



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

June 3, 2020

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

In Reply Refer To:
HSST-1/WZ-413

Juan Banuelos
Crashworthy Traffic Control
2265 Highland Vista Drive
Arcadia, CA 91006
USA

Dear Mr. Banuelos:

This letter is in response to your April 17, 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-413 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:

- Barricade (Wood/Metal) with 2 Rigid Aluminum Signs and Light

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: Barricade (Wood/Metal) with 2 Rigid Aluminum Signs and Light
Type of system: Work Zone
Test Level: MASH Test Level 3 (TL3)
Testing conducted by: KARCO
Date of request: April 17, 2020

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-413 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 17, 2020	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Steven Matsusaka	
	Company:	Applus IDIADA KARCOEngineering, 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':CrashWorthyWorkZon	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	Barricade (Wood/Metal) with Rigid Aluminum Sign and Light	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:	Juan Banuelos	Same as Submitter <input type="checkbox"/>
Company Name:	Crashworthy Traffic Control	Same as Submitter <input type="checkbox"/>
Address:	2265 Highland Vista Drive, Arcadia, CA 91006	Same as Submitter <input 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.

Crashworthy Traffic Control and Applus IDIADA KARCO Engineering 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

Help


- New Hardware or Significant Modification
 Modification to Existing Hardware

The Crashworthy Traffic Control Barricade (Wood/Metal) is a work-zone traffic control device. The as-tested device consisted of one (1) galvanized steel frame, four (4) wood panels, one (1) 30 in. (762 mm) x 48 in. (1219 mm) aluminum sign, one (1) 36 in. (914 mm) x 24 in. (610 mm) aluminum sign, and one (1) warning light. In the deployed position the barricade has an approximate overall height of approximately 46.6 in. (1057.09 mm). The barricade is usable with or without the rigid aluminum signs and warning light and can be configured as a Type I or a Type II barricade.

The galvanized steel frame is composed of four (4) legs, two (2) on the left side and two (2) on the right side. The legs are constructed of 12 Ga galvanized steel and measure 44.75 in. (1137 mm) long. Each set of legs is hinged at the top of the frame. The barricade has two (2) wooden panels mounted to each side. The panels are 24.0 in. (609.6 mm) wide, 8.0 in. (203.2 mm) tall, and 0.5 in. (12.7 mm) thick. Each panel is made of ACX Plywood and has a 0.125 in. (3.2 mm) wide by 0.125 in. (3.2 mm) deep breakaway slot cut across its back surface. The as-tested device was configured with two (2) aluminum signs and a warning light. The 30 in. (762 mm) x 48 in. (1219 mm) aluminum sign was mounted to the front side and the 36 in. (914 mm) x 24 in. (610 mm) aluminum sign was mounted to the back side. The warning light is bolted to one of the top wood panels of the barricade.

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:	Steven Matsusaka	
Engineer Signature:	 <small>DN: cn=Steven Matsusaka, email=steven.matsusaka@idiada.com, c=US Digitally signed by Steven Matsusaka Date: 2020.04.17 18:13:05 -07'00'</small>	
Address:	9270 Holly Road, Adelanto, CA 92301	Same as Submitter <input checked="" type="checkbox"/>
Country:	United States of America	Same as Submitter <input checked="" type="checkbox"/>

A brief description of each crash test and its result:


Help

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, Test 3-70 is considered optional for work-zone traffic control devices weighing less than 220 lb (100 kg). The Crashworthy Traffic Control Barricade (Wood/Metal) approximately 35.0 lbs (15.9 kg) and therefore the test was non-relevant and not conducted.	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	<p>Applus IDIADA KARCO Test No. P38232-01. An 1100C test vehicle impacting two (2) work-zone devices in one (1) test run at a nominal velocity of 62 mph. The first device was oriented at a CIA of 0° and the second device was oriented at a CIA of 90°. The test vehicle impacted the 0°CIA device at a velocity of 62.19 mph (100.08 km/h). Upon impact, the light detached from the barricade and impacted the vehicle's windshield. The windshield was not penetrated and deformation limits were not exceeded by the impact with the light. The remainder of the sign remained intact and was propelled forward, ultimately interfering between the vehicle and the 90° CIA device. Due to this interference, the 90° CIA device was tested again in a separate run. The barricade yielded in a predictable manner and the test vehicle remained stable and upright throughout the test.</p> <p>Applus IDIADA KARCO Test No. P38232-03. An 1100C test vehicle impacting one (1) work-zone device at a nominal velocity of 62 mph and a CIA of 90°. The test vehicle impacted the device at a velocity of 65.37 mph (105.20 km/h). Upon impact the signs and lights detached from the barricade. The vehicle's occupant compartment was not penetrated and deformation limits were not exceeded. The barricade yielded in a predictable manner and the test vehicle remained stable and upright throughout the test.</p> <p>The Crashworthy Traffic Control Barricade (Wood/Metal) with aluminum signs and light met all of the requirements of MASH 3-71.</p>	

3-72 (2270P)	<p>Applus IDIADA KARCO Test No. P38232-02. A 2270P test vehicle impacting two (2) work-zone devices in one (1) test run at a nominal speed of 62 mph. The first device was oriented at a CIA of 0° and the second device was oriented at a CIA of 90°.</p> <p>The test vehicle impacted the 0°CIA device and the 90°CIA device at velocities of 63.19 mph (101.70 km/h) and 62.20 mph (101.00 km/h), respectively. Upon impact, the 0°CIA barricade remained intact and stuck to the front end of the vehicle as the vehicle proceeded toward the second device. The 90°CIA barricade was propelled forward by the impact before the light and one of the aluminum signs detached from the frame. The test vehicle's occupant compartment was not penetrated and deformation limits were not exceeded. The devices yielded in a predictable manner and the test vehicle remained stable and upright throughout the test.</p> <p>The Crashworthy Traffic Control Barricade (Wood/Metal) with aluminum signs and light met all of the requirements of MASH 3-72.</p>	
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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:	 <small>DN: cn=Steven Matsusaka, email=steven.matsusaka@idiada.com, c=US Digitally signed by Steven Matsusaka Date: 2020.04.17 18:13:58 -07'00'</small>	
Address:	9270 Holly Road, Adelanto, CA 92301	Same as Submitter <input checked="" type="checkbox"/>
Country:	United States of America	Same as Submitter <input checked="" type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	TL-371: July 2019 - July 2022	

Submitter Signature*: **Steven Matsusaka**

Digitally signed by Steven Matsusaka
DN: cn=Steven Matsusaka,
email=steven.matsusaka@idiada.com, c=US
Date: 2020.04.17 18:14:05 -07'00'

Submit Form

ATTACHMENTS

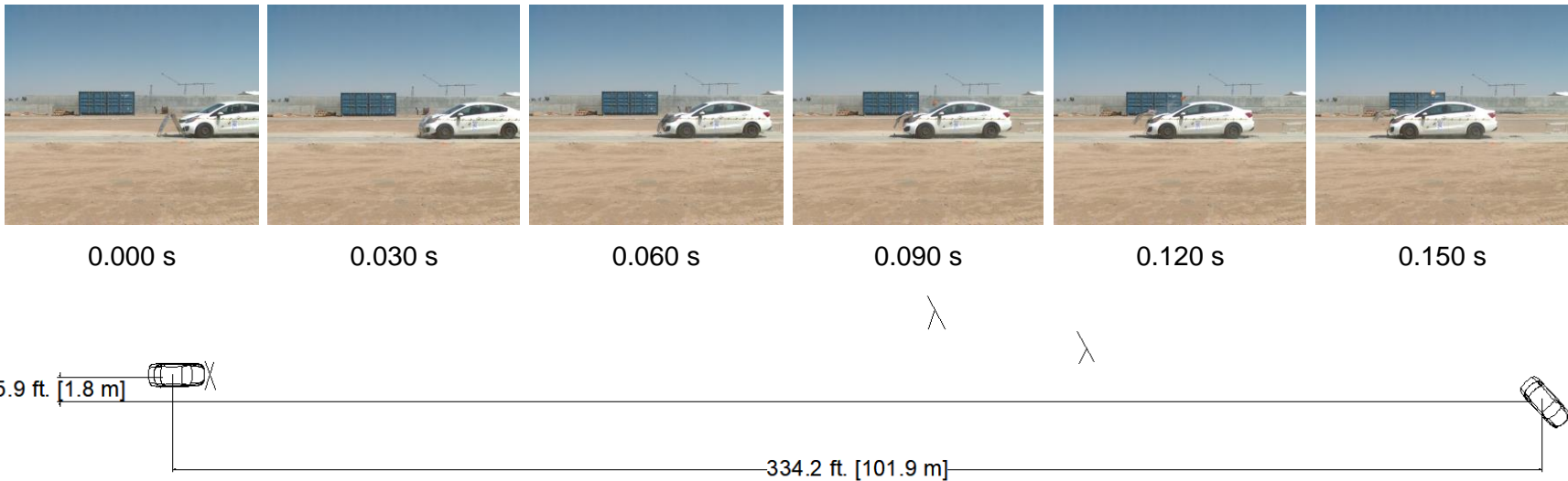
Attach to this form:

- 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 0° CIA Summary



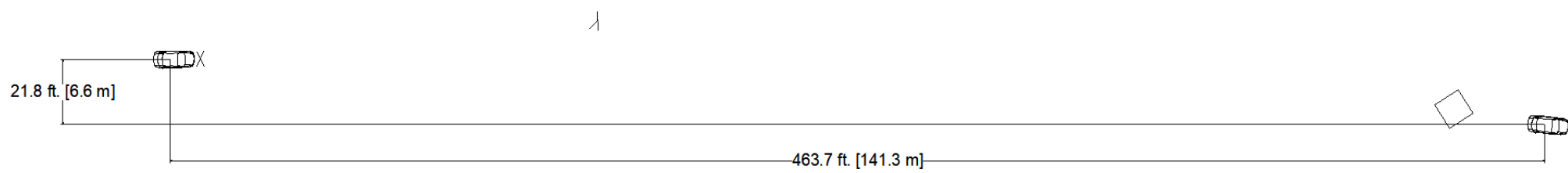
GENERAL INFORMATION	
Test Agency.....	Applus IDIADA KARCO
Test No.....	P38232-01
Test Designation.....	3-71
Test Date.....	8/17/18
TEST ARTICLE	
Name / Model.....	Barricade (Wood/Metal)
Type.....	Work-Zone Traffic Control Device
Device Height	3.5 ft. (1.1 m)
Key Features.....	Galvanized steel frame, plywood panels, aluminum signs, light
Road Surface.....	Concrete
TEST VEHICLE	
Type / Designation.....	1100C
Year, Make, and Model.....	2012 Kia Rio
Curb Mass.....	2,528.7 lbs (1,147.0 kg)
Test Inertial Mass.....	2,421.7 lbs (1,098.5 kg)
Gross Static Mass.....	2,583.8 lbs (1,172.0 kg)

Impact Conditions	
Impact Velocity Device 2.....	62.19 mph (100.08 km/h)
Device 1 Angle.....	0.0°
Device 1 Kinetic Energy.....	313.1 kip-ft (424.5 kJ)
Exit Conditions	
Device 1 Exit Velocity.....	61.80 mph (99.40 km/h)
Vehicle Resting Position.....	334.2 ft. (101.9 m) Down 5.9 ft. (1.8 m) Right
Vehicle Stability	Satisfactory
Maximum Roll Angle.....	N/A* 15
Maximum Pitch Angle.....	N/A*
Maximum Yaw Angle.....	N/A*

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	
Debris Field (longitudinal)	213.4 ft. (65.0 m)
Debris Field (lateral).....	15.2 ft. (4.6 m)
Vehicle Damage	
Vehicle Damage Scale.....	12-FD-1
CDC.....	12FDAW1
Maximum Intrusion.....	1.5 in (38 mm) at windshield

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

MASH 2016 Test 3-71 90° CIA Summary



GENERAL INFORMATION	
Test Agency.....	Applus.IDIADA KARCO
Test No.....	P38232-03
Test Designation.....	3-71.....
Test Date.....	07/23/2019
TEST ARTICLE	
Name / Model.....	Barricade.(Wood/Metal)
Type.....	Work-Zone Device
Device Height.....	3.5 ft. (1.1 m)
Key Elements.....	Galvanized steel frame, plywood panels, aluminum signs, light
Road Surface.....	Concrete.....
TEST VEHICLE	
Type / Designation.....	1100C.....
Year, Make, and Model.....	2012 Kia Rio.....
Curb Mass.....	2,528.7.lbs (1,147.0 kg)
Test Inertial Mass.....	2,428.4.lbs (1,101.5 kg)
Gross Static Mass.....	2,593.7.lbs (1,176.5 kg)

Impact Conditions	
Impact Velocity Device 2.....	65.37.mph (105.20 km/h)
Device 2 Angle.....	90.0°.....
Device 2 Kinetic Energy.....	346.9.kip-ft (470.3 kJ)
Exit Conditions	
Device 2 Exit Velocity.....	63.70.mph (102.50 km/h)
Vehicle Resting Position.....	463.7.ft. (141.3 m) Down 21.8 ft. (6.6 m) Right
Vehicle Stability.....	Satisfactory.....
Maximum Roll Angle.....	N/A* .16.....
Maximum Pitch Angle.....	N/A*
Maximum Yaw Angle.....	N/A*

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

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	
Debris Field (longitudinal).....	422.9 ft. (128.9 m)
Debris Field (lateral).....	12.2 ft. (3.7 m)
Vehicle Damage	
Vehicle Damage Scale.....	12:FD-1
CDC.....	12FDAW 1
Maximum Intrusion.....	N/A.....

TR-P38232-01-NC

MASH 2016 Test 3-72 Summary

0° CIA

90° CIA



0.000 s

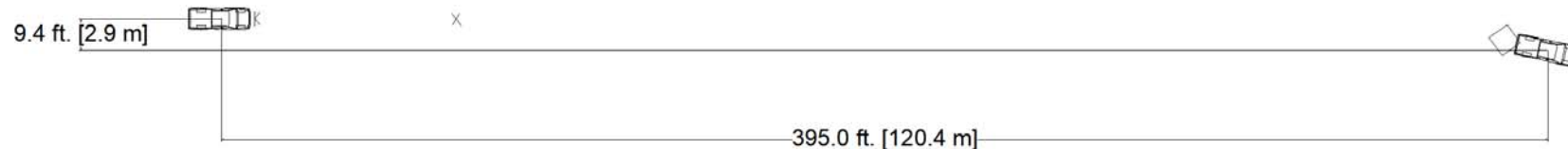
0.060 s

0.120 s

0.638 s

0.698 s

0.758 s



GENERAL INFORMATION	
Test Agency.....	Applus IDIADA KARCO
Test No.....	P38232-02
Test Designation.....	3-72
Test Date.....	08/17/18
TEST ARTICLE	
Name / Model.....	Barricade (Wood/Metall)
Type.....	Work-Zone Traffic Control Device
Device Height	3.75 ft. (1.1 m)
Key Elements.....	Galvanized steel frame, plywood panels, aluminum signs, light
Road Surface.....	Concrete
TEST VEHICLE	
Type / Designation.....	2270P
Year, Make, and Model.....	2012, Dodge Ram 1500
Curb Mass.....	4,769.6 lbs (2,163.5 kg)
Test Inertial Mass.....	4,985.7 lbs (2,261.5 kg)
Gross Static Mass.....	4,985.7 lbs (2,261.5 kg)

Impact Conditions	
Impact Velocity Device 1.....	63.19 mph (101.70 km/h)
Impact Velocity Device 2.....	62.20 mph (100.10 km/h)
Device 1 Angle.....	00°
Device 2 Angle.....	90°
Device 1 Kinetic Energy.....	665.6 kip-ft (902.4 kJ)
Device 2 Kinetic Energy.....	644.8 kip-ft (874.2 kJ)
Exit Conditions	
Device 1 Exit Velocity.....	62.9 mph (101.2 km/h)
Device 2 Exit Velocity.....	61.9 mph (99.6 km/h)
Vehicle Resting Position.....	395.0 ft. (120.4 m) Downstream 9.4 ft. (2.9 m) Left
Vehicle Stability	Satisfactory
Maximum Roll Angle.....	N/A*
Maximum Pitch Angle.....	N/A*
Maximum Yaw Angle.....	N/A*

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

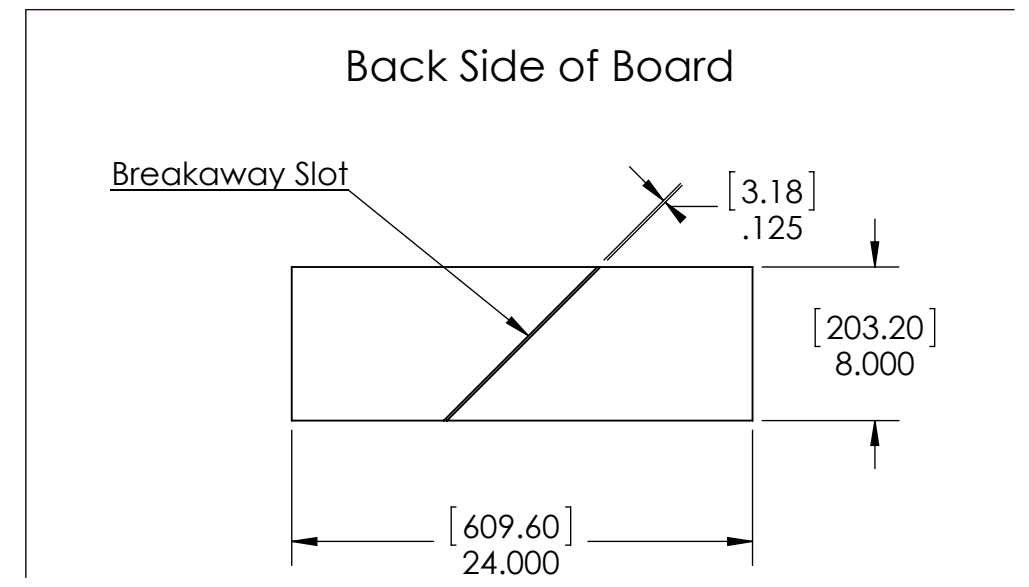
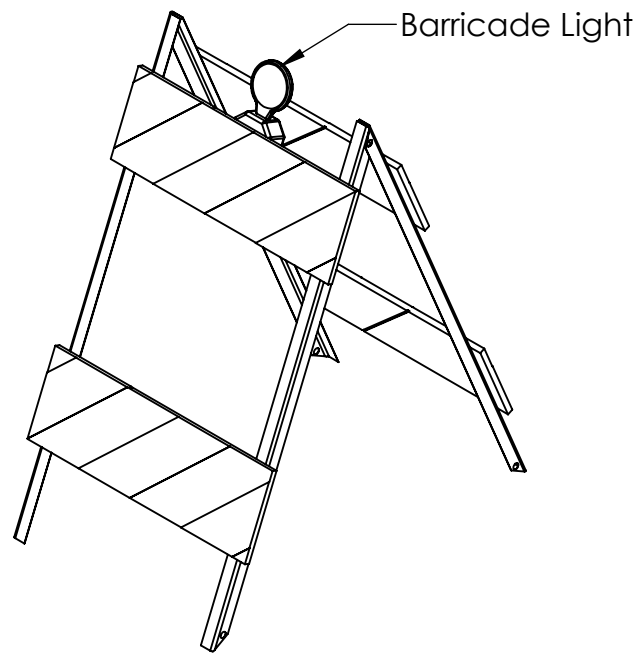
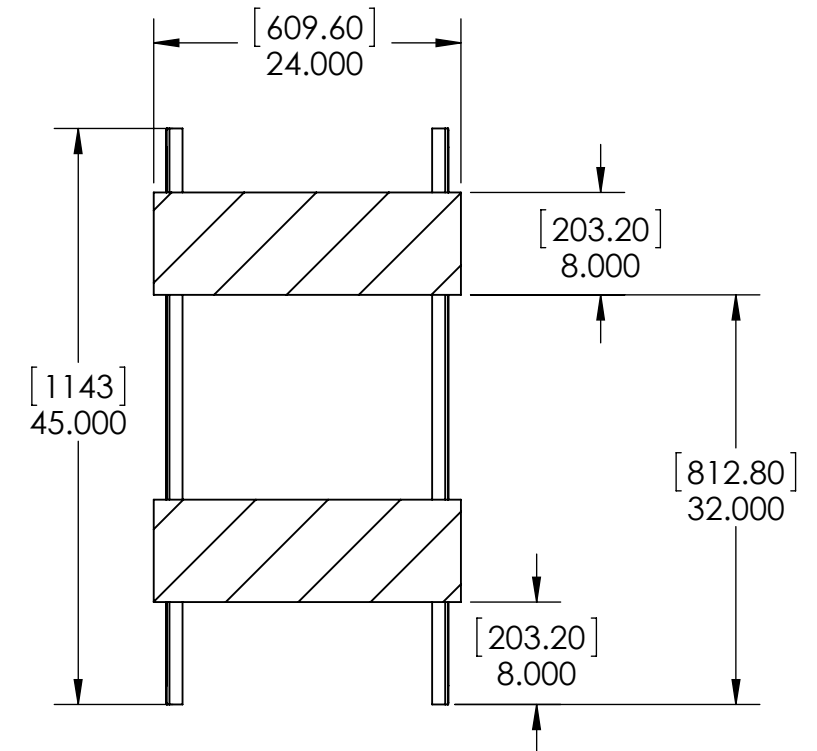
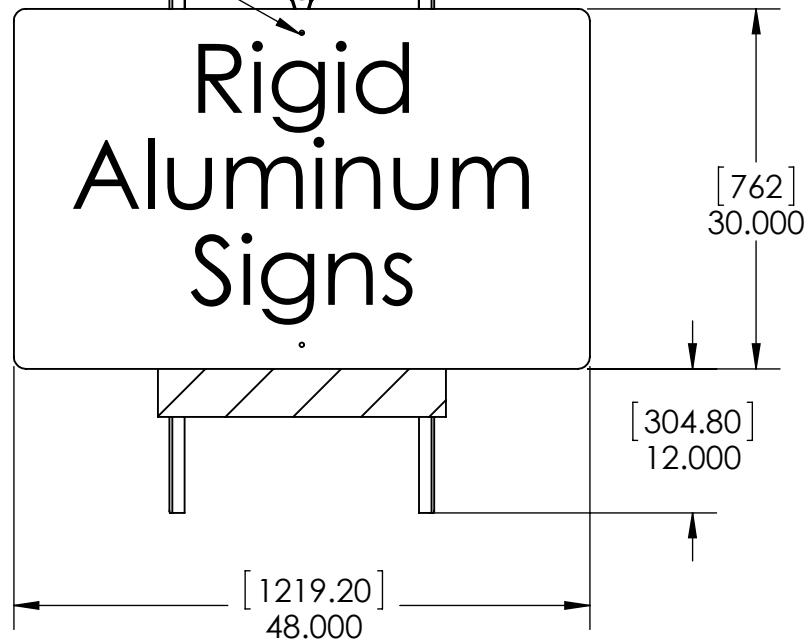
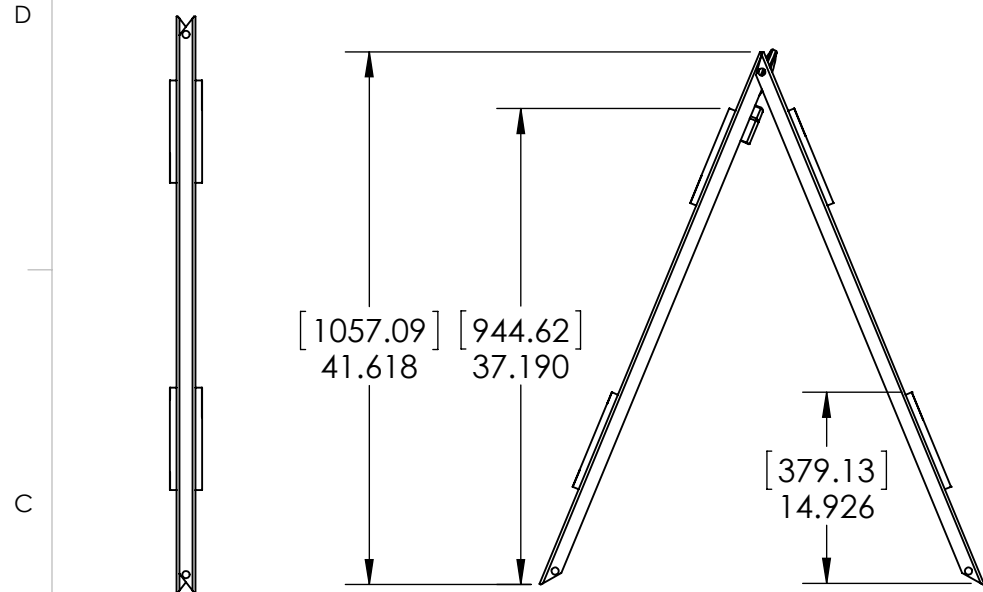
Occupant Risk	
Longitudinal OIV.....	N/A*
Lateral OIV.....	N/A*
Longitudinal RA.....	N/A*
Lateral RA.....	N/A*
THIV.....	N/A*
PHD.....	N/A*
ASI.....	N/A*
Test Article Deflections	
Debris Field (longitudinal)	372.3 ft. (113.5 m)
Debris Field (lateral).....	47.5 ft. (14.5 m)
Vehicle Damage	
Vehicle Damage Scale.....	12-FD-1
CDC.....	12FCMW1
Maximum Intrusion.....	N/A

Figure 2 Summary of Test 3-72

MASH Compliant

Aluminum Signs
Bolted on with
3/8"-16 2"L Hex head
bolt with Flat Washers
and Nylock Nut

Barricade Light



Crashworthy Traffic Control

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
ANGULAR: MACH ±1 BEND ±2
TWO PLACE DECIMAL ±0.01
THREE PLACE DECIMAL ±0.005

	NAME	DATE
DRAWN	SR	10/4/19
CHECKED	JB	12/16/19
ENG APPR.		
MFG APPR.		
Q.A.		

TITLE: **Barricade (Wood/Metal) With 2 Aluminum Signs & Light**

PROPRIETARY AND CONFIDENTIAL
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF TERA ENGINEERING CO. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF TERA ENGINEERING CO. IS PROHIBITED.

MATERIAL
Galvanized Steel Frame, Wood Panels
DO NOT SCALE DRAWING



SIZE **B** DWG. NO. REV **NA**
SCALE: 1:15 WEIGHT: SHEET 1 OF 1