U.S. Department of Transportation
Federal Highway Administration

February 22, 2021

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

In Reply Refer To:
HSST-1/WZ-425

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

Dear Mr. Ross:

This letter is in response to your November 23, 2020 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-425 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:

- Plasticade SS620A Sign Stand with corrugated plastic signs (84-in)

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: Plasticade SS620A Sign Stand with corrugated plastic signs (84-in)
  Type of system: Work Zone
  Test Level: Test Level 3
  Testing conducted by: Texas A&M Transportation Institute (TTI)
  Date of request: November 23, 2020

FHWA concurs with the recommendation of the accredited crash testing laboratory on the attached form.

In accordance with FHWA's Memo "Federal-aid Reimbursement Eligibility Process for Safety Hardware Devices" dated November 12, 2015, FHWA will make note of any reported damage to a test vehicle's fuel tank, oil pan, or other feature that might serve as a surrogate of the fuel tank. AASHTO's MASH states "Although not a specific factor in assessing test results, integrity of a test vehicle's fuel tank is a potential concern. It is preferable that the fuel tank remains intact and not be punctured. Damage or rupture of the fuel tank, oil pan, or other feature that might serve as a surrogate of the fuel tank should be reported". A test report included in this submittal documenting Test 3-71 at 90 degrees and 0 degrees states "there was a cut in the oil pan".

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-425 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:	November 23, 2020	◉ New ○ Resubmission
	Name:	Henry A. Ross	
	Company:	Plasticade	
	Address:	100 Howard Avenue, Des Plaines, IL 60018	
	Country:	U.S.A.	
	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 L ! - ! - !

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'WZ': Crash Worthy Work Zon Zone Traffic Control Devices	◉ Physical Crash Testing ○ Engineering Analysis	Plasticade®SS620A Sign Stand with corrugated plastic signs (84-in)	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 A. Ross	Same as Submitter ☒
Company Name:	Plasticade	Same as Submitter ☒
Address:	100 Howard Avenue, DesPlaines, IL 60018	Same as Submitter ☒
Country:	U.S.A.	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.		
Texas A&M Transportation Institute (TTI) was contracted by Plasticade® to perform full-scale crash testing of the Pasticade®SS620A Sign Stand with corrugated plastic signs. There are no shared financial interests in the Plasticade®SS620A Sign Stand with corrugated plastic signs by TTI, or between Plasticade® and TTI, other than costs involved in the actual crash tests and reports for this submission to FHWA. 690900-PLP 13-14-15 (84-in)		

PRODUCT DESCRIPTION

Help

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

The Plasticade® SS620A Sign Stand is a proprietary sign stand tested to hold corrugated plastic sign panels at 84 inches above grade. Each sign stand was tested with a 48 inch square diamond-shaped Plasticade® corrugated plastic sign panel. Above the sign, three conspicuity flags were mounted at the top of the stand. A 40-lb sand bag was placed on each of the four legs of the sign stand to hold the stands in place. Each sign stand weighed 60.8 lb (exclusive of the sand bags).

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:	D. Lance Bullard, Jr., P.E.	
Engineer Signature:	D. Lance Bullard, Jr. Digitally signed by D. Lance Bullard, Jr. Date: 2020.11.22 08:07:38 -06'00'	
Address:	1254 Avenue A, Bldg 7091, Bryan, Texas 77807	Same as Submitter ☐
Country:	U.S.A.	Same as Submitter ☐

A brief description of each crash test and its result: Help

Required Test Number	Narrative Description	Evaluation Results
3-70 (1100C)	3-70 MASH states that Test 3-70 for small vehicles is considered optional for work-zone traffic control devices weighing less than 220 lb, because velocity changes during low-speed impacts with free-standing, lightweight features will be within acceptable limits. The Plasticade® SS620A Sign Stand weighed 60.8 lb (excluding the sand bags). Therefore, MASH Test 3-70 was not performed on this traffic control device. Non-critical, not conducted	Non-Critical, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	The results of test 690900-PLP14 are found in TTI Test Report number 690900-PLP13-18. In this test, two sign stands with corrugated plastic signs mounted 84 inches from grade to the bottom of sign were impacted. The first was aligned 90° to the test vehicle, and the second was aligned 0° to the test vehicle. The test vehicle was traveling at an impact speed of 63.5 mi/h when it contacted the first sign stand at an impact angle of 90°. During this test, the first sign stand interfered with the performance of the second sign stand. Therefore, the 0° test was repeated and is discussed below in test number 690900-PLP15. For the first impacted sign stand at 90 degrees, part of the post, sign, and one leg remained at the impact site, with a 1.5-ft long section of the post landing 180 ft downstream, and the remainder of the base landing 60 ft downstream and in line with the impact. There was a cut in the oil pan. No fuel tank damage was observed. The windshield was cracked at the upper right corner but suffered no hole or tear, and the rear glass was shattered and separated from the frame. There was no measurable exterior crush to the vehicle, and no occupant compartment deformation or intrusion occurred. The results of test 690900-PLP15 are found in TTI Test Report number 690900-PLP13-18. In this test, a sign stand with a corrugated plastic sign mounted 84 inches from grade to the bottom of sign was impacted. The sign stand was aligned 0° to the test vehicle. The test vehicle was traveling at an impact speed of 61.8 mi/h when it contacted the sign stand at an impact angle of 0°. The post of the sign stand landed 4 ft to the right and 3 ft downstream of the impact. The base came to rest 115 ft downstream and 4 ft to the right of the impact. No damage to the fuel tank or windshield was observed. Maximum exterior crush to the vehicle was too small to measure. No occupant compartment deformation or intrusion was observed. MASH does not require instrumentation of the vehicle when impacting lightweight, freestanding work zone traffic control devices weighing less than 220 lb, therefore the occupant risk factors were not calculated for these tests. The device performed acceptably for MASH test 3-71 with impact angles of 90° and 0°.	PASS

3-72 (2270P)	The results of test 690900-PLP13 are found in TTI Test Report number 690900-PLP13-18. In this test, a sign stand with a corrugated plastic sign mounted 84 inches from grade to the bottom of sign was impacted. The test vehicle was traveling at an impact speed of 61.9 mi/h when it contacted the first sign stand at an impact angle of 90°. The vehicle was traveling at an impact speed of 61.0 mi/h and impact angle of 0° when it contacted the second sign stand. The base of the first impacted sign stand separated from the post and landed 8 ft downstream and in line with the impact. The remaining leg from that sign stand landed 100 ft downstream and 25 ft to the left of impact. The post of the second impacted sign stand and two of the legs landed 3 ft downstream, and the sign panel and the other two legs landed 60 ft downstream and in line with the impact. Half of the base from the second impacted sign stand landed 75 ft downstream and in line with the impact. There were scuff marks on the windshield and roof. No fuel tank damage was observed. Maximum exterior crush to the vehicle was 0.5 inches in the front plane to the right and left of the centerline of the vehicle at bumper height. No occupant compartment deformation or intrusion was observed. MASH does not require instrumentation of the vehicle when impacting lightweight, freestanding work zone traffic control devices weighing less than 220 lb, therefore the occupant risk factors were not calculated for this test. The Plasticade® SS620A Sign Stand weighed 60.8 lb (excluding the sand bags). The device performed acceptably for MASH test 3-72 with impact angles of 0° and 90°.	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:	Texas A&M Transportation Institute	
Laboratory Signature:	Digitally signed by Darrell L. Kuhn 'Date: 2020.11.20 16:14:15 -06'00	
Address:	1254 Avenue A, Bldg 7091, Bryan, Texas 77807	Same as Submitter ☐
Country:	U.S.A	Same as Submitter ☐
Accreditation Certificate Number and Dates of current Accreditation period :	ISO 17025-2017 Laboratory A2LA Certificate Number: 2821.01 Valid To: April 30, 2021	

Submitter Signature*: Henry A. Ross Digitally signed by Henry A. Ross Date: 2020.12.03 10:09:05 -06'00'

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:

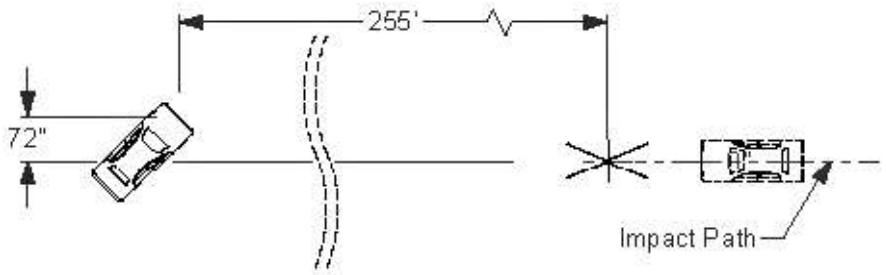
Eligibility Letter		
Number	Date	Key Words

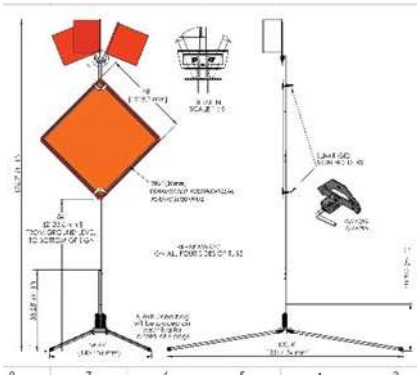

0.000 s


0.150 s


0.300 s


0.450 s





General Information
- Test Agency ..... Texas A&M Transportation Institute (TTI)
- Test Standard Test No. ..... MASH Test 3-71 at 0°
- TTI Test No. 690900-PLP15
- Test Date 2020-06-11

Test Article
- Type ..... Work-Zone Traffic Control Device
- Name ..... Plasticade® SS620A sign stand with corrugated plastic signs mounted at 84 inches
- Installation Height ..... 84 inches to bottom of sign panel
- Material or Key Elements ... 48-inch square diamond-shaped Plasticade® sign panel mounted on a four-legged 13-ft 8¾-inch stand and held in place by two slim, rigid sign holders
- **Soil Type and Condition** ..... Concrete pavement, dry; 4 sand bags

Test Vehicle
- Type/Designation 1100C
- Make and Model ..... 2014 Nissan Versa
- Curb ..... 2436 lb
- Test Inertial ..... 2444 lb
- Dummy ..... 165 lb
- Gross Static ..... 2609 lb

Impact Conditions
- Speed Sign Stand #1 ..... 61.8 mi/h
- Angle Sign Stand #1 ..... 0°

Kinetic Energy #1 ..... 312 kip-ft

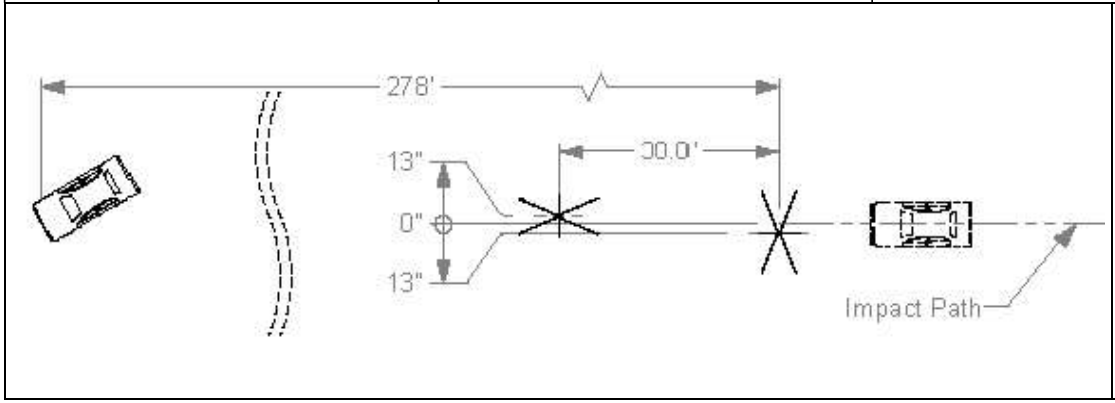
Exit Conditions
- Speed Sign Stand #1 ..... 60.8 mi/h

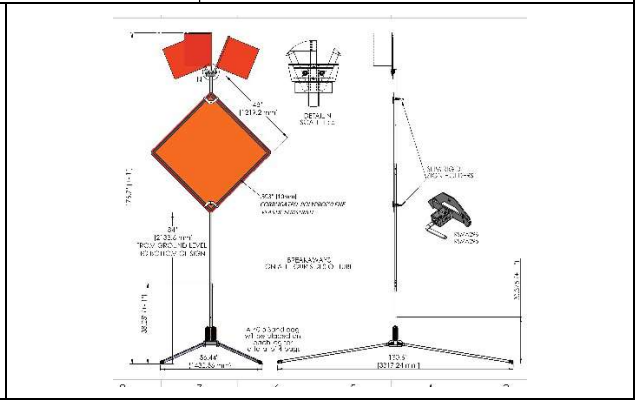
Post-Impact Trajectory
- Stopping Distance ..... 255 ft downstream 6 ft right of center

Maximum Test Debris Scatter
- Sign Stand #1 ..... 115 ft downstream 5 ft left/4 ft right

Vehicle Damage
- VDS 12FR1
- CDC 12FREN1
- Max. Exterior Deformation ..... None
- OCDI FS0000000
- Max. Occupant Compartment Deformation ..... None
- Windshield Damage ..... None

Figure 7.6. Summary of Results for *MASH* Test 3-71 at 0 Degrees on Plasticade® SS620A Sign Stand with Corrugated Plastic Signs Mounted at 84 inches.





General Information
- Test Agency ..... Texas A&M Transportation Institute (TTI)
- Test Standard Test No. ..... MASH Test 3-71 at 90°
- TTI Test No. 690900-PLP14
- Test Date 2020-06-11

Test Article
- Type ..... Work-Zone Traffic Control Device
- Name ..... Plasticade® SS620A sign stands with corrugated plastic signs mounted at 84 inches
- Installation Height ..... 84 inches to bottom of sign panel
- Material or Key Elements ... 48-inch square diamond-shaped Plasticade® sign panel mounted on a four-legged 13-ft 8¾-inch stand and held in place by two slim, rigid sign holders
- **Soil Type and Condition** ..... Concrete pavement, dry; 4 sand bags

Test Vehicle
- Type/Designation 1100C
- Make and Model ..... 2014 Nissan Versa
- Curb ..... 2418 lb
- Test Inertial ..... 2420 lb
- Dummy ..... 165 lb
- Gross Static ..... 2585 lb

Impact Conditions
- Speed Sign Stand #1 ..... 63.5 mi/h
- Angle Sign Stand #1 ..... 90°
- Speed Sign Stand #2 ..... 60.2 mi/h
- Angle Sign Stand #2 ..... NA
- **Kinetic Energy #1 & #2** ..... 326 kip-ft

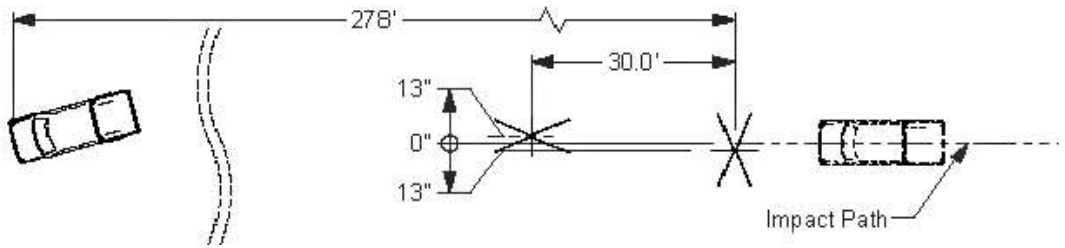
Exit Conditions
- Speed Sign Stand #1 ..... 60.2 mi/h
- Speed Sign Stand #2 ..... NA

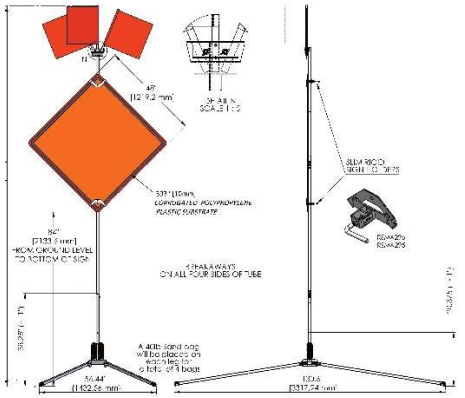
Post-Impact Trajectory
- Stopping Distance ..... 278 ft downstream and in line

Maximum Test Debris Scatter
- Sign Stand #1 ..... 180 ft downstream centerline
- Sign Stand #2 ..... 30 ft downstream 6 ft to right of center

Vehicle Damage
- VDS 12FL1/12FR1
- CDC 12FLEN1/12FREN1
- Max. Exterior Deformation ..... None measurable
- OCDI FS0000000
- Max. Occupant Compartment Deformation ..... None
- Windshield Damage ..... Cracked, no hole

Figure 6.7. Summary of Results for *MASH* Test 3-71 at 90 Degrees on Plasticade® SS620A Sign Stands with Corrugated Plastic Signs Mounted at 84 inches.





General Information
- Test Agency ..... Texas A&M Transportation Institute (TTI)
- Test Standard Test No. ..... MASH Test 3-72 at 90° and 0°
- TTI Test No. 690900-PLP13
- Test Date 2020-06-11

Test Article
- Type ..... Work-Zone Traffic Control Device
- Name ..... Plasticade® SS620A sign stands with corrugated plastic signs mounted at 84 inches
- Installation Height ..... 84 inches to bottom of sign panel
- Material or Key Elements ... 48-inch square diamond-shaped Plasticade® sign panel mounted on a four-legged 13-ft 8¾-inch stand and held in place by two slim, rigid sign holders

Soil Type and Condition ..... Concrete pavement, dry; 4 sand bags

Test Vehicle
- Type/Designation 2270P
- Make and Model ..... 2014 RAM 1500
- Curb ..... 4962 lb
- Test Inertial ..... 5008 lb
- Dummy ..... No dummy
- Gross Static ..... 5008 lb

Impact Conditions
- Speed Sign Stand #1 ..... 61.9 mi/h
- Angle Sign Stand #1 ..... 90°
- Speed Sign Stand #2 ..... 61.0 mi/h
- Angle Sign Stand #2 ..... 0°

Kinetic Energy #1 & #2 ..... 641 & 623 kip-ft

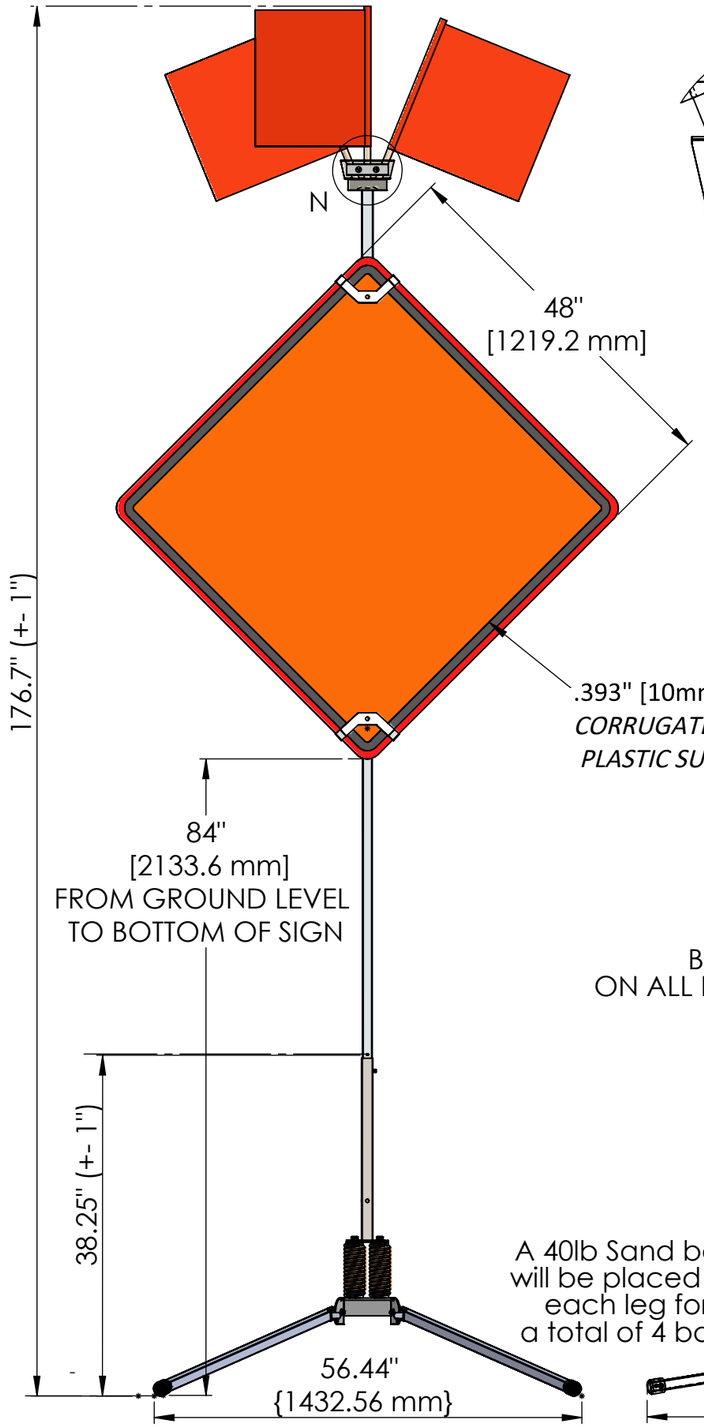
Exit Conditions
- Speed Sign Stand #1 ..... 61.0 mi/h
- Speed Sign Stand #2 ..... 60.7 mi/h

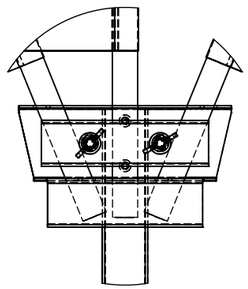
Post-Impact Trajectory
- Stopping Distance ..... 278 ft downstream and in line

Maximum Test Debris Scatter
- Sign Stand #1 ..... 100 ft downstream 25 ft left of center
- Sign Stand #2 ..... 75 ft downstream and on centerline

Vehicle Damage
- VDS 12FL1/12FR1
- CDC 12FLEN1/12FREN1
- Max. Exterior Deformation ..... 0.5 inches
- OCDI FS0000000
- Max. Occupant Compartment Deformation ..... None
- Windshield Damage ..... None

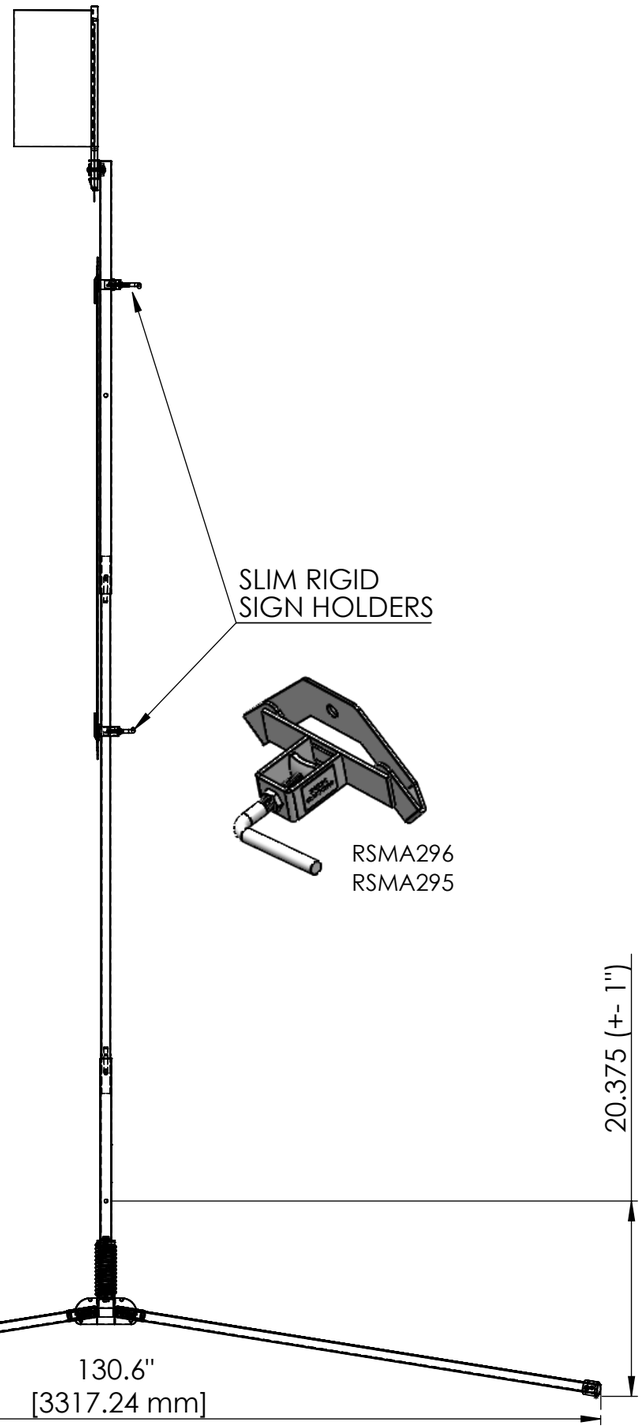
Figure 5.6. Summary of Results for *MASH* Test 3-72 at 0° and 90° on Plasticade® SS620A Sign Stands with Corrugated Plastic Signs Mounted at 84 inches.





BREAKAWAYS
ON ALL FOUR SIDES OF TUBE

A 40lb Sand bag
will be placed on
each leg for
a total of 4 bags



PLASTICADE	NAME	DATE
DRAWN	BAS	11/04/2020

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES[mm].
TOLERANCES:
FRACTIONAL: X/X ± 1/16 [1.6mm]
DECIMAL X.X ± .0625
X.XX±.032
.XXXX±.015"
DEGREES: ±0.5°

PROPRIETARY AND CONFIDENTIAL

PLASTICADE INC.
7700 N AUSTIN AVE
SKOKIE IL
1-800-470-3300

SS620A with 10mm Corrugated Plastic Substrate at 84

SIZE	DWG. NO.	REV
B	SS620A CRASH TEST	G

SCALE:1:20 | SHEET 1 OF 1