CRASH DATA RESEARCH CENTER

Calspan Corporation
Buffalo, NY 14225

CALSPAN ON-SITE AIR BAG RELATED FATALITY CRASH INVESTIGATION

CASE NO: CA04-030

VEHICLE: 1997 MAZDA MIATA

LOCATION: GEORGIA

CRASH DATE: SEPTEMBER 2003

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. CA04-030	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Calspan On-Site Air Bag Related Fatality Crash Investigation Vehicle: 1997 Mazda Miata Location: State of Georgia		*5. Report Date*: April 2006 *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.* C00410.0000.0220 *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: September 2003 *14. Sponsoring Agency Code*	
15. Supplementary Note This on-site investigation focused on the injury source and the cause of death for a 3-year-old male front right passenger of a 1997 Mazda Miata.			
16. Abstract This on-site investigation focused on the injury source and the cause of death for a 3-year-old male front right passenger of a 1997 Mazda Miata. The Mazda was equipped with a frontal air bag system for the driver and front right passenger positions; both deployed as result of an intersection crash with a 2000 Pontiac Trans Am. The Mazda was occupied by an unrestrained 23-year-old female driver, an unrestrained 9-year-old female front right passenger, and an unrestrained 3-year-old male passenger who was seated on the lap of the 9-year-old. The front of the Mazda impacted the front of the Pontiac, which resulted in the deployment of the frontal air bag systems in both vehicles. The driver of the Mazda was not injured. The 9-year-old female front right passenger sustained police reported visible injuries and was transported by ambulance to a local hospital; however, there was no record of treatment for this passenger. The unrestrained 3-year-old male front right passenger was displaced forward into the path of the deploying front right air bag. The expanding front right air bag module cover flap impacted the upper facial region of the child resulting in fractures of the vault and base of the skull and a cervical subluxation with dislocation of the atlanto-occipital joint with an associated spinal cord injury. He was transported by ambulance to a local hospital where he was evaluated and stabilized prior to air transfer to a regional pediatric trauma center. He expired two days post-crash. Both vehicles sustained moderate severity damage and were towed from the crash site.			
17. Key Words Air bag related child fatality		*18. Distribution Statement* General Public	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 13	*22. Price*

TABLE OF CONTENTS

CALSPAN ON-SITE CHILD AIR BAG RELATED FATALITY INVESTIGATION
SCI CASE NO: CA04-030
SUBJECT VEHICLE – 1997 MAZDA MIATA
LOCATION - STATE OF GEORGIA
CRASH DATE – SEPTEMBER 2003

BACKGROUND

This on-site investigation focused on the injury source and the cause of death for a 3-year-old male front right passenger of a 1997 Mazda Miata. The Mazda was equipped with a frontal air bag system for the driver and front right passenger positions; both deployed as result of an intersection crash with a 2000 Pontiac Trans Am. The Mazda was occupied by an unrestrained 23-year-old female driver, an unrestrained 9-year-old female front right passenger, and an unrestrained 3-year-old male passenger who was seated on the lap of the 9-year-old. The front of the Mazda impacted the front of the Pontiac, which resulted in the deployment of the frontal air bag systems in both vehicles. **Figure 1** is a front right view of the damage to the Mazda. The driver of the Mazda was not injured. The 9-year-old female front right passenger sustained police reported visible injuries and was transported by ambulance to a local hospital; however, there was no record of treatment for this passenger. The unrestrained 3-year-old male front right passenger was displaced forward into the path of the deploying front right air bag. The expanding front right air bag module cover flap impacted the upper facial region of the child resulting in fractures of the vault and base of the skull and a cervical subluxation with dislocation of the atlanto-occipital joint with an associated spinal cord injury. He was transported by ambulance to a local hospital where he was evaluated and stabilized prior to air transfer to a regional pediatric trauma center. He expired two days post-crash. Both vehicles sustained moderate severity damage and were towed from the crash site.

Figure 1. Frontal damage to the 1997 Mazda Miata.

This September 2003 crash was identified by the Crash Investigations Division of the National Highway Traffic Safety Administration (NHTSA) through a review of the Fatality Analysis Reporting System (FARS) data. The crash was forwarded to the Calspan Special Crash Investigation (SCI) team and a remote level investigation was initiated on July 6, 2004. Police documentation and images of the crashes were requested from the investigating agency. The medical records were also requested and obtained from both medical facilities. The Mazda was eventually located at a salvage yard; however, the drive train, front clip and interior components were removed from the vehicle prior to the SCI inspection. A partial inspection of the vehicle was conducted during the week of July 15, 2005.

SUMMARY

Crash Site

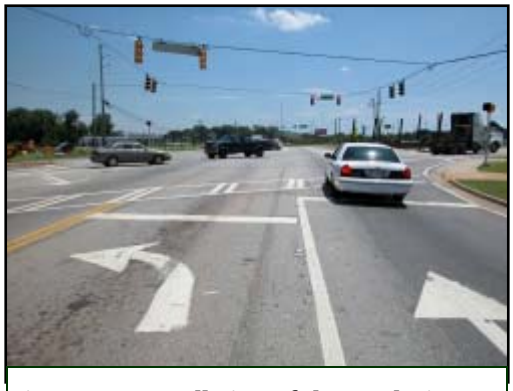

Figure 2. Overall view of the crash site from the southbound travel direction.

The crash occurred at a four-leg intersection of a state route and a local roadway. This intersection crash occurred during the daylight hours of September 2003. At the time of the crash, the weather was clear with no adverse conditions. The involved vehicles were traveling in opposite directions on the north/south state route, both approaching the intersection on a green signal phase. The south leg of the intersection was configured with one through traffic lane in each direction and a designated left and right turn lane for northbound traffic. The north leg of the intersection was configured with a through lane for both travel directions and a designated left turn lane for southbound travel **(Figure 2)**. The travel lanes of the north/south legs were surfaced with asphalt and were delineated by solid white lane lines and double yellow centerlines. The east and west legs of the intersection were also configured with one through traffic lane, a left turn lane, and a right turn lane. Traffic flow through the intersection was controlled by overhead three-phase traffic signals. The posted speed limit for the north/south legs was 72 km/h (45 mph). The scene schematic is included as **Figure 18** of this report.

Vehicle Data - 1997 Mazda Miata

Figure 3. Overall view of the Mazda Miata.

The 1997 Mazda Miata was manufactured on 3/97 and was identified by the Vehicle Identification Number (VIN): JM1NA3537V (production sequence omitted). The Mazda was manufactured as a two-passenger, two-door convertible **(Figure 3)** that was equipped with a 1.8-liter, four-cylinder engine, a 5-speed manual transmission, power-assisted brakes, OEM alloy wheels and power steering. The interior of the Mazda was configured with front bucket seats with integrated head restraints. The odometer reading was 124,001 kilometers (77,053 miles) at the time of the SCI inspection. At the time of the crash, the convertible top was in the down position. A single tire and wheel was with the vehicle at the time of the inspection. A Goodyear Eagle GPS P185/60R14 all-season tire was mounted on a 7-spoke alloy wheel. It was unknown if the tire was mounted on the vehicle or used as a spare at the time of the crash.

The Mazda was located nearly two years following the crash at a salvage yard. At the time it was located, the vehicle was dismantled and numerous components were removed and sold from the vehicle. These components consisted of the front clip, engine, transmission, axles, tires and wheels, doors, and the trunk lid. The interior was intact with the exception of the front right air bag module that was removed and placed in the

trunk of the vehicle. It was retrieved from a pool of water with the front suspension components placed above it. The front seats were unbolted from the chassis and repositioned in the passenger compartment. The convertible top was repositioned to the closed position. The interior of the vehicle was exposed to the weather and was extremely dusty at the time of the inspection.

Vehicle Data – 2000 Pontiac Trans Am

The other vehicle in this crash was a 2000 Pontiac Trans Am. The Pontiac was not inspected during this investigation due to the time frame between case assignment and location of the Miata. The police report and supplied images indicated that the vehicle was a 2-door coupe with a T-top. At the time of the crash, the removable roof panels were in place. The Trans Am was identified by VIN 2G2FV22G1Y2 (production number deleted). A 5.7-liter engine powered the vehicle. The service brakes were power-assisted four-wheel disc. The Trans Am was equipped with redesigned frontal air bags for the driver and front right passenger positions that deployed as a result of the crash with the Miata.

Crash Sequence

Pre-Crash

The unrestrained 23-year-old female driver of the Mazda was traveling southbound in the left turn lane approaching the intersection where she was intending to turn left. Based on the on-scene police images, the convertible top was in the open position at the time of the crash. The 46-year-old male driver of the Pontiac was operating the vehicle northbound in the right turn only lane (Figure 4). As he approached the intersection, the driver of the Pontiac changed lanes to the center through lane and proceeded into the intersection. Both vehicles were entering the intersection on green signal phases. As the driver of the Mazda observed the Pontiac enter her travel path, she applied a braking force in an attempt to avoid the crash. Although there was no evidence at the scene to support the braking maneuver, the braking was supported by the deformation to the front right cover flap from contact against the displaced front right child passenger.

Figure 4. Pontiac's northbound approach to the intersection.

Crash

The front center and right aspect of the Mazda impacted the front left and center aspect of the Pontiac in the center of the signalized intersection. The impact rotated the Mazda in a counterclockwise (CCW) direction and displaced the vehicle rearward of its initial southbound trajectory. The Pontiac was displaced slightly to its right and continued on a forward trajectory to rest. Based on the scene and vehicle images that were supplied by the police, the resultant directions of force were 1 o'clock for the Mazda and 11 o'clock for the Pontiac. Due to the dismantled status of the Mazda, a crush profile could not be obtained; therefore the WINSMASH program was not used to calculate a delta V for this

deployment event. Based on SCI experience, the total delta V's were estimated at 19-24 km/h (12-15 mph) for Mazda and 16 km/h (10 mph) for the Pontiac. The impact was sufficient to deploy the frontal air bag systems in both vehicles.

Figure 5. Final rest positions for both vehicles.

The Mazda was rotated approximately 125 degrees CCW and came to rest in a painted gore area at the northeast quadrant of the intersection facing a northeasterly direction. The Pontiac came to rest rearward of the Mazda. **Figure 5** is an on-scene view of the vehicles at final rest at the northeast quadrant of the intersection.

Post-Crash

Police and EMS personnel responded to the crash site. The unrestrained driver of the Mazda was not injured. She exited the vehicle and apparently removed the 3-year old from the vehicle. The unrestrained 9-year-old female front right passenger sustained police reported visible injuries and was transported by ambulance to a local hospital. The unrestrained 3-year-old male front right passenger that was seated on the lap of the 9-year-old female passenger sustained critical injuries and was transported by ambulance to a local hospital for treatment. His condition was evaluated and stabilized for air transfer to a pediatric trauma center where he expired two days post-crash. The EMS and hospital medical records listed the 3-year-old male as ejected from the vehicle. The police investigation did not note an ejection of this passenger. The driver of the Mazda placed him on the road surface as she waited for rescue personnel to arrive on-scene.

Vehicle Damage

Exterior Damage – 1997 Mazda Miata

The 1997 Mazda Miata sustained moderate severity frontal damage as a result of the offset, head-on impact with the Pontiac **(Figure 6)**. This damage assessment was based on the on-scene police images. The Mazda was located at a salvage yard nearly two years after the crash and inspected for this investigation. The vehicle was stripped of numerous components and the damaged front clip had been removed and crushed. A crush profile could not be obtained from the remaining chassis/body. The convertible roof was repositioned to the closed position at the salvage yard. **Figure 7 and 8** reflect the condition of the Mazda at the time of the SCI investigation.

Figure 6. Frontal damage to the Mazda Miata.

Based on the assessment of the police images, the direct contact damage began right of the centerline and extended to the front right corner. The damage involved the bumper fascia, hood, right hide-away headlamp assembly and the right front fender. Maximum crush was estimated at 15 cm (6") located at the right corner of the bumper beam. The lateral component of the 1 o'clock direction of force was evident in the lateral left displacement of the left front fender. A Collision Deformation Classification (CDC) of 01-FZEW-2 was derived from the police images.

Figure 7. The condition of the Mazda at the time of the SCI inspection.

Figure 8. Dismantled frontal area of the Miata.

Interior Damage – 1997 Mazda Miata

The 1997 Mazda Miata sustained minor interior damage as a result of frontal air bag deployment and possible occupant contact. There was no intrusion of the passenger compartment. **Figure 9** is an overall view of the interior that was taken by the investigating police officer. **Figure 10** is an overall view of the interior at the time of the SCI inspection. Three areas of possible occupant contact were noted to interior components. The glove box door was removed from its mounting points and was located within the vehicle's interior. Three scuffmarks were noted on the glove box door that where white in color. Given the time duration between the crash and the SCI inspection, it was unknown if these scuffmarks were directly related to the crash. The first scuffmark was located 15-24 cm (5.8-9.3") left of the right edge and 8-17 cm (3.3-6.5") above the bottom edge. The second scuffmark began 18 cm (7.0") left of the right edge and measured 5 cm (2") in width and extended upward 5 cm (1.8") from the bottom edge. The third scuffmark measured 4 cm (1.5") and began 1 cm (0.5") left of the right edge and 6 cm (2.3") above the bottom edge and extended upward 11 cm (4.5"). All three scuff marks were possible leg contact points from the child passengers.

Figure 9 - Police image of the Mazda's interior.

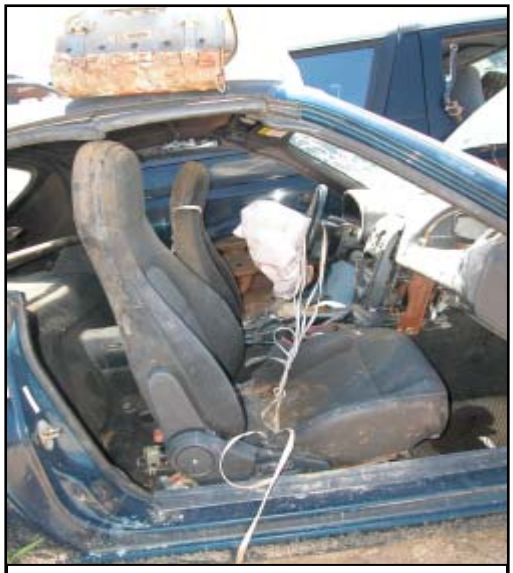

Figure 10. View of the Mazda's interior at the time of the SCI inspection.

Figure 11. Multiple windshield cracks.

The windshield had five distinct impact points that resulted in cracking to the laminated glass **(Figure 11)**. Two star-like cracks were located above the front right air bag module cover. The inboard crack was related to flap contact during the deployment of the passenger air bag. The outboard of the two cracks was possibly occupant contact or air bag induced. A large vertically oriented crack pattern was located adjacent to the right A-pillar. This resulted from stress applied at the right A-pillar area.

Two star-like fracture patterns were located forward of the driver's position. There was no contact evidence associated with these fractures.

The interior mounted rear view mirror was displaced laterally to the left. This displacement resulted from the altered deployment path of the front right air bag due to the forward opposition of the child passenger.

The center console and right aspect of the mid instrument panel were fractured. These fractures were noted during the on-site investigation and were not visible in the on-scene police images. This cracking may have resulted from child passenger contact during the crash or occurred during the dismantling of the vehicle. Once more, there were no scuffmarks associated with this cracking.

Exterior Damage – 2000 Pontiac Trans-Am

The 2000 Pontiac Trans-Am could not be located for this on-site investigative effort. The damage assessment was derived from the police images **(Figure 12)**. The direct contact damage was located on the front bumper fascia, hood and left front fender. The bumper fascia concealed the structural damage; therefore, a crush profile could not be estimated from the images. The hood of the Pontiac was fiberglass and the left front fender was

composite. The right side of the windshield was fractured from contact by the front right air bag cover flap. The CDC for this impact was estimated at 11-FYEW-1.

Figure 12. Frontal damage to the Pontiac Trans Am.

Manual Restraint Systems – 1997 Mazda

The 1997 Mazda Miata was equipped with manual 3-point lap and shoulder safety belts for the two outboard positions. The driver's safety belt was configured with a belt sensitive Emergency Locking Retractor (ELR), sliding latch plate, fixed height D-ring, and an emergency management loop that was concealed in a vinyl sleeve. The driver did not use her safety belt at the time of the crash, which was supported by the lack of loading evidence on the belt system and the non-deployed status of the management loop.

The front right safety belt was configured the same as the driver's position with the exception of a switchable ELR/Automatic Locking Retractor (ALR). The front right safety belt was not used to restrain the front right child passengers. This was supported by the lack of loading evidence on the safety belt and the non-deployment status of the emergency management loop.

Frontal Air Bag System – 1997 Mazda Miata

The 1997 Mazda Miata was equipped with frontal air bags for the driver and front right positions that deployed as result of the crash **(Figure 13)**. The driver's air bag was concealed by asymmetrical H-configuration module cover flaps. The top flap measured 18 cm (7.0") in width and 9 cm (3.6") in height. The lower flap was 17 cm (7.0") in width at the horizontal tear seam and 7 cm (2.6") in height. The driver's air bag was tethered by two 8 cm (3") wide internal tethers located at the 12 and 6 o'clock positions. These tethers controlled the deployment path and limited the excursion of the air bag. The bag measured 62 cm (24.5") in diameter in its deflated state. The air bag was vented by two symmetrical ports that measured 3 cm (1.3") in diameter. The ports were located at the 10 and 2 o'clock positions on the rear panel of the air bag. No occupant contact points or failures were noted to the driver's air bag. The following information was stamped on the rear panel of the driver's air bag at the 12 o'clock position:

Figure 13. Deployed driver's air bag.

BBNH007
4SS973236
A070397
005720

The front right passenger air bag was a mid-mount design and deployed from the right instrument panel. During the dismantling of the vehicle, the front right air bag module was removed from the instrument panel and placed in the trunk. It was contaminated by water and rust prior to the SCI inspection.

The module was concealed by a single cover flap that measured 35 cm (13.6”) in width and 19 cm (7.4”) in height. The flap was hinged at the top surface and reinforced by a sheet metal backer plate on the inside surface of the flap. Although the flap opened at the designated tear seams, the right side of the flap was deformed. The contour of the deformation was typical of an impeded deployment against an out-of-position passenger. That is, the flap opened against the head of the child passenger. The leading edge of the flap was deformed to an S-profile with the right side deflected downward approximately 8 cm (3”). **Figure 14** is a police image view of the deformed module cover flap. **Figure 15** is a close-up view of the deformed cover flap taken during the SCI inspection of the vehicle.

Figure 14. Deformed front right air bag module cover flap.

Figure 15. View of the deformed cover flap at the time of the SCI investigation.

The air bag membrane measured 53 cm (21”) in width and 51 cm (20”) in height (**Figure 16)**. The front right air bag and was vented by two 6 cm (2.3”) diameter vent ports located on the top panel. The air bag was not tethered. The rearward excursion of the air bag measured 48 cm (19”) from the leading edge of the instrument panel **(Figure 17)**. No occupant contacts or failures were noted to the front right air bag. A bar code with the following information was located on the air bag membrane:

PUT 12302-02F
TAW 296K10177

A second bar code that was located on the air bag module contained the following information:

UT12301-07
DBP H3B 40 AWF

Figure16. Deployed front right passenger air bag.

Figure 17. Rearward excursion of the front right air bag.

Occupant Demographics/Data – 1997 Mazda Miata

Driver

Age/Sex:	23-year-old/Female
Height:	Unknown
Weight:	Unknown
Seat Track Position:	Unknown
Manual Restraint Use:	None Used
Usage Source:	Vehicle inspection
Eyewear:	Unknown
Type of Medical Treatment:	Not injured

Driver Kinematics

The 23-year-old female driver of the 1997 Mazda Miata was seated in a presumed upright posture. The driver was not restrained by the manual safety belt during the crash. The determination regarding the lack of restraint usage was supported by the non-deployed state of the emergency management loop, and the lack of loading evidence to the safety belt webbing and hardware components. At impact, the frontal air bags deployed and the driver initiated a forward and right trajectory in response to the 1 o'clock direction of force. She loaded the deployed air bag, which arrested her forward motion and prevented her from contacting the frontal components. As a result of air bag loading, the driver was not injured in the crash.

Front Right Passenger

Age/Sex:	9-year-old/Female
Height:	Unknown
Weight:	Unknown
Seat Track Position:	Unknown
Manual Restraint Use:	None Used
Eyewear:	Unknown
Type of Medical Treatment:	Transported by ambulance to a local hospital, no record of treatment

Front Right Passenger Kinematics

The 9-year-old female front right passenger of the 1997 Mazda Miata was seated in a presumed upright posture with the 3-year-old male sitting on her lap. She was not restrained by the manual 3-point lap and shoulder safety belt. The presumed pre-crash braking probably displaced her forward. The 3-year old child passenger shielded her from the frontal interior components and the deploying front right air bag and cover flap.

At impact, the front right air bag deployed and she initiated a forward and right trajectory in response to the 1 o'clock direction of force. She probably contacted the back of the 3-year-old passenger, who was redirected upward and rearward as a result of the deploying front air bag. The 3-year-old passenger restricted her forward movement and shielded her from possible contact with the deployed front air bag and frontal components. The 9-year-old female passenger was police reported as injured and transported by ambulance to a local hospital. It did not appear that she was treated at the hospital, as there was no record of treatment for this passenger.

Additional Front Right Passenger

Age/Sex:	3-year-old/Male
Height:	Unknown
Weight:	Unknown
Seat Track Position:	Unknown
Manual Restraint Use:	None used
Usage Source:	Vehicle inspection
Eyewear:	Not available
Type of Medical Treatment:	Transported by ambulance to a local trauma center where he was transferred by air ambulance to a pediatric trauma center and expired two days post-crash

Additional Front Right Passenger Injuries

Injury Data	Injury Severity (AIS 90/Update 98)	Injury Source
Spinal cord injury (NFS) with atlanto-occipital dislocation, C2/C3 subluxation, and minimally displaced comminuted fractures of the junction of the pedicle and body of C2 on the left and of the right posterior lamina	Maximum (640236.6,6)	Front right air bag module cover flap
Subdural hemorrhage over the frontal lobes bilaterally	Critical (140654.5,3)	Front right air bag module cover flap
Bilateral lower lobe pulmonary contusions	Severe (441410.4,3)	Expanding front right air bag

Injury Data	Injury Severity (AIS 90/Update 98)	Injury Source
Fracture on the basilar skull that extends through the petrous segment and into the left orbital roof with bilateral periorbital ecchymosis	Serious (150200.3,8)	Front right air bag module cover flap
Subarachnoid hemorrhage surrounding the medulla oblongata and brain stem	Serious (140466.3,6)	Front right air bag module cover flap
Bilateral pneumocephalus	Serious (140682.3,1; 140682.3,2)	Front right air bag module cover flap
Right orbital wall fracture	Moderate (251200.2,1)	Front right air bag module cover flap
Left orbital wall fracture	Moderate (251200.2,2)	Front right air bag module cover flap
Fracture extending through the left temporal and parietal bones	Moderate (150402.2,2)	Front right air bag module cover flap
Diffuse contusions over the bilateral upper extremities	Minor (790402.1,3)	Expanding front right air bag
5 cm laceration of the anterior left lower leg	Minor (890602.1,2)	Lower mid instrument panel (possible)

Source = Hospital medical records

Additional Front Right Passenger Kinematics

The 3-year-old male was seated on the lap of the 9-year-old female front right passenger. His pre-crash and crash posture was unknown; however, due to the small interior space of the Mazda Miata, it was likely that he was in close proximity to the mid mount front right air bag module. The children were not restrained by the manual safety belt system. Immediately prior to impact, the driver of the Miata probably applied a braking force in an attempt to avoid the impending crash with the Pontiac. This braking action would have displaced the child passengers forward placing the 3-year old closer, or against the mid mount module cover flap. This unrestrained child passenger probably extended his arms forward in an attempt to brace against the right instrument panel.

At impact with the Pontiac, the frontal air bag system in the Miata deployed. The front right air bag module cover flap opened in an upward direction. The right aspect of the flap contacted the child across the upper face at the level of the forehead. The cover flap was reinforced on the underside by a sheet metal backer panel. This contact fractured the orbital walls bilaterally with a fracture line that extended into the basilar skull through the petrous segment and into the left orbital roof. Additional fractures of the left temporal and parietal bones resulted from the cover flap contact. The child also sustained subdural hemorrhage over the frontal lobes bilaterally. The right aspect of the air bag module cover flap was deformed from the contact against the child's head.

The expanding air bag rotated the flap upward which displaced the child's head rearward, hyperextending the neck. This resulted in subluxation of cervical vertebrae 2-3, dislocation of the atlanto-occipital joint, and comminuted fractures of the pedicle and lamina of C2 with a spinal cord injury. Subarachnoid hemorrhage occurred in the areas of the medulla oblongata and the brain stem. At the time of the SCI inspection of the vehicle, the front right air bag was submerged in water and retrieved from the trunk of the vehicle. There was no contact evidence remaining on the bag membrane. Several blood spatters were noted to the deployed air bag in the on-scene police images that were obtained from the investigating agency.

As the front right air bag expanded from the mid mount module, the bag impacted the chest of the child passenger resulting in bilateral pulmonary contusions of the lower lobes. He also sustained diffuse contusions of the upper extremities from contact by the inflating air bag.

The combination of the cover flap and expanding air bag contact displaced the child passenger upward and rearward. The convertible top was in the down position at the time of the crash. The EMS and hospital medical records indicated that the 3-year old child passenger was ejected from the vehicle. The child's injuries were not consistent with ejection and he was void of abrasion (road rash) that is typically associated with ejection onto an asphalt road surface. The police investigation did not note an ejection of this passenger.

Medical Treatment

The 3-year old child passenger was transported from the scene by ambulance to a local hospital where he was evaluated and stabilized for air transfer to a regional pediatric trauma center. The child was mechanically supported and diagnosed with the above injuries. The medical staff consulted the parents of the child and informed them his condition was grave with no brain activity. Life support was terminated and the child expired two days following the crash. Due to the hospitalization and the extensive medical diagnosis, no autopsy was ordered for this child.

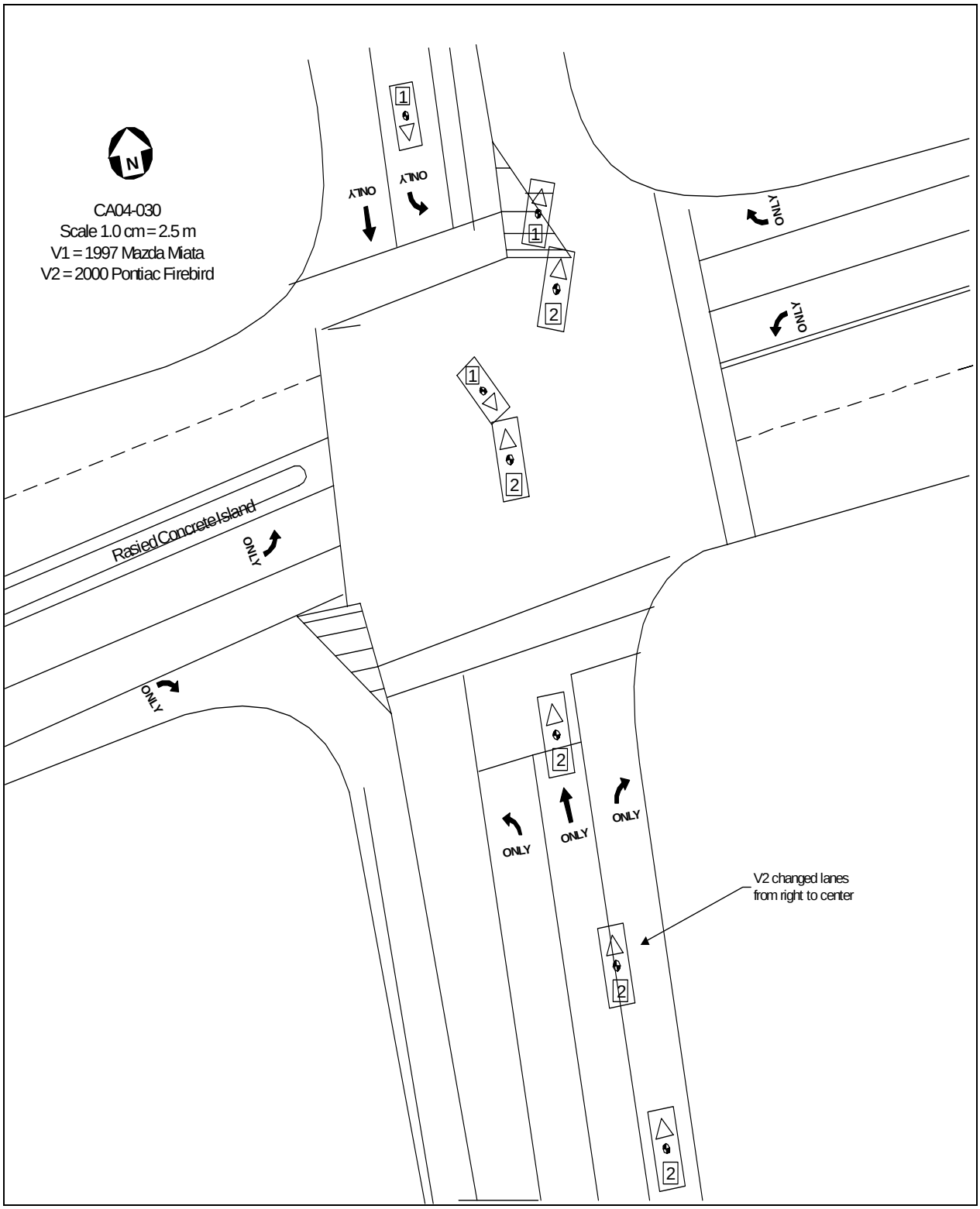

Figure 14. Scene Schematic