



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

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

In Reply Refer To: HSA-10/WZ-221

December 19, 2005

Mr. Mark G. Carrk, Sr.
VP – Risk Management
Mathy Construction Co.
920 10th Avenue North
P.O. Box 189
Onalaska, Wisconsin 54650

Dear Mr. Carrk, Sr.:

Thank you for your letter of June 9, 2005, requesting the Federal Highway Administration's (FHWA) acceptance of your company's A-Frame portable sign stand as a crashworthy traffic control device for use in work zones on the National Highway System (NHS). Accompanying your letter were reports of crash testing conducted by E-TECH Testing Services and video of the tests. 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." Additional information on the windshield deformation was supplied by E-TECH on December 6, 2005, in response to our request.

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.

A brief description of the devices follows:

The Mathy Construction Sign Stand consists of a sign support formed from a pair of 16mm hot rolled steel round bar legs. The legs are hinged together at the top with a pair of 19 mm



Schedule 40 pipe joints that are welded to one of the legs and disposed about the other. Metal flat washer “stops” are welded to adjacent legs to limit the spread angle between the legs to approximately 60 degrees. The frame unfolds into an A-frame like support for a 1219 x 1219 mm by 2.03 mm thick aluminum sign panel. The base of the panel rests in a 25 x 25 mm by 3mm angle iron “pocket” welded to one of the legs. When deployed the base of the sign is at a nominal 305 mm above the ground. The top of the sign is secured to the frame at the top with a pair of rubber “bungee” cords crossed over one another. The total test article mass was 16.3 kg and the sign mass was 8.2 kg. A drawing of the Mathy Construction Sign Stand is enclosed for reference.

Testing

Full-scale automobile testing was conducted on your company’s devices. Two stand-alone examples of the device were tested in tandem, one head-on and the next placed 6 meters downstream turned at 90 degrees, as called for in our guidance memoranda.

The tests are summarized in the table below.

NCHRP Report 350 Test 3-71		
Test Number		
Sign Stand Tested	Head-on	90-degree
Weight of Tested Stand	16.3 kg	
Mounting heights	305 mm	
Flags? Lights?	none	none
Mass of Test Vehicle	818 kg	
Impact Speed	101.1 km/hr	99.7 km/hr
Velocity Change	0.4 m/s	0.4 m/s
Extent of contact	Both signs hit windshield	
Windshield Damage	Extensive damage across entire windshield	
Other notes	Maximum windshield deformation 2.625 inches	

Findings

Damage to the windshield was extensive due to the impact of the solid aluminum sign panels. There was general overall cracking and flexing of the glass, but there were no holes through the plastic laminate layer because the flat face of the sign impacted the windshield during the head-on test. Our guidance has a “preferred” limit of 2 inches of deflection, with a maximum allowable deflection of 3 inches. Devices that cause the windshield to deflect between 2 and 3 inches can be found “acceptable, but marginal.

The results of the testing met the FHWA requirements and, therefore, the device described in request above and detailed in the enclosed drawings is marginally acceptable as a test-level 3 device 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 the 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 the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-221 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.
- The Mathy Construction Sign Stand is a patent pending device and will be 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. 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 for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate device, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. 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

Enclosures

FHWA:HSA-10:NArtimovich:tb:x61331:12/15/05

File: h://directory folder/artimovich/WZ221-MathFIN

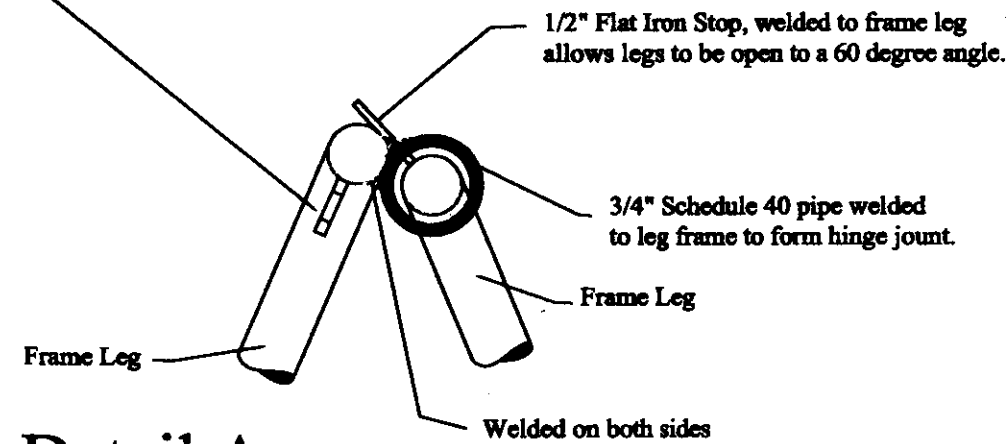
cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;
N.Artimovich, HSA-10)

Materials List

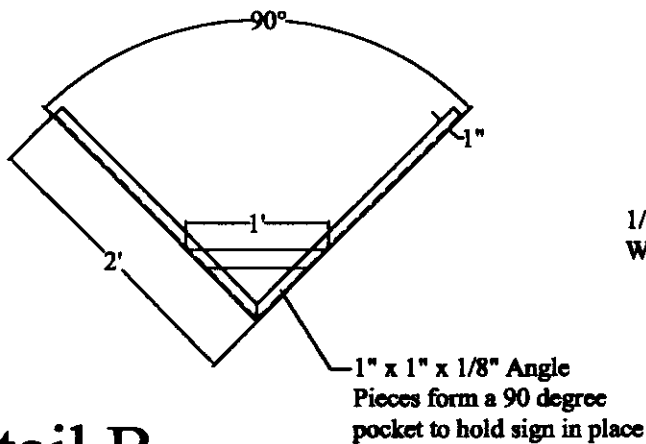
Quantity	Part Description	Type of Material	Dimensions	Lbs/ linear foot	Weight
2	Frame legs	5/8" Hot Rolled Round Rod	140"	1.04	
2	Sign Pocket	1"x1"x1/8" angle iron	24"	0.8	
2	Cross Brace	1/4" x 1 1/2" Flat Bar Stock	2' 8"	1.275	
1	Pocket Cross Brace	1/4" x 1 1/2" Flat Bar Stock	1'	1.275	
2	Hinge Sleeve	3/4" Schedule 40 Pipe	3"	1.13	

Total

Metal washer welded to pipe sleeve.
Tiedown straps are hooked to washers and used to hold sign in place.



Detail A



Detail B

