June 3, 2020

In Reply Refer To:
HSST-1/ B-294A

Stephan Flapper
Laura Metaal Road Safety
Rimburgerweg 40, 647 XX Kerkrade
Netherlands

Dear Mr. Flapper:

This letter is in response to your May 13, 2020 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 letter supersedes the original letter B-294 for the SafeZone MASH TL-4 Limited Deflection Barrier. This FHWA letter of eligibility is assigned FHWA control number B-294A 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:
- SafeZone MASH TL-4 Limited Deflection

**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: SafeZone MASH TL-4 Limited Deflection  
Type of system: Rigid/Semi-Rigid Barriers  
Test Level: MASH Test Level 4  
Testing conducted by: Crashtest-service.com GmbH  
Date of request: May 13, 2020

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**

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 B-294A 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.

Sincerely,

Michael Griffith
Director, Office of Safety Technologies
Office of Safety

Enclosures
Request for Federal Aid Reimbursement Eligibility
of Highway Safety Hardware

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 L

<table>
<thead>
<tr>
<th>System Type</th>
<th>Submission Type</th>
<th>Device Name / Variant</th>
<th>Testing Criterion</th>
<th>Test Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>'B': Rigid/Semi-Rigid Barriers</td>
<td>Physical Crash Testing</td>
<td>SafeZone MASH TL-4 Limited Deflection</td>
<td>AASHTO MASH</td>
<td>TL4</td>
</tr>
</tbody>
</table>

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:**

<table>
<thead>
<tr>
<th>Contact Name:</th>
<th>Stephan Flapper</th>
<th>Same as Submitter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name:</td>
<td>Laura Metaal Road Safety</td>
<td>Same as Submitter</td>
</tr>
<tr>
<td>Address:</td>
<td>Rimburgerweg 40, 6471 XX Kerkrade</td>
<td>Same as Submitter</td>
</tr>
<tr>
<td>Country:</td>
<td>The Netherlands</td>
<td>Same as Submitter</td>
</tr>
</tbody>
</table>

Enter below all disclosures of financial interests as required by the FHWA 'Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.

With respect to Laura Metaal Road Safety, Crashtest-service.com GmbH does not hold any financial interests. Laura Metaal Road Safety contracted Crashtest-service.com GmbH for the services of crash testing our product SafeZone according to specifications of AASHTO Manual for Assessing Safety Hardware (MASH) Tests 4-10, 4-11 and 4-12. Crashtest-service.com GmbH was compensated for the cost of the crash tests. No consulting relationship, research funding or other forms of research support, patents, copyrights, other intellectual property interests, licenses, contractual relationships, business ownership or investments interests are retained for Crashtest-service.com GmbH.
PRODUCT DESCRIPTION

SafeZone system is a proprietary modular high containment and low deflection steel barrier developed by Laura Metaal Road Safety. It is designed for both permanent and temporary use in construction and roadwork applications. The system is typically deployed in 5.8 m (19') standard sections that can quickly be connected together to form the desired total length of barrier wall.

Joining of the sections is done by linking them together and applying one security bolt per section to keep the sections securely fastened. If desired, two or three sections can remain connected permanently to form 11.6 m (38') or 17.4 m (54') combined sections for quicker placement on the road.

SafeZone is 0.81 m (32") high and 0.45 m (18") wide without anchor units or 0.64 m (25") with anchor units. The weight is approximately 93 kg/m or 62 lbs/ft. For the MASHTL-4 Limited Deflection setup, 7 standard sections were lined up on asphalt, forming a 40.6 m (133 ft) string. The anchor positions used were the two outer positions, the second position on element one and the second position on every second element thereafter.

Threaded rods 0.30 m (11.8") long and 0.030 m (1.18") diameter were used. All anchors were epoxied in asphalt. The dynamic deflection of the MASHTL4-12 test was 0.85 m (33.5") and the permanent deflection was 0.45 m (17.7"). The dynamic working width was 2.17 m (85.4") and the permanent working width was 0.88 m (34.6").

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.

<table>
<thead>
<tr>
<th>Required Test Number</th>
<th>Narrative Description</th>
<th>Evaluation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-10 (1100C)</td>
<td>Test nr. 18648-2. Test report nr. 11775-2887/18648-2 performed 20 April 2017 by Crashtest-Service.com. The 32&quot; high longitudinal barrier contained and redirected the 1100C vehicle. The vehicle did not penetrate, underride or override the installation. Maximum dynamic deflection during the test was 13.8&quot;. No significant parts separated from either vehicle or barrier. No occupant compartment deformation or intrusion occurred. The vehicle remained upright during and after the impact.</td>
<td>PASS</td>
</tr>
<tr>
<td>Required Test Number</td>
<td>Narrative Description</td>
<td>Evaluation Results</td>
</tr>
<tr>
<td>----------------------</td>
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<td>--------------------</td>
</tr>
<tr>
<td>4-11 (2270P)</td>
<td>Test nr. 18933. Test report nr. 11717-3157/18933 performed 23 May 2018 by Crashtest-service.com. The 32&quot; high longitudinal barrier contained and redirected the 2270P vehicle. The vehicle did not penetrate, underride or override the installation. Maximum dynamic deflection during the test was 23.8&quot;. No significant parts separated from either vehicle or barrier. No occupant compartment deformation or intrusion occurred. The vehicle remained upright during and after the impact.</td>
<td>PASS</td>
</tr>
<tr>
<td>4-12 (10000S)</td>
<td>Test nr. 19154 Test report nr. 11717-3401-19154 performed 16 April 2019 by Crashtest-service.com. The 32&quot; high longitudinal barrier contained and redirected the 10000S vehicle. The vehicle did not penetrate, underride or override the installation. Maximum dynamic deflection during the test was 33.5&quot;. No significant parts separated from either vehicle or barrier during impact. No occupant compartment deformation or intrusion occurred. The vehicle remained upright during and after the impact.</td>
<td>PASS</td>
</tr>
<tr>
<td>4-20 (1100C)</td>
<td>Device is stand alone. 4-20 now not relevant</td>
<td>Non-Relevant Test, not conducted</td>
</tr>
<tr>
<td>4-21 (2270P)</td>
<td>Device is stand alone. 4-20 now not relevant</td>
<td>Non-Relevant Test, not conducted</td>
</tr>
<tr>
<td>4-22 (10000S)</td>
<td>Device is stand alone. 4-20 now not relevant</td>
<td>Non-Relevant Test, not conducted</td>
</tr>
</tbody>
</table>

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.):
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:

<table>
<thead>
<tr>
<th>Eligibility Letter</th>
</tr>
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<tbody>
<tr>
<td>Number</td>
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<tr>
<td></td>
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</tbody>
</table>
1. Sequential Photographs

<table>
<thead>
<tr>
<th>0.000 s</th>
<th>0.077 s</th>
<th>0.153 s</th>
<th>0.240 s</th>
<th>0.317 s</th>
</tr>
</thead>
</table>

2. Plan View

3. Cross-Sectional View

4. General Information

- **Test Agency**: crashtest-service.com GmbH (CTS)
- **Test Standard**: MASH Test TL4-10
- **CTS-Test No.**: 18648
- **Date**: April 20, 2017

5. Test Article

- **Type**: Barrier
- **Name**: SafeZone
- **Installation Length**: 40.62 m (1599.2 in)
- **Key Elements - Barrier**:
  - Length: 5.80 m (228.3 in)
  - Base Width: 0.45 m (17.7 in)
  - Height: 0.81 m (31.9 in)

6. Soil Type and Condition

- **Type of Soil**: Asphalt
- **Soil strenght** /
- **Condition**: sunny, dry, 15.2° C (59.36° F)

7. Test Vehicle

- **Type/Designation**: 1100C
- **Make and Model**: 2014 KIA Rio
- **Curb**: 1140 kg (2513 lb)
- **Test Inertial**: 1123 kg (2476 lb)
- **Dummy**: 75 kg (165 lb)
- **Gross Static**: 1198 kg (2641 lb)

8. Impact Conditions

- **Speed**: 102.1 km/h (63.4 mph)
- **Angle**: 25 degrees
- **Location/Orientation**: 1.06 m (41.7 in) before transition of elements III & IV

9. Exit Conditions

- **Speed**: 84 km/h (52 mph)
- **Angle**: 12 degrees

10. Post-Impact Trajectory

- **Vehicle Stability**: Satisfactory
- **Stopping Distance**:
  - Downstream: 42.90 m (1689 in)
  - Lateral: 9.40 m (370 in)

- **Vehicle Snagging**: None
- **Vehicle Pocketing**: None

11. Occupant Risk

- **Impact Velocity**:
  - Longitudinal: 4.72 m/s (15.49 ft/s)
  - Lateral: 7.22 m/s (23.69 ft/s)

- **Ridedown Accelerations (10 msec avg.)**:
  - Longitudinal: -5.37 g
  - Lateral: -14.73 g

12. Test Article Damage

- **Classification**: Moderate
- **particularities**: None

13. Test Article Deflections

- **Dynamic Deflection**: 0.35 m (13.8 in)
- **Permanent Deflection**: 0.24 m (9.4 in)
- **Dynamic Working Width**: 0.89 m (35.0 in)
- **Permanent Working Width**: 0.68 m (26.8 in)

14. Vehicle Damage

- **Classification**: Moderate
- **VDS**: 11LFQ3
- **CDC**: 11FDEW3
- **Max. Exterior Deformation**: 74 mm (2.91 in)
- **Max. Interior Deformation**: 68 mm (2.68 in)
- **OCDI**: LF0000011
Summary of Crash Test Results

1. Sequential Photographs

2. Plan View

3. Cross-Sectional View

4. General Information
   - Test Agency: crash-test-service.com GmbH (CTS)
   - Test Standard: MASH Test TL 4-11
   - CTS Test No: 18933
   - Date: May 23, 2018

5. Test Article
   - Type: Barrier
   - Name: HS1 barrier
   - Installation Length: 40.62 m (1599.2 in)
   - Key Elements - Barrier: Length: 5.80 m (228.3 in), Base Width: 0.45 m (17.7 in), Height: 0.81 m (31.9 in)

6. Soil Type and Condition
   - Type of Soil: Asphalt
   - Soil Strength: / 
   - Condition: Dry, sunny, 26.8°C (80.2°F)

7. Test Vehicle
   - Type/Designation: 2270P
   - Make and Model: 2013 Dodge Ram 1500 Pickup
   - Curb: 2242 kg (4942 lb)
   - Test Inertial: 2280 kg (5027 lb)
   - Dummy: / kg (lb)
   - Gross Static: 2280 kg (5027 lb)

8. Impact Conditions
   - Speed: 98.3 km/h (61.1 mph)
   - Angle: 25 degrees
   - Location/Orientation: 1.56 m (5.12 ft) before transition of elements 3 & 4

9. Exit Conditions
   - Speed: 80.4 km/h (49.99 mph)
   - Angle: 6 degrees

10. Post-Impact Trajectory
    - Vehicle Stability: Satisfactory
    - Stopping Distance: 51.8 m (170 ft) downstream, 4.5 m (14.8 ft) laterally in front
    - Vehicle Snagging: None
    - Vehicle Pockering: None

11. Occupant Risk
    - Impact Velocity
      - Longitudinal: 3.47 m/s (11.4 ft/s)
      - Lateral: 5.78 m/s (19 ft/s)
    - Ridedown Accelerations (10 msec avg.)
      - Longitudinal: -3.59 g
      - Lateral: 8.29 g

12. Test Article Damage
    - Classification: Moderate
    - Particularities: None

13. Test Article Deflections
    - Dynamic Deflection: 0.605 m (23.8 in)
    - Permanent Deflection: 0.250 m (9.8 in)
    - Dynamic Working Width: 1.062 m (41.8 in)
    - Permanent Working Width: 0.650 m (25.6 in)

14. Vehicle Damage
    - Classification: Moderate
    - VDS: 11-LFG-3
    - CDC: 11-FDEW-3
    - Max. Exterior Deformation: 174 mm (6.8 in)
    - Max. Interior Deformation: 48 mm (1.9 in)
    - OCCI: LP0000000
1. Sequential Photographs

2. Plan View

3. Cross-Sectional View

4. General Information

Test Agency: crash-test-service.com GmbH (CTS)
Test Standard: MASH Test TL 4-12
CT-Test No.: 19154
Date: 16-Apr-2019

5. Test Article

Type: Barrier
Name: SafeZone
Installation Length: 40.62 m (1599.2 in)
Key Elements - Barrier Length: 5.80 m (228.3 in)
Height: 0.81 m (31.9 in)

6. Soil Type and Condition

Type of Soil: Asphalt
Soil strength: / 
Condition: cloudy, dry

7. Test Vehicle

Type/Designation: 10000S
Make and Model: 2007 Freightliner M2
Curb: 8342 kg (18391 lb)
Test Inertial: 9706 kg (21398 lb)
Dummy: / kg (lb)
Gross Static: 9706 kg (21398 lb)

8. Impact Conditions

Speed: 92.0 km/h (57.2 mph)
Angle: 15 degrees
Location/Orientation: 1.75 m (68.9 in) before transition of barriers

9. Exit Conditions

Speed: 70.8 km/h (44 mph)
Angle: not obtainable

10. Post-Impact Trajectory

Vehicle Stability: Satisfactory
Stopping Distance: 66.1 m (2602 in)
Vehicle Snagging: None
Vehicle Pocketing: None

11. Occupant Risk

Impact Velocity:
Longitudinal: N/A m/s (ft/s)
Lateral: N/A m/s (ft/s)

RideDown Accelerations (10 msec avg.): 
Longitudinal: N/A g
Lateral: N/A g

12. Test Article Damage

THIV: N/A m/s
PHD: N/A g
ASI: N/A

Classification: Moderate
particularities: None

13. Test Article Deflections

Dynamic Deflection: 0.85 m (33.5 in)
Permanent Deflection: 0.45 m (17.7 in)
Dynamic Working Width: 2.17 m (85.43 in)
Permanent Working Width: 0.88 m (34.6 in)

14. Vehicle Damage

CurbSnagging: Moderate
VDS: 11-LFQ-5
CDC: 11FFLW3
Max. Exterior Deformation: N/A
Max. Interior Deformation: N/A
OCDI: N/A
Effective barrier length: 5800 mm.
LAURA METAAL
ROAD SAFETY

Anchor unit
AS31840020

SafeZone barrier
AS31840000

Toleranties
maattoleranties
Algemene Thermisch snijden Lassen Materiaal:
lasconstructie

SafeZone barrier
NEN-EN-ISO 9013
NEN-ISO 2768-c
NEN-EN-ISO 13920
NEN-EN-ISO 5817-D

Massa: N/A

Including anchor unit AS31840000+20

454 mm.
540 mm.
639 mm.

Tekenaar: ramaekersn
Getekend: 15-3-2017
Maateenheid: mm

Het auteursrecht van deze tekening wordt door ons voorbehouden. Zij blijft ons eigendom en mag zonder toestemming noch gereproduceerd noch aan derden getoond worden.

Including anchor unit

LAURA METAAL, SYDELSHOF/DV , Rimburgerweg 44, NL-6471 XX Kerkrade, tel. +31 (0)45 546 88 88, www.laurametaal.nl
Het auteursrecht van deze tekening wordt door ons voorbehouden. Ze blijft ons eigendom en mag zonder toestemming noch gereproduceerd noch aan derden getoond worden.

LAURA METAAL EYGELSHOVEN BV, Rimburgerweg 40, NL-6471 XX Kerkrade, tel: +31 (0)45 - 546 88 88, www.laurametaal.nl
Connecting 2 barriers

Male coupling including security bolt.

Lowering one element over the other

Downstream

Access hole in top of barrier:

Security Bolt

Barrier 2:
Female section

Barrier 1:
Male section

F (1:8)

G-G (1:2)