Insurance Institute for Highway Safety
Crashworthiness Evaluation

Crash Test Report
1998 Nissan Frontier (CF98005)

Vehicle identification number: 1N6DD21S6WC314905
Body style: Small pickup with short bed and regular cab
Engine/transmission: Longitudinal 2.4-liter 4-cylinder, 5-speed manual, rear-wheel drive

Standard crashworthiness features:

Driver and right front passenger airbags
Passenger airbag on/off switch
Dual-locking shoulder belts
Shoulder belt upper anchorage height adjusters
Seat belt force-limiting mechanisms (front outboard seating positions only)
Right front shoulder belt retractor is convertible from emergency to automatic locking for ease of child restraint use

Other standard safety features:

Rear-wheel antilock brakes (four-wheel antilock brakes standard on four-wheel drive models only; not available on rear-wheel drive models)

Vehicle specifications (provided by manufacturer):

Wheelbase:	265 cm
Overall length:	485 cm
Overall width:	169 cm
Curb weight:	1,320 kg

Vehicle specifications (measured):

Front bumper to firewall:	111 cm
Curb weight:	1,370 kg
Test weight:	1,518 kg
Overall width:	169 cm

Nominal test parameters:

40.0 mi/h (64.4 km/h), 40 percent overlap, deformable barrier face with slotted bumper

Crash test date:

February 27, 1998

Figure 1
Precrash and Postcrash Side Views — 1998 Nissan Frontier

Summary

A 1998 Nissan Frontier was crash tested on February 27, 1998 into a fixed deformable barrier at 39.9 mi/h (64.2 km/h) and a 40 percent overlap on the driver side. A Hybrid III 50th percentile male dummy was positioned in the driver seat with the lap/shoulder belt fastened.

Measures of intrusion taken after the crash indicate the lower instrument panel in front of the dummy moved rearward 8 cm. Resultant intrusion in the driver footwell measured 20 cm at the area where a footrest typically would be located and 15-23 cm at other places on the toepan. Both doors remained closed during the crash. After the crash, the driver door required slight manipulation of the latch with a tool to open, but the passenger door opened with ease. The welded seam between the lower portion of the driver door hinge pillar and the adjacent toepan was torn open.

The driver dummy was restrained by a three-point lap/shoulder belt and an airbag. During the crash, 5 cm of webbing spooled off the retractor, including about 4 mm from the force-limiting mechanism. The dummy's head contacted the steering wheel through the airbag, rebounded against the head restraint, and later contacted the B-pillar. After the crash, the upper end of the steering column had moved upward 14 cm and rearward 3 cm.

The dummy's head experienced a HIC of 800 while loading the airbag and a maximum resultant head acceleration of 84 g when it contacted the steering wheel through the airbag. The dummy's head contact against the B-pillar produced a peak resultant head acceleration of 41 g. The left tibia had a maximum axial force of 7.9 kN, an upper tibia index of 1.03, and a lower tibia index of 1.40. The left foot had a maximum resultant acceleration of 203 g. The right tibia had a maximum axial force of 4.0 kN and a lower tibia index of 1.17.

Test Conditions

This vehicle had been tested previously in the Institute's Low-Speed Crash Test Program and subjected to an impact on the front at 5 mi/h (8 km/h) into a full-width rigid barrier and a rear center impact at 5 mi/h (8 km/h) into a pole. All structural damage on the front was repaired prior to this test (see Appendix, Low-Speed Crash Test Damage Repair Estimate).

This test was conducted according to the procedures specified in the IIHS Offset Barrier Crash Test Protocol (Version V). The Hybrid III dummy positioned in the driver seat was equipped with instrumented lower legs that included feet modified to include two accelerometers and to have a 45 degree dorsiflexion range with soft stops at all extremes of foot-ankle motion. All dummy seating parameters were set according to the procedures specified for Federal Motor Vehicle Safety Standard 208 compliance testing (49 *CFR* Part 571.208 § 11). The dummy's left foot was placed on the area where a footrest typically would be located.

Seat back, shoulder belt upper anchorage, and steering column adjustments were set according to the manufacturer's specifications for government crash testing. Other adjustments were set according to the procedure specified for Federal Motor Vehicle Safety Standard 208 compliance testing (49 *CFR* Part 571.208 § 7 and 8). After final positioning of the dummy, measurements from various parts of the dummy to a number of vehicle interior points were made. These measurements and the seat back, shoulder belt upper anchorage, and steering column adjustments are described in the Appendix, Dummy Clearance Measurements.

Vehicle acceleration measurements were made by a triaxial arrangement of accelerometers attached to the metal cover over the airbag sensor module, which was located on the vehicle's longitudinal centerline and 35 cm behind its center of gravity (162 cm behind the front axle). The sensor module cover moved independently of the rest of the occupant compartment during the crash. Consequently, the vehicle acceleration measurements shown in Figures A1-A5 do not represent the gross acceleration of the occupant compartment. The vehicle speed recorded just prior to impact was 39.9 mi/h (64.2 km/h), and the actual overlap was 40 percent.

Structural Performance

Both doors remained closed during the crash. The driver door aperture shortened 4 cm as measured at the lower edge of the window. After the crash, the driver door required only slight manipulation of the latch release linkage with a screwdriver to open, but the passenger door opened with ease.

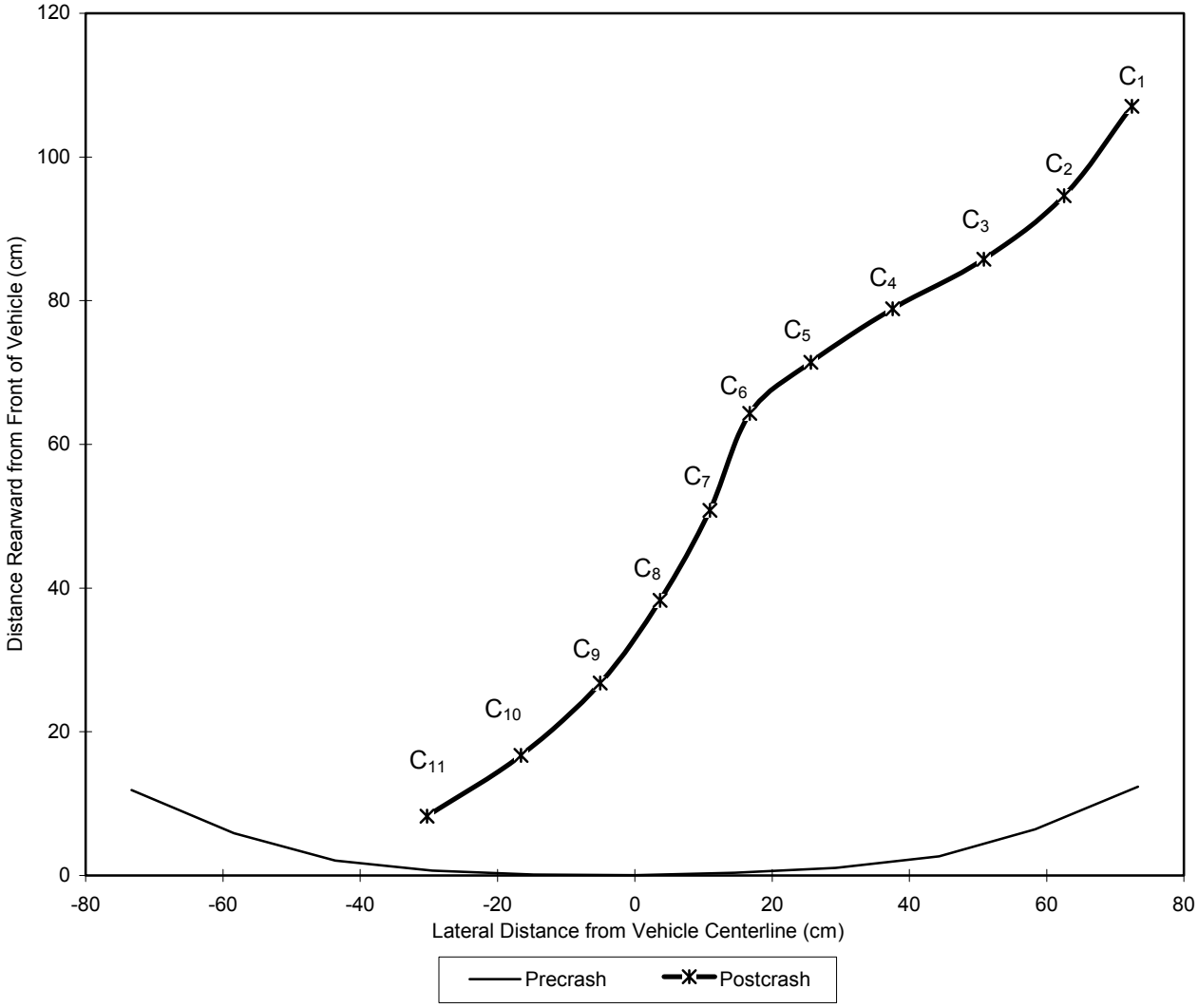
As the left front wheel was forced rearward, it passed inboard of the driver door sill and loaded the footrest area of the toepan. There was tearing of the welded seam connecting the toepan and the adjacent door hinge pillar. The tear measured about 32 cm in length from about the midpoint of the hinge pillar to its base.

No fuel system leaks were observed after the crash. In addition, no fuel system leaks were observed when the vehicle was rotated onto its right side to allow postcrash photography.

Figure 2 shows the overhead view of the crash deformation. Figures 3 and 4 illustrate the precrash and postcrash contour measures of the front bumper face bar and the upper crossmember of the radiator support. Figure 5 shows the precrash and postcrash views from below. Figure 6 illustrates the deformation of the frame rails, crossmembers, and door sills, which are visible in Figure 5.

Figure 2
Overhead View of Crash Deformation — 1998 Nissan Frontier

Figure 3
Front Bumper Bar Crush Contour — 1998 Nissan Frontier



	C_1	C_2	C_3	C_4	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}
Postcrash Contour (cm)	107	95	86	79	71	64	51	38	27	17	8
Precrash Contour (cm)	12	6	3	1	0	0	0	1	2	6	12
Resulting Crush (cm)	95	89	83	78	71	64	51	37	25	11	-4

The length of the reference line was 147 cm precrash and 103 cm postcrash.

Figure 4
Upper Radiator Support Crossmember Crush Contour — 1998 Nissan Frontier

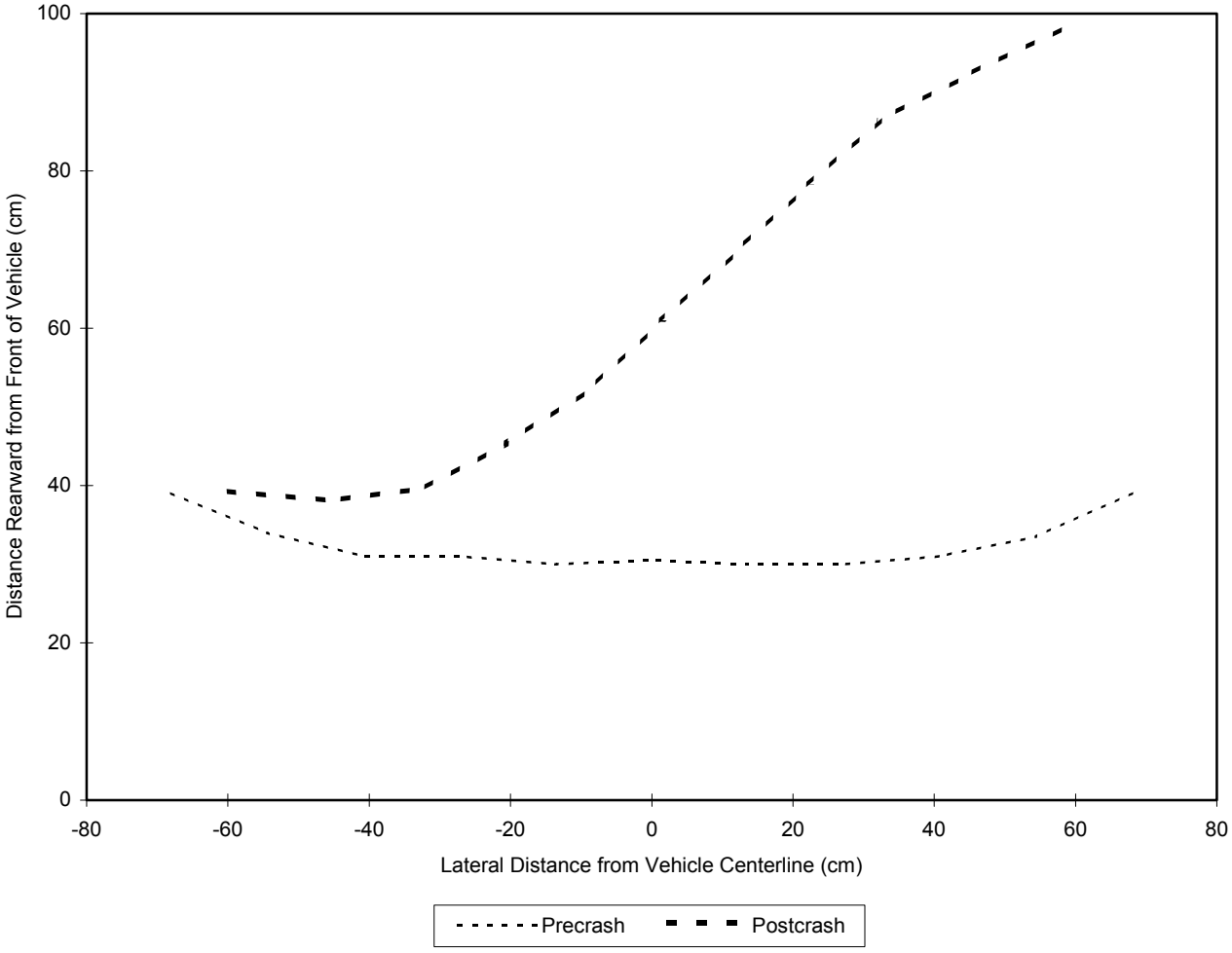


Figure 5
Precrash and Postcrash Views from Below — 1998 Nissan Frontier

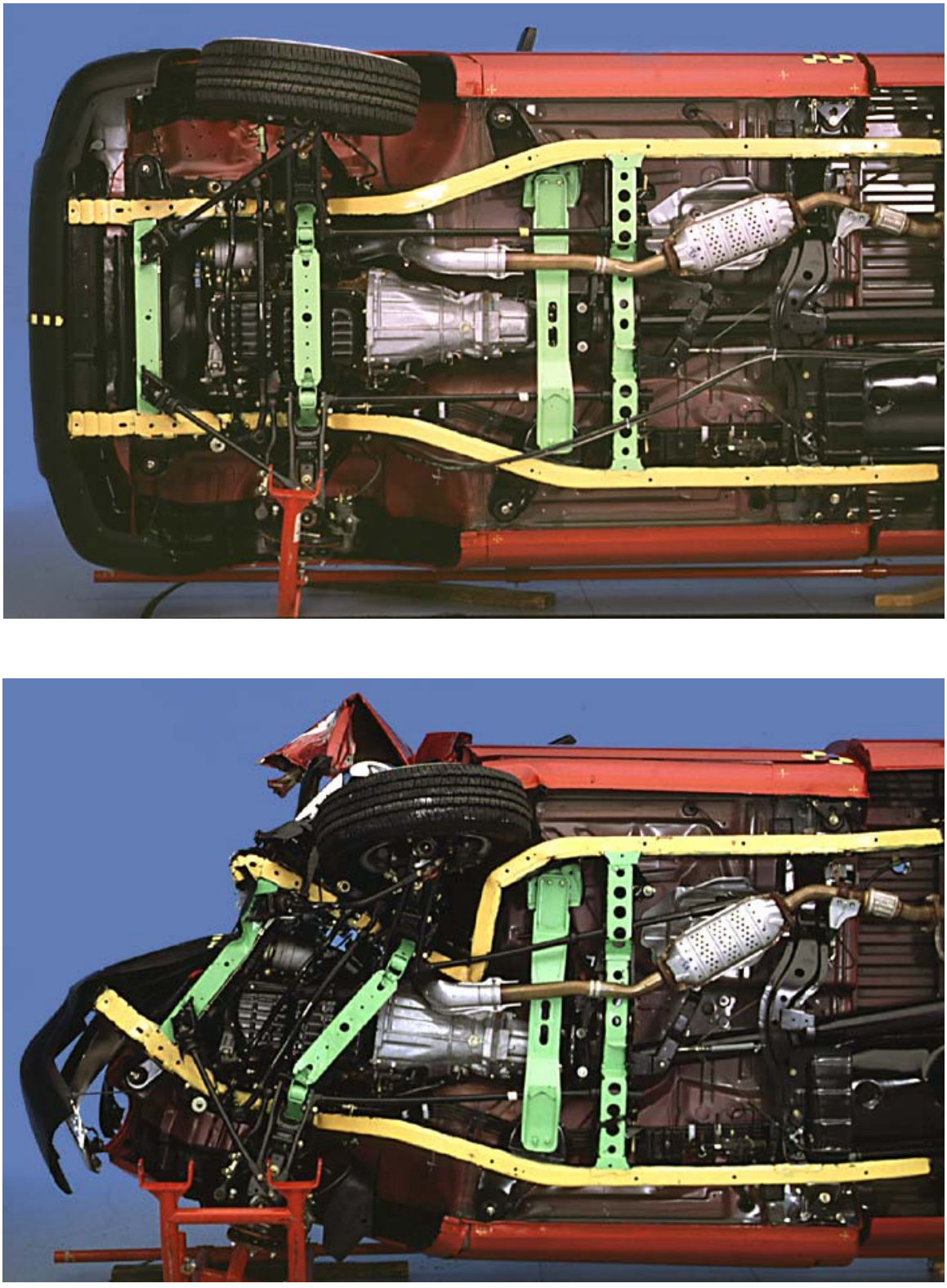
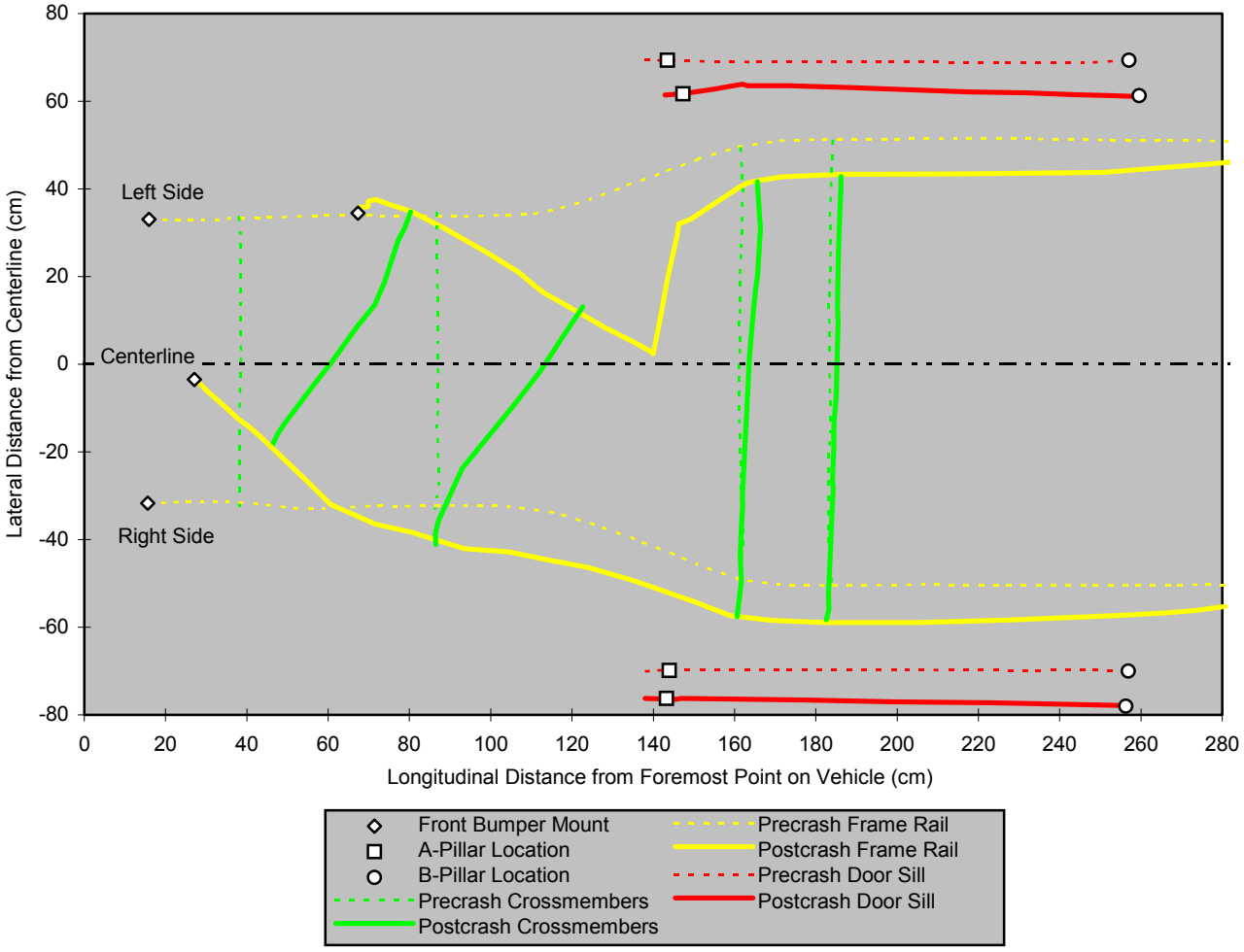
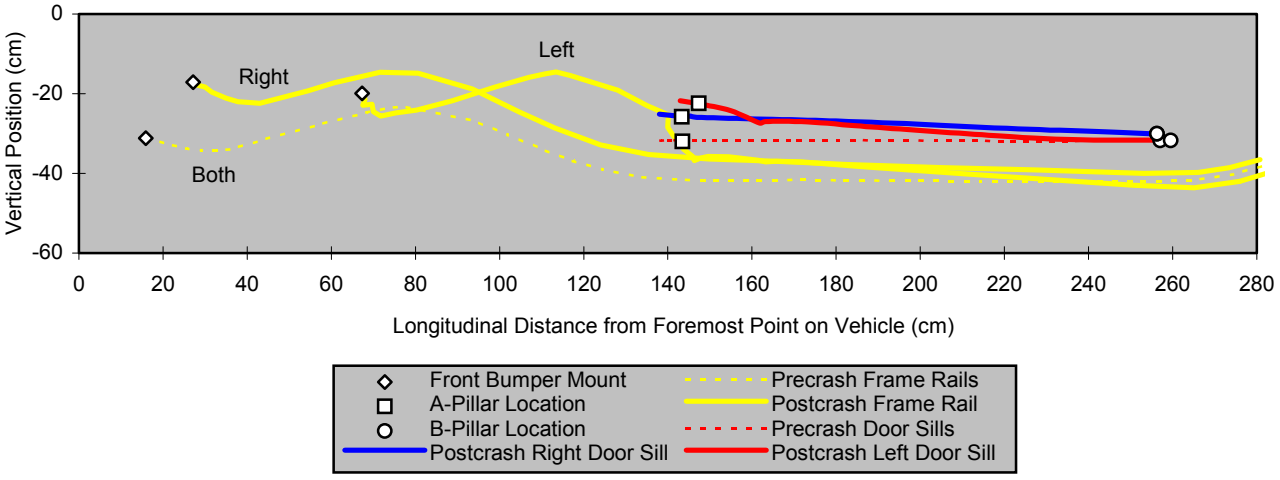


Figure 6
Frame Rail Deformation, Views from Below and Side — 1998 Nissan Frontier





Various measures of intrusion were made after the crash. These residual measures of intrusion typically are less than the maximum deformation that occurs during the crash. The primary coordinate reference system for these measures is described in the IIHS Offset Barrier Crash Test Protocol (Version V). The measures of deformation shown in Table 1 have been adjusted to better reflect the displacement of the various target locations relative to the driver. This was done by subtracting the average component displacements of the two seat-attachment bolts on the driver side of the one-piece bench seat, which also were measured relative to the primary coordinate system, from the respective components of displacement for each of the target locations. The average displacement of the two seat-attachment bolts relative to the primary reference system also is shown in Table 1.

Table 1
Residual Measurements of Intrusion Relative to Driver Seat — 1998 Nissan Frontier

Selected Locations*	Longitudinal	Lateral	Vertical	Resultant
Steering column (cm)	-3	5	14	15
Left lower instrument panel (cm)	-8	3	9	12
Right lower instrument panel (cm)	-8	3	8	11
Brake pedal (cm)	-20	5	10	23
Left toepan (cm)	-20	-1	10	23
Center toepan (cm)	-20	1	7	21
Right toepan (cm)	-14	2	5	15
Footrest (cm)	-17	0	11	20
Average displacement of the two driver side seat-attachment bolts from primary reference system (cm)	-1	-1	-2	n/a

* All measurements taken on driver side. From the driver's position, positive is forward, left, and up.

Restraint System Performance

Airbags

Driver: The uninflated driver airbag was 65 cm in diameter, and the excursion of its center when inflated was limited by four 21 cm-long tethers. The airbag was vented by two 35 mm-diameter holes located at positions corresponding to 10 and 2 o'clock on the forward-facing surface of the airbag. Analysis of the high-speed film taken from camera positions D and E indicates the airbag deployed at 24 ms into the crash and appeared to be fully inflated at 64 ms.

Passenger: The top-mounted passenger airbag deployed at an angle and was untethered. The cylinder-shaped airbag was vented by two 55 mm-diameter holes located at the lateral ends. Neither the airbag nor its deployment door contributed to windshield damage during deployment.

Seat Belts

This vehicle is equipped with dual-locking lap/shoulder belts with sliding latch plates and adjustable upper anchorage points at both outboard seating positions. The center seating position is equipped only with a lap belt. The inboard and outboard lower anchorage points for the lap/shoulder belts are bolted to the floor, as are both anchorage points for the center lap belt. During the crash, 5 cm of webbing was pulled from the retractor through the D-ring as measured by a pull-string mounted between the retractor housing and the webbing above the retractor. The force-limiting mechanism consists of two coiled wires attached to outer rings on each side of the retractor spool. Both wires were stretched, and the retaining pins on each side were sheared. The postcrash positions of the outer rings relative to the shear pins indicate the action of the force limiter contributed about 4 mm to the total amount of webbing pulled from the retractor.

Seat

Postcrash examination of the driver seat rails indicated no discernible movement of the seat in its tracks during the crash. There was little deformation of the floor under the driver seat.

Steering Column

The upper end of the steering column moved upward 14 cm and rearward 3 cm relative to the driver seat. The portion of the steering column between the instrument panel and firewall uses a tube-in-tube, energy-absorbing design, which was found compressed 6 cm following the crash. The shear modules separated less than 1 cm on both sides of the upper portion of the column.

Dummy Kinematics

Head, Neck, and Torso

Analysis of the high-speed film taken from camera positions D and E indicates the dummy's head began to load the airbag at 68 ms into the crash (4 ms after the airbag was fully inflated). Paint transferred from the dummy's face onto the airbag indicates the nose loaded the airbag 4 cm directly above its center. Film analysis of the dummy's head and steering wheel movements shows their close proximity at the time head acceleration rapidly increases (102 ms), indicating the dummy's head bottomed out the airbag and contacted the steering wheel underneath. During rebound, the dummy's head moved downward and to the left and then upward into the head restraint (at 225 ms), pushing it against the rear window at about 260 ms. The dummy's head was thrown against the front edge of the B-pillar at about 635 ms when the vehicle's rear wheels landed (both had left the ground during the crash). Table 2 provides the timing and duration of these events.

Table 2 Restraint System Performance and Dummy Kinematics — 1998 Nissan Frontier	
Event	**Time (ms)**
Deployment of airbag	24
Airbag fully inflated	64
Head begins to load airbag	68
Head contacts steering wheel through airbag	102
Back of head rebounds against head restraint	225
Upper rear of head contacts B-pillar	635

Figure 7
Dummy and Vehicle Interior, Postcrash — 1998 Nissan Frontier

Legs and Feet

Left leg and foot: Paint transferred from the dummy's left knee indicates the knee primarily contacted the left side and bottom of the steering column plastic trim. A small amount of paint was transferred to the left underside of the airbag module near the column. Paint transferred from the dummy's left shin indicates the shin contacted both the flat area of the knee bolster, including the fuse box cover, to the left of the steering column and the bolster's protrusion around the column. The left foot was found fully dorsiflexed and slightly everted, with the back of the heel on the floormat/carpeting and the sole away from the intruded toepan.

Right leg and foot: Paint transferred from the dummy's right knee indicates the knee contacted the lower right corner of the steering column trim and the right edge of the knee bolster's protrusion around the steering column. Paint transferred from the dummy's right shin indicates the shin contacted the bolster below the right knee impact location. The outside edge of the shin contacted the hand-operated parking brake lever recessed in the bolster to the right of the column. The right foot was found fully dorsiflexed and slightly everted, with the sole from the heel through the arch pressed against the intruded toepan. The lateral edge of the heel was against the transmission tunnel, and the lateral edge of the foot near the toes was underneath the center console side trim.

Dummy Injury Measures

Head

The HICs were calculated during an interval that corresponds with the dummy's head excursion into the airbag. The maximum resultant head acceleration (84 g at 104 ms) was recorded shortly after the head contacted the steering wheel through the airbag. The dummy's head contact against the B-pillar produced a peak resultant head acceleration of 41 g at 642 ms. This contact, however, does not appear in Figures A6-A9 because head acceleration is shown only for the first 350 ms of the crash. The smaller peaks (11 g at 230 ms and 8 g at 266 ms) correspond to the head contacting the head restraint and pushing it against the rear window. Table 3 provides a summary of the maximum head injury measurements recorded during the crash.

Table 3 Head Injury Measurements — 1998 Nissan Frontier			
Measure	**Published Tolerance Threshold**	**Result**	**Time (ms)**
Vector resultant acceleration (g)	80	84	104
Vector resultant acceleration — 3 ms clip (g)	80	75	93-96
Head Injury Criterion (HIC)	1000	800	83-107
Head Injury Criterion — 15 ms interval (HIC-15)*	700	642	90-105

* A proposed amendment to the Canadian Motor Vehicle Safety Regulations suggests calculating HIC during a 15 ms interval rather than the 36 ms interval specified by the U.S. standard. The Canadian proposal includes an injury threshold of 700 for front-seat occupants protected by airbags.

Neck

Table 4 provides a summary of the maximum neck injury measurements recorded during the crash.

Table 4 Neck Injury Measurements — 1998 Nissan Frontier			
Measure	**Published Tolerance Threshold**	**Result**	**Time (ms)**
A-P shear force (kN)	±3.1*	0.3	73
Axial compression force (kN)	4.0*	0.8	644
Axial tension force (kN)	3.3*	1.8	106
Flexion bending moment (Nm)	190**	18	86
Extension bending moment (Nm)	57**	13	66

* These values are for instantaneous loading. Neck loads are compared with magnitude-duration injury criteria in Figures A-12 to A-15.

** These published thresholds are recommended injury assessment reference values from Backaitis and Mertz (1994), but significant neck injury may occur at lower bending moments. Mertz and Patrick (1971) report that bending moments of 47 Nm in extension and 88 Nm in flexion would be non-injurious for occupants represented by the Hybrid III 50th percentile adult male dummy.

Chest

Table 5 provides a summary of the maximum chest injury measurements recorded during the crash.

Table 5
Chest Injury Measurements — 1998 Nissan Frontier

Measure	Published Tolerance Threshold	Result	Time (ms)
Vector resultant spine acceleration — 3 ms clip (g)	60	45	98-101
Rib compression (mm)	50	38	94
Viscous criterion (m/s)	1.0	0.2	83

Legs and Feet

Left leg and foot: The left leg had a maximum upper tibia A-P bending moment of 181 Nm at 67 ms and a maximum tibia axial force of 7.9 kN at 66 ms, which contributed to an upper tibia index of 1.03 at 67 ms. The left leg had a maximum lower tibia A-P bending moment of 300 Nm at 117 ms, which contributed to a lower tibia index of 1.40 at 117 ms. The left foot had a maximum I-S acceleration of 198 g and a maximum vector resultant acceleration of 203 g, both at 64 ms.

Right leg and foot: The right leg had a maximum lower tibia A-P bending moment of 237 Nm at 82 ms, which contributed to a lower tibia index of 1.17 at 82 ms. The maximum tibia axial force was 4.0 kN at 73 ms.

Table 6 provides a summary of the maximum leg and foot injury measurements recorded during the crash.

Table 6 Leg and Foot Injury Measurements — 1998 Nissan Frontier					
Measure	**Published Tolerance Threshold**	**Left**	**Time (ms)**	**Right**	**Time (ms)**
Axial femur force (kN)	9.1*	0.4	172	3.8	84
Tibia-femur displacement (mm)	15	<1	n/a	9	87
Upper Tibia					
L-M moment (Nm)	±225	-68	69	83	72
A-P moment (Nm)	±225	181	67	109	71
Vector resultant moment (Nm)	225	183	67	117	72
Index	1.00	1.03	67	0.62	72
Lower Tibia					
L-M moment (Nm)	±225**	-208	68	140	72
A-P moment (Nm)	±225**	300	117	237	82
Vector resultant moment (Nm)	225**	300	117	250	82
Axial force (kN)	8.0**	7.9	66	4.0	73
Index	1.00	1.40	117	1.17	82
Foot					
A-P foot acceleration (g)	±150	-81	67	-102	67
I-S foot acceleration (g)	±150	198	64	126	71
Vector resultant foot acceleration (g)	150	203	64	133	71

* This critical value is for instantaneous loading. Femur loads are compared with magnitude-duration injury criteria in Figures A-23 and A-34.

** These published thresholds are for fractures of the tibia. Ankle and foot injuries have been associated with bending moments as low as 50-100 Nm, and heel fractures have been associated with axial forces as low as 6.0 kN.

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Appendix

Low-Speed Crash Test Damage Repair Estimate

Dummy Clearance Measurements

Graph Index — index to graphs of time plots of dummy and vehicle data

Manufacturer's window sticker

Low-Speed Crash Test Damage Repair Estimate

1998 Nissan Frontier Small Pickup: 5 mi/h Front into Barrier

Test Number: LF98003
VIN: 1N6DD21S6WC314905
Mileage: 24
Features: Driver and passenger airbags, rear-wheel antilock brakes, air conditioning, manual transmission, power steering, chrome bumpers, rear step bumper, two-stage paint.

	Part		Labor	
Description	**Mfg. No**	**Price**	**Operation**	**Hours**
Bumper face bar, front			Repair/align*	0.5
Bumper mounting bracket, left front	62215-3S500	$11.12	Replace**	1.3
Bumper mounting bracket, right front	62214-3S500	11.12	Replace**	
Valance panel, lower front			Repair/align	1.0
Panel filler, grille	62651-3S530	30.73	Replace**	0.3
Panel filler, grille			Refinish	1.0
Windshield washer reservoir	28910-S3500	24.33	Replace	0.2
Radiator support			Repair/align**	3.0
Radiator support			Refinish	0.5
Fender, left front			Repair/align**	2.0
Fender, left front			Refinish	3.4
Fender, right front			Repair/align**	1.5
Fender, right front			Refinish	2.5
Headlamps			Aim	0.5
Fender skirt, left front	63842-3S500	11.32	Replace	0.5
Fender skirt, right front	63843-3S500	11.32	Replace	0.5
Seal, radiator support	62684-3S500	7.85	Replace	0.4
Hood vertical lock support			Repair/align**	0.1
Frame rail end plate, left front			Repair/align**	1.0
Frame rail end plate, left front			Refinish	0.2
Frame rail end plate, right front			Repair/align**	1.0
Frame rail end plate, right front			Refinish	0.2
Air conditioning condenser			Remove/reinstall	0.2
Paint and materials		124.80		
Total Parts		$232.59		
Total Labor		675.80		21.8
Grand Total		$908.39		

* This item was replaced rather than repaired before the 40 mi/h frontal offset test.
** This item was repaired or replaced as indicated before the 40 mi/h frontal offset test.

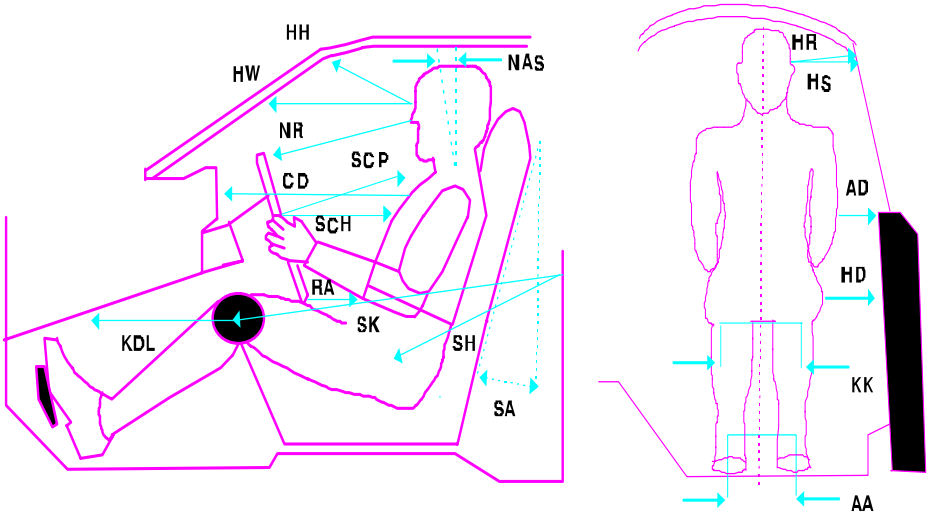
Dummy Clearance Measurements

Test Number: CF98005
Vehicle Make/Model: Nissan Frontier
Vehicle Model Year: 1998
Seat Type: Manually adjusted bench seat (fore/aft adjustment only)

Manufacturer's Specifications
Seat Back Information: Fixed
Upper Belt Anchorage: Set to second position from top
Steering Column Adjustment: Fixed

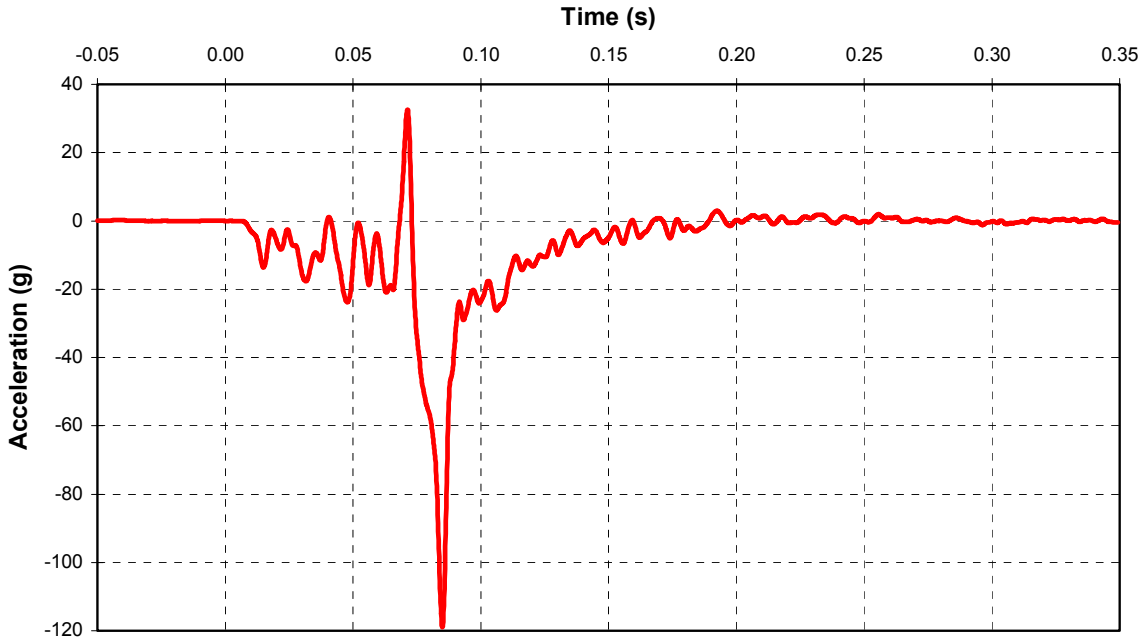
Location	Code	Measure	Location	Code	Measure
Head to header	HH	420	Neck angle, torso 90	NAT90	20.9°
Head to windshield	HW	605	Neck angle, seated**	NAS	3.9°
Nose to rim	NR	395	Torso angle (NAT90 – NAS)	TA	17.0°
Chest to dash	CD	619	Striker to knee***	SK	646
Rim to abdomen	RA	199	Striker to knee angle***	SKA	3.2°
Knee to dash, left	KDL	229	Striker to H-point, horizontal	SHH	255
Knee to dash, right	KDR	313	Striker to H-point, vertical	SHV	74
Steering wheel to chest, horizontal	SCH	301	Ankle to ankle	AA	329
Steering wheel to chest, perpendicular	SCP	396	Knee to knee	KK	313
Steering wheel to chest, reference	SCR	367	Arm to door	AD	70
Hub to chest, minimum	HCM	246	H-point to door	HD	112
Pelvic angle	PA	23.6°	Head to A-pillar	HA	545
Seat back angle*	SA	11.9°	Head to roof	HR	221
			Head to side window	HS	230

All distance measurements are in millimeters (mm).
* Measured along the left rear edge of the seat.
** Dummy's neck bracket was adjusted to +3.5 degrees to achieve a level instrumentation plane.
*** These measurements were made in a vertical plane containing the striker and parallel to the driver door sill.

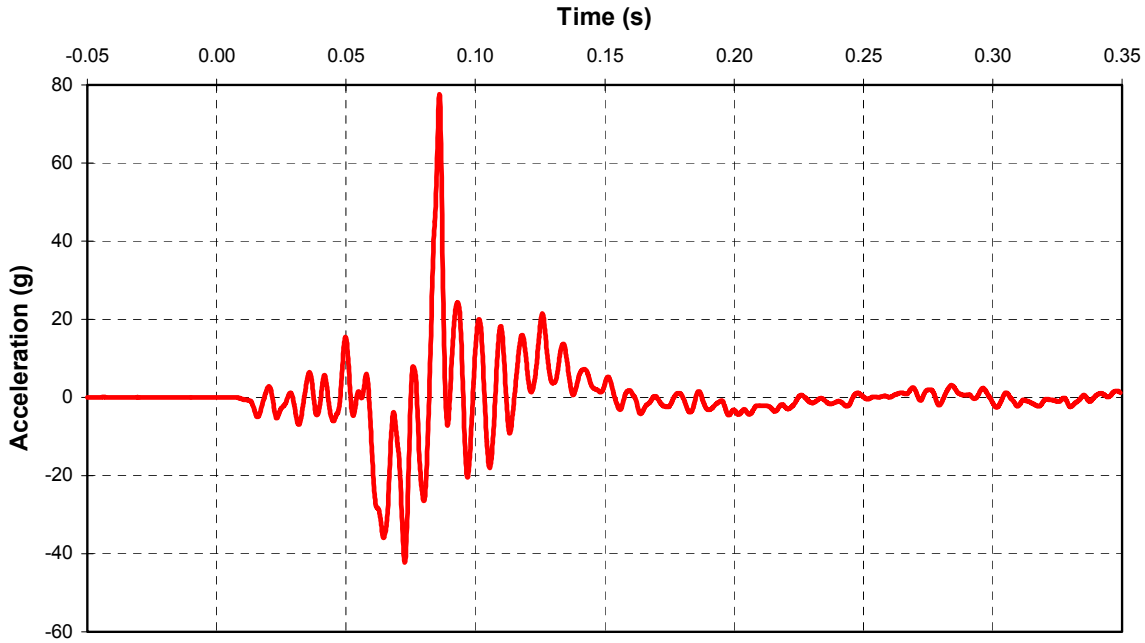


Graph Index

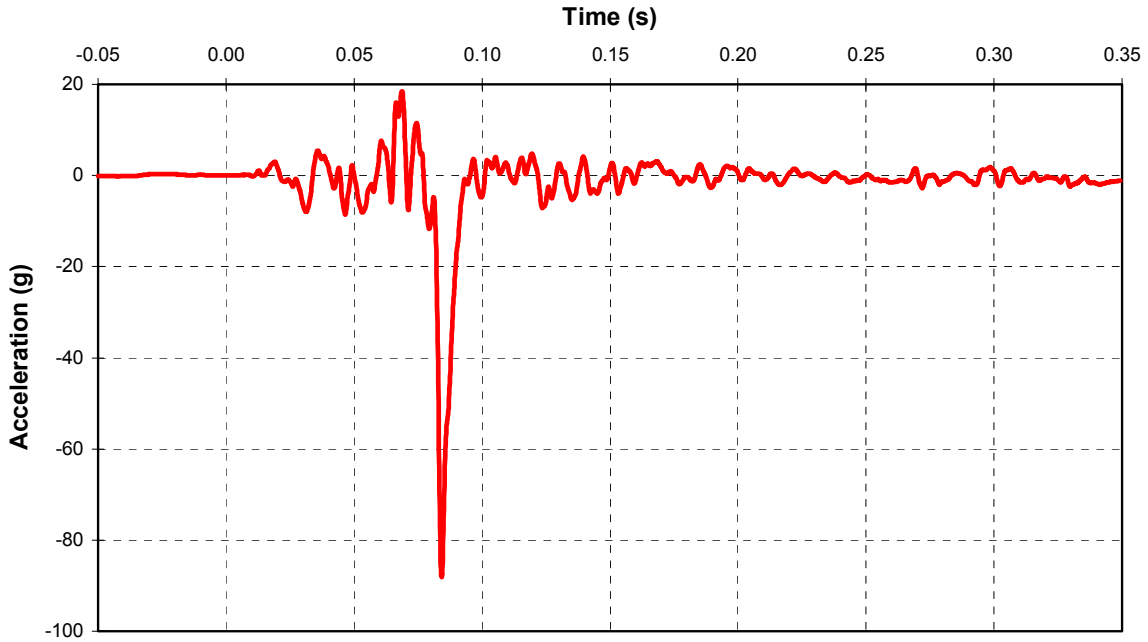
A-1 CF98005 1998 Nissan Frontier Vehicle Longitudinal Acceleration



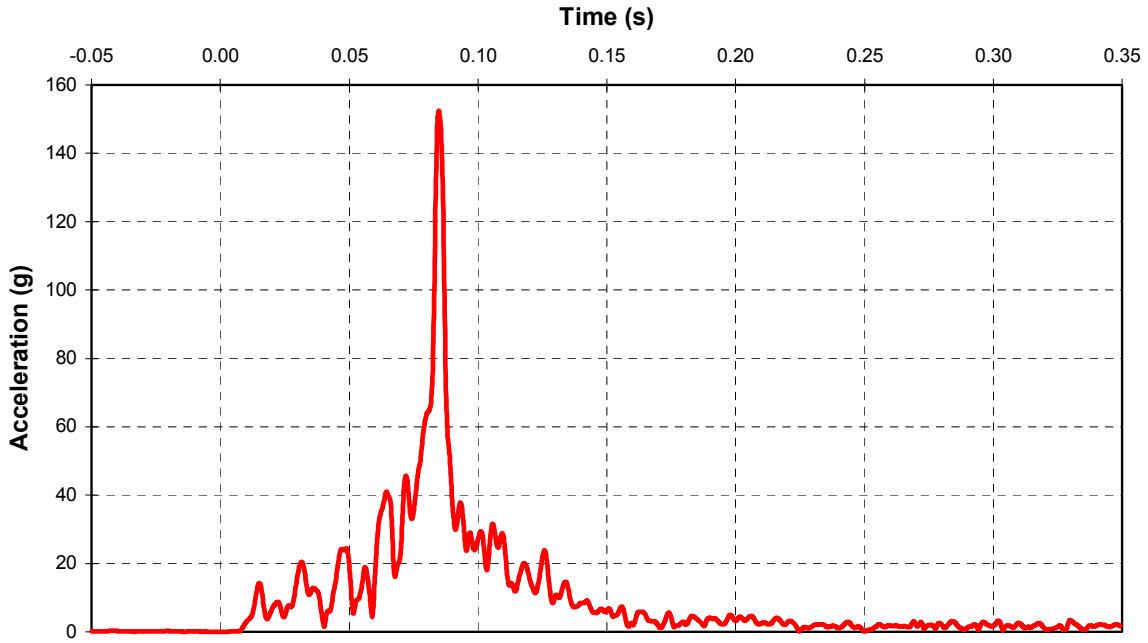
A-2 CF98005 1998 Nissan Frontier Vehicle Lateral Acceleration



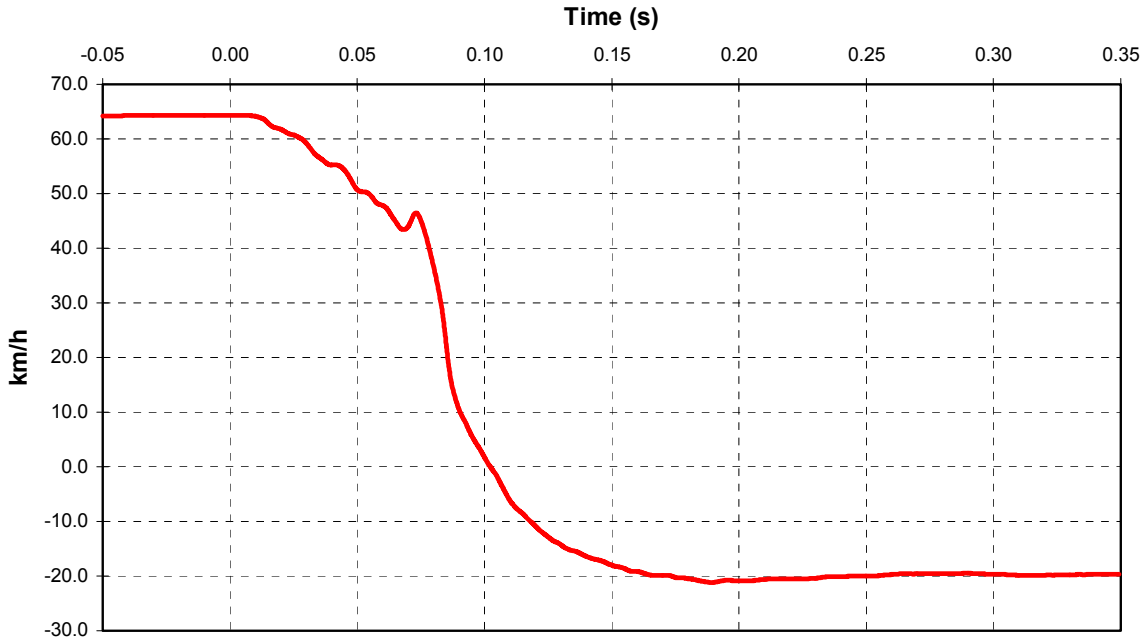
A-3 CF98005 1998 Nissan Frontier Vehicle Vertical Acceleration



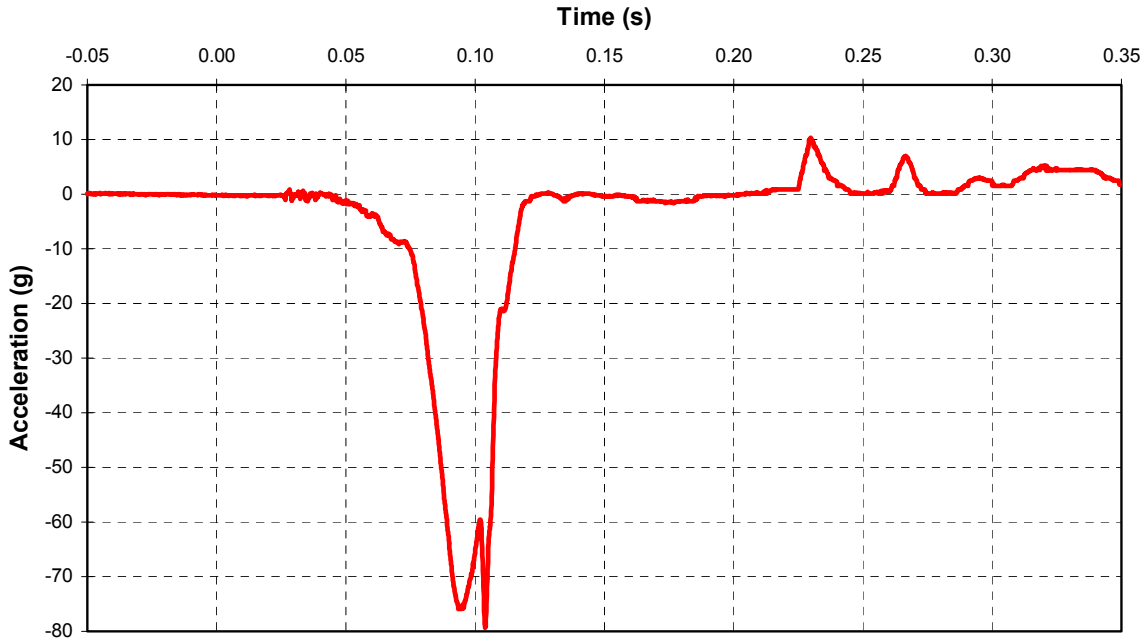
A-4 CF98005 1998 Nissan Frontier Vehicle Vector Resultant Acceleration



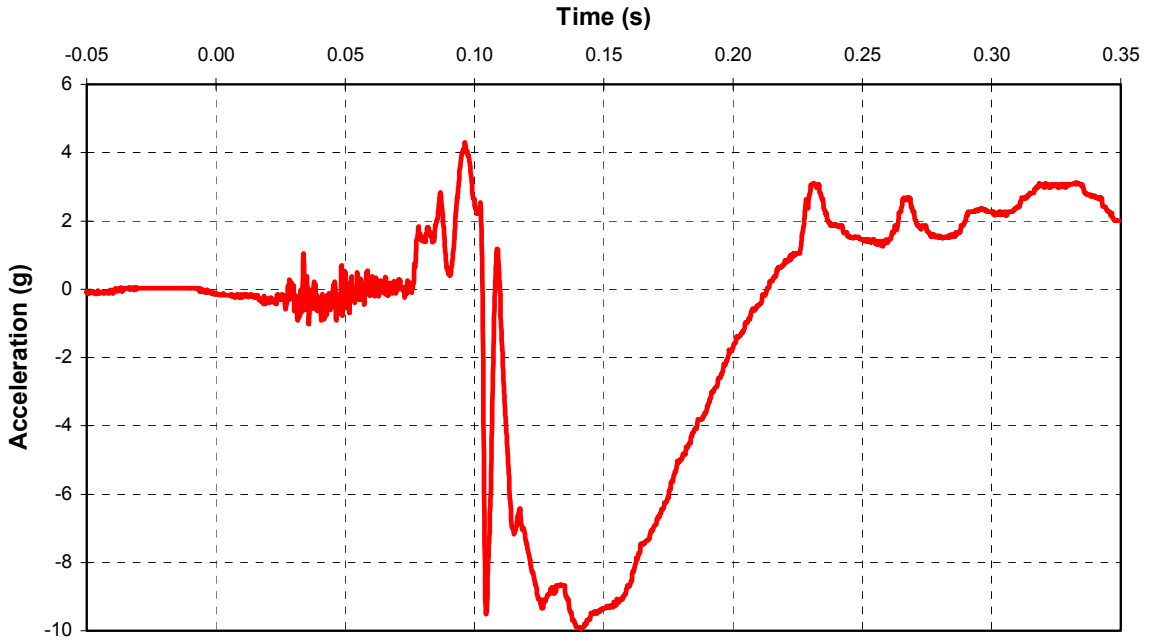
A-5 CF98005 1998 Nissan Frontier Integration of Vehicle Longitudinal Acceleration



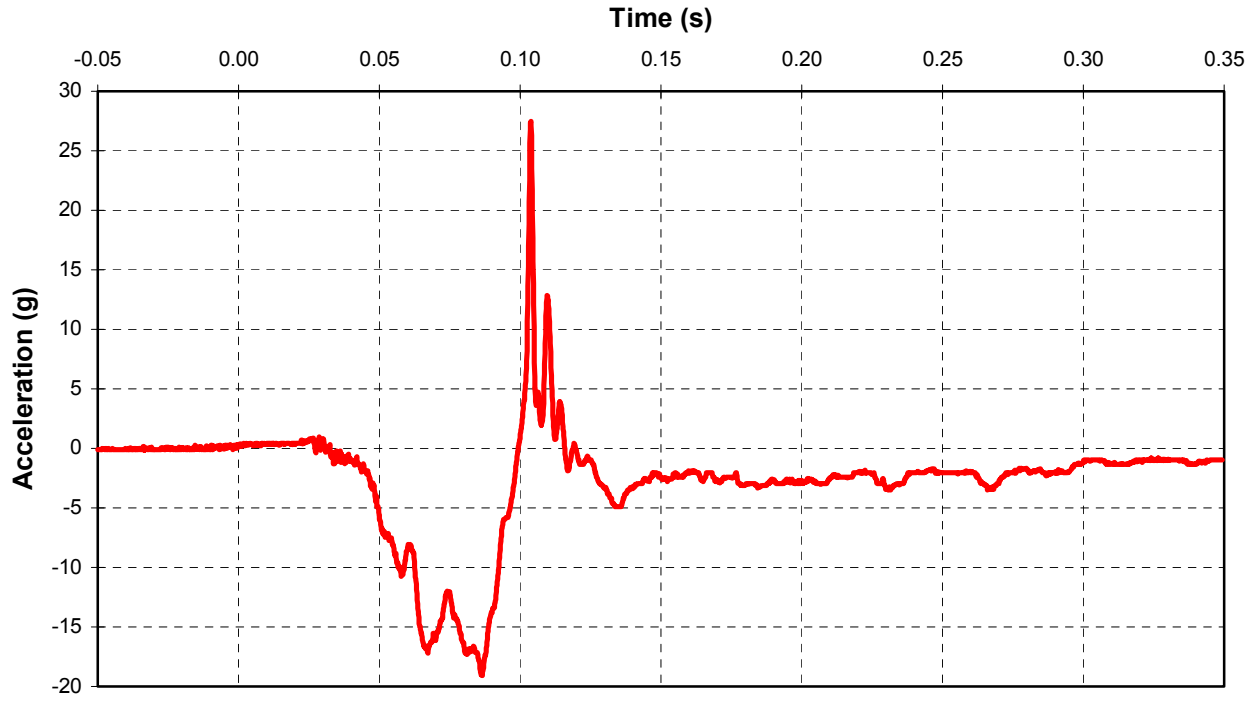
A-6 CF98005 1998 Nissan Frontier Head A-P Acceleration



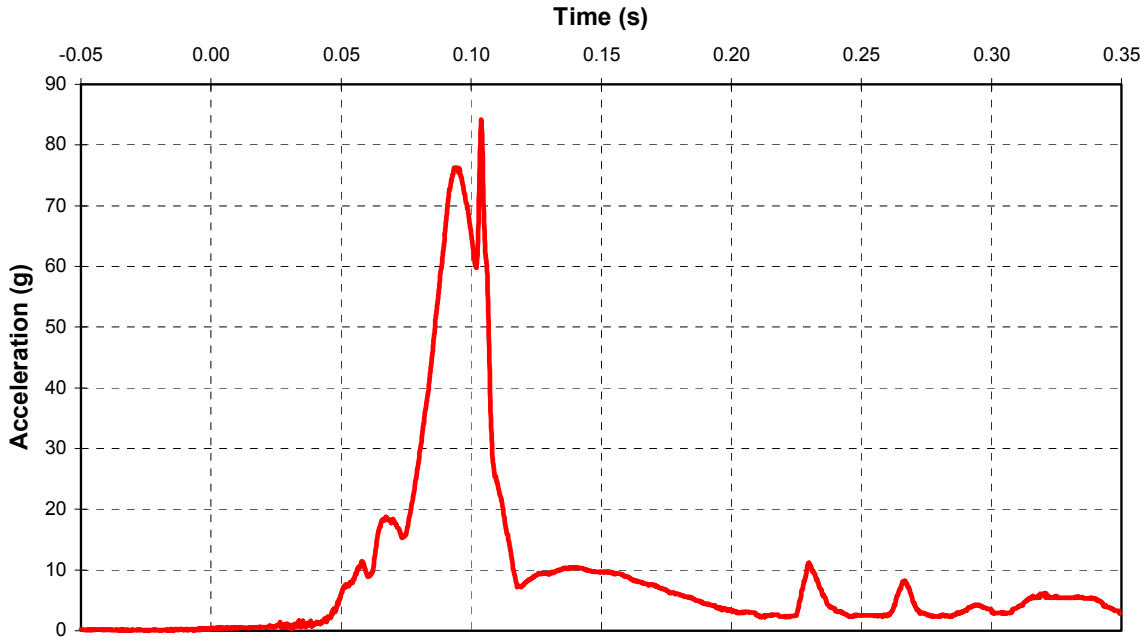
A-7 CF98005 1998 Nissan Frontier Head L-M Acceleration



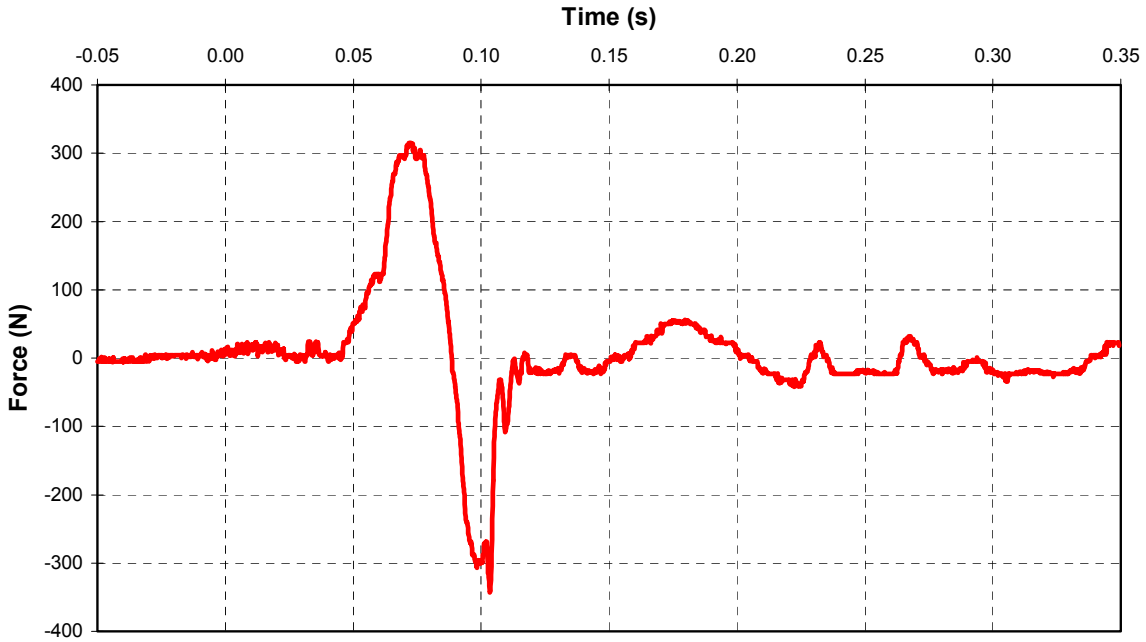
A-8 CF98005 1998 Nissan Frontier Head I-S Acceleration



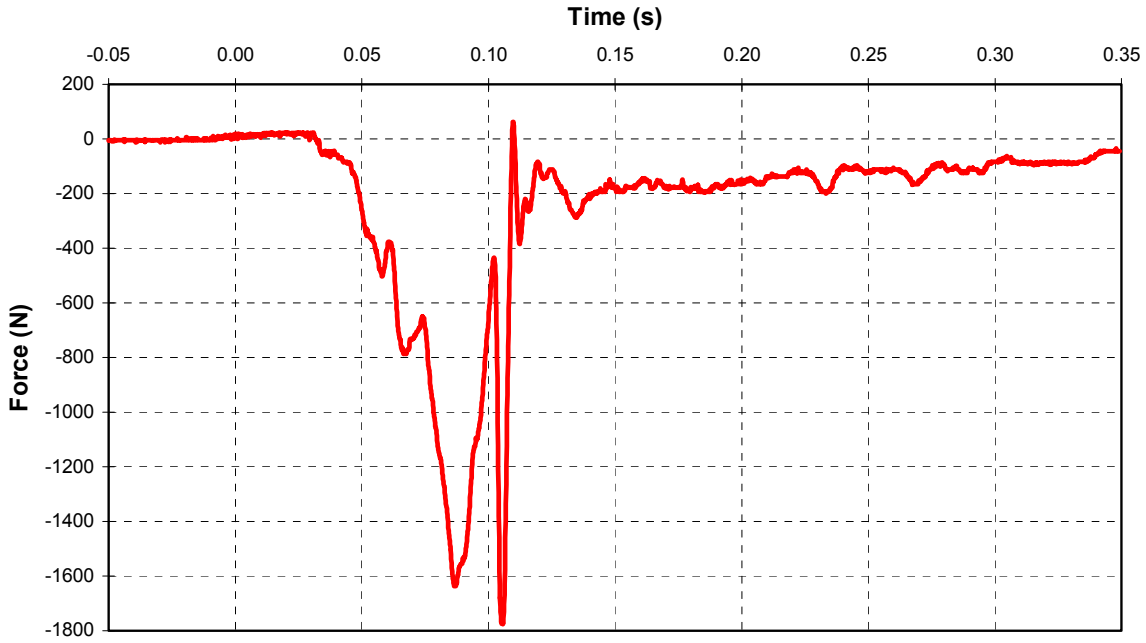
A-9 CF98005 1998 Nissan Frontier Head Vector Resultant Acceleration



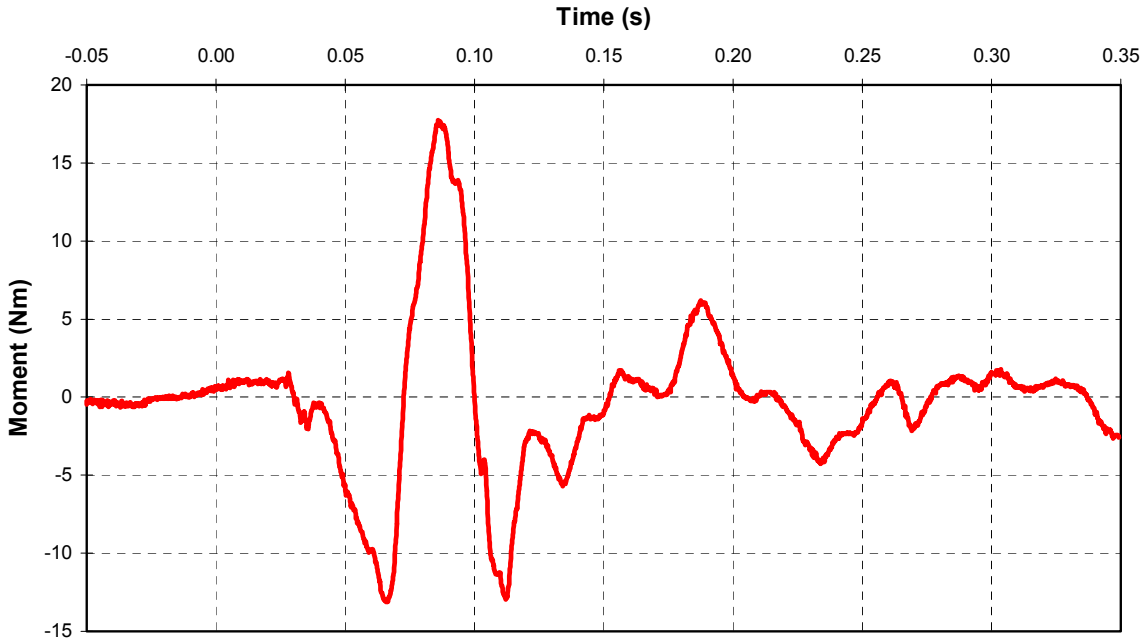
A-10 CF98005 1998 Nissan Frontier Neck A-P Shear Force



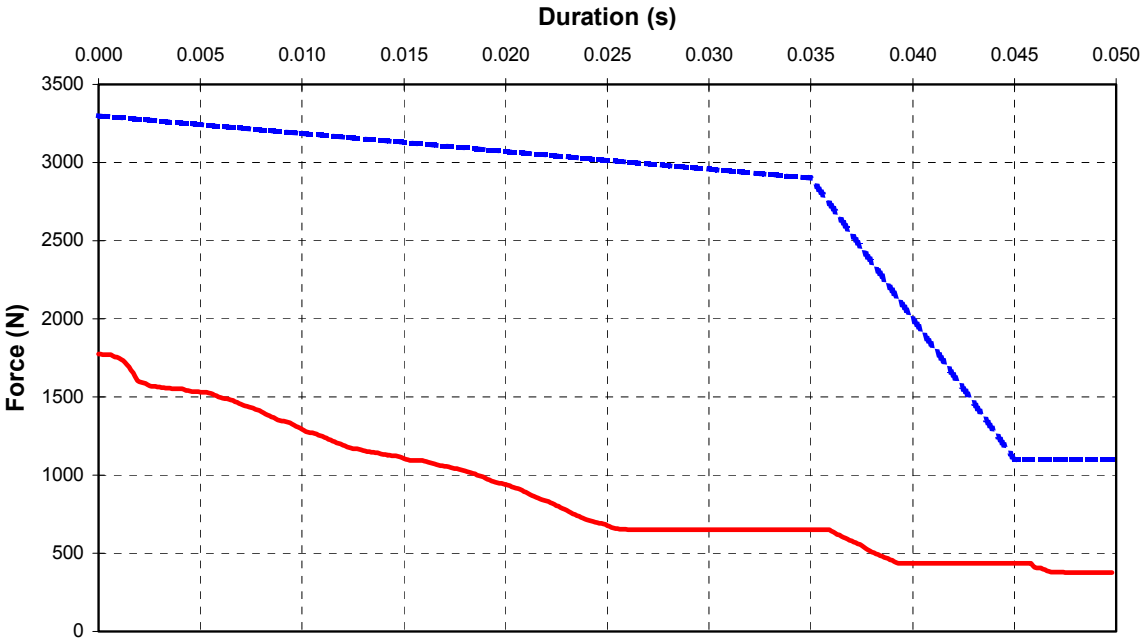
A-11 CF98005 1998 Nissan Frontier Neck Axial Force



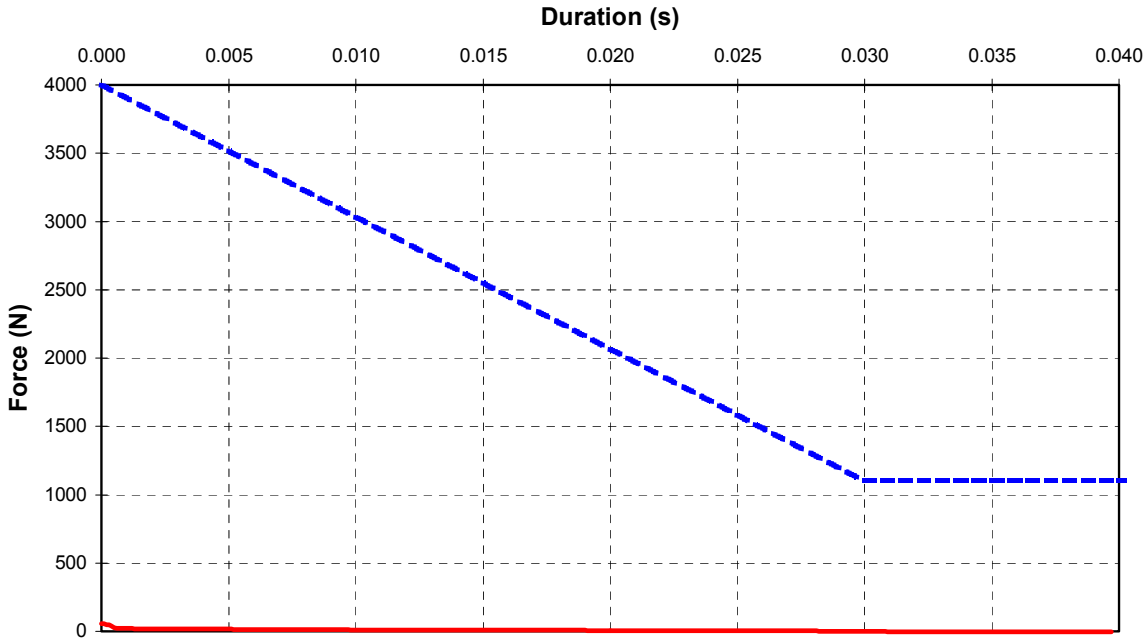
A-12 CF98005 1998 Nissan Frontier Neck Occipital A-P Moment



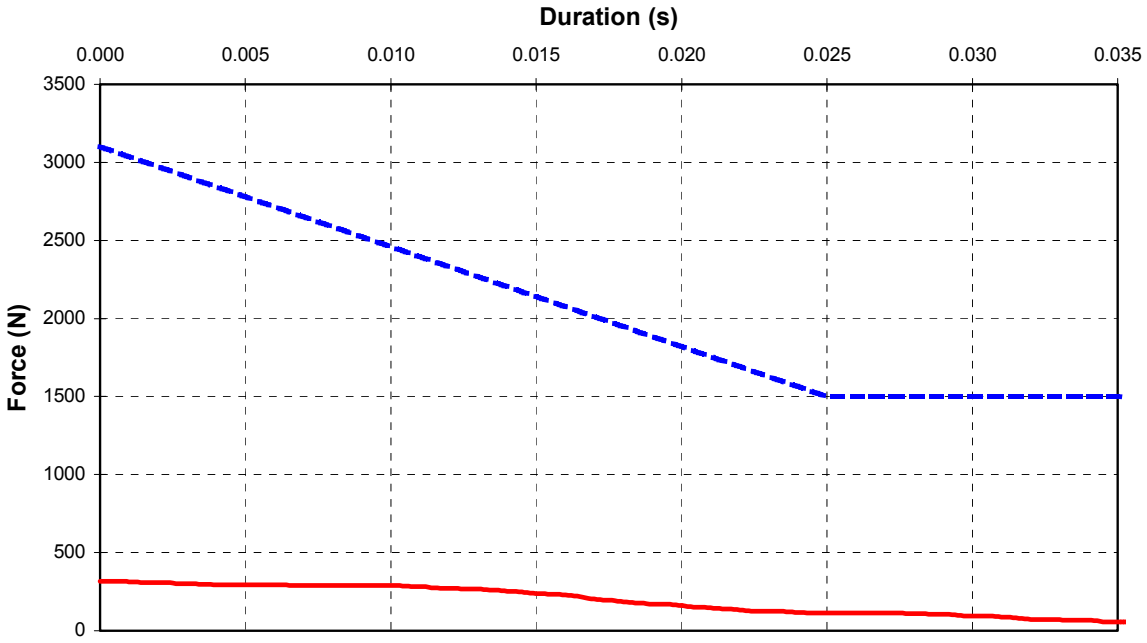
A-13 CF98005 1998 Nissan Frontier Neck Tension Analysis



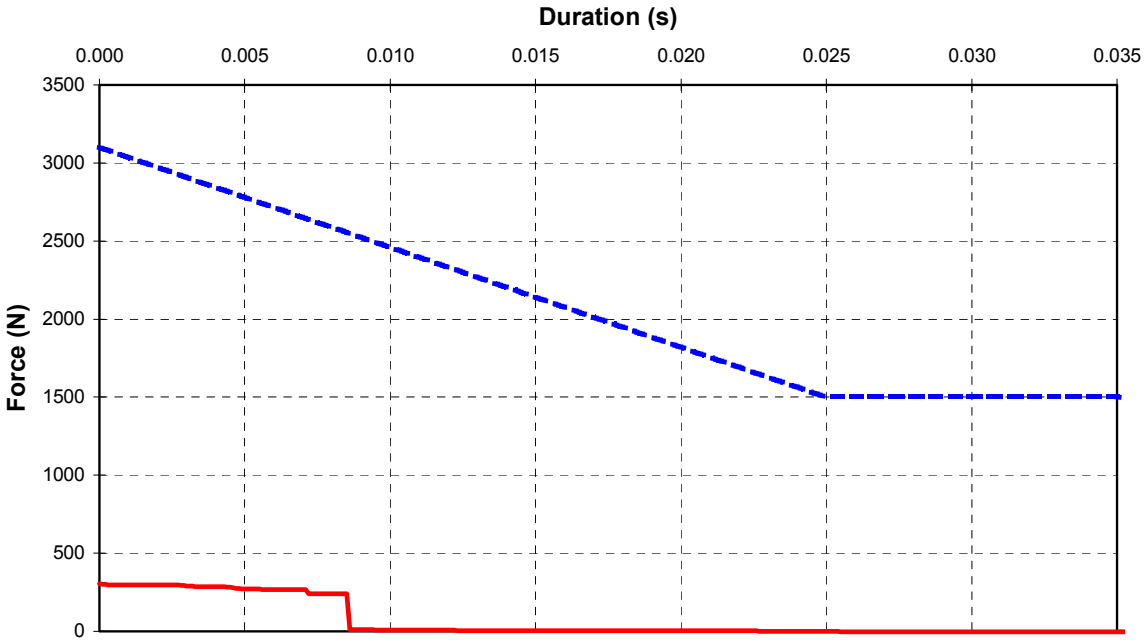
A-14 CF98005 1998 Nissan Frontier Neck Compression Analysis



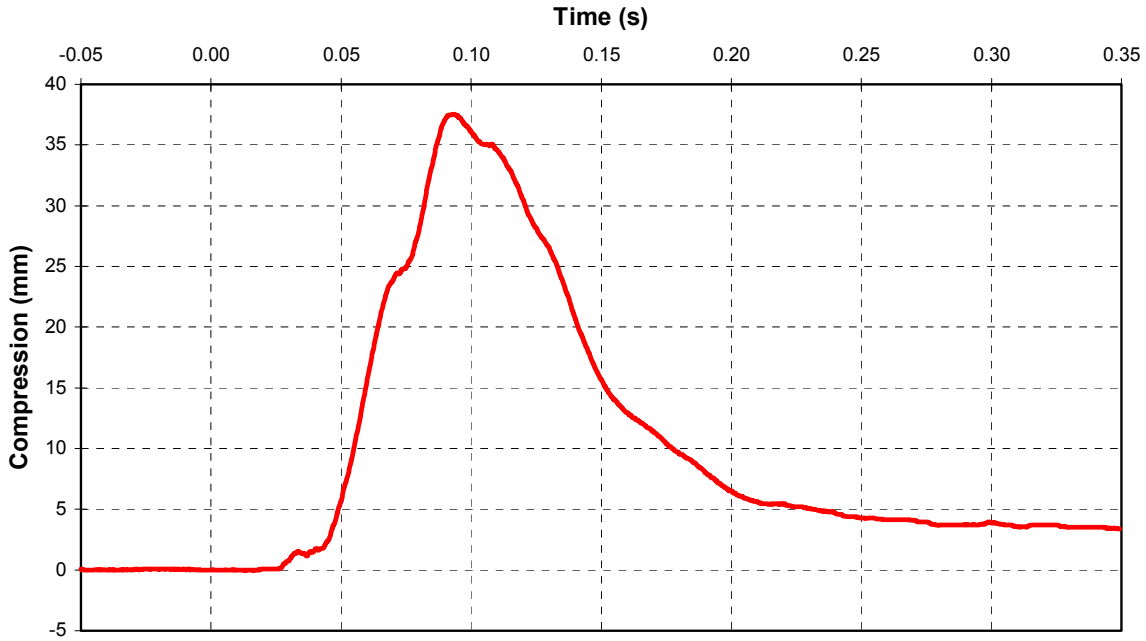
A-15 CF98005 1998 Nissan Frontier Neck A-P Shear (Positive) Analysis



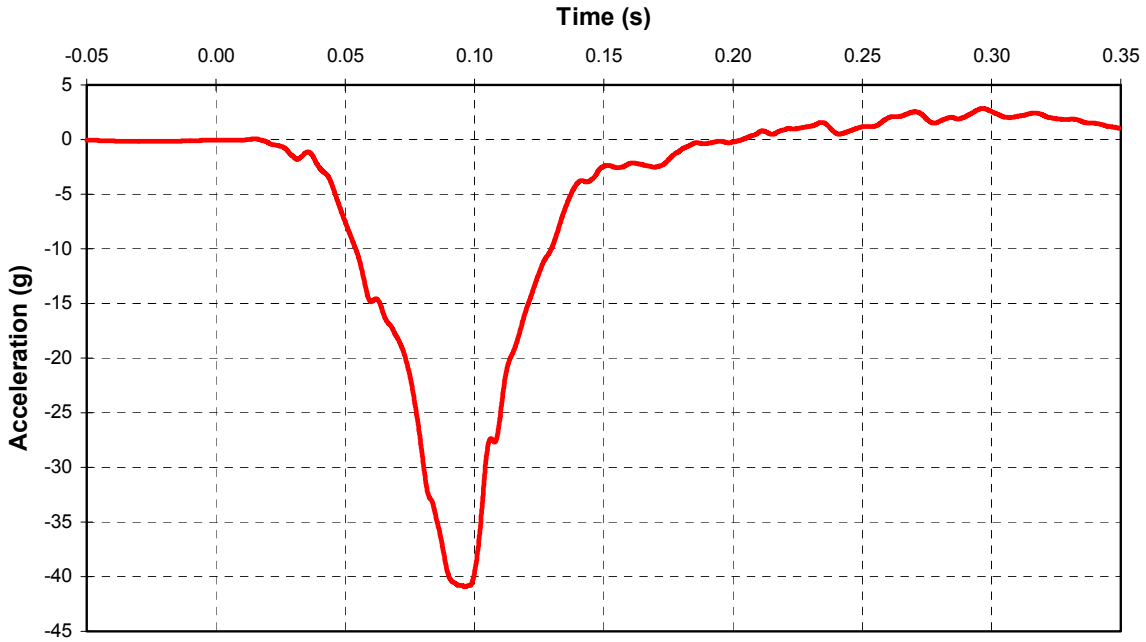
A-16 CF98005 1998 Nissan Frontier Neck A-P Shear (Negative) Analysis



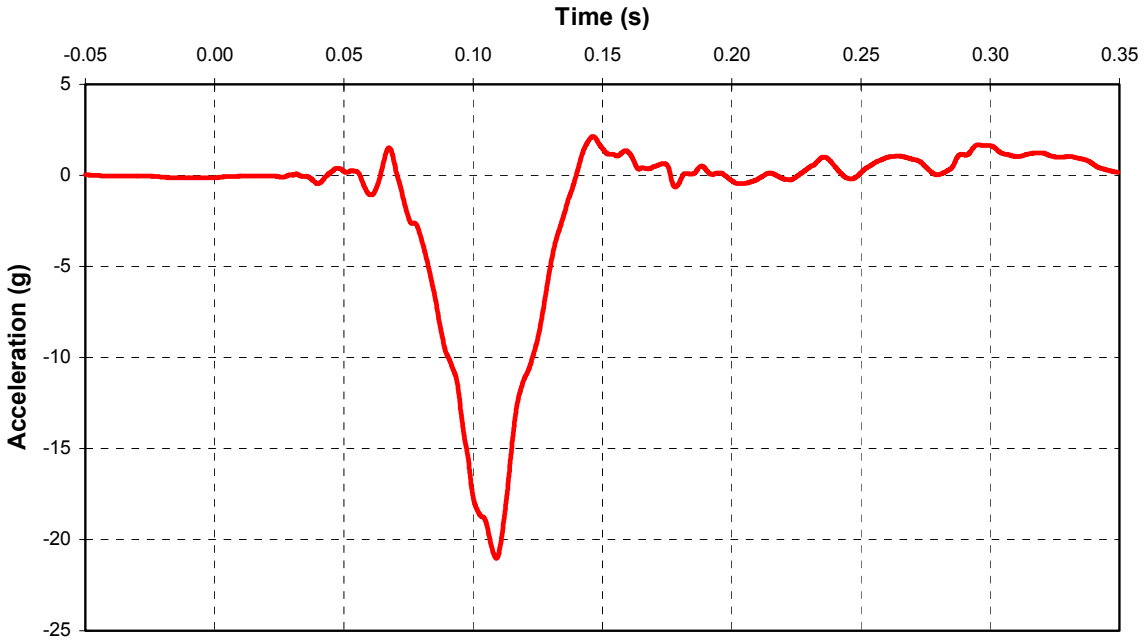
A-17 CF98005 1998 Nissan Frontier Chest Compression



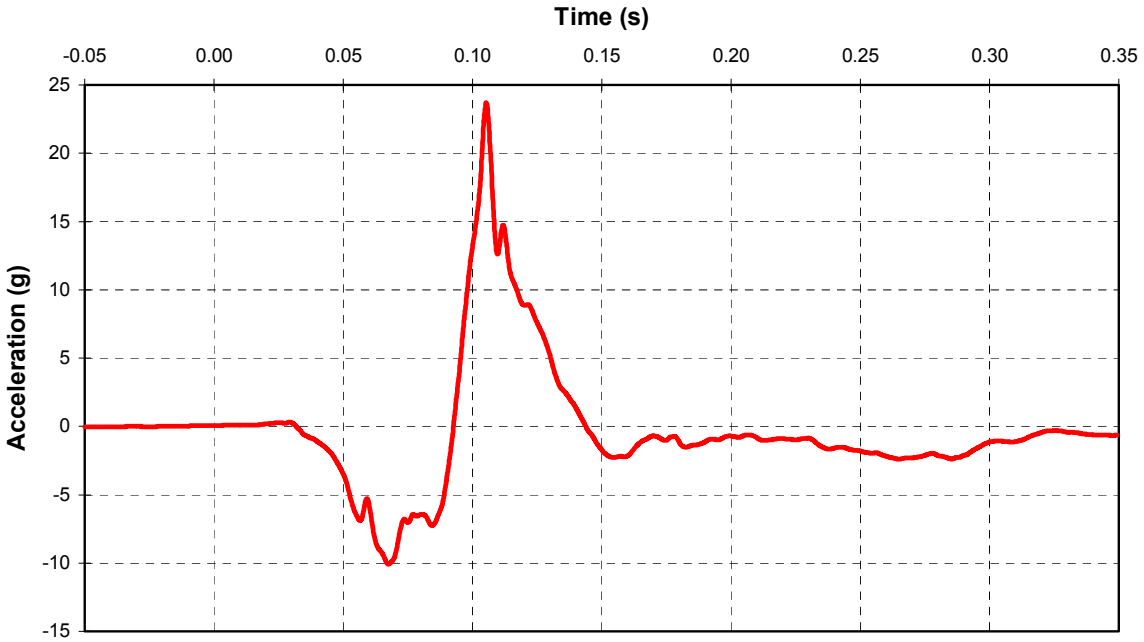
A-18 CF98005 1998 Nissan Frontier Chest A-P Acceleration



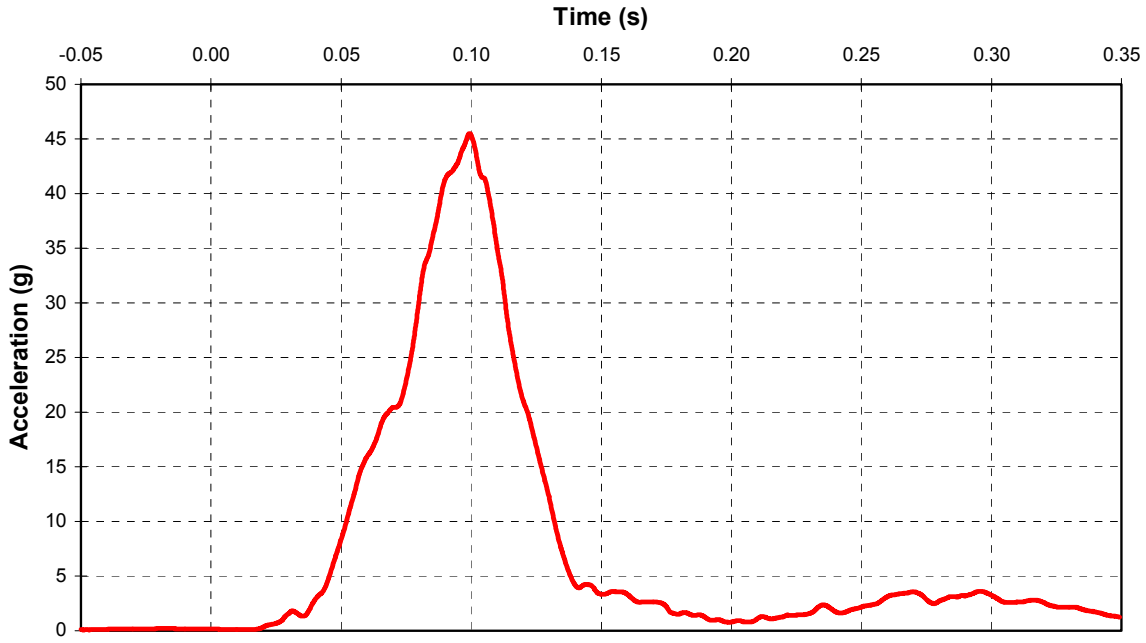
A-19 CF98005 1998 Nissan Frontier Chest L-M Acceleration



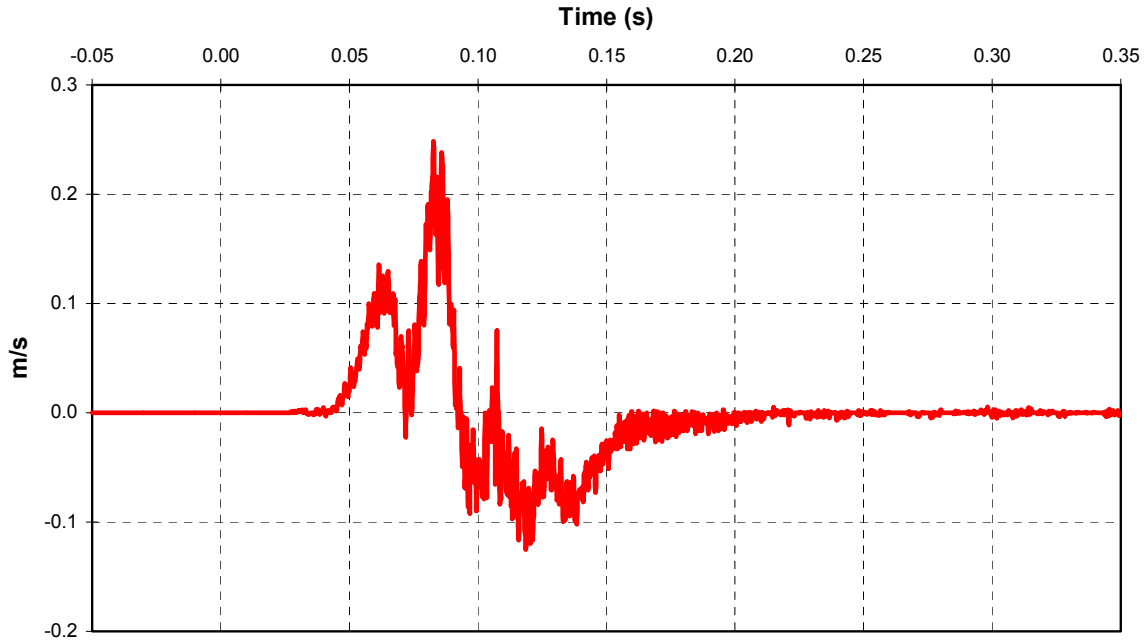
A-20 CF98005 1998 Nissan Frontier Chest I-S Acceleration



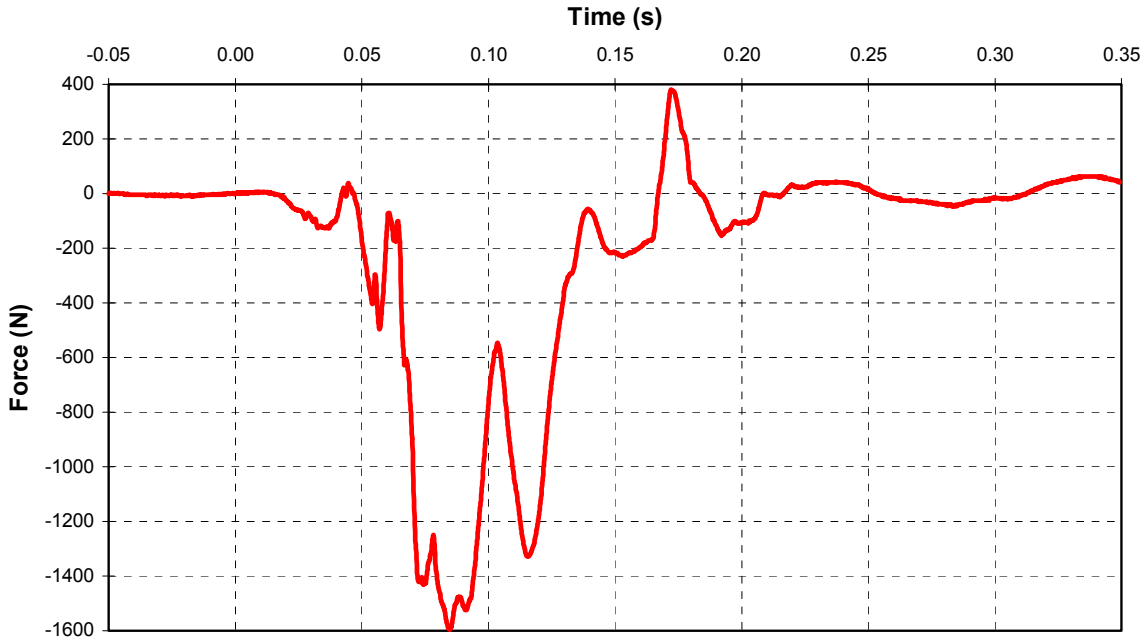
A-21 CF98005 1998 Nissan Frontier Chest Vector Resultant Acceleration



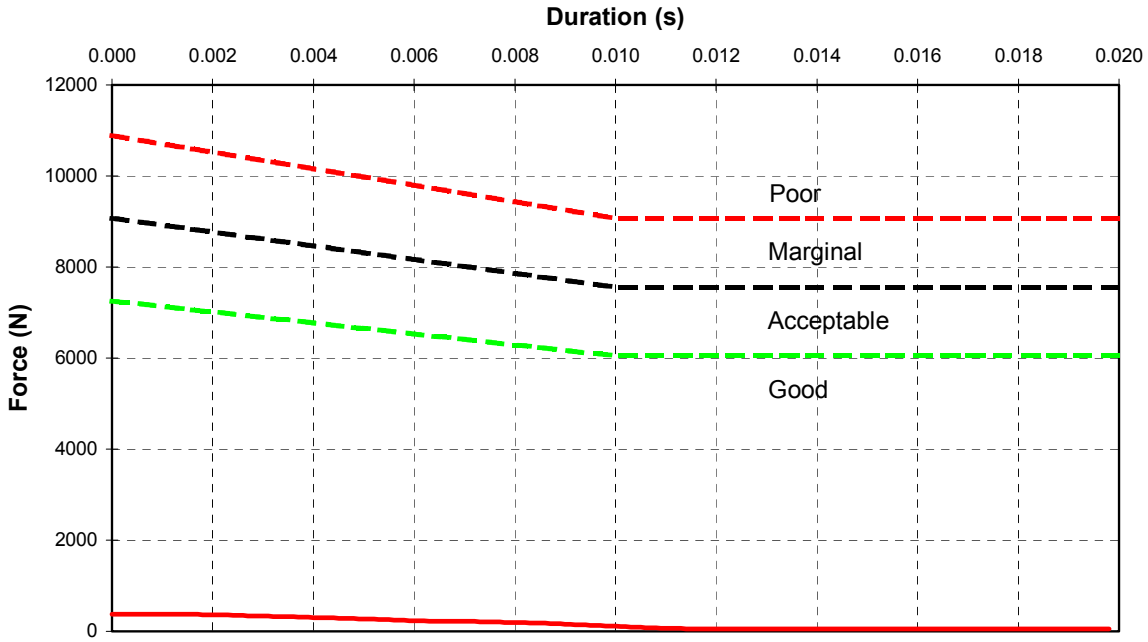
A-22 CF98005 1998 Nissan Frontier Viscous Criterion



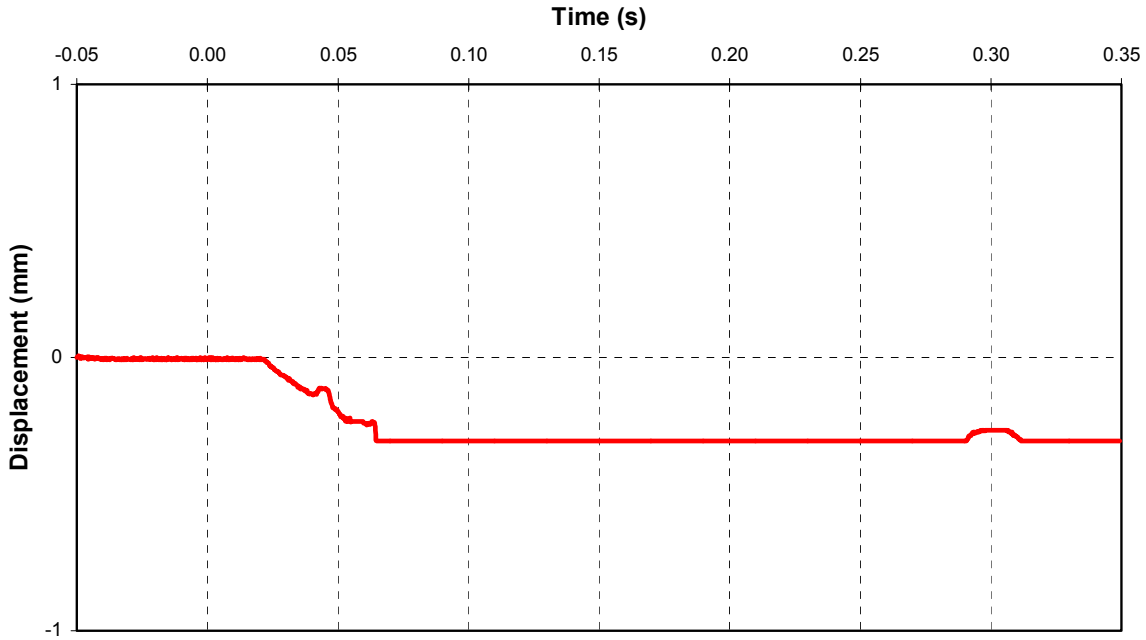
A-23 CF98005 1998 Nissan Frontier Left Femur Axial Force



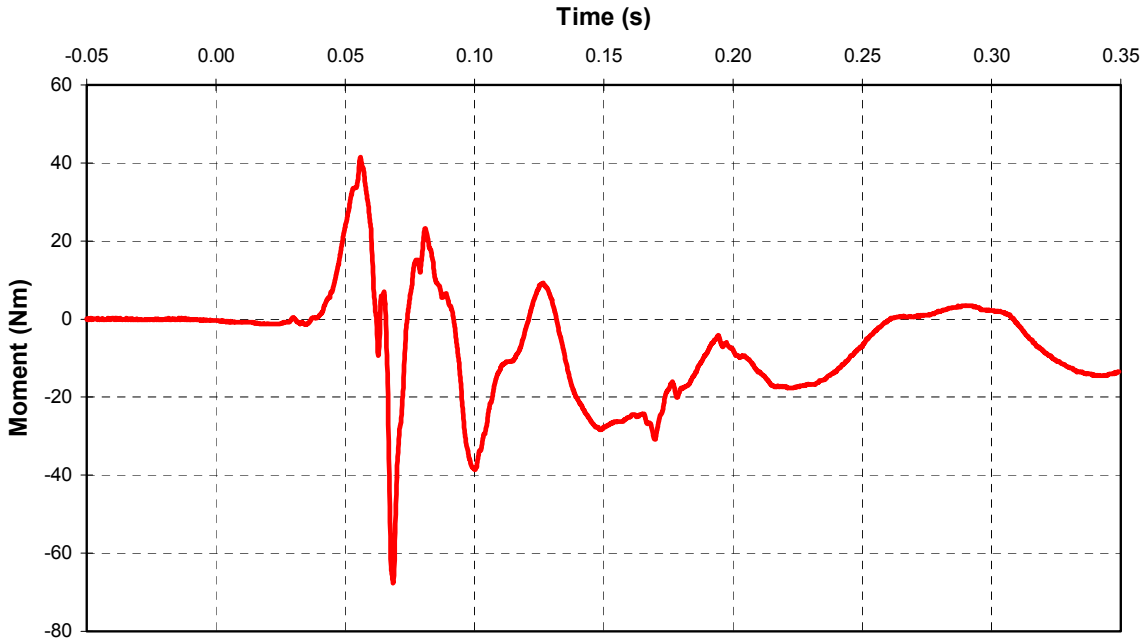
A-24 CF98005 1998 Nissan Frontier Left Femur Axial Force Analysis



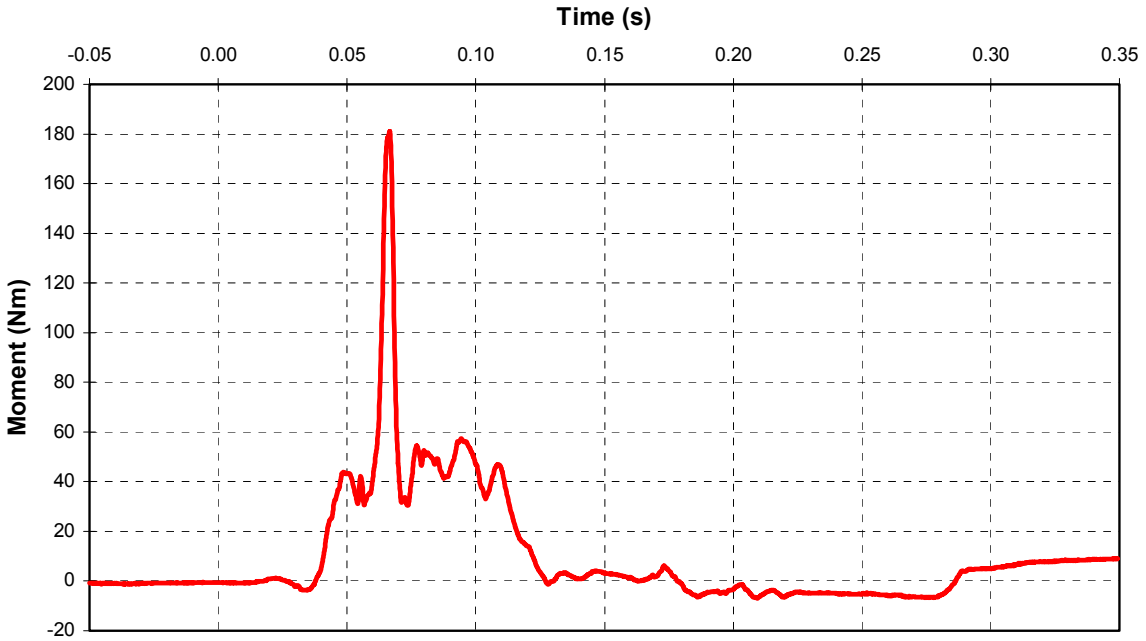
A-25 CF98005 1998 Nissan Frontier Left Tibia-Femur Displacement



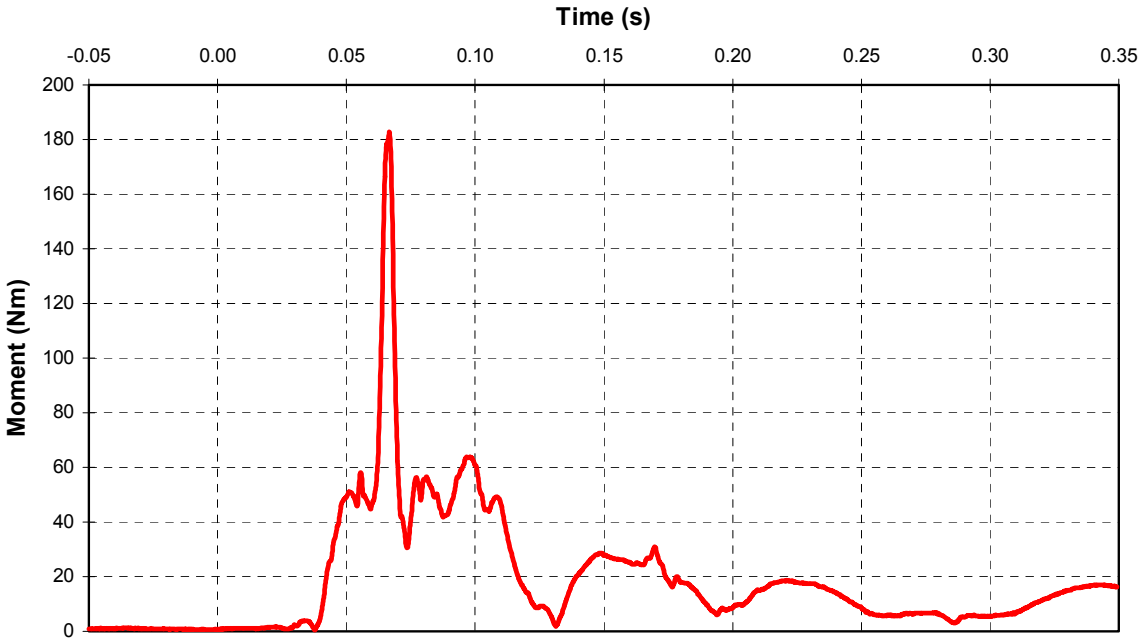
A-26 CF98005 1998 Nissan Frontier Left Upper Tibia L-M Moment



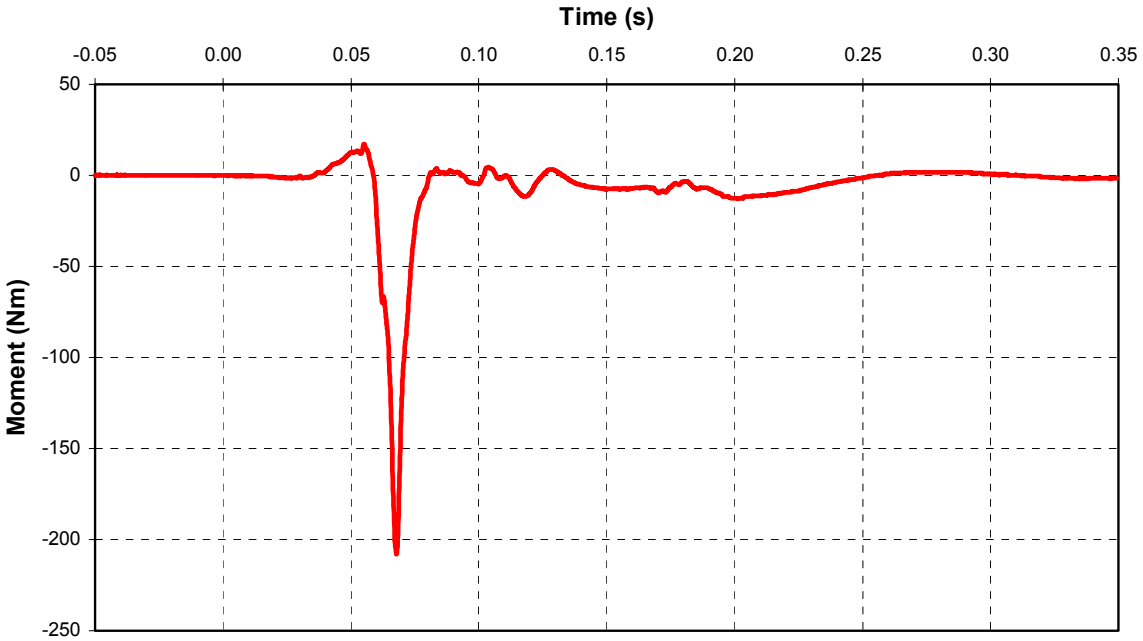
A-27 CF98005 1998 Nissan Frontier Left Upper Tibia A-P Moment



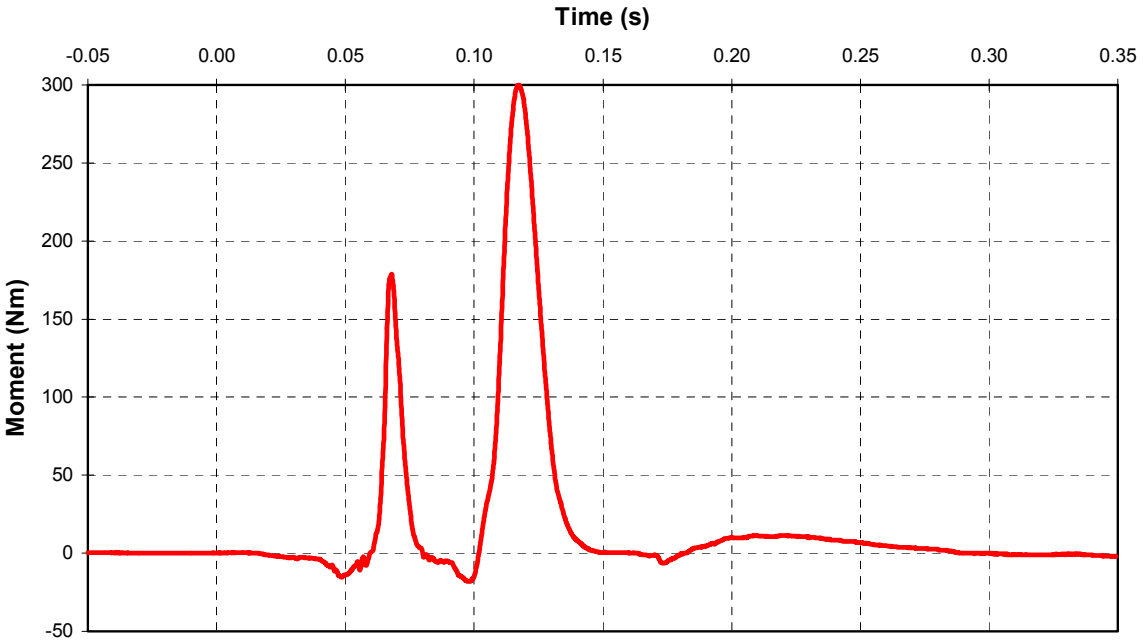
A-28 CF98005 1998 Nissan Frontier Left Upper Tibia Vector Resultant Moment



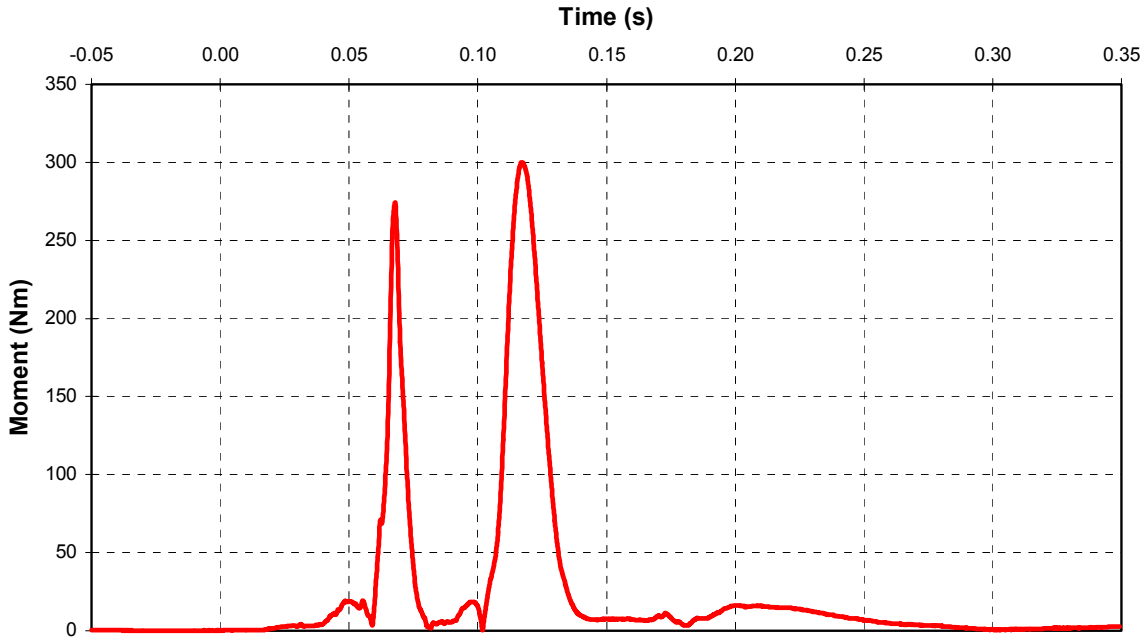
A-29 CF98005 1998 Nissan Frontier Left Lower Tibia L-M Moment



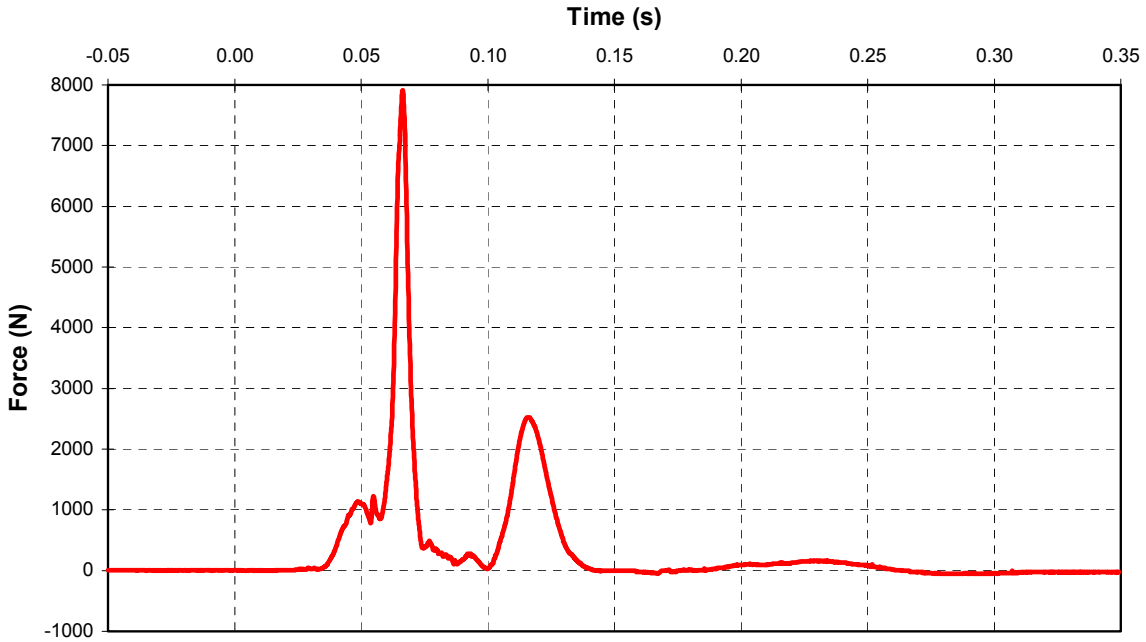
A-30 CF98005 1998 Nissan Frontier Left Lower Tibia A-P Moment



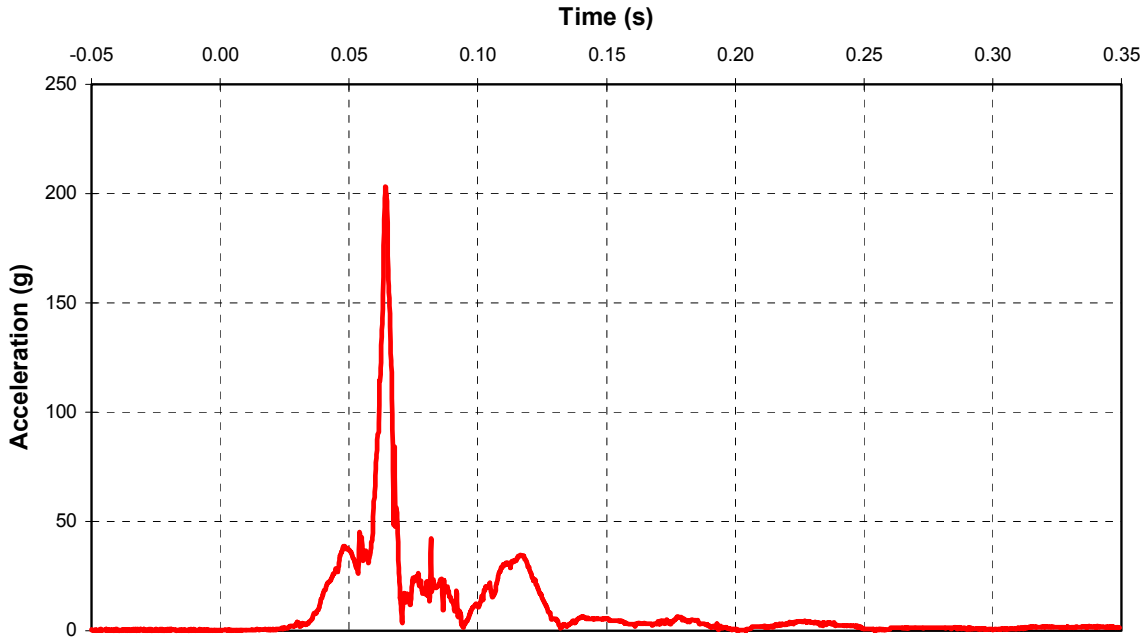
A-31 CF98005 1998 Nissan Frontier Left Lower Tibia Vector Resultant Moment



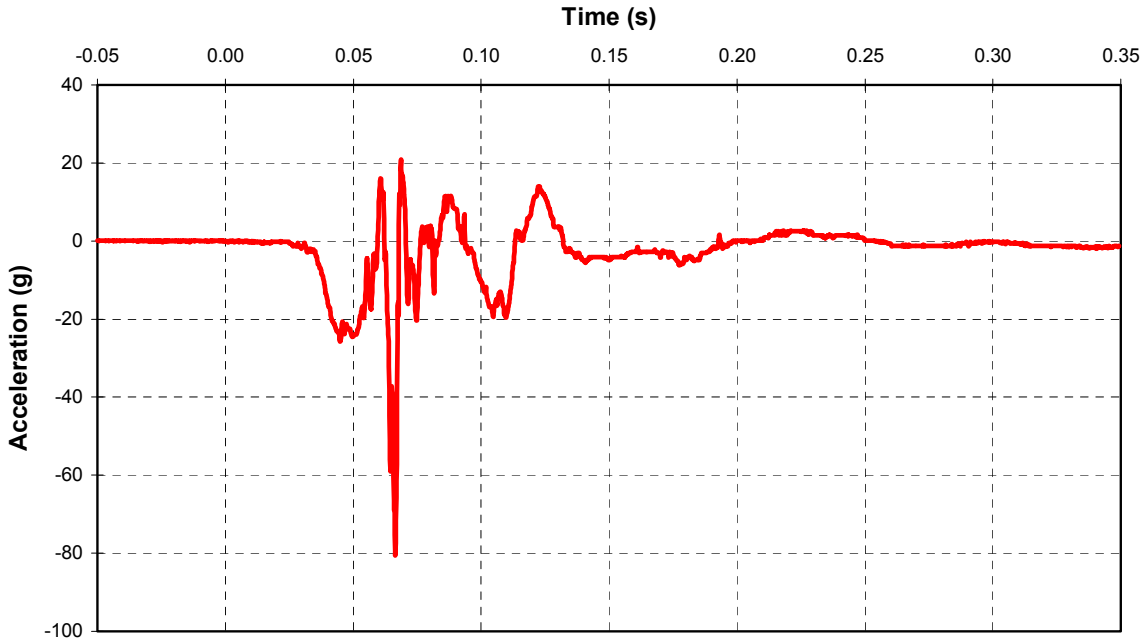
A-32 CF98005 1998 Nissan Frontier Left Lower Tibia Axial Force



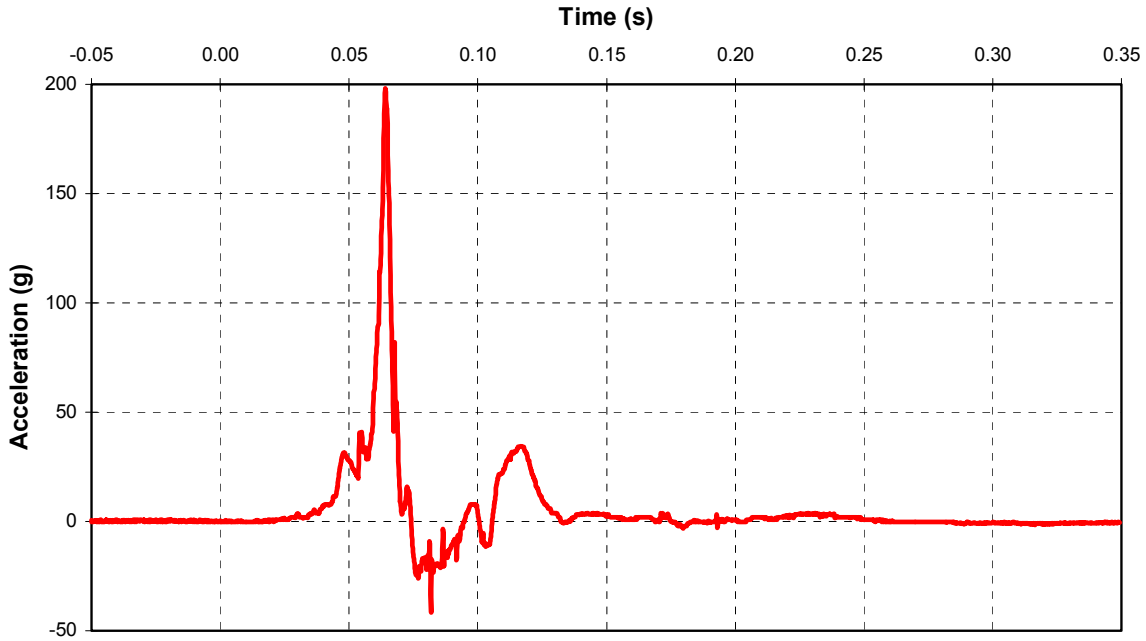
A-33 CF98005 1998 Nissan Frontier Left Foot Vector Resultant Acceleration



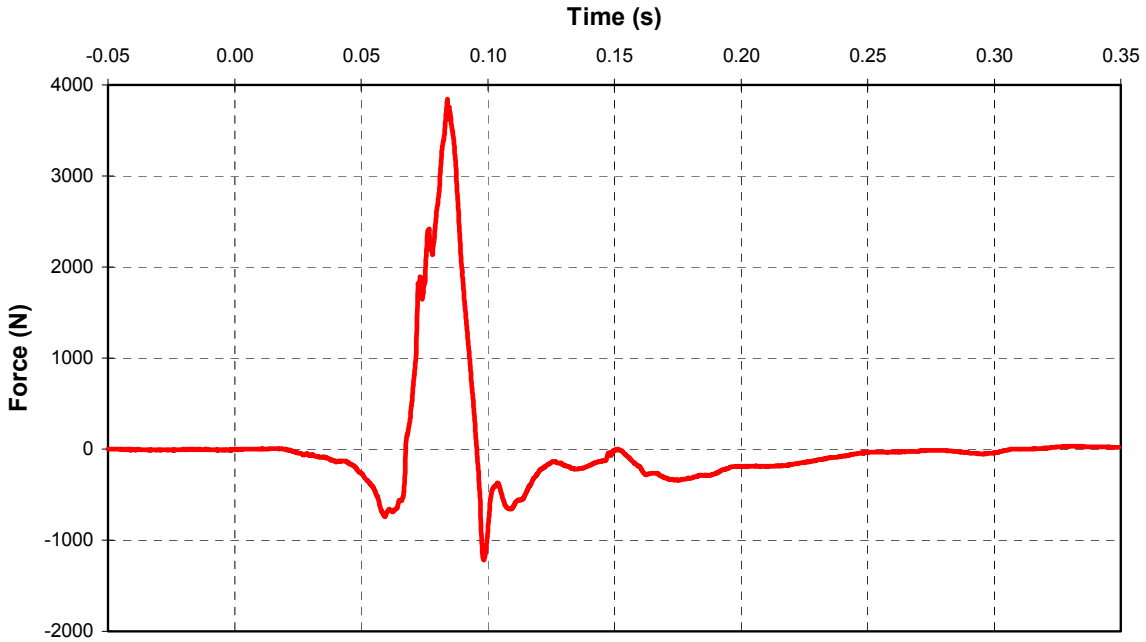
A-34 CF98005 1998 Nissan Frontier Left Foot A-P Acceleration



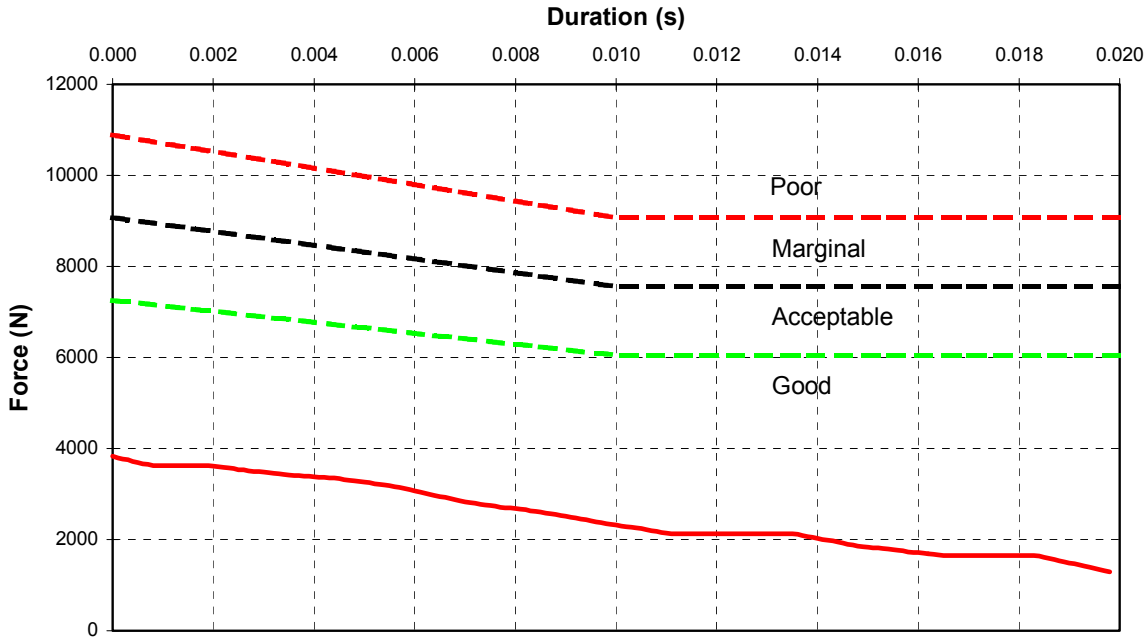
A-35 CF98005 1998 Nissan Frontier Left Foot I-S Acceleration



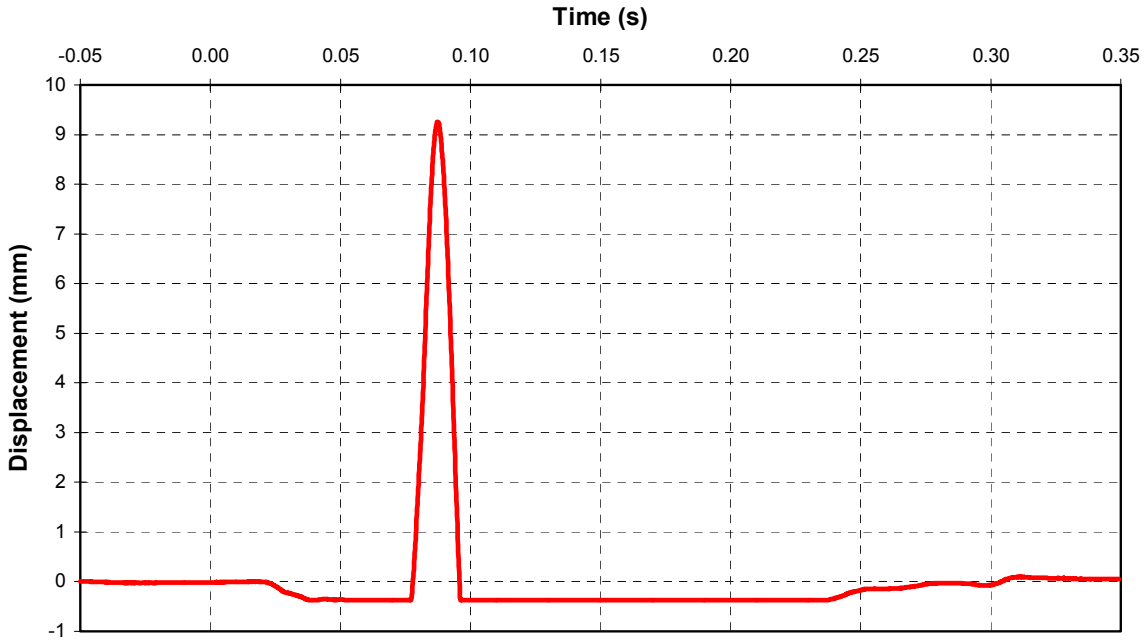
A-36 CF98005 1998 Nissan Frontier Right Femur Axial Force



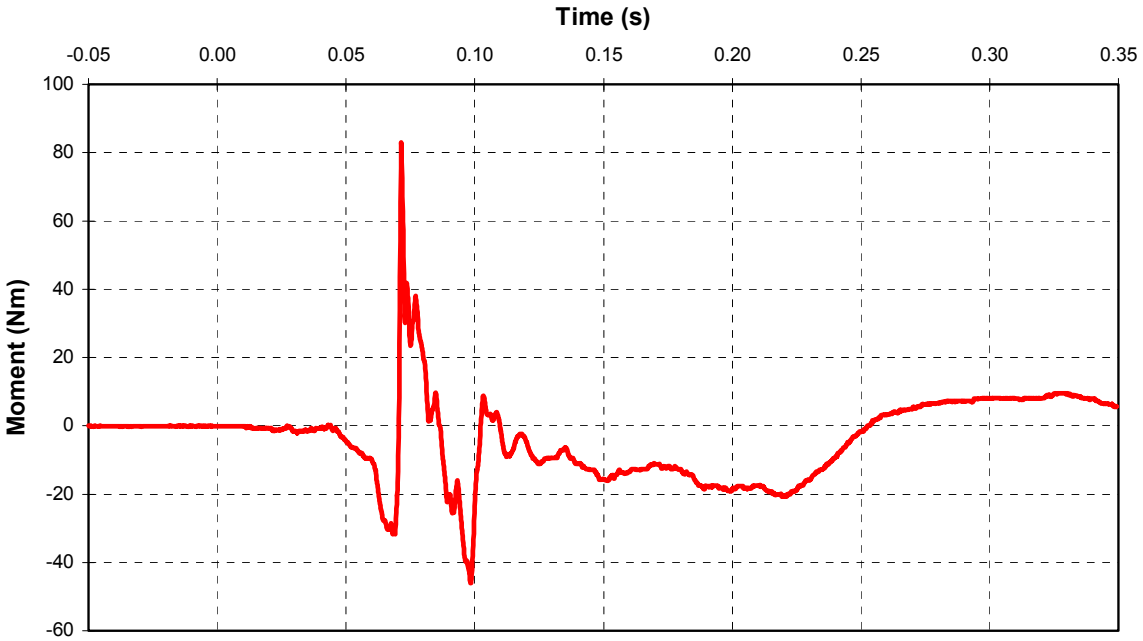
A-37 CF98005 1998 Nissan Frontier Right Femur Axial Force Analysis



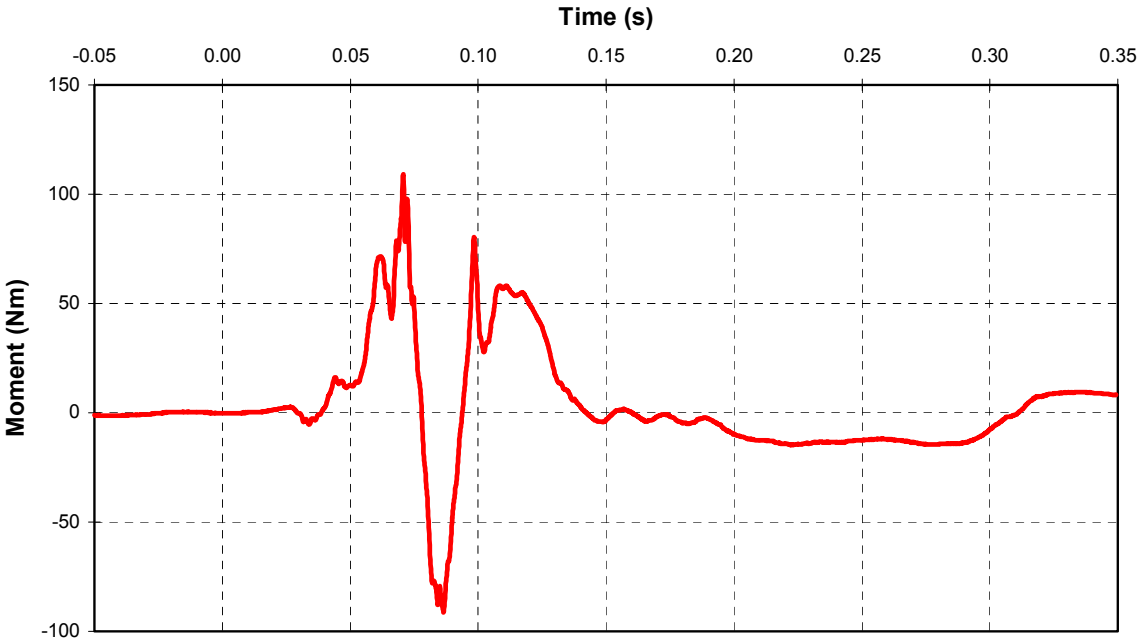
A-38 CF98005 1998 Nissan Frontier Right Tibia-Femur Displacement



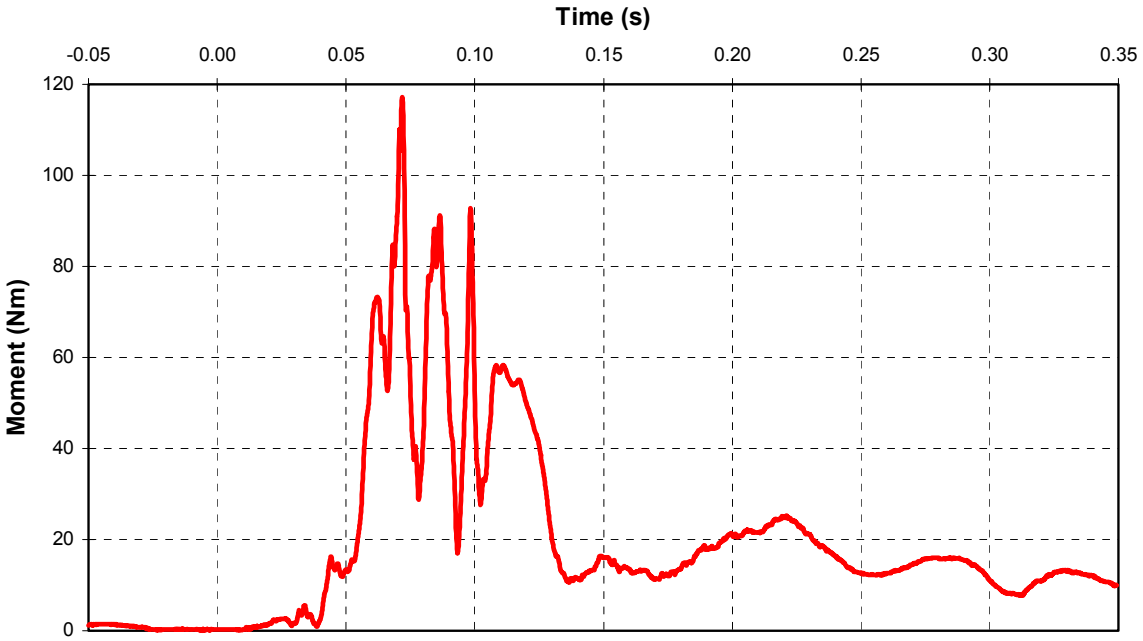
A-39 CF98005 1998 Nissan Frontier Right Upper Tibia L-M Moment



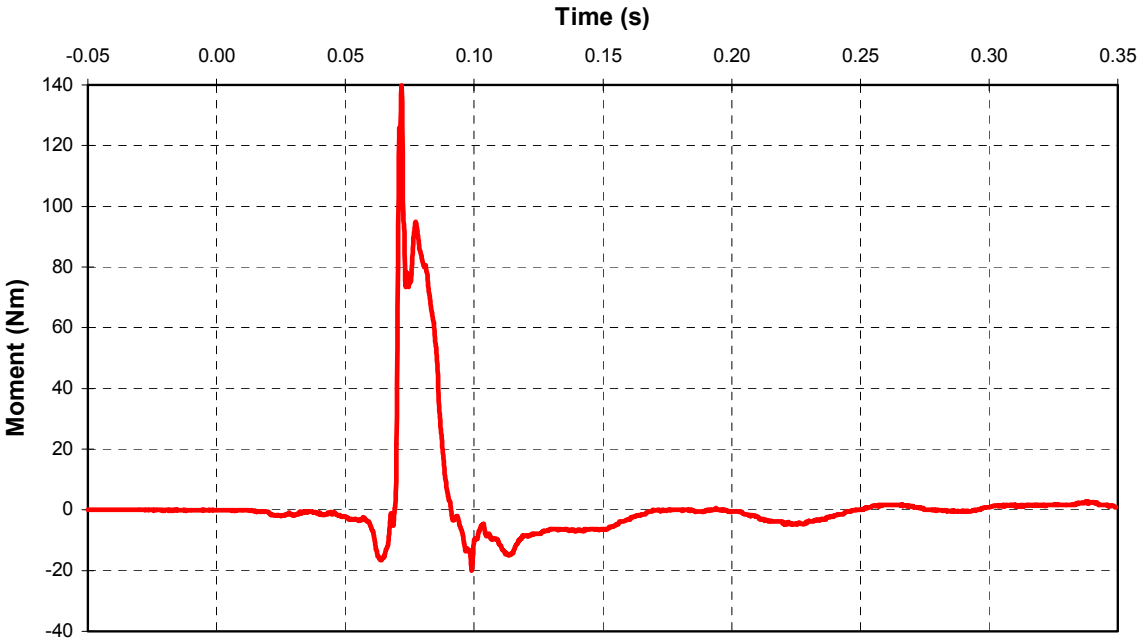
A-40 CF98005 1998 Nissan Frontier Right Upper Tibia A-P Moment



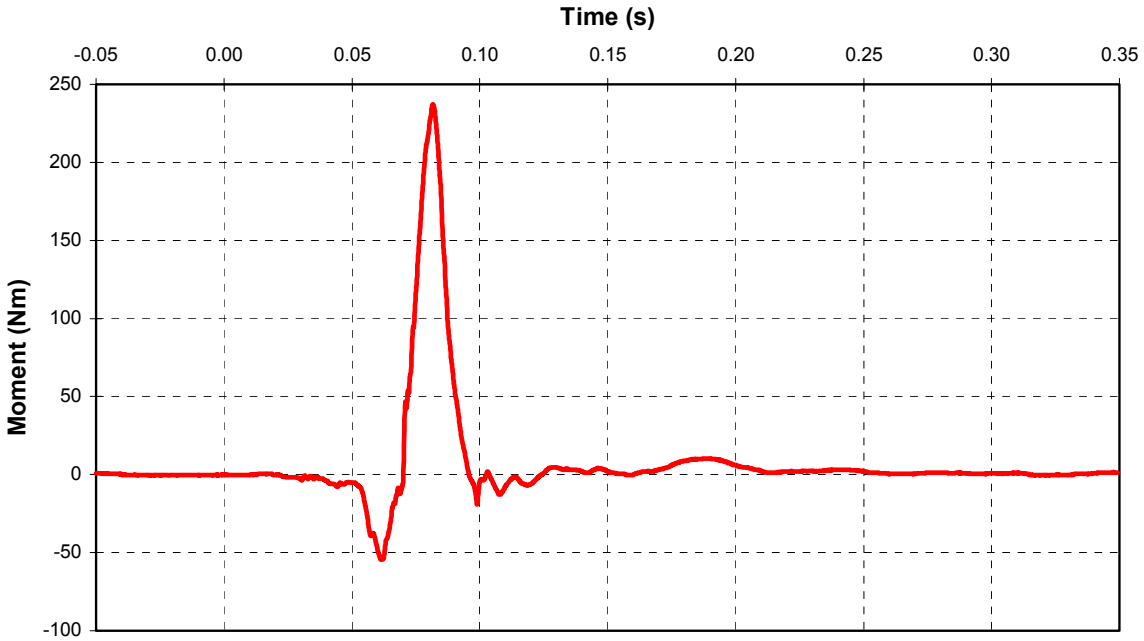
A-41 CF98005 1998 Nissan Frontier Right Upper Tibia Vector Resultant Moment



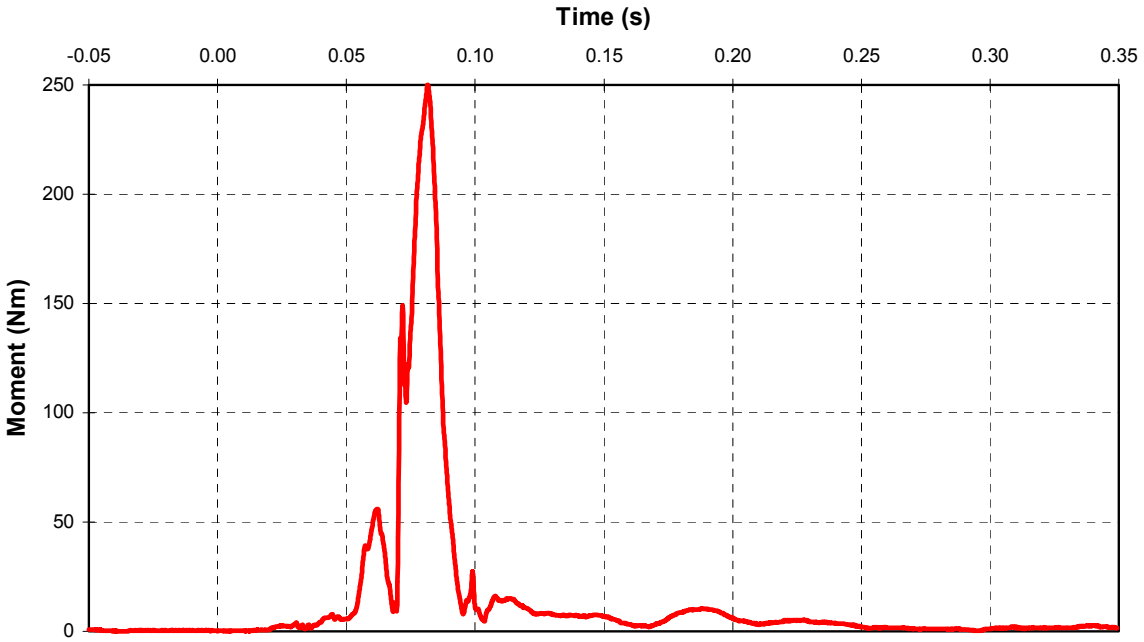
A-42 CF98005 1998 Nissan Frontier Right Lower Tibia L-M Moment



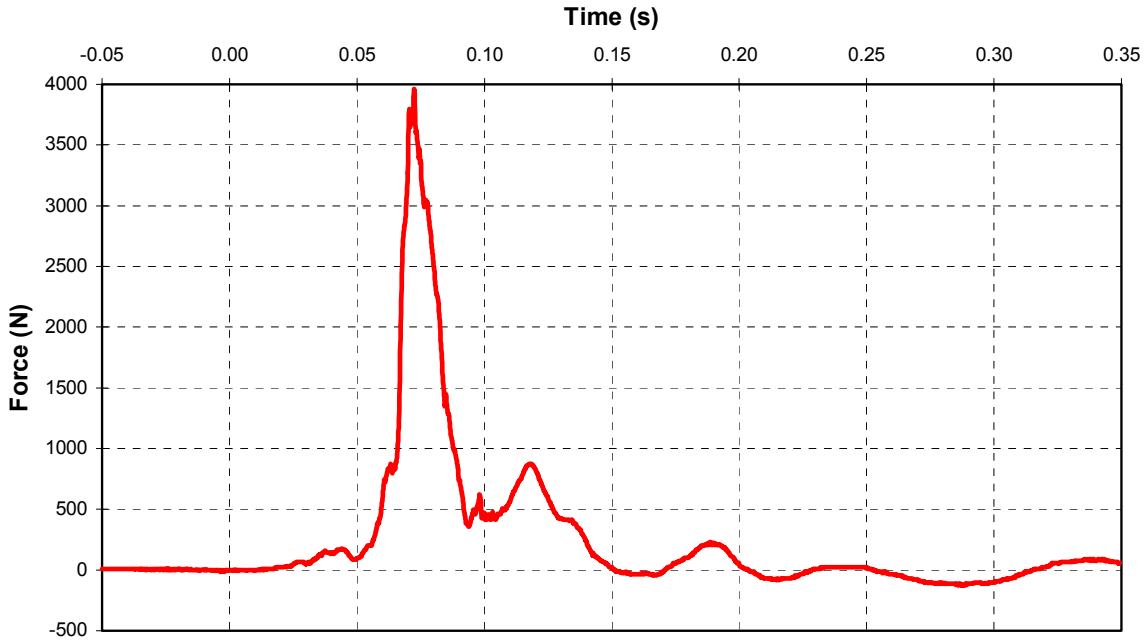
A-43 CF98005 1998 Nissan Frontier Right Lower Tibia A-P Moment



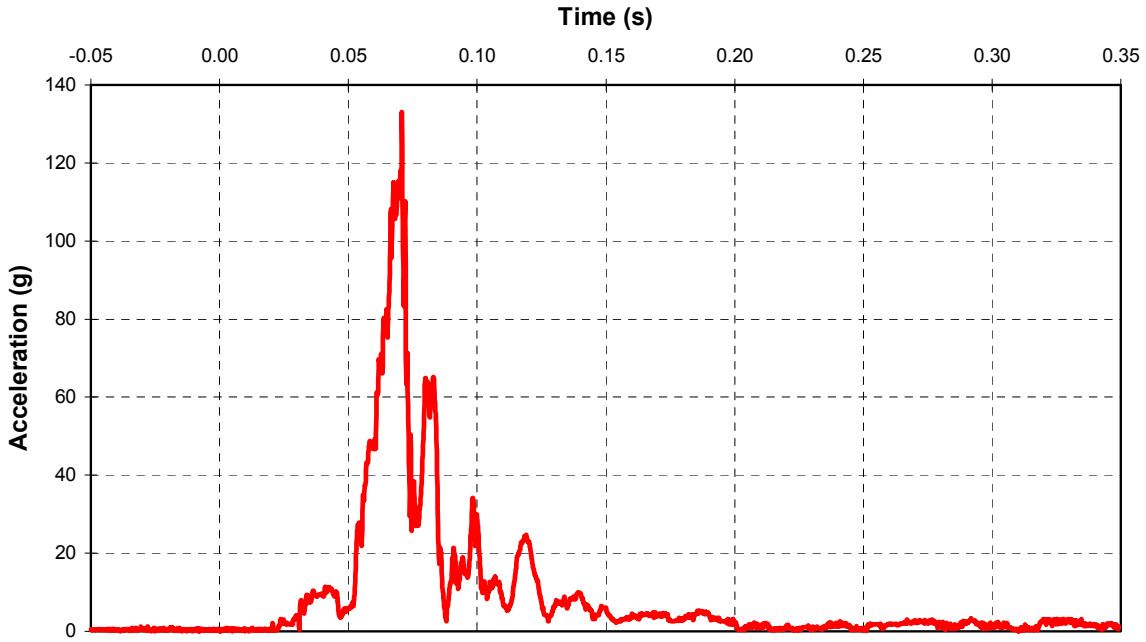
A-44 CF98005 1998 Nissan Frontier Right Lower Tibia Vector Resultant Moment



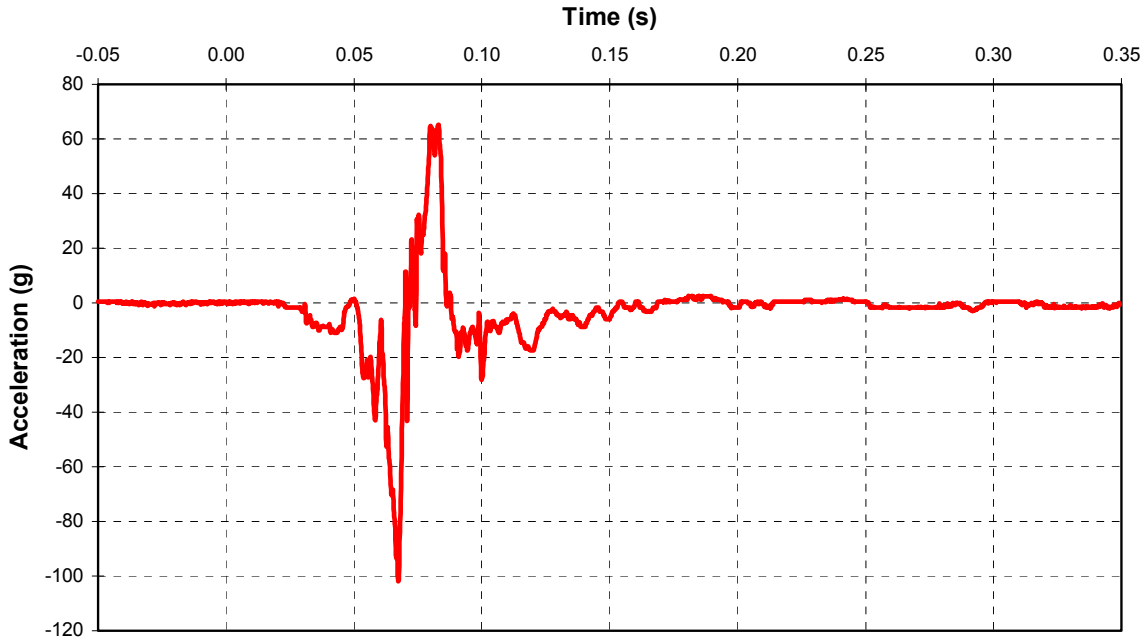
A-45 CF98005 1998 Nissan Frontier Right Lower Tibia Axial Force



A-46 CF98005 1998 Nissan Frontier Right Foot Vector Resultant Acceleration



A-47 CF98005 1998 Nissan Frontier Right Foot A-P Acceleration



A-48 CF98005 1998 Nissan Frontier Right Foot I-S Acceleration