

Project Title:	MASH Evaluation of MGS Traffic Barrier for 8" Curb with Various Curb Shapes and Offsets
Project Synopsis:	<p>MASH evaluation and determination of MGS traffic barrier for 8" high curb with various shapes and offsets. Perform the necessary steps to certify MASH compliance to at least TL-2, but preferably to TL-3. If MASH TL-3 (or TL-2) is not feasible, evaluate the effect of stiffening the guardrail to achieve MASH compliance.</p>
Project Goal(s):	<p>Provide a determination of MASH compliance to at least TL-2, but preferably TL-3, for MGS barrier with 8" curb with various shapes and offsets. This includes 8-inch vertical curb flush (and with a larger offset, including a sidewalk) to the MGS barrier.</p>
Project Background:	<p>Standards for curb heights, shapes, and offsets vary from state to state. Applications on roadways for guardrail and curb is extremely common throughout the country (and world). Therefore, MASH compliance is needed for all of these variations.</p> <p>MDOT has been using curb combination and traffic barrier (standard <i>17_12_21_MD-605.31</i>) for many years with the face of barrier rail flush with the face of the curb. For design speed equal and less than 45 mph, Type A curb (8-inch) is used (standard <i>MD-602.02</i>).</p> <p>MDOT also uses traffic barrier with curb and sidewalk, which is basically having the barrier offset from the curb.</p> <p>Due to lack of crash testing for 8-inch curb with barrier aligned up with the face of curb, MDOT has difficulty to meet the criteria of MASH 2016.</p> <p>PennDOT also uses 8-inch vertical curb for roadways typically (<i>PennDOT typical curb detail</i>). A 4-inch curb is used with traffic barrier (<i>PennDOT Guide Rail with curb detail</i>). However, 4-inch curb often cannot be used on projects, and then 8-inch curb is allowed with stiffened traffic barrier. For example, 4-inch curb is problematic for drainage, so 8-inch curb is used with drainage inlet (<i>PennDOT inlet profile detail</i>).</p> <p>NCHRP 22-39 is an ongoing project, which is evaluating the use of the MGS Traffic Barrier with curbs for MASH TL-3 applications. The scope of the project currently includes the evaluation of the MGS with a 6-inch curb at offsets ranging from 6 in to 15 ft. Also, vehicle trajectory analyses have been conducted on the MGS with a 4-inch curb.</p>
Proposed Work Plan:	<p>Task 1: Literature Review</p> <ul style="list-style-type: none"> • Review previous testing conducted on guardrail systems with curbs • Coordinate with ongoing NCHRP 22-39 project and ensure no duplicated efforts <p>Task 2: Initial Computer Simulations</p> <ul style="list-style-type: none"> • Build a confidence level (validation) of the simulation model of the guardrail with a curb by simulating MASH tested designs, such as the ones conducted at the MwRSF. • Evaluate MGS traffic barrier installed along an 8-inch vertical curb using LS-DYNA simulation. The face of the barrier rail should be flush with the face of the curb for MASH criteria at least TL-2, but preferably TL-3. • Evaluate, if the barrier is pushed back, how much offset from the face of the curb is acceptable. Also, evaluate various shapes of the curb from vertical to sloped. • If needed for MASH TL-3 (or TL-2), evaluate the effect of stiffening and types of stiffening methods for the guardrail to the various curb and barrier configurations. • Identify the most critical successful configuration based on the simulations.

	<p>Task 3: Crash Testing</p> <ul style="list-style-type: none"> Evaluate MASH compliance via crash testing. <p>Task 4: Final Computer Simulations</p> <ul style="list-style-type: none"> Perform additional validations based on full-scale crash testing to further increase confidence in the computer model Evaluate additional curb offsets and curb shapes for MASH compliance <p>Task 5: Final Report</p> <ul style="list-style-type: none"> Provide final report, including engineering opinion for MASH compliance for crash testing. Provide engineering opinion on any acceptable variations, such as variations of shape of curb (acceptable offset from curb, heights, shapes, etc.) All states may not have the exact same shape of vertical curb, so engineering opinion needs to consider the potential MASH compliant variations. Provide engineering opinion for 4" curb and any acceptable variations, such as variations of curb shape and offset.
Deliverables:	<p>A report providing details of traffic barrier rail face flush with face of 8-inch curb, variations of barrier offset from curb, documentation of the evaluation and crash tests performed, the results of each crash test, the assessment of the performance according to MASH criteria to at least TL-2, but preferably TL-3, and engineering opinion for MASH compliance for similar, less critical, designs which were not crash tested.</p>
Urgency and Expected Benefit:	<p>Standards for curb heights, shapes, and offsets vary from state to state. Applications on roadways for guardrail and curb is extremely common throughout the country (and world). Therefore, MASH compliance is needed for all of the variations.</p> <p>MDOT and PennDOT use and 8-inch vertical curb flush with traffic barrier rail face on many roadway applications. Evaluation of MGS traffic barrier with 8-inch vertical curb will help MDOT and PennDOT comply with MASH 2016 criteria.</p>
Problem Funding and Research Period:	<p>Estimated cost is \$210,000. Project Duration is 24 months.</p>
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