U.S. Department of Transportation
Federal Highway Administration

June 13, 2024

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

In Reply Refer To:
HSST-1/WZ-461

Mark Buehner
Bone Safety
6450 Industrial Way
Alpharetta, GA 30004
USA

Dear Mr. Buehner:

We received your initial correspondence on April 2, 2021 requesting issuance of a Federal-aid reimbursement eligibility letter under the Federal-aid highway program for the roadside safety system, device, design, product, or hardware (collectively "device") described below. On March 13, 2024, we received a complete set of files needed to complete our review. We write to inform you that the device SZ-412X w/Aluminum Sign is eligible for Federal-aid reimbursement. This letter is assigned Federal Highway Administration (FHWA) control number WZ-461.

ELIGIBILITY LETTERS

The FHWA issues Federal-aid reimbursement eligibility letters for new roadside safety devices that are crash tested in accordance with the industry standard of the American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH).

FHWA, the Department of Transportation, and the United States (government) do not regulate roadside safety devices, crash test facilities, or the manufacturing industry. Issuance of eligibility letters is discretionary and provided only as a service to the states. FHWA may, at its discretion, decline to issue, revise, or rescind an eligibility letter. Eligibility letters are only issued by the FHWA headquarters Office of Safety.

Eligibility letters are issued only as notice to the states that a device is eligible for reimbursement under the Federal-aid highway program. They do not establish approval or certification for any other purpose. Issuance of an eligibility letter is not a prerequisite or requirement for state transportation agencies seeking to use Federal-aid funds for roadside safety devices. State agencies may use a device for which an eligibility letter has not been issued and seek Federal-aid reimbursement.

FEDERAL-AID REIMBURSEMENT

The request for issuance of this letter certified the device was crash tested in accordance with the industry standard of AASHTO's MASH. This eligibility letter is based on that certification and

the material offered in support of its issuance. The device described below is eligible for reimbursement under the Federal-aid highway program.

Name of system: SZ-412X w/Aluminum Sign
Type of system: Work Zone Sign Stand
Test Level: Test Level 3
Testing conducted by: Calspan Corporation
Date of request: April 2, 2021

Information about the device, including material such as the eligibility request, crash test reports, drawings, or images are included in one or more attachment(s) to this letter.

Eligibility letter WZ-461 is inapplicable to devices, optional equipment, alternate materials, or other features that were not crash tested in accordance with AASHTO's MASH.

This letter is issued only for the subject device as crash tested under AASHTO's MASH. Later modification(s) of the device are not eligible for Federal-aid reimbursement under this letter. Notice of later modification(s) should be given to transportation agencies, facility owners, and operators (collectively "agencies").

Agencies should be provided appropriate information about the device's design, installation, maintenance, materials, and mechanical properties.

Issuance of this letter is discretionary, and it may be revised or rescinded at FHWA's discretion. This letter is not a determination of compliance with the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) or ownership of any intellectual property rights.

This eligibility letter is not a determination by the government that a crash involving the subject device will result in any particular outcome. It is limited to only the device's eligibility for Federal-aid reimbursement.

INTELLECTUAL PROPERTY

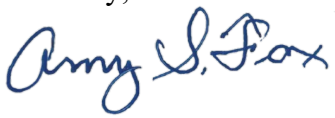
Issuance of this eligibility letter does not convey property rights of any sort nor any exclusive privilege. This letter is not authorization or consent by the government for the use, manufacture, or sale of any patented or proprietary system, device, design, product, or hardware for which the requester is not the patent owner. Eligibility letters are not an expression of any view, position, or determination by the government as to the validity, scope, or ownership of any intellectual property rights to a specific device. These letters do not grant, impute, suggest, or otherwise establish any ownership, distribution, or licensing rights to the requester. The government expresses no opinion about the intellectual property rights relating to any device for which this or any other eligibility letter is issued.

PUBLIC DISCLOSURE

To prevent any misunderstanding, and as discussed above, this Federal-aid eligibility letter is assigned FHWA control number WZ-461. It should only be reproduced in full with its attachment(s). This Federal-aid eligibility letter and the material offered by the requester supporting its issuance is public information. All eligibility letters and supporting material are subject to public disclosure under the Freedom of Information Act (FOIA). Eligibility letters are available to the public at https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/.

If you have any questions please contact Aimee Zhang at Aimee.Zhang@dot.gov.

Sincerely,



Amy S. Fox
Acting Director
Office of Safety Technologies
Office of Safety

Enclosures

Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

Submitter	Date of Request:	April 02, 2021	◉ New ○ Resubmission
	Name:	Mark Buehner	
	Company:	Bone Safety	
	Address:	6450 Industrial Way, Alpharetta, GA 30004	
	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
'WZ': Crash Worthy Work Zone Traffic Control Devices	◉ Physical Crash Testing ○ Engineering Analysis	SZ-412-X w/ Aluminum Sign	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:	Mark Buehner	Same as Submitter ☒
Company Name	Bone Safety	Same As Submitter ☒
Address:	6450 Industrial Way, Alpharetta, GA 30004	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.

Bone Safety and Calspan LLC, share no financial interests between the two organizations. This includes no shared financial interest but not limited to:
i. Compensation including wages, salaries, commissions, professional fees, or fees for business referrals
iii. Research funding or other forms of research support;
iv. Patents, copyrights, licenses, and other intellectual property interests;
vi. Business ownership and investment interests;

PRODUCT DESCRIPTION

(●) New Hardware or Significant Modification ( ) Modification to Existing Hardware

The Bone Safety sign tested in conjunction with the SZ-412-X stand was a 48" x 48" aluminum sign. All sign stands are manufactured from steel components, which have been powder-coated and clear zinc-plated to minimize corrosion. The sign stand is designed using basic nut & bolt construction, so that all component parts may be readily replaced if worn or damaged. The frame of the stand utilizes dual attachment points with ridged brackets to hold and display an aluminum sign. A foldable flag mechanism is used to display a set of warning flags. The flag mechanism is pivotally attached to the vertical cross-brace member. The combination of the sign and sign stand assembly can be quickly and readily assembled to its display condition and, correspondingly, disassembled and folded-up to its storage and transport condition. The sign was set at a height of 12" from ground to bottom of sign.

The legs of the stand are non-telescoping, fixed length legs that are painted bright orange powder coated for high visibility. The legs have both a dual pull-pin and kick release mechanism for releasing legs. Pull-pins have oversized heads to allow for gloved hands in winter environments. The as-tested sign stand measures 48.25 " x 63.5" x 102".

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:	Benjamin Metzger	
Engineer Signature:	Benjamin Metzger Digitally signed by Benjamin Metzger Date: 2024.03.13 11:55:05 -04'00'	
Address:	4455 Genesee Street, Cheektowaga, NY 14225	Same as Submitter ☐
Country:	USA	Same as Submitter ☐

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-70 (1100C)	Designated to evaluate the ability of a small vehicle to activate any breakaway, fracture, or yielding mechanism. Is considered optional for work zone traffic control weighting less than 220 lb. (100 kg)	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	For this test, two Bone Safety signs were impacted in two separate runs on two different days. The first test article was aligned at 0° (6/23/21) and the second test article was aligned at 90° (4/5/21) to the impacting test vehicle's direction of travel. This test is intended to evaluate the sign stand's behavior when impacted. The primary evaluation is based on intrusion into the occupant compartment, windshield damage, and vehicle stability. Lightweight devices such as the Bone Safety sign cannot cause sufficient velocity change that would result in exceeding occupant risk criteria limits. Therefore Test 71 was conducted without instrumentation for evaluating occupant risk values OIV and RA per MASH test description. The test on 6/23 was conducted using a commercially available 2014 Hyundai Accent compact small car with a test inertia mass of 2392 lb. (1085 g). The test on 4/5 was conducted using a commercially available 2013 Nissan Versa compact small car with a test inertia mass of 2396 lb. (1087 kg). On 6/23, the test vehicle impacted the first sign stand (oriented at 0°) at a velocity of 64.3 mph (103.5 km/hr). Upon impact, the upper portion of the sign stand and the sign separated from the base of the stand. The aluminum sign impacted the hood of the car and the windshield. The aluminum sign moved up the windshield and flipped off the roof. The test vehicle's occupant compartment was not penetrated by the test article, but there was 2.25 in. of windshield deformation. There was no damage done to the vehicle's fuel tank or oil pan. On 4/5, the test vehicle impacted the second sign stand (oriented at 90°) at a velocity of 63.9 mph (102.8 km/hr). Upon impact, the upper portion of the sign stand and the sign separated from the base of the stand. The aluminum sign impacted the hood of the car and the windshield. The aluminum sign flipped over the roof of the car after impact. The test vehicle's occupant compartment was not penetrated by the test article and there was NO cab deformation. There was no damage done to the vehicle's fuel tank or oil pan. In both test runs, debris from the test articles did not block the driver's vision. The vehicle remained upright and did not exceed 75° roll and pitch throughout the test. The vehicle did not leave its lane and its trajectory was stable after both sign stands were impacted. TEST RESULT = PASS	

3-72 (2270P)	For this test, two Bone Safety signs were impacted in one run. The first test article was aligned at 0° and the second test article was aligned at 90° to the test vehicle's direction of travel. This test is intended to evaluate the sign stand's behavior when impacted. The primary evaluation is based on intrusion into the occupant compartment, windshield damage, and vehicle stability. Lightweight devices such as the Bone Safety sign cannot cause sufficient velocity change that would result in exceeding occupant risk criteria limits. Therefore Test 72 was conducted without instrumentation for evaluating occupant risk values OIV and RA per MASH test description. The test was conducted using a commercially available 2009 Dodge Ram 1500 Pickup Truck with a test inertia mass of 5022 lb. (2278 kg). The test vehicle impacted the first sign stand (oriented at 0°) at a velocity of 62.4 mph (100.4 km/hr). Upon impact, the aluminum sign separated from the sign stand and the test vehicle ran over the stand. The aluminum sign impacted the hood of the test vehicle and eventually fell down the front of the vehicle to the ground. The second sign stand (oriented at 90 degrees) was impacted at 60.6 MPH (97.5 km/hr) The test vehicle's occupant compartment was not penetrated by the test article and there was NO [0 in.] cab deformation. There was no damage done to the vehicle's fuel tank or oil pan. Debris from the test articles did not block the driver's vision. The vehicle remained upright and did not exceed 75° roll and pitch throughout the test. The vehicle did not leave its lane and its trajectory was stable after both sign stands were impacted. TEST RESULT = PASS	

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:	Calspan LLC,	
Laboratory Signature:	Benjamin Metzger Digitally signed by Benjamin Metzger Date: 2024.03.13 11:55:05 -04'00'	
Address:	4455 Genesee Street, Cheektowaga, NY 14225	Same as Submitter ☐
Country:	USA	Same as Submitter ☐
Accreditation Certificate Number and Dates of current Accreditation period :	L20-602 December 31, 2022	

Submitter Signature*: Mark Buehner Digitally signed by Mark Buehner Date: 2024.03.07 11:53:55 -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		
Number	Date	Key Words