Scott Rosenbaugh  
Research Associate Engineer  
Midwest Roadside Safety Facility UNL  
527 Nebraska Hall  
P.O. Box 880529  
Lincoln Nebraska 68588-0529

Dear Mr. Rosenbaugh:

This letter is in response to your request for the Federal Highway Administration (FHWA) to review a roadside safety system for eligibility for reimbursement under the Federal-aid highway program.

Name of system: MidwestGuardrail System with White Pine Posts  
Type of system: 31 inch high W-beam guardrail  
Test Level: MASH Test Level 3  
Testing conducted by: Midwest Roadside Safety Facility  
Task Force 13 Designator: SGR20c  
Date of request: June 28, 2011  
Date initially acknowledged: July 18, 2011  
Date of completed package: June 28, 2011

Decision:  
The following device is eligible, with details provided in your June 28, 2011, letter which is enclosed and considered an integral part of this finding:  
• Midwest Guardrail System (MGS) with White Pine Posts  

Based on a review of crash test results you submitted certifying the device described herein meets the crashworthiness criteria of the American Association of State Highway and Transportation Officials’ Manual for Assessing Safety Hardware (MASH), the device is eligible for reimbursement under the Federal-aid highway program. Eligibility for reimbursement under the Federal-aid highway program does not establish approval or endorsement by the FHWA for any particular purpose or use.

The FHWA, the Department of Transportation, and the United States Government do not endorse products or services and the issuance of a reimbursement eligibility letter is not an endorsement of any product or service.
**Requirements**
Roadside safety devices should meet the guidelines contained in the MASH.

**Description and Crash Testing**
The MGS with White Pine Posts is described in the enclosed letter dated June 28, 2011 and is illustrated in the enclosed drawings. The MASH Test 3-11 is detailed in the enclosed Test Data Summary Sheet and showed that the pickup truck test met all appropriate criteria. The maximum dynamic deflection of the barrier was 46.3 inches, and the Working Width of the system was 58.4 inches. In comparison, the Working Width of the MGS on Southern Yellow Pine posts was 49 inches.

**Findings**
Therefore, the system described and detailed in the enclosures is eligible for reimbursement and may be installed under the range of conditions tested.

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

- This letter provides a AASHTO/ARTBA/AGC Task Force 13 designator that should be used for the purpose of the creation of a new and/or the update of existing Task Force 13 drawing for posting on the on-line ‘Guide to Standardized Highway Barrier Hardware’ currently referenced in AASHTO Roadside Design Guide.
- This finding of eligibility is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may influence the crashworthiness of the system will require a new reimbursement eligibility letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals safety problems, or that the system is significantly different from the version that was crash tested, we reserve the right to modify or revoke this letter.
- 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 the same chemistry, mechanical properties, and geometry as that submitted for review, and that it will meet the crashworthiness requirements of the Manual for Assessing Safety Hardware.
- To prevent misunderstanding by others, this letter of eligibility is designated as number B-230 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.
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. The finding of eligibility is limited to the crashworthiness characteristics of the candidate system, 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,

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

Enclosures
January 12, 2012

Scott Rosenbaugh
Research Associate Engineer
Midwest Roadside Safety Facility UNL
527 Nebraska Hall
P.O. Box 880529
Lincoln Nebraska 68588-0529

Dear Mr. Rosenbaugh:

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Sincerely yours,

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

Enclosures
June 28, 2011

Mr. Nicholas A. Artimovich
Highway Engineer
Federal Highway Administration - HSSD
Office of Safety Design
Room E71-322
1200 New Jersey Avenue, SE
Washington, D.C. 20590
(202) 366-1331 phone

Subject: Application for Federal Highway Administration (FHWA) acceptance of the Midwest Guardrail System (MGS) with White Pine posts.

Dear Mr. Artimovich:

I have enclosed documentation on the compliance testing and evaluation of a longitudinal barrier system by the Midwest Roadside Safety Facility (MwRSF) at the University of Nebraska-Lincoln. In this research project, the Midwest Guardrail System (MGS) utilizing White Pine timber posts was successfully crash tested according to Test Level-3 (T1.-3) requirements provided in the Manual for Assessing Safety Hardware (MASH). A final MwRSF research report has been prepared for this guardrail system using White Pine posts entitled:

Evaluation of the Midwest Guardrail System (MGS) with White Pine Wood Posts

Please note that the MGS utilizing either steel W6x9 or Southern Yellow Pine timber 6"x8" posts has previously been shown to meet the T1.-3 requirements provided in NCHRP Report No. 350 and has been accepted by the Federal Highway Administration (FHWA) in Letter No. B-133, dated March 1, 2005. Variations of the MGS utilizing round timber posts made from Douglas Fir, Ponderosa Pine, and Southern Yellow Pine were also previously shown to satisfy NCHRP Report No. 350, T1.-3 requirements and have been accepted by the FHWA in Letter B-175, dated June 25, 2008. Further, an acceptance letter stating that the MGS satisfies MASH T1.-3 requirements is currently in draft form under letter B-215.

According to T1.-3 guidelines contained in MASH, longitudinal barrier systems should be subjected to two full-scale crash test: (1) test designation no. 3-10 consisting of a 2,425-lb passenger vehicle impacting at 62.1 mph and 25 degrees and (2) test designation no. 3-11 consisting of a 5,000-lb pickup truck impacting at 62.1 mph and 25 degrees. However, previous full-scale tests have illustrated that vehicle snagging and occupant risk values are minimal during the small car test. Therefore, only the pickup truck test was deemed necessary to evaluate the system’s performance with the weaker White Pine timber posts. Documentation of the compliance testing and analysis is contained within the CD-ROM and hard copy file enclosures listed at the
end of this letter.

On behalf of the Wisconsin Department of Transportation, MwRSF is requesting that the FHWA accept the use of the MGS with White Pine timber posts for roadside use along Federal-aid highways.

If you have any questions regarding the enclosed information or need any other information, please feel free to contact either Mr. Rosenbaugh [(402) 472-9324 or srosenha@unlserve.unl.edu] or Dr. Faller [(402) 472-6864 or rfaller1@unl.edu] at your earliest convenience.

Sincerely,

Scott Rosenbaugh, MSCE, EIT
Research Associate Engineer

Ronald K. Faller, Ph.D., P.E.
Research Assistant Professor

Enclosures:  
(1) two copies of MwRSF research report no. TRP-03-241-11  
(2) one CD-ROM set documenting the full-scale crash test  
(3) one CD-ROM with electronic drawing and PDF report files  
(4) one hard copy of CAD system drawings
Figure 19. Summary of Test Results and Sequential Photographs. Test No. MGSWP-1
Notes: (1) Test no. MGSWP–1 is to be performed according to test designation no. 3–11 of MASH.
(2) The impact location is 13'–6" [4115] upstream from the midspan of the rail splice between post nos. 14 and 15.
(3) The BCT anchor posts are placed in Ø3" [914] holes.
(4) Critical region located between post nos. 10 through 27.
6'-3" [1905] W-Beam Section, 12 gauge [2.7]
Part a5

12'-6" [3810] W-Beam Section, 12 gauge [2.7]
Part a3

12'-6" [3810] W-Beam Section, 12 gauge [2.7], End Section
Part a4

MGS with White Pine
Wood Posts
Rail Section Details
Midwest Roadside Safety Facility
<table>
<thead>
<tr>
<th>Item No.</th>
<th>QTY.</th>
<th>Description</th>
<th>Material Specification</th>
<th>Hardware Guide</th>
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<td>25</td>
<td>6&quot;x8&quot;x72&quot; [152x203x1829] White Pine Wood Post</td>
<td>Wisconsin 2009 Standard Specifications Sections 614.2.4, 614.2.6, 507.2.2.3, and 507.2.2.4</td>
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<tr>
<td>a2</td>
<td>25</td>
<td>6&quot;x12&quot;x14 1/4&quot; [152x305x362] Blockout</td>
<td>SYP Grade No.1 or better</td>
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<td>a3</td>
<td>12</td>
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<td>2</td>
<td>12'–6&quot; [3810] W-Beam MGS End Section</td>
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<td>RWM14a</td>
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<td>6'–3&quot; [1905] W-Beam MGS Section</td>
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<td>RWM01a</td>
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<td>25</td>
<td>16D Double Head Nail</td>
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<td>b1</td>
<td>4</td>
<td>72&quot; [1829] Long Foundation Tube</td>
<td>ASTM A500 Gr. B</td>
<td>PTE06</td>
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<td>b2</td>
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<td>BCT Timber Post–MGS Height</td>
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<td>b3</td>
<td>2</td>
<td>Strut and Yoke Assembly</td>
<td>ASTM A36 Steel Galvanized</td>
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<tr>
<td>b4</td>
<td>4</td>
<td>BCT Cable Anchor Assembly</td>
<td>φ3/4&quot; 6x19 IWRC IPS Galvanized Wire Rope</td>
<td>FCA01-02</td>
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<tr>
<td>b5</td>
<td>2</td>
<td>Anchor Bracket Assembly</td>
<td>ASTM A36 Galvanized</td>
<td>FPA01</td>
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<td>b6</td>
<td>2</td>
<td>8&quot;x8&quot;x5/8&quot; [203x203x16] Anchor Cable Bearing Plate</td>
<td>ASTM A36 Galvanized</td>
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<td>2 3/8&quot; [60] O.D. x 6&quot; [152] Long BCT Post Sleeve</td>
<td>ASTM A53 Grade B Schedule 40</td>
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<td>b13</td>
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<td>FWC16a</td>
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<td>b14</td>
<td>4</td>
<td>7/8&quot; Dia. x 7 1/2&quot; [M22x191] Long Hex Head Bolt and Nut</td>
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<td>FBX22a</td>
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<td>7/8&quot; [22] Dia. Flat Washer</td>
<td>ASTM F436 Grade 1</td>
<td>FWC22a</td>
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### Midwest Roadside

<table>
<thead>
<tr>
<th>Species</th>
<th>Nominal Width of Face</th>
<th>Nominal Slope of Grain</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGS with White Pine</td>
<td>1 in. 15</td>
<td>1 in. 15</td>
</tr>
<tr>
<td>Wood Posts</td>
<td>1 in. 15</td>
<td>1 in. 15</td>
</tr>
</tbody>
</table>

### Safety Facility

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### Notes:
1. Do not exceed the maximum allowable knot on the centline of the wide face of the same piece.
2. Do not exceed the maximum allowable knot on the centline of the wide face of the same piece.
3. This table was taken directly from the Wisconsin Department of Transportation, 2009 Standards.