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

April 20, 2011

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

In Reply Refer To:  
HSST/CC-65F

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

Dear Mr. Almanza:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety device for use on the National Highway System (NHS).

Name of device:	Scorpion Truck Mounted Attenuator on lightweight shadow vehicle
Type of device:	Truck Mounted Attenuator
Test Level:	NCHRP Report 350 Test Level 2
Testing conducted by:	Karco Engineering
Date of request:	November 29, 2010
Complete package Rec'd:	December 1, 2010
Request acknowledged:	December 12, 2010

You requested that we find this system acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

### **Requirements**

Roadside safety devices should meet the guidelines contained in the NCHRP Report 350 or the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH). The FHWA memorandum "Identifying Acceptable Highway Safety Features" of July 25, 1997, provides further guidance on crash testing requirements of longitudinal barriers.

### **Decision**

The following device is found acceptable:

- Test Level 2 Scorpion Truck Mounted Attenuator (TMA) on 4500 kg (9920 lb) shadow vehicle.



**Description**

The Traffix Devices, Inc. Scorpion TMA is a crash cushion which mounts directly to a host vehicle's rigid frame. It is comprised of three sections: (1) steel mounting section; (2) steel back-up section; and (3) aluminum cartridge section.

The steel mounting section provides a rigid attachment for the interface between the TMA and the host vehicle. The steel back-up section provides a structural mounting frame for the pivot location for the TMA to rotate to the vertical stored position when needed for transport. The aluminum cartridge section is comprised of structural energy absorbing curved aluminum tube framework, and three aluminum crush modules. The device has an overall length of 2.885 m (113.6 in) and overall width of 2.406 m (94.7 in). Enclosures 1 through 3 show the above components.

**Crash Testing**

The Scorpion TMA was crash tested by KARCO Engineering according to NCHRP 350 test designation 2-51 guidelines. Occupant impact velocities and occupant risk values were within allowable limits in this test. The test vehicle was not penetrated during the test. Enclosure 4 summarizes the results of test 2-51. In this test a 4497 kg (9914 lb) medium duty truck. It should be noted that the support vehicle roll-ahead distance in test 2-51 was measured 4121 mm (162 in, or 13-1/2 ft). Enclosure 5 illustrates movement of the support truck and deformation of the test article.

**Findings**

The Scorpion TMA described above was previously crash tested and accepted by FHWA for use on the NHS in acceptance letter CC-65 dated on July 14, 2000. In test 2-51 a 9000 kg (19,842 lb) dump truck was used. For this current request letter, a smaller truck (4497 kg) was used for test 2-51. Results of the testing indicate that satisfactory results were obtained.

I concur with your request that the Scorpion TMA can be installed on vehicles weighing a minimum of 4500 kg (9920 lb). One element that highway agencies should be aware of when considering use of this product is the roll-ahead distance of 13-1/2 ft that was observed in the crash test.

Therefore, the device described above and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency.

Please note the following standard provisions that apply to FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is

significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.

- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number CC-65F and 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 at our office upon request.
- Scorpion TMAs are patented products and considered proprietary. If proprietary devices are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS 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.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented device for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate device, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely,



Michael S. Griffith  
Director, Office of Safety Technologies  
Office of Safety

Enclosures

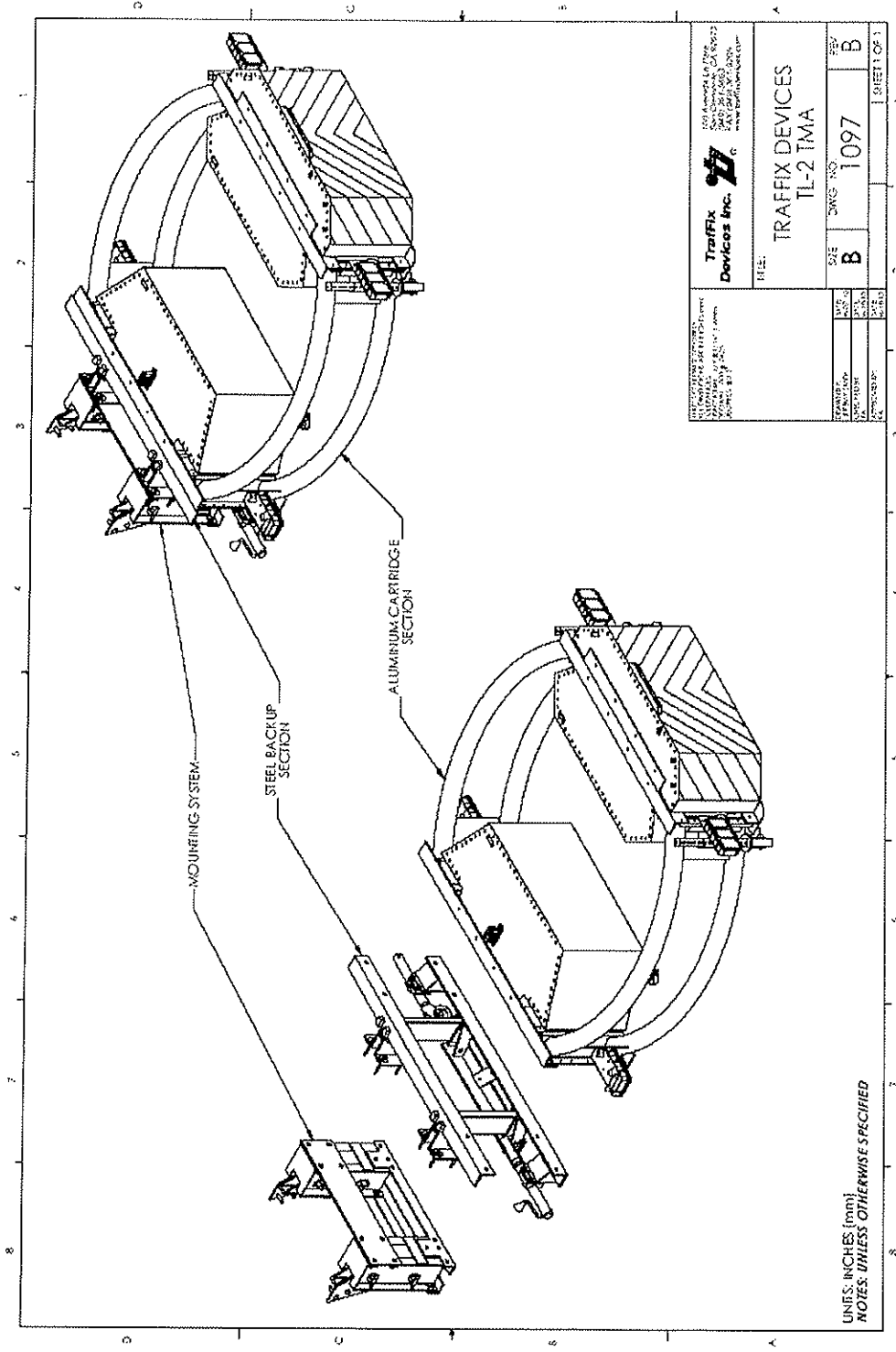


Figure 48: Manufacturer's Drawing

Enclosure 1



DATA SHEET 5

SUMMARY OF RESULTS

Test Article: TrafFix Devices Scorpion Truck Mounted Attenuator Project No.: P30073-01  
 Test Program: NCHRP 350 2-51 Test Date: 06/15/10  
 Test Vehicle: 2000 GMC 2500



GENERAL INFORMATION		OCCUPANT RISK VALUES	
TEST AGENCY	KARCO Engineering, LLC	FLAIL SPACE VELOCITY (m/sec)	
TEST NO.	2-51	X DIRECTION	8.7
DATE	6/15/2010	Y DIRECTION	0.1
TEST ARTICLE		THIV (Optional)	N/A
TYPE	TMA	RIDEDOWN ACCELERATION (g's)	
INSTALLATION LENGTH	N/A	X DIRECTION	-12.8
SIZE AND/OR DIMENSION OF KEY ELEMENTS	Approximately 2.885 meters long and 2.406 meters wide	Y DIRECTION	-3.2
SOIL TYPE AND CONDITION	Concrete	PHD (Optional)	N/A
TEST VEHICLE		ASI (Optional)	N/A
TYPE	Production Model	TEST ARTICLE DEFLECTIONS (m)	
DESIGNATION	2000P	DYNAMIC	N/A
MODEL	GMC 2500	PERMANENT	N/A
MASS (CURB)	2197.5 kg (4845 lbs)	VEHICLE DAMAGE	
MASS (TEST INERTIAL)	2030.0 kg (4475 lbs)	EXTERIOR	
DUMMY MASS	0 kg (0 lbs)	VDS	12-FD-4
MASS (GROSS STATIC)	2030.0 kg (4475 lbs)	CDC	12FDEW2
IMPACT CONDITIONS		INTERIOR	
VELOCITY (km/h)	70.7 km/h (43.9 mph)	OCDI	FS0000000
ANGLE (°)	0.3		
IMPACT SEVERITY (kJ)	383.7	POST-IMPACT VEHICULAR BEHAVIOR	
EXIT CONDITIONS		MAXIMUM ROLL ANGLE (°)	
VELOCITY (km/h)		-4.6	
ANGLE (°)		MAXIMUM PITCH ANGLE (°)	
		-9.0	
		MAXIMUM YAW ANGLE (°)	
		2.9	

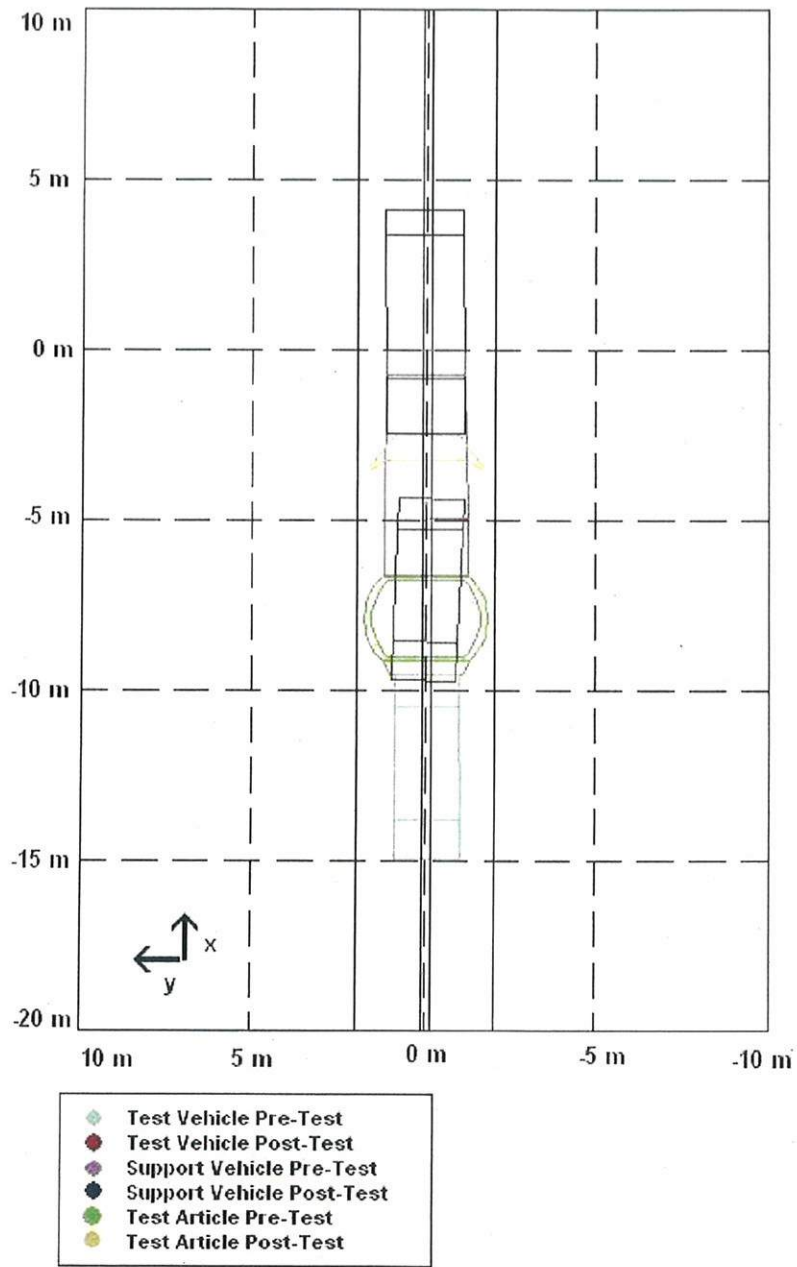


Figure 51: Overhead Illustration

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## Enclosure 5