



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

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

February 27, 1996

Refer to: HNG-14/SS-61

Mr. Leon J. Witman, Jr.
Regional Federal Highway Administrator
Portland, Oregon

This is in response to your January 3 office memorandum requesting the Federal Highway Administration's, (FHWA) Office of Engineering acceptance of the subject breakaway sign support. You referenced the report of bogie vehicle testing, titled "Testing of a Modified Oregon Multi-Directional Slip-Base Sign Support, FOIL Test Numbers: 95F007 and 95F009," and dated June 1995, which we obtained on February 5.

Our requirements for breakaway supports are those in the American Association of State Highway and Transportation Officials (AASHTO), Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. We also recognize the testing and acceptance guidelines found in the National Cooperative Highway Research Report number 350 Recommended Procedures for the Safety Performance Evaluation of Highway Features.

The sign supports consisted of a 200-mm by 200-mm steel tube post with a wall thickness of 4.3 mm welded to a triangular slip-base. The base had three 90-degree notches to accept the three 1-inch (25.4-mm) diameter bolts. Bolted to the top of the post was an "H" shaped bracket to which an extruded aluminum sign panel was attached. The three bolts clamped the sign post to a matching foundation stub and were torqued to the manufacturers recommended torque of 102 N.m. The rectangular washers used were 25 mm thick, 50 mm wide and 200 mm long. The bolt threads in each test were lubricated before sign installation. A 0.53-mm (25 gage) slip-bolt keeper plate was used to maintain the 343-mm bolt circle diameter. The sign stub was bolted to the FOIL runway's foundation plate. An 839-kg bogie vehicle fitted with a 10-stage crushable nose, was used to simulate an impacting automobile. A summary of the testing follows:

| Test Parameter / Test # | 95F007 | 95F009 |
|-------------------------|-----------|------------|
| Mass of test article | 386 kg | 386 kg |
| Impact speed | 35.9 km/h | 101.4 km/h |
| Velocity change | 7.0 m/s* | 2.7 m/s |
| Occupant impact speed | 2.2 m/s | 2.7 m/s |
| Stub Height | 95 mm | 95 mm |

* The base of the sign caught on the framework of the bogie vehicle and slowed the vehicle during a much longer time interval than is normal. This result is unlikely in an impact with an automobile.

These results meet the change-in-velocity and stub height requirements adopted by the FHWA and ASSHTO. Therefore, the modified Oregon multi-directional slip-base sign support described above and illustrated in the enclosures is acceptable for use on the National Highway System within the range of conditions tested, if requested by a State. The following conditions and limitations also apply unless further crash testing indicates acceptability under other conditions:

1. No more than one sign support may be used within a 2.1-meter width.
2. All supports shall be mounted to a structural concrete foundation that will not move in the soil if the support is struck by a vehicle.
3. Mass of sign, post, and other hardware above the couplings shall not exceed 450kg.

Our acceptance is limited to the breakaway characteristics of the slip-bas and does not cover the structural features of the support. Presumably, the State will develop sufficient information on structural design and installation requirements to ensure proper performance.

Jerry L. Poston

Geometric and Roadside Design Acceptance letter No. SS-61