U.S. Department
of Transportation
Federal Highway
Administration

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

February 15, 2018

In Reply Refer To:
HSST-1/ WZ-358

Felipe Almanza
TrafFix Devices Inc.
160 La Pata
San Clemente CA

Dear Mr. Almanza:

This letter is in response to your November 17, 2017 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-358 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:

- TrafFix Water Wall LCD

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 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: TrafFix Water Wall LCD
Type of system: Work Zone Traffic Control Devices
Test Level: MASH Test Level 2
Testing conducted by: KARCO
Date of request: November 29, 2017
Date of completed package: November 29, 2017

FHWA concurs with 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

This eligibility letter is issued for the subject device as tested. Modifications made to the device are not covered by this letter and will need to be tested in accordance with all recommended tests in AASHTO's MASH as part of a new and separate submittal.

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-358 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,

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:	November 17, 2017	◉ New ○ Resubmission
	Name:	Felipe Almanza	
	Company:	TrafFix Devices Inc.	
	Address:	160 La Pata San Clemente CA	
	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	◉ Physical Crash Testing ○ Engineering Analysis	TrafFix Water Wall LCD	AASHTO MASH	TL2

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:	Felipe Almanza	Same as Submitter ☒
Company Name:	TrafFix Devices Inc.	Same as Submitter ☒
Address:	160 La Pata San Clemente CA	Same as Submitter ☒
Country:	United States	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.		
TrafFix Devices Inc. and Karco Engineering LLC share no financial interests between the two organizations. This includes no shared financial interest but not limited to: i. Compensation included 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 Water Wall is a Longitudinal Channelizing Device (LCD) used to provide a clear visual indication of the intended travel path through a construction zone. The individual pinned modules create a continuous unobstructed longitudinal wall without gaps that would allow pedestrians or motor vehicle to pass through. It is free standing, does not require anchoring to the road surface, and can be used on concrete, asphalt, gravel, and dirt surfaces. The surfaces used for these tests were concrete and dirt. The TrafFix Water Wall LCD consists of a series of individual water filled modules that are connected to adjacent modules creating a continuous longitudinal wall of up to infinite length. Adjoining modules can rotate up to 30 degrees from straight at the connection, allowing the LCD wall to contour to varying road curvature. Individual modules have overall dimensions of 73.0 in (1.85 m) long, pin to pin X 18.0 in (0.46 m) wide X 32.0 in (0.81 m) tall. An empty module weighs approx. 75 lbs. (34 kg) and 1,000 lbs. (454 kg) when filled with water. The modules are manufactured from UV stabilized polyethylene. Orange and white modules were the as tested colors, but the product may be produced in other colors. The modules are designed with knuckles at the ends which contain a series of vertically aligned concentric holes that allow a steel t-pin to be inserted to connect adjacent modules together. When modules are pinned together there are a total of eight knuckles aligned with the steel t-pin inserted. This provides a positive connection between adjacent modules.
The TrafFix Water Wall is not intended to function as a barrier but instead is designed and tested to provide clear visual indication of the intended traveled path through construction zones.

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:	Robert L. Ramirez	
Engineer Signature:	Robert Ramirez — Digitally signed by Robert Ramirez DN: cn=Robert Ramirez, o=KARCO Engineering, ou=Project Engineer, email=rramirez@karco.com, c=US Date: 2017.11.27 09:31:18 -08'00'	
Address:	9270 Holly Rd. Adelanto, CA 92301	Same as Submitter ☐
Country:	United States	Same as Submitter ☐

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
2-90 (1100C)	The TrafFix Longitudinal Channelizing Device (LCD) was angled 25° from the direction of the impacting vehicle. The test was conducted using a commercially available 2013 Kia Rio 4-door sedan with a test inertial mass of 2,430.5 lbs. (1,102.5 kg). The vehicle was in good condition, was free of major body damage, and was not missing any structural components. The bumpers were standard equipment and were not modified for this test. Based on CarFax reporting there was no recorded history of major accidents, was not a salvage titled vehicle, not involved in flooding, or fire. The test vehicle impacted the LCD at a velocity of 45.73 mph (73.60 km/hr) and at an impact angle of 25.9°. The as tested TrafFix LCD consisted of 25 water filled modules pinned together measuring 153 ft. (47 m) long, pin to pin. Upon initial contact with the first module the vehicle moved forward, impacted the adjacent module causing the module to rupture and disperse the contained water. The vehicle gated through the traffic side of the LCD and was brought to a controlled stop 93.2 ft. (28.4 m) longitudinally (downstream) and 83.0 ft. (25.3 m) toward the non-traffic side from the initial point of contact. The vehicle remained upright throughout the impact event. The test vehicle's occupant compartment was not penetrated and there was no measurable in cab deformation. The maximum roll and pitch angle did not exceed 75° and occupant risk values were within limits per MASH specifications for Occupant Impact Velocity (OIV) and Ridedown Acceleration (RA).	PASS

Required Test Number	Narrative Description	Evaluation Results
2-91 (2270P)	The TrafFix Water Wall Longitudinal Channelizing Device (LCD) was angled 25° from the direction of the impacting vehicle. The test was conducted using a commercially available 2012 RAM 1500 4-door pickup truck with a test inertial mass of 5,002.3 lbs. (2,269.0 kg). The vehicle was in good condition, was free of major body damage, and was not missing any structural components. The bumpers were standard equipment and were not modified for this test. Based on CarFax reporting there was no recorded history of major accidents, was not a salvage titled vehicle, not involved in flooding, or fire. The test vehicle impacted the LCD at a velocity of 44.97 mph (72.37 km/hr) and at an impact angle of 25.4°. The as tested TrafFix LCD consisted of 25 water filled modules pinned together measuring 153 ft. (47 m) long, pin to pin. Upon initial contact with the first module the vehicle moved forward, impacted the adjacent module causing the module to rupture and disperse the contained water. The vehicle gated through the traffic side of the LCD and was brought to a controlled stop 73.5 ft. (22.4 m) longitudinally (downstream) and 19.4 ft. (5.9 m) toward the non-traffic side from the initial point of contact. The vehicle remained upright throughout the impact event. The test vehicle's occupant compartment was not penetrated and there was no measurable in cab deformation. The maximum roll and pitch angle did not exceed 75° and occupant risk values were within limits per MASH specifications for Occupant Impact Velocity (OIV) and Ridedown Acceleration (RA).	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, LLC.	
Laboratory Signature:	Alex Beltran — Digitally signed by Alex Beltran DN: cn=Alex Beltran, o=KARCO Engineering, ou=Testing Laboratory, email=abeltran@karco.com, c=US Date: 2017.11.27 14:05:48 -08'00'	
Address:	9270 Holly Rd. Adelanto CA 92301	Same as Submitter ☐
Country:	United States	Same as Submitter ☐
Accreditation Certificate Number and Dates of current Accreditation period :	December 18, 2015 - December 18, 2017	

Submitter Signature*: Felipe Almanza — Digitally signed by Felipe Almanza DN: cn=Felipe Almanza, o=Traffix Devices Inc., ou, email=falmanza@traffixdevices.com, c=US Date: 2017.11.29 11:52:45 -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		
Number	Date	Key Words

SECTION 4

MASH TEST 2-90 SUMMARY

Test Article:	TrafFix Devices LCD Wall	Project No.	P36117-01
Test Program:	MASH 2-90	Test Date:	05/19/16

SEQUENTIAL PHOTOGRAPHS

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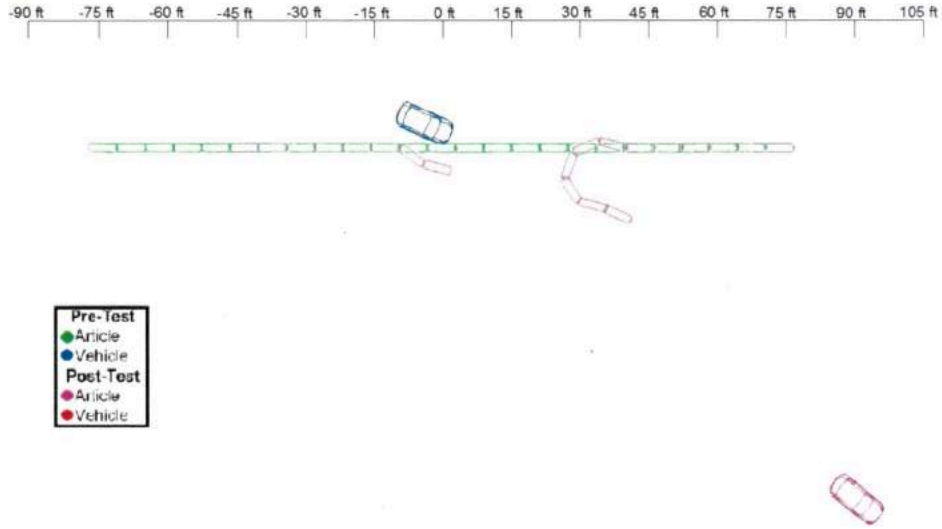
PLAN VIEW



SECTION 4 ... (CONTINUED)

MASH TEST 2-90 SUMMARY

Test Article: TrafFix Devices LCD Wall Project No. P36117-01

Test Program: MASH 2-90 Test Date: 05/19/16

GENERAL INFORMATION	
TEST AGENCY	KARCO Engineering, LLC.
TEST NUMBER	P36117-01
TEST DESIGNATION	2-90
TEST DATE	5/19/16
TEST ARTICLE	
NAME / MODEL	LCD Wall
TYPE	Longitudinal Channelizer
KEY ELEMENTS	Water Barricades, Drop T-Pins
ARTICLE LENGTH	72.0 in. (1,823 mm)
TOTAL INSTALLATION LENGTH	153.5 ft. (46.8 m)
HEIGHT	32.0 in. (813 mm)
MAXIMUM WIDTH	18.0 in. (457 mm)
ROAD SURFACE	Concrete
TEST VEHICLE	
TYPE / DESIGNATION	1100C
YEAR, MAKE AND MODEL	2013 Kia Rio
CURB MASS	2,555.2 lbs (1,159.0 kg)
TEST INERTIAL MASS	2,430.5 lbs (1,102.5 kg)
GROSS STATIC MASS	2,603.7 lbs (1,181.0 kg)
IMPACT CONDITIONS	
IMPACT VELOCITY	45.73 mph (73.60 km/h)
IMPACT ANGLE	25.9°
IMPACT LOCATION / ORIENTATION	3.5 ft. (1.1 m) upstream from the joint connecting module 13 and 14

EXIT CONDITIONS		
EXIT VELOCITY		14.49 mph (23.32 km/h)
EXIT ANGLE		
VEHICLE STABILITY		Satisfactory
FINAL VEHICLE POSITION		93.2 ft. (28.4 m) downstream, 83.0 ft. (25.3 m) towards non-traffic side.
VEHICLE SNAGGING		None
VEHICLE POCKETING		None
MAXIMUM ROLL ANGLE		-17.3°
MAXIMUM PITCH ANGLE		-16.2°
MAXIMUM YAW ANGLE		41.5°
KINETIC ENERGY		169.9 kip-ft (230.4 kJ)
OCCUPANT RISK VALUES		
OCCUPANT IMPACT VELOCITY	Longitudinal	26.9 ft/s (8.2 m/s)
	Lateral	3.3 ft/s (1.0 m/s)
RIDEDOWN ACCELERATION	Longitudinal	-5.5 g
	Lateral	3.0 g
THIV		27.2 ft/s (8.3 m/s)
PHD		5.8 g
ASI		0.61
TEST ARTICLE DEFLECTIONS		
WORKING WIDTH		
DYNAMIC DEFLECTION		
ARTICLE DAMAGE		Damage to Modules 13 through 17.
VEHICLE DAMAGE		
VEHICLE DAMAGE SCALE		1-FR-1
COLLISION DAMAGE CLASSIFICATION		01FREW1

SECTION 4

MASH TEST 2-91 SUMMARY

Test Article:	TrafFix Devices LCD Wall	Project No.	P36118-01
Test Program:	MASH 2-91	Test Date:	05/20/16

SEQUENTIAL PHOTOGRAPHS

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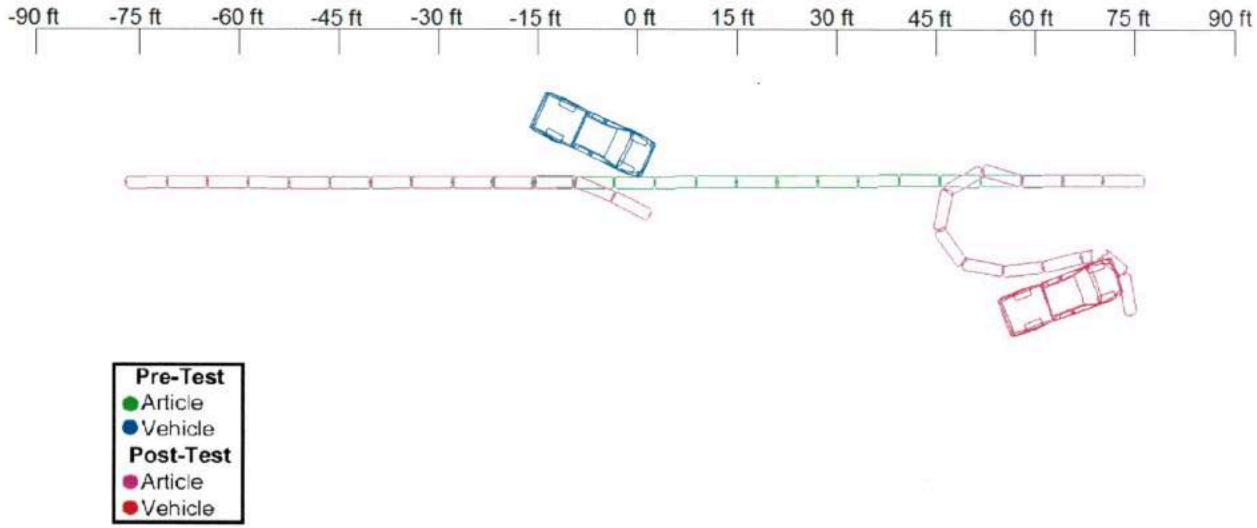
PLAN VIEW



SECTION 4 ... (CONTINUED)

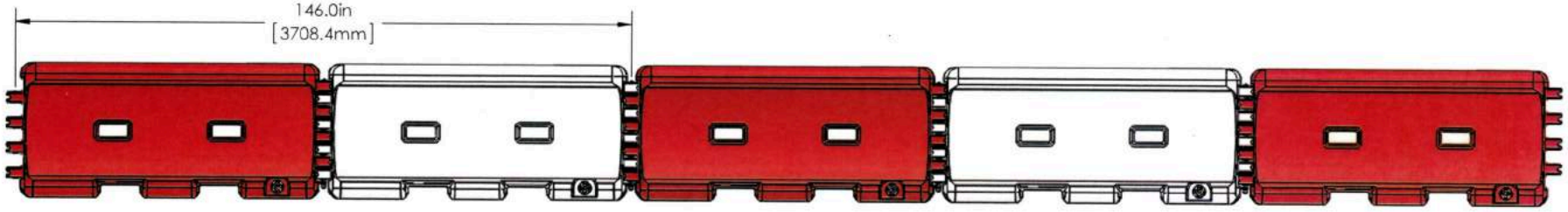
MASH TEST 2-91 SUMMARY

Test Article: TrafFix Devices LCD Wall Project No. P36118-01

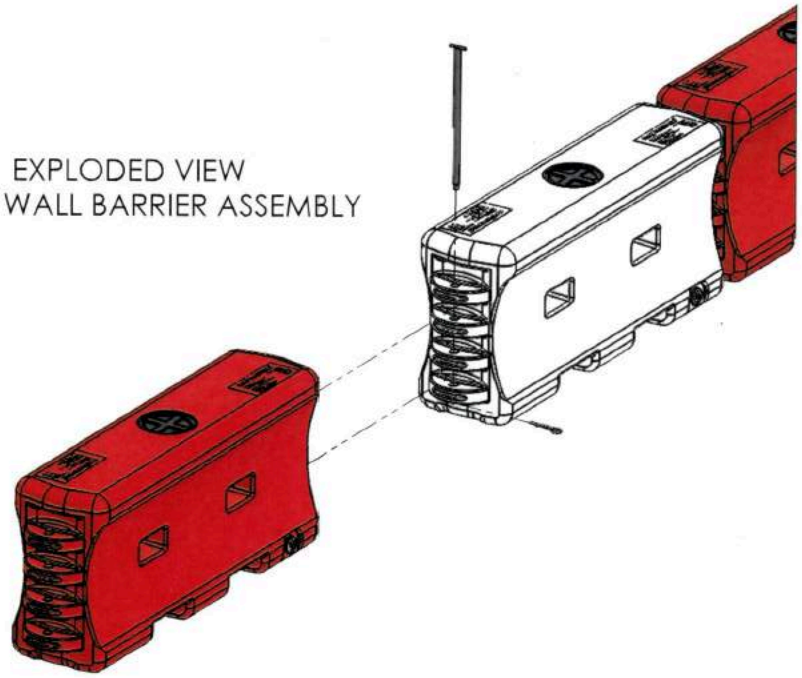
Test Program: MASH 2-91 Test Date: 05/20/16

GENERAL INFORMATION	
TEST AGENCY	KARCO Engineering, LLC.
TEST NUMBER	P36118-01
TEST DESIGNATION	2-91
TEST DATE	5/20/16
TEST ARTICLE	
NAME / MODEL	LCD Wall
TYPE	Longitudinal Channelizer
KEY ELEMENTS	Water Barricades, Drop T-Pins
ARTICLE LENGTH	73.0 in. (1,854 mm)
TOTAL INSTALLATION LENGTH	153.2 ft. (46.7 m)
HEIGHT	32.0 in. (813 mm)
MAXIMUM WIDTH	18.0 in. (457 mm)
ROAD SURFACE	Concrete
TEST VEHICLE	
TYPE / DESIGNATION	2270P
YEAR, MAKE AND MODEL	2012 RAM 1500
CURB MASS	4,977.9 lbs (2,258.0 kg)
TEST INERTIAL MASS	5,002.3 lbs (2,269.0 kg)
GROSS STATIC MASS	5,002.3 lbs (2,269.0 kg)
IMPACT CONDITIONS	
IMPACT VELOCITY	44.97 mph (72.37 km/h)
IMPACT ANGLE	25.4°
IMPACT LOCATION / ORIENTATION	2.9 ft. (0.9 m) upstream from the joint connecting module 13 and 14

EXIT CONDITIONS		
EXIT VELOCITY		N/A
EXIT ANGLE		N/A
VEHICLE STABILITY		Satisfactory
FINAL VEHICLE POSITION		73.5 ft. (22.4 m) downstream, 19.4 ft. (5.9 m) towards non-traffic side.
VEHICLE SNAGGING		None
VEHICLE POCKETING		None
MAXIMUM ROLL ANGLE		-15.0°
MAXIMUM PITCH ANGLE		4.8°
MAXIMUM YAW ANGLE		6.6°
KINETIC ENERGY		338.2 kip-ft (458.5 kJ)
OCCUPANT RISK VALUES		
OCCUPANT IMPACT VELOCITY	Longitudinal	21.3 ft/s (6.5 m/s)
	Lateral	2.3 ft/s (0.7 m/s)
RIDEDOWN ACCELERATION	Longitudinal	-3.4 g
	Lateral	2.0 g
THIV		21.3 ft/s (6.5 m/s)
PHD		3.6 g
ASI		0.37
TEST ARTICLE DEFLECTIONS		
WORKING WIDTH		N/A
DYNAMIC DEFLECTION		N/A
ARTICLE DAMAGE		Damage to Modules 13 through 17.
VEHICLE DAMAGE		
VEHICLE DAMAGE SCALE		1-FD-2
COLLISION DAMAGE CLASSIFICATION		01FDEW1



EXPLODED VIEW
WATER WALL BARRIER ASSEMBLY

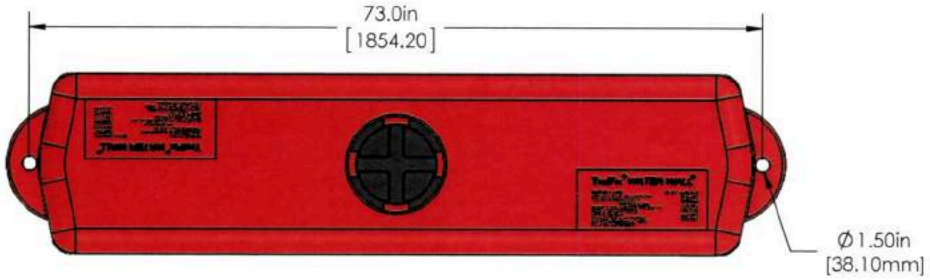


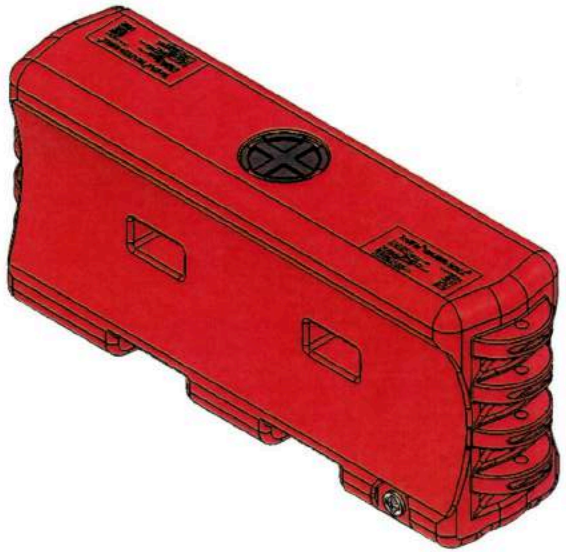
UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES [mm]

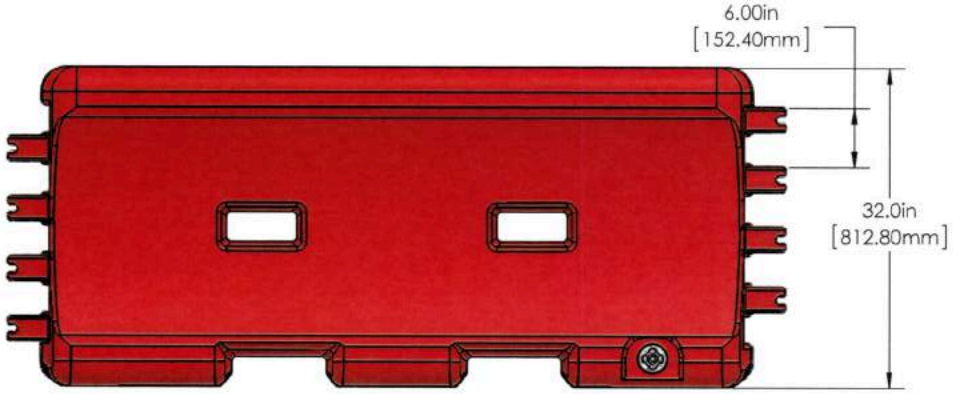
TrafFix Devices Inc.
160 Avenida La Pata
San Clemente, CA 92673
(949) 361-5663
FAX (949) 361-9205
www.traffixdevices.com

TITLE:
TL-1 & TL-2
TrafFix Water Wall
Array

DRAWN BY: Christopher Jaime	DATE: 01/07/16	SIZE: B	DWG. NO. 300-233
CHECKED BY: FA	DATE: 01/07/16		REV: C
APPROVED BY: FA	DATE: 01/07/16		SHEET 1 OF 2







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

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES [mm]

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

TITLE:

TL-1 &TL-2
TrafFix Water Wall

DRAWN BY: Christopher Jaime	DATE: 01/07/16	SIZE: B	DWG. NO.: 300-233
CHECKED BY: FA	DATE: 01/07/16		REV: C
APPROVED BY: FA	DATE: 01/07/16		SHEET 2 OF 2