



U.S. Department  
of Transportation

**Federal Highway  
Administration**

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

June 28, 1995

Refer to: HNG-14

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

Dear Mr. Walter:

Your May 16 letter requested the Federal Highway Administration (FHWA) to review the results of full-scale crash testing on the modified Fitch Universal Module Crash Cushion (Fitch sand barrels) and to confirm its continued acceptance for use on Federal-aid projects.

Each Module consists of two identical half-cylinders, four "zip strip" connectors which fasten the two cylinder halves together to form the basic sand module, a "Unicore" sand support structure, and a lid. To pass the requirements for a test level (TL-3) crash cushion, the centers of gravity of the three lightest modules (90 kg, 180 kg, and 320 kg) were changed from those in the equivalent modules you currently supply. The test array consisted of two rows of single 90-kg modules, two rows of single 180-kg modules, a row of two 320-kg modules, two rows of two 640-kg modules, and at the rear of the array, a row of two 960-kg modules, making 14 modules in all. You will note that we have rounded the individual weights when converting to metric units and suggest that these weights be used as standards. Each module was spaced approximately 150 mm to 200 mm from adjacent modules and the entire array was angled at 5 degrees from the centerline of the concrete backup, with the recommended 760-mm lateral offsets from the sides of the shielded hazard at the rear of the unit.

*2 rows  
of two 180-kg  
modules*

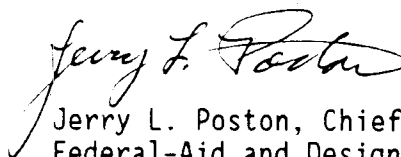
The National Cooperative Highway Research Program (NCHRP) tests 3-40 through 3-44 (as required for a non-redirective crash cushion) were run. These tests are listed on Table 1 and their results are summarized on Table 2.

We note that almost all of the compliance crash tests indicated occupant impact velocities and ridedown accelerations below the preferred values of 9 m/s and 15 g's respectively. The two exceptions were the occupant ridedown acceleration in test 3-41 and the occupant impact velocity on test 3-44. In the former case, the test vehicle was 238 kg heavier than required and struck the barrier at 109.4 km/h instead of the recommended 100 km/h. Even so, the ridedown acceleration was less than the maximum allowable value of 20 g's. In test 3-44, the occupant impact velocity was less than the maximum allowable value of 12 m/s, even though meeting this criterion is not required for test 3-44.

Based on the above, we conclude that the specific array described above fully meets the NCHRP Report 350 requirements for a TL-3 crash cushion and it may continue to be used on the National Highway System (NHS) when selected by a highway agency. Since this device is proprietary, all regulations regarding its use on Federal-aid projects (except exempt non-NHS projects) remain applicable.

By a copy of this letter, we will advise our field offices of the this determination.

Sincerely yours,



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

2 Enclosures

Geometric and Roadside Design Acceptance Letter Number CC-28

**Table 1 - CRASH TESTS PERFORMED SATISFYING ALL TEST LEVEL 3  
NCHRP 350 REQUIREMENTS**

NCHRP 350 TEST NUMBER	VEHICLE	IMPACT VELOCITY (KM/H)	IMPACT ANGLE (DEGREES)	IMPACT POINT	DATE PERFORMED	TEST FACILITY
3-40	820C	100	0	NOSE OF DEVICE OFFSET W/4	6/30/94	CALSPAN
3-41	2000P	100	0	CENTER NOSE	6/29/94	CALSPAN
3-42	820C	100	15	CENTER NOSE	12/12/94	TTI
3-43	2000P	100	15	CENTER NOSE	1/17/95	TTI
3-44	2000P	100	20	CRITICAL IMPACT PT., L/2	1/18/95	TTI

Table 2 - SUMMARY OF CRASH TEST RESULTS

NCHRP 350 TEST DESIGNATION					
	3-40	3-41	3-42	3-43	3-44
VEHICLE MASS (KG)	911	2,238	896	2,000	2,000
IMPACT SPEED (KM/HR)	100.6	109.4	100.1	101.7	100.2
IMPACT ANGLE (DEGREES)	0	0	15	15	20
IMPACT LOCATION	NOSE OFFSET W/4	NOSE	NOSE	NOSE	CRITICAL IMPACT PT. L/2
OCCUPANT IMPACT VEL. (M/5) <u>LONGITUDINAL</u> (12M/S MAX ALLOWABLE) <u>LATERAL</u> (12M/S MAX ALLOWABLE)	6.24 M/SEC	7.94 M/SEC	6.7 M/SEC	6.4 M/SEC	11.4 M/SEC
	20.48 FT/SEC	26.03 FT/SEC	22.0 FT/SEC	20.8 FT/SEC	37.5 FT/SEC
	-5.54 M/SEC -18.17 FT/SEC	-2.47 M/SEC -8.1 FT/SEC	-1.7 M/SEC -5.5 FT/SEC	-2.9 M/SEC -9.6 FT/SEC	1.5 M/SEC 4.9 FT/SEC
OCCUPANT RIDEDOWN ACCEL, G (PEAK 10 MSEC AVERAGE) <u>LONGITUDINAL</u> (20 MAX ALLOWABLE) <u>LATERAL</u> (20 MAX ALLOWABLE)	-14.2	-19.1	-9.1	-8.4	-9.8
	-4.92	<1.0	2.4	4.5	5.1
	PASS	PASS	PASS	PASS	PASS
ASSESSMENT	PASS	PASS	PASS	PASS	PASS