



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

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

November 8, 2000

Refer to: HSA-1\HSA-B73

Mr. Michael P. Culmo, P.E.
29 Crabtree Lane, Suite 200
P.O. Box 149
Woodstock, CT 06281-0149

Dear Mr. Culmo:

Your July 19 letter to Mr. Arthur A. Hamilton, Program Manager for Federal Lands Highways, was forwarded to Mr. Richard Powers of my staff for appropriate action. My office has the responsibility for reviewing roadside hardware tested under the guidelines contained in the National Cooperative Highway Research Program (NCHRP) Report 350 to determine if the hardware is acceptable for use on the National Highway System (NHS).

In your letter, you specifically requested acceptance of a Stone Cast Barrier based on the crash performance documented in the Texas Transportation Institute (TTI) May 2000 report, "NCHRP Report 350 TEST 3-11 of the Stone Cast Barrier Wall." The tested barrier installation was 24 meters long and consisted of eight 3-meter long precast units. Each unit is 1100 mm high, including its 300-mm deep x 1200-mm wide footing which is cast integrally with its stem. This stem is 800-mm tall and is nearly vertical, being 600-mm wide at its base and 500-mm wide at its top. The stone veneer on the stem is also cast integrally with each unit. The concrete used had a 28-day compressive strength of 28 MPa and the reinforcing steel met ASTM A615A Grade 400. Enclosure 1 shows these and other details of the design.

The NCHRP Report 350 test 3-11 was successfully conducted with a 2000-kg pickup truck impacting the test installation at a nominal speed of 100 km/h and an impact angle of 25 degrees. The truck was contained and redirected as desired and occupant severity measurements were well below the maximum values suggested in Report 350. Enclosure 2 shows the summary results of the test. Damage to the test installation was primarily cosmetic, requiring no repairs, and there was no measurable deflection. Based on previous tests successfully conducted on similar barriers with 820-kg cars, we concur with the TTI researchers that Report 350 test 3-10 with the small car is not necessary.

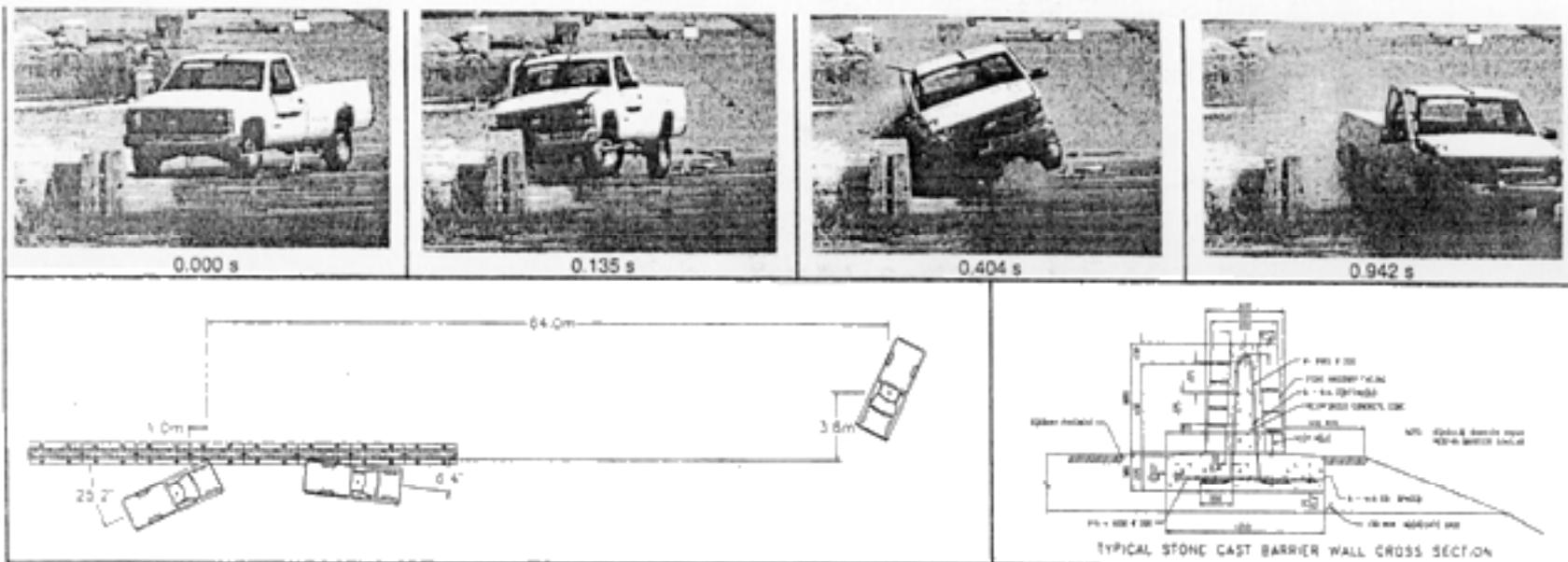
Based on the information presented, we consider the Stone Cast Barrier Wall, as described above, to meet the performance requirements of NCHRP Report 350 at test level 3 (TL-3). It may be used on the NHS when it is selected by the appropriate transportation agency. Since it is a proprietary product, its use on Federally-funded projects, except exempt non-NHS projects is subject to the conditions noted in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed (Enclosure 3) for your ready reference. Since a crashworthy end terminal has

not been developed for the Stone Cast Barrier, this barrier must be introduced outside the minimum clear zone established for each project by the contracting authority or, preferably, terminated at its full height in a backslope where site conditions permit. Please call Mr. Powers at (202) 366-1320 if you have any questions regarding this acceptance letter.

Sincerely yours,

Frederick G. Wright, Jr.
Program Manager, Safety

3 Enclosures



General Information

Test Agency	Texas Transportation Institute
Test No.	400001-SCW1
Date	04/27/00

Test Article

Type	Longitudinal Barrier
Name or Manufacturer	Stone Cast Barrier Wall
Installation Length (m)	24.0
Material or Key Elements	3.0 m long Precast Concrete Cores with Stone Masonry Veneer
Soil Type and Condition	Concrete Pavement, Dry

Test Vehicle

Type	Production
Designation	2000P
Model	1995 Chevrolet 2500 Pickup Truck
Mass (kg)	
Curb	2118
Test Inertial	2000
Dummy	No dummy
Gross Static	2000

Impact Conditions

Speed (km/h)	101.6
Angle (deg)	25.2

Exit Conditions

Speed (km/h)	67.6
Angle (deg)	6.4

Occupant Risk Values

Impact Velocity (m/s)	
x-direction	7.7
y-direction	7.0
THIV (km/h)	36.7
Ridedown Accelerations (g's)	
x-direction	-5.6
y-direction	-10.2
PHD (g's)	14.5
ASI	1.60
Max. 0.050-s Average (g's)	
x-direction	-11.0
y-direction	-11.3
z-direction	-4.8

Test Article Deflections (m)

Dynamic	nil
Permanent	nil

Vehicle Damage

Exterior	
VDS	01RFQ4
CDC	01FREK3
	01RYEW3
Maximum Exterior	
Vehicle Crush (mm)	640
Interior	
OCDI	FS1213000
Max. Occ. Compart.	
Deformation (mm)	130

Post-Impact Behavior

(during 1.0 s after impact)	
Max. Yaw Angle (deg)	-37
Max. Pitch Angle (deg)	-4
Max. Roll Angle (deg)	19

Figure 10. Summary of Results for test 400001-SCW1, NCHRP Report 350 test 3-11.

Sec. 635.411 Material or product selection.

(a) Federal funds shall not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

(1) Such patented or proprietary item is purchased or obtained through competitive bidding with equally suitable unpatented items; or

(2) The State highway agency certifies either that such patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists; or

(3) Such patented or proprietary item is used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes.

(b) When there is available for purchase more than one nonpatented, nonproprietary material semifinished or finished article or product that will fulfill the requirements for an item of work of a project and these available materials or products are judged to be of satisfactory quality and equally acceptable on the basis of engineering analysis and the anticipated prices for the related item(s) of work are estimated to be approximately the same, the PS&E for the project shall either contain or include by reference the specifications for each such material or product that is considered acceptable for incorporation in the work. If the State highway agency wishes to substitute some other acceptable material or product for the material or product designated by the successful bidder or bid as the lowest alternate, and such substitution results in an increase in costs, there will not be Federal-aid participation in any increase in costs.

(c) A State highway agency may require a specific material or product when there are other acceptable materials and products, when such specific choice is approved by the Division Administrator as being in the public interest. When the Division Administrator's approval is not obtained, the item will be nonparticipating unless bidding procedures are used that establish the unit price of each acceptable alternative. In this case Federal-aid participation will be based on the lowest price so established.

(d) Appendix A sets forth the FHWA requirements regarding (1) the specification of alternative types of culvert pipes, and (2) the number and types of such alternatives which must be set forth in the specifications for various types of drainage installations.

(e) Reference in specifications and on plans to single trade name materials will not be approved on Federal-aid contracts.