February 15, 2019

Mr. Rajesh Taneja  
New York State Thruway Authority  
P. O. Box 189  
Albany, NY, 12201-0189

Dear Mr. Taneja:

This letter is in response to your October 31, 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-317 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:

- Three-Rail Steel Bridge Rail with Curb

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: Three-Rail Steel Bridge Rail with Curb  
Type of system: Longitudinal Barrier  
Test Level: MASH Test Level 5 (TL5)  
Testing conducted by: TamTI  
Date of request: January 30, 2019

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. 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-317 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

**Date of Request:** 10-31-2018  
**Name:** Christopher Gaunt, P.E.  
**Company:** HNTB Corporation  
**Address:** Empire State Building, 350 Fifth Avenue, 57th Floor, New York, NY, 10118  
**Country:** United States of America  
**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

<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 (Roadside, Median, Bridge Railings)</td>
<td>Physical Crash Testing</td>
<td>Three-Rail Steel Bridge Rail with Curb</td>
<td>AASHTO MASH</td>
<td>TL5</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>Company Name:</th>
<th>Address:</th>
<th>Country:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajesh Taneja</td>
<td>New York State Thruway Authority</td>
<td>P. O. Box 189, Albany, NY, 12201-0189</td>
<td>United States of America</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.

**HNTB:** HNTB Corporation is a paid consultant for New York State Thruway Authority (NYSTA) for the Governor Mario M. Cuomo (formerly Tappan Zee) Bridge Rail design and eligibility request. HNTB has no further financial interest in the use of this barrier system.

**TTI:** Texas A&M Transportation Institute (TTI) was contracted by HNTB to perform full-scale crash testing of the NYSTA Governor Mario M. Cuomo (formerly Tappan Zee) Bridge Rail design. There are no shared financial interests in the NYSTA Governor Mario M. Cuomo (formerly Tappan Zee) Bridge Rail design by TTI, or between HNTB and TTI, other than costs involved in the actual crash tests and reports for this submission to FHWA.
PRODUCT DESCRIPTION

The bridge rail design tested was a three-rail steel bridge rail with a reinforced concrete curb that was constructed on a reinforced concrete grade beam and deck. The curb had a 7-inch tall face. Fabricated steel posts were mounted on the curb, spaced at 48 inches on center. There were three rows of 6-inch square HSS tubing rails bolted to the posts, with the top surface of the top rail at 38 inches above the curb, for a total rail height of 45 inches above grade. The top of the middle rail was 33 inches above grade, and the top of the bottom rail was 21 inches above grade.

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>Engineer Name:</th>
<th>Nauman M. Sheikh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer Signature:</td>
<td>Nauman M. Sheikh</td>
</tr>
<tr>
<td>Address:</td>
<td>TTI, TAMUS MS 3135, College Station, TX 77843-3135</td>
</tr>
<tr>
<td>Country:</td>
<td>USA</td>
</tr>
</tbody>
</table>

A brief description of each crash test and its result:

<table>
<thead>
<tr>
<th>Required Test Number</th>
<th>Narrative Description</th>
<th>Evaluation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-10 (1100C)</td>
<td>A 2011 Kia Rio traveling at an impact speed of 61.1 mi/h contacted the bridge rail 3.6 ft upstream of the joint between posts 30 and 31 at an impact angle of 25.2°. The bridge rail contained and redirected the 1100C vehicle. The vehicle did not penetrate, underride, or override the installation. There was 0.7 inch of dynamic deflection of the bridge rail during the test. No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or to present hazard to others in the area. Maximum occupant compartment deformation was 2.0 inches on the left side at the wheel/foot well area. The 1100C vehicle remained upright during and after the collision event. A gyroscope/accelerometer connection was severed during the test, However, based on video analysis, the vehicle did not exceed 75 degrees of roll or pitch. Longitudinal OIV was 18.7 ft/s, and lateral OIV was 30.5 ft/s. Longitudinal occupant ridedown acceleration was 2.7 g, and lateral occupant ridedown acceleration was 9.8 g.</td>
<td>PASS</td>
</tr>
<tr>
<td>Required Test Number</td>
<td>Narrative Description</td>
<td>Evaluation Results</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>5-11 (2270P)</td>
<td>A 2013 RAM 1500 traveling at an impact speed of 62.8 mi/h contacted the bridge rail 4.1 ft upstream of the joint between posts 20 and 21 at an impact angle of 25.7. The bridge rail contained and redirected the 2270P vehicle. The vehicle did not penetrate, underride, or override the installation. There was 1.0 inch of dynamic deflection of the bridge rail during the test. No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or to present hazard to others in the area. Maximum occupant compartment deformation was 3.0 inches on the left side at the floor pan to roof, and wheel/foot well and toe pan area. The 2270P vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 13° and 5°, respectively. Longitudinal OIV was 20.3 ft/s, and lateral OIV was 28.5 ft/s. Longitudinal occupant ridedown acceleration was 7.8 g, and lateral occupant ridedown acceleration was 8.5 g.</td>
<td>PASS</td>
</tr>
<tr>
<td>5-12 (36000V)</td>
<td>A 2006 Freightliner with a 2002 Utility trailer was traveling at an impact speed of 50.9 mi/h when it contacted the bridge rail 1.4 ft downstream of the splice between posts 10 and 11 at an impact angle of 15.2°. The bridge rail contained and redirected the 36000V vehicle. The vehicle did not penetrate, underride, or override the installation. There was 1.5 inches of dynamic deflection of the bridge rail during the test. No detached elements, fragments, or other debris were present to penetrate or show potential for penetrating the occupant compartment, or to present hazard to others in the area. Maximum occupant compartment deformation was 2.0 inches on the left side firewall/floor pan area. The 36000V vehicle remained upright during and after the collision.</td>
<td>PASS</td>
</tr>
<tr>
<td>5-20 (1100C)</td>
<td>Hardware is not a transition. This test is therefore not applicable and was not performed.</td>
<td>Non-Relevant Test, not conducted</td>
</tr>
<tr>
<td>5-21 (2270P)</td>
<td>Hardware is not a transition. This test is therefore not applicable and was not performed.</td>
<td>Non-Relevant Test, not conducted</td>
</tr>
<tr>
<td>5-22 (36000V)</td>
<td>Hardware is not a transition. This test is therefore not applicable and was not performed.</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.):

<table>
<thead>
<tr>
<th>Laboratory Name:</th>
<th>Texas A&amp;M Transportation Institute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Signature:</td>
<td>Digitally signed by Darrell L. Kuhn</td>
</tr>
<tr>
<td>Date:</td>
<td>2018.10.15 10:48:18 -05'00'</td>
</tr>
<tr>
<td>Address:</td>
<td>TTI, TAMUS MS 3135, College Station, TX 77843-3135</td>
</tr>
<tr>
<td>Country:</td>
<td>USA</td>
</tr>
<tr>
<td>Accreditation Certificate Number and Dates of current Accreditation period:</td>
<td>ISO 17025 Laboratory Certificate Number: 2821.01 Valid To: April 30, 2019</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Eligibility Letter</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Date</td>
</tr>
</tbody>
</table>
Figure 5.6. Summary of Results for MASH Test 5-10 on Tappan Zee Hudson River Crossing Bridge Rail.
Figure 6.6. Summary of Results for MASH Test 5-11 on Tappan Zee Hudson River Crossing Bridge Rail.
Figure 7.6. Summary of Results for MASH Test 5-12 on Tappan Zee Hudson River Crossing Bridge Rail.
EXPANSION SPlice INSIDE TUBE
SCALE: 1" = 1'-0"

EXPANSION SPlice TUBE ASSEMBLY
SCALE: 1" = 1'-0"

NOTES:
1. ALL STRUCTURAL STEEL, HARDWARE, AND ANCHOR STUDIES SHALL BE PROVIDED BY THE STRUCTURAL ENGINEER.
2. PROVISIONS CAUSED BY MELDING OR DRAWING ARE NOT PERMITTED TO BE BLOCKED OR SPLIT ON THE DRAWING, BARRIER TUBES AND FIT PLATES.
3. FOR SPICE LOCATIONS, SEE DRAW NO. 6-2

DRAWN BY: [Signature]
CHECKED BY: [Signature]