On-Site Advanced Occupant Protection System Investigation
Dynamic Science, Inc. / Case Number: DS02015
2003 Toyota Corolla S
Washington
June, 2002

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

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16. Abstract

This Advanced Occupant Protection System (AOPS) case occurred in June, 2002 at 2252 hours in the state of Washington. This single vehicle crash occurred within the confines of a four leg intersection of a residential roadway. The case vehicle was a 2003 Toyota Corolla S four door sedan driven by a restrained 18-year-old male. The police report indicates that there were seven additional occupants in the vehicle. The front right seat was occupied by a restrained 15-male. The rear left seat was occupied by an unrestrained 15-year-old male. The rear middle seat was occupied by an unrestrained 16-year-old female. The rear right seat was occupied by an unrestrained 15-year-old male. The remaining three occupants left the scene of the crash before the police arrived at the scene. The driver reported that two were females and a male. It is presumed that these three occupants were seated in the rear seat of the vehicle.

The case vehicle was traveling eastbound at a driver reported 97-113 km/h (60-70 mph). The vehicle was traveling downhill and approaching the intersection. As the vehicle approached the intersection, the driver saw the red flashing lights for the four-way stop sign at the intersection. The driver tried to stop the vehicle by braking. The brakes locked up and the vehicle began skidding down the hill towards the intersection. There was a non-contact vehicle that was traveling southbound and had stopped at the intersection. The driver of the contact vehicle saw the case vehicle coming straight at him and he accelerated through the intersection. The driver of the case vehicle lost control of his vehicle and ran off the roadway at the south-east corner of the intersection. The front right (12FRWN3) and rear right (12FRWN9) tire rims were damaged by impacts with the concrete curbs. The case vehicle continued moving forward in a southeast direction off the roadway away from the southeast corner. The front right corner (12FREE2) of the case vehicle crashed into a steel power transfer box. The driver's and front right passenger's air bag deployed in the case vehicle at this time, and the seat belt pretensioners in both front seats actuated. After impact with the power box, the case vehicle rotated clockwise and continued moving forward. The left rear door and rear panel struck (12LZES1) a high voltage wooden power pole. The case vehicle was redirected to clockwise and continued moving forward. The case vehicle came to final rest on all four wheels heading east, several feet east of impact 4.

All occupants exited the case vehicle presumably under their own power. The driver complained of stomach discomfort. The front right occupant complained of being dizzy. The rear left occupant did not report any injuries. The rear middle sustained scratches/lacerations to her arms and legs (unknown source). The rear right occupant sustained a bump on his head, which was possibly as a result of occupant to occupant contact. There was no indication on the police report as to whether any of the remaining occupants sustained any injuries. The police report did not indicate whether rescue personnel were called to the scene, nor that any of the injured occupants in the case vehicle were transported to a hospital for medical treatment.

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Dynamic Science, Inc.
Crash Investigation
Case Number: DS02015

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BACKGROUND:

Description:	This Advanced Occupant Protection System (AOPS) case was selected by the NHTSA in their weekly General Estimates System review. DSI was notified of this potential AOPS case by NHTSA on July 15, 2002. DSI located and obtained permission to inspect the case vehicle on July 16, 2002. Field work was completed on July 17, 2002.
Investigation Type:	On-Site AOPS
Crash Location:	Washington
Crash Date:	June, 2002
Notification Date:	July 15, 2002
Field Work Completed:	July 17, 2002

SUMMARY

Crash Site

This single vehicle crash occurred in June, 2002 at 2252 hours in the state of Washington. The crash occurred within the confines of a four leg intersection of a residential roadway. The divided westbound approach to the intersection is comprised of one eastbound through lane, one westbound right turn lane, and one eastbound travel lane. The eastbound dry, bituminous roadway is straight and approximately 61 m (200 ft) from the north/east corner the westbound roadway has a -16% downhill grade. All other roadways leading to the intersection were dry, bituminous, straight and level surfaces. The four corners of the intersection are bordered at the edges by 16.5 cm (6.5 in) high concrete curbs. The intersection is controlled by standard diamond shaped stop signs at all four corners and a flashing red colored traffic light hangs over the middle of the intersection that is visible to all travel lanes. There were no reported roadway defects or visual obstructions. The weather was overcast and the street was dark but lighted. The speed limit for all roadways leading to the intersection is 48 km/h (30 mph).

Figure 1. Downhill grade leading to impact areas

Pre-Crash

The case vehicle was a 2003 Toyota Corolla S four door sedan (VIN: 2T1BR32E43Cxxxxxx) driven

by a lap and shoulder belt restrained 18-year-old male (unknown height and weight). The police report indicates that there were seven additional occupants in the vehicle. The front right seat was occupied by a restrained 15-male (height and weight unknown). The rear left seat was occupied by an unrestrained 15-year-old male (height and weight unknown). The rear middle seat was occupied by an unrestrained 16-year-old female (height and weight unknown). The rear right seat was occupied by an unrestrained 15-year-old male (height and weight unknown). The remaining three occupants left the scene of the crash before the police arrived at the scene. The driver reported that two were females and a male. Their position in the vehicle was not indicated on the police report. It is presumed that these three occupants were seated in the rear seat of the vehicle, possibly on the laps of the other three seated occupants.

The case vehicle was traveling eastbound at a driver reported 97-113 km/h (60-70 mph). The vehicle was traveling downhill and approaching the intersection. The driver reported that he was talking to his friends in the vehicle and that the windows were fogged up and he did not have clear visibility. As the vehicle approached the intersection, the driver saw the red flashing lights for the four-way stop sign at the intersection.

Crash

Impacts 1 and 2:
The driver tried to stop the vehicle by braking. The brakes locked up and the vehicle began skidding down the hill towards the intersection. There was a non-contact vehicle that was traveling southbound and had stopped at the intersection. This non-contact vehicle accelerated and was attempting to cross through the intersection. The driver saw the non-contact vehicle in the intersection and released pressure on the break pedal and tried to steer around the other vehicle. The driver of the contact vehicle saw the case vehicle coming straight at him and he accelerated through the intersection.

Figure 2. Impacts 1 and 2 with concrete curbs

The driver of the case vehicle lost control of his vehicle and ran off the roadway at the south-east corner of the intersection.

The front right (12FRWN3) and rear right (12FRWN9) tire rims were damaged by impacts with the 16.5 cm (6.5 in) high concrete curbs.

Impact 3:
The case vehicle continued moving forward in a southeast direction off the roadway away from the southeast corner. The front right corner (12FREE5) of the case vehicle crashed into a steel power transfer box, knocking the power box forward several feet of its concrete base. The case vehicle sustained a maximum crush of 34.2 cm (13.5 in) at C6. The total velocity change as

calculated by the barrier algorithm of the WinSmash reconstruction program was 16.0 km/h (9.9 mph). The longitudinal and lateral delta V components were -16.0 km/h (-9.9 mph) and 0.0 km/h (0.0 mph), respectively. This is a borderline reconstruction given that the steel power box was a yielding object. The driver's and front right passenger's air bag deployed in the case vehicle at this time, and the seat belt pretensioners in both front seats actuated.

Impact 4:
After impact with the power box, the case vehicle rotated clockwise and continued moving forward. The left rear door and rear panel struck (12LZES1) a high voltage wooden power pole and power lines that were sheathed in a plastic tube running up along side the power pole. The case vehicle sustained a maximum crush of 3.0 cm (1.2 in) at C4.

The case vehicle was redirected to clockwise and continued moving forward. The case vehicle came to final rest on all four wheels heading east, several feet east of impact 4 with the high voltage power pole. Electrical power in the area was interrupted for more than two hours.

Post-Crash

All occupants exited the case vehicle presumably under their own power. The driver complained of stomach discomfort. The driver's seat back was found deformed. As the seat belt pretensioner in the driver's seat belt actuated, the seat back was pushed forward tightening around the stomach of the driver. The front right occupant complained of being dizzy. The rear left

Figure 3. Impact with power box and final rest

Figure 4. Damaged power transfer box

Figure 5. Damage to pole and electrical cabling

occupant did not report any injuries. The rear middle sustained scratches/lacerations to her arms and legs (unknown source). The rear right occupant sustained a bump on his head, which was possibly as a result of occupant to occupant contact. There was no indication on the police report as to whether any of the remaining occupants sustained any injuries. As indicated earlier, they left the scene of the crash prior to the police arrival. The police report did not indicate whether rescue personnel were called to the scene, nor that any of the injured occupants in the case vehicle were transported to a hospital for medical treatment.

Figure 6. Final rest area

The case vehicle sustained major damage to its front end. The front right tire was displaced rearward and restricted by the vehicle frame. It was towed from the scene due to damage, and later declared a total loss by the insurance company. It was subsequently sold at a salvage vehicle auction.

VEHICLE DATA - 2003 Toyota Corolla

The case vehicle was a 2003 Toyota Corolla S four-door sedan. The vehicle was equipped with an all-aluminum 1.8 liter DOHC 16-valve 4-cylinder 130 hp engine, 4-speed automatic electronically controlled transmission, front wheel drive, air conditioning, power steering, a tilt steering wheel with an energy absorbing steering column, daytime running lights, internal trunk release, and power assisted ventilated front disc/rear drum brakes.

VIN:	2T1BR32E43Cxxxxxxx
Odometer:	Unknown, electronic display
Reported Defects:	None noted
Cargo:	None at time of vehicle inspection

The 2003 Toyota Corolla S was equipped with Toyo Proxes FZ4 P215/40R17 tires with alloy rims. The vehicle manufacturer's recommended tire pressure is not known. The specific tire data is as follows:

Tire	Measured Pressure	Maximum Tire Manufacturer Pressure	Measured Tread Depth	Damage	Restricted
LF	Flat	276 kPa (40 psi)	7 mm (9/32 in)	Flat	No
LR	Flat	276 kPa (40 psi)	8 mm (10/32 in)	Flat	No
RR	Flat	276 kPa (40 psi)	8 mm (10/32 in)	Cracked tire rim, flat	No
RF	Flat	276 kPa (40 psi)	7 mm (9/32 in)	Cut tire and cracked rim, flat	Yes

The 2003 Toyota Corolla S was configured for five occupants (2-3). The front seating positions were configured with fabric covered bucket seats. The driver's seat was adjusted to between the middle and rear most seat track position with an adjustable head restraints. The head restraint had been removed for an unknown reason and was found in the rear floor area of the vehicle. The driver's seat back had been deformed due to loading from the rear occupant on impact. The front right passenger's seat was adjusted to the rear most seat track position and the adjustable head restraint was in the full down position. The rear seating positions were configured with a fabric covered splint bench seat with a 60/40 folding back and adjustable head restraints for the outboard positions. Both rear head restraints had been removed to allow removal of stereo equipment in the rear trunk.

VEHICLE DAMAGE

Exterior Damage - 2003 Toyota Corolla

Damage Description:	Major damage to front right bumper corner, and front fender. The front bumper fascia cover was off the vehicle. The front right tire was pushed rearward into the vehicle frame. The right wheelbase was shortened 13.3 cm (5.2 in). The front hood, and grille areas also sustained damage. There was damage to the left rear door that extended rearward.	
CDC:	Impact 1: 12FRWN3 (Concrete curb) Impact 2: 12FRWN9 (Concrete curb) Impact 3: 12FREE5 (Steel power transfer box) Impact 4: 12LZES1 (High Voltage Power pole/power lines)	
Delta V (Impact 3)[1]:	Total	16.0 km/h (9.9 mph)
	Longitudinal	-16.0 km/h (-9.9 mph)
	Latitudinal	0.0 km/h (0.0 mph)
	Energy	19,057 joules (14,056 ft-lbs)

Direct and induced damage from Impact 3 (Steel power transfer box) began at the front right bumper corner. It measured 113.0 cm (44.5 in) and extended laterally to the left. The bumper fascia had been removed prior to the vehicle inspection. Two sets of crush measurements were taken. One at the front bumper backing bar and the second above the bumper. These two sets of crush measurements were averaged and the resultant crush is as follows: C1= 6.8 cm (2.7 in), C2= 0.0 cm (0.0 in), C3=7.6 cm (3.0 in), C4=10.5 cm (4.1 in), C5=12.2 cm (4.8 in), C6=34.2 cm (13.5 in).

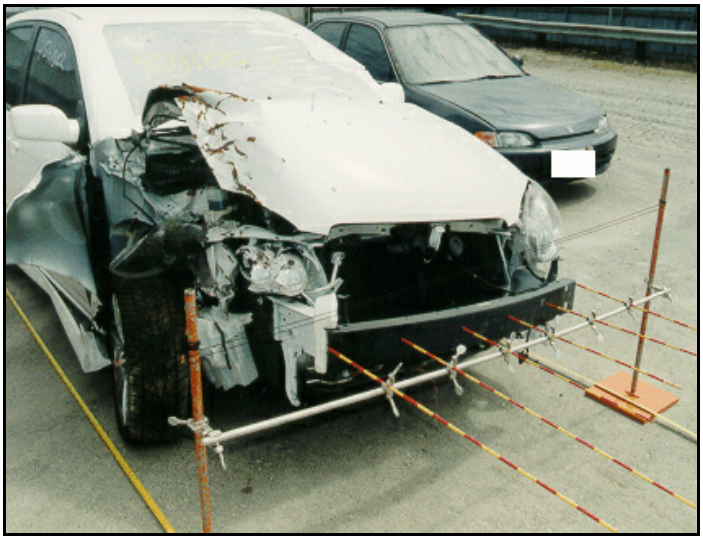

Figure 7. Front exterior damage to case vehicle

[1]WinSmash results provided for information only. Collision was with a yielding object which is out of scope forWinSmash

Direct and induced damage from Impact 4 (Power pole/power lines) began 14.0 cm (5.5 in) rearward of the rear left axle. It measured 111.0 cm (43.7 in) and extended rearward. Six crush measurements were taken at the mid-door level and measured: C1= 0.0 cm (0.0 in), C2= 1.5 cm (0.6 in), C3=1.0 cm (0.4 in), C4=3.0 cm (1.2 in), C5=2.8 cm (1.1 in), C6=0.0 cm (0.0 in).

Figure 8. Left rear damage to case vehicle

Interior Damage - 2003 Toyota Corolla

There was no interior damage to the Toyota Corolla due to the impact forces and there was no intrusion to the passenger compartment area. The windshield sustained fracture damage from the deployment of the front right passenger's air bag. The rear left door's glazing was disintegrated on impact with the power pole. The glazing however, remained in place as a result of the after market tinting (plastic tinted sheet). The driver's seat back was deformed forward from rear occupant loading on impact. Both front seat belt pretensioners actuated and displaced the retractor covers on the B pillars. The glove box had been removed prior to the vehicle inspection and it was clear that this was done to facilitate the removal of stereo equipment and not due to impact forces. Both rear seat head restraints were also removed to facilitate removal of stereo equipment. The driver's adjustable head restraint was removed for unknown reasons.

AOPS SAFETY SYSTEMS DISCUSSION - 2003 Toyota Corolla

Restraint Systems

The case vehicle was configured with manual restraint systems at all five seating positions which consisted of a continuous 3-point lap and shoulder safety belts with sliding latch plates. Both front belts restraints were equipped with pretensioners and force limiters, in addition to adjustable shoulder belt anchorages. Both front adjustable shoulder belt anchorages were adjusted to the full up position. The driver's manual restraint was configured with an emergency locking retractor (ELR) located in the B-pillar. The front right seat and all three rear seat positions were equipped with switchable emergency/automatic locking retractors (ELR/ALS). Both front seat belt pretensioners actuated as a result of the impact with the steel power box (impact 3). Both the driver's and front right passenger's lap and shoulder safety seat belts were locked in the extended positions.

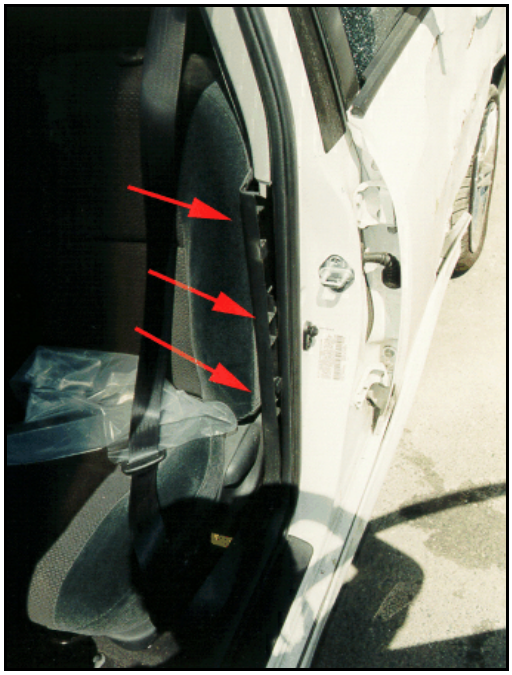

Figure 9. Driver's seat belt actuated pretensioner and retractor displaced

The two rear outboard seat positions were equipped with Lower Anchors and Tethers for Children (LATCH).

Frontal Air Bag System

The case vehicle was also equipped with multi-stage driver and front right passenger air bags. The driver's air bag has a three-stage deployment sequence based on impact severity and the position of the driver's seat. A seat position sensor judges the size of the occupant based on the seat position. The driver's air bag will deploy at a faster rate (high stage) or slower rate (low stage) for medium and large size occupants, depending on impact severity. The driver's air bag will deploy at low stage, or extra-low stage for smaller occupants, depending on impact severity. Based on the known seat track position (between middle and rear most position), the air bag should have deployed at a low to high stage with the latter being the most likely.

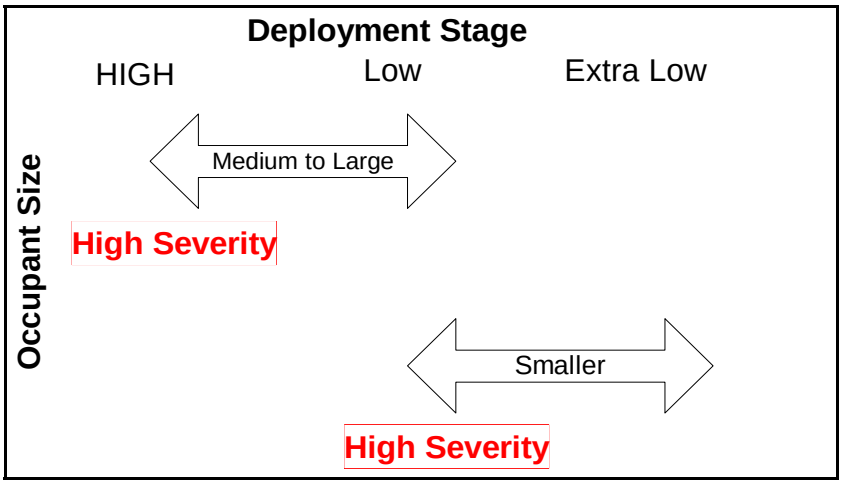

Figure 10. Driver's air bag deployment logic

Both front air bags deployed as a result of impact with the steel power box. The circular driver's front air bag was mounted in the steering wheel hub and measured 52.0 cm (20.5 in) in diameter in its post deflated state. The air bag had a maximum excursion of 26.0 cm (10.2 in). There was no evidence of driver contact, but there was what appeared to be light grease about the front face and back of the air bag fabric. The air bag was equipped with two vents ports–located at the 11 and 1 o'clock positions-- and two tethers sewn to the face of the air bag. The driver's module cover flap consisted of an inverted, triangular, curvilinear-shaped cover that contained three asymmetrical flaps. The top and largest flap was somewhat semicircular in design while the left and right lower flaps were obliquely oriented. The top flap measured 15.0 cm (5.9 in) horizontally and 9.0 cm (3.5 in) vertically. The two lower flaps were mirror imaged and each measured 9.0 cm (3.5 in) diagonally. The inspection of the air bag's module cover flaps revealed that the cover flaps opened at the designed tear points and there was no damage to the covers. There was no steering wheel rim deformation.

Figure 11. Driver's deployed air bag

Figure 12. FR occupant's deployed air bag

The front right passenger's air bag was a top-mount design located in the right aspect of the instrument panel. The deployed air bag was rectangular and measured 42.0 cm (16.5 in) in width and 45.0 cm (17.7 in) in height. The air bag had a maximum air bag excursion of 49.0 cm (19.3 cm). The air bag was not tethered and was vented by two circular ports that were located at the 10 and 2 o'clock positions. There were two symmetrical "H" configuration, modular cover flaps. The cover flaps both measured 20.0 cm (7.9 in) wide by 6.0 cm (2.4 in) high. Inspection of the cover module flaps and the air bag revealed no occupant contacts to either the cover flaps nor the air bag. There was also no damage to the cover flaps nor the air bag. The deployment of the front right air bag cracked the windshield.

OCCUPANT DEMOGRAPHICS - 2003 Toyota Corolla

	Driver	Occupant 2
Age/Sex:	18/Male	15/Male
Seated Position:	Front left	Front right
Seat Type:	Fabric covered bucket seat. Seat adjusted to between middle and rear most track position. Seat back was deformed.	Fabric covered bucket seat. Seat adjusted to rear most track position. Seat back slightly reclined 84 degrees from horizontal
Height:	Height unknown	Height unknown
Weight:	Weight unknown	Weight unknown
Occupation:	Unknown	Unknown
Pre-existing Medical Condition:	Unknown	Unknown
Alcohol/Drug Involvement:	None	N/A
Driving Experience:	Presumed < 3 years	N/A
Body Posture:	Presumed normal, upright	Presume normal, upright
Hand Position:	Both hands on wheel	Unknown
Foot Position:	Right foot on either brake or accelerator pedal, left on floorboard	Unknown
Restraint Usage:	Lap and shoulder belt, used. Pretensioner actuated.	Lap and shoulder belt, used. Pretensioner actuated.
Air bag:	Steering wheel mounted air bag, deployed	Top-mount front right passenger’s air bag, deployed

OCCUPANT DEMOGRAPHICS - 2003 Toyota Corolla

	Occupant 3	Occupant 4
Age/Sex:	15/Male	16/Female
Seated Position:	Rear left	Rear middle
Seat Type:	Fabric covered bench seat with 60/40 folding back	Fabric covered bench seat with 60/40 folding back
Height:	Unknown	Unknown
Weight:	Unknown	Unknown
Occupation:	Presumed student	Presumed student
Pre-existing Medical Condition:	Unknown	Unknown
Alcohol/Drug Involvement:	N/A	NA
Driving Experience:	N/A	NA
Body Posture:	Unknown due to five occupants in rear seat	Unknown due to five occupants in rear seat
Hand Position:	Unknown	Unknown
Foot Position:	Unknown	Unknown
Restraint Usage:	Lap and shoulder belt available, not used.	Lap and shoulder belt available. Not used.
Air bag:	None available	None available

OCCUPANT DEMOGRAPHICS - 2003 Toyota Corolla

	Occupant 5	Occupant 6
Age/Sex:	15/Male	Unknown/Female
Seated Position:	Rear right	Rear seat, specifics unknown
Seat Type:	Fabric covered bench seat with 60/40 folding back	Fabric covered bench seat with 60/40 folding back
Height:	Unknown	Unknown
Weight:	Unknown	Unknown
Occupation:	Presumed student	Presumed student
Pre-existing Medical Condition:	Unknown	Unknown
Alcohol/Drug Involvement:	N/A	N/A
Driving Experience:	N/A	NA
Body Posture:	Unknown	Unknown
Hand Position:	Unknown	Unknown
Foot Position:	Unknown	Unknown
Restraint Usage:	Lap and shoulder belt available, not used.	Lap and shoulder belt available, not used.
Air bag:	None available	None available

OCCUPANT DEMOGRAPHICS - 2003 Toyota Corolla

	Occupant 7	Occupant 8
Age/Sex:	Unknown/Female	Unknown/Male
Seated Position:	Rear seat, specifics unknown	Rear seat, specifics unknown
Seat Type:	Fabric covered bench seat with 60/40 folding back.	Fabric covered bench seat with 60/40 folding back
Height:	Unknown	Unknown
Weight:	Unknown	Unknown
Occupation:	Unknown	Unknown
Pre-existing Medical Condition:	Unknown	Unknown
Alcohol/Drug Involvement:	N/A	N/A
Driving Experience:	N/A	N/A
Body Posture:	Unknown	Unknown
Hand Position:	Unknown	Unknown
Foot Position:	Unknown	Unknown
Restraint Usage:	Lap and shoulder belt available, not used	Lap and shoulder belt available, not used.
Air bag:	None available	None available

OCCUPANT INJURIES - 2003 Toyota Corolla

All injury data was obtained from the police report.

	Injury	OIC Code	Injury Mechanism	Confidence Level
Driver:	Complaint of stomach discomfort. Not codeable injury			
Front Right Occupant (2):	Complained of dizziness. Result not codeable injury			
Left Rear Occupant (3):	No reported injuries			
Middle Rear Occupant (4):	Bilateral lacerations to arms and legs.	790600.1,3 890600.1,3	Unknown Unknown	Unknown Unknown
Right Rear Occupant (5)	Bump/contusion to head	190402.1,9	Unknown	Unknown
Occupant (6)	No reported injuries			
Occupant (7)	No reported injuries			
Occupant (8)	No reported injuries			

OCCUPANT KINEMATICS - 2003 Toyota Corolla

The 18-year-old male driver of the case vehicle was seated in a normal, upright fashion in a fabric covered bucket seat. The seat was found adjusted to between the middle and rear most seat track position. The seat back was deformed forward presumably due to the rear left occupant loading during the collision. The driver was using the available lap and shoulder belt. The shoulder belt anchorage was adjusted to the full up position. Prior to impact, the case vehicle had been involved in an evasive maneuver. Both hands were on the steering wheel actively involved in efforts to steer to the right away from a non-contact vehicle. The right foot was initially on the brake, and then on the accelerator. The left foot was on the floorboard. Impacts 1 and 2 with the concrete curb, probably had little effect on the driver's kinematic due to the lap and shoulder belt and his likely bracing on the steering wheel. On impact (3) with the steel power transfer box, the driver's air bag deployed and the driver's seat belt pretensioner actuated. The driver responded to the 12 o'clock direction of force moving forward and slightly to the right. The lap and shoulder safety seat belt kept him in place. He likely contacted the deploying driver's air bag even though there was no evidence of contact. No injuries resulted from contact with the air bag. He complained of stomach discomfort and this was likely the result of loading on the driver's seat back from the rear left occupant (s). The driver's seat back was deformed forward. As the driver's seat belt pretensioner actuated, the rear left occupant was loading and pushing the driver's seat back forward. This caused the driver's lap belt to tighten even more on the driver's stomach while pushing him slightly forward. The case vehicle then rotated slightly in a clockwise direction and continued moving forward before striking (impact 4) a high voltage power pole and power lines. This impact probably had little effect on the driver's kinematics.

The 15-year-old male front right occupant of the case vehicle was seated in a presumed normal, upright fashion in a fabric covered bucket seat. The seat was found adjusted to the rear most track position. The seat back was slightly reclined to 84 degrees from vertical. The front right occupant was using the available lap and shoulder safety seat belt. The shoulder belt anchorage was adjusted to the full up position. Impacts 1 and 2 with the concrete curb, probably had little effect on the front right occupant's kinematic due to the lap and shoulder belt. On impact (3) with the steel power transfer box, the front right passenger's air bag deployed and the seat belt pretensioner actuated. The front right occupant responded to the 12 o'clock direction of force moving forward and slightly to the right. The lap and shoulder safety seat belt kept him in place. He likely contacted the deploying driver's air bag even though there was no evidence of contact. No injuries resulted from contact with the air bag, but he did complain of dizziness. The case vehicle then rotated slightly in a clockwise direction and continued moving forward before striking (impact 4) a high

Figure 13. FR occupant's actuated pretensioner and retractor cover displaced

voltage power pole and power lines. This impact probably had little effect on the front right occupant's kinematics.

Figure 14. Rear seat area

There were three additional occupants in the rear seat as reported by the police. Additionally, there were three other occupants that left the scene prior to the arrival of the police. It is presumed that these three occupants were likely seated in the rear seat, possibly on the laps of the other occupants. The rear seat is a fabric covered bench seat with a 60/40 split folding seat back. There were lap and shoulder safety seat belts with sliding latch plates available to all three seat positions. While there was evidence of historical usage, there no evidence of loading which indicated that none of the rear occupants were using the lap and shoulder belts. Impacts 1 and 2 with the concrete curb, probably had little effect on any of the rear seat occupant's kinematic. On impact (3) with the steel power transfer box, the rear left occupant (s) responded to the 12 o'clock direction of force moving forward and slightly to the right. The rear left occupant (s) loaded and deformed the driver's seat back. The case vehicle then rotated slightly in a clockwise direction and continued moving forward before striking (impact 4) a high voltage power pole and power lines. This impact probably had little effect on the rear seat occupant's kinematics. Occupant (4) rear middle sustained scratches/lacerations to her arms and legs. The source of these injuries is not known. Occupant (5) rear right reported a bump/contusion to his head, possibly as a result of occupant to occupant contact.

There was no indication on the police report as to whether any of the unreported occupants sustained any injuries. As indicated earlier, they left the scene of the crash prior to the police arrival. The police report did not indicate whether rescue personnel were called to the scene, nor that any of the injured occupants in the case vehicle were transported to a hospital for medical treatment.

Attachment 1. Scene Diagram