



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

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

In Reply Refer To:
HSST-1 / B-311

Mr. Felipe Almanza
TraFFix Devices Inc.
160 Avenida La Pata
San Clemente CA 92672

Dear Mr. Almanza:

This letter is in response to your August 10, 2018 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-311 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:

- TraFFix Water Cable Barrier with Water Wall Fence Panels

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: Traffix Water Cable Barrier with Water Wall Fence Panels
Type of system: Longitudinal Barrier
Test Level: MASH Test Level 2 (TL2)
Testing conducted by: KARCO
Date of request: August 10, 2018
Date initially acknowledged: August 14, 2018

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 B-311 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.
- 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:	August 10, 2018	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	Felipe Almanza	
	Company:	TrafFix Devices Inc.	
	Address:	160 Avenida La Pata San Clemente CA 92672	
	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
'B': Rigid/Semi-Rigid Barriers (Roadside, Median, Bridge Railings)	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	TrafFix Water Cable Barrier W/Water Wall Fence Panels	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 <input checked="" type="checkbox"/>
Company Name:	TrafFix Devices Inc.	Same as Submitter <input checked="" type="checkbox"/>
Address:	160 Avenida La Pata San Clemente CA 92672	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 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 Water Cable Barrier (WCB) with Water Wall Fence Panels is a longitudinal barrier designed to contain, redirect, and shield vehicles from roadside obstacles while providing positive protection and separation between the traveling public and the personnel in the work zone. The Traffix WCB with Water Wall Fence panels can be used in TL-1 and TL-2 applications. The barrier system is free standing, does not require anchoring to the road surface, can be used on concrete, asphalt, gravel, and dirt surfaces. The surfaces used for these tests were concrete and dirt. The Traffix WCB can be used with or without the optional Water Wall Fence panels. For these tests the fence panels were included.

A barrier system consists of individual water filled modules with fence panels that are connected to adjacent water filled modules and fence panels creating a continuous barrier wall of unlimited maximum length with a minimum Length Of Need of 13 connected modules. Adjoining modules can rotate up to 30 degrees between the connection with or without the fence panels installed, allowing the barrier wall to contour to varying road curvature.

Individual modules have overall dimensions of approximately 73 in (1.9 m) long, pin to pin X 18 in (0.46 m) wide X 32 in (0.8 m) tall with an empty weight of approximately 90 lbs. (41 kg) and approximately 1,070.3 lbs. (485.5 kg) when filled with water. The modules are manufactured from polyethylene that is UV stabilized. The as tested module colors were orange and white and may be produced in other colors. The modules are designed with four knuckles at each end 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.

Permanently molded within the top three upper knuckles are molded in corrosion resistant cables. The three cables in each module act similarly to a cable barrier when impacted. Upon impact the plastic modules rupture, dispersing the contained water, simultaneously engaging and tightening the internal molded-in cable barrier.

The Traffix WCB was previously tested, passed, and was issued two FHWA Eligibility letters B-271 and B-272. The barrier modules used in this recent test series are identical to the barrier modules tested under B-271 and B-272.

The Water Wall Fence panels are attached to the Water Cable Barrier by inserting a 72.25 in (1.84 m) long drop t-pin through the sides of the fence panels. The fence panels have overall dims. of approximately 74.50 in (1.90 m) X wide 51.75 in (1.31 m) tall.

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 Ramirez	
Engineer Signature:	Robert Ramirez	Digitally signed by Robert Ramirez DN: cn=Robert Ramirez, o=KARCO Engineering, ou=Project Engineer, email=r.ramirez@karco.com, c=US Date: 2018.08.09 17:43:15 -07'00'
Address:	9270 Holly Rd Adelanto, CA 92301	Same as Submitter <input type="checkbox"/>
Country:	United States	Same as Submitter <input type="checkbox"/>

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
2-10 (1100C)	<p>The Traffix Water Cable Barrier (WCB) with Water Wall Fence Panels 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.</p> <p>The test was conducted using a commercially available 2013 Hyundai Accent 4-door sedan with a test inertial mass of 2,401.9 lbs. (1,089.5 kg). The test vehicle impacted the barrier at a velocity of 44.01 mph (70.83 km/hr) and at an impact angle of 25.5°. The as tested MASH Water Cable Barrier with Water Wall Fence Panels consisted of 25 water filled modules and fence panels pinned together measuring 152.1 ft (46.4 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. All fence panels remained attached to the barrier modules throughout the impact event. The vehicle was contained on the traffic side of the barrier and was brought to a controlled stop 23.3 ft (7.1 m) longitudinally (downstream) and 8.9 ft (2.7 m) lateral (toward non-traffic side) from the initial point of contact. The barrier had a maximum working width of 12.1 ft. (3.7 m) and a maximum dynamic deflection of 10.4 ft (3.2 m).</p> <p>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 degrees and occupant risk values were within limits per MASH specifications for Occupant Impact Velocity (OIV) and Ridedown Acceleration (RA).</p>	PASS

Required Test Number	Narrative Description	Evaluation Results
2-11 (2270P)	<p>The Traffix Water Cable Barrier with Water Wall Fence panels was angled 25 degrees 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.</p> <p>The test was conducted using a commercially available 2014 RAM 1500 4-door with a test inertial mass of 5,016.5 lbs. (2,275.5 kg). The test vehicle impacted the barrier at a velocity of 44.71 mph (71.96 km/hr) and at an impact angle of 25.1°. The as tested MASH Water Cable Barrier with Water Wall Fence panel consisted of 25 water filled modules and fence panels pinned together measuring 152.1 ft (46.4 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. All fence panels remained attached to the barrier modules. The vehicle was contained on the traffic side of the barrier and was brought to a controlled stop 27.4 ft (8.4 m) longitudinally (downstream) and 18.4 ft (5.6 m) lateral (toward non-traffic side) from the initial point of contact. The barrier had a maximum working width of 22.7 ft. (6.9 m) and a maximum dynamic deflection of 19.2 ft (5.9 m).</p> <p>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 degrees and occupant risk values were within limits per MASH specifications for Occupant Impact Velocity (OIV) and Ridedown Acceleration (RA).</p>	PASS
2-20 (1100C)	Transition tests are not applicable for this product.	Non-Relevant Test, not conducted
2-21 (2270P)	Transition tests are not applicable for this product.	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:	APPLUS IDIADA KARCO ENGINEERING	
Laboratory Signature:		<small>Digitally signed by Alex Beltran DN: cn=Alex Beltran, o=KARCO Engineering, ou=Testing Laboratory, email=abeltran@karco.com, c=US Date: 2018.08.09 17:42:23 -07'00'</small>
Address:	9270 HOLLY RD ADELANTO CA	Same as Submitter <input type="checkbox"/>
Country:	UNITED STATES	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	TL-371, July 2018 - July 2019	

Submitter Signature*:



Digitally signed by Felipe Almaraz
DN: cn=Felipe Almaraz, o=Traffic Devices
Inc., ou=Engineering,
email=almaraz@trafficdevices.com, c=US
Date: 2018.08.02 14:34:12 -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.

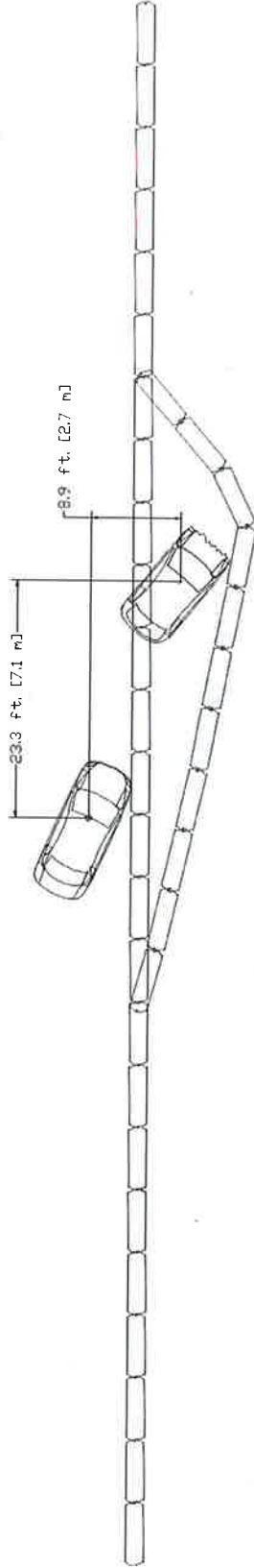
FHWA Official Business Only:

Eligibility Letter		
Number	Date	Key Words

MASH Test 2-10 Summary



0.000 s 0.160 s 0.320 s 0.640 s 1.120 s



General Information	
Test Agency	KARCO Engineering, LLC.
KARCO Test No.	P38064-01
Test Designation	2-10
Test Date	05/09/18
Test Article	
Name / Model	Water Cable Barrier w/ Fence Array
Type	Longitudinal Barrier
Installation Length	152.1 ft. (46.4 m)
Module Length	73.0 in (1854 mm)
Road Surface	Concrete and Soil
Test Vehicle	
Type / Designation	1100C
Year, Make, and Model	2013 Hyundai Accent
Curb Mass	2,491.2 lbs (1,130.0 kg)
Test Inertial Mass	2,401.9 lbs (1,089.5 kg)
Gross Static Mass	2,567.2 lbs (1,164.5 kg)

Impact Conditions	
Impact Velocity	44.01 mph (70.83 km/h)
Impact Angle	25.5°
Location / Orientation	3.3 ft. (1.0 m) upstream from splice
Impact Severity	28.8 kip-ft (39.1 kJ)
Exit Conditions	
Exit Velocity	N/A
Exit Angle	N/A
Final Vehicle Position	23.3 ft (7.1 m) downstream
Vehicle Snagging	8.9 ft. (2.7 m) right
Vehicle Pocketing	None
Vehicle Stability	Yes
Vehicle Roll Angle	Satisfactory
Maximum Roll Angle	-4.7°
Maximum Pitch Angle	-2.5°
Maximum Yaw Angle	14.3°

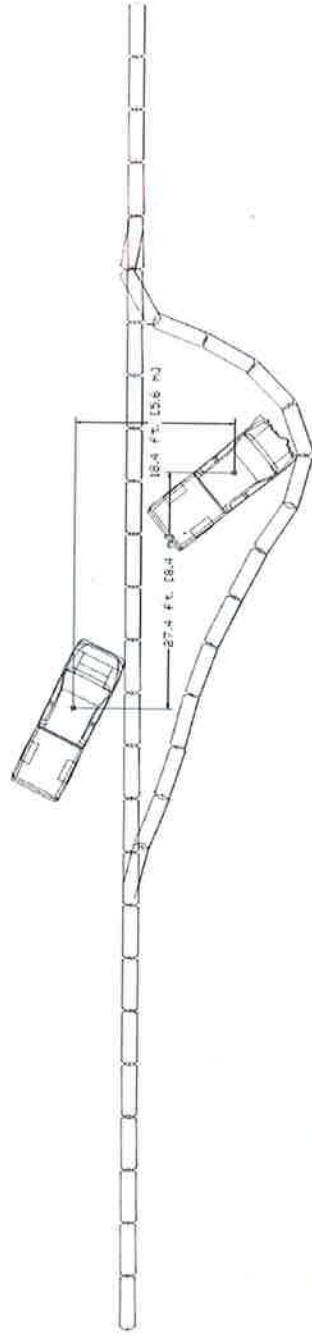
Occupant Risk	
Longitudinal OIV	26.6 ft/s (8.1 m/s)
Lateral OIV	7.9 ft/s (2.4 m/s)
Longitudinal RA	-6.6 g
Lateral RA	2.1 g
THIV	27.6 ft/s (8.4 m/s)
PHD	6.7 g
ASI	0.59
Test Article Deflections	
Static	10.4 ft. (3.2 m)
Dynamic	10.4 ft. (3.2 m)
Working Width	12.1 ft. (3.7 m)
Vehicle Damage	
Vehicle Damage Scale	01-FR-2
CDC	01FREW1
Maximum Intrusion	Negligible

Figure 2 Summary of Test 2-10

MASH Test 2-11 Summary



0.000 s 0.150 s 0.450 s 0.750 s 2.000 s



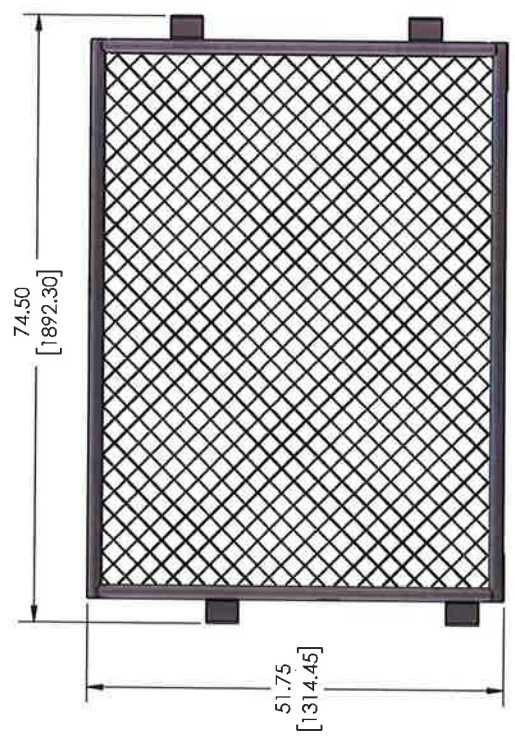
General Information	
Test Agency	KARCO Engineering, LLC.
KARCO Test No.	P38068-01
Test Designation	2-11
Test Date	05/08/18
Test Article	
Name / Model	Water Cable Barrier w/ Fence Array
Type	Longitudinal Barrier
Installation Length	152.1 ft. (46.4 m)
Module Length	73.0 in (1854 mm)
Road Surface	Concrete and Soil
Test Vehicle	
Type / Designation	2270P
Year, Make, and Model	2014 RAM 1500
Curb Mass	4,997.8 lbs (2,267.0 kg)
Test Inertial Mass	5,016.5 lbs (2,275.5 kg)
Gross Static Mass	5,016.5 lbs (2,275.5 kg)

Impact Conditions	
Impact Velocity	44.71 mph (71.96 km/h)
Impact Angle	25.1°
Location / Orientation	2.6 ft. (0.8 m) upstream from splice
Impact Severity	60.3 kip-ft (81.8 kJ)
Exit Conditions	
Exit Velocity	N/A
Exit Angle	N/A
Final Vehicle Position	27.4 ft (8.4 m) downstream
Vehicle Snagging	None
Vehicle Pocketing	Yes
Vehicle Stability	Satisfactory
Maximum Roll Angle	-36.4°
Maximum Pitch Angle	4.8°
Maximum Yaw Angle	19.2°

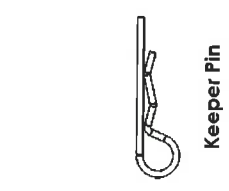
Occupant Risk	
Longitudinal OIV	21.3 ft/s (6.5 m/s)
Lateral OIV	3.3 ft/s (1.0 m/s)
Longitudinal RA	-5.5 g
Lateral RA	3.5 g
THIV	21.7 ft/s (6.6 m/s)
PHD	6.4 g
ASI	0.49
Test Article Deflections	
Static	19.2 ft. ft. (5.9 m)
Dynamic	19.2 ft. (5.9 m)
Working Width	22.7 ft. (6.9 m)
Vehicle Damage	
Vehicle Damage Scale	12-FD-2
CDC	12FDEW1
Maximum Intrusion	Negligible

Figure 2 Summary of Test 2-11

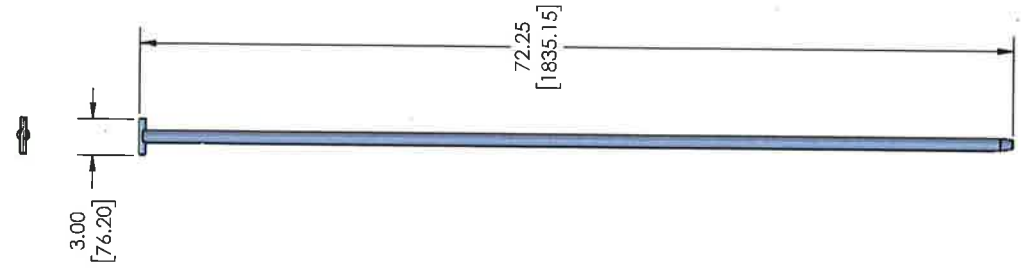
1 2 3 4 5 6 7 8



Fence Panel



Keeper Pin



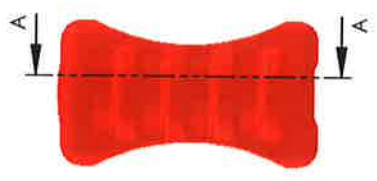
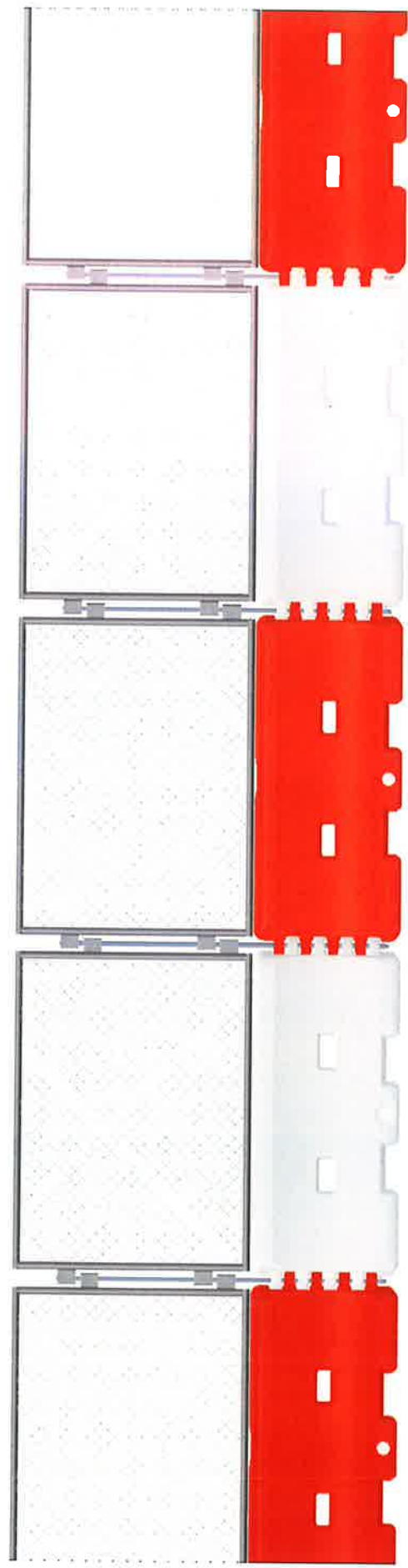
Water Wall Fence-T-Pin

UNLESS OTHERWISE SPECIFIED:
 TOLERANCES: FRACTIONS: XX.X/16 (1.6mm)
 DECIMALS: XXX ± .002

Traffix Devices Inc.
 100 Avenida La Plata
 San Clemente, CA 92673
 TEL: (949) 361-9205
 FAX: (949) 361-9205
 www.traffixdevices.com

TITLE:		Water Wall Fencing Hardware	
SIZE	DWG. NO.	REV	
B	300-302	A1	
DRAWN BY:		DATE:	
Christopher Jame		3/7/18	
CHECKED BY:		DATE:	
FA		3/7/18	
APPROVED BY:		DATE:	
FA		3/7/18	

1 2 3 4 5 6 7 8



TrafficFix WCB Individual Module

SECTION A-A
Section View of TrafficFix WCB Individual Module

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES (mm).

**TrafficFix
Devices Inc.**
160 Avenida La Playa
San Clemente, CA 92673
Tel: (949) 361-5200
Fax: (949) 361-5205
www.trafficdevices.com

TITLE:		TRAFFIX WCB w/ Water Wall Fence Array	
SIZE	DWG. NO.	REV	
B	300-303	A	
DRAWN BY: Christopher Jairo		DATE:	3/9/18
CHECKED BY:		DATE:	
APPROVED BY:		DATE:	3/9/18

NOTES: UNLESS OTHERWISE SPECIFIED

1 2 3 4 5 6 7 8

SHEET 1 OF 1