CRASH DATA RESEARCH CENTER

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CALSPAN ON-SITE CHILD SAFETY SEAT CRASH INVESTIGATION

CASE NO: CA04-038

VEHICLE: 1998 CHRYSLER SEBRING CONVERTIBLE

LOCATION: MARYLAND

CRASH DATE: SEPTEMBER 2004

Contract No. DTNH22-01-C-17002

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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 are 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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BACKGROUND

This on-site crash investigation focused on the installation and performance of a forward facing child safety seat (CSS) that was installed in the rear left position of a 1998 Chrysler Sebring convertible **(Figure 1)**. The Chrysler was involved in an intersection crash with a 1998 Chevrolet C1500 series pickup truck. The impact deployed the redesigned frontal air bags in both vehicles. The Chrysler was deflected to its right and traversed the mouth of the intersection where it struck the left side of a stopped Jeep Wrangler. The 34-year old male driver of the Chrysler was restrained by the integrated 3-point lap and shoulder belt system. His 4-year old daughter was positioned in a Cosco Ventura forward-facing CSS and restrained by the integrated five-point harness system. The CSS was secured to the vehicle by the 3-point lap and shoulder belt system with taut tension applied by the lightweight locking latch plate. Immediately following the crash, the driver removed the child from the CSS and waited at the crash site for emergency personnel to arrive on-scene. Both the driver and child passenger of the Sebring were transported by ambulance to a local hospital where they were treated for minor severity soft-tissue injuries and released. The Chrysler and the Chevrolet sustained disabling damage and were towed from the crash site. The Jeep sustained wheel damage and was also towed from the scene.

Figure 1. 1998 Chrysler Sebring convertible

The Crash Investigation Division of the National Highway Traffic Safety Administration (NHTSA) provided notification of the crash to the Calspan Special Crash Investigations team on September 2, 2004 and assigned the crash for on-site investigation. The towed location of the vehicle was confirmed and an on-site investigation was conducted on September 3, 2004. In addition, to the vehicle and scene inspections, the driver of the Chrysler was interviewed and the child was repositioned in the CSS to confirm the adjusted position of the integral harness straps.

SUMMARY

Crash Site

Figure 2. Westbound view of the crash site

The crash occurred during daylight hours at a rural three-leg intersection. The crash site consisted of a two-lane east/west roadway that was 6.4 m (21') in width and was intersected by a north/southbound two-lane roadway that formed a Y-intersection **(Figure 2)**. The roadways were surfaced with asphalt and were dry at the time of the crash. No defects were present in the road surfaces. The east/west roadway curved left for westbound traffic flow and was bordered by narrow stone shoulders. The radius of curvature was measured at 666.8 m (2,188'). Traffic flow in east/west travel directions was uncontrolled. The east and west bound travel lanes were delineated by a double yellow centerline which terminated at the mouth of the intersection. The road edges were marked with solid white edge lines. The posted speed limit was 80 km/h (50 mph). The intersecting roadway was 6.7 m (22') in width and consisted of two-lanes for the north/south travel directions. Northbound traffic entering the intersection was regulated by a stop sign. The roadway was marked with a solid white stop line, double yellow centerlines, and solid white edge lines. Stone shoulders bordered the travel lanes. The posted speed limit on this roadway was 80 km/h (50 mph). The crash scene schematic is included as **Figure 14** of this report.

Vehicle Data

1998 Chrysler Sebring Convertible

The subject vehicle in this crash was a 1998 Chrysler Sebring convertible. The vehicle was manufactured in 6/98 and was identified by Vehicle Identification Number (VIN): 3C3EL55H9WT (production number deleted). The Chrysler was powered by a transverse mounted 2.5 liter V-6 gasoline engine that was linked to a 4-speed automatic transmission with the "auto-stick" feature and a console mounted shifter. The front-wheel drive convertible was also equipped with 4-wheel disc brakes with anti-lock (ABS). The placarded Gross Vehicle Weight Rating (GVWR) was 1,914 kg (4,219 lb) with a front and rear split of 1,081 kg (2,382 lb) and 856 kg (1,887 lb) respectively. The Sebring was equipped with OEM five-spoke alloy wheels and Michelin XGT 4 P215/55R15 radial tires. The manufacturer's recommended cold tire pressure was 206 kPa (30.0 PSI). The specific tire data for each wheel position is identified in the following table:

Position	Measured Tire Pressure	Measured Tread Depth	Damage
LF	216 kPa (31.5 PSI)	6 mm (8/32”)	Alloy wheel gouge at outer bead
LR	219 kPa (32.0 PSI)	5 mm (6/32”)	Superficial abrasions to face of alloy wheel
RF	0 kPa	6 mm (7/32”)	Asphalt abrasions to outer bead of wheel, tire de-beaded
RR	230 kPa (33.5 PSI)	6 mm (7/32”)	None

The interior of the Chrysler Sebring was configured with leather trimmed front bucket seats and a two-passenger rear bench seat. The front seated positions were equipped with adjustable head restraints. The left side was adjusted 7 cm (2.875”) above the seat back while the right side was adjusted to the full down position. Power equipment included windows, door locks, outside rear view mirrors, and an eight-way adjustable driver’s seat. The tilt steering wheel was found adjusted to the full-up position. It should be noted that the vehicle was operated with the top in the stowed/retracted position at the time of the crash.

1998 Chevrolet C1500 Pickup Truck

The striking vehicle in this crash was a 1998 Chevrolet C1500 series pickup truck. The vehicle was configured with the 299 cm (117.7”) wheelbase and the style-side short pickup box. The vehicle was locked at the time of the SCI inspection; therefore, the door/B-pillar mounted manufacturer’s identification was not accessible. This precluded the investigator from obtaining the Date of Manufacturer, recommended tire pressure, and the Event Data Recorder (EDR) download. At the time of the inspection, the vehicle’s odometer reading was 173,318 km (107,698 miles). The pickup truck was equipped with a 4.3 liter V-6 gasoline engine linked to a four-speed automatic transmission with a column mounted shifter. Standard equipment included power-assisted steering and power front disc/rear drum brakes with four-wheel anti-lock (ABS). The pickup truck was equipped with Cornell 535, P235/75R15 radial tires at all positions. The tires were mounted on OEM steel chrome wheels. The specific tire data for each wheel is identified in the following table:

Position	Measured Tire Pressure	Measured Tread Depth	Damage
LF	192 kPa (28.0 PSI)	3 mm (4/32”)	None
LR	189 kPa (27.5 PSI)	5 mm (6/32”)	None
RF	185 kPa (27.0 PSI)	3 mm (4/32”)	None
RR	189 kPa (27.5 PSI)	4 mm (5/32”)	None

The interior of the pickup truck was equipped with a vinyl, three-passenger bench seat. The outboard positions were equipped with adjustable head restraints. Both were

adjusted to the full down position at the time of the SCI inspection. The outboard positions were equipped with manual three-point lap and shoulder belts while the center position was equipped with a lap belt. The Chevrolet pickup truck was also equipped with redesigned frontal air bags for the driver and front right passenger positions. The air bags deployed as a result of the initial impact with the Sebring.

1997 Jeep Wrangler

The Jeep Wrangler was towed from the scene, but released prior to case assignment and was not inspected for this SCI investigation. The Police Accident Report (PAR) was not available at the time of this on-site SCI investigation; therefore, the owner and location of the Jeep was unknown. The PAR reported the Wrangler as having the flowing VIN: 1J4FY49S4VP (production number deleted). The VIN denoted the vehicle as a four-wheel drive Sahara model that was powered by a 4.0-liter in-line six-cylinder engine.

Crash Sequence

Pre-Crash

The driver of the 1998 Chrysler Sebring convertible was traveling in a westerly direction on the two-lane road at a driver estimated speed of 72 km/h (45 mph). The convertible top was in the down (retracted) position. The driver's 4-year old daughter was restrained in the rear left position of the Sebring in a forward facing child safety seat. The driver was restrained by the integrated 3-point lap and shoulder belt system. As he approached the four-leg intersection, the driver of the Sebring observed the eastbound 1998 Chevrolet pickup truck. The Sebring driver lifted his foot off the accelerator pedal as he proceeded into the intersection, continuing in a westerly direction while negotiating the left curve.

The driver of the Chevrolet pickup truck was traveling in an easterly direction. As he approached the intersection, he either failed to detect the Chrysler or misjudged its position on the roadway and initiated a left turn across the Sebring's path of travel. The driver of the Sebring steered right and applied a heavy braking force to the ABS equipped vehicle in an attempt to avoid the crash. The driver of the Chevrolet did not initiate avoidance maneuvers. There was no pre-crash physical evidence at the crash site.

A third vehicle, a 1997 Jeep Wrangler was traveling in a southerly direction on the intersecting roadway and stopped at the mouth of the intersection for the regulatory stop sign. This vehicle was facing in a southerly direction with its left side exposed to the travel path of the Chrysler Sebring.

Crash

The full frontal area of the Chevrolet pickup truck impacted the left front side area of the Sebring in an L-configuration impact. **Figure 3** is a view of the intersection at the location of the crash. The resultant directions of force were 1 o'clock for the Chevrolet and 11 o'clock for the struck Sebring. The initial contact involved the center frontal area of the pickup truck

Figure 3. Area of impact at the intersection.

against the left side surface of the front bumper fascia of the Sebring. The license plate frame of the Chevrolet transferred onto the corner aspect of the bumper fascia. The right aspect of the trucks bumper engaged the left front tire and wheel of the Sebring. The crush to the Sebring was minimal as the impact forces were distributed through the body, bumper, and left front suspension. A damage (with CDC only) algorithm of the WinSMASH program computed total velocity changes of 25 km/h (15.5 mph) for the Chrysler and 22 km/h (13.7 mph) for the Chevrolet. The specific longitudinal and lateral components were -22 km/h (-8.7 mph) and 13 km/h (5.1 mph) for the Sebring and -21 km/h (-13.1 mph) and -8 km/h (-5.0 mph) for the pickup. As a result of the initial impact, the redesigned frontal air bags in both vehicles deployed.

The Sebring was deflected laterally to its right as it continued on a forward trajectory. The deformed right corner area of the pickup truck contacted the left side surface of the Sebring as the Sebring traveled past the position of the pickup truck. The protruding right bumper corner of the pickup truck engaged the lower surface of the left door while the right hood edge of the truck contacted and tore the top surface of the left quarter panel at the area aft of the B-pillar. This secondary impact resulted in force directions of 12 o'clock for the Sebring and 3 o'clock for the pickup truck.

The Sebring continued forward as it separated from the pickup truck and impacted the left front tire and wheel of the stopped Jeep Wrangler. The front left corner area of the Sebring's bumper fascia impacted the alloy wheel of the Jeep. The circular lugholes of the wheel were imprinted onto the white bumper fascia of the Sebring. The impact deformed the Sebring's bumper beam to a measured depth of 4 cm (1.5") at the left corner. The resultant directions of force for this impact were 12 o'clock for the Sebring and 9 o'clock for the struck Jeep. A missing vehicle damage algorithm of the WinSMASH program computed total velocity changes of 15 km/h (9.3 mph) for the Chrysler and 15 km/h (9.3 mph) for the Jeep. The specific longitudinal and lateral components were -15 km/h (-9.3 mph) and 0 km/h for the Sebring and 0 km/h and -15 km/h (-9.3 mph) for the Jeep. These results appear to be high given the minor damage to the front of the Sebring.

Post-Crash

Immediately following the crash, the driver of the Chrysler Sebring unbuckled his safety belt and exited the vehicle through the left door. He moved the seat back forward and unbuckled the 4-year old from the forward facing CSS. The driver held the child and waited for emergency personnel to arrive on-scene. The driver and child were transported by ambulance to a local hospital where they were treated for minor severity soft tissue injuries and released. All three vehicles sustained disabling damage and were towed from the scene.

Vehicle Damage

Exterior – 1998 Chrysler Sebring

The exterior of the Chrysler Sebring sustained moderate severity damage as a result of the initial impact and the subsequent left side engagement by the frontal area of the

Chevrolet pickup truck. Additional minor severity damage resulted to the front left area of the bumper fascia from a third impact sequence with the stopped 1997 Jeep Cherokee.

The initial impact was located on the left front corner area of the Sebring **(Figure 4)**. The black center mounted license plate frame of the Chevrolet pickup truck transferred onto the side aspect of the front bumper fascia of the Sebring. This contact began 39 cm (15.25") forward of the left front axle and extended 44 cm (17.25") forward to the corner area of the fascia. This impact compressed the side surface of the bumper fascia, but did not result in residual crush to this location. As the side surface of the fascia compressed, the front bumper of the pickup truck engaged the left front tire and wheel assembly of the Sebring. This contact altered the camber of the axle position and probably resulted in transaxle/constant velocity joint damage as the wheel assembly was compressed laterally into the driveline components. The aftermarket air/bug deflector that was mounted to the hood face of the pickup truck engaged the upper surface of the left front fender, crushing the upper surface of the fender to a maximum depth of 5.1 cm (2.0"). Horizontal transfers for the hood edge were present on the fender of the Sebring. The combined direct contact damage of the left front fender began 83 cm (32.5") forward of the left front axle position and extended 131 cm (51.6") rearward to the left A-pillar which involved the full length of the fender **(Figure 5)**. The crush of the pickup front bumper and the compliant left side surface of the Sebring resulted in the hood of the truck contacting the top surface of the Sebring's hood. A black paint transfer extended 12 cm (4.625") laterally onto the rear third of the Chrysler's hood. Due to the various components involved in this initial contact sequence, a crush profile was not documented. The Collision Deformation Classification (CDC) for this event was 11-LFEW-2.

Figure 4. Initial impact damage to the left front fender area.

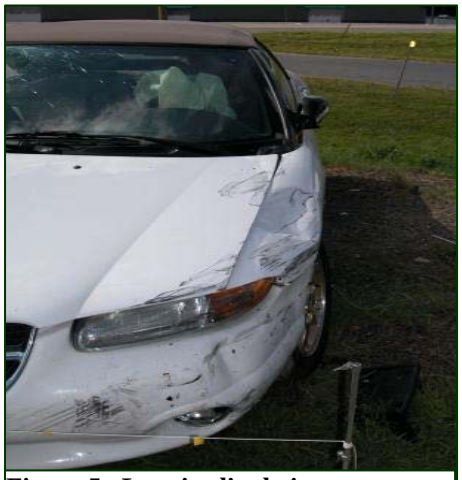

Figure 5. Longitudinal view documenting the leteral extent of crush.

As a result of the initial contact, the Sebring was deflected slightly to its right as it continued forward across the mouth of the intersection. The Sebring remained engaged against the front of the Chevrolet pickup truck resulting in direct contact damage that began at the left A-pillar and extended 329 cm (129.5") to the rear bumper corner. Although this damage was continuous along the left side of the Sebring, there were

isolated areas of deformation and contact damage. The CDC for this secondary contact was 12-LZAS-2.

This secondary engagement resulted in the pickup truck's hood contacting the left outside rear view mirror and upper A-pillar of the Sebring. The deformed right corner area of the truck's front bumper contacted the lower aspect of the left front fender and the left door of the Sebring **(Figure 6)**. This area of damage began 58 cm (23.0") aft of the left front axle position and extended 196 cm (77.0") to the forward edge of the left rear wheel opening. The crush profile for this damage was as follows: C1 = 0 cm, C2 = 3 cm (1.125"), C3 = 1 cm (0.5"), C4 = 4 cm (1.625"), C5 = 2 cm (0.75"), C6 = 0 cm.

Figure 6. Right side damage from the secondary engagement.

The right corner of the truck's hood edge gouged the top surface of the left quarter panel aft of the door. This gouge penetrated the sheet metal at the aft aspect of the contact that was located 22-81 cm (8.6-31.75") forward of the left rear axle. The 27 cm (10.75") gouge was 1 cm (0.5") in width.

Two isolated dents were noted to the left quarter panel. The first dent was located 20-47 cm (7.75-18.5") forward of the rear axle and was 2 cm (0.75") in depth. The second dent was round in nature and measured 2 cm (0.75") in maximum depth, located 48-76 cm (19-29.75") aft of the referenced axle. Longitudinal transfers were noted to the compliant left side surface of the rear bumper fascia. These transfers terminated at the bumper corner as the vehicles separated.

As the Sebring traversed the intersection en route to final rest, the front left area impacted the stopped 1997 Jeep Wrangler. The direct contact damage began 12 cm (4.75") left of center on the bumper fascia and extended 58 cm (22.9') to the left bumper corner. Located within this contact damage that consisted of tire transfers, were four circular imprints from the lug nut holes of the Jeep's left front alloy wheel. The entire width of the front bumper beam of the Sebring was minimally displaced from this impact sequence with a maximum crush value of 4 cm (1.5") located at the left corner. The combined induce and direct contact damage width (Field L) was measured at 133 cm (52.25"). Six equidistant crush measurements documented along this profile was as follows: C1 = 4 cm (1.5"), C2 = 2 cm (0.9"), C3 = 1 cm (0.4"), C4 = 0 cm, C5 = 0 cm, C6 = 0 cm. The CDC for this third event was 12-FYLW-1.

The Chrysler Sebring was towed from the scene and was subsequently written as a total loss by the insurance company due to the multiple damage locations and the deployment of the redesigned frontal air bags.

Interior – 1998 Chrysler Sebring

The interior of the Chrysler Sebring was not damaged as a result of the crash. There were no visible occupant contact points and the energy absorbing steering column remained in its full pre-crash position. There was no intrusion of the passenger compartment. The only interior damage resulted from the deployment of the redesigned frontal air bag system. This is addressed in the *Air Bag* section of this report.

Exterior – 1998 Chevrolet C1500 Pickup Truck

The frontal area roof the Chevrolet pickup truck sustained moderate severity damage as a result of the initial engagement against the front left side area of the Chrysler Sebring. The direct contact damage began 43 cm (16.75") right of center and extended 131 cm (51.5") to the right. The damage bowed the full length of the front bumper and resulted in a combined direct and induced damage length of 173 cm (68.0") that extended from corner-to-corner. Maximum crush was 34.0 cm (13.4") located on the front bumper, located 20 cm (7.75") left of the vehicle's centerline. The crush profile at bumper level **(Figure 8)** was as follows: C1 = 28 cm (11.1"), C2 = 29 cm (11.4"), C3 = 33 cm (13.0"), C4 = 31 cm (12.1"), C5 = 18 cm (7.2"), C6 = 5 cm (2.0"). There was no reduction of the pickup truck's wheelbases. The CDC for this impact event was 01-FDEW-2.

Figure 7. Front right view of the frontal damage to the 1998 Chevrolet pickup truck.

Figure 8. Lateral view documenting the extent of frontal crush.

As the vehicles rotated in their respective directions, the deformed front right corner of the Chevrolet engaged the left side of the Sebring. The bumper corner creased the lower side panels of the Sebring while the protruding hood edge contacted the upper sheet metal of the Chrysler. The right corner of the truck's hood was torn from the engagement. There was no additional crush associated with this impact event. The CDC for this secondary engagement was 03-RFES-1.

Frontal Air Bag System – 1998 Chrysler Sebring

The Chrysler Sebring was equipped with redesigned frontal air bags for the driver and front right passenger positions that deployed as a result of the initial impact with the Chevrolet pickup truck. The system consisted of the driver's air bag module that was conventionally mounted within the steering wheel spokes, the top right instrument panel mounted passenger air bag, and a single point sensing and diagnostic/control module that

was mounted in the aft aspect of the center console. The system deployed as designed with no apparent defects. This Chrysler product was not equipped with an Event Data Recorder (EDR).

The driver's air bag was concealed by a single cover flap that measured 18 cm (7.125") wide at the top hinge point, 15 cm (5.75") wide at the bottom tear seam, 23 cm (9.125") in width at the mid point, and 15 cm (5.75") in height. At the time of inspection, the steering wheel rim was rotated 180 degrees. The driver air bag membrane measured 67 cm (26.5") in its deflated state and was tethered internally by two wide band tethers at the 12 and 6 o'clock positions. Each tether strap measured 12 cm (4.75") in width. The tethers were sewn to the face of the bag with a 17 cm (6.75") diameter stitch pattern. The membrane was vented by two 2.5 cm (1.0") diameter vent ports that were located at the backside of the bag at the 12 o'clock position, 10 cm (3.75") below the peripheral seam. There was no occupant contact evidence or damage to the driver air bag membrane.

The front right passenger air bag deployed from the top mount design from a single cover flap. The rectangular flap measured 36 cm (14") in width and 15 cm (6") in depth and was hinged at the forward aspect. The passenger air bag membrane measured 43 cm (17") in width at the top surface, 61 cm (24") in height, and 51 cm (20") in width at the bottom aspect of the bag face. The bag was not vented externally; however, it was tethered by a 26 cm (10.25") wide band sewn to the lower face of the bag. There was no occupant in the right front position at the time of the crash and no damage or driver evidence noted to the bag.

Safety Belt Systems – 1998 Chrysler Sebring

The driver and front right passenger positions were equipped with integrated manual 3-point lap and shoulder safety belts. Both belt systems were equipped with continuous loop webbing, light weight locking latch plates, Emergency Locking Retractors (ELR) with belt sensitive features, and rigid buckle stalks mounted to the inboard aspects of the seat frames. The driver's belt system yielded historical wear marks on the latch plate with slight edge wear on the webbing. There was no occupant load induced damage or evidence on the belt system. The front right seat was not occupied at the time of the crash. This belt system yielded similar routine wear to the driver's system.

The rear seat of the Sebring was configured as a two-passenger bench seat with a fixed seat back. The seat back was not equipped with head restraints. The width of the rear seat was reduced due to the mechanical retraction system for the convertible roof that was located at the lower C-pillar locations. Both rear seat positions were equipped with 3-point lap and shoulder safety belt systems that consisted of continuous loop webbing, light weight locking latch plates, ELR retractors with belt sensitive features, and fixed upper pivots at the top of the seat back. Both belt systems were utilized to restrain forward facing child safety seats. The belt systems yielded evidence of subtle historical usage at the latch plates; however, there was no crash loading evidence to the belt system components.

Child Safety Seats

Two forward facing child safety seats (CSS) were installed in the rear seat positions of the Chrysler Sebring and secured by the manual 3-point lap and shoulder belts systems **(Figure 9)**. A four-year old female was restrained in a Cosco Ventura CSS in the rear left position, while the rear right CSS was not occupied at the time of the crash.

Figure 9. Installed child safety seats in the rear of the Sebring.

The Cosco Ventura was identified by Model No. 22-2000-BNG and was manufactured on 11/21/03. The CSS was purchased new by the driver/parent of the child. This CSS could be used as a forward-facing CSS with the integral 5-point harness system or used without the harness as a belt positioning booster seat. The manufacturer recommendations for the forward-facing/5-point harness mode were for children between 9-18 kg (20-40 lb) in weight and 73-102 cm (29-40") in height. The belt positioning mode recommendations were 14-36 kg (30-80 lb) in weight and 74-132 cm (29-52") in height. The 4-tear old child who occupied the CSS at the time of the crash was 18 kg (39.5 lb) and 94 cm (37") in height. She was within the forward facing recommendations and was restrained by the 5-point harness system.

The CSS remained secured to the vehicle by the manual belt system at the time of the SCI inspection. The CSS was secured with the belt system routed through the proper belt path at the lower back aspect of the CSS shell and the belt tension was maintained by the light weight locking latch plate. Although he did not attend a designated checkpoint, he frequently checked and maintained proper tension of the belt system. The CSS was found secure in the left rear position with no lateral movement at the belt path. The CSS was installed on a folded cotton towel that the driver placed over the leather seat cushion.

Figure 10. Frontal view of the Cosco CSS.

Figure 11. Vehicle safety belt loading at the right belt path of the CSS.

The CSS shell was constructed of a molded plastic with a single belt path in the back lower aspect of the shell. This belt path was used for this installation and is the proper routing of the vehicle's safety belt when using the CSS as a forward facing CSS with the five-point harness system. Two adjustment slots for the integrated harness system were molded into the shell. The driver used the top slots, which routed the integrated harness straps over a formed reinforcement in the back of the shell. A center detachable chest clip was present on the harness straps and used at the time of the crash. The driver had this clip positioned at the level of the child's armpits. The CSS was covered with a typical foam/cloth cover that concealed the seated area and wrap-around aspects of the shell **(Figure 10)**.

Subtle loading evidence was visible on the right side of the CSS belt path. This abrasion pattern was located at the lower forward aspect of the belt path. Surrounding the abrasion was an area of loading (whitish stretch discoloration) to the plastic shell **(Figure 11)**. There was no other damage or loading evidence to this CSS.

The second, unoccupied CSS in this vehicle was a forward facing convertible child safety seat (CSS) that was installed in the rear right position of the Sebring. The CSS was a Kolcraft Auto-Mate with a Model Number of 0708 and a Date of Manufacturer of 06-09-98.

The CSS was installed in the forward facing position with the adjustable leg in the extended position and the vehicle's 3-point lap and shoulder belt routed through the forward facing belt path. The safety belt was taut with the tension provided by the lightweight locking latch plate. This CSS had no lateral movement at the belt path. Again, this CSS was positioned on a folded towel that was placed over the leather seat cushion.

Occupant Demographics/Data

Driver – Chrysler Sebring

Age/Sex:	34-year old/Male
Height:	175 cm (69.0")
Weight:	91 kg (200 lb)
Eyewear:	Non-prescription sunglasses
Manual Restraint Usage:	Integrated 3-point lap and shoulder belt
Usage Source:	Vehicle inspection, driver interview
Seat Track Position:	Rear track, adjusted 1 cm (0.375") forward of the full rear position
Egress from Vehicle:	Exited unassisted through left door
Mode of Transport	Ambulance
Type of Medical Treatment:	Transported to a local hospital, treated and released

Driver Injuries

Injury	Injury Severity (AIS 90/Update 98)	Injury Mechanism
Cervical strain	Minor (640278.1,6)	Impact force
Bilateral abrasions of the anterior forearms	Minor (790202.1,3)	Expanding driver's air bag membrane
Small laceration of the left thumb	Minor (790602.1,2)	Expanding driver's air bag membrane
Right thumb contusion	Minor (790402.1,1)	Expanding driver's air bag membrane
Left anterior shoulder abrasion	Minor (790202.1,2)	Integrated shoulder belt webbing
Mid lower abdominal contusion	Minor (590402.1,4)	Lap belt compression of belt buckle into abdomen

Source – Driver interview

Driver Kinematics

The driver of the Chrysler Sebring was seated in a normal driving posture with both hands positioned on the steering wheel rim. The power-seat track was adjusted to a rear track position [1 cm (0.375") forward of full rear] with the seat back reclined to a measured angle of 19 degrees. The power seat was set to the lowest height adjustment, and measured 25 cm (9.875") above the floor at the leading edge of the seat cushion. The steering column was adjusted to the full-up position. In these adjusted positions, the horizontal distance between the mid point of the driver's air bag module and the seat back was measured at 64 cm (25.25").

The driver was restrained by the integrated 3-point lap and shoulder belt system. The shoulder belt was properly placed across his left shoulder and torso with the lap belt positioned across his hips. The driver was dressed in a short-sleeved golf shirt and shorts and was wearing non-prescription sunglasses.

At impact, the redesigned frontal air bag system deployed. The expanding air bag membrane contacted the anterior (exposed) aspect of the driver's forearms which resulted in bilateral abrasions. The air bag membrane also contacted both thumbs of the driver as his hands braced against the steering wheel rim. This interaction resulted in a small laceration of the left thumb and a contusion of the right thumb.

The driver initiated a forward and lateral trajectory and loaded the integrated belt system as the emergency-locking mode of the retractor locked due to the crash forces. His loading of the shoulder belt system resulted in an abrasion of the left anterior shoulder. The driver partially submarined the lap belt webbing, which resulted in the lap belt webbing engaging against his clothing belt. The buckle of this belt contused his mid abdomen. As the driver continued forward, the integrated safety belt system arrested his forward motion. The driver's head continued forward and jackknifed over the belt webbing resulting in cervical strain. Due to the driver's rear seat track position and belt usage, he did not move far enough forward to contact the deployed driver's air bag.

The driver responded on a slight lateral trajectory and contacted the door panel with his left leg and left arm. There was no contact evidence on the door to support this contact pattern or resultant injury.

Immediately following the crash, the driver exited the Chrysler Sebring and removed his daughter from her CSS. He walked her to a grassy area adjacent to the intersection and waited for emergency personnel to arrive on scene. The driver was transported by ambulance to a local hospital where he was treated for his soft tissue injuries and released. It should be noted that the driver reported his sunglasses as missing in the crash. He could not recall if they were displaced from his face during the crash, or if he removed them in the ambulance post-event.

Child Passenger Demographics/Data

Age/Sex:	4-year old/Female
Height:	100 cm (39.5")
Weight:	17 kg (37.0 lb)
Position:	Rear left
Manual Restraint Usage:	Retrained in a forward facing Cosco child safety seat
Usage Source:	Vehicle inspection, driver interview
Eyewear:	None
Egress from Vehicle:	Removed from CSS by driver immediately following the crash
Mode of Transport From Scene:	Ambulance
Type of Medical Treatment:	Treated at a local hospital and released

Child Passenger Injury

Injury	Injury Severity (AIS 90/Update 98)	Injury Mechanisms
Bilateral abrasions of the anterior shoulders	Minor (790202.1,3)	Child safety seat harness straps
Bilateral abrasions of the lateral neck	Minor (390202.1,1; 309292.1,2)	Child safety seat harness straps

Child Passenger Kinematics

The child passenger was restrained in a Cosco forward facing child safety seat by the integral 5-point harness system in the rear left position of the Chrysler Sebring **(Figure 12)**. The CSS was secured to the vehicle by the manual 3-point lap and shoulder belt system. Tension to the manual belt system was maintained by the lightweight locking latch plate of the belt system. The child was restrained in the CSS by the integrated 5-point harness system. During this on-site investigation, the CSS was removed from the Chrysler Sebring and the child was repositioned in the CSS. The

Figure 12. Installed CSS in the rear left of the Sebring.

harness straps were positioned over the child and buckled to determine the adjustments at the time of the crash. With the straps in position, and the chest clip placed at armpit level, the harness straps were adjusted snug to the child with approximately 1 cm (0.5”) of slack at the level of the anterior shoulder.

At impact with the Chevrolet pickup truck, the child passenger initiated a forward trajectory in response to the 11 o’clock impact force. She loaded the harness straps which resulted in bilateral abrasions of the anterior shoulders and lateral neck. The snug fit of the harness straps and the taut tension of the vehicle’s belt system through the CSS prevented the child from movement outboard of the CSS. As a result, she did not sustain further injury and was not in contact with interior components.

Immediately following the crash, the driver of the Sebring removed the child from the CSS and comforted her until the arrival of the ambulance personnel. Both occupants were transported by ambulance to a local hospital where they were treated for the minor severity injuries and released.

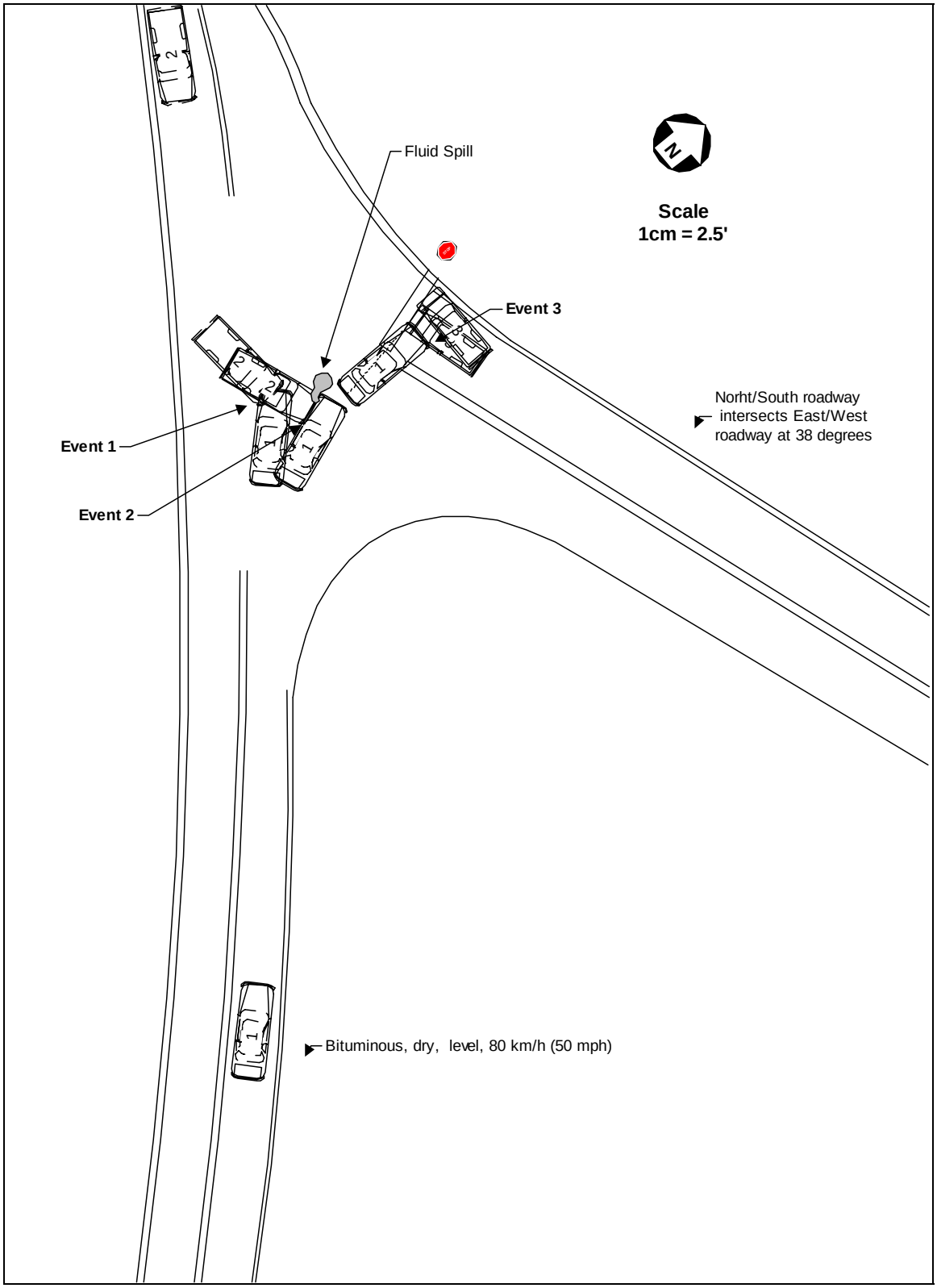

Figure 13 – Scene Schematic