August 24, 2001

Refer to: HSA-10/B-90

Mr. Rich Peter, Chief
Roadside Safety Technology Branch – MS #5
California Department of Transportation
5900 Folsom Blvd.
Sacramento, CA 95819-4612

Dear Mr. Peter:

In your July 12 letter, you requested formal Federal Highway Administration (FHWA) headquarters acceptance of your precast Type 60K single-slope concrete barrier, a design that our Sacramento Division office has previously accepted for use in California based on preliminary test results. After reviewing the final report, FHWA/CA/TL-2001/08, entitled "Compliance Crash Testing Of The Type 60K Concrete Barrier Used In Semi-Permanent Installations," and the crash test videos submitted with your letter, my staff agrees that the final design was tested in conformance with the National Cooperative Highway Research Program (NCHRP) Report 350 to test level 3 (TL-3) and met all appropriate evaluation criteria. Consequently, the design described below may be used on the National Highway System when such use is allowed or specified by the contracting agency. I understand that the design is non-proprietary and that detailed drawings and specifications may be obtained by calling you at (916) 227-7257.

The tested installation, named the 60K-v3 design, consisted of twelve (12) 4-m long, single-slope profile concrete barriers. The barrier face was 9.1 degrees from vertical on both sides of the barrier. Each segment was 910-mm tall, 610-mm wide at the base, and 320-mm wide at the top. Adjacent barrier segments were connected at each end with two 31.8-mm diameter steel pins 760-mm long. These pins were inserted parallel to the barrier faces through 44-mm diameter holes in steel connection plates cast into each barrier segment. There were no retention devices used on the pins and the test installation was freestanding on a 50-mm thick asphalt pad.

For NCHRP Report 350 test 3-11, a 2000-kg pickup impacted the barrier between segments 6 and 7 at 98.7 km/h and an angle of 25 degrees. The reported occupant impact velocity was 5.8 m/sec and the subsequent 10-millisecond ridedown acceleration was 12.2 g's, both measured in the lateral direction. Maximum roll and pitch angles were each approximately 11 degrees. Maximum barrier deflection was 750 mm. Test 3-10, an 820-kg passenger car impacting at 101.0 km/h and 20 degrees, also met appropriate evaluation criteria.

It is noteworthy that two earlier designs (60K-v1 and 60K-v2) using 3.1-m long segments with the same cross-section as the 60K-v3 design failed to meet Report 350 evaluation criteria. The first design consisted of sixteen barrier segments set into a 30-mm deep concrete trough and connected with a single steel pin at each joint. The

31.8-mm diameter pins were inserted through four 19-mm diameter steel bar loops and extended 150 mm into sleeves cast into the concrete trough. The second test installation omitted the concrete trough and used only the 31.8-mm diameter pins driven 150 mm into the asphalt concrete base to minimize barrier deflection. Both designs resulted in significant test vehicle damage as a result of excessive lateral deflection between barrier segments at the joint downstream from the point of impact. The resultant vehicular snagging on the exposed ends of the downstream segments was considered unacceptable. The 60K-v3 connection design successfully minimized differential lateral movement at the joints and resulted in satisfactory crash performance. I appreciated the opportunity to review the results of the earlier tests. Information gleaned from specific failure mechanisms in unsuccessful tests is extremely valuable in the design, development, and testing of new safety hardware.

Sincerely yours,

(original signed by Frederick G. Wright, Jr.)

Frederick G. Wright, Jr.
Program Manager, Safety