U.S. Department
of Transportation
Federal Highway Administration

400 Seventh St., S.W.
Washington, D.C. 20590

October 27, 2006

In Reply Refer To: HSA-10/B-150

Mr. Andrew Artar
Vice President Sales and Marketing
Gregory Highway Products
4100 13th Street, SW
Canton, Ohio 44710

Dear Mr. Artar:

In your September 28, 2006 letter, you requested Federal Highway Administration (FHWA) acceptance of a new strong post W-beam guardrail design that incorporates a proprietary fastener, called a Gregory Mini Spacer (GMS), in lieu of a standard guardrail bolt. This new connector was designed to improve the crash performance of W-beam guardrail. You also sent copies of test reports prepared by the Southwest Research Institute documenting the performance of your design and videotapes of the two tests that were conducted on a strong-post W-beam that did not use offset blocks. Test 3-10 was conducted on a double-sided (median) barrier using the current NCHRP 820C car, and test 3-11 was conducted on a single-sided (roadside) installation using a quad-cab pickup truck with a nominal weight of 2270 kg.

The GMS system was tested with 12-gauge W-beam panels mounted directly onto standard, unmodified W6 x 8.5 steel posts with no offset blocks and with a top-of-rail height of 31 inches. The rail was attached to each post using a 5/16-inch diameter standard hex head bolt. Design details for the proprietary GMS fastener are shown on Enclosure 1 and the two test summary sheets are shown on Enclosure 2.

Based on the reported test results, the GMS system as described above is classified as a test level 3 barrier and may be used on the National Highway System when such use is acceptable to the contracting authority. Additionally, the GMS fastener may be used in place of a standard guardrail bolt on any non-proprietary strong or weak post W-beam guardrail designs that currently meet NCHRP Report 350 test and evaluation criteria, exclusive of transition designs and end treatments. Such usage will not change the test level of the barrier on which it is used and is based on the assumption that the GMS fastener is likely to improve the crash performance of all W-beam barrier systems because of its predictable and consistent beam release characteristics. This assumption should be verified through in-service evaluations to the extent practical.

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

- This acceptance is limited to the crashworthiness characteristics of the tested design and does not cover its structural features, durability, or maintainability.
- Any changes that may adversely influence the crashworthiness of this barrier 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, 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.
- To prevent misunderstanding by others, this correspondence, designated as acceptance letter B-150, shall not be reproduced except in full. This letter, and the test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.
- Since the GMS design is a steel product, the provisions of Title 23, Code of Federal Regulations, Section 635.410 apply to its use on federally funded projects.
- The GMS system includes patented components and is considered a proprietary product. When proprietary devices are *specified by a highway agency* for use on federally-funded 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 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.
- 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. Patent issues, if any, are to be resolved by the applicant.

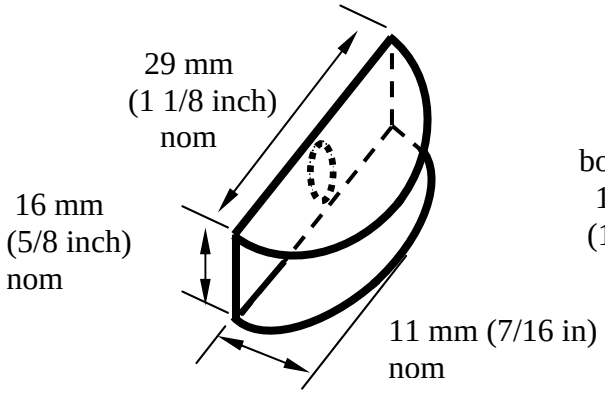
Sincerely yours,

John R. Baxter, P.E.
Director, Office of Safety Design
Office of Safety

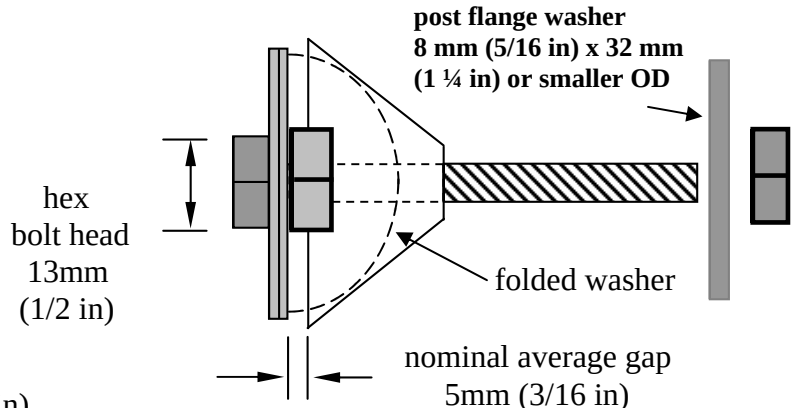
2 Enclosures

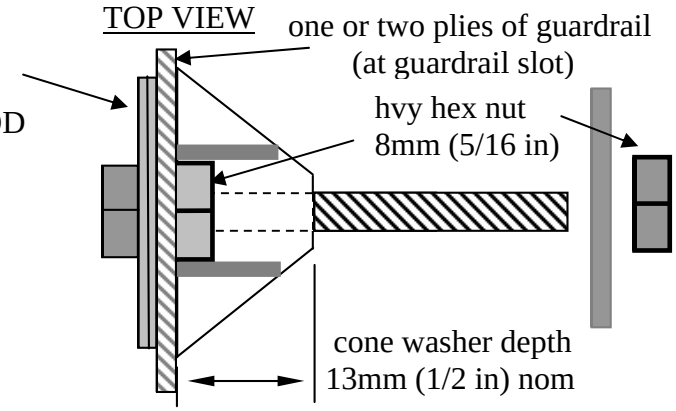
GREGORY MINI SPACER

DESCRIPTION	LENGTH	MATERIAL
5/16 BOLT	1-3/4"min	A307
5/16 GMS CONICAL WASHER		F844
5/16 X 1-1/4 O.D. RELEASE WASHER (2)		F844
5/16 X 1-1/4 O.D. BENT WASHER		F844
5/16 X 1-1/4 O.D. POST WASHER		F844
5/16 HVY HX NUT		A563 GR A
ALTERNATE SOLID NUT		A563 GR A

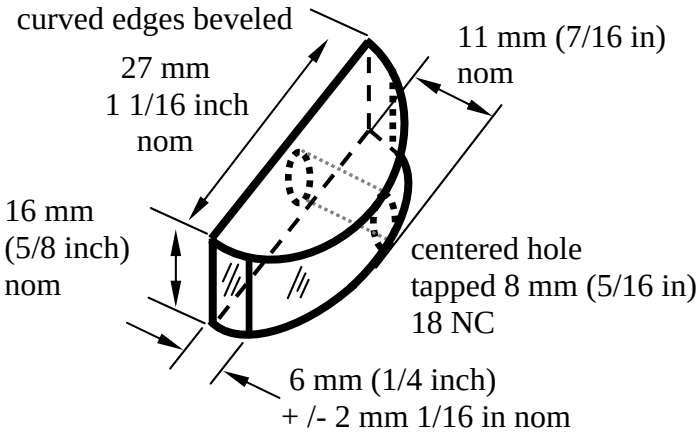


BENT WASHER
PERSPECTIVE VIEW





SIDE VIEW

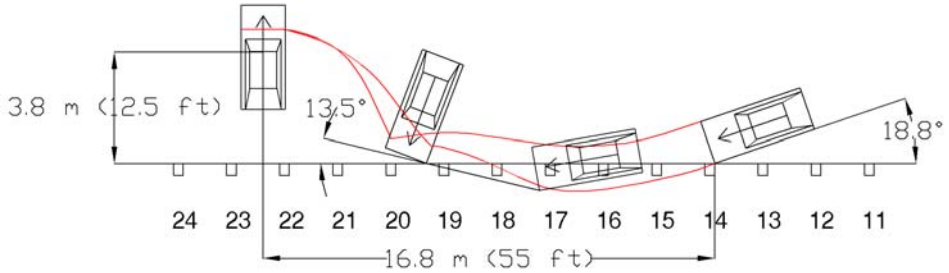


ALTERNATE SOLID NUT
(combines folded washer & hex nut)
PERSPECTIVE VIEW

Note: post flange washer and heavy hex nut may be combined into a single part for installation efficiency.

Table 4.1 – Summary of Test Results and Conditions



General Information
- Test Agency ..... Southwest Research Institute
- Test Number GMS-2
- Test Date 09/13/2006
- Test Category 3-10

Test Article
- Type ..... Longitudinal Barrier
- Installation Length ..... 57.15 m (187.5 ft)
- Nom. Barrier Height ..... 787 mm (31 in)
- Type of Primary Barrier .. Modified G4-1S Longitudinal Barrier

Soil Stable, Moist – "Standard" Soil

Test Vehicle
- Type ..... Small Car
- Designation 820C
- Model ..... 2001 Suzuki Swift
- Mass (kg) 820
- Inertial Mass (kg) 820
- Dummy Mass (kg) 73
- Gross Static Mass (kg) 893

Impact Conditions
- Speed (km/hr) 106.3
- Angle (degrees) 18.8

Exit Conditions
- Speed (km/hr) ..... 30 (calculated)
- Angle (degrees) 13.5

Occupant Risk Values
- Impact Velocity (m/s)
  - x-direction 7.6
  - y-direction ..... -4.8
- Ridedown Accelerations (g's)
  - x-direction ..... -8.1
  - y-direction 7.1

Post Impact Vehicular Behavior (limited to events <1.000 seconds)
- Maximum Roll Angle (degrees) ..... 7.8 @ 0.265 sec.
- Maximum Pitch Angle (degrees) ..... -5.2 @ 0.998 sec.
- Maximum Yaw Angle (degrees) ..... -97.1 @ 0.998 sec.

Test Article Deflection
- Dynamic ..... 0.66 m (2.2 ft)
- Permanent ..... 0.56 m (1.8 ft)

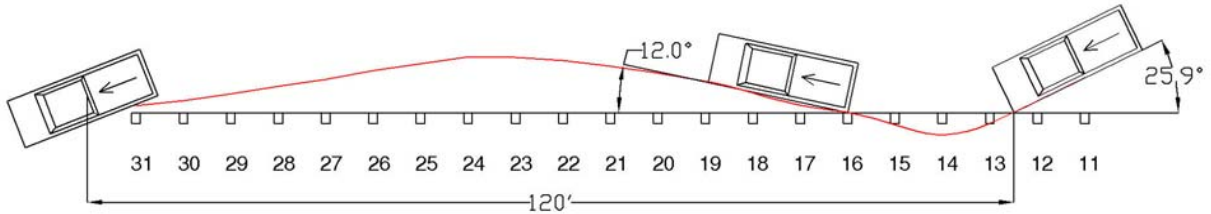
Vehicle Damage

Exterior
- CDC 11LFEW5
- VDS 11-LFQ-5

Interior
- OCDI LF0000000
- Max. Deform. (mm) 0

Table 4.1 – Summary of Test Results and Conditions



General Information
- Test Agency ..... Southwest Research Institute
- Test Number GMS-1
- Test Date 08/17/2006
- Test Category 3-11

Test Article
- Type ..... Longitudinal Barrier
- Installation Length ..... 57.15 m (187.5 ft)
- Nom. Barrier Height ..... 787 mm (31 in)
- Type of Primary Barrier .. Modified G4-1S Longitudinal Barrier

Soil Stable, Dry – "Standard" Soil

Test Vehicle
- Type ..... ½ Ton Quad Cab Pickup
- Designation 2270P
- Model ..... 2002 Dodge Ram 1500 Quad Cab
- Mass (kg) 2197
- Inertial Mass (kg) 2197
- Dummy Mass (kg) ..... NA
- Gross Static Mass (kg) 2197

Impact Conditions
- Speed (km/hr) 97.7
- Angle (degrees) 25.9

Exit Conditions
- Speed (km/hr) ..... 65 (calculated)
- Angle (degrees) 12.0

Occupant Risk Values
- Impact Velocity (m/s)
  - x-direction 5.0
  - y-direction ..... -3.2
- Ridedown Accelerations (g's)
  - x-direction ..... -10.7
  - y-direction 11.5

Post Impact Vehicular Behavior (limited to events <1.000 seconds)
- Maximum Roll Angle (degrees) ..... -12.3 @ 0.506 sec.
- Maximum Pitch Angle (degrees) ..... -6.2 @ 0.674 sec.
- Maximum Yaw Angle (degrees) ..... 35.9 @ 0.542 sec.

Test Article Deflection
- Dynamic ..... 0.89 m (2.92 ft)
- Permanent ..... 0.56 m (1.8 ft)

Vehicle Damage

Exterior
- CDC 11LFEW5
- VDS 11-LFQ-3

Interior
- OCDI LF0000000
- Max. Deform. (mm) 0