

Refer to: HSA-10/WZ-110

Mr. Greg Hannah  
President  
Impact Recovery Systems, Inc.  
246 West Josephine Street  
P.O. Box 12637  
San Antonio, TX 78212

Dear Mr. Hannah:

Thank you for your letter of January 8, 2002, requesting Federal Highway Administration (FHWA) acceptance of your company's portable Roll Up Sign Stands and your Type III Barricades as crashworthy traffic control devices for use in work zones on the National Highway System (NHS). Accompanying your letter was a report of crash testing conducted by Karco Engineering and a video of the test. 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." You provided additional information at our request on February 22, 2002.

### **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.

A brief description of the devices follows:

**One Base Portable Roll-up Sign Stand** with Auto Latch Bracket No. 351, two 24 inch x 24 inch Flags, and 48 x 48 inch Roll Up Sign mounted 18 inches Above the Ground. The base is solid rubber, measuring 34 inches x 14 inches x 2 inches high. Into the base is inserted the No.1350 Sign Stand and the No. AL Auto Latch. Installed, these three components reach a height of 18.5 inches. The vertical rib of the roll-up sign is inserted into the Auto Latch. The vertical stiffener ribs of the roll up sign are 1 1/4 inch wide, 5/16 inch thick fiberglass. The horizontal ribs are identical except that they are 3/16 inch thick. The weight of the sign, exclusive of the rubber base, is

10 pounds. The weight of the base is approximately 39 pounds.

**Eight Foot Long Type 3 Plastic Barricade** No. 600-8 with Square Plastic Vertical Uprights. The bases are solid rubber as described above. The vertical uprights are 1.75 x 1.75 "X" cross-section square PVC plastic posts that are 59 inches long as manufactured by Davidson Plastics/Bunzl Extrusion. They are inserted into 7 inch long pieces of 2x2 inch, 14 gage perforated square steel tubing. This socket is bolted to a plastic knuckle that attaches to the Portable One base. The horizontal barricade rails are 96.25 inches long, 8 inches wide, and are made of 1 inch thick corrugated High Density Polyethelene as manufactured by Davidson Plastics/Bunzl Extrusion. The weight of the vertical supports plus horizontal panels is 22 pounds.

### 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 6 meters downstream turned at 90 degrees, as called for in our guidance memoranda. The complete device as tested is shown in Enclosure 1. The crash test is summarized in the table below:

Test Number	Test 1	Test 2
Test Article	Roll-up sign on Rubber Base	Type III Barricade
Height to Bottom of Sign	380 mm (15 inches)	Bottom of rails: 305 mm (12 inches)
Height to Top of Sign	2110 mm (83 inches)	Top of rails: 66 inches
Flags or lights	2 Flags	None
Test Article Mass (each)	4.5 kg (10 pounds) + ballast	45 kg (100 pounds)
Vehicle Inertial Mass	903.4 kg (1991 lbs)	898.0 kg (1980 kg)
Impact Speed, Head-on	100.9 km/h (62.7 mph)	98.35 km/h (61.13 mph)
Impact Speed, 90 deg.	97.62 km/h (60.67 mph)	96.78 km/h (60.15 mph)
Velocity Change, Head-on	0.91 m/s (2.99 fps)	0.44 m/s (1.44 fps)
Velocity Change, 90 deg.	n/a	n/a
Vehicle crush	Dents to hood and roof	Dents to hood and roof
Occupant Compart. Intrusion	None	None
Windshield Damage	None	Light to Moderate cracking

### Findings

There was no windshield damage in the test of the portable sign stand. Window damage did result from the barricade test, however, the heaviest concentration of broken glass was near the bottom of the windshield, with spider cracking extending throughout the rest of the window. There was little if any deflection of the glass in the second test.

The results of the testing met the FHWA requirements and, therefore, the devices described above and shown in the enclosed drawings for reference are acceptable for use on the NHS under the range of conditions tested, when proposed by a State.

Please 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.
- To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-110 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 Impact Recovery System portable sign stand and Type III barricades 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,

A. George Ostensen  
Program Manager, Safety

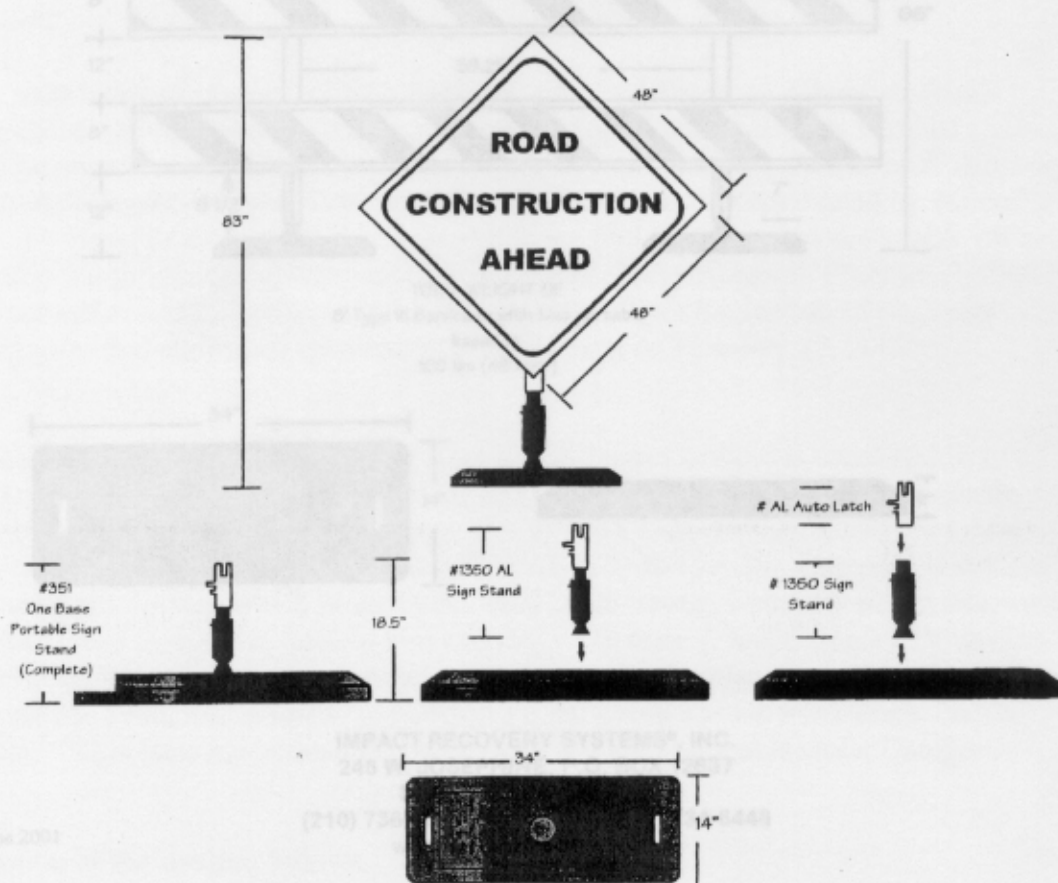
Enclosure

FHWA:HSA-10:NArtimovich:tb:x62177:3/18/02  
File: WZ110-IRSFebFin.wpd  
cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;  
NArtimovich, HSA-10)

# IMPACT RECOVERY SYSTEMS, INC.

## Part #351 One Base Portable Sign Stand with Auto Latch Bracket

### Component Parts Breakdown



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Figure 1. – One Base Portable Roll-up Sign Stand with Auto Latch Bracket #351, Two Twenty-four Inch by Twenty-four Inch Flags, and Forty-eight Inch by Forty-eight Inch Roll-up Sign; Sign Height Eighteen Inches Above Ground.

