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

Office of the Administrator

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

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HSA-10/CC-69A

Mr. Kaddo Kothmann
President, Road Systems, Inc.
3616 Howard County Airport Road
Big Spring, TX 79720

Dear Mr. Kothmann:

Mr. Frederick G. Wright's November 9, 2000, letter to you formally accepted your Burster Energy Absorbing Terminal (BEAT) as an National Cooperative Highway Research Program (NCHRP) Report 350 terminal for a standard roadside box-beam guardrail, but suggested additional tests be run to verify crashworthy performance when used as a terminal for a box-beam median barrier. In a December 20, 2001, letter to Mr. Wright, you provided information on the results of these additional tests and requested FHWA acceptance of your BEAT Median Barrier Terminal (BEAT-MT).

The BEAT-MT is identical to the roadside design with the following exceptions:

- A Stage 2 energy absorbing tube was added
- A transition from the Stage 2 tube to the standard box-beam tubular rail element for a median barrier was added
- Three additional posts were added to support the Stage 2 tube
- A modified post-to-rail connection design was used for all support posts, including the standard line posts

In the BEAT roadside terminal, the standard TS 152 mm x 152 mm x 4.8 mm box-beam rail section serves as the Stage 2 energy absorbing tube. However, the mandrel in the BEAT-MT will not work with the larger TS 203 mm x 152 mm x 6.4 mm rail element used in the median box-beam. Thus, a 5.5-m long TS 152 mm x 152 mm x 4.8 mm rail section and a transition section was added to the BEAT-MT as the Stage 2 energy absorbing tube, making its total length 9.8 m. Lastly, in lieu of the standard beam to post support paddles, the rail was attached to all support posts with 10-mm thick bent steel plates fastened to each post with two 19-mm diameter A307 bolts. The rail was then attached to the support angles with 11.1-mm diameter A307 through bolts, 190-mm long. This final design modification was critical in preventing the rail element from dropping too rapidly in the redirection impact and allowing vehicular penetration behind the barrier.

The two additional tests that you conducted were NCHRP Report 350 tests 3-32 and 3-35. Test 3-32 was an 820-kg car impacting the nose of the BEAT-MB at a nominal speed and angle of 100 km/h and 15 degrees, respectively. In this test, the car burst approximately 2 m of the terminal before yawing counterclockwise and coming to rest upright 19.4 m downstream from the point of initial contact and 4.4 m behind the barrier installation. The longitudinal occupant impact velocity was 10.3 m/s and the 10-millesecond ridedown acceleration was 10.1 g's. Test 3-35 was a 2000-kg pickup truck impacting at the beginning of the barrier length of need. This point was selected to be at post no. 3 which is located 4.4 m downstream from the first post of the BEAT-MT. The vehicle was contained and redirected with an extremely low occupant impact velocity of 3 m/s and a maximum 10-millesecond ridedown acceleration of 7.4 g's.

Based on the results of these new tests and earlier testing done on the roadside BEAT, the BEAT-MB, as described above, may be considered an NCHRP Report 350 box-beam median barrier terminal at test level 3. Consequently, it may be used on the National Highway System (NHS) when such use is acceptable to the contracting authority. Since it is a proprietary product, its use on Federal-aid projects, except exempt non-NHS projects, is subject to the provisions in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed for your ready reference.

Sincerely yours,

Michael L. Halladay

Michael L. Halladay
Acting Program Manager, Safety

Enclosure