



U.S. Department
of Transportation

**Federal Highway
Administration**

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

September 23, 1997

Refer to: HNG-14

Mr. E. Scott Walter
President
Roadway Safety Service, Inc.
80 Remington Blvd.
Ronkonkoma, New York 11779

Dear Mr. Walter:

My June 25 letter to you acknowledged receipt of crash test data on the REACT 350 anchored on asphalt and accepted this unit as a test level 3 temporary barrier for use on the National Highway System except at locations where reverse-direction, rear-corner impacts are possible. At that time, I was concerned that vehicular snagging was likely in such a hit.

Your September 4 letter transmitted a copy of a test report prepared by the Texas Transportation Institute dated August 1997 and entitled "Reverse Direction Crash Test with Small Vehicle on the REACT 350 Anchored in Asphalt." This report documented the results of an 820-kg car striking the interface of the backup unit and the rear-most cylinder of the REACT 350 at 100 km/h and a 20-degree impact angle. This test met the National Cooperative Highway Report Program Report 350 evaluation criteria as can be seen in the enclosed test summary.

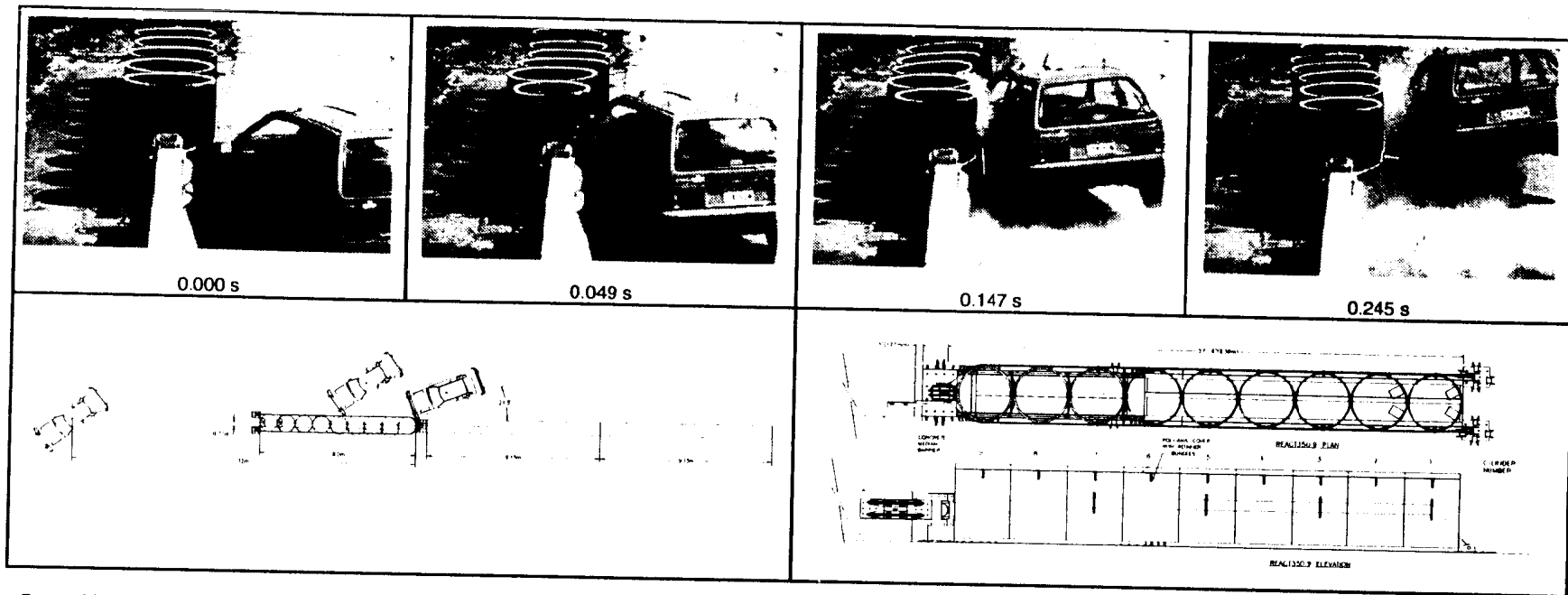
Consequently, the limitations on the REACT 350 usage noted in the aforementioned letter are rescinded. This unit may now be used as either a temporary or permanent installation for both unidirectional and bi-directional traffic when anchored and installed as tested and when selected for use by the responsible highway agency.

Sincerely yours,

Dwight A. Horne, Chief
Federal-Aid and Design Division

Enclosure

Geometric and Roadside Design Acceptance Letter CC-26F



27

General Information

Test Agency Texas Transportation Institute
 Test No. 400001-RSS3
 Date 07/21/97

Test Article

Type Crash Cushion
 Name or Manufacturer REACT 350 in asphalt
 Installation Length (m) 8.0
 Size and/or dimension and material of key elements Nine polyethylene cylinders of varying densities 1.22 m tall by 0.91 m dia
 Soil Type and Condition Asphalt pavement, dry

Test Vehicle

Type Production
 Designation 820C
 Model 1992 Ford Festiva
 Mass (kg) Curb 814
 Test Inertial 820
 Dummy 76
 Gross Static 896

Impact Conditions

Speed (km/h) 98.26
 Angle (deg) 21.50

Exit Conditions

Speed (km/h) 54.99
 Angle (deg) 13.15

Occupant Risk Values

Impact Velocity (m/s)
 x-direction 11.71
 y-direction 6.45
 Ridedown Accelerations (g's)
 x-direction -13.70
 y-direction 9.23
 Max. 0.050-s Average (g's)
 x-direction -14.64
 y-direction 11.34
 z-direction -2.15

Test Article Deflections (m)

Dynamic 0.27
 Permanent 0.10

Vehicle Damage

Exterior
 VDS 11LFQ4
 CDC 11FLEW3
 Maximum Exterior
 Vehicle Crush (mm) 485
 Interior
 OCDI LF0020000
 Max. Occ. Compart.
 Deformation (mm) 110

Post-Impact Behavior

(during 1.0 s after impact)
 Max. Roll Angle (deg) -7.16
 Max. Pitch Angle (deg) -17.61
 Max. Yaw Angle (deg) 15.00

Figure 16. Summary of results for test 400001-RSS3.



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

MAY - 4 2001

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

Refer to: HSA-CC73

Barry D. Stephens, P.E.
Senior Vice President - Engineering
Energy Absorption Systems, Inc.
3617 Cincinnati Avenue
Rocklin, CA 95765

Dear Mr. Stephens:

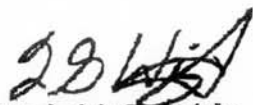
In your April 6 letter, you requested the Federal Highway Administration's review and acceptance of your REACT 350 (60") System, a self-restoring impact attenuator designed to meet the National Cooperative Highway Research Program (NCHRP) Report 350 evaluation criteria for a Test Level 3 (TL-3) crash cushion. To support your request, you provided Mr. Richard Powers of my staff copies of the March 2001 E-TECH Testing Services, Inc., report entitled "NCHRP Report 350 Crash Test Results for the REACT 350 (60)" which included your engineering summary "REACT 350 (60") (5 Foot [1525 mm] Wide System) Qualification to NCHRP Report 350 Test Level 3" and a videotape showing the full-scale tests that were conducted.

The TL-3 REACT 350 (60"), intended as a replacement for the original Wide REACT, consists of an array of High Density Polyethylene (HDPE) cylinders 610 mm (24 inches) in diameter. They are arranged in 13 rows of two cylinders each, plus a single nose cylinder, making the unit 8915 mm (29 feet) long. The single nose cylinder and the cylinders in rows 1-3 have a wall thickness of 19 mm (0.74 inches) and are 813 mm (32 inches) tall. The cylinders in rows 4-9 are the same thickness but 1070 mm (42 inches) high. Those in rows 10-13 remain 1070 mm (42 inches) high but their wall thickness is increased to 29 mm (1.14 inches). All cylinders in rows 5-13 contain self-restoring, hinged internal steel struts to provide redirection in side impacts. The two cylinders in each row are attached to steel space frame diaphragms that are mounted on a steel monorail similar to the monorail used with the QuadGuard family of impact attenuators. Your specifications require the monorail to be bolted to a concrete foundation using 19 mm (0.75 inch) diameter by 191 mm (7.5 inch) long ASTM A-193 Grade B7 polyester grouted studs. Enclosure 1 is a schematic drawing of the tested unit.

Since the REACT 350 (60") System is classified as a redirective, nongating crash cushion, the recommended NCHRP Report 350 test matrix consists of eight tests. Six of these tests were run and successfully completed. My staff agreed beforehand that test 3-36 (820 kg vehicle/100 km/h impact speed/15 degree impact angle at the Critical Impact Point) was less severe than test 3-37 (2000-kg vehicle/100 km/h/20 degree impact at the same location) and that the former could be waived if test 3-37 was fully satisfactory. Test 3-39, the reverse direction impact, was waived because the rearmost corner of the REACT 350 (60") is effectively shielded by the concrete backup structure and there are no external components on the cylinders that might cause an impacting vehicle to snag. Enclosure 2 contains summary information on the six tests that were successfully conducted.

Based on staff review of the information you submitted, I agree that the REACT 350 (60") System, when attached to a 1525 mm (60 inch) wide reinforced and anchored concrete backup, meets the appropriate evaluation criteria for an NCHRP Report 350 TL-3 crash cushion and may be used on the National Highway System when selected by a transportation agency. Since the REACT 350 (60") is a proprietary device, its use on Federal-aid projects, except exempt, non-NHS projects, is subject to the conditions listed in Title 23, Code of Federal Regulations, Section 635.411.

Sincerely yours,


Frederick G. Wright, Jr.
Program Manager, Safety

2 Enclosures