| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | HII-01-08 | 2009 | 51 | 73 |

## HIGHWAY LIGHTING NOTES

1. Contractor to energize highway lights a minimum of six (6) hours for Final Inspection and Acceptance. Contractor to assume costs.
2. Contractor shall have one set of approved plans at the job site at all times during the construction work.
3. All neutral conductors shall have solid white insulation. Any other method of identification is unacceptable.
4. Contractor shall not backfill trenches until work is approved by the Engineer.
5. The Contractor shall inform the inspector of all concrete pours at least two (2) working days in advance. Concrete shall not be poured until approval is granted by the inspector.
6. All work shall be done by a duly licensed electrician.
7. Trench dirt and material will not be allowed to be stored on roadway or shoulder.
8. Temporary trench patches shall match grade.
9. Engineer to determine salvageable material. Deliver all salvageable material to the baseyard as directed by the Engineer. Remaining material shall be Contractor's property.
10. Submit shop drawings for all highway lighting components including luminaires, lamps, photocell and mast arms, for approval.
11. The Contractor shall be responsible for any damages to existing highway lighting facilitites and damages shall be repaired by the Contractor at his cost with no additional cost to the State.

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

A. 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.

B. Equipment manufacturers providing structural supports for luminaires and traffic signals shall include the following design parameters in the design of the project materisal.

C. Modifications to "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", 4th Edition with 2002 Interim Revisions, published by the American Association of State Highway and Transportation officials (AASHTO):

1. 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.
2. 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:
   a. Freeways shall be based on a recurrence interval of 100 years.
   b. Ramps and other highways with "high" ADT shall be based on a recurrence interval of 100 years unless otherwise directed.
3. 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 surround 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.
4. 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:
   a. Fatigue Category I - For all structures where failure would result in the structure falling onto the travel way.
   b. Fatigue Category II - For all others.
5. 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.
6. 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.
7. 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.
8. 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 may be used in areas with design speeds not exceeding 45 mph.
9. 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.

| | | |
|---|---|---|
| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE 11/14/08 |
| | DRAWN BY M. Takata | |
| | TRACED BY | |
| NOTE BOOK Hdr.hwy Lighting | DESIGNED BY | |
| | QUANTITIES BY | |
| | CHECKED BY | |

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

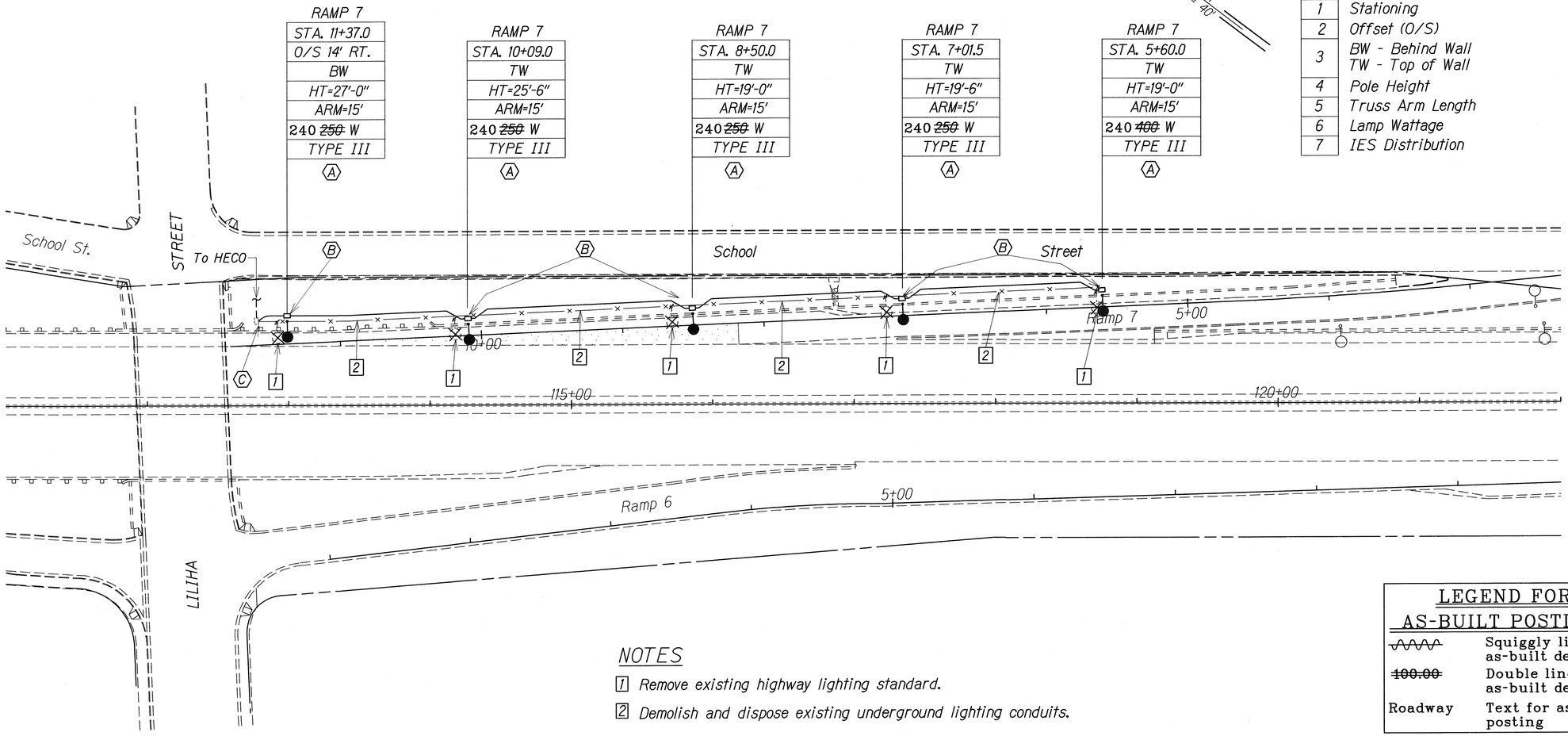
**HIGHWAY LIGHTING NOTES**

**INTERSTATE ROUTE H-1**
Extension and Repair of
School Street On-Ramp Wall
Project No. HII-01-08

Not to Scale Date: February 2009

SHEET No. E1 OF 5 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | HII-01-08 | 2009 | 52 | 73 |




## HIGHWAY LIGHTING INDICATOR

| | |
|---|---|
| 1 | Stationing |
| 2 | Offset (O/S) |
| 3 | BW - Behind Wall<br>TW - Top of Wall |
| 4 | Pole Height |
| 5 | Truss Arm Length |
| 6 | Lamp Wattage |
| 7 | IES Distribution |

## NOTES

1. Remove existing highway lighting standard.
2. Demolish and dispose existing underground lighting conduits.

A. Install aluminum light pole with 15' aluminum truss arm and non-breakaway transformer base.
B. Install Type "A" highway lighting pullbox and underground 1-2" PVC Sch. 40 conduit.
C. Intercept existing highway lighting pullbox, and connect new lighting circuit to existing.

## LEGEND FOR AS-BUILT POSTINGS

| | |
|---|---|
| ~~~~ | Squiggly line for as-built deletion |
| ~~100.00~~ | Double line for as-built deletion |
| Roadway | Text for as-built posting |

## DEMOLITION & CONSTRUCTION NOTES

1. The Contractor shall verify all existing circuit wiring prior to any demolition work.
2. Existing highway lighting system shall remain operational during non daylight hours until New highway lighting system is operational. Contractor shall provide temporary lighting if the existing highway lights are de-energized before the new highway lights are operational. Temporary work shall be coordinated with and shall be acceptable to the Engineer.
3. All conduits shall not be paid for separately but shall be considered incidental to the various contract items.

## ELECTRICAL SYMBOLS

- Existing pole with street light
- Existing pole with street light to be removed
- New pole with street light
- -X--X- Existing underground highway lighting conduit and wires to be removed

| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
|---|---|---|
| | DRAWN BY X | |
| NOTE BOOK (12/mm) No. (mm) | TRACED BY X | |
| | DESIGNED BY | |
| | QUANTITIES BY | |
| | CHECKED BY | |

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

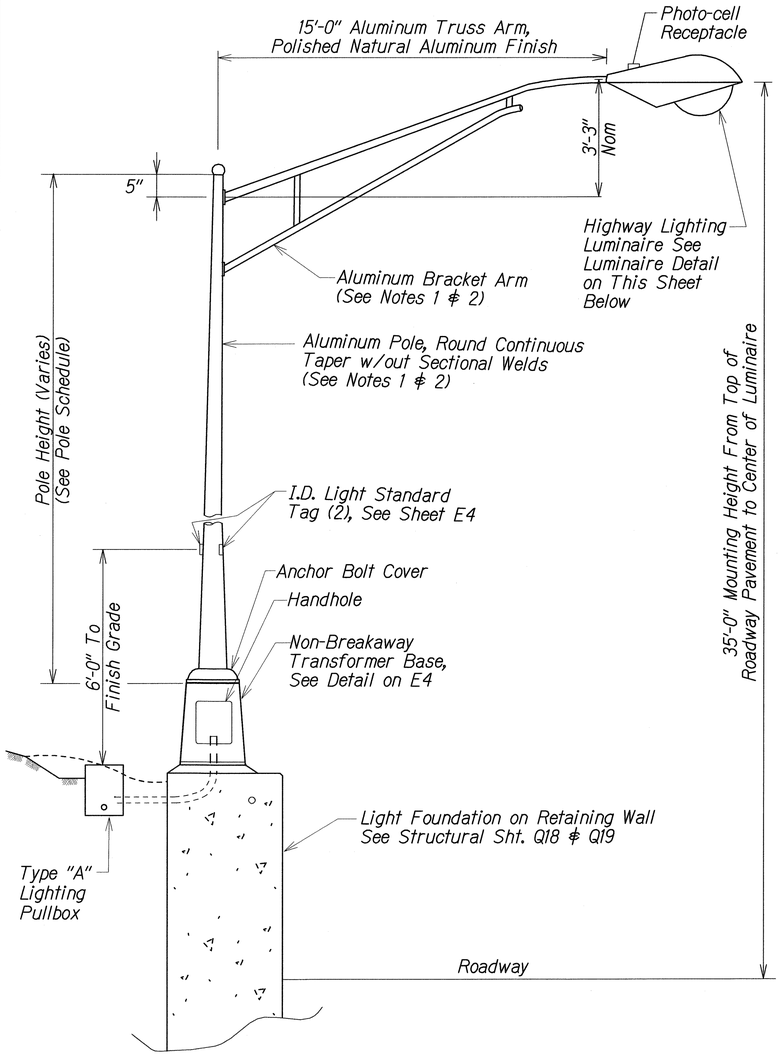
# HIGHWAY LIGHTING PLAN

INTERSTATE ROUTE H-1
Extension and Repair of
School Street On-Ramp Wall
Project No. HII-01-08

Scale: 1" = 40' Date: February 2009

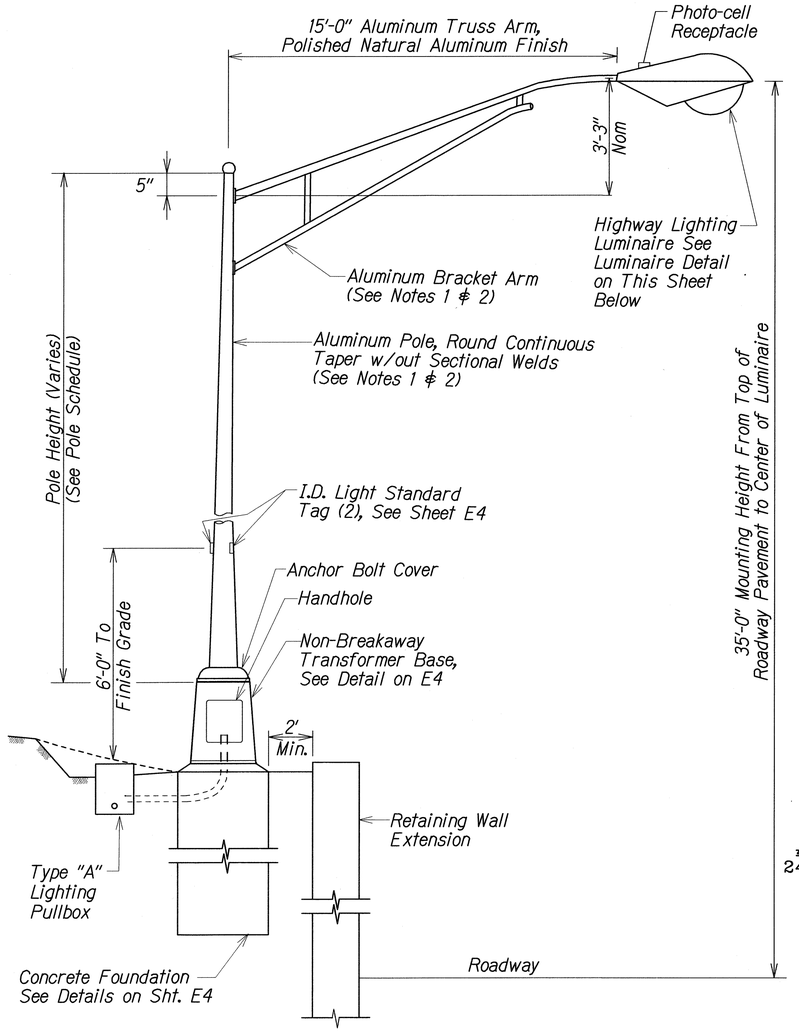
SHEET No. E2 OF 5 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | HII-01-08 | 2009 | 53 | 73 |



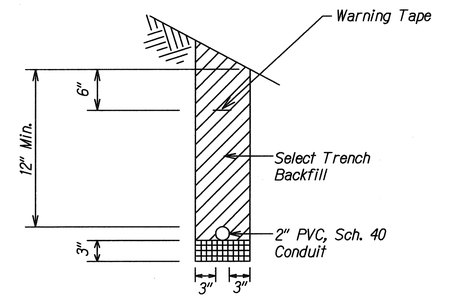

TYPICAL LIGHT STANDARD INSTALLATION WITH TRANSFORMER BASE-MOUNTED ON RETAINING WALL

Not to Scale



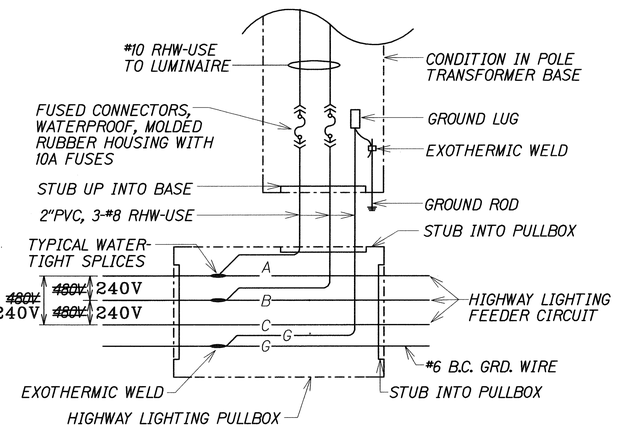

TYPICAL LIGHT STANDARD INSTALLATION WITH TRANSFORMER BASE-FREE STANDING (BACK OF WALL)

Not to Scale




LIGHTING CONDUIT (DIRECT BURIED)

Not to Scale




CONNECTION DIAGRAM - PULLBOX & TRANSFORMER BASE CONDITION

Not to Scale

NOTES:

1. Standard and bracket arms shall be designed in accordance with the latest edition of "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", with design revisions noted on sheet E1.
2. Submit shop drawings for approval.

LUMINAIRE DETAIL:

Lamp: 250W/400W HPS, 240/480V
Distrib: Medium, semi-cutoff, Type III

| LEGEND FOR AS-BUILT POSTINGS | |
|---|---|
| ~~^^^^~~ | Squiggly line for as-built deletion |
| ~~100.00~~ | Double line for as-built deletion |
| Roadway | Text for as-built posting |

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**HIGHWAY LIGHTING DETAILS**

INTERSTATE ROUTE H-1
Extension and Repair of
School Street On-Ramp Wall
Project No. HII-01-08

Not to Scale Date: February 2009

SHEET No. E3 OF 5 SHEETS

| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
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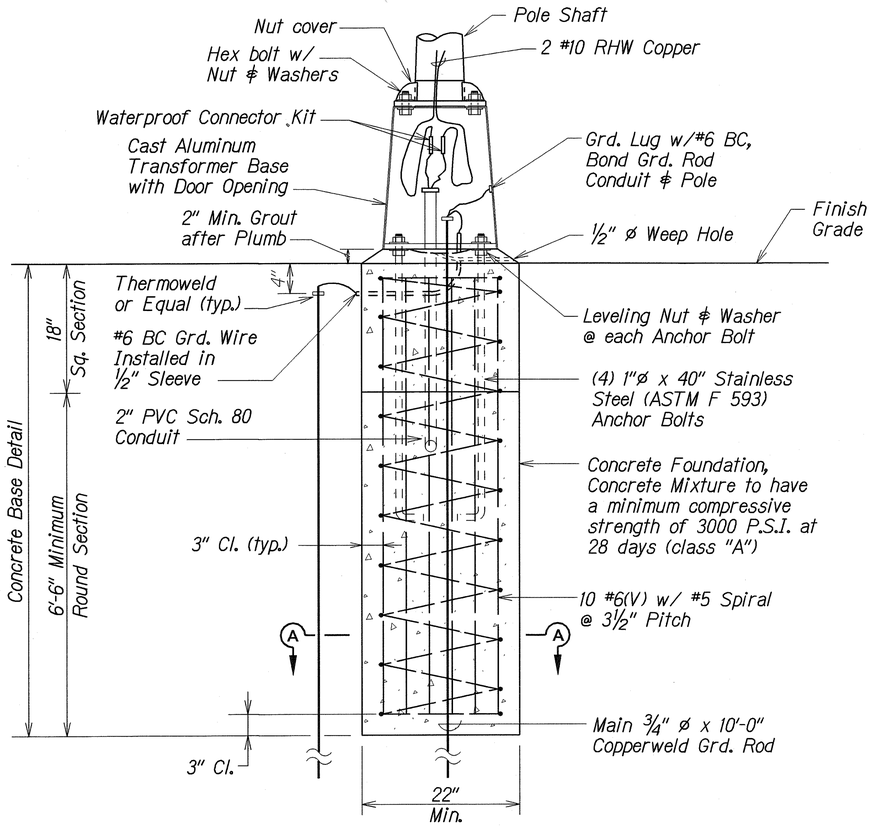
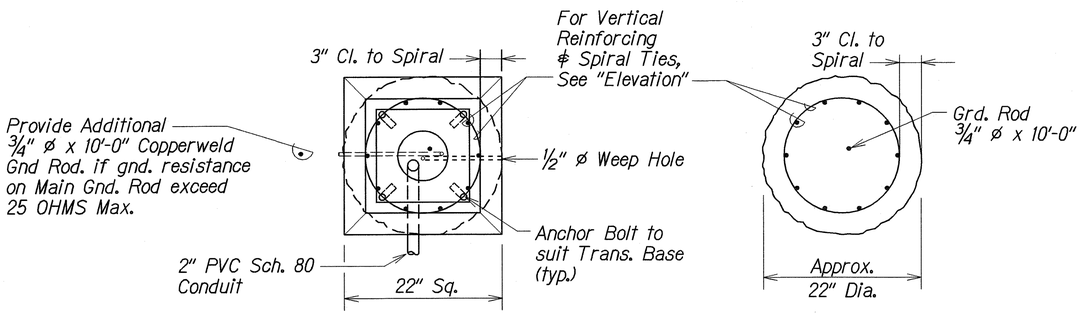
| NOTE BOOK dd,mm ddthwd | DRAWN BY | |
| | TRACED BY | |
| | DESIGNED BY | |
| No. | QUANTITIES BY | |
| | CHECKED BY | |

| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | HII-01-08 | 2009 | 54 | 73 |



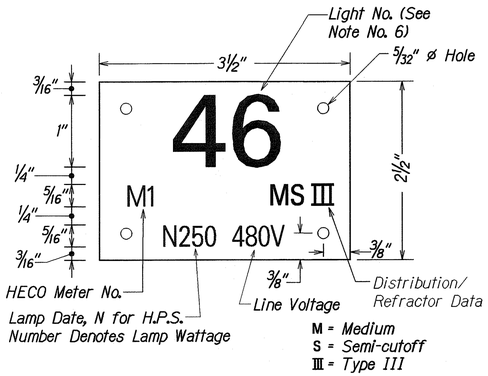

ELEVATION




PLAN SECTION A-A

TYPICAL CONCRETE FOUNDATION AND TRANSFORMER BASE DETAIL

Not to Scale

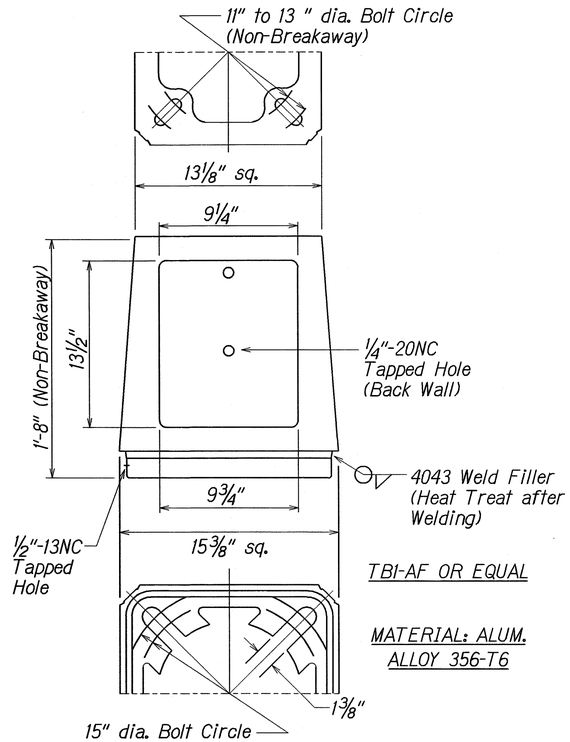



NOTES

1. 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".
2. Light Pole Number Size shall be 1" High and Engraved ⅛" wide, White in Color (Number as Required).
3. Nomenclature Size Shall be 5/16" High and Engraved 1/32" Wide, White in Color (HECO Contract Number, Lamp Data and Refractor Data as Required).
4. Attach to Aluminum and Steel Poles with No. 8 Satinless Steel, ½" long drive screw in ⅛" Drill Hole. Attach to Wood Pole With 4d Aluminum Nails.
5. Numbers are Inscribed by Cutting Through "Black Cap Street" to Expose "White Letters".
6. Light Numbers Shall be Obtained From the State.

LIGHT POLE TAG DETAIL

Not to Scale




TBI-AF OR EQUAL

MATERIAL: ALUM. ALLOY 356-T6

BASE SUPPLIED WITH:

1. Door and ¼"-20NC S.S. Screw
2. Eight 1" Washers ½" Thick x 2¾" O.D. (Washers Mechanical Galvanized per ASTM B454)
3. Four 1"-8NC x 3¾" Long Galvanized Steel Hex. Hd. Bolts
4. Four 1"-8NC Galvanized Steel Hex. Nuts
5. Four 1" Galvanized Steel Lock Washers
6. Four 1" x 2" O.D. Galvanized Steel Flatwashers
7. Transformer Base shall be Non-Breakaway Type. Akron Foundry TBI-AF 1315 I.W. or Equal

NON-BREAKAWAY TRANSFORMER BASE DETAIL

Not to Scale

ORIGINAL PLAN
SURVEY PLOTTED BY
DRAWN BY X
TRACED BY
DESIGNED BY X
QUANTITIES BY
CHECKED BY
DATE
NOTE BOOK
N.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

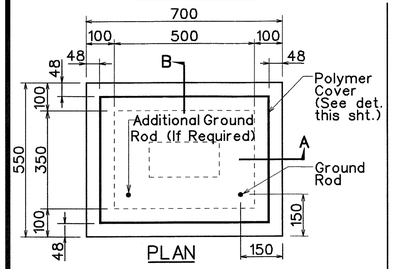
HIGHWAY LIGHTING DETAILS

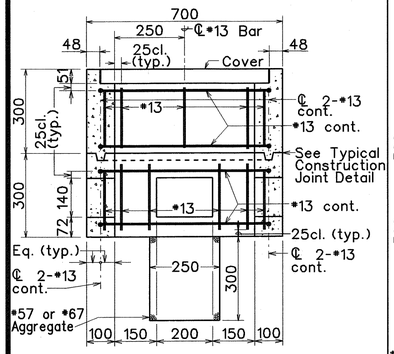
INTERSTATE ROUTE H-1
Extension and Repair of
School Street On-Ramp Wall
Project No. HII-01-08

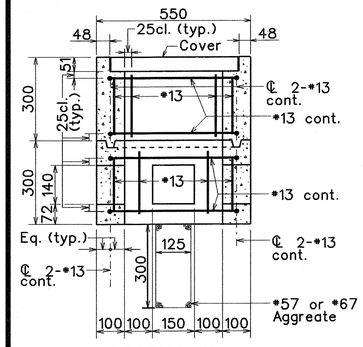
Not to Scale Date: February 2009

SHEET No. E4 OF 5 SHEETS

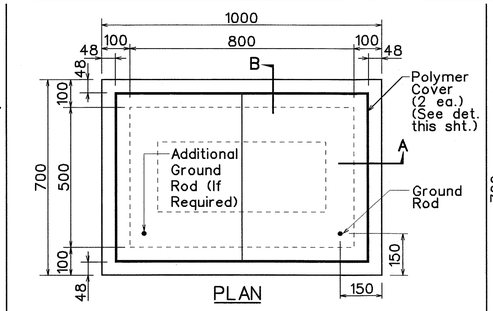
| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | HII-01-08 | 2009 | 55 | 73 |

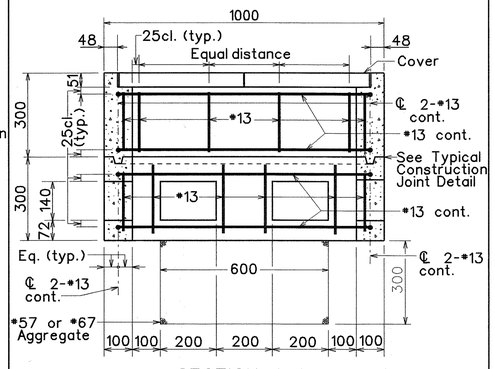


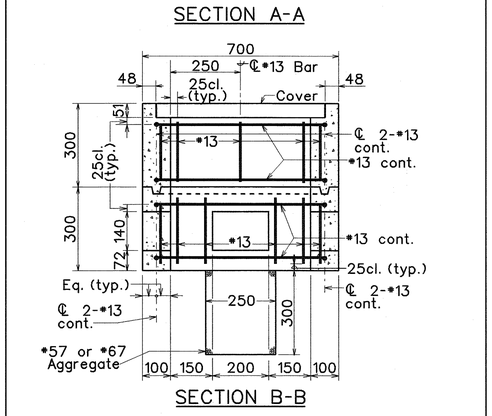



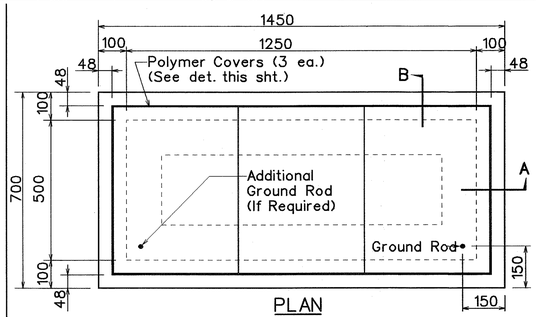

TYPE "A" PULLBOX
(Old Type "B")

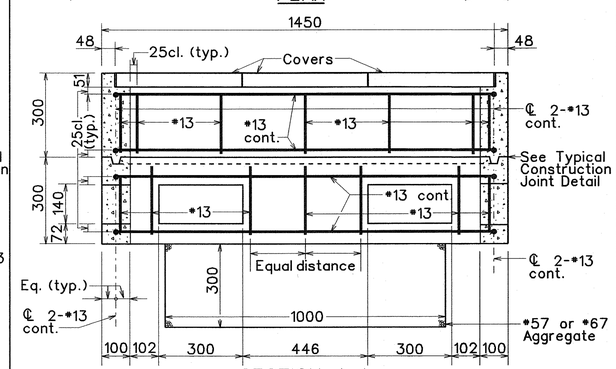


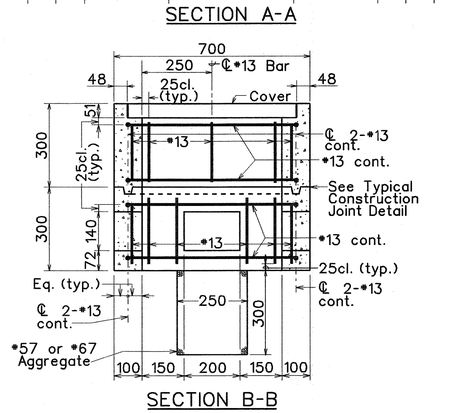



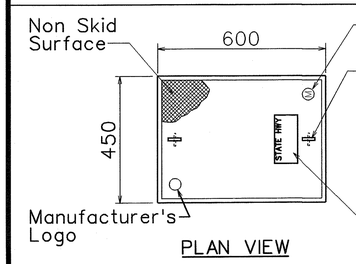

TYPE "B" PULLBOX (Old Type "C")

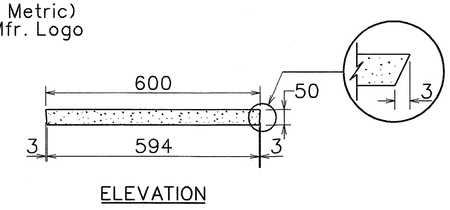


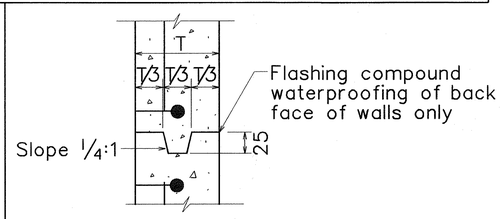




TYPE "C" PULLBOX (Old Type "D")



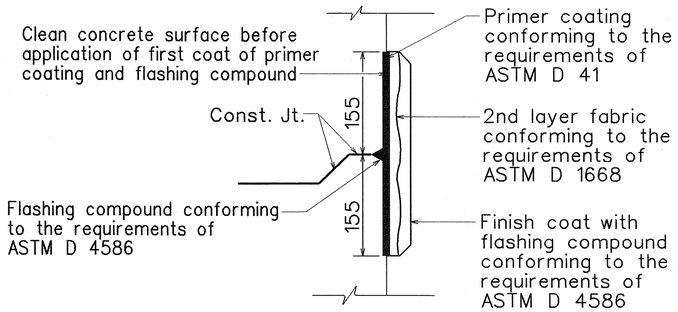

POLYMER CONCRETE COVER




TYPICAL CONSTRUCTION JOINT DETAIL

## GENERAL NOTES

1. Provide a minimum of one 16 ø x 2.5m Copperweld Ground Rod in each pullbox. When directed by the Traffic Signal Inspector/Engineer, install additional Ground Rods. Cost of Ground Rods shall be incidental to the pullboxes.
2. All pre-cast concrete pullboxes shall be manufactured in two pieces.
3. The pullbox with cover shall be capable of supporting an MS 18 Loading.
4. The maximum weight of the pullbox cover shall not exceed 27 kilograms.
5. The openings for the conduits on all pullboxes shall be pre-cast concrete knockouts.
6. After installing the conduits in the openings of the pullboxes, the Contractor shall fill the excess opening in the pre-cast knockouts with concrete mortar.
7. Prior to installing the pullboxes, the Contractor shall level the bottom of the trench and achieve a minimum of 95% relative compaction of the bottom of the trench.
8. All concrete shall be Class A (21 MPa (3,000 psi), min.)
9. Rebars shall be Grade 300 and all lapped splices shall be 360mm minimum.
10. The *57 or *67 size aggregate shall conform to latest version of AASHTO M43 (ASTM D 448).
11. Type "C" Pullbox shall be installed in a location protected from vehicular traffic (i.e. raised sidewalk, behind A.C. curbs, traffic signal standard or pipe guards).




TYPICAL FLASHING COMPOUND WATERPROOFING DETAILS

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

SURVEY PLOTTED BY
DRAWN BY M. Tadaki
TRACED BY
DESIGNED BY
NOTE BOOK
QUANTITIES BY
CHECKED BY
DATE
ORIGINAL PLAN
12/09 M. Tadaki

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

**PULLBOX & COVER DETAILS**

INTERSTATE ROUTE H-1
Extension and Repair of
School Street On-Ramp Wall
Project No. HII-01-08

Not to Scale Date: February 2009

SHEET No. E5 OF 5 SHEETS