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

February 22, 2005

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

In Reply Refer To: HSA-10

Mr. Rick Mauer
National Sales Manager
Marion Steel Co./SAFERoads LLC
4 Caswell Drive
Greenland, New Hampshire 03840

Dear Mr. Mauer:

In your January 25 letter, you asked for my opinion on the relationship between post spacing and dynamic lateral deflection for your SAFERoads high-tensioned cable barrier. In your February 17 follow-up, you sent me a revised graph depicting deflection distance vs. post spacing for the SAFERoads barrier consisting of a straight line connecting two points established through full-scale crash testing – one with the posts on 2-m centers and one with posts on 5-m centers. You contended that the design deflection for intermediate post spacings could be obtained from this line to an accuracy of plus or minus 0.15 m.

I have noted that you ran two tests with your posts on 2-m centers – one using U-channel posts with bolted trapezoidal soil plates and set to a depth of 775 mm below grade, and the second using 1219-mm long U-channel posts in steel sockets made from 100-mm diameter Schedule 40 pipe. In this second test, the odd-numbered line posts were installed in 406-mm long steel sockets set in 300-mm diameter by 768-mm deep concrete footings and the even numbered posts were set in 856-mm long steel sockets driven directly into the soil. In the former test, design deflection was reported to be 1.99 m; in the latter, 1.60 m. Based on these two tests, one can assume that both post spacing and post embedment design have some affect on the dynamic deflection of your barrier and that deflection is less with posts set in concrete footings compared to direct-driven posts.

Your test with 5-m post spacing used a direct-drive 1829-mm long U-channel post set to a depth of 990 mm below grade. No soil plate was used. Reported dynamic deflection was 2.8-m. Static analysis and pendulum testing on single posts conducted by research engineers at the Texas Transportation Institute indicated that the relative strength of posts 1664-mm long with soil plates were approximately equivalent to that of 1829-mm long posts without soil plates. Therefore, it is reasonable to conclude that the graph you plotted is a fairly accurate

depiction of the deflection/post spacing relationship for your SAFERoads barrier. I understand that you have scheduled a crash test for an intermediate post spacing in the near future, the results of which should corroborate the deflections interpolated from your graph for post spacings between 2-m and 5-m. In the meantime, your graph may be used to predict deflections for post spacings between 2-m and 5-m within a plus or minus 0.2-m margin of error.

I will take this opportunity to emphasize, however, that design dynamic deflections are always based on a single test, currently a 3/4-ton pickup truck impacting the barrier length of need at 25 degrees and 100 km/h under "ideal" test and weather conditions. The actual deflections in field installations can and will vary significantly depending on the vehicle type, speed, and impact angle as well as soil type and condition, and vehicle position at the time of impact. Therefore, all barrier design deflections in actuality represent a single point in a range of deflections that can be expected in service, not a precise distance. If barrier is placed in a location where deflection is absolutely critical and must be limited, a rigid barrier would be a more logical selection than a flexible barrier.

Sincerely yours,

Richard D. Powers

Richard D. Powers
Highway Engineer, Office of Safety Design
Office of Safety