

Refer to: HSA-10/WZ-166

Mr. Chuck Mettler
Plastic Safety Systems, Incorporated
2444 Baldwin Road
Cleveland, Ohio 44104

Dear Mr. Mettler:

Thank you for your letters of July 28 and September 30, 2003, requesting Federal Highway Administration (FHWA) acceptance of modifications to your company's Type III Barricade with "Anchor" base system, and acceptance for the "MVP" vertical panel, respectively, as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying your letter were CD videos of crash testing you conducted. You requested that we find these devices 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

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 are those lightweight devices which are to be self-certified by the vendor, Category II devices are other lightweight devices which need individual crash testing but with reduced instrumentation, Category III devices are barriers and other fixed or heavy devices also needing crash testing with normal instrumentation, and Category IV devices are trailer mounted lighted signs, arrow panels, etc. for which crash testing requirements have not yet been established. 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.

TYPE III BARRICADE

The **Plastic Safety Systems Type III Barricade** was found acceptable via FHWA Acceptance Letter WZ-61 dated December 13, 2000. At that time, the tested barricade was described as follows:

The horizontal rails, or "legs," are 1217-mm (48 inch) long, 98 mm (3.9 inch) square HDPE, and are placed 1225 mm (48 inches) apart. Underneath each end of the legs

rubber pads are attached to increase friction with the pavement. On the top center of each leg is bolted a 127 mm x 76 mm (5 x 3 inch) steel plate, to which is welded a 72 mm diameter x 3.06 mm wall x 200 mm (2.83 x 0.12 x 7.87 inch) long steel tube. These steel tubes support the vertical upright masts, which are 88 mm (3.5 inch) square x 5.08 mm (0.2 inch) wall x 1521 mm (60 inch) long High Density Polyethylene (HDPE) plastic. To these vertical masts are bolted (with 1/4 - 20 bolts and nuts with washers) three 205 mm (8 inch) wide x 22.75 mm (0.9 inch) thick x 2435 mm (8 feet) long HDPE honeycomb extrusions. A “ballast board” was also used to connect the legs. This 130 mm (5 inch) wide x 29.83 mm (1.2 inch) thick x 1225 mm (48 inch) long HDPE extrusion with a wall thickness of 6.1 mm (1/4 inch) was installed as a safer location to place sandbags.

This configuration was tested in accordance with NCHRP Report 350 guidelines and was successful. Subsequent informal testing of the Type III barricade with the ANCHOR base system showed that it was an acceptable alternative to the square HDPE leg. This was acknowledged in FHWA Acceptance Letter WZ-152 dated April 10, 2003.

Testing

Your present request is to permit modifications to your Type III plastic barricade:

- 1) Substitute up to 3658 mm (12 feet) long HDPE rails on 1524 mm (5 feet) HDPE uprights.
- 2) Substitute up to 1829 mm (6 feet) long HDPE rails on 2133 mm (7 feet) HDPE uprights.
- 3) Substitute up to 2438 mm (8 feet) long HDPE rails on 1524 mm (5 feet) 1 3/4” perforated square steel tube (Telespar) uprights.

The following configurations were informally crash tested at 60 mph using a full sized automobile. Because the results were so favorable we will consider this an adequate surrogate vehicle to evaluate variations to devices that had already been tested under Report 350 guidelines.

Configuration	Weight of Upper Portion of Barricade	Barricade Rails - Length	Uprights	
			Height	Material
As Tested	11.4 kg (25 lbs)	8 Feet	5 feet	HDPE
Modification 1	14.9 kg (32.8 lbs)	12 Feet	5 Feet	HDPE
Modification 2	13.1 kg (29.0 lbs)	10 Feet	5 Feet	HDPE
Modification 3	11.1 kg (24.5 lbs)	6 Feet	7 Feet	HDPE
Modification 4	16.0 kg (35.3 lbs)	8 Feet	5 Feet	Telespar

Note: All Modifications used the “ANCHOR” base system.

Findings

Damage was limited to cosmetic sheet metal dents and dings to the hood and bumper, with little or no windshield contact. The upper portion of the barricade remained intact and rode over the vehicle or was knocked ahead. Because these informal tests used a large passenger car, there is some question over the ability of these tests to qualify the barricades under NCHRP Report 350. The most significant potential impacts are during the end-on tests where the ends of the barricade rails may contact the windshield. In the tests listed above, no damage was observed partly due to the length of the crash test vehicle's hood – more contact would be expected with an 820C vehicle that meets Report 350 criteria. In order to reduce the potential for damage, you offered to change the design of these barricades by relocating the uprights no further than 24 inches from the end of each rail. We agree this design change is necessary.

The results of the testing shows that the type III barricades, modified with rails up to 12 feet long for 5-foot tall units, and up to 6 feet long with up to 7 foot units, would meet the FHWA requirements and, therefore, the Plastic Safety Systems Type III barricades, as detailed above and in the enclosed drawings, with the exception that the overhang be limited to 24 inches from the uprights, are acceptable for use on the NHS under the range of conditions tested, when proposed by a State.

VERTICAL PANEL

Introduction and Testing

The blow-molded **Plastic Safety System's "MVP" Vertical Panel** of HDPE weighs approximately 7 pounds and is shown in the enclosed drawings for reference. With reflective sheeting (12" x 36") added it weighs 8.4 pounds. It is supported on a 45 pound molded rubber ballast/base, and was crash tested using a warning light and batteries which weighed 4.3 pounds. The informal automobile testing showed that immediately after impact the top of the MVP flexes towards the car and the light hits the hood of the vehicle. As the lens shatters, the bottom of the MVP pulls out of the rubber base and the device is projected ahead of the vehicle. The battery case remains with the vertical panel.

Findings

The results of the testing shows that the "MVP" vertical panel would meet the FHWA requirements and, therefore, the Plastic Safety Systems "MVP" Vertical Panel, with or without warning light, and with reflective sheeting up to 12" x 36", as detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when proposed by a State.

Please note the following standard provisions that 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-166 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.
- Plastic Safety Systems devices are 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 by a highway agency* for use on Federal-aid 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. These provisions do not apply to exempt Non-NHS projects. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented device. Patent issues are to be resolved by the applicant and the patent owner.

Sincerely yours,

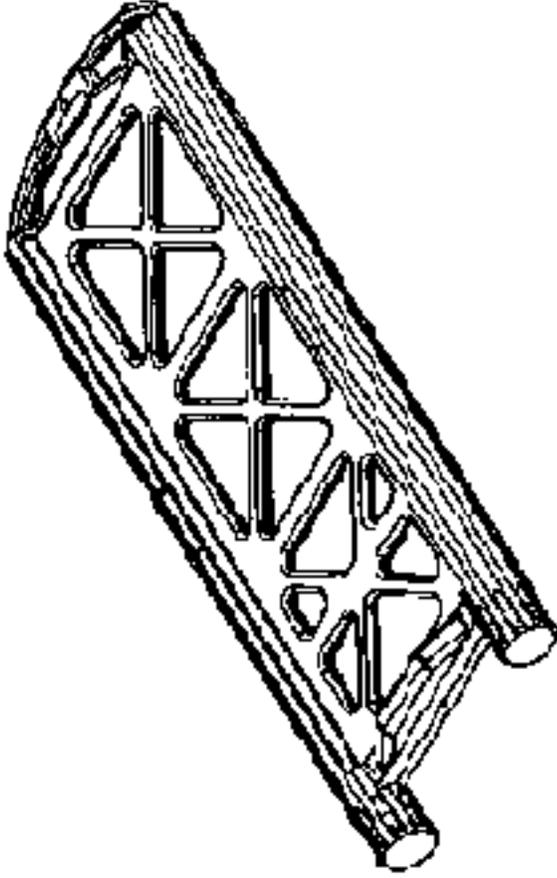
John R. Baxter, P.E.
 Director, Office of Safety Design
 Office of Safety

Enclosures

FHWA:HSA-10:NArtimovich:tb:x61331:10/30/03

File: h://directory folder/nartimovich/WZ166-PSSfin

cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;
 N. Artimovich, HSA-10)



CONFIDENTIAL

1.400 DIA
8.75 x 1.25"

12.51



8.00
29.59
30.75

4.50

NOTE: Roughs

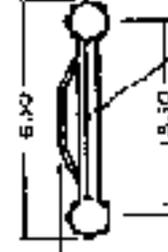
1.70

3.52

5.00 x .07

5.00 x .07

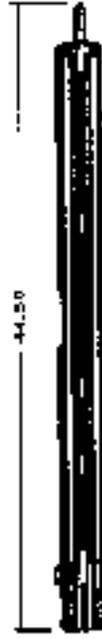
5.00 x .07



6.100

18.50

45.100 P/100 P/100



44.50

Note: Material - HDPE
Standard Part Weight 6 1/2 - 7 1/2

Messiah Lattice, COOP, J of Specialization, and Part Weight/size
Business, per High Quality Control Area

Manufacturer of Plastic Substrates, Inc. and its associated
facilities for the purpose of this project, which shall be used
for the design, construction, and/or maintenance of
any facility or structure, and shall not be used for any other
purpose without the written consent of Plastic Substrates, Inc.
The manufacturer's name and address are: Plastic Substrates, Inc.,
10000 W. 10th Street, Overland Park, KS 66211-1000

Rev	Material	Subst. No.	Part No.	QTY	By	DATE	Rev.	DATE
1					CUM	10-11-80		
2								
3								
4								
5								
6								
7								
8								
9								
10								

Plastic Substrates, Inc.
Overland Park, Kansas



