Dear Mr. Willetts:

This letter is in response to your December 2, 2019 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-399 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:

- MDI Worldwide 50SM-2S Sign Stand TL-3

**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: MDI Worldwide 50SM-2S Sign Stand
- Type of system: Work Zone
- Test Level: MASH Test Level 3 (TL3)
- Testing conducted by: Applus IDIADA KARCO Engineering, LLC.
- Date of request: December 2, 2019

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-399 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,

[Signature]

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

Enclosures
Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

Date of Request: December 2, 2019
Name: Eric Willetts
Company: MDI Worldwide
Address: 38271 W. Twelve Mile Road, Farmington Hills, MI 48331
Country: United States
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

<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</td>
<td>Physical Crash Testing Engineering Analysis</td>
<td>50SM-2S</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>Company Name:</th>
<th>Address:</th>
<th>Country:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eric Willetts</td>
<td>MDI Worldwide</td>
<td>38271 W. Twelve Mile Road, Farmington Hills, MI 48331</td>
<td>United States</td>
</tr>
</tbody>
</table>

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

Marketing Displays, Inc., doing business as MDI Worldwide (“MDI”), whose principal place of business is 38271 West Twelve Mile Road, Farmington Hills, Michigan 48331-3041, and Applus IDIADA KARCO Engineering, LLC., whose principal place of business is 9270 Holly Road, Adelanto, CA 92301 share no ($0.00) financial interests between the two organizations. This includes no ($0.00) financial interest but not limited to:

i. Compensation, including wages, salaries, commissions, professional fees, or fees for business referrals (dollar values are not needed);
ii. Consulting relationships;
iii. Research funding or other forms of research support;
iv. Patents, copyrights, and other intellectual property interests;
v. Licenses or contractual relationships; or
vi. Business ownership and investment interest.
PRODUCT DESCRIPTION

New Hardware or Modification to
- Significant Modification  - Existing Hardware

Product Description of 50SM-2S
(Reference Drawing ZA-07914)

The 50SM-2S temporary sign stand is a work-zone traffic control device used to display traffic control signs.

Further Description:
The 50SM-2S temporary sign support is a portable/fold-up sign stand manufactured with two vertically mounted wind deflecting steel coil springs. The sign stand consists of a steel base assembly, four steel legs and a steel telescoping upright. The leg is constructed of 1" SQ tube. The two piece telescoping uprights are constructed of 1" SQ tube and 0.75" SQ tube. An aluminum sign is attached to the telescoping mast with the use of adjustable rigid sign brackets. The sign can be raised and lowered to the desired height. The overall height of the stand is 104". The test was conducted with the sign mounted at 12" above grade to the bottom of the sign. The total weight of the stand is approximately 36 lbs (no sign).

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: Nick V. Injev

Engineer Signature: Nick Injev

Address: 9270 Holly Road, Adelanto, CA 92301

Country: USA

A brief description of each crash test and its result:

<table>
<thead>
<tr>
<th>Required Test Number</th>
<th>Narrative Description</th>
<th>Evaluation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-70 (1100C)</td>
<td>Designed to evaluate the ability of a small vehicle to activate any breakaway, fracture, or yielding mechanism. Is considered optional for work-zone traffic control devices weighing less than 220 lbs (100 kg). The as-tested device weighed 30.5 lbs (13.8 kg) and therefore Test 70 was not performed.</td>
<td>Non-Relevant Test, not conducted</td>
</tr>
<tr>
<td>Required Test Number</td>
<td>Narrative Description</td>
<td>Evaluation Results</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>3-71 (1100C)</td>
<td>An 1100C test vehicle approached the test article at a nominal speed of 62 mph. The first 50SM-2S sign stand impacted was oriented at 0° and the second test article at 90°. The vertical upright of both devices sheared at the breakaway upon impact. Both aluminum signs made contact with the windshield but did not tear the plastic liner or cause excessive deformation. There was no penetration into the test vehicles occupant compartment nor were the deformation limits exceeded. The devices did not induce any vehicle instability. The 50SM-2S met all the requirements for MASH Test 3-71.</td>
<td>PASS</td>
</tr>
<tr>
<td>3-72 (2270P)</td>
<td>A 2270P test vehicle approached the test article at a nominal speed of 62 mph. The first 50SM-2S sign stand impacted was oriented at 0° and the second at 90°. Upon impact the 0° vertical upright sheared at the breakaway causing the aluminum sign to make contact with the hood of the vehicle. The aluminum sign of the 90° stand released from the rigid brackets upon impact going over the occupant compartment. There was no penetration into the test vehicles occupant compartment nor were the deformation limits exceeded. The devices did not induce any vehicle instability. The 50SM-2S met all the requirements for MASH Test 3-72.</td>
<td>PASS</td>
</tr>
</tbody>
</table>

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:** Applus IDIADA KARCOEngineering, LLC.

**Laboratory Signature:** Nick Injev

**Address:** 9270 Holly Road, Adelanto, CA 92301

**Country:** USA

**Accreditation Certificate Number and Dates of current Accreditation period:** TL-371: July 1, 2019 - July 1, 2022

**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:

<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>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MASH 2016 Test 3-71 Summary

**General Information**
- **Test Agency**: Applus IDIADA KARCO
- **Test No.**: P39116-01
- **Test Designation**: 3-71
- **Test Date**: 03/29/2019

**Test Article**
- **Name / Model**: MDI 50SM-2S
- **Type**: Work-Zone Device
- **Device Height**: 8.6 ft. (2.6 m)
- **Key Elements**: Aluminum sign, steel coil springs, upright, base assembly
- **Road Surface**: Concrete

**Vehicle**
- **Type / Designation**: 1100C
- **Year, Make, and Model**: 2009 Kia Rio Sedan
- **Curb Mass**: 2,339.1 lbs (1,061.0 kg)
- **Test Inertial Mass**: 2,398.9 lbs (1,084.5 kg)
- **Gross Static Mass**: 2,559.5 lbs (1,161.0 kg)

**Impact Conditions**
- **Impact Velocity Device 1**: 62.12 mph (99.97 km/h)
- **Device 1 Angle**: 0.0°
- **Device 1 Kinetic Energy**: 308.4 kip-ft (418.2 kJ)

**Exit Conditions**
- **Device 1 Exit Velocity**: 61.7 mph (99.3 km/h)

**Debris Field**
- Longitudinal: 181.7 ft. (55.4 m)
- Lateral: 56.4 ft. (17.2 m)

**Vehicle Damage**
- **Vehicle Damage Scale**: 12-FC-1

**Test Article Deflections**
- **Debris Field (longitudinal)**: 181.7 ft. (55.4 m)
- **Debris Field (lateral)**: 56.4 ft. (17.2 m)

**Vehicle Stability**
- Satisfactory

**Occupant Risk**
- **Longitudinal OIV**: N/A*
- **Lateral OIV**: N/A*
- **Longitudinal RA**: N/A*
- **Lateral RA**: N/A*
- **THIV**: N/A*
- **PHD**: N/A*
- **ASI**: N/A*

---

* Not Applicable, device weighs less than 220 lbs (100 kg)
MASH 2016 Test 3-72 Summary

0° CIA

90° CIA

0.300 s 0.100 s 0.000 s 0.964 s 0.764 s 0.664 s

268.6 ft. (81.9 m)

9.1 ft. (2.8 m)

GENERAL INFORMATION

Test Agency: Applus IDIADA KARCO
Test No.: P39116-02
Test Designation: 3-72
Test Date: 4/1/19

TEST ARTICLE

<table>
<thead>
<tr>
<th>Name / Model</th>
<th>MDI 50SM-2S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Work-Zone Device</td>
</tr>
<tr>
<td>Device Height</td>
<td>8.7 ft. (2.6 m)</td>
</tr>
<tr>
<td>Key Elements</td>
<td>Aluminum sign, steel coil springs, upright, base assembly</td>
</tr>
<tr>
<td>Road Surface</td>
<td>Concrete</td>
</tr>
</tbody>
</table>

TEST VEHICLE

<table>
<thead>
<tr>
<th>Type / Designation</th>
<th>2270P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year, Make, and Model</td>
<td>2013 Ram 1500</td>
</tr>
<tr>
<td>Curb Mass</td>
<td>4,894.2 lbs (2,220.0 kg)</td>
</tr>
<tr>
<td>Test Inertial Mass</td>
<td>5,003.3 lbs (2,269.5 kg)</td>
</tr>
<tr>
<td>Gross Static Mass</td>
<td>5,003.3 lbs (2,269.5 kg)</td>
</tr>
</tbody>
</table>

Impact Conditions

- Impact Velocity Device 1: 60.94 mph (98.07 km/h)
- Impact Velocity Device 2: 60.15 mph (96.81 km/h)
- Device 1 Angle: 0°
- Device 2 Angle: 90°
- Device 1 Kinetic Energy: 621.1 kip-ft (842.1 kJ)
- Device 2 Kinetic Energy: 605.2 kip-ft (820.6 kJ)

Exit Conditions

- Device 1 Exit Velocity: 60.4 mph (97.2 km/h)
- Device 2 Exit Velocity: 59.4 mph (95.5 km/h)
- Vehicle Resting Position: 268.6 ft. (81.9 m) Downstream, 9.1 ft. (2.8 m) Right
- Vehicle Stability: Satisfactory
- Maximum Roll Angle: N/A*
- Maximum Pitch Angle: N/A*
- Maximum Yaw Angle: N/A*

* Not Applicable, device weighs less than 220 lbs (100 kg)

Occupant Risk

- Longitudinal OIV: N/A*
- Lateral OIV: N/A*
- Longitudinal RA: N/A*
- Lateral RA: N/A*
- THIV: N/A*
- PHD: N/A*
- ASI: N/A*

Test Article Deflections

- Debris Field (longitudinal): 250.0 ft. (76.2 m)
- Debris Field (lateral): 26.0 ft. (7.9 m)

Vehicle Damage

- Vehicle Damage Scale: 12-FC-1
- CDC: 12FLMN1
- Maximum Intrusion: 0.0 in. (0 mm)

Figure 2 Summary of Test 3-72
MODEL: 50SM-2S
TEMPORARY SIGN SUPPORT
AASHTO MASH (TL-3)

NOTE:
-DIMENSIONS SHOWN ARE PER THE DESIGN INTENT AND ARE SHOWN FOR REFERENCE ONLY.

50SM-2S SIGN STAND
OVERALL WEIGHT: APPROX. 36.0 lbs. (NO SIGN)
OVERALL DIMENSIONS: APPROX. 38" X 81" X 104"

MDI Traffic Control Products, 38271 West 12 Mile Road, Farmington Hills, MI 48331-3041 800-521-6776

Figure 1: 50SM-2S Sign Stand