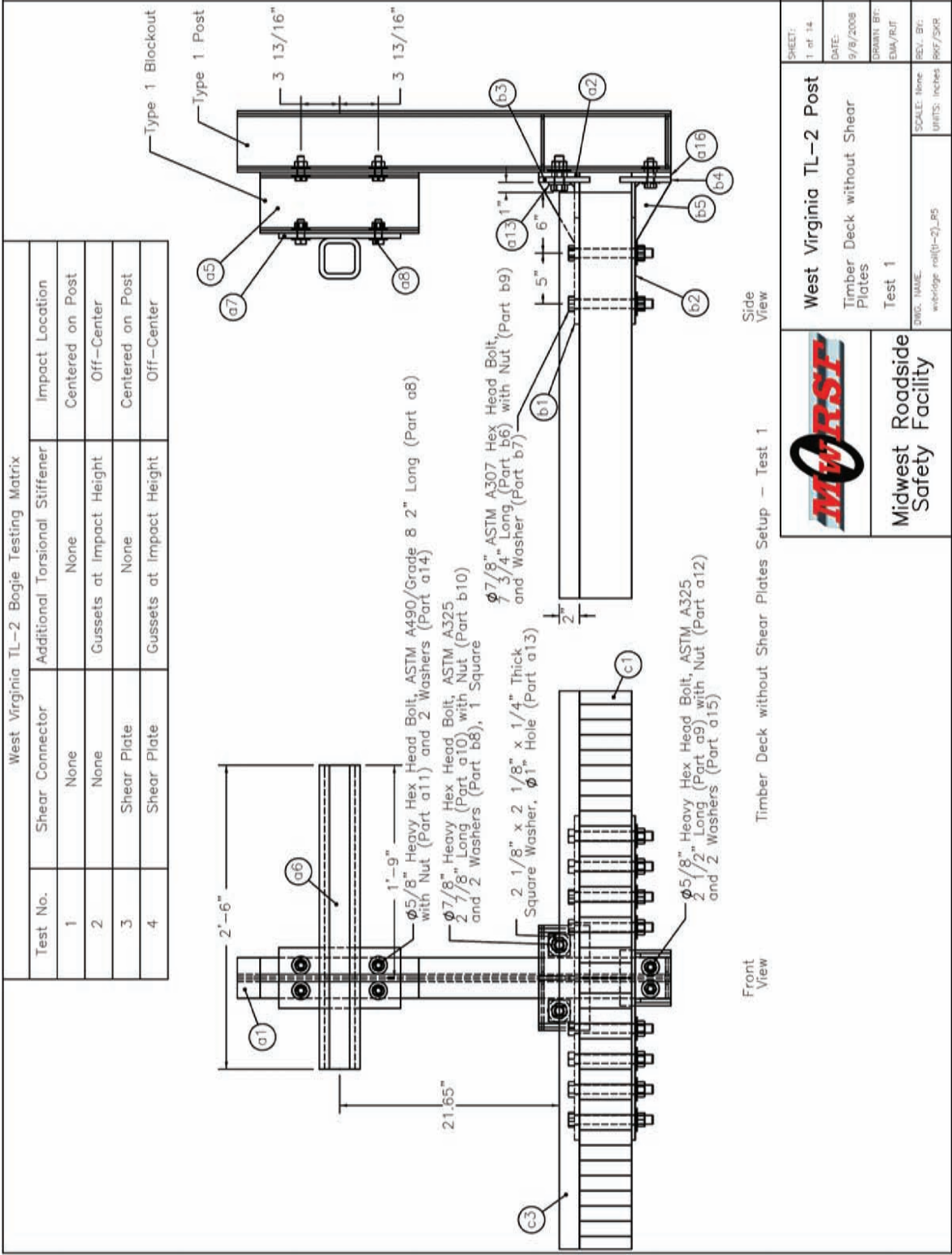


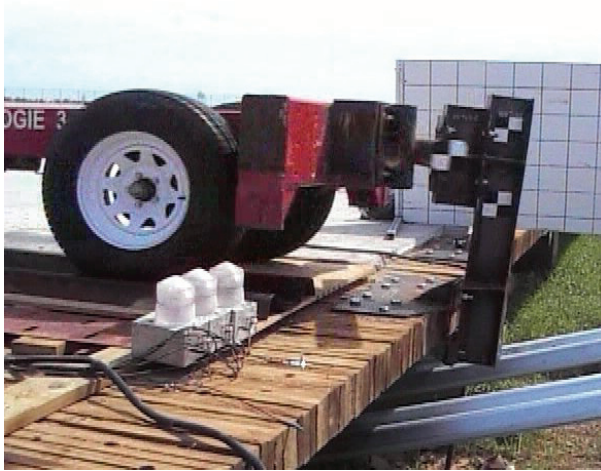
TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. TRP-03-212-09	2.	3. Recipient's Accession No.	
4. Title and Subtitle Development of a TL-2 Steel Bridge Railing and Transition for Use on Transverse, Nail-Laminated, Timber Bridges		5. Report Date August 13, 2009	
		6.	
7. Author(s) Terpsma, R.J., Faller, R.K., Reid, J.D., Sicking, D.L., Bielenberg, R.W., Rosenbaugh, S.K., Lechtenberg, K.A., and Holloway, J.C.		8. Performing Organization Report No. TRP-03-212-09	
9. Performing Organization Name and Address Midwest Roadside Safety Facility (MwRSF) University of Nebraska-Lincoln 527 Nebraska Hall Lincoln, Nebraska 68588-0529		10. Project/Task/Work Unit No. WV-09-2007-B2	
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12. Sponsoring Organization Name and Address West Virginia Department of Transportation Division of Highways – District 7 Bridge Department 255 Depot Street Weston, West Virginia 26452-1288		13. Type of Report and Period Covered Final Report: 2008 - 2009	
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15. Supplementary Notes Prepared in cooperation with U.S. Department of Transportation, Federal Highway Administration.			
16. Abstract (Limit: 200 words) A previously designed and full-scale vehicle crash tested, thrie beam and channel bridge railing was adapted for use on transverse, nail-laminated, timber deck bridges used by the West Virginia Department of Transportation. The original bridge railing and transition systems were developed and crash tested for transverse, glue-laminated, timber decks using the Test Level 2 (TL-2) requirements found in NCHRP Report No. 350. For this study, the steel bridge posts and post-to-deck attachment hardware were fastened to the new timber deck. Four dynamic bogie tests were used to evaluate the structural capacity of the steel hardware as well as the timber deck. The use of timber shear connectors was evaluated in two of the four tests. For all of the tests, the bridge posts were plastically deformed, bent backward, and twisted. No rupture was observed in the steel bridge hardware or within the timber deck. Timber deck damage consisted of slight bearing deformations surrounding a few of the vertical bolt holes. The timber deck, posts, and post-to-deck attachment hardware withstood peak impact loading and provided sufficient structural capacity to support the TL-2 thrie beam and channel bridge railing system. Although the timber shear connectors reduced the minor bearing deformations, their use was not deemed necessary for actual bridges.			
17. Document Analysis/Descriptors Highway Safety, Bridge Post, Bogie Testing, Transverse Timber Deck, TL-2, Nail-Laminated Deck, NCHRP 350, Thrie Beam Bridge Rail, and Roadside Safety		18. Availability Statement No restrictions. Document available from: National Technical Information Services, Springfield, Virginia 22161	
19. Security Class (this report) Unclassified	20. Security Class (this page) Unclassified	21. No. of Pages 129	22. Price



	West Virginia TL-2 Post Timber Deck without Shear Plates Test 1 <small>DWG. NAME: wvbridge_nsl(1-2)_B5 SCALE: None UNITS: inches</small>
Midwest Roadside Safety Facility	SHEET: 1 of 14 DATE: 9/8/2008 DRAWN BY: EMA/RJT REV. BY: BSK/SJR

Figure 1. Post Testing Schematic, Test No. WVTL2-1



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0.033 sec



0.267 sec



0.100 sec



0.534 sec

Figure 21. Sequential Photographs, Test No. WVTL2-2

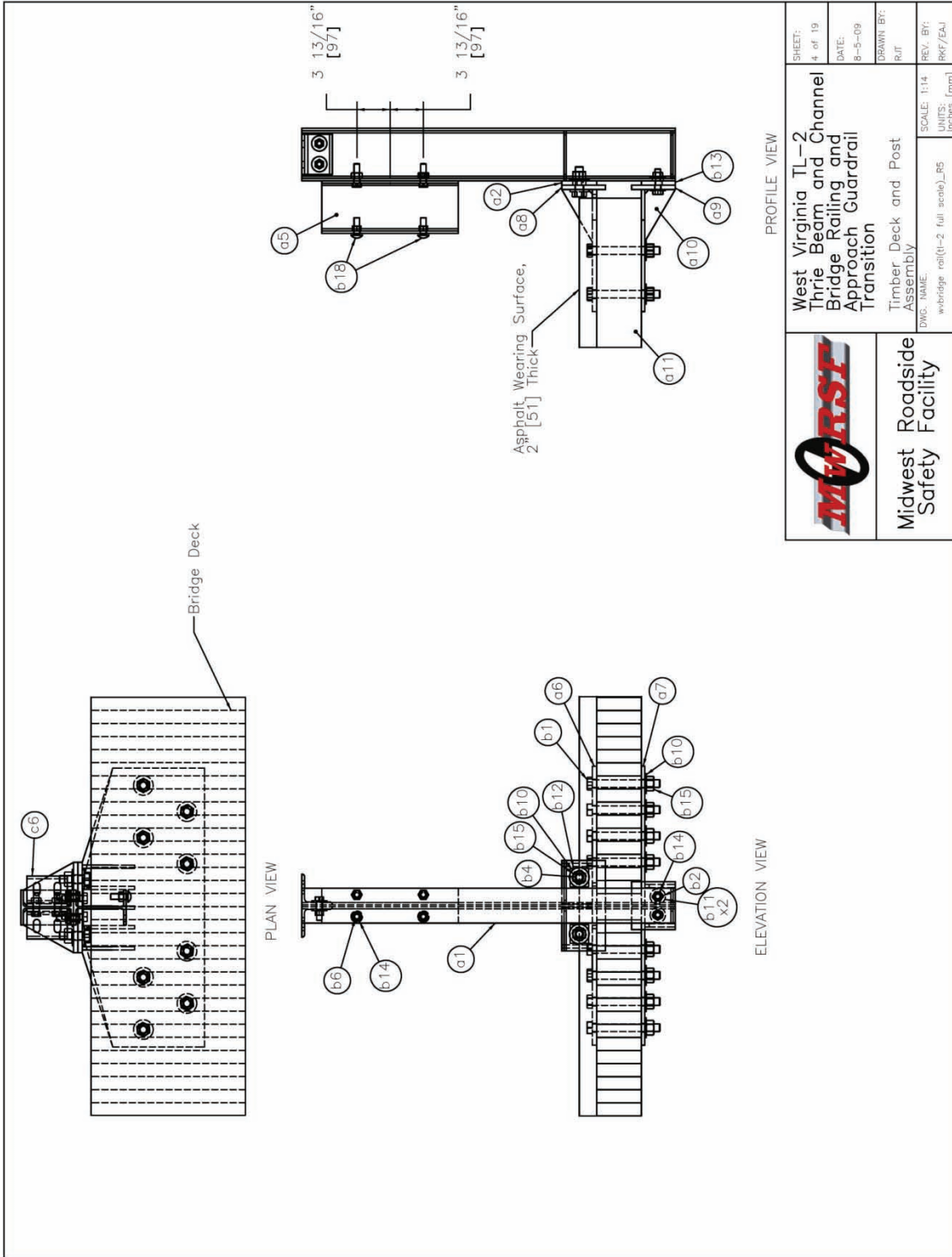


Figure B - 4. Timber Deck and Post Assembly