AUG 14 1995

Refer to: HNG-14

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John F. Carney, III, Ph.D., P.E.
Associate Dean for Research and
Graduate Affairs
Vanderbilt University
Nashville, Tennessee 37235

Dear Dr. Carney:

Your July 7 letter requested Federal Highway Administration's (FHWA) acceptance of two lower-speed crash cushions patterned after the REACT 350 which we accepted for use as a test level 3 (TL-3) crash cushion on April 12, 1995. The two variations of the REACT 350 for which you are requesting FHWA acceptance were developed through a combination of modeling, computer simulations, and full-scale crash tests.

The first of these, the REACT 350.4, is a 70 km/h crash cushion composed of four high-molecular weight, high-density polyethylene cylinders in place of the nine that comprise the original version, renamed the REACT 350.9. The shorter REACT 350.4 was developed as an National Cooperative Highway Research Program (NCHRP) Report 350 TL-2 attenuator and successfully passed tests 2-30, 2-31 and 2-37, as shown on the enclosed summary (Table 2). Because of the similarities between the TL-2 unit (REACT 350.4) and the REACT 350.9, tests 2-32 and 2-33 (angle impacts on the nose) were not considered necessary since comparable tests were successfully run on the REACT 350.9 at the TL-3 impact speed of 100 km/h. Also, since the REACT 350.4 is only 4000 mm long, the critical impact point (test 2-38) and the beginning of the length-of-need (test 2-37) are at approximately the same point. Therefore, only the latter test was run. The FHWA previously concurred in this reduced test matrix.

In addition to the REACT 350.9 and 350.4, you provided drawings and analytical data on a 55-mph (approximately 90-km/h) design called the REACT 350.6. This unit is similar to the TL-3 nine-cylinder REACT 350.9, but is shorter since it consists of only six polyethylene cylinders. The same mathematical model used to design the REACT 350.9 and REACT 350.4 attenuators, and verified through full-scale testing, predicted occupant impact velocities and ride-down accelerations for a head-on impact with the 820-kg automobile of 10.54 m/s and 16.46 g's, respectively, for the REACT 350.6. Comparable predicted values for the 2000-kg pickup truck were 8.48 m/s and 15.71 g's. All of these values are below the maximum values specified in the NCHRP Report 350.

Based on our review of the data submitted and subsequent discussions between you and members of my staff, the REACT 350.4 and the REACT 350.6 may be considered acceptable for use on projects on the National Highway System under service conditions compatable with their respective indicated performance limits if proposed for such use by a highway agency. Since all of the REACT units are proprietary items, the provisions of Title 23, Code of Federal Regulations, Section 635.411, are applicable. We would also suggest that potential users of the REACT attenuator be cautioned against using any of the units at locations where anticipated impact speeds significantly exceed those for which a unit has been certified.

By copy of this letter, our field offices will be advised of this action.

Sincerely yours,

Original signed by
Jerry L. Poston

Jerry L. Poston, Chief
Federal-Aid and Design Division

Enclosure

Federal Highway Administration
HNG-14:RPowers:gm:8-11-95:366-1320
copies to:
HPD-1 HNG-1 HNG-10 HNG-14 Reader, 3128
File, 3128 RAs HFL-1 HHS-10 HSR-20

Supplement Number 2 to Geometric and Roadside Design Acceptance Letter CC-26

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Table 2. Summary of Crash Test Results for REACT 350.4

NCHRP Report 350 Test Designation	2-30	2-31	2-37
Vehicle mass (kg)	820	2,000	2,000
Impact speed (km/h)	70.70	70.70	74.19
Impact angle (degrees)	0	0	19.7
Vehicle impact location	nose, with width/4 offset	nose	length of need
Maximum crash cushion deflection (m)	1.74	2.42	NA
Occupant impact velocity (m/s) longitudinal (12 max. allowable) lateral (12 max. allowable)	 9.64 2.73	 8.18 1.03	 6.42 5.60
Occupant ridedown acceleration (peak 10 msec avg g's) longitudinal (20 max. allowable) lateral (20 max.allowable)	 10.36 3.13	 18.56 4.00	 2.97 9.39
Assessment	Passed all requirements	Passed all requirements	Passed all requirements