U.S. Department of Transportation
Federal Highway Administration

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

September 29, 2016

In Reply Refer To:
HSST-1/B-266

Ms. Karla Lechtenberg
Midwest Roadside Safety Facility
130 Whittier Research Center
2200 Vine Street
Lincoln, NE 68583-0853

Dear Ms. Lechtenberg,

This letter is in response to your December 31, 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-266 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:

- Modified U.S. Standard and Arizona G4(2W) W-beam Guardrail Systems with 8⅝-in. and 8½-in. Nominal Diameter Ponderosa Pine Posts, respectively

Scope of this Letter

To be found eligible for Federal-aid funding, modified roadside safety devices should meet the crash test and evaluation criteria contained in the National Cooperative Highway Research Program (NCHRP) Report 350. However, FHWA, the U.S. Department of Transportation (DOT), and the U.S. 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 FHWA, DOT, or the U.S. 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

Eligibility for Reimbursement

The FHWA previously issued an eligibility letter for the roadside safety system described in your pending request. Your pending request now identifies a modification to that roadside safety system.

The original roadside safety device information is provided here:

Name of system: Modified U.S. Standard and Arizona G4(2W) W-beam Guardrail Systems with 8⅝-in. and 8½-in. Nominal Diameter Ponderosa Pine Posts, respectively
Type of system: Longitudinal Barrier
Test Level: NCHRP350 Test Level 3 (TL3)
Testing conducted by: Midwest Roadside Safety Facility
Date of request: December 31, 2015
Date initially acknowledged: January 7, 2016
Date of completed package: May 26, 2016

The pending modification(s) U.S. Standard G4(2W) W-beam guardrail system consists of the following changes:

1. 8⅝-in. nominal diameter Ponderosa Pine (PP) wood posts (SGR04d)
2. PP wood posts 65 in. long (PDE22) and set at 75-in. centers
3. posts are embedded 36 inches in the ground.
4. 6-in. x 8-in. x 14¼-in. routed wood blockout (PDB24)

The pending modification(s) Arizona G4(2W) W-beam guardrail system consists of the following changes:

1. 8½-in. nominal diameter Ponderosa Pine (PP) wood posts (SGR04e)
2. PP wood posts that are 64 in. long (PDE21) and set at 75-in.
3. posts are embedded 35 inches in the ground.
4. 6-in. x 8-in. x 14¼-in. routed wood blockout (PDB24)

The 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.

The FHWA 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 NCHRP Report 350.

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-266 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 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,

(for) 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:	May 26, 2016	○ New ◉ Resubmission
	Name:	Karla Lechtenberg	
	Company:	Midwest Roadside Safety Facility	
	Address:	130 Whittier Research Center, 2200 Vine Street, Lincoln, NE 68583-0853	
	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	Modified U.S. Standard and Arizona G4(2W) W-beam Guardrail Systems with 8⅝-in. and 8½-in. Nominal Diameter Ponderosa Pine Posts, respectively	NCHRP Report 350	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 NCHRP Report 350 (Report 350) and that the evaluation results meet the appropriate evaluation criteria in the Report 350.

Identification of the individual or organization responsible for the product:

Contact Name:	Karla Lechtenberg	Same as Submitter ☒
Company Name:	Midwest Roadside Safety Facility	Same as Submitter ☒
Address:	130 Whittier Research Center, 2200 Vine Street, Lincoln, NE 68583-	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.

The Midwest Roadside Safety Facility (MwRSF) and its employees are requesting a letter of eligibility on behalf of the (1)Arizona State Forestry, (2) U.S. Department of Agriculture - Forest Service, and (3) Arizona Log & Timberworks.

MwRSF's financial interests are as follows:
(i) No compensation, including wages, salaries, commissions, professional fees, or fees for business referrals;
(ii) Consulting relationships consist of answering design and implementation questions;
(iii) Research funding or other forms of research support include continuing to fund research projects with MwRSF;
(iv) No patents, copyrights, or other intellectual property interests for this system;
(v) No licenses or contractual relationships for this system; and
(vi) No business ownership and investment interests for this system.

PRODUCT DESCRIPTION

○ New Hardware or Significant Modification ◉ Modification to Existing Hardware	Non-Significant

The modified U.S. Standard G4(2W) W-beam guardrail system supported by 8⅝-in. nominal diameter Ponderosa Pine (PP) wood posts (SGR04d) consists of standard 12-gauge W-beam sections (RWM02a) installed with the top of the rail set at a nominal height of 27¾ inches. The rail is mounted on 8⅝-in. nominal round PP wood posts that are 65 in. long (PDE22) and set at 75-in. centers. The posts are embedded 36 inches in the ground. A 6-in. x 8-in. x 14¼-in. routed wood blockout (PDB24) is used to block the rail away from the front face of the PP wood post.

The modified Arizona G4(2W) W-beam guardrail system supported by 8½-in. nominal diameter Ponderosa Pine (PP) wood posts (SGR04e) consists of standard 12-gauge W-beam sections (RWM02a) installed with the top of the rail set at a nominal height of 28 inches. The rail is mounted on 8½-in. nominal round PP wood posts that are 64 in. long (PDE21) and set at 75-in. centers. The posts are embedded 35 inches in the ground. A 6-in. x 8-in. x 14¼-in. routed wood blockout (PDB23) is used to block the rail away from the front face of the PP wood post.

In both systems, the rail splices are located at post locations. Standard guardrail bolts or ASTM A307 ⅝-in. diameter x 18-in. long guardrail bolts and nuts (FBB04) are used to attach the rail to the posts.

CRASH TESTING

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-10 (820C)	Based on the success of prior small car testing on strong-post, W-beam guardrail systems, the 1,808-lb (820-kg) small car crash test was deemed unnecessary for this demonstration project and a sampling of pertinent crash tests is contained herein. In test no. GR-1 found in TRR 1024, a G4(2W) guardrail system that was configured with 6-in. x 8-in. x 14-in. long timber blockouts and supported by 6-in. x 8-in. x 6-ft long timber posts spaced on 6 ft – 3 in. centers was successfully impacted by a 1,989-lb small car at 60.1 mph and 15.5 degrees according to the NCHRP Report No. 230 safety performance criteria. Two tests in TTI report no. 1147-1F were conducted on strong-post, W-beam guardrail systems according to the NCHRP Report No. 230 safety performance criteria. In test no. 1147-1, a W-beam guardrail system configured with 7-in. diameter round wood posts without the use of spacer blocks, embedded 38 in., and spaced on 8 ft – 4 in. centers was successfully impacted by a 1,967-lb small car at 61.7 mph and 20.7 degrees. In test no. 1147-3, a modified G4(1S) W-beam guardrail system configured with steel posts with offset blocks, and spaced on 8 ft – 4 in. centers was successfully impacted by a 1,968-lb small car at 61.5 mph and 20.5 degrees. Significant wheel snag on the posts was observed in both tests. In test no. 1862-2-89 found in FHWA report no. FHWA-RD-93-082, a G4(1S) guardrail with steel posts and offset blocks spaced on 6 ft – 3 in. centers and positioned on a 1,192-ft radius curve with flat terrain was successfully impacted by a 1,964-lb small car at 62.2 mph and 20.0 degrees according to the NCHRP Report No. 230 safety performance criteria. In test no. 99F003 found in FHWA report no. FHWA-RD-01-048, a modified G4(1S) guardrail system configured with steel posts and 6-in. x 8-in. offset blocks, using a 6-ft 3-in. post spacing was successfully impacted by a 2,002-lb small car at 62.4 mph and 20.5 degrees according to the NCHRP Report No. 350 criteria. Some wheel snag was observed on the posts. In test no. GR-6 found in NCHRP Report No. 289, a G4(2W) guardrail system configured with 6-in. x 8-in. x 14-in. long timber blockouts and supported by 6-in. x 8-in. x 6-ft long timber posts spaced on 6 ft – 3 in. centers was successfully impacted by 1,928-lb small car impacting at 61.9 mph and 21.7 degrees according to the NCHRP Report No. 230 safety performance criteria.	Non-Critical, not conducted
S3-10 (700C)	This test is not applicable for this type of system.	Non-Critical, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-11 (2000P)	The modified U.S. Standard and modified Arizona G4(2W) W-beam guardrail systems supported by 8⅝-in. and 8½-in. nominal diameter Ponderosa Pine (PP) wood posts are adaptations of the U.S. Standard and Arizona G4(2W) W-beam guardrail systems with rectangular SYP posts. If the new components (which are the round PP posts) are shown to withstand equivalent strength and soil rotation resistance to the 72-in. long, rectangular SYP post embedded 43¼ inches and the 64-in. long, rectangular SYP post embedded 35 inches, the modified U.S. Standard and modified Arizona G4 (2W) W-beam guardrail systems supported by 8⅝-in. and 8½-in. nominal diameter Ponderosa Pine (PP) wood posts, respectively, would perform similarly to the original U.S. Standard and Arizona G4(2W) W-beam guardrail systems with rectangular SYP posts. The original G4(2W) W-beam guardrail system has been tested, satisfies the NCHRP Report 350 testing criteria, and has an FHWA Eligibility Letter (B-64). Dynamic component testing consisted of a lateral impact (90-degree impact angle) on the posts at a height of 21.65 in. (550 mm), resulting in strong-axis bending. This is believed to be a critical loading condition which matches the height to the center of the W-beam rail and represents maximum lateral loading into the guardrail system. The results of test nos. AZSYP-1 through AZSYP-3, AZPP-2, AZPP-4, AZPP-5, AZPP-7, and AZPP-8 are found in MwRSF report no. TRP-03-287-13. The results of test nos. PPUS-1 through PPUS-3 are found in MwRSF report no. TRP-03-315-14. The results of these posts installed in strong soils showed that there was less than a 2 percent difference in ultimate strength and the post sections were deemed to have equivalent strengths. The results of test nos. PPW-1, PPW-2, PPSYPW-1, and PPSYPW-2 are found in MwRSF report no. TRP-03-315-14. The results of these posts installed in moderately compacted soil showed that the average forces and absorbed energies between the two post types were within 6 percent at deflections between 5 in. and 20 in. and the post sections were deemed to have equivalent soil resistance. Based on the results of the dynamic component tests, an 8⅝-in. nominal diameter PP post with a 65-in. post length and a 36-in. embedment depth was found to provide strength and soil rotation resistance equivalent to the 72-in. long, rectangular SYP post embedded 43¼ inches for use in the modified U.S. Standard G4(2W) W-beam guardrail system. The results of test nos. AZSYP-4 through AZSYP-6 and AZPP-1 through AZPP-11 are found in MwRSF report no. TRP-03-287-13. The results of these posts installed in strong soils showed that the round PP posts provided a greater average force and energy dissipation than the SYP posts. In addition, it was determined the 8½-in. nominal diameter PP post with a 64-in. post length and a 35-in. embedment depth was a closer match to the soil resistance of the rectangular SYP post. Based on the results of the dynamic component tests, an 8½-in. nominal diameter PP post with a 64-in. post length and a 35-in. embedment depth was found to provide strength and soil rotation resistance equivalent to the 64-in. long, rectangular SYP post embedded 35 inches for use in the modified Arizona G4(2W) W-beam guardrail systems.	Non-Critical, not conducted

3-20 (820C)	This test is not applicable for this type of system.	Non-Critical, not conducted
S3-20 (700C)	This test is not applicable for this type of system.	Non-Critical, not conducted
3-21 (2000P)	This test is not applicable for this type of system.	Non-Critical, not conducted

Full Scale Crash Testing was done in compliance with NCHRP Report 350 by the following accredited crash test Laboratory. By signature below, the Laboratory agrees in support of this submission that all critical and relevant crash tests for the device listed above were conducted. (cite the laboratory's accreditation status as noted in the crash test reports.):

Testing Laboratory's signature concurs that these modifications are considered Non-Significant.		
Laboratory Name:	Midwest Roadside Safety Facility	
Laboratory Signature:	Karla Lechtenberg — Digitally signed by Karla Lechtenberg, DN: cn=Karla Lechtenberg, o=Midwest Roadside Safety Facility (MwRSF), ou, email=kpolivka2@unl.edu, c=US, Date: 2016.08.11 15:08:27 -05'00'	
Address:	130 Whittier Research Center, 2200 Vine Street, Lincoln, NE 68583-0853	Same as Submitter ☒
Country:	USA	Same as Submitter ☒
Accreditation Certificate Number and Dates of current Accreditation period :	A2LA Certificate Number: 2937.01, Valid to November 30, 2017	

Submitter Signature*: Karla Lechtenberg — Digitally signed by Karla Lechtenberg, DN: cn=Karla Lechtenberg, o=Midwest Roadside Safety Facility (MwRSF), ou, email=kpolivka2@unl.edu, c=US, Date: 2016.08.11 15:08:46 -05'00'

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