

July 3, 2002

HSA-10/B102

Mr. David Eichbrecht
John Carlo, Inc.
45000 River Ridge Drive - Suite 200
Clinton Township, MI 48038

Dear Mr. Eichbrecht:

Mr. Todd Dresback, Project Manager at the Transportation Research Center in East Liberty, Ohio, sent Mr. Richard Powers of my staff two copies of his test report "NCHRP Report 350 Test 3-11 of the John Carlo, Inc. Cabled Concrete Barrier Wall System, Test No. 020417", dated April-May 2002, and videotape copies of the test that was run. He subsequently requested that any correspondence related to the tested barrier be sent directly to you.

The tested barrier is an 810-mm high New Jersey shape portable barrier made with 3500 psi concrete in segment lengths of 20 feet. Its base width is 28 inches and it tapers to 10 inches at the top. Reinforcing consists of three longitudinal # 6 bars (Grade 60 steel), located in the center of the barrier 4 inches, 15 inches and 26 inches from the bottom. Each segment contains two 3/4-inch diameter galvanized steel cables with double factory-installed crimps used to form a loop at each end of both cables. These cables are placed through two-inch diameter schedule 40 PVC sleeves located in the center of the barrier nine inches from the top and seven inches from the bottom of the barrier segments. The loops extend three inches from the ends of the barrier segments. Adjacent barrier segments were connected with two 1-1/4 inch diameter steel pins, each 32-inches long. The pins have T-shaped handles on top and are unrestrained at the bottom. Mr. Powers was later informed that the use of double pins was an error, and that only one pin had been used in actual field installations prior to the Report 350 testing.

Ten barrier segments were used in the test for a total installation length of 200 feet. The impact point was 4 feet upstream from the connection between segments 3 and 4 or approximately 56 feet from the upstream end of the test installation. The pickup truck hit the barrier at 101.6 km/h and at an impact angle of 26 degrees. Under these impact conditions, the permanent deflection of the barrier was reported to be 7.5 feet. The pickup truck was contained and redirected by the barrier. Occupant Impact Velocity was 7.4 m/s and ridedown acceleration was 10.1 g's. The reported pitch and roll angles were 5 and 44 degrees, respectively. The reported occupant compartment intrusion was 263-mm or slightly above 10 inches.

On this latter criterion, Report 350 is currently very subjective and it remains the user's ultimate responsibility to determine how much passenger compartment intrusion is acceptable. Lacking specific guidelines for this area, the Federal Highway Administration and most test agencies are in general agreement that intrusions up to 150-mm (6 inches) would not be likely to cause serious injury to vehicle occupants but that greater intrusions generally would not be acceptable test results. This criterion is currently under review, but it will be some time before more objective guidelines can be developed. In any case, the TRC report concluded that the intrusion seen in your test "would pose little risk of serious injury." A review of the overhead crash test video showed that a large piece of concrete spalled from the end of barrier segment #5 just before the truck contacted this section. The increased tire-barrier friction at this location may then have been responsible for much of the vehicle damage, including the deformation of the passenger compartment. Additional steel reinforcing of the ends of your barriers may reduce the potential for this type of damage and minimize barrier repair/replacement costs.

Based on the reported test results, I am willing to accept the John Carlo Barrier conditionally, when constructed as tested, as an NCHRP Report 350 test level 3 (TL-3) longitudinal barrier. It may be used on the National Highway System (NHS) when such use is acceptable to the contracting agency, but because of the high occupant compartment intrusion and the use of double pins in the crash test, its in-service performance must be monitored to verify its crashworthiness under actual service conditions. Chapter 7 of NCHRP Report 350 outlines the requirements for an appropriate in-service evaluation for highway barriers. Basically, if the barrier, connected with a single pin, performs acceptably over an approximate two-year period (based on a written analysis of reported accidents during that time period) full acceptance will be granted. If no in-service evaluation report is sent to me by October 1, 2004, the continued use of this barrier on the NHS may be disallowed. If you decide to re-test your barrier with additional reinforcing and a single pin at each joint and the results are satisfactory, the condition acceptance will be rescinded and no formal evaluation will be necessary. Please call Mr. Powers at (202) 366-1320 if you have any questions on either of these options.

Assuming the John Carlo barrier is a proprietary design, the conditions noted in Title 23, Code of Federal Regulations, Section 635.411 apply. A copy of this law is enclosed for your ready reference.

Sincerely yours,

(original signed by Harry W. Taylor)

for

Carol H. Jacoby, P.E.

Director, Office of Safety Design

Enclosure

Sec. 635.411 Material or product selection.

(a) Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

(1) Such patented or proprietary item is purchased or obtained through competitive bidding with equally suitable unpatented items; or

(2) The State highway agency certifies either that such patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or

(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(b) When there is available for purchase more than one nonpatented, nonproprietary material, semifinished or finished article or product that will fulfill the requirements for an item of work of a project and these available materials or products are judged to be of satisfactory quality and equally acceptable on the basis of engineering analysis and the anticipated prices for the related item(s) of work are estimated to be approximately the same, the PS&E for the project shall either contain or include by reference the specifications for each such material or product that is considered acceptable for incorporation in the work. If the State highway agency wishes to substitute some other acceptable material or product for the material or product designated by the successful bidder or bid as the lowest alternate, and such substitution results in an increase in costs, there will not be Federal-aid participation in any increase in costs.

(c) A State highway agency may require a specific material or product when there are other acceptable materials and products, when such specific choice is approved by the Division Administrator as being in the public interest. When the Division Administrator's approval is not obtained, the item will be nonparticipating unless bidding procedures are used that establish the unit price of each acceptable alternative. In this case Federal-aid participation will be based on the lowest price so established.

(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of culvert pipes, and (2) the number and types of such alternatives which must be set forth in the specifications for various types of drainage installations.

(e) Reference in specifications and on plans to single trade name materials will not be approved on Federal-aid contracts.