



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

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

Refer to: HSA-1/WZ-58

Mr. Lynn Sivilli
Buildem Barricades
P.O. Box 398
Loxahatchee, Florida 33470

Dear Ms. Sivilli:

Thank you for your October 3 letter to Mr. Nicholas Artimovich of my office requesting Federal Highway Administration (FHWA) acceptance of your company's Type II Barricades with plywood panels as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Your company's barricades are identical to the generic Type II barricades described in our September 15 memorandum on generic crashworthy barricade designs except that the width of your barricades is 610 mm (24 inches) rather than the tested 914 mm (36 inch) wide barricades. You requested that we find your company's barricades acceptable for use on the National Highway System under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Introduction

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.

Testing

The barricades were initially the subject of our November 23, 1998, acceptance letter number WZ-6 to Bent Manufacturing Co. They were tested in accordance with our guidelines which call for head-on and 90-degree testing. The Type II barricade was tested using "lightweight" warning lights (the "ToughLite 2000" was the model used, with a mass of 1.3 kg).

The 914-mm (36 inch) wide A-frame Type II barricade was successfully crash tested. It consists of four 1156-mm (45.5 inch) long, 12-gage steel, 31.75 x 31.75 mm (1.25 x 1.25 inch) angle legs, each with a 14.29-mm (9/16-inch) hole at the top for bolting the two halves together and/or

attaching a warning light of 1.5-kg (3.3 pounds) mass or less. Four 13-mm (½ inch) thick plywood panels were attached to the legs using 6.35-mm bolts, nuts, and washers. The top two panels were 305 mm (12 inches) in width and the bottom two were 203 mm (8 inches) wide. All panels were 914 mm (36 inches) long.

After reviewing the crash tests of these and other barricades with lightweight warning lights we concur that the 610 mm (24 inch) wide barricades should perform in a similar manner and are acceptable for use.

In summary, this generic Type II barricade is considered acceptable with the following variations:

- ! plywood panels are 305 mm (12 inches) or 203 mm (8 inches) wide,
- ! plywood panels are 914 mm (36 inches) or 610 mm (24 inches) long,
- ! when 12 gage or 14 gage steel legs are used.
- ! when waffleboard plastic panels are used, as shown in the attached specification sheets

Ballast, when used, may not be placed higher than the bottom rail (a sandbag placed on the bottom rail, or hanging from the top rails barely suspended above the pavement is acceptable.)

This same device becomes a Type I barricade when only the top rail carries reflective sheeting per the MUTCD. If a Type I barricade with no bottom rail is needed, then the legs should 12-gage steel angle. The lighter, 14-gage legs should not be used without the bottom panel as the barricade's center of gravity and structural integrity may change, significantly altering its crash performance.

Findings

The Type I and II barricades described above and on the enclosed specification sheets (in metric and English units) and shown in the enclosed drawing for reference are acceptable for use as Test Level 3 devices on the National Highway System under the range of conditions tested, when proposed by a state.

Please note the following provisions which apply to this letter of acceptance:

- ! Our acceptance is limited to the crashworthiness characteristics of the barricades and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- ! Only the variations in design and materials discussed above are acceptable for devices covered by this memorandum. Any changes other than normal manufacturing tolerances 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 devices being marketed are significantly different from the version considered crashworthy, it reserves the right to modify or revoke its acceptance.
- ! Manufacturers, vendors and / or suppliers will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.

- ! Contractors, vendors, etc., will be expected to certify to highway agency users that the barricades, drums, warning lights, and connecting hardware furnished have essentially the same chemistry, mechanical properties, mass, and geometry as those shown in the attached drawings and specifications, 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-58, shall not be reproduced except in full.

Sincerely yours,

Frederick G. Wright, Jr.
Program Manager, Safety

Specifications for Generic Crashworthy Barricades - METRIC UNITS

Barricades	Type I or II	Type II	Type III
Frame	1156 mm long, 12 ga steel angle, 31.75 x 31.75 mm "A-Frame" design 12.7 mm fasteners	1156 mm long 12 ga or 14 ga steel angle 31.75 x 31.75 mm "A-Frame" design 12.7 mm fasteners	Two 1525-mm long, 10 ga (3.5 mm thick), 38x38 mm angle bases. Uprights same except 1600 mm tall. All steel to be high- carbon, hot rolled steel.
Panels	13-mm thick plywood	13-mm thick plywood or 13-mm thick waffleboard	19-mm ACX plywood
Panel Length	914 mm or 610 mm	914 mm or 610 mm	2440 mm (or shorter: 1830mm or 1220mm)**
Panel Width	203mm to 305mm	203mm to 305mm	203 mm to 305 mm
Fastener Hardware All hardware zinc plated	(Acceptance based on test of Type II barricades.)	1/4"-20 x 1" Steel Carriage Bolt, Class 1 1/4"-20 Steel Keps Lock Nut	3/8"-16 x 1 3/4" Steel Hex Bolt, Class #2 3/8"-16 Steel Hex Nut Steel flat lock washer
Height to top		1200 mm to top of light	1525 mm to top of rails
Mass		13.2 kg	30 kg
Lights (Optional)	1 lightweight	1 lightweight	2 lightweight
<p>* The tested Type III barricade had a mass of 40.1 kg which included the lights (an acceptable option) and a 48x48-inch aluminum sign which is not part of the accepted barricade. ** Rails are not to extend more than 200 mm beyond the uprights.</p>			

Specifications for optional "waffleboard" material for use with Generic Type I and II Barricades

WAFFLEBOARD PLASTIC BARRICADE PANELS	
Intended Application	Type I and II Barricades
Material	High density comopolymer polyethylene with UV stabilizers
Dimensions (panel size)	6" x 24", 8" x 24", 12" x 24" Thickness: .500 (1/2 ")
Tensile strength (ASTM) D638-72	4000 PSI
Elongation 2" min % (ASTM) D38-72	600%
Flexural Modulus (ASTM) D790-71	240,000 PSI
Brittle Temperature	-180 Deg F
Softening Temperature	+320 Deg F

Specifications for Generic Crashworthy Barricades - ENGLISH UNITS

Barricades	Type I or II	Type II	Type III
Frame	45.5 inch long, 12 ga steel angle, 1.25 x 1.25 inch "A-Frame" design ½ inch fasteners	45.5 inch long, 12 ga or 14 ga steel angle, 1.25 x 1.25 inch "A-Frame" design ½ inch fasteners	Two 60-inch long, 10 ga (0.14 inch thick), 1.25 x 1.25 inch angle bases. Uprights same except 60-inches tall. Steel to be high-carbon, hot rolled steel.
Panels	½-inch thick plywood	½-inch thick plywood or ½-inch waffleboard	¾-inch thick ACX plywood
Panel Length	36 inch or 24 inch	36 inch or 24 inch	96 inches (or shorter: 72-inch or 48-inch mm)**
Panel Width	8- to 12-inches	8- to 12-inches	8- to 12-inches
Fastener Hardware All hardware zinc plated	(Acceptance based on test of Type II barricades.)	1/4"-20 x 1" Steel Carriage Bolt, Class 1 1/4"-20 Steel Keps Lock Nut	3/8"-16 x 1 3/4" Steel Hex Bolt, Class #2 3/8"-16 Steel Hex Nut Steel flat lock washer
Height to top		48 inches to top of light	60 inches to top of rails
Mass		30 pounds	66 pounds
Lights (Optional)	1 lightweight	1 lightweight	2 lightweight

* The tested Type III barricade had a mass of 88.4 pounds which included the lights (an acceptable option) and a 48x48-inch aluminum sign which is not part of the accepted barricade.

** Rails are not to extend more than 8 inches beyond the uprights.

Specifications for optional "waffleboard" material for use with Generic Type I and II Barricades

WAFFLEBOARD PLASTIC BARRICADE PANELS	
Intended Application	Type I and II Barricades
Material	High density comopolymer polyethylene with UV stabilizers
Dimensions (panel size)	6" x 24", 8" x 24", 12" x 24" Thickness: .500 (½ ")
Tensile strength (ASTM) D638-72	4000 PSI
Elongation 2" min % (ASTM) D38-72	600%
Flexural Modulus (ASTM) D790-71	240,000 PSI
Brittle Temperature	-180 Deg F
Softening Temperature	+320 D