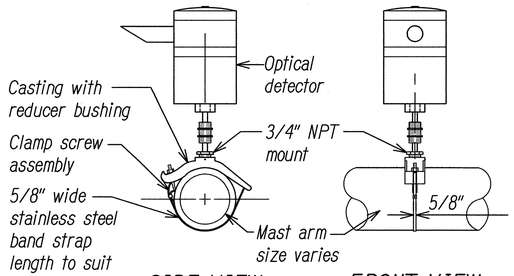
FED.ROAD DIST.NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
OAHU	HAW.	99C-01-13	2014	31	41

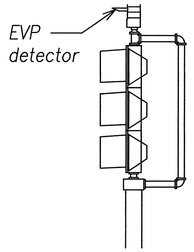


NOTES:

1. Optical detector shall be "Model 711 preemption detector", or approved equal, unless noted otherwise in the special provisions.
2. Support saddle assembly shall be "ASTRO MINI-BRAC, AB-0132-29", or approved equal, unless noted otherwise in the special provisions.

OPTICAL DETECTOR FOR MAST ARM MOUNTING

NOT TO SCALE



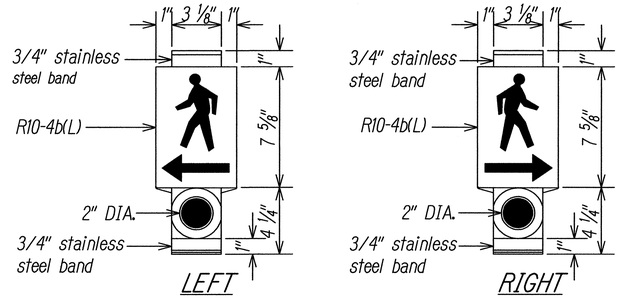
POST TOP TP-EVP MOUNTING

NOT TO SCALE

The color scheme shall be:

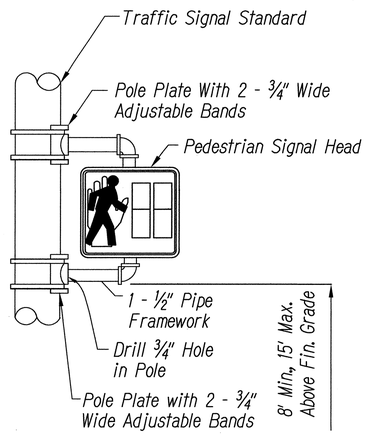
White - Man, arrow and push button
Black - Background

NOTE: On plan sheet, use applicable detail. see state STD. DET. for PPB pedestal.



PEDESTRIAN PUSH BUTTON DETAILS

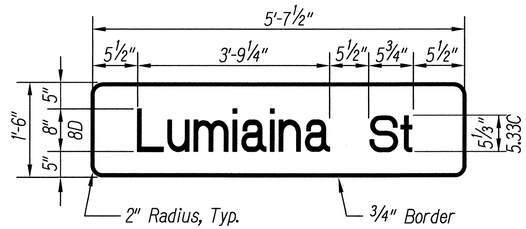
NOT TO SCALE



BRACKET MOUNT - ONE WAY

PEDESTRIAN SIGNAL MOUNTING

NOT TO SCALE



STREET NAME SIGN DETAIL

Not To Scale

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

KEITH K. NIIYA
LICENSED PROFESSIONAL ENGINEER
No. 8226-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

APRIL 30, 2014
AUSTIN, TSUTSUMI & ASSOC., INC. LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

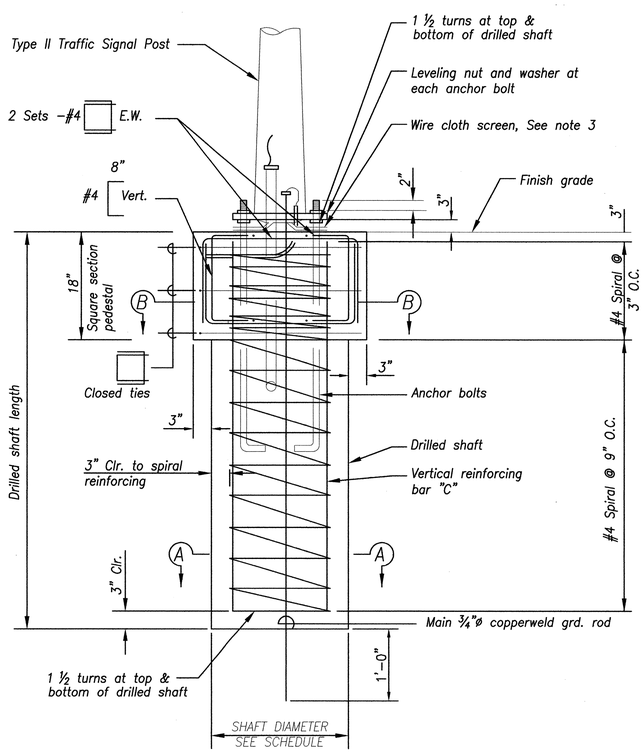
TRAFFIC SIGNAL DETAILS

TRAFFIC OPERATIONAL IMPROVEMENTS AT VARIOUS LOCATIONS
Vicinity of Kamehameha Highway and Lumiaina Street
Project No. 99C-01-13

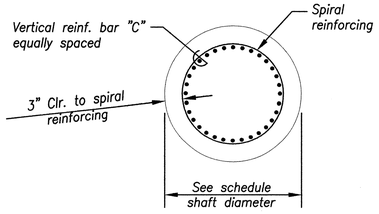
Scale: As Noted Date: Jan 2014

SHEET No. TS-5 OF 6 SHEETS

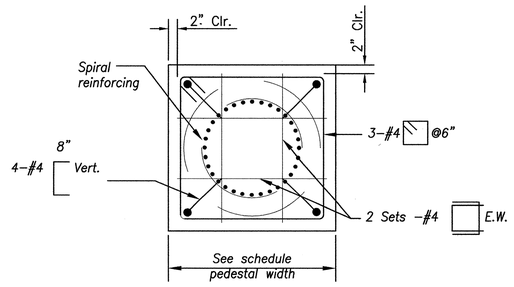
Level Group Condition – Above Groundwater						
Soil Type	Mast Arm Length	Shaft Diameter	Shaft Length	Pedestal Width	Bars "C"	Bolt Pattern
Clay & Silt Clay	45' - 50'	42"	15'-0"	48"	32-#6	6-Bolt Circle



ELEVATION



SECTION A-A



SECTION B-B

DRILLED SHAFT FOUNDATION FOR TYPE III MAST ARM STANDARD

NOT TO SCALE

(FOR MAST ARM GREATER THAN 40' IN LENGTH)

Notes:

1. Traffic signal poles manufacturer's recommendations shall be followed
2. See schedules this sheet for additional details.
3. Mast arm standards have been designed and shall conform to 4.0 Modifications to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals as noted in HDOT" Design criteria for Bridges and Structures", March 1, 2013.

A. 4.01 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 judgment. 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. The wind maps for Effective Wind Speed, Topographic Effects and Exposure Category included in the State Building Code (Hawaii Administrative Rules, Chapter 3-180) should be used for guidance.

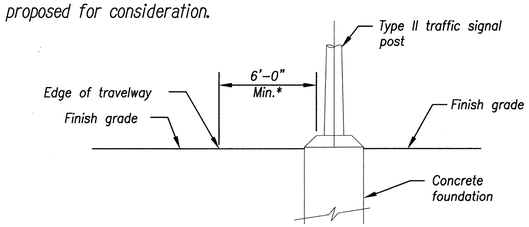
B. 4.02 Wind Importance Factor [Article 3.8.3] noted in Table 3-2 used to determine the design wind pressures shall be based on the following recurrence intervals:

- For overhead sign structures: 100 years
- For traffic signal structures: 50 years
- For luminaire support structures less than 50 feet in height: 25 years
- For other support structures including luminaire support structures 50 feet or more in height, and when luminaire is mounted on a traffic signal structure: 50 years
- For roadside sign structures & temporary support structures: 10 years

C. 4.04 Minimum Anchor Bolts [Article 5.17.3]. Cantilevered traffic signal structures with mast arms greater than 40 feet and other cantilevered support structures with design life of 50 years or more shall have base plate connections with a minimum of six (6) anchor bolts. A minimum of four (4) anchor bolts shall be provided for all other base plate connections.

D. 4.05 Use of Grout [Article 5.17.3.3]. Grout shall not be used under base plates for all support structures except for ordinary street light poles unless approved by the Bridge Design Engineer. Anchor bolts with leveling nuts shall be designed to transfer all loads from the structure to its base support.

A wire cloth screen shall be specified to be placed vertically between the base plate and the top of the foundation and wrapped horizontally around the base plate with a 3 inches minimum lap. The wire cloth shall be galvanized steel standard grade plain weave 2x2 mesh 0.063 inch diameter wires. The screen shall be attached to the base plate with stainless steel self-tapping 1/4 inch diameter screws with stainless steel washers spaced at 9 inches on centers. Also, alternate means of protecting the underside of the base plate from debris, birds, bees and other nesting animals may be proposed for consideration.



* If 6'-0" min. cannot be maintained due to conflict with other utilities, coordinate field adjustments with Engineer.

HIGHWAY LIGHTING DETAIL

NOT TO SCALE

E. 4.06 Plumbness of Anchor Bolts [Article 5.17.5.3]. The designer shall include this provision of the design specification in the construction plans and/or specifications.

"Anchor bolts shall be installed with misalignments of less than 1:40 from vertical. After installation, firm contact shall exist between the anchor bolt nuts, washers, and base plate on any anchor bolt installed in a misaligned position."

F. 4.07 Fatigue Importance Factors [Article 11.6] noted in Table 11-1 for overhead sign and traffic signal structures shall be based on Fatigue Category I.

Support structures other than that noted in Table 11-1 with round cross sections under 50 feet, roadside sign structures, and temporary structures do not need to be designed for fatigue.

Support structures 50 feet or more in height shall be designed for fatigue and be based on Fatigue Category I.

G. 4.08 Galloping [Article 11.7.1]. Provisions shall be made to install effective vibration mitigation devices on overhead cantilevered sign and traffic signal support structures unless they are designed for galloping-induced cyclic loads. With approval from HDOT, mitigation devices may be installed after construction if vibration due to galloping is identified. Responsible party for the mitigation devices shall be determined during design and included in the construction documents.

H. 4.09 Natural Wind Gust [Article 11.7.3]. Overhead sign, traffic signal, and high-level 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.

I. 4.10 Truck-Induced Gust [Article 11.7.4]. Overhead sign and traffic signal support structures shall be designed to resist an equivalent static truck gust pressure range based on a truck speed of 20 mph over the posted speed.

FED.ROAD DIST.NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
OAHU	HAW.	99C-01-13	2014	32	41

DELWIN P.K. CHING LICENSED PROFESSIONAL ENGINEER No. 1440-S HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

1/15/14

APRIL 30, 2014
AUSTIN, TSUTSUMI & ASSOC. INC. LIC. EXP. DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL DETAILS

TRAFFIC OPERATIONAL IMPROVEMENTS AT VARIOUS LOCATIONS
Vicinity of Kamehameha Highway and Lumiaina Street
Project No. 99C-01-13

Scale: As Noted Date: Jan 2014

SHEET No. TS-6 OF 6 SHEETS

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