U.S. Department
of Transportation
Federal Highway
Administration

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

Refer to: HSA-10/LS-51

Mr. Kash Kasturi
Senior Engineer, Structures and Transportation Group
Foster-Miller
350 Second Avenue
Waltham, MA 02451-1196

Dear Mr. Kasturi:

Thank you for your letter of September 20, 2001, requesting Federal Highway Administration (FHWA) acceptance of your company's "Composite Breakaway Coupling" for use with utility pole guy wires on the National Highway System (NHS). Accompanying your letter was a report from the Southwest Research Institute and videos of the crash tests. You requested that we find guy wires using your company's Safety Link acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Introduction

Testing of the coupling was in compliance with the guidelines contained in the NCHRP Report 350, Recommended Procedures for the Safety Performance Evaluation of Highway Features. Requirements for breakaway supports are those in the American Association of State Highway and Transportation Officials' Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

The Foster-Miller coupling consists of a square fiberglass composite tube whose wall thickness was 1/4 inch and was 1.75 inches on a side. The device first tested (test FM-13) was 36 inches long and slotted on each side. There were four slots, each 1/8 inch x 3 inches long equally spaced on two opposing sides and three each 1/8 inch x 3 inches equally spaced on the remaining opposing sides. In test FM-16 the slot pattern was changed. Each side was only equipped with three slots and they were ½ inch wide by 6 inches long and equally spaced at 3 inches apart along each side. Eight 0.06 inch notches were saw cut into each slot.

The ends of the tubes used in both tests were fitted with machined steel end plugs which were thru-bolted with three each 3/8 inch bolts. The ends of the caps were machined to accept a standard 3/8 inch shackle. The coupling is shown in the enclosures for reference.

Testing
Full-scale automobile testing was conducted on your company's devices in test FM13. As the high-speed test proved that the breakaway concept worked as intended, a pendulum bogie was used for the low-speed test. The masses of the test vehicle and the pendulum bogie were 820 kg.

Test #	Impact Angle	Speed	Occup. Speed	Delta V
FM13, 3-61	18.7 degrees	102.5 kmh	0.9 m/s	0.9 m/s
FM16, 3-60	20 degrees	35 kmh	0.2 m/s	n/a

Speed: Actual impact speed of the test vehicle. Units are kilometers per hour.
Occup. Speed: The Occupant Impact Speed is the speed at which a theoretical front seat occupant will contact the windshield. Units are meters per second.
Delta V: Speed change of the test vehicle before and after contacting test article. Units are meters per second.

Findings
The test vehicle in test FM13 sustained damage to the front bumper and headlight/grille area. The hood and both front fenders were deformed but repairable. All tires remained inflated during the impact sequence. As mentioned above the low speed test was run with a pendulum bogie. Because the coupling's revised slot pattern in the low speed test would tend to improve the breakaway performance of the coupling it was not deemed necessary to re-run the high speed test. Based on these tests the Foster-Miller composite breakaway coupling is acceptable for use on the NHS when requested by a State.

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

- Our 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, 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 they will meet the crashworthiness requirements of FHWA and NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number LS-51 shall not be reproduced except in full. As this letter and the supporting documentation become public information, it will be available for inspection at our office by interested parties.

- The Foster-Miller composite guy wire coupling is or will be a patented product and is considered "proprietary." The use of proprietary devices specified on Federal-aid projects, except exempt, non-NHS projects: (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, a copy of which is enclosed.

Sincerely yours,

Michael L. Halladay
Acting Program Manager, Safety

Enclosure

FHWA:HSA-10:NArtimovich:tm:x61331:1/07/02
File: LS51FosterMillerFin.wpd
cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;
N. Artimovich, HSA-10)

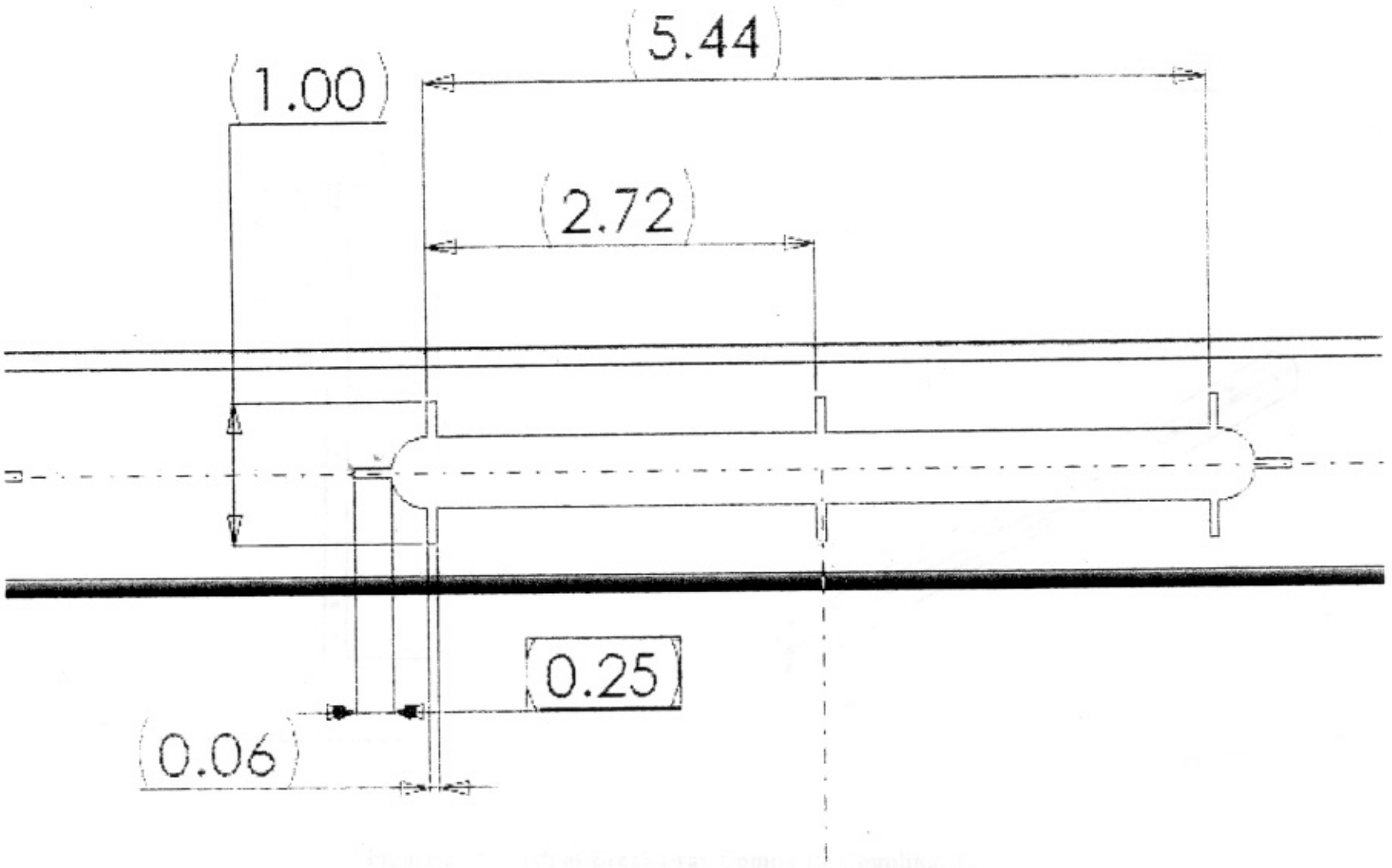

Figure 14 – Notch Details of the Composite Coupling Tested in the Pendulum Facility

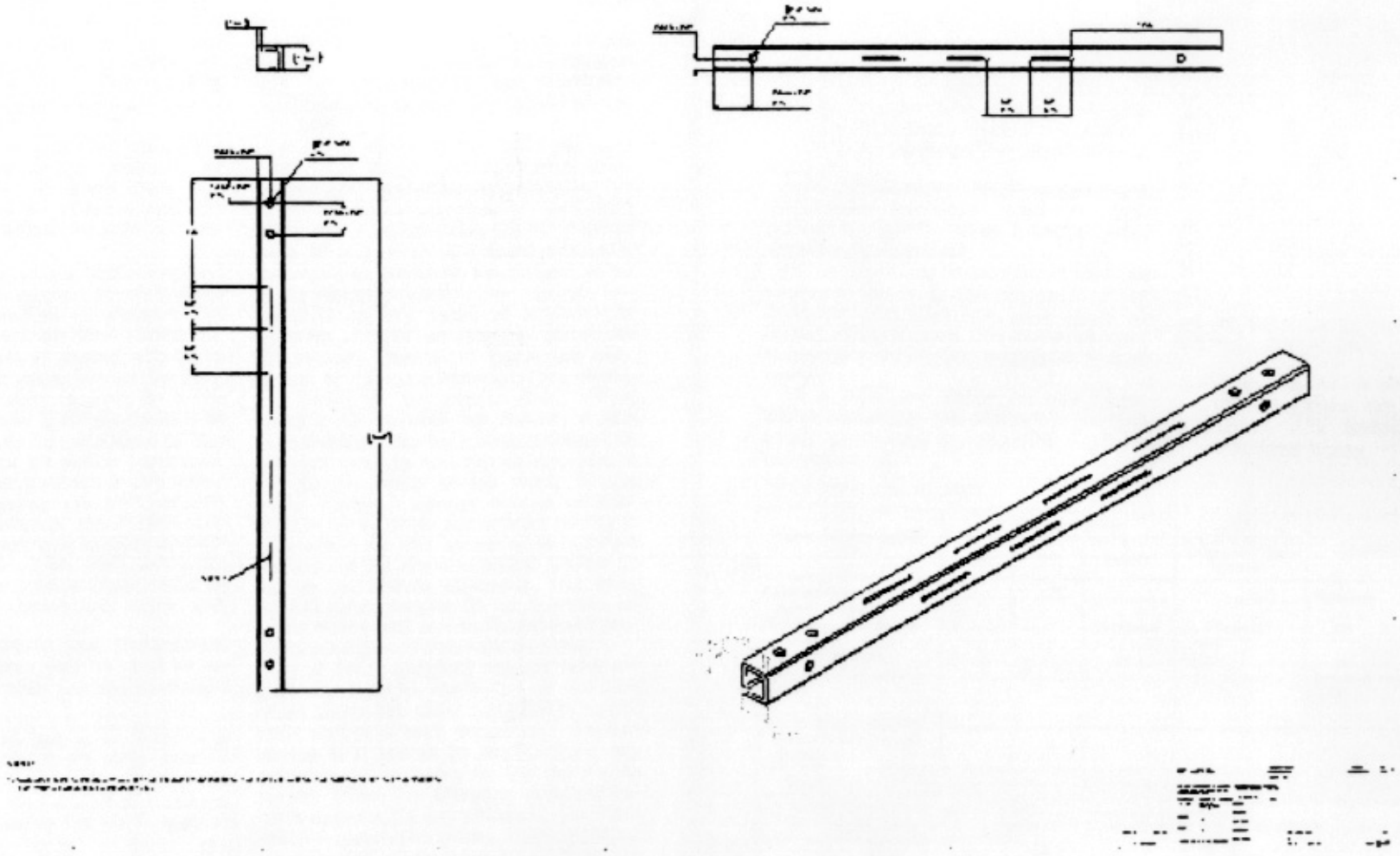

Figure 1 – Sketch of Breakaway Composite Coupling, Test FM-13

Sec. 635.411 Material or product selection.

(a) Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

(1) Such patented or proprietary item is purchased or obtained through competitive bidding with equally suitable unpatented items; or

(2) The State highway agency certifies either that such patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or

(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(b) When there is available for purchase more than one nonpatented, nonproprietary material, semifinished or finished article or product that will fulfill the requirements for an item of work of a project and these available materials or products are judged to be of satisfactory quality and equally acceptable on the basis of engineering analysis and the anticipated prices for the related item(s) of work are estimated to be approximately the same, the PS&E for the project shall either contain or include by reference the specifications for each such material or product that is considered acceptable for incorporation in the work. If the State highway agency wishes to substitute some other acceptable material or product for the material or product designated by the successful bidder or bid as the lowest alternate, and such substitution results in an increase in costs, there will not be Federal-aid participation in any increase in costs.

(c) A State highway agency may require a specific material or product when there are other acceptable materials and products, when such specific choice is approved by the Division Administrator as being in the public interest. When the Division Administrator's approval is not obtained, the item will be nonparticipating unless bidding procedures are used that establish the unit price of each acceptable alternative. In this case Federal-aid participation will be based on the lowest price so established.

(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of culvert pipes, and (2) the number and types of such alternatives which must be set forth in the specifications for various types of drainage installations.

(e) Reference in specifications and on plans to single trade name materials will not be approved on Federal-aid contracts.

ENCLOSURE 2