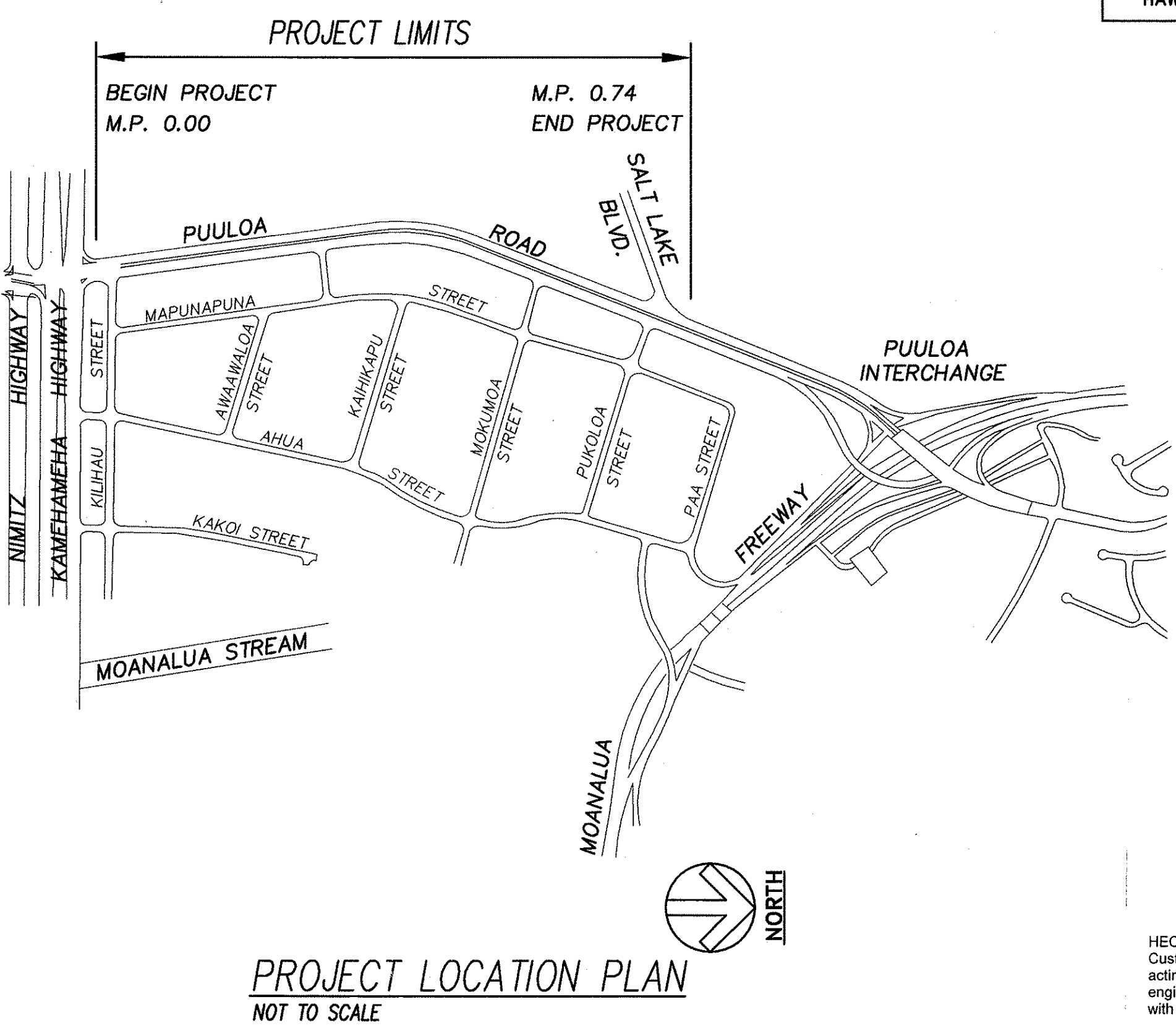


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PROJECT LOCATION PLAN
NOT TO SCALE

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	122	193

DRAWING REVIEW
Reviewed for HECO's Facilities Only
Date 8/4/03 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]
VERIZON HAWAII, INC. DATE
[Signature]
OCEANIC CABLEVISION 7/24/03 DATE
[Signature]
AT&T 7/25/03 DATE

ORIGINAL SURVEY PLOTTED BY _____ DATE _____
PLAN DRAWN BY _____
NOTE BOOK DESIGNED BY _____
QUANTITIES BY _____
CHECKED BY _____
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RONALD M. 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
[Signature]
5-9-03
Expiration Date of the License: 04/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

INDEX OF ELECTRICAL DRAWINGS.
PROJECT LOCATION PLAN
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-1 OF 56 SHEETS

ELECTRICAL SYMBOLS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	123	193

NEW	EXISTING	DESCRIPTION	NEW	EXISTING	DESCRIPTION	NEW	EXISTING	DESCRIPTION
		Type "A" Highway Light Pullbox			Utility Wood Pole			2' x 4' CATV Pullbox
		Type "B" Highway Light Pullbox			Utility Steel Pole			3' x 5' CATV Handhole
		Type "C" Highway Light Pullbox			Guy & Anchor			
		Type "A" Traffic Signal Pullbox			Overhead utility lines			
		Type "B" Traffic Signal Pullbox			Underground Ductlines			
		Type "C" Traffic Signal Pullbox			2' x 4' Electric Pullbox			
		Highway Light Standard			5' x 7' Electric Handhole			
		Traffic Signal Standard, Type I with Indicated Signal Heads			2' x 4' Telephone Pullbox			
					3' x 5' Telephone Handhole			
		Traffic Signal Standard, Type II, with Indicated Signal Heads Mounted on Mast Arm			5'-10" x 9'-6" x 7' Telephone Manhole			
					6' x 12' Telephone Manhole			
					3' x 5' ATT Handhole			
		Vehicle Loop Detector			4' x 4' x 6' Deep ATT Manhole			
		Traffic Signal Head, R-Y-G Ball			6' Diameter ATT Std. Manhole			
		Traffic Signal Head, R-Y-G (Straight Ahead Directional Arrow)	E	e	Indicates Electric			
			T	t	Indicates Telephone			
		Traffic Signal Head, R-Y-G (Left Turn Directional Arrow), Including G Ball Where Indicated	V	v	Indicates Cable Television			
			ATT	att	Indicates A T & T			
		Traffic Signal Head, Programmed Visibility, R-Y-G (Left Turn Directional Arrow)			Indicate Removal Work			
				ep2	Indicates Existing Joint Utility Pole Designation			
		Existing Traffic Signal Standard or Wood Pole to be Removed			Note Indicator Designators, "See Note No. 1"			
					Indicated			
		Existing Traffic Signal Head to be Removed			Sewer Line and Structure			
		Existing Pedestrian Pushbutton to be Removed			Water Line and Structure			
		Existing Pedestrian Signal Head to be Removed			Drain Line and Structure			
					Gas Line			
		Pedestrian Signal Head			Equipment Indicator, See Schedule on Sheet E-5			
		Traffic Signal System Controller			Traffic Signal System Conduit and Cable Data Indicator, See Schedule on Sheet E-23A			
		Pedestrian Pushbutton						
		EVP Detector			Duct Section Indicator, with 2-5" Electric Ducts, 2-4" Telephone Ducts, 1-4" Cable Television Ducts, 1-2" Traffic Signal Duct, 1-2" Highway Light Duct, 1-4" AT&T Duct Indicated. See Sheets E-25, E-25A, and E-26 for Duct Section Details			
HL	hl	Indicates Highway Lights						
TS	ts	Indicates Traffic Signals						
SP		Indicates New Joint Utility Steel Pole Designation						
WP		Indicates New Joint Utility Wood Pole Designation						

Note(s): "X" Thru Symbol Denotes Item to be Removed, Unless Otherwise Noted.

HIGHWAY LIGHT ID TAG INDICATOR LEGEND

1		= Highway Light & Pole Number
2		= Pole Location, Offset In Feet from Baseline
3		= Bracket Arm Span, In Feet
4		= Luminaire Height Above Pavement, In Feet
5		= Pole Location, Station Number
6		= Pole Base Condition, See Note Below
7		= Light Circuit Number & Phase To Phase Connection, When Applicable

Pole Base Type Notes:
Type A : Breakaway Transformer Base Without Highway Light Pullbox
Type B : Breakaway Transformer Base With Highway Light Pullbox
Type I : 22" Dia/Sq x 8'-0" Deep Light Standard Concrete Foundation
Type II : 36" Dia/Sq x 5'-6" Deep Light Standard Concrete Foundation

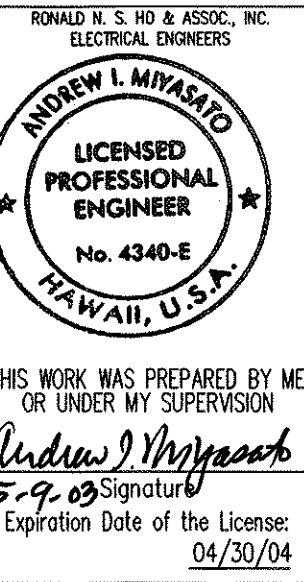
DRAWING REVIEW

Reviewed for HECO's Facilities Only
Date 8/4/03 By
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 7-14-03
VERIZON HAWAII, INC. DATE 7/24/03
OCEANIC CABLEVISION DATE 7/25/03
A T & T DATE 7/25/03



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
ELECTRICAL SYMBOLS

PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-1A OF 56 SHEETS

ORIGINAL PLAN
DATE
DRAWN BY
DESIGNED BY
CHECKED BY
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No.
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GENERAL CONSTRUCTION NOTES

- A. Trenching to be by hand digging near and across existing utility lines.
- B. Unless otherwise requested by the Board of Water Supply, minimum clearance between water lines and conduits shall be:
Horizontal = 3 feet
Vertical = 6 inches
- C. Adjust new conduit alignment, if required to provide clearances. If conduit cannot be realigned, adjustments to existing water system shall be performed in accordance with standards of the Board of Water Supply.
- D. Minimum clearance between highway light standards and fire hydrants shall be 3 feet.
- E. Underground utilities shown hereon are for information only. No guarantee is made on the accuracy or completeness of said information.
- F. All new and existing concrete pullbox and handhole covers which are located in new finished sidewalks shall be provided with new exposed aggregate concrete covers to match new exposed aggregate concrete sidewalk finish.
- G. Where necessary, reconstruction of sidewalk, gutter and driveway areas shall conform to the standard details of the governmental agency having jurisdiction over the work.
- H. The Contractor shall be responsible for removal of all silt and debris resulting from his work and deposited in drainage facilities, roadways and other areas. The cost for any necessary remedial action by the Chief Engineer shall be payable by the Contractor.
- I. The Contractor, at his own expense, shall keep the project area free from dust nuisance. The work shall be in conformance with the air pollution control standards and regulations of the State Department of Health.
- J. The Contractor shall notify the Traffic Control Branch, Department of Transportation Services, three (3) working days prior to commencing work on the Traffic Signal System (phone: 523-4589).
- K. The Traffic Signal System shall be kept operational during construction. Any relocation required shall be approved by the Traffic Control Branch, Department of Transportation Services, and paid for by the Contractor.
- L. The Contractor shall be responsible for any damages to the existing Traffic Signal Facilities, including the Traffic Signal Interconnect System. Any and all damages to these Facilities shall be repaired by the Contractor at his cost in accordance with the requirements of the City and County of Honolulu.

The Contractor shall be responsible for any damages to the existing Traffic Signal Fiber Optic Cable System. Any and all damages to these Facilities shall be repaired by the Contractor at his cost in accordance with the requirement of the City and County of Honolulu.

HECO REFERENCE SPECIFICATIONS

SPEC. NO.	DESCRIPTION
CS7001	Construction of Underground Facilities
CS7003	Construction of Electrical Facilities
CS7202	General Conditions for Construction of Projects
CS9301	Concrete Work

HECO REFERENCE DRAWINGS

DWG NO.	DESCRIPTION
16688	Details Handholes & Manholes, SHT. 1&2
30-2005	Pullbox, 2' x 4'
18841	Handhole, 3' x 5'
18843	Handhole, 5' x 7'

HAWAIIAN ELECTRIC COMPANY (HECO) NOTES

1. Location of HECO Facilities

The location of HECO's overhead and underground facilities shown on the plans are from existing records with varying degrees of accuracy and are not guaranteed as shown. The Contractor shall verify in the field the locations of the facilities and shall exercise proper care in excavating and working in the area. The Contractor shall be responsible for any damages to HECO's facilities whether shown or not shown on the plans.

2. Compliance with Hawaii Occupational Safety and Health Laws

The Contractor shall comply with the State of Hawaii's Occupational Safety and Health laws and regulations, including without limitation, those related to working on or near exposed or energized electrical lines and equipment.

3. Excavation Permit

The Contractor shall obtain all necessary permits, including an excavation permit from HECO's Technical Division (543-5654) located at 820 Ward Avenue, 4th Floor, two weeks prior to starting construction. Please refer to our request number at that time.

4. Overhead Lines

State law requires that a worker and the longest object he or she may contact cannot come closer than a minimum radial clearance of 10 feet when working close to or under any overhead lines rated 50kV and below. For each additional 1kV above 50kV, an additional 0.4 inch shall be added to the 10-foot clearance requirement. The preceding information on line clearance requirements is provided as a convenience and it is the contractor's responsibility to be informed of and comply with any revisions or amendments to the law.

Should the Contractor anticipate that his work will result in the need to encroach within the minimum required clearance at any time, the Contractor shall notify HECO at least four (4) weeks prior to the planned encroachment so that, if feasible, the necessary protections (e.g. relocate, de-energize, or blanket HECO lines) can be put in place. HECO's cost of safeguarding its lines will be charged to the Contractor.

Contact HECO's Customer Installations Department at 543-7846 for assistance in identifying and safeguarding overhead power lines.

Refer to Section X of HECO's Electric Service Installation Manual for additional guidelines when working around HECO's facilities. A copy may be obtained from HECO's Customer Installations Department.

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	124	193

HECO NOTES (Continuation)

5. Pole Bracing

A minimum clearance of 10 feet must be maintained when excavating around utility poles and/or their anchor system to prevent weakening or pole support failure. Should work require excavating within 10 feet of a pole and/or its anchor system, the Contractor shall protect, support, secure, and take all other precautions to prevent damage to or leaning of these poles. The Contractor is responsible for all associated costs to brace, repair, or straighten poles. All means of structural support for the pole proposed by the Contractor shall first be reviewed by HECO before implementation. For pole bracing instructions, the Contractor shall call the HECO Construction and Maintenance Dept., Customer & System Superintendent at 543-4223 a minimum of two (2) weeks in advance.

6. Underground Lines

The Contractor shall exercise extreme caution whenever construction crosses or is in close proximity of underground lines. HECO's existing electrical cables in the area are energized and will remain energized during construction. Only HECO personnel are to handle these cables and erect temporary guards to protect these cables from damage. The cost of HECO's assistance in providing proper support and protection of its underground lines will be charged to the Contractor. The contractor shall exercise due care and precautions to avoid disturbing any energized cables and temporary guards and shall work cautiously at all times to avoid accidents.

For verification of underground lines or for assistance in providing proper support and protection of these lines, the Contractor shall call HECO's Construction & Maintenance Dept., Customer & System Superintendent, at 543-4223, a minimum of two (2) weeks in advance.

7. Excavations

When trench excavation is adjacent to or beneath HECO's existing structures or facilities, the Contractor is responsible for:

a) Sheet piling and bracing the excavation to prevent slides, cave-ins, and settlements. Protecting existing structures or facilities with beams, struts, or under-pinnings. Backfilling with proper backfill material including special thermal backfill where existing (refer to Engineering Department for thermal backfill specifications).

DRAWING REVIEW

Reviewed for HECO's Facilities Only

Date 6/3/03 By J.K.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.

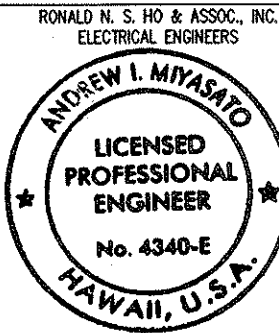
APPROVED BY:

HAWAIIAN ELECTRIC COMPANY, INC. DATE

VERIZON HAWAII, INC. DATE

OCEANIC CABLEVISION DATE

A T & T DATE



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Signature: Andrew I. Miyamoto

Expiration Date of the License: 04/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GENERAL CONSTRUCTION
NOTES, HECO NOTES 1
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

HAWAIIAN ELECTRIC COMPANY NOTES (Continued)

8. Relocation of HECO Facilities

Any work required to relocate or modify HECO facilities shall be done by HECO, or by the Contractor under HECO's supervision. The Contractor shall be responsible for all coordination, and shall provide necessary support for HECO's work, which may include, but not be limited to, excavation and backfill, permits and traffic control, and restoration of pavement, sidewalks, and other facilities.

All costs associated with any relocation or modification (either temporary or permanent) for the convenience of the Contractor, or to enable the Contractor to perform his work in a safe and expeditious manner in fulfilling his contract obligations shall be borne by the Contractor.

9. Conflicts

The Contractor acknowledges that HECO is not responsible for any delay or damage that may arise as a result of any conflicts discovered or identified with respect to the location or construction of HECO's electrical facilities in the field, regardless of whether the Contractor has met the requested minimum advance notices. In order to minimize any delay or impact arising from such conflicts, the Contractor shall notify HECO immediately upon discovery or identification of such conflict.

10. Damage to HECO facilities

The Contractor shall be responsible for the protection of all HECO surface and subsurface utilities and shall be responsible for any damages to HECO's facilities as a result of his operations. The Contractor shall immediately report such damages to HECO's trouble dispatcher at 548-7961. Repair work shall be done by HECO or by the Contractor under HECO's supervision. Costs for damages to HECO's facilities shall be borne by the Contractor.

11. HECO Stand-By Personnel

The Contractor may request HECO to provide an inspector to stand-by during construction near HECO's facilities. The cost of such inspection will be charged to the Contractor.

The Contractor shall call the HECO Construction and Maintenance Dept., Customer & System Superintendent at 543-4223 a minimum of 5 working days in advance to arrange for HECO stand-by personnel.

12. Indemnity

The Contractor shall indemnify, defend and hold harmless HECO from and against all losses, damages, claims, and actions, including but not limited to reasonable attorney's fees and costs based upon or arising out of damage to property of injuries to persons, or other tortious acts caused or contributed to by Contractor or anyone acting under its direction or control or on its behalf; provided Contractor's indemnity shall not be applicable to any liability based upon the sole negligence of HECO.

13. The Contractor to stakeout all facilities for verification by the utility involved and/or affected before proceeding. Location and depth of all manholes, pullboxes and the routing of all ductlines shall be verified by the utilities prior to excavation, construction, or installation.

14. All manholes, pullboxes and ductlines to be installed in concrete, shall be inspected and approved by the utility company before placing concrete. Notify utility company 48 hours prior to placing concrete.

15. All completed ductlines shall be mandrel tested by the Contractor in the presence of the utility company's inspector using the utility company's standard practice.

16. The Contractor shall install a 1/8" polyolefin pull line in all completed HECO and CATV ductlines after mandrel testing is complete.

HAWAIIAN ELECTRIC COMPANY NOTES (Continued)

17. The Contractor shall be responsible for all proposed work within private property to enable the conversion from overhead to underground. The Contractor shall coordinate all work with the utility companies.

18. The Contractor shall give HECO forty (40) working days notice to proceed with it's portion of the work.

19. Barricading of HECO's facilities, if required, shall be done by Contractor. Breaking into existing HECO facilities shall be done by HECO.

20. HECO shall remove all existing HECO facilities except as noted on the plans.

21. The following terms will be used interchangeably throughout this project:

- a. VH or "T" for Verizon Hawaii
- b. HECO or "E" for Hawaiian Electric Company
- c. Oceanic Cable or "V" for Oceanic Cablevision

22. The Contractor shall furnish his construction schedule forty-five (45) working days prior to starting any HECO work.

23. CAUTION!!! ELECTRICAL HAZARD!!!!

Existing electrical facilities, overhead lines and underground encased buried duct lines are energized and will remain energized during construction. Cables in service boxes, transformer vaults and handholes are also energized. Only Hawaiian Electric Company personnel are to handle these energized cables and erect temporary guards to protect cables from damage. Contractor shall work cautiously to avoid accidents and damage to existing facilities, which can result in electrocution. Contractor shall coordinate his work with HECO U.G. Division and Inspection Division (phone: 543-5668)

24. The Contractor shall furnish and install all materials to complete construction of the underground ductline system, including riser conduits. All electric ducts shall be encased in concrete jacket unless otherwise specified. All ducts and conduits shall be inspected and approved by HECO prior to placing concrete. The Contractor shall notify HECO's inspection division (phone 548-7763) at least 48 hours prior to placing concrete.

25. The Contractor is to stake out all temporary & permanent new pole locations so as not to conflict with any existing or proposed utility or any proposed improvement.

26. The Contractor shall install Schedule 40 PVC conduit for all HECO ductline, no split ducts will be allowed. No notching of HECO boxes will be allowed.

27. For construction of underground facilities refer to HECO Specification CS7003 and CS7001.

28. The underground pipes, cables or ductlines known to exist by the Engineer from his search of records are indicated on the plans. The Contractor shall verify the locations and depths of the facilities and exercise proper care in excavating the area. Wherever connections of new utilities to existing utilities are shown on the plans, the Contractor shall expose the existing lines at the proposed connections to verify their locations and depths prior to excavation for the new lines.

29. Locations of all existing handholes and service boxes are approximate and exact location shall be determined in the field.

APPROVED:

HAWAIIAN ELECTRIC COMPANY, INC.

HAWAIIAN ELECTRIC COMPANY NOTES (Continued)

30. The Contractor shall provide two sets of as-built reproducible tracings showing the offsets, stationing and vertical elevation of the duct line(s) constructed. One set is for the State Department of Transportation, Highways Division and the other is for the Hawaiian Electric Company.

31. All manholes shall be cast in place unless approved by HECO.

32. The following clearances shall be maintained between HECO's ductline and all adjacent structures (charted and uncharted) in the trench:

Structure type	Minimum Clearance (Inches)
Water Lines, Parallel	36
Water Lines, Crossing	12 (A)
Sewer Lines, Parallel	36 (B)
Sewer Lines, Crossing	24 (C)
Drain Lines, Parallel	12
Drain Lines, Crossing	6 (D)
Electrical and Gas Lines, Parallel	12
Electrical and Gas Lines, Crossing	12
Telephone Lines, Parallel	6 (D)
Telephone Lines, Crossing	6 (D)
Chevron Oil Lines, Parallel	36
Chevron Oil Lines, Crossing	48 Below Oil Line (E)

- A. The minimum vertical clearances to water lines crossing electrical ductlines can be reduced to 6 inches if the electrical ductline structure is smaller than 16 inches, is concrete encased, and is below the water line.
- B. A minimum horizontal clearance of 36 inches is required between new handholes and existing sewer laterals.
- C. The minimum vertical clearances to sewer pipes crossing electrical ductlines can be reduced to 12 inches if the sewer pipe is jacketed in concrete.
- D. The minimum clearances shall be increased to 12 inches if the electrical ductline is direct buried.
- E. The minimum vertical clearances to oil lines crossing electrical ductlines can be reduced to 24 inches below oil lines if the crossings are encased in 6 inches of concrete.
- F. The contractor shall notify the Construction Manager & HECO of any heat sources (power cable duct bank, steamline, etc.) encountered that are not properly identified on the drawing.

DRAWING REVIEW

Reviewed for HECO's Facilities Only

Date

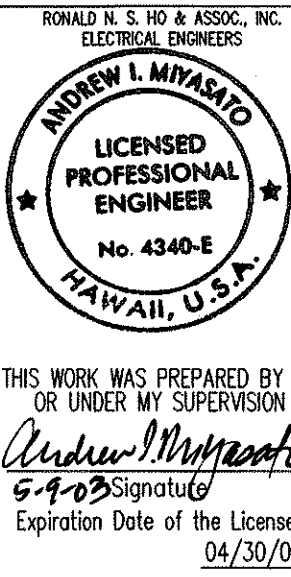
By

Engineering Department
Hawaiian Electric Company, Inc.

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DATE

REVISION



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

HECO NOTES II

PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED

DATE: MAY 2003

SHEET No. E-3 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	127	193

GENERAL CONSTRUCTION NOTES FOR VERIZON HAWAII (VH) FACILITIES (Continued)

HANDHOLES/MANHOLES NOTES:

- All ducts associated with manholes or handholes shall be installed to provide adequate drainage toward the manholes or handholes (minimum 0.25% slope, unless otherwise noted). The "through" ducts entering manholes and handholes shall be splayed with a 20' transition and enter the manhole/handhole 6" to 8" from the inside edge of the wall (see manhole wall elevation details and duct transition detail).
- 5'-10" x 9'-6" x 7'-0"D manholes (VH Standard Drawing 34060), 5' x 10' manholes (VH Standard Drawing 34108), 6' x 12' manholes (VH Standard Drawing 180018) may be cast-in place or precast. If using precast manholes and handholes, the construction joint between precast sections must be thoroughly cleaned of all dirt or other debris, and shall be bonded with a mastic or sealing compound when installed to prevent water entry. The mastic tape or sealing compound must completely fill the construction joint, and cover the entire joint area. The precast sections must be placed as soon as the sealant installation is completed. Two coats of THORO-SEAL or approved equal shall be applied 12" on both sides of exterior joint areas.
- Before placing precast sections, the Contractor shall provide at least three to six inches of sand or base material on the bottom of the excavation. In fluid soils, or soils vulnerable to becoming fluid, #9 or 10 stone (1/2" to 3/4") may be used for stability. The base material shall be compacted and graded to level.
- The manhole cover and frame has a clear opening of 30" and is available as a 5-5/8" high frame (part no. R-1750-C1) or as a 10" high frame (part no. R-1750-C) from Neenah Foundry Company in Neenah, WI (phone: 1-800-558-5075). The 10" high frame shall be selected for normal applications. the 5-5/8" high frame shall be used for applications where the depth of pavement down to the concrete manhole slab is shallow and limited. The manhole roof slab opening is 36" in diameter. The cover shall have the Verizon logo and be equipped with two 1" diameter lift holes 180 degrees apart. The bolts that come with the cover to lock down the cover are to be turned over to the Verizon Hawaii inspector. Do not lock covers down with these bolts. Refer to VH Standard Drawing 34086.

PULLBOX NOTES:

- All Type 435TB (2' x 4') and 435TB6 (2' x 6') pullboxes shall be constructed with a 12" base and a minimum of three 8" precast sections. (Refer to VH Standard Drawings 34056 and 34078). Modified 3' x 5' pullboxes shall be installed (refer to Verizon Hawaii Standard Drawing No. 34110a for 3' x 5' modified pullbox details). Install one 5/8" x 8' ground rod in all other Verizon Hawaii pullboxes and handholes, except in 436T meter type boxes (12" x 20").
- At no time shall cement mortar, wood or any other material be used between precast sections. Leveling or raising of pullboxes shall be done at the brickwork section using cement mortar. The permanent installation of wooden wedges to level or raise the precast sections shall not be permitted.
- Concrete precast base shall be used in new construction. Bricks may be used as an alternative only when intercepting existing ducts. The minimum layers of bricks to be used shall always be at least one layer lower than the lowest duct entering the pullbox. At no time, however, shall there be less than two layers of bricks on each installation.
- Unless indicated otherwise, conduits shall enter boxes at 90-degree angle and be flush to the wall with flared or bell ends to prevent cable damage.
- The base or bricks shall be placed on a minimum of 6" of #3 crushed rock backfill.
- The top of all utility boxes shall be 1" above finish grade in non-paved shoulders unless otherwise noted. Finish grade material shall be placed from the top of the utility box and feathered two feet around to finish grade.

EQUIPMENT SCHEDULES

Hawaiian Electric Co. Inc., Verizon Hawaii, Inc., Oceanic Cable, and AT&T Pullboxes, Handholes & Manholes to be Provided as Indicated.

ITEM	DESCRIPTION
A	HECO 2' X 4' PULLBOX PER HECO DWG. 30-2005
B	HECO 3' X 5' HANDHOLE PER HECO DWG. 18841
C	HECO 5' X 7' HANDHOLE PER HECO DWG. 18843
D	HTCO 2' X 4' PULLBOX PER HTCO DWG. 34056
E	HTCO 3' X 5' HANDHOLE PER HTCO 34110A
F	HTCO 3' X 5' MODIFIED HANDHOLE (CHECK W/HTCO)
G	HTCO 5'-10" X 9'-6" X 7'-0"D MANHOLE PER HTCO DWG. 34108
H	HTCO 6' X 12' X 7'-0" MANHOLE PER HTCO DWG. 180020
J	AT&T 4' X 4' MANHOLE PER AT&T REQUIREMENTS
K	CATV 2' X 4' PULLBOX, SIMILAR TO HTCO DWG. NO. 34056 EXCEPT WITH "CATV" INSCRIBED ON COVERS.
L	CATV 3' X 5' HANDHOLE, PER DETAILS ON SHEET E-27

AT&T CONTRUCTION NOTES

- The location of AT&T's underground facilities as shown on the plans are from record of varying degrees of accuracy and are not guaranteed as shown. The Contractor shall exercise extreme caution when the excavation and construction crosses or is in close proximity to underground fiber optic facilities. Any damage to the existing underground facilities shall be repaired and paid for by the Contractor.
- This project involves work that will impact AT&T's fiber optic communications cable. Please call 1-800-227-2600 prior to the start of work, to arrange for exact cable location. 72 hours prior notification will be appreciated.
- Whenever a Contractor is working over or near the AT&T cable, an AT&T technician must be on site.

DRAWING REVIEW

Reviewed for HECO's Facilities Only
Date 8/4/03 By JAL
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
VERIZON HAWAII, INC. DATE
OCEANIC CABLEVISION DATE
AT & T DATE

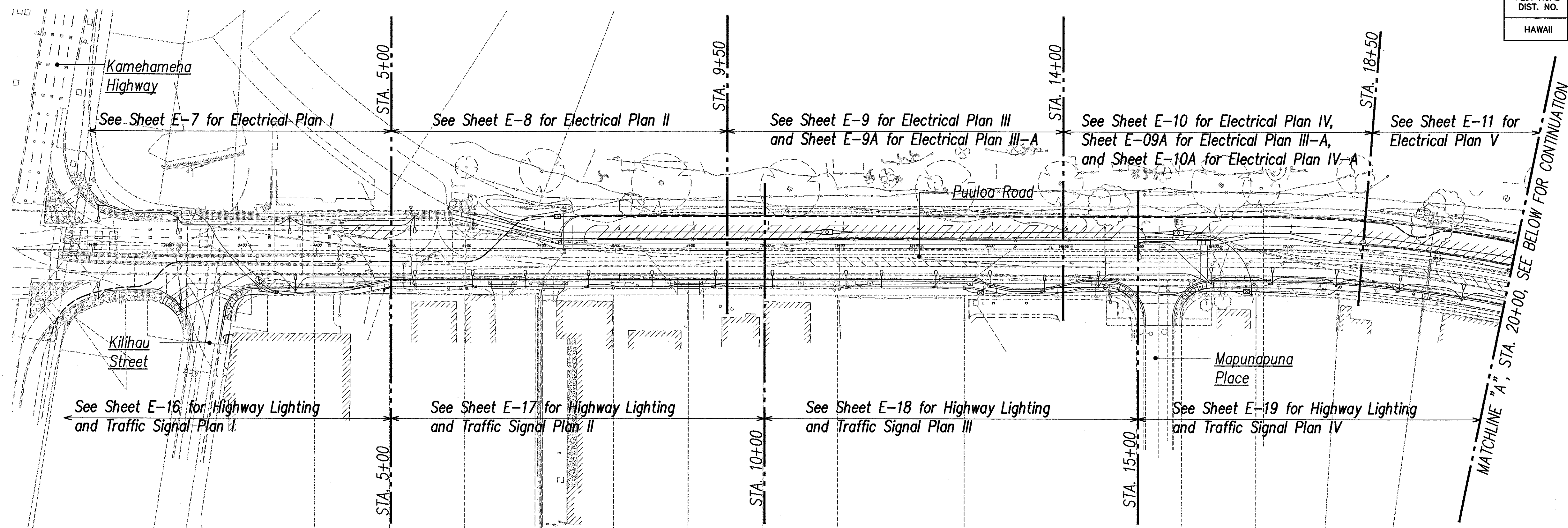


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
VH CONSTRUCTION NOTES II
AND AT&T CONSTRUCTION NOTES
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)
SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-5 OF 56 SHEETS

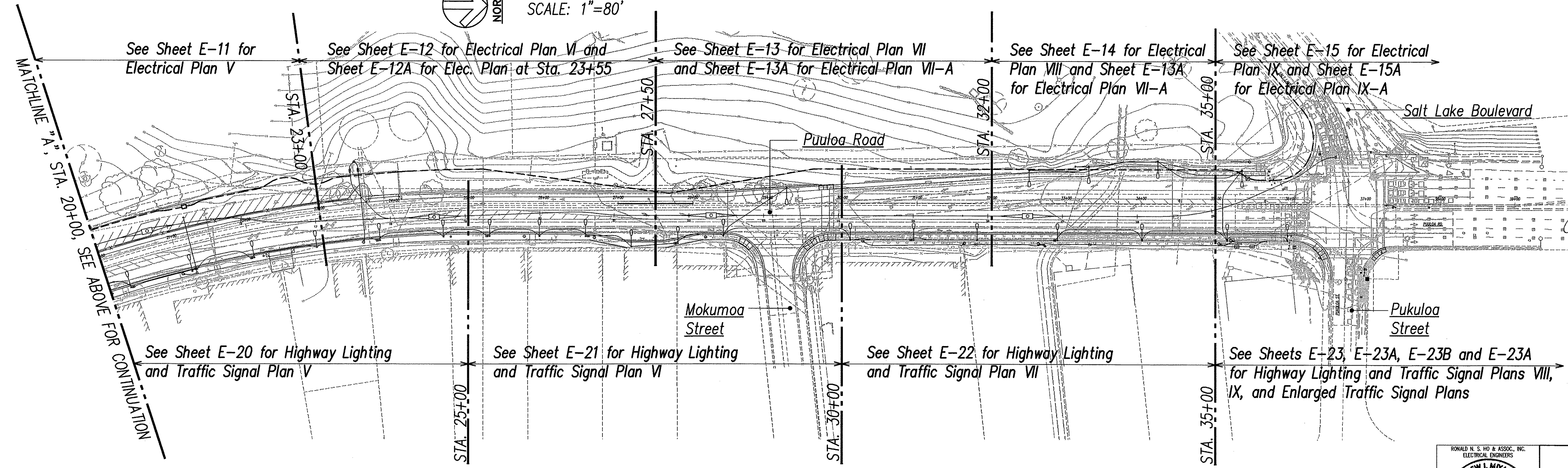
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NOTE BOOK	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

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FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	128	193



GENERAL ELECTRICAL AND HIGHWAY LIGHTING PLAN I
SCALE: 1"=80'



GENERAL ELECTRICAL AND HIGHWAY LIGHTING PLAN II
SCALE: 1"=80'

DRAWING REVIEW
Reviewed for HECO's Facilities Only
Date 8/4/03 By JML
Engineering Department
Hawaiian Electric Company, Inc.

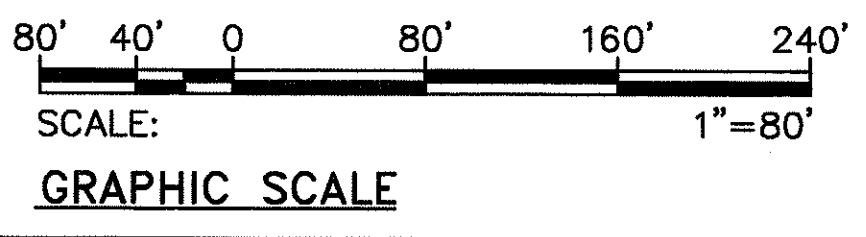
HECO's review of these drawings shall in no way relieve the Customer, its Consultant, its Contractor or anyone acting on the Customer's behalf from the responsibility for engineering, design, materials and any other liability associated with this project.

APPROVED BY:	
HAWAIIAN ELECTRIC COMPANY, INC.	DATE
<i>[Signature]</i>	7-14-03
VERIZON HAWAII, INC.	DATE
<i>[Signature]</i>	7/24/03
OCEANIC CABLEVISION	DATE
<i>[Signature]</i>	7/25/03
A T & T	DATE

DATE	REVISION

ORIGINAL PLAN	DATE
SURVEY PLOTTED BY	
DESIGNED BY	
TRACED BY	
NOTED BY	
CHECKED BY	

THIS DRAWING IS THE PROPERTY OF THE HAWAIIAN ELECTRIC COMPANY, INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT PERMISSION IN WRITING FROM THE HAWAIIAN ELECTRIC COMPANY, INC. ANY VIOLATION OF THIS NOTICE SHALL BE SUBJECT TO PROSECUTION IN THE DISTRICT COURT OF THE FIRST JUDICIAL CIRCUIT OF THE STATE OF HAWAII.



RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS
ANDREW I. MYASATO
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.
7-10-03
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION
[Signature]
Signature
Expiration Date of the License: 04/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
GENERAL ELECTRICAL AND HIGHWAY LIGHTING LAYOUT PLANS
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)
SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-6 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	129	193

NOTES:

1 Adjust existing manhole neck, frame and cover to finish pavement, grade, or sidewalk.

DRAWING REVIEW

Reviewed for HECO's Facilities Only

Date 11/13/03 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

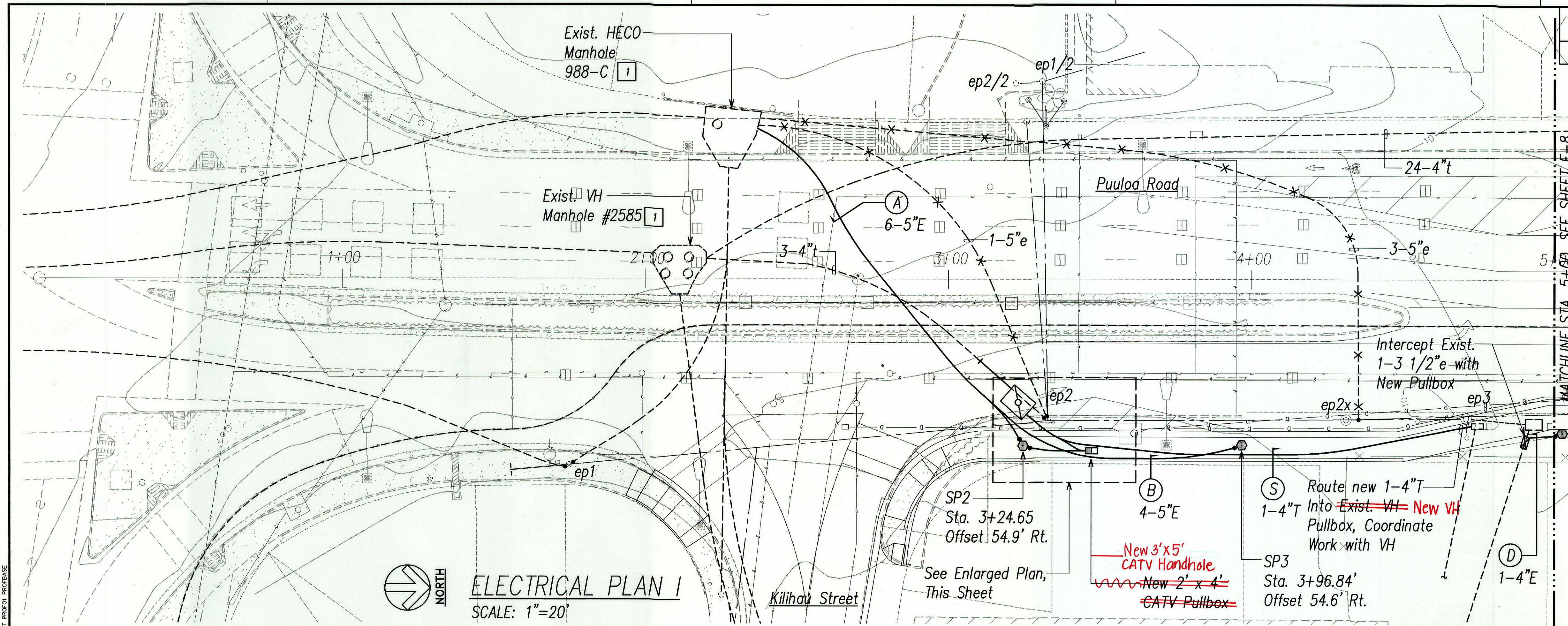
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VERIZON HAWAII, INC. DATE

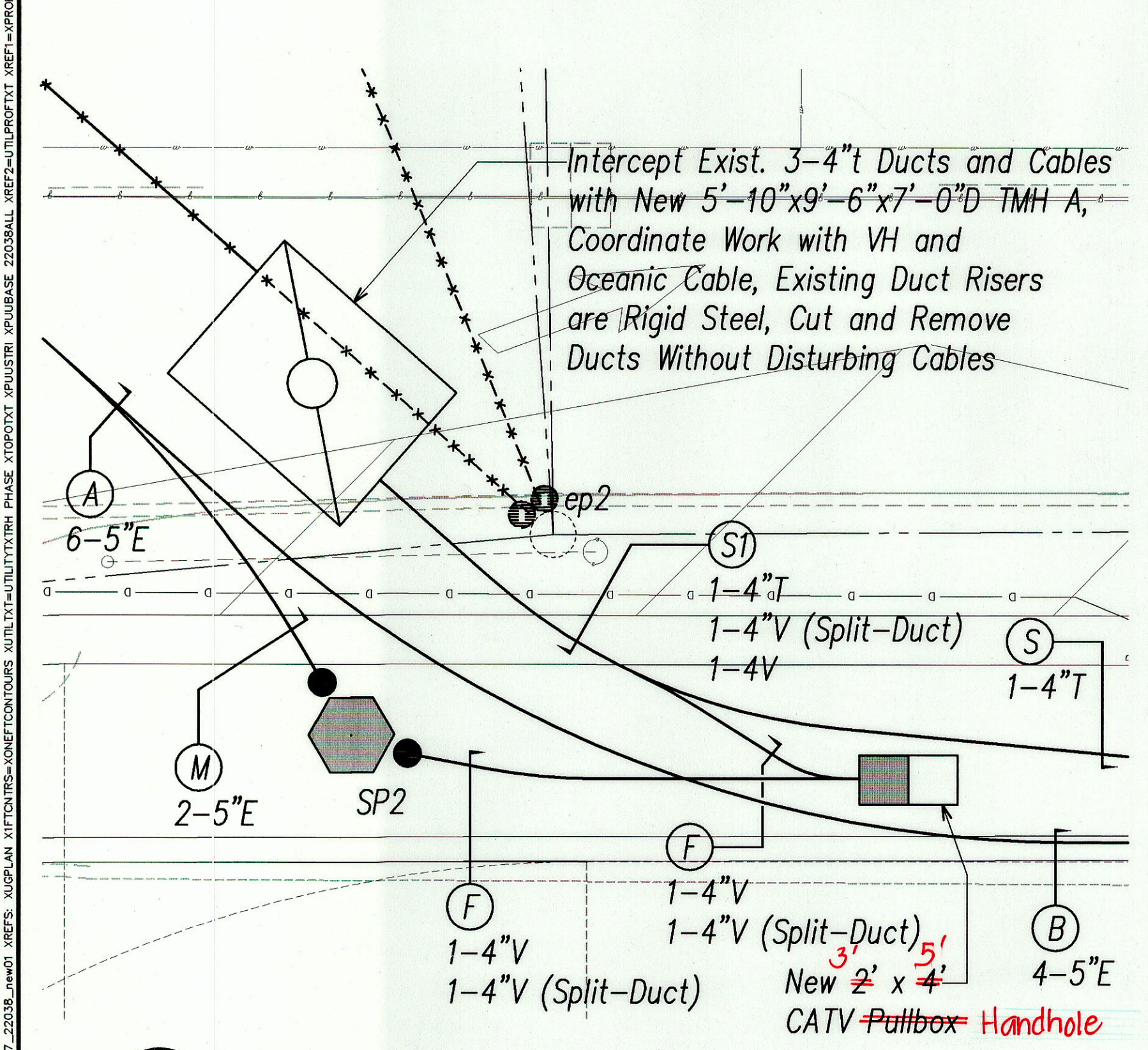
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OCEANIC CABLEVISION DATE

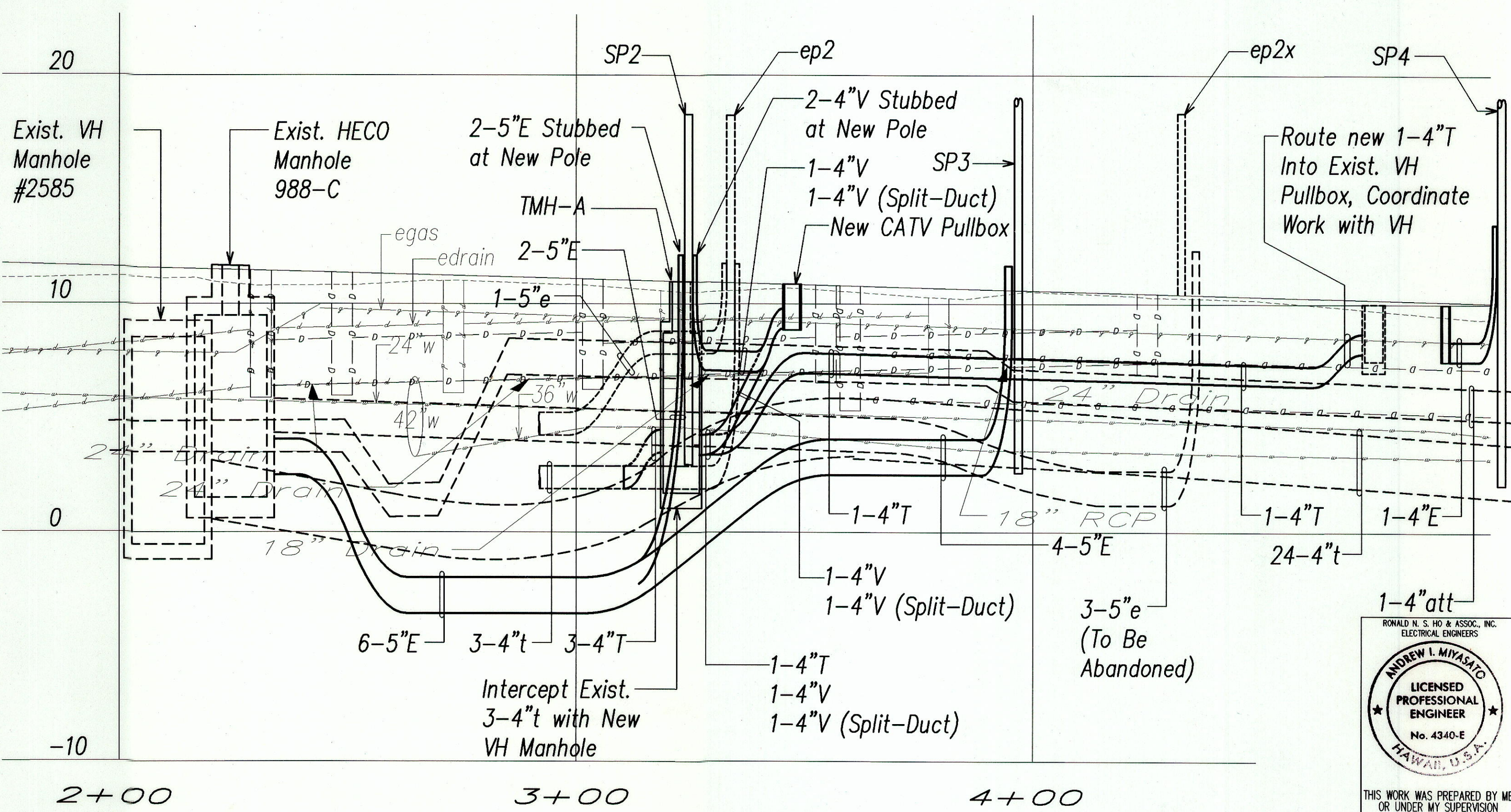
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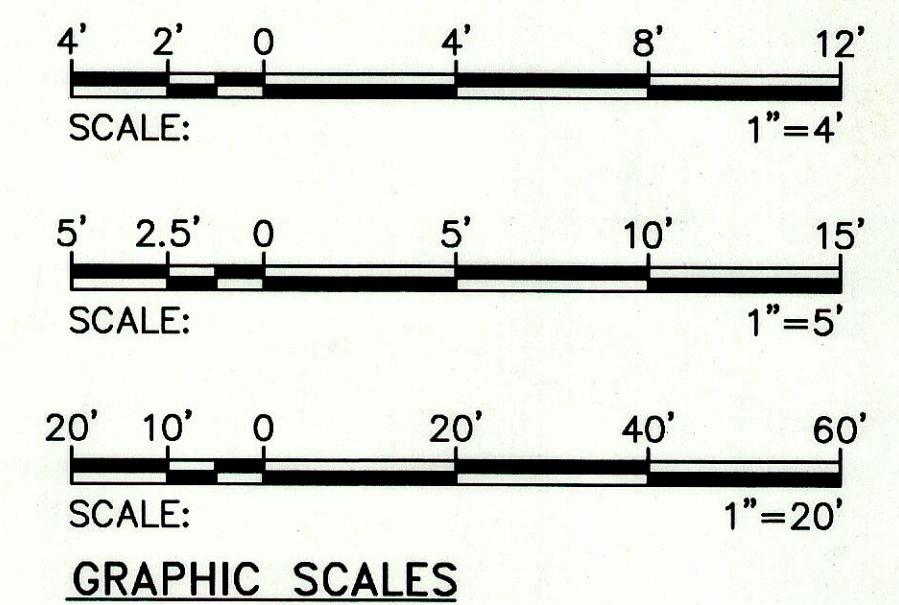
ELECTRICAL PLAN I
SCALE: 1"=20'



ENLARGED ELECTRICAL PLAN
SCALE: 1"=5'



DUCTLINE PROFILE ALONG BASELINE
SCALE: 1"=20' HORIZ.
1"=4' VERT.



RONALD N. S. TRU & 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
[Signature]
11.9.03 Signature
Expiration Date of the License: 04/30/04

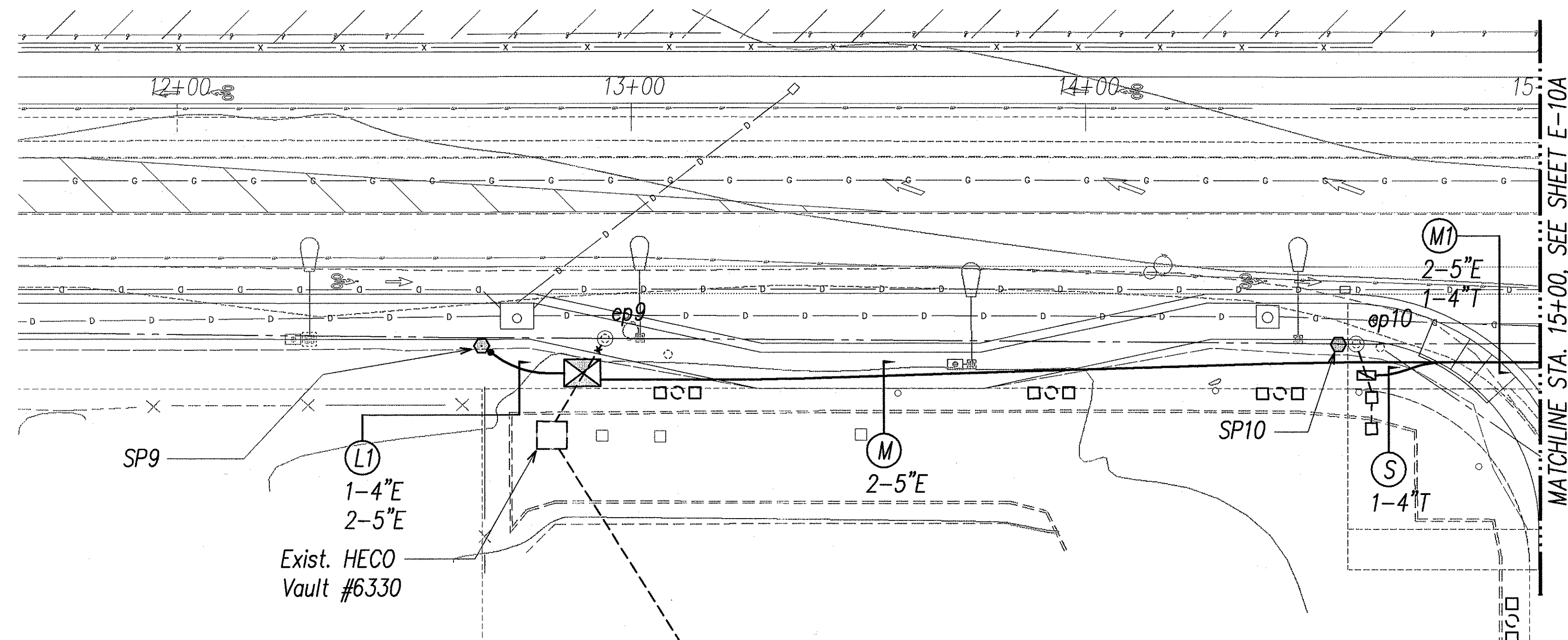
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN I -
ELECTRIC, TELEPHONE, CATV, AT&T
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-7 OF 56 SHEETS

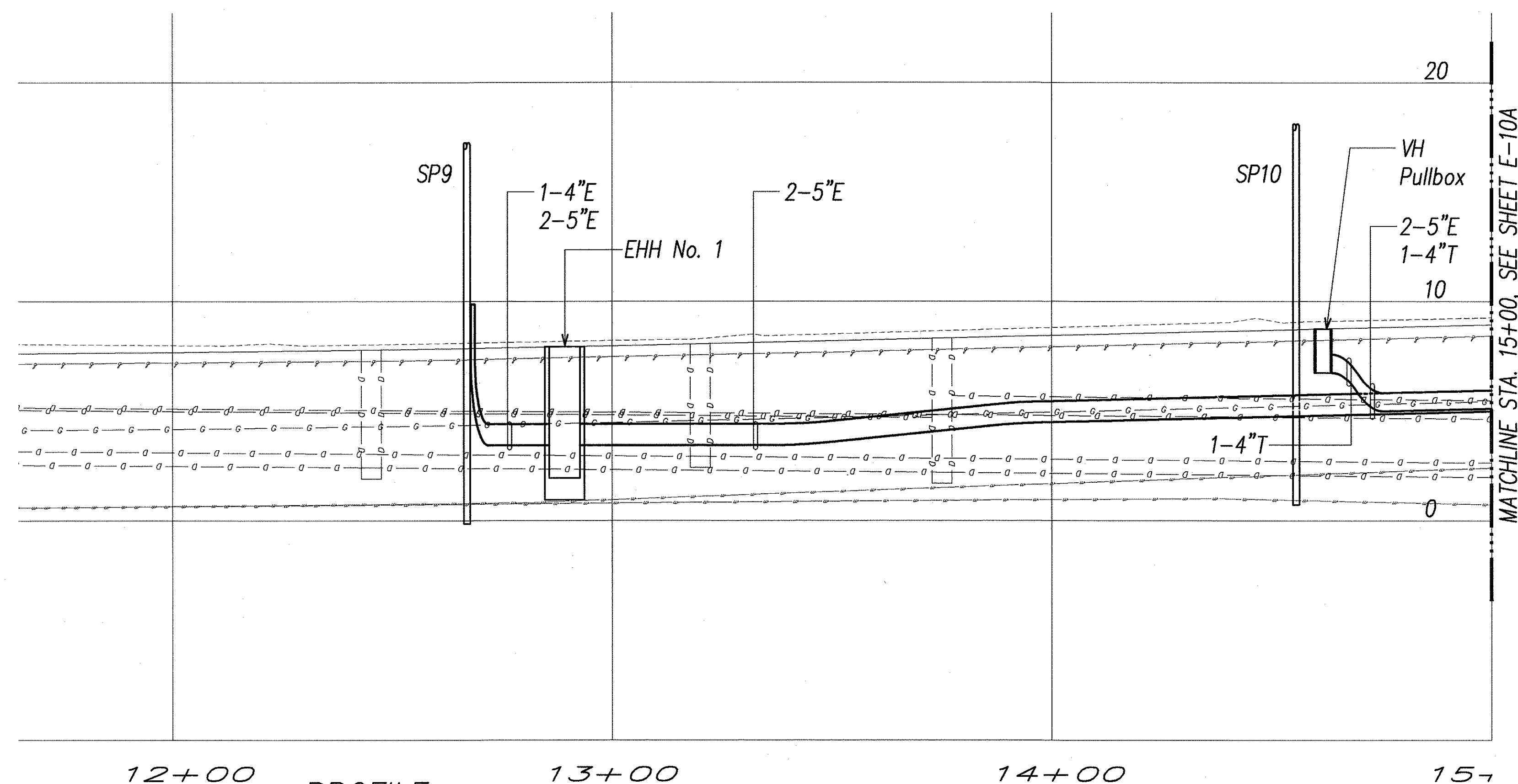
"AS-BUILT"

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	132	193



ELECTRICAL PLAN III-A

SCALE: 1"=20'



PROFILE

SCALE: 1"=20' HORIZ.
1"=4' VERT.

MATCHLINE STA. 15+00, SEE SHEET E-10A

MATCHLINE STA. 15+00, SEE SHEET E-10A

DRAWING REVIEW

Reviewed for HECO's Facilities Only

Date 11/13/03 By JKL

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 _____

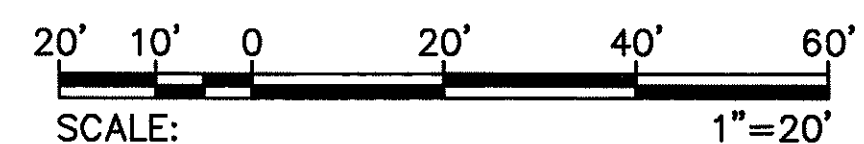
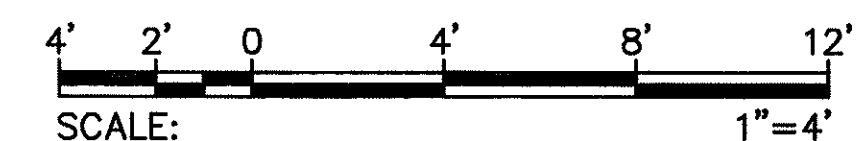
VERIZON HAWAII, INC. *Pls.*

DATE _____

OCEANIC CABLEVISION


DATE _____

Agenda Item / FOR Rosemary Hamill 12/1/03



GRAPHIC SCALES

<i>DATE</i>	<i>REVISION</i>
-------------	-----------------



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 M
OR UNDER MY SUPERVISION
Andrew J. Miyasato
11.3.03 Signature
Expiration Date of the License:
04/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN III-A -
ELECTRIC, TELEPHONE, CATV, AT&T

PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED

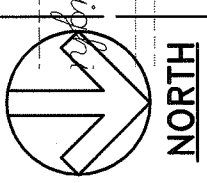
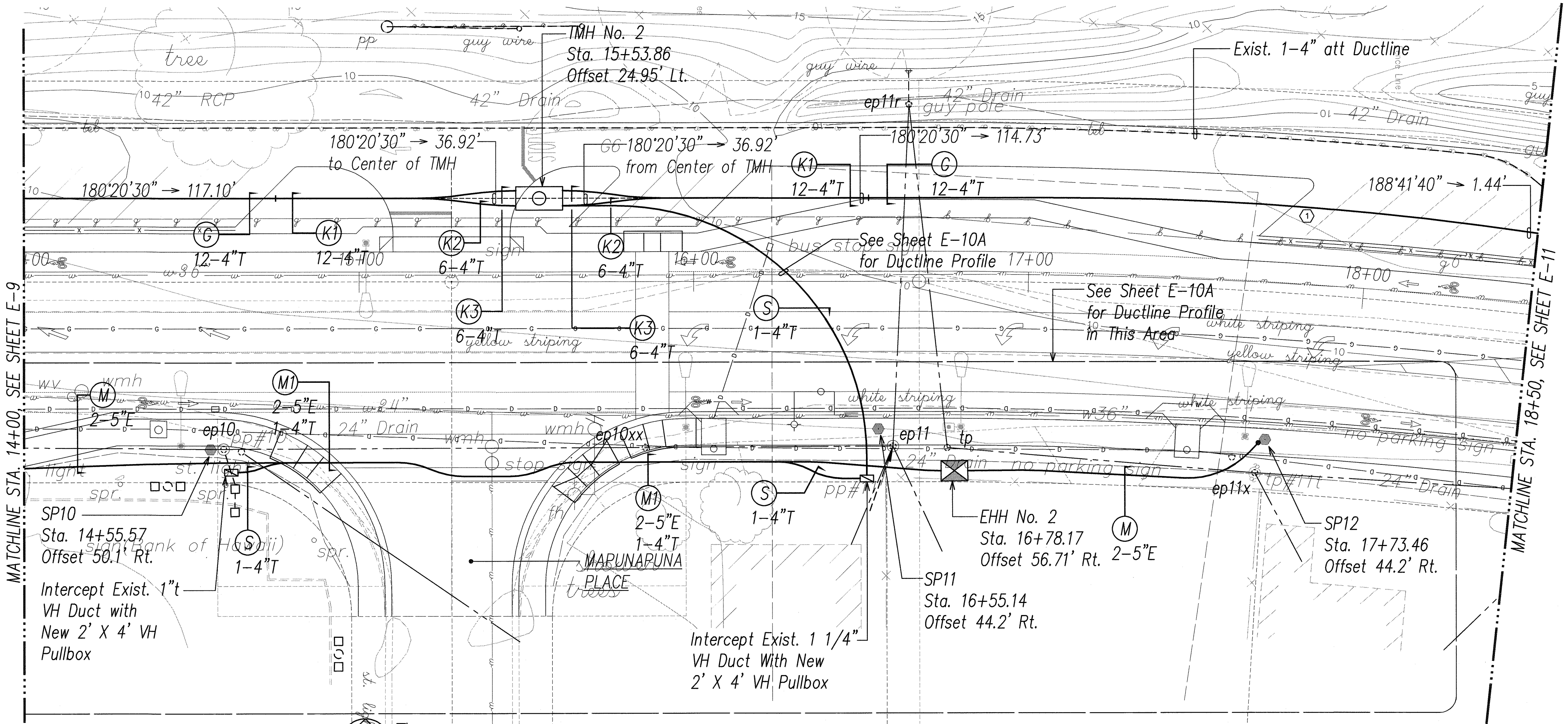
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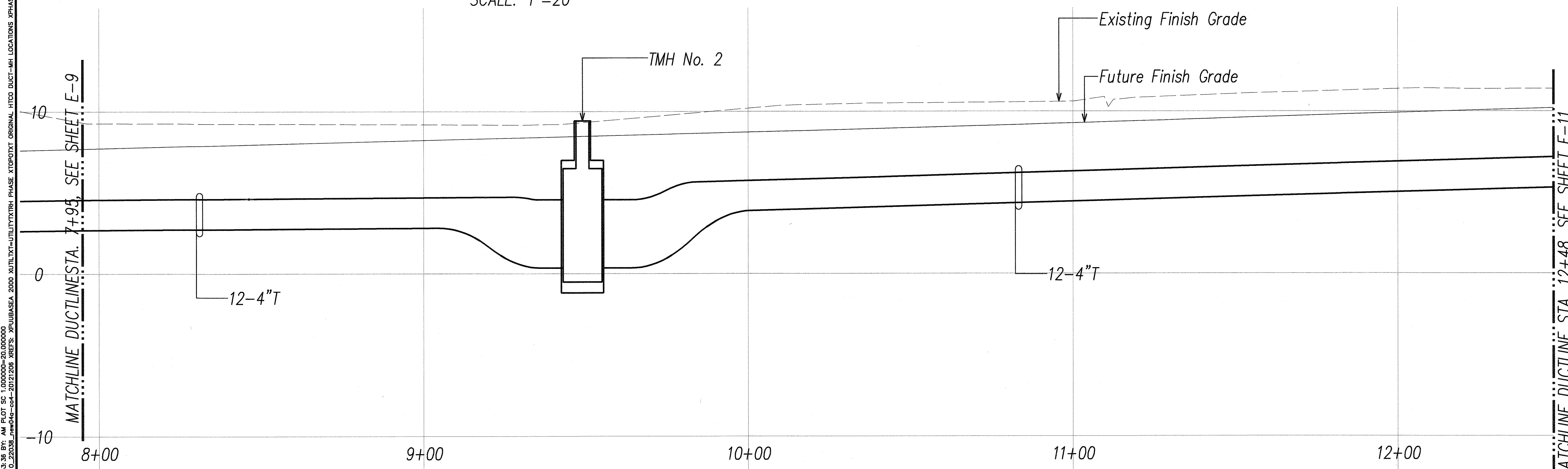
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	C.O. 133	193

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NOTE BOOK	DRAWN BY	
	TRACED BY	
	QUANTITIES BY	
	CHECKED BY	



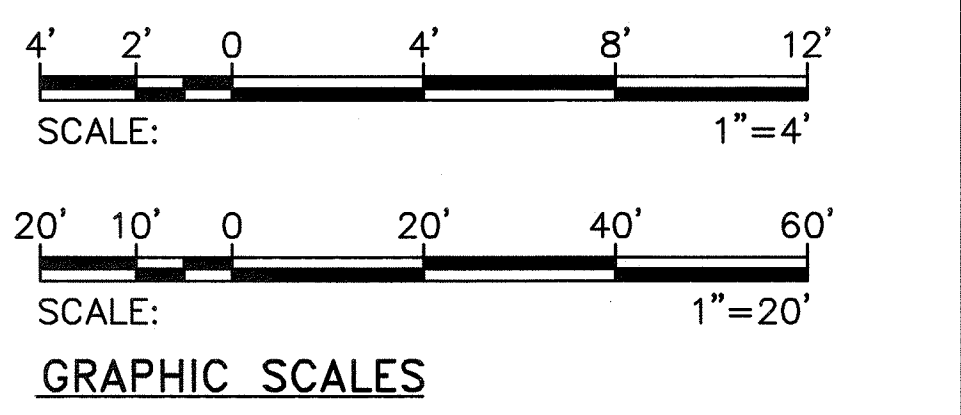
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 SCALE: 1"=20'



DUCTLINE PROFILE ALONG DUCTLINE
 SCALE: 1"=20' HORIZ.
 1"=4' VERT.

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APPROVED BY:	
HAWAIIAN ELECTRIC COMPANY, INC.	DATE
VERIZON HAWAII, INC.	DATE
OCEANIC CABLEVISION	DATE
A T & T	DATE



7/10/06	Relocated Electric Handhole EHH No. 2 to Clear New 24" Drain Line
DATE	REVISION

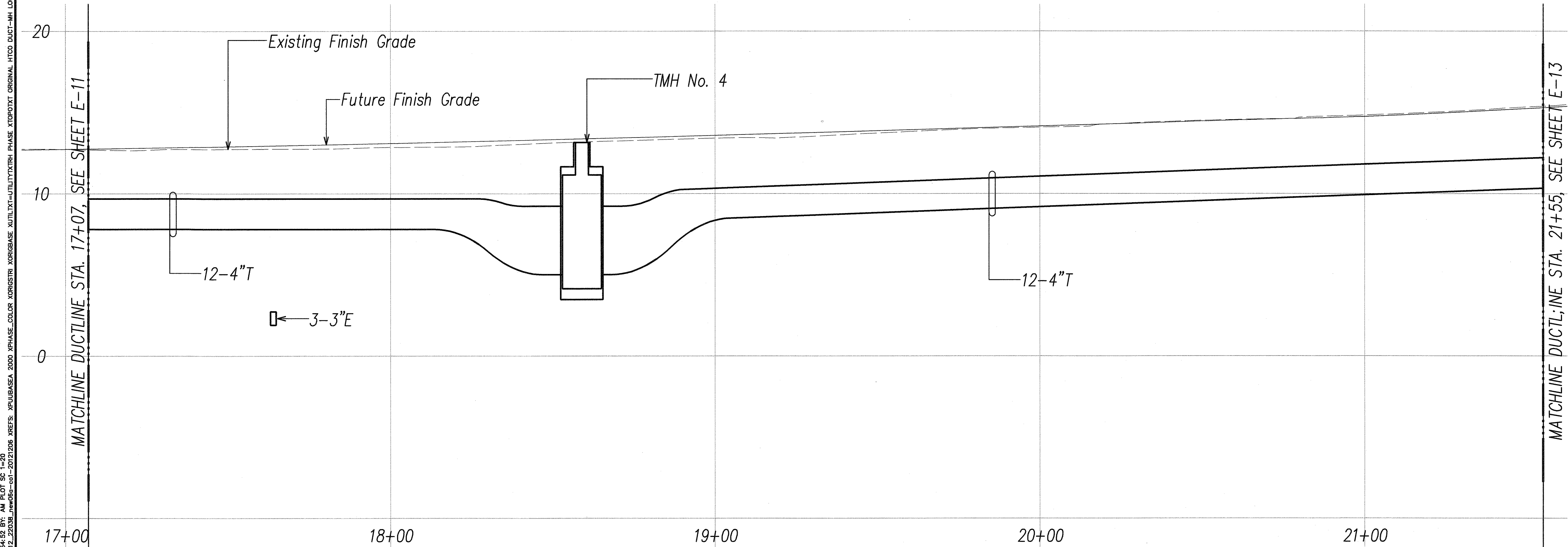
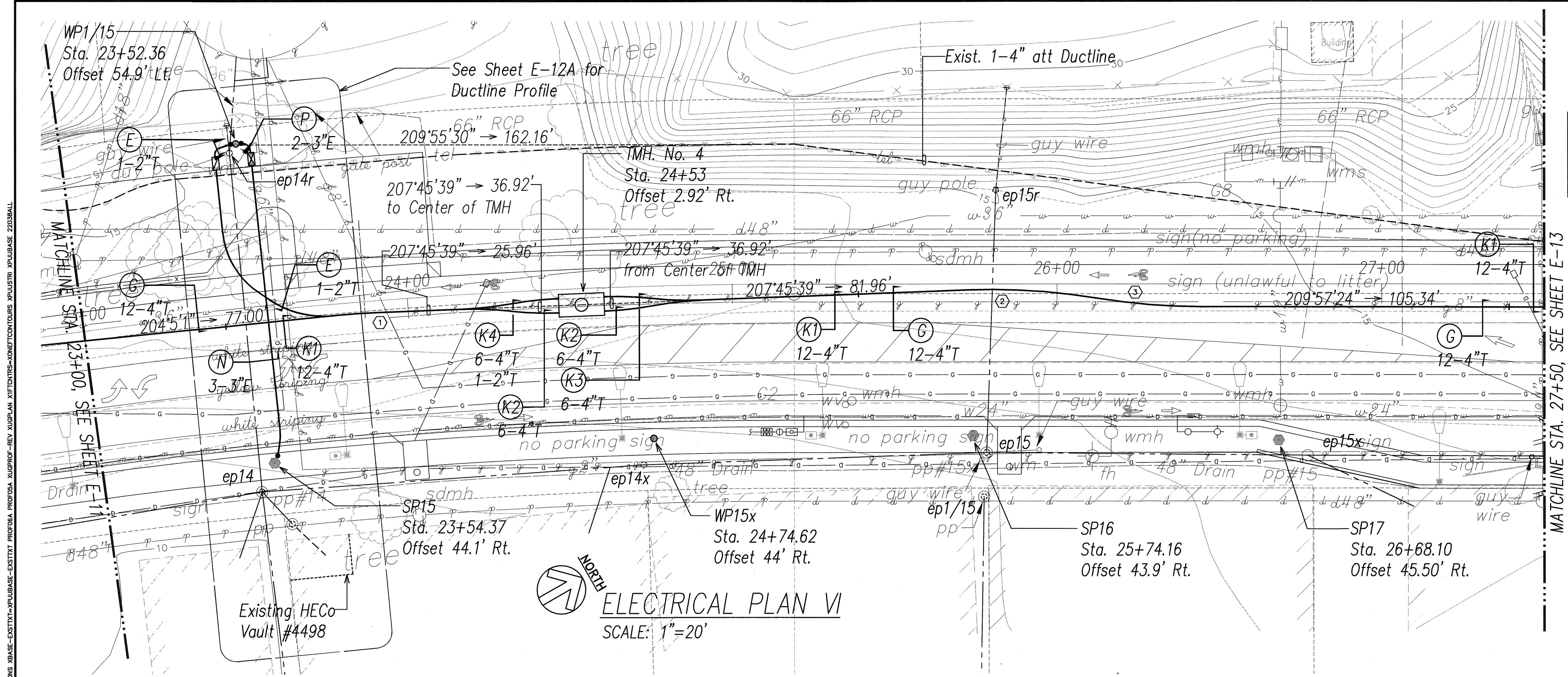


THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
 Signature: Andrew L. Miyasato
 Expiration Date of the License: 04/30/14

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION
ELECTRICAL PLAN IV - ELECTRIC, TELEPHONE, CATV, AT&T PUULOLO ROAD IMPROVEMENTS Kamehameha Hwy. to Salt Lake Blvd. Federal Aid Project No. STP-7310(1)
SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-10 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	C.O. 136	193

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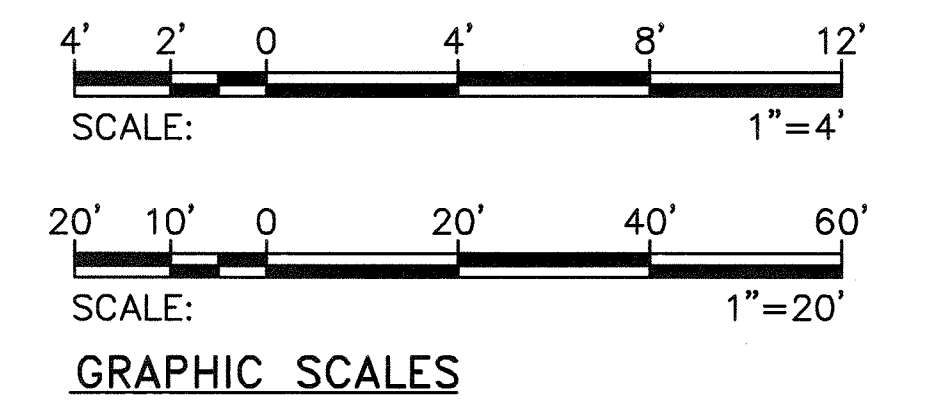
APPROVED BY:

HAWAIIAN ELECTRIC COMPANY, INC. _____ DATE _____

VERIZON HAWAII, INC. _____ DATE _____

OCEANIC CABLEVISION _____ DATE _____

A T & T _____ DATE _____



12/01/05	Revised Telephone Ductline Alignment and Manhole Location to be Within Phase 1 Construction Area
DATE	REVISION

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

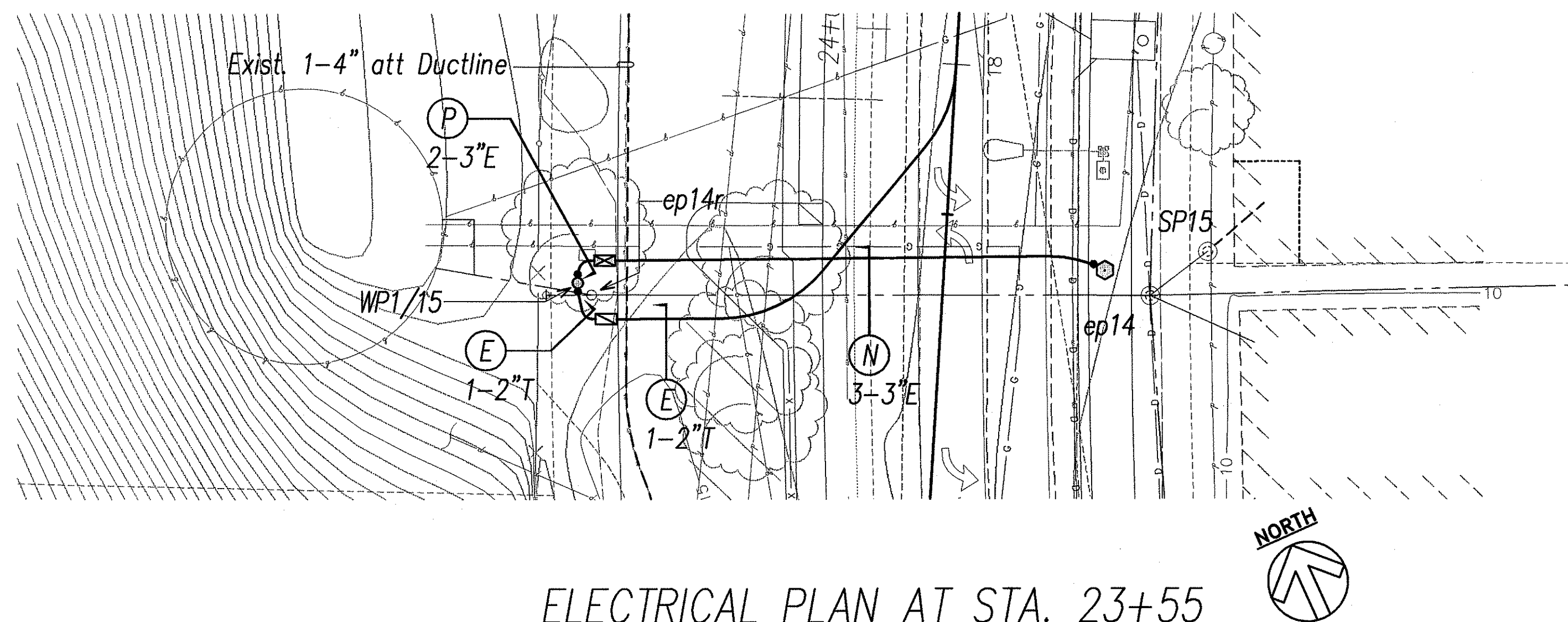
RONALD W. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS
ANDREW I. MIYASATO
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Andrew I. Miyasato
Signature
Expiration Date of the License: 04/30/14

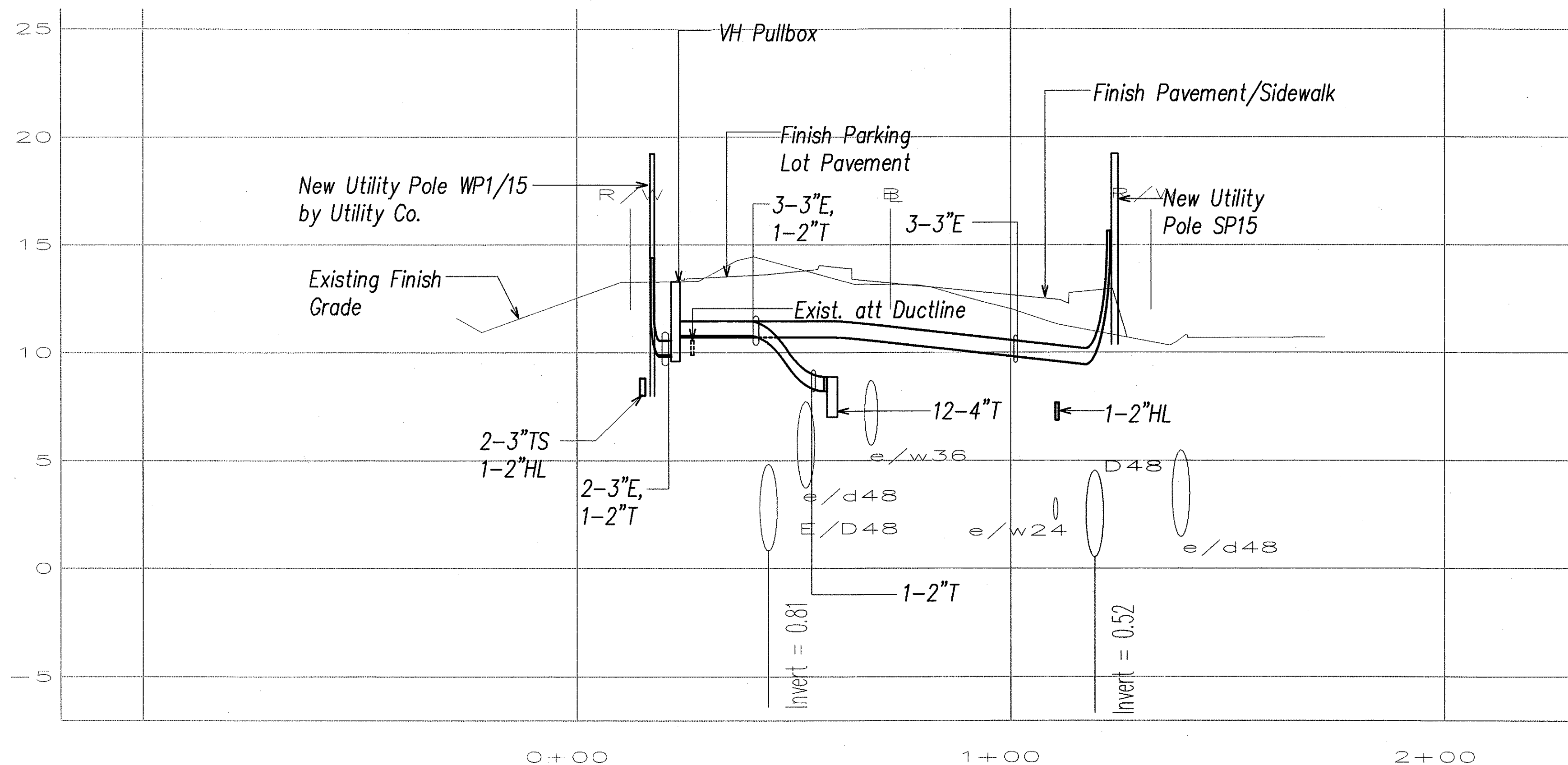
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**ELECTRICAL PLAN VI -
ELECTRIC, TELEPHONE, CATV, AT&T
PUULOLO ROAD IMPROVEMENTS**
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-12 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	137	193



ELECTRICAL PLAN AT STA. 23+55
SCALE: 1"=20'



DUCTLINE PROFILE AT STA. 23+55
SCALE: 1"=20' HORIZ.
1"=4' VERT.

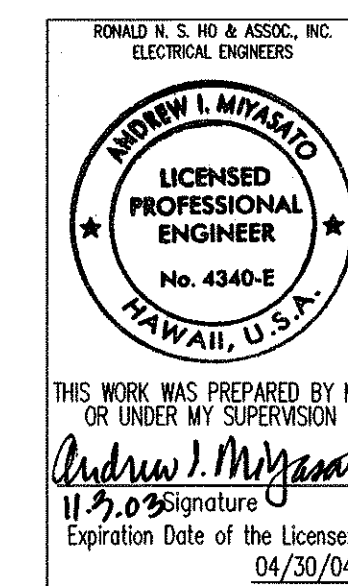
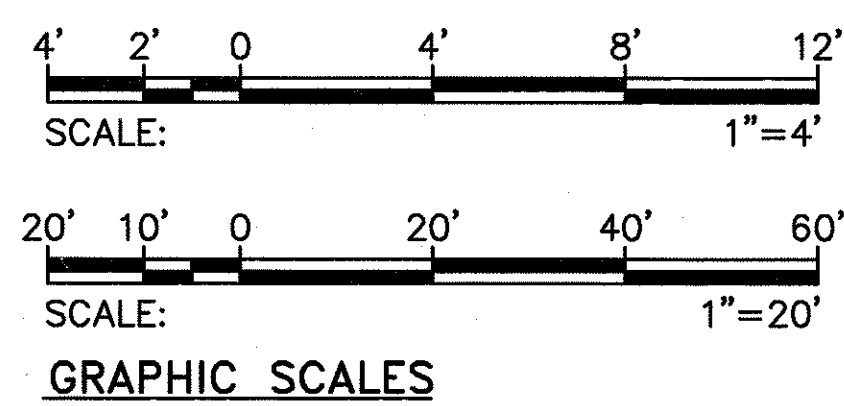
DRAWING REVIEW

Reviewed for HECO's Facilities Only
Date 11/13/03 By *ML*
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
Lynette Yoon
VERIZON HAWAII, INC. DATE



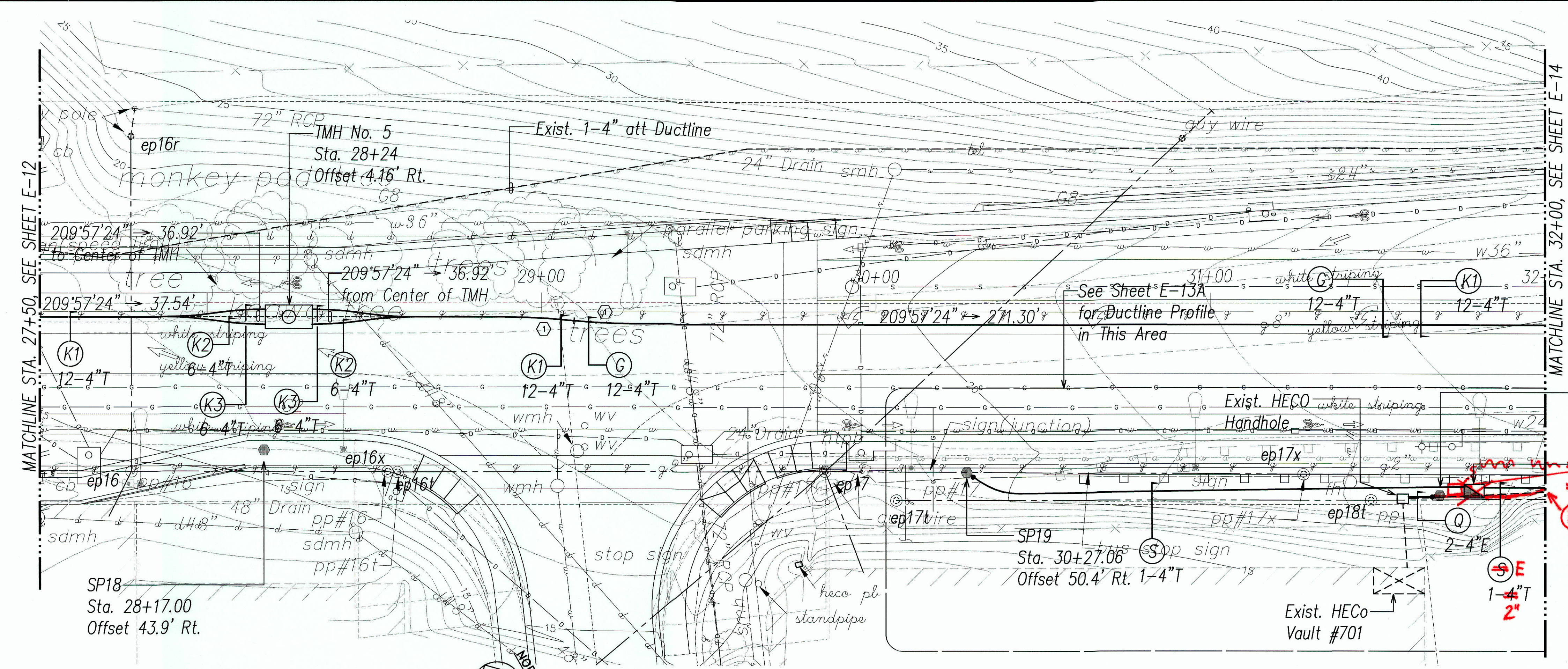
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
DUCTLINE PROFILE STA. 23+55 -
ELECTRIC, TELEPHONE
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)
SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-12A OF 56 SHEETS

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

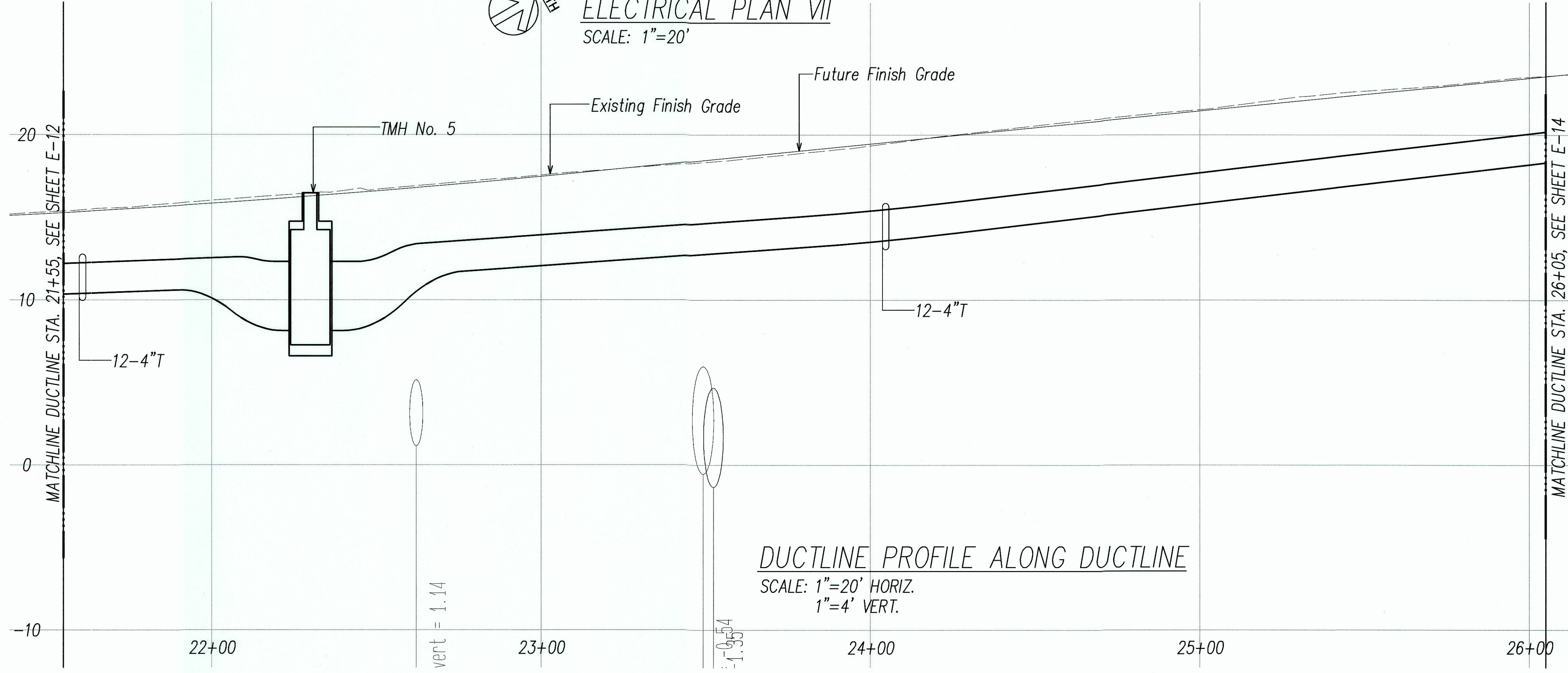
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FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	C.O. 138	193

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					Lc
					20.20'



ELECTRICAL PLAN VII
SCALE: 1"=20'



DUCTLINE PROFILE ALONG DUCTLINE
SCALE: 1"=20' HORIZ.
1"=4' VERT.

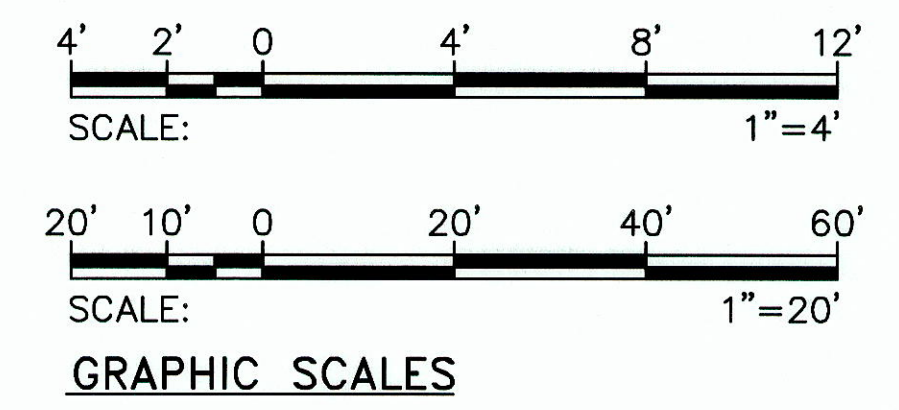
APPROVED BY:

HAWAIIAN ELECTRIC COMPANY, INC. DATE

VERIZON HAWAII, INC. DATE

OCEANIC CABLEVISION DATE

A T & T DATE



DATE	REVISION
12/01/05	Revised Telephone Ductline Alignment and Manhole Location to be Within Phase 1 Construction Area

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
Signature: Andrew I. Miyasato
Expiration Date of the License: 04/30/14

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
ELECTRICAL PLAN VII -
ELECTRIC, TELEPHONE, CATV, AT&T
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)
SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-13 OF 56 SHEETS

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NO. 1	DRIVEN BY	
NO. 2	DESIGNED BY	
NO. 3	QUANTITIES BY	
NO. 4		
NO. 5		
NO. 6		
NO. 7		
NO. 8		
NO. 9		
NO. 10		

LAST DATE: 12/01/05
PROJECT: STP-7310(1)
SHEET: E-13 OF 56
SHEET NO.: 138
SHEET TOTAL: 193

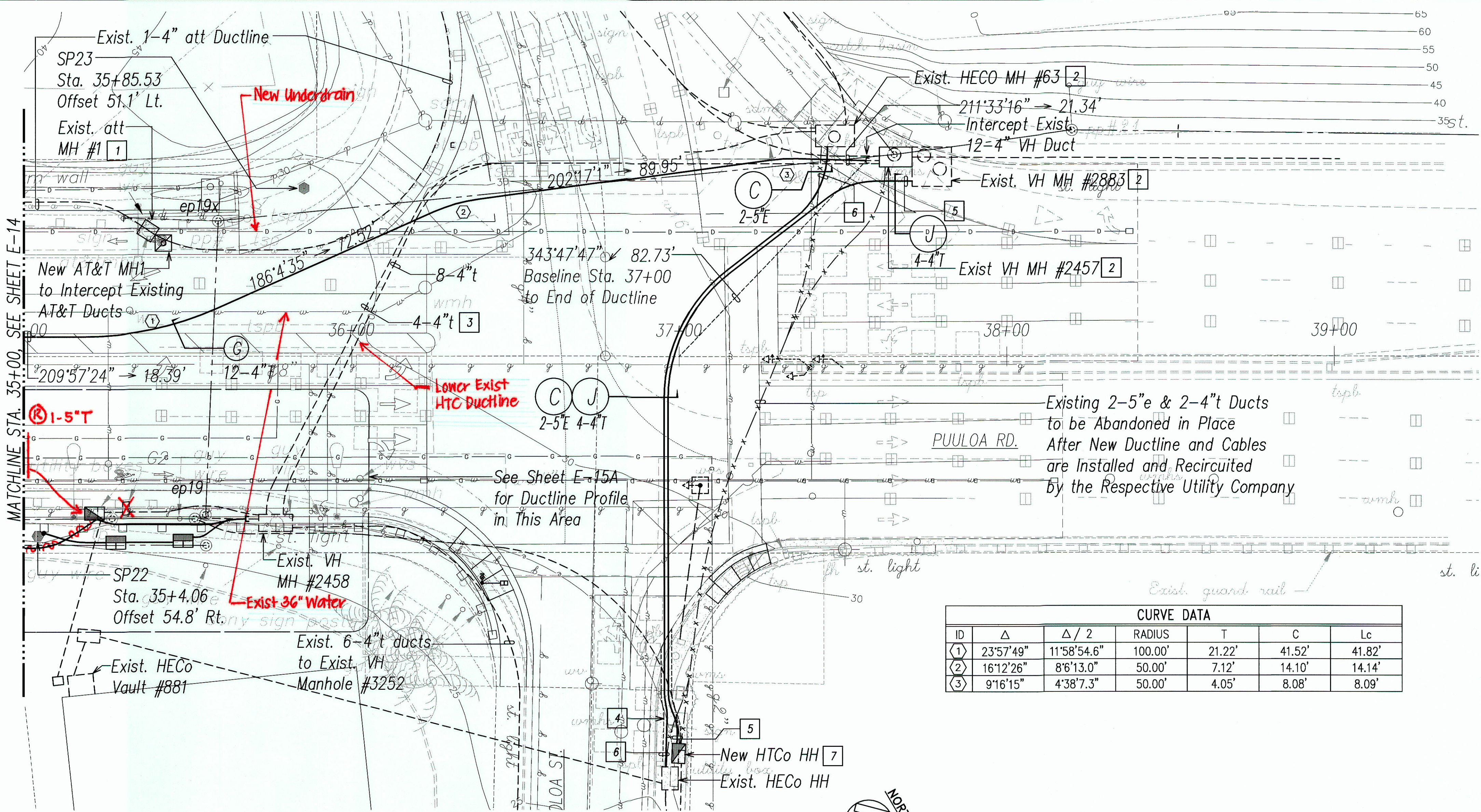
"AS-BUILT"

C.O. 138

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	C.O. 141	193

PLAN NOTES

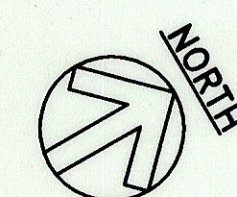
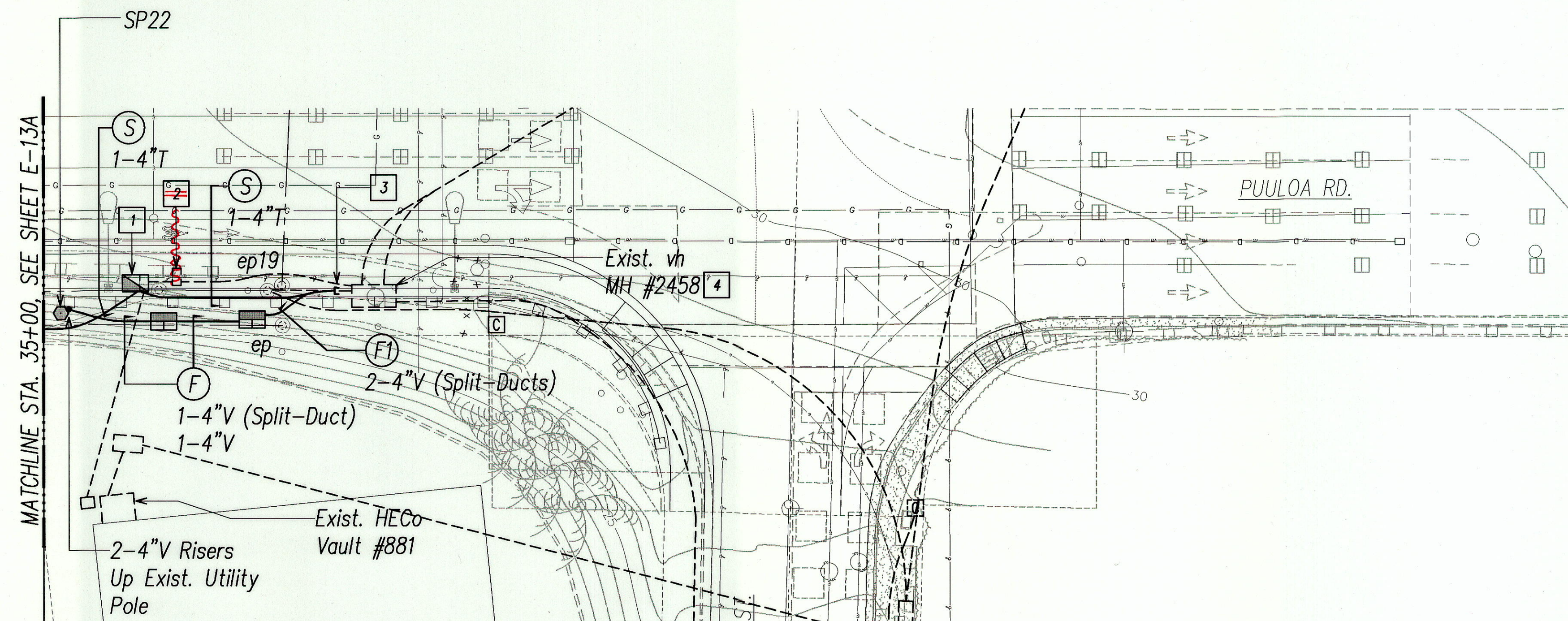
- Demolish existing manhole after new manhole constructed and existing cables are intercepted with new 4" split-duct system, and extended to new AT&T manhole. See Duct Section H on Sheet E-25A.
- Adjust existing utility company manhole neck and covers to new finish grade / pavement per respective utility company requirements and approval.
- Existing 4-4"t Ducts, Break Concrete Encasement, Remove Existing Ducts, Lower Existing Cables, Provide New Split-Ducts, Concrete Encased; All in Accordance With HCo Requirements and Approval, to Maintain Min. 3'-0" Cover from Top of Concrete Encasement and New Finish Pavement. See Duct Section (K) 4-4"t.
- Sawcut and Patch Existing Concrete Sidewalk Per City & County of Honolulu & State DOT Requirements and Approval for the Installation of the New Ducts.
- Route New HCo Ducts into Existing HCo Handhole or Manhole per HCo Requirements and Approval.
- Route New HCo Ducts into Existing HCo Handhole or Manhole per HCo Requirements and Approval.
- Demolish Existing HCo 2'x4' Pullbox and Provide New 3'x5' HCo Handhole per HCo Requirements and Approval.



FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	142	193

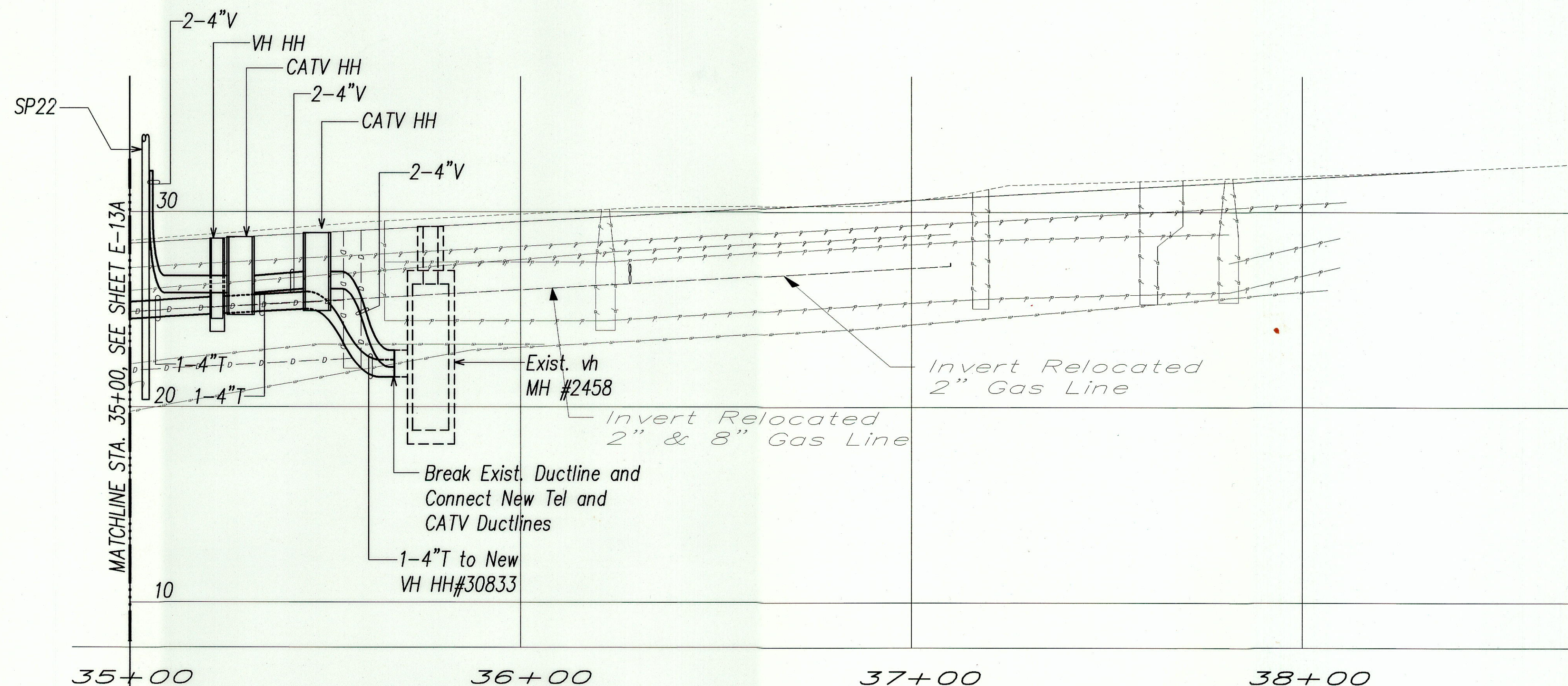
PLAN NOTES

- 1 Replace existing 2'x4' VH pullbox #30833 with new 3'x5' VH handhole #30833.
- 2 ~~Repair top tier of existing VH 2'x4' pullbox #22917, replace rusted covers with new covers per VH standards and adjust top of pullbox to new finish sidewalk grade.~~
- 3 Break concrete jacket of existing 2w x 2h VH ductbank. Intercept one of the existing 4" ducts and extend to VH handhole #30833. Intercept 2 of the existing 4" ducts and extend to CATV 3' x 5' handhole for CATV.
- 4 Adjust existing utility company manhole neck and covers to new finish grade / pavement per respective utility company requirements and approval.



ELECTRICAL PLAN IX-A

SCALE: 1"=20'



DUCTLINE PROFILE ALONG BASELINE

SCALE: 1"=20' HORIZ.

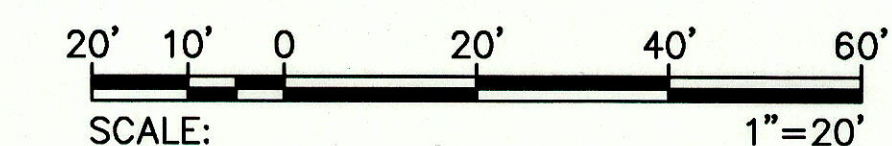
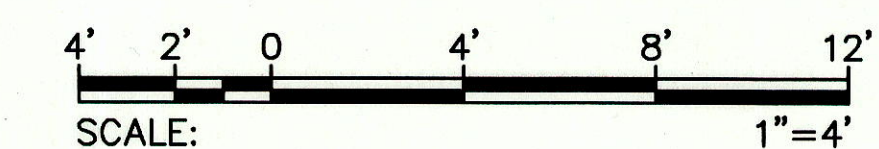
1"=4' VERT.

APPROVED BY:

Upman Yoon
VERIZON HAWAII, INC. *Ching* DATE

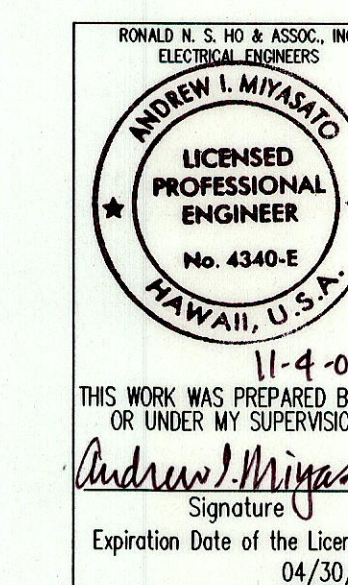
David Wright 1/29/03
OCEANIC CABLEVISION DATE

Andrew & Vicky For Rosemary Hamid 12/1/03
A T & T DATE



GRAPHIC SCALES

DATE REVISION



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ELECTRICAL PLAN IX-A - ELECTRIC, TELEPHONE, CATV, AT&T PUULOA ROAD IMPROVEMENTS

Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

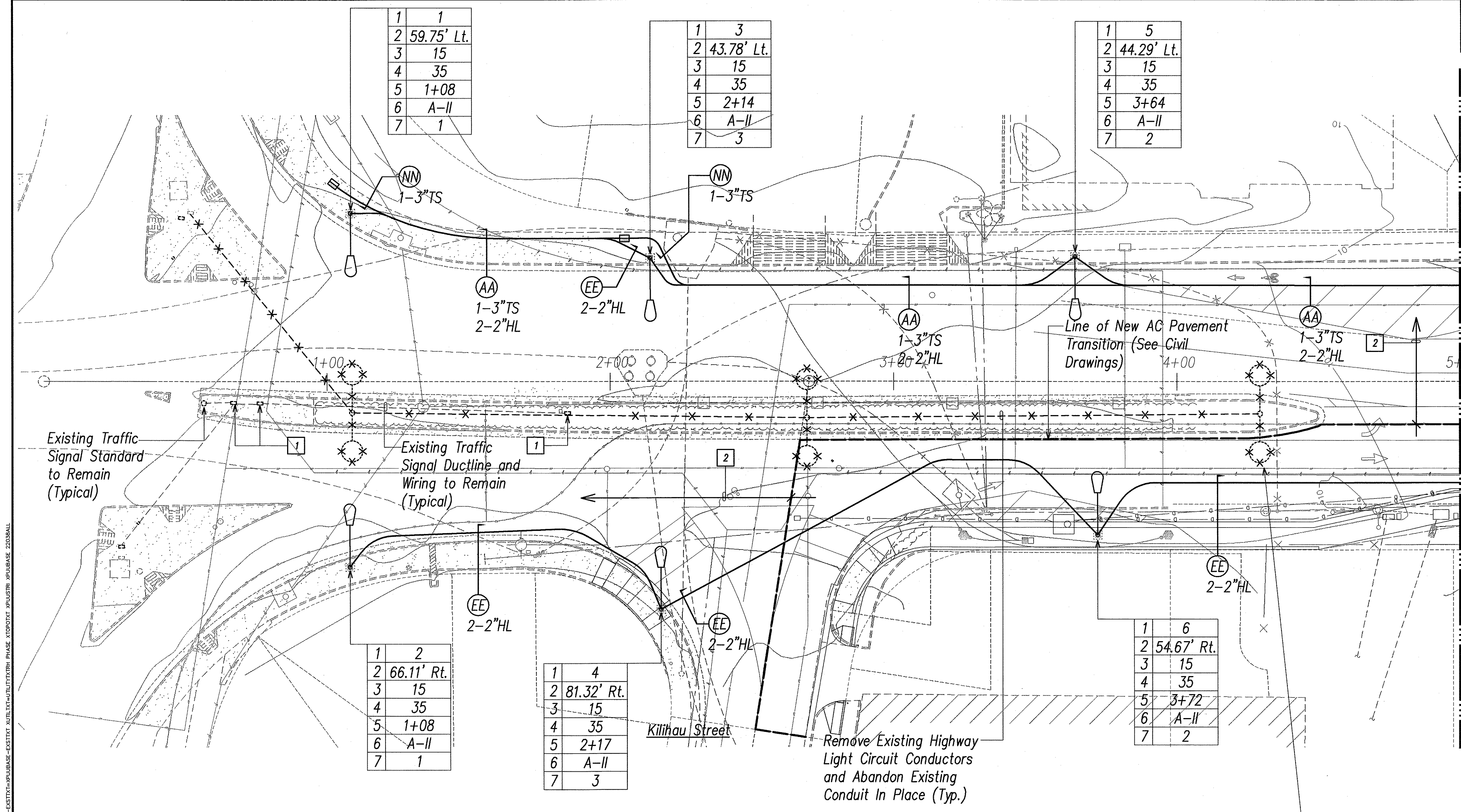
SCALE: AS NOTED

DATE: MAY 2003

SHEET No. E-15A OF 56 SHEETS

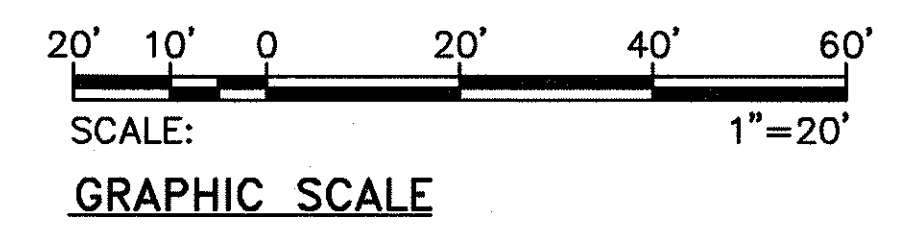
"AS-BUILT"

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	143	193



- NOTES:
- 1 Existing traffic signal pullbox to remain.
 - 2 Sawcut and patch existing AC pavement for installation of new ductline in this area.

HIGHWAY LIGHTING AND TRAFFIC SIGNAL SYSTEM PLAN 1
 SCALE: 1"=20'



Remove and Salvage Existing Highway Light Standard with Twin Bracket Arms and Luminaires; Demolish and Remove Existing Concrete Base (Typ. for 3)

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

LAST SAVE: 07/09/03 09:55:31 BY: JLM/STP/11/03
 Z:\ACAD\PROJECTS\2003\HAWAII\STP-7310\HAWAII\STP-7310(1).DWG

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Andrew I. Miyasato
 11/3/03
 Expiration Date of the License: 04/30/04

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION

**HIGHWAY LIGHTING AND TRAFFIC
 SIGNAL SYSTEM PLAN 1**

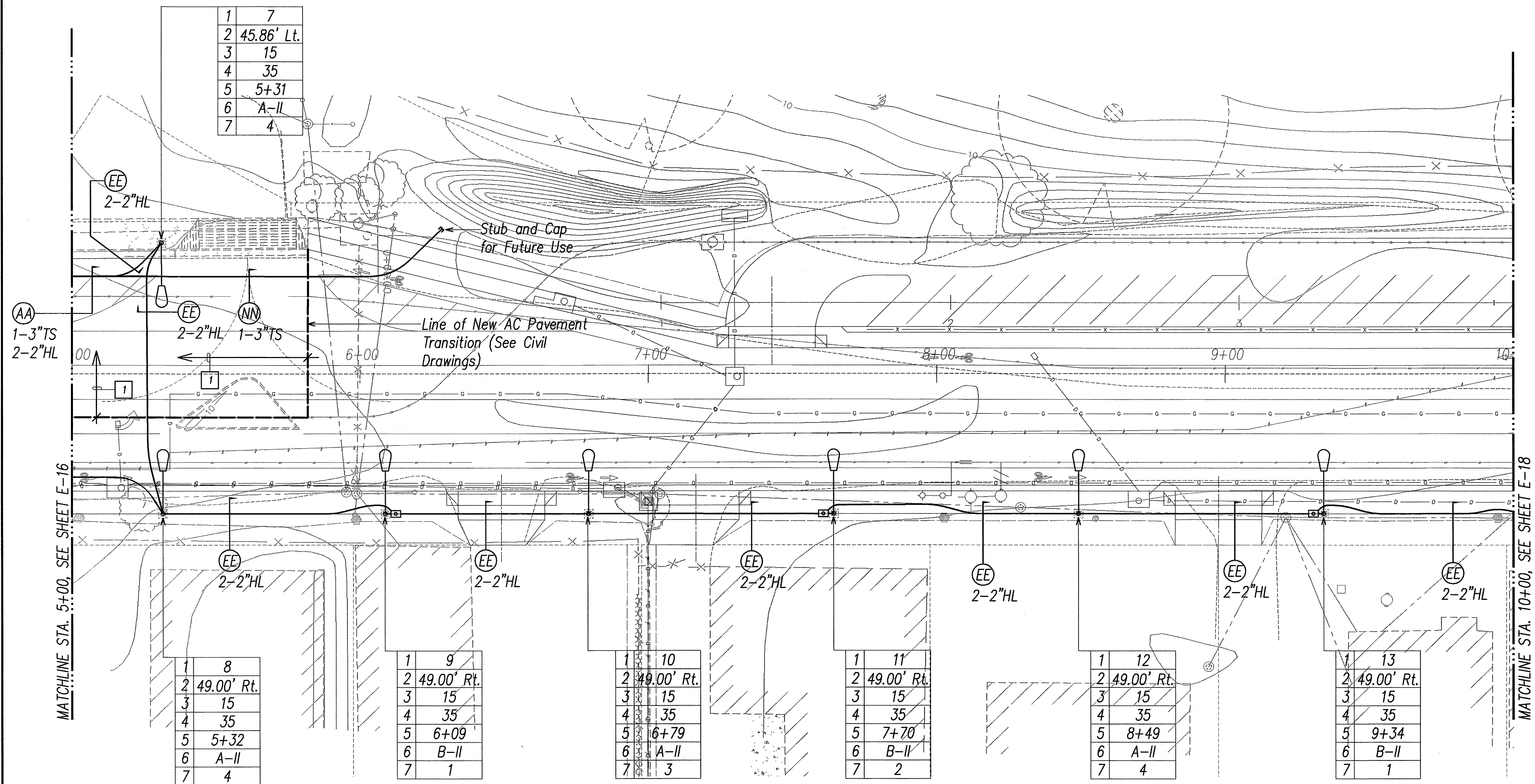
PUULOA ROAD IMPROVEMENTS
 Kamehameha Hwy. to Salt Lake Blvd.
 Federal Aid Project No. STP-7310(1)

DATE: MAY 2003

SCALE: AS NOTED

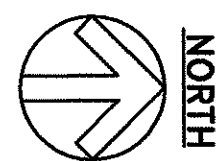
SHEET No. E-16 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	144	193



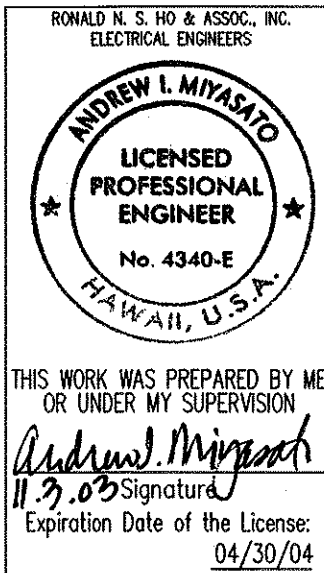
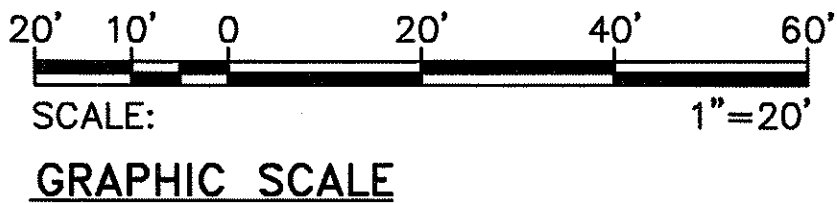
NOTES:

- 1 Sawcut and patch existing AC pavement for installation of new ductline in this area.



HIGHWAY LIGHTING AND TRAFFIC SIGNAL SYSTEM PLAN II

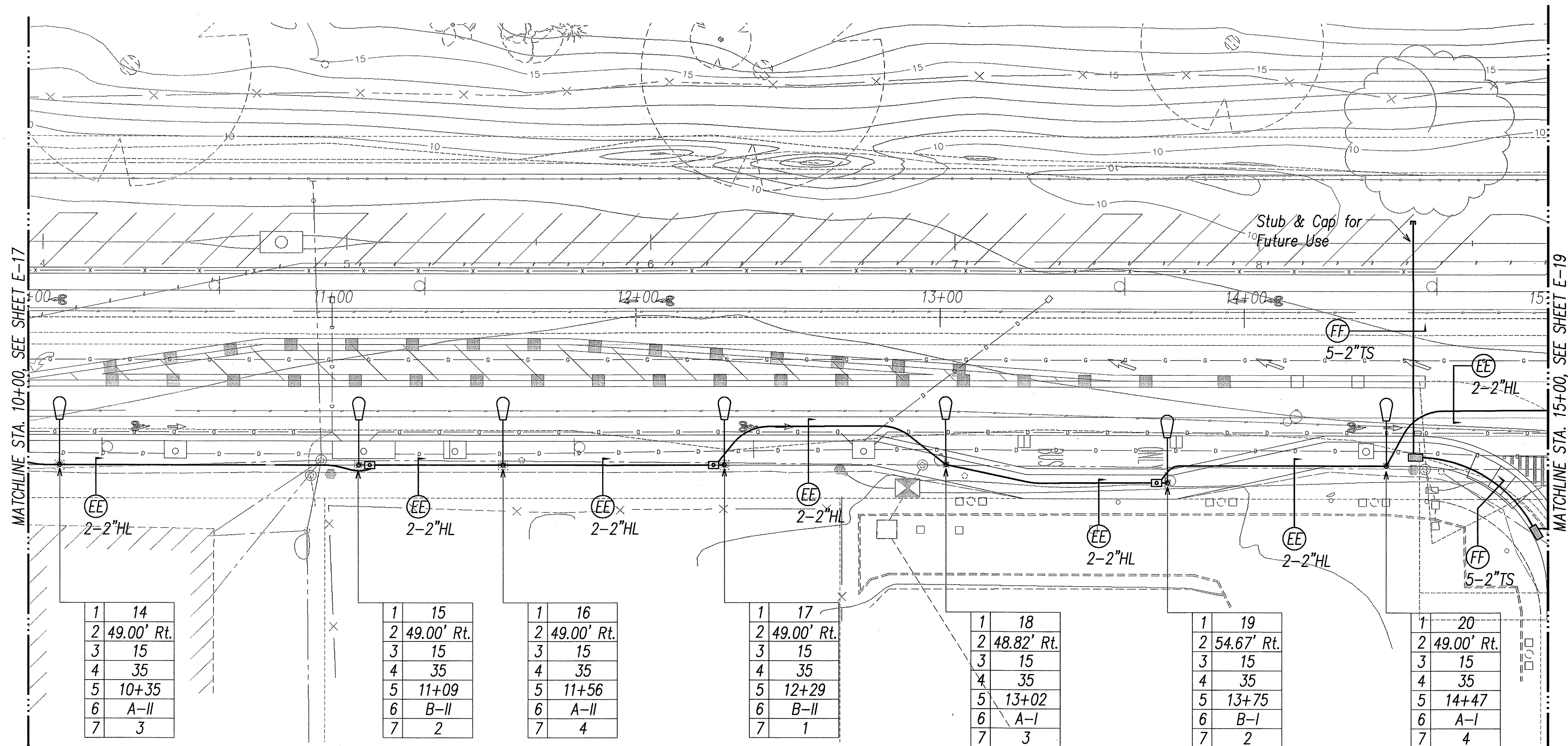
SCALE: 1"=20'



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**HIGHWAY LIGHTING AND TRAFFIC
SIGNAL SYSTEM PLAN II**
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-17 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	145	193



1	14
2	49.00' Rt.
3	15
4	35
5	10+35
6	A-II
7	3

1	15
2	49.00' Rt.
3	15
4	35
5	11+09
6	B-II
7	2

1	16
2	49.00' Rt.
3	15
4	35
5	11+56
6	A-II
7	4

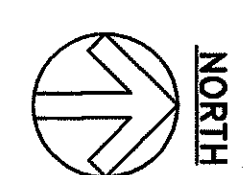
1	17
2	49.00' Rt.
3	15
4	35
5	12+29
6	B-II
7	1

1	18
2	48.82' Rt.
3	15
4	35
5	13+02
6	A-I
7	3

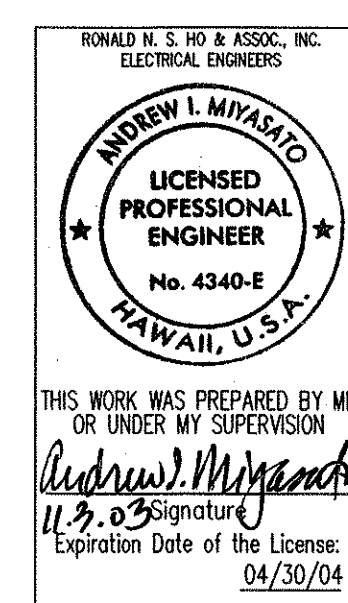
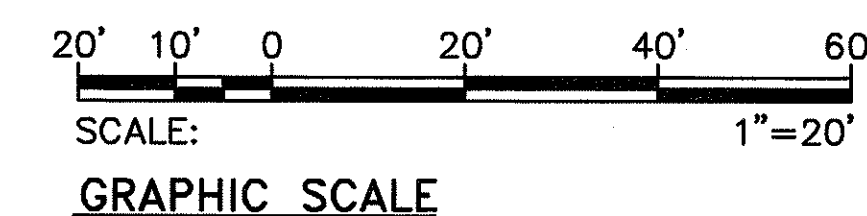
1	19
2	54.67' Rt.
3	15
4	35
5	13+75
6	B-I
7	2

1	20
2	49.00' Rt.
3	15
4	35
5	14+47
6	A-I
7	4

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
CHECKED BY	
NOTED BY	
QUANTITIES BY	
LAST DATE OF REV.	
2003/05/01	



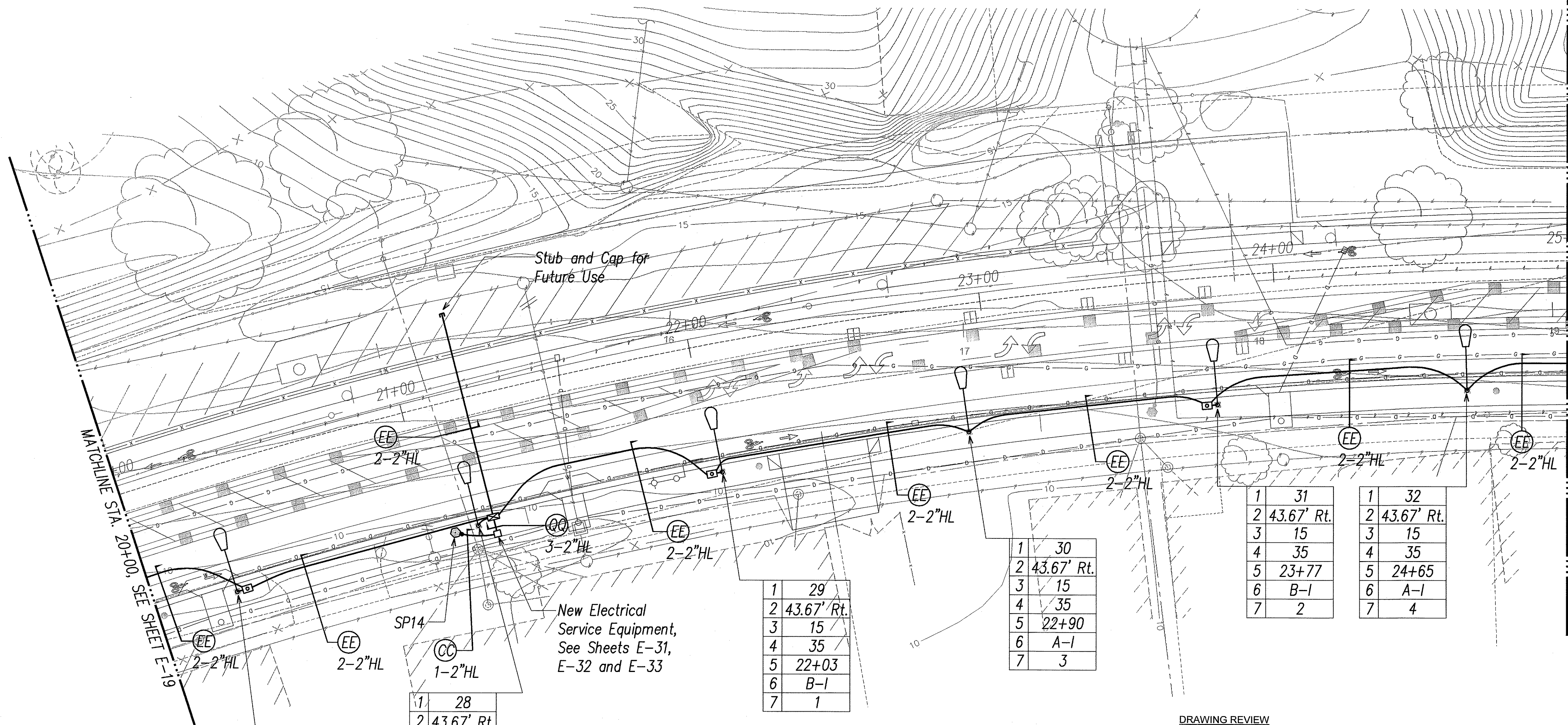
HIGHWAY LIGHTING AND TRAFFIC SIGNAL SYSTEM PLAN III SCALE: 1"=20'



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**HIGHWAY LIGHTING AND TRAFFIC
SIGNAL SYSTEM PLAN III**
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

DATE: MAY 2003
SHEET No. E-18 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	147	193



1	27
2	43.67' Rt.
3	15
4	35
5	20+29
6	B-1
7	2

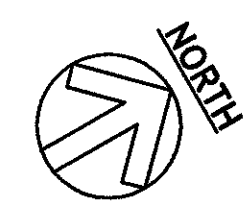
1	28
2	43.67' Rt.
3	15
4	35
5	21+16
6	A-1
7	4

1	29
2	43.67' Rt.
3	15
4	35
5	22+03
6	B-1
7	1

1	30
2	43.67' Rt.
3	15
4	35
5	22+90
6	A-1
7	3

1	31
2	43.67' Rt.
3	15
4	35
5	23+77
6	B-1
7	2

1	32
2	43.67' Rt.
3	15
4	35
5	24+65
6	A-1
7	4



HIGHWAY LIGHTING AND TRAFFIC SIGNAL SYSTEM PLAN V SCALE: 1"=20'

DRAWING REVIEW

Reviewed for HECO's Facilities Only

Date 11/7/03 By *G. Chu*

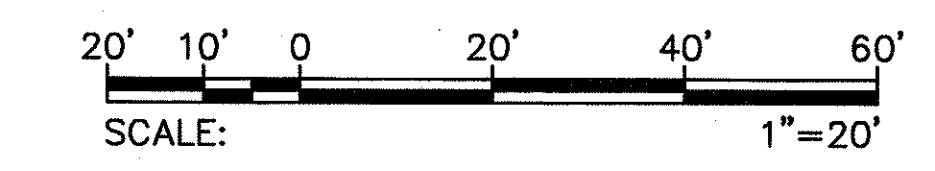
Engineering Department
Hawaiian Electric Company, Inc.

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



SCALE: 1"=20'

GRAPHIC SCALE

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

LAST SAVE: 10/23/03 @ 10:22:41 BY: TM PROT 32 1/20
 2. 43.67' RT. 15 35 20+29 B-1 2
 3. 15 35 21+16 A-1 4
 4. 35 22+03 B-1 1
 5. 22+90 A-1 3
 6. A-1 2
 7. 4

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: 04/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING AND TRAFFIC
SIGNAL SYSTEM PLAN V
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-20 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	C.O. 152	193

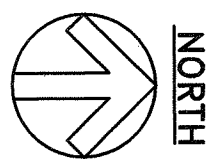
NOTES:
1 Provide Loop Detectors as Shown.

1	49
2	45.42' Lt.
3	15
4	35
5	35+35
6	A-I
7	3

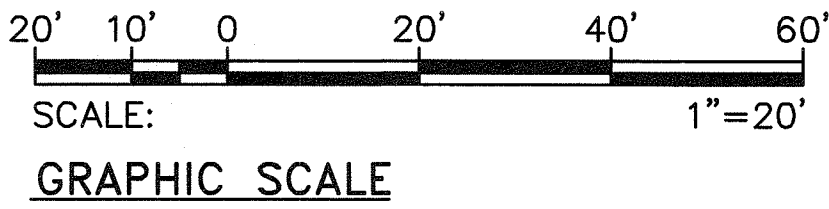
1	48
2	49.00' Rt.
3	15
4	35
5	35+15
6	A-I
7	4

SP22
Sta. 35+4.06
offset 55' RT.

1	50
2	49.00' Rt.
3	15
4	35
5	35+95
6	A-I
7	1



HIGHWAY LIGHTING AND TRAFFIC SIGNAL SYSTEM PLAN VIII
SCALE: 1"=20'



THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION
Andrew I. Miyasato
Signature
Expiration Date of the License:
04/30/14

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**HIGHWAY LIGHTING AND TRAFFIC
SIGNAL SYSTEM PLAN VIII**
PUULOLO ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-23B OF 56 SHEETS

02/26/07 Deleted Duplicate Traffic
Signal Conduit Schedule

DATE REVISION

TRAFFIC SIGNAL SYSTEM CONDUIT & CABLE DATA

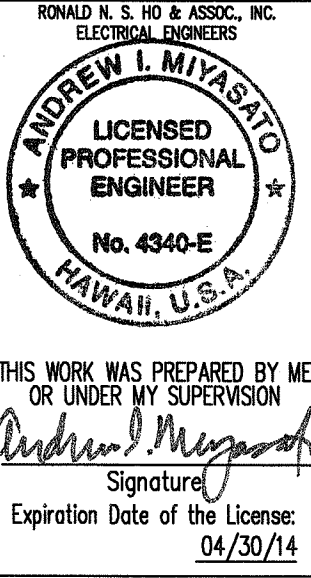
CONDUIT	CABLE	ITEM DESCRIPTION FOR CONDUIT AND CABLE QUANTITY														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2"	1-Type 1		•	•	•		•	•	•	•	•					
2"	1-Type 1		•	•	•		•	•	•	•	•					
2"	1-Type 2							•					•		•	•
2"	2-Type 2															
2"	4-Type 2				•	•			•							
2"	5-Type 2									•						
2"	6-Type 2		•								•					
2"	7-Type 2		•										•			
2"	8-Type 2		•											•		
2"	Spare (Fut. Type 3)		•					•	•	•			•			
2"	1-Type 6		•	•	•	•	•						•	•		
2"	1-Type 6				•	•										
2"	1-Type 7				•		•				•	•				
2"	2-Type 7			•												
2"	4-Type 7		•													
3"	Spare (Fut. Type 3)												•		•	
2"	Spare		•					•								
2"	Exist. Fiber Optic Cable Reinstalled				•	•	•	•								
2"	2-Type 1		•													
2"	2-Type 1		•													

Notes: Type 1 Cable (Ctrl) Type 6 Cable (Pwr)
Type 2 Cable (Loop/Ped) Type 7 Cable (Opticom)
Type 3 Cable (Interconnect)

- NOTES:
- Replace existing traffic signal pullbox with new traffic signal pullbox as indicated.
 - Route new traffic signal duct into existing traffic signal pullbox, break and patch pullbox as required.
 - Add new opticom cable in existing conduit.
 - Provide four (4) Opticom cards and install in existing controller cabinet.
 - Existing fiber optic cable shall be rerouted into new 2" traffic signal duct, (rerouted from overhead system to underground system per City DTS approval). Contractor shall splice fiber optic cables together after it has been run through the conduits.
 - Intercept existing traffic signal conduits and cables with new Type "C" traffic signal pullbox. Pullbox should be penetrated from the sides; coordinate requirements with City DTS Engineer and Inspector.
 - Remove existing temporary traffic signal light;
 - Remove existing traffic signal standard and base;
 - Remove and relocate existing traffic signal light onto new traffic signal standard.
 - Remove temporary traffic signal light/wires; abandon temporary ug conduit.
- | | |
|----------|---|
| 02/26/07 | Revised Traffic Signal System per DTS Comments (Entire Sheet) |
| DATE | REVISION |

05.10.07 Revised T.S. Sys. per DTS Comments; Added Temp T.S. Std.

03/19/07 Relocated T.S. Std. & Added New T.S. Std. due to Field Conditions

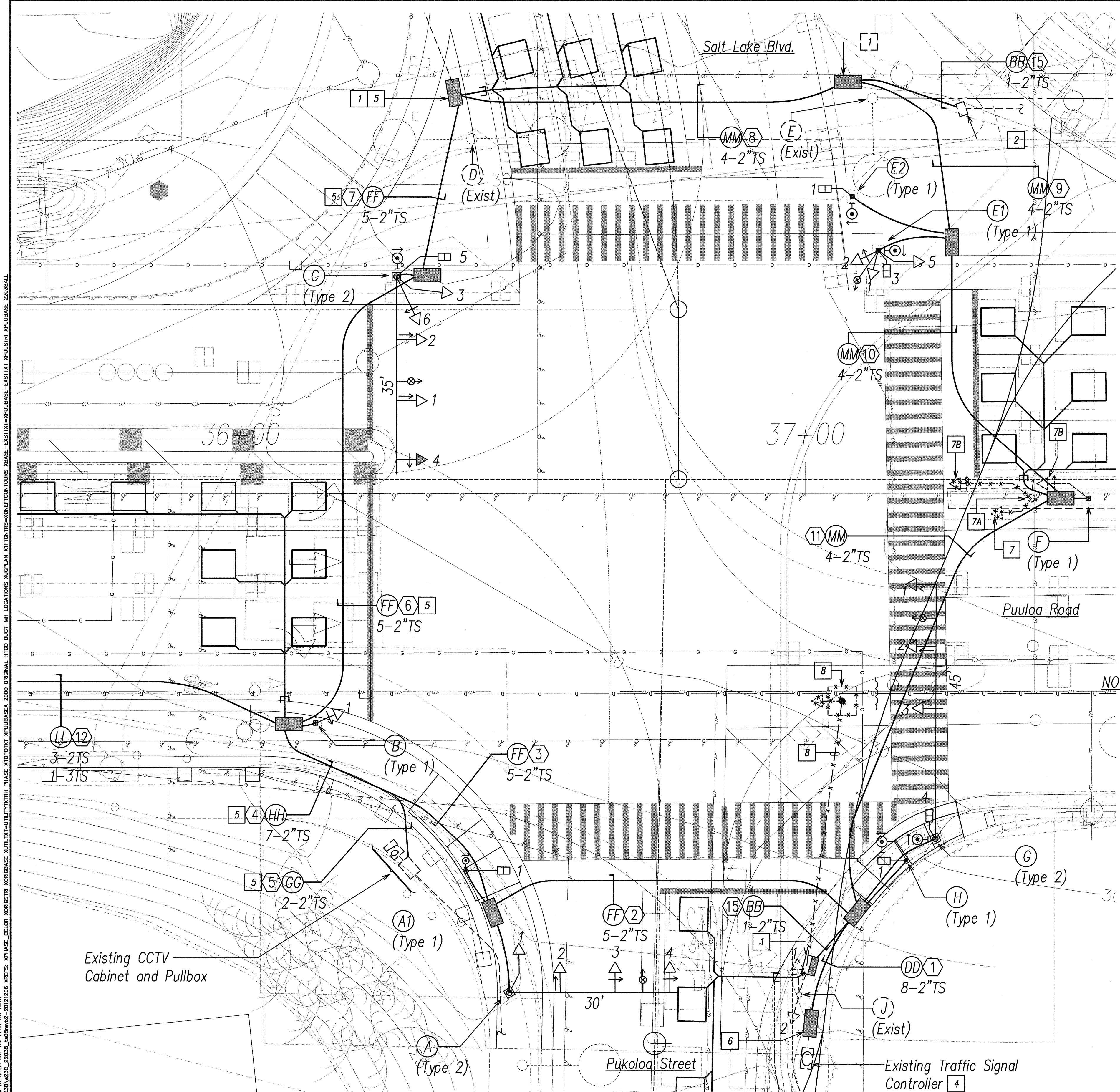


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
ENLARGED TRAFFIC SIGNAL SYSTEM PLAN IX
PUULOLO ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-23C OF 56 SHEETS

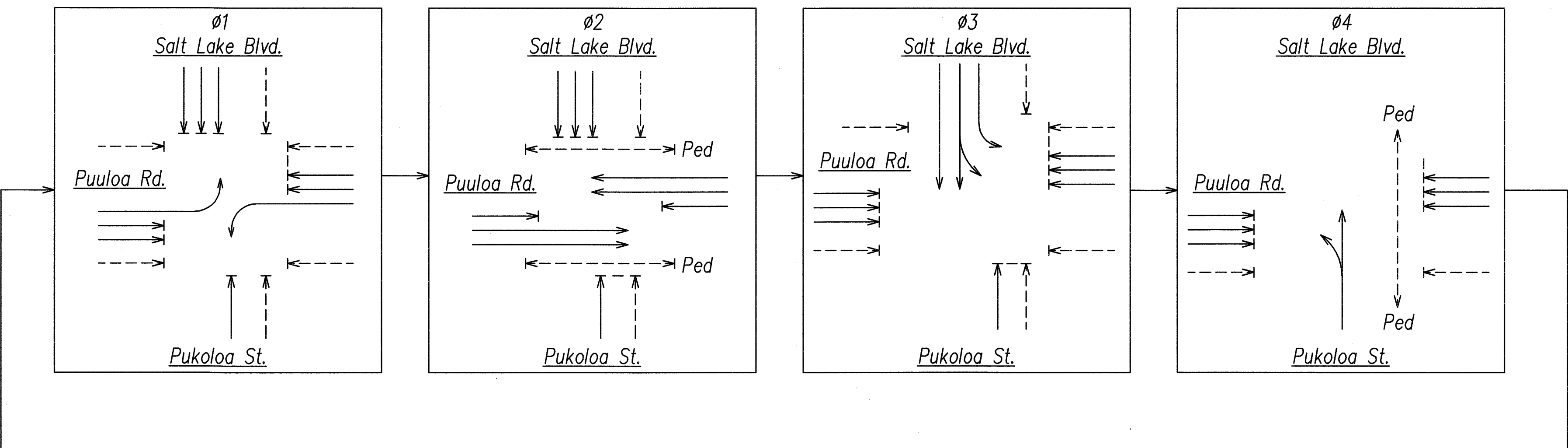
ORIGINAL PLAN
DATE
DRAWN BY
CHECKED BY
NOTED BY
QUANTITIES BY

LAST SAVE: 12/06/07 @ 13:12:54 BY: AM PLT 50 1-10
PROJECT: 22038 (K22-22038) - KAMEHAMEHA HWY. IMPROVEMENTS - EXISTING TRAFFIC SIGNAL SYSTEM - EXISTING TRAFFIC SIGNAL SYSTEM - EXISTING TRAFFIC SIGNAL SYSTEM

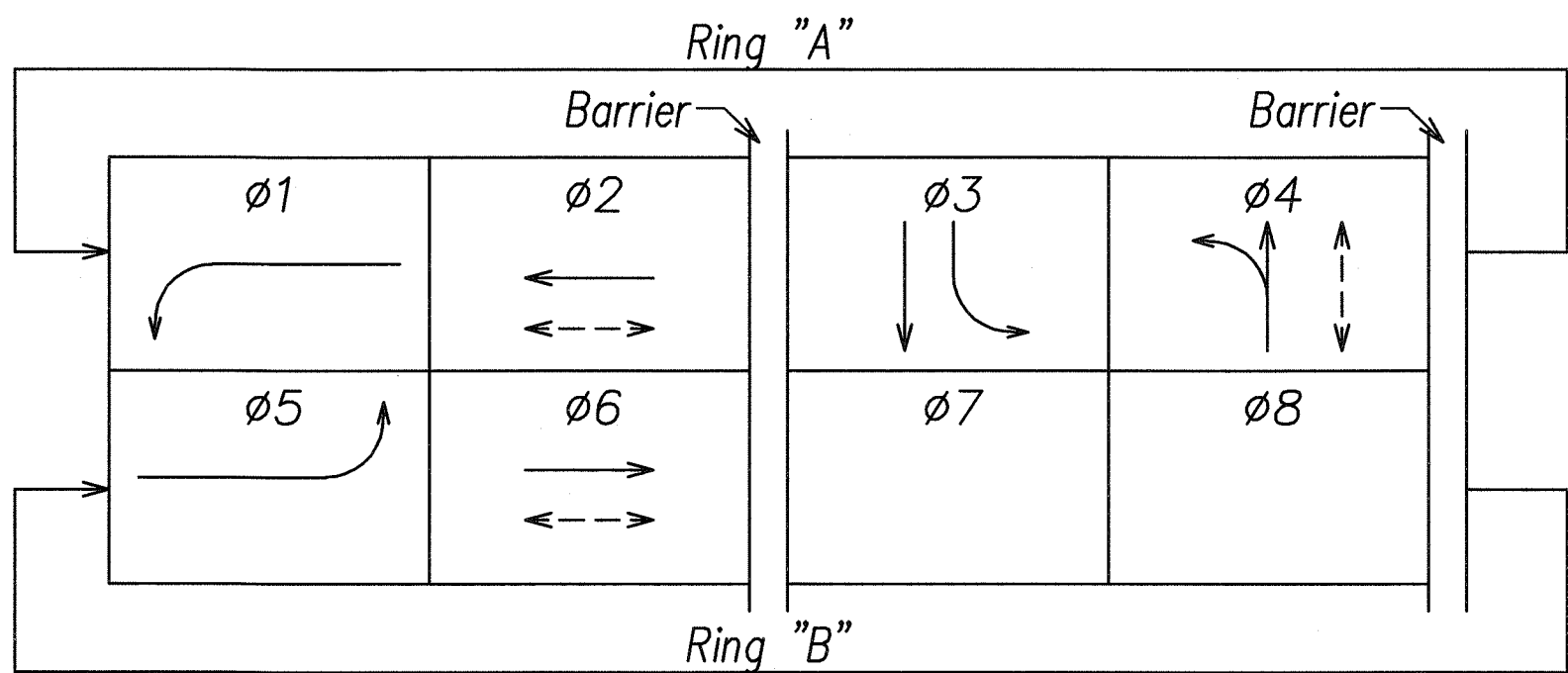


ENLARGED TRAFFIC SIGNAL SYSTEM PLAN IX
SCALE: 1"=10'

SCALE: 1"=10'
GRAPHIC SCALE




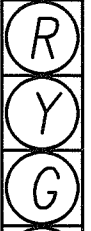

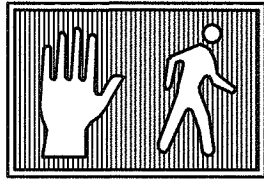


PHASE DIAGRAM



PHASE ASSIGNMENT DIAGRAM

NEW TRAFFIC SIGNAL PHASING DIAGRAM
SALT LAKE BLVD/PUKOLOA INTERSECTION

TRAFFIC SIGNAL HEAD SCHEDULE SALT LAKE BOULEVARD/PUKOLOA INTERSECTION			
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	A-1 C-3 G-3 J-2 (Exist) E1-1 E1-5		
 12" RYGA Traffic Signal Head*	C-4 F-1 (Relocated)		
 12" RYGA Traffic Signal Head	A-4 B-1 J-1 (Exist) C-6 E1-2		A-3 D-2 (Exist)
 12" RYGA Traffic Signal Head	A-2 C-1 C-2 G-1 G-2	12" RYGG Traffic Signal Head	
 Pedestrian Signal Head	A1-1 C-5 E1-3 E2-1 G-4 H-1		

* Indicates Programmed Visibility Traffic Signal Head

03/19/07 Relocated Ped. Signal Lt. to New T.S. Std. due to Field Conditions

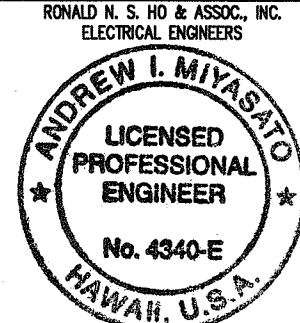
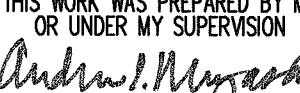
DATE REVISION

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
NOVE BOOK	DRAWN BY	
	DESIGNED BY	
	QUANTITIES BY	
	CHECKED BY	

LAST SAVE: 12/06/02 @ 13:14:27 BY: AM PLOT SET: 12/06/02-12/06/02
P:\ASD\PROJECTS\2203\W2203\W2203.dwg 12/22/02

05.10.07
Revised T.S. Sys. per DTS Comments

DATE
DATE


ANDREW L. MIYASATO
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Signature: 
Expiration Date of the License: 04/30/14



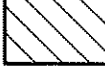

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
NEW TRAFFIC SIGNAL PHASING DIAGRAM
SALT LAKE BLVD/PUKOLOA INTERSECTION
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)
SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-24 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	155	193

VH NOTES:

- Contractor shall closely coordinate all work with Verizon Hawaii. All trenches must be inspected by Verizon Hawaii prior to backfilling and concrete-encasing. Contractor shall notify inspector at least 72 hours prior to pouring of concrete.
- Contractor shall place Muletape (WP1800P) in each duct throughout its entire length with protrusions of 2 feet in manholes and handholes at each end, and 2 feet in pull-boxes. Muletape is rated for 1800lb. pull and has footage markings for measuring duct lengths.
- Contractor shall place 8-mil orange colored plastic warning tape, not less than 4" wide, in entire length of trench for all underground installations. Tape should read "WARNING-STOP DIGGING-CALL VERIZON HAWAII COMMUNICATIONS CABLE BURIED BELOW, FAILURE TO COMPLY COULD RESULT IN LEGAL ACTION".
- Unless otherwise indicated, all conduits, sweeps, coupling, adapters and bell ends shall be Carlon GT42 conduit meeting VH Specification GTS-8342. All risers and riser bends shall be PVC Schedule 80 conduit.
- A Verizon Hawaii inspector shall be required to be present at the job site whenever there will be a breakage into any structure containing Verizon Hawaii facilities.

STATE RIGHT-OF-WAY BACKFILL NOTES

-  Trench Backfill Material "B"
 - Sand Equivalent ≥ 2
 - 8" Max. Lift Loose
 - 95% Compaction
 (Unless Otherwise Noted, See Duct Section "A" on Sheet E-25A)
-  Trench Backfill Material "A"
 - Sand Equivalent ≥ 20
 - 8" Max. Lift Loose
 - 95% Compaction
-  if Material Below Duct is not Equivalent to Backfill Material "A", Excavate Material & Provide 3" Backfill Material "A". See Above
-  Concrete - 3" Encasement, 3000 psi Compressive Strength @ 28 Days. (Unless Otherwise Noted, See Duct Section "A" on Sheet E-25A)

DRAWING REVIEW

Reviewed for HECO's Facilities Only

Date 5/21/03 By G. Che

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.

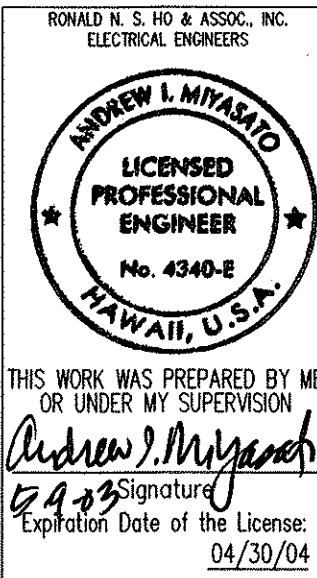
APPROVED BY:

HAWAIIAN ELECTRIC COMPANY, INC. DATE

VERIZON HAWAII, INC. DATE 7-14-03

OCEANIC CABLEVISION DATE 7/24/03

A T & T DATE 7/25/03

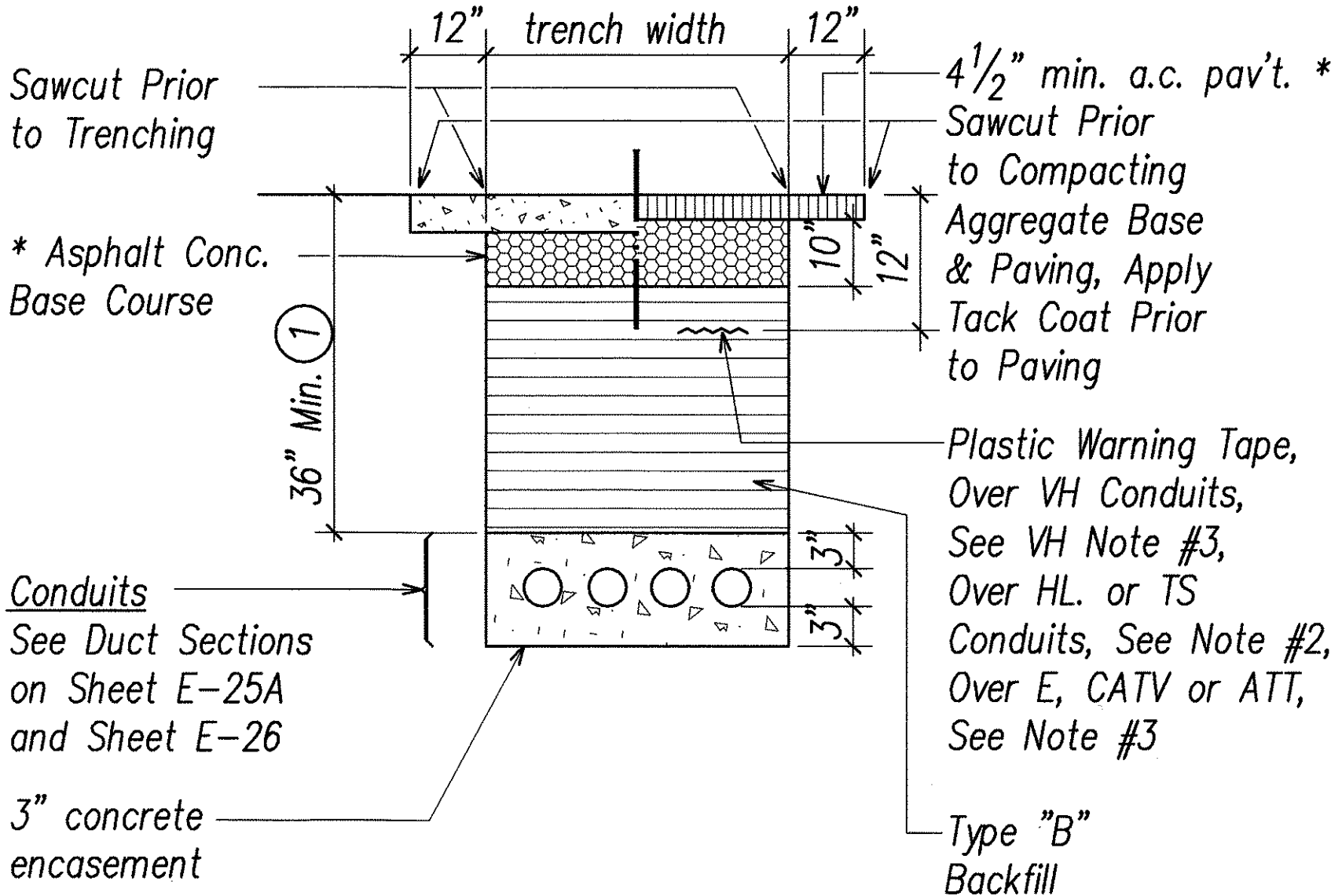


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DUCT SECTION DETAILS 1

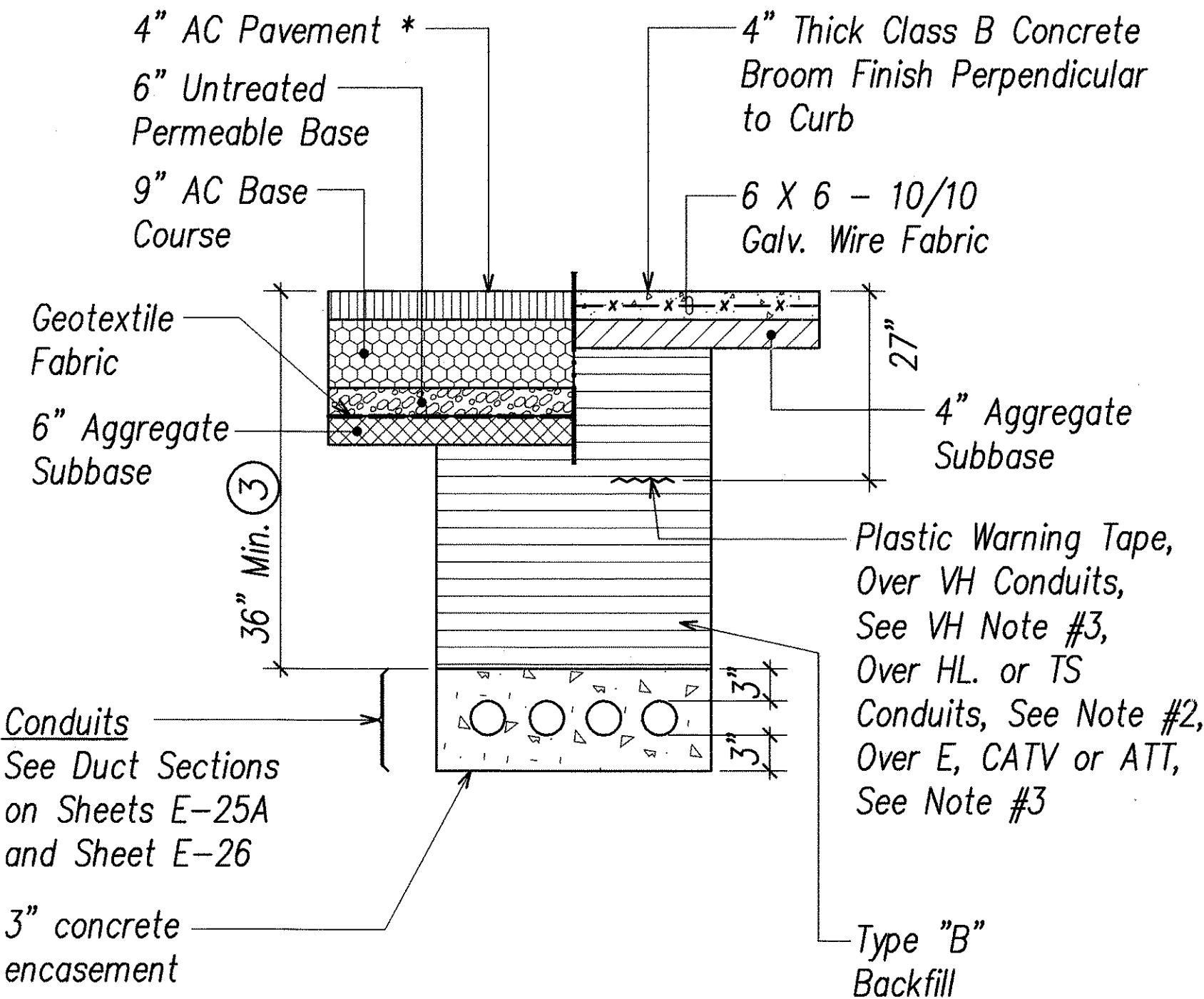
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-25 OF 56 SHEETS



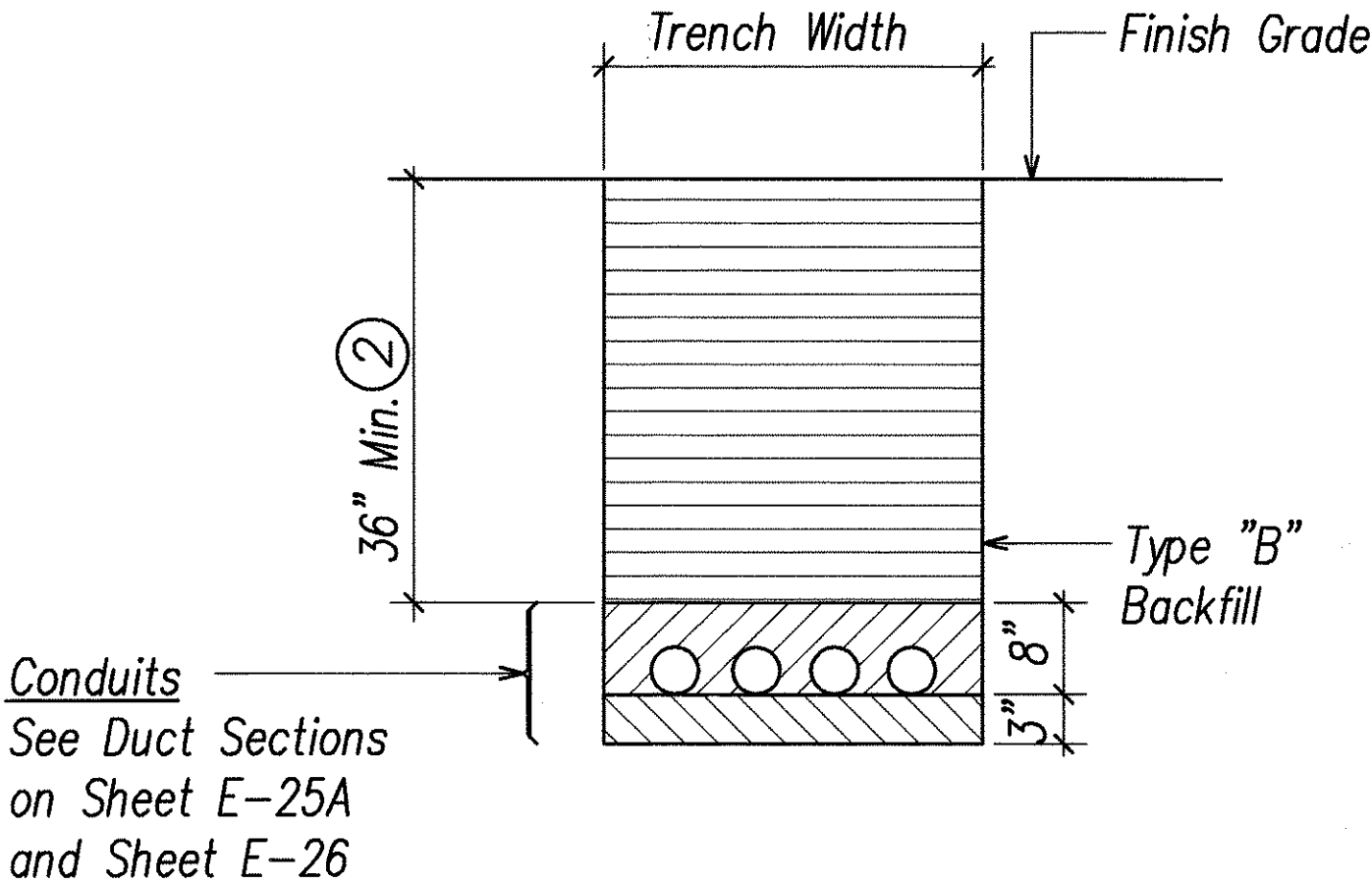
* A.C. and Base Course to Match Existing Thickness or the Minimum Thickness Shown, Whichever is Greater.

① TYPICAL BACKFILL SECTION
Within State Right-of-Way
Under Existing Roadway & Sidewalk



* A.C. and Base Course to Match Existing Thickness or the Minimum Thickness Shown, Whichever is Greater.

② TYPICAL BACKFILL SECTION
Within State Right-of-Way
Under New Roadway & Sidewalk



③ TYPICAL BACKFILL SECTION
Within State Right-of-Way
Under Finish Grade

NOTES:

- Base Course & Sub-base Course per 1994 State Standard Specifications for Highway Construction.
- The Metal Detectable High Fluorescence red Plastic Warning Tape shall be a minimum 5 mils thick and 4" wide with a continuous metallic backing and corrosion resistant 1 mil thick foil core. The tape shall read, "CAUTION - STATE TRAFFIC SIGNAL AND/OR HWY LIGHTING BURIED BELOW," utilizing 3 inch series "C" lettering. The message will be repeated with a 36-inch spacing between the end and beginning of repeated message.
- Plastic Marking Tape. Provide plastic marking tape that is acid and alkali resistant polyethylene film 6" inches wide with minimum thickness of 0.004 inch. Provide tape with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. Manufacture tape specifically for marking and locating underground utilities. Provide the metallic core of the tape encased in a protective jacket or provided with other means to protect it from corrosion. Conform to the following tape color and bear a continuous printed inscription describing the specific utility.

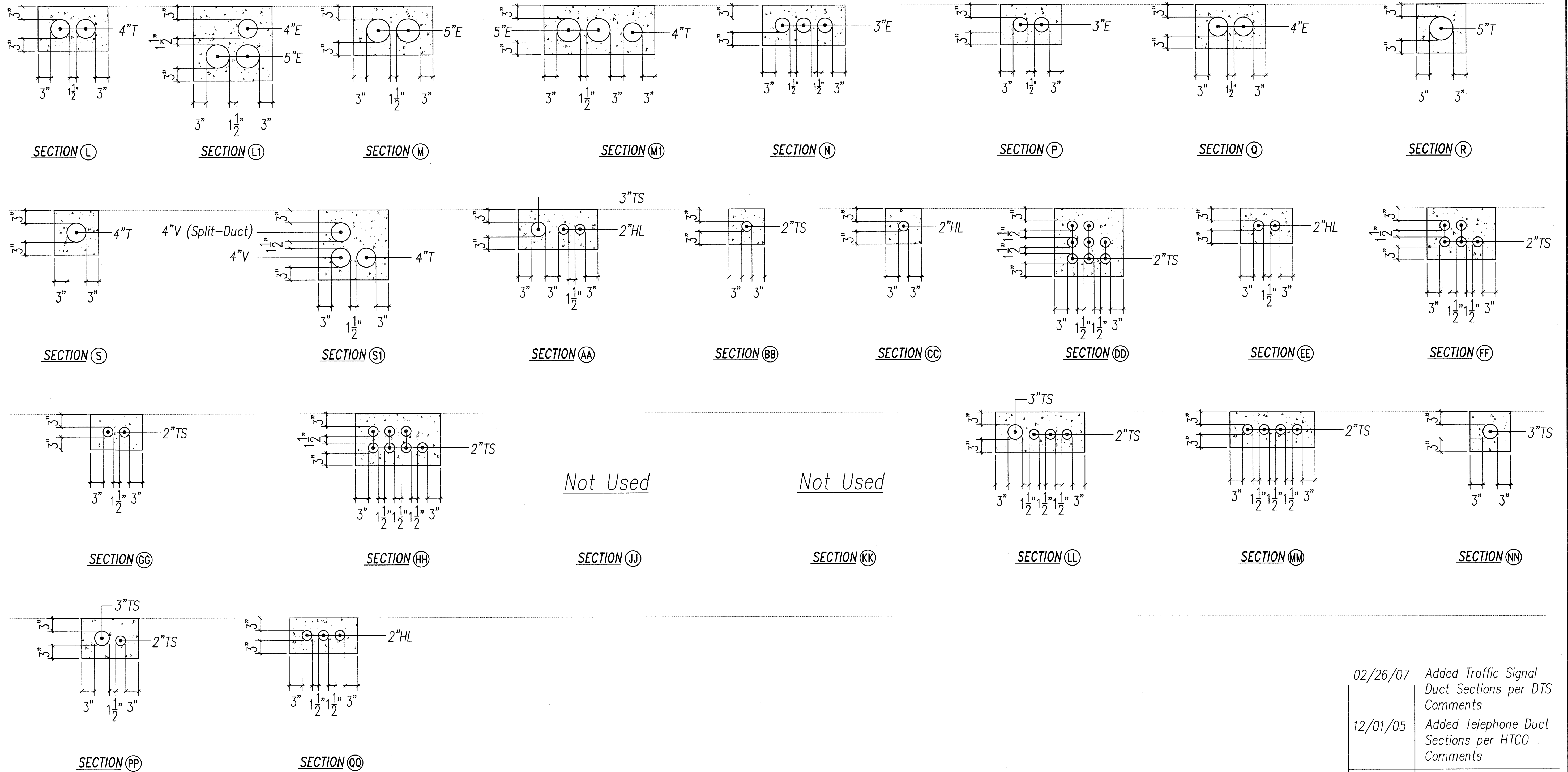
Red: Electric
Orange: CATV, ATT

TYPICAL DUCT SECTION BACKFILL DETAILS NOT TO SCALE

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

LAST SAVE: 06/07/03 16:55:44 BY: JLM PROJECT: 22038.dwg

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	C.O. 157	193



NOTE:
For Typical Duct Section Backfill Notes,
See Sheet E-25.

DUCT SECTION DETAILS
NOT TO SCALE

APPROVED BY:

HAWAIIAN ELECTRIC COMPANY, INC. DATE

VERIZON HAWAII, INC. DATE

OCEANIC CABLEVISION DATE

A T & T DATE

02/26/07	Added Traffic Signal Duct Sections per DTS Comments
12/01/05	Added Telephone Duct Sections per HTCO Comments
DATE	REVISION

RONALD W. 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: 04/30/14

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

DUCT SECTION DETAILS III

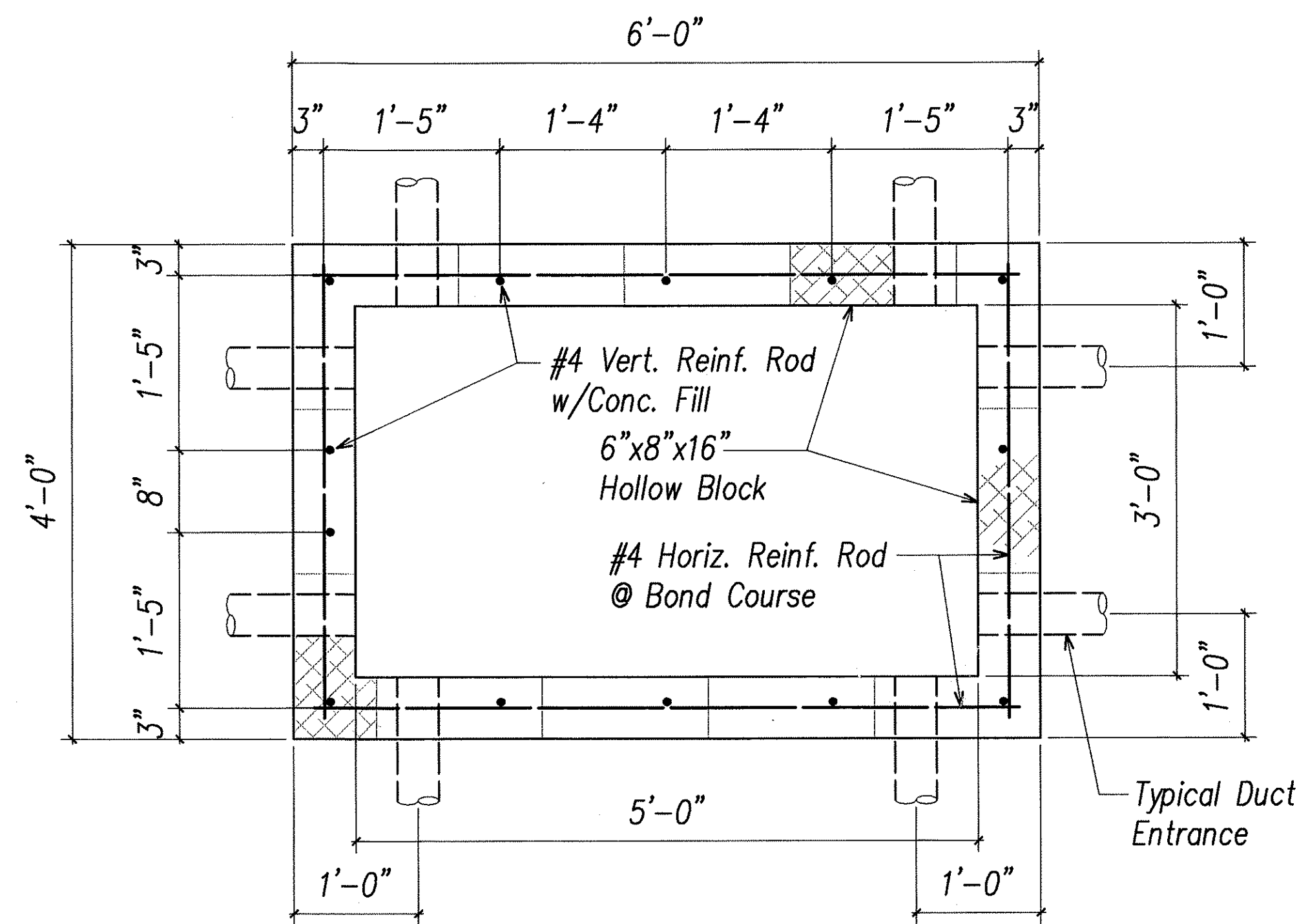
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-26 OF 56 SHEETS

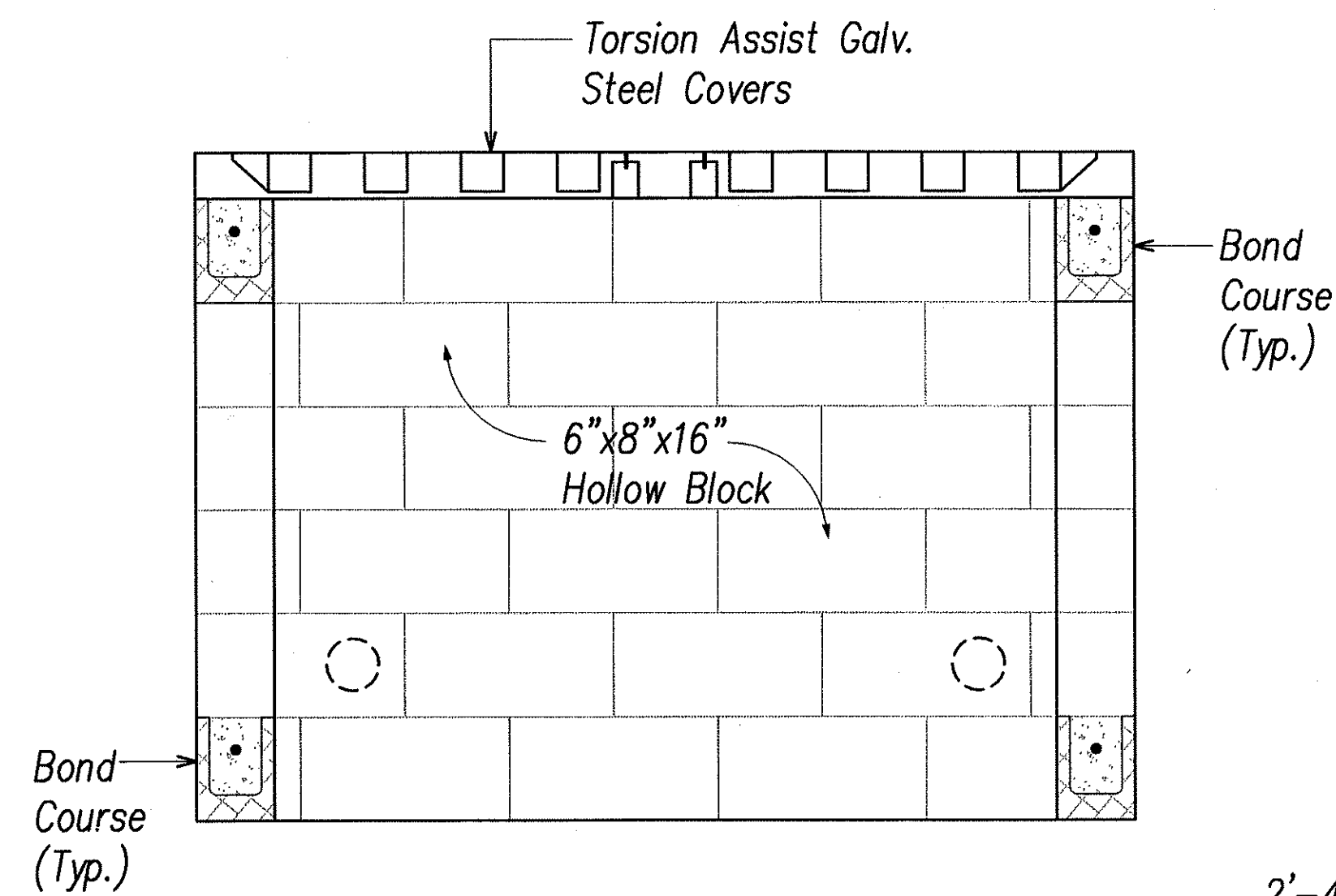
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NOTE BOOK	DRAWN BY	
	TRACED BY	
	DESIGNED BY	
	CHECKED BY	
No.		

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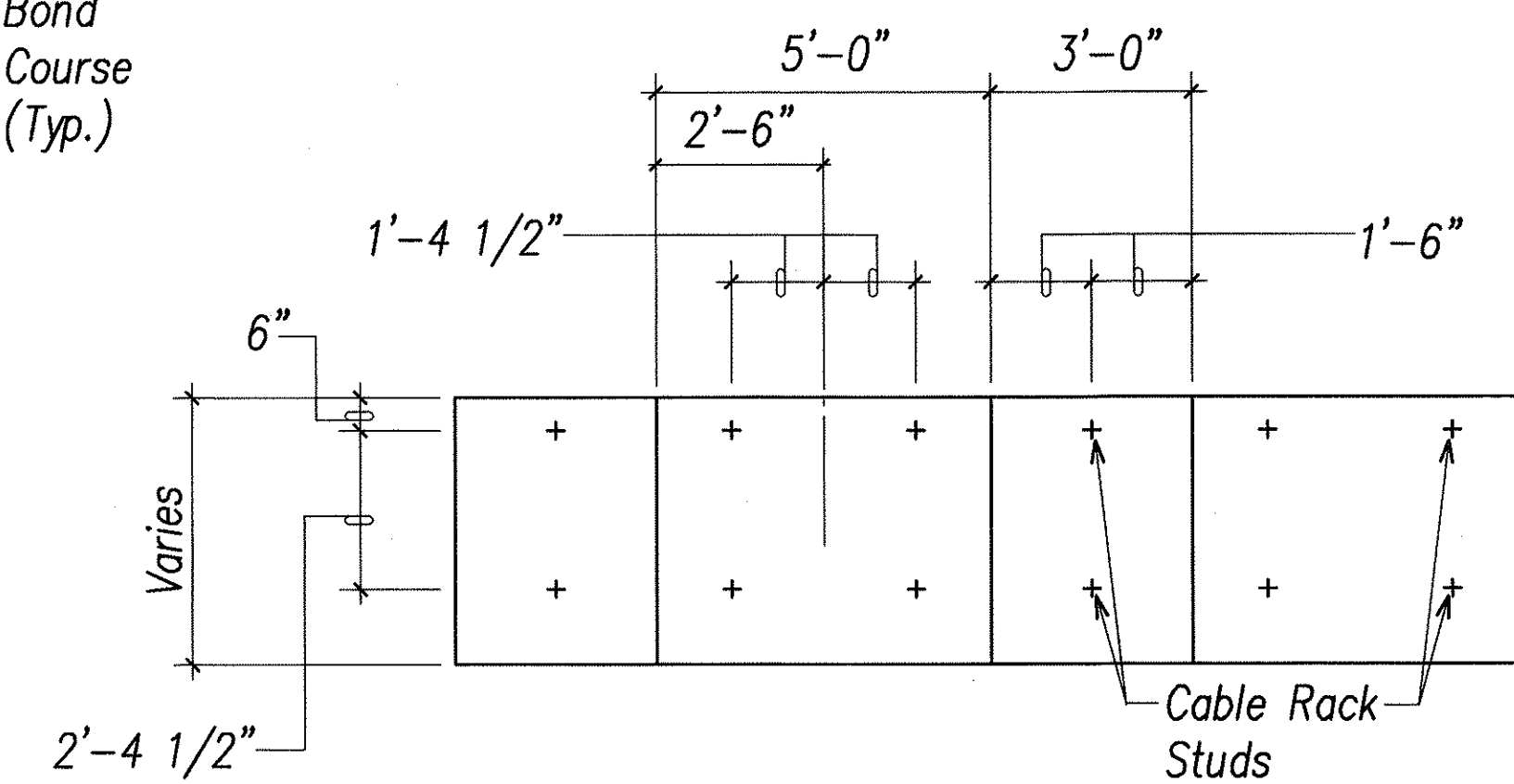
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	158	193



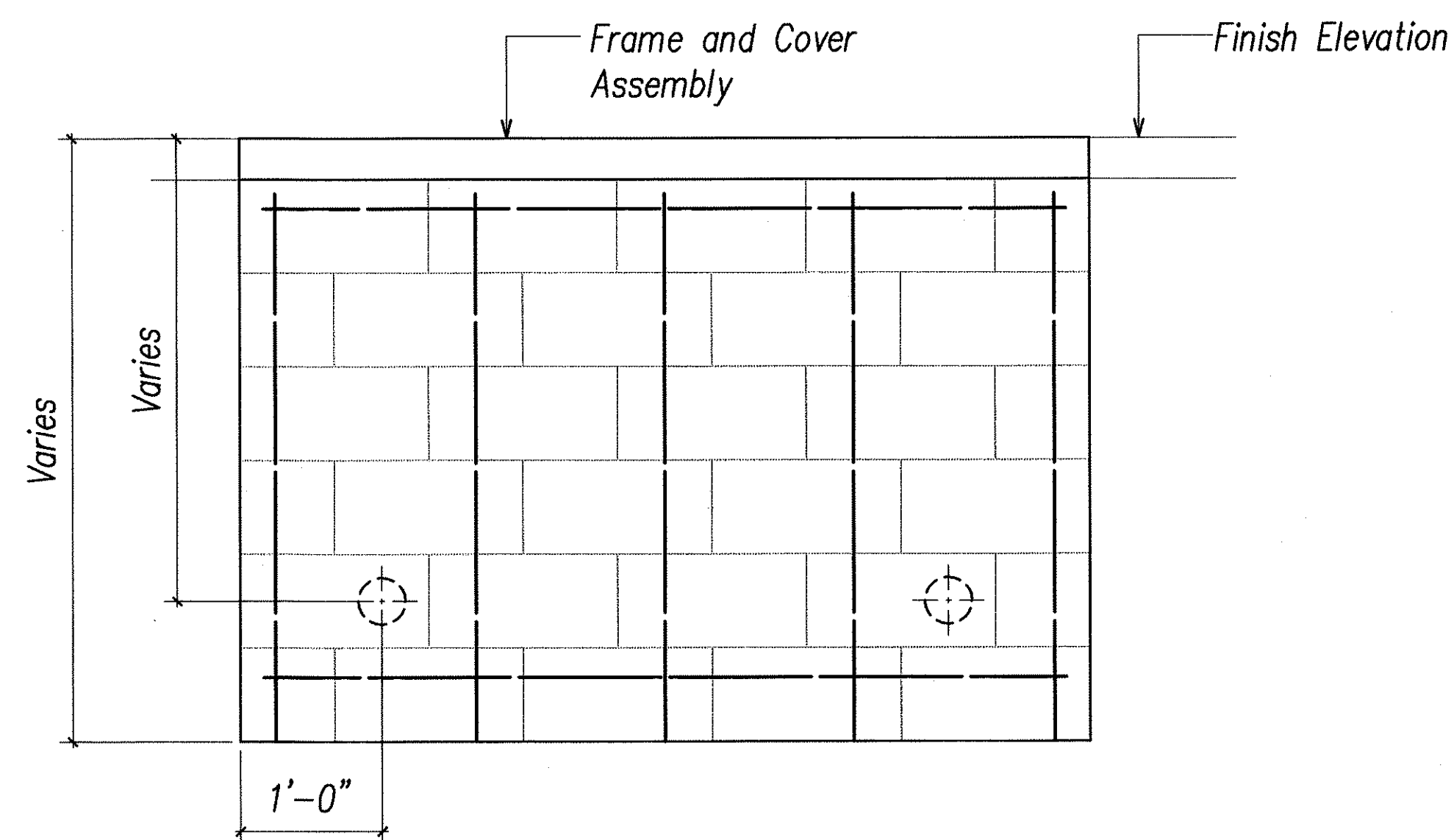
PLAN



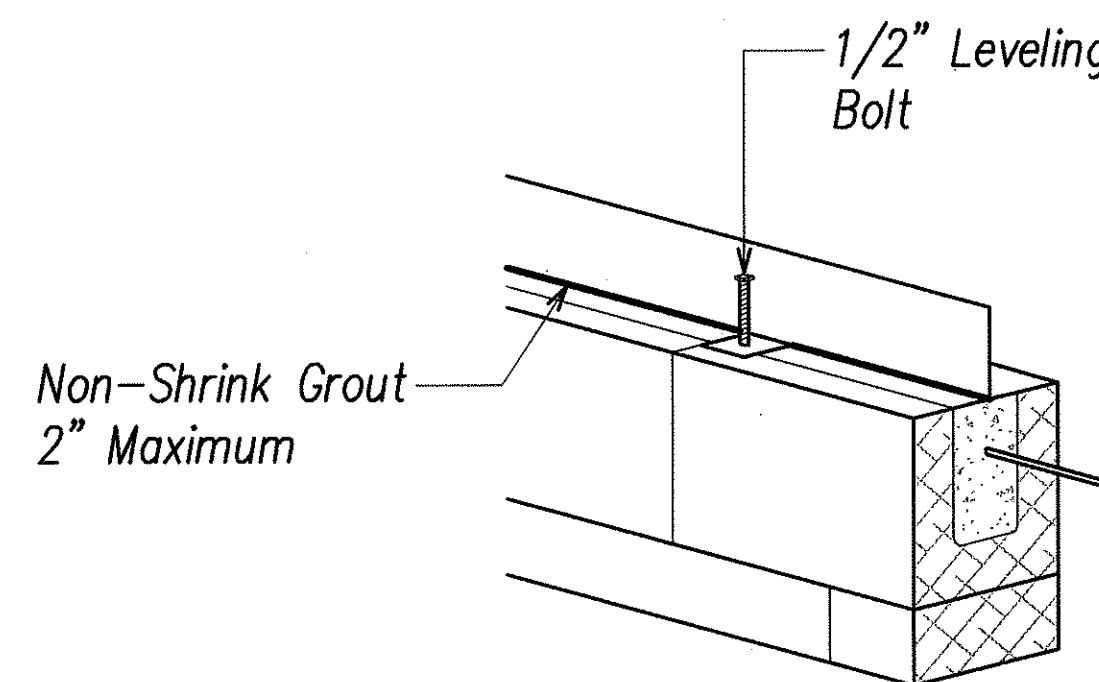
LONGITUDINAL SECTION



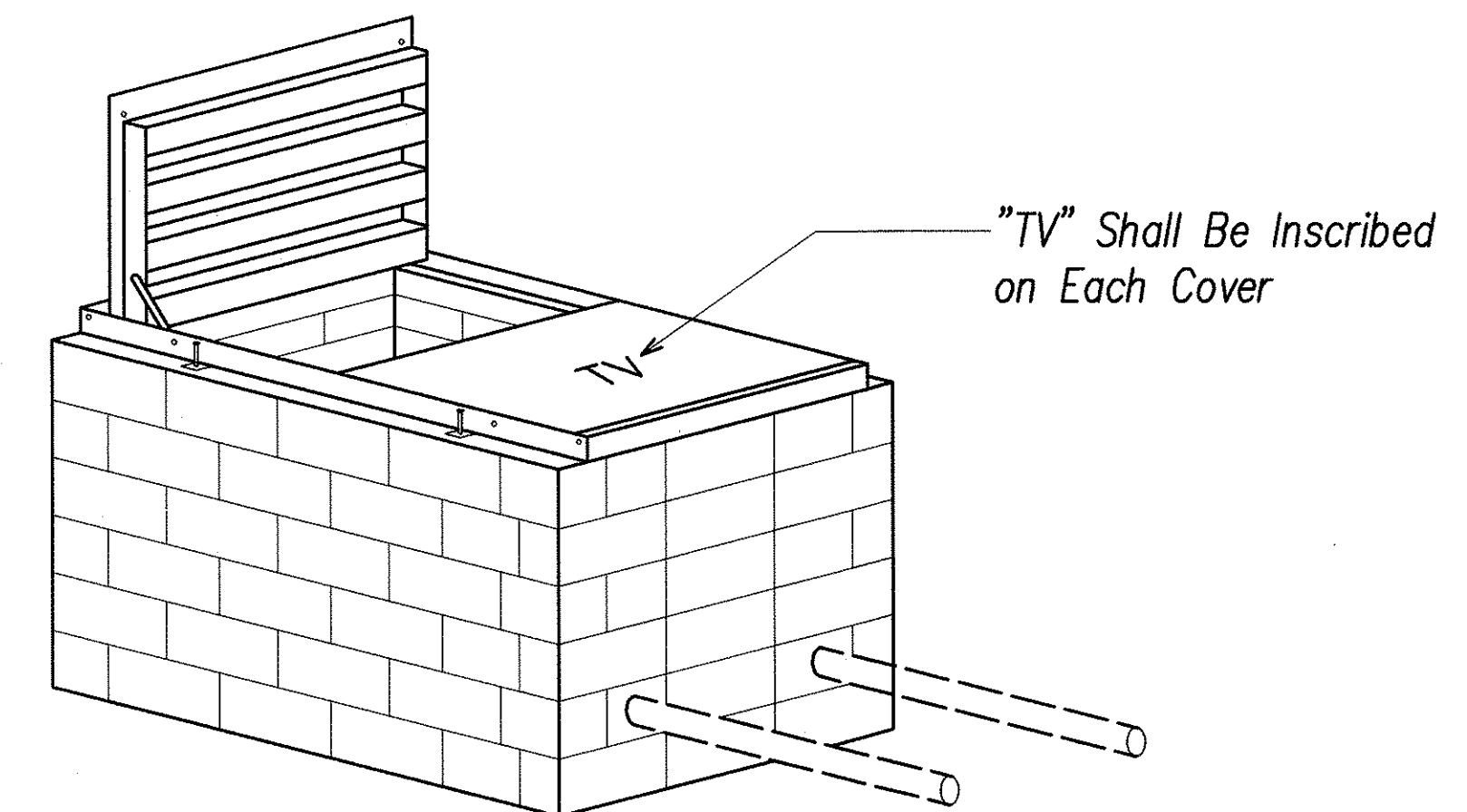
CABLE RACK LAYOUT



ELEVATION



LEVELING BOLT DETAIL

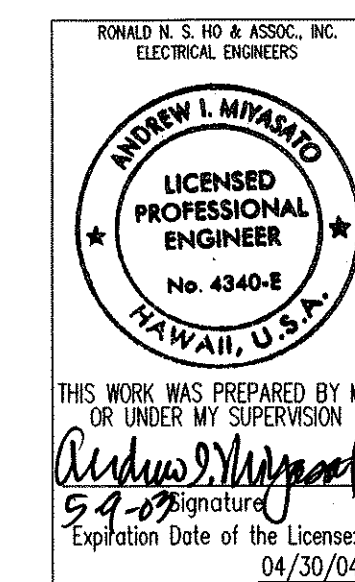


ASSEMBLED HANDHOLE

- NOTES:
1. All cover assembly parts to be galvanized.
 2. Cells with reinforcing rods to be grouted.
 3. Bond first and last course.
 4. Cover surface to be of slip-not grip type.

OCEANIC CABLE 3' X 5' HANDHOLE DETAILS NOT TO SCALE

APPROVED BY: *[Signature]* 7/24/03
OCEANIC CABLEVISION DATE

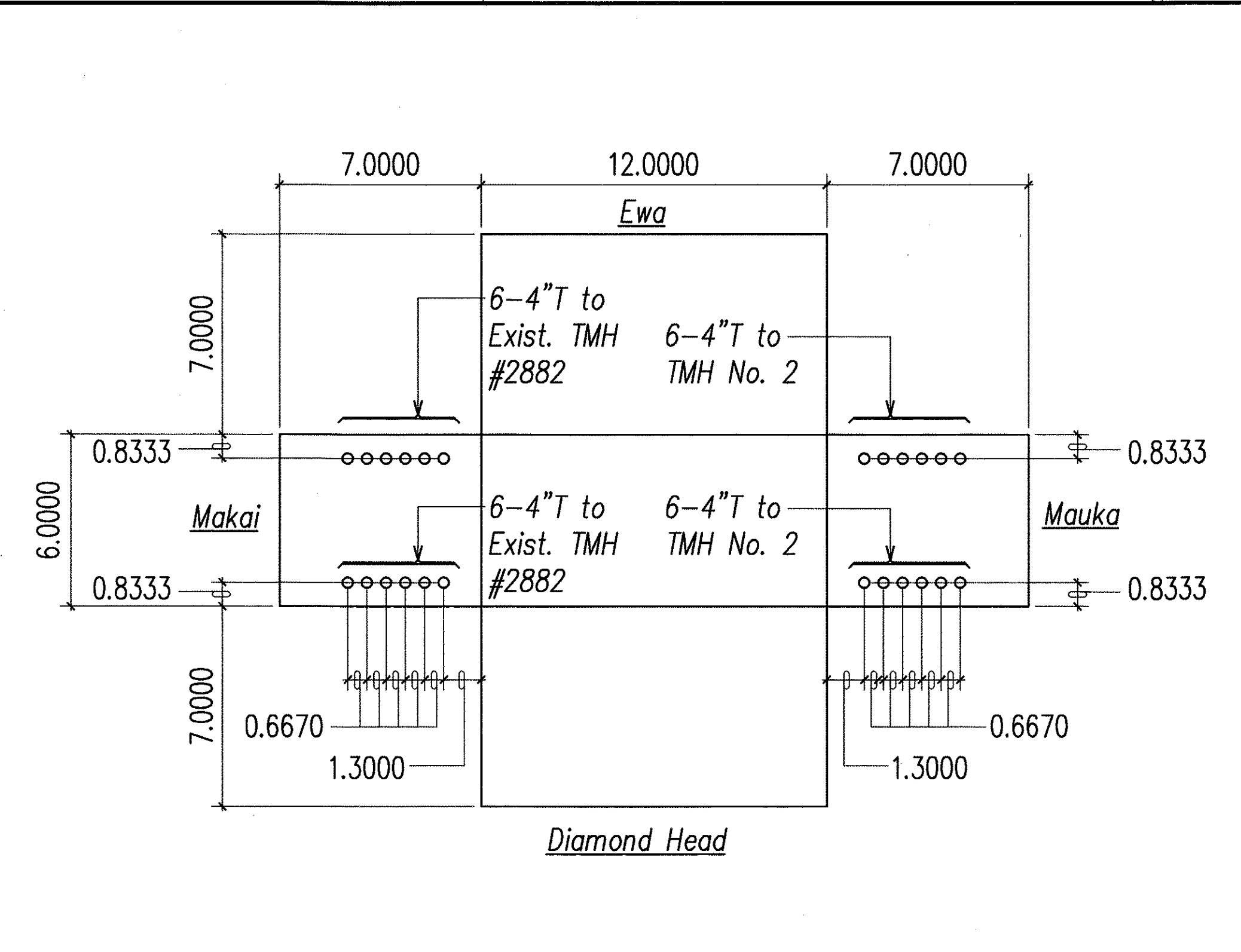


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
OCEANIC CABLE 3' X 5'
HANDHOLE DETAILS
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)
SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-27 OF 56 SHEETS

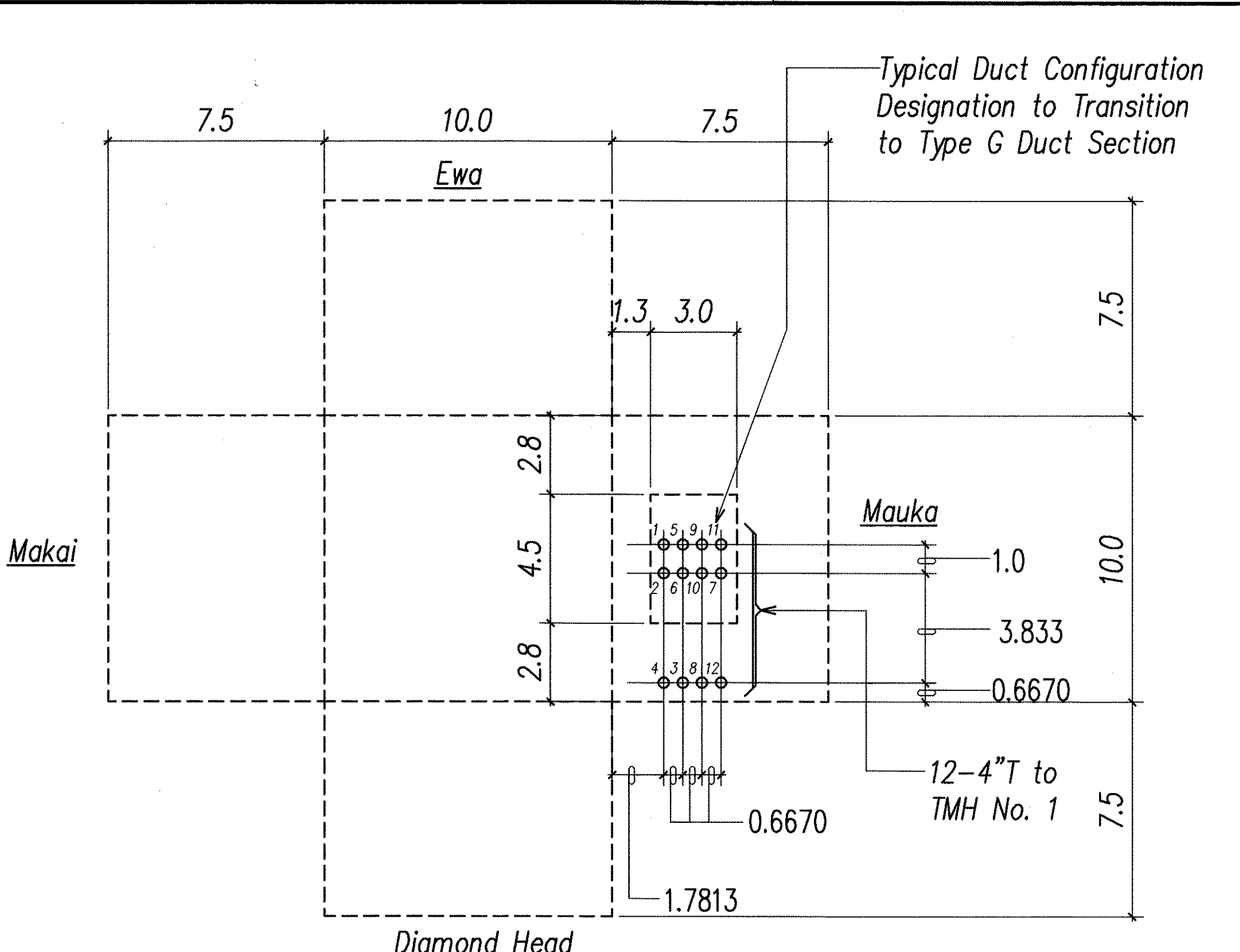
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DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
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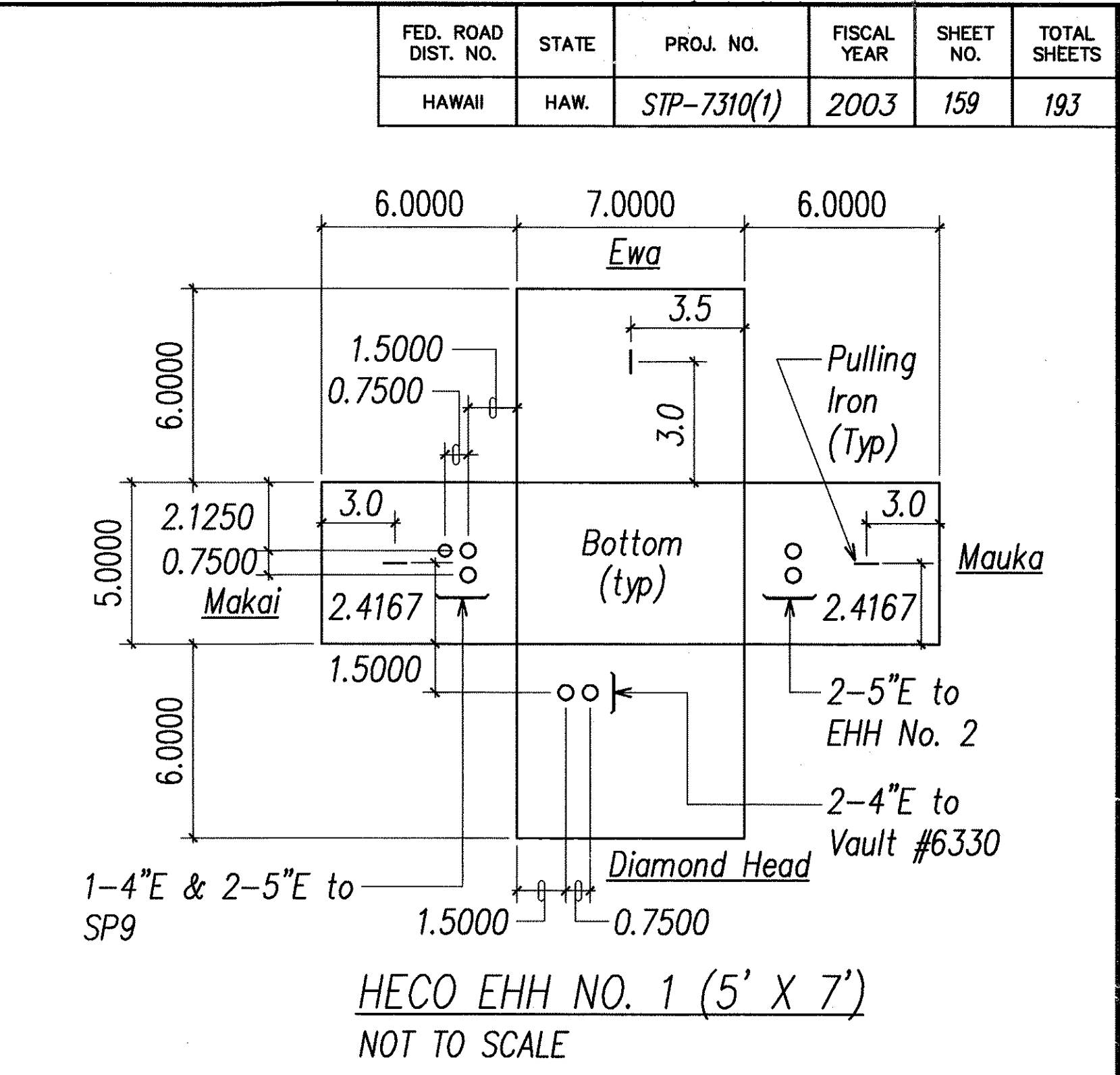
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	159	193



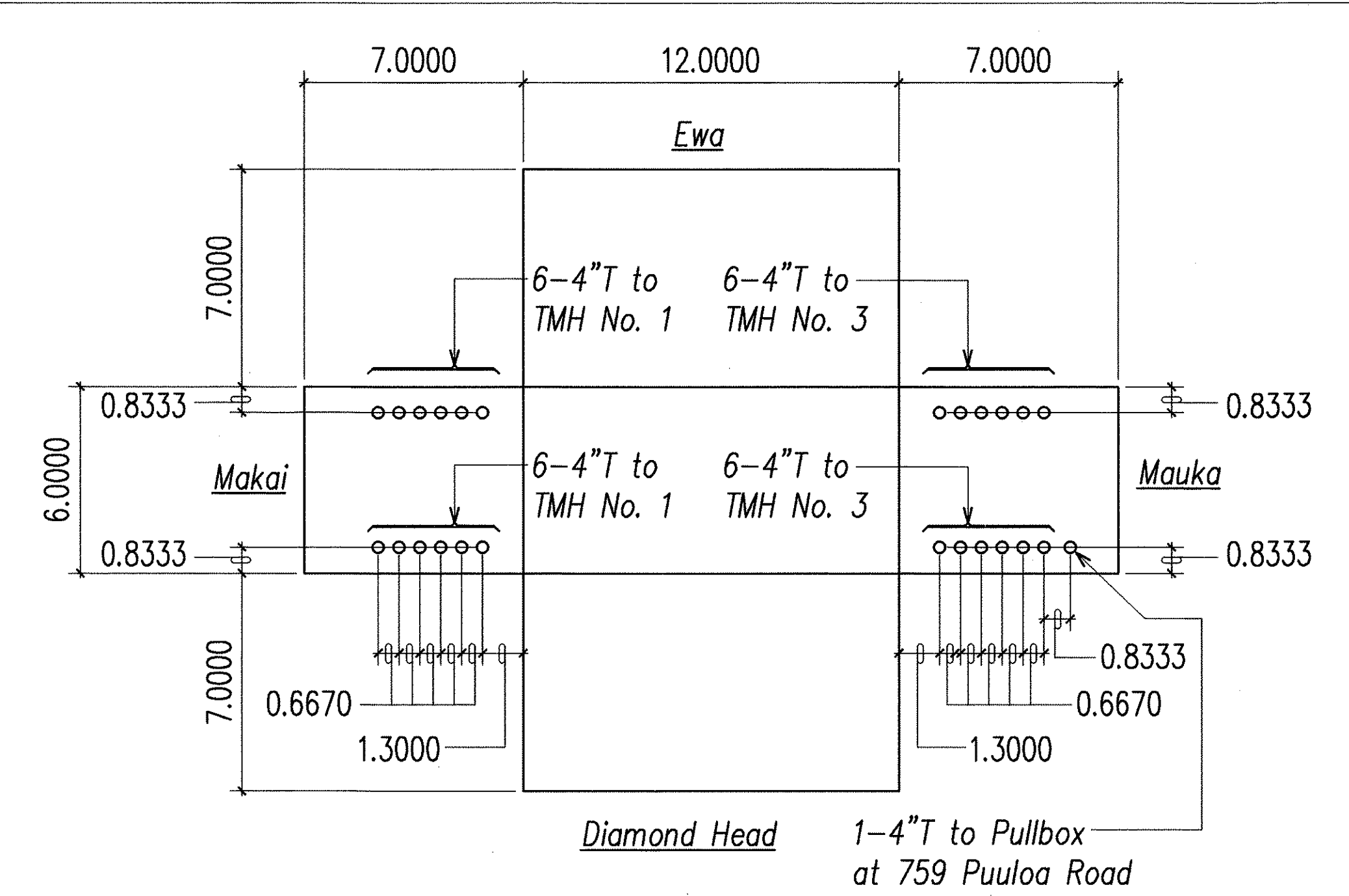
VH TMH NO. 1 (6' X 12' X 7')
NOT TO SCALE



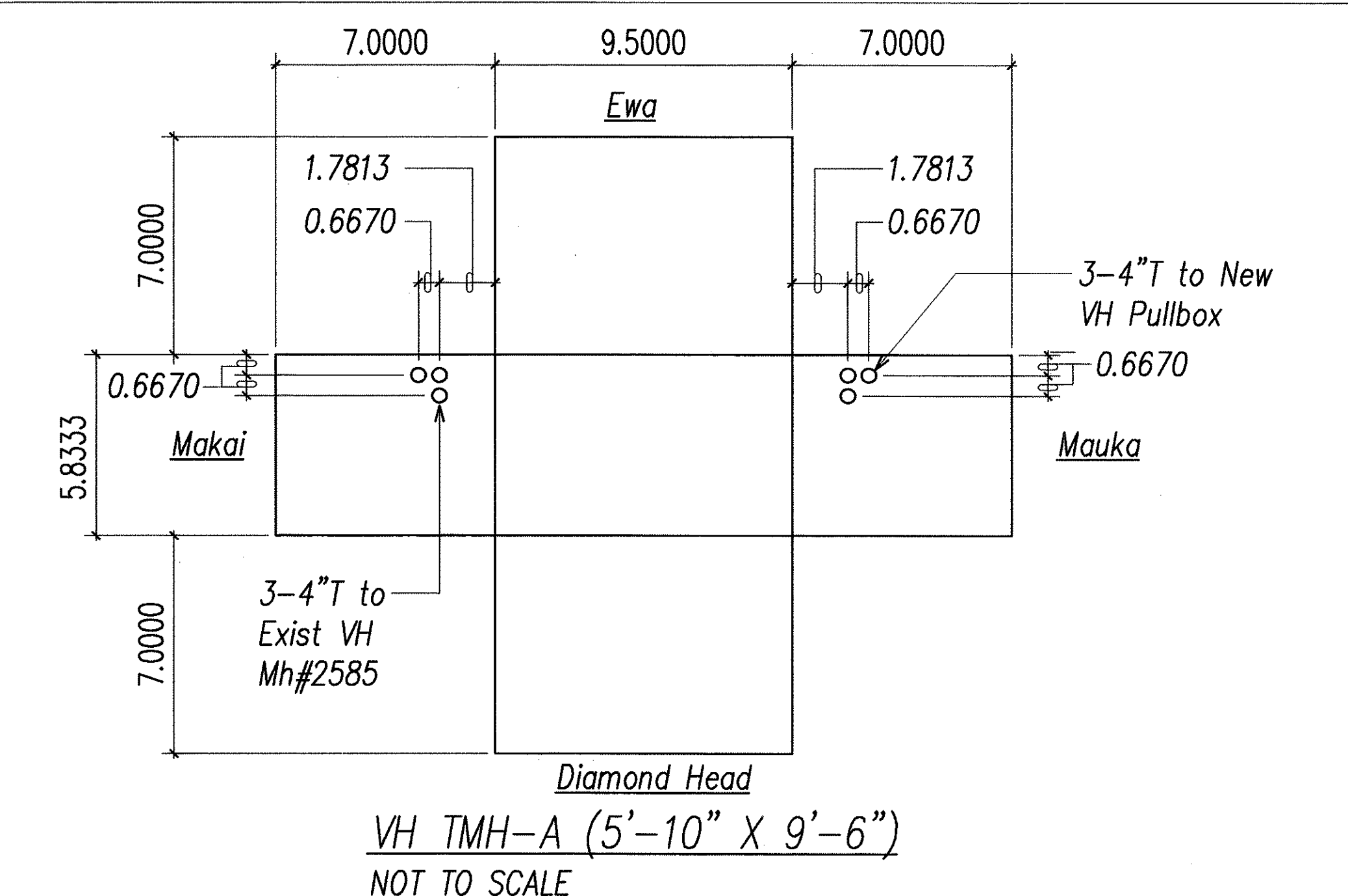
NOTE:
Existing Duct Penetrations Not Shown for Clarity.
EXISTING VH TMH NO. 2882 (10' X 10' X 7.5' HIGH)
NOT TO SCALE



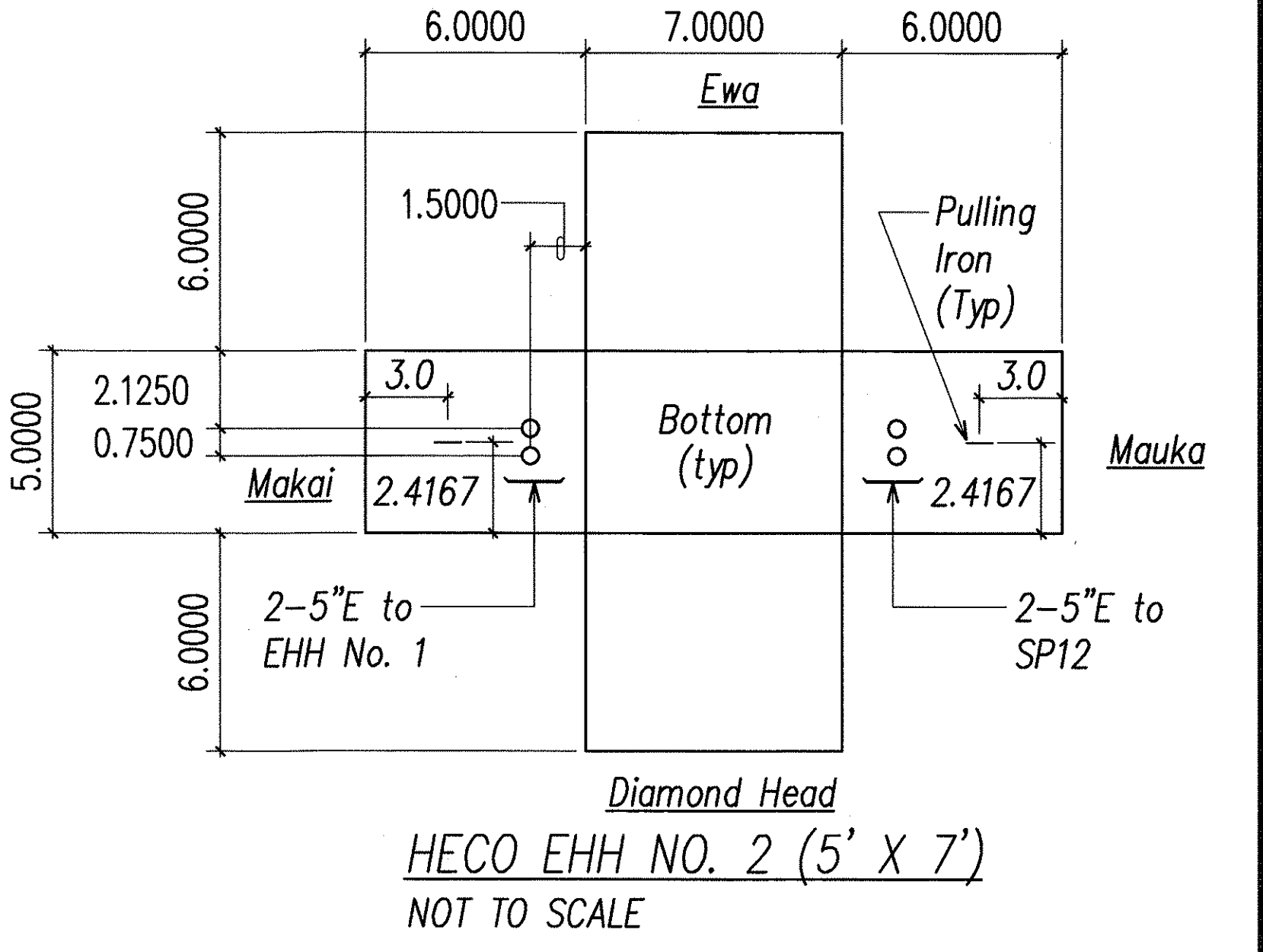
HECO EHH NO. 1 (5' X 7')
NOT TO SCALE



VH TMH NO. 2 (6' X 12' X 7')
NOT TO SCALE



VH TMH-A (5'-10" X 9'-6")
NOT TO SCALE



HECO EHH NO. 2 (5' X 7')
NOT TO SCALE

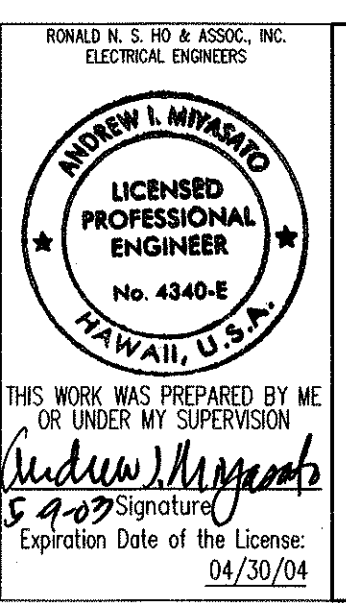
All Dimensions on this Sheet are in Feet

DATE	REVISION
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ORIGINAL PLAN	DATE
DESIGNED BY	
TRACED BY	
NOTED BY	
CHECKED BY	
APPROVED BY	
DATE	

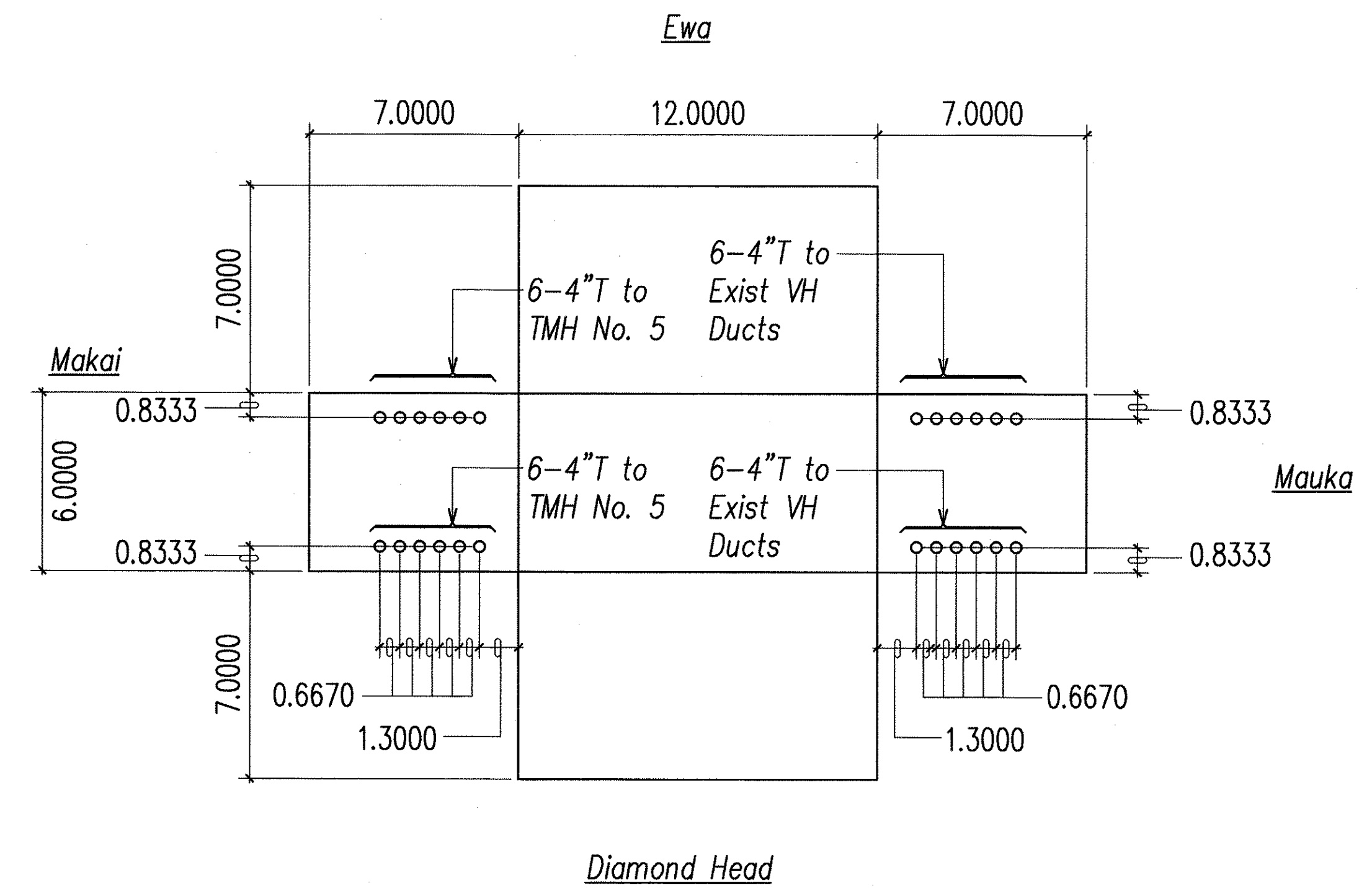
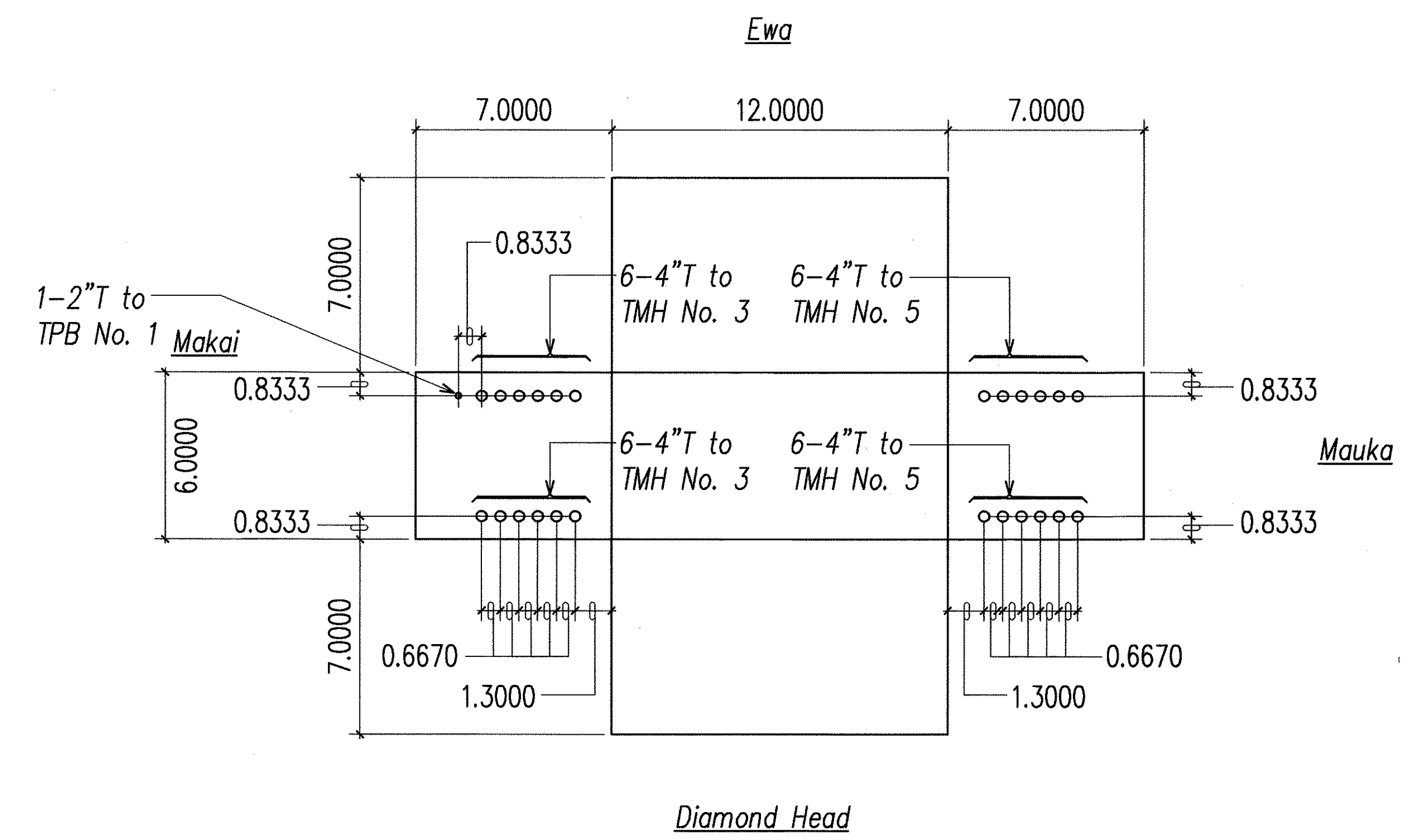
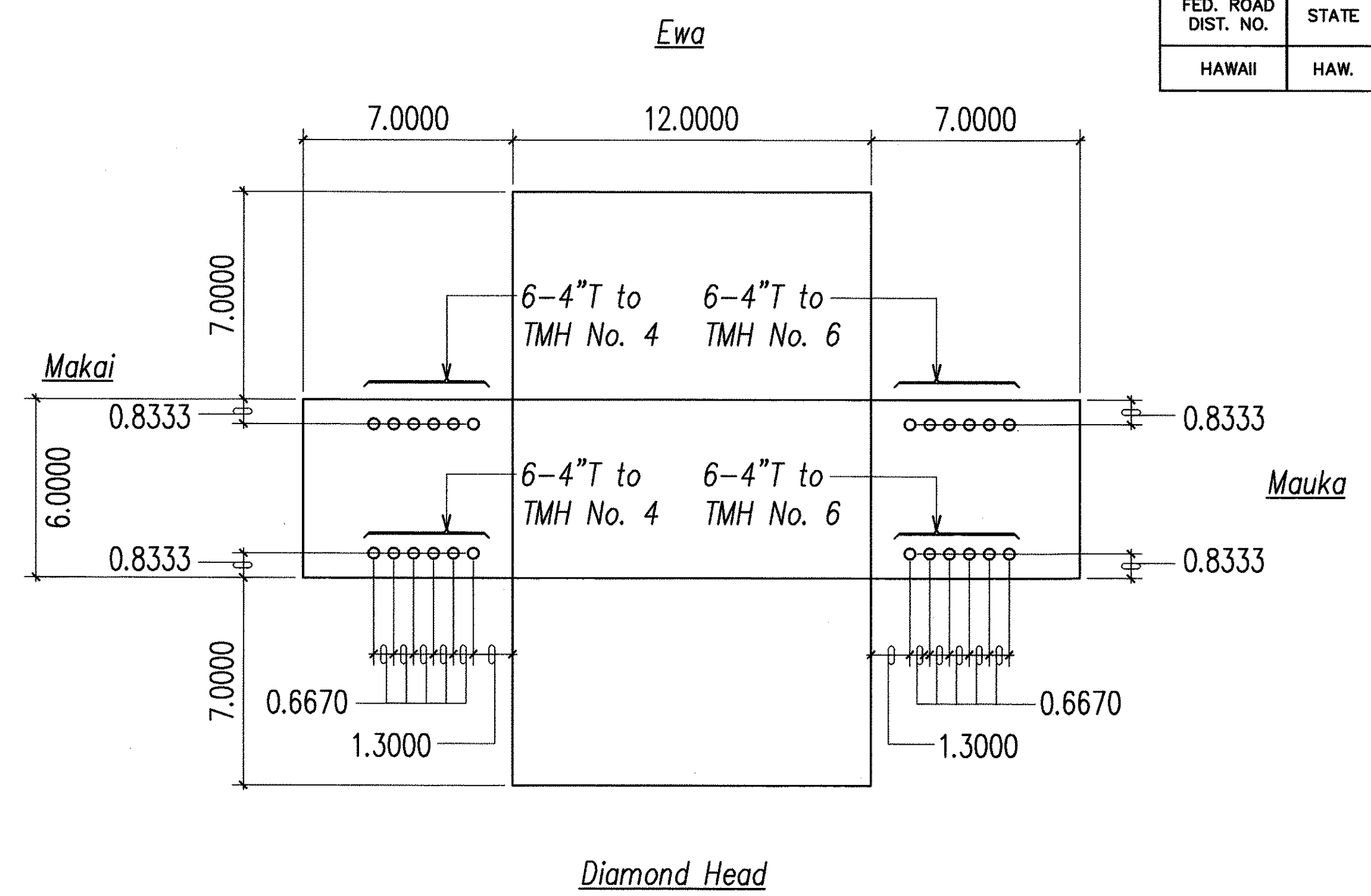
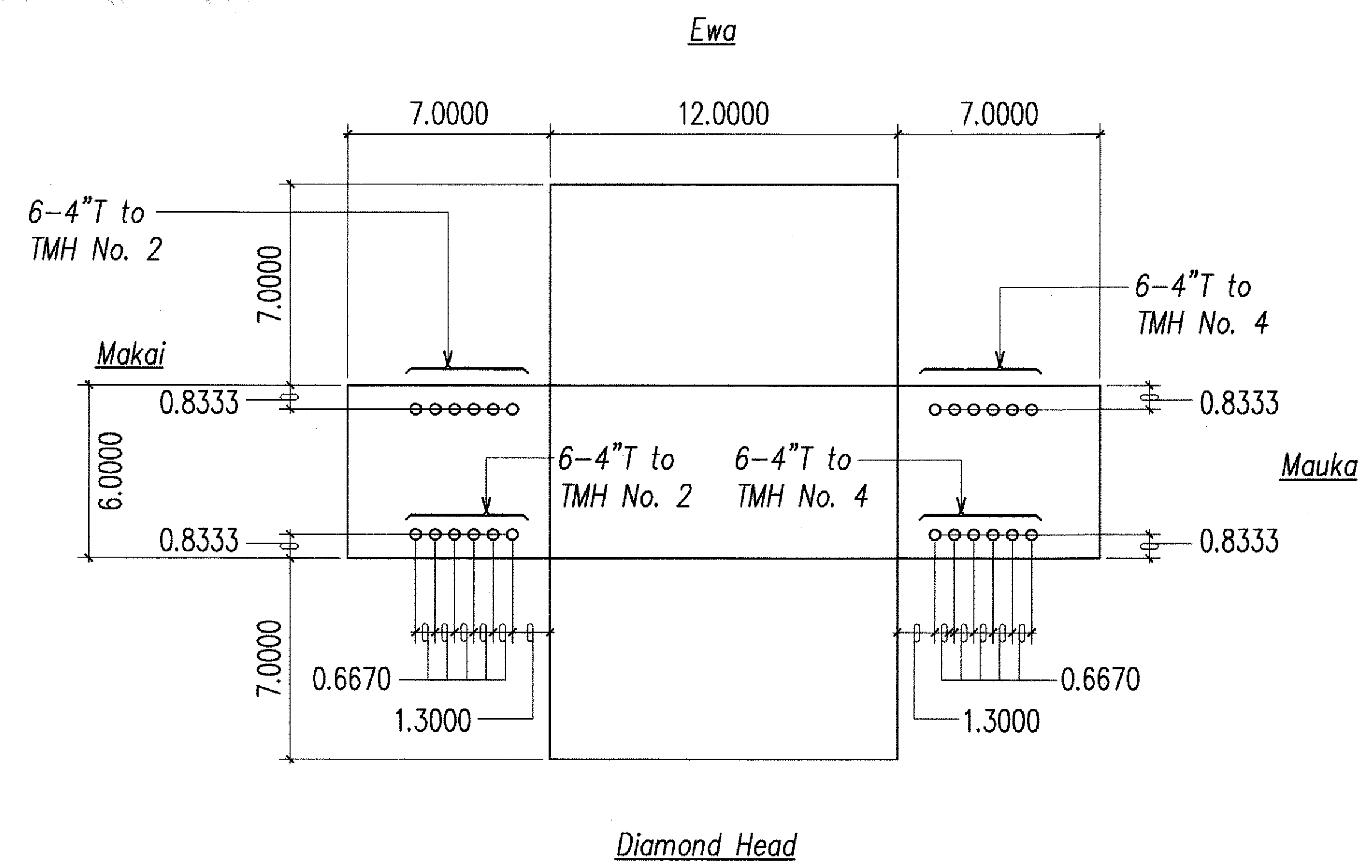
DRAWING REVIEW
Reviewed for HECO's Facilities Only
Date 6/3/03 By [Signature]
Engineering Department
Hawaiian Electric Company, Inc.

APPROVED BY:
HAWAIIAN ELECTRIC COMPANY, INC. DATE
VERIZON HAWAII, INC. DATE



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HECO HANDHOLE AND VERIZON HAWAII
MANHOLE BUTTERFLY DRAWINGS I
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	160	193



SURVEY PLOTTED BY: _____ DATE: _____
 ORIGINAL PLAN: _____
 NOTE BOOK: _____
 DESIGNED BY: _____
 QUANTITIES BY: _____
 CHECKED BY: _____
 No. 16.03.03
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 2. VACUUM PROJECTS 2003 V08 220308 2/02

All Dimensions on this Sheet are in Feet

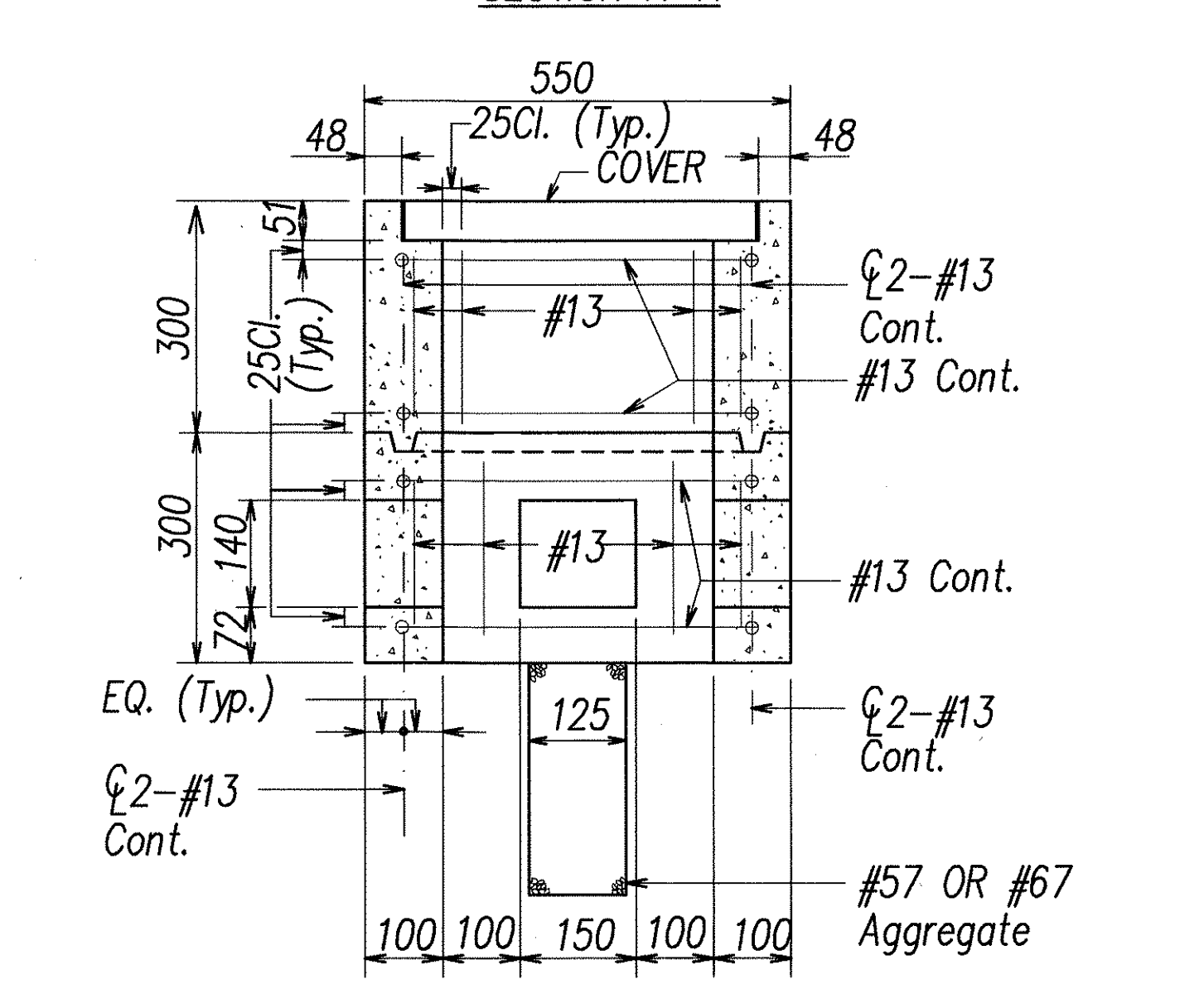
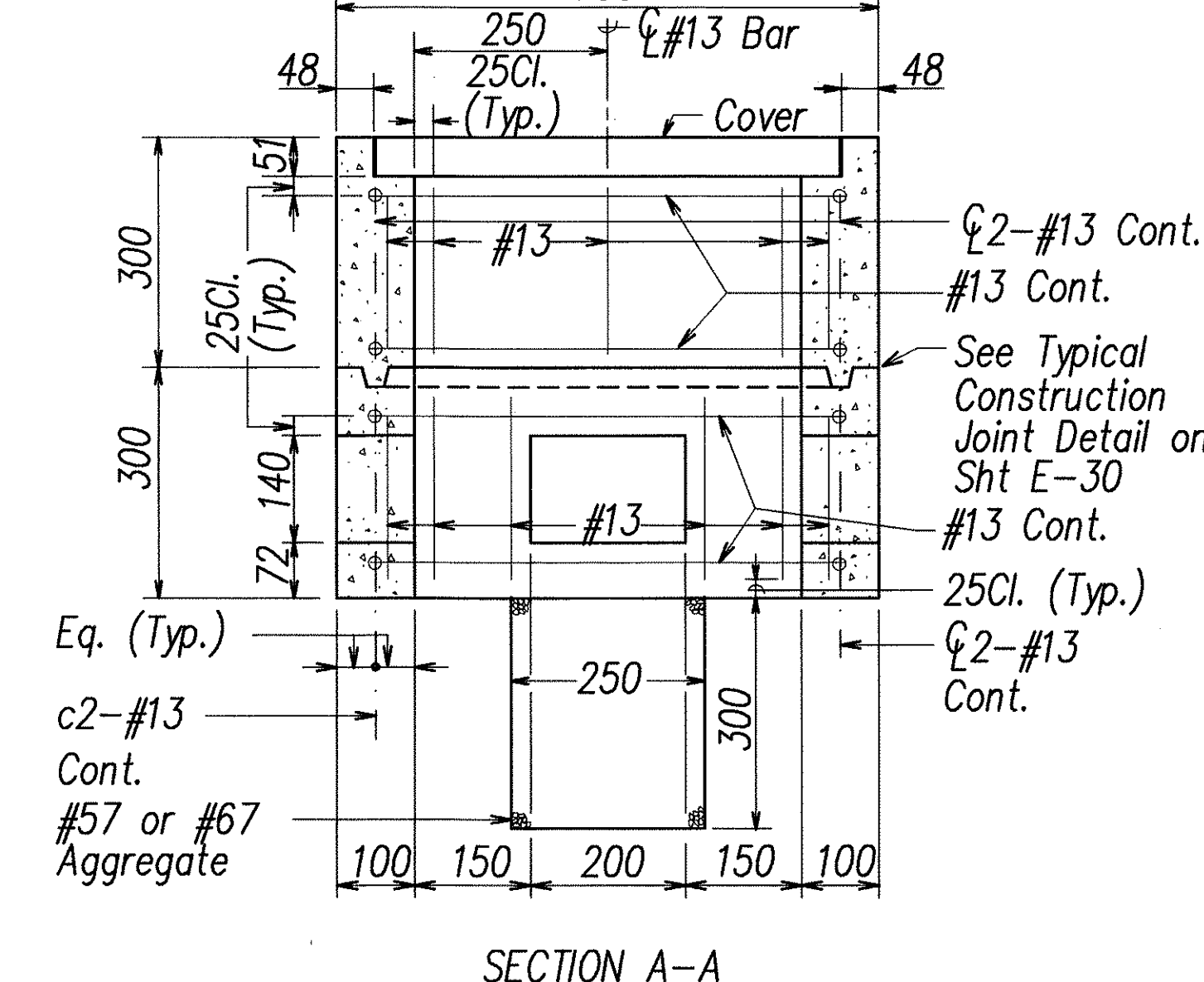
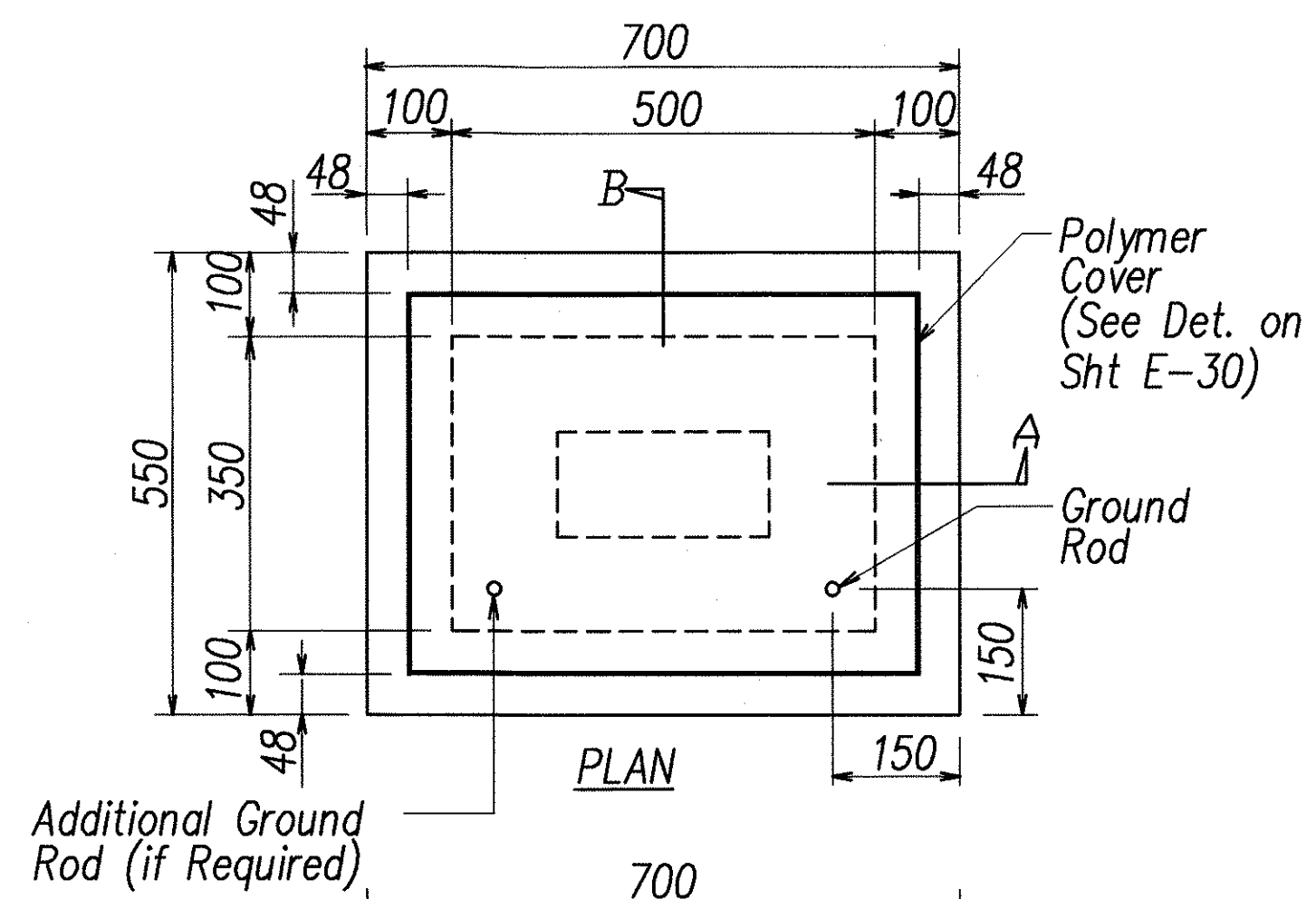
APPROVED BY: _____
 VERIZON HAWAII, INC. _____
 DATE: 7-14-03

THIS WORK WAS PREPARED BY ME
 OR UNDER MY SUPERVISION
 Signature: _____
 Expiration Date of the License: 04/30/04

STATE OF HAWAII
 DEPARTMENT OF TRANSPORTATION
 HIGHWAYS DIVISION
**VERIZON HAWAII MANHOLE
 BUTTERFLY DRAWINGS II**
PUULOLO ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

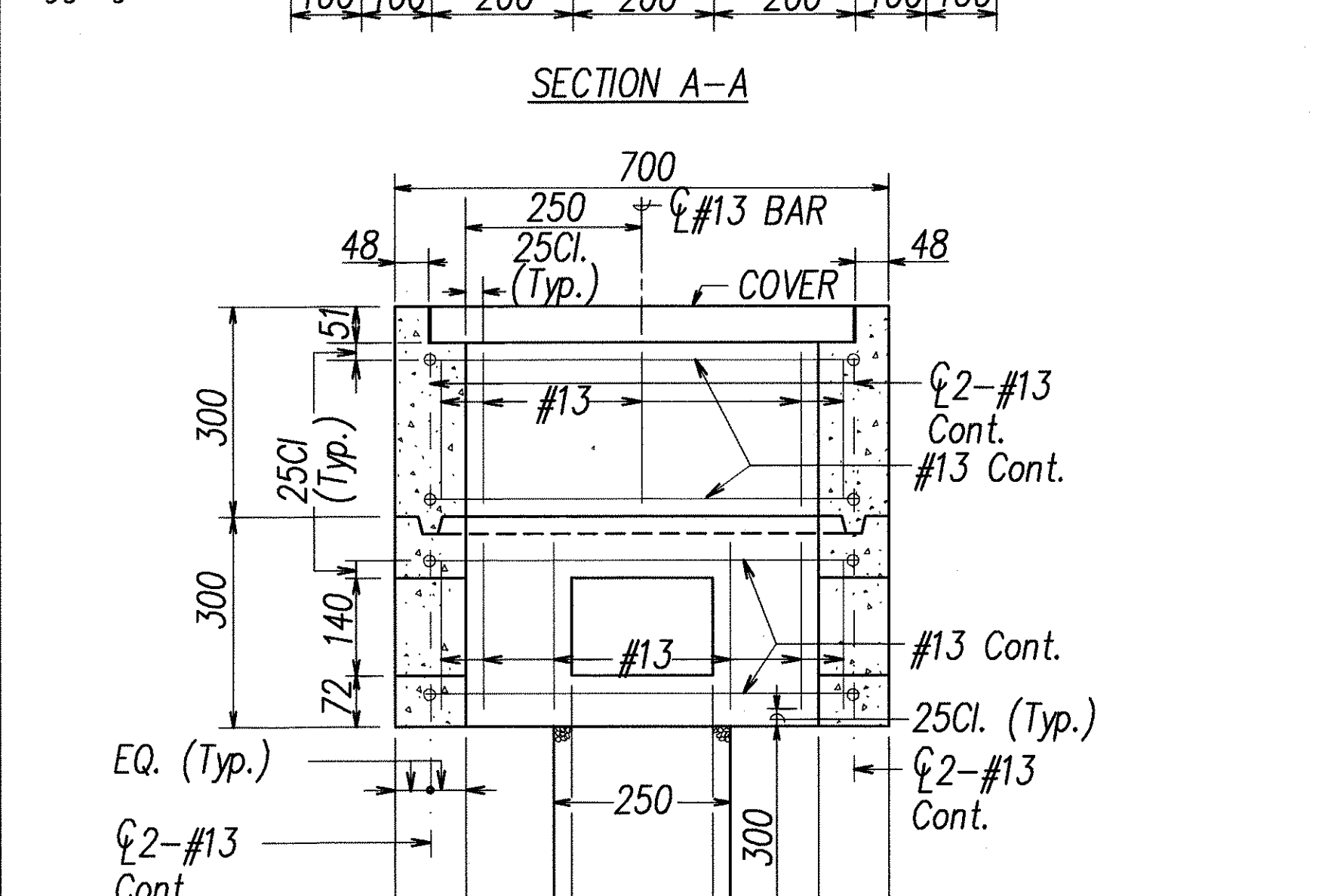
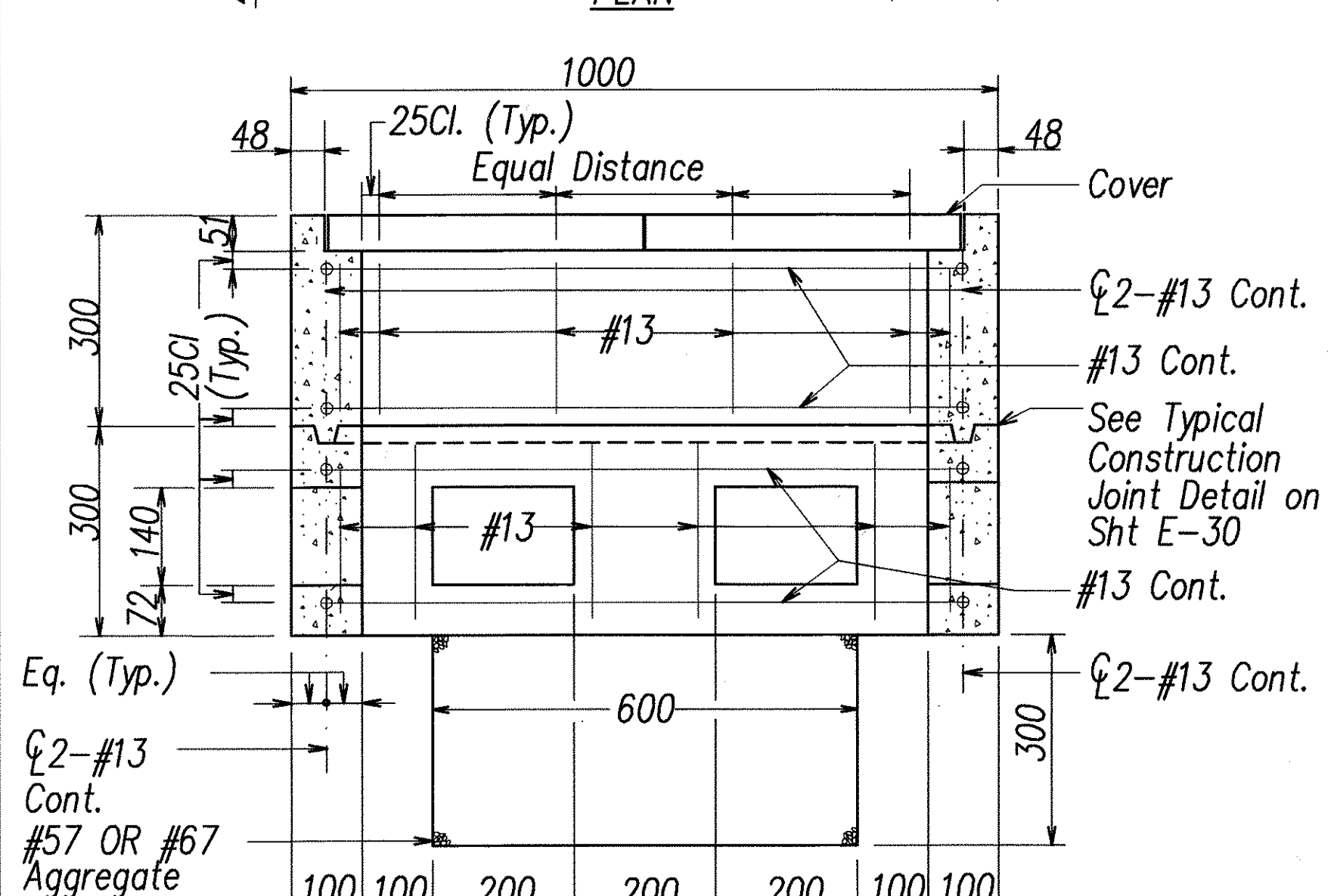
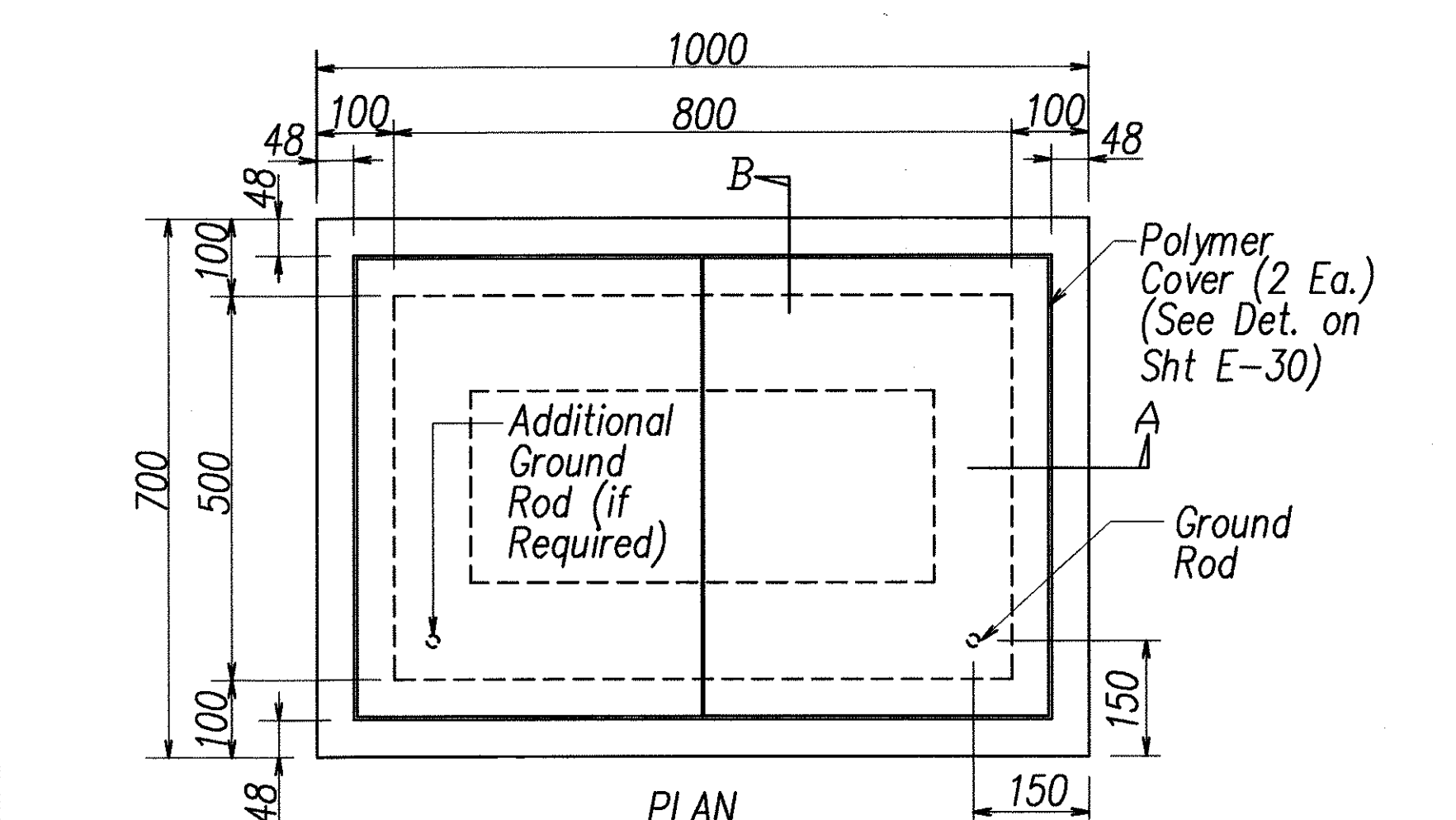
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 DATE: MAY 2003
 SHEET No. E-28 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	161	193



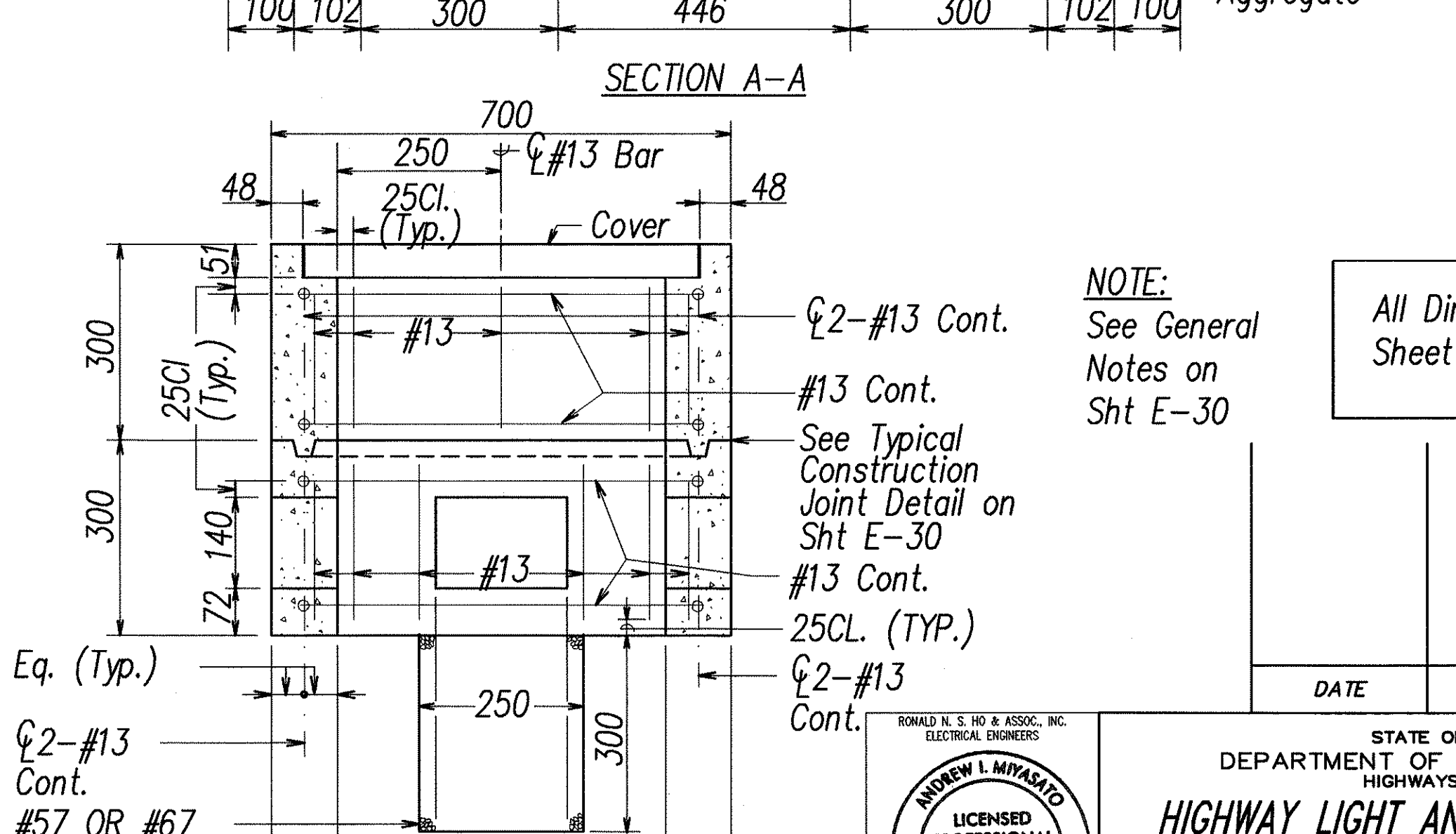
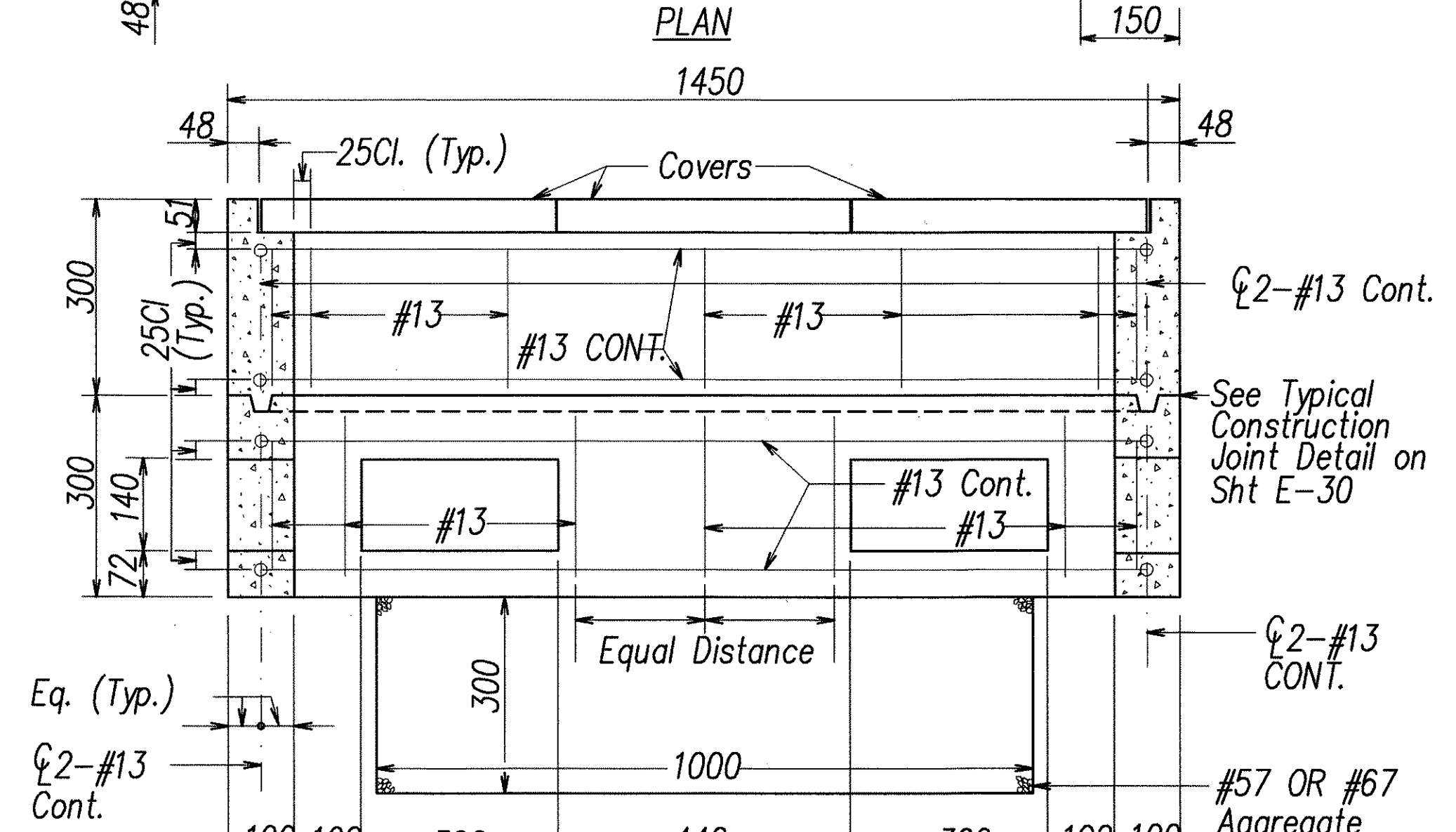
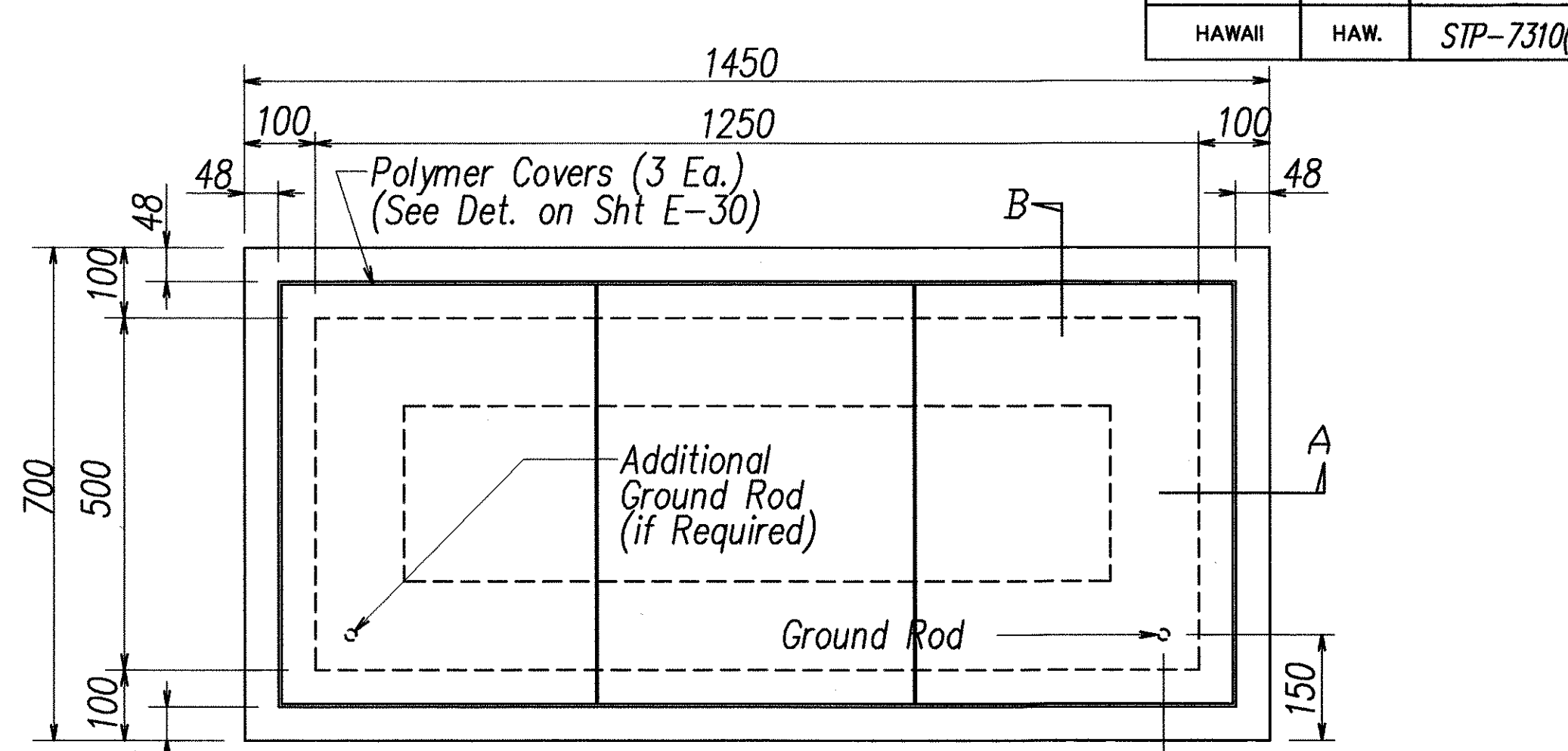
**TYPE "A" PULLBOX
(OLD TYPE "B")**
NOT TO SCALE

NOTE:
See General
Notes on
Sht E-30



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

NOTE:
See General
Notes on
Sht E-30



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

NOTE:
See General
Notes on
Sht E-30

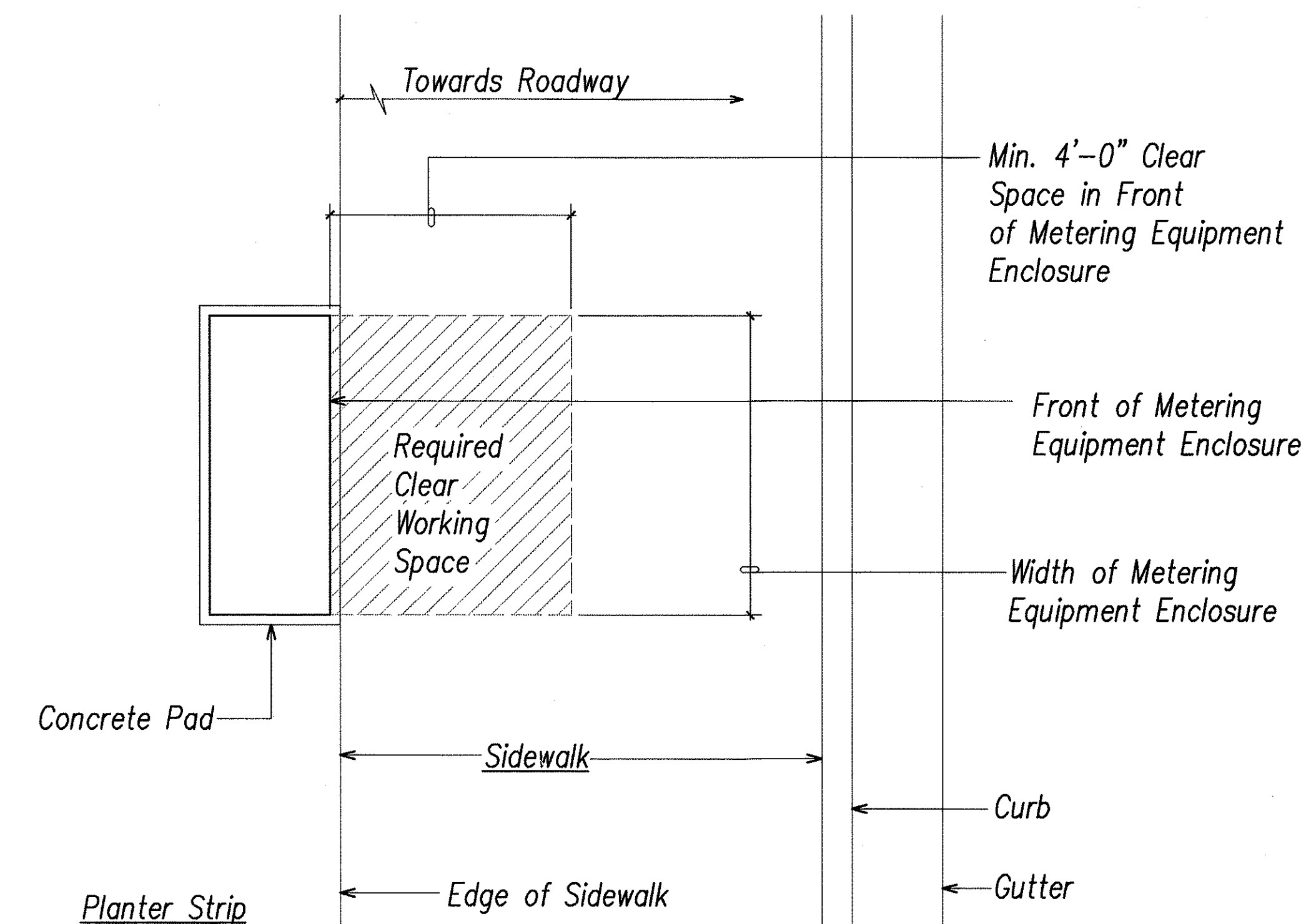
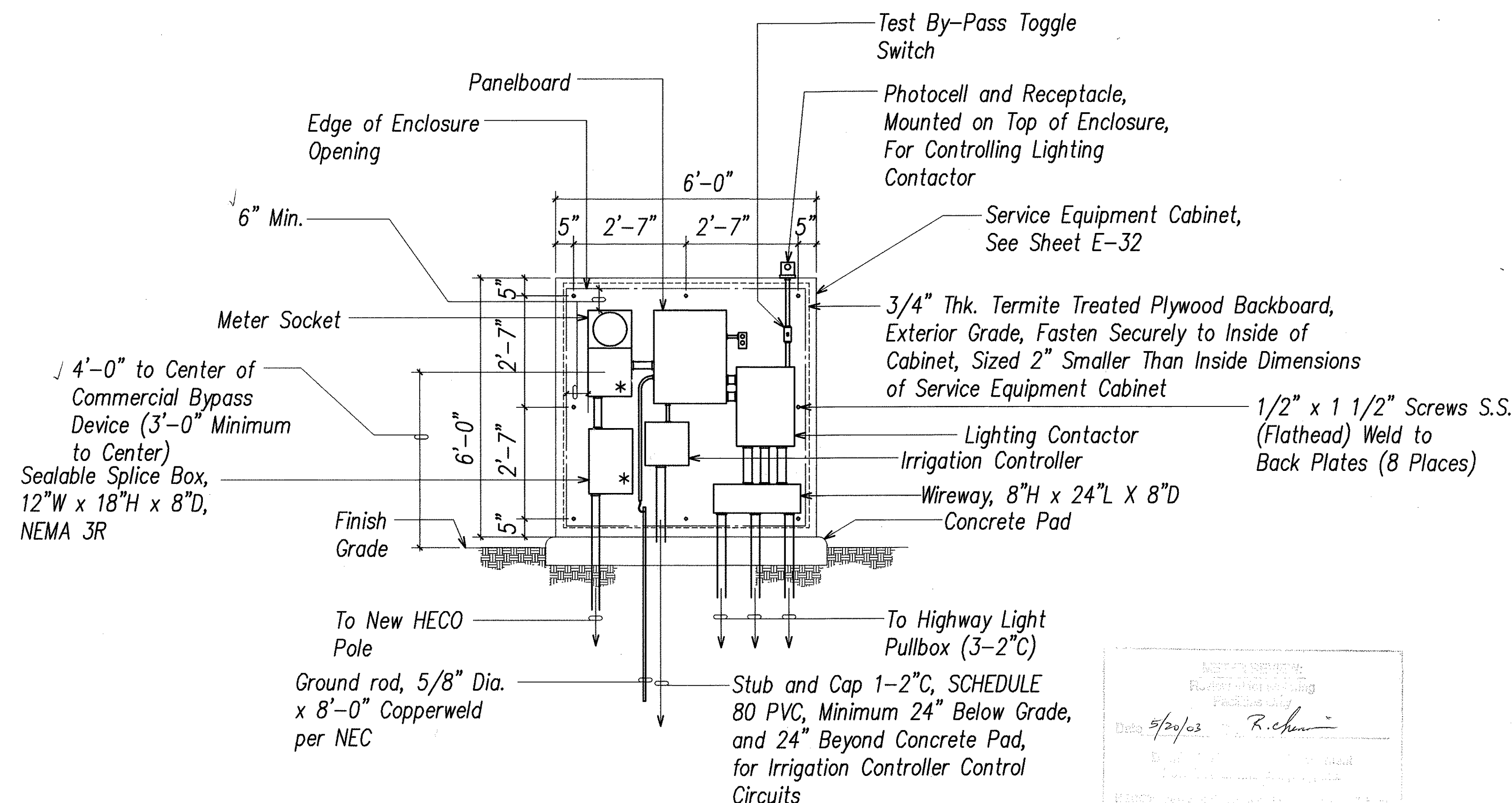
All Dimensions on this
Sheet are in Millimeters

ORIGINAL PLAN
DRAWN BY
DESIGNED BY
QUANTITIES BY
DATE
NO.
LAST SAVE: 05/07/03 16:53:14 BY: M1 E01 S0 T-02-01
2: VACU PROJECTS 2008 v09 22038, sheet

RONALD N. S. HO & ASSOC., INC.
ELECTRICAL ENGINEERS
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.
THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION
Signature
Expiration Date of the License: 04/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
**HIGHWAY LIGHT AND TRAFFIC SIGNAL
PULLBOX DETAILS I**
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)
SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-29 OF 56 SHEETS

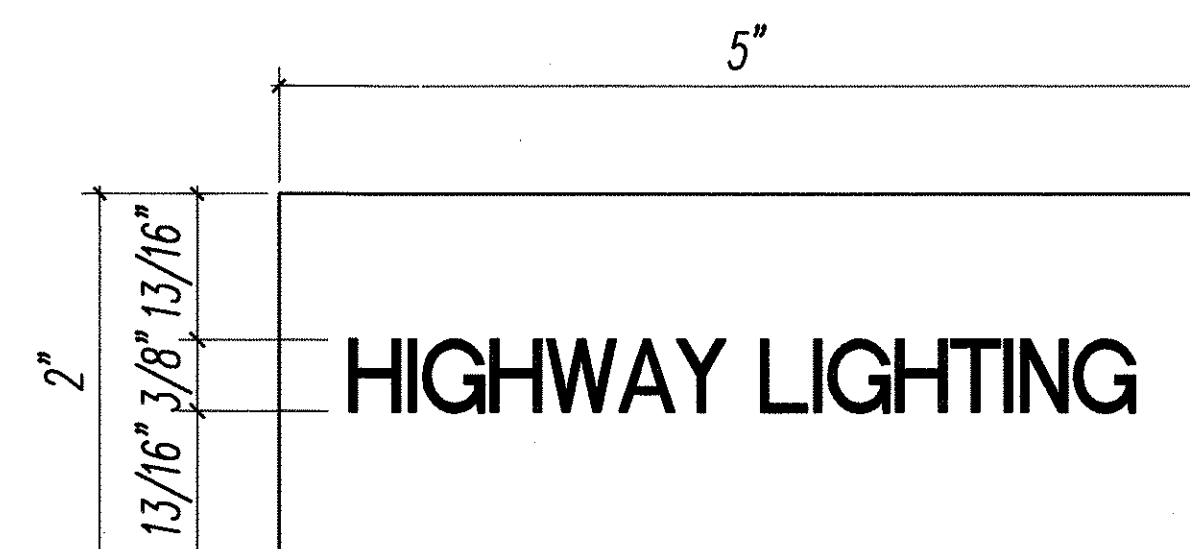
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	163	193



- NOTES:
- "*" Indicates provisions for HECO seals.
 - All equipment enclosure in service equipment cabinet shall be NEMA Type 1.
 - Contractor shall verify equipment enclosure size.

2 METERING EQUIPMENT ENCLOSURE LOCATION PLAN (Near Pole NP14)
E-31 NOT TO SCALE

1 HIGHWAY LIGHTING METERING EQUIPMENT ELEVATION (Near Pole NP14)
E-31 NOT TO SCALE



- NOTES:
- Use 3-ply laminated flexible plastic, black-white-black thickness: black cap sheet - 0.010", white base sheet - 0.052", black base sheet - 0.010".
 - Attach to meter enclosure using Scotch 3 brand very high bond (VHB) double coated acrylic foam tape or equivalent.
 - Letters/numbers shall be 3/8" high, 1/16" stroke (white in color).
 - Letters/numbers area inscribed by cutting through "black cap sheet" to expose white letters/numbers.

3 METER ID TAG DETAIL
E-31 NOT TO SCALE

DRAWING REVIEW

Reviewed for HECO's Facilities Only

Date 5/21/03 By [Signature]

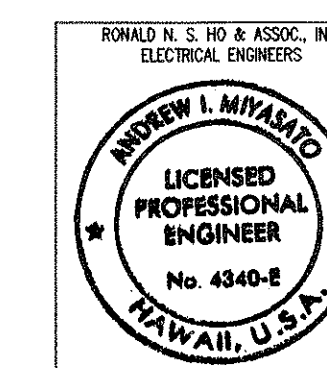
Engineering Department
Hawaiian Electric Company, Inc.

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

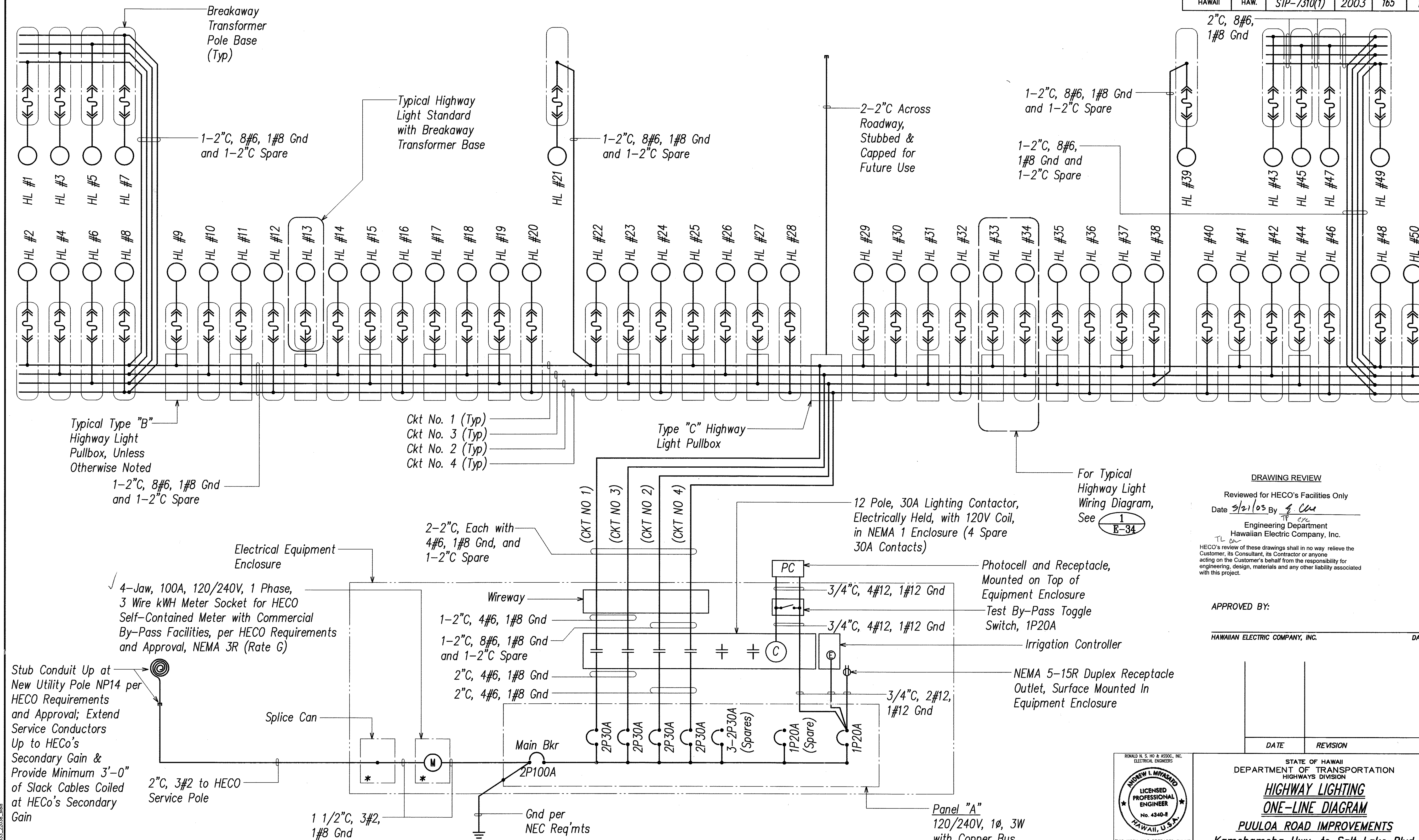


THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION
Signature: Andrew I. Miyasato
Expiration Date of the License: 04/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING METERING EQUIPMENT DETAILS
PULUOIA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED DATE: MAY 2003
SHEET No. E-31 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	165	193



DRAWING REVIEW

Reviewed for HECO's Facilities Only

Date 3/21/03 By *g cm*

Engineering Department

Hawaiian Electric Company, Inc.

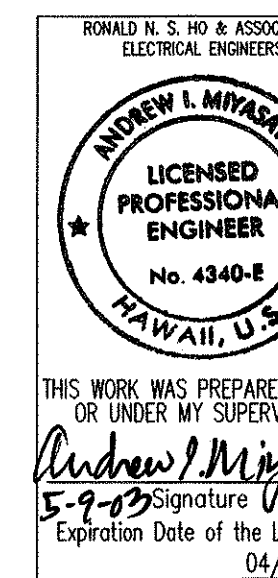
HECO's review of these drawings shall in no way relieve the Customer, its Consultant, its Contractor or anyone acting on the Customer's behalf from the responsibility for engineering, design, materials and any other liability associated with this project.

APPROVED BY:

HAWAIIAN ELECTRIC COMPANY, INC.

DATE

DATE REVISION



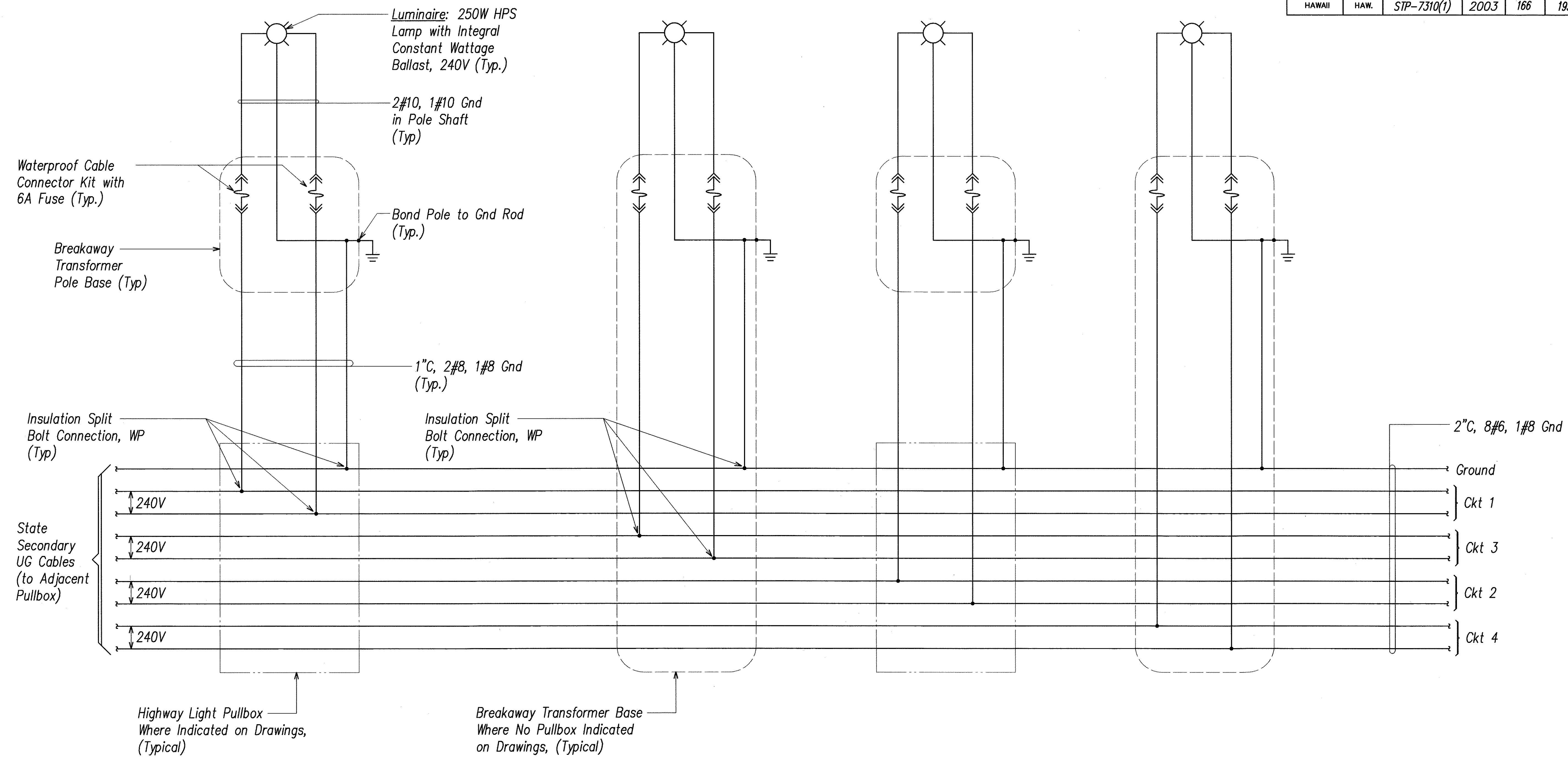
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING
ONE-LINE DIAGRAM
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED

DATE: MAY 2003

SHEET No. E-33 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	166	193



1
E-34 TYPICAL HIGHWAY LIGHT WIRING DIAGRAM
(120/240V UNDERGROUND METERED SYSTEM)

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

LAST SAVE: 06/07/03 @ 16:55:13 BY: AM PLOT SET 1-0-1
C:\WORK\PROJECTS\2003\HAWAII\2003\2003-2004

RONALD W. & TRACY A. ASSOC., INC.
ELECTRICAL ENGINEERS

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Signature: *Andrew I. Mays*

Expiration Date of the License: 04/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TYPICAL HIGHWAY LIGHT WIRING DIAGRAM

PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

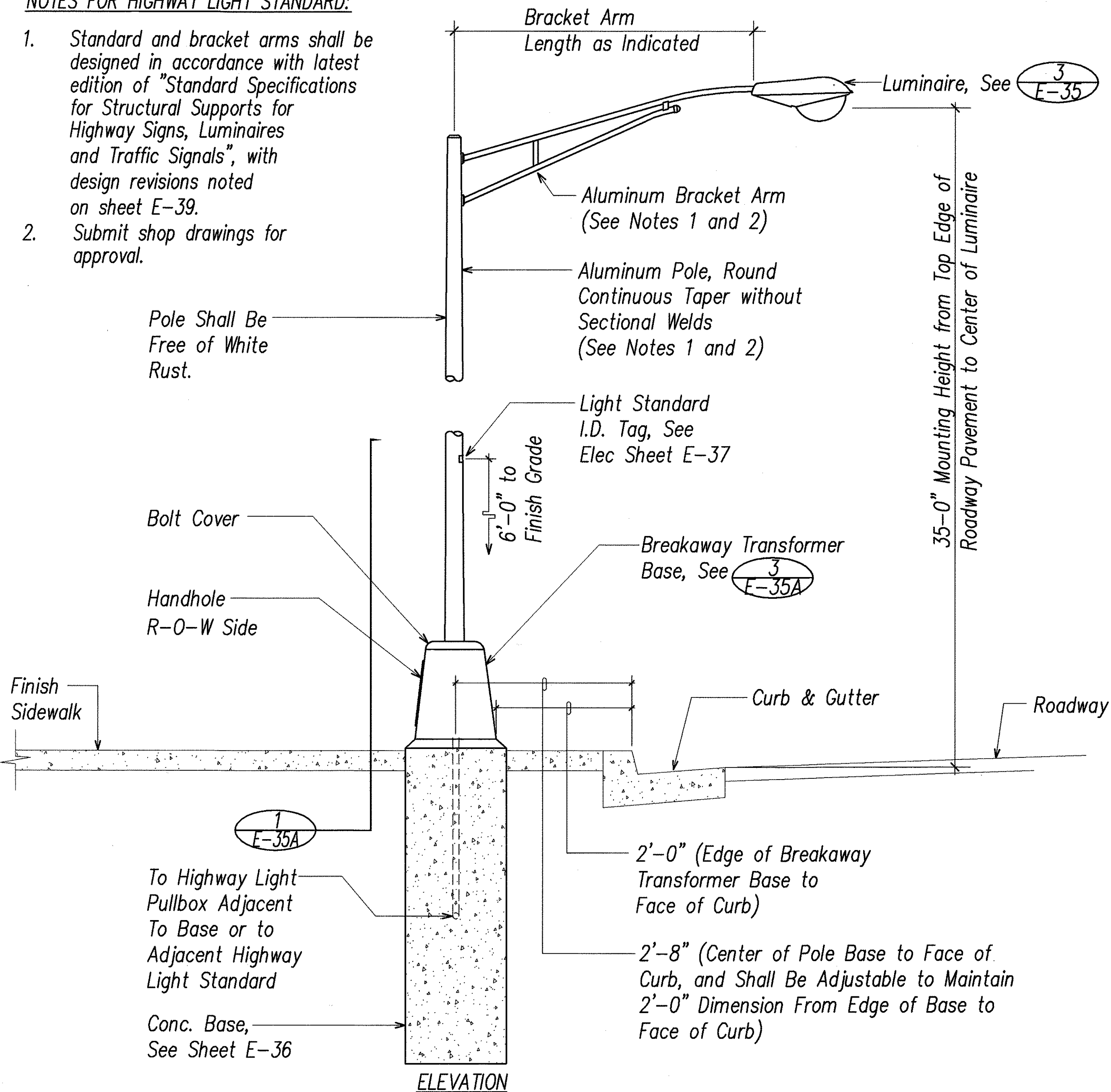
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SHEET No. E-34 OF 56 SHEETS

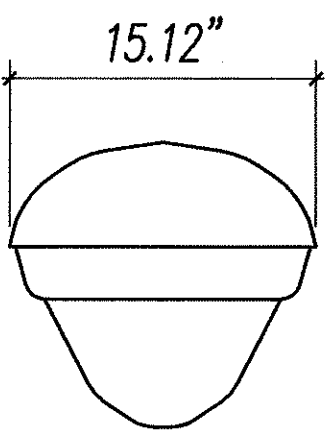
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	167	193

NOTES FOR HIGHWAY LIGHT STANDARD:

- Standard and bracket arms shall be designed in accordance with latest edition of "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", with design revisions noted on sheet E-39.
- Submit shop drawings for approval.



1 HIGHWAY LIGHT STANDARD DETAIL IN SIDEWALK LOCATION
E-35 NOT TO SCALE

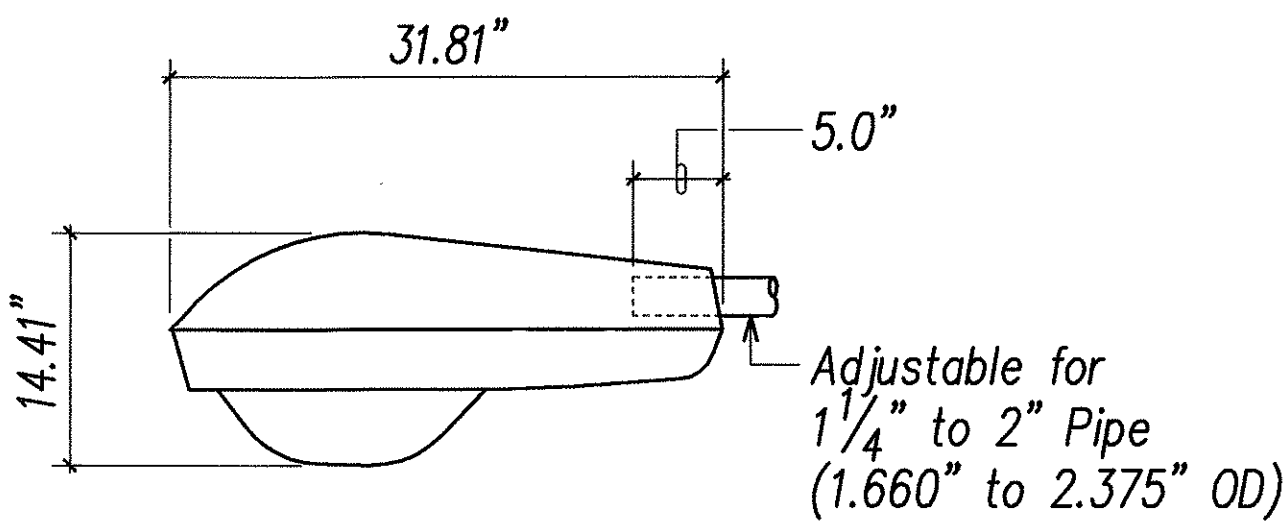


Lamp: 250W HPS, Unless Otherwise Noted
Voltage: 240V, Unless Otherwise Noted
IES Distrib.: Medium, Semi-Cutoff, Type III, Unless Otherwise Noted
EPA: 1.4 Sq Ft (Max)

Note:

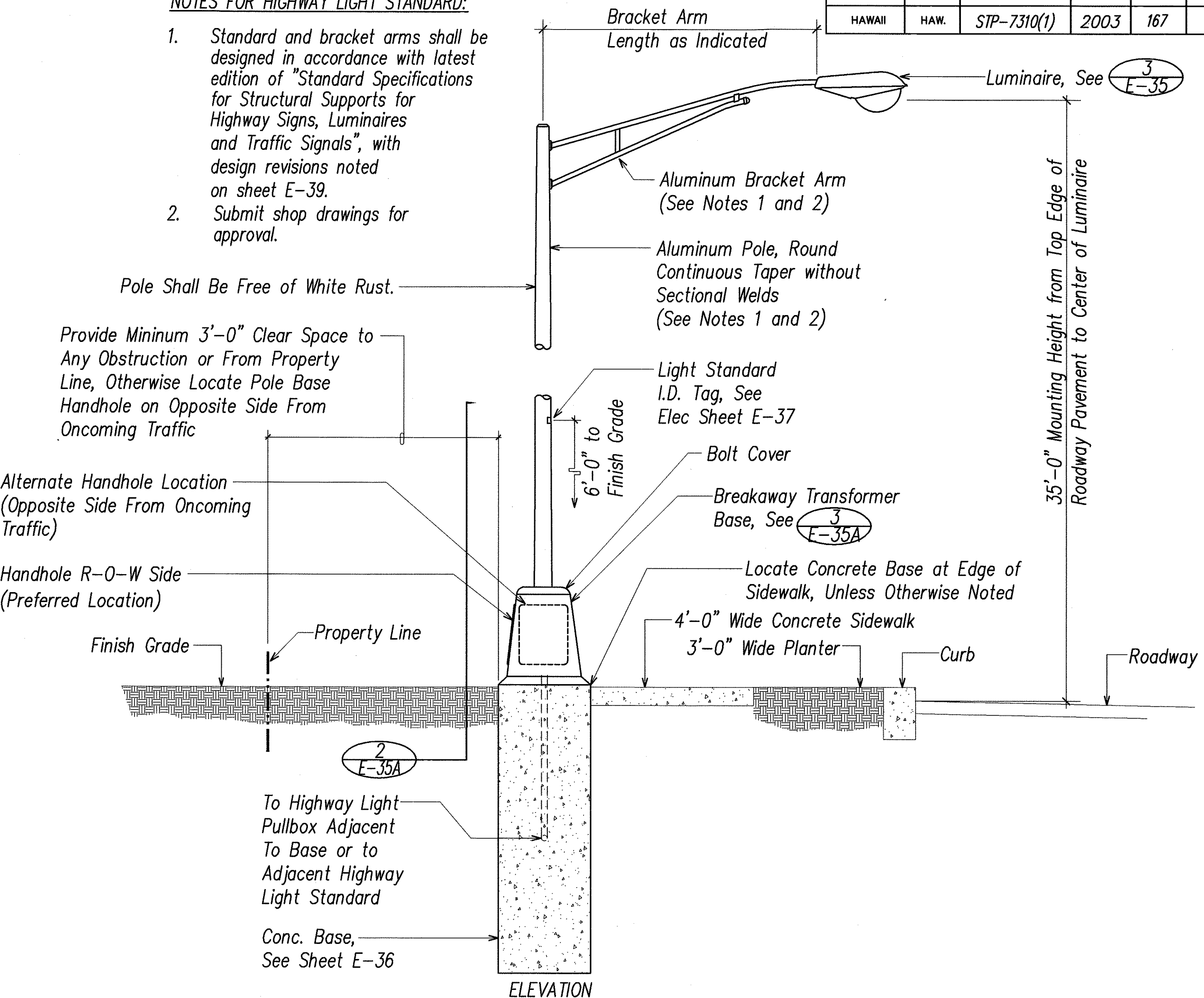
- All dimensions shown are nominal.
- Fixture shall be capable of adding a "house-side" shield, if necessary, after it has been installed.

3 LUMINAIRE DETAIL
E-35 N.T.S.

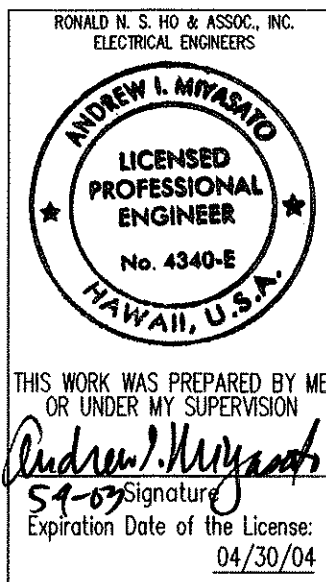


NOTES FOR HIGHWAY LIGHT STANDARD:

- Standard and bracket arms shall be designed in accordance with latest edition of "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", with design revisions noted on sheet E-39.
- Submit shop drawings for approval.



2 HIGHWAY LIGHT STANDARD DETAIL BEHIND SIDEWALK LOCATION
E-35 NOT TO SCALE

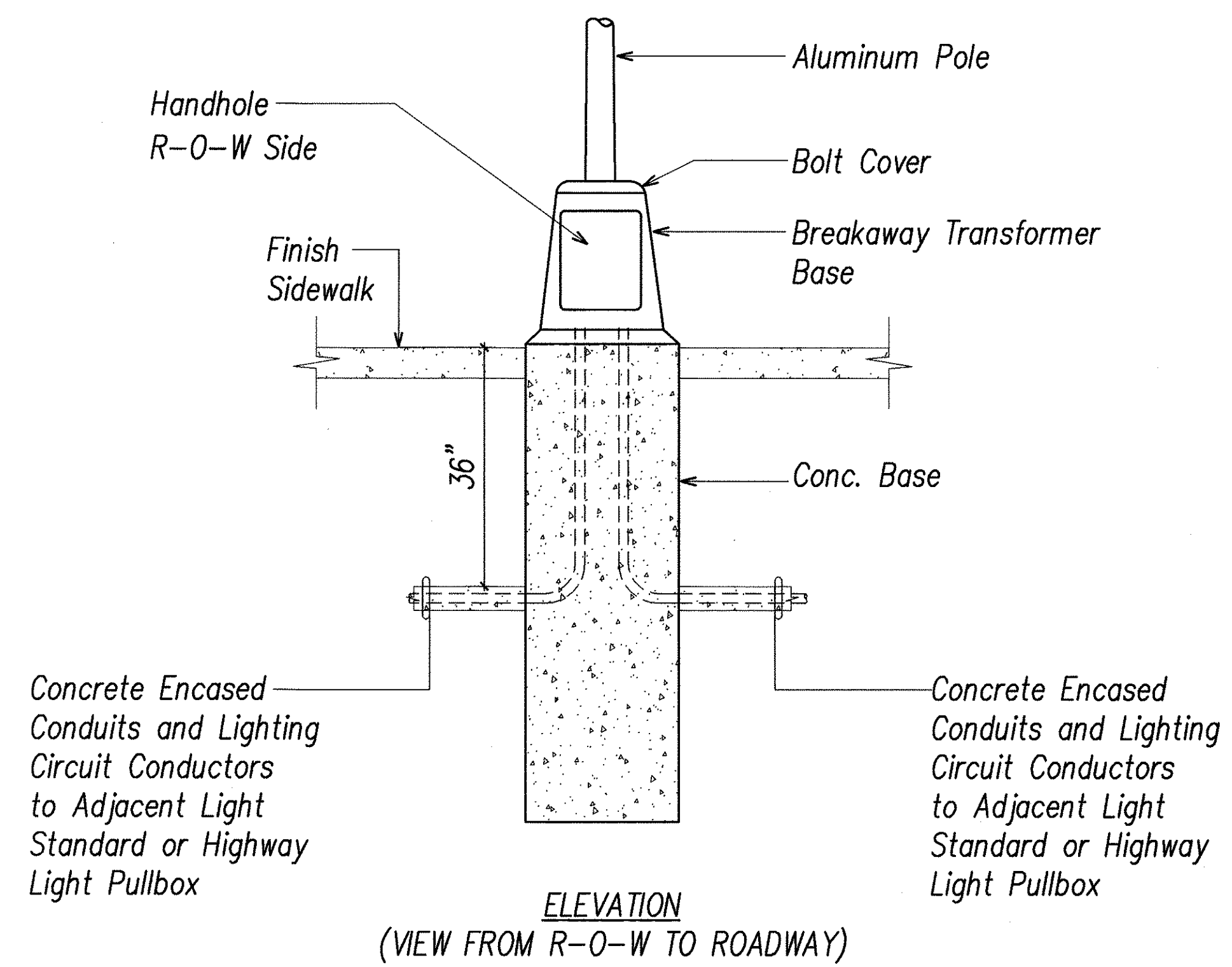


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING SYSTEM DETAILS I

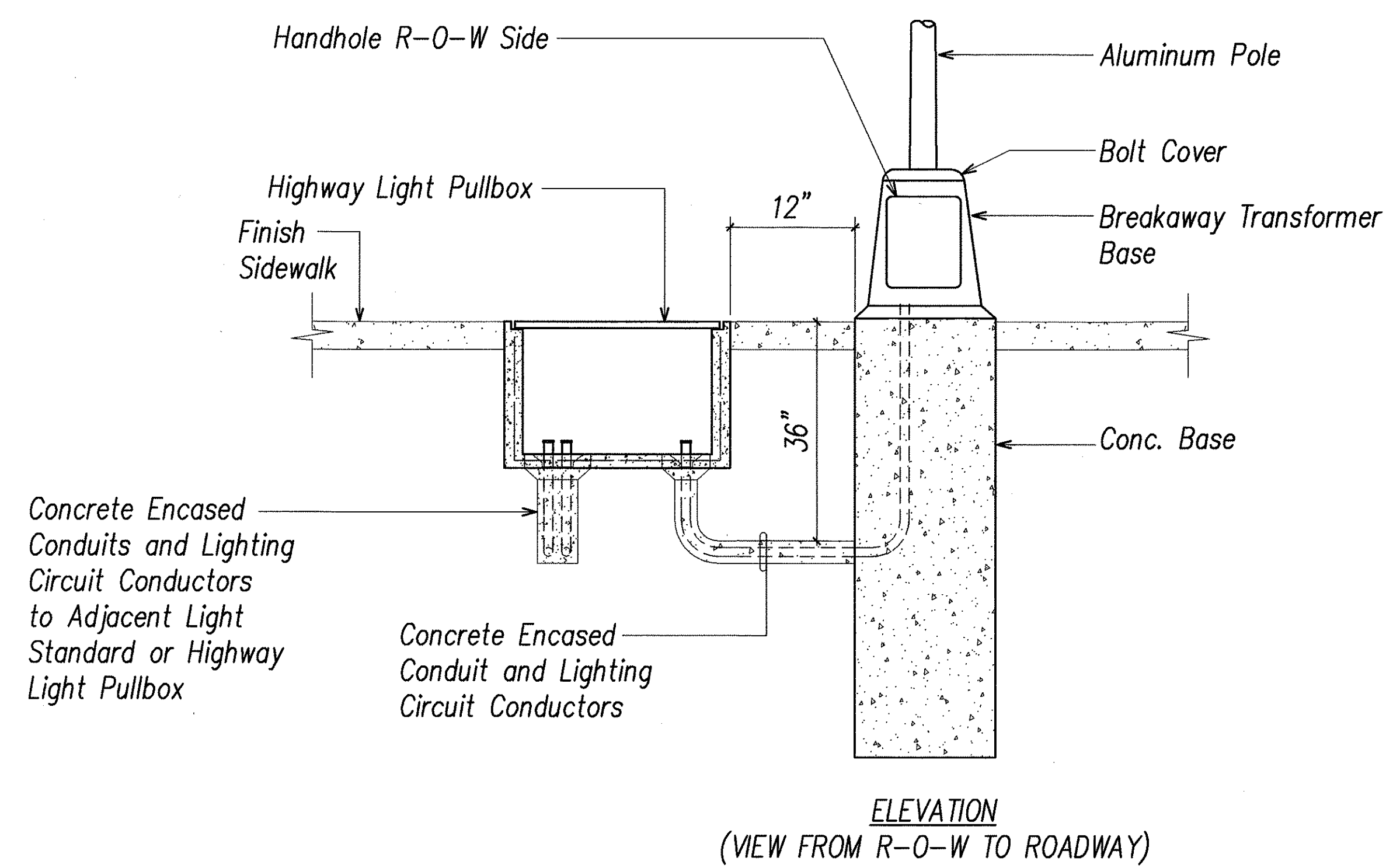
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-35 OF 56 SHEETS

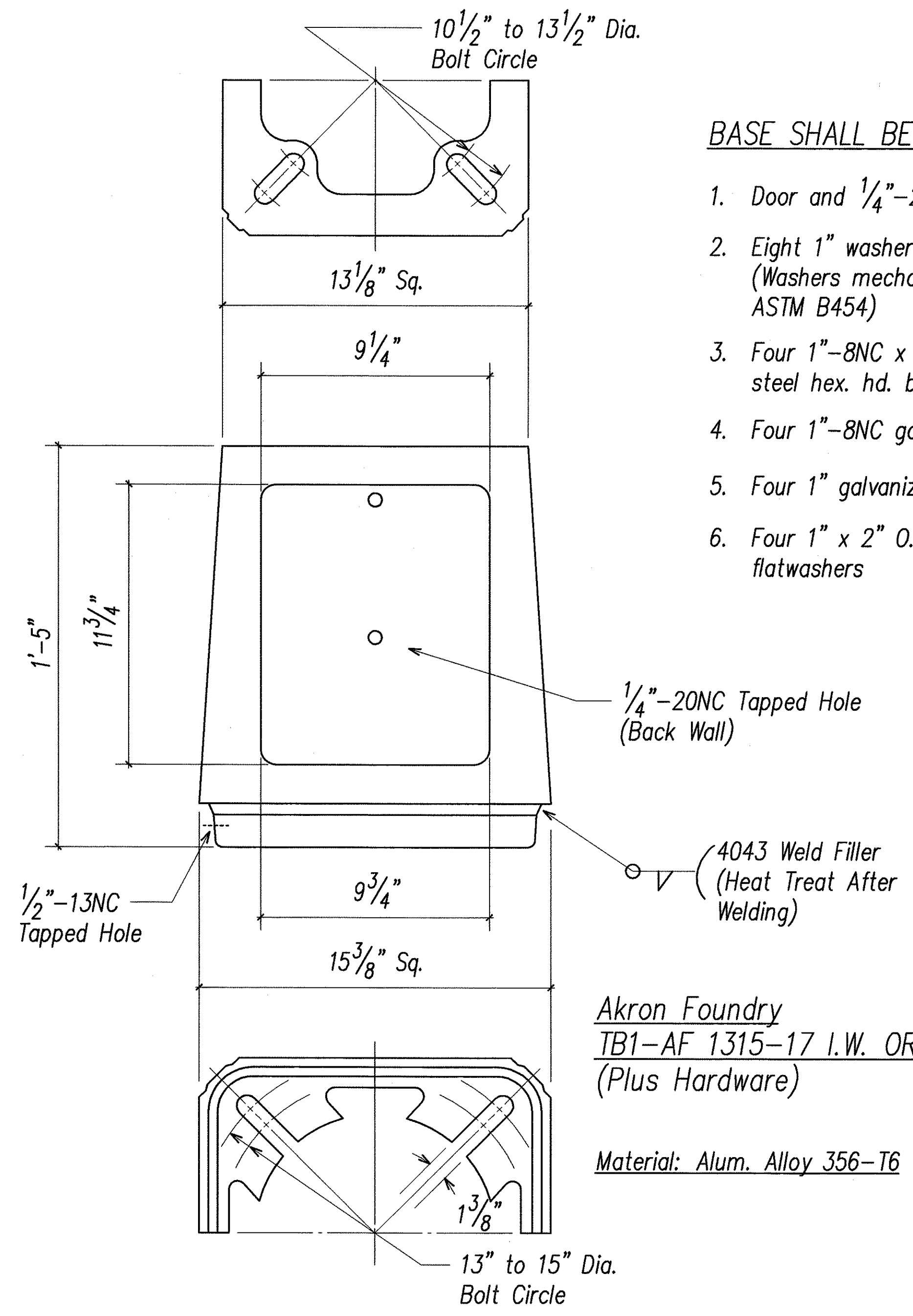
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	168	193



1 TYPE "A" HIGHWAY LIGHT STANDARD WITHOUT PULLBOX DETAIL
E-35A NOT TO SCALE



2 TYPE "B" HIGHWAY LIGHT STANDARD WITH PULLBOX LOCATION DETAIL
E-35A NOT TO SCALE



3 BREAKAWAY TRANSFORMER BASE DETAIL
E-35A NOT TO SCALE

BASE SHALL BE SUPPLIED WITH:

1. Door and 1/4" - 20NC S.S. screw
2. Eight 1" washers 1/2" thick x 2 3/4" O.D. (Washers mechanical galvanized per ASTM B454)
3. Four 1" - 8NC x 3 3/4" long galvanized steel hex. hd. bolts
4. Four 1" - 8NC galvanized steel hex. nuts
5. Four 1" galvanized stl. lock washers
6. Four 1" x 2" O.D. galvanized stl. flatwashers

1/4" - 20NC Tapped Hole (Back Wall)

4043 Weld Filler (Heat Treat After Welding)

Akron Foundry
TB1-AF 1315-17 I.W. OR Equal
(Plus Hardware)

Material: Alum. Alloy 356-T6

SURVEY PLOTTED BY	DATE
DRAWN BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	
APPROVED BY	
LAST SAVE: 06/07/04 16:55:57 BY: 04/30/04	
2: ACADE PROJECTS 2003B V35A 2003B-HAW-0	

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

HIGHWAY LIGHTING SYSTEM DETAILS II

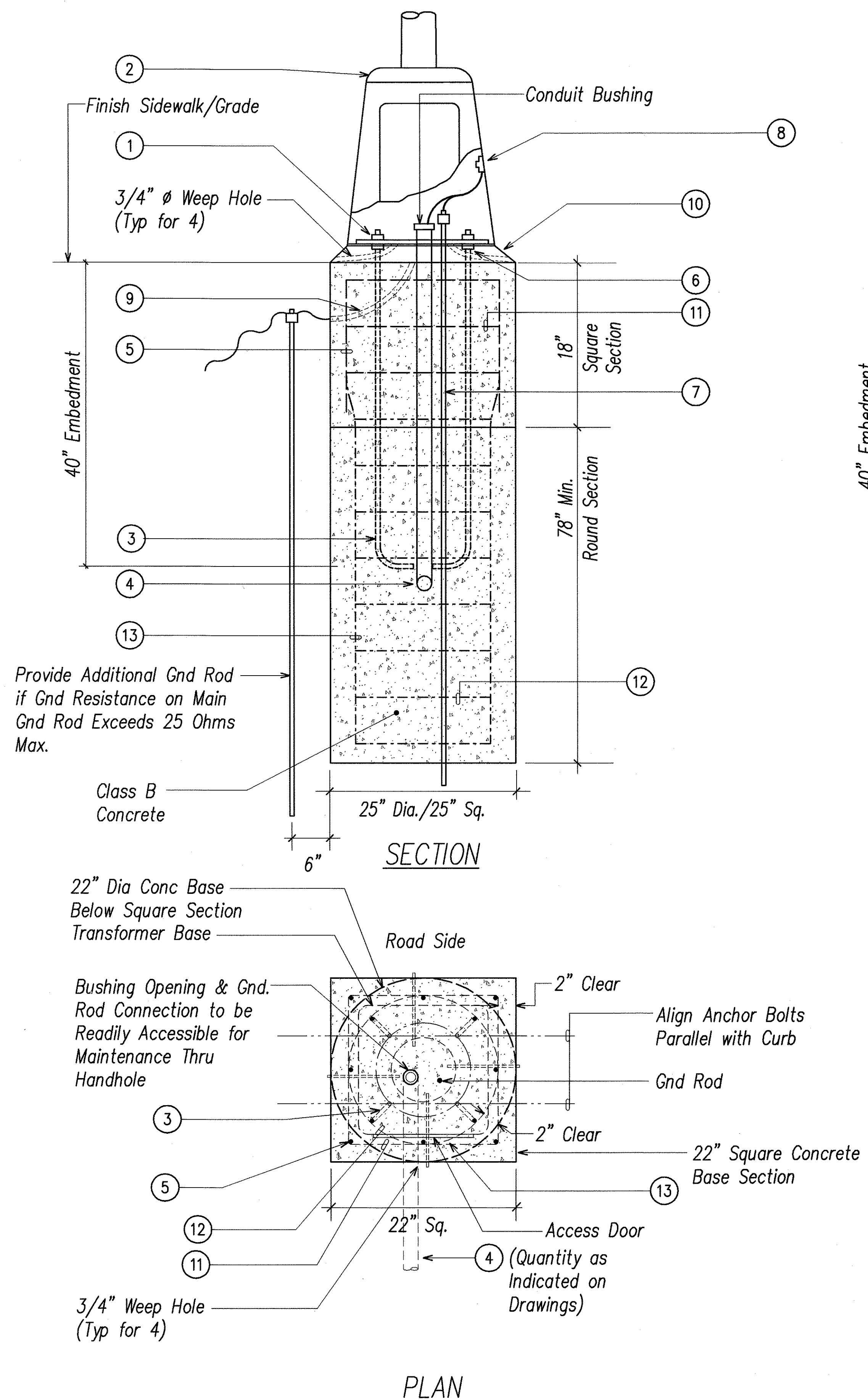
PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-35A OF 56 SHEETS

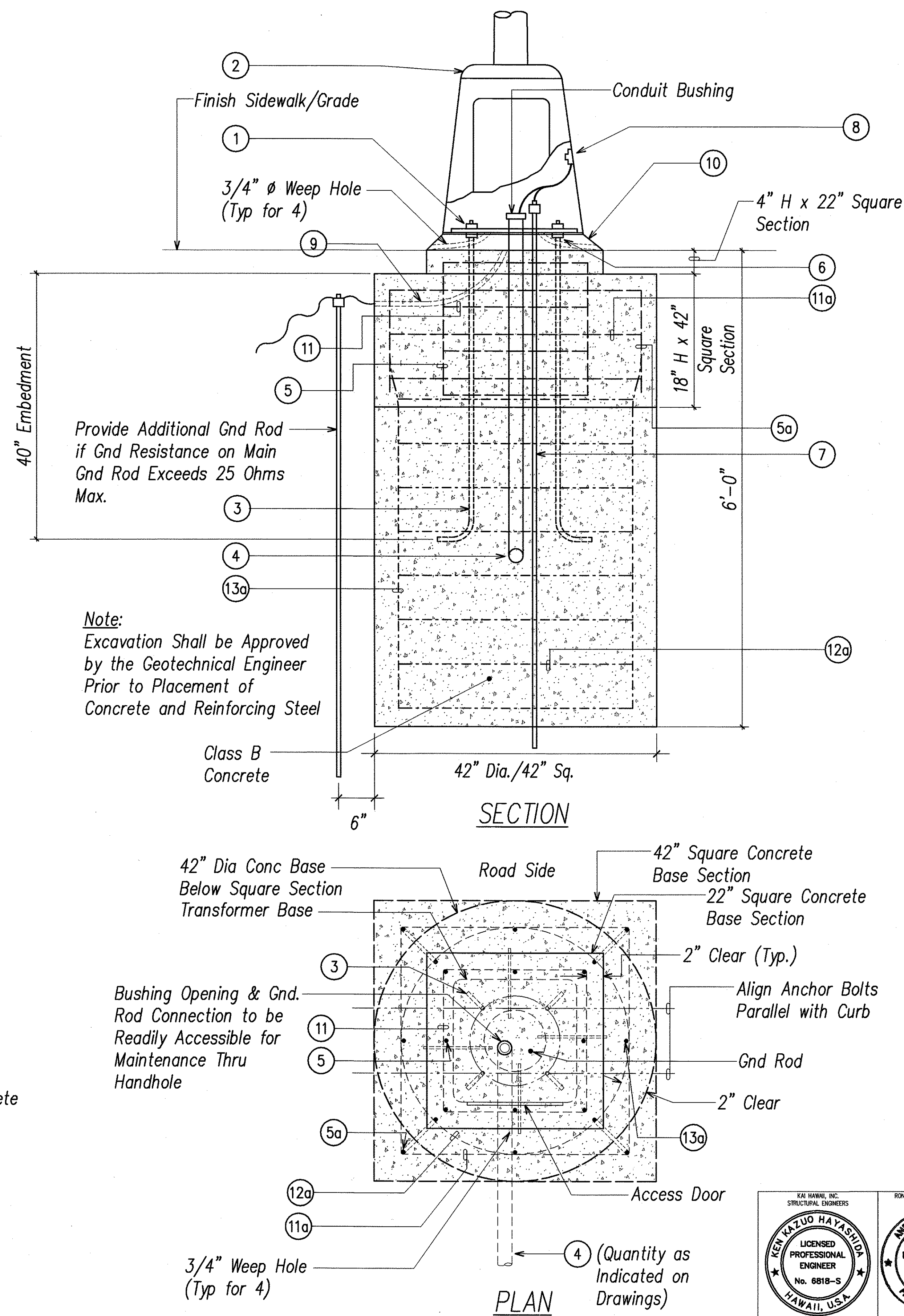
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	169	193

MATERIAL LIST:

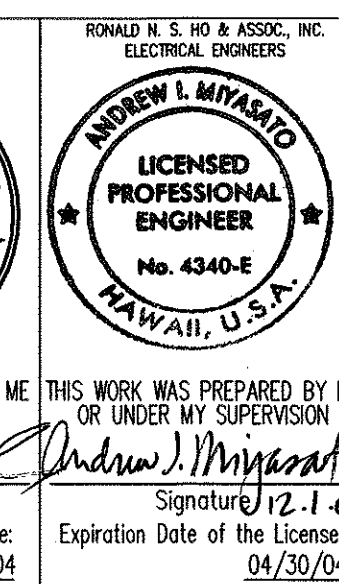
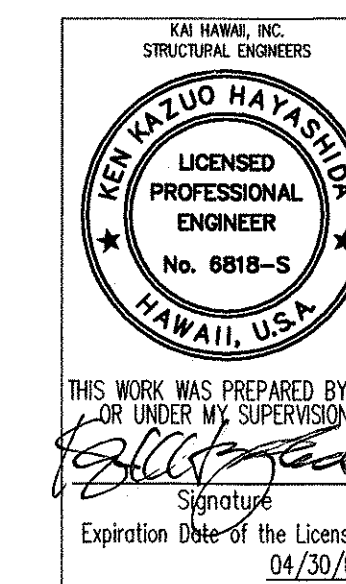
- ① Pole base 4-bolts, washer & nuts
- ② Pole base bolt cover
- ③ 4-1", 40" Embedment, Galv. anchor bolts; AASHTO M314 GR55 with 9" hook
- ④ PVC Schd. 40 with 3" Conc. Jacket, Quantity as Indicated on Drawings
- ⑤ 4#5 Verticals at Square Section
- 5a 4#5 Verticals at Square Section
- ⑥ Leveling nuts and Washers (4)
- ⑦ Ground rod 3/4" x 10'-0" copper clad
- ⑧ Grounding lug (Opposite handhole)
- ⑨ 1/2" Dia. PVC sleeve
- ⑩ 3" Max. Grout after plumbing pole
- ⑪ #3 \square @ 12" O.C.
- 11a #4 \square @ 6" O.C. at Square Section
- ⑫ #3 \circ @ 12" O.C.
- 12a #4 \circ @ 6" O.C.
- ⑬ 8#4 Verticals (\)
- 13a 8#6 Verticals (\)



1
E-36 TYPE "I" LIGHT STANDARD CONCRETE FOUNDATION DETAIL
N.T.S.



2
E-36 TYPE "II" LIGHT STANDARD CONCRETE FOUNDATION DETAIL
N.T.S.



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
HIGHWAY LIGHTING SYSTEM DETAILS III

PULUOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-36 OF 56 SHEETS

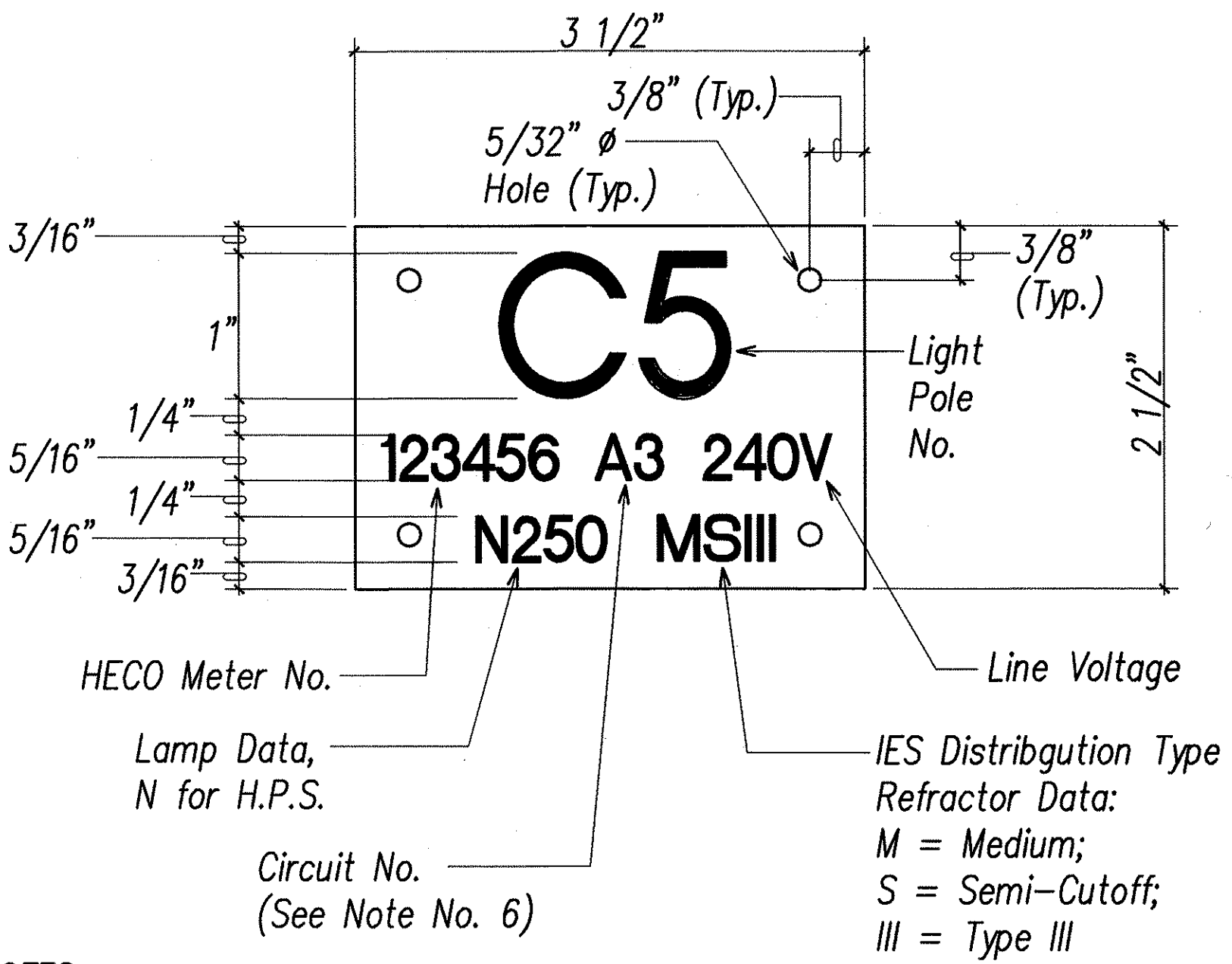
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	170	193

HIGHWAY LIGHT ID TAG SCHEDULE

ID TAG ITEMS						ID TAG ITEMS					
LIGHT POLE NO.	HECO METER NO.	CIRCUIT NO.	LINE VOLTAGE	LAMP DATA	REFRACTOR DATA	LIGHT POLE NO.	HECO METER NO.	CIRCUIT NO.	LINE VOLTAGE	LAMP DATA	REFRACTOR DATA
1	123456	1	240V	N250	MSIII	31	123456	2	240V	N250	MSIII
2	123456	1	240V	N250	MSIII	32	123456	4	240V	N250	MSIII
3	123456	3	240V	N250	MSIII	33	123456	1	240V	N250	MSIII
4	123456	3	240V	N250	MSIII	34	123456	3	240V	N250	MSIII
5	123456	2	240V	N250	MSIII	35	123456	2	240V	N250	MSIII
6	123456	2	240V	N250	MSIII	36	123456	4	240V	N250	MSIII
7	123456	4	240V	N250	MSIII	37	123456	1	240V	N250	MSIII
8	123456	4	240V	N250	MSIII	38	123456	3	240V	N250	MSIII
9	123456	1	240V	N250	MSIII	39	123456	2	240V	N250	MSIII
10	123456	3	240V	N250	MSIII	40	123456	4	240V	N250	MSIII
11	123456	2	240V	N250	MSIII	41	123456	1	240V	N250	MSIII
12	123456	4	240V	N250	MSIII	42	123456	3	240V	N250	MSIII
13	123456	1	240V	N250	MSIII	43	123456	1	240V	N250	MSIII
14	123456	3	240V	N250	MSIII	44	123456	2	240V	N250	MSIII
15	123456	2	240V	N250	MSIII	45	123456	3	240V	N250	MSIII
16	123456	4	240V	N250	MSIII	46	123456	4	240V	N250	MSIII
17	123456	1	240V	N250	MSIII	47	123456	2	240V	N250	MSIII
18	123456	3	240V	N250	MSIII	48	123456	1	240V	N250	MSIII
19	123456	2	240V	N250	MSIII	49	123456	4	240V	N250	MSIII
20	123456	4	240V	N250	MSIII	50	123456	3	240V	N250	MSIII
21	123456	1	240V	N250	MSIII						
22	123456	3	240V	N250	MSIII						
23	123456	2	240V	N250	MSIII						
24	123456	4	240V	N250	MSIII						
25	123456	1	240V	N250	MSIII						
26	123456	3	240V	N250	MSIII						
27	123456	2	240V	N250	MSIII						
28	123456	4	240V	N250	MSIII						
29	123456	1	240V	N250	MSIII						
30	123456	3	240V	N250	MSIII						

NOTES:

- Verify highway light pole number with State D.O.T. prior to fabrication of I.D. tags.
- Verify HECO meter number with State D.O.T. and HECO prior to fabrication of I.D. tags.



- NOTES:
- Use 3 ply laminated flexible plastic, black-white-black. thickness: black cap sheet-0.010", white base sheet-0.052", black base sheet-0.010".
 - Light pole number size shall be 1" high and engraved 1/8" wide, white in color (number as required).
 - Nomenclature size shall be 5/16" high and engraved 1/32" wide, white in color (meter number, circuit number, line voltage, lamp data and refractor data as required).
 - Attach to aluminum pole with no. 8 stainless steel, 1/2" long drive screws in 1/8" drill hole.
 - Numbers and letters are inscribed by cutting through "black cap sheet" to expose "white letters".
 - Assign circuit number (letter indicates panelboard, number indicates circuit).
 - Contractor to verify all items of I.D. tag with State D.O.T. prior to fabrication.

1
E-37
HIGHWAY LIGHT I.D. TAG DETAIL
NOT TO SCALE

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

LAST SAVE: 11/28/03 8:08:56:37 PM PLOT SIZE: 11x17
2: \ACAD\PROJECTS\2003\EST-22038.dwg

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

ANDREW L. MINAYTO
LICENSED PROFESSIONAL ENGINEER
No. 4340-E
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION

Signature: Andrew L. Minayto
Expiration Date of the License: 04/30/04

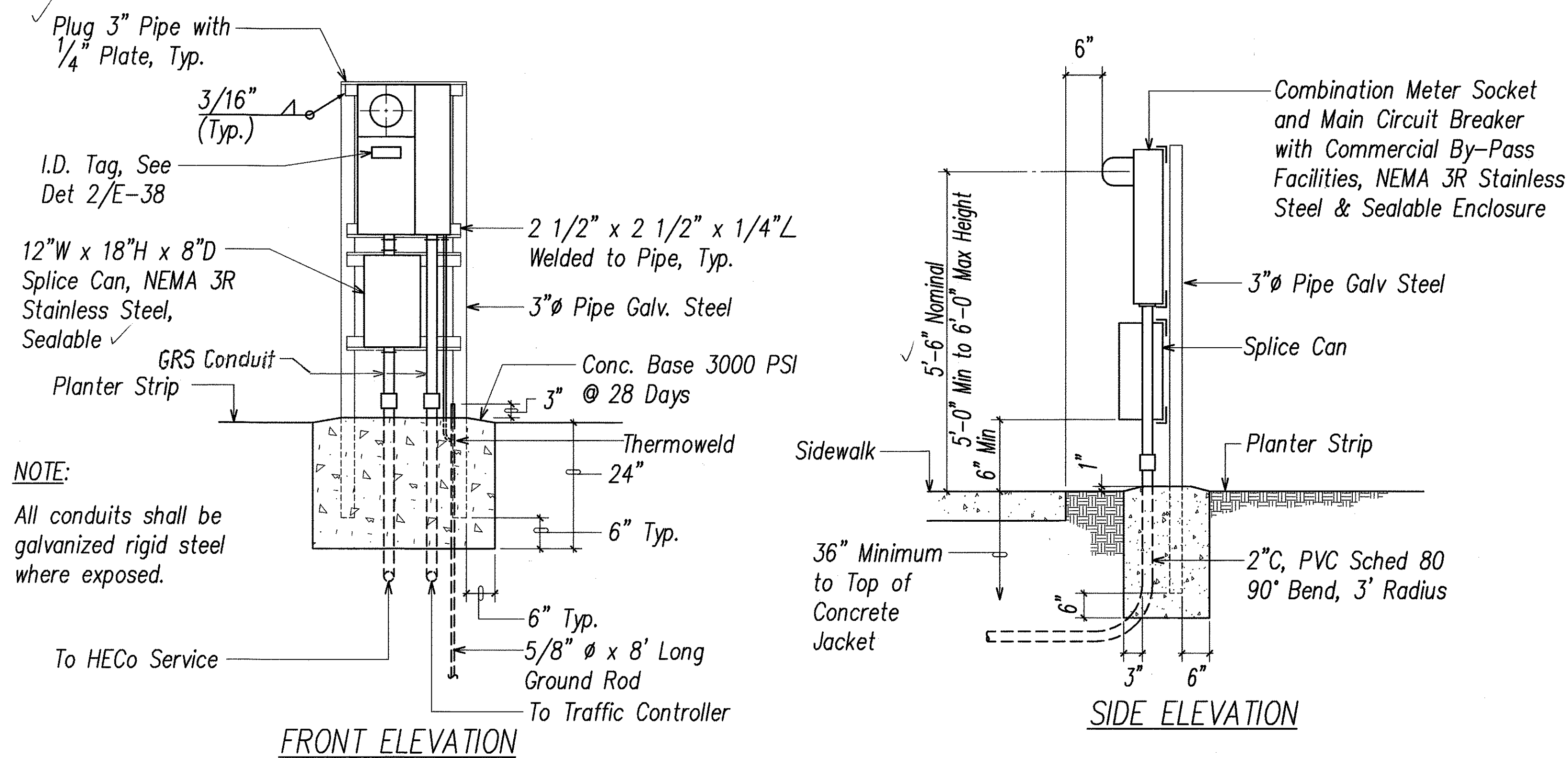
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

HIGHWAY LIGHT ID TAG DETAILS

PULUOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

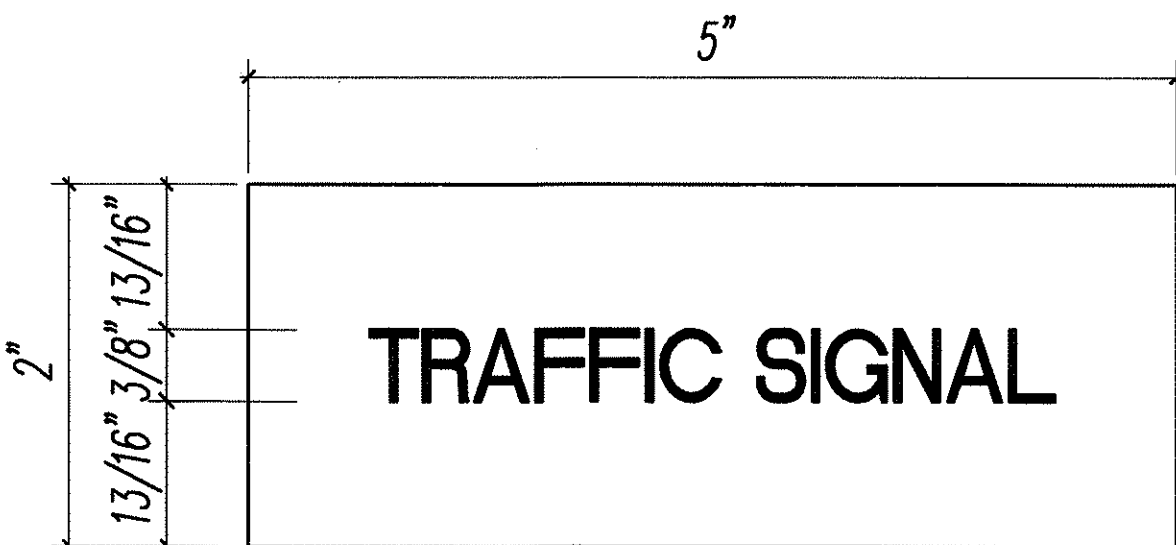
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DATE: MAY 2003

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	171	193

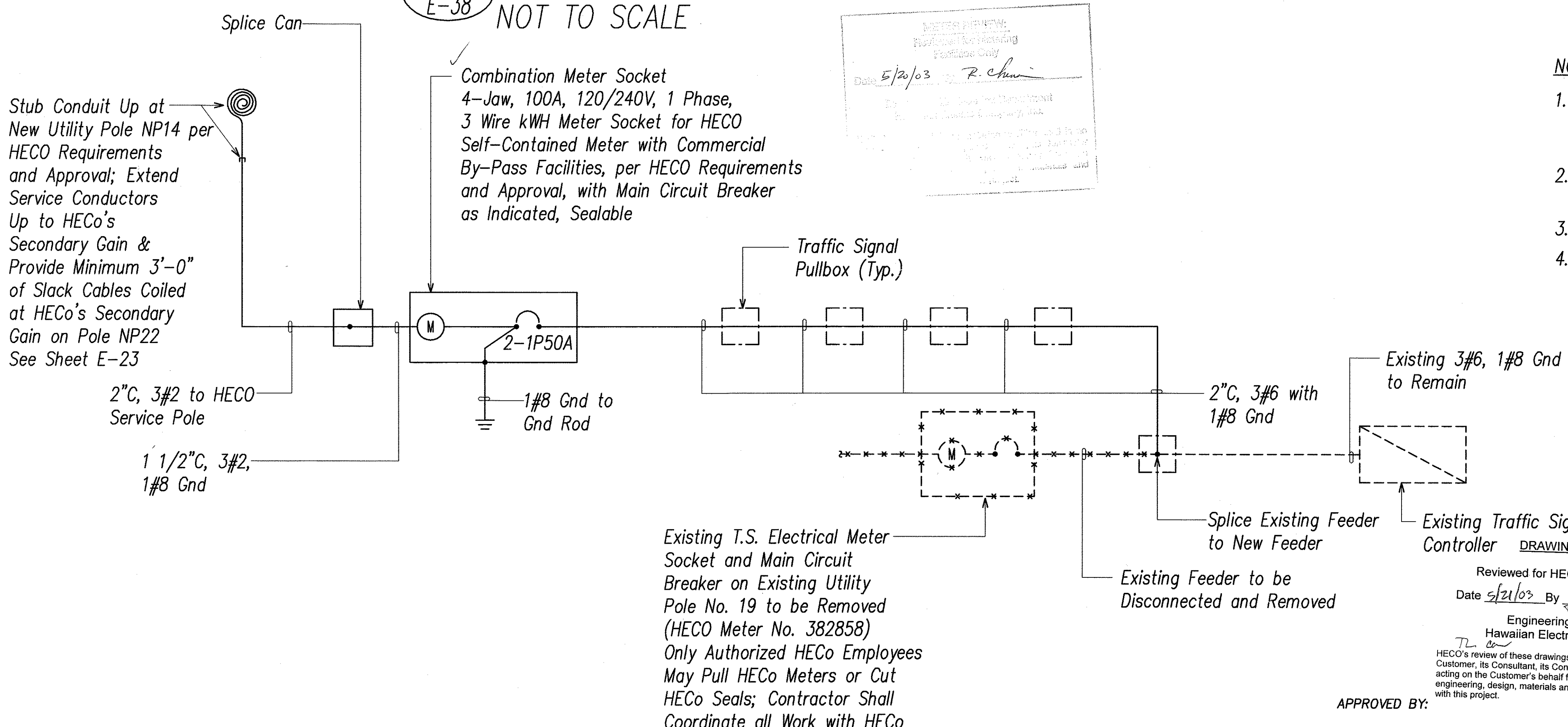


NOTE:
All conduits shall be galvanized rigid steel where exposed.

- TRAFFIC SIGNAL SYSTEM METERING EQUIPMENT NOTES:**
- Contractor shall make all electrical connection to controller, provide 2-1P50A breakers, ground and 2" conduit.
 - All conduits to contain a polyolefin pull line. (Jet Line Cat. #232 or Equiv)
 - Pedestal shall be hot-dipped galvanized after fabrication.
 - All fastening bolts, nuts & washers shall be stainless steel. Provide one coat shop primer & two coats of acrylic enamel finish, color to match controller cabinet.
 - Provide 4'-0" clearance in front of meter face.



1
E-38 **TRAFFIC SIGNAL SYSTEM METERING EQUIPMENT DETAILS**
NOT TO SCALE



- NOTES:**
- Use 3-ply laminated flexible plastic, black-white-black thickness: black cap sheet - 0.010", white base sheet - 0.052", black base sheet - 0.010".
 - Attach to meter enclosure using Scotch 3 brand very high bond (VHB) double coated acrylic foam tape or equivalent.
 - Letters/numbers shall be 3/8" high, 1/16" stroke (white in color).
 - Letters/numbers area inscribed by cutting through "black cap sheet" to expose white letters/numbers.

2
E-38 **METER ID TAG DETAIL**
NOT TO SCALE

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

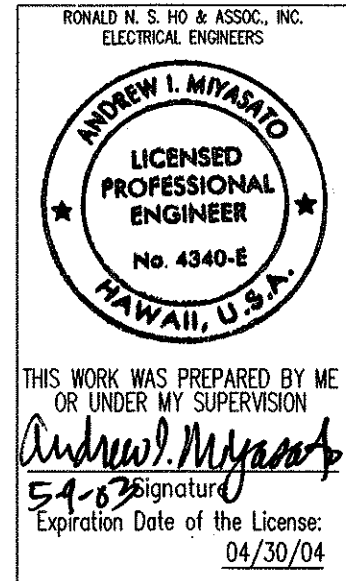
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TRAFFIC SIGNAL SERVICE ONE-LINE DIAGRAM

APPROVED BY:

HAWAIIAN ELECTRIC COMPANY, INC.

DATE



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**TRAFFIC SIGNAL METERING
EQUIPMENT DETAILS**

PULUOA ROAD IMPROVEMENTS

Kamehameha Hwy. to Salt Lake Blvd.

Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED

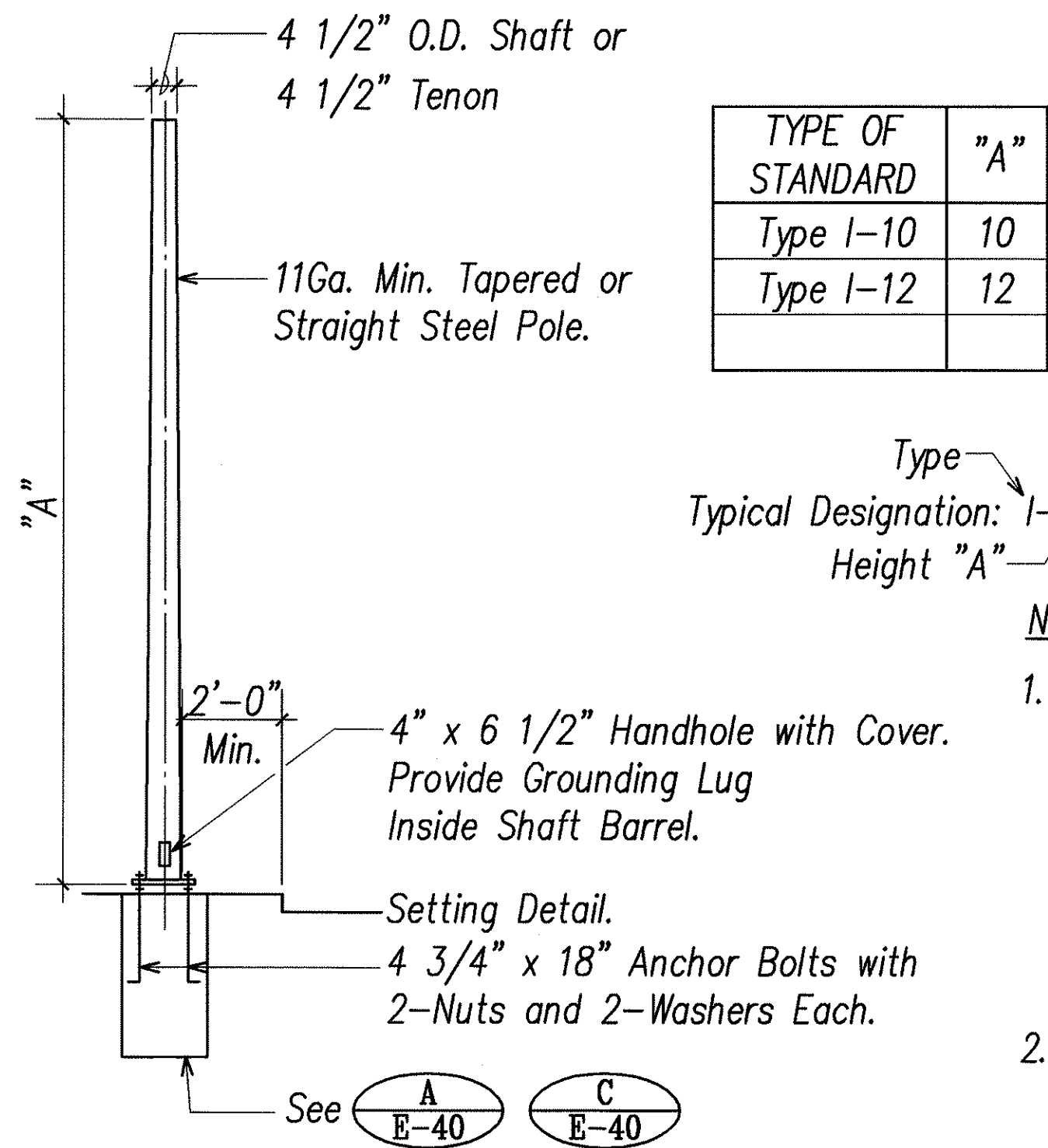
DATE: MAY 2003

SHEET No. E-38 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	172	193

NEW DESIGN REQUIREMENTS FOR LUMINAIRES, POLE STANDARDS AND TRAFFIC SIGNAL STANDARDS
(Highway Lighting Luminaires, Pole Standards, Bracket Arms and Traffic Signal Standards and Mast Arms Being Furnished for This Project Shall Conform with the New Design Requirements noted Below)

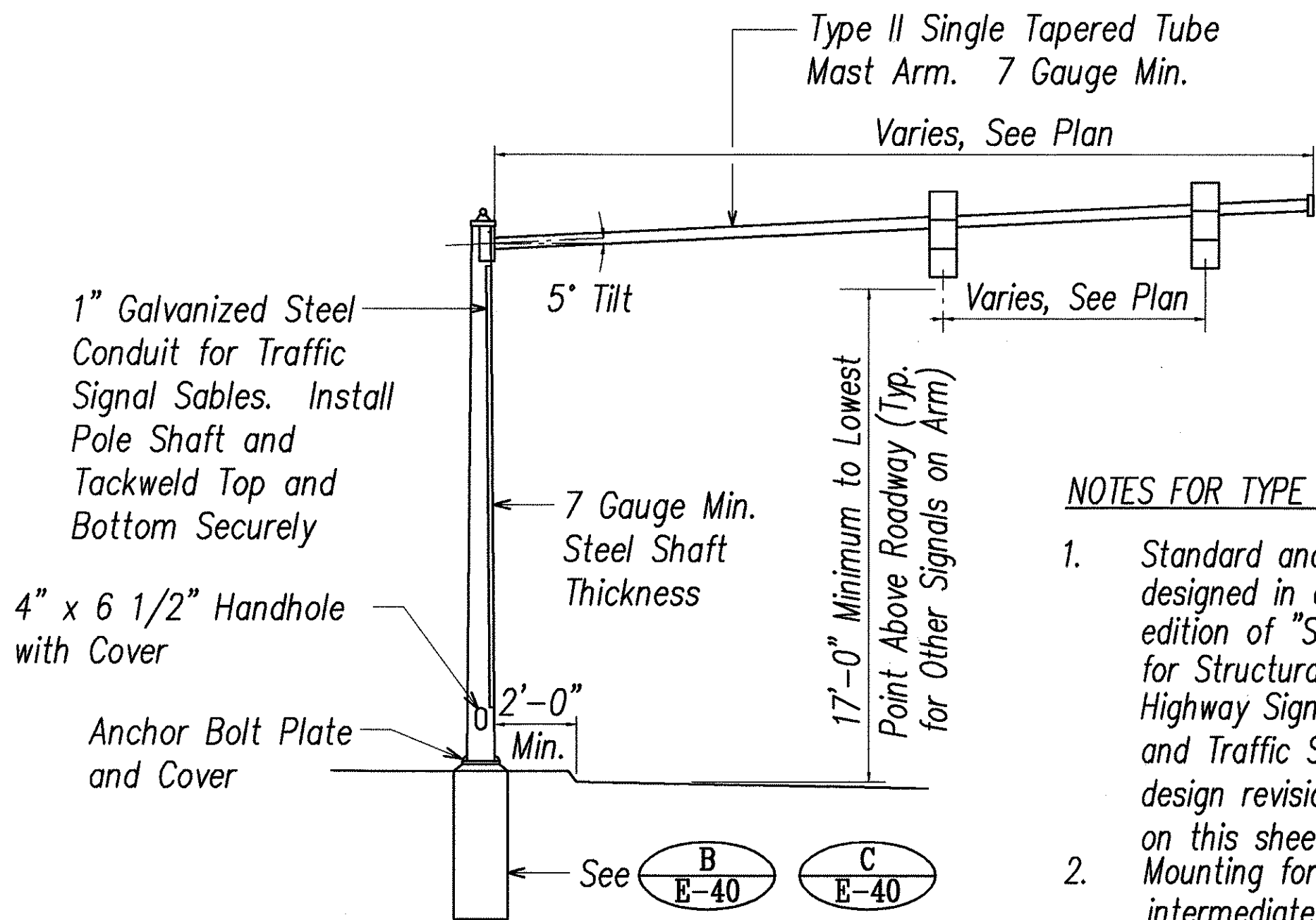
- Equipment manufacturers providing structural supports for Luminaires and Traffic Signals, the following design parameters to be included in the design of the project materials.
- Modifications to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 4th Edition, 2002 Interim Revisions, Published by the American Association of State Highway and Transportation Officials.
- Basic Wind Speed [Article 3.8.2] to determine the design wind pressure shall be 105 mph. For unusual or differing exposure conditions, the basic wind speed should be increased using rational procedures and sound engineering judgement. Alternatively, the design wind pressure may be increased by using a higher Wind Importance Factor [Table 3-2] corresponding to a recurrence interval of at least one level greater than recommended.
- Wind Importance Factor [Article 3.8.3] noted in Table 3-2 used to determine the design wind pressure for overhead cantilevered support structures over:
 - Freeways shall be based on a recurrence interval of 100 years
 - Ramps and other highways with "high" ADT shall be based on a recurrence interval of 100 years unless otherwise directed.
- Height and Exposure Factor [Article 3.8.4]. For sign and luminaire support structures on bridges, the height and exposure factor shall be determined based on the maximum height they are above the surrounding ground. For severe exposure conditions such as along the coastline, the factor shall be increased based on the latest ANSI/ASCE Standard No. 7, Minimum Design Loads for Buildings and Other Structures.
- Fatigue Importance Factors [Article 11.6] noted in Table 11-1 for overhead cantilevered sign, traffic signal and luminaire support structures shall be based on the following:
 - Fatigue Category I - For all structures where failure would result in the structure falling onto the travel way.
 - Fatigue Category II - For all others.
- Galloping [Article 11.7.1]. Overhead cantilevered sign and 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]. Overhead cantilevered sign, traffic signal and high-level lighting support structures shall be designed to resist an equivalent static natural wind gust pressure. For unusual or differing exposure conditions, the equivalent static natural wind gust pressure should be increased using references noted in the specifications.
- Truck-Induced Gust [Article 11.7.4, Interim 2002]. Overhead cantilevered sign and traffic signal support structures shall be designed to resist an equivalent static truck gust pressure range based on a truck speed of 65 mph. At the option of the State of Hawaii, Department of Transportation, a lower truck speed maybe used in areas with design speeds not exceeding 45 mph.
- Equipment manufacturers providing structural supports for Luminaires and Traffic Signals, Is responsible to provide the Engineer with any information that will impact the current foundation design.



NOTES FOR TYPE I STANDARD:

- Standard shall be designed in accordance with latest edition of "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", with design revisions noted on this sheet.
- Submit shop drawings for approval.

A E-39 TYPE I TRAFFIC SIGNAL STANDARD
NOT TO SCALE



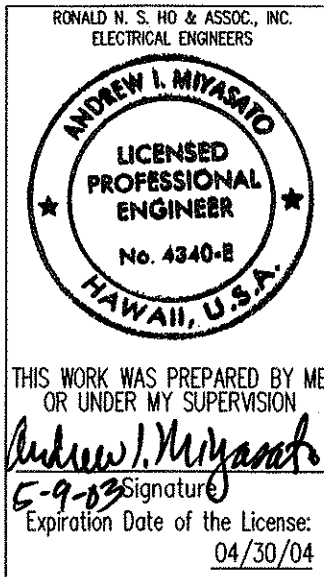
NOTES FOR TYPE II STANDARD:

- Standard and mast arms shall be designed in accordance with latest edition of "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", with design revisions noted on this sheet.
- Mounting for signals at intermediate points of mast arm shall be of the adjustable type.
- Signals shall be centered over lane lines.
- Submit shop drawings for approval.

B E-39 TYPE II TRAFFIC SIGNAL STANDARD
NOT TO SCALE

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

LAST SAVE: 05/07/03 @ 16:57:38 BY: AM PLOT SE: 11-31-01
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

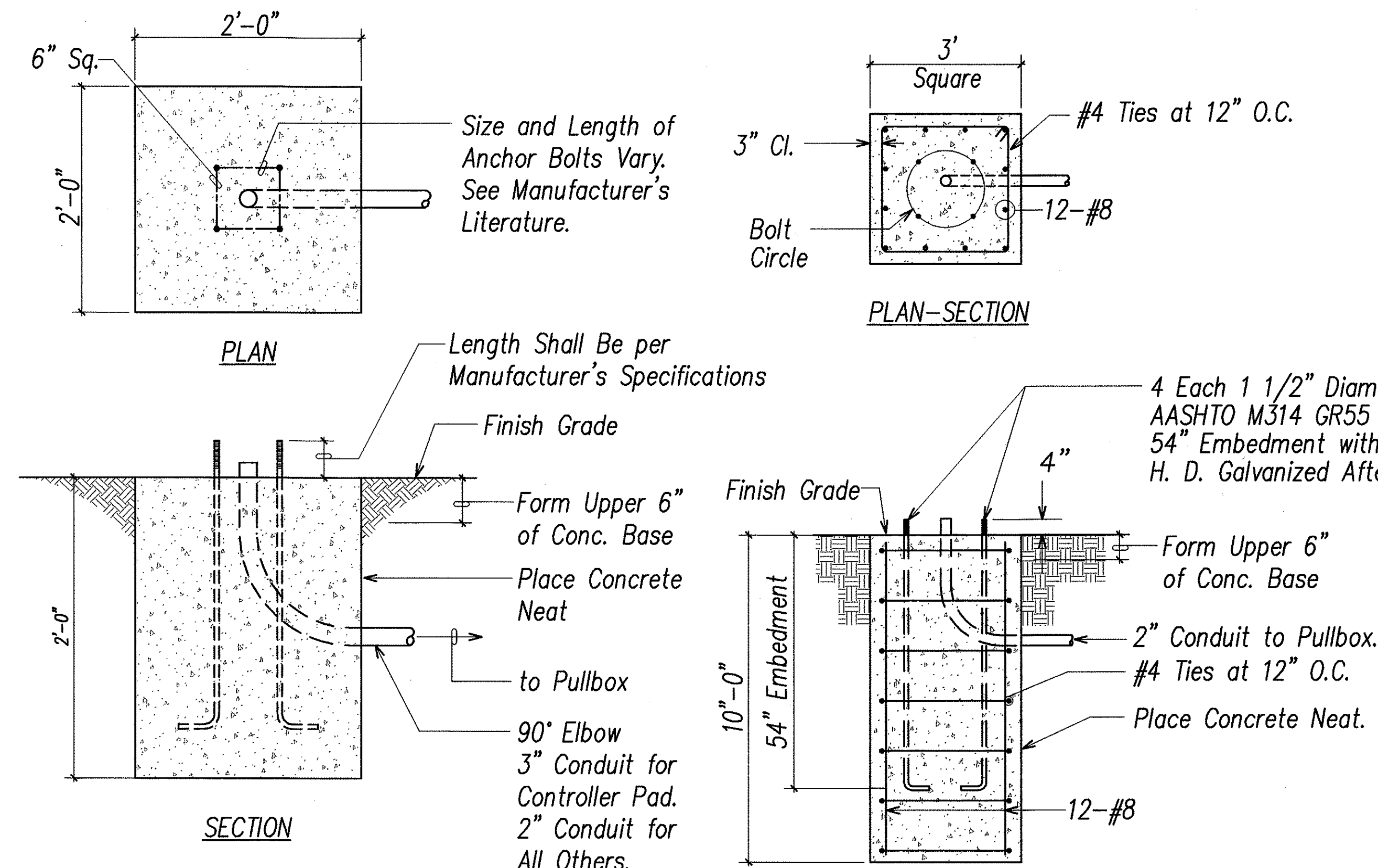
TRAFFIC SIGNAL DETAILS I

PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED
SHEET No. E-39 OF 56 SHEETS

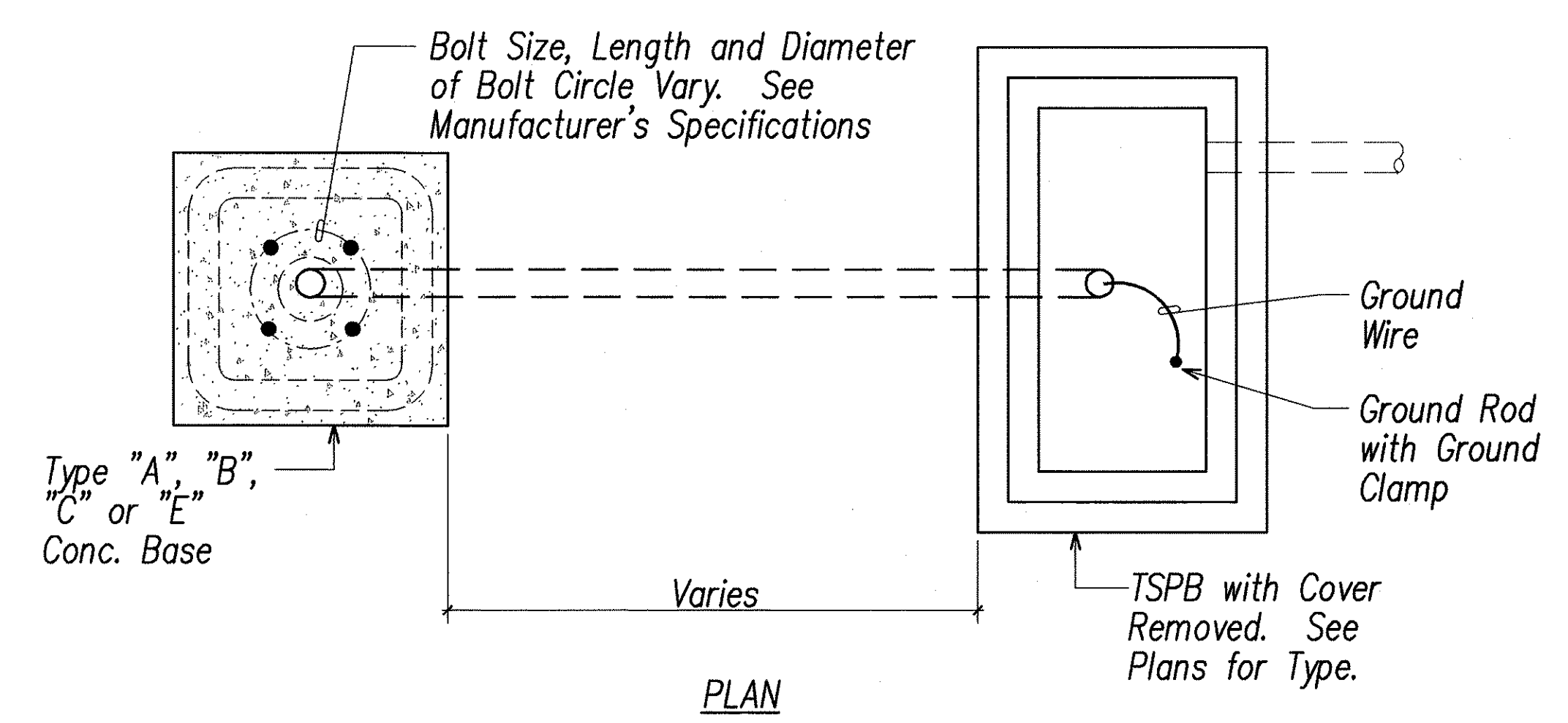
DATE: MAY 2003

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	173	193



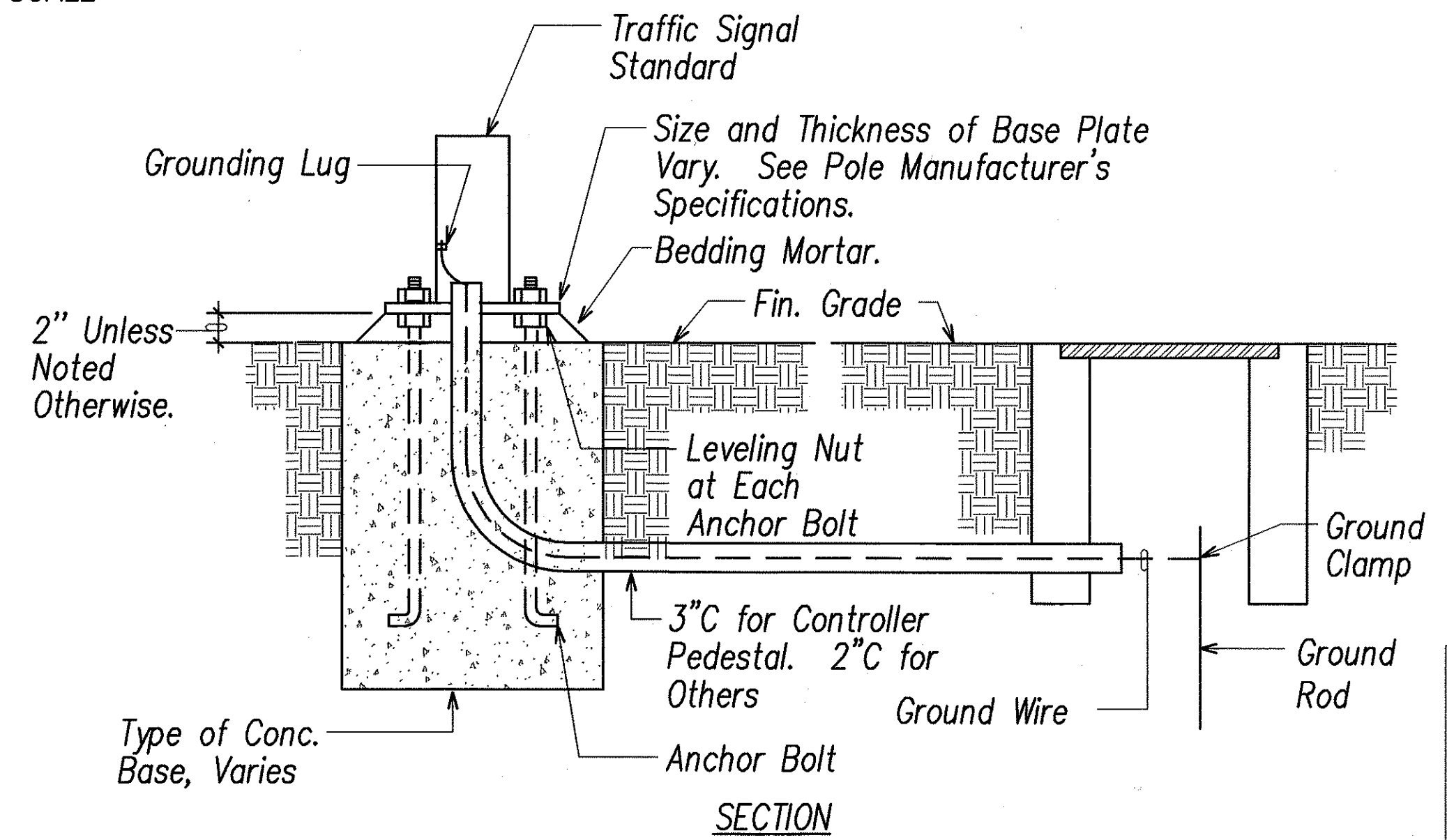
- NOTES:
- Concrete shall be class "B".
 - Type "A" concrete base shall be used for type I-10, I-7 and I-3 standards.
 - Conduit bend is incidental to concrete base construction.

A TYPE "A" CONCRETE BASE
E-40 NOT TO SCALE

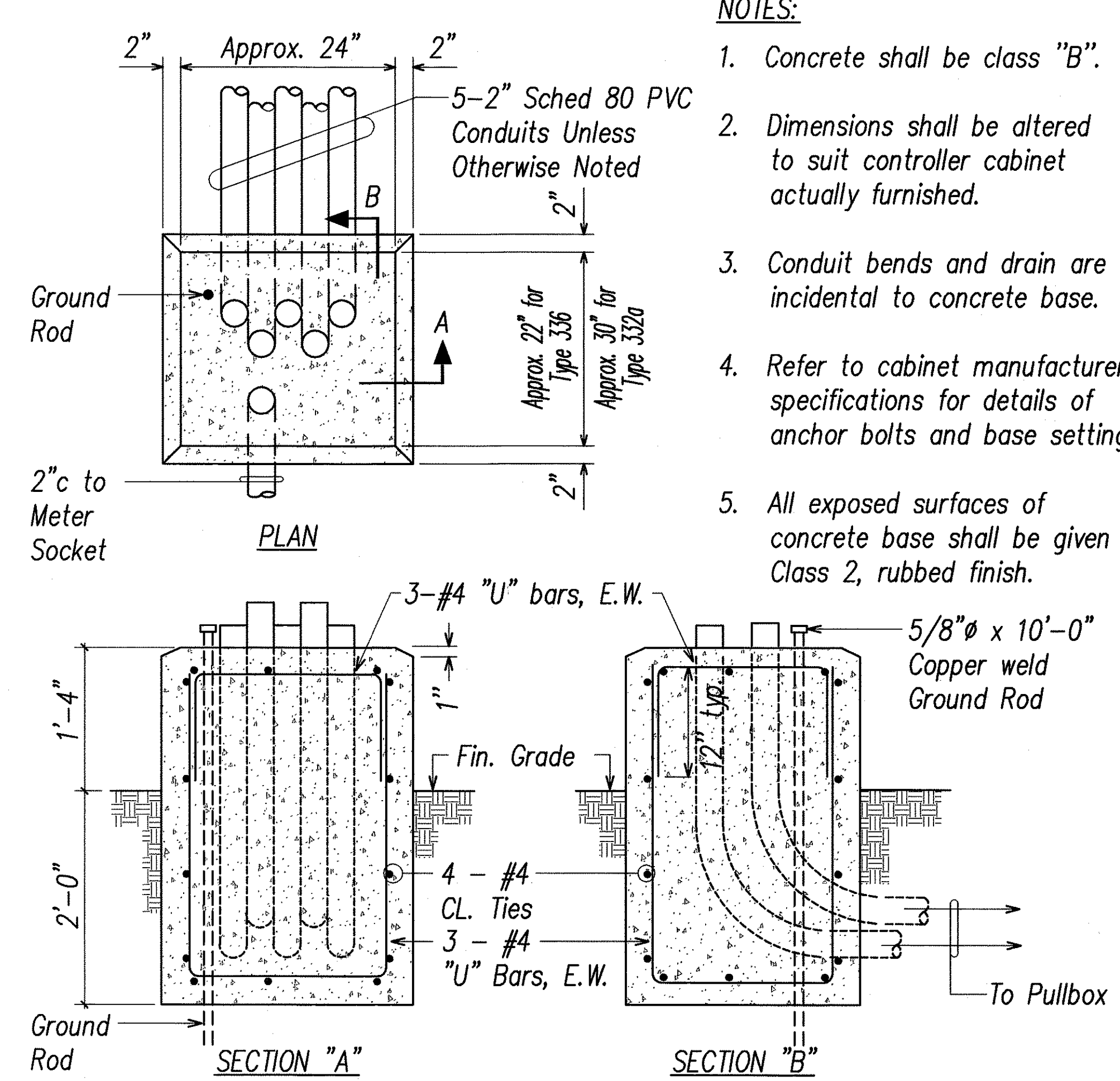


C TYPICAL STANDARD & PEDESTAL DETAIL
E-40 NOT TO SCALE

B TYPE "C" CONCRETE BASE
E-40 NOT TO SCALE



D TYPE "D" CONCRETE BASE DETAIL
E-40 NOT TO SCALE



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

DATE	_____
SURVEYED BY	_____
DRAWN BY	_____
DESIGNED BY	_____
CHECKED BY	_____
IN CHARGE	_____
PROJECT NO.	2003-10-10
DATE	04/30/04

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Signature: *Ken M. Hayashi*

Expiration Date of the License: 04/30/04

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Signature: *Ronald L. Miyasato*

Expiration Date of the License: 04/30/04

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL DETAILS II

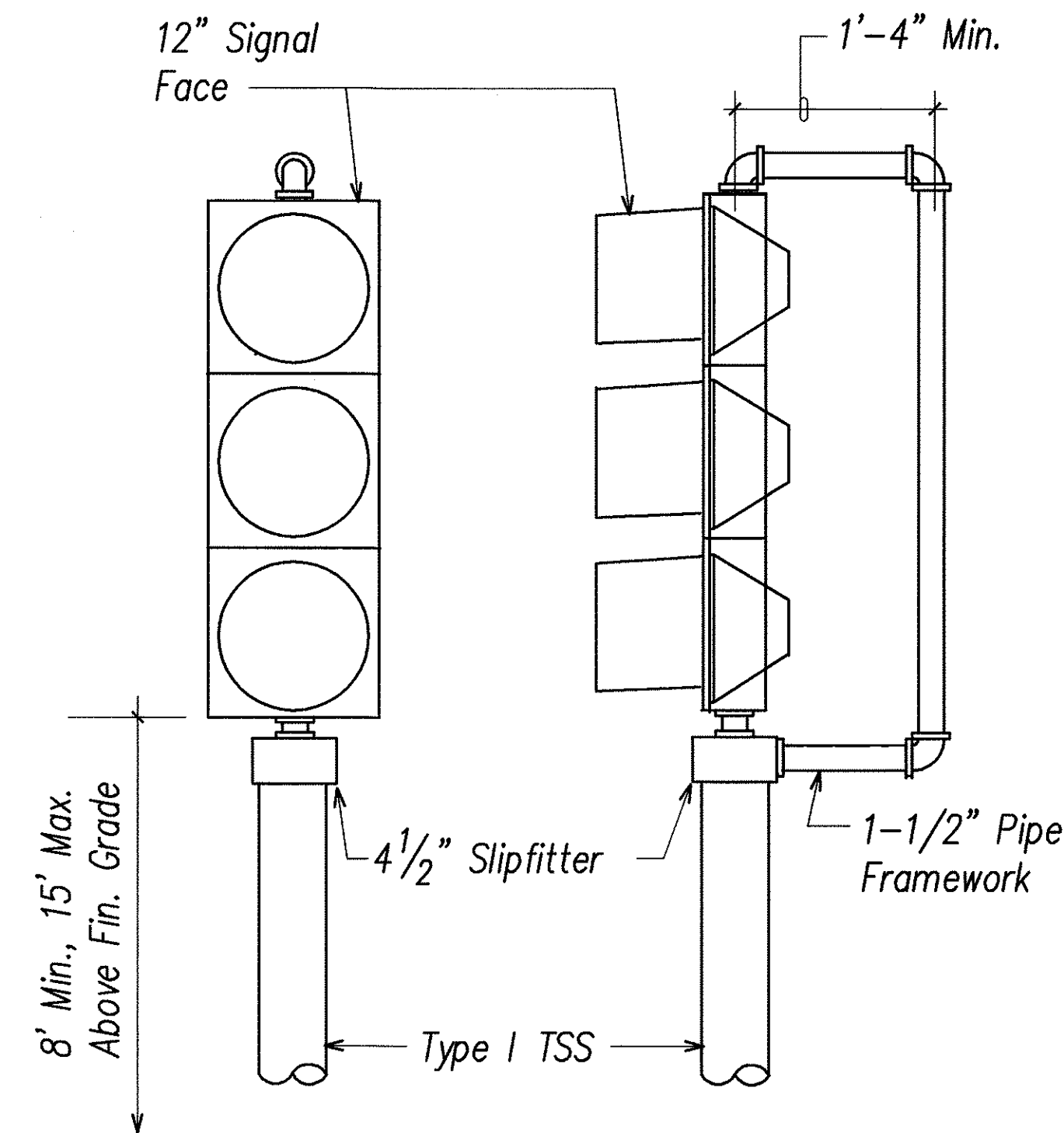
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Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED

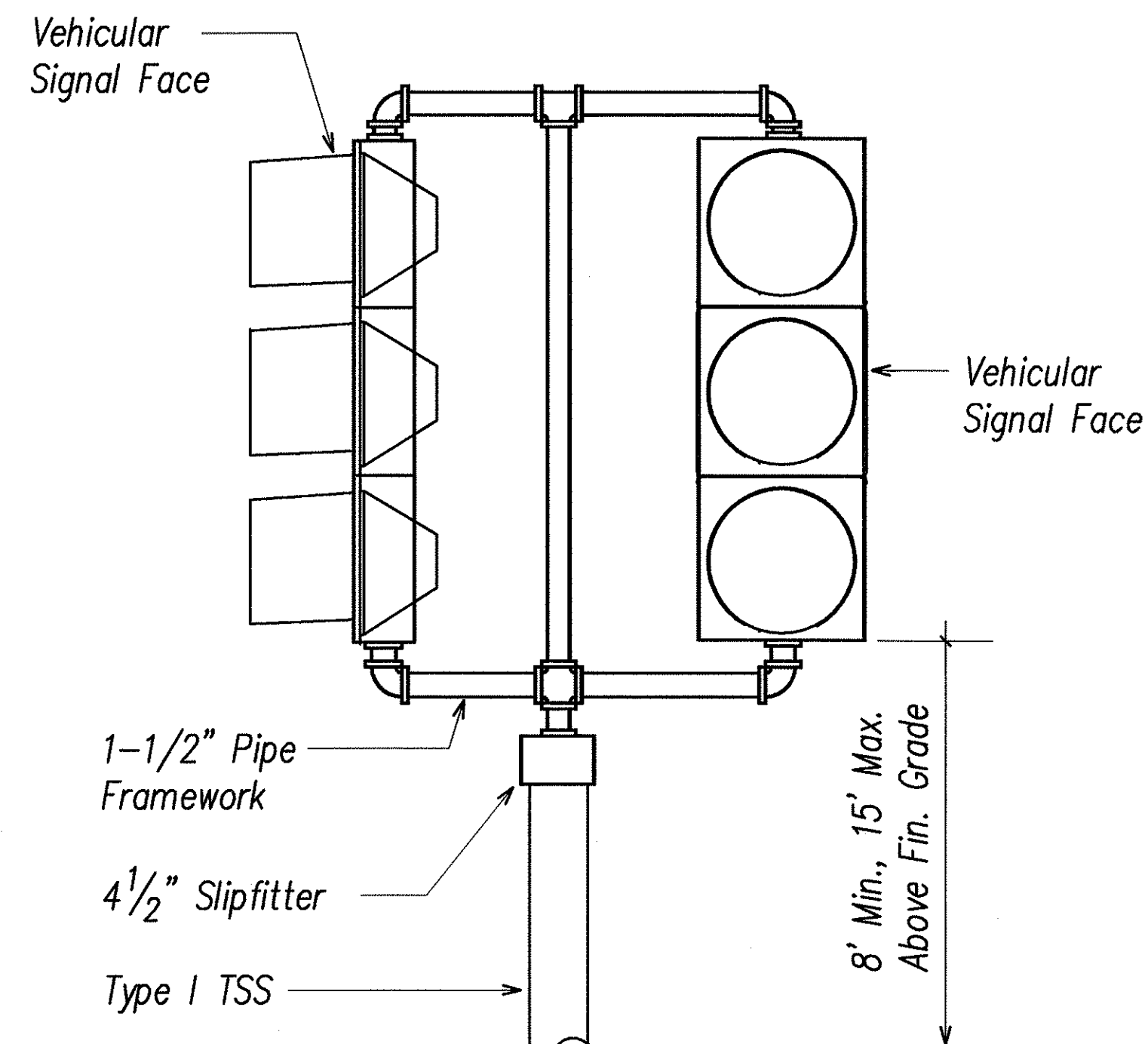
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SHEET No. E-40 OF 56 SHEETS

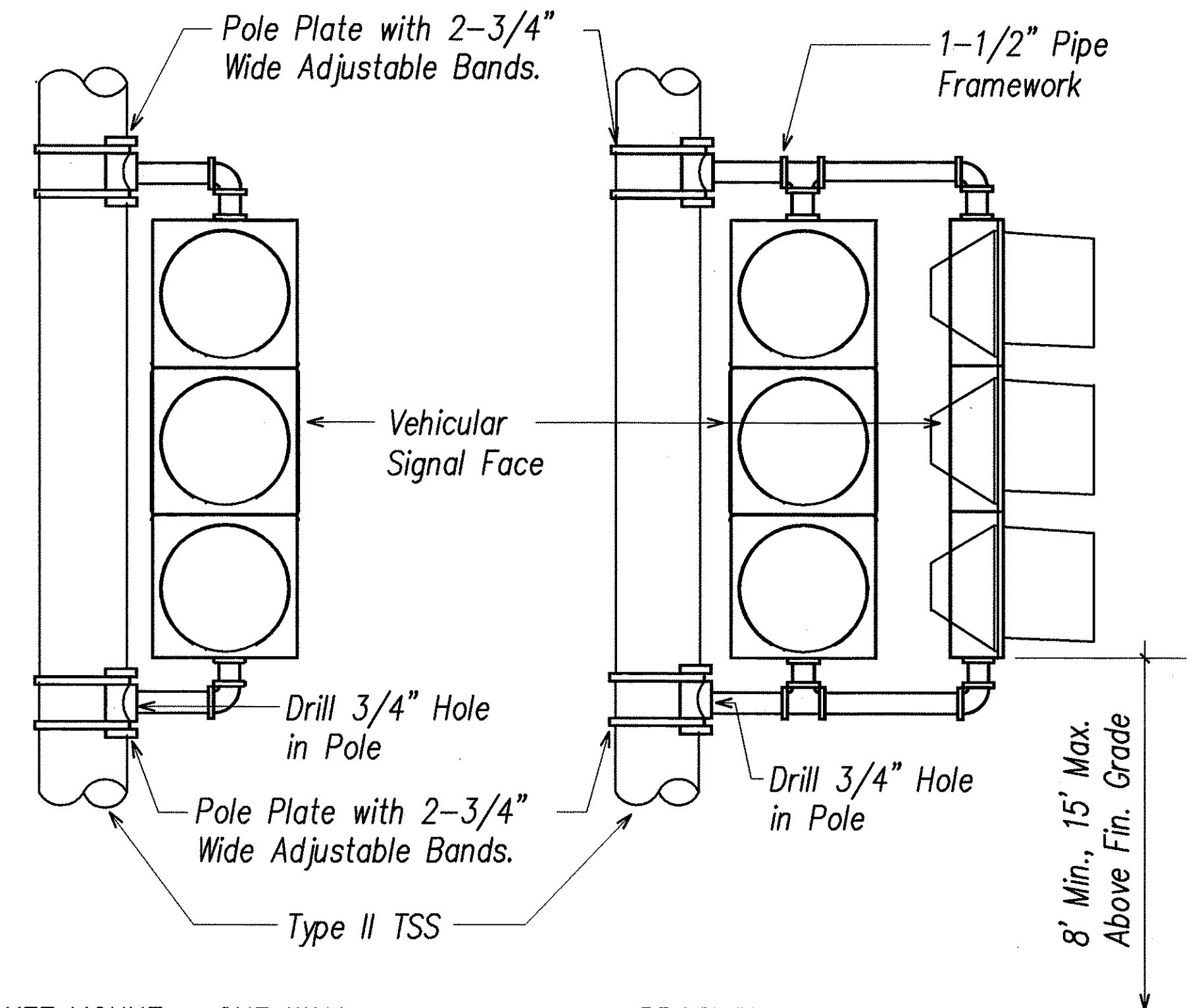
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	174	193



TOP OF POLE – ONE WAY MOUNTING



TOP OF POLE – TWO WAY MOUNTING

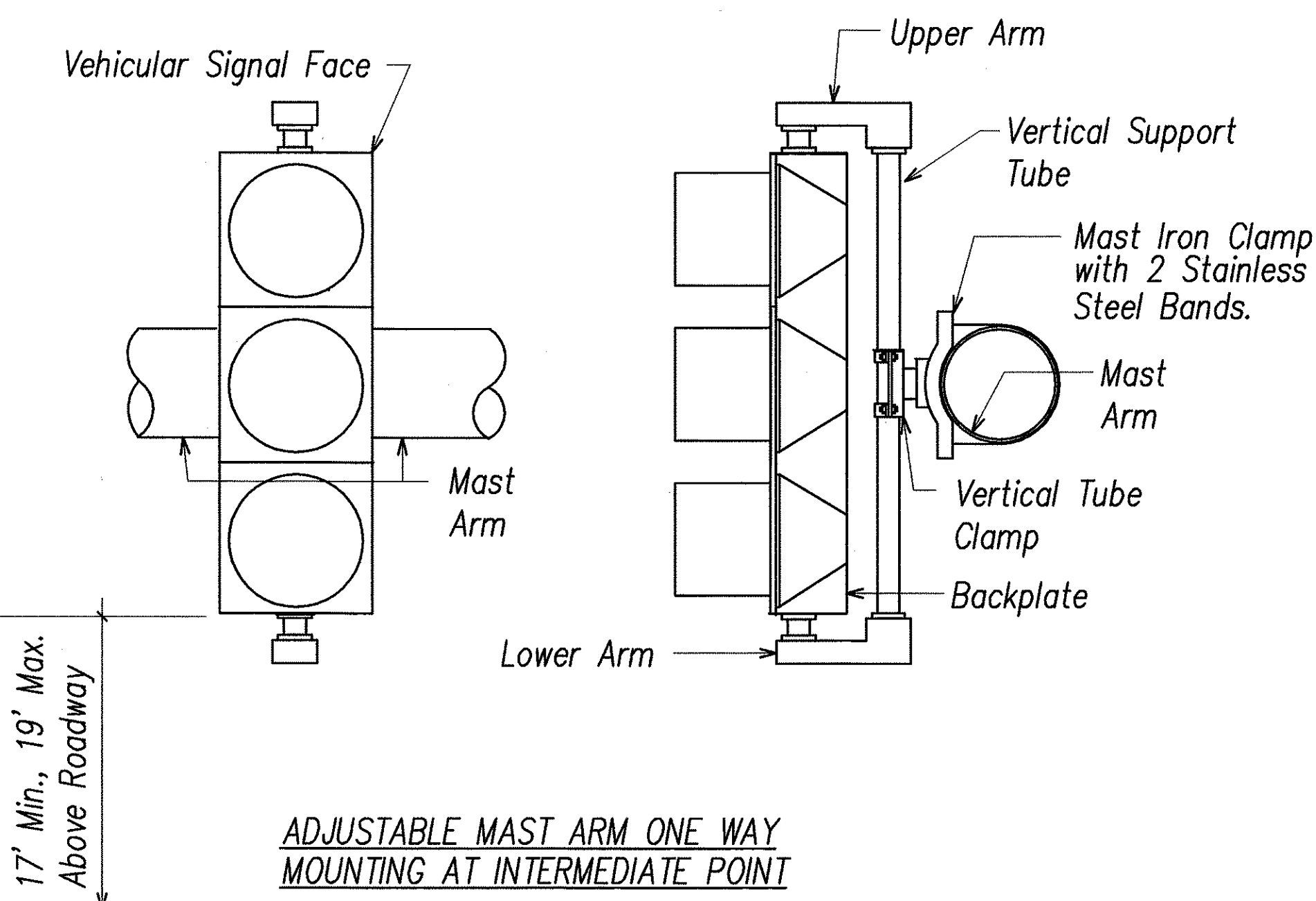


BRACKET MOUNT – ONE WAY

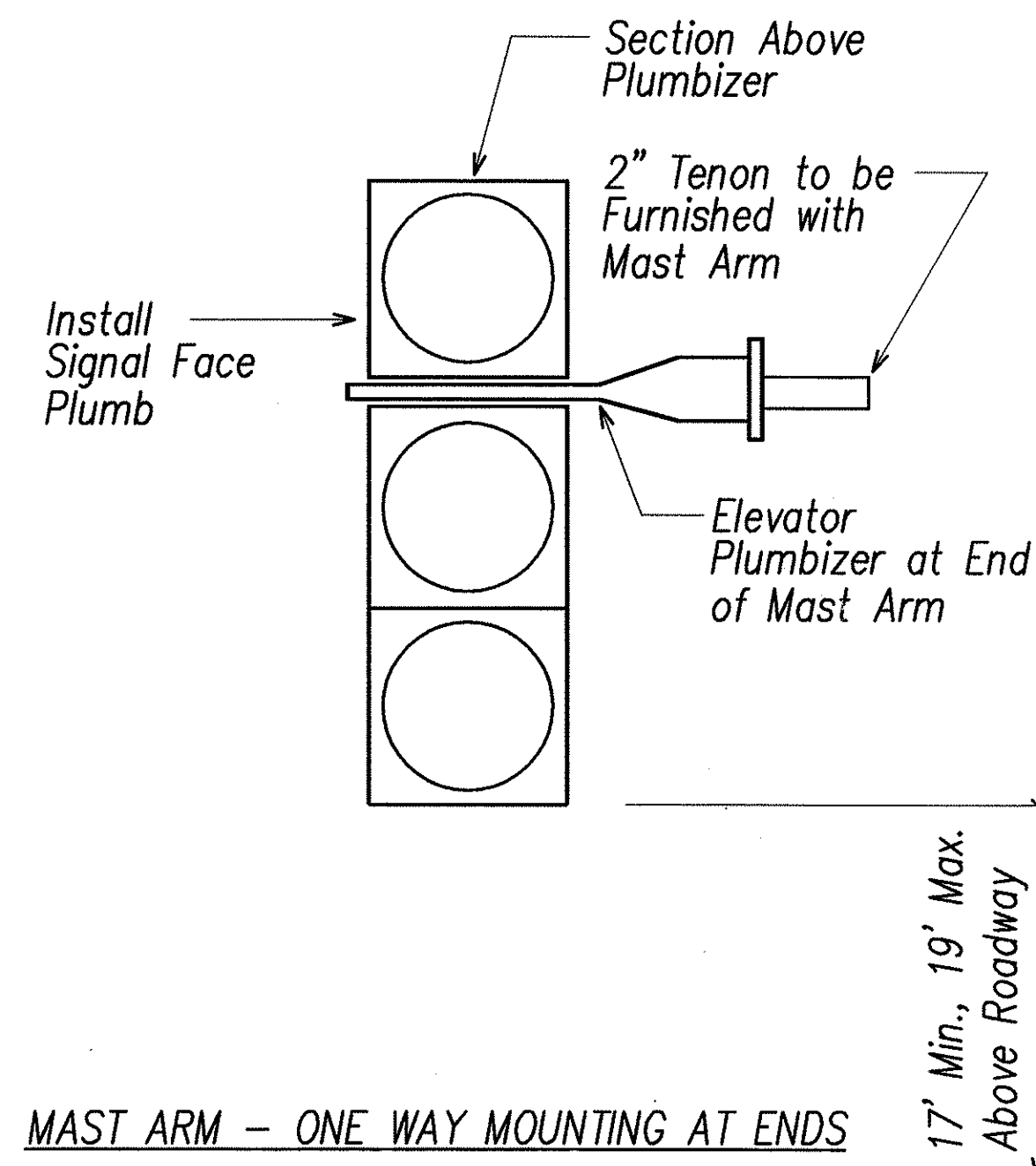
BRACKET MOUNT – TWO WAY

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

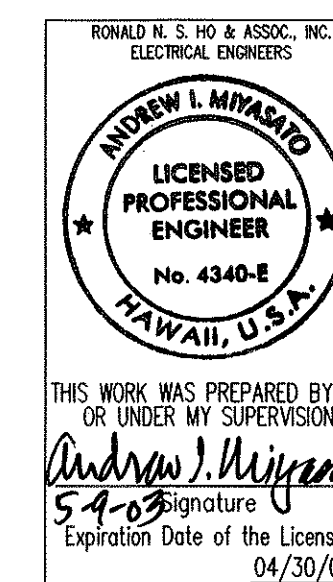


MAST ARM – ONE WAY MOUNTING AT ENDS

VEHICULAR SIGNAL MOUNTING DETAILS
NOT TO SCALE

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

LAST SAVE: 05/07/03 @ 16:38:31 BY: AM PROJ 52 1-9-03
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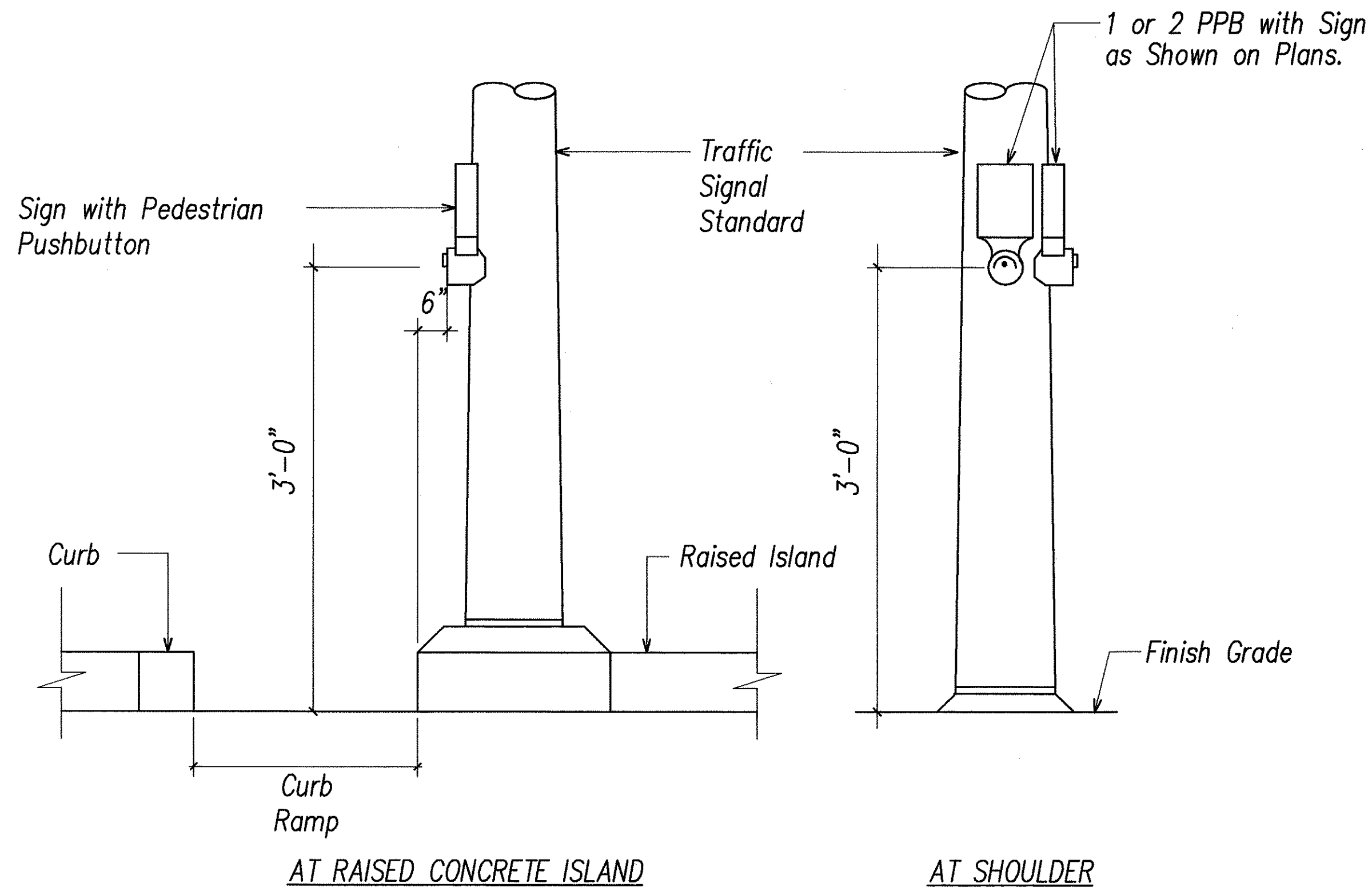


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL DETAILS III

PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

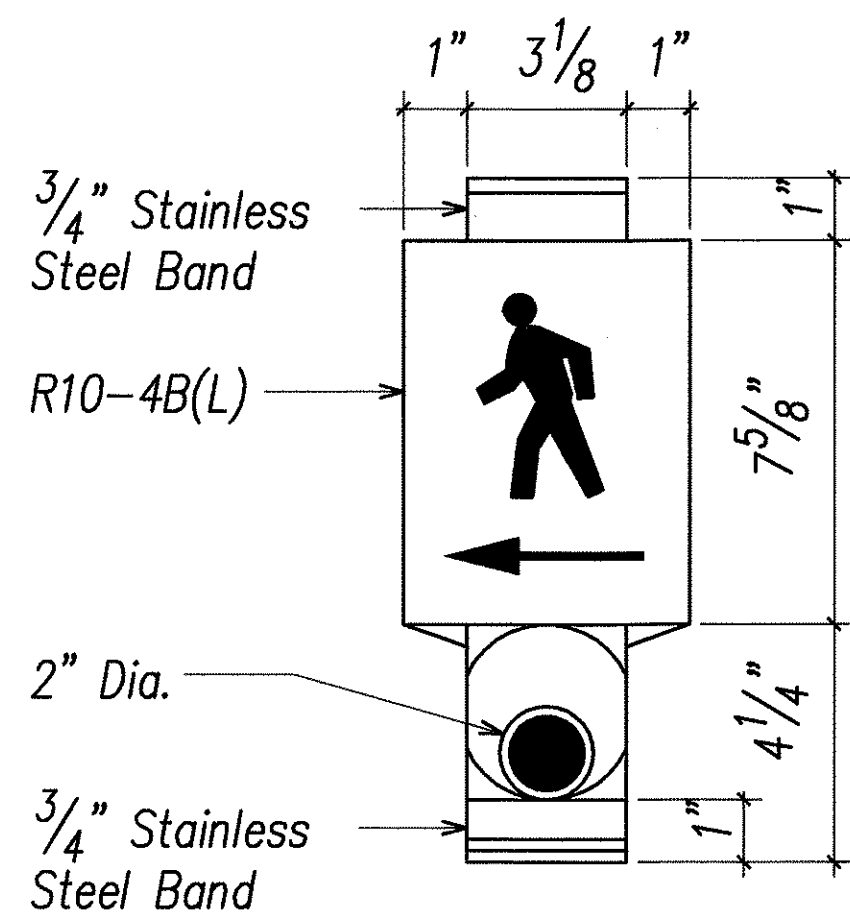
SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-41 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	175	193

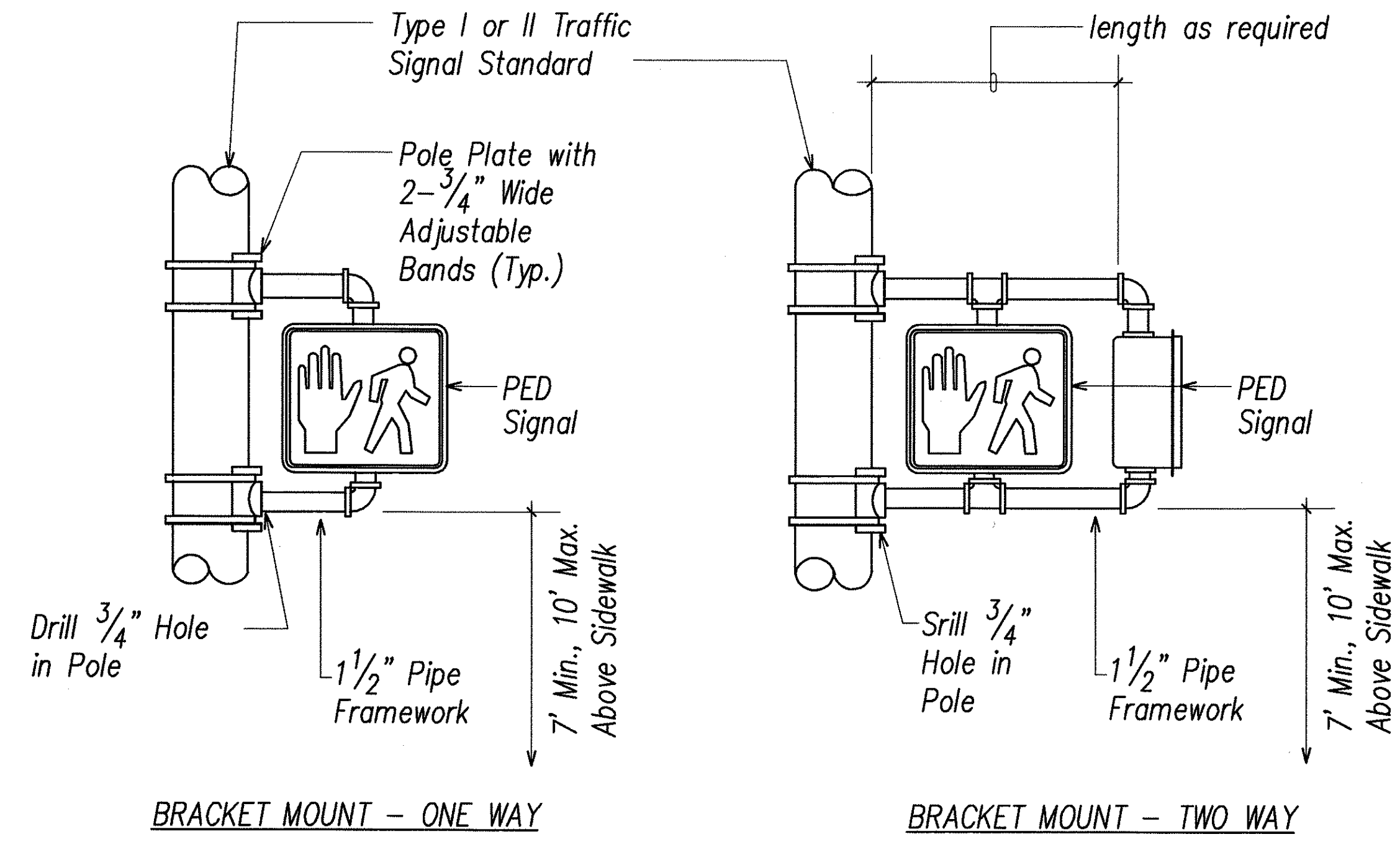
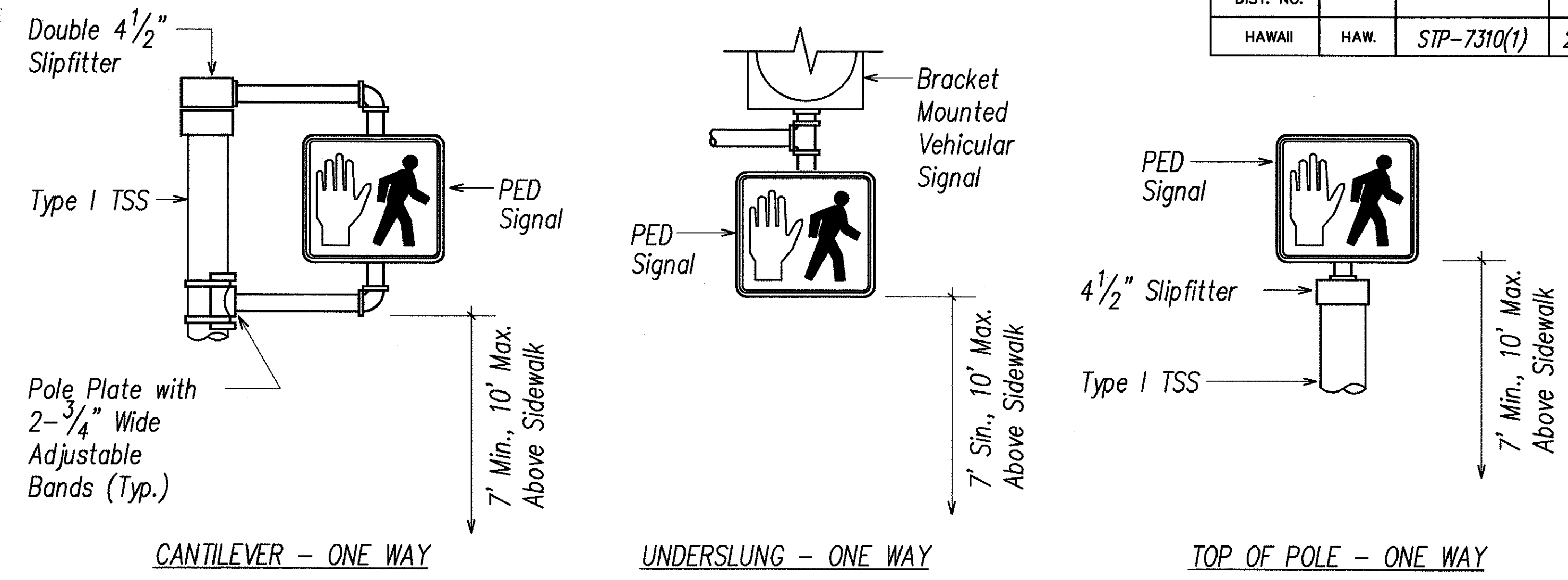


DETAIL NOTES:

- The pedestrian pushbutton unit shall consist of a one piece assembly with a raised 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



PEDESTRIAN PUSHBUTTON DETAILS
NOT TO SCALE



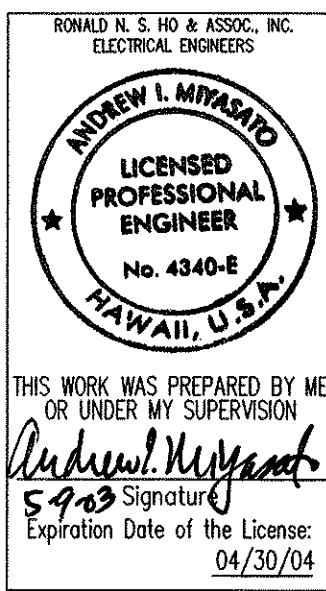
NOTES:

- 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.

PEDESTRIAN SIGNAL MOUNTING DETAILS
NOT TO SCALE

DESIGNED BY	DATE
CHECKED BY	
QUANTITIES BY	
NOTE BOOK	
ORIGINAL PLAN	

LAST SAVE: 06/07/03 @ 16:55:40 BY: AM PLOT SC: 1-0001
C:\WORK\PROJECTS\200305\2220305.dwg

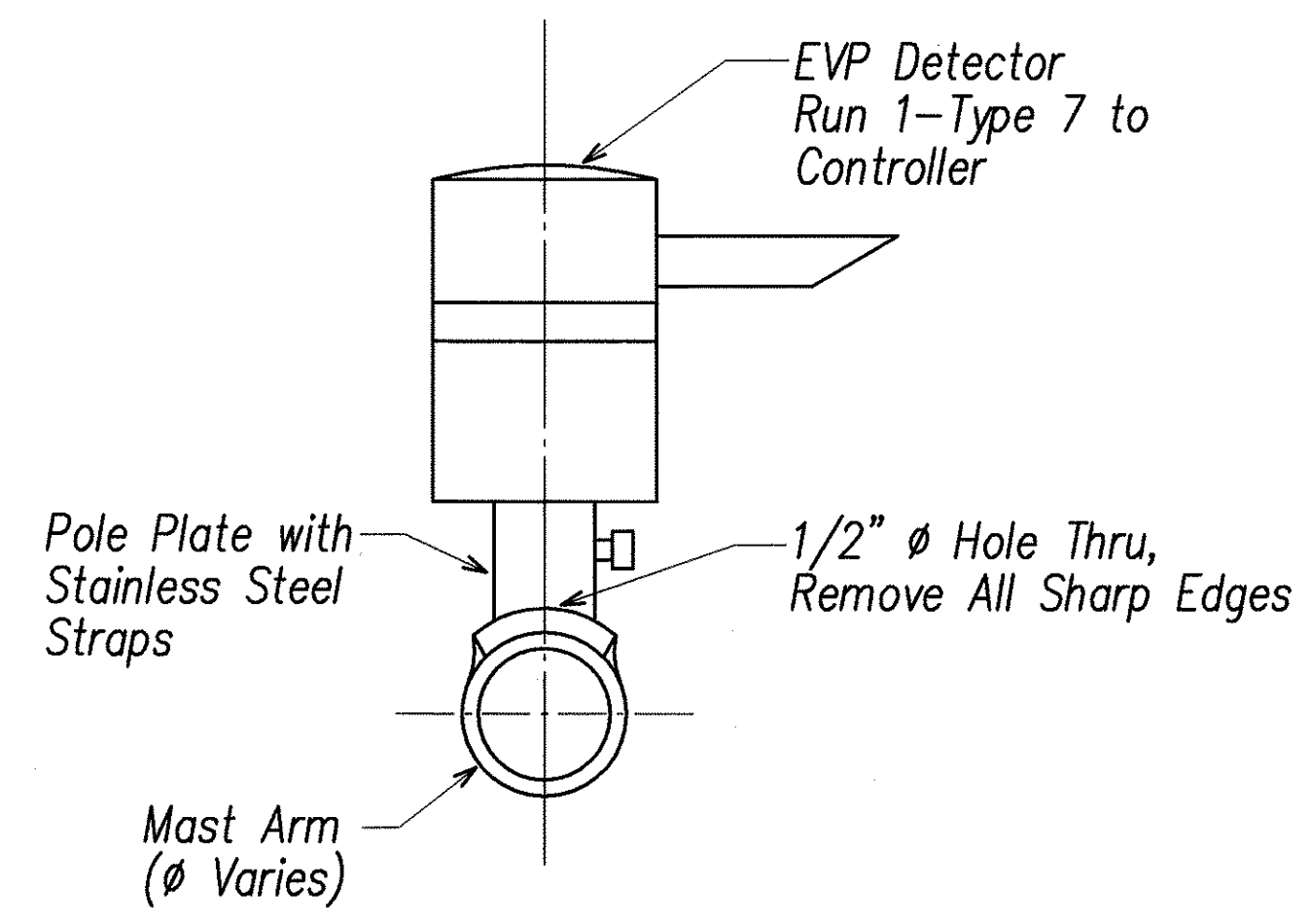


STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL DETAILS IV

PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

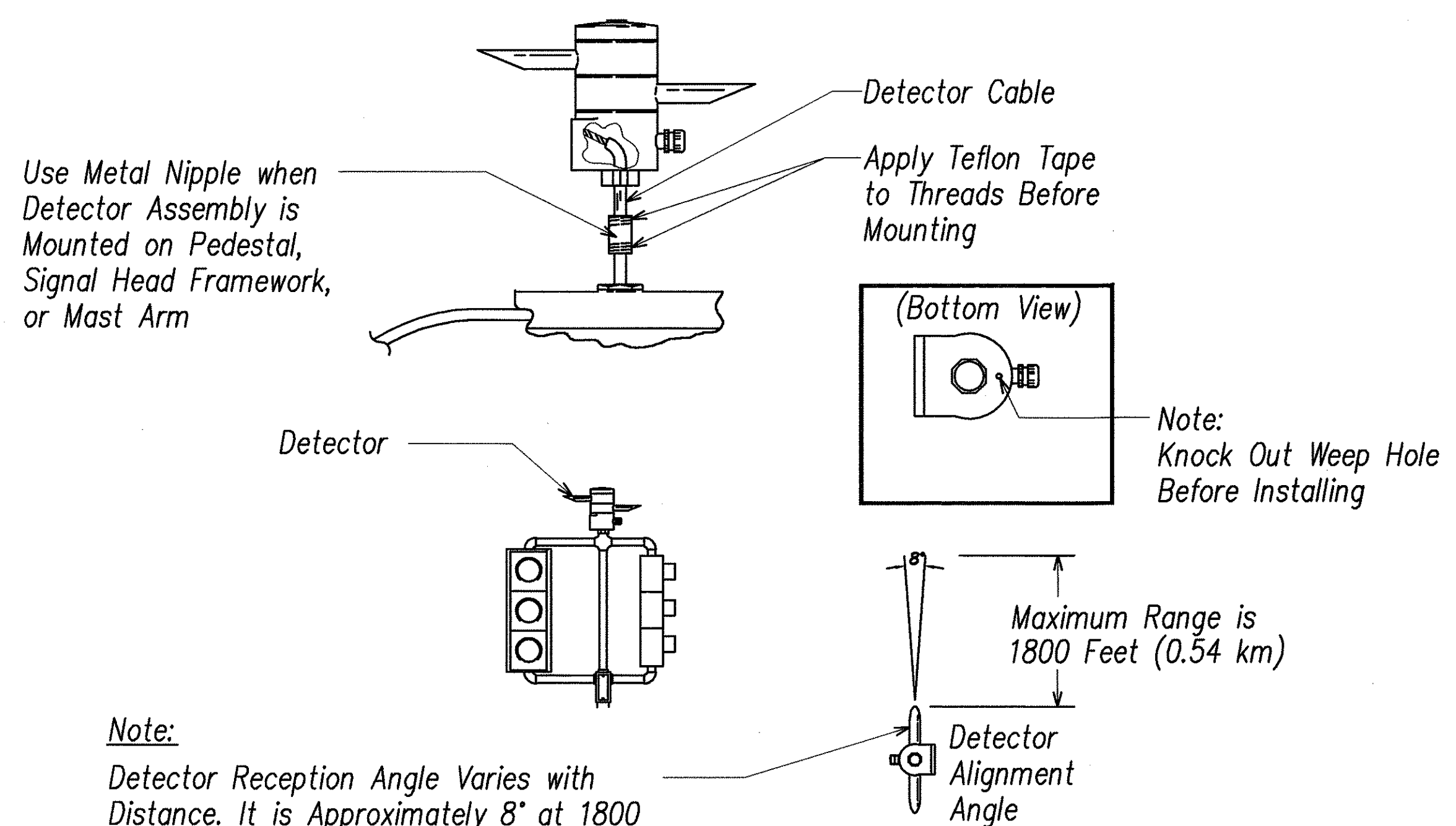
SCALE: AS NOTED
DATE: MAY 2003
SHEET No. E-42 OF 56 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	STP-7310(1)	2003	176	193



1
E-43

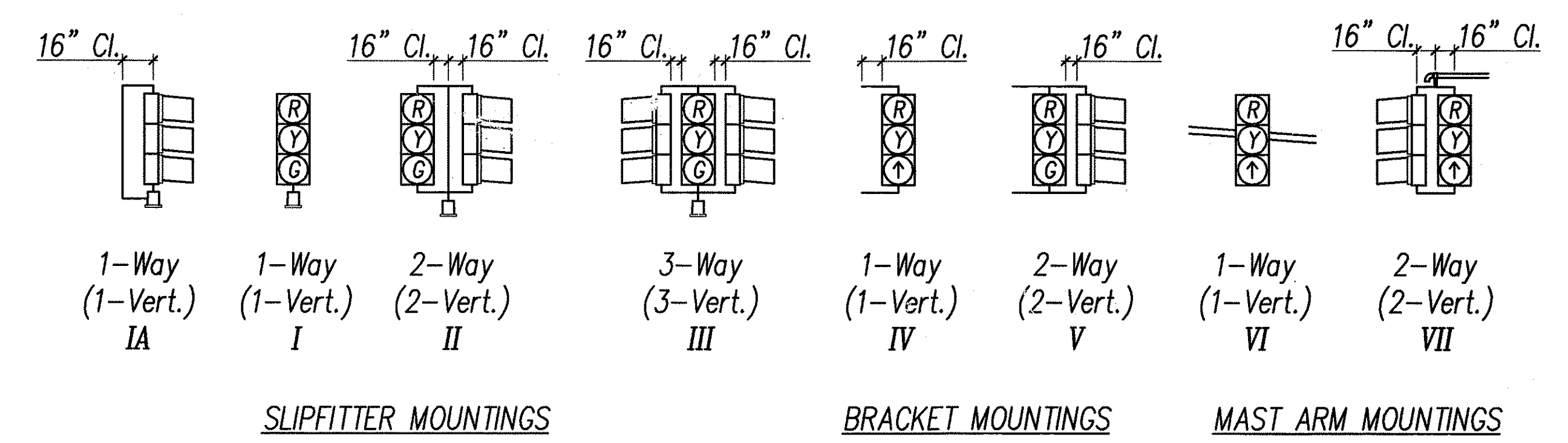
EVP DETECTOR
HORIZONTAL MOUNTING DETAIL
NOT TO SCALE



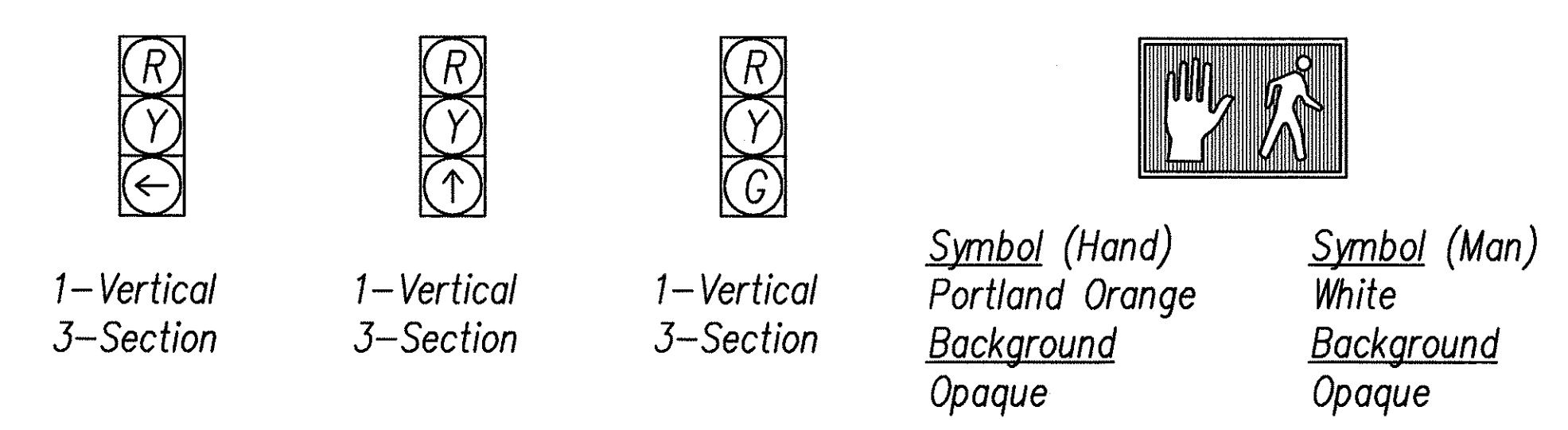
Note:
Detector Reception Angle Varies with Distance. It is Approximately 8° at 1800 Feet (0.54km). Due to Reflection, Reception Angle is Increased at Close Range. The Detector Must be Aligned within 8° of the Farthest Point Where Priority Vehicle is to be Sensed.

2
E-43

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



TYPICAL VEHICULAR AND PEDESTRIAN SIGNAL MOUNTINGS



TYPICAL SIGNAL ARRANGEMENTS

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

LAST SAVE: 06/07/03 @ 16:55:01 BY: AM PLOT SC: 1'-0"=1'
C:\WORK\PROJECTS\2003\04\22\030422.DWG

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL DETAILS V

PUULOA ROAD IMPROVEMENTS
Kamehameha Hwy. to Salt Lake Blvd.
Federal Aid Project No. STP-7310(1)

SCALE: AS NOTED DATE: MAY 2003

SHEET No. E-43 OF 56 SHEETS

