



U.S. Department
of Transportation

**Federal Highway
Administration**

Memorandum

Subject **ACTION:** Blockouts for Use with Strong-Post W-Beam
Guardrail Systems

Date January 27, 1998

From Chief, Federal-Aid and Design Division

Reply to
Att: of HNG-14

To
Regional Administrators
Federal Lands Highway Program Administrator

As previously reported, the adoption of the NCHRP Report 350 and the FHWA's subsequent policy requiring the use of traffic barriers meeting the acceptance criteria contained in that document by October 1, 1998, led to a series of crash tests of widely-used barrier systems with a 2000-kg pickup truck (NCHRP Report 350 test 3-11). One of the more significant failures in this test series was the standard steel-post, steel-blockout w-beam guardrail, or G4(1S) system, which resulted in vehicle rollover after impact, apparently caused by wheel snagging when the posts and blockouts twisted laterally, thus allowing significant wheel contact with the posts. The system was modified by substituting a 150-mm X 200-mm routed timber blockout for the steel blockout and successfully contained and redirected the pickup truck in a re-test. A similar successful test was run on the strong steel-post system using a recycled plastic blockout manufactured by Mondo Polymer, Inc. and having essentially the same dimensions as the timber blockout.

More recently, the NCHRP Report 350 test 3-11 was run on the strong steel-post system using a routed timber blockout approximately 150 mm X 150 mm in cross section. Although the vehicle was contained and redirected, and satisfied the appropriate evaluation criteria, the roll and pitch angles measured in this test were significantly higher than in either of the tests using 200-mm deep blockouts and the truck became airborne after impact. It is not clear whether or not the short steel posts (1676 mm versus the more typical 1830 mm) used for this test contributed to the undesirable vehicle trajectory.

Test 3-11 was also run on the G4(1S) system using standard W150 X 12.6 steel posts, but substituting W150 X 17.9 blockouts for the lighter W150 X 12.6 blockouts. The use of a stiffer blockout did not result in acceptable performance. This system failed when the pickup truck penetrated the rail and rolled onto its side.



Based on the above information, we conclude that even though the 150-mm X 200-mm routed timber blockouts performed significantly better than those that were only 150 mm deep, both sizes are acceptable for use on the National Highway System (NHS) in conjunction with W150 X 12.6 steel posts when requested by a transportation agency. However, the use of the deeper blockout is strongly suggested. Likewise, blockouts having the same dimensions as the tested timber blockouts, but made from recycled/synthetic materials that have been previously accepted by the Office of Engineering may also be considered acceptable for use on the NHS with strong steel-post w-beam without additional testing. Since the latter products are proprietary, Federal regulations concerning their use remain applicable. Also, FHWA acceptance of recycled/synthetic blockouts applies to their expected crash performance based on reported material properties and/or actual crash performance, but does not address long-term durability. The State departments of transportation should be informed of this fact and should consider seeking warranties from the manufacturers on the durability of these products.



Dwight A. Horne