U.S. Department of Transportation
Federal Highway Administration

March 26, 2024

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

In Reply Refer To:
HSST-1/WZ-453

Eric Willetts
MDI Worldwide
38271 West Twelve Mile Road
Farmington Hills, MI 48331

Dear Mr. Willetts:

We received your correspondence of January 27, 2023, 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-453.

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: 4860M Sign Stand with 48”x48” Aluminum Sign
Type of system: Work Zone
Test Level: Test Level 3
Testing conducted by: Applus IDIADA KARCO Engineering, LLC
Date of request: January 27, 2023

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-453 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-453. 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,

Amy 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:	January 27, 2023	◉ New ○ Resubmission
	Name:	Eric Willetts	
	Company:	MDI Worldwide	
	Address:	38271 West Twelve Mile Road, Farmington Hills, Michigan 48331	
	Country:	United States of America	
	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	4860M Sign Stand with 48" x 48" 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:	Eric Willetts	Same as Submitter ☒
Company Name:	MDI Worldwide	Same as Submitter ☒
Address:	38271 West Twelve Mile Road, Farmington Hills, Michigan 48331	Same as Submitter ☒
Country:	United States of America	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.

MDI Worldwide is the manufacturer and marketer of the device.

Applus IDIADA KARCO Engineering, LLC (IDIADA KARCO) is an independent research and testing laboratory having no affiliation with any other entity. IDIADA KARCO is actively Involved in data acquisition and compliance/certification testing for a variety of government agencies and equipment manufacturers. The principals and staff of IDIADA KARCO have no past or present financial, contractual or organizational interest in any company or entity directly or indirectly related to the products that IDIADA KARCO tests. If any financial interest should arise, other than receiving fees for testing, reporting, etc., with respect to any project, the company will provide, In writing, a full and immediate disclosure to the FHWA.

PRODUCT DESCRIPTION

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

The MDI Worldwide 4860M sign stand is a portable work-zone traffic control device. The as-tested device consisted of one (1) steel stand base assembly, two (2) coil springs, four (4) aluminum legs, one (1) aluminum telescoping upright, two (2) adjustable rigid brackets, one (1) flag bracket, three (3) wood dowel flags and one (1) 48.0 in. (1.2 m) square aluminum sign. The as-tested device weighed 53.0 lbs (24.0 kg), including the weight of the sign. For this test, one (1) 25.0 lb. (11.3 kg) sand bag was placed on each of the device's legs.
The aluminum legs have open footprint dimensions of 55 in. (1.4 m) and 122 in. (3.1 m). The aluminum legs are constructed of 1.25" x 1.25" square tube. The telescoping upright consists of two (2) parts: upright one (1) which consists of a 1.5" square tube and upright two (2) which consists of a 1.25" square tube. For this test, the telescoping upright was set so that the sign had a mounting height of 60 in. (1.5 m) measured from grade to the bottom corner of the sign. The height of the 4860M sign stand was 132.0 in. (3.4 m), excluding the sign and flags. The sign was attached to the upright with two (2) adjustable rigid brackets. The dowel flags were attached to the upright using one (1) flag bracket.

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:	Antonio Reyes	
Engineer Signature:	Antonio Reyes Digitally signed by Antonio Reyes DN: cn=Antonio Reyes, o=Applus Idiada, ou, email=Antonio.Reyes@idiada.com, c=US Date: 2023.01.27 16:29:01 -08'00'	
Address:	9270 Holly Road, Adelanto, CA 92301	Same as Submitter ☐
Country:	United States of America	Same as Submitter ☐

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-70 (1100C)	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 53.0 lbs (24.0 kg) including the weight of the sign and therefore Test 70 was not performed.	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	Applus IDIADA KARCO Test No. P41147-01 and P42033-01. Test Dates May 12, 2021 and December 22, 2022. Crash Test Report No. TR-P41147-01-NC and P42033-01-NC for MASH 2016 Test 3-71 Crash Test of MDI Worldwide MDI Worldwide 4860M Sign Stand with 48" x 48" Aluminum Sign. Two (2) MDI Worldwide 4860M Sign Stands with 48" x 48" Aluminum Signs were impacted by the same 2016 Kia Rio 4-door sedan on two (2) different dates. The devices were set at two (2) critical impact angles (CIA), 0° and 90°. On May 12, 2021 the first device was tested and oriented at 0°. The work-zone device was impacted at a velocity of 62.12 mph (99.97 km/h). The 90° device tested on this date had an impact speed below MASH 2016 tolerances. Upon impact, the 4860M Sign Stand with 48" x 48" Aluminum Sign, that was oriented at 0°, yielded in a predictable manner. MASH deformation limits were not exceeded and there was no penetration into the vehicle's occupant compartment. On December 22, 2022 the MDI Worldwide 4860M Sign Stand with 48" x 48" Aluminum Sign oriented at 90° was re-tested and was impacted at a velocity of 64.82 mph (104.32 km/h). Upon impact the 4860M Sign Stand with 48" x 48" Aluminum Sign yielded in a predictable manner. MASH deformation limits were not exceeded and there was no penetration into the vehicle's occupant compartment.	PASS

3-72 (2270P)	Applus IDIADA KARCO Test No. P41148-01. Test Date May 12, 2021. Crash Test Report No. TR-P41148-01-NC for MASH 2016 Test 3-72 Crash Test of MDI Worldwide MDI Worldwide 4860M Sign Stand with 48" x 48" Aluminum Sign. Two (2) MDI Worldwide MDI Worldwide 4860M Sign Stands with 48" x 48" Aluminum Signs were impacted by a 2016 Ram 1500 pickup truck. The two (2) 4860M Sign Stands were impacted on the same test run. The devices were spaced 60.0 ft. (18.3 m) apart and set at two (2) critical impact angles (CIA), 0° and 90°. The first device was oriented at 0° and was impacted at 62.53 mph (100.64 km/h). Upon impact, 4860M Sign Stand broke away in a predictable manner. MASH deformation limits were not exceeded and there was no penetration into the vehicle's occupant compartment. The second device was oriented at 90° and was impacted at a velocity of 60.52 mph (97.39 km/h). Upon impact, the 4860M Sign Stand broke away in a predictable manner. The aluminum sign contacted the vehicle's windshield and roof. The windshield was deformed 0.4 in. (10mm) and the roof was deformed 0.9 in. (23 mm). MASH deformation limits were not exceeded and there was no penetration into the vehicle's occupant compartment.	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:	Applus IDIADA KARCO Engineering, LLC	
Laboratory Signature:	Antonio Reyes Digitally signed by Antonio Reyes DN: cn=Antonio Reyes, o=Applus Idiada, ou, email=Antonio.Reyes@idiada.com, c=US Date: 2023.01.27 16:29:30 -08'00'	
Address:	9270 Holly Road, Adelanto, CA 92301	Same as Submitter ☐
Country:	United States of America	Same as Submitter ☒
Accreditation Certificate Number and Dates of current Accreditation period :	International Accreditation Services (IAS) ISO 17025 Accreditation Certificate #TL-371 Expires April 27, 2023	

Submitter Signature*: Eric Willetts Digitally signed by Eric Willetts Date: 2023.02.03 13:22:00 -05'00'

Submit Form

ATTACHMENTS

Attach to this form:

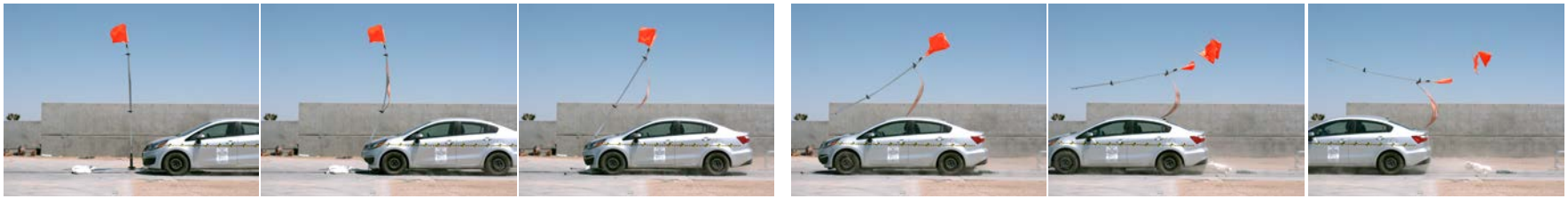
1) Additional disclosures of related financial interest as indicated above.
2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
3) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [Hardware 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

MASH 2016 Test 3-71 Summary (P41147-01, 0°CIA)

0° CIA



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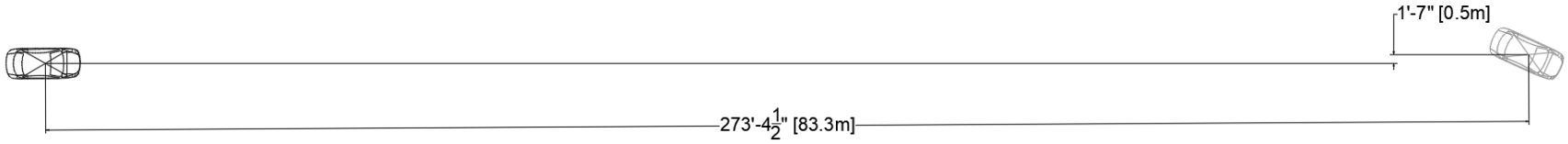


GENERAL INFORMATION

Test Agency	Applus IDIADA KARCO Engineering
Test Number	P41147-01
Test Designation	3-71
Test Date	5/12/21

TEST ARTICLE

Name / Model	MDI Worldwide 4860M Sign Stand with 48" x 48" Aluminum Sign
Type	Work-Zone Traffic Control Device
Device Height	11.0 ft. (3.4 m)
Key Elements	Square Tube Legs and Upright, Coil Springs
Road Surface	Smooth, clean Concrete

TEST VEHICLE

Type / Designation	1100C
Year, Make, and Model	2016 Kia Rio
Curb Mass	2,578.3 lbs (1,169.5 kg)
Test Inertial Mass	2,452.6 lbs (1,112.5 kg)
Gross Static Mass	2,615.7 lbs (1,186.5 kg)

Impact Conditions

Impact Velocity	62.12 mph (99.97 km/h)
Location/ Orientation	17.3 in. (440 mm) From Vehicle Centerline on Passenger Side
Device Angle	0.0°
Kinetic Energy	316.4 kip-feet (428.9 Kilojoules)
Minimum KE Required	288 kip-feet (390 Kilojoules)

Exit Conditions

Exit Velocity	61.06 mph (98.26 km/h)
Vehicle Resting Position	273.4 ft. (83.3 m) Downstream 1.6 ft. (0.5 m) Left
0° - Vehicle Stability	Satisfactory
0° - Maximum Roll Angle	Did Not Exceed 75°
0° - Maximum Pitch Angle	Did Not Exceed 75°

Occupant Risk

Longitudinal OIV	Not Applicable*
Lateral OIV	Not Applicable*
Longitudinal RA	Not Applicable*
Lateral RA	Not Applicable*
THIV	Not Applicable*
PHD	Not Applicable*
ASI	Not Applicable*

Test Article Deflections

0° - Sign Debris Field (longitudinal)	236.6 ft. (72.1 m)
0° - Sign Debris Field (lateral)	2.3 ft. (0.7 m)

Vehicle Damage

Vehicle Damage Scale	12-FR-1
CDC	12FREN1
0° - Maximum Deformation	MASH Deformation Limits Not Exceeded (0.0 in.) 0 mm

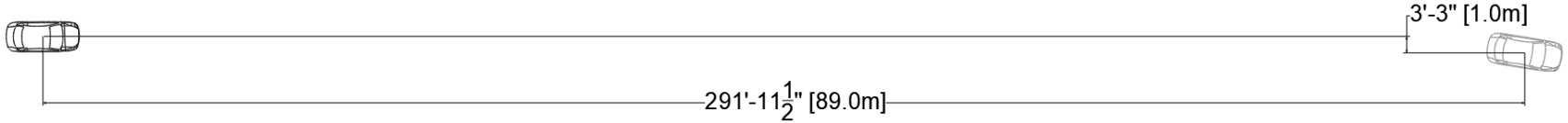
** Not Applicable, device weighs less than 220 lbs (100 kg)*

Figure 3 Summary of Test 3-71 (P41147-01, 0°CIA)

MASH 2016 Test 3-71 Summary (P42033-01, 90° CIA)

90° CIA

0.000 seconds | 0.035 seconds | 0.070 seconds | 0.105 seconds | 0.140 seconds | 0.175 seconds



GENERAL INFORMATION

Test Agency	Applus IDIADA KARCO Engineering
Test Number	P42033-01
Test Designation	3-71
Test Date	12/22/22

TEST ARTICLE

Name / Model	MDI Worldwide 4860M Sign Stand with 48" x 48" Aluminum Sign
Type	Work-Zone Traffic Control Device
Device Height	11.0 ft. (3.4 m)
Key Elements	Square Tube Legs and Upright, Coil Springs
Road Surface	Smooth, clean Concrete

TEST VEHICLE

Type / Designation	1100C
Year, Make, and Model	2016 Kia Rio
Curb Mass	2,578.3 lbs (1,169.5 kg)
Test Inertial Mass	2,452.6 lbs (1,112.5 kg)
Gross Static Mass	2,615.7 lbs (1,186.5 kg)

Impact Conditions

Impact Velocity	64.82 mph (104.32 km/h)
Location/ Orientation	13.8 in. (350 mm) From Vehicle Centerline on Passenger Side
Device Angle	90.0°
Device Kinetic Energy	344.5 kip-feet (467.1 Kilojoules)
Minimum KE Required	288 kip-feet (390 Kilojoules)

Exit Conditions

Device Exit Velocity	64.25 mph (103.39 km/h)
Vehicle Resting Position	292.0 ft. (89.0 m) Downstream 3.3 ft. (1.0 m) Right
90° - Vehicle Stability	Satisfactory
90° - Maximum Roll Angle	Did Not Exceed 75°
90° - Maximum Pitch Angle	Did Not Exceed 75°

Occupant Risk

Longitudinal OIV	Not Applicable*
Lateral OIV	Not Applicable*
Longitudinal RA	Not Applicable*
Lateral RA	Not Applicable*
THIV	Not Applicable*
PHD	Not Applicable*
ASI	Not Applicable*

Test Article Deflections

90° - Sign Debris Field (longitudinal)	221.0 ft. (67.4 m)
90° - Sign Debris Field (lateral)	0.3 ft. (0.1 m)

Vehicle Damage

Vehicle Damage Scale	12-FR-1
CDC	12FREN1
90° - Maximum Deformation	MASH Deformation Limits Not Exceeded (0.0 in.) 0 mm

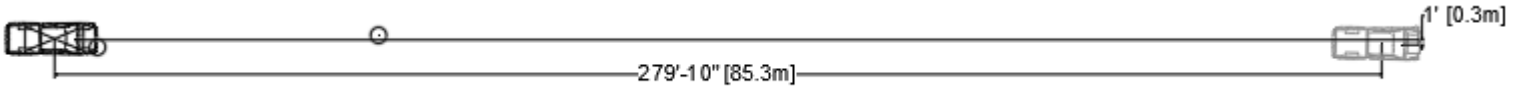
** Not Applicable, device weighs less than 220 lbs (100 kg)*

Figure 4 Summary of Test 3-71 (P42033-01, 90°CIA)

MASH 2016 Test 3-72 Summary

0° CIA **90° CIA**

0.000 seconds 0.100 seconds 0.200 seconds 0.650 seconds 0.760 seconds 0.870 seconds



GENERAL INFORMATION

Test Agency	Applus IDIADA KARCO
Test Number	P41148-01
Test Designation	3-72
Test Date	5/12/21

TEST ARTICLE

Name / Model	MDI Worldw ide 4860M Sign Stand w ith 48" x 48" Aluminum Sign
Type	Work-Zone Device
Device Height	11.0 ft. (3.35 m)
Key Elements	Square Tube Upright and Legs, Coil Springs
Road Surface	Smooth, clean concrete

TEST VEHICLE

Type / Designation	2270P
Year, Make, and Model	2016 Ram 1500
Curb Mass	5,083.8 lbs (2,306.0 kg)
Test Inertial Mass	5,009.9 lbs (2,272.5 kg)
Gross Static Mass	5,009.9 lbs (2,272.5 kg)

Impact Conditions

Impact Velocity Device 1	62.53 mph (100.64 km/h)
Impact Velocity Device 2	60.52 mph (97.39 km/h)
Device 1 Angle	0.0°
Device 2 Angle	90.0°
Location / Orientation Device 1	22.2 in. (563 mm) From vehicle centerline to passenger side
Location / Orientation Device 2	14.1 in. (354 mm) From vehicle centerline to driver side
Device 1 Kinetic Energy	656.9 kip-feet (890.6 Kilojoules)
Device 2 Kinetic Energy	613.3 kip-feet (831.6 Kilojoules)
Minimum KE Required	594 kip-feet (806 Kilojoules)

Exit Conditions

Device 1 Exit Velocity	62.40 mph (100.40 km/h)
Device 2 Exit Velocity	59.86 mph (96.3 km/h)
Vehicle Resting Position	279.8 ft. (85.3 m) Downstream 1.0 ft. (0.3. m) Right
0° - Vehicle Stability	Satisfactory
90° - Vehicle Stability	Satisfactory
0° - Maximum Roll Angle	Did Not Exceed 75°
0° - Maximum Pitch Angle	Did Not Exceed 75°
90° - Maximum Roll Angle	Did Not Exceed 75°
90° - Maximum Pitch Angle	Did Not Exceed 75°

Occupant Risk

Longitudinal OIV	Not Applicable*
Lateral OIV	Not Applicable*
Longitudinal RA	Not Applicable*
Lateral RA	Not Applicable*
THIV	Not Applicable*
PHD	Not Applicable*
ASI	Not Applicable*

Test Article Deflections

0° Debris Field (longitudinal)	21.9 ft. (6.7 m)
0° Debris Field (lateral)	4.4 ft. (1.3 m)
90° Debris Field (longitudinal)	87.8 ft. (26.8 m)
90° Debris Field (lateral)	8.3 ft. (2.5 m)

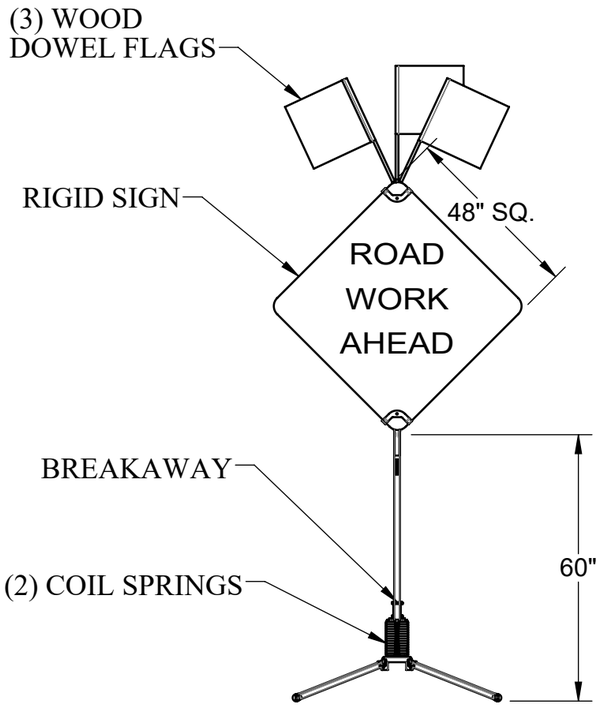
Vehicle Damage

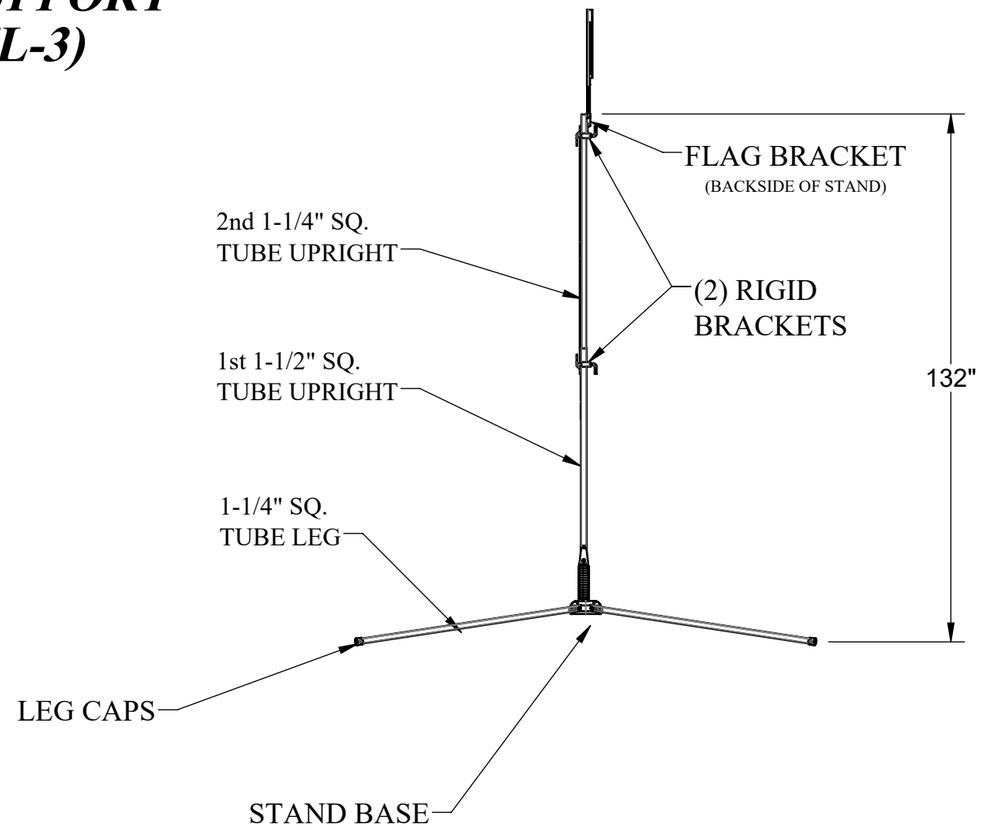
Vehicle Damage Scale	12-FD-1
CDC	12FDAW1
0° - Maximum Deformation	MASH Deformation Limits Not Exceeded (0.0 in.) 0 mm
90° - Maximum Deformation	0.9 in. (23 mm) Roof 0.4 in. (10 mm) Windshield

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

Figure 2 Summary of Test 3-72

MODEL: 4860M
TEMPORARY SIGN SUPPORT
AASHTO MASH (TL-3)





NOTES:
-DIMENSIONS SHOWN ARE PER THE DESIGN INTENT AND ARE SHOWN FOR REFERENCE ONLY.
-OPTIONAL SANDBAGS PLACED ON LEGS

4860M SIGN STAND

OVERALL WEIGHT: APPROX.	35.0 lbs. (NO SIGN)
OVERALL DIMENSIONS: APPROX.	55" X 122" X 132"

MDI WORLDWIDE

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

ZA-08108

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