



U.S. Department
of Transportation

**Federal Highway
Administration**

February 5, 1999

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

Refer to: HNG-14

Marc Christensen
Off The Wall Productions, Inc.
P.O.Box 112303
Salt Lake City, Utah 84147

Dear Mr. Christensen:

Thank you for your letter of July 13 requesting Federal Highway Administration's (FHWA) acceptance of your company's "Multi-Barrier MB2" Safety Barricade work zone traffic control device as meeting the crashworthiness guidelines contained in the National Cooperative Highway Research Program Report 350. Accompanying your letter were copies of the crash test reports by E-Tech Testing Services, Inc., color photographs, and video documentation of the crash tests.

The FHWA guidance on crash testing of work zone traffic control devices is contained in two memoranda. The first, dated July 25, 1997, titled "INFORMATION: Identifying Acceptable Highway Safety Features," established four categories of work zone devices: Category I devices were those lightweight items which could be self-certified by the vendor, Category II devices were other lightweight devices which needed individual crash testing, Category III devices were barriers and other fixed or massive devices also needing crash testing, and Category IV devices were trailer mounted lighted signs, arrow panels, etc. The second guidance memorandum was issued on August 28 and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This recent memorandum lists devices that are acceptable under Categories I, II, and III.

The "Multi-Barrier MB2" Safety Barricade is a "Category II" device. It is a rotation molded hollow plastic barricade which can accept water ballast. Details of test articles, lights and fastener hardware are enclosed. The results of the test are summarized in the enclosed table. In the test, two devices were impacted by an 820 kg automobile. The first was positioned normal to the edge of the traveled way, and the second was perpendicular to the first and placed approximately 6 meters downstream. Details of E-Tech test number 10-9718-001 (NCHRP 350 Test 3-71) are shown in the following table:

Device Name and Orientation	Multi-Barrier Head On	Multi-Barrier Right Angle
Mass of device*	44 kg	44 kg
Mass w/o ballast	22.7 kg	22.7 kg
Height**	1219 mm	1219 mm
Width	1016 mm	1016 mm
Warning light?	Yes	Yes
Signs attached?	No	No
Impact Speed	103.93 km/h	99.00 km/h
Exit Speed	99.00 km/h	94.07 km/h
Delta V, m/s	1.37 m/s	1.37 m/s

*Mass includes light and ballast. Lights were "Cone Lights" as shown on the enclosed drawing. No signs were attached to any of the barricades during the tests.

**Height does not include light.

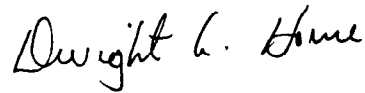
During the test the vehicle's windshield was broken (but not penetrated nor dished in) by the warning lights which were knocked loose from the barricades. (The approximate mass of the lens striking the windshield was 1.1 kg.) However, there were no significant intrusions into the occupant compartment and the damage was judged not to interfere with driver visibility. The test vehicle also sustained significant cosmetic dents to the front bumper, grill, and hood. There was no occupant compartment intrusion or deformation observed. Crashworthiness of the device as a support for rigid sign panels was not demonstrated as no signs were in place during the testing.

There was no test article debris detached during the test series that would penetrate or show potential for penetrating the occupant compartment or present an undue hazard to other traffic, pedestrians, or personnel in a work zone. The results of the full-scale testing also met the FHWA velocity change and vehicle trajectory requirements, therefore Multi-Barrier MB2 barricades are acceptable for use on the National Highway System, in the range of conditions tested, when proposed by a State. Lights, if used, shall be "cone lights" as used in the crash testing and shall be firmly secured such that the battery pack will remain with the barricade.

Our acceptance is limited to the crashworthiness characteristics of the MB2 and does not cover their structural features, nor conformity of the devices with the Manual on Uniform Traffic Control Devices. Presumably, you will supply potential users with sufficient information on design and installation requirements to ensure proper performance. We anticipate that the States will require certification from Off the Wall Products that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance. To prevent misunderstanding by others, this letter of acceptance, number WZ-8, shall not be reproduced except in full.

The MB2 is a proprietary product. The use of proprietary work zone traffic control devices in Federal-aid projects is generally of a temporary nature. They are 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 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, a copy of which is enclosed.

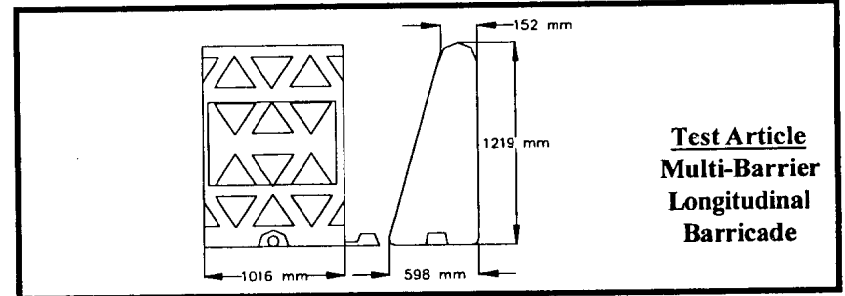
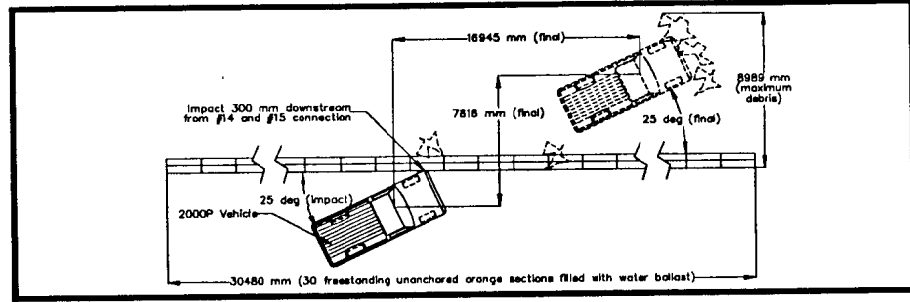
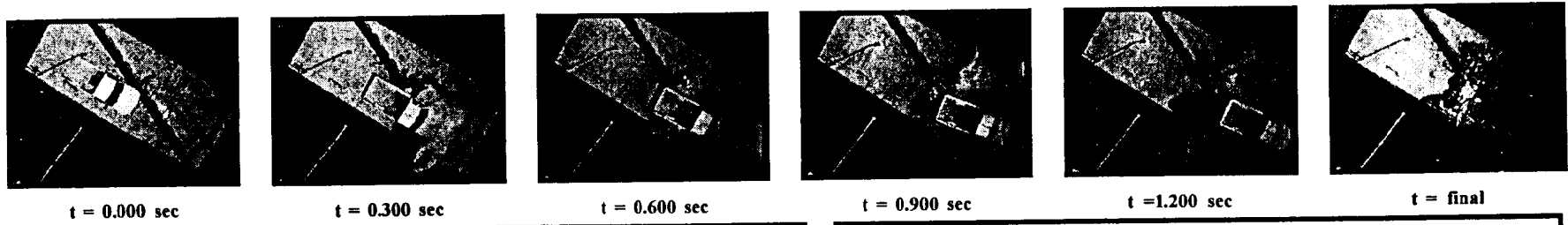
Sincerely yours,



Dwight A. Horne
Chief, Federal-Aid and Design Division

Enclosure

Geometric and Roadside Safety Acceptance Letter WZ-8



**Test Article
Multi-Barrier
Longitudinal
Barricade**

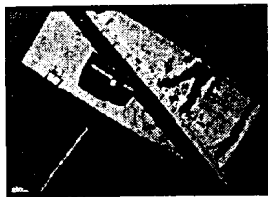
E-TECH Testing Services, Inc.
3617 B. Cincinnati Avenue
Rocklin, CA 95765
PHONE (916) 645-8188
FAX (916) 645-3633

Multi-Barrier Longitudinal Barrier NCHRP 350 Test 1-11 (of 1)

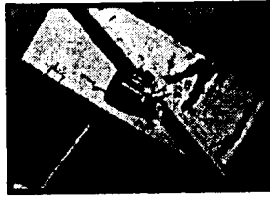
General Information		Exit conditions	
Test Agency	E-TECH Testing Services, Inc.	Speed (km/h)	N/A
Test Designation	NCHRP 350 Test 1-11	Angle (deg)	N/A
Test No.	10-9718-002	Occupant Risk Values	
Date	6/9/98	Impact Velocity (m/s)	
Test Article		x-direction	4.78
Type	Off the Wall Productions, Inc.	y-direction	0.19
.....	Multi-Barrier Long. Barrier	Ridedown Acceleration (g's)	
.....	w/U-Connectors and water ballast	x-direction	-3.45
Installation Length, (mm)	30480 (30 sections)	y-direction	-2.77
Size and/or dimension and material		THIV (m/s)	4.79
of key elements	Height - 1219 mm	PHD (g's)	3.03
.....	Length - 1016 mm (per section)	ASI	0.26
.....	Width - 598/152 mm (base/top)	Test Article Deflections (mm)	
.....	Mass - 418 kg (orange section	Dynamic	8989
.....	filled with water ballast)	Permanent	8989
.....		Vehicle Damage	
Foundation Type and Condition	Dry Portland Cement Concrete	Exterior	
Test Vehicle		VDS	FD-1
Type	Production Model	CDC	12FDEW1
Designation	2000P	Interior	
Model	1988 GMC C-2500	OCDI	AS0000000
.....	3/4T Pickup	Post-Impact Vehicular Behavior (deg - gyro @ c.g.)	
Mass (kg)		Maximum Roll Angle	9.55
Curb	1843.0	Maximum Pitch Angle	4.26
Test inertial	2011.6	Maximum Yaw Angle	-8.70
Dummy(s)	N/A	NCHRP 350 Test 1-11 Evaluation	
Gross Static	2011.6	Structural Adequacy	Fail - No containment
Impact Conditions		Occupant Risk	Pass
Speed (km/h)	51.24	Vehicle Trajectory	Fail - Vehicle penetration
Angle (deg)	25.0 (on sloped face)		
Impact Severity (kJ)	36.39		

Summary of Results - Multi-Barrier Longitudinal Barrier NCHRP 350 Test 1-11

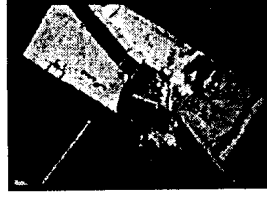
The results of this report relate only to the Multi-Barrier Longitudinal Barrier tested. This report may not be reproduced except in full, without the prior written approval of E-TECH Testing Services, Inc. Prepared by: John F. LaTurner, P.E. - Manager.



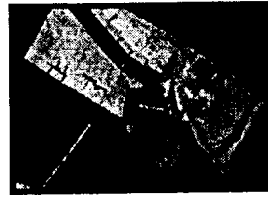
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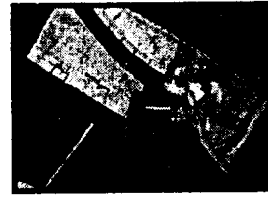
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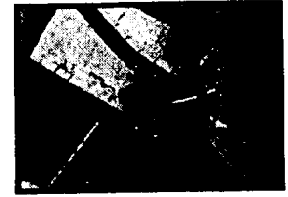
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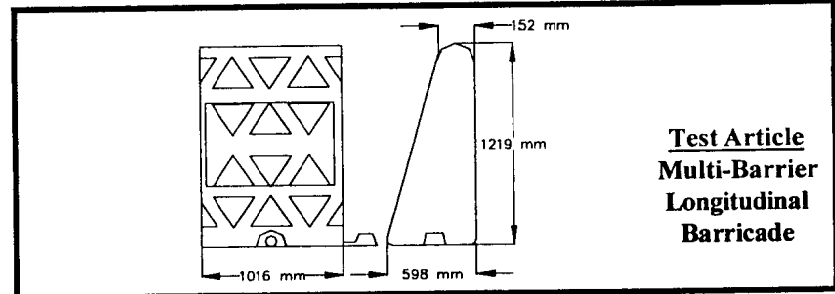
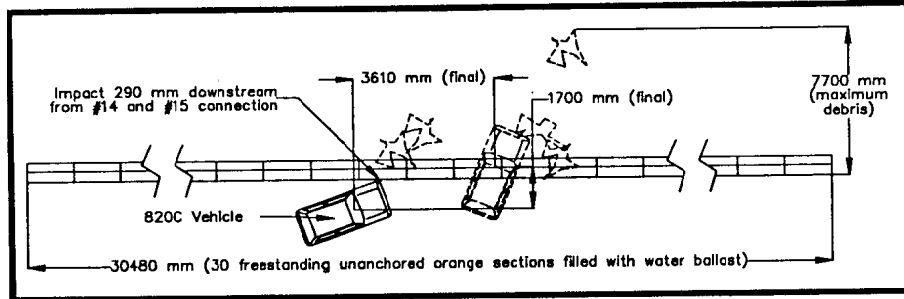
t = 0.540 sec



t = 0.720 sec



t = final



**Test Article
Multi-Barrier
Longitudinal
Barricade**

Multi-Barrier Longitudinal Barrier NCHRP 350 Test 1-10 (1 of 1)

General Information

Test Agency E-TECH Testing Services, Inc.
 Test Designation NCHRP 350 Test 1-10
 Test No. 10-9718-003
 Date 6/9/98

Test Article

Type Off the Wall Productions, Inc.
 Multi-Barrier Long. Barrier
 w/U-Connectors and water ballast
 Installation Length, (mm) 30480 (30 sections)

Size and/or dimension and material
 of key elements Height - 1219 mm
 Length - 1016 mm (per section)
 Width - 598/152 mm (base/top)
 Mass - 418 kg (orange section
 filled with water ballast)

Foundation Type and Condition Dry Portland Cement Concrete

Test Vehicle

Type Production Model
 Designation 820C
 Model 1991 Ford Festiva
 Hatchback
 Mass (kg)
 Curb 802.4
 Test inertial 826.2
 Dummy(s) 75.0
 Gross Static 901.2

Impact Conditions

Speed (km/h) 49.16
 Angle (deg) 20.0 (on vertical face)
 Impact Severity (kJ) 9.01

Exit conditions

Speed (km/h) N/A
 Angle (deg) N/A

Occupant Risk Values

Impact Velocity (m/s)
 x-direction 6.78
 y-direction 0.99
 Ridedown Acceleration (g's)
 x-direction -3.77
 y-direction -1.95
 THIV (m/s) 6.97
 PHD (g's) 4.30
 ASI 0.42

Test Article Deflections (mm)

Dynamic 7700
 Permanent 7700

Vehicle Damage

Exterior
 VDS FD-1
 CDC 12FDEW1
 Interior
 OCDI AS000000

Post-Impact Vehicular Behavior (deg - gyro @ c.g.)
 Maximum Roll Angle 5.54
 Maximum Pitch Angle -2.62
 Maximum Yaw Angle -47.06

NCHRP 350 Test 1-10 Evaluation

Structural Adequacy Fail - No containment
 Occupant Risk Pass
 Vehicle Trajectory Fail - Vehicle penetration

Summary of Results - Multi-Barrier Longitudinal Barrier NCHRP 350 Test 1-10

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Cone Light Specification

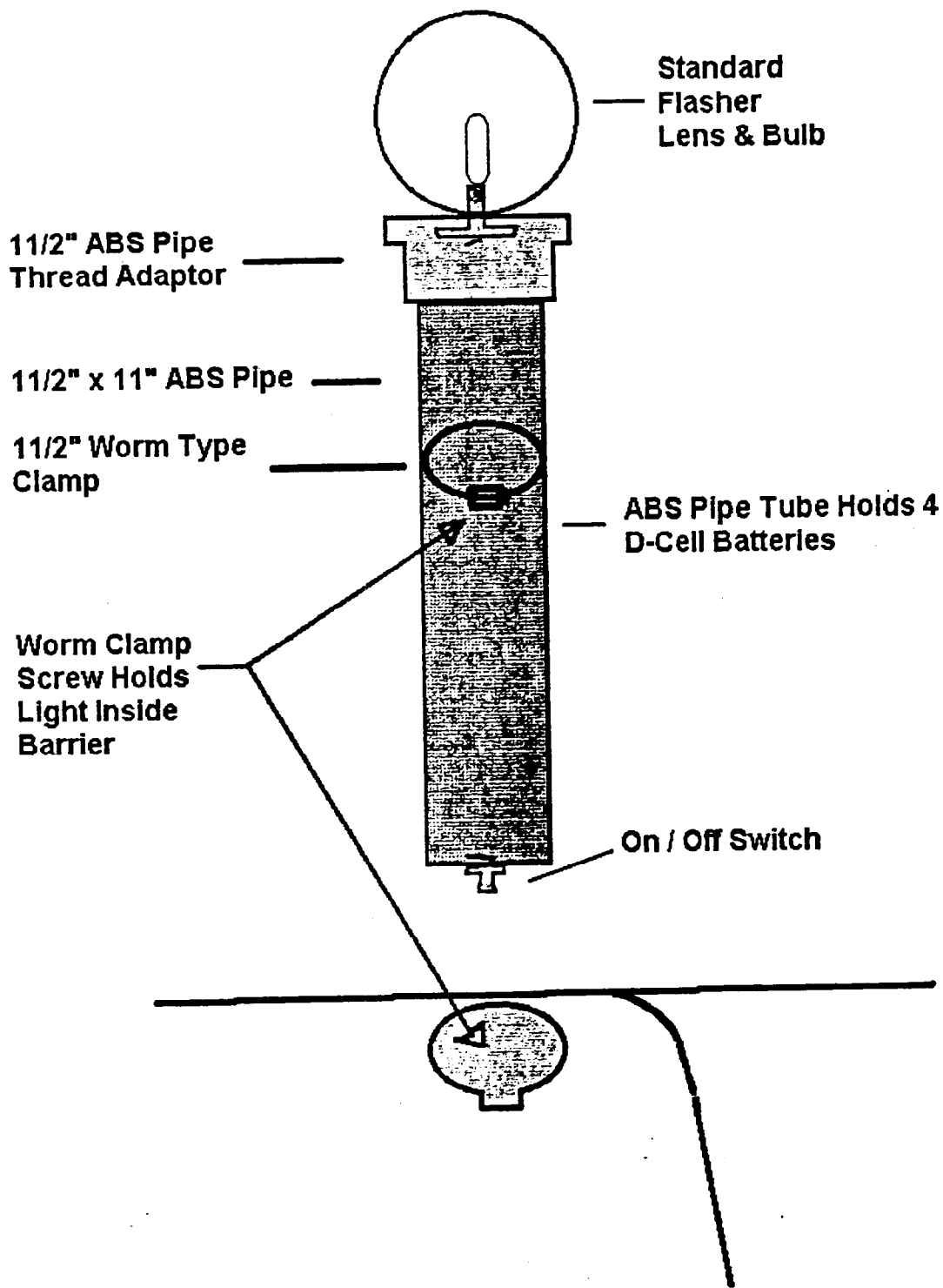


Illustration 3. Cone Light Warning Light (2 of 2)