



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

January 6, 2020

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

In Reply Refer To:
HSST-1/WZ-364

Mr. Eric Larson
MDI Worldwide
38271 W. Twelve Mile Road
Farmington Hills, MI 48331

Dear Mr. Larson:

This letter is in response to your August 05, 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-364 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:

- 50SM-NS Temporary Sign Support

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: 50SM-NS Temporary Sign Support

Type of system: Work Zone

Test Level: MASH Test Level 3 (TL3)

Testing conducted by: E-TECH Testing Services Inc

Date of request: August 05, 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-364 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

Submitter	Date of Request:	April 20, 2018	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Troy Tapley	
	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

!-!-!

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'WZ': Crash Worthy Work Zone Traffic Control Devices	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	50SM-NS	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:	Troy Tapley	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	MDI Worldwide	Same as Submitter <input checked="" type="checkbox"/>
Address:	38271 W. Twelve Mile Road, Farmington Hills, MI 48331	Same as Submitter <input checked="" type="checkbox"/>
Country:	United States	Same as Submitter <input checked="" type="checkbox"/>

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 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

<input checked="" type="radio"/> New Hardware or Significant Modification	<input type="radio"/> Modification to Existing Hardware
<p>Product Description of 50SM-NS (Reference drawing ZA-07795-03)</p> <p>The 50SM-NS temporary sign support is a work-zone traffic control device used in displaying light weight sign substrates; primarily 48" x 48" [1219 mm x 1219 mm] diamond shape or up to 16 sq. ft. [1.5 sq. m] vinyl roll up signs.</p> <p>Further description:</p> <p>The 50SM-NS temporary sign support is a portable/fold-up sign stand manufactured without the use of wind deflecting springs. The sign stand consists of a .188" [5 mm] thick steel base with a vertically welded upright tube, four steel telescoping legs, and a steel telescoping upright that inserts into the base upright tube. The two piece telescoping legs are constructed of 1.25" x 1.25" x .06" [32 mm x 32 mm x 1.5 mm] and 1.00" x 1.00" x .06" [25 mm x 25 mm x 1.5mm], respectively. The two piece telescoping uprights are constructed of 1.00" x 1.00" x .06" [25 mm x 25 mm x 1.5 mm] and .75" x .75" x .06" [20 mm x 20 mm x 1.5mm], respectively. A roll up sign is attached to the telescoping mast with the use of an adjustable roll up sign bracket. The sign can be raised and lowered to the desired height.</p> <p>The overall height of the stand is 98" [2489 mm]. The test was conducted with the sign mounted 54" [1372 mm] above grade to the bottom of the sign. The total weight of the stand is approximately 31.0 lbs [14.1 kg], which includes the stand of 23.5 lbs [10.7 kg] and the sign (including sign bracket) of 7.5 lbs [3.4 kg]. Sand bags can be placed on the legs as needed for ballast.</p>	

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:	Alex Beltran	
Engineer Signature:		Digitally signed by Alex Beltran DN: cn=Alex Beltran, o=KARCO Engineering, ou=Testing Laboratory, email=abeltran@karco.com, c=US Date: 2018.04.26 11:20:08 -07'00'
Address:	9270 Holly Rd. Adelanto, CA 92301	Same as Submitter <input type="checkbox"/>
Country:	United States	Same as Submitter <input type="checkbox"/>


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 lb (100 kg).	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	<p>(2) Separate test runs conducted</p> <p>A 2,589.3 lb (1,174.5 kg) small car approached the test article at an impact speed of 61.86 mph (99.55 km/h) with a critical impact angle of 0° .</p> <p>For this test, a 50SM-NS sign stand was impacted. The article was aligned at 0° and to the test vehicle's direction of travel. Upon impact the 50SM-NS vertical mast separated from its base upright assembly. The roll up sign remained attached to the upright and dropped to impact the windshield. After impact, the roll up sign and mast brushed over the roof and dropped off the passenger side. There was no penetration into the test vehicles occupant compartment nor were the deformation limits exceeded. The 50SM-NS sign stand yielded with the sign and upright separating away from the base assembly. Debris from the test articles did not cause a hazard to the driver's vision. The vehicle remained upright and did not exceed 75° roll angle throughout the test. The vehicle did not leave its lane and its trajectory was stable after the sign stand was impacted.</p> <p>A 2,595.9 lb (1,177.5 kg) small car approached the test article at an impact speed of 62.19 mph (100.08 km/h) with a critical impact angle of 90° .</p> <p>For this test, a 50SM-NS sign stand was impacted. The article was aligned at 90° and to the test vehicle's direction of travel. Upon impact the 50SM-NS vertical mast separated from its base upright assemble. The roll up sign remained attached to the upright and dropped to impact the windshield. After impact, the roll up sign and mast brushed over the roof of the vehicle before permanently losing contact with the vehicle. There was no penetration into the test vehicles occupant compartment nor were the deformation limits exceeded. The 50SM-NS sign stand yielded with the sign and upright separating away from the base assembly. Debris from the test articles did not cause a hazard to the driver's vision. The vehicle remained upright and did not exceed 75° roll angle throughout the test. The vehicle did not leave its lane and its trajectory was stable after the sign stand was impacted.</p>	PASS

3-72 (2270P)	<p>A 5,012.1 lb (2,273.5 kg) pickup truck approached the test article at an impact speed of 63.90 mph (102.83 km/h) with a critical impact angle between 0° and 90°. For this test, two 50SM-NS sign stands were impacted. The first article was aligned at 0° and the second was aligned to 90° to the test vehicle's direction of travel.</p> <p>Upon impact the 50SM-NS vertical mast deformed around the vehicle bumper and released from the base upright assemble in both the 0° and 90° positions.</p> <p>The mast and roll up sign from the first article slid along the windshield and over the roof without causing occupant compartment deformation. The mast and roll up sign from the second article slid along the windshield and over the roof in the same manner. The test vehicles occupant compartment deformation limits were not exceeded. The 50SM-NS sign stand yielded with the sign and upright separating away from the base assemble. Debris from the test articles did not cause a hazard to the driver's vision. The vehicle remained upright and did not exceed 75° roll angle throughout the test. The vehicle did not leave its lane and its trajectory was stable after both sign stands were impacted.</p>	PASS
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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:	KARCO Engineering	
Laboratory Signature:		<small>Digitally signed by Alex Beltran DN: cn=Alex Beltran, o=KARCO Engineering, ou=Testing Laboratory, email=abeltran@karco.com, c=US Date: 2018.04.26 11:20:27 -07'00'</small>
Address:	9270 Holly Rd. Adelanto, CA. 92301	Same as Submitter <input type="checkbox"/>
Country:	United States	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	October 12, 2017 - July 1, 2018	

Submitter Signature*:


Digitally signed by Troy Tapley
Date: 2018.04.20 15:49:52
-04'00'

Submit Form

ATTACHMENTS

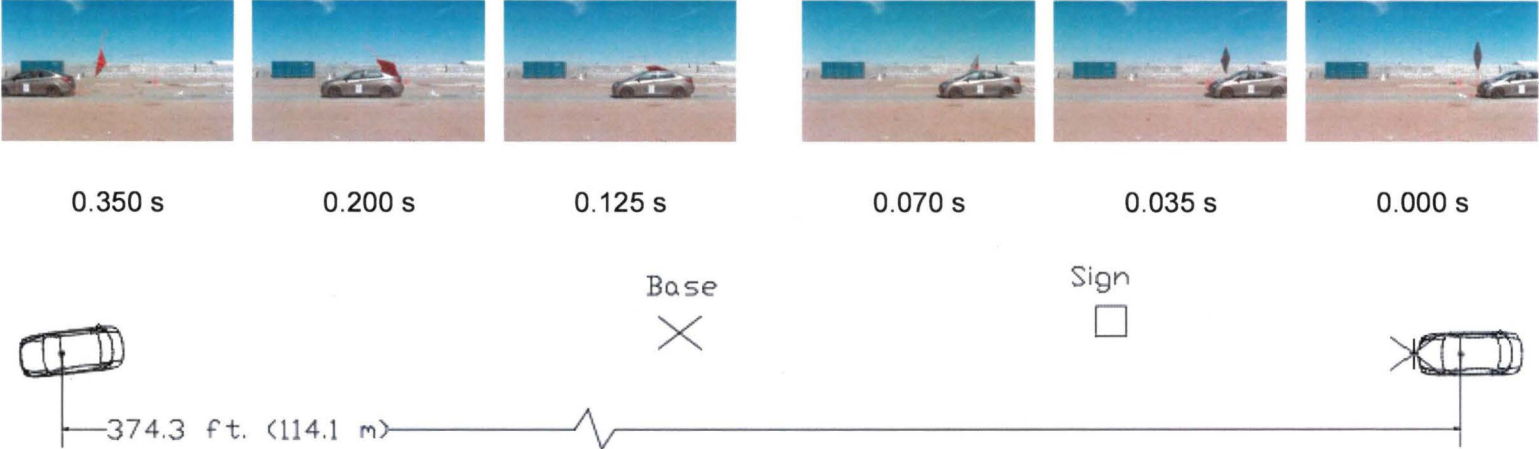
Attach to this form:

- 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		
Number	Date	Key Words

MASH Test 3-71 0° CIA SUMMARY



General Information	
Test Agency.....	KARCO Engineering, LLC.
KARCO Test No.....	P38054-01
Test Designation.....	3-71
Test Date.....	02/28/18
Test Article	
Name / Model.....	50SM-NS
Type.....	Work-Zone Traffic Control Device
Installation Length.....	N/A
Sign Height.....	122.0 in. (4.8 m)
Road Surface.....	Concrete
Test Vehicle	
Type / Designation.....	1100C
Year, Make, and Model.....	2014 Hyundai Accent
Curb Mass.....	2,379.9 lbs (1,079.5 kg)
Test Inertial Mass.....	2,423.9 lbs (1,099.5 kg)
Gross Static Mass.....	2,589.3 lbs (1,174.5 kg)

Impact Conditions	
Impact Velocity.....	61.86 mph (99.55 km/h)
Impact Angle.....	0°
Impact Location.....	Offset 16.7 in. (424 mm)
Kinetic Energy.....	310.1 kip-ft (420.4 kJ)
Exit Conditions	
Exit Velocity (0°).....	59.75 mph (96.16 km/h)
Exit Angle (0°).....	N/A
Final Vehicle Position.....	374.3 ft. (114.1 m) downstream

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	
Maximum Debris Field.....	96.8 ft. (29.5 m) downstream 4.4 ft. (1.4 m) right
Vehicle Damage	
Vehicle Damage Scale.....	N/A
CDC.....	N/A
Maximum Intrusion.....	Windshield 0.2 in. (6 mm)

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

Figure 3 Test 3-71 0° CIA Summary

MASH Test 3-71 90° CIA Summary



0.300 s

0.185 s

0.090 s

0.060 s

0.030 s

0.000 s



General Information	
Test Agency.....	KARCO Engineering, LLC.
KARCO Test No.....	P38054-02
Test Designation.....	3-71
Test Date.....	03/01/18
Test Article	
Name / Model.....	50SM-NS
Type.....	Work-Zone Traffic Control Device
Installation Length.....	N/A
Sign Height.....	122.0 in. (4.8 m)
Road Surface.....	Concrete
Test Vehicle	
Type / Designation.....	1100C
Year, Make, and Model.....	2014 Hyundai Accent
Curb Mass.....	2,485.7 lbs (1,127.5 kg)
Test Inertial Mass.....	2,428.4 lbs (1,101.5 kg)
Gross Static Mass.....	2,595.9 lbs (1,177.5 kg)

Impact Conditions	
Impact Velocity.....	62.19 mph (100.08 km/h)
Impact Angle.....	90°
Impact Location.....	Offset 12.8 in. (325 mm)
Kinetic Energy.....	314.0 kip-ft (425.7 kJ)
Exit Conditions	
Exit Velocity (0°).....	61.59 mph (99.12 km/h)
Exit Angle (0°).....	N/A
Final Vehicle Position.....	341.2 ft. (104.0 m) downstream

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	
Maximum Debris Field.....	299.4 ft. (91.2 m) downstream 26.8 ft. (8.2 m) right
Vehicle Damage	
Vehicle Damage Scale.....	N/A
CDC.....	N/A
Maximum Intrusion.....	Windshield 0.2 in. (6 mm)

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

Figure 4 Test 3-71 90° CIA Summary

MASH 2016 Test 3-72 Summary

90° CIA

0° CIA



0.940 s

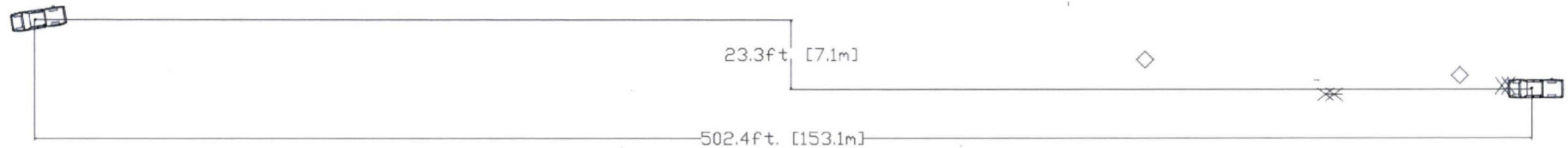
0.700

0.636 s

0.300 s

0.045 s

0.000 s



General Information	
Test Agency.....	KARCO Engineering, LLC.
KARCO Test No.....	P38060-01
Test Designation.....	3-72
Test Date.....	02/28/18
Test Article	
Name / Model.....	50SM-NS
Type.....	Work-Zone Traffic Control Device
Installation Length.....	Signs 60 ft. (18.3 m) apart
Sign Height.....	10.2 ft. (3.1 m)
Road Surface.....	Concrete
Test Vehicle	
Type / Designation.....	2270P
Year, Make, and Model.....	2013 Ram 1500
Curb Mass.....	4,994.5 lbs (2,265.5 kg)
Test Inertial Mass.....	5,012.1 lbs (2,273.5 kg)
Gross Static Mass.....	5,012.1 lbs (2,273.5 kg)

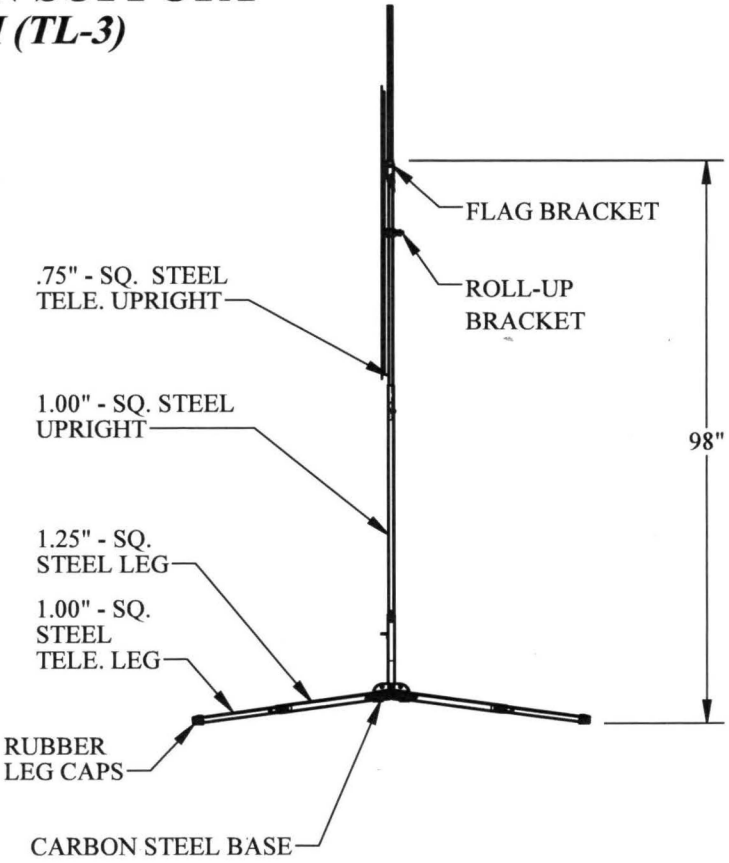
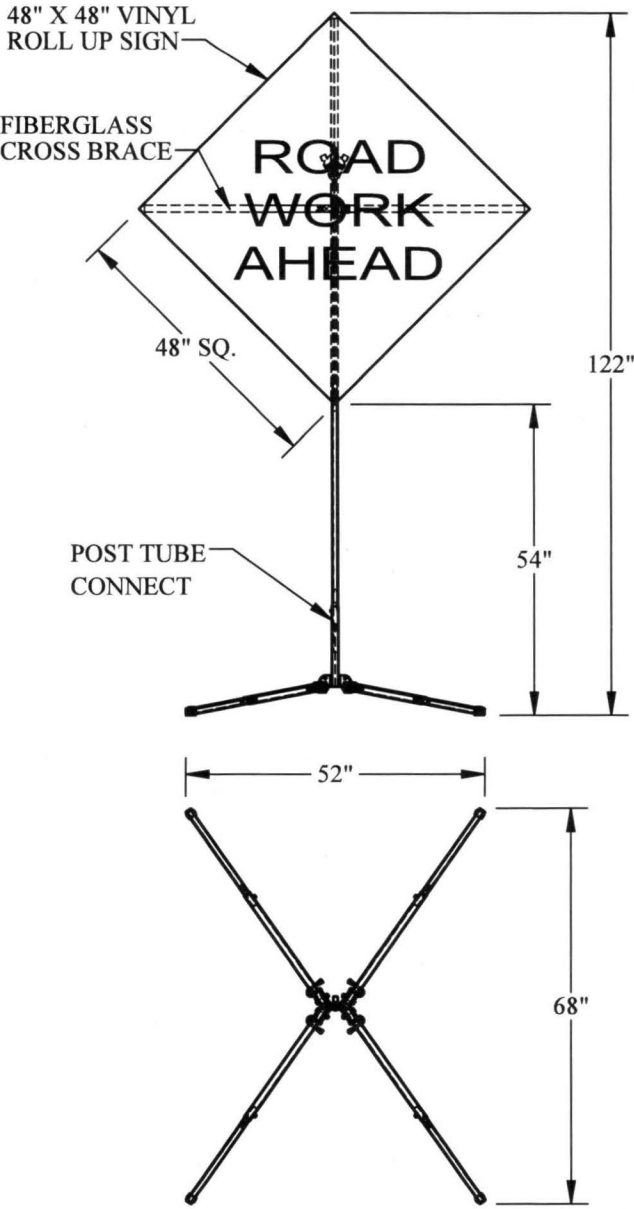
Impact Conditions	
Impact Velocity (0°).....	63.90 mph (102.83 km/h)
Impact Velocity (90°).....	62.57 mph (100.70 km/h)
Impact Angle Sign 1.....	90°
Impact Angle Sign 2.....	0°
Sign 1 Impact Location	Offset 19.6 in. (498 mm)
Sign 2 Impact Location	Offset 19.6 in. (498 mm)
Kinetic Energy (0°).....	684.1 kip-ft (927.5 kJ)
Kinetic Energy (90°).....	656.0 kip-ft (889.4 kJ)
Exit Conditions	
Exit Velocity (0°).....	63.43 mph (102.08 km/h)
Exit Velocity (90°).....	61.94 mph (102.08 km/h)
Exit Angle (0°).....	N/A
Exit Angle (90°).....	N/A
Final Vehicle Position.....	502.4 ft. (153.1 m) downstream
	23.3 ft. (7.1 m) right

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	
Maximum Debris Field.....	155.3 ft. (47.3 m) downstream
	28.8 ft. (8.8 m) right
Vehicle Damage	
Vehicle Damage Scale.....	N/A
CDC.....	N/A
Maximum Intrusion.....	N/A

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

Figure 2 Summary of Test 3-72

MODEL: 50SM-NS TEMPORARY SIGN SUPPORT AASHTO MASH (TL-3)



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



50SM-NS SIGN STAND
 OVERALL WEIGHT: APPROX. 23.5 lbs. (NO SIGN)
 OVERALL DIMENSIONS: APPROX. 52" X 68" X 98"