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FULL-SCALE CRASH EVALUATION OF SIDEWALK-MOUNTED STEEL BRIDGE RAILING

NCHRP TEST 4-11
SwRI TEST NO. NETC-2

Research, Development, and Technology
Turner-Fairbank Highway Research Center
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McLean, Virginia 22101-2296

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16. Abstract

This report presents the results of a NCHRP Report 350 type 4-11 crash test conducted on a sidewalk-mounted steel bridge railing designed by the New England Transportation Consortium (NETC). The test utilized a 2109 kg (gross weight including dummy) pickup truck impacting at 100 km/h and a 25° angle to evaluate the strength of the barrier section to contain and redirect the vehicle. The performance of the barrier was judged to pass all evaluation criteria of NCHRP Report 350, and barrier damage was limited to rail scuffing and one post with permanent deflection.

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
	AREA			
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yards	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
	VOLUME			
fl oz	fluid ounces	29.57	milliliters	ml
gal	gallons	3.785	liters	l
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: Volumes greater than 1000 l shall be shown in m^3.				
	MASS			
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5(F-32)/9 or (F-32)/1.8	Celcius temperature	°C
	ILLUMINATION			
fc	foot-candles	10.76	lux	l
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
	FORCE and PRESSURE or STRESS			
lbf	poundforce	4.45	newtons	N
psi	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
	AREA			
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	ac
ha	hectares	2.47	acres	mi^2
km^2	square kilometers	0.386	square miles	
	VOLUME			
ml	milliliters	0.034	fluid ounces	fl oz
l	liters	0.264	gallons	gal
m^3	cubic meters	35.71	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
	MASS			
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg	megagrams	1.103	short tons (2000 lb)	T
	TEMPERATURE (exact)			
°C	Celcius temperature	1.8C + 32	Fahrenheit temperature	°F
	ILLUMINATION			
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
	FORCE and PRESSURE or STRESS			
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	psi

* SI is the symbol for the International System of Units. Appropriate

(Revised August 1992)

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INTRODUCTION

The purpose of this test was to evaluate the performance of the New England Transportation Consortium (NETC) 4-bar, sidewalk-mounted steel bridge railing. To accomplish this, a test designated as type 4-11 in NCHRP Report 350[1] was performed. Test 4-11 utilizes a 2000-kg pickup truck impacting at 100-km/h and a 25° impact angle to evaluate the strength of the barrier for containing and redirecting the vehicle. The text in the following sections describe the test installation, vehicle, sequence, and resulting damage to both the installation and vehicle. In addition, conclusions regarding barrier performance will be offered. Following the text, figures and tables which further describe the test setup, procedures, and results will be presented.

TEST INSTALLATION

Facility

This test was performed along and adjacent to the inactive East Runway at Brooks Air Force Base, San Antonio, Texas. As shown in figure 1, a concrete approach and 34.1-m-long sidewalk were constructed at an angle to the runway and a 32.9-m-long bridge rail test article was erected on the sidewalk.

Test Article

Drawings showing an elevation and cross section of the test installation are shown in figures 2 and 3, respectively. Briefly, the steel-reinforced, concrete sidewalk was 2.0 m wide by 203 mm high on the traffic side which sloped upward to a level 229 mm high where the bridge rail was mounted. The bridge rail utilized W6 x 25 steel posts welded to 25-mm x 254-mm x 356-mm baseplates which were attached to the concrete with 25-mm anchor bolts. Post spacing was 2.44 m. Four longitudinal rails fabricated from steel structural tubing were attached to the posts with 19.1-mm diameter studs; rail heights, measured from the concrete sidewalk to the top of the rails, were 229 mm, 475 mm, 813 mm, and 1168 mm. Further details of the installation and its components are shown in the drawing of Appendix A.

Photographs of details of the barrier installation are shown in figure 4; the scuffing of the longitudinal rails which occurred during the previous test was painted over. Table 1 summarizes the beam and post materials used in the installation and also lists dimensions of the key components of the system.

TEST VEHICLE, CONTROLS, AND DATA SYSTEMS

Vehicle and Dummy

The vehicle used for this test was a 1991 Ford F-250 pickup. An uninstrumented dummy was placed in the driver's seat of the vehicle and restrained with lap and shoulder belts. Gross test weight, including the dummy and vehicle instrumentation, was 2109 kg. Pretest photographs of the vehicle are shown in figure 5.

Vehicle Controls

Target impact point of the vehicle was the centerline of post 6. It was guided to that location using a 6.4-mm diameter x 457.2-m-long steel cable which passed through a guide tube/bracket attached to the left front wheel spindle. The cable was pretensioned and located alongside the run-up strip where it would not interfere with post-impact vehicle trajectory. Just prior to impact, the guide tube/bracket was sheared off allowing the vehicle free trajectory.

Braking of the test vehicle was accomplished by use of an air cylinder attached to

[1]Ross, H.E., Jr., Sicking, D.L., Zimmer, R.A., and Michie, J.D., "Recommended Procedures for the Safety Performance Evaluation of Highway Appurtenances," NCHRP Report 350, Washington, D.C., 1993.

its brake pedal. The air cylinder was activated by a gas-charged accumulator through an intermediate solenoid valve. The solenoid valve was remotely controlled by the test conductor.

The test vehicle was towed into the barrier using a cable/pulley system for reverse towing, i.e., the tow vehicle moved away from the barrier as the test vehicle moved toward it. The tow cable was attached to the underside of the test vehicle and released just prior to impact. Vehicle impact speed control was achieved by means of an automatic controller attached to the engine distributor of the tow vehicle. After the tow vehicle accelerated to its predetermined test speed, the controller pulsed the ignition, maintaining the tow vehicle at that speed.

Electronic Data Acquisition

The vehicle was instrumented with eleven accelerometers and one rate gyro; the location of each of these transducers in the vehicle is shown in table 2. The accelerometers were oriented to obtain data in directions parallel to the longitudinal, lateral, or vertical axes of the vehicle, and the rate gyro was oriented to measure the yaw angular rate change the vehicle experienced during the impact sequence. The transducer data was recorded by a Pacific Instruments Model 5600 Data Acquisition System (DAS) which contained signal conditioners, amplifiers, appropriate SAEJ211 filters and digitizers with on-board memory for up to 32 data channels at programmable sample rates to 100 kilohertz per channel. Digitized data was recorded in solid state non-volatile memory with a capacity of 65,000 data points per channel. For this test, twelve channels were used to measure and record X, Y, and Z accelerations as well as yaw rate of the vehicle.

In addition to the above, two accelerometers were mounted on the back flange of post 7 of the barrier installation. These were located 51mm and 533 mm below the top of the post and were oriented to obtain data in a lateral direction to the barrier. These two transducers were connected to a signal conditioning unit for power, calibration and balancing, and their signals recorded by digital computer at a rate of 1 kilohertz.

Film Data Acquisition

In addition to the electronic data, high-speed film coverage of the event included a camera onboard the vehicle as well as cameras adjacent to and overhead of the barrier installation.

Data Processing

Vehicle transducer data were downloaded to a personal computer after the test and processed through an Institute-developed computer program. The program utilizes accelerometer and rate gyro data to determine vehicle acceleration (in longitudinal, lateral, and vertical directions), heading angle, velocity, and displacement as a function of time during the event. In addition, from this data the program calculates the highest 50-millisecond average accelerations for the vehicle as well as occupant risk data, including impact velocities (with the interior of the vehicle) and 10-millisecond average ridedown accelerations. The output of this data is provided in either tabular or graphical form.

Data from the two accelerometers mounted on post 7 were transferred to a floppy disk and then imported to a Microsoft Excel spreadsheet. These data were then converted to standard engineering units (g's) and output in both tabular and graphical form.

TEST DESCRIPTION

Ambient temperature at test time was 7°C. Actual impact conditions were 100.0 km/h and a 25° impact angle. As shown in the test summary diagram of figure 6, the vehicle traversed the sidewalk and impacted the barrier 610 mm downstream of post 6, maintaining contact with the longitudinal rails for

3.96 m as it was redirected, exiting the installation at a 8.2° angle (calculated from measured tire marks). Figures 7 and 8 show the redirection sequence of the vehicle from overhead as well as behind the barrier viewpoints. The post-impact trajectory of the vehicle was such that it traveled in a relatively straight line after loss of contact, coming to a stop 62 m downstream of initial impact point (brakes had been applied immediately after loss of contact with the barrier). Three of the vehicle accelerometers, the lateral accelerometer at the c.g. and the longitudinal accelerometers mounted on the instrument panel and bottom of the engine, malfunctioned at impact, resulting in no data on those channels. The net effect of the data loss from the lateral accelerometer was that maximum 50 sec average vehicle acceleration and occupant risk values in the lateral direction could not be calculated. However, the more important (for this test) longitudinal factors could be calculated and were as follows: (1) maximum 50 msec average vehicle acceleration in the longitudinal direction was -6.12 g's, (2) the occupant impact velocity was 3.99 m/sec, and (3) the maximum occupant ridedown acceleration was -2.55 G's. Figures 9 through 19 contain plots of the functional transducer data recorded during the event, and tabular printouts of the transducer data are shown in Appendices B and C.

BARRIER DAMAGE

Damage to the barrier, as shown in figure 20, occurred mostly at post 7. The top of post 7 and the top rail section attached to it had 13 mm of permanent deflection, and the baseplate of the post was raised upward at the center approximately 3.5 mm. The remainder of the damage consisted of scuffing of the longitudinal rails which only required repainting prior to further testing. The top rail section was straightened, but post 7 required replacement prior to subsequent testing.

VEHICLE DAMAGE

As shown in figure 21, the test vehicle sustained extensive damage to the left front fender and along the left side, as well as damage to the headlight/grill area. The left side of the front bumper was deformed rearward, and the left front suspension/wheel/tire displaced rearward. Contact with the edge of the sidewalk damaged the right front suspension also. All tires except the right rear were either blown out or deflated as a result of the impact. The exterior vehicle damage scale was estimated to be 11-FL-3 using the VDS system and 11FLEE3 using the CDC system. The interior deformation of the occupant compartment was LF0000000 using the OCDI system. There was no deformation or intrusion into the occupant compartment.

EVALUATION OF TEST RESULTS

Performance evaluation is based on the criteria shown in table 5.1 titled "Safety Evaluation Guidelines," of NCHRP Report 350. The specific requirements applicable for a Test Type 4-11 are shown in table 3 together with the test NETC-2 results. Barrier performance compared with recommended criteria indicates it passed in all categories.

CONCLUSIONS

From the evaluation described in the preceding section, the NETC 4-bar, sidewalk-mounted steel bridge railing, as described in the section on "Test Article," appears to meet the requirements for a longitudinal barrier as applicable to a Test Type 4-11.

Table 1. Installation bill of material - Test NETC-2.

Bill of Material

Item	Quantity
TS 4 x 4 x 1/4 - 7.31 M long Rail	12
TS 8 x 4 x 5/16 - 7.31 M long Rail	4
TS 4 x 4 x 1/4 - 3.66 M long Rail	3
TS 8 x 4 x 5/16 - 3.66 M long Rail	1
W6 x 25 - 1.05 M high Post	14

Table 2. Vehicle data transducer locations - Test NETC-2.

Type	Location	Orientation
Accelerometer	Center of gravity	Longitudinal axis
Accelerometer	Center of gravity	Lateral axis
Accelerometer	Center of gravity	Vertical axis
Rate Gyro	Center of gravity	Longitudinal axis
Accelerometer	Over rear axle	Longitudinal axis
Accelerometer	Over rear axle	Lateral axis
Accelerometer	Over rear axle	Vertical axis
Accelerometer	Top engine block	Longitudinal axis
Accelerometer	Bottom of engine block	Longitudinal axis
Accelerometer	Right front disc brake caliper	Longitudinal axis
Accelerometer	Left front disc brake caliper	Longitudinal axis
Accelerometer	Center of instrument panel	Longitudinal axis

Table 3. Test assessment summary - NCHRP Report 350 test designation 4-11 - SwRI test number NETC-2.

Designation	Factor	Description		Test Results	Assessment
A	Structural Adequacy	Test article should contain and redirect the vehicle; the vehicle should not penetrate, underride, or override the installation although controlled lateral deflection of the test article is acceptable.		Vehicle contained and redirected.	**PASS**
D	Occupant Risk	Detached elements, fragments, or other debris from the test article shall not penetrate or show potential for penetrating the occupant compartment, or present an undue hazard to other traffic, pedestrians, or personnel in a work zone. Deformation of, or intrusions into, the occupant compartment that could cause serious injuries shall not be permitted.		This article and its elements did not penetrate the occupant compartment or present undue hazard to adjacent traffic or others. There was no deformation or intrusion into the occupant compartment.	**PASS**
F	Occupant Risk	The vehicle should remain upright during and after collision although moderate roll, pitching, and yawing are acceptable.		Vehicle remained upright during and after the collision.	**PASS**
L	Vehicle Trajectory	Occupant longitudinal impact velocity and ridedown acceleration should satisfy the following:		Occupant longitudinal impact velocity and ridedown acceleration values were:	
		Component	**Maximum**		
		Longitudinal impact velocity	12 m/sec	3.99 m/sec	**PASS**
		Longitudinal ridedown acceleration	20 G's	2.55 G's	**PASS**
K	Vehicle Trajectory	After collision, it is preferable that the vehicle's trajectory not intrude into adjacent traffic lanes.		Vehicle did not intrude into adjacent traffic lanes.	**PASS**
M	Vehicle Trajectory	The exit angle from the test article preferably should be less than 60 percent of test impact angle, measured at time of vehicle loss of contact with test device.		Vehicle exit angle was 6.6 degrees.	**PASS**

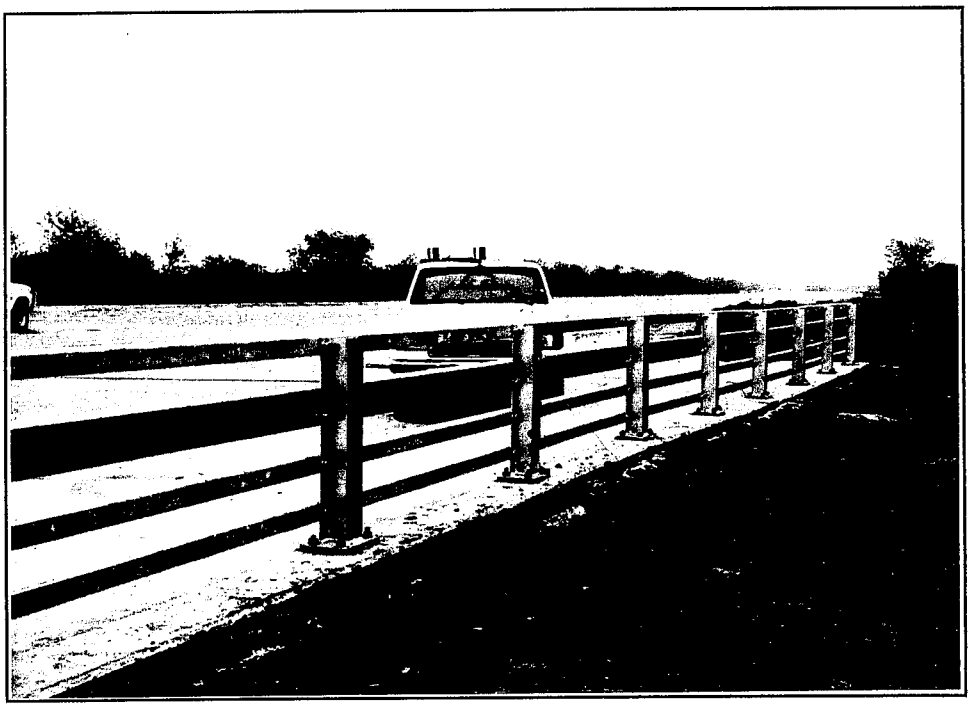


Figure 1. Test installation - Test NETC-2.

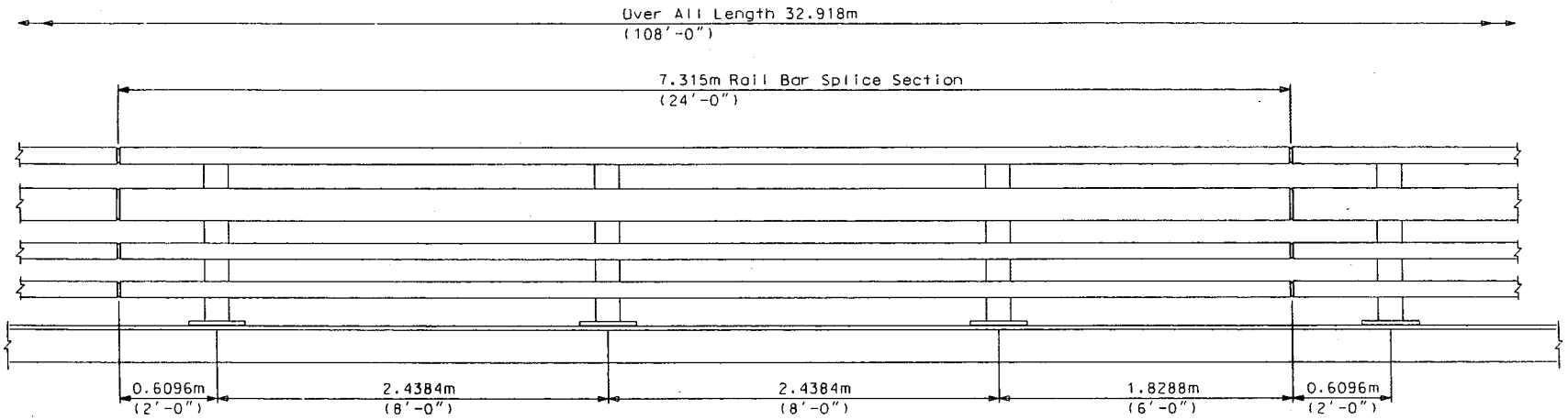


Figure 2. Barrier elevation drawing - Test NETC-2.

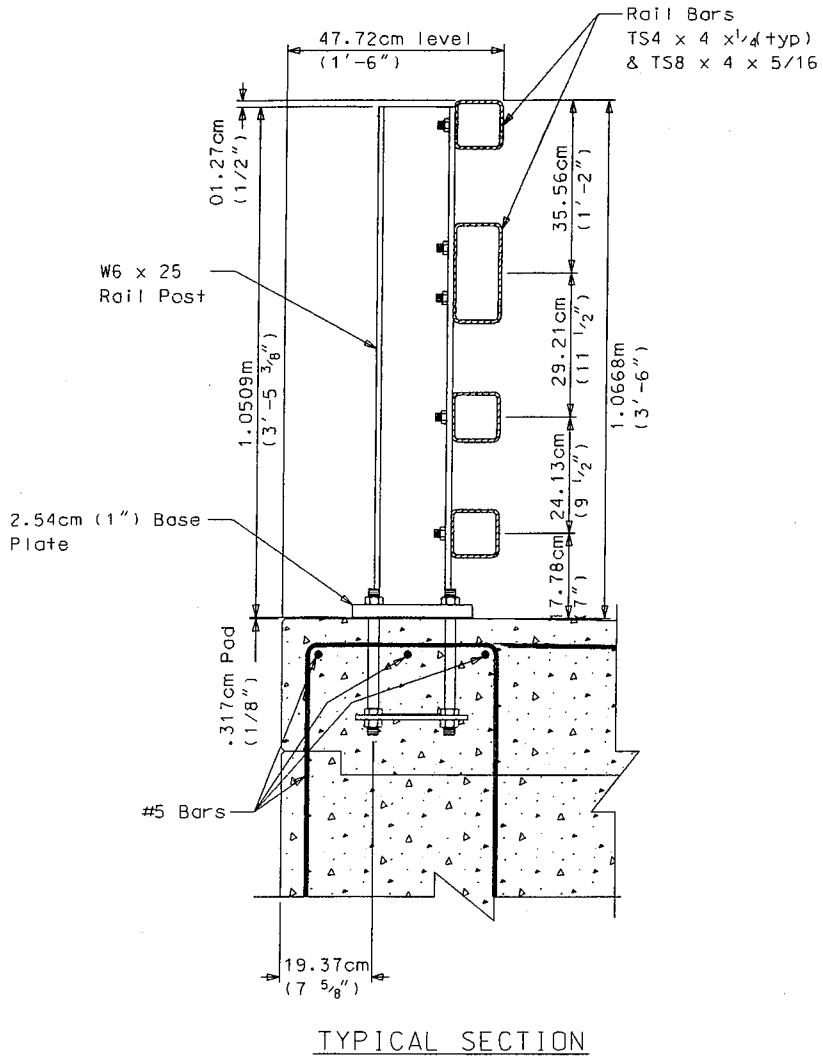


Figure 3. Barrier cross-section drawing - Test NETC-2.

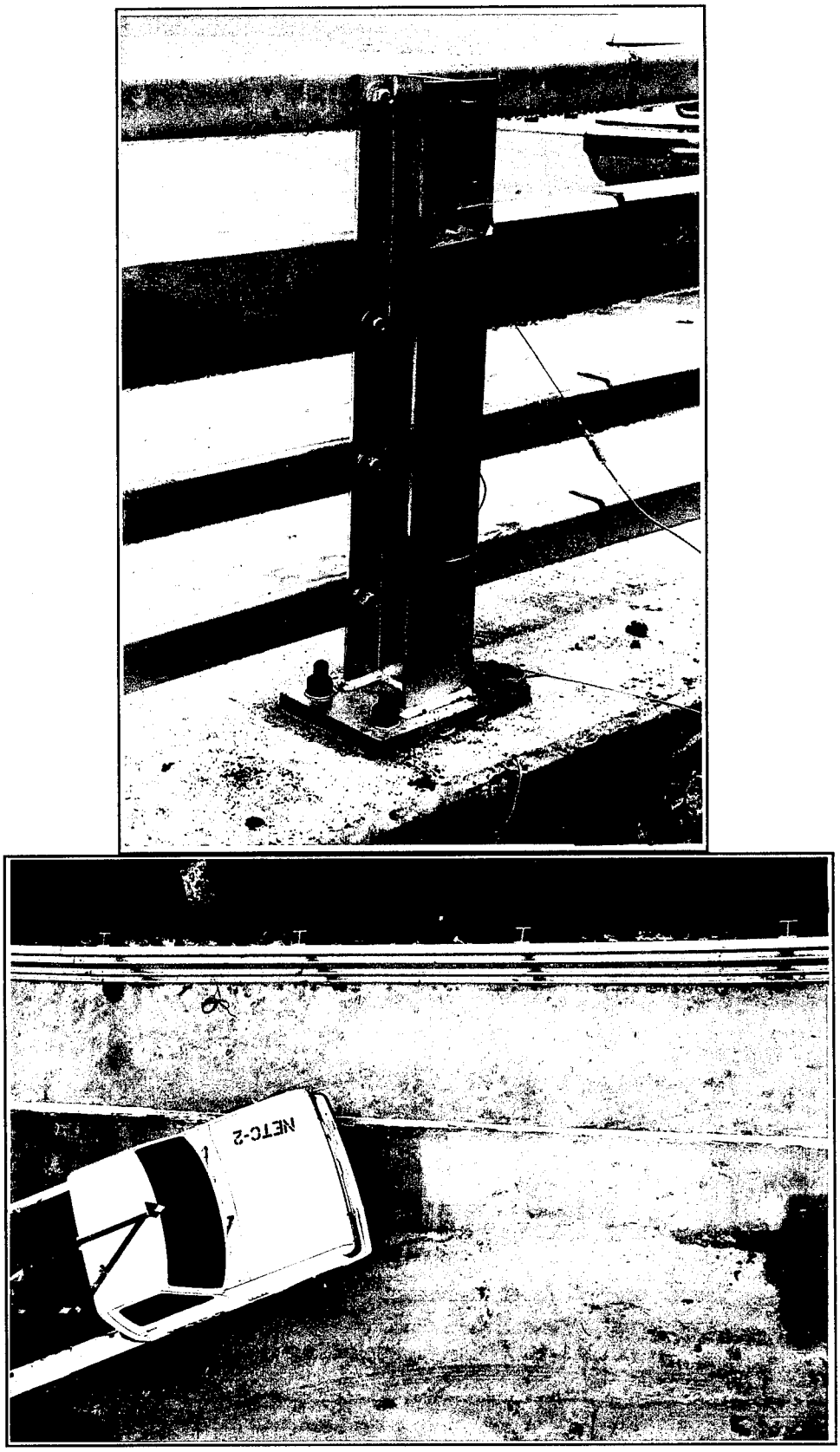
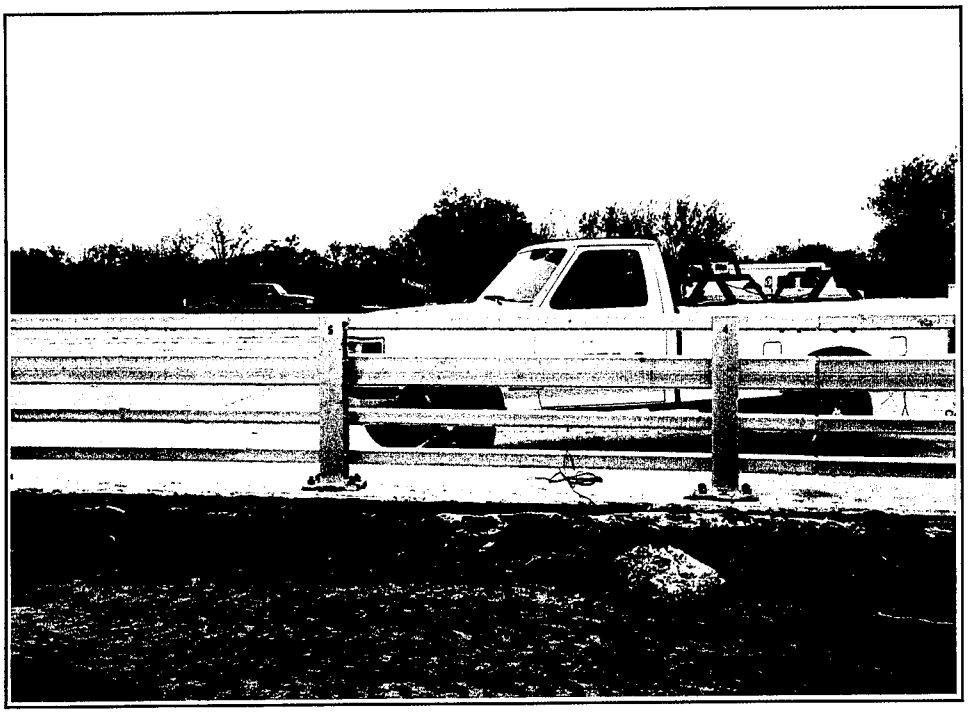


Figure 4. Barrier photographs - Test NETC-2.



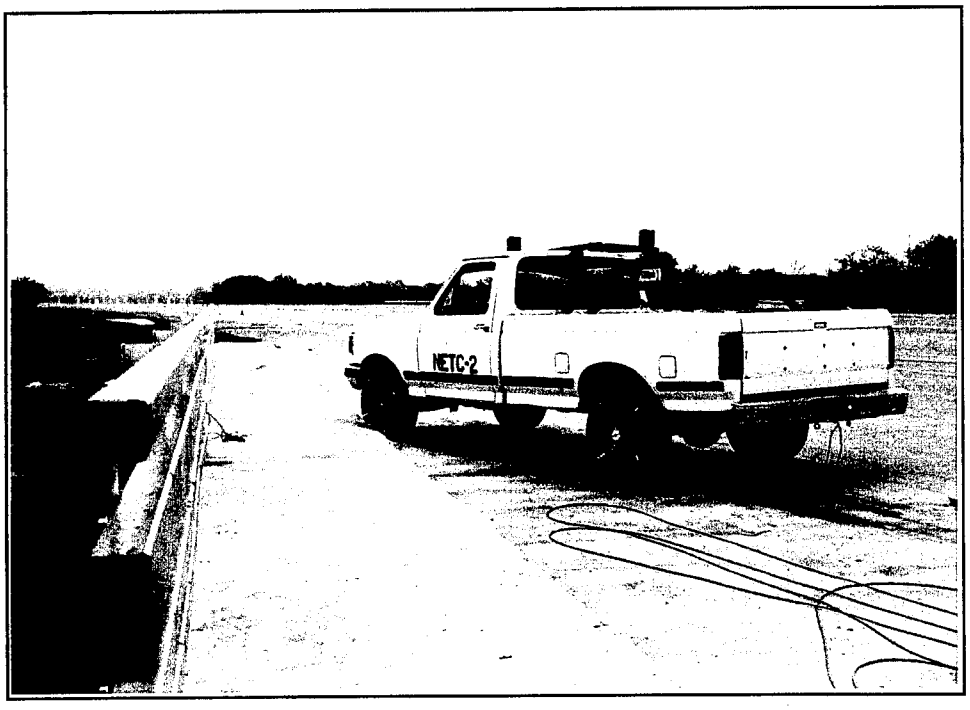
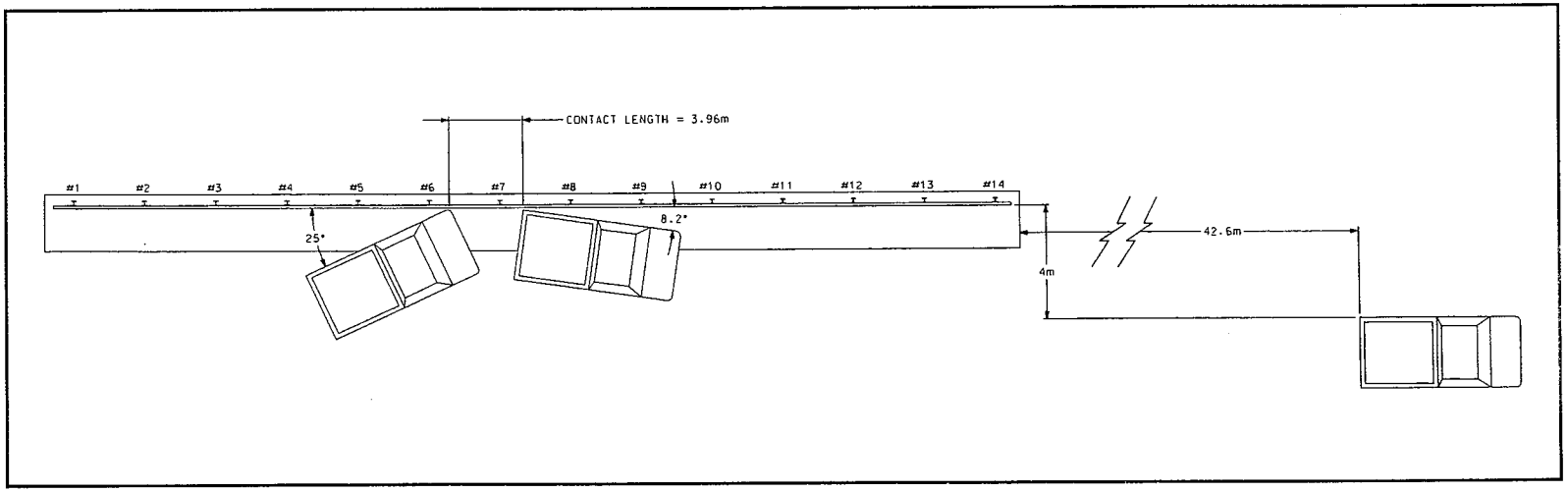


Figure 5. Vehicle photographs - Test NETC-2.



4. General Information		7. Test Vehicle (Continued)		10. Ridedown Acceleration (g's)	
Test Agency	Southwest Research Institute	Mass (kg) Dummy(s)	75	y-direction	*
Test Number	NETC-2	Mass (kg) Gross Static	2,109	11. Test Article Deflection (mm)	
Test Date	11/20/97	8. Impact Conditions		Dynamic	25 (est.)
5. Test Article		Speed (km/h)	100.0	Permanent	13
Type	Bridge Rail	Angle (deg)	25.0	12. Vehicle Damage	
Installation Length (m)	34.1	9. Exit Conditions		Exterior	
Barrier	4 Bar, Sidewalk-Mounted	Speed (km/h)	17	VDS	11-FL-3
6. Soil Type and Condition	N/A	Angle (deg)	8.2	CDC	11FLEE3
7. Test Vehicle		10. Occupant Risk Values		Interior	
Type	Production	Impact Velocity (m/s)		OCDI	LF0000000
Designation	2000P	x-direction	3.99	13. Post-Impact Vehicular Behavior	
Model	1991Ford F-250	y-direction	*	Maximum Roll Angle (deg)	20 Approximate
Mass (kg) Curb	2,034	Ridedown Acceleration (g's)		Maximum Pitch Angle (deg)	15 Approximate
Mass (kg) Test Inertial	2,034	X-direction	-2.55	Maximum Yaw Angle (deg)	N/A

*No data - vehicle lateral accelerometer malfunctioned during test.

Figure 6. Impact sequence and summary of test conditions and results - Test NETC-2.

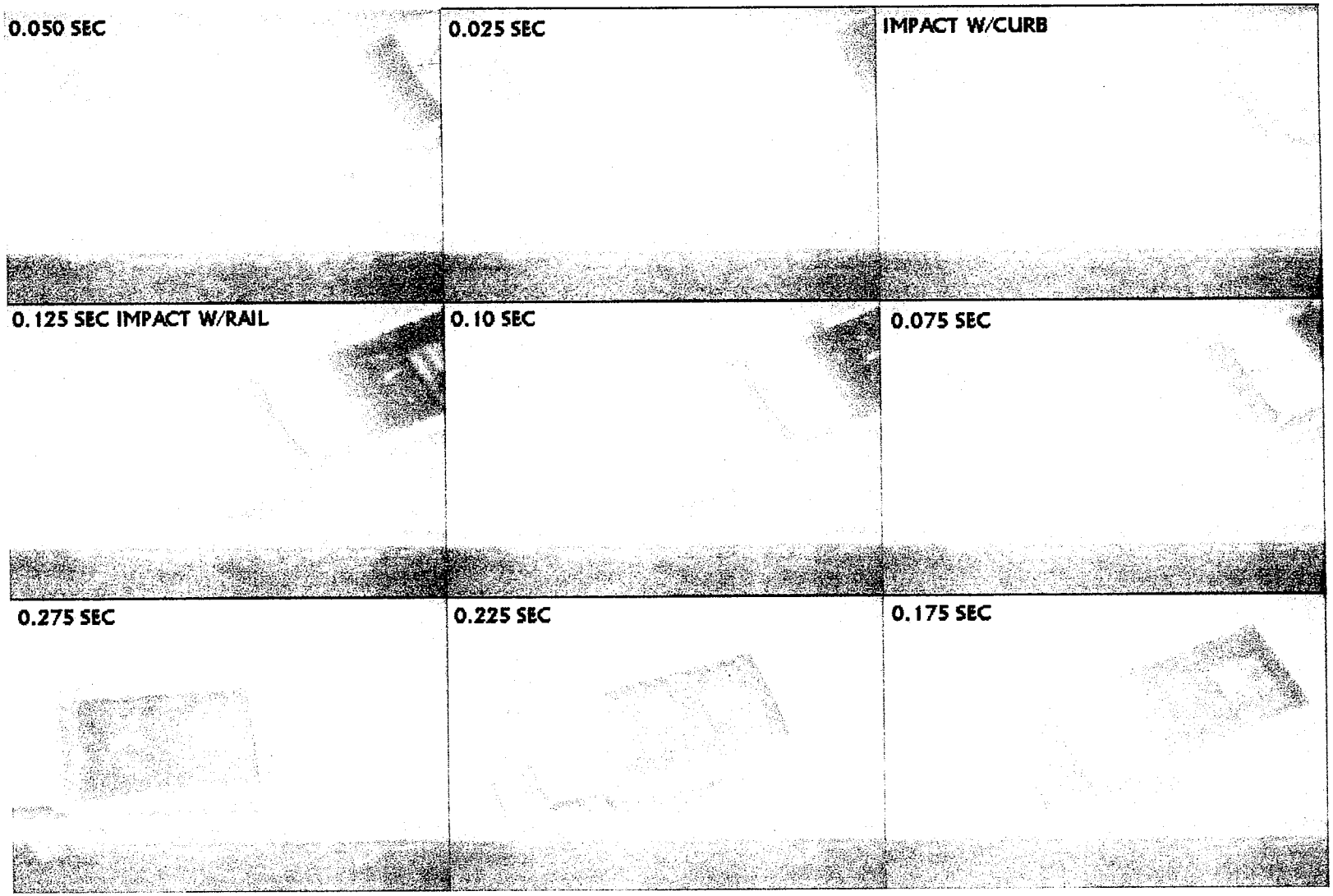


Figure 7. Overhead sequential photographs - Test NETC-2.

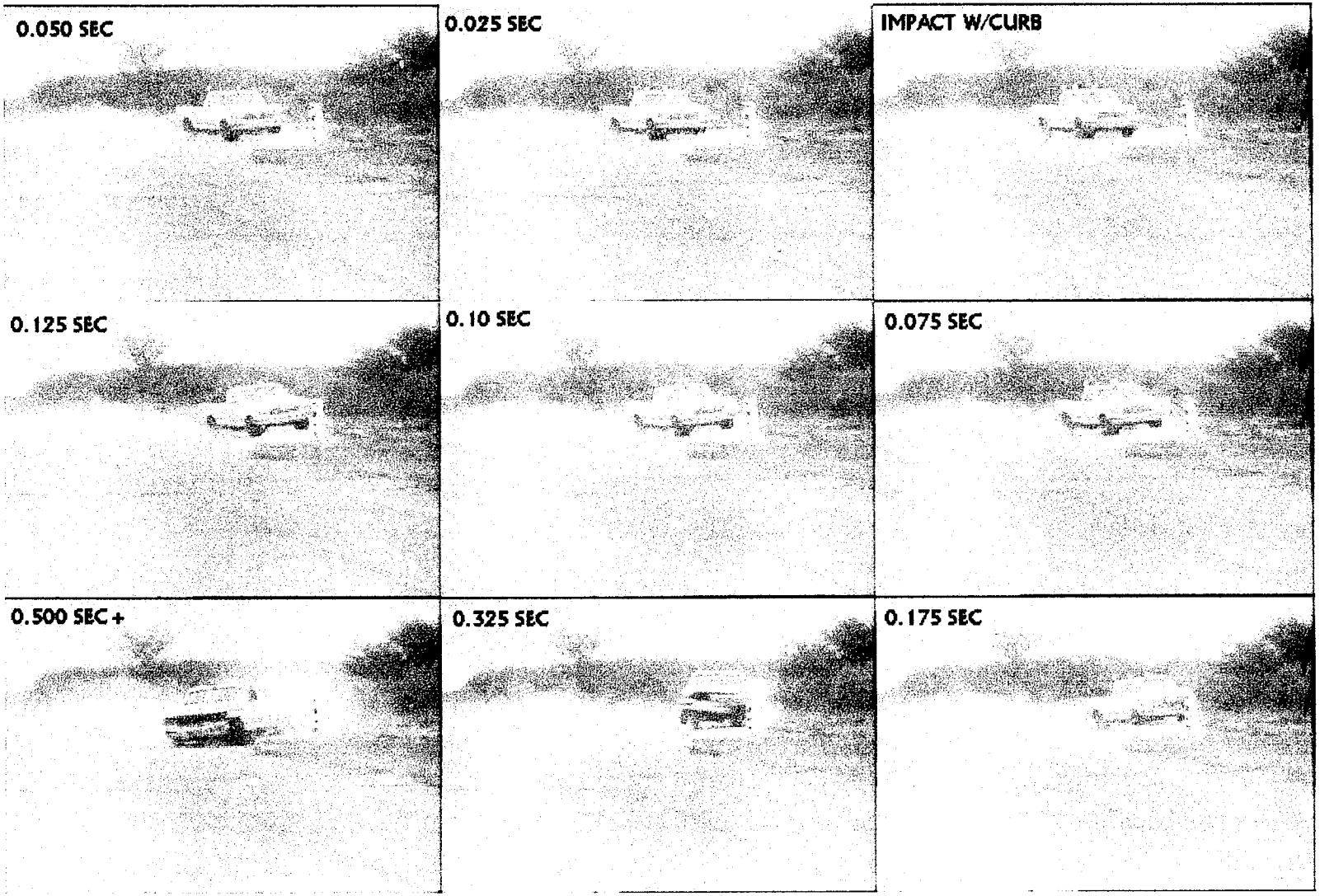


Figure 8. Sequential photographs - Test NETC-2.

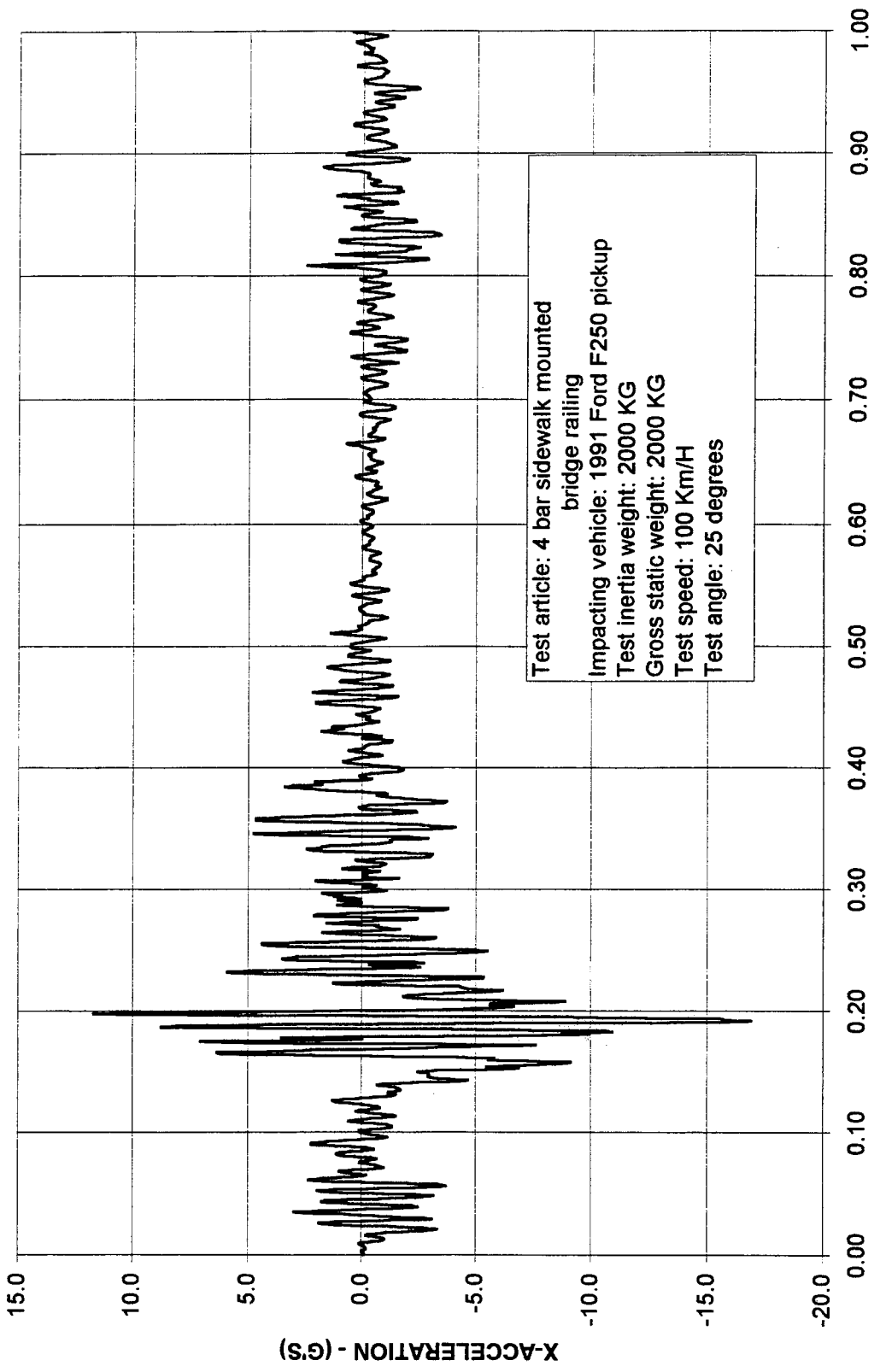


Figure 9. Vehicle C.G. longitudinal accelerometer plot - Test NETC-2.

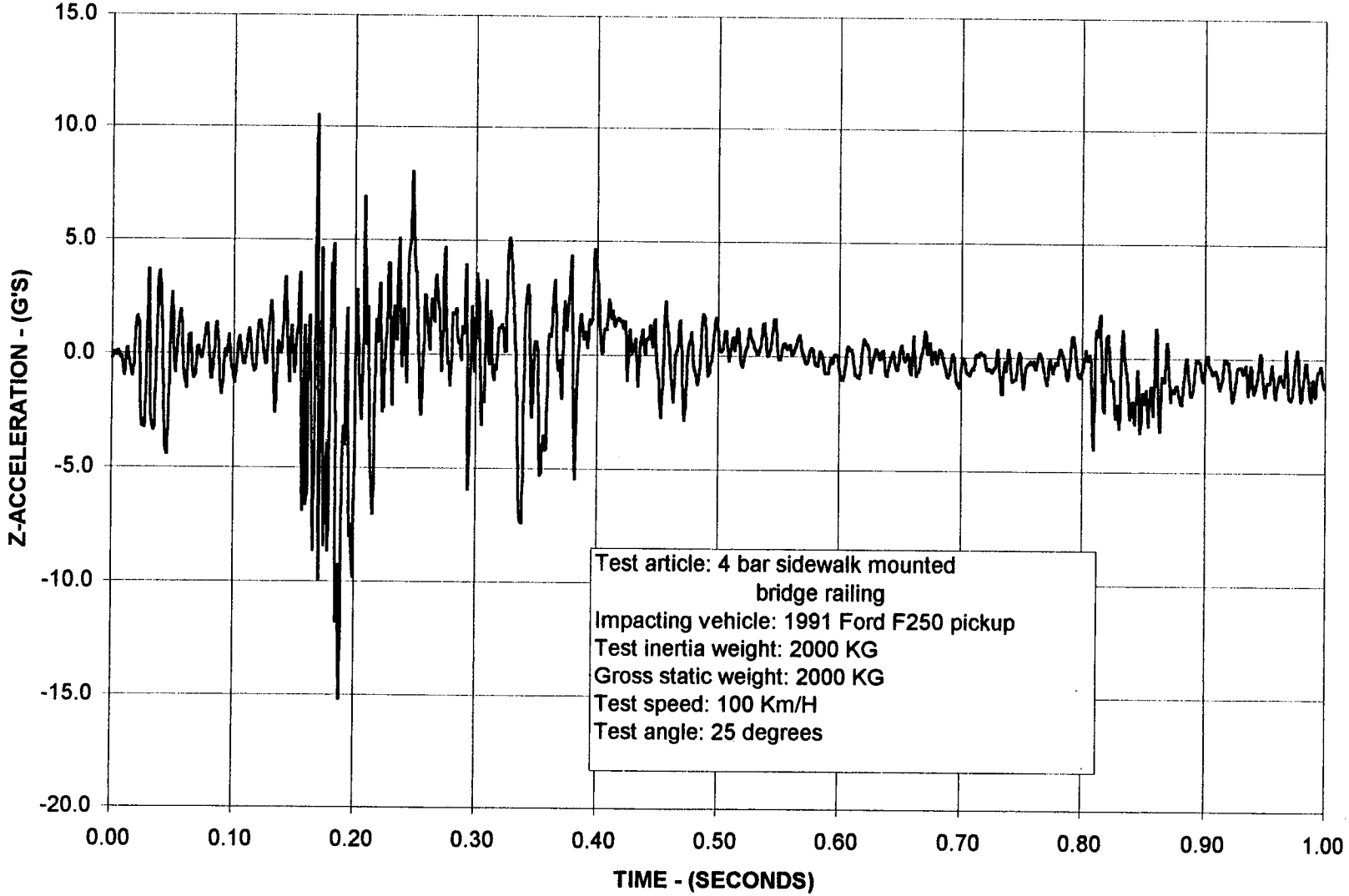


Figure 10. Vehicle C.G. vertical accelerometer plot - Test NETC-2.

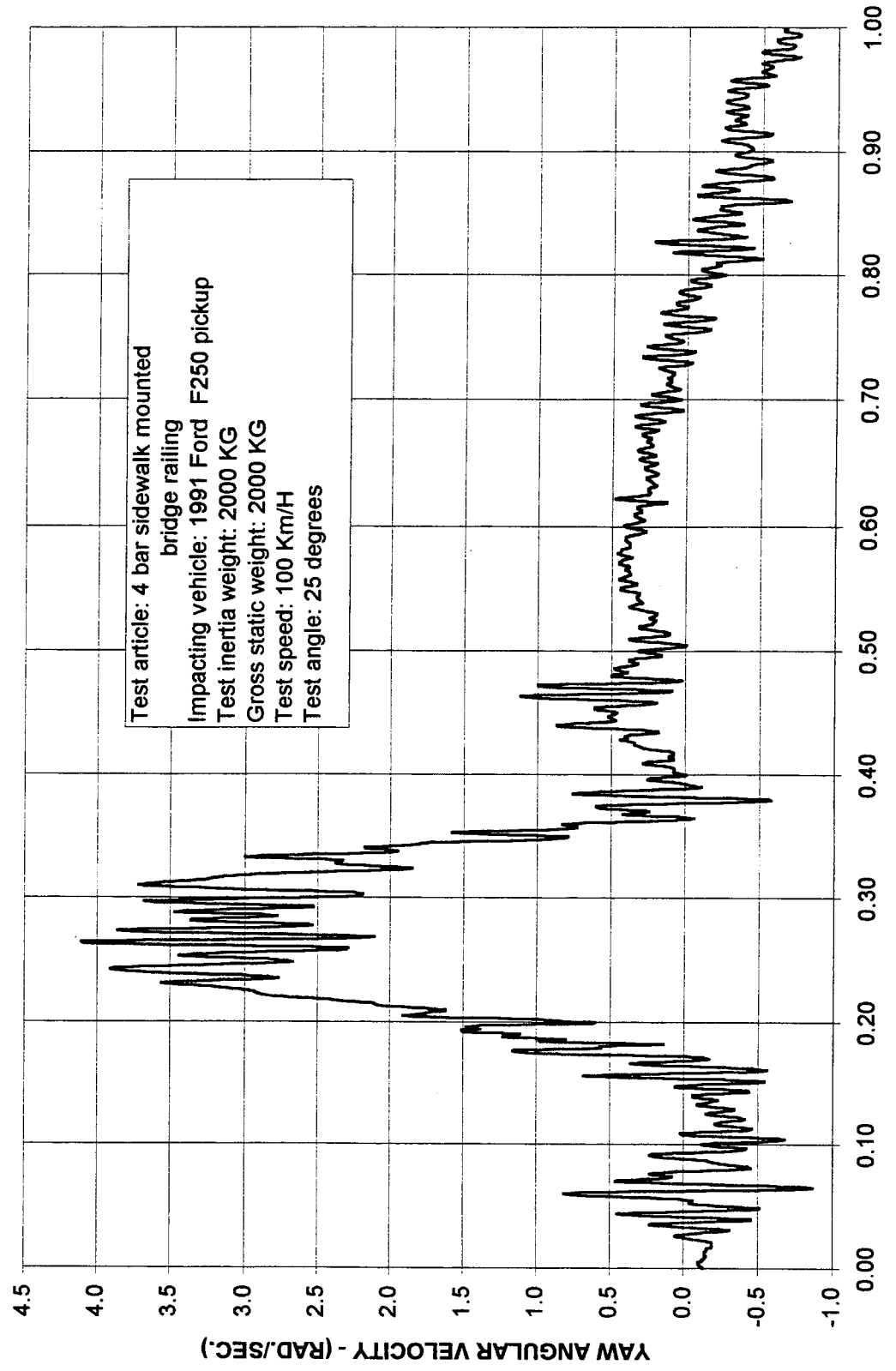


Figure 11. Rate gyro plot - Test NETC-2.

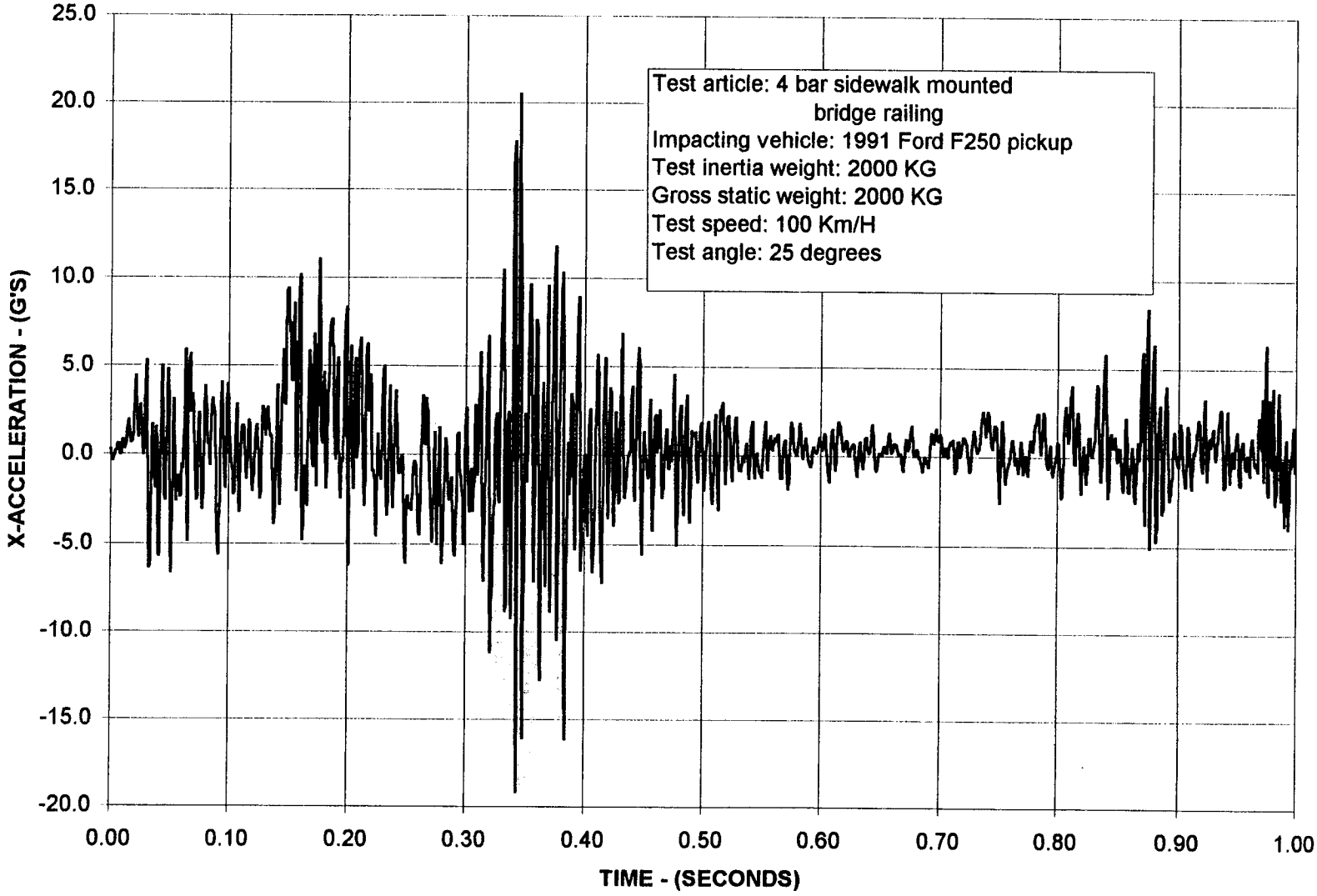


Figure 12. Rear axle longitudinal accelerometer plot - Test NETC-2.

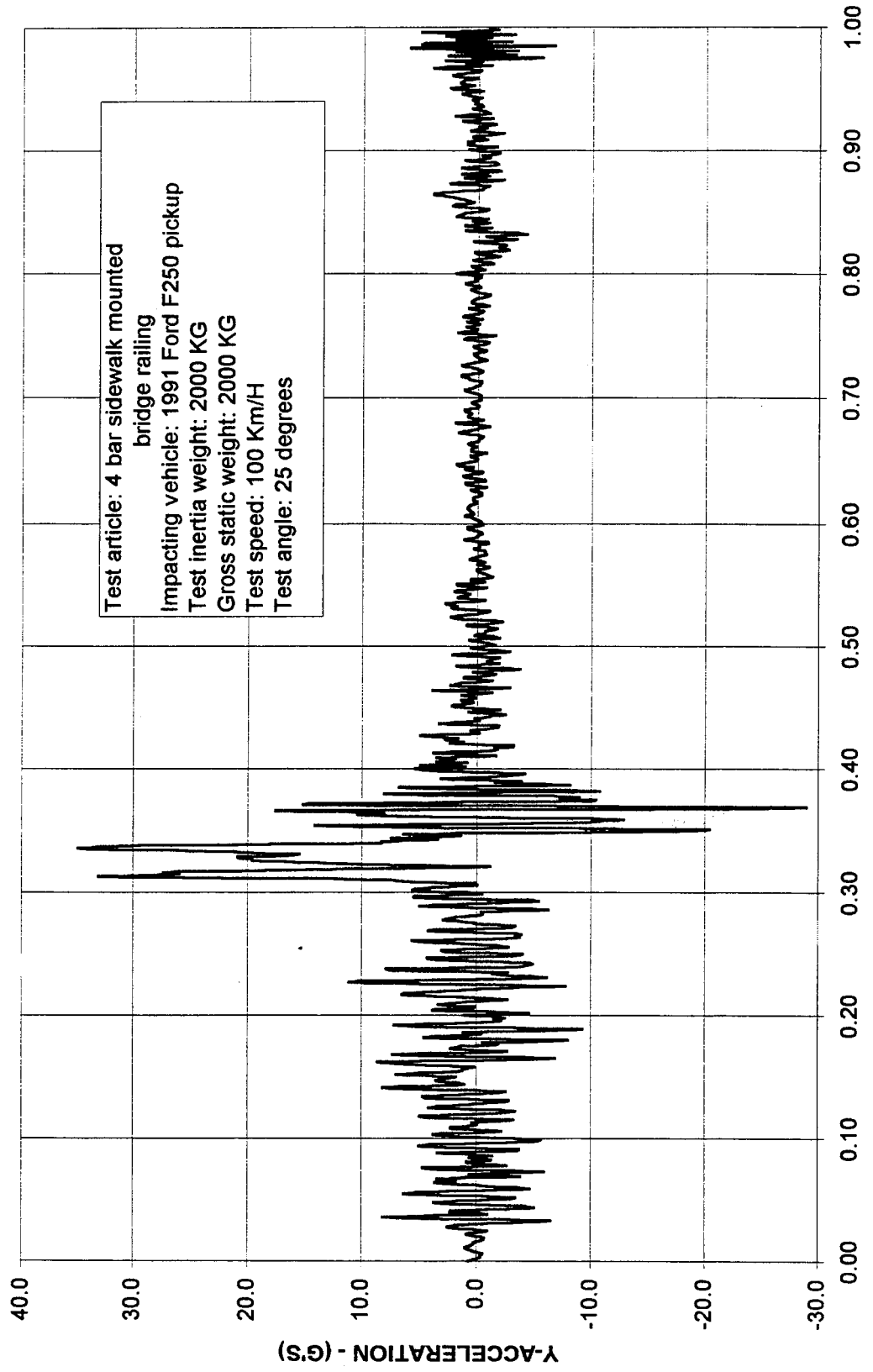


Figure 13. Rear axle lateral accelerometer plot - Test NETC-2.

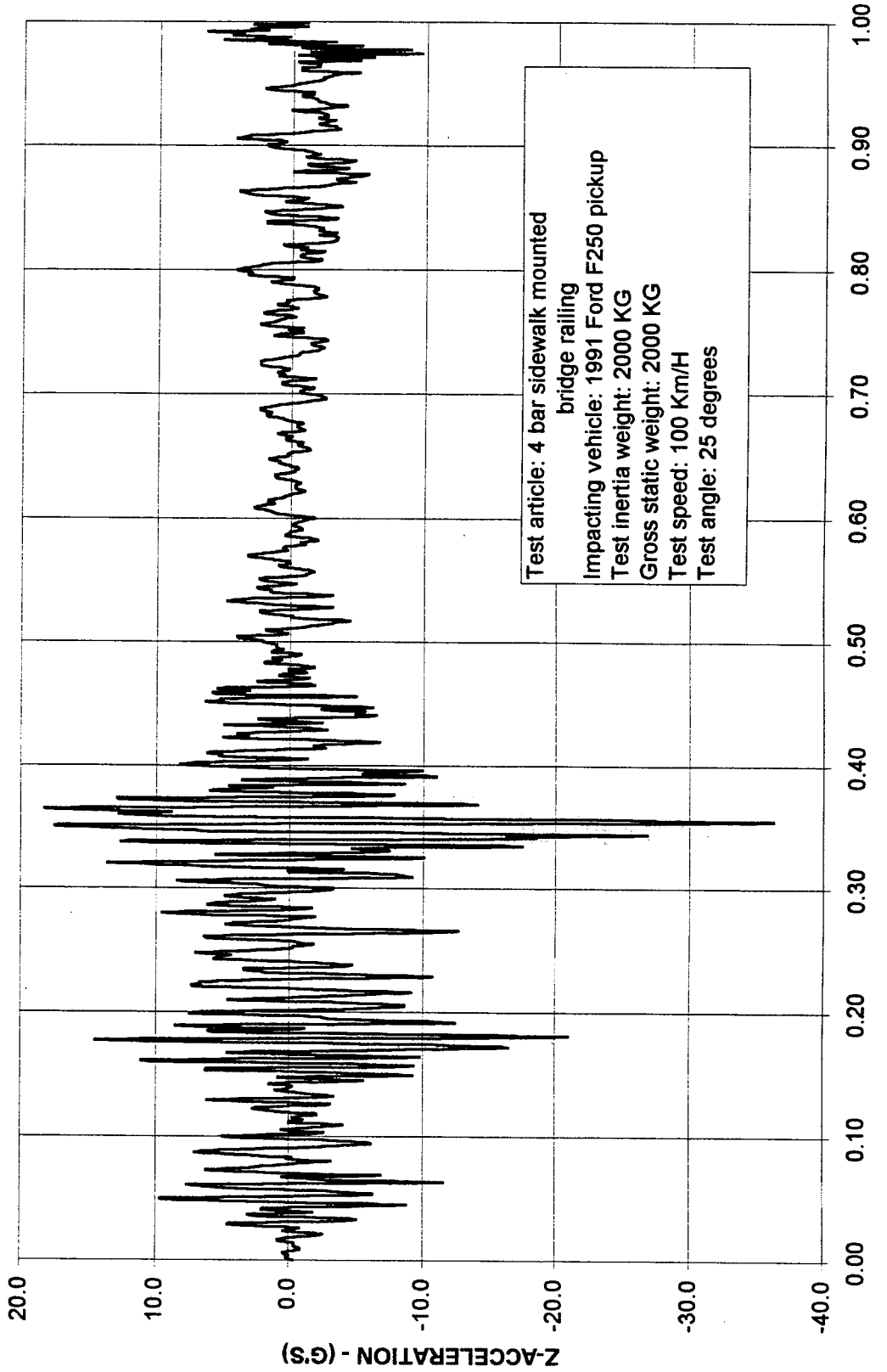


Figure 14. Rear axle vertical accelerometer plot - Test NETC-2.

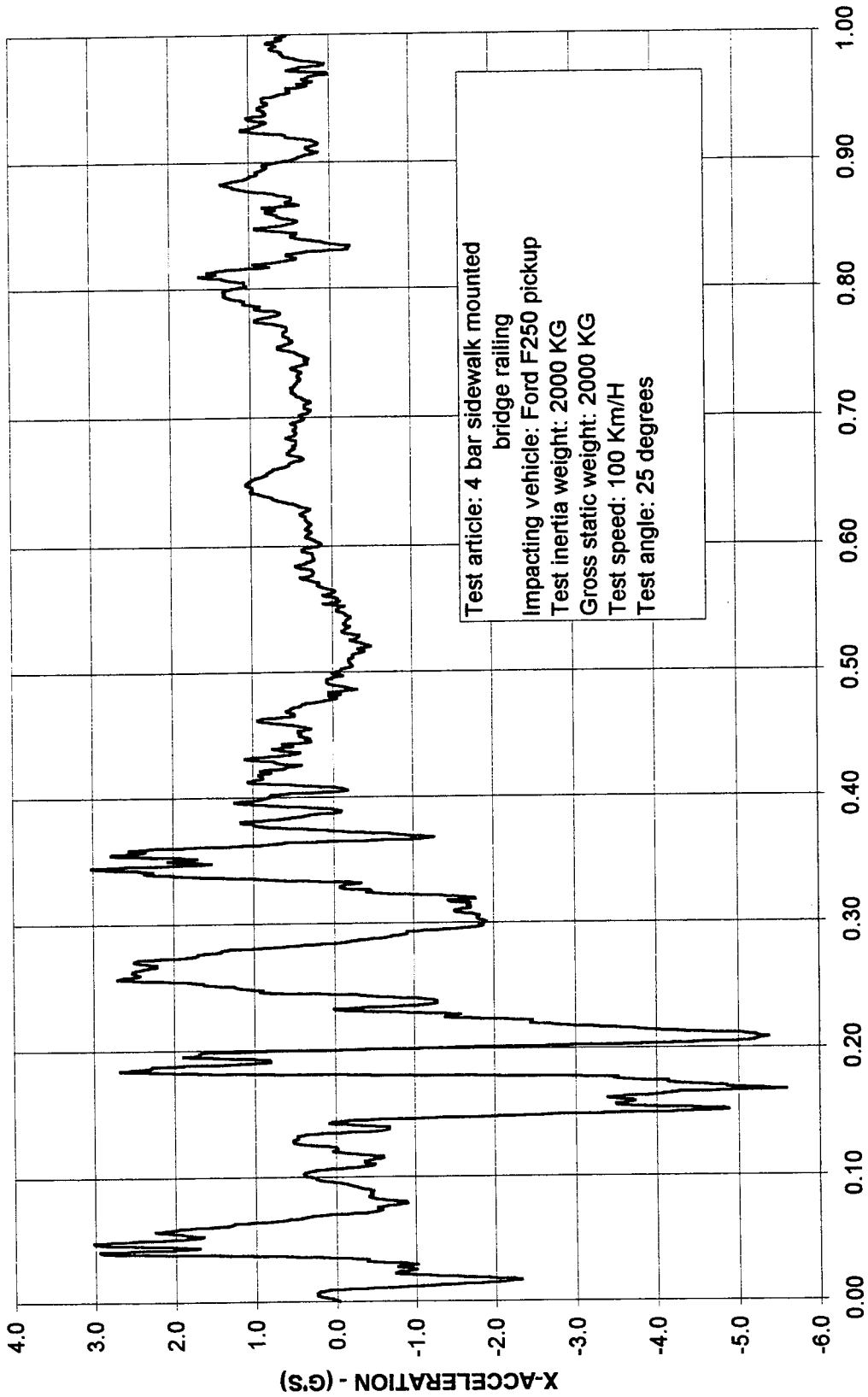


Figure 15. Top of engine longitudinal accelerometer plot - Test NETC-2.

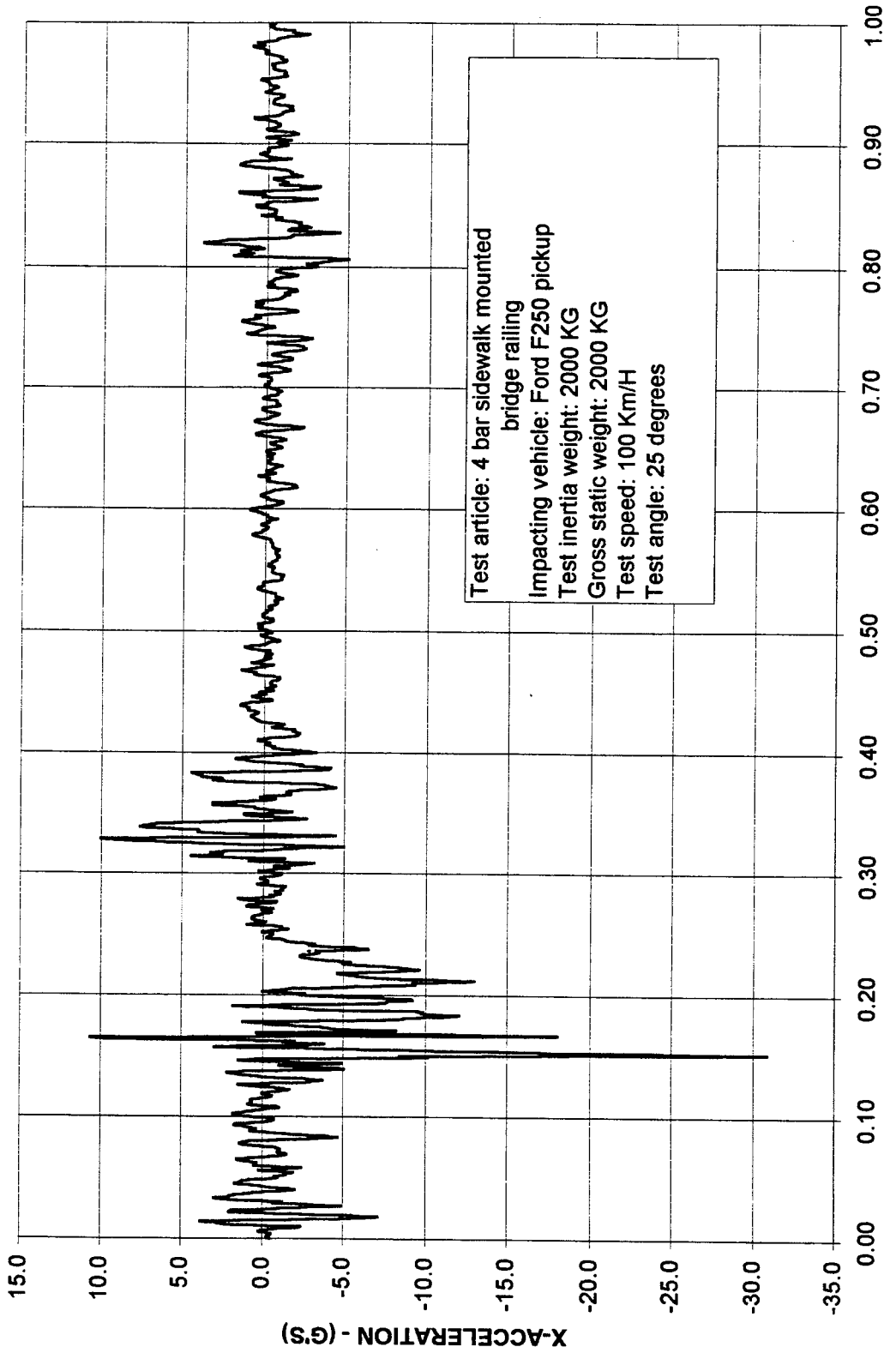


Figure 16. Right front disc brake longitudinal accelerometer plot - Test NETC-2.

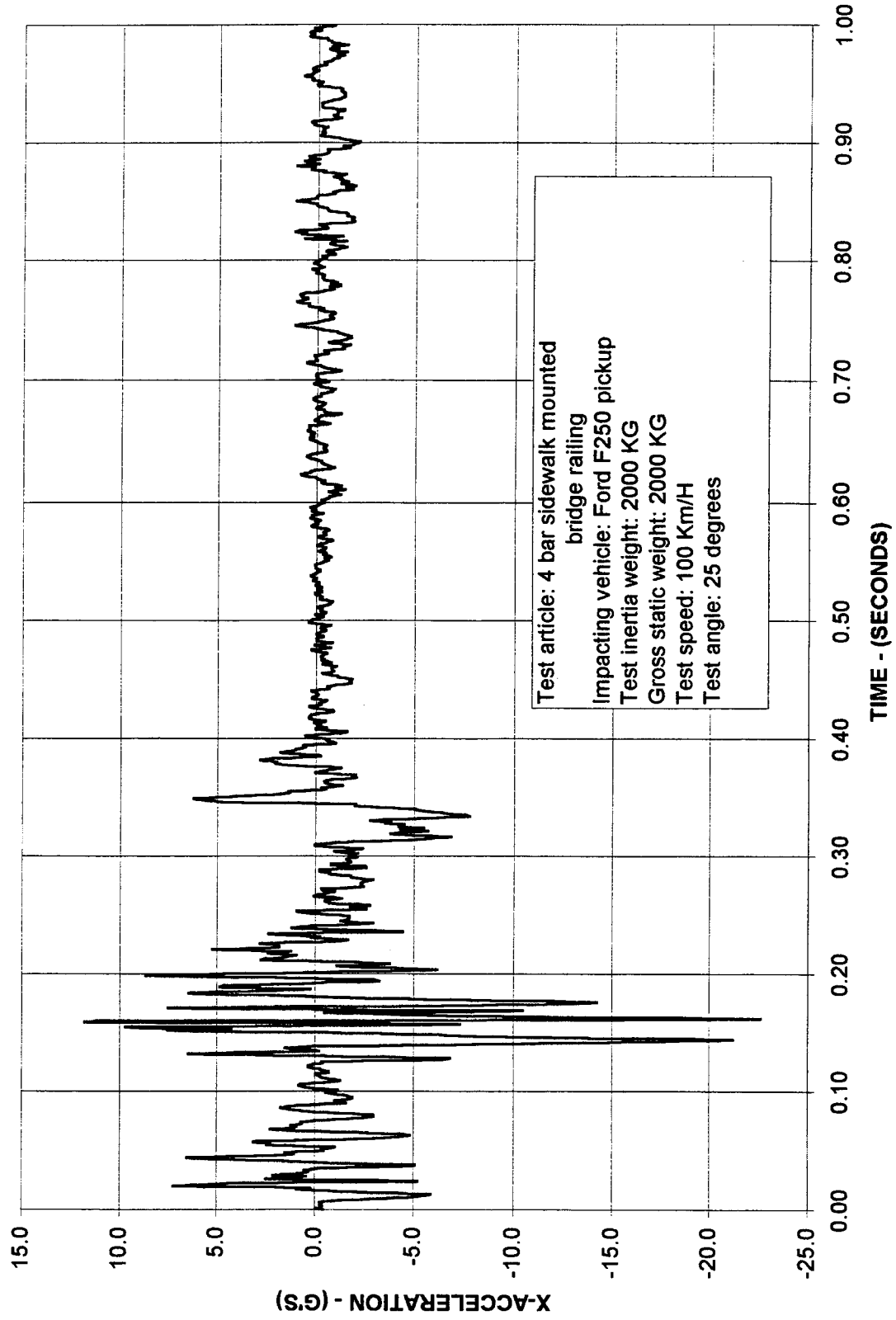


Figure 17. Left front disc brake longitudinal accelerometer plot - Test NETC-2.

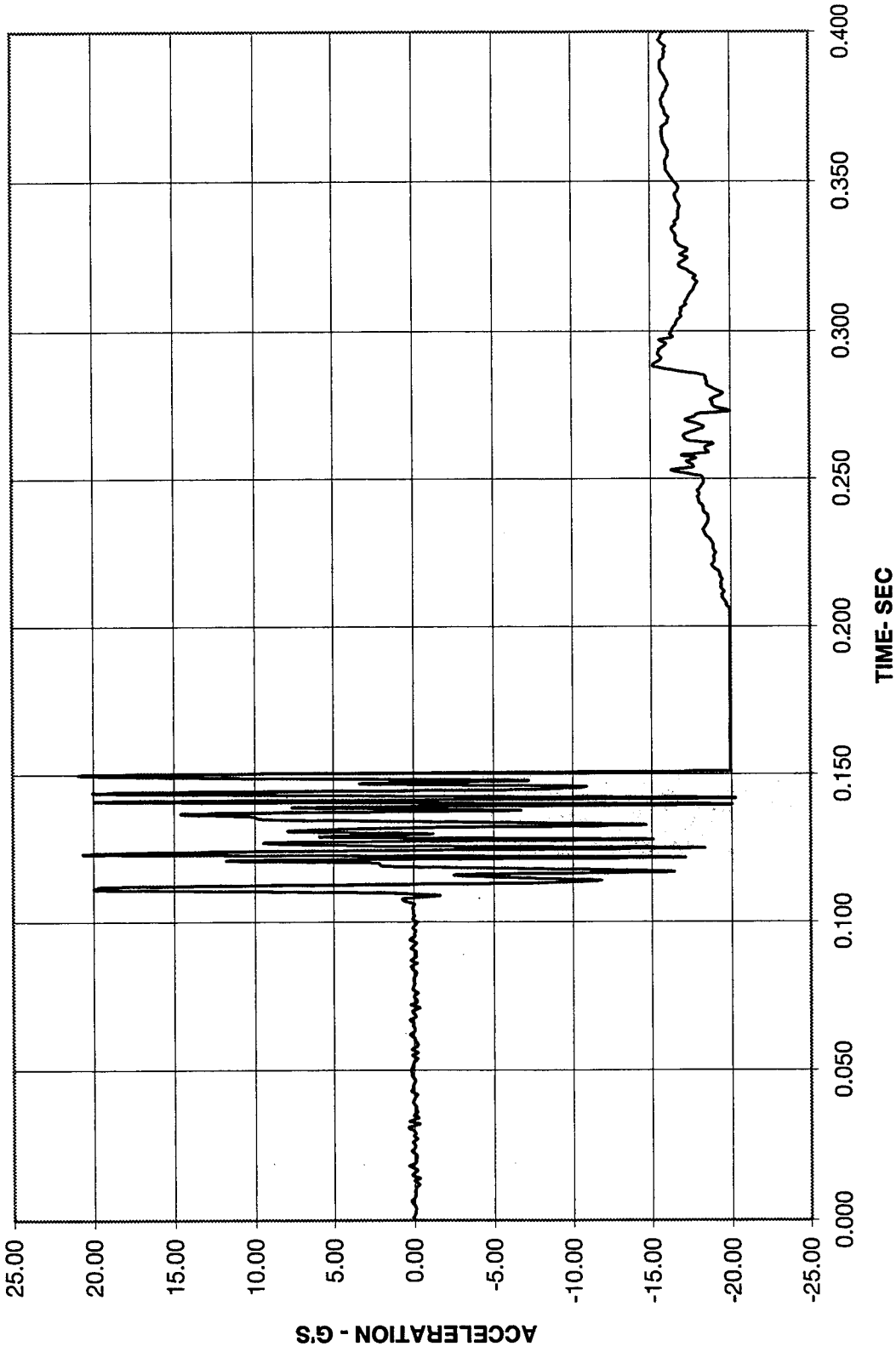


Figure 18. Top of post 7 lateral accelerometer plot - Test NETC-2.

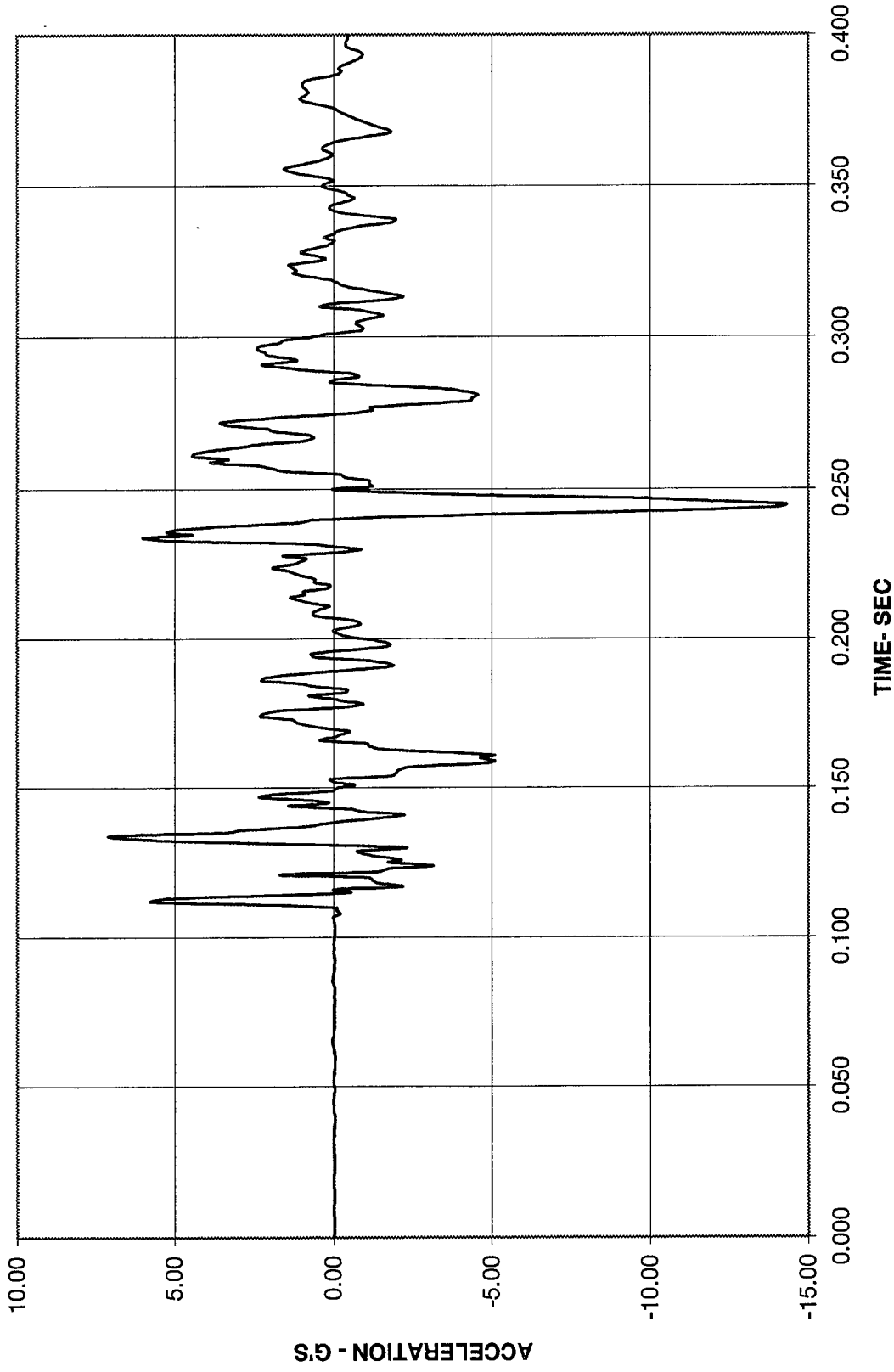


Figure 19. Bottom of post 7 lateral accelerometer plot - Test NETC-2.

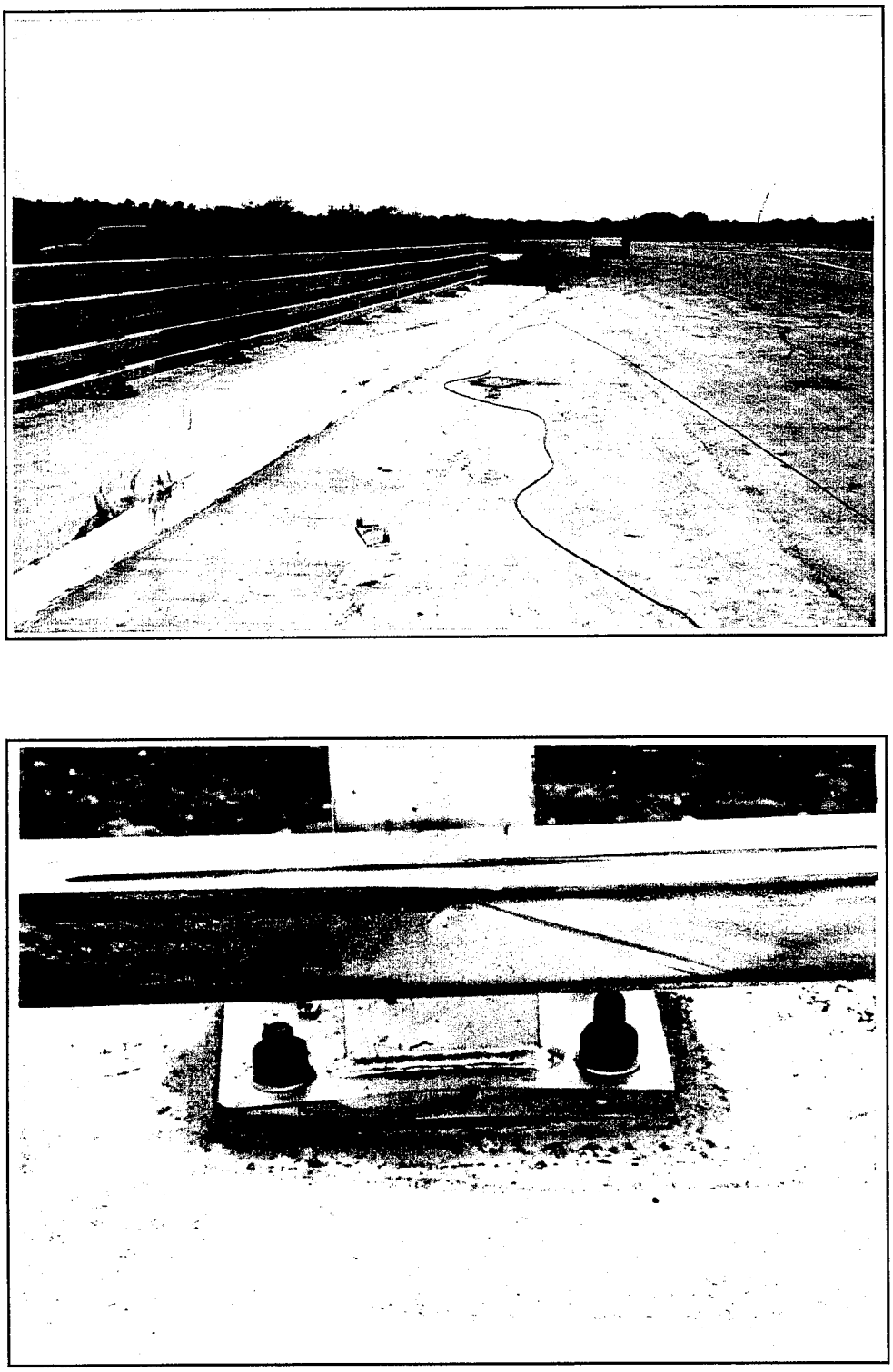
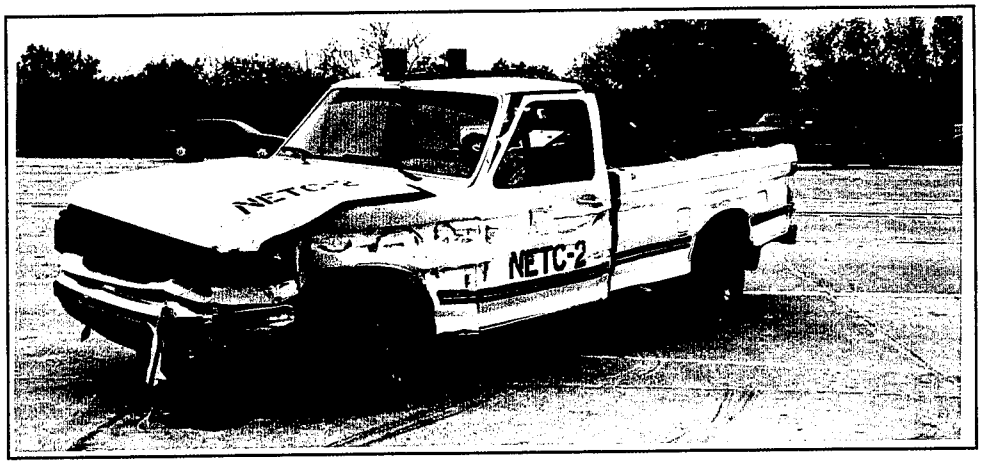


Figure 20. Barrier damage photographs - Test NETC-2.



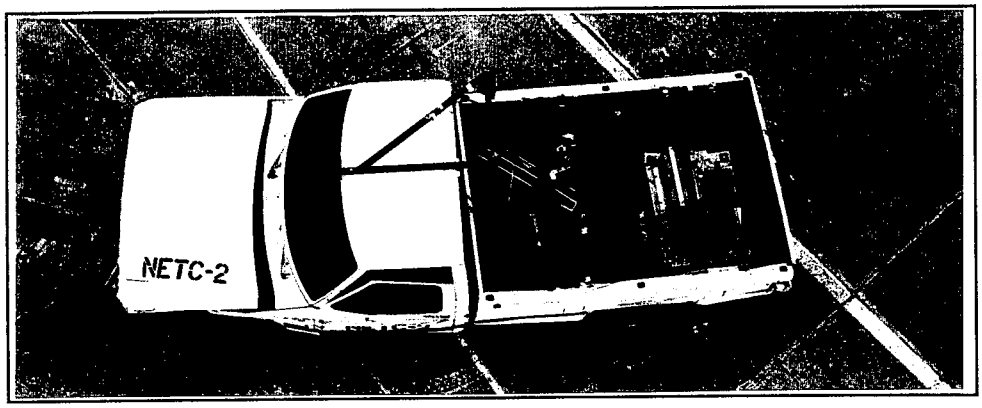
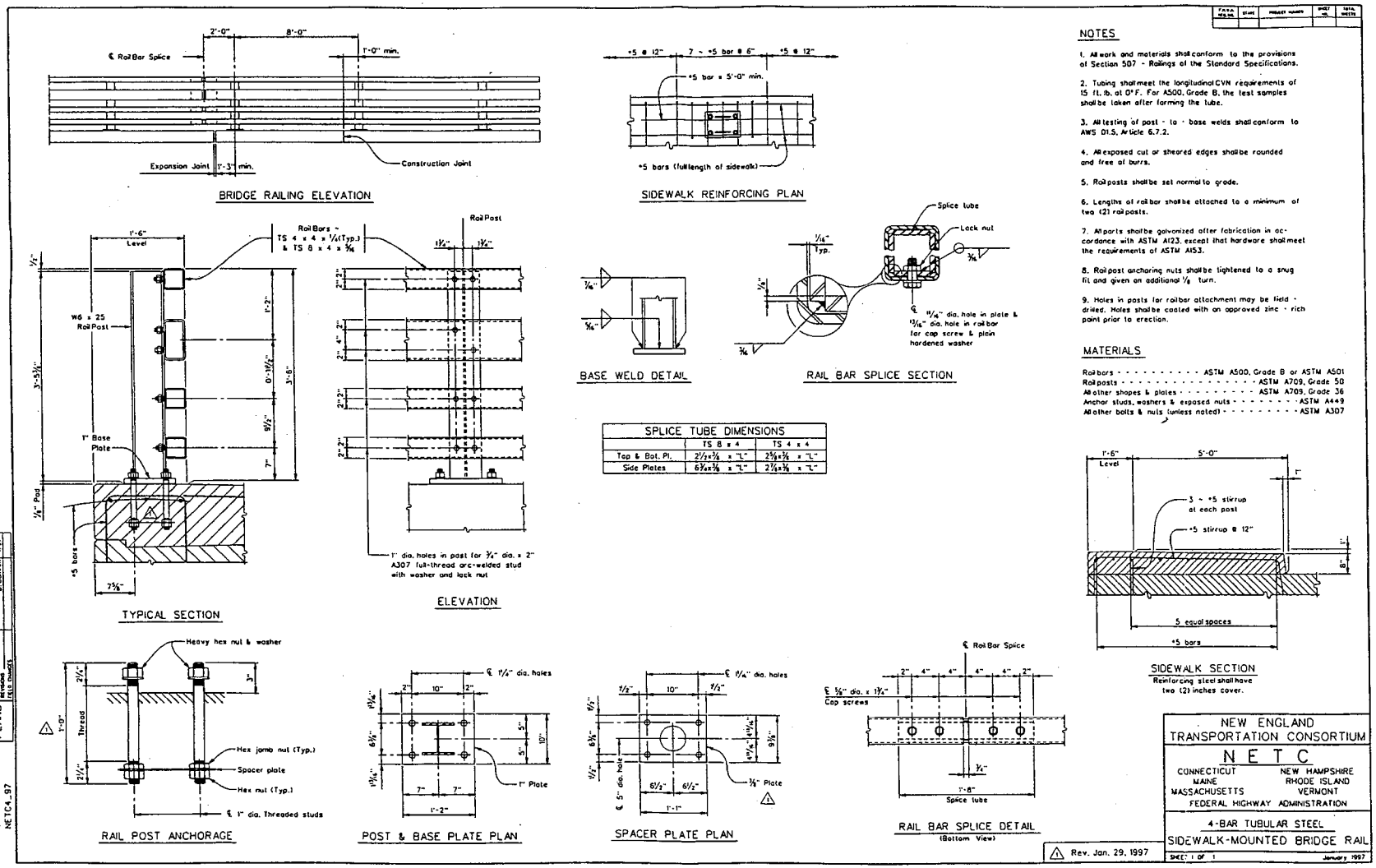


Figure 21. Vehicle damage photographs - Test NETC-2.

APPENDIX A - NETC CRASH TEST STEEL BRIDGE RAILING DRAWING



APPENDIX B - TRANSDUCER DATA WITH CALCULATED VEHICLE KINETICS AND OCCUPANT RISK SUMMARIES

TEST ID ------- NETC-2
TEST DATE ----- 11-20-96
VEHICLE CLASS - 2000P
IMPACT SPEED -- 27.78 M/S

VEHICLE KINETICS SUMMARY
NOTE: VALUES ARE INSTANTANEOUS AT TIME

TIME	---ACCEL. (G'S)---			HEAD.	--VELOCITY (MPS)--			-----DISP. (M)----		
(S)	LONG.	LAT.	VERT.	ANG(D)	LONG.	LAT.	VERT.	X	Y	Z
.000	-.1	.0	-.4	25.0	27.8	.0	.0	.0	.0	.0
.010	.1	.0	-1.8	25.1	27.8	.0	.0	.3	.1	.0
.020	-4.8	.0	2.2	25.2	27.6	.1	-.1	.5	.2	.0
.030	-4.6	.0	7.5	25.2	27.5	.1	-.2	.8	.4	.0
.040	-3.8	.0	5.3	25.3	27.5	.1	-.2	1.0	.5	.0
.050	-.8	.0	3.3	25.3	27.4	.1	-.3	1.3	.6	.0
.060	3.0	.0	-1.9	25.2	27.2	.1	-.3	1.5	.7	.0
.070	-1.0	.0	.5	25.3	27.4	.2	-.4	1.7	.8	.0
.080	.5	.0	-.5	25.2	27.3	.1	-.3	2.0	.9	.0
.090	3.7	.0	-3.0	25.4	27.4	.2	-.3	2.2	1.0	.0
.100	.2	.0	-1.8	25.4	27.4	.2	-.4	2.5	1.2	.0
.110	.5	.0	-.2	25.6	27.3	.3	-.4	2.7	1.3	.0
.120	-1.4	.0	1.6	25.8	27.3	.4	-.4	3.0	1.4	.0
.130	-2.2	.0	2.5	26.0	27.3	.5	-.3	3.2	1.5	.0
.140	-1.2	.0	.3	26.0	27.1	.5	-.3	3.5	1.6	.0
.150	-3.6	.0	-1.5	26.1	26.6	.5	-.2	3.7	1.7	.0
.160	-7.6	.0	-15.1	26.2	25.6	.6	-.2	4.0	1.8	.0
.170	-4.5	.0	-4.6	26.2	25.6	.6	-.3	4.2	2.0	.0
.180	-16.4	.0	4.6	25.9	25.6	.4	-1.1	4.4	2.1	-.1
.190	-9.0	.0	-3.6	25.4	25.2	.2	-1.9	4.7	2.2	-.1
.200	1.2	.0	-10.4	24.7	24.5	-.1	-2.6	4.9	2.3	-.1
.210	-3.1	.0	-2.7	23.8	23.6	-.4	-2.5	5.1	2.4	-.1
.220	-7.9	.0	4.0	22.6	23.0	-.9	-2.8	5.3	2.5	-.1
.230	4.1	.0	-2.3	20.9	22.6	-1.6	-2.6	5.5	2.6	-.2
.240	-4.7	.0	2.6	19.0	22.7	-2.4	-2.5	5.7	2.7	-.2
.250	-8.0	.0	4.9	17.1	22.5	-3.1	-1.9	5.9	2.8	-.2
.260	-5.5	.0	2.8	15.5	22.5	-3.8	-1.8	6.1	2.9	-.2
.270	-1.8	.0	3.7	13.7	22.3	-4.5	-1.5	6.3	3.0	-.3
.280	.9	.0	-1.3	11.9	22.2	-5.2	-1.4	6.5	3.0	-.3
.290	.7	.0	1.6	10.1	21.8	-5.9	-1.2	6.7	3.1	-.3
.300	-.7	.0	.1	8.3	21.7	-6.5	-1.3	7.0	3.2	-.3
.310	1.2	.0	-1.7	6.8	21.6	-7.1	-1.2	7.2	3.3	-.3
.320	-1.1	.0	1.9	4.9	21.3	-7.8	-1.1	7.4	3.4	-.3
.330	-3.8	.0	6.4	3.6	20.9	-8.3	-.8	7.6	3.5	-.3
.340	-2.5	.0	-.1	2.2	20.8	-8.8	-1.2	7.8	3.6	-.3
.350	-5.9	.0	.5	1.4	20.7	-9.1	-1.1	8.0	3.7	-.3

TIME	---ACCEL. (G'S)---			HEAD.	--VELOCITY (MPS)--			-----DISP. (M)----		
(S)	LONG.	LAT.	VERT.	ANG(D)	LONG.	LAT.	VERT.	X	Y	Z
.360	3.5	.0	1.7	.8	20.7	-9.3	-1.6	8.2	3.8	-.4
.370	-3.0	.0	-1.8	.6	20.6	-9.4	-1.4	8.4	3.9	-.4
.380	.2	.0	1.6	.5	20.2	-9.4	-1.2	8.6	4.0	-.4
.390	-.7	.0	1.6	.4	20.5	-9.5	-1.3	8.8	4.1	-.4
.400	-2.9	.0	5.8	.3	20.4	-9.5	-1.0	9.0	4.2	-.4
.410	-1.6	.0	4.1	.3	20.4	-9.5	-.8	9.2	4.3	-.4
.420	-1.3	.0	2.2	.2	20.3	-9.5	-.5	9.4	4.4	-.4
.430	3.1	.0	.1	.0	20.3	-9.6	-.4	9.6	4.5	-.4
.440	-.3	.0	-.3	-.3	20.3	-9.7	-.4	9.8	4.6	-.4
.450	-.9	.0	-1.5	-.6	20.2	-9.8	-.3	10.0	4.7	-.4
.460	-.6	.0	.3	-.8	20.2	-9.9	-.3	10.2	4.8	-.4
.470	.2	.0	.5	-1.2	20.2	-10.0	-.3	10.4	4.9	-.4
.480	.8	.0	-1.1	-1.4	20.1	-10.1	-.4	10.6	5.0	-.4
.490	-1.3	.0	2.3	-1.7	20.1	-10.2	-.4	10.8	5.1	-.5
.500	.8	.0	1.8	-1.8	20.1	-10.2	-.3	11.0	5.2	-.5
.510	1.3	.0	.0	-1.9	20.0	-10.3	-.2	11.2	5.3	-.5
.520	-.5	.0	-.7	-2.1	20.1	-10.3	-.2	11.4	5.4	-.5
.530	.3	.0	.4	-2.2	20.0	-10.4	-.1	11.6	5.4	-.5
.540	-.1	.0	.3	-2.4	19.9	-10.4	.0	11.8	5.5	-.5
.550	.3	.0	-.2	-2.5	19.8	-10.5	.1	12.0	5.6	-.5
.560	-1.0	.0	.3	-2.8	19.8	-10.6	.1	12.3	5.7	-.5
.570	-.8	.0	.1	-3.0	19.7	-10.6	.2	12.5	5.8	-.5
.580	-.1	.0	-.6	-3.2	19.5	-10.7	.2	12.7	5.9	-.5
.590	-.7	.0	-1.0	-3.5	19.5	-10.8	.2	12.9	6.0	-.5
.600	-.5	.0	-1.0	-3.7	19.4	-10.9	.1	13.1	6.1	-.5
.610	-.8	.0	.5	-3.9	19.3	-10.9	.1	13.3	6.2	-.5
.620	-1.7	.0	1.4	-4.0	19.2	-11.0	.0	13.5	6.3	-.5
.630	-1.4	.0	.6	-4.2	19.1	-11.1	.0	13.7	6.4	-.5
.640	.2	.0	-.8	-4.3	19.0	-11.1	.0	13.9	6.5	-.5
.650	-1.4	.0	.5	-4.5	19.0	-11.1	.0	14.1	6.6	-.5
.660	-.9	.0	.3	-4.6	18.9	-11.2	.0	14.2	6.7	-.5
.670	-.9	.0	2.0	-4.8	18.8	-11.2	.0	14.4	6.8	-.5
.680	-.8	.0	-.6	-4.9	18.7	-11.3	.0	14.6	6.9	-.5
.690	-.1	.0	-1.1	-5.1	18.6	-11.3	.0	14.8	7.0	-.5
.700	-.7	.0	-.5	-5.2	18.5	-11.4	-.1	15.0	7.1	-.5
.710	-1.3	.0	-1.0	-5.2	18.4	-11.4	-.2	15.2	7.2	-.5
.720	-1.1	.0	-.4	-5.3	18.3	-11.4	-.2	15.4	7.3	-.5
.730	-1.9	.0	1.0	-5.4	18.2	-11.4	-.3	15.6	7.4	-.5
.740	-2.4	.0	-.1	-5.4	18.1	-11.5	-.3	15.8	7.5	-.5
.750	-1.6	.0	-1.1	-5.5	17.9	-11.5	-.4	16.0	7.6	-.5
.760	-.1	.0	.1	-5.5	17.9	-11.5	-.5	16.2	7.7	-.5
.770	-.3	.0	-1.4	-5.5	17.8	-11.5	-.5	16.4	7.8	-.5
.780	-.2	.0	-.6	-5.5	17.7	-11.5	-.6	16.6	7.9	-.5
.790	-.7	.0	-.2	-5.5	17.6	-11.5	-.7	16.7	8.0	-.5
.800	-1.1	.0	-.9	-5.5	17.6	-11.5	-.7	16.9	8.1	-.5

TIME	---ACCEL. (G'S)---			HEAD.	--VELOCITY (MPS)--			-----DISP. (M)----		
(S)	LONG.	LAT.	VERT.	ANG(D)	LONG.	LAT.	VERT.	X	Y	Z
.810	-1.0	.0	-4.0	-5.4	17.6	-11.4	-.8	17.1	8.1	-.5
.820	-3.2	.0	1.7	-5.2	17.5	-11.4	-.8	17.3	8.2	-.5
.830	1.1	.0	-5.5	-5.2	17.4	-11.4	-.9	17.5	8.3	-.5
.840	-.6	.0	-3.8	-5.1	17.1	-11.3	-1.1	17.7	8.4	-.5
.850	.1	.0	-3.5	-4.9	17.0	-11.3	-1.4	17.8	8.5	-.5
.860	-2.3	.0	2.5	-4.7	17.0	-11.2	-1.7	18.0	8.6	-.6
.870	-2.1	.0	1.0	-4.6	17.0	-11.2	-1.8	18.2	8.7	-.6
.880	-.1	.0	-3.2	-4.4	16.9	-11.1	-2.0	18.4	8.8	-.6
.890	2.3	.0	-2.2	-4.2	17.0	-11.1	-2.2	18.6	8.9	-.6
.900	1.2	.0	-.9	-3.9	17.0	-11.0	-2.3	18.7	9.0	-.6
.910	-1.1	.0	-1.3	-3.7	16.9	-11.0	-2.3	18.9	9.1	-.7
.920	-1.1	.0	-.8	-3.5	16.8	-10.9	-2.4	19.1	9.2	-.7
.930	-.9	.0	-.8	-3.3	16.8	-10.8	-2.6	19.3	9.3	-.7
.940	-1.6	.0	-2.5	-3.1	16.8	-10.8	-2.7	19.4	9.4	-.7
.950	-1.0	.0	-2.0	-2.9	16.7	-10.7	-2.8	19.6	9.5	-.8
.960	.0	.0	-1.5	-2.7	16.5	-10.6	-3.0	19.8	9.6	-.8
.970	-.5	.0	-2.6	-2.4	16.5	-10.6	-3.1	20.0	9.7	-.8
.980	-.9	.0	-2.9	-2.1	16.5	-10.5	-3.3	20.1	9.8	-.9
.990	.4	.0	-1.1	-1.7	16.5	-10.4	-3.4	20.3	9.9	-.9

HIGHEST 50.0-MS AVG. ACCEL.

	G'S	TIME (SEC) START	END
LONG.	-6.12	.180	.230
LAT.	.00	.950	1.000

TEST ID ------- NETC-2
TEST DATE ----- 11-20-96
VEHICLE CLASS - 2000P
IMPACT SPEED -- 27.78 M/S

OCCUPANT RISK SUMMARY
NOTE: INSTANTANEOUS 10-MS AVERAGE ACCELERATIONS

TIME (S)	(----- VEHICLE ------) ACCEL. (G'S) LONG.	LAT.	ANG.VEL (RAD/S)	(---------- OCCUPANT ----------) VEL. (M/S) LONG.	LAT.	DISP. (M) LONG.	LAT.
.000	-.12	.00	-.13	.00	.00	.00	.00
.010	-.62	.00	-.15	.04	.07	.00	.00
.020	-1.99	.00	-.19	.25	.18	.00	.00
.030	.06	.00	-.26	.52	.24	.00	.00
.040	.15	.00	-.45	.86	.37	.01	.00
.050	-1.19	.00	-.36	.82	.38	.01	.00
.060	-.75	.00	.81	-1.02	-.10	.01	.00
.070	-.16	.00	.46	-.56	.10	.01	.00
.080	.37	.00	-.36	.87	.30	.01	.00
.090	1.05	.00	.18	-.11	.24	.02	.00
.100	-.99	.00	-.12	.36	.41	.02	.00
.110	-1.01	.00	-.11	.41	.58	.03	.00
.120	-.22	.00	-.39	.97	.86	.04	.00
.130	-.83	.00	-.27	.74	.97	.05	.00
.140	-3.74	.00	-.06	.60	.98	.05	.00
.150	-6.33	.00	-.36	1.60	1.18	.06	.00
.160	-7.30	.00	-.49	2.83	1.24	.08	.00
.170	1.01	.00	-.17	2.22	1.17	.10	.00
.180	-6.69	.00	.57	1.02	.59	.11	.00
.190	-8.07	.00	1.11	.48	-.02	.12	-.01
.200	-.08	.00	.60	2.11	-.49	.13	-.01
.210	-6.96	.00	1.62	1.29	-1.60	.14	-.02
.220	-4.50	.00	2.74	.01	-3.09	.15	-.03
.230	.33	.00	3.48	-.94	-4.89	.14	-.05
.240	.29	.00	3.71	-1.50	-6.58	.13	-.07
.250	-1.66	.00	2.84	.02	-7.95	.12	-.10
.260	-.21	.00	2.54	.42	-9.28	.12	-.12
.270	-.60	.00	2.70	.22	-10.87	.11	-.14
.280	-1.73	.00	3.13	-.56	-12.56	.10	-.17
.290	.75	.00	3.11	-.41	-14.10	.09	-.19
.300	.05	.00	2.50	.48	-15.37	.08	-.22
.310	.09	.00	3.72	-1.59	-17.10	.07	-.24
.320	-.42	.00	2.72	.05	-18.31	.05	-.27
.330	-.95	.00	2.33	.90	-19.20*	.06	-.30*
.340	-.55	.00	2.17	1.02	-20.26	.06	-.33
.350	-.76	.00	.79	3.24	-20.48	.07	-.35

	(----- VEHICLE ------)			(---------- OCCUPANT ----------)			
TIME (S)	ACCEL. (G'S) LONG.	LAT.	ANG.VEL (RAD/S)	VEL. (M/S) LONG.	LAT.	DISP. (M) LONG.	LAT.
.360	2.12	.00	.83	3.06	-20.97	.10	-.38
.370	-2.52	.00	.24	4.14	-20.89	.14	-.40
.380	1.04	.00	-.56	5.77	-20.69	.18	-.42
.390	1.14	.00	-.11	4.72	-20.96	.22	-.44
.400	-1.19	.00	-.01	4.67	-21.03	.27	-.47
.410	.10	.00	.25	4.24	-21.18	.31	-.49
.420	-.71	.00	.19	4.36	-21.20	.35	-.51
.430	1.13	.00	.39	4.06	-21.43	.39	-.53
.440	-.32	.00	.87	3.17	-21.79	.43	-.56
.450	.58	.00	.46	3.91	-21.90	.46	-.58
.460	.47	.00	.44	3.89	-22.08	.50	-.61
.470	-.46	.00	.66	3.47	-22.43	.53	-.63
.480	.37	.00	.50	3.75+	-22.58	.57+	-.66
.490	-.23	.00	.32	4.01	-22.71	.60	-.69
.500	.25	.00	.32	3.97	-22.83	.64	-.71
.510	.09	.00	.38	3.89	-22.94	.68	-.74
.520	-.55	.00	.31	3.95	-23.01	.72	-.76
.530	-.09	.00	.19	4.20	-23.07	.76	-.79
.540	-.38	.00	.30	4.06	-23.23	.80	-.81
.550	-.39	.00	.44	3.86	-23.43	.84	-.84
.560	-.55	.00	.41	3.89	-23.60	.87	-.87
.570	-.83	.00	.43	3.95	-23.78	.91	-.89
.580	-.53	.00	.44	3.99	-23.97	.94	-.92
.590	-.41	.00	.41	4.08	-24.13	.98	-.95
.600	-.28	.00	.40	4.11	-24.28	1.02	-.98
.610	-.44	.00	.35	4.21	-24.41	1.06	-1.01
.620	-.86	.00	.13	4.64	-24.45	1.10	-1.04
.630	-.85	.00	.26	4.49	-24.64	1.14	-1.07
.640	-.24	.00	.23	4.59	-24.73	1.18	-1.10
.650	-.78	.00	.20	4.69	-24.82	1.23	-1.12
.660	-.18	.00	.33	4.53	-24.98	1.27	-1.15
.670	-.59	.00	.24	4.70	-25.06	1.31	-1.18
.680	-1.12	.00	.31	4.65	-25.20	1.36	-1.21
.690	-.94	.00	.11	5.05	-25.23	1.40	-1.24
.700	-.50	.00	.04	5.28	-25.28	1.45	-1.27
.710	-.90	.00	.10	5.21	-25.35	1.50	-1.30
.720	-.70	.00	.09	5.32	-25.40	1.55	-1.32
.730	-.49	.00	.01	5.55	-25.41	1.60	-1.35
.740	-1.63	.00	.12	5.46	-25.49	1.65	-1.38
.750	-1.18	.00	.14	5.61	-25.55	1.71	-1.41
.760	-.52	.00	.16	5.60	-25.56	1.77	-1.43
.770	-.98	.00	.17	5.67	-25.57	1.83	-1.46
.780	-.80	.00	-.03	6.04	-25.52	1.88	-1.48
.790	-.89	.00	-.12	6.27	-25.49	1.94	-1.51
.800	-.77	.00	-.25	6.58	-25.39	2.01	-1.53

TIME (S)	(----- VEHICLE ------) ACCEL. (G'S) LONG.	LAT.	ANG.VEL (RAD/S)	(---------- OCCUPANT ----------) VEL. (M/S) LONG.	LAT.	DISP. (M) LONG.	LAT.
.810	-.88	.00	-.19	6.46	-25.34	2.08	-1.55
.820	-1.74	.00	-.17	6.61	-25.26	2.15	-1.57
.830	-1.57+	.00	-.33	6.99	-25.16	2.22	-1.60
.840	-1.61	.00	-.27	7.15	-25.09	2.29	-1.62
.850	-.92	.00	-.35	7.44	-24.98	2.36	-1.64
.860	-.35	.00	-.69	8.08	-24.72	2.44	-1.65
.870	-1.24	.00	-.30	7.49	-24.74	2.52	-1.67
.880	-.53	.00	-.51	7.98	-24.53	2.60	-1.68
.890	.32	.00	-.46	7.81	-24.41	2.69	-1.70

OCCUP. RISK FACTORS	TIME (S)	VELOCITY (M/S)
>LONG. VEL. AFTER 0.6 M DISP. --	.489	3.99
>LAT. VEL. AFTER 0.3 M DISP. --	.330	19.17

MAX. ACCEL. AFTER OCCUPANT IMPACT		TIME(S)	ACC.(GS)
>LONG. ACCELERATION	--	.836	-2.55
>LAT. ACCELERATION	--	.900	.00

TEST ID ------- NETC-2
TEST DATE ----- 11-20-97
VEHICLE CLASS - 2000P
IMPACT SPEED -- 27.78 M/S

TIME	(--- VEL. CG ACCEL.-(G'S) ---)				(-- VEL. REAR ACCEL.-(G'S) --)			
(SEC)	X	Y	Z	R	X	Y	Z	R
.000	-.1	.0	-.2	.2	.3	.7	-.3	.8
.010	.0	.0	-1.0	1.0	.8	.8	-.8	1.4
.020	-3.0	.0	1.3	3.3	2.8	-.4	-1.7	3.3
.030	-2.7	.0	3.7	4.6	5.3	.6	4.5	6.9
.040	-2.2	.0	3.0	3.7	-5.6	2.3	.1	6.0
.050	-.5	.0	1.8	1.9	-3.1	-1.1	9.7	10.2
.060	1.7	.0	-1.3	2.1	-.6	-3.5	6.8	7.6
.070	-.6	.0	.3	.6	2.8	-2.8	-.9	4.1
.080	.3	.0	-.3	.4	3.8	.7	-3.2	5.0
.090	2.2	.0	-1.8	2.8	-4.3	-3.5	1.9	5.9
.100	.1	.0	-1.1	1.1	3.1	-3.3	5.0	6.7
.110	.3	.0	-.2	.3	-.3	.7	-2.6	2.7
.120	-.8	.0	.9	1.2	-2.0	-.4	1.3	2.4
.130	-1.3	.0	1.6	2.1	2.4	-2.7	3.6	5.1
.140	-.9	.0	.3	1.0	.6	4.7	-.2	4.7
.150	-2.5	.0	-.8	2.6	9.4	1.8	-8.1	12.5
.160	-5.6	.0	-6.6	8.7	10.2	5.2	10.7	15.6
.170	-3.3	.0	-1.7	3.7	-.3	-1.0	-8.7	8.7
.180	-8.0	.0	1.0	8.1	4.6	-7.9	-15.0	17.6
.190	-5.8	.0	-4.6	7.4	-.3	-3.4	3.6	4.9
.200	.9	.0	-5.3	5.3	-1.5	1.1	6.6	6.9
.210	-2.8	.0	.4	2.8	5.9	2.3	4.6	7.8
.220	-4.3	.0	2.2	4.8	3.8	2.8	4.3	6.4
.230	2.4	.0	-.7	2.5	4.3	-3.9	-8.8	10.5
.240	-2.3	.0	1.4	2.7	1.1	-3.8	-2.0	4.5
.250	-4.9	.0	3.8	6.3	-2.5	-4.0	2.4	5.3
.260	-3.3	.0	1.8	3.7	-4.1	4.5	6.2	8.6
.270	-.7	.0	2.0	2.1	-1.9	3.7	3.3	5.3
.280	.6	.0	-.3	.7	-6.1	1.8	9.5	11.4
.290	.5	.0	.9	1.1	-5.3	3.7	2.5	7.0
.300	-.7	.0	.7	1.0	1.8	.8	-3.3	3.8
.310	-.2	.0	.4	.5	-1.1	7.2	-8.4	11.1
.320	-.9	.0	1.2	1.5	-2.5	4.6	13.6	14.6
.330	-2.0	.0	4.0	4.5	7.5	16.5	-7.5	19.6
.340	-1.2	.0	-.9	1.5	16.6	8.3	-11.9	22.1
.350	-3.6	.0	.5	3.6	2.3	-19.3	17.5	26.1

TIME (SEC)	(--- VEL. CG ACCEL.-(G'S) ---) X	Y	Z	R	(-- VEL. REAR ACCEL.-(G'S) --) X	Y	Z	R
.360	2.2	.0	.6	2.2	7.3	-10.2	12.8	17.9
.370	-1.9	.0	-1.1	2.2	-1.3	-6.8	-.9	7.0
.380	.0	.0	.9	1.0	7.5	8.1	5.7	12.4
.390	-.3	.0	.9	1.0	2.9	-3.9	-4.0	6.3
.400	-1.6	.0	3.7	4.0	-.1	5.4	6.7	8.6
.410	-.9	.0	2.4	2.6	2.5	1.6	6.2	6.9
.420	-.8	.0	1.5	1.7	-3.5	.4	-5.3	6.4
.430	1.8	.0	.2	1.8	-2.5	-.1	-2.2	3.3
.440	-.2	.0	.0	.2	3.3	.2	-5.9	6.8
.450	-.5	.0	-.8	.9	-.8	1.4	1.2	2.0
.460	-.3	.0	.3	.4	2.2	1.4	3.5	4.3
.470	.2	.0	.2	.3	1.5	1.4	-1.0	2.3
.480	.5	.0	-.5	.7	.7	-1.1	-1.8	2.3
.490	-.7	.0	1.2	1.4	-1.8	-1.6	-.8	2.6
.500	.5	.0	1.1	1.2	-.1	-.6	2.0	2.1
.510	.8	.0	.0	.8	1.3	.0	1.9	2.3
.520	-.3	.0	-.5	.5	-.5	-2.2	-.1	2.2
.530	.1	.0	.3	.4	-.3	.3	.5	.6
.540	-.1	.0	.2	.2	-.6	1.7	1.3	2.2
.550	.1	.0	-.1	.2	-1.2	1.7	2.2	3.0
.560	-.6	.0	.2	.6	.7	-.4	-.2	.8
.570	-.5	.0	.0	.5	.9	-.2	3.2	3.3
.580	-.1	.0	-.3	.4	.1	.3	-.8	.8
.590	-.4	.0	-.7	.8	-.3	.0	-.4	.5
.600	-.3	.0	-.6	.7	.8	-.4	-1.8	1.9
.610	-.5	.0	.3	.5	1.5	.7	2.5	2.9
.620	-1.1	.0	.8	1.3	.5	.4	-.1	.7
.630	-.8	.0	.3	.9	-1.1	.0	-.3	1.1
.640	.1	.0	-.5	.6	.2	-.3	-.6	.7
.650	-.8	.0	.3	.9	.2	.2	.3	.4
.660	-.5	.0	.2	.5	.4	.4	-.8	1.0
.670	-.6	.0	1.1	1.2	.0	.0	-.6	.6
.680	-.6	.0	-.3	.6	.4	2.0	.6	2.1
.690	-.2	.0	-.7	.7	-.6	1.2	1.5	2.0
.700	-.3	.0	-.4	.6	1.2	-.2	-1.1	1.7
.710	-.8	.0	-.5	.9	.7	-.1	.2	.7
.720	-.7	.0	-.3	.7	1.1	-.2	.2	1.1
.730	-1.2	.0	.4	1.2	1.1	-.7	.0	1.3
.740	-1.6	.0	.0	1.6	1.5	.4	-1.4	2.1
.750	-1.0	.0	-.7	1.2	-1.3	-1.5	-.8	2.1
.760	-.1	.0	-.1	.1	.0	.4	.8	.9
.770	-.2	.0	-.9	1.0	.3	-.4	.0	.5
.780	-.1	.0	-.3	.3	1.0	.1	-2.0	2.2
.790	-.4	.0	-.1	.4	.7	.0	1.6	1.8
.800	-.7	.0	-.6	.9	.9	1.9	4.1	4.6

TIME (SEC)	(--- VEL. CG ACCEL.-(G'S) ---) X	Y	Z	R	(-- VEL. REAR ACCEL.-(G'S) --) X	Y	Z	R
.810	-.4	.0	-2.3	2.3	1.2	.0	-.8	1.4
.820	-1.8	.0	.9	2.0	-2.0	-2.4	.7	3.2
.830	.4	.0	-3.1	3.1	.5	-.6	-3.3	3.4
.840	-.3	.0	-2.3	2.3	5.8	.0	-1.0	5.9
.850	-.1	.0	-2.0	2.0	-.2	.5	-2.4	2.5
.860	-1.4	.0	1.3	1.9	-1.9	1.3	1.1	2.6
.870	-1.5	.0	.4	1.5	4.2	-.5	-3.5	5.4
.880	-.2	.0	-2.0	2.0	6.3	-.6	-.8	6.4
.890	1.3	.0	-1.4	1.9	4.0	-1.4	-1.7	4.6
.900	.7	.0	-.5	.9	-.5	.2	1.9	2.0
.910	-.6	.0	-.8	1.1	-1.0	-.3	-.4	1.1
.920	-.7	.0	-.6	.9	-.8	-.3	-3.2	3.3
.930	-.6	.0	-.5	.8	.6	-.9	-3.0	3.2
.940	-1.0	.0	-1.5	1.8	.8	.1	-.7	1.0
.950	-.6	.0	-1.3	1.5	.6	2.3	-1.0	2.6
.960	-.1	.0	-1.0	1.0	-1.0	2.0	-.6	2.3
.970	-.3	.0	-1.8	1.8	.5	1.2	-1.6	2.1
.980	-.5	.0	-1.7	1.8	3.9	2.0	-5.1	6.7
.990	.3	.0	-.9	1.0	-3.8	2.0	3.8	5.7

MAXIMUM VALUES AND TIME OF OCCURANCE

	X	X----SEC	Y	Y----SEC	Z	Z----SEC	R	R----SEC
- VEL. CG ACCEL.-(G'S)	-17.4	.192	.0	1.000	-15.9	.188	17.9	.192
VEL. REAR ACCEL.-(G'S)	21.1	.341	35.5	.336	-36.3	.355	38.2	.355

TEST ID ------- NETC-2
TEST DATE ----- 11-20-96
VEHICLE CLASS - 2000P
IMPACT SPEED -- 27.78 M/S

TIME (S)	ACCELERATION-(G'S) ENGIN BLOCK TOP	BOTTOM	DISK BRAKE CALIPERS RIGHT	LEFT	INSTRUMENT PANEL
.000	.0	.0	-.5	-.4	.0
.010	-.2	.0	-2.4	-4.0	.0
.020	-1.5	.0	-2.4	7.2	.0
.030	-1.0	.0	-1.3	1.6	.0
.040	2.9	.0	-2.0	-.1	.0
.050	2.5	.0	-1.0	-.5	.0
.060	1.8	.0	.5	-2.1	.0
.070	.1	.0	-1.4	.9	.0
.080	-.9	.0	.8	-2.9	.0
.090	-.4	.0	.4	-1.6	.0
.100	.3	.0	.7	-1.1	.0
.110	-.5	.0	.9	-1.0	.0
.120	.0	.0	-.4	.2	.0
.130	.5	.0	-3.7	-.6	.0
.140	-.5	.0	-4.7	-8.0	.0
.150	-4.4	.0	-8.4	-.6	.0
.160	-3.5	.0	-3.8	11.2	.0
.170	-4.8	.0	-6.0	.1	.0
.180	-.2	.0	-8.3	-1.7	.0
.190	.8	.0	-.8	4.6	.0
.200	-.4	.0	-2.3	4.6	.0
.210	-5.2	.0	-9.2	-2.0	.0
.220	-2.4	.0	-8.6	3.2	.0
.230	-.4	.0	-2.8	-.5	.0
.240	-1.0	.0	-3.5	.7	.0
.250	1.3	.0	-.6	-1.3	.0
.260	2.4	.0	-.2	-.7	.0
.270	2.5	.0	.1	-1.0	.0
.280	1.3	.0	.1	-2.9	.0
.290	-.7	.0	-.5	-2.6	.0
.300	-1.9	.0	-1.1	-1.7	.0
.310	-1.5	.0	.9	.0	.0
.320	-1.8	.0	-1.2	-4.4	.0
.330	-.1	.0	-1.8	-2.8	.0
.340	2.3	.0	6.9	-5.0	.0
.350	2.1	.0	-.7	5.0	.0

TIME (S)	ACCELERATION-(G'S) ENGIN TOP	BLOCK BOTTOM	DISK BRAKE CALIPERS RIGHT	LEFT	INSTRUMENT PANEL
.360	2.3	.0	.7	-1.4	.0
.370	-.9	.0	-3.8	-1.0	.0
.380	1.1	.0	3.8	2.0	.0
.390	.0	.0	-2.4	1.1	.0
.400	.8	.0	-3.2	-.4	.0
.410	.5	.0	.4	-.3	.0
.420	.8	.0	-1.2	.3	.0
.430	.9	.0	.8	-.1	.0
.440	.6	.0	1.4	.2	.0
.450	.4	.0	.3	-1.8	.0
.460	.8	.0	-.9	-.8	.0
.470	.5	.0	.5	-.3	.0
.480	.0	.0	-.3	-.4	.0
.490	.0	.0	-.1	-.2	.0
.500	-.1	.0	-.3	.2	.0
.510	-.2	.0	-.5	-.3	.0
.520	-.5	.0	-.2	-.3	.0
.530	-.2	.0	-.7	.1	.0
.540	-.2	.0	.1	.1	.0
.550	-.1	.0	-.4	-.3	.0
.560	.1	.0	-.7	-.3	.0
.570	.2	.0	-.4	-.2	.0
.580	.3	.0	.6	.3	.0
.590	.2	.0	-.2	-.1	.0
.600	.2	.0	.9	-.4	.0
.610	.3	.0	.2	-.9	.0
.620	.3	.0	-1.6	.0	.0
.630	.3	.0	-.3	-.6	.0
.640	.9	.0	-.3	.3	.0
.650	1.0	.0	-1.0	.0	.0
.660	.7	.0	.2	.4	.0
.670	.4	.0	.2	.0	.0
.680	.4	.0	-.2	-.3	.0
.690	.5	.0	-.1	-.6	.0
.700	.4	.0	-.2	-.4	.0
.710	.3	.0	.5	-.4	.0
.720	.5	.0	.3	.2	.0
.730	.4	.0	-1.2	-1.1	.0
.740	.3	.0	-2.5	-.9	.0
.750	.5	.0	-.5	-.6	.0
.760	.5	.0	.7	-.1	.0
.770	.6	.0	.3	.8	.0
.780	.6	.0	-1.8	-.6	.0
.790	1.1	.0	-.5	.0	.0
.800	1.2	.0	-2.9	-.1	.0

TIME (S)	ACCELERATION-(G'S) ENGIN BLOCK TOP	BOTTOM	DISK BRAKE CALIPERS RIGHT	LEFT	INSTRUMENT PANEL
.810	1.6	.0	1.8	-1.1	.0
.820	.8	.0	3.9	-1.3	.0
.830	.0	.0	-1.3	.0	.0
.840	.4	.0	-.9	-1.4	.0
.850	.6	.0	.7	1.1	.0
.860	.8	.0	1.8	-1.8	.0
.870	.5	.0	-.9	-1.1	.0
.880	1.2	.0	-.4	1.1	.0
.890	.9	.0	.1	-.3	.0
.900	.6	.0	-.8	-2.0	.0
.910	.3	.0	-.8	-.3	.0
.920	.6	.0	.8	-.9	.0
.930	.9	.0	-1.5	-.2	.0
.940	.8	.0	-.7	-1.3	.0
.950	.8	.0	.0	-.1	.0
.960	.3	.0	-.5	.2	.0
.970	.0	.0	-.7	-.7	.0
.980	.4	.0	1.0	-1.0	.0
.990	.7	.0	-2.5	.5	.0

APPENDIX C - POST NO. 7 ACCELEROMETER DATA

ACCELEROMETER DATA - TEST NETC-2		
TIME (SEC)	POST 7 TOP ACCEL (G'S)	POST 7 BOTTOM ACCEL (G'S)
0.000	0.00	0.01
0.001	0.12	-0.03
0.002	-0.05	-0.02
0.003	-0.05	-0.03
0.004	-0.06	-0.03
0.005	0.01	-0.02
0.006	0.19	-0.02
0.007	0.12	-0.02
0.008	-0.03	-0.01
0.009	-0.02	-0.01
0.010	-0.02	-0.01
0.011	-0.12	-0.02
0.012	-0.26	-0.02
0.013	0.00	-0.02
0.014	-0.30	-0.02
0.015	0.14	-0.02
0.016	-0.06	-0.02
0.017	-0.10	-0.01
0.018	0.31	-0.01
0.019	-0.04	-0.01
0.020	-0.07	-0.01
0.021	-0.13	-0.02
0.022	-0.07	-0.02
0.023	0.17	-0.03
0.024	-0.01	-0.03
0.025	-0.02	-0.03
0.026	0.09	-0.03
0.027	-0.18	-0.02
0.028	0.03	-0.02
0.029	-0.08	-0.01
0.030	0.10	-0.01
0.031	0.33	-0.01
0.032	-0.32	-0.01
0.033	0.27	-0.01
0.034	-0.22	-0.02
0.035	0.02	-0.01
0.036	-0.16	-0.02
0.037	-0.10	-0.03
0.038	-0.11	-0.04
0.039	0.07	-0.05
0.040	0.05	-0.04
0.041	-0.07	-0.02
0.042	-0.18	-0.01

	0.043	0.17	-0.01		
	0.044	0.06	0.00		
	0.045	0.08	0.01		
	0.046	-0.05	-0.01		
	0.047	-0.03	-0.01		
	0.048	0.13	-0.03		
	0.049	0.14	-0.04		
	0.050	0.17	-0.02		
	0.051	0.15	-0.01		
	0.052	0.06	-0.01		
	0.053	0.01	-0.01		
	0.054	-0.20	-0.03		
	0.055	0.11	-0.03		
	0.056	-0.21	-0.04		
	0.057	0.14	-0.04		
	0.058	-0.17	-0.04		
	0.059	-0.20	-0.06		
	0.060	-0.05	-0.06		
	0.061	0.01	-0.03		
	0.062	0.25	-0.02		
	0.063	0.00	0.00		
	0.064	-0.04	0.02		
	0.065	0.08	0.02		
	0.066	0.04	0.02		
	0.067	0.22	0.00		
	0.068	-0.12	-0.01		
	0.069	-0.01	-0.02		
	0.070	0.12	-0.03		
	0.071	-0.33	-0.03		
	0.072	0.16	-0.03		
	0.073	-0.16	-0.02		
	0.074	-0.10	-0.02		
	0.075	0.01	-0.02		
	0.076	-0.25	-0.02		
	0.077	0.03	-0.03		
	0.078	0.03	-0.04		
	0.079	-0.05	-0.04		
	0.080	-0.01	-0.03		
	0.081	-0.01	-0.04		
	0.082	-0.09	-0.04		
	0.083	-0.15	-0.04		
	0.084	0.12	-0.01		
	0.085	0.14	0.02		
	0.086	-0.18	0.01		
	0.087	0.19	0.01		
	0.088	-0.09	0.00		
	0.089	-0.09	-0.02		
	0.090	-0.12	-0.03		
	0.091	0.19	-0.03		
	0.092	-0.02	-0.04		
	0.093	-0.15	-0.03		

	0.094	0.22	-0.02		
	0.095	-0.05	-0.01		
	0.096	-0.03	-0.02		
	0.097	-0.11	-0.01		
	0.098	0.08	-0.01		
	0.099	-0.10	-0.02		
	0.100	-0.17	-0.02		
	0.101	0.07	-0.04		
	0.102	-0.03	-0.04		
	0.103	0.02	-0.04		
	0.104	0.04	-0.04		
	0.105	0.06	-0.03		
	0.106	-0.04	-0.01		
	0.107	0.53	0.00		
	0.108	0.65	-0.22		
	0.109	-1.57	-0.10		
	0.110	2.54	-0.10		
	0.111	19.94	2.48		
	0.112	19.55	5.73		
	0.113	-6.13	5.14		
	0.114	-11.82	2.42		
	0.115	-7.02	-0.50		
	0.116	-2.82	-0.01		
	0.117	-16.32	-2.13		
	0.118	-7.53	-1.48		
	0.119	1.94	-1.25		
	0.120	2.24	-1.10		
	0.121	11.22	1.71		
	0.122	-17.06	-1.36		
	0.123	19.94	-1.75		
	0.124	12.19	-3.14		
	0.125	-18.26	-1.74		
	0.126	3.30	-2.14		
	0.127	9.00	-1.39		
	0.128	-15.08	-0.94		
	0.129	5.52	-0.76		
	0.130	-1.20	-2.29		
	0.131	7.91	0.24		
	0.132	0.35	4.30		
	0.133	-14.65	6.13		
	0.134	-1.92	7.00		
	0.135	9.55	3.53		
	0.136	10.04	2.88		
	0.137	14.13	0.93		
	0.138	-6.66	0.37		
	0.139	7.43	-0.54		
	0.140	-19.95	-1.54		
	0.141	19.94	-2.21		
	0.142	-19.95	-0.94		
	0.143	2.02	-0.53		
	0.144	19.94	1.42		

	0.145	-6.84	0.16		
	0.146	-10.80	0.99		
	0.147	3.34	2.34		
	0.148	-7.13	1.61		
	0.149	12.16	0.06		
	0.150	19.94	-0.15		
	0.151	-19.95	-0.68		
	0.152	-19.95	-0.04		
	0.153	-19.95	0.09		
	0.154	-19.95	-1.81		
	0.155	-19.95	-1.98		
	0.156	-19.95	-2.05		
	0.157	-19.95	-2.43		
	0.158	-19.95	-4.48		
	0.159	-19.95	-5.09		
	0.160	-19.95	-4.62		
	0.161	-19.95	-5.05		
	0.162	-19.95	-3.24		
	0.163	-19.95	-1.59		
	0.164	-19.95	-1.10		
	0.165	-19.95	-1.07		
	0.166	-19.95	0.39		
	0.167	-19.95	0.00		
	0.168	-19.95	-0.23		
	0.169	-19.95	-0.50		
	0.170	-19.95	0.22		
	0.171	-19.95	0.86		
	0.172	-19.95	1.17		
	0.173	-19.95	1.29		
	0.174	-19.95	2.30		
	0.175	-19.95	2.19		
	0.176	-19.95	1.61		
	0.177	-19.95	-0.09		
	0.178	-19.95	-0.93		
	0.179	-19.95	-0.42		
	0.180	-19.95	0.05		
	0.181	-19.95	0.79		
	0.182	-19.95	-0.35		
	0.183	-19.95	-0.44		
	0.184	-19.95	0.51		
	0.185	-19.95	1.15		
	0.186	-19.95	2.27		
	0.187	-19.95	2.18		
	0.188	-19.95	1.37		
	0.189	-19.95	0.25		
	0.190	-19.95	-1.10		
	0.191	-19.95	-1.88		
	0.192	-19.95	-1.53		
	0.193	-19.95	-0.71		
	0.194	-19.95	0.59		
	0.195	-19.95	0.69		

	0.196	-19.95	-0.13		
	0.197	-19.95	-1.42		
	0.198	-19.95	-1.80		
	0.199	-19.95	-1.52		
	0.200	-19.95	-0.96		
	0.201	-19.95	-0.38		
	0.202	-19.95	-0.09		
	0.203	-19.95	-0.01		
	0.204	-19.95	-0.56		
	0.205	-19.95	-0.85		
	0.206	-19.95	-0.68		
	0.207	-19.79	0.03		
	0.208	-19.75	0.63		
	0.209	-19.61	0.63		
	0.210	-19.45	0.42		
	0.211	-19.45	0.13		
	0.212	-19.59	0.68		
	0.213	-19.38	1.09		
	0.214	-19.44	1.37		
	0.215	-19.39	0.91		
	0.216	-19.48	0.94		
	0.217	-19.37	0.23		
	0.218	-19.34	0.10		
	0.219	-19.22	0.60		
	0.220	-18.91	0.58		
	0.221	-18.82	0.91		
	0.222	-18.97	1.19		
	0.223	-18.98	1.51		
	0.224	-18.96	1.94		
	0.225	-19.08	1.34		
	0.226	-18.95	1.08		
	0.227	-18.93	0.87		
	0.228	-18.91	1.59		
	0.229	-18.80	0.12		
	0.230	-18.68	-0.87		
	0.231	-18.47	-0.04		
	0.232	-18.37	1.01		
	0.233	-18.30	4.87		
	0.234	-18.42	6.01		
	0.235	-18.54	4.47		
	0.236	-18.60	5.25		
	0.237	-18.61	4.62		
	0.238	-18.57	3.24		
	0.239	-18.35	1.11		
	0.240	-18.29	0.61		
	0.241	-18.25	-2.51		
	0.242	-18.06	-6.58		
	0.243	-18.00	-10.99		
	0.244	-17.97	-14.06		
	0.245	-18.05	-14.30		
	0.246	-17.94	-11.61		

	0.247	-18.10	-9.74		
	0.248	-18.22	-4.81		
	0.249	-18.35	-2.14		
	0.250	-18.29	0.02		
	0.251	-18.17	-1.21		
	0.252	-17.20	-1.13		
	0.253	-16.29	-1.11		
	0.254	-17.67	-0.38		
	0.255	-17.55	-0.17		
	0.256	-17.26	1.48		
	0.257	-17.84	2.00		
	0.258	-16.96	2.45		
	0.259	-18.61	3.87		
	0.260	-18.43	3.31		
	0.261	-18.47	4.43		
	0.262	-18.91	4.33		
	0.263	-17.35	3.75		
	0.264	-17.09	2.85		
	0.265	-17.11	2.28		
	0.266	-17.58	1.01		
	0.267	-18.22	0.64		
	0.268	-18.29	0.79		
	0.269	-17.67	1.85		
	0.270	-17.20	2.13		
	0.271	-17.78	3.30		
	0.272	-18.00	3.56		
	0.273	-19.95	2.71		
	0.274	-19.21	1.16		
	0.275	-18.90	-0.48		
	0.276	-18.87	-1.24		
	0.277	-18.81	-1.17		
	0.278	-19.28	-2.95		
	0.279	-19.55	-4.32		
	0.280	-19.19	-4.35		
	0.281	-18.78	-4.55		
	0.282	-18.54	-4.20		
	0.283	-18.55	-3.38		
	0.284	-18.45	-1.65		
	0.285	-18.37	0.09		
	0.286	-17.32	-0.06		
	0.287	-16.34	-0.79		
	0.288	-15.21	-0.54		
	0.289	-15.23	0.70		
	0.290	-15.59	1.66		
	0.291	-15.69	2.26		
	0.292	-15.49	1.20		
	0.293	-15.52	1.43		
	0.294	-15.57	2.07		
	0.295	-15.88	2.17		
	0.296	-15.95	2.42		
	0.297	-15.57	2.31		

	0.298	-16.40	1.75		
	0.299	-16.24	1.51		
	0.300	-16.38	0.68		
	0.301	-16.41	0.22		
	0.302	-16.58	-0.87		
	0.303	-16.65	-0.94		
	0.304	-16.76	-0.72		
	0.305	-16.94	-0.73		
	0.306	-16.89	-1.17		
	0.307	-16.98	-1.55		
	0.308	-16.91	-1.26		
	0.309	-17.27	-0.61		
	0.310	-17.19	0.42		
	0.311	-17.33	-0.10		
	0.312	-17.39	-1.39		
	0.313	-17.53	-2.18		
	0.314	-17.71	-1.86		
	0.315	-17.78	-1.37		
	0.316	-17.90	-0.70		
	0.317	-17.98	-0.29		
	0.318	-17.71	-0.10		
	0.319	-17.88	0.15		
	0.320	-17.49	0.85		
	0.321	-17.29	1.28		
	0.322	-16.89	1.18		
	0.323	-16.86	1.34		
	0.324	-17.12	1.40		
	0.325	-17.35	0.57		
	0.326	-16.91	0.24		
	0.327	-17.31	0.66		
	0.328	-17.34	1.04		
	0.329	-16.88	0.81		
	0.330	-16.73	0.31		
	0.331	-16.61	0.08		
	0.332	-16.64	0.00		
	0.333	-16.56	0.30		
	0.334	-16.42	0.00		
	0.335	-16.41	-0.10		
	0.336	-16.61	-0.42		
	0.337	-16.59	-1.05		
	0.338	-16.78	-1.84		
	0.339	-16.79	-1.94		
	0.340	-16.79	-1.23		
	0.341	-16.82	-0.31		
	0.342	-16.88	0.02		
	0.343	-16.82	0.14		
	0.344	-16.68	-0.04		
	0.345	-16.61	-0.41		
	0.346	-16.58	-0.66		
	0.347	-16.74	-0.48		
	0.348	-16.77	-0.34		

	0.349	-16.75	0.06	
	0.350	-16.58	0.35	
	0.351	-16.40	0.22	
	0.352	-16.28	0.00	
	0.353	-16.13	0.38	
	0.354	-15.99	0.96	
	0.355	-16.02	1.45	
	0.356	-15.96	1.55	
	0.357	-16.00	1.08	
	0.358	-16.11	0.65	
	0.359	-16.13	0.32	
	0.360	-16.17	0.07	
	0.361	-16.05	0.06	
	0.362	-15.95	0.31	
	0.363	-15.86	0.34	
	0.364	-15.80	0.11	
	0.365	-15.76	-0.17	
	0.366	-15.75	-0.66	
	0.367	-15.78	-1.41	
	0.368	-15.79	-1.82	
	0.369	-16.10	-1.62	
	0.370	-16.13	-1.33	
	0.371	-16.20	-1.02	
	0.372	-16.01	-0.77	
	0.373	-15.95	-0.59	
	0.374	-15.88	-0.33	
	0.375	-15.74	-0.16	
	0.376	-15.74	0.02	
	0.377	-15.71	0.39	
	0.378	-15.86	0.90	
	0.379	-15.88	1.08	
	0.380	-16.02	0.92	
	0.381	-16.07	0.80	
	0.382	-16.17	0.86	
	0.383	-16.09	0.97	
	0.384	-16.01	1.00	
	0.385	-15.90	0.85	
	0.386	-15.73	0.38	
	0.387	-15.67	-0.08	
	0.388	-15.66	-0.24	
	0.389	-15.65	-0.17	
	0.390	-15.67	-0.28	
	0.391	-15.89	-0.53	
	0.392	-15.87	-0.77	
	0.393	-15.97	-0.91	
	0.394	-15.89	-0.91	
	0.395	-16.00	-0.73	
	0.396	-15.74	-0.42	
	0.397	-15.58	-0.38	
	0.398	-15.67	-0.40	
	0.399	-15.74	-0.46	
	0.400	-15.99	-0.44	