

Refer to: HSA-10/WZ-138

Mrs. Kathy Rogalla  
Marketing Displays International  
38271 W. Twelve Mile Road  
Farmington Hills, MI 48331-3041

Dear Mrs. Rogalla:

This is in response to your letter of November 20, 2002, requesting Federal Highway Administration (FHWA) acceptance of your company's portable breakaway sign stand, MDI Model 4884 as a crashworthy traffic control device for use in work zones on the National Highway System (NHS). Accompanying your letter was a drawing of the stand. You requested that we find this stand 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." You provided additional details at our request on January 30 and on February 21, 2003.

### **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.

The MDI Model 4884 breakaway portable sign stand is similar to your crash-tested breakaway stand, the MDI Model 4860. The Model 4860 was found acceptable in our letter WZ-69, dated May 9, 2001. In your model numbers the first two digits identify the size of the sign that can be supported and the second two digits identify the mounting height, both in inches. The Model 4860 was described as follows:

### **Model 4860, with breakaway feature, tested with Aluminum panel and light:**

This stand is manufactured with two vertically mounted steel coil springs to support 1219 x 1219 x 2 mm (48 x 48 x 0.080 inch) aluminum signs. The four legs of the stand are 32 x 32 x 2.5 mm (1.25 x 1.25 x 0.10 inch) square 6061-T6 extruded aluminum tubing. The coil springs attach the 5 mm (0.19 inch) thick autophoretic coated steel base to the telescoping upright. The two-piece

upright, consisting of a 38 mm (1.50 inch)(bottom) and a 32 mm (1.25 inch)(top) square

aluminum tube, supports the sign. The bottom upright has a scored “breakaway section” at 483 mm (19 inches) above grade when the stand is fully assembled. Rigid sign mounting brackets support the aluminum sign at top and bottom and a steel flag lock bracket is attached to the top upright supporting three hardwood dowel flags. A barricade light assembly, consisting of a 6-volt battery and a 178 mm (7 inch) polycarbonate lens, is mounted to the top upright above the flag bracket. The overall height of the stand, with flags and light is 4115 mm (162 inches) and 3251 mm (128 inches) without the light and flags. The bottom of the sign mounts to 1524 mm (60 inches) above grade. The total weight of the sign stand is 31.6 kg (69.7 pounds) which includes the stand of 21.7 kg (47.7 pounds), the sign and flags of 8.4 kg (18.5 pounds) and the light of 1.6 kg (3.5 pounds) as tested in MDI 4.

Your current request is for the **Model 4884** breakaway portable sign stand. The Model 4884 is identical in construction to the Model 4860 with the exception of the mast, which is in three parts. The bottom section of the Model 4884’s mast is 775 mm (30.5 inches) long of 44.5 mm (1.75 inch) square aluminum with a wall thickness of 2.54 mm (0.10 inch). The middle section is 865 mm (34 inches) long of 38.1 mm (1.50 inch) square aluminum with a wall thickness of 2.54 mm. The top section is 1725 mm (68 inches) long of 31.75 mm (1.25 inch) square aluminum with a wall thickness of 2.54 mm.

### **Testing and Findings**

Full-scale automobile testing was conducted on the Model 4860 and was found acceptable. The Model 4884 is similarly constructed, includes the breakaway feature, and mounts the sign higher above the roadway. The only significant difference is the size of the lower mast, which is where the breakaway feature (external groove) is found. Because this could have a material effect on the breakaway performance of the stand, we asked you to conduct static tests to determine what forces were needed to activate the breakaway feature. When subjected to horizontal beam load tests, the 1 ½ inch specimen broke under a static beam load of 1480 pounds. The 1 ¾ inch specimen broke at a load of 1760 pounds. The difference of 280 pounds of force was less than a 20 percent increase. After reviewing the crash tests of the Model 4860 stand we conclude that any delay in the breakaway action of the larger mass would very likely be offset by the increased height of the sign and the sign and mass should still pass over the impacting vehicle. Therefore, the MDI Model 4884 breakaway portable sign stand described above and detailed in the enclosed drawing is acceptable for use on the NHS under the range of conditions that the Model 4860 was 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-138 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.
- MDI portable sign stands may include patented components and if so are 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,

Michael S. Griffith  
Acting Director, Office of Safety Design  
Office of 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

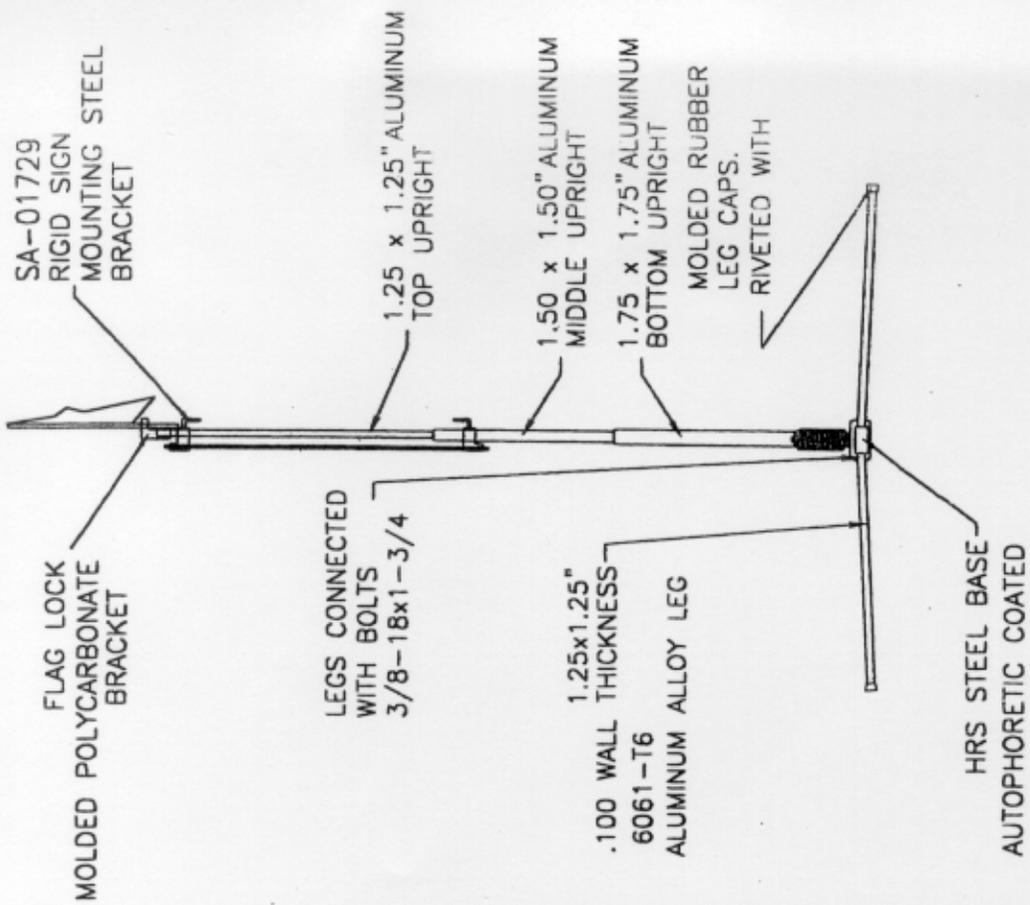
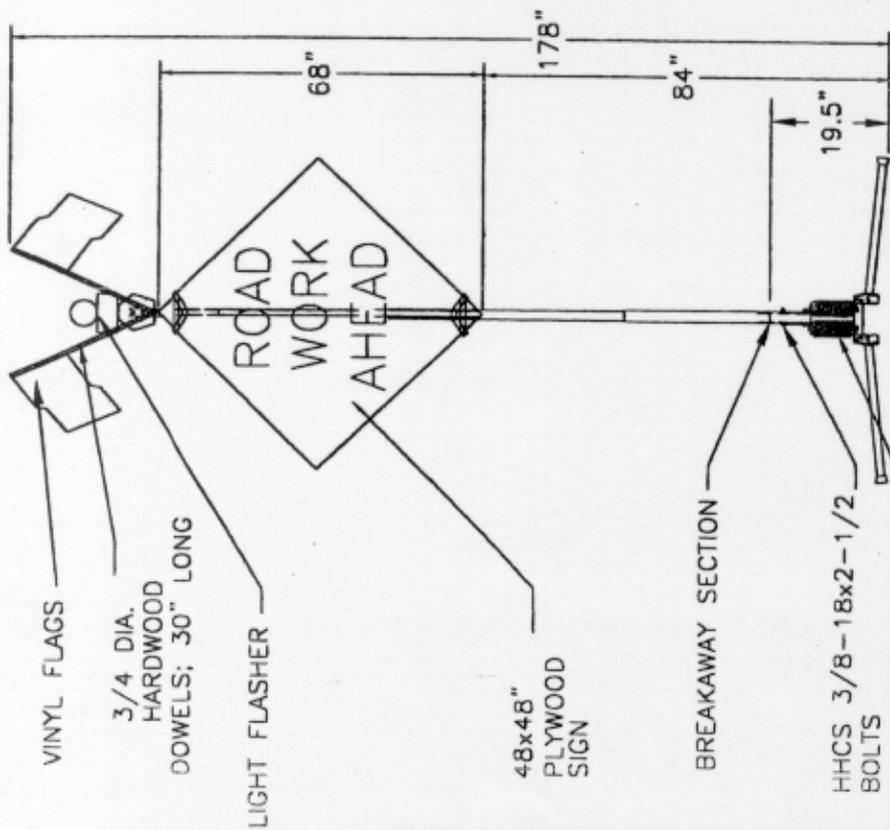
(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(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.



4860 WEIGHT:

PLYWOOD SIGN	--	35 LB
LIGHT FLASHER	----	3.5 LB
SIGN STAND WITH		
RIGID SIGN BRACKETS	--	53 LB
TOTAL	-----	91.5 LB

MDI

DATE: 11/01/02

NAME: MODEL 5084

SCHEMATIC DRAWING