CRASH DATA RESEARCH CENTER
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CALSPAN ON-SITE AMBULANCE CRASH INVESTIGATION
SCI CASE NO: CA09080

VEHICLE: 2000 FORD E-350 TYPE III AMBULANCE
LOCATION: TENNESSEE

CRASH DATE: SEPTEMBER, 2009

Contract No. DTNH22-07-C-00043

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Washington, D.C. 20590

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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.

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. CA09080	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Calspan On-Site Ambulance Crash Investigation Vehicle: 2000 Ford E350 Type III Ambulance Location: Tennessee		*5. Report Date*: February 2010 *6. Performing Organization Code*	
7. Author(s) Crash Data Research Center		*8. Performing Organization Report No.*	
9. Performing Organization Name and Address Calspan Corporation Crash Data Research Center P.O. Box 400 Buffalo, New York 14225		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-07-C-00043	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Washington, D.C. 20590		*13. Type of Report and Period Covered* Technical Report Crash Date: September 2009 *14. Sponsoring Agency Code*	
15. Supplementary Note An investigation of a multiple event crash involving a 2000 Ford E350 Type III ambulance.			
16. Abstract This investigation focused on the multiple event crash and the outcome of the occupants in a 2000 Ford E-350 Type III ambulance. The ambulance was occupied by a 55-year-old male driver, a 32-year-old male paramedic and a 57-year-old female patient. The ambulance was conducting a non-emergency transfer of the patient from a local clinic to an urban hospital at the time of the crash. The crash occurred during the nighttime hours in clear weather conditions. The Ford ambulance was westbound on a two-lane state roadway. A 2001 Chevrolet Lumina was eastbound driven by a 51-year-old female. The driver of the Chevrolet allowed the vehicle to cross the centerline into the path of the Ford ambulance resulting in an offset frontal crash. The force of the impact separated the left front wheel from the ambulance and the ambulance departed the north side of the road in a counterclockwise (CCW) rotation. The ambulance fell down a steep 4 m (13 ft) roadside embankment rolled over one-quarter turn coming to rest on its right side. The Chevrolet rotated CCW and came to rest in the westbound lane The unrestrained male driver of the Ford was ejected during the roll sequence. He sustained life-threatening injuries and subsequently expired after a three-day hospitalization. The patient was reportedly restrained on the cot that was secured in the patient compartment. She was displaced from the cot during the crash sequence and sustained fatal injuries. The unrestrained paramedic was initially seated on the rear-facing jump seat. The paramedic was displaced from the seat by the force of the crash and sustained multiple skeletal fractures.			
17. Key Words Road side departure Frontal crash Type III ambulance Patient compartment Rollover…..Fatal injuries		*18. Distribution Statement* General Public	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 25	*22. Price*

TABLE OF CONTENTS

BACKGROUND 1

SUMMARY
- Vehicle Data
  - 2000 Ford E350 Type III Ambulance 2
  - 2001 Chevrolet Lumina 2
- Ambulance Company and Personnel 3
- Patient and Transport Details 3
- Crash Site 4
- Crash Sequence 4
- 1998 Ford E350 Type III Ambulance
  - Exterior Damage 6
- 2001 Chevrolet Lumina
  - Exterior Damage 7
- 1998 Ford E350 Type III Ambulance
  - Interior Damage 7
  - Safety Belt System 8
  - Frontal Air Bag System 8
- Patient Compartment 9
- Patient Cot 11
- Driver Demographics 12
- Driver Injury 12
- Driver Kinematics 14
- Paramedic Demographics 15
- Paramedic Injury 15
- Paramedic Kinematics 16
- Patient Demographics 17
- Patient Injury 17
- Patient Kinematics 20
- Crash Schematic 21
- ATTACHMENT A: 2001 Chevrolet Lumina EDR Report 22

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BACKGROUND

This investigation focused on the multiple event crash and the outcome of the occupants in a 2000 Ford E-350 Type III ambulance (**Figure 1**). The ambulance was occupied by a 55-year-old male driver, a 32-year-old male paramedic and a 57-year-old female patient. The ambulance was conducting a non-emergency transfer of the patient from a local clinic to an urban hospital at the time of the crash. The crash occurred during the nighttime hours in clear weather conditions. The Ford ambulance was westbound on a two-lane state roadway. A 2001 Chevrolet Lumina was eastbound driven by a 51-year-old female. The driver of the Chevrolet allowed the vehicle to cross the centerline into the path of the Ford ambulance resulting in an offset frontal crash. The force of the impact separated the left front wheel from the ambulance and the ambulance departed the north side of the road in a counterclockwise (CCW) rotation. The ambulance fell down a steep 4 m (13 ft) roadside embankment rolled over one-quarter turn coming to rest on its right side. The Chevrolet rotated CCW and came to rest in the westbound lane.

Figure 1: Left front oblique view of the Ford ambulance.

The unrestrained male driver of the Ford was ejected during the roll sequence. He sustained life-threatening injuries and subsequently expired after a three-day hospitalization. The patient was reportedly restrained on the cot that was secured in the patient compartment. She was displaced from the cot during the crash sequence and sustained fatal injuries. The unrestrained paramedic was initially seated on the rear-facing jump seat. The paramedic was displaced from the seat by the force of the crash and sustained multiple skeletal fractures.

This crash was identified by the National Highway Traffic Safety Administration's (NHTSA's) Crash Investigation Division (CID) and forward to the Calspan Special Crash Investigations (SCI) team for follow-up research. The case was assigned on November 19, 2009. Calspan SCI established cooperation with the police investigator on November 20, 2009. The vehicles were impounded by the pending resolution of the criminal aspects of the crash and were available for inspection. The on-scene portion of this investigation was conducted on November 23 and 24, 2009 and included inspections of both vehicles and the crash site. Additionally, the police investigator and paramedic were interviewed.

SUMMARY

Vehicle Data

2000 Ford E-350 Type III Ambulance

The 2000 Ford E-350 chassis was manufactured as an incomplete vehicle and was identified by the Vehicle Identification Number (VIN): 1FDSE35F2YH (production sequence deleted). The date of manufacturer was unknown. The Ford E-350 was configured on a 351 cm (138 in) wheelbase with a single-wheel rear axle. It had a Gross Vehicle Weight Rating (GVWR) of 4,356 kg (9,600 lb). The odometer read 313,765 km (194,970 miles) at inspection. The power train consisted of a 6.8-liter/V-8 diesel engine linked to a 4-speed automatic transmission. The service brakes were a front disc/rear drum system without antilock. The manufacturer's recommended tire size was LT245/75R16. The recommended cold tire pressure was 379 kPa (55 PSI) front and 552 kPa (80 PSI) rear. The ambulance was equipped with Firestone TransForce HT LT245/75R16 tires. The specific data measured at the time of the SCI inspection was as follows:

Tire	Measured Pressure	Tread Depth	Restricted	Damage
LF	Tire flat	9 mm (11/32 in)	No	Sidewall cut, rim deformed, tire/wheel separated
LR	Tire flat	3 mm (4/32 in)	No	Sidewall cut
RF	Tire flat	9 mm (11/32 in)	No	Tire debeaded, debris in rim
RR	497 kPa (72 PSI)	3 mm (4/32 in)	No	Debris in rim bead

The patient compartment of the ambulance was manufactured by American Emergency Vehicles in December 2000. The Type III compartment bore the model designation Trauma Hawk SR-3 YSF R92. The curb weight of the ambulance was listed as 3,667 kg (8,085 lb). The ambulance could carry a payload of 687 kg (1,515 lb) inclusive of 225 kg (495 lb) of specified optional equipment. The patient compartment had a typical layout with a double rear door for cot loading, a three passenger bench seat along the right side, a right side entry door, a rear facing paramedic seat behind the driver and multiple cabinets for storage.

Maintenance records were obtained from the ambulance company. The records reflected the routine maintenance of the vehicle beginning in January 2003. The mileage reading at that time was 6,806 km (4,229 miles). The service consisted of oil and filter changes, and brake and tire maintenance. There was no history of previous crashes with this ambulance.

2001 Chevrolet Lumina

The 2001 Chevrolet Lumina was identified by the following VIN: 2G1WL52J811 (production number omitted). The Chevrolet's date of manufacture was unknown. The vehicle was powered by a 2.5-liter V-6 engine linked to a 4-speed automatic transmission with front-wheel drive. The braking system consisted of power front disc and rear drum brakes without ABS. The manual restraint system consisted of three-point lap and shoulder belts in all five seat positions. The Chevrolet was equipped with redesigned frontal air bags for the driver and front right passenger that deployed during the crash. The vehicle was equipped with an Event Data Recorder (EDR)

that was imaged at the time of the SCI inspection. The imaged data is attached to the end of report as Attachment A. The Chevrolet was equipped with Gillette Silver Bear P205/70R15 tires mounted on the OEM steel wheels. The tires were the proper size recommended by the manufacturer. The vehicle manufacturer recommended front and rear cold tire pressure was 207 kPa (30 PSI). The specific tire data measured at the time of the SCI inspection was as follows:

Tire	Measured Pressure	Tread Depth	Restricted	Damage
LF	Unknown	Unknown	No	Rim deformed, , tire separated from rim and missing
LR	234 kPa (34 PSI)	6 mm (7/32 in)	No	None
RF	234 kPa (34 PSI)	6 mm (7/32 in)	No	None
RR	214 kPa (31 PSI)	6 mm (7/32 in)	No	None

AMBULANCE COMPANY AND PERSONNEL

The involved ambulance service was owned and operated by the Tennessee County in which it was based. The service provided both 9-1-1 emergency response and non-emergency intra-facility transport.

The unrestrained driver of the ambulance was a 55-year-old male with a reported height and weight of 188 cm (74 in) and111 kg (244 lb). He was employed full-time by the service. He normally worked Friday through Tuesday 0930 hours to 1800 hours. On the day of the crash, he was working a 24-hour shift and had been at work approximately 13 hours at the time of the crash.

The paramedic was a 32-year-old male with a height and weight of 191 cm (75 in) and 186 kg (410 lb). He was employed full time by the ambulance service and it was his only job. He was also working a 24-hour shift on the day of the crash. He reported to duty at 0930 hours and was in his 13th hour of work at time of the crash. He was initially seated on the side-facing bench seat monitoring the patient. Approximately 4 minutes prior to the crash, he moved from the bench seat and sat in the rear-facing jump seat located behind the driver. He was unrestrained.

PATIENT AND TRANSPORT DETAILS

The crash occurred during the transport of the 57-year-old female with a reported height and weight of 183 cm (72 in) and 137 kg (302 lb). She was being transferred from a local health clinic to an urban hospital for symptoms of influenza that required hospitalization. The clinic was located approximately 72 km (45 miles) from the medical center. The crash occurred approximately 24 km (15 miles) into the transport. The patient was positioned on a Stryker cot that was secured in the patient compartment of the ambulance by the antler bracket and rail-clamp.

CRASH SITE

The crash occurred during the nighttime hours of September 2009 in a rural setting. At the time of the crash, it was dark, (not lighted), with clear and dry weather conditions. The crash occurred on a straight 2-lane east/west road. There was a negative six percent (-6%) grade in the westbound direction. **Figure 2** is a westbound trajectory view of the ambulance at the point of impact. At the crash site, the total width of the asphalt road measured 6.9 m (22.6 ft). The travel lanes were separated by solid and broken yellow centerlines that represented a passing zone in the westbound direction. The edges of the road were delineated by white fog lines. The travel lanes were bordered by 0.5 m (1.6 ft) gravel shoulders. The north roadside consisted of an open field that had an elevation 4 m (13 ft) below the level of the road. The north road side embankment was steep with a measured slope of negative 83 percent (-83%). After the vehicle-to-vehicle crash, the ambulance fell down the embankment rolling one-quarter turn. It came to rest in the field on its right side. The speed limit in the area of the crash was 89 km/h (55 mph). A schematic of the crash is attached at the end of this report as **Figure 16**.

Figure 2: Westbound trajectory view of the ambulance at the point of impact.

CRASH SEQUENCE

Pre-Crash

The ambulance was westbound occupied by the 55-year-old driver, the 32-year-old paramedic and the 57-year old patient. The ambulance was approximately 20 minutes into a 60 minute patient transport from a local health clinic to an urban hospital at the time of the crash. The 2001 Chevrolet Lumina was eastbound driven by the 51-year-old female.

The eastbound Chevrolet crossed the centerline and entered the westbound lane of travel at a shallow angle. The driver of the ambulance reacted to the encroaching vehicle by steering to the right and maneuvering the ambulance to the outboard edge of the travel lane in an attempt to avoid the crash. The right side tires of the ambulance travelled off the pavement and onto the north roadside. A rolling tire mark in the grass roadside was observed by the police investigator leading to the area of the impact.

Crash

The front left aspect of the Chevrolet struck the front left aspect of the ambulance in an offset collision (Event 1). The point of impact was evidenced by a gouge mark in the westbound lane located 1.2 m (3.9 ft) inboard of the fog line. The offset impact resulted in the fracture of the left front suspensions of both vehicles, as the vehicles reached maximum engagement. The ambulance separated from the Chevrolet and was deflected to the right with a west-northwest trajectory along the roadside due to its momentum. The offset force of the crash caused the Chevrolet to initiate a counterclockwise (CCW) rotation. The Chevrolet's contact to the ambulance extended along the left plane of the ambulance to its left rear axle area as the

Chevrolet rotated through separation. The front bumper of the Chevrolet cut the left rear tire of the ambulance causing the tire to air out. The Chevrolet rotated 100 degrees and came to rest 11m (36 ft) east of the impact straddling the westbound travel lane facing northwest.

The severity of the crash (delta-V) was calculated by the Damage Algorithm of the WINSMASH collision program. The total delta V of the Ford ambulance was 9.0 km/h (5.6 mph). The longitudinal and lateral delta-V components were -8.9 km/h (-5.5 mph) and 1.6 km/h (1.0 mph). The total delta-V of the Chevrolet was 23.0 km/h (14.3 mph) with longitudinal and lateral components of -23.0 km/h (-14.3 mph) and 0 km/h (0 mph), respectively. The analysis was considered borderline due to the violation of the common-velocity assumption of the program and offset/non-central impact configuration of this crash. Additionally, the stiffness values used in the analysis were not representative of the vehicle damage. The longitudinal delta-V recorded by the Chevrolet's EDR was 26.1 km/h (-16.2 mph).

The west-northwest trajectory of the ambulance was evidenced by a series of gouge marks distributed over a 21.4 m (70.2 ft) length west of the impact. These marks were located 0.9 m (3.0 ft) inboard of the fog line and angled toward the pavement edge. The gouge marks were attributed to components of the left front suspension. A tire impression from the aired out left rear tire of the ambulance was also observed. Immediately inboard of the north fog line, the pavement was heavily abraded over an 18.3 m (60.0 ft) length from the undercarriage of the ambulance as the vehicle slid along the roadside. Along this trajectory, the rear aspect of the ambulance encountered the steep roadside embankment and the vehicle initiated a CCW rotation. The ambulance rotated approximately 50 degrees and fell-over (Event 2) due to the slope of the roadside embankment. A 20 cm (8 in) deep gouge was located in the soft roadside terrain 40.6 m (133.2 ft) west of the impact. This gouge measured 25 cm x 25 cm (10 in x 10 in) and was attributed to contact with the upper right corner of the ambulance's patient compartment. Asphalt debris was noted in the fractured corner of the compartment. **Figure 3** is a view from the gouge toward the final rest of the ambulance. **Figure 4** is a lookback from final rest to the road departure. The ambulance continued down the steep embankment into the open field to final rest position on its right plane. The distance from the estimated fall over to final rest measured 22 m (72 ft). The ambulance came to rest 64 m (210 ft) from the initial impact.

Figure 3: View along the fall-over trajectory of the ambulance to final rest.

Figure 4: Lookback view from the final rest position of the ambulance toward the road.

Post-Crash

The police, fire and ambulance personnel responded to the crash site. The unrestrained driver of the ambulance was ejected during the rollover event and was found approximately 10 m (31 ft) east of ambulance in the open field. He was unresponsive. He was flown by air ambulance to a regional trauma center and hospitalized. Medical efforts to treat the driver were unsuccessful and the driver died of his injuries 3 days post-crash. The paramedic was displaced from and jump seat and was found on the right door in the right entry area of the patient compartment. He was removed from the ambulance and flown by air ambulance to a regional trauma center. He was hospitalized for 6 days for the treatment of multiple skeletal fractures. The patient was displaced from the cot and came to rest on the right wall of the ambulance above the bench seat. She sustained multiple internal thoracic injuries and was pronounced deceased at the scene.

2000 FORD E-350 TYPE III AMBULANCE

Exterior Damage

The Ford ambulance sustained direct contact damage to the front and left side planes as a result of the offset frontal crash (Event 1). **Figures 5 and 6** are the front and left side views depicting the damage. The direct contact damage on the frontal plane began 64 cm (25.0 in) left of center and extended 24 cm (9.5 in) to left front bumper corner. The residual crush profile along the front bumper was as follows: C1 = 11 cm (4.3 in), C2 = 0, C3 = 0, C4 = 0, C5 =0, C6 = 0. The direct contact with the Chevrolet extended along the left plane of the ambulance to the forward left corner area of the patient compartment. The direct contact ended 74 cm (29.0 in) rearward of the forward wall of the ambulance body. This contact jammed closed the 55 cm x 152 cm (21.5 in x 60 in) exterior door of the forward storage compartment. The impact with the Chevrolet fractured the left front suspension and separated the wheel assembly. The left aspect of the windshield was fractured from the exterior crash force. The left door was jammed closed. The left front window glazing was closed at the time of the crash and disintegrated. The Collision Deformation Classification (CDC) was 12-FLEE9.

Figure 5: Front view of the Ford ambulance.

Figure 6: Left view of the ambulance depicting the extent of damage.

The right plane of the ambulance exhibited evidence of the one-quarter turn rollover (Event 2). **Figure 7** is a right side view of the ambulance. The right fender and A-pillar were abraded by contact with the road pavement with minor deformation. The front right corner of the patient compartment was abraded at its upper aspect and holed by ground impact. The hole measured 8 cm x 10 cm (3 in x 4 in). Asphalt debris was embedded in the contact area. The top longitudinal aspect of patient compartment was abraded along its entire length. All the right side storage compartment doors and the right entry door were operational. There was no change in the right wheelbase dimension. The right door remained closed during the crash, but was open at the time of the SCI inspection. It would not close due to body deformation. The window glazing was disintegrated. The CDC for Event 2 was 00-RDAO2.

Figure 7: Right side view of the ambulance.

2001 CHEVROLET LUMINA

Exterior Damage

The Chevrolet Lumina sustained moderate severity impact damage to the left front corner that extended along the left side plane onto the driver's door panel, **Figure 8**. The direct contact damage to the frontal plane measured 30 cm (12.0 in) and began 38 cm (15.0 in) left of center extended in the left front corner. The impact fractured and separated the bumper fascia exposing the bumper reinforcement bar. The residual crush profile measured along the reinforcement bar was as follows: C1 = 31 cm (12.2 in), C2 = 16 cm (6.3 in), C3 = 11 cm (4.3 in), C4 = 8 cm (3.1 in), C5 = 8 cm (3.1 in), C6 = 4 cm (1.6 in). The maximum crush was located at the left front corner, the C1 crush measurement. The direct contact then extended along the left side plane ending 118 cm (46.5 in) forward of the left rear axle. The left front wheel assembly of the Chevrolet contacted the left front wheel assembly of the ambulance resulting in a fracture of the suspension. The left front rim was displaced rearward 42 cm (16.5 in) and the tire debeaded and separated. The left front door was jammed closed and its window glazing disintegrated. The CDC was 12-FLEE9.

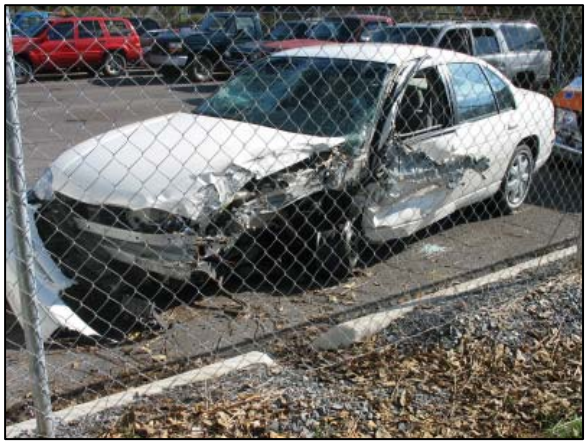


Figure 8: Left oblique view of the Chevrolet depicting the extent of damage.

2000 FORD E-350 AMBULANCE

Interior Damage

Inspection of the passenger compartment of the ambulance was unremarkable. There was no intrusion or interior damage associated with the exterior crash force. There was no observed evidence of interior occupant contact points. The driver's bolster panel had separated from the

lower instrument panel and was found in the patient compartment. Its inspection was unremarkable.

The box-mounted driver seat was adjusted to the full-rear track position. The seat track travel measured 19 cm (7.5 in). The seat back was reclined 15 degrees aft of vertical. The horizontal distance from the seat back to the driver air bag module in the center of the steering wheel measured 66 cm (26.0 in). The anti-submarine angle of the seat cushion measured 10 degrees. The two-spoke, tilt steering wheel was adjusted to the center position. There was no deformation of the steering wheel rim. There was no separation of the steering column's shear capsules.

Safety Belt System

The cab of the 2000 Ford E-350 ambulance was equipped with manual 3-point lap and shoulder safety belts for the two seating positions. The driver's safety belt was configured with continuous loop webbing, a sliding latch plate, a height adjustable D-ring, an Emergency Locking Retractor (ELR), and a buckle mounted pretensioner. The D-ring was adjusted to the full-down position at the time of the SCI inspection. The buckle pretensioner had actuated during the frontal impact and was evidenced by buckle stalk compression. The webbing was stowed in the retractor upon initial inspection. Examination of the webbing and latch plate revealed historical use consistent with the age of the vehicle. There was no crash related loading or evidence of use during the crash. Based on the observations of the SCI inspection, the driver was unrestrained at the time of the crash

The front right safety belt was configured with continuous loop webbing, a sliding latch plate, a height adjustable D-ring, a switchable ELR/Automatic Locking Retractor (ALR) and a buckle pretensioner. The front right seat was not occupied during the crash. The right buckle pretensioner had also actuated during the frontal impact.

Frontal Air Bag System

The 2000 Ford E-350 ambulance was equipped with a redesigned frontal air bag system for the driver and front right positions. As a result of the frontal impact, the frontal air bag system deployed. The driver's air bag was conventionally located in the center of the steering wheel hub and was concealed by two cover flaps. The top cover flap measured 19 cm (7.5 in) in height and 13 cm (5 in) in width. The lower cover flaps measured 6 cm (2.5 in) in height and 13 cm (5 in) width. The driver's air bag measured 61 cm (24 in) in diameter in its deflated state. The air bag contained two tethers at the 12 and 6 o'clock positions and was vented by two vent ports at the 11 and 1 o'clock positions. There was no damage or occupant contact points present on the air bag.

The front right air bag was a top-mount design incorporated into the right aspect of the instrument panel. The air bag was concealed by a single cover flap that measured 29 cm (11.5 in) in height and 39 cm (15.5 in) in width. The rectangular shaped air bag membrane measured 91 cm (36 in) in height and 46 cm (18 in) in width. The air bag contained two vent ports on the side panels and was not tethered. The air bag was free of damage and occupant contact evidence.

PATIENT COMPARTMENT

The exterior panels of the patient compartment sustained minor damage as described in the *Exterior Damage* section of this report. There was no separation of the compartment's panels or intrusion into the compartment's interior. The body panel at the upper right corner was fractured and holed by ground contact but the structure of the patient compartment remained intact.

There was one exterior compartment on the left side of the ambulance located at the forward aspect. The door of the compartment remained closed during the crash sequence and was jammed shut. A 127 cm (50 in) tall H-size oxygen cylinder was located in the compartment. The tank remained secure and was not damaged. There were two right side exterior compartments located forward of the side entry door into the ambulance. These compartment doors remained closed during the crash and were operational post-crash.

Figure 9 is a police image of the patient compartment interior taken on the night of the crash after the vehicle was up-righted. There was no interior damage to the compartment from the exterior force of the crash. The interior damage to the compartment was associated to the displacement of the occupants and loose interior objects. The design of the compartment consisted of the typical layout with multiple cabinets, shelves and counter space along the left wall, a side-facing, three-passenger bench along the right wall and a storage unit at the forward right aspect.

Figure 9: Police image of the patient compartment interior.

The paramedic jump seat was located on the forward left side behind the driver's seat. This position was equipped with a non-adjustable, box-mounted rear-facing bucket seat with a lap (only) safety belt. The safety belt consisted of a sewn on latch plate, retractable webbing, and an ALR retractor. The lap belt revealed minor historical use evidence. There was no observed crash related evidence. The paramedic was seated in this position and was unrestrained

At the time of the crash, a cardiac monitor was located on the center shelf (**Figure 10**) of the compartment's left wall and was in use monitoring the patient. It was secured to the shelf by two 5 cm (2 in) long straps. A spring clip fastened to one end of the strap was attached to the monitor. The use of the spring clip allowed for the easy removal of the unit. The fixed end of each strap was secured to the shelf with a wood screw. During the crash, the monitor was displaced from the shelf by the impact force. The wood screw securing the forward strap pulled out of the particle board shelf. The paramedic reported that the cardiac monitor struck him in the chest.

Figure 10: View of the shelf that housed the cardiac monitor at the time of the crash. Note, the missing wood screw and strap.

A 2.3 kg (5 lb) fire extinguisher and two portable D-size oxygen bottles were housed in a storage cabinet at the lower left aspect of the left wall. The fire extinguisher was secured by a single band clamp. The oxygen bottles rested in a metal retainer cup and were secured with a threaded clam shell clamp. During the crash, both the fire extinguisher and oxygen bottles were displaced from the cabinet. The fire extinguisher impacted the right aspect of the rear wall and discharged. The shape of the fractured wall matched the contour of the extinguisher. Fire retardant was observed inside the patient compartment at the time of the police on-scene investigation.

The right side of the patient compartment consisted of the side-facing bench seat. A vertically-oriented net restraint was located at the forward end of the bench. The net restraint covered an area that measured 30 cm x 122 cm (12 in x 48 in) and was comprised of six horizontal straps woven to three vertical straps. Each strap was 4 cm (1.5 in) wide. The end of each strap was threaded through a metal ring that was attached to spring loaded fastener and the strap was sewn onto itself forming a loop. The net was hung by attaching the spring loaded fastener at the end of the vertical straps to four retainers that were attached to the ceiling and the end of the bench cabinet. Each retainer was attached to the ceiling and the cabinet by two wood screws. During the rollover, the netting was loaded by the paramedic. The stitching at the upper aspect of the inboard vertical strap and at the center aspect of upper horizontal strap released. Additionally, the wood screws securing the ceiling retainers partially pulled free. **Figures 11 and 12** are views of the restraint net.

Figure 11: Overall view of the restraint net.

Figure 12: Close-up view of the separated upper aspect of the net.

Evidence of body fluid and matter was observed on the central aspect of the roof, the aluminum grab handle attached roof and on the right wall above the bench seat. There was a small fracture of the lens covering the recessed light fixture located in the roof of the patient compartment.

At the time of the crash, the cot was secured within the ambulance in the transport position by a floor-mounted rail clamp and an antler bracket. There was no noted damage to either the clamp or bracket. Reportedly, the cot remained secure throughout the crash sequence.

PATIENT COT

The cot used to transport the patient in this crash was a Stryker Pro-Pro XT 6500; Serial Number: 060939589. **Figure 13** is a view of the cot. This cot was constructed of steel tubing with a scissor design which allowed for height adjustment. This model was designed with a battery-powered hydraulic lift assist. The cot measured 183 cm (72 in) in length and 46 cm (18 in) in width. The empty weight of the cot was 57 kg (125 lb). The maximum patient weight capacity was 318 kg (700 lb). The angle of the back rest was set via a pneumatic adjustment. The specific angle of the back rest at the time of the crash was not known. The paramedic reported the back rest was slightly elevated in a semi-fowler's position. A 20 cm (8 in) length of the cot at the patient's feet was deformed vertically. The source/cause of the deformation could not be determined.

Figure 13: Overall view of the Stryker cot.

Figures 14 and 15 are views of the cot frame with the mattress removed depicting the location of the restraints. The cot contained a shoulder harness and three lateral restraints for securing patients. The shoulder harness was not in use. At inspection, the harness straps revealed minimal evidence of historical use. The lateral restraints were attached to the side frame of the cot at the level of a patient's chest, abdomen and lower extremities. The chest restraint consisted of two adjustable length belts, a locking latch plate and a buckle. The abdomen and lower extremity restraints utilized one fixed length belt and buckle and one adjustable length belt with a locking latch plate. Using the pivot axis of the back rest as a reference, the chest restraint was located 15 cm (6 in) above the pivot (toward the head). The abdomen and lower extremity restraints were located 30 cm (12 in) and 86 cm (34 in) below the pivot axis, respectively. The inspection of each lateral restraint revealed signs of historical use. It was not possible to differentiate between the historical use and potential crash related evidence.

Figure 14: View of the cot frame and back rest.

Figure 15: View of the cot frame.

DRIVER DEMOGRAPHICS

Age/Sex:	55-year-old/Male
Height:	188 cm (74 in)
Weight:	111 kg (244 lb)
Seat Track Position:	Full-rear track position
Eyewear:	None
Safety Belt Usage:	Unrestrained
Usage Source:	SCI vehicle inspection
Egress from Vehicle:	Ejected during the crash
Mode of Transport from Scene:	Air ambulance to a Level 1 trauma center
Type of Medical Treatment:	Hospitalized and died 3 days post-crash

DRIVER INJURIES

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Intracerebral hemorrhage (right and left temporal lobes)	Critical (140646.5,3)	Ground
Left subdural hemorrhage (20ml) in the left cerebral convexity and the left anterior and middle cranial fossa	Severe (140652.4,2)	Ground
Basilar skull fracture (right petrous portion of the temporal bone has multiple comminuted non displaced fractures)	Severe (150206.4,8)	Ground

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Bilateral lung contusion; posterior right lower lobe and inferior border of left upper lobe	Severe (441410.4,3)	Ground
Vault fracture (comminuted temporal bone)	Serious (150404.3,1)	Ground
Left temporal contusions (multiple)	Serious (140612.3,2)	Ground
Right lung laceration, subpleural 3.8 x 1.3 x 1.9 cm at the convergence of lobes	Serious (441430.3,1)	Ground
Multiple severe right side rib fractures; Right 2 thru 7 anterior, lateral 1 thru 9, and posterior 1 thru 8	Serious (450250.3,1)	Ground
Pituitary gland hemorrhage	Serious (140799.3,8)	Ground
Liver lacerations (subcapsular right lobe, oblique 0.6cm long laceration, and three subcapsular parallel linear lacerations , all 0.8 cm deep on posterior lobe	Moderate (541622.2,1)	Ground
Right kidney laceration (hilum of kidney, 0.6 x0.2 cm	Moderate (541620.2,1)	Ground
Right clavicle fracture	Moderate (752200.2,1)	Ground
T7 spinous process fracture	Moderate (650418.2,7)	Ground
T8 spinous process fracture	Moderate (650418.2,7)	Ground
T3 transverse process fracture	Moderate (650420.2,7)	Ground
T4 transverse process fracture	Moderate (650420.2,7)	Ground
L1 transverse process fracture	Moderate (650620.2,8)	Ground
Right adrenal gland hematoma, 3.8 x 1.3 x 1.9cm , intra-adrenal	Moderate (540210.1,1)	Ground
Left frontal subgaleal hemorrhage (2.5 cm diameter)	Minor (190402.1,5)	Ground
Right temporalis muscle hemorrhage (2.5 cm in greatest dimension)	Minor (190402.1,1)	Ground
Right superior shoulder vertical abrasions (3.8x 0.6 cm)	Minor (790202.1,1)	Ground
Right distal upper arm and elbow laceration	Minor (790602.1,1)	Ground

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Right posterior forearm abrasions (in an irregular area of confluent abrasion measuring 3.8 cm in greatest dimension)	Minor (790202.1,1)	Ground
Right metacarpophalangeal joint laceration (horizontal to oblique 3.8 cm in length)	Minor (790602.1,1)	Ground
Left dorsal hand laceration (between metacarpophalangeal joint of the middle finger and wrist) curvilinear vertical 12.7 cm long laceration	Minor (790600.1,2)	Ground
Right lateral abdomen abrasions (scattered oblique abrasions which cross the right axillaries line anteriorly and measure 20 cm in length)	Minor (590202.1,1)	Ground
Lower right back abrasion (in a 7.6 x 2.5 cm horizontal confluent pattern)	Minor (690202.1,8)	Ground
Right back (flank) lacerations radiating from the superior aspect	Minor (690602.1,1)	Ground

Source: Autopsy Report

DRIVER KINEMATICS

The 55-year-old male driver of the ambulance was seated in a full-rear track position and was unrestrained. At impact, the frontal air bags deployed. The driver responded to the 12 o'clock direction of the impact force by initiating a forward trajectory. The driver loaded the deployed air bag and rode down the force of the frontal crash. The driver then rebounded back into his seat.

As the ambulance was sliding along the roadside and encountering the embankment, the right rear aspect of the ambulance traveled down the embankment resulting in an imbalance of the vehicle. The ambulance suddenly rolled to the right. The driver was ejected through the disintegrated left front window opening and down the embankment. The driver came to rest in the open field approximately 15 m (46 ft) from the point of ejection. His contact with the ground resulted in the fatal blunt force head and thoracic injuries. He succumbed to those injuries 3 days post-crash.

PARAMEDIC DEMOGRAPHICS

Age/Sex:	32-year-old/Male
Height:	191 cm (75 in)
Weight:	186 kg (410 lb)
Seat Position:	Rear facing seat in patient compartment
Eyewear:	None
Safety Belt Usage:	None
Usage Source:	SCI vehicle inspection
Egress from Vehicle:	Assisted due to serious injury
Mode of Transport from Scene:	Air ambulance to a Level 1 trauma center
Type of Medical Treatment:	Hospitalized 6 days

PARAMEDIC INJURIES

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
T1 spinous process fracture	Moderate (650418.2, 7)	Seat back
T2 spinous process fracture	Moderate (650418.2, 7)	Seat back
T12 spinous process fracture	Moderate (650418.2, 7)	Seat back
L1 spinous process fracture	Moderate (650618.2, 8)	Seat back
L2 spinous process fracture	Moderate (650618.2, 8)	Seat back
L3 spinous process fracture	Moderate (650618.2, 8)	Seat back
Sternum fracture	Moderate (450804.2, 4)	Interior loose object
Left lateral tibia plateau fracture	Moderate (853406.2, 2)	Cot frame
Left knee sprain	Moderate (850826.2, 2)	Cot frame
Small avulsion of the left navicular bone	Moderate (852200.2, 2)	Cot frame, indirect
Left side scalp abrasion	Minor (190202.1, 2)	Right wall of patient compartment
Right posterior upper arm and elbow abrasion	Minor (790202.1, 1)	Right wall of patient compartment
Right shoulder and upper arm contusions	Minor (790402.1, 1)	Right wall of patient compartment
Right wrist laceration	Minor (790600.1, 1)	Unknown
Left upper arm laceration	Minor (790600.1,2)	Right wall of patient compartment

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Left forearm abrasion	Minor (790202.1, 2)	Right wall of patient compartment
Left forearm laceration	Minor (790600.1,2)	Right wall of patient compartment
Left hand laceration	Minor (790600.1,2)	Right wall of patient compartment
Lower back, (right side) abrasion	Minor (690202.1,8)	Right wall of the patient compartment
Bilateral knee contusions	Minor (890402.1,3)	Occupant to occupant contact
Left ankle contusion	Minor (890402.1,2)	Cot frame

Source: Discharge Summary

PARAMEDIC KINEMATICS

The unrestrained paramedic was seated on the rear-facing jump seat immediately prior to the crash. At impact with the Chevrolet, the paramedic responded with a forward trajectory (with respect to the vehicle) and loaded the seat back with his torso. His head and neck loaded the integrated head restraint of the seat. The paramedic compressed and bottomed out the seat back and cushion. His loading of the seat back resulted in the spineous process fractures to his back.

In his interview, the paramedic recalled that the cardiac monitor was displaced from the shelf and that it struck him in the chest. This loose interior object was the source of his sternal fracture. He also recalled that the patient was being displaced from the cot, moving forward toward him. The patient contacted the paramedic in the area of his knees causing the contusion to that body region. The patient then continued forward into the paramedic's torso. Coincident with this interaction, the paramedic was rebounding from the jump seat and also responding to the rolling of the vehicle. As the vehicle rolled down the embankment, the paramedic was displaced toward the right side and roof of the patient compartment. Due to his size and weight, the paramedic's momentum also redirected the patient to the right side of the patient compartment. It was likely that the injuries to his left leg, ankle and foot resulted from contact with the cot frame during his displacement.

The patient engaged the restraint net at the end of the bench seat and she was loaded by the paramedic. His loading of the patient resulted in the multiple fatal thoracic injuries sustained by the patient. Their combined loading resulted in the separation of the net's stitching and the separation of the fasteners from the ceiling. The paramedic decelerated from this trajectory and rotated into the entry way impacting the right door/wall of patient compartment. His contact to the right side of the patient compartment resulted in soft tissue injuries to his head and upper extremities. The paramedic came to rest on the right door. He removed from the ambulance by the first responders, transported and hospitalized for 6 days.

PATIENT DEMOGRAPHICS

Age/Sex:	57-year-old/Female
Height:	183 cm (72 in)
Weight:	137 kg (302 lb)
Seat Position:	Supine on a rear-facing cot in a semi-fowlers position for comfort
Eyewear:	None
Safety Belt Usage:	Three separate manual restraints across her abdomen and legs
Usage Source:	Paramedic interview
Egress from Vehicle:	Removed from vehicle by rescue personnel
Mode of Transport from Scene:	Ground ambulance
Type of Medical Treatment:	None, fatally injured during the crash

PATIENT INJURIES

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Multiple lacerations of the heart (including transverse laceration of the right atrium, left and right ventricles partial circumferential laceration along the transverse plane with partial avulsion, and complete avulsion at the attachments of the inferior and superior vena cava)	Maximum (441016.6,4)	Restraint net w/ occupant to occupant loading
Multiple severe lacerations of the pericardium (with herniation of the heart into the left pleural cavity)	Critical (441606.5,4)	Restraint net w/ occupant to occupant loading
Multiple subcapsular hilar lacerations of the spleen	Critical (544228.5,2)	Restraint net w/ occupant to occupant loading
Multiple bilateral hilar lacerations of the lungs	Severe (441450.4,3)	Restraint net w/ occupant to occupant loading
Multiple parenchymal lung contusions (of all lobes, the most severe on the left)	Severe (441410.4,3)	Restraint net w/ occupant to occupant loading
Pulmonary artery laceration (with partial avulsion)	Serious (421006.3,4)	Restraint net w/ occupant to occupant loading
Diffuse subarachnoid hemorrhage of the cerebrum (greatest on the left cerebral convexity)	Serious (140684.3, 3)	Occupant to occupant contact
Subarachnoid hemorrhage of the cerebellum	Serious (140466.3,6)	Occupant to occupant contact
Left comminuted humerus fracture	Serious (752604.3,2)	Right wall of the patient compartment

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Right proximal radius open fracture (with overlying 3.8 x 2.5 cm irregular, full thickness laceration with protruding bone fragments)	Serious (752804.3,1)	Right wall of the patient compartment
Right proximal ulna open fracture (with overlying 3.8 x 2.5 cm irregular, full thickness laceration with protruding bone fragments)	Serious (753204.3,1)	Right wall of the patient compartment
Right distal humerus fracture	Moderate (752600.2,1)	Right wall of the patient compartment
Left clavicle fracture	Moderate (752200.2,2)	Right wall of the patient compartment
Multiple severe bilateral rib fractures (anterolateral and posterior aspects)	Moderate (450220.2,3)	Restraint net with occupant to occupant contact
Bilateral parietal pleura laceration	Moderate (441800.2,3)	Restraint net with occupant to occupant contact
T5 vertebra crushed and fractured with complete transection	Moderate (650430.2,7)	Occupant to occupant contact
Transverse fracture of the sternal body	Moderate (450804.2,4)	Restraint net with occupant to occupant contact
Multiple contusions of the left atrium of the heart	Minor (441002.1,4)	Restraint net with occupant to occupant contact
Vertex of scalp, 0.6 cm linear, partial thickness laceration	Minor (190602.1,7)	Occupant to occupant contact
Right forehead, 7.6 x 5 cm contusion,	Minor (290402.1,7)	Occupant to occupant contact
which includes a superimposed patterned contusion consisting of two parallel 2.5 x 0.3 cm wide lines with a 0.3cm area of central sparing	Minor (290402.1,7)	Restraint net with occupant to occupant loading
Right periorbital contusion	Minor (297402.1,1)	Right wall of the patient compartment
Right periorbital abrasion	Minor (297202.1,1)	Right wall of the patient compartment
Right bridge of nose, 0.6 cm square abrasion	Minor (290202.1,4)	Right wall of the patient compartment
Right cheek extending obliquely between the right alar process to the attachment of the right ear, 13 cm long x 0.3 cm wide, patterned linear contusion	Minor (290402.1,1)	Restraint net with occupant to occupant loading
Left upper lip, 0.3 cm round abrasion	Minor (290202.1,8)	Right wall of the patient compartment

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Left submentum abrasion, 2.5 x 1.3cm rectangular shaped abrasion	Minor (290202.1,8)	Right wall of the patient compartment
Right clavicle, two discontinuous abrasions measuring < 2.5 cm in greatest dimension	Minor (790202.1,1)	Right wall of the patient compartment
Left breast contusions, scattered over medial breast, measuring up to 1.3 cm in greatest dimension	Minor (490402.1,2)	Restraint net with occupant to occupant loading
Medial right breast and sternum abrasion (15 cm x 5cm)	Minor (490202.1,4)	Restraint net with occupant to occupant loading
Abdominal abrasions (linear, strap like), one 30cm x 0.6cm which extends diagonally from the mid epigastrum laterally to the left lateral abdomen, stopping at the level of the umbilicus, and one 13cm x 5 cm which extends discontinuously and obliquely from the right lateral axillary line over an area of 15 cm x 2.5 cm to the level of the umbilicus	Minor (590202.1,0)	Lateral cot restraint
Right upper abdomen contusion	Minor (590402.1,1)	Lateral cot restraint
Left upper back , discontinuous abrasion, 5cm x 2.5 cm	Minor (690202.1,7)	Cot mattress
Right mid back , discontinuous abrasion, 8cm x 2.5 cm	Minor (690202.1,4)	Cot mattress
Lower back, scattered contusions, ranging individually from 1 cm to 0.6cm in greatest dimension	Minor (690402.1,8)	Cot mattress
Left upper arm, 13 cm x 8 cm contusion; Left anterior forearm, 0.6 cm contusion	Minor (790402.1,2)	Right wall of the patient compartment
Left little finger, 0.6 cm partial thickness laceration over the distal interphalangeal joint	Minor (790602.1,2)	Right wall of the patient compartment
Right medial elbow, 2.8 cm laceration	Minor (790602.1,1)	Right wall of the patient compartment
Left medial arm (elbow area), 5 cm x 2.5 cm abrasion; right anterior forearm, scattered abrasions < 5cm in greatest dimension; right little finger, 0.3 cm abrasion on the proximal interphalangeal joint	Minor (790202.1,3)	Right wall of the patient compartment
Right 3rd ring finger, 0.3 cm partial thickness laceration at the proximal interphalangeal joint	Minor (790602.1,1)	Right wall of the patient compartment

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Left lateral thigh, 2.5cm x 0.6cm abrasion	Minor (890202.1,2)	Unknown
Left distal anterior thigh, 0.6 cm irregular abrasion	Minor (890202.1,2)	Unknown
Left lateral thigh, four linear and parallel partial thickness lacerations ranging in length from 0.6cm to 2.5 cm	Minor (890602.1,2)	Unknown
Left medial knee, two abrasions, measuring individually less than 5cm in length	Minor (890202.1,2)	Unknown
Left medial ankle contusion, 5cm x 2.5 cm	Minor (890402.1,2)	Unknown
Left lateral malleolus (ankle area) abrasion, measuring < 5cm	Minor (890202.1,2)	Unknown
Right medial calf contusion, 5cm x 2.5, irregular shaped	Minor (890402.1,1)	Unknown

Source: Autopsy Report

PATIENT KINEMATICS

The 57-year-old female patient was lying on the cot in a semi-Fowler's position. The paramedic reported that she was restrained by three lateral restraints. The restraints were positioned across the lower legs, the upper thighs and abdomen. There was some slack in the restraints. He indicated that a hand could easily slide underneath the restraint. The side rails of the cot were up and locked.

The patient responded to the frontal crash by initiating a forward trajectory. The force of the crash caused her to slide out from underneath the restraints and ramp up the back rest of the cot. Her forward displacement resulted in the soft tissue injuries to her abdomen due to the interaction with the restraints and abrasions to her back from contact with the mattress. As the patient began to separate from the cot, her head and shoulders contacted the paramedic's lower extremities. This occupant to occupant contact resulted in soft tissue injuries to the paramedic. The patient's forward trajectory then displaced her into the paramedic's torso. Her head contact resulted in the forehead contusion and underlying brain hemorrhages. As her head and shoulder's decelerated from the contact with the paramedic's torso and became restrained, the patient's body loaded the thoracic spine resulting in the T5 fracture.

Coincident to this, the paramedic was rebounding rearward. His momentum caused the patient to be redirected. In addition, the vehicle began to rollover, further displacing both occupants to the right. The patient engaged the restraint net located at the forward edge of the bench and was loaded by the displaced paramedic. His loading of the patient against the restraint net resulted in the severe thoracic trauma and soft tissue facial injuries sustained by the patient. The combined loading of the restraint net resulted in the stitching separation and the separation of the fasteners from the ceiling. The patient then impacted the patient compartment's right wall, above the bench seat, and came to rest. She was pronounced deceased at the scene.

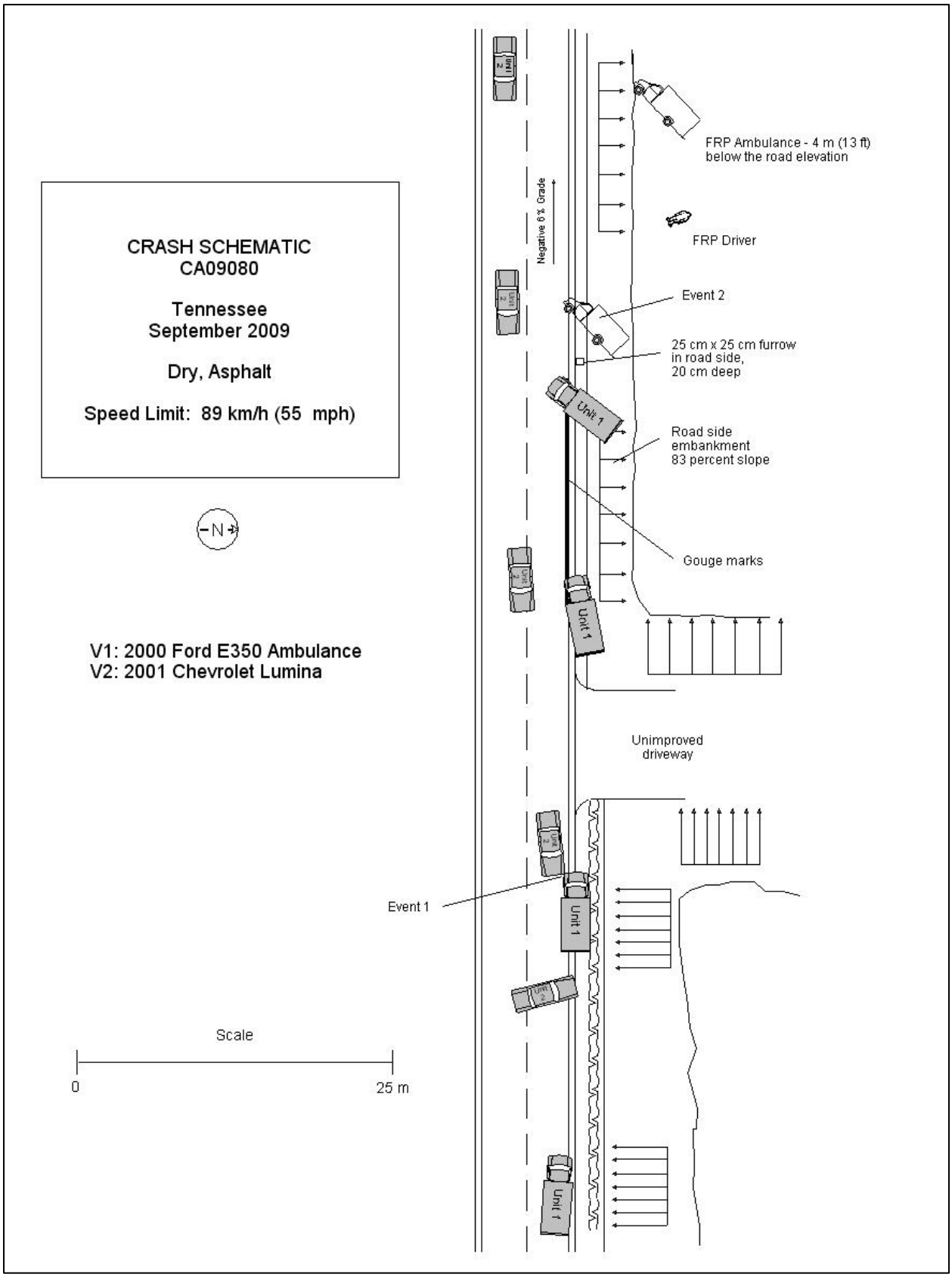


Figure 16: Crash Schematic

ATTACHMENT A

2001 Chevrolet Lumina EDR Data

CDR File Information

User Entered VIN	2G1WL52J811******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	CA09080 LUMINA.CDR
Saved on	Monday, November 23 2009 at 04:55:48 PM
Collected with CDR version	Crash Data Retrieval Tool 3.3
Reported with CDR version	Crash Data Retrieval Tool 3.3
EDR Device Type	airbag control module
Event(s) recovered	Deployment Non-Deployment

IMPORTANT NOTICE: Robert Bosch LLC recommends that the latest production release of Crash Data Retrieval software be utilized when viewing, printing or exporting any retrieved data from within the CDR program. This ensures that the retrieved data has been translated using the most recent information including but not limited to that which was provided by the manufacturers of the vehicles supported in this product.

Data Limitations

Recorded Crash Events:

There are two types of Recorded Crash Events. The first is the Non-Deployment Event. A Non-Deployment Event records data but does not deploy the air bag(s). The SDM can store up to one Non-Deployment Event. This event can be overwritten by an event that has a greater SDM recorded longitudinal velocity change. This event will be cleared by the SDM, after approximately 250 ignition cycles. This event can be overwritten by a second Deployment Event, referred to as a Deployment Level Event, if the Non-Deployment Event is not locked. The data in the Non-Deployment Event file will be locked, if the Non-Deployment Event occurred within five seconds before a Deployment Event. A locked Non Deployment Event cannot be overwritten or cleared by the SDM. The second type of SDM recorded crash event is the Deployment Event. The SDM can store up to two different Deployment Events, if they occur within five seconds of one another. If a Deployment Level Event occurs within five seconds after the Deployment Event, the Deployment Level Event will overwrite any non-locked Non-Deployment Event. Deployment Events cannot be overwritten or cleared by the SDM. Once the SDM has deployed an air bag, the SDM must be replaced.

Data:

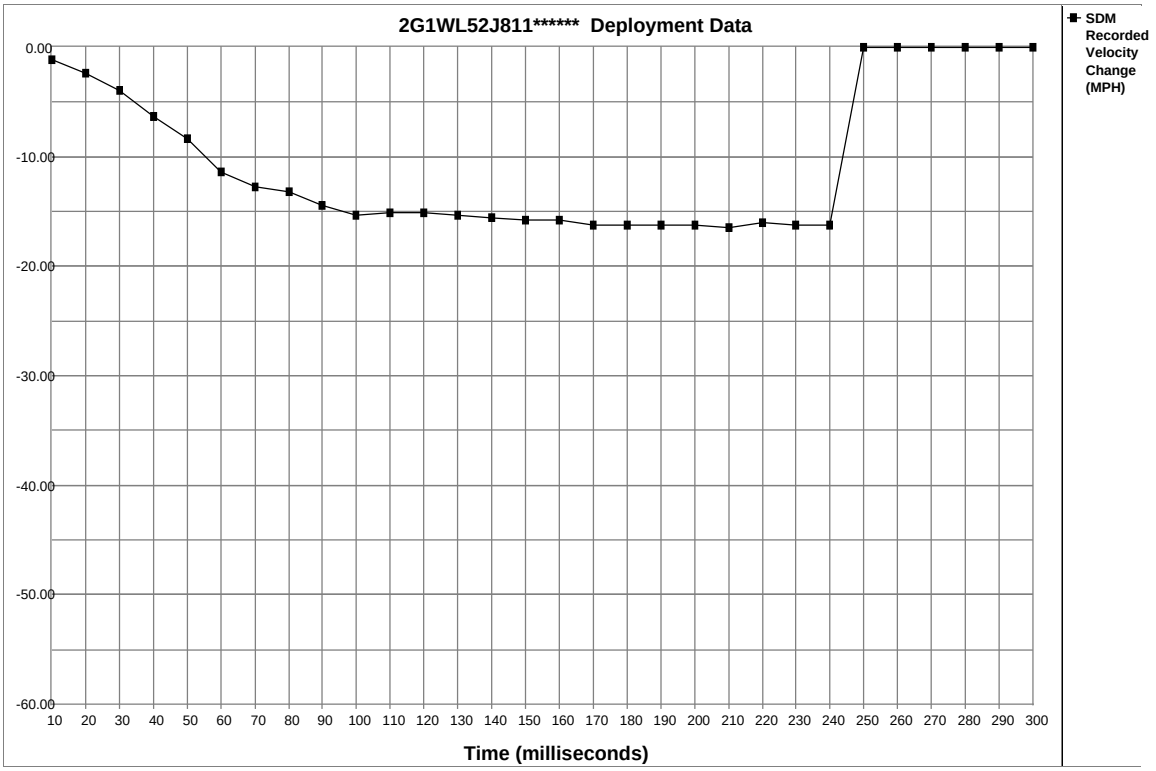
-SDM Recorded Vehicle Longitudinal Velocity Change reflects the change in longitudinal velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Longitudinal Velocity Changeis the change in velocity during the recording time and is not the speed the vehicle was traveling before the event, and is also not the Barrier Equivalent Velocity. The SDM records the first 300 milliseconds of Vehicle Longitudinal Velocity Change after Algorithm Enable. The maximum value that can be recorded for Vehicle Longitudinal Velocity Change is 56 MPH. Velocity Change data is displayed in SAE sign convention.
-Driver's Belt Switch Circuit Status indicates the status of the driver's seat belt switch circuit.
-The Time between Non-Deployment and Deployment Events is displayed in seconds. If the time between the two events is greater than five seconds, "N/A" is displayed in place of the time.
-If power to the SDM is lost during a crash event, all or part of the crash record may not be recorded. An indication of a loss of power would be if the ignition cycles at the event is recorded as zero. Data recorded after that may not be reliable, such as Time Between Non-Deployment and Deployment Events, Driver Belt Switch Circuit Status, and Passenger SIR Suppression Switch Circuit Status.
-All data should be examined in conjunction with other available physical evidence from the vehicle and scene.

Data Source:

All SDM recorded data is measured, calculated, and stored internally, except for the following:
-The Driver's Belt Switch Circuit is wired directly to the SDM.
-The Passenger Front Air Bag Suppression Switch Circuit is wired directly to the SDM.

System Status At Deployment

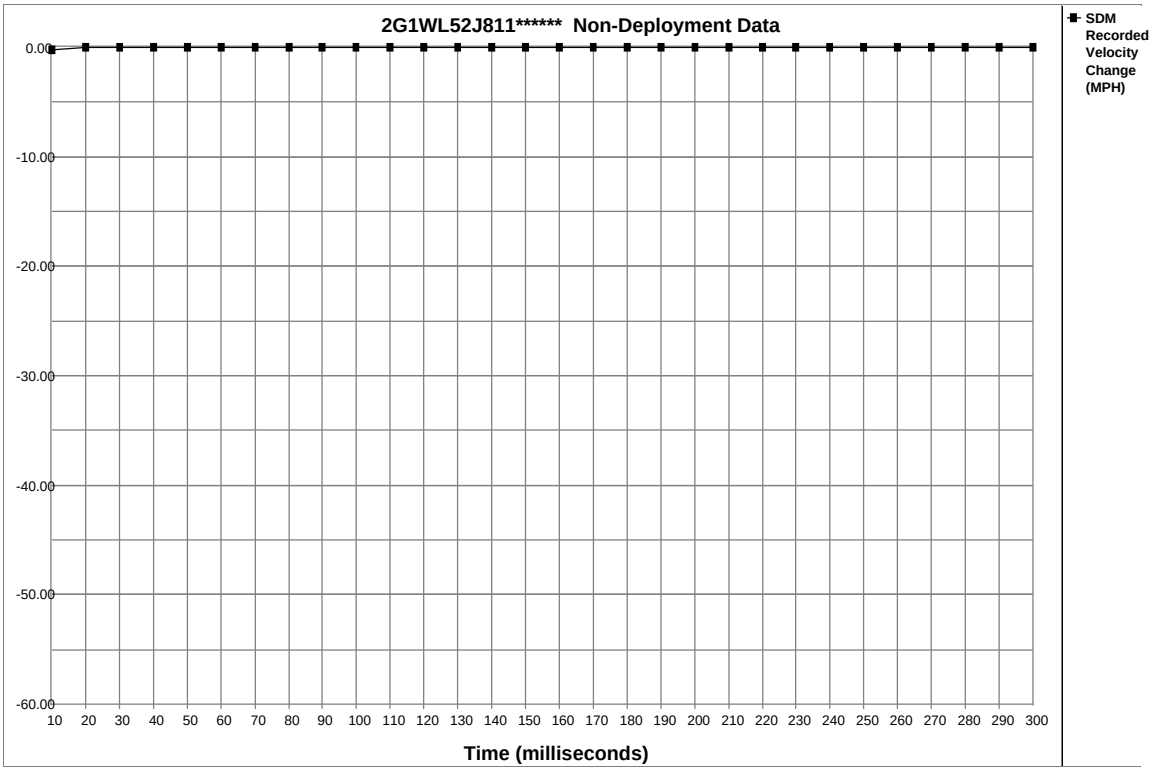
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	UNBUCKLED
Passenger Front Air Bag Suppression Switch Circuit Status	Air Bag Not Suppressed
Ignition Cycles At Deployment	0
Ignition Cycles At Investigation	16093
Time From Algorithm Enable To Deployment Command (msec)	18.75
Time Between Non-Deployment And Deployment Events (sec)	0



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-1.10	-2.41	-3.95	-6.36	-8.34	-11.41	-12.73	-13.16	-14.48	-15.36	-15.14	-15.14	-15.36	-15.58	-15.80
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Recorded Velocity Change (MPH)	-15.80	-16.24	-16.24	-16.24	-16.24	-16.46	-16.02	-16.24	-16.24	0.00	0.00	0.00	0.00	0.00	0.00

System Status At Non-Deployment

SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Passenger Front Air Bag Suppression Switch Circuit Status	Air Bag Not Suppressed
Ignition Cycles At Non-Deployment	16034
Ignition Cycles At Investigation	16093
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	8.75
Maximum SDM Recorded Velocity Change (MPH)	-0.22
A Deployment was Commanded Prior to this Event	No



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00