May 18, 1999

Refer to: HMHS-B53

Rich Peter, Chief
Roadside Safety Technology Section
Office of Materials Engineering and
Testing Services - MS #5
5900 Folsom Boulevard
Sacramento, California 95819-0128

Dear Mr. Peter:

In your April 6 letter to Mr. Henry Rentz, you requested formal Federal Highway Administration acceptance of the California Type 80 Bridge Rail at NCHRP Report 350 test level 4 (TL-4). To support your request, you also sent a copy of your March 1999 report entitled "Vehicle Crash Tests of the Type 80 Bridge Rail" and a video tape of the three tests you conducted. Copies of these materials were also sent to Mr. Charles McDevitt for his concurrent review and comments.

The Type 80 Bridge Rail is an aesthetic concrete post and beam design incorporating a 230-mm high curb, a 280-mm clear opening, and a 300-mm deep top beam. The posts are offset 100 mm from the face of the upper beam. Enclosure 1 is a schematic drawing of the final design. Staff members have reviewed the results of the tests you conducted on the Type 80 Bridge Rail and concur with your assessment that appropriate NCHRP Report 350 evaluation criteria were met. The summary results of each test are shown in Enclosure 2. This design may be considered acceptable for use on the National Highway System (NHS) as a TL-4 bridge railing.

As you recall, you previously sent information to Mr. Rentz on a similar design called the Type 80SW Bridge Railing. This design was identical to the Type 80, but it was tested behind a 200-mm high curb and a 1500-mm wide sidewalk. Additionally, it had a horizontal TS 51 x 51 x 4.8 steel tube at the midpoint of the clear opening, and a TS 76 x 51 x 4.8 steel tube mounted on the top beam to raise the total height to 1060 mm. This design is shown in Enclosure 3. The Type 80SW Bridge Railing was actually tested at TL-4, but there was significant passenger compartment intrusion when this design was impacted by the 2000-kg pickup truck at 100 k/hr and at an angle of 25 degrees. Summary results for all three tests are shown in Enclosure 4. My December 2, 1998 letter to you indicated that we would accept the Type 80SW Bridge Rail as a TL-2 design without additional testing, thus permitting its use on the NHS at locations where impact speeds are not expected to exceed 70 k/hr.

There is a significant interest in acceptable, aesthetic bridge railing designs nationwide. I am assuming that any agency interested in using the Type 80 or the Type 80SW designs will be able to obtain copies of detailed plans and specifications directly from your Department.

Sincerely yours,

(original signed by Dwight A. Horne)

Dwight A. Horne
Director, Office of Highway Safety Infrastructure

4 Enclosures

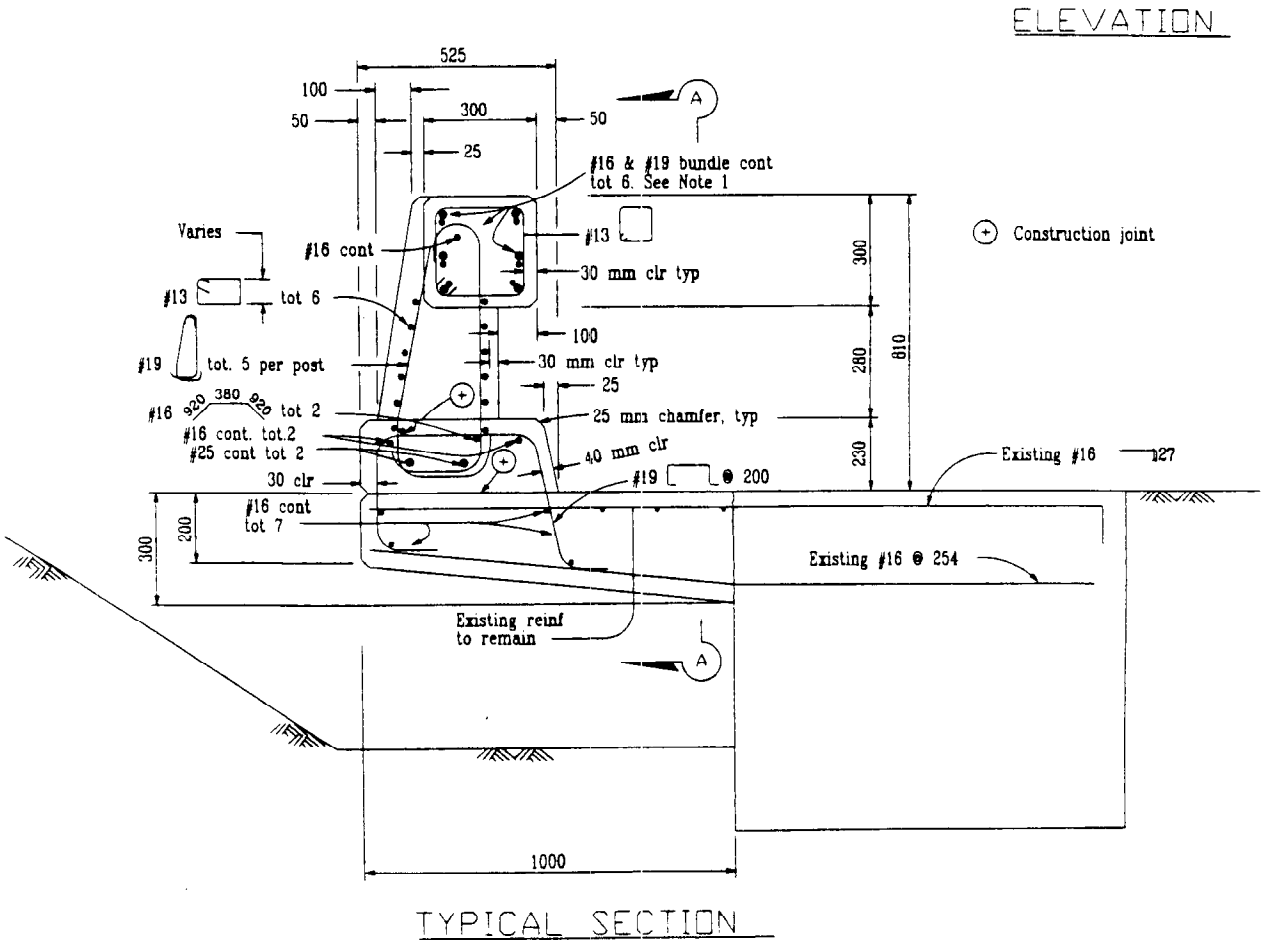
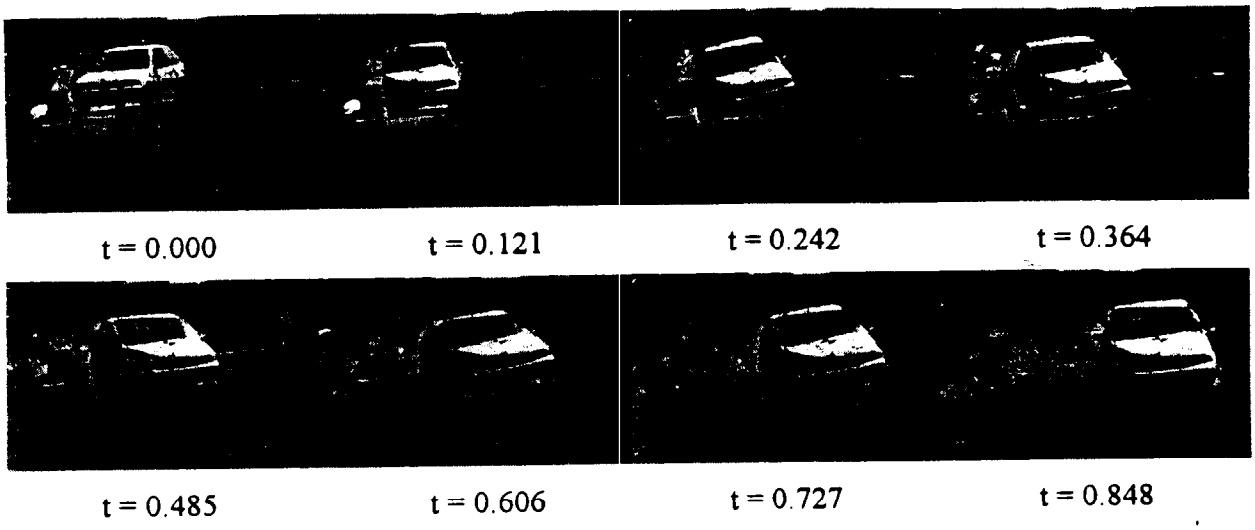
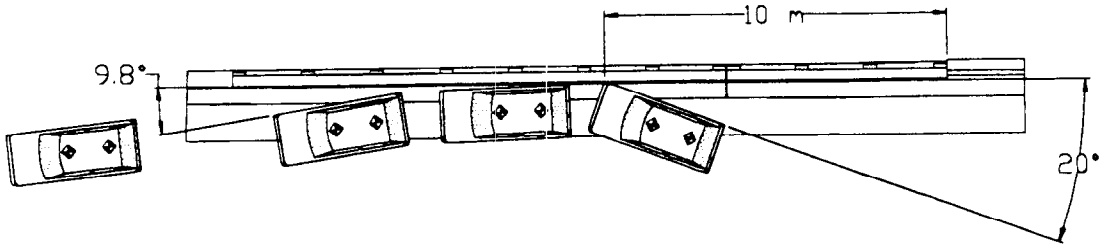

ELEVATION
525
100
50
300
50
25
A
#16 & #19 bundle cont
tot 6. See Note 1
Varies
#13
tot 6
#16 cont
#13
30 mm clr typ
Construction joint
#19
tot. 5 per post
100
30 mm clr typ
25
#16
920
380
920
tot 2
25 mm chamfer, typ
#16 cont. tot.2
#25 cont tot 2
40 mm clr
30 clr
#19
@ 200
Existing #16
#16 cont
tot 7
Existing #16 @ 254
Existing reinf
to remain
A
1000
300
200
300
280
230
810
TYPICAL SECTION

Figure 2-22 Test 544 Data Summary Sheet





General Information:
- Test Agency ..... California DOT
- Test Number 544
- Test Date ..... September 16, 1998

Test Article:
- Name ..... Type 80 bridge rail
- Installation Length ..... 23.1 m
- Description ..... Post and beam reinforced concrete bridge railing

Test Vehicle:
- Model ..... 1994 Geo Metro
- Inertial Mass ..... 799 kg

Impact Conditions:
- Velocity ..... 111.1 km/h
- Angle ..... 20°

Exit Conditions:
- Velocity ..... 99 km/h
- Angle ..... 9.8°

Test Dummy:
- Type ..... Hybrid III
- Weight / Restraint ..... 75 kg / lap, shoulder belt
- Position ..... Front Right

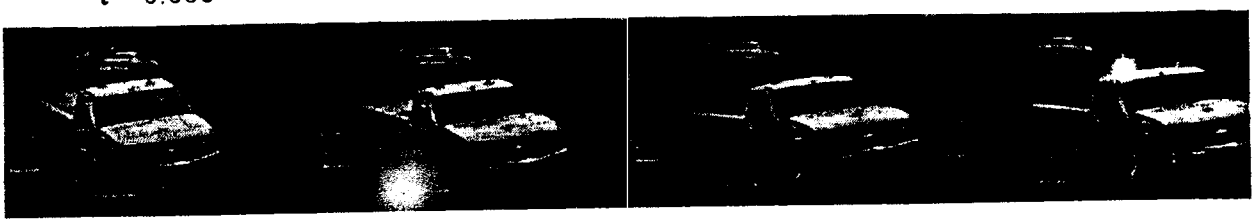
Vehicle Exterior:
- VDS[10] FR-5, RD-4
- CDC[11] 02RFEW3

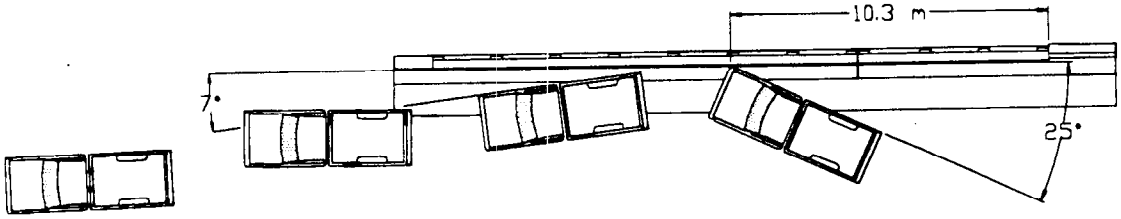
Vehicle Interior:
- OCDI[1] RF0000000

Barrier Damage: ..... Superficial scuffing

Occupant Risk Values	*Longitudinal*	*Lateral*
Occupant Impact Velocity	6.69 m/s	7.46 m/s
Ridedown Acceleration	-2.99 g	-8.15 g
Max. 50ms avg. Acceleration	-10.68 g	-14.07 g

Figure 2-32 Test 545 Data Summary Sheet





General Information:
- Test Agency ..... California DOT
- Test Number 545
- Test Date ..... December 2, 1998

Test Article:
- Name ..... Type 80 bridge rail
- Installation Length ..... 23.1 m
- Description ..... Post and beam reinforced concrete bridge railing

Test Vehicle:
- Model ..... 1994 Chevrolet 2500
- Inertial Mass ..... 1947 kg

Impact Conditions:
- Velocity ..... 100.8 km/h
- Angle ..... 25°

Exit Conditions:
- Velocity ..... 88.5 km/h
- Angle ..... 7°

Test Dummy:
- Type ..... None used
- Weight / Restraint ..... NA
- Position ..... NA

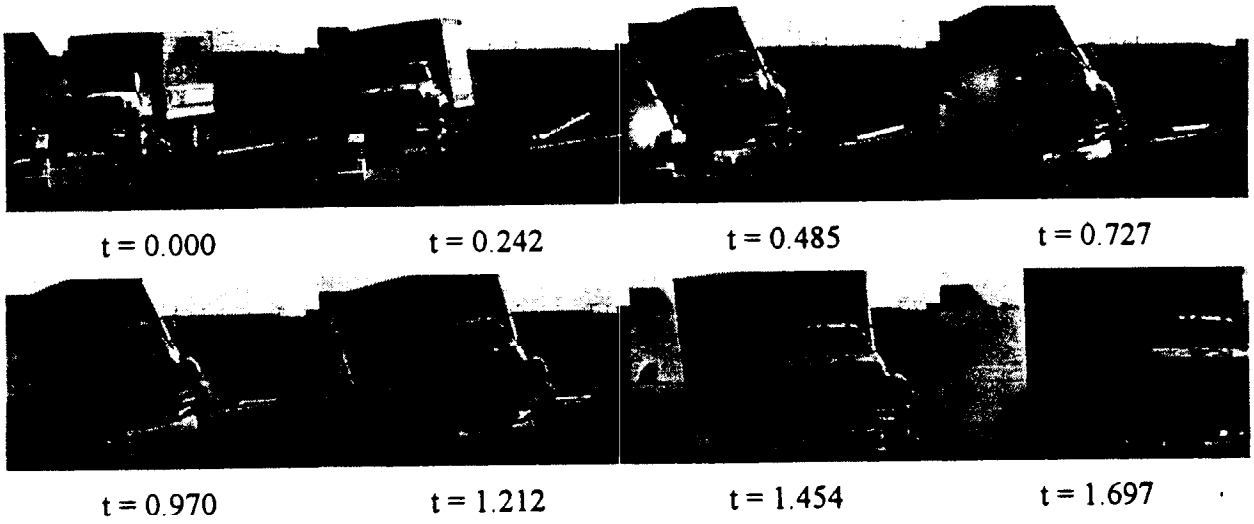
Vehicle Exterior:
- VDS[10] FR-5, RD-6
- CDC[11] 02RFEW9

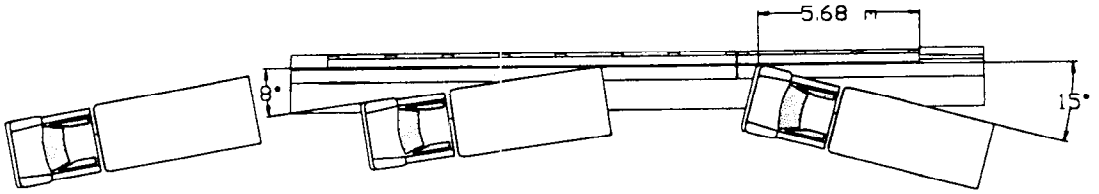
Vehicle Interior:
- OCDI[1] RF0011000

Barrier Damage: ..... The barrier sustained minor spalling from the point of impact to 2 m downstream. Other barrier damage was cosmetic, consisting of scrapes and tire marks, with no structural damage.

Occupant Risk Values	*Longitudinal*	*Lateral*
Occupant Impact Velocity	5.76 m/s	6.97 m/s
Ridedown Acceleration	-3.51 g	-8.60 g
Max. 50ms avg. Acceleration	-8.86 g	-13.52 g

Figure 2-43 Test 546 Data Summary Sheet





General Information:
- Test Agency ..... California DOT
- Test Number 546
- Test Date ..... November 4, 1998

Test Article:
- Name ..... Type 80 bridge rail
- Installation Length ..... 23.1 m
- Description ..... Post and beam reinforced concrete bridge railing

Test Vehicle:
- Model ..... 1993 GMC TopKick
- Inertial Mass ..... 8056 kg
- Ballast ..... 2994 kg

Impact Conditions:
- Velocity ..... 80.1 km/h
- Angle ..... 15.0°

Exit Conditions:
- Velocity ..... 64.7 km/h
- Angle ..... 8°

Test Dummy:
- Type ..... None used
- Weight / Restraint ..... NA
- Position ..... NA

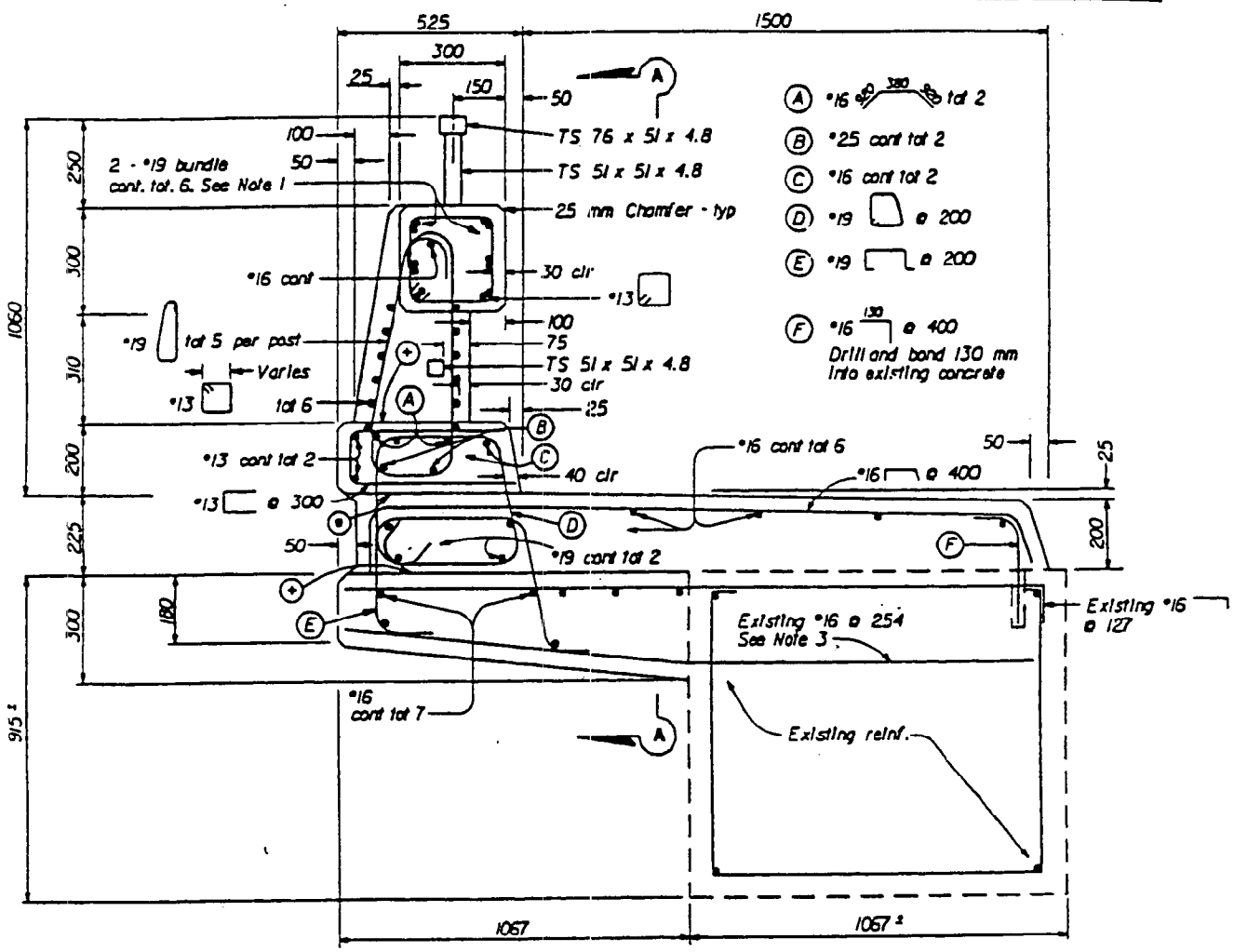
Vehicle Exterior:
- VDS10 ..... NA
- CDC11 ..... NA

Vehicle Interior:
- OCDI1 ..... RF0000000

Barrier Damage: ..... The barrier sustained minor spalling near the point of impact and at the expansion joint. Other barrier damage was cosmetic, consisting of scrapes and tire marks, with no structural damage.

Occupant Risk Values	*Longitudinal*	*Lateral*
Occupant Impact Velocity	Not measured	
Ridedown Acceleration	Not measured	
Max. 50ms avg. Acceleration	Not measured	

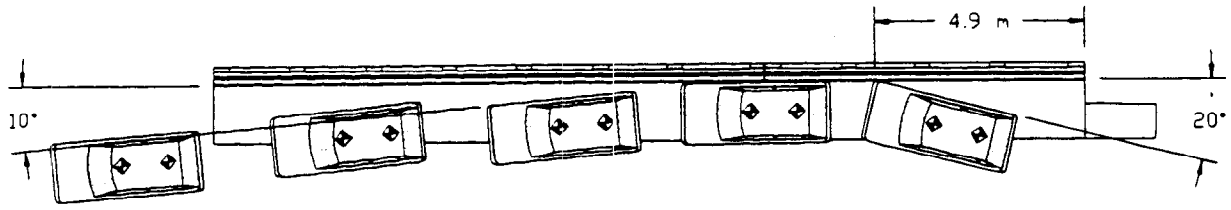
ELEVATION



TYPICAL SECTION

Figure 2-27 - Test 541 Data Summary Sheet

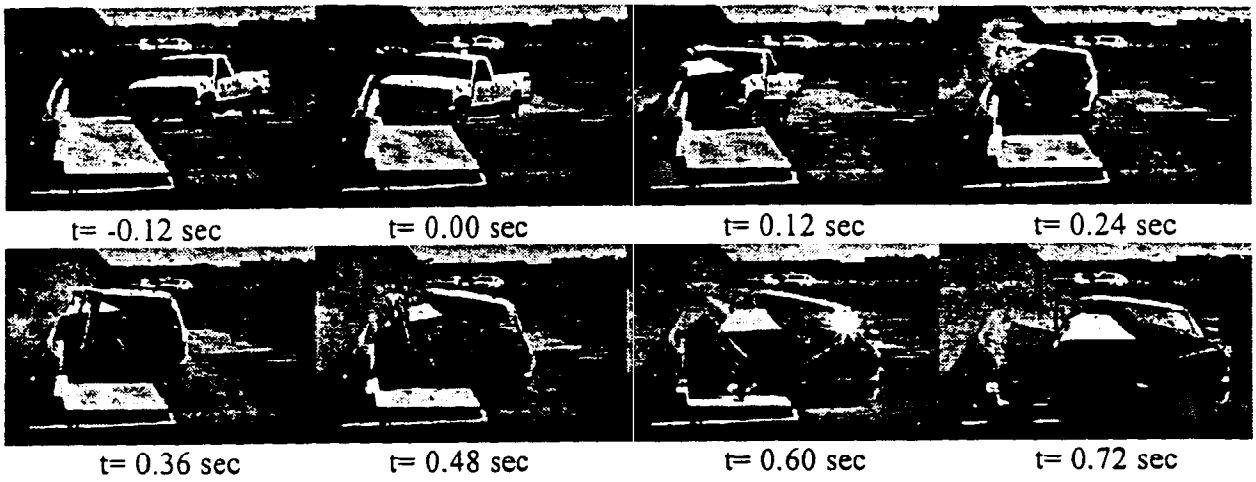
Frontal impact photo series unavailable,
refer to Figure 2-18 for alternate photo series.

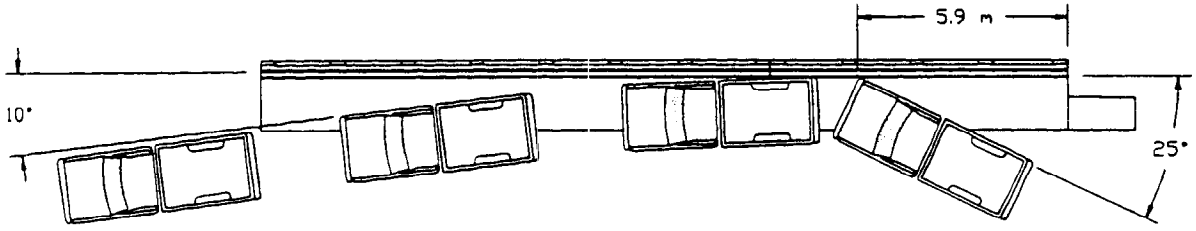


Test Barrier

Type:	Type 80SW
Length:	22.8 m
Test Date:	December 10, 1997
Test Vehicle:	
Model:	1992 Geo Metro
Inertial Mass:	823 kg
Impact / Exit Velocity:	102 km/h / 75 km/h
Impact / Exit Angle:	20° / 10°
Test Dummy:	
Type:	Hybrid III
Weight / Restraint:	74.8 kg / lap and shoulder
Position:	Front Right
Test Data:	
Occ. Impact Velocity (Long / Lat):	5.98 m/s / 6.34 m/s
Ridedown Acceleration (Long / Lat):	-5.5 *g* / -9.9 *g*
Max. 50 ms Avg. Accel. (Long / Lat):	-8.58 *g* / -10.15 *g*
Exterior: VDS[9]/CDC[10]	FR-5, RD-4 / 02RFEW3
Interior: OCDI[11]	RF0000000
Barrier Damage:	Superficial scuffing

Figure 2-42 - Test 542 Data Summary Sheet

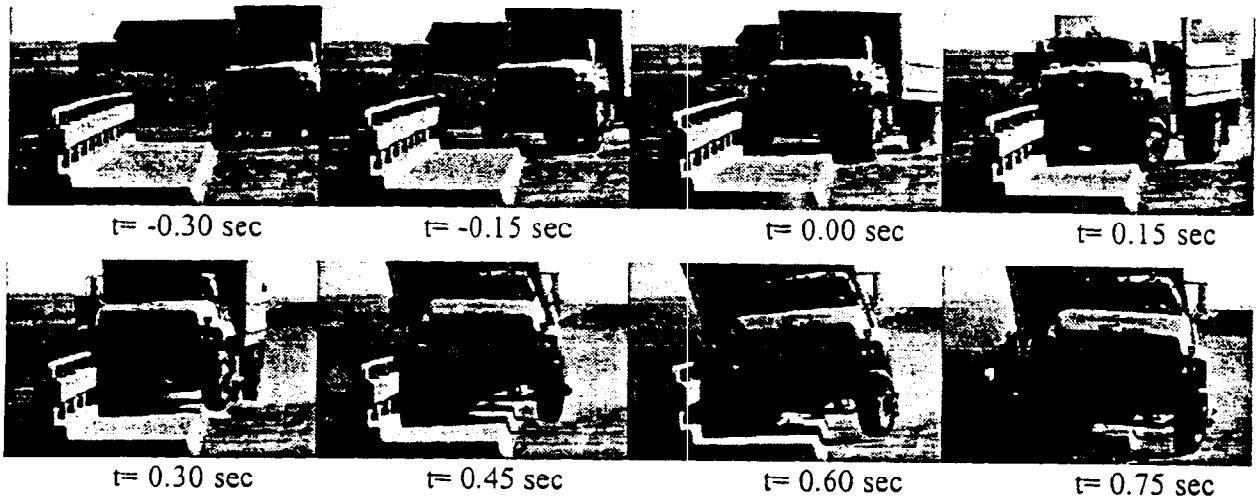


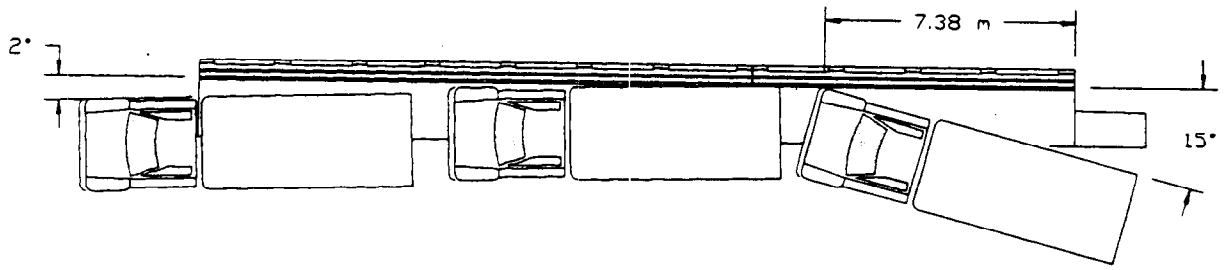


Test Barrier

Type:	Type 80SW
Length:	22.8 m
Test Date:	April 1, 1998
Test Vehicle:	
Model:	1993 Chevrolet 2500
Inertial Mass:	1954 kg
Impact / Exit Velocity:	110.2 km/h / 77 km/h
Impact / Exit Angle:	25.0° / 7°
Test Dummy:	
Type:	NA
Weight / Restraint:	NA
Position:	NA
Test Data:	
Occ. Impact Velocity (Long / Lat):	9.37 m/s / 8.16 m/s
Ridedown Acceleration (Long / Lat):	-7.45 *g* / -12.75 *g*
Max. 50 ms Avg. Accel. (Long / Lat):	-9.26 *g* / -14.41 *g*
Exterior: VDS[9]/CDC[10]	FR-5, RD-6 / 02RFEW9
Interior: OCD[11]	RF2012110
Barrier Damage:	The barrier sustained minor spalls from the point of impact to roughly 4 m downstream. Other barrier damage was cosmetic only, consisting of scrapes and tire marks.

Figure 2-57 - Test 543 Data Summary Sheet





Test Barrier

Type:	Type 80SW
Length:	22.8 m
Test Date:	October 28, 1997
Test Vehicle:	
Model:	1992 GMC TopKick
Inertial Mass / Ballast:	8020 kg / 2918 kg
Impact / Exit Velocity:	80.8 km/h / 72 km/h
Impact / Exit Angle:	15.0 / 2°
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 along the face and edges over a 3 m length. There was also spalling on the underside of the beam and at the expansion joint with no structural damage.