



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

June 6, 2000

WZ-41  
400 Seventh St., S.W.  
Washington, D C 20590

Refer to: HSA-1

Mr. Henry Ross  
United Rentals Highway Technologies  
880 North Addison Road  
P.O. Box 7050  
Villa Park, Illinois 60181-7050

Dear Mr. Ross:

Thank you for your letter of February 28 requesting Federal Highway Administration (FHWA) acceptance of your company's Type I and Type II barricades as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying your letter was a report from E-TECH Testing Services, Inc., and videos of the crash tests. You requested that we find the 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." On May 10 you provided additional information in response to our request.

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.

All three barricades tested feature 610 mm long and 13 mm thick plywood panels. The legs are 12 ga, 32 mm x 23 mm steel angles conforming to American Society for Testing and Materials specification A-499 grade 60 rail steel. The width of the plywood panels vary by model, as detailed in the table below. The panels are riveted to the legs using 5/16" x 3/4" semi-tubular aluminum rivets (alloy 5056, 0 tempered) with a 3/4" head diameter. Each barricade also had a Toughlite 2000 warning lite manufactured by WLI Industries, mounted with standard vandal-resistant hardware with cupped washer.

Full-scale automobile testing was conducted on your company's barricades. Two stand-alone examples of each 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 complete devices as tested are shown in Enclosure 1.

The crash tests are summarized in the table below:

| Test Number                 | 05-5807-001        | 05-5807-002        | 05-5807-003        |
|-----------------------------|--------------------|--------------------|--------------------|
| Test Article                | Type I "12x24"     | Type I "8x24"      | Type II            |
| Height to Top of Rails      | 950 mm             | 950 mm             | 950 mm             |
| Width of top rail           | 305 mm             | 200 mm             | 200 mm             |
| Width of bottom rail        | 150 mm             | 150 mm             | 200 mm             |
| Test Article Mass (each)    | 10.6 kg            | 9.5 kg             | 11.6 kg            |
| Mass of ballast added       | 18 kg              | 18 kg              | 18 kg              |
| Vehicle Inertial Mass       | 812 kg             | 813 kg             | 824 kg             |
| Impact Speed, Head-on       | 99.0 km/h          | 101.8 km/h         | 101.8              |
| Impact Speed, 90 Deg.       | 96.4 km/h          | 98.3 km/h          | 98.3               |
| Velocity Change, Head-on    | 0.72 m/s           | 0.97 m/s           | 0.97 m/s           |
| Velocity Change, 90 Deg.    | 0.72 m/s           | 0.97 m/s           | 0.97 m/s           |
| Vehicle crush               | Superficial (hood) | Superficial (hood) | Superficial (hood) |
| Occupant Compart. Intrusion | none               | none               | none               |
| Windshield Damage Head-on   | none               | none               | none               |
| Windshield Damage 90 Deg.   | none               | none               | none               |


Damage to the test vehicles was limited to broken grills and dents in the hoods. The test articles did not show potential for penetrating the occupant compartments. The results of this testing met the PHWA requirements and, therefore, the devices listed above and shown in Enclosure 1 are acceptable for use as Test Level 3 devices on the NHS under the range of conditions tested, when proposed by a State.

Please also 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.

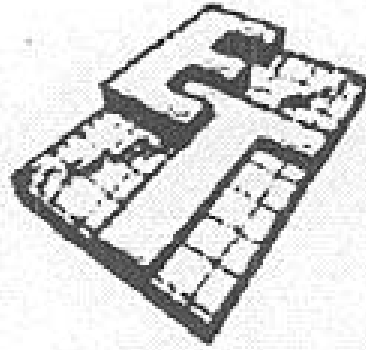
- Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly 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. A quality assurance program, developed to suit your needs, is necessary to do this.
- To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-41, shall not be reproduced except in full.

Sincerely yours,



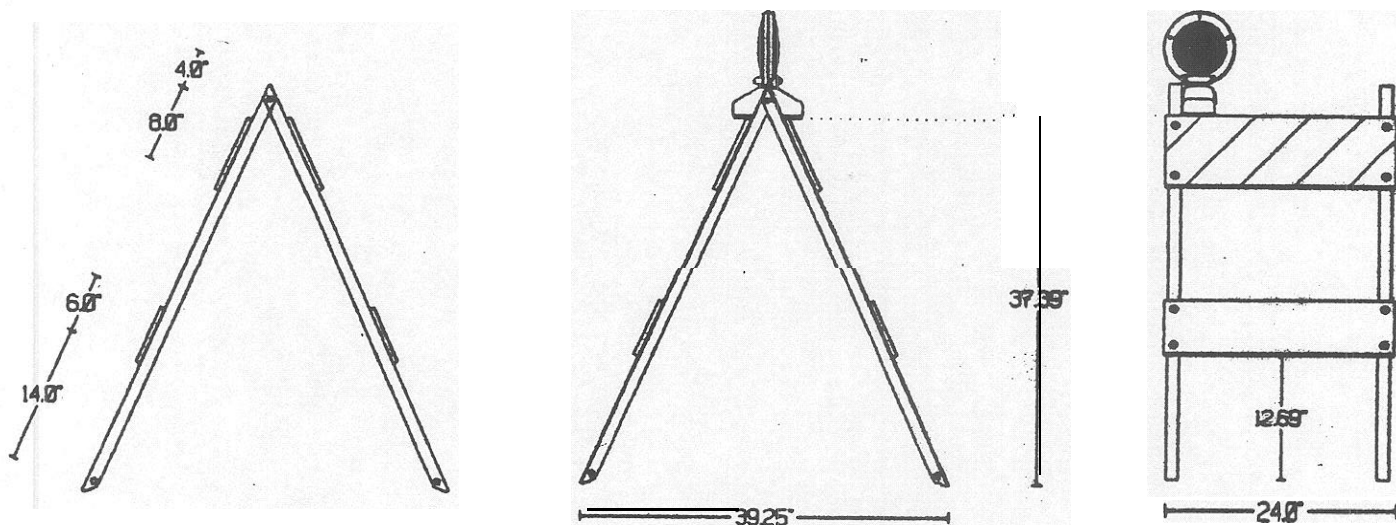
Frederick G. Wright, Jr.  
Program Manager, Safety

Enclosure



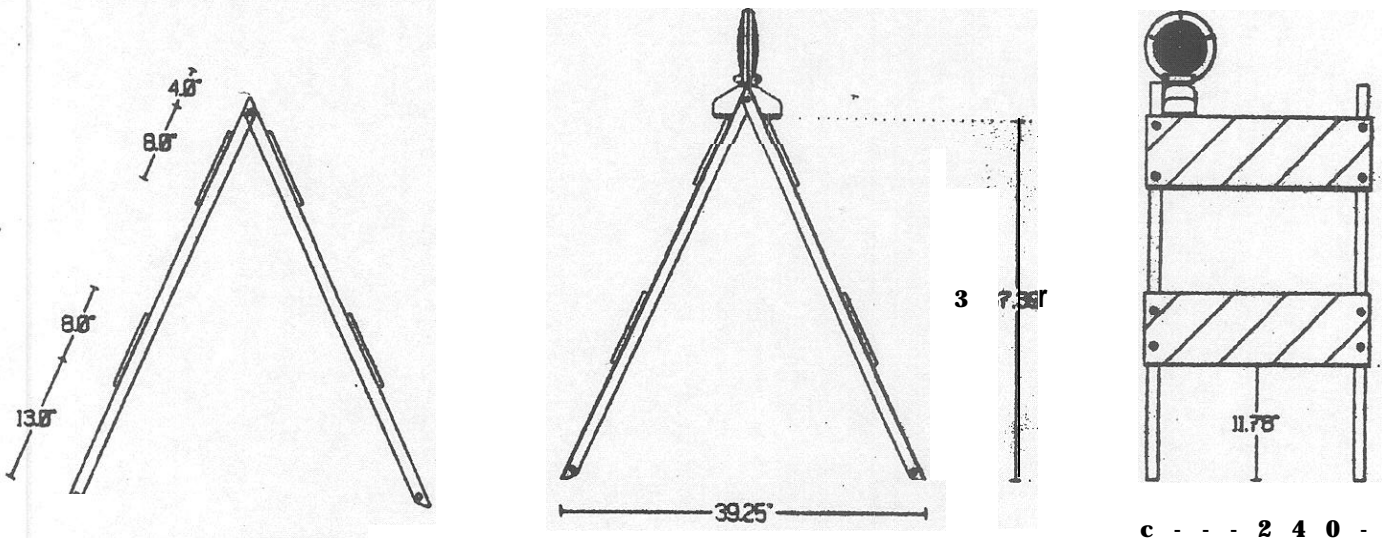
***E-TECH Testing Ser***

## **C. Illustrations**



Type I Barricade 8-x24' Top and 6"x25" Bottom 1/2 Plywood Panels Barricade have 4 - 4 5' 12.0. 1-1/4-x1-1/4' anular rail steel legs, meeting ASTM A-499. The legs are manufactured from Grade 60 Rail Steel.  
Panels are riveted to legs using 5/16"x3/4" semi-tubular aluminum rivets (alloy 5056 0 tempered) with a 3/4" head diameter.  
Attached light is a Toughlite 2000, manufactured by WLI Industries.

Illustration C-1. WLI Barricade Drawings (2 of 3)



Type II Barricade 8'x24" Top and 8'x24" Bottom 1/2" Plywood Panels. Barricade have 4-45° 12ga. 1-1/4"x1-1/4" angular rail steel legs, meeting ASTM A-499. The legs are manufactured from Grade 60 Rail Steel. Panels are riveted to legs using 5/16"x3/4" semi-tubular aluminum rivets (alloy 5056 Ø tempered) with a 3/4" head diameter. Attached light is a Toughlite 2000, manufactured by WLI Industries.

Illustration C-1. WLI Barricade Drawings (3 of 3)