Special Permanent Applications (MASH)

NAME	MANUFACTURER	MASH 2016 Test Level	DIMENSIONS			SYSTEM INFORMATION	LOCATIONS CAN BE USED
			WIDTH	LENGTH	HEIGHT		
PERMANENT APPLICATIONS - NON-REDIRECTIVE, GATING SYSTEMS							
RAPTOR™ https://www.valtir.com/product/raptor-crash-cushion/ No FHWA Eligibility Letter	 **RAPTOR™**	Valtir, LLC	TL-1	3'-9"	9'-1"	3'-5"	The RAPTOR™ utilizes two pieces of High Density Polyethylene (HDPE) shells that connect together and provide protection from a rigid object such as a pole or tree. The impacting vehicles energy is absorb by the internal plastic matrix of the HDPE shell and it is also capable of re-directing a vehicle in side on angled impacts. The non-impacted side is typically reusable. It is a free standing, unanchored system. Two sizes avaliable to fit hazard up to 12" or 24" wide.	Single point objects, such as a pole or tree.
PERMANENT APPLICATIONS - REDIRECTIVE, NON-GATING SYSTEMS							
TxDOT Short Radius System; TL-3 https://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/standard/roadway/srgtl321.pdf No FHWA Eligibility Letter	 **TxDOT Short Radius System**	Generic	TL-3*	8' radius	Varies	31"	The system utilizes slotted thrie-beam guardrail, a wire rope and sand barrels attach to an existing rail-to-bridge transition adjacent to a driveway. It uses BCT and CRT wood posts to provide quick release for capture impacts. Main Road Section - The system uses standard thrie-beam including a slotted thrie-beam nose section. **It is critcal that the primary guardrail maintains a 4 degree flare with the primary driveway.** Radius Section: Consist of a 8' radius curved section of slotted thrie-beam guardrail, a wire rope and six (6) sand barrels placed on a 5' shelf behind the rails. Side Road: Consist of a 29'-3" long straight thrie-beam guardrail connected to a rigid terminal in a driveway. The system requires a minimum of 5 ft of flat ground behind it at a slope of 10H:1V or flatter to accommodate the placement of the six 700-lb sand barrels positioned per the supplied drawings. A slope of 3H:1V or flatter can be placed after the 5-ft flat area to accommodate ditches in the field side. Additional Reports: https://library.ctr.utexas.edu/hostedpdfs/tti/0-6711-1.pdf https://static.tti.tamu.edu/tti.tamu.edu/documents/9-1002-15-9.pdf	Clear Area: 34'-10" along the primary road and 35' along the driveway.
TxDOT Short Radius System; TL-2 https://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/standard/roadway/srgtl221.pdf No FHWA Eligibility Letter		Generic	TL-2*	16' radius	Varies	31"	Main Road Section - The system uses a 12'-6" long section of standard thrie-beam guardrail and two (2) sand drums. Radius Section: Consist of a 16' radius curved section of 11" long slots on the nose of the curved thrie-beam guardrail, two cables with and four (4) sand drums placed on a 3' shelf behind the rails. Side Road: Consists of a 12'-6" long thrie-beam, connected to a W-beam to thrie beam asymmetrical transition and connected to regular run of W-Beam and a crashworthy terminal. The system requires a minimum of 3 ft of flat ground behind it at a slope of 10H:1V or flatter, from there a 3H:1V slope or flatter ditch may be placed. Additional Reports: http://tti.tamu.edu/documents/0-6913-R1.pdf * No crash test matrix for this type of system under MASH 2016 were established. Conducted the four crash tests previously used to determine crashworthiness for similar curved rail installations. System was crash tested with a 3:1 ditch behind the nose of the system.	Clear Area: 27'-7.5" along the primary road and 34'-10.5” along the secondary road till the beginning of the regular W-Beam run.

Special Permanent Applications (MASH)

NAME	MANUFACTURER	MASH 2016 Test Level	DIMENSIONS			SYSTEM INFORMATION	LOCATIONS CAN BE USED
			WIDTH	LENGTH	HEIGHT		
PERMANENT APPLICATIONS - REDIRECTIVE, NON-GATING SYSTEMS							
Short Radius Guardrail System (SRGS) https://nap.nationalacademies.org/catalog/26800/roadside-barrier-designs-near-bridge-rail-ends-with-restricted-rights-of-way-a-national-survey-and-testing-reports No FHWA Eligibility Letter	 **SRGS**	Generic	TL-3*	8' radius	Varies	31"	SRGS is designed to attach to an existing MASH TL-3, rail-to-bridge transition on the main road, adjacent to a side road. The system utilizes all 10 gauge W-beam and two cables; one in the valley of the W-beam and the second cable below the bottom of the W-beam, held in place by eye bolts so it can capture an impacting vehicle within the radius and decelerate the vehicle as the energy dissapates. These cables are attached to the back side of the rails with a half of standard bracket. Main Road Section - The SRGS uses a 6'-3" long section of W-beam to connect to the W-beam transition and 18'-9" of W-beam rail attached to the back of the Thrie-beam. Radius Section: Consist of a 12'-6" long section, curved 90 degrees to form an 8' radius. Side Road: Consist of two 12'-6" long straight W-beam sections connected to crashworthy terminal or W-beam. SRGS utilizes all 6' standard steel post spaced at 37 ½" and 8" wood or composite blockouts. * No crash test matrix for this type of system under MASH 2016 were established. Conducted the four crash tests previously used to determine crashworthiness for similar curved rail installations. Researchers conducted extensive computer simulations to provide guidance for field conditions that differed from the crash tested layout. System was crash tested at a 2:1 slope at 50 mph. Additional research is ongoing.	Clear Area: 30' Long (parellel to main road) x 15' width (perpendicular to main road)
Thrie-Beam Bullnose Guardrail System https://mwrsf.unl.edu/researchhub/files/Report387/TRP-03-389-20.pdf https://mwrsf.unl.edu/researchhub/files/Report393/TRP-03-418-20.pdf No FHWA Eligibility Letter	 **Thrie-Beam Bullnose**	Generic	TL-3	14'-9" but can vary	Varies 66' - 1¾" minimum	31 ⅝"	When a vehicle impact within the radiused nose of a bullnose, the barrier captures the vehicle, collapses inward, and dissipates energy to decelerate the vehicle. When a vehicle impact along the sides of the barrier, it is redirected similar to standard guardrail. The system consists of a guardrail envelope made up a slotted thrie-beam nose section with reinforcing nose cables. On each side; one curved, slotted thrie beam section, one straight, slotted thrie beam section, one standard thrie beam section (no cureve or slots) and asymmetric W-to-thrie transition. The system utilizes Breakaway Cable Terminal (BCT) posts for post 1 and 2. Posts 3 through 8 are Universal Breakaway Steel Posts (UBSPs), posts 9 through 12 are thrie-beam guardrail steel posts, and posts 13 and on are standard W-beam guardrail posts. Post 1 - no blockout. Post 2 - blockout is tapered and timber.Post nos. 3-8 - special double blockouts that are shorter and tapered on the front block. Post nos. 9-12 - use shorter blockouts and not full height thrie beam blockouts.	Wide medians, connections at bridge openings, bridge piers and gore areas.