



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

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

January 18, 2005

In Reply Refer To: HSA-10/WZ-33B

Mr. Frank J. Dvoracek
Three D Traffic Works, Incorporated
430 North Varney Street
Burbank, California 91502

Dear Mr. Dvoracek:

This is in reply to Mr. Kevin King's letter of September 18, 2003, requesting the Federal Highway Administration (FHWA) acceptance of your company's barricades and panel system with attached warning lights as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying the letter was a letter report of bogie crash testing conducted by the Midwest Roadside Safety Facility (MwRSF) and video of the tests. Mr. King requested that we find these devices acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features." We provided a preliminary response in December of 2003, and you recently asked that this acceptance be formalized.

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:

Three D Traffic Works TD2100 plastic Type I/Type II barricades were found acceptable as Test Level 3 devices in our letter WZ-33 dated May 24, 2000, and WZ-33A dated June 20, 2003, having passed full-scale crash testing. Your present request is for combinations of these barricades supporting 12-foot long 1x8 inch extruded plastic rails, and affixed with warning lights.

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 six meters downstream turned at 90 degrees, as called for in our guidance memoranda.

The tests are summarized in the table below:

Test Number	3D-1	3D-2
Barricade Tested	3 Barricades, 2 Boards	2 Barricades, 1 Board
Orientation	Head-on	End – on
Weight of Tested Device	39.3 kg (86.7 lbs)	24.1 kg (53.3 lbs)
Height to top of Barricade	960 mm (37.8 in)	972 mm (38.25 in)
Height to top of Board	908 mm (35.75 inches)	908 mm (35.75 in)
Flags? Lights?	3 at 1.2 kg (2.64 lbs)	2 at 1.2 kg (2.64 lbs)
Barricade spacing	3.7 m (12 feet)	3.7 m (12 feet)
Mass of Test Vehicle	929 kg (2049 lbs)	
Impact Speed	100.7 km/hr (62.6 mph)	101.4 km/hr (63.0 mph)
Velocity Change	2.9 km/hr (0.8 m/s)	5.5 km/hr (1.5 m/s)
Extent of contact	Warning light assembly contacted "windshield"	Board and 1 barricade contacted "windshield"
Windshield Damage	Only minor cracking expected	Only minor cracking expected

This crash-testing program used a hard-nosed bogie vehicle of a mass larger than the standard 820C test vehicle. There are significant constraints involved in using such a non-standard testing device, some of which are:

1. The potential vehicle velocity change must be considered insignificant.
2. The crush characteristics of an automobile bumper must not be expected to have a significant affect on the trajectory of the test article.
3. The profile of the bogie vehicle must be configured to replicate the outline of a production vehicle. The MwRSF bogie was configured to replicate the outline of a Geo Metro, a vehicle commonly used in testing of work zone devices.
4. No part of the test article may intrude into the windshield area of the vehicle after impact.

The testing met the first 3 criteria but parts of the barricade and panel system contacted the bogie vehicle in the windshield area. In test 3D-1 a warning light detached from its barricade, reflected off the hood, and struck the windshield. In test 3D-2 the lens broke from one light and contacted

the center of the windshield. Also in this test the 12 foot long board made glancing contact with the top of the “windshield”, and the downstream barricade rotated up and over the hood of the car such that the top of the light impacted in the windshield area. The MwRSF researchers are of the opinion that these contacts would not have caused substantial damage to the windshield should an 820C automobile have been used. Upon reviewing the films of the test we concur in that assessment.

Findings

The results of the testing met the FHWA requirements and, therefore, the devices described above and detailed in the enclosed drawings are 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 the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-33B 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.
- Three-D Traffic Works Barricades are patented devices and 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 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,

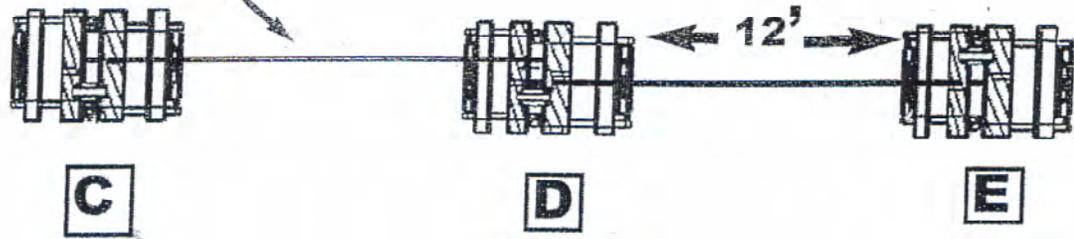
/Original Signed by/

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

Enclosure

FHWA:HSA-10:NArtimovich:tb:x61331:1/13/05
File: h://directory folder/artimovich/WZ33B3D-TrafficFIN
cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;
N.Artimovich, HSA-10)

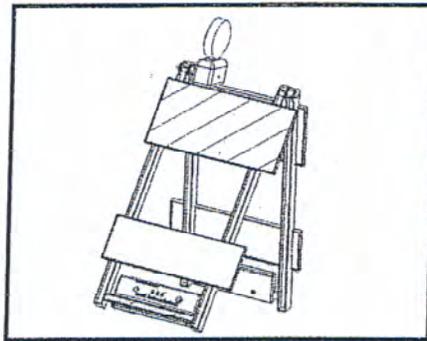
1" x 8" x 12' Extruded Plastic Board



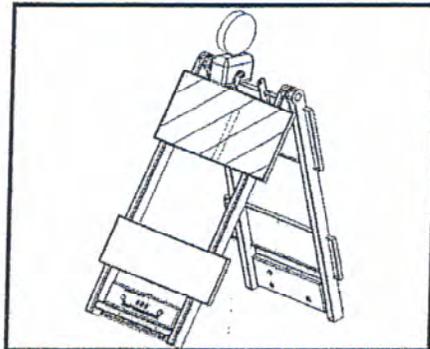
C = Hinge Mounted Barricade

D = Bracket Mounted Barricade

E = Hinge Mounted Barricade

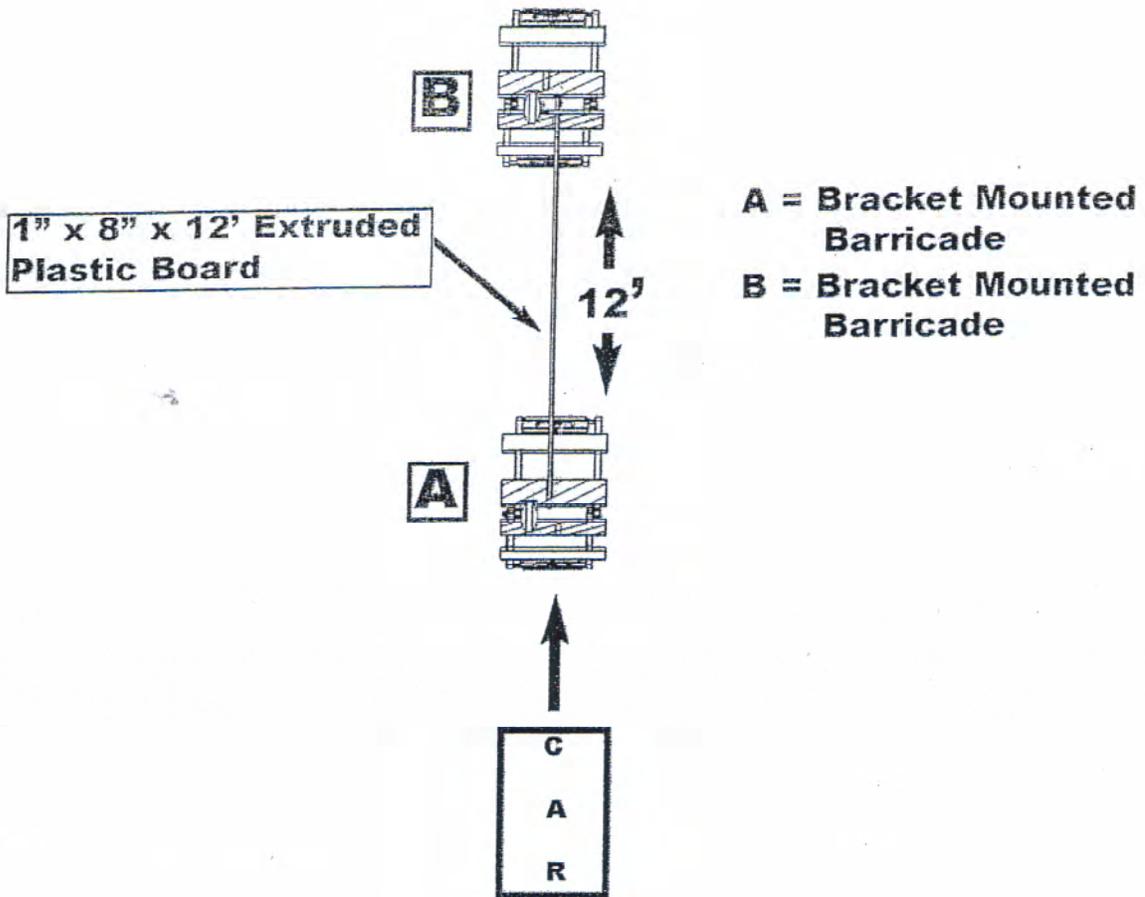


Hinge Mounted Light Barricade with 6V Light



Bracket Mounted Light Barricade with 6V Light

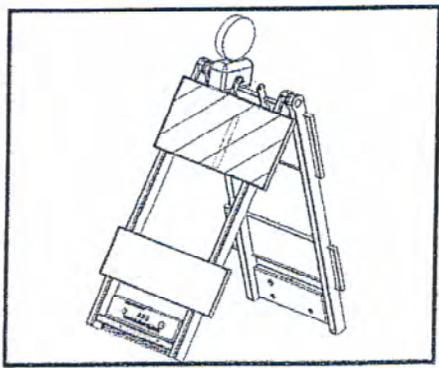
Refer to WZ-33 For Barricade Specifications

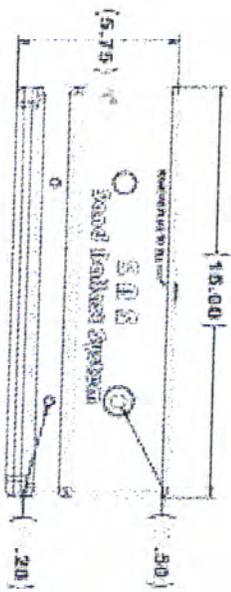
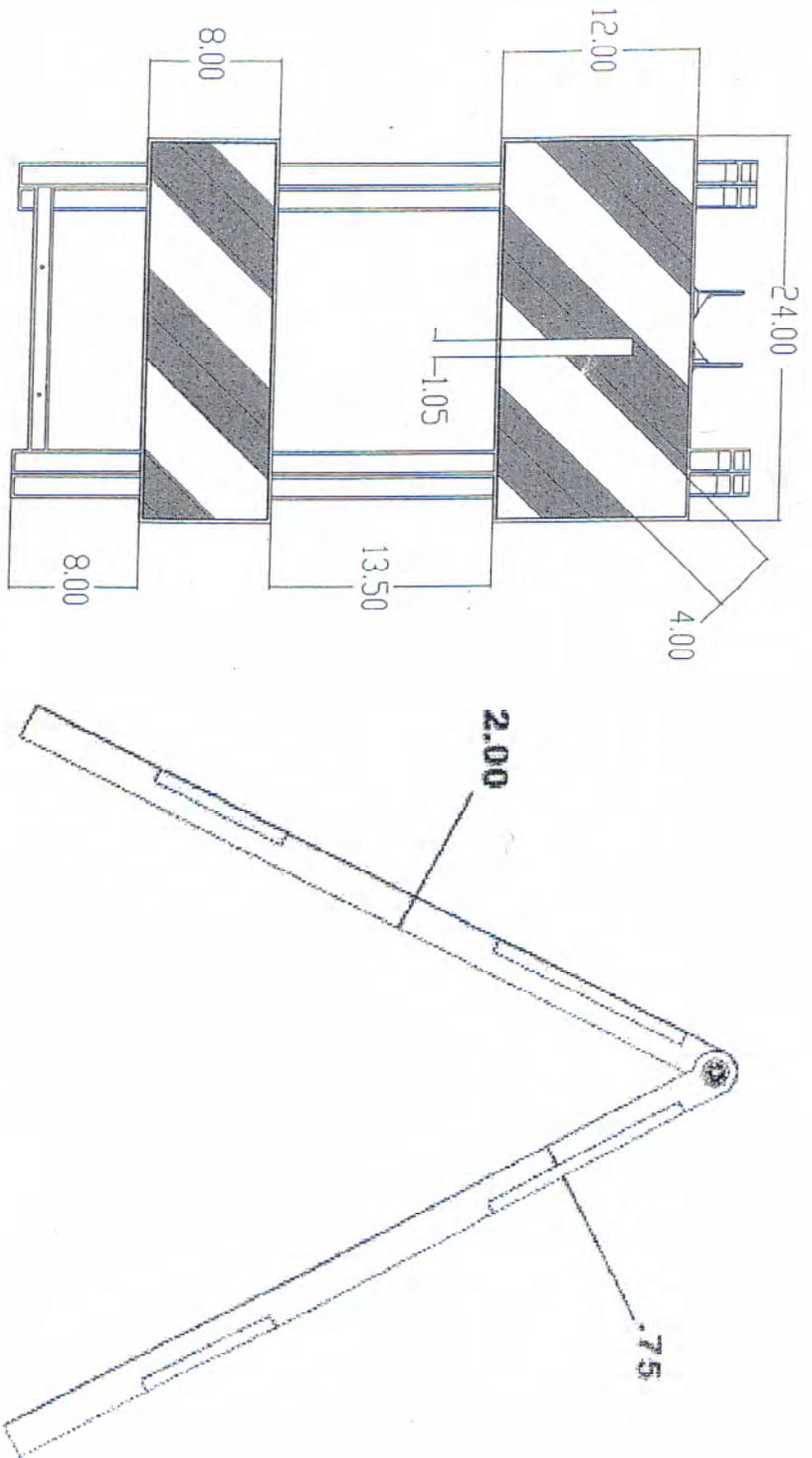


A = Bracket Mounted Barricade
B = Bracket Mounted Barricade

Bracket Mounted Light Barricade with 6V Light

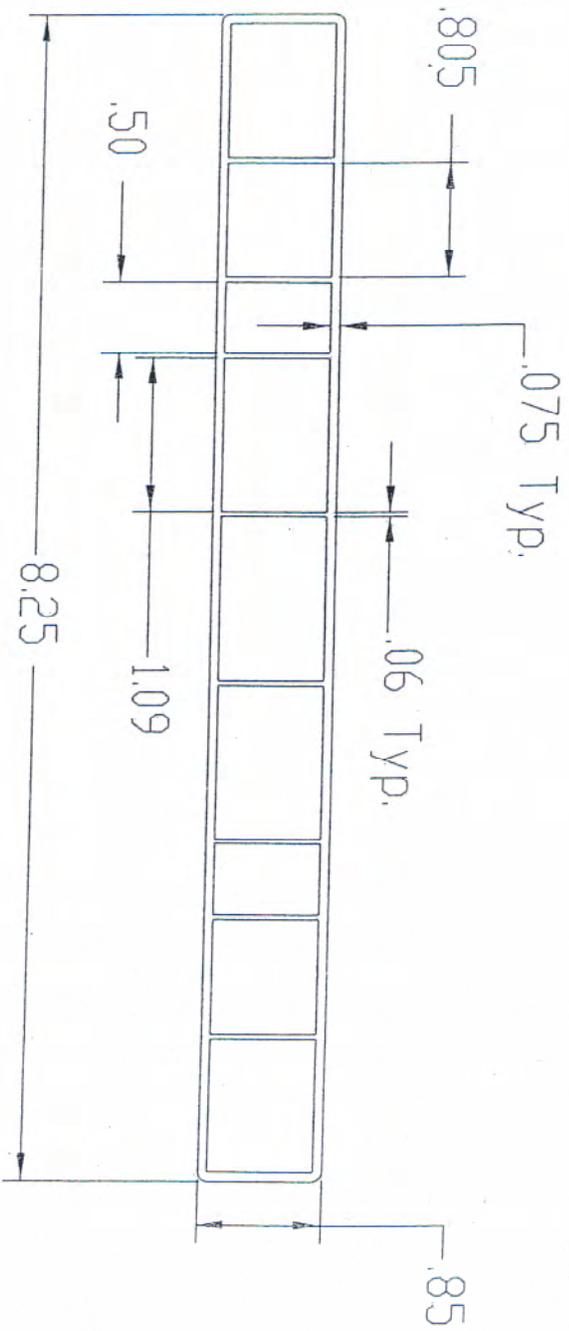
Refer to WZ-33 For Barricade Specifications





SBS SAND BALLAST SYSTEM

TD2100 Works Plastic A-Frame Barricade Details



Board Tested was 144 Inches

TD4100 Plastic Barricade Board Details