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

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

May 17, 2018

In Reply Refer To:
HSST-1 / B-286 REVISED

Mr. Adrian Bullock
Highway Care Ltd.
Callow Hill Business Park
Ledbury, Herefordshire
HR8 2PZ

Dear Mr. Bullock:

This letter is in response to FHWA correspondence dated March 15, 2018 in reference to revocation of eligibility letter B-286 dated February 18, 2018. This correspondence serves to reinstate this eligibility letter as B-286 REVISED, as follows.

Your January 23, 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-286 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:

- BarrierGuard 800 MDS

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: BarrierGuard 800 MDS
Type of system: Longitudinal Barrier
Test Level: MASH Test Level 3 (TL3)
Testing conducted by: Safe Technologies, Inc.
Date of request: January 23, 2018
Date initially acknowledged: January 23, 2017

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-286 REVISED 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,

/ Signature of Brian Fouch (for) */*

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:	June 09, 2017	○ New ◉ Resubmission
	Name:	Adrian Bullock	
	Company:	Highway Care Ltd	
	Address:	Callow Hill Business Park, Ledbury, Herefordshire HR8 2PZ	
	Country:	UK	
	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)	◉ Physical Crash Testing ○ Engineering Analysis	BarrierGuard 800, MDS	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:	Adrian Bullock	Same as Submitter ☒
Company Name:	Highway Care Ltd	Same as Submitter ☒
Address:	Callow Hill Business Park, Ledbury, Herefordshire HR8 2PZ	Same as Submitter ☒
Country:	UK	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.		
Safe Technologies Inc. (STI) was the test laboratory used for physical crash testing of this product for this eligibility application, STI has no financial interests in BarrierGuard 800, MDS and has no ownership of the product IP.		

PRODUCT DESCRIPTION

(•) New Hardware or Significant Modification ( ) Modification to Existing Hardware

BarrierGuard 800 MDS is made from a base steel barrier being BarrierGuard 800 which is formed from two step profile, thin gauge sheets of steel being welded together to form a long hollow section, there is then an additional longitudinal steel member fixed to the top the base barrier. The overall dimensions of the barrier section is 540mm wide at the base, 470mm wide at the top and 915mm high. Each longitudinal section can be joined together using a Quicklink hole and pin arrangement or a bolted joint arrangement. These barrier sections are joined together and laid out along the road surface and anchored at 6m intervals to create a longitudinal barrier system (wall).

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:	Joseph Nagy	
Engineer Signature:	Joseph Nagy	Digitally signed by Joseph Nagy Date: 2018.01.23 16:25:52 -08'00'
Address:	170 River Road, Rio Vista, CA 94571	Same as Submitter ☐
Country:	USA	Same as Submitter ☐

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-10 (1100C)	This test was conducted by STI on September 21, 2016 under STI Test number BG1716. The BarrierGuard 800 MDS satisfied the MASH structural adequacy criteria for its intended function as a longitudinal barrier. The test article redirected the 1100C vehicle in a controlled manner. The vehicle did not penetrate, underride, or override the installation. The test article exhibited controlled permanent and dynamic deflection in the test. All of the occupant risk criteria were satisfied in testing the BarrierGuard 800 MDS. Theoretical occupant impact velocities in the longitudinal and lateral directions were well below the preferred limit of 30.0 ft/s (9.6 m/s). Ridedown accelerations in the longitudinal and lateral directions were well below the preferred limit of 15.0 G. There was no test article debris detached during the test. There was no deformation to the occupant compartment of the 1100C test vehicle. There were no intrusions into the occupant compartment. The test vehicle remained upright during and after the collision with minor roll and pitch. The BarrierGuard 800 MDS was judged as satisfying the applicable MASH vehicle trajectory criteria. The barrier was judged to have successfully met all of the evaluation criteria for MASH Test 3-10.	PASS

Required Test Number	Narrative Description	Evaluation Results
3-11 (2270P)	This test was conducted by STI on August 3, 2016, under STI Test No BG1615. The BarrierGuard 800 MDS satisfied the MASH structural adequacy criteria for its intended function as a longitudinal barrier. The test article redirected the 2270P vehicle in a controlled manner. The vehicle did not penetrate, underride, or override the installation. The test article exhibited controlled permanent and dynamic deflection in the test. All of the occupant risk criteria were satisfied in testing the BarrierGuard 800 MDS. Theoretical occupant impact velocities in the longitudinal and lateral directions were well below the preferred limit of 30.0 ft/s (9.6 m/s). Ridedown accelerations in the longitudinal and lateral directions were well below the preferred limit of 15.0 G. There was no test article debris detached during the test. There was no deformation to the occupant compartment of the 2270P test vehicle. There were no intrusions into the occupant compartment. The test vehicle remained upright during and after the collision with minor roll, pitch and yaw. The BarrierGuard 800 MDS was judged as satisfying the applicable MASH vehicle trajectory criteria. The barrier was judged to have successfully met all of the evaluation criteria for MASH Test 3-11.	PASS
3-20 (1100C)	This system is a whole longitudinal barrier wall not a transition.	Non-Relevant Test, not conducted
3-21 (2270P)	This system is a whole longitudinal barrier wall not a transition.	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:	Safe Technologies, Inc.	
Laboratory Signature:	Joseph Nagy Digitally signed by Joseph Nagy Date: 2018.01.23 16:49:11 -08'00'	
Address:	170 River Road, Rio Vista, CA 94571	Same as Submitter ☐
Country:	USA	Same as Submitter ☐
Accreditation Certificate Number and Dates of current Accreditation period :	1851.01 valid to March 31, 2018	

Submitter Signature*: Adrian Bullock Digitally signed by Adrian Bullock Date: 2018.01.23 16:50:45 -08'00'

Submit Form

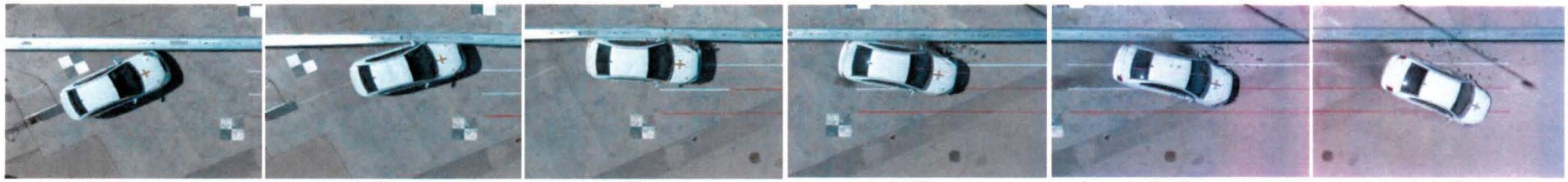
ATTACHMENTS

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



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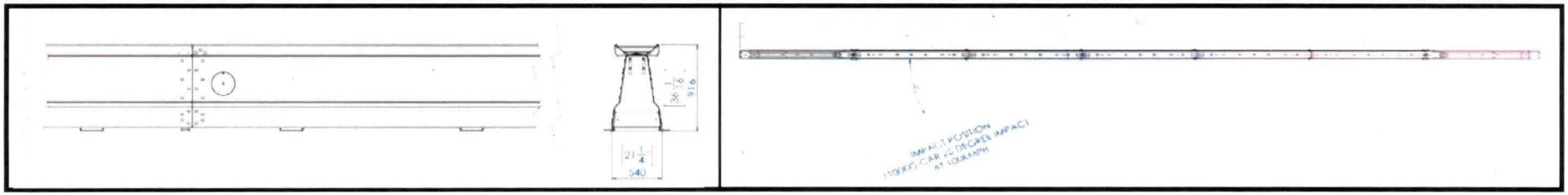


General Information

Test Agency	**SAFE TECHNOLOGIES, INC.**
Test Number	BG1716
Test Designation	MASH 3-10
Date	9/21/2017

Test Article

Name	Highway Care Ltd. - BarrierGuard 800, MDS
Type	Steel Longitudinal Barrier
Installation Length	137.8 ft (42 m)
Segment Length	12 m (39.4 ft) and 6 m (19.7 ft)
Width	540 mm (21.3 in)
Height	916 mm (36.1 in)
Soil Conditions	Impact area on 204 mm (8 in) thk concrete. Up and
Concrete slab and asphalt	downstream of impact area on 89 mm -102 mm (3.5 in – 4 in) thk asphalt over 152 mm (6 in) thk DGA

Test Vehicle

Type / Designation	1100C
Make and Model	2011 Hyundai Accent
Curb Weight	1,096 kg (2,416 lb)
Test Inertial Weight	1,111 kg (2,449 lb)
Gross Static Weight	1,186 kg (2,615 lb)

Impact Conditions

Speed	100.1 kph (62.2 mph)
Angle	25.0 deg
Location / Orientation	Midpoint, 17.2 m (56.4 ft) downstream

Exit Conditions

Speed (mph)	81.1 kph (50.4 mph)
Angle (deg)	9
Exit Box Criterion	Pass

Post Impact Trajectory

Vehicle Stability	Satisfactory
Longitudinal Stopping Distance (CG)	49.2 m (161 ft)
Vehicle Snagging/Pocketing	None

Occupant risk Values

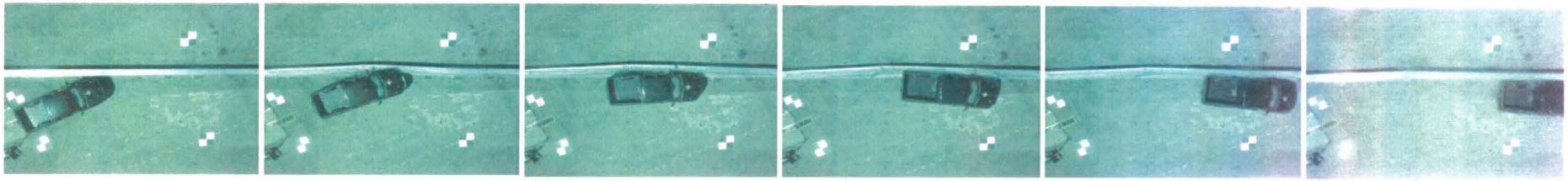
Longitudinal OIV	6.4 m/s (21.0 ft/s)
Lateral OIV	8.0 m/s (26.2 ft/s)
Longitudinal ORA	6.6 g's
Lateral ORA	7.5 g's
THIV	9.9 m/s (32.5 ft/s)
PHD	9.4 g's
ASI	2.05
Test Article Damage:	Moderate

Test Article Deflections

Permanent	0.07 m (0.23 ft)
Dynamic	0.19 m (0.62 ft)
Working Width	0.67 m (2.20 ft)

Vehicle Damage

VDS	11-LFQ-4
CDC	11LFEW2
Maximum Deformation	25.4 mm (1 in) - ceiling



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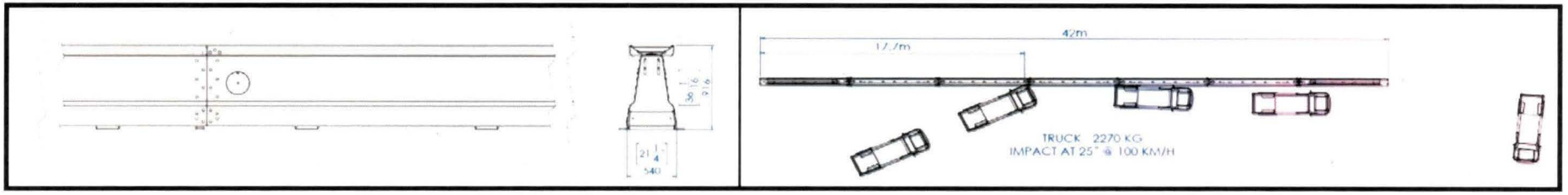

General Information

Test Agency	**SAFE TECHNOLOGIES, INC.**
Test Number	BG1615
Test Designation	MASH 3-11
Date	8/3/2016

Test Article

Name	Highway Care Ltd. - BarrierGuard 800, MDS
Type	Steel Longitudinal Barrier
Installation Length	42 m (137.8 ft)
Segment Length	12 m (39.4 ft)
Width	540 mm (21.3 in)
Height	916 mm (36.1 in)

Soil Conditions

Asphalt	The system was installed on 89 mm -102 mm (3.5"-4") thick asphalt over approximately 152 mm (6") thick dense graded aggregate (DGA).

Test Vehicle

Type / Designation	2270P
Make and Model	2010 Dodge Ram 1500 Quad Cab Pickup
Curb Weight	2,196.5 kg (4,843.3 lbs)
Test Inertial Weight	2,162.0 kg (4,767.2 lbs)
Gross Static Weight	2,254.5 kg (4,972.3 lbs)

Impact Conditions

Speed	101.6 kph (63.1 mph)
Angle	25.0 deg
Location / Orientation	midpoint, 17.7 m (58.1 ft) downstream

Exit Conditions

Speed	75.3 kph (46.8 mph)
Angle (deg)	8
Exit Box Criterion	Pass

Post Impact Trajectory

Vehicle Stability	Satisfactory
Stopping Distance	NA - captured
Vehicle Snagging/Pocketing	None

Occupant risk Values

Longitudinal OIV	5.2 m/s (17.1 ft/s)
Lateral OIV	6.2 m/s (20.3 ft/s)
Longitudinal ORA	6.4 g's
Lateral ORA	9.3 g's
THIV	8.1 m/s (26.6 ft/s)
PHD	10.5 g's
ASI	1.1

Test Article Damage: Moderate

Test Article Deflections

Permanent	0.22 m (0.72 ft)
Dynamic	0.47 m (1.54 ft)
At Base	0.13 m (0.43 ft)
Working Width	1.01 m (3.31 ft)

Vehicle Damage

VDS	11-LFQ-4
CDC	11FLYA3
Maximum Deformation	No interior damage

Appendix A (Continued)
Illustration A-2