


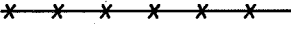
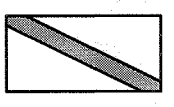
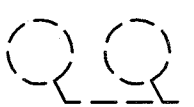

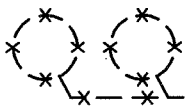
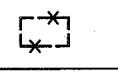
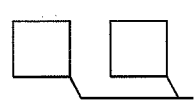

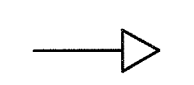

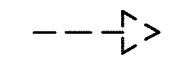
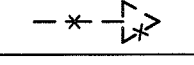
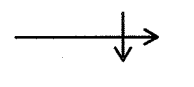
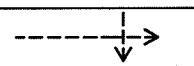
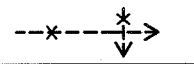
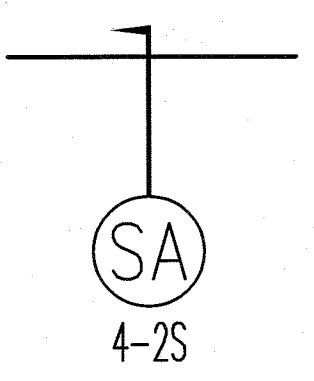
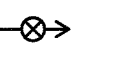
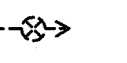
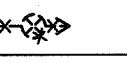
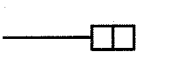
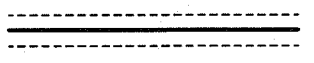
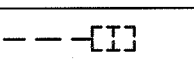
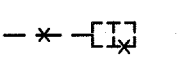
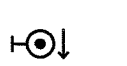
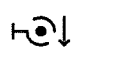
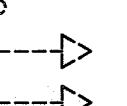


FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56A-02-05	2009	26	39

GENERAL CONSTRUCTION NOTES

1. Contractor shall coordinate all work with Kauai Island Utility Cooperative.
2. Provide polyolefin 200lb test pullcord in all empty conduits, unless otherwise noted.
3. All electrical equipment enclosures and equipment mounting hardware for outdoor installation shall be Type 316 Stainless Steel, unless otherwise noted.

ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	Existing Traffic Signal Conduit		
	Existing KIUC Secondary Service		Traffic Signal Pullbox, Type B, See Sheets E-7 and E-8
	Existing underground ductlines and cables; Existing cables to be removed and ductlines to be abandoned or demolished and removed as required (by Contractor) due to new construction		Traffic Signal Pullbox, Type C, See Sheets E-7 and E-8
	Existing Detector Loop		Existing Pullbox or Handhole, See Plans for Designation
	Existing Detector Loop to be Replaced		Existing Pullbox to be Demolished, Backfill Pit to 95% Compaction
	New Detector Loop, See Sheet E-14		Remove Type 1 Traffic Signal Standard, Demolish Exist. Conc. Base 2 Ft. Below Finish Grade. Backfill Pit to 95% Compaction; Restore Sidewalk or Grass per City and State Requirements, Salvage as Required.
	New Traffic Signal Head 3-Section RYG, Provide Necessary Mounting Brackets and Accessories		New Type I Traffic Signal Standard, See Plan for Height, See Details on Sheets E-9 and E-10
	Existing Traffic Signal Head to Remain, 3-Section		
	Remove Traffic Signal Head		
	New Traffic Signal Head 4-Section RYGG, Provide Necessary Mounting Brackets and Accessories		
	Existing Traffic Signal Head to Remain, 4-Section		
	Remove Traffic Signal Head		Traffic Signal Ductline with Designators; Items in Circle Indicates Duct Section Type, with Duct Complements Noted Below (Type "SA" Duct Indicated with 4-2"S Duct; S=Traffic Signal); See Sheet E-3 for Duct Section Details
	New Opticom Detector, Provide Necessary Mounting Brackets and Accessories		
	Existing Opticom Detector to Remain		
	Remove Opticom Detector		
	New Pedestrian Traffic Signal Head, Provide Necessary Mounting Brackets and Accessories		Sawcut Existing Sidewalk, AC Pavement, and Curb and Gutter to Install Ducts, and Patch to Match Existing; See Restoration Details on Civil Drawing Sheet
	Existing Pedestrian Traffic Signal Head to Remain		
	Remove Pedestrian Signal Head		
	New Pedestrian Pushbutton Shall Meet Current American With Disabilities Act (ADA) Accessibility Guidelines and will be Subject to Engineer's Approval See Details on Sheet E-11		
	Existing Pedestrian Pushbutton		
	Existing Type II Traffic Signal Standard to Remain		

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
	TRACED BY	
	DESIGNED BY	
	CHECKED BY	
	NOTED BY	
	APPROVED BY	

LAST DATE: 10/24/09
Z:\ADON\PROJECTS\2012\56A-02-05\56A-02-05-26121-SYMBOLS

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

ANDREW I. MIYASATO
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.

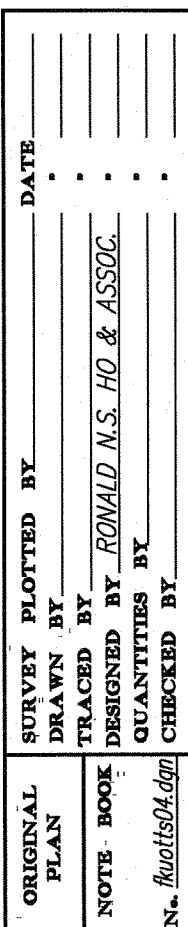
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION
Andrew I. Miyasato
Signature
Expiration Date of the License: 04/30/2010

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL
GENERAL NOTES & SYMBOLS
KUHIU HIGHWAY
Intersection Improvements
at Eha Street
Project No. 56A-02-05
Scale: Not to Scale Date: April 2009

SHEET No. E-1 OF 14 SHEETS

LAST SAVE: 12/29/08 @ 11:48:52 BY: KKO PLOT SC 1=10



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- A horizontal graphic scale bar. The bar is divided into segments by tick marks. Above the bar, the following values are labeled from left to right: 10', 5', 0, 10', 20', 30. The segments between 10' and 5', 5' and 0, 0 and 10', 10' and 20', and 20' and 30' are all of equal length. Below the bar, the text "SCALE:" is on the left, and "1"=10'" is on the right. Below "SCALE:" is the text "GRAPHIC SCALE".

1
E-4

Kuhio Highway/Eha Street – Existing & Demolition Work

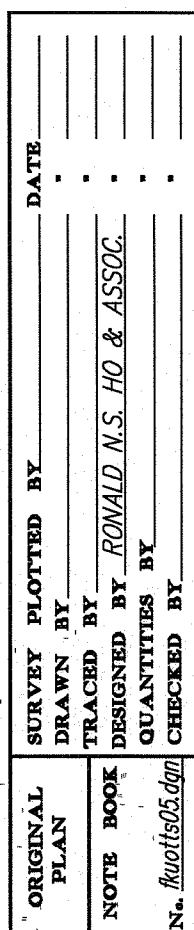
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL
EXIST. & DEMOLITION WORK
KUHIO HIGHWAY
Intersection Improvements
at Eha Street
Project No. 56A-02-05

Scale: As Noted Date: April 2009

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10' 5' 0 10' 20' 30'
SCALE: 1"=10'
GRAPHIC SCALE

1
F-5

Kuhio Highway/Eha Street – New Work

SCALE: 1"=10'

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

ANDREW I. MIYASATO
★ **LICENSED PROFESSIONAL ENGINEER** ★
No. 4340-E
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY
OR UNDER MY SUPERVISION

Andrew I. Miyasato
Signature 2009.03.31

Expiration Date of the License 04.30.20

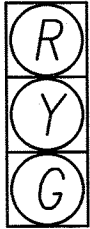
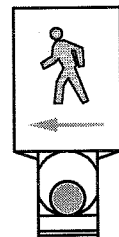
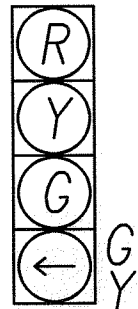
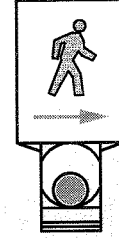
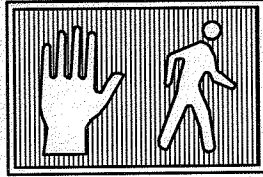
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL
NEW WORK
KUHIO HIGHWAY
Intersection Improvements
at Eha Street
Project No. 56A-02-05


Scale: As Noted Date: April 2009

SHEET No. E-5 OF 14 SHEETS

TRAFFIC SIGNAL SYSTEM CONDUIT & CABLE DATA																			
CONDUIT	CABLE	ITEM DESCRIPTION FOR CONDUIT SIZE AND CABLE QUANTITY																	
		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬					
Existing Conduit And Cable																			
2"	Type 1	1		1	1	1		1	1					1					
2"	Type 1	1																	
2"	Type 2	4	1	6	5	4	2	1						3					
2"	Type 2	6																	
2"	Type 7	4		1	1				1					2					
2"	Spare (P.C.)					1													
New Conduit And Cable																			
2"	Type 1									1	1		1						
2"	Type 2									2	3	2	5						
2"	Type 7									1	2		2						
2"	Spare (P.C.)									1	1		1						
2"	Spare (P.C.)									1	1		1						
Install New Type 2 Cable		2												2					
In Existing 2" Conduit																			
<div>Notes: Type 1 Cable (Load Circuits) P.C. (Pull Cord)</div> <div> Type 2 Cable (Loop/Ped)</div> <div> Type 3 Cable (Interconnect)</div> <div> Type 6 Cable (Power)</div> <div> Type 7 Cable (Opticom)</div>																			

NEW TRAFFIC SIGNAL HEAD SCHEDULE			
TRAFFIC SIGNAL HEAD TYPE AND DESCRIPTION	POLE LETTER – SIGNAL HEAD NUMBER	TRAFFIC SIGNAL HEAD TYPE AND DESCRIPTION	POLE LETTER – SIGNAL HEAD NUMBER
 12" RYG Traffic Signal Head	G-2 H-3	 Pedestrian Push Button	H-4
 12" RYGA Traffic Signal Head	J-1	 Pedestrian Push Button	G-1
Opticom Head	H-2	 Pedestrian Signal Head	G-3 H-1

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ELECTRICAL ENGINEERS



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OR UNDER MY SUPERVISION

Andrew L. Miyasato
Signature 2008.03.17

Expiration Date of the License:
04.30.2010

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**TRAFFIC SIGNAL CONDUIT,
CABLE & HEAD SCHEDULE**

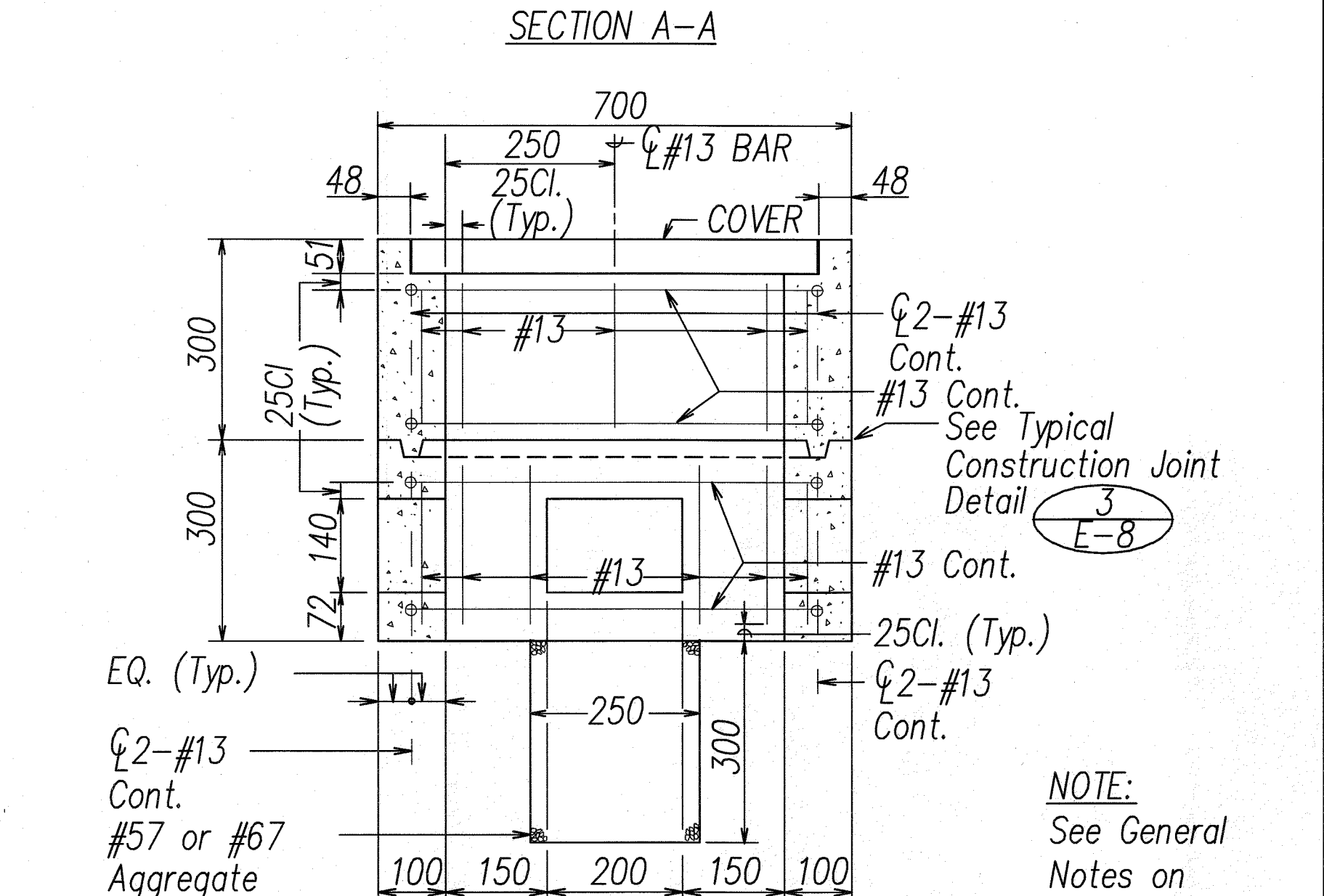
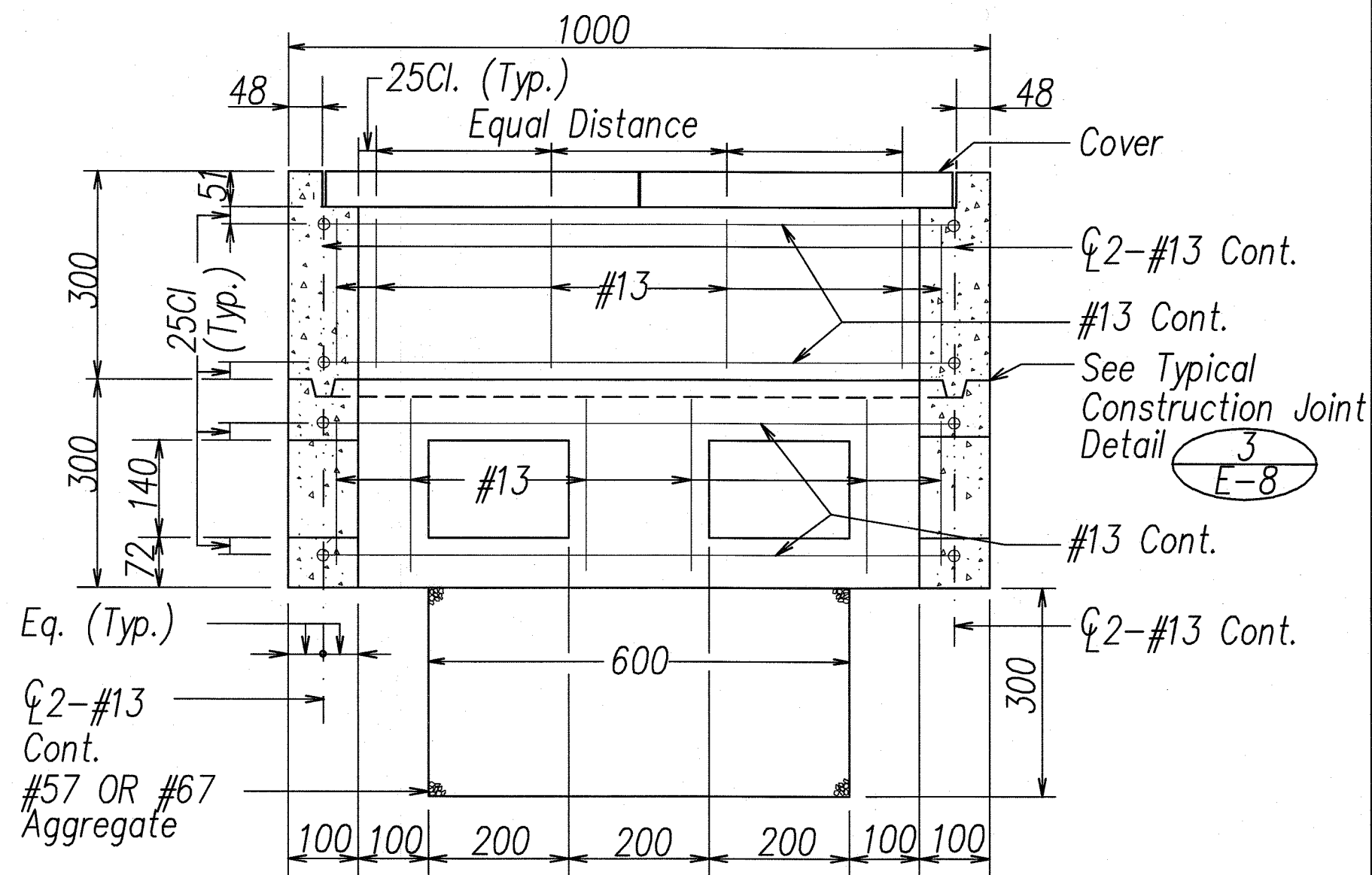
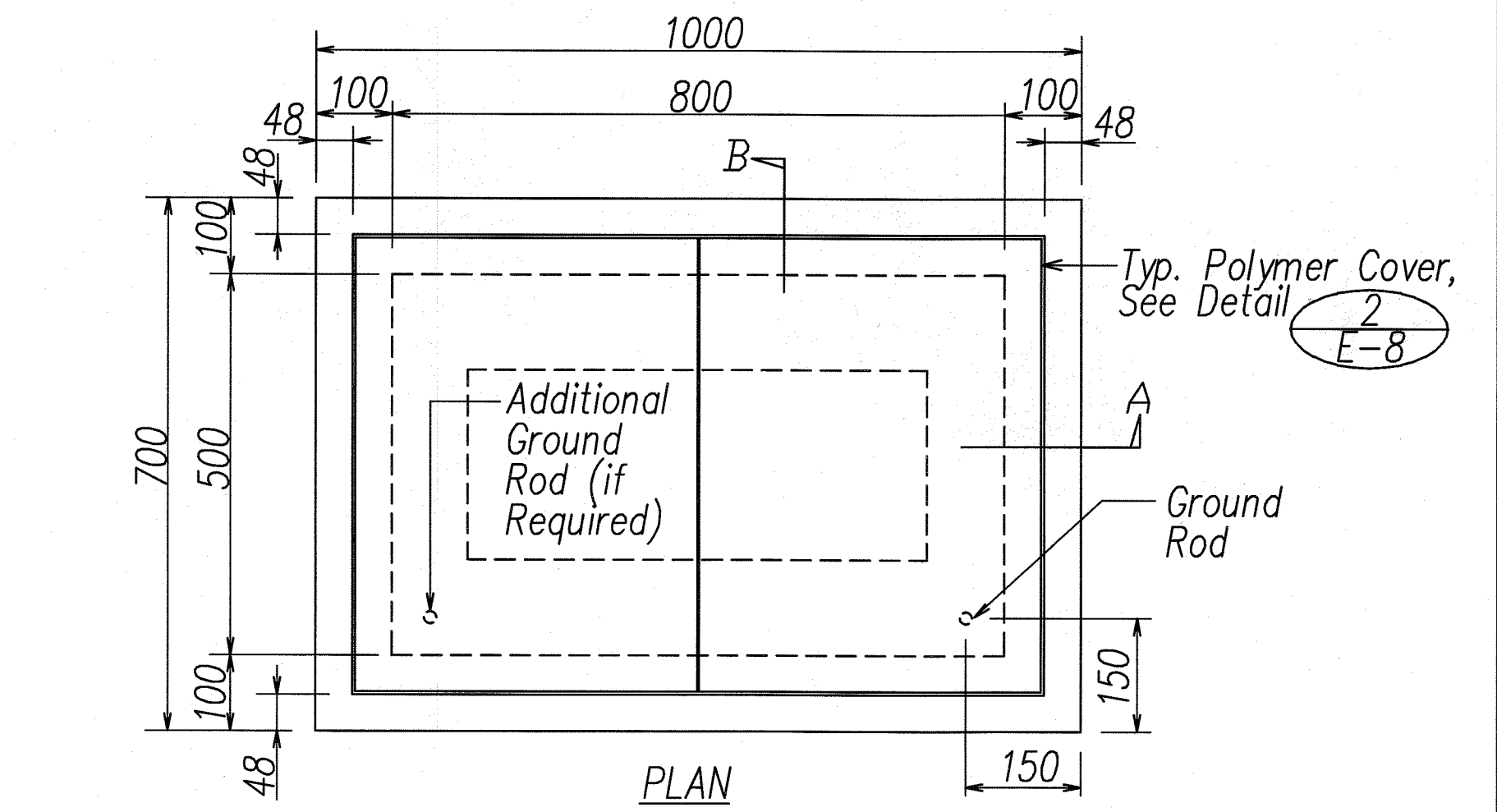
KUHTO HIGHWAY

Intersection Improvements
at Eha Street

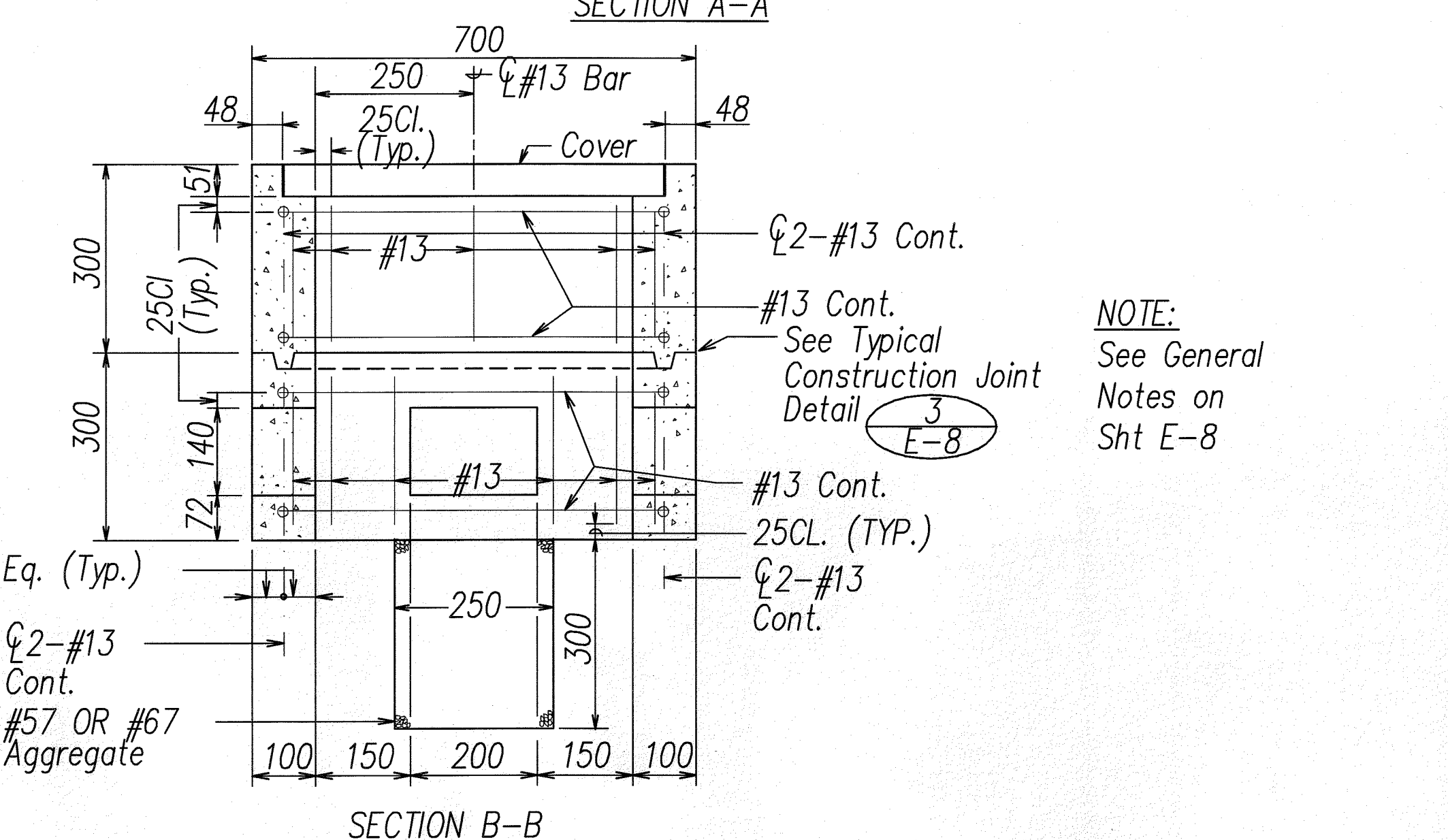
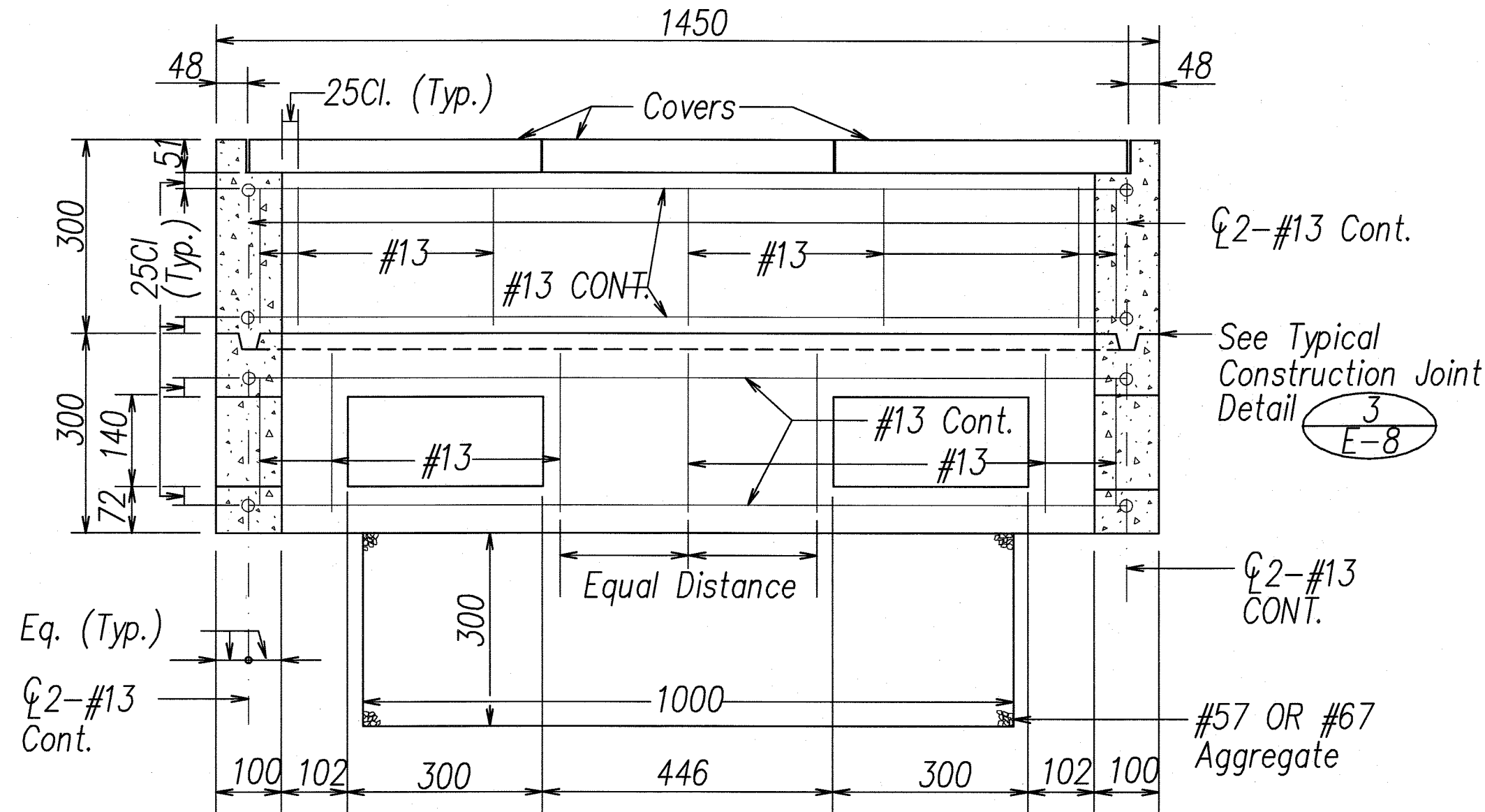
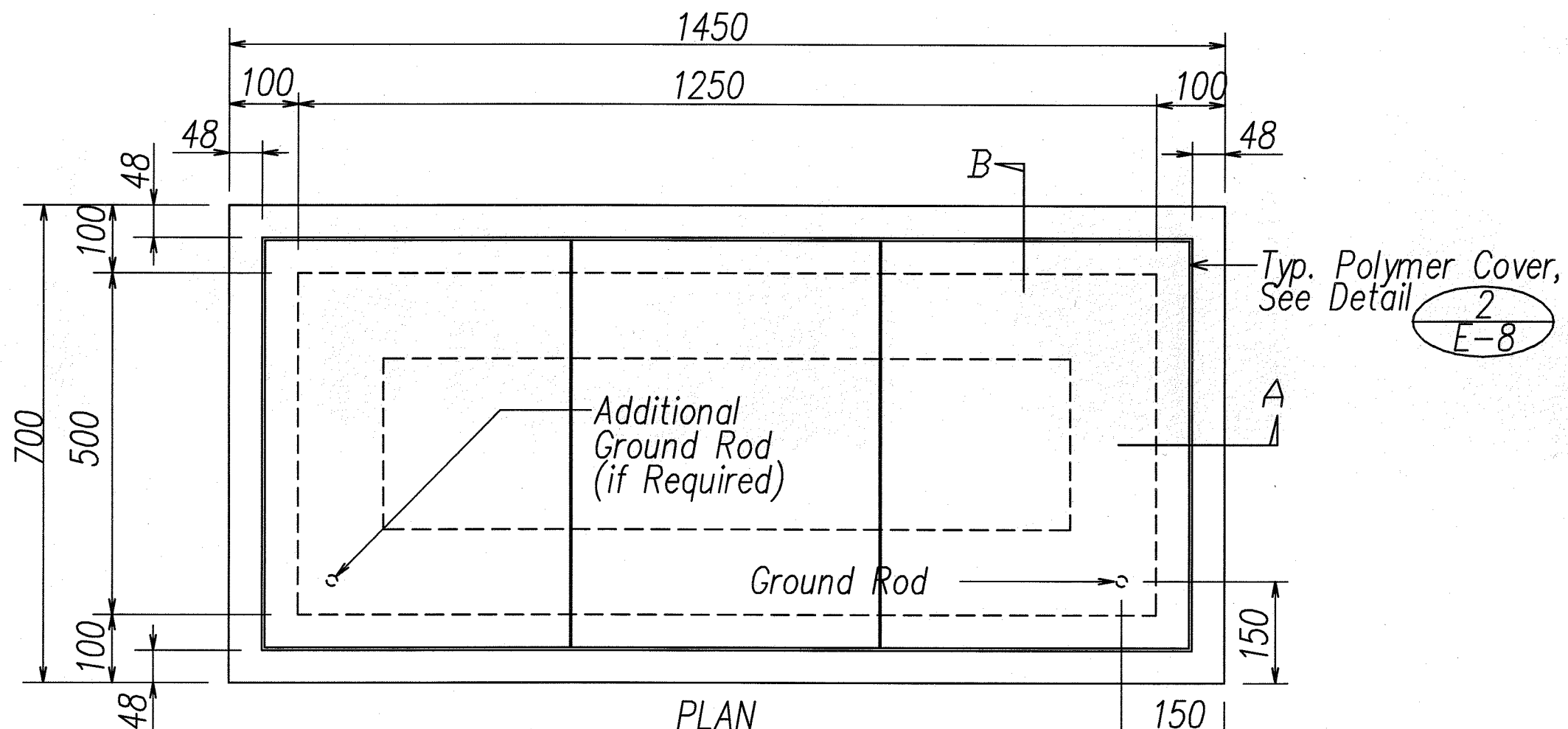
Project No. 56A-02-05

Scale: Not to Scale Date: April 2009

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56A-02-05	2009	32	39



1
E-7
TYPE "B" PULLBOX (OLD TYPE "C")
NOT TO SCALE



2
E-7
TYPE "C" PULLBOX (OLD TYPE "D")
NOT TO SCALE

All Dimensions on this Sheet are in Millimeters

SURVEY PLOTTED BY	DATE
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TRACED BY	
CHECKED BY	
NOTE BOOK	
NO. 10/10/07	

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ANDREW I. MIYAMOTO
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

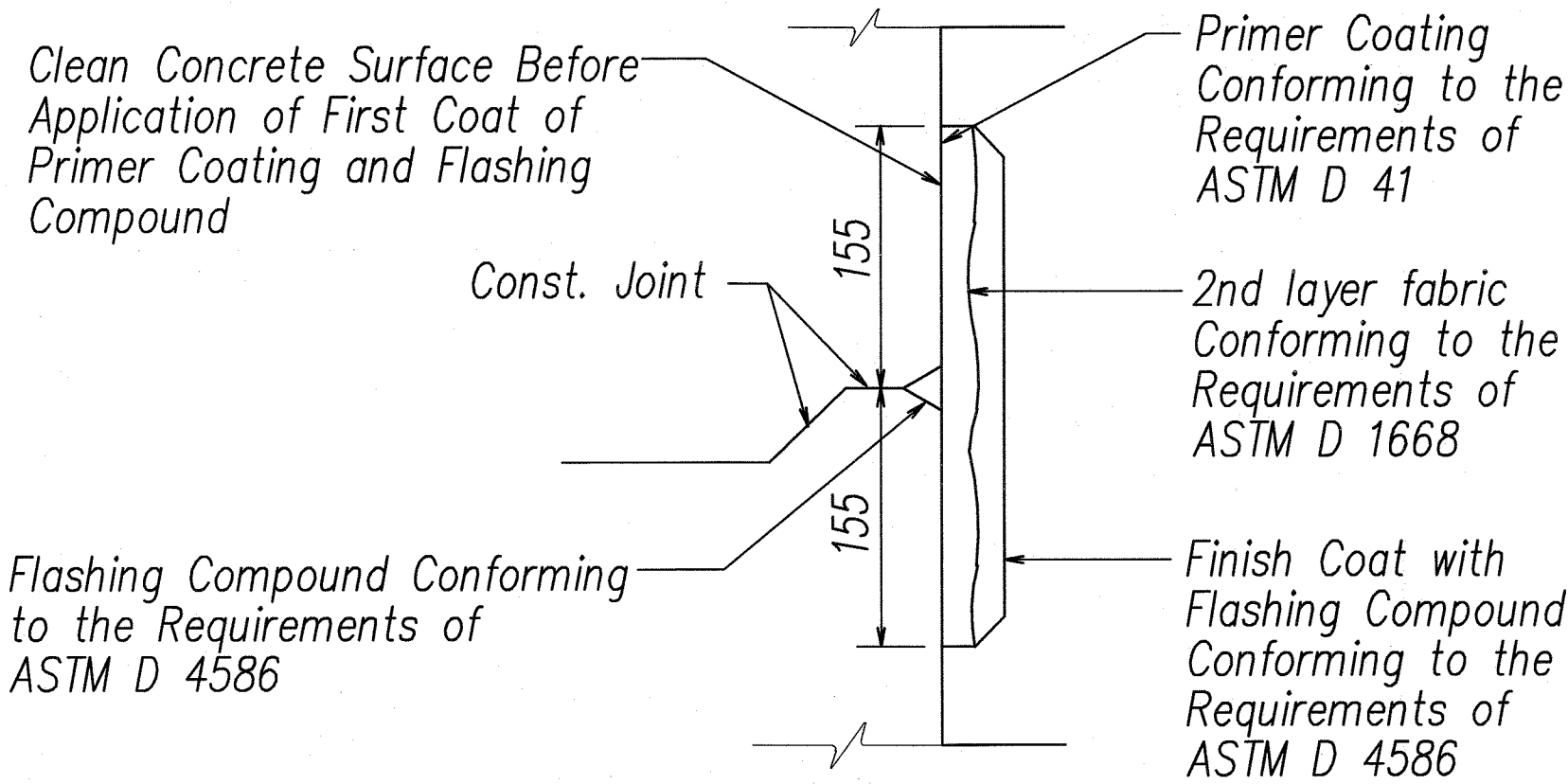
**TRAFFIC SIGNAL
PULLBOX DETAILS I**

KUHIO HIGHWAY
Intersection Improvements
at Eha Street
Project No. 56A-02-05

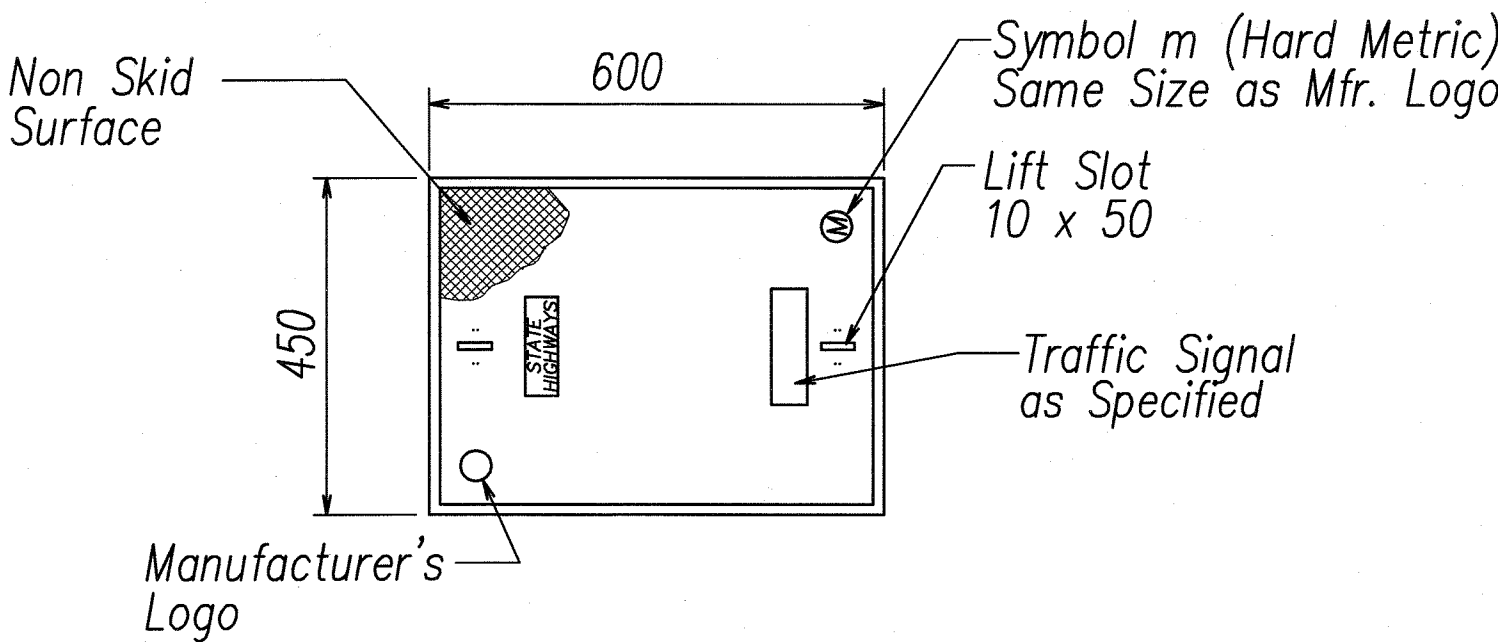
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GENERAL NOTES FOR TRAFFIC SIGNAL PULLBOX DETAILS

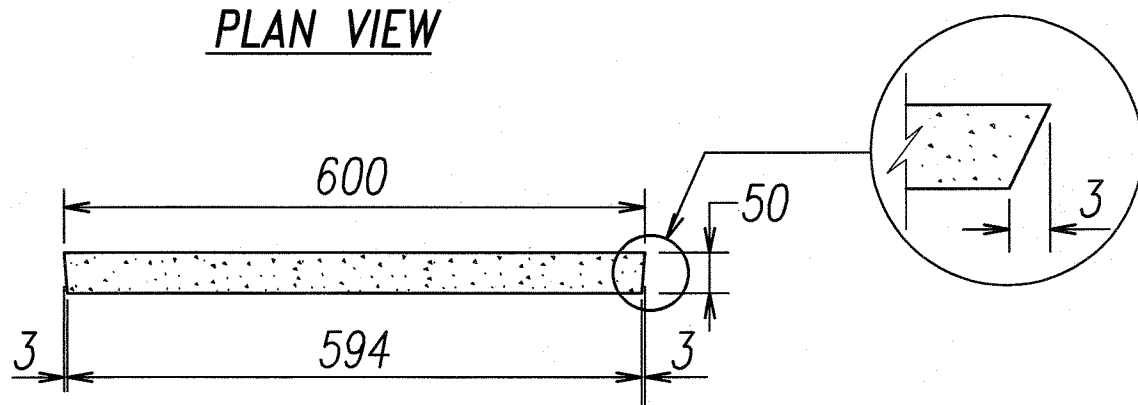
1. Provide a minimum of one 16 x 2.5m copperweld ground rod in each pullbox. When directed by the traffic signal inspector/engineer, install additional ground rods. Cost of ground rods shall be incidental to the pullboxes.
2. All pre-cast concrete pullboxes shall be manufactured in two pieces.
3. The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



1
E-8
TYPICAL FLASHING COMPOUND WATERPROOFING DETAILS
NOT TO SCALE



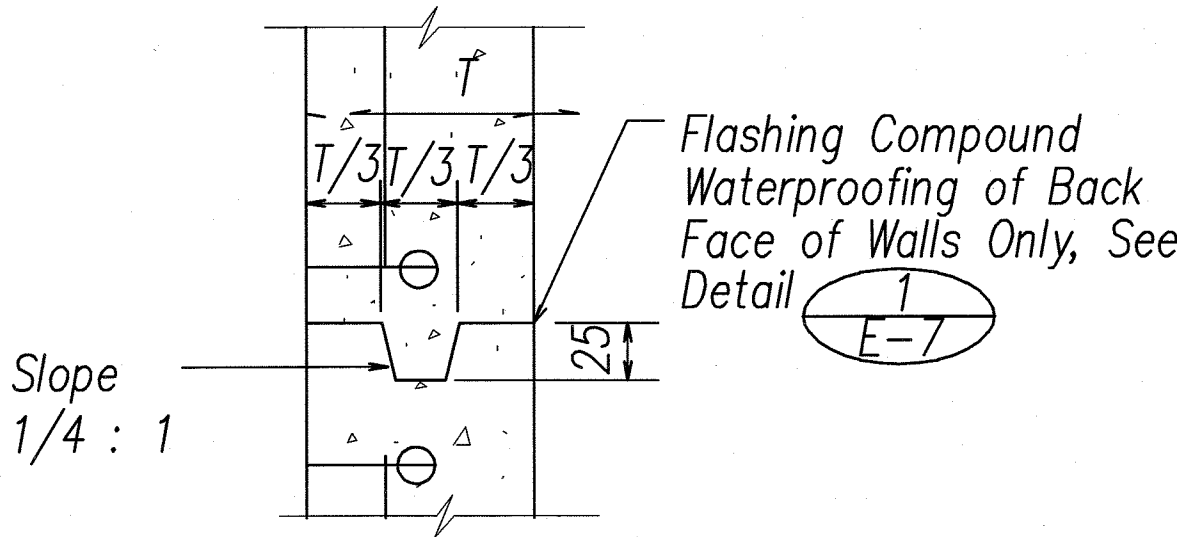
PLAN VIEW



ELEVATION

Note: See Traffic Signal Pullbox Details,
Sheet E-7

2
E-8
POLYMER CONCRETE COVER
NOT TO SCALE

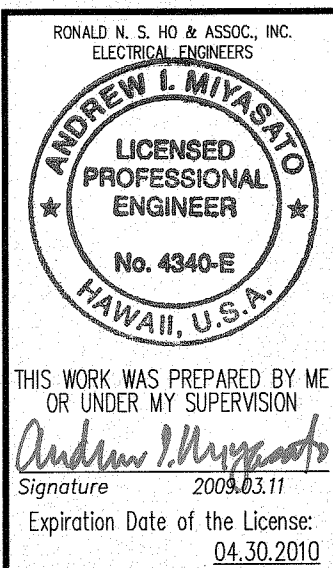


Note: See Traffic Signal Pullbox Details,
Sheet E-7

3
E-8
TYPICAL CONSTRUCTION JOINT DETAIL
NOT TO SCALE

All Dimensions on this
Sheet are in Millimeters
Unless Otherwise Shown

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56A-02-05	2009	33	39

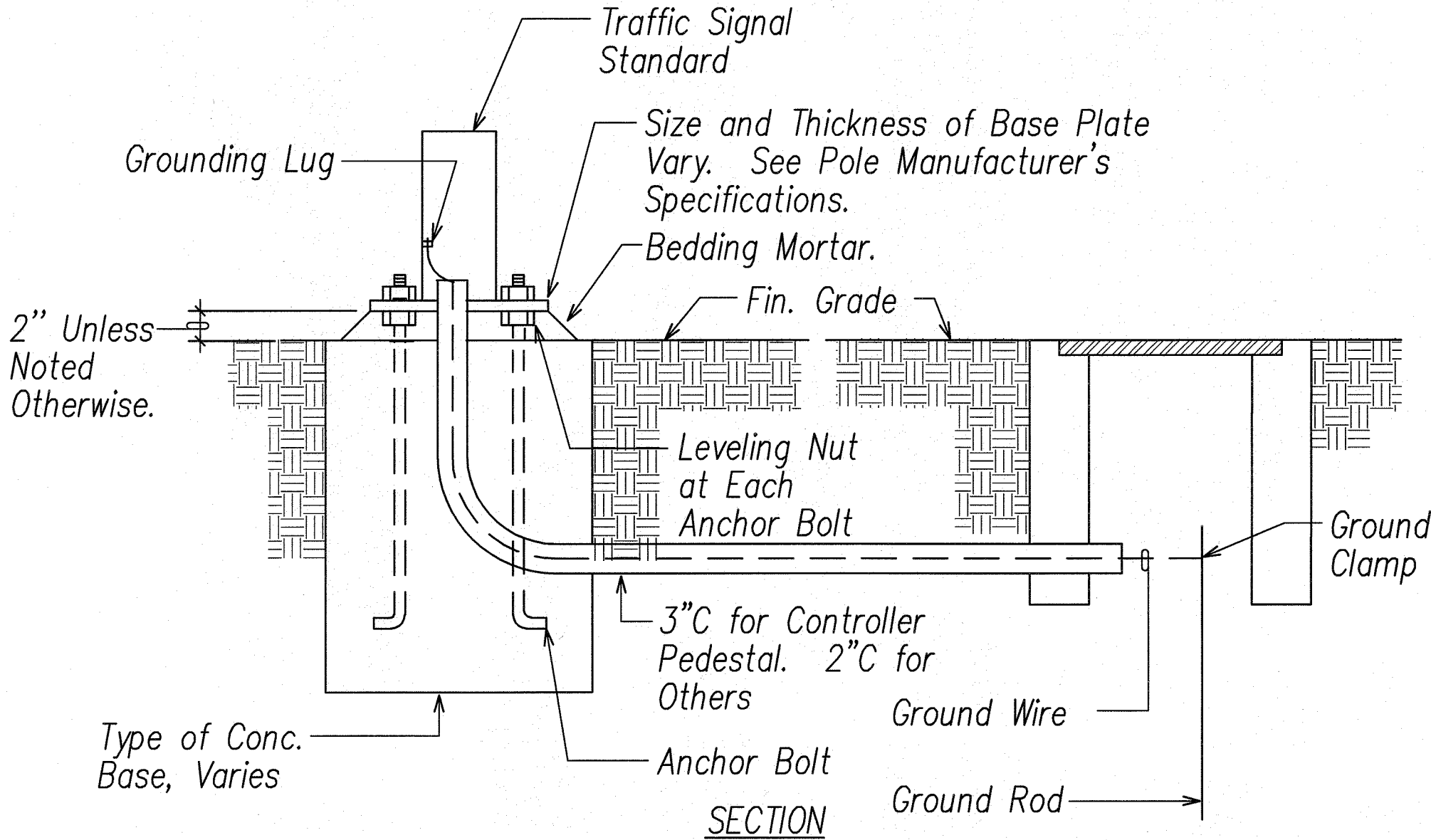
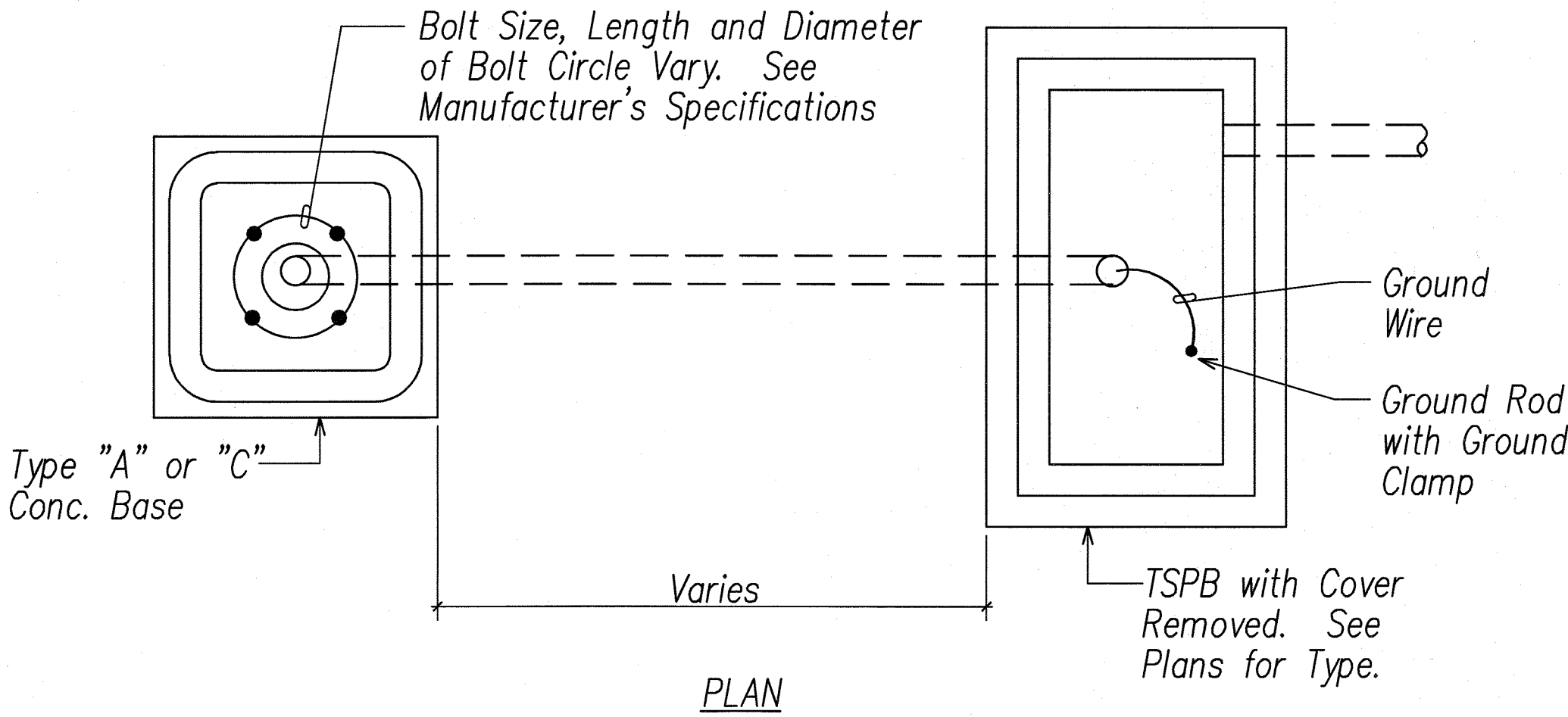
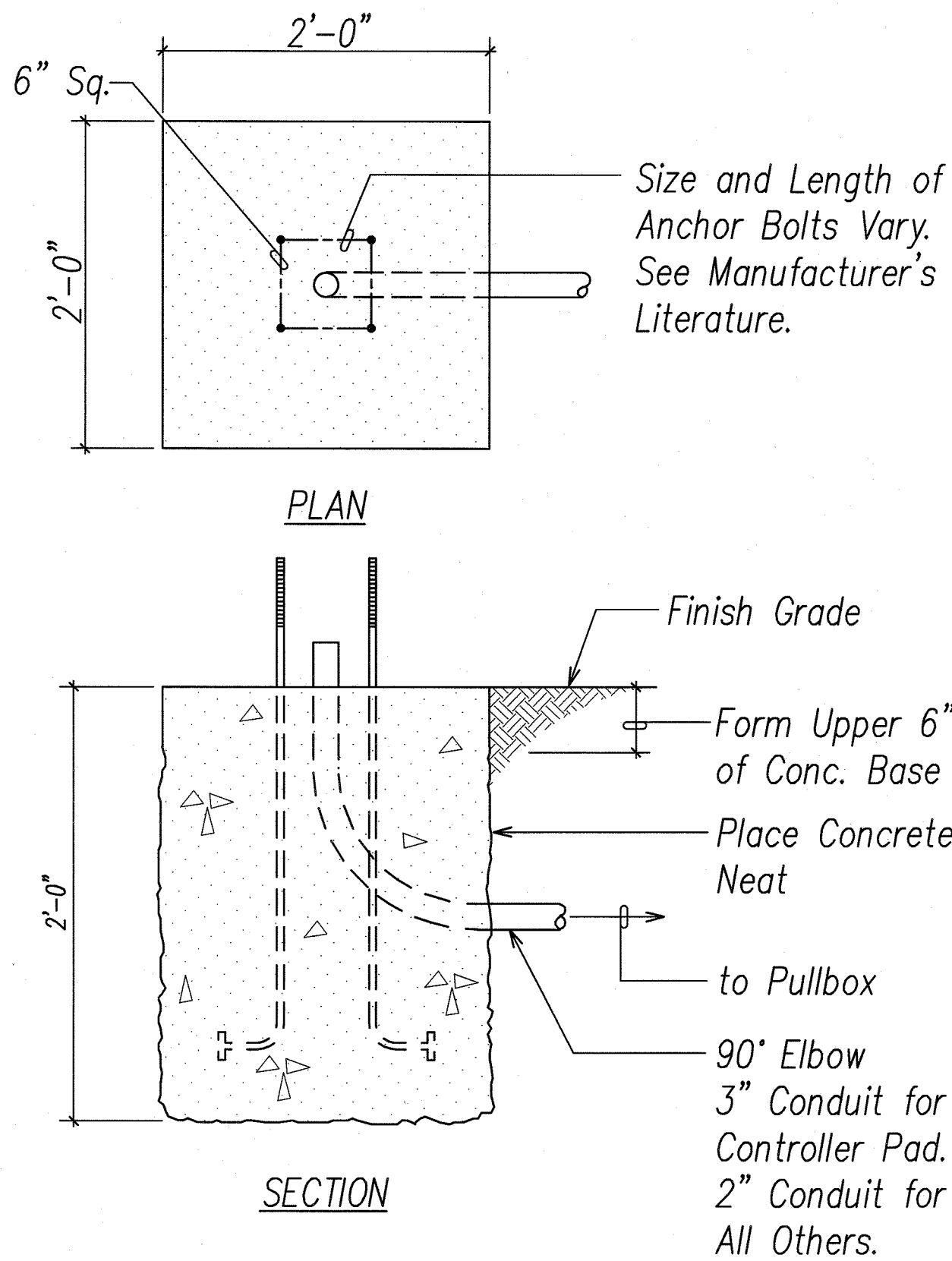


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**TRAFFIC SIGNAL
PULLBOX DETAILS II**
KUHIO HIGHWAY
**Intersection Improvements
at Eha Street**
Project No. 56A-02-05

Scale: Not to Scale Date: April 2009

SHEET No. E-8 OF 14 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56A-02-05	2009	35	39



2
E-10 **TYPICAL STANDARD & PEDESTAL DETAIL**
NOT TO SCALE

NOTES:

- Concrete shall be class "B".
- Type "A" concrete base shall be used for types I-7, I-10, I-12 and I-3 standards.
- Conduit bend is incidental to concrete base construction.

1
E-10 **TYPE "A" CONCRETE BASE**
NOT TO SCALE

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
	TRACED BY	
	CHECKED BY	
	DESIGNED BY	
	NOTED BY	
	REVIEWED BY	
	APPROVED BY	

LAST SAVE: 10/21/09 @ 07:42:30 PM. KNO PLOT SC: 1"=10'-4"
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ANDREW I. MIYASATO
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Signature: *Andrew I. Miyasato*
2009/03/11
Expiration Date of the License: 04/30/2010

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**TRAFFIC SIGNAL
DETAILS II**

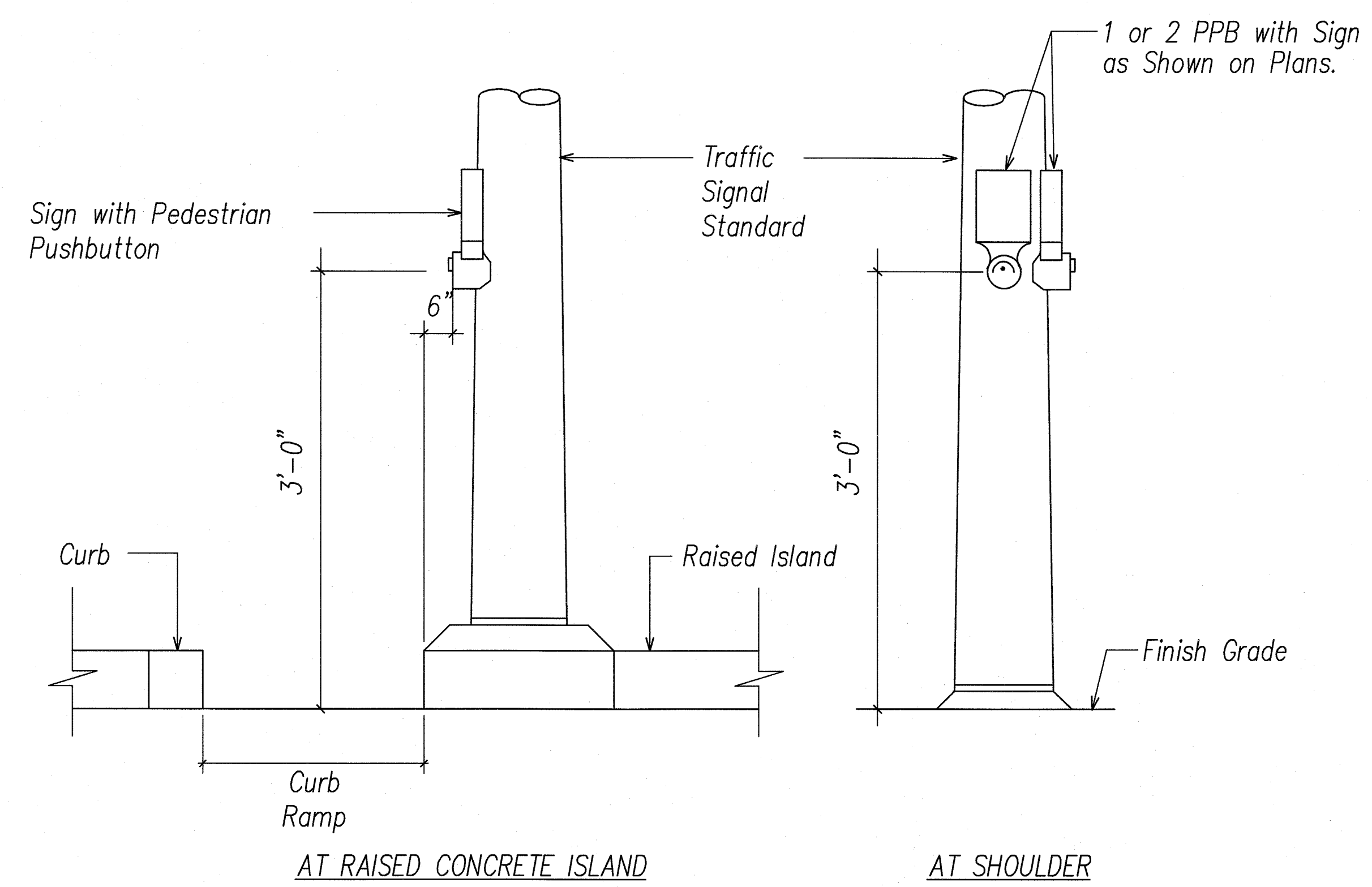
KUHIO HIGHWAY

**Intersection Improvements
at Eha Street**

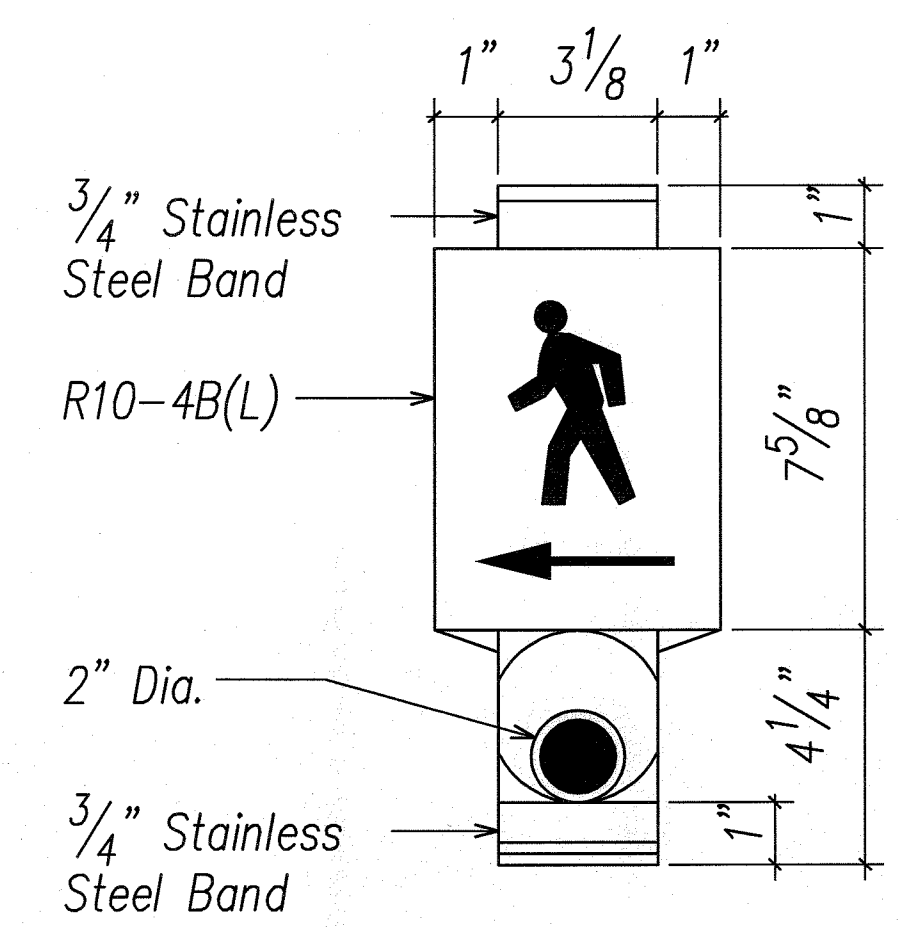
Project No. 56A-02-05

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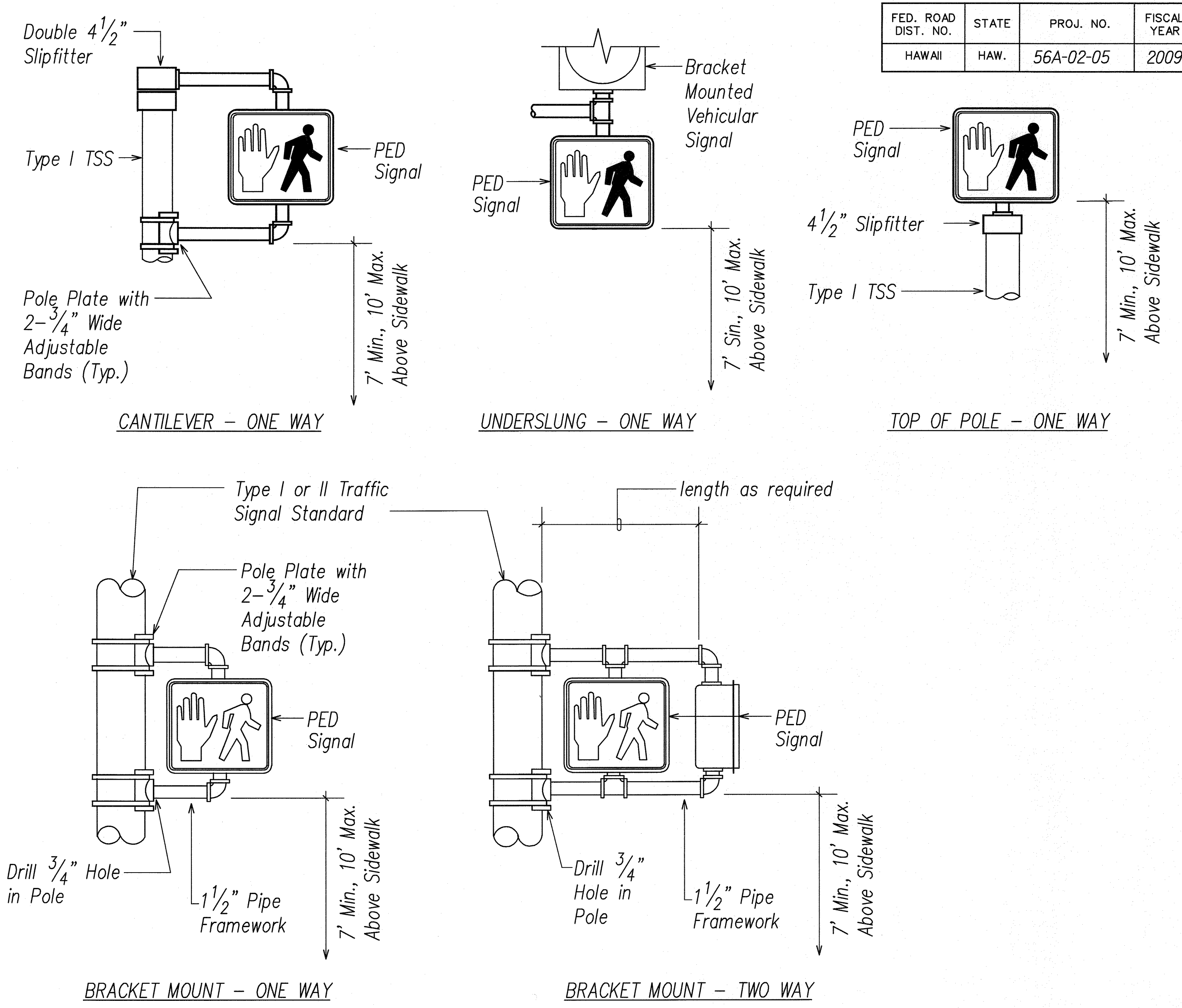
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56A-02-05	2009	36	39



- DETAIL NOTES:**
- The pedestrian pushbutton unit shall consist of a one piece assembly with a raise walking man, arrow indication and push button.
 - 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.
 - The color scheme shall be:
White – Man, arrow and pushbutton
Black – Background



1 PEDESTRIAN PUSHBUTTON DETAILS
E-11 NOT TO SCALE



- NOTES:**
- Stainless steel bands shall be 1/2" wide x .050" thick, minimum. tensile strength shall be 100,000 psi minimum.
 - Upper arm, lower arm and vertical support tube shall be of 356 cast aluminum.
 - All wiring shall be concealed.
 - Vertical tube clamp shall be of malleable iron, grade 32510.
 - All aluminum parts shall have an alodine 1200 finish.
 - Signal as noted on plans.
 - Maintain 16" min. clearance at rear of all programmed faces.

2 PEDESTRIAN SIGNAL MOUNTING DETAILS
E-11 NOT TO SCALE

SURVEY PLOTTED BY	DATE
DRAWN BY	
NOTED BY	
CHECKED BY	
APPROVED BY	

LAST SAVE: 10/27/09 @ 07:40:10 PM WCO PLOT 55: 11-04-11
Z:\ACAD\PROJECTS\56A\56A-02-05\56A-02-05.dwg XREFS: 258121-TS DETAILS

ANDREW I. MIYAMOTO
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.

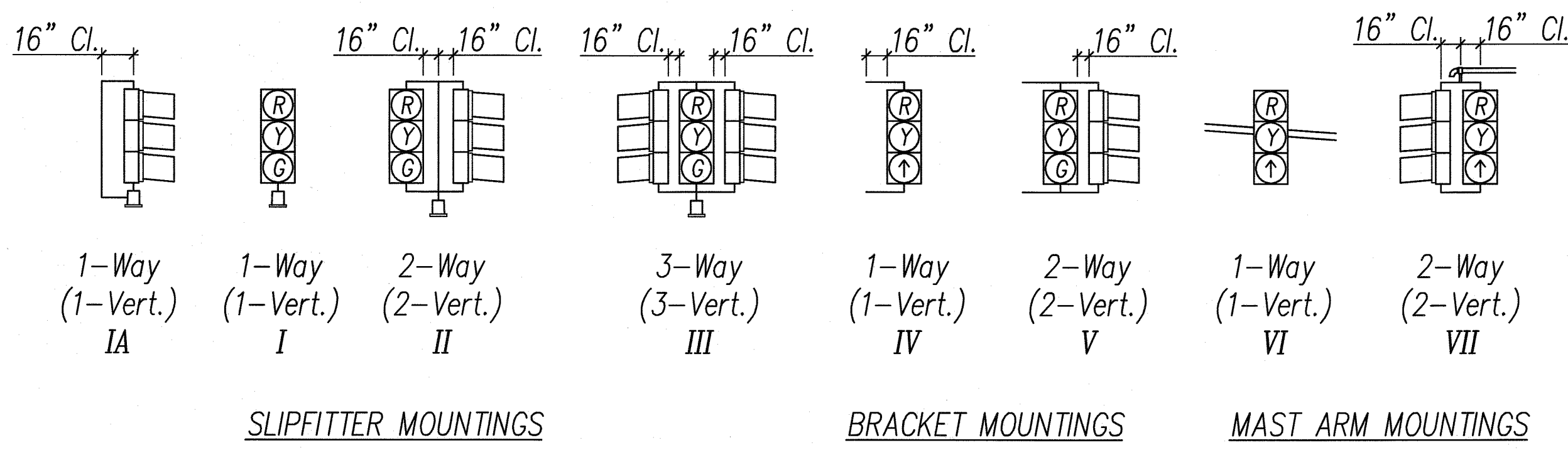
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Signature: *Andrew I. Miyamoto*
2009.03.11
Expiration Date of the License: 04.30.2010

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

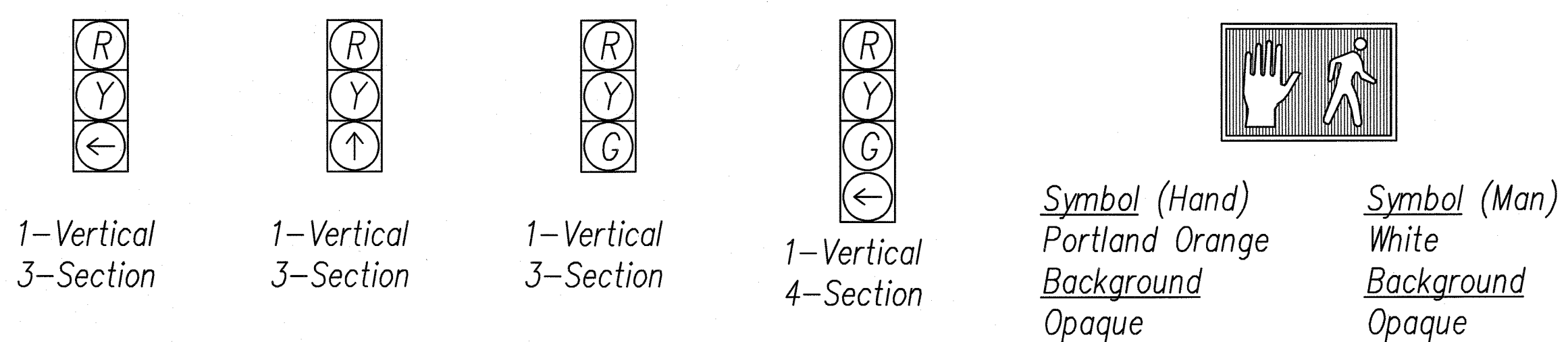
**TRAFFIC SIGNAL
DETAILS III**
KUHIO HIGHWAY
**Intersection Improvements
at Eha Street**
Project No. 56A-02-05

Scale: Not to Scale Date: April 2009

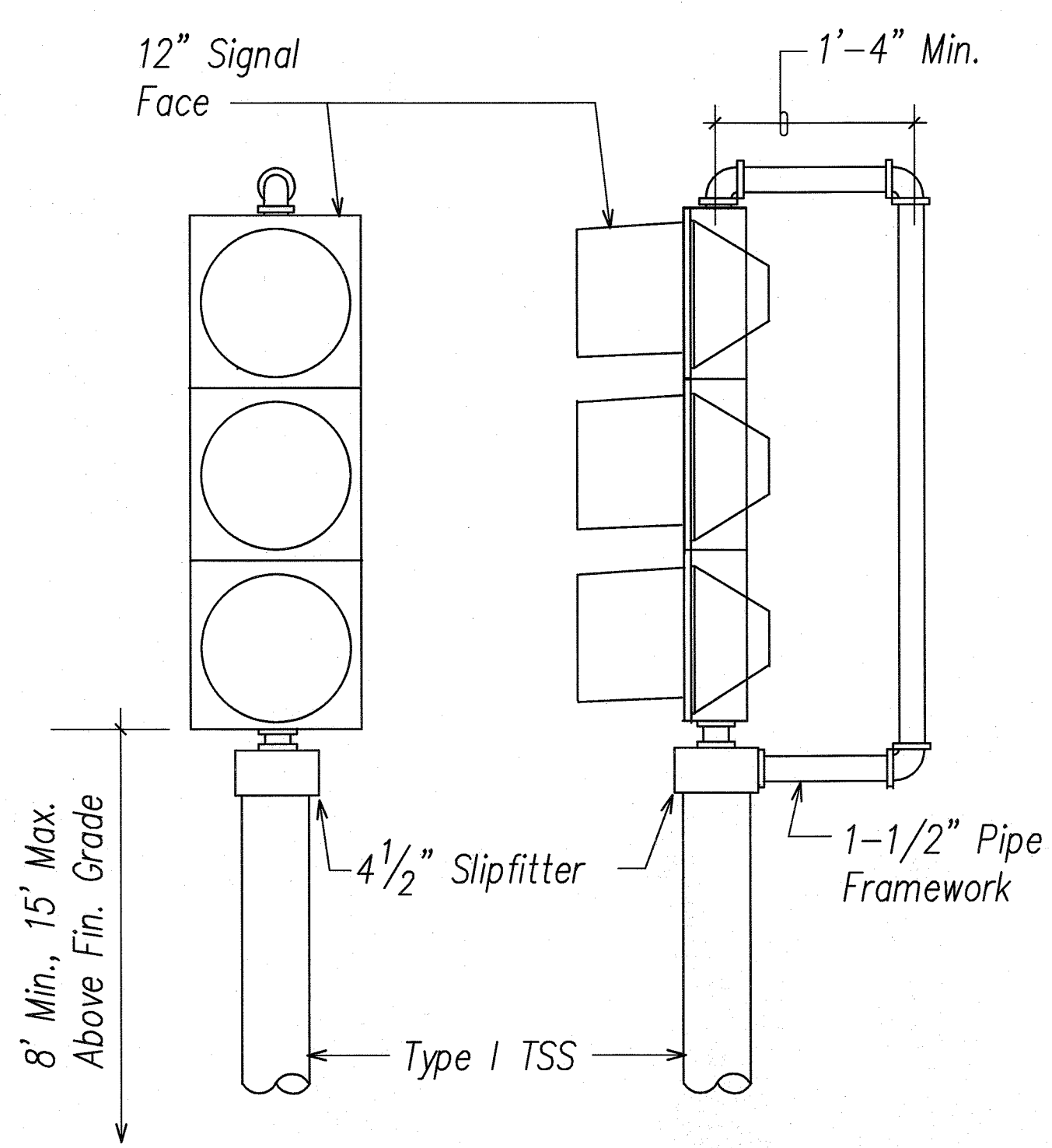
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56A-02-05	2009	37	39



TYPICAL VEHICULAR AND PEDESTRIAN SIGNAL MOUNTINGS

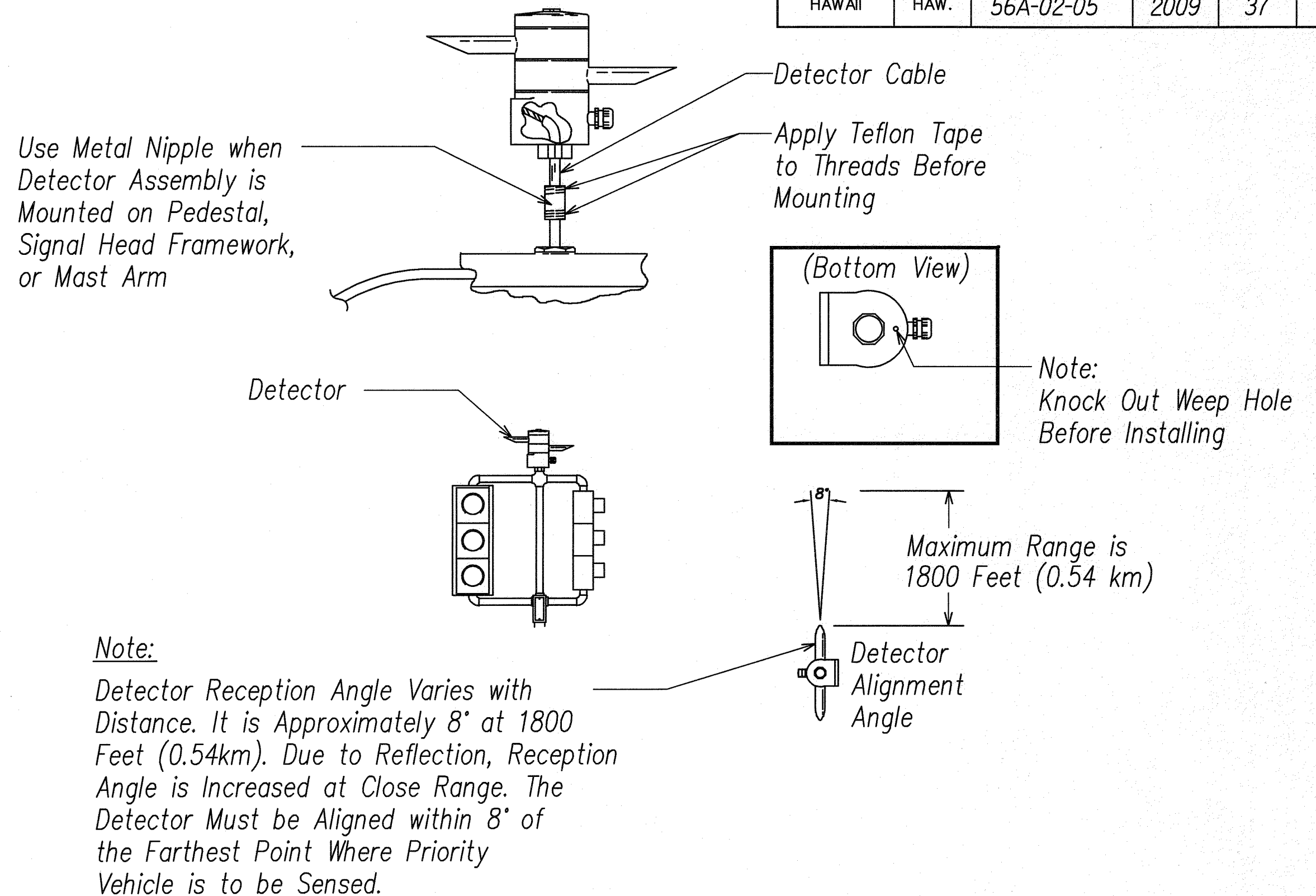


1 E-12 TYPICAL SIGNAL ARRANGEMENTS



TOP OF POLE - ONE WAY MOUNTING

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



2 E-12 TYPICAL PEDESTAL/MAST ARM INSTALLATION OF EVP DETECTOR NOT TO SCALE

SURVEY PLOTTED BY	DATE
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DESIGNED BY	
CHECKED BY	
APPROVED BY	
NOTED BY	
REVISIONS	
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ANDREW I. MIYASATO
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Signature: Andrew I. Miyasato
2008.11.17
Expiration Date of the License: 04.30.2010

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

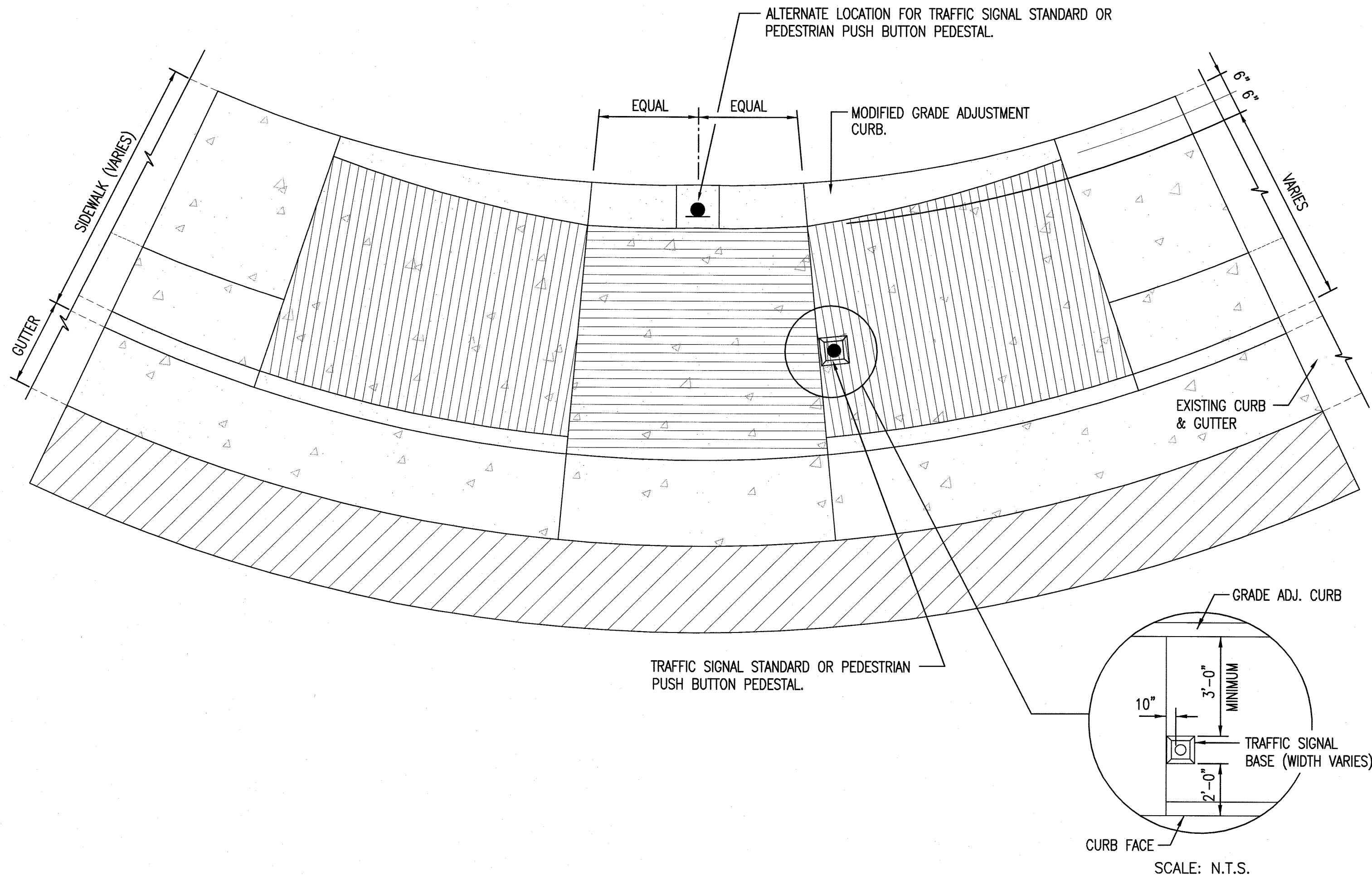
**TRAFFIC SIGNAL
DETAILS IV
KUHIO HIGHWAY**

**Intersection Improvements
at Eha Street**

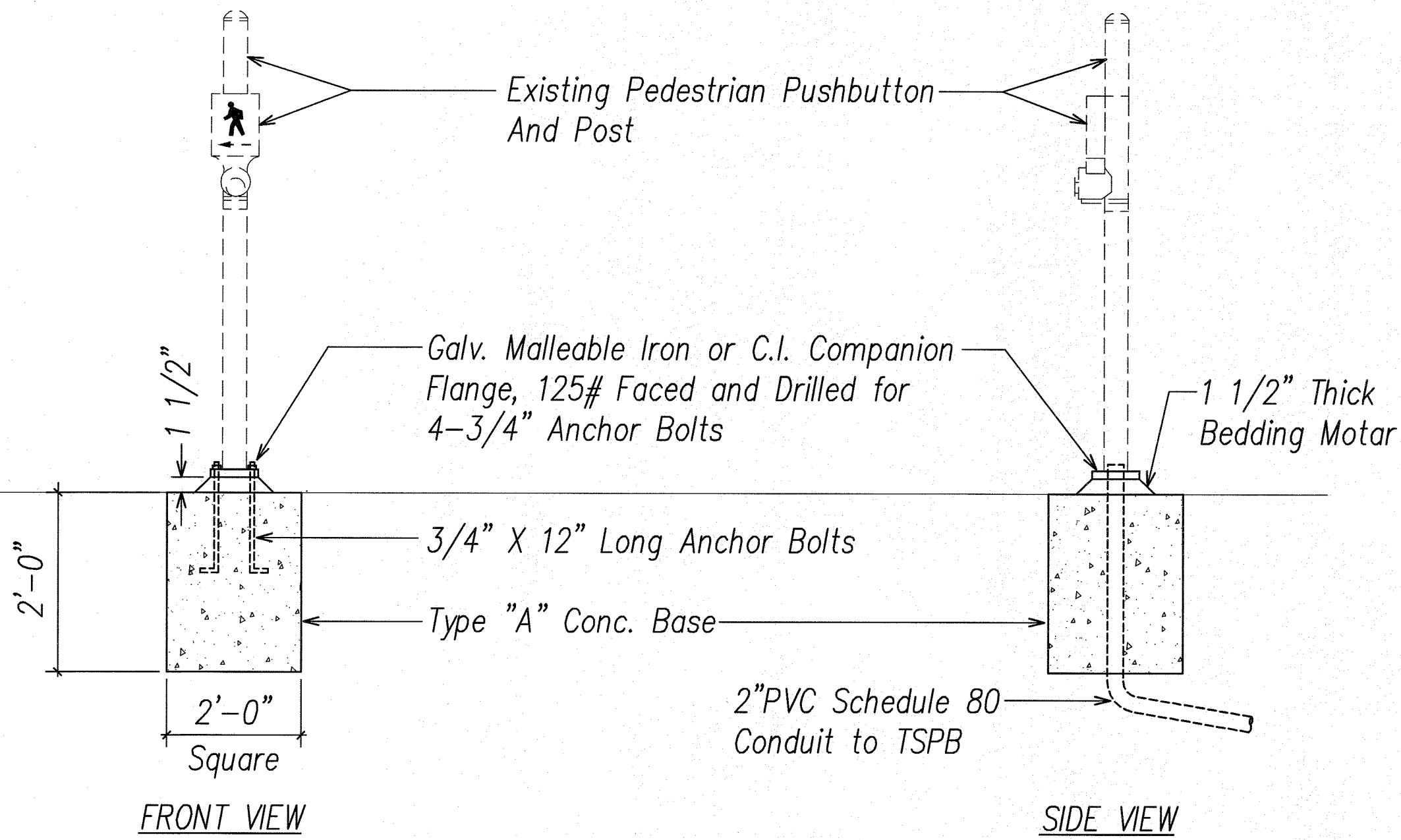
Project No. 56A-02-05

Scale: Not to Scale Date: April 2009

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56A-02-05	2009	38	39



1
E-13 **TRAFFIC SIGNAL STANDARD LOCATION @ CURB RAMP TYPE "B"**
NOT TO SCALE



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

2
E-13 **PEDESTRIAN PUSHBUTTON POST AND FOOTING DETAIL**
NOT TO SCALE

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DRAWN BY	
	TRACED BY	
	QUANTITIES BY	
	CHECKED BY	

LAST SAVE: 10/23/08 @ 02:41:18 BY: KMO PLOT SC: 1'-0"=1'-0"
Z:\ASD\PROJECTS\2821\2821-15-0000 V.XREFS: X2821-15 DETAILS

ANDREW I. MIYASATO
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

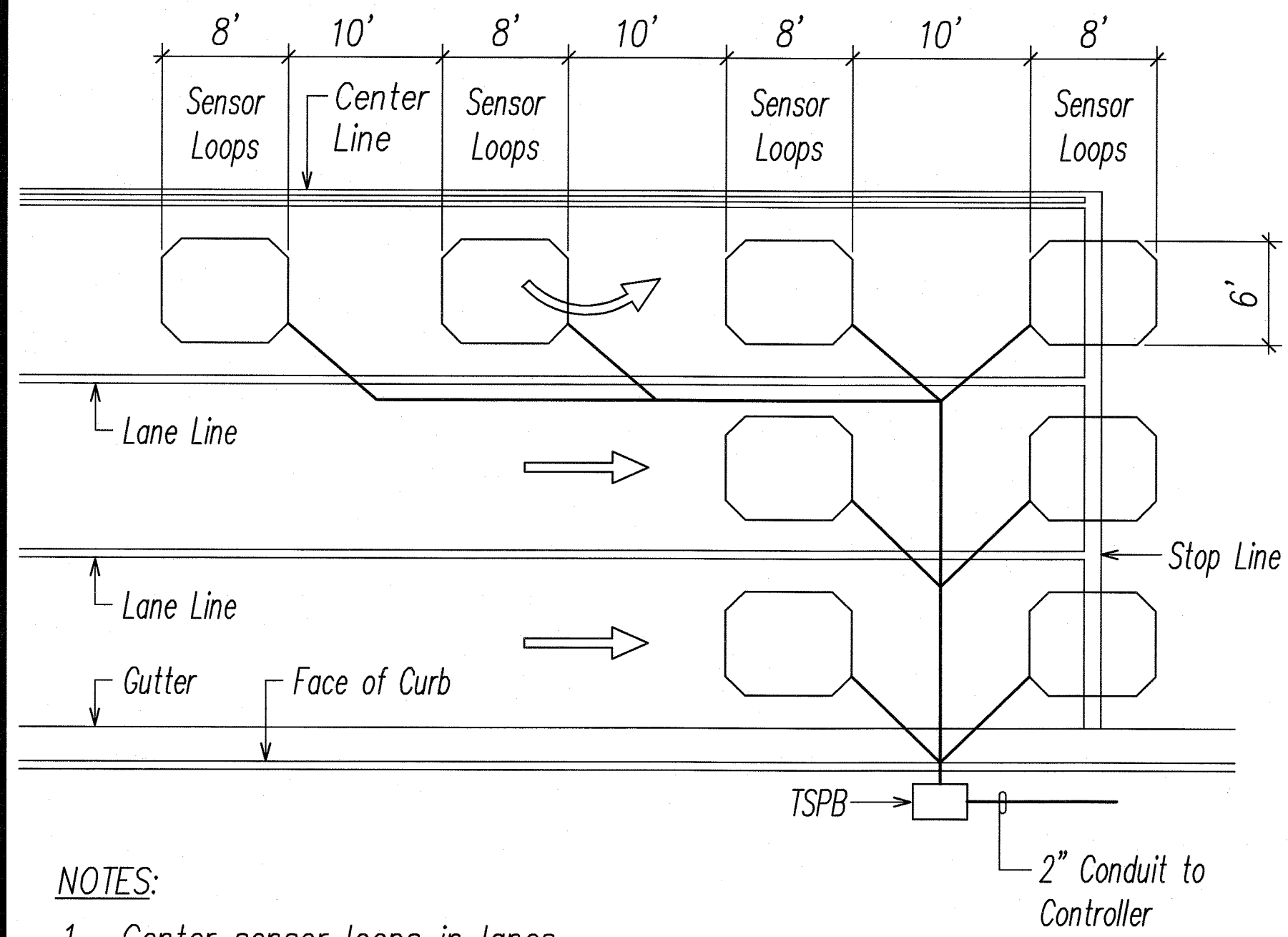
Signature: *Andrew I. Miyasato*
2009.03.11
Expiration Date of the License: 04.30.2010

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL DETAILS V
KUHIO HIGHWAY
Intersection Improvements at Eha Street
Project No. 56A-02-05

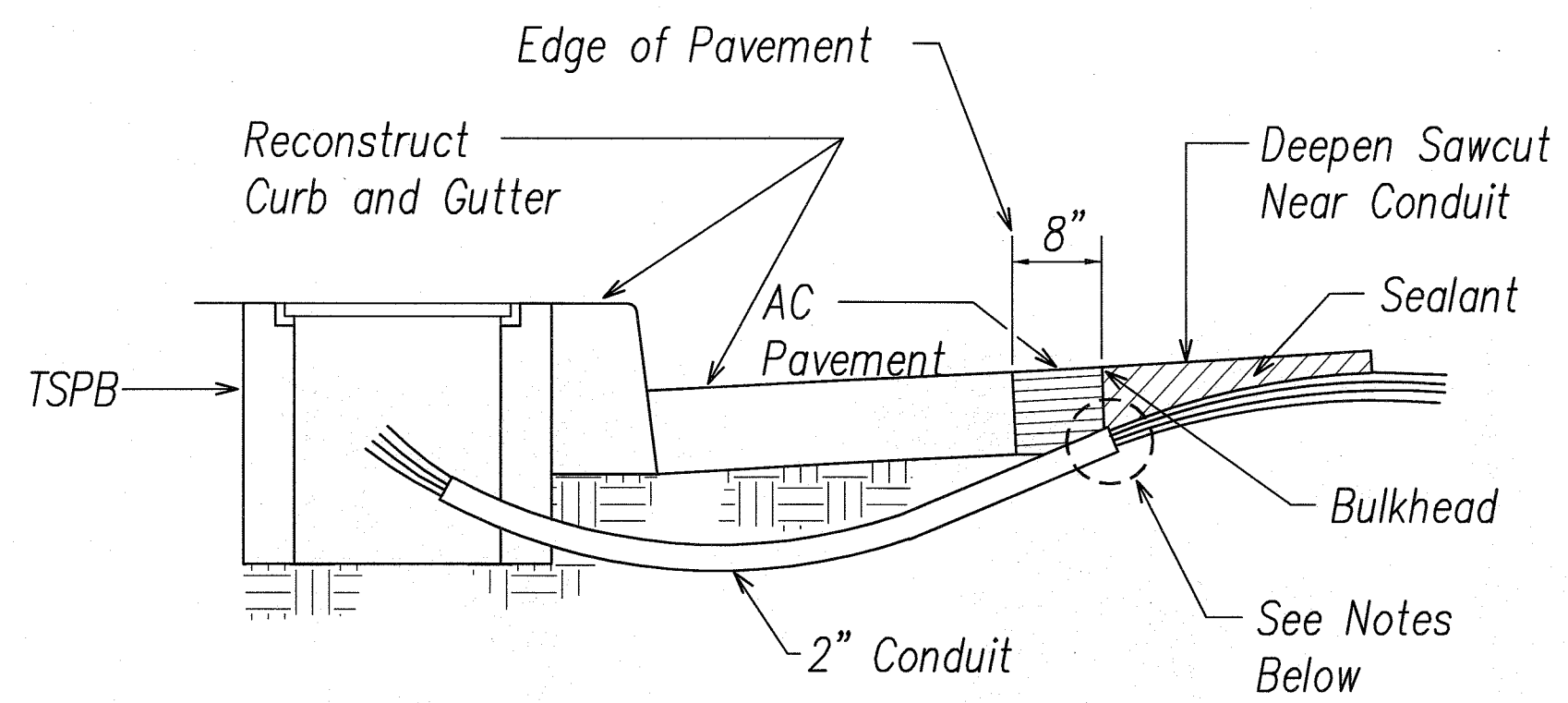
Scale: Not to Scale Date: April 2009

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	56A-02-05	2009	39	39



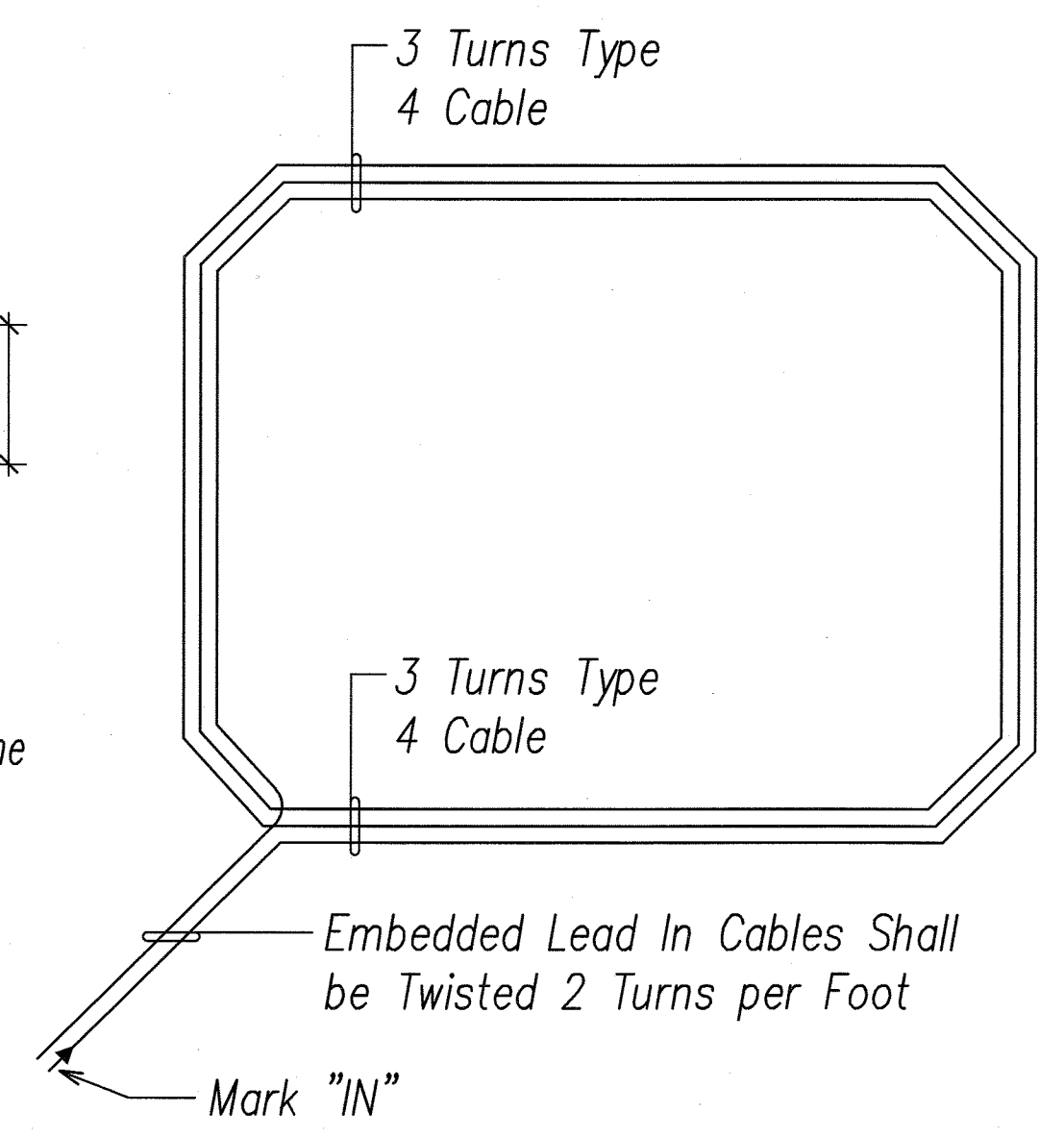
- NOTES:**
- Center sensor loops in lanes.
 - Center first loop in middle of stop line.
 - Collector cables shall be twisted 2 turns per foot.
 - Number of loops and locations vary. See project plans.
 - Number and locations of collector sawcuts may be varied in the field to suit.

1
E-14 **TYPICAL SENSOR LOOP LAYOUT**
NOT TO SCALE



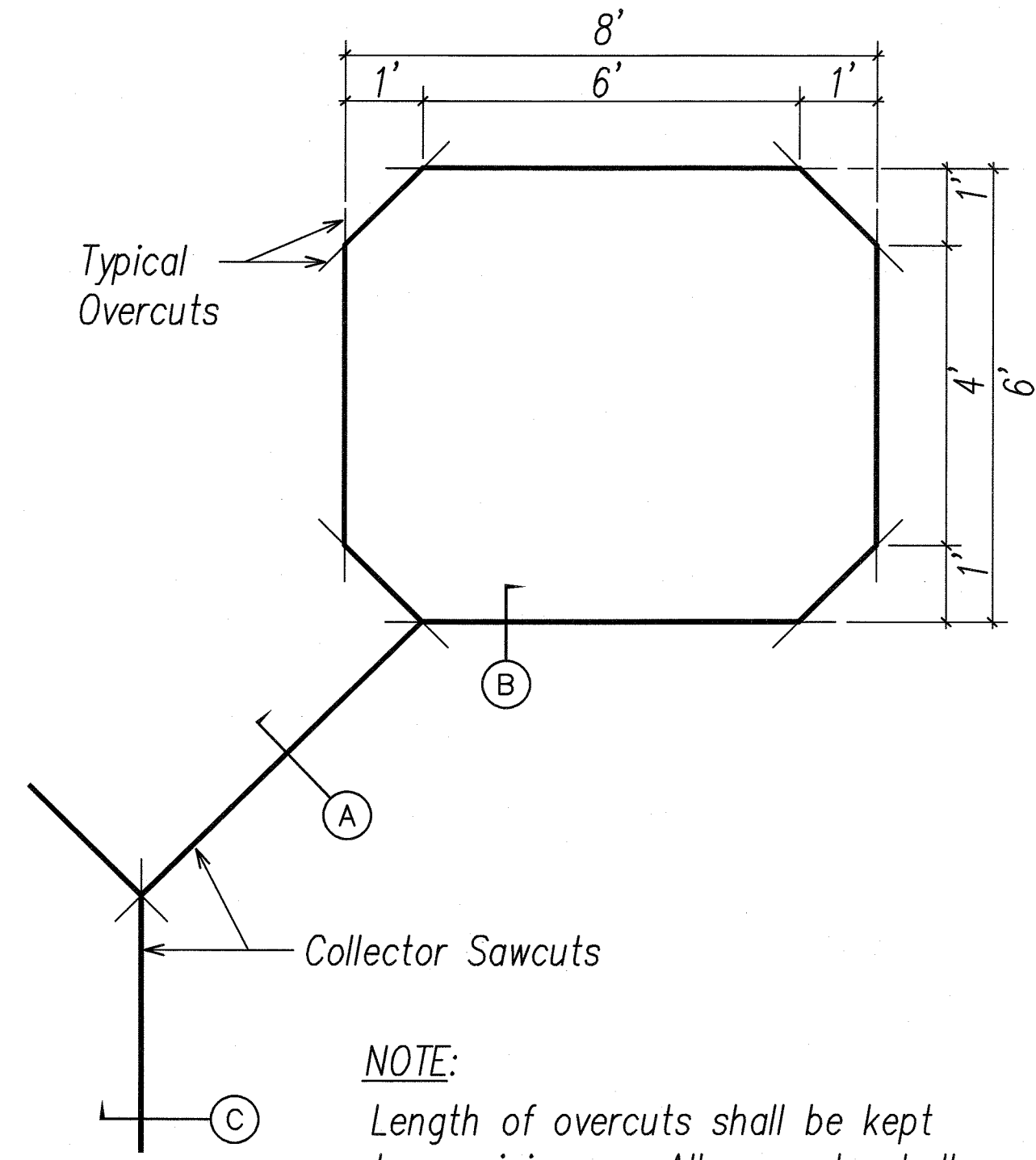
- NOTES:**
- Seal roadway end of conduit after installation of conductors.
 - Install bulkhead across conduit trench.
 - Place hot tar in sawcut.
 - Backfill over conduit with new a.c.
 - Reconstruct curb and gutter as required.

2
E-14 **DETAIL OF SENSOR LOOP INSTALLATION AT EDGE OF ROADWAY**
NOT TO SCALE



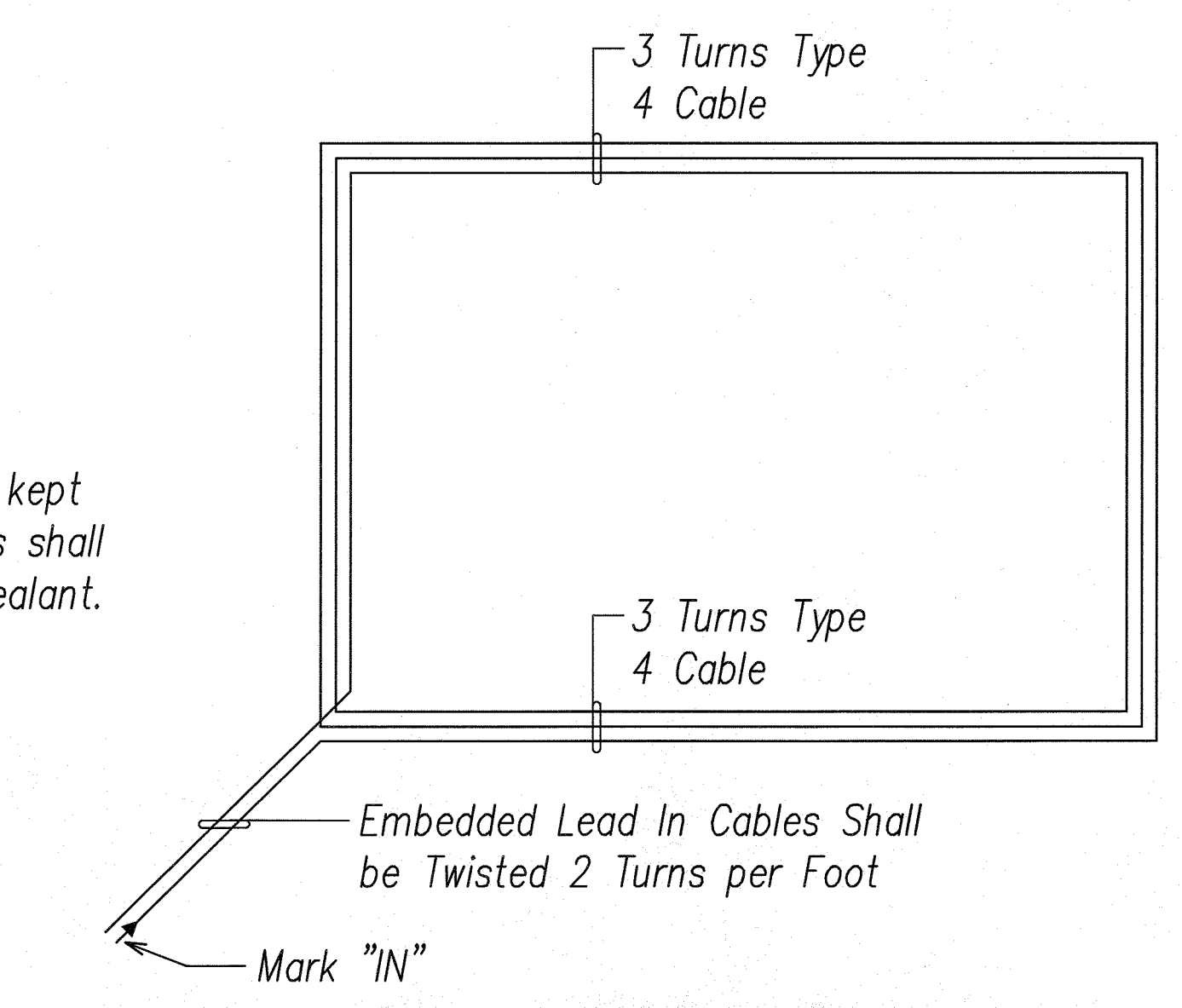
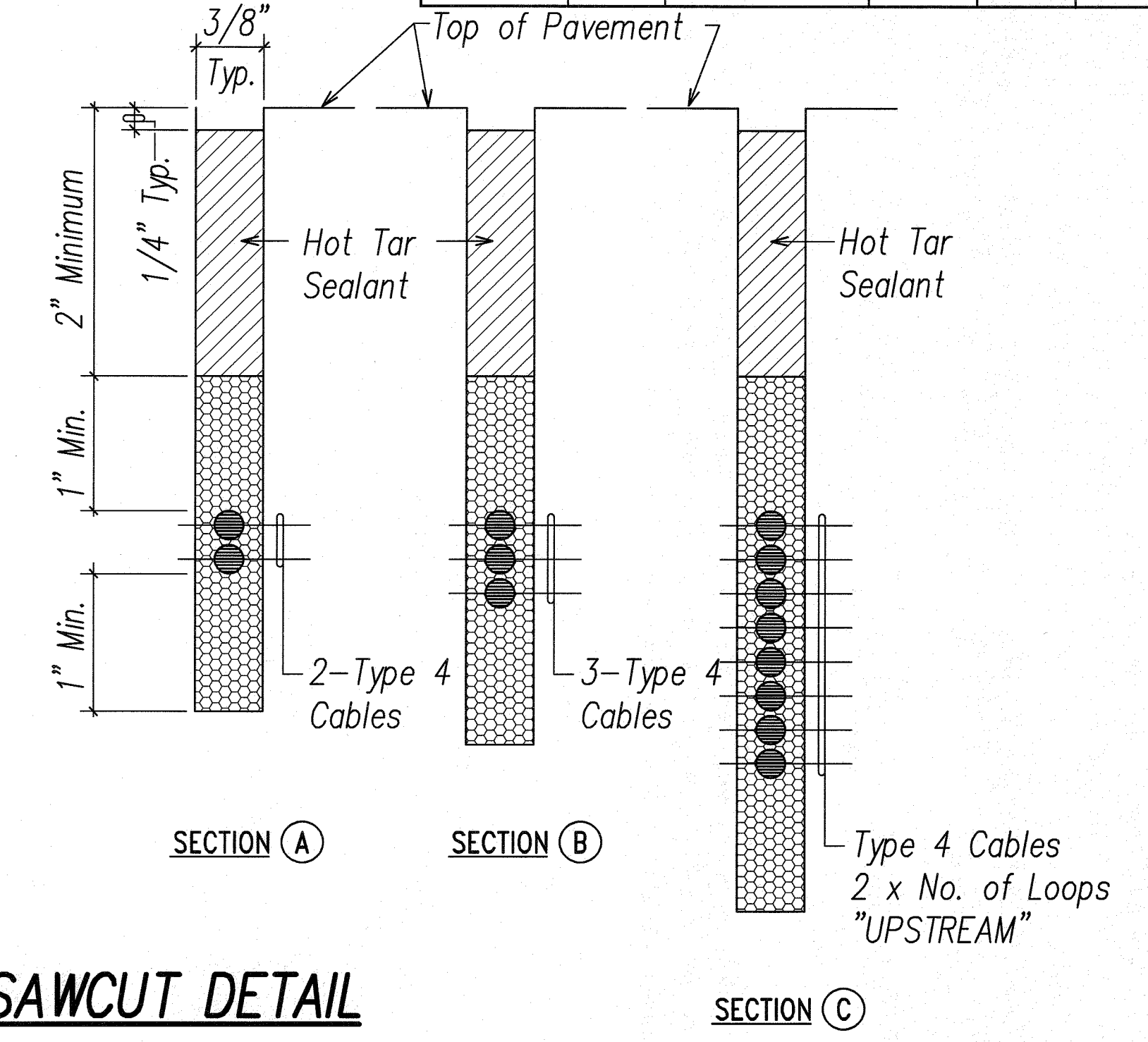
NOTE: Type 4 Cable – Loop Sensor Cable: Solid No. 12, Single Conductor to IMSA Spec 51-5

3
E-14 **TYPICAL SENSOR LOOP WIRING DIAGRAM**
NOT TO SCALE

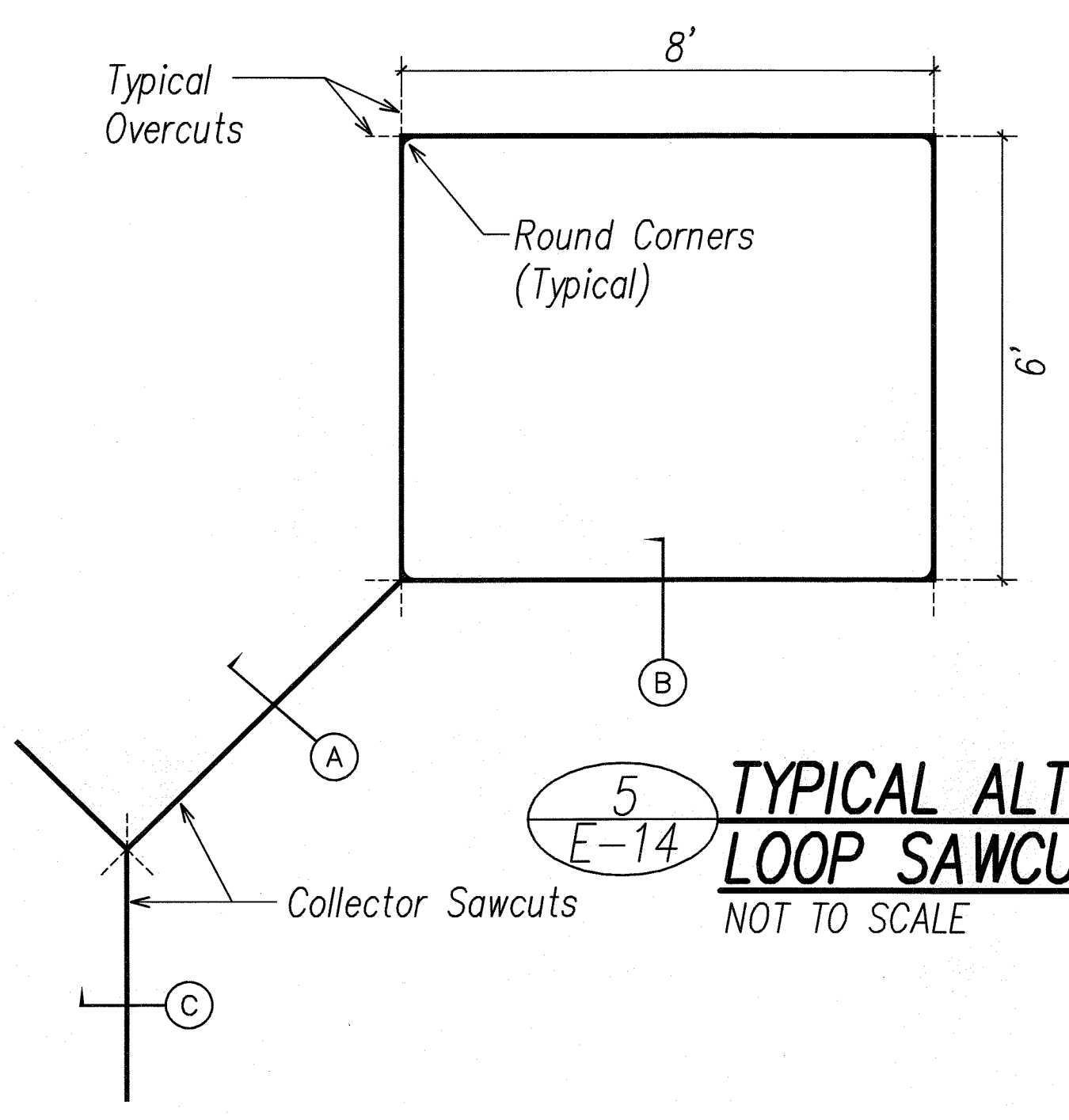


NOTE: Length of overcuts shall be kept to a minimum. All overcuts shall be backfilled with hot tar sealant.

4
E-14 **TYPICAL SENSOR LOOP SAWCUT DETAIL**
NOT TO SCALE



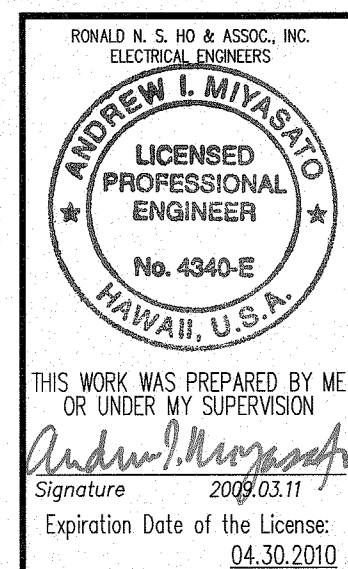
6
E-14 **TYPICAL ALTERNATE SENSOR LOOP WIRING DETAIL**
NOT TO SCALE



NOTE: Length of overcuts shall be kept to a minimum. All overcuts shall be backfilled with hot tar sealant.

5
E-14 **TYPICAL ALTERNATE SENSOR LOOP SAWCUT DETAIL**
NOT TO SCALE

SURVEY PLOTTED BY	DATE
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QUANTITIES BY	
NO. REVISED	



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**TRAFFIC SIGNAL
DETECTOR LOOP DETAILS**

KUHIO HIGHWAY

**Intersection Improvements
at Eha Street**

Project No. 56A-02-05

Scale: Not to Scale Date: April 2009

SHEET No. E-14 OF 14 SHEETS