



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

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

November 1, 2004

In Reply Refer To: HSA-10/B-129

Mr. Anthony J. Carey
President
Barriers USA, Incorporated
5850 Sawmill Road
Paradise, California 95969

Dear Mr. Carey:

In September, you sent Mr. Richard Powers of my staff copies of an August 2004 test report prepared by Dr. Roger Zou and Professor Raphael Grzebieta in the Department of Civil Engineering at Monash University in Victoria, Australia. This report detailed the results of two National Cooperative Highway Research Program (NCHRP) Report 350 crash tests into a water-filled plastic barrier/W-beam rail design called the Guardliner System and you requested formal acceptance of its use in the United States. Mr. Powers has reviewed the report as well as additional information on the Monash University crash test facility that was subsequently provided by Professor Grzebieta and has concluded that the tests were conducted in conformance with the NCHRP Report 350 test and evaluation procedures and can be accepted as such.

The Guardliner Barrier is comprised of polyethylene segments 2000-mm long x 960-mm high. Each is 600-mm wide at the base and 530-mm wide across the top, weighing approximately 50 kg when empty and 630 kg when filled with water. Units are connected at each end by 30-mm diameter steel bolts 200-mm long. A W-beam guardrail complying with the American Association of State Highway and Transportation Officials' M 180 specification for steel beam guardrail is attached to the traffic face using special steel linkage brackets. Enclosure 1 is a schematic drawing of the Guardliner design.

To certify this barrier as meeting the NCHRP Report 350 test level 2 (TL-2) evaluation criteria, test 2-10 and 2-11 were conducted. Enclosure 2 contains the summary test sheets for each test. The maximum reported deflection for test 2-11 was 2640 mm and occurred when the pickup truck impacted near the joint between segments 12 and 13. The test installation was comprised of 30 units and the ends were free-standing. As with all unanchored barrier installations, impacts nearer either end would have resulted in greater deflections. Impacts very near the ends may not have contained or redirected the vehicles. Since there is currently no crashworthy terminal for the Guardliner, its ends should be flared away from approaching traffic or adequately shielded. Based on the performance of the Guardliner, it may be



considered an NCHRP Report 350 TL-2 temporary traffic barrier and used at appropriate locations on National Highway System (NHS) when selected by the contracting authority.

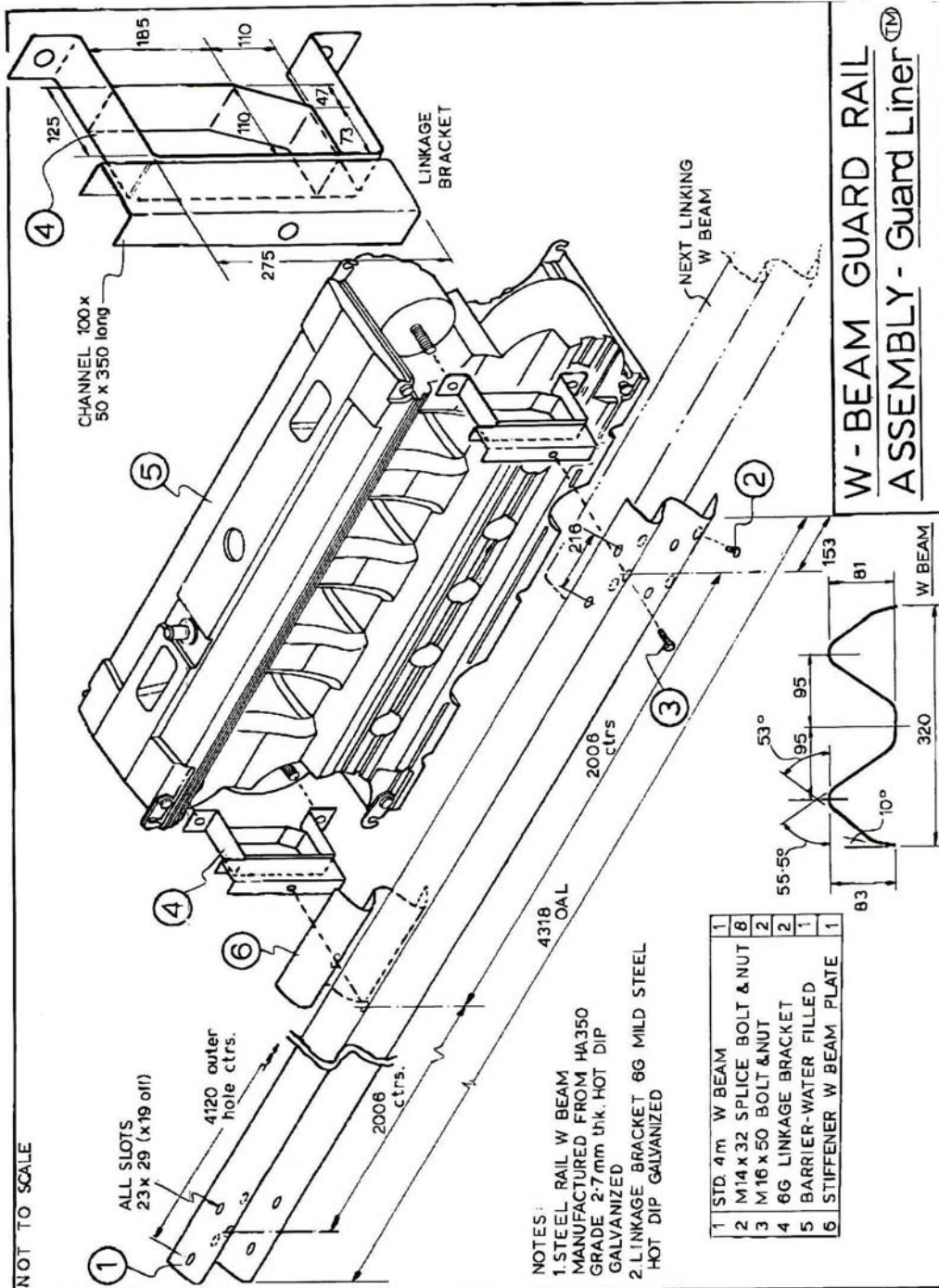
Please note the following standard provisions that apply to FHWA letters of acceptance:

- Our acceptance is limited to the crashworthiness characteristics of the Guardliner Barrier and does not address its structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes to the tested design that may adversely influence its crashworthiness 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 device being marketed is significantly different from the version that was crash tested, it reserves the right to modify or revoke its acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure optimal performance.
- You will be expected to certify to users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as the design that was crash tested.
- To prevent misunderstanding by others, this letter of acceptance, designated as number B129 shall not be reproduced except in full. This letter, and the test documentation upon which this letter is based, is public information. All such letters and documentation may be reviewed at our office upon request.
- The Guardliner Barrier is considered a proprietary product. The use of proprietary hardware in a work zone on Federal-aid projects is generally of a temporary nature. These features are usually *selected by the contractor* for use as needed and removed upon completion of the project. Under such conditions they can be presumed to meet requirement (a) given below for the use of proprietary products on Federal-aid projects. On the other hand, if proprietary devices are *specified by a highway agency* for use on Federal-aid projects, except exempt, non-NHS projects, they: (a) must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with existing highway facilities or that no equally suitable alternative exists or; (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.
- In accordance with Section 635.410 of Title 23, Code of federal Regulations, any products containing steel that are permanently incorporated into a highway project must use steel products manufactured in the U.S. from U.S. steel. Assuming your product will be used as a temporary barrier only, this restriction should not apply.

Sincerely yours,

/Original Signed by/

John R. Baxter, P.E.
Director, Office of Safety Design
Office of Safety

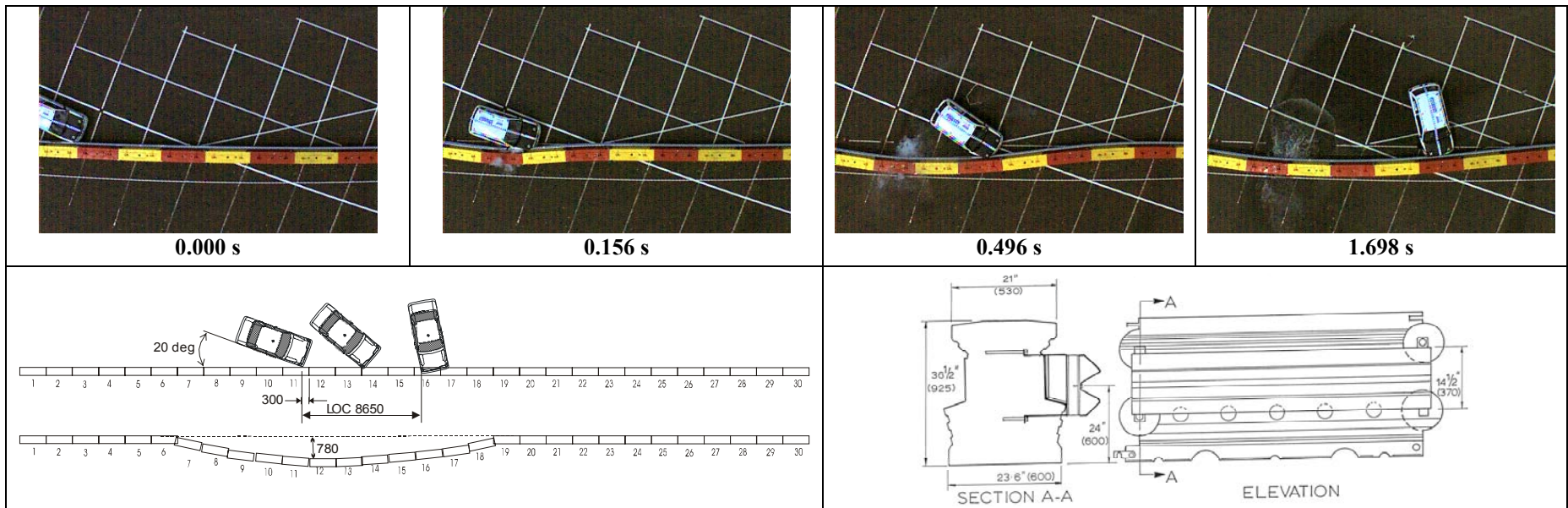


**W-BEAM GUARD RAIL
ASSEMBLY - Guard Liner™**

NOT TO SCALE

NOTES:
 1. STEEL RAIL W BEAM
 MANUFACTURED FROM HA350
 GRADE 2.7mm thk. HOT DIP
 GALVANIZED
 2. LINKAGE BRACKET 6G MILD STEEL
 HOT DIP GALVANIZED

1	STD. 4m W BEAM	1
2	M14 x 32 SPLICE BOLT & NUT	8
3	M16 x 50 BOLT & NUT	2
4	6G LINKAGE BRACKET	2
5	BARRIER-WATER FILLED	1
6	STIFFENER W BEAM PLATE	1



General Information

Test Agent..... Department of Civil Engineering
 Monash University
 Test No..... BR 210T1
 Date..... Dec 9th, 2003

Test Article

Type..... Guardliner™
 Installation Length (m) 60
 Material of key elements 925-mm tall water-filled plastic section with W-beam attached

Road surface and condition ...

Asphalt surface, Dry

Test Vehicle

Type..... Production Model
 Designation..... 820 C
 Model..... 2002 Daihatsu Cuore
 Mass (kg)
 Curb 816
 Test inertial..... 816
 Dummy(s)..... 75
 Gross Static..... 891

Impact conditions

Speed (km/h)..... 70
 Angle (deg)..... 20.5

Exit conditions

Speed (km/h)..... 0
 Angle (deg)..... 78.1

Occupant Risk Values

Impact velocities (m/s)
 x-direction..... 6.22
 y-direction..... -4.17
 THIV (km/h) 26.9
 Ridedown Acceleration (g's)
 x-direction..... -6.79
 y-direction..... -3.21
 PHD (g's)..... 6.82
 ASI 0.46
 Max. 0.050-s Average (g')
 x-direction..... -6.93
 y-direction..... -5.71
 z-direction -1.83

Test Article Deflections (m)

Dynamic..... 0.82
 Permanent..... 0.78
 Working Width 1.00

Vehicle Damage

Exterior
 VDS RFQ-2
 CDC 01RFWE1

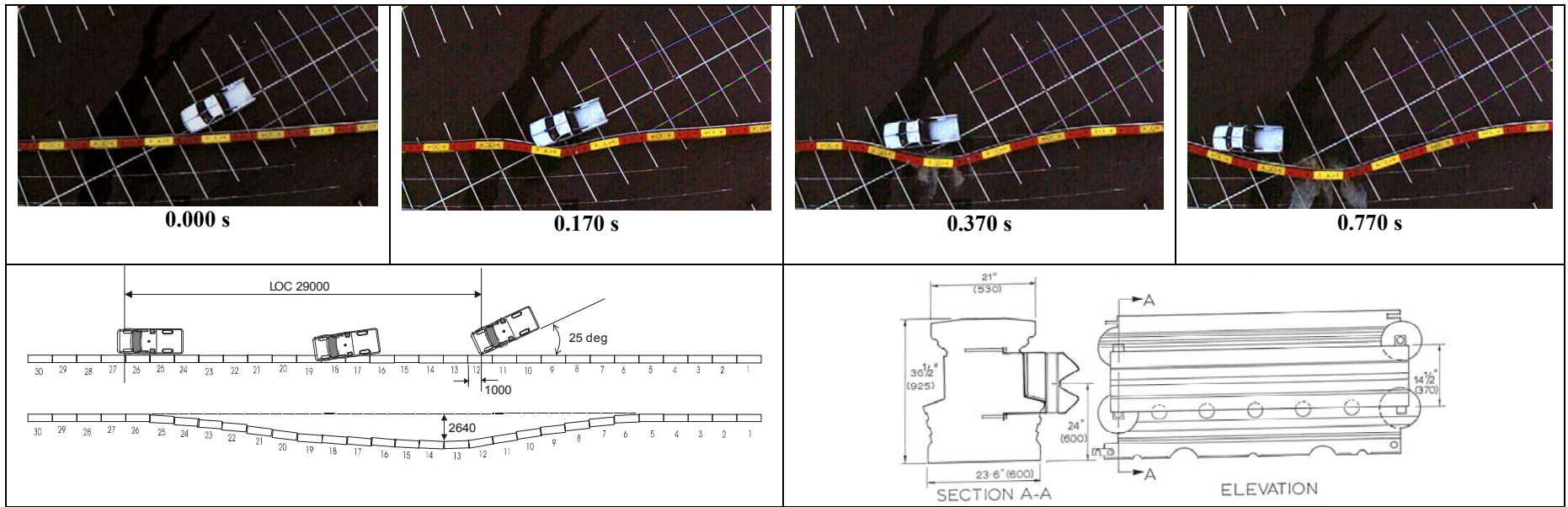
Maximum Exterior
 Vehicle Crush (mm)... 150

Interior
 VCDI..... AS0000000
 Max. Occu. Compart.
 Deformation (mm) ... Negligible

Post-Impact Vehicular Behavior
 (during 2.0s after impact)

Maximum Roll Angle (deg) -12
 Maximum Pitch Angle (deg) -2
 Maximum Yaw Angle (deg) 58.1

Figure 1. Summary of results – Guardliner Barrier System NCHRP Report 350 Test BR_210T



General Information

Test Agent..... Department of Civil Engineering
 Monash University
 Test No..... BR_211T1
 Date..... Aug 2rd, 2004

Test Article

Type..... Guardliner™
 Installation Length (m) 60
 Material of key elements 925-mm tall water-filled plastic section with W-beam attached

Road surface and condition ...

Asphalt surface, Dry

Test Vehicle

Type..... Production Model
 Designation..... 2000P
 Model..... 2000 Chevrolet C2500 Pickup
 Mass (kg)
 Curb N/A
 Test inertial..... 2170
 Dummy(s)..... None
 Gross Static..... 2170

Impact conditions

Speed (km/h)..... 70.0
 Angle (deg)..... 25.0

Exit conditions

Speed (km/h)..... 0
 Angle (deg)..... 3

Occupant Risk Values

Impact velocities (m/s)
 x-direction..... 4.04
 y-direction..... -3.19
 THIV (km/h) 18.5
 Ridedown Acceleration (g's)
 x-direction..... -2.85
 y-direction..... 3.67
 PHD (g's)..... 3.68
 ASI 0.43
 Max. 0.050-s Average (g')
 x-direction..... -3.73
 y-direction..... 2.86
 z-direction -2.87

Test Article Deflections (m)

Dynamic..... 2.80
 Permanent..... 2.64
 Working Width 3.00

Vehicle Damage

Exterior
 VDS LFQ-2
 CDC 01LFW1
 Maximum Exterior
 Vehicle Crush (mm)... 150
 Interior
 OCDI..... AS0000000
 Max. Occu. Compart.
 Deformation (mm) ... Negligible

Post-Impact Vehicular Behavior
 (during 2.0s after impact)

Maximum Roll Angle (deg) 3
 Maximum Pitch Angle (deg) -2
 Maximum Yaw Angle (deg) 30

Figure 6. Summary of results – Guardliner Barrier System NCHRP Report 350 Test BR_211T