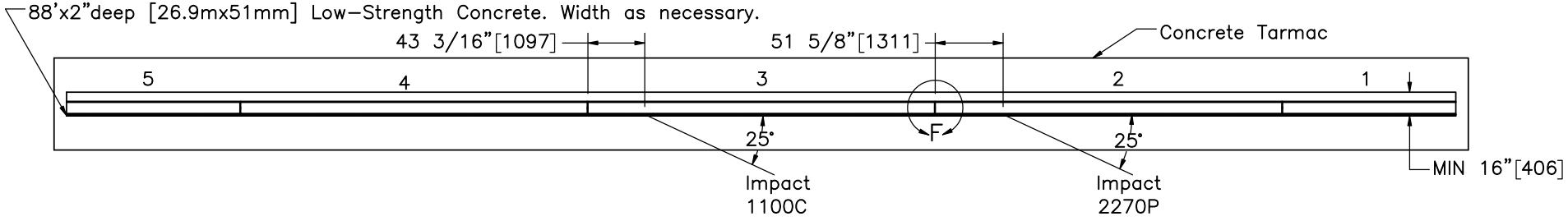
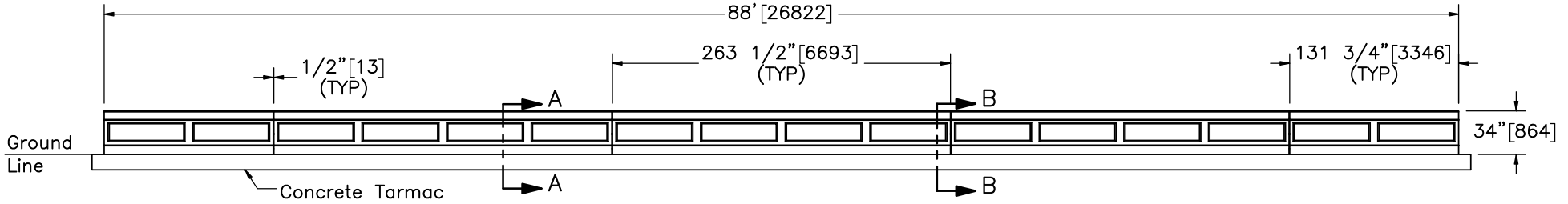
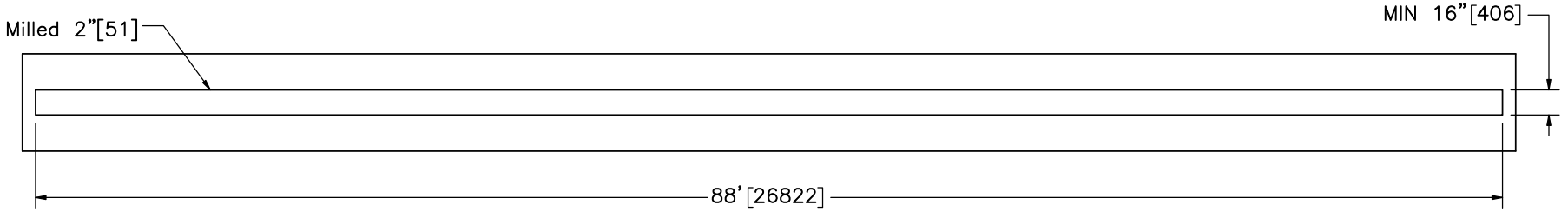


PLAN VIEW



ELEVATION VIEW



Mill and Grout Detail

Notes: (1) Tests shall be performed according to test designation nos. 3-10 and 3-11 of MASH 2016 criteria, respectively.
(2) The impact location for test 1 is 43 3/16" [1097] upstream of the expansion joint between barrier nos. 3 and 4.
(3) The impact location for test 2 is 51 5/8" [1311] upstream of the expansion joint between barrier nos. 2 and 3.
(4) Mill exisitng tarmac surface down 2" [51] in order to accomodate 2" [51] thick concrete pad on front side of barrier.

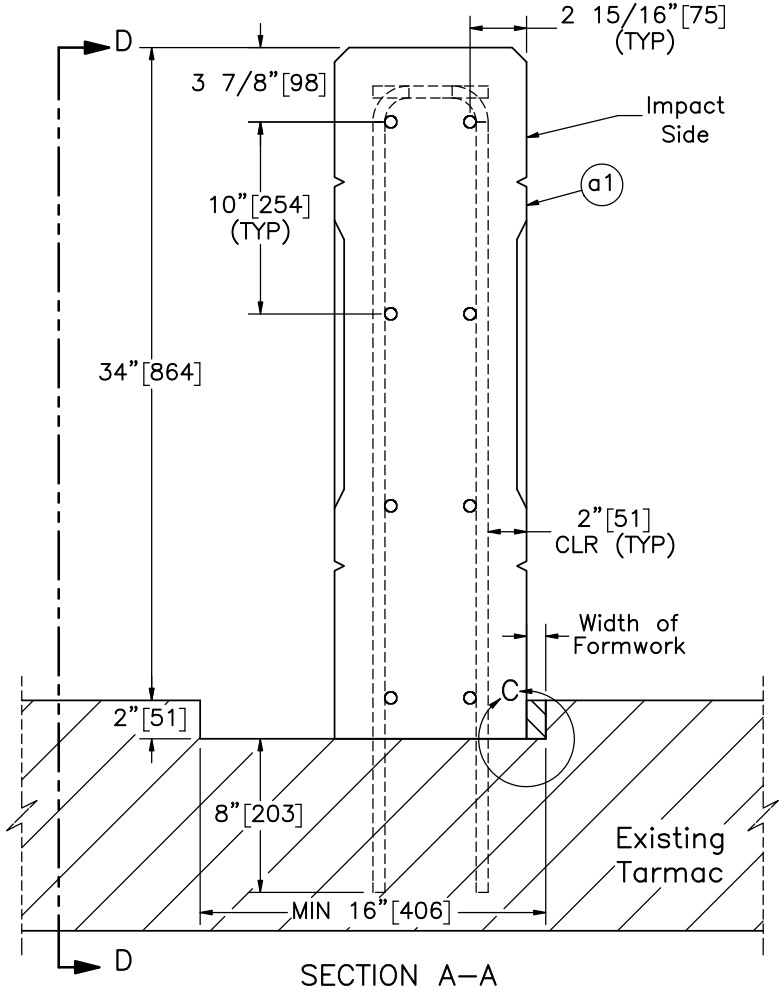
MwRSF

Midwest Roadside Safety Facility

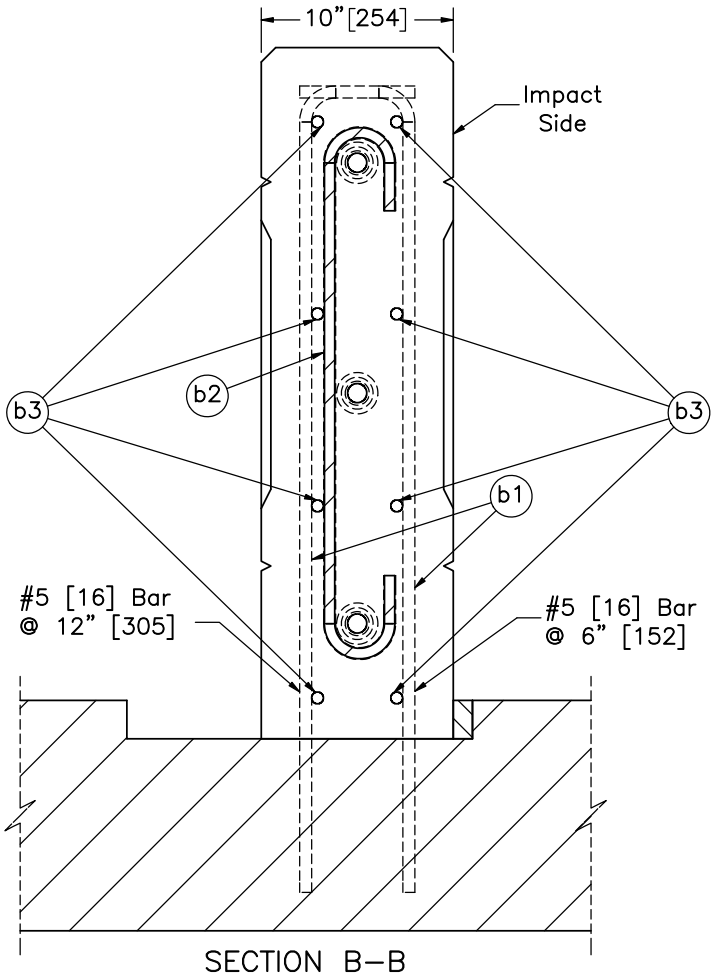
Hawaii 34" Aesthetic Concrete Bridge Rail
Test No. H34BR-1-2

System Layout

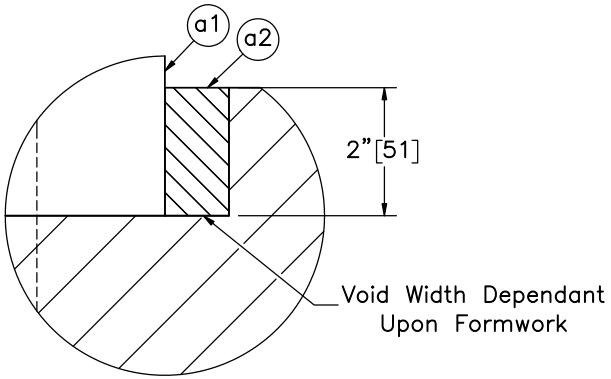
SHEET:	1 of 9
DATE:	3/29/2019
DRAWN BY:	DJW/JEK/MKB
DWG. NAME.	H34BR-1-2_R9
SCALE:	1:120
UNITS:	in.[mm]
REV. BY:	JEK/RWB/JCH



SECTION A–A



SECTION B–B

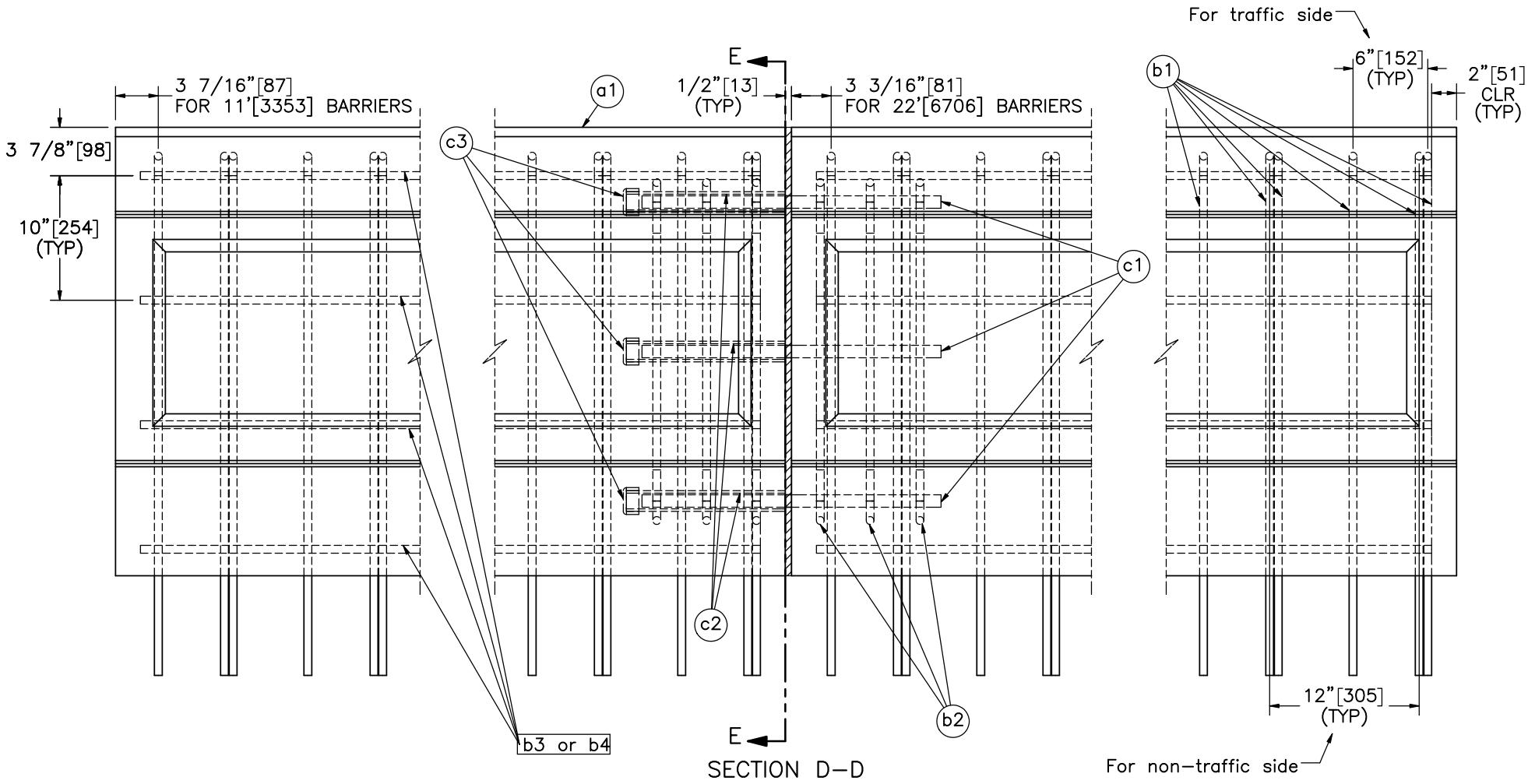


DETAIL C
SCALE 1:3

Notes: (1) Mill existing tarmac surface down to a depth of 2" [51] and a minimum width of 16" [406] to allow for recess of bridge rail on tarmac and installation of concrete formwork. After removal of formwork, fill void on impact side only, using low–strength concrete (part a2).

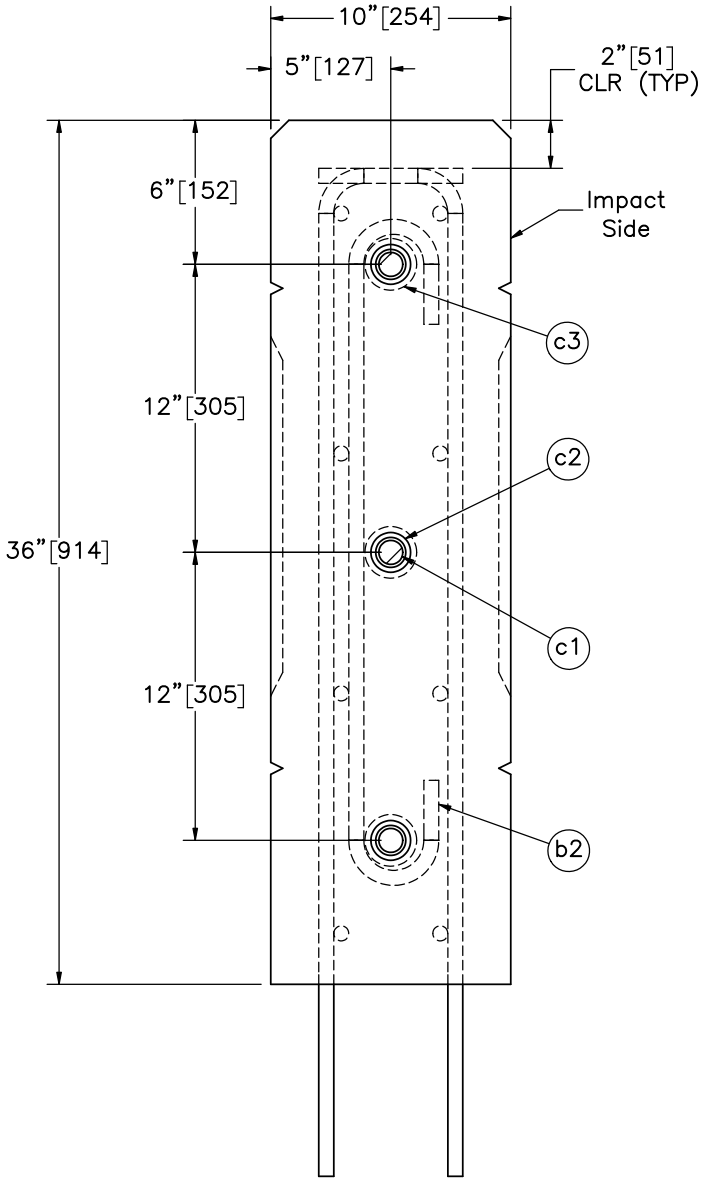
(2) Reinforcement bar no. b1 is to be anchored into the existing tarmac with Hilti HIT RE–500 V3 (part c4).

MwRSF	Hawaii 34" Aesthetic Concrete Bridge Rail Test No. H34BR–1–2	SHEET: 2 of 9
	Section Details	DATE: 3/29/2019
Midwest Roadside Safety Facility		DRAWN BY: DJW/JEK/MKB
	DWG. NAME. H34BR–1–2_R9 / SCALE: 1:10 / UNITS: in.[mm]	REV. BY: JEK/RWB/JCH

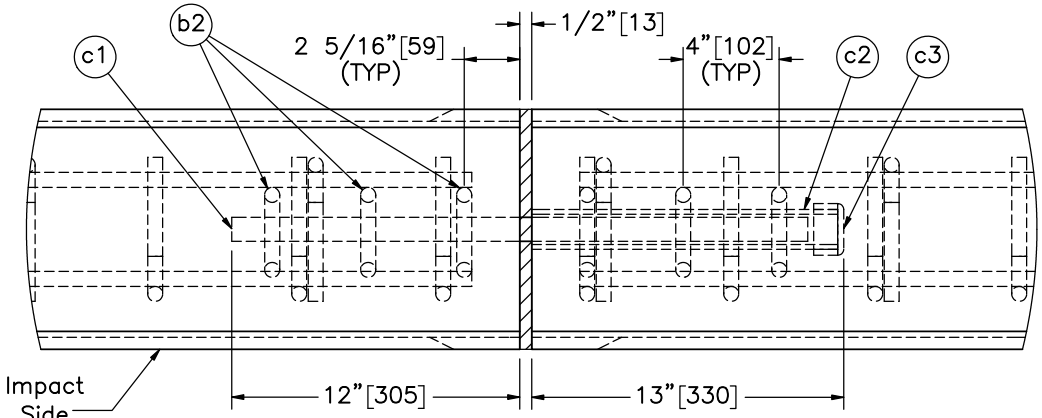


Notes: (1) 1/2" [13] expansion joints to be bonded together by premolded joint filler and joint sealer (parts c5 and c6) according to specifications.
(2) PVC tubes (parts c2 and c3) are to be cast on the upstream side of expansion joints.

MwRSF Midwest Roadside Safety Facility	Hawaii 34" Aesthetic Concrete Bridge Rail Test No. H34BR–1–2 Reinforcement Detail	SHEET: 3 of 9 DATE: 3/29/2019 DRAWN BY: DJW/JEK/MKB
DWG. NAME. H34BR–1–2_R9	SCALE: 1:12 UNITS: in.[mm]	REV. BY: JEK/RWB/JCH



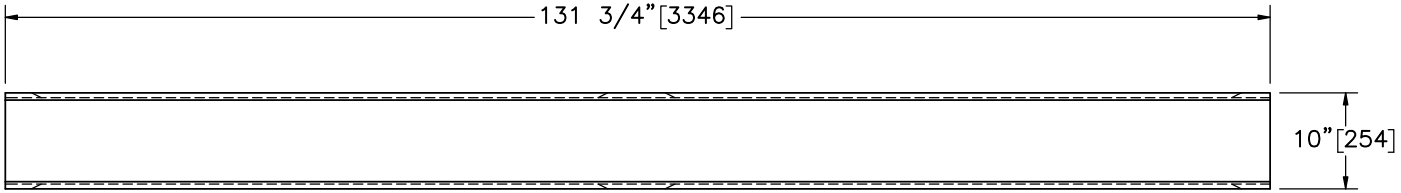
SECTION E–E



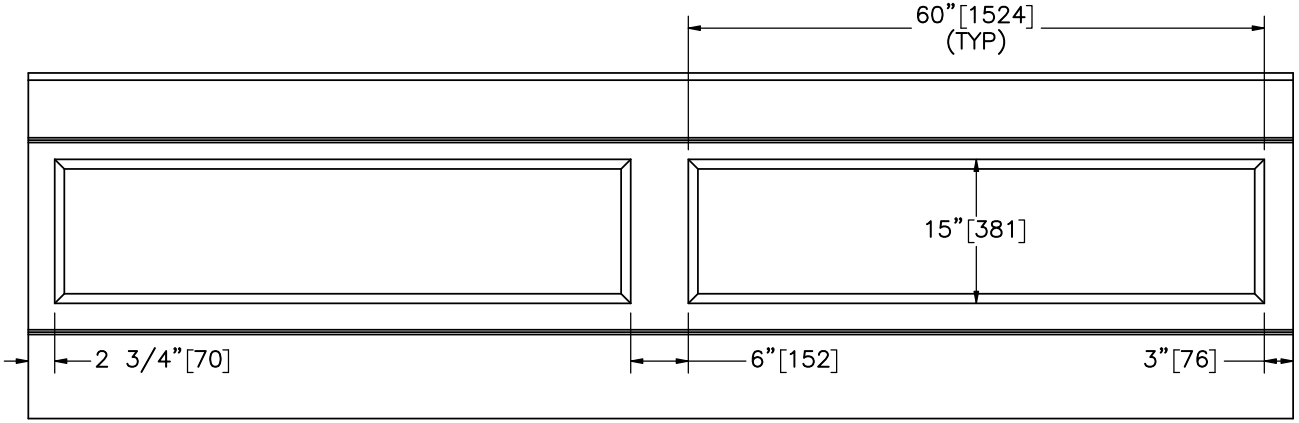
DETAIL F

Notes: (1) Smooth dowels (Part c1) are cast in place on one side of the expansion joint, and inserted into plastic sleeves (Part c2), which are cast into the barrier on the other side of the expanson joint.

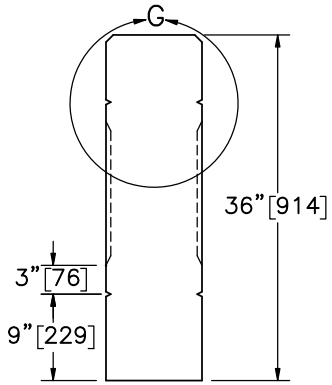
MwRSF	Hawaii 34" Aesthetic Concrete Bridge Rail Test No. H34BR–1–2	SHEET: 4 of 9
	Expansion Joint Details	DATE: 3/29/2019
Midwest Roadside Safety Facility		DRAWN BY: DJW/JEK/MKB
DWG. NAME. H34BR–1–2_R9	SCALE: 1:8 UNITS: in.[mm]	REV. BY: JEK/RWB/JCH



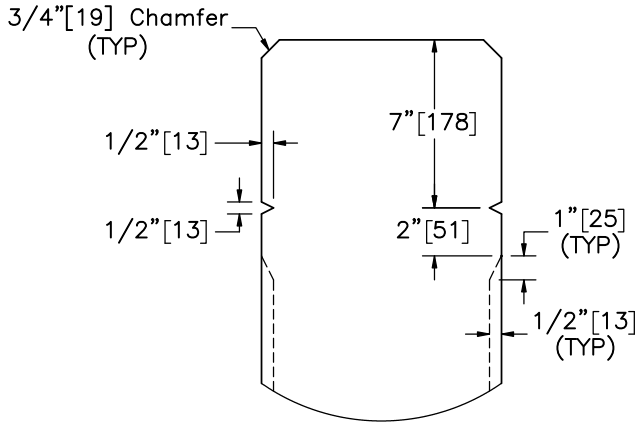
PLAN VIEW



ELEVATION VIEW



PROFILE VIEW



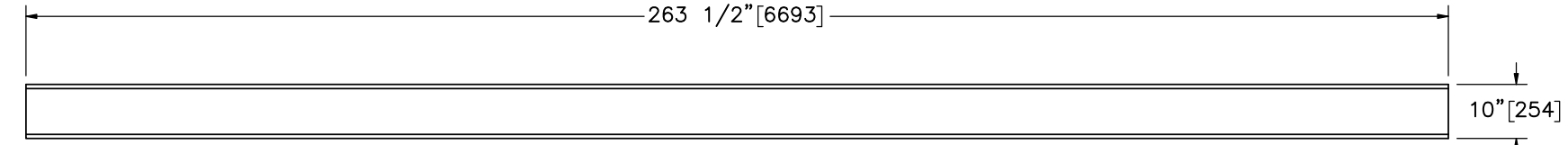
DETAIL G
SCALE 1:8

Midwest Roadside Safety Facility

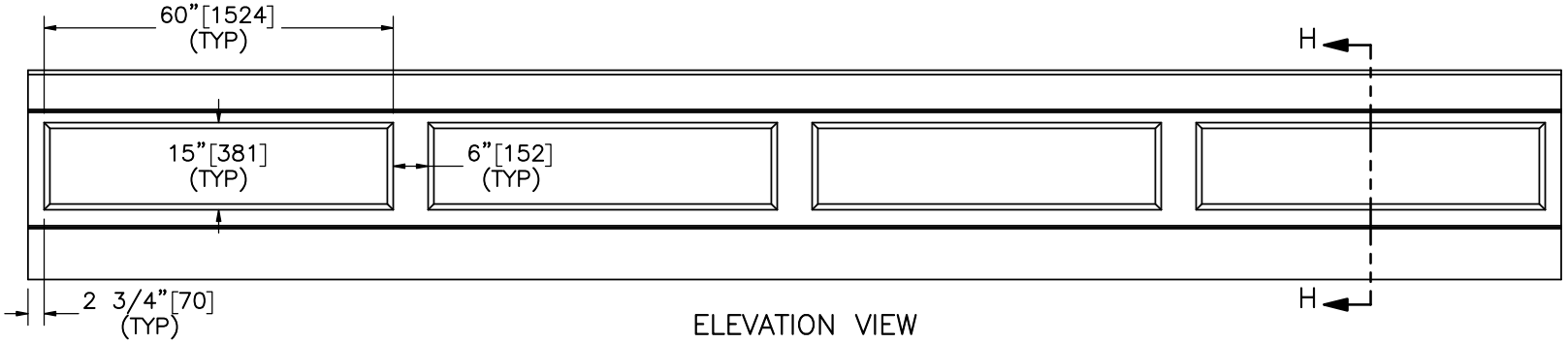
Hawaii 34" Aesthetic Concrete Bridge Rail
Test No. H34BR-1-2

11'[3353] Concrete Parapet Details

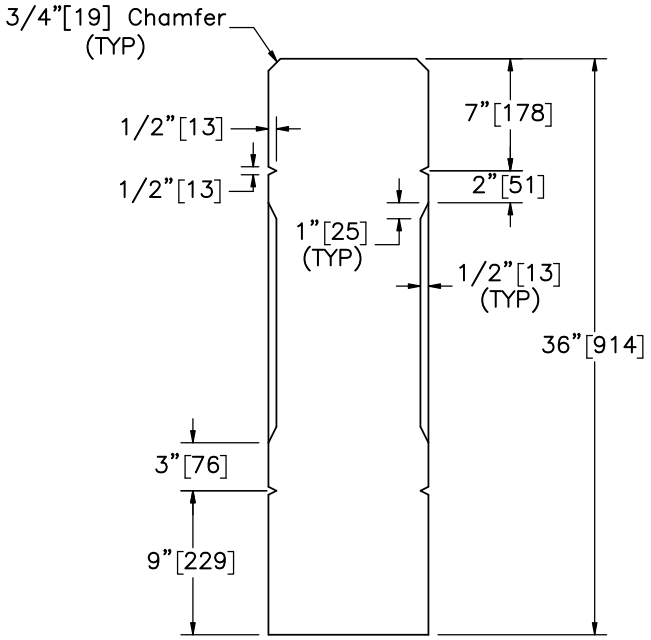
SHEET:	5 of 9
DATE:	3/29/2019
DRAWN BY:	DJW/JEK/MKB
DWG. NAME.	H34BR-1-2_R9
SCALE:	1:20
UNITS:	in.[mm]
REV. BY:	JEK/RWB/JCH



PLAN VIEW



ELEVATION VIEW



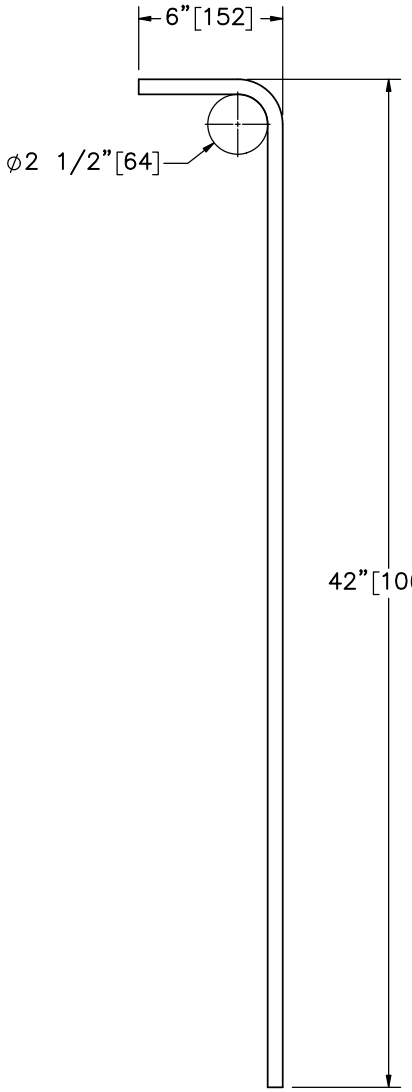
SECTION H–H
SCALE 1:12

Midwest Roadside Safety Facility

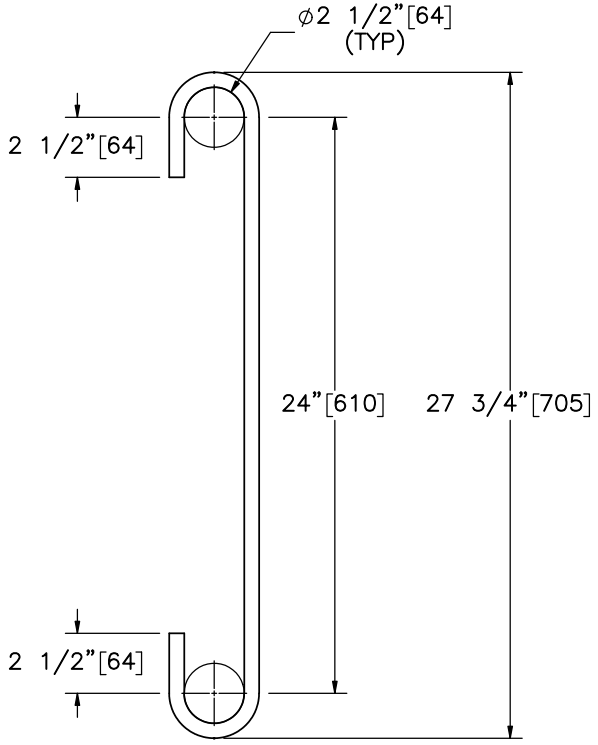
Hawaii 34" Aesthetic Concrete Bridge Rail
Test No. H34BR–1–2

22'[6706] Concrete Parapet Details

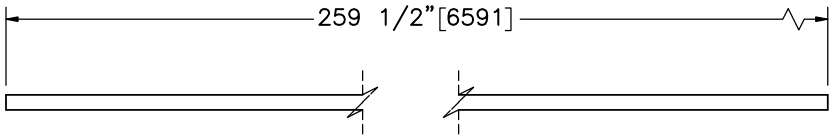
SHEET: 6 of 9
DATE: 3/29/2019
DRAWN BY: DJW/JEK/MKB
DWG. NAME. H34BR–1–2_R9
SCALE: 1:32
UNITS: in.[mm]
REV. BY: JEK/RWB/JCH



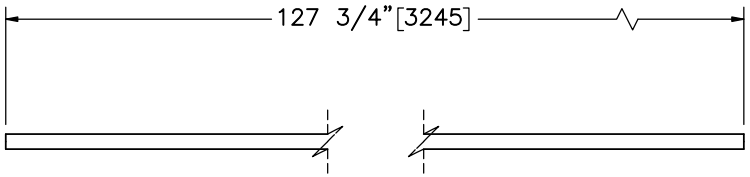
Bar b1



Bar b2



Bar b3



Bar b4

Notes: (1) Reinforced Steel: Deformed and plain carbon steel bars for concrete reinforcement shall meet the requirements of AASHTO M31M/M31–07 Grade 60 (ASTM A615–15a Grade 60).
(2) Steel reinforcing shall be supported, bent and placed as per AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014 including all interim revisions.

Bill of Bars

Part No.	Bar No.	Qty.	Unbent Length	Material Specification
b1	#5	264	46 3/4" [1187]	ASTM A615 Gr. 60
b2	#5	24	38 7/8" [987]	ASTM A615 Gr. 60
b3	#5	24	259 1/2" [6591]	ASTM A615 Gr. 60
b4	#5	16	127 3/4" [3245]	ASTM A615 Gr. 60

MwRSF

Midwest Roadside Safety Facility

Hawaii 34" Aesthetic Concrete Bridge Rail Test No. H34BR–1–2

Rebar Details

SHEET: 7 of 9

DATE: 3/29/2019

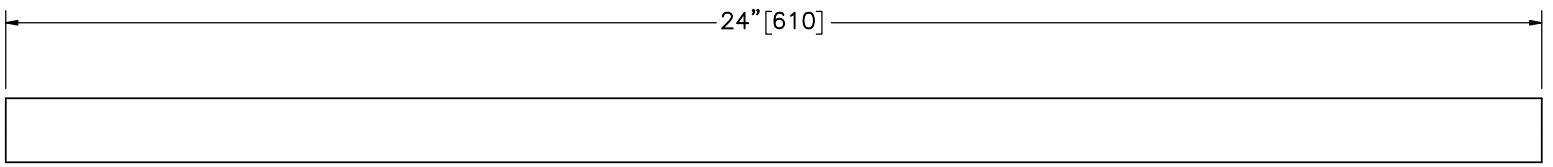
DRAWN BY: DJW/JEK/MKB

DWG. NAME. H34BR–1–2_R9

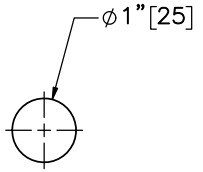
SCALE: 1:8

UNITS: in.[mm]

REV. BY: JEK/RWB/JCH

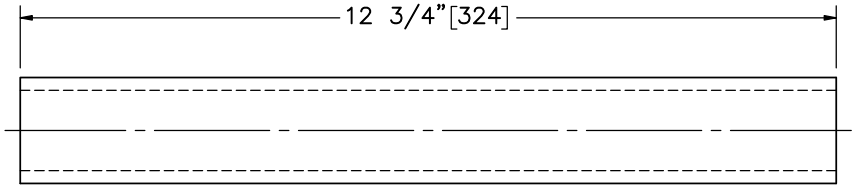


ELEVATION VIEW

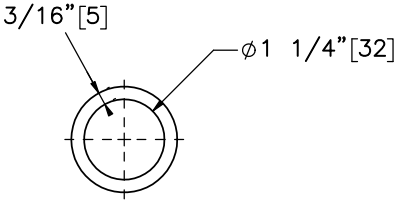


PROFILE VIEW

Part c1

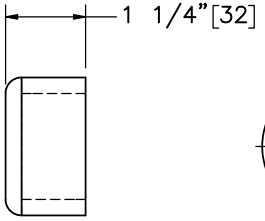


ELEVATION VIEW

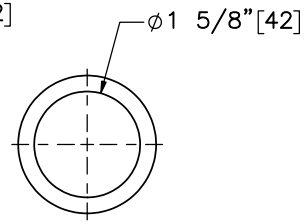


PROFILE VIEW

Part c2



ELEVATION VIEW



PROFILE VIEW

Part c3

MwRSF Midwest Roadside Safety Facility	Hawaii 34" Aesthetic Concrete Bridge Rail Test No. H34BR-1-2 Expansion Joint Components		SHEET: 8 of 9
			DATE: 3/29/2019
			DRAWN BY: DJW/JEK/MKB
	DWG. NAME. H34BR-1-2_R9	SCALE: 1:3 UNITS: in.[mm]	REV. BY: JEK/RWB/JCH

Item No.	QTY.	Description	Material Specification	Treatment Specification
a1	–	Reinforced Concrete	Min. f'c = 4,000 psi [27.6 MPa] NE Mix 47BD	–
a2	–	Low–Strength Concrete Overlay	Concrete NE Mix 9019 CITY	–
b1	264	#5 [16] Rebar, 46 3/4" [1187] Total Unbent Length	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)*
b2	24	#5 [16] Rebar, 38 7/8" [987] Total Unbent Length	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)*
b3	24	#5 [16] Rebar, 259 1/2" [6591] Total Length	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)*
b4	16	#5 [16] Rebar, 127 3/4" [3245] Total Length	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)*
c1	12	#8 [25] Smooth Rebar, 24" [288] Total Length	ASTM A615 Gr. 60	Epoxy Coated (ASTM A775 or A934)*
c2	12	1 1/4" [32] Dia. PVC Pipe	Schedule 80 PVC Gr. 12454	–
c3	12	1 1/4" [32] PVC Cap	Schedule 80 PVC Gr. 12454	–
c4	–	Epoxy Adhesive	Hilti HIT RE–500 V3	–
c5	–	Expansion Joint Filler	AASHTO M33, M153, or M213	–
c6	–	Expansion Joint Sealant	AASHTO M173, M282, M301, ASTM D3581, or ASTM D5893	–

*Rebar does not need to be epoxy–coated for testing purposes.

System: Hawaii 34" Bridge Rail

Drawing: H34BR–1–2

Revision History

REV.	DATE OF ISSUE	Page	NATURE OF CHANGES	REVIEWER	REVISED BY
0	1/9/2019	–	New Drawing created.	–	DJW
1	1/10/2019	1	Note and dim edits.	JEK	DJW
		2	Title block edit.		
		3	Dim adds and edits. Note adds and edits.		
		4	Note and dim edits.		
		5,6	Dim and title block edits.		
		7	Dim and table edits.		
		8	Dim add. Separate one part into two.		
		BOM	Description edits. Title block edit.		
2	1/14/2019	1	Dim and note edits. Corrected barrier placement in trench.	RWB	DJW
		2	Dim and note edits.		
		3	Dim edit. Add hatching for expansion joint gap.		
		4	Removed profile view, added new section view.		
		5,6	Dim edits.		
		7	Rebar bend edits. Added rebar notes.		
		BOM	Split joint filler and sealant into two parts. Removed tack coat. Part a2 description and material edit.		
3	1/16/2019	–	Title block edits.	JEK	DJW
		2	Note and bubble edits. Edit section B–B depth.		
		BOM	Description edit.		
4	1/18/2019	4	Hatch added to joint for filler and sealer.	RWB	JEK
		5–6	Ground line removed.		
5	1/28/2019	1	Impact location & barrier numbers flipped. Mill cavity width edit	JCH	DJW
		2	Added notes and dim. Mill cavity width dim edit.		
		4	Impact side note added to Detail F.		
		7	Bar b3 and b4 length edits.		
		BOM	Rebar description edits.		
6	1/29/2019	1	Impact location & barrier numbers flipped back to original orientation.	JEK	DJW
7	2/4/2019	1	Cosmetic note and section line edits.	JEK	DJW
		2	Cosmetic section line edit. Note 1 edit.		
		3	Cosmetic note edit.		
		5,6	Reletter section views.		

System: Hawaii 34" Bridge Rail

Drawing: H34BR–1–2

Revision History

8	2/27/2019	1	Test 2 information added. Dim shifts. Note 1 & 2 edit. Note 3 add.	RWB	JEK
9	3/29/2019	3	Note add.	JCH	MKB