



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

**Administration**

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

Refer to: HSA-10/WZ-91

**MR. HENRY A. ROSS, DIRECTOR**  
**SALES AND MARKETING**  
**UNITED RENTALS HIGHWAY TECHNOLOGIES**  
**880 NORTH ADDISON ROAD**  
**P.O. BOX 7050**  
**VILLA PARK, IL 60181-7050**

Dear Mr. Ross:

Thank you for your letter of June 6 requesting Federal Highway Administration (FHWA) acceptance of your company's **Low H-Stand sign stand** as a crashworthy traffic control device for use in work zones on the National Highway System (NHS). Accompanying your letter was a report of crash testing conducted by E-Tech Testing Services along with a video of the test. You requested that we find this device 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.

A brief description of the device for which you are requesting acceptance follows:

The Low H-Stand is a portable sign stand featuring an "H-Frame" upright support. The support consists of two 38.1 mm square 12 gauge Unistrut Telespar perforated steel tubing uprights. The uprights are braced with two 38.1 mm square 11 gague steel tubing crossbars. Each crossbar is fastened to the uprights with four 9.5 mm diameter ASTM A307 hex bolts. Each bolt uses a flat washer, lock washer, and hex nut. Each upright slips into a 44.5 mm square 12 gauge Telespar sleeve which is welded to a base tube. The base tubes are 44.5 mm square 11 gage tubing. The material specification for the steel is ASTM A500 Grade B.

The Low H-Stand system features a 915 mm square, 1.8 mm thick aluminum sign which is fastened to the uprights with four 9.5 mm diameter ASTM A307 hex fasteners and flat washers, lock washers, and nuts. When deployed the bottom of the sign is nominally 533 mm above the ground. The mass of the stand with sign was 29.1 kg. Four 16 kg sand bags were draped over the ends of the base tubes.

#### TESTING

FULL-SCALE AUTOMOBILE TESTING WAS CONDUCTED ON YOUR COMPANY'S DEVICES. TWO STAND-ALONE EXAMPLES OF THE DEVICE WERE TESTED IN TWO SEPARATE TESTS, ONE HEAD-ON AND ONE WITH THE DEVICE TURNED AT 90 DEGREES. THE COMPLETE DEVICES AS TESTED ARE SHOWN IN ENCLOSURE 1.

THE CRASH TEST IS SUMMARIZED IN THE TABLE BELOW:

TEST NUMBER	05-3721-008	05-3721-009
TEST ARTICLE	Low H-Stand system	
HEIGHT TO BOTTOM OF SIGN	533 MM	
HEIGHT TO TOP OF SIGN	1827 MM	
FLAGS OR LIGHTS	NONE	
TEST ARTICLE MASS (EACH)	29.1 KG	
VEHICLE INERTIAL MASS	817 KG	819 KG
IMPACT SPEED, HEAD-ON	99.0 KM/HR	-
IMPACT SPEED, 90 DEG.	-	97.7 KM/HR
VELOCITY CHANGE, HEAD-ON	1.5 M/S	-
VELOCITY CHANGE, 90 DEG.	-	3.1 M/S
VEHICLE CRUSH	MODERATE DENTING TO BUMPER, GRILLE, AND HOOD	MODERATE DENTING TO BUMPER, GRILLE, AND HOOD
OCCUPANT COMPART. INTRUSION	NONE	NONE
WINDSHIELD DAMAGE	NONE	NONE

#### Findings

Damage was limited to moderate denting of the bumper, grille, and hood, but there was no contact with the windshield. 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 as Test Level 3 devices 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-91 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.
- United Rentals work zone traffic control devices 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,

Frederick G. Wright, Jr.  
Program Manager, Safety

Enclosure

FHWA:HSA-10:NArtimovich:tm:x61331:09/24/01



C. Illustrations

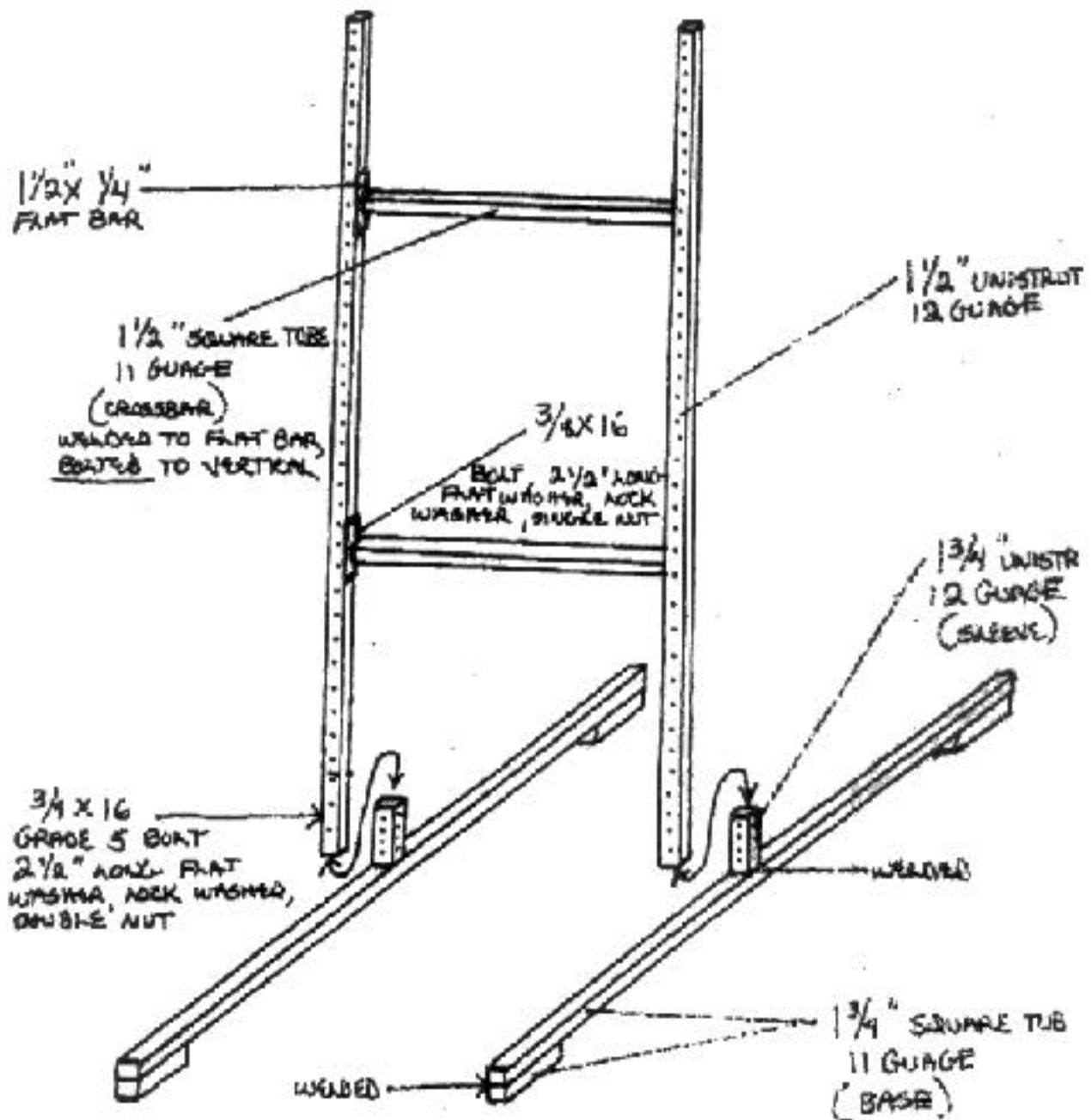


Illustration C-1. United Rentals Low H-Stand Sign Stand (1 of 2)

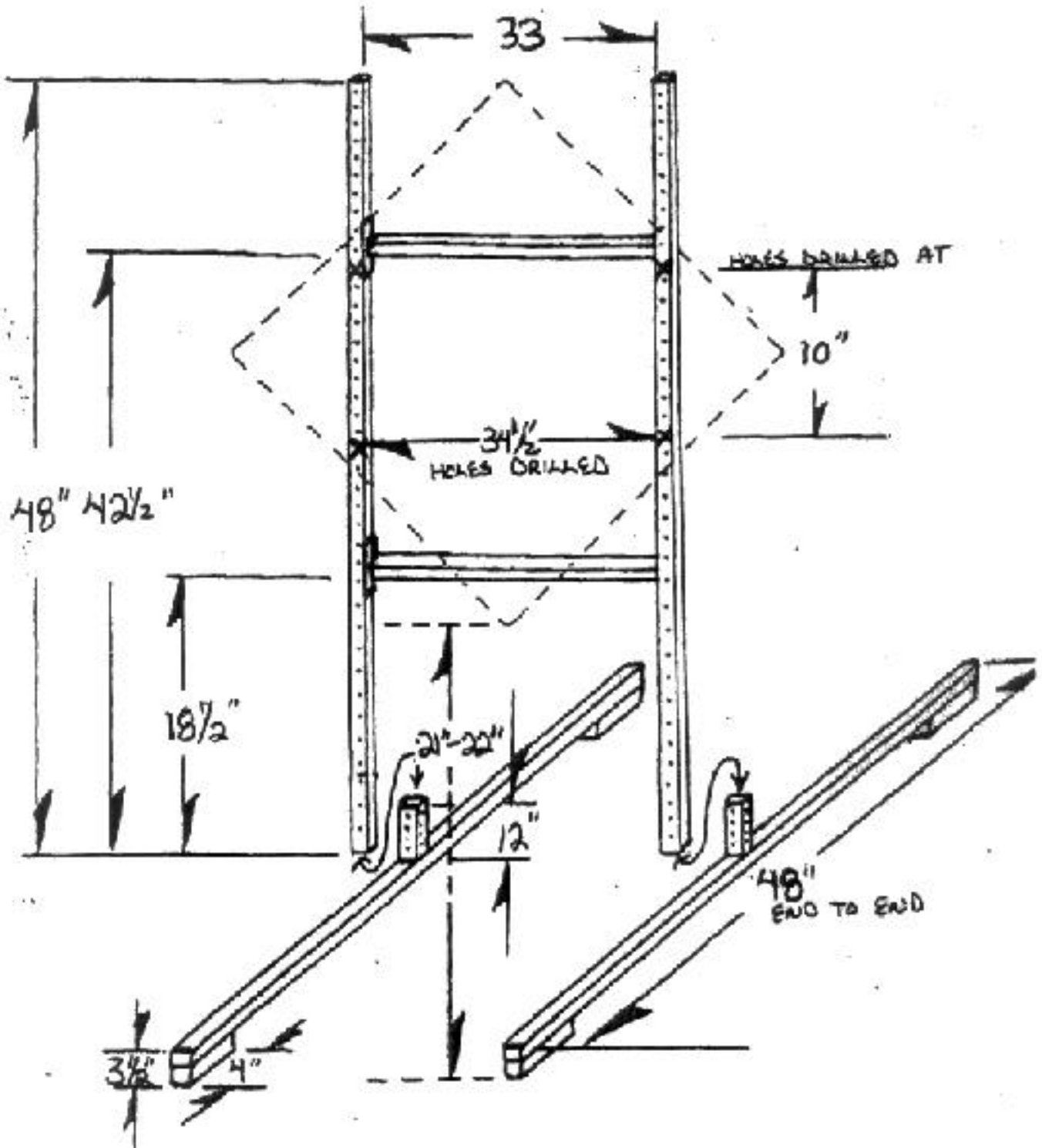


Illustration C-1. United Rentals Low H-stand Sign Stand (2 of 2)