

**Project 0-6946**

**Establishing Comprehensive Manual on Assessing Safety Hardware (MASH) Compliance  
for Roadside Safety Systems in Texas**

**Phase I Full-Scale Crash Testing Results (FY 17)**

<b>Device</b>	<b>TxDOT Standard</b>	<b>Test Level</b>	<b>MASH Compliant</b>	<b>Comments</b>
36" vertical parapet	N.A.	TL-4	Yes	Modified 32-inch tall T221 rail by increasing height and adding additional reinforcement.
1" ACP lateral support for concrete barrier	SSCB(1F)-10	TL-4	Yes	75-ft minimum segment length
Pinning pattern for concrete barrier in concrete	CSB(7)-10	TL-3	Yes	F-shape portable concrete barrier segments with J-J Hooks connection placed at edge of concrete deck and restrained with four 1-1/4 inch angled pins per 30-ft segment.
Direct embedded wood sign support	BC(5)-14 (single)	TL-3	No	Failed pickup truck test at 90 degrees due to penetration of windshield by sign and segment of wood sign support. Modification being developed under Project 0-6968.
	BC(5)-14 (dual)	TL-3	No	Failed small car test at 0 degrees due to hole in windshield caused by contact with a fragment of the fractured wood support. Modification being developed under Project 0-6968.
Pedestal pole with beacon (drilled shaft foundation)	RFBA-13 (without solar assembly)	TL-3	Yes	Pedestal pole with sign and flashing beacons
	SPRFBA-13 (with solar assembly)	TL-3	Yes	Pedestal pole with sign, flashing beacons, solar panel, and battery cabinet
Mailbox Type 1 foundation (multi) 56" hanger	MB-15(1)	TL-3	Yes	Multiple (four) mailboxes on "hanger" style support in wedge and socket foundation system
Mailbox Type 2 foundation (double)-thin walled galvanized tubing	MB-15(1)	TL-3	Yes	Two mailboxes on single thin-wall steel tube support in wedge and socket foundation system
Mailbox Type 3 foundation (double)-winged channel post	MB-15(1)	TL-3	Yes	Two mailboxes on direct embedded 2 lb/ft U-channel support

### Phase II Full-Scale Crash Testing Results (FY 18)

Device	Standard	Test Level	MASH Compliant	Comments
C402 bridge rail	C402	TL-4	Yes	Elliptical steel rail on concrete parapet
C412 bridge rail	C412	TL-5	Yes	Aesthetic TL-5 concrete bridge rail with windows
C411 bridge rail	C411	TL-2	Yes	Aesthetic concrete baluster style rail
T1W bridge rail	T1W	TL-3	Pending	Two tubular steel rails on concrete curb
W-beam guardrail with round wood posts	GF(31)-14	TL-3	No	Wood posts fractured rather than deflecting through soil and vehicle penetrated system. Modification being developed under Project 0-6968.
Modified W-beam guardrail with round wood posts		TL-3	Yes	Round wood posts with 36-inch embedment (tested under Project 0-6968)
W-beam guardrail with steel posts in rocky terrain	GF(31)-14 (note 9)	TL-3	Yes	Steel posts embedded 24 inches in simulated rocky terrain.
W-beam guardrail with round wood posts in rocky terrain	GF(31)-14 (note 9)	TL-3	Pending	Round wood posts embedded 24 inches in simulated rocky terrain.
Modified W-beam guardrail with round wood posts in concrete mow strip	GF(31)-14 (note 9)	TL-3	Pending	Round wood posts with 36-inch embedment installed in concrete mow strip with grout filled leave outs.
Concrete barrier at light post	SSCB(4)-10 & RIP-11	TL-4	Pending	Add 10' long cast-in-place barrier section for light pole onto single slope barrier constructed in 2017 for evaluation of 1" ACP lateral barrier support.
Single post perforated square metal tubing skid	BC(5)-14	TL-3	Yes	Temporary, free-standing single sign support system for small signs
Dual wood post temporary sign support system on skids	BC(5)-14	TL-3	Yes	Temporary, free-standing sign support system with dual wood supports
Mailbox Type 4 foundation (single)-recycled rubber post	MB-15(1)	TL-3	Yes	Single mailbox on recycled rubber post in wedge and socket foundation system.
Mailbox Type 4 foundation (double)-thin walled white post	MB-15(1)	TL-3	Yes	Two mailboxes on single thin-wall steel tube support in wedge and socket foundation system
Mailbox Type 4 foundation (multi)-Shurtite Multi Hanger	MB-15(1)	TL-3	Yes	Multiple (four) mailboxes on semi-circular style support in wedge and socket foundation system
Mailbox Type 5 foundation (single)-timber post	MB-15(1)	TL-3	Yes	Molded plastic mailbox system mounted to direct embedded timber post

**Planned Phase III Full-Scale Crash Testing (FY 19)**

<b>Device</b>	<b>Standard</b>	<b>Test Level</b>	<b>Comments</b>
C1W bridge rail	C1W	TL-4	Four tubular steel rails on concrete curb.
C66 bridge rail	C66	TL-3	Concrete beam and post bridge rail.
Low profile concrete barrier	LPCB-13	TL-2	20-inch tall, portable, low-profile concrete barrier
F-shape to low profile barrier transition	FSLP(TR)-10	TL-2	Precast concrete transition section to transition from 20-inch TL-2 low-profile barrier to 32-inch TL-3 F-shape precast concrete barrier
TL-3 Thrie Beam transition downstream end without end shoe block	GF(31)TR-14	TL-3	Thrie beam transition to 36-inch single slope bridge parapet without tapered block behind end terminal connector
Single post wood skid	BC(5)-14	TL-3	Soil embedded perforated square steel tube support for temporary small signs
Single embedded perforated square metal tube	BC(5)-14	TL-3	Foundation Option 1 is considered most critical and will achieve MASH compliance for foundation options 2 and 3. MASH requires testing of signs at 90 degrees if they are used at intersections.
Burn ban sign attached to sign support below primary sign	SMD(SLIP-1)-08 (slip base)	TL-3	County burn ban sign attached to slip base sign support system below primary sign.
	SMD(TWT)-08 (wedge anchor)	TL-3	County burn ban sign attached to thin-wall steel tube in wedge and socket foundation system below primary sign
Mailbox Type 6 foundation (single) construction barrel	MB-15(1)	TL-3	Temporary mailbox attached to plastic drum
Mailbox Type 7 foundation (double)-thin walled white post	MB-15(1)	TL-3	Two mailboxes on single thin-wall steel tube support in wedge and socket foundation system
Mailbox Type 7 foundation (multi)-50" hanger	MB-15(1)	TL-3	Multiple (four) mailboxes on triangular-shaped steel support in wedge and socket foundation system