FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H2-1(33)	2007	135	168

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.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

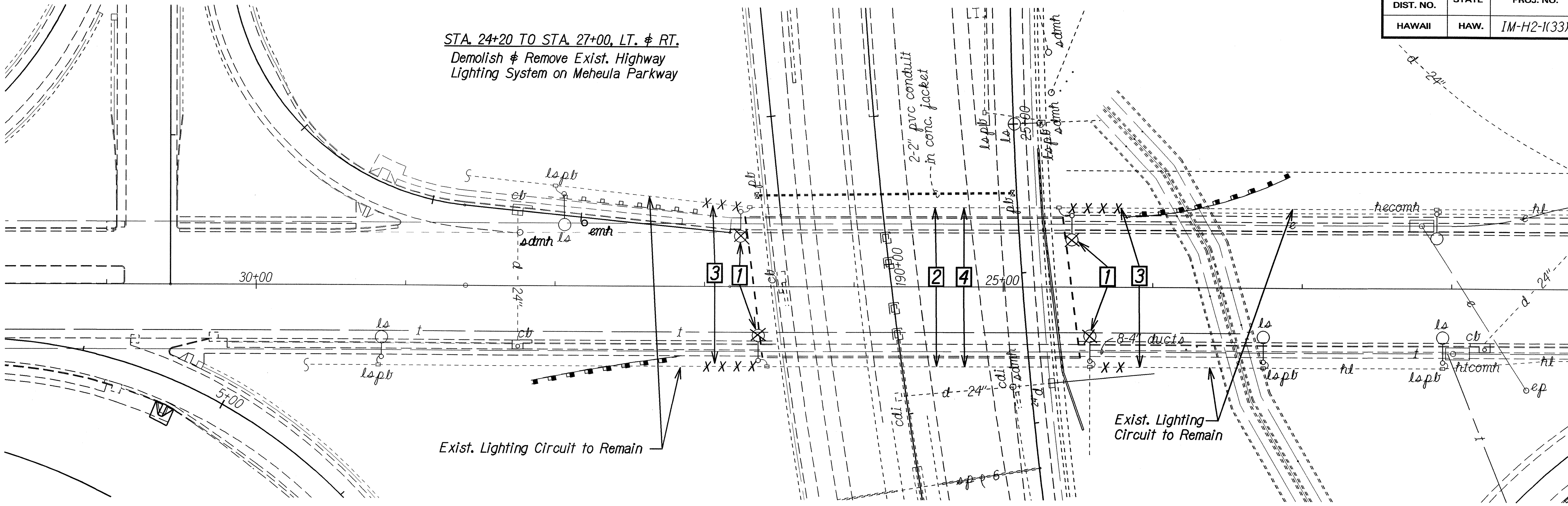
HIGHWAY LIGHTING NOTES

INTERSTATE ROUTE H-2 REHABILITATION
Waipio Interchange & Mililani Interchange
On/Off Ramps, Ka Uka Blvd., Meheula Pkwy.
Overpass, & Kipapa Stream Bridge
Federal Aid Project No. IM-H2-1(33)

Not to Scale Date: Dec. 2006

SHEET No. E1 OF 5 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H2-1(33)	2007	136	168



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. Temporary highway lighting system Items.
3. All conduits shall not be paid for separately but shall be considered incidental will not be paid for separately, but considered incidental to the Various Contract to the various contract items.

NOTES

[1] Remove existing highway lighting standard.

[2] Existing lighting conduits and pullboxes embedded in the Meheula Parkway overpass structure shall be abandoned in place.

[3] Demolish and dispose existing underground lighting conduits.

[4] Remove existing lighting circuit wiring, including wiring in the Meheula Parkway overpass bridge railings. Save and coil neatly, at least 5 feet of existing cables at each end for reconnection later.

ELECTRICAL SYMBOLS

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

ORIGINAL PLAN / NOTE BOOK td2may 4lh2thlds — SURVEY PLOTTED BY / DRAWN BY M. Takashiji / TRACED BY / DESIGNED BY HWY-TD / QUANTITIES BY / CHECKED BY — DATE 11/14/06

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

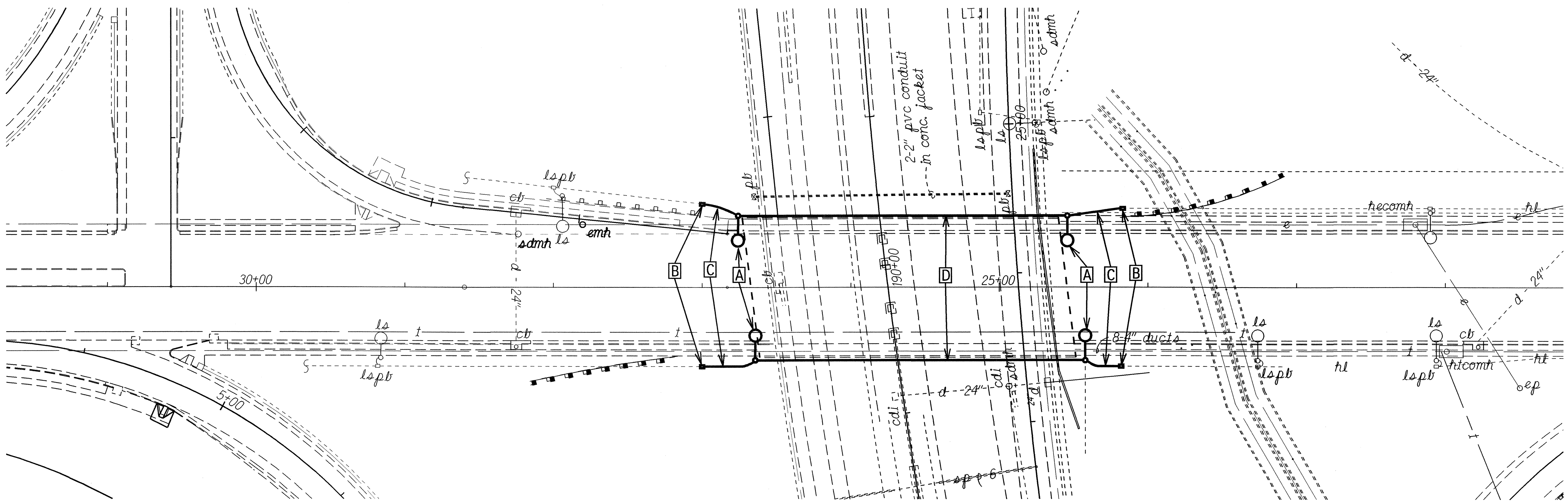
HIGHWAY LIGHTING DEMOLITION & SYMBOLS

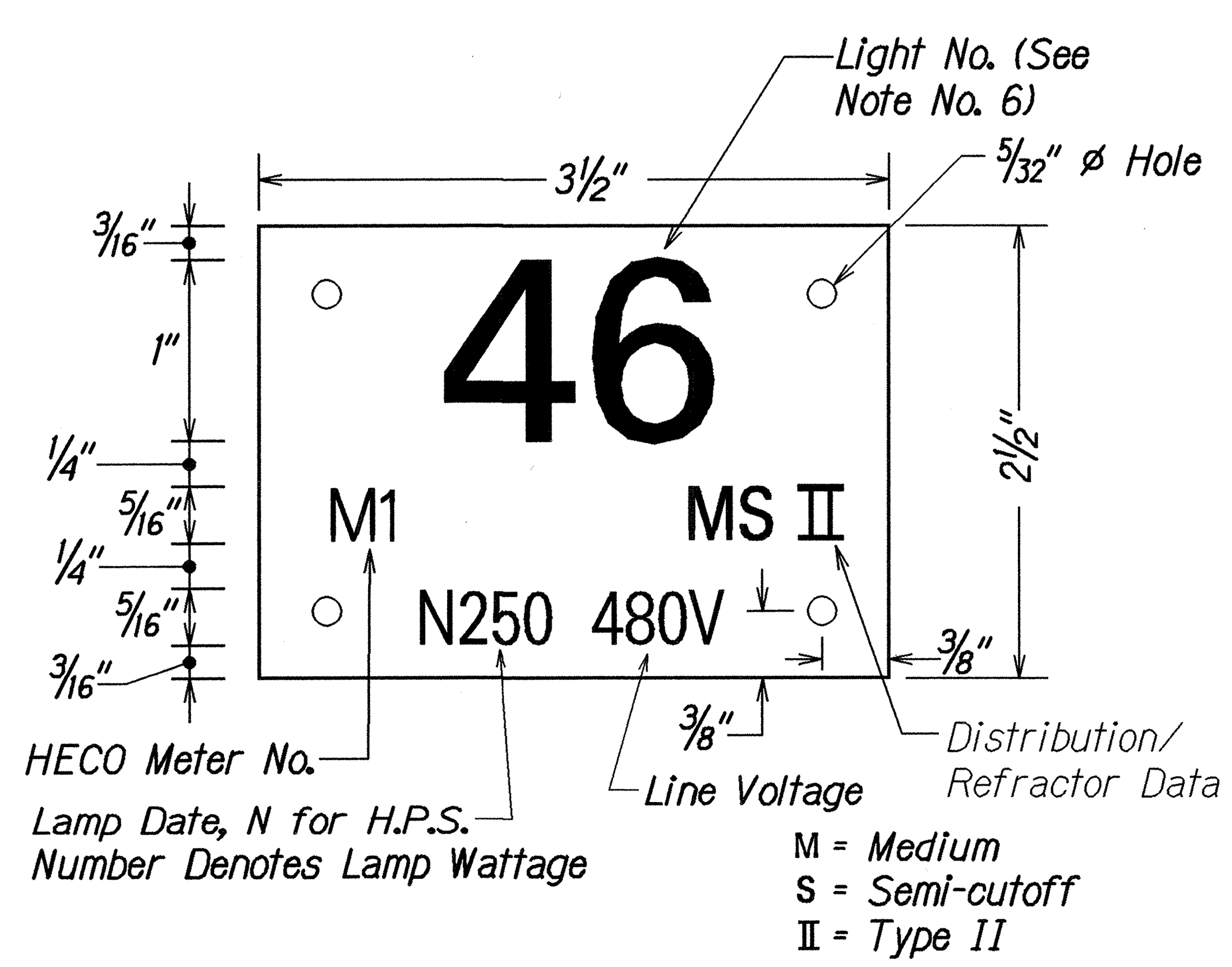
INTERSTATE ROUTE H-2 REHABILITATION
Waipio Interchange & Mililani Interchange
On/Off Ramps, Ka Uka Blvd., Meheula Pkwy. Overpass, & Kipapa Stream Bridge
Federal Aid Project No. IM-H2-1(33)

Scale: 1" = 40' Date: Dec. 2006

SHEET No. E2 OF 5 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H2-1(33)	2007	137	168





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 1/8" 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 1/8" 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

NOTES

[A] Install aluminum light pole with 10' aluminum truss arm.

[B] Install Type "A" lighting pullbox and intercept existing lighting circuit. Connect new lighting circuit to existing.

[C] Underground 1-2" PVC conduit

[D] Surface-mounted 1-2" conduit on bridge concrete railing

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

HIGHWAY LIGHTING PLAN

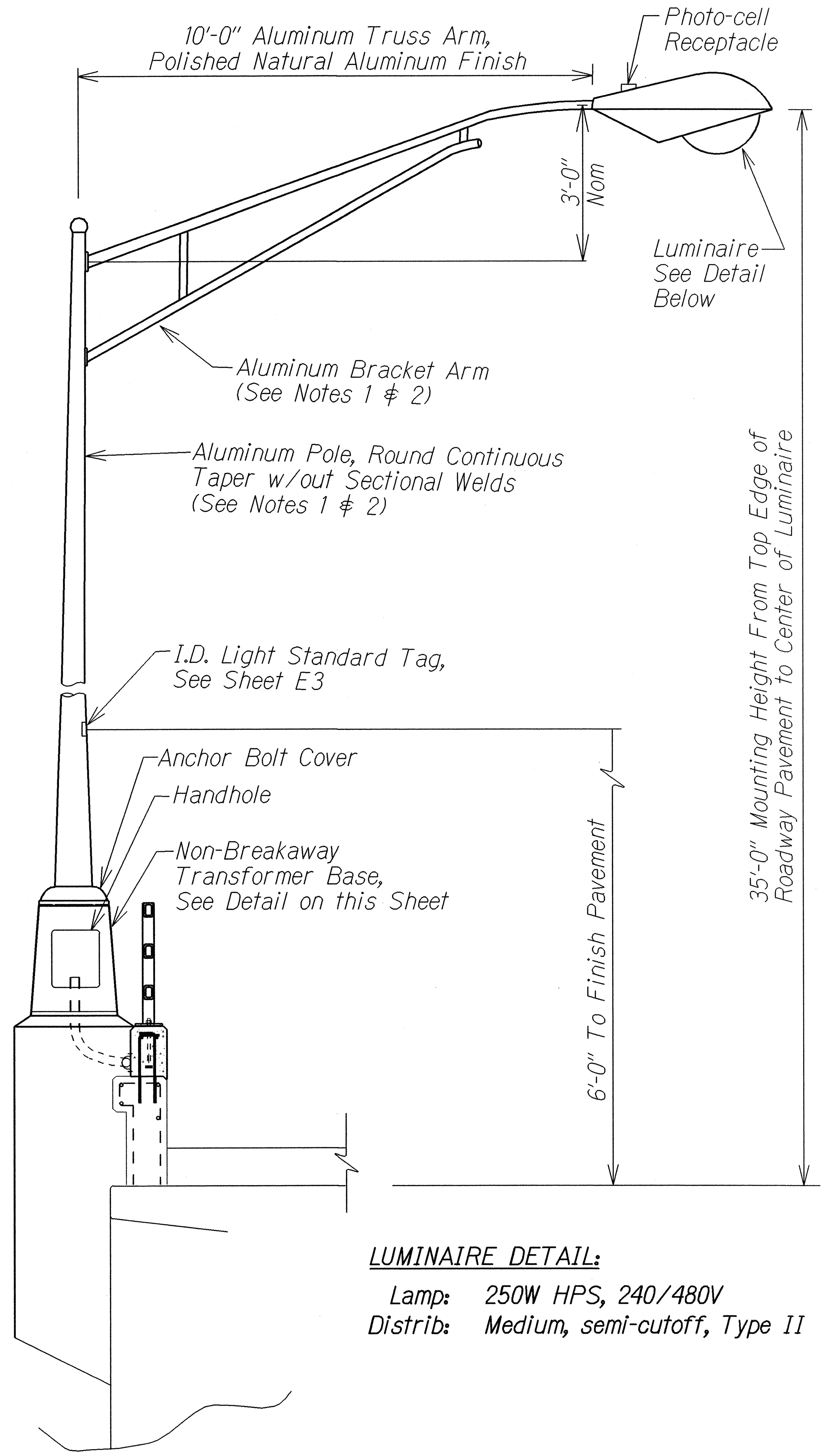
INTERSTATE ROUTE H-2 REHABILITATION
Waipio Interchange & Mililani Interchange
On/Off Ramps, Ka Uka Blvd., Meheula Pkwy.
Overpass, & Kipapa Stream Bridge
Federal Aid Project No. IM-H2-1(33)

Scale: 1" = 40' Date: Dec. 2006

SHEET No. E3 OF 5 SHEETS

ORIGINAL PLAN | SURVEY | PLOTTED BY | DRAWN BY M. Takafuji | TRACED BY | DESIGNED BY HWY-TD | QUANTITIES BY | CHECKED BY | NOTE BOOK td2.mep 4h2thlp | DATE 11/14/06

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H2-1(33)	2007	138	168



LUMINAIRE DETAIL:

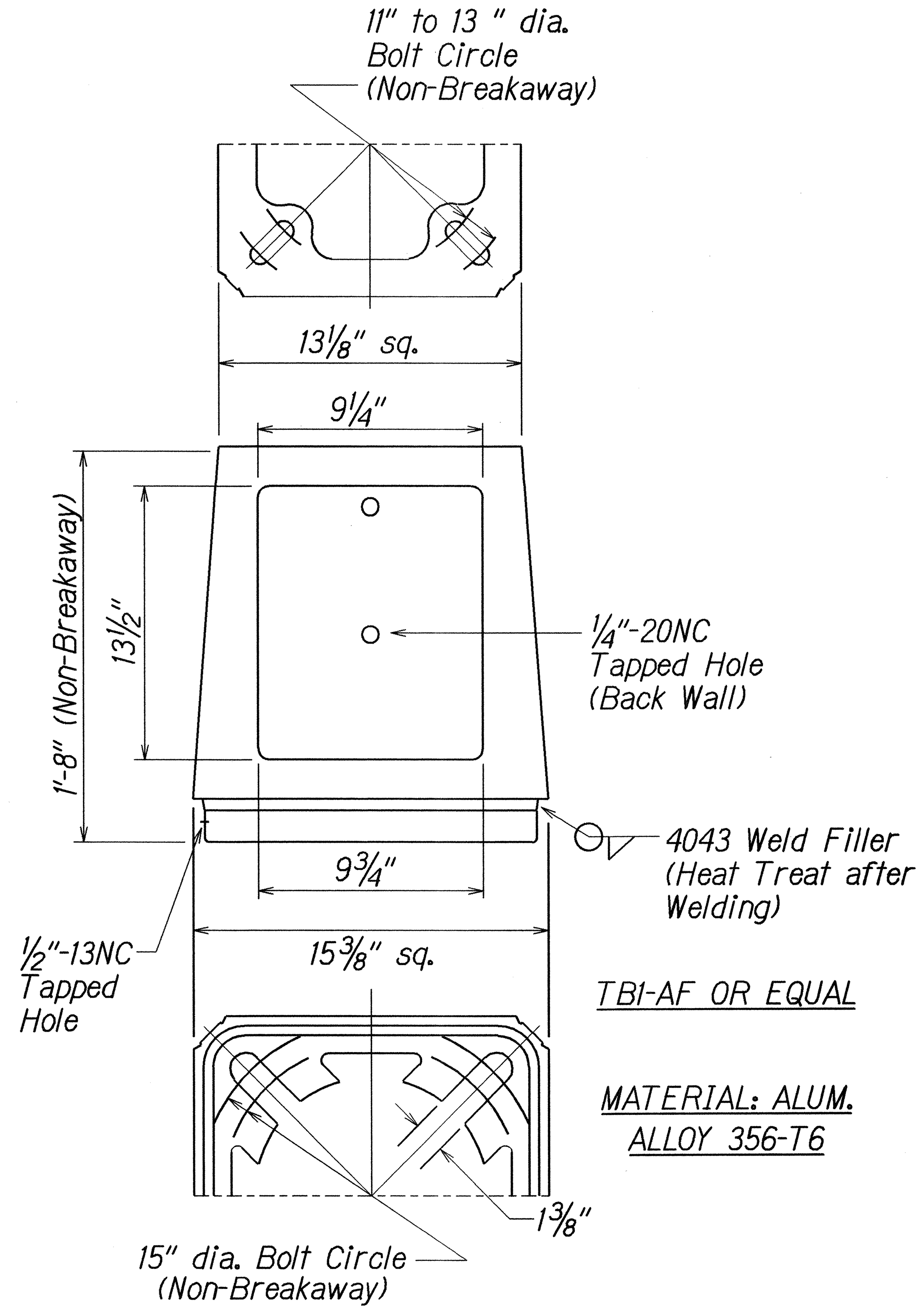
Lamp: 250W HPS, 240/480V
Distrib: Medium, semi-cutoff, Type II

LIGHT STANDARD SUPPORT SECTION

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.



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

TRANSFORMER BASE DETAIL

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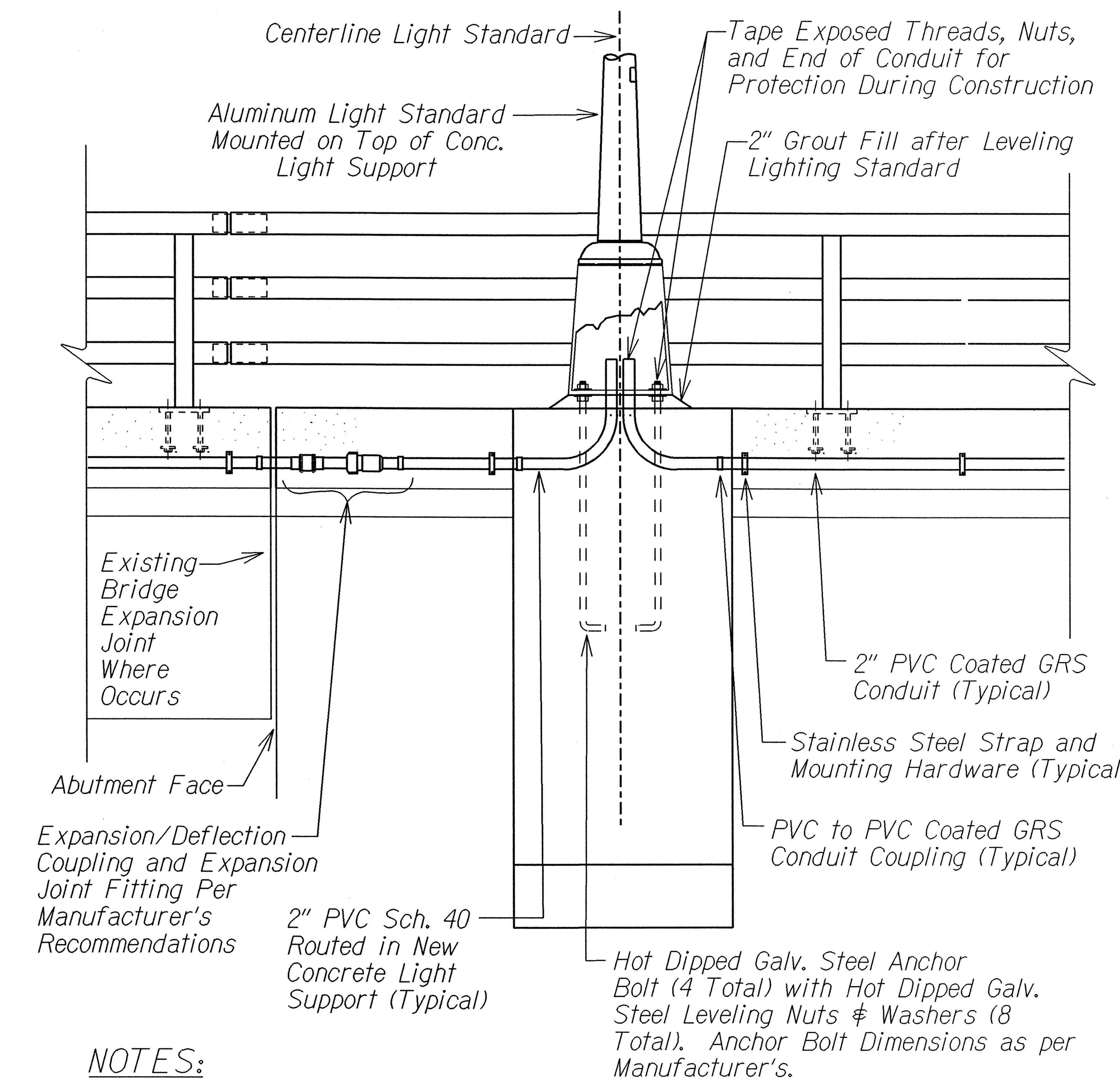


NOTES:

1. Expansion/deflection fitting assembly shall accommodate a minimum of 4" expansion, 4" contraction and ±4" transverse movement in the horizontal plane.
2. The Contractor shall submit shop drawing for expansion/deflection fitting assembly for approval.
3. Expansion/deflection fitting assembly shall be installed as close to abutment as practicable.
4. Provide supports for expansion/deflection fitting assembly as required. Assembly shall not be strapped to supports.
5. Expansion fitting assembly similar except without deflection coupling.

LIGHT STANDARD SUPPORT ELEVATION

Not to Scale

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

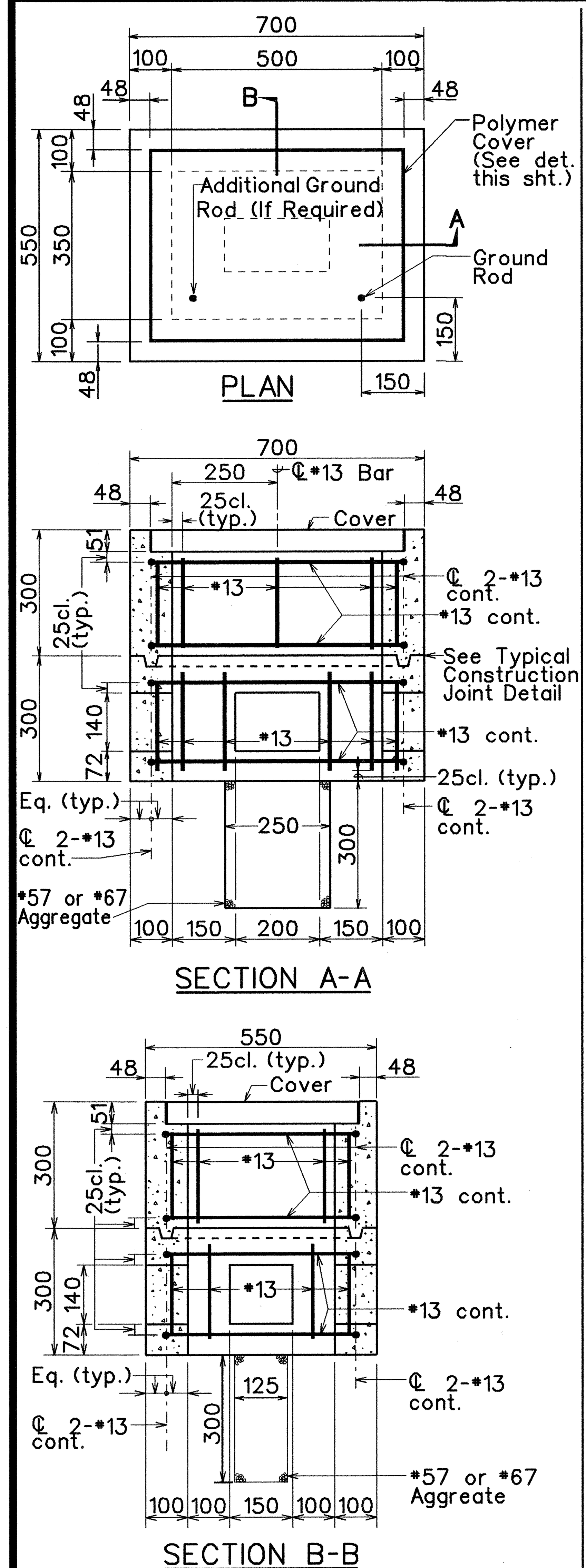
HIGHWAY LIGHTING DETAILS

INTERSTATE ROUTE H-2 REHABILITATION
Waipio Interchange & Mililani Interchange On/Off Ramps, Ka Uka Blvd., Meheula Pkwy. Overpass, & Kipapa Stream Bridge
Federal Aid Project No. IM-H2-1(33)

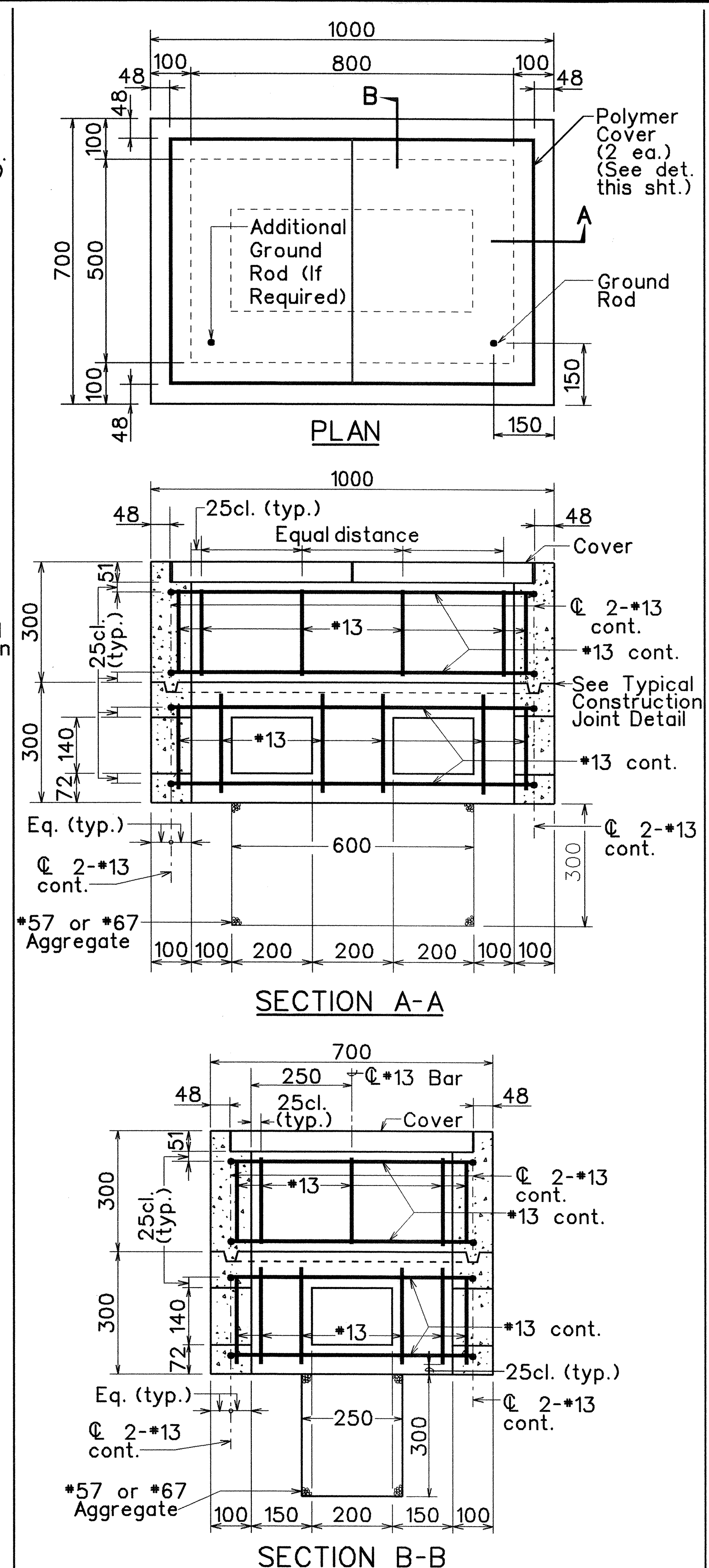
Not to Scale — Date: Dec. 2006

SHEET No. E4 OF 5 SHEETS

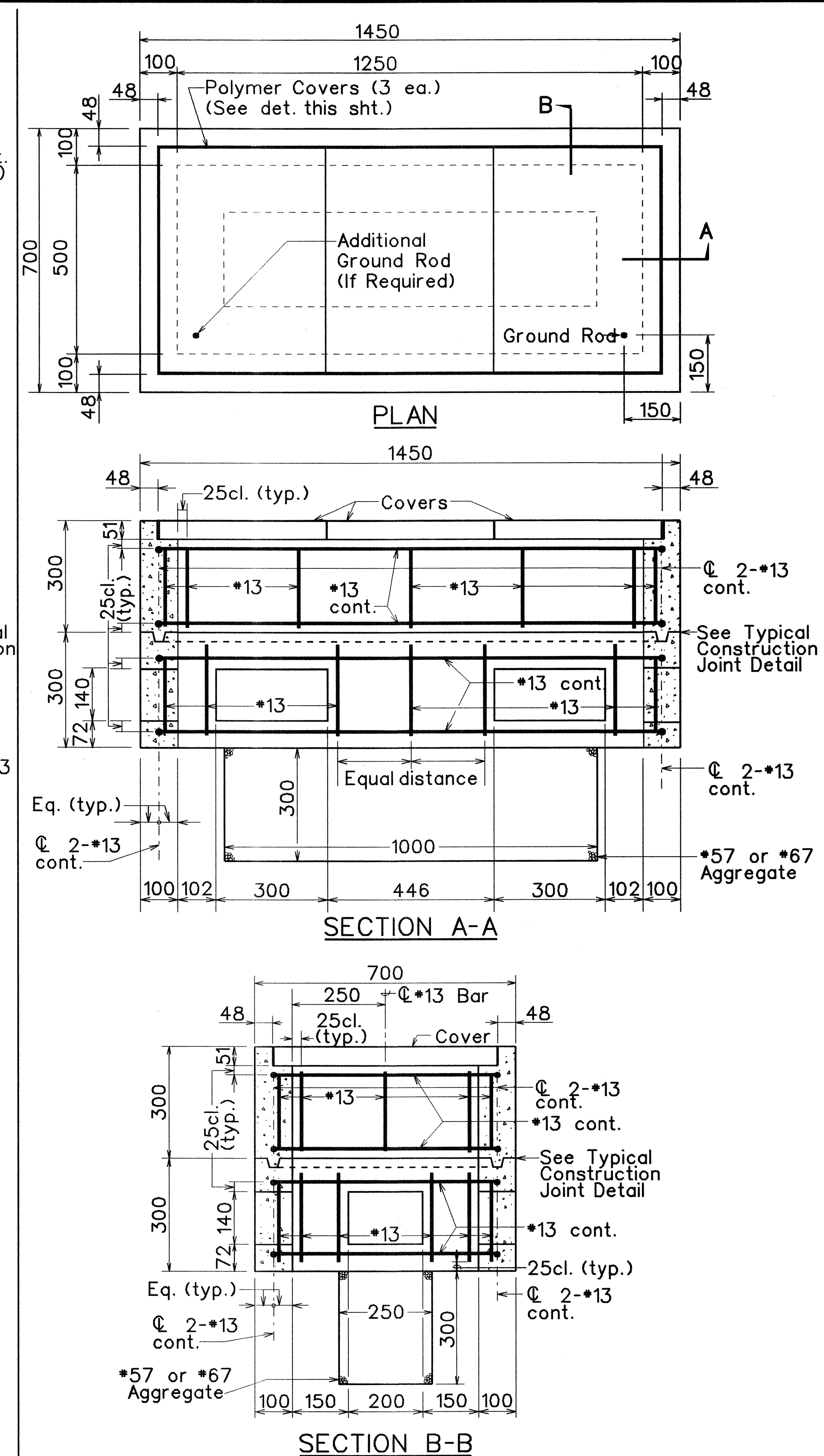
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	IM-H2-1(33)	2007	139	168



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



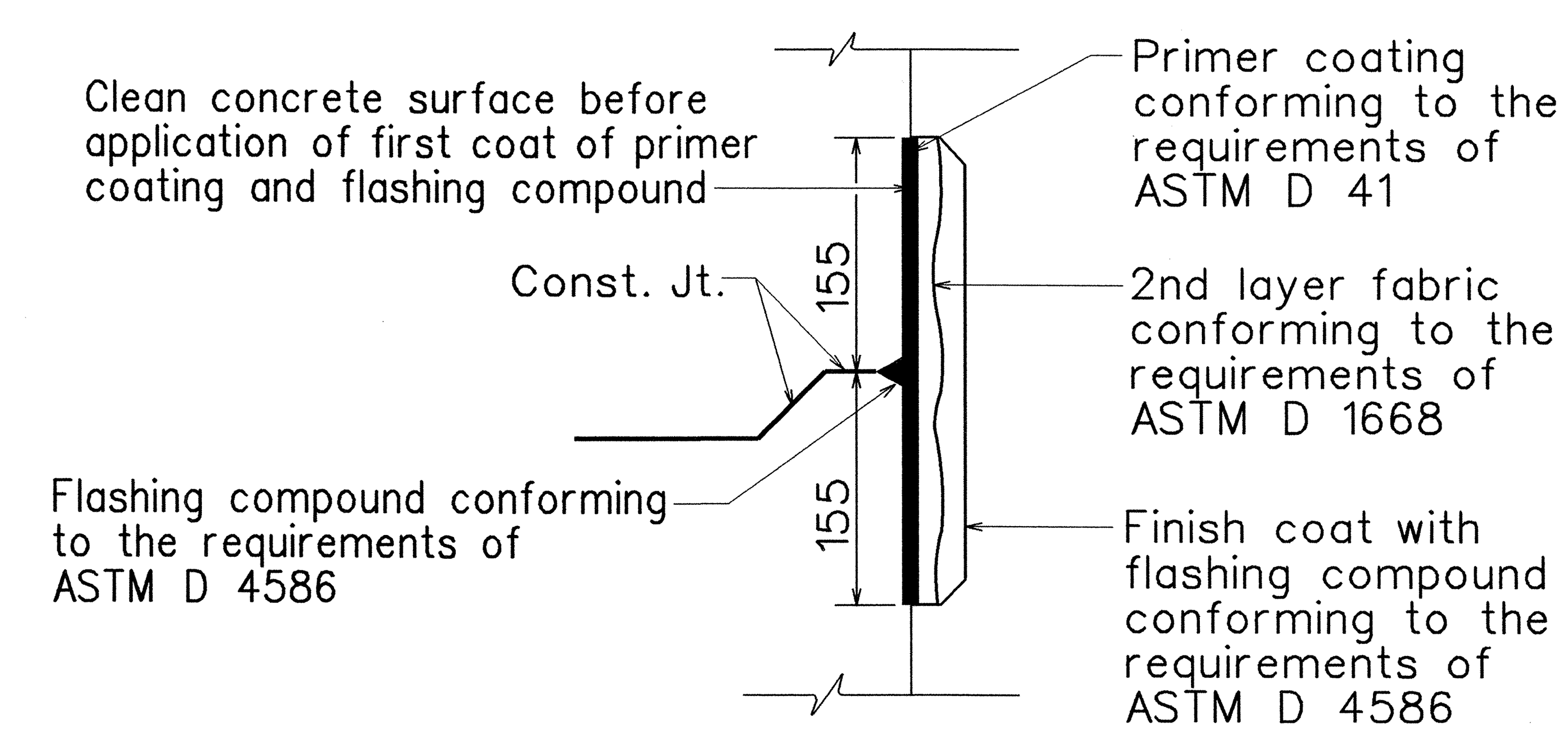
TYPE "B" PULLBOX (Old Type "C")



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

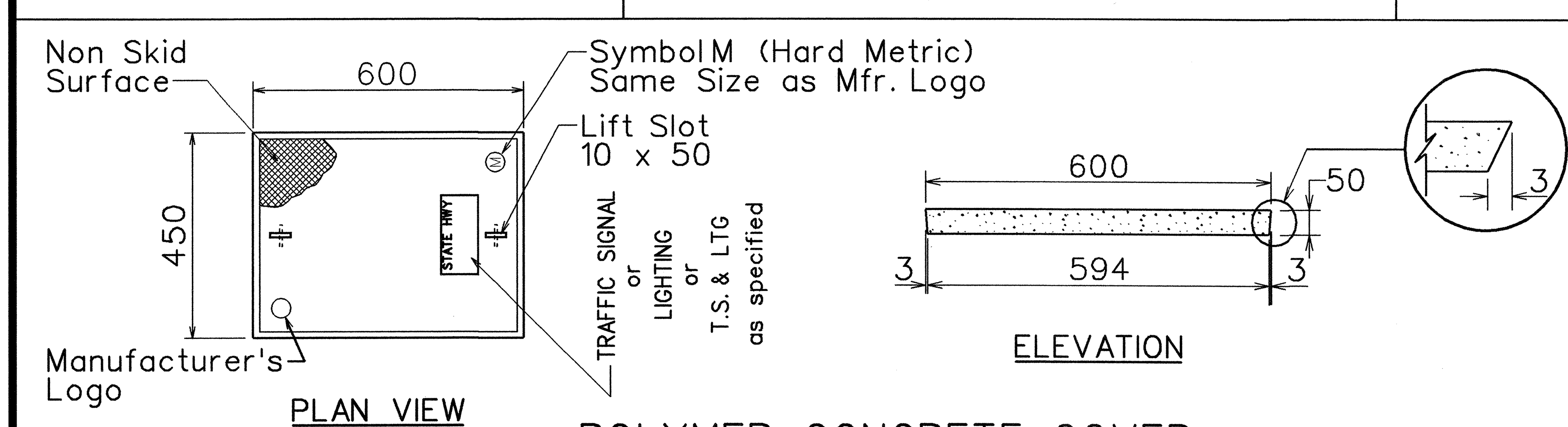
GENERAL NOTES

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).

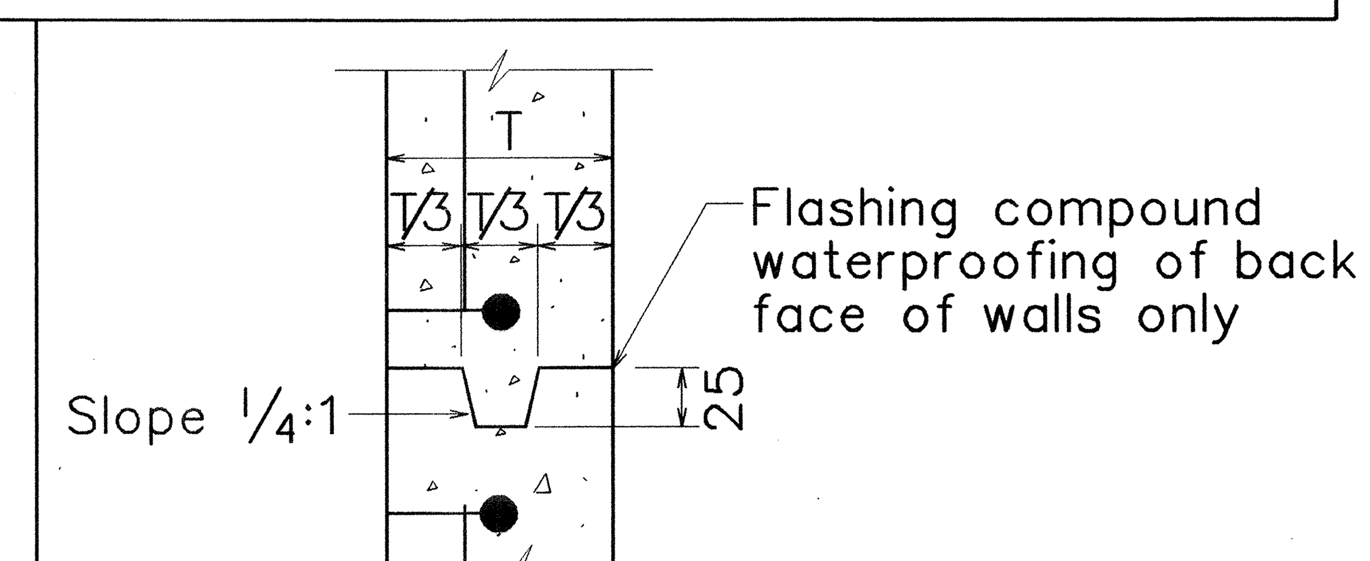


TYPICAL FLASHING COMPOUND WATERPROOFING DETAILS

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN



POLYMER CONCRETE COVER



TYPICAL CONSTRUCTION JOINT DETAIL

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PULLBOX & COVER DETAILS

INTERSTATE ROUTE H-2 REHABILITATION
Waipio Interchange & Mililani Interchange
On/Off Ramps, Ka Uka Blvd., Meheula Pkwy. Overpass, & Kipapa Stream Bridge
Federal Aid Project No. IM-H2-1(33)

Not to Scale — Date: Dec. 2006

SHEET No. E5 OF 5 SHEETS

ORIGINAL PLAN — NOTE BOOK td2may 4h2tpd — SURVEY PLOTTED BY / DRAWN BY M. Taketa / TRACED BY / DESIGNED BY / QUANTITIES BY / CHECKED BY — DATE