



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

November 3, 2022

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

In Reply Refer To:
HSST-1/WZ-448

Kevin Harrison
Eastern Metal of Elmira, Inc.
1430 Sullivan Street
Elmira NY 14901
USA

Dear Mr. Harrison:

We received your correspondence of April 2, 2021 requesting issuance of a reimbursement eligibility letter under the Federal-aid highway program for the roadside safety system, device, design, product, or hardware (collectively “device”) described below. This letter is assigned Federal Highway Administration (FHWA) control number WZ-448.

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: Apex Tripod
Type of system: Work Zone
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-448 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.

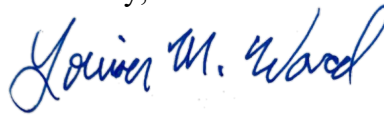
PUBLIC DISCLOSURE

To prevent any misunderstanding, and as discussed above, this eligibility letter is assigned FHWA control number WZ-448. It should only be reproduced in full with its attachment(s). This 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,

A handwritten signature in blue ink that reads "Louisa M. Ward". The signature is written in a cursive style with a large initial "L".

Louisa M. Ward
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	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Kevin Harrison	
	Company:	Eastern Metal of Elmira, Inc.	
	Address:	1430 Sullivan Street Elmira, NY 14901	
	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	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	Apex Tripod	AASHTOMASH	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:	Kevin Harrison	Same as Submitter <input type="checkbox"/>
Company Name:	Eastern Metal of Elmira, Inc.	Same as Submitter <input type="checkbox"/>
Address:	1430 Sullivan Street Elmira, NY 14901	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>
Enter below all disclosures of financial interests as required by the FHWA 'Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.		
Eastern Metal of Elmira, Inc. and Calspan Corporation 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

Help
<p> <input checked="" type="radio"/> New Hardware or Significant Modification <input type="radio"/> Modification to Existing Hardware </p> <p> The Eastern Metal Apex Tripod is a work zone sign stand attached to a 48" plywood sign substrate. It consists of a three-legged galvanized steel frame with components to hold signs. The frame and sign components yield a minimum bottom height of 15" from the ground. 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 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. </p> <p> The folded dimensions are 9" x 4.5" x 55.5" without the sign attached. Open dimensions are 49" wide x 30" depth x 76" height with the plywood sign attached. The tested sign stand assembly weight is 38 lbs. </p> <h3 style="text-align: center;">CRASH TESTING</h3> <p> 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. </p>

Engineer Name:	Mark Parisi	
Engineer Signature:	Mark J. Parisi	Digitally signed by Mark J. Parisi Date: 2021.04.21 13:27:01 -04'00'
Address:	4455 Genesee Street, Cheektowaga, NY 14225	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>

A brief description of each crash test and its result: Help

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)	<p>For this test, two Apex Tripod work zone signs were impacted. The first test article was aligned at 0° and the second test article was aligned at 90° to the impacting 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 Apex Tripod sign cannot cause sufficient velocity change that would result in exceeding occupant risk criteria limits.</p> <p>Therefore Test 71 was conducted without instrumentation for evaluating occupant risk values OIV and RA per MASH test description.</p> <p>The test was conducted using a commercially available 2014 Kia Rio 4 door sedan with a test inertia mass of 2458 lbs (1115 kg).</p> <p>The test vehicle impacted the first sign stand (orientated at 0°) at a velocity of 63 mph (101.4 km/hr). Upon impact the plywood sign folded over the front end of the vehicle and impacted both the roof and the windshield. The top of the plywood sign dented the roof, but did not penetrate the occupant compartment. The test vehicle continued along its path and impacted the second sign stand (oriented at 90°) at a velocity of 62 mph (99.8 km/hr). Upon impact the plywood sign released from the sign support and impacted the hood and windshield of the vehicle. The plywood sign broke the windshield, but did not create any tears or deformation. The test vehicle's occupant compartment was not penetrated by the test articles, but there was an acceptable deformation on the roof of the vehicle measured to be 0.80". This is acceptable per the 4" requirement.</p> <p>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.</p> <p>TESTRESULT = PASS</p>	

3-72 (2270P)	<p>For this test, two Apex Tripod road signs were impacted . 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 Apex Tripod 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 .</p> <p>The test was conducted using a commercially available 2010 Ram 1500 Pickup Truck with a test inertia mass of 5066 lbs (2298kg).</p> <p>The test vehicle impacted the first sign stand (oriented at 0°) at a velocity of 62 mph (99.8 km/ hr). Upon impact the plywood sign impacted and folded over the front end of the vehicle. The top of plywood sign impacted the hood and slid up and over the windshield. The test vehicle continued along its path and impacted the second sign stand (oriented at 90°) at a velocity of 60.9 mph (98.0km/hr). Upon impact the plywood sign released from the sign stand and impacted both the grille and hood. The plywood sign crushed the hood and removed the front grille from the vehicle. The test vehicle's occupant compartment was not penetrated by the test articles and there was no measurable deformation in the cab.</p> <p>Debris from the test article did not cause a hazard to 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 .</p> <p>TESTRESULT = PASS</p>	
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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 Corporation	
Laboratory Signature:	Mark J. Parisi	Digitally signed by Mark J. Parisi Date: 2021.04.21 13:29:11 -04'00'
Address:	4455 Genesee Street Cheektowaga, NY 14225	Same as Submitter <input type="checkbox"/>
Country:	USA	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	L20-602 December 31, 2022	

Submitter Signature*: **Kevin Harrison** Digitally signed by Kevin Harrison
Date: 2021.04.21 16:25:01 -04'00'

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		Key Words
Number	Date	

SECTION 4

MASH TEST 3-71 SUMMARY

Test Article: Eastern Metal Apex Tripod
Test Program: MASH 3-71

Project No. BR0046
Test Date: 03/04/2021

SEQUENTIAL PHOTOGRAPHS

0° Orientation



0.000s

0.030s

0.062s

90° Orientation



0.000s

0.030s

0.060s

PLAN VIEW

-15 ft 0 ft 15 ft 30 ft 45 ft 60 ft 75 ft 90 ft 105 ft 120 ft 135 ft 150 ft 165 ft 180 ft 195 ft 210 ft 225 ft 240 ft 255 ft 270 ft 285 ft



Vehicle is at 63 MPH when it contacts first sign and it is 5 feet from the point it is released from the Tow System (which occurs at 0 feet on scale)

Vehicle is Stopped at 185 feet from the point of initial release from the Two Systems (which occurs at 0 feet on scale)



SECTION 4... (CONTINUED)
MASHTEST 3-71 SUMMARY

Test Article: Eastern Metal Apex Tripod
Test Program: MASH 3-71

Project No. BR0046
Test Date: 03/04/2021

SUMMARY TABLE

GENERAL INFORMATION		IMPACT CONDITIONS		
TEST AGENCY	Calspan Corporation	IMPACT VELOCITY(0°)	63.0 MPH (101.4 km/h)	
TEST NUMBER	Cal BR0046	IMPACT VELOCITY (90°)	62.0 MPH (99.8 km/h)	
TEST DESIGNATION	3-71	IMPACT SEVERITY (0°)	442.3 kJ	
TEST DATE	3/04/2021	IMPACT SEVERITY (90°)	428.5 kJ	
		Impact Location (0°)	Vehicle centerline (0 inches)	
		Impact Location (90°)	Vehicle centerline (0 inches)	
TEST ARTICLE		EXIT CONDITIONS		
NAME / MODEL	Apex Tripod	EXIT VELOCITY (0°)	63.0 MPH (101.4 km/h)	
TYPE	Work-Zone Traffic Control Device	EXIT VELOCITY (90°)	62 MPH (99.8 km/h)	
KEY ELEMENTS	Sign Stand, Metal Tripod Base, Wood Sign	FINAL RESTING POSITION	185 ft. downstream	
OVERALL HEIGHT	76 in. (1930 mm)	VEHICLE STABILITY	Satisfactory	
OVERALL WIDTH	68 in. (1727 mm)	VEHICLE SNAGGING	None	
BASE WEIGHT	18 lbs. (7.71 kg)	VEHICLE POCKETING	None	
SIGN WEIGHT	21 lbs. (9.53 kg)	OCCUPANT RISK VALUES 1		
ROAD SURFACE	Asphalt	OCCUPANT IMPACT VELOCITY	Longitudinal	N/A
			Lateral	N/A
TEST VEHICLE		RIDEDOWN ACCELERATION	Longitudinal	N/A
TYPE / DESIGNATION	1100C		Lateral	N/A
YEAR, MAKE AND MODEL	2014 Kia Rio	TEST ARTICLE POST-IMPACT		
CURB MASS	2531 lbs. (1148 kg)	ARTICLE DAMAGE	Base Deformation/Upper separation	
TEST INERTIAL MASS	2458 lbs. (1115kg)	VEHICLE DAMAGE		
GROSS STATIC MASS	2458 lbs. (1115kg)	VEHICLE DAMAGE SCALE	FL-3 ; FR-4	
		COLLISION DAMAGE CLASSIFICATION	12FLEN01 12FREN01	
		MAXIMUM DEFORMATION	Negligible	

¹Values not calculated due to test article weight being less than 220 lbs. (100 kg)

SECTION 4

MASH TEST 3-72 SUMMARY

Test Article: Eastern Metal Apex Tripod
Test Program: MASH 3-72

Project No. BR0058
Test Date: 03/16/2021

SEQUENTIAL PHOTOGRAPHS

0° Orientation

90° Orientation



0.000s

0.030s

0.062s

0.000s

0.032s

0.076s

PLAN VIEW

-15 ft 0 ft 15 ft 30 ft 45 ft 60 ft 75 ft 90 ft 105 ft 120 ft 135 ft 150 ft 165 ft 180 ft 195 ft 210 ft 225 ft 240 ft 255 ft 270ft



Vehicle is at 62 MPH when it contacts first sign and it is 5 feet from the point it is released from the Tow System (which occurs at 0 feet on scale)

Vehicle is Stopped at 181 feet from the point of initial release from the Two Systems (which occurs at 0 feet on scale)



SECTION 4... (CONTINUED)
MASHTEST 3-72 SUMMARY

Test Article: Eastern Metal Apex Tripod
Test Program: MASH 3-72

Project No. BR0058
Test Date: 03/16/2021

SUMMARY TABLE

GENERAL INFORMATION		IMPACT CONDITIONS	
TEST AGENCY	Calspan Corporation.	IMPACT VELOCITY (0°)	62.0 MPH (99.8 km/h)
TEST NUMBER	BR0058	IMPACT VELOCITY (90°)	60.9 MPH (98.0 km/h)
TEST DESIGNATION	3-72	KINETIC ENERGY (0°)	883.0 kJ
TEST DATE	03/16/2021	KINETIC ENERGY (90°)	851.5 kJ
		Impact Location (0°)	387.35 mm towards driver
		Impact Location (90°)	396.87 mm towards passenger
TEST ARTICLE		EXIT CONDITIONS	
NAME / MODEL	Apex Tripod	EXIT VELOCITY (0°)	62.0 MPH (99.8 km/h)
TYPE	Work-Zone Traffic Control Device	EXIT VELOCITY (90°)	60.9 MPH (98 km/h)
KEY ELEMENTS	Sign Stand, Metal Tripod Base, Wood Sign	FINAL RESTING POSITION	181 ft. downstream
OVERALL HEIGHT	76 in. (1930 mm)	VEHICLE STABILITY	Satisfactory
OVERALL WIDTH	68 in. (1727 mm)	VEHICLE SNAGGING	None
BASE WEIGHT	18 lbs. (8.2 kg)	VEHICLE POCKETING	None
SIGN WEIGHT	21 lbs. (9.53 kg)	OCCUPANT RISK VALUES 1	
ROAD SURFACE	Asphalt	OCCUPANT IMPACT VELOCITY	Longitudinal N/A
			Lateral N/A
TEST VEHICLE		RIDEDOWN ACCELERATION	Longitudinal N/A
TYPE / DESIGNATION	2270P		Lateral N/A
YEAR, MAKE AND MODEL	2010 RAM 1500		
CURB MASS	5105 lbs. (2316 kg)	TEST ARTICLE POST-IMPACT	
		ARTICLE DAMAGE	Base Deformation/Upper separation
TEST INERTIAL MASS	5066 lbs. (2298 kg)	VEHICLE DAMAGE	
		VEHICLE DAMAGE SCALE	FL-2 ; FR-2
GROSS STATIC MASS	5066 lbs. (2298 kg)	COLLISION DAMAGE CLASSIFICATION	12FLEN01 12FREN01
		MAXIMUM DEFORMATION	Negligible

¹Values not calculated due to test article weight being less than 220 lbs. (100 kg)

JPEG of TEST ARTICLE DRAWINGS: APEX TRIPOD



Model No. Apex Tripod

