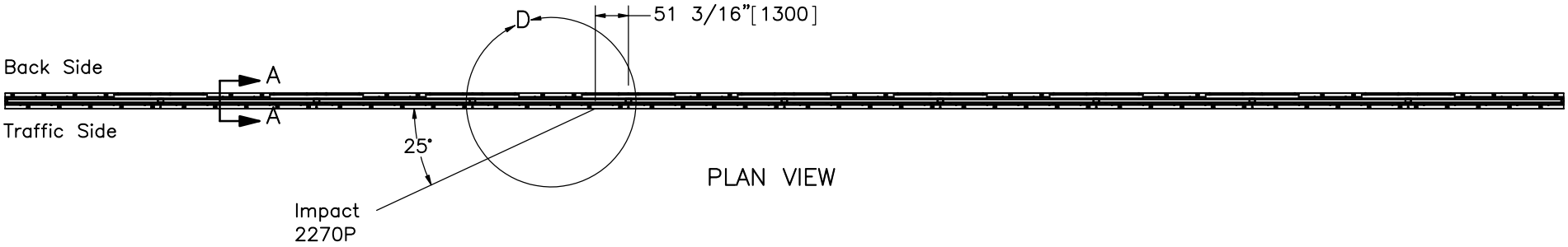
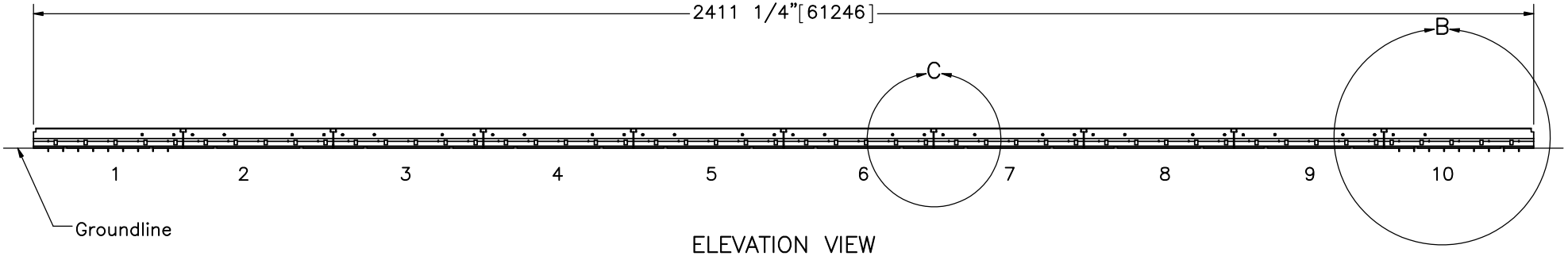
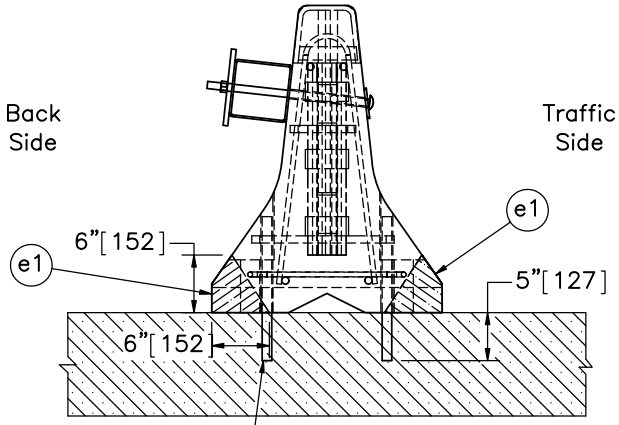


PLAN VIEW



ELEVATION VIEW



SECTION A–A
SCALE 1 : 20

Barrier segments 1 and 10 are anchored to concrete tarmac through the pin anchor recesses with 1" [25] diameter ASTM A36 steel pins (Part a2) inserted into 1 1/4" [32] diameter pre–drilled holes in the concrete tarmac.

Notes:
(1) Place 1" [25] diameter steel pins (Part a2) into every pin anchor recess (9 each) of barrier segments 1 and 10.
(2) Place grout wedges (Part e1) at the toe of each barrier segment between adjacent barrier segments in every joint.
(3) Test shall be performed according to test designation no. 3–11 of MASH.
(4) The critical impact location is 51 3/16" [1300] upstream from the centerline of the joint between barrier nos. 4 and 5.
(5) NJDOT Precast Concrete Curb and Construction Barrier curb will be referred to as Portable Concrete Barrier (PCB).
(6) The system is NJDOT Type 4 (Alternate B) barrier and box–beam stiffeners, corresponding to connection type B in the 2015 NJDOT *Roadway Design Manual*.

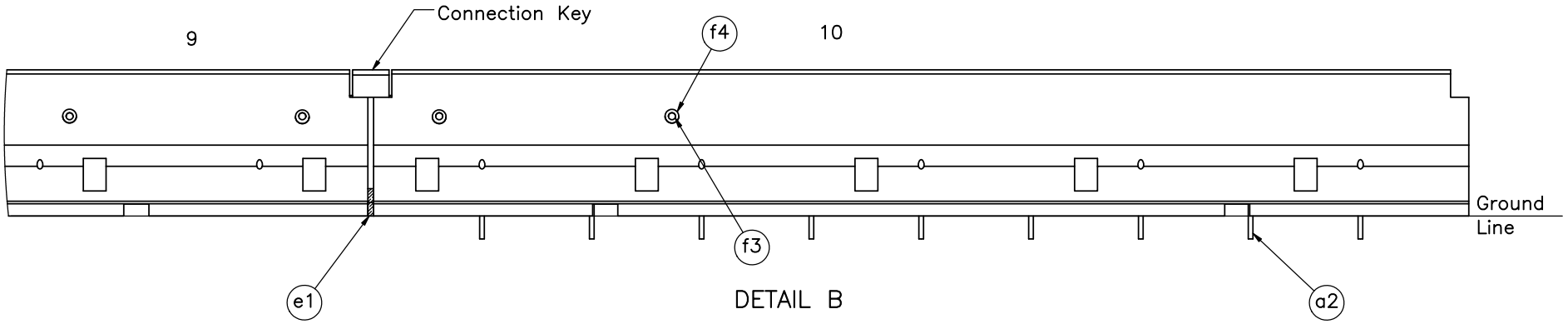
MwRSF

Midwest Roadside Safety Facility

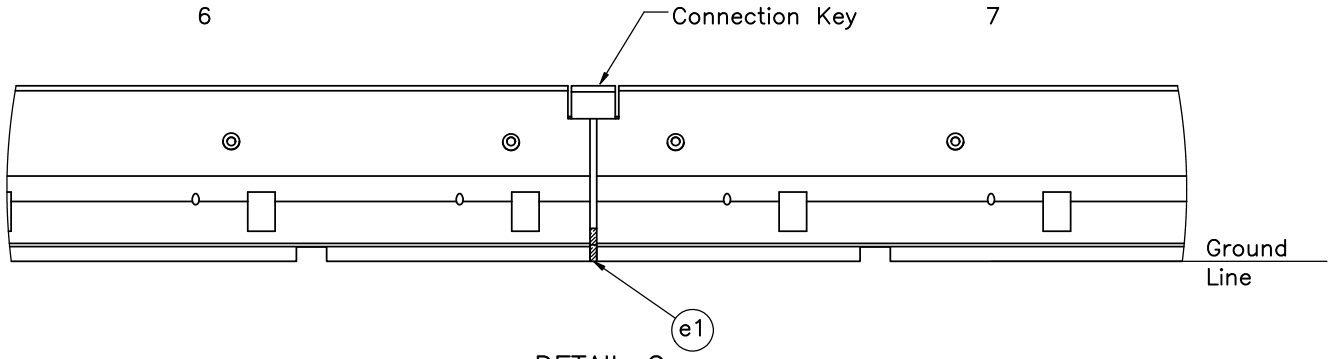
NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5

System Layout

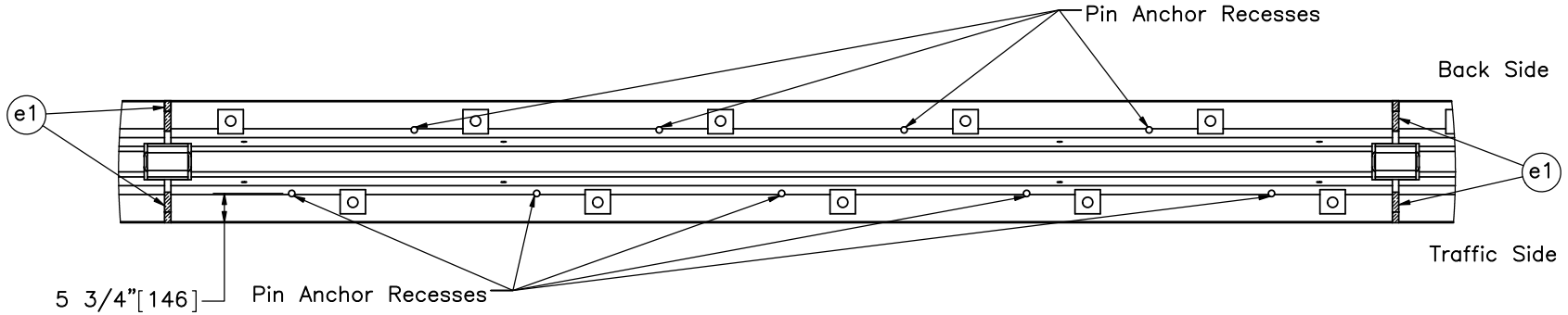
SHEET: 1 of 16		
DATE: 10/30/2018		
DRAWN BY: TJD/JEK/DTM		
DWG. NAME. NJPCB–5_R9	SCALE: 1:245 UNITS: In.[mm]	REV. BY: KAL/SB/JEK/JCH



DETAIL B



DETAIL C



DETAIL D

Notes: (1) Traffic side of barrier contains the five pin anchor recesses, and the back side of the barrier contains the four pin anchor recesses.

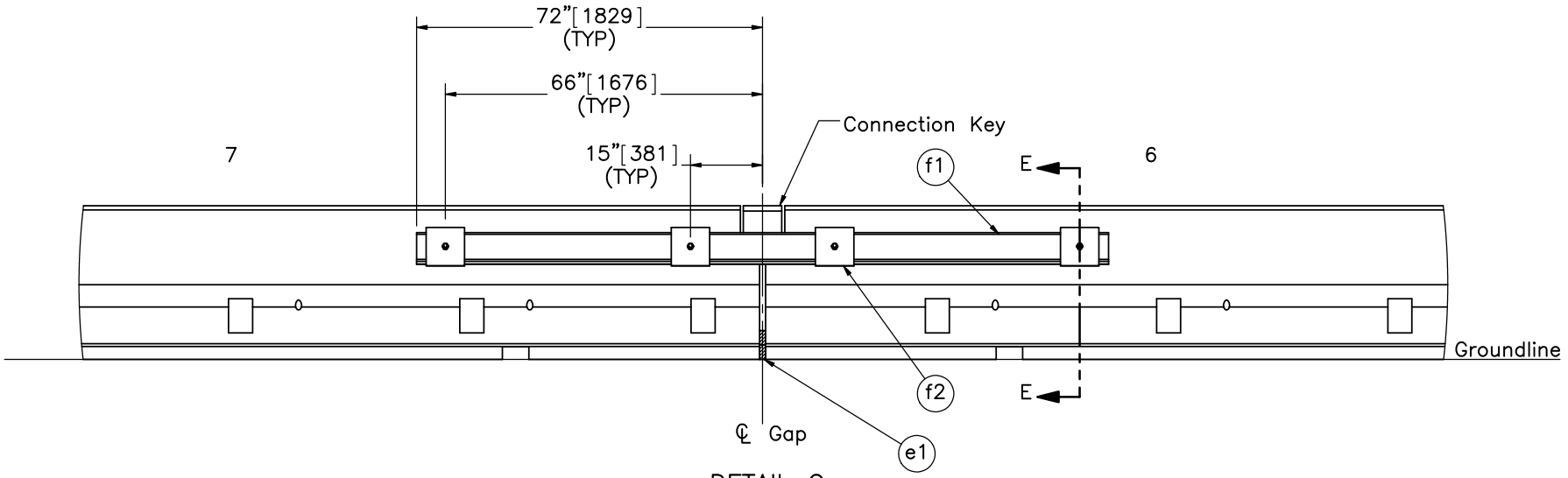
(2) Box–beam not shown in Detail D for clarity.

Midwest Roadside Safety Facility

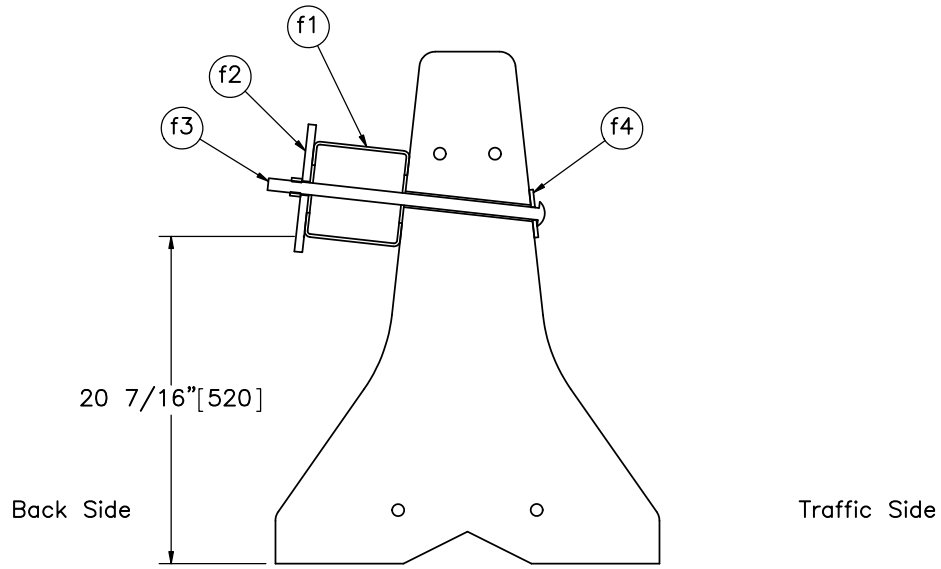
NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5

Barrier and Pin Anchor Recess Details

SHEET:	2 of 16
DATE:	10/30/2018
DRAWN BY:	TJD/JEK/DTM
DWG. NAME.	NJPCB–5_R9
SCALE: 1:35 UNITS: In.[mm]	
REV. BY:	KAL/SB/JEK/JCH



DETAIL C
BACK VIEW



SECTION E–E
SCALE 1 : 12

Notes:
(1) The box–beam section (Part f1) will be attached using carriage bolts without square neck (Part f3) with the smooth end on the traffic side of the barrier.
(2) Length of the box–beam (Part f1) shall be 12' [3658] continuous. Splices are not permitted.
(3) Fender washers (Part f4) to be 3" [76] nominal OD.

Midwest Roadside Safety Facility

NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5

Box–Beam Details

DWG. NAME. NJPCB–5_R9

SCALE: 1:35

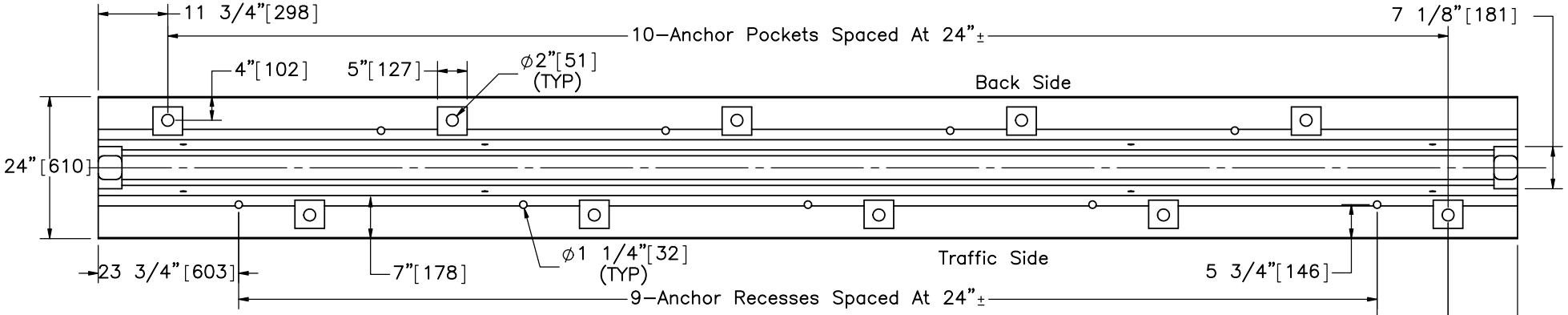
UNITS: In.[mm]

SHEET: 3 of 16

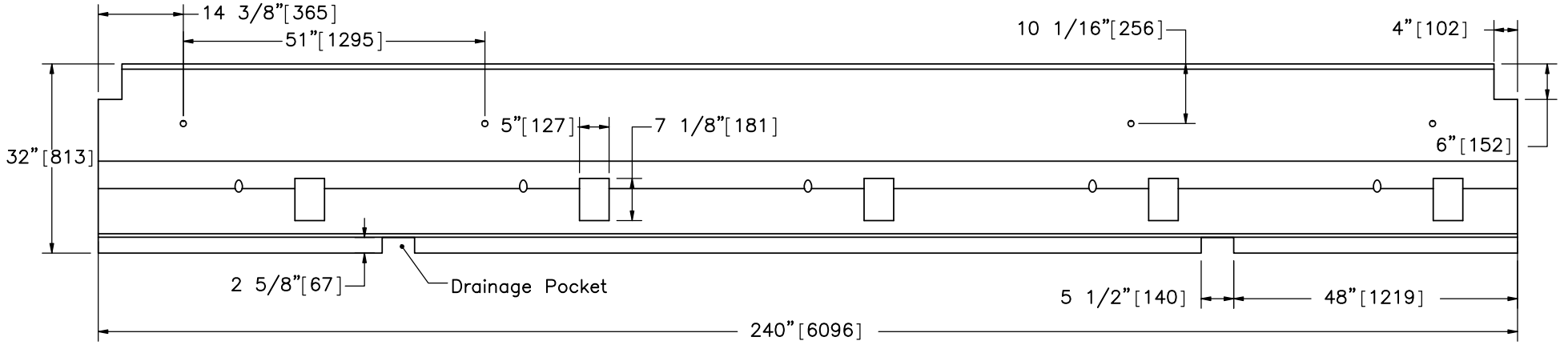
DATE: 10/30/2018

DRAWN BY: TJD/JEK/DTM

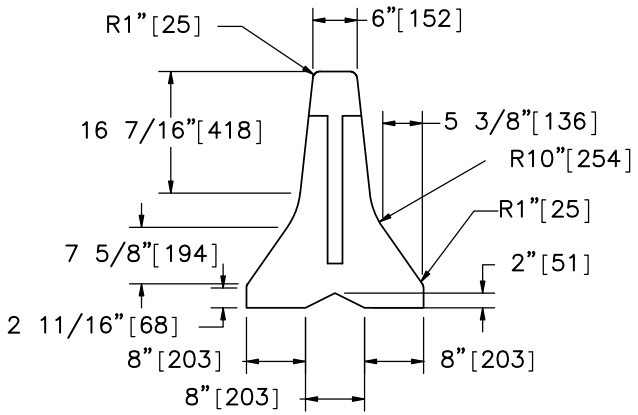
REV. BY: KAL/SB/JEK/JCH



PLAN VIEW



ELEVATION VIEW

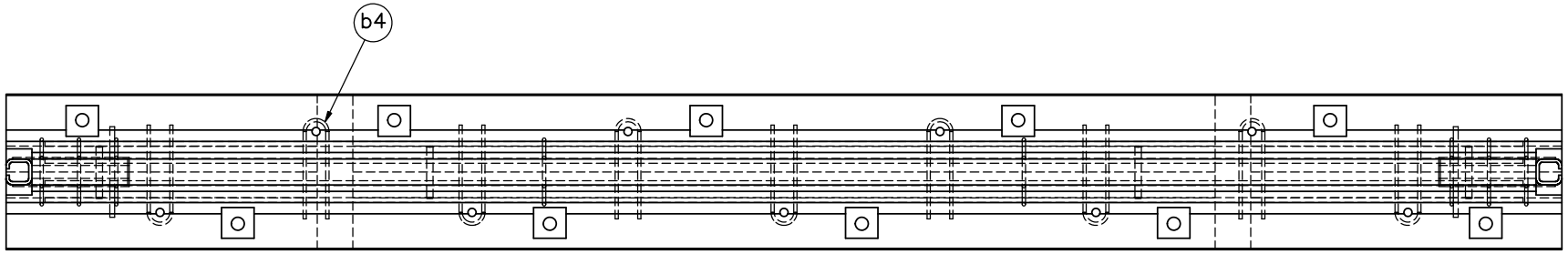


PROFILE VIEW

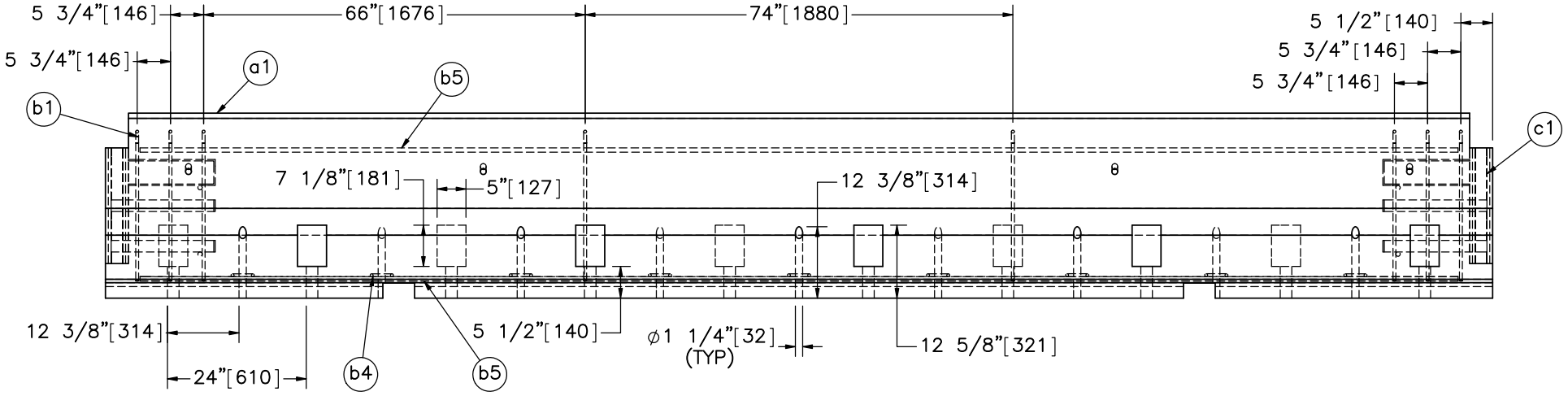
Notes: (1) Concrete has a minimum 28–day compressive strength of 3.7 ksi [25.5 MPa].

(2) Two 2 5/8" x 5 1/2" [67 x 140] drainage pockets required in segments 12' [3658] long or greater.

Midwest Roadside Safety Facility	NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5 Concrete Barrier Segment	SHEET: 4 of 16 DATE: 10/30/2018 DRAWN BY: TJD/JEK/DTM
	DWG. NAME. NJPCB–5_R9 SCALE: 1:26 UNITS: In.[mm]	REV. BY: KAL/SB/JEK/JCH



PLAN VIEW

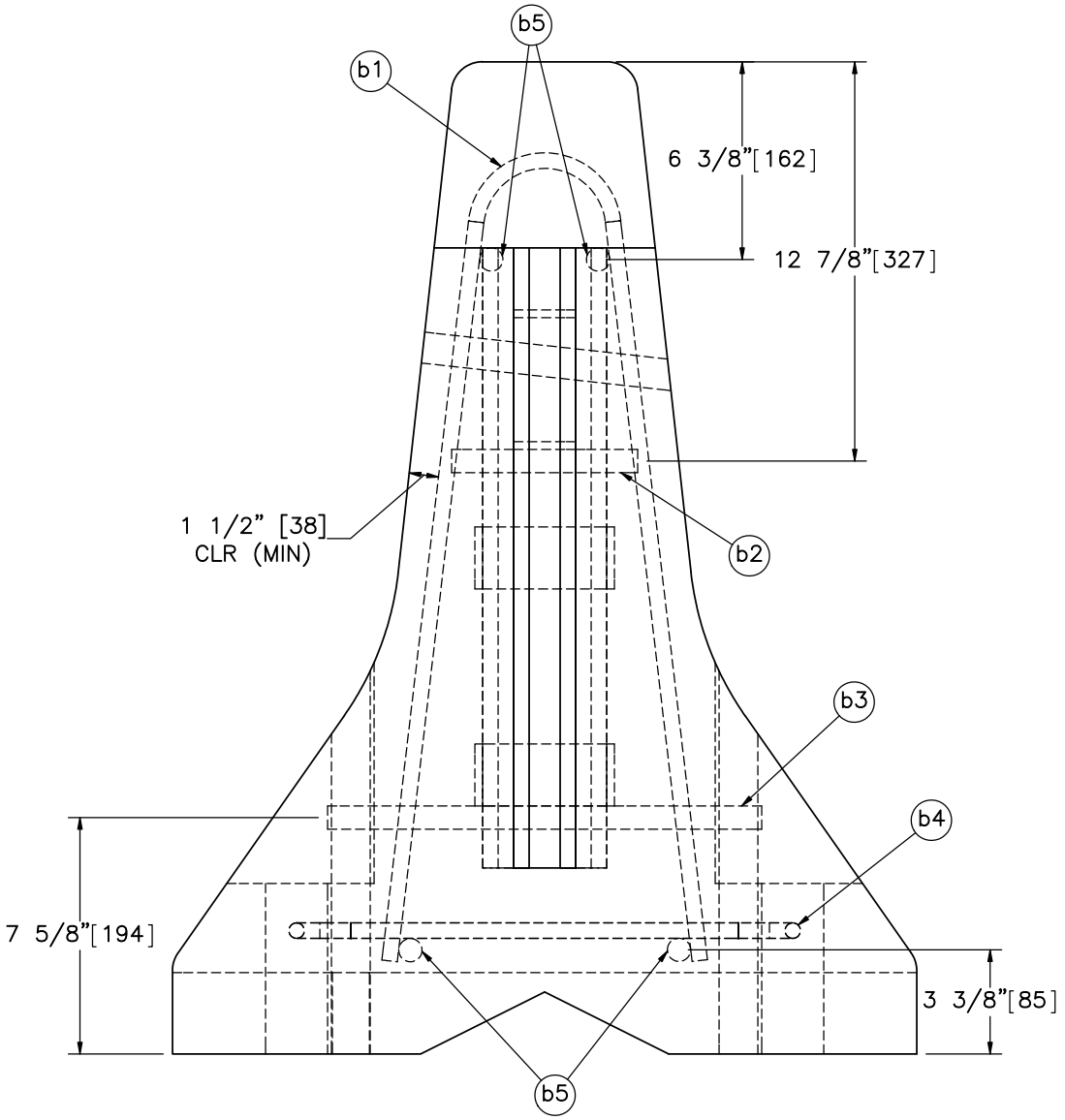


ELEVATION VIEW

Midwest Roadside Safety Facility	NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5 Reinforcement Details	SHEET: 5 of 16 DATE: 10/30/2018 DRAWN BY: TJD/JEK/DTM
DWG. NAME. NJPCB–5_R9	SCALE: 1:27 UNITS: In.[mm]	REV. BY: KAL/SB/JEK/JCH

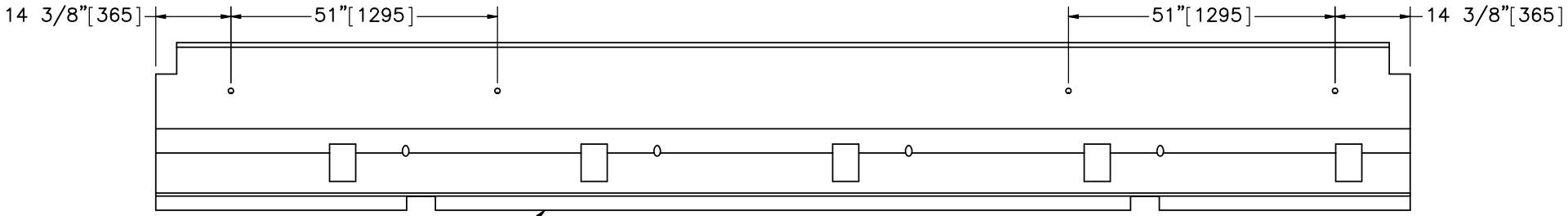
Back Side

Traffic Side



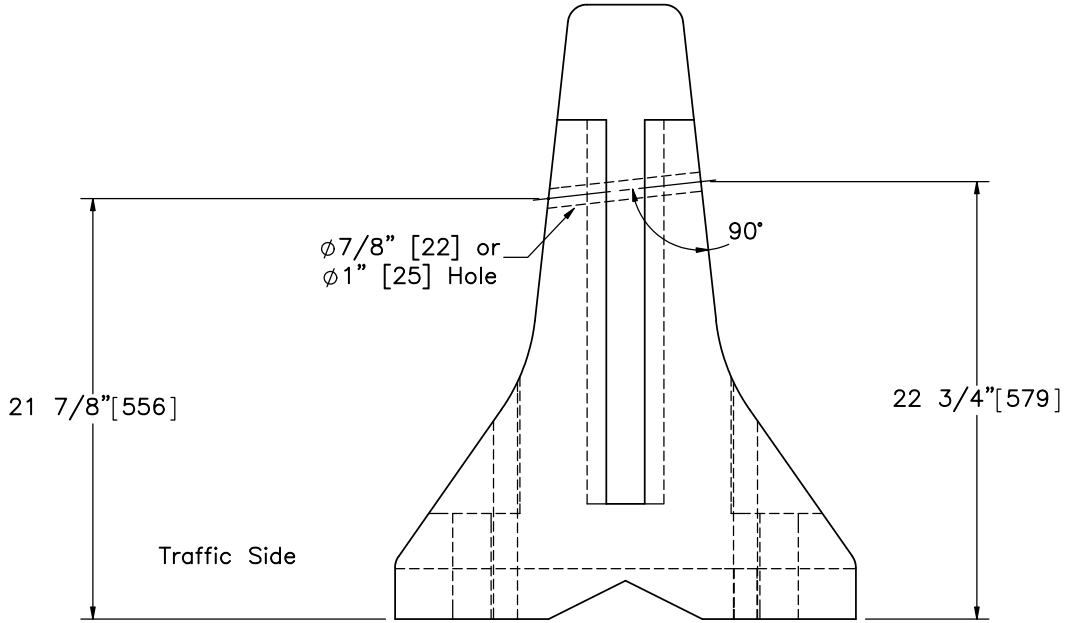
PROFILE VIEW

Midwest Roadside Safety Facility	NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5	SHEET: 6 of 16
		DATE: 10/30/2018
	Reinforcement Details – End View	DRAWN BY: TJD/JEK/DTM
	DWG. NAME. NJPCB–5_R9 / SCALE: 1:6 / UNITS: In.[mm]	REV. BY: KAL/SB/JEK/JCH



BACK VIEW

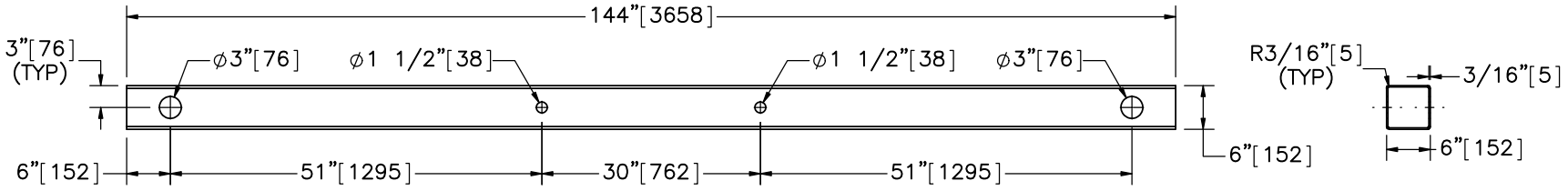
Only interior sections will have holes on both ends of the barrier. End sections will have holes on only one end.



PROFILE VIEW
SCALE 1:10

Note: (1) All box–beam stiffening bolt holes through concrete barrier are field drilled.

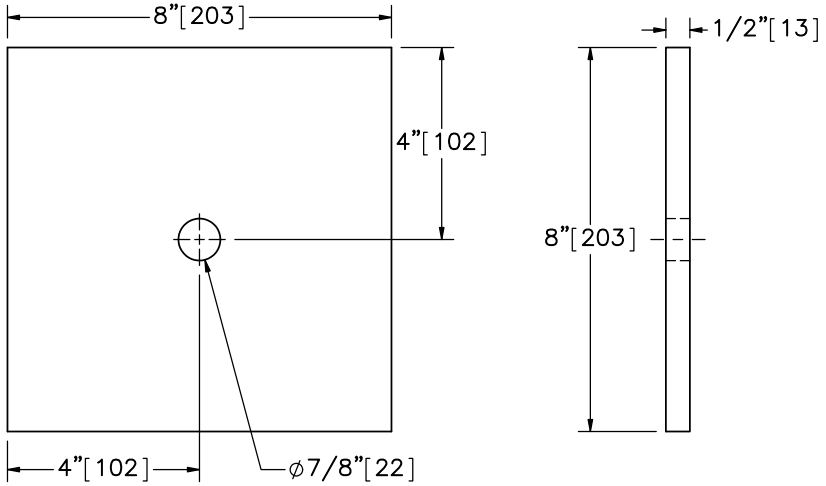
MwRSF	NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5	SHEET: 7 of 16
		DATE: 10/30/2018
Midwest Roadside Safety Facility	Concrete Barrier Segment Bolt Hole Details	DRAWN BY: TJD/JEK/DTM
	DWG. NAME. NJPCB–5_R9 / SCALE: 1:30 / UNITS: In.[mm]	REV. BY: KAL/SB/JEK/JCH



ELEVATION VIEW

PROFILE VIEW

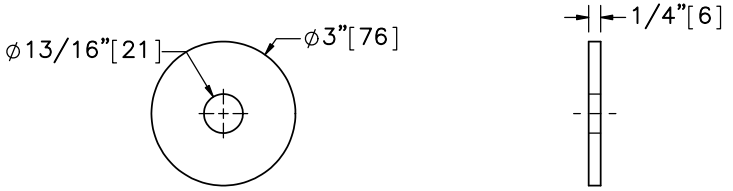
Part f1
SCALE 1:24



ELEVATION VIEW

PROFILE VIEW

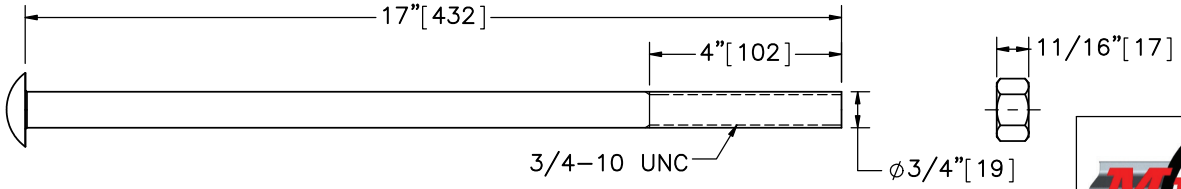
Part f2



ELEVATION VIEW

PROFILE VIEW

Part f4



Part f3

Midwest Roadside Safety Facility

NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5

Box–Beam Components

DWG. NAME. NJPCB–5_R9

SCALE: 1:4

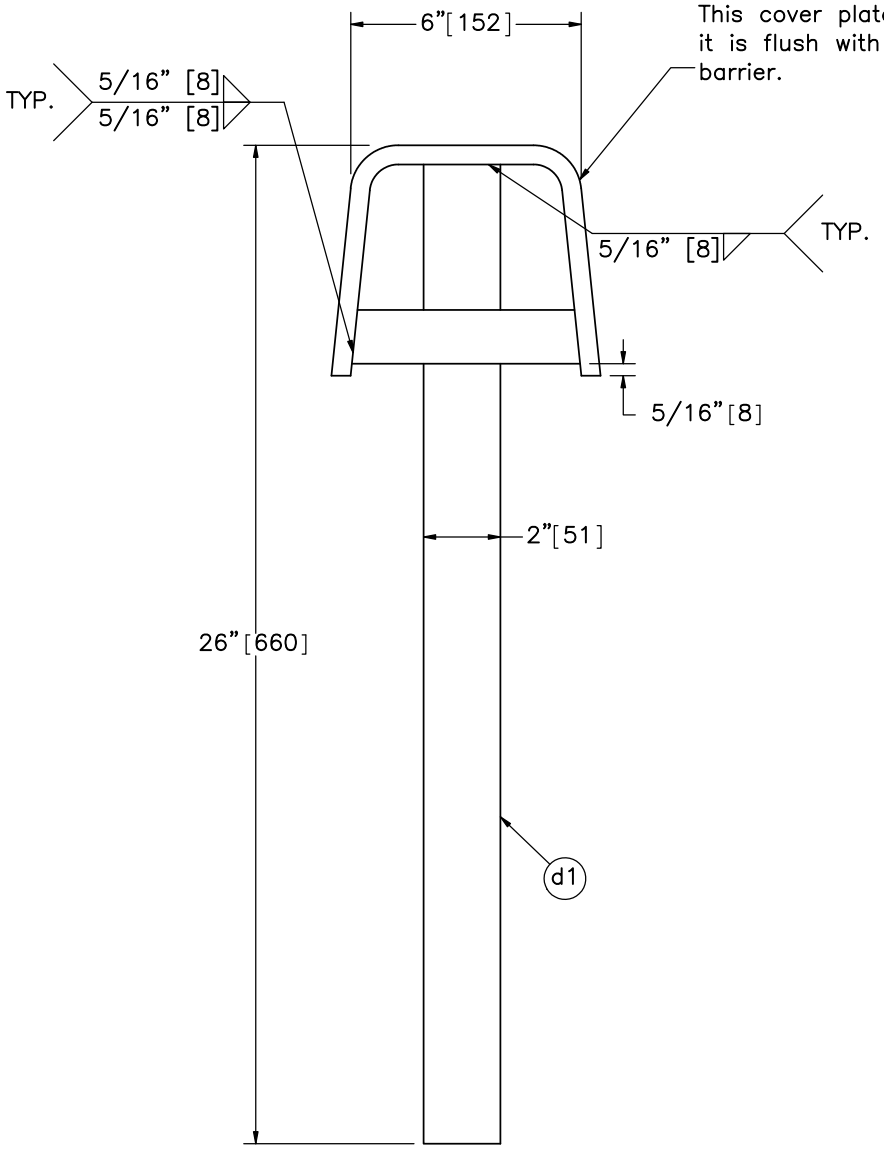
UNITS: In.[mm]

SHEET: 8 of 16

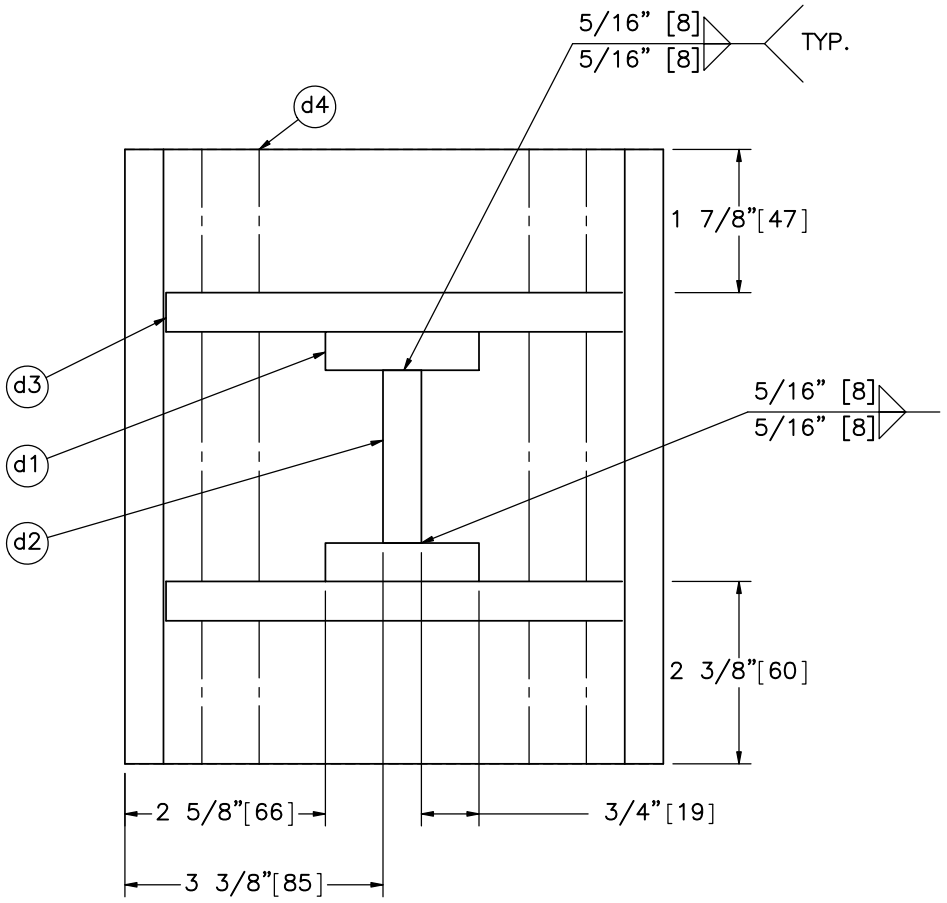
DATE: 10/30/2018

DRAWN BY: TJD/JEK/DTM

REV. BY: KAL/SB/JEK/JCH

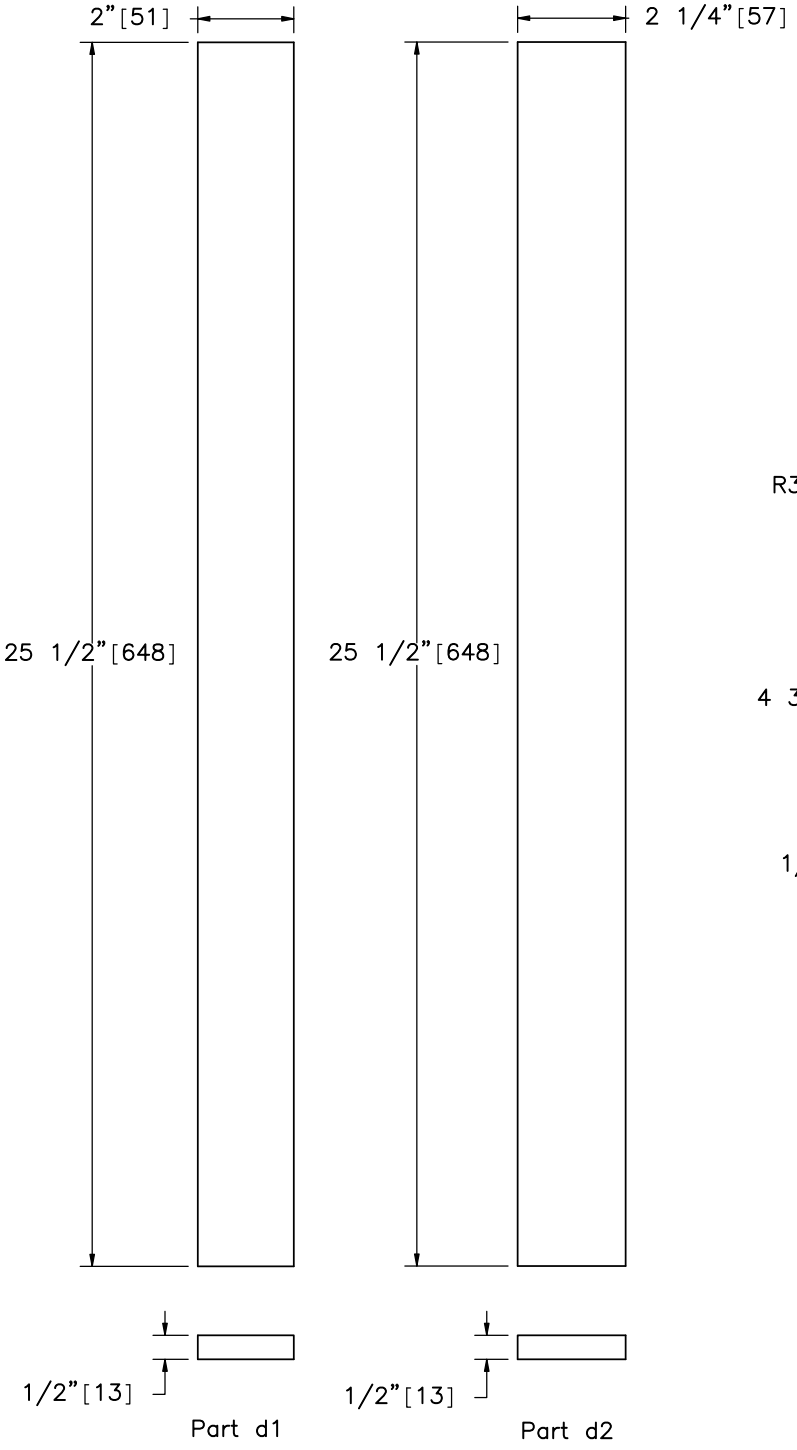


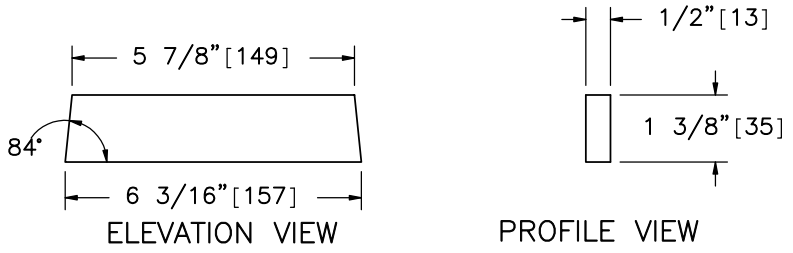
PROFILE VIEW



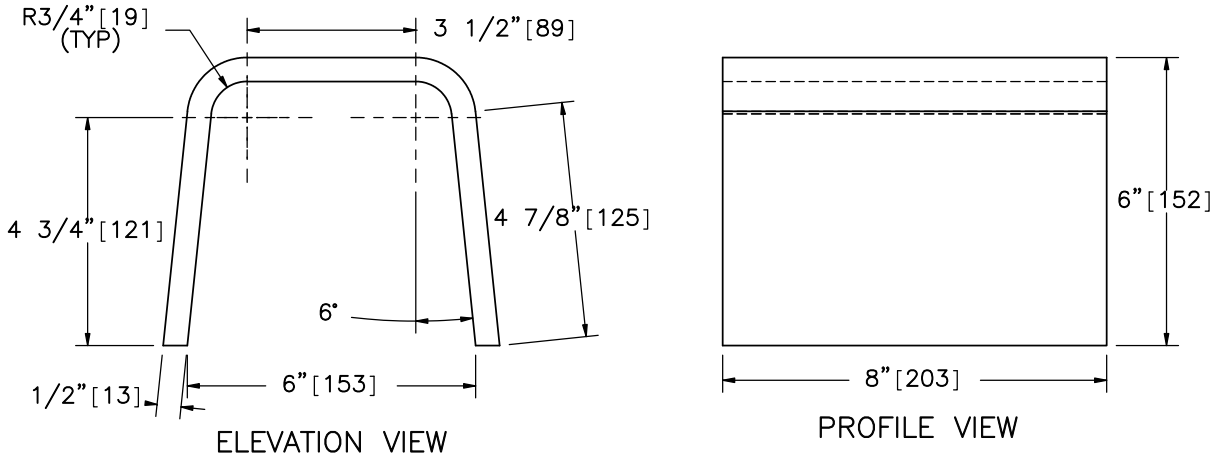
BOTTOM VIEW
SCALE: 2:5

Midwest Roadside Safety Facility	NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5 Connection Key	SHEET: 9 of 16 DATE: 10/30/2018 DRAWN BY: TJD/JEK/DTM
	DWG. NAME. NJPCB–5_R9 SCALE: 1:5 UNITS: In.[mm]	REV. BY: KAL/SB/JEK/JCH



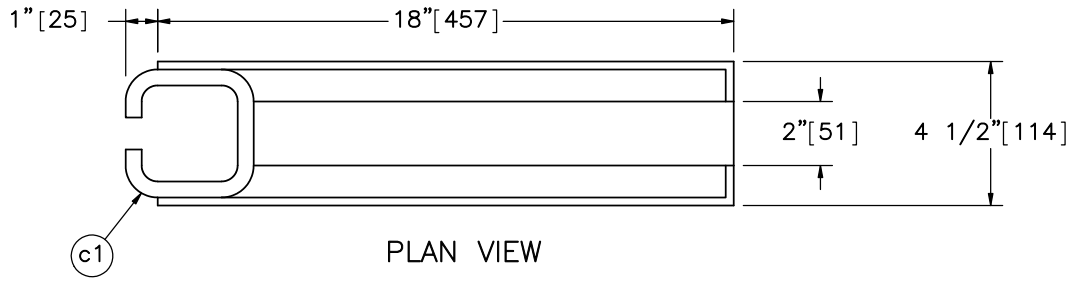


Part d3

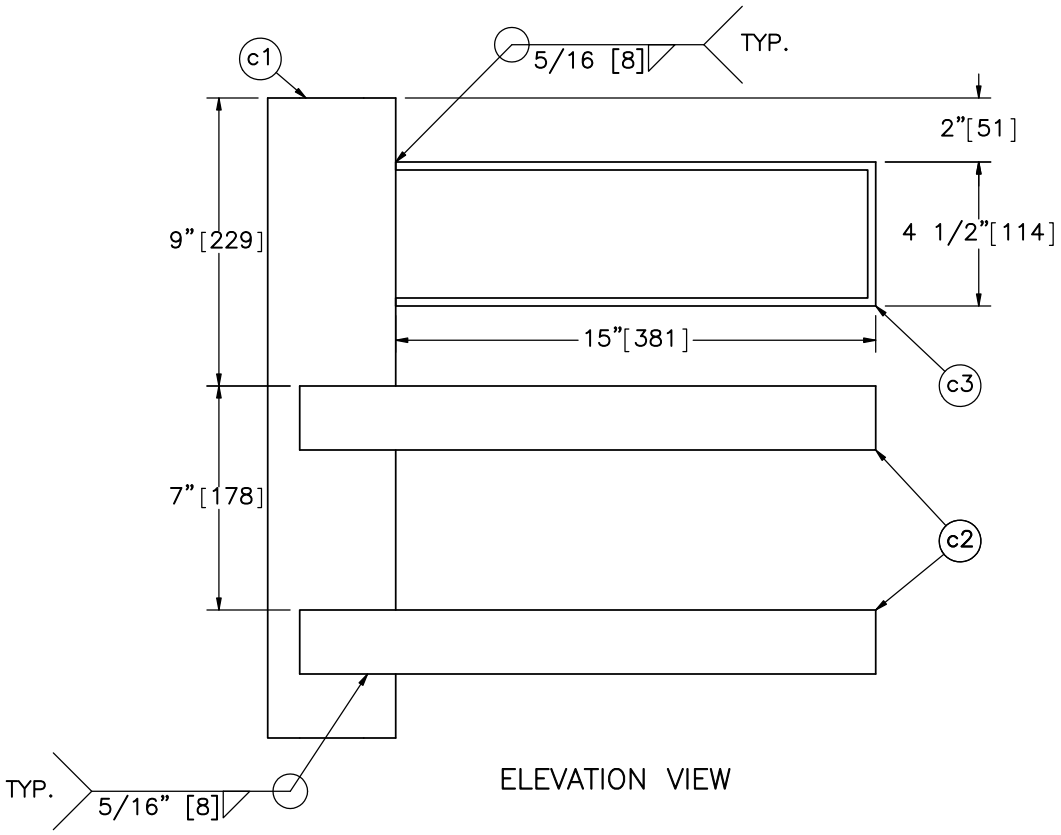


Part d4

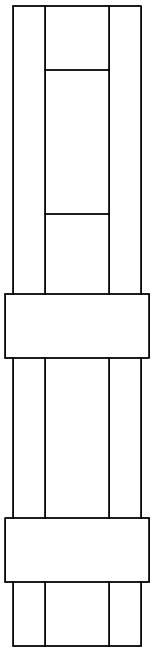
Midwest Roadside Safety Facility	NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5 Connection Key Components	SHEET: 10 of 16 DATE: 10/30/2018 DRAWN BY: TJD/JEK/DTM
DWG. NAME. NJPCB–5_R9	SCALE: 1:4 UNITS: In.[mm]	REV. BY: KAL/SB/JEK/JCH



PLAN VIEW



ELEVATION VIEW



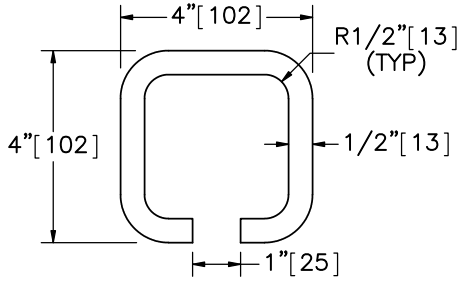
PROFILE VIEW

Midwest Roadside Safety Facility

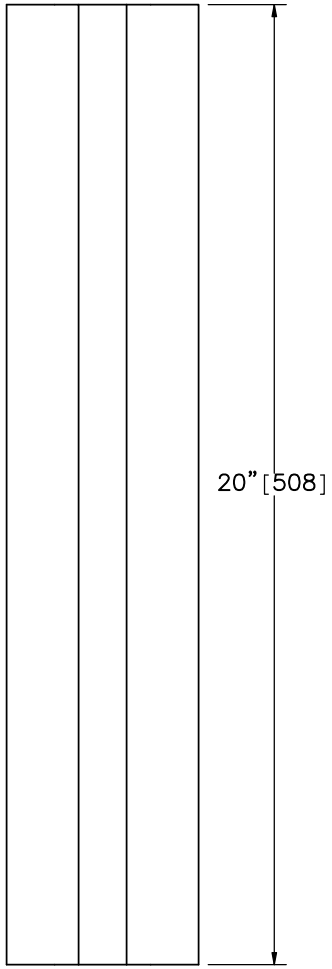
NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5

Connection Socket

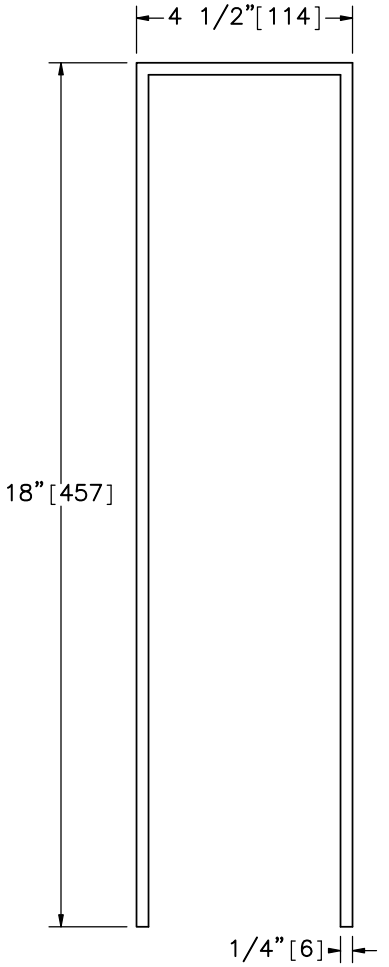
DWG. NAME. NJPCB–5_R9	SCALE: 1:6 UNITS: In.[mm]	REV. BY: KAL/SB/JEK /JCH	DRAWN BY: TJD/JEK/ DTM
		DATE: 10/30/2018	
		SHEET: 11 of 16	



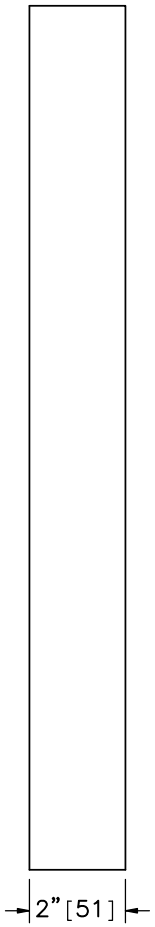
PLAN VIEW



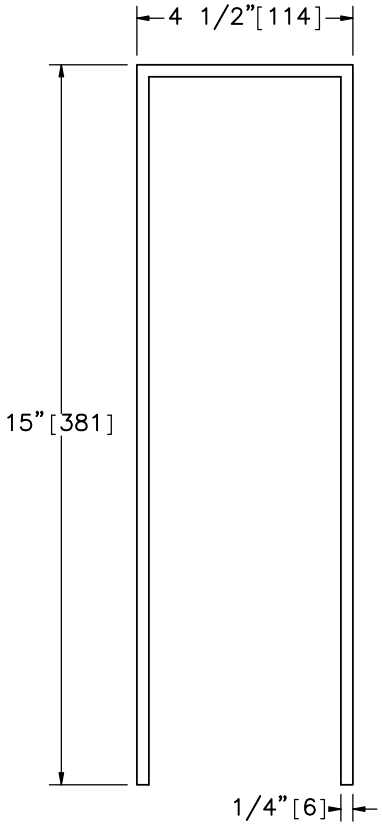
ELEVATION VIEW
Part c1



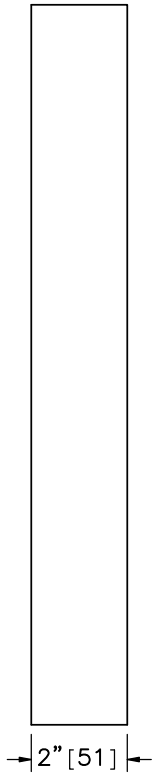
ELEVATION VIEW
Part c2



PROFILE VIEW



ELEVATION VIEW
Part c3



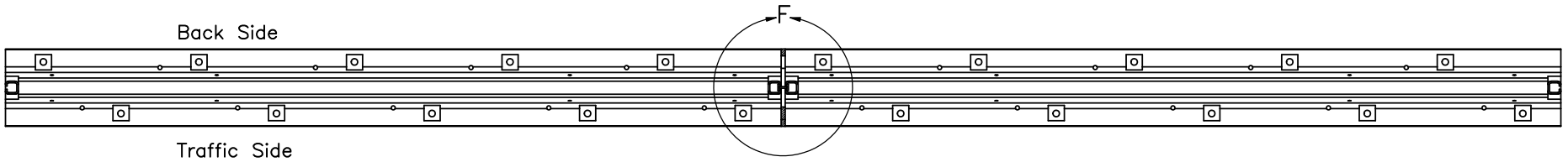
PROFILE VIEW

Midwest Roadside Safety Facility

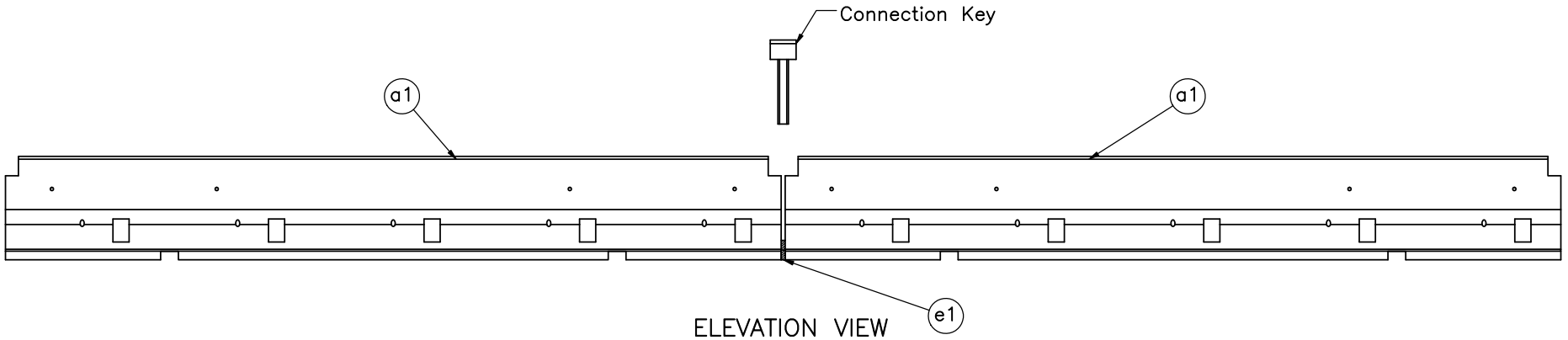
NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5

Connection Socket Components

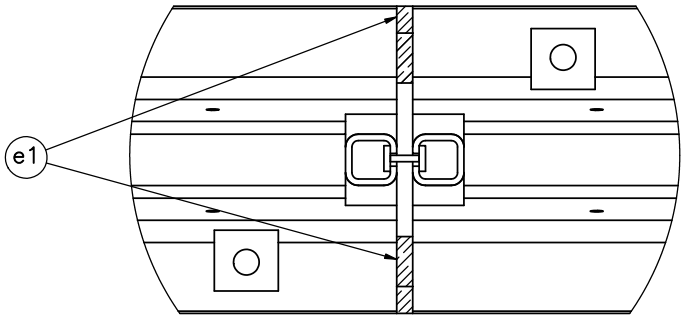
SHEET: 12 of 16		
DATE: 10/30/2018		
DRAWN BY: TJD/JEK/DTM		
DWG. NAME. NJPCB–5_R9	SCALE: 1:4 UNITS: In.[mm]	REV. BY: KAL/SB/JEK/JCH



PLAN VIEW



ELEVATION VIEW



DETAIL F
SCALE 1 : 15

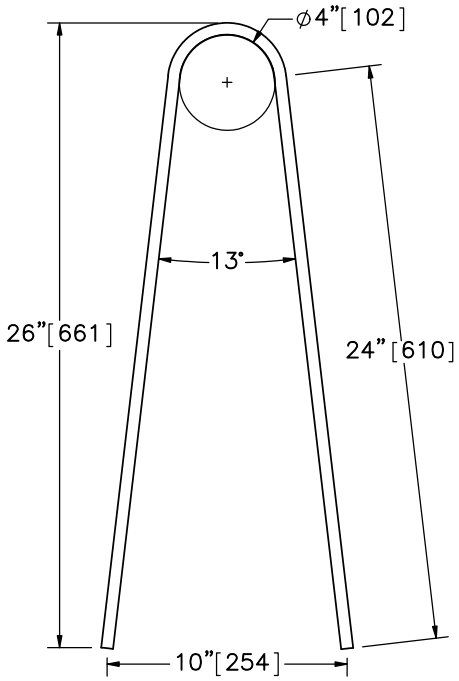
Notes: (1) Curved cover plate, stiffeners, and box–beam are not shown in Plan View and Detail F.

(2) Groundline and vertical anchors at toe of barrier not shown for clarity.

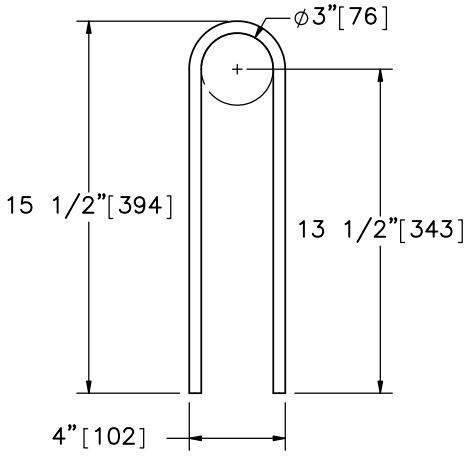
Midwest Roadside Safety Facility	NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5 Connection Key Placement	SHEET: 13 of 16 DATE: 10/30/2018 DRAWN BY: TJD/JEK/DTM
DWG. NAME. NJPCB–5_R9	SCALE: 1:50 UNITS: In.[mm]	REV. BY: KAL/SB/JEK/JCH

BILL OF BARS				
ITEM NO.	QTY.	BAR SIZE	TOTAL LENGTH	MATERIAL SPEC.
a2	18	∅1" [25]	15" [381]	A36
b1	80	#4 [13]	59" [1499]	A615 Gr. 60
b2	20	#6 [19]	6" [152]	A615 Gr. 60
b3	20	#6 [19]	14" [356]	A615 Gr. 60
b4	90	#4 [13]	37" [940]	A615 Gr. 60
b5	40	#6 [19]	19'–0" [5791]	A615 Gr. 60

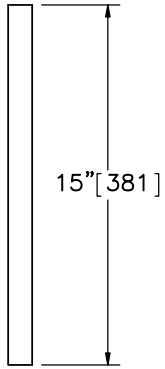
Note: (1) Quantities in Bill of Bars represent a system with ten barriers.



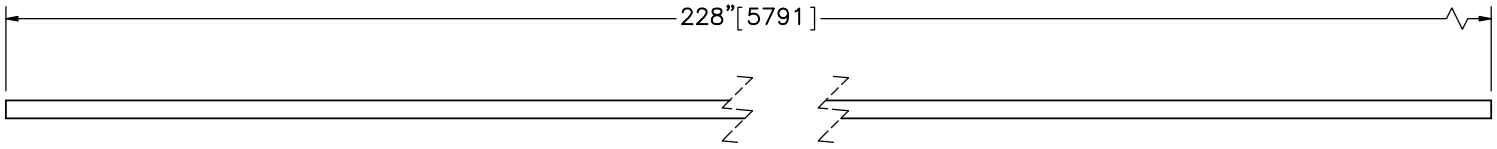
Part b1



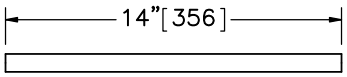
Part b4



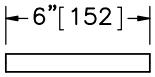
Part a2



Part b5



Part b3



Part b2

Midwest Roadside Safety Facility

NJ Box–Beam Stiffened Portable Concrete Barrier Test NJPCB–5

Bill of Bars

SHEET: 14 of 16

DATE: 10/30/2018

DRAWN BY: TJD/JEK/DTM

DWG. NAME. NJPCB–5_R9

SCALE: 1:8

UNITS: In.[mm]

REV. BY: KAL/SB/JEK/JCH

(1) Minimum concrete clear cover for reinforcement steel shall be 1 1/2" [38 mm].

(2) All end segments shall be pinned.

(3) After a segment has been placed and the connection key inserted, pull the unit in a direction parallel to its longitudinal axis to remove any slack in the joint.

(4) The portable concrete barrier shall be cast in steel forms.

(5) The portable concrete barrier shall be barrier segments of 20 feet [6,096 mm]. However, other lengths may be used to meet field conditions. The number and placement of the b2 and b3 reinforcement steel will vary with the length of the barrier segment as shown on the table of variable reinforcement steel. The b5 reinforcement steel shall be 10" [254 mm] shorter than the nominal length of the barrier segments.

(6) Reinforcing shown is the minimum required. Additional reinforcing necessary for handling shall be the option and responsibility of the contractor.

(7) Welding and fabrication of steel structures shall be in accordance with sections 1 thru 6 of the ANSI/AASHTO/AWS D1.5 bridge welding code and section 10 of the ANSI/AWS D1 structural welding code. Surfaces to be welded shall be free of scale, slag, rust, moisture, grease or any other material that will prevent proper welding or produce objectional fumes. Welding shall be shielded metal arc welding using properly dried 5/32" [4 mm] dia. E7018 electrodes.

(8) The length of the pins shall be such that a minimum embedment length of 5" [127 mm] is obtained when embedded into concrete pavement. When anchor pins are in place, they shall not project above the plane of the concrete surface of the barrier. Holes in bridge decks shall be 1 1/4" [32 mm] diameter maximum and made with a core drill or any other approved rotary drilling device that does not impart an impact force.

(9) Use non–shrink grout of a plastic consistency that is listed on the QPL and conforms to ASTM C 1107 with the following amendments:
1. Ensure that the grout has a working time of at least 30 minutes from the time the water is added.
2. Match the color of the hardened grout, where visible, to the color of the adjacent hardened concrete.
3. Include 1–day strength tests as part of the performance requirements of ASTM C 1107.
4. Ensure that the grout contains no more than 0.05 percent chlorides or 5.0 percent sulfates by weight.
5. Minimum 1–day compressive strength of 1,000 psi [6.9 MPa].

(10) Use connection key in every joint. Pin end segments with pins in every anchor pin recess.

(11) The box–beam is to be in accordance with the requirements of the standard specifications.

(12) The shimming consists of 8"x8"x1/2" [203x203x13 mm] square plate and fender washers as needed to snug the box–beam stiffener to the portable concrete barrier.

(13) The presence of normal holes drilled per this sheet will not affect the reusability of the concrete segments.

(14) Drill holes in the portable concrete barrier for purpose of box–beam attachment using a core drill or any other approved rotary drilling device that does not impart an impact force.

Item No.	QTY.	Description	Material Spec	Galvanization Spec
a1	10	Concrete Barrier Segment – NJDOT Type 4 Barrier (Alternate B)	Min. f'c = 3,700 psi [25.5 MPa]	–
a2	18	1" [25] Dia., 15" [381] Long Steel Anchor Pin	ASTM A36	* ASTM A123
b1	80	1/2" [13] Dia., 59" [1,499] Long Bent Rebar	ASTM A615 Gr. 60	–
b2	20	3/4" [19] Dia., 6" [152] Long Rebar	ASTM A615 Gr. 60	–
b3	20	3/4" [19] Dia., 14" [356] Long Rebar	ASTM A615 Gr. 60	–
b4	90	1/2" [13] Dia., 37" [940] Long Bent Rebar	ASTM A615 Gr. 60	–
b5	40	3/4" [19] Dia., 228" [5,791] Long Rebar	ASTM A615 Gr. 60	–
c1	20	4"x4"x1/2" [102x102x13] x 20" [508] Long Tube	ASTM A500 Gr. B or C	–
c2	40	40 1/2"x2"x1/4" [1,029x51x6] Bent Steel Plate	ASTM A36	–
c3	20	34 1/2"x2"x1/4" [876x51x6] Bent Steel Plate	ASTM A36	–
d1	18	25 1/2"x2"x1/2" [648x51x13] Steel Plate	ASTM A36	–
d2	9	25 1/2"x2 1/4"x1/2" [648x57x13] Steel Plate	ASTM A36	–
d3	18	6 3/16"x1 3/8"x1/2" [157x35x13] Steel Plate – Stiffener	ASTM A36	–
d4	9	17"x8"x1/2" [432x203x13] Bent Steel Plate – Top Plate	ASTM A36	–
e1	1	Non-Shrink Grout	Min. 1-day Compressive Strength 1,000 psi [6.9 MPa]	–
f1	9	6"x6"x3/16" [152x152x5] x 144" [3,658] Long Box Beam	ASTM A500 Gr. C	* ASTM A123
f2	36	8"x8"x1/2" [203x203x13] Steel Plate	ASTM A36	* ASTM A123
f3	36	3/4" [19] Dia., 17" [432] Long Carriage Bolt without Square Neck and Nut	Bolt – ASTM A307 Gr. A Nut – ASTM A563A	* ASTM A153 or B695 Class 55 or F2329
f4	36	3/4" [19] Dia. Fender Washer	ASTM F844	* ASTM A123 or A153 or F2329

* Component does not need to be galvanized for testing purposes.

Midwest Roadside Safety Facility

NJ Box-Beam Stiffened Portable Concrete Barrier Test NJPCB-5

Bill of Materials

SHEET: 16 of 16

DATE: 10/30/2018

DRAWN BY: TJD/JEK/DTM

DWG. NAME. NJPCB-5_R9

SCALE: None

UNITS: In.[mm]

REV. BY: KAL/SB/JEK/JCH

System: NJ Box–Beam Stiffened Portable Concrete Barrier Revision History
Drawing: NJPCB–5

REV.	DATE OF ISSUE	Page	NATURE OF CHANGES	REVIEWER	REVISED BY
0	5/25/2016	–	Drawing created from NJPCB–3.	–	TJD
1	5/25/2016	13	Note edit.	KAL	TJD
		15	Changed sheet scale.		
2	6/7/2016	1	Dimension edits. Changed size of details b and c.	SB	TJD
		2	Dimension edits. Added detail c front view, moved detail c back view to next page. Added detail d.		
		3	Added section view. Detail c back view moved to this page.		
		6	Removed box–beam from view. Deleted notes.		
		7	Note edits. Dimension edit.		
		8	Changed length of bolt b4.		
		15	Added notes 11–14.		
		16	Bill of materials edits.		
3	6/13/2016	2	Sheet name change.	SB	TJD
		3	Sheet name change. Note edits.		
		15	Note edit.		
4	12/19/2016	–	Template, font sizes, dual dimension placement, conventions updated throughout. Part renumbering. Dimension shifts throughout.	JEK	JEK
5	1/18/2017	3	Dim add.	JCH	JEK
6	5/26/2017	BOM	Galv: a2, c1–3, d1–4, f1–4.	KAL	JEK
7	6/5/2017	16	Changed Galvanization specs on part nos. b1 through b5.	JEK	DTM
8	2/27/2018	1	Note 6 edit.	KAL	JEK
		BOM	Description: f3. Mtrl: e1.		
9	10/30/2018	1	Note edit.	JEK	DJW