

May 18, 1999

Refer to: HMHS-B55

Mr. Steven O. Bradford, PE
Chief Bridge Engineer
Alaska Department of Transportation and
Public Facilities
3132 Channel Drive
Juneau, Alaska 99801-7898

Dear Mr. Bradford:

In your April 14 letter to me, you requested the Federal Highway Administration's acceptance of a curb-mounted, two-tube bridge railing that was tested to NCHRP Report 350 test level 4 (TL-4). To support your request, you sent me three Texas Transportation Institute (TTI) reports prepared by Buth, Williams, Menges, and Schoeneman. These were entitled "NCHRP REPORT 350 TEST 4-10 OF THE ALASKA MULTI-STATE BRIDGE RAIL" and "NCHRP REPORT 350 TEST 4-11 OF THE ALASKA MULTI-STATE BRIDGE RAIL", both dated December 1998, and "NCHRP REPORT 350 TEST 4-12 OF THE ALASKA MULTI-STATE BRIDGE RAIL", dated February 1999. You also sent video tapes of the crash tests that were conducted by TTI.

The Alaska Multi-State Bridge Railing consists of two TS 127 x 127 x 7.9 tubes supported by W200x36 posts on 3050-mm centers set on a 180-mm high curb. The centerline of the lower rail is 410 mm above the riding surface and the centerline of the top rail is 765 mm above the deck. Total rail height is 830 mm. These and other details are shown in Enclosure 1. We have reviewed the test reports and the video tapes and agree that each test met the appropriate Report 350 evaluation criteria. Summary reports of these tests are included as Enclosure 2.

Based on our review of the information you submitted, we conclude that the Alaska Multi-State Bridge Rail is acceptable for use on the National Highway System at NCHRP Report 350 test level 4 when such use is specified by a contracting agency. We understand that the design is non-proprietary and assume that other agencies desiring complete plans and material specifications can obtain those directly from you upon request.

Sincerely yours,

(original signed by Dwight A. Horne)

Dwight A. Horne
Director, Office of Highway Safety Infrastructure

2 Enclosures

File: B-55 (AK 2-tube)

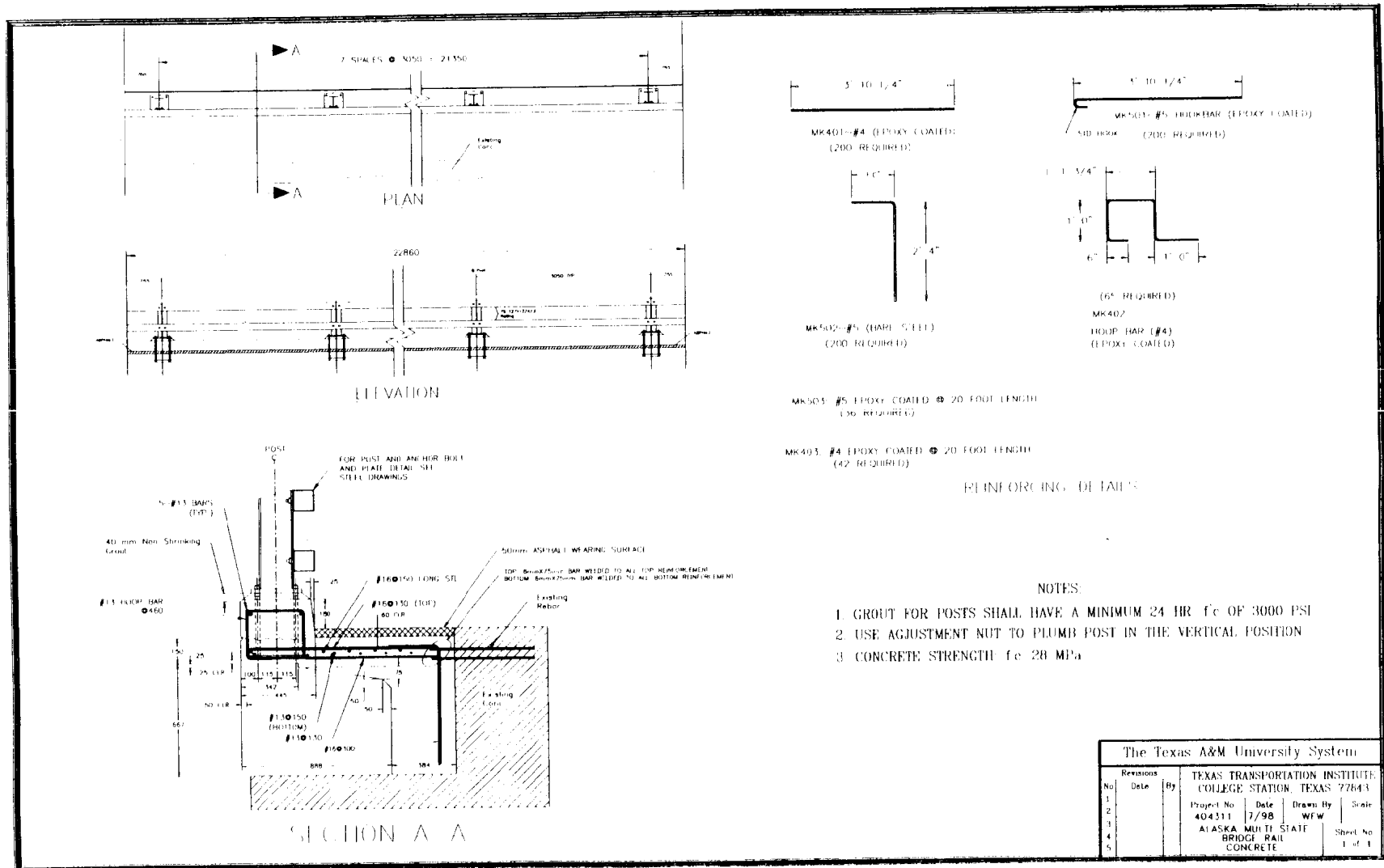


Figure 1. Details of the Alaska Multi-State Bridge Railing mounted on the curb (concrete).

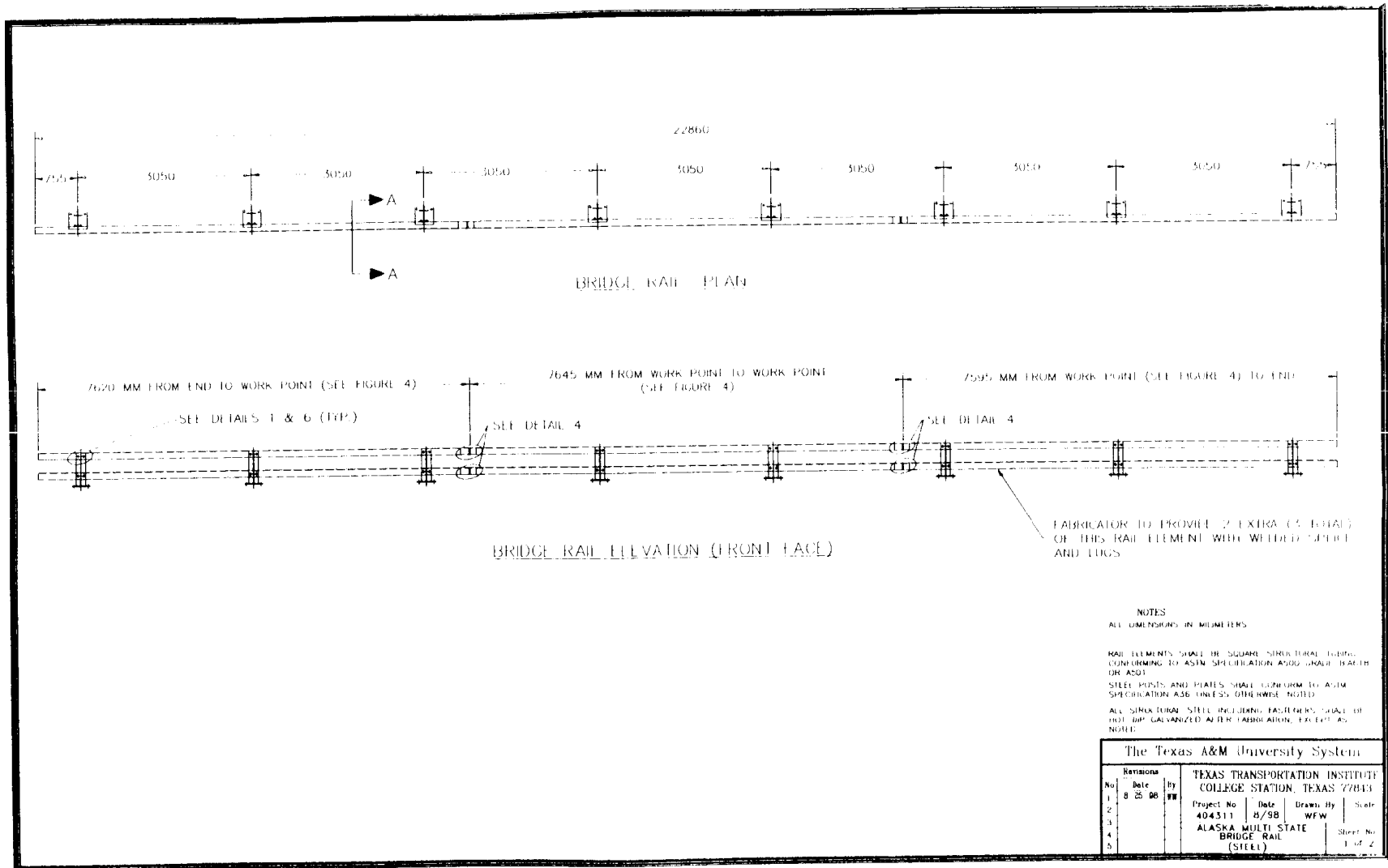


Figure 2. Details of the Alaska Multi-State Bridge Railing mounted on the curb (steel).

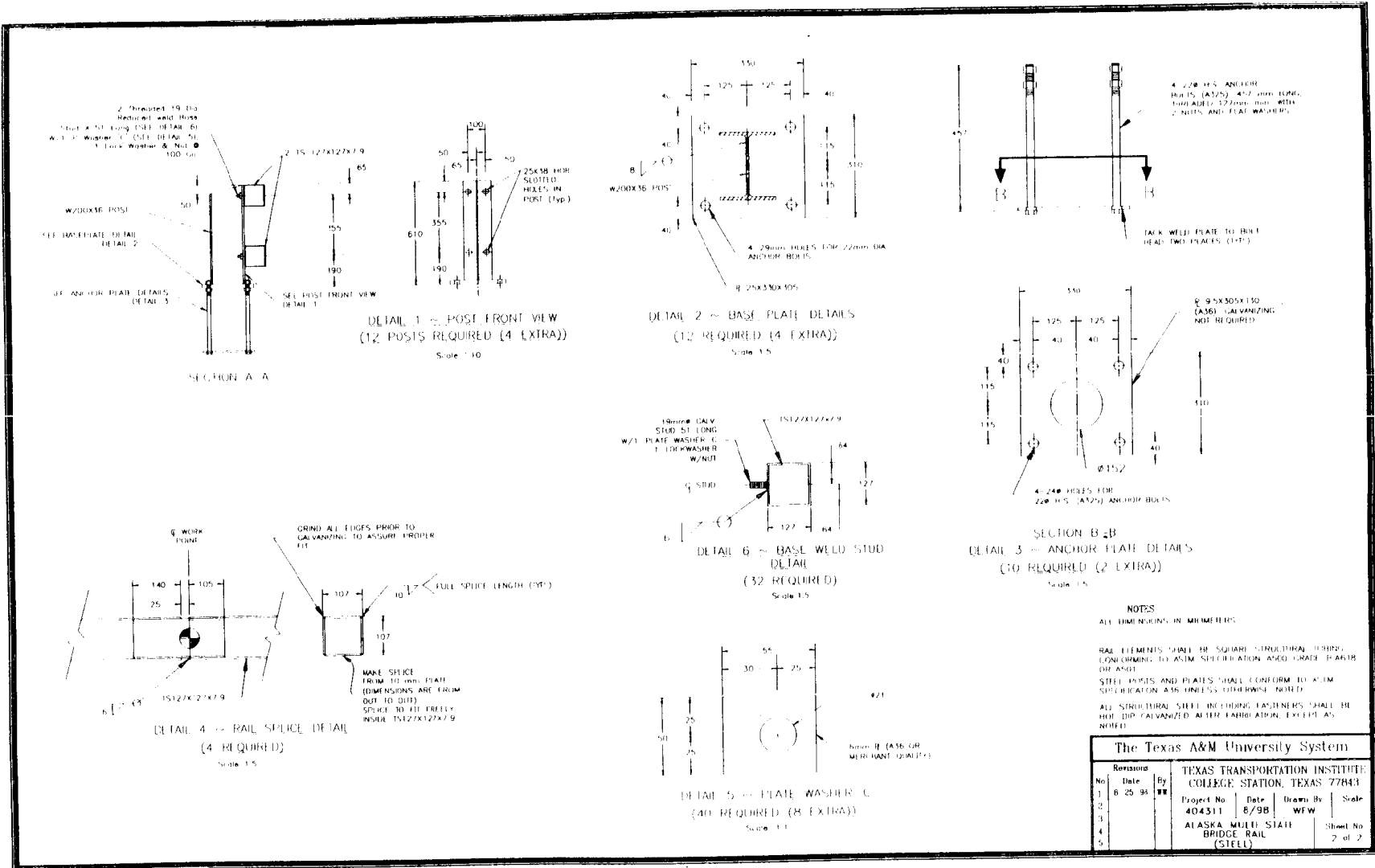
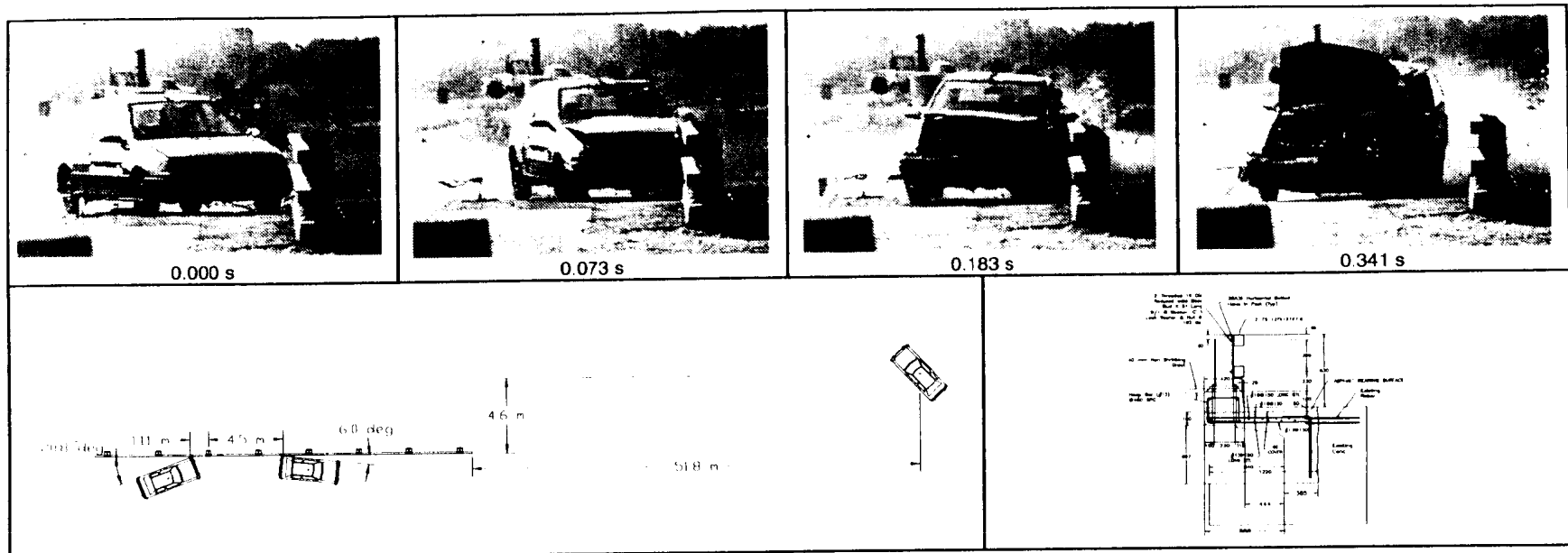


Figure 2. Details of the Alaska Multi-State Bridge Railing mounted on the curb (steel) (continued).



General Information

Test Agency	Texas Transportation Institute
Test No.	404311-1
Date	10/12/98
Test Article	
Type	Bridge Rail
Name or Manufacturer	Alaska Bridge Rail
Installation Length (m)	22.9
Material or Key Elements	Tubular Steel Rail Elements on Steel Wide Flange Posts on Curb
Soil Type and Condition	Concrete deck, Dry

Test Vehicle

Type	Production
Designation	820C
Model	1993 Geo Metro
Mass (kg)	
Curb	758
Test Inertial	820
Dummy	76
Gross Static	896

Impact Conditions

Speed (km/h)	100.0
Angle (deg)	20.8

Exit Conditions

Speed (km/h)	86.7
Angle (deg)	6.0

Occupant Risk Values

Impact Velocity (m/s)	
x-direction	4.7
y-direction	-8.3
THIV (km/h)	31.4
Ridedown Accelerations (g's)	
x-direction	-4.4
y-direction	13.4
PHD (g's)	14.5
ASI	1.80
Max. 0.050-s Average (g's)	
x-direction	-8.6
y-direction	15.0
z-direction	3.9

Test Article Deflections (m)

Dynamic	nil
Permanent	nil

Vehicle Damage

Exterior	
VDS	11LFQ4
CDC	11FLEK2 & 11LYEW3

Maximum Exterior Vehicle Crush (mm)	200
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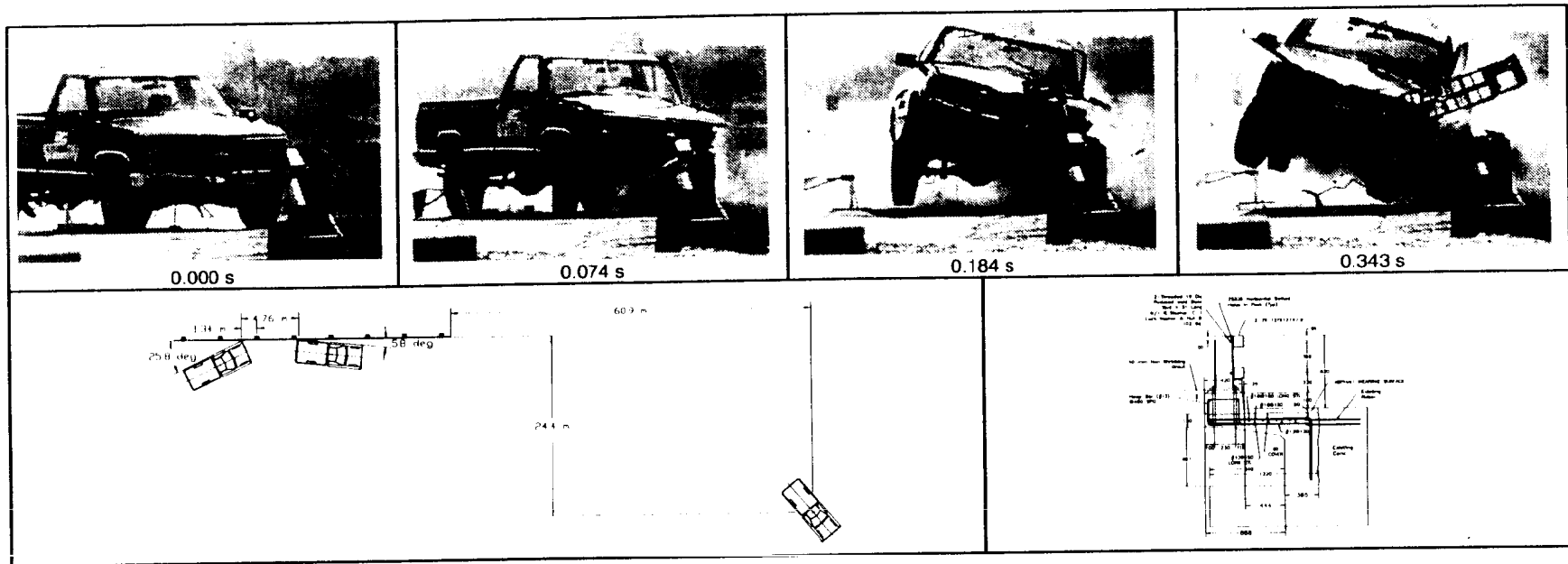
Interior	
OCDI	LF0012100

Max. Occ. Compart. Deformation (mm)	47
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Post-Impact Behavior

(during 1.0 s after impact)	
Max. Yaw Angle (deg)	31
Max. Pitch Angle (deg)	-4
Max. Roll Angle (deg)	-11

Figure 11. Summary of results for test 404311-1, NCHRP Report 350 test 4-10.



General Information

Test Agency Texas Transportation Institute
 Test No. 404311-2
 Date 10/14/98

Test Article

Type Bridge Rail
 Name Alaska Bridge Rail
 Installation Length (m) xx.x
 Material or Key Elements Tubular Steel Rail Elements on Steel Wide
 Flange Posts on Curb

Soil Type and Condition

..... Concrete deck, Dry

Test Vehicle

Type Production
 Designation 2000P
 Model 1995 Chevrolet 2500 Pickup Truck
 Mass (kg)
 Curb 2104
 Test Inertial 2000
 Dummy No dummy
 Gross Static 2000

Impact Conditions

Speed (km/h) 100.7
 Angle (deg) 25.8

Exit Conditions

Speed (km/h) 84.9
 Angle (deg) 5.8

Occupant Risk Values

Impact Velocity (m/s)
 x-direction 6.1
 y-direction -7.4
 THIV (km/h) 29.8
 Ridedown Accelerations (g's)
 x-direction -6.9
 y-direction 6.1
 PHD (g's) 12.0
 ASI 1.66
 Max. 0.050-s Average (g's)
 x-direction -8.2
 y-direction 13.8
 z-direction -6.4

Test Article Deflections (m)

Dynamic N/A
 Permanent 0.04

Vehicle Damage

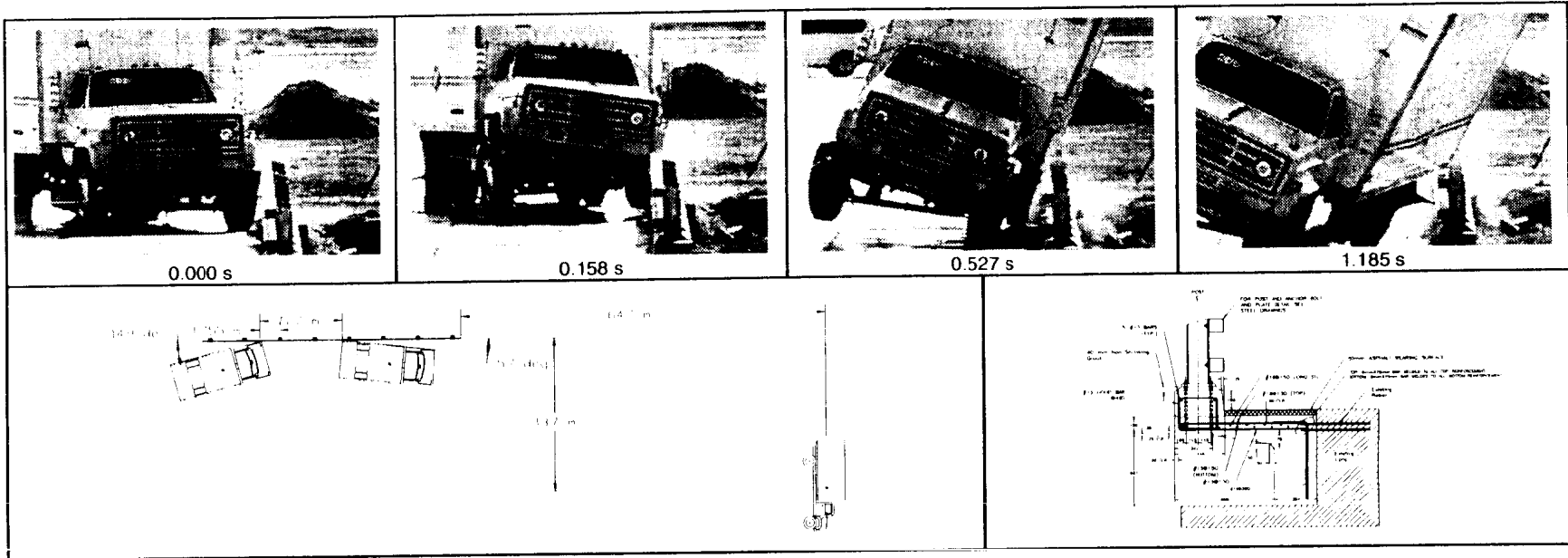
Exterior
 VDS 11LFQ5
 CDC 11FYEK3
 & 11LYEW3

Maximum Exterior
 Vehicle Crush (mm) 540
 Interior
 OCDI LF1112000
 Max. Occ. Compart.
 Deformation (mm) 115

Post-Impact Behavior

(during 1.0 s after impact)
 Max. Yaw Angle (deg) 40
 Max. Pitch Angle (deg) -5
 Max. Roll Angle (deg) -21

Figure 11. Summary of results for test 404311-2, NCHRP Report 350 test 4-11.



General Information

Test Agency Texas Transportation Institute
 Test No. 404311-3
 Date 01/07/99

Test Article

Type Bridge Rail
 Name or Manufacturer Alaska Bridge Rail
 Installation Length (m) 22.9
 Material or Key Elements Tubular Steel Rail Elements on Steel Wide Flange Posts on Curb

Soil Type and Condition

Standard soil, dry

Test Vehicle

Type Production
 Designation 8000S
 Model 1987 GMC single-unit truck
 Mass (kg)
 Curb 5384
 Test Inertial 8000
 Dummy No Dummy
 Gross Static 8000

Impact Conditions

Speed (km/h) 78.7
 Angle (deg) 14.9

Exit Conditions

Speed (km/h) 57.6
 Angle (deg) 5.7

Occupant Risk Values

Impact Velocity (m/s)
 x-direction 2.3
 y-direction 3.5
 THIV (km/h) 14.8
 Ridedown Accelerations (g's)
 x-direction -2.5
 y-direction 10.9
 PHD (g's) 11.0
 ASI 0.51
 Max. 0.050-s Average (g's)
 x-direction 1.7
 y-direction 4.5
 z-direction -1.5

Test Article Deflections (m)

Dynamic N/A
 Permanent 0.005

Vehicle Damage

Exterior
 VDS N/A
 CDC N/A
 Maximum Exterior
 Vehicle Crush (mm) 150
 Interior
 OCDI FS0000000
 Max. Occ. Compart.
 Deformation (mm) 0

Post-Impact Behavior

(during 1.0 s after impact)
 Max. Yaw Angle (deg) 24
 Max. Pitch Angle (deg) 3
 Max. Roll Angle (deg) -33

Figure 10. Summary of results for test 404311-3, NCHRP Report 350 test 4-12.