



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

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

May 12, 2016

In Reply Refer To:
HSST-1/WZ-335

Mr. Felipe Almanza
TraFFix Devices Inc.
160 Avenida La Pata
San Clemente, California 92673

Dear Mr. Almanza:

This letter is in response to your February 4, 2014 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-335 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

Decision

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

- Aluminum Buster Sign Stand

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' 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 American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (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: Aluminum Buster Sign Stand
 Type of system: Work Zone Traffic Control Device
 Test Level: MASH Test Level 3
 Testing conducted by: KARCO Engineering, Inc.
 Date of request: February 4, 2014
 Date initially acknowledged: July 3, 2014
 Date of completed package: February 23, 2016

FHWA concurs with the recommendation of the accredited crash testing laboratory as stated within 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

If a manufacturer makes any modification to any of their roadside safety hardware that has an existing eligibility letter from FHWA, the manufacturer must notify FHWA of such modification with a request for continued eligibility for reimbursement. The notice of all modifications to a device must be accompanied by:

- Significant modifications – For these modifications, crash test results must be submitted with accompanying documentation and videos.
- Non-signification modifications – For these modifications, a statement from the crash test laboratory on the potential effect of the modification on the ability of the device to meet the relevant crash test criteria.

FHWA's determination of continued eligibility for the modified hardware will be based on whether the modified hardware will continue to meet the relevant crash test criteria.

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 the 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-335 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.
- If the subject device is a patented product it may be considered to be proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects: (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.

Sincerely yours,



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:	February 2014	<input type="radio"/> New <input checked="" type="radio"/> Resubmission
	Name:	Felipe Almanza	
	Company:	Traffix Devices Inc.	
	Address:	160 Avenida La Pata, San Clemente, California 92673	
	Country:	USA	
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.

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	Aluminum Buster	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.

Identification of the individual or organization responsible for the product:

Contact Name:	Felipe Almanza	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Traffix Devices Inc.	Same as Submitter <input checked="" type="checkbox"/>
Address:	160 Avenida La Pata, San Clemente, California 92673	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.		
Traffix Devices Inc. Corporate Office 160 Avenida La Pata, San Clemente, CA 92672 and Karco Engineering LLC 9270 Holly Road, Adelanto, CA 92301 share no (\$0.00) financial interests between the two organizations. This includes no (\$0.00) shared financial interest but not limited to: <ol style="list-style-type: none"> 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 interests. 		

PRODUCT DESCRIPTION

<input checked="" type="radio"/> New Hardware or Significant Modification	<input type="radio"/> Modification to Existing Hardware	
<p>The Traffix Devices Aluminum Buster is a work-zone traffic control device consisting of four major assemblies, one spring base assembly, an aluminum vertical mast (inner and outer), four aluminum legs, and one vinyl roll up sign.</p> <p>The steel spring base assembly is the platform for bolting the mast, legs, and springs in the final assembly. Bolted to the steel base are two vertically aligned coil springs. The coil springs have a diameter of 2.5" (64 mm) and are 6.5" (165 mm) in height. The telescoping vertical aluminum mast assembly consists of an inner and outer mast. The outer mast is 1.25" (32 mm) X 1.25" (32 mm) X 0.1" (2.54 mm) wall and is bolted directly to the springs. The roll up sign is attached to the telescoping inner mast by means of a clamp on roll up sign bracket. The sign can be raised and lowered to the desired height. The roll up vinyl sign measures 4.0' (1.2 m) X 4.0' (1.2 m).</p> <p>The sign stand is supported by four aluminum legs with overall dimensions of 42.2" (1072 mm) X 1" (25.4 mm) X 1" (25.4 mm) X 0.1" (2.54) wall. The legs are stored in a vertical position and when they are deployed, the legs drop to the surface creating an X-footprint. The X-footprint measures 6.6' (2.0 m) X 3.3' (1.0 m). Sandbags can be placed on the legs as needed for ballast.</p>		

CRASH TESTING

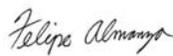
A brief description of each crash test and its result:

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. Is considered optional for work-zone traffic control devices weighting less than 220lb (100kg).	Non-Critical, not conducted
3-71 (1100C)	<p>A 2,430 lb (1102 kg) small car approaching the test article at impact speed of 62.4 mph (100.42 km/h) with a critical impact angle between 0° and 90°. For this test, two Aluminum Buster Sign Stands were impacted. The first article was aligned at 90° and the second article was aligned to 0° to the test vehicle's direction of travel.</p> <p>Upon impact the Aluminum Buster's vertical mast yielded and fractured from the spring base assembly in a predictable manner in both the 90° and 0° positions.</p> <p>The test vehicle's occupant compartment was not penetrated by the test articles. The windshield was impacted by the signs and deformed 0.9" (22 mm). Debris from the test articles did not cause a hazard to the driver's vision. The vehicle remained upright and did not exceed 75° roll angle through the test. The vehicle did not leave its lane and its trajectory was stable after both sign stands were impacted.</p>	PASS

Required Test Number	Narrative Description	Evaluation Results
3-72 (2270P)	<p>A 4,970.3 lb (2,254.5 kg) pickup truck approaching the test article at nominal speed of 63.57 mph (102.3 km/h) with a critical impact angle between 0° and 90°. For this test two Aluminum Buster Sign Stands were impacted. The first article was aligned at 90° and the second article was aligned to 0° to the test vehicle's direction of travel.</p> <p>Upon impact the Aluminum Buster's vertical mast yielded and fractured from the spring base assembly in a predictable manner in both the 90° and 0° positions.</p> <p>The test vehicle's occupant compartment was not penetrated by the test articles. The windshield was impact by the signs and deformed 1.5" (38 mm). Debris from the test articles did not cause a hazard to the driver's vision. The vehicle remained upright and did not exceed 75° roll angle through the test. The vehicle did not leave its lane and its trajectory was stable after both sign stands were impacted.</p>	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:	KARCO Engineering, INC	
Laboratory Signature:	Steven Matsusaka	<small>Digitally signed by Steven Matsusaka DN: cn=Steven Matsusaka, o=KARCO Engineering, LLC., ou, email=smatsusaka@karco.com, c=US Date: 2016.02.22 17:28:22 -08'00'</small>
Address:	9270 Holly Road, 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, December 18, 2015	

Submitter Signature*:  Digitally signed by Felipe Almanza
DN: cn=Felipe Almanza, o=Traffix Devices
Inc., ou=Felipe Almanza,
email=falmanza@traffixdevices.com, c=US
Date: 2016.02.23 11:54:41 -08'00'

Submit Form

ATTACHMENTS

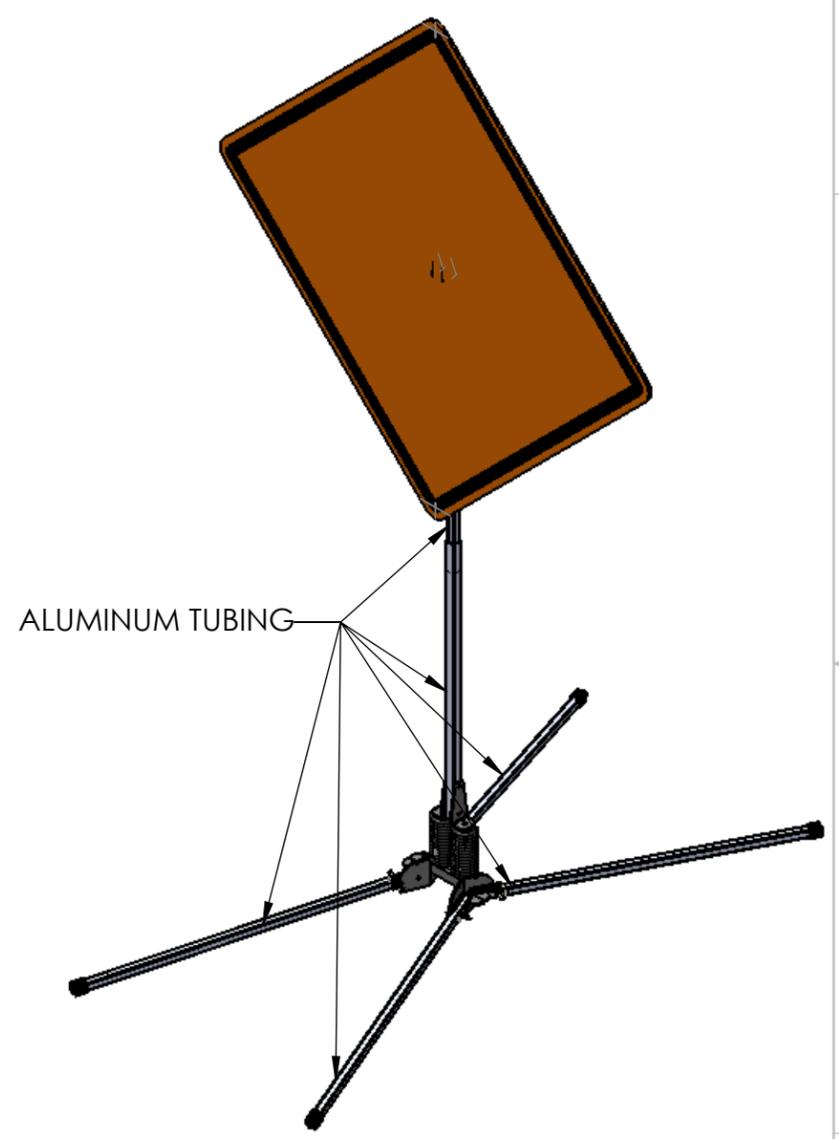
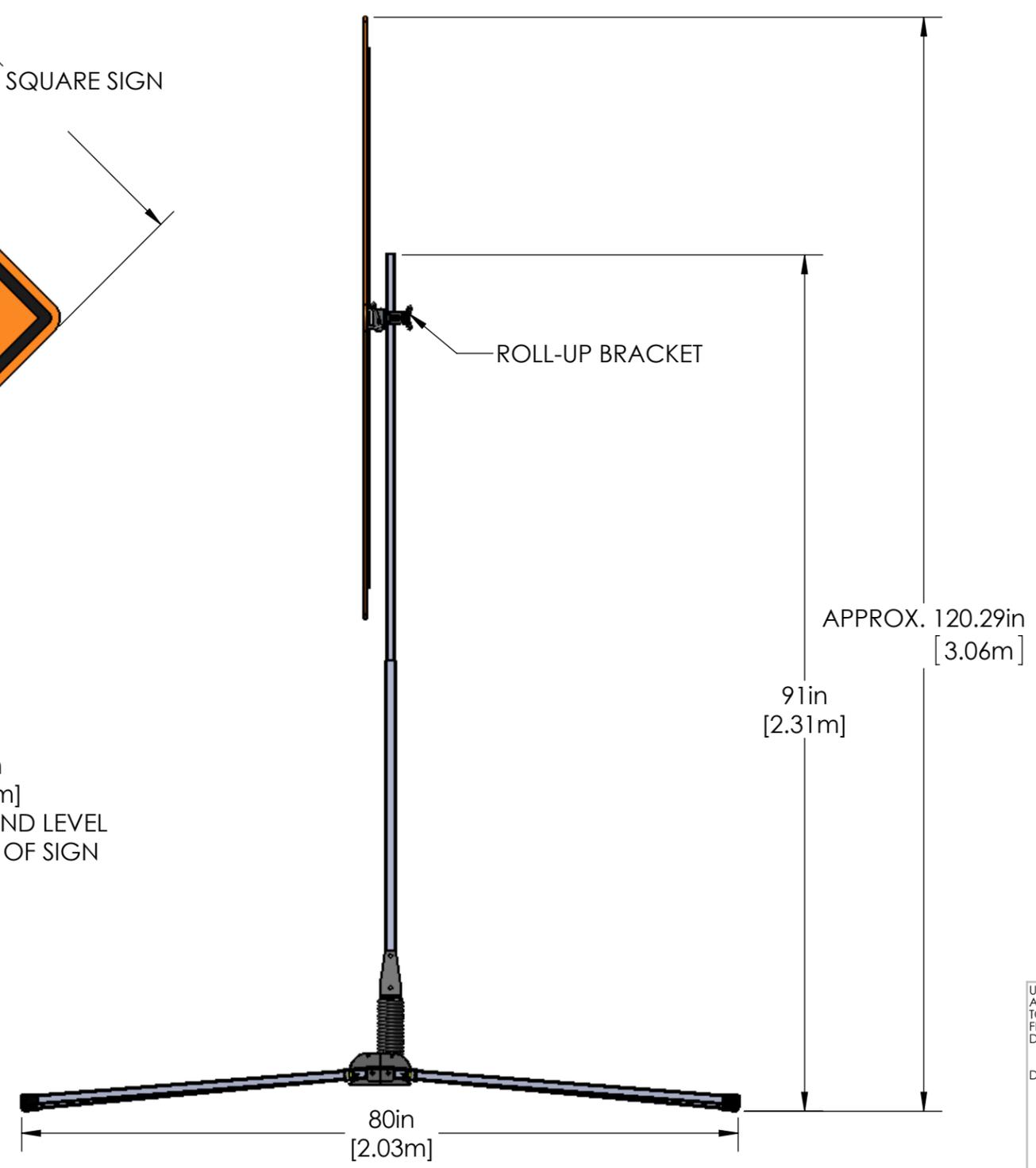
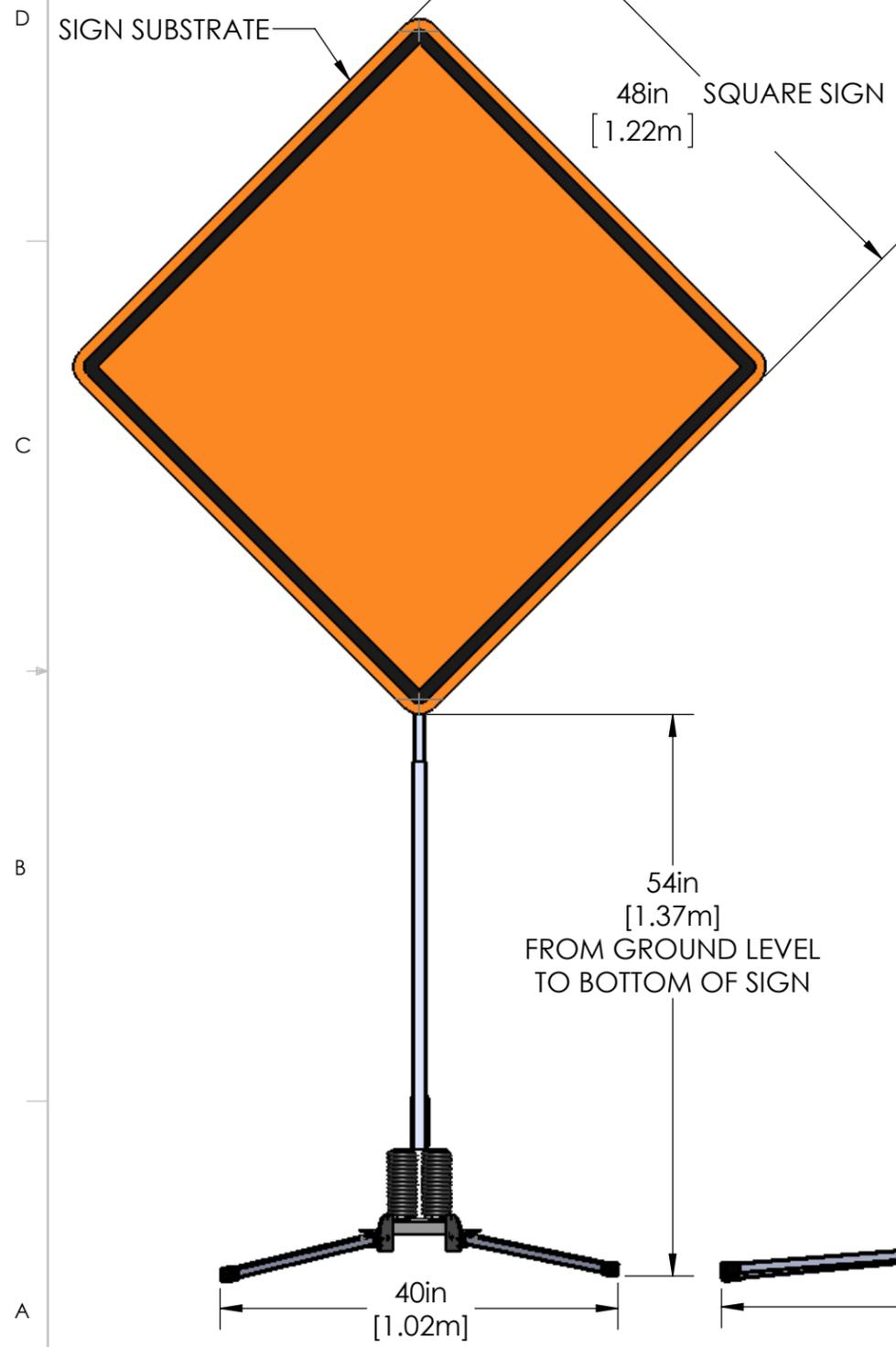
Attach to this form:

- 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		AASHTO TF13	
Number	Date	Designator	Key Words
WZ-335	May 12, 2016		Work Zone, Sign Support

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	12/23/2013	JS



ALUMINUM BUSTER SIGN STAND
 OVERALL WEIGHT: APPROX. 29 LBS [13.15kg] (NO SIGN)
 OVERALL DIMENSIONS: APPROX. 40"[1.02m] X 80"[2.03m] X 91"[2.31m]
 FRAME MATERIAL: ALUMINUM TUBING

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

Traffix Devices Inc.  160 Avenida La Pata
 San Clemente, CA 92673
 (949) 361-5663
 FAX (949) 361-9205
 www.traffixdevices.com

TITLE:
ALUMINUM BUSTER

DRAWN BY: JEREMY SMITH
 CHECKED BY: FA
 APPROVED BY: FA
 DATE: 12/23/13
 DATE: 12/23/13
 DATE: 12/23/13

SIZE B	DWG. NO. 500-170	REV A
		SHEET 1 OF 1

SECTION 4

MASH TEST 3-71 SUMMARY

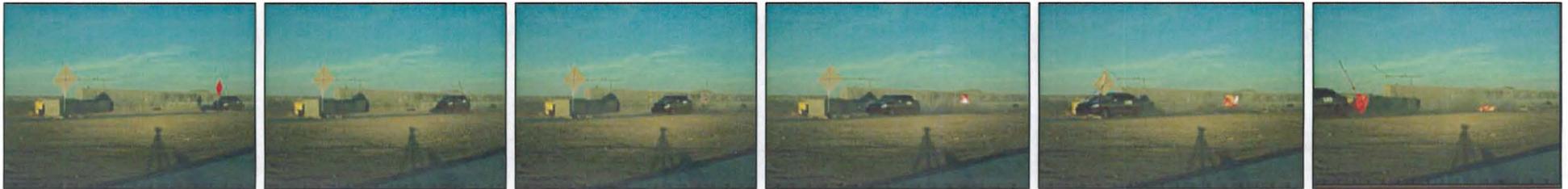
Test Article: TraFFix Devices Aluminum Buster

Project No. P33186-01

Test Program: MASH 3-71

Test Date: 12/30/13

SEQUENTIAL PHOTOGRAPHS



0.000 s

0.200 s

0.400 s

0.600 s

0.800 s

1.000 s

PLAN VIEW

110 m 105 m 100 m 95 m 90 m 85 m 80 m 75 m 70 m 65 m 60 m 55 m 50 m 45 m 40 m 35 m 30 m 25 m 20 m 15 m 10 m 5 m 0 m -5 m -10 m



SECTION 4

MASH TEST 3-71 SUMMARY ... (CONTINUED)

Test Article: TraFFix Devices Aluminum Buster
 Test Program: MASH 3-71

Project No. P33186-01
 Test Date: 12/30/13

SUMMARY TABLE

GENERAL INFORMATION		IMPACT CONDITIONS	
TEST AGENCY	KARCO Engineering, LLC.	IMPACT VELOCITY (ARTICLE 1)	62.40 mph (100.42 km/h)
TEST NUMBER	P33186-01	EXIT VELOCITY (ARTICLE 1)	60.57 mph (97.47 km/h)
TEST DESIGNATION	3-71	IMPACT ANGLE (ARTICLE 1)	90.0
TEST DATE	12/30/13	IMPACT VELOCITY (ARTICLE 2)	60.49 mph (97.35 km/h)
TEST ARTICLE		EXIT VELOCITY (ARTICLE 2)	58.63 mph (94.36 km/h)
TEST ARTICLE NAME / MODEL	Aluminum Buster	IMPACT ANGLE (ARTICLE 2)	0.0
TEST ARTICLE TYPE	Work-Zone Traffic Control Device	IMPACT LOCATION	Center of Mast
SIGN PANEL HEIGHT	5.7 ft. (1.7 m)	VEHICLE STABILITY	Satisfactory
SIGN PANEL WIDTH	5.7 ft. (1.7 m)	OCCUPANT RISK VALUES	
MOUNTING HEIGHT OF SIGN PANEL	7.5 ft. (2.3 m)	OCCUPANT IMPACT VELOCITY	Longitudinal
TOTAL ARTICLE WEIGHT	34.0 lbs (15.4 kg)		Lateral
TEST VEHICLE		RIDEDOWN ACCELERATION (g's)	Longitudinal
VEHICLE TYPE / DESIGNATION	1100C		Lateral
YEAR, MAKE AND MODEL	2009 Kia Rio	VEHICLE DAMAGE	
CURB MASS	2,494.5 lbs (1,131.5 kg)	VEHICLE DAMAGE SCALE	12-FD-1
TEST INERTIAL MASS	2,430.6 lbs (1,102.5 kg)	COLLISION DAMAGE CLASSIFICATION	12FDEW1
GROSS STATIC MASS	2,595.9 lbs (1,177.5 kg)	MAXIMUM DEFORMATION	0.9 in. on the vehicle windshield

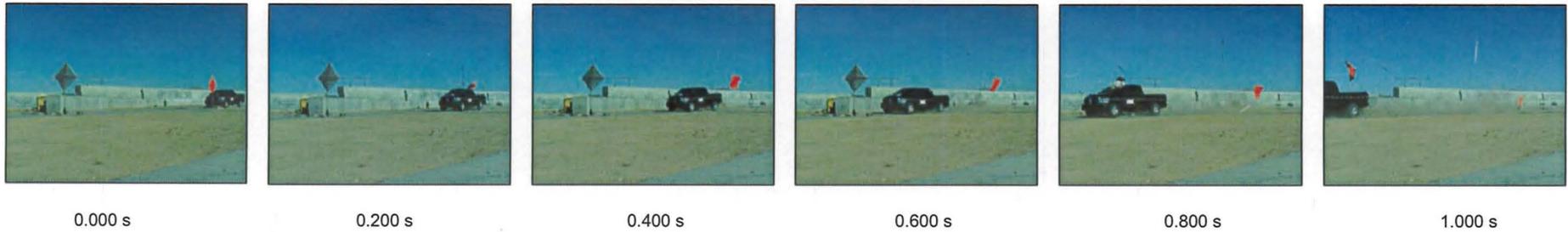
¹Values not calculated due to test article weight being less than 220 lbs (100 kg)

SECTION 4
MASH TEST 3-72 SUMMARY

Test Article: Aluminum Buster
Test Program: MASH 3-72

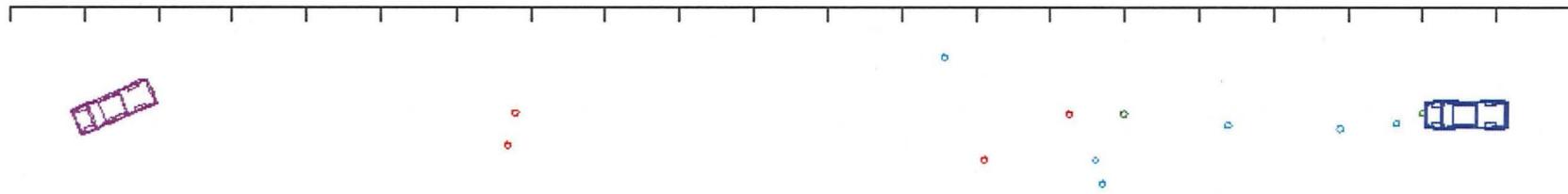
Project No. P33050-01
Test Date: 12/30/13

SEQUENTIAL PHOTOGRAPHS



PLAN VIEW

95 m 90 m 85 m 80 m 75 m 70 m 65 m 60 m 55 m 50 m 45 m 40 m 35 m 30 m 25 m 20 m 15 m 10 m 5 m 0m -5 m -10 m



Pre-Test		Post-Test	
■ Vehicle	■ Article 1	■ Vehicle	■ Article 1
■ Article 1	■ Article 2	■ Article 1	■ Article 2
■ Article 2		■ Article 2	

SECTION 4

MASH TEST 3-72 SUMMARY ... (CONTINUED)

Test Article: Aluminum Buster
 Test Program: MASH 3-72

Project No. P33050-01
 Test Date: 12/30/13

SUMMARY TABLE

GENERAL INFORMATION		IMPACT CONDITIONS	
TEST AGENCY	KARCO Engineering, LLC.	IMPACT VELOCITY (ARTICLE 1)	63.57 mph (102.31 km/h)
TEST NUMBER	P33050-01	EXIT VELOCITY (ARTICLE 1)	62.84 mph (101.13 km/h)
TEST DESIGNATION	3-72	IMPACT ANGLE (ARTICLE 1)	90.0
TEST DATE	12/30/13	IMPACT VELOCITY (ARTICLE 2)	61.25 mph (98.57 km/h)
TEST ARTICLE		EXIT VELOCITY (ARTICLE 2)	60.76 mph (97.78 km/h)
TEST ARTICLE NAME / MODEL	Aluminum Buster	IMPACT ANGLE (ARTICLE 2)	0.0
TEST ARTICLE TYPE	Work-Zone Traffic Control Device	IMPACT LOCATION	Center of Support Post
SIGN PANEL HEIGHT	5.7 feet (1.7 meters)	VEHICLE STABILITY	Satisfactory
SIGN PANEL WIDTH	5.7 feet (1.7 meters)	OCCUPANT RISK VALUES	
MOUNTING HEIGHT OF SIGN PANEL	7.6 feet (2.3 meters)	OCCUPANT IMPACT VELOCITY	Longitudinal
TOTAL ARTICLE HEIGHT	10.0 feet (3.1 meters)		Lateral
TEST VEHICLE		RIDEDOWN ACCELERATION (g's)	Longitudinal
VEHICLE TYPE / DESIGNATION	2270P		Lateral
YEAR, MAKE AND MODEL	2008 Dodge Ram	VEHICLE DAMAGE	
CURB MASS	4,860.1 lbs (2,204.5 kg)	VEHICLE DAMAGE SCALE	12-FD-1
TEST INERTIAL MASS	4,970.3 lbs (2,254.5 kg)	COLLISION DAMAGE CLASSIFICATION	12FDEW1
GROSS STATIC MASS	4,970.3 lbs (2,254.5 kg)	MAXIMUM DEFORMATION	1.5 in. on the windshield

¹Values not calculated due to test article weight being less than 220 lbs (100 kg)



TraFFix Devices, Inc.
160 Avenida La Pata
San Clemente, CA 92673

Attention: Mr. Felipe Almanza

Date: January 12, 2016

Mr. Felipe Almanza,

On December 30, 2013 two test level 3, (tests 71 and 72) were conducted on the Traffix Devices Aluminum Buster Sign Support based on the Manual for Assessing Safety Hardware (MASH) test procedure. The as-tested test article weight was 34.0 lbs (15.4 kg). Based on the requirements outlined in the MASH test procedure, test 3-70 is considered optional for test articles weighing less than 220 lbs (100 kg). Because the total weight of the Traffix Devices Aluminum Buster Sign Support was less than 220 lbs (100 kg), test 3-70 was not conducted.

For the test level 3 (test 71) on the Aluminum Buster Sign Support the test vehicle's hood height dimension measurement was 31.1 in. (790 mm). The specified hood height dimension measurement as outlined in the MASH test procedure is 24.0 in. +/- 4 in. (610 mm +/- 102 mm). We determined that the use of this vehicle was acceptable and the differences in the hood height can be attributed to the changing vehicle fleet and the different methods used to take the hood height measurement. Furthermore, we felt that the difference in the hood height posed no significant effect on the performance of the test article.

Sincerely yours,

A handwritten signature in black ink that reads "Frank D. Richardson". The signature is written in a cursive style.

Frank D. Richardson
President
KARCO Engineering, LLC.

TrafFix Devices, Inc.
160 Avenida La Pata
San Clemente, CA 92673

Attention: Mr. Felipe Almanza

Date: April 20, 2016

Mr. Felipe Almanza,

On December 30, 2013, one Test Level 3, Test 71 was conducted on the TrafFix Devices, Inc. Aluminum Buster per the Manual for Assessing Safety Hardware (MASH) test procedure. The test vehicle used for this test was a 2009 Kia Rio 4-door sedan. The test vehicle had a hood height of 31.1 in. (791 mm). The specified hood height dimension measurement as outlined in the MASH test procedure is 24.0 in. \pm 4 in. (600 mm \pm 100 mm). In recent years, the Kia Rio test vehicle's hood height has been increasing with its model year. An Interlaboratory Comparison performed at Task Force 13 has confirmed this observation.

Despite the hood height dimension falling out of the MASH tolerance, KARCO determined that the dimension would not have a significant effect on the performance of the device for this test. The Aluminum Buster is designed to breakaway near its base in the event of an impact in order to prevent severe impacts to the test vehicle's windshield and to avoid potentially blocking the driver's vision. For this test, the test vehicle's bumper makes first contact with the sign mast. The breakaway is activated upon impact with the bumper, before the hood height can affect the impact dynamics. Thus, a variation in the hood height would not affect the results of this test.

Sincerely yours,



Steven D. Matsusaka
Engineering Department Supervisor
KARCO Engineering, LLC.