CRASH DATA RESEARCH CENTER

Calspan Corporation
Buffalo, NY 14225

NOT-IN-TRAFFIC SURVEILLANCE
CALSPAN ON-SITE BACKOVER FATALITY INVESTIGATION

CASE NO: CA06-028

VEHICLE: 2005 CADILLAC ESCALADE ESV

LOCATION: NEW YORK

CRASH DATE: NOVEMBER 2006

Contract No. DTNH22-01-C-17002

Prepared for:

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

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points are coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

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

TECHNICAL REPORT STANDARD TITLE PAGE

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17. Key Words Not-In-Traffic Surveillance Backover Pedestrian fatality Ultrasonic Rear Parking Aid		*18. Distribution Statement* General Public	
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TABLE OF CONTENTS

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BACKGROUND

This on-site investigation focused on the visibility issues and the Ultrasonic Rear Parking Assist system of a 2005 Cadillac Escalade ESV Sport Utility Vehicle (SUV) that was involved in a fatal backover crash with a 7-year old male pedestrian. The crash occurred at the mouth of a private driveway as the Cadillac was backing up a positive 13.5 percent (7.7 degree) grade. A Jeep Cherokee was parked in the driveway to the right of the Cadillac's backing trajectory. The child was reportedly "skipping" along the sidewalk that intersected the driveway. As he cleared the parked Jeep Cherokee, the back right area of the Cadillac's bumper struck the child and knocked him to the asphalt surface. The driver was unaware of this contact and continued to back as she steered the vehicle to the right. The undercarriage mounted spare tire and the rear sway bar contacted the child as evidenced by wipe marks (road film removed). The right front tire subsequently ran over the child resulting in fatal head injuries. The driver, aware that she ran over something, stopped the vehicle in the road and exited the vehicle to find the child pedestrian lying face-up on the driveway near the sidewalk location. The child was transported by ambulance to a local hospital where he expired within one-hour of the incident of a massive head injury. **Figure 1** is an aerial view of the crash site and the stopped position of the Cadillac Escalade.

Figure 1. Aerial view of the crash site and the stopped position of the Cadillac Escalade.

The Calspan SCI team received notification of the crash from the investigating police agency on the day following the November incident and an Internet news article was subsequently forward to the SCI team by NHTSA for on-site follow-up investigation. Cooperation was established with the investigating officers and the on-site investigation was conducted on Monday, November 5. The 2005 Cadillac was impounded by the police agency and held for this on-site investigation. In addition to the vehicle inspection and documentation, the scene was documented and a brief in-person interview was conducted with the driver and her husband. The crash was documented by the police on the standard Traffic Crash Report form and reported to the state as a fatal crash.

SUMMARY

Crash Site

This incident occurred on a private residential driveway at the intersection of a sidewalk. Both surfaces were paved with asphalt. This incident occurred during daylight hours on a clear and dry day. The private driveway was located adjacent to the driver's residence and was 5.1 m (16.7') in width, extending in an east/west direction. Backing onto the two-lane residential street required backing in the easterly direction. **Figure 2** is an aerial view of the crash site. The driveway had a positive slope toward the road of 13.5 percent (7.7 degrees) which transitioned to 6.2 percent (3.5 degrees) at the location of the sidewalk **(Figure 3)**. The cross slope at the sidewalk was 1.3 percent (0.8 degrees), negative to the south, the direction of travel of the pedestrian. Two sport utility vehicles were parked at the north edge of the driveway, facing downhill in a westerly direction. The black Jeep Cherokee was parked on the driveway with the rear bumper at the outboard edge of the asphalt sidewalk. The sidewalk was 1.2 m (3.9') in width and was located 2.3 m (7.5') west of the travel lane. There were no curbs or painted lines delineating the edges of the street. Several non-contact vehicles were parallel parked on the west side of the road, both north and south of the subject driveway.

Figure 2. Aerial view of the crash site.

Figure 3. Lateral view of the driveway positive 13.5 percent slope.

Vehicle Data – 2005 Cadillac Escalade ESV

The involved vehicle was a 2005 Cadillac Escalade ESV **(Figure 4)** Sport Utility Vehicle (SUV) that was purchased used by the driver's husband at an auto auction. He stated that he owned the vehicle for approximately three months. The Cadillac was manufactured on 9/04 and was identified by Vehicle Identification Number (VIN) 1GYEK63N55R (production number deleted). The odometer reading was 57,619 km (35,804 miles) at the time of the SCI inspection. The Cadillac was a four-door SUV that was configured with eight-passenger seating (2-3-3). The Escalade was a full-time all-wheel drive vehicle that was equipped with power-assisted four-wheel disc brakes with anti-lock (ABS), traction control, and Stabili-Trac electronic stability control. The Escalade was powered by a 6.0 liter conventionally mounted V-8 engine linked to a four-speed automatic transmission with a column mounted transmission selector lever. The OEM 265/70R17 tires and wheels were replaced prior to the auction purchase with aftermarket 305/35ZR/24 Pirelli Scorpion Zero tires on chrome surfaced six-spoke alloy wheels. These tires **(Figure 5)** had a diameter of 82 cm (32.4") with a tread width of 28 cm (11"). The OEM spec tire

had a diameter of 80 cm (31.6”). The specific tire data at the time of the SCI inspection was as follows:

Position	Measured pressure	Measured tread Depth	Damage
Left Front	259 kPa (37.5 PSI)	6 mm (7/32”)	None
Left Rear	290 kPa (42 PSI)	6 mm (7/32”)	None
Right Front	286 kPa (41.5 PSI)	6 mm (7/32”)	None
Right Rear	283 kPa (41 PSI)	6 mm (7/32”)	None

Figure 4. Right rear view of the Cadillac Escalade and OEM window tint.

Figure 5. Aftermarket tire/wheel diameter.

The interior was configured with front bucket seats with adjustable head restraints. The second row was a three-passenger split bench with adjustable head restraints in the outboard positions. All head restraints were in the full-down positions. The third row seat was folded forward and stowed against the second row seat.

The laminated windshield and the front door glazing were standard SolarRay glass with minimal OEM tint. The rear door glass, rear quarter windows, and the backlight glass were OEM deep-tinted AS3. The transparency rating of the backlight glass was labeled at 13 percent. All windows were fully closed at the time of this incident.

The vehicle was measured and documented on a fairly level paved surface of the complex at the police impound yard. The following table identifies the heights and clearances of key components of the Cadillac Escalade.

Component	Height / Clearance
Backlight at top of high mounted brake light	141 cm (55.5”)
Base of backlight, viewable surface	137 cm (54”)
Top of rear bumper fascia	76 cm (30.1”)
Bottom of rear bumper fascia at outboard backing sensors	52 cm (20.5”)
Bottom of rear bumper fascia at inboard backing sensors	48 cm (19”)
Trailer hitch receiver	42 cm (16.5”)
Trailer hitch receiver bracket	41 cm (16”)
Aftermarket receiver cover	39 cm (15.5”)
Aft aspect of undercarriage mounted spare tire	42 cm (16.5”)
Forward aspect of spare tire	33 cm (13”)
Bottom of differential housing	27 cm (10.75”)
Bottom of sway bar bracket	28 cm (11.1”)
Bottom of rear shock mount	24 cm (9.6”)
Bottom of tail pipe, outboard end	35 cm (13.75”)
Tail pipe at bend	36 cm (14”)
End of sway bar	33 cm (12.9”)
Bottom of muffler	31 cm (12.1”)
Frame at B-pillar	33 cm (13.1”)
Transmission cross member	29 cm (11.6”)

Ultrasonic Rear Parking Assist System

The 2005 Cadillac Escalade was equipped with an Ultrasonic Rear Parking Assist (URPA) system designed to aid the driver with reverse parking maneuvers. The configuration and operation of the system was clearly outlined on pages 3-18 to 3-20 of the Cadillac Escalade Owner’s Manuel. The URPA system was comprised of four symmetrically-mounted rear bumper sensors used for object detection, a right D-pillar mounted visual warning, an audible chime and an On/Off button switch located on the center instrument panel. The On/Off switch was a hard button-type switch that required manual reactivation. The URPA did not automatically recycle to the On-position at each ignition cycle. The URPA operated while the vehicle was in reverse and at a speed of less than 5 km/h (3 mph) and detected objects within 1.5 m (5’) of the rear bumper.

Figure 6 is a view of the rear bumper ultrasonic sensors. The sensors were flush mounted within the fascia at an average elevation of 53 cm (21”) above the ground. The outboard sensors were located 94 cm (37”) right and left of the vehicle’s centerline respectively. The respective inboard sensor locations measured 28 cm (11”) from the centerline. The width of the bumper measured 166 cm (65.5”).

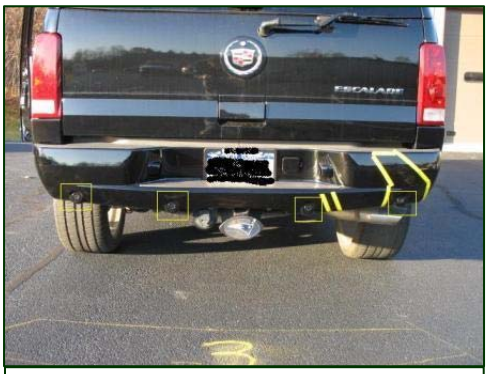

Figure 6. Rear bumper ultrasonic sensors.

Figure 7. URPA display on the right D-pillar.

Figure 7 is an interior view of the right D-pillar and the URPA display. The display utilized three colored-coded lights to provide distance and system information to the driver. When the vehicle's transmission was shifted to reverse the display's three lights illuminated for 1.5 seconds to inform the driver the system was operational. Then if an object was detected at a reverse speed less than 5 km/h (3 mph), one of the following occurred:

	Description	**Nominal Object Distance**
Zone 1	Amber light/chime	102-152 cm (40-60")
Zone 2	Amber/Amber lights/chime	51-102 cm (20-40")
Zone 3	Amber/Amber/Red lights/ Continuous chime	51-30 cm (20-12")
Zone 4	Flashing Amber/Amber/Red lights/ Continuous chime	Less than 30 cm (12")

The sensor array pattern was measured at the time of the SCI inspection and is included as **Figure 9** on the following page. The measured object detection for Zone 1 on the vehicle's centerline extended to 180 cm (71"). The transition from Zone 1 to Zone 2 detection measured 97 cm (38"). The distance to Zone 3 detection measured 43 cm (17"). The maximum width of the conical pattern in Zone 2 measured 267 cm (105").

Figure 8 is a view of the mid instrument panel mounted On/Off switch used to disable the system. A small diameter amber indicator light was located immediately left of the switch and provided visual information to the driver of the system status. If the URPA system was turned OFF, the instrument panel indicator light was illuminated and the D-pillar mounted display was dark with no lights illuminated.

Figure 8. URPA On/Off switch.

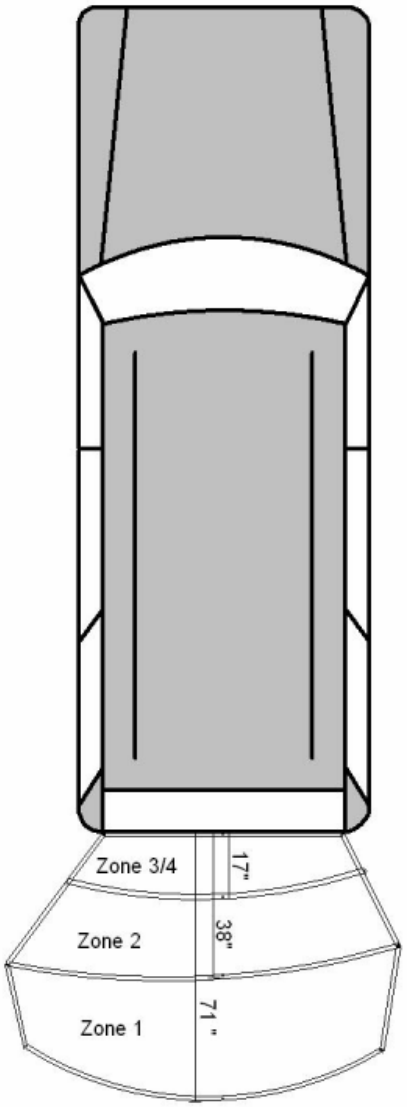

Figure 9. Measured URPA sensor array pattern.

Crash Sequence

Pre-Crash

The 39-year old female driver of the Cadillac Escalade returned to her residence between the hours of 1430 and 1445 from her job as a rural postal worker. The driver had an estimated height and weight of 165 cm (65") and 59 kg (130 lb). She parked her route vehicle, the black Jeep Cherokee, in her residential driveway. The Jeep was parked facing west on the north half of the driveway with the back of the vehicle positioned at the outboard edge of the asphalt sidewalk. The Jeep was positioned on the 13.5 percent slope, thus elevating the rear of the Cherokee in its parked position. It should be noted that the Jeep Cherokee was equipped with a deep tint privacy glass at the rear doors, quarter windows, and backlight. This glass would have precluded the driver from viewing through the glass to detect vehicles and/or pedestrians from approaching the driveway from the northerly direction (i.e. the direction of the approaching pedestrian). A second sport utility was parked facing in a westerly direction forward of the Jeep. The 2005 Cadillac Escalade was parked in the driveway to the left of the other parked vehicles. It was also facing in a westerly direction which required a backing maneuver from the driveway.

The driver and her 15-year old daughter entered the vehicle at approximately 1503 hours to drive to a dental appointment. The driver started the Escalade and placed the transmission selector in reverse to back out of the driveway onto the local street to proceed in a southerly direction. This required her to back across the sidewalk area at the time of school dismissal. The parked Jeep Cherokee completely obscured her view of pedestrians approaching the driveway from the north (right). The positive 13.5 percent grade of the driveway probably required a throttle input for the vehicle to overcome the backing grade. It should be noted that the vehicle's onboard URPA was in the off-position (for reasons that could not be determined). The driver stated to the investigating officer that as she began to back in an easterly direction, she turned to her right and looked through the backlight glazing. She also noted that her daughter turned to her right to look behind the vehicle as it backed. The driver's husband further reported that as the Escalade approached the rear of the parked Cherokee, the driver stopped the vehicle before backing across the sidewalk and into the street. Based on the position of the Cherokee, had the driver stopped at this point, she would not have been able to detect the approaching pedestrian or southbound traffic.

The 7-year old male pedestrian was proceeding in a southerly direction on the sidewalk, reportedly en route to an after school day care center that was located approximately 100 m (300') south of the crash site. The pedestrian was reportedly 117 cm (46") in height with a weight of 23 kg (50 lb). His height was 20 cm (8") below the beltline of the Cadillac Escalade (the base of the side window and backlight). The child was reported to be skipping along the sidewalk with two fellow students walking behind him. The driver's husband was positioned in the yard at the end of the driveway. He did not see the children on the sidewalk. Two of his employees were working across the street and observed a third pedestrian walking ahead of the 7-year old. They believed the 7-year old was trying to catch-up to this other child. The child pedestrian was dressed in a black hooded sweatshirt and wind pants, and was carrying or wearing a backpack that

contained his school supplies. The Crash Schematic is included as **Figure 19** on page 13 of this report.

Figure 10. Southerly sidewalk trajectory of the child pedestrian.

Figure 11. Trajectory of the child pedestrian as he crossed the parked position of the Jeep Cherokee.

Crash

As the 7-year old child crossed the driveway and cleared the parked Jeep Cherokee, he entered the path of the backing Cadillac Escalade with his right side exposed to the backing vehicle. The back right area of Cadillac's bumper struck the child pedestrian and knocked him to the pavement. Two diagonally oriented scuff marks were present on the face of the bumper from contact with the child pedestrian. The child's forward momentum, due to his "skipping" mode, carried him forward as he fell. The forward aspect of the undercarriage mounted spare tire and the aft edge of the rear sway bar contacted the child pedestrian as the vehicle continued backing. The driver was unaware of the initial contact with the pedestrian.

The rear tires apparently straddled the pedestrian as the vehicle continued backing. The driver applied a right steering input to direct the vehicle to a northerly direction onto the roadway in order to proceed in a southerly direction. As a result of the steering maneuver, the front tires tracked outboard of the rear tires as the vehicle continued to back on a counterclockwise arc. It was unknown if the child was rolled or displaced by the undercarriage contact. The front right tire subsequently ran over the child's head.

The driver felt a thump from the right front tire and assumed that she had backed over something. She stopped the vehicle approximately 2 m (7') northeast of the point of contact and exited the vehicle from the driver's door. She walked behind the Escalade and as she cleared the back of the vehicle, she observed the child laying on the asphalt driveway surface. A call was placed immediately to the emergency response system for police and medical assistance.

The child pedestrian came to rest on the driveway, positioned on his back with his head positioned approximately 1.1 m (3.6') east of the outboard edge of the sidewalk with his feet extending toward the roadway. He bled profusely from the right ear.

Post-Crash

The local police department responded to the call. Due to the severity of the crash, a higher authority police agency was summoned to the scene to investigate and report the crash. An ambulance was also dispatched to the scene. Emergency medical personnel placed the child pedestrian on a backboard and loaded him in the ambulance for rapid transport to a local hospital. At the hospital, the child was evaluated and determined to have massive head injuries with a fatal outcome. His parents were summoned to the hospital and he was pronounced deceased 43 minutes following the crash. An autopsy was performed on the body. The investigating officer indicated the child sustained a massive skull fracture with displacement and a large brain laceration with matter exuding from the right ear.

Injury	***Injury Severity (AIS 98 Update)***	***Injury Source***
Complex skull fracture, unknown aspect	Severe (150406.4,9)	Front right tire
Large brain laceration with matter exuding from the right ear	Severe (140688.4,9)	Front right tire

Vehicle Contact Evidence

The pedestrian's contact with the face of the back right bumper fascia did not result in damage to the vehicle. Two scuff marks were noted to the rear bumper that collected dust which evidenced the contact area **(Figure 12)**. A small diagonally oriented mark was noted 37 cm (14.5") right of center and extended 6 cm (2.5") vertically on the face of the bumper. A larger mark was noted outboard of the previously identified mark and was located 62-79 cm (24.5-31") right of center and was 28 cm (11") in height extending the full height of the bumper fascia **(Figure 13)**. This contact area surrounded the right outboard backing sensor. At the lower right aspect of this contact point was a vertically oriented patterned mark that resembled a fabric impression. There was no abrasion to the polished surface of the fascia. It should be noted that the investigating officer indicated that the outboard contact point resembled a hand print immediately following the crash. The hand print was not apparent at the time of this SCI inspection which occurred five days post-event. An aftermarket cover/plug was positioned in the receiver trailer hitch of the Escalade. This cover was gouged and fractured from a previous event. There was no other contact evidence to the back plane of the Escalade.

Figure 12. Rear contact plane of the Cadillac Escalade.

Figure 13. Pedestrian contact evidence to the rear bumper fascia.

Figure 14. Undercarriage contact evidence to the spare tire and rear sway bar.

Figure 15. Right lateral view of the spare tire wipe mark.

The undercarriage of the Escalade yielded several contact points as the vehicle overrode the child pedestrian. The forward aspect of the spare tire sidewall contained a wipe mark (area where the road film had been removed) that was longitudinally oriented. The wipe mark was 33 cm (13”) in width at the tread area and tapered to 20 cm (8”) in width, terminating 10 cm (4”) rearward of the tread area. The contact originated 10 cm (4”) left of center, extending 23 cm (9”) to the right of the vehicle. This contact point was located 85-95 cm (33.5-37.5”) forward of the rear bumper face.

The aft surface of the rear sway bar contained two wipe marks from pedestrian contact. The first wipe mark was located 8-18 cm (3.25-7”) left of center and was located 99 cm (39”) forward of the rear bumper face. The second wipe mark was located 16-19 cm (6.25-7.5”) right of center and located 100 cm (39.5”) forward of the bumper face. **Figures 14 and 15** are images of the undercarriage contact points. There was no other contact evidence to the undercarriage components. The police investigator did note that body fluid was present on the tread of the front right tire at the time of the crash. The vehicle was towed directly from the crash scene to the impound lot and stored outdoors uncovered prior to this investigation.

Rear Visibility

The baseline rear visibility of the Cadillac was measured at the time of the SCI inspection with the subject vehicle positioned in a nominally level parking lot. At the time of the visibility study, the demographics of the subject driver were unknown. Therefore, a 173 cm (68”) tall substitute driver was used. The seated eye height of the substitute driver measured 90 cm (35.5”) from the floor of the Cadillac.

The rear visibility was measured along the centerline of the vehicle with the Escalade positioned on level pavement. A 71 cm (28”) tall red reflective target was placed on the vehicle’s centerline and moved rearward to a location where the substitute driver could first see the red target by looking over his right shoulder. The centerline visibility

distance was measured from the rear bumper. A second measurement was taken with the target placed at ground level. The measured distance is summarized below:

- Sight distance to 71 cm (28") target: 5.9 m (19.3')
- Sight distance to ground level target: 11.3 m (37')

Although the above measurements reflect a level surface, the rear visibility site distance was greatly affected by the 13.5 percent (7.7 degrees) positive slope of the subject driveway. On this slope, the sight distance would have gone to infinity as the ground behind the vehicle would not have been visible to the driver. Her line of sight while backing would have been limited to the sky and the upper level of the neighboring houses.

The rear visibility from the driver's position of the Escalade was affected by the width of the C- and D-pillars, as well as by the second row head restraints. The seats in the third row of the subject vehicle were folded down at the time of the crash and did not affect the visibility. **Figures 16 and 17** are views looking to the right rear along the approximate driver's line of sight. A large blind spot was created by the wide C-pillar and second row right head restraint. This blind spot was directly along the child's travel path. For reference, a 183 cm/100 kg (72"/200 lb) male was not visible to the driver at a location 2.6 m (8.5') right and 1.1 m (3.6') behind the right rear corner of the Escalade. These visibility measurements are depicted graphically in **Figure 18** at the end of this report.

Figure 16. Driver's view to the blind spot at the right C-pillar.

Figure 17. Additional view of the C-pillar blind spot.

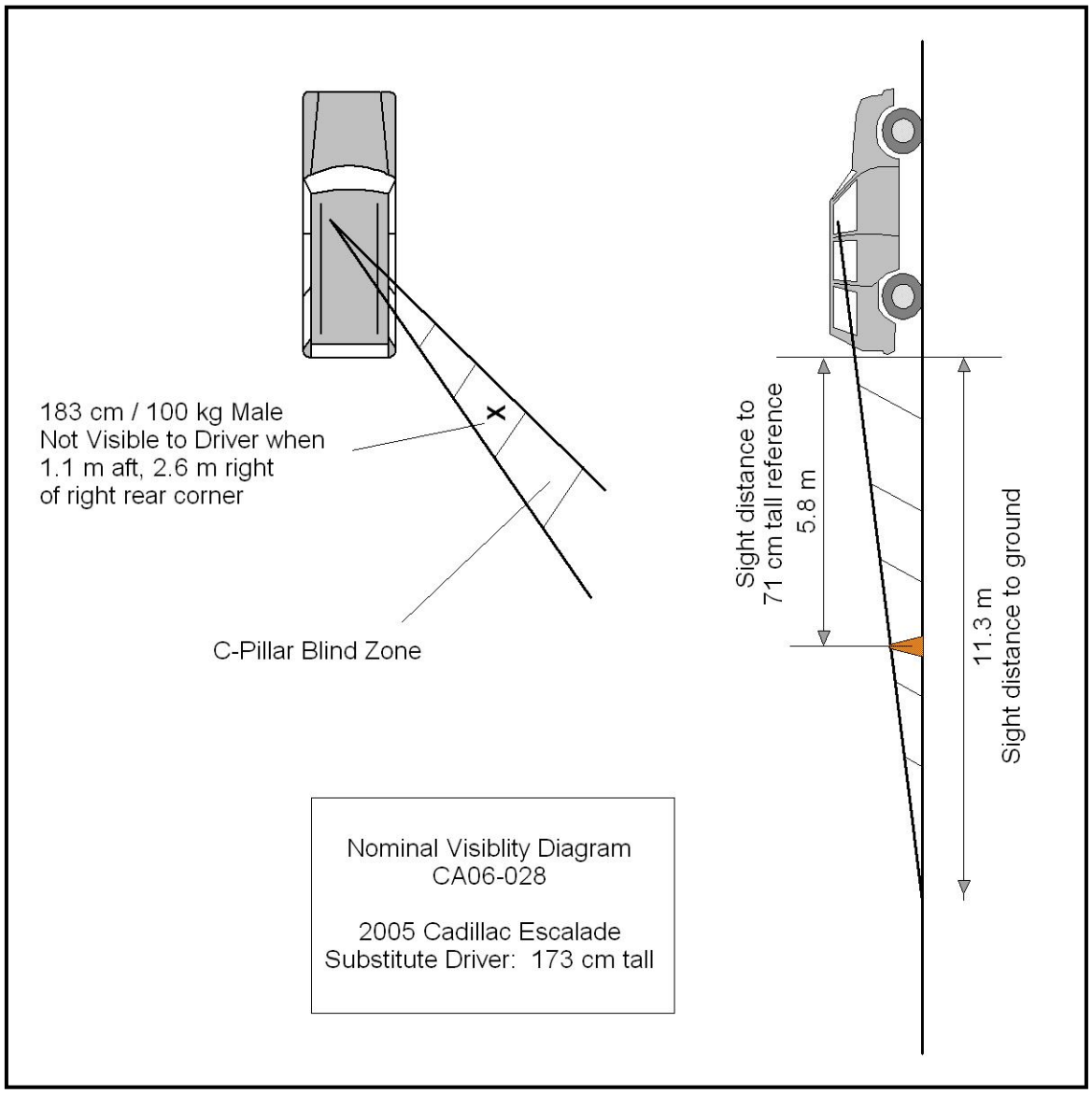

Figure 18: Nominal Visibility Diagram

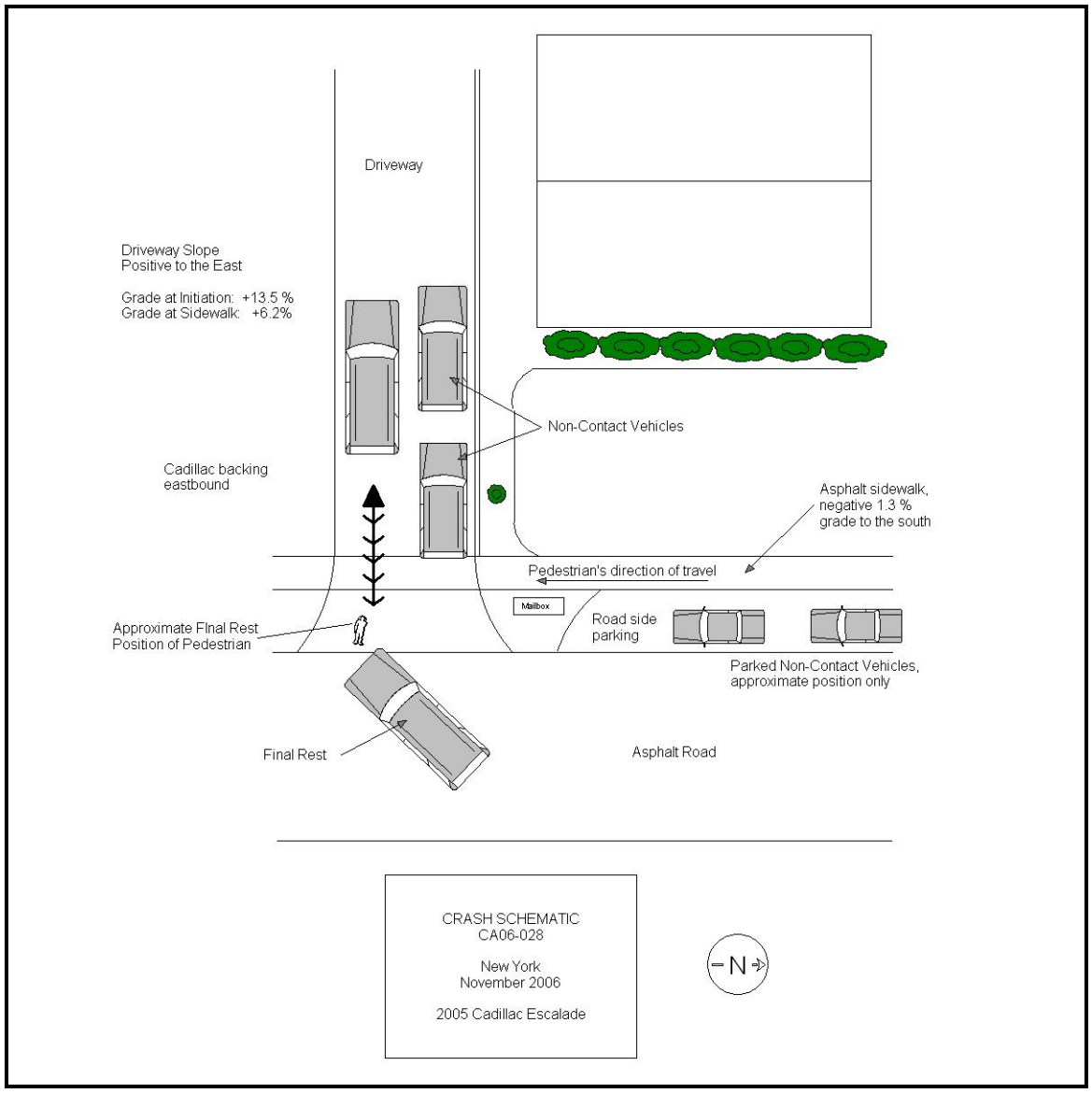

Figure 19: Crash Schematic

ATTACHMENT A

Not-In-Traffic Surveillance Forms

Not Applicable ☐

Reset Values

Print Forms

U.S. Department of Transportation
National Highway Traffic Safety Administration

SCENE FORM

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number

C A 0 6 0 2 8

IDENTIFICATION

2. Date of Crash 1 1 / X X / 0 6

3. Time of Crash 1 5 0 3

Code reported military time of crash.

NOTE: Midnight = 2400
Unknown = 9999

AMBIENT CONDITIONS

4. Light Conditions

- ◉ Daylight
- ○ Dark
- ○ Dark but lighted
- ○ Dawn
- ○ Dusk
- ○ Unknown

5. Atmospheric Conditions
(*Select all that apply)*

- ◉ Clear-No adverse conditions
- ○ Cloudy
- ○ Rain
- ○ Snow
- ○ Fog, Smog, Smoke
- ○ Sleet, Hail (freezing rain or drizzle)
- ○ Blowing Snow
- ○ Severe Crosswinds
- ○ Blowing Sand, Soil, Dirt
- ○ Other (specify): _____
- ○ Unknown

6. Temperature

- ○ Below 0 degrees Celsius (Below 32 F)
- ○ 1-10 degrees Celsius (33-50 F)
- ○ >10-24 degrees Celsius (51-75 F)
- ◉ Over 24 degrees Celsius (Over 75 F)
- ○ Unknown

SCENE INFORMATION

7. Type of area in which crash occurred
(*Select all that apply)*

- ◉ Single family residential
- ○ Row houses/townhouses
- ○ Multi family housing
- ○ Commercial
- ○ Industrial
- ○ Rural
- ○ Unknown

8. Driver exterior sightline obstructions
(*Select all that apply)*

- ○ None
- ◉ Other vehicles
- ○ Building
- ○ Trees
- ○ Shrubbery
- ◉ Other (specify) Grade at scene
- ○ Utility poles
- ○ Signs
- ○ Glare
- ○ Unknown
- ○ No driver present

9. Crash location

- ○ Driveway
- ○ Parking Lot
- ○ Sidewalk
- ○ Alley
- ◉ Intersection of driveway and sidewalk
- ○ Road / street
- ○ Roadside / shoulder
- ○ Other (specify)_____
- ○ Unknown

10. Non motorist sightline obstructions
(*Select all that apply)*

- ○ None
- ◉ Other vehicles
- ○ Building
- ○ Trees
- ○ Shrubbery
- ○ Utility poles
- ○ Signs
- ○ Glare
- ○ Other (specify) _____
- ○ Unknown

11. Grade at parked position (+ / -) + 1 4 %

12. Estimated distance from parked position to impact

0 0 4 . 3 m

13. Estimated speed at impact 0 0 2 kmph

14. Grade at impact (+ / -) + 0 6 %

15. Estimated distance from impact to vehicle final rest

0 0 8 . 2 m

Unknown. = 999 Reference Items 11,12, 13, 14, 15

Rev July/2007

Not Applicable ☐

Reset Values

U.S. Department of Transportation
National Highway Traffic Safety Administration

VEHICLE FORM

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number C A 0 6 0 2 8

VEHICLE IDENTIFICATION

2. VIN 1 G Y E K 6 3 N 5 5 6 X X X X X X

3. Model Year 2 0 0 5

4. Vehicle Make (specify): CADILLAC

5. Vehicle Model (specify): ESCALADE ESV

GLAZING

Location	Presence (check)	Status (select)	Clarity (select)	Tint (check)	Glazing Obstructions (specify if present)
Windshield	☑	☑ Fixed / ☐ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☑ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☐	
LF	☑	☐ Fixed / ☑ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☑ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☐	
RF	☑	☐ Fixed / ☑ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☑ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☐	
2nd Left	☑	☐ Fixed / ☑ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☑ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☑	
2nd Right	☑	☐ Fixed / ☑ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☑ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☑	
3rd Left	☑	☐ Fixed / ☑ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☑ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☑	
3rd Right	☑	☐ Fixed / ☑ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☑ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☑	
Backlight	☑	☐ Fixed / ☑ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☑ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☑	
Left Backlight	☐	☐ Fixed / ☐ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☐ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☐	
Right Backlight	☐	☐ Fixed / ☐ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☐ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☐	
Roof	☑	☐ Fixed / ☑ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☑ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☑	
Other (specify)	☐	☐ Fixed / ☐ Closed / ☐ Open / ☐ Partially Open / ☐ Unknown	☐ Clear / ☐ Hazy / ☐ Very Dirty / ☐ Unknown	☐	

TIRE DATA

6. Vehicle Manufacturer Recommended Tire Size 265/70R17

7. LF Tire Size 305/35ZR24

8. LR Tire Size 305/35ZR24

9. RF Tire Size 305/35ZR24

10. RR Tire Size 305/35ZR24

Seats / Head Restraint Data

Seat Position	Seat Type (Select from below)	Head Restraint (Check if available)	Head Restraint Adjustment (select)
Front Left	1	☑	☑ Full Down / ☐ Mid / ☐ Full Up
Front Middle		☐	☐ Full Down / ☐ Mid / ☐ Full Up
Front Right	1	☑	☑ Full Down / ☐ Mid / ☐ Full Up
2nd Left	7	☑	☑ Full Down / ☐ Mid / ☐ Full Up
2nd Middle	7	☐	☐ Full Down / ☐ Mid / ☐ Full Up
2nd Right	7	☑	☑ Full Down / ☐ Mid / ☐ Full Up
3rd Left	10	☐	☐ Full Down / ☐ Mid / ☐ Full Up
3rd Middle	10	☐	☐ Full Down / ☐ Mid / ☐ Full Up
3rd Right	10	☐	☐ Full Down / ☐ Mid / ☐ Full Up

NOTES:

3rd row seats folded forward against the second row

Seat Type codes:

0 = No seat or seat folded down
1 = Bucket
2 = Bucket w/ folding back
3 = Bench
4 = Bench w/ separate back cushions
5 = Bench w/ folding back
6 = Split bench w/ separate back cushions
7 = Split bench w/ folding back
8 = Pedestal (i.e. column supported)
9 = Box mounted (i.e. van type)
10= Other seat type (specify)
99= Unknown seat type

VEHICLE MEASUREMENTS

Clearance Heights		Measurements (all from ground, and in centimeters	NOTES
Beltline		137	
Top of trunk/tailgate		137	
Bottom of bumper		52	
Trailer hitch (if applicable)		42	
Undercarriage			
	Sway bar	28	
	Axle	N/A	
	Differential	27	
	Other (specify): Spare	33	
Sensor Height (if equipped)		53	
Camera Height (if equipped)		N/A	

Not Applicable ☐

Reset Values

U.S. Department of Transportation
National Highway Traffic Safety Administration

Back Up / Parking Aid Form

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number

C A 0 6 0 2 8

PARKING AID PRESENCE

2. Type of backing/parking aid present

- ○ OEM camera
- ◉ OEM ultrasonic/radar sensor
- ○ OEM combination camera-ultrasonic/radar sensor
- ○ OEM Fresnel lens
- ○ OEM interior mirrors
- ○ Aftermarket camera
- ○ Aftermarket ultrasonic/radar sensor
- ○ Aftermarket combination camera-ultrasonic radar sensor
- ○ Aftermarket Fresnel lens
- ○ Aftermarket interior mirrors
- ○ Other (specify): _____

CAMERA INFORMATION

Specify field of view measurements on diagram

3. System make/model

Not equipped with camera

4. Video monitor type

- ◉ None present
- ○ LCD (color)
- ○ CRT (black & white)
- ○ Unknown

5. Video display size *(Diagonal)* N/A cm

6. Camera location

- ◉ None present
- ○ Bumper
- ○ License plate
- ○ Tailgate/Hatch/Trunk
- ○ Other (specify): _____

7. Video image quality under scene lighting conditions

- ◉ None present
- ○ Good
- ○ Average
- ○ Poor (specify): _____
- ○ Unknown

8. Was the camera functioning properly

- ◉ None present
- ○ Yes
- ○ No, poor image quality due to glare
- ○ No, poor image quality due to atmospheric conditions
- ○ No, camera turned off
- ○ No, camera inoperable
- ○ Unknown

ULTRASONIC/RADAR SENSOR

Specify object detection range on diagram

9. System make/model

Ultrasonic Rear Park Assist

10. Auditory warning illumination

- ○ No sensor present
- ◉ Yes
- ○ No
- ○ Unknown

11. Number of sensors 4

12. Sensor locations *(Select all that apply)*

- ○ No sensor present
- ◉ Left bumper
- ◉ Center bumper
- ◉ Right bumper
- ○ License plate area
- ○ Tailgate/Hatch/Trunk

13. Was warning system functioning properly

- ○ No sensor present
- ○ Yes, system alerted driver
- ○ No, system did not alert driver
- ◉ No, system turned off
- ○ No, system inoperable
- ○ Unknown

14. Did driver react to warning

- ○ No sensor present
- ○ Yes
- ◉ No
- ○ Unknown

15. Did driver report common false warnings

- ○ No sensor present
- ○ Yes
- ○ No
- ◉ Unknown

Not Applicable ☐

Reset Values

U.S. Department of Transportation
National Highway Traffic Safety Administration

DRIVER FORM

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number

C A 0 6 0 2 8

DRIVER PROFILE

2. Driver's Age 3 9
   99 = Unknown

3. Driver's Sex
   - ○ Male
   - ◉ Female
   - ○ Unknown

4. Driver's Height 1 6 5 cm
   999 = Unknown

5. Driver's Weight 0 5 9 kg
   999 = Unknown

6. Driver eyewear worn
   (Select all that apply)
   - ○ None
   - ○ Eyeglasses
   - ○ Sunglasses
   - ○ Contacts
   - ◉ Unknown

7. Driver vision deficiency condition
   (Select all that apply)
   - ○ None
   - ○ Near sighted
   - ○ Far sighted
   - ○ Astigmatism
   - ○ Other (specify) _____
   - ◉ Unknown

8. Non motorist's relationship to driver
   - ◉ No relationship
   - ○ Child
   - ○ Grandchild
   - ○ Sibling
   - ○ Neighbor
   - ○ Friend
   - ○ Other (specify): _____
   - ○ Unknown

DRIVER ACTIONS

9. Driver approach to vehicle for entry
   - ◉ From left front
   - ○ From left
   - ○ From left rear
   - ○ From right rear
   - ○ From right front
   - ○ Circled vehicle
   - ○ Return trip (backing into driveway/lot)
   - ○ Other (specify): _____
   - ○ N/A
   - ○ Unknown

10. Driver entry interruption
    (Select all that apply)
    - ◉ Direct trip from building to vehicle
    - ○ Loaded items into vehicle
    - ○ Spoke with family
    - ○ Spoke with neighbors
    - ○ Spoke with contacted nonmotorist
    - ○ Return trip (backing into driveway/lot)
    - ○ Other (specify): _____
    - ○ N/A
    - ○ Unknown

11. Purpose of backing
    - ○ Leaving parking space in parking lot
    - ◉ Backing onto roadway from driveway
    - ○ Entering parking space in parking lot
    - ○ Backing into driveway from roadway
    - ○ Other (specify): _____
    - ○ N/A
    - ○ Unknown

12. Where was driver going
    Description:

    Leaving for an appointment

13. Driver in a hurry
    - ○ Yes
    - ○ No
    - ○ N/A
    - ◉ Unknown

14. How did driver check behind (rear area of vehicle) after vehicle entry
    (Select all that apply)
    - ○ Did not look
    - ○ Checked mirrors
    - ○ Turned right and looked back
    - ○ Turned left and looked back
    - ○ Viewed Camera
    - ○ Listened for auditory/visual warning from system
    - ○ Other (specify): _____
    - ○ N/A
    - ◉ Unknown

15. Estimated time between vehicle entry and start of backing
    - ○ 0-10 Seconds
    - ◉ 11-30 Seconds
    - ○ 31-60 Seconds
    - ○ Over 60 Seconds
    - ○ N/A
    - ○ Unknown

16. What direction was the driver looking during backing maneuver
(Select all that apply)

- ○ Straight ahead
- ◉ Right
- ○ Left
- ◉ Rearward
- ○ At object inside the car
- ○ At mirrors
- ○ Other (specify): _____
- ○ N/A
- ○ Unknown

17. Was the driver distracted during back up maneuver
(Select all that apply)

- ○ No non-driving activities

External

- ○ Looking at other vehicles
- ○ Looking at other non motorist
- ○ Looking at intended turn destination
- ○ External focus, not specified
- ○ Other external focus (specify): _____

Internal

- ○ Looking at other occupant
- ◉ Talking to passenger
- ○ Dialing phone
- ○ Talking on phone
- ○ Listening to radio/cd/portable playback device
- ○ Adjusting radio/cd player
- ○ Adjusting climate controls
- ○ Using a device/controls integral to vehicle (specify): _____
- ○ Reading/adjusting navigation system
- ○ Eating or drinking
- ○ Smoking related
- ○ Retrieving fallen object (specify): _____
- ○ Internal focus, not specified
- ○ Focused on other internal object (specify): _____
- ○ N/A
- ○ Unknown

18. Driver avoidance actions prior to impact
(Select all that apply)

- ◉ None
- ○ Braking
- ○ Steering left
- ○ Steering right
- ○ Accelerating
- ○ Other (specify): _____
- ○ N/A
- ○ Unknown

19. Did driver see struck non motorist prior to impact
(Select all that apply)

- ◉ No, never saw non motorist
- ○ Saw non motorist prior to entering vehicle
- ○ Saw non motorist after entering vehicle
- ○ Other (specify): _____
- ○ N/A
- ○ Unknown

20. Est time between start of backing and impact

- ○ <2 or = 1 second
- ◉ 2-5 seconds
- ○ 6-10 seconds
- ○ > 10 seconds
- ○ N/A
- ○ Unknown

21. Driver interior sightline obstructions
(Select all that apply)

- ◉ Pillar
- ◉ Headrest
- ○ Cargo
- ○ Other occupant
- ○ Other (specify) _____
- ○ Unknown
- ○ None

22. Recent experience driving this vehicle

- ◉ More than 10 times the last three months
- ○ 6-10 times the last three months
- ○ 2-5 times the last three months
- ○ Less than 2 times the last three months
- ○ First time driving this vehicle
- ○ N/A
- ○ Unknown

23. Frequency of driving in this parking lot/driveway

- ◉ Daily
- ○ Weekly
- ○ Several times a month
- ○ Monthly
- ○ Rarely
- ○ First time in lot/driveway
- ○ N/A
- ○ Unknown

24. Driver Impairment
(Select all that apply)

- ◉ No drugs or alcohol present
- ○ Alcohol present (specify BAC): _____
- ○ Drugs present (specify):_____
- ○ Unknown

25. Source of alcohol/drug results

- ◉ Police reported
- ○ Medical record
- ○ Other (specify)_____
- ○ Not Tested
- ○ Unknown if tested

Not Applicable ☐

U.S. Department of Transportation
National Highway Traffic Safety Administration

Non Motorist Form

Reset Values

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number
C A 0 6 0 2 8

NON-MOTORIST PROFILE

2. Non-motorist's Age
99 = Unknown
0 7 ○ Months ◉ Years

3. Non-motorist's Sex
◉ Male
○ Female
○ Unknown

4. Non-motorist's Height
999 = Unknown
1 1 7 cm

5. Non-motorist's Weight
999 = Unknown
0 2 3 kg

6. Medical outcome
○ Not injured
○ ER only
○ Hospitalized 1-4 days
○ Hospitalized 5 days or more
○ Treatment later
◉ Fatal
○ Unknown

7. Source of most severe injury
○ Bumper
◉ Tire
○ Undercarriage
○ Other Specify:_____
○ Ground
○ N/A
○ Unknown

8. Non-motorist impairment
(Select all that apply)
◉ No drugs or alcohol present
○ Positive for alcohol (specify BAC): _____
○ Positive for drugs (specify): _____
○ Unknown

9. Source of alcohol/drug results
○ Police reported
○ Medical Report
○ Other (specify) _____
◉ Not Tested
○ Unknown if tested

NON-MOTORIST ACTIONS

10. Non-motorist attitude
◉ Standing
○ Bending at waist
○ Sitting
○ Crouching
○ Kneeling
○ On skates/skateboard
○ On bike/scooter
○ Other (specify)_____
○ Unknown

11. Non-motorist motion
○ Not moving
○ Walking slowly
○ Walking rapidly
○ Running or jogging
◉ Skipping/Hopping/Jumping
○ Falling/Stumbling/Rising
○ On skates/skateboard
○ On bike/scooter
○ Other (specify): _____
○ Unknown

12. Non-motorist approach relative to rear of vehicle
○ Stationary
○ From left
◉ From right
○ From behind
○ Other (specify): _____
○ Unknown

13. Non-motorist first avoidance action
◉ No avoidance actions
○ Stopped
○ Accelerated pace
○ Ran away (along vehicle path)
○ Jumped
○ Turned away from vehicle
○ Turned toward vehicle and braced
○ Dove or fell away from vehicle
○ Other (specify): _____
○ Unknown

14. Non-motorist primary focus of attention
○ Striking vehicle
○ Play object
○ Person
○ Surrounding traffic
○ Animal
○ Handheld electronic (phone, MP3 player, etc.)
○ Other Object (specify) _____
◉ Unknown

15. Were any other Non-motorists present?
(Select all that apply)
○ Alone
○ One adult present
○ One other child present
○ Multiple adults present
◉ Multiple children present
○ Unknown

NON MOTORIST CLOTHING

NOTES:

- Specify Color, Fabric and Texture/Weight for outermost layer only
- Indicate "*NONE*" if applicable
- Available codes:

Colors		***Fabrics***	***Textures***	***Weights***
Black	Charcoal gray	Natural	Soft	Heavy
Lt gray/silver	Brown	Synthetic	Slick	Medium
Gold/tan	Purple	Blend	Coarse	Light
Dark blue	Light blue			
Dark green	Light green			
Maroon	Red			
Orange	Yellow			
White	Other (specify)			

	Clothing	Color	Fabric	Texture	Weight
HEADWEAR	Hat				
	Helmet				
	Hood				
	Other (specify): _____				
UPPER BODY	Short Sleeve				
	Long Sleeve	Black	Unknown	Soft	Medium
	Light Jacket				
	Heavy Jacket				
	Other (Specify): _____				
LOWER BODY	Shorts				
	Pants	Wind pants/unk color	Unknown	Slick	Light
	Shoes				
	Other (specify): _____				