

APPENDIX L

**Occupant Risk Assessment From Curb-Barrier Impact
Summary Report from TRAP**

-Finite Element Analysis Results-

Test Summary Report

General Information

Test Agency: WPI
Test Number: B-0m-70
Test Date: June 2002
Test Article: B Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1487 seconds on left side of interior
x-direction 4.1
y-direction -3.6

THIV (km/hr): 16.3 at 0.1360 seconds on left side of interior
THIV (m/s): 4.5

Ridedown Accelerations (g's)

x-direction -6.0 (0.1597 - 0.1697 seconds)
y-direction 4.7 (0.2490 - 0.2590 seconds)

PHD (g's): 7.2 (0.1710 - 0.1810 seconds)

ASI: 0.47 (0.0067 - 0.0567 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -4.6 (0.0070 - 0.0570 seconds)
y-direction 3.3 (0.2130 - 0.2630 seconds)
z-direction 2.0 (0.1210 - 0.1710 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -1.9 (0.6060 seconds)
Pitch -6.4 (0.4153 seconds)
Yaw 44.0 (0.6060 seconds)

Figure L.1: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO B Curb
Impact Speed – 70 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: C-0m-70
Test Date: June 2002
Test Article: C Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1553 seconds on left side of interior
x-direction 4.2
y-direction -4.2

THIV (km/hr): 20.1 at 0.1500 seconds on left side of interior
THIV (m/s): 5.6

Ridedown Accelerations (g's)
x-direction -6.3 (0.2957 - 0.3057 seconds)
y-direction 7.5 (0.5503 - 0.5603 seconds)

PHD (g's): 9.7 (0.5503 - 0.5603 seconds)

ASI: 0.52 (0.0980 - 0.1480 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -4.0 (0.1043 - 0.1543 seconds)
y-direction 3.8 (0.0217 - 0.0717 seconds)
z-direction -1.7 (0.2803 - 0.3303 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -7.0 (0.6233 seconds)
Pitch -3.7 (0.4867 seconds)
Yaw 46.1 (0.7300 seconds)

Figure L.2: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO C Curb
Impact Speed – 70 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: D-0m-70
Test Date: June 2002
Test Article: D Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1607 seconds on left side of interior
x-direction 4.3
y-direction -4.1

THIV (km/hr): 20.7 at 0.1540 seconds on left side of interior
THIV (m/s): 5.7

Ridedown Accelerations (g's)
x-direction -6.6 (0.2450 - 0.2550 seconds)
y-direction 6.7 (0.3017 - 0.3117 seconds)

PHD (g's): 8.1 (0.2443 - 0.2543 seconds)

ASI: 0.50 (0.0780 - 0.1280 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -4.6 (0.1037 - 0.1537 seconds)
y-direction 3.7 (0.0777 - 0.1277 seconds)
z-direction -2.0 (0.0570 - 0.1070 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll 2.2 (0.5767 seconds)
Pitch 3.5 (0.3087 seconds)
Yaw 45.2 (0.7420 seconds)

Figure L.3: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO D Curb
Impact Speed – 70 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: NY-0m-70
Test Date: June 2002
Test Article: NY Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1580 seconds on left side of interior
x-direction 4.7
y-direction -4.2

THIV (km/hr): 21.7 at 0.1527 seconds on left side of interior
THIV (m/s): 6.0

Ridedown Accelerations (g's)
x-direction -5.1 (0.2643 - 0.2743 seconds)
y-direction 5.7 (0.2050 - 0.2150 seconds)

PHD (g's): 7.2 (0.2643 - 0.2743 seconds)

ASI: 0.57 (0.0827 - 0.1327 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -4.7 (0.1017 - 0.1517 seconds)
y-direction 4.1 (0.0837 - 0.1337 seconds)
z-direction 1.5 (0.2143 - 0.2643 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -4.3 (0.6653 seconds)
Pitch -2.1 (0.6980 seconds)
Yaw 46.3 (0.6980 seconds)

Figure L.4: Summary Report of Occupant Risk Factors from TRAP:
Curb Type – New York Curb (100 mm)
Impact Speed – 70 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: B-0m-85
Test Date: June 2002
Test Article: B Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 85.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1533 seconds on left side of interior
x-direction 4.2
y-direction -4.1

THIV (km/hr): 19.7 at 0.1467 seconds on left side of interior
THIV (m/s): 5.5

Ridedown Accelerations (g's)
x-direction 8.1 (0.4403 - 0.4503 seconds)
y-direction 10.6 (0.4330 - 0.4430 seconds)

PHD (g's): 15.9 (0.4363 - 0.4463 seconds)

ASI: 0.67 (0.0807 - 0.1307 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -4.2 (0.0803 - 0.1303 seconds)
y-direction 5.7 (0.1443 - 0.1943 seconds)
z-direction 4.2 (0.4503 - 0.5003 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll 5.4 (0.9580 seconds)
Pitch -7.6 (0.6260 seconds)
Yaw 44.3 (0.5187 seconds)

Figure L.5: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO B Curb
Impact Speed – 85 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: C-0m-85
Test Date: June 2002
Test Article: C Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 85.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1527 seconds on left side of interior
x-direction 4.1
y-direction -4.3

THIV (km/hr): 19.7 at 0.1467 seconds on left side of interior
THIV (m/s): 5.5

Ridedown Accelerations (g's)

x-direction -12.9 (0.4377 - 0.4477 seconds)
y-direction 12.6 (0.4377 - 0.4477 seconds)

PHD (g's): 32.8 (0.4417 - 0.4517 seconds)

ASI: 0.67 (0.1413 - 0.1913 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -4.1 (0.0837 - 0.1337 seconds)
y-direction 5.5 (0.1410 - 0.1910 seconds)
z-direction 2.3 (0.4543 - 0.5043 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll 8.2 (0.9567 seconds)
Pitch -3.3 (0.4800 seconds)
Yaw 43.5 (0.5247 seconds)

Figure L.6: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO C Curb
Impact Speed – 85 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: B-0m-100
Test Date: June 2002
Test Article: B Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 100.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1287 seconds on left side of interior
x-direction 5.5
y-direction -5.0

THIV (km/hr): 23.9 at 0.1240 seconds on left side of interior
THIV (m/s): 6.6

Ridedown Accelerations (g's)

x-direction -11.0 (0.4443 - 0.4543 seconds)
y-direction 14.9 (0.4437 - 0.4537 seconds)

PHD (g's): 33.4 (0.4457 - 0.4557 seconds)

ASI: 0.89 (0.1400 - 0.1900 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -5.4 (0.0757 - 0.1257 seconds)
y-direction 7.6 (0.1303 - 0.1803 seconds)
z-direction 3.3 (0.4523 - 0.5023 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -18.0 (0.6373 seconds)
Pitch -14.2 (0.6980 seconds)
Yaw 47.4 (0.5287 seconds)

Figure L.7: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO B Curb
Impact Speed – 100 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: C-0m-100
Test Date: June 2002
Test Article: C Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 100.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1427 seconds on left side of interior
x-direction 5.7
y-direction -5.0

THIV (km/hr): 26.1 at 0.1367 seconds on left side of interior
THIV (m/s): 7.2

Ridedown Accelerations (g's)

x-direction 8.7 (0.6477 - 0.6577 seconds)
y-direction 7.4 (0.1530 - 0.1630 seconds)

PHD (g's): 17.5 (0.6863 - 0.6963 seconds)

ASI: 0.76 (0.1167 - 0.1667 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -5.3 (0.0337 - 0.0837 seconds)
y-direction 6.0 (0.1150 - 0.1650 seconds)
z-direction -3.9 (0.2523 - 0.3023 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll 31.3 (0.6980 seconds)
Pitch 6.0 (0.6600 seconds)
Yaw 54.5 (0.6980 seconds)

Figure L.8: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO C Curb
Impact Speed – 100 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: D-0m-100
Test Date: June 2002
Test Article: D Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 100.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1360 seconds on left side of interior
x-direction 5.9
y-direction -4.8

THIV (km/hr): 24.9 at 0.1307 seconds on left side of interior
THIV (m/s): 6.9

Ridedown Accelerations (g's)

x-direction -14.0 (0.4463 - 0.4563 seconds)
y-direction 15.9 (0.4457 - 0.4557 seconds)

PHD (g's): 29.1 (0.4477 - 0.4577 seconds)

ASI: 0.85 (0.1273 - 0.1773 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -5.4 (0.0823 - 0.1323 seconds)
y-direction 7.1 (0.1297 - 0.1797 seconds)
z-direction 3.5 (0.4597 - 0.5097 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -12.5 (0.6293 seconds)
Pitch -14.3 (0.6980 seconds)
Yaw 49.2 (0.5227 seconds)

Figure L.9: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO D Curb
Impact Speed – 100 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: G-0m-100
Test Date: June 2002
Test Article: G Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 100.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1247 seconds on left side of interior
x-direction 4.8
y-direction -5.3

THIV (km/hr): 23.8 at 0.1207 seconds on left side of interior
THIV (m/s): 6.6

Ridedown Accelerations (g's)

x-direction -11.6 (0.4363 - 0.4463 seconds)
y-direction 14.8 (0.4337 - 0.4437 seconds)

PHD (g's): 21.0 (0.4190 - 0.4290 seconds)

ASI: 0.83 (0.1240 - 0.1740 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -5.0 (0.0717 - 0.1217 seconds)
y-direction 7.0 (0.1270 - 0.1770 seconds)
z-direction 2.5 (0.4410 - 0.4910 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -11.4 (0.9180 seconds)
Pitch -21.6 (0.8607 seconds)
Yaw 68.9 (0.9180 seconds)

Figure L.10: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO G Curb
Impact Speed – 100 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: NY-0m-100
Test Date: June 2002
Test Article: NY Curb @ 0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 100.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.1260 seconds on left side of interior
x-direction 5.0
y-direction -5.2

THIV (km/hr): 23.5 at 0.1213 seconds on left side of interior
THIV (m/s): 6.5

Ridedown Accelerations (g's)

x-direction -8.2 (0.1743 - 0.1843 seconds)
y-direction 13.1 (0.4283 - 0.4383 seconds)

PHD (g's): 16.3 (0.4297 - 0.4397 seconds)

ASI: 0.72 (0.1073 - 0.1573 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -5.0 (0.0750 - 0.1250 seconds)
y-direction 5.7 (0.2203 - 0.2703 seconds)
z-direction 2.4 (0.4117 - 0.4617 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -10.9 (0.5853 seconds)
Pitch -9.1 (0.6200 seconds)
Yaw 48.5 (0.5360 seconds)

Figure L.11: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – New York Curb (100 mm)
Impact Speed – 100 km/hr
Offset Distance – 0.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: B-2.5m-70
Test Date: June 2002
Test Article: B Curb @ 2.5-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.4373 seconds on left side of interior
x-direction 3.5
y-direction -2.5

THIV (km/hr): 14.6 at 0.4327 seconds on left side of interior
THIV (m/s): 4.1

Ridedown Accelerations (g's)

x-direction -15.1 (0.5857 - 0.5957 seconds)
y-direction 19.4 (0.5550 - 0.5650 seconds)

PHD (g's): 51.9 (0.5883 - 0.5983 seconds)

ASI: 1.13 (0.5700 - 0.6200 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction 4.6 (0.7190 - 0.7690 seconds)
y-direction -10.0 (0.5697 - 0.6197 seconds)
z-direction 7.4 (0.4863 - 0.5363 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -11.9 (0.6773 seconds)
Pitch -3.2 (0.9927 seconds)
Yaw 38.7 (1.2720 seconds)

Figure L.12: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO B Curb
Impact Speed – 70 km/hr
Offset Distance – 2.5 m.

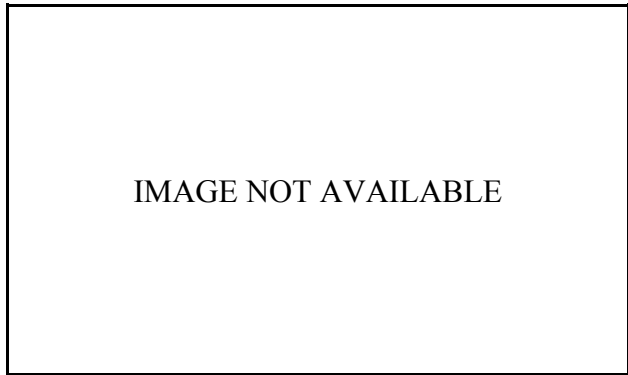


Figure L.13: Summary Report of Occupant Risk Factors from TRAP:

| | |
|-----------------|-----------------|
| Curb Type | – AASHTO C Curb |
| Impact Speed | – 70 km/hr |
| Offset Distance | – 2.5 m. |

Test Summary Report

General Information

Test Agency: WPI
Test Number: D-2.5m-70
Test Date: June 2002
Test Article: D Curb @ 2.5-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.2287 seconds on right side of interior
x-direction -0.1
y-direction 1.6

THIV (km/hr): 6.1 at 0.2293 seconds on right side of interior
THIV (m/s): 1.7

Ridedown Accelerations (g's)

x-direction -12.7 (0.5070 - 0.5170 seconds)
y-direction 17.3 (0.2357 - 0.2457 seconds)

PHD (g's): 34.2 (0.6490 - 0.6590 seconds)

ASI: 0.83 (0.3520 - 0.4020 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -5.6 (0.4657 - 0.5157 seconds)
y-direction 5.8 (0.8497 - 0.8997 seconds)
z-direction -7.7 (0.3517 - 0.4017 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -11.4 (0.6347 seconds)
Pitch -5.2 (1.0747 seconds)
Yaw 43.9 (0.9020 seconds)

Figure L.14: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO D Curb
Impact Speed – 70 km/hr
Offset Distance – 2.5 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: G-2.5m-70
Test Date: June 2002
Test Article: G Curb @ 2.5-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.4507 seconds on front of interior
x-direction 6.0
y-direction -2.4

THIV (km/hr): 21.9 at 0.4513 seconds on front of interior
THIV (m/s): 6.1

Ridedown Accelerations (g's)

x-direction -26.6 (0.7197 - 0.7297 seconds)
y-direction 17.2 (0.7143 - 0.7243 seconds)

PHD (g's): 79.6 (0.7103 - 0.7203 seconds)

ASI: 0.89 (1.1880 - 1.2380 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -6.6 (0.6063 - 0.6563 seconds)
y-direction 5.2 (0.4997 - 0.5497 seconds)
z-direction -8.2 (1.1877 - 1.2377 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -14.1 (0.6880 seconds)
Pitch -6.3 (0.9907 seconds)
Yaw 44.9 (1.3020 seconds)

Figure L.15: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO G Curb
Impact Speed – 70 km/hr
Offset Distance – 2.5 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: NY-2.5m-70
Test Date: June 2002
Test Article: NY Curb @ 2.5-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.4940 seconds on front of interior
x-direction 5.8
y-direction -4.5

THIV (km/hr): 23.2 at 0.4960 seconds on left side of interior
THIV (m/s): 6.5

Ridedown Accelerations (g's)

x-direction -11.0 (0.5343 - 0.5443 seconds)
y-direction 10.9 (0.5023 - 0.5123 seconds)

PHD (g's): 26.6 (0.5923 - 0.6023 seconds)

ASI: 0.88 (0.3547 - 0.4047 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -4.4 (0.4437 - 0.4937 seconds)
y-direction 6.4 (0.3537 - 0.4037 seconds)
z-direction -5.1 (0.3550 - 0.4050 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -8.4 (0.6480 seconds)
Pitch -5.2 (1.0253 seconds)
Yaw 40.8 (1.0253 seconds)

Figure L.16: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – New York Curb (100 mm)
Impact Speed – 70 km/hr
Offset Distance – 2.5 m.

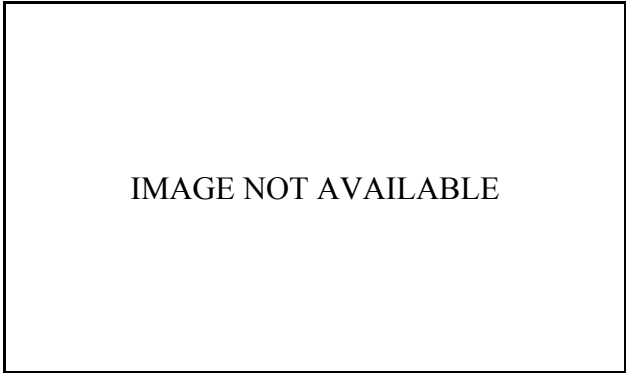


Figure L.17: Summary Report of Occupant Risk Factors from TRAP:

| | |
|-----------------|-----------------|
| Curb Type | – AASHTO B Curb |
| Impact Speed | – 85 km/hr |
| Offset Distance | – 2.5 m. |

Test Summary Report

General Information

Test Agency: WPI
Test Number: C-2.5m-85
Test Date: June 2002
Test Article: C Curb @ 2.5-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 85.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.3473 seconds on front of interior
x-direction 6.1
y-direction -3.6

THIV (km/hr): 25.2 at 0.3487 seconds on front of interior
THIV (m/s): 7.0

Ridedown Accelerations (g's)

x-direction -25.2 (0.4317 - 0.4417 seconds)
y-direction -22.0 (0.4463 - 0.4563 seconds)

PHD (g's): 72.8 (0.4570 - 0.4670 seconds)

ASI: 1.68 (0.3947 - 0.4447 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -9.2 (0.4170 - 0.4670 seconds)
y-direction 8.5 (0.3963 - 0.4463 seconds)
z-direction -12.5 (0.3983 - 0.4483 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -6.1 (0.4667 seconds)
Pitch -2.2 (0.4660 seconds)
Yaw 6.0 (0.4540 seconds)

Figure L.18: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO C Curb
Impact Speed – 85 km/hr
Offset Distance – 2.5 m.

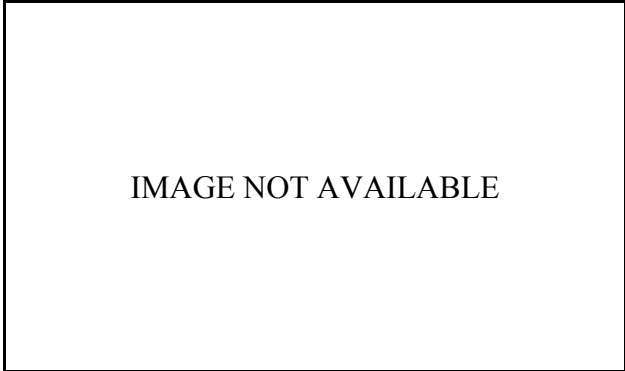


Figure L.19: Summary Report of Occupant Risk Factors from TRAP:

| | |
|-----------------|-----------------|
| Curb Type | – AASHTO G Curb |
| Impact Speed | – 100 km/hr |
| Offset Distance | – 2.5 m. |

Test Summary Report

General Information

Test Agency: WPI
Test Number: B-4.0m-70
Test Date: June 2002
Test Article: B Curb @ 4.0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.6893 seconds on left side of interior
x-direction 2.0
y-direction -4.5

THIV (km/hr): 18.0 at 0.6907 seconds on left side of interior
THIV (m/s): 5.0

Ridedown Accelerations (g's)

x-direction 13.6 (0.8270 - 0.8370 seconds)
y-direction -19.2 (0.8257 - 0.8357 seconds)

PHD (g's): 41.4 (0.8243 - 0.8343 seconds)

ASI: 1.10 (0.7773 - 0.8273 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -6.3 (0.6583 - 0.7083 seconds)
y-direction 8.3 (0.7757 - 0.8257 seconds)
z-direction -6.7 (0.7770 - 0.8270 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll 5.1 (0.2260 seconds)
Pitch -2.8 (0.8547 seconds)
Yaw 27.4 (0.9380 seconds)

Figure L.20: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO B Curb
Impact Speed – 70 km/hr
Offset Distance – 4.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: C-4.0m-70
Test Date: June 2002
Test Article: C Curb @ 4.0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.4460 seconds on right side of interior
x-direction 1.6
y-direction 1.4

THIV (km/hr): 8.0 at 0.4400 seconds on right side of interior
THIV (m/s): 2.2

Ridedown Accelerations (g's)

x-direction 14.4 (1.1557 - 1.1657 seconds)
y-direction 13.8 (0.5870 - 0.5970 seconds)

PHD (g's): 38.9 (0.7163 - 0.7263 seconds)

ASI: 0.77 (0.1213 - 0.1713 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction 6.9 (1.1330 - 1.1830 seconds)
y-direction 6.3 (0.5850 - 0.6350 seconds)
z-direction 6.8 (0.5470 - 0.5970 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -7.6 (0.8320 seconds)
Pitch -2.7 (0.6047 seconds)
Yaw 42.7 (1.0667 seconds)

Figure L.21: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO C Curb
Impact Speed – 70 km/hr
Offset Distance – 4.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: D-4.0m-70
Test Date: June 2002
Test Article: D Curb @ 4.0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.3767 seconds on left side of interior
x-direction 0.3
y-direction -1.6

THIV (km/hr): 6.1 at 0.3813 seconds on left side of interior
THIV (m/s): 1.7

Ridedown Accelerations (g's)

x-direction 13.3 (1.1363 - 1.1463 seconds)
y-direction 14.4 (0.6417 - 0.6517 seconds)

PHD (g's): 49.7 (1.1397 - 1.1497 seconds)

ASI: 0.84 (0.6420 - 0.6920 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -3.9 (0.7890 - 0.8390 seconds)
y-direction 7.2 (1.0597 - 1.1097 seconds)
z-direction 5.1 (0.0690 - 0.1190 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll 5.6 (0.2153 seconds)
Pitch -2.9 (0.8547 seconds)
Yaw 44.2 (1.1013 seconds)

Figure L.22: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO D Curb
Impact Speed – 70 km/hr
Offset Distance – 4.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: G-4.0m-70
Test Date: June 2002
Test Article: G Curb @ 4.0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 70.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.4007 seconds on left side of interior
x-direction 1.1
y-direction -2.6

THIV (km/hr): 10.5 at 0.4027 seconds on left side of interior
THIV (m/s): 2.9

Ridedown Accelerations (g's)

x-direction -21.2 (0.8103 - 0.8203 seconds)
y-direction -16.8 (1.3470 - 1.3570 seconds)

PHD (g's): 39.2 (1.4863 - 1.4963 seconds)

ASI: 0.80 (0.7933 - 0.8433 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -8.5 (0.7850 - 0.8350 seconds)
y-direction 5.6 (0.6590 - 0.7090 seconds)
z-direction 6.9 (0.7237 - 0.7737 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll 4.4 (0.2727 seconds)
Pitch -3.4 (1.0987 seconds)
Yaw 39.6 (1.0707 seconds)

Figure L.23: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO G Curb
Impact Speed – 70 km/hr
Offset Distance – 4.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: B-4.0m-85
Test Date: June 2002
Test Article: B Curb @ 4.0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 85.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.2967 seconds on left side of interior
x-direction 0.1
y-direction -2.6

THIV (km/hr): 9.7 at 0.2973 seconds on left side of interior
THIV (m/s): 2.7

Ridedown Accelerations (g's)

x-direction -31.1 (0.5683 - 0.5783 seconds)
y-direction 29.0 (0.6657 - 0.6757 seconds)

PHD (g's): 68.6 (0.6657 - 0.6757 seconds)

ASI: 1.66 (0.5720 - 0.6220 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -14.7 (0.5710 - 0.6210 seconds)
y-direction 10.1 (0.6470 - 0.6970 seconds)
z-direction -9.0 (0.5757 - 0.6257 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -10.8 (0.8353 seconds)
Pitch -2.0 (0.5593 seconds)
Yaw 43.9 (1.4973 seconds)

Figure L.24: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO B Curb
Impact Speed – 85 km/hr
Offset Distance – 4.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: C-4.0m-85
Test Date: June 2002
Test Article: C Curb @ 4.0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 85.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.3260 seconds on left side of interior
x-direction 0.7
y-direction -1.7

THIV (km/hr): 5.6 at 0.3307 seconds on left side of interior
THIV (m/s): 1.6

Ridedown Accelerations (g's)

x-direction -20.0 (0.8890 - 0.8990 seconds)
y-direction 16.9 (0.8150 - 0.8250 seconds)

PHD (g's): 50.7 (0.8610 - 0.8710 seconds)

ASI: 0.81 (0.8553 - 0.9053 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -6.9 (0.8563 - 0.9063 seconds)
y-direction 5.8 (0.8550 - 0.9050 seconds)
z-direction 6.7 (0.6177 - 0.6677 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -6.3 (0.7273 seconds)
Pitch -3.2 (1.0527 seconds)
Yaw 42.0 (1.4973 seconds)

Figure L.25: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO C Curb
Impact Speed – 85 km/hr
Offset Distance – 4.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: B-4.0m-100
Test Date: June 2002
Test Article: B Curb @ 4.0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 100.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.3213 seconds on front of interior
x-direction 3.6
y-direction 0.3

THIV (km/hr): 13.1 at 0.3220 seconds on front of interior
THIV (m/s): 3.6

Ridedown Accelerations (g's)

x-direction -40.0 (0.5437 - 0.5537 seconds)
y-direction -49.9 (0.5570 - 0.5670 seconds)

PHD (g's): 143.3 (0.5650 - 0.5750 seconds)

ASI: 1.79 (0.5040 - 0.5540 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -13.1 (0.5037 - 0.5537 seconds)
y-direction 9.6 (0.4330 - 0.4830 seconds)
z-direction -14.6 (0.5417 - 0.5917 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -19.6 (0.5933 seconds)
Pitch -6.2 (0.5933 seconds)
Yaw -8.6 (0.5933 seconds)

Figure L.26: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO B Curb
Impact Speed – 100 km/hr
Offset Distance – 4.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: C-4.0m-100
Test Date: June 2002
Test Article: C Curb @ 4.0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 100.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.5007 seconds on left side of interior
x-direction 5.0
y-direction -3.8

THIV (km/hr): 23.7 at 0.4960 seconds on left side of interior
THIV (m/s): 6.6

Ridedown Accelerations (g's)

x-direction -40.0 (0.0190 - 0.0290 seconds)
y-direction -49.9 (0.0323 - 0.0423 seconds)

PHD (g's): 33.5 (0.4957 - 0.5057 seconds)

ASI: 0.87 (0.4420 - 0.4920 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -6.5 (0.4157 - 0.4657 seconds)
y-direction 5.8 (0.4417 - 0.4917 seconds)
z-direction -4.2 (0.4423 - 0.4923 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -6.7 (0.5047 seconds)
Pitch -3.5 (0.4673 seconds)
Yaw -2.7 (0.3847 seconds)

Figure L.27: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO C Curb
Impact Speed – 100 km/hr
Offset Distance – 4.0 m.

Test Summary Report

General Information

Test Agency: WPI
 Test Number: G-4.0m-100
 Test Date: June 2002
 Test Article: G Curb @ 4.0-m offset

Test Vehicle

Description: C2500
 Test Inertial Mass: 2000 kg
 Gross Static Mass: 2000 kg

Impact Conditions

Speed: 100.0 km/hr
 Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.4667 seconds on front of interior
 x-direction 6.3
 y-direction -4.9

THIV (km/hr): 28.6 at 0.4680 seconds on front of interior
 THIV (m/s): 8.0

Ridedown Accelerations (g's)

x-direction 26.2 (0.6237 - 0.6337 seconds)
 y-direction -29.2 (1.0250 - 1.0350 seconds)

PHD (g's): 83.4 (0.9703 - 0.9803 seconds)

ASI: 1.45 (0.9973 - 1.0473 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction 13.4 (0.6223 - 0.6723 seconds)
 y-direction -9.6 (0.9970 - 1.0470 seconds)
 z-direction -11.5 (0.9783 - 1.0283 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -45.1 (1.0380 seconds)
 Pitch 3.5 (0.7860 seconds)
 Yaw 14.7 (0.7840 seconds)

Figure L.28: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – AASHTO G Curb
 Impact Speed – 100 km/hr
 Offset Distance – 4.0 m.

Test Summary Report

General Information

Test Agency: WPI
Test Number: NY-4.0m-100
Test Date: June 2002
Test Article: NY Curb @ 4.0-m offset

Test Vehicle

Description: C2500
Test Inertial Mass: 2000 kg
Gross Static Mass: 2000 kg

Impact Conditions

Speed: 100.0 km/hr
Angle: 25.0 degrees

Occupant Risk Factors

Impact Velocity (m/s) at 0.4920 seconds on front of interior
x-direction 5.3
y-direction -5.6

THIV (km/hr): 24.6 at 0.4927 seconds on front of interior
THIV (m/s): 6.8

Ridedown Accelerations (g's)

x-direction -17.0 (0.5517 - 0.5617 seconds)
y-direction 21.1 (0.5477 - 0.5577 seconds)

PHD (g's): 43.0 (0.6250 - 0.6350 seconds)

ASI: 1.12 (0.4413 - 0.4913 seconds)

Max. 50msec Moving Avg. Accelerations (g's)

x-direction -10.4 (0.5363 - 0.5863 seconds)
y-direction 9.3 (0.4237 - 0.4737 seconds)
z-direction 6.7 (0.4943 - 0.5443 seconds)

Max Roll, Pitch, and Yaw Angles (degrees)

Roll -15.2 (0.6347 seconds)
Pitch -3.1 (0.5140 seconds)
Yaw 22.4 (0.6347 seconds)

Figure L.29: Summary Report of Occupant Risk Factors from TRAP:

Curb Type – New York Curb (100 mm)
Impact Speed – 100 km/hr
Offset Distance – 4.0 m.