U.S. Department
of Transportation
Federal Highway
Administration

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

December 6, 2000

Refer to: HSA-1\HSA-B78

Richard A. Pratt, P.E.
Chief Bridge Engineer
Alaska Department of Transportation
and Public Facilities
3132 Channel Drive
Juneau, AK 99801-7898

Dear Mr. Pratt:

In your September 5 letter to Mr. Dwight Horne, former Director of our Office of Highway Safety Infrastructure, you requested formal acceptance of a National Cooperative Highway Research Program (NCHRP) Report 350 test level 3 (TL-3) transition design to the Alaska Multi-State Bridge Rail. A test level 4 (TL-4) transition has previously been accepted for use with this bridge rail. To support your request, you also sent copies of the August 2000 report prepared by the Texas Transportation Institute, "NCHRP Report 350 Test 3-20 of the Alaska Multi-State W-Beam Transition" and the July 2000 report, "NCHRP Report 350 Test 3-21 of the Alaska Multi-State Bridge Rail W-Beam Transition," plus video tapes showing the two tests that were conducted.

As shown in detail in Enclosure 1, the transition consists of two nested 12-gage W-beam panels connected to the Alaska Two-Rail Bridge Rail with a standard W-beam terminal connector and a fabricated steel connection plate. The connection plate was designed to permit use of either the W-beam or Thrie-beam transition without having to modify the bridge rail. Posts 15 through 17 are W200 x 19 x 2090-mm long, each having blockouts 360-mm high fabricated from TS 356 x 102 steel. Post 17, immediately adjacent to the bridge, is offset 1145 mm from the first bridge rail post. Posts 11 through 14 are W150 x 13.5 x 1980-mm long and have W360 x 33 steel blocks. Post embedment depths, shown in Enclosure 1, vary to match the approach rail to the Alaska Bridge rail. The concrete curb was flared back 114-mm over its last 457 mm to minimize wheel snagging at that point.

Review of the test reports and video tapes confirm that the Alaska W-beam transition meets the NCHRP Report 350 evaluation criteria for TL-3 performance. Summary sheets for the two tests that were conducted are shown in Enclosure 2. However, there was significant vehicle contact near the first bridge rail post in both tests. This resulted in 170-mm of intrusion in the driver's side kick panel of the 820-kg car and a considerable amount of damage to the bridge deck during the pickup truck impact. As a result of this performance, you stated that this design will be used

primarily on roads with low traffic volumes and design speeds. It may be possible to improve the design significantly by extending the curb beyond the end of the bridge deck, thereby minimizing vehicular snagging and damage to the structure at this location. It appears that the wheels of both test vehicles folded under the slightly-raised W-beam and contributed heavily to both vehicular and structural damage. An approach curb, leading away from the bridge and tapered under the transition, would likely minimize the extent of this intrusion.

Based on staff review of the test reports and the video tapes, I concur that the TL-3 Alaska W-beam transition design, as tested, may be used in conjunction with your Multi-State Bridge Rail on the National Highway System when such use is requested by a transportation agency. I understand that the design, like the bridge rail, is non-proprietary and that copies of detailed plans and specifications can be obtained directly from you upon request.

Sincerely yours,

Frederick G. Wright, Jr.
Program Manager, Safety

2 Enclosures

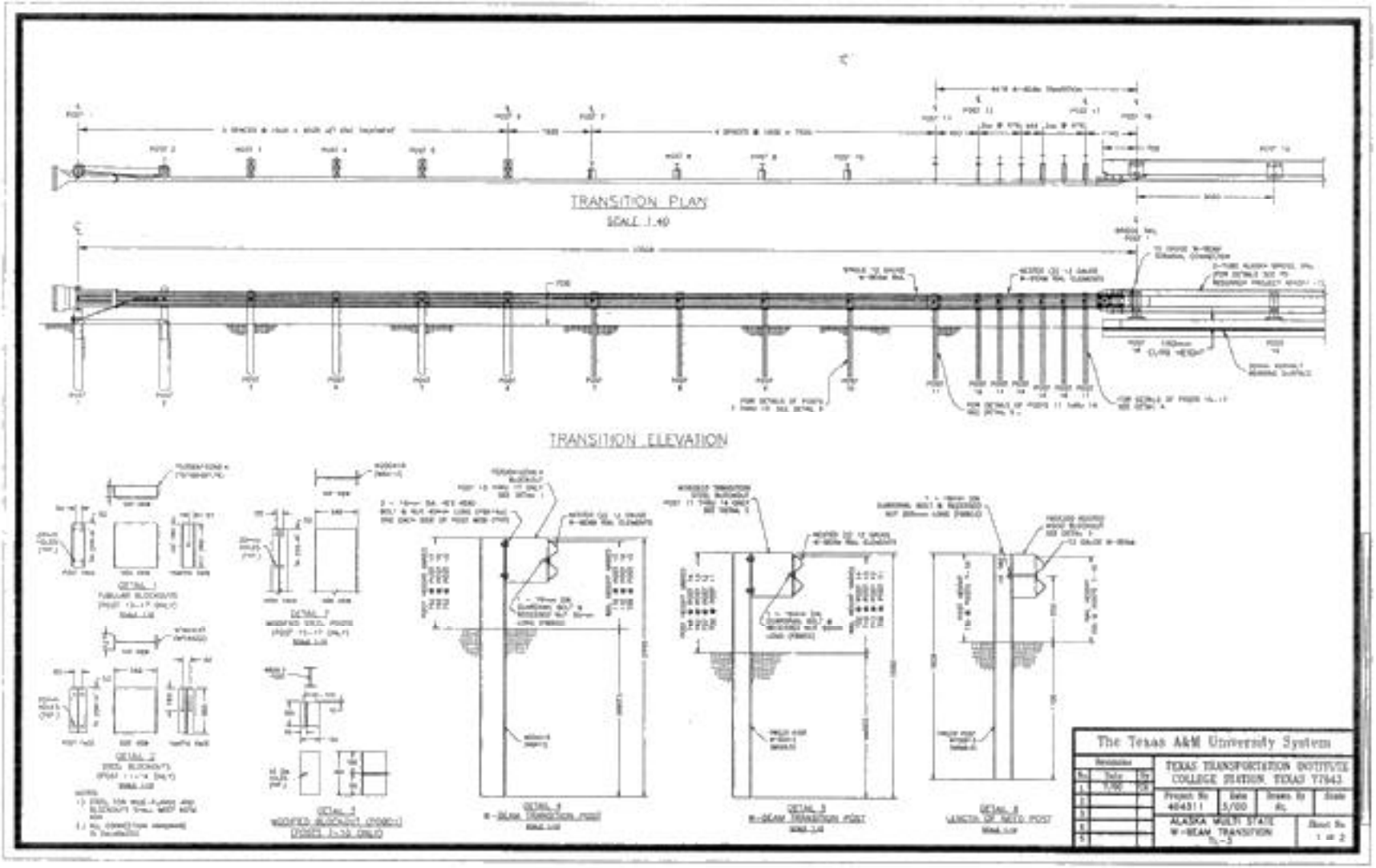


Figure 1. Details of the Alaska Multi-State W-Beam Transition.

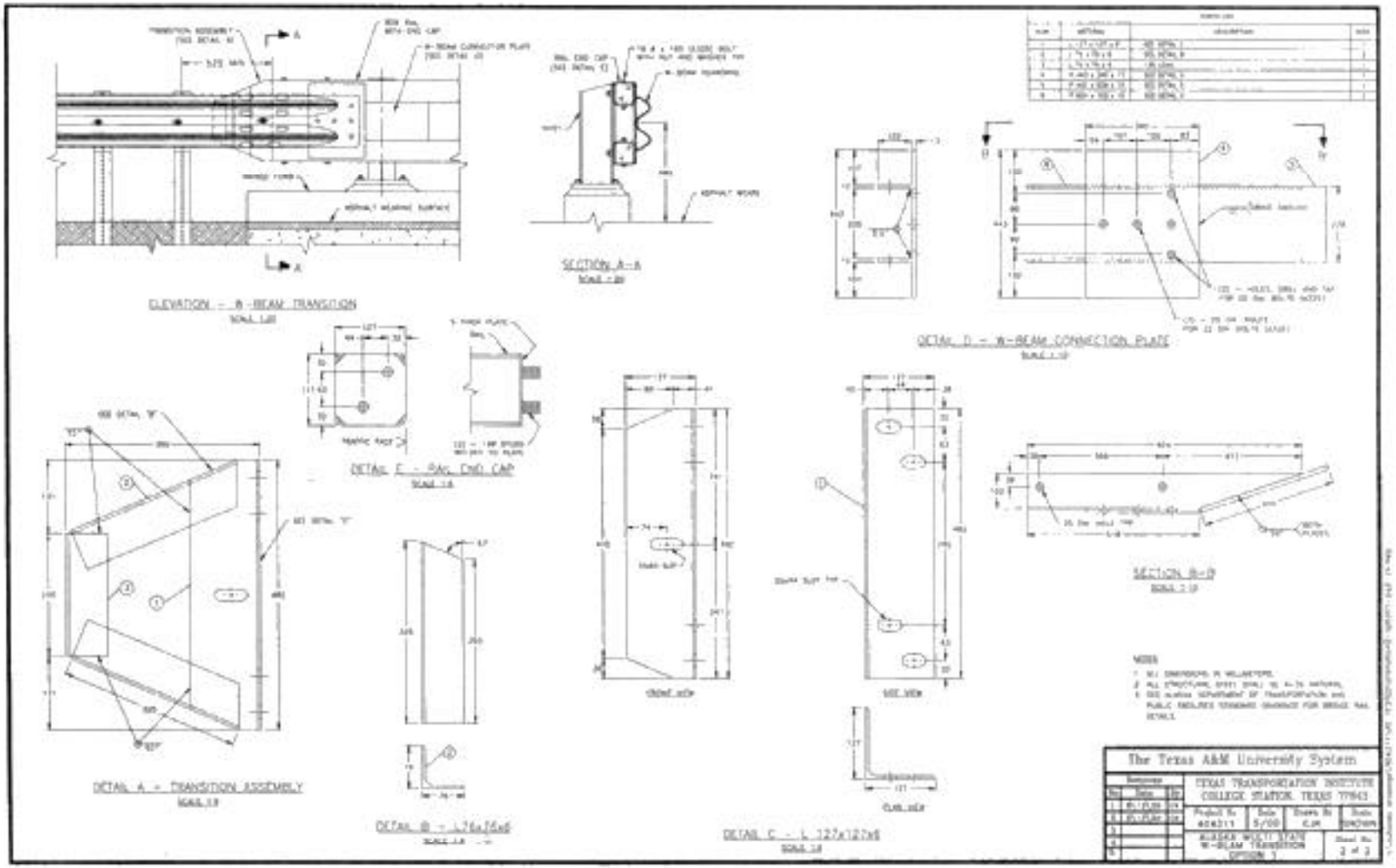
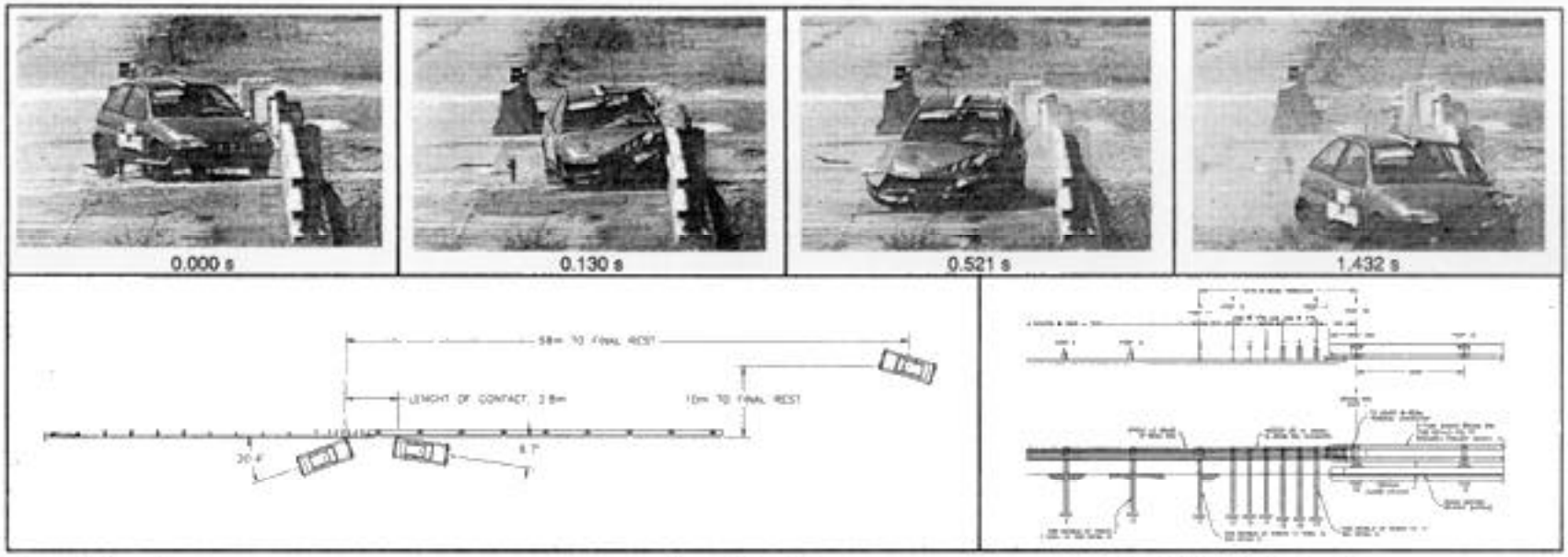


Figure 1. Details of the Alaska Multi-State W-Beam Transition (continued).



General Information

Test Agency	Texas Transportation Institute
Test No.	404311-8
Date	07/17/00

Test Article

Type	Transition
Name	Alaska W-beam Transition
Installation Length (m)	22.8
Material or Key Elements	W-Beam Attached to Tubular Bridge Rail
Soil Type and Condition	Standard Soil, Dry

Test Vehicle

Type	Production
Designation	820C
Model	1995 Geo Metro
Mass (kg)	
Curb	858
Test Inertial	820
Dummy	75
Gross Static	895

Impact Conditions

Speed (km/h)	98.8
Angle (deg)	20.4

Exit Conditions

Speed (km/h)	77.5
Angle (deg)	8.7

Occupant Risk Values

Impact Velocity (m/s)	
x-direction	5.3
y-direction	7.9
THIV (km/h)	33.4
Ridedown Accelerations (g's)	
x-direction	-9.4
y-direction	5.1
PHD (g's)	9.5
ASI	1.70
Max. 0.050-s Average (g's)	
x-direction	-9.0
y-direction	13.9
z-direction	2.6

Test Article Deflections (m)

Dynamic	N/A
Permanent	.005

Vehicle Damage

Exterior	
VDS	11LFQ4
CDC	11FLEK3
Maximum Exterior Vehicle Crush (mm)	350
Interior	
OCDI	LF0120000
Max. Occ. Compart. Deformation (mm)	170

Post-Impact Behavior

(during 1.0 s after impact)

Max. Yaw Angle (deg)	27
Max. Pitch Angle (deg)	-6
Max. Roll Angle (deg)	-11

Figure 11. Summary of Results for test 404311-8, *NCHRP Report 350* test 3-20.