



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

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

Refer to: HSA-10\WZ-71

MR. Joseph N. Frazzetta
St. Louis Steel Products
191 Rock Industrial Park Drive
St. Louis, MO 66044

Dear Mr. Frazzetta:

Thank you for your letter of December 7, 2000, requesting Federal Highway Administration (FHWA) acceptance of your company's perforated square steel tubes (PSST) as components of crashworthy Type III barricades for use in work zones on the National Highway System (NHS). Type III barricades framed with PSST have been successfully tested using a number of different base connections. Your letter requested acceptance of your company's base design which use PSST skids and a shear bolt connector to support the upright elements. You requested that we find that base connection 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." In your email message of March 5, 2001, you asked that we clarify how other traffic control companies may use crashworthy generic barricade designs and certify that they are acceptable for use.

Introduction

The FHWA guidance on crash testing of work zone traffic control devices is contained in two memoranda. The first, dated July 25, 1997, titled "INFORMATION: Identifying Acceptable Highway Safety Features," established four categories of work zone devices: Category I devices were those lightweight devices which could be self-certified by the vendor, Category II devices were other lightweight devices which needed individual crash testing, Category III devices were barriers and other fixed or massive devices also needing crash testing, and Category IV devices were trailer mounted lighted signs, arrow panels, etc. The second guidance memorandum was issued on August 28, 1998, and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This later memorandum lists devices that are acceptable under Categories I, II, and III.

Testing

Type III barricades with frames of PSST have been tested in a number of studies. The table below lists the FHWA letters of acceptance which include these barricades:

<p>FHWA WZ-3 8-28-98</p>	<p>TTI for Texas D.O.T.</p>	<p>TTI tested numerous work zone traffic control devices. All the devices listed here were successfully tested in these two crash test programs and met Test Level 3 (TL-3) criteria. The crash testing is fully documented in the two reports which should be consulted for additional details of the hardware.</p> <hr/> <p>Perforated Steel Tube Type III Barricade with Plastic Panels. Base connection uses splice plates.</p>
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		Perforated Steel Tube Type III Barricade with 1x8 Wood Panels. Base connection uses splice plates.
		Type III Perforated Tubing Barricade (3.7 m) Similar to barricades above except for welded base connection. (Vertical braces added Acceptable with 1x8 wood or hollow core plastic rails.)
		Type III perforated Tubing Barricade (1.2 m) Welded Base Connection. Acceptable with 1x8 wood or hollow core plastic rails.
WZ-40 6-6-2000	FHWA/TTI	Pooled-Fund Study on Work Zone Traffic Control Devices: Perforated Square Tube Type III with sign.
WZ-44 7-25-2000	Penn DOT	Type III Barricade/Sign Support. Perforated square tube frame, 4 ft. plastic rails, plywood sign, warning light.

Your requests were that the PSST Type III barricade could be fabricated using any of the following base connection details:

- PSST stub welded to the horizontal rails (or “skids”), also of PSST
- Using the rectangular splice plate and shear bolt arrangement used in the TTI tests described in WZ-3.

Findings

The results of the crash testing of the various PSST Type III barricades met the FHWA requirements. We concur that the base connections listed above will result in acceptable performance when used on any of the crash-tested PSST Type III barricades, therefore they are acceptable for use as TL-3 devices on the NHS under the range of conditions tested, when proposed by a State.

Additional discussion of PSST Type III barricades:

Numerous tests have been run on Type III barricades using PSST as horizontal skids and uprights. Wood or plastic rail elements have been used in the mostly head-on tests. These tests, some of which are covered in our FHWA Acceptance Letter WZ-3 dated August 28, 1998, show acceptable performance. Some individuals have expressed concern that an end-on test was not conducted on this class of barricade. (New York State DOT ran an informal end on test in the 1980's and reported acceptable results.) A test detailed in acceptance letter WZ-40 shows that the PSST Type III barricade is crashworthy per Report 350 when struck head on and at 90 degrees, at least when the horizontal barricade rails are 1219-mm (4 feet) long. In another series of tests, documented in Acceptance Letter WZ-55, dated December 18, 2000, the Minnesota DOT had a PSST barricade tested using extruded aluminum rails. It performed in an acceptable manner in both the head-on and 90 degree tests. There was no additional structure beyond the PSST frame and the rails. A successful test was also run with this barricade supporting an aluminum sign panel mounted to and above the top rail. What has become especially evident is that secure connections of the panels to the uprights using bolts with washers are important and necessary for the crashworthy performance of Type III barricades.

The PSST barricades covered in WZ-3, WZ-55, and this letter are generic in design and may be

fabricated by any supplier in accordance with the crash tested design. Variations not spelled out in an FHWA acceptance letter may not be used on the NHS unless approved by the local Secure connections of the panels to the uprights using bolts with washers are important and necessary for the crashworthy performance of Type III barricades.

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 WZ-71, shall not be reproduced except in full.
- Some of the barricade components may be patented products and considered "proprietary." The use of proprietary work zone traffic control devices in Federal-aid projects is generally of a temporary nature. They are selected by the contractor for use as needed and removed upon completion of the project. Under such conditions they can be presumed to meet requirement "a" given below for the use of proprietary products on Federal-aid projects. On the other hand, if proprietary devices are specified 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 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,

Frederick G. Wright, Jr.
Program Manager, Safety

Enclosure

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