



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

May 9, 2006

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

In Reply Refer To:  
HSA-10/WZ-239

Mr. Doug Yetzer  
Quality Restoration Services, Inc.  
3066 Spruce Street  
Little Canada, Minnesota 55117

Dear Mr. Yetzer:

Thank you for your February 15 letter requesting Federal Highway Administration (FHWA) acceptance of your company's QRS Vertical Sign Stand as a crashworthy traffic control device for use in work zones on the National Highway System (NHS). Accompanying your letter was the FHWA Office of Safety Design form completed and signed by you and E-Tech Testing Services, and a DVD compilation of relevant crash tests conducted by E-Tech. You requested that we find this stand acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

This letter is the acknowledgement of the FHWA's acceptance of your request. The results of the testing met the FHWA requirements and, therefore, the device described in the form and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when proposed by a State. The form, of which a copy is enclosed for reference, will be posted on our website in the near future.

You also asked for the following practical field-use scenarios:

1. Use with or without flasher: Accepted
2. Use with fewer or lighter sandbags than used in the crash test: Accepted
3. Use without the four channel brackets: Denied – the sign mounted on the QRZ Vertical Sign Stand damaged the windshield even though the sign remained securely attached to the stand. Acceptable performance may not result if a less secure attachment method is used.
4. Use without plating/finishing of components: Accepted
5. Use with four-point sign attachment bolt patterns other than the 25" x 30" (VxH) pattern used in the test: Accepted
6. Use with a 36"x 36"x 0.100" solid aluminum sign mounted such that the center of gravity of the sign matches that of the tested 48" x 48" sign: Accepted



Thank you for working with us as we institute this new review and acceptance process.

Sincerely yours,

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

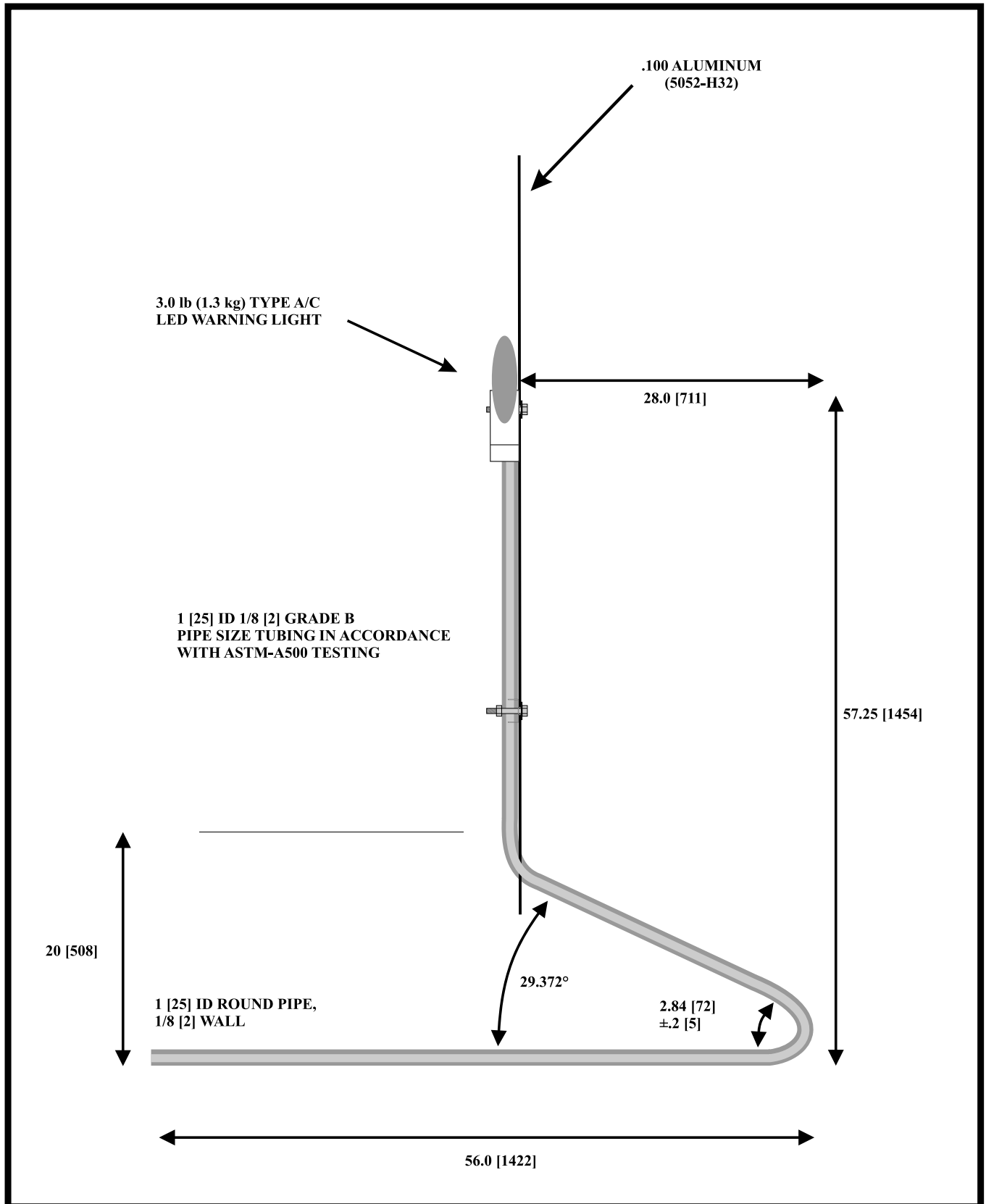
Enclosure

FHWA:HSA-10:NArtimovich:tb:x61331:5/9/06

File: h://directory folder/artimovich/WZ239-QRSformLetter.doc

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





QRS VERTICAL SIGN STAND, SIDE VIEW



**QUALITY RESTORATION  
SERVICES, INC.**

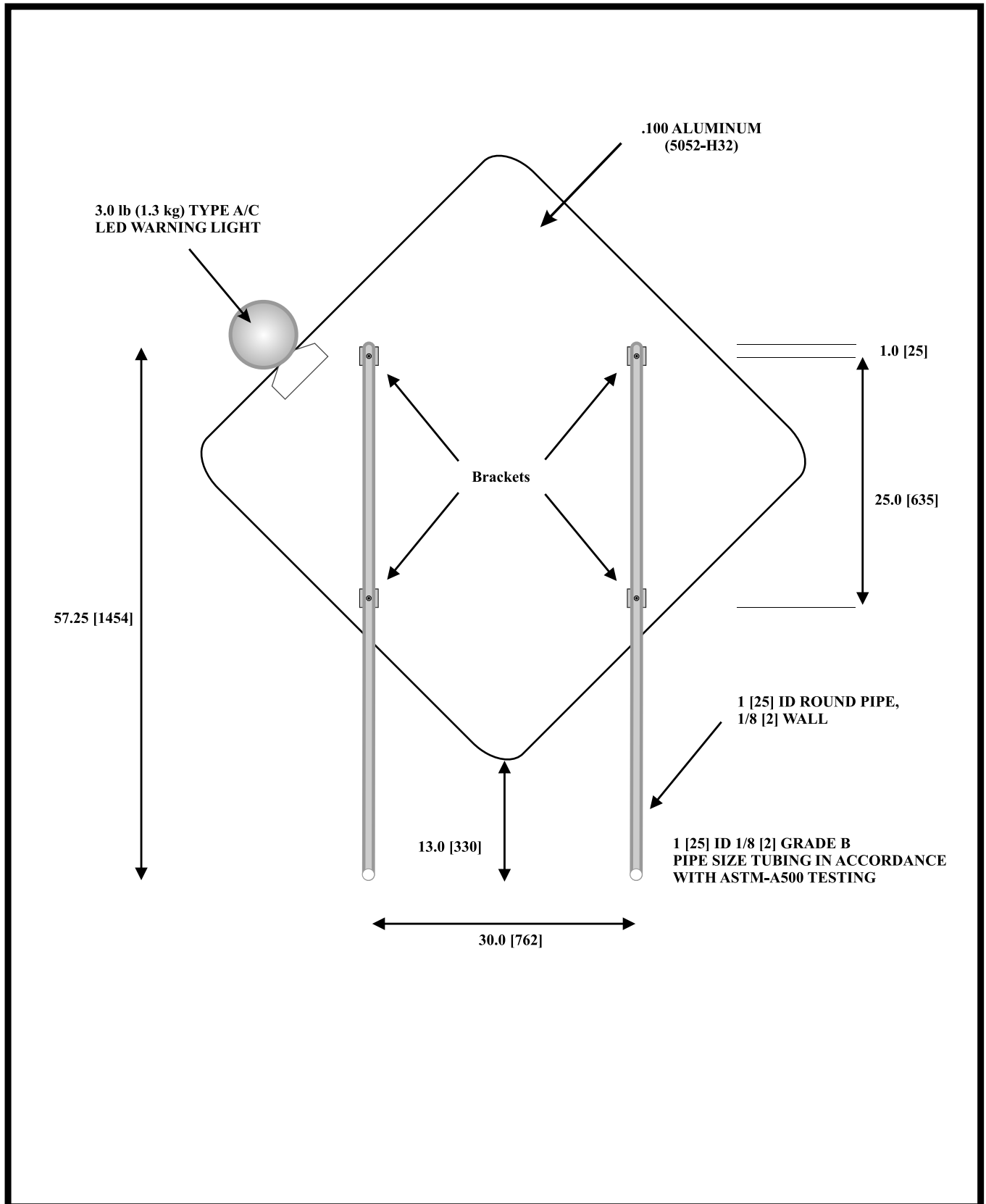
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SHEET NO.

DATE:

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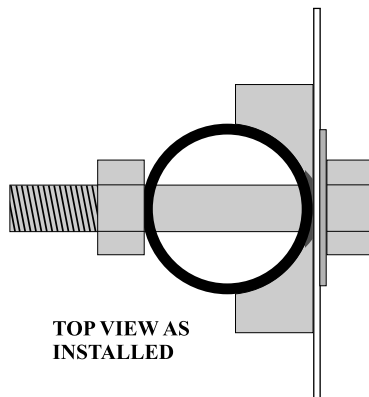
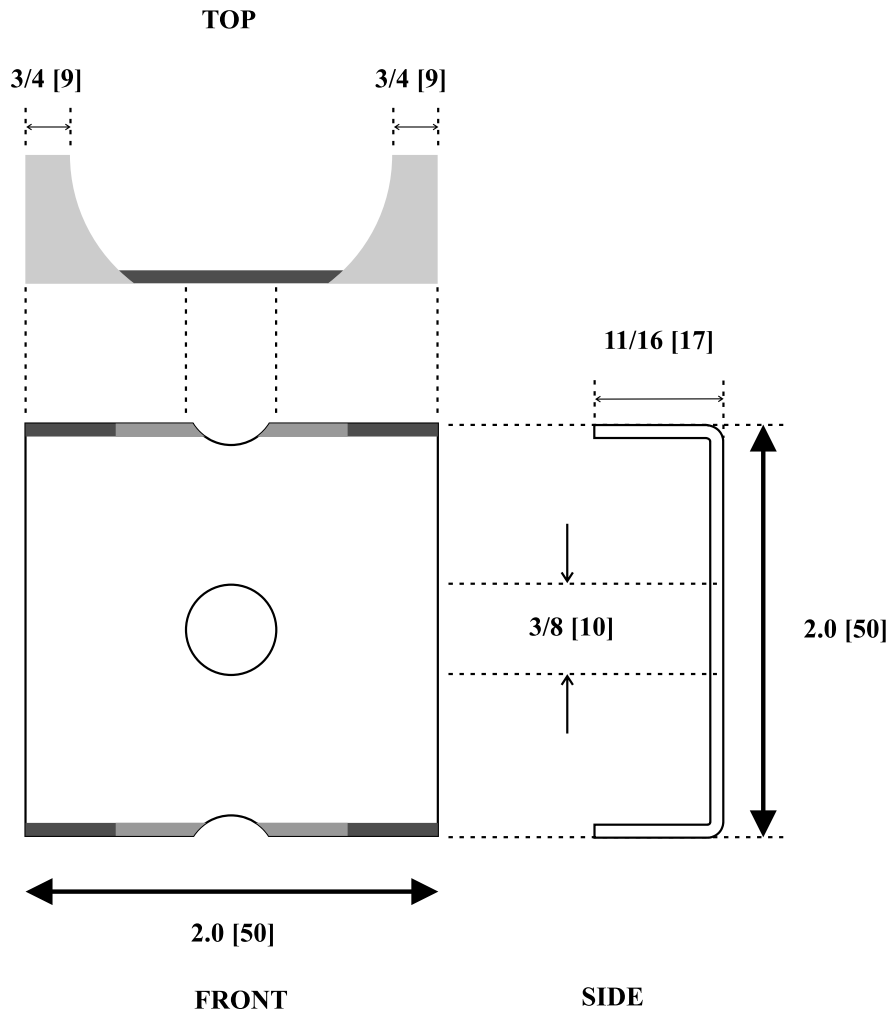
QRS VERTICAL SIGN STAND, BACK VIEW



**QUALITY RESTORATION SERVICES, INC.**

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**QRS VERTICAL SIGN STAND, CHANNEL BRACKET DETAIL**



**QUALITY RESTORATION  
SERVICES, INC.**

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## INTENDED USE

The Quality Restoration Vertical Sign Stand is a portable and crashworthy metal sign stand used primarily for supporting construction and regulatory signs in urban work areas. The Quality Restoration Vertical Sign Stand has been successfully crash tested to the National Cooperative Highway Research Program Report 350 (NCHRP 350) testing procedures for test 3-71 (100km/hr) in both normal and perpendicular orientations. The sign stand is equipped with a 48" x 48" x 0.100" [915 x 915 x 2.5] aluminum substrate sign. The sign stand is engineered to achieve a 12" [300] minimum bottom sign height, while keeping the overall height of the device to a minimum. The Quality Restoration Vertical Sign Stand is proprietary, with a U.S. patent pending.

To represent both typical and worst-case usage, the Quality Restoration Vertical Sign Stand was tested with two 27 lb [12.3 kg] sand bags for ballast, a lightweight barricade light, and two 16" [410] wood dowels. Under the worst-case scenario for testing, it is anticipated that a smaller or lighter mass sign substrate other than that tested may be used without creating an unfavorable crash test result. Likewise, it is anticipated that the ancillary components tested such as the barricade light, flags, or sandbags, may be omitted completely or reduced in mass without creating an unfavorable crash test result.

APPROVALS: PENDING

### Contact Information

Quality Restoration Services  
Mr. Doug Yetzer  
3066 Spruce Street  
Little Canada, MN 55127

Telephone: (612) 369-1229  
FAX: (651) 224-2220  
[www.qqu3.com](http://www.qqu3.com)

## QRS VERTICAL SIGN STAND

SWMxx		 <b>QUALITY RESTORATION SERVICES, Inc.</b>
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**Normal Impact**



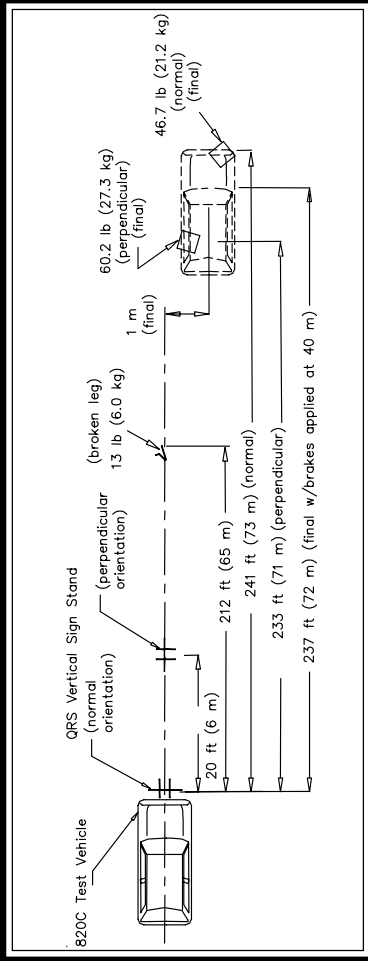
t = 0.000 sec



t = 0.096 sec



t = 0.192 sec



**General Information**

Test Agency ..... E-TECH Testing Services, Inc.  
 Test Designation ..... NCHRP 350 Test 3-71  
 Test No. .... 61-2889-001  
 Date ..... 01/17/06

Test Article  
 Type ..... QRS Vertical Sign Stand  
 Impact Orientation ..... Normal and Perpendicular  
 Size and/or dimension and material of key elements ..... Upright: two (2) 1 1/4" dia. by 1/8" thick (32 mm x 6 mm) thick steel tube upright supports.  
 Sign: 48" (1219 mm) diamond 0.100" (3 mm) thick 5052-H32 aluminum  
 Warning light: Type A/CLEDD-cell  
 Mass: 60.4 lb (27.4 kg) total w/o (4) 35.0 lb (15.8 kg) sand ballast bags

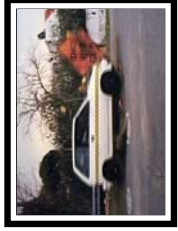
**Test Vehicle**

Type .....  
 Designation .....  
 Model .....  
 Mass lb (kg) .....  
 Curb .....  
 Test inertial .....  
 Dummy .....  
 Gross Static .....

**Perpendicular Impact**



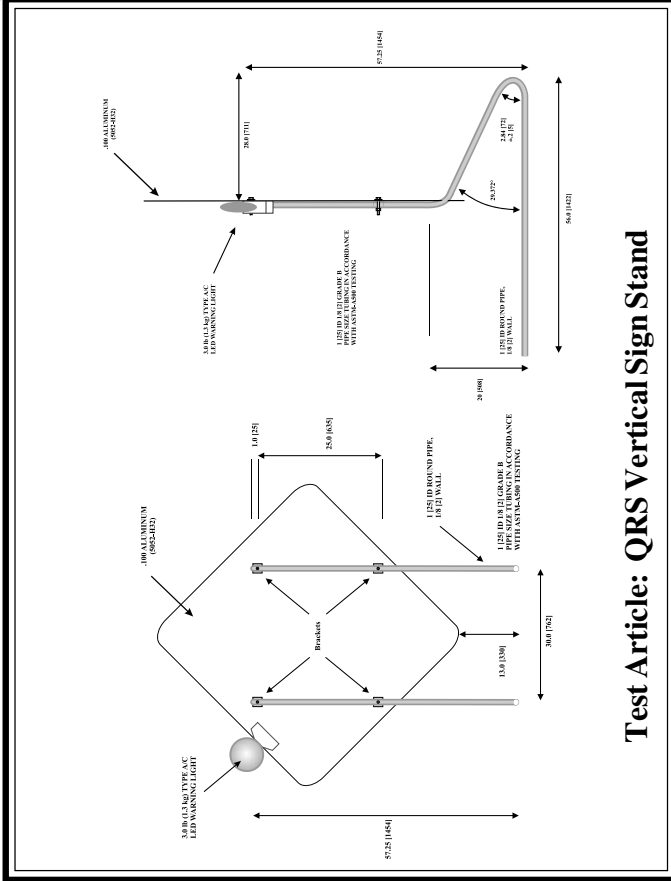
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t = 0.096 sec



t = 0.192 sec



**Test Article: QRS Vertical Sign Stand**

Impact Conditions (Normal/Perpendicular)  
 Speed mi/hr (km/h) ..... 63.7 (102.5) / 59.5 (95.7)  
 Angle (deg) ..... 0 / 0  
 Impact Severity ft-kip (kJ) ..... 250.7 (340.0) / 218.8 (253.5)  
 Exit conditions (Normal/Perpendicular)  
 Speed mi/hr (km/h) ..... 59.5 (95.7) / 55.2 (88.9)  
 Angle (deg) ..... 0 / 0  
 Vehicle Damage (Normal/Perpendicular) Exterior  
 VDS ..... FD-1 / FC-1  
 CDC ..... 12FDEW1 / 12FCEN1  
 Interior  
 OCIDI ..... AS0000000  
 Windshield per-FHWA .....  
 Case 5 Pass: Roughly circular localized cracking / shattering, no penetration, 5/8" (16mm) deformation

**Figure 1. Summary of Results - QRS Vertical Sign Stand Test 61-2889-001**