

May 18, 1999

Refer to: HMHS-B54

Mr. Roberto Fonseca-Martinez  
Division Administrator  
The Dale Building, Suite 205  
1504 Santa Rosa Road  
Richmond, Virginia 23229

Dear Mr. Martinez:

On April 2, Mr. Robert McCarty of your staff forwarded a request from Mr. J.G. Browder, Chief Engineer for the Virginia Department of Transportation, to accept the Modified MB-7D Portable Concrete Barrier for use on the National Highway System as a test level 3 temporary barrier. Included with this request were copies of the Texas Transportation Institute's January 1999 report, "NCHRP REPORT 350 TEST 3-11 OF THE MODIFIED VIRGINIA DOT PORTABLE CONCRETE BARRIER," prepared by Buth, Menges, and Schoeneman, and copies of the crash test video tape.

The tested barrier was an 810-mm tall F-shaped concrete barrier 6100-mm long. Each segment was made from 30 Mpa concrete (28 day compressive strength) and contains three longitudinal #19 bars and one longitudinal #13 bar. Adjacent segments are connected by 25-mm diameter ASTM A36 steel pins 610-mm long which pass through loops fabricated with 20-mm diameter steel bars. ASTM F-488 steel washers are used under the pin head and above the 25-mm hex nut used to retain the pin at the bottom. These and other design details are shown in Enclosure 1.

NCHRP Report 350 Test 3-11 was run on a free-standing installation comprised of five 6100 mm segments with two 3100-mm long segments added at each end of the test installation, making a total installation length of approximately 43.3 m. The impact point was 1.3 m upstream from the joint between segments 2 and 3, or approximately 17 m from the upstream end of the test installation. Under these conditions, the maximum barrier deflection was 1.83 m. Summary data from this test are shown in Enclosure 2.

Based on our review of the information you submitted, we have concluded that the tested design satisfactorily meets the evaluation criteria contained in NCHRP Report 350 for a test level 3 barrier and it may be used on the National Highway System when deemed appropriate by the contracting agency.

We note that Mr. Browder also requested FHWA acceptance of the State's method of bolting temporary concrete barrier to a bridge deck during construction. Unfortunately, there has been only limited testing of this type of installation to date and we are unable to predict with any certainty what the outcome of an NCHRP Report 350 test at test level 3 would be. Assuming

that field performance of this design has been acceptable, we would agree to its continued use until such time as it (or a comparable design) is successfully tested, provided such testing takes place within two years. The State may wish to analyze its bolted design through computer simulation to gain insight into its likely performance in a full-scale crash test. In this regard, the FHWA/NHTSA National Crash Analysis Center (NCAC) has developed models that can predict the performance of portable concrete barriers under impact, including barrier deflection, vehicle trajectory, and vehicle and barrier loads and accelerations. If the State has an interest in pursuing this option, the contact person at NCAC is Mr. Azim Eskandarian at (703) 729-8362. Other questions pertaining to this letter should be addressed to Mr. Richard Powers at (202) 366-1320.

Sincerely yours,

(original signed by Dwight A. Horne)

Dwight A. Horne  
Director, Office of Highway Safety Infrastructure

2 Enclosures

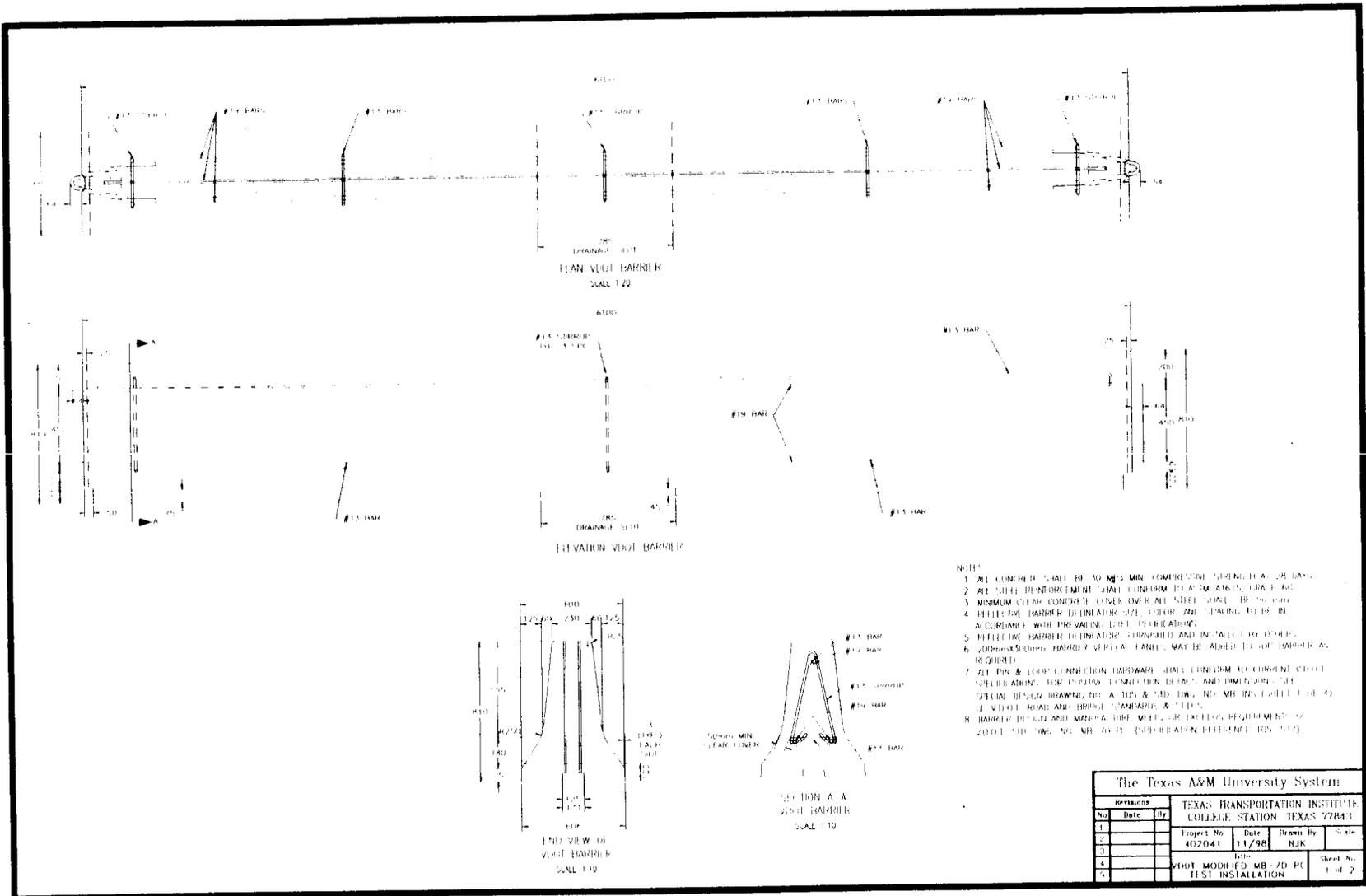


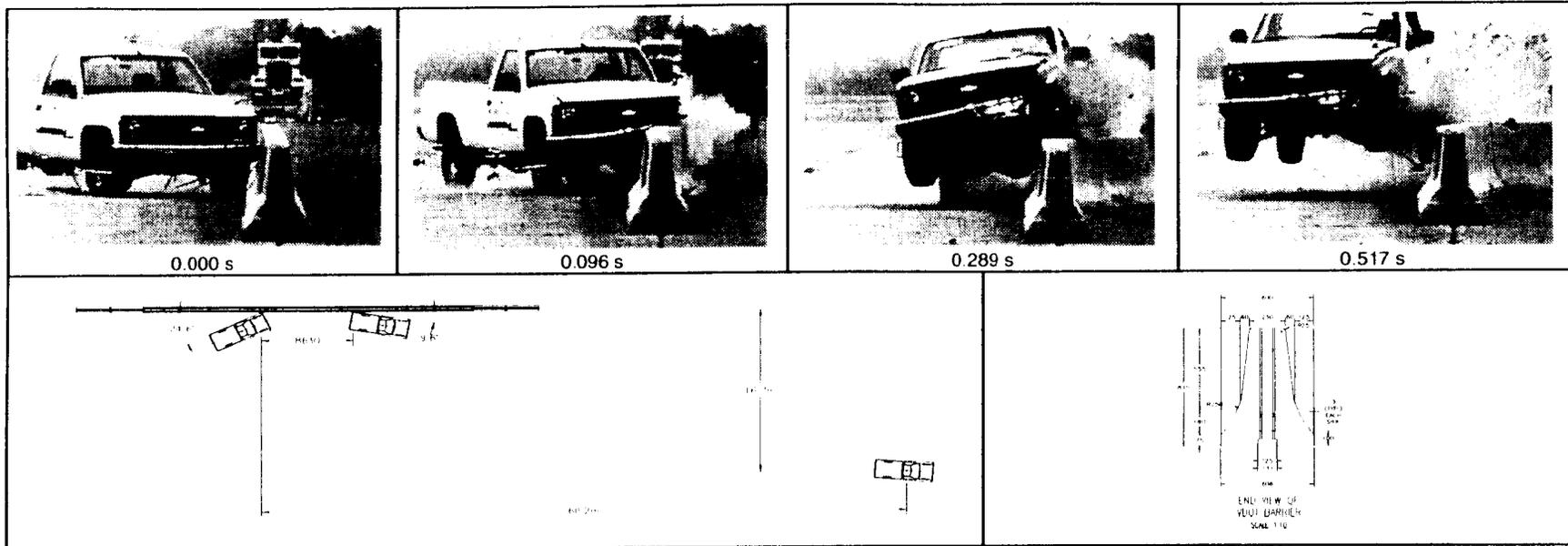
Figure 1. Details of Modified Virginia DOT portable barrier.

| The Texas A&M University System |      |  |       |
|---------------------------------|------|--|-------|
| Revisions                       |      | TEXAS TRANSPORTATION INSTITUTE<br>COLLEGE STATION, TEXAS 77843 |       |
| No.                             | Date | By   | Scale |
| 1                               |      |  |       |
| 2                               |      |  |       |
| 3                               |      |  |       |
| 4                               |      |  |       |
| 5                               |      |  |       |

|                        |       |          |           |
|------------------------|-------|----------|-----------|
| Project No.            | Date  | Drawn By | Scale     |
| 402041                 | 11/98 | RJK      |           |
| Title                  |       |          | Sheet No. |
| VDOT MODIFIED MB-70 PC |       |          | 1 of 2    |
| TEST INSTALLATION      |       |          |           |





**General Information**

Test Agency ..... Texas Transportation Institute  
 Test No. .... 402041-1  
 Date ..... 11/18/98

**Test Article**

Type ..... Portable Concrete Barrier  
 Name ..... Modified VDOT Portable Concrete Barrier  
 Installation Length (m) ..... 43.3  
 Material or Key Elements ..... 810 mm High 6.1 m long F-shape CMB  
 Segments with Pin & Loop Connections  
 Soil Type and Condition ..... Concrete Pavement, Dry

**Test Vehicle**

Type ..... Production  
 Designation ..... 2000P  
 Model ..... 1994 Chevrolet 2500 pickup truck  
 Mass (kg)  
 Curb ..... 2032  
 Test Inertial ..... 2000 kg  
 Dummy ..... No dummy  
 Gross Static ..... 2000 kg

**Impact Conditions**

Speed (km/h) ..... 100.6  
 Angle (deg) ..... 24.6

**Exit Conditions**

Speed (km/h) ..... 70.5  
 Angle (deg) ..... 9.6

**Occupant Risk Values**

Impact Velocity (m/s)  
 x-direction ..... 5.9  
 y-direction ..... -5.1  
 THIV (km/h) ..... 25.2  
 Ridedown Accelerations (g's)  
 x-direction ..... -4.7  
 y-direction ..... 12.4  
 PHD (g's) ..... 12.5  
 ASI ..... 1.50  
 Max. 0.050-s Average (g's)  
 x-direction ..... -8.3  
 y-direction ..... 10.8  
 z-direction ..... -7.4

**Test Article Deflections (m)**

Dynamic ..... 1.83  
 Permanent ..... 1.71

**Vehicle Damage**

Exterior  
 VDS ..... 11LFQ4  
 CDC ..... 11FLEK3  
 &11LYEW3

Maximum Exterior  
 Vehicle Crush (mm) ..... 370

Interior  
 OCDI ..... LF0110000

Max. Occ. Compart.  
 Deformation (mm) ..... 80

**Post-Impact Behavior**

(during 1.0 s after impact)  
 Max. Yaw Angle (deg) ..... 34  
 Max. Pitch Angle (deg) ..... 9  
 Max. Roll Angle (deg) ..... -12

Figure 10. Summary of Results for test 402041-1, NCHRP Report 350 test 3-11.