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

Dear Mr. Harrison:

This letter is in response to your March 22, 2021 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 WZ-435 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

**Decision**

The following device is eligible within the length-of-need, with details provided in the form which is attached as an integral part of this letter:

- Apex

**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 AASHTO’s 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: Apex  
Type of system: Work Zone Sign Stand  
Test Level: Test Level 3  
Testing conducted by: Calspan Corporation  
Date of request: March 22, 2021

FHWA concurs with the recommendation of the accredited crash testing laboratory on 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**

This eligibility letter is issued for the subject device as tested. Modifications made to the device are not covered by this letter. Any modifications to this device should be submitted to the user (i.e., state DOT) as per their requirements.

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 AASHTO’s 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 WZ-435 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.

- This FHWA eligibility letter is not an expression of any Agency view, position, or determination of validity, scope, or ownership of any intellectual property rights to a specific device or design. Further, this letter does not impute any distribution or licensing rights to the requester. This FHWA eligibility letter determination is made based solely on the crash-testing information submitted by the requester. The FHWA reserves the right to review and revoke an earlier eligibility determination after receipt of subsequent information related to crash testing.

Sincerely,

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

Enclosures
Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

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

<table>
<thead>
<tr>
<th>System Type</th>
<th>Submission Type</th>
<th>Device Name / Variant</th>
<th>Testing Criterion</th>
<th>Test Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘WZ’ : Crash Worthy Work Zone Traffic Control Devices</td>
<td>Physical Crash Testing</td>
<td>Apex</td>
<td>AASHTO MASH</td>
<td>TL3</td>
</tr>
</tbody>
</table>

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:**

<table>
<thead>
<tr>
<th>Contact Name:</th>
<th>Kevin Harrison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name:</td>
<td>Eastern Metal of Elmira, Inc.</td>
</tr>
<tr>
<td>Address:</td>
<td>1430 Sullivan Street  Elmira, NY  14901</td>
</tr>
<tr>
<td>Country:</td>
<td>USA</td>
</tr>
</tbody>
</table>

I, Kevin Harrison, Eastern Metal of Elmira, Inc., hereby declare that 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

ii. Research funding or other forms of research support;

iii. Patents, copyrights, licenses, and other intellectual property interests;

iv. Business ownership and investment interests;

v. Business ownership and investment interest s;
PRODUCT DESCRIPTION

New Hardware or Modification to

Significant Modification ☑ Existing Hardware

The Eastern Metal of Elmira, Inc. Apex is a 48" collapsible rollup sign attached to a collapsible sign stand and the two members can be disassembled and folded-up into a compact package for storage and transport. The collapsible rollup sign attaches to the sign stand by its spin handle on to the sign’s vertical cross-brace. Another attachment includes the X-connect latch which attaches by sliding the rollup’s vertical sign pocket into the sign stand. Both attachments yield a minimum bottom height of 12” from the ground in order to meet MASH certification and to be fully displayed for viewing by passing motorists and pedestrians. 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.

The leg release system on the sign stands are readily adjustable for varying sign heights and/or uneven terrain, held in place on the ground using sandbags. The telescoping legs are made of galvanized steel or aluminum and assembled to the steel sign stand base via standard nuts and bolts. The legs have either pull-pins or kick lever releases for quick and efficient releasing from the foldup position. The folded dimensions are 7.5” x 9.5” x 26.5” and weighs 20 lbs. without the rollup sign attached. Open dimensions are 35” x 72” x 27.5 without the rollup sign attached. Legs at fully extended position.

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: Mark Parisi

Engineer Signature: Mark J. Parisi

Address: 4455 Genesee Street, Cheektowaga, NY 14225

Country: USA

Same as Submitter

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) WZ Traffic Device is less than 220 lb, therefore this was optional. | Non-Relevant Test, not conducted

Digitally signed by Mark J. Parisi

Date: 2021.03.22 14:12:08 -04'00'
For this test, two Apex road 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 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 was conducted using a commercially available 2014 Kia Rio 4 door sedan with a test inertia mass of 2,410.7 lbs (1093.5 kg).

The test vehicle impacted the first sign stand (orientated at 0°) at a velocity of 63 mph (101.4 km/hr). Upon impact the roll up sign released from the sign support and folded over the front end of the vehicle. The top of the soft vertical cross frame impacted the top of the windshield. 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 roll up sign released from the sign support and folded over the front end of the vehicle. The top of the vertical soft cross frame impacted the hood of the vehicle. The test vehicle's occupant compartment was not penetrated by the test articles and there was NO cab deformation.

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**
For this test, two Apex Signs Stands 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 Sign Stand 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 Ram 1500 Pickup Truck with a test inertia mass of 5001.1 lbs (2,268.5 kg).

The test vehicle impacted the first sign stand (oriented at 0°) at a velocity of 62 mph (99.8 km/hr). Upon impact the rollup sign released from the Latch Bracket and folded over the front end of the vehicle. The top of the vertical cross frame impacted the top of the windshield. The test vehicle continued along its path and impacted the second sign stand (oriented at 90°) at a velocity of 61.8 mph (99.5 km/hr). Upon impact the roll up sign released from the Latch Bracket and folded over the front end of the vehicle. The top of the vertical cross frame impacted the top of the windshield. The test vehicle's occupant compartment was not penetrated by the test articles and there was no measurable in cab deformation. 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 through out 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):
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:

<table>
<thead>
<tr>
<th>Eligibility Letter</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Date</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION 4
MASH TEST 3-71 SUMMARY

Test Article: Eastern Metal Apex
Test Program: MASH 3-71
Project No. BR0042
Test Date: 02/10/2021

0° Orientation

90° Orientation (& camera on other side)

PLAN VIEW

Vehicle at 63 MPH
Vehicle Stopped
## MASHTEST 3-71 SUMMARY

**Test Article:** Eastern Metal Apex  
**Test Program:** MASH 3-71  
**Project No.:** BR0042  
**Test Date:** 02/10/2021

### GENERAL INFORMATION | IMPACT CONDITIONS
--- | ---
**TEST AGENCY** | Calspan Corporation  
**TEST NUMBER** | Cal BR0042  
**TEST DESIGNATION** | 3-71  
**TEST DATE** | 2/10/2021  
**IMPACT VELOCITY (0°)** | 63.3 mph (101.89 km/h)  
**IMPACT VELOCITY (90°)** | 61.9 mph (99.6 km/h)  
**IMPACT SEVERITY (0°)** | 446.58 kJ  
**IMPACT SEVERITY (90°)** | 426.74 kJ

### TEST AGENCY IMPACT CONDITIONS

- **Impact Location (0 deg):** 475 mm offset from Centerline (Pssgr)
- **Impact Location (90 deg):** 328 mm offset from Centerline (Drvr)

### TEST ARTICLE EXIT CONDITIONS

- **EXIT VELOCITY (0°):** 62.3 mph (100.25 km/h)  
- **EXIT VELOCITY (90°):** 59.3 mph (95.4 km/h)  
- **FINAL RESTING POSITION:** 188 ft. downstream

### TEST ARTICLE

- **NAME / MODEL:** Apex  
- **TYPE:** Work-Zone Traffic Control Device  
- **KEY ELEMENTS:** Sign Stand, Metal Base, Roll Up Sign  
- **OVERALL HEIGHT:** 79 in. (2006mm)  
- **OVERALL WIDTH:** 41 in. (1041mm)  
- **BASE WEIGHT:** 20 lbs. (9.07 kg)  
- **SIGN WEIGHT:** <5 lbs. (2.27 kg)

### ROAD SURFACE

- **Asphalt

### TEST VEHICLE

- **TYPE / DESIGNATION:** 1100C  
- **YEAR , MAKE AND MODEL:** 2014 Kia Rio

### CURB MASS

- **2530.9 lbs. (1148 kg)

### TEST INERTIAL MASS

- **2458.2 lbs. (1115 kg)

### GROSS STATIC MASS

- **2458.2 lbs. (1115 kg)

### ARTICLES DAMAGE

- **Base Deformation/Upper separation

### VEHICLE DAMAGE

- **VEHICLE DAMAGE SCALE:** FL-0 ; FR-1  
- **COLLISION DAMAGE CLASSIFICATION:** 12FLEN1 ; 12FREN1  
- **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
Test Program: MASH 3-72
Project No. BR0054
Test Date: 02/18/2021

SEQUENTIAL PHOTOGRAPHS

0° Orientation
0.000s 0.030s 0.054s

90° Orientation
0.000s 0.070s 0.100s

PLAN VIEW

Vehicle at 63 MPH + Vehicle Stopped
### SUMMARY TABLE

#### GENERAL INFORMATION

<table>
<thead>
<tr>
<th>Test Agency</th>
<th>Calspan Corporation.</th>
</tr>
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<tbody>
<tr>
<td>Test Number</td>
<td>BR0054</td>
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<tr>
<td>Test Date</td>
<td>02/18/2021</td>
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</table>

#### IMPACT CONDITIONS

<table>
<thead>
<tr>
<th>Impact Location (0 deg)</th>
<th>494 mm offset from Centerline (Drvr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Location (90 deg)</td>
<td>572 mm offset from Centerline (Psgr)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Designation</th>
<th>3-72</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinetic Energy (0°)</td>
<td>874.47 kJ</td>
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<tr>
<td>Kinetic Energy (90°)</td>
<td>852.69 kJ</td>
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<table>
<thead>
<tr>
<th>Impact Velocity (0°)</th>
<th>62.0 mph (99.8 km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Velocity (90°)</td>
<td>61.2 mph (98.5 km/h)</td>
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#### TEST ARTICLE

<table>
<thead>
<tr>
<th>Name / Model</th>
<th>Apex</th>
</tr>
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<tbody>
<tr>
<td>Type</td>
<td>Work-Zone Traffic Control Device</td>
</tr>
<tr>
<td>Key Elements</td>
<td>Sign Stand, Metal Base, Roll Up Sign</td>
</tr>
<tr>
<td>Overall Height</td>
<td>79 in. (2006mm)</td>
</tr>
<tr>
<td>Overall Width</td>
<td>41 in. (1041mm)</td>
</tr>
<tr>
<td>Base Weight</td>
<td>20 lbs. (9.07 kg)</td>
</tr>
<tr>
<td>Sign Weight</td>
<td>&lt; 5 lbs. (2.27 kg)</td>
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<tr>
<td>Road Surface</td>
<td>Asphalt</td>
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<table>
<thead>
<tr>
<th>Final Resting Position</th>
<th>189 ft. downstream</th>
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<tbody>
<tr>
<td>Vehicle Stability</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Vehicle Snagging</td>
<td>None</td>
</tr>
<tr>
<td>Vehicle Pocketing</td>
<td>None</td>
</tr>
<tr>
<td>Sign Weight</td>
<td>&lt; 5 lbs. (2.27 kg)</td>
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#### OCCUPANT RISK VALUES

<table>
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<tr>
<th>Occupant Impact Velocity</th>
<th>Longitudinal</th>
<th>N/A</th>
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<tbody>
<tr>
<td>Lateral</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

| Ridedown Acceleration    | N/A          |     |
| Longitudinal             | N/A          |     |
| Lateral                  | N/A          |     |

#### TEST VEHICLE

<table>
<thead>
<tr>
<th>Type / Designation</th>
<th>2270P</th>
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<tbody>
<tr>
<td>Year, Make and Model</td>
<td>2009 RAM 1500</td>
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</table>

<table>
<thead>
<tr>
<th>Curb Mass</th>
<th>5022.1 lbs. (2278 kg)</th>
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</table>

<table>
<thead>
<tr>
<th>Test Inertial Mass</th>
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<table>
<thead>
<tr>
<th>Gross Static Mass</th>
<th>5022.1 lbs. (2278 kg)</th>
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#### TEST ARTICLE POST-IMPACT

<table>
<thead>
<tr>
<th>Article Damage</th>
<th>Base Deformation/Upper separation</th>
</tr>
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</table>

#### VEHICLE DAMAGE

<table>
<thead>
<tr>
<th>Vehicle Damage Scale</th>
<th>FL-1 ; FR-1</th>
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<tbody>
<tr>
<td>Collision Damage Classification</td>
<td>12FLEN1 &amp; 12FLGN1 ; 12FREN1</td>
</tr>
<tr>
<td>Maximum Deformation</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

1 Values not calculated due to test article weight being less than 220 lbs. (100 kg)
APPENDIX C – TEST ARTICLE DRAWINGS:

Legs Extended and 48 inch Roll up: