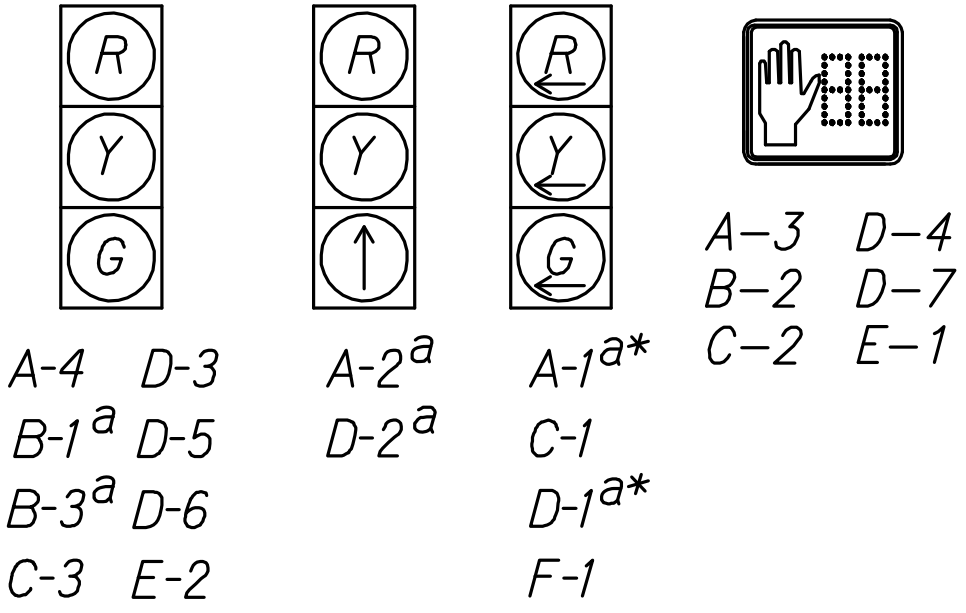
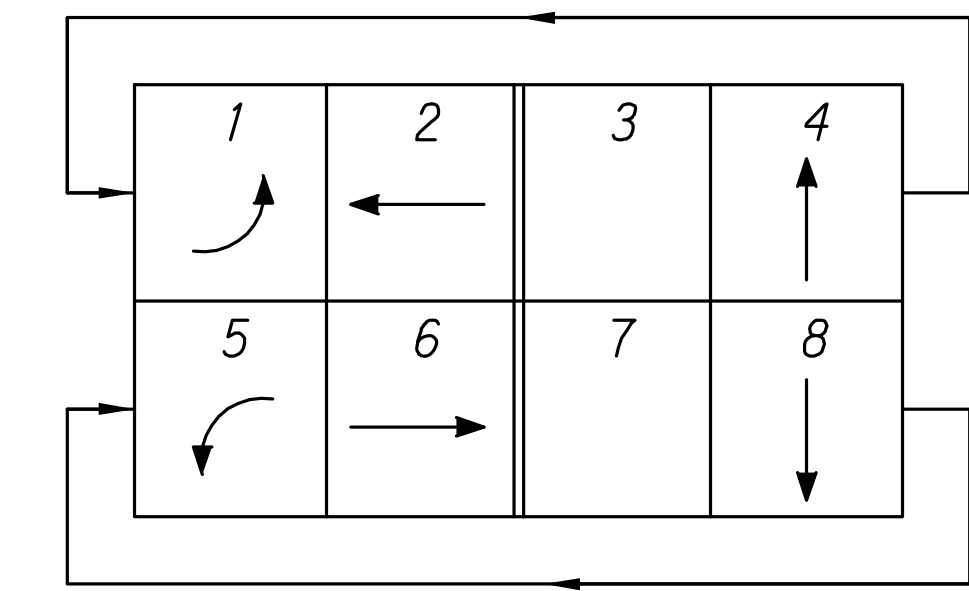


- Notes:
1. See sheet PM-4 for location of TSPB 9.
 2. Install a detectable "ELECTRICAL" warning tape 12" below depth from the finish grade.
 3. See sheet TD-2 for additional notes.

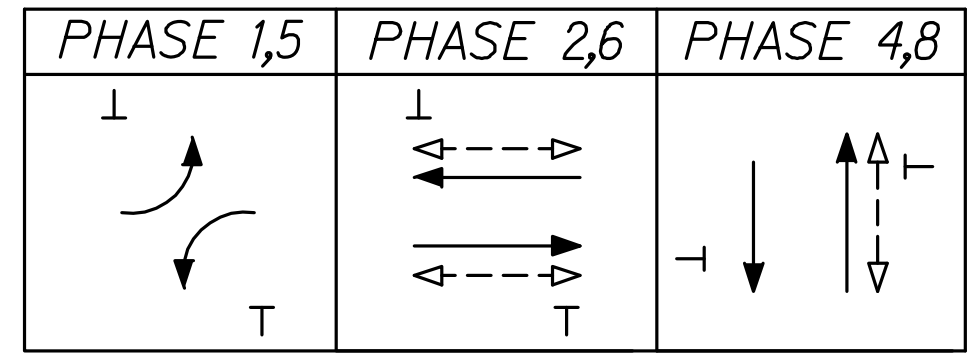


SIGNAL INDICATIONS

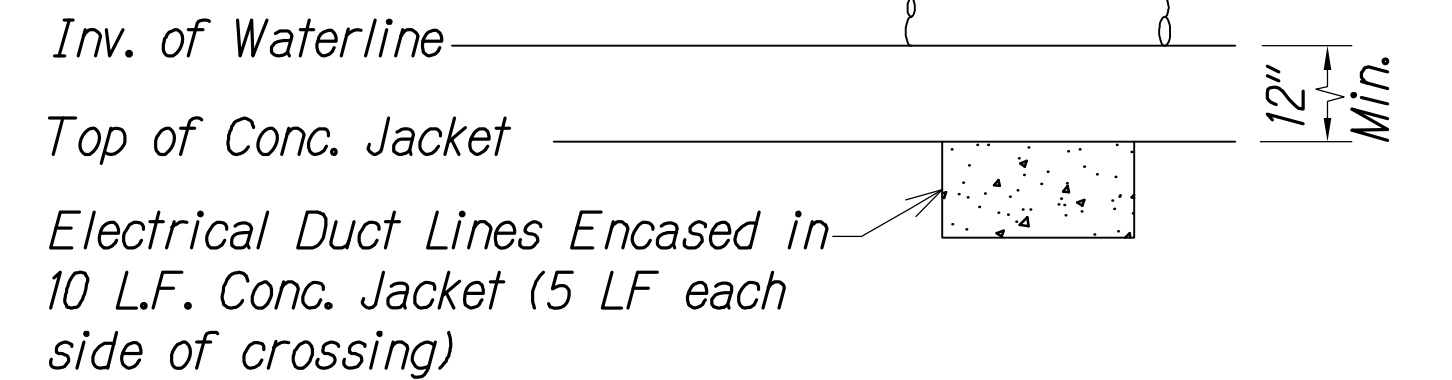
* Programmable Visibility
a Install Backplates On All Mast Arm Mounted Traffic Signal Heads. Backplates Shall Be 5" With Slots To Reduce Wind Load With 1" Retro-Reflective Border.



**PHASE ASSIGNMENT DIAGRAM
MODEL 170 CONTROLLER MODEL
332S CABINET**



PHASE DIAGRAM



PROFILE AT WATERLINE CROSSINGS DETAIL

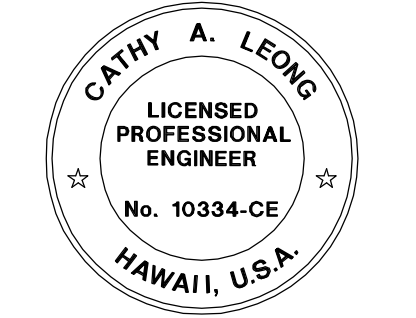
Not to Scale

Replace Sheet; Revised Striping and Traffic Signal Layout

DATE REVISION

**LEGEND FOR
AS-BUILT POSTINGS**

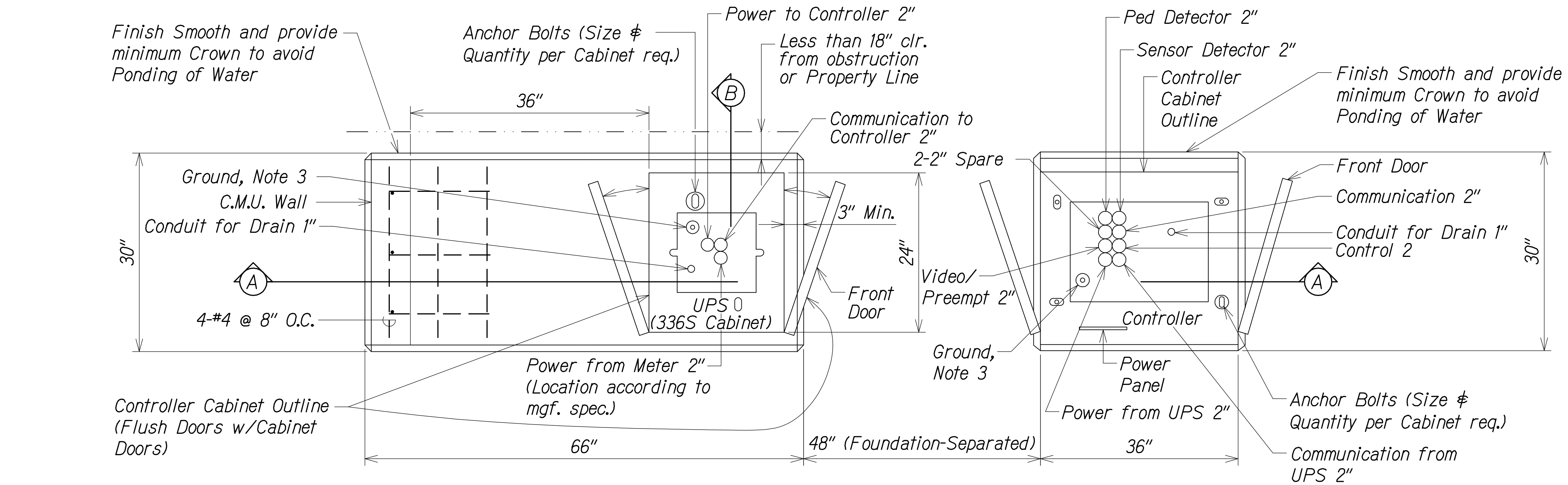
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| ~~~~~ | Squiggly line for as-built deletion |
| ==== | Double line for as-built deletion |
| ~~~~~ | Roadway |
| ~~~~~ | Text for as-built posting |



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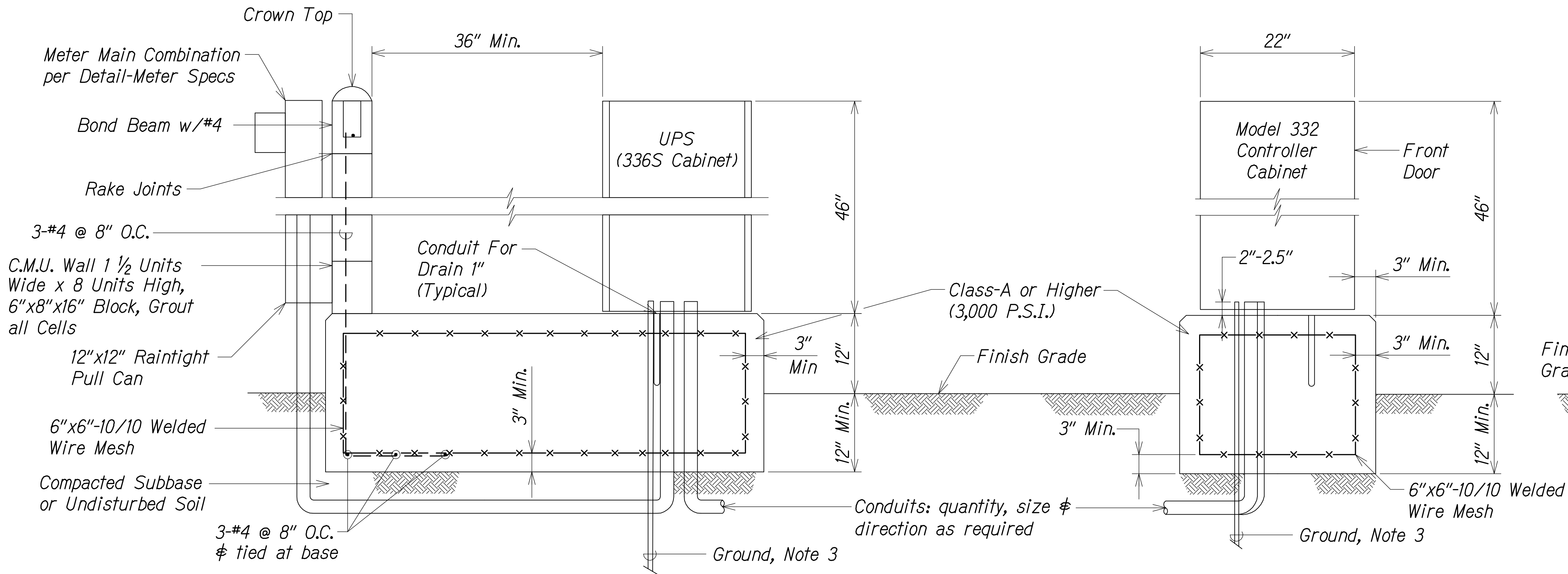
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL PLAN
SHOWER DR. AT KEAAU-PAHOA RD.
KEAAU-PAHOA ROAD, SHOULDER
LANE CONVERSION, PHASE 2
Shower Drive Intersection Improvements
Fed. Aid Proj. No. STP-0130(33)
Scale: Date: March 2016
SHEET No. TSP-10F 1 SHEETS

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII | HAW. | STP-0130(33) | 2017 | 81 | 99 |

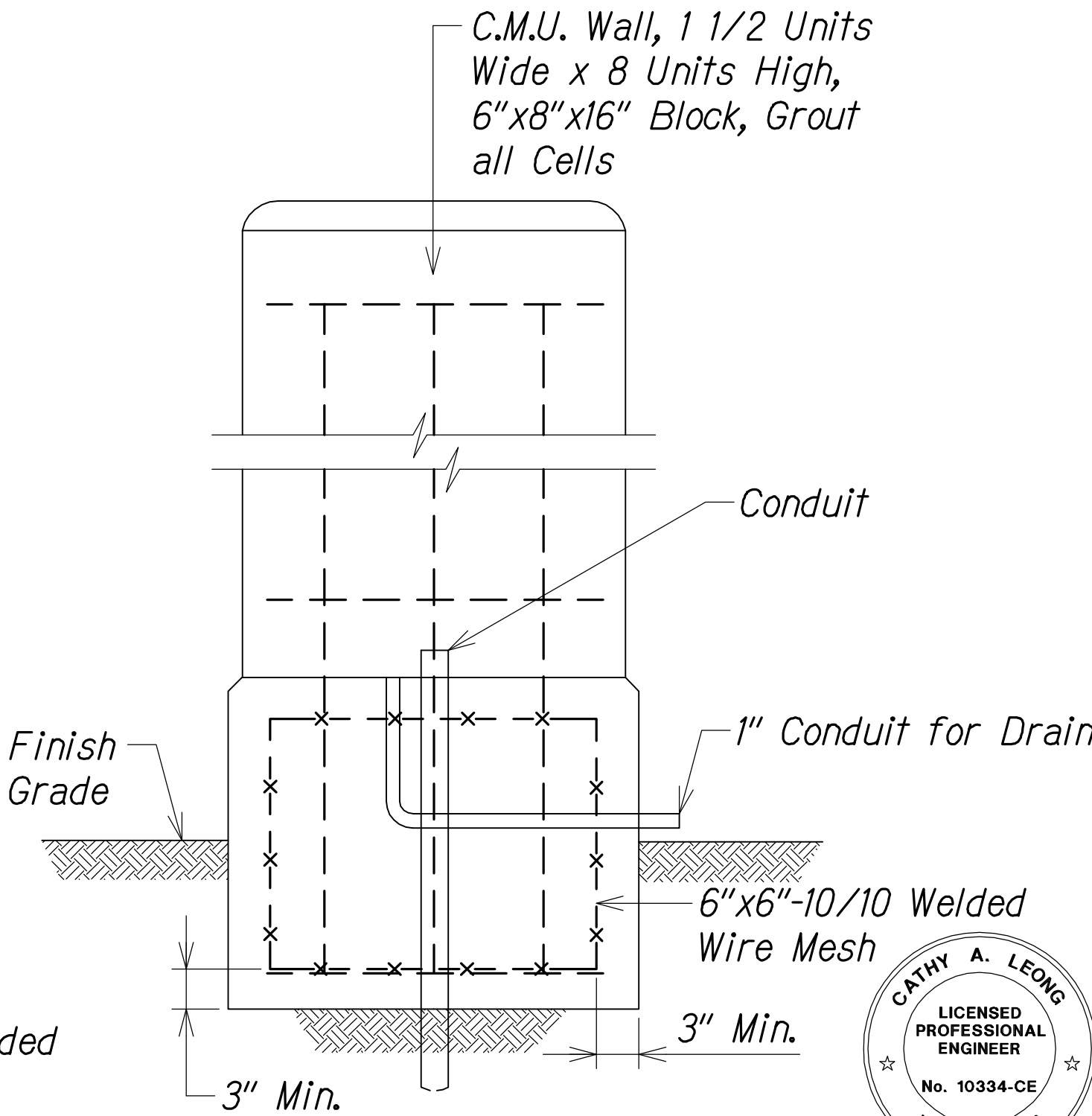


NOTES:

- Contractor shall verify all Conduit requirements prior to installation.
- Confirm location of Conduits with actual cabinets.
- Concrete encased Electrode (UFER Ground). Per Section 250-50(c) of the National Electrical Code.
- Locate Controller Cabinet such that personnel facing equipment at front door shall have a clear view of the intersection.



SECTION A



SECTION B

CONTROLLER/UPS ASSEMBLY FOUNDATION DETAIL
Not To Scale

LEGEND FOR
AS-BUILT POSTINGS

- Squiggly line for as-built deletion
- Double line for as-built deletion
- Roadway Text for as-built posting

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL DETAILS

KEAAU-PAHOA ROAD, SHOULDER
LANE CONVERSION, PHASE 2

Show Drive Intersection Improvements

Fed. Aid Proj. No. STP-0130(33)

Scale: NTS Date: March 2016

SHEET No. TD-1 OF 6 SHEETS

"AS-BUILT"

81

△ CABLE AND CONDUIT SCHEDULE




| | | | | | |
|------------------------|-------|-----------------------|----------------|--------------|-----------------|
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
| HAWAII | HAW. | STP-0130(33) | 2017 | C.O. 82 | 99 |

| From | To | GROUND #6 AWG | MAIN CONTROL | | | SIGNAL CONTROL | | DETECTORS | | SPARE | OPTICOM | |
|------|--------|------------------|--------------|--------|-------|----------------|-------|-----------|-------|---------|---------|-------|
| | | | CONDUIT | CABLE | CABLE | CONDUIT | CABLE | CONDUIT | CABLE | CONDUIT | CONDUIT | CABLE |
| | | | 2" | 26C#14 | 9C#14 | 2" | 4C#14 | 2" | 2C#14 | 2" | 2" | |
| PB-1 | Pole A | 1 | | | | 2 | 4 | | | 1 | 1 | 1 |
| PB-1 | PB-2 | 1 | 2 | 1 | 1 | | | 2 | 2 | 1 | 2 | 2 |
| PB-2 | Pole B | 1 | | | | 1 | 3 | | | 2 | 1 | 1 |
| PB-2 | PB-3 | 1 | 2 | 1 | 1 | | | 2 | 1 | 1 | 1 | 1 |
| PB-3 | Pole C | 1 | | | | 1 | 2 | | | | | |
| PB-3 | PB-4 | 1 | 2 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 |
| PB-4 | Pole D | 1 | | | | 2 | 7 | | | 1 | 1 | 1 |
| PB-4 | PB-5 | 1 | 2 | 1 | 1 | | | 1 | 1 | 1 | | |
| PB-5 | Pole E | 1 | | | | 1 | 3 | | | 2 | 1 | 1 |
| PB-5 | Pole F | 1 | | | | 1 | 1 | | | | | |
| PB-5 | PB-1 | 1 | 2 | 1 | 2 | | | 1 | 1 | 2 | 1 | 1 |
| PB-1 | Cont. | 1 | 4 | 1 | 1 | | | 4 | 3 | 1 | 4 | 4 |
| PB-5 | PB-6 | 1 | 1 | | 1 | 1 | 1 | | | 1 | | |
| PB-6 | PB-7 | 1 | | | | 1 | 1 | | | 1 | | |
| PB-3 | PB-8 | | | | | 1 | 1 | | | 1 | | |
| PB-8 | PB-9 | 1 | | | | 1 | 1 | | | 1 | | |
| PB-9 | PB-10 | 1 | | | | 1 | 1 | | | 1 | | |

- △ Notes:
1. All pull box shall have an 8'x⁵/₈" diameter ground rod installed and #6AWG RHW wire (safety ground green wire) connecting between each pull box ground rod: the #6 is then connected to the main UFER Ground Grid ground rod.
 2. All electrical equipment enclosures (controller and UPS cabinets, electrical panels, etc.) shall have a safety ground (#6AWG RHW, green) referenced to the UFER Grounding circuit.
 - 3 A 8'x⁵/₈" diameter ground rod shall be installed in each of the Controller and UPS foundation pads.

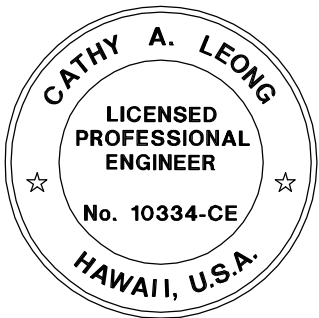
| | | |
|------------------|-------------------|------|
| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
| | DRAWN BY | |
| | TRACED BY | |
| | CHECKED BY | |
| NOTE BOOK | QUANTITIES BY | |
| | CHECKED BY | |
| | | |
| | No. | |

LEGEND FOR
AS-BUILT POSTINGS

Squiggly line for
as-built deletion
Double line for
as-built deletion
Text for as-built
posting

| | |
|-----------|---|
| △ r6/8/17 | Revised Cable and Conduit Schedule and added Notes |
| DATE | REVISION |



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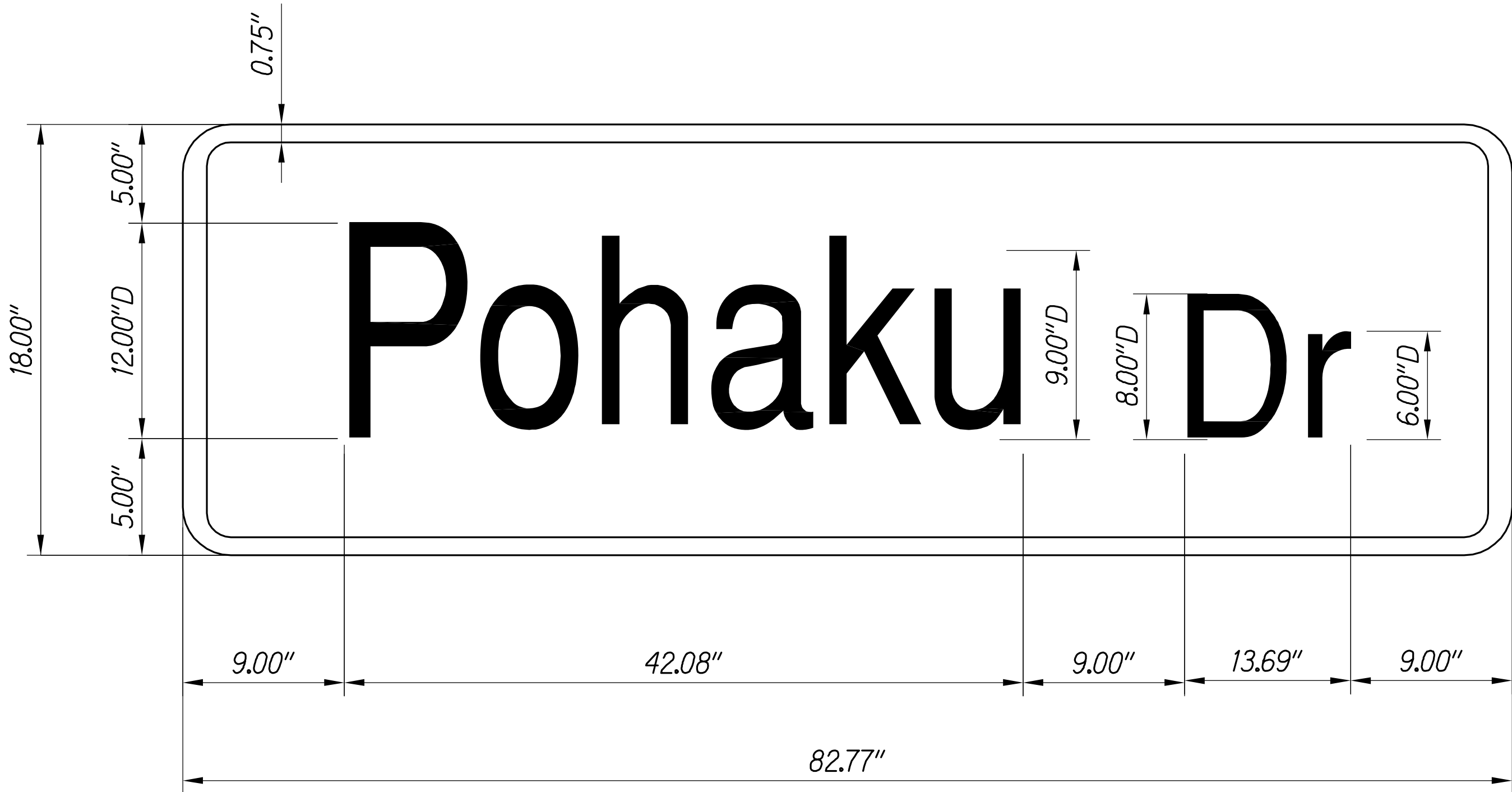
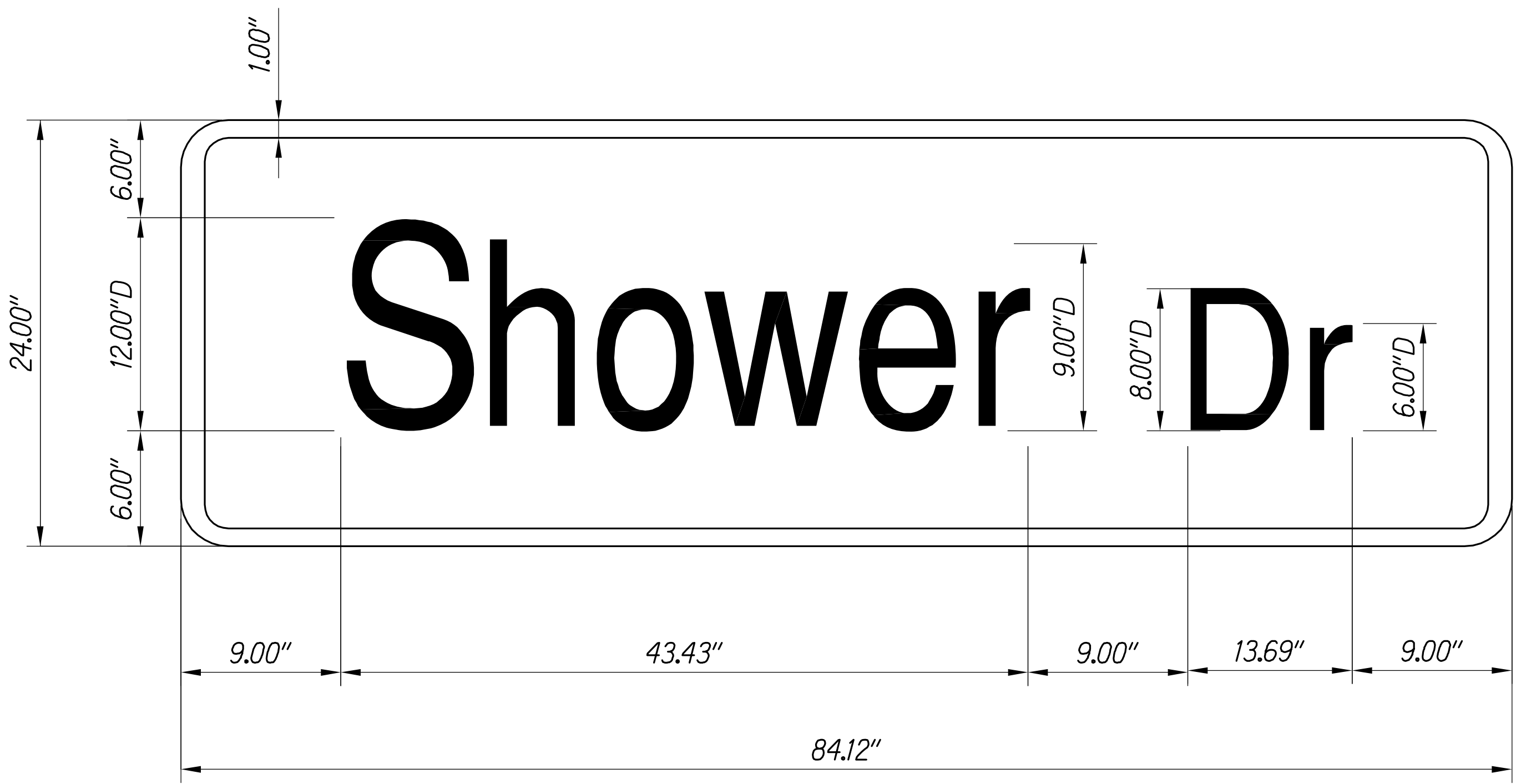
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC DETAILS

KEAAU-PAHOA ROAD, SHOULDER
LANE CONVERSION, PHASE 2
Shower Drive Intersection Improvements
Fed. Aid Proj. No. STP-0130(33)
Scale: As Noted Date: March 2016

SHEET No. TD-2 OF 27 SHEETS

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII | HAW. | STP-0130(33) | 2017 | 83 | 99 |



- Notes:
- Street Name Signs Shall be In Accordance With State Standard Plan TE-13.
 - All Sign Faces Shall be Completely Reflectorized With Type "B" Reflective Sheeting.

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



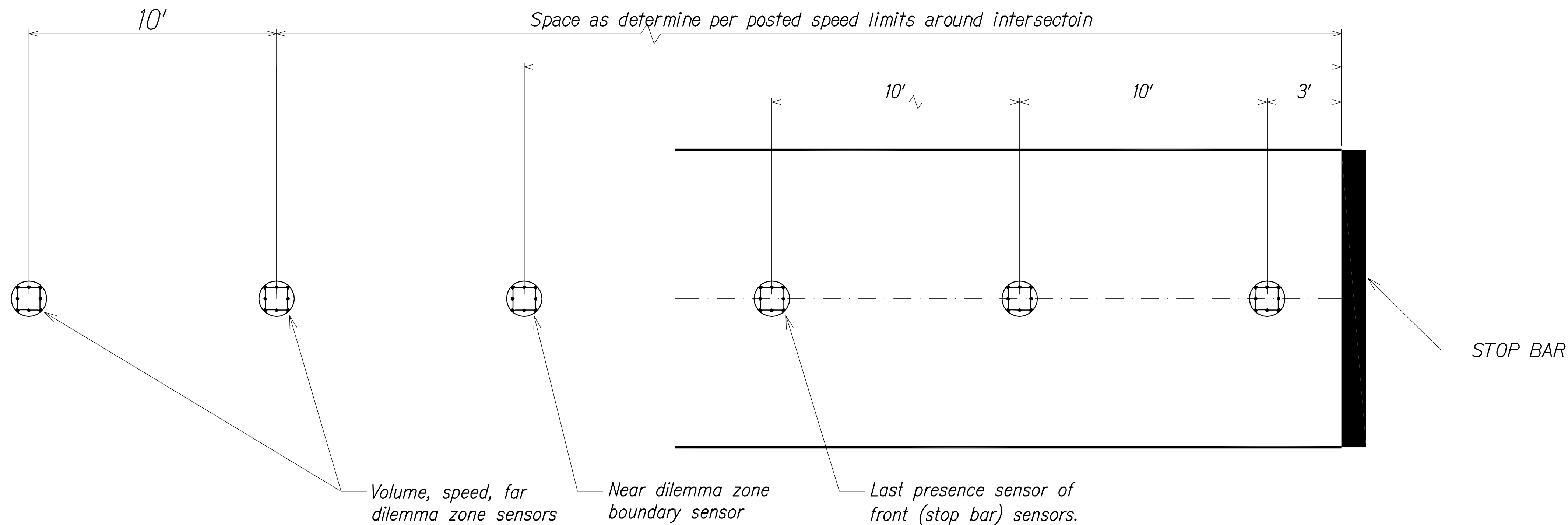
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APRIL 30, 2018
WILSON OKAMOTO CORPORATION LIC. EXP. DATE

| STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION | |
|---|------------------|
| TRAFFIC SIGNAL DETAILS | |
| KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION, PHASE 2 Shower Drive Intersection Improvements Fed. Aid Proj. No. STP-0130(33) | |
| Scale: NTS | Date: March 2016 |

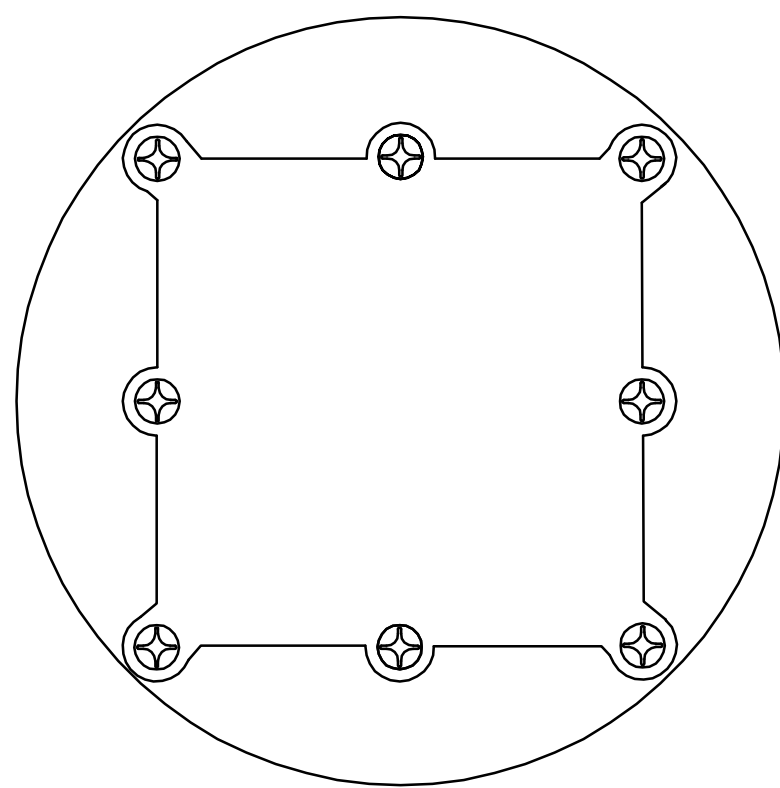
SHEET No. TD-3 OF 6 SHEETS

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII | HAW. | STP-0130(33) | 2017 | 84 | 99 |



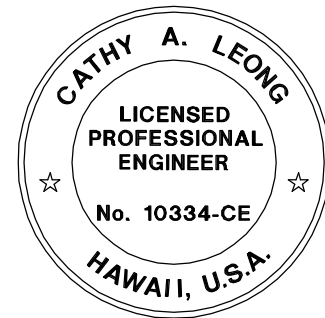
- MINIMUM EQUIPMENT LIST*
(SENSYS NETWORKS, INC.):
1. APCC-SPP, Digital Radio
 2. RP240-B-LL, Repeater
 3. KIT-MTG, Mounting Kit
 4. APCC-M-E, APCC Module
 5. EX-170, Extension Module
 6. APCC-ACC-1, Isolator Module
 7. VSN240-T, Flush-Mount Wireless Sensor
 8. VSN240-F, Flush-Mount Wireless Sensor
 9. VSN240-EPX, Epoxy Tube for installation of VSN240-F or T

*Or Latest Models
Note: Quantities will vary depending on intersection configuration.



624
Phase (6)
Wireless Detector Position (4th from Stop bar)
Lane Position (2 OUTSIDE)

Sensor ID Example

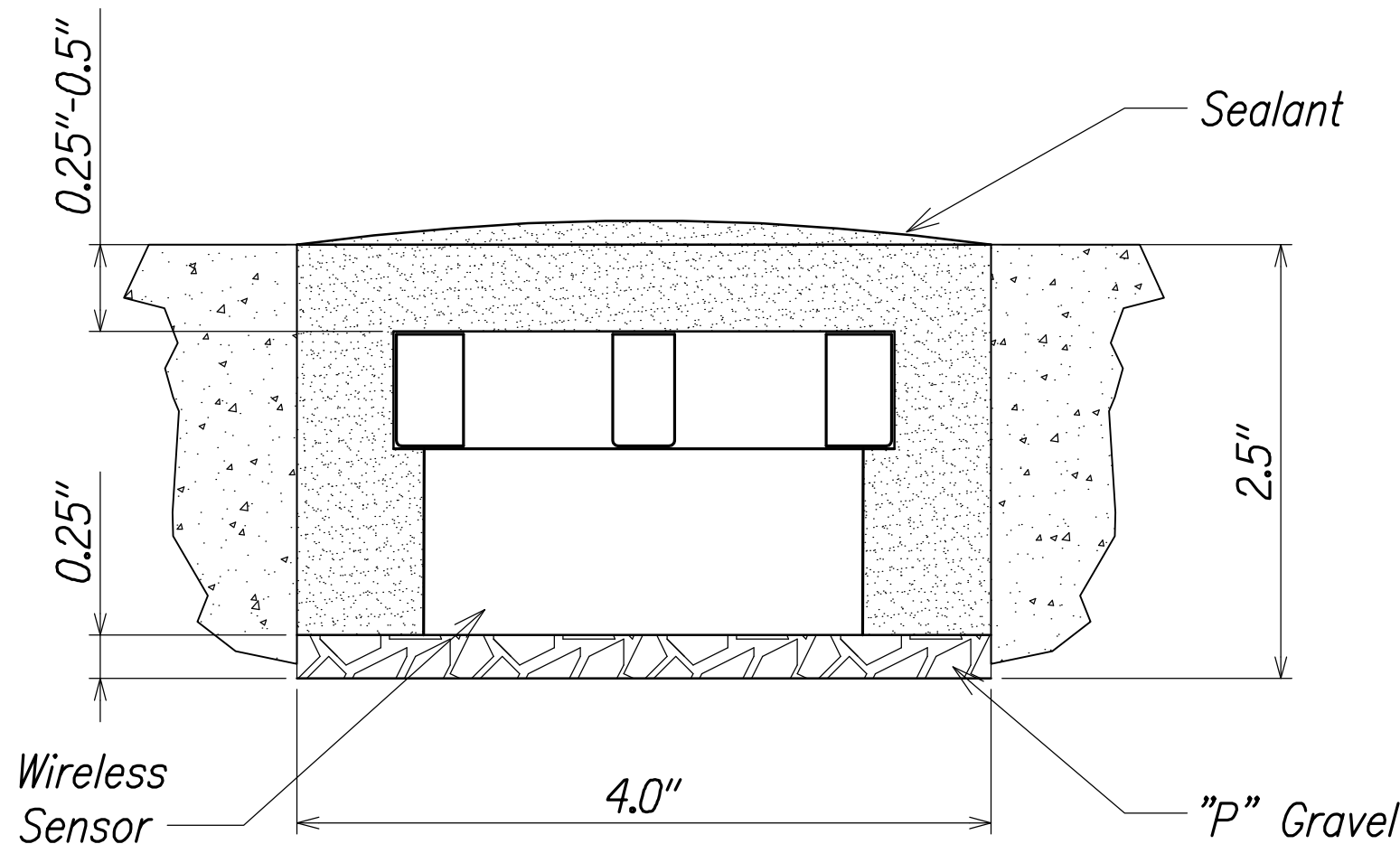


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APRIL 30, 2018
WILSON OKAMOTO CORPORATION LIC. EXP. DATE

| | |
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| SURVEY PLOTTED BY | DATE |
| DRAWN BY | |
| TRACED BY | |
| NOTED BY | |
| QUANTITIES BY | |
| CHECKED BY | |

| | |
|---------------|-----------|
| ORIGINAL PLAN | NOTE BOOK |
| No. | No. |



NOTES:

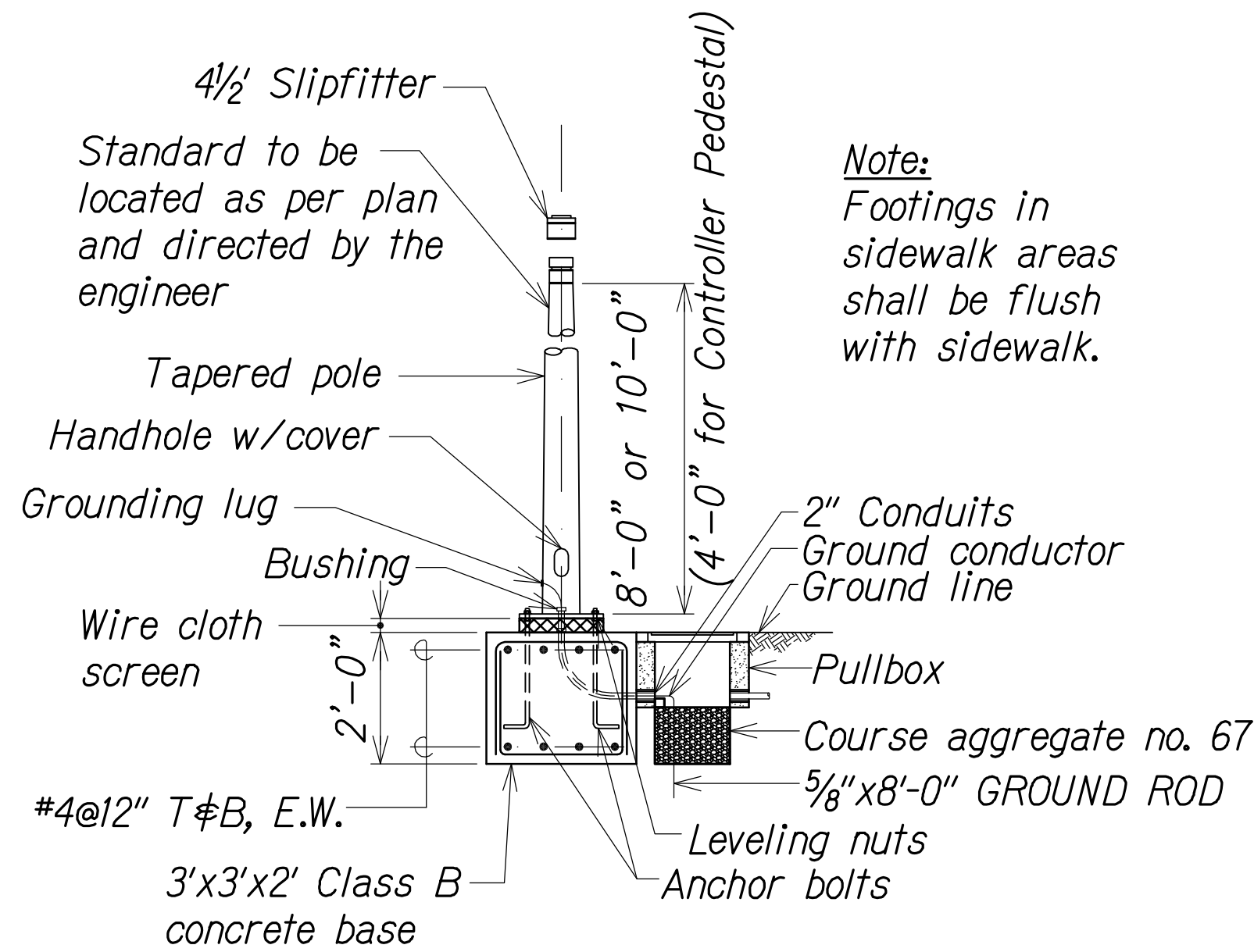
1. Cored hole shall be 4" in diameter x 2.5" - 3" in depth.
2. Clamshell housing for sensor shall be used.
3. P gravel shall be used at the bottom of the core hole for leveling of the sensor. fill level ~.25".
4. The sensor shall be aligned with the arrow on the top of the sensor pointed in the direction of travel.
5. Sealant type is fabrick MP-55 two (2) component polyurethane/polyurea based joint sealant (or equivalent).
6. Sensor addresses shall be compiled and identified to locations by COH, traffic division personnel prior to installation in the roadway.
7. Presence sensor located closest to stop bar shall be located 3' away from stop bar with 10' between each presence sensor.
8. Near and far dilemma zone sensors shall be located as indicated on sheet 1.

LEGEND FOR
AS-BUILT POSTINGS

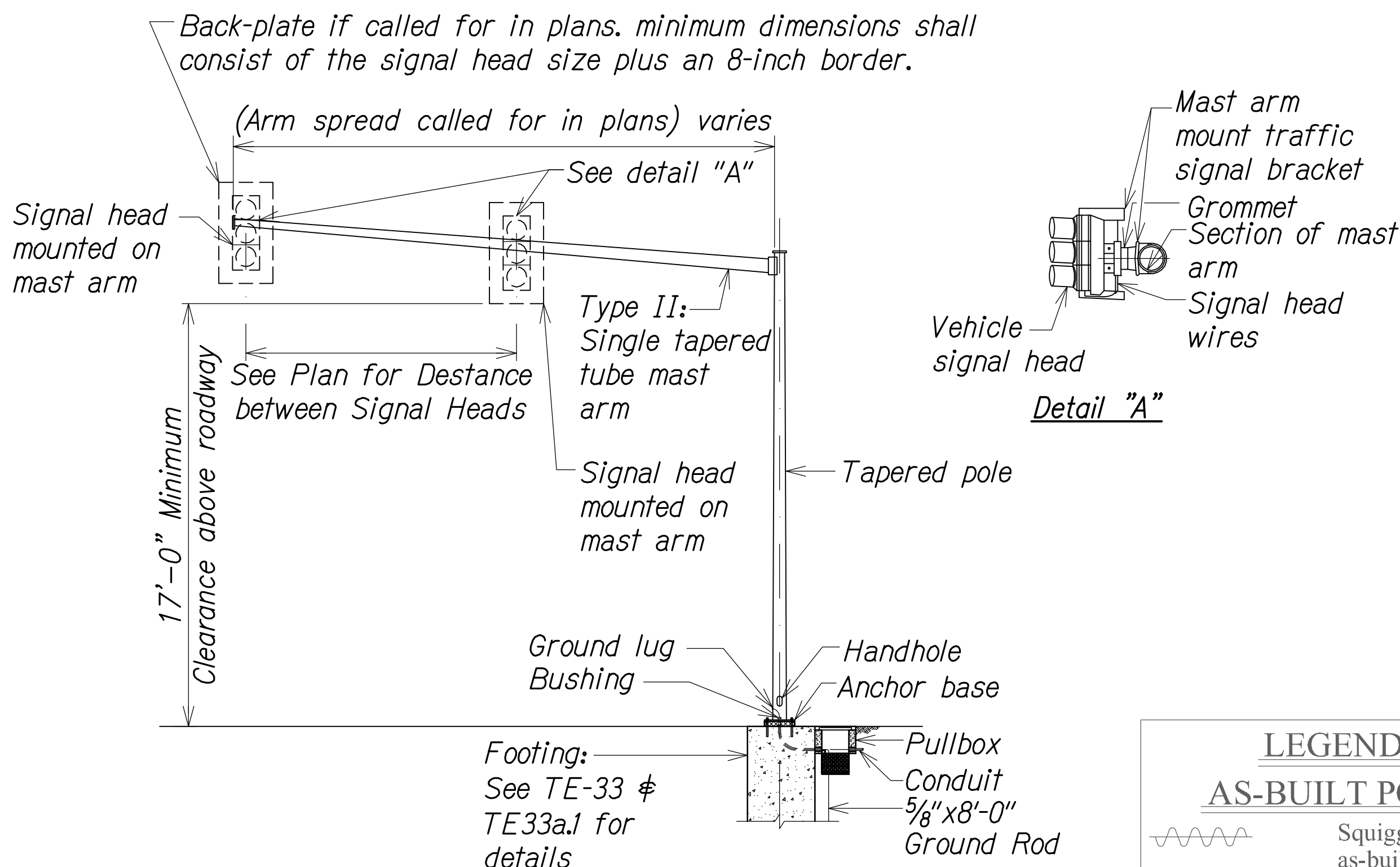
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Double line for as-built deletion
Roadway Text for as-built posting

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
TRAFFIC SIGNAL DETAILS
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION, PHASE 2
Show Drive Intersection Improvements
Fed. Aid Proj. No. STP-0130(33)
Scale: NTS Date: March 2016

SHEET No. TD-4 OF 6 SHEETS



Type I Signal Standard or
Controller Pedestal and
Footing



Type II Mast Arm Standard

Note for Type I and Type II Signal Standard:

1. See notes on TE-33 for additional information.
2. All accessories, fittings, connection details, and stiffener details (as required) shall be designed for the loads specified in the general notes TE-33 and submitted to the engineer for approval 20 days prior to installation.
3. Design criteria for traffic signal poles and mast arms shall comply to HDOT Design Criteria for Bridges and Structures, dated August 2014.

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

Type II Traffic Signal:

1. Design Specification:

- A. Design shall conform w/ the latest AASHTO standard specifications for the structural supports for highway signs, luminaries & traffic signals and its interim supplements and modifications by the highways division, Department of Transportation State of Hawaii.
- B. Latest HDOT memorandum with subject title "Design Criteria for Bridges and Structures, dated August, 2014."

2. Loads:

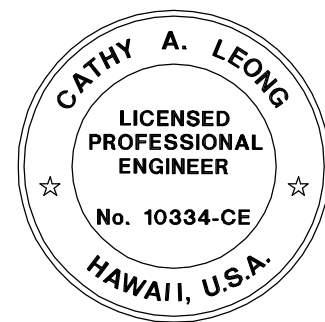
- A. Basic wind speed: 105 mph.
- B. Recurrence interval of 50 years.
- C. Fatigue importance factor, if, shall be based on fatigue category I for cantilevered traffic signal structures.
- D. Vortex shedding induced loads shall be considered for cantilevered mast arms and pole shafts that do not have tapers or have tapers of less than 0.14 in./ft.
- E. Traffic signal structures shall be designed for a truck induced gust based on a truck speed of 20 mph over the posted speed.
- F. Galloping and natural wind gusts shall be considered for cantilevered traffic signal structures.

3. Materials:

- △ A. All concrete strengths shall be as noted below unless other noted:
- | Item No. | Class of Structural parts | Specified compressive Strength f'c (28 days) |
|----------|---------------------------|--|
| 1. | Type I and pedestal | A 3,000 psi |
| 2. | Type II and Type III | - 5,000 psi |
- See specifications for drilled shaft concrete.
All concrete with 28 day compressive strength of 4,000 psi or greater shall have a maximum w/c ratio of .045.
- B. All connection bolts shall be ASSHTO M164 bolts and anchor bolts shall be AASHTO M314-105 bolt.
 - C. Aluminum members and surfaces in contact with structural steel shall be isolated with neoprene materials as approved by the engineer.

4. General:

- A. See B-01, TE-32, TE-33a.1, and TE-33a.2 for additional information.
- B. The recommendation of the traffic pole manufacturer shall be followed. Manufacturer shall select pole, anchor bolts, etc. based on criteria given in the contract documents. The contractor shall submit catalog cuts and calculations to the engineer for approval.
- C. Alternate designs in accordance with the plans and specifications shall use the service load design method and shall be stamped by a registered engineer of the State of Hawaii in the related discipline and submitted to the engineer for approved.
- D. The contractor shall use templates while installing the anchor bolts. Anchor bolts shall be vertical.
- E. Excavation and backfill shall be considered incidental to the cost of the traffic signal foundation.



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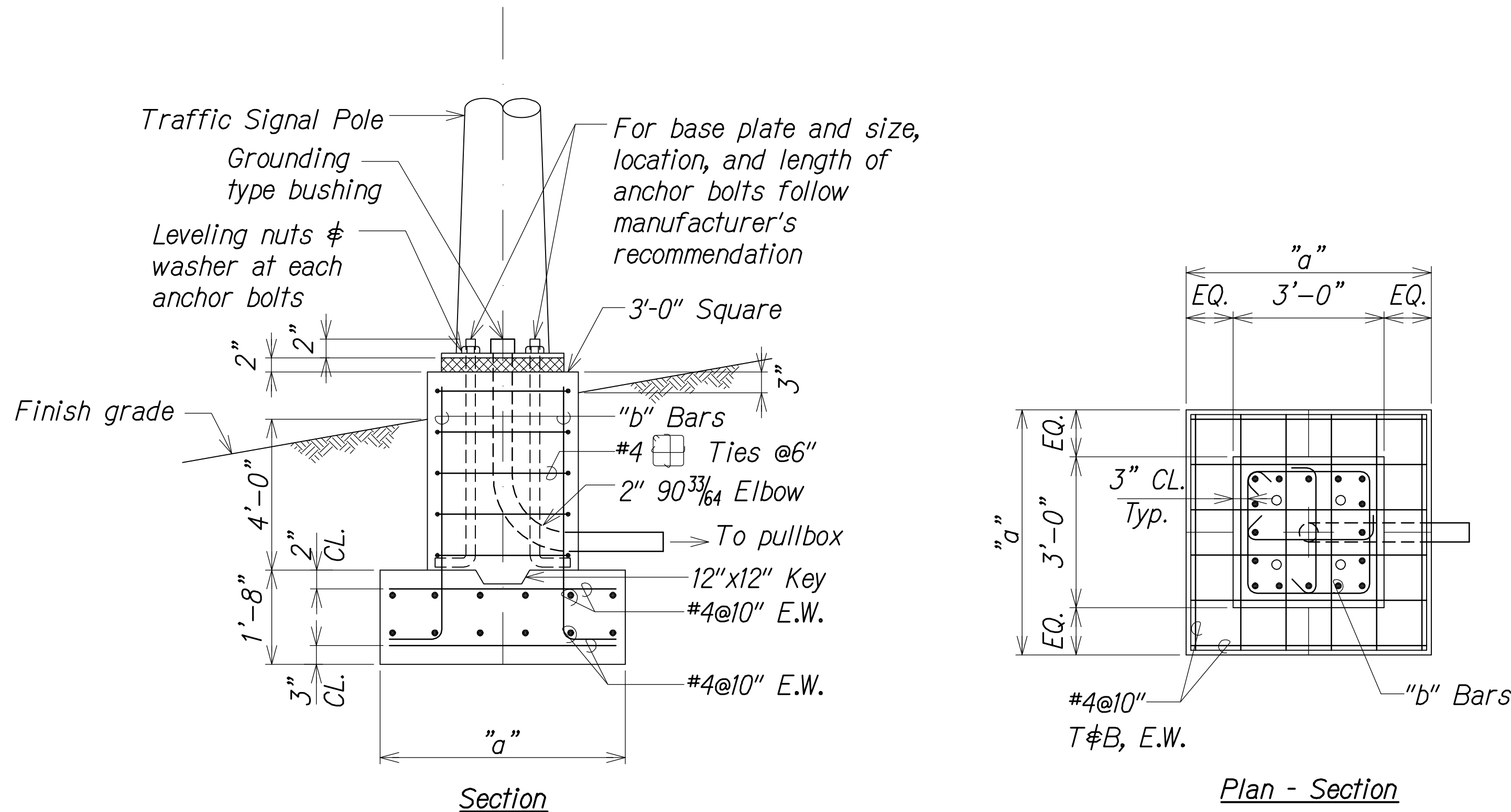
APRIL 30, 2018
WILSON OKAMOTO CORPORATION LIC. EXP. DATE

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| STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION | |
| <u>TRAFFIC DETAILS</u> | |
| <u>KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSION, PHASE 2</u> | |
| <u>Showder Drive Intersection Improvements</u> | |
| <u>Fed. Aid Proj. No. STP-0130(33)</u> | |
| Scale: As Noted | Date: March 2016 |

△ r6/8/17 Revised Note 3. A.

| | |
|------|----------|
| DATE | REVISION |
|------|----------|

SHEET No. TD-5 OF 27 SHEETS



| Soil Type | Mast Arm Length | "a" | "b" Bars |
|---------------|-----------------|-------|----------|
| Stiff Clays | 16' - 18' | 3'-6" | 16-#5 |
| | 20' | 3'-6" | 16-#5 |
| | 25' | 3'-6" | 16-#5 |
| | 30' | 4'-0" | 16-#6 |
| | 35' | 4'-3" | 16-#6 |
| | 40' | 4'-6" | 16-#6 |
| Sand & Gravel | 16' - 18' | 3'-6" | 16-#5 |
| | 20' | 3'-6" | 16-#5 |
| | 25' | 3'-6" | 16-#5 |
| | 30' | 3'-6" | 16-#6 |
| | 35' | 3'-9" | 16-#6 |
| | 40' | 4'-0" | 16-#6 |
| Rock | 16' - 18' | 3'-6" | 16-#5 |
| | 20' | 3'-6" | 16-#5 |
| | 25' | 3'-6" | 16-#5 |
| | 30' | 3'-6" | 16-#6 |
| | 35' | 3'-9" | 16-#6 |
| | 40' | 4'-0" | 16-#6 |

Type II Spread Footing Schedule

Spread Footing for Type II Mast Arm Standard

LEGEND FOR
AS-BUILT POSTINGS

Squiggly line for as-built deletion

Double line for as-built deletion

Roadway

Text for as-built posting

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC SIGNAL DETAILS

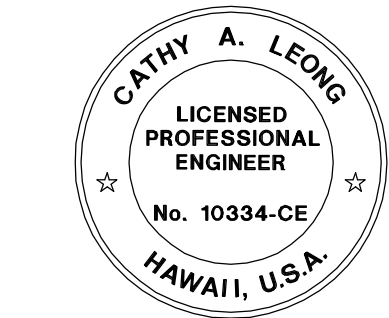
KEAAU-PAHOA ROAD, SHOULDER
LANE CONVERSION, PHASE 2

Shower Drive Intersection Improvements

Fed. Aid Proj. No. STP-0130(33)

Scale: NTS Date: March 2016

SHEET No. TD-7 OF 7 SHEETS



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