INDIANA UNIVERSITY

TRANSPORTATION RESEARCH CENTER
School of Public and Environmental Affairs
501 South Morton Street Suite 105
Bloomington, Indiana 47403-2452
(812) 855-3908 Fax: (812) 855-3537

ON-SITE ROLLOVER INVESTIGATION

CASE NUMBER - IN10006
LOCATION - TEXAS
VEHICLE - 2008 NISSAN PATHFINDER LE
CRASH DATE - January 2010

Submitted:

August 2, 2010

Contract Number: DTNH22-07-C-00044

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
National Center for Statistics and Analysis
Washington, D.C. 20590-0003

DISCLAIMERS

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 be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

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

Technical Report Documentation Page

1. *Report No.* IN10006	2. *Government Accession No.*	3. *Recipient's Catalog No.*
4. *Title and Subtitle* On-Site Rollover Investigation Vehicle - 2008 Nissan Pathfinder LE Location - Texas		5. *Report Date:* August 2, 2010 6. *Performing Organization Code*
7. *Author(s)* Special Crash Investigations Team #2		8. *Performing Organization Report No.*
9. *Performing Organization Name and Address* Transportation Research Center Indiana University 501 South Madison Street, Suite 105 Bloomington, Indiana 47403-2452		10. *Work Unit No. (TRAIS)* 11. *Contract or Grant No.* DTNH22-07-C-00044
12. *Sponsoring Agency Name and Address* U.S. Department of Transportation (NVS-411) National Highway Traffic Safety Administration National Center for Statistics and Analysis Washington, D.C. 20590-0003		13. *Type of Report and Period Covered* Technical Report Crash Date: January 2010 14. *Sponsoring Agency Code*

15. *Supplementary Notes*
On-site rollover investigation involving a 2008 Nissan Pathfinder LE.

16. *Abstract*

This on-site investigation focused on the rollover of a 2008 Nissan Pathfinder. The Nissan was occupied by a restrained 50-year-old female driver, a restrained 18-year-old male front right passenger, a restrained 52-year-old male second row left passenger, and a restrained 14-year-old male second row right passenger. The driver was traveling east on an interstate highway in the first lane from the right. A 2009 Mitsubishi Eclipse GS was traveling east in the on-ramp approaching the acceleration lane. The driver of the Mitsubishi applied hard braking to avoid another vehicle while attempting to merge into eastbound traffic. The Mitsubishi rotated counterclockwise approximately 180 degrees and the right quarter panel impacted the right quarter panel and right rear door of the Nissan (event 1). The impact on the Nissan caused it to rotate clockwise and the vehicle rolled over left side leading (event 2) 4 quarter turns. The Nissan was equipped with rollover/side impact inflatable curtain (IC) air bags, which deployed during the rollover. The driver and second row left passenger of the Nissan were transported by ambulance to a hospital. The driver was treated in the emergency room and released. The second row left passenger was hospitalized for one day. They driver sustained minor injuries, while the second row left passenger sustained a serious injury. The other two occupants of the Nissan were not transported. Both vehicles were towed from the crash scene due to damage.

17. *Key Words* Rollover Motor Vehicle Traffic Crash Injury Severity		18. *Distribution Statement* General Public	
19 *Security Classif. (of this report)* Unclassified	20. *Security Classif. (of this page)* Unclassified	21. *No. of Pages* 12	22. *Price*

Form DOT 1700.7 (8-72) Reproduction of completed page authorized

TABLE OF CONTENTS

Page No.

This on-site investigation focused on the rollover of a 2008 Nissan Pathfinder (**Figure 1**). This crash was brought to our attention by the National Highway Traffic Safety Administration (NHTSA) on February 9, 2010 through the sampling activities of the National Automotive Sampling System-General Estimates System (NASS-GES). This investigation was assigned on March 5, 2010. The crash involved the Nissan and a 2009 Mitsubishi Eclipse GS. The crash occurred in January, 2010 at 1737 hours, in Texas and was investigated by the city police department. The Nissan was inspected on March 9, 2010. The crash scene was photographed on March 10, 2010. The driver of the Nissan was interviewed on April 16, 2010. The Mitsubishi was not inspected since it had been driven from the crash scene and was not available. This report is based on the police crash report, vehicle and crash scene inspections, exemplar vehicle inspection, driver interview, medical records, occupant kinematic principles, and evaluation of the evidence.

Figure 1: The damaged 2008 Nissan Pathfinder

CRASH CIRCUMSTANCES

Crash Environment: This crash occurred during daylight hours and clear weather conditions in an interchange area of a 12-lane, divided interstate highway. The interstate traversed in an east-west direction. The roadway that the Nissan was traveling on had 4 through lanes, a High Occupancy Vehicle (HOV) lane, and an acceleration lane for merging traffic from an on-ramp. The Mitsubishi was traveling on the 1-lane on-ramp to the interstate highway. Each travel lane was approximately 3.7 m (12.1 ft) in width. The roadway pavement markings consisted of broken white lane lines, solid white outside edge lines, and solid yellow median edge lines. The roadway surface was dry, level concrete. The speed limit was 97 km/h (60 mph). The site of the crash was urban commercial. The Crash Diagram is on page 12 of this report.

Pre-Crash: The Nissan was occupied by a restrained 50-year-old female driver, a restrained 18-year-old male front passenger, a restrained 52-year-old male second row left passenger, and a restrained 14-year-old male second row right passenger. The driver was traveling east in the first lane from the right (**Figure 2**) and intended to continue straight ahead. The Mitsubishi was traveling east in the on-ramp approaching the acceleration lane (**Figure 3**) and the driver intended to merge into traffic. According to the police crash report, the driver of the Mitsubishi

Figure 2: Approach of the Nissan to the area of the crash

applied hard braking to avoid a vehicle while attempting to merge into eastbound traffic. The braking caused the Mitsubishi to rotate counterclockwise.

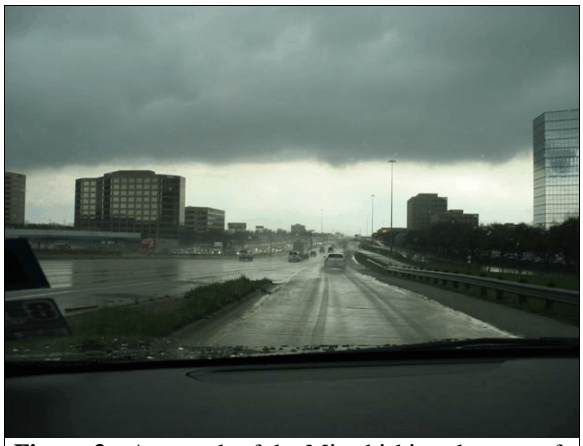


Figure 3: Approach of the Mitsubishi to the area of the crash

Crash: The Mitsubishi rotated counterclockwise approximately 180 degrees and the right quarter panel impacted the right quarter panel and right rear door of the Nissan (event 1). The impact on the Nissan caused it to rotate clockwise and the vehicle rolled over (**Figure 4**) left side leading (event 2) 4 quarter turns. The Nissan was equipped with rollover/side impact inflatable curtain (IC) air bags, which deployed during the rollover. The Nissan came to final rest on its wheels on the south shoulder heading northwest. The Mitsubishi was redirected in a northeast direction and came to final rest in the HOV lane heading northwest.

Figure 4: Damage on the roof and right A-pillar from the rollover

Post-Crash: The driver and front right passenger exited the vehicle through their respective doors. A passerby assisted the second row left passenger out of the vehicle through the left rear door. The second row right passenger exited the vehicle through the left rear door since the right rear door was jammed closed. The police and emergency medical personnel responded to the crash scene. The driver and second row left passenger of the Nissan were transported by ambulance to a hospital. The other occupants of the Nissan were not transported to a medical facility. The Nissan was towed from the crash scene due to damage. The driver and front passenger of the Mitsubishi were not injured and the driver drove the vehicle from the crash scene.

ROLLOVER DISCUSSION

The Nissan's rollover mitigation features consisted of Electronic Stability Control (ESC). The vehicle has been given a three star rollover rating on a five star scale by the NHTSA and a Static Stability Factor of 1.13[1]. A three star rating indicates that the vehicle has a 20%-30% chance of a rollover when involved in a single vehicle crash. The specific chance of a rollover for this vehicle model was given as 23%. The Static Stability Factor (SSF) is a calculation based on the vehicle's track width and height of its center of gravity. The result of the calculation is a measure of a vehicle's resistance to a rollover. A higher SSF indicates a more stable vehicle. The

[1] www.safercar.gov, 3/22/10

majority of passenger vehicles have an SSF of 1.30 to 1.50[2]. The test vehicle also did not tip-up during the dynamic steering maneuver test in which the test vehicle was put through a fish-hook shaped steering maneuver (i.e., hard left and hard right steer) at between 56-80km/h (35-50 mph).

The impact by the Mitsubishi caused the Nissan to rotate clockwise. The abrasions on the left front wheel rim, the debeaded left front tire, and the abrasions on the left rear wheel rim indicated that as the vehicle rotated, the tires were deflected and the rims contacted the pavement causing the vehicle to trip and roll over left side leading. The vehicle came to final rest on it wheels in the HOV lane heading northwest. The damage pattern on the vehicle indicated that it probably rolled over 4 quarter turns. Since it was not possible to inspect the crash scene due to heavy traffic volume, the specific location of rollover initiation and the distance traveled during the rollover could not be determined.

CASE VEHICLE

The 2008 Nissan Pathfinder was a rear wheel drive, 7-passenger, 4-door, sport utility vehicle (VIN: 5N1AR18U88C------) manufactured in November 2007. It was equipped with a 4.0-liter, 6-cylinder engine, 5-speed automatic transmission, 4-wheel anti-lock disc brakes with electronic brake force distribution, traction control, electronic stability control, and a rollover sensing system. The front row was equipped with bucket seats, active head restraints, lap-and-shoulder safety belts with pretensioners, dual stage driver and front right passenger frontal air bags, seat-mounted side impact air bags, and rollover/side impact IC air bags that provided protection for the front, second, and third rows. The second row was equipped with a split bench seat with folding backs, adjustable head restraints, lap-and-shoulder belts, and Lower Anchors and Tethers for Children (LATCH) in the outboard seating positions. The third row was equipped with split bench seat with folding backs, adjustable head restraints, and lap-and-shoulder safety belts. The driver estimated the vehicle's mileage was approximately 25,000 (40,000 miles). The vehicle's specified wheelbase was 270 cm (106.3 in).

CASE VEHICLE DAMAGE

Exterior Damage: The Nissan sustained damage on the right quarter panel and right rear door from the impact with the Mitsubishi. This area also sustained damage from the rollover, which masked any damage that may have occurred from the impact with the Mitsubishi. The only distinguishable damage that may have resulted from the Mitsubishi impact was a longitudinal scratch approximately 4 cm (1.6 in) in length that

Figure 5: Damage on the Nissan from the impact with the Mitsubishi was masked by damage from the rollover; arrow shows location of longitudinal scratch, possibly from impact with the Mitsubishi

[2] "Trends in the Static Stability Factor of Passenger Cars, Light Trucks, and Vans", NHTSA Technical Report, DOT HS 809 868, June 2005

began 50 cm (19.7 in) forward of the right rear axle (**Figure 5**).

The rollover involved the top and both side planes of the Nissan. The direct damage on the top plane began on the right fender and right portion of the hood. It extended onto the A-pillars and roof (**Figure 6**). The direct damage on the left side plane began 78 cm (30.7 in) rear of the left front axle and extended along the roof side rail and top of the left side doors and quarter panel ending at the D-pillar. The direct damage on the right side plane began 57 cm (22.4 in) forward of the right front axle and extended rearward along the fender onto the right A-pillar, top of the right front door, right roof side rail, right rear door, and the full height of the right quarter panel. The maximum residual lateral crush was 8 cm (3.1 in) and occurred at the top of the right A-pillar. The maximum residual vertical crush (**Figure 7**) was 5 cm (2 in) and occurred at the right corner of the windshield header. Both crush points were located 115 cm (45.3 in) rear of the right front axle.

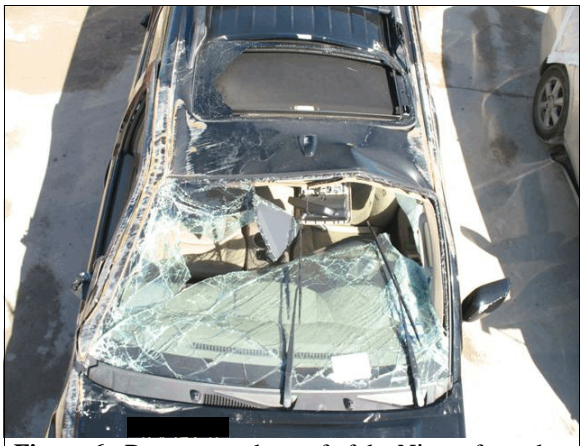


Figure 6: Damage on the roof of the Nissan from the rollover

Figure 7: The maximum lateral and vertical crush occurred at the top of the right A-pillar

Damage Classification: The Collision Deformation Classification (CDC) for the impact on the right quarter panel (event 1) of the Nissan was 03R9999. Columns 4-6 of the CDC were coded unknown since the damage from this impact was masked by the damage from the rollover. The CDC for the rollover (event 2) was 00TDDO2. The severity of the damage from the rollover was minor based on the extent of the roof crush.

The vehicle manufacturer's recommended tire size was P265/65R17. The Nissan was equipped with tires of the recommended size. The vehicle's tire data are shown in the table below.

Tire	*Measured Pressure*		*Vehicle Manufacturer'sRecommended Cold Tire Pressure*		*Tread Depth*		*Damage*	*Restricted*	*Deflated*
	kPa	psi	kPa	psi	milli-meters	32nd of an inch			
LF	Flat	Flat	241	35	6	8	Debeaded	No	No
LR	207	30	241	35	6	8	None	No	No
RR	234	34	241	35	6	7	None	No	No
RF	234	34	241	35	6	8	None	No	No

Vehicle Interior: The inspection of the interior of the Nissan revealed no discernable evidence of occupant contact within the front row. Scuff marks were present on the roof in the second row left and right seating positions, probably from head contact by the second row left and right passengers. There was no deformation of the steering wheel rim or compression of the energy absorbing steering column.

The right rear door was jammed shut, while the other doors remained closed and operational. All the window glazings was either closed or fixed prior to the crash. The window glazings in the right front, third right rear, third left rear, and sunroof were disintegrated from impact forces. The windshield had collapsed due to weathering. It was probably in place and cracked following the crash. The remaining window glazings were undamaged.

The vehicle's passenger compartment sustained four intrusions as a result of the rollover, which all occurred in the front passenger area. The most severe intrusions involved the right A-pillar, roof side rail, and windshield header. The right A-pillar and roof side rail intruded laterally 9 cm (3.5 in). The windshield header intruded vertically 5 cm (2 in).

AUTOMATIC RESTRAINT SYSTEM

The Nissan was equipped with a Certified Advanced 208-Compliant (CAC) frontal air bag system that consisted of dual stage driver and front right passenger air bags, driver seat position sensor, safety belts usage sensors, retractor-mounted pretensioners and a front passenger weight sensor. Based on the Holmatro Rescuer's Guide to Vehicle Safety Systems, the frontal air bag impact sensor was located on the center of the front cross frame member. The manufacturer has certified that the vehicle is compliant to the Advanced Air Bag portion of the Federal Motor Vehicle Safety Standard (FMVSS) No. 208. Neither frontal air bag deployed in this crash.

The Nissan was also equipped with rollover/side impact IC air bags and front seat-mounted side impact air bags. The inflators for the IC air bags were located within the roof side rail over the B-and D-pillars. Both IC air bags deployed in this crash.

The IC air bags were located along the roof side rails inside the headliner (**Figures 8** and **9**) and extended from the top of the A-pillar to the D-pillar. The deployed IC bags were 220 cm (86.6 in) in width and 40 cm (15.7 in) in height. They were attached at the lower A-pillars by a 32 cm (12.6 in) tether. The IC air bags extended vertically to approximately 1 cm (0.4 in) above the beltline. The gap between the bottom of IC air bag and the A-pillar was approximately 42 cm (16.5 in) in length below the tether and approximately 37 cm (14.6 in) above the tether (**Figure 10**). There was no visible tether at the D-pillar. Inspection of the IC air bags revealed no discernable evidence of occupant contact and no damage.

Figure 8: The front portion of the Nissan's deployed right IC air bag

Figure 9: The back portion of the deployed right IC air bag

Figure 10: The front of the right IC air bag

MANUAL RESTRAINT SYSTEM

The Nissan was equipped with lap-and-shoulder belts in all the seating positions. The driver's safety belt consisted of continuous loop belt webbing, an Emergency Locking Retractor (ELR), sliding latch plate, and an adjustable upper anchor that was in the full-up position. The front passenger safety belt consisted of continuous loop belt webbing, an ELR/Automatic Locking Retractor (ALR), sliding latch plate, and an adjustable upper anchor that was located in the full-up position. The driver and front passenger safety belts were equipped with retractor-mounted pretensioners, which actuated during the crash. The second and third row safety belts were similar to the front passenger safety belt but had fixed upper anchors and locking latch plates. The third row safety belts were similar to the front passenger safety belt but had fixed upper anchors. The second and third row safety belts were not equipped with pretensioners.

Inspection of the driver's safety belt assembly revealed that the retractor was jammed and a length of belt webbing was extended out of the retractor consistent with usage. The length of the belt webbing was 95 cm (37.4 in) from the stop button to the D-ring. The latch plate showed historical usage scratches and light load abrasions were present on the latch plate belt guide.

There were also minor abrasions on the belt webbing near the D-ring. This evidence indicated that the driver was restrained by the lap-and-shoulder safety belt at the time of the crash.

Inspection of the front right passenger's safety belt assembly revealed that the retractor was jammed and a length of belt webbing was extended out of the retractor consistent with usage. The length of the belt webbing was 97 cm (38.2 in) from the stop button to the D-ring. The latch plate showed historical usage scratches and load abrasions were present on the latch plate belt guide. There were also minor abrasions on the belt webbing near the D-ring. This evidence indicated that the passenger was restrained by the lap-and-shoulder belt at the time of the crash.

Inspection of the second row left passenger's safety belt assembly revealed that the belt webbing was slightly stretched. This evidence supported the driver's statement during the SCI interview that this passenger restrained by the lap-and-shoulder safety belt at the time of the crash.

Inspection of the second row right passenger's safety belt assembly revealed that the belt webbing was slightly stretched. The belt webbing was also entrapped in the forward corner of the D-ring with a length of safety belt extended out of the retractor consistent with usage. This evidence indicated that the passenger was restrained by the lap-and-shoulder safety belt at the time of the crash.

CASE VEHICLE DRIVER KINEMATICS

Based on the SCI interview, the driver of the Nissan [50-year-old female, 163 cm (64 in) and 57 kg (125 lbs] was seated in an upright posture with her back against the seat back. She had both hands on the steering wheel at the 10 and 2 o'clock positions. The seat track was adjusted to the middle position and the seat back was slightly reclined. The head restraint was adjusted to the full-down position. The distance from the top of the seat back to the top of head restraint was 18 cm (7.1 in). The tilt steering column was located in the center position. The driver was wearing the safety belt snugly across her hips and shoulder. The driver was wearing contact lenses.

The impact on the right quarter panel of the Nissan by the Mitsubishi probably displaced the driver to the right and forward within the safety belt. As the vehicle rotated clockwise prior to the rollover, she was redirected to the left. When the vehicle rolled over left side leading, the driver was redirected toward the roof and loaded the safety belt, which fractured her left anterior 6th rib. She also sustained a contusion on the left flank from contacting the left front door armrest and a small laceration on the right hand from flying glass fragments. While there was no discernable evidence of occupant contact on the left IC air bag, occupant kinematic principles suggest that the driver probably loaded the IC air bag during the rollover. The driver remained restrained in her seat position throughout the rollover. She exited the vehicle without assistance through the left front door.

The driver was transported by ambulance to a trauma center where she was treated in the emergency room and released. She had one follow-up visit for physical therapy regarding pain in her neck and back. The driver was not working at the time of the crash. The table below presents the driver's injuries and injury sources.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 2005	Injury Source	Source Confidence	Source of Injury Data
1	Fracture, left anterior 6th rib, not further specified	minor 450201.1,2	Torso portion of safety belt system	Probable	Emergency room records
2	Laceration, small, on dorsal (top) surface right hand, not further specified	minor 710602.1,1	Noncontact injury: flying glass, roof glazing	Probable	Interviewee (same person)
3	Contusion left flank[3], not further specified	minor 510402.1,2	Left front hardware/armrest, rear upper quadrant	Probable	Emergency room records

CASE VEHICLE FRONT ROW RIGHT PASSENGER KINEMATICS

The Nissan's front row right passenger [18-year-old male, 178 cm (70 in) and 75 kg (165 lbs)] was seated in an upright posture with his back against the seat back. His right arm was on the arm rest and his left arm was on his lap. The seat track was adjusted to between the middle and rear positions and the seat back was slightly reclined. The head restraint was adjusted to the full-down position. The distance from the top of the seat back to the top of head restraint was 18 cm (7.1 in). The passenger was wearing the safety belt snugly across his hips and shoulder. The passenger was wearing contact lenses.

The passenger remained restrained in his seat position during the rollover and loaded the safety belt. There was no discernable evidence that he contacted any interior surfaces or components during the crash. He sustained small lacerations on the top of both hands from flying glass fragments. The passenger exited the vehicle without assistance through the right front door.

CASE VEHICLE FRONT ROW RIGHT PASSENGER INJURIES

The front row right passenger was not transported to a hospital. The table below shows the passenger's injury and injury source based on the SCI interview with the driver.

[3] Pain/tenderness were noted to posterior left lateral chest and abdomen and left lateral anterior abdomen.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 2005	Injury Source	Source Confidence	Source of Injury Data
1	Lacerations, multiple, small, on dorsal (top) surface of both hands, not further specified	minor 710602.1,3	Noncontact injury: flying glass, roof glazing	Probable	Interviewee (driver)

CASE VEHICLE SECOND ROW LEFT PASSENGER KINEMATICS

The Nissan's second row left passenger [52-year-old male, 183 cm (72 in) and 82 kg (180 lbs)] was seated in an upright posture with his back against the seat back and both feet on the floor. The seat track and seat back were not adjustable. The head restraint was adjusted to the full-down position, which was flush with the top of the seat back. The passenger was wearing the safety belt snugly across his hips and shoulder.

The impact on the right quarter panel of the Nissan probably displaced the second row left passenger to the right and forward within his safety belt. As the vehicle rotated clockwise prior to the rollover, he was redirected to the left. When the vehicle rolled over, the passenger was redirected toward to roof and loaded the safety belt. There was a light scuff mark on the roof near the roof side rail, which indicated that the passenger probably contacted his head on the roof during the rollover. The passenger sustained a fracture of the left lateral 5th rib and fractured 6th-8th posterior left ribs from contact with the rear upper quadrant of the left rear door. He contacted the left IC air bag with his left hand, which caused an abrasion at the base of the left thumb. He also sustained contusions on his left side and left knee from contact with the left rear door. A passerby helped the passenger exit the vehicle through the left rear door.

CASE VEHICLE SECOND ROW LEFT PASSENGER INJURIES

The second row left passenger was transported by ambulance to a trauma center where he was admitted overnight for treatment of his injuries. The passenger had no follow-up visits to a medical facility. He missed one day of work as a result of the crash. The table below presents the passenger's injuries and injury sources.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 2005	Injury Source	Source Confidence	Source of Injury Data
1	Fractured left ribs: lateral 5th rib with irregularity lateral 6th rib, and posterior ribs 6th through 8th, not further specified	serious 450203.3,2	Left rear door panel, rear upper quadrant	Probable	Hospitalization records
2	Abrasion on palmar surface at left base of thumb	minor 710202.1,2	Air bag, left side (IC)	Probable	Emergency room records

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 2005	Injury Source	Source Confidence	Source of Injury Data
3	Contusion, 15.1 cm (6 in) diameter, left side, not further specified[4]	minor 510402.1,2	Left rear door panel, rear upper quadrant	Probable	Emergency room records
4	Contusion (soft tissue damage) left knee, not further specified	minor 810402.1,2	Left rear door panel, forward lower quadrant	Probable	Interviewee (driver)

CASE VEHICLE SECOND ROW RIGHT PASSENGER KINEMATICS

The Nissan's second row right passenger [14-year-old male,175 cm (69 in) and 54 kg (120 lbs)] was seated in an upright posture with his back against the seat back. The seat track and seat back were not adjustable. The head restraint was adjusted to the full-down position and the distance from the top of the seat back to the top of the head restraint was 2 cm (0.8 in). The passenger was wearing the safety belt snugly across his hips and shoulder.

The second row right passenger was redirected toward the roof as the vehicle rolled over left side leading. He loaded the safety belt, which caused an abrasion on the right side of the neck. There was a light scuff mark on the roof near the roof side rail, which indicated that the passenger probably contacted his head on the roof during the rollover, but he sustained no injury from this contact. The roof glazing was disintegrated during the rollover and glass fragments caused small lacerations on the top of his right hand. Following the crash, the passenger exited the vehicle through the left rear door, since the right rear door was jammed shut.

CASE VEHICLE SECOND ROW RIGHT PASSENGER INJURIES

The passenger sustained a no police-reported injury and was not transported to a hospital.

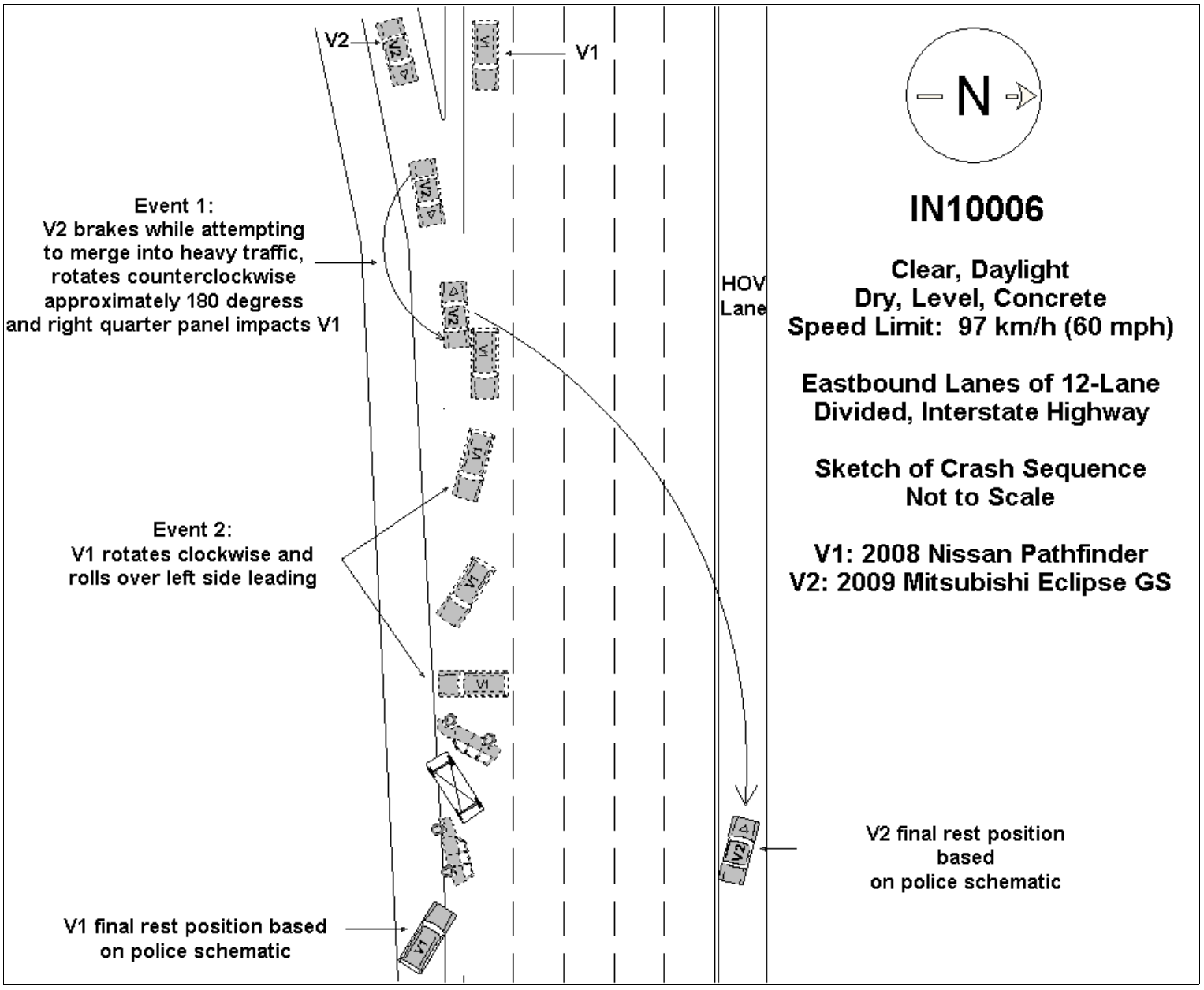
Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 2005	Injury Source	Source Confidence	Source of Injury Data
1	Abrasion, 7.6 cm (3 in) right side of neck, not further specified	minor 310202.1,1	Torso portion of safety belt system	Certain	Interviewee (driver)
2	Lacerations (cuts) on dorsal (top) surface right hand, not further specified	minor 710602.1,1	Noncontact injury: flying glass, roof glazing	Probable	Interviewee (driver)

[4] Patient was listed as having cervicalgia with pain in left posterior shoulder, scapular, and subscapular areas as well as pain/tenderness to left anterior chest, left breast, left posterior chest and mid-back. However, the exact site of the contusion was never identified in the medical records.

The 2009 Mitsubishi Eclipse GS was a front wheel drive, 4-passenger, 2-door hatchback (VIN: 4A3AK24FX9E-------) equipped with a 2.4-liter, I-4 engine, automatic transmission, 4-wheel anti-lock disc brakes, dual stage driver and front passenger frontal air bags, seat-mounted side impact air bags, and side impact IC air bags protecting the outboard seating positions. The manufacturer has certified that the vehicle is compliant to the Advanced Air Bag portion of the Federal Motor Vehicle Safety Standard (FMVSS) No. 208.

Exterior Damage: The police crash report indicated that the Mitsubishi sustained damage on the right quarter panel. None of the vehicle's air bags deployed during the crash. The vehicle was driven from the crash scene by the driver and was not available for inspection.

Other Vehicle's Driver: The police crash report indicated that the Buick's driver (19-year-old female) was restrained by the lap-and-shoulder belt and the driver's air bag deployed. The driver sustained a police reported C injury and was transported by private conveyance from the scene to a medical facility.


V2
V1
N
IN10006
Clear, Daylight
Dry, Level, Concrete
Speed Limit: 97 km/h (60 mph)
Eastbound Lanes of 12-Lane Divided, Interstate Highway
Sketch of Crash Sequence
Not to Scale
V1: 2008 Nissan Pathfinder
V2: 2009 Mitsubishi Eclipse GS
Event 1:
V2 brakes while attempting to merge into heavy traffic, rotates counterclockwise approximately 180 degress and right quarter panel impacts V1
HOV Lane
Event 2:
V1 rotates clockwise and rolls over left side leading
V2 final rest position based on police schematic
V1 final rest position based on police schematic