CRASH DATA RESEARCH CENTER

Calspan Corporation
Buffalo, NY 14225

CALSPAN ON-SITE REAR OCCUPANT PROTECTION PROGARM CRASH INVESTIGATION

CASE NO. – CA05-063

VEHICLE – 2004 CHEVROLERT TRAILBLAZER

LOCATION – NEW YORK

CRASH DATE – DECEMBER 2005

Contract No. DTNH22-01-C-17002

Prepared for:

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

DISCLAIMER

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no responsibility for the contents or use thereof.

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the National Highway Traffic Safety Administration.

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. CA05-063	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Calspan On-Site Rear Occupant Protection Program Crash Investigation Vehicle: 2004 Chevrolet TrailBlazer Location: State of New York		*5. Report Date*: February 2007 *6. Performing Organization Code*	
7. Author(s) Crash Data Research Center		*8. Performing Organization Report No.*	
9. Performing Organization Name and Address Crash Data Research Center Calspan Corporation P.O. Box 400 Buffalo, New York 14225		*10. Work Unit No.* C00410.0000.0332 *11. Contract or Grant No.* DTNH22-01-C-17002	
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: December 2005 *14. Sponsoring Agency Code*	
15. Supplementary Note This on-site investigation focused on the severity of the crash and the 3-point lap and shoulder safety belt system for the rear right passenger of a 2004 Chevrolet TrailBlazer.			

16. Abstract

This on-site investigation focused on the severity of the crash and the 3-point lap and shoulder safety belt system for the rear right passenger of a 2004 Chevrolet TrailBlazer. The TrailBlazer was involved in a severe frontal crash with a large diameter tree that resulted in the death of the 17-year old female rear right passenger. In addition to the rear right passenger, the TrailBlazer was driven by a 17-year old female with a 15-year old female in the front right position and a 14-year old male in the rear left position. The 14-year old was the only unrestrained occupant in the vehicle. The TrailBlazer was equipped with dual-stage frontal air bags for the driver and front right passenger positions that deployed as a result of the crash. The driver responded to the frontal crash forces and loaded the integrated 3-point lap and shoulder belt system. The unrestrained rear left passenger loaded the back of the driver's seat back, deflecting the seat back forward. The driver subsequently loaded through the deployed air bag and deformed the lower steering wheel rim 9 cm (3.5") forward and compressed the steering column shear capsules 5 cm (2.0"). The driver sustained a right femur fracture and was admitted for treatment of her injuries. The front right passenger loaded the integrated belt and the deployed front right air bag. She sustained a police reported fractured hand. The rear left passenger loaded the front seat back and traveled between the seat backs, impacting the top center instrument panel with his lower face. He sustained police reported bilateral mandible fractures and was admitted to a local hospital for surgical repair of the fractures. The rear right passenger was restrained by the C-pillar mounted 3-point lap and shoulder belt system. She was wearing the belt system with the shoulder belt positioned over the right upper arm and the lap belt positioned high on the abdomen. At impact, she initialed a forward trajectory and loaded the belt system. Due to the position of the safety belt webbing, the passenger rotated in a clockwise direction and partially underrode the belt webbing. As a result of belt loading, she sustained a diagonally oriented contusion across her right upper arm that extended across her right chest, under the breast. The lap belt contused her upper abdomen in an arcing pattern to the umbilicus at the mid point. As she submarined the belt system, the latch plate and webbing produced a large contusion over her left lateral flank, extending from the left hip to below the level of the breast. Internally, she sustained an aortic laceration, a partial avulsion of the left kidney, a fracture of lumbar vertebrae L1 and fractures of left ribs 5-12. The rear right passenger was transported to a local hospital where she expired approximately 1.75 hours post-crash.

17. Key Words Rear Occupant Protection Program		*18. Distribution Statement* General Public	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 26	*22. Price*

TABLE OF CONTENTS

CALSPAN ON-SITE REAR OCCUPANT PROTECTION PROGARM CRASH INVESTIGATION
CASE NO. – CA05-063
VEHICLE – 2004 CHEVROLERT TRAILBLAZER
LOCATION – NEW YORK
CRASH DATE – DECEMBER 2005

BACKGROUND

This on-site investigation focused on the severity of the crash and the 3-point lap and shoulder safety belt system for the rear right passenger of a 2004 Chevrolet TrailBlazer. The TrailBlazer **(Figure 1)** was involved in a severe frontal crash with a large diameter tree that resulted in the death of the 17-year old female rear right passenger. In addition to the rear right passenger, the TrailBlazer was driven by a 17-year old female with a 15-year old female in the front right position and a 14-year old male in the rear left position. The 14-year old was the only unrestrained occupant in the vehicle. The TrailBlazer was equipped with dual-stage frontal air bags for the driver and front right passenger positions that deployed as a result of the crash. The driver responded to the frontal crash forces and loaded the integrated 3-point lap and shoulder belt system. The unrestrained rear left passenger loaded the back of the driver's seat back, deflecting the seat back forward. The driver subsequently loaded through the deployed air bag and deformed the lower steering wheel rim 9 cm (3.5") forward and compressed the steering column shear capsules 5 cm (2.0"). The driver sustained a right femur fracture and was admitted for treatment of her injuries. The front right passenger loaded the integrated belt and the deployed front right air bag. She sustained a police reported fractured hand. The rear left passenger loaded the front seat back and traveled between the seat backs, impacting the top center instrument panel with his lower face. He sustained police reported bilateral mandible fractures and was admitted to a local hospital for surgical repair of the fractures. The rear right passenger was restrained by the C-pillar mounted 3-point lap and shoulder belt system. She was wearing the belt system with the shoulder belt positioned over the right upper arm and the lap belt positioned high on the abdomen. At impact, she initialed a forward trajectory and loaded the belt system. Due to the position of the safety belt webbing, the passenger rotated in a clockwise direction and partially underrode the belt webbing. As a result of belt loading, she sustained a diagonally oriented contusion across her right upper arm that extended across her right chest, under the breast. The lap belt contused her upper abdomen in an arcing pattern to the umbilicus at the mid point. As she submarined the belt system, the latch plate and webbing produced a large contusion over her left lateral flank, extending from the left hip to below the level of the breast. Internally, she sustained an aortic laceration, a partial avulsion of the left kidney, a fracture of lumbar vertebrae L1 and fractures of left ribs 5-

Figure 1. Subject vehicle 2004 Chevrolet TrailBlazer.

12. The rear right passenger was transported to a local hospital where she expired approximately 1.75 hours post-crash.

The investigating police officer notified the NHTSA Regional Office in New York State on the day following the crash. The notification was forwarded to NHTSA's Crash Investigation Division and telephone follow-up was conducted with the officer. Based on the police reported severity of the crash and the outcome of the belted rear right passenger, the crash was assigned to the Calspan Special Crash Investigations team on Monday, December 5 as an on-site investigative effort. The SCI team contacted the investigating officer and gained cooperation to inspect the vehicle at the tow facility on Tuesday, December 6. This Preliminary Summary will be upgraded to Final following the acquisition of the medical records. The report will be linked to the Electronic Data System for review.

SUMMARY

Crash Site

The crash occurred on a two-lane, north/south roadway **(Figure 2)** in a residential area during dark, evening hours. The roadway was surfaced with asphalt and was delineated with double yellow centerlines and white edge lines. The travel lanes were 3.2 m (10.5') in width and were bordered by 1.2 m (4.0') paved shoulders. At the time of the crash, the road surface was wet. Immediately following the crash, the weather changed to a light snowfall. The TrailBlazer was traveling in a northerly direction on a straight segment of road with a downgrade of 1.5 percent that transitioned to a sag at the crash site. The speed limit was posted at 64 km/h (40 mph) and reduced to 48 km/h (30 mph) approximately 0.8 km (0.5 mile) south of the crash site. Single family residences were located on both sides of the roadway. In the vicinity of the crash site, several large diameter trees were located 5.2 m (17.0') outboard of the east edge line. A wooden utility pole was located 2.7 m (8.8') outboard of the edge line with the struck tree located directly east of the pole. The struck hardwood tree measured 48 cm (19") in diameter. The Crash Site Schematic is included as **Figure 16** at the end of this summary.

Figure 2. Overall view of the north/south roadway.

Vehicle Data – 2004 Chevrolet TrailBlazer

The subject vehicle in this single vehicle run-off-road crash was a 2004 Chevrolet TrailBlazer, 4-door sport utility vehicle. The TrailBlazer was manufactured in 11/03 and was identified by Vehicle Identification Number (VIN) 1GNDT13S342 (production number deleted). The vehicle was body-on-frame design powered by a conventionally mounted 4.2 liter gasoline engine linked to a four-speed automatic transmission with a console mounted shifter. The TrailBlazer was equipped with four-wheel drive, power-assisted four-wheel disc brakes with anti-lock (ABS), and power-assisted steering. The

vehicle was also equipped with OEM 5-spoke alloy wheels with BF Goodrich Open Trail T/A all-season tires with a manufacturer specified pressure of 240 kPa (35 PSI). The specific tire data at the time of the SCI inspection is identified in the following table:

Position	Measured Tire Pressure	Measure Tread Depth	Damage
Left Front	209 kPa (30.5 PSI)	3 mm (4/32”)	None
Right Front	209 kPa (30.5 PSI)	3 mm (4/32”)	None
Left Rear	240 kPa (35.0 PSI)	4 mm (5/32”)	None
Right Rear	247 kPa (36.0 PSI)	3 mm (4/32”)	None

The interior of the TrailBlazer was configured with front bucket seats with reclining seat backs and adjustable head restraints that were adjusted to the full-down positions. Both seat backs were loaded by the rear seat passengers and deformed forward. A full-length center console that extended to the aft edge of the front seat tracks was present with center armrest and rear storage compartment.

The rear seat was a 60/40 forward folding spilt bench seat, driver side wide. The seat cushions were equipped with mechanical locks with a pull tab release that was located at the center rear aspect of the seat cushion. This allowed the seat cushions to rotate 90 degrees forward to a vertical position. The rear seat backs were equipped with mechanical release levers on the upper outboard aspect of the backs. The seat backs folded forward against the seat cushions forming a flat floor for the full cargo area. The rear seat backs were equipped with adjustable head restraints for the outboard positions. Both were adjusted to the full down positions. As the seat back locks are released to fold the backs forward, the head restraints released from a locked vertical position and hinged rearward, which allowed the seat backs to fold against the cushions when stowed for the storage application of the cargo area.

The seating and interior surfaces were cloth. The driver’s seat was power adjusted while the front right seat was manually adjusted. The TrailBlazer was equipped with power windows, power door locks, and power adjusted rear view mirrors. The interior rear view mirror was mounted to the windshield and mounted above the mirror was an aftermarket antenna for a remote starter system.

Figure 3. Chevrolet's northbound trajectory.

Crash Sequence

Pre-Crash

The 17-year old female driver of Chevrolet TrailBlazer was traveling in a northerly direction on the two-lane roadway **(Figure 3)**. As she entered the residential village area, the roadway speed limit reduced from 64 km/h (40 mph) to 48 km/h (30 mph). The TrailBlazer was equipped with an Event Data Recorder (EDR) that was downloaded during

the SCI investigation. This EDR recorded five seconds of pre-crash data. Based on the output, the vehicle's speed was recorded at 85 km/h (53 mph) at the five second interval with no throttle or brake applications. Based on this data, the driver was probably coasting toward the crash site as she traveled on the straight segment of road with a 1.5 percent negative grade. Physical evidence at the crash site consisted of two short yaw marks that were present on the painted double yellow centerlines. These marks indicated that the driver probably crossed the centerline of the roadway and applied a rapid clockwise (CW) steering input in an attempt to regain the northbound travel lane. This steering input induced a slight CW yaw to the trailblazer.

The rapid CW steering maneuver redirected the vehicle across the northbound travel lane on an angle trajectory toward the right (east) road edge. There was no physical evidence off-road to support the vehicle's trajectory. The Trailblazer departed the east shoulder onto a lawn area and traversed a residential driveway. The EDR data recorded a decrease in vehicle speed due to engine braking from the 85 km/h (53 mph) speed at the five-second interval to 72 km/h (45 mph) at the one-second pre-crash interval. The driver did not apply the brakes, however, she did apply 13 percent throttle at the two-second interval. Although not EDR recorded, the driver probably applied a rapid counterclockwise (CCW) steering input in a final attempt to regain the roadway. At impact, the steering wheel was rotated approximately 180 degrees.

Crash

The center frontal area of the Trailblazer impacted the 48.3 cm (19") diameter tree **(Figure 4)** that was located 5.2 m (17') outboard of the east edge line. The crash resulted in an impact force of 12 o'clock. The impact was located between the front frame rails of the TrailBlazer and crushed the bumper beam to a depth of 65 cm (25.5"). The EDR recorded a longitudinal velocity change of 69 km/h (-43.05 mph). The damage algorithm of the WinSmash program computed a total velocity change of 42 km/h (26 mph) with longitudinal and lateral components of -42 km/h (26 mph) and 0 km/h, respectively. The WinSmash damage algorithm under estimated the delta V for this crash due to the narrow impact. The crash deployed the frontal air bags for the driver and front right passenger positions. The EDR recorded Stage 2 deployments for both frontal air bags.

Figure 4. Struck 48 cm (19") diameter tree

As the vehicle crushed to maximum engagement, the impact induced a CCW rotation and separated from the struck tree. The TrailBlazer rotated approximately 90 degrees CCW from its at-impact position, before coming to rest on the lawn area, facing in a westerly direction. At rest, the front of the TrailBlazer was in close proximity to the struck tree.

Post-Crash

Immediately following the crash, residents of the crash site alerted the 911 system and requested police and medical assistance. The first arriving officer on-scene observed all four occupants of the vehicle at rest in the vehicle. The driver was conscious, belted, and police reported as pinned in the vehicle. The front right passenger was conscious and did not appear to be in pain. She was observed as belted by the reporting officer. The rear left passenger was bleeding heavily from the mouth and was not restrained. He did appear to be in obvious pain. The rear right passenger was police reported as slumped in her seated position and restrained by the manual safety belt system. She was unconscious, pale, and unresponsive.

As medical personnel arrived on-scene, the driver was removed from the vehicle and transported by ambulance to a regional trauma center where she was admitted for treatment of a right femur fracture. The front right passenger sustained a reported hand fracture and was transported to a local hospital for treatment. Her admission status was unknown at the time of this summary report. The rear left passenger was transported by ambulance to the regional trauma center where he was admitted for surgical repair of the mandible fractures. Emergency medical personnel restored a pulse to the rear right passenger and transported her to a local hospital where she expired approximately 1.75 hours following the crash.

Vehicle Damage

Exterior

The 2004 Chevrolet TrailBlazer sustained severe frontal damage as a result of the center front tree impact **(Figure 5)**. Maximum crush was measured at 65 cm (25.5”) at the centerline of the bumper reinforcement beam. The direct contact damage was measured on the hood face as the bumper fascia fractured and partially separated from the bumper beam. The direct contact damage began 29 cm (11.5”) right of center, extending 42 cm (16.5”) to the left, and ending at a point 13 cm (5.0”) left of the vehicle’s centerline. The impact, which was centered between the front frame rails, deformed the front bumper beam to a U-shape resulting in a Field L measurement of 50 cm (19.5”). The crush profile measured at the level of the bumper beam was as follows: C1 = 3 cm (1.1”), C2 = 59 cm (23.4”), C3 = 63 cm (24.75”), C4 = 65 cm (25.5”), C5 = 57 cm (22.4”), C6 = 1 cm (0.5”). The Collision Deformation Classification (CDC) for this impact was 12-FCEN-3.

Figure 5. Frontal damage to the 2004 Chevrolet TrailBlazer.

The frontal crush was absorbed through the body-on-frame design. The body was mounted to the box beam frame with eight rubber isolated mounts. As the frontal structure of the TrailBlazer engaged the tree, the frame was displaced rearward relative to

the body of the vehicle. This was evidenced by the separation of all body mounts from the sheet metal body and the rearward displacement of the rear bumper beam against the rear bumper fascia. The total extent of body and frame displacement was 13 cm (4").

All four side doors remained closed during the crash sequence. Both front doors were opened post-crash without the need of rescue equipment to aid in the removal of the front seat occupants. Due to the deformation of the body, the latches and strikers were misaligned and the doors would not close. Both rear doors remained operational post-crash. The rear liftgate was not damaged, however, due to the power lock system, the door would not unlock. The hinged backlight glazing remained in tact and operational.

The windshield was 100 percent fractured due to body deformation. There was no bond separation or integrity loss of the laminate glazing.

All door glass and side quarter windows remained intact. Both right side doors windows were partially open at the time of the SCI inspection.

Interior

The interior of the subject TrailBlazer sustained severe damage that was associated with exterior deformation, passenger compartment intrusion, and occupant contact. Maximum intrusion involved the rearward displacement of the toe pan at the driver and front right passenger positions. Additional frontal intrusions involved rearward displacement of the left instrument panel and foot pedals.

Figure 6. Driver's contact points to the steering wheel and knee bolster.

Occupant contact damage was noted at all four positions of the vehicle. The driver loaded the integrated belt system which resulted in longitudinal creases of the lap belt webbing. Her face loaded the deployed driver's air bag, evidenced by a large make-up transfer to the face of the bag. This transfer is described in detail in the Frontal Air Bag Section of this report.

As the driver loaded the belt system and the deployed air bag, she was displaced further forward by the forward deflection of the front left seat back as it was loaded by the unrestrained rear seat passenger. She loaded through the deployed air bag and engaged the lower right quadrant of the steering wheel rim. Her loading of the wheel rim fractured the lower right spoke and deformed the wheel rim 10 cm (3.75") forward. The driver's loading force was transmitted into the energy absorbing steering column, compressing the column and completely separating the shear capsules from the blocks. The left shear capsule was separated 4 cm (1.5") while the right unit was separated 5 cm (2"). The steering wheel was rotated approximately 180 degrees, therefore all references

to the damage steering assembly reflect the wheel in this position. **Figure 6** is an overall view of the driver's contact points.

The driver's knees and lower extremities impacted the knee bolster. Pinkish fabric transfers evidenced the contact points. The left knee/lower leg contact was located 20 cm (8") left of the mid point of the steering column and extended 3-23 cm (1.25-9.25) from the top of the bolster panel. The fabric transfer and associated scuff mark was 3 cm (1.25") in width. The driver's right knee impacted the lower right corner of the bolster panel at its junction with the center console. The triangular fabric transfer on the bolster was located 16-23 cm (6.25-9.0") right of the column and 16-28 cm (6.4-11.0") below the top surface of the panel.

The plastic bolster panel was not fractured; however, it was fractured from its mounting points and was completely separated from the instrument panel. The panel was reinforced by a plastic sub panel that was affixed to the inside surface of the bolster. This panel was not damaged. Two sheet metal energy absorbing brackets backed up the bolster on both sides of the steering column. These brackets were attached to the aluminum sub panel and corrugated for compression. The right bracket was not damaged as the knee contact was located below the level of the bracket. The left bracket was compressed 8 cm (3") as a result of left knee loading in the area of the bracket **(Figure 7)**.

Figure 7. Compressed left bolster energy absorbing bracket and left shear capsule.

The front right passenger loaded the integrated safety belt system as she responded to the frontal crash forces. Her loading of the belt system abraded the latch plate and the upper pivot at the top of the seat back. Additionally, the belt webbing was cupped from occupant loading with longitudinal creases/stretching to the lap belt webbing.

The front right passenger possibly braced against the windshield with her left hand. Four left hand finger prints were present on the windshield glazing, located 27-38 cm (10.75-15.0") right of center and 11-20 cm (4.5-8.0") below the header. Located immediately below these prints was an impact to the glazing with fracturing and an outward bowing of the laminated glazing. This contact point was attributed to the palm of the hand and was 13 cm (5") in diameter, centered 36 cm (14") right of center and 24 cm (9.5") below the windshield header. There was no tissue or hair within the fracture site.

There were no other contact points within the front right occupant space attributable to the front right passenger.

The rear left male passenger was unrestrained. He initiated a forward trajectory and loaded the front seat backs and the rear aspect of the center console **(Figure 8)**. He primarily loaded the inboard aspect of front left seat back, bending the seat back frame and deforming the entire seat back forward. The direct contact area on the seat back involved a 18x18 cm (7x7") area at the mid point of the inboard side. The outboard aspect of the seat back was displaced forward approximately 10 cm (3") to a measured angle of 17 degrees while the inboard aspect was displaced approximately 20 cm (8") to a angle of 5 degrees aft of vertical. The front left seat back remained rigid.

Figure 8. Rear left passenger's trajectory and contact points to the front seat backs.

The rear left passenger impacted the inboard aspect of the front right seat back. A scuffmark was noted to the inboard side surface of the seat back. Additionally, the seat back was deformed in a forward direction, most notably on the inboard aspect of the seat back. The entire front right seat was rotated forward.

The lower extremities of the rear left passenger impacted and fractured the plastic storage compartment at the aft edge of the center console. This unit was completely fractured with fragmenting of the rigid plastic shell. The armrest/cover remained intact.

The unrestrained rear left passenger continued forward between the front seat backs and impacted the upper mid instrument panel with his face. Three linear cuts of the top center instrument panel were related to upper teeth contact **(Figure 9)**. Immediately below these vinyl cuts was a second area of contact from his lower teeth. This contact to the trim panel surrounding the upper vent louvers displaced the trim panel and was evidenced by several small gouges (teeth marks). His upper arm or torso impacted the center mid instrument panel that surrounded the HVAC and radio controls. The radio face plate was fractured and the trim panel was scuffed.

Figure 9. Upper center instrument panel contact from the rear left passenger.

The rear left passenger's hand or arm impacted the windshield mounted rear view mirror. The mirror was not fractured; however, it was separated from the windshield mounting

point. The interior layer of glazing separated from the laminate at the bonded surface of the mirror mount.

The rear left passenger rebounded into the rear left position. Body fluid spatters were present along his rebound trajectory, on the front left seat back and rear seat and door panel areas.

The rear right passenger loaded the manual safety belt system which minimized her contact with interior components. Her safety belt loading is discussed in the Manual Safety Belt Section of this report. The rear right passenger did impact the front right seat back along with the rear left passenger. Her loading of the seat back could not be isolated as the seat back was deflected forward, primarily by the rear left passenger. Additionally, the entire front right seat assembly was rotated forward.

Second Row Seat Backs

The second row seat was configured as a three passenger 60/40 spilt bench seat, left side wide. The rear seat folded forward to provide additional cargo space. The left aspect of the seat cushion was 81 cm (32") in width and was designed for the left rear and center rear positions. The right seat cushion was 51 cm (20") in width. Both cushions were equipped with a manual locks to secure the cushions in the open position for occupant seating. Release of these locks was accomplished by pulling on a vinyl tab that was located at the rear center point of the seat bight of the cushion. Release of the locks provided forward rotation of the seat cushions to a vertical position behind the front seats. Both seat cushion locks remained engaged during the crash.

Figure 10. View of the rear seat backs from the right side.

The rear seat backs were spilt to the same dimensions as the cushions. The seat backs were equipped with adjustable head restraints and manually operated locks. The seat back lock release levers were located on the upper outboard aspect of both seat backs. To release the locks, the lever was pulled upward and this would allow for forward rotation of the seat backs to a horizontal position. As the seat back locks were released, the head restraint stalks unlocked and the head restraint rotated rearward as the seat back was folded forward against the vertical seat cushion.

Figure 11. View of deformed rear seat backs from the rear cargo area.

Both seat back locks were secure post-crash and were examined in this position during this SCI inspection. **Figures 10 and 11** are lateral and rear views from the right side and rear cargo area respectively.

The rear seat backs were deflected forward by the force of the crash and from minimal loading of loose cargo placed in the cargo area of the vehicle. At the time of the SCI inspection, this cargo consisted of several loose leaf notebooks, a skateboard, numerous clothing items, and a partial case of 24 oz water bottles. The case originally contained 28 bottles, however, approximately eight were found in the vehicle post-crash. Abrasions and subtle evidence of impact to the rear seat backs was noted during this investigation.

The rear left seat back deformed forward and was measured at a post-crash angle of 22 degrees forward of vertical. The top aspect of the seat back was displaced approximately 25 cm (10") forward of its original position. There was no loading of the seat back by the rear seat passengers.

The rear right seat back was deflected forward and rotated slightly in a clockwise direction. The inboard aspect of the seat back was deformed forward to a vertical position. The outboard aspect of the seat back was deformed to a measured angle of 5 degrees aft of vertical. Both seat backs were deformed at the lower hinge points and were not bent along the height of the backs.

Manual Safety Belt Systems

The Chevrolet TrailBlazer was equipped with integrated 3-point continuous loop safety belt systems for the front seated positions. Both belt systems were equipped with sliding latch plates and retracted into the outboard top aspect of the seat backs. The driver's side was equipped with an Emergency Locking Retractor (ELR) while the front right position was equipped with a switchable ELR/Automatic Locking retractor (ALR). Both retractors incorporated the belt sensitive feature which locked the retractor during rapid spool-out of the webbing.

The driver was observed in the vehicle post-crash, restrained by the integrated belt. In addition, the EDR data listed the driver's belt switch status as Buckled. The driver's latch plate did not yield evidence of loading (frictional abrasions) and the plastic pivot point at the top of the seat back failed to show frictional abrasions commonly associated with this severity of crash. Longitudinal creasing from driver loading was present in the lap belt webbing. The creasing began 5 cm (2") above the latch plate stop button and extended 36 cm (14") above. (The referenced stop button was located 17 cm (6.5") above the seat cushion.) The front left integrated belt retracted into the seat back post-crash and would not spool-out at the time of the SCI inspection. It should be noted that the driver's loading against the belt system was reduced as the rear seat passenger impacted and deformed her seat back forward, allowing her to engage the deployed air bag and the steering assembly.

The front right integrated belt system was worn by the female passenger. The latch plate yielded frictional abrasions on both sides of the crossbar as the continuous loop webbing

was tensioned by occupant loading during the crash. The upper pivot at the top of the seat back was displaced due to loading. This component had a full-width [5.7 cm (2.25")] frictional abrasion from belt webbing interaction as the passenger loaded the belt webbing. The lap belt webbing had similar longitudinal creasing to the driver's webbing. The passenger's abdominal loading of the lap belt webbing resulted in an outward cupping of the webbing that began at the latch plate stop button, extending 33 cm (13") upstream of the stop button.

The rear outboard seated positions were equipped with continuous loop 3-point lap and shoulder belt systems affixed to the respective C-pillars. The buckle assembles were affixed to the seat cushions. Both outboard rear seat belt systems were equipped with sliding latch plates, fixed D-rings, and switchable ELR/ALR retractors. The center rear position was equipped with an integrated belt system, integrated into the left seat back of the 60/40 split bench seat. The retractor was ELR/ALR and the latch plate was sliding.

The rear left passenger did not wear the safety belt system at the time of the crash. The lack of belt usage was supported by his trajectory and subsequent contacts points to the front seat backs and the upper mid instrument panel. The safety belt system did not yield evidence of loading. In addition, he was observed in the vehicle post-crash unrestrained. The rear center position was not occupied at the time of the crash.

The rear right passenger was restrained by 3-point lap and shoulder safety belt system **(Figure 12)**. Belt usage was supported by loading evidence on the webbing and hard points of the manual restraint. Autopsy images that were viewed by the SCI investigators showed safety belt contusions of the abdomen, left lateral flank, diagonally across the chest extending onto the left upper arm. The internal injures discussed in the Rear Right Passenger Injury section of this report resulted from the safety belt system.

The rear right safety belt system was removed from the passenger intact and partially retracted onto the C-pillar mounted ALR/ELR retractor. Extensive loading evidence was documented for the belt system with all points of interest referenced from the latch plate stop button that was fastened to the mid point of the webbing 44 cm (17.5") above the outboard seat frame mounted anchor point.

Figure 12. Rear right safety belt.

Figure 13. Loading and creasing of the rear right safety belt.

With the belt system buckled into the inboard mounted buckle assembly, the referenced stop button was located at the approximate mid pint of the lap belt webbing. Longitudinal creasing of the lap belt webbing began at the stop button and extended 13 cm (5") downstream toward the anchor. A frictional abrasion on the webbing from spooling through the sliding latch plate was located 19-33 cm (7.5-13.0") above the stop button. The full length of the lap belt webbing was curled in an outward direction from occupant loading **(Figure 13)**. The shoulder belt aspect of the continuous loop system yielded an outward curling of the webbing that extended 55-131 cm (21.5-51.5") above the referenced stop button. A black diagonally oriented frictional D-ring transfer was located 144-150 cm (56.5-59.0") above the stop button. The D-ring transfer extended full width across the webbing.

Frontal Air Bag System

The 2004 Chevrolet TrailBlazer was equipped with dual-stage frontal air bags for the driver and front right passenger positions. Both air bags deployed as a result of the frontal impact with the tree.

Figure 14. Deployed driver's frontal air bag.

The driver's air bag was concealed by symmetrical I-configuration module cover flaps. The cover flaps open at the designated tear points. The driver's air bag measured 67 cm (26.5") in diameter in its deflated state **(Figure 14)** and was tethered by two wide band tethers located at the 12 and 6 o'clock positions. The bag was vented by two 2.5 cm (1.0") ports located at the 11 and 1 o'clock sectors. The centerline of the ports were located 13 cm (4") inboard of the internally sewn peripheral seam.

Figure 15. Deployed front right air bag.

Although there was no damage to the bag, a large make-up transfer evidenced the driver's facial contact with the deployed bag. The flesh-tone transfer was located over the face of the bag, encompassing all four quadrants. The transfer extended 8 cm (3") right of the vertical centerline to 10 cm (4") left of the referenced centerline. The vertical dimensions of the transfer extended 8 cm (3") below the horizontal centerline to 20 cm (7.75") above the CL. Located within the make-up transfer, was a black eye make-up transfer. This transfer was located 13-15 cm (5.25-5.75") above the horizontal CL and 0.6-3 cm (0.25-1.25") left of the vertical reference line. It should be

noted that the steering wheel was rotated approximately 180 degrees and that all measurements were documented and referenced with the wheel in this position.

The front right air bag deployed from a mid mount module cover flap that measured 15 cm (5.75") vertically and 33 cm (13.0") horizontally. The cover flap was a single ply molded vinyl flap that was hinged at the top surface, which allowed the flap to open in an upward direction.

The deployed front right air bag **(Figure 15)** measured 48 cm (19") vertically and 52 cm (20.5") horizontally. A single wide band tether limited the bag to a maximum excursion of 35 cm (14"), measured from the leading edge of the module to the tether location. The bag was vented by two 4 cm (1.5") diameter ports located at the lateral aspects of the bag. There was no damage or contact evidence noted to the bag. Several post-crash related blood spatters were present, but these were not reflective of occupant contact.

Event Data Recorder

The TrailBlazer's Event Data Recorder (EDR) was downloaded during the SCI inspection of the vehicle. The EDR was downloaded using the Vetronix Crash Data Retrieval Tool with software version 2.7. The battery was damaged by the crash and the firefighters cut all cabling to the battery post-crash. The download was accomplished by connecting the CDR tool directly to the console mounted Sensing and Diagnostic Module (SDM). Power was provided by the 110V adaptor. A single deployment file was retrieved from the download.

The EDR System Status at Deployment provided the following:

> The driver's Safety Belt Switch Circuit Status was listed as Buckled. The maximum SDM recorded velocity change was -69 km/h (-43.05 mph) at 130 msec of Algorithm Enable (AE). The driver and passenger frontal air bags met First Stage deployment command at 7.5 msec of AE and the Second Stage at 10 msec.

The EDR Output is included as **Attachment A** of this Report.

Occupant Data/Demographics

Driver

Age/Sex:	17-year old/Female
Height:	Unknown
Weight:	Unknown
Seat Track Position:	Mid
Safety Belt Usage:	Integrated 3-point lap and shoulder belt
Usage Source:	Vehicle inspection
Egress from Vehicle:	Removed by rescue personnel
Mode of Transport From Scene:	Ambulance to a regional trauma center
Type of Medical Treatment:	Admitted for treatment of her injuries

Driver Injuries

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Fractured right femur	Serious (851800.3,1)	Knee bolster

Driver Kinematics

The driver of the Chevrolet TrailBlazer was seated in a mid track position and was restrained by the integrated 3-point lap and shoulder safety belt system. At impact, the frontal air bag system deployed. The downloaded EDR data recorded a Stage 2 deployment at 10 ms of algorithm enable. The driver responded to the 12 o'clock direction of force impact by initiating a forward trajectory. She initially loaded the integrated safety belt system and the deployed air bag. Belt loading was verified by longitudinal creases of the lap belt webbing. Her air bag loading was evidenced by a large flesh-tone make-up transfer of the face of the bag with an eye make-up transfer within the large transfer.

As the driver engaged the restraint system, the unrestrained rear left passenger initiated a forward trajectory and impacted the front left seat back. His loading force against the seat back deformed the right side of the seat back approximately 30 cm (12") forward (residual). The dynamic displacement of the seat back was estimated at 33-41 cm (13-16"). This subsequent deflection of the seat back resulted in additional forward travel of the driver. The integrated belt system moved forward with the seat back, offering a reduced level of protection to the driver.

During the forward movement of the driver, the left instrument panel intruded rearward which resulted in an upward displacement of the steering assembly. The steering wheel was rotated approximately 180 degrees as the driver loaded through the deployed air bag and engaged the lower right quadrant of the rotated steering wheel rim. This driver engagement resulted in 9 cm (3.5") of forward bending of the steering wheel rim and a fracture the steering wheel spoke (upper left spoke when wheel is positioned in 12/6 position). In addition to the steering wheel deformation, the driver's loading force was transmitted into the energy absorbing steering column. Shear capsule separation was measured at 4 cm (1.5") on the left side and 5 cm (2") on the right.

The driver's knees and lower legs impacted the intruded (rearward) knee bolster. The left knee contact consisted of a vertically oriented pink fabric transfer that was located 23 cm (9") left of the steering column and extended the full height of the plastic bolster panel. The right knee was pocketed into the lower right corner of the knee bolster panel and the center console. A similar pink fabric transfer evidenced the contact on both components. The outer bolster panel was reinforced with an underlying panel which rested against the two convoluted sheet metal deflectors. The right side deflector was not compressed; however, the left side was compressed 8 cm (3"). The pocketing of the right knee against the lower bolster panel and console, in conjunction with the loading by the driver and subsequent loading by the rear seat passenger, resulted in the right femur fracture.

The driver was removed from the vehicle by rescue personnel and transported to a regional trauma center where she was admitted for surgical repair of the femur fracture. She was discharge from the Intensive Case Unit on day five of her hospitalization and transferred to a floor in good condition.

Front Right Passenger

Age/Sex:	15-year old/Female
Height:	Unknown
Weight:	Unknown
Seat Track Position:	Mid-to-rear track
Safety Belt Usage:	Integrated 3-point lap and shoulder belt
Usage Source:	Vehicle inspection
Egress from Vehicle:	Rescue personnel
Mode of Transport From Scene:	Ambulance
Type of medical Treatment:	Transported to a local hospital, admission status unknown

Front Right Passenger Injuries

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Fracture of the left hand	Moderate (752500.2,2)	Windshield

Front Right Passenger Kinematics

The front right female passenger was seated in a mid-to-rear track position and was restrained by the integrated 3-point lap and shoulder belt system. Belt usage was supported by load-induced frictional abrasions on the latch plate and upper seat back pivot. The lap belt webbing was cupped and stretched from passenger abdominal loading.

Immediately prior to impact, the front right passenger may have attempted to brace against the mid windshield. At impact, the front right passenger air bag deployed with an EDR recorded Stage 2 deployment command at 10 ms of AE. She initiated a forward trajectory in response to the 12o'clcok impact force. Four left finger prints (skin oil transfers) were noted to the windshield 27-38 cm (10.75-15.0") right of center. A 13 cm (5") diameter fracture site to the windshield was located directly below the finger prints with an outward bowing. This fracture was attributed to the palm of the left hand. Although unconfirmed by hospital medical records, the investigating officer noted that the front right passenger sustained a fracture of the hand (aspect unknown).

The front right passenger loaded the integrated safety belt system. Her loading was evidenced by the frictional abrasions to the hard points of the webbing. She also loaded the deployed front right air bag. The combination of restraints protected the front right passenger from potential serious injury.

The restrained rear right passenger loaded the back surface of the front right seat back. Her loading force deformed the seat back and rotated the seat assembly forward. The front right passenger was not injured as a result of the seat back loading. There were no knee contacts to the glove box door of the TrailBlazer.

The front right passenger was removed from the vehicle by rescue personnel and transported to a local hospital where she was treated for her injury. Her admission status is unknown.

Rear Left Passenger

Age/Sex:	14-year old/Male
Height:	Unknown
Weight:	Unknown
Seat Track Position:	Fixed
Safety Belt Usage:	None
Usage Source:	Vehicle inspection, occupant trajectory and resultant injuries
Egress from Vehicle:	Rescue personnel
Mode of Transport From Scene:	Ambulance
Type of medical Treatment:	Transported to a regional trauma center where he was admitted for treatment of his injuries

Rear Left Passenger Injuries

Injury	Injury Severity (AIS90/Update 98)	Injury Source
Bilateral fractures of the mandible	Moderate (250600.1,3)	Upper mid instrument panel

Rear Left Passenger Kinematics

The rear right male passenger of the TrailBlazer was not restrained by the manual 3-point lap and shoulder belt system. The lack of safety belt usage was determined from the trajectory of the passenger, his contacts points within the vehicle, and the lack of loading evidence on the safety belt system.

At impact with the tree, the rear left passenger initiated a forward trajectory in response to the 12 o'clock direction of force. As he initiated his trajectory, the TrailBlazer began to rotate in a counterclockwise direction. This rotation resulted in the vehicle rotating out from under the passenger as he continued on a straight line trajectory with respect to the 12 o'clock direction of force. With respect to the vehicle, the unrestrained passenger moved toward the center of the vehicle as he continued forward.

The passenger's lower extremities impacted and fractured the plastic storage compartment of the center console. This contact shattered the plastic and separated the padded armrest/cover. No lower extremity injury was reported for this contact event.

The passenger's left knee and hip impacted the inboard aspect of the front left seat back, deforming the frame of the seat back and deflecting the seat back forward. His right arm and torso contacted the inboard aspect of the front right seat back, evidenced by a scuff mark to the cloth fabric. Additionally, the seat back was deformed forward and the entire seat assembly was rotated in a forward direction.

These contact points allowed his head and upper body to pitch downward as he continued forward between the front seats. The passenger's face impacted the mid upper instrument panel. His lower teeth gouged and disengaged the trim panel surrounding the center vent louvers. The left vent louver in this cluster was fractured. His upper teeth penetrated the top surface of the center instrument panel. Three laterally oriented cuts to the instrument panel evidenced the contact point. As a result of these contacts, the passenger sustained bilateral fractures of the mandible.

The rear left passengers' head probably contacted the windshield mounted rear view mirror. Although the mirror glass was not fractured, the mirror assembly was separated from the windshield. The interior layer of the windshield glazing separated at the mirror mount.

The passenger's torso and or right arm contacted the mid instrument panel. The trim panel that surrounded the radio and HVAC controls was scuffed. The faceplate of the radio was also cracked from this contact.

The passenger rebounded into this original seated position. He was observed in the rear left position by the first responders as they arrived on-scene. The passenger bled profusely from the mouth area. Body fluids were noted the back aspect of the front left seat back, rear left seat cushion, and the left rear door panel.

The 14-year old passenger was removed from the vehicle by rescue personnel and transported to a regional trauma center where he was admitted for surgical repair of the mandible fractures.

Rear Right Passenger

Age/Sex:	17-year old/Female
Height:	171 cm (67.5")
Weight:	77 kg (170 lb)
Seat Track Position:	Fixed
Safety Belt Usage:	3-point lap and shoulder belt
Usage Source:	Vehicle inspection, passenger injuries
Egress from Vehicle:	Rescue personnel
Mode of Transport From Scene:	Ambulance
Type of medical Treatment:	Transported to a local hospital where she expired 1.75 hours of the crash

Rear Right Passenger Injuries

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Lacerated aorta	Severe (420206.4,4)	Shoulder belt webbing
Fractures of left ribs 5-12 with deep peritoneal lacerations	Serious (450230.3,2)	Shoulder belt webbing
Partial avulsion of the left kidney	Moderate (541624.3,2)	Junction of the lap and shoulder belt webbing
Fracture of lumbar vertebrae L1	Moderate (650616.2,8)	Safety belt system
Liver contusions	Moderate (541810.2,1)	Shoulder belt webbing
Spleen contusions	Moderate (544210.2,2)	Shoulder belt webbing
Laceration of the left abdominal peritoneum and soft tissue	Moderate (590604.2,2)	Shoulder belt webbing
Large contusion of the left lateral flank that extends from the hip to the level of the left breast	Minor (590402.1,2)	Safety belt buckle/latch plate and the junction of the lap and shoulder belt webbing
Bilateral contusions to the lower breasts	Minor (490402.1,3)	Shoulder belt webbing
Contusion of the right upper arm	Minor (790402.1,1)	Shoulder belt webbing

**Source: Autopsy*

Rear Right Passenger Kinematics

The rear right passenger was seated in an unknown posture with the manual 3-point lap and shoulder worn loose against her body. This was based on the inspection of the belt system, the review of her internal injuries, and photographic documentation of her soft tissue injuries. The lap belt webbing was positioned across her abdomen, above the level of the hips and the shoulder belt was low, below the level of the right shoulder. The belt loading evidence consisted of a frictional D-ring transfer on the safety belt webbing, frictional abrasions on the webbing from spooling through the sliding latch plate, cupping of the lap belt webbing, and stretching with cupping an fabric transfers on the shoulder belt webbing.

Prior to impact, the driver allowed the Chevrolet TrailBlazer to cross the double yellow centerline of the two-lane roadway. She applied a rapid clockwise steering input to regain the northbound travel lane. This steering maneuver induced a clockwise yaw to the TrailBlazer, evidenced by laterally oriented striation from the left side tires on the painted double yellow center lines. The combination of the steering input and the vehicle yaw displaced the rear left passenger laterally to her left. This slight lateral movement allowed the shoulder belt webbing to drop off her shoulder onto her right upper arm and extend across the chest below the level of the breasts.

At impact with the tree, the rear right passenger initiated a forward trajectory and loaded the poorly positioned safety belt system. Her loading of the lap belt webbing produced an arcing band-like contusion across her abdomen that extended from both hips to the level of the umbilicus. The shoulder belt webbing produced a similar band-like contusion that extended from the right hip area, diagonally across the chest, under the right breast and onto the right upper arm.

Due to the position of the webbing and the slack in the lap belt, the rear left passenger's torso rotated clockwise with respect to the vehicle and her pelvic region submarined the lap belt. As a result, the junction of the lap and shoulder belt at the latch plate contused the left lateral flank of the passenger as she submarined the belt system. This contusion extended full width of the flank area and vertically from the left hip to the level of the left breast. Underlying this contusion, the passenger sustained a partial avulsion of the left kidney.

The cupping of the belt webbing reduced the effective width of the webbing and allowed the belt webbing to penetrate into the soft abdominal region of the passenger. She sustained an aortic laceration, a laceration of the left abdominal peritoneum, contusions to the liver and spleen and fractures of the left 5-12 ribs.

As she submarined the safety belt system and rotated in a clockwise direction, the lower extremities of the rear right passenger engaged the back surface of the front right seat back. This seat back was deflected forward and the entire seat assembly was rotated in a forward direction. This seat and seat back deflection was a combination of the loading from both rear seat passengers.

The rear right passenger was found unresponsive, slumped in the rear right position with the safety belt system buckled around her body. Rescue personnel unbuckled the safety belt and removed the passenger from the vehicle. CPR was initiated and a faint pulse was restored. She was transported by ambulance to the emergency room of a local hospital where she expired approximately 1.75 hours post-crash. Her family consented to organ donation. Multiple organs and bone were harvested for transplant. An autopsy was performed on the body two days following the crash.

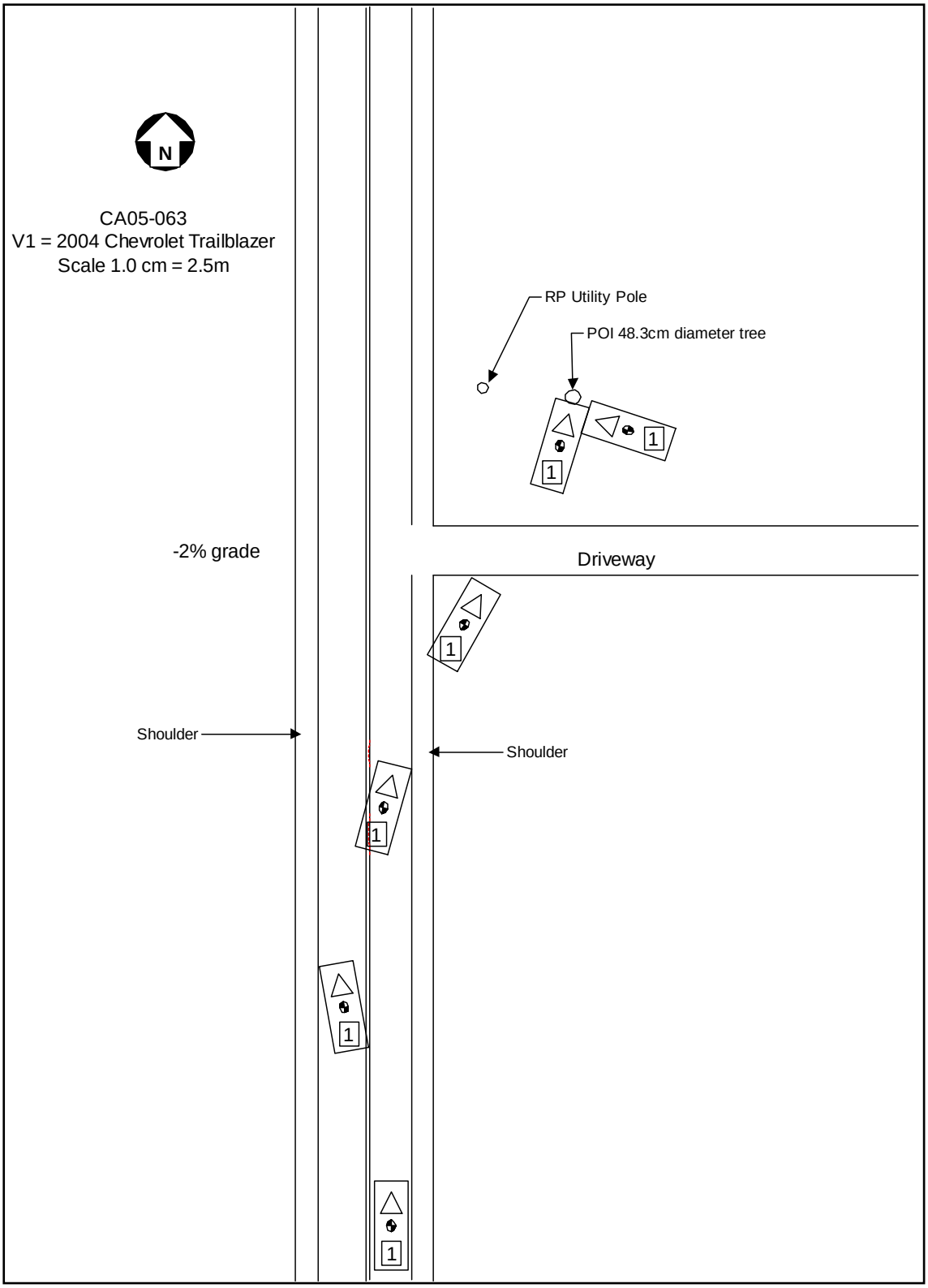


Figure 16: Scene Schematic

Attachment A: EDR Printout

CDR File Information

Vehicle Identification Number	1GNDT13S342xxxxxx
Investigator	
Case Number	CA05-063
Investigation Date	
Crash Date	
Filename	1.CDR
Saved on	Tuesday, December 6 2005 at 11:26:23 AM
Data check information	A8ECEDDE
Collected with CDR version	Crash Data Retrieval Tool 2.70
Collecting program verification number	70812808
Reported with CDR version	Crash Data Retrieval Tool 2.70
Reporting program verification number	70812808
Interface used to collected data	Block number: 00 Interface version: 41 Date: 11-04-04 Checksum: 9E00
Event(s) recovered	Deployment

SDM Data Limitations

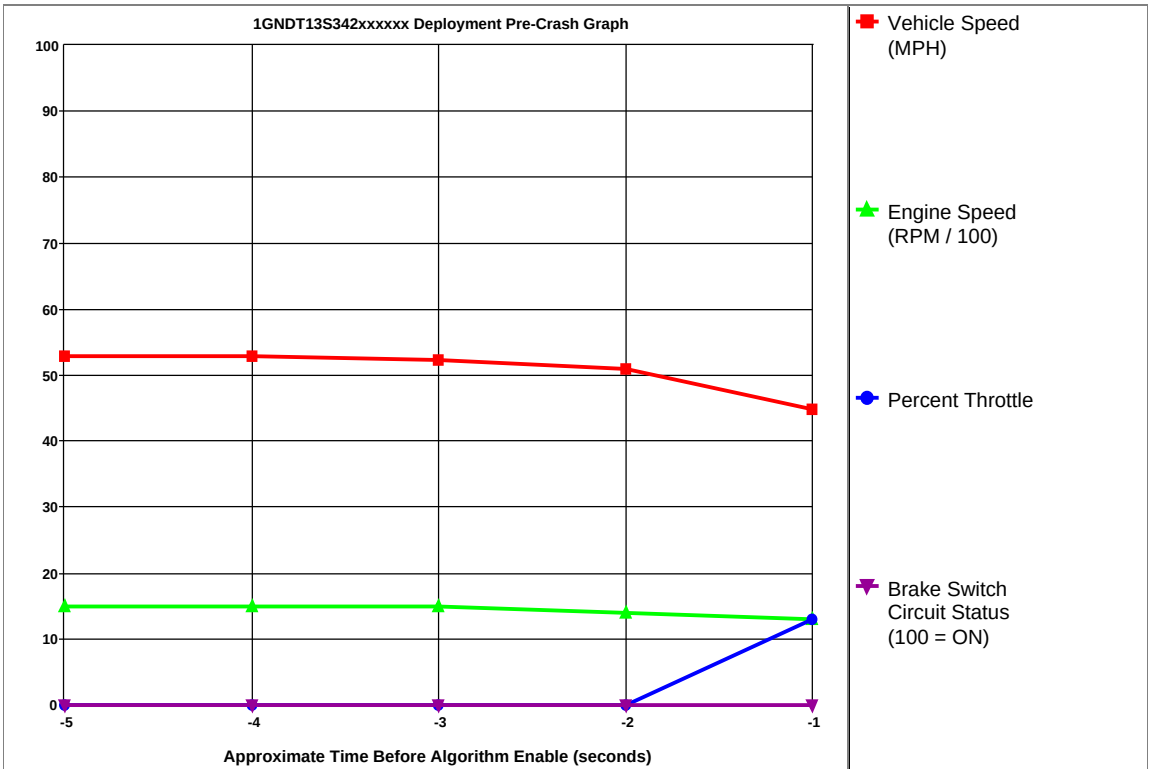
SDM Recorded Crash Events:
There are two types of SDM recorded crash events. The first is the Non-Deployment Event. A Non-Deployment Event is an event severe enough to "wake up" the sensing algorithm but not severe enough to deploy the air bag(s). It contains Pre-Crash and Crash data. The SDM can store up to one Non-Deployment Event. This event can be overwritten by an event that has a greater SDM recorded vehicle forward velocity change. This event will be cleared by the SDM after the ignition has been cycled 250 times.
The second type of SDM recorded crash event is the Deployment Event. It also contains Pre-Crash and Crash data. The SDM can store up to two different Deployment Events, if they occur within five seconds of one another. Deployment events cannot be overwritten or cleared from the SDM. Once the SDM has deployed the air bag, the SDM must be replaced.
The data in the non-deployment file will be locked after a deployment, if the non-deployment occurred within 5 seconds before the deployment or a deployment level event occurs within 5 seconds after the deployment.

SDM Data Limitations:
-SDM Recorded Vehicle Forward Velocity Change reflects the change in forward velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Forward Velocity Change is 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. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle forward velocity change. For deployments and deployment level events, the SDM will record 100 milliseconds of data after deployment criteria is met and up to 50 milliseconds before deployment criteria is met. For non-deployments, the SDM will record the first 150 milliseconds of data after algorithm enable.
-Event Recording Complete will indicate if data from the recorded event has been fully written to the SDM memory or if it has been interrupted and not fully written.
-SDM Recorded Vehicle Speed accuracy can be affected if the vehicle has had the tire size or the final drive axle ratio changed from the factory build specifications.
-Brake Switch Circuit Status indicates the status of the brake switch circuit.
-Pre-Crash Electronic Data Validity Check Status indicates "Data Invalid" if the SDM does not receive a valid message.
-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 25.4 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.

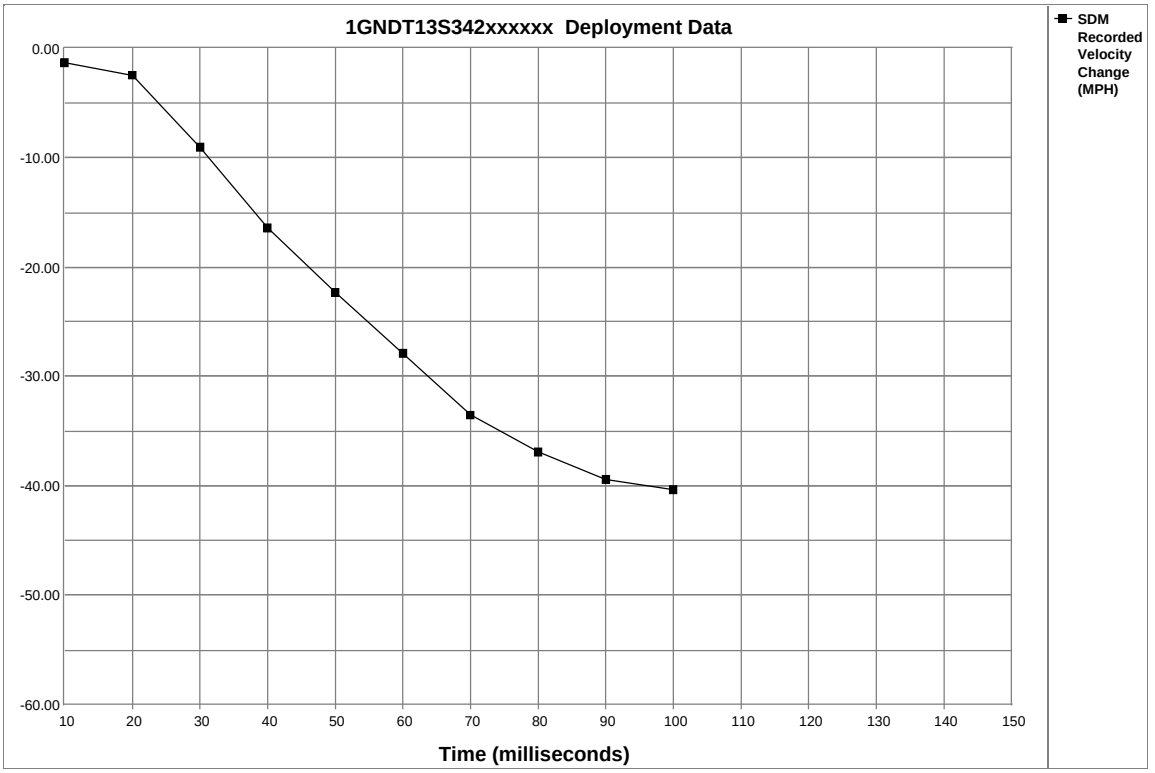
SDM Data Source:
All SDM recorded data is measured, calculated, and stored internally, except for the following:
-Vehicle Speed, Engine Speed, and Percent Throttle data are transmitted once a second by the Powertrain Control Module (PCM), via the Class 2 data link, to the SDM.
-Brake Switch Circuit Status data is transmitted once a second by either the ABS module or the PCM, via the Class 2 data link, to the SDM.
-In most vehicles, the Driver's Belt Switch Circuit is wired directly to the SDM. In some vehicles, the Driver's Belt Switch Circuit Status data is transmitted from the Body Control Module (BCM), via the Class 2 data link, to the SDM.

System Status At Deployment

SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Ignition Cycles At Deployment	6238
Ignition Cycles At Investigation	6239
Maximum SDM Recorded Velocity Change (MPH)	-43.05
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	130
Driver First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	7.5
Driver Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	10
Passenger First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	7.5
Passenger Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	10
Time Between Non-Deployment And Deployment Events (sec)	N/A
Frontal Deployment Level Event Counter	1
Event Recording Complete	Yes
Multiple Events Associated With This Record	No
One Or More Associated Events Not Recorded	No



Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle	Brake Switch Circuit Status
-5	53	1536	0	OFF
-4	53	1472	0	OFF
-3	52	1472	0	OFF
-2	51	1408	0	OFF
-1	45	1280	13	OFF



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-1.24	-2.48	-8.99	-16.43	-22.32	-27.90	-33.48	-36.89	-39.37	-40.30	N/A	N/A	N/A	N/A	N/A

Hexadecimal Data

This page displays all the data retrieved from the air bag module.
It contains data that is not converted by this program.

```
$01  E1 29 99 4C AB 76
$02  D1 D1 00 00 00 00
$03  41 53 33 33 31 36
$04  4B 43 52 31 51 31
$06  15 19 91 69 00 00
$10  FC F4 80 00 00 00
$11  83 83 84 7A 7A 7B
$12  CA B8 00 00 00 01
$13  FF 02 00 00 00 00
$14  03 03 00 00 00 00
$15  FA FA FA FA FA FA
$16  FA FA FA FA FA FA
$17  FA FA 00 00 00 00
$18  0F 00 05 AC 01 00
$1F  FE 00 00 00 00 00
$20  FF FF FF FF FF FF
$21  FF FF FF FF FF FF
$22  FF FF FF FF FF FF
$23  FF FF FF FF FF FF
$24  FF FF FF FF FF FF
$25  FF FF FF FF FF FF
$26  FF FF FF FF FF FF
$27  FF FF FF FF FF FF
$28  FF FF FF FF FF FF
$29  FF FF FF FF FF FF
$2A  FF FF FF FF FF FF
$2B  FF FF FF FF FF FF
$2C  FF FF FF FF FF FF
$2D  FF FF 00 00 00 00
$30  B2 FE 00 00 FF FF
$31  FF F7 FF FF FF FF
$32  FF F7 FF FF FF FF
$33  EF FF FF FF 7F FF
$34  00 00 05 07 03 03
$35  00 05 07 03 03 00
$36  35 08 04 03 00 35
$37  08 04 03 08 AB 53
$38  34 03 5E 2F 00 00
$39  0F 00 00 03 FF FF
$3A  04 08 1D 35 48 5A
$3B  6C 77 7F 82 00 00
$3C  00 00 00 0A FC F4
$3D  C0 A5 00 00 00 00
$40  48 52 54 55 55 00
$41  00 00 21 00 00 00
$42  00 00 14 16 17 17
$43  18 00 7D 80 00 00
$44  0E 30 34 34 35 00
$45  40 00 35 00 00 00
$46  16 00 0E 0F 10 10
$47  14 00 7D 80 00 00
$48  FF FF FF FF FF FF
$49  FF FF FF FF FF FF
$4A  FF FF FF FF FF FF
$4B  FF FF FF FF 00 00
$4C  FF FF FF FF FF FF
$4D  FF FF FF FF FF FF
$4E  FF FF FF FF FF FF
$4F  FF FF FF FF 00 00
$50  FF FF FF FF FF FF
$51  FF FF FF FF FF FF
$52  FF FF FF FF FF FF
```

$53 FF FF FF FF FF FF
$54 FF FF FF FF FF FF