



U.S. Department
of Transportation

**Federal Highway
Administration**

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

JUL 17 2000

Refer to: HSA-B70

Milford L. Miller, P.E./L.S.
Standard Drawing Engineer
State of Idaho Transportation Department
P.O. Box 7129
Boise, Idaho 83707-1 129

Dear Mr. Miller:

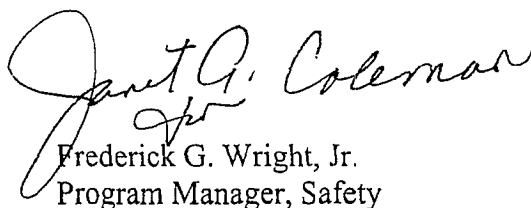
In your June 20 letter you requested formal Federal Highway Administration acceptance of the Idaho Transportation Department's 6095-mm (20-foot) long precast concrete barrier for use on the National Highway System (NHS) as a test level 3 (TL-3) barrier. To support your request, you also sent a copy of an April 2000 test report prepared by E-TECH Testing Services, Inc., in Rockland, California, entitled "NCHRP Report 350 Crash Test Results for the Idaho 6095-mm Concrete Barrier" and a video tape of the two tests that were conducted.

The barrier you tested was a standard New Jersey profile concrete barrier 810-mm (32-inches) tall and 6.095-m (20-feet) long. The base width was 610-mm (24 inches) and the top width was 150-mm (6 inches). Each segment weighed approximately 3630 kg (8000 pounds). Adjacent segments were connected using 3 1.8-mm (1.25-inch) diameter steel pins passed through four loops made from 19-mm (.75-inch) diameter steel bars. Longitudinal reinforcement consisted primarily of six no. 16 bars per segment. Two different connection designs were tested. The first consisted of galvanized 32-mm (1.25-inch) diameter by 638-mm (25-inch) long A307 hex bolts secured by 32-mm (1.25-inch) A536 heavy hex nuts. Two F844 Wide Type A washers were used, one under the bolt head and one above the nut. Enclosure 1 is a schematic drawing of this connection detail. The connection in the second test was a 32-mm (1.25-inch) diameter A36 steel pin that was 660-mm (26-inches) long. No locking nut or other pin retention device was used in this design. The steel loops were identical in both tests.

Staff members have reviewed the results of the two tests you conducted and concur with your assessment that appropriate NCHRP Report 350 evaluation criteria were met. They also agree that it is not necessary to test the 860-kg car since the barrier is identical to California's K-Rail which was successfully tested with the small car. The summary results of each test are shown in Enclosure 2. Maximum permanent deflection was 1.0 m with the bolted connection and 1.1 m with the pinned connection. The test installation was 73.2 m long and

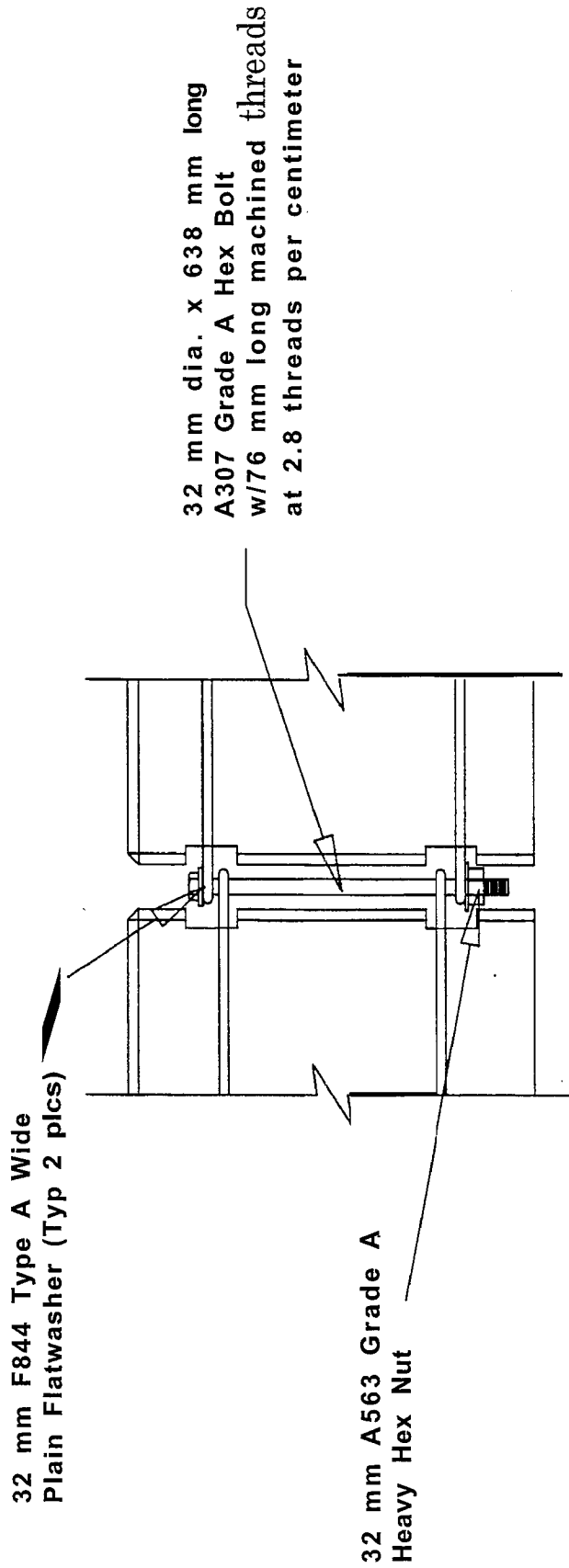
the pickup truck impacted 1.2 m from the mid-point in both tests. Impacts nearer the ends of an installation would be expected to increase the deflection distance under similar impact conditions. Based on these test results, the Idaho Concrete Barrier, with either the bolted pin connection or the drop-pin connection, may be considered acceptable for use as an NCHRP Report 350 TL-3 barrier on the NHS when such use is requested by a State transportation agency. I understand that this design remains nonproprietary and that anyone wanting to obtain detailed specifications and plan sheets for this barrier (can request them by calling you directly at (208) 334-8475.

Sincerely yours,

A handwritten signature in cursive script that reads "Frederick G. Wright, Jr." with a stylized flourish at the end.

Frederick G. Wright, Jr.
Program Manager, Safety

2 Enclosures



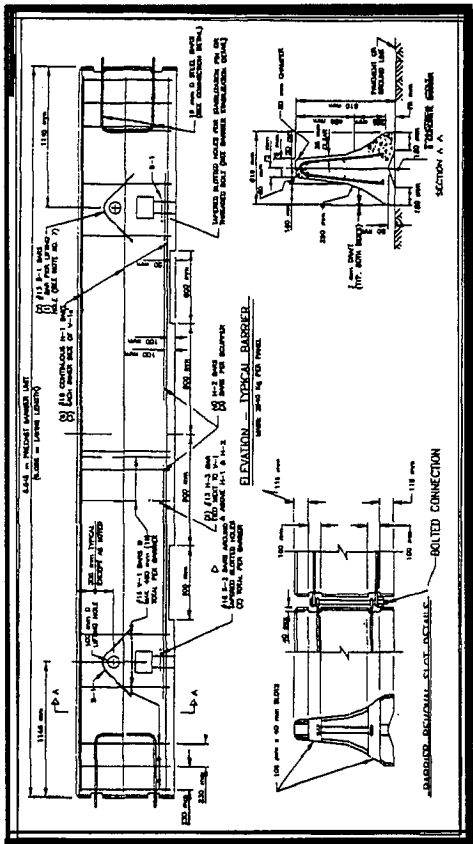
Note: All fasteners galvanized per A153 Class C. Drawing not to scale.

BOLTED CONNECTION

Illustration D-2 Bolted Connection and Material Certifications (1 of 2)



t = final

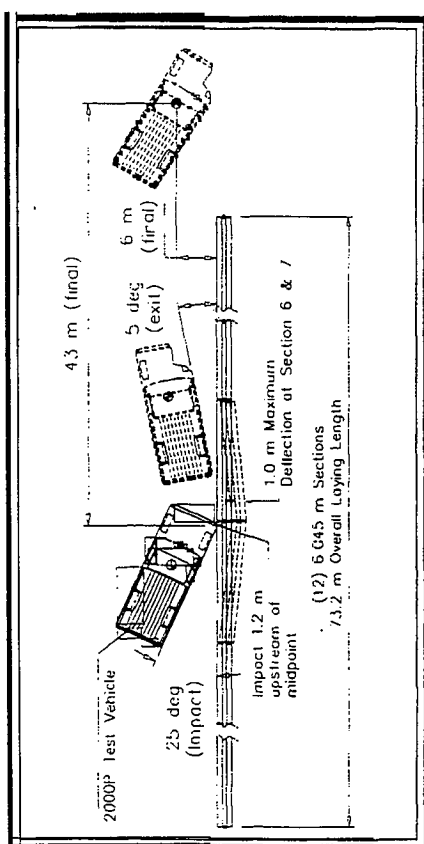


t = 0.600 SW

t = 0.450 set

t = 0.300 sec

t = 0.150 sec



General Information

Test Agency E-TECH Testing Services, Inc.
 Test Designation NCHRP 350 Test 3-1 I
 Test No. 13-4300-001
 Date 3/16/00

Test Article

Type Idaho Transportation Department
 Installation Length, (m) 6095 mm Concrete Barrier
 Material and key elements 73.2 (overall installation)
 6095 -mm long NJ Shaped
 Concrete Barrier section with
 32 mm dia. bolted connection and
 19 mm dia. solid steel loops
 Aged chip-sealed asphalt

Foundation Type and Condition

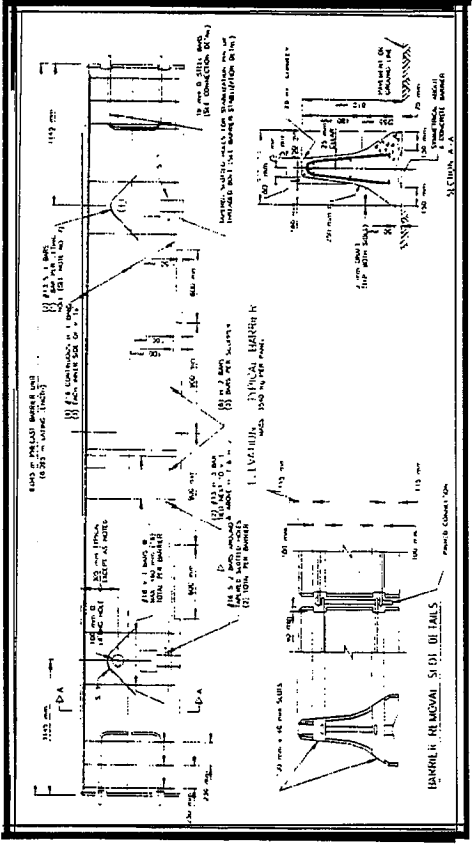
Test Vehicle
 Type Production Model
 Designation 2000P
 Model 1993 Chevrolet C2.500
 314 Ton Pickup

Impact Conditions

Mass (kg) 1859
 Curb 1975
 Test inertial N/A
 Dummy 1975
 Gross Static 101.1
 Speed(km/h) 25
 Angle (deg) 138.9
 Impact Severity (kJ)

Exit conditions	76
Speed (km/h)	5
Angle (deg)	
Occupant Risk Values	
Impact Velocity (m/s)	5.2
x-direction	-5.9
y-direction	
ride-down Acceleration (g's)	
x-direction	-11.7
y-direction	-10.1
European Committee for Normalization (CEN) Values	
THIV (m/s)	7.9
PIID (g's)	13.8
ASI	1.2
Test Article Deflections (m)	
Dynamic	1.0
Permanent	1.0
Vehicle Damage	
Exterior	
VDS	RF0-5
CDC	01RFEW3
Interior	
OCDI	RF0001000
Post-Impact Vehicular Behavior (deg - rate gyro)	
Maximum Roll Angle	-52.7
Maximum Pitch Angle	16.4
Maximum Yaw Angle	-69.5

Figure 1. Summary of Results - Idaho 6095 mm Concrete Barrier Test 13-4300-001



General Information

Test Agency E-TECH Testing Services, Inc.
 Test Designation NCHRP 350 Test 3-11
 Test No. 13-4300-002
 Date 4/1/00

Test Article Type Idaho Transportation Department
 6095 mm Concrete Barrier
 73.2 (overall installation)
 6095 mm long NJ Shaped
 Concrete Barrier section with
 32 mm dia. pinned connection and
 19 mm dia. solid steel loops
 Aged chip-sealed asphalt

Foundation Type and Condition
 Test Vehicle Type Production Model
 2000P
 Designation 1995 Chevrolet C2500
 Model 314 Ton Pickup

Mass (kg)
 Curb 1972
 Test inertial 1994
 Dummy N/A
 Gross Static 1994

Impact Conditions
 Speed (km/h) 99.0
 Angle (deg) 25
 Impact Severity (kJ) 134.6

Exit conditions
 Speed (km/h) 72
 Angle (deg) 7

Occupant Risk Values
 Impact Velocity (m/s)
 x-direction 4.9
 y-direction -5.8
 z-direction -4.0
 y-direction -8.8

European Committee for Normalization (CEN) ValueT
 THIV (m/s) 7.8
 PHID (g's) x.9
 ASI 1.2

Test Article Deflections (m)
 Dynamic 1.1
 Permanent 1.1

Vehicle Damage
 Exterior
 VDS RI'Q-5
 CDC 01RIWW/3
 Interior AS0000000
 Post-Impact Vehicular Behavior (deg - rate gyro)
 Maximum Roll Angle 23.3
 Maximum Pitch Angle 2x.3
 Maximum Yaw Angle 135.x

Figure 6. Summary of Results - Idaho 6095 mm Concrete Barrier Test 13-4300-002