



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

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

November 24, 2004

In Reply Refer To: HSA-10/WZ-100 Amendment #5

Mr. Bill Korman  
Korman Signs, Incorporated  
3029 Lincoln Avenue  
Richmond, Virginia 23228

Dear Mr. Korman:

Thank you for your letter of October 5, 2004, requesting Federal Highway Administration (FHWA) acceptance of your company's Model WBT2 Type I or Type II barricades and an X-footprint sign stand as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying your letter were reports of crash testing prepared by AnteRapture Engineering 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."

### **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 barricades follows:

**Steel:** The steel used in the Type II barricades was ASTM-A500, Grade 1008 with 45,000 psi yield strength and 48,000 psi tensile.



**Panels:** The barricades were 2 to 3 feet wide, 3 feet tall. The barricade rails were 8 inch to 12 inch tall panels of hollow fluted plastic (polyethylene or polypropylene) of 10 mm or 13 mm thickness, and hollow extruded plastic (polyethylene, polypropylene, or polyolefin) of 1 inch nominal thickness, or 2 mm thick ALPOLIC® 350 aluminum composite laminate. The barricades are hinged at the top with ½ inch diameter bolts and opened to a stop or braced open with steel braces (see drawings enclosed for reference). They may be used with or without ballast and/or an attached light of up to 4.4 pounds. The light will be attached to one of the hinged bolts that is increased in length for the purpose. These barricades may be used with or without up to 16 square feet of ALPOLIC® 350 signs fastened directly to the panels and/or legs with a minimum height of 12 inches to the bottom of the sign.

**Frames:** The barricade frames were either plastic or steel. The plastic legs were 1 ½ inch square HDPE tubing with ¼ inch wall thickness and a horizontal crossbar of ½ inch x 1 ½ inch HDPE or larger making the barricade capable of ballasting in windy conditions. The steel braces, cross bars and the panels are fastened to the legs with #14 sheet metal screws or stronger. As an alternate the panels may be “welded” or glued to the legs. The steel legs were ¾ inch square, 16-gage steel tubing. The steel framed barricades also had two crossbars of the same material, which may be welded or fastened to the legs. The panels will be fastened to the legs with 3/16 inch aluminum blind rivets or stronger fasteners.

A brief description of the sign stands follows:

The SS548UCRX, SS548UCRAX, SS548UCX, SS548UCAX, SS560UCRX, SS560UCRAX, SS560UCX, and SS560UCAX stands were found acceptable for use with roll up signs in the FHWA acceptance letter WZ-100 dated June 20, 2002. The stands tested in the current program supported 2 mm thick ALPOLIC® 350 aluminum composite laminate sign substrates. The signs have a 1 inch square aluminum tube bolted using ¼ inch or stronger bolts or rivets such that the tube is inserted and retained in the vertical tube of the sign stand with the same size signs and mounting heights as in the previous acceptances of these models.

### **Testing**

Full-scale automobile testing was conducted on your company’ 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. Each article was ballasted with one or two water-filled bags weighing approximately 50 pounds each. The test vehicle was attached to the drive/guidance vehicle and was driven into the test article at approximately 60 mph. The impacts were recorded on multiple video cameras. The tests covering the Type II barricades and the X-footprint sign stands referenced in this letter number from 112A through 118B and are summarized on Sheet 6 of Enclosure 7.

### **Findings**

Damage was generally limited to cosmetic damage to the bumper, grille, and hood of the test vehicle. In only two impacts was damage caused to the windshield. In impacts 114B and 118A the warning lights caused minor cracking of the windshield. There were no holes through the glass, nor was the cracking extensive enough to cause visibility problems for the driver.

You also requested that you be allowed the option to use purchased “Fibercade” plastic legs and cross bars that had been crash tested by others and accepted by the FHWA. These frame elements would be of similar size and mass to those tested by your company and would be in the same Type I or Type II barricade configuration. As you will purchase these elements from Plasticade Products, who sponsored the crash testing, we concur in their use.

The results of the testing met the FHWA requirements and, therefore, the devices described in the various requests above and detailed in the enclosed drawings and tables 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 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-100 Amendment #5 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.
- Some Korman barricades and sign stands contain patented products and may 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. 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 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,

*/Original Signed by/*

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

Enclosures

FHWA:HSA-10:NArtimovich:tb:x61331:11/17/04

File: h://directory folder/nartimovich/WZ100-KormanFIN1-AmendFive

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