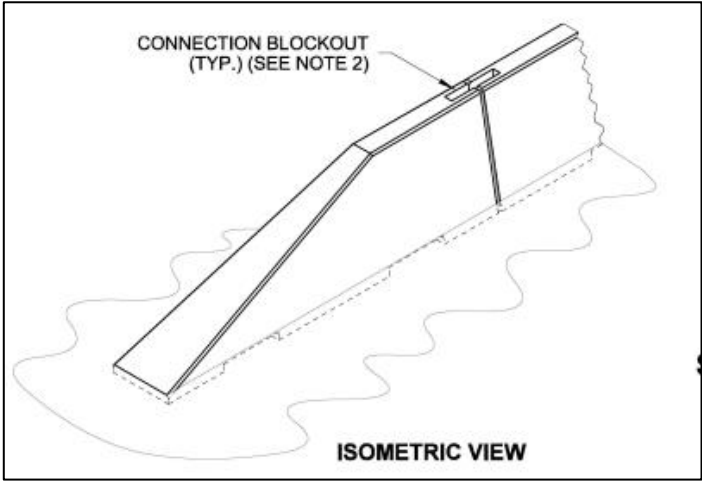


<b>Project Title:</b>	<b>MASH (TL-1 or TL-2) Crash Testing of Concrete Barrier Sloped End Terminals (2023-01-LCB)</b>
<b>Project Synopsis:</b>	<p>State DOT's have several options to terminate concrete barrier runs. One of the options is to use concrete sloped end terminals. The sloped end terminal can be used when concrete barrier cannot be tapered away from the roadway, cannot be buried into a cut slope, or when a lower cost option than using an impact attenuator is desired.</p> <p>There is need to determine if concrete barrier sloped end terminal designs are MASH compliant when errant vehicles hit the end of the terminal. Upon impact, will the errant vehicle stay stable or roll-over?</p> <div data-bbox="586 684 1284 1161" data-label="Image">  </div>
<b>Project Goal(s):</b>	<ol style="list-style-type: none"> <li>1.) Conduct pooled fund state survey to see if concrete sloped end terminals are used, what types (F-Shape, Single Slope, etc.) and lengths of sloped end terminals are used, and the state's policy for allowing use of the sloped end terminal.</li> <li>2.) Conduct literature research for crash tests/reports of concrete sloped end terminals.</li> <li>3.) From survey and research, select a critical concrete sloped end terminal design for crash testing and testing speed (TL-1 or TL-2). Ideally, the sloped end terminal design used can give MASH compliancy for a wide number of sloped end terminals used by the pooled fund states</li> <li>4.) MASH crash test (TL-1 or TL-2) a concrete sloped end terminal</li> <li>5.) Prepare final report</li> </ol>
<b>Project Background:</b>	<p>WSDOT and other agencies allow concrete barrier runs to be terminated with a sloped end terminal under certain policy conditions. For instance, WSDOT allows concrete end terminals to be installed outside the Design Clear Zone, on trailing ends of barrier runs when it is outside the Design Clear Zone for opposing traffic, on trailing ends of barrier runs on one-way roadways, and where posted speed is 25 mph or lower. WSDOT is not aware of any crash tests associated with concrete sloped end terminals and there is a concern that a vehicle hitting the end of the terminal can become unstable and roll over. WSDOT research could only find information given in Roadside Design Guide Section 8.4.4.1 Sloped Concrete End Treatment</p>

	<p><b>8.4.4.1 Sloped Concrete End Treatment</b></p> <p>When preferred treatments are not feasible, terminating a concrete barrier by tapering the end is occasionally necessary, even though this end treatment has not met acceptable crash-testing criteria. This treatment should be used only in locations where the traffic speeds are 60 km/h [40 mph] or less and space is limited by right-of-way constraints or the other roadside features that preclude using a crash-worthy end treatment. Recommended length of the taper is 6 m [20 ft], with 9 m to 12 m [30 ft to 40 ft] desirable. The height of the end of the taper should be no greater than 102 mm [4 in.] (8). Other applications include locations where the barrier is flared out beyond the clear zone or where end-on impacts are not likely to occur. Figure 8-43 shows a typical tapered end treatment on a concrete barrier.</p>
<p><b>Proposed Work Plan:</b></p>	<ol style="list-style-type: none"> <li>1.) Task 1 – Conduct pooled state survey</li> <li>2.) Task 2 – Literature research for any past concrete barrier sloped end terminals crash tests/reports</li> <li>3.) Task 3 – Select a critical sloped end terminal design</li> <li>4.) MASH Crash Test (TL-1 or TL-2) of critical sloped end terminal design</li> <li>5.) Final Report</li> </ol>
<p><b>Deliverables:</b></p>	<p>Final crash test report detailing research and crash testing of the concrete sloped end terminal.</p>
<p><b>Urgency and Expected Benefit:</b></p>	<p>A successfully crash tested concrete sloped end terminal will give Agencies the confidence to use this type of end terminal within the Design Clear Zone on low-speed roadways.</p>
<p><b>Problem Funding and Research Period:</b></p>	<p><b>Total Estimated Cost = TBD</b></p> <p><b>Research Period = TBD</b></p>
<p><b>Developer(s) of the Problem Statement:</b></p>	<p>Name: Tim Moeckel, WSDOT  Email: MoeckeT@wsdot.wa.gov  Phone: (360) 704-6377</p>