



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

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

September 26, 1995

Refer to: HNG-14/SS-57

Mr. Rick Mauer
National Sales Manager
Marion Steel Company
912 Cheney Avenue
Marion, Ohio 43302

Dear Mr. Mauer:

Thank you for your July 31 letter requesting that the Federal Highway Administration (FHWA) accept the Minute Man Breakaway System for use with your company's Rib-Bak u-channel sign supports. Your letter was accompanied by the draft report Evaluation of the Crash Performance of Triple Steel U-Channel Sign Support with Minute Man Connection in Weak Soil by the Texas Transportation Institute (TTI). You submitted additional information on a facsimile transmitted on August 14, and a final copy of the TTI report dated September 1995, was submitted on September 15.

The full-scale crash testing was done in accordance with the National Highway Cooperative Research Program Report 350 Recommended Procedures for the Safety Performance Evaluation of Highway Features. The requirements for breakaway supports are found in the American Association of State Highway and Transportation Officials' (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. These specifications have been adopted by the FHWA.

You requested comprehensive acceptance of your sign support system based on the low-speed test in S-2 ("weak") soil only. This soil and speed combination is usually considered a "worst case" for testing small sign support systems that have failure mechanisms that result in relatively short duration breakaway such as the Minute Man assembly.

The test was conducted on a triple post installations buried in weak soil. The supports were constructed from Marion Steel SP-80 Rib-Bak, 4.5-kg/m (3.0-lb/ft) steel u-channel sign supports. Ground support stubs of 6.5-kh/m (4 pound per foot) u-channel measuring 1.067 m (3.5 feet) long were driven so that their tops were 38 mm above the ground. The soil plates used were 330 mm (13 inches) wide at the top, 305 mm (12 inches) high, and 3.2 mm (0.125 inches) thick with their tops located just below the ground line. The top

18 mm (0.7-inch) was folded to provide additional stiffness. The bottom 228 mm (3.0 inches) on both sides were tapered to facilitate driving of the support. (Drawings of the Minute Man Breakaway connection and the soil bearing plate are enclosed.)

Test Number:	270687-MIN-4
Test Article	4.5 kg/m Rib-Bak Posts with Minute Man Breakaway Couplings
Soil Type	Weak
Soil Plates Used?	Yes
Vehicle mass, kg (lbs.)	820 (1808)
Impact Speed, km/h (mp/h)	35.11 (21.82)
Vehicle Delta V m/a (ft/s)	1.80 (5.92)
Est. High Speed Delta V m/s (ft/s)	0.66 (2.18)
Occupant Imp. M/s (ft/s)	1.79 (5.86)
Maximum Stub Height, mm (in)	38 (1.5)
Failure Mode	All 3 posts broke at bumper height. Two couplings broke, post pulled away from third coupling, which remained attached to the stub.

The results of this test meet the change in velocity and stub-height requirements adopted by AASHTO and FHWA. Earlier testing by SwRI for Minute Man Breakaway, Inc., confirmed that the dual-post installation of 4.5-kg/m Marion Rib-Bak posts performed in an acceptable manner when tested in strong and weak soils (no soil plate needed). This was the subject of our acceptance letters dated June 19, 1990 (Number SS-18) and December 26, 1990, (Number SS-21), respectively. The change in pendulum velocity was identical in the two tests (4.08 m/s).

Therefore, the 4.5-kg/m Marion Steel Rib Back sign supports with Minute Man Breakaway connections will be acceptable for use on the National Highway System (NHS), under conditions comparable to those evaluated, when selected by a highway agency. One, two, or three of these supports may be placed within a span of 2.1 m, but soil plates on the stubs are required when three posts are within a 2.1-meter span. The minimum clearance between the bottom of the sign panel and the ground line is to be 2.1 m.

Our acceptance is limited to the breakaway characteristics of the system and does not cover its structural features. Presumably, you will supply potential users with sufficient information on structural design and installation requirements to ensure proper performance. We anticipate that the States will require certification from Marion Steel Company and/or Minute Man Breakaway, Inc., that the posts and breakaway hardware furnished have essentially the same chemistry, mechanical properties, and geometry as those used in the tests, and that they will meet the FHWA change in velocity requirements.

Because the Minute Man Breakaway connection is proprietary, to be used in Federal aid highway projects, except exempt non-NHS projects: (a) It must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that it is essential for synchronization with existing highway facilities or that no equally suitable alternate exists; or (c) it 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, a copy of which is enclosed.

Sincerely yours,

Jerry L. Poston, Chief
Federal-Aid and Design Division

Federal Highway Administration
HNG-14:Nartimovich:gm:9-20-95:61331
Copies to:
HPD-1 HNG-1 HNG-10 HNG-14
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Geometric and Roadside Design Acceptance Letter SS-57