

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

February 1, 2017

In Reply Refer To: HSST-1/B-271

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

Dear Mr. Almanza:

This letter is in response to your September 26, 2016 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 B-271 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:

MASH TrafFix Water Wall TL-1

#### 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 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: MASH TrafFix Water Wall

Type of system: Longitudinal Barrier Test Level: MASH Test Level 1 (TL1)

Testing conducted by: KARCO Date of request: September 28, 2016

Date initially acknowledged: October 2, 2016 Date of completed package: December 16, 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.

Any user or agency relying on this eligibility letter is expected to use the same designs, specifications, drawings, installation and maintenance instructions as those submitted for review.

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 AASHTO 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 B-271 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,

Scott T. Johnson

Acting Director, Office of Safety

Secto TI. Jhusan

Technologies

Office of Safety

Enclosures

# Request for Federal Aid Reimbursement Eligibility of Highway Safety Hardware

	Date of Request:	September 26, 2016	New	
	Name:	Felipe Almanza		
ter		TrafFix Devices Inc.		
Submitter	Address:	160 Avenida La Pata		
	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

1-1-1

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'B': Rigid/Semi-Rigid Barriers (Roadside, Median, Bridge Railings)	AND THE RESERVE OF THE PERSON	MASH TrafFix Water Wall TL-1	AASHTO MASH	TL1

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 Avenida La Pata	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;

Same as Submitter

## PRODUCT DESCRIPTION

New Hardware or Significant Modification	Modification to Existing Hardware		
from roadside obstacles while puthe personnel in the work zone.	-1 is a longitudinal barrier designed to c roviding positive protection and separa The MASH TrafFix Water Wall is free sta concrete, asphalt, gravel, and dirt surfa	tion between t anding, does no	he traveling public and ot require anchoring to
A water wall system consists of a	series of individual water filled module parrier wall. Adjoining modules can rota		
Individual modules have overall tall. An empty module weights a modules are manufactured from and white barrier modules were Permanently molded within the designed with knuckles at the er steel t-pin to be inserted to conra total of eight knuckles aligned adjacent modules.	dimensions of 73 in (1.9 m) long, pin to approx. 90 lbs. (41 kgs) and 1070.3 lbs. (42 kgs) and 1070.3 lbs. (42 kgs) and 1070.3 lbs. (42 kgs) and 1070.3 lbs. (43 kgs) and 1070.3 lbs. (41 kgs) and 1070.3 lbs. (42 kgs) and 1070.3 lbs. (43 kgs) and 1	485.5 kgs) whe is orange and verticed in control of the produced in control of the produced in concent modules are pingles a positive control of the produced in the produced	n filled with water. The white in color. Orange other colors. The modules are tric holes that allow a nned together there are connection between
	CRASH TESTING		
all of the critical and relevant cra	r affiliated with the testing laboratory, a sh tests for this device listed above were nined that no other crash tests are nece	e conducted to	meet the MASH test
Engineer Name:	Balbino A. Beltran		
Engineer Signature:	Balbino A. Beltran	Digitally signed by Balbin DN: cn=Balbino A. Beltran email=abeltran@karco.co Date: 2016.09.23 18:27:41	n, o=KARCO Engineering, LLC., ou, m, c=US
Address:	9270 Holly Road, Adelanto CA 92301		Same as Submitter

A brief description of each crash test and its result:

United States

Address: Country:

		Page 3 of 5
Required Test Number	Narrative Description	Evaluation Results
1-10 (1100C)	The TrafFix Water Wall was angled 25° from the direction of the impacting vehicle. The side angle impact examines the barrier's ability to contain, re-direct, or bring the vehicle to a controlled stop. The vehicle should not penetrate the installation while controlled lateral deflection of the test article is acceptable.  The test was conducted using a commercially available 2013 Kia Rio 4-door sedan with a test inertial mass of 2,428.3 lbs (1,110.5 kg). The test vehicle impacted the barrier at a velocity of 32.45 mph (52.22 km/hr) and at an impact angle of 24.7°. The as tested MASH Water Wall TL-1 consisted of 25 water filled modules pinned together measuring 151.8 ft (46.3 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, dispersing the contained water, simultaneously engaging and tightening the internal molded-in cable barrier. The vehicle was contained on the traffic side of the barrier and was brought to a controlled stop 46.3 ft. (14.1 m) longitudinally (downstream) and 2.3 ft. (0.7 m) lateral (toward non traffic side) from the initial point of contact. The barrier had a maximum working width of 8.9 ft (2.7 m) and a maximum dynamic deflection of 6.9 ft. (2.1 m).  The vehicle remained upright throughout the impact event. The test vehicle's occupant compartment was not penetrated and there was no measureable 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

		Page 4 of 5
Required Test Number	Narrative Description	Evaluation Results
1-11 (2270P)	The TrafFix Water Wall was angled 25° from the direction of the impacting vehicle. The side angle impact examines the barrier's ability to contain, re-direct, or bring the vehicle to a controlled stop. The vehicle should not penetrate the installation while controlled lateral deflection of the test article is acceptable.  The test was conducted using a commercially available 2012 RAM 1500 4-door with a test inertial mass of 5,021.0 lbs. (2,277.5 kg). The test vehicle impacted the barrier at a velocity of 31.21 mph (50.23 km/hr) and at an impact angle of 24.9°. The as tested MASH Water Wall TL-1 consisted of 25 water filled modules pinned together, measuring 151.8 ft. (46.3 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, dispersing the contained water, simultaneously engaging and tightening the internal molded-in cable barrier. The vehicle was contained on the traffic side of the barrier and was brought to a controlled stop 42.8 ft. (13.0 m) longitudinally (downstream) and 16.7 ft. (5.1 m) lateral (toward non traffic side) from the point of impact. The barrier had a maximum working width of 18.7 ft. (5.7 m) and a maximum dynamic deflection of 17.1 ft. (5.2 m).  The vehicle remained upright throughout the impact event. The test vehicle's occupant compartment was not penetrated and there was no measureable 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
1-20 (1100C)	Test for transition is not applicable for the MASH TrafFix Water Wall TL-1.	Non-Relevant Test, not conducted
1-21 (2270P)	Test for transition is not applicable for the MASH TrafFix Water Wall TL-1.	Non-Relevant Test, not conducted

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:	Balbino A. Beltran  Digitally signed by Balbino A. Beltran Dix cn=Balbino A. Beltran, o=KARCO Eng email-abeltran@karco.com, c=US Date: 2016.09.23 18:28:22-07'00'		, o=KARCO Engineering, LLC., ou, m, c=US
Address:	9270 Holly Road, Adelanto CA 92301		Same as Submitter
Country:	United States		Same as Submitter
Accreditation Certificate Number and Dates of current Accreditation period:	ent TL-371; December 18, 2015 through December 18, 2017		17

Submitter Signature\*: Felipe almong

Digitally signed by Felipe Almanza
DN: cn=Felipe Almanza, o=Traffix Devices
Inc., ou,
email=falmanza@traffixdevices.com, c=US

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:

Eligibil	ity Letter		
Number	Date	Key Words	

## **SECTION 4**

## **MASH TEST 1-10 SUMMARY**

Test Article: TrafFix Devices Water Cable Barrier Project No. P36145-01

Test Program: MASH 1-10 Test Date: 05/20/16

## **SEQUENTIAL PHOTOGRAPHS**











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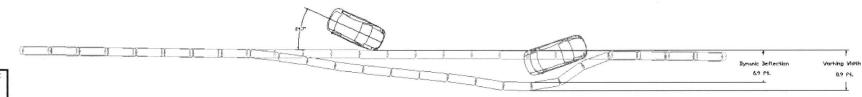
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## **PLAN VIEW**

-90 ft -75 ft -60 ft -45 ft -30 ft -15 ft 0 ft 15 ft 30 ft 45 ft 60 ft 75 ft 90 ft 105 ft



Pre-Test
Article
Vehicle
Post-Test
Article
Vehicle

## SECTION 4 ... (CONTINUED) MASH TEST 1-10 SUMMARY

Test Article:	TrafFix Devices Water Cable Barrier	Project No.	P36145-01
Test Program:	MASH 1-10	Test Date:	05/20/16

GENERA	EXIT CONDITIONS				
TEST AGENCY	KARCO Engineering, LLC.	EXIT VELOCITY		N/A	
TEST NUMBER	P36145-01	EXIT ANGLE	i.	N/A	
TEST DESIGNATION	1-10	VEHICLE STABILITY		Satisfactory	
TEST DATE	5/20/16	FINAL VEHICLE POS	SITION	46.3 ft. (14.1 m) downstream and 2.3 ft. (0.7 m) toward the non-traffic side	
TES	ST ARTICLE	VEHICLE SNAGGING	3	None	
NAME / MODEL	Water Cable Barrier	VEHICLE POCKETIN	IG	None	
TYPE	Longitudinal Barrier	MAXIMUM ROLL AN	GLE	-8.5°	
KEY ELEMENTS	Water Bersier Internal Cables Bare T Bire	MAXIMUM PITCH AN	NGLE	1.8°	
RET ELEMENTS	Water Barrier, Internal Cables, Drop T-Pins	MAXIMUM YAW AND	GLE	-15.7°	
MODULE LENGTH	73.0 in. (1,854 mm)	IMPACT SEVERITY		14.9 kip-ft (20.2 kJ)	
TOTAL INSTALLATION LENGTH	152.7 ft. (46.6 m)	OCCUPANT RISK VALUES		NT RISK VALUES	
HEIGHT	32.0 in. (813 mm)	OCCUPANT IMPACT	Longitudinal	17.4 ft/s (5.3 m/s)	
MAXIMUM WIDTH	18.0 in. (457 mm)	VELOCITY	Lateral	6.6 ft/s (2.0 m/s)	
ROAD SURFACE	Concrete	RIDEDOWN	Longitudinal	-1.9 g	
TES	ST VEHICLE	ACCELERATION	Lateral	-1.4 g	
TYPE / DESIGNATION	1100C	THI	j	18.0 ft/s (5.5 m/s)	
YEAR, MAKE AND MODEL	2013 Kia Rio	PHC	)	2.0 g	
CURB MASS	2,588.1 lbs (1,174.0 kg)	ASI		0.40	
TEST INERTIAL MASS	2,428.3 lbs (1,101.5 kg)		TEST ARTI	CLE DEFLECTIONS	
GROSS STATIC MASS	2,590.4 lbs (1,175.0 kg)	WORKING WIDTH		8.9 ft. (2.7 m)	
IMPACT CONDITIONS		DYNAMIC DEFLECTION		6.9 ft. (2.1 m)	
IMPACT VELOCITY	32.45 mph (52.22 km/h)	ARTICLE DAMAGE		Module 13 Ruptured, Cosmetic Damage to Module 14 through 21	
IMPACT ANGLE	24.7°	24.7° VEHICLE DAMAGE		CLE DAMAGE	
IMPACT LOCATION / ORIENTATION	3.5 ft. (1.1 m) upstream from the joint connecting	VEHICLE DAMAGE S	SCALE	1-FRQ-1	
INIT ACT ECCATION / ORIENTATION	modules 13 and 14	COLLISION DAMAGE	CLASSIFICATION	ON 01FZEW1	

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## **SECTION 4**

## **MASH TEST 1-11 SUMMARY**

Test Article:	TrafFix Devices Water Cable Barrier	Project No.	P36064-01
Test Program:	MASH 1-11	Test Date:	03/14/16

## **SEQUENTIAL PHOTOGRAPHS**











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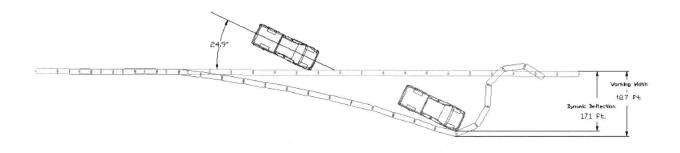
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## **PLAN VIEW**

45 ft -90 ft -75 ft -60 ft -45 ft -30 ft -15 ft 0 ft 15 ft 30 ft 75 ft 90 ft 105 ft 120 ft 135 ft 150 ft 165 ft 60 ft



Pre-Test
Article
Vehicle
Post-Test
Article
Vehicle
Debris

## SECTION 4 ... (CONTINUED) MASH TEST 1-11 SUMMARY

Test Article:	TrafFix Devices Water Cable Barrier	Project No.	P36064-01
Test Program:	MASH 1-11	Test Date:	03/14/16

GENERAL INFORMATION		EXIT CONDITIONS		
TEST AGENCY	KARCO Engineering, LLC.	EXIT VELOCITY		N/A
TEST NUMBER	P36064-01	EXIT ANGLE		N/A
TEST DESIGNATION	1-11	VEHICLE STABILITY		Satisfactory
TEST DATE	3/14/16	FINAL VEHICLE POSITION		42.8 ft. (13.0 m) downstream, 16.7 ft. (5.1 m) toward non-traffic side
TEST ARTICLE		VEHICLE SNAGGING		None
NAME / MODEL	Water Cable Barrier	VEHICLE POCKETING		Yes
TYPE	Longitudinal Barrier	MAXIMUM ROLL ANGLE		-4.5°
KEY ELEMENTS	Water Barrier, Internal Cables, Drop Pins	MAXIMUM PITCH ANGLE		9.3°
		MAXIMUM YAW ANGLE		6.1°
MODULE LENGTH	73.0 in. (1854 mm)	IMPACT SEVERITY		29.0 kip-ft (39.3 kJ)
TOTAL INSTALLATION LENGTH	151.9 ft. (46.3 m)	OCCUPANT RISK VALUES		
HEIGHT	32.0 in. (813 mm)	OCCUPANT IMPACT	Longitudinal	10.8 ft/s (3.3 m/s)
MAXIMUM WIDTH	18.0 in. (457 mm)	VELOCITY	Lateral	5.2 ft/s (1.6 m/s)
ROAD SURFACE	Concrete	RIDEDOWN	Longitudinal	-3.9 g
TEST VEHICLE		ACCELERATION	Lateral	-2.2 g
TYPE / DESIGNATION	2270P	THIV		13.1 ft/s (4.0 m/s)
YEAR, MAKE AND MODEL	2012 RAM 1500	PHD		4.5 g
CURB MASS	5,038.5 lbs (2,285.5 kg)	ASI		0.33
TEST INERTIAL MASS	5,021.0 lbs (2,277.5 kg)	TEST ARTICLE DEFLECTION		CLE DEFLECTIONS
GROSS STATIC MASS	5,021.0 lbs (2,277.5 kg)	WORKING WIDTH		18.7 ft (5.7 m)
IMPACT CONDITIONS		DYNAMIC DEFLECTION		17.1 ft. (5.2 m)
IMPACT VELOCITY	31.21 mph (50.23 km/h)	ARTICLE DAMAGE		Cosmetic Damage to modules 13 through 17
IMPACT ANGLE (°)	24.9		VEHIC	LE DAMAGE
IMPACT LOCATION / ORIENTATION	2.7 ft. (0.8 m) upstream from the joint connecting modules 13 and 14	VEHICLE DAMAGE SCALE		1-FR-1
		COLLISION DAMAGE CLASSIFICATION		01FRLW1

