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

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

May 6, 2016

In Reply Refer To:
HSST-1/B-259

Mr. David Whitesel
California Department of Transportation
5900 Folsom Blvd., MS-5
Sacramento, CA 95819-4612

Dear Mr. Whitesel:

This letter is in response to your January 27, 2015 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-259 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:

- Type 732SW Bridge Rail

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' 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' 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: Type 732SW Bridge Rail
Type of system: Longitudinal Barrier
Test Level: MASH Test Level 2
Testing conducted by: Roadside Safety Research Group, CalTrans
Date of request: January 27, 2015
Date of completed package: April 6, 2016

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.

You are expected to supply potential users with sufficient information on design, installation and maintenance requirements to ensure proper performance.

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 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-259 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 yours,

Michael S. Griffith

Michael S. Griffith
Director, Office of Safety Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

Submitter	Date of Request:	January 27, 2015	◉ New ○ Resubmission
	Name:	David Whitesel	
	Company:	California Department of Transportation	
	Address:	5900 Folsom Blvd., MS-5	
	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.

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'B': Barriers (Roadside, Median, Bridge Railings)	◉ Physical Crash Testing ○ Engineering Analysis	Type 732SW Bridge Rail	AASHTO MASH	TL2

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.

Identification of the individual or organization responsible for the product:

Contact Name:	David Whitesel	Same as Submitter ☒
Company Name:	California Department of Transportation	Same as Submitter ☒
Address:	5900 Folsom Blvd., MS-5	Same as Submitter ☒
Country:	USA	Same as Submitter ☒

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

This is a non-proprietary bridge rail designed by the California Department of Transportation (Caltrans) Structures Barrier Specialists. The testing lab, the Caltrans Roadside Safety Research Group (RSRG), is part of the same parent organization as the designer. However, no person in the RSRG benefits in any way financially if the products does or does not meet MASH requirements and/or is eligible for Federal-Aid Reimbursement.

PRODUCT DESCRIPTION

◉ New Hardware or Significant Modification ○ Modification to Existing Hardware	
This is a MASH TL-2 bridge rail with ADA-compliant pedestrian sidewalk.	

CRASH TESTING

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
2-10 (1100C)	Test 110MASH2C14-01 was conducted on 3/12/2014. The vehicle impacted the sidewalk at 24.3° and 71.1 km/h. It was smoothly redirected and exited the vertical face at 10.6°. Occupant Impact Velocities and Ridedown Accelerations were below MASH preferred limits.	PASS
3-11 (2270P)	Test 130MASH3P13-01 was conducted on 5/14/2013. The vehicle impacted the sidewalk at 24.8° and 100.9 km/h. It was smoothly redirected and exited the vertical face at 9°. Occupant Impact Velocities and Ridedown Accelerations were below MASH preferred limits. Test 3-11 was run rather than 2-11 to ensure the bridge rail was strong enough to redirect a pickup exceeding the posted speed without suffering major damage. Given that Test 3-11 requires a higher impact velocity, it is likely the Occupant Impact Velocities and Ridedown Accelerations were higher than they would have been in Test 2-11.	PASS
2-20 (1100C)	Transition test that is optional. Test not conducted.	Non-Critical, not conducted
2-21 (2270P)	Transition test. Test not conducted.	Non-Critical, 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:	Roadside Safety Research Group, CalTrans	
Laboratory Signature:	David Whitesel — Digitally signed by David Whitesel DN: cn=David Whitesel, o=California Department of Transportation, ou=Roadside Safety Research Group, email=david_whitesel@dot.ca.gov, c=US Date: 2016.04.05 14:09:59 -07'00'	
Address:	5900 Folsom Blvd., MS-5	Same as Submitter ☒
Country:	USA	Same as Submitter ☒
Accreditation Certificate Number and Dates of current Accreditation period :	3046.01, valid until November 30, 2016	

Submitter Signature*: David Whitesel — Digitally signed by David Whitesel DN: cn=David Whitesel, o=California Department of Transportation, ou=Roadside Safety Research Group, email=david_whitesel@dot.ca.gov, c=US Date: 2016.04.05 14:10:36 -07'00'

Submit Form

ATTACHMENTS

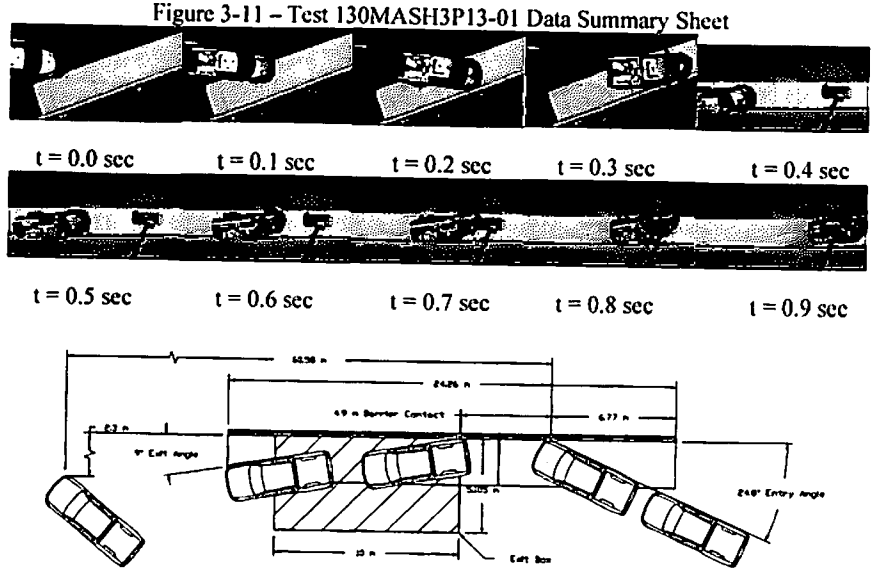
Attach to this form:

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		AASHTO TF13	
Number	Date	Designator	Key Words

Figure 3-11 – Test 130MASH3P13-01 Data Summary Sheet



Test Barrier

Type: Type 732 SW bridge rail

Length: 80 ft (24.23 m). Handrail posts spaced at 9.125 ft (2.78 m).

Test Date: May 14, 2013

Test Vehicle:

Model: 2006 Dodge RAM 1500 Crew Cab

Inertial Mass: 5062 lb (2296 kg) with ballast

Test Dummy:

Type: None used

Weight/ Position: N/A

Impact/ Exit Conditions:

Impact[1] / Exit Velocity[2]: 62.7 mph (100.9 km/h) / 51 mph (82.0 km/h)

Impact / Exit Angle: 24.8° / 9°

Impact Severity: 117,000 ft-lb (158.6 kJ)

Test Data:

Occ. Impact Velocity (Long / Lat): 17.71 ft/s (5.4 m/s) / 27.9 ft/s (8.5 m/s)

Ridedown Acceleration (Long / Lat): 9.2 g / -8.1 g

ASI 2.06

Exterior: VDS[6]/CDC[7] FR-5, RD-4/01RFEK9, 01RDEK9

Interior: Occupant Compartment Deformation[3] : Maximum 2.1" (54 mm) at floor pan

Max. Roll/Pitch/Yaw Angles: 27.9° /4.9° /-20.6°

Barrier Damage:

Handrail dynamic deflection of 1 inch (25 mm). Minor scraping of steel handrail, superficial concrete scraping, and no permanent lateral deflection of handrail.

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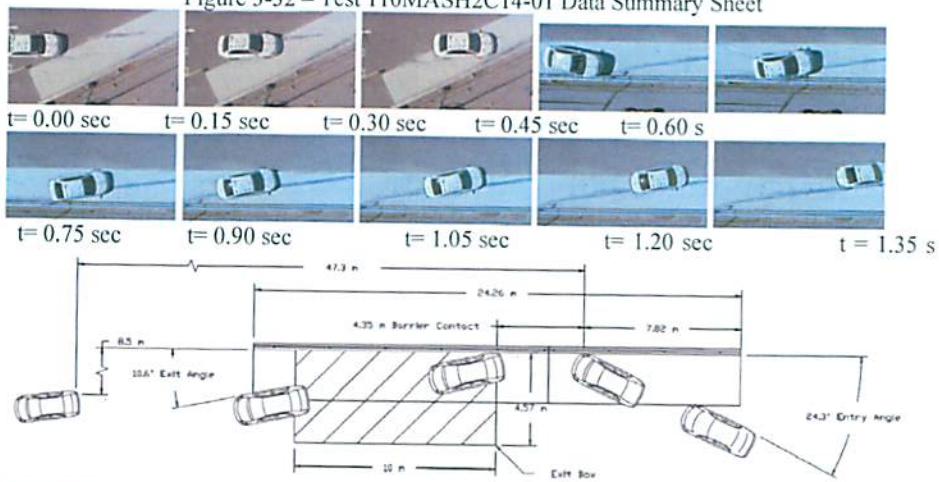
[1] Impact angle and speed were determined when the vehicle impacted the sidewalk.

[2] Exit speed and angle were determined when the vehicle exited the vertical face.

Figure 3-32 – Test 110MASH2C14-01 Data Summary Sheet



Test Barrier

Type: Type 732SW bridge rail

Length: 80 ft (24.23 m). Handrail posts spaced at 9.125 ft (2.78 m).

Test Date: March 12, 2014

Test Vehicle:

Model: 2006 Kia Rio

Inertial Mass: 2474 lb (1122 kg)

Gross static Mass: 2646 lb (1200 kg)

Test Dummy:

Type: Hybrid III 50th %

Weight / Position: 165 kg (75 kg) / Front Passenger

Impact/ Exit Conditions:

Impact[1] / Exit Velocity[2]: 44.1 mph (71.0 km/h) / 35.2 mph (56.6 km/h)

Impact / Exit Angle: 24.3° / 10.6°

Impact Severity: 26,300 ft-lb (35.6 kJ)

Test Data:

Occ. Impact Velocity (Long / Lat): 11.2 ft/s (3.4 m/s) / 19.4 ft/s (5.9 m/s)

Ridedown Acceleration (Long / Lat)[3]: -3.9 g / -8.3 g

ASI 1.54

Exterior: VDS[(6)]/CDC[(7)] FR-2, BR-3/01RFEK9, 01RBEK5

Interior: Occupant Compartment Deformation[(3)] : Max. 0.6 in (15 mm) at floor pan near door

Max. Roll/Pitch/Yaw Angles: 17.0° / -12.0° / -33.9°

Barrier Damage:

No deflection in steel handrail, minor superficial concrete spalling.

[1] Impact angle and speed were determined when the vehicle impacted the sidewalk.

[2] Exit speed and angle were determined when the vehicle exited the vertical face.

[3] There were some issues with lateral channel data acquisition. See Appendix 10 for details.

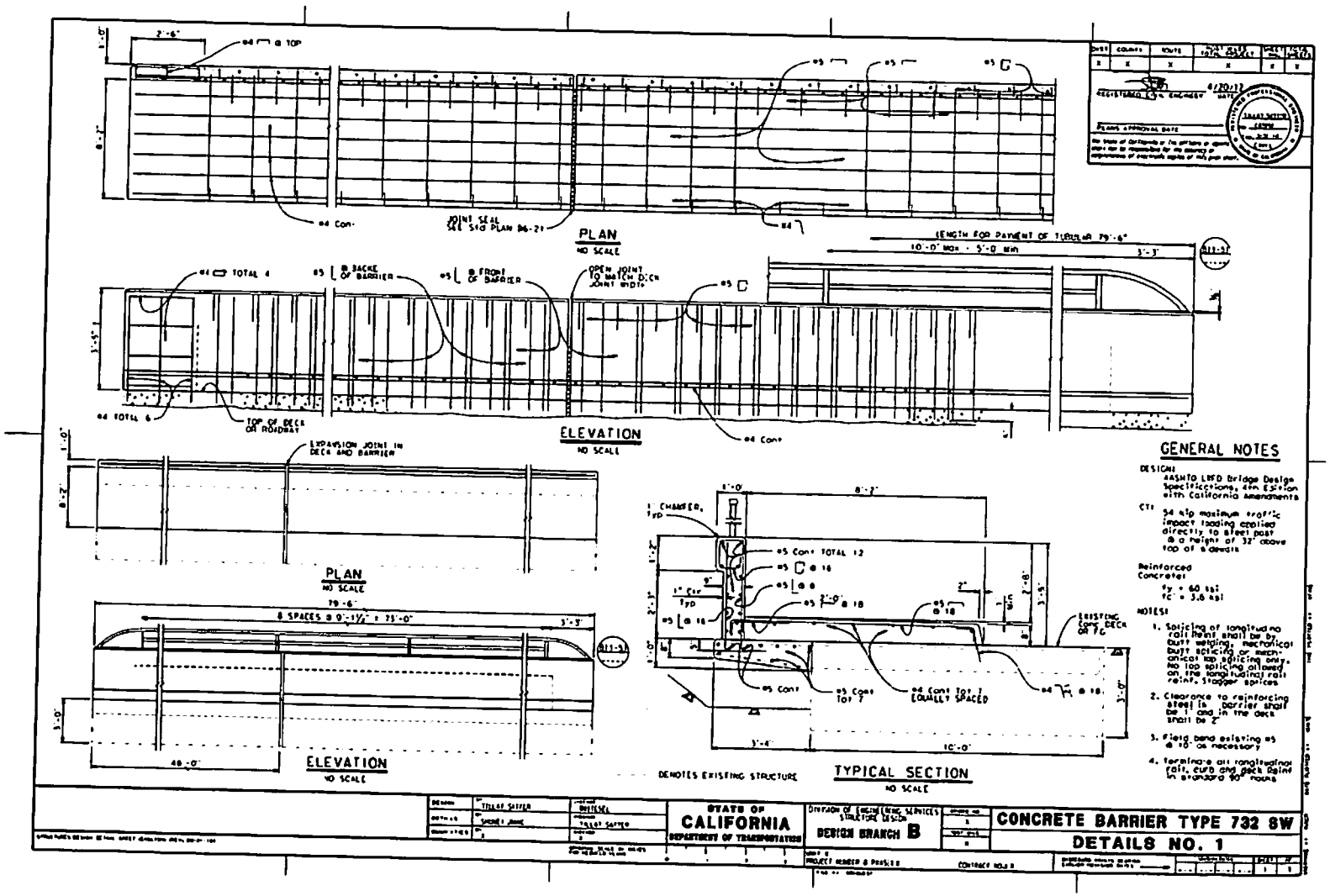


Figure 9-1 – Caltrans Type 732SW Bridge Rail Detail No. 1