



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

August 20, 2024

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

In Reply Refer To:  
HSST-1/WZ-460

Henry A. Ross  
Plasticade  
100 Howard Avenue  
Des Plaines, IL 60018

Dear Mr. Ross:

We received your initial correspondence on January 2, 2024, requesting issuance of a Federal-aid reimbursement eligibility letter under the Federal-aid highway program for the roadside safety system, device, design, product, or hardware (collectively “device”) described below. On July 17, 2024, we received a complete set of files needed to complete our review. We write to inform you that the device SS-440 Sign Stand with 48”x48” Roll-up sign at 60” is eligible for Federal-aid reimbursement. This letter is assigned Federal Highway Administration (FHWA) control number WZ-460.

### **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: SS-440 Sign Stand with 48"x48" Roll-up sign at 60"  
Type of system: Work Zone  
Test Level: Test Level 3  
Testing conducted by: Applus IDIADA KARCO Engineering  
Date of request: January 2, 2024

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-460 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 Federal-aid eligibility letter is assigned FHWA control number WZ-460. It should only be reproduced in full with its attachment(s). This Federal-aid eligibility 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/](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](mailto:Aimee.Zhang@dot.gov).

Sincerely,

A handwritten signature in blue ink that reads "Amy S. Fox". The signature is written in a cursive, flowing style.

Amy S. Fox  
Acting Director, Office of Safety  
Technologies  
Office of Safety

Enclosures

## Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

<b>Submitter</b>	Date of Request:	January 02, 2024	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Fadi Alset	
	Company:	Applus IDIADA KARCO Engineering, LLC.	
	Address:	9270 Holly Road, Adelanto, CA 92301	
	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	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	SS440 Sign Stand with 48"x48" Roll-Up Sign at 60"	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:	Henry Ross	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Plasticade	Same as Submitter <input checked="" type="checkbox"/>
Address:	100 Howard Avenue, Des Plaines, IL 60018	Same as Submitter <input checked="" type="checkbox"/>
Country:	United States of America	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.

Plasticade is the manufacturer and marketer of 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 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 Plasticade SS440 sign stand is a work-zone traffic control device. The as-tested device utilized a 48.0 in. (1.2 m) reflective square vinyl roll-up sign mounted at a height of 60.0 in. (1.5 m) measured to the bottom corner of the sign. The device has a total weight of 48.0 lbs (21.8 kg).

The SS440 sign stand consists of four (4) steel legs, two (2) steel masts (upper mast and lower mast) and one (1) vinyl sign. Each two (2) legs are connected by one (1) SS440 leg cross over to make a SS440 steel leg assembly. The two (2) steel leg assemblies connect to each other using SS440 base assembly. The total footprint created by sign is  $39.8 \pm 1.0$  in. ( $1,013 \pm 305$  mm) by  $84.5 \pm 1.0$  in. ( $2,146 \pm 305$  mm). The lower mast is a 50.0 in. (1270 mm) long, 0.98 in. (25 mm) square tube that is bolted to the (1) coil spring SS440 base assembly with two (2) brackets. The upper mast is a 47.2 in. (1200 mm) long, 0.79 in. (20 mm) square tube. The upper mast has two folding flag holders bolted in place and one (1) mast snap button that pins to the hole in the lower mast. The vinyl roll-up sign is mounted to the upper mast via a small mast roll-up sign clamp. The total sign height measured  $140.0 \pm 1$  in. ( $3,566 \pm 25.4$  mm). Each sign was tested with four (4) 40 lbs sandbags, one on each leg.

## 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:	Fadi Alset	
Engineer Signature:	<b>Fadi Alset</b>	Digitally signed by Fadi Alset DN: cn=Fadi Alset, o=Applus Idiada Karco, ou, email=fadi.alset@idiada.com, c=US Date: 2023.12.15 14:29:44 -08'00'
Address:	9270 Holly Rd, Adelanto, CA 92301	Same as Submitter <input type="checkbox"/>
Country:	United States of America	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)	Per MASH 2016, Test 70 is designed to evaluate the ability of small vehicles to activate any breakaway, fracture, or yielding mechanism associated with the work zone feature during low-speed impacts. For free-standing, lightweight features, velocity changes during low-speed impacts will be within acceptable limits, even when a breakaway, fracture, or yielding feature is not incorporated. Therefore, Test 70 is considered optional for work-zone traffic control devices weighing less than 220 lbs (100 kg). The as-tested device weight was 48 lbs (21.8 kg) and therefore Test 70 was not performed.	Non-Critical, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	<p>Applus IDIADA Test No. P43228-01. Test Date October 16, 2023. Crash Test Report No. TR-P43228-01-A for MASH 2016 Test 3-71 Crash Test of Plasticade SS440 Sign Stand with 48x48 Roll-up Signs at 60". Two (2) SS440 sign stands with 48" roll-up signs were impacted in a single test run. The devices were spaced 60.0 ft. (18.3 m) apart and set at two (2) critical impact angles (CIA), 90° and 0°. The first device was positioned at a CIA of 90° and was aligned 17.7 in. (450 mm) to the passenger side of the vehicle's centerline. The second device was positioned at a CIA of 0° and was aligned 13.8 in. (350 mm) to the driver side of the vehicle's centerline. An 1100C test vehicle approached the first sign oriented at 90° at a nominal speed of 62.00 mph (100.00 km/h). The first sign was impacted at a velocity of 64.55 mph (103.89 km/h). The impact location was 18.7 in. (475 mm) from the vehicle centerline on the passenger side. The test vehicle then impacted the 0° CIA device at a velocity of 61.54 mph (99.04 km/h). The impact location was 13.7 in. (348 mm) from the vehicle centerline on the driver side.</p> <p>The SS440 Sign Stand with 48"x48" Rollup Sign at 60" yielded and broke away in a predictable manner. There was no penetration or deformation into the occupant compartment. The SS440 Sign Stand with 48x48 Roll-Up Sign at 60" met all the requirements for MASH Test 3-71.</p>	PASS

3-72 (2270P)	<p>Applus IDIADA Test No. P43229-01. Test Date October 17, 2023. Crash Test Report No. TR-P43229-01-A for MASH 2016 Test 3-72 Crash Test of Plasticade SS440 Sign Stand with 48x48 Roll-up Signs at 60". Two (2) SS440 sign stands with 48" roll-up signs were impacted in a single test run. The devices were spaced 60.0 ft. (18.3 m) apart and set at two (2) critical impact angles (CIA), 90° and 0°. The first device was positioned at a CIA of 90° and was aligned 19.7 in. (500 mm) to the passenger side of the vehicle's centerline. The second device was positioned at a CIA of 0° and was aligned 15.7 in. (400 mm) to the driver side of the vehicle's centerline. An 2270P test vehicle approached the first sign oriented at 90° at a nominal speed of 62.00 mph (100.00 km/h). The first sign was impacted at a velocity of 62.55 mph (100.67 km/h). The impact location was 22.0 in. (558.3 mm) from the vehicle centerline on the passenger side. The test vehicle then impacted the 0° CIA device at a velocity of 60.29 mph (97.02 km/h). The impact location was 19.6 in. (498.0 mm) from the vehicle centerline on the driver side. The SS440 Sign Stand with 48"x48" Rollup Sign at 60" yielded and broke away in a predictable manner. There was no penetration or deformation into the occupant compartment. The SS440 Sign Stand with 48x48 Roll-Up Sign at 60" met all the requirements for MASH Test 3-72.</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:	Applus IDIADA KARCO Engineering, LLC.	
Laboratory Signature:	<b>Fadi Alset</b>	<small>Digitally signed by Fadi Alset DN: cn=Fadi Alset, o=Applus Idiada Karco, ou, email=fadi.alset@idiada.com, c=US Date: 2023.12.21 11:08:08 -08'00'</small>
Address:	9270 Holly Rd, Adelanto, CA 92301	Same as Submitter <input type="checkbox"/>
Country:	United States of America	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	TL 371: April 27, 2022 - April 27, 2025	

Submitter Signature\*: **Henry A. Ross** Digitally signed by Henry A. Ross  
Date: 2024.06.04 09:02:16 -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

90° CIA

0° CIA



0.000 seconds

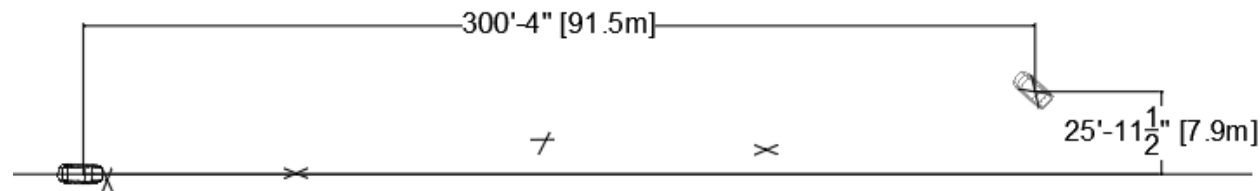
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0.654 seconds

0.720 seconds

0.850 seconds



## General Information

Test Agency..... Applus IDIADA KARCO  
 Test No..... P43228-01  
 Test Designation..... 3-71  
 Test Date..... 10/16/23

## Test Article

Name / Model..... SS440 w 48 in. Rollup  
 Type..... Work-Zone Device  
 Device Height ..... 11.7 ft. (3.6 m)  
 Key Elements..... SS440 w 48 in. Rollup  
 Road Surface..... Smooth, clean concrete

## Test Vehicle

Type / Designation..... 1100C  
 Year, Make, and Model.... 2018 Kia Rio  
 Curb Mass..... 2,513.2 lbs (1,140.0 kg)  
 Test Inertial Mass..... 2,440.5 lbs (1,107.0 kg)  
 Gross Static Mass..... 2,597.0 lbs (1,178.0 kg)

## Impact Conditions

Impact Velocity Device 1.. 64.55 mph (103.89 km/h)  
 Impact Velocity Device 2.. 61.54 mph (99.04 km/h)  
 Device 1 Angle..... 90.0°  
 Device 2 Angle..... 0.0°  
 Location / Orientation Device 1... 18.7 in. (475 mm) From Vehicle centerline on Passenger Side  
 Location / Orientation Device 2... 13.7 in. (348 mm) From Vehicle centerline on Driver Side  
 Device 1 Kinetic Energy... 340.0 kip-ft (461.0 kilojoules)  
 Device 2 Kinetic Energy... 309.0 kip-ft (418.9 kilojoules)  
 Minimum KE Required..... 288 kip-ft (390 kilojoules)

## Exit Conditions

Device 1 Exit Velocity..... 61.74 mph (99.40 km/h)  
 Device 2 Exit Velocity..... 59.39 mph (95.60 km/h)  
 Vehicle Resting Position... 300.3 ft. (91.5 m) Downstream from its initial point  
 25.9 ft. (7.9 m) toward the driver side from its initial point  
 Vehicle Stability ..... Satisfactory  
 Maximum Roll Angle..... Not Applicable\*  
 Maximum Pitch Angle..... Not Applicable\*  
 Maximum Yaw Angle..... Not Applicable\*

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

## 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) ... 183.5 ft. (55.9 m)  
 0° Sign Debris Field (lateral)... 12.9 ft. (3.9 m)  
 90° Sign Debris Field (longitudinal).. 238.1 ft. (72.6 m)  
 90° Sign Debris Field (lateral)..... 6.4 ft. (2.0 m)

## Vehicle Damage

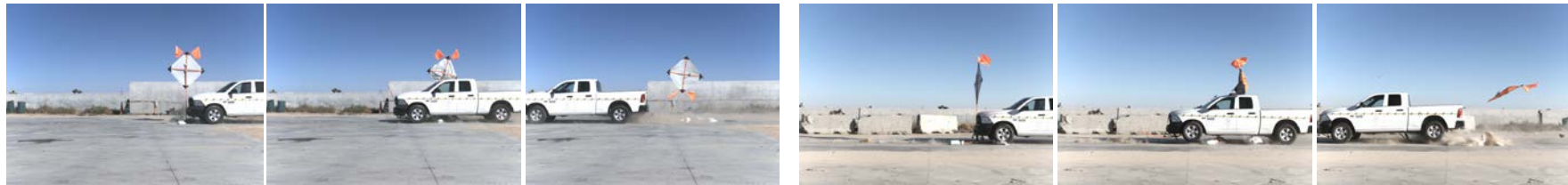
Vehicle Damage Scale..... 12-FD-1  
 CDC..... 12FDAW1  
 Maximum Deformation..... 0.0 in. (0 mm)

Figure 2: Summary of Test 3-71

# MASH 2016 Test 3-72 Summary

90° CIA

0° CIA



0.000 seconds

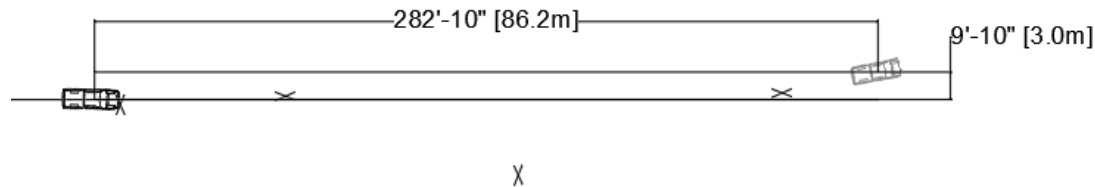
0.086 seconds

0.308 seconds

0.667 seconds

0.767 seconds

0.928 seconds



<b>General Information</b>	
Test Agency.....	Applus IDIADA KARCO
Test No.....	P43229-01
Test Designation.....	3-72
Test Date.....	10/17/23
<b>Test Article</b>	
Name / Model.....	SS440
Type.....	Work-Zone Device
Device Height .....	11.7 ft. (3.6 m)
Key Elements.....	SS440 w 48 IN. Rollup
Road Surface.....	Smooth, clean concrete
<b>Test Vehicle</b>	
Type / Designation.....	2270P
Year, Make, and Model.....	2018 Ram 1500
Curb Mass.....	5,112.4 lbs (2,319.0 kg)
Test Inertial Mass.....	5,024.3 lbs (2,279.0 kg)

<b>Impact Conditions</b>	
Impact Velocity Device 1.....	62.55 mph (100.67 km/h)
Impact Velocity Device 2.....	60.29 mph (97.02 km/h)
Device 1 Angle.....	90.0°
Device 2 Angle.....	0.0°
Location / Orientation Device 1...	22.0 in. (558.3 mm) From Vehicle centerline on Passenger Side
Location / Orientation Device 2...	19.6 in. (498 mm) From Vehicle centerline on Driver Side
Device 1 Kinetic Energy.....	657.2 kip-ft (891.1 kilojoules)
Device 2 Kinetic Energy.....	610.4 kip-ft (827.6 kilojoules)
Minimum KE Required.....	594.0 kip-ft (806.0 kilojoules)
<b>Exit Conditions</b>	
Device 1 Exit Velocity.....	62.14 mph (100.0 km/h)
Device 2 Exit Velocity.....	57.00 mph (91.7 km/h)
Vehicle Resting Position.....	282.8 ft. (86.2 m) Downstream from its initial point of impact 9.8 ft. (3.0 m) toward the driver side from its initial point of impact
Vehicle Stability .....	Satisfactory
Maximum Roll Angle.....	Not Applicable*
Maximum Pitch Angle.....	Not Applicable*

<b>Occupant Risk</b>	
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*
<b>Test Article Deflections</b>	
0° Sign Debris Field (longitudinal) ...	179.3 ft. (54.7 m)
0° Sign Debris Field (lateral)...	1.1 ft. (0.3 m)
90° Sign Debris Field (longitudinal)..	279.9 ft. (85.3 m)
90° Sign Debris Field (lateral).....	9.3 ft. (2.8 m)
<b>Vehicle Damage</b>	
Vehicle Damage Scale.....	12-FD-1
CDC.....	12FDAW1
Maximum Deformation.....	0.0 in. (0 mm)

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

Figure 1: Summary of Test 3-72

8 7 6 5 4 3 2 1

D

C

B

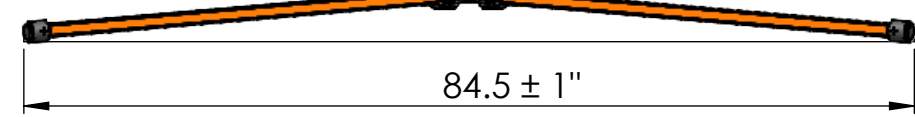
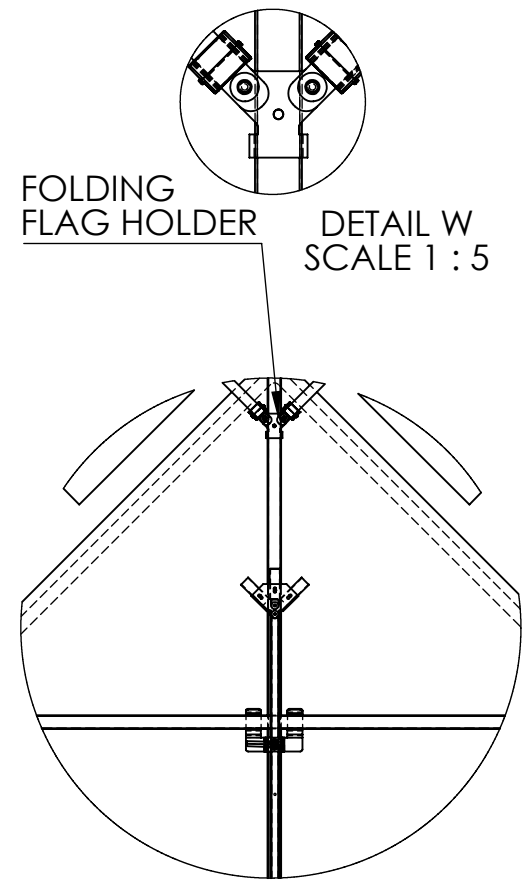
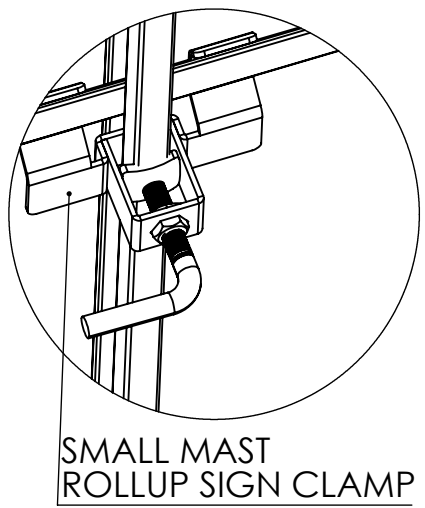
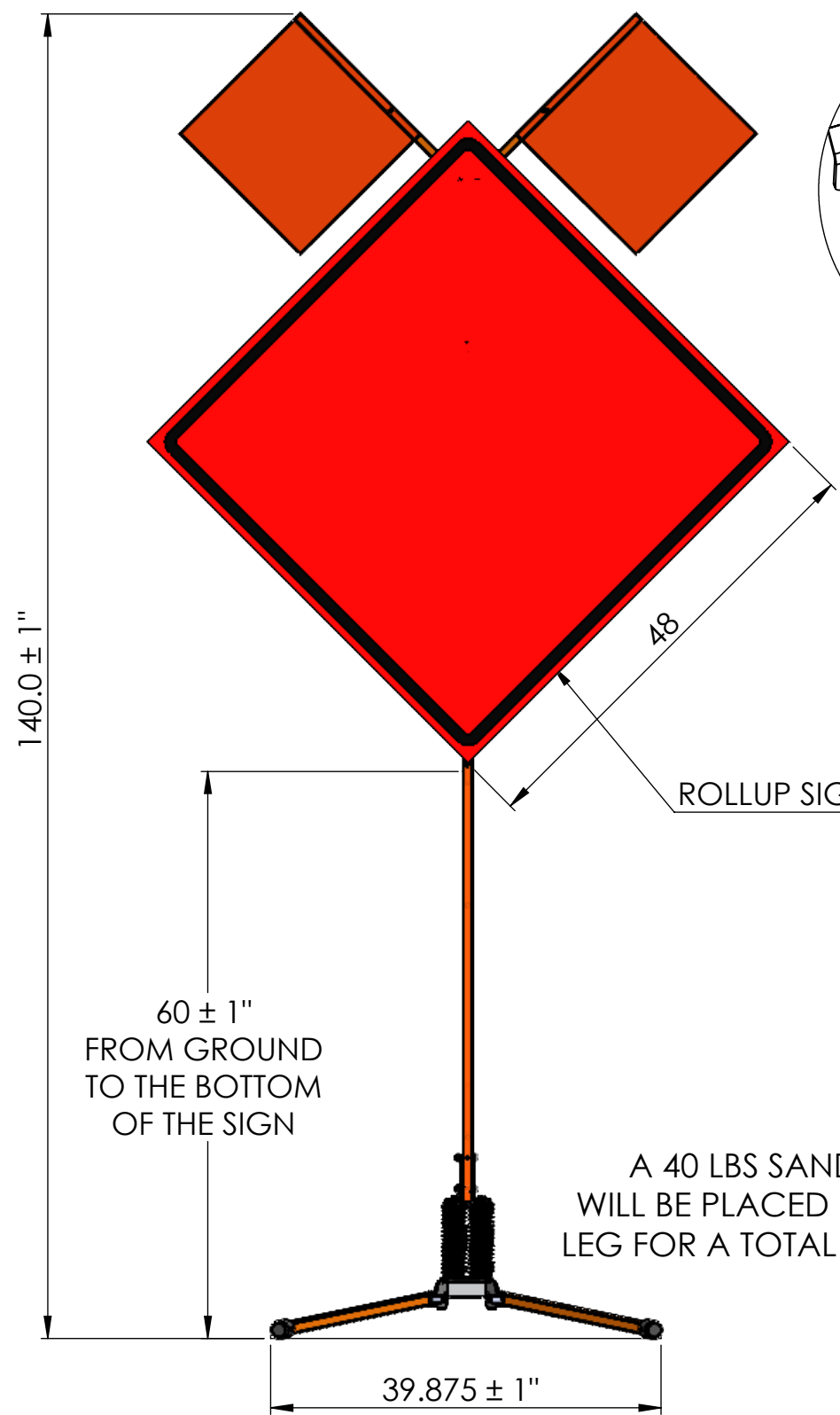
A

D

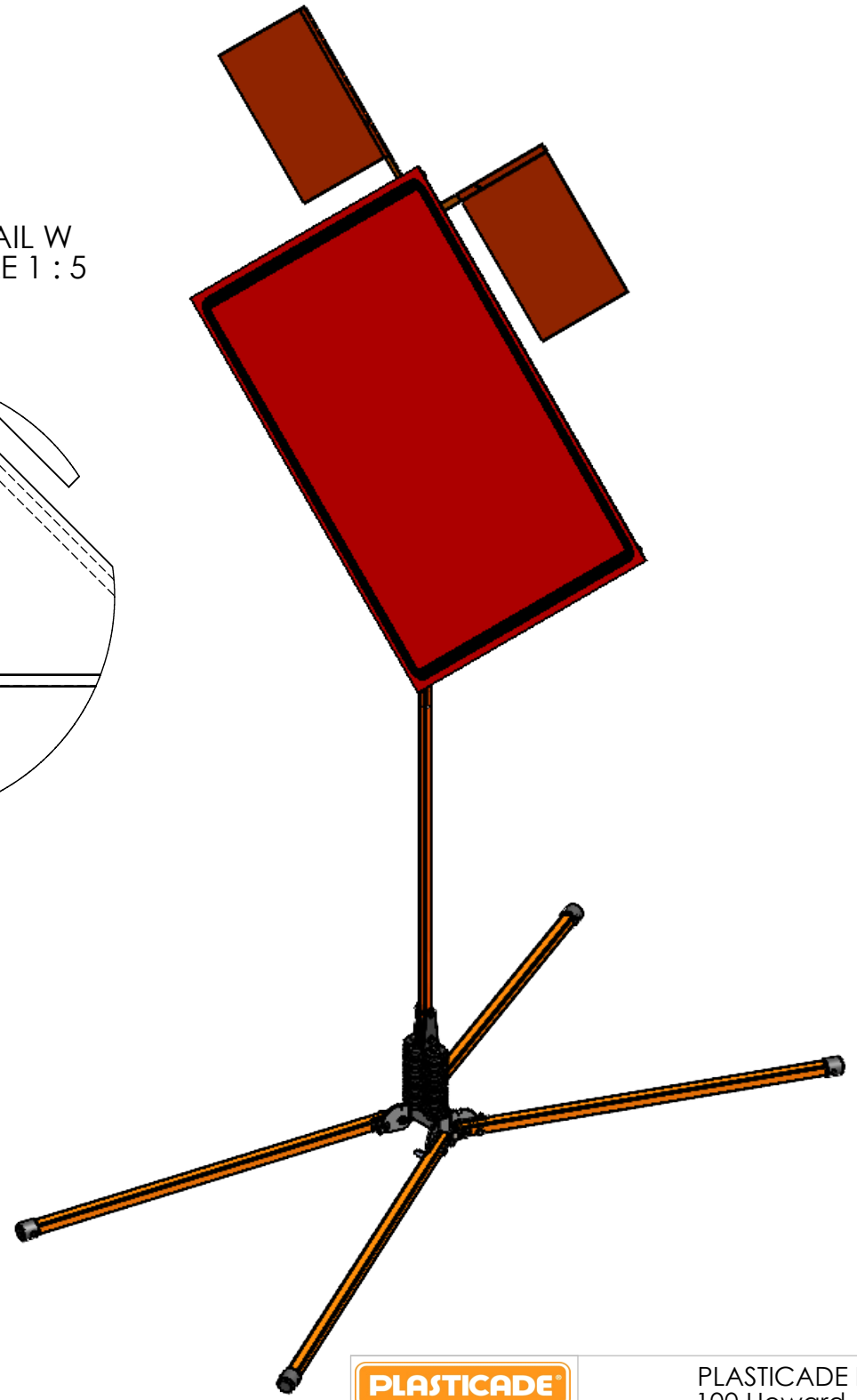
C

B

A



A 40 LBS SANDBAG  
WILL BE PLACED ON EACH  
LEG FOR A TOTAL OF 4 BAGS



<b>PLASTICADE</b>		PLASTICADE INC. 100 Howard Ave Des Plaines, IL 60018 1-800-470-3300	
NAME BAS	DATE 08/29/2023	SS440 with STEEL LEGS AND ROLLUP SIGN AT 60"	
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES.		SIZE <b>B</b>	REV <b>B</b>
DWG. NO. SS440 CRASH TEST		SCALE: 1:20	
DATE: 08/29/2023		SHEET 1 OF 1	
<small>PROPRIETARY AND CONFIDENTIAL</small> <small>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF PLASTICADE INC./ALC.</small>			

8 7 6 5 4 3 2 1