


## GENERAL CONSTRUCTION NOTES

- ## ELECTRICAL SYMBOLS

### DRAWING REVIEW



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

ELECTRICAL SYMBOLS,  
GENERAL CONSTRUCTION NOTES

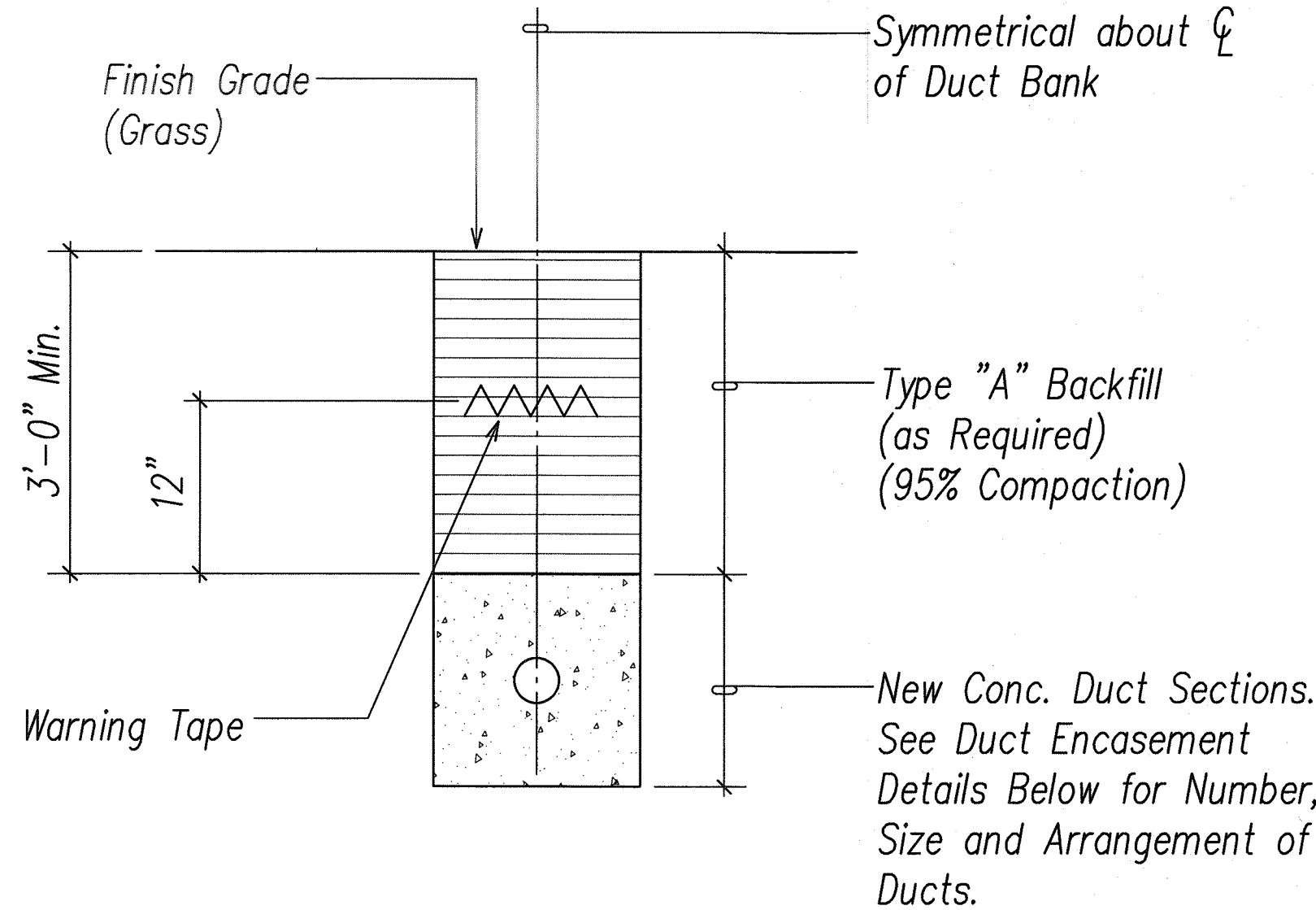
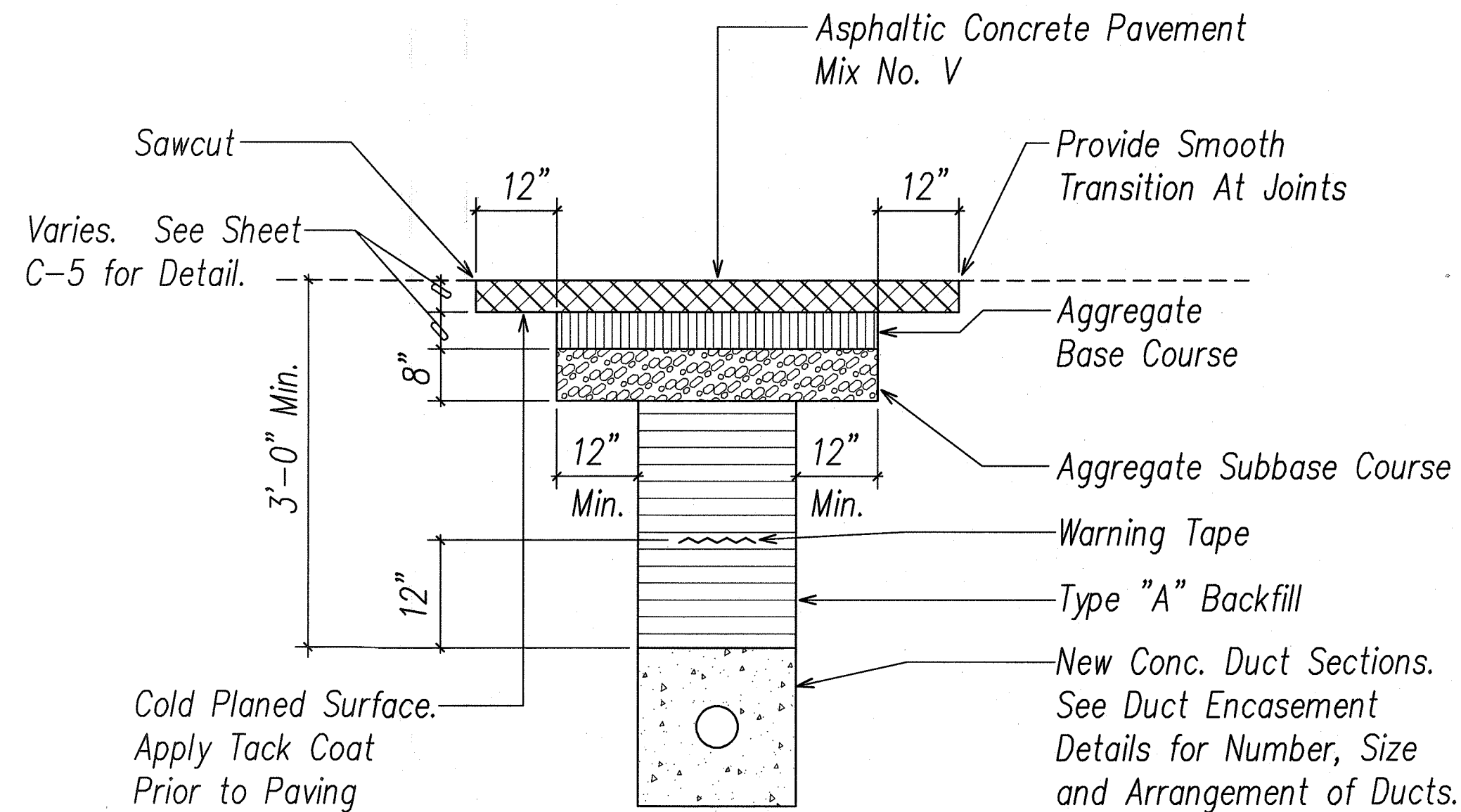
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)

DATE: January 2009

**SHEET No. E-1 OF 34 SHEETS**



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	32	64

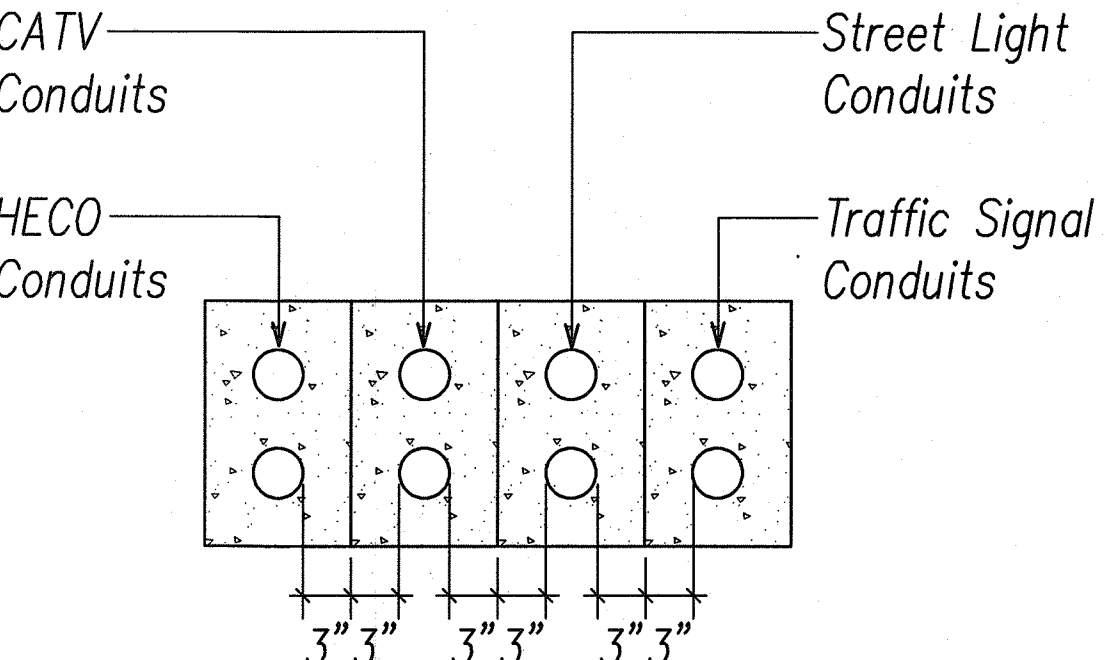
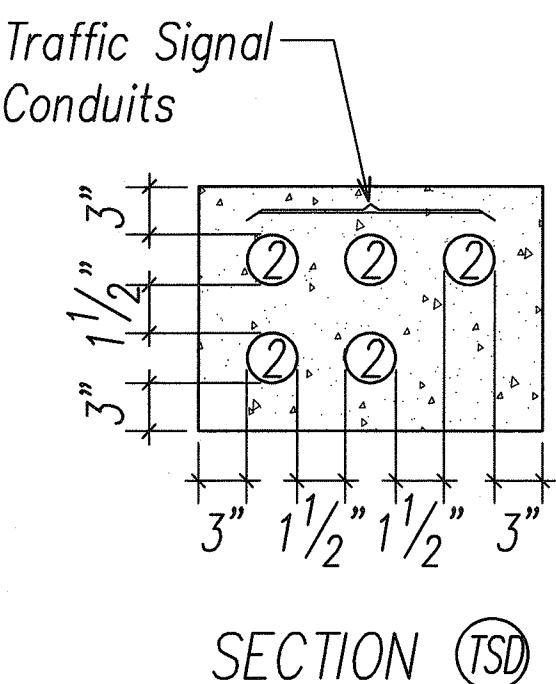
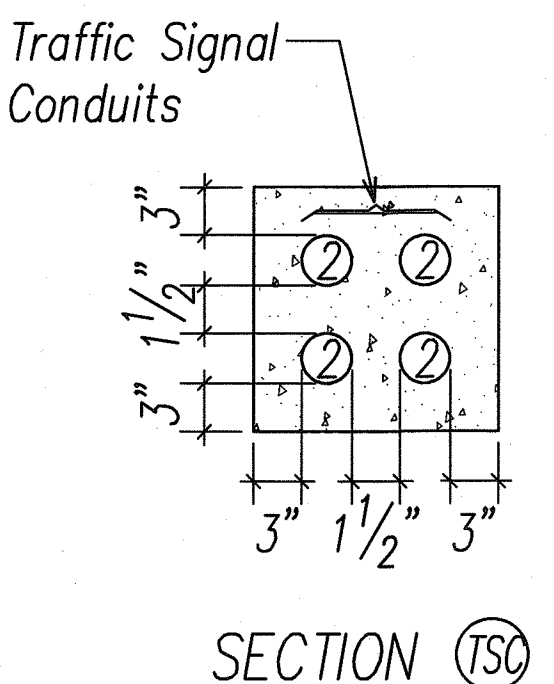
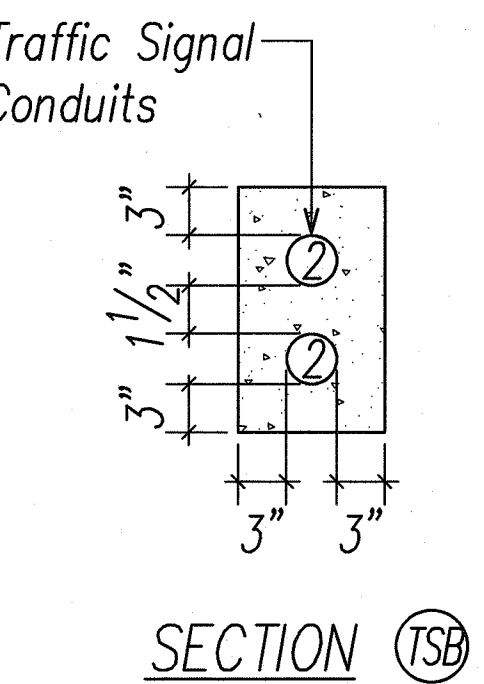
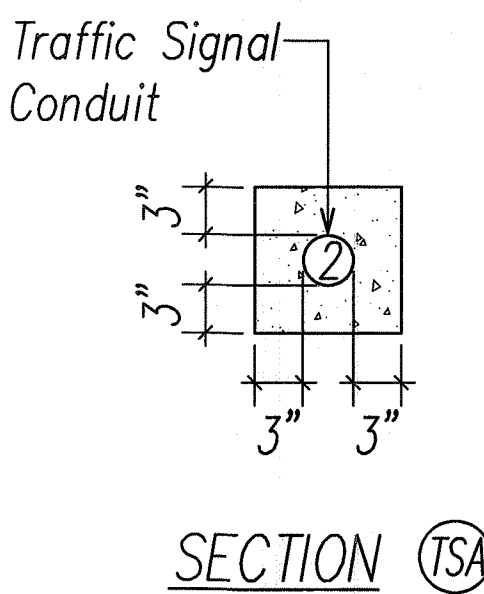
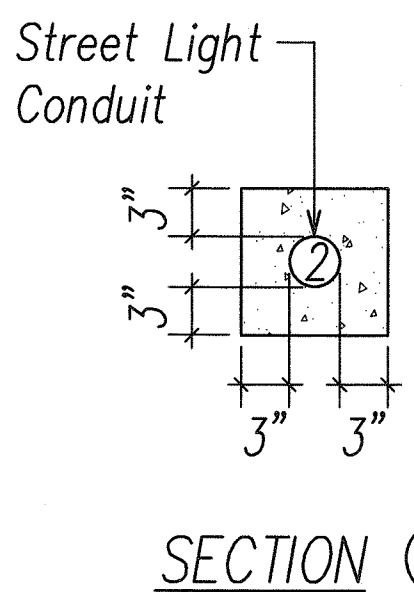
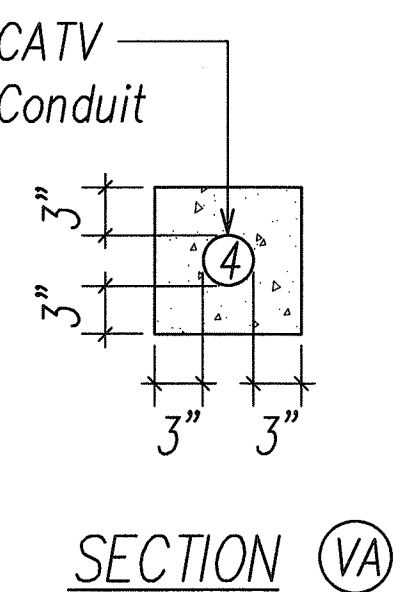
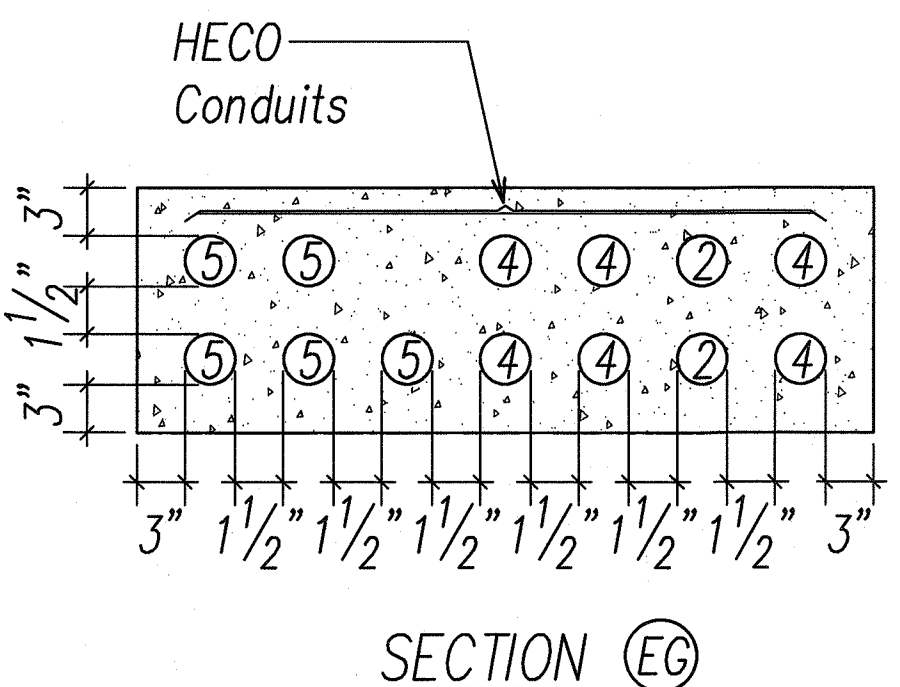
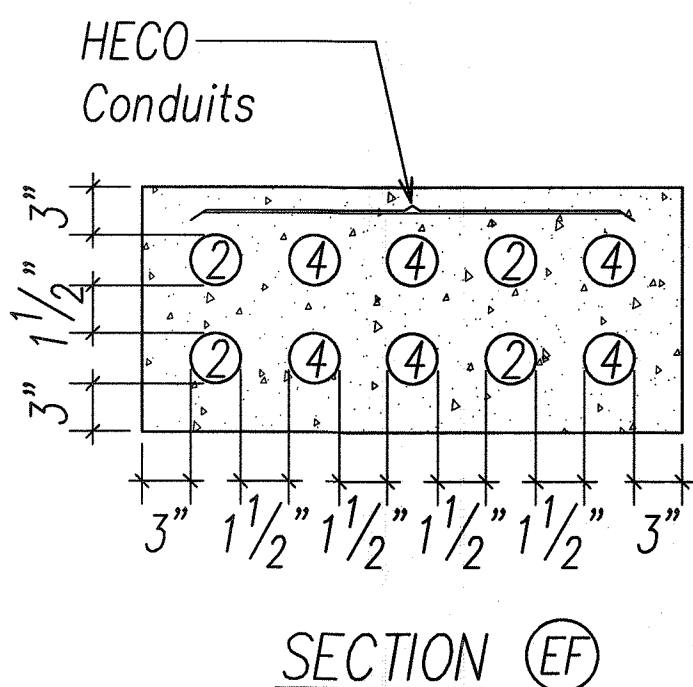
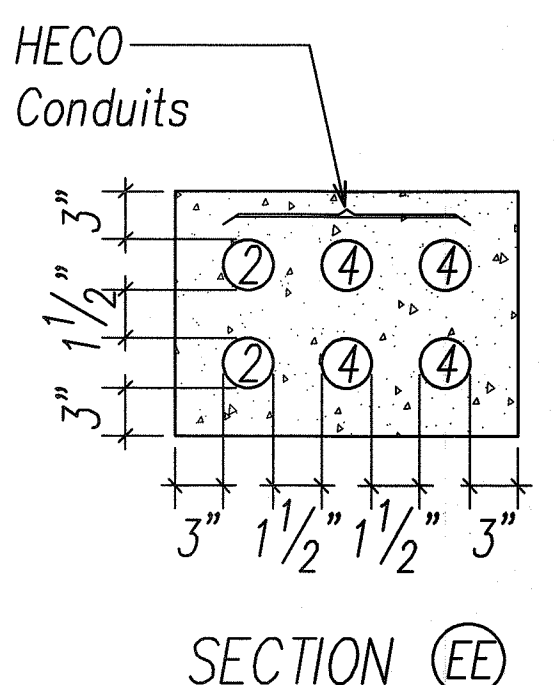
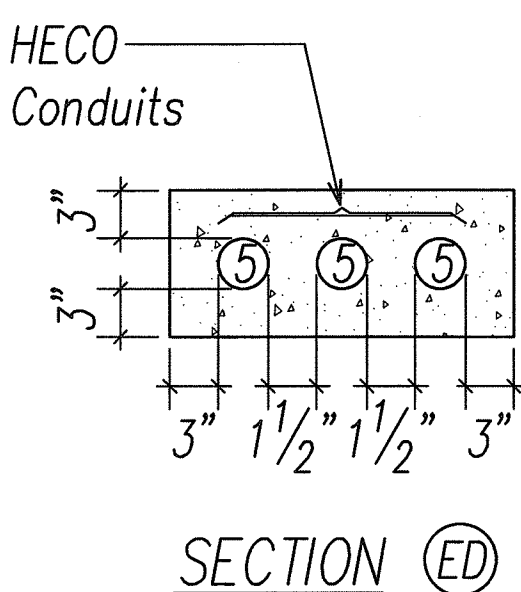
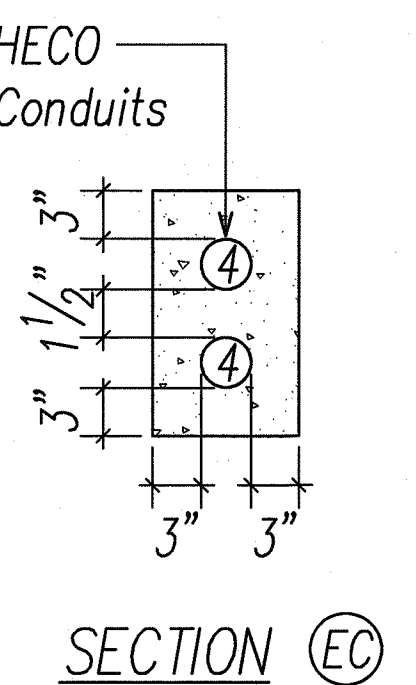
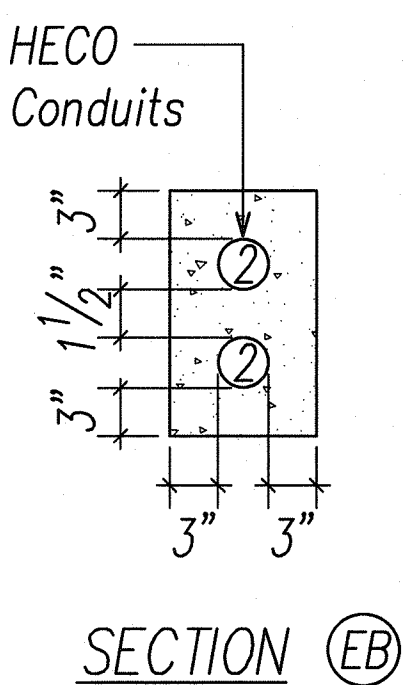
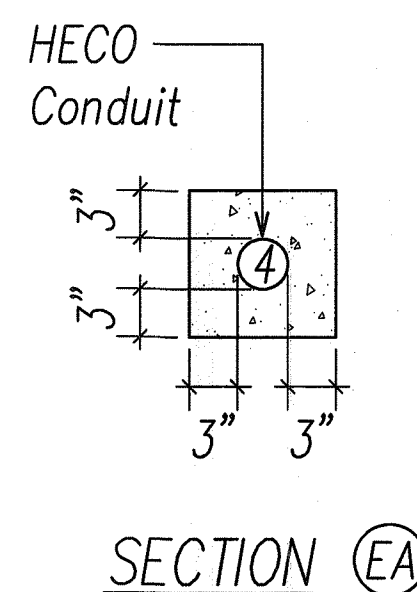


- Trench Backfill Material "A"  
 1. Sand Equivalent  $\geq 2$   
 2. 8" Max. Lift Loose  
 3. 95% Compaction  
  
 Concrete - 3" Encasement, 2500 PSI Compressive Strength @ 28 Days.

NOTES:

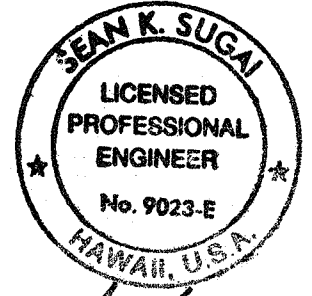
- Tack Coat Existing Asphalt Bound Material Faces Prior To Filling Excavation With Asphalt Bound Material.
- When Ground Water Is Encountered In Trenches. Backfill With Gravel Conforming To ASTM C-33, Size 67 Material Until One Foot Above Waterlevel. Encapsulate The Size 67 And Sides Of The Trench And Overlaps At The Top Of The Material For The Width Of The Trench. Complete Backfilling The Trench Per Detail.
- Smoothness of Paved Surfaces:  
The Distance From The Paved Surface To The Testing Edge Of A Ten-Foot Straight Edge Between Two Points Of Contact Shall Not Exceed 3/16".
- Base Course & Sub-Base Course Per 1994 State Standard Specifications For Highway Construction.
- Sawcutting & Repairing Of Exst A.C. Pavement Shall Not Be Paid For Separately, But considered Incidental to the Various Contract Items.
- The Metal Detectable Reel Warning Tape Shall Be A Minimum Of 5 Mils Thick And 4" Wide With A Continuous Metallic Backing And Corrosion Resistant 1± Mil Thick Foil Core. The Message On The Tape Shall Read, "Caution-State Highway Lighting Cables Buried Below", Utility 2" Series "C" Black Lettering. The Message Shall Be Repeated With A 36" Spacing. Message Shall Be Repeated With A 36" Spacing. Warning Tape For Signal Corps Conduits Shall Be Per Signal Corps Standards.

For HECO Ducts, Provide Warning Tape Per HECO Specification M0302-0. Place Warning Tape 12" Above HECO Ductbank.



DUCT SECTION DETAILS  
NOT TO SCALE

APPROVED BY:  
HAWAIIAN ELECTRIC COMPANY, INC. DATE  
*Carly Madigan* 02-16-09  
OCEANIC TIME WARNER CABLE DATE



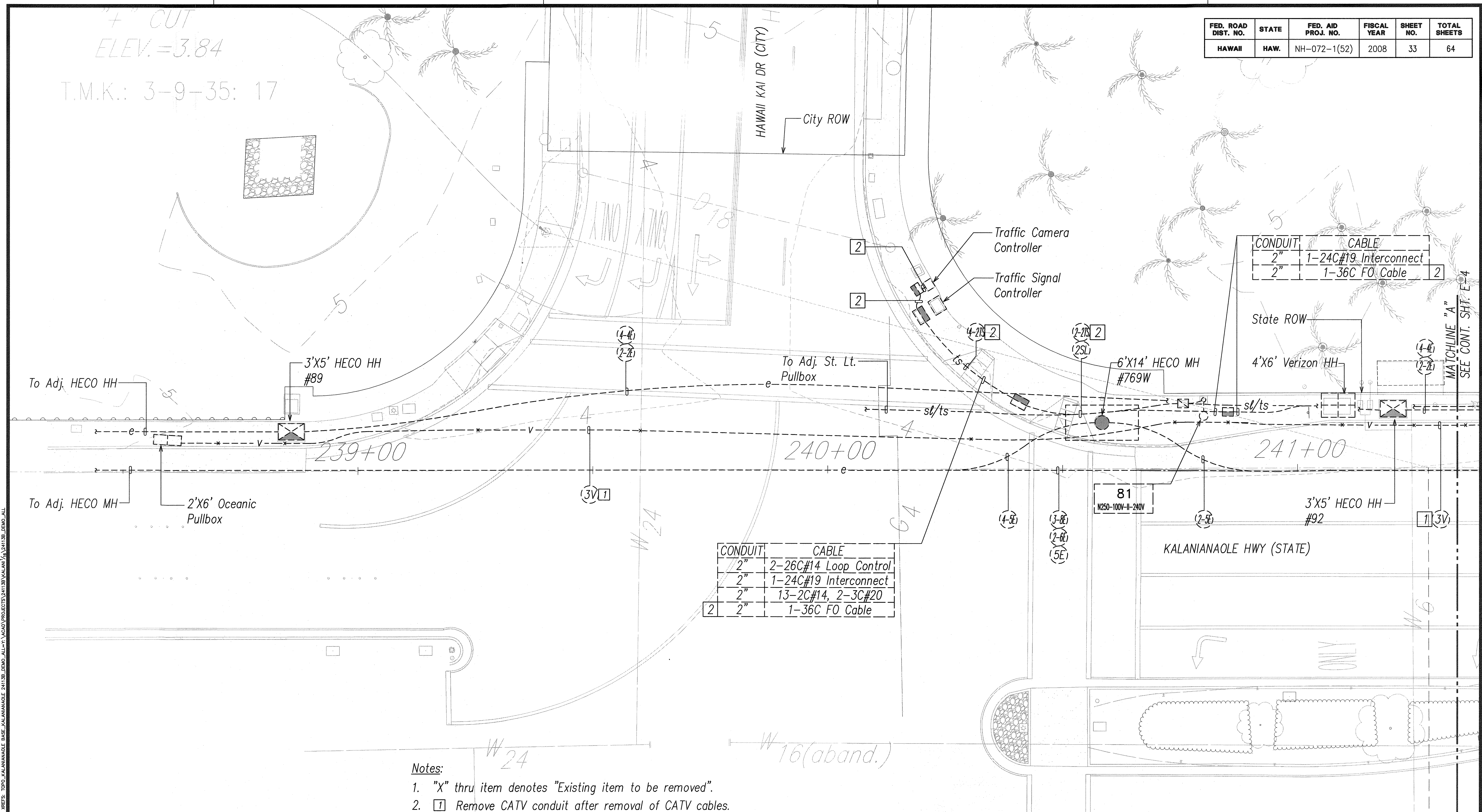
SIGNATURE  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
  
DUCT SECTION DETAILS  
  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009  
  
SHEET No. E-2 OF 34 SHEETS

ORIGINAL PLAN	DATE
NOTED BY	
DESIGNED BY	
CHECKED BY	
NO.	

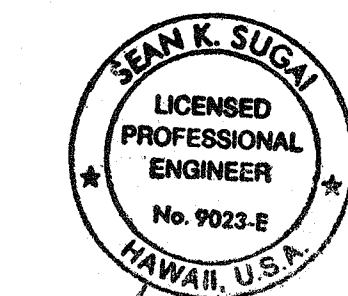
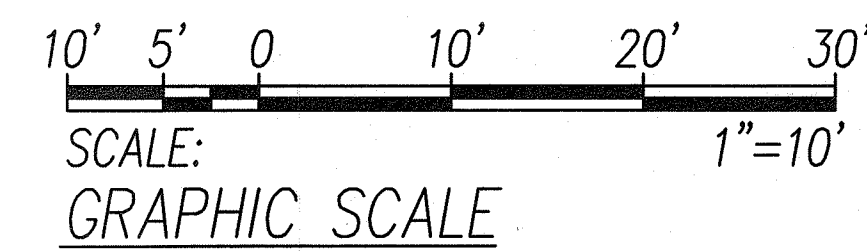


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	33	64



- Notes:
- "X" thru item denotes "Existing item to be removed".
  - 1 Remove CATV conduit after removal of CATV cables. CATV cables to be removed by Oceanic.
  - 2 Remove fiber optic cable for traffic cameras. Conduit to be reused for new fiber optic cable.

APPROVED BY: *[Signature]* 02-18-09  
OCEANIC TIME WARNER CABLE DATE



SIGNATURE: *[Signature]* 2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

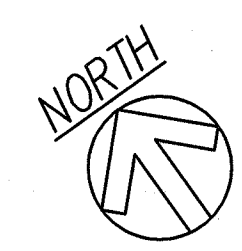
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**ELECTRICAL DEMOLITION PLAN I**

KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

SHEET No. E-3 OF 34 SHEETS

ORIGINAL PLAN	DATE
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NO.	

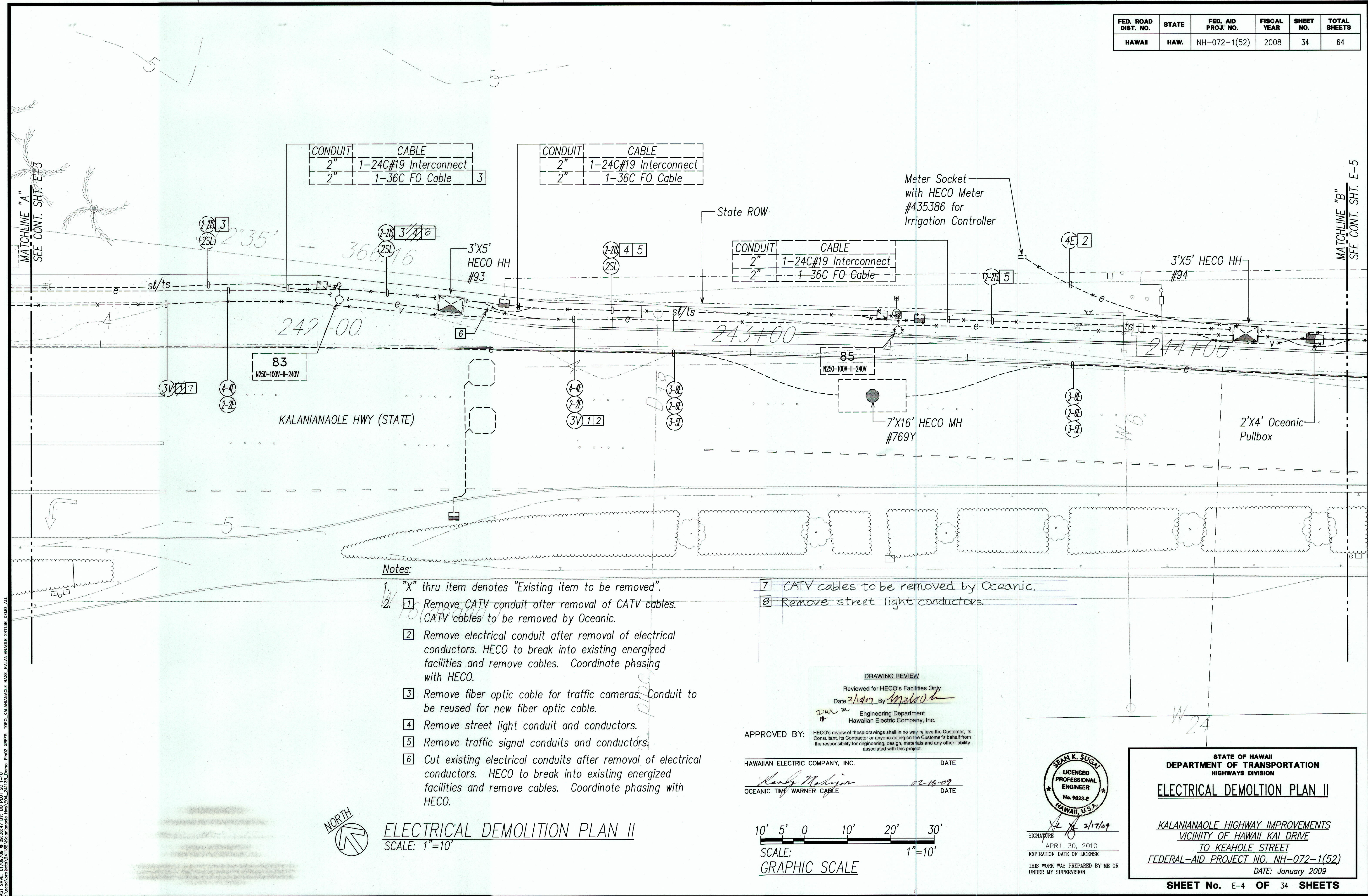
**DRAWING REVIEW**  
Reviewed for HECO's Facilities Only  
Date 2/14/09 By *[Signature]*  
Engineering Department  
Hawaiian Electric Company, Inc.  
HECO's review of these drawings shall in no way relieve the Customer, its Consultant, its Contractor or anyone acting on the Customer's behalf from the responsibility for engineering, design, materials and any other liability associated with this project.



**ELECTRICAL DEMOLITION PLAN I**  
SCALE: 1"=10'



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	34	64



Notes:

- "X" thru item denotes "Existing item to be removed".
- Remove CATV conduit after removal of CATV cables. CATV cables to be removed by Oceanic.
  - Remove electrical conduit after removal of electrical conductors. HECO to break into existing energized facilities and remove cables. Coordinate phasing with HECO.
  - Remove fiber optic cable for traffic cameras. Conduit to be reused for new fiber optic cable.
  - Remove street light conduit and conductors.
  - Remove traffic signal conduits and conductors.
  - Cut existing electrical conduits after removal of electrical conductors. HECO to break into existing energized facilities and remove cables. Coordinate phasing with HECO.
- CATV cables to be removed by Oceanic.
- Remove street light conductors.

DRAWING REVIEW

Reviewed for HECO's Facilities Only

Date 2/1/09 By *[Signature]*

Engineering Department  
Hawaiian Electric Company, Inc.

APPROVED BY: 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.

HAWAIIAN ELECTRIC COMPANY, INC.

DATE

*[Signature]*  
OCEANIC TIME WARNER CABLE

DATE  
02-03-09

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



SIGNATURE *[Signature]* 2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
ELECTRICAL DEMOLITION PLAN II

KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

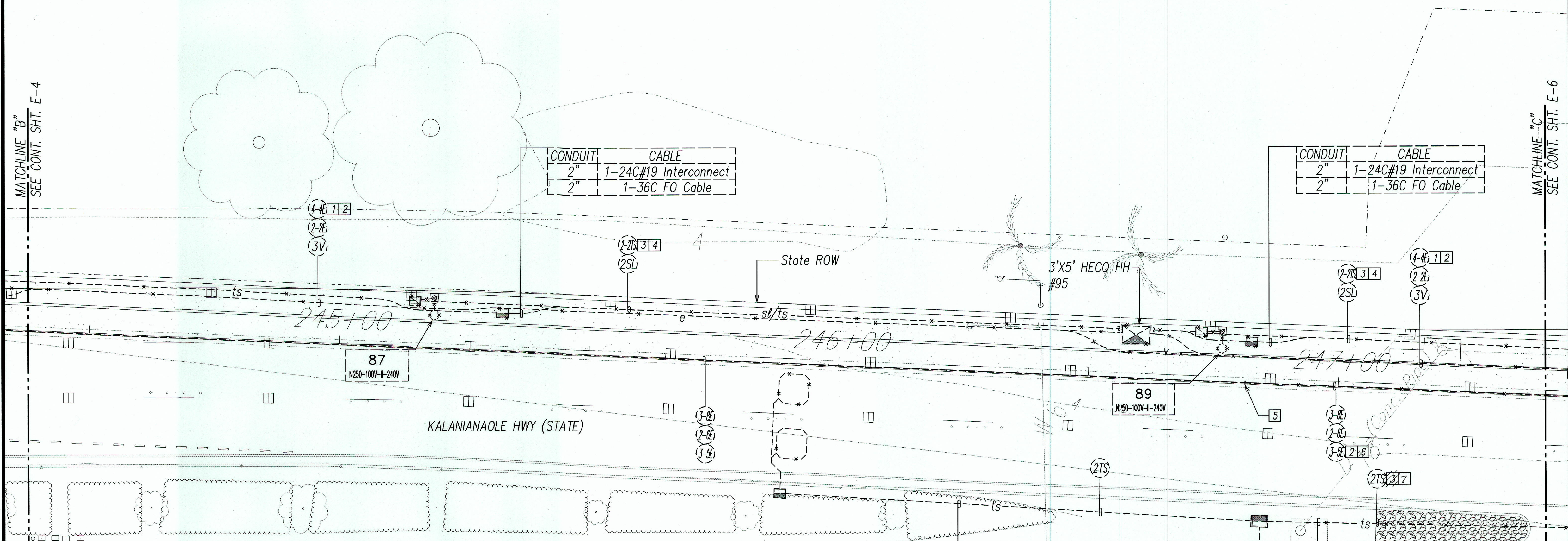
SHEET No. E-4 OF 34 SHEETS

"AS-BUILT"

34



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	35	64



# Notes:

- "X" thru item denotes "Existing item to be removed".
- 1 Remove CATV conduit after removal of CATV cables. CATV cables to be removed by Oceanic.
- 2 Remove electrical conduit after removal of electrical conductors. HECO to break into existing energized facilities and remove cables. Coordinate phasing with HECO.
- 3 Remove traffic signal conduits and conductors.
- 4 Remove street light conduit and conductors.
- 5 Cut existing electrical conduits after removal of electrical conductors. HECO to break into existing energized facilities and remove cables. Coordinate phasing with HECO.
- 6 Existing 3-8" and 2-6" electrical conduits to remain. Replace concrete jacket as required to maintain a minimum 3" concrete jacket around remaining conduits.

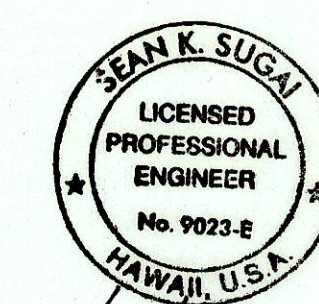
APPROVED BY:

HAWAIIAN ELECTRIC COMPANY, INC.  
*Sean K. Sugan*  
OCEANIC TIME WARNER CABLE

DATE

02-16-09  
DATE

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



SIGNATURE: *[Signature]* 2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

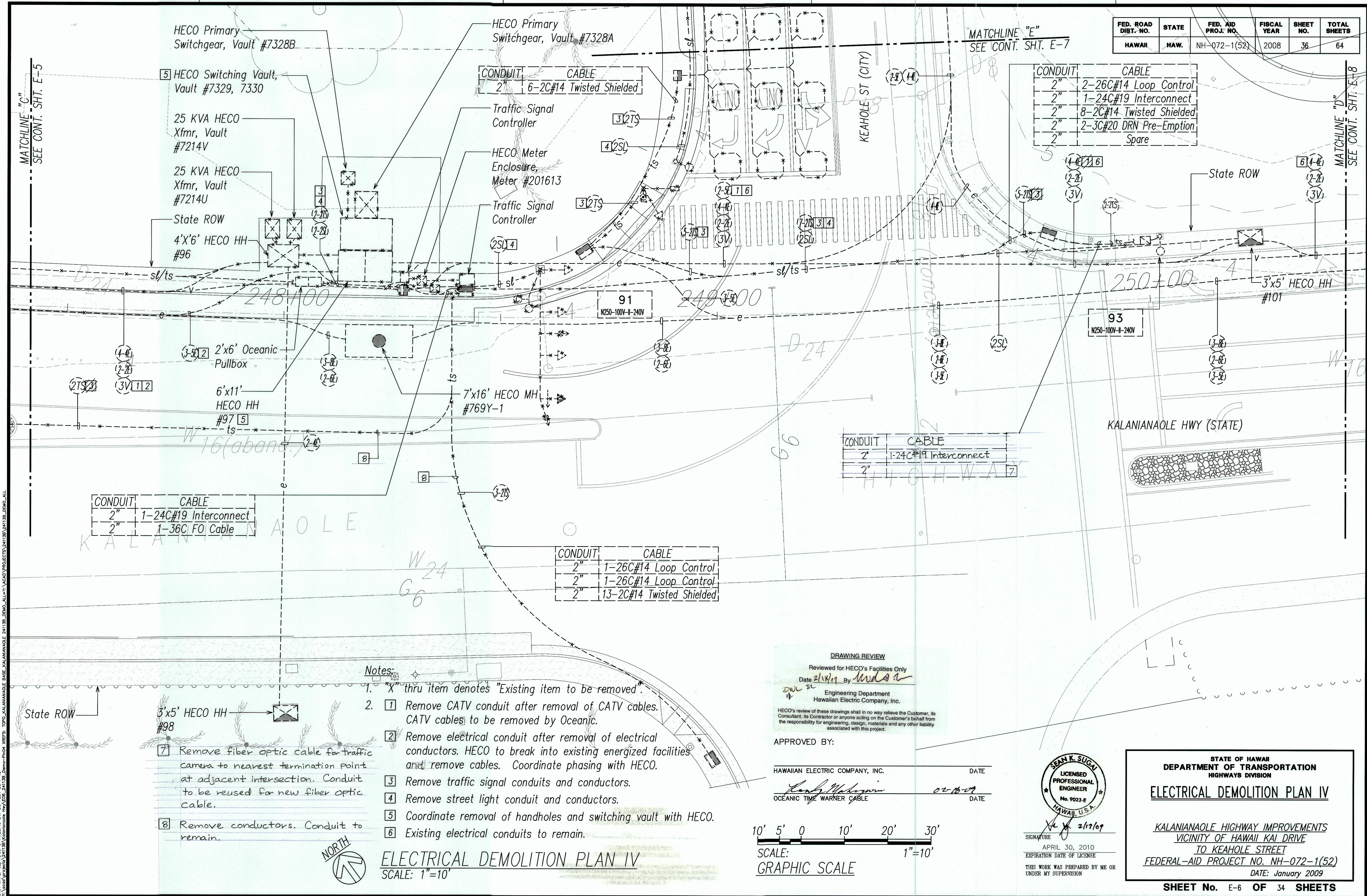
## STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION ELECTRICAL DEMOLITION PLAN III

KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

SHEET No. E-5 OF 34 SHEETS

"AS-BUILT"





FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	36	64

CONDUIT	CABLE
2"	2-26C#14 Loop Control
2"	1-24C#19 Interconnect
2"	8-2C#14 Twisted Shielded
2"	2-3C#20 DRN Pre-Emption Spare

CONDUIT	CABLE
2"	1-24C#19 Interconnect
2"	1-36C FO Cable

CONDUIT	CABLE
2"	1-26C#14 Loop Control
2"	1-26C#14 Loop Control
2"	13-2C#14 Twisted Shielded

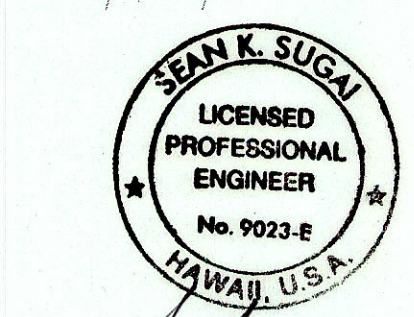
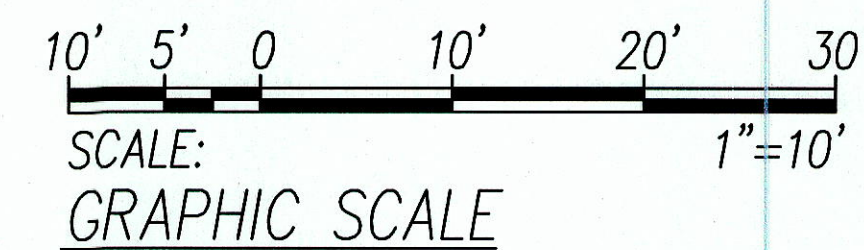
CONDUIT	CABLE
2"	1-24C#19 Interconnect
2"	1-6C#14 Twisted Shielded

- Notes:
1. "X" thru item denotes "Existing item to be removed".
  2. [1] Remove CATV conduit after removal of CATV cables. CATV cables to be removed by Oceanic.
  3. [2] Remove electrical conduit after removal of electrical conductors. HECO to break into existing energized facilities and remove cables. Coordinate phasing with HECO.
  3. [3] Remove traffic signal conduits and conductors.
  4. [4] Remove street light conduit and conductors.
  5. [5] Coordinate removal of handholes and switching vault with HECO.
  6. [6] Existing electrical conduits to remain.

**ELECTRICAL DEMOLITION PLAN IV**  
SCALE: 1"=10'

**DRAWING REVIEW**  
Reviewed for HECO's Facilities Only  
Date 2/18/09 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 BY:  
HAWAIIAN ELECTRIC COMPANY, INC. DATE  
*[Signature]* 02-18-09  
OCEANIC TIME WARNER CABLE DATE



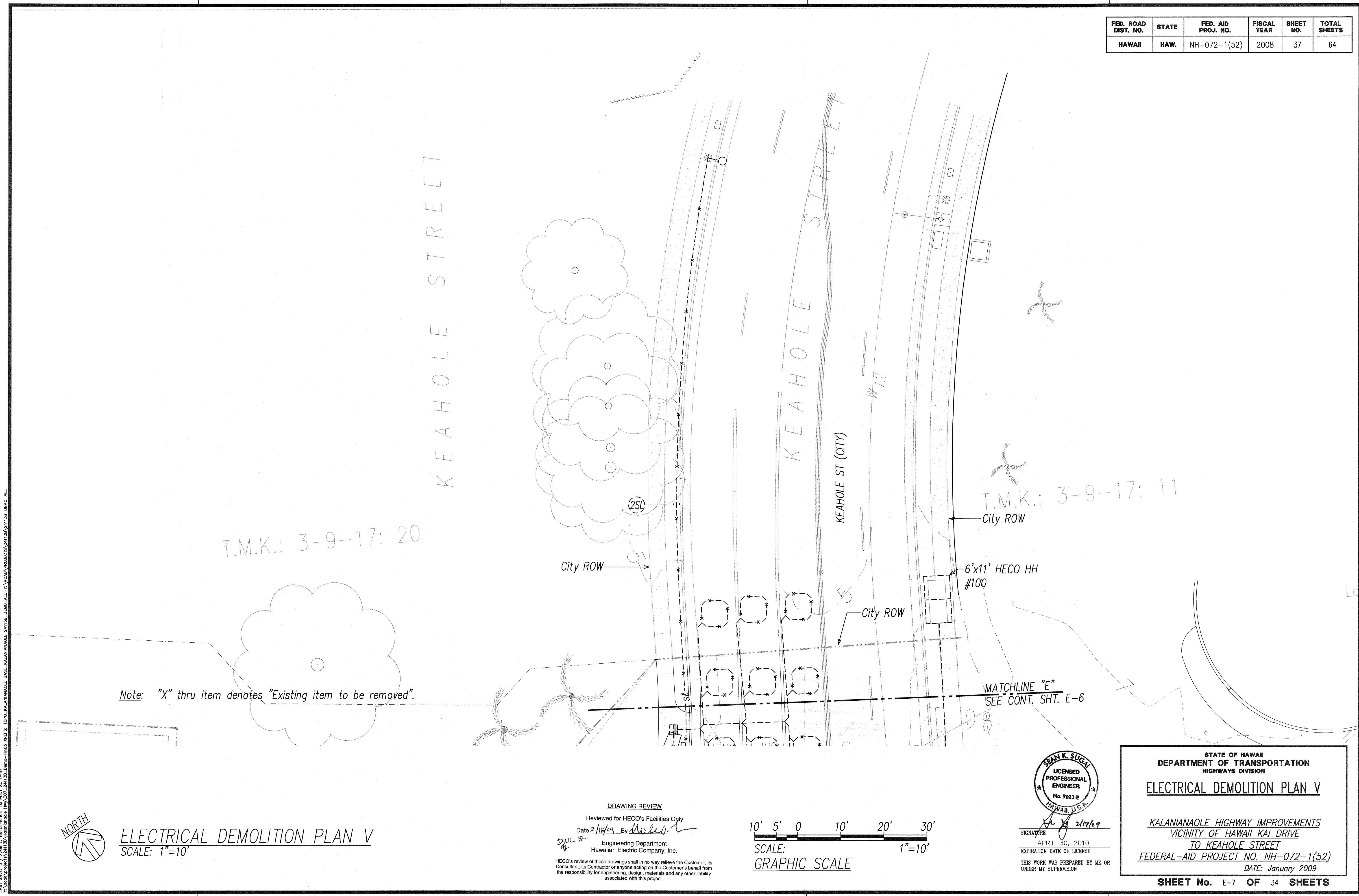
SIGNATURE *[Signature]* 2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**ELECTRICAL DEMOLITION PLAN IV**  
  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009  
**SHEET No. E-6 OF 34 SHEETS**

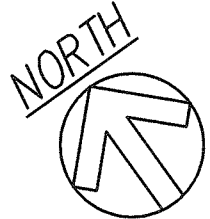
**"AS-BUILT"**



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	37	64

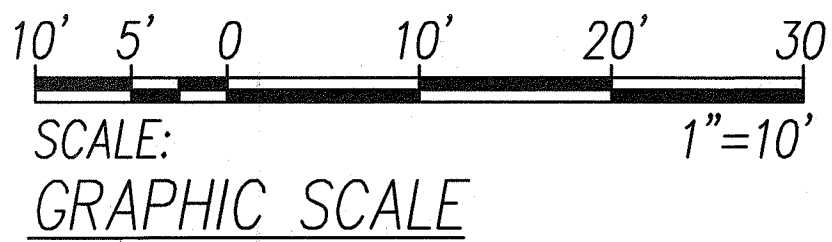


ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOTE BOOK	DESIGNED BY	
QUANTITIES BY	CHECKED BY	
No.		



ELECTRICAL DEMOLITION PLAN V  
SCALE: 1"=10'

DRAWING REVIEW  
Reviewed for HECO's Facilities Only  
Date 2/14/09 By *W. L. L.*  
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.



SEAN K. SUGA  
LICENSED PROFESSIONAL ENGINEER  
No. 9023-E  
HAWAII, U.S.A.  
SIGNATURE *SKS* 2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**ELECTRICAL DEMOLITION PLAN V**  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009  
SHEET No. E-7 OF 34 SHEETS







4" CUT  
ELEV.=3.84  
T.M.K.: 3-9-35: 17

City ROW  
HAWAII KAI DR (CITY)

Existing 2' X 6' Oceanic Pullbox  
Existing 3' X 5' HECO HH #89  
Existing 6' x 14' HECO MH #769W  
Existing 3' x 5' HECO/HH #92

CONDUIT CABLE  
2" 1-24C#19 Interconnect  
2" 1-60C SM, FO Cable  
1-36C SM/MM, FO Cable  
1-12C SM/12C MM, FO Cable

State ROW  
KALANIANA'OLE HWY (STATE)

239+00 240+00

CONDUIT CABLE  
2" 2-26C#14 Loop Control  
2" 1-24C#19 Interconnect  
2" 13-2C#14, 2-3C#20  
1 2" 1-60C SM, FO Cable  
1-36C SM/MM, FO Cable  
1-12C SM/12C MM, FO Cable

Notes:  
1. Coordinate penetration of existing pullboxes/handholes with respective utility companies.  
2. [1] Provide new fiber optic cables in existing spare 2" C.D.

North Arrow  
ELECTRICAL PLAN I  
SCALE: 1"=10'

DRAWING REVIEW  
Reviewed for HECO's Facilities Only  
Date 2/14/09 By Michael J.  
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 BY:  
Oceanic Time Warner Cable  
DATE 02/18/09

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

SEAN K. SUGAI  
LICENSED PROFESSIONAL ENGINEER  
No. 9023-E  
HAWAII, U.S.A.  
DATE 2/17/09  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

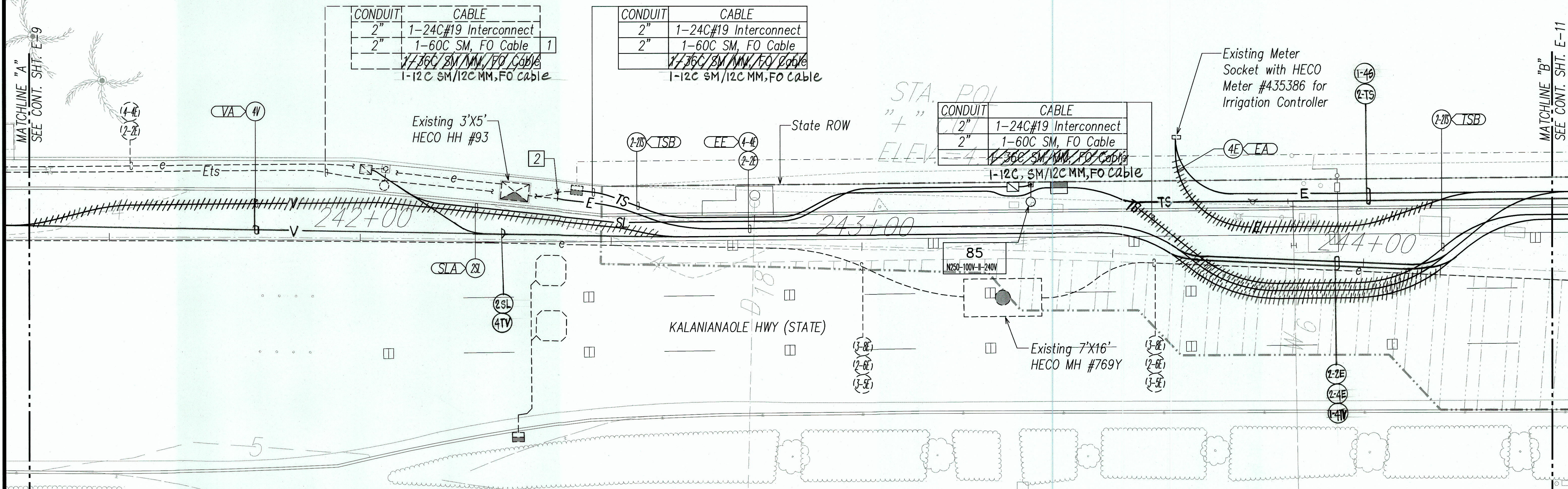
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
ELECTRICAL PLAN I  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

SHEET No. E-9 OF 34 SHEETS

39



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	40	64



- Notes:
1. Coordinate penetration of existing pullboxes/handholes/manholes with respective utility companies.
  2. ☐ Provide new fiber optic cables in existing spare 2"C.
  2. ☐ Provide conduit couplings to extend existing conduits to new 4' x 6' HECO HH #94. HECO to break into existing energized facilities and remove cables. Coordinate phasing with HECO.

DRAWING REVIEW  
Reviewed for HECO's Facilities Only  
Date 2/18/09 By Mike D. L.  
Engineering Department  
Hawaiian Electric Company, Inc.

APPROVED BY:  
HAWAIIAN ELECTRIC COMPANY, INC. DATE  
OCEANIC TIME WARNER CABLE 02-18-09 DATE

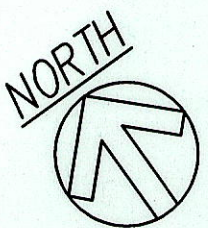


SIGNATURE  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

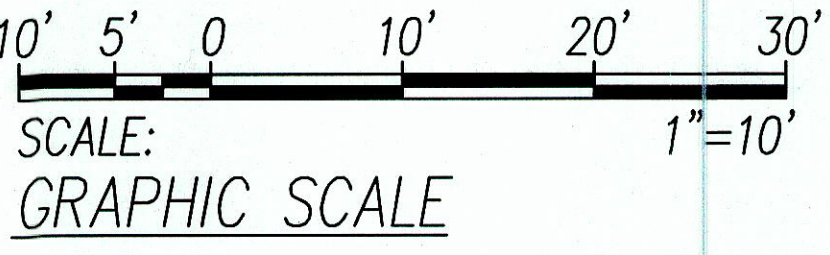
STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**ELECTRICAL PLAN II**  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009  
SHEET No. E-10 OF 34 SHEETS

ORIGINAL PLAN	SURVEY PLATTED BY	DATE
NOTE BOOK	DRAWN BY	
No.	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

LAST SAVE: 07/09/08 @ 08:47:58 BY: 180 PLT: 05: 11:00  
C:\Users\paul\Documents\241112\_1100\_Plan-II-Electrical\241112\_1100\_Plan-II-Electrical.dwg



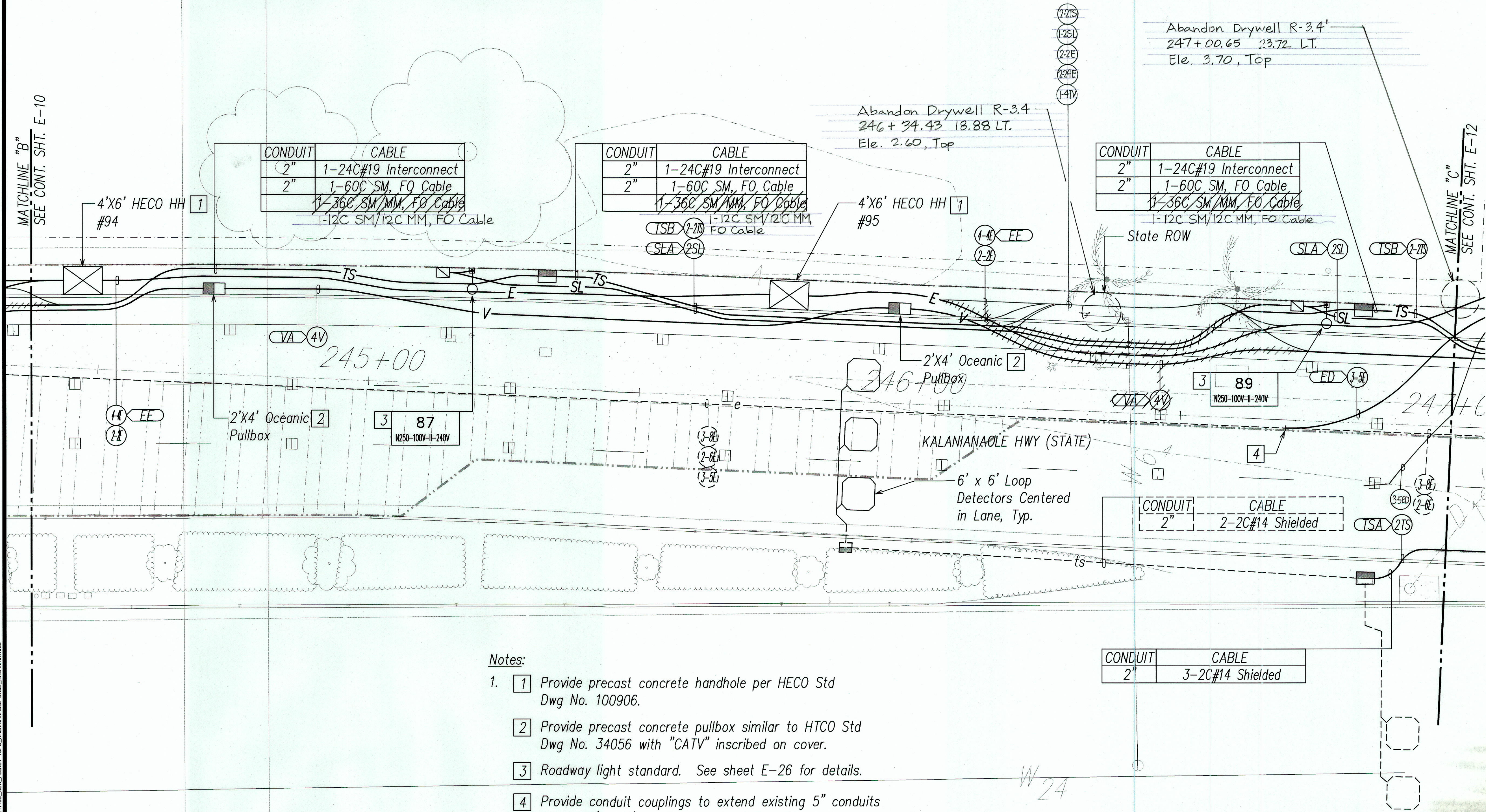
**ELECTRICAL PLAN II**  
SCALE: 1"=10'



"AS-BUILT"



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	41	64



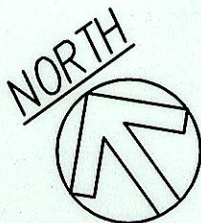
- Notes:
- 1 Provide precast concrete handhole per HECO Std Dwg No. 100906.
  - 2 Provide precast concrete pullbox similar to HECO Std Dwg No. 34056 with "CATV" inscribed on cover.
  - 3 Roadway light standard. See sheet E-26 for details.
  - 4 Provide conduit couplings to extend existing 5" conduits to new 6' x 14' HECO handhole #97. HECO to break into existing energized facilities and remove cables. Coordinate phasing with HECO.

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

LAST SAVE: 07/09/08 @ 12:27:27 BY: BD Plot 35:1=0  
 Y:\Users\paul\Documents\Hawaii\NH-072-1(52)\Drawings\Hawaii\NH-072-1(52)\ELECTRICAL\PLAN III.dwg

**DRAWING REVIEW**  
 Reviewed for HECO's Facilities Only  
 Date 2/15/09 By Michael Osh  
 Engineering Department  
 Hawaiian Electric Company, Inc.

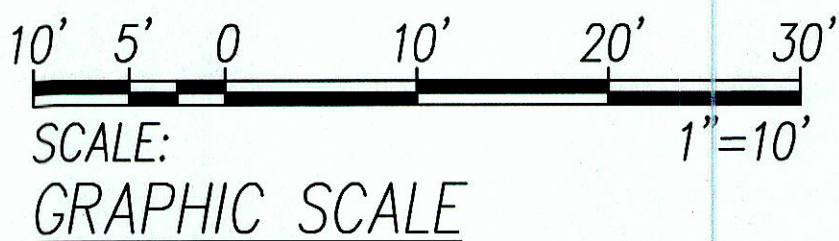
HECO's review of these drawings shall in no way relieve the Customer, its Consultant, its Contractor or anyone acting on the Customer's behalf from the responsibility for engineering, design, materials and any other liability associated with this project.



**ELECTRICAL PLAN III**  
 SCALE: 1"=10'

APPROVED BY:

HAWAIIAN ELECTRIC COMPANY, INC. DATE  
Sean K. Sugan 02-18-09  
 OCEANIC TIME WARNER CABLE DATE



SIGNATURE  
Sean K. Sugan 2/12/09  
 APRIL 30, 2010  
 EXPIRATION DATE OF LICENSE  
 THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
 DEPARTMENT OF TRANSPORTATION  
 HIGHWAYS DIVISION

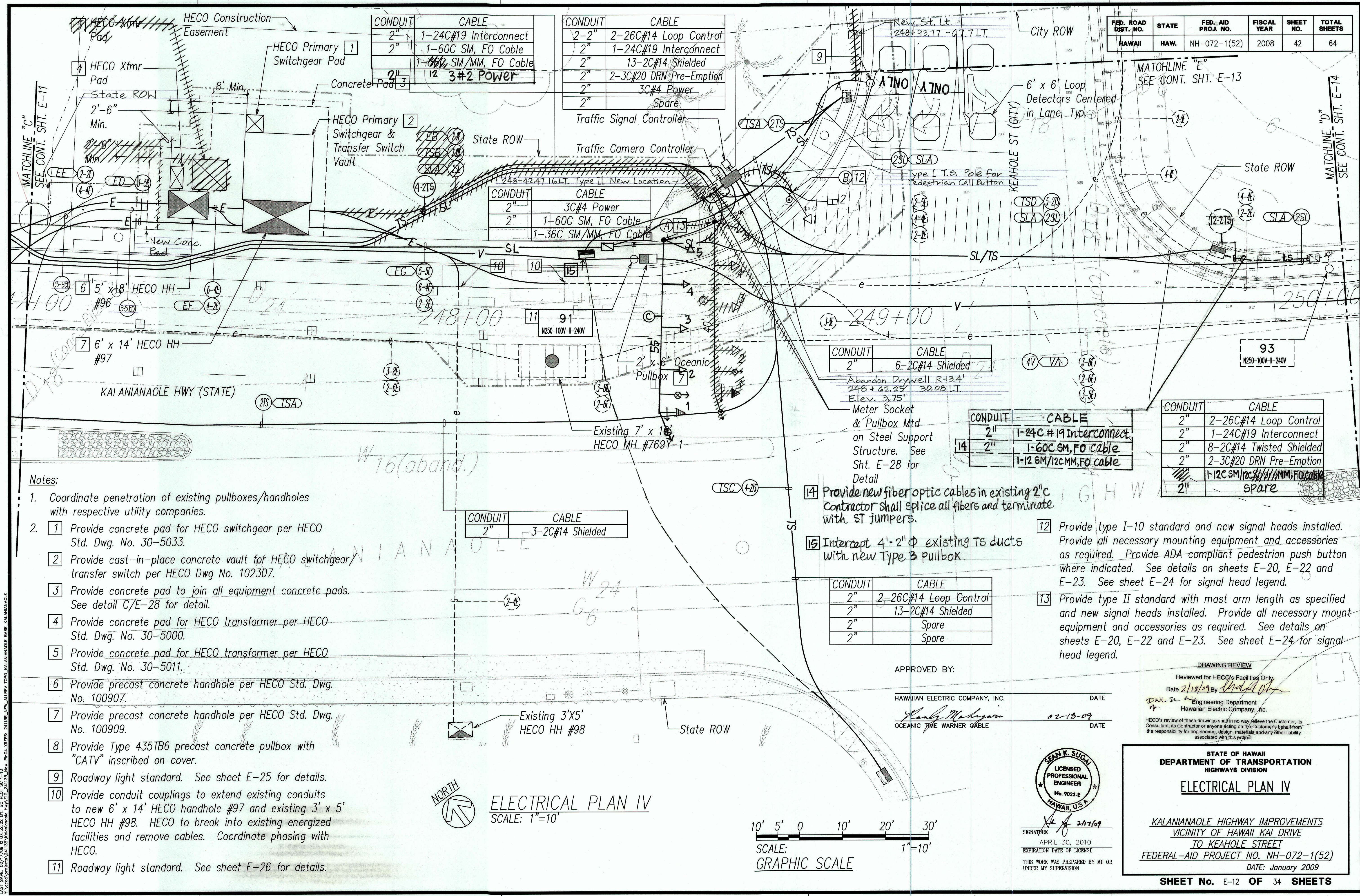
**ELECTRICAL PLAN III**

KALANIANA'OLE HIGHWAY IMPROVEMENTS  
 VICINITY OF HAWAII KAI DRIVE  
 TO KEAHOE STREET  
 FEDERAL-AID PROJECT NO. NH-072-1(52)  
 DATE: January 2009

SHEET No. E-11 OF 34 SHEETS

"AS-BUILT"





FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	42	64

- Notes:
- Coordinate penetration of existing pullboxes/handholes with respective utility companies.
  - 1 Provide concrete pad for HECO switchgear per HECO Std. Dwg. No. 30-5033.
  - 2 Provide cast-in-place concrete vault for HECO switchgear/transfer switch per HECO Dwg No. 102307.
  - 3 Provide concrete pad to join all equipment concrete pads. See detail C/E-28 for detail.
  - 4 Provide concrete pad for HECO transformer per HECO Std. Dwg. No. 30-5000.
  - 5 Provide concrete pad for HECO transformer per HECO Std. Dwg. No. 30-5011.
  - 6 Provide precast concrete handhole per HECO Std. Dwg. No. 100907.
  - 7 Provide precast concrete handhole per HECO Std. Dwg. No. 100909.
  - 8 Provide Type 435TB6 precast concrete pullbox with "CATV" inscribed on cover.
  - 9 Roadway light standard. See sheet E-25 for details.
  - 10 Provide conduit couplings to extend existing conduits to new 6' x 14' HECO handhole #97 and existing 3' x 5' HECO HH #98. HECO to break into existing energized facilities and remove cables. Coordinate phasing with HECO.
  - 11 Roadway light standard. See sheet E-26 for details.

CONDUIT	CABLE
2"	1-24C#19 Interconnect
2"	1-60C SM, FO Cable
2"	1-60C SM/MM, FO Cable
2"	3#2 Power

CONDUIT	CABLE
2"	2-26C#14 Loop Control
2"	1-24C#19 Interconnect
2"	13-2C#14 Shielded
2"	2-3C#20 DRN Pre-Emption
2"	3C#4 Power
2"	Spare

CONDUIT	CABLE
2"	3C#4 Power
2"	1-60C SM, FO Cable
2"	1-36C SM/MM, FO Cable

CONDUIT	CABLE
2"	6-2C#14 Shielded

CONDUIT	CABLE
2"	1-24C#19 Interconnect
2"	1-60C SM, FO cable
2"	1-12 SM/12C MM, FO cable

CONDUIT	CABLE
2"	2-26C#14 Loop Control
2"	1-24C#19 Interconnect
2"	8-2C#14 Twisted Shielded
2"	2-3C#20 DRN Pre-Emption
2"	1-12C SM/12C MM, FO cable
2"	Spare

- 14 Provide new fiber optic cables in existing 2" C. Contractor shall splice all fibers and terminate with ST jumpers.
- 15 Intercept 4'-2" Ø existing TS ducts with new Type B pullbox.

CONDUIT	CABLE
2"	2-26C#14 Loop Control
2"	13-2C#14 Shielded
2"	Spare
2"	Spare

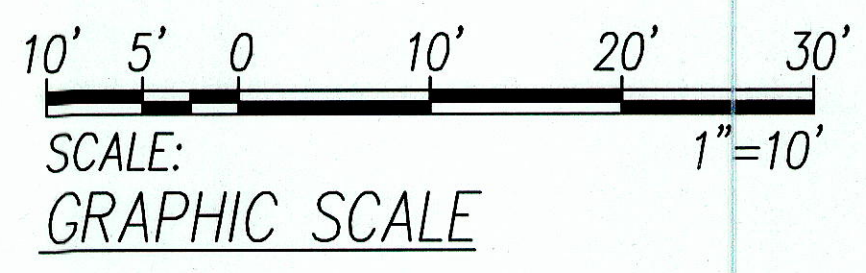
- 12 Provide type I-10 standard and new signal heads installed. Provide all necessary mounting equipment and accessories as required. Provide ADA-compliant pedestrian push button where indicated. See details on sheets E-20, E-22 and E-23. See sheet E-24 for signal head legend.
- 13 Provide type II standard with mast arm length as specified and new signal heads installed. Provide all necessary mount equipment and accessories as required. See details on sheets E-20, E-22 and E-23. See sheet E-24 for signal head legend.

APPROVED BY:  
HAWAIIAN ELECTRIC COMPANY, INC.  
*[Signature]*  
OCEANIC TIME WARNER CABLE  
DATE 02-18-09

DRAWING REVIEW  
Reviewed for HECO's Facilities Only  
Date 2/18/09 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.



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**ELECTRICAL PLAN IV**  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009  
SHEET No. E-12 OF 34 SHEETS



"AS-BUILT"



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	43	64

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

LAST SAVE: 07/09/09 08:51:34 BY: B5 PLOTTED: 10/06/09 10:00:00  
 PLOTTED BY: KALANANAOLE HIGHWAY IMPROVEMENTS PROJECT  
 PLOTTED AT: 24113B, NEW ALLEY, TPO, KALANANAOLE BASE, KALANANAOLE

T.M.K.: 3-9-17: 20

KEAHOLE STREET

City ROW

6' x 6' Loop Detector  
Centered in Lane, Typ.

SLA (2SL)

KEAHOLE STREET

W12

KEAHOLE ST (CITY)

City ROW

T.M.K.: 3-9-17: 11

City ROW

Existing 6'x11'  
HECO HH #100

MATCHLINE "E"  
SEE CONT. SHT. E-12



ELECTRICAL PLAN V  
SCALE: 1"=10'

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



SIGNATURE  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR  
UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**ELECTRICAL PLAN V**

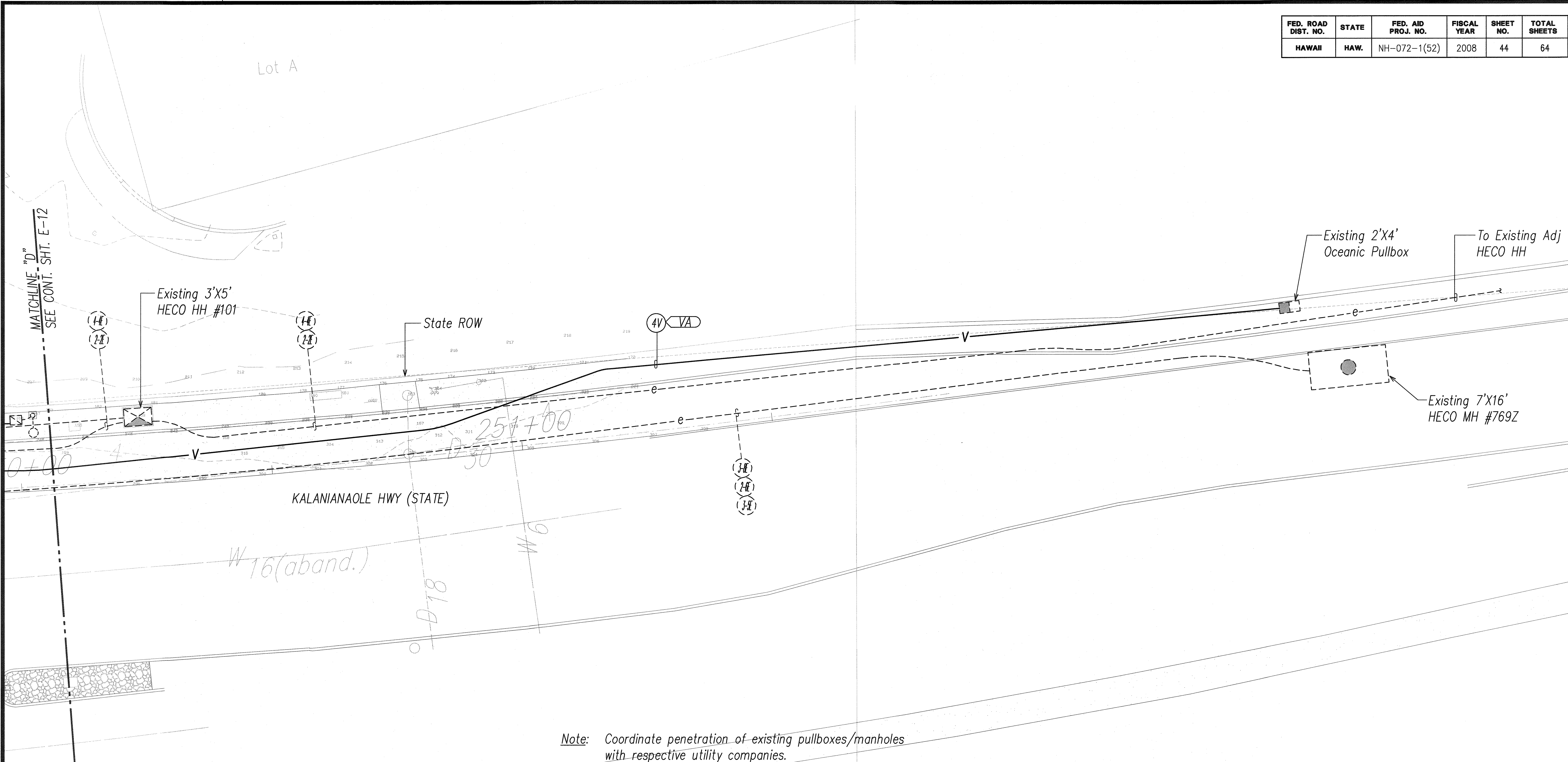
KALANIANAOLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

SHEET No. E-13 OF 34 SHEETS

"AC-BUILT"

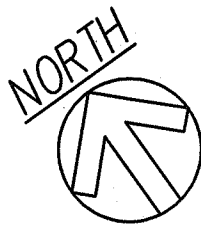


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	44	64



DATE	DATE
DESIGNED BY	DESIGNED BY
DRAWN BY	DRAWN BY
CHECKED BY	CHECKED BY
NOTED BY	NOTED BY
DATE	DATE

LAST SAVE BY: 1/13/09 10:05:05 AM  
V:\Road Projects\241138 Kalaniana'ole Hwy\EL\241138 New-Photos XREFS\241138 NEW ALREV TPOD\_KALANIANA'OLE BASE\_KALANIANA'OLE



**ELECTRICAL PLAN VI**  
SCALE: 1"=10'

**DRAWING REVIEW**

Reviewed for HECO's Facilities Only

Date: 2/16/09 by: Middle

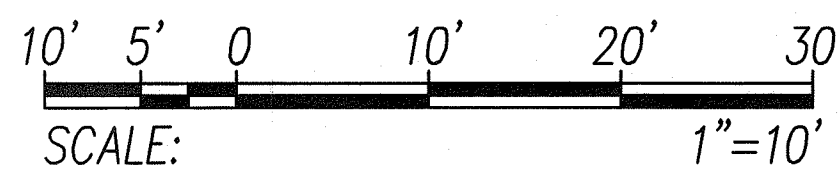
Engineering Department  
Hawaiian Electric Company, Inc.

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.

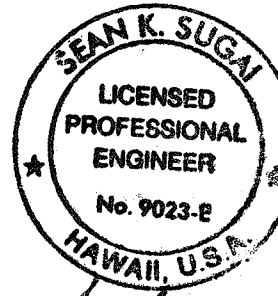
APPROVED BY:

*Sean K. Sugai*  
OCEANIC TIME WARNER CABLE

DATE: 02-16-09



SCALE:  
GRAPHIC SCALE



SIGNATURE: *Sean K. Sugai*  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

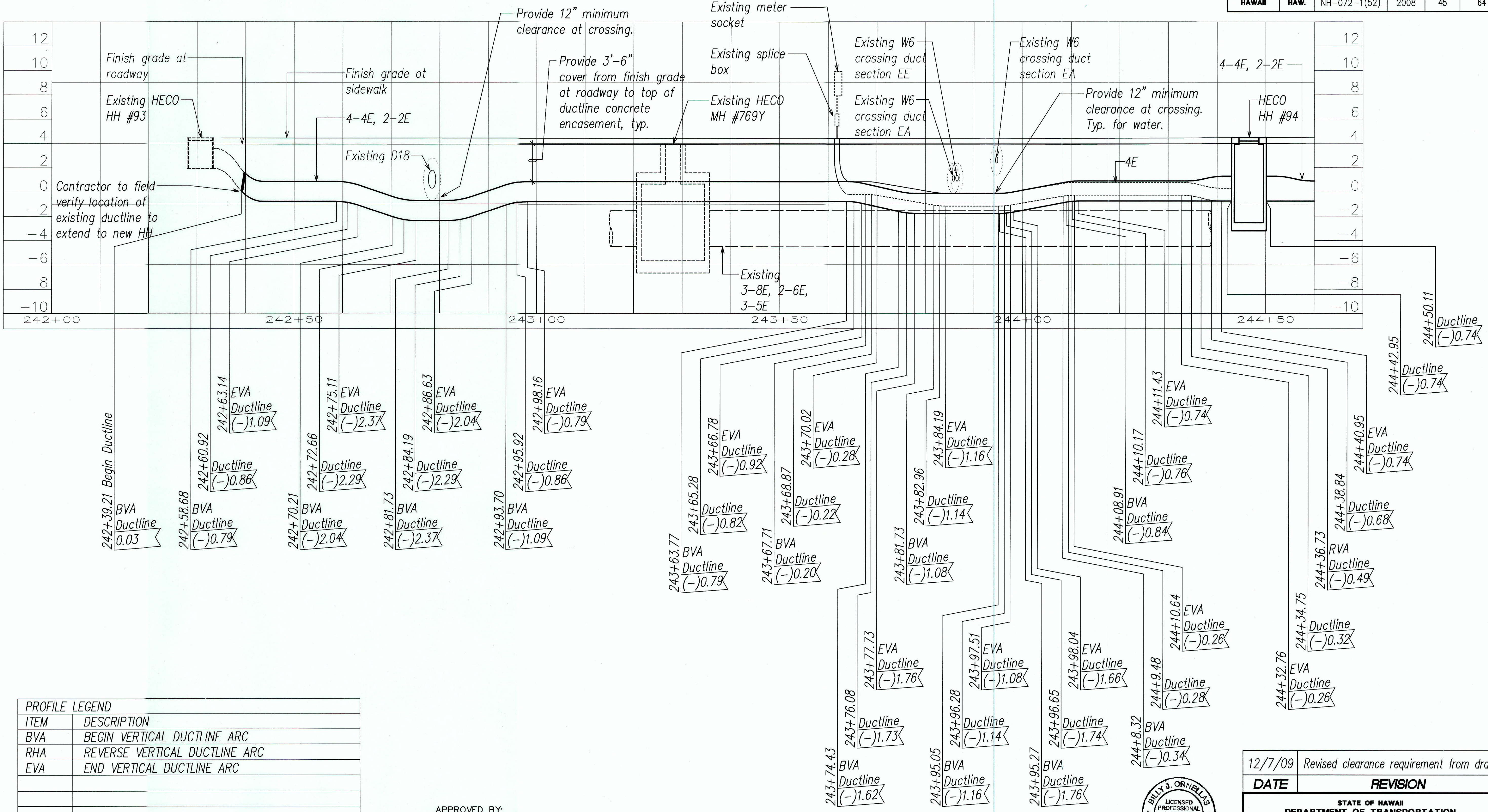
**ELECTRICAL PLAN VI**

KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

SHEET No. E-14 OF 34 SHEETS



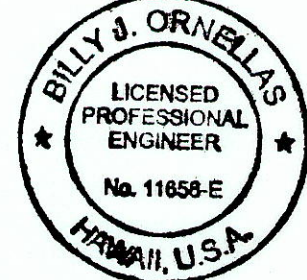
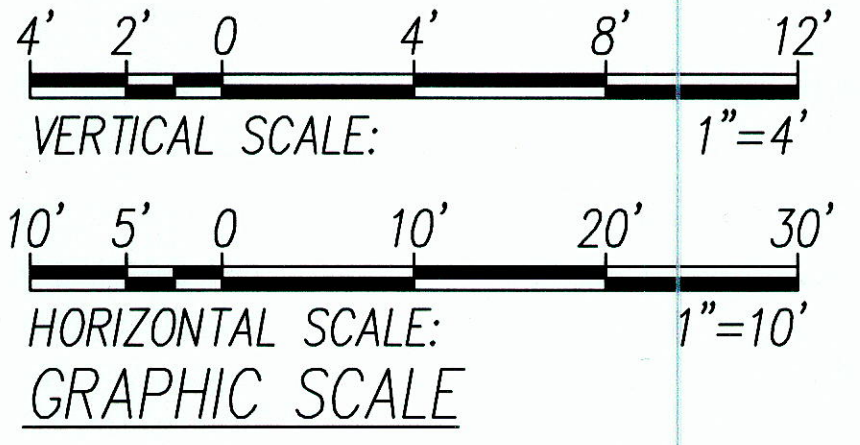
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	45	64



PROFILE LEGEND	
ITEM	DESCRIPTION
BVA	BEGIN VERTICAL DUCTLINE ARC
RHA	REVERSE VERTICAL DUCTLINE ARC
EVA	END VERTICAL DUCTLINE ARC

APPROVED BY: \_\_\_\_\_  
HAWAIIAN ELECTRIC COMPANY, INC. \_\_\_\_\_  
DATE \_\_\_\_\_

PARTIAL ELECTRICAL DUCTLINE PROFILE I  
HORIZONTAL SCALE: 1"=10'-0"  
VERTICAL SCALE: 1"=4'-0"



SIGNATURE \_\_\_\_\_  
APRIL 30, 2012  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

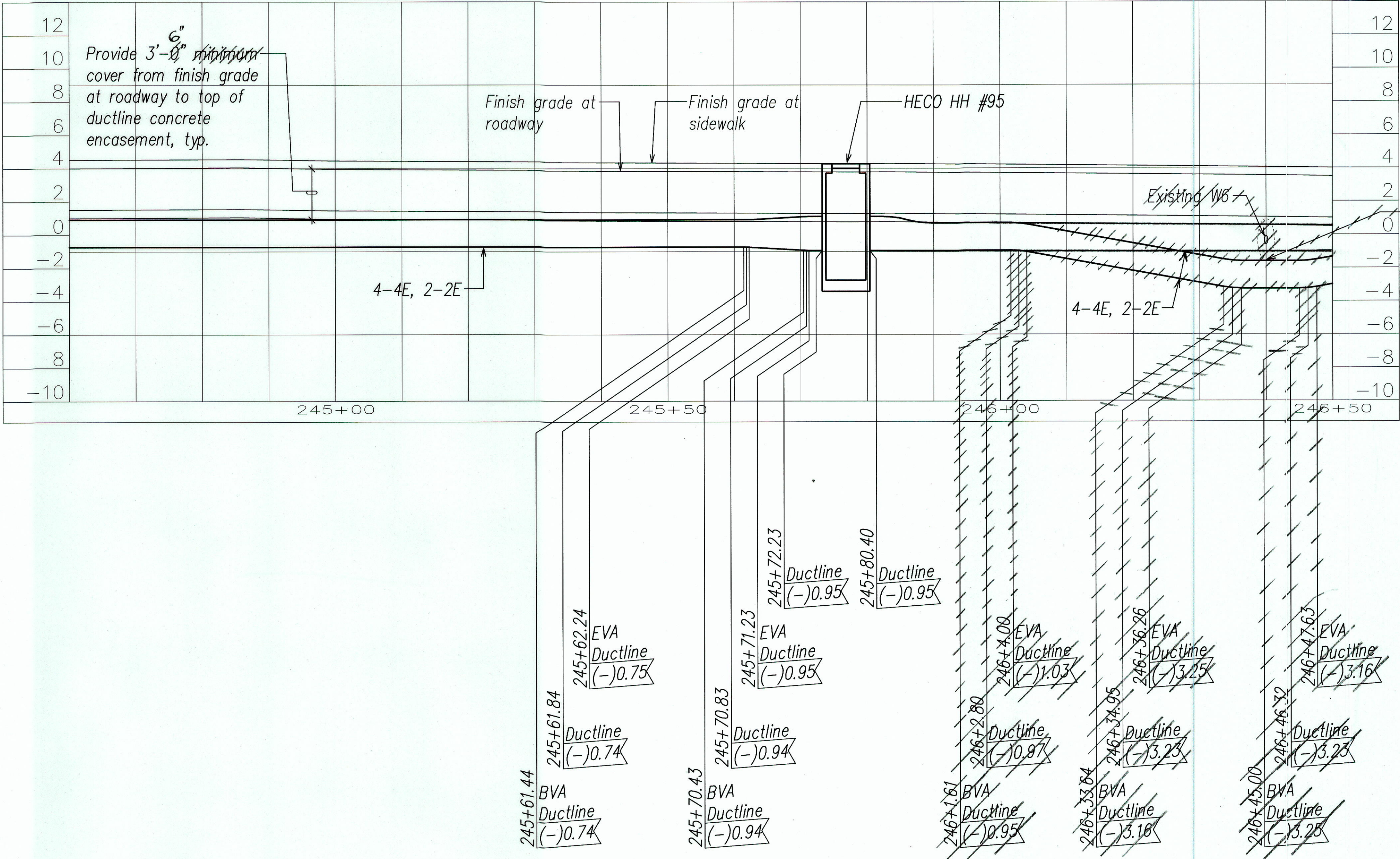
12/7/09	Revised clearance requirement from drain
DATE	REVISION
STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION	
PARTIAL ELECTRICAL DUCTLINE PROFILE I	
KALANIANA'OLE HIGHWAY IMPROVEMENTS VICINITY OF HAWAII KAI DRIVE TO KEAHOLE STREET	
FEDERAL-AID PROJECT NO. NH-072-1(52)	
DATE: January 2009	
SHEET No. E-15 OF 34 SHEETS	

"AS-BUILT"

CO. 45



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	46	64



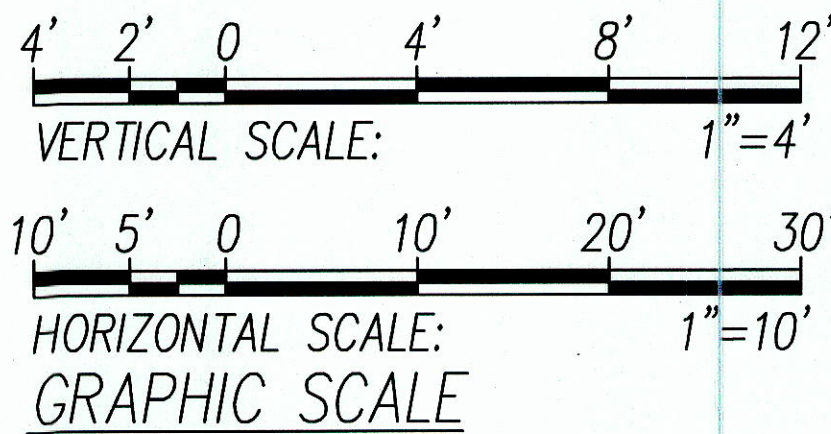
Provide 12" minimum clearance when crossing existing water line.

PROFILE LEGEND	
ITEM	DESCRIPTION
BVA	BEGIN VERTICAL DUCTLINE ARC
RHA	REVERSE VERTICAL DUCTLINE ARC
EVA	END VERTICAL DUCTLINE ARC

DRAWING REVIEW  
Reviewed for HECO's Facilities Only  
Date 2/14/09 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 BY: *[Signature]*  
HAWAIIAN ELECTRIC COMPANY, INC. DATE

PARTIAL ELECTRICAL DUCTLINE PROFILE II  
HORIZONTAL SCALE: 1"=10'-0"  
VERTICAL 1"=4'-0"



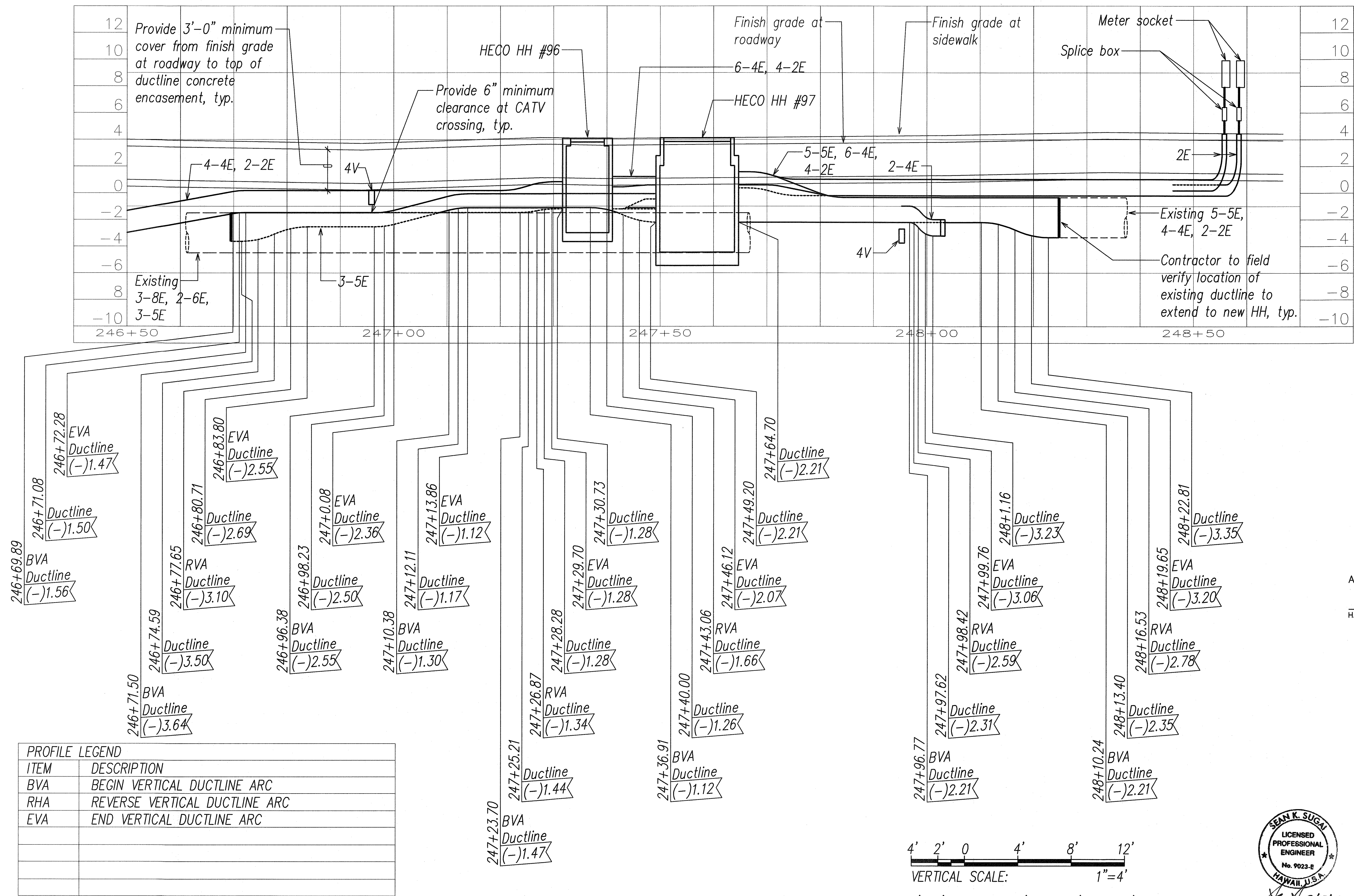
SEAN K. SUGAL  
LICENSED PROFESSIONAL ENGINEER  
No. 9023-E  
HAWAII, U.S.A.  
SIGNATURE: *[Signature]* 2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
PARTIAL ELECTRICAL  
DUCTLINE PROFILE II  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009  
SHEET No. E-16 OF 34 SHEETS

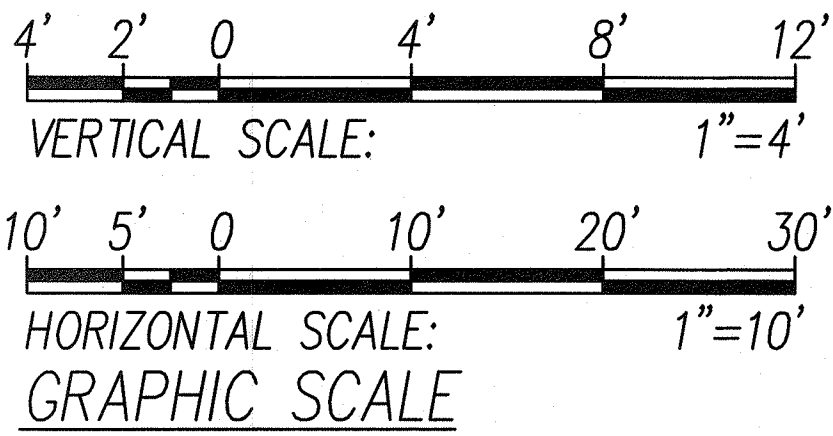
"AS-BUILT"



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	47	64



PARTIAL ELECTRICAL DUCTLINE PROFILE III  
HORIZONTAL SCALE: 1"=10'-0"  
VERTICAL 1"=4'-0"



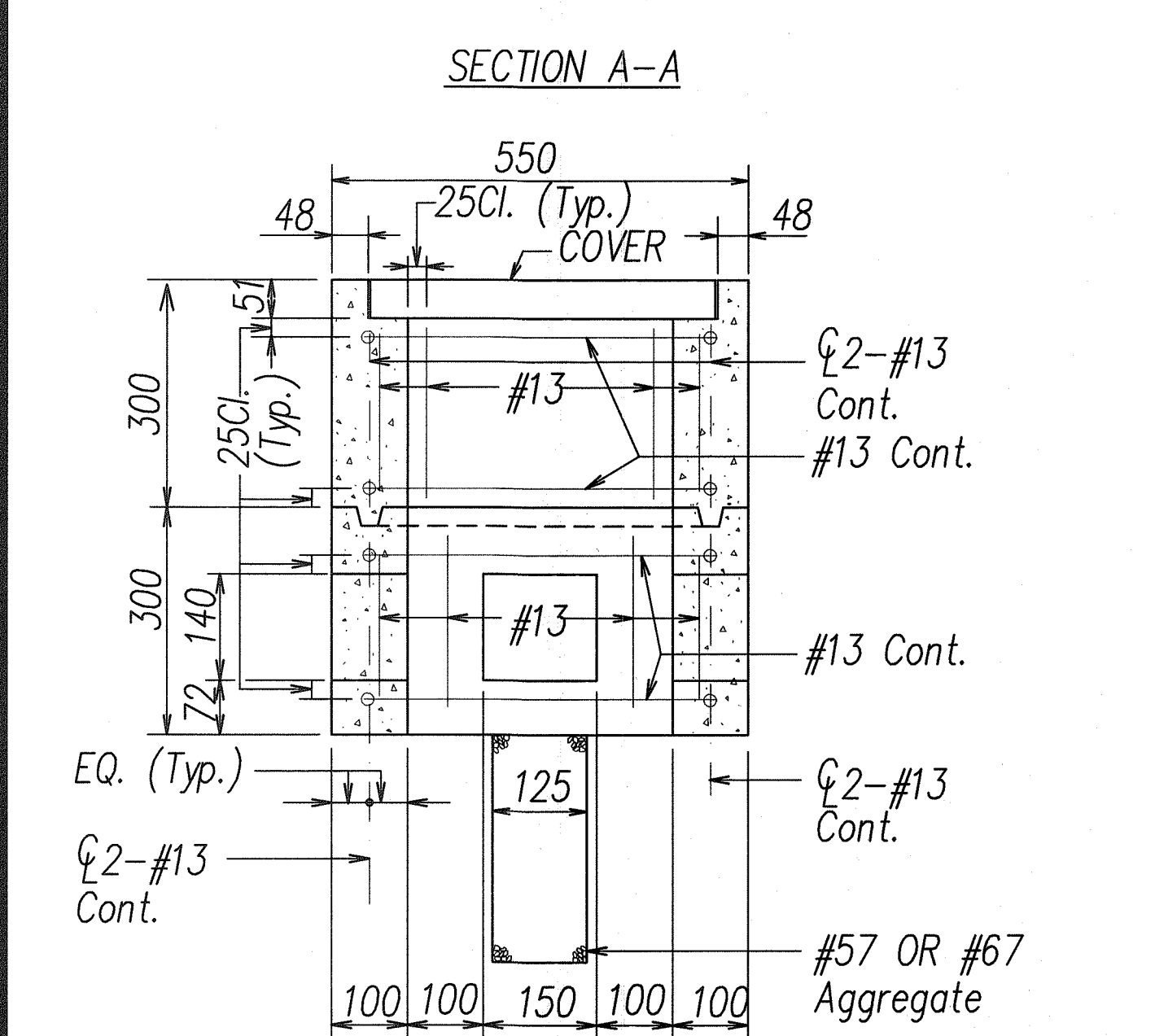
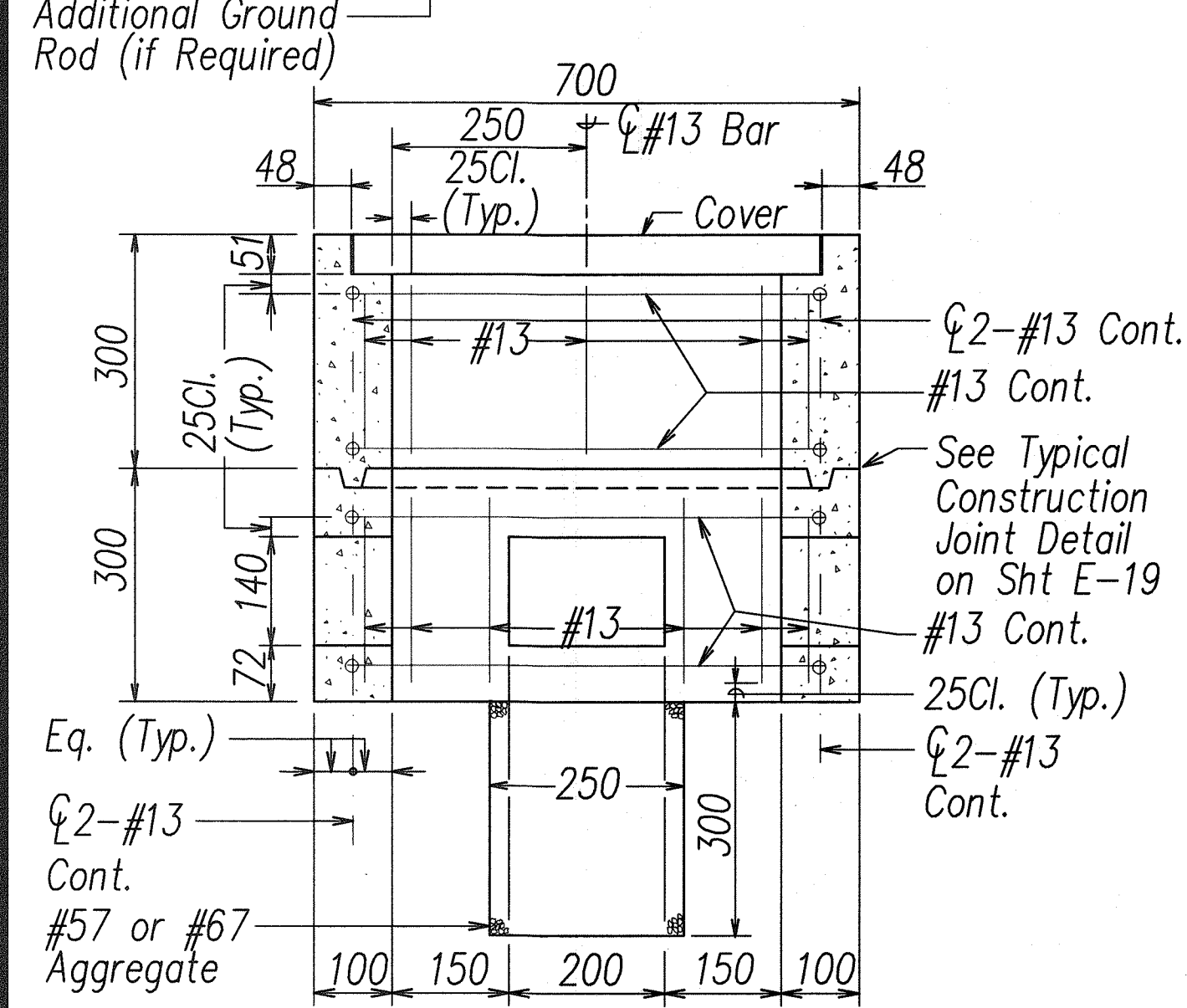
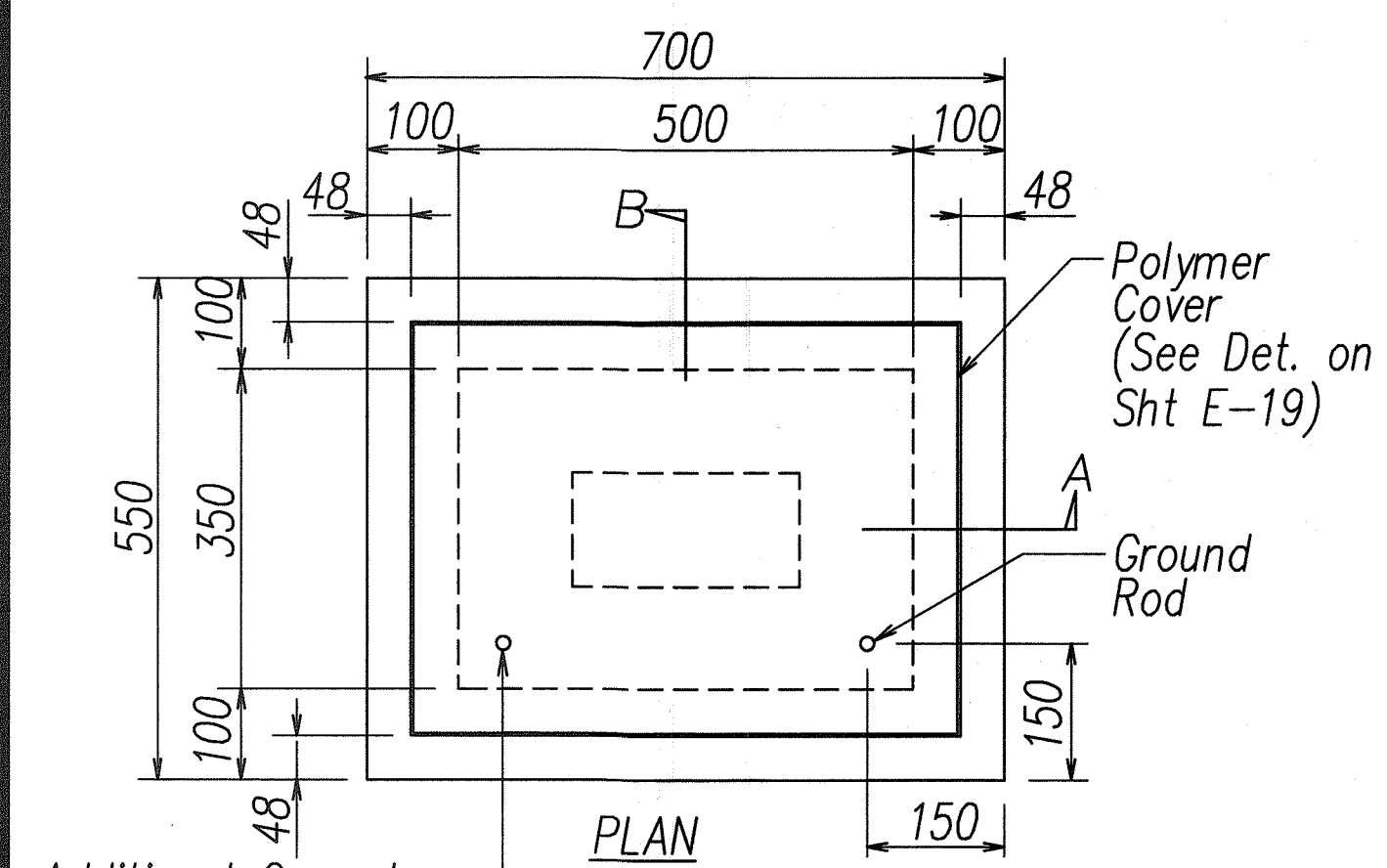
SEAN K. SUGAL  
LICENSED PROFESSIONAL ENGINEER  
No. 9023-E  
HAWAII, U.S.A.  
2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

DRAWING REVIEW  
Reviewed for HECO's Facilities Only  
Date: 2/17/09 By: [Signature]  
Engineering Department  
Hawaiian Electric Company, Inc.  
APPROVED BY: [Signature]  
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.  
HAWAIIAN ELECTRIC COMPANY, INC. DATE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
PARTIAL ELECTRICAL  
DUCTLINE PROFILE III  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009  
SHEET No. E-17 OF 34 SHEETS

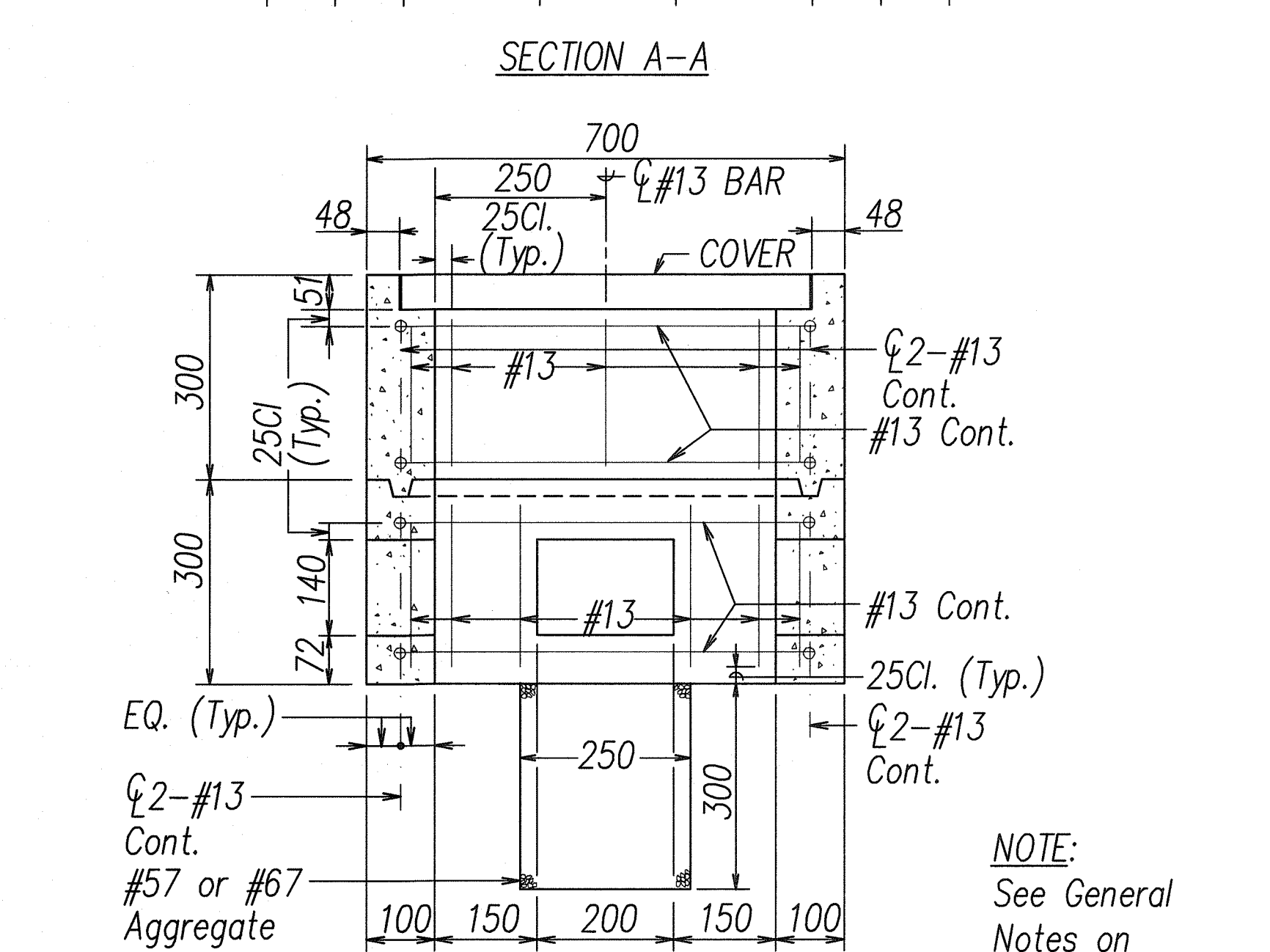
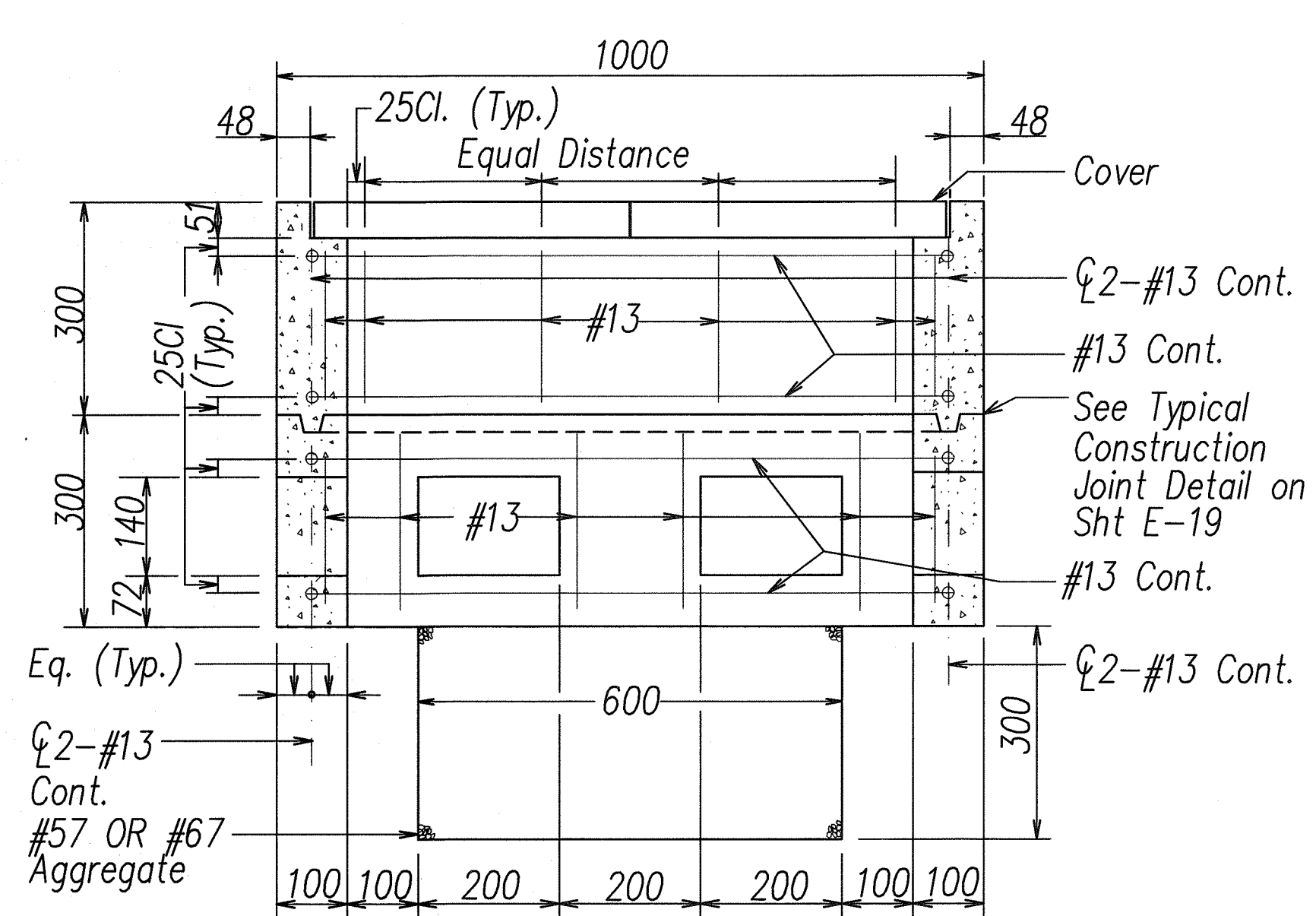
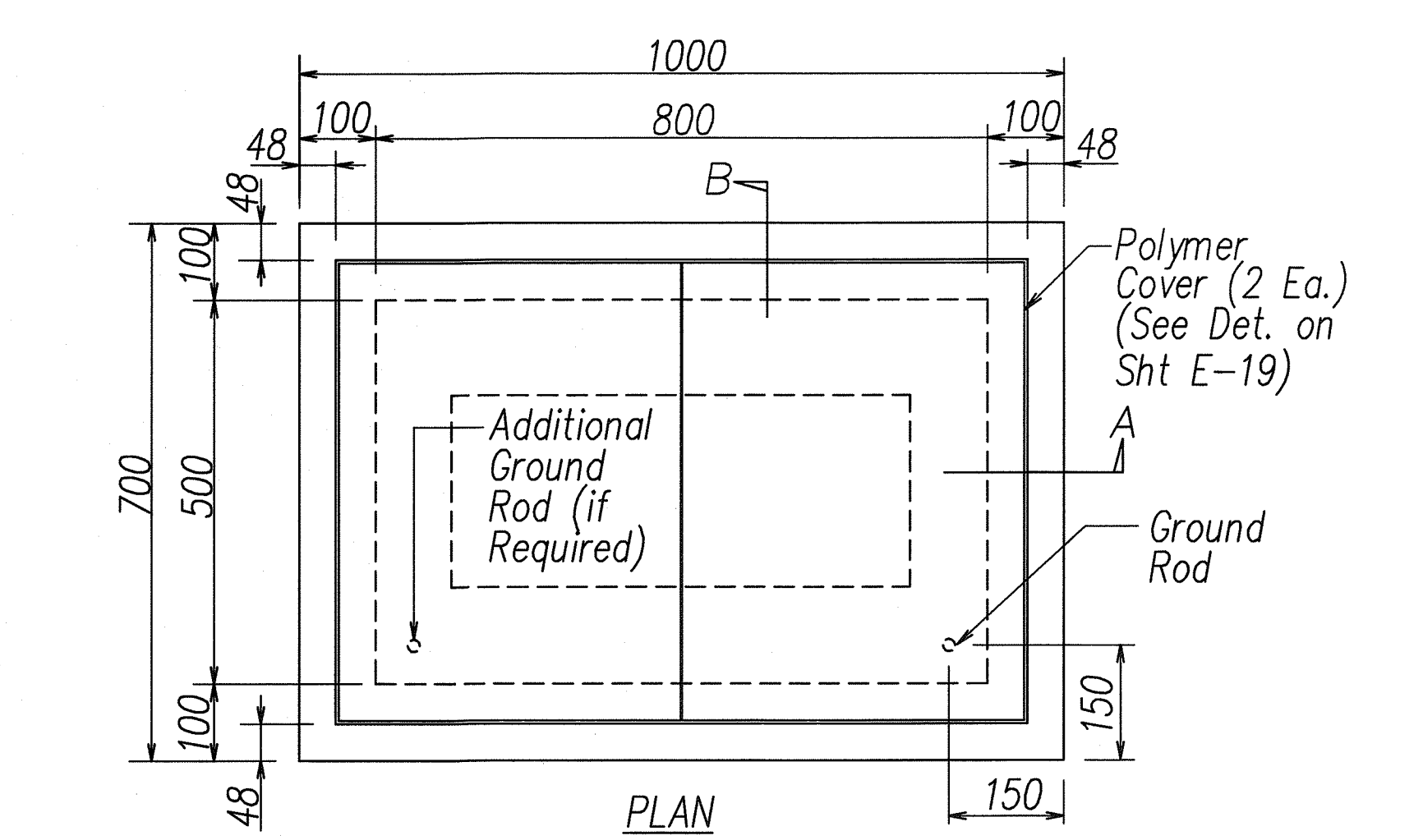


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	48	64



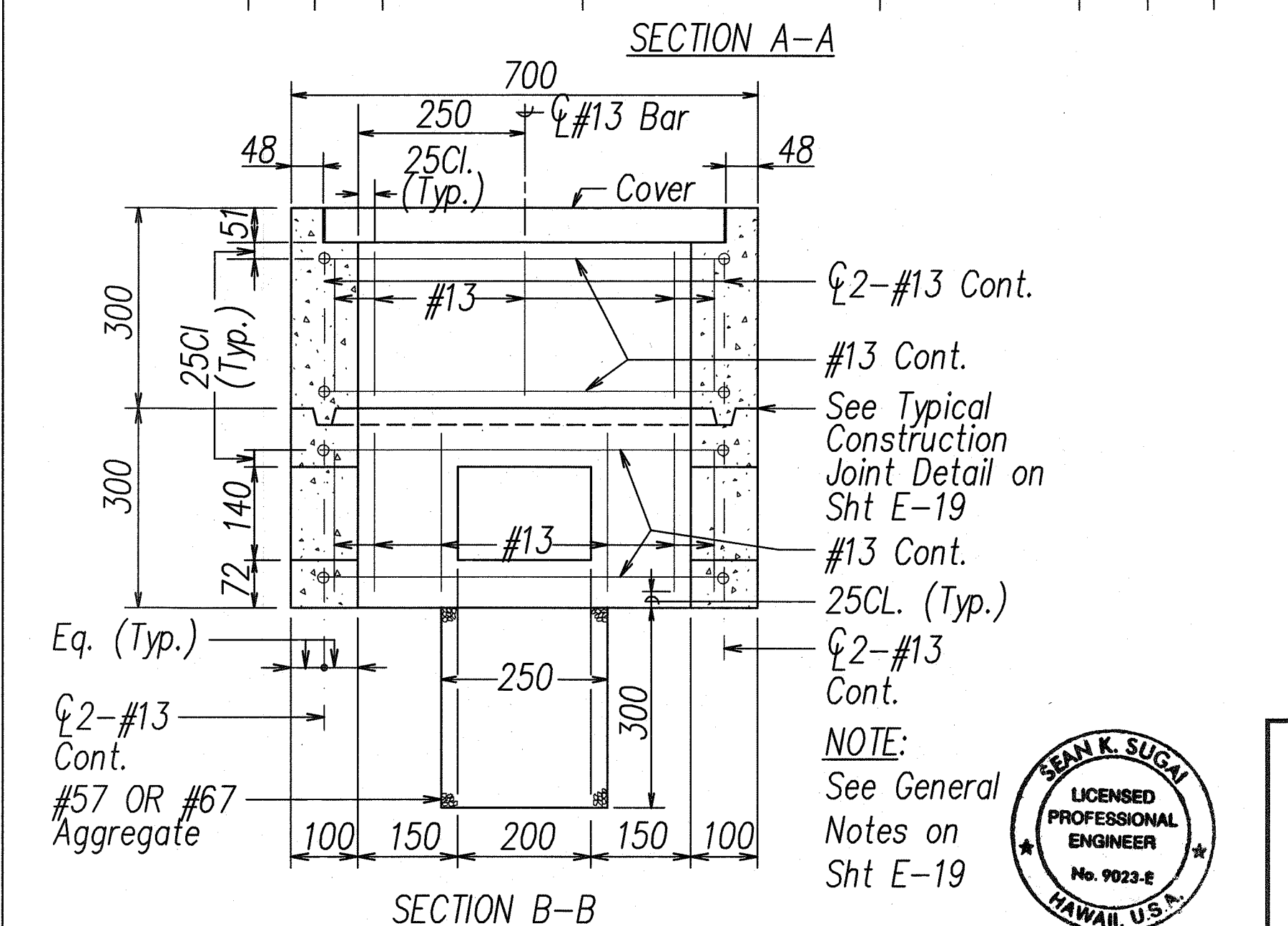
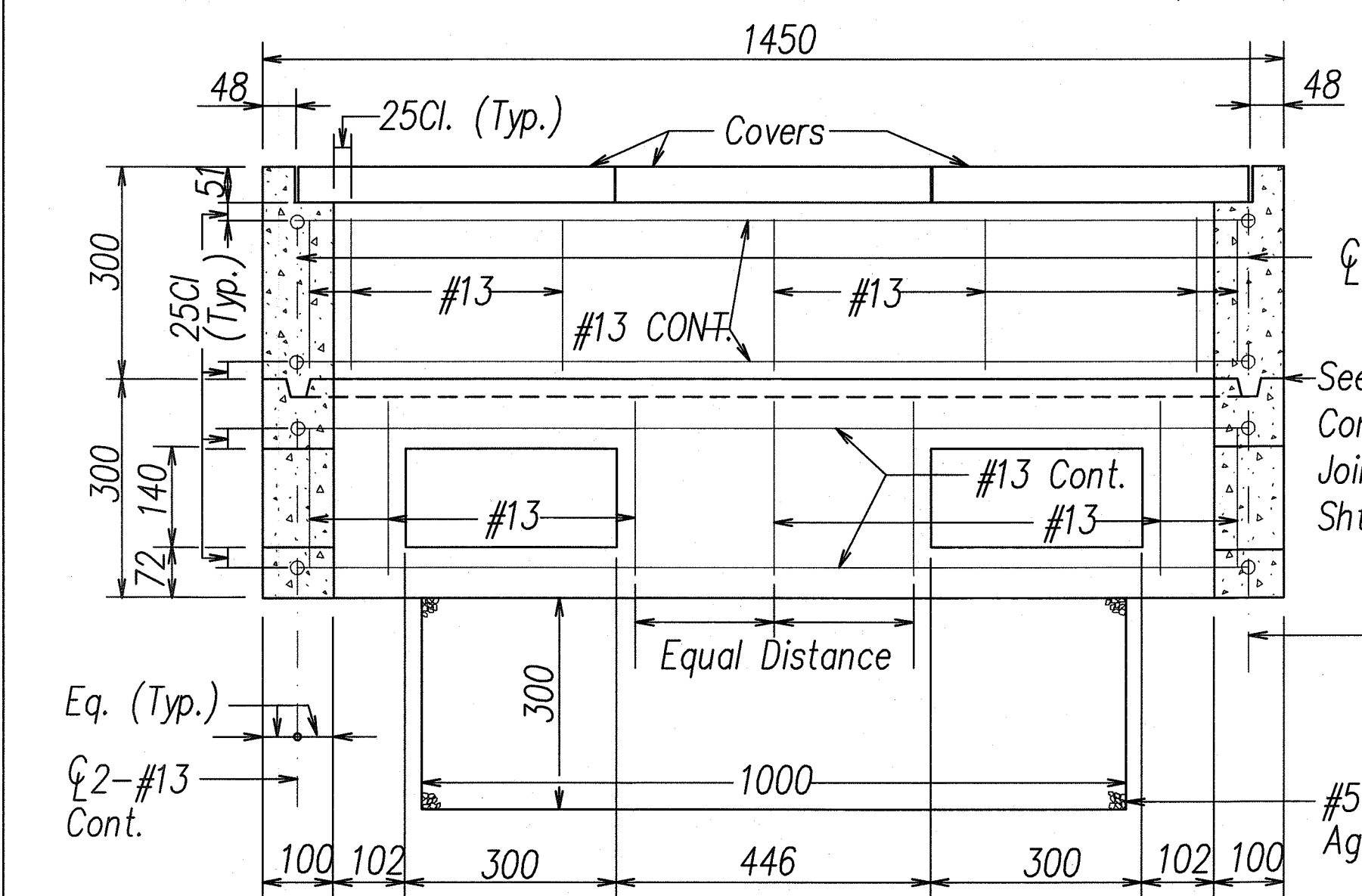
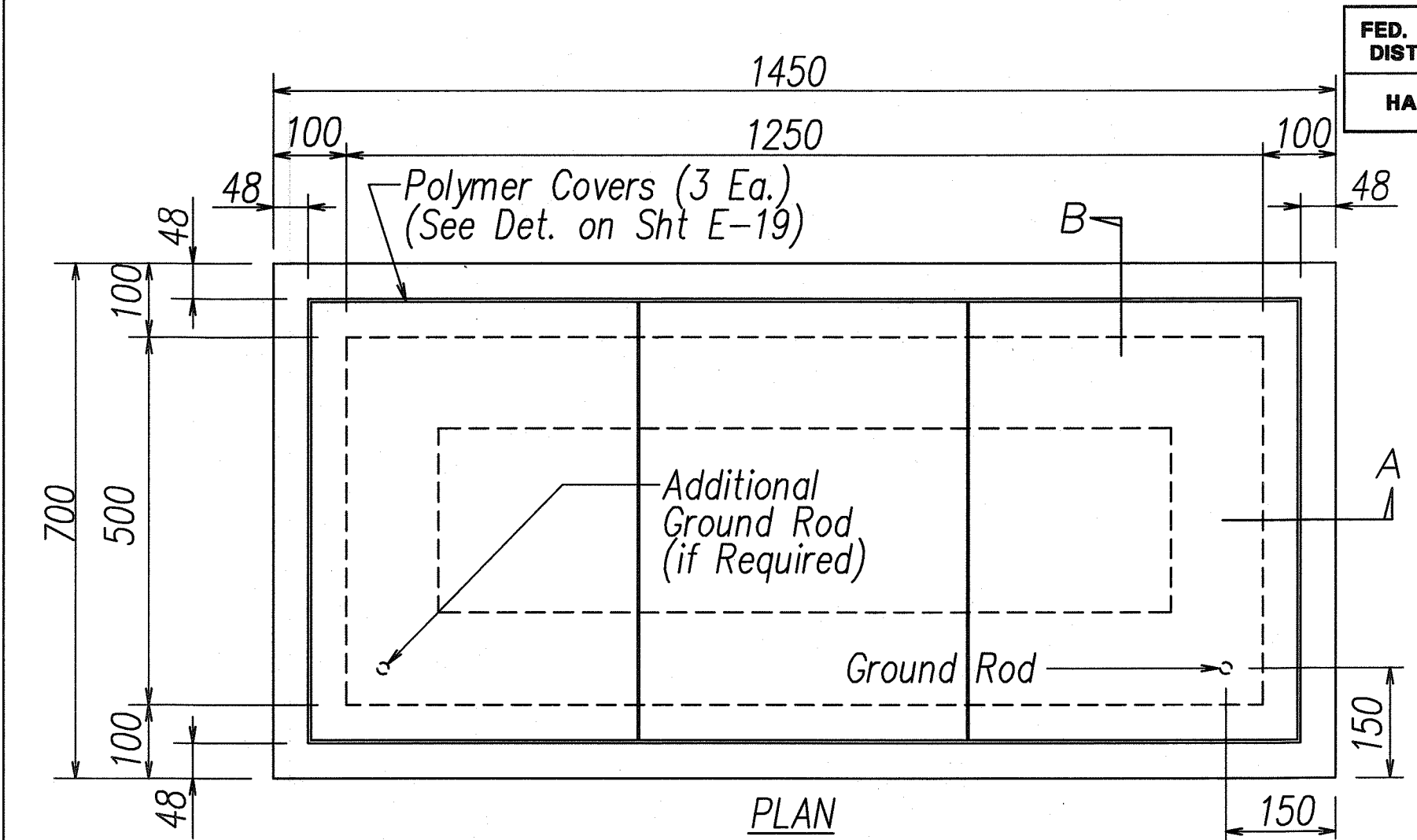
NOTE:  
See General  
Notes on  
Sht E-19

**A** TYPE "A" PULLBOX OLD TYPE "B"  
E-18 NOT TO SCALE

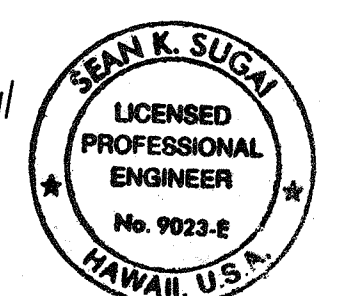


NOTE:  
See General  
Notes on  
Sht E-19

**B** TYPE "B" PULLBOX (OLD TYPE "C")  
E-18 NOT TO SCALE



NOTE:  
See General  
Notes on  
Sht E-19



All Dimensions on this  
Sheet are in Millimeters

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TRAFFIC SIGNAL  
PULLBOX DETAILS I**

KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAL DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

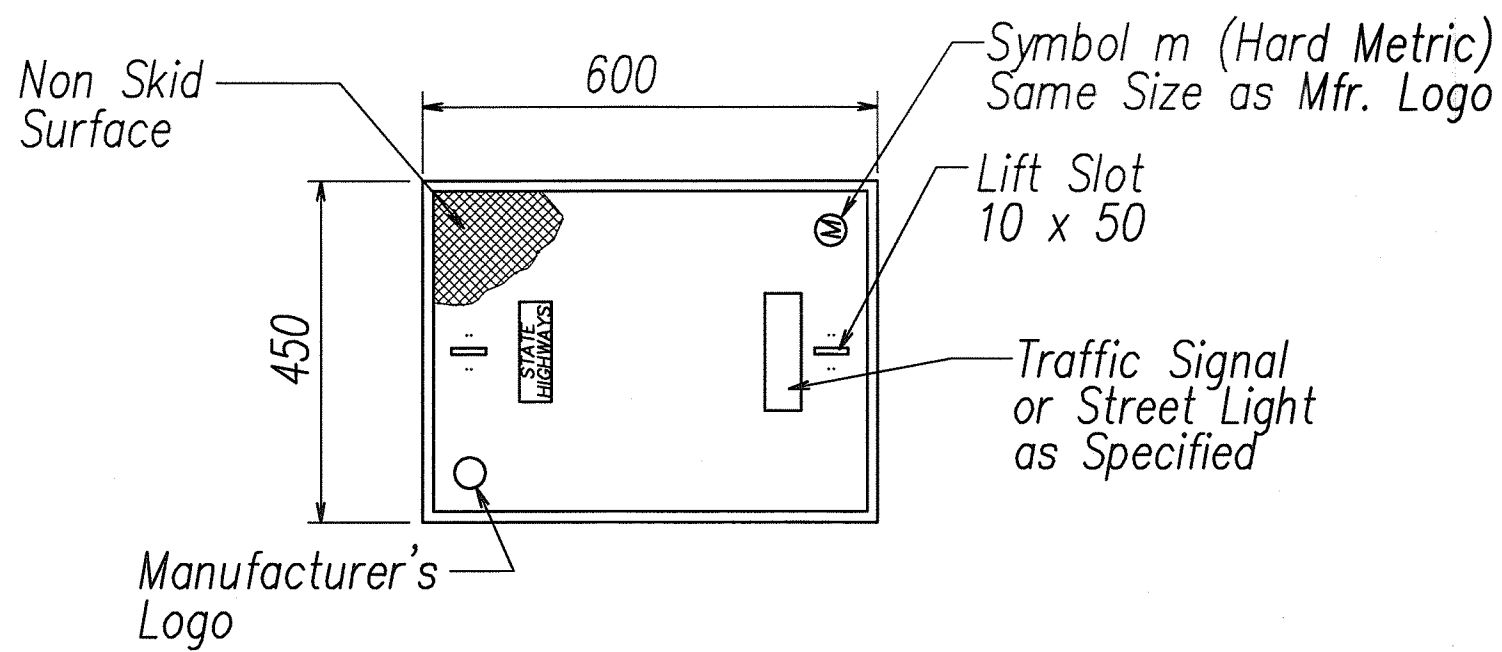
SHEET No. E-18 OF 34 SHEETS



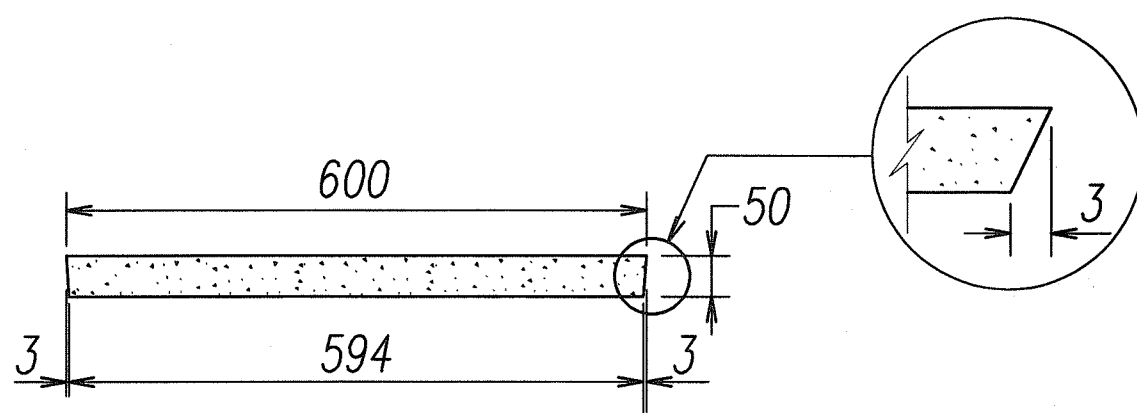
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	49	64

GENERAL NOTES FOR TRAFFIC SIGNAL PULLBOX  
DETAILS ON SHEET E-18

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).

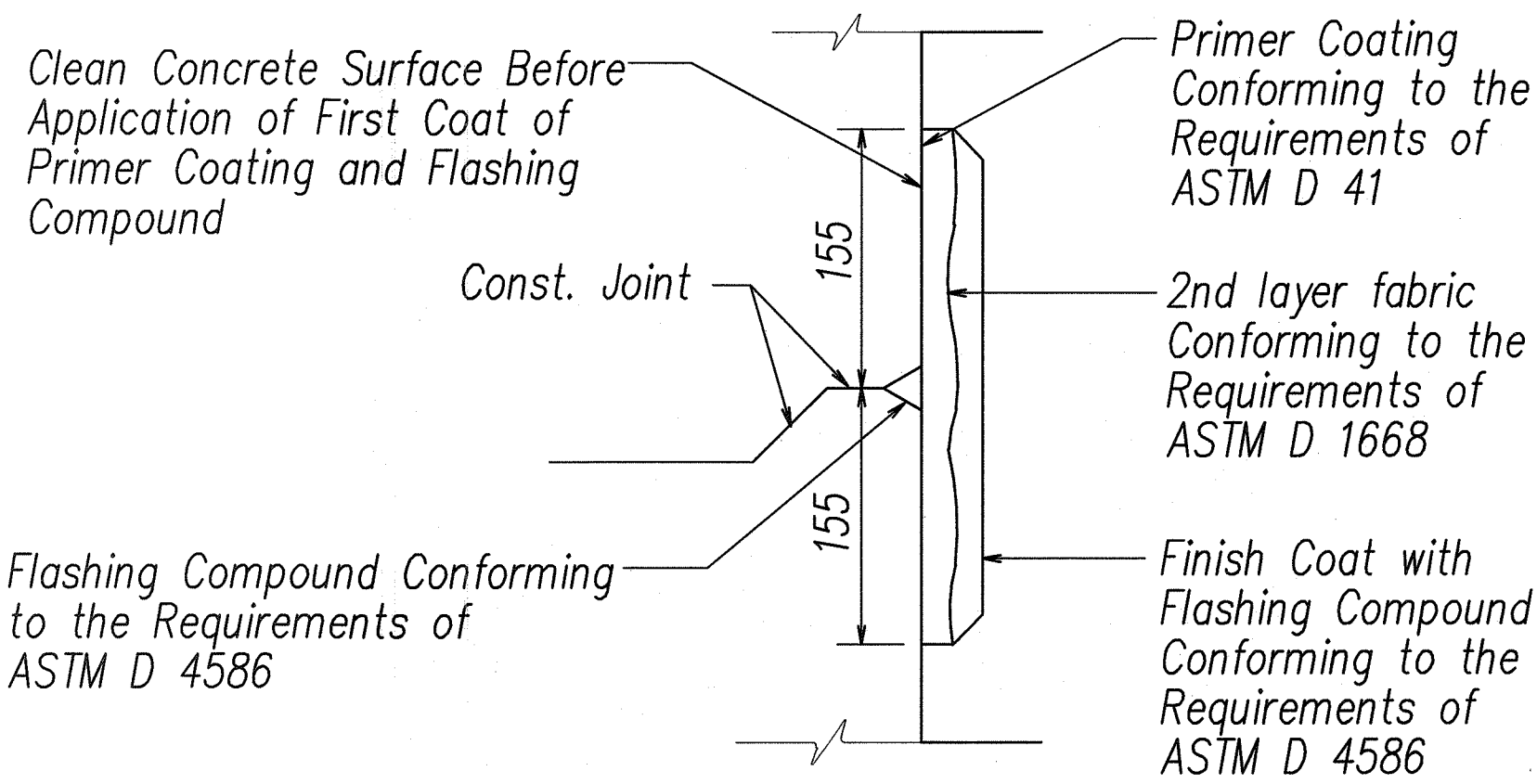


PLAN VIEW



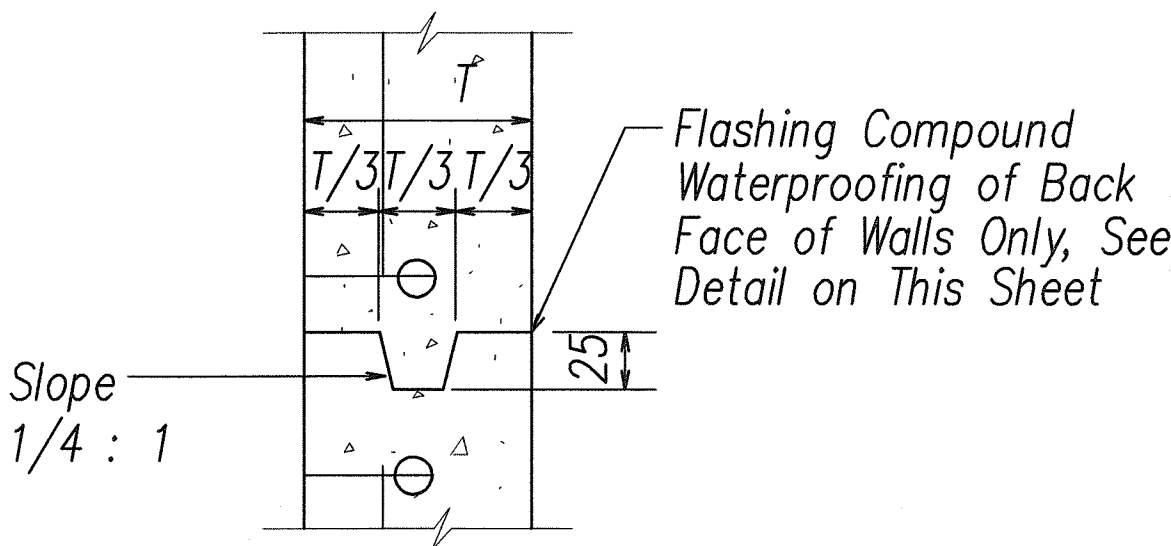
ELEVATION

Note: See Highway Lighting and  
Traffic Signal Pullbox Details  
on Sht E-18



A  
E-19  
TYPICAL FLASHING COMPOUND  
WATERPROOFING DETAILS  
NOT TO SCALE

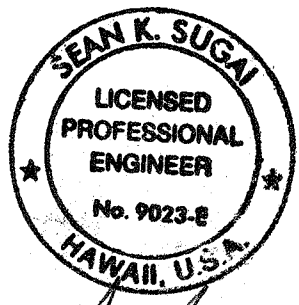
B  
E-19  
POLYMER CONCRETE COVER  
NOT TO SCALE



Note: See Highway Lighting and  
Traffic Signal Pullbox Details  
on Sht E-18

C  
E-19  
TYPICAL CONSTRUCTION JOINT DETAIL  
NOT TO SCALE

All Dimensions on this  
Sheet are in Millimeters  
Unless Otherwise Shown



SIGNATURE  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR  
UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
TRAFFIC SIGNAL  
PULLBOX DETAILS II  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009  
SHEET No. E-19 OF 34 SHEETS

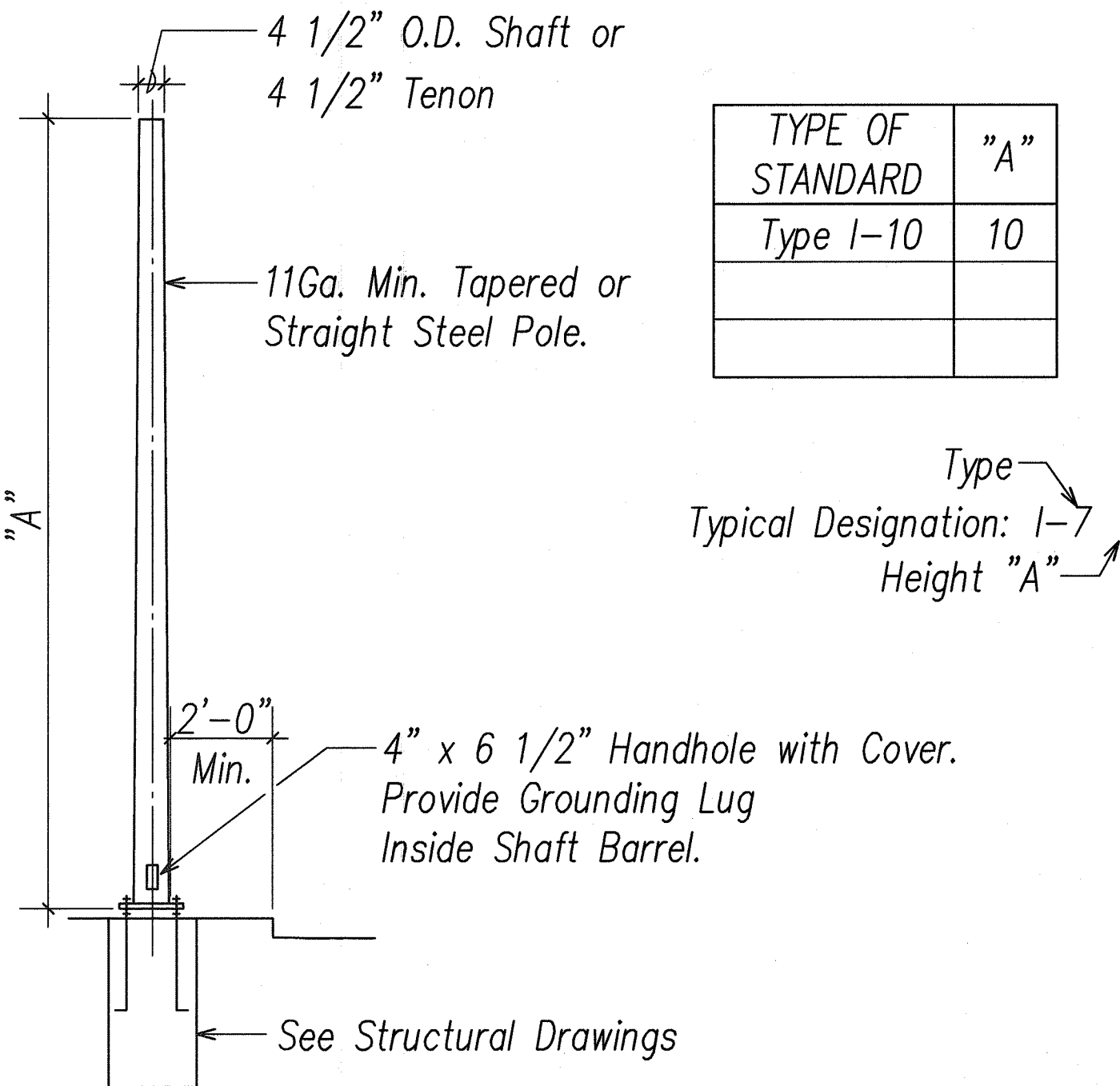


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	50	64

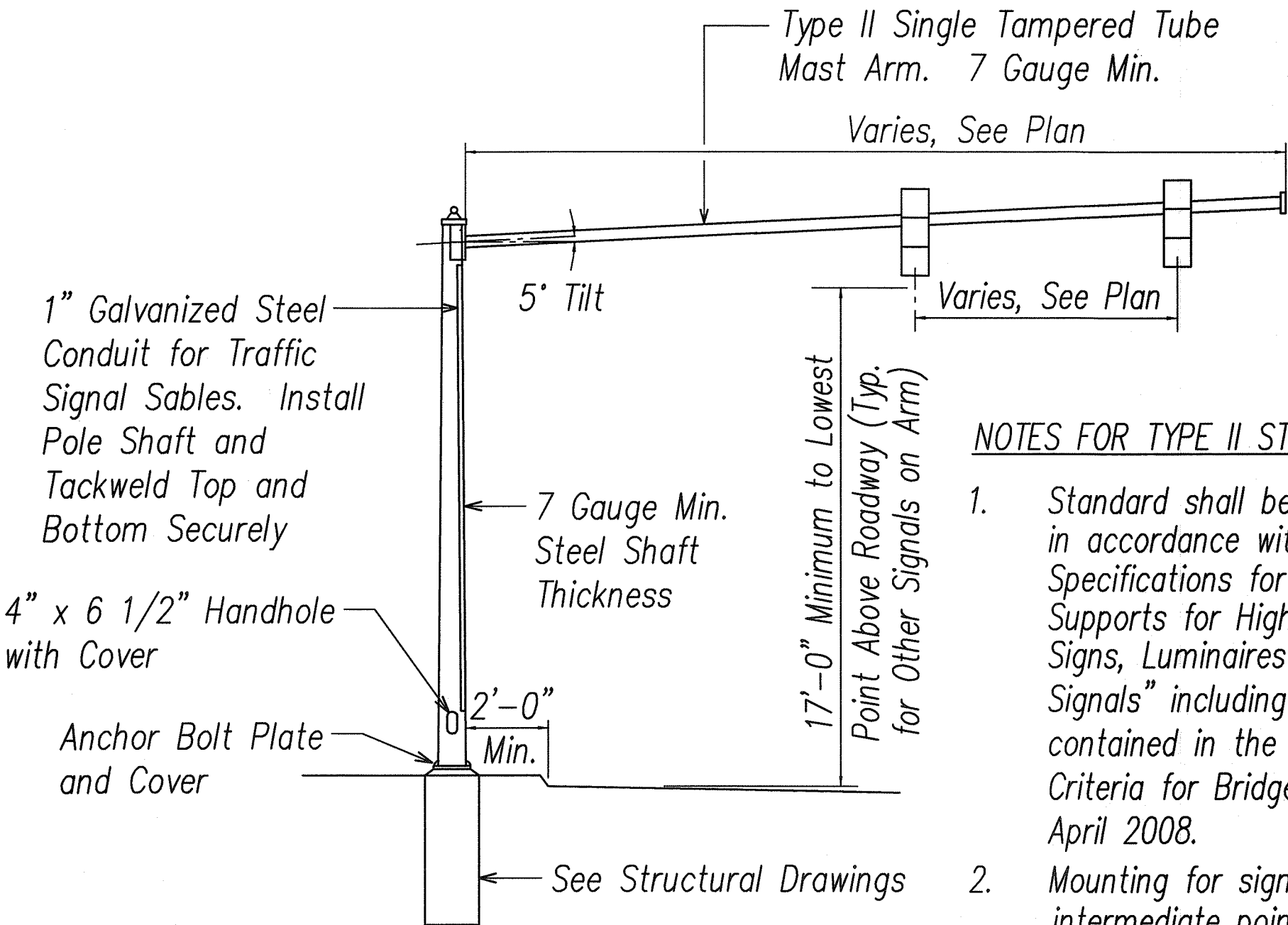
NEW DESIGN REQUIREMENTS FOR LUMINAIRES,  
POLE STANDARDS AND TRAFFIC SIGNAL STANDARDS

Highway lighting luminaires, pole standards, bracket arms, traffic signal standards and mast arms being furnished for this project shall conform with the design requirements noted below. Design shall be in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 4th Edition, including the latest interim revisions, published by the American Association of State Highway and Transportation Officials with the following modifications.

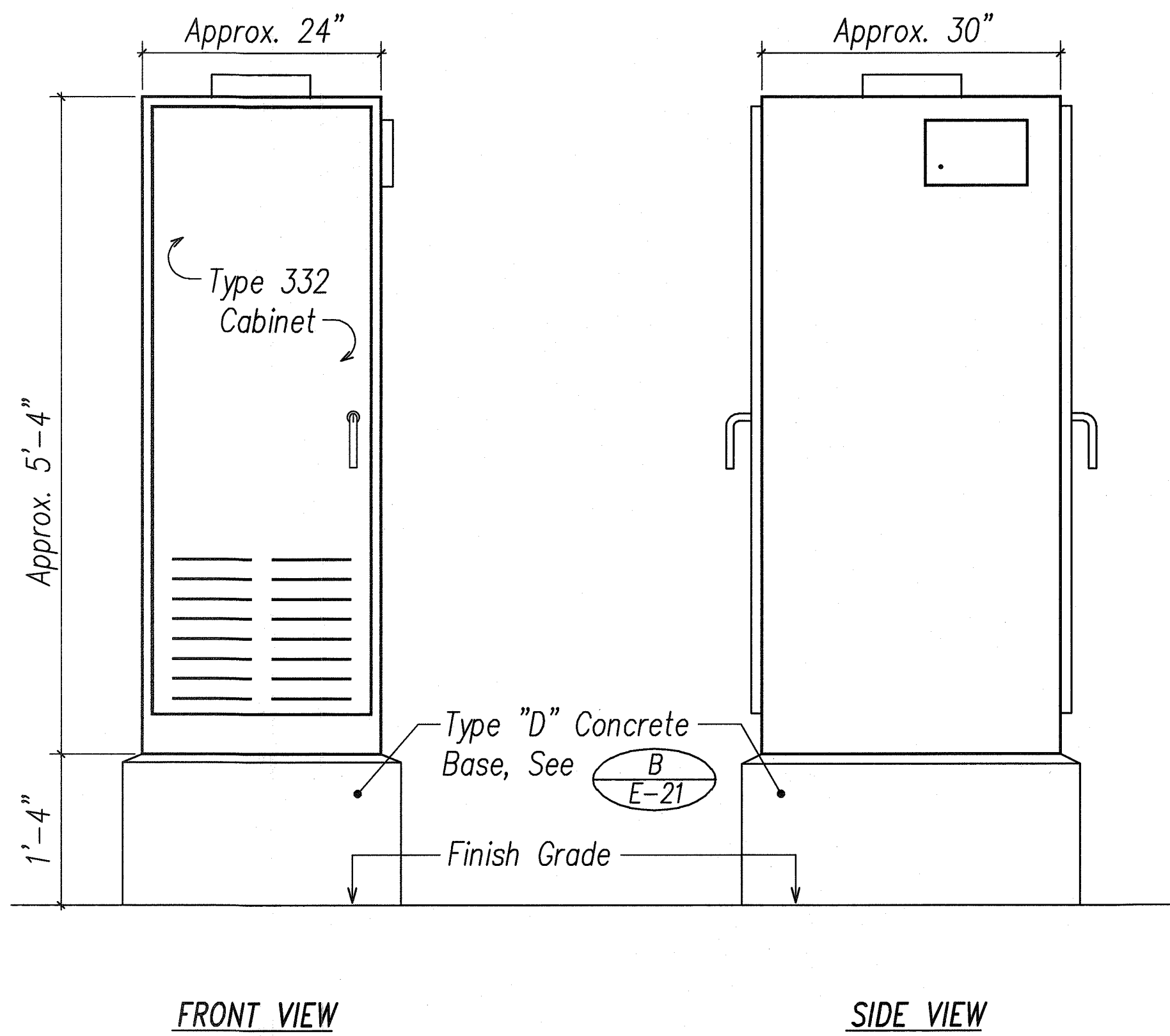
- Basic Wind Speed [Article 3.8.2] to determine the design wind pressure shall be 105 mph.
- Wind Importance Factor [Article 3.8.3] noted in Table 3-2 used to determine the design wind pressure shall be based on the following recurrence intervals:
  - For traffic signal structures: 50 years
  - For luminaire support structures: 25 years
- Fatigue Importance Factors [Article 11.6] noted in Table 11-1 for traffic signal structures shall be based on Fatigue Category 1. Luminaire support structures with round cross sections under 50 feet do not need to be designed for fatigue.
- Galloping [Article 11.7.1]. Traffic signal support structures shall be designed for galloping-induced cyclic loads unless approved vibration mitigation devices are installed.
- Vortex Shedding [Article 11.7.2]. Nontapered lighting structures shall be designed to resist vortex shedding-induced loads including cantilevered mast arms and lighting structures that have tapers less than 0.14 in/ft.
- Natural Wind Gust [Article 11.7.3]. Traffic signal structures shall be designed to resist an equivalent static natural wind gust pressure.
- Truck-Induced Gust [Article 11.7.4]. Traffic signal support structures shall be designed to resist an equivalent static truck gust pressure range based on a truck speed of 20 mph over the posted speed.
- Equipment manufacturers providing structural supports for luminaires and traffic signals are responsible to provide the Engineer with any information that will impact the current foundation design.



A  
E-20 TYPE I TRAFFIC SIGNAL STANDARD  
NOT TO SCALE



B  
E-20 TYPE II TRAFFIC SIGNAL STANDARD  
NOT TO SCALE



C  
E-20 TYPE 332A TRAFFIC SIGNAL  
CONTROLLER CABINET DETAIL  
NOT TO SCALE

DESIGNED BY	DATE
DRAWN BY	
CHECKED BY	
NOTED BY	
NO.	

SEAN K. SUGA  
LICENSED PROFESSIONAL ENGINEER  
No. 9023-B  
HAWAII, U.S.A.  
2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

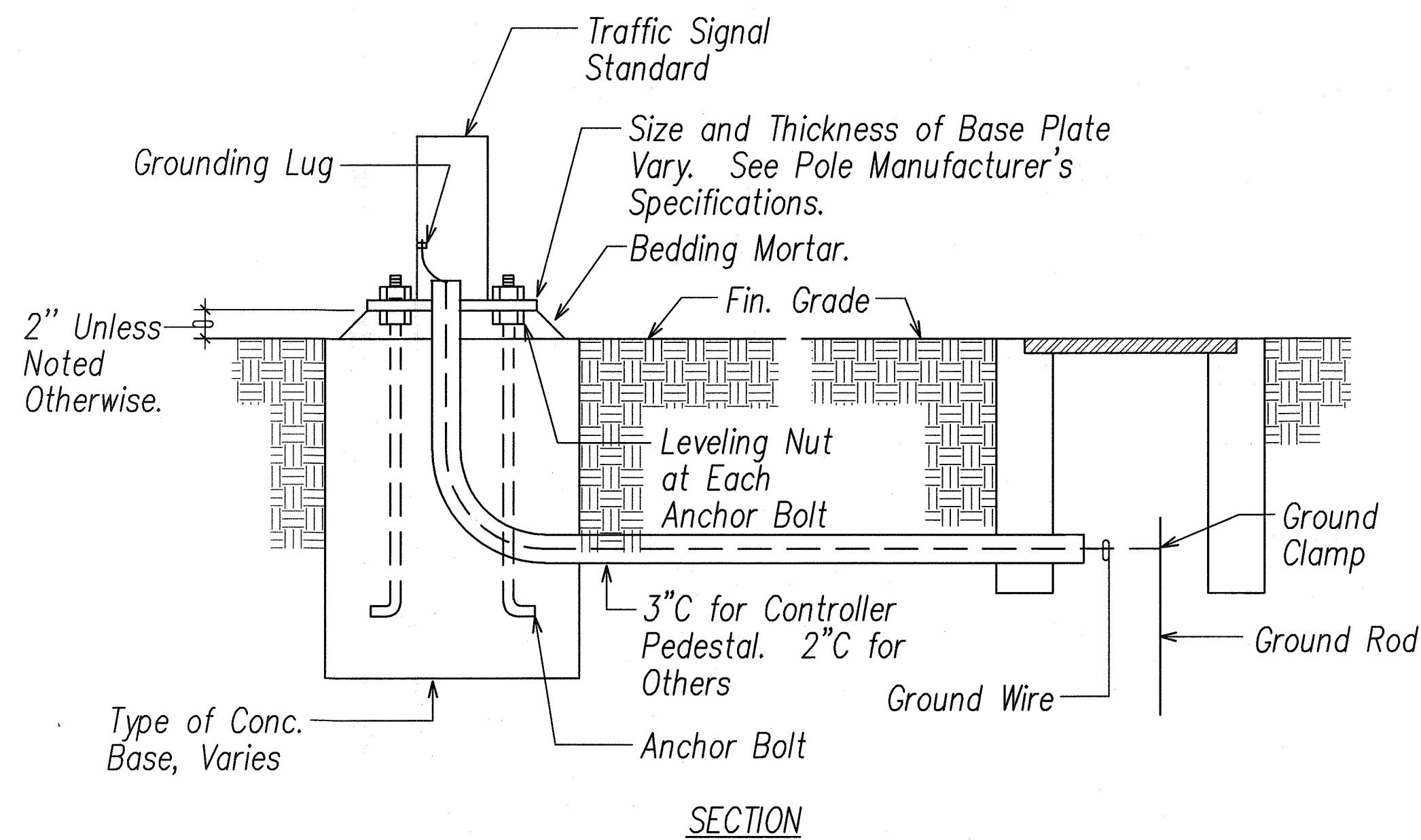
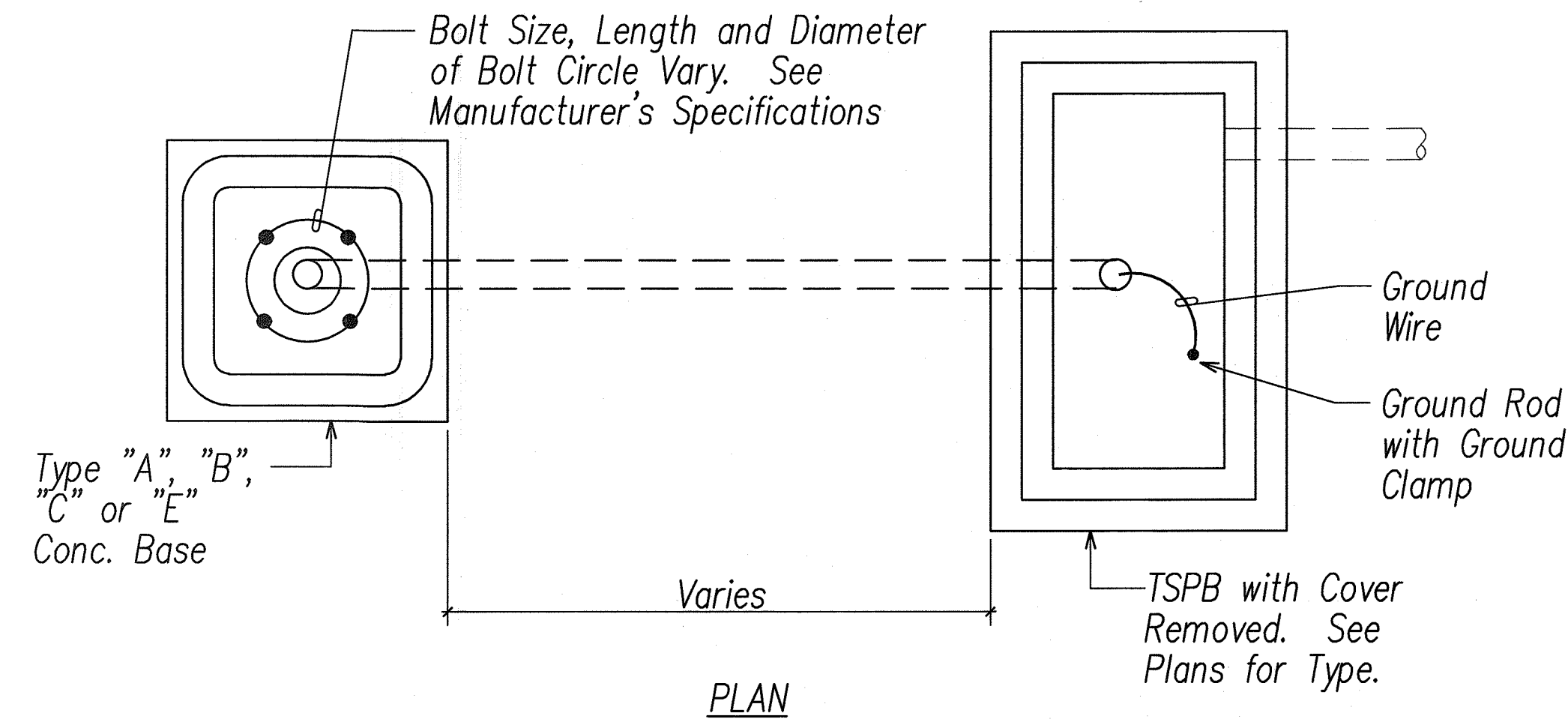
TRAFFIC SIGNAL DETAILS I

KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

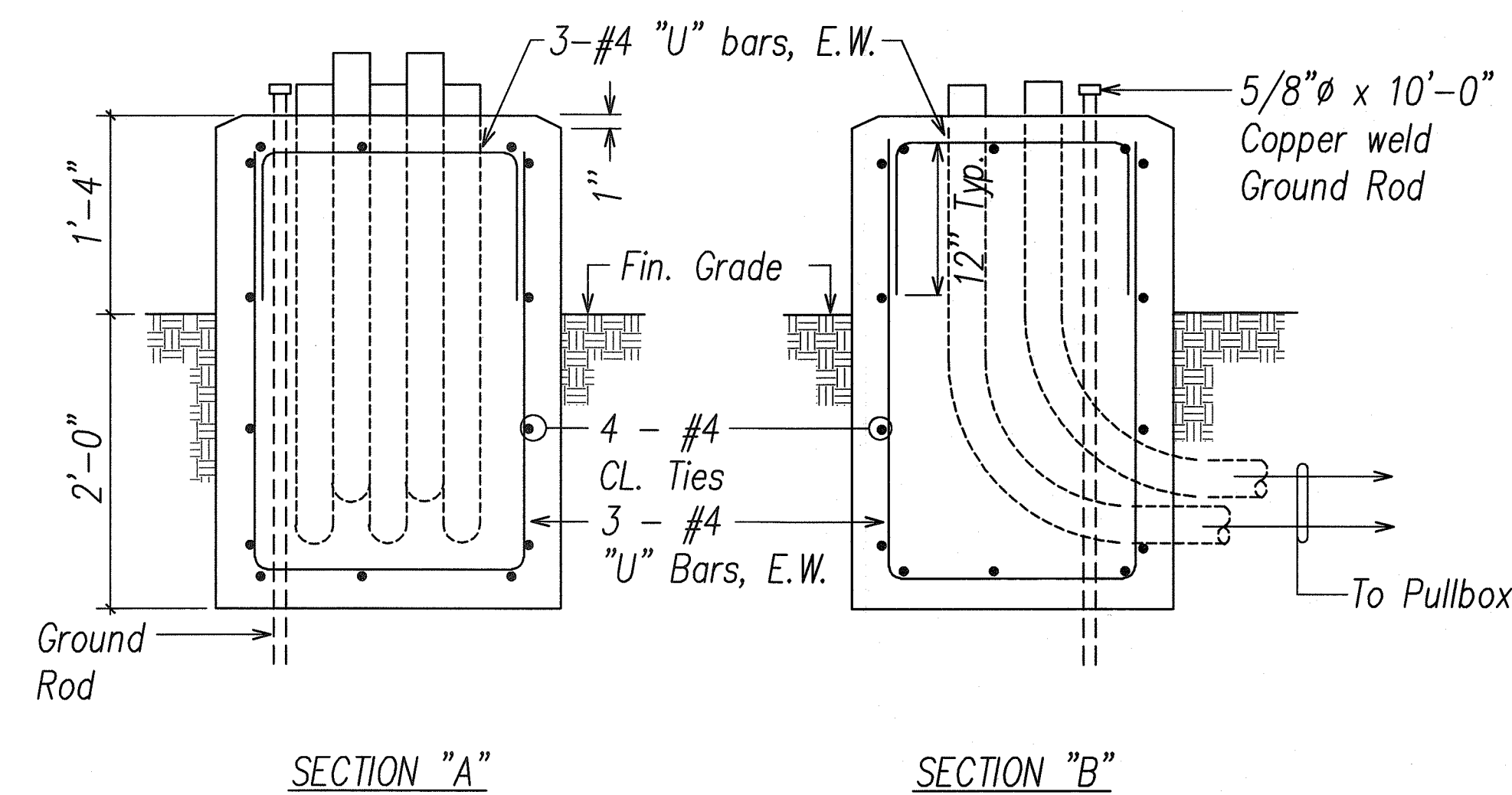
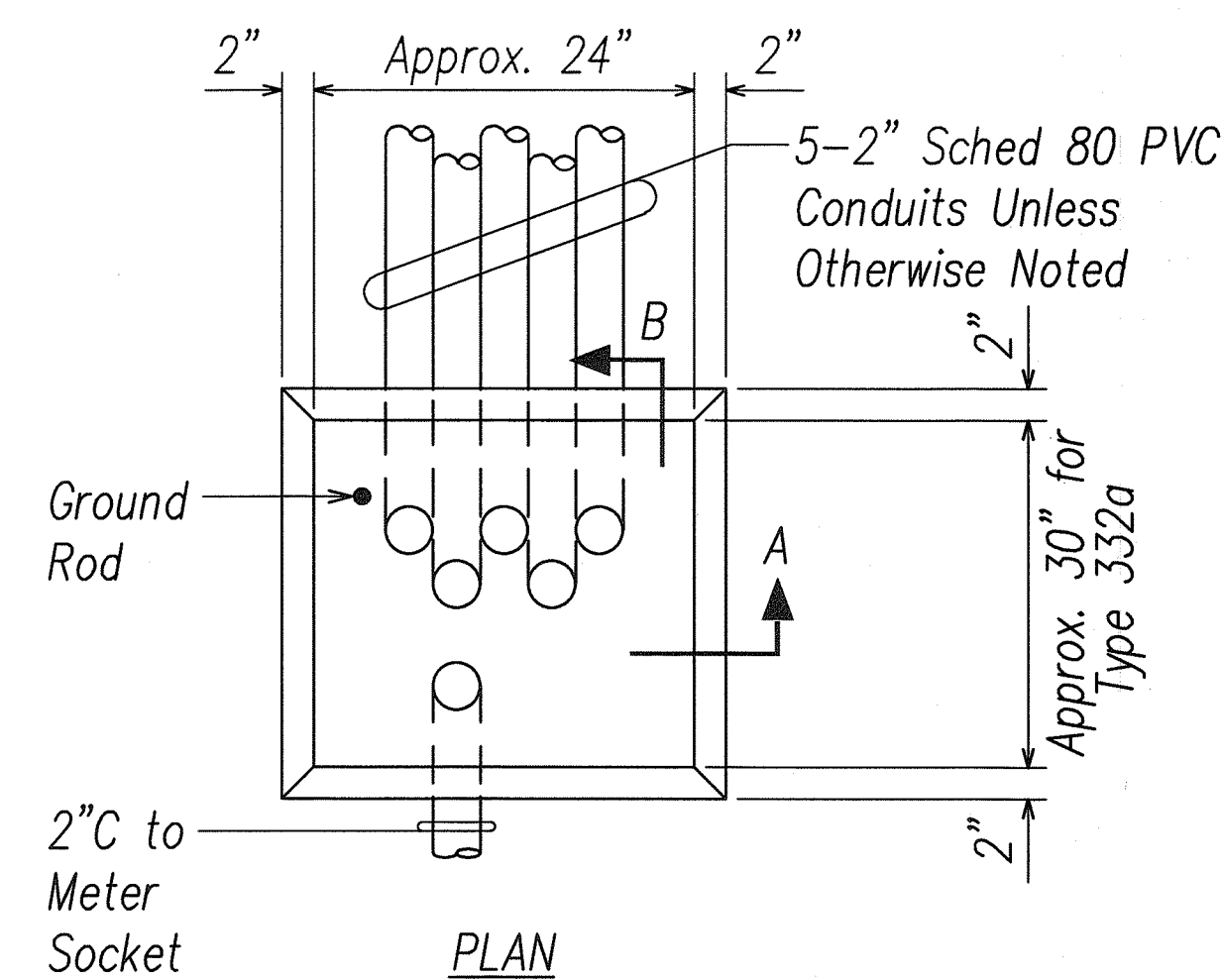
SHEET No. E-20 OF 34 SHEETS



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	51	64



**A** TYPICAL STANDARD & PEDESTAL DETAIL  
E-21 NOT TO SCALE



**B** CONTROLLER CONCRETE BASE DETAIL  
E-21 NOT TO SCALE

**NOTES:**

1. Concrete shall be class "B".
2. Dimensions shall be altered to suit controller cabinet actually furnished.
3. Conduit bends and drain are incidental to concrete base.
4. Refer to cabinet manufacturer's specifications for details of anchor bolts and base setting.
5. All exposed surfaces of concrete base shall be given a Class 2, rubbed finish.

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

LAST SAVE: 1/20/2009 @ 11:54:18 AM  
V:\Lead Projects\241118\Volunteers Hwy\21\_241118B\_100.dwg



SIGNATURE: *[Signature]* 2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

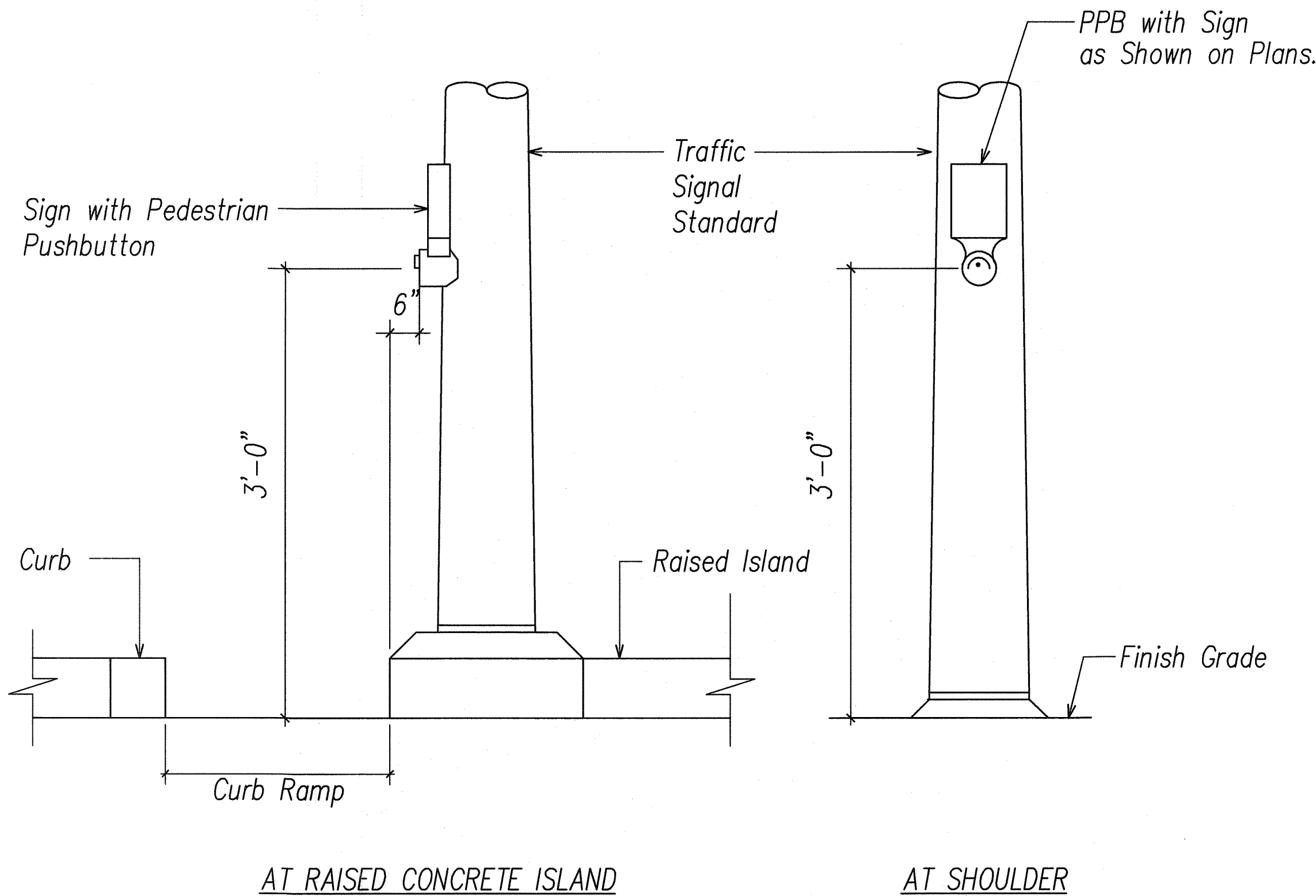
**TRAFFIC SIGNAL DETAILS II**

KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

**SHEET No. E-21 OF 34 SHEETS**

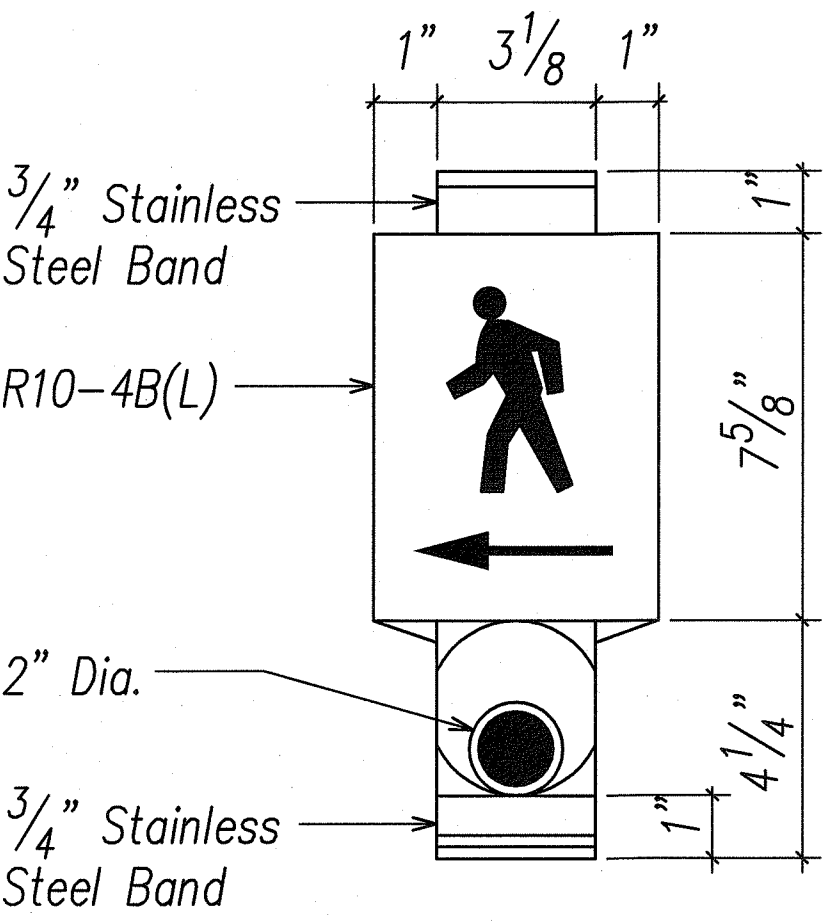


FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	52	64

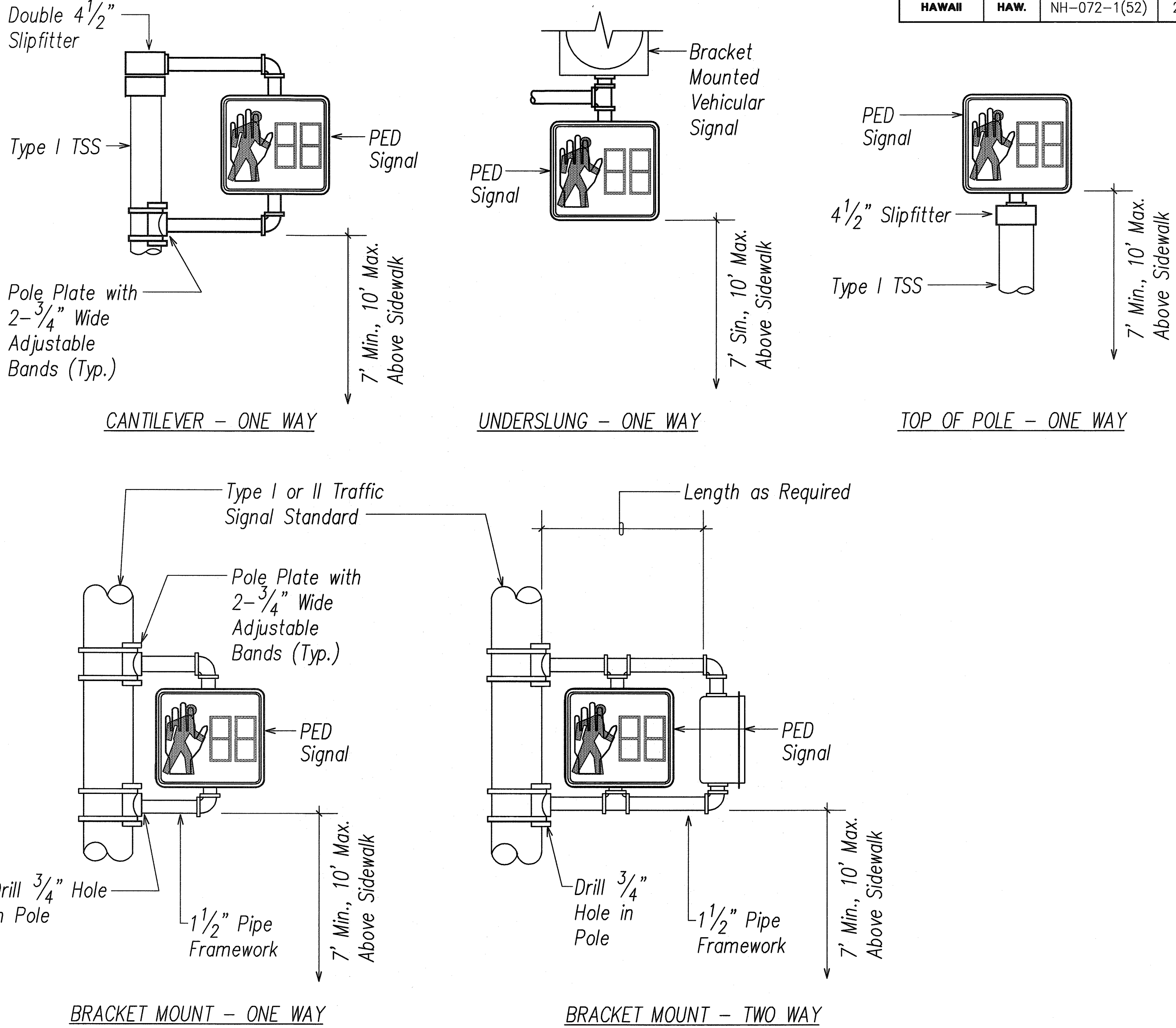


#### DETAIL NOTES:

- 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



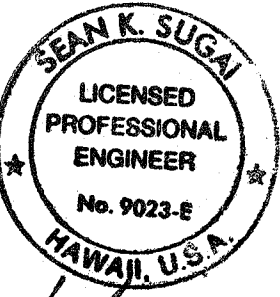
**A** PEDESTRIAN PUSHBUTTON DETAILS  
E-22 NOT TO SCALE



#### NOTES:

- Stainless steel bands shall be 3/4" 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.

**B** PEDESTRIAN SIGNAL MOUNTING DETAILS  
E-24 NOT TO SCALE



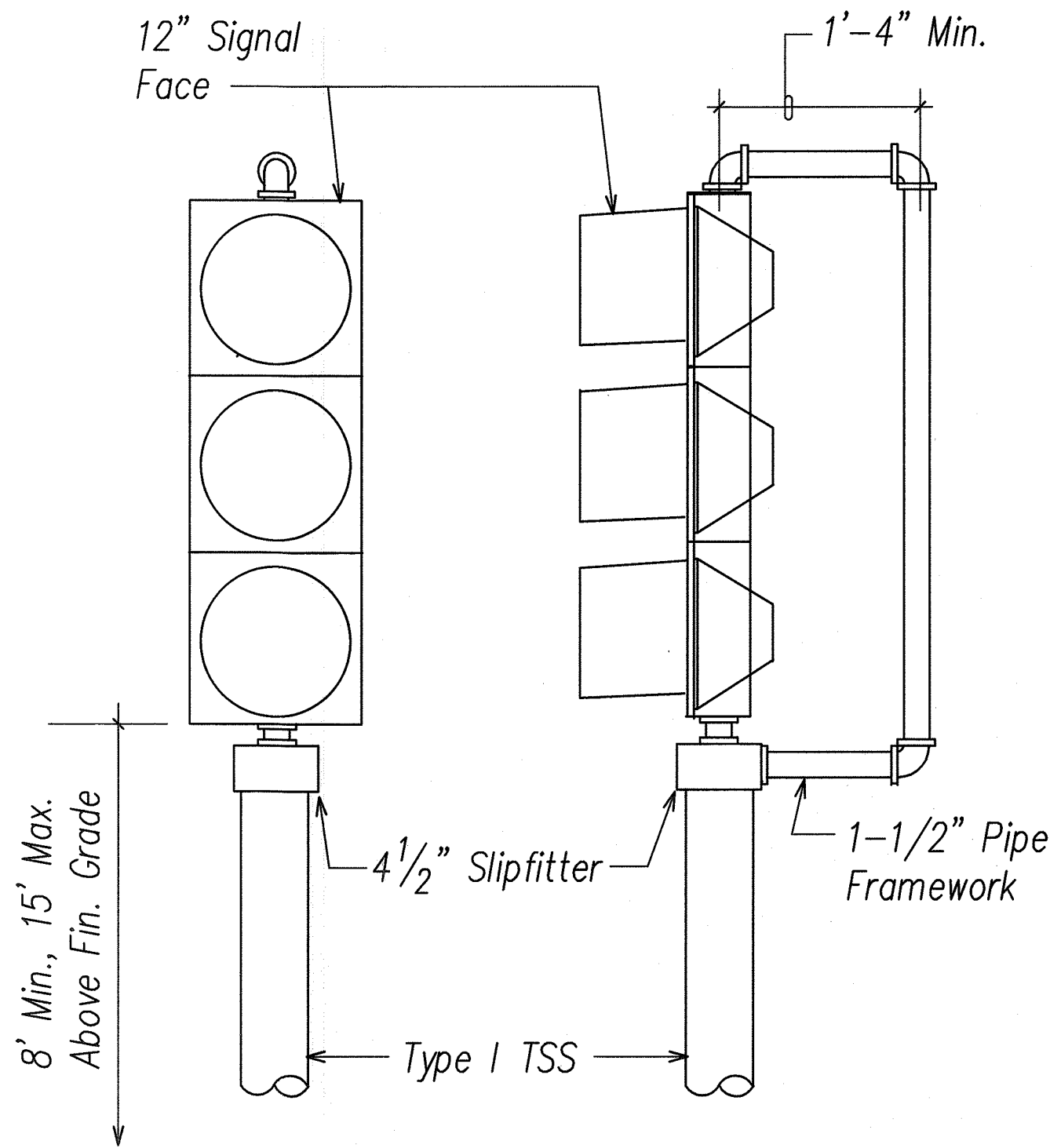
SIGNATURE  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**TRAFFIC SIGNAL DETAILS III**  
  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

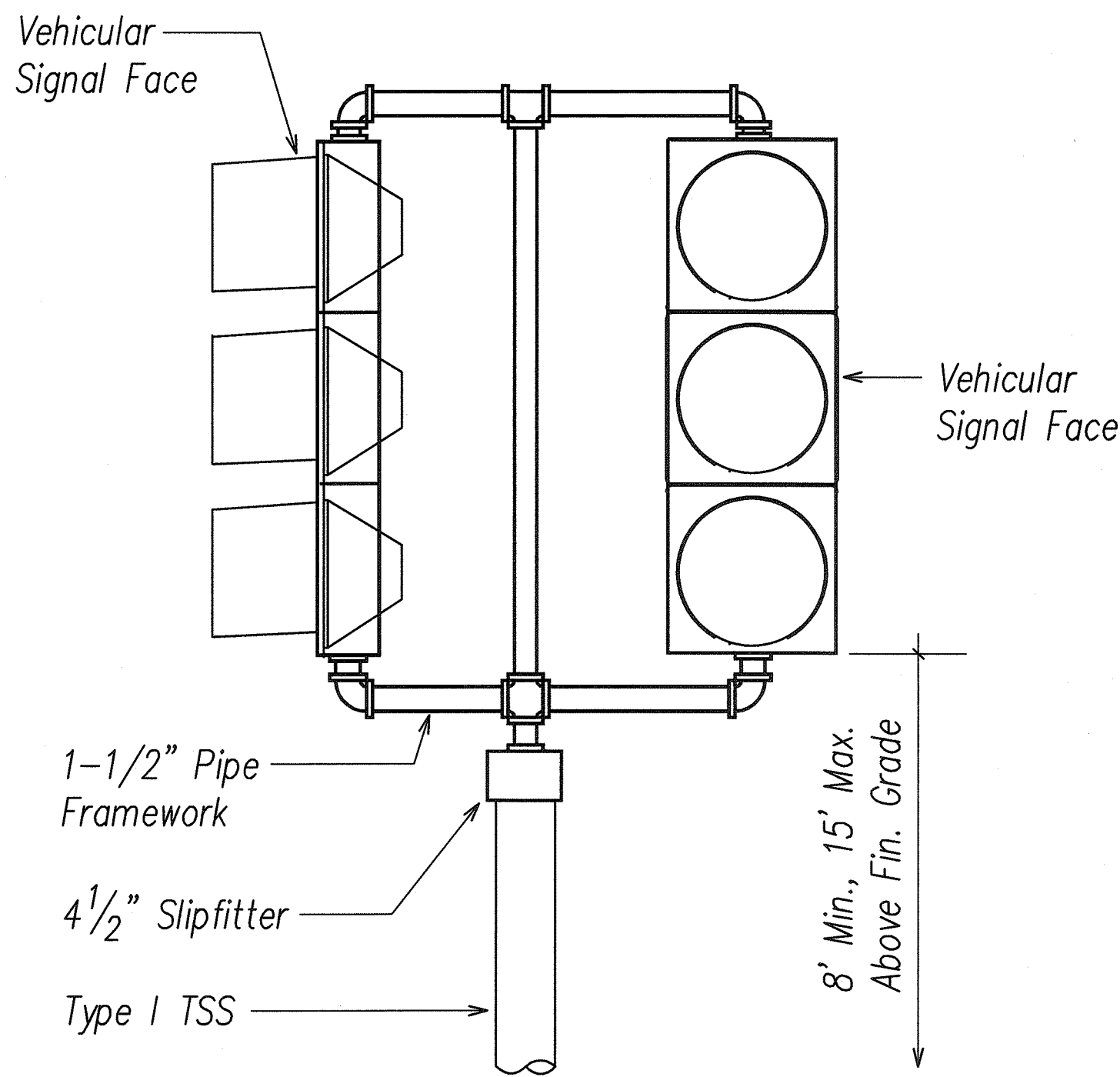
SHEET No. E-22 OF 34 SHEETS



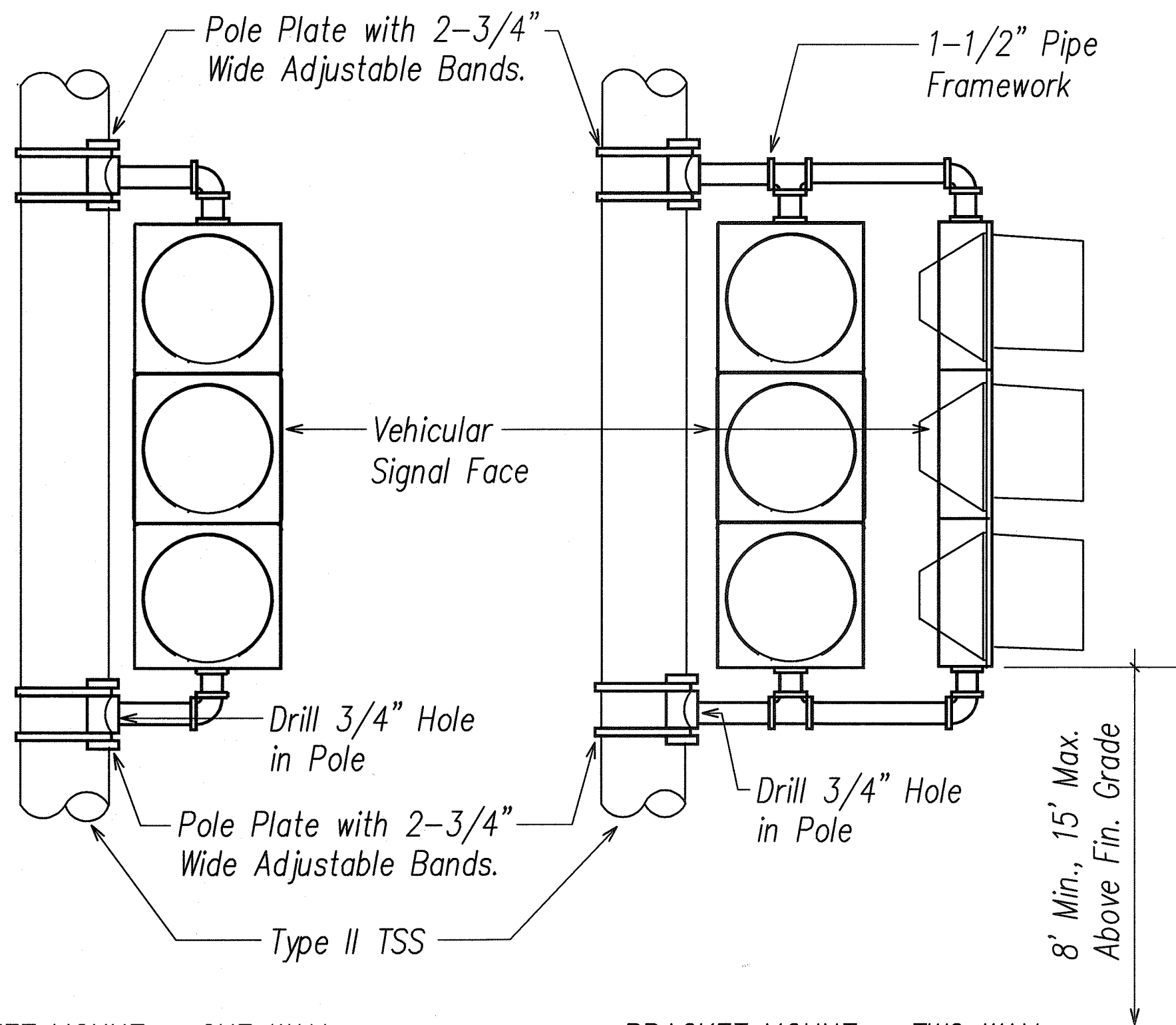
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	53	64



TOP OF POLE – ONE WAY MOUNTING



TOP OF POLE – TWO WAY MOUNTING

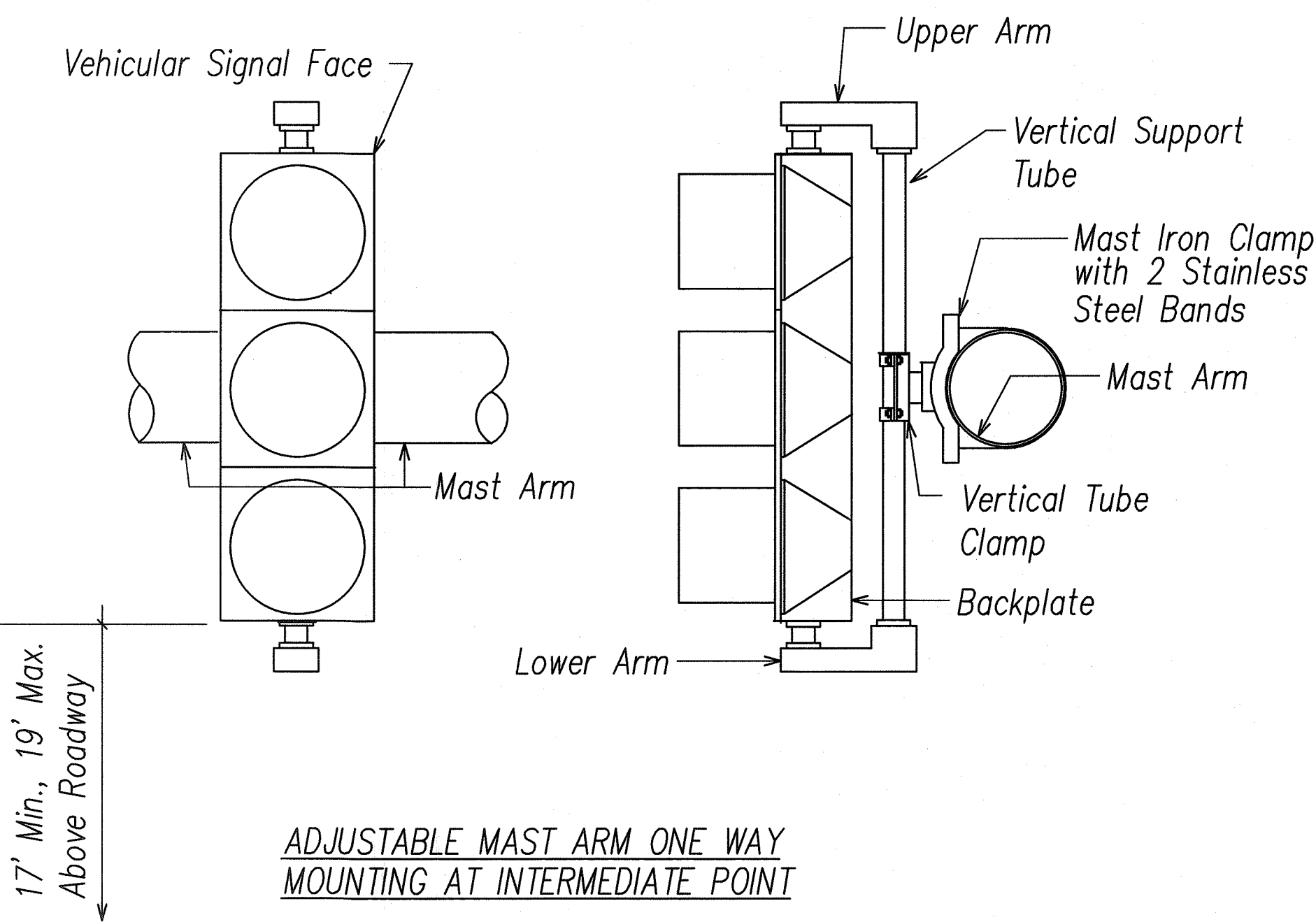


BRACKET MOUNT – ONE WAY

BRACKET MOUNT – TWO 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.
6. Signal as noted on plans.
7. Maintain 16" min. clearance at rear of all programmed faces.

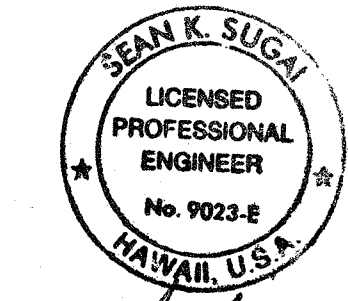


ADJUSTABLE MAST ARM ONE WAY MOUNTING AT INTERMEDIATE POINT

ORIGINAL PLAN	DATE
NO. 1	DATE
NO. 2	DATE
NO. 3	DATE
NO. 4	DATE
NO. 5	DATE
NO. 6	DATE
NO. 7	DATE
NO. 8	DATE
NO. 9	DATE
NO. 10	DATE

LAST SAVE: 11/10/2009 15:55:01 BY: 05/05/09 15:55:01  
V:\Road\Project\24118\Information\Rev\24118B\_1000.dwg

A  
E-23 VEHICULAR SIGNAL MOUNTING DETAILS  
NOT TO SCALE



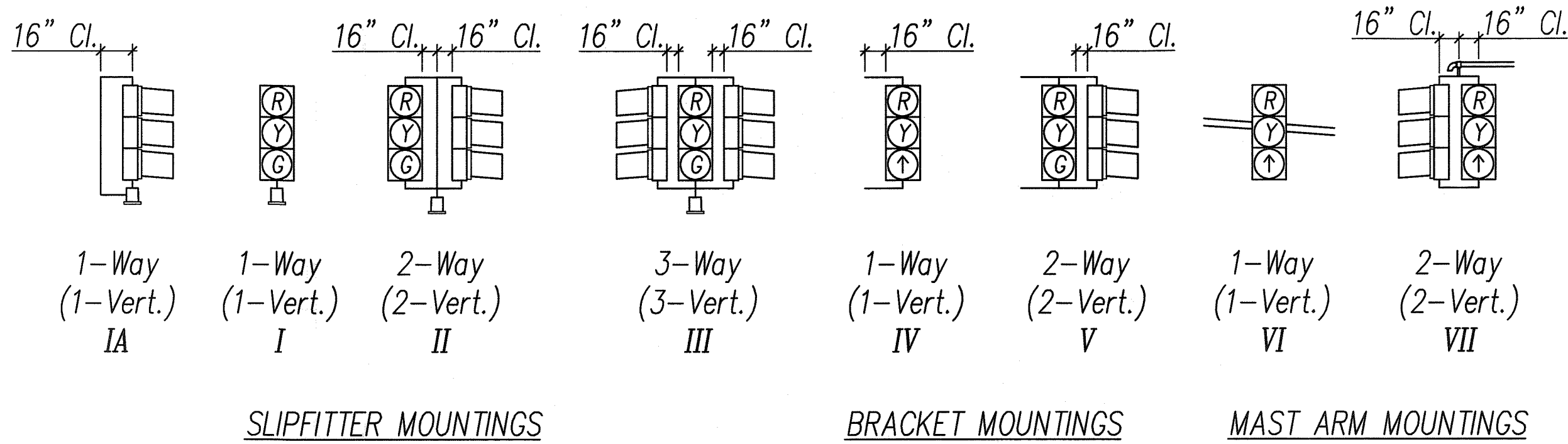
SIGNATURE  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
TRAFFIC SIGNAL DETAILS IV  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

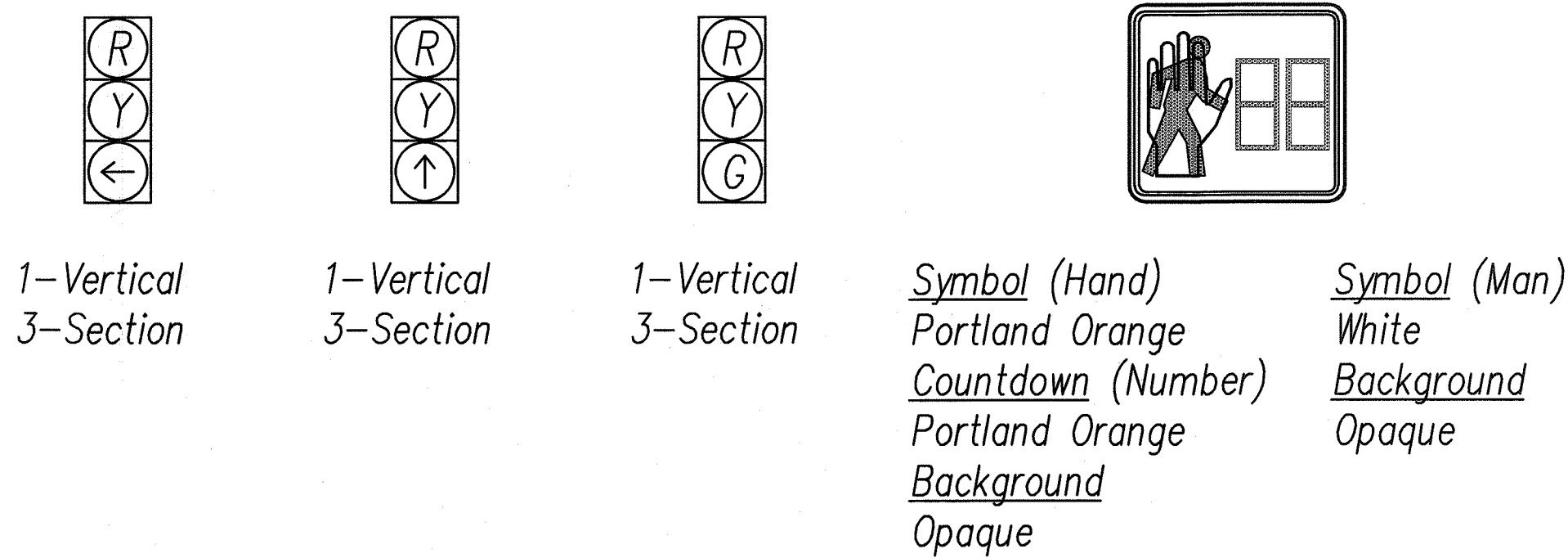
SHEET No. E-23 OF 34 SHEETS



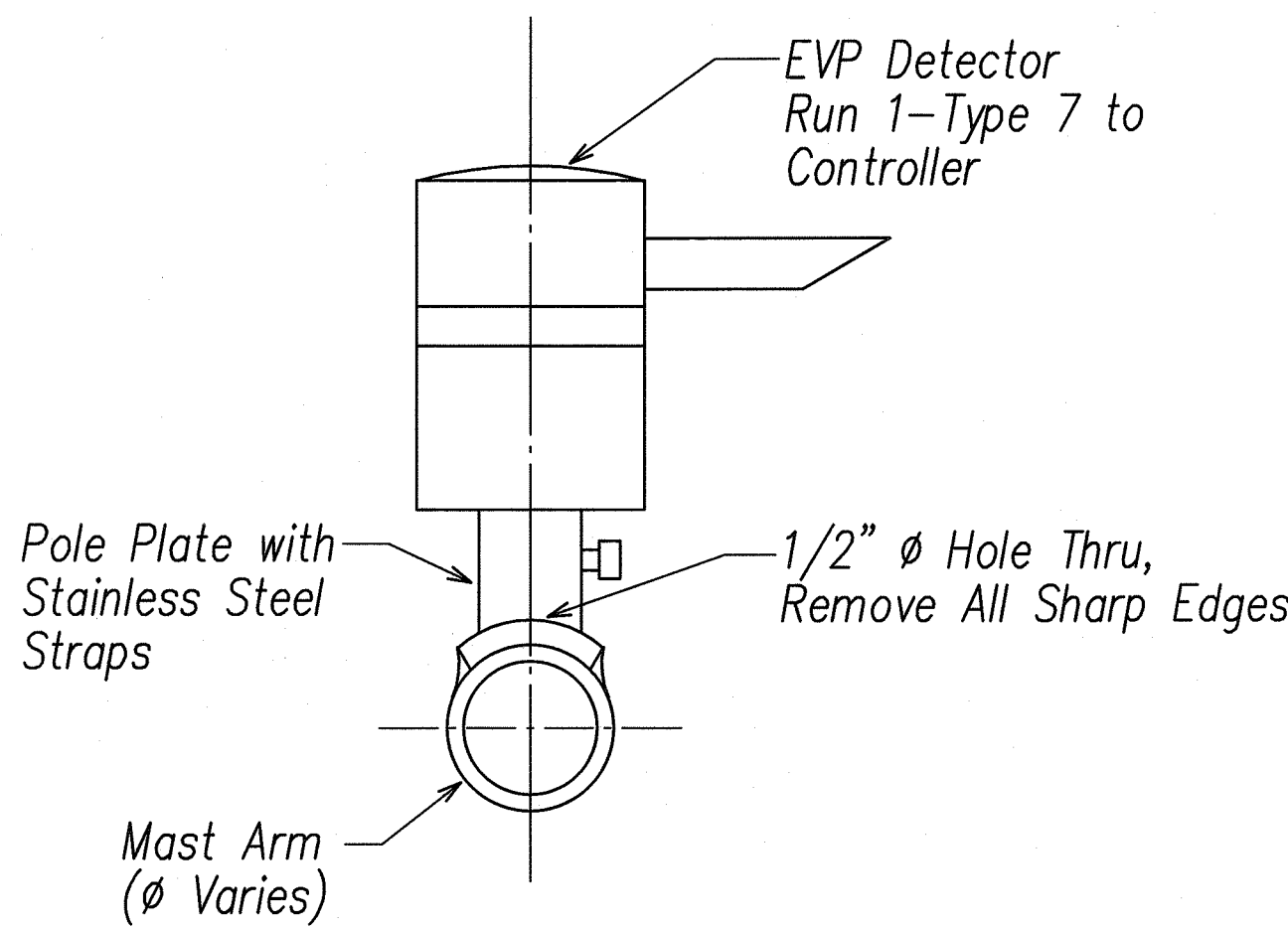
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	54	64



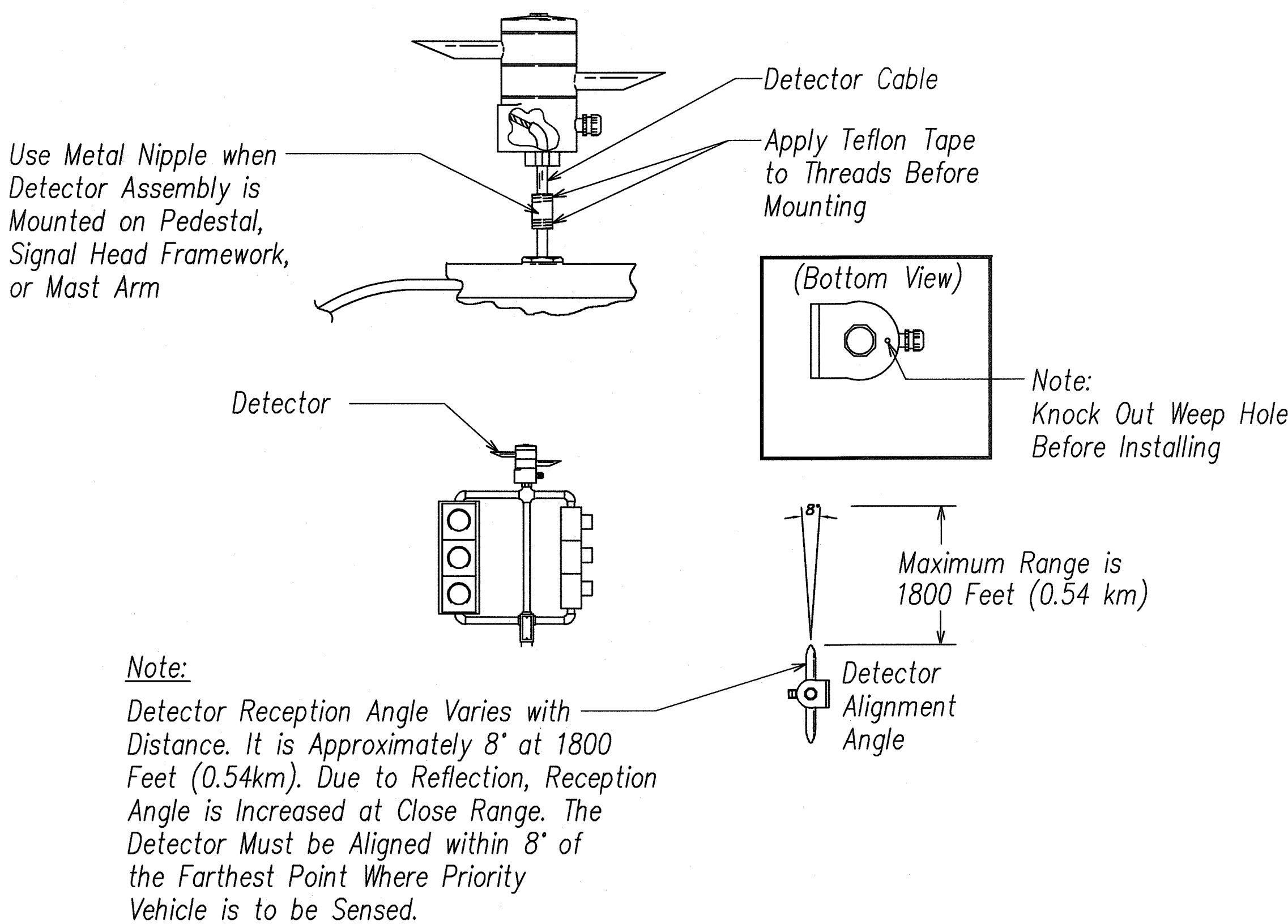
### TYPICAL VEHICULAR AND PEDESTRIAN SIGNAL MOUNTINGS



**A**  
E-24 TYPICAL SIGNAL ARRANGEMENTS  
NOT TO SCALE



**C**  
E-24 EVP DETECTOR HORIZONTAL MOUNTING DETAIL  
NOT TO SCALE

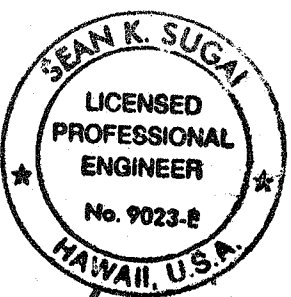


**B**  
E-24 TYPICAL PEDESTAL/MAST ARM INSTALLATION OF EVP DETECTOR  
NOT TO SCALE

			SIGNAL INDICATION
12" RYG TRAFFIC SIGNAL HEAD (L.E.D. SIGNAL ASSEMBLY)	12" RYGA TRAFFIC SIGNAL HEAD (L.E.D. SIGNAL ASSEMBLY)	PEDESTRIAN SIGNAL HEAD (L.E.D. SIGNAL ASSEMBLY)	DESCRIPTION
			SYMBOL
A-2 A-3 A-4 A-5	A-1*	B-2	

\* - PROGRAMMED VISIBILITY

**D**  
E-24 TRAFFIC SIGNAL HEAD LEGEND



SIGNATURE *[Signature]* 2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
  
TRAFFIC SIGNAL DETAILS V  
  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

SHEET No. E-24 OF 34 SHEETS

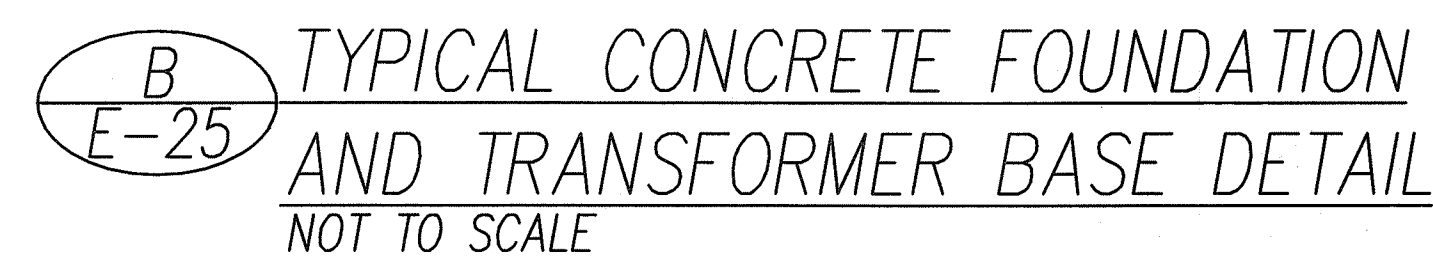
DESIGNED BY	DATE
CHECKED BY	
IN CHARGE	
NOTED BY	
REVISIONS	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	



\\acad\projects\241138\Kalaniana'ole Hwy\E25\_241138\_Sidetall02

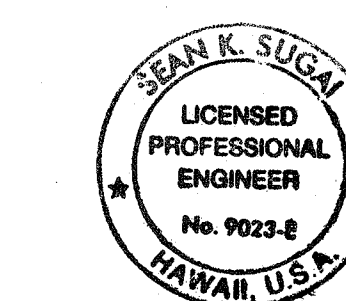



- A ROADWAY LIGHT I.D. TAG METERED SYSTEM  
E-25 NOT TO SCALE



*All Components of the Light Standard shall be Designed in Accordance with AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", Dated 2001, 4th Edition, including modifications contained in the HDOT "Design Criteria for Bridges & Structures", April 2008. See "New Design Requirements for Luminaires, Pole Standards and Traffic Signal Standards" on sheet E-20.*

C ROADWAY LIGHT STANDARD  
E-25 NOT TO SCALE



SIGNATURE 

APRIL 30, 2010

EXPIRATION DATE OF LICENSE

THIS WORK WAS PREPARED BY ME OR  
UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

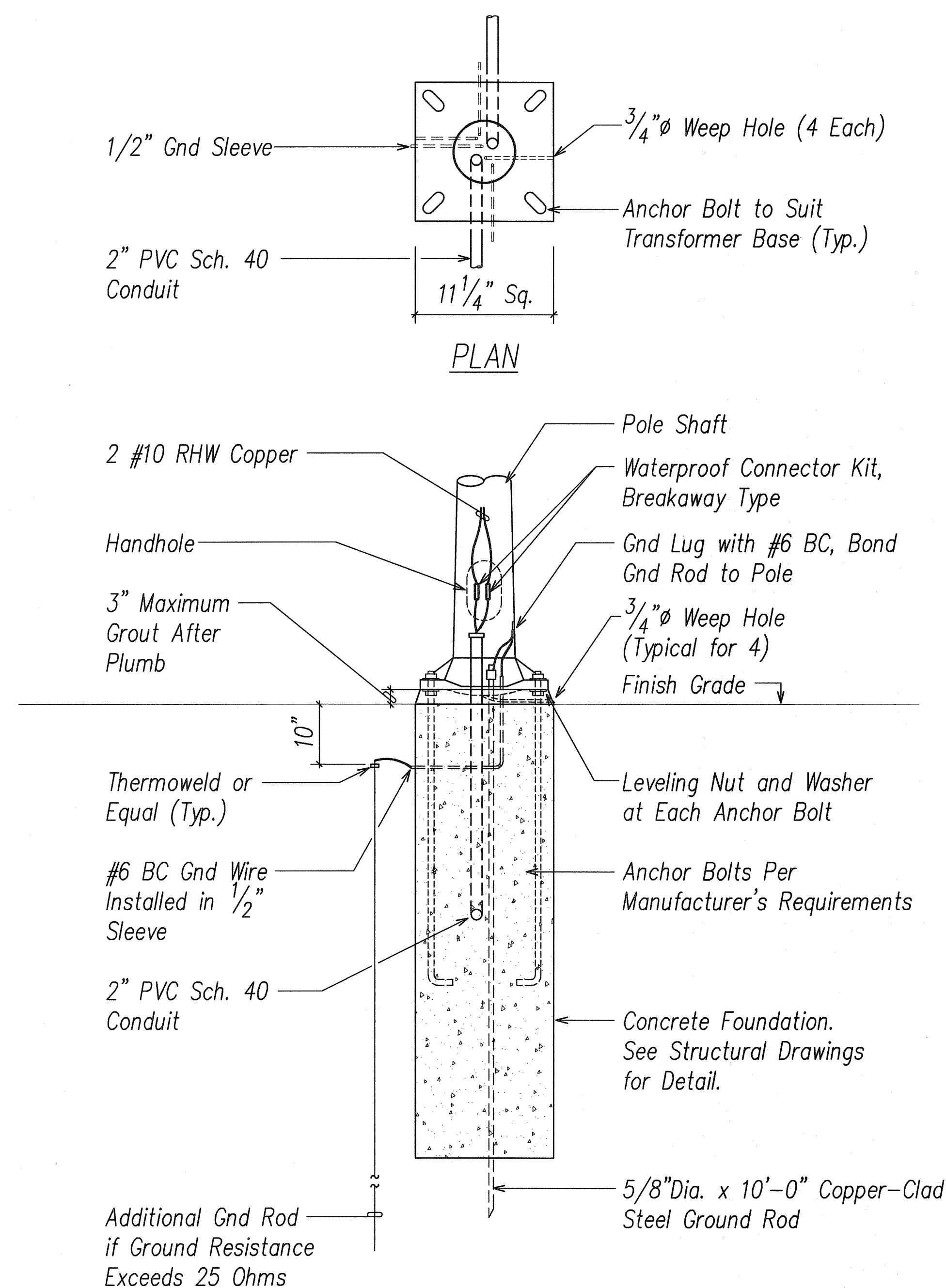
KEAHOLE ST.  
ROADWAY LIGHT DETAILS

KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)

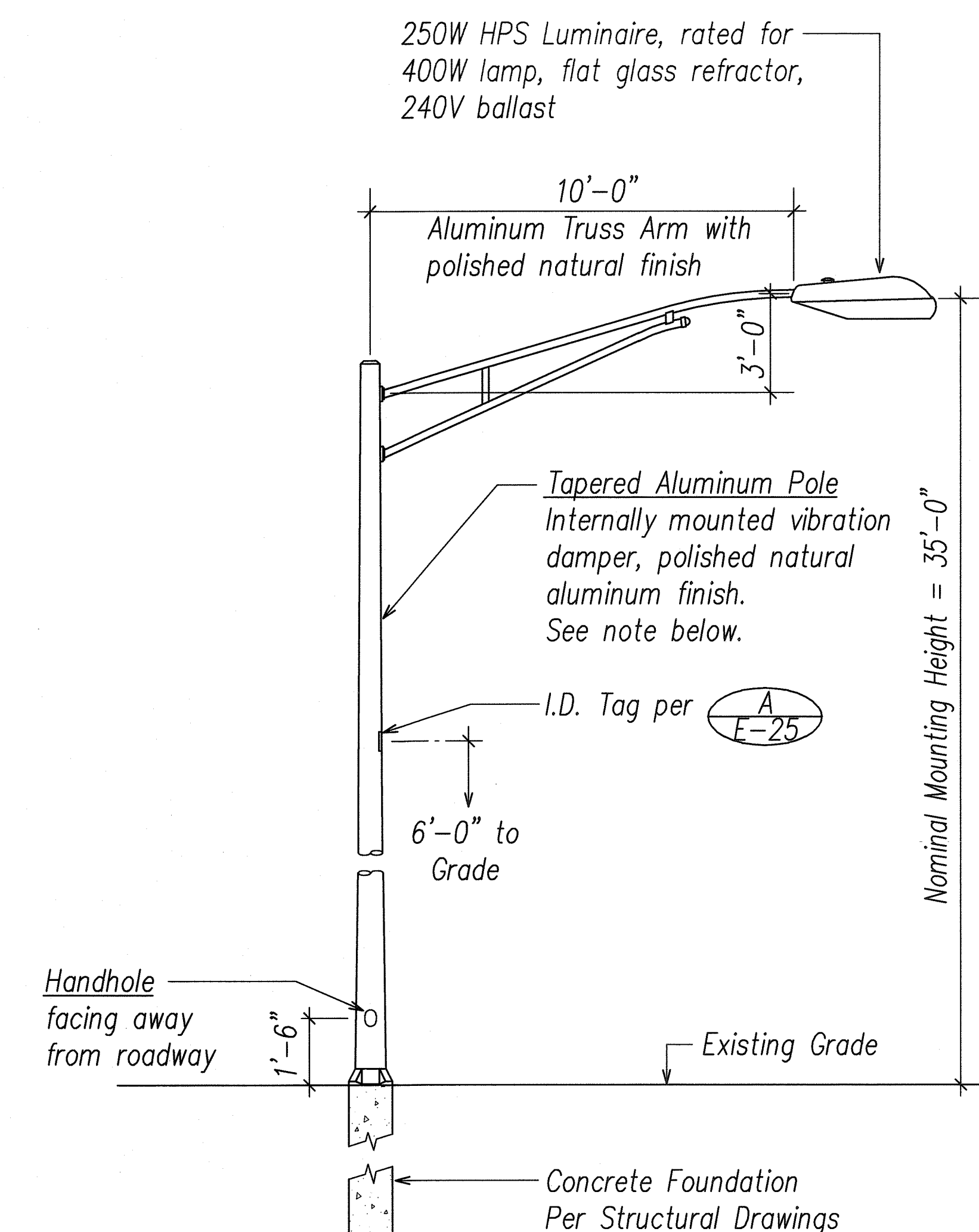
**SHEET No. E-25 OF 34 SHEETS**



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	56	64



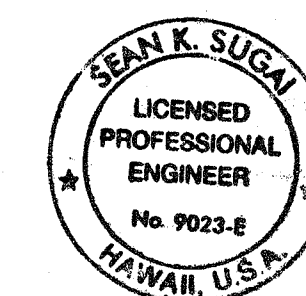
TYPICAL CONCRETE FOUNDATION  
AND BASE DETAIL  
NOT TO SCALE

ELEVATION

POLE NOTE:

*All Components of the Light Standard shall be Designed in Accordance with AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", Dated 2001, 4th Edition, including interims.*

B ROADWAY LIGHT STANDARD  
E-26 NOT TO SCALE



SIGNATURE \_\_\_\_\_  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE \_\_\_\_\_  
THIS WORK WAS PREPARED BY ME OR  
UNDER MY SUPERVISION \_\_\_\_\_

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

KALANIANA'OLE HWY.  
ROADWAY LIGHT DETAILS

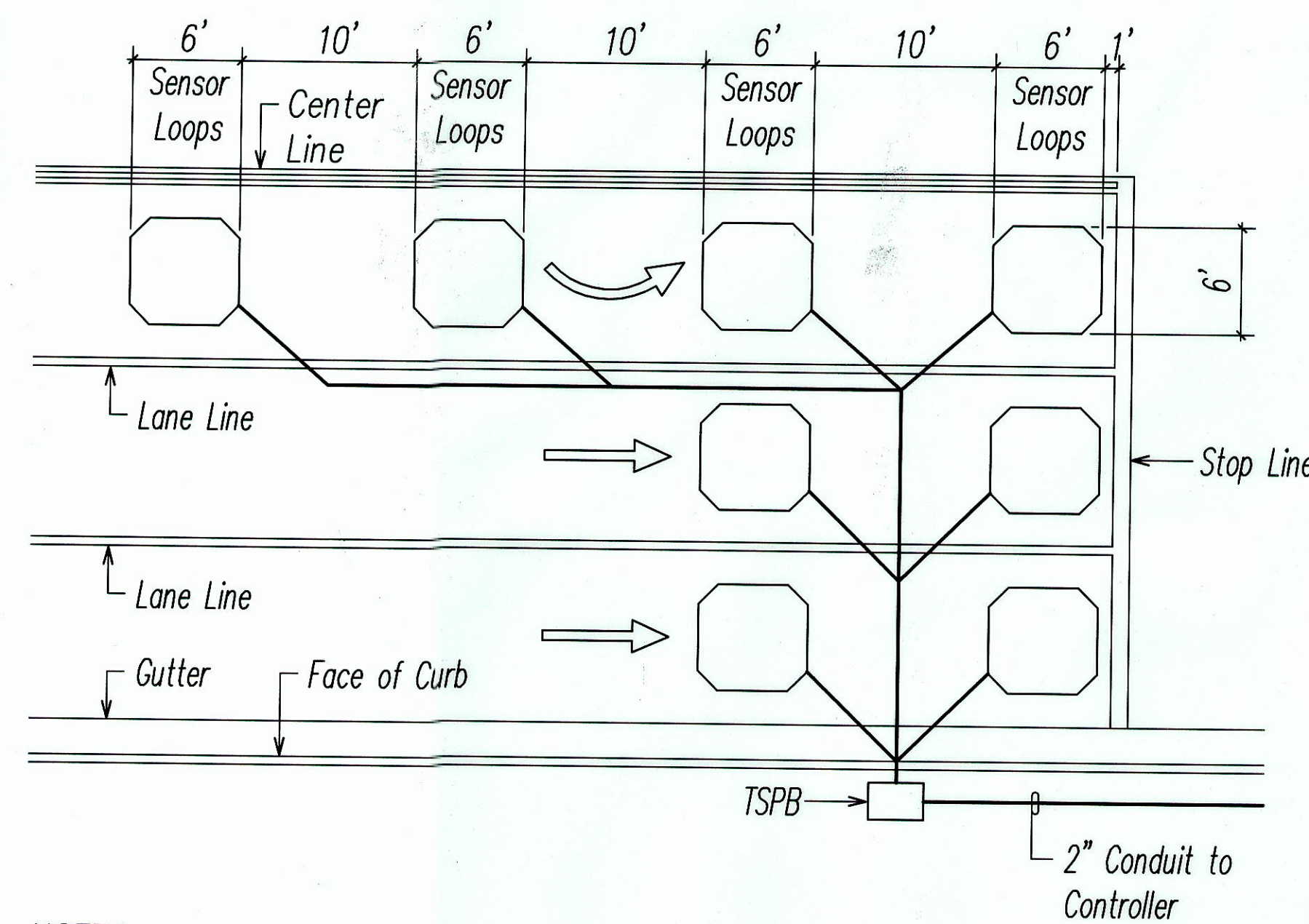
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET

FEDERAL-AID PROJECT NO. NH-072-1(5).  
DATE: January 2009

SHEET No. E-26 OF 34 SHEET



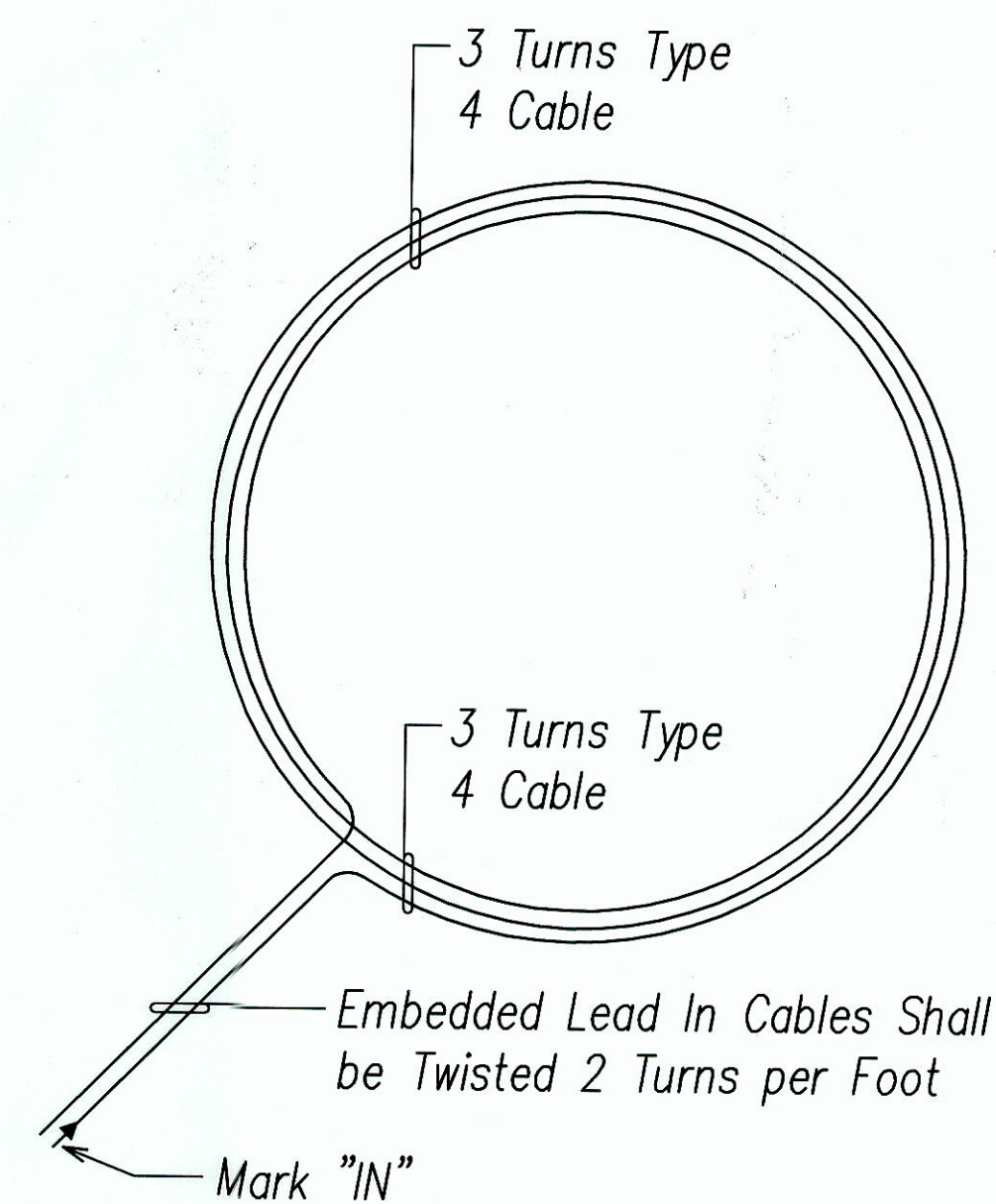
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	57	64



**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.

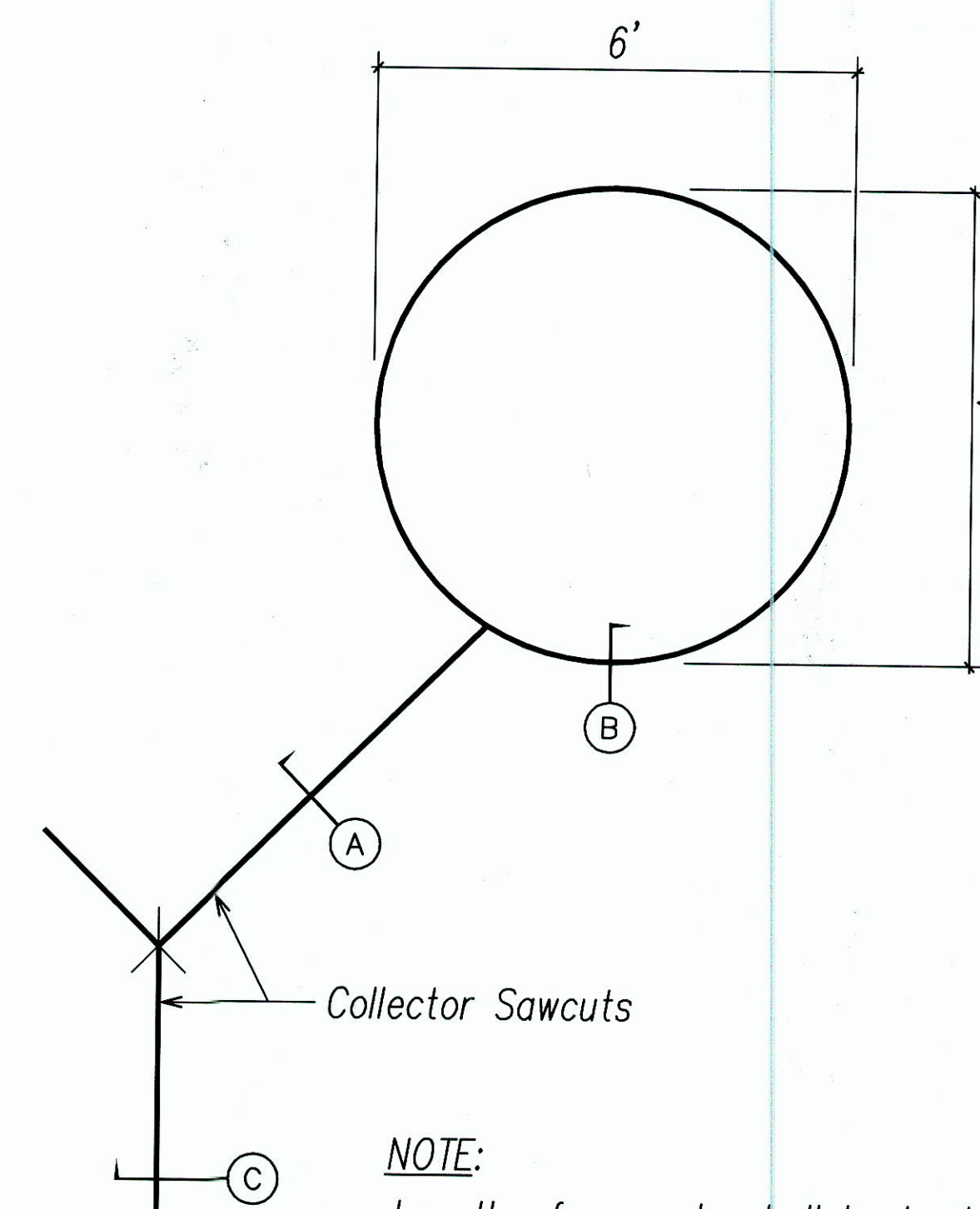
TYPICAL SENSOR LOOP LAYOUT  
NOT TO SCALE



PLAN

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

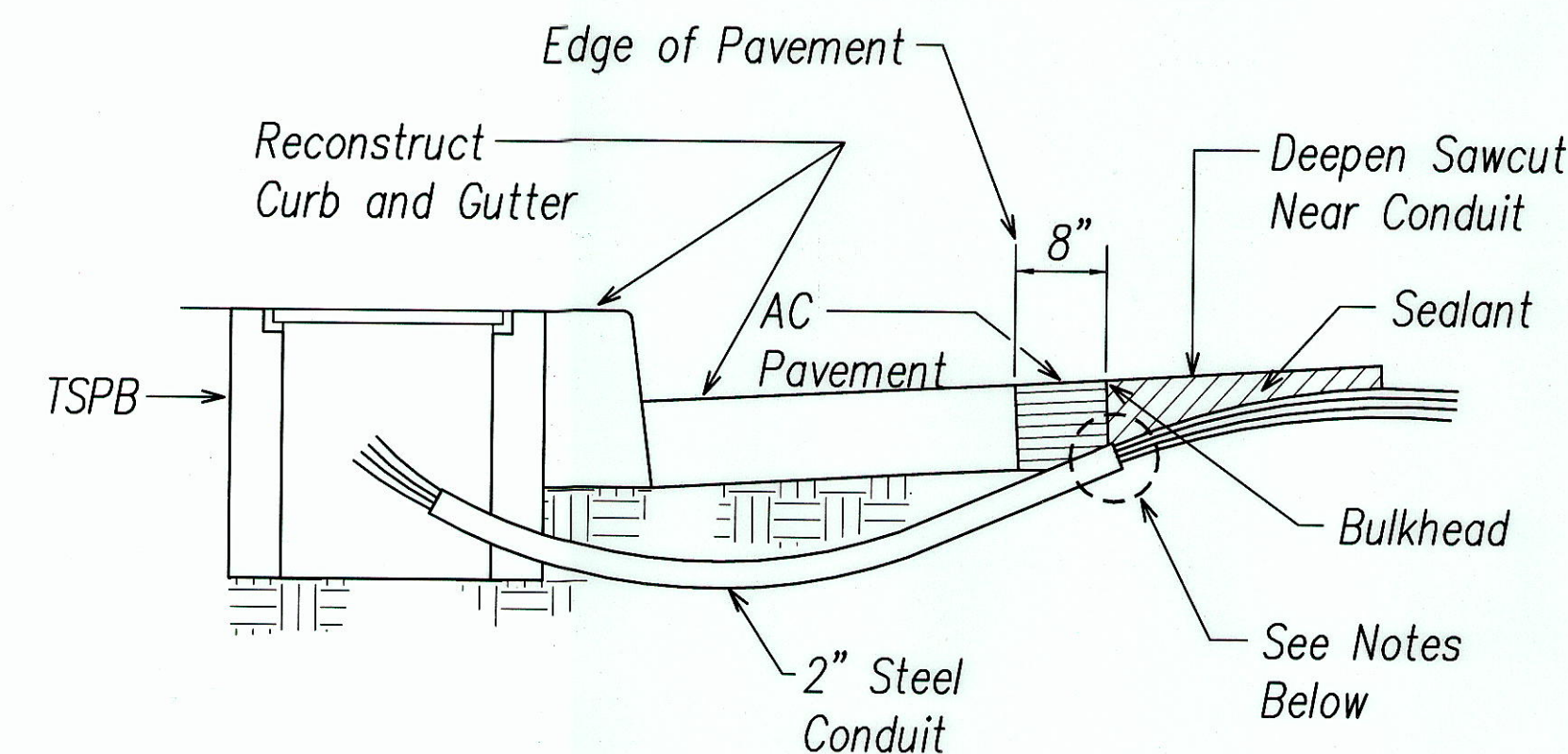
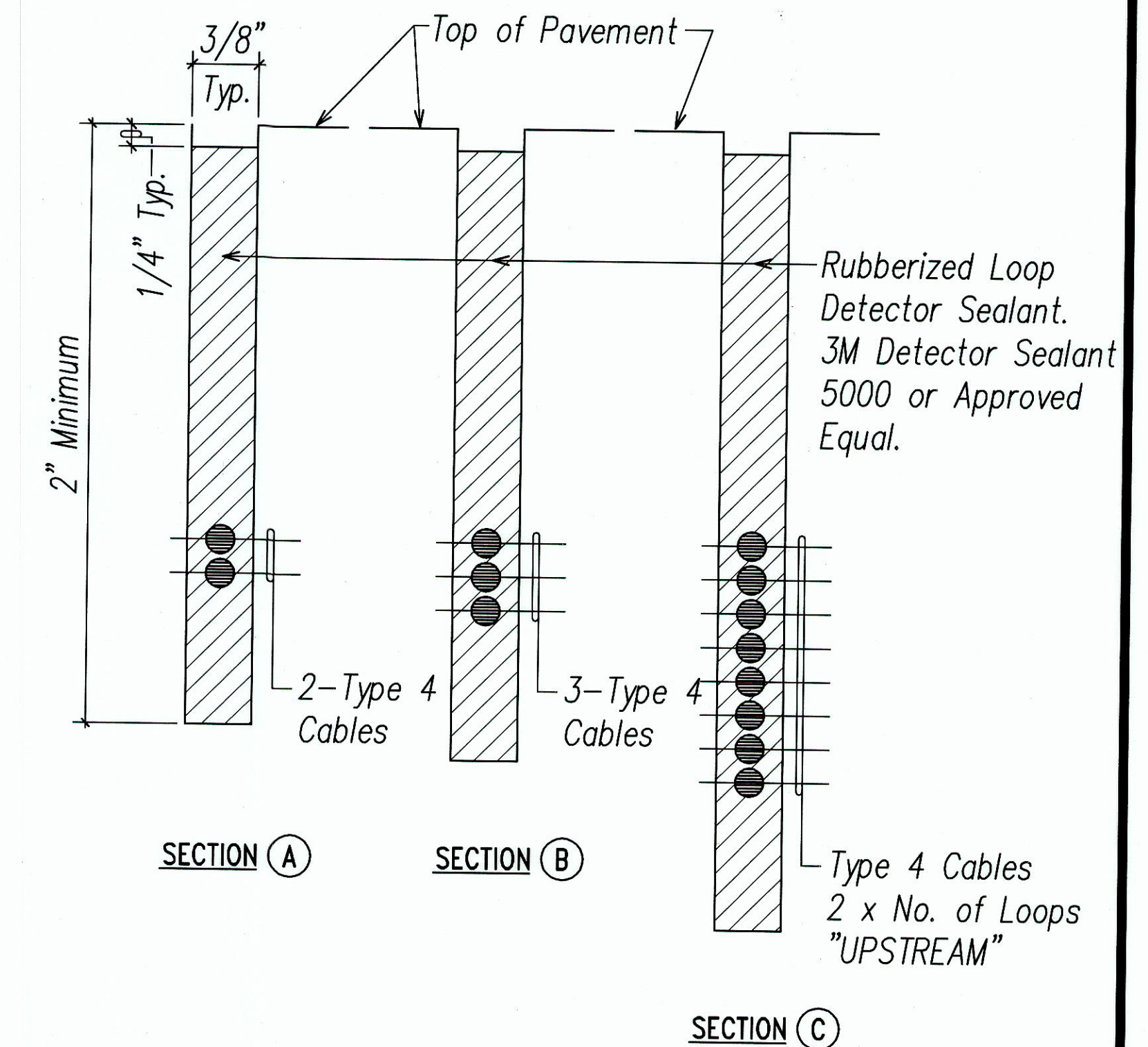
TYPICAL SENSOR LOOP WIRING DIAGRAM  
NOT TO SCALE



**NOTE:**

Length of overcuts shall be kept to a minimum. All overcuts shall be filled with rubberized loop detector sealant.

TYPICAL SENSOR LOOP SAWCUT DETAIL  
NOT TO SCALE



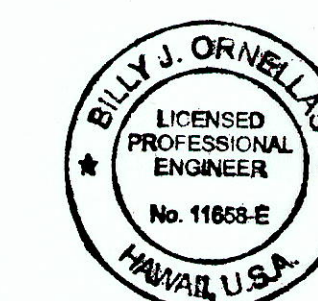
**NOTES:**

1. Seal roadway end of conduit after installation of conductors.
2. Install bulkhead across conduit trench.
3. Place rubberized loop detector sealant 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  
NOT TO SCALE

ORIGINAL PLAN	DATE
DESIGNED BY	
TRACED BY	
QUANTITIES BY	
CHECKED BY	
NO.	

LAST DATE: 12/08/09  
V:\Road\Veronica\41118\Kalamia\07-2013-13-14\07-2013-13-14.dwg  
V:\Road\Veronica\41118\Kalamia\07-2013-13-14\07-2013-13-14.dwg



SIGNATURE  
APRIL 30, 2012  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**TRAFFIC SIGNAL LOOP  
DETECTOR DETAILS**

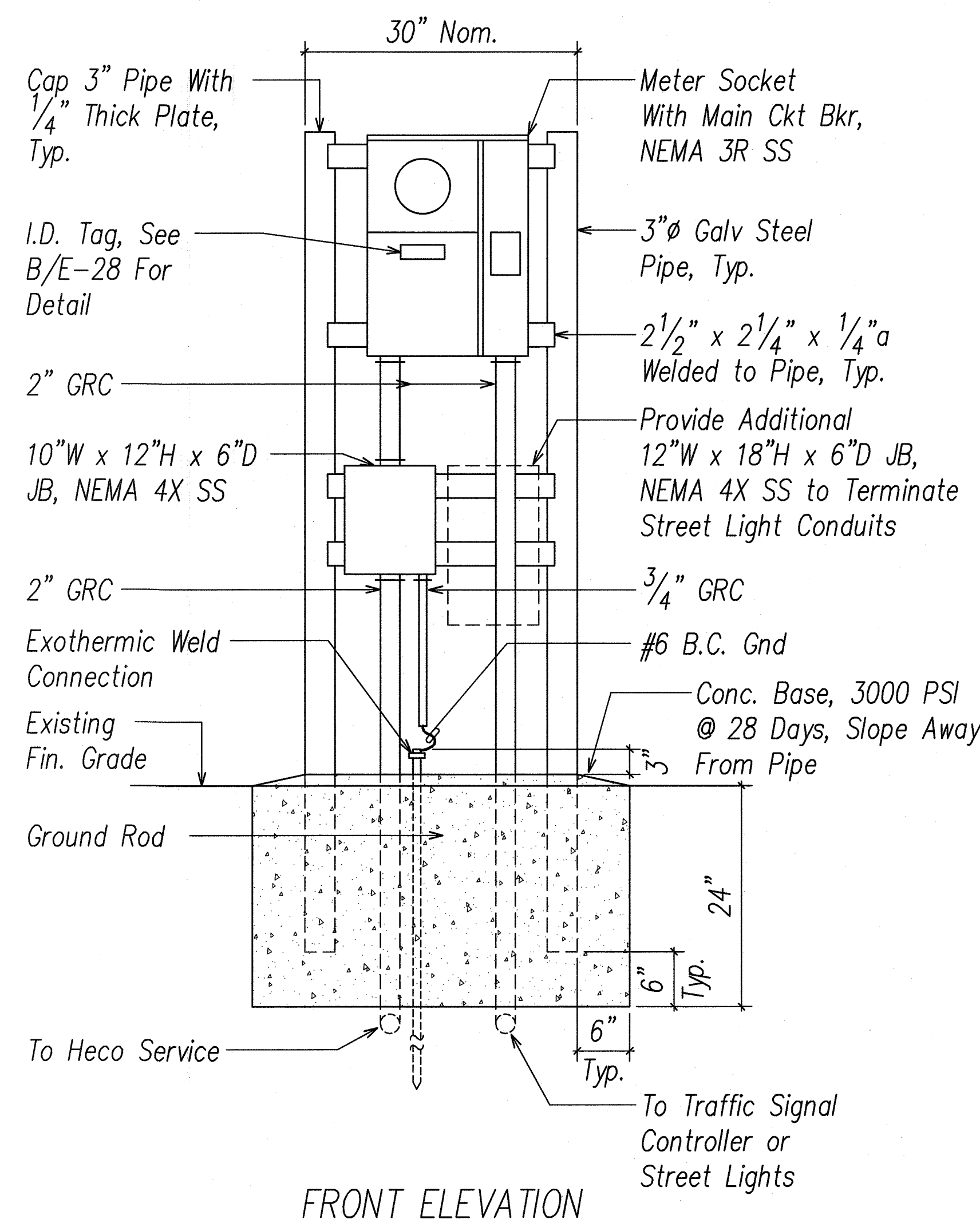
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

SHEET No. E-27 OF 34 SHEETS

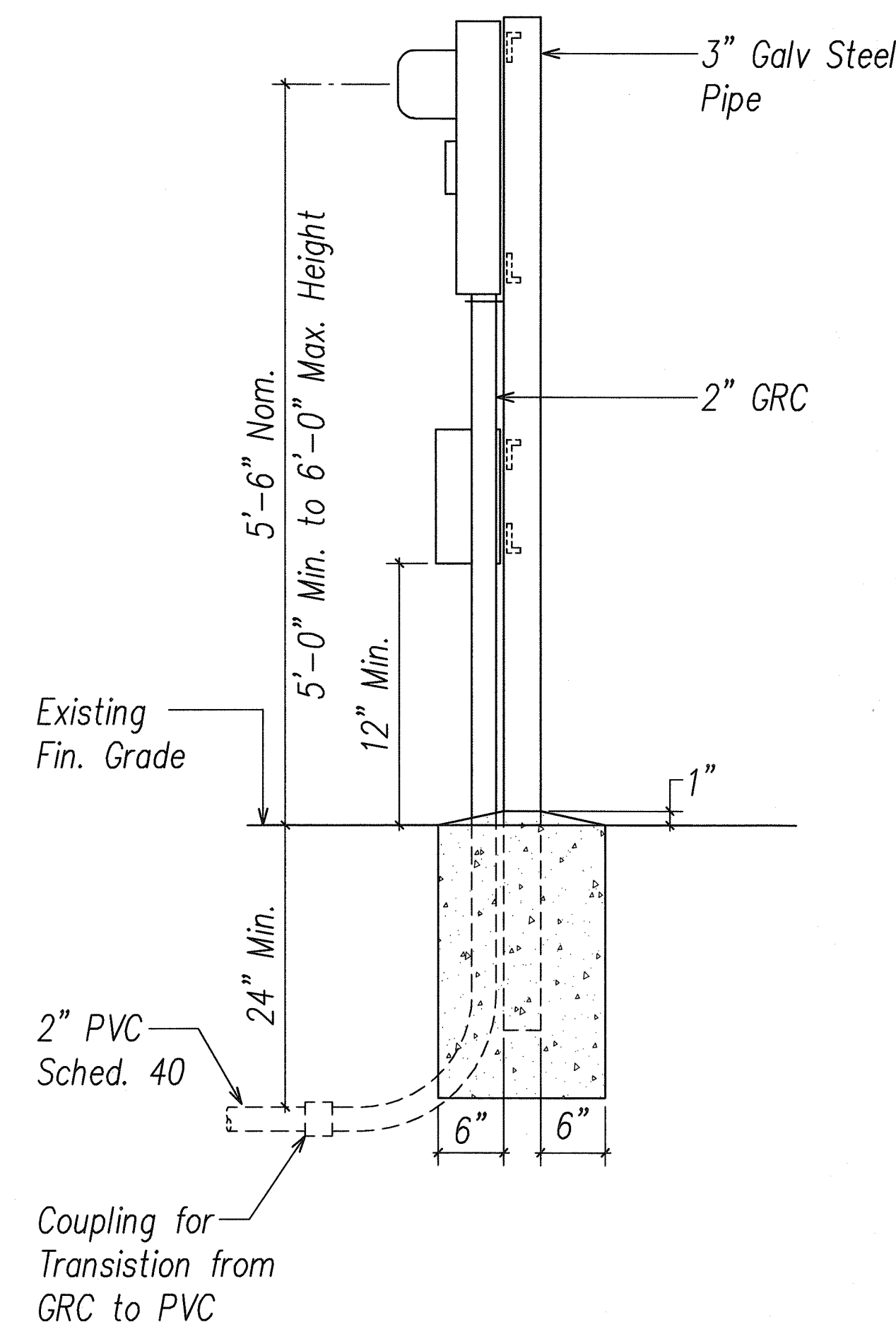
"AS-BUILT"



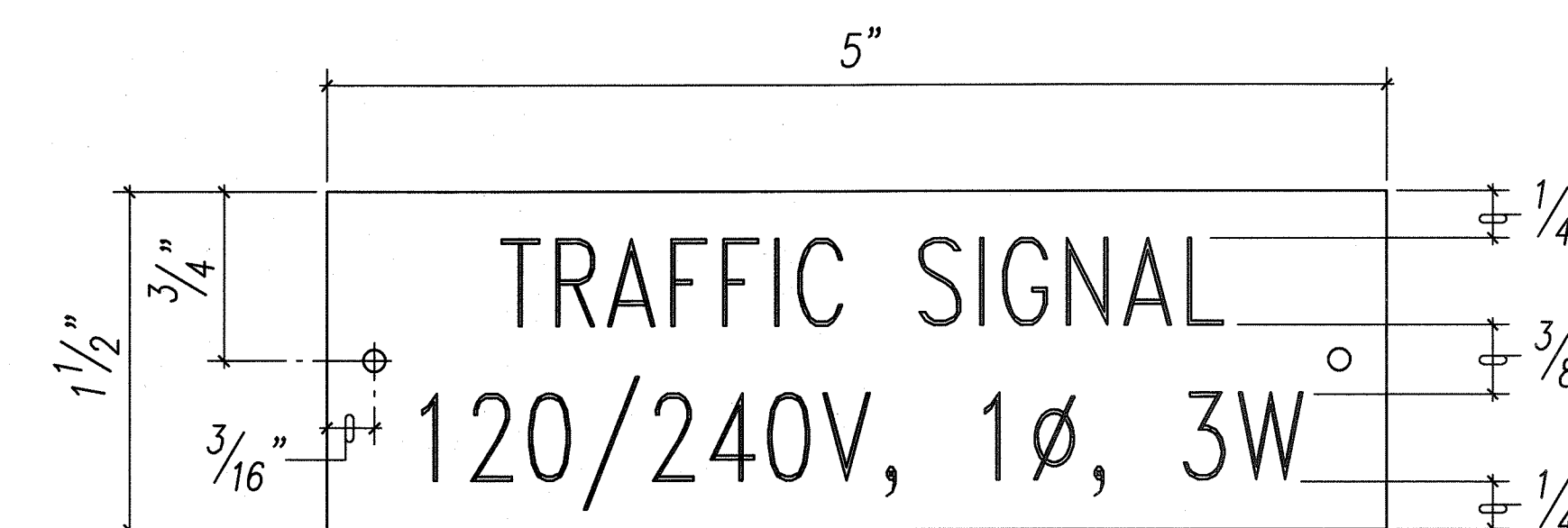
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	58	64



FRONT ELEVATION



SIDE ELEVATION



# NOTES:

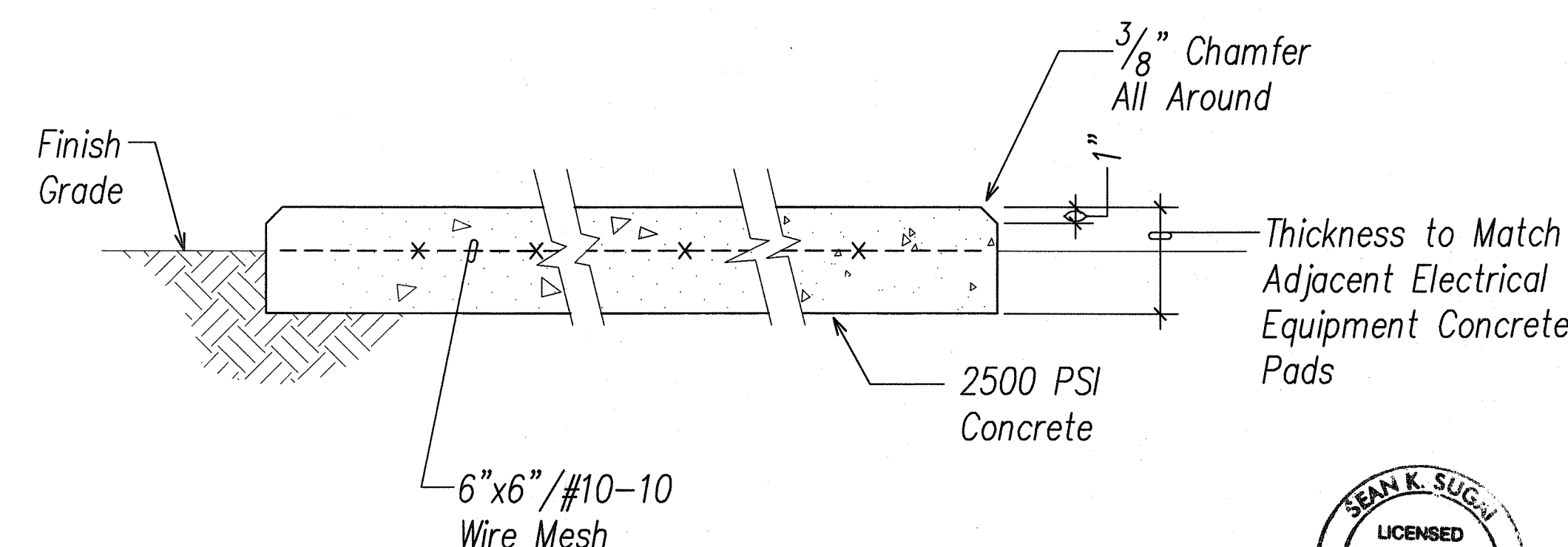
1. Use 2 Ply Plastic - Black, White.
2. Traffic Signal Letters Shall Be 3/8" High, 1/16" Stroke, (White in Color)
3. 120/240V, 1Ø, 3W Letters and Numbers Shall Be 1/4" High and Engraved 1/32" Wide (White in Color)
4. Attach to Meter Enclosure With No. 7 Stainless Steel Drive Screws.

B  
E-28 METER SOCKET I.D. TAG DETAIL  
NOT TO SCALE

# NOTES:

1. Contractor Shall Make All Electrical Connection to Controller, Provide 2P50A Breaker, 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 Gray Acrylic Enamel Finish.
5. Provide 4 ft Clearance in Front of Meter.

A  
E-28 METER MOUNTING DETAIL  
NOT TO SCALE

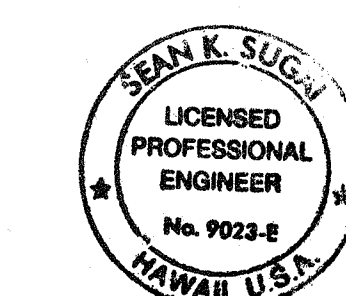


C  
E-28 CONCRETE PAD DETAIL  
NOT TO SCALE

# DRAWING REVIEW

Reviewed for HECO's Facilities Only  
Date 2/17/09 By [Signature]  
DWL [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.



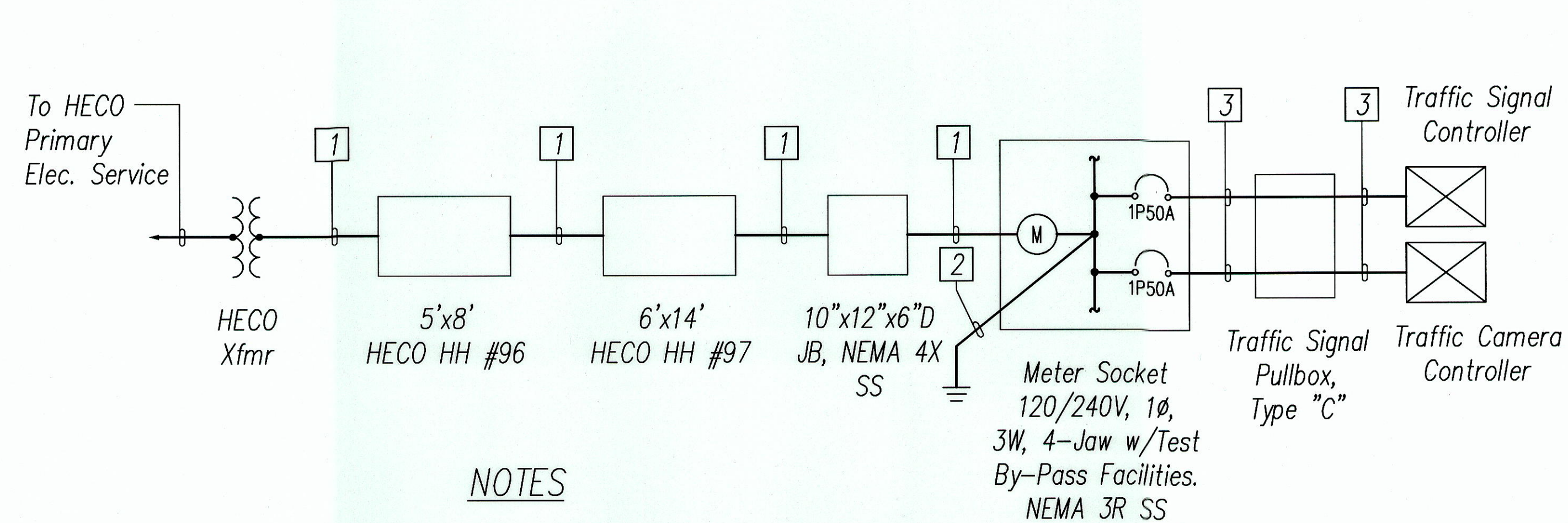
SIGNATURE [Signature]  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
METER MOUNTING DETAIL,  
METER SOCKET I.D. TAG DETAIL  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

SHEET No. E-28 OF 34 SHEETS



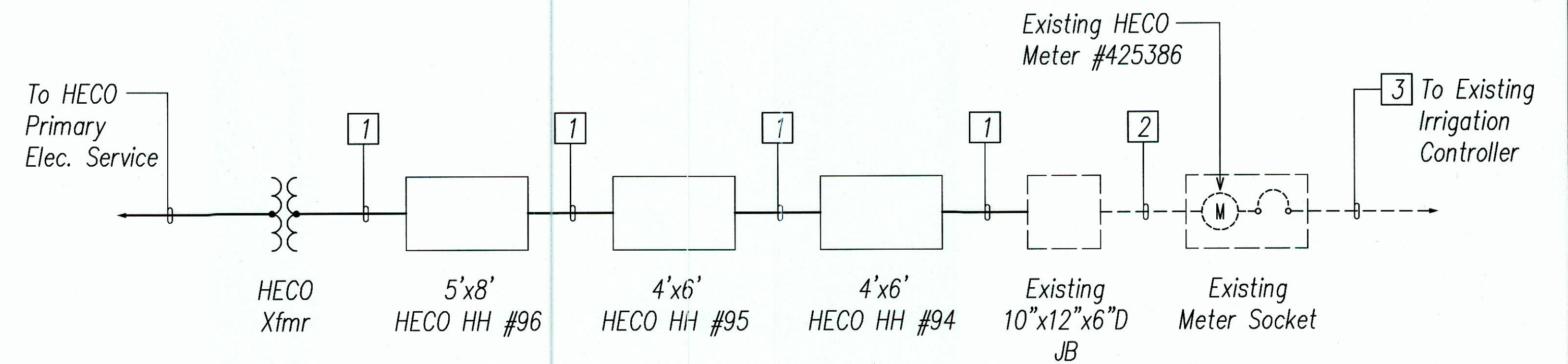
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	59	64



#### NOTES

1. All items shown are new.
2. [1] 2"C, 3#2  
[2] 3/4"C, 1#6 Gnd  
[3] 2"C, 3C#4, 1#8 Gnd

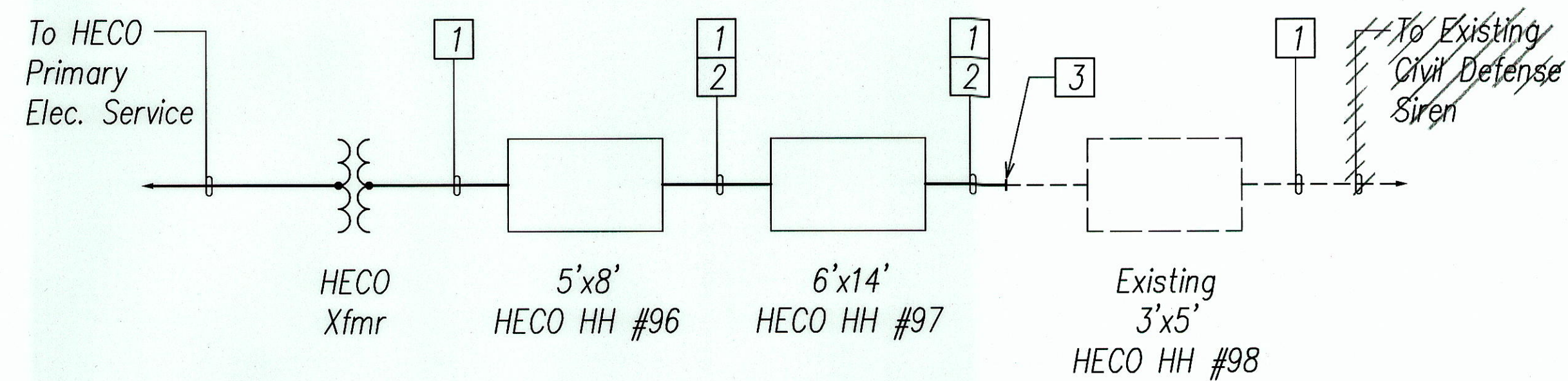
### ONE LINE DIAGRAM - KEAHOLE ST. TRAFFIC SIGNAL CONTROLLER



#### NOTES

1. Dashed line symbol denotes "Existing Item".  
Solid line symbol denotes "New Item".
2. [1] 4"C, 2#4/0  
[2] 1 1/4"C, 2#4  
[3] 1 1/4"C, 2#4, 1#6 Gnd

### ONE LINE DIAGRAM - IRRIGATION CONTROLLER



#### NOTES

1. Dashed line symbol denotes "Existing Item".  
Solid line symbol denotes "New Item".
2. [1] 4"C, 3#1/0, 1#2 Gnd  
[2] 4"C, w/Pullwire (Spare)  
[3] Provide conduit couplings to connect existing and new conduits.

### ONE LINE DIAGRAM - CIVIL DEFENSE SIREN

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

LAST SAVE: 01/09/09 09:34:44 AM  
C:\Users\jgarcia\Documents\2008\2008-2009\2008-2009.dwg

DRAWING REVIEW  
Reviewed for HECO's Facilities Only  
Date 2/10/09 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.



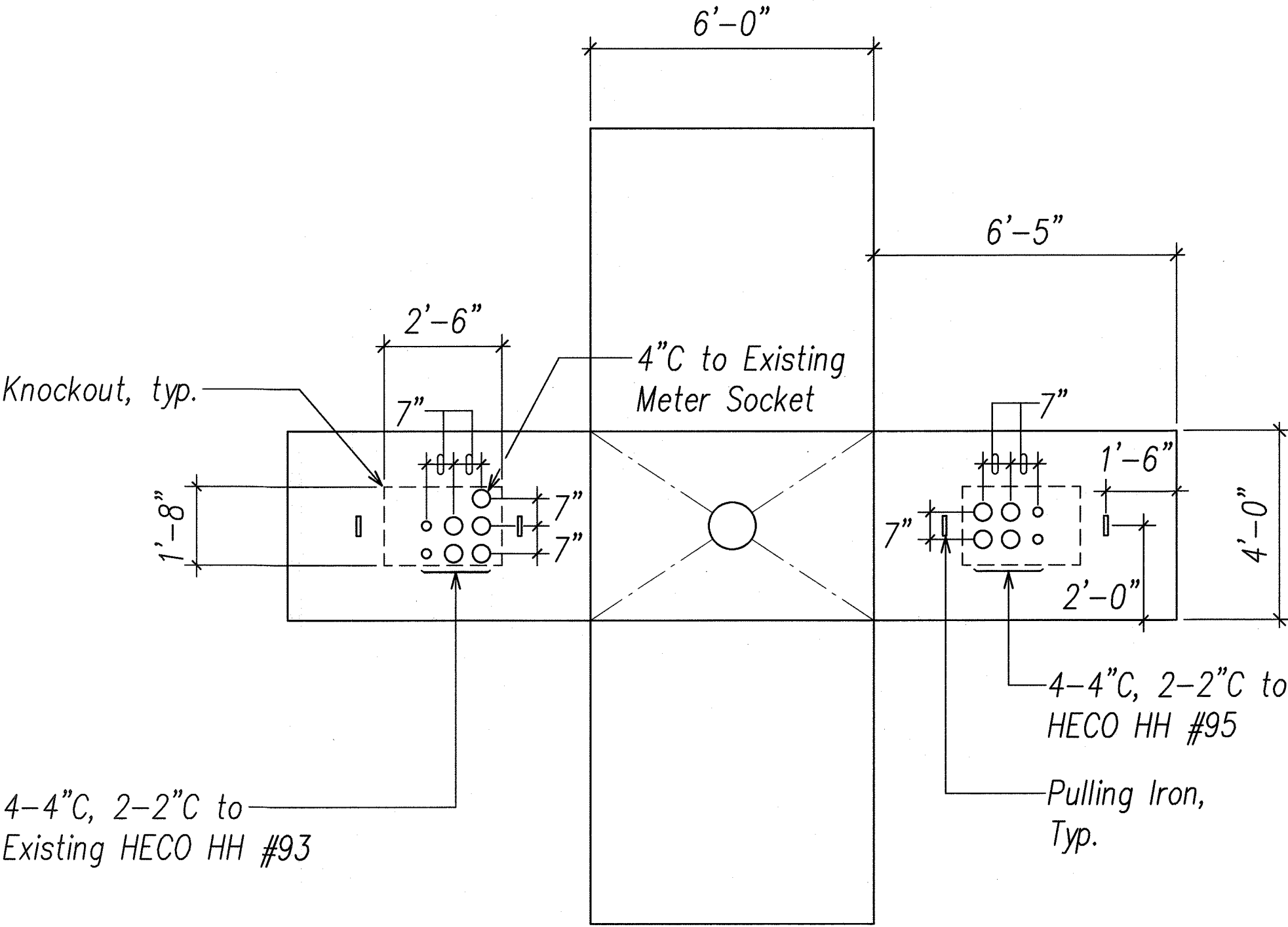
SIGNATURE [Signature]  
2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**ONE LINE DIAGRAMS**  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009  
SHEET No. E-29 OF 34 SHEETS

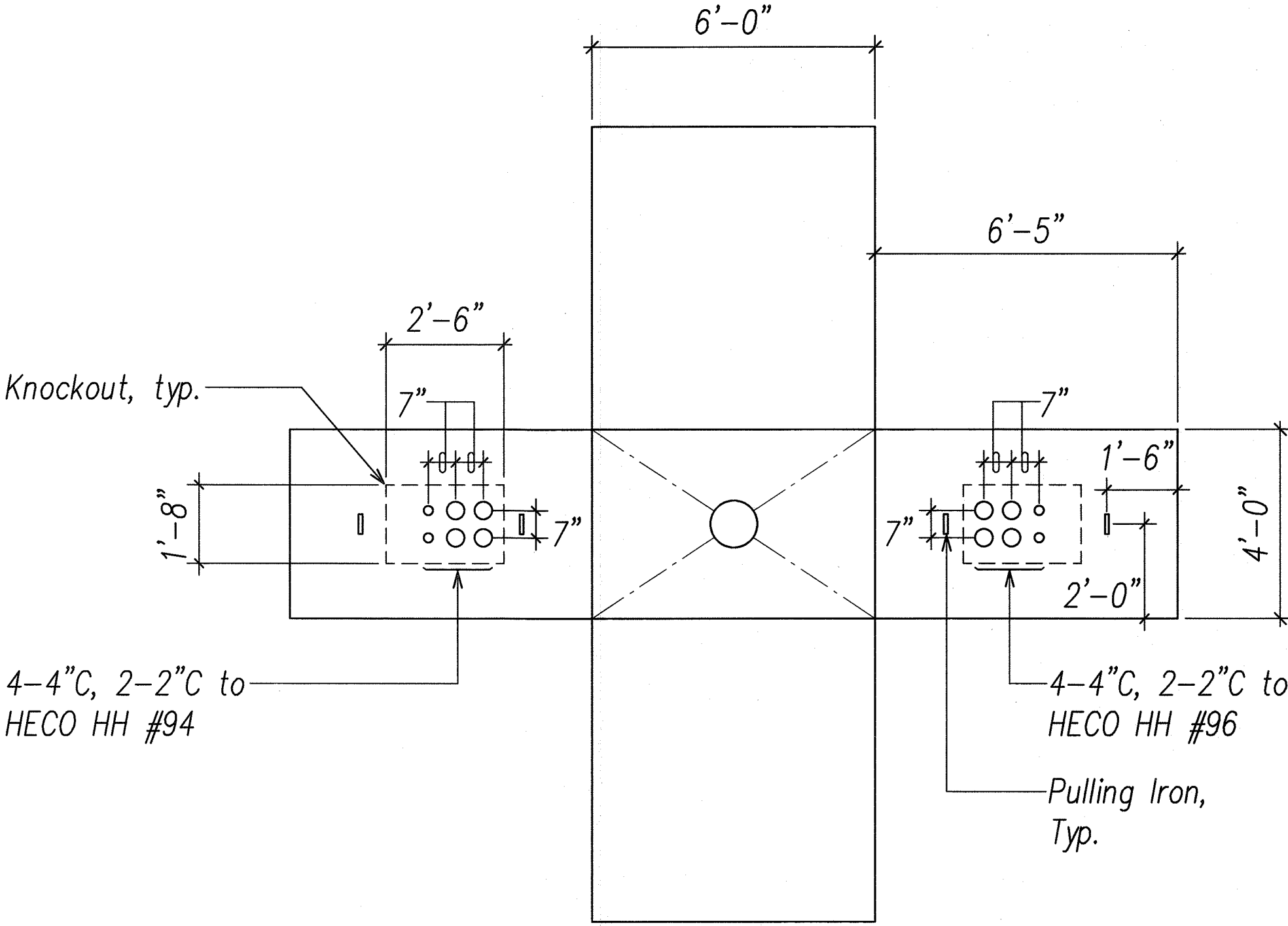
"AS-BUILT"



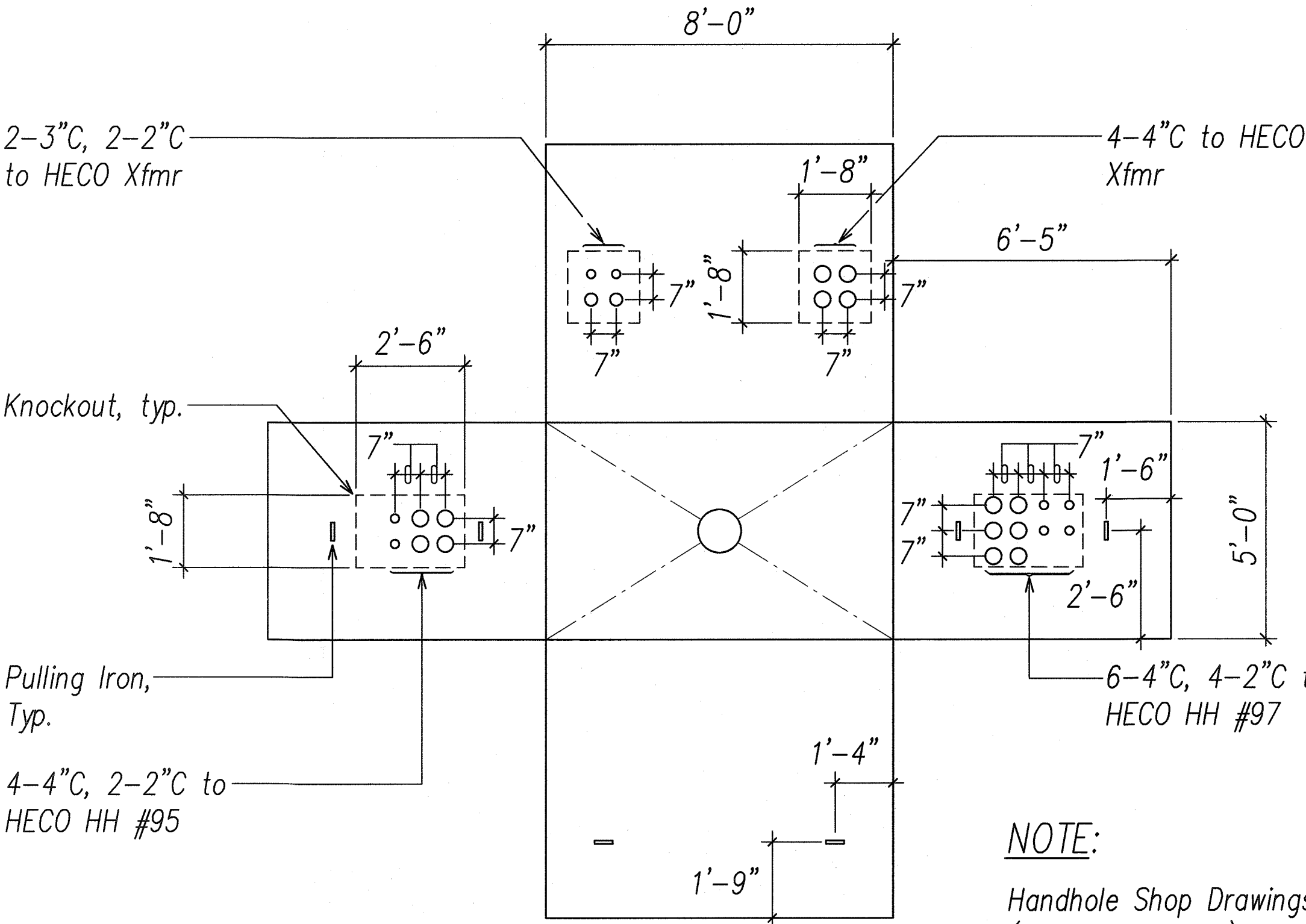
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	60	64



HECO HH #94 (4' X 6')



HECO HH #95 (4' X 6')



HECO HH #96 (5' X 8')

**NOTE:**  
Handhole Shop Drawings and Structural Calculations (If Non-Standard) Shall be Submitted to Utility Company(s) for Review and Approval Prior to Fabrication and/or Construction.

HECO HANDHOLE DEVELOPMENT PLAN I  
SCALE: 3/8"=1'-0"

DRAWING REVIEW

Reviewed for HECO's Facilities Only

Date 2/18/09 By [Signature]

Engineering Department  
Hawaiian Electric Company, Inc.

APPROVED BY: [Signature]  
HAWAIIAN ELECTRIC COMPANY, INC. DATE

2' 1' 0' 2' 4' 6' 8'  
SCALE: 3/8"=1'-0"  
GRAPHIC SCALE



SIGNATURE: [Signature]  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
  
HECO HANDHOLE  
DEVELOPMENT PLAN I  
  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

SHEET No. E-30 OF 34 SHEETS

ORIGINAL PLAN	DATE
DESIGNED BY	
TRACED BY	
QUANTITIES BY	
CHECKED BY	
No.	

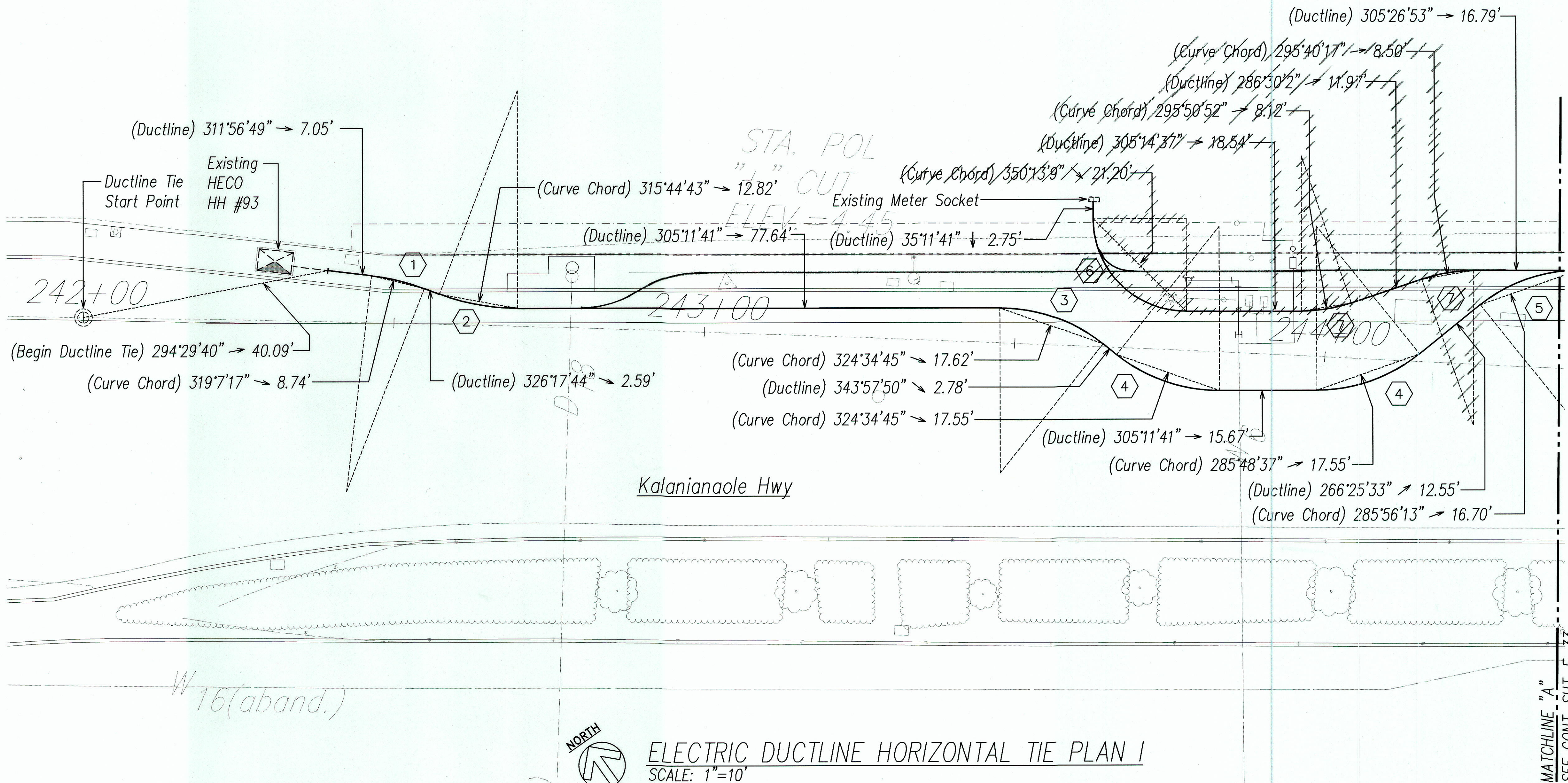
LAST SAVE: 02/17/09 09:04:46 BY: [Signature]  
C:\WORK\PROJECTS\NH072-1\HH096.DWG







FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	62	64



DUCTLINE CURVE DATA

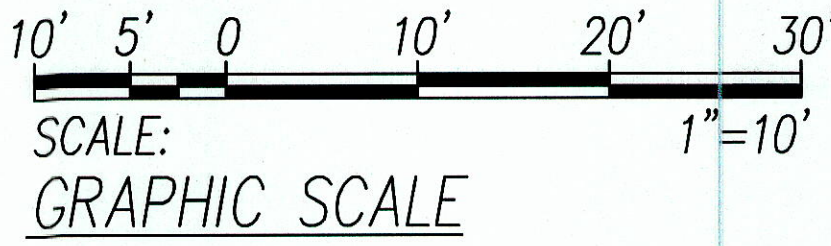
CURVE DATA						
ID	$\Delta$	$\Delta / 2$	RADIUS	T	C	Lc
1	14 20'55"	7 10'27.6"	35.00'	4.41'	8.74'	8.77'
2	21 6'3"	10 33'1.5"	35.00'	6.52'	12.82'	12.89'
3	38 46'7"	19 23'3.5"	26.54'	9.34'	17.62'	17.96'
4	38 46'9"	19 23'4.3"	26.44'	9.30'	17.55'	17.89'
5	39 1'21"	19 30'40.4"	25.00'	8.86'	16.70'	17.03'
6	30 0'0"	15 0'0.0"	15.00'	15.00'	21.21'	23.58'
7	18 32'4"	9 46'2.2"	25.05'	4.31'	8.50'	8.54'



ELECTRIC DUCTLINE HORIZONTAL TIE PLAN I  
SCALE: 1"=10'

DRAWING REVIEW  
Reviewed for HECO's Facilities Only  
Date 3/14/11 By [Signature]  
DWL  
Engineering Department  
Hawaiian Electric Company, Inc.

APPROVED BY: HAWAIIAN ELECTRIC COMPANY, INC. DATE



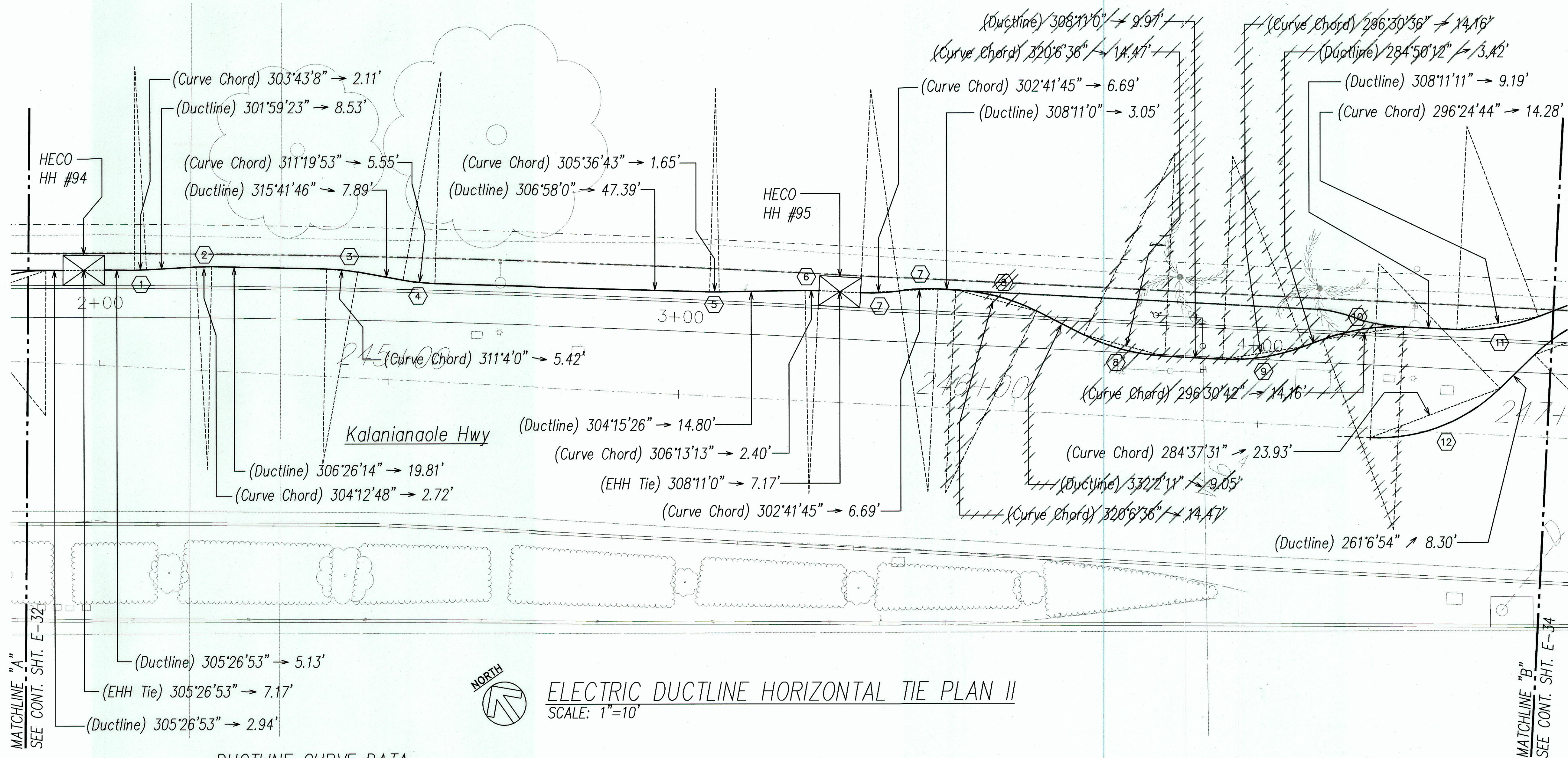
SIGNATURE [Signature]  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**ELECTRIC DUCTLINE  
HORIZONTAL TIE PLAN I**  
KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009

"AS-BUILT"



FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-072-1(52)	2008	63	64



DUCTLINE CURVE DATA

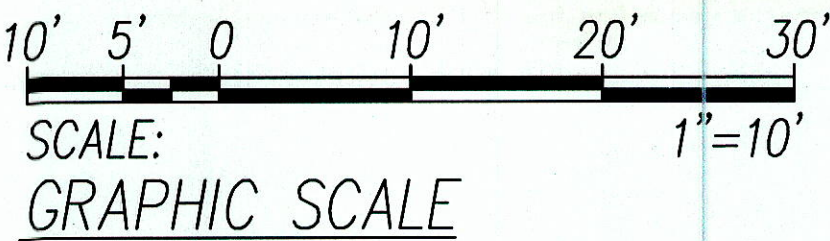
CURVE DATA						
ID	Δ	Δ / 2	RADIUS	T	C	Lc
①	3 27' 30"	1 43' 45.2"	35.00'	1.06'	2.11'	2.11'
②	4 26' 51"	2 13' 25.3"	35.00'	1.36'	2.72'	2.72'
③	9 15' 32"	4 37' 46.1"	33.56'	2.72'	5.42'	5.42'
④	8 43' 46"	4 21' 53.0"	36.44'	2.78'	5.55'	5.55'
⑤	2 42' 34"	1 21' 17.0"	35.00'	0.83'	1.65'	1.66'
⑥	3 55' 34"	1 57' 47.0"	35.00'	1.20'	2.40'	2.40'
⑦	10 58' 29"	5 29' 14.7"	35.00'	3.36'	6.69'	6.70'
⑧	23 51' 11"	11 55' 35.7"	35.00'	7.39'	14.47'	14.57'
⑨	23 20' 48"	11 40' 23.8"	35.00'	7.23'	14.16'	14.26'
⑩	23 20' 59"	11 40' 29.3"	35.00'	7.23'	14.16'	14.26'
⑪	23 32' 54"	11 46' 27.0"	35.00'	7.30'	14.28'	14.38'
⑫	47 1' 13"	23 30' 36.7"	30.00'	13.05'	23.93'	24.62'

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

LAST SAVE: 01/09/09 @ 10:20:21 BY: BO PLATT SE: 12-10  
Y:\RoadProjects\241139\Kalanianaʻole Hwy\241139-New-Hwy\241139-Ph02-XREFS\TOPO-KALANIANAʻOLE BASE-KALANIANAʻOLE-241139-NEW-ALL-HECO-DUCTLINE

**DRAWING REVIEW**  
Reviewed for HECO's Facilities Only  
Date 2/11/09 By [Signature]  
DWL  
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 BY: \_\_\_\_\_ DATE \_\_\_\_\_  
HAWAIIAN ELECTRIC COMPANY, INC.



SIGNATURE [Signature] 2/17/09  
APRIL 30, 2010  
EXPIRATION DATE OF LICENSE  
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**ELECTRIC DUCTLINE  
HORIZONTAL TIE PLAN II**  
KALANIANAʻOLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(52)  
DATE: January 2009  
**SHEET No. E-33 OF 34 SHEETS**

"AS-BUILT"



DATE: 02/12/08 @ 12:33:30 DT: 11 FEB 08 11:10  
 PROJ: JAVL  
 ACOD: /acod/projects/241138/Kalanianaole Hwy/E34\_241138\_New-HecoTie-Phn03 XREFS: TOPO\_KALANIANAOLE BASE\_KALANIANAOLE \_X241138\_NEW\_ALL-HECO-DUCTLINE



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

### DRAWING REVIEW

Reviewed for HECQ's Facilities Only

Date 2/14/14 By W. O. R.

DWL *ea*  
 Engineering Department  
 Hawaiian Electric Company, Inc

APPROVED BY: 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.

HAWAIIAN ELECTRIC COMPANY, INC.

DATE \_\_\_\_\_



APRIL 30, 2010

EXPIRATION DATE OF LICENSE

THIS WORK WAS PREPARED BY ME OR  
UNDER MY SUPERVISION

### ELECTRIC DUCTLINE HORIZONTAL TIE PLAN III

KALANIANA'OLE HIGHWAY IMPROVEMENTS  
VICINITY OF HAWAII KAI DRIVE  
TO KEAHOLE STREET  
FEDERAL-AID PROJECT NO. NH-072-1(5)  
DATE: January 2009

**SHEET No. E-34 OF 34 SHEETS**