U.S. Department of Transportation
Federal Highway Administration

November 22, 2021

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

In Reply Refer To:
HSST-1/WZ-428

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

Dear Mr. Ross:

This letter is in response to your May 19, 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-428 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 ADA Pathcade Longitudinal Channelizers

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 ADA Pathcade Longitudinal Channelizers
  Type of system: Work Zone
  Test Level: Test Level 3
  Testing conducted by: Texas A&M Transportation Institute (TTI)
  Date of request: May 19, 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-428 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:	May 19, 2021	◉ 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 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	Plasticade® ADA Pathcade™ Longitudinal Channelizers	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, Des Plaines, 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 Plasticade® ADA Pathcade™ Longintudinal Channelizers. There are no shared financial interests in the Plasticade® ADA Pathcade™ Longintudinal Channelizers 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 23-24		

PRODUCT DESCRIPTION

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

The installation consisted of 34 Plasticade® ADA Pathcade™ Longitudinal Channelizers connected end-to-end longitudinally. Each barrier was anchored by a 40 lb sandbag placed on each of the two traffic-side extended legs. The middle leg remained stowed during the tests. The barriers were approximately 69.4 inches wide and 38 inches tall, with the deployed legs extending 17.3 inches. Total length of the installation was approximately 196.6 ft.

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: 2021.09.15 12:39:22 -05'00'	
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:

Required Test Number	Narrative Description	Evaluation Results
3-90 (1100C)	MASH Test 3-90 involves an 1100C vehicle weighing 2420 lb ± 55 lb impacting the CIP of the longitudinal channelizer at an impact speed of 62 mi/h ± 2.5 mi/h and an angle of 0-25 degrees ± 1.5 degrees. The selected impact angle was 10 degrees. The CIP for MASH Test 3-90 on the Plasticade® ADA Pathcade™ longitudinal channelizers was the centerline of the joint of channelizers 10 and 11. The results of test 690900-PLP23 conducted on February 25, 2021 are found in TTI Test Report number 690900-PLP23-24. The 1100C vehicle weighed 2384 lb, and the actual impact speed and angle were 63.0 mi/h and 9.3 degrees. The actual impact point was 6.2 inches downstream of the centerline of the joint of channelizers 10 and 11. The minimum target kinetic energy (KE) was 141 kip-ft, and actual KE was 308 kip-ft. The vehicle came to rest 247 ft downstream of the point of impact and 57 ft toward the field side with the application of the vehicle's brakes. Channelizers 1 through 8 and 20 through 34 were not damaged and remained in place for the duration of the test. Channelizers 9 through 11 remained attached but were pushed back towards the field side of the installation. Channelizer 12 landed 87 ft downstream and 8 ft toward the field side from impact. Channelizers 13 and 14 were trapped under the vehicle for the duration of the test. Channelizer 15 came to rest 173 ft downstream and 3 ft towards the field side. Channelizer 16 landed 42 ft downstream and 18 ft towards the traffic side. Channelizer 17 remained upright, but was rotated clockwise, and was 41 ft downstream and 3 ft toward the traffic side. The joint of channelizers 18 and 19 was pushed 2 ft towards the field side. The vehicle sustained slight damage to the front bumper, hood, grill, right front headlight, and right rear bumper. No fuel tank damage was observed. Maximum exterior crush to the vehicle was 4.5 inches at the front bumper. No occupant compartment deformation or intrusion occurred. Occupant risk values were within MASH preferred limits. The device performed acceptably for MASH test 3-90.	PASS

Required Test Number	Narrative Description	Evaluation Results
3-91 (2270P)	MASH Test 3-91 involves a 2270P vehicle weighing 5000 lb ± 110 lb impacting the CIP of the longitudinal channelizer at an impact speed of 62 mi/h ± 2.5 mi/h and an angle of 0 25 degrees ± 1.5 degrees. The selected impact angle was 10 degrees. The CIP for MASH Test 3-91 on the Plasticade® ADA Pathcade™ longitudinal channelizers was the centerline of the joint of channelizers 10 and 11. The results of test 690900-PLP24 conducted on February 26, 2021 are found in TTI Test Report number 690900-PLP23-24.The 2270P vehicle weighed 5053 lb, and the actual impact speed and angle were 63.8 mi/h and 10.0 degrees. The actual impact point was 10.2 inches upstream of the centerline of the joint of channelizers 10-11. The minimum target KE was 291 kip ft, and actual KE was 667 kip ft. The vehicle came to rest 297 ft downstream of the point of impact and 53 ft toward the field side with the application of the vehicle's brakes. Channelizers 1 through 9 and 20 through 34 were not damaged and remained in place for the duration of the test. Channelizer 10 remained attached to the installation, but was pushed towards the field side. Channelizer 11 landed 9 ft downstream and 12 ft towards the field side from impact. Channelizer 12 came to rest 183 ft downstream and 41 ft towards the field side. Channelizer 13 fell 172 ft downstream and 35 ft towards the field side. Channelizer 14 landed 152 ft downstream and 12 ft towards the field side. Channelizer 15 came to rest 187 ft downstream and 41 ft towards the field side. Channelizers 16 through 19 were deformed, but remained attached to the installation and were pushed together into an accordion shape. The front bumper sustained scuff marks and a 3-inch × 5-inch tear located 19 inches to the right of centerline of the vehicle. No fuel tank damage was observed. No exterior crush to the vehicle was observed. No occupant compartment deformation or intrusion occurred. Occupant risk values were within MASH preferred limits. The device performed acceptably for MASH test 3-91.	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: 2021.09.15 12:53:50 -05'00	
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, 2023	

Submitter Signature*: Henry A Ross Digitally signed by Henry A Ross Date: 2021.09.15 14:42:44 -05'00'

Submit Form

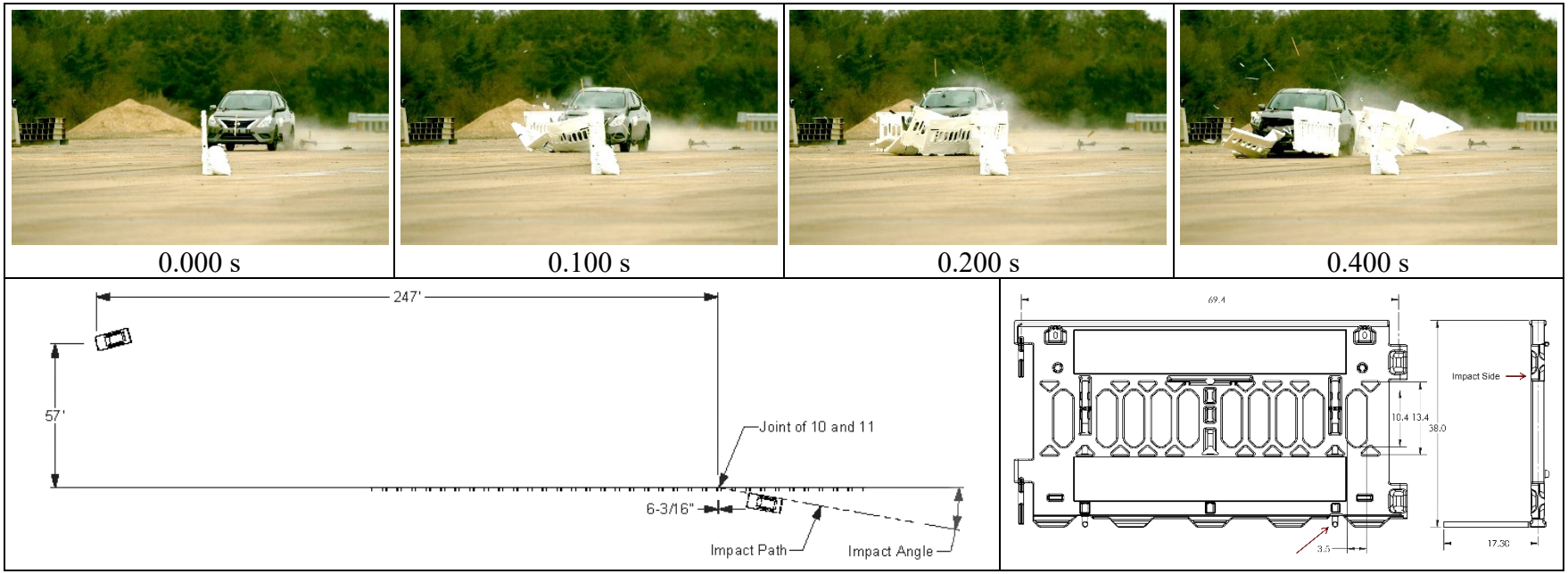
ATTACHMENTS

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 3-90
- TTI Test No. 690900-PLP23
- Test Date 2021-02-25

Test Article
- Type ..... Longitudinal Channelizer
- Name ..... Plasticade® ADA Pathcade™
- Installation Length ..... 196.6 ft
- Material or Key Elements ... Polyethylene and recycled plastic with 2 sandbags on each channelizer

Soil Type and Condition ..... Concrete pavement, damp

Test Vehicle
- Type/Designation 1100C
- Make and Model ..... 2015 Nissan Versa
- Curb ..... 2394 lb
- Test Inertial ..... 2429 lb
- Dummy ..... 165 lb
- Gross Static ..... 2594 lb

Impact Conditions
- Speed ..... 63.0 mi/h
- Angle ..... 9.3°
- Location/Orientation ..... 6.2 inches downstream of joint 10-11

Impact Severity ..... 308 kip-ft

Exit Conditions
- Speed ..... Out of view
- Trajectory/Heading Angle ... Out of view

Occupant Risk Values
- Longitudinal OIV ..... 10.9 ft/s
- Lateral OIV ..... 0.3 ft/s
- Longitudinal Ridedown ..... 2.0 g
- Lateral Ridedown ..... 2.5 g
- THIV ..... 3.3 m/s
- ASI 0.1

Max. 0.050-s Average
- Longitudinal ..... −1.4 g
- Lateral ..... 1.0 g
- Vertical ..... −0.9 g

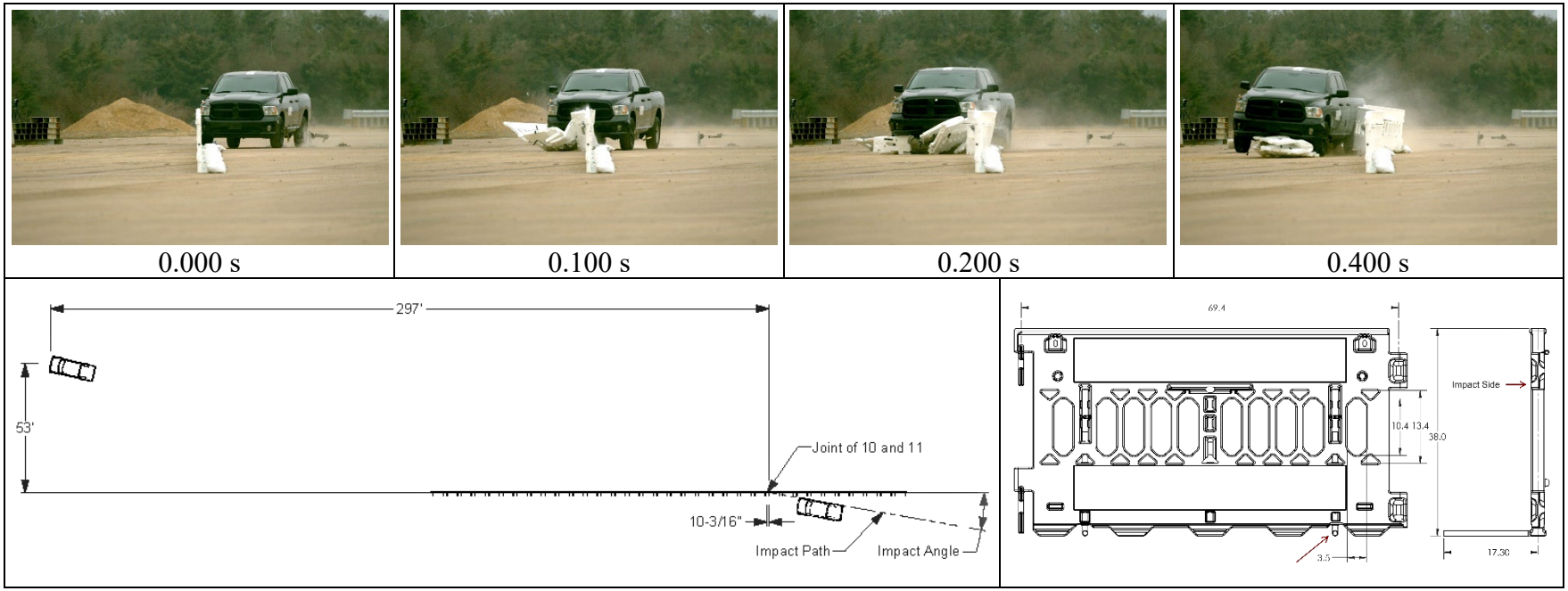
Post-Impact Trajectory
- Stopping Distance ..... 247 ft downstream 57 ft twd field side

Vehicle Stability
- Maximum Roll Angle ..... 6°
- Maximum Pitch Angle ..... 1°
- Maximum Yaw Angle ..... 8°
- Vehicle Snagging ..... No
- Vehicle Pocketing ..... No

Test Article Debris Field
- Longitudinal ..... 247 ft
- Toward Traffic Side ..... 18 ft
- Toward Field Side ..... 57 ft

Vehicle Damage
- VDS 01RFQ2
- CDC 01FREW2
- Max. Exterior Deformation ..... 4.5 inches
- OCDI FS0000000
- Max. Occupant Compartment Deformation ..... None

Figure 5.6. Summary of Results for *MASH* Test 3-90 on Plasticade® ADA Pathcade™ Longitudinal Channelizers.



General Information
- Test Agency ..... Texas A&M Transportation Institute (TTI)
- Test Standard Test No. ..... *MASH* Test 3-91
- TTI Test No. 690900-PLP24
- Test Date 2021-02-26

Test Article
- Type ..... Longitudinal Channelizer
- Name ..... Plasticade® ADA Pathcade™
- Installation Length ..... 196.6 ft
- Material or Key Elements ... Polyethylene and recycled plastic with 2 sandbags on each channelizer

Soil Type and Condition ..... Concrete pavement, damp

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

Impact Conditions
- Speed ..... 63.8 mi/h
- Angle ..... 10.0°
- Location/Orientation ..... 10.2 inches upstream of joint 10-11

Impact Severity ..... 667 kip-ft

Exit Conditions
- Speed ..... Out of view
- Trajectory/Heading Angle ... Out of view

Occupant Risk Values
- Longitudinal OIV ..... 6.2 ft/s
- Lateral OIV ..... 0.7 ft/s
- Longitudinal Ridedown ..... 1.1 g
- Lateral Ridedown ..... 1.2 g
- THIV ..... 1.9 m/s
- ASI 0.1

Max. 0.050-s Average
- Longitudinal ..... −0.8 g
- Lateral ..... −0.7 g
- Vertical ..... 1.1 g

Post-Impact Trajectory
- Stopping Distance ..... 297 ft downstream 53 ft twd field side

Vehicle Stability
- Maximum Roll Angle ..... 6°
- Maximum Pitch Angle ..... 2°
- Maximum Yaw Angle ..... 2°

Test Article Debris Scatter
- Longitudinal ..... 187 ft
- Toward Traffic Side ..... None
- Toward Field Side ..... 41 ft

Vehicle Damage
- VDS 01RFQ1
- CDC 01FREW1
- Max. Exterior Deformation ..... Negligible
- OCDI FS0000000
- Max. Occupant Compartment Deformation ..... None

Figure 6.6. Summary of Results for *MASH* Test 3-91 on Plasticade® ADA Pathcade™ Longitudinal Channelizers.

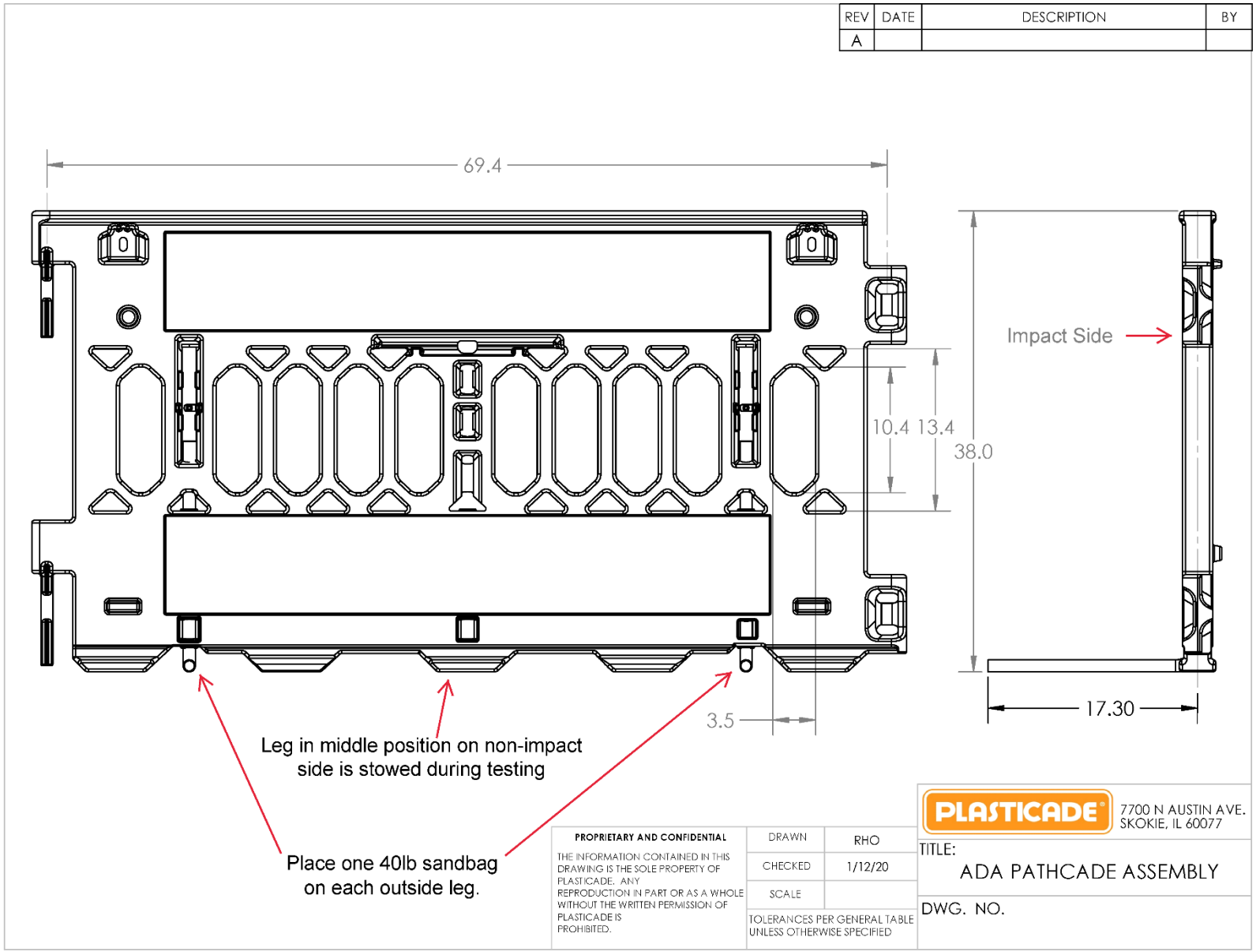


Figure 2.1. Details of Plasticade® ADA Pathcade™ longitudinal channelizers.