



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

# Memorandum

SENT VIA ELECTRONIC MAIL

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Subject: INFORMATION: FHWA Acceptance Letter B-181 Random  
Rubble Cavity Wall

Date: July 28, 2008

From:   
David A. Nicol, P.E.  
Director, Office of Safety Design

In Reply Refer To: HSSD/B-181

To: Ms. Victoria Brinkly  
Highway Safety Engineer (HFL-17)  
Western Federal Lands Highway Division

This memorandum is in response to your request for FHWA's acceptance of a roadside safety system for use on the NHS.

Name of system: Random Rubble Cavity Wall  
Type of system: Aesthetic Stone Faced Concrete Barrier Guardwall  
Test Level: NCHRP Report 350 TL-1  
Testing conducted by: SwRI  
Date of request: March 10, 2008

You requested that we find this system acceptable for use on the NHS under the provisions of the NCHRP Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

## **Requirements**

Roadside safety systems should meet the guidelines contained in the NCHRP Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features". The FHWA Memorandum "ACTION: Identifying Acceptable Highway Safety Features" of July 25, 1997 provides further guidance on crash testing requirements of longitudinal barriers.

## **Description**

The Random Rubble Cavity Wall is 460 mm wide and composed of two different height sections. One section is 460 mm tall by 3.66 m long, and the other section is 610 mm tall by 1.68 m long as shown in the attached drawings for reference. The sections are staggered such that there is a 610 mm tall section then a 460 mm tall section and then another 610 mm

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tall section. This alternating height pattern continues for the length of the installation. The guardwall consists of a reinforced concrete footing and a reinforced concrete core. Indigenous rock is placed on the sides and top of the concrete core. The majority of the rock is 300 mm to 460 mm in size with smaller rocks and masonry mortar used to complete the assembly of the guardwall.

### **Crash Testing**

Full-scale crash testing was conducted on this barrier. The TL-2 testing at 70 km/hr (43.5 mph) resulted in failure when the 2000P test vehicle drove over the barrier. Two TL-1 tests were conducted at 50 km/hr (31 mph), NCHRP Report 350 Test 1-10 (RW-2) and Test 1-11 (RW-1). Copies of the test data summary sheets for these tests are enclosed for reference. In both tests the vehicles were smoothly redirected and the occupant impact values were within the required limits. There was no deflection of the barrier in either test, nor was there any deformation of the occupant compartment.

### **Findings**

Therefore, Random Rubble Cavity Wall described above and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency.

Please note the following standard provisions that apply to the FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the system will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the system being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number B-181 and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate system, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

FHWA:HSSD:NArtimovich:tb:x61331:7/24/08

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cc: HSSD (Reader, HSA; Chron File, HSSD; DNicol, HSSD)

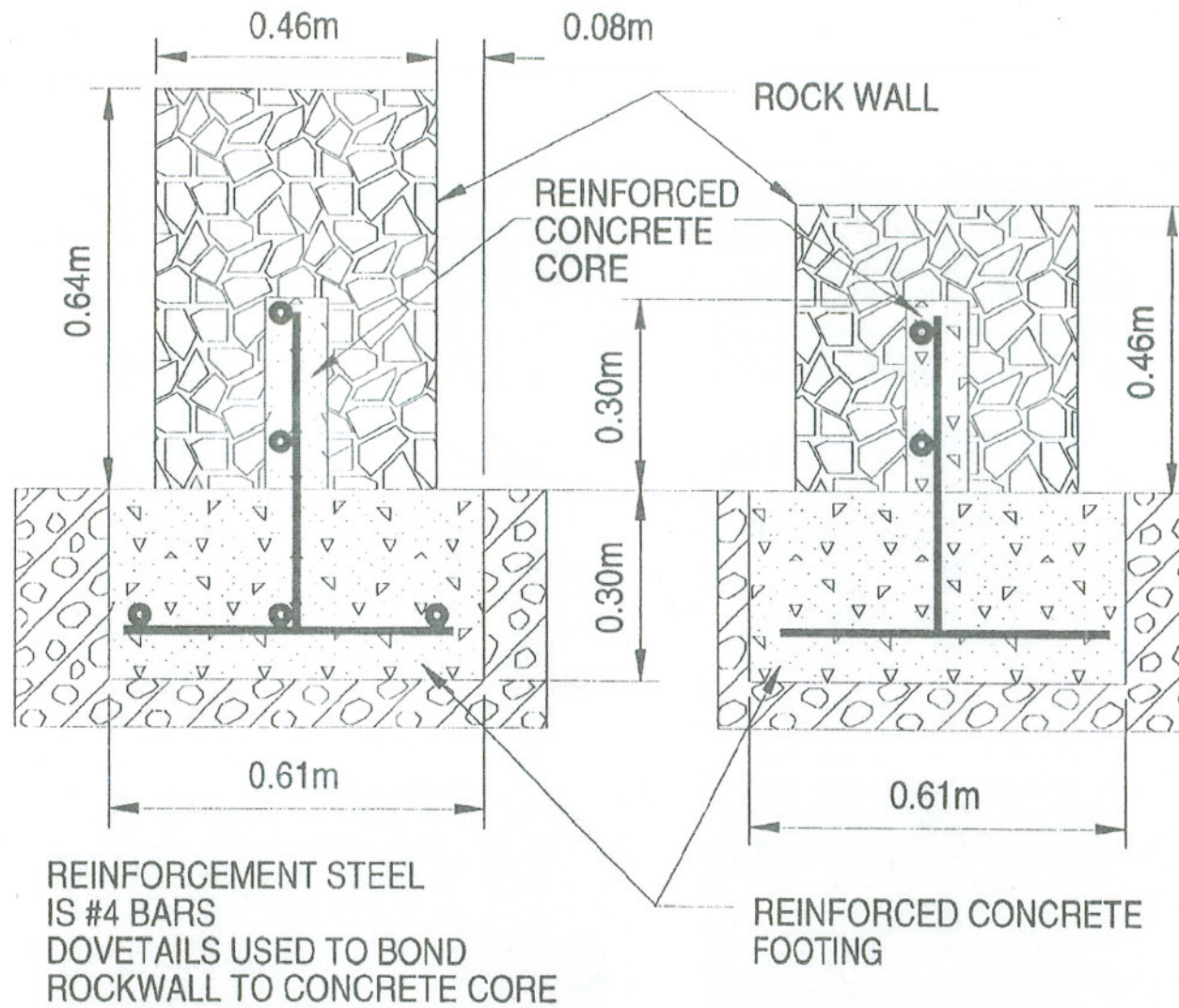


Figure 1. Variable Height Guardwall Construction Details

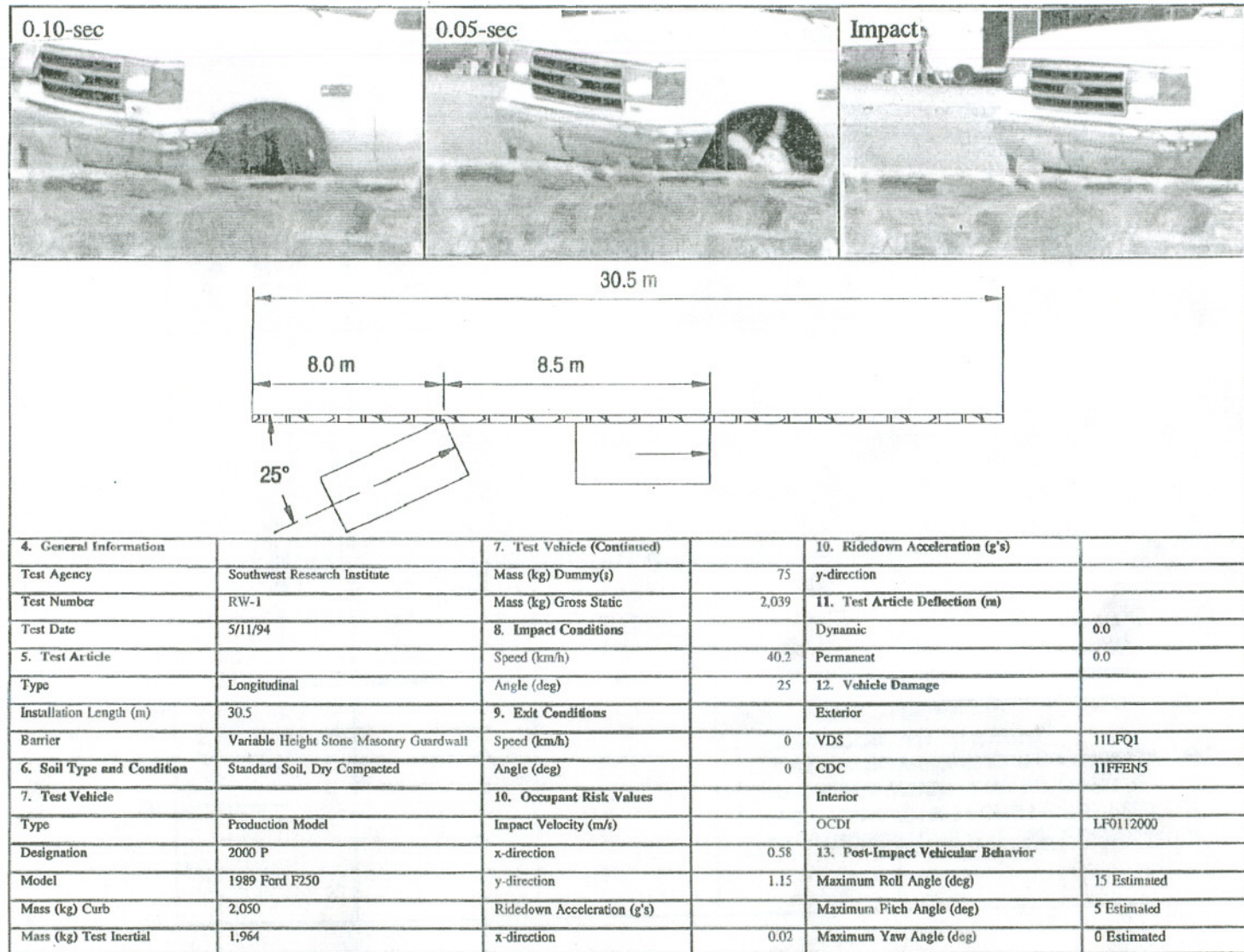
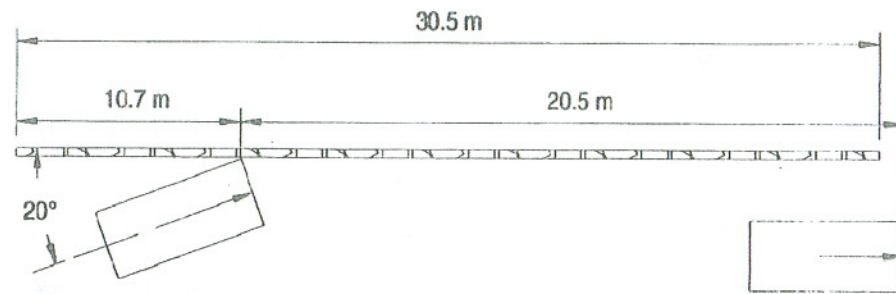


Figure 8. Summary of Test Conditions and Results - Test RW-1





46

4. General Information		7. Test Vehicle (Continued)		10. Ridedown Acceleration (g's)	
Test Agency	Southwest Research Institute	Mass (kg) Dummy(s)	75	y-direction	
Test Number	RW-2	Mass (kg) Gross Static	915	11. Test Article Deflection (m)	
Test Date	5/13/94	<b>8. Impact Conditions</b>		Dynamic	0.0
<b>5. Test Article</b>		Speed (km/h)	40.2	Permanent	0.0
Type	Longitudinal	Angle (deg)	20	<b>12. Vehicle Damage</b>	
Installation Length (m)	30.5	<b>9. Exit Conditions</b>		Exterior	
Barrier	Variable Height Stone Masonry Guardwall	Speed (km/h)	0	VDS	11LFQ1
<b>6. Soil Type and Condition</b>	Standard Soil, Dry Compacted	Angle (deg)	0	CDC	11FFEN1
<b>7. Test Vehicle</b>		<b>10. Occupant Risk Values</b>		Interior	
Type	Production Model	Impact Velocity (m/s)		OCDI	1F0112000
Designation	820 C	x-direction	1.75	<b>13. Post-Impact Vehicular Behavior</b>	
Model	1989 Ford Festiva	y-direction	0.83	Maximum Roll Angle (deg)	15 Estimated
Mass (kg) Curb	845	Ridedown Acceleration (g's)		Maximum Pitch Angle (deg)	5 Estimated
Mass (kg) Test Inertial	840	x-direction	0.37	Maximum Yaw Angle (deg)	0 Estimated

Figure 14. Summary of Test Conditions and Results - Test RW-2