



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

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

January 19, 2022

In Reply Refer To:  
HSST-1/WZ-429

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

Dear Mr. Ross:

This letter is in response to your October 31, 2021 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-429 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

### **Decision**

The following device is eligible with details provided in the form which is attached as an integral part of this letter:

- Plasticade SS310A Sign Stand with rollup signs

### **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 SS310A Sign Stand with rollup signs  
Type of system: Work Zone  
Test Level: Test Level 3  
Testing conducted by: Texas A&M Transportation Institute (TTI)  
Date of request: October 31, 2021

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-429 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,

A handwritten signature in blue ink that reads "Michael S. Griffith". The signature is written in a cursive style with a large, stylized "M" and "G".

Michael S. Griffith  
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:	October 13, 2021	<input checked="" type="radio"/> New <input type="radio"/> 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 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	Plasticade® SS310A Sign Stand with rollup signs	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 <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:	U.S.A.	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.		
Texas A&M Transportation Institute (TTI) was contracted by Plasticade® to perform full-scale crash testing of the Plasticade® SS310A sign stands with roll-up sign panels. There are no shared financial interests in the Plasticade® SS310A sign stands by TTI, or between Plasticade® and TTI, other than the costs involved in the actual crash tests and reports for this submission to FHWA.		
**690900-PLP 42-43-44**		

## PRODUCT DESCRIPTION

- New Hardware or Significant Modification
  Modification to Existing Hardware

The Plasticade® SS310A Sign Stand is a proprietary sign stand tested with a 48 inch square diamond-shaped roll-up sign panel. The sign panel was mounted at 13 inches from grade to the bottom of the sign panel. The overall height of the stand was approximately 6 ft 10 inches to the top of the sign panel. Each sign stand weighed 21 lbs (including the sign panel).

### 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:	<b>D. Lance Bullard, Jr.</b>	Digitally signed by D. Lance Bullard, Jr. Date: 2021.10.11 15:51:00 -05'00'
Address:	1254 Avenue A, Bldg 7091, Bryan, Texas 77807	Same as Submitter <input type="checkbox"/>
Country:	U.S.A.	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)	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® SS310A Sign Stand weighed 21 lb (including the sign panel). 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)	<p>MASH Test 3-71 involved an 1100C vehicle weighing 2420 lb ±55 lb impacting the traffic control device at an impact speed of 62 mi/h ±2.5 mi/h. Per MASH recommendations, the device was tested at critical impact angles (CIAs) of 90° ±1.5° and 0° ±1.5°.</p> <p>The results of test 690900-PLP42 conducted on June 2, 2021 are found in TTI Test Report number 690900-PLP42-44. In this test, a sign stand with a roll-up sign panel mounted 13 inches from grade to the bottom of sign was impacted. The test vehicle was traveling at an impact speed of 62.3 mi/h when it contacted the sign stand at an impact angle of 0°. Brakes on the vehicle were applied after the vehicle exited the test site, and the vehicle subsequently came to rest 375 ft downstream of the point of impact and 3 ft to the left of the initial vehicle path. Maximum exterior crush to the vehicle was 1.5 inches in the front plane at bumper height. Maximum occupant compartment deformation was 1.25 inches in the windshield. No fuel tank damage was observed.</p> <p>The results of test 690900-PLP44 conducted on June 3, 2021 are found in TTI Test Report number 690900-PLP42-44. In this test, a sign stand with a roll-up sign panel mounted 13 inches from grade to the bottom of sign was impacted. The test vehicle was traveling at an impact speed of 61.2 mi/h when it contacted the sign stand at an impact angle of 90°. Brakes on the vehicle were applied after the vehicle exited the test site, and the vehicle subsequently came to rest 345 ft downstream of and in-line with the point of impact. Maximum exterior crush to the vehicle was 1.0 inch in the front plane at bumper height. Maximum occupant compartment deformation was 0.12 inch in the windshield. No fuel tank damage was observed.</p> <p>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® SS310A Sign Stand weighed 21 lb (including the sign panel).</p> <p>The device performed acceptably for MASH test 3-71 with an impact angle of 90° and 0°.</p>	PASS

3-72 (2270P)	<p>MASH Test 3-72 involves a 2270P vehicle weighing 5000 lb ±110 lb impacting the traffic control device at an impact speed of 62 mi/h ±2.5 mi/h. Per MASH recommendations, the device was tested at critical impact angles (CIAs) of 90° ±1.5° and 0° ±1.5°.</p> <p>The results of test 690900-PLP43 conducted on June 3, 2021 are found in TTI Test Report number 690900-PLP42-44. In this test, a sign stand with a roll-up sign panel mounted 13 inches from grade to the bottom of sign was impacted. The test vehicle was traveling at an impact speed of 61.5 mi/h when it contacted the first sign stand at an impact angle of 90°. The vehicle was traveling at an impact speed of 61.1 mi/h and impact angle of 0° when it contacted the second sign stand. Brakes on the vehicle were applied after the vehicle exited the test site, and the vehicle subsequently came to rest 397 ft downstream of the point of impact and 12 ft left of the centerline of the initial impact path. Maximum exterior crush to the vehicle in the front plane at bumper height was insignificant. No occupant compartment deformation or intrusion was observed. No fuel tank damage was observed.</p> <p>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® SS310A Sign Stand weighed 21 lb (including the sign panel).</p> <p>The device performed acceptably for MASH test 3-72 with impact angles of 0° and 90°.</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:	Texas A&M Transportation Institute	
Laboratory Signature:	Digitally signed by Darrell L. Kuhn 'Date: 2021.10.12 09:33:55 -05'00	
Address:	1254 Avenue A, Bldg 7091, Bryan, Texas 77807	Same as Submitter <input type="checkbox"/>
Country:	U.S.A	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	ISO 17025-2017 Laboratory A2LA Certificate Number: 2821.01 Valid To: April 30, 2023	

Submitter Signature\*: **Henry A Ross** Digitally signed by Henry A Ross  
Date: 2021.10.25 09:33:00 -05'00

Submit Form

## ATTACHMENTS

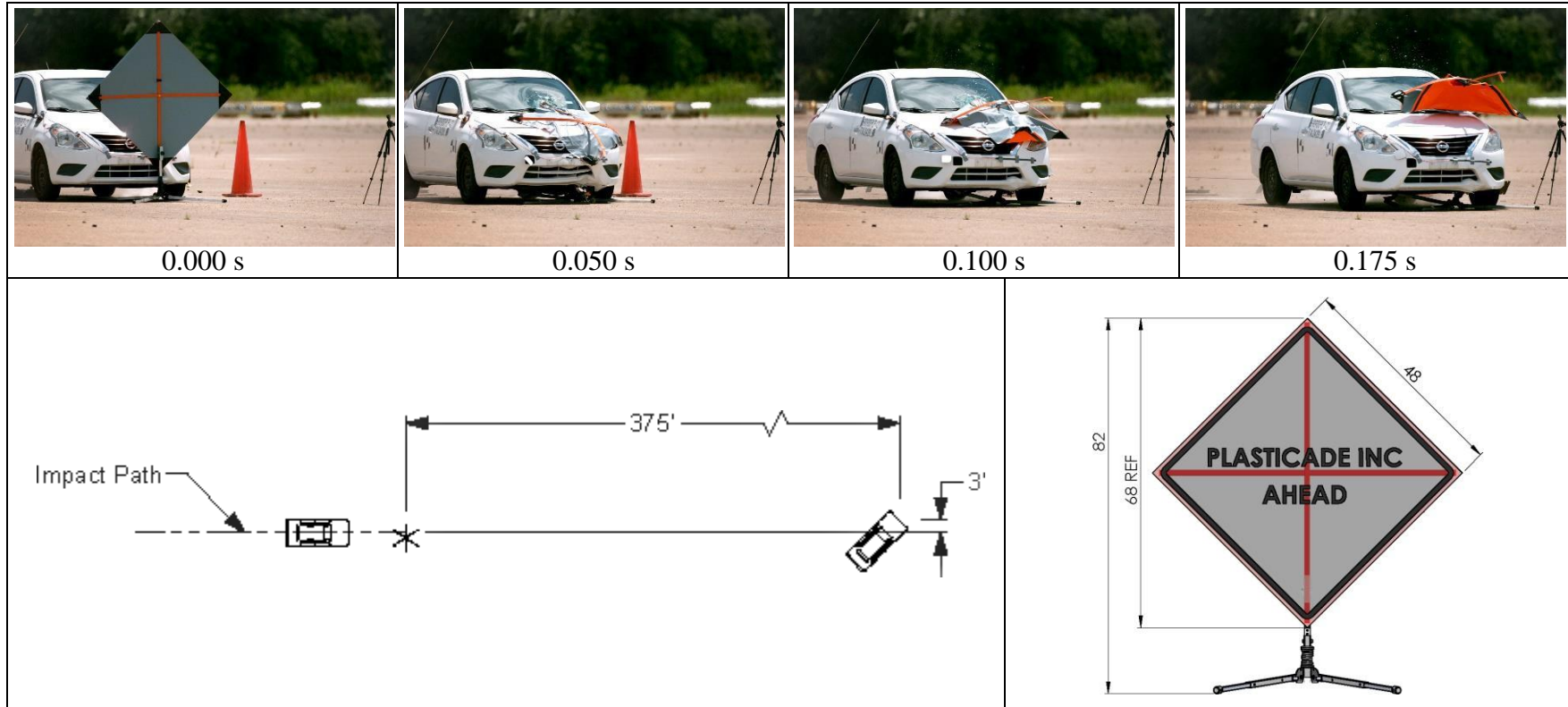
Attach to this form:

- 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





**General Information**

Test Agency..... Texas A&M Transportation Institute (TTI)  
 Test Standard Test No. .... MASH Test 3-71 at 0°  
 TTI Test No. .... 690900-PLP42  
 Test Date ..... 2021-06-02

**Test Article**

Type ..... Work-Zone Traffic Control Device  
 Name ..... Plasticade® SS310A sign stand with roll-up sign panel  
 Installation Height ..... 13 inches to bottom of sign panel  
 Material or Key Elements ... 48-inch diamond-shaped roll-up sign panel on 4-legged aluminum stand

**Soil Type and Condition** .....

Concrete pavement, dry

**Test Vehicle**

Type/Designation ..... 1100C  
 Make and Model..... 2016 Nissan Versa  
 Curb..... 2400 lb  
 Test Inertial ..... 2433 lb  
 Dummy ..... 165 lb  
 Gross Static ..... 2598 lb

**Impact Conditions**

Speed ..... 62.3 mi/h  
 Angle ..... 0°

**Kinetic Energy** .....

316 kip ft  
**Exit Conditions**  
 Speed ..... 62.1 mi/h

**Post-Impact Trajectory**

Stopping Distance ..... 375 ft downstream  
 3 ft left

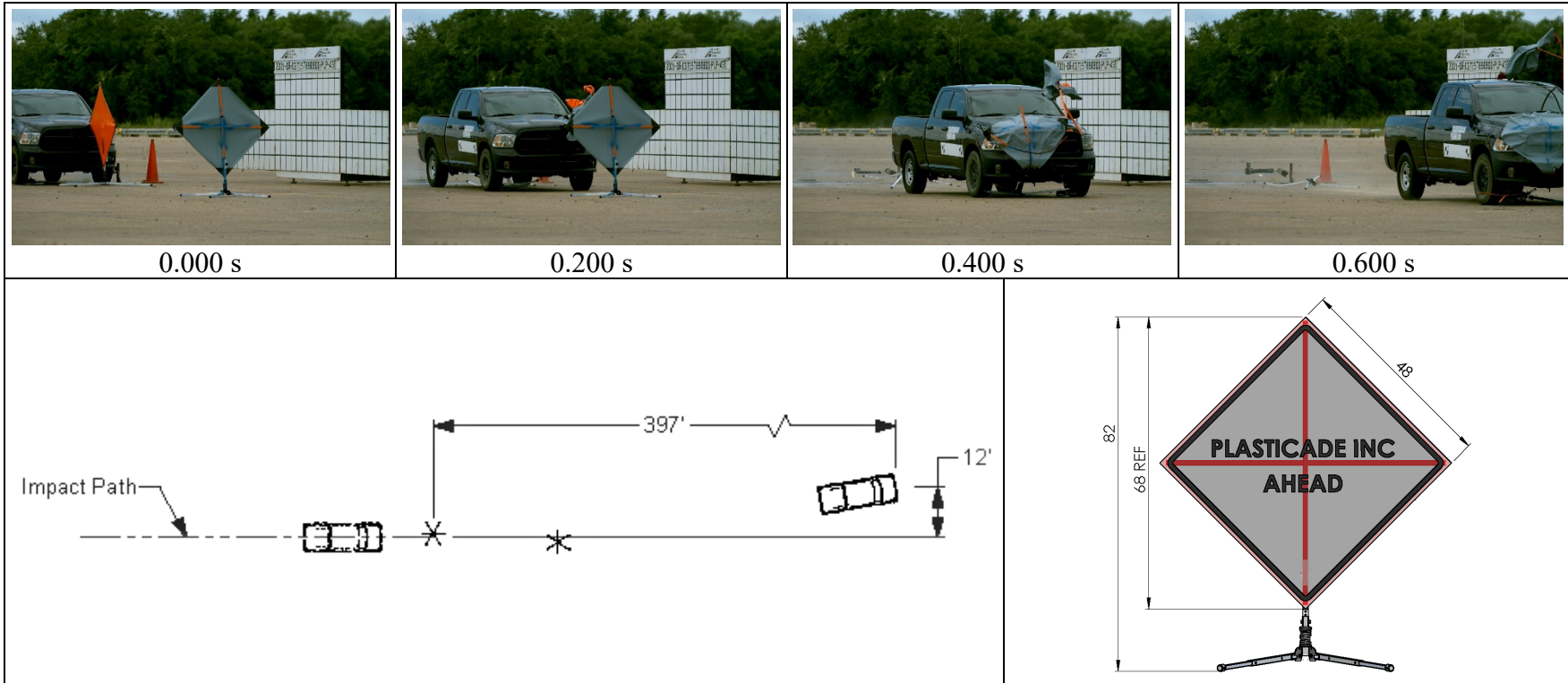
**Maximum Test Debris Scatter**

Sign Stand ..... 160 ft downstream  
 2 ft left

**Vehicle Damage**

VDS ..... 12FL1  
 CDC..... 12FLEN1  
 Max. Exterior Deformation..... 1.5 inches  
 OCDI..... FS0000000  
 Max. Occupant Compartment Deformation ..... 1.25 inches  
 Windshield Damage..... 1.25 inches  
 (No hole or tear)

**Figure 5.6. Summary of Results for MASH Test 3-71 at 0 Degree on Plasticade® SS310A Sign Stand with Roll-Up Sign Panel.**



**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-PLP43  
 Test Date ..... 2021-06-03

**Test Article**

Type ..... Work-Zone Traffic Control Device  
 Name ..... Plasticade® SS310A sign stand with roll-up sign panel  
 Installation Height ..... 13 inches to bottom of sign panel  
 Material or Key Elements ... 48-inch diamond-shaped roll-up sign panel on 4-legged aluminum stand

**Soil Type and Condition**

..... Concrete pavement, dry

**Test Vehicle**

Type/Designation ..... 2270P  
 Make and Model ..... 2015 RAM 1500  
 Curb ..... 4953 lb  
 Test Inertial ..... 5053 lb  
 Dummy ..... No dummy  
 Gross Static ..... 5053 lb

**Impact Conditions**

Speed – 1<sup>st</sup> Sign Stand ..... 61.5 mi/h  
 Angle – 1<sup>st</sup> Sign Stand ..... 90°  
 Speed – 2<sup>nd</sup> Sign Stand ..... 61.1 mi/h  
 Angle – 2<sup>nd</sup> Sign Stand ..... 0°

**Kinetic Energy**

..... 639 kip ft  
**Exit Conditions**  
 Speed ..... 60.3 mi/h

**Post-Impact Trajectory**

Stopping Distance ..... 397 ft  
 ..... 12 ft left

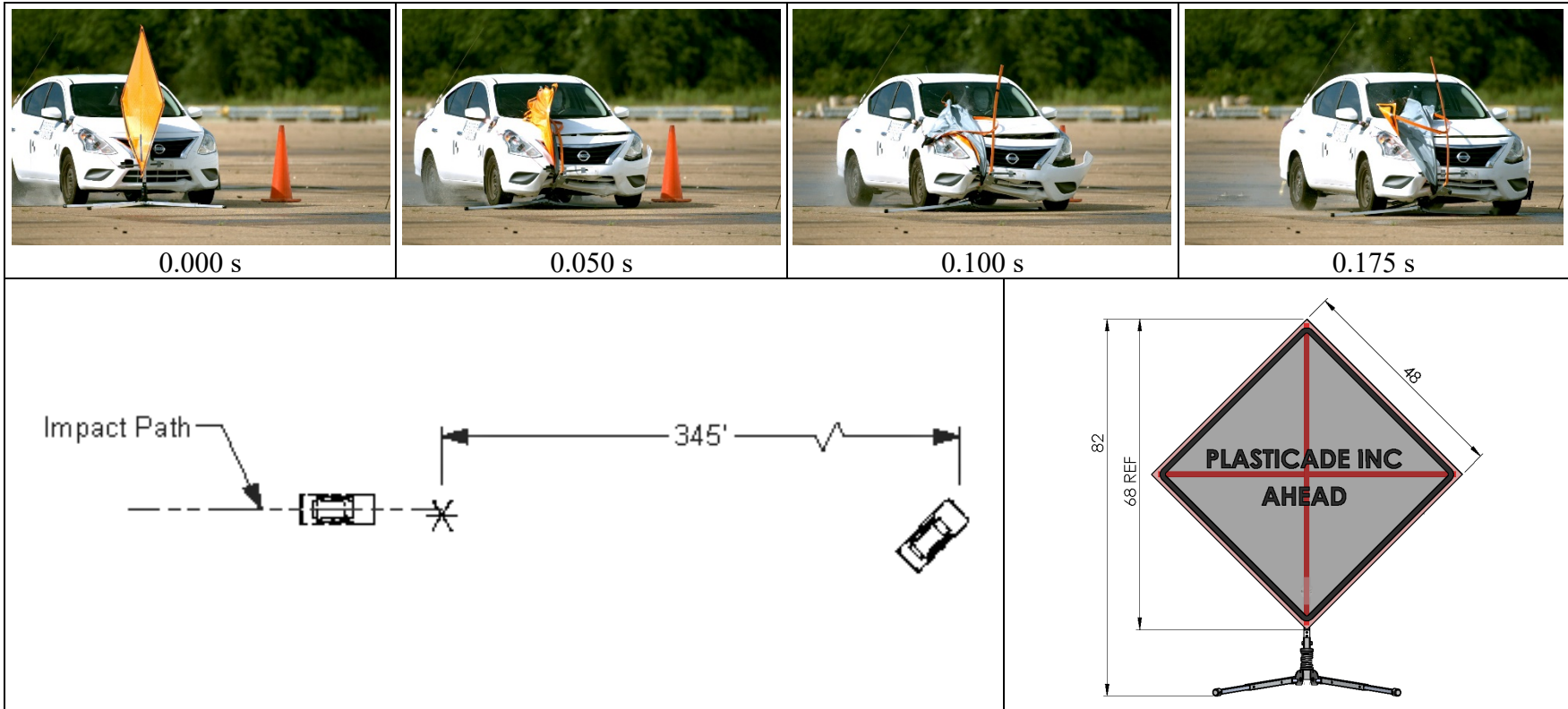
**Maximum Test Debris Scatter**

Sign Stand ..... 381 ft downstream  
 ..... 12 ft left

**Vehicle Damage**

VDS ..... 12FL1  
 CDC ..... 12FLEN1  
 Max. Exterior Deformation ..... Negligible  
 OCDI ..... FS0000000  
 Max. Occupant Compartment Deformation ..... None  
 Windshield Damage ..... None

**Figure 6.5. Summary of Results for MASH Test 3-72 at 90 Degrees and 0 degrees on Plasticade® SS310A Sign Stand with Roll-Up Sign Panel.**



**General Information**

Test Agency..... Texas A&M Transportation Institute (TTI)  
 Test Standard Test No. .... MASH Test 3-71 at 90°  
 TTI Test No. .... 690900-PLP44  
 Test Date ..... 2021-06-03

**Test Article**

Type ..... Work-Zone Traffic Control Device  
 Name ..... Plasticade® SS310A sign stand with roll-up sign panel  
 Installation Height ..... 13 inches to bottom of sign panel  
 Material or Key Elements ... 48-inch diamond-shaped roll-up sign panel on 4-legged aluminum stand

**Soil Type and Condition** .....

Concrete pavement, dry

**Test Vehicle**

Type/Designation ..... 1100C  
 Make and Model ..... 2016 Nissan Versa  
 Curb ..... 2400 lb  
 Test Inertial ..... 2433 lb  
 Dummy ..... 165 lb  
 Gross Static ..... 2598 lb

**Impact Conditions**

Speed ..... 61.2 mi/h  
 Angle ..... 90°

**Kinetic Energy** .....

305 kip ft

**Exit Conditions**

Speed ..... 60.35 mi/h

**Post-Impact Trajectory**

Stopping Distance ..... 345 ft  
 Centerline

**Maximum Test Debris Scatter**

Sign Stand ..... 157 ft downstream  
 6 ft left

**Vehicle Damage**

VDS ..... 12FL1  
 CDC ..... 12FLEN1  
 Max. Exterior Deformation ..... 1.0 inch  
 OCDI ..... FS0000000  
 Max. Occupant Compartment Deformation ..... 0.12 inch  
 Windshield Damage ..... 0.12 inch  
 (No hole or tear)

**Figure 7.6. Summary of Results for MASH Test 3-71 at 90 Degrees on Plasticade® SS310A Sign Stand with Roll-Up Sign Panel.**

# APPENDIX A. DETAILS OF PLASTICADE® SS310A SIGN STAND WITH ROLL-UP SIGN PANEL

