U.S. Department of Transportation
Federal Highway Administration

1200 New Jersey Avenue, SE.
Washington, DC 20590

January 28, 2010

In Reply Refer To: HSSD/B-200

Mr. Ronald K. Faller, Ph.D.
Research Assistant Professor
Midwest Roadside Safety Facility
University of Nebraska-Lincoln
527 Nebraska Hall
Lincoln, NE 68588-0529

Dear Dr. Faller:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety device for use on the National Highway System (NHS).

Name of device:	West Virginia Steel Bridge Railing for use on Transverse, Nail-Laminated, Timber Bridges
Type of device:	Permanent Steel Barrier
Test Level:	NCHRP Report 350 TL-2
Testing conducted by:	Midwest Roadside Safety Facility (MwRSF)
Date of request:	September 13, 2009
Date of completed package:	September 13, 2009
Task Force 13 Designator:	SBT11b

You requested that we find this device acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Requirements
Roadside safety devices should meet the guidelines contained in the NCHRP Report 350 or the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH). The FHWA Memorandum "Identifying Acceptable Highway Safety Features" of July 25, 1997, provides further guidance on crash testing requirements of longitudinal barriers.

Description

For this project, the research objectives included the modification of existing test level 2 (TL-2) steel thrie beam bridge railing as per FHWA Acceptance Letter HSA-10/B-138 dated August 4, 2005. This thrie beam steel post bridge barrier was connected to a transverse, glue-laminated, timber bridge deck system. Eight 7/8-in. (22.2-mm) diameter by 7 3/4-in. (197-mm) long, ASTM A307 (Grade 2 equivalent) hex head bolts with timber shear connectors were used to anchor the posts and deck plates to the glulam timber deck panels. For this research, crash testing used the same barrier and connection plate system for use on a transverse, nail laminated, timber bridge deck supported by steel wide-flange beams. The Steel Bridge Railing for use on Transverse, Nail-Laminated Timber Bridge Decks was evaluated using dynamic bogie testing on the steel bridge posts attached to nail-laminated timber deck. The dynamic component testing program was then used to verify that the post-to-deck attachment hardware as well as the timber deck would remain intact under peak impact loading deemed representative of a pickup truck crash test conducted under the TL-2 impact safety standards of NCHRP Report 350. In addition, the testing was used to demonstrate that the peak impact loading would not result in significant deck damage. Dynamic component testing was used to verify use of the previously crash-tested bridge railing system on transverse, nail-laminated, timber deck bridges. In addition, testing also evaluated the benefits for utilizing timber shear plates within the post-to-deck connection.

The steel bridge posts were 42 3/4-in. (1,086-mm) long, W6x12 (W152x17.9) beams made from ASTM A992 or ASTM A572 Grade 50 steel, as shown in Figures 7 through 9. Near the top of the post, four 3/4-in. (19-mm) diameter bolt holes were placed within the front flange. The blockouts were bolted to the posts using these bolt holes. Slots were cut into the front flange near the bottom of each post and used to fasten the bottom deck plate to the post.

In addition to the fabricated holes and slots, a steel post plate was welded to the front flange 9 in. (229 mm) from the bottom of the post. Each post plate measured 10 3/8 in. x 4 in. x 1/2 in. (264 mm x 102 mm x 13 mm). Two slots were cut into the post plate and used to bolt the top deck plate to the post. To provide stiffness and resistance to buckling, gusset plates and stiffeners were also welded to the posts.

Gussets were placed on both sides of the web at the bottom of the post and directly behind the top of the post plate, while the post wing stiffeners were located along the top of the post plate and adjacent to the gusset plates. These gussets and stiffeners were designed to provide additional stiffness to the post and to prevent localized buckling near the deck plate attachments.

Deck plate assemblies were utilized to attach the bridge posts to the bridge deck. The top deck plate was 1/2 in. (13 mm) thick, while the bottom deck plate was 3/8 in. (10 mm) thick. The deck plates are fabricated from ASTM A36 steel and contained eight 1-in. (25-mm) diameter holes. Eight 7/8-in. (22.2-mm) diameter by 7 3/4-in. (197-mm) long, Grade 5 bolts were to be used to fasten the deck plates to the edge of the timber bridge deck. Since this detail produced minor bearing deformations around some of the vertical holes, the following alternative attachment options to reduce the incidence of deformations may be specified:

a. Eight 7/8-in. (22.2-mm) diameter ASTM A307 (Grade 2 equivalent) bolts in combination with 4-in. (102-mm) diameter timber shear connectors.
b. Eight 7/8-in. (22.2-mm) diameter ASTM A325 (Grade 5 equivalent) bolts in combination with 4-in. (102-mm) diameter timber shear connectors

Steel rectangular end plates were welded to the back side of the deck plates and provided the locations where the bridge post bolted to the plates. The end plates were welded to the deck plates using triangular-shaped plate stiffeners. Two 7/8-in. (22.2-mm) diameter ASTM A325 hex head bolts were used to fasten the top deck plate to each post, while two 5/8-in. (15.9-mm) diameter ASTM A325 hex head bolts were used to fasten the bottom deck plate to each post.

Post blockouts were configured with ASTM A992 or ASTM A572 Grade 50, W6x12 (W152x17.9) steel sections that attached to the front face of the bridge posts. Eight 3/4-in. (19-mm) holes, four in the front flange and four in the back flange, were placed into each blockout. Four 5/8-in. (15.9-mm) diameter by 2-in. (51-mm) long, ASTM A307 heavy hex head bolts were used to secure each blockout to each post.

A transverse, nail-laminated, timber bridge deck was constructed at MwRSF's outdoor test facility for this research project. The bridge deck was constructed from 14-ft (4.3-m) long, 2-in. x 6-in. (51-mm x 152-mm) treated, dimensional lumber and covered by a 2-in. (51-mm) thick concrete wearing surface. The timber boards were manufactured from Grade No. 1 Southern Yellow Pine and treated with ACQ-D to a minimum net retention of 0.40 lbs/ ft^3 (6.41 kg/m3) satisfying AWPA U1, UC4A. However for actual bridge installations, the research recommends that the dimensional lumber boards be treated to a net retention of 0.60 lbs/ft^3 (9.61 kg/m^3) satisfying AWPA U1, UC4B. The boards were placed on end and nailed together through and perpendicular to the wide face of the board using 20d or 20 penny "common" nails. A specific nail pattern, which repeated every four boards, was used to ensure that a nail did not contact a previously driven nail. Special care was given to the nail pattern near the deck edge to ensure the nails did not occupy space where the vertical bolt holes for the bridge rail would later be drilled. During deck assembly, two beads of Liquid Nails Heavy Duty Construction Adhesive were applied to the sides of the boards and over the outer 3 ft (0.9 m) of deck. The adhesive was used to provide additional punching shear resistance in the deck as well as improved load transfer between boards.

West Virginia TL-2 Steel Bridge Railing for use on Transverse Nail-Laminated, Timber Bridge Barrier drawings for the construction of the test installation are included with this correspondence. In addition, transition details for this bridge barrier can also be found in FHWA Acceptance Letter HSA-10/B-138 Revised.

Findings

We concur with your request that the West Virginia Steel Bridge Railing for use on Transverse Nail-Laminated, Timber Bridges be granted equivalence to existing successfully crash tested bridge rail meeting TL-2 conditions as per NCHRP Report 350 and will be considered acceptable for use on the NHS. For further information on the crash test, the Test Data Summary Sheet is included with this correspondence.

Please note the following standard provisions that apply to the FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and the MASH.
- To prevent misunderstanding by others, this letter of acceptance is designated as number B-200 and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- The West Virginia Steel Bridge Railing for use on Transverse, Nail-Laminated, Timber Bridges is a generic system and not considered proprietary.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented device for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate device, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely yours,

David A. Nicol, P.E.
Director, Office of Safety Design
Office of Safety

FHWA:HSSD:WLongstreet:tb:x60087:1/8/10
File: s://directory folder/wlongstreet/ B200_WV steel post for nail laminated bridge deck 010710 RKF.doc
cc: HSSD (Reader, HSA; Chron File, HSSD; W.Longstreet, HSSD; NArtimovich, HSSD; MMcDonough, HSSD)

U.S. Department of Transportation
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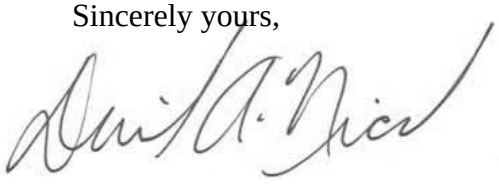
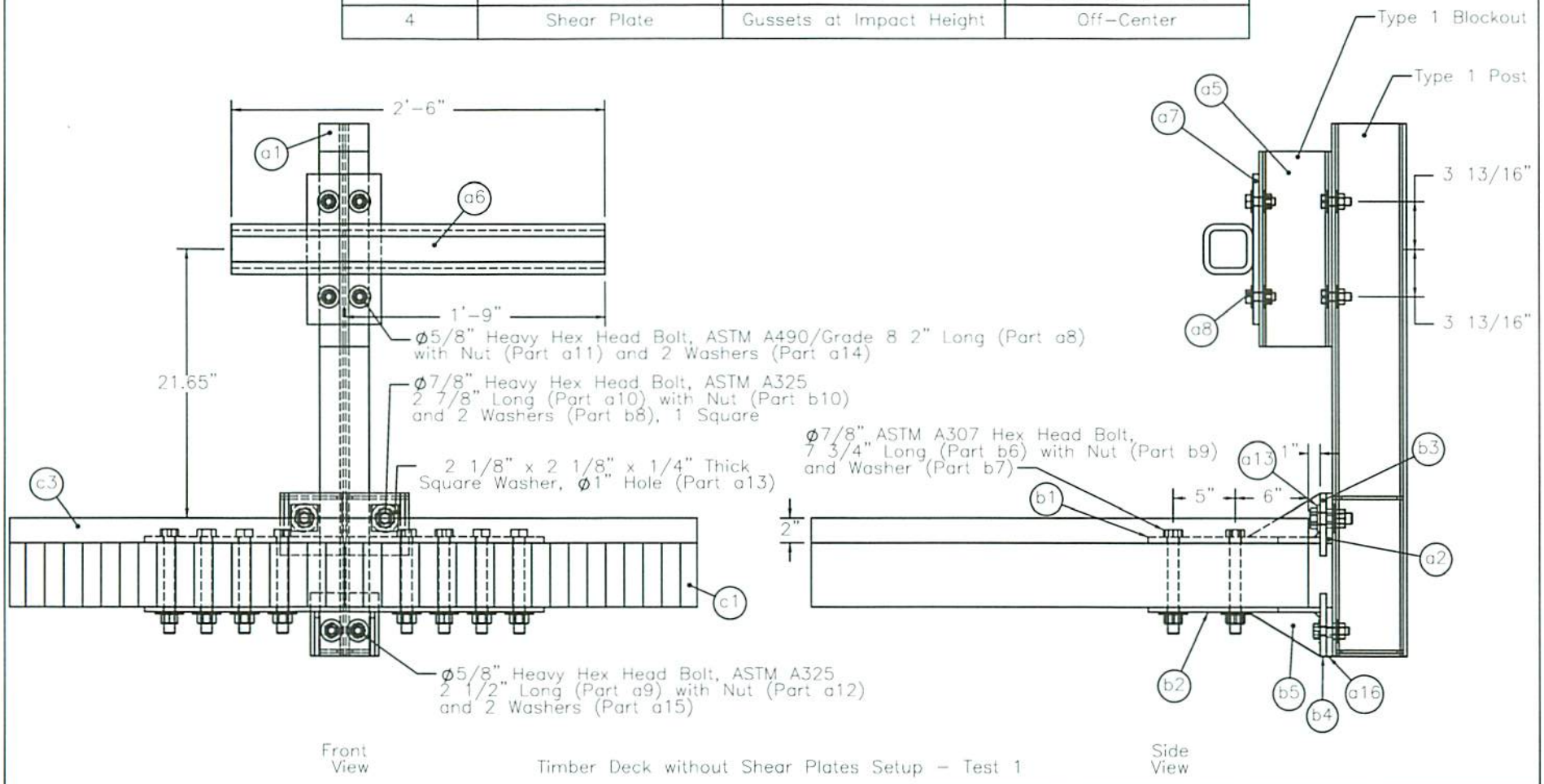


David A. Nicol, P.E.
Director, Office of Safety Design
Office of Safety

West Virginia TL-2 Bogie Testing Matrix			
Test No.	Shear Connector	Additional Torsional Stiffener	Impact Location
1	None	None	Centered on Post
2	None	Gussets at Impact Height	Off-Center
3	Shear Plate	None	Centered on Post
4	Shear Plate	Gussets at Impact Height	Off-Center



Timber Deck without Shear Plates Setup - Test 1

Midwest Roadside Safety Facility

West Virginia TL-2 Post

Timber Deck without Shear Plates

Test 1

SHEET: 1 of 14

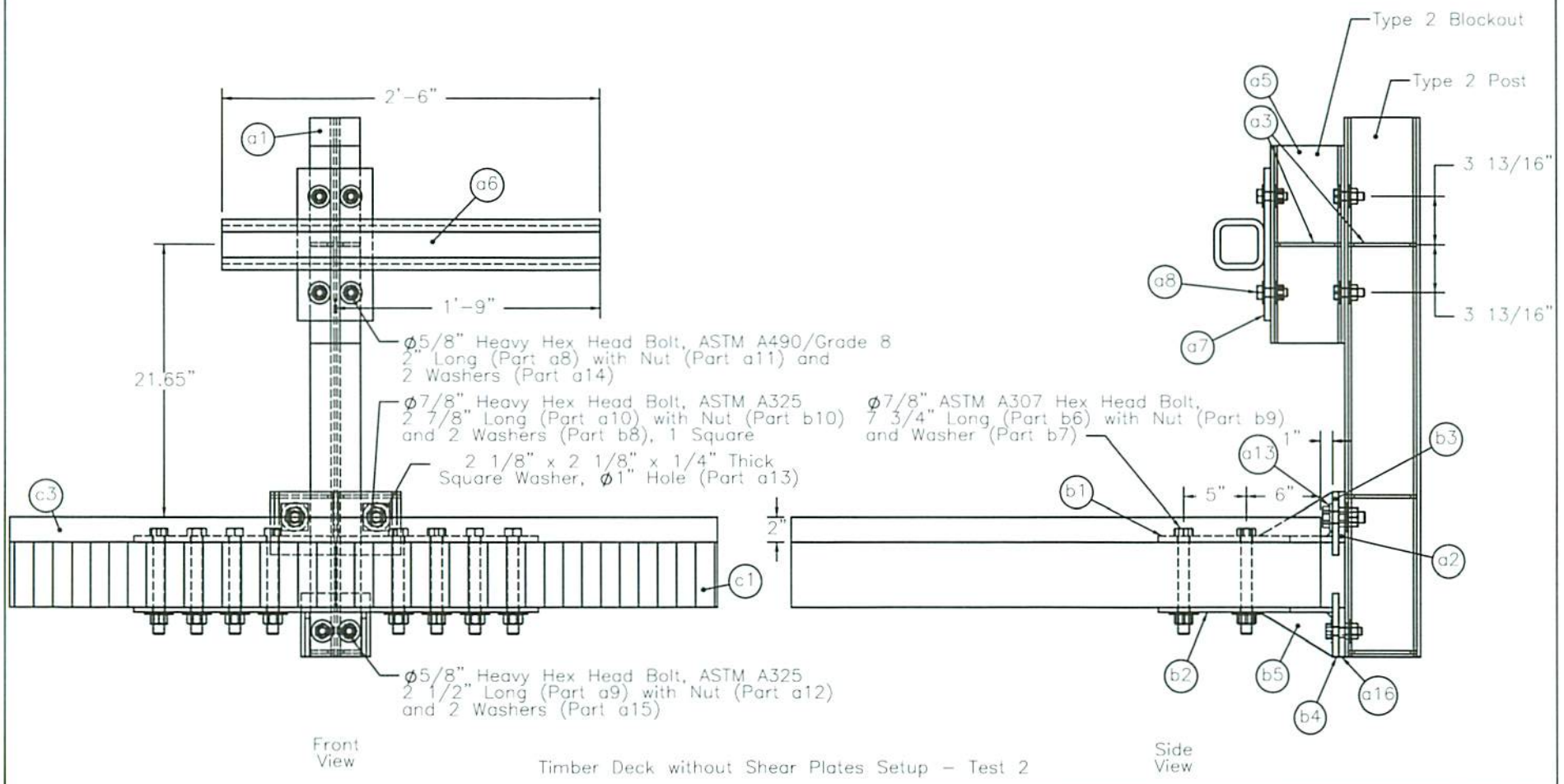
DATE: 9/8/2008

DRAWN BY: EMA/RJT

DWG. NAME: wvbridge rail (t-2)_R5

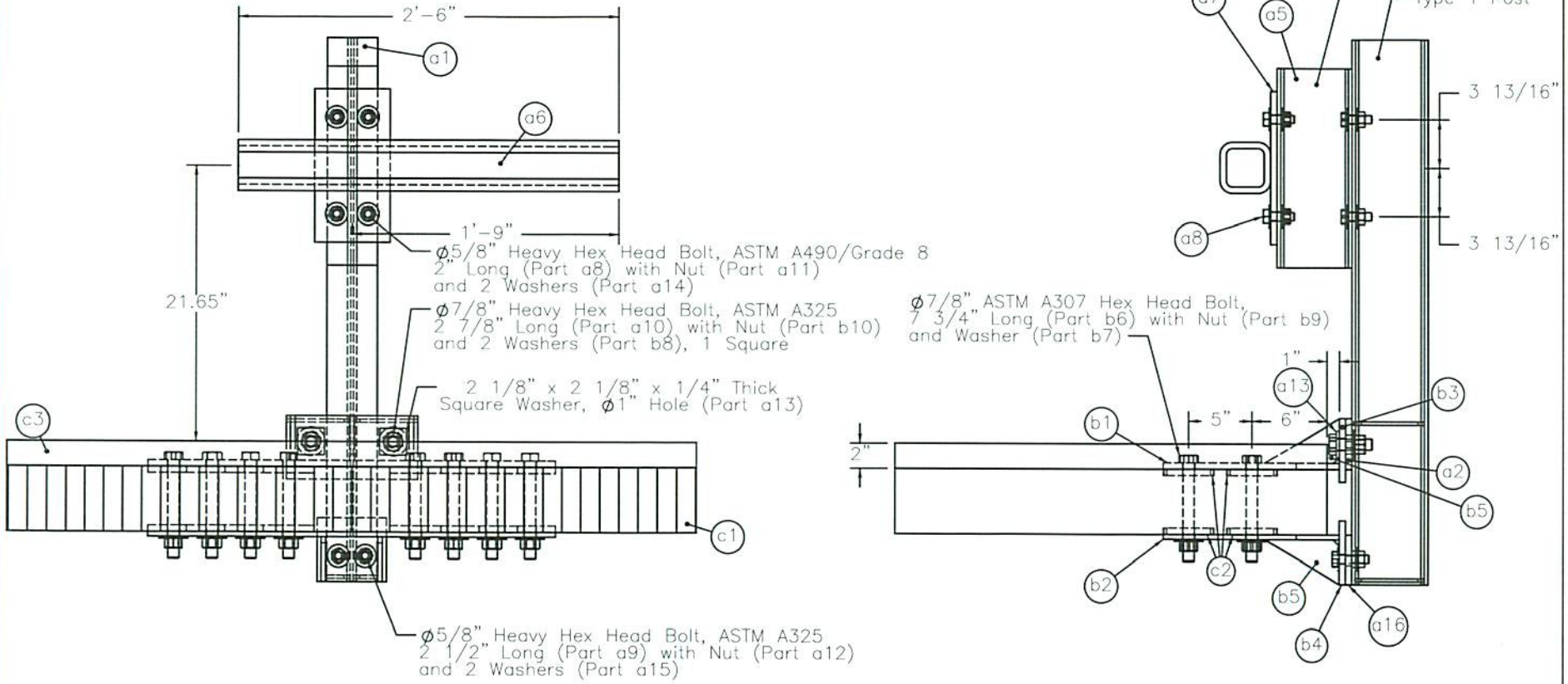
SCALE: None UNITS: Inches

REV. BY: RKF/SKR



Timber Deck without Shear Plates Setup – Test 2

Midwest Roadside Safety Facility	West Virginia TL-2 Post Timber Deck without Shear Plates Test 2	SHEET: 2 of 14 DATE: 9/8/2008 DRAWN BY: EMA/RJT
	DWG. NAME: wvbridge rail (t-2)_R5 SCALE: None UNITS: Inches	REV. BY: RKF/SKR

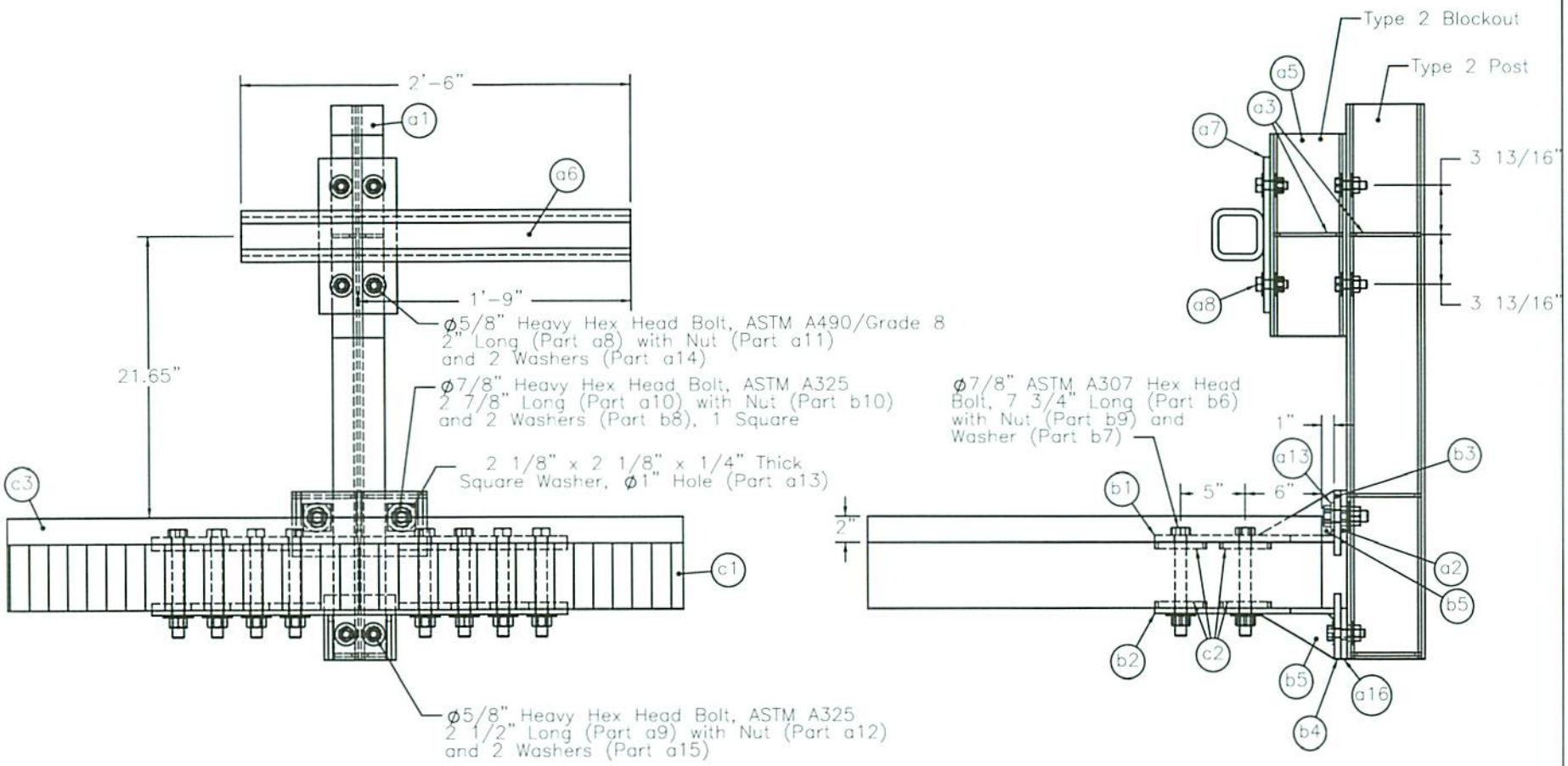


Front View

Timber Deck with Shear Plates Setup – Test 3

Side View

Midwest Roadside Safety Facility	West Virginia TL-2 Post Timber Deck with Shear Plates Test 3	SHEET: 3 of 14 DATE: 9/8/2008 DRAWN BY: EVA/RJT
	DWG. NAME: wvbridge rail(tl-2)_R5 SCALE: None UNITS: Inches	REV. BY: RKF/SKR

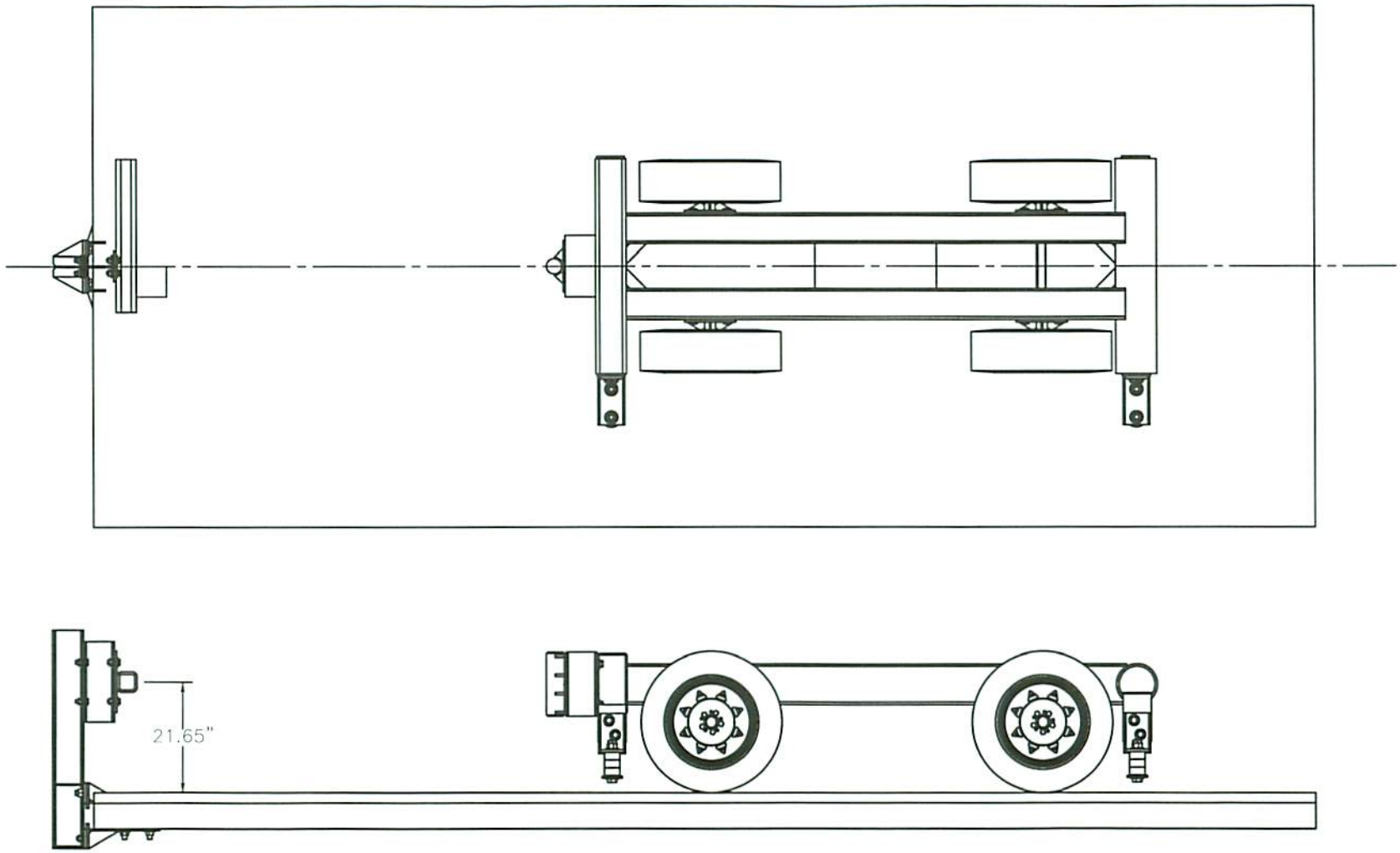


Front View

Timber Deck with Shear Plates Setup – Test 4

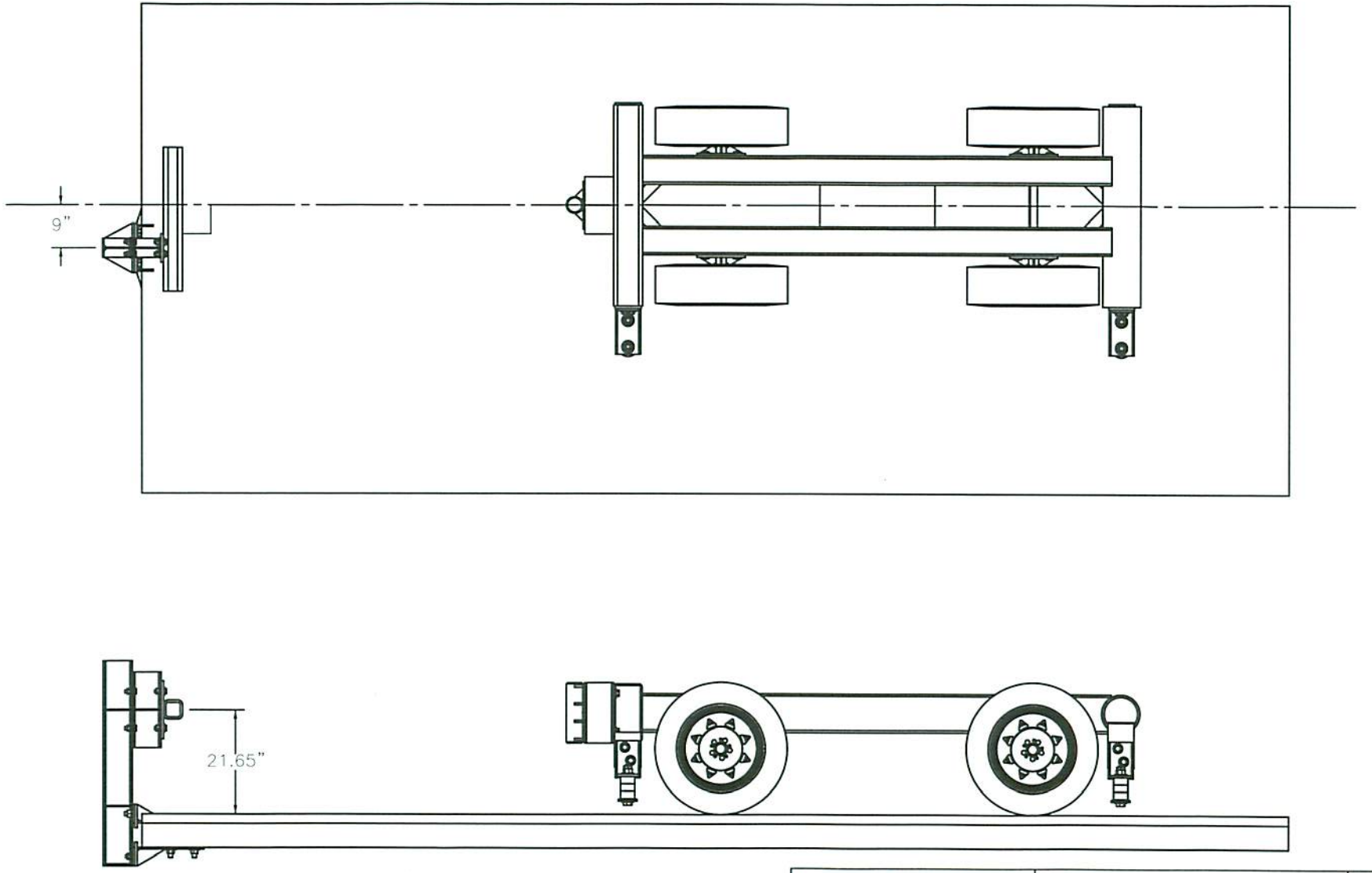
Side View

Midwest Roadside Safety Facility	West Virginia TL-2 Post Timber Deck with Shear Plates Test 4	SHEET: 4 of 14 DATE: 9/8/2008 DRAWN BY: EMA/RJT
	DWG. NAME: wvbridge rail(tl-2)_R5 SCALE: None UNITS: inches	REV. BY: RKF/SKR



Notes: (1) Target impact speed = TBD mph.

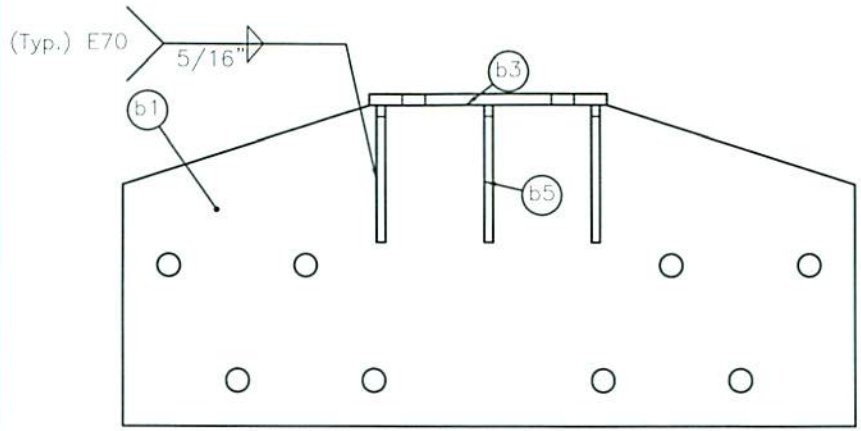
Midwest Roadside Safety Facility	West Virginia TL-2 Post Inline Bogie Orientation Tests 1 and 3	SHEET: 5 of 14 DATE: 9/8/2008 DRAWN BY: EMA/RJT
	DWG. NAME: wvbridge rail(tl-2)_R5 SCALE: None UNITS: Inches	REV. BY: RKF/SKR



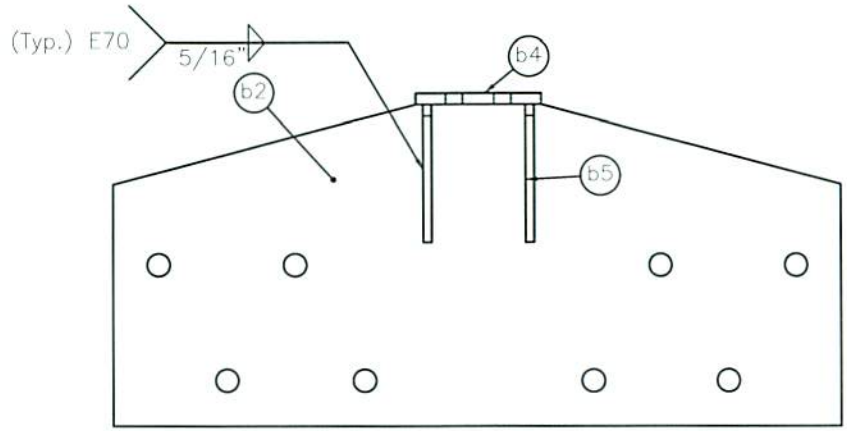
Notes: (1) Target impact speed = TBD mph.

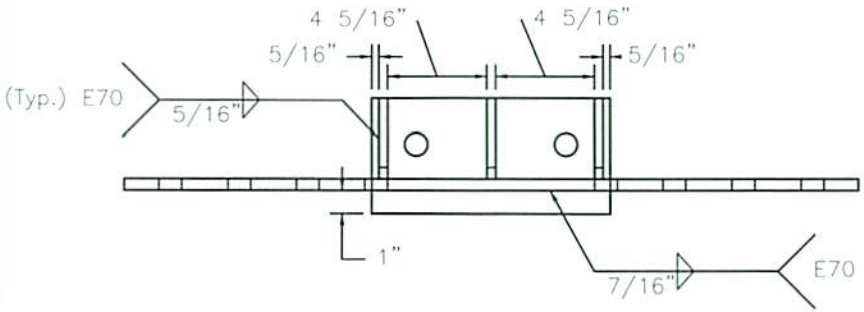
Midwest Roadside Safety Facility	West Virginia TL-2 Post Offset Bogie Orientation Tests 2 and 4	SHEET: 6 of 14 DATE: 9/8/2008 DRAWN BY: EMA/RJT
	DWG. NAME: wvbridge rail(t-2)_R5 SCALE: None UNITS: Inches	REV. BY: RKF/SKR

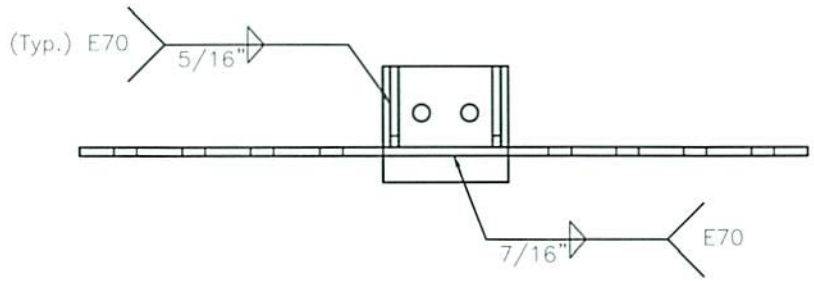
Top Deck Plate Assembly



Bottom Deck Plate Assembly







Midwest Roadside Safety Facility

West Virginia TL-2 Post

Top and Bottom Deck Plate Assemblies

SHEET: 7 of 14

DATE: 9/8/2008

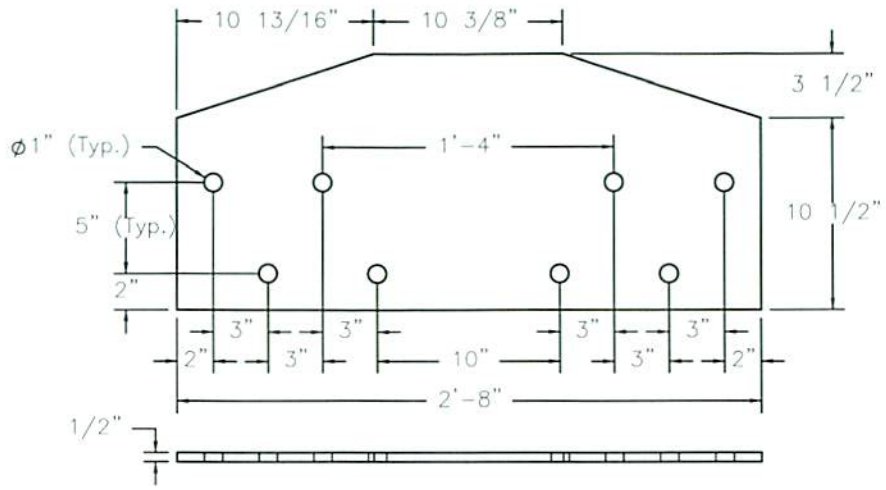
DRAWN BY: EVA/RJT

DWG. NAME: wvbridge rail(tl-2)_R5

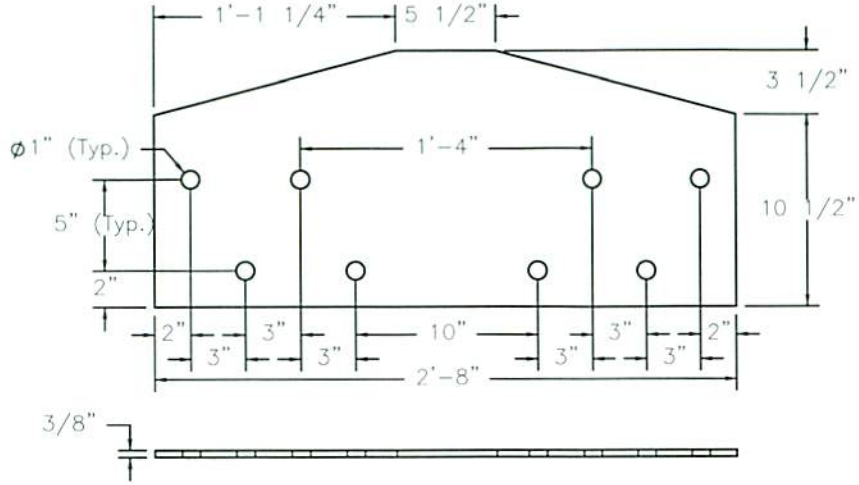
SCALE: None

UNITS: inches

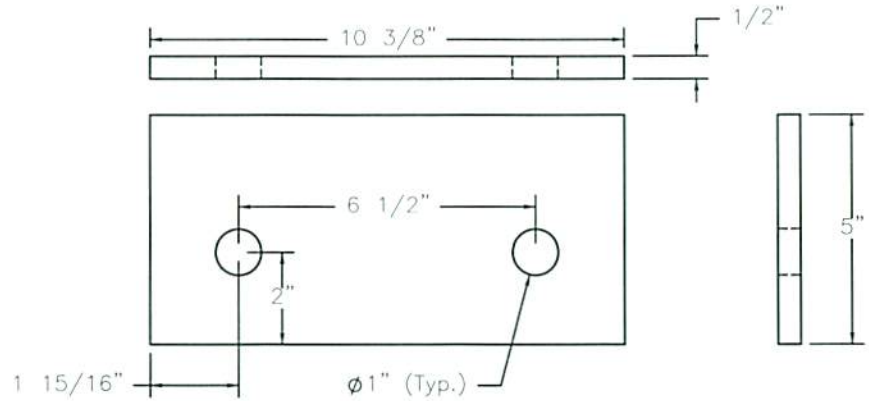
REV. BY: RKF/SKR



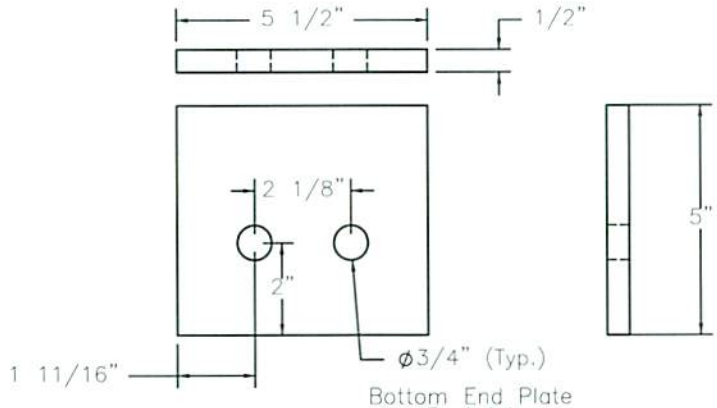
Top Deck Plate
Part b1



Bottom Deck Plate
Part b2



Top End Plate
Part b3



Bottom End Plate
Part b4

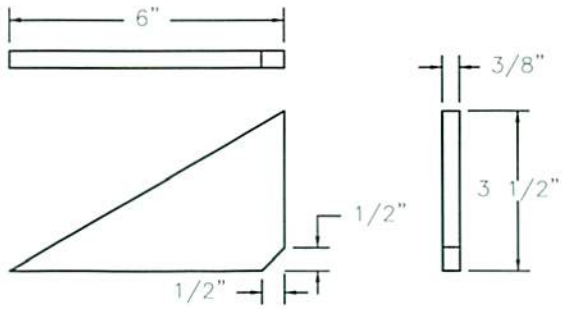
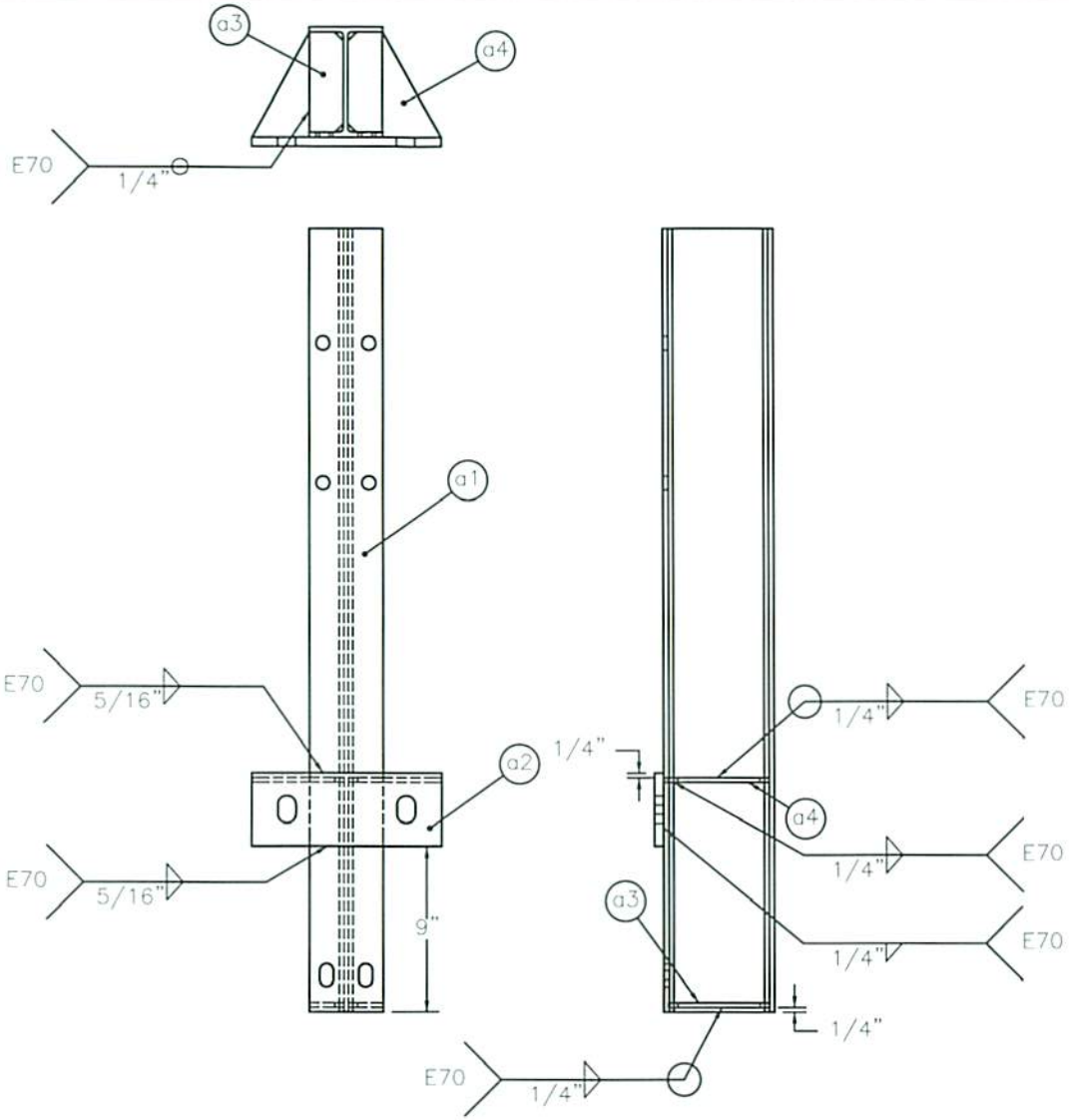
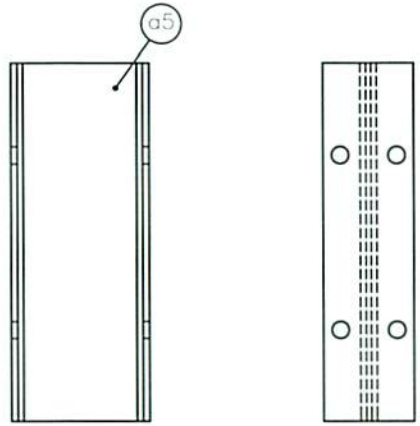


Plate Stiffener
Part b5

MwRSF	West Virginia TL-2 Post	SHEET: 8 of 14
	Deck Plate Component Details	DATE: 9/8/2008
		DRAWN BY: EVA/RJT
Midwest Roadside Safety Facility	DWG. NAME: wvbridge rail(tl-2)_R5 SCALE: None UNITS: Inches	REV. BY: RKF/SKR

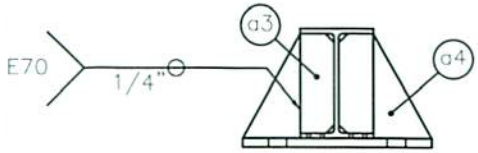


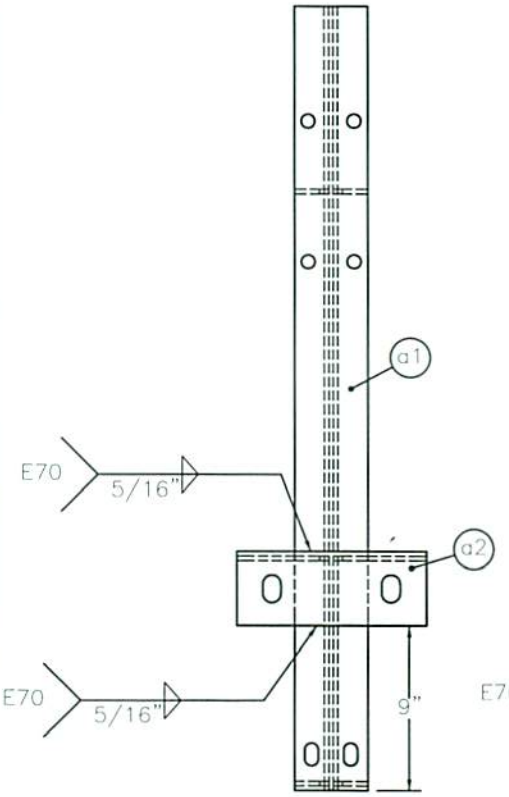
Bridge Post Assembly – Type 1

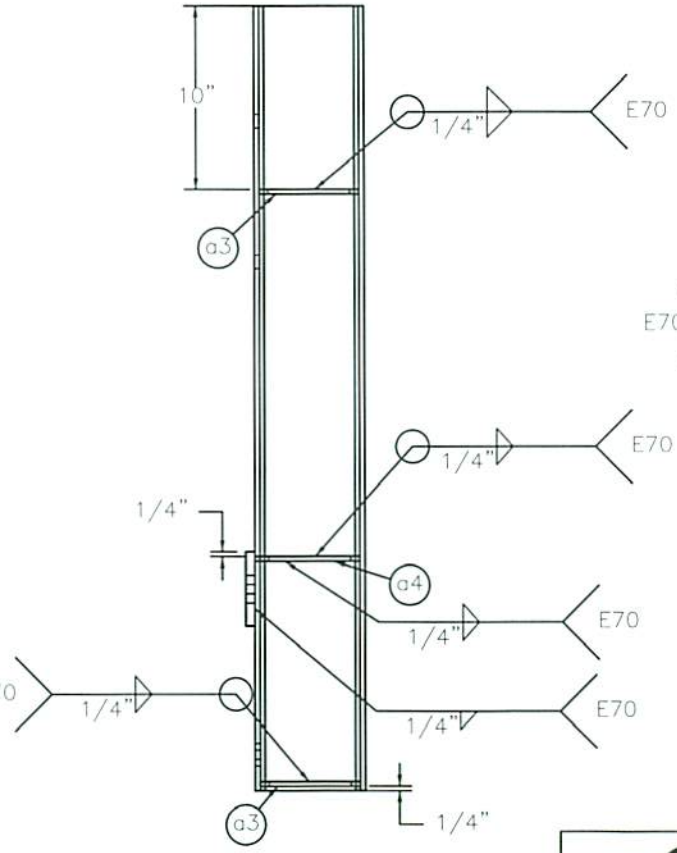


Blockout Assembly – Type 1

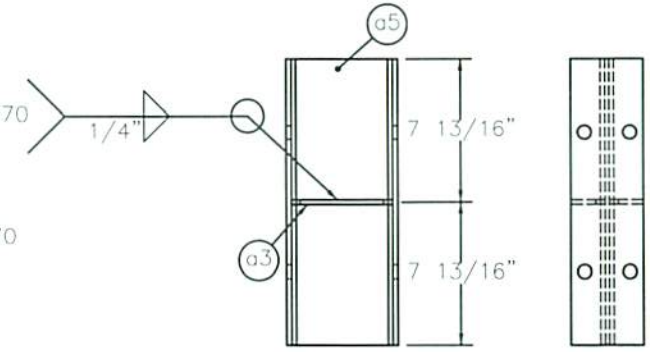
Midwest Roadside Safety Facility	West Virginia TL–2 Post Bridge Post and Blockout Assemblies Type 1	SHEET: 9 of 14 DATE: 9/8/2008 DRAWN BY: EMA/RJT
	DWG. NAME: wvbridge rail(tl-2)_R5 SCALE: None UNITS: Inches	REV. BY: RKF/SKR





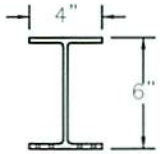


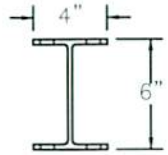
Bridge Post Assembly – Type 2

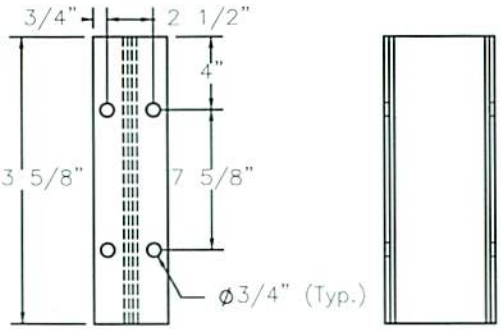


Blockout Assembly – Type 2

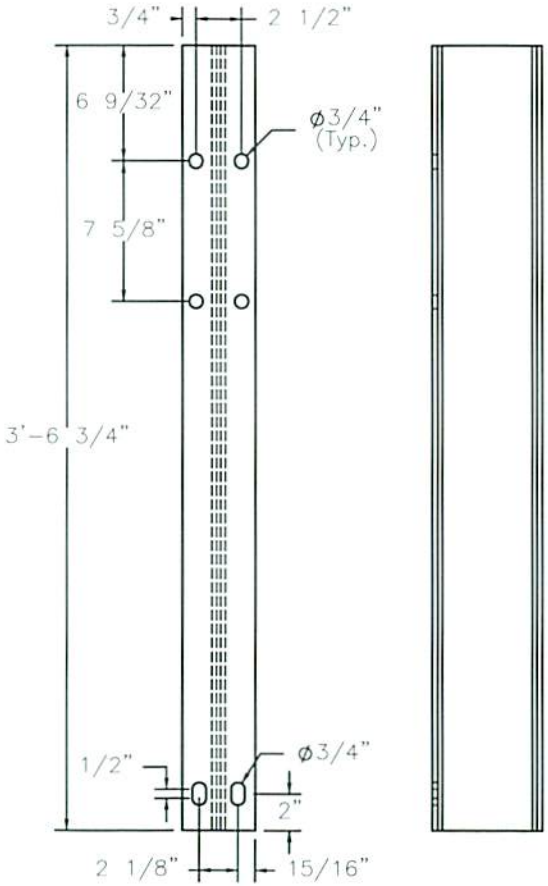
Midwest Roadside Safety Facility	West Virginia TL–2 Post Bridge Post and Blockout Assemblies Type 2	SHEET: 10 of 14 DATE: 9/8/2008 DRAWN BY: EMA/RJT
	DWG. NAME: wvbridge rail(tl-2)_R5 SCALE: None UNITS: Inches	REV. BY: RKF/SKR



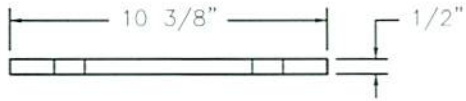


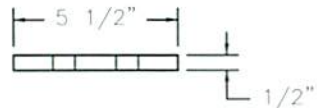


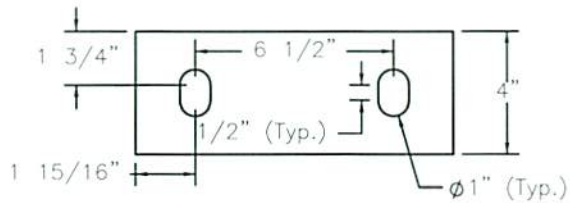
W6x12 Steel Blockout
Part a5



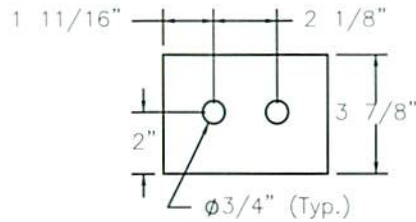
W6x12 Steel Post
Part a1





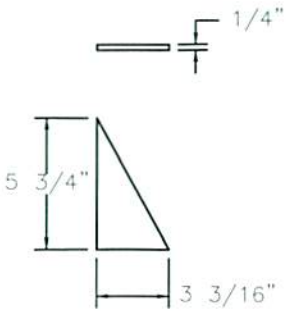


Post Plate
Part a2

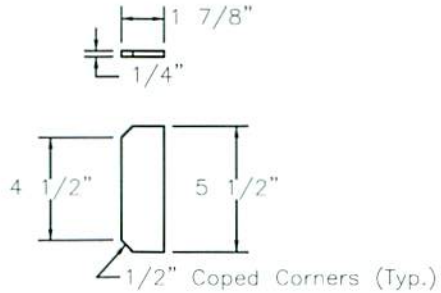


Post Plate Washer
Part a16

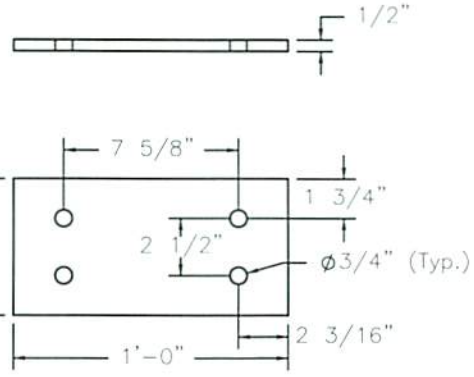
MwRSF	West Virginia TL-2 Post	SHEET: 11 of 14
	Post, Blockout, Post Plate, and Washer Details	DATE: 9/8/2008
		DRAWN BY: EVA/RJT
Midwest Roadside Safety Facility	DWG. NAME: wvbridge rail (tl-2)_R5 / SCALE: None / UNITS: Inches	REV. BY: RKF/SKR



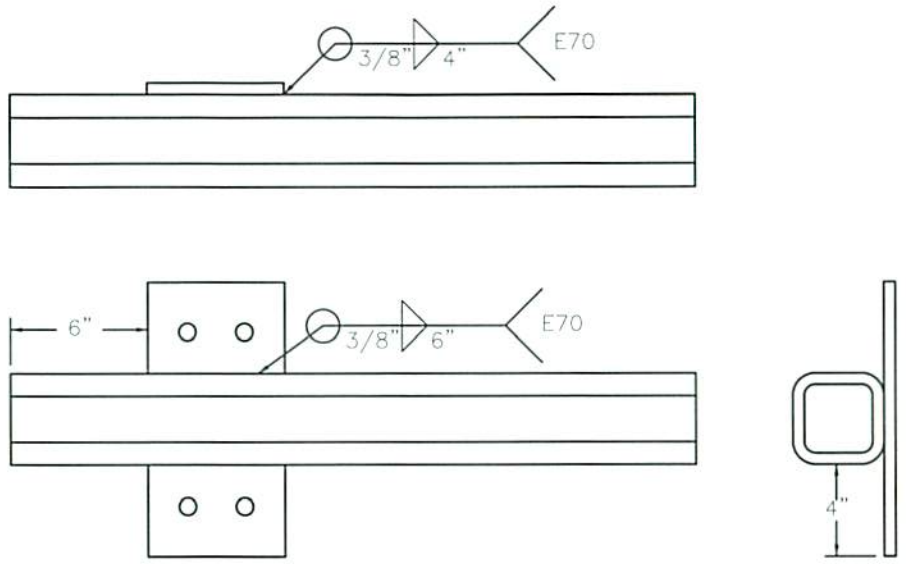
Post Wing Stiffener
Part a4



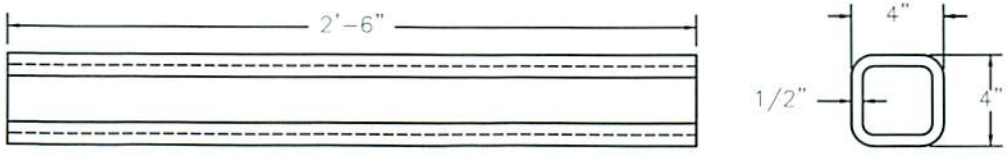
Post and Blockout Stiffener
Part a3



Weld Plate for Square Tube
Part a7

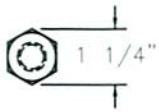


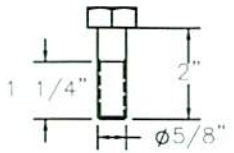
Square Tube and Weld Plate Assembly



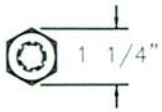
4x4x1/2" Square Tube
Part a6

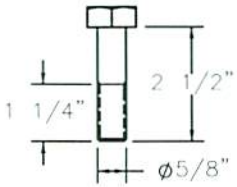
Midwest Roadside Safety Facility	West Virginia TL-2 Post Tube, Stiffeners, and Weld Plate Details	SHEET: 12 of 14 DATE: 9/8/2008 DRAWN BY: EMA/RJT
	DWG. NAME: wvbridge rail(tl-2)_R5 SCALE: None UNITS: Inches	REV. BY: RKF/SKR



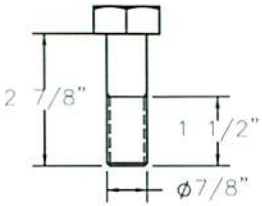


ø5/8" Heavy Hex Head Bolt,
ASTM A490/Grade 8, 2" Long
Part a8

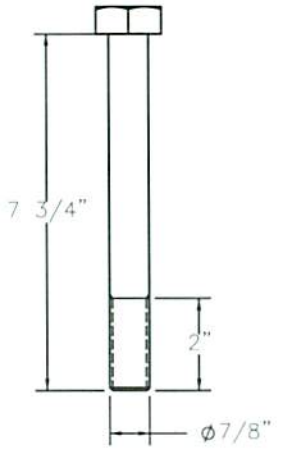




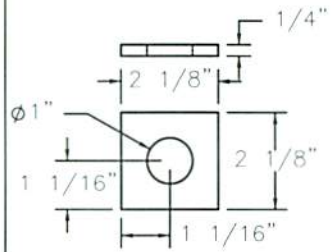
ø5/8" Heavy Hex Head Bolt,
ASTM A325, 2 1/2" Long
Part a9



ø7/8" Heavy Hex Head Bolt,
ASTM A325, 2 7/8" Long
Part a10



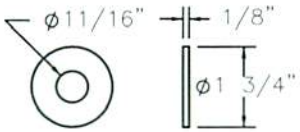
ø7/8" Hex Head Bolt,
ASTM A307, 7 3/4" Long
Part b6



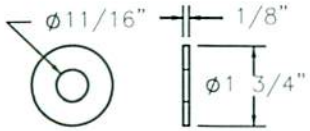
ø1" Square Washer
ASTM A325
Part a13

ø5/8" Heavy Hex Nut
ASTM A325
Part a12

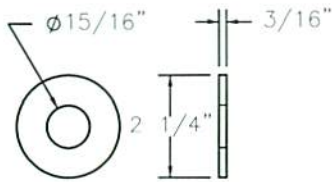
ø5/8" Heavy Hex Nut
ASTM A490/Grade 8
Part a11



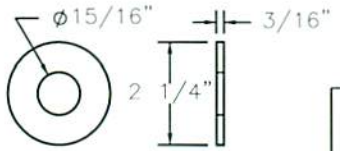
ø5/8" Flat Washer
ASTM A325
Part a15



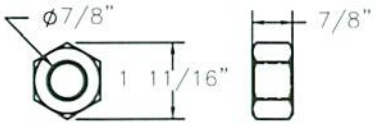
ø5/8" Flat Washer
ASTM A490/Grade 8
Part a14



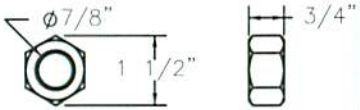
ø7/8" Flat Washer
ASTM A307
Part b7



ø7/8" Flat Washer
ASTM A325
Part b8



ø7/8" Heavy Hex Nut
ASTM A325
Parts b10



ø7/8" Hex Nut
ASTM A307
Parts b9

Midwest Roadside Safety Facility

West Virginia TL-2 Post

Bolts, Nuts, and Washers
(Shear Plates Not Shown)

SHEET:	13 of 14
DATE:	9/8/2008
DRAWN BY:	EVA/RJT
DWG. NAME:	wvbridge rail(tl-2)_R5
SCALE: None	
UNITS: Inches	
REV. BY:	RKF/SKR

West Virginia Bridge Rail – TL-2			
Item No.	QTY.	Description	Material Specification
a1	4	W6x12x42 3/4" Post	A992 or A572 Grade 50
a2	4	Post Plate	A36
a3	24	Post Stiffener	A36
a4	8	Post Wing Stiffener	A36
a5	4	W6x12x15 5/8" Steel Blockout	A992 or A572 Grade 50
a6	2	4x4x0.5" Square Tube 30" Long (One per test series)	A500 Grade B or C
a7	2	Weld Plate for Square Tube	A36
a8	32	5/8" Heavy Hex Head Bolt 2" Long	A490/Grade 8
a9	8	5/8" Heavy Hex Head Bolt 2 1/2" Long	A325
a10	8	7/8" Heavy Hex Head Bolt 2 7/8" Long	A325
a11	32	5/8" Heavy Hex Nut	A490/Grade 8
a12	8	5/8" Heavy Hex Nut	A325
a13	8	Square Washer	A36
a14	64	5/8" Flat Washer	A490/Grade 8
a15	16	5/8" Flat Washer	A325
a16	4	Post Plate Washer	A36
b1	4	Top Deck Plate	A36
b2	4	Bottom Deck Plate	A36
b3	4	Top End Plate	A36
b4	4	Bottom End Plate	A36
b5	20	Plate Stiffener	A36
b6	32	7/8" Hex Head Bolt 7 3/4" Long	A307
b7	32	7/8" Flat Washer	A307
b8	8	7/8" Flat Washer	A325
b9	32	7/8" Hex Nut	A307
b10	8	7/8" Heavy Hex Nut	A325
c1	960	2"x6"x14' Long Treated, Dimensional Lumber (0.60 lbs retention)	Southern Yellow Pine No. 1
c2	32	ø4" Shear Plate for ϕ7/8" bolts	Galvanized Steel
c3	1	Asphalt	–

Midwest Roadside Safety Facility

West Virginia TL-2 Post

Bill of Materials for Four Post Tests

SHEET: 14 of 14

DATE: 9/8/2008

DRAWN BY: EMA/RJT

DWG. NAME: wvbridge rail(tl-2)_R5

SCALE: None

UNITS: inches

REV. BY: RKF/SKR

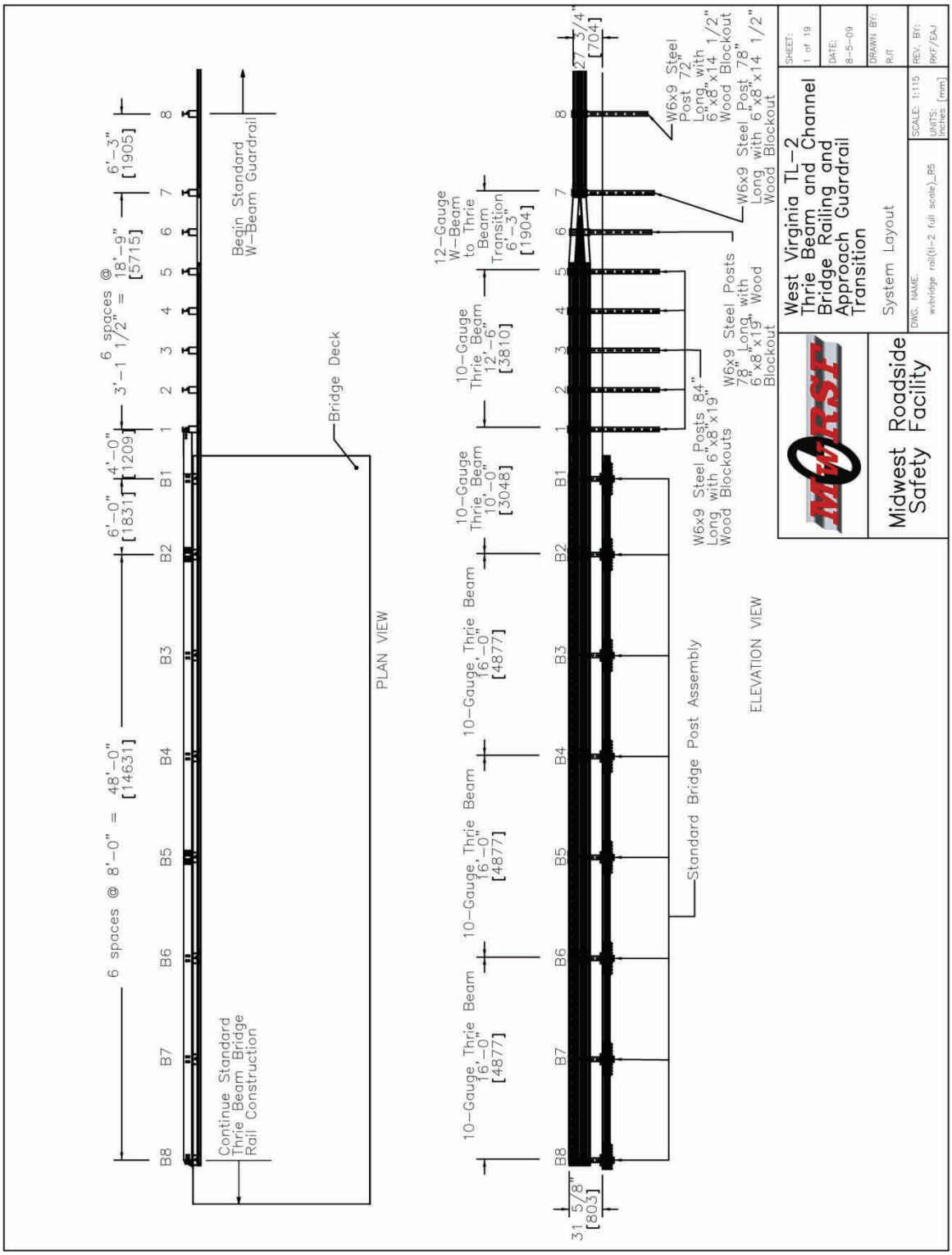


Figure B - 1. System Layout

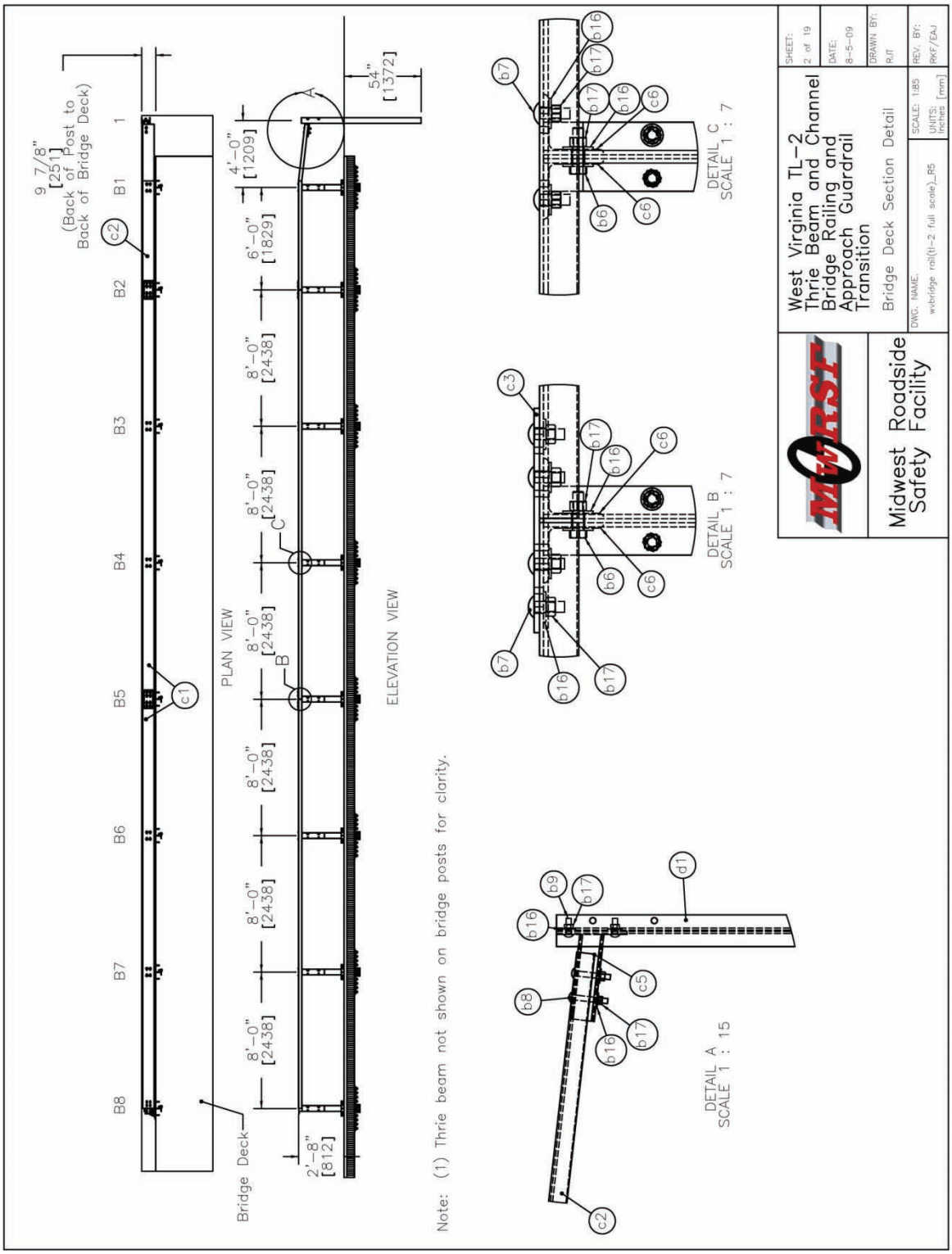


Figure B - 2. Bridge Deck Section Detail

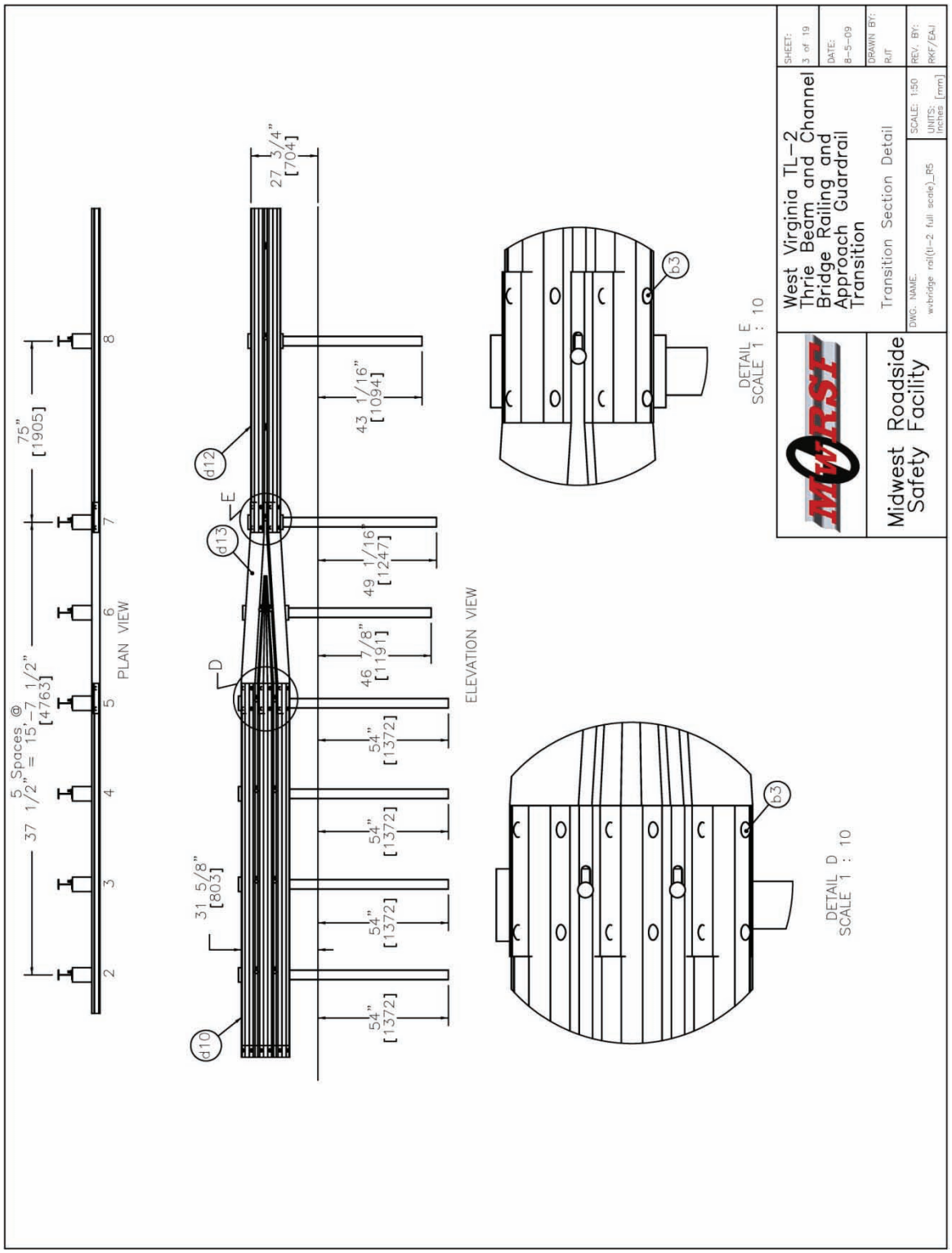


Figure B - 3. Transition Section Detail

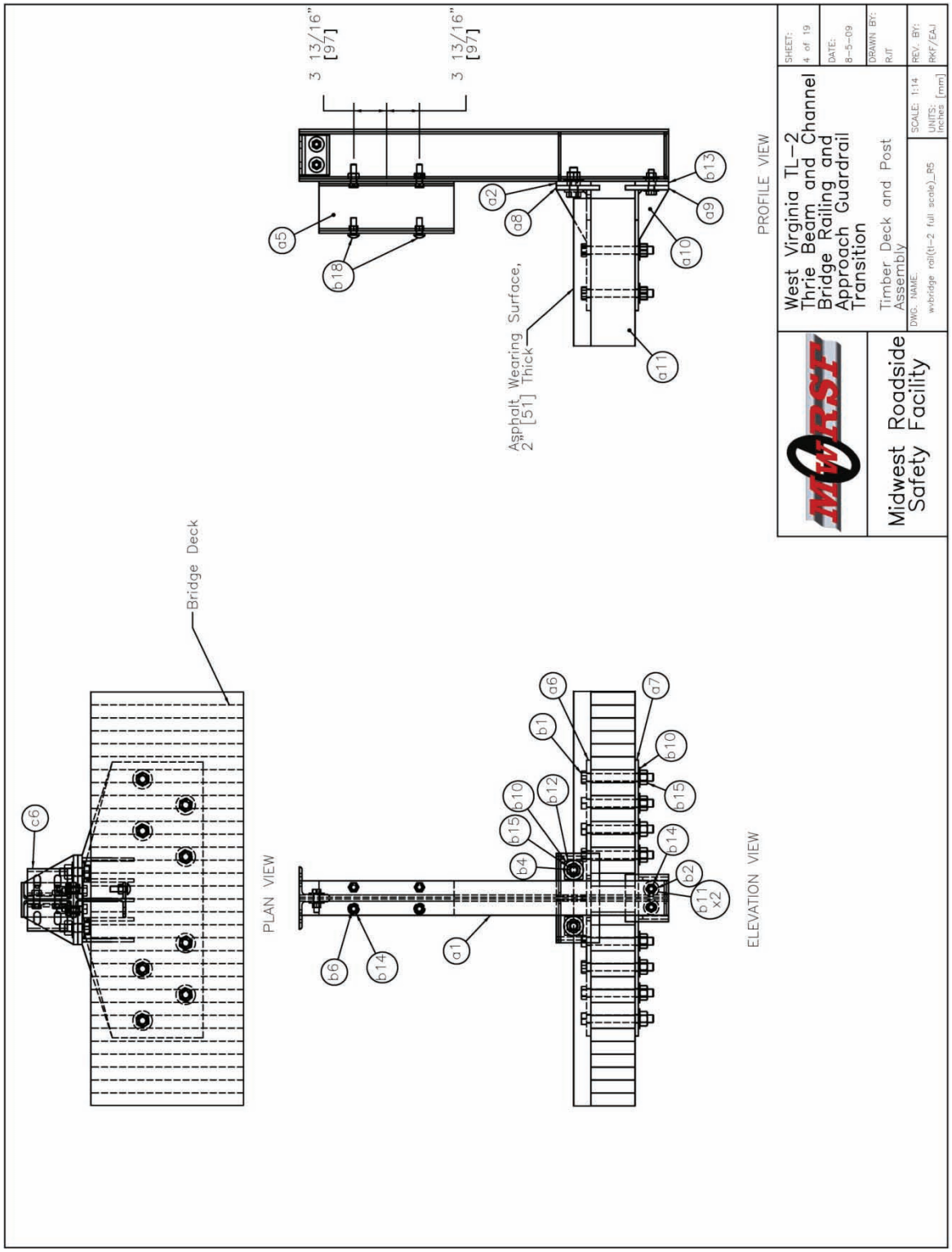


Figure B - 4. Timber Deck and Post Assembly

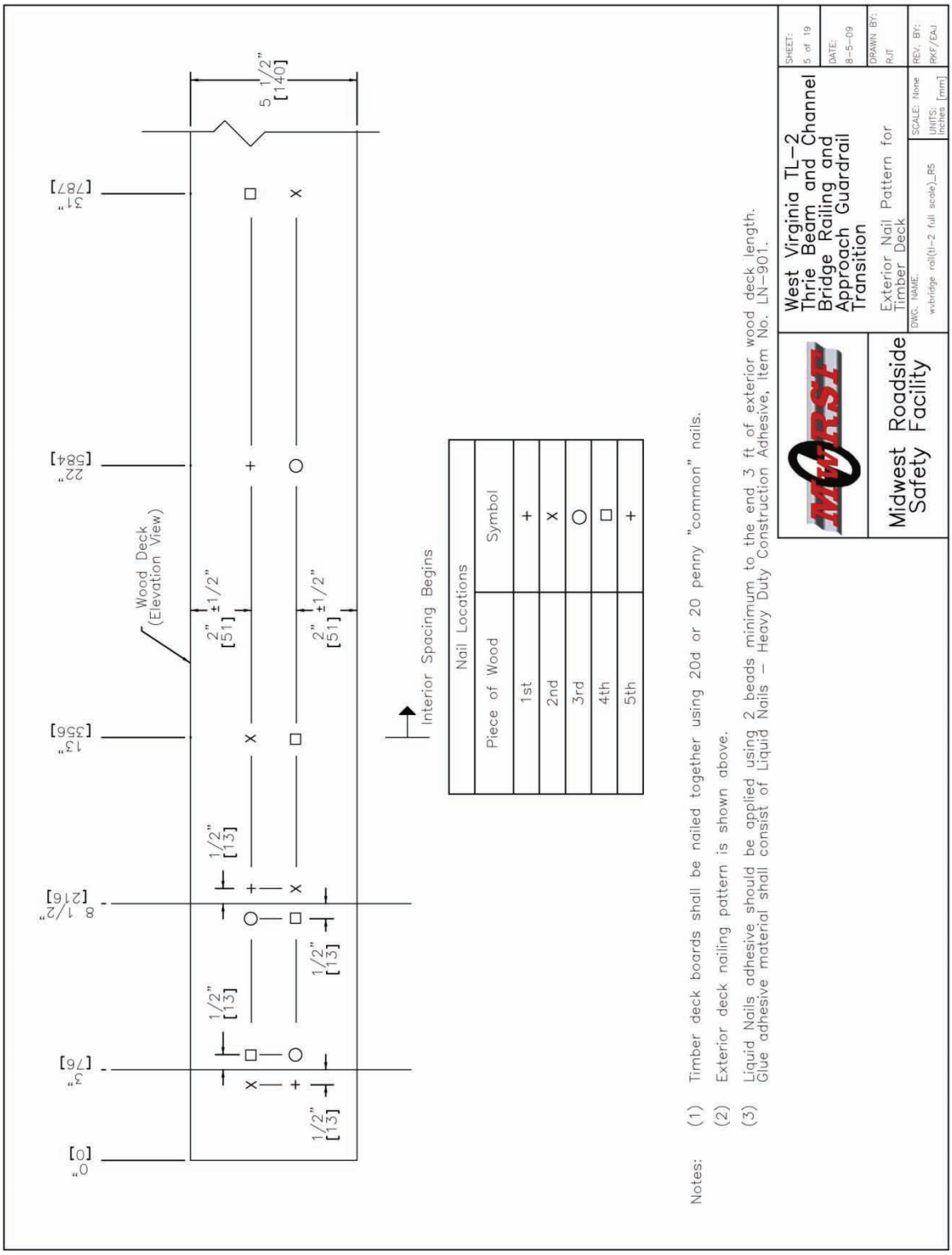


Figure B - 5. Exterior Nail Pattern for Timber Deck

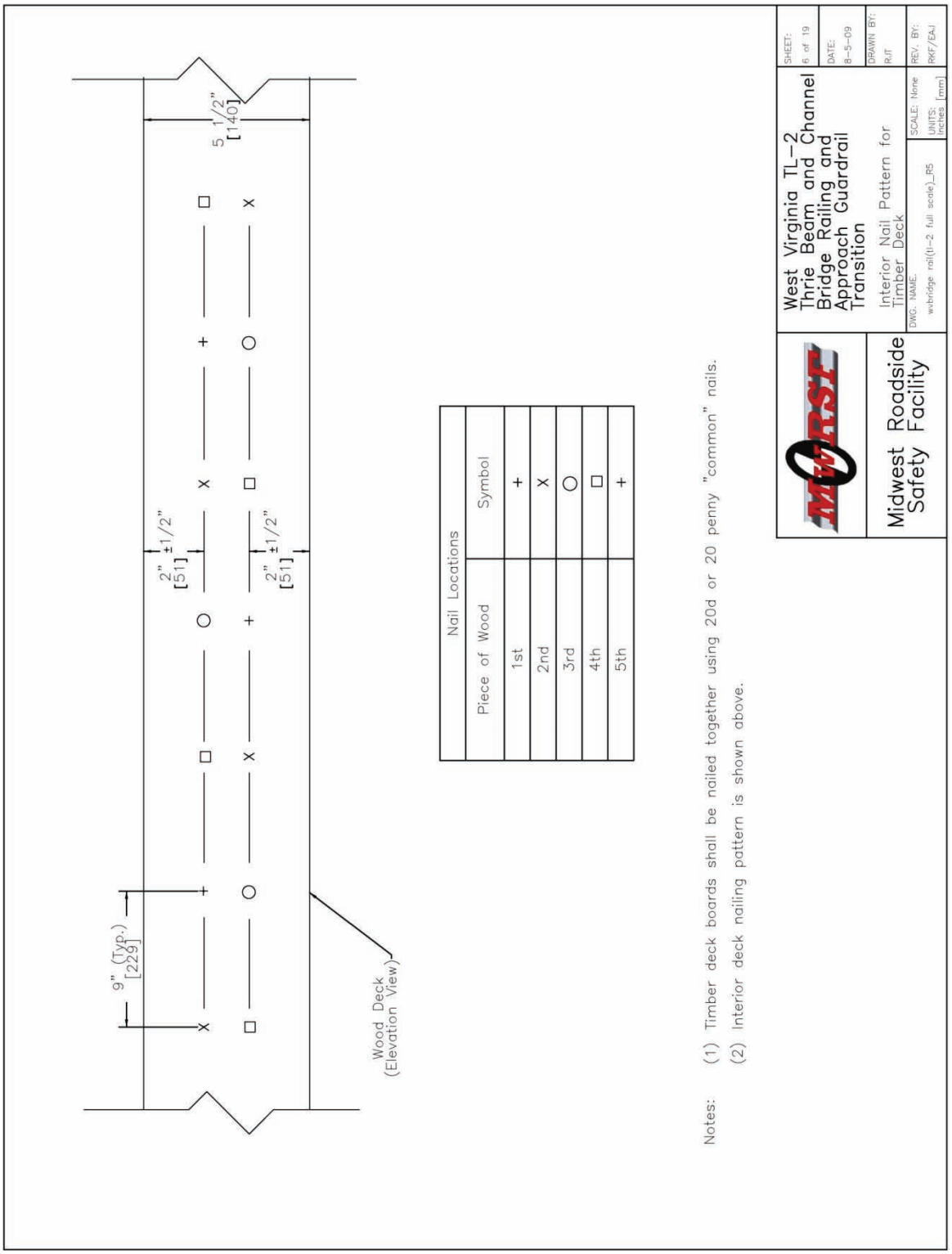


Figure B - 6. Interior Nail Pattern for Timber Deck

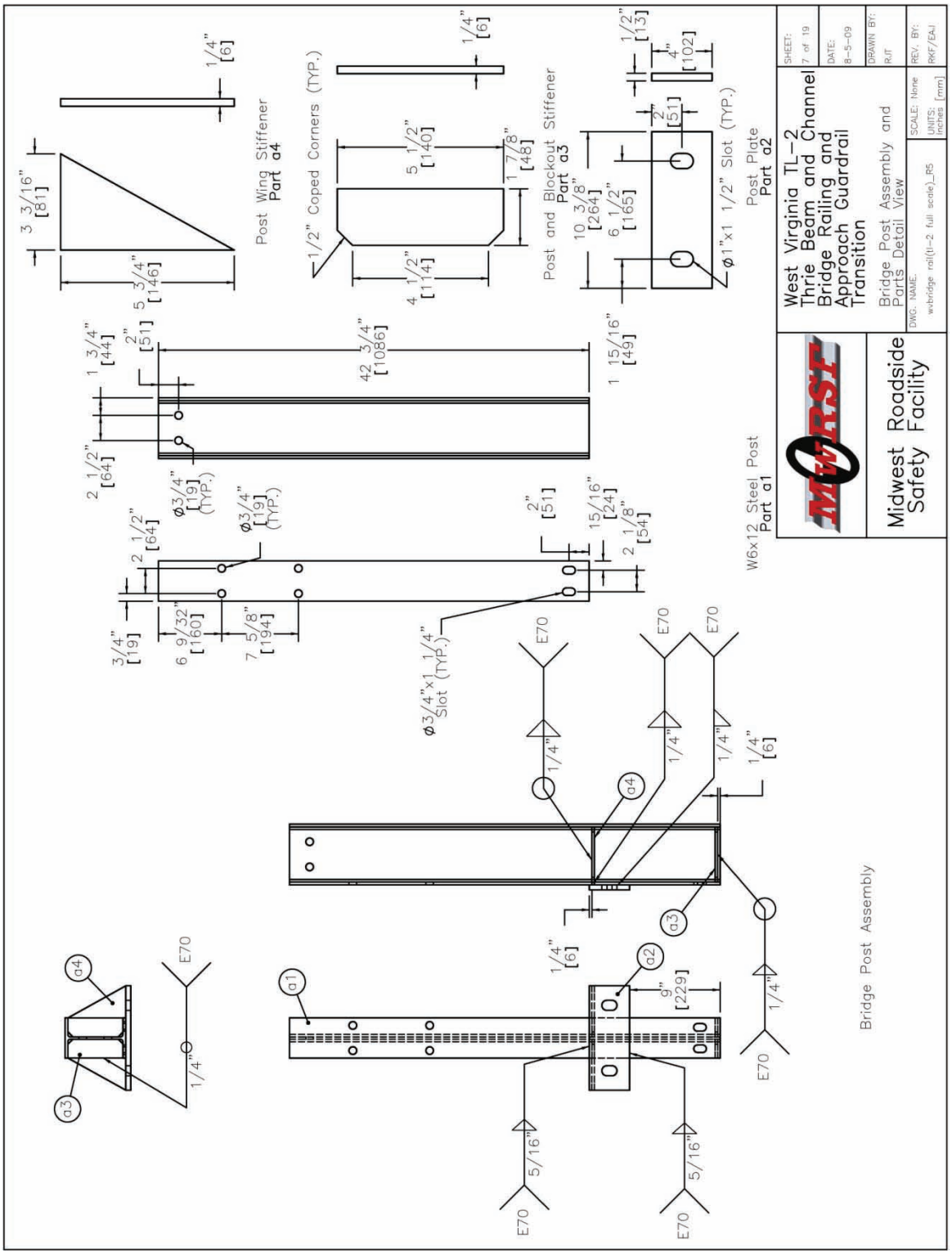


Figure B - 7. Bridge Post Assembly and Parts Detail View

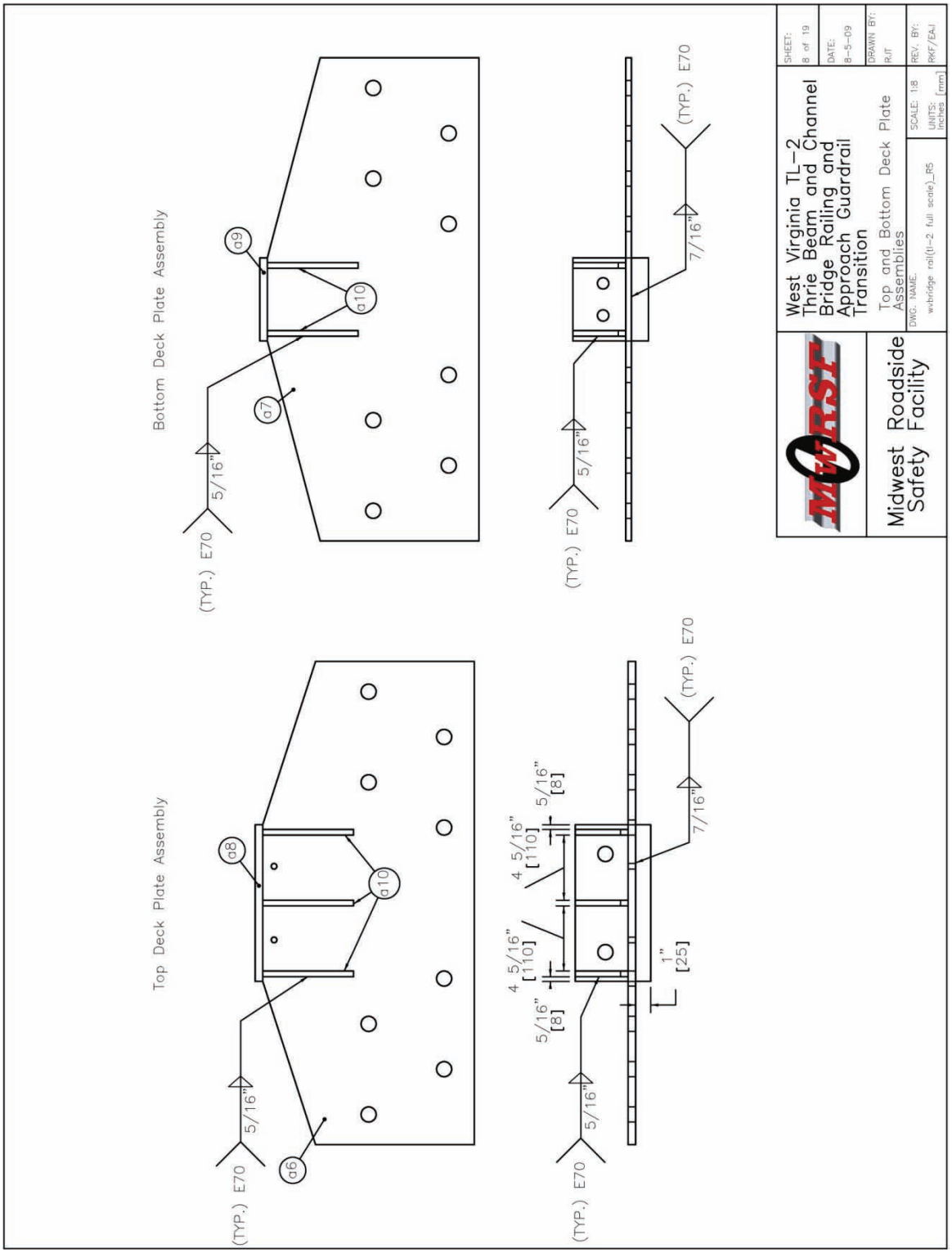


Figure B - 8. Top and Bottom Deck Plate Assemblies

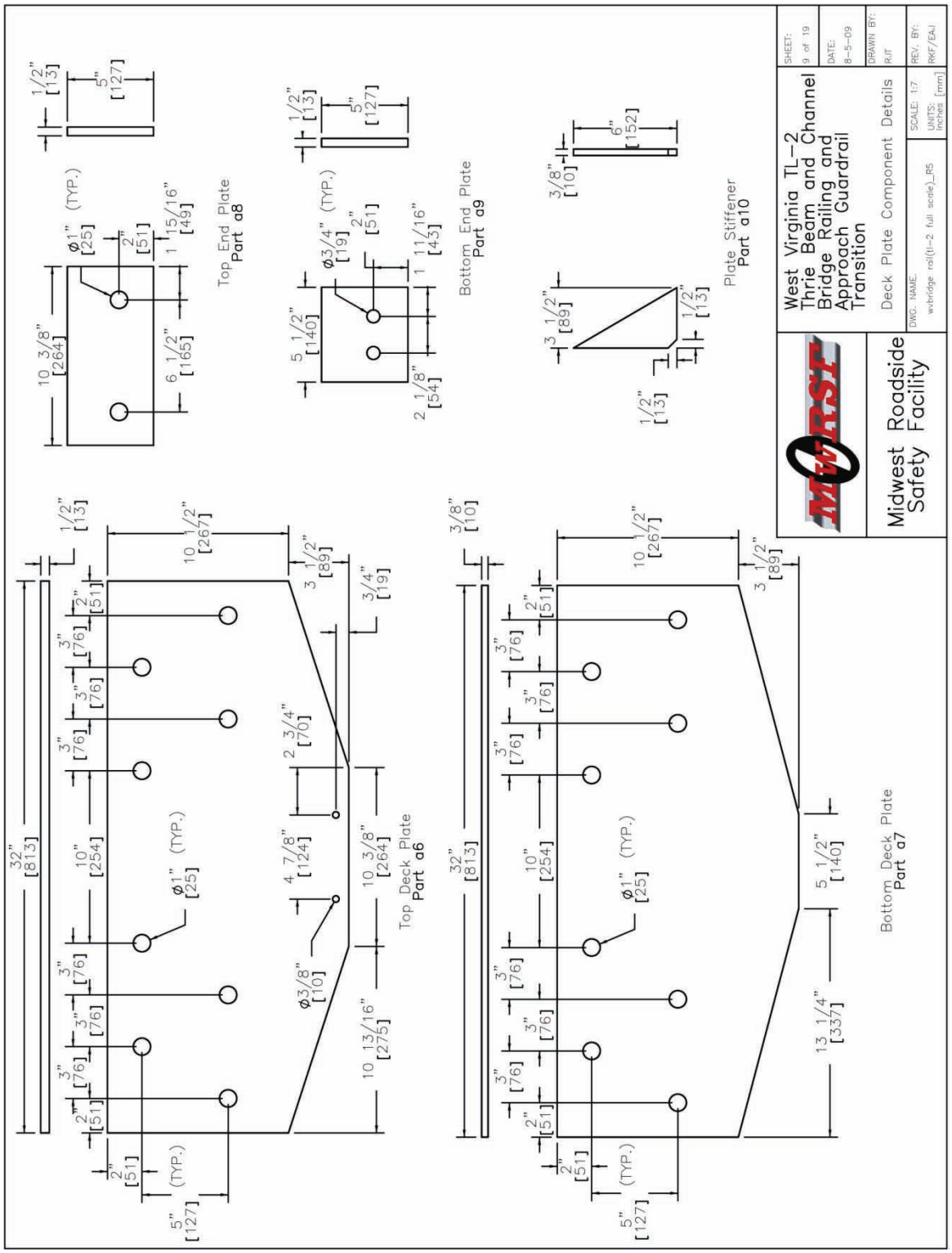


Figure B - 9. Deck Plate Component Details

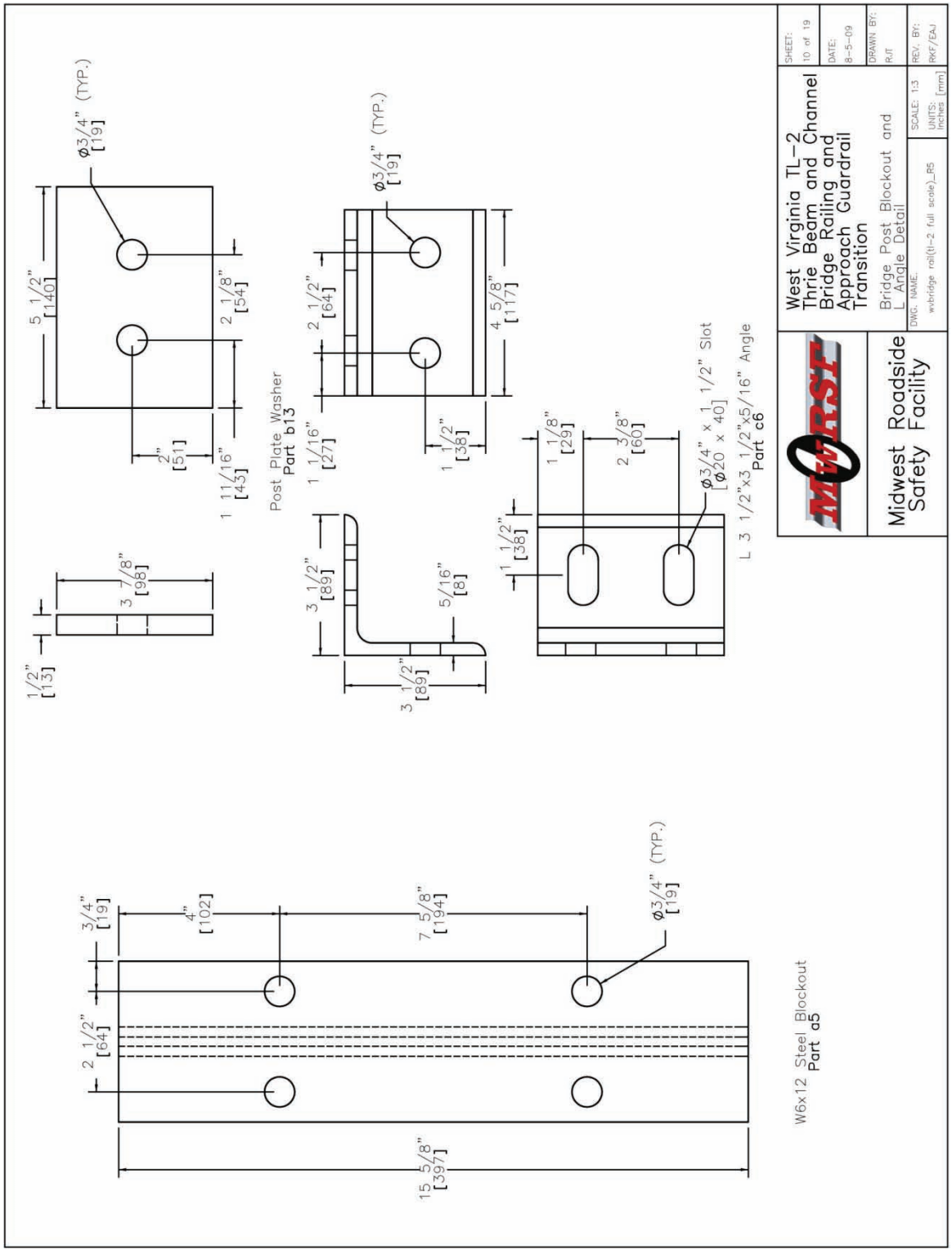


Figure B - 10. Bridge Post Blockout and L Angle Detail

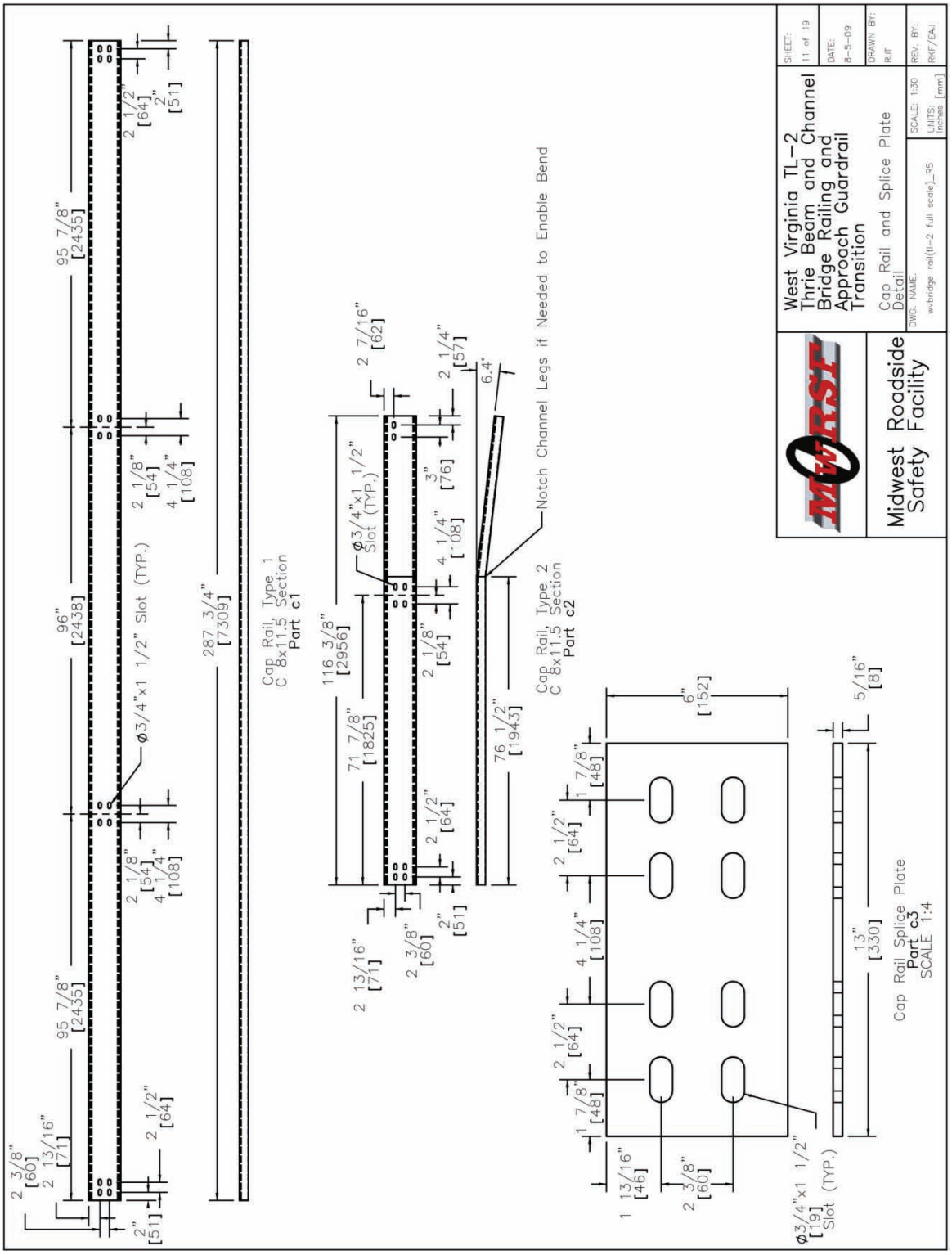


Figure B - 11. Cap Rail and Splice Plate Detail

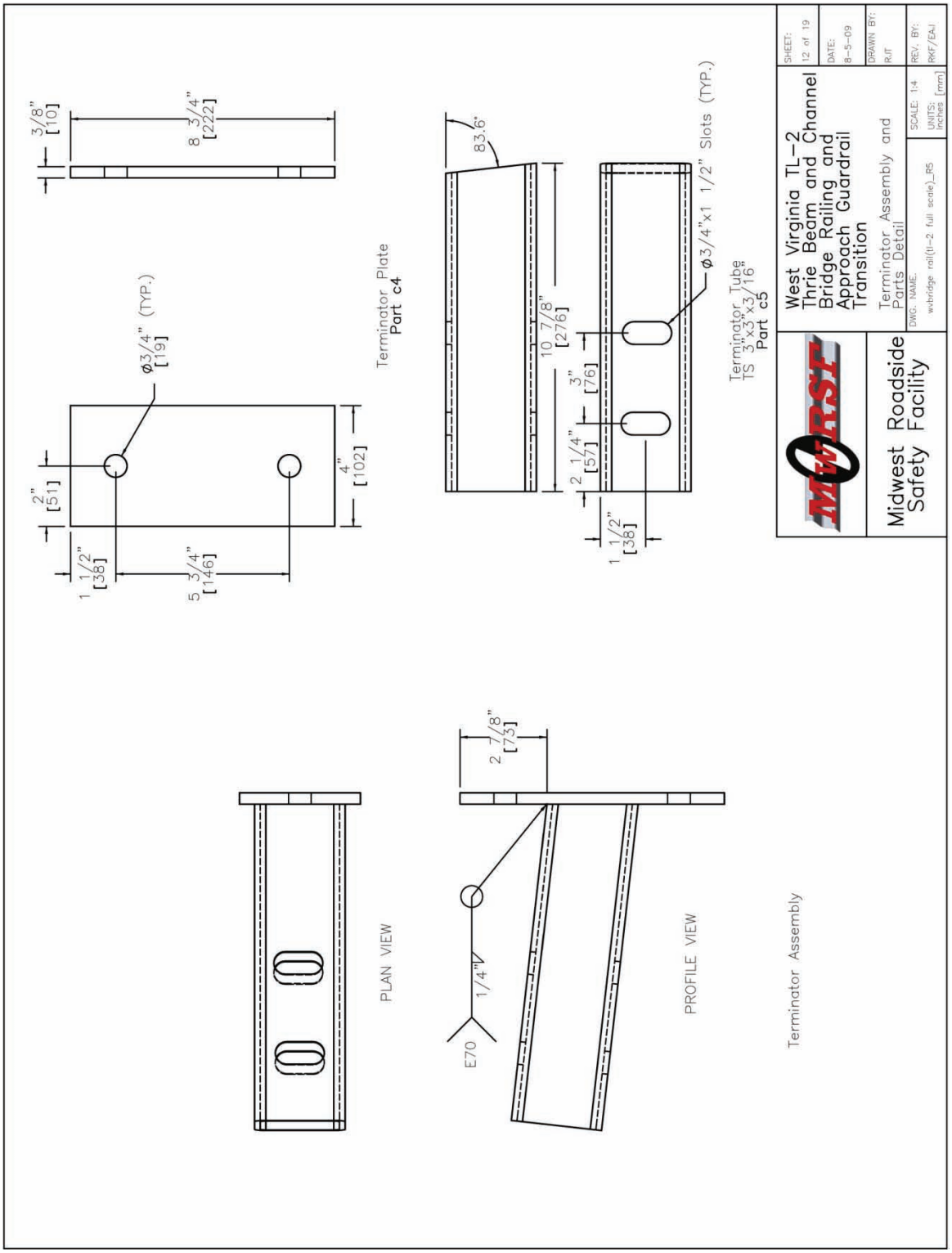


Figure B - 12. Terminator Assembly and Parts Detail

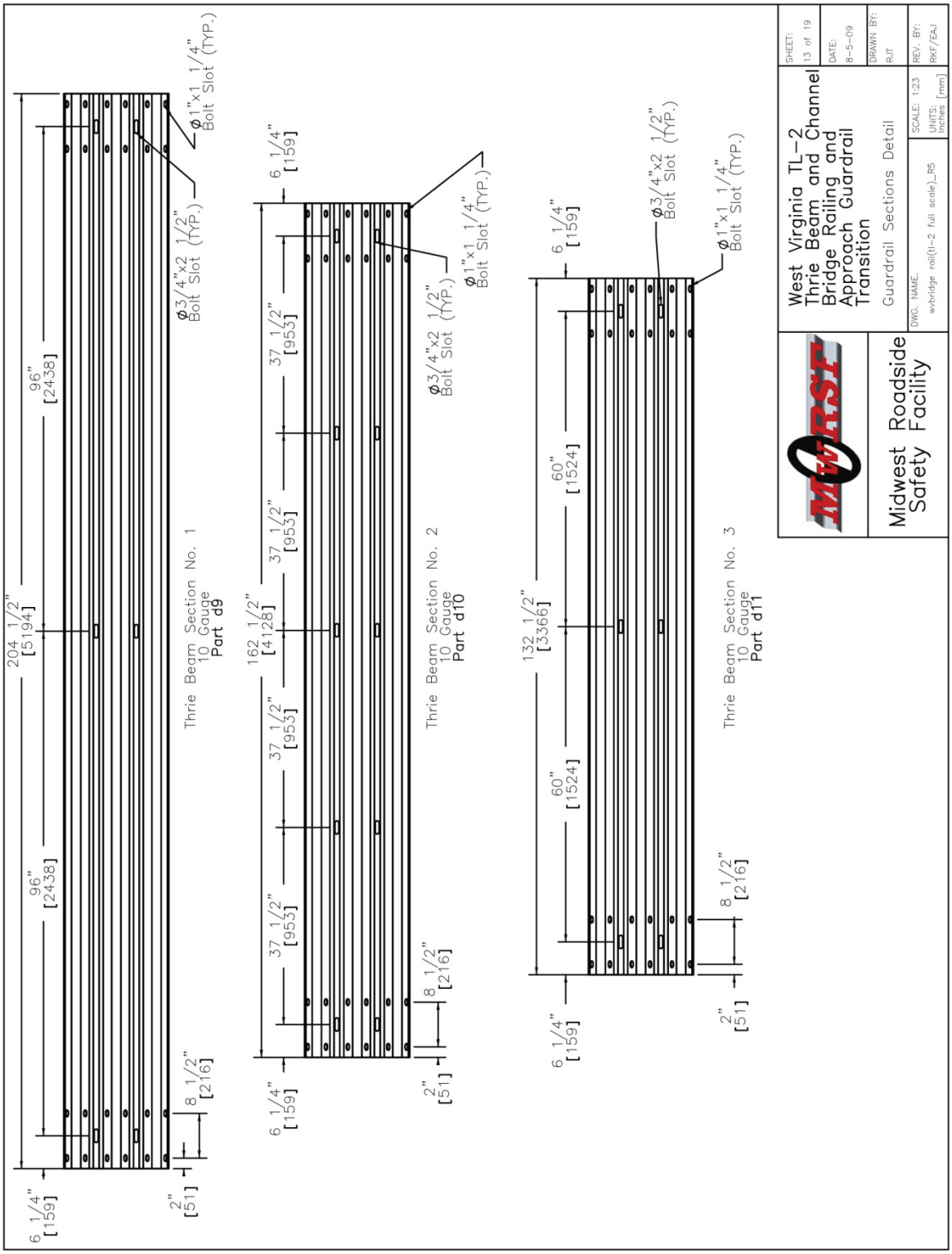


Figure B - 13. Guardrail Sections Detail

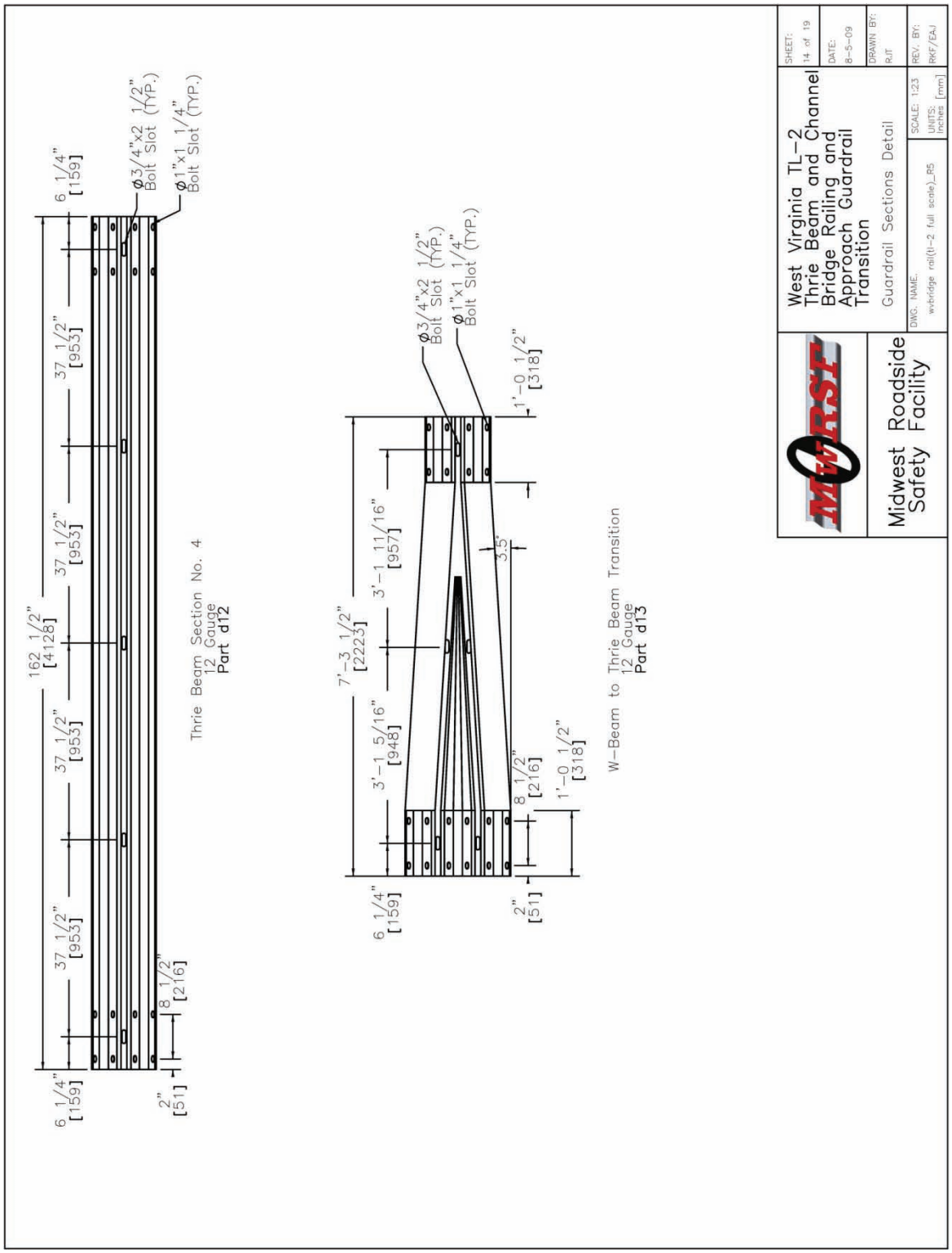


Figure B - 14. Guardrail Sections Detail

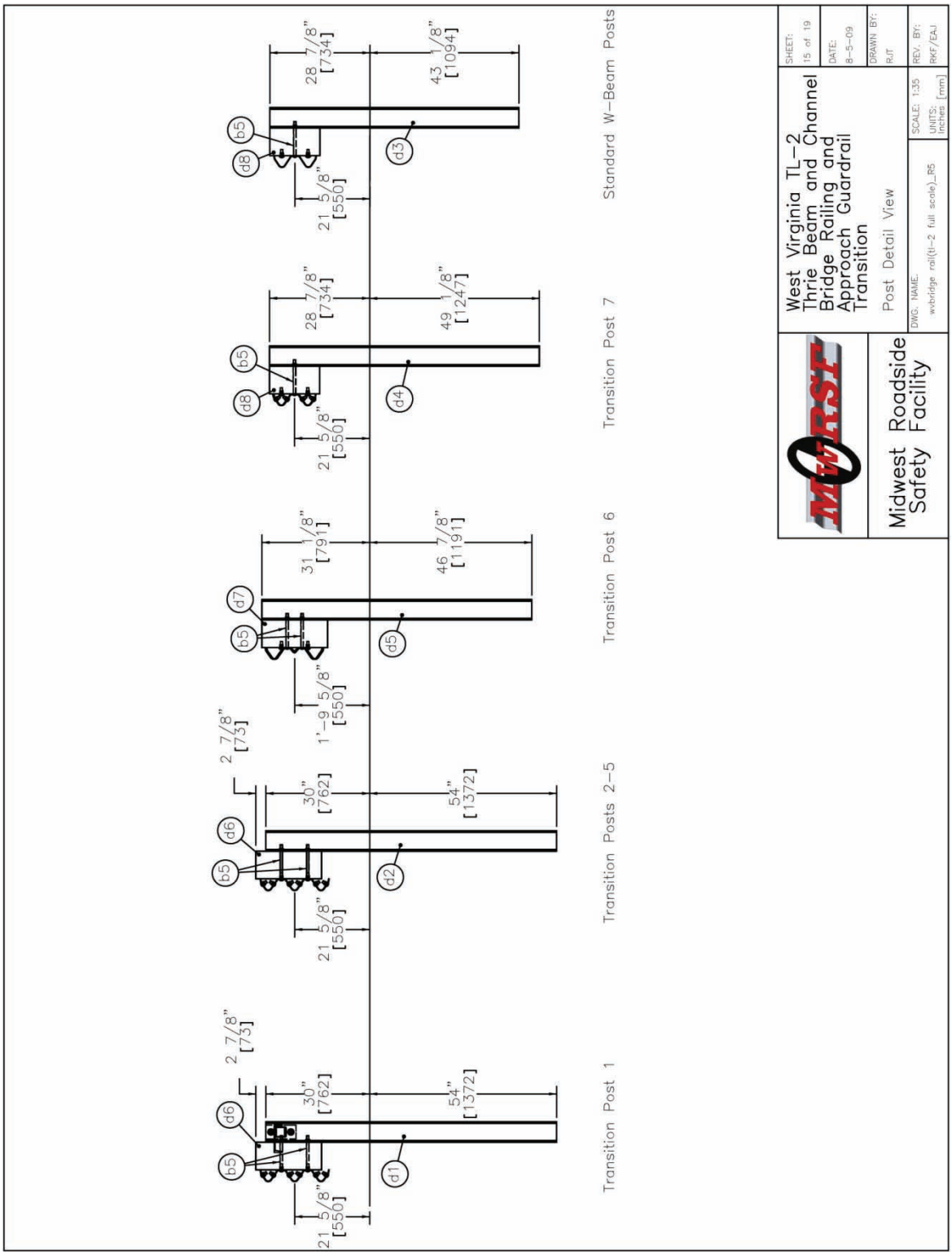


Figure B - 15. Post Detail View

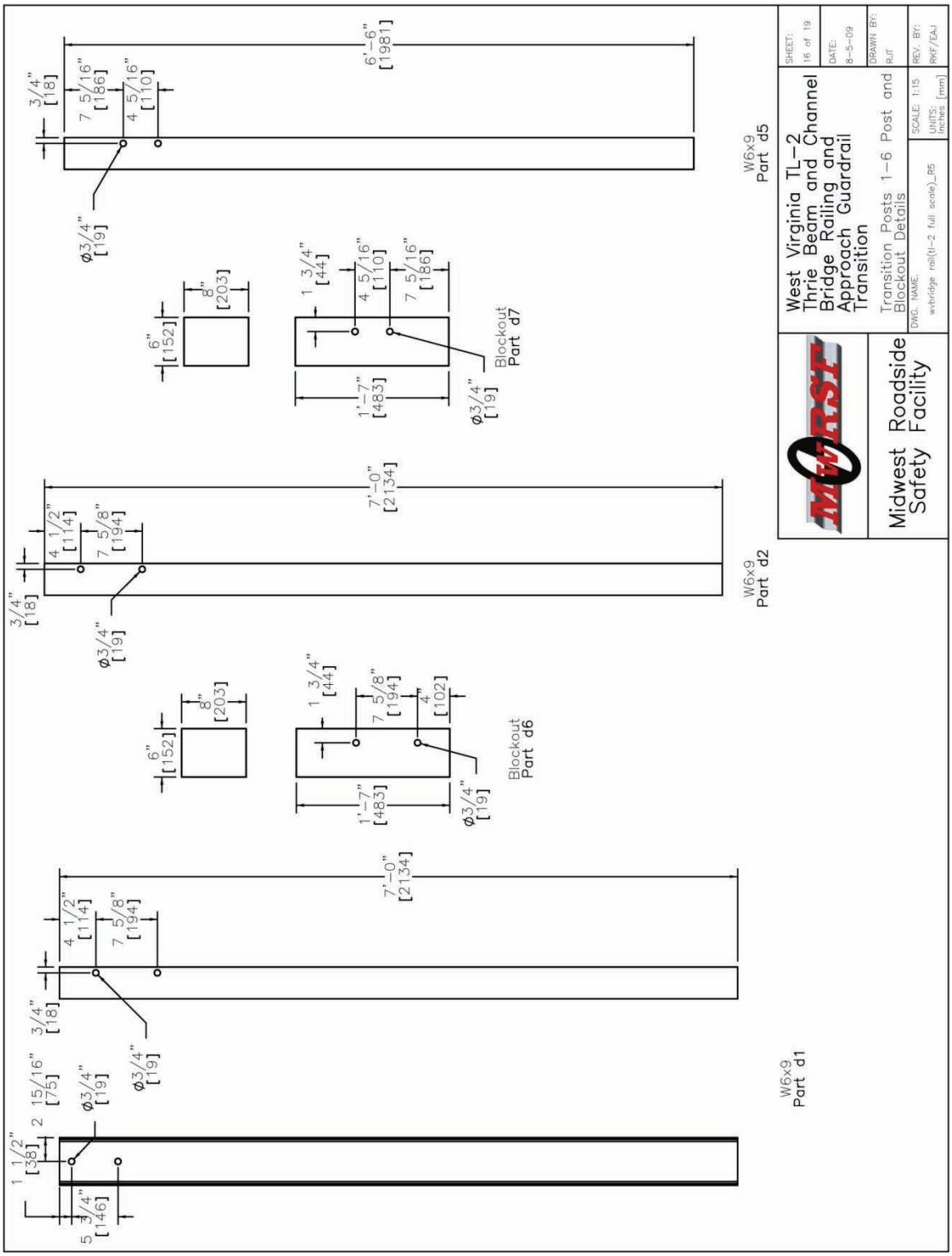


Figure B - 16. Transition Posts 1-6 and Blockout Details

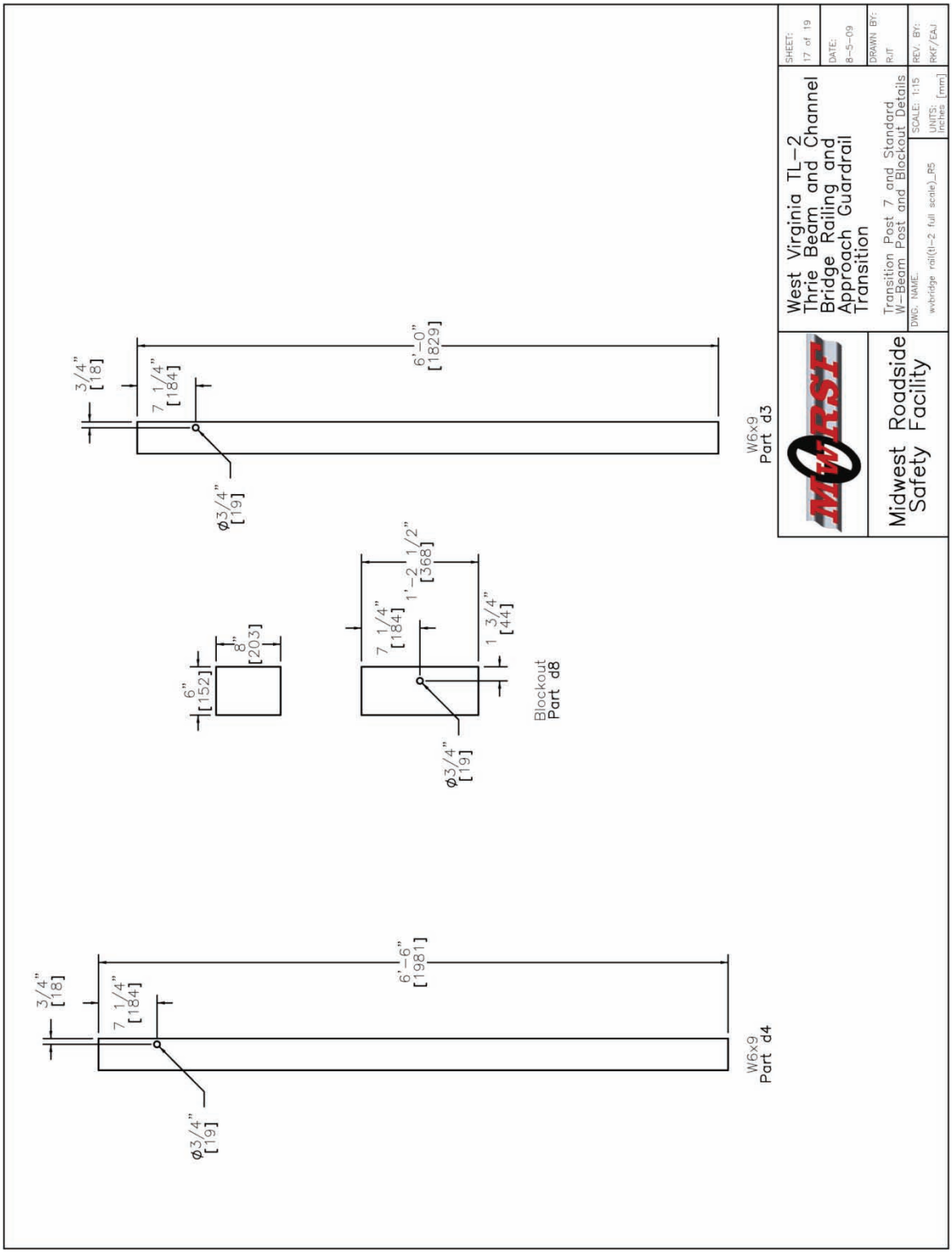


Figure B - 17. Transition Post 7, Standard W-Beam Post, and Blockout Details

West Virginia TL–2 Bridge Railing and Approach Transition				
Item No.	QTY.	Description	Material Specification	Hardware Guide
a1	8	W6x12x42 3/4" Post	A992 or A572 Grade 50	–
a2	8	Post Plate	A36	–
a3	32	Post Stiffener	A36	–
a4	16	Post Wing Stiffener	A36	–
a5	8	W6x12x15 5/8" Steel Blockout	A992 or A572 Grade 50	–
a6	8	Top Deck Plate	A36	–
a7	8	Bottom Deck Plate	A36	–
a8	8	Top End Plate	A36	–
a9	8	Bottom End Plate	A36	–
a10	40	Plate Stiffener	A36	–
a11	1000	2"x6"x14' Long Treated, Dimensional Lumber (0.60 lbs retention)	Southern Yellow Pine No. 1	–
b1	64	ø7/8" Heavy Hex Head Bolt 7 3/4" Long	A325 Type 1	–
b2	16	ø5/8" Heavy Hex Head Bolt 2 1/2" Long	A325 Type 1	–
b3	80	ø5/8"x1 1/2" Guardrail Bolt and Nut	A307 Grade A	FBB01
b4	16	ø7/8" Heavy Hex Head Bolt 2 7/8" Long	A325 Type 1	–
b5	14	ø5/8"x10" Guardrail Bolt and Nut	A307 Grade A	FBB03
b6	48	ø5/8"x2 1/4" Long Hex Bolt	A307 Grade A	–
b7	36	ø5/8"x1 3/4" Round Head Bolt	A307 Grade A	–
b8	2	ø5/8"x4 1/2" Round Head Bolt	A307 Grade A	–
b9	2	ø5/8"x2" Round Head Bolt	A307 Grade A	–
b10	80	ø7/8" Flat Washer	F436 Gr. 1	FWC22a
b11	32	ø5/8" Flat Washer	F436 Gr. 1	FWC16a
b12	16	ø1" Square Washer	A36	–
b13	8	Post Plate Washer	A36	–
b14	16	ø5/8" Hex Nut	A563DH	–
b15	80	ø7/8" Hex Nut	A563DH	–
b16	72	ø5/8" Flat Washer	F844	–
b17	88	ø5/8" Hex Nut	A563A	–
b18	16	ø5/8"x2" Guardrail Bolt and Nut	A307 Grade A	FBB02
c1	2	C8x11.5 Cap Rail	A36	–
c2	1	C8x11.5 Bent Cap Rail	A36	–
c3	2	Cap Rail Splice Plate	A36	–
c4	1	Terminator Plate	A36	–
c5	1	Terminator Tube	A500 Grade B	–
c6	16	3 1/2"x3 1/2"x5/16" L Angle	A36	–

Midwest Roadside Safety Facility

West Virginia TL–2 Thrie Beam and Channel Bridge Railing and Approach Guardrail Transition

Bill of Materials

DWG. NAME. wvbridge rail(tl–2 full scale)_R5

SCALE: None

UNITS: Inches [mm]

SHEET: 18 of 19

DATE: 8–5–09

DRAWN BY: RJT

REV. BY: RKF/EAJ

Figure B - 18. Bill of Materials

West Virginia TL–2 Bridge Railing and Approach Transition				
Item No.	QTY.	Description	Material Specification	Hardware Guide
d1	1	W6x9 84" Long, Post 1	A36	–
d2	4	W6x9 84" Long, Posts 2–5	A36	–
d3	1	W6x9 72" Long, Post 8	A36	–
d4	1	W6x9 78" Long, Post 7	A36	–
d5	1	W6x9 78" Long, Post 6	A36	–
d6	5	6x8x19" Blockout	Southern Yellow Pine No. 1	–
d7	1	6x8x19" Blockout	Southern Yellow Pine No. 1	–
d8	2	6x8x14 1/2" Blockout	Southern Yellow Pine No. 1	PDB09
d9	3	12'–6" Thrie Beam Section	10 gauge AASHTO M180	RTM02b
d10	1	12'–6" Thrie Beam Section – 1/2 Post Spacing	10 gauge AASHTO M180	RTM04b
d11	1	10' Thrie Beam Section	10 gauge AASHTO M180	RTM02b
d12	1	12'–6" W–Beam Section – 1/2 Post Spacing	12 gauge AASHTO M180	RWM04a
d13	1	6'–3" W–Beam to Thrie Beam Transition Section	12 gauge AASHTO M180	RWT01a

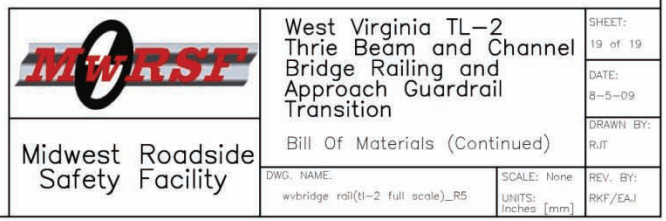


Figure B - 19. Bill of Materials (Continued)