Roadside Safety Pooled Fund

Research Problem Statement

Project Title:	**Barrier Deflections at Lower Speeds (Project Category: LCB and LSRB)**
Project Synopsis:	There is a need for State DOT's and other municipalities to have accurate deflection distances of barrier systems when a vehicle hits them at lower speeds. It stands to reason that if an impacting vehicle hits the barrier system at a lower speed then the barrier will deflect a shorter distance. This project will document the deflection distances of MGS guardrail (semi-rigid) and F-Shape/New Jersey barrier systems at posted speeds less than TL-3, 62 mph for Agency use. This project will: • Conduct a comprehensive literature review of past crash tests/studies of MGS, F-Shape, and NJ barrier deflections at lower speeds • Conduct a survey with pooled fund states to determine what types of barrier they are most interested in finding deflection distances for, what lengths of concrete barrier segments they are most interested in, and at what vehicle impact speeds they are most interested in. Update project goals as needed depending on survey results. • Provide any known deflections of these three barrier types at lower speed limits found during the literature review, post member states survey results. • Complete computer simulations to evaluate deflections of barriers which were not found in the literature review Below are links to some literature concerning barrier deflections at lower speeds: MGS Guardrail: https://mwrsf.unl.edu/researchhub/files/Report307/TRP-03-314-15.pdf F-Shape Barrier: https://mwrsf.unl.edu/q&a/view.php?id=1505 F-Shape Barrier: https://mwrsf.unl.edu/reportResult.php?reportId=243&search-textbox=concrete%20barrier
Project Goal(s):	Determine barrier deflection distances for test impact conditions at lower speeds. This involves completing a review of currently available deflection distances and performing additional computer simulations. Specific barrier configurations (post spacing, segment length, anchorage) will be determined through a survey of the Pooled Fund member states. The reduced speeds may vary from 25 mph to 45 mph. *** Note: Embedded Single Slope barrier has little to no deflection at speeds of 62 mph, therefore it is not necessary to include this type of barrier in the project.*
Project Background:	State DOT's and other municipalities are often required to permanently install barrier on lower speed roadways, and temporarily install portable concrete barrier in lower speed work zones. Low speed roadways or work zones are often located in constrained areas where there is little available clear space behind barriers to accommodate their deflections. Most, if not all, DOT's provide barrier deflection distances based off Test Level 3 high speed conditions (62 mph impact speed) and have policy to require clear areas behind barrier for deflection distances that are greater than what may actually be needed along a low speed roadway.

<table>
<tr><td>Proposed Work Plan:</td><td>Task 1: Literature review and State Survey: Review previous research of barrier deflections at lower speeds than 62 mph.

Task 2: Perform Initial Computer Simulations: Two barrier systems identified in Task 1 will be evaluated for dynamic deflection distances through computer simulation.

Task 3: Perform Additional Computer Simulations: Researchers will analyze the dynamic deflection distances of additional barrier systems as financial and time constraints allow

Task 4: Reporting: Researchers will document the effort completed during this project, including a list of the barrier deflections measured during this project.</td></tr>
<tr><td>Deliverables:</td><td>Final project report compiling deflection distances of MGS guardrail, F-Shape barrier, and NJ Barrier at lower speeds, a summary of the survey to pooled fund states, and recommendations for future research</td></tr>
<tr><td>Urgency and Expected Benefit:</td><td>A successful project will give Agencies a comprehensive listing of barrier deflection distances at lower speeds available in a single document. If the deflection distances are lower as expected, it will give Agencies more flexibility in designing roadways/work zones in constrained areas.</td></tr>
<tr><td>Problem Funding and Research Period:</td><td>Total Estimated Cost:

<table><tr><th>Option</th><th>Total Number of Barrier Analyzed</th><th>Cost</th></tr><tr><td>1</td><td>4</td><td>$105,000</td></tr><tr><td>2</td><td>6</td><td>$135,000</td></tr><tr><td>3</td><td>8</td><td>$160,000</td></tr></table>
Research Period = 14 Months</td></tr>
<tr><td>Developer(s) of the Problem Statement:</td><td>Name: Tim Moeckel, WSDOT
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