Research Update

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Recently Completed Projects

- Keyed-in Single Slope Barrier
- MASH Testing of F-shape TCB Pinned on Concrete
- 31" BIB Compatible with MGS Guardrail





TTI Researcher: Nauman Sheikh Technical Representative: Kurt Brauner (LADOTD)





- Need
 - TTI tested 75-ft segment of 42" tall SSB keyed into 1" asphalt (for TxDOT)
 - MASH TL-4, Test 4-11 was successful
 - Determine if the keyed-in barrier will perform acceptably with shorter segment length
- Objective
 - Using past installation, perform MASH Test 4-12
 with a 40-ft segment length





- Test Installation
 - 120-ft installation with impact on the 40-ft segment
 - No connections between adjacent segments



• Test Installation









- Results
 - The 40-ft keyed-in SSB successfully passed MASH Test 4-12
 - Max. dynamic deflection = 5.8 inches
 - Permanent deflection = 0.75 inch
 - MASH Tests 4-10 (small car) and 4-11 (pickup) were not performed due to successful past testing with SSB





- Conclusions
 - 40-ft segment keyed-in SSB is considered MASH TL-4 compliant
 - Greater than 40-ft segment lengths can also be used
 - Shorter than 40-ft segment lengths will need additional testing
- Future Tasks
 - Final report is currently under internal review and will be submitted shortly





MASH Testing of F-shape TCB Pinned on Concrete

TTI Researcher: Nauman Sheikh Technical Representative: Kurt Brauner (LADOTD)





- Need
 - Pinned-down anchored barrier system's original test with TCB pinned on concrete was performed under NCHRP Report 350
 - All subsequent transitions and applications were tested under MASH
 - Need to evaluate the TCB pinned on concrete under MASH
 - Last year's MASH Test 3-11 failed due to pavement concrete failing under impact, causing the barrier to topple

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 Using some offset from the edge of pavement will be helpful in preventing concrete failure





- Objectives
 - Determine a suitable offset from the edge of the concrete pavement
 - Perform MASH Test 3-11 of the F-shape TCB pinned to concrete with the offset
- Test Installation
 - 100-ft installation with 12.5-ft segments
 - Pin-and-loop connection (2 sets of 3 loops)
 - 8-inch thick unreinforced concrete pavement
 - A 9-inch offset was determined to be suitable for the design to meet MASH TL-3 requirement





• Test Installation









- Conclusions
 - F-shape TCB with pin-and-loop connection successfully passed MASH Test 3-11
 - Barrier deflection
 - Dynamic = 22.1 inches
 - Permanent = 9.0 inches
 - Passed MASH Occupant Risk Criteria
- Final report is currently under internal review and will be submitted shortly

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31-INCH BURIED-IN-BACKSLOPE TERMINAL COMPATIBLE WITH MGS GUARDRAIL

TTI Researcher: Chiara Dobrovolny Technical Representative: Jeff Jeffers (AKDOT)





BIB Design

- Resemble 350 tested system
- > 31" BIB height to paved roadway
- Splices off posts (compatible with MGS)



V-Ditch Details

4:1 Foreslope2:1 Backslope13:1 Guardrail flare







Test Installation









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Test 3-35







3-35 Results











Occupant Risk Values

Longitudinal OIV	17.4 ft/s
Lateral OIV	16.4 ft/s
Longitudinal Ridedown	5.4 g
Lateral Ridedown	8.8 g

Vehicle Stability

Maximum Yaw Angle	36°
Maximum Pitch Angle	3°
Maximum Roll Angle	6°

Test Article Deflections

Dynamic	4.3	ft
Permanent	4.3	ft
Working Width	5.2	ft
Height of Working Width	4.6	ft

Test 3-34



Texas A&M Transportation Institute



3-34 Results



Occupant Risk Values

Longitudinal OIV	14.1 ft/s
Lateral OIV	20.3 ft/s
Longitudinal Ridedown	7.5 g
Lateral Ridedown	8.5 g

Vehicle Stability

Maximum Yaw Angle	44°
Maximum Pitch Angle	6°
Maximum Roll Angle	17°

Test Article Deflections

Dynamic	1.7	ft
Permanent	0.5	ft
Working Width	2.1	ft
Height of Working Width	2.7	ft





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Conclusions

- Designed and tested a 31" BIB w/ rubrail compatible with MGS per MASH TL-3 conditions
- System IS MASH compliant when installed on V-ditch on 4:1 or flatter foreslope and 2:1 backslope

Additional Investigations

- Investigate implementation of BIB system on different foreslope /backslope conditions – as well as flat bottom ditch rather then V-ditch
- Need for BIB on 6:1 foreslope WITHOUT rubrail?



