U.S. Department
Of Transportation
Federal Highway
Administration

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

December 26, 1990

Refer to: HNG-14/SS-21

Mr. Albert M. Moreno, Jr.
President
Minute Man Breakaway, Inc.
Number One Moreno Place
East Flat Rock, North Carolina 28726

Dear Mr. Moreno:

This is in response to your November 21 letter requesting acceptance of your company's Minute Man MMB-1HD breakaway sign support system (in S-2 soil) for use on Federal-aid highway projects. Transmitted with your letter was the Southwest Research Institute report Pendulum Test Report of Two Post Model MMB-1HD Breakaway Sign Support, dated November 1990, describing the pendulum tests you had performed. The drawings of the MMB-1HD were already on file at this office. Our letter of June 16, 1990, accepted the use of this device in S-1 soil only and we recommend that testing in weak soil be conducted. We are please that you followed up on this recommendation.

A test was conducted to assess the compliance of the MMB-1HD Breakaway Sign Support is S-2 (weak) soil with the breakaway requirements of the 1985 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic signals. These specifications have been adopted, with minor modifications, by the Federal Highway Administration (FHWA). Testing was conducted using an 1,800 pound instrumented pendulum with a 10stage crushable nose. The speed of the pendulum at impact was 20 mph (29.3 fps). The test article had two 3-foot 8-inch long, high carbon steel, flanged channel base posts, weighing 3 pounds-per-foot each, driven 3 feet 5 inches into the National Cooperative Highway Research Program (NCHRP) Report 230 type S-2 (weak) soil. The MMB-1HD breakaway couplings were mounted to these base posts. Attached to the couplings were two 7-foot 11 ½-inch mild steel signposts, which were also 3-pounds-per-foot flanged channel "U" posts. These post sections were extended 13 ¾ inches with two 18-inch long U-post sections. The posts were spaced 18 inches on center. The assembly supported a 30-inch aluminum sheet "stop" sign with a top mounting height of 9 feet 6 inches. The impact speed was 29.3 feet-per-second (20 mph) and the change in velocity was 13.4 feet-per-second. The top of the bases of both posts translated in excess of 4 inches during the impact event but the stub heights

remained at 3 inches. Calculations you provided estimate that the change in velocity for a 60 mph impact would be approximately 5.7 feet-per-second.

These results meet the change in velocity and stub height requirements adopted by AASHTO and the FHWA. Therefore, your company's MMB-1HD breakaway coupling is acceptable for use on Federal-aid highway projects for single or dual U-post supports mounted in soil, within the ranges of conditions tested, if proposed by a State. It appears likely that the 41-inch embedment depth probably played an important role in the test in developing the required lateral resistance and anchorage necessary to fracture the shear pin. Therefore, we recommend that anchor post embedment always equal or exceed that used in the test. Since the strong soil test of the dual post support referred to earlier used an embedment length that was within a few inches of that used in this weak soil test, it would be prudent to recommend a consistent embedment length for all soils so as to avoid confusion when specifying ir installing this hardware.

Our acceptance is limited to breakaway characteristics of the system and does not cover the 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 Minuteman Breakaway, Inc., that the hardware furnished has essentially the same chemistry, mechanical properties and geometry as that used in the tests, and that it will meet the FHWA change in velocity requirements.

As you are aware, the MMB-1HD breakaway device is a proprietary item. To be used in a Federal-aid highway project they: (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the State highway agency certifies that they are essential for synchronization with existing highway facilities or that no equally suitable alternate exists; or (c) they are 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,

L.A. Staron, Chief
Federal-Aid and Design Division

Enclosures

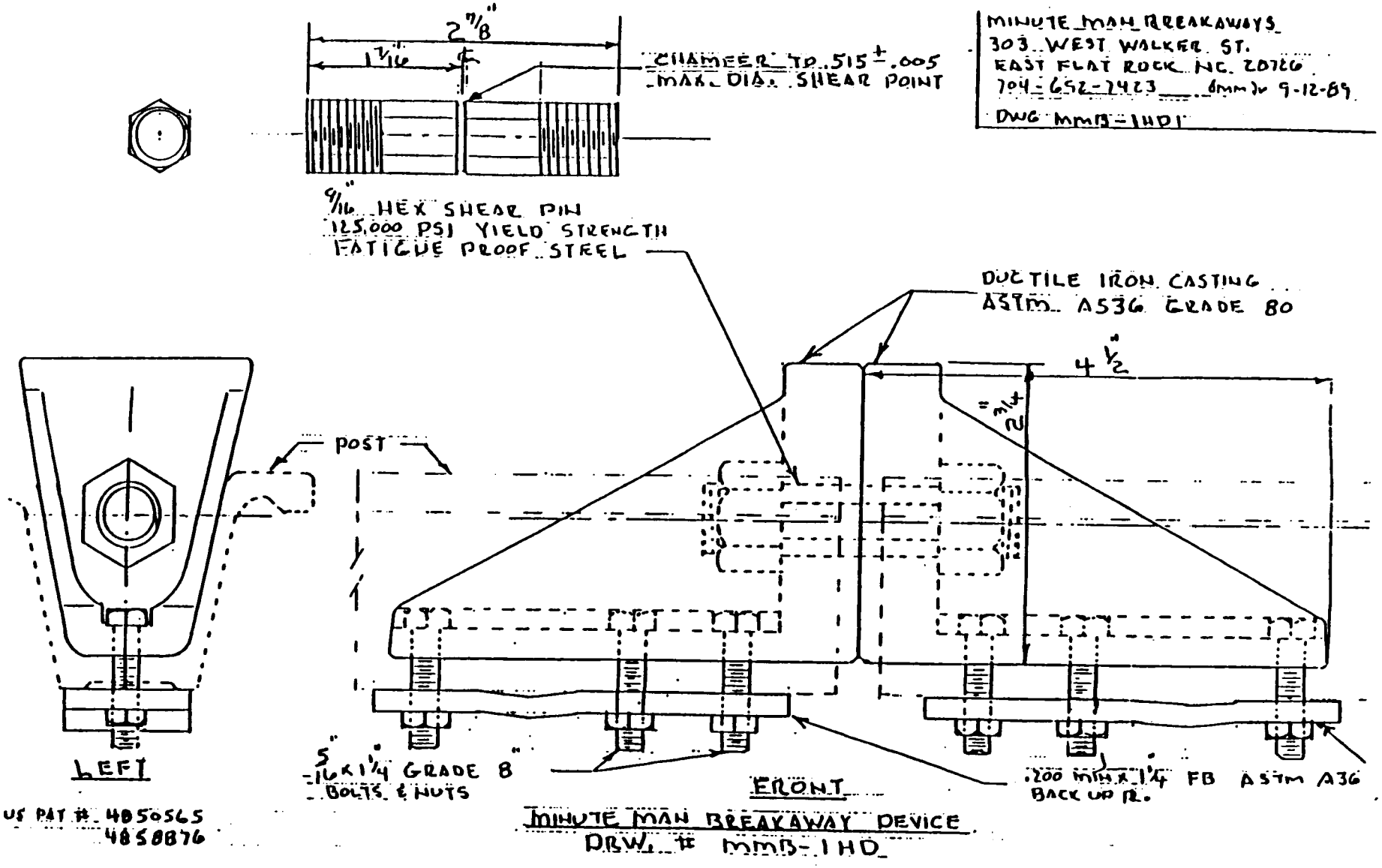

Figure 2. Manufacturer's Drawing of Test Article, Test MMDWS