



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

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

January 12, 2010

In Reply Refer To:  
HSSD/B-198

Mr. Ronald K. Faller, Ph.D  
Research Assistant Professor  
Midwest Roadside Safety Facility  
University of Nebraska-Lincoln  
527 Nebraska Hall  
Lincoln, NE 68588-0529

Dear Dr. Faller:

You requested that we formally find this device acceptable for use on the National Highway System (NHS) under the provisions of American Association of State Highway and Transportation Officials, Manual for Assessing Safety Hardware (MASH). This letter is a response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety device for use on the NHS.

Name of device: West Virginia TL-1 Timber Curb-Type Bridge Barrier  
Type of device: Permanent Timber Barrier Bridge Railing  
Test Level: AASHTO Manual for Assessing Safety Hardware (MASH) TL-1  
Testing conducted by: Midwest Roadside Safety Facility (MwRSF)  
Date of request: September 13, 2009  
Date of completed package: September 13, 2009  
Task Force 13 Designator: SBD05a

### **Requirements**

Roadside safety devices should meet the guidelines contained in the MASH.

### **Description**

For this project, the research objective was to adapt an existing, crashworthy, Test Level 1 (TL-1) curb-type bridge barrier for use on transverse, timber, nail-laminated bridge decks supported by steel wide-flange beams. The barrier system was redesigned to meet the TL-1 impact safety standards set forth by MASH. The existing MwRSF curb-type timber bridge barrier system was successfully crash tested to the TL-1 safety performance criteria as per



NCHRP Report 350. This timber bridge barrier system served as the basis for the new West Virginia TL-1 Timber Curb-Type Bridge Barrier design. However, the railing for this project was required to meet the TL-1 safety performance criteria provided in MASH. Therefore, modifications were made to the previous system in order to accommodate the increased impact severity and increased vehicle height resulting from the 2270P vehicle as per current MASH guidelines. These changes are described as follows.

The test installation consisted of three major sub-systems: (1) a 120-ft (36.6-m) long, nail-laminated, timber bridge deck placed on wide-flange, steel girders; (2) a curb-type, timber bridge railing system; and (3) a 35-ft (10.7-m) long, sloped, safety treatment located on the upstream end of the bridge barrier. The total length of the test installation was 155 ft (47.2 m).

The bridge barrier system consisted of three major structural components: (1) a longitudinal, glulam timber rail; (2) steel H-splice plates; and (3) post assemblies consisting of sawn lumber scupper blocks.

The glulam timber rail consisted of 19.9-ft (6.08-m) long, glulam rail segments with a 6-3/4 in. x 12 3/8 in. (171 mm x 314 mm) cross section, as shown in Figure 36. The glulam rails were manufactured from Combination No. 48 Southern Yellow Pine and were treated with pentachlorophenol in heavy oil to a minimum net retention of 0.60 lbs/ft<sup>3</sup> (9.61 kg/m<sup>3</sup>) conforming to the American Wood Preserver's Association (AWPA) use category UC4A [8]. The ends of each rail segment were narrowed to a width of 11 5/8 in. (295 mm) in order to accept the steel H-splice plates and allow the outer plate surface to be flush with the gross rail section.

The steel H-Splice plates were fabricated from ASTM A656 Grade 50 Type 7 material. The two side plates were 34 3/4 in. long by 6 3/4 in. wide by 3/8 in. thick (883 mm x 171 mm x 9.5 mm) with twelve 1 1/8-in. (29-mm) diameter holes. For the H-splice, the center connecting plate was installed orthogonal to the outer two plates and measured 11 5/8 in. long by 6 3/4 in. wide by 3/8 in. thick (295 mm x 171 mm x 9.5 mm). The H-splice plates connected adjacent glulam rail segments end to end using six 1-in. (25.4-mm) diameter by 14-in. (356-mm) long, ASTM A307 galvanized dome-head bolts in each rail end.

The bridge rail post assemblies consisted of two timber scupper blocks stacked on top of each other. Each scupper block was fabricated from Grade No. 1 Southern Yellow Pine sawn lumber and measured 23 in. long by 9 1/2 in. wide, and 7 1/2 in. tall (584 mm x 241 mm x 191mm). Four 13/16-in. (21-mm) diameter bolt holes were drilled in the scuppers at 5-in. (127-mm) spacing intervals.

The West Virginia TL-1 Timber Curb-Type Bridge Barrier drawings for the construction of the test installation are included with this correspondence.

### **Findings**

We concur with your request that the West Virginia TL-1 Timber Curb-Type Bridge Barrier that has been successfully crash tested to AASHTO MASH TL-1 conditions will be considered

acceptable for use on the NHS, assuming all other factors such as timber specifications and component details are identical to the tested version. For further information on the crash test, the Test Data Summary Sheet is included with this correspondence.

Please note the following standard provisions that apply to the 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 MASH.
- To prevent misunderstanding by others, this letter of acceptance is designated as number B-198 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.
- The Timber Curb-Type Bridge Barrier system is a generic system and not considered proprietary.
- 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 yours,

David A. Nicol, P.E.  
Director, Office of Safety Design  
Office of Safety

Enclosures

FHWA:HSSD:WLongstreet:tb:x60087:12/16/09

File: s://directory folder/WLongstreet/B198-FDOT Low Profile Barrier – Space Restrictive Applications.doc

cc: HSSD (Reader, HSA; Chron File, HSSD; W.Longstreet, HSSD; NArtimovich, HSSD; MMcDonough, HSSD)