

Refer to: HSA-10/WZ-109

Mr. Matthew G. Schindler  
Regional Manager  
Qwick Kurb, Inc.  
1916 Tamiami Trail  
Ruskin, FL 33570

Dear Mr. Schindler:

Thank you for your letters of December 31, 2001, and February 8, 2002, requesting Federal Highway Administration (FHWA) acceptance of your company's "Qwick Kurb" longitudinal channelizer as a crashworthy traffic control devices for use in work zones and in permanent installations on the National Highway System (NHS). Accompanying your letter was a report of impact testing conducted by the Transportation Research Center, Inc., and a video of the tests. You requested that we find these devices acceptable for use on the NHS under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

### **Introduction**

The FHWA guidance on crash testing of work zone traffic control devices is contained in two memoranda. The first, dated July 25, 1997, titled "INFORMATION: Identifying Acceptable Highway Safety Features," established four categories of work zone devices: Category I devices were those lightweight devices which could be self-certified by the vendor, Category II devices were other lightweight devices which needed individual crash testing, Category III devices were barriers and other fixed or massive devices also needing crash testing, and Category IV devices were trailer mounted lighted signs, arrow panels, etc. The second guidance memorandum was issued on August 28, 1998, and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This later memorandum lists devices that are acceptable under Categories I, II, and III.

### **Longitudinal Channelizers**

Your product is a system composed of two common roadway elements - curbs and road tubes. The effects that permanent curbs have on the trajectory of impacting vehicles has been the subject of crash testing and computer simulations for many years. Modular curbs, such as the Qwick Kurb, had not been subject to crash testing, although there were the same questions relative to vehicle trajectory. There are additional concerns regarding modular curbs with respect to their ability to remain attached to each other and to stay in alignment, and to remain on the pavement in the event of an impact. These questions must be answered on a product-by-product basis.

Road tubes have long been considered so benign as to not require crash testing when affixed to the pavement. Your combination device creates an entirely new device or system, a longitudinal channelizer, that is covered neither by the Manual on Uniform Traffic Control Devices (MUTCD) nor NCHRP Report 350. Because of our concerns about the performance of a device in this new category of longitudinal channelizers we developed a crash test matrix that you agreed to follow.

### **Testing**

A brief description of the tested device follows:

The Qwick Kurb is a series of individual, one-meter long, raised separator units that are interconnected to form a continuous longitudinal appearance. Vertical channelizers mount integrally into the raised separator units, and reflectors in the shape of an arc depict the raised character of the separator at night. A drawing of the system is enclosed for reference.

Full-scale automobile testing was conducted on your company's devices. A unique crash test matrix was developed for this device to answer concerns FHWA expressed in our letter of May 21, 2001. Our first concern was that the curb could cause errant vehicles to be redirected or thrown out of control upon impact with the raised separator. Our second concern was that the individual sections of the modular system might be dislodged by an impacting vehicle and become airborne and potentially hazardous to other traffic.

Four tests were performed to address these concerns. In all cases a live driver drove a 1996 Honda Civic over the test installation at a speed of approximately 65 miles per hour (mph). As the Qwick Kurb system has no significant effect on the speed of the test vehicle, no speed change instrumentation was used.

#### Travel Test 1A-Vaulting while crossing

At an approach angle of approximately 14°, the car was driven, at 65 mph, over the separator with the right front tire making first contact with the separator. The steering wheel was maintained in the straight-ahead position, using a light touch. There was no input required to maintain directional control of the car. The tire and rim was not damaged. The event was recorded using a high-speed digital camera and a high-speed film camera. Review of the high-speed digital image and the high speed film showed no vaulting occurred, unloading of the tire did occur and the tire did not follow the backside contour of the separator.

#### Travel Test 1B – Crossing a Vee in front of an Attenuator

Phase 1:

The car was driven, at 65 mph, across a 30-degree Vee of separators. The steering wheel was maintained in the straight-ahead position using a light touch. There was no input required to maintain directional control of the car. The tire and rim was not damaged. Review of the high-speed images show no vaulting occurred, unloading of the tire did occur and there were no control problems with this car.

## Phase 2:

The car was then driven through a Styrofoam cutout representing an Attenuator, and the height of the contact was determined to be 20 inches, by reviewing the digital image. Then the car was driven over the Vee at 65 mph and through another Attenuator placed 30 feet beyond the Vee. The steering wheel was maintained in the straight-ahead position using a light touch. There was no input required to maintain directional control of the car. The tire and rim was not damaged. Review of the high-speed images did not show any vaulting occurred. The contact point of the car with the Attenuator was determined to be 21 inches, after crossing the Vee, as demonstrated by viewing the digital image. Although the test requirements specify that the contact heights remain unchanged by passing over the Vee, it is apparent that the one-inch difference creates no adverse reaction by this car.

### Travel Test 2 – Vaulting end-treatment

Approaching the end of the separator, at a zero degree angle and at 65 mph, the left front tire was allowed to ride up onto and along the separator for a distance of 2 meters. The steering wheel required only light contact and no correction was required. The car traveled the entire 100 feet length of the separator and the driver removed his hands from the steering wheel for the last half of the length. The tire and rim was not damaged. No vaulting occurred.

### Travel Test 3 – Returning to the proper lane

100 feet of separators were installed in a straight line. The car approached, at 65 mph, along the right side of the separator. The angle of approach was 2° as determined by review of a still photo taken from the video showing the tire marks on the lane separator. Light steering pressure was applied to the left, and the left front tire was allowed to climb over the separator. The tire remained in contact with the separator during the entire event. The driver's subjective comment concerning the effort required to cross the separator while maintaining control of the vehicle was that some effort was required but that it was well within the normal range and there was never a concern about maintaining control of this car.

## **Findings**

The results of the testing showed that there was no tendency for the curb to cause the driver to lose control of the vehicle, nor was there any movement of the curb sections that could lead to separation. Therefore, the devices described above and shown in the enclosed drawings for reference are acceptable for use on the NHS under the range of conditions tested, when proposed by a State.

Please note the following standard provisions, which apply to FHWA letters of acceptance:

- Our acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the MUTCD.
- Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.

- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that they will meet the crashworthiness requirements of FHWA and NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-109 shall not be reproduced except in full. This letter, and the test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.
- The Qwick Kurb may include patented components and if so are considered "proprietary." The use of proprietary work zone traffic control devices in Federal-aid projects is generally of a temporary nature. They are selected by the contractor for use as needed and removed upon completion of the project. Under such conditions they can be presumed to meet requirement "a" given below for the use of proprietary products on Federal-aid projects. On the other hand, if proprietary devices are specified for use on Federal-aid projects, except exempt, non-NHS projects, they: (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with existing highway facilities or that no equally suitable alternative exists or; (c) they 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,

A. George Ostensen  
Program Manager, Safety

Enclosure

FHWA:HSA-10:NArtimovich:tb:x61331:4/9/02  
File: WZ109QuikKurbApril.wpd  
cc: HSA-10 (Reader, HSA-1; Chron File, HSA-10;  
N. Artimovich, HSA-10)