



Memorandum

U.S. Department
of Transportation

**Federal Highway
Administration**

400 Seventh Street, SW
Washington, DC 20590

Subject: INFORMATION: Florida DOT Submission of Fiberglass Composite Sign Stand for Maintenance Work Zone Use Date:

From: Frederick G. Wright, Jr.
Program Manager, Safety

Reply to
Attn. of: HSA-1\WZ-96

To: Mr. James St. John
Division Administrator
Tallahassee, Florida

This is in response to your office memorandum of August 14 of requesting Federal Highway Administration (FHWA) acceptance of Florida's Fiberglass Composite Sign Stand as a crashworthy traffic control device for use in maintenance work zones on the National Highway System (NHS). Accompanying your memo was a report of informal crash testing conducted by the Florida Department of Transportation (FDOT). You requested that we find these temporary ground-mounted roll-up sign stands acceptable for use on the National Highway System 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 devices for which FDOT is requesting acceptance follows:

The stand consists of a 12-inch pointed steel base with a fin welded to the top to allow field personnel to use body weight and a hammer to install the base level with the ground. A 60-inch long fiberglass angle mast measuring 1.5 x 1.5 x 0.25-inches in cross section is bolted to the steel base with two 5/16-inch diameter x 3/4 inch long bolts with nylon lock nuts. Two 11/16th-inch holes are drilled 12-inches above the base, one in each "side" of the fiberglass angle, to facilitate breakaway. (The location of these holes is such that they will be approximately 2-inches above the ground when the stand is installed.) The 48-inch diamond roll-up sign is supported by 3/16-inch thick by 1.25-inch wide fiberglass spreaders which are bolted to the fiberglass angle by two 5/16-inch diameter by 1.25-inch long bolts. The top connection bolt is 7-inches below the top of the fiberglass angle, resulting in a sign mounting height of approximately 15-inches from the ground to the bottom

point of the sign.

Testing

Informal automobile and pick-up truck testing was conducted on the Fiberglass Composite Sign Stand. The complete devices as tested are shown in the Enclosure 1. Four tests were run, each at a nominal speed of 20 miles per hour. Two versions of the base were tested, one with two bolts and one with three bolts attaching the composite angle to the steel base. The tests are summarized in the following table:

Test #1	1	2	3	4
Vehicle	Ford F-150	Ford F-150	Chev. Cavalier	Chev. Cavalier
Base version	2-bolt	3-bolt	3-bolt	2-bolt
Vehicle damage	None	None	Grill Scratched	Grill Scratched

Findings

The composite mast broke readily in each of the tests and the fiberglass spreaders remained with the mast. Damage was limited to minor scratching of the grill on the passenger car used. Although the tests conducted did not consist of a full matrix as provided for in NCHRP Report 350, they do provide enough information to allow us to rule on this device.

This FDOT Fiberglass Composite Sign Stand is unlike other temporary sign stands that are free-standing and are often placed directly on the traveled way pavement. Free-standing devices must be crash tested at 100 km/hr (62 mph) and must not cause excessive damage to the windshield of the test vehicle. Roadside mounted breakaway supports, like the FDOT stand, need only meet a change-in-velocity criteria, and may be tested at 35 km/hr (22 mph) with results extrapolated to the higher speed if necessary. From the design of the support and the results of these low speed tests it is clear that the velocity change of any impacting vehicle with be insignificant, and that a high speed test is not necessary. The strength of the composite angle is similar to many delineator posts that have been used successfully in many states, and the holes drilled near the base enhance the breakaway performance. The use of fabric/roll-up signs further reduces the likelihood of serious windshield damage.

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.
 - The Florida DOT will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
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- 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-96 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.

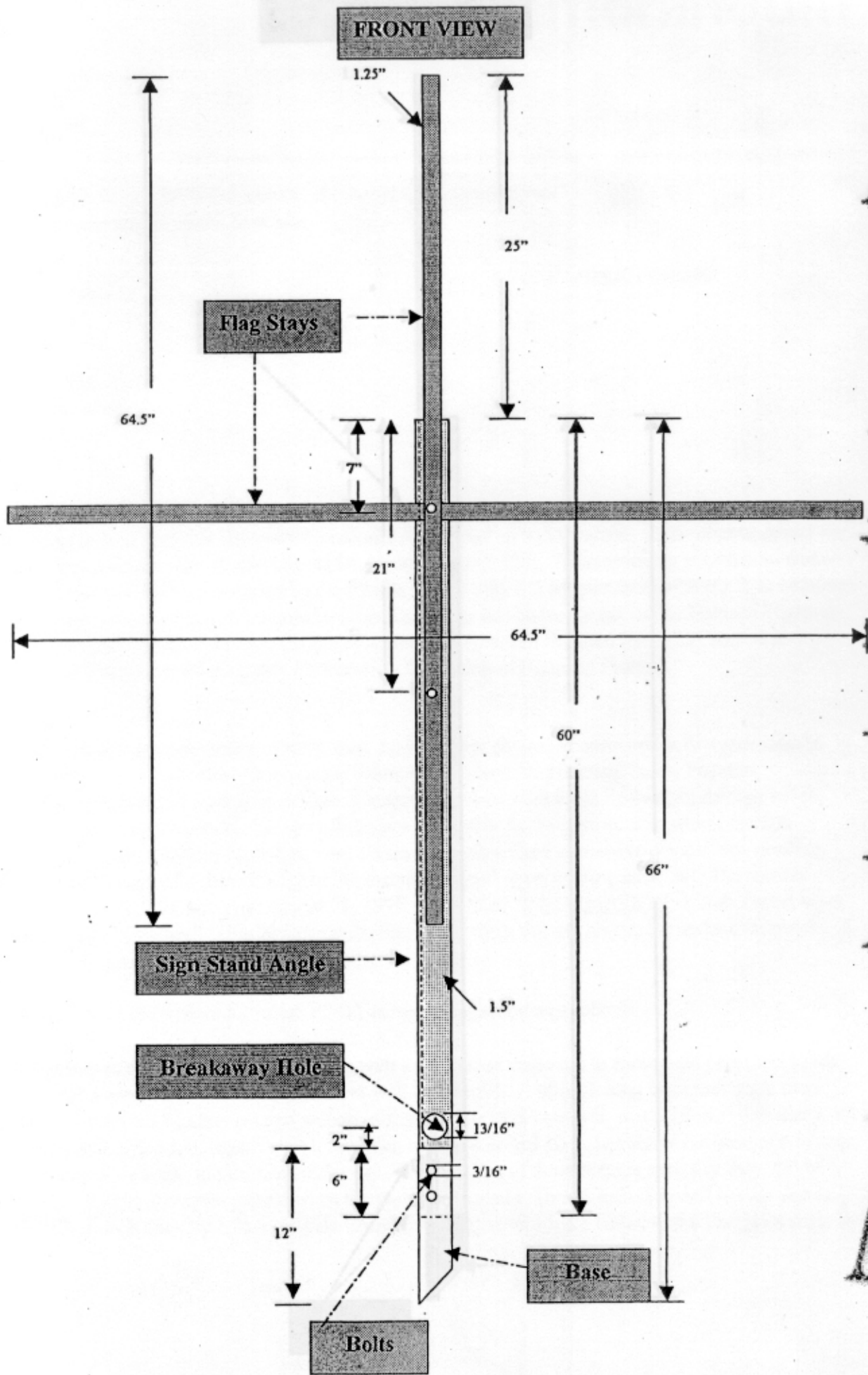
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cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;
NArtimovich, HSA-10)

APPENDIX

A



APPENDIX B

