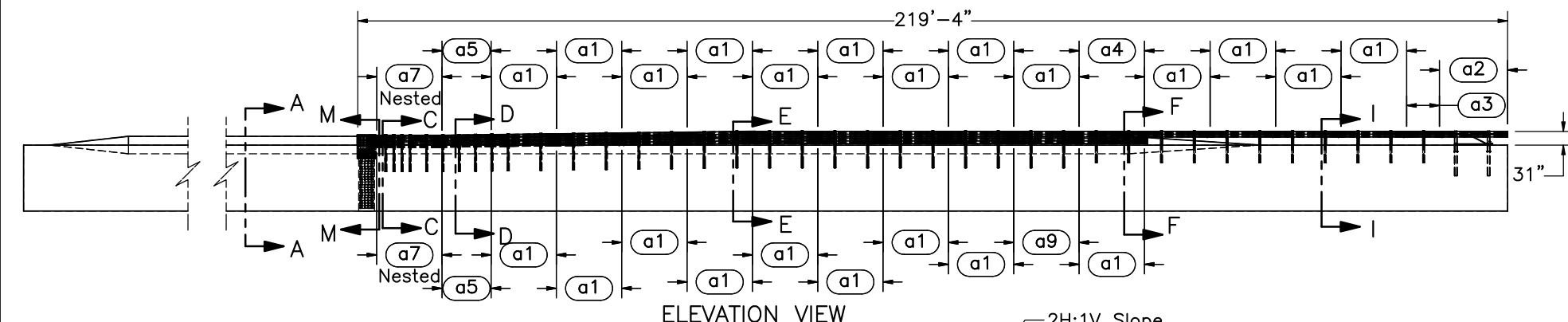
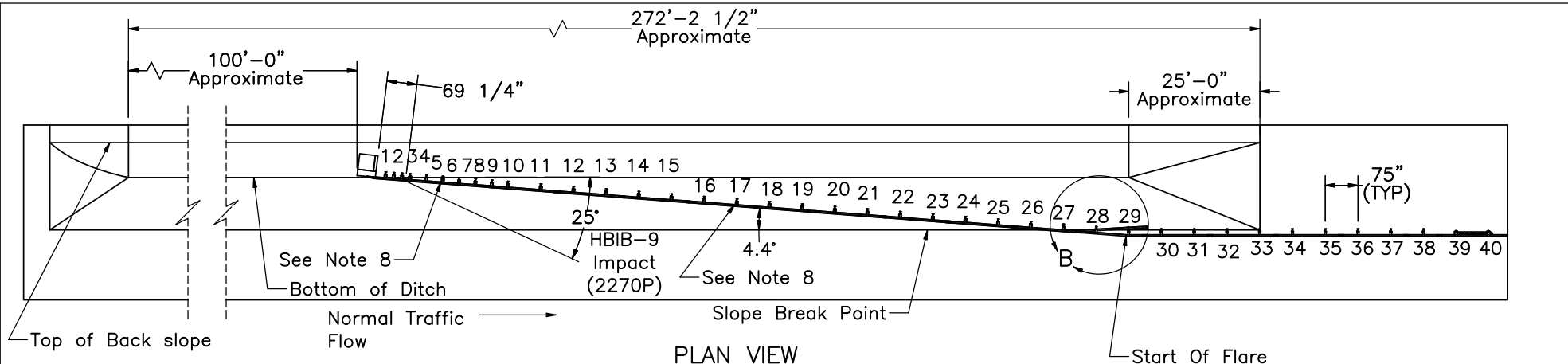
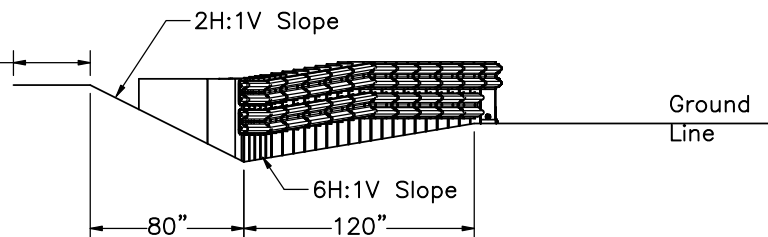




Notes:

- (1) Test no. HBIB-9 shall be performed according to test designation no. 3-37a using MASH 2016 criteria.
- (2) Impact location for test no. HBIB-9 is 69 1/4" upstream from the upstream end of the fascia.
- (3) Impact angle is respect to tangent portion of system between post nos. 30 and 40.
- (4) Critical regions are located between post nos. 1 thru 10 and post nos. 26 thru 33.
- (5) Width of backstop plateau extends for 2' behind system before transitioning back to the nominal ground line.
- (6) Rails shall be lapped in accordance with traffic flow from lower numbered posts to higher numbered posts.
- (7) Downstream end of nested W-beam sections (part a7) sandwich upstream end of adjacent W-beam section (part a5) at splice location in accordance with traffic flow.
- (8) Guardrail system has a linear slope up and out of ditch between post nos. 6-17.



SECTION A-A
SCALE 1 : 100



Midwest Roadside
Safety Facility

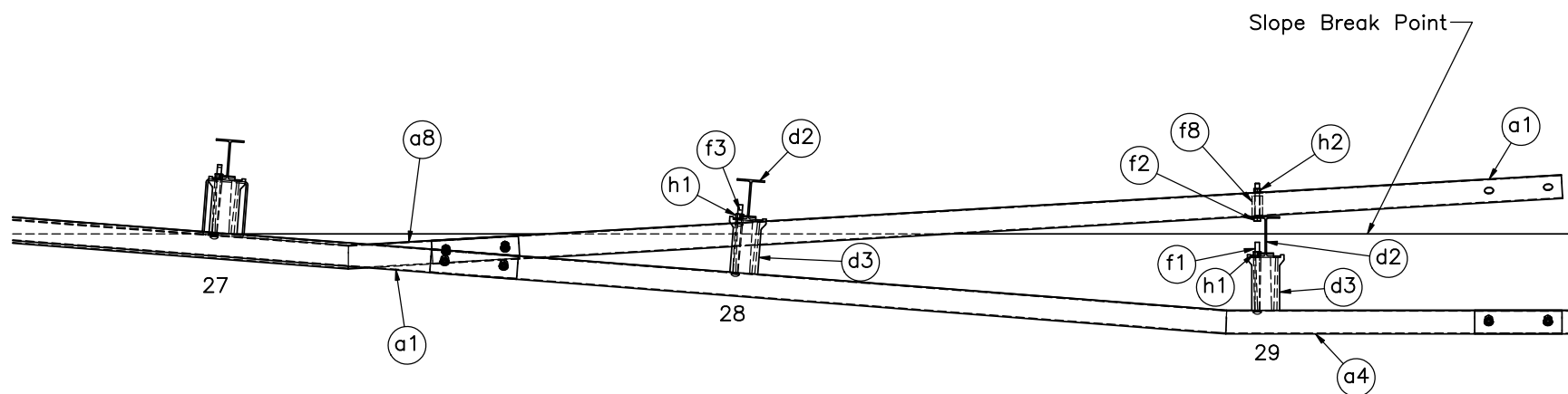
Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

System Layout

DWG. NAME.
HBIB-9wCap_R4

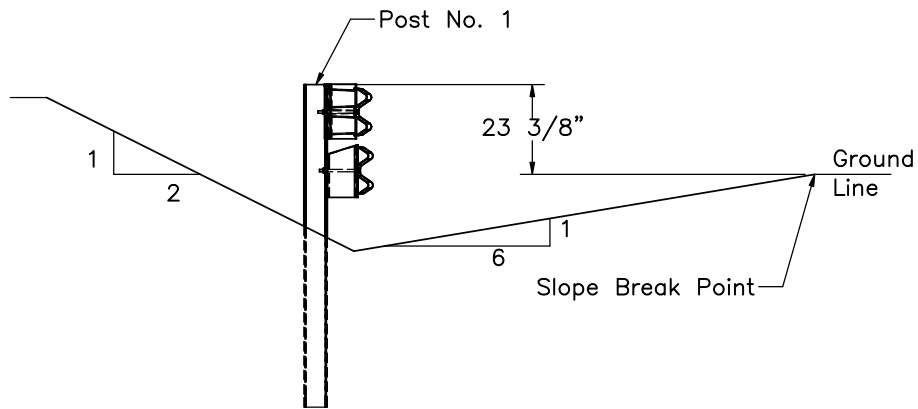
SCALE: 1:350
UNITS: in.

SHEET:
1 of 35
DATE:
10/01/2025
DRAWN BY:
JJO/TJC/MS
W
REV. BY:
KAL/CSS

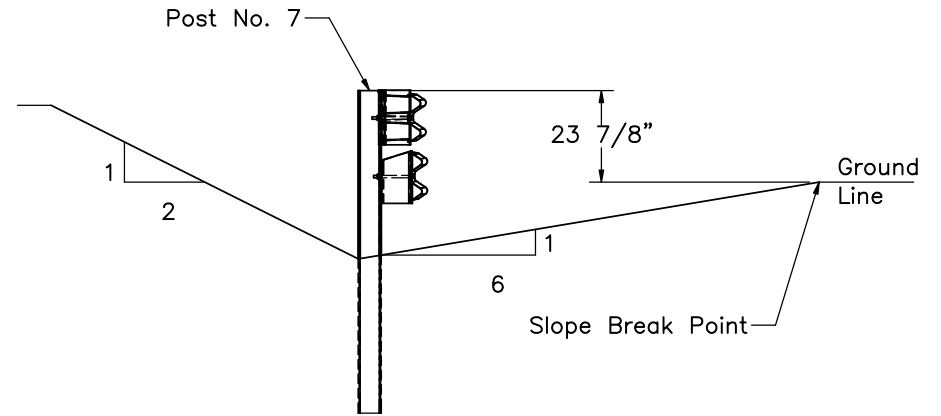


Detail B

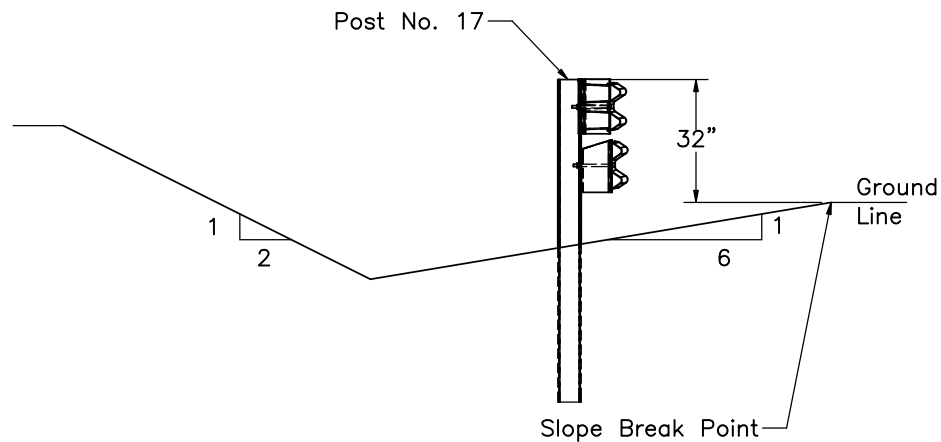
	Hawaii Buried in Backslope Test No. HBIB-9 (with Cap)		SHEET: 2 of 35
	Detail B View		DATE: 10/01/2025
Midwest Roadside Safety Facility	DWG. NAME: HBIB-9wCap_R4		DRAWN BY: JJO/TJC/MS W
	SCALE: 1:25 UNITS: in.		REV. BY: KAL/CSS



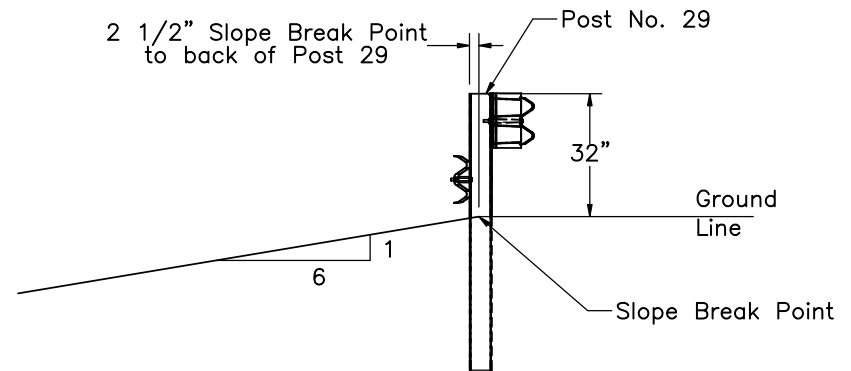
SECTION C-C



SECTION D-D



SECTION E-E



SECTION F-F

- Note: (1) Post heights are measured from the Ground Line to the center back of the post.
- (2) The top of the upper W-beam rail is located 1" below the top of the post and blockout at each post location. The lower W-beam is located 3" below the bottom of the upper W-beam.



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Ground Cross Sections

DWG. NAME.
HBIB-9wCap_R4

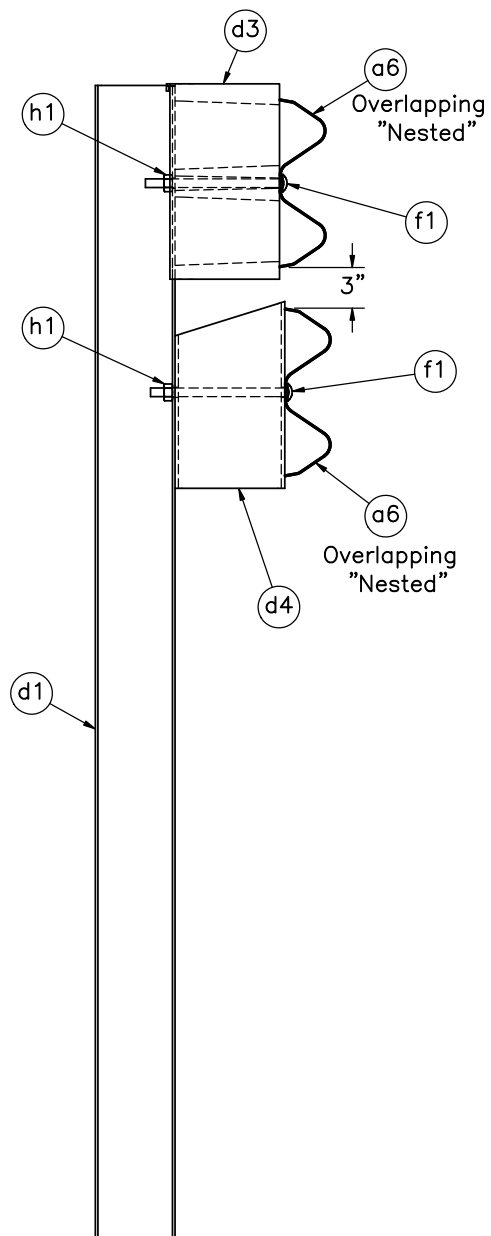
SCALE: 1:50
UNITS: in.

SHEET:
3 of 35

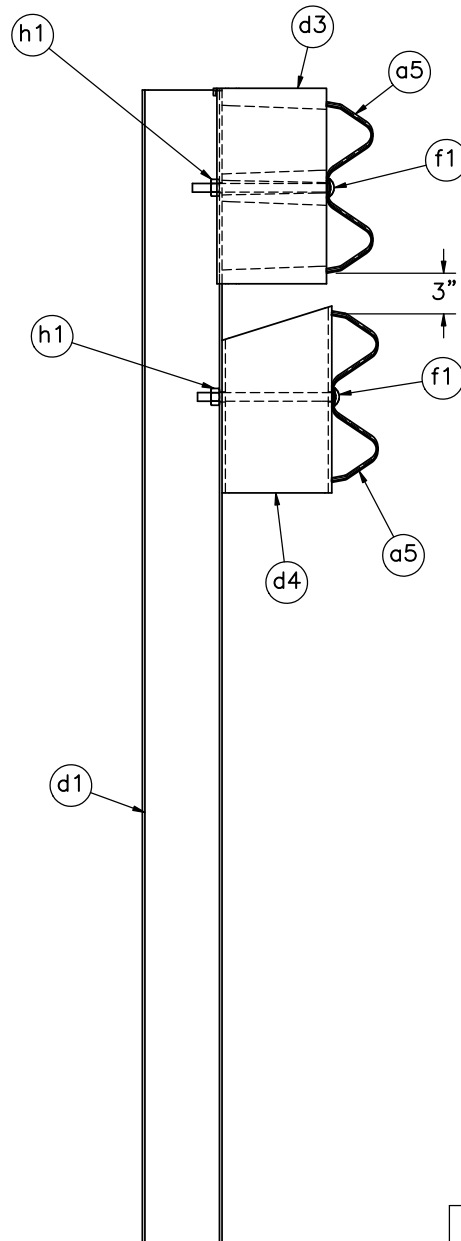
DATE:
10/01/2025

DRAWN BY:
JJQ/TJC/MS
W

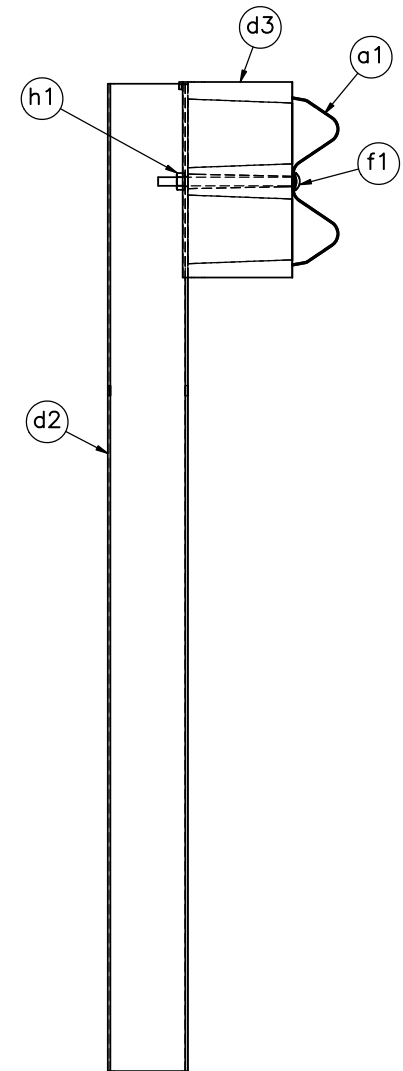
REV. BY:
KAL/CSS



SECTION G-G
Post 1-6



SECTION H-H
Post 7-27



SECTION I-I
Post 28-38

Note: (1) 3" Gap between bottom of top rail and top of Rub rail, Posts 1-27



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Post Nos. 1-38 Details

DWG. NAME.
HBIB-9wCap_R4

SCALE: 1:14
UNITS: in.

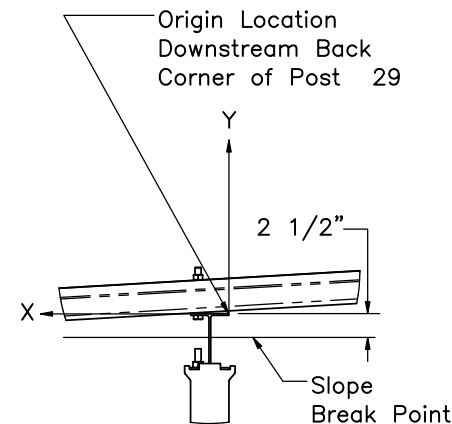
SHEET:
4 of 35

DATE:
10/01/2025

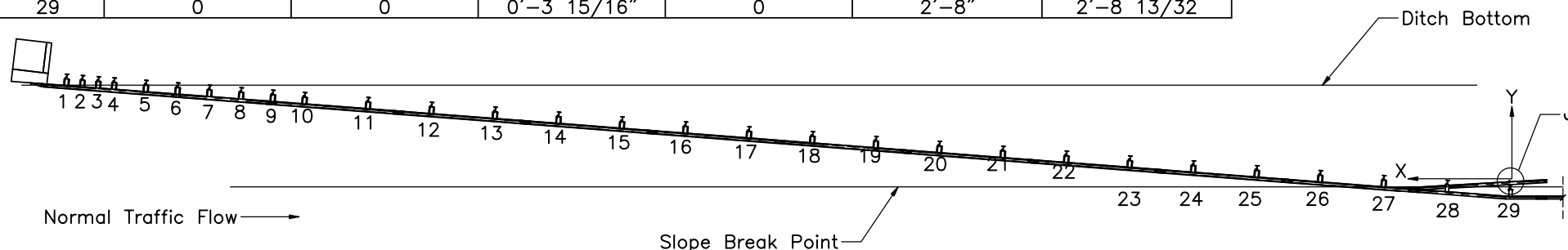
DRAWN BY:
JJO/TJC/MS
W

REV. BY:
KAL/CSS

Post Locations						
Post No.	Downstream Back Corner of Post		Upstream Back Corner of Post		Top of the post to ground line	Top of the Back Side Centerline Post to Ditch
	X	Y	X	Y		
1	141'-8 35/64"	10'-10 1/4"	142'-0 31/64"	10'-10 35/64"	1'-11 3/8"	3'-0 15/16"
2	140'-1 55/64"	10'-8 13/16"	140'-5 25/32"	10'-9 7/64"	1'-11 3/8"	3'-1 21/32"
3	138'-7 5/32"	10'-7 3/8"	138'-11 3/32"	10'-7 43/64"	1'-11 3/8"	3'-2 3/8"
4	137'-0 15/32"	10'-5 15/16"	137'-4 25/64"	10'-6 15/64"	1'-11 3/8"	3'-3 3/32"
5	133'-11 5/64"	10'-3 1/16"	134'-3"	10'-3 23/64"	1'-11 3/8"	3'-4 17/32"
6	130'-9 11/16"	10'-0 3/16"	131'-1 39/64"	10'-0 31/64"	1'-11 3/8"	3'-5 61/64"
7	127'-8 19/64"	9'-9 19/64"	128'-0 15/64"	9'-9 39/64"	1'-11 27/32"	3'-7 27/32"
8	124'-6 29/32"	9'-6 7/16"	124'-10 27/32"	9'-6 47/64"	2'-0 21/64"	3'-7 27/32"
9	121'-5 17/32"	9'-3 35/64"	121'-9 29/64"	9'-3 27/32"	2'-0 13/16"	3'-7 27/32"
10	118'-3 29/32"	9'-0 45/64"	118'-7 53/64"	9'-1"	2'-1 19/64"	3'-7 27/32"
11	112'-1"	8'-6 15/16"	112'-4 15/16"	8'-7 15/64"	2'-2 1/4"	3'-7 27/32"
12	105'-10 23/64"	8'-1 3/16"	106'-2 9/32"	8'-1 31/64"	2'-3 13/64"	3'-7 27/32"
13	99'-7 37/64"	7'-7 7/16"	99'-11 33/64"	7'-7 47/64"	2'-4 5/32"	3'-7 27/32"
14	93'-4 13/16"	7'-1 11/16"	93'-8 47/64"	7'-1 63/64"	2'-5 1/8"	3'-7 7/8"
15	87'-2 3/64"	6'-7 15/16"	87'-5 61/64"	6'-8 15/64"	2'-6 5/64"	3'-7 27/32"
16	80'-11 9/32"	6'-2 3/16"	81'-3 13/64"	6'-2 31/64"	2'-7 3/64"	3'-7 7/8"
17	74'-8 1/2"	5'-8 27/64"	75'-0 27/64"	5'-8 23/32"	2'-8"	3'-7 27/32"
18	68'-5 23/32"	5'-2 43/64"	68'-9 41/64"	5'-2 31/32"	2'-8"	3'-6 15/16"
19	62'-2 15/16"	4'-8 29/32"	62'-6 55/64"	4'-9 7/32"	2'-8"	3'-5 29/32"
20	56'-0 5/32"	4'-3 5/32"	56'-4 3/32"	4'-3 29/64"	2'-8"	3'-5"
21	49'-9 3/8"	3'-9 13/32"	50'-1 5/16"	3'-9 45/64"	2'-8"	3'-4 1/32"
22	43'-6 19/32"	3'-3 21/32"	43'-10 17/32"	3'-3 61/64"	2'-8"	3'-3 1/32"
23	37'-3 13/16"	2'-9 29/32"	37'-7 3/4"	2'-10 13/64"	2'-8"	3'-2 3/32"
24	31'-1 3/64"	2'-4 9/64"	31'-4 31/32"	2'-4 29/64"	2'-8"	3'-1 5/32"
25	24'-10 9/32"	1'-10 25/64"	25'-2 13/64"	1'-10 11/16"	2'-8"	3'-3/16"
26	18'-7 18/32"	1' 4 41/64"	18'-11 13/32"	1'-4 15/16"	2'-8"	2'-11 7/32"
27	12'-4 45/64"	0-10 7/8"	12'-8 5/8"	0'-11 3/16"	2'-8"	2'-10 1/4"
28	6'-1 29/32"	0-5 9/64"	6'-5 27/32"	0'-5 29/64"	2'-8"	2'-9 9/32"
29	0	0	0'-3 15/16"	0	2'-8"	2'-8 13/32"



DETAIL J
SCALE 1 : 20



- Note: (1) Post x,y,z dimensions are measured from downstream back corner of post 29. Vertical dimensions are from the top of the front slope break point to the top of the post.
- (2) Post no. 17 through No. 29 do not change in height from the top of the post to the ground line.



Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Post Location Layout

DWG. NAME.
HBIB-9wCap_R4

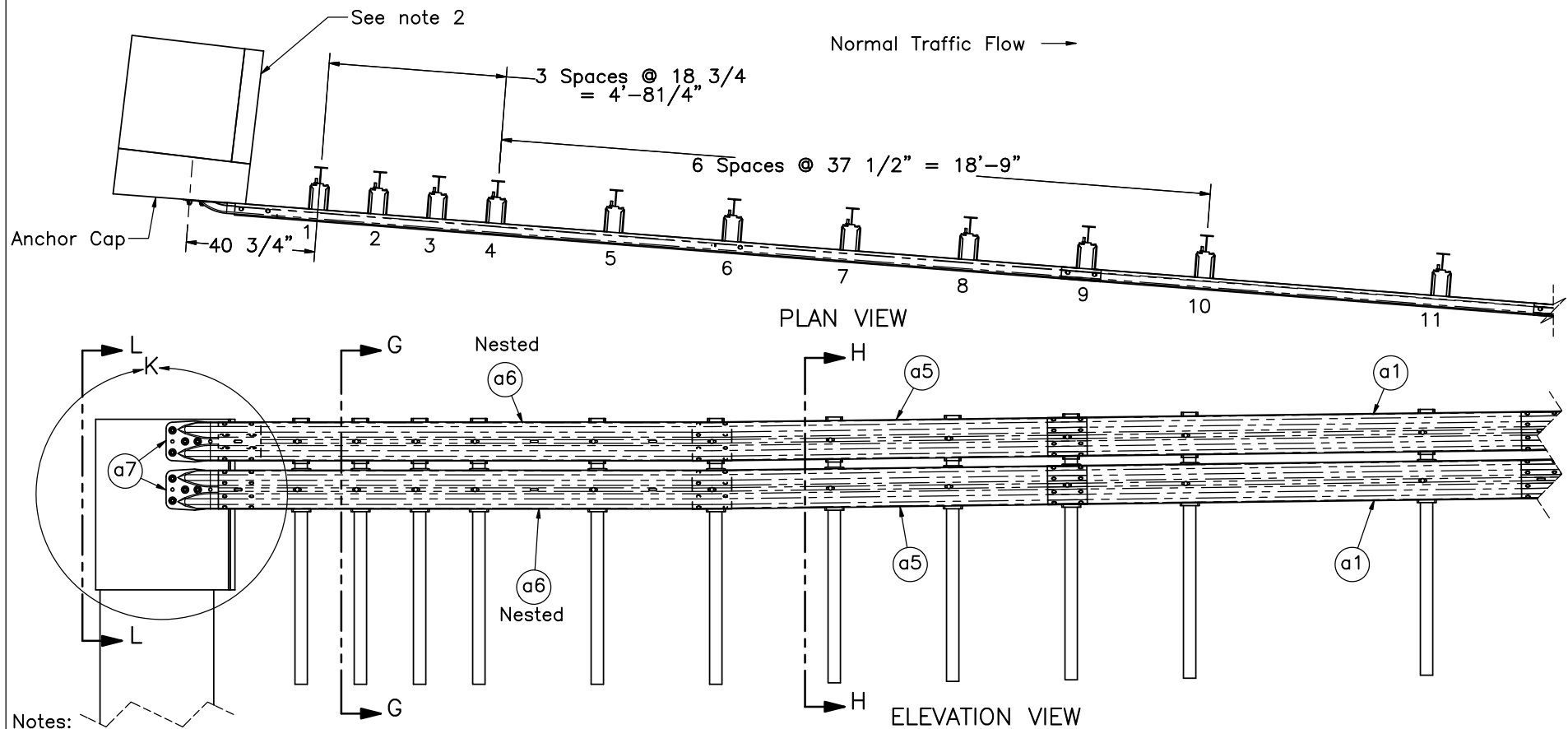
SCALE: 1:185
UNITS: in.

SHEET:
5 of 35

DATE:
10/01/2025

DRAWN BY:
JJO/TJC/MS
W

REV. BY:
KAL/CSS



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Flare to Anchor Details

DWG. NAME.
HBIB-9wCap_R4

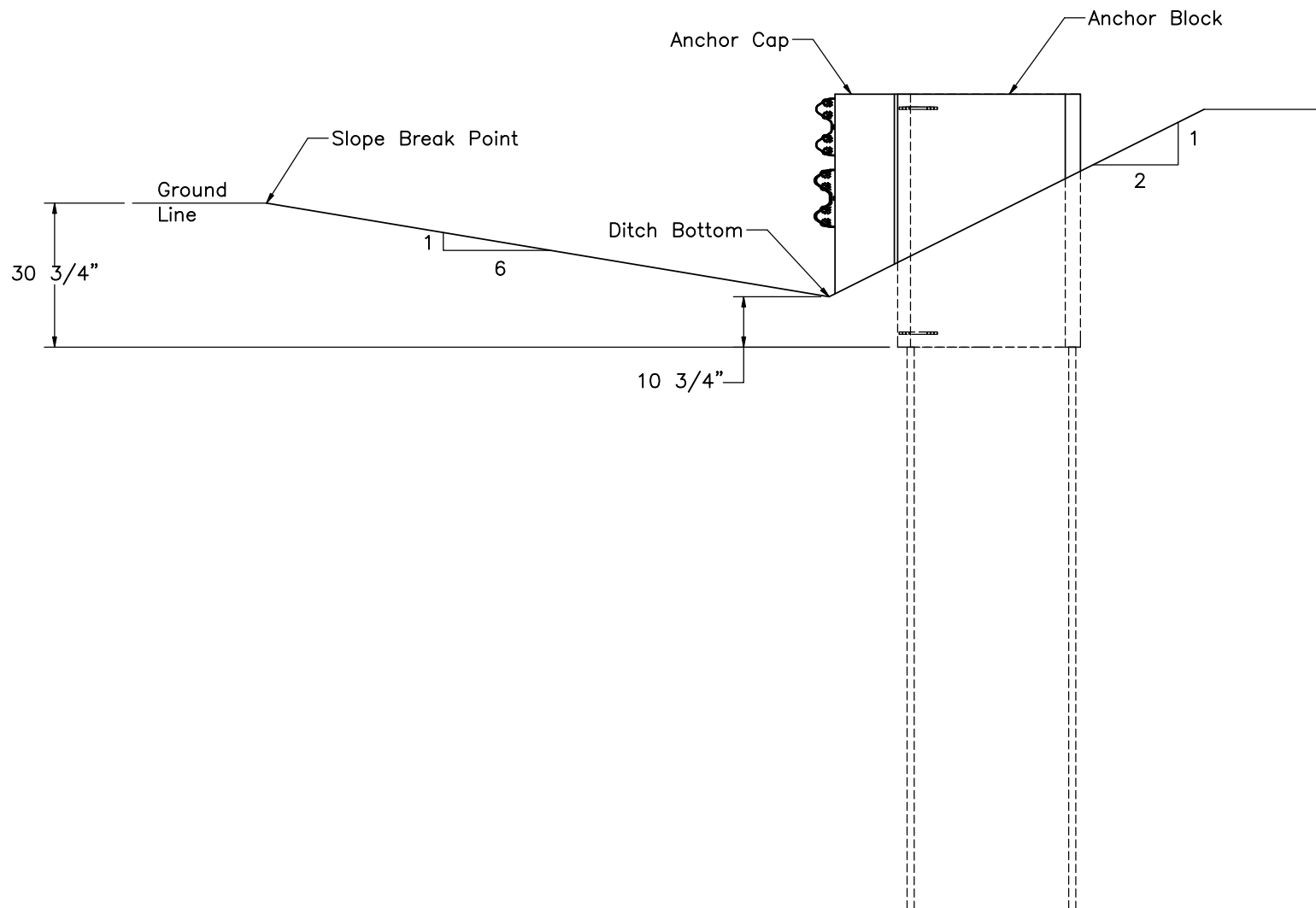
SCALE: 1:50
UNITS: in.

REV. BY:
KAL/CSS

SHEET:
7 of 35

DATE:
10/01/2025

DRAWN BY:
JJO/TJC/MS
W

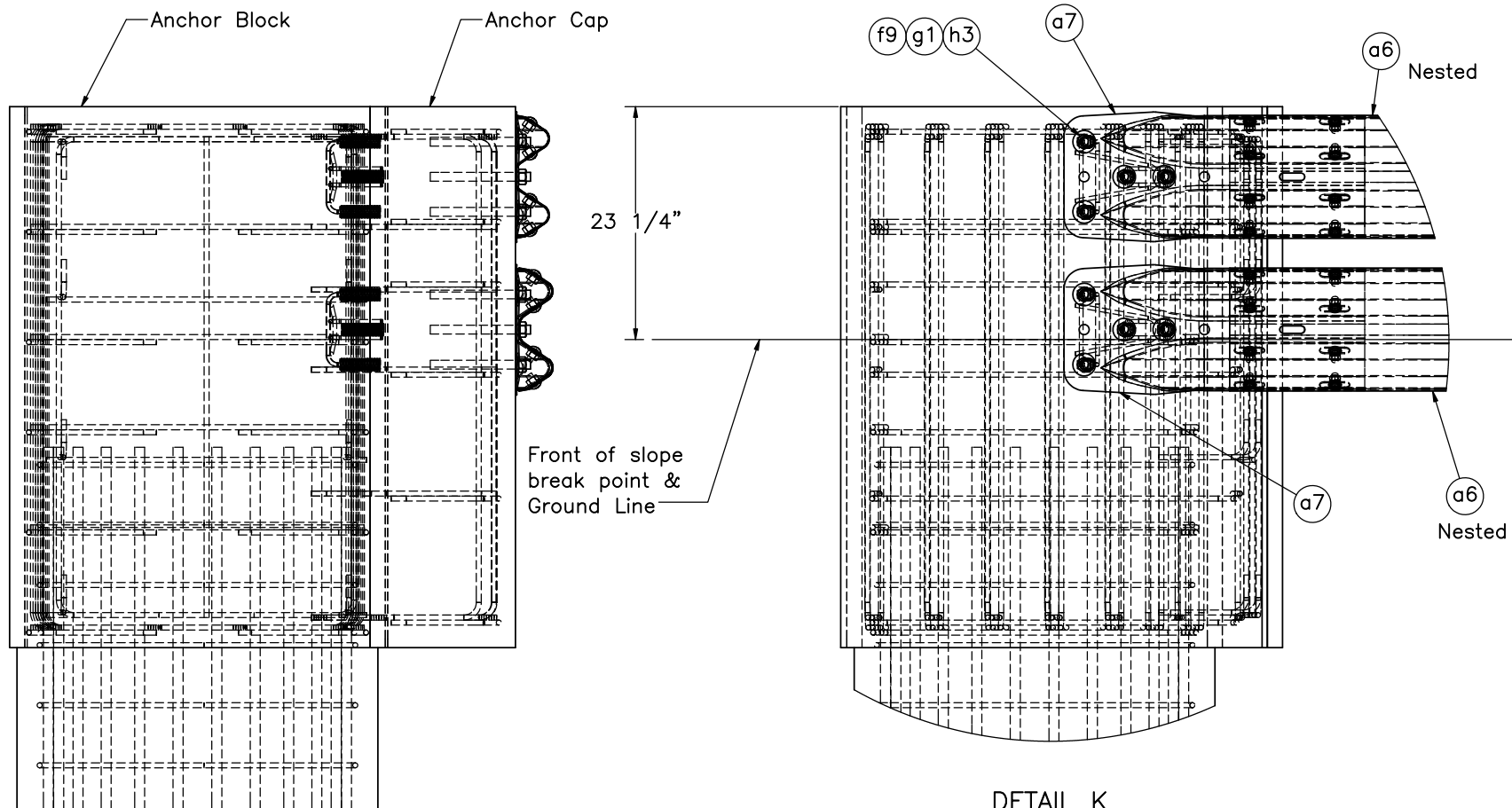


SECTION M-M



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope Test No. HBIB-9 (with Cap)		SHEET: 8 of 35
		DATE: 10/01/2025
Anchor Block Section View		DRAWN BY: JJQ/TJC/MS W
		REV. BY: KAL/CSS
DWG. NAME: HBIB-9wCap_R4	SCALE: 1:35 UNITS: in.	



SECTION L-L

- Notes: (1) Hawaii DOT typically utilizes an aesthetic stone-faced exterior of the anchor block, which will be represented by a 6" thick low-strength fascia, which is to be added to the upstream surface of the concrete anchor block. The fascia can be normal strength concrete anchored to the anchor block with minimum steel reinforcement to represent the lateral supported grouted rubble paving.
- (2) Optional: the 6" fascia can be included in the anchor block and cast as one unit for testing purposes.
- (3) View is normal to concrete block, back slope is shown at an angle.
- (4) See sheet 12 for optional end section installation details.



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

End Section Installation Details

DWG. NAME.
HBIB-9wCap_R4

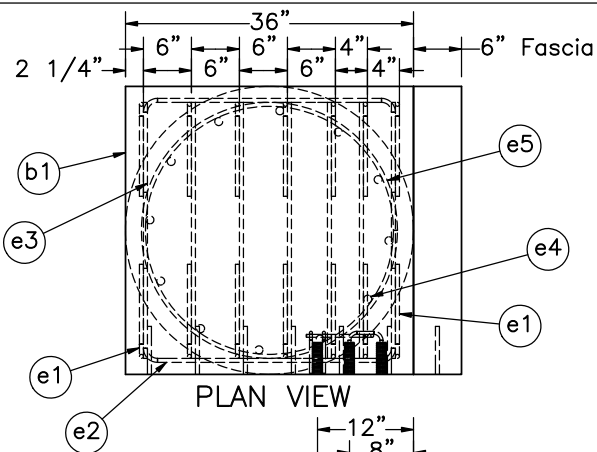
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SHEET:
9 of 35

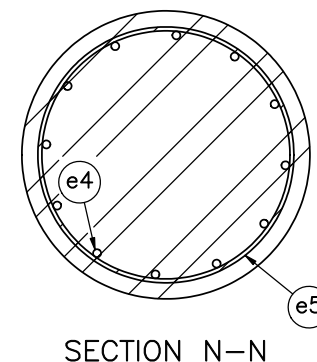
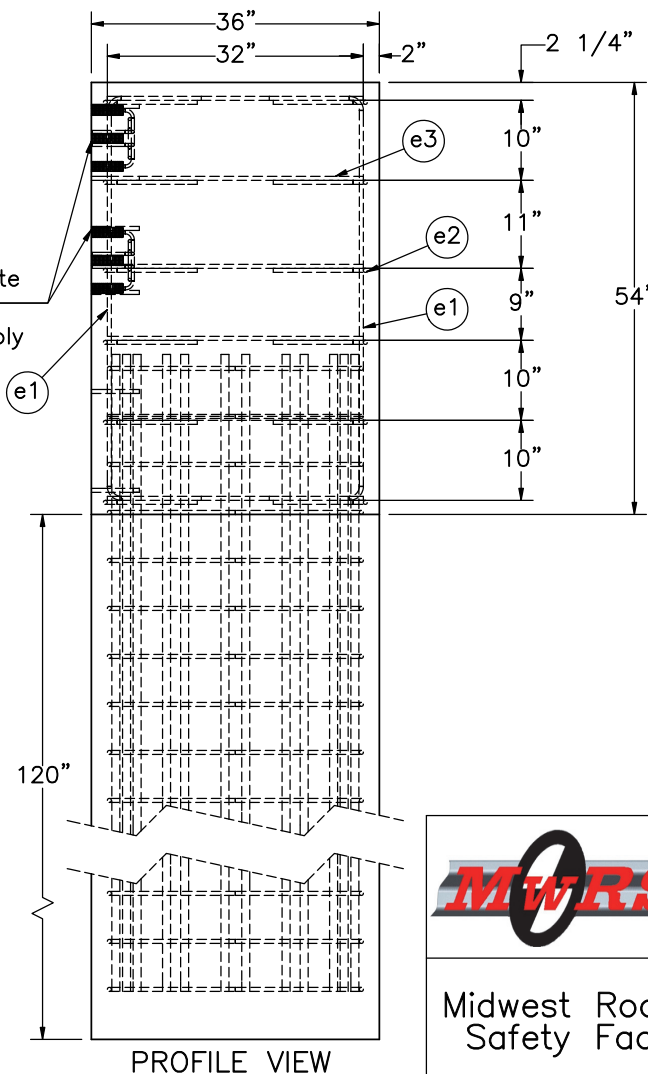
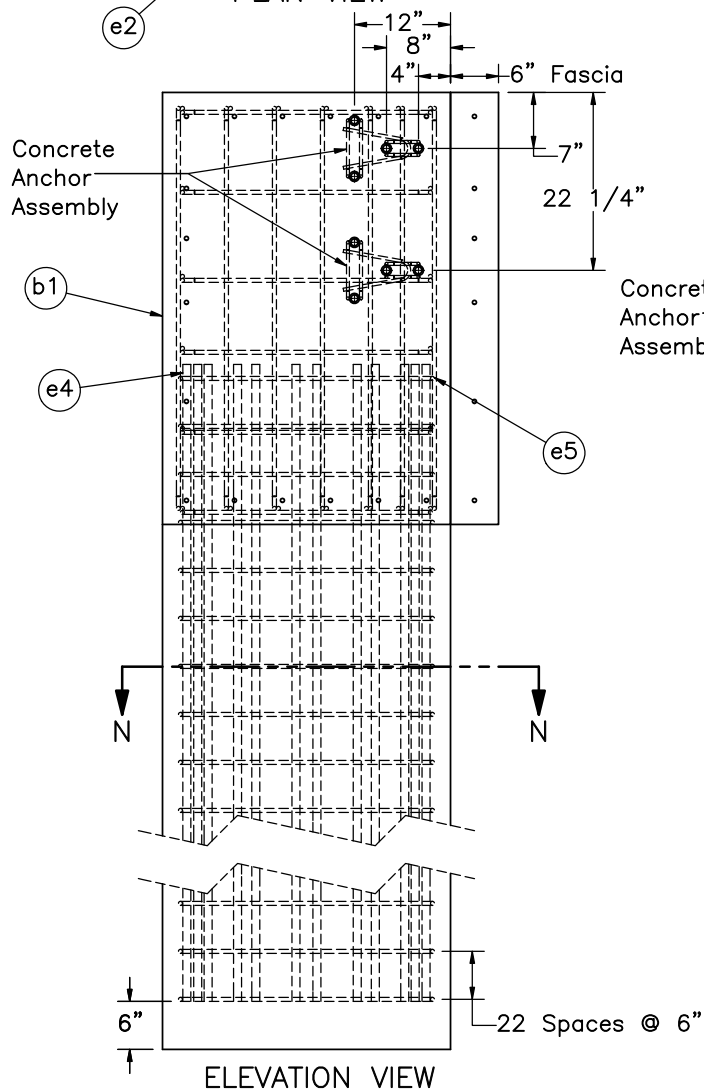
DATE:
10/01/2025

DRAWN BY:
JJQ/TJC/MS
W

REV. BY:
KAL/CSS



- Notes: (1) Hawaii DOT typically utilizes an aesthetic stone-faced exterior of the anchor block, which will be represented by a 6" thick low-strength fascia, which is to be added to the upstream surface of the concrete anchor block. The fascia can be normal strength concrete anchored to the anchor block with minimum steel reinforcement to represent the lateral supported grouted rubble paving. Optional: the 6" fascia can be included in the anchor block and cast as one unit for testing purposes.
- (2) Rebar in fascia not shown in these views for clarity.
- (3) Additional reinforcement and subgrade anchorage added to Hawaii DOT anchor block to increase rigidity.



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Concrete Anchor Block Details

DWG. NAME:
HBIB-9wCap_R4

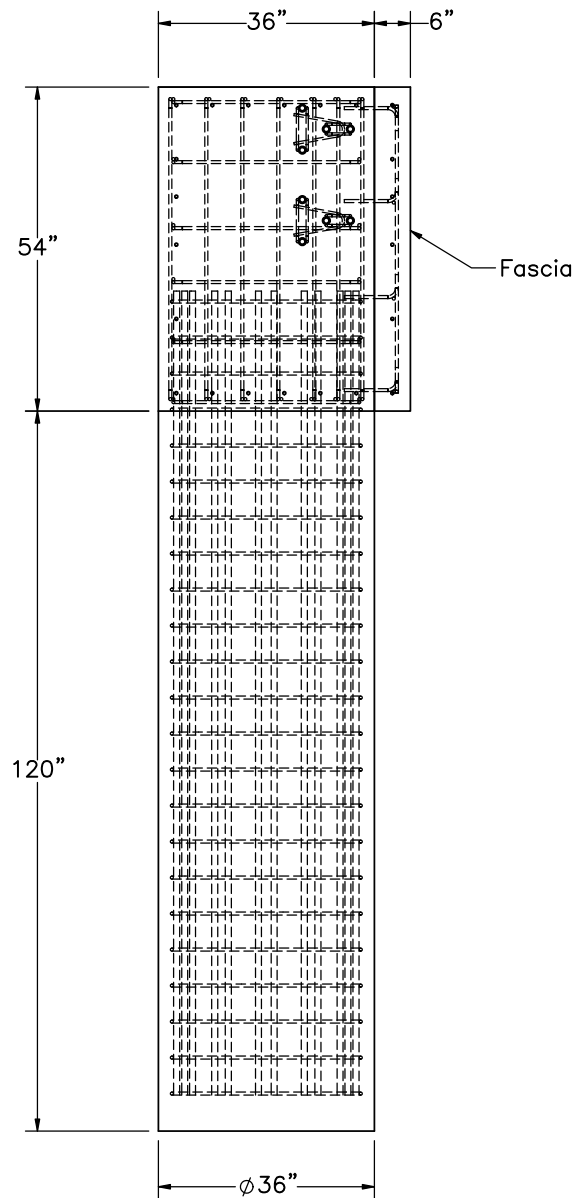
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UNITS: in.

SHEET:
10 of 35

DATE:
10/01/2025

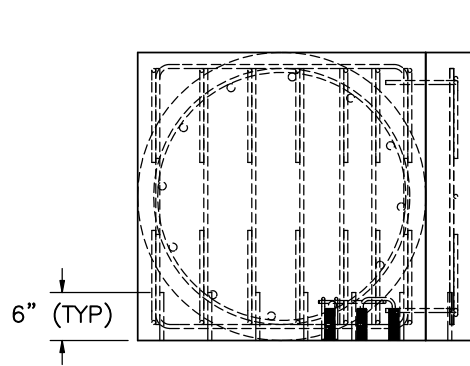
DRAWN BY:
JJQ/TJC/MS
W

REV. BY:
KAL/CSS

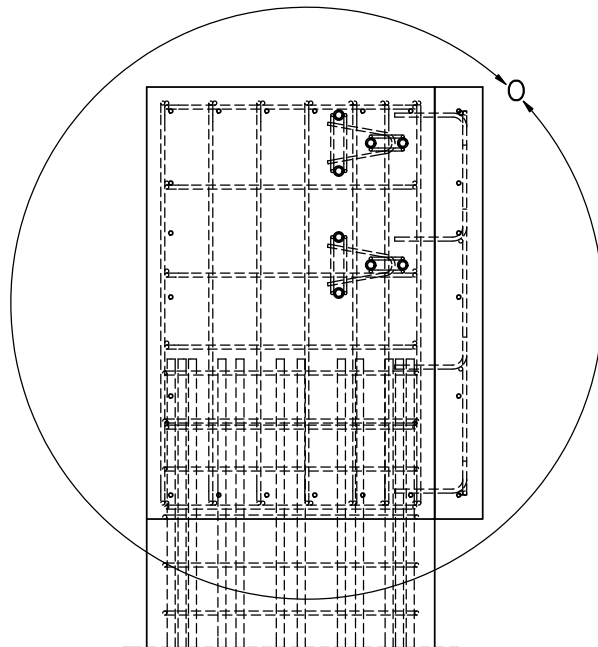


- Note: (1) Hawaii DOT typically utilizes an aesthetic stone-faced exterior of the anchor block, which will be represented by a 6" thick low-strength fascia, which is to be added to the upstream surface of the concrete anchor block. The fascia can be normal strength concrete anchored to the anchor block with minimum steel reinforcement to represent the lateral supported grouted rubble paving.
- (2) Optional: the 6" fascia can be included in the anchor block and cast as one unit for testing purposes.

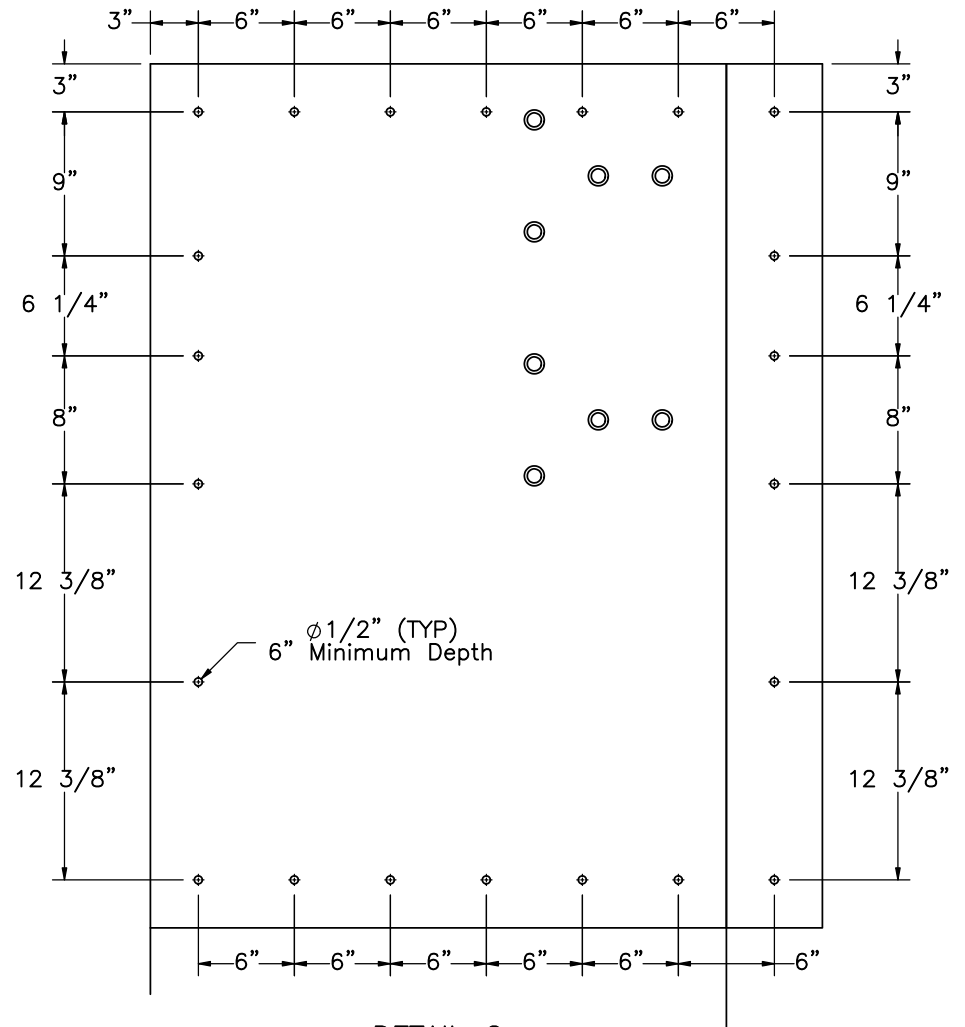
	Hawaii Buried in Backslope		SHEET:
	Test No. HBIB-9		11 of 35
Midwest Roadside Safety Facility	(with Cap)		DATE:
	Anchor Block Assembly		10/01/2025
DWG. NAME:	SCALE: 1:32	DRAWN BY:	
HBIB-9wCap_R4	UNITS: in.	JJO/TJC/MS	
		REV. BY:	
		KAL/CSS	



PLAN VIEW



ELEVATION VIEW



DETAIL O
SCALE 1 : 12

Notes: Modify anchor block drilling holes as shown for pinning of anchor cap.



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope

Test No. HBIB-9
(with Cap)

Anchor block details

DWG. NAME.
HBIB-9wCap_R4

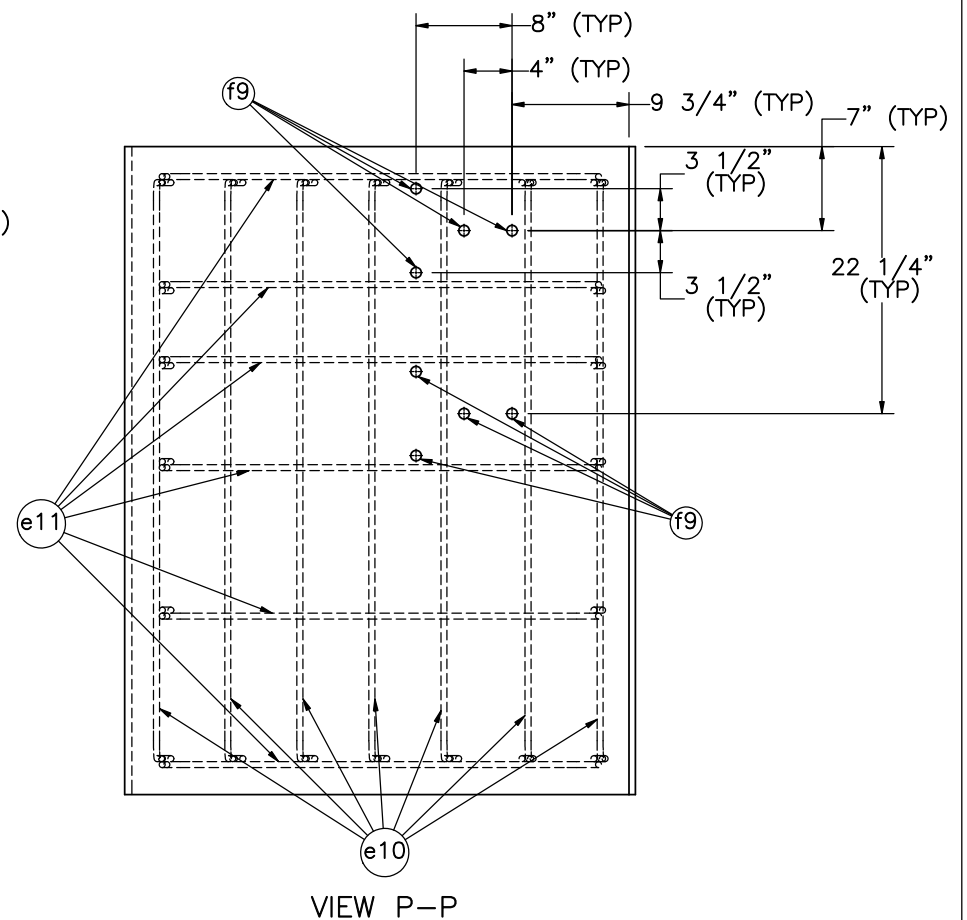
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UNITS: in.

SHEET:
12 of 35

DATE:
10/01/2025

DRAWN BY:
JJO/TJC/MS
W

REV. BY:
KAL/CSS



Note: Epoxy install Part e1 into holes drilled in Anchor Block using a chemical epoxy adhesive with a minimum bond strength of 1,450 psi.

Bill of Bars					
Bar	QTY	Size	Length	Material	Treatment
e9	22	#4	17"	ASTM A615 Gr. 60	Eposy Coated (ASTM A775 or A934)
e10	7	#4	67"	ASTM A615 Gr. 60	Eposy Coated (ASTM A775 or A934)
e11	6	#4	54 3/4"	ASTM A615 Gr. 60	Eposy Coated (ASTM A775 or A934)



Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Anchor Cap with Rebar

DWG. NAME.	HBIB-9wCap_R4
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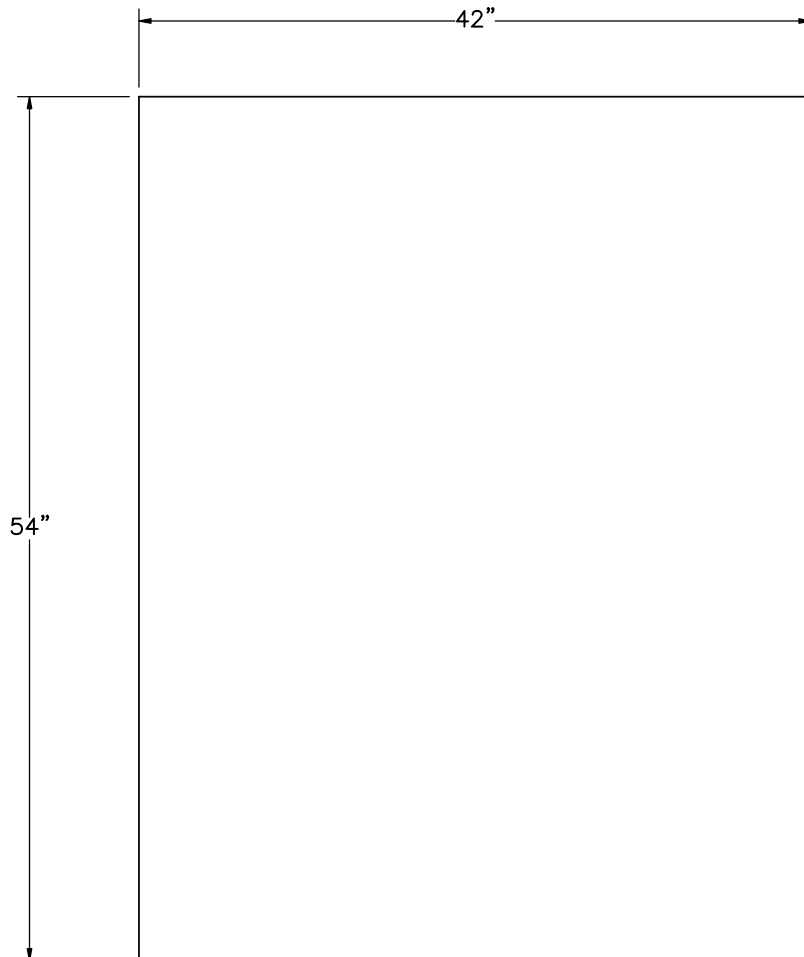
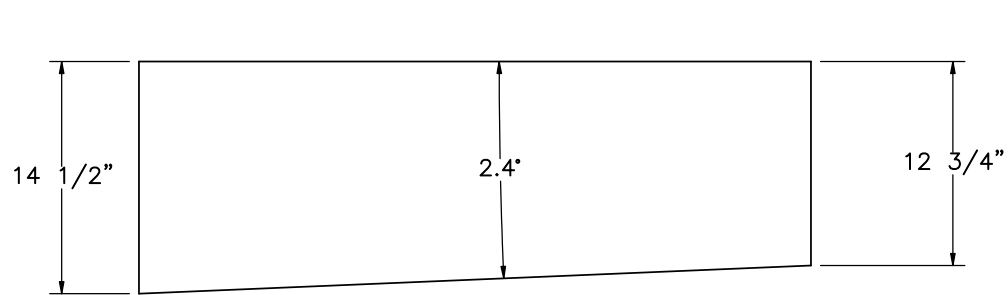
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SHEET:
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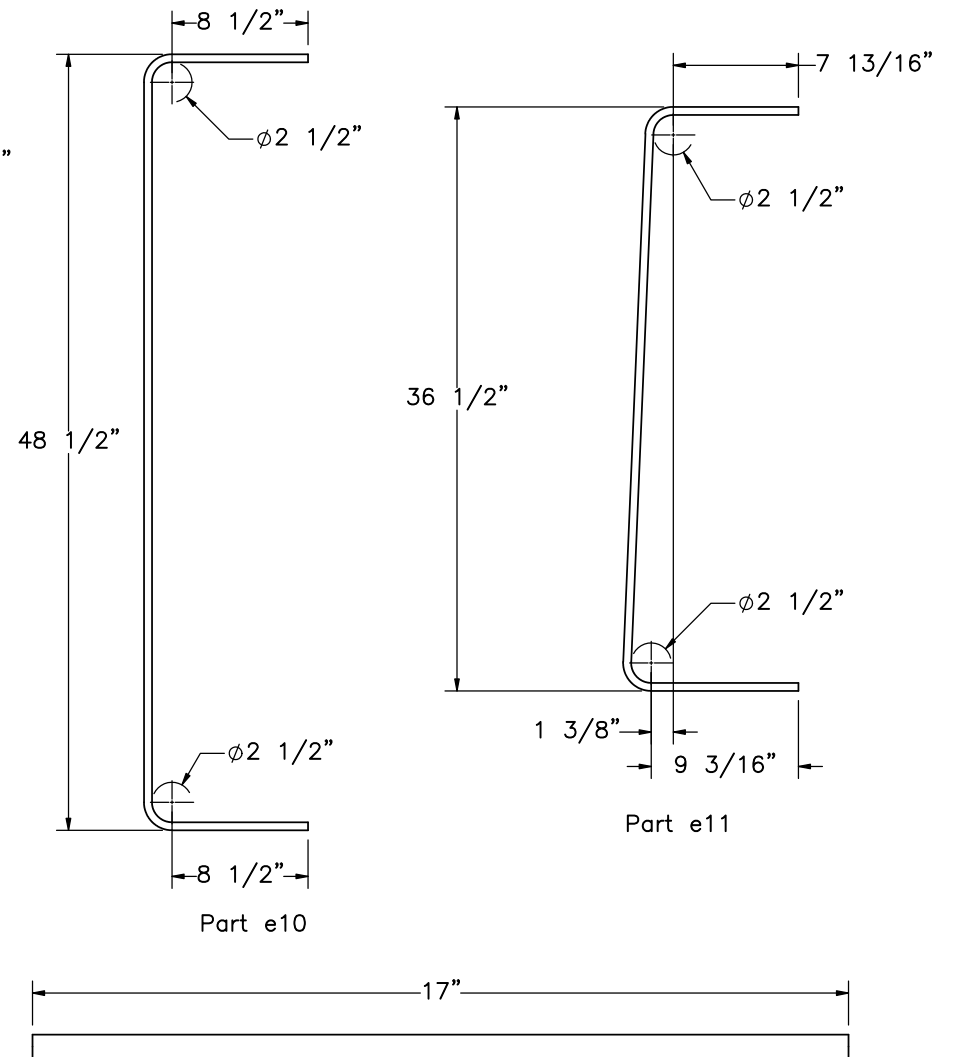
DATE:	10/01/2025
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DRAWN BY:
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W

REV. BY:	
KAL/CSS	



Part b2



Part e9
Scale 1:4



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Anchor Cap and Rebar details

DWG. NAME.
HBIB-9wCap_R4

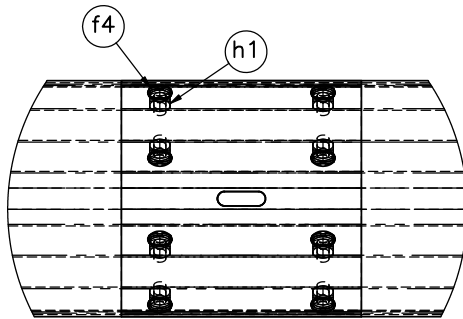
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SHEET:
14 of 35

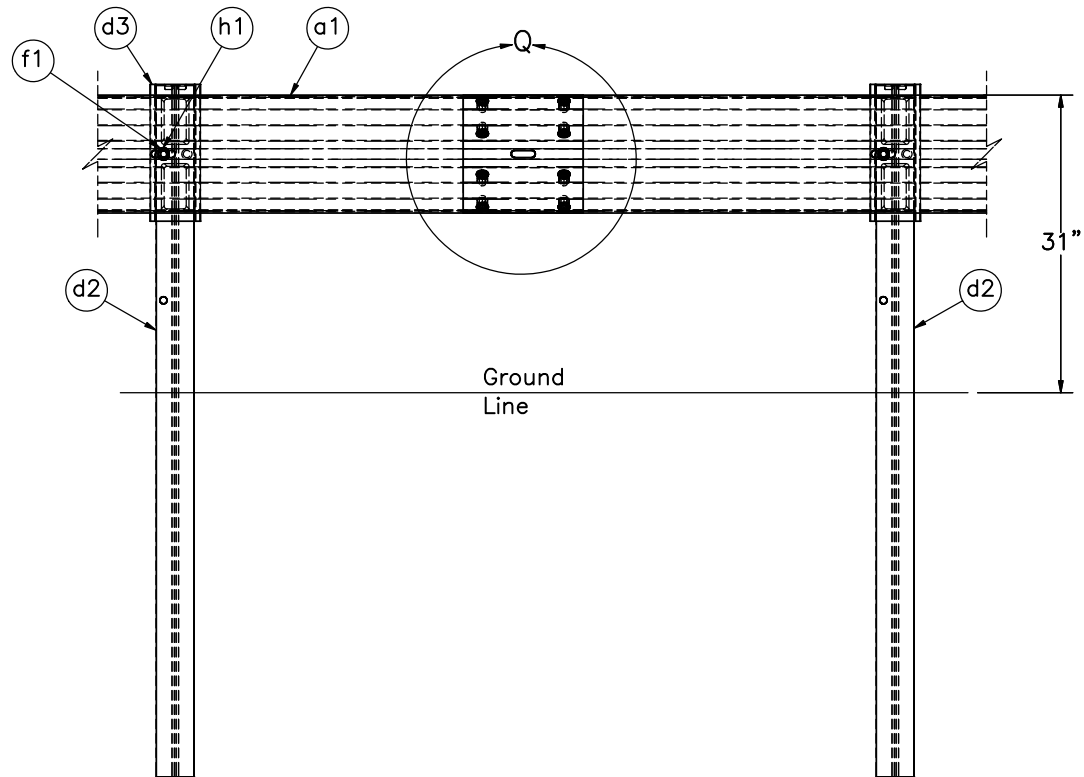
DATE:
10/01/2025

DRAWN BY:
JJQ/TJC/MS
W

REV. BY:
KAL/CSS



DETAIL Q
SCALE 1 : 10



Post no. 38

Post no. 37

Note:

- (1) Guardrail bolts (part f1) on the upstream side of the web.
- (2) Guardrail bolts (part f4) may be used in place of guardrail bolts (part f3) in nested W-beam splices if the nut can be fully threaded (dependent on thickness of stacked guardrail layers).
- (3) All rail splices should be lapped in accordance with traffic flow from lower post numbers to higher post numbers.



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Splice Detail

DWG. NAME.
HBIB-9wCap_R4

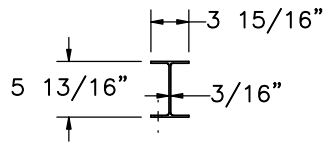
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SHEET:
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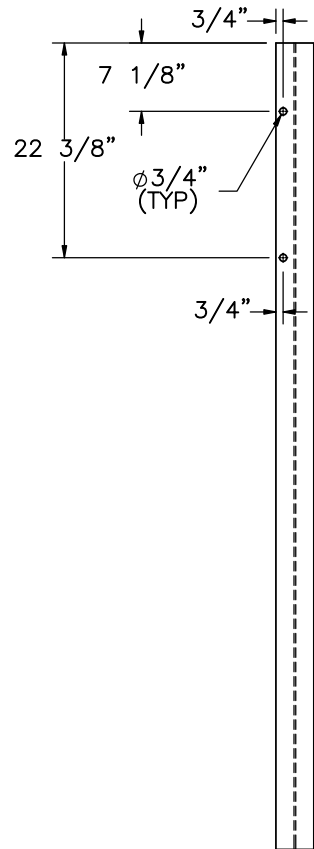
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10/01/2025

DRAWN BY:
JJO/TJC/MS
W

REV. BY:
KAL/CSS

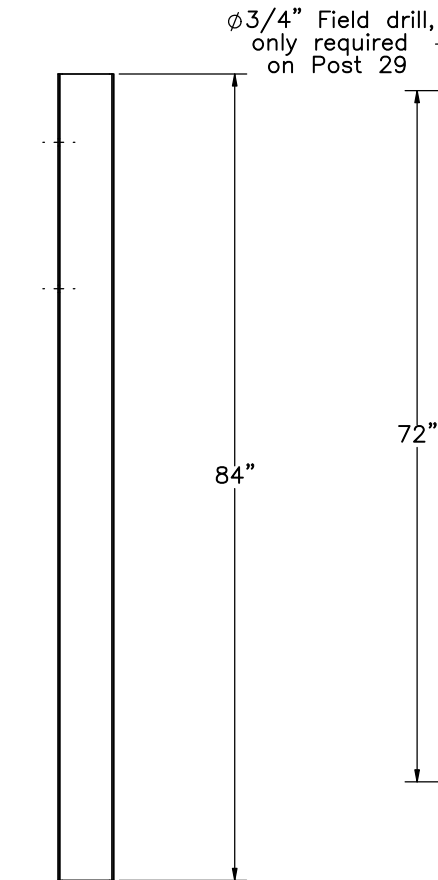


PLAN VIEW

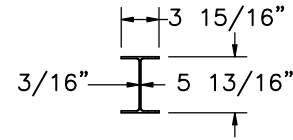


ELEVATION VIEW

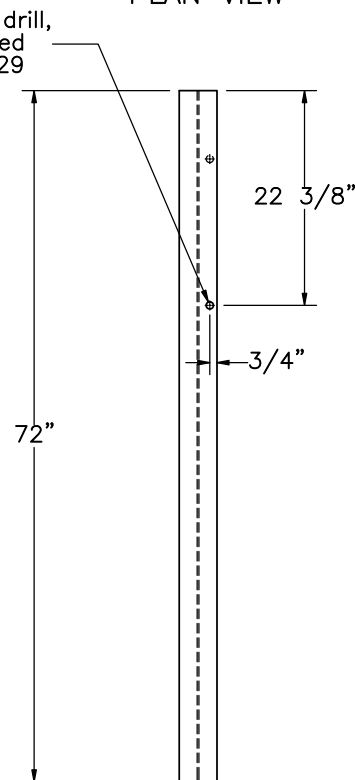
Part d1



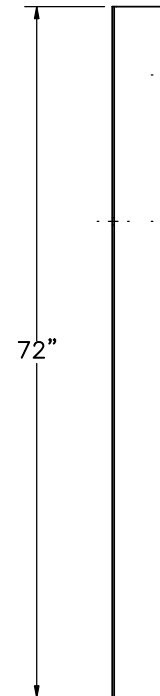
PROFILE VIEW



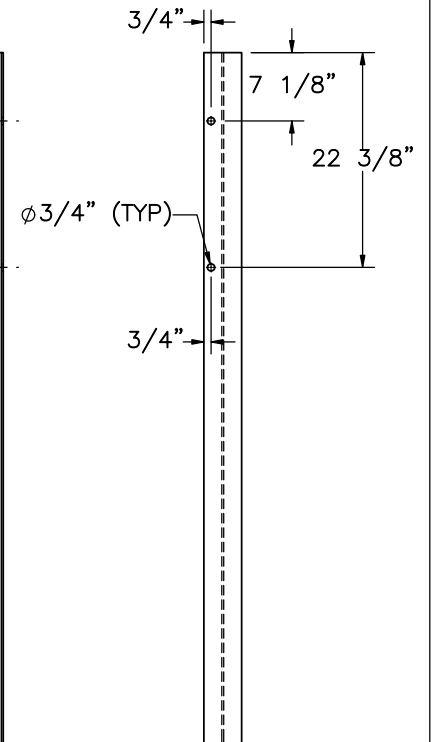
PLAN VIEW



REAR VIEW



PROFILE VIEW
Part d2



ELEVATION VIEW



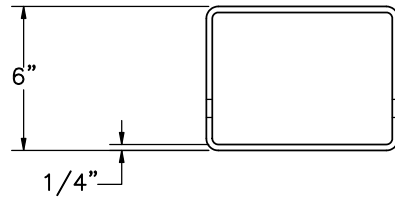
Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Post Components

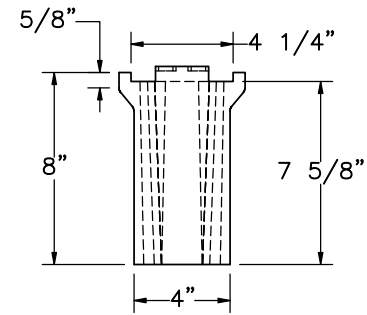
DWG. NAME.
HBIB-9wCap_R4

SCALE: 1:20
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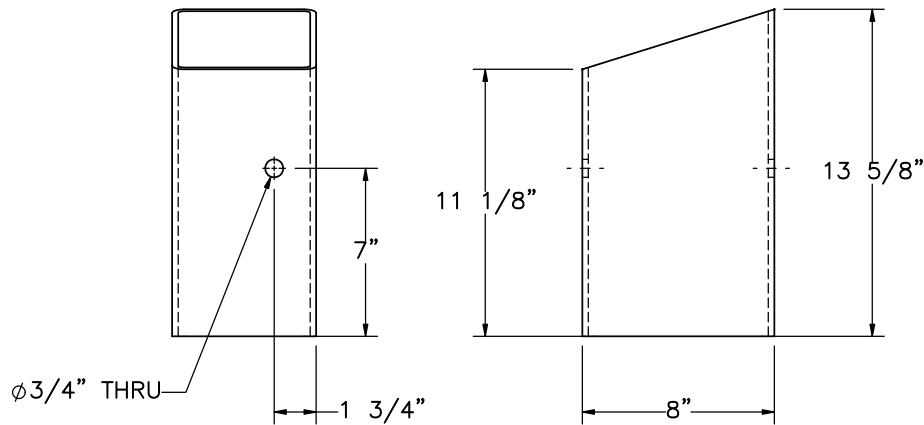
SHEET:
16 of 35
DATE:
10/01/2025
DRAWN BY:
JJQ/TJC/MS
W
REV. BY:
KAL/CSS



PLAN VIEW



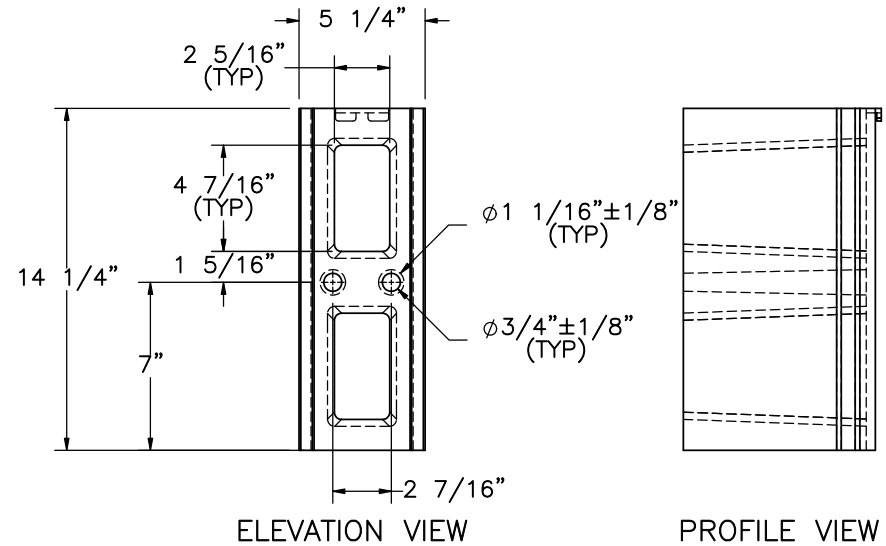
PLAN VIEW



ELEVATION VIEW

PROFILE VIEW

Part d4



ELEVATION VIEW

PROFILE VIEW

Part d3



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Tapered Blockout Details

DWG. NAME.
HBIB-9wCap_R4

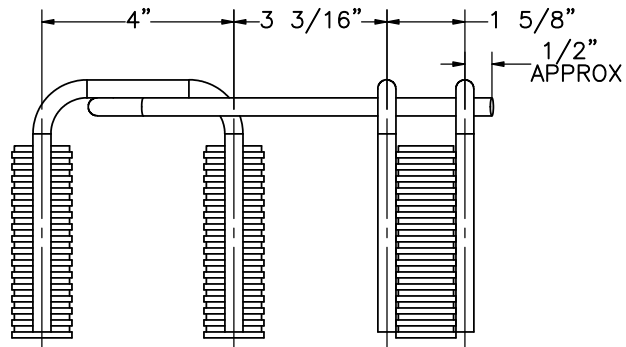
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UNITS: in.

SHEET:
17 of 35

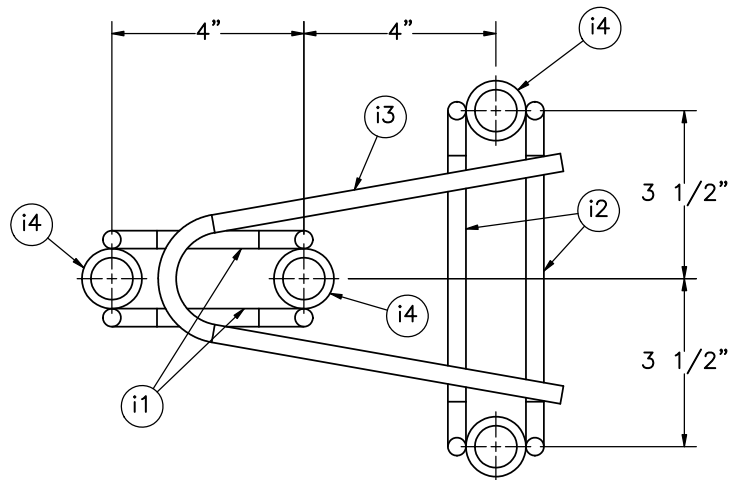
DATE:
10/01/2025

DRAWN BY:
JJQ/TJC/MS
W

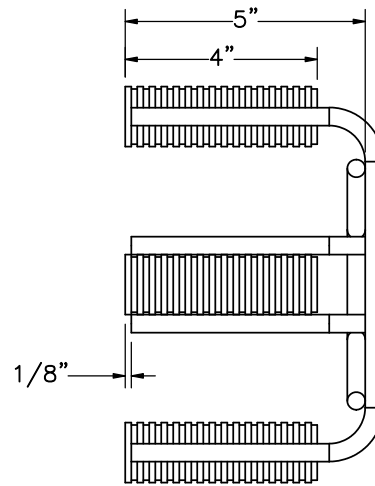
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KAL/CSS



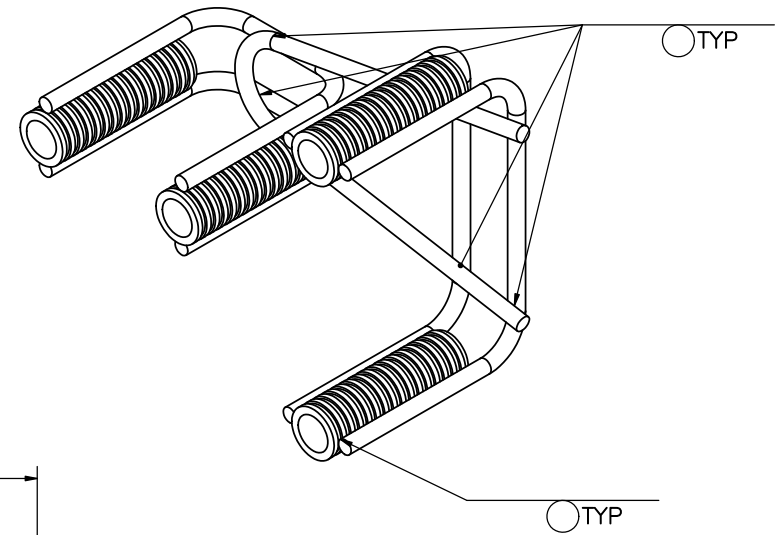
PLAN VIEW



ELEVATION VIEW



PROFILE VIEW



Note:

- (1) Ferrule and threaded fasteners shown for connection to concrete anchor block. Alternative anchorages may include cast or post-installed threaded rods or bolts. Details of alternative anchor blocks not shown here.
- (2) See BOM for threaded rod information.

Item No.	QTY.	Description	Material Specification	Treatment Specification
—	2	Concrete Anchor	—	—
i1	2	3/8" Dia. Wire Strut, 13 3/8" Long Unbent	Min. Tensile Strength = 100,000 psi	AASHTO M111
i2	2	3/8" Dia. Wire Strut, 16 3/8" Long Unbent	Min. Tensile Strength = 100,000 psi	AASHTO M111
i3	1	3/8" Dia. Wire Strut, 18" Long Unbent	Min. Tensile Strength = 100,000 psi	AASHTO M111
i4	4	7/8 Dia. Threaded Ferrule	—	—



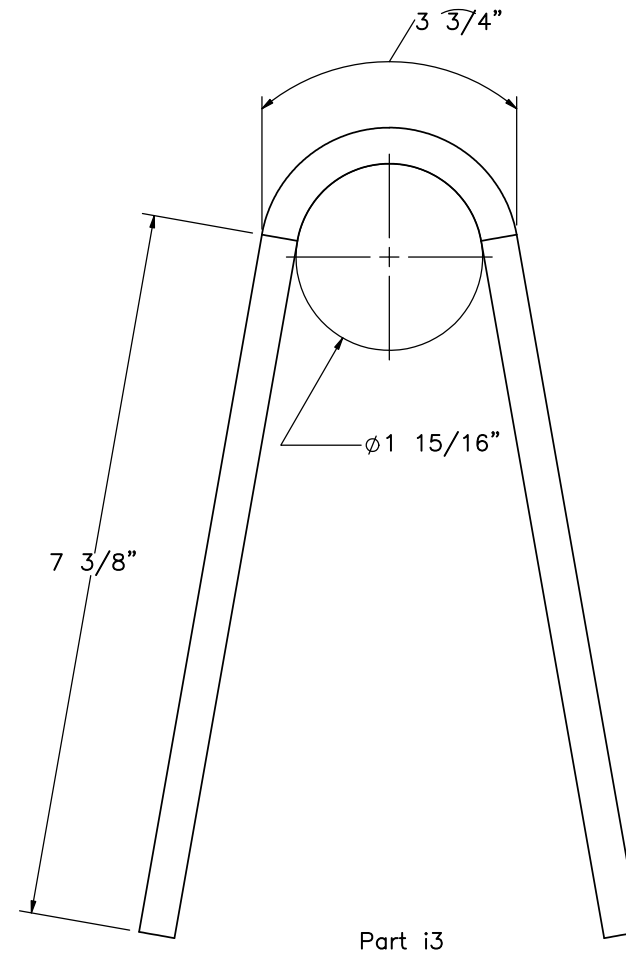
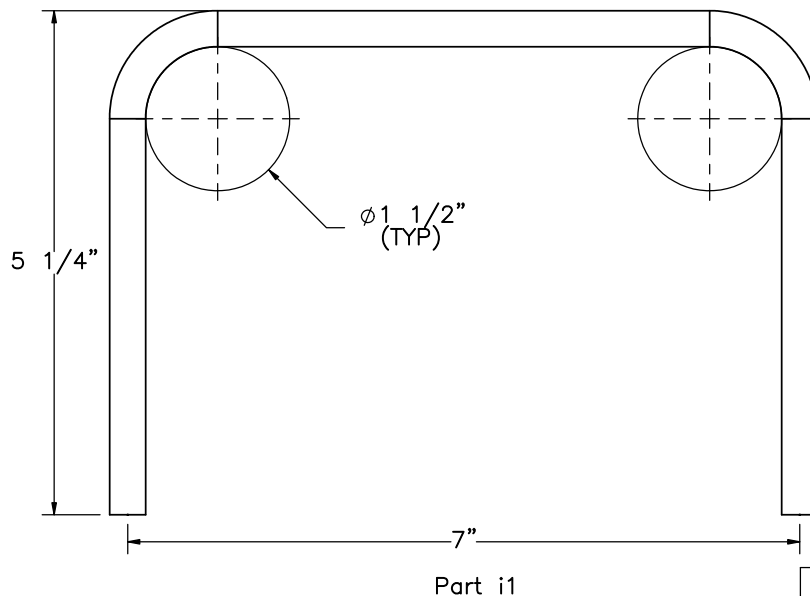
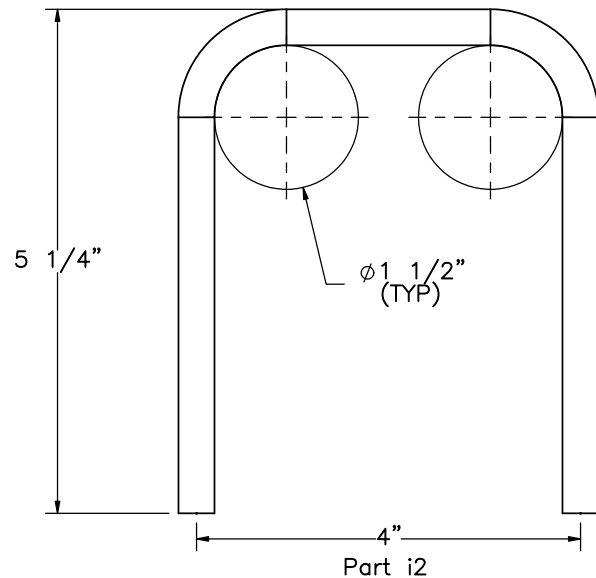
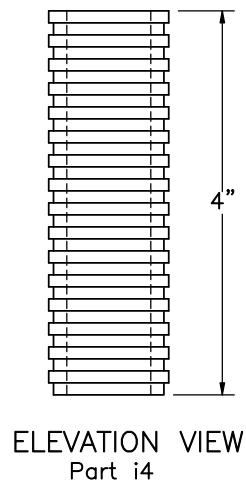
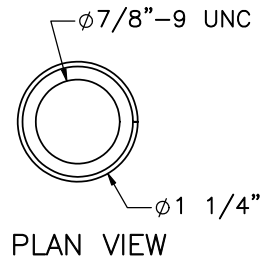
Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)
Concrete Anchor Block Insert
Assembly

DWG. NAME:
HBIB-9wCap_R4

SCALE: 1:4
UNITS: in.

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DATE:
10/01/2025
DRAWN BY:
JJQ/TJC/MS
W
REV. BY:
KAL/CSS



Bill of Bars					
Bar	QTY (Per Anchor)	Bar Size	Length	Material	Treatment
i1	2	#3	13 3/8"	Min. Tensile Strength = 100,000 psi	AASHTO M111
i2	2	#3	16 3/8"	Min. Tensile Strength = 100,000 psi	AASHTO M111
i3	1	#3	18"	Min. Tensile Strength = 100,000 psi	AASHTO M111



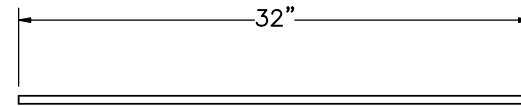
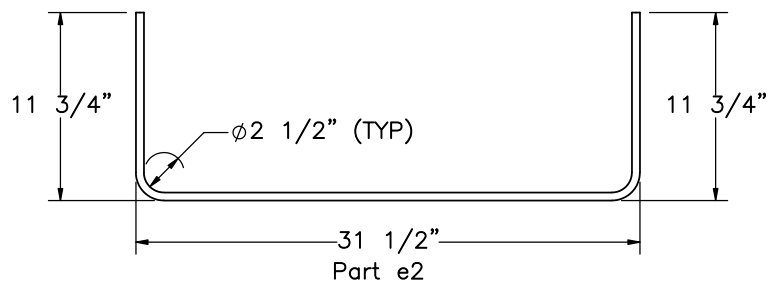
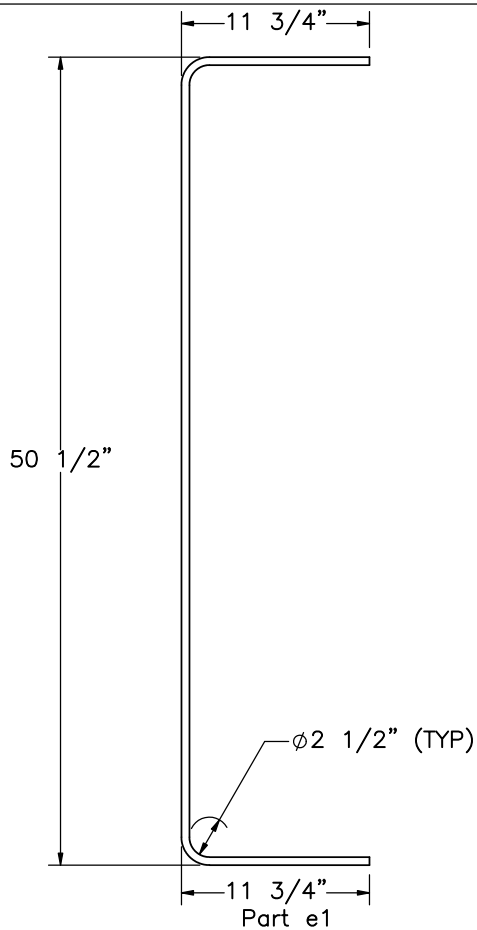
Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Insert Component Details

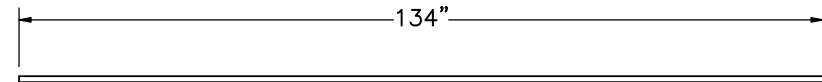
DWG. NAME:
HBIB-9wCap_R4

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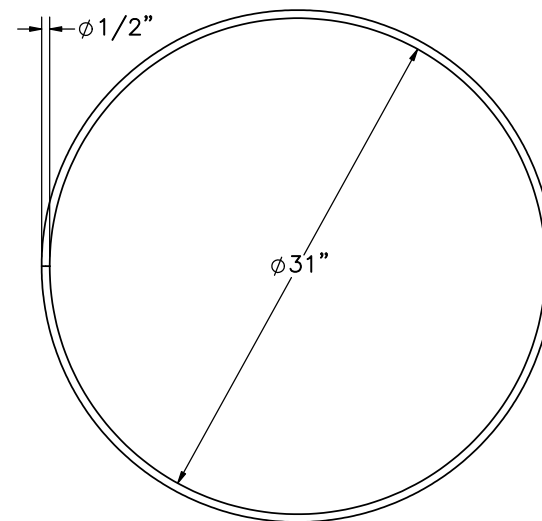
SHEET:
19 of 35
DATE:
10/01/2025
DRAWN BY:
JJQ/TJC/MS
W
REV. BY:
KAL/CSS



Part e3



Part e4



Part e5

Bill of Bars

Bar	QTY	Size	Length	Material	Treatment
e1	14	#4	72"	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)
e2	12	#4	53"	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)
e3	23	#4	32"	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)
e4	12	#8	134"	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)
e5	23	#4	99"	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)



Midwest Roadside
Safety Facility

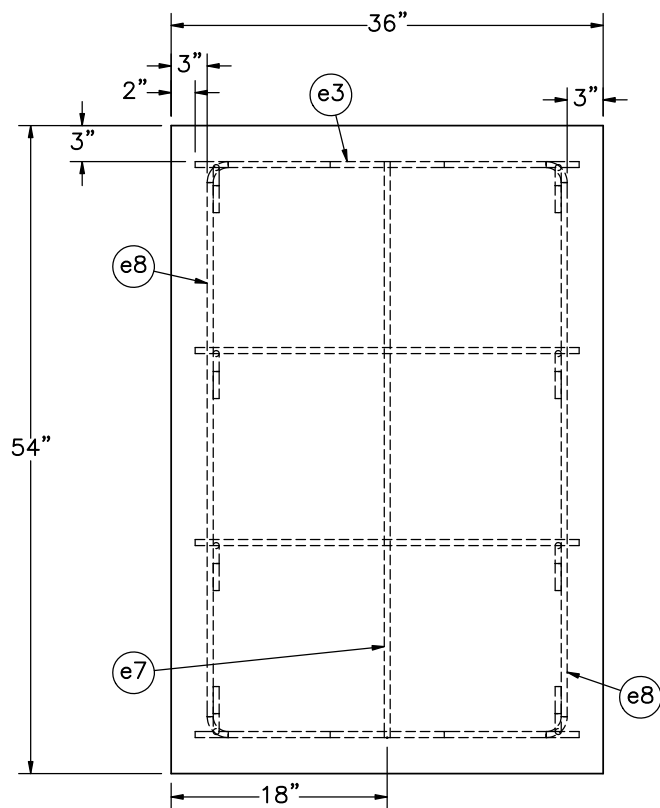
Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Anchor Block Rebar Details

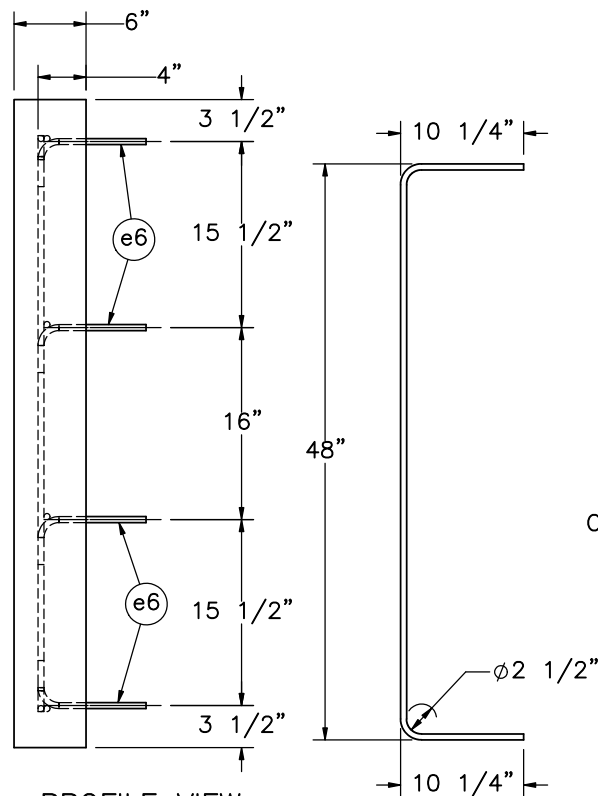
DWG. NAME:
HBIB-9wCap_R4

SCALE: 1:12
UNITS: in.

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10/01/2025
DRAWN BY:
JJQ/TJC/MS
W
REV. BY:
KAL/CSS

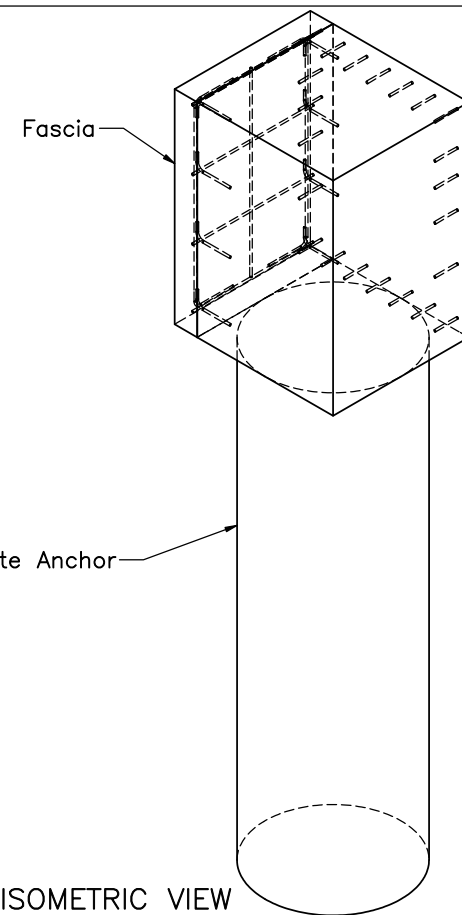


ELEVATION VIEW



PROFILE VIEW

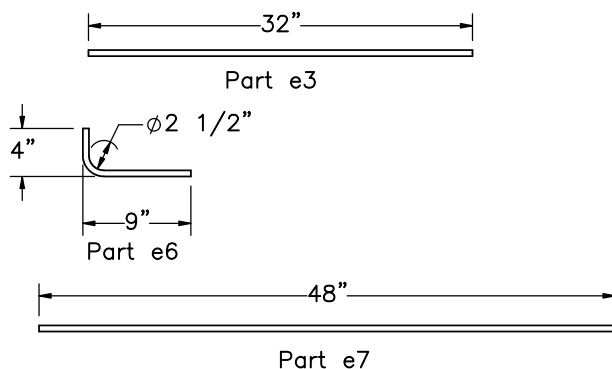
Part e8



ISOMETRIC VIEW

Notes:

- (1) Hawaii DOT typically utilizes an aesthetic stone-faced exterior of the anchor block, which will be represented by a 6" thick fascia, which is to be added to the upstream surface of the concrete anchor block. The fascia can be normal strength concrete anchored to the anchor block with minimum steel reinforcement to represent the lateral supported grouted rubble paving. The installation procedure should be followed. Remove forms from the concrete anchor and drill holes in the anchor block. Install epoxied rebar as shown. Apply Fascia then backfill and compact soil.
- (2) Optional: the 6" fascia can be included in the anchor block and cast as one unit for testing purposes.



Bill of Bars					
Bar	QTY	Size	Length	Material	Treatment
e3	4	#4	32"	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)
e6	8	#4	12"	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)
e7	1	#4	48"	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)
e8	2	#4	67"	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)



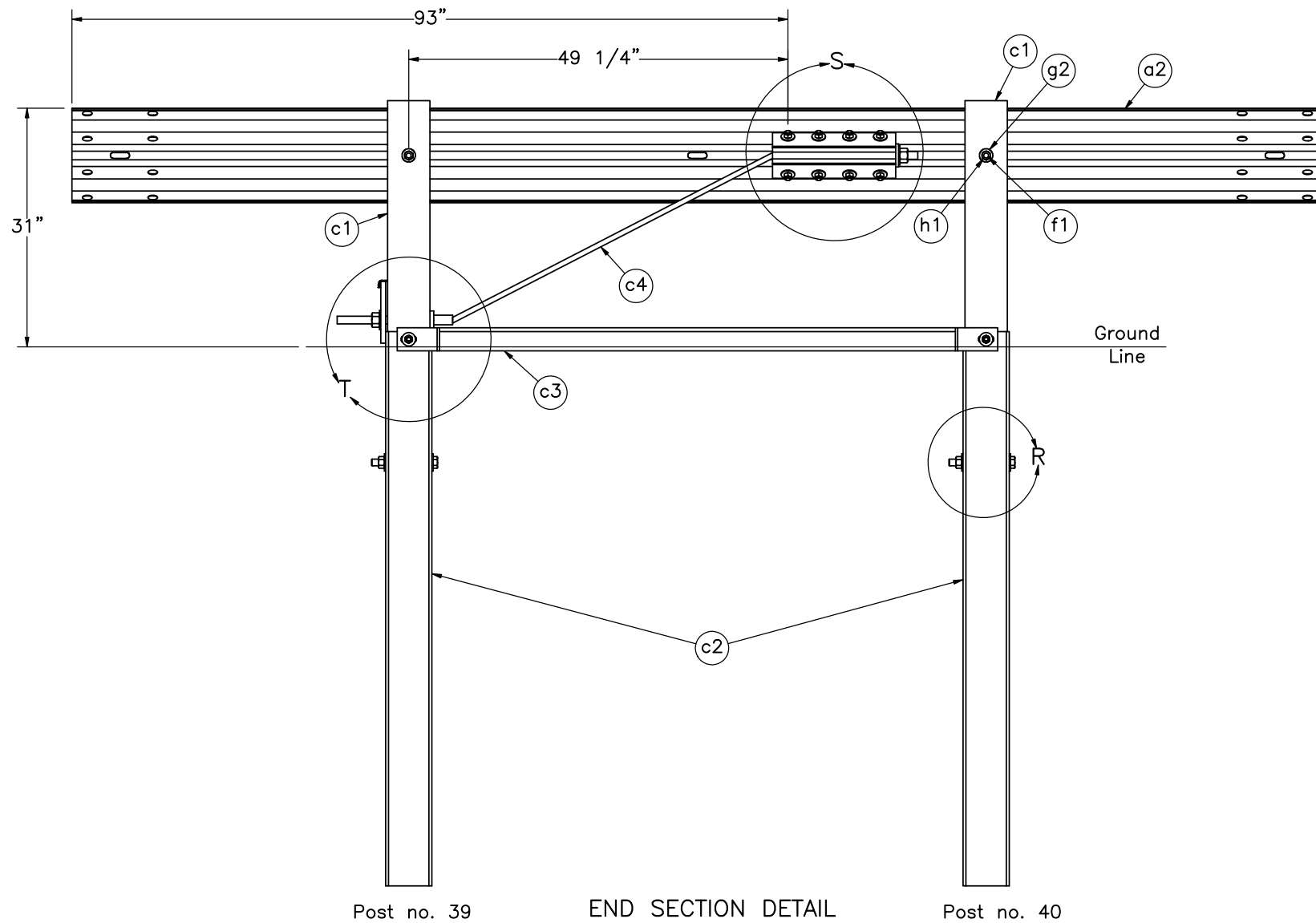
Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Fascia Installation

DWG. NAME.
HBIB-9wCap_R4

SCALE: 1:16
UNITS: in.

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DATE:
10/01/2025
DRAWN BY:
JJO/TJC/MS
W
REV. BY:
KAL/CSS



END SECTION DETAIL
BACKSIDE



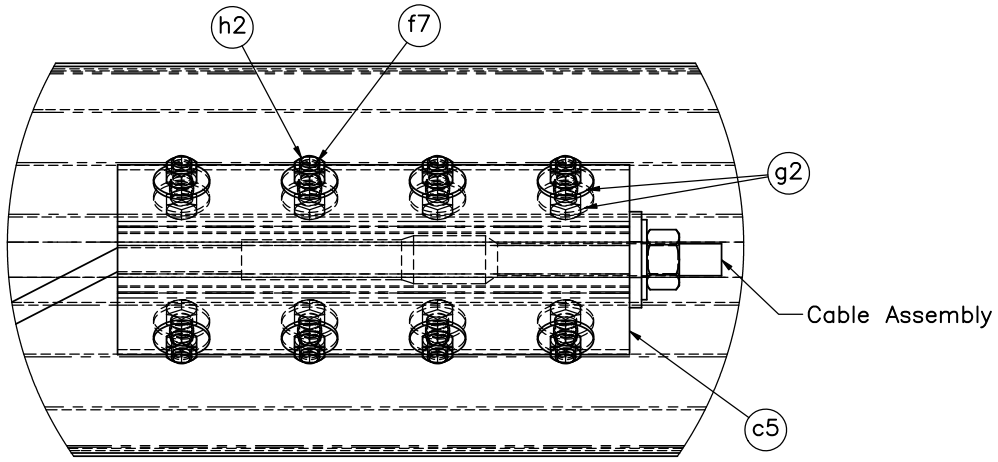
Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

End Section Detail

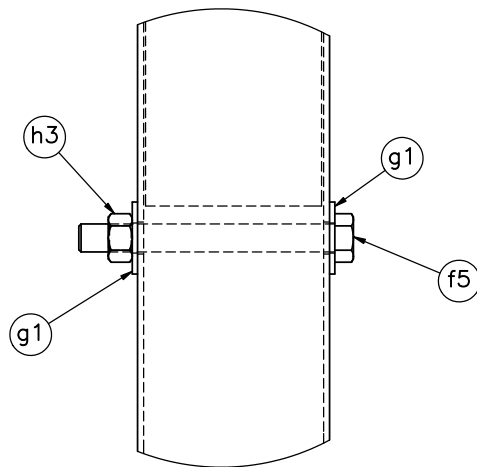
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HBIB-9wCap_R4

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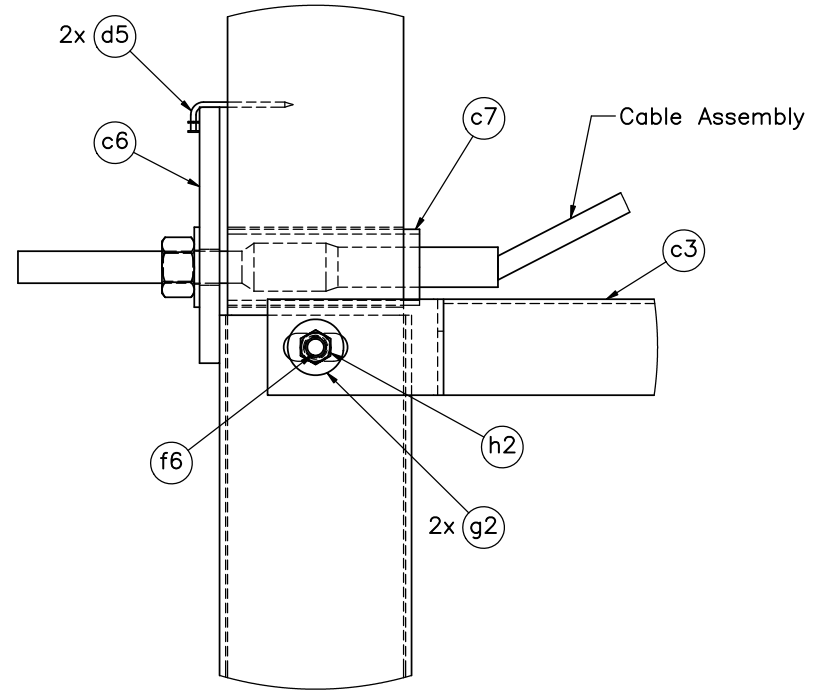
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10/01/2025
DRAWN BY:
JJO/TJC/MS
W
REV. BY:
KAL/CSS



DETAIL S



DETAIL R



DETAIL T



Midwest Roadside
Safety Facility

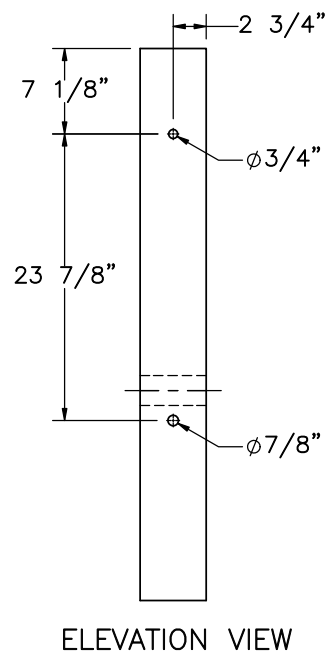
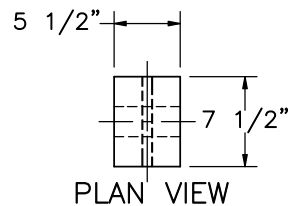
Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

BCT Anchor Details

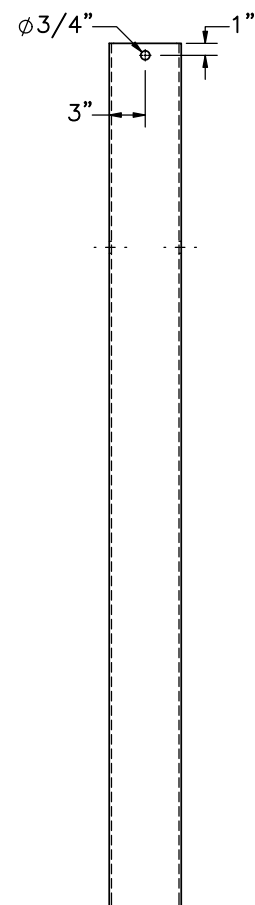
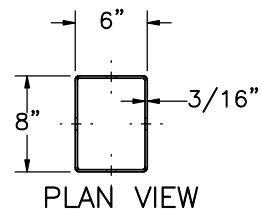
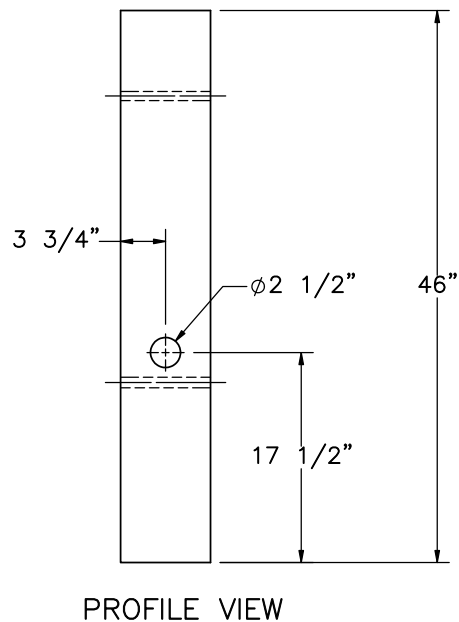
DWG. NAME.
HBIB-9wCap_R4

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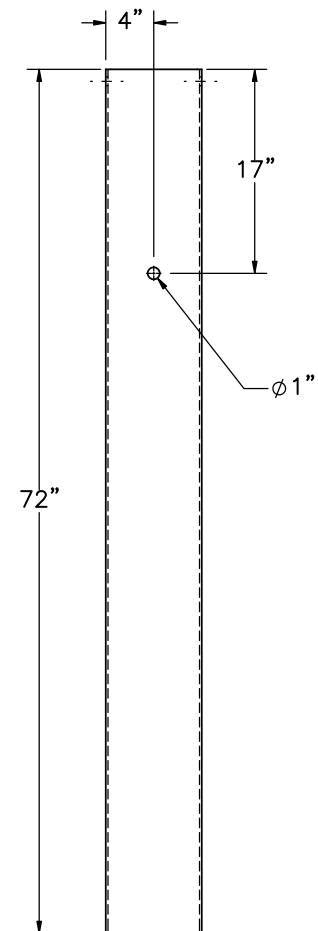
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DATE:
10/01/2025
DRAWN BY:
JJQ/TJC/MS
W
REV. BY:
KAL/CSS



Part c1



Part c2



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

BCT Timber Post and
Foundation Tube Details

DWG. NAME.
HBIB-9wCap_R4

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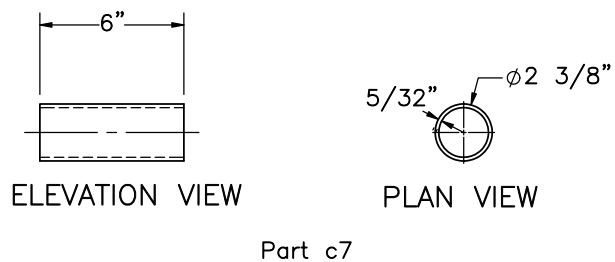
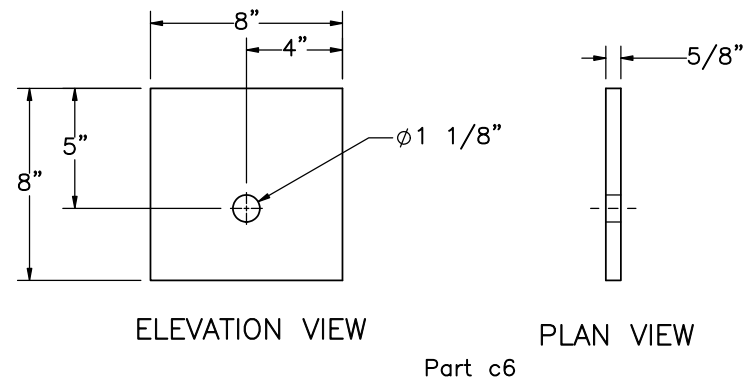
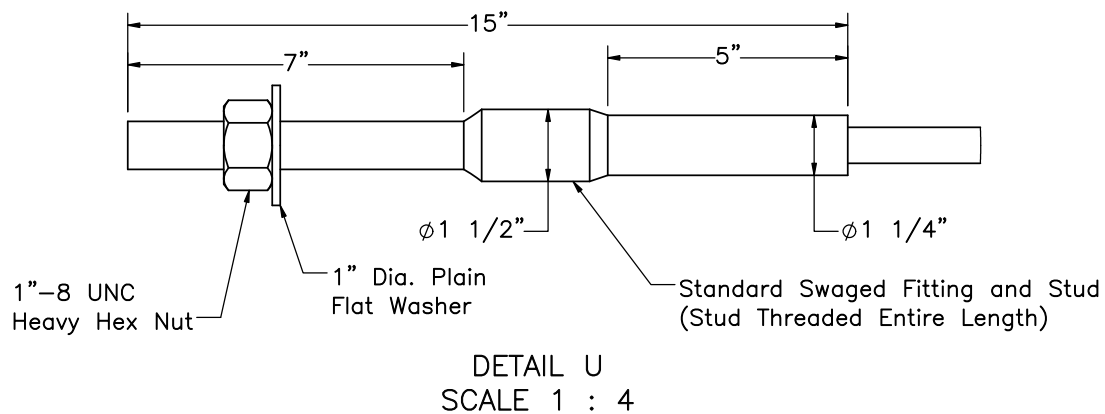
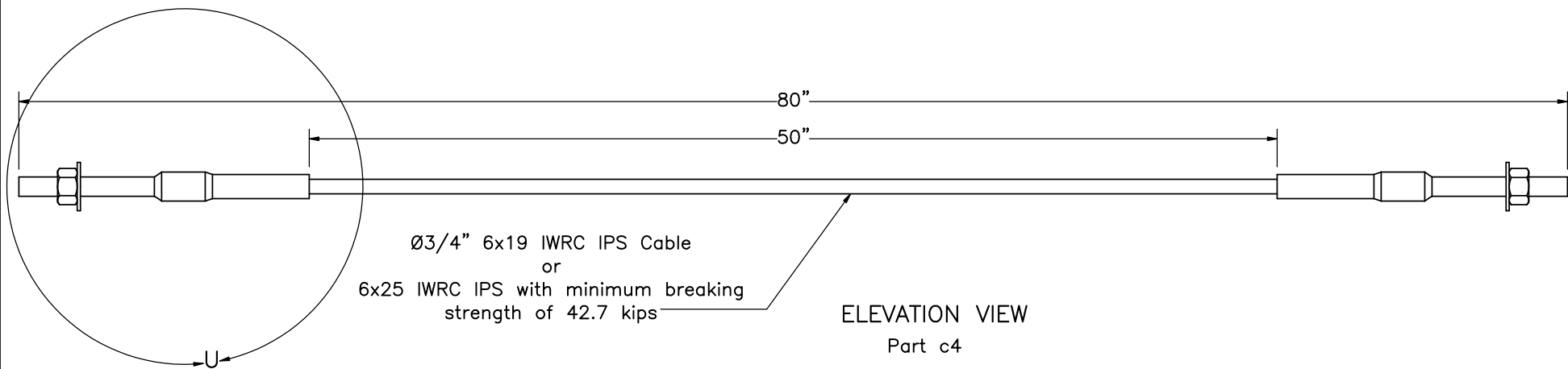
SHEET:
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DATE:
10/01/2025

DRAWN BY:
JJQ/TJC/MS
W

REV. BY:
KAL/CSS

	Hawaii Buried in Backslope Test No. HBIB-9 (with Cap)		SHEET: 25 of 35
	Ground Strut Details		DATE: 10/01/2021
Midwest Roadside Safety Facility	DWG. NAME: HBIB-9wCap_R4		DRAWN BY: JJO/TJC/MSW
	SCALE: 1:16 UNITS: in.		REV. BY: KAL/CSS



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

BCT Anchor Cable

DWG. NAME.
HBIB-9wCap_R4

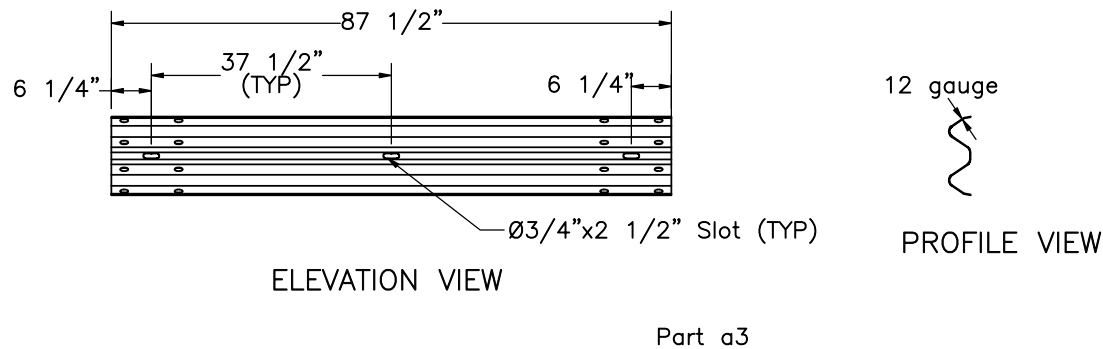
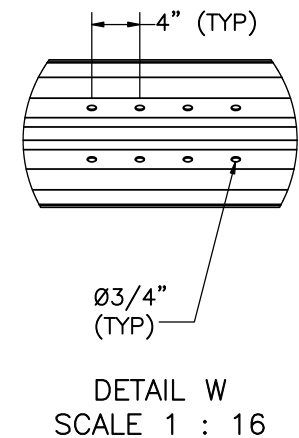
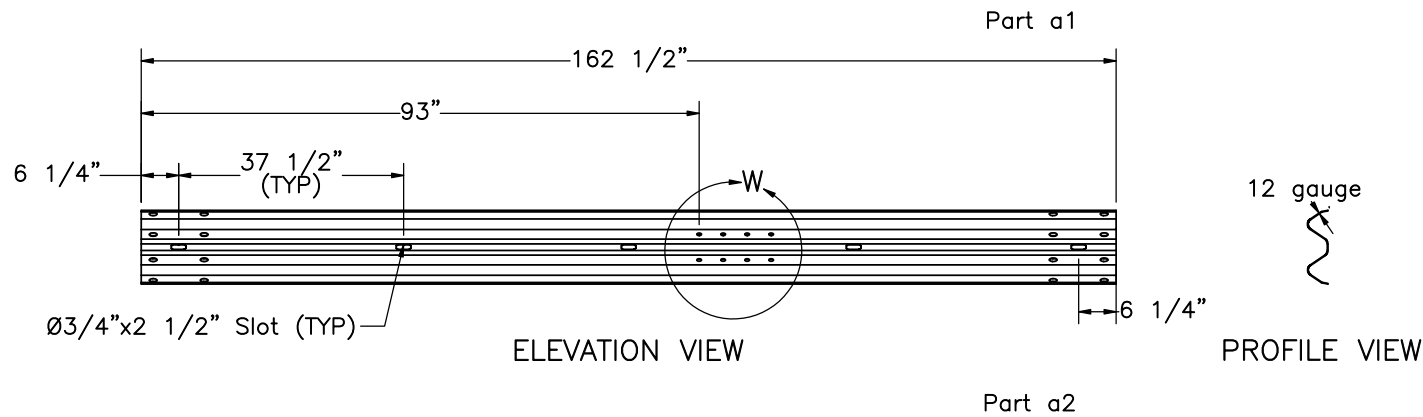
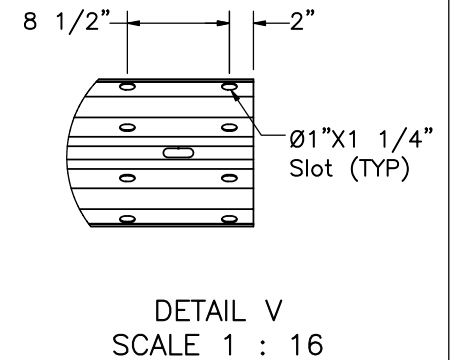
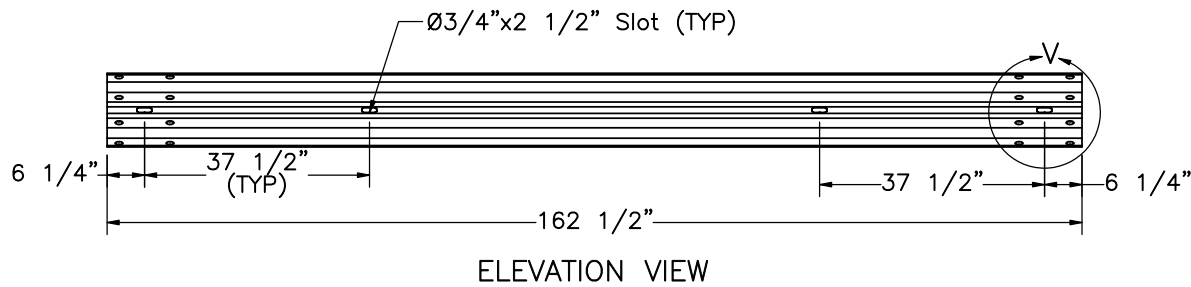
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SHEET:
26 of 35

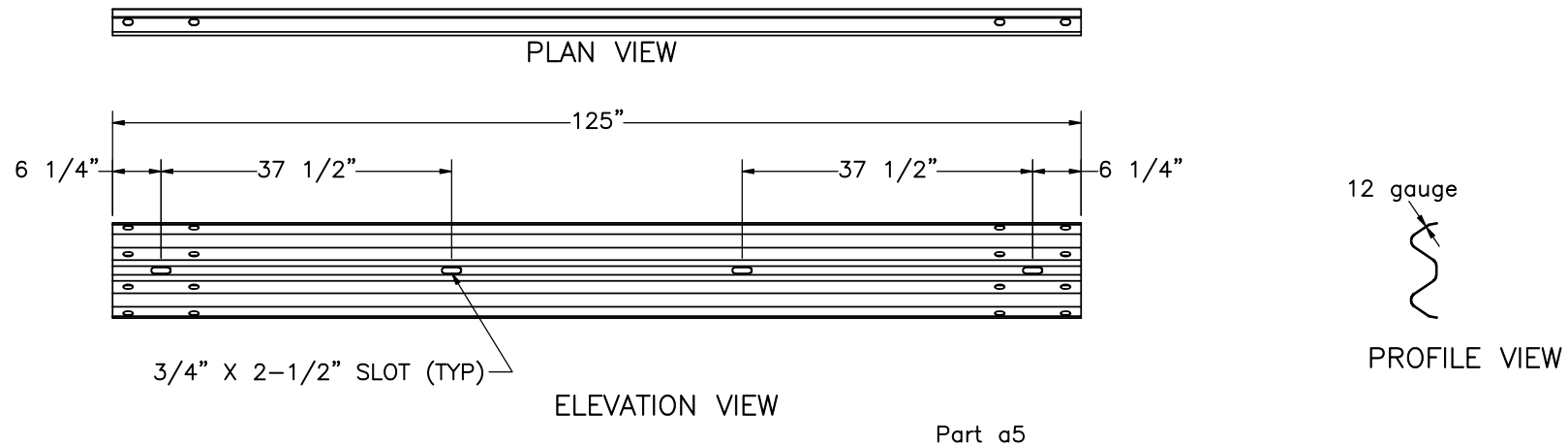
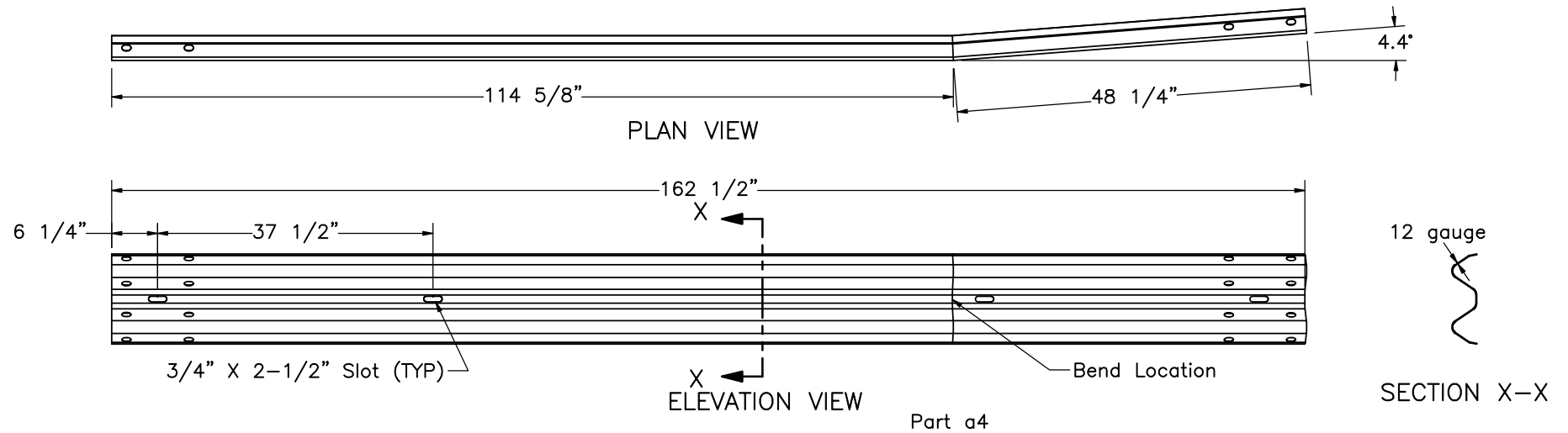
DATE:
10/01/2025

DRAWN BY:
JJQ/TJC/MS
W

REV. BY:
KAL/CSS



 Midwest Roadside Safety Facility	Hawaii Buried in Backslope Test No. HBIB-9 (with Cap)		SHEET: 27 of 35
	Guardrail Section Details		DATE: 10/01/2025
DWG. NAME: HBIB-9wCap_R4	SCALE: 1:30 UNITS: in.	DRAWN BY: JJQ/TJC/MS W REV. BY: KAL/CSS	



Midwest Roadside
Safety Facility

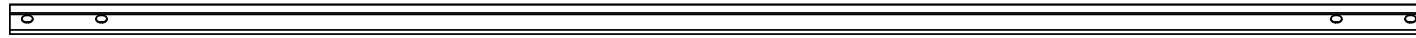
Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Guardrail Section Details

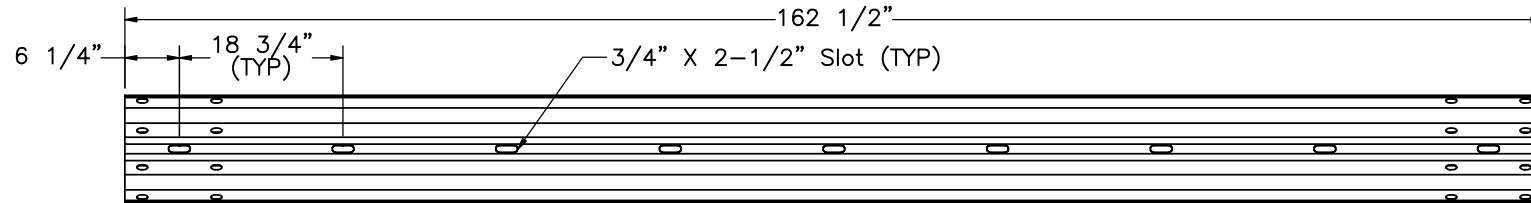
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HBIB-9wCap_R4

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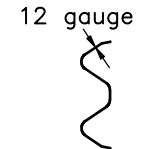
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10/01/2025
DRAWN BY:
JJG/TJC/MS
W
REV. BY:
KAL/CSS



PLAN VIEW

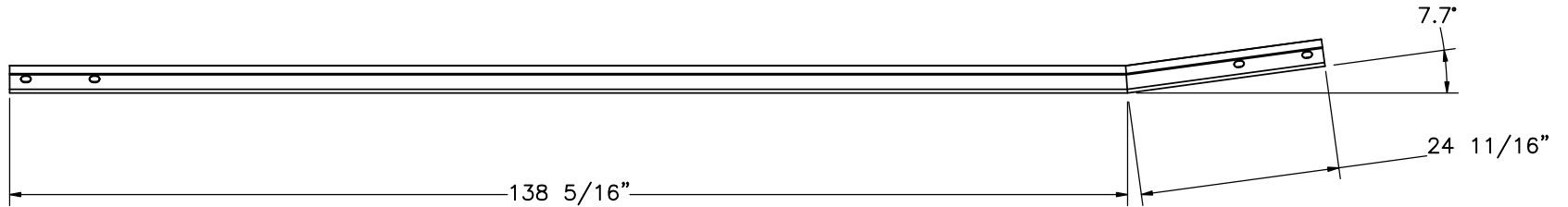


ELEVATION VIEW

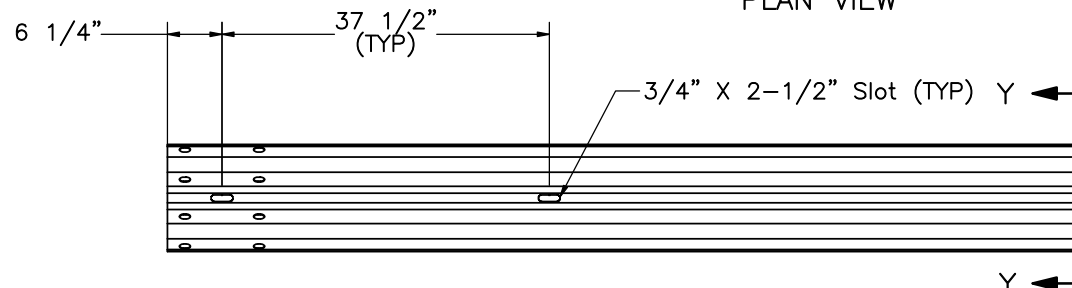


PROFILE VIEW

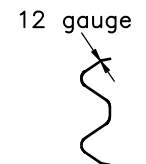
Part a6



PLAN VIEW



ELEVATION VIEW



SECTION Y-Y
PROFILE VIEW

Part a8

Bend Location



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

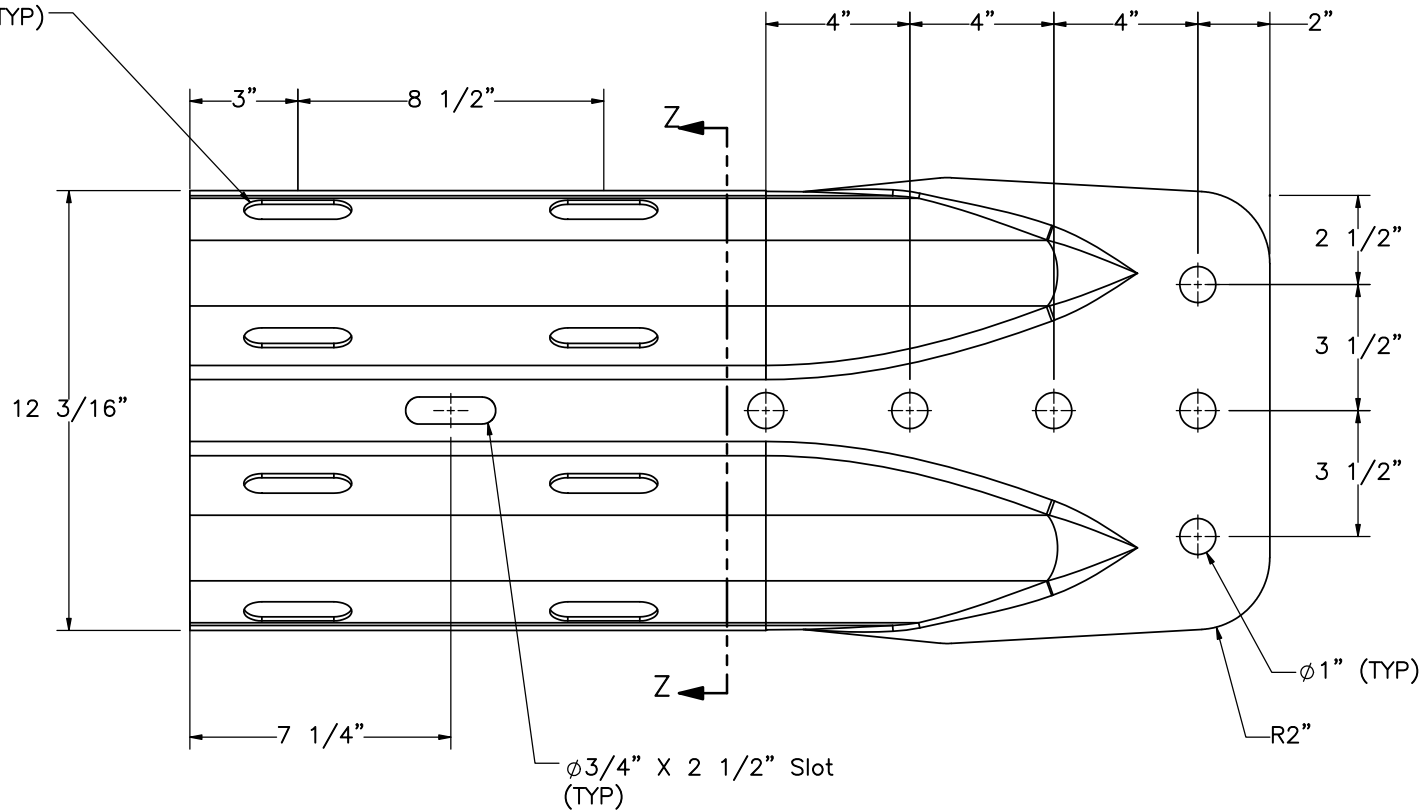
Guardrail Section Details

DWG. NAME.
HBIB-9wCap_R4

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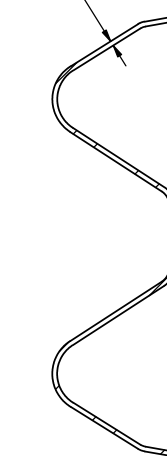
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DRAWN BY:
JJQ/TJC/MS
W
REV. BY:
KAL/CSS

ø1" X 3" Slot
(TYP)



ELEVATION VIEW

10 gauge



SECTION Z-Z

Part a7



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Terminal Connector Details

DWG. NAME.
HBIB-9wCap_R4

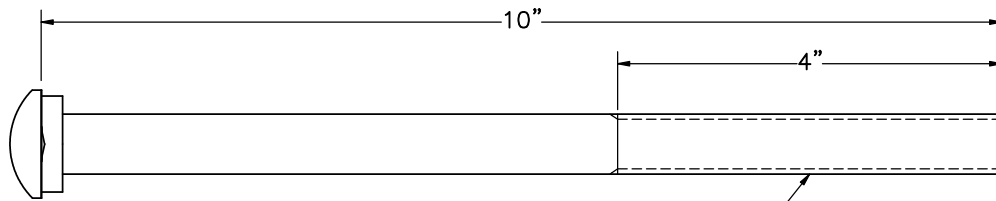
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SHEET:
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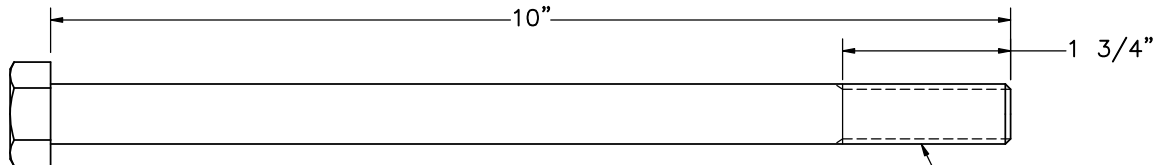
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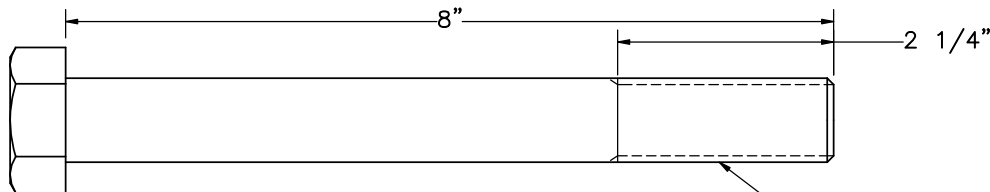
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KAL/CSS



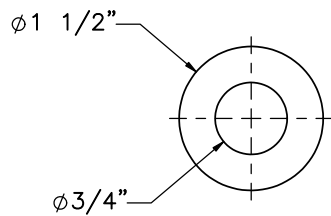
ELEVATION VIEW
Part f1



ELEVATION VIEW
Part f6

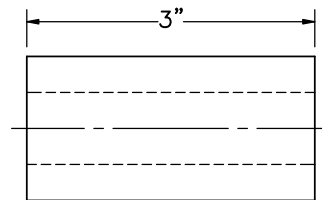


ELEVATION VIEW
Part f5

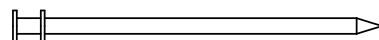


ELEVATION VIEW

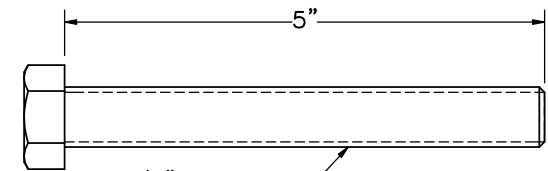
Part f8



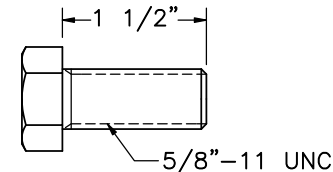
PROFILE VIEW



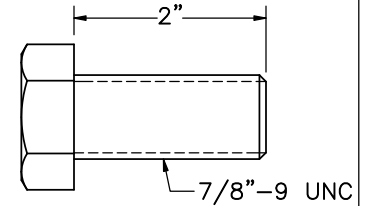
Part d5



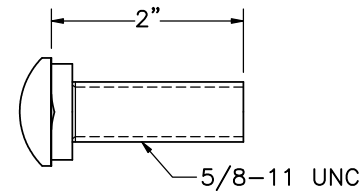
5/8"-11 UNC
ELEVATION VIEW
Part f2



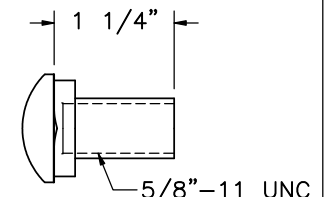
ELEVATION VIEW
Part f7



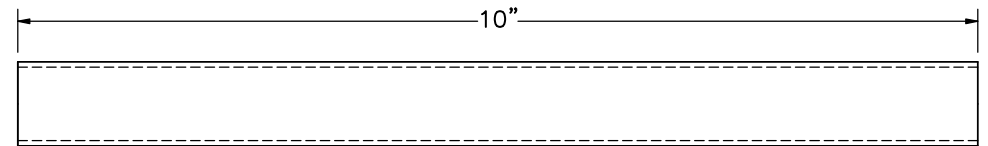
ELEVATION VIEW
Part f6



ELEVATION VIEW
Part f3



ELEVATION VIEW
Part f4



Part f9

7/8"-9 UNC



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Hardware

DWG. NAME.
HBIB-9wCap_R4

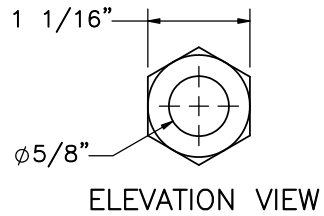
SCALE: 1:2
UNITS: in.

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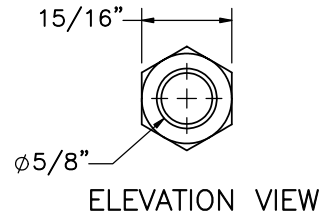
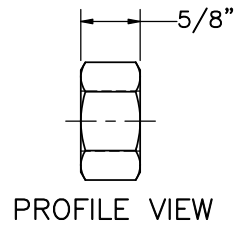
DATE:
10/01/2025

DRAWN BY:
JJQ/TJC/MS
W

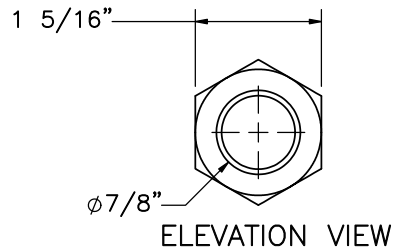
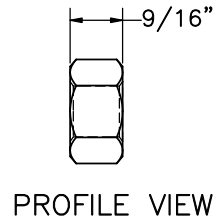
REV. BY:
KAL/CSS



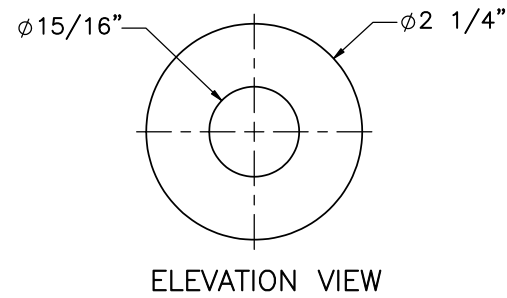
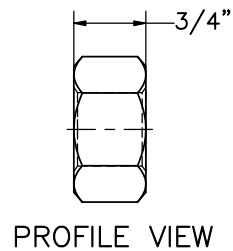
Part h1



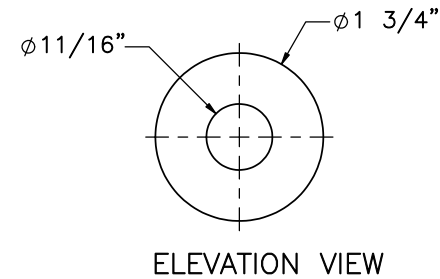
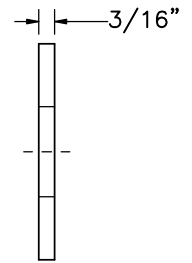
Part h2



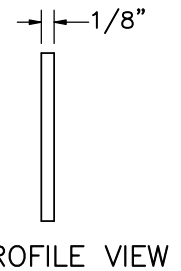
Part h3



Part g1



Part g2



Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Hardware

DWG. NAME:
HBIB-9wCap_R4

SCALE: 1:2
UNITS: in.

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10/01/2025
DRAWN BY:
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W
REV. BY:
KAL/CSS

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
a1	22	12'-6" 12-gauge W-Beam MGS Section	AASHTO M180	ASTM A123 or A653	RWM04a
a2	1	12'-6" 12-gauge W-Beam MGS End Section	AASHTO M180	ASTM A123 or A653	RWM14a
a3	1	6'-3" 12-gauge W-Beam Section	AASHTO M180	ASTM A123 or A653	RWM01b
a4	1	12'-6" 12-gauge Bent W-Beam [4.4 deg]	AASHTO M180	ASTM A123 or A653	—
a5	2	9'-4 1/2" 12-gauge W-Beam	AASHTO M180	ASTM A123 or A653	—
a6	4	12'-6" 12-gauge W-Beam Section — 1/4 Post Spacing	AASHTO M180	ASTM A123 or A653	RWM04a
a7	2	W-Beam Terminal Connector	AASHTO M180	ASTM A123 or A653	RWE02b
a8	1	12'-6" 12-gauge Bent W-Beam [7.7 deg]	AASHTO M180	ASTM A123 or A653	—
b1	1	3'x3' Concrete Anchor Block	Min. f'c = 4,000 psi	—	—
b2	1	Anchor Cap	Min. f'c = 4,000 psi	—	—
c1	2	BCT Timber Post — MGS Height	SYP Grd No. 1 or better (No knots +/- 18" from ground on tension face)	—	PDF01
c2	2	72" Long Foundation Tube	ASTM A500 Gr. B	ASTM A123	PTE06
c3	1	Ground Strut Assembly	ASTM A36	ASTM A123	PFP02
c4	2	BCT Anchor Cable Assembly with Heavy Hex Nuts and Washers	Fitting—ASTM A576 Gr. 1035 Stud—ASTM F568 Class C	Fitting—ASTM A153 Cable, Nut, Washer & Stud—ASTM A153 or B695	FCA01
c5	1	Ground Anchor Bracket Assembly	ASTM A36	ASTM A123	FPA01
c6	1	8"x8"x5/8" Anchor Bearing Plate	ASTM A36	ASTM A123	FPB01
c7	1	2 3/8" O.D. 6" Long BCT Post Sleeve	ASTM A53 Gr. B Schedule 40	ASTM A123	FMM02
d1	27	W6x8.5 or W6x9, 84" Long Steel Post	ASTM A992 Gr. 50	ASTM A123	PWE06
d2	11	W6x8.5 or W6x9, 72" Long Steel Post	ASTM A992 Gr. 50	ASTM A123	PWE06
d3	38	Composite Recycled Blockout	Mondo Polymer GB14SH2 or Equivalent	—	—
d4	27	13 5/8" Long, 8"x6"x1/4" Steel Blockout	ASTM A500 Gr. B	*ASTM A123	—
d5	2	16D Double Head Nail	—	—	—
					Hawaii Buried in Backslope Test No. HBIB-9 (with Cap)
					Bill of Materials DWG. NAME: HBIB-9wCap_R4
			SCALE: None UNITS: in.		SHEET: 33 of 35 DATE: 10/01/2025 DRAWN BY: JJO/TJC/MSW REV. BY: KAL/CSS

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
e1	14	72" Unbent Length #4 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
e2	12	53" Unbent Length #4 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
e3	27	32" Long #4 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
e4	12	134" Long #8 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
e5	23	99" Unbent Length #4 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
e6	8	12" Long Unbent #4 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
e7	1	48" Long #4 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
e8	2	67" Unbent Length #4 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
e9	22	17" Long #4 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
e10	7	67" Unbent Length #4 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
e11	6	54 3/4" Unbent Length #4 Rebar	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)	—
f1	67	5/8" Dia. UNC, 10" Long Guardrail Bolt	ASTM A307 Gr. A	ASTM A153 or B695 Class 55 or F2329	FBB03
f2	1	5/8 Dia, UNC, 5" Long Hex Head Bolt	ASTM A459 Gr. 5 or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX16a
f3	1	5/8" Dia. UNC, 2" Long Guardrail Bolt	ASTM A307 Gr. A	ASTM A153 or B695 Class 55 or F2329	FBB01
f4	240	5/8" Dia. UNC, 1 1/4" Long Guardrail Bolt	ASTM A307 Gr. A	ASTM A153 or B695 Class 55 or F2329	FBB01
f5	2	7/8" Dia. UNC, 8" Long Hex Head Bolt	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX22a
f6	2	5/8" Dia. UNC, 10" Long Hex Head Bolt	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX16a
f7	8	5/8" Dia. UNC, 1 1/2" Long Hex Head Bolt	ASTM A307 Gr. A or equivalent	ASTM A153 or B695 Class 55 or F2329	FBX16a
f8	1	3/4 Dia, Unthreaded Spacer Sleeve	ASTM A53 Gr. B	ASTM A123	FMM03—04
f9	8	7/8" Dia. 9 UNC, 10" Long Fully Threaded Rod	ASTM A307 Gr. A or Equivalent	ASTM A153 or B695 Class 55 or F2329	—



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB—9
(with Cap)

Bill of Materials

DWG. NAME.
HBIB—9wCap_R4

SCALE: None
UNITS: in.

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DRAWN BY:
JJO/TJC/MS
W
REV. BY:
KAL/CSS

Item No.	QTY.	Description	Material Specification	Treatment Specification	Hardware Guide
g1	12	7/8" Dia. Plain Round Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC20a
g2	22	5/8" Dia. Plain Round Washer	ASTM F844	ASTM A123 or A153 or F2329	FWC16a
h1	308	5/8" Dia. UNC Heavy Hex Nut	ASTM A563A or equivalent	ASTM A153 (AASHTO M232) for Class C or ASTM B695 (AASHTO M298) for Class 50	FNX16b
h2	11	5/8" Dia. Hex Nut	ASTM A563A	ASTM A153 (AASHTO M232) for Class C or ASTM B695 (AASHTO M298) for Class 50	FNX16a
h3	10	7/8" Dia. UNC Hex Nut	ASTM A307A or equivalent	ASTM A153 (AASHTO M232) for Class C or ASTM B695 (AASHTO M298) for Class 50	—
* i1	4	3/8" Dia. Wire Strut, 13 3/8" Long Unbent	Min. Tensile Strength = 100,000 psi	AASHTO M111	
* i2	4	3/8" Dia. Wire Strut, 16 3/8" Long Unbent	Min. Tensile Strength = 100,000 psi	AASHTO M111	—
* i3	2	3/8" Dia. Wire Strut, 18" Long Unbent	Min. Tensile Strength = 100,000 psi	AASHTO M111	—
* i4	8	7/8 Dia. Threaded Ferrule	—	—	—
k2	1	Fascia	Min. f'c = 4,000 psi	—	—
—	—	Soil	—	—	—

* Components not required if optional anchor is used.



Midwest Roadside
Safety Facility

Hawaii Buried in Backslope
Test No. HBIB-9
(with Cap)

Bill of Material

DWG. NAME.
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UNITS: in.

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W
REV. BY:
KAL/CSS

REV.	DATE OF ISSUE	Page	NATURE OF CHANGES	REVIEWER	REVISED BY
0	2/10/2024	—	Drawing set created	KAL	JJO
1	3/18/2025	1	Altered note 1 to be test no. 3-37a (69 1/4"). Altered notes on page with vehicle details and dimension details. + altered title block for all pages.	KAL	MSW
2	3/21/2025	3, 8	Made construction surface hidden in views.	KAL/CSS	JJO
		4	Corected "Nested" note location.		
		6	Corected spelling in note 2		
		12	Anchor block details was Anchor block modifications		
		31	Added detail view of double headed nail part d5		
		5,6	Added "Normal Traffic Flow" arrow and note		
3	5/15/2025	30	10 gauge was 12 gauge	KAL/CSS	JJO
		33	W-Beam Terminal Connector hardware guide RWE02b was RWE02a		
4	10/1/2025	BOM	Removed length and width dimensions from description of part d3.	KAL/CSS	JJO