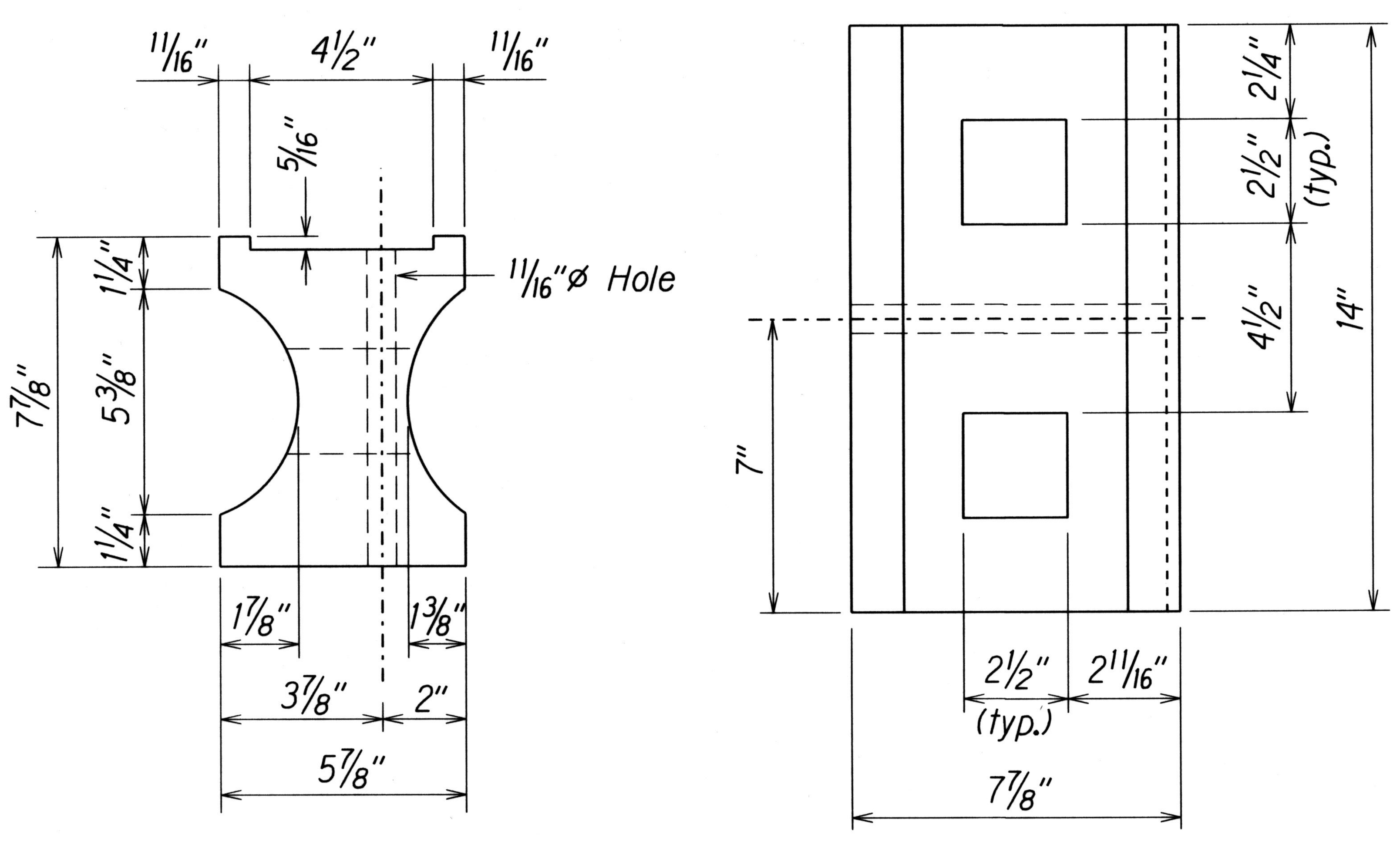
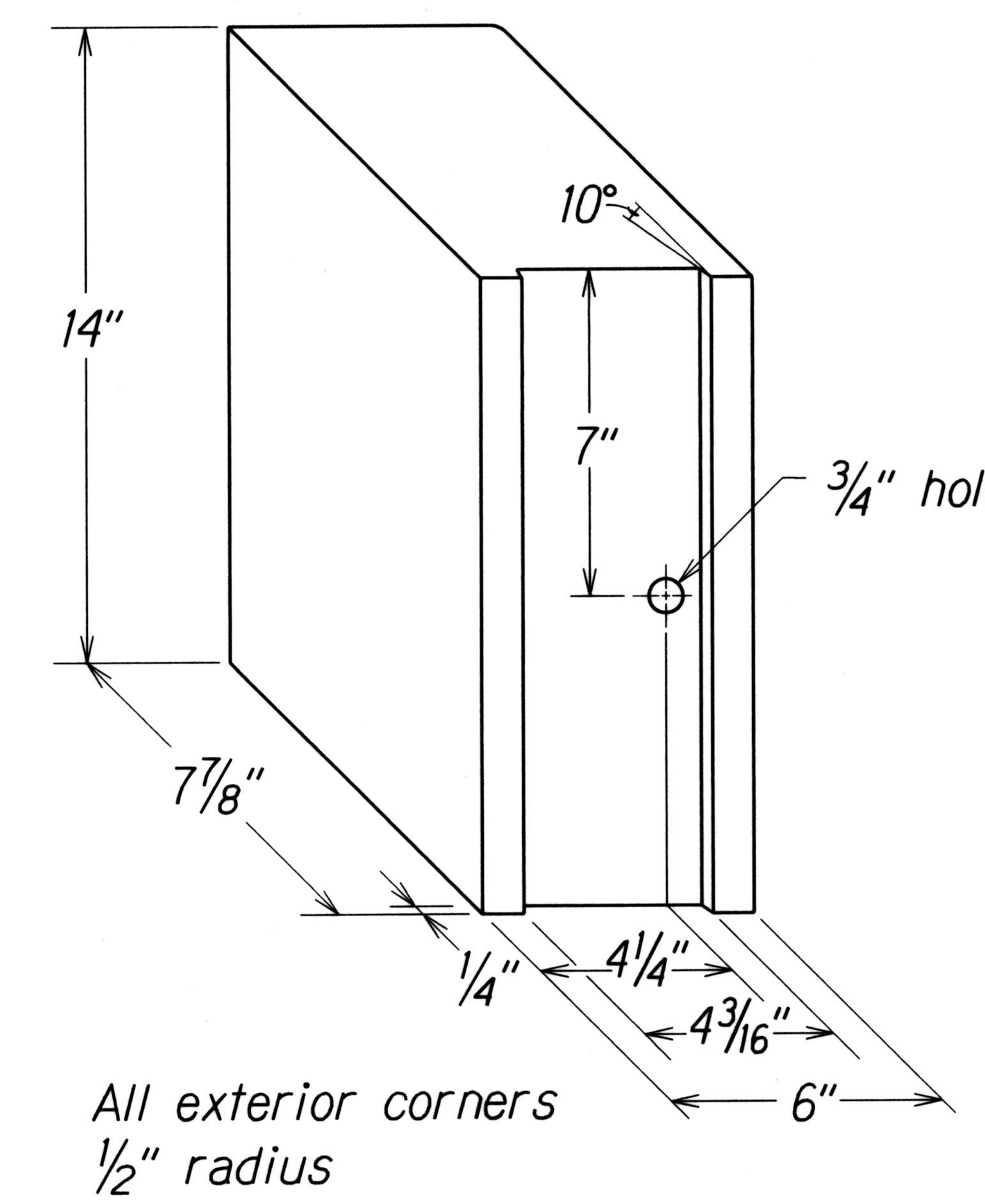
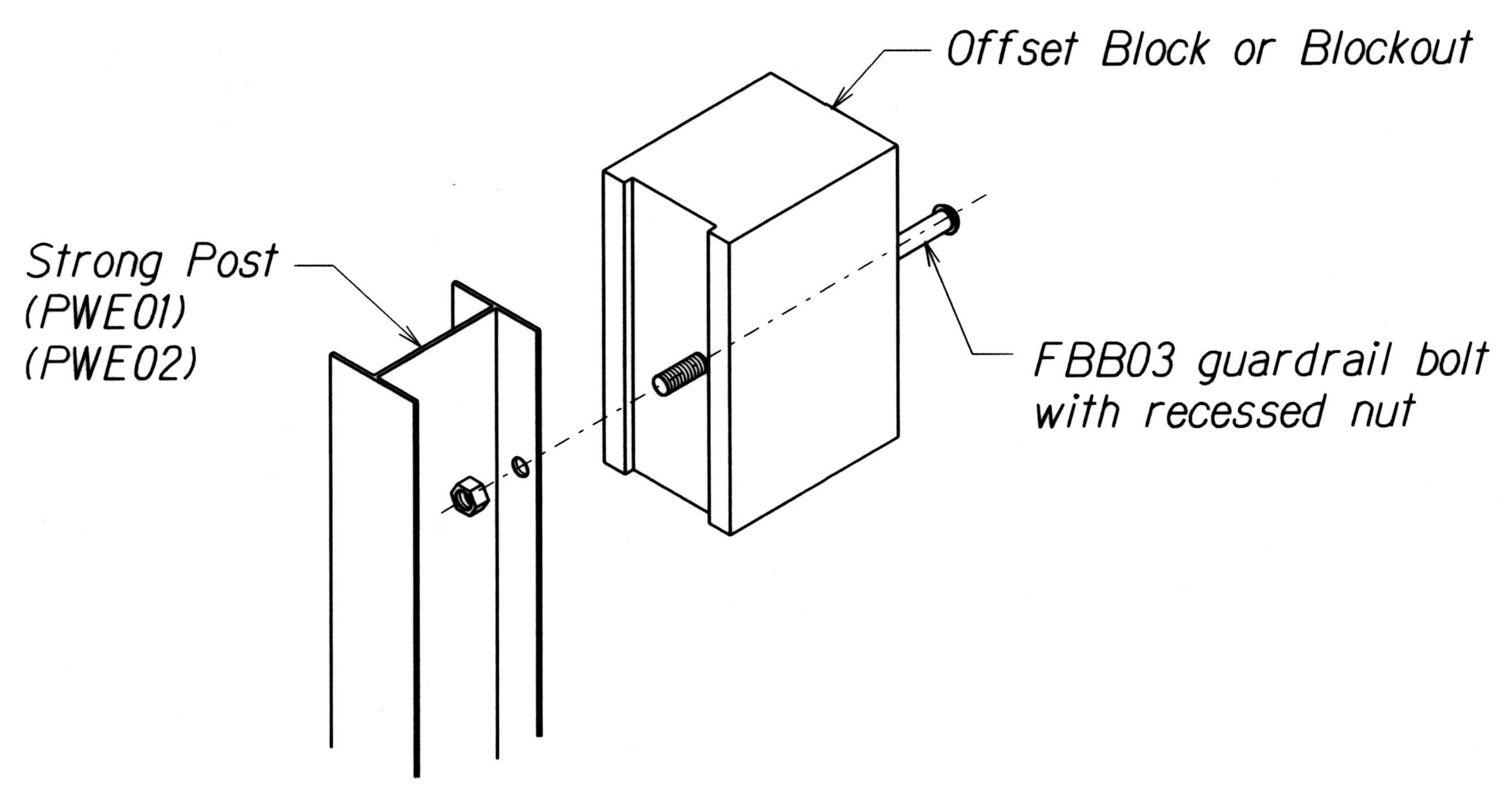
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30DE-01-17M	2017	ADD.8S-1	14



RECYCLED PLASTIC BLOCKOUT (TYPE I)

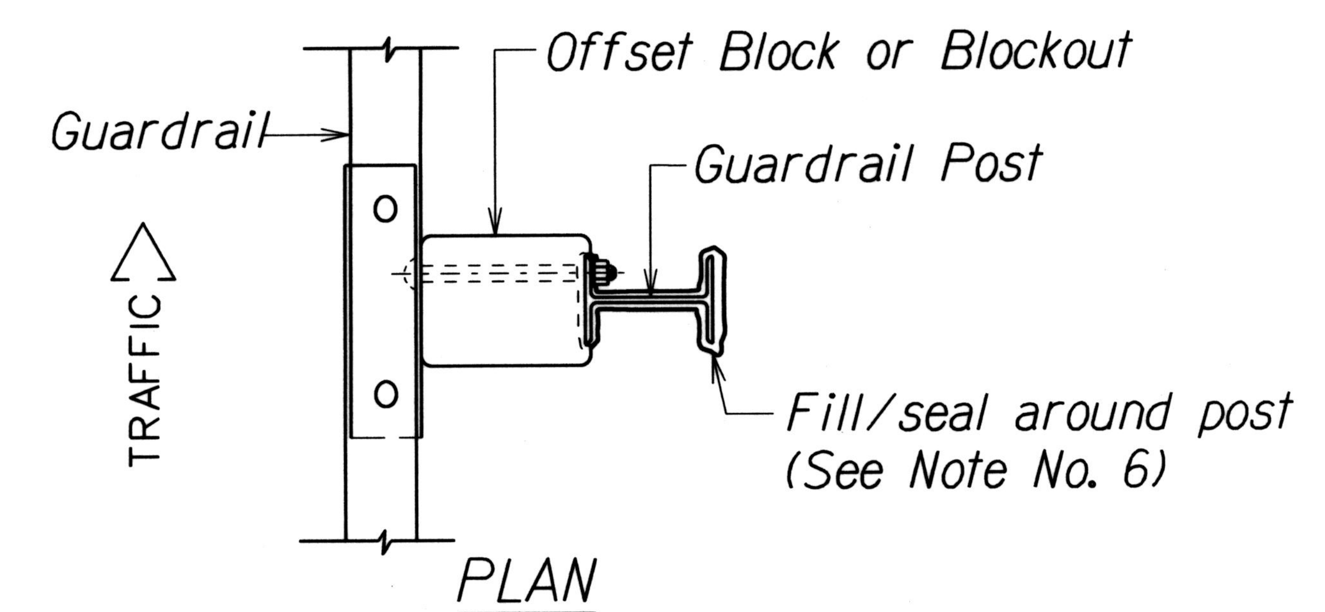


RECYCLED POLYETHYLENE OFFSET BLOCK (TYPE II)

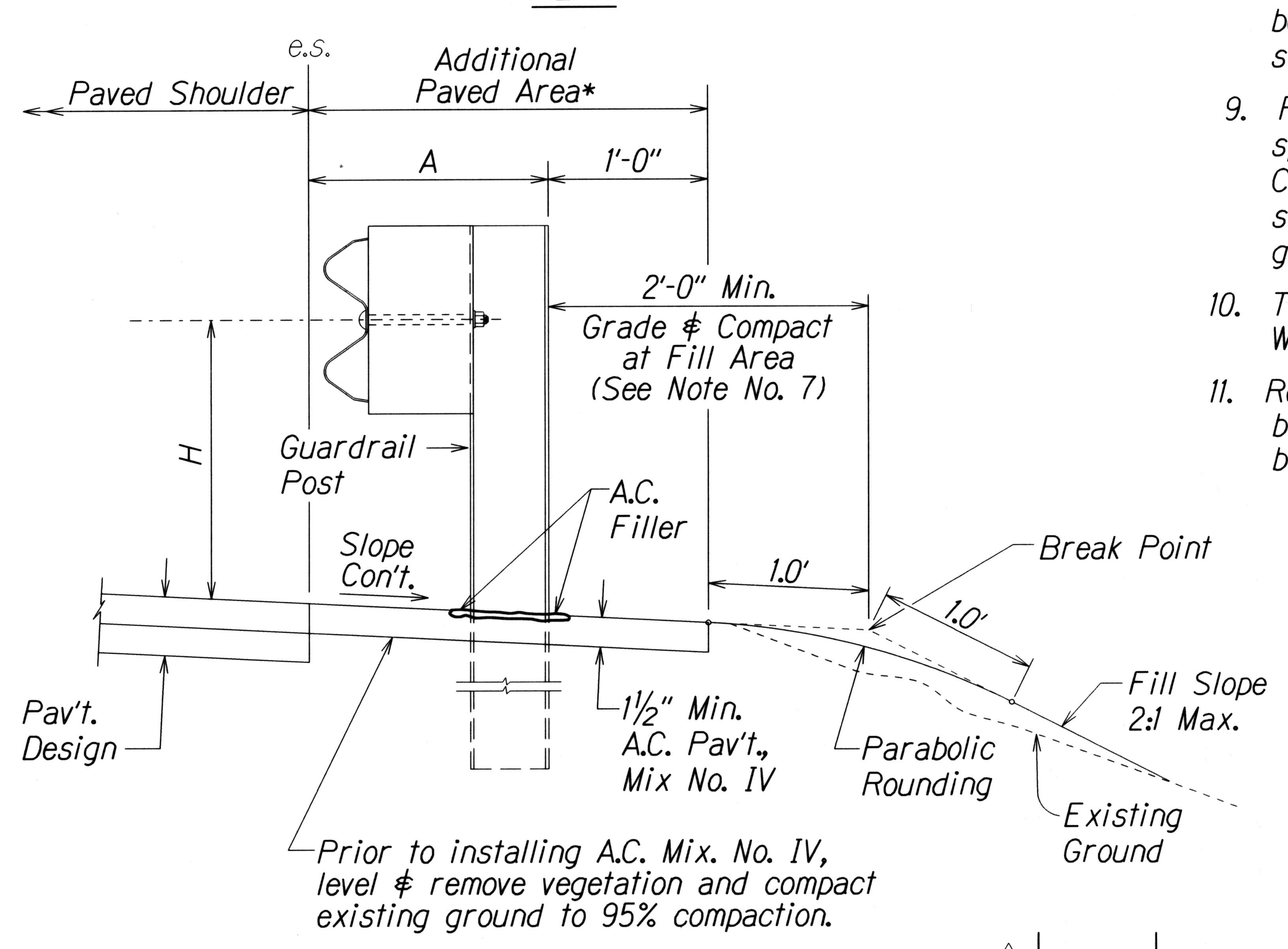


Exploded View
(Rail and washer not shown)

STEEL POST AND BLOCK DETAIL

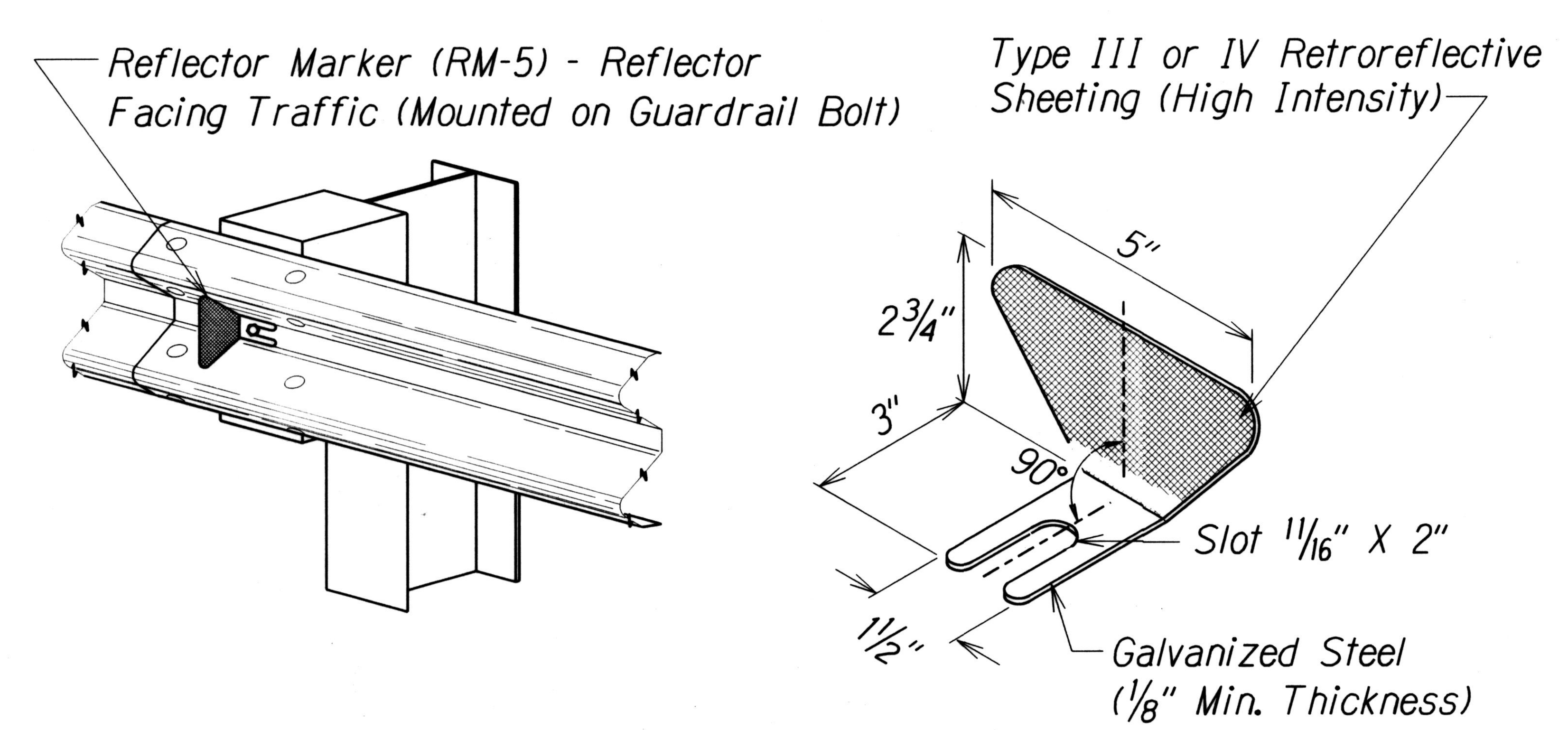


PLAN



ELEVATION

TYPICAL GUARDRAIL INSTALLATION



REFLECTOR MARKER (RM-5) DETAIL AND TYPICAL INSTALLATION

GENERAL NOTES

1. All hardware, posts and fasteners shall be hot-dip zinc coated galvanized after fabrication. No punching, drilling or cutting will be permitted after galvanizing.
2. Where conditions require, special post lengths in increments of 6 inches may be specified.
3. All fasteners, posts, and rail elements (i.e. FBB03, PWE01, RWM02b, etc.) shall conform to the latest edition and amendments of "A Guide to Standardized Highway Barrier Rail Hardware", a report prepared and approved by the AASHTO-AGC-ARTBA Joint Cooperative Committee, Subcommittee On New Highway Materials, Task Force 13 Report. Dimensions of fastners, posts and rail elements have been converted from metric units into their present form.
4. The Recycled Plastic Block or Offset Block shall be approved by the State.
5. All new guardrail areas, shoulder shall be grubbed, graded and paved as shown on the plan. Paved shoulder width shall be determined in the field and approved by the Engineer. This work will not be paid separately but shall be made under Item 401.0100 A.C. Pavement, Mix IV.
6. After the guardrail posts are installed in the paved area, the Contractor shall fill/seal around each guardrail post and all cracks in the paved area caused during the guardrail post installation. If required by the inspector/engineer, the Contractor shall tamper the paved area around the guardrail post prior to filling/sealing. All costs associated with this work shall not be paid for separately, but shall be considered incidental to the various guardrail items.
7. When standards for the fill slope area cannot be met, a site specific, engineer approved design may be used.
8. New A.C. pavement at guardrails shall extend 6 feet longitudinally beyond terminal ends. This work will not be paid separately but shall be made under Item No. 401.0100 A.C. Pavement, Mix IV.
9. Reflector Markers (RM-5) mounted on guardrails shall be spaced every 25 feet. Spacing of RM-5's on Horizontal Curves shall comply with Table III-1 of the MUTCD. RM-5's shall not be installed on Terminal Sections. RM-5 on new guardrail shall be incidental to guardrail pay item.
10. Type G end terminals shall be paid for under Strong Post W-Beam Guardrail.
11. Removed guardrails and post shall be delivered to State Highways baseyard, Kahului. This work shall not be paid separately but shall be considered incidental to guardrail pay items.

GUARDRAIL TYPE	DIMENSION	
	H	A
Strong Post W-Beam	1'-9 5/8"	1'-6"
Strong Post Rubrail (W-Beam)	2'-0"	1'-6"
Modified or Strong Post Thrie Beam	2'-0"	2'-0"

DATE	REVISION
1 5-25-17	Additional Detail.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS & NOTES

HIGH STREET RESURFACING
Main Street to Keanu Street
Project No. 30DE-01-17M

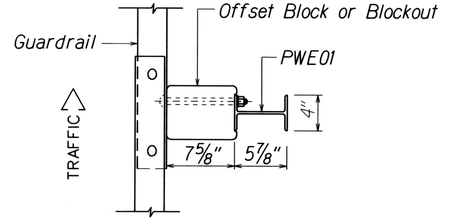
Scale: As Shown Date: May, 2017

SHEET No. 1 OF 4 SHEETS

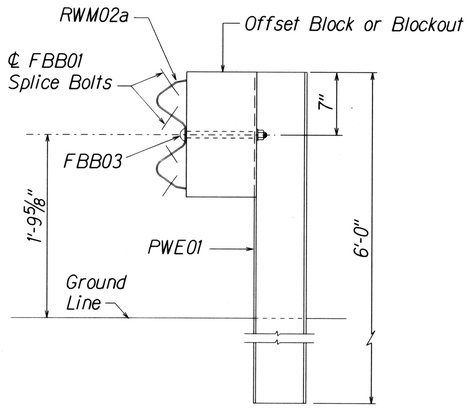
ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
	DRAWN BY	
	TRACED BY	
NOTE BOOK	DESIGNED BY	
	QUANTITIES BY	
No.	CHECKED BY	

re:2/21/01 tef.uby/guardrail/te50rev.dgn (standard plan TE-50 r09/01/00)

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30DE-01-17M	2017	ADD.8S-2	14



PLAN

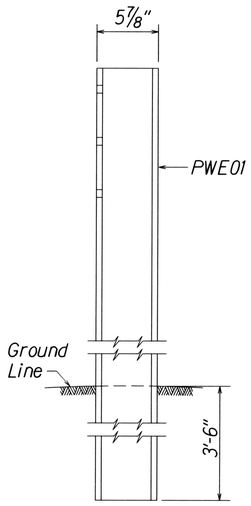


ELEVATION

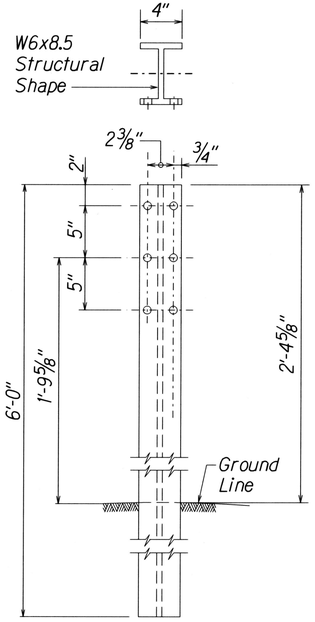
STRONG POST W-BEAM GUARDRAIL

(SGR04a)

NOTE:
All Holes are 3/4" Dia.

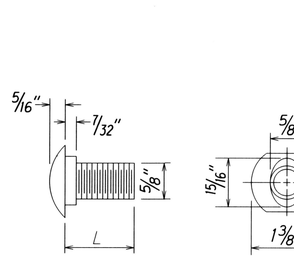


SIDE

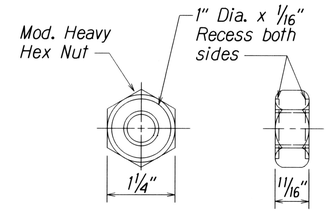


FRONT

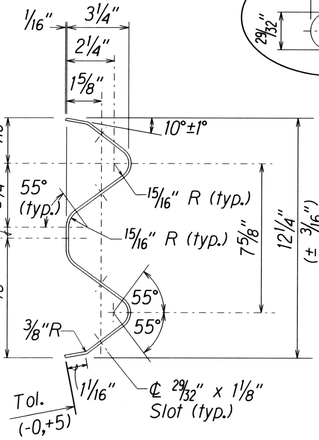
W-BEAM STRONG POST (PWE01)



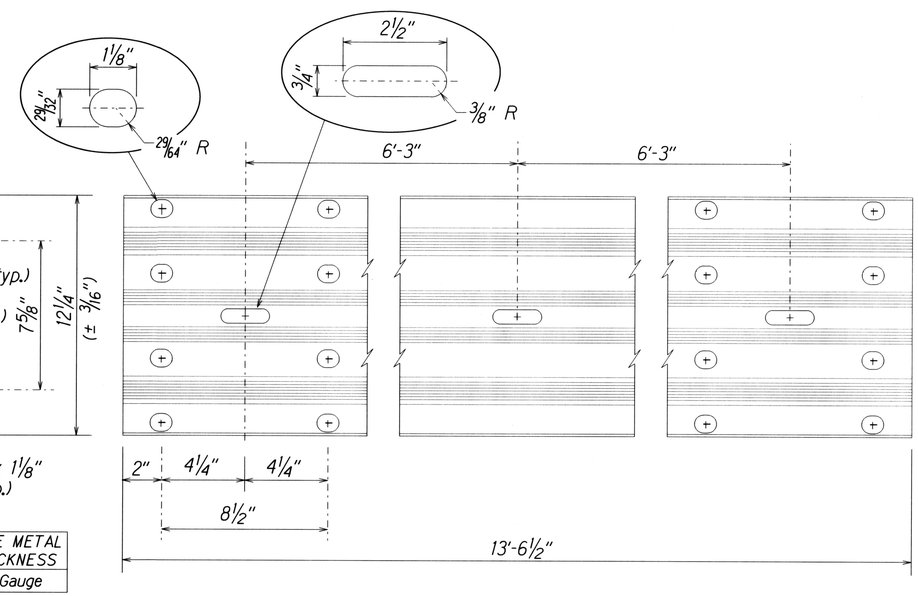
DESIGNATOR	L
FBB01	1 3/8"
FBB02	2"
FBB03	10"



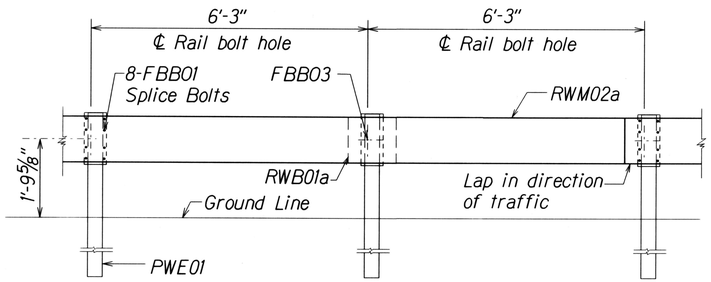
GUARDRAIL BOLTS AND RECESSED NUT



DESIGNATOR	BASE METAL THICKNESS
RWM02a	12 Gauge



2 SPACE W-BEAM GUARDRAIL (RWM02a)



ELEVATION

STRONG POST W-BEAM GUARDRAIL WITH RECYCLED OFFSET BLOCK OR PLASTIC BLOCKOUT

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

tdr:ruby/guardrail/wbeamsdgn (standard pen TE-50 03/05/87)

3/24/03

DATE	REVISION
5-25-17	Additional Detail.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRONG POST W-BEAM GUARDRAIL

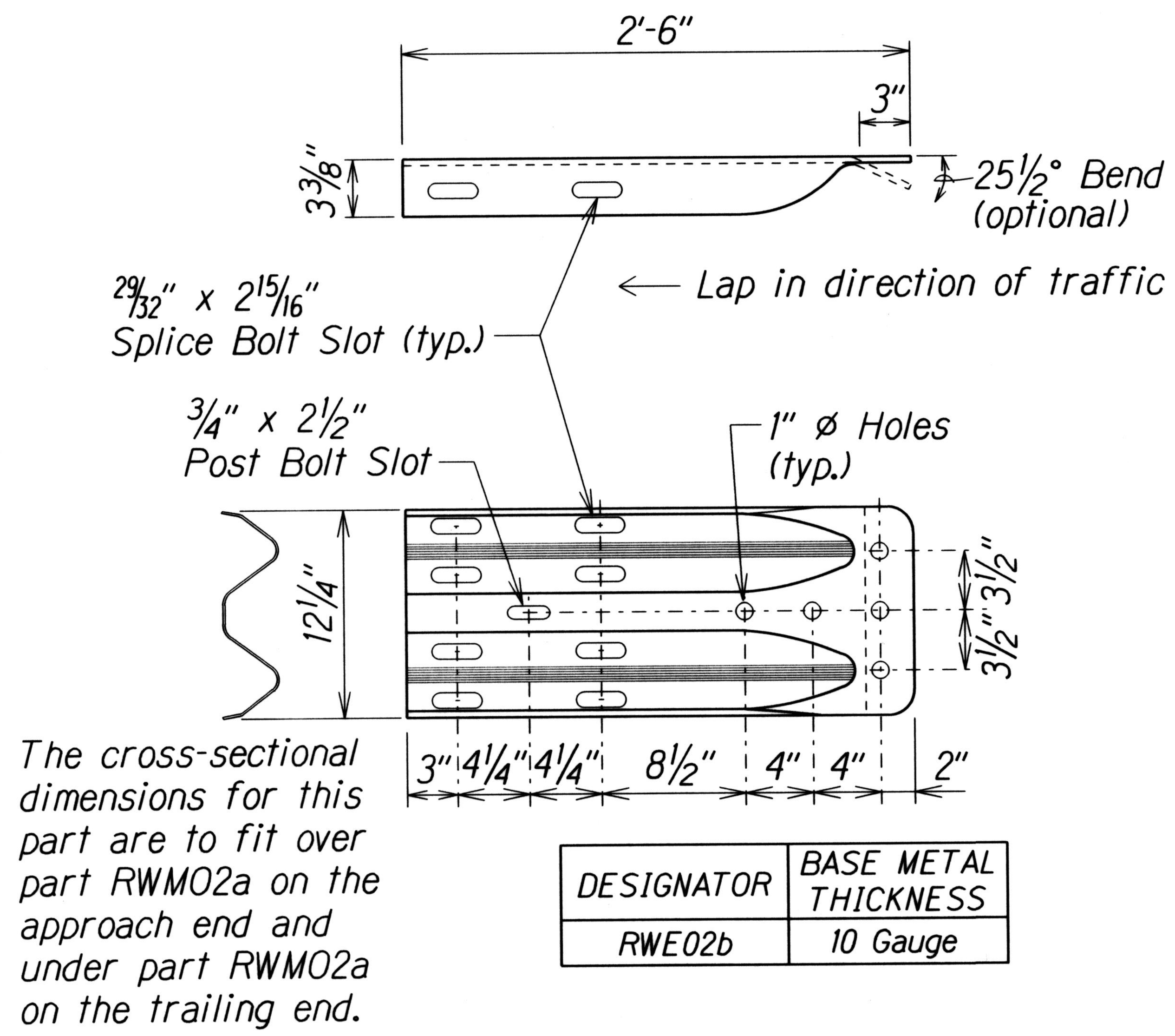
HIGH STREET RESURFACING
Main Street to Keanu Street
Project No. 30DE-01-17M

Scale: As Shown Date: May, 2017

SHEET No. 2 OF 4 SHEETS

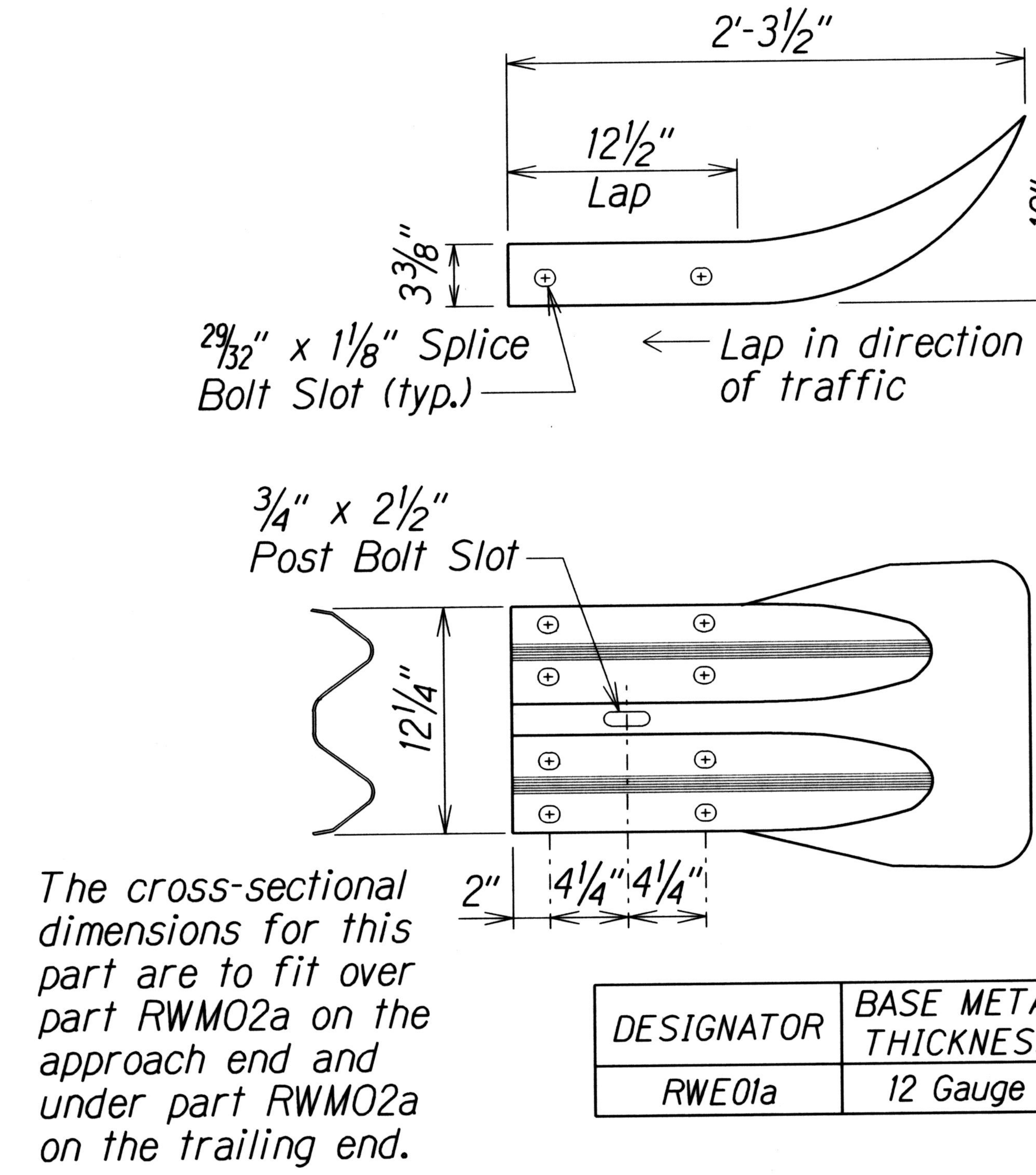
ADD. 8S-2

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30DE-01-17M	2017	ADD.8S-3	14



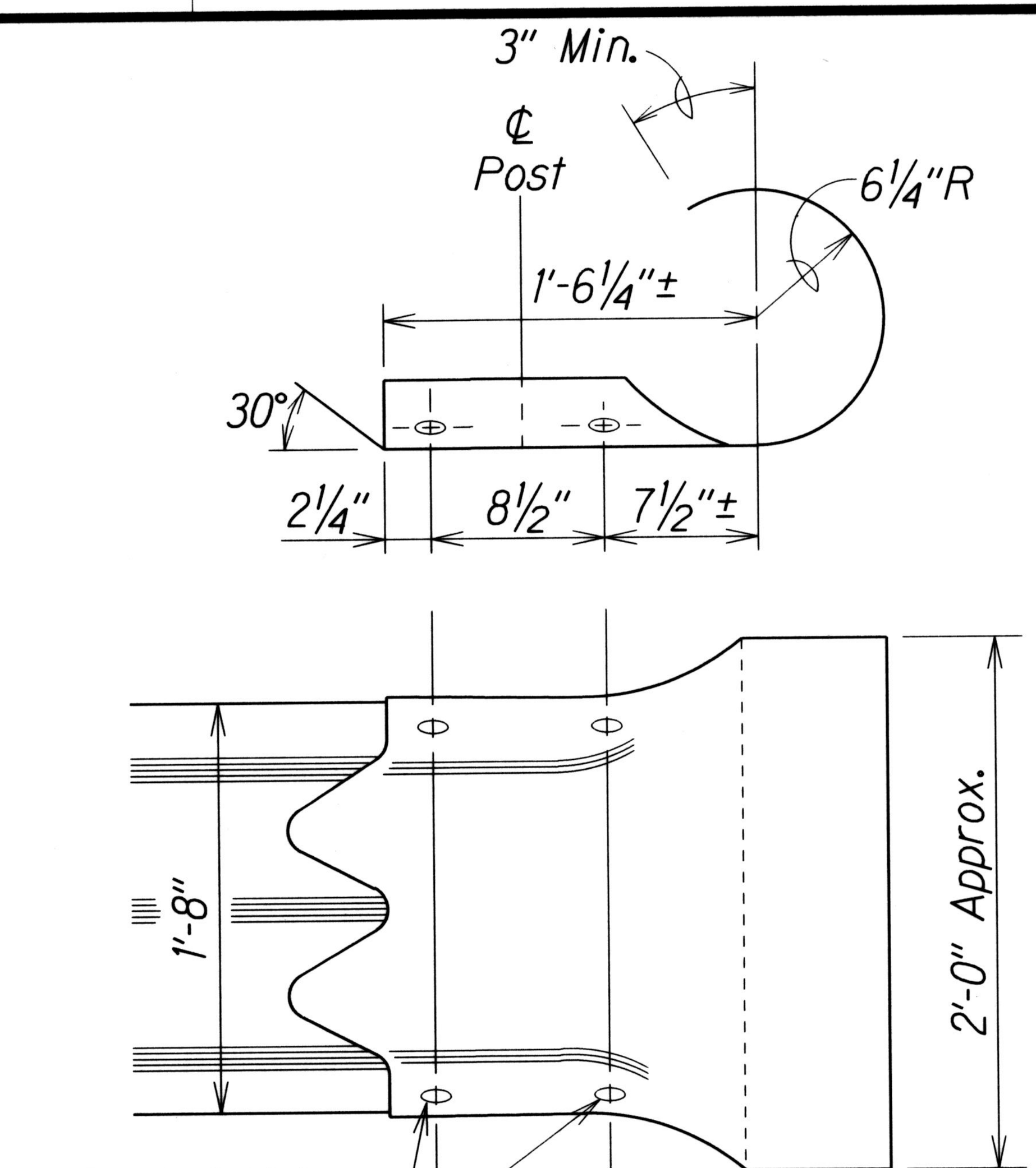
DESIGNATOR	BASE METAL THICKNESS
RWE02b	10 Gauge

W-BEAM TERMINAL CONNECTOR (RWE02b)



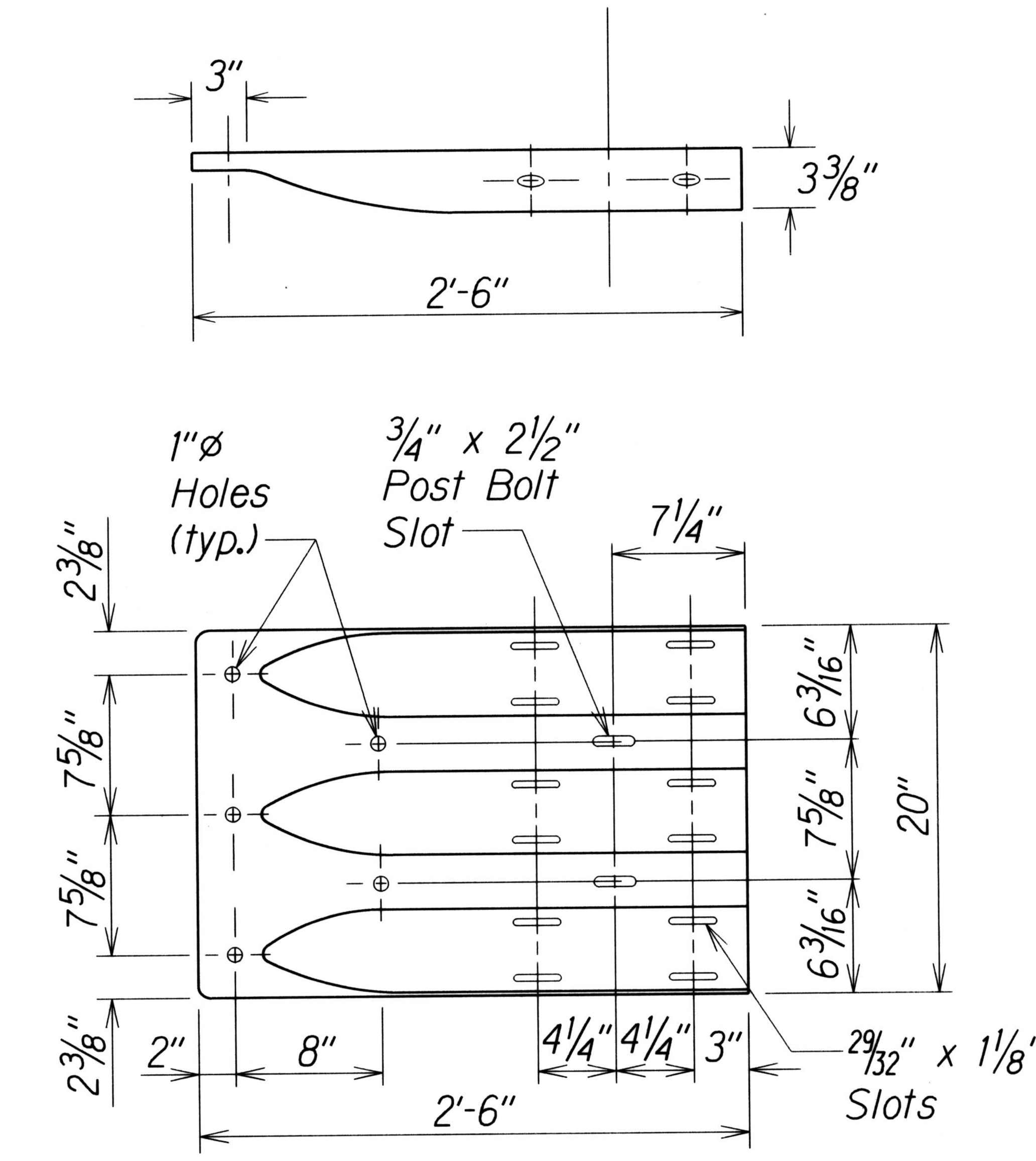
DESIGNATOR	BASE METAL THICKNESS
RWE01a	12 Gauge

W-BEAM END SECTION (FLARED RWE01a)



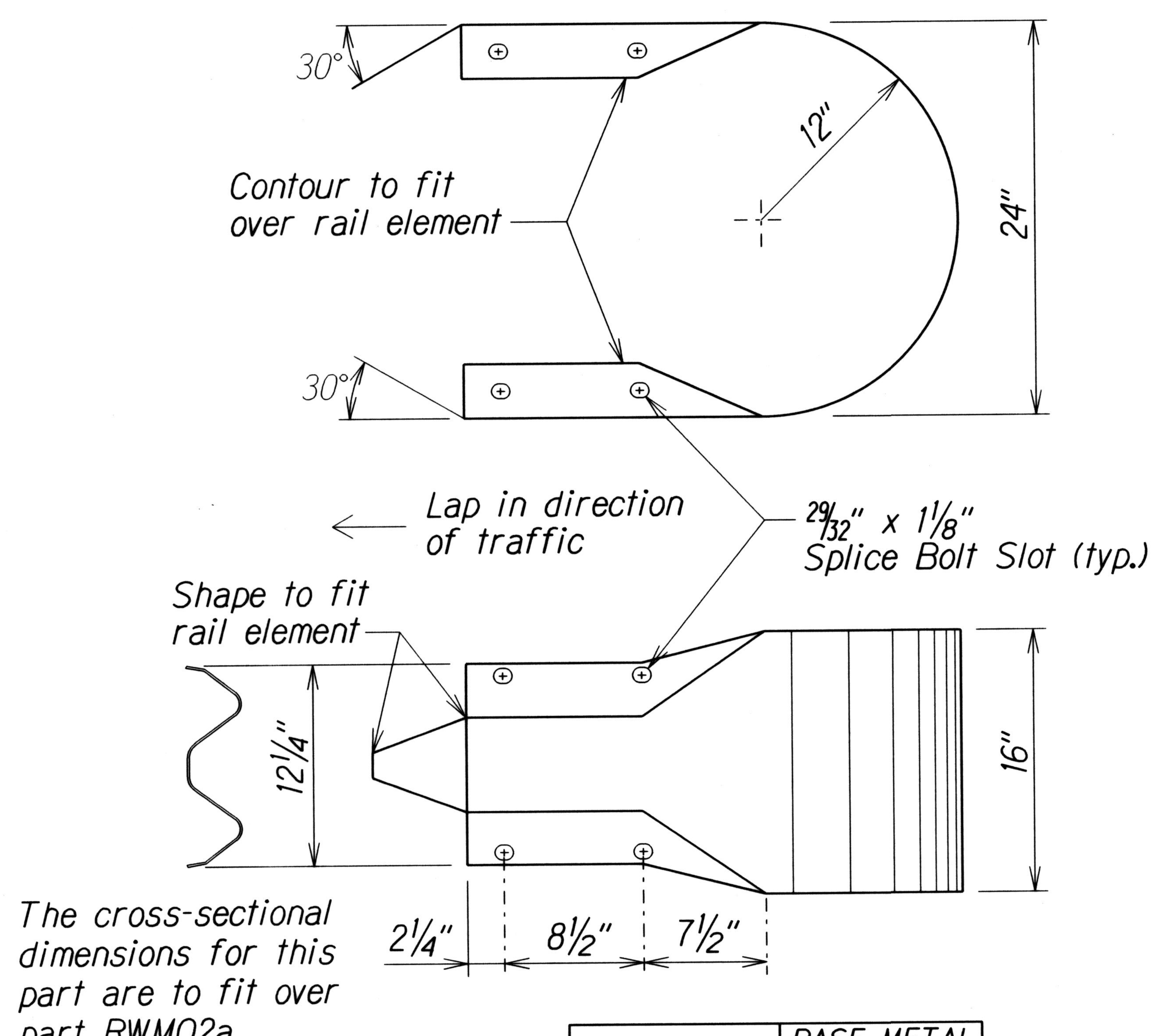
DESIGNATOR	BASE METAL THICKNESS
RTE02b	10 Gauge

THRIE-BEAM SECTION (ROUNDED) (RTE02b)



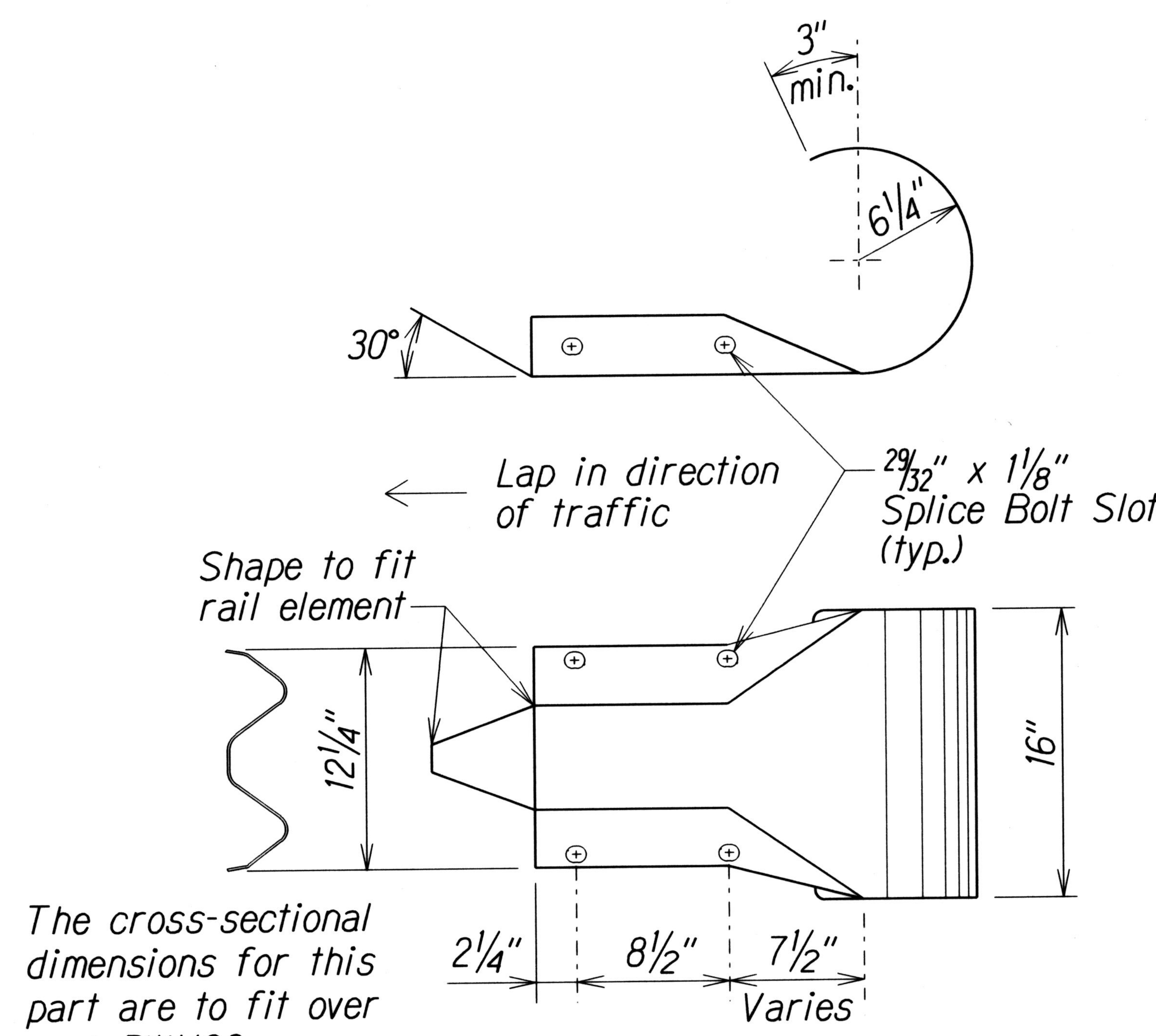
DESIGNATOR	BASE METAL THICKNESS
RTE01b	10 Gauge

THRIE-BEAM TERMINAL CONNECTOR (RTE01b)



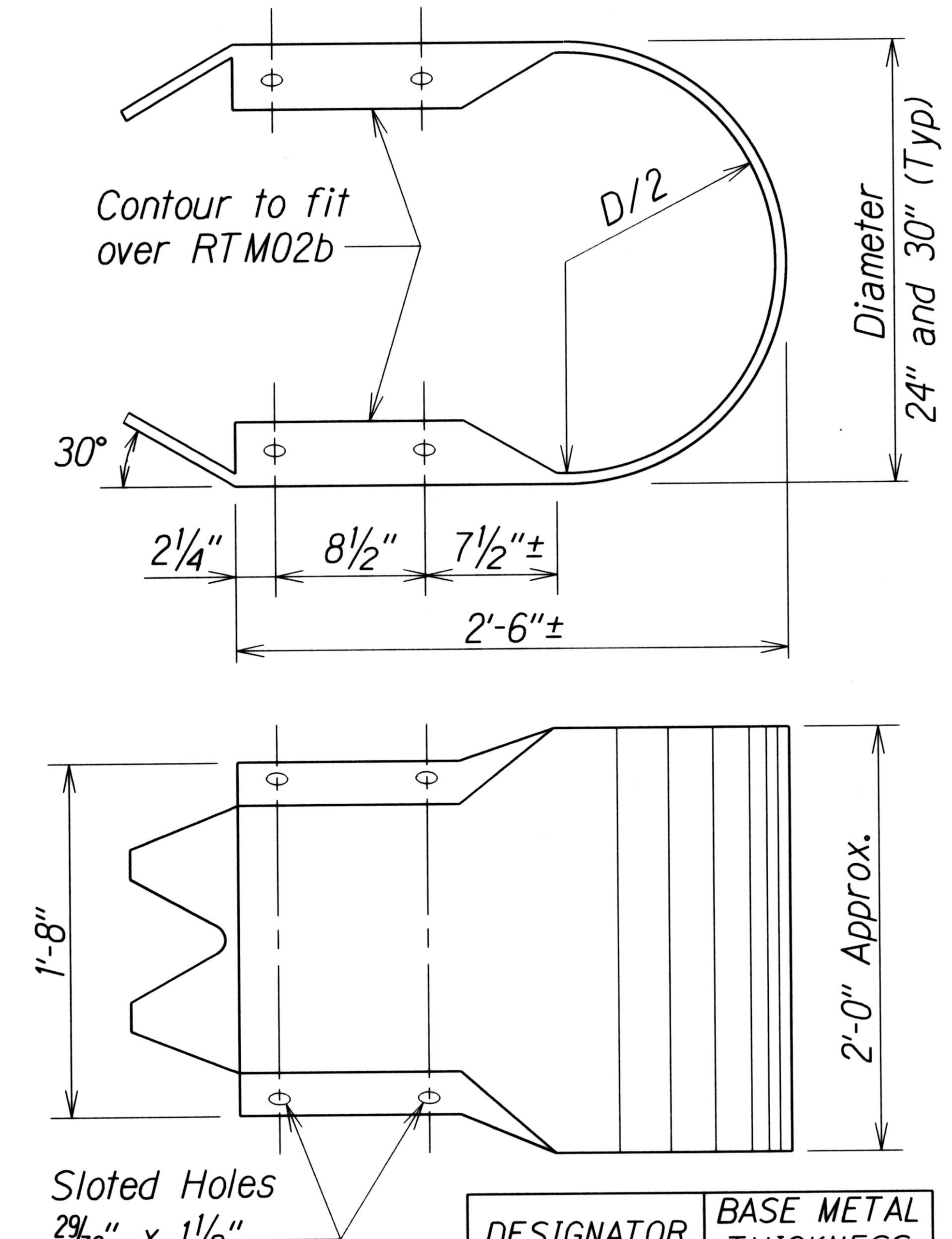
DESIGNATOR	BASE METAL THICKNESS
RWE06a	12 Gauge

W-BEAM END SECTION (BUFFER RWE06a)



DESIGNATOR	BASE METAL THICKNESS
RWE03a	12 Gauge

W-BEAM END SECTION (ROUNDED RWE03a)



DESIGNATOR	BASE METAL THICKNESS
RTE03b & RTE04b	10 Gauge

THRIE-BEAM END SECTION (BUFFER RTE03b or RTE04b)

1	5-25-17	Additional Detail.
	DATE	REVISION

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL TERMINAL CONNECTORS AND END SECTIONS

HIGH STREET RESURFACING
Main Street to Keanu Street
Project No. 30DE-01-17M

Scale: As Noted Date: May, 2017

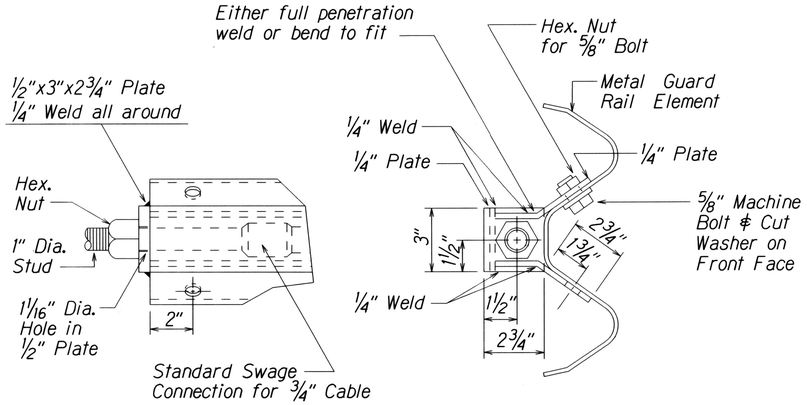
SHEET No. 3 OF 4 SHEETS

ADD. 8S–3

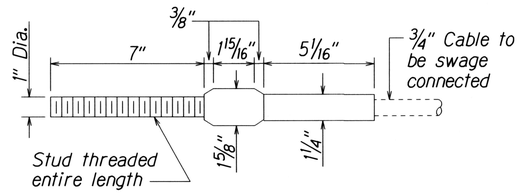
ORIGINAL PLAN / NOTE BOOK / No. — SURVEY PLOTTED BY / DRAWN BY / TRACED BY / DESIGNED BY / QUANTITIES BY / CHECKED BY — DATE

td/.ruby/guardrail/te51rev.dgn (standard plan TE-51 (09/01/87))

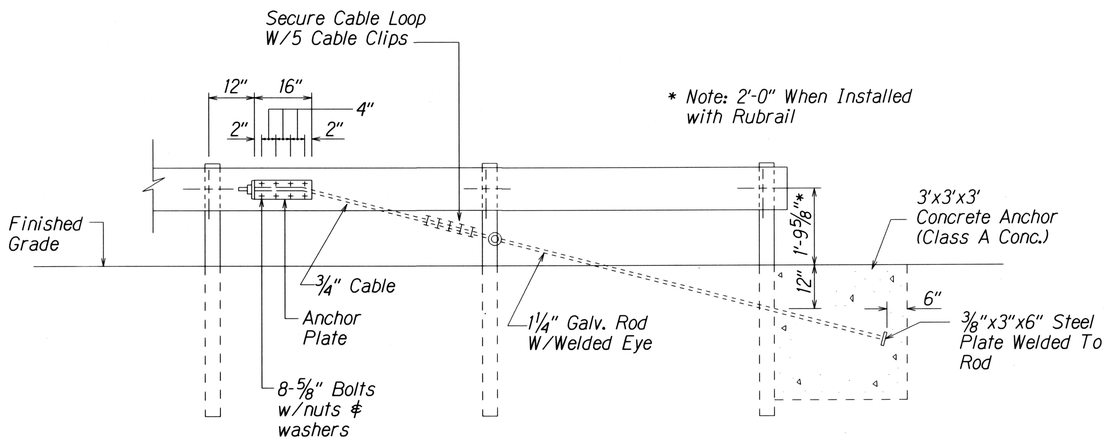
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30DE-01-17M	2017	ADD.8S-4	14



ANCHOR PLATE DETAILS

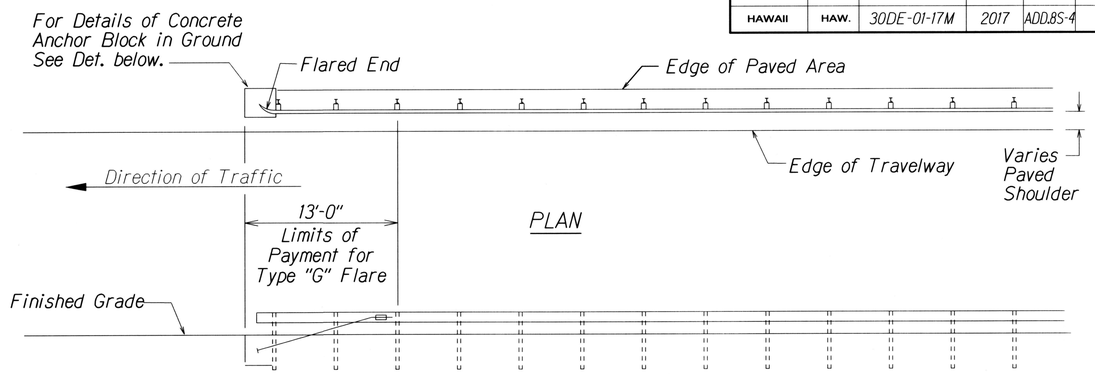


STANDARD SWAGED FITTING AND STUD



ANCHOR BLOCK DETAIL

1. Concrete, G.R.P., excavation, anchor rod and miscellaneous appurtenances necessary to anchor the guardrail ends shall be incidental to metal guardrail.



ELEVATION

TYPE "G" FLARE END TERMINAL

NOTE:

Type "G" Modified End Terminal is a site specific end terminal with a taper and radial termini. A site specific detailed drawing is required for all Type "G" Modified End Terminal and must receive Engineer's approval.

The taper (flare rate) of the guardrail shall follow the latest edition of AASHTO'S Roadside Design Guide (currently, Table 5.6 - Suggested Flare Rate for Barrier Design, page 5-21, Jan. 1996 edition).

The radius of the radial termini is an Engineer's judgement based on the site evaluation. The Engineer shall consider safety (minimize the spearing & blunt end situation); degree and potential seriousness of the hazard; bicycle and pedestrian accessibility; maintenance equipment accessibility; Right-of-Way availability; the smallest radii the metal w-beam/thrie-beam railing can be constructed (check with supplier/contractor); posted speed limit; angle of vehicle impact; and aesthetics when designing the Type "G" Modified End Terminal.

During construction, the Contractor shall layout the proposed Type "G" Modified End Terminal and receive approval from the Construction Engineer prior to installation.

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

1d:/ruby/guardrail/te59ev.dgn (standard plan TE-59 rll/03/89)

r3/13/02

DATE	REVISION
1 5-25-17	Additional Detail.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GUARDRAIL DETAILS

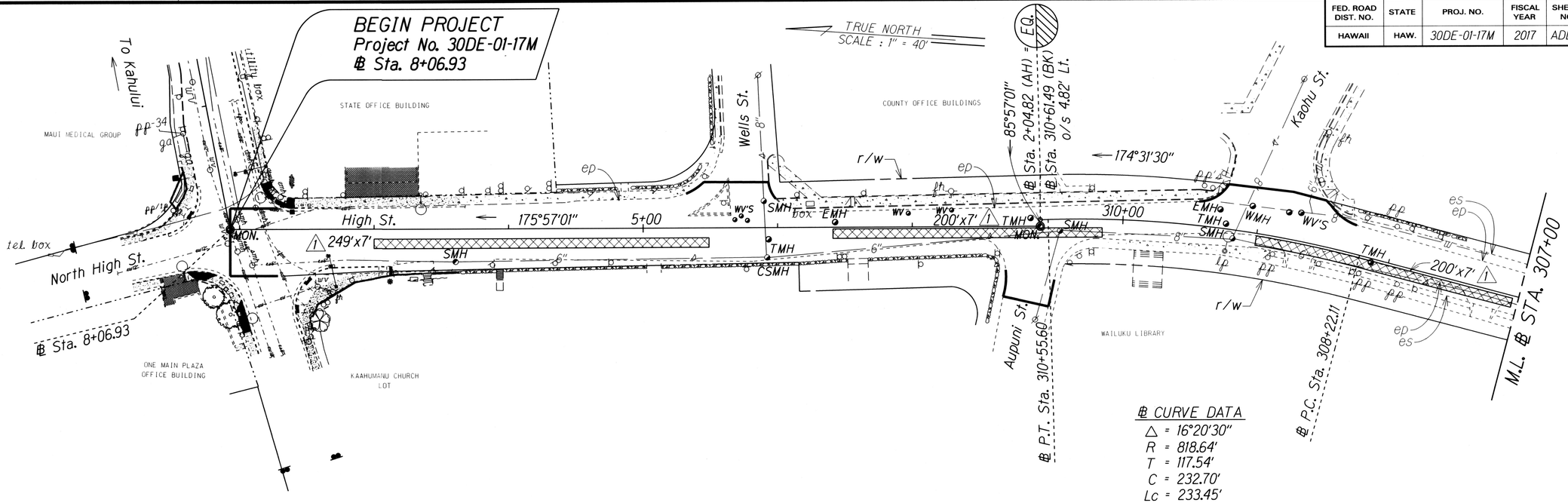
HIGH STREET RESURFACING
Main Street to Keanu Street
Project No. 30DE-01-17M

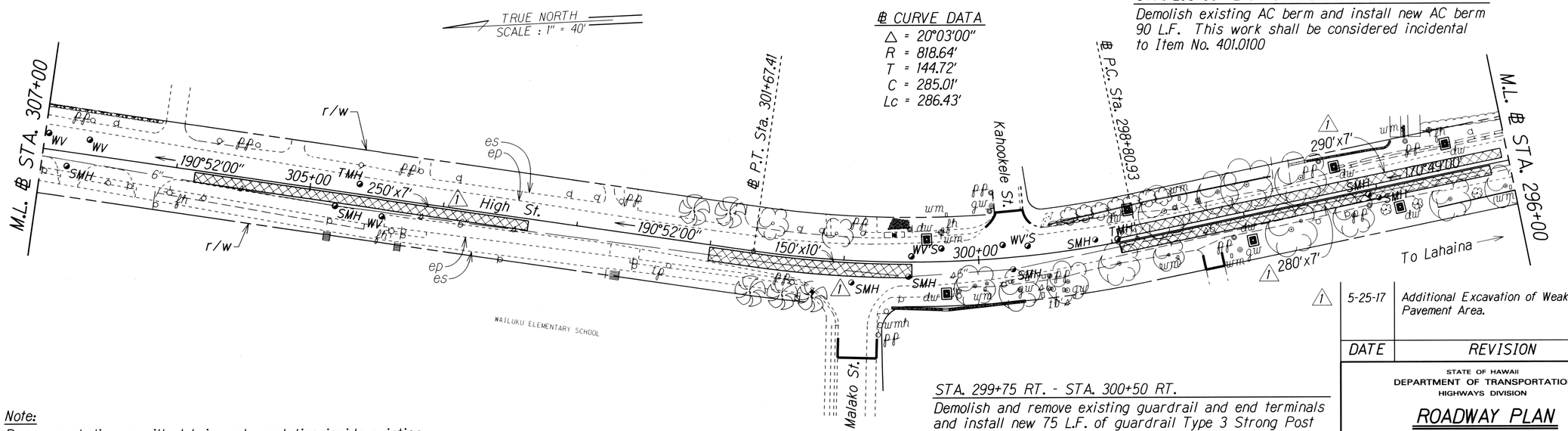
Scale: As Shown Date: May, 2017

SHEET No. 4 OF 4 SHEETS

ADD. 8S-4

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30DE-01-17M	2017	ADD.9	14





Note:
Remove and dispose silt, debris and vegetation inside existing drywell (30 Feet Deep). Payment shall be paid under contract Item No. 603.1000 Clean of Existing Culverts

STA. 298+50± LT. - STA. 299+60± LT.
Demolish existing AC berm and install new AC berm 90 L.F. This work shall be considered incidental to Item No. 401.0100

STA. 299+75 RT. - STA. 300+50 RT.
Demolish and remove existing guardrail and end terminals and install new 75 L.F. of guardrail Type 3 Strong Post W-Beam and Type G end terminal. Paved under guardrail and beyond. Payment shall be paid under contract Item No. 401.0100

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

DATE	REVISION
5-25-17	Additional Excavation of Weakened Pavement Area.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ROADWAY PLAN

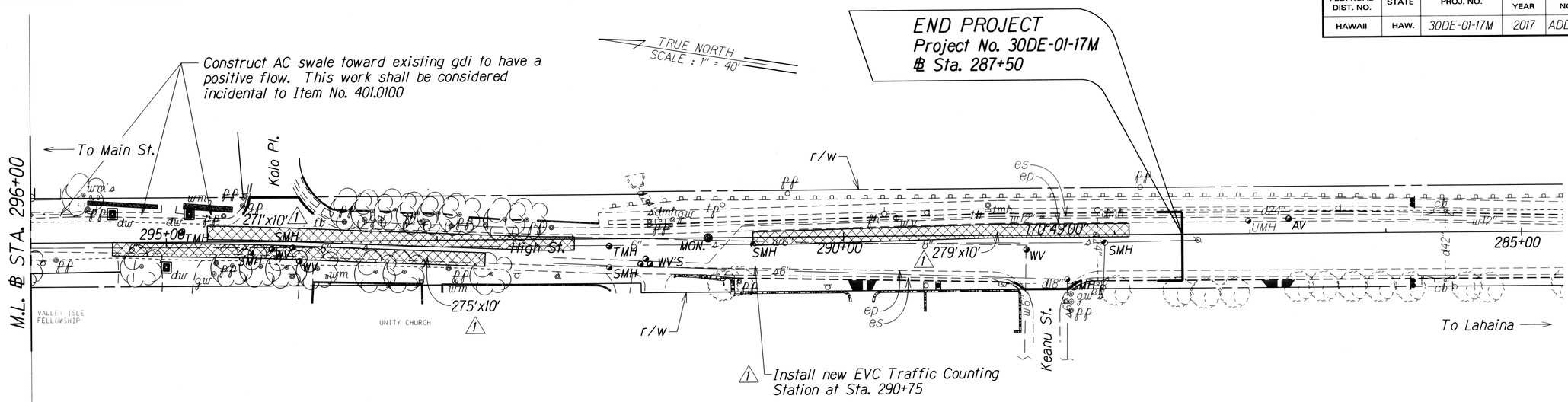
HIGH STREET RESURFACING
Main Street to Keanu Street
Project No. 30DE-01-17M

Scale: 1" =40' Date: February, 2017

SHEET No. 1 OF 2 SHEETS

ADD. 9

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30DE-01-17M	2017	ADD.10	14



NOTE:

Remove and dispose silt, debris and vegetation inside existing drywell (30 Feet Deep). Payment shall be paid under contract Item No. 603.1000 Clean of Existing Culverts

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE 2-17
	DRAWN BY AE	
NOTE BOOK	TRACED BY	
No.	DESIGNED BY AE	
	QUANTITIES BY	
	CHECKED BY	

DATE	REVISION
5-25-17	Detail of EVC Counting Station.
5-25-17	Additional Detail of Excavation of Weakened Pavement Area.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ROADWAY PLAN

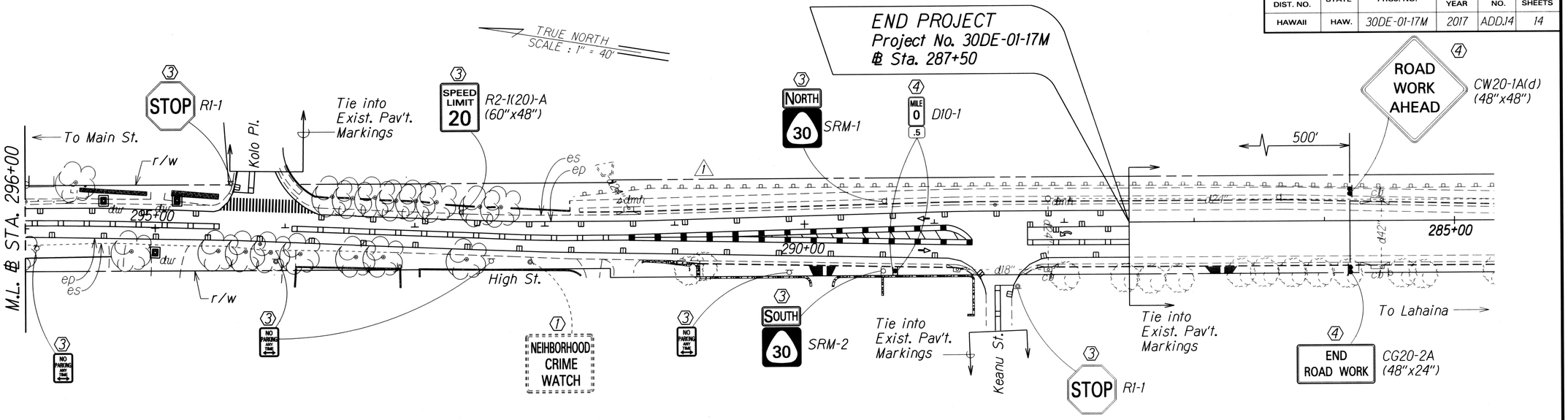
HIGH STREET RESURFACING
Main Street to Keanu Street
Project No. 30DE-01-17M

Scale: 1" =40' Date: February, 2017

SHEET No. 2 OF 2 SHEETS

ADD. 10

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30DE-01-17M	2017	ADD.14	14



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

KEY:

⟨1⟩ Exist. Sign(s) & Post(s) to Remain
⟨2⟩ Remove Exist. Sign(s) & Post(s)
⟨3⟩ Remove Exist. & Install New Sign(s) & Post(s)
⟨4⟩ Install New Sign(s) & Post(s)

DATE	REVISION
1 5-25-17	Detail of EVC Counting Station.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

SIGNING & PAVEMENT MARKING PLAN

HIGH STREET RESURFACING
Main Street to Keanu Street
Project No. 30DE-01-17M

Scale: 1" =40' Date: February, 2017

SHEET No. 2 OF 2 SHEETS

ADD. 14

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30DE-01-17M	2017	ADD.14S-1	14

ELECTRONIC VEHICLE COUNTING (EVC) SYSTEM NOTES

1. The location of new sensor loops and piezo sensors shall be staked out in the field by the Contractor and approved by the Engineer prior to installation.
2. The Contractor shall inform the Engineer at least three days prior to saw-cutting pavement and installing sensor loops and piezo sensors.
3. Pull in in-bound lanes sensor loop cable and piezo sensor lead cables into conduit, where indicated. Cables shall be tested for acceptance before and after installation into conduit.
4. Piezo lead cables shall be continuous with no splices.
5. The Contractor shall restore all affected areas to their original condition. This item of work shall not be paid for separately, but shall be considered incidental to work of other paid items.
6. The Contractor shall verify the location of the existing utilities and underground structures whether or not it is shown on the plans.
7. The Contractor shall assume that existing undergound utilities not shown on the plans may exists. The Contractor shall be responsible for contacting the different utility companies for information and toning.
8. The Contractor shall be held liable for any damages incurred to the existing utilities and underground structures as a result of his operations. All damaged portions shall be replaced in accordance with the standards and specifications of the affected utility company at no cost to the State.
9. Changes to the contract plans and specifications will not be permitted, unless approved by the Engineer in writing.
10. All cables are to be terminated within the EVC cabinet and shall have a minimum 12" additional slack.
11. Highway crossing conduit shall be provided with 36" cover.
12. Vacuum, pressure wash and air dry by air compressor and clean sawcut thoroghly before installing sensors and/or cables and filling with epoxy loop sealant or PU200 Piezo Installation Resin.
13. All Saw-cutting Slurry shall be Wet Vacuumed, either simultaneous with or immediately after the Saw-cutting operations. The collected Slurry shall be disposed of appropriately (i.e., either, placed in a Filter Fabric Lined Filtration Box or in a Filter Fabric Lined Dug Up Retention/Percolation Basin, and after Filtration/Percolation, the Filter Fabric and the retained sediments, disposed of appropriately).
14. Dry saw-cutting shall not be permitted.

SENSOR LOOP LAYOUT NOTES

1. Detector loop shall consist of four turns of 1C #14 cable meeting IMSA Spec 51-3 or equivalent embedded in a 3/8" wide by 4" deep sawcut, except as noted. Detector loop shall be provided a minimum 2" cover.
2. Sensor loop and lead cable shall be one continuous wire. Lead wires from the same loop shall be twisted in pairs, five twists per foot from the edge of paved shoulder to the pullbox. Do not twist one loop pair with another loop pair.
3. Continuity of sensor loops and lead-in wires shall be tested and warranted for one year from the date of accepatance by the Contractor.
4. Sensor loop lead cables shall be spliced only at the final pullbox to the EVC cabinet. Splice point of cables must be suspended near the top of the pullbox with a j-hook.
5. Splices shall be made by use of a splice kit.
6. All sensor loop lead cables shall be crimped with open end lugs that will fit into the terminal board slots snugly.
7. Stagger sensor loops on roadways with lanes that are less than 12 feet in width.
8. The Contractor shall connect the sensor loop wires on each terminal slot, as shown on plans.
9. The left lane in the direction of traffic flow is designated as lane 1, and the next lane to its right as lane 2 and so on as indicated on plans.
10. All sensor loop lead wires in the EVC cabinet and the pullboxes shall be identified and labeled by direction of traffic flow and lane number as shown on plans.
11. Only one sensor loop shall be placed per saw cut.

ORIGINAL PLAN	
NOTE BOOK ddx.x X.dgn No.	SURVEY PLOTTED BY ___ DATE 10/16
	DRAWN BY alex r. "
	TRACED BY ___ "
	DESIGNED BY alex r. "
	QUANTITIES BY ___ "
	CHECKED BY ___ "

	DATE	REVISION
1	5/25/17	Additional Traffic Counting Station Details.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EVC TRAFFIC COUNTING SYSTEM NOTES

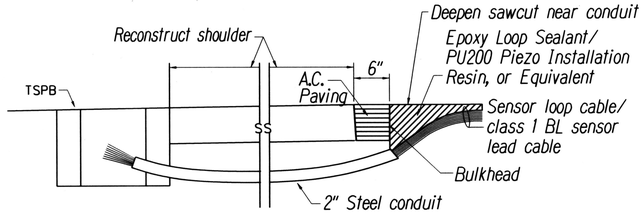
HIGH STREET RESURFACING
Main Street to Keanu Street
Project No. 30DE-01-17M

Date: May, 2017

SHEET No. 1 OF 3 SHEETS

ADD. 14S–1

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30DE-01-17M	2017	ADDJ4S-2	14

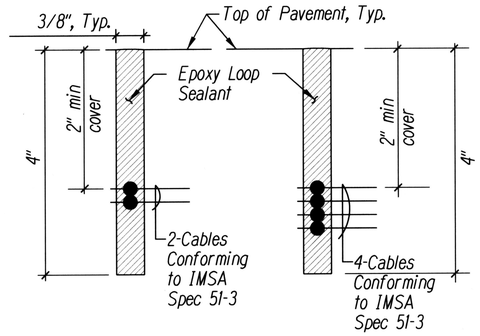


NOTES ON CONSTRUCTION AT END OF SAWCUT

1. Seal roadway end of conduit after installation of conductors
2. Install bulkhead across conduit trench.
3. Place Epoxy Loop Sealant or PU200 Piezo Installation Resin or Equivalent in sawcut
4. Backfill over conduit with new A.C.
5. Reconstruct curb and gutter as required.

DETAIL OF SENSOR LOOP/ CLASS 1 BL SENSOR AT EDGE OF ROADWAY

Not to Scale

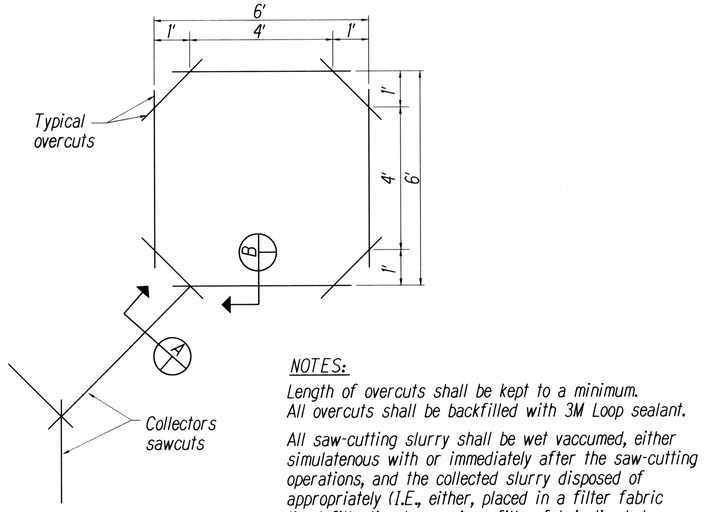


SECTION A / 00 Not to Scale

SECTION B / 00 Not to Scale

TYPICAL SECTION THROUGH SENSOR LOOP

Not to Scale



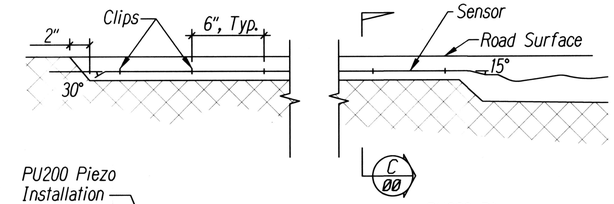
NOTES:

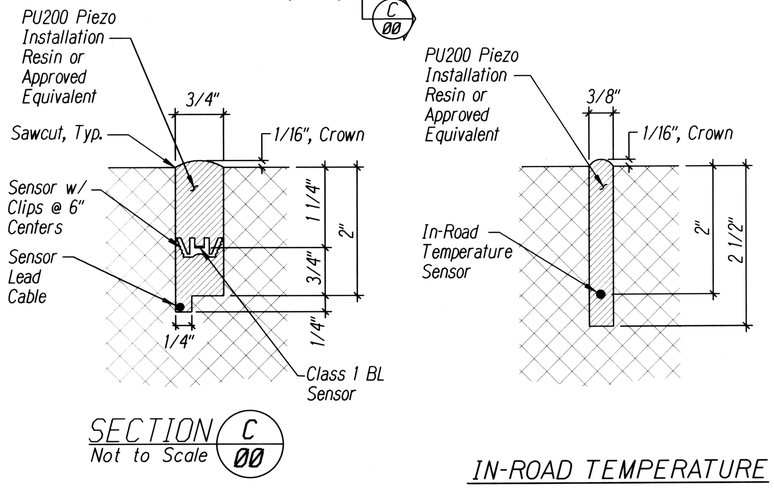
Length of overcuts shall be kept to a minimum. All overcuts shall be backfilled with 3M Loop sealant.

All saw-cutting slurry shall be wet vaccumed, either simulatenous with or immediately after the saw-cutting operations, and the collected slurry disposed of appropriately (I.E., either, placed in a filter fabric lined filtration box or in a filter fabric lined dug up retention/percolation basin, and after filtration/percolation, the filter fabric and the retained sediments, disposed of appropriately).

TYPICAL SENSOR LOOP SAWCUT DETAIL

Not to Scale





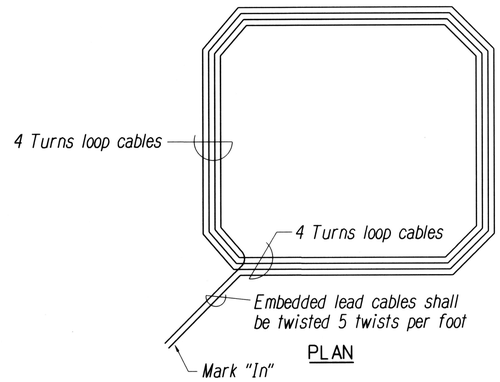
SECTION C / 00 Not to Scale

PIEZOELECTRIC SENSOR INSTALLATION DETAILS

Not to Scale

IN-ROAD TEMPERATURE SENSOR INSTALLATION DETAIL

Not to Scale



PLAN

TYPICAL SENSOR LOOP WIRING DIAGRAM

Not to Scale

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

DATE	REVISION
1 5/25/17	Additional Traffic Counting Station Details.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC COUNTING STATION DETAILS

HIGH STREET RESURFACING
Main Street to Keanu Street
Project No. 30DE-01-17M

Scale: As Shown Date: May, 2017

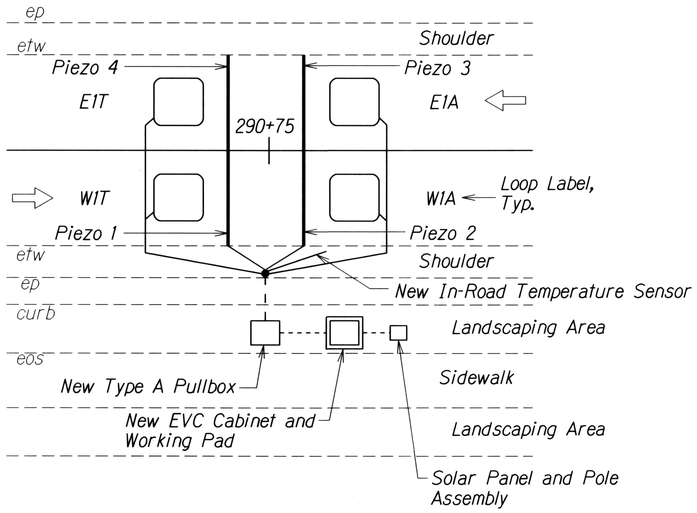
SHEET No. 2 OF 3 SHEETS

ADD. 14S-2

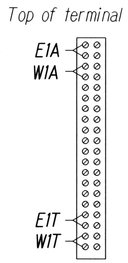
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	30DE-01-17M	2017	ADD14S-3	14

E2T
- Indicates approaching or trailing loop
- Indicates lane number
- Indicates direction*

LOOP LABEL LEGEND:
E = East
W = West
A = Approaching
T = Trailing

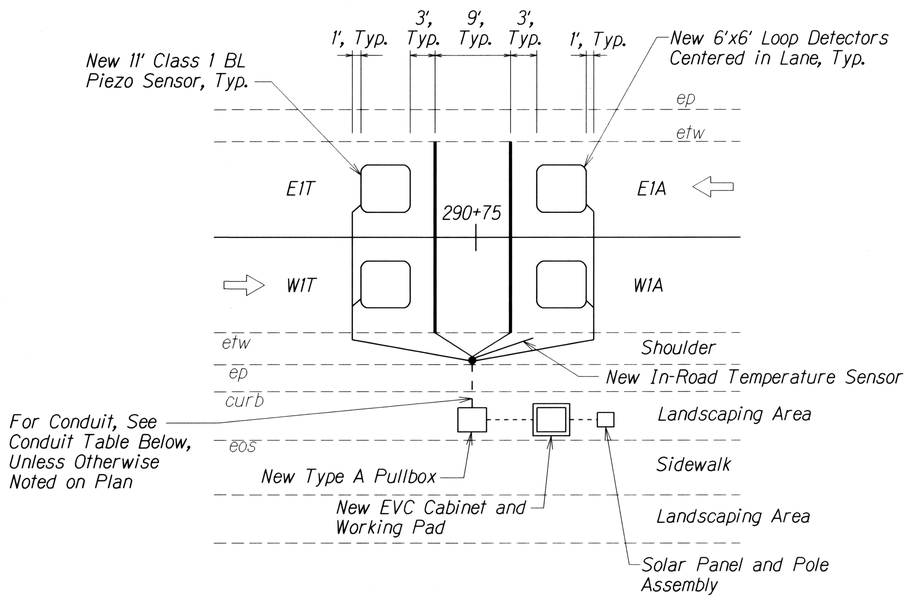


LABELING OF LOOPS AND PIEZOS
Not to Scale



Connecting layout of loop lead-in wires to terminal block inside cabinet

TYPICAL TWO-LANE ROADWAY TERMINAL BLOCK WIRING DETAILS
Not to Scale



Conduit "A" Table:

Conduit* #-Size	Class 1 BL Sensor Lead Cables	2C #18 Loop Detector Cable
Existing	4	4

*Conduits under pavement and at utility crossings shall be concrete encased.

*NOTES:
1. All dimensions and callouts are typical unless otherwise noted on plan.
2. Contractor shall coordinate service agreements and connections to electrical and communication service. Contractor shall also contact the appropriate State Dept of Transportation Representative for service agreement. (Highways Planning, Contact, Goro Sulijoadikusumo, P.E., at 587-1839).

EVC COUNTING SYSTEM LAYOUT DETAIL
Not to Scale

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

DATE	REVISION
5/25/17	Additional Traffic Counting Station Details.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC COUNTING STATION DETAILS

HIGH STREET RESURFACING
Main Street to Keanu Street
Project No. 30DE-01-17M

Scale: As Shown Date: May, 2017

SHEET No. 3 OF 3 SHEETS

ADD. 14S-3