

Refer to: HSA-10/WZ-121

Mr. Jeff Smith  
Work Area Protection Corporation  
P.O. Box 4087  
St. Charles, IL 60174-9081

Dear Mr. Smith:

Thank you for your letter of February 28, 2002, requesting Federal Highway Administration (FHWA) acceptance of your company's SCI48 plastic sign blank as a component of crashworthy traffic control devices for use in work zones on the National Highway System (NHS).

Accompanying your letter was a list of portable sign stands which have been successfully crash tested with other sign substrates. 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 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.

This 48 x 48 inch sign blank is blow molded of high-density polyethylene, with tack offs on back to reduce straight line creasing. Its thickness is 0.625 inches and it weighs approximately 11 pounds. You requested that this sign substrate be permitted as a substitute to a number of other substrates that have been successfully crash tested on various manufacturers' sign stands.

Because this sign substrate has not yet been crash tested we cannot be sure of its performance in every application. Although there are certain substitutions that are a reasonable extrapolation, others may only be applied on a case-by-case basis. Recent discussions with crash test experts have indicated that rounded corners of signs are not always a feature that will improve the

performance during a crash. In some cases the square cut corner will crush, absorbing some of the energy of the impact. Of course, in other cases the hard square corner will penetrate the glass much more readily. Therefore, we will review those various applications here to assess the potential of your company's sign panel to perform at least as well as the tested substrate.

#### Rigid Substrates:

Aluminum, Solid. 0.080, 0.100, 0.125 inches thick. These substrates are usually made with rounded corners. Because they are much thinner, and also are usually heavier than the SCI48 blank, aluminum signs are a "worst case" crash test scenario. Therefore, any sign support, permanent or temporary, that has been successfully crash tested with a solid aluminum sign may also be used with the SCI48 sign.

Plywood. Plywood is sometimes rounded, but usually cut square. In the few tests run using square cut corners the windshield was penetrated readily. Plywood corners do not crush. Because the SCI48 is significantly lighter than typical plywood substrates, it will be allowed as a substitute on sign supports that have been successfully tested with plywood signs.

#### Semi-Rigid Substrates:

Alpolic/Dibond/Renalite. This two millimeter thick aluminum laminate material appears to be very flexible when impacting windshield glass. Although the aluminum laminate sign blanks that have been tested also have rounded corners, we cannot be certain that the SCI48 sign blanks will flex in a similar manner when mounted on low to medium height stands. We recommend that the SCI48 be crash tested on stands where aluminum laminate signs were mounted at heights of 12 to 18 inches. We do believe, however, that the SCI48 will perform in an acceptable manner when mounted on portable sign stands at a height at or above 5 feet as windshield contact is unlikely.

Reflexite Endurance. This 5/8 inch thick fluted Lexan sign panel is similar in thickness and weight to the SCI48 substrate. As with the aluminum laminate signs we can expect the SCI48 to perform in a similar manner when mounted on sign stands where Endurance was tested at heights of 5 feet or above. In tests where the Endurance sign was mounted low to the ground (12" to 18" range) there was overall cracking of the test vehicle windshields. Because the structural differences that lead to success or failure are not completely understood, we recommend that crash testing be conducted at this height range.

Hinged ABS. Here we concur that the SCI48 is likely to be a less harmful sign substrate than the hinged ABS. Therefore, the SCI48 may be used on any sign stand that has been successfully crash tested with the hinged ABS material at the same heights.

Corplast/coroplast/safetycor/safetyplast. These lightweight corrugated plastic substrates are thinner than the SCI48 sign blank. Also, their resistance to flexing is dependent upon the orientation of the fluting whereas the SCI48 is homogenous. These significant differences

between the materials lead us to recommend that the SCI48 be crash tested. We do expect that the crash testing recommended above will reveal a great deal about the performance of the SCI48 and may allow us to then extrapolate our acceptance to sign stands tested with corrugated plastic signs.

Use on Type III barricades. The SCI48 may be used on any Type III barricade that has been successfully crash tested with a 48 x 48 sign mounted above the top rail of the barricade. This includes those tested for the FHWA (WZ-40) and the Pennsylvania DOT (WZ-44).

In your request you included a table of portable sign stands that you wished to use the SCI48 on. Here is a list summarizing the stands we consider acceptable with the SCI48 without further testing.

WZ #	Manufacturer	Model	Description
WZ-44	Pennsylvania DOT	Type III Barricade	Sign above top rail
WZ-46	Traffix Devices	Big Buster	60 inch mounting ht.
WZ-52	Reflexite	DF4700TX	60 inch mounting ht.
WZ-59	Eastern Metal / USA Sign	X-602	60 inch mounting ht.
WZ-69	MDI	4860K Breakaway	60 inch mounting ht.
WZ-73	Traffix Devices	Big Buster	60 inch mounting ht.
WZ-73	Traffix Devices	Big Buster, with light	60 inch mounting ht.
WZ-74	United Rentals	Hi-Pro 350	84 inch mounting ht.
WZ-78A	Eastern Metal / USA Sign	E-350 Econo Stand	15 inch mounting ht
WZ-78A	Eastern Metal / USA Sign	X-842	12 inch mounting ht.
WZ-78A	Eastern Metal / USA Sign	X-602	60 inch mounting ht.
WZ-78B	Eastern Metal / USA Sign	X-602	60 inch mounting ht.

### Findings

The signs in the above table have been shown to perform in an acceptable manner when tested with sign substrates more rigorous than the SCI48. We expect that they would also perform in an acceptable manner when tested with the SCI48 plastic sign panel. Therefore, the devices described above and shown in their respective FHWA acceptance letters 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 FHWA and NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-121 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 signs and stands covered by this letter may include patented components and if so 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 for use on Federal-aid projects, except exempt, non-NHS 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.

Sincerely yours,

Carol H. Jacoby, P.E.  
Director, Office of Safety Design

Enclosure