



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

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

March 22, 2005

In Reply Refer To: HSA-10/WZ-201
(REVISED: October 19, 2005)

Mr. Tim Bedinger
Field Sales Manager
Allied Tube and Conduit
16100 South Lathrop Avenue
Harvey, Illinois 60426

Dear Mr. Bedinger:

Thank you for your letter of December 20, 2004, requesting the Federal Highway Administration (FHWA) acceptance of your company's Perforated Square Steel Tube framed dual support portable sign stand as a crashworthy traffic control device for use in work zones on the National Highway System (NHS). Accompanying your letter were reports of crash testing conducted by the Texas Transportation Institute (TTI) 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 devices follows:

A 48-inch long vertical sleeve fabricated from 2-inch square, 14-gage perforated square steel tubing meeting ASTM A1011, Grade 50, was welded to the center of a 5-foot long skid fabricated from 2-inch square, 12-gage steel of the same grade using two lines of weld parallel



to the length of the skid along the inside and outside edges of the sleeve. The sleeves were not welded to the skids along their front or back edges. A 3/8-inch diameter bolt was inserted through prefabricated holes in the sleeve approximately 1-inch off the top surface of the skid and welded in place. A 1 3/4-inch square by 11 feet long 12-gage perforated steel upright was inserted into the sleeve until it rested on the 3/8-inch diameter offset bolt. A 1 3/4-inch square by 38-inch long 14-gage cross brace was bolted to the sleeves and uprights at a height of 18-inches above ground using two 3/8-inch diameter by 4 1/4-inch long through bolts. The two vertical supports were placed 36-inches apart center to center.

A 48 x 48-inch Choroplast corrugated plastic sign panel was attached to the vertical supports in a diamond configuration using six 5/16-inch diameter hex head bolts – three through each support. A 1 1/2-inch diameter plastic washer was used between the head of the bolts and the sign substrate. The bottom edge of the sign was mounted 7 feet above ground. A 40-pound sandbag was placed on the front and back of each skid for a total of 4 sandbags. The unballasted weight of the sign supports system was 88.5 pounds. The Choroplast sign panel weighed 8 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 six meters downstream turned at 90 degrees, as called for in our guidance memoranda.

The tests are summarized in the table below.

Test Number	4000001-ATC1, Report 350 Test No. 3-71	
Sign Stand Orientation	Head on	90 degrees
Weight of Tested Stand	88.5 pounds	
Mounting heights	7 feet	
Flags? Lights?	None	none
Mass of Test Vehicle	1818 pounds	
Impact Speed	61.7 mph (99.2 km/h)	54.9 mph (88.3 km/h)
Maximum O.I.V.	9.2 ft/s (2.8 m/s)	
Velocity Change	3.0 m/s	2.7 m/s
Extent of contact	Sign struck roof	Sign struck roof
Windshield Damage	No contact	No contact
Other notes	Deformed roof 0.2 inch	None

Findings

Damage was limited to crushing of the bumper, grill, and hood, with a minor indentation in the roof. The roof contact was minimal, and there was no contact with the test vehicle's windshield.

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

You also requested acceptance of a single post version of this support. Accompanying this request was a letter from the TTI enumerating the key design elements of the tested sign stand as:

- The weld detail of the stub to the skid,
- The 48-inch stub height and nesting of the post inside the stub,
- The use of a lightweight, corrugated plastic sign panel, and
- A 7-foot mounting height from the ground to the bottom of the sign panel.

The TTI acknowledged that, as long as these same critical design elements were incorporated into it, the single-post version would be crashworthy based on the dual-post design being a “worst case.” We concur in the TTI analysis, and conclude that the single post version is also acceptable for use.

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-201 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.
- This Allied Tube and Conduit design is patent pending is 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 George Ed Rice, Jr./

~for~

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

Enclosure

FHWA:HSA-10:NArtimovich:tb:x61331:10/19/05

File: h://directory folder/artimovich/WZ201-AlliedTubeFIN2

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

Figure 1. Details of the dual-leg perforated square steel tube temporary sign support.

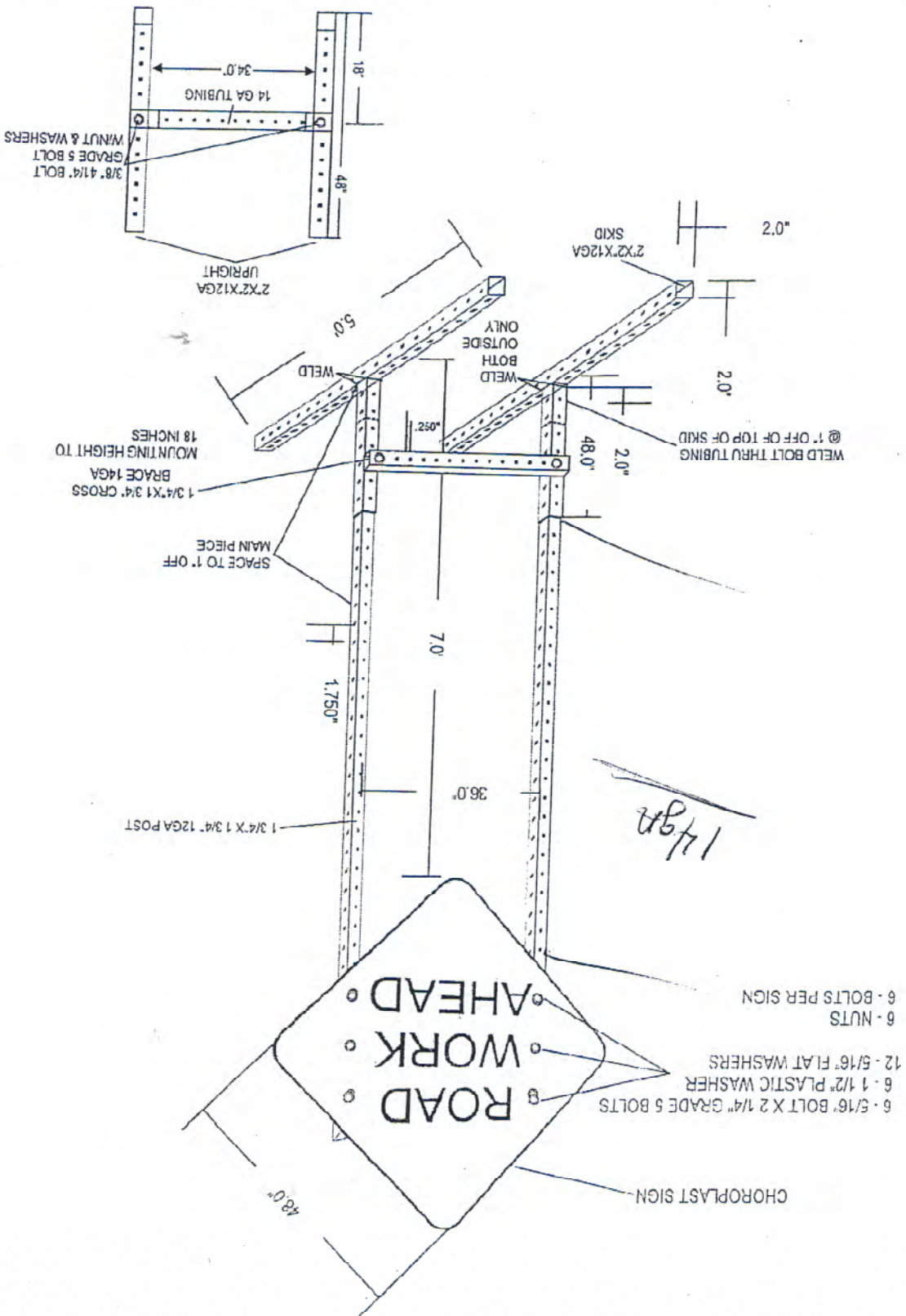
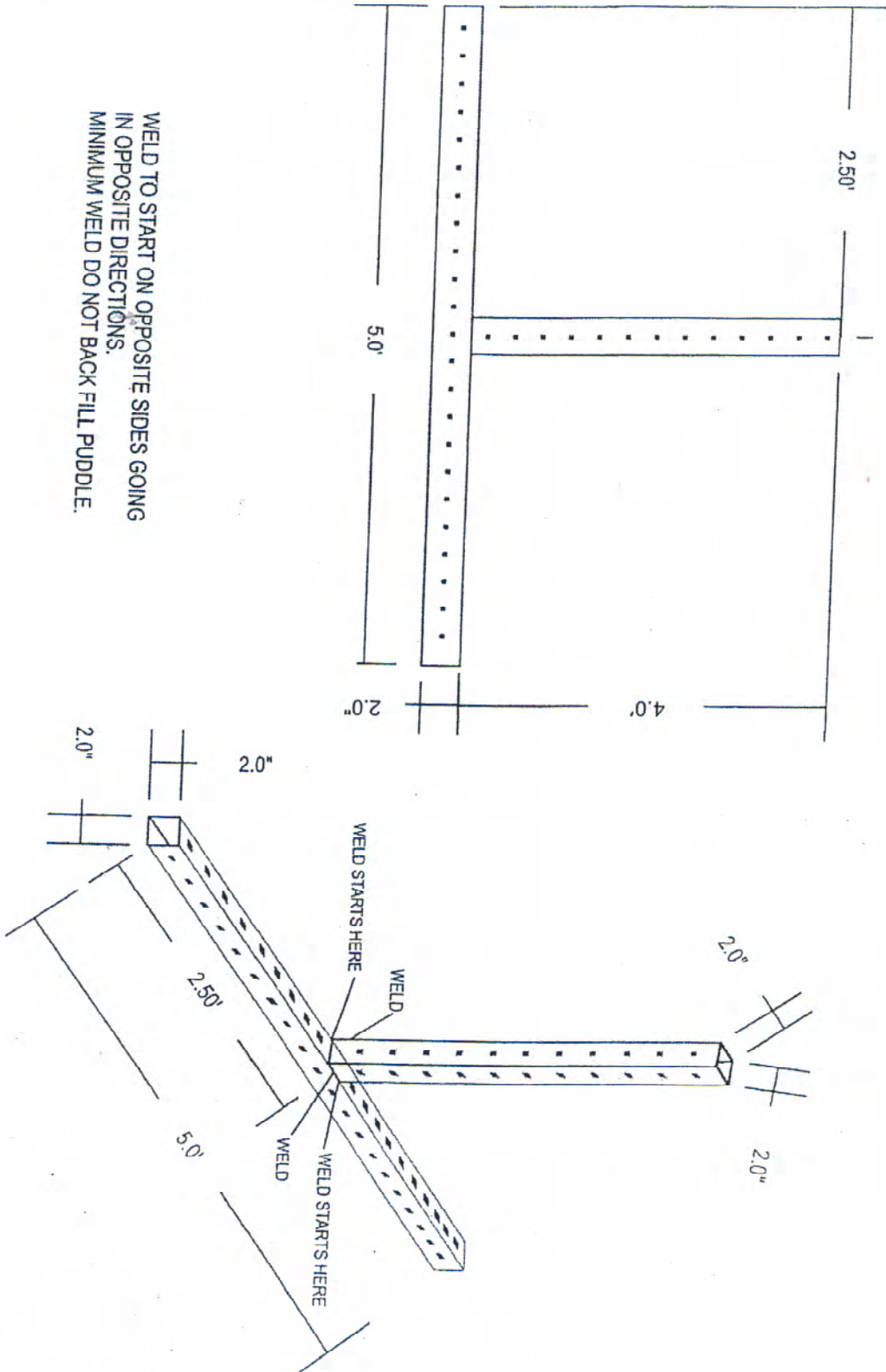
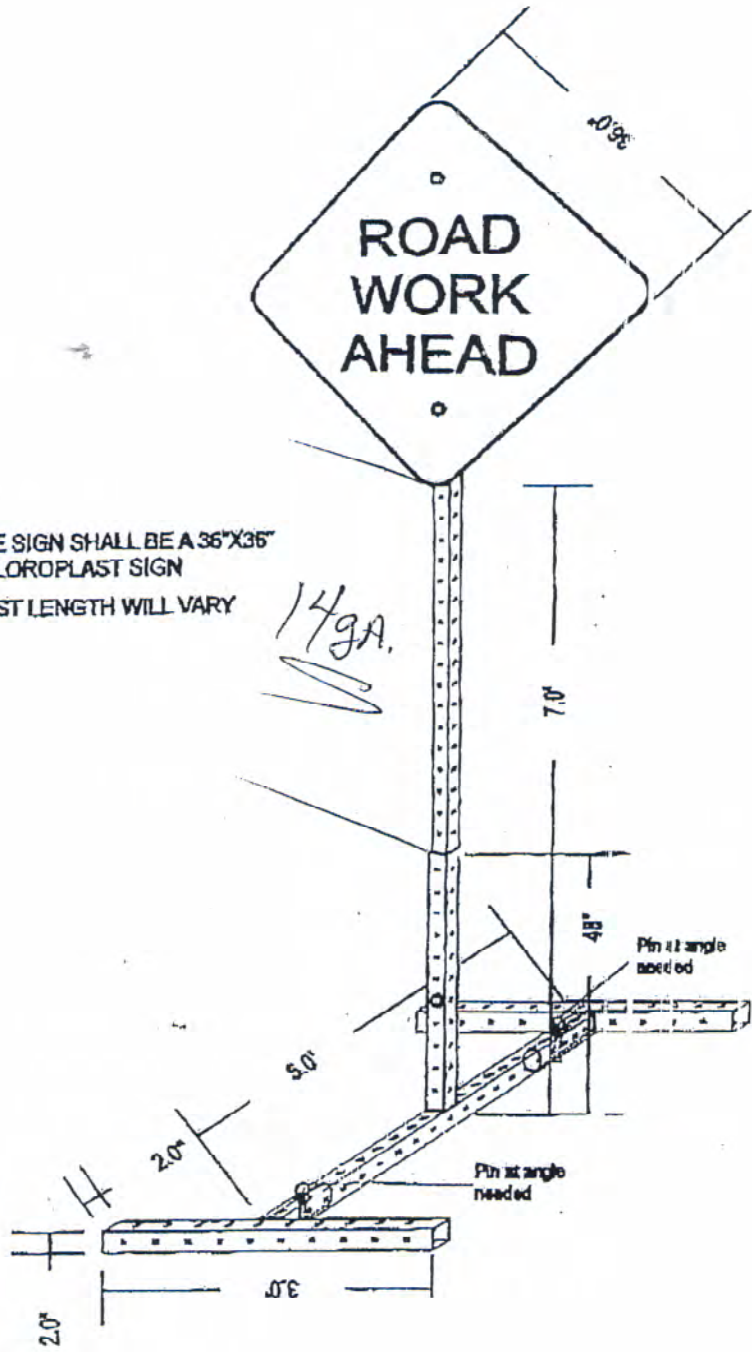


Figure 1. Details of the dual-leg perforated square steel tube temporary sign support (continued).





TRAFFIC CONTROL DESIGNER GARY BRUNDEL 617584-8885 DWG NO: 2-04-06 DATE: 2-04-06 DRAWN BY: Gary Brundel	NOTES: Sandbag as required	EQUIPMENT ± Sign Post: <input type="checkbox"/> Standard of Traffic Dept <input type="checkbox"/> Metal Post <input type="checkbox"/> TYPES IN: <input type="checkbox"/> TYPES IN EQUIPMENT: <input checked="" type="checkbox"/> APPROVED	PRE-WARNING BOARD BY TYPE: <input type="checkbox"/> V-LIGHT APPLY: <input type="checkbox"/> V-LIGHT MATERIAL: <input type="checkbox"/> V-LIGHT PERMITTY: <input type="checkbox"/> FLO SCHEDULES: <input type="checkbox"/> SCHEDULES Type: <input type="checkbox"/> Standard	START DATE TIME: DURATION: ALL EQUIPMENT WILL BE INCLUDED & PLACED DRAWING NOT TO SCALE	TITLE NAME CONTRACT NO. AGENCY: LOCATION
					TXD01