



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

December 27, 2019

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

In Reply Refer To:
HSST-1/WZ-385

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

Dear Mr. Almanza:

This letter is in response to your March 28, 2019 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-385 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:

- Big 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' (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: Big Buster Sign Stand
Type of system: Work Zone
Test Level: MASH Test Level 3 (TL3)
Testing conducted by: KARCO
Date of request: March 8, 2019

FHWA concurs with the recommendation of the accredited crash testing laboratory per the attached form for the above device using a 48" x 48" aluminum substrate sign.

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

Standard Provisions

- To prevent misunderstanding by others, this letter of eligibility designated as FHWA control number WZ-385 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:	February 21, 2019	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Robert Ramirez	
	Company:	Traffix Devices, Inc.	
	Address:	160 Ave La Pata, San Clemente, CA 92673	
	Country:	United States	
	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	Big Buster Sign Stand	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:	Robert Ramirez	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Traffix Devices, Inc.	Same as Submitter <input checked="" type="checkbox"/>
Address:	160 Ave La Pata, San Clemente, CA 92673	Same as Submitter <input checked="" type="checkbox"/>
Country:	United States	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. and Applus IDIADA Karco Engineering LLC share no financial interests between the two organizations. This includes no shared financial interest but not limited to:

- i. Compensation including wages, salaries, commissions, professional fees, or fees for business referrals
- iii. Research funding or other forms of research support;
- iv. Patents, copyrights, licenses, and other intellectual property interests;
- vi. Business ownership and investment interests;

PRODUCT DESCRIPTION

- New Hardware or Significant Modification
 Modification to Existing Hardware

The Traffix Devices Big Buster Sign Stand is a temporary work-zone device consisting of five main components: one steel base assembly, one outer aluminum mast, one inner aluminum telescoping mast, two rigid sign brackets, and one 48" x 48" x 0.080" thick aluminum sign.

The steel base consists of a dual spring assembly at the base of the outer mast. When deployed, the aluminum legs form an X-footprint that has overall dimensions of 57.31 in. [1455.7 mm] x 125.25 in. [3181.4 mm].

The inner mast telescopes through the outer mast and locks into place when fully extended using a push button.

The rigid sign brackets are designed hold the aluminum sign in place. The sign is removed by loosening one of the rigid sign brackets to provide clearance for the sign to be lifted and removed from the sign stand.

The Big Buster Sign Stand can be used on concrete, asphalt, gravel, or dirt surfaces. The test was conducted on a concrete surface. The Big Buster Sign Stand can be used with or without flags. Flags were installed for these tests.

The overall dimensions of the Big Buster Sign Stand with the aluminum sign installed is approx. 57.31 in. [1455.7 mm] x 125.25 in. [3181 mm] x 132.0 in. [3352.8 mm]. Sand bags can be placed on the legs as needed for ballast.

The MASH tested and passed Big Buster Sign Stand, described above, is based on the previously tested and passed NCHRP-350 Big Buster Sign Stand (Reference WZ-24, WZ-73, WZ-108, and WZ-113).

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:	Steven Matsusaka	Digitally signed by Steven Matsusaka DN: cn=Steven Matsusaka, o=Applus IDIADA KARCO Engineering, LLC, ou, email=Steven.Matsusaka@idiada.com, c=US Date: 2019.03.28 11:36:31 -0700
Address:	9270 Holly Rd, Adelanto, CA 92301	Same as Submitter <input type="checkbox"/>
Country:	United States of America	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)	Designed to evaluate the ability of a small car to activate any breakaway, fracture or yielding mechanism. Test 3-70 is considered optional for work-zone traffic control devices weighing less than 220 lbs (100 kg). The as-tested Big Buster weighted approximately 69 lbs (31 kg) therefore the test was non-relevant and was not conducted.	Non-Relevant Test, not conducted

Required Test Number	Narrative Description	Evaluation Results
3-71 (1100C)	<p>For this test, two Big Buster Sign Stands were impacted. The first test article was aligned at 90° and the second test article was aligned at 0° to the impacting vehicle's direction of travel. This test is intended to evaluate the sign stand's behavior when impacted by an 1100C test vehicle. The primary evaluation is based on intrusion into the occupant compartment, windshield damage, and vehicle stability. According to MASH lightweight devices under 220 lbs (100 kg), such as the Big Buster Sign Stand cannot cause sufficient velocity change that would result in exceeding occupant risk criteria limits. The as-tested devices weighed approximately 69 lbs (31 kg), therefore Test 3-71 was conducted without instrumentation for evaluating occupant risk values.</p> <p>The test was conducted using a commercially available 2014 Hyundai Accent 4 door sedan with a test inertial mass of 2,412.9 lbs. (1,094.5 kg). The test vehicle impacted the first sign stand (oriented at 90°) at a velocity of 63.45 mph (102.12 km/h). Upon impact the springs were activated as the outer mast folded over the front of the vehicle. The aluminum sign released from the mast upon impact. The top of inner mast contacted the windshield and roof on the driver side of the vehicle.</p> <p>The test vehicle continued along its path and impacted the second sign stand (oriented at 0°) at a velocity of 61.16 mph (98.43 km/h). Upon impact the springs were activated as the mast began to fold over the vehicle. The aluminum sign separated from the mast as the mast broke off at the breakaway point.</p> <p>The vehicle's occupant compartment was not penetrated by the test articles and the intrusion limits did not exceed the MASH allowable limits. Debris from the test articles did not block the driver's vision. The vehicle remained upright and the roll angle did not exceed 75°. The vehicle cleared both devices in a controlled and stable manner. The Big Buster Sign Stand met all the requirements for MASH Test 3-71.</p>	PASS

3-72 (2270P)	<p>For this test, two Big Buster Sign Stands were impacted. The first test article was aligned at 90° and the second test article was aligned at 0° to the impacting vehicle's direction of travel. This test is intended to evaluate the sign stand's behavior when impacted by a 2270P test vehicle. The primary evaluation is based on intrusion into the occupant compartment, windshield damage, and vehicle stability. According to MASH lightweight devices under 220 lbs (100 kg), such as the Big Buster Sign Stand cannot cause sufficient velocity change that would result in exceeding occupant risk criteria limits. The as-tested devices weighed approximately 69 lbs (31 kg), therefore Test 3-72 was conducted without instrumentation for evaluating occupant risk values.</p> <p>The test was conducted using a commercially available 2012 RAM 1500 4 door pickup with a test inertia mass of 4,955.9 lbs. (2,248.0 kg). The test vehicle impacted the first sign stand (oriented at 90°) at a velocity of 63.09 mph (101.53 km/h). Upon impact the springs were activated. The aluminum sign released from the sign stand as the mast bent around the vehicle's front profile. The sign contacted and damaged both the windshield and the roof. The test vehicle continued along its path and impacted the second sign stand (oriented at 0°) at a velocity of 60.44 mph (97.27 km/h). Upon impact the springs were activated, and the mast broke away from the outer mast. The aluminum sign separated from the mast and contacted the windshield and roof but caused no damage. The vehicle's occupant compartment was not penetrated and the intrusion limits did not exceed the MASH allowable limits. Debris from the test articles did not block the driver's vision. The vehicle remained upright and the roll angle did not exceed 75°. The vehicle cleared both devices in a controlled and stable manner. The Big Buster Sign Stand met all the requirements for MASH Test 3-72.</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:	Applus IDIADA KARCO Engineering, LLC.	
Laboratory Signature:	Steven Matsusaka	<small>Digitally signed by Steven Matsusaka DN: cn=Steven Matsusaka, o=Applus IDIADA KARCO Engineering, LLC., ou, email=Steven.Matsusaka@idiada.com, c=US Date: 2019.03.29 11:37:47 -0700'</small>
Address:	9270 Holly Rd, 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, September 14, 2018 - July 1, 2019	

Submitter Signature*: **Robert Ramirez** Digitally signed by Robert Ramirez
Date: 2019.03.28 14:04:36 -0700'

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		Key Words
Number	Date	

MASH 2016 Test 3-72 Summary

90° CIA

0° CIA



0.000 s

0.100 s

0.250 s

0.679 s

0.750 s

0.950 s

Debris: •



GENERAL INFORMATION

Test Agency..... KARCO Engineering, LLC.
 KARCO Test No..... P37378-02
 Test Designation..... 3-72
 Test Date..... 11/16/17

TEST ARTICLE

Name / Model..... Big Buster
 Type..... Work Zone Device
 Device Height..... 14.2 ft. (4.3 m)
 Key Elements..... Mast, base, AI substrate
 Road Surface..... Concrete

TEST VEHICLE

Type / Designation..... 2270P
 Year, Make, and Model..... 2012 RAM 1500
 Curb Mass..... 4,799.4 lbs (2,177.0 kg)
 Test Inertial Mass..... 4,955.9 lbs (2,248.0 kg)
 Gross Static Mass..... 4,955.9 lbs (2,248.0 kg)

Impact Conditions

Impact Velocity Device 1..... 63.09 mph (101.53 km/h)
 Impact Velocity Device 2..... 60.44 mph (97.27 km/h)
 Device 1 Angle..... 90°
 Device 2 Angle..... 0°
 Device 1 Kinetic Energy..... 659.7 kip-ft (894.4 kJ)
 Device 2 Kinetic Energy..... 605.5 kip-ft (820.9 kJ)

Exit Conditions

Device 1 Exit Velocity..... 61.34 mph (98.72 km/h)
 Device 2 Exit Velocity..... 58.27 mph (93.78 km/h)
 Vehicle Resting Position..... 296.5 ft. (90.4 m) Downstream
 Vehicle Stability..... 3.1 ft. (1.0 m) Right
 Maximum Roll Angle..... Satisfactory
 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)..... 285.7 ft. (87.1 m)
 Debris Field (lateral)..... 20.1 ft. (6.1 m)

Vehicle Damage

Vehicle Damage Scale..... N/A
 CDC..... N/A
 Maximum Intrusion..... 1.6 in. (41 mm)

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

Figure 2 Summary of Test 3-72

MASH 2016 Test 3-71 Summary

90° CIA

0° CIA



0.300 s

0.075 s

0.000 s

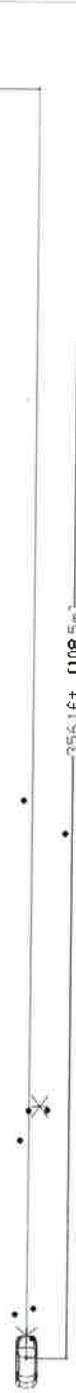
0.836 s

0.738 s

0.676 s

Debris:

71.6 ft (21.8 m)



GENERAL INFORMATION

Test Agency	IDIADA KARCO
KARCO Test No	P37393-01
Test Designation	3-71
Test Date	1/4/18
TEST ARTICLE	
Name / Model	MASH Big Buster
Type	Work Zone Device
Device Height	14.2 ft (4.3 m)
Key Elements	Mast base, Al substrate
Road Surface	Concrete
TEST VEHICLE	
Type / Designation	1100C
Year, Make, and Model	2014 Hyundai Accent
Curb Mass	2,412.9 lbs (1,094.5 kg)
Test Inertial Mass	2,412.9 lbs (1,094.5 kg)
Gross Static Mass	2,584.9 lbs (1,172.5 kg)

Figure 3 Summary of Test 3-71

Impact Conditions

Impact Velocity Device 1	63.45 mph (102.12 km/h)
Impact Velocity Device 2	61.16 mph (98.43 km/h)
Device 1 Angle	90°
Device 2 Angle	0°
Device 1 Kinetic Energy	324.8 kip-ft (440.4 kJ)
Device 2 Kinetic Energy	301.7 kip-ft (409.1 kJ)

Exit Conditions

Device 1 Exit Velocity	61.9 mph (99.6 km/h)
Device 2 Exit Velocity	59.7 mph (96.1 km/h)
Vehicle Resting Position	356.1 ft. (108.5 m) Downstream 71.6 ft. (21.8 m) Left
Vehicle Stability	Satisfactory
Maximum Roll Angle	N/A*
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*

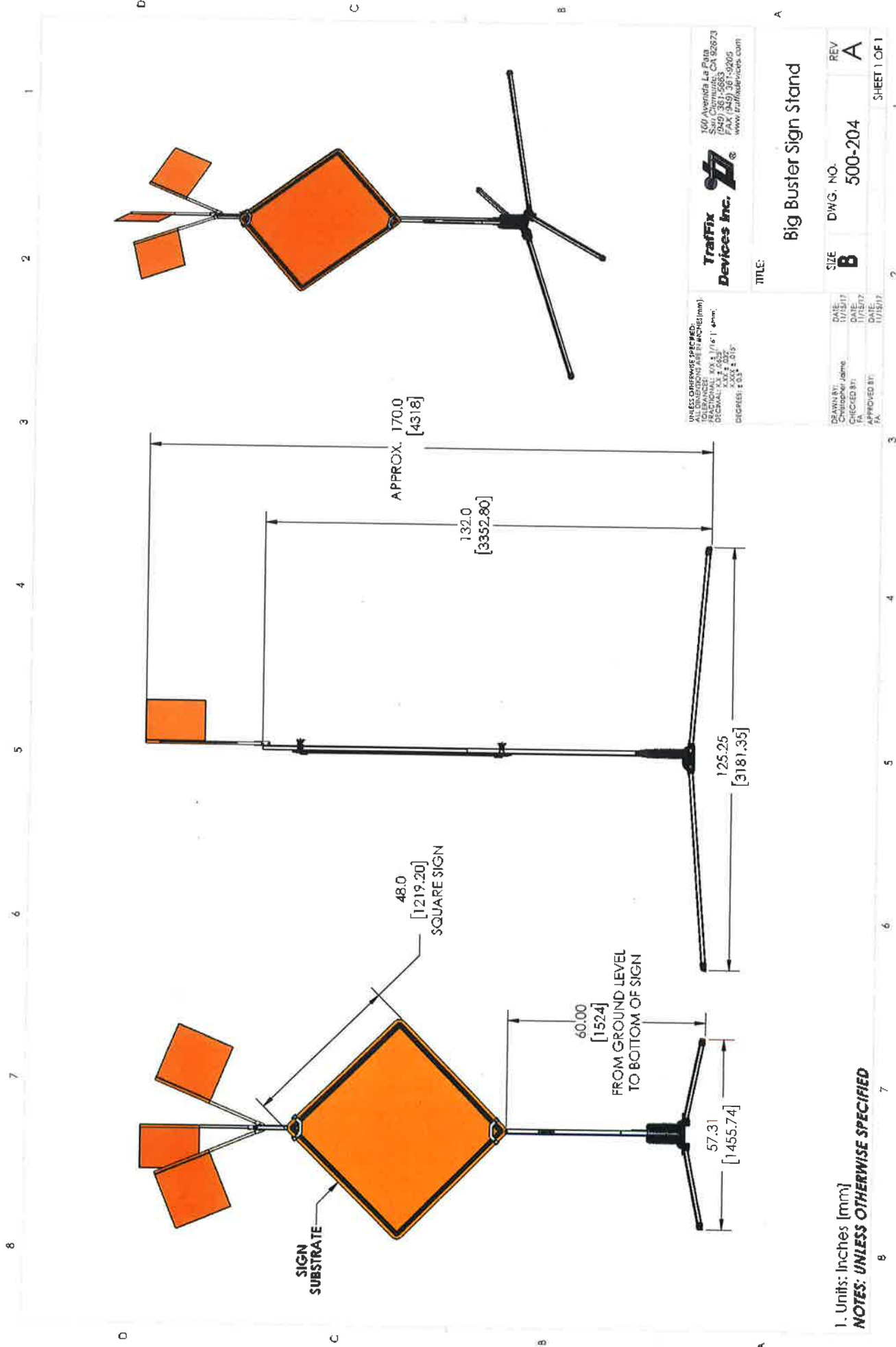
Test Article Deflections

Debris Field (longitudinal)	297.7 ft. (90.7 m)
Debris Field (lateral)	38.9 ft. (11.9 m)

Vehicle Damage

Vehicle Damage Scale	12-FD-0
CDC	12FDEN0
Maximum Intrusion	0.9 in. (23 mm)

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



UNLESS OTHERWISE SPECIFIED:
 ALL DIMENSIONS ARE IN INCHES (mm)
 TOLERANCES: FRACTIONS 1/16" & 1/8" ±mm
 DECIMALS: 0.0001" ±0.025
 ANGLES: ±30'
 DECIMALS: 0.001" ±0.15'

Traffix Inc.
 300 Avenida La Plata
 Vista Del Mar, CA 92083
 (949) 361-9553
 FAX (949) 361-9205
 www.traffixinc.com

TITLE: **Big Buster Sign Stand**

SIZE	DWG. NO.	REV
B	500-204	A

DRAWN BY:	DATE:
CHECKED BY:	DATE:
APPROVED BY:	DATE:

SHEET 1 OF 1

1. Units: Inches [mm]
 NOTES: UNLESS OTHERWISE SPECIFIED