



U.S. Department
of Transportation
**Federal Highway
Administration**

1200 New Jersey Ave., SE
Washington, D.C. 20590

February 2, 2017

In Reply Refer To:
HSST-1/B-277

Mr. Gerrit Dyke, P.E.
Lindsay Transportation Solutions
180 River Road
Rio Vista, CA 94571

Dear Mr. Dyke:

This letter is in response to your December 20, 2016 request for the Federal Highway Administration (FHWA) to review a roadside safety device, hardware, or system for eligibility for reimbursement under the Federal-aid highway program. This FHWA letter of eligibility is assigned FHWA control number B-277 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

Decision

The following devices are eligible, with details provided in the form which is attached as an integral part of this letter:

- QuickChange Moveable Barrier Concrete Reactive Tension System (QMB- CRTS)

Scope of this Letter

To be found eligible for Federal-aid funding, new roadside safety devices should meet the crash test and evaluation criteria contained in the American Association of State Highway and Transportation Officials' (AASHTO) Manual for Assessing Safety Hardware (MASH). However, the FHWA, the Department of Transportation, and the United States Government do not regulate the manufacture of roadside safety devices. Eligibility for reimbursement under the Federal-aid highway program does not establish approval, certification or endorsement of the device for any particular purpose or use.

This letter is not a determination by the FHWA, the Department of Transportation, or the United States Government that a vehicle crash involving the device will result in any particular outcome, nor is it a guarantee of the in-service performance of this device. Proper manufacturing, installation, and maintenance are required in order for this device to function as tested.

This finding of eligibility is limited to the crashworthiness of the system and does not cover other structural features, nor conformity with the Manual on Uniform Traffic Control Devices.

Eligibility for Reimbursement

Based solely on a review of crash test results and certifications submitted by the manufacturer, and the crash test laboratory, FHWA agrees that the device described herein meets the crash test and evaluation criteria of the American Association of State Highway and Transportation Officials' (AASHTO) Manual for Assessing Safety Hardware (MASH). Therefore, the device is eligible for reimbursement under the Federal-aid highway program if installed under the range of tested conditions.

Name of system: QuickChange Moveable Barrier Concrete Reactive Tension System
(QMB- CRTS)

Type of system: Longitudinal Barrier (unanchored)

Test Level: MASH Test Level 3 (TL3)

Testing conducted by: Texas A&M Transportation Institute (TamTI)

Date of request: December 20, 2016

Date initially acknowledged: December 21, 2016

Date of completed package: January 11, 2016

FHWA concurs with the recommendation of the accredited crash testing laboratory as stated within the attached form.

Full Description of the Eligible Device

The device and supporting documentation, including reports of the crash tests or other testing done, videos of any crash testing, and/or drawings of the device, are described in the attached form.

Notice

If a manufacturer makes any modification to any of their roadside safety hardware that has an existing eligibility letter from FHWA, the manufacturer must notify FHWA of such modification with a request for continued eligibility for reimbursement. The notice of all modifications to a device must be accompanied by:

- Significant modifications – For these modifications, crash test results must be submitted with accompanying documentation and videos.
- Non-signification modifications – For these modifications, a statement from the crash test laboratory on the potential effect of the modification on the ability of the device to meet the relevant crash test criteria.

FHWA's determination of continued eligibility for the modified hardware will be based on whether the modified hardware will continue to meet the relevant crash test criteria.

Any user or agency relying on this eligibility letter is expected to use the same designs, specifications, drawings, installation and maintenance instructions as those submitted for review.

You are expected to certify to potential users that the hardware furnished has the same chemistry, mechanical properties, and geometry as that submitted for review, and that it will meet the test and evaluation criteria of the AASHTO MASH.

Issuance of this letter does not convey property rights of any sort or any exclusive privilege. This letter is based on the premise that information and reports submitted by you are accurate and correct. We reserve the right to modify or revoke this letter if: (1) there are any inaccuracies in the information submitted in support of your request for this letter, (2) the qualification testing was flawed, (3) in-service performance or other information reveals safety problems, (4) the system is significantly different from the version that was crash tested, or (5) any other information indicates that the letter was issued in error or otherwise does not reflect full and complete information about the crashworthiness of the system.

Standard Provisions

- To prevent misunderstanding by others, this letter of eligibility designated as FHWA control number B-277 shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed upon request.
- This letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder.
- If the subject device is a patented product it may be considered to be proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects: (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.

Sincerely,



Scott T. Johnson
Acting Director, Office of Safety
Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

Submitter	Date of Request:	December 12, 2016	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Gerrit A. Dyke, P.E.	
	Company:	Lindsay Transportation Solutions, Inc.	
	Address:	180 River Road, Rio Vista, CA 95471	
	Country:	USA	
	To:	Michael S. Griffith, Director FHWA, Office of Safety Technologies	

I request the following devices be considered eligible for reimbursement under the Federal-aid highway program.

Device & Testing Criterion - Enter from right to left starting with Test Level



System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'B': Rigid/Semi-Rigid Barriers (Roadside, Median, Bridge Railings)	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	QuickChange Moveable Barrier Concrete Reactive Tension System (QMB-CRTS)	AASHTO MASH	TL3

By submitting this request for review and evaluation by the Federal Highway Administration, I certify that the product(s) was (were) tested in conformity with the AASHTO Manual for Assessing Safety Hardware and that the evaluation results meet the appropriate evaluation criteria in the MASH.

Individual or Organization responsible for the product:

Contact Name:	Gerrit A. Dyke, P.E.	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Lindsay Transportation Solutions, Inc.	Same as Submitter <input checked="" type="checkbox"/>
Address:	180 River Road, Rio Vista, CA 95471	Same as Submitter <input checked="" type="checkbox"/>
Country:	USA	Same as Submitter <input checked="" type="checkbox"/>

Enter below all disclosures of financial interests as required by the FHWA 'Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.

Crash testing and evaluation of the performance of the QMB-CRTS to MASH was performed by Texas AM Transportation Institute (TTI). TTI nor any testing facility employee has any financial interest in LTS or the product being tested. TTI employees have, and may in the future, provided consulting services to LTS unrelated to the current testing and evaluation of this product.

PRODUCT DESCRIPTION

- New Hardware or Significant Modification
- Modification to Existing Hardware

The Concrete Reactive Tension Quickchange® Movable Barrier (CRTS) system is an unanchored longitudinal barrier capable of rapid lateral transfer by a transfer vehicle. CRTS is designed to meet the rigid requirements of deployment in movable barrier applications where positive separation is required and where lane widths and lateral space are limited.

CRTS is a heavily reinforced concrete barrier connected end to end with tensioning hinge mechanisms and steel pins. Each barrier segment is approximately 39 in [1.0 m] and weighs approximately 1500 lb (680 kg). The barrier is 18 in [460 mm] wide. Steel variable length barriers (VLB) are used in conjunction with the concrete segments. The system is applicable to asphalt or concrete road surfaces.

The CRTS system can be utilized with or without VLBs. VLB positioning is configured in accordance with the requirements of the barrier application. Typical VLB spacing is 1 in 17 CRTS barrier segments or fewer, however, some applications may require more.

The CRTS pin used to link the barrier segments utilizes a washer and retaining clip to minimize maintenance of the connection during transfer operations. The washer and retaining clip do not effect the capacity of the joint or the function or performance of the barrier system. The CRTS system can be deployed with or without the washer and retaining clip.

A series of insignificant modifications to the CRTS barrier were submitted and deemed eligible under NCHRP Report 350 including alternative retaining clips, pusher plates, and VLB hydraulic reservoir cap (Reference FHWA letter B-69E). These alternative components may also be applied to the CRTS system eligible under MASH. In addition, alternative corrosion resistant coatings may be applied and used on CRTS and VLB hardware, including the integral tension spring, as the coatings do not effect the capacity, function, or performance of the hardware or CRTS system.

Markings may be stamped into the concrete for identification, quality assurance, and tracking. The markings will be alpha numeric characters set into the top of the barrier. In some cases, a metal identification tag may be fastened to the barrier.

CRASH TESTING

By signature below, the Engineer affiliated with the testing laboratory, agrees in support of this submission that all of the critical and relevant crash tests for this device listed above were conducted to meet the MASH test criteria. The Engineer has determined that no other crash tests are necessary to determine the device meets the MASH criteria.

Engineer Name:	Dean C. Alberson	
Engineer Signature:	Dean C. Alberson	<small>Digitally signed by Dean C. Alberson DN: cn=Dean C. Alberson, o=Texas AM Transportation Institute, ou=Roadway Safety and Physical Security Division, email=d-alberson@tti.tamu.edu, c=US Date: 2016.12.13 08:45:30 -0600</small>
Address:	3135 TAMU College Station TX 77843-3135	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-10 (1100C)	TTI Crash Test No. 690900-LTS1: The CRTS Barrier contained and redirected the 1100c vehicle. The vehicle did not penetrate, underide, or override the installation. Maximum dynamic deflection during the test was 26.0 inches (660 mm). No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or present a hazard to others in the area. No occupant compartment deformation or intrusion occurred. Maximum roll and pitch angles were 18 degrees and 6 degrees, respectively. Occupant risk factors were within the preferred limits specified in MASH.	PASS
3-11 (2270P)	TTI Crash Test No. 690900-LTS2: The CRTS Barrier contained and redirected the 2270P vehicle. The vehicle did not penetrate, underide, or override the installation. Maximum dynamic deflection during the test was 41.4 inches (1052 mm). No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or present a hazard to others in the area. No occupant compartment deformation or intrusion occurred. Maximum roll and pitch angles were 11 degrees and 6 degrees, respectively. Occupant risk factors were within the preferred limits specified in MASH.	PASS
3-20 (1100C)	Optional Test not performed. CRTS is a stand alone barrier system that will not transition to any stiffer or more rigid barrier systems. Therefore, test 3-20 is not required.	Non-Relevant Test, not conducted
3-21 (2270P)	Test not performed. CRTS is a stand alone barrier system that will not transition to any stiffer or more rigid barrier systems. Therefore, test 3-21 is not required.	Non-Relevant Test, not conducted

Full Scale Crash Testing was done in compliance with MASH by the following accredited crash test laboratory (cite the laboratory's accreditation status as noted in the crash test reports.):

Laboratory Name:	Texas AM Transportation Institute	
Laboratory Signature:	Matt Robinson	<small>Digitally signed by Matt Robinson DN: cn=Matt Robinson, o, ou, email=m-robinson@tti.tamu.edu, c=US Date: 2016.12.20 08:55:19 -06'00'</small>
Address:	3135 TAMU, College Station, TX 77843	Same as Submitter <input type="checkbox"/>
Country:	United States	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	Certificate No. 2821.01 through April 30, 2017	

Submitter Signature*: Gerrit Dyke, P.E. Digitally signed by Gerrit Dyke, P.E.
Date: 2016.12.20 14:05:45 -08'00'

Submit Form

ATTACHMENTS

Attach to this form:

- 1) Additional disclosures of related financial interest as indicated above.
- 2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
- 3) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [[Hardware Guide Drawing Standards](#)]. For proprietary products, a single isometric line drawing is usually acceptable to illustrate the product, with detailed specifications, intended use, and contact information provided on the reverse. Additional drawings (not in TF-13 format) showing details that are relevant to understanding the dimensions and performance of the device should also be submitted to facilitate our review.

FHWA Official Business Only:

Eligibility Letter		
Number	Date	Key Words

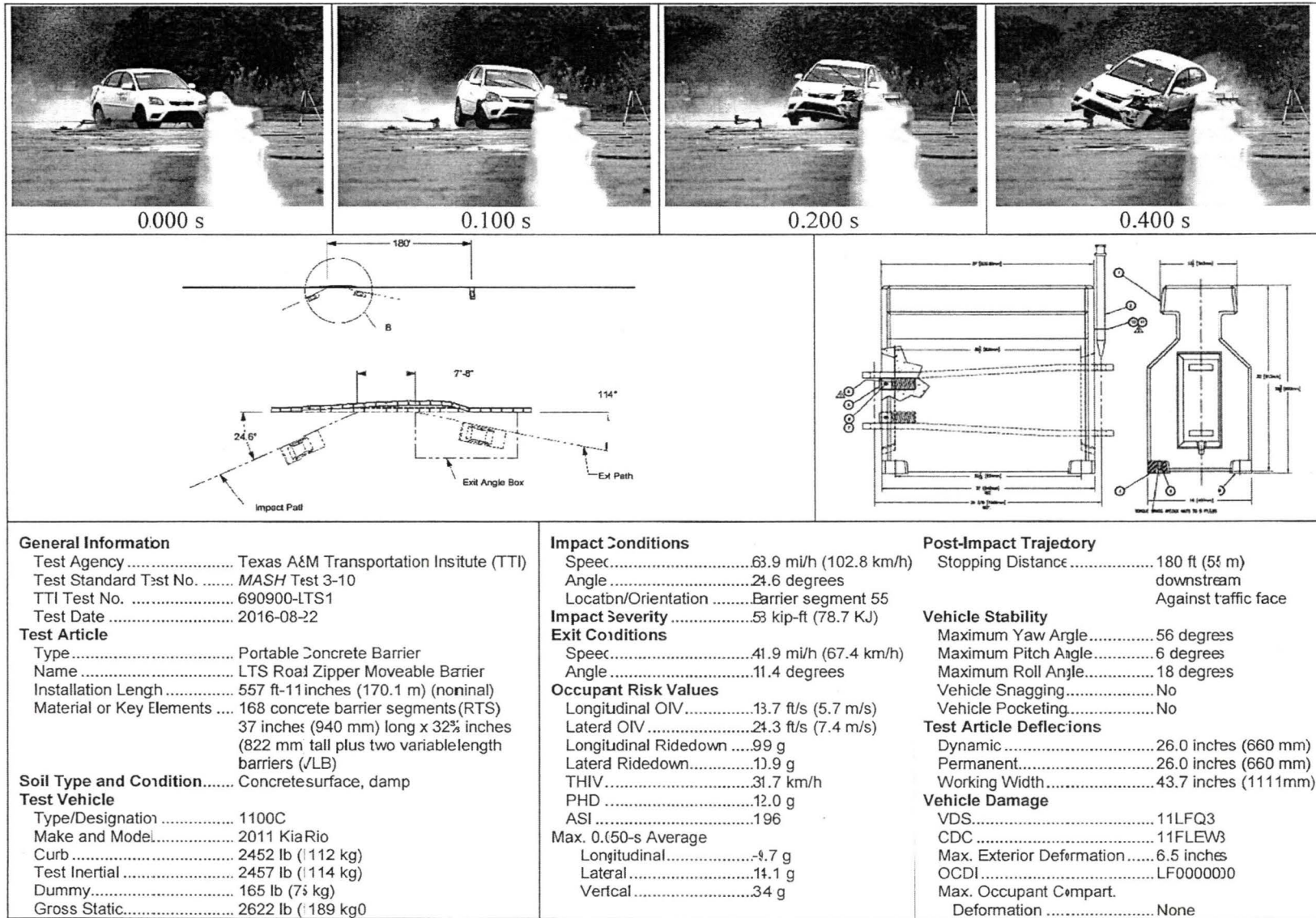


Figure 5.7. Summary of Results for MASH Test 3-10 on LTS Road Zipper Moveable Barrier.

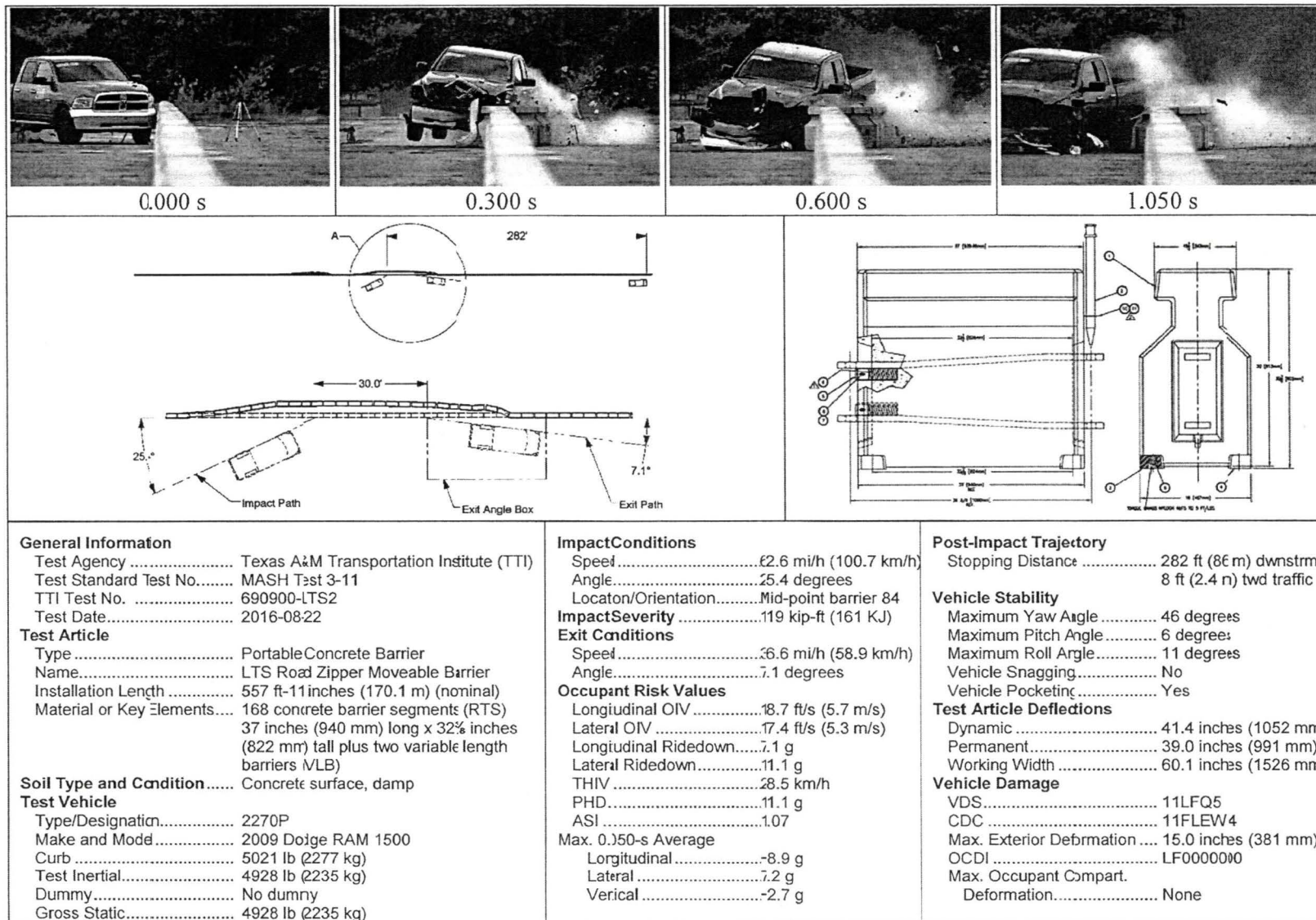
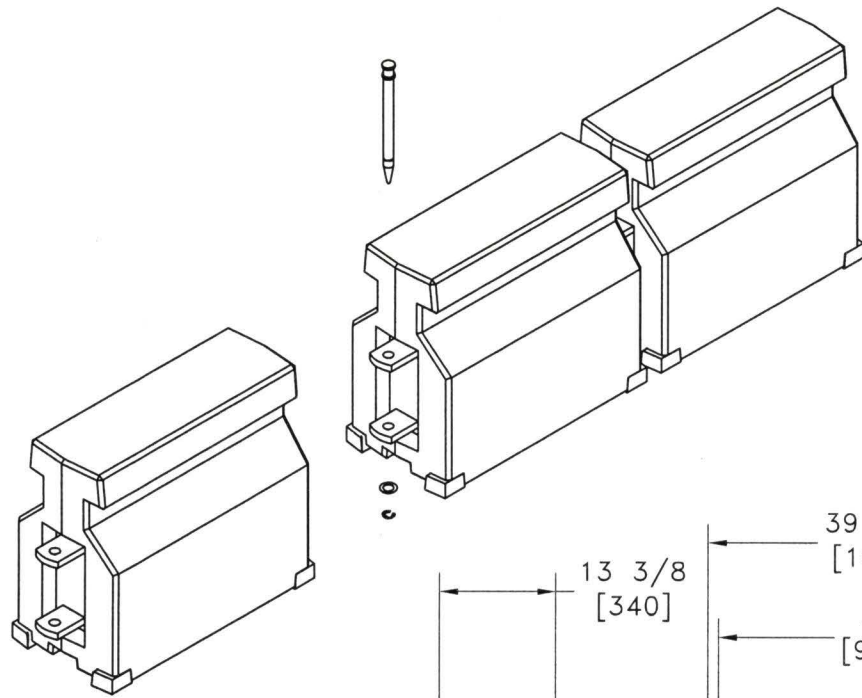
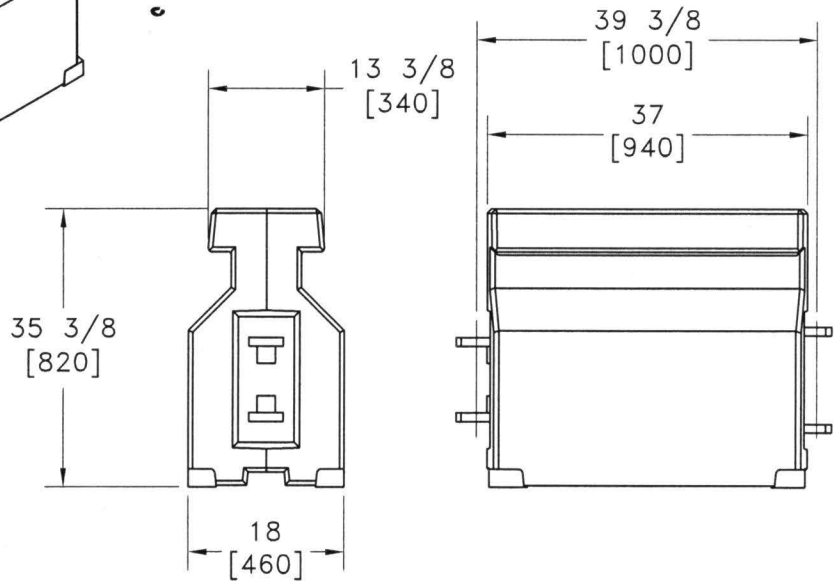


Figure 6.6. Summary of Results for MASH Test 3-11 on LTS Road Zipper Moveable Barrier.



CONCRETE REACTIVE
TENSION® BARRIER



REACTIVE TENSION® MOVEABLE BARRIER, MASH TL-3



BY LINDSAY

Lindsay Transportation Solutions, 180 River Rd., Rio Vista CA. 94571, 888-800-3691
www.theroadzipper.com

SHEET NO.	DATE:
1 OF 2	12/12/16

INTENDED USE

The Concrete Reactive Tension® QuickChange® Moveable Barrier (CRTS) system is a MASH TL-3 longitudinal barrier capable of rapid lateral transfer by a transfer vehicle. CRTS is designed to meet the rigid requirements of deployment in moveable barrier applications where positive separation is required and where lane widths and lateral space are limited. The CRTS system is unanchored and has low deflection during vehicle impacts.

CRTS MASH TL-3 is a heavily reinforced concrete barrier connected end to end with tensioning hinge mechanisms and steel pins. Each barrier segment is approximately 39 in [1.0 m] and weighs approximately 1500 lb (680 kg). The barrier is 18 in [460 mm] wide.

Specially constructed transfer machines are used to lift, move, and reposition the barrier laterally on the roadway. Transfer vehicles are capable of moving the barrier wall up to 24 ft [7.5 m] at up to 10 mph [16 kph] on a permanent system and up to 5 mph [8 kph] for a temporary or construction system.

RTS is used as median barrier on congested roadways to open and close lanes of traffic to adapt to changing traffic volumes during commuting hours or special events. It is also used to open and close construction zones on a periodic basis to increase safety, workspace, reduce congestion, and improve construction worker productivity.

RTS barrier is compatible with the ABSORB 350® Crash Cushion (SC111).

APPROVALS

The Reactive Tension® QuickChange® Moveable Barrier system has been fully tested in conformance with MASH Test Level 3 and determined eligible for federal reimbursement by FHWA.

FHWA Acceptance Letter: TBD

CONTACT INFORMATION

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REACTIVE TENSION® MOVEABLE BARRIER, MASH TL-3



SHEET NO.

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2 OF 2

12/12/16

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