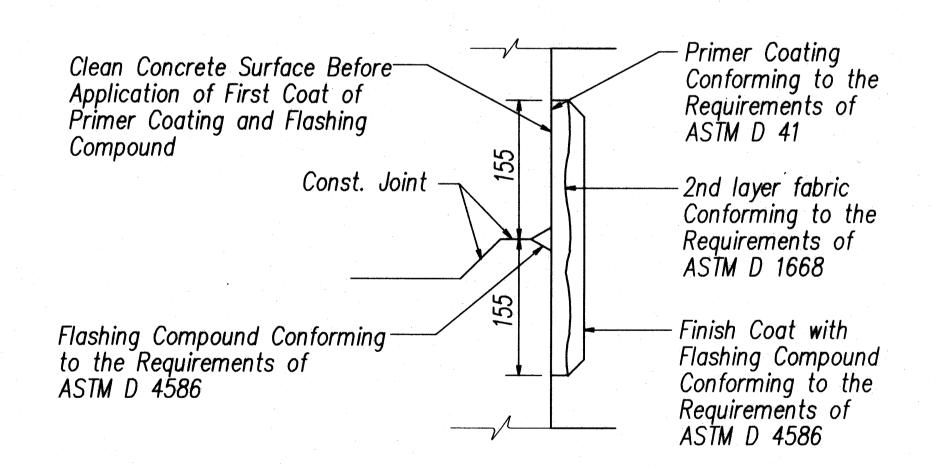


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TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY

FILE PATH: Z:\ACAD\PROCECTS\20020\e018-20020-te details v-pullbackding CAD USER: Moturil PLOT BATE: 20 0.11.30 XREFS:\\_x20020-te details LAST SAVE: 11/22/10 © 08:27:47 BY: AM PLOT SC 1'-0'=1'

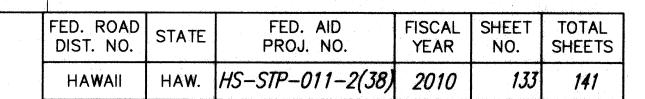
### GENERAL NOTES FOR TRAFFIC SIGNAL PULLBOX DETAILS

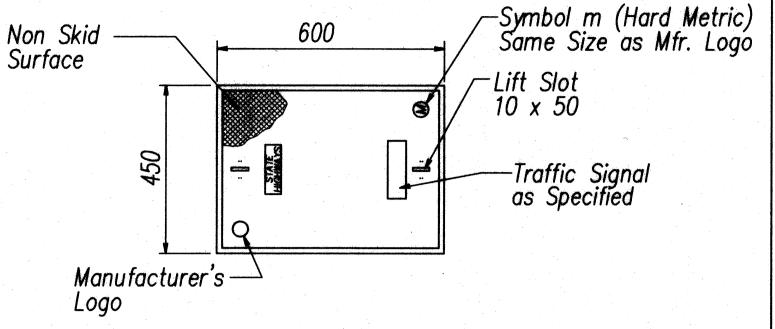
- 1. Provide a minimum of one 16 x 2.5m copperweld ground rod in each pullbox. When directed by the traffic signal inspector/engineer, install additional ground rods. Cost of ground rods shall be incidental to the pullboxes.
- 2. All pre-cast concrete pullboxes shall be manufactured in two pieces.
- The pullbox with cover shall be capable of supporting an ms 18 loading.
- 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.
- 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.
- B. 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).

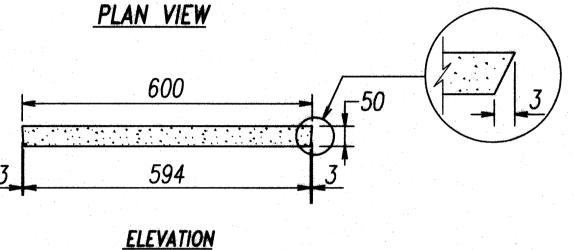




All Dimensions on this Sheet are in Millimeters Unless Otherwise Shown

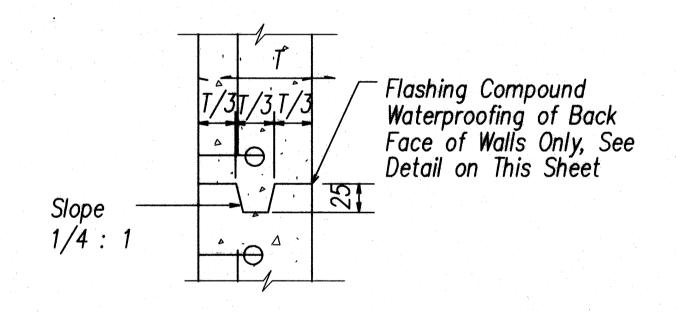






<u>Note:</u> See Traffic Signal Pullbox Details, This Sheet and Sheet E-17

# F-18 NOT TO SCALE



<u>Note:</u> See Traffic Signal Pullbox Details, This Sheet and Sheet E-17

# 4 TYPICAL CONSTRUCTION JOINT DETAIL E-18 NOT TO SCALE



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL

DETAILS V

<u>Volcano Road Intersection and</u>

<u>Drainage Improvements</u>

<u>Federal-Aid Project No. HS-STP-011-2(38)</u>

Scale: AS NOTED

OTED Date: November 2010

SHEET No. E-18 OF 26 SHEETS

Signature 1. M 1 yasat 2010.11.30
License Exp. Date: 04.30.2012

# NEW DESIGN REQUIREMENTS FOR LUMINAIRES, POLE STANDARDS AND TRAFFIC SIGNAL STANDARDS

(Highway Lighting Luminaires, Pole Standards, Bracket Arms and Traffic Signal Standards and Mast Arms Being Furnished for This Project Shall Conform with the New Design Requirements noted Below)

- Equipment manufacturers providing structural supports for Luminaires and Traffic Signals, the following design parameters to be included in the design of the project materials.
- AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 4th Edition, 2001 Including Subequent Interim Revisions, Published by the American Association of State Highway and Transportation Officials, as Modified Herein.
- Basic Wind Speed [Article 3.8.2] to determine the design wind pressure shall be 105 mph. For unusual or differing exposure conditions, the basic wind speed should be increased using the rational procedures and sound engineering judgment. Alternatively, the design wind pressure may be increased by using a higher Wind Importance Factor [Table 3-2] corresponding to a recurrence interval of at least one level greater than recommended.
- Wind Importance Factor [Article 3.8.3] noted in Table 3-2 used to determine the design wind pressure shall be based on the following recurrence intervals:
  - For Overhead Sign Structures:

100 Years

For Traffic Signal Structures:

50 Years

For Luminaire Support Structures less than 50 feet in height: 25 Years

- For other support structures including luminaire support structures 50 feet or more in height, and when luminaire mounted on a traffic Signal Structure: 50 Years
- For Temporary Support Structures: 10 Years
- Height and Exposure Factor [Article 3.8.4]. For support structures on bridges, the height and exposure factor shall be determined based on the maximum height they are above the surrounding ground. For severe exposure conditions such as along the coastline, the factor shall be increased based on the latest ASCE Standard ASCE/SEI 7, Minimum Design Loads for Buildings and Other Structures.
- Minimum Anchor Bolts [Article 5.17.3]. Cantilevered traffic signal structures with mast arms greater than 40 feet and other cantilevered support structures with design life of 50 years or more shall have base plate connections with a minimum of six (6) anchor bolts. A mimimum of (4) anchor bolts shall be provided for all other base plate connections.
- Plumbness of Anchor Bolts [Article 5.17.6.3]. The anchor bolts shall be installed as required.
- Use of Grout [Article 5.17.6.5]. Grout shall not be used under base plates for all support structures unless approved by the Bridge Design Engineer. Anchor bolts with leveling nuts shall be designed to transfer all loads from the structure to its base support.

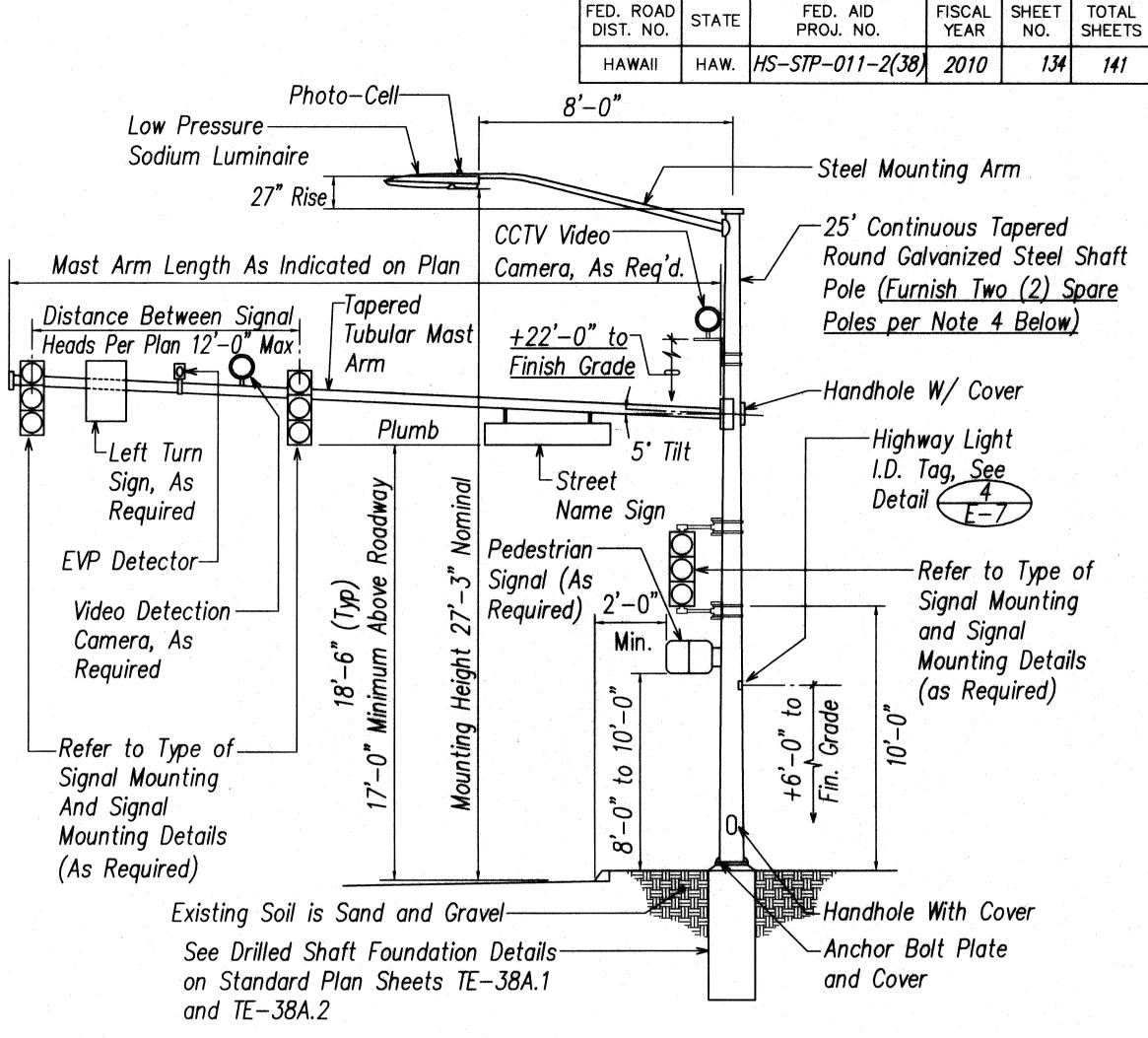
A wire cloth screen shall be placed vertically between the base plate and the top of the foundation and wrapped horizontally around the base plate with a 3 inch minimum lap. The wire cloth shall be galvanized steel standard grade plain weave 2x2 mesh 0.063 inch diameter wires. The screen shall be attached to the base plate with stainless steel self—tapping 1/4 inch diameter screws with stainless steel washers spaced at 9 inches on center.

<u>Fatique Importance Factors</u> [Article 11.6] noted in Table 11–1 for overhead sign and traffic signal structures shall be based on Fatigue Category I.

Support structures other than that noted in Table 11—1 with round cross sections under 50 feet and roadside sign structures do not need to be designed for fatigue.

Support structures 50 feet or more in height shall be designed for fatigue and be based on Fatigue Category I.

- Galloping [Article 11.7.1]. Provisions shall be made to install effective vibration mitigation devices on overhead cantilevered sign and traffic signal support structures unless they are designed for galloping—induced cyclic loads. With approval from HDOT, mitigation devices may be installed after construction if vibration due to galloping is identified.
- Natural Wind Gust [Article 11.7.3]. Overhead sign, traffic signal, and high-level support structures shall be designed to resist an equivalent static natural wind qust pressure.
- <u>Truck-Induced Gust</u> [Article 11.7.4]. Overhead sign and traffic signal support structures shall be designed to resist an equivalent static truck qust pressure range based on a truck speed of 20 mph over the posted speed.
- Equipment manufacturers providing structural supports for Luminaires and Traffic Signals, is responsible to provide the Engineer with any information that will impact the current foundation design.

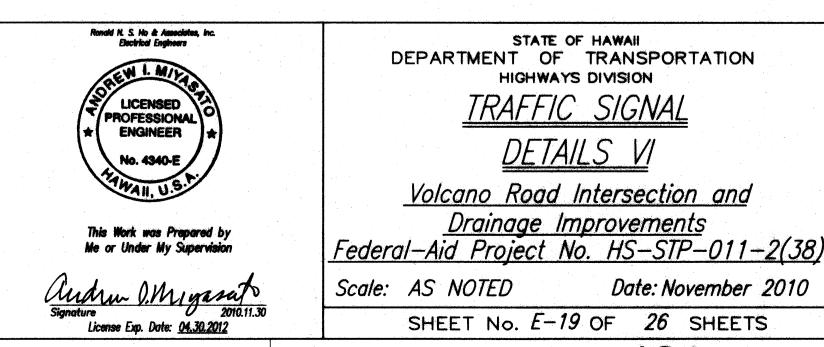


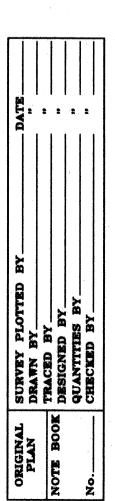
FED. ROAD

#### Notes:

- 1. Item for Type III Traffic Signal Standard with Mast Arm and Foundation Includes Roadway Lighting Bracket Arm.
- 2. For Additional Type III Traffic Signal Standard Details, See Standard Plan Sheets TE-38, TE-38A.1 and TE-38A.2.
- 3. Standards, Mast Arms, and Bracket Arms Shall be Designed in Accordance with the Latest Edition of "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", with Design Revisions Noted on this Sheet.
- Furnish Two (2) Additional Spare 25' Continuous Tapered Round Galvanized Steel Shaft Poles, Delivered to the County of Hawaii's Traffic Division Baseyard at 108 Railroad Avenue in Hilo per the County's Requirements. Contractor Shall Contact and Coordinate Delivery with Sonny Brown at 808-961-8341.



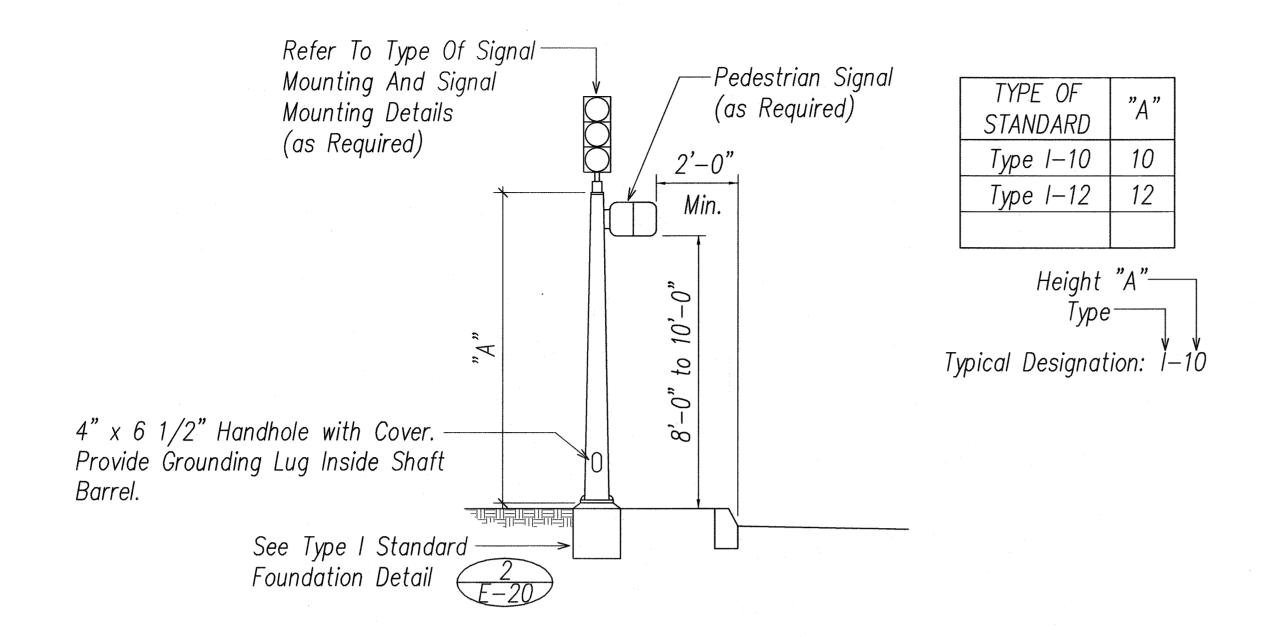




FED. ROAD DIST. NO. STATE FED. AID PROJ. NO. FISCAL SHEET TOTAL SHEETS

HAWAII HAW. HS-STP-011-2(38) 2010 ADD. 135 141

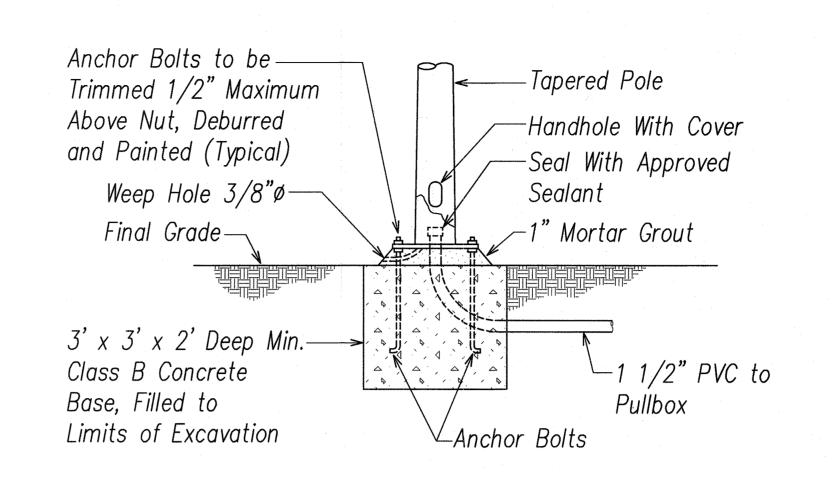
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#### NOTES FOR TYPE I STANDARD;

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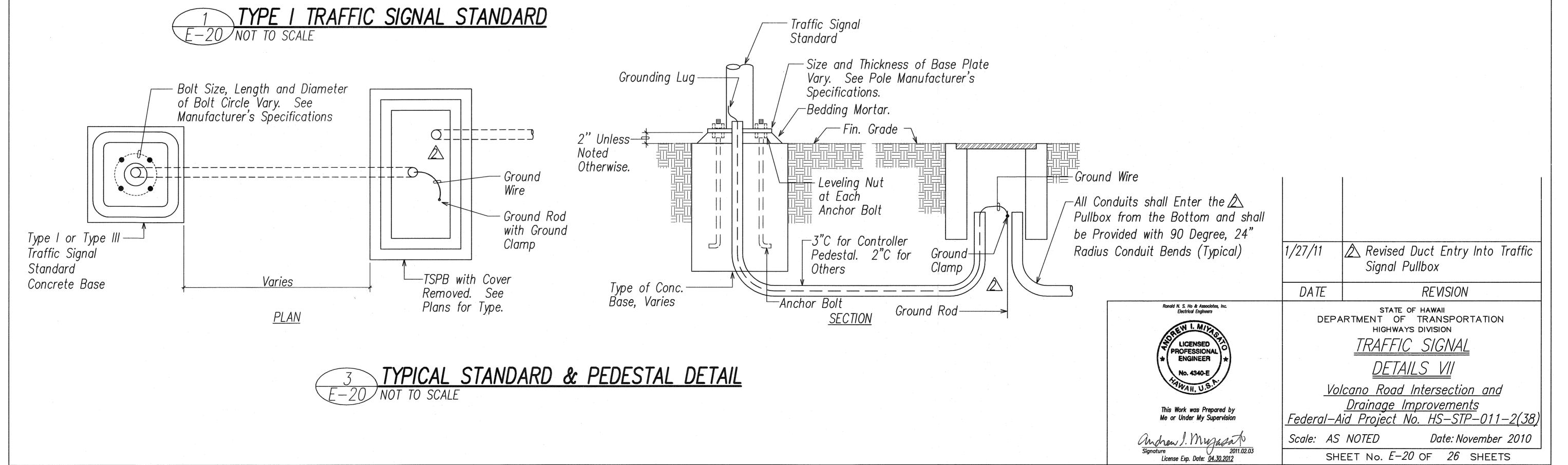
- 1. Standards Shall be Designed in Accordance With the Latest Edition of "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals", with Design Revisions Noted on Sheet E-19.
- 2. Submit Shop Drawings and Structural Calculations for Approval,
- 3. For Additional Type I Traffic Signal Standard Details, See Standard Sheet TE-32.

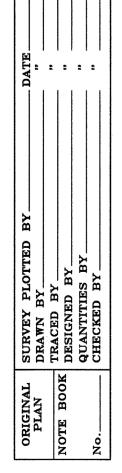


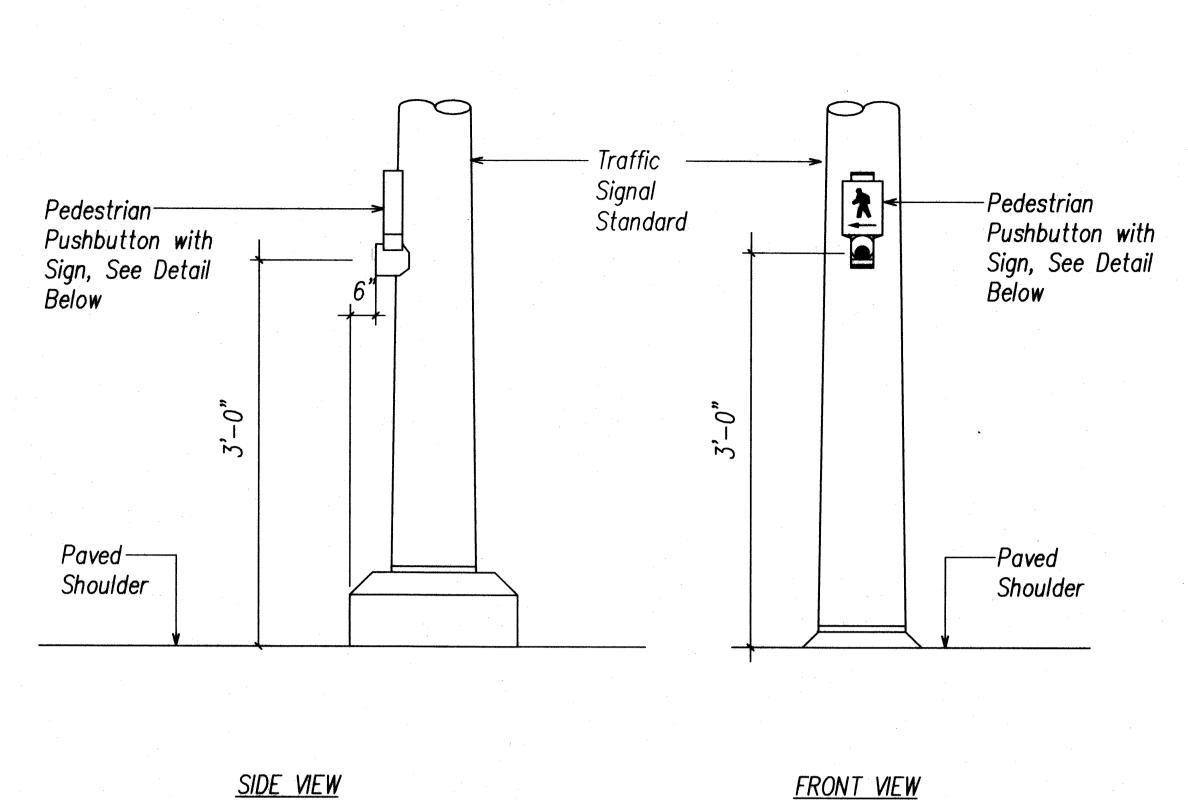
### <u>Note</u>:

1. For Additional Type I Signal Standard Footing Details, See Standard Plan Sheet TE-32.

2 TYPE I STANDARD FOUNDATION DETAIL E-20 Not to Scale





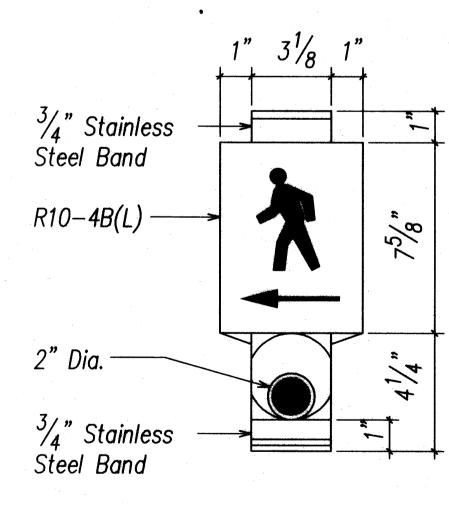


DETAIL NOTES:

ORIGINAL BRAWN BY
NOTE BOOK DESIGNED BY
OUNDESTONE BY
CHECKED BY
CHECKED BY
CHECKED BY

- 1. The pedestrian pushbutton unit shall consist of a one piece assembly with a raise walking man, arrow indication and push button.
- 2. The pushbutton activator shall be of the mushroom plunger type, ADA acceptable, 2 inches in diameter that requires less than 5 lbs. of pressure to activate.
- The raised man and arrows shall be directional and match the directional indication as shown on the plans.
- The pushbutton shall be tamper proof, weatherproof and constructed so that electrical shocks are impossible.
- 5. The color scheme shall be: White — Man, arrow and pushbutton Black - Background

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SHEET TOTAL NO. SHEETS FED. ROAD DIST. NO. FED. AID PROJ. NO. FISCAL YEAR HAW. HS-STP-011-2(38) 2010 -Galv. Malleable Iron Cover -−3/4" Wide Stainless Steel Bar Strap— -Traffic Sign as Specified on P -Standard Strength "Walking Man Symbol with Array, R10-4b(L), R10-4b(R) or R10 4b(L&R) Galvanized Steel Pipe -C.I. Companion Hole For 3/4"-Pedestrian Pushbutton with Sign-Flange 125# F D Anchor Bolt See Detail 1/E-21 (Typ.)-3/4" Wide Stainless Steel Band Strap— "0 3 1/2" -<u>SECTION</u> -Galv. Malleable Iron or C.I. Companion — 1/2" Paved— ─1 1/2" Thick Bedding Motar Flange, 125# Faced and Drilled for Shoulder 4-3/4" Anchor Bolts -3/4" X 12" Long Anchor Bolts -Type "A" Conc. Base-3 1/2" 2"PVC Schedule 80-2'-0" Square Conduit to TSPB FRONT VIEW SIDE VIEW TOP VIEW

<u>NOTE</u>:

- 1. Conduit shall Protrude 2" Max above Finished Surface of Foundation
- 2. Conduit Shall slope away from Post Foundation.

PEDESTRIAN PUSHBUTTON POST AND FOOTING DETAIL NOT TO SCALE

FLANGE DETAIL

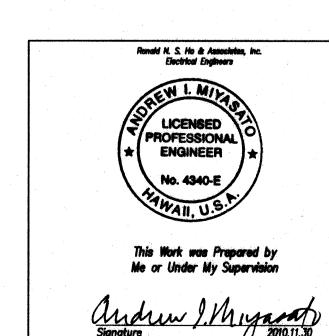
STATE

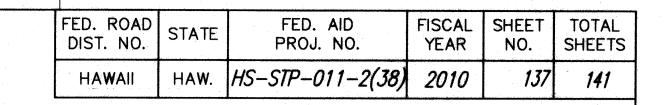
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION TRAFFIC SIGNAL DETAILS VIII

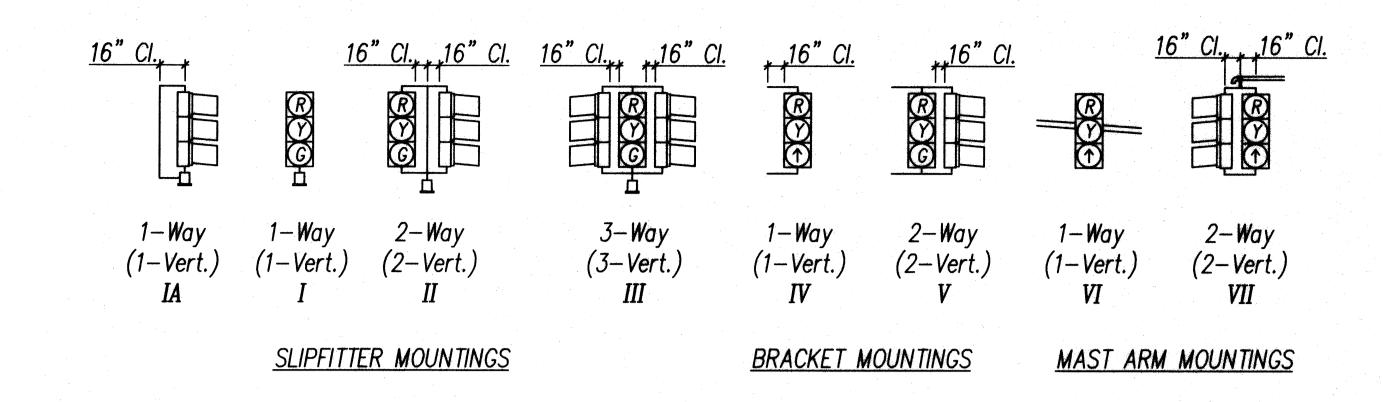
Volcano Road Intersection and

<u>Drainage Improvements</u> <u>Federal-Aid Project No. HS-STP-011-2(38)</u> Date: November 2010 Scale: AS NOTED

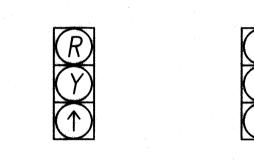
PEDESTRIAN PUSHBUTTON DETAILS NOT TO SCALE







# TYPICAL VEHICULAR AND PEDESTRIAN SIGNAL MOUNTINGS

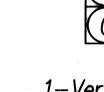


1-Vertical

3-Section

1-Vertical

3-Section

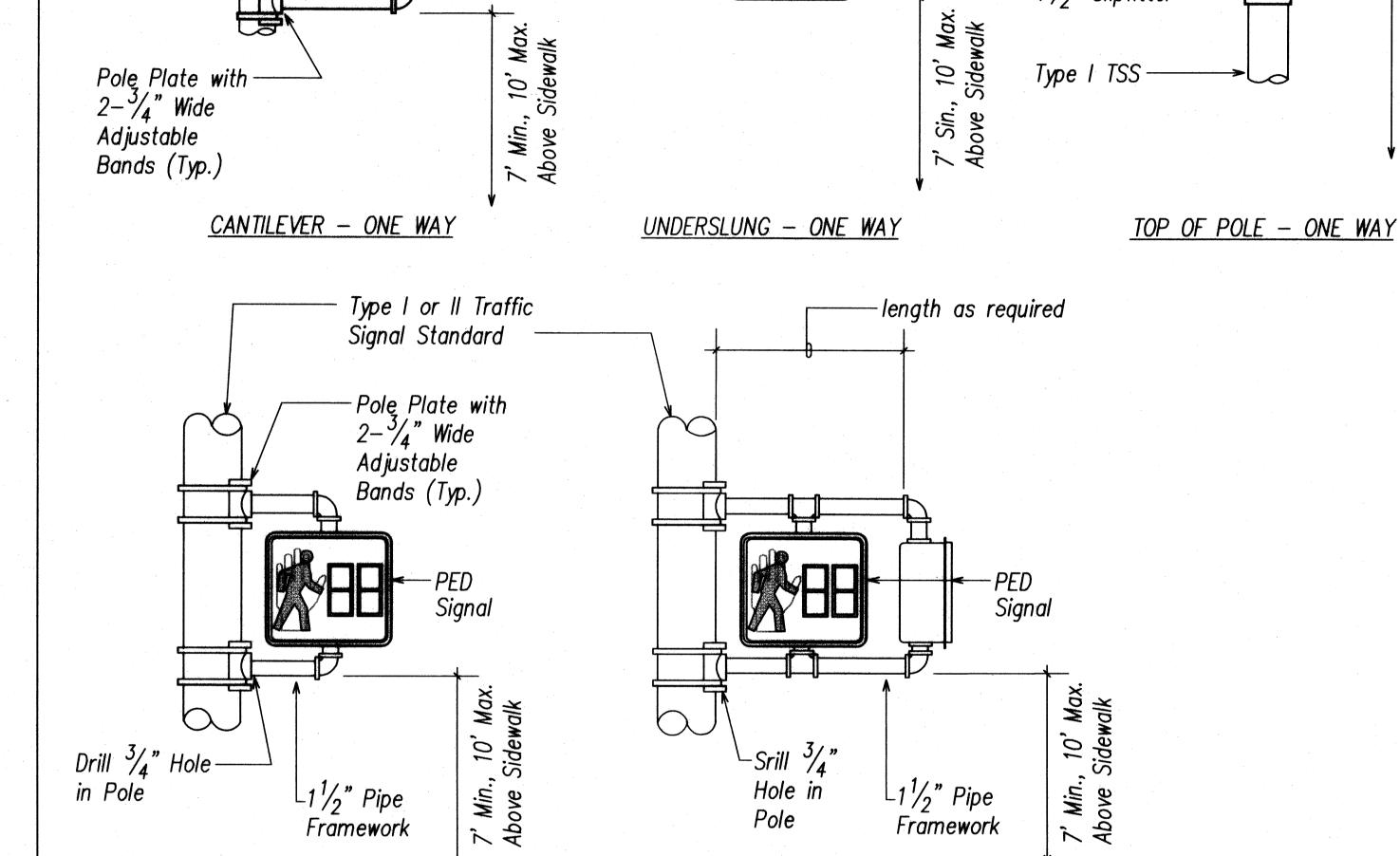


1-Vertical 3-Section Symbol (Hand) Portland Orange <u>Background</u>

Opaque

<u>Symbol</u> (Man) White <u>Background</u> Opaque

TYPICAL SIGNAL ARRANGEMENTS



-PED Signal

-Bracket

Mounted

Vehicular

 $4\frac{1}{2}$ " Slipfitter –

Type I TSS

7' Min., 10' Max. Above Sidewalk

Signal

BRACKET MOUNT - TWO WAY

#### NOTES:

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<u>BRACKET MOUNT - ONE WAY</u>

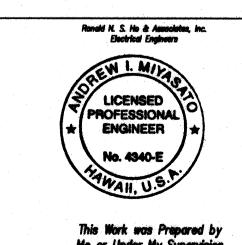
Double  $4\frac{1}{2}$ " —

Type | TSS →

Slipfitter

- 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.
- 6. Signal as noted on plans.
- 7. Maintain 16" min. clearance at rear of all programmed faces.





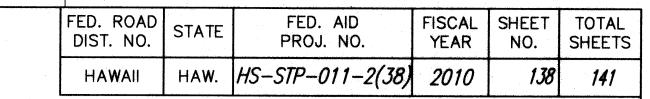
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DEPARTMENT OF TRANSPORTATION TRAFFIC SIGNAL

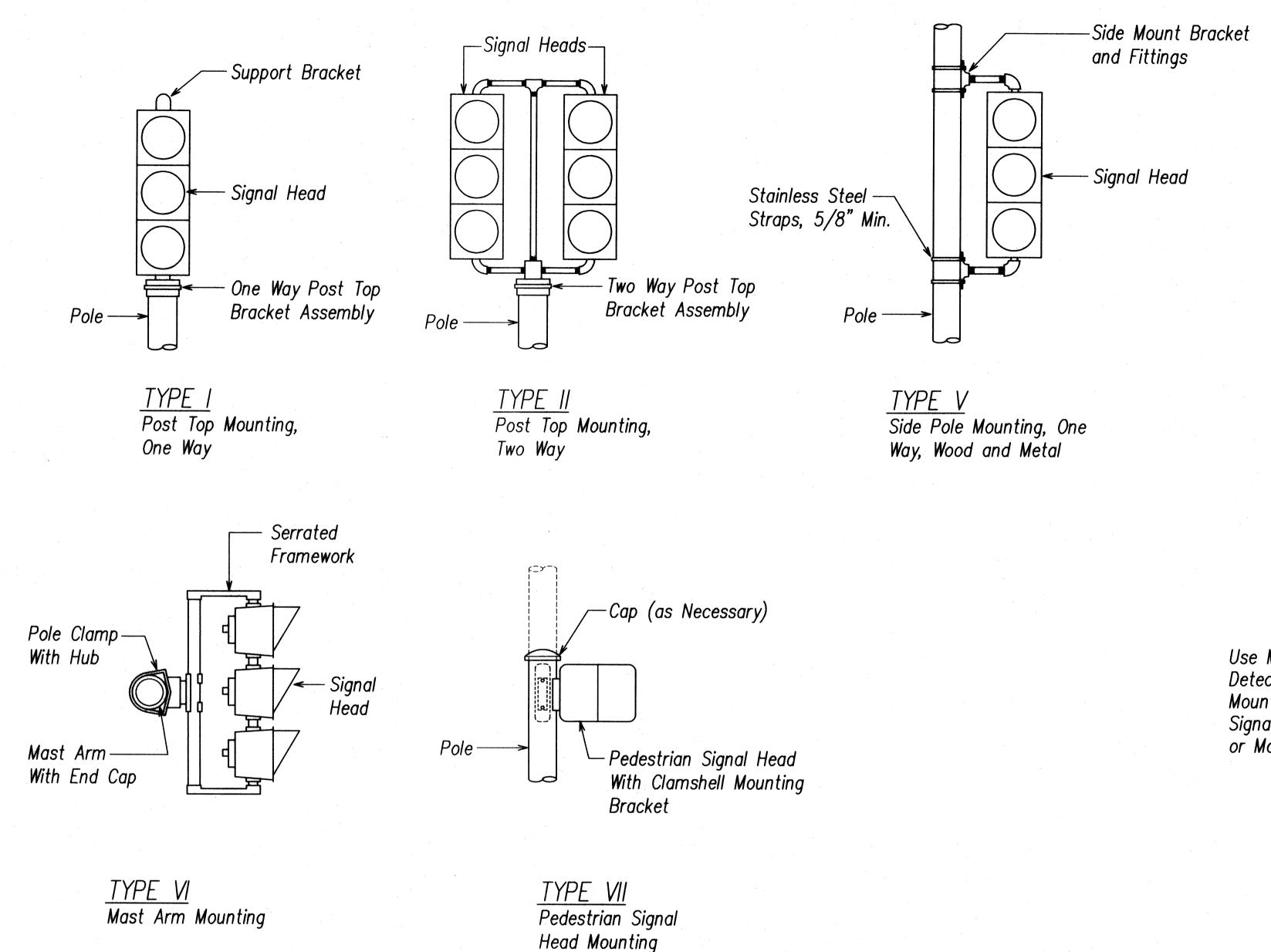
DETAILS IX

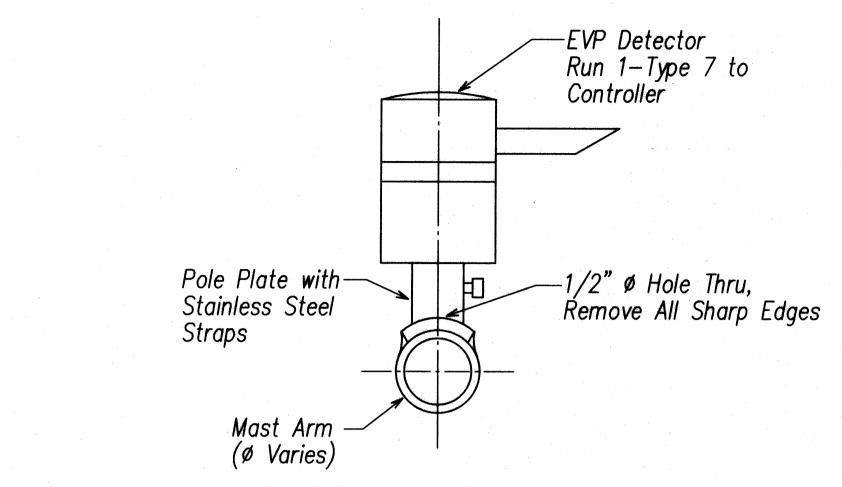
Volcano Road Intersection and Drainage Improvements

Federal-Aid Project No. HS-STP-011-2(38) Scale: AS NOTED Date: November 2010

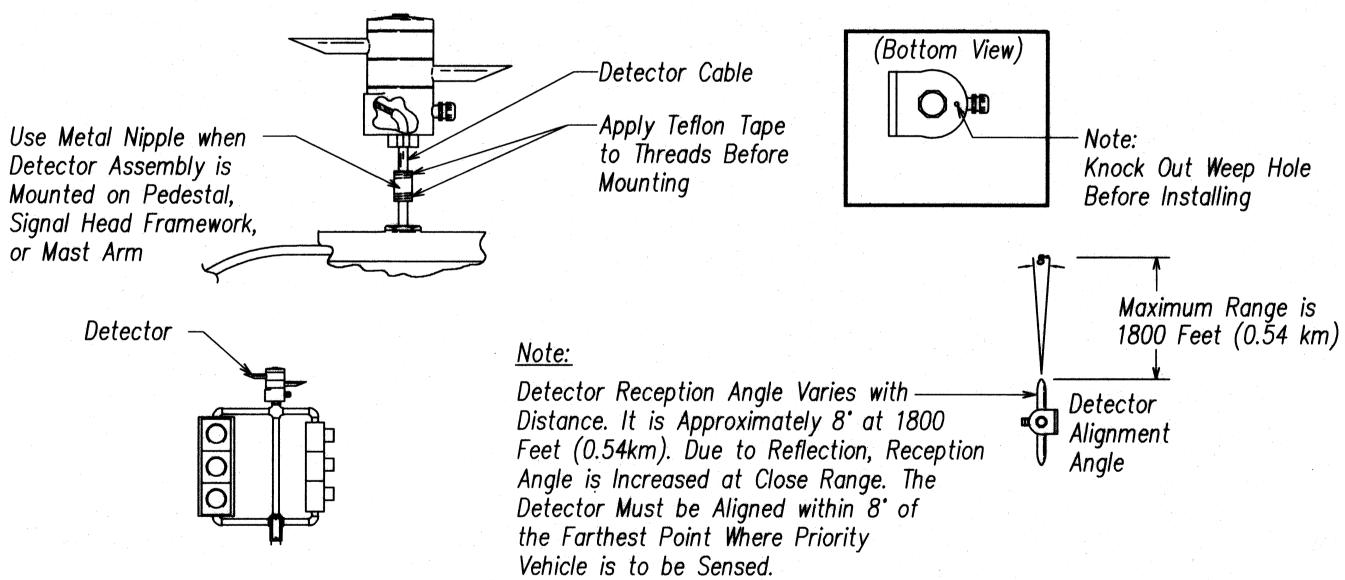
SHEET No. E-22 OF 26 SHEETS





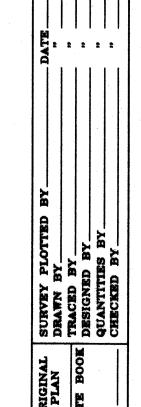


EVP DETECTOR HORIZONTAL MOUNTING DETAIL =-23 Not to Scale



TYPICAL PEDESTAL/MAST ARM INSTALLATION OF EVP DETECTOR

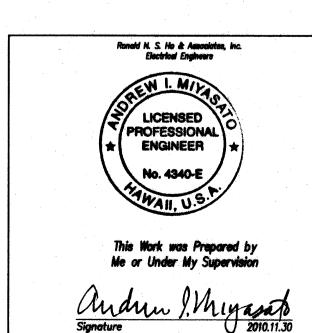
E-23 Not to Scale



For Additional Mounting Details, See Standard Plan Sheet TE-32.

<u>Note</u>:

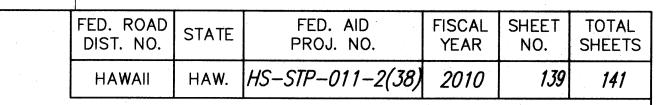


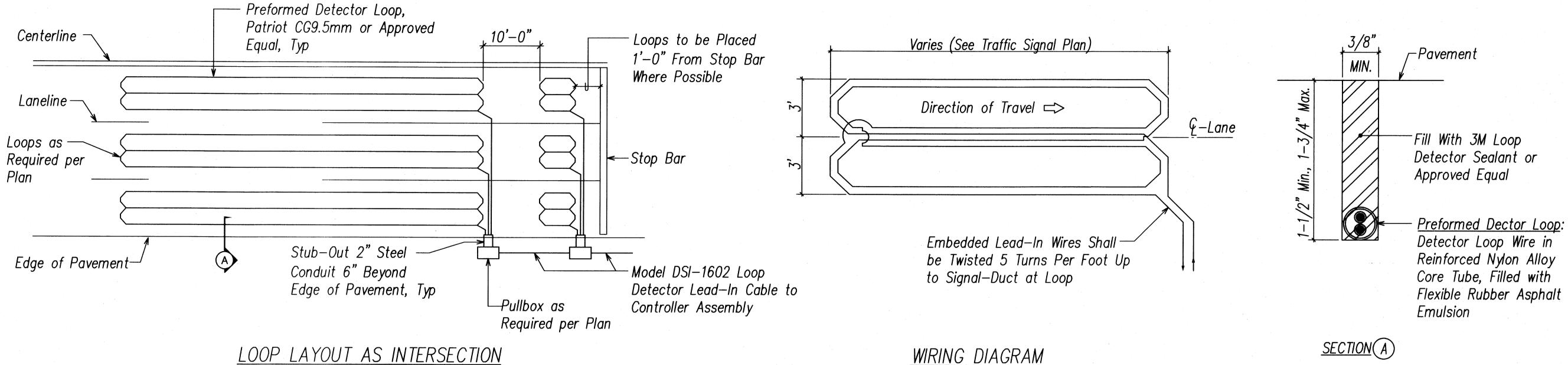


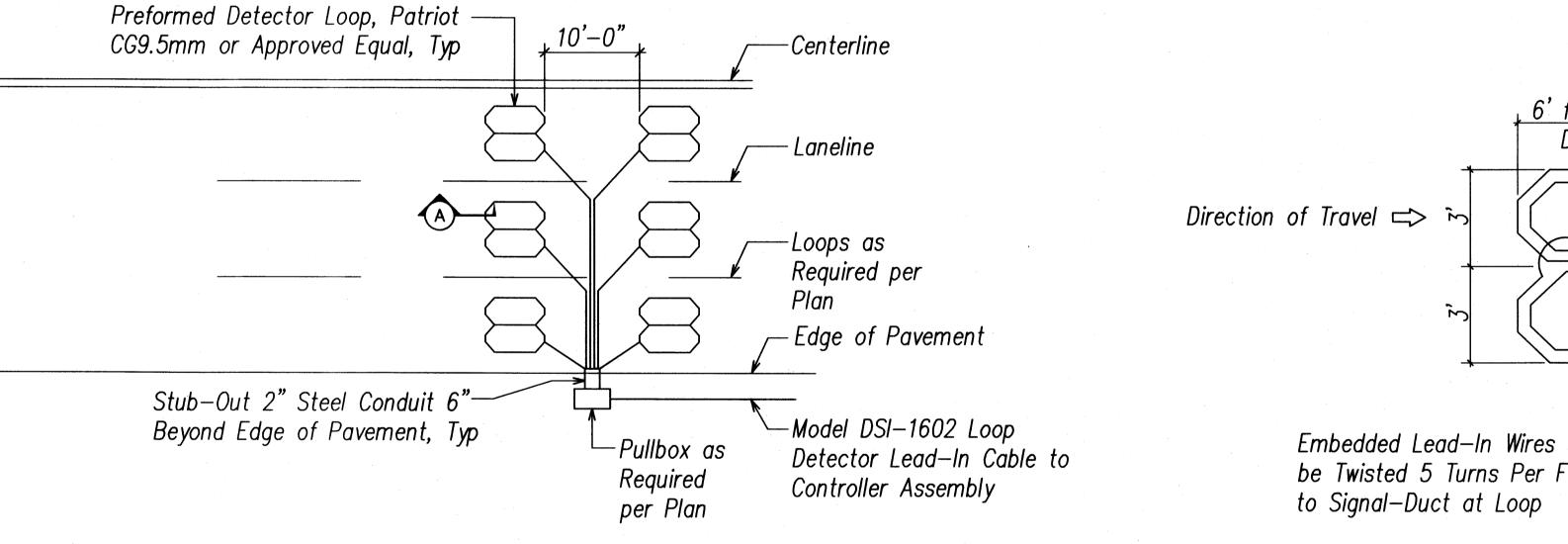
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION TRAFFIC SIGNAL DETAILS X Volcano Road Intersection and <u>Drainage Improvements</u> <u>Federal-Aid Project No. HS-STP-011-2(38)</u>

Date: November 2010 Scale: AS NOTED

SHEET No. E-23 OF 26 SHEETS

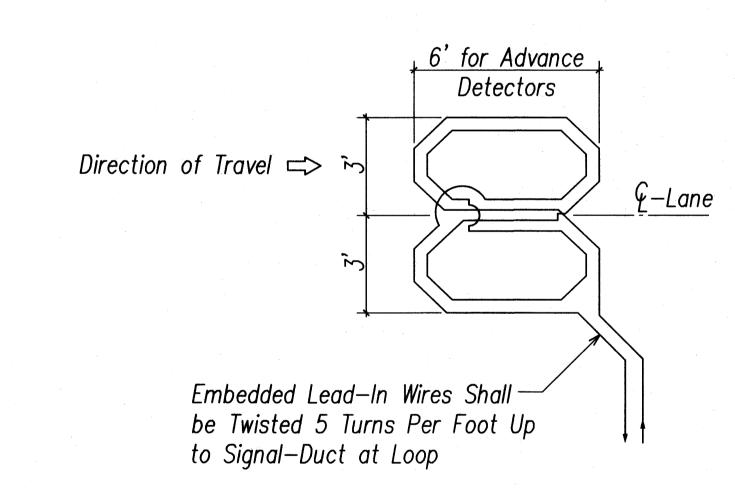






LOOP LAYOUT AT HIGH SPEED APPROACH

ADVANCE DETECTORS TO INTERSECTION



WIRING DIAGRAM



FILE PATH: Z:\ACAD\PROJECTS\26020\e024-26020-ts details xi.dwg CAD USER: Nikotani PLOT DATE: 2010.11.30 | XREFS:|\_x26020-ts details| LAST SAVE: 11/22/10 ● 08:34:46 BY: AM PLOT SC 1'-0"=1'

LOOP DETECTOR DETAILS



Signature J. M. Jasab 2010.11.30
License Exp. Date: 04.30.2012

Volcano Road Intersection and <u>Drainage Improvements</u> <u>Federal-Aid Project No. HS-STP-011-2(38)</u>

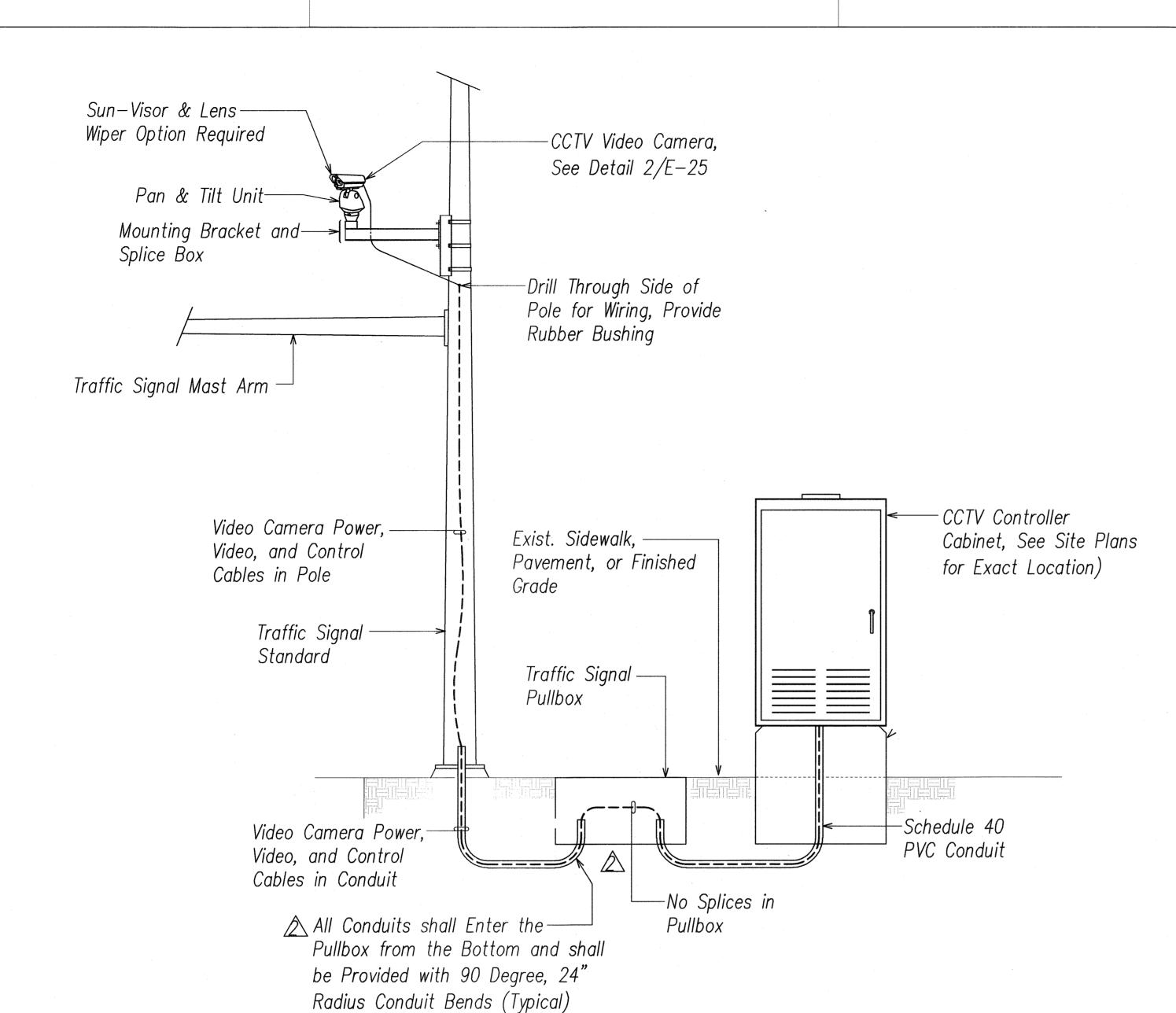
Scale: AS NOTED

Date: November 2010 SHEET No. E-24 OF 26 SHEETS

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL

<u>DETAILS XI</u>



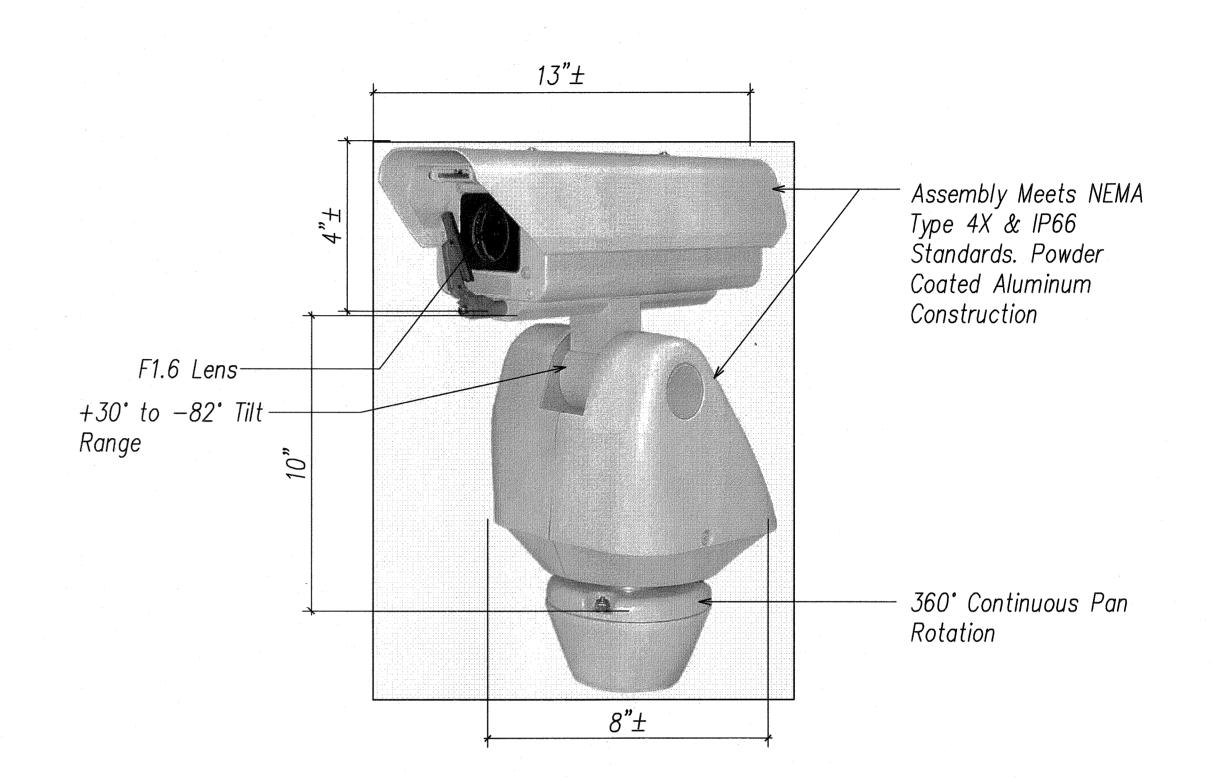
#### <u>Notes:</u>

FILE PATH: Z:\aCAD\PROJECTS\26020\e025-26020-ts details xii-add2.dwg CAD USER: andy PLOT DATE: 2011.02.03 XREFS:\\_x26020-ts details\
LAST SAVE: 01/25/11 @ 11:51:38 BY: AM PLOT SC 1'-0"=1'

Coordinate Aiming of All Cameras with the Hawaii County Department of Public Works Traffic Division



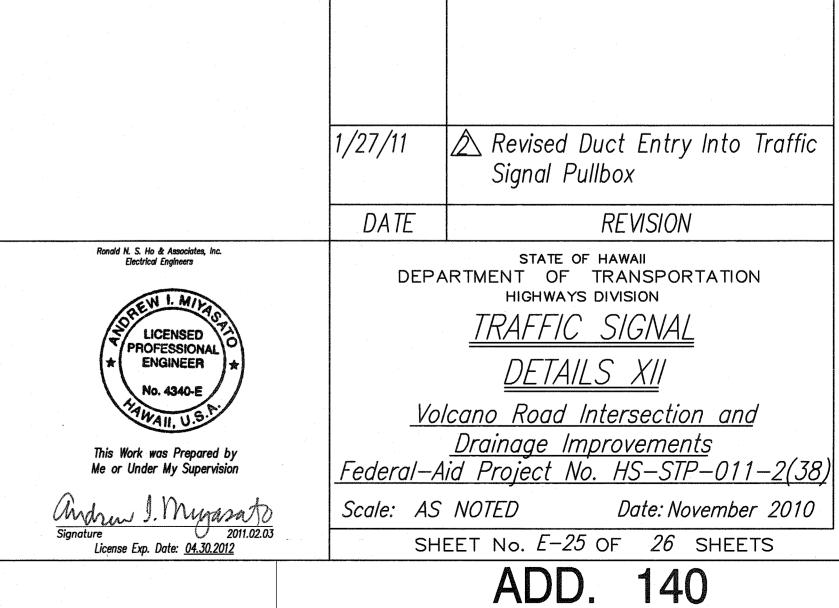
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR		TOTA SHEET
HAWAII	HAW.	HS-STP-011-2(38)	2010	ADD. 140	141

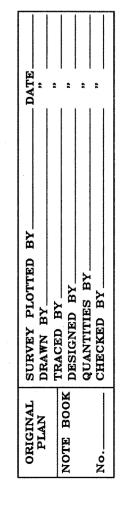


#### <u>Notes:</u>

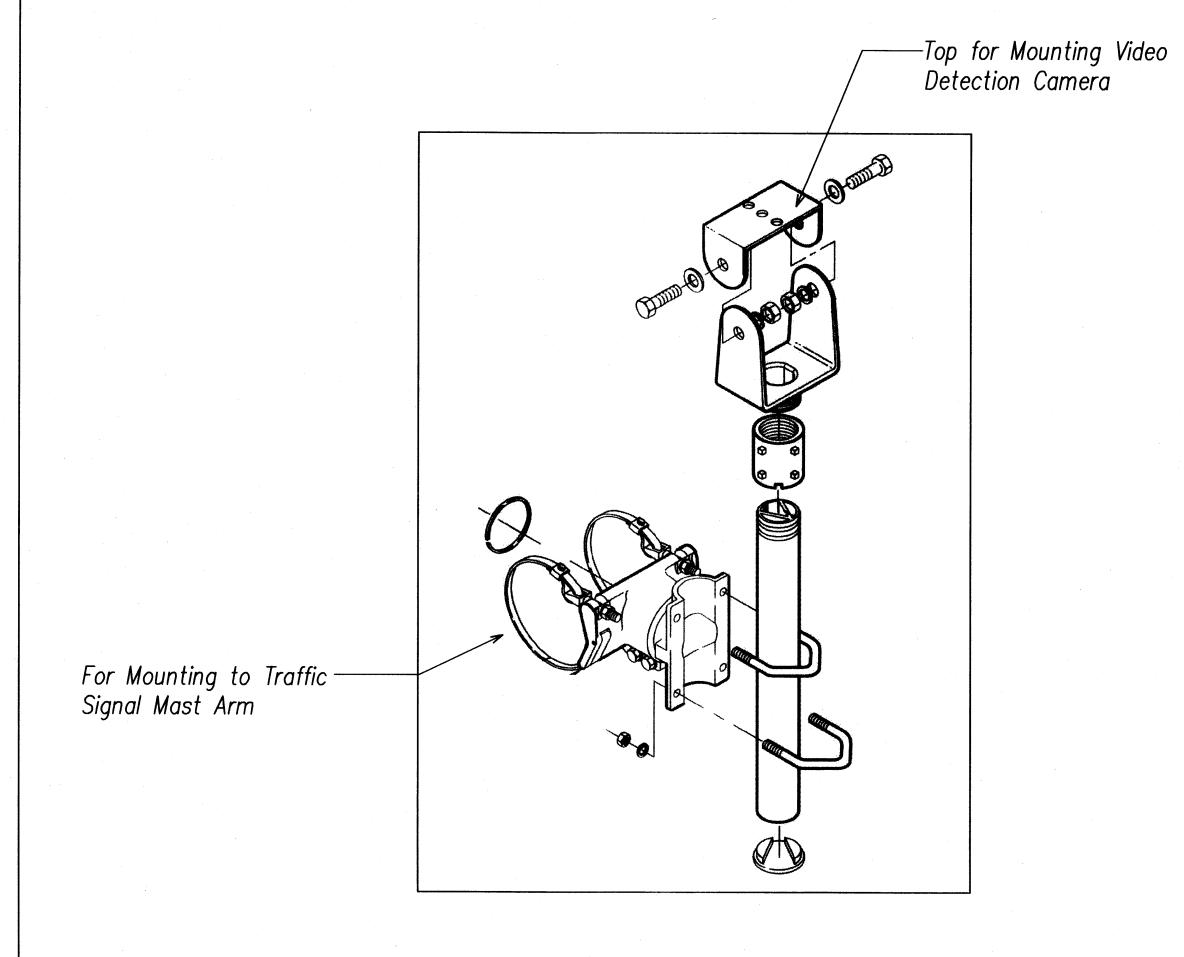
- Digital Position and Zoom Control Feedback Using "D" Protocal.
- UL Listed, Rated for Full Continuous Duty, CE Class B.
- Assembly Rated for 90 MPH Operation. Do Not Select Optional Window Wiper.

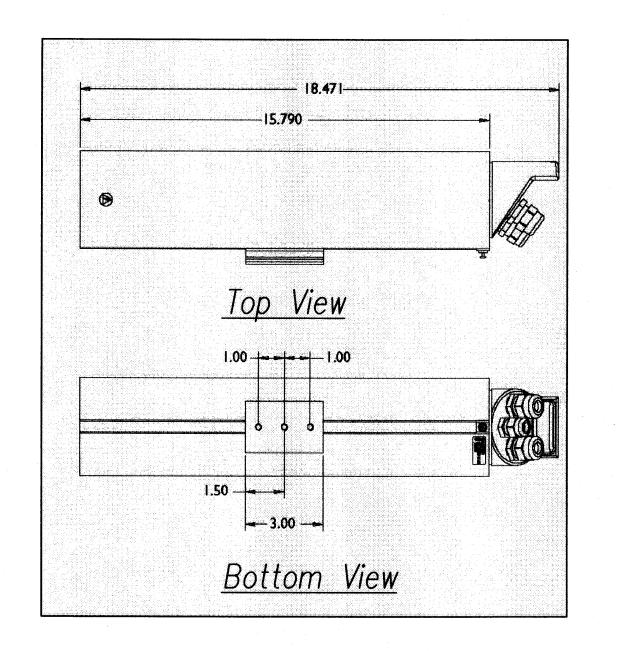
# 2 CCTV VIDEO CAMERA DETAIL -25 Not to Scale





FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR		TOTAL SHEETS
HAWAII	HAW.	HS-STP-011-2(38)	2010	141	141





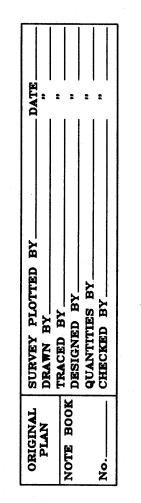
VIDEO DETECTION CAMERA DETAIL Not to Scale

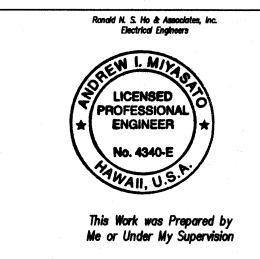
# ASTRO BRAC VIDEO DETECTION CAMAERA MOUNT DETAIL Not to Scale

### <u>Notes:</u>

Coordinate Aiming of All Cameras with the Hawaii County Department of Public Works Traffic Division







STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION TRAFFIC SIGNAL

DETAILS XIII

Volcano Road Intersection and

<u>Drainage Improvements</u> Federal-Aid Project No. HS-STP-011-2(38) Scale: AS NOTED

Date: November 2010 SHEET No. E-26 OF 26 SHEETS