



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

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

August 16, 2011

In Reply Refer To:  
HSSD/CC-103A

Mr. Gerrit A. Dyke, P.E.  
Vice President of Engineering and R & D  
Barrier Systems, Inc.  
3333 Vaca Valley Parkway, Suite 800  
Vacaville, CA 95688

Dear Mr. Dyke:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a modified trailer-mounted attenuator for use on the National Highway System (NHS).

Name of system:	U-MAD Trailer-Mounted TMA
Type of system:	Trailer-Mounted Attenuator
Test Level:	NCHRP Report 350 TL-3
Testing conducted by:	not applicable
Date of request:	December 30, 2010
Date received by FHWA:	January 7, 2011

You requested that we find a modified version of your previously-accepted U-MAD trailer attenuator acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

### **Requirements**

Roadside safety devices should meet the guidelines contained in NCHRP Report 350 if tested prior to January 1, 2011, and the guidelines in AASHTO's Manual for Assessing Safety Hardware if tested after that date. The FHWA memorandum "ACTION: Identifying Acceptable Highway Safety Features" of July 24, 1997, provides further guidance on crash testing requirements of longitudinal barriers and crash cushions. Modifications to previously-accepted devices that are not likely to affect crash performance may be accepted without additional crash testing.

### **Decision**

The U-MAD trailer-mounted TMA was previously accepted as a TL-2/TL-3 design in FHWA acceptance letter CC-103. This design was modified by the addition of mounting brackets and a removable sign board assembly, as described below. Based on the results of your analysis, as summarized below, the FHWA agrees that your modified trailer-mounted attenuator remains a crashworthy design under NCHRP Report 350 at TL-2 and TL-3, depending on which energy-absorbing cartridge is mounted on the trailer.

FHWA: HSSI: WLongstreet: mb: x60087:7/15/11

File: h: //directory folder/HSST/ CC103A\_U-MAD Trailer Mounted TMA.docx

cc: HSST Will Longstreet

## Description

The basic U-MAD trailer-mounted attenuator described in detail in FHWA acceptance letter CC-103 was modified to add mounting brackets for a removable illuminated sign board assembly. Modifications to the trailer frame consist of two upright steel tubes and gussets welded to the trailer frame. The uprights are 3.5-inch x 2.5-inch x 3/16-inch (90-millimeter x 65-millimeter x 5-millimeter) steel tubes and the gussets are 1.5-inch x 1.5-inch x 3/16-inch (40-millimeter x 40-millimeter x 5-millimeter) steel angles. The sign support frame is made from 2-inch x 3-inch x 3/16-inch (50-millimeter x 75-millimeter x 5-millimeter) steel structural tubing designed to accommodate a 4-foot x 8-foot (1.2-meter x 2.4-meter) sign board. Enclosure 1 shows the modified trailer and Enclosure 2 shows the trailer with a TL-3 U-MAD cartridge and a sign board in place.

## Testing

The design of the U-MAD trailer-mounted attenuator is such that an impacting vehicle is not likely to contact the trailer assembly when it is loaded with a TL-2 or a TL-3 U-MAD cartridge. The weight of the sign board and mounting hardware increases the total weight of the unit by approximately 12 percent. Your conservation of momentum analysis concluded that this minor increase in weight would not cause a significant increase in the occupant impact velocity reported in test 3-51 for the un-modified design. Your structural analysis further concluded that the sign board mounting structure and hardware is sufficient to withstand the maximum loads associated with an NCHRP Report 350 TL-3 impact. We have reviewed your analysis and agree with your conclusions.

## Findings

Based on the considerations noted above, the FHWA agrees that the U-MAD trailer-mounted attenuator, as modified, remains acceptable as an NCHRP Report 350 TL-2 or TL-3 attenuator.

Please note also that the following provisions apply to FHWA letters of acceptance:

- This acceptance letter provides an AASHTO/ARTBA/AGC Task Force 13 designator that should be used to identify any new or updated Task Force 13 drawings for this product.
- This acceptance is limited to the crashworthiness characteristics of the device and does not cover its structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any design 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, the in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its 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 NCHRP Report 350.

- To prevent misunderstanding by others, this letter of acceptance, designated as number CC-103A shall not be reproduced except in full. This letter, and test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.
- The modified U-MAD trailer-mounted attenuator is a patented product and is considered proprietary. If proprietary devices are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, they: (a) 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 yours,

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

Enclosures



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### **Decision**

The U-MAD trailer-mounted TMA was previously accepted as a TL-2/TL-3 design in FHWA acceptance letter CC-103. This design was modified by the addition of mounting brackets and a removable sign board assembly, as described below. Based on the results of your analysis, as summarized below, the FHWA agrees that your modified trailer-mounted attenuator remains a crashworthy design under NCHRP Report 350 at TL-2 and TL-3, depending on which energy-absorbing cartridge is mounted on the trailer.

## Description

The basic U-MAD trailer-mounted attenuator described in detail in FHWA acceptance letter CC-103 was modified to add mounting brackets for a removable illuminated sign board assembly. Modifications to the trailer frame consist of two upright steel tubes and gussets welded to the trailer frame. The uprights are 3.5-inch x 2.5-inch x 3/16-inch (90-millimeter x 65-millimeter x 5-millimeter) steel tubes and the gussets are 1.5-inch x 1.5-inch x 3/16-inch (40-millimeter x 40-millimeter x 5-millimeter) steel angles. The sign support frame is made from 2-inch x 3-inch x 3/16-inch (50-millimeter x 75-millimeter x 5-millimeter) steel structural tubing designed to accommodate a 4-foot x 8-foot (1.2-meter x 2.4-meter) sign board. Enclosure 1 shows the modified trailer and Enclosure 2 shows the trailer with a TL-3 U-MAD cartridge and a sign board in place.

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## Findings

Based on the considerations noted above, the FHWA agrees that the U-MAD trailer-mounted attenuator, as modified, remains acceptable as an NCHRP Report 350 TL-2 or TL-3 attenuator.

Please note also that the following provisions apply to FHWA letters of acceptance:

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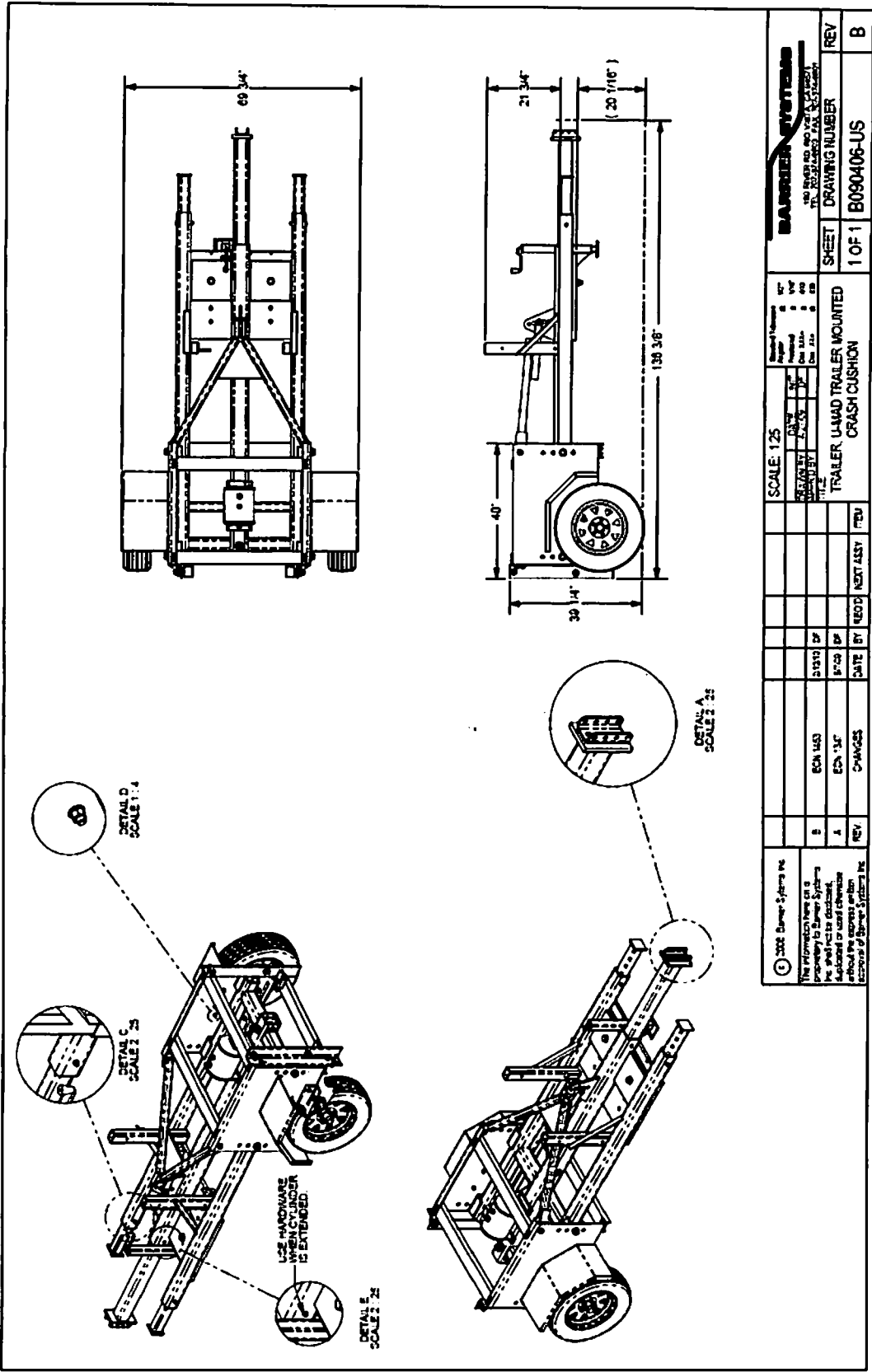
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Sincerely yours,



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

Enclosures



<b>BARRETT SYSTEMS</b> 140 BARRETT RD. NEWTON, MA 02459 TEL: 781/552-7443 FAX: 781/552-7444		SCALE: 1/2" = 1'-0" 1/4" = 1'-0" 1/8" = 1'-0" 1/16" = 1'-0" 1/32" = 1'-0" 1/64" = 1'-0" 1/128" = 1'-0" 1/256" = 1'-0" 1/512" = 1'-0" 1/1024" = 1'-0" 1/2048" = 1'-0" 1/4096" = 1'-0" 1/8192" = 1'-0" 1/16384" = 1'-0" 1/32768" = 1'-0" 1/65536" = 1'-0" 1/131072" = 1'-0" 1/262144" = 1'-0" 1/524288" = 1'-0" 1/1048576" = 1'-0" 1/2097152" = 1'-0" 1/4194304" = 1'-0" 1/8388608" = 1'-0" 1/16777216" = 1'-0" 1/33554432" = 1'-0" 1/67108864" = 1'-0" 1/134217728" = 1'-0" 1/268435456" = 1'-0" 1/536870912" = 1'-0" 1/1073741824" = 1'-0" 1/2147483648" = 1'-0" 1/4294967296" = 1'-0" 1/8589934592" = 1'-0" 1/17179869184" = 1'-0" 1/34359738368" = 1'-0" 1/68719476736" = 1'-0" 1/137438953472" = 1'-0" 1/274877906944" = 1'-0" 1/549755813888" = 1'-0" 1/1099511627776" = 1'-0" 1/2199023255552" = 1'-0" 1/4398046511104" = 1'-0" 1/8796093022208" = 1'-0" 1/17592186044416" = 1'-0" 1/35184372088832" = 1'-0" 1/70368744177664" = 1'-0" 1/140737488355328" = 1'-0" 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