U.S. Department
of Transportation
Federal Highway Administration

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

March 6, 1998

Refer to: HNG-14

Mr. Rich Peter
Chief, Roadside Safety Technology Unit
Office of Materials Engineering and
Testing Services - MS #5
P.O. Box 19128
Sacramento, California 95819-0128

Dear Mr. Peter:

In your February 17 letter to Mr. Henry Rentz, you requested Federal Highway Administration's acceptance of the California Department of Transportation Type 70 Bridge Rail at the National Cooperative Highway Research Program (NCHRP) Report 350 test level 4 (TL-4). To support this request, you sent us a copy of your report: "Vehicle Crash Tests of the Type 70 Bridge Rail," dated January 1998, and a copy of a video tape documenting the certification tests that were conducted.

Our review of this material indicated that the Type 70 Bridge Rail is an 810-mm tall concrete barrier with its traffic face sloped at a constant 9.1 degrees away from traffic. This face geometry is identical to your Type 60 roadside/median barrier that was accepted for use on the National Highway System (NHS) at TL-3 in my February 4 letter to you. However, the Type 70 Bridge Rail has a vertical back face with some architectural treatment and is more heavily reinforced than the Type 60. Design details are shown in Enclosure 1.

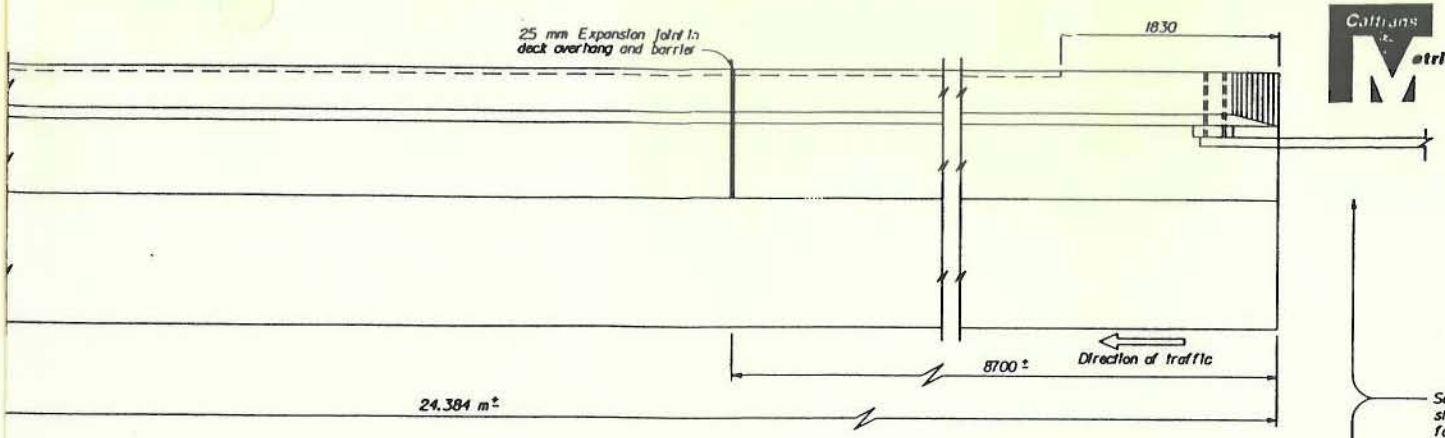
We noted that three tests were reported, including test 4-12 with an 8000 kg single-unit truck impacting the barrier at an angle of 15 degrees and a speed of 80 km/h Each of these tests met appropriate NCHRP Report 350 evaluation criteria. The individual test results are summarized in Enclosure 2. We noted also that test 4-11 was re-run after a first unsuccessful attempt in which the pickup truck rolled over after impact. You theorized that the non-standard floating rear hub of the test vehicle caused the drive shaft to pull out of the transmission housing on impact and that the shaft then dug into the test track and precipitated the rollover. This test was then re-run with a pickup truck with a standard wheel hub. Considering the successful retest and the earlier pickup truck tests with your Type 60 constant slope barrier as well as successful pickup tests with the New Jersey, F-profile, and the Texas Department of Transportation constant slope barrier, we are willing to consider test 512 (NCHRP Report 350 test 4-11) as an anomaly.

Based on the above, we consider the California Type 70 Bridge Rail a NCHRP Report 350 TL-4 design that may be used on the NHS when proposed by a State or local transportation agency. Since you did not provide any details on your transition design, nor submit any crash-test results, our acceptance is limited at this time to the design of the bridge rail itself. By copy of this letter, we will advise our field offices of this finding. Please call Mr. Richard Powers of my staff at (202) 366-1320, if you have any questions.

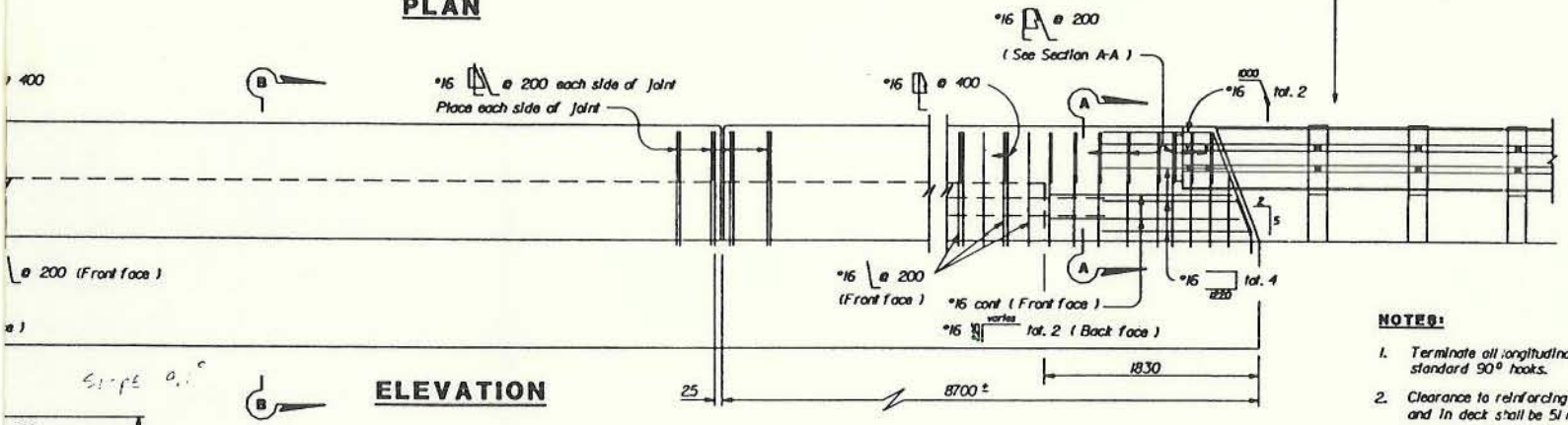
Sincerely yours,

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

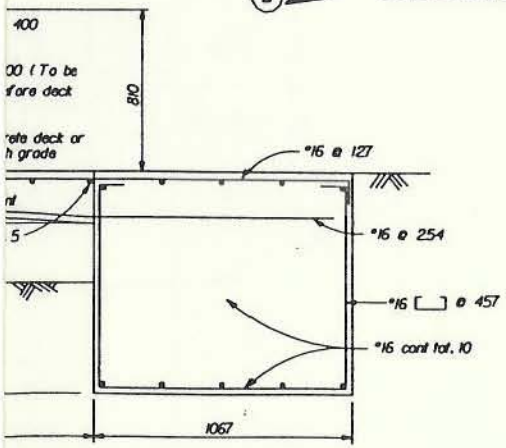
2 Enclosures



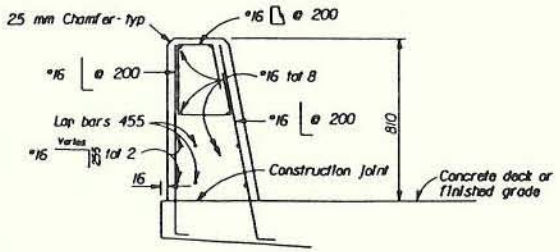
PLAN



ELEVATION



TYPICAL SECTION



SECTION

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOT SHE

Caltrans Metric

REGISTERED ENGINEER - CIVIL

R.C. ANDERSON 17180 Exp. 6-30-97 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

LOAD FACTOR DESIGN

Reinforced concrete fy = 413.68 MPa
f'c = 22.408 MPa

See " Approach Guardrail " sheet for configuration and for connection details (A78E)

NOTES:

1. Terminate all longitudinal rail and deck reinforcement in standard 90° hooks.
2. Clearance to reinforcing steel in barrier shall be 25 mm and in deck shall be 51 mm.

NO SCALE
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY R. BISHOP	CHECKED R. C. ANDERSON	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES STRUCTURE DESIGN	BRIDGE NO.
DETAILS	BY R. YEE	CHECKED R. BISHOP			KILOMETER POST
QUANTITIES	BY R. BISHOP	CHECKED R. C. ANDERSON			BRIDGE BARRIER TESTS A & B TYPE 732 CONCRETE BARRIER DETAILS

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU
EA

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

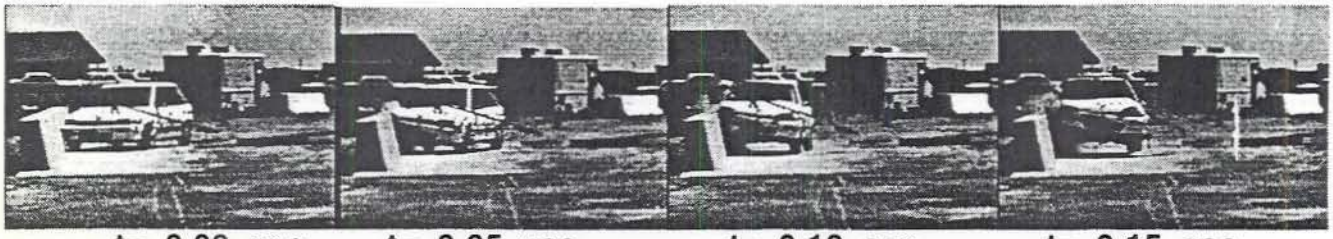
REVISION DATES (PRELIMINARY STAGE ONLY)

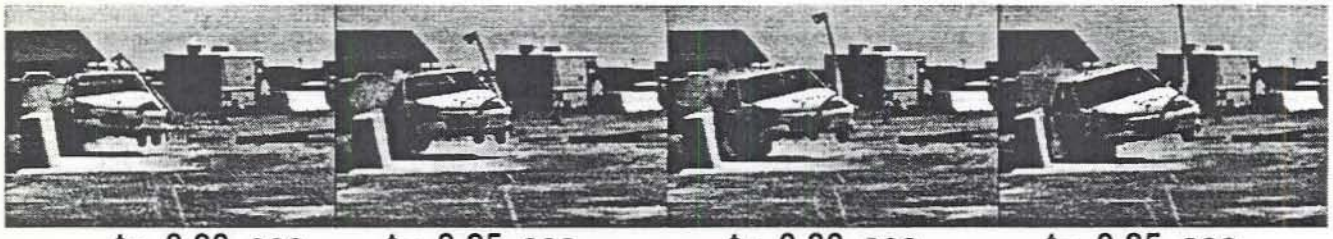
SHEET 3 OF 7

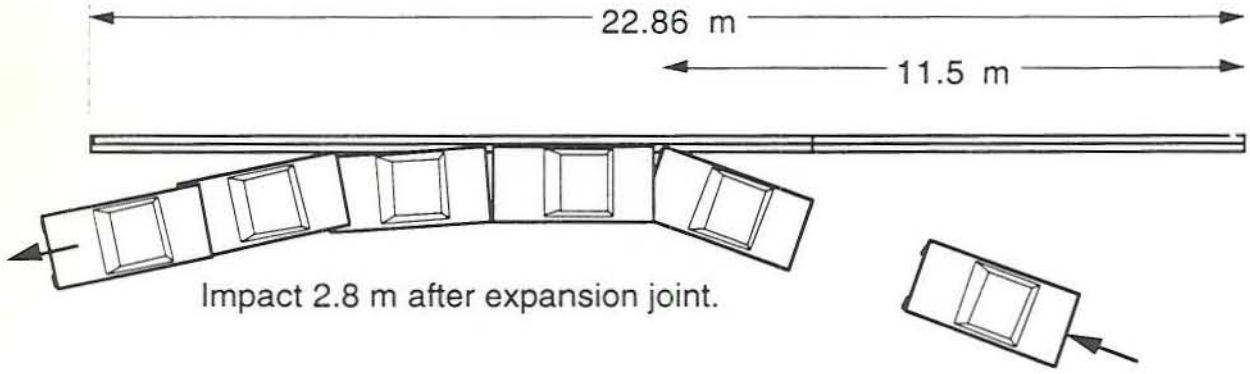
Enclosure 1

2. TECHNICAL DISCUSSION (Continued)

Figure 2.13 - Test 511 Data Summary Sheet





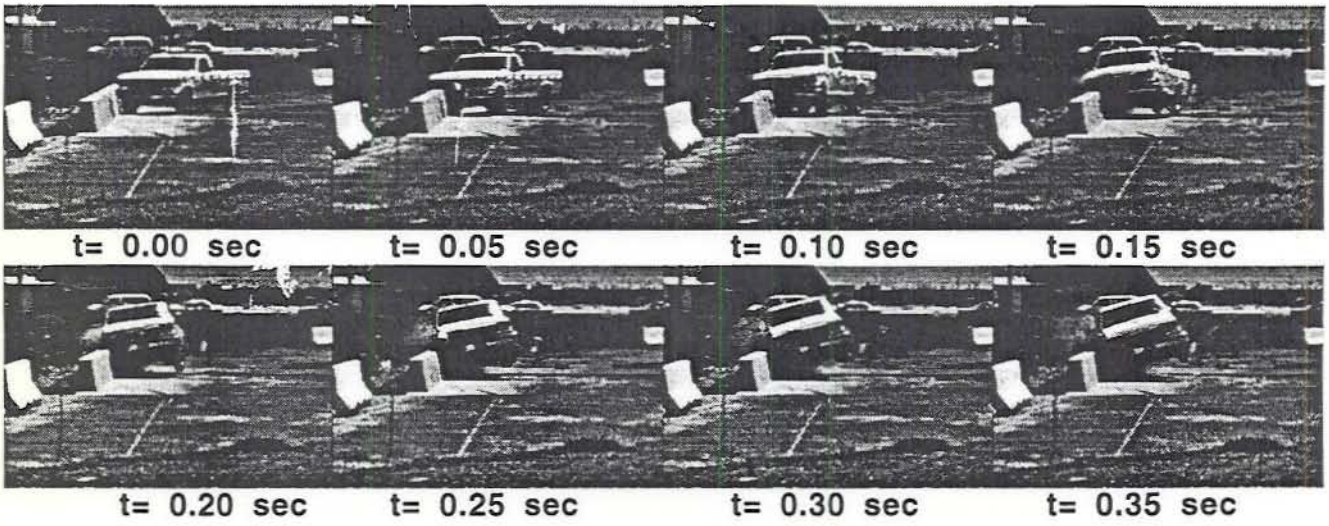


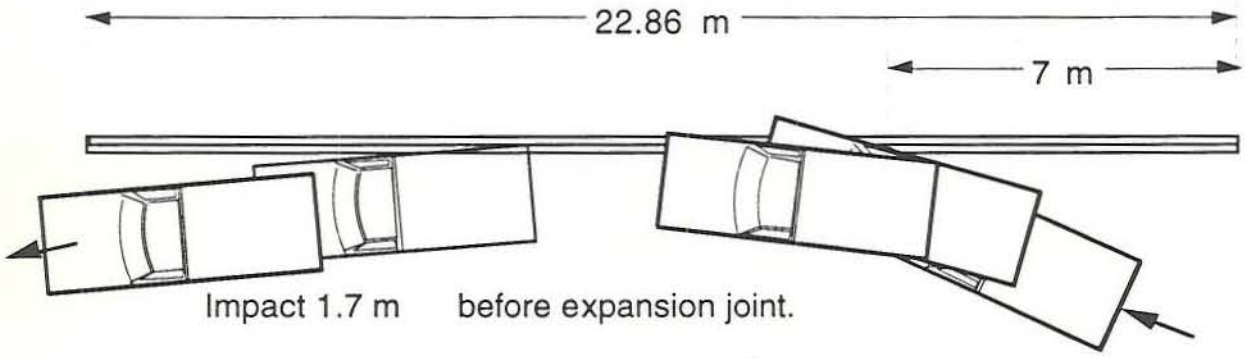
Test Barrier

Type:	Type 70 Bridge Rail
Length:	22.9 m
Test Date:	May 6, 1997
Test Vehicle:	
Model:	1992 Geo Metro
Inertial Mass:	843 kg
Impact / Exit Velocity:	104.1 km/h / 92 km/h
Impact / Exit Angle:	20.0 / 12.1°
Test Dummy:	
Type:	Hybrid III
Weight / Restraint:	74.8 kg / lap and shoulder
Position:	Front Right
Test Data:	
Occ. Impact Velocity (Long / Lat):	4.51 m/s / 7.22 m/s
Ridedown Acceleration (Long / Lat):	-2.9g / -16.0g
Max. 50 ms Avg. Accel (Long / Lat):	-7.0g / -13.4g
Exterior: VDS[7]/CDC[8]	FR-5, RD-4 / 12RFEW3
Interior: OCDI[1]	RF0000110
Barrier Damage:	Only superficial scuffing

2. TECHNICAL DISCUSSION (Continued)

Figure 2.22 - Test 512 Data Summary Sheet



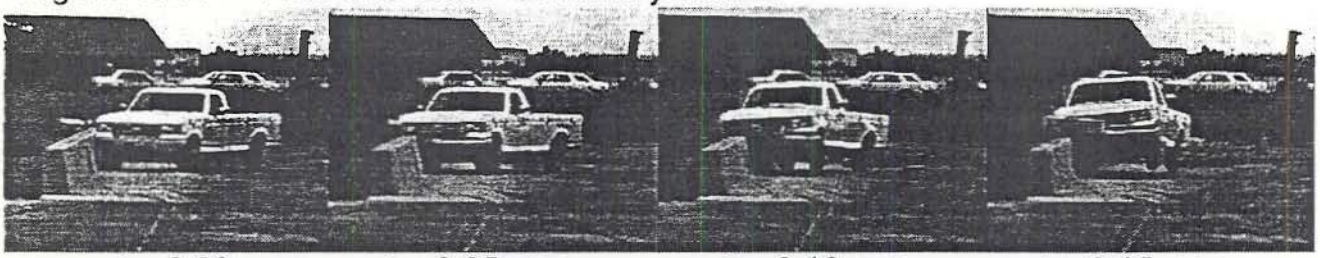


Test Barrier

Type:	Type 70 Bridge Rail
Length:	22.9 m
Test Date:	June 11, 1997
Test Vehicle:	
Model:	1991 Ford F250
Inertial Mass:	2018 kg
Impact / Exit Velocity:	97.0 km/h / 65 km/h
Impact / Exit Angle:	25.1° / 5°
Test Dummy:	
Type:	NA
Weight / Restraint:	NA
Position:	NA
Test Data:	
Occ. Impact Velocity (Long / Lat):	6.07 m/s / 8.2 m/s
Ridedown Acceleration (Long / Lat):	-6.9g / -6.7g
Max. 50 ms Avg. Accel (Long / Lat):	-7.1g / -14.6g
Exterior: VDS[7]/CDC[8]	FR-5, RD-5/ 01RFEW3
Interior: OCD[1]	RF0150013
Barrier Damage:	The barrier sustained a 200 mm long gouge just upstream from the impact area. The gouge was 20 to 100 mm wide and 0 to 20 mm deep.

2. TECHNICAL DISCUSSION (Continued)

Figure 2.44 - Test 515 Data Summary Sheet



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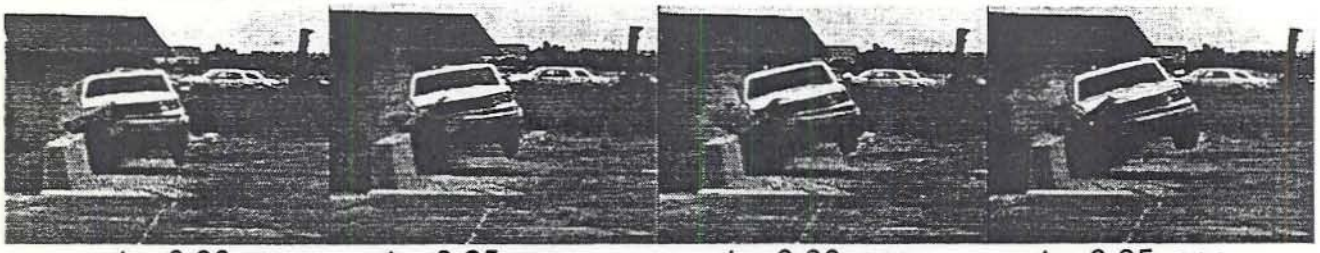
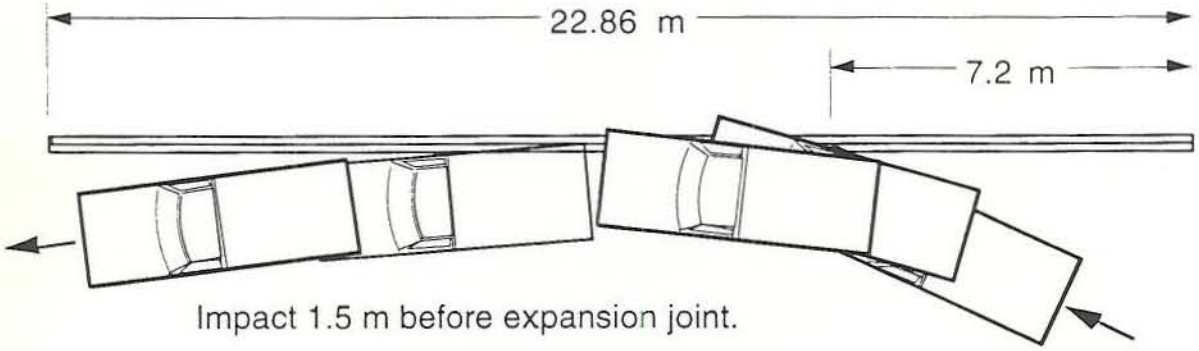


t= 0.20 sec t= 0.25 sec t= 0.30 sec t= 0.35 sec



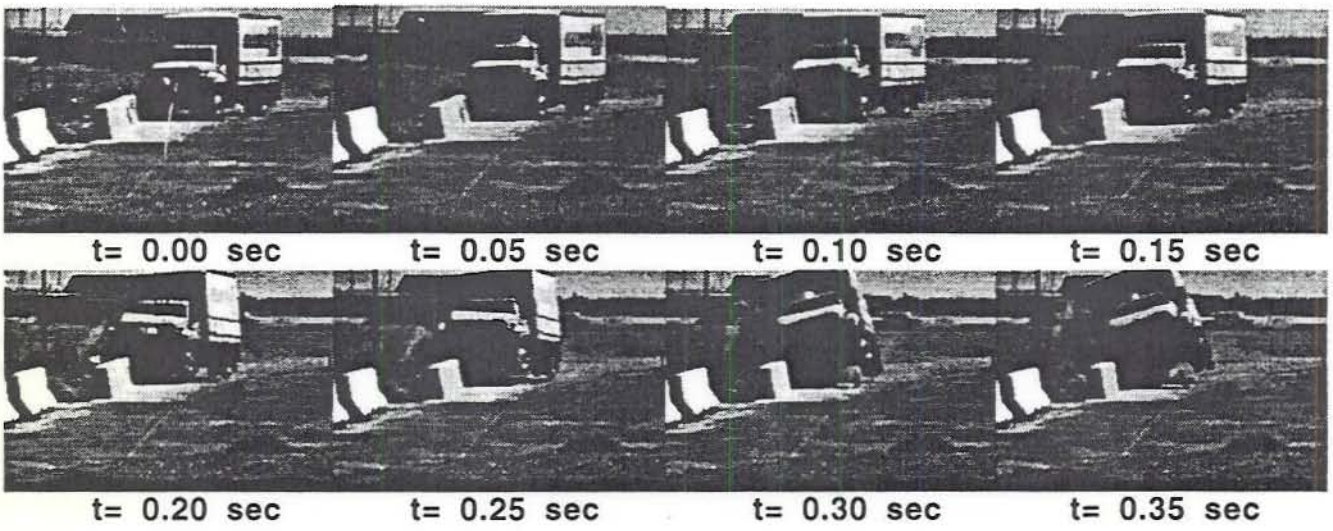
Impact 1.5 m before expansion joint.

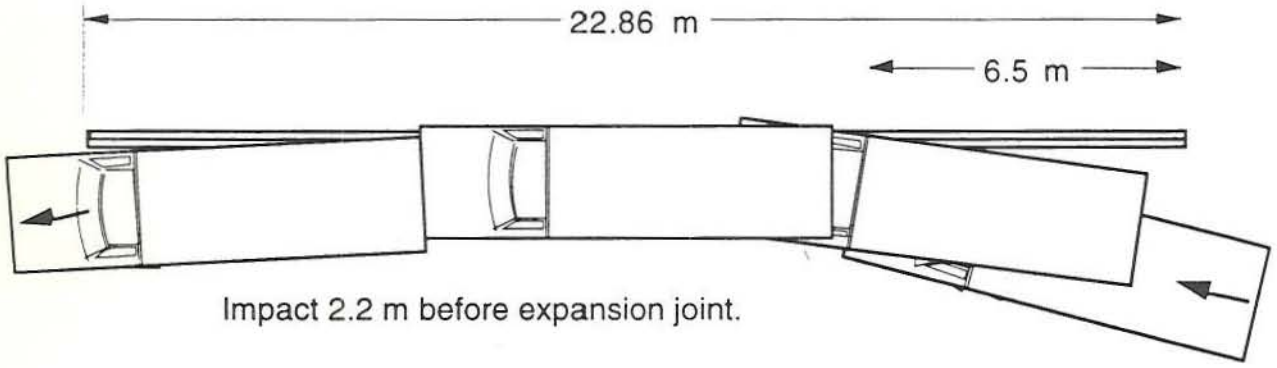
Test Barrier

Type:	Type 70 Bridge Rail
Length:	22.9 m
Test Date:	July 23, 1997
Test Vehicle:	
Model:	1991 Ford F250
Inertial Mass:	2009
Impact / Exit Velocity:	100.4 km/h / 54 km/h
Impact / Exit Angle:	24.2° / 8°
Test Dummy:	
Type:	NA
Weight / Restraint:	NA
Position:	NA
Test Data:	
Occ. Impact Velocity (Long / Lat):	5.46 m/s / 6.16 m/s
Ridedown Acceleration (Long / Lat):	-8.2g / -14.1g
Max. 50 ms Avg. Accel (Long / Lat):	-5.7g / -11.9g
Exterior: VDS[7]/CDC[8]	FR-5, RD-5 / 01RFEW3
Interior: OCDI[1]	RF0001000
Barrier Damage:	Damage consisted of only moderate scraping and tire scuffing over a length of four meters

2. TECHNICAL DISCUSSION (Continued)

Figure 2.34 - Test 513 Data Summary Sheet





Impact 2.2 m before expansion joint.

Test Barrier

Type:	Type 70 Bridge Rail
Length:	22.9 m
Test Date:	September 3, 1997
Test Vehicle:	
Model:	1992 GMC Topkick
Inertial Mass:	8010 kg
Impact / Exit Velocity:	83.5 km/h / 71 km/h
Impact / Exit Angle:	15.0 / 4°
Test Dummy:	
Type:	NA
Weight / Restraint:	NA
Position:	NA
Test Data:	
Occ. Impact Velocity (Long / Lat):	not measured
Ridedown Acceleration (Long / Lat):	not measured
Max. 50 ms Avg. Accel (Long / Lat	not measured
Interior: OCDI[1]	RF0000000
Barrier Damage:	The barrier was scraped during the time of vehicle contact. Damage was mainly limited to minor spalling.