



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

1200 New Jersey Ave., SE
Washington, D.C. 20590

December 7, 2010

In Reply Refer To:
HSSI/SS-166

Mr. Eric Hemphill, P.E.
Assistant Director of Maintenance Operations
North Texas Tollway Authority
P.O. Box 260729
Plano, TX 75026

Dear Mr. Hemphill:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety system for use on the National Highway System (NHS).

Name of system:	North Texas Tollway Authority (NTTA) Short Sign Support
Type of system:	Sign Supports – Reduced Height
Test Level:	Manual for Assessing Safety Hardware (MASH) Test Level 3 (TL-3)
Testing conducted by:	Texas Transportation Institute (TTI)
Task Force 13 Designator:	SSP10a-b
Date of request:	July 22, 2010
Date of completed package:	November 23, 2010
Initially acknowledged:	July 29, 2010

You requested that we find this system acceptable for use on the NHS under the provisions of the American Association of State Highway and Transportation Officials' (AASHTO) Manual for Assessing Safety Hardware (MASH).

Decision:

The following device was found acceptable. Details are below:

- NTTA Short Sign Support for WRONG WAY signing.



Requirements

Roadside safety devices should meet the guidelines contained in the AASHTO MASH. The FHWA memorandum, "Identifying Acceptable Highway Safety Features" of July 25, 1997, provides further guidance on crash testing requirements of longitudinal barriers.

Description

The NTTA Short Sign Support is a post and sign system supporting a 2-ft high by 3-ft wide WRONG WAY sign mounted 2 ft above ground. The sign panel is 0.11 inch thick aluminum and is mounted on a single 60-inch long post consisting of a 2 3/8-inch diameter pipe support with a wall thickness of 13 gauge (0.092 inch). The pipe support is embedded in a 12 inch diameter by 30 inch deep concrete footing using a Poz-Loc wedge and socket device. Details of the system are shown in Enclosures 1 and 2. The sign is intended for use on main lane freeway exit ramps to alert drivers of wrong way movements.

Crash Testing

Test 3-61 was conducted on the sign support by TTI according to the MASH guidelines. The 1100C vehicle impacted the test article at 64.3 mph at 0 degrees. The testing was conducted with the test vehicle hitting the back of the sign post, as this orientation is likely to be the most common type of impact experienced in service, given that the majority of vehicular traffic towards the sign will be travelling the correct direction, leaving the highway. The crash test was evaluated in accordance with the criteria presented in the MASH. The test article successfully passed test 3-61. The NTTA short sign support yielded to the 1100C vehicle. In testing the sign panel separated from the post, vaulted, but did not penetrate the occupant compartment. The longitudinal and lateral Occupant Impact Velocities were 2.6 ft/sec and 0.3 ft/sec respectively which were below the MASH preferred value of 10 ft/sec. The maximum longitudinal and lateral Occupant Ridedown Accelerations were -0.3G and -0.2G respectively. Both values were well below the MASH preferred value of 15.0G. Enclosure 3 shows the results of the test results.

Findings

According to the MASH, test designations 3-60, 3-61, and 3-62 are to be conducted for approval of TL-3 for support structures. Test 3-60 which is a low speed impact test with a passenger car and test 3-62 which is a high speed impact test with a pickup truck were not performed. In your letter you requested that tests 3-60 and 3-62 be waived. You also requested that the TL-2 acceptance be granted. We concur with these requests as explained below.

Test 3-62 can be waived on the grounds that (1) the post will likely yield in the same manner that was observed in test 3-61 with a passenger car; (2) given the height of the hood of most pickup trucks, it will be unlikely that the sign panel can hit the windshield of a pickup truck; and (3) the Occupant Impact Velocities and Occupant Ridedown Accelerations were well below the preferred limits and those are not expected to be much larger for a pickup truck.

Low- speed tests including Test 3-60 and tests required for TL-2 approval are waived based on the performance of the test article observed in the video of the high speed test and the fact that the low speed tests have generally been to verify that the breakaway features perform as intended. In addition, the wedge and socket system has been tested and accepted at both low and high speeds as a full-height sign support.

In test 3-61, the sign panel separated from the post once the test vehicle impacted the sign. Therefore, use of the sign system should give consideration to proximate pedestrian activity. In the context of the comments provided, the system described in the requests above and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency.

Please note the following standard provisions that apply to FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the systems 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 system 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 system being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our 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 it will meet the crashworthiness requirements of the FHWA and MASH.
- To prevent misunderstanding by others, this letter of acceptance is designated as number SS-166 and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- The Poz-Loc Base is a patented product and considered proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the 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.

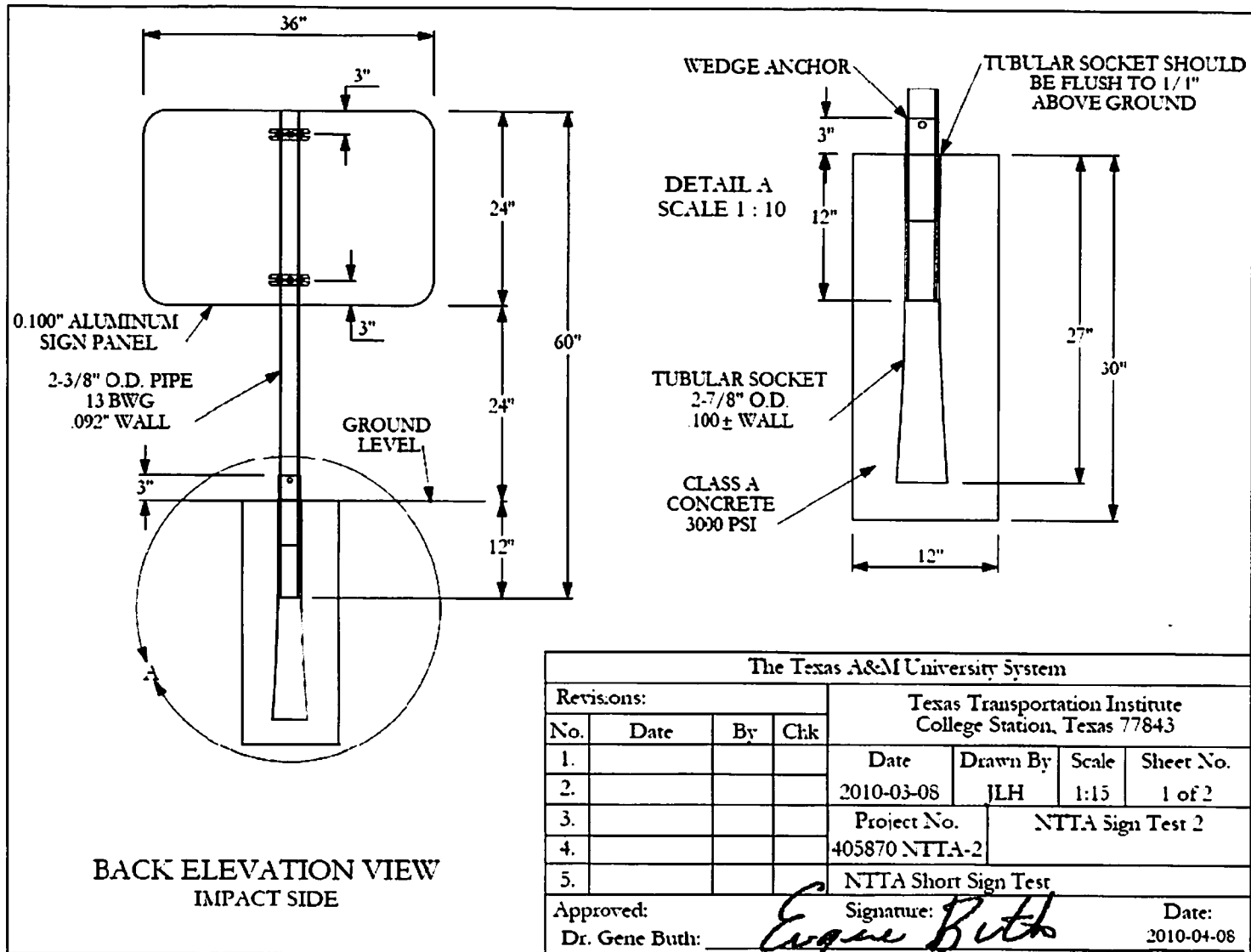
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate system, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely yours,



Michael S. Griffith
Director, Office of Safety Technologies
Office of Safety

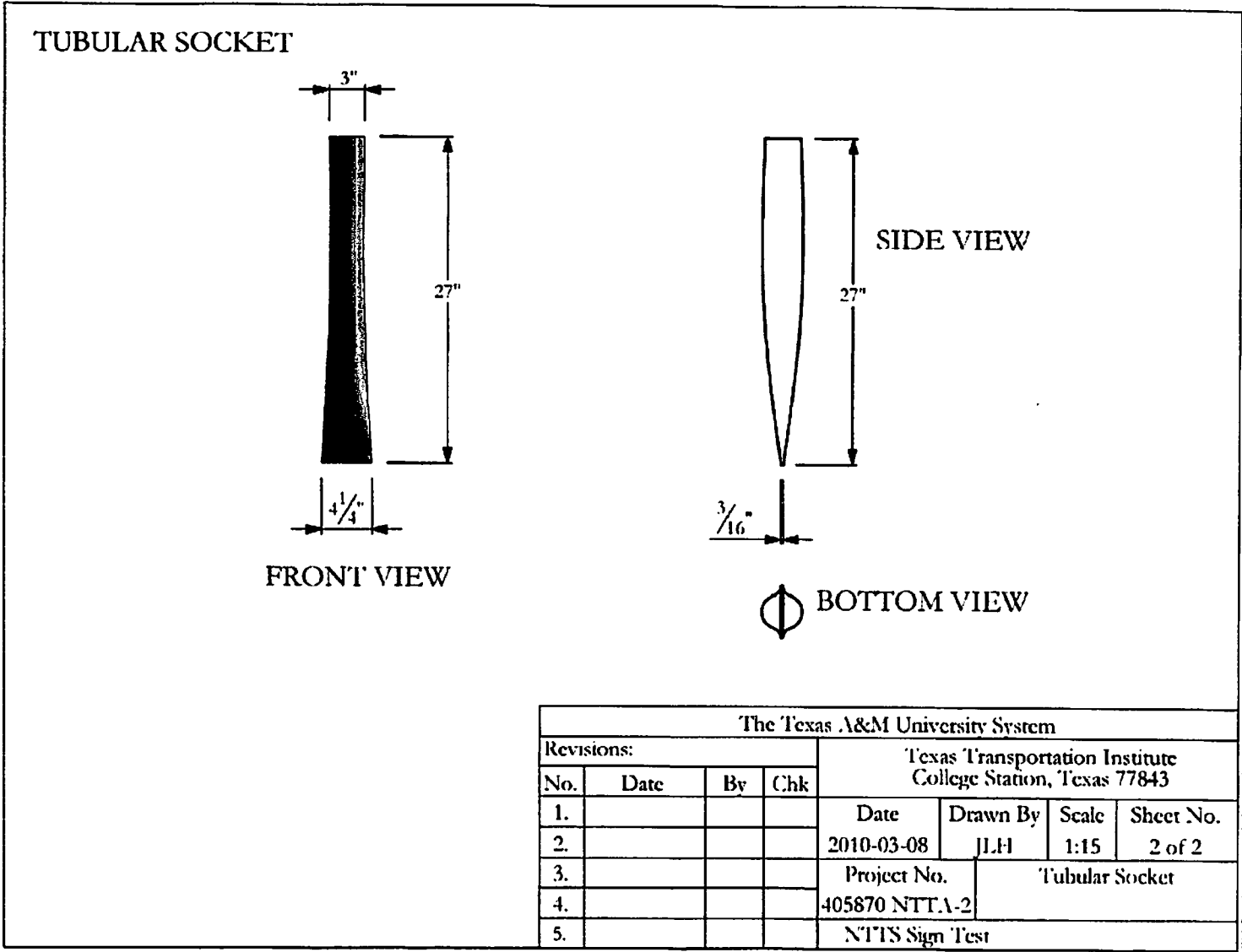
3 Enclosures



Enclosure 1

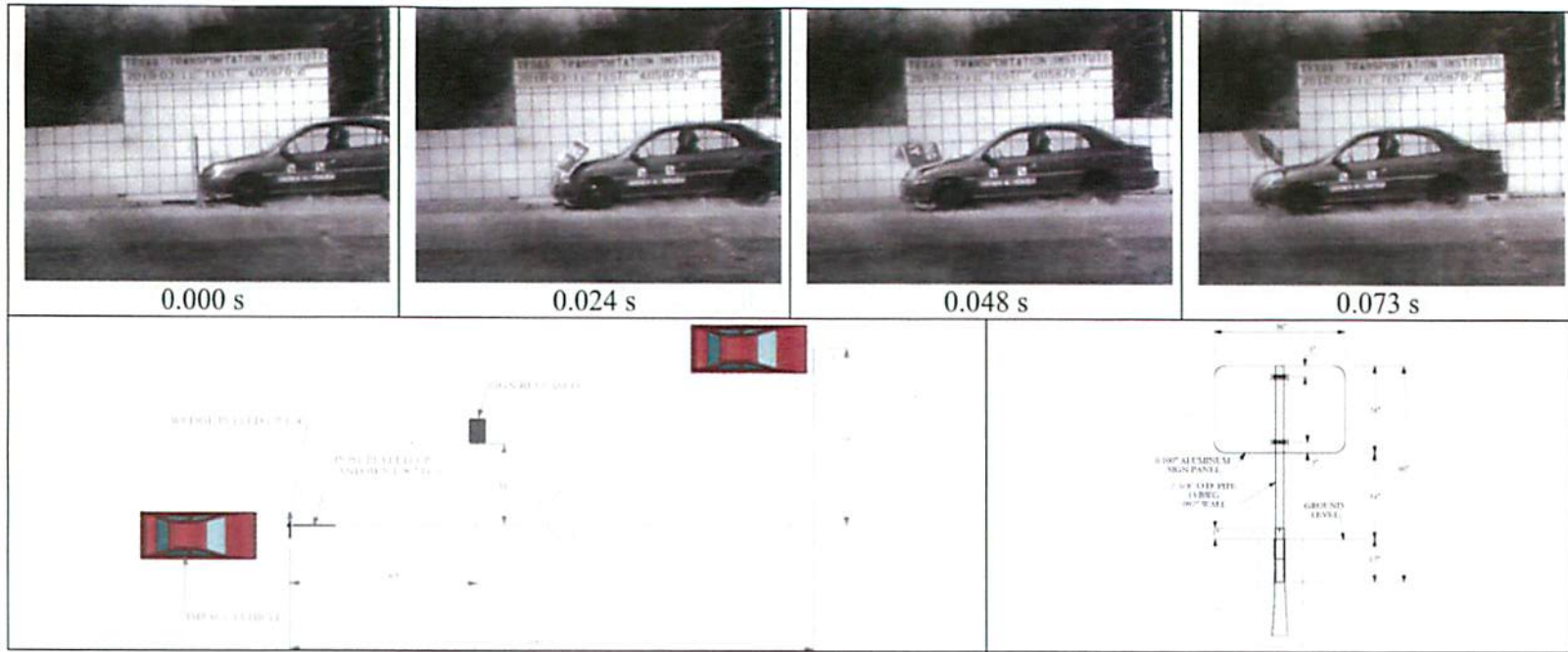
Figure 2.1. Details of the NTTA short sign support.

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Enclosure 2

Figure 2.2. Details of the wedge for the NTTA short sign support.



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General Information

Test Agency..... Texas Transportation Institute
 Standard Test Designation *MASH* 3-62
 Test No. 405870-2
 Date 2010-03-11

Test Article

Type..... Sign Support
 Name NTTA Short Sign Support
 Installation Height 2.0 ft
 Material or Key Elements 2-ft high by 3-ft wide aluminum wrought way sign on 2-3/8-inch diameter pipe support with wedge and socket anchor

Soil Type and Condition

..... *MASH* Standard Soil, Dry

Test Vehicle

Type/Designation..... 1100C
 Make and Model 2003 Kia Rio
 Curb 2411 lb
 Test Inertial..... 2391 lb
 Dummy 170 lb
 Gross Static..... 2561 lb

Impact Conditions

Speed 64.3 mi/h
 Angle 0.1 degree
 Location/Orientation

Exit Conditions

Speed 57.9 mi/h
 Angle 5 degrees

Occupant Risk Values

Impact Velocity
 Longitudinal..... 2.6 ft/s
 Lateral 0.3 ft/s
 Ridedown Accelerations
 Longitudinal..... -0.3 G
 Lateral -0.2 G
 THIV 3.0 km/h
 PHD 0.4 G
 Max. 0.050-s Average
 Longitudinal..... -1.3 G
 Lateral 0.5 G
 Vertical -0.6 G

Post-Impact Trajectory

Stopping Distance 600 ft
 54 ft left

Vehicle Stability

Maximum Yaw Angle..... -2 degrees
 Maximum Pitch Angle..... -1 degrees
 Maximum Roll Angle..... -3 degrees
 Vehicle Snagging..... No
 Vehicle Pocketing..... No

Test Article Deflections

Dynamic..... N/A
 Permanent..... N/A
 Working Width N/A

Vehicle Damage

VDS 12LFQ1
 CDC 12FLEN1
 Max. Exterior Deformation..... 0
 Max. Occupant Compartment Deformation..... 0

Figure 5.7. Summary of results for *MASH* test 3-61 on North Texas Tollway Authority short sign support.