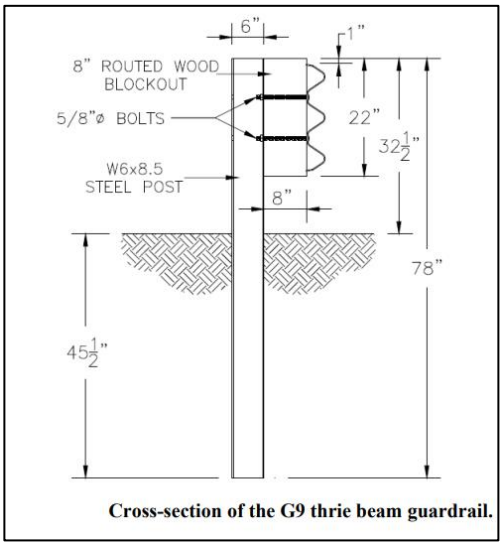
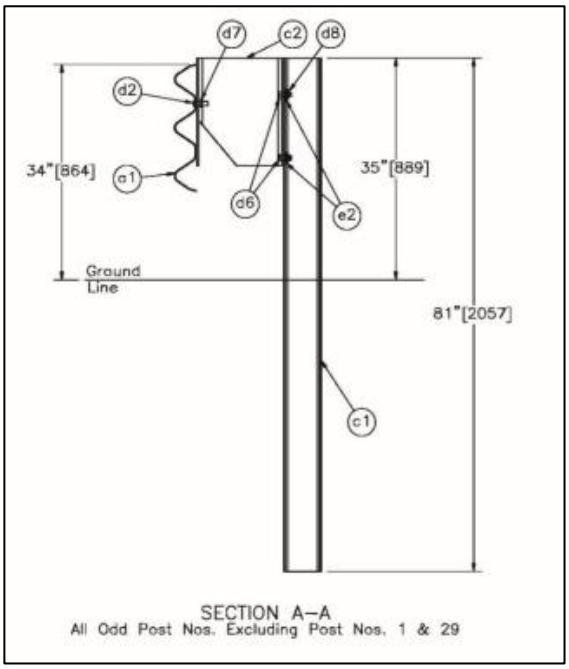
Research Problem Statement

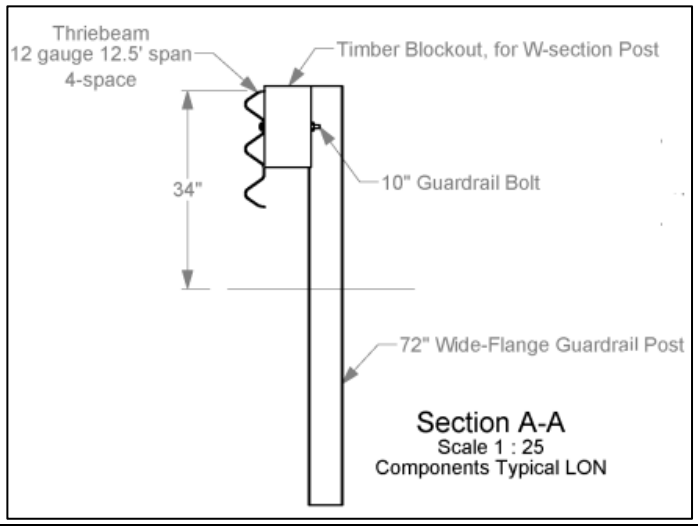
2024-10-LSRB

Project Title:	MASH TL-3 Design, Testing and Evaluation of a Thrie Beam Guardrail System (TGS) with Wood Posts 
Project Synopsis:	Develop, computer model, and crash test a thrie-beam roadside and median system with wooden posts that will meet MASH TL-3 testing criteria. Additionally, develop a transition between MGS W-beam and the wood post thrie-beam systems. Recently, TTI has successfully completed the MASH design and crash testing of a thrie-beam system with steel posts. However, many states desire the flexibility of using wood posts for thrie beam systems. If successful, a MASH compliant thrie-beam system with wood posts will be available for State DOTs implementation at locations where a more robust guardrail system is needed.
Project Goal(s):	• Develop designs for a MASH TL-3 thrie-beam with wood posts for roadside and median locations • Develop designs for a MASH TL-3 transition between MGS W-beam & wood post thrie-beam • MASH TL-3 crash tests for the roadside thrie-beam system (single-sided) with wood posts, median thrie-beam system (double-sided) with wood posts, and a transition system with wood posts between W-beam and thrie-beam.
Project Background:	Thrie-beam systems have been available for many years where a more robust beam guardrail system is needed. The G9 thrie-beam system was originally developed back in 1982 under NCHRP 350 guidelines with a rail height of 32.5-inches. Subsequently, several G9 thrie-beam system variations were developed and successfully crash tested under NCHRP-350. In 2010, the G9 thrie-beam system was tested under MASH criteria for the first time under NCHRP Project 47640-0001 “Volume I: Evaluation of Existing Roadside Safety Hardware Using Updated Criteria”. The G9 thrie-beam system failed MASH crash test 3-11 due to vehicle rolling.  Cross-section of the G9 thrie beam guardrail. 

Recently, there have been two thrie-beam projects which met MASH criteria. The projects developed thrie-beam system designs that were modified from the original G9 thrie-beam design.
The first project was MwRSF TRP-03-417-20 “MASH 2016 Evaluation of the Modified Thrie Beam System” completed in July 2020. This MASH compliant thrie-beam system was based off an original design from NJDOT and was modified from the original G9 system by utilizing a 34” tall rail height, longer 81” (6.75’) long steel posts, and a shorter notched steel blockout. This project successfully designed and crash tested roadside thrie-beam (single-sided) and median thrie-beam (double-sided) systems. In addition, the project conducted computer modeling of thrie-beam to w-beam transitions.



The second project was TTI TRP 614341-01 “Design and Testing of MASH TL-3 Thrie-Beam Guardrail System (TGS) for Roadside and Median Applications” which was completed in October 2021. This MASH compliant thrie-beam system more closely matches the original G9 thrie-beam system and utilizes more cost-effective/less specialized parts than the MASH MwRSF thrie-beam design. The TTI thrie-beam system was modified from the original G9 system by utilizing a 34” tall rail height, and shorter wood MGS blockouts. The system used standard length 6-foot long steel posts. This project successfully designed, and crash tested a roadside thrie-beam (single-sided) system, a median thrie-beam (double-sided) system, and a thrie-beam to w-beam transition.



Proposed Work Plan:	• Task 1: Computer Modeling and Simulation – This task will develop the roadside, median, and transition thrie-beam systems with wood posts through computer simulations. • *MASH* Crash Testing – This task will crash test the roadside, median, and transition systems to MASH TL-3 criteria. • Task 3: Reporting – This task will provide the final technical report documenting the work completed in this project including background, computer modeling, testing results, and recommendations for implementation.
Deliverables:	The project's deliverable will be a crashworthy MASH compliant thrie-beam guardrail system with wood posts. The final report will summarize the results of the MASH TL-3 full scale crash testing, provide system design details, and provide appropriate system implementation recommendations.
Urgency and Expected Benefit:	Testing the thrie-beam guardrail with wood post installation will enhance the evaluation a MASH TL-3 compliant thrie-beam systems with both wood and steel posts. This will provide a high benefit to states wishing to use a more robust thrie-beam system while giving contractors the option of steel or wood posts and help ensure lower costs due to flexibility in the design.
Problem Funding and Research Period:	**Total Cost and Schedule = TBD**
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