

April 21, 2003

HSA-10/CC47A

Barry D. Stephens, P.E.
Senior Vice President of Engineering
ENERGY ABSORPTION Systems, Inc.
03617 Cincinnati Avenue
Rocklin, CA 95765

Dear Mr. Stephens:

In your April 8 letter to Mr. George Ostensen, you requested the Federal Highway Administration's acceptance of a modified TRITON end treatment designed to shield the end of temporary concrete barrier. A previous acceptance letter, designated CC-47 and dated May 8, 1998, allowed the use of a ten-segment TRITON terminal design to shield the end of a TRITON installation.

The new design, subsequently named the TRITON Concrete End Treatment System (TCETS), consists of six connected TRITON barrier segments. Five of these segments are filled with water and set 150 mm off the ground on plastic support pedestals. The lead segment is inverted and left empty (as with the original design) and supported 130 mm off the ground by an attached metal bracket. The rearmost TRITON segment is pinned to a foam-filled steel transition section that, in turn, was attached to the blunt end of a series of 4 -m long New Jersey shape concrete barrier segments with a unique connection design.

You requested acceptance based on two tests. The first was NCHRP Report 350 test 3-41 in which a 2000-kg pickup truck impacted the terminal head-on at 99.7 km/h. All Report 350 evaluation criteria were met. The second test you conducted was Test 3-44. NCHRP Report 350 states that the intent of Test 3-44 is "...to evaluate the ability of the cushion to safely stop a large passenger car prior to a life-threatening impact with the corner of the hazardous object being shielded". Aiming the centerline of the impacting vehicle at the center of the shielded concrete barrier is clearly the critical impact point for the TCETS design and the test is essentially the same as test 3-38 for a redirecting crash cushion. As noted in your letter, Report 350 acknowledges that test 3-38 "would be difficult to pass for a nonredirective crash cushion", and does not require that the normal limiting occupant impact velocities and ridedown accelerations be met. In fact, the test summary sheet that you submitted indicated an occupant impact velocity of 12.8 m/sec and a possible peak ridedown acceleration of 25.9 g's. These values exceed the normal threshold values of 12 m/sec and 20 g's.

Of greater concern, I noted that the passenger compartment intrusion in test 3-44 was reported on the summary sheet to be 375 mm. The generally accepted limiting value has been 150 mm. You inferred in your letter that in spite of the actual deformation, the location was such that serious injury might not have occurred and the photographs you provided appear to corroborate this opinion. The degree of passenger compartment intrusion considered acceptable remains a judgment call and, until the results of a study

currently underway by the National Highway Traffic Safety Administration are available for review and possible incorporation into an updated Report 350, I am willing to let any potential users of the TCETS decide if the intrusion noted is acceptable. However, the FHWA reserves the right to rescind this letter if it is subsequently decided that intrusion to the extent noted and in the area noted is likely to cause severe injuries to vehicle occupants. For now, I agree that the TCETS, as described above and as tested, marginally meets the evaluation criteria for a nonredirective crash cushion at Report 350 TL-3 and may be used on the National Highway System when such use is acceptable to the contracting authority. The marginal designation is applied because of the high occupant compartment intrusion seen in the test. As noted in your letter, the TCETS should not be used in locations where high-speed impacts into the side of the unit are likely.

I understand that you are developing a modified transition piece so the TCETS can be attached to a standard pin and loop temporary concrete barrier. When you request formal acceptance of that modification, please include a standard report with a full description of the TCETS, the transition piece, and the tests that you have run with your submittal, as well as pdf drawings suitable for posting on our safety hardware website.

Sincerely yours,

(original signed by Harry W. Taylor)

for:

Michael S. Griffith
Acting Director, Office of Safety Design
Office of safety