

CRASH DATA RESEARCH CENTER

Calspan Corporation
Buffalo, NY 14225

NOT-IN-TRAFFIC SURVEILLANCE

CALSPAN ON-SITE FATAL BACK OVER INCIDENT INVESTIGATION

SCI CASE NO.: CA07-034

VEHICLE: 2004 CADILLAC ESCALADE

LOCATION: NEW YORK

INCIDENT DATE: OCTOBER 2007

Contract No. DTNH22-07-C-00043

Prepared for:

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

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

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

TECHNICAL REPORT STANDARD TITLE PAGE

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NOT-IN-TRAFFIC SURVEILLANCE
CALSPAN ON-SITE FATAL BACK OVER INCIDENT INVESTIGATION
SCI CASE NO.: CA07-034
VEHICLE: 2004 CADILLAC ESCALADE
LOCATION: NEW YORK
INCIDENT DATE: OCTOBER 2007

BACKGROUND

This on-site investigation focused on the circumstances of a fatal back over incident and the rear visibility issues of the involved 2004 Cadillac Escalade (**Figure 1**). This incident occurred on the sidewalk in a city environment as the driver of the Cadillac was backing from a private commercial parking lot onto a local street. The Escalade was equipped with an Ultrasonic Rear Parking Assist (URPA) system. The driver stated that the URPA system was turned off prior to the on-set of this trip as he frequently backs in congested areas that trigger false warnings.



Figure 1. Back left view of the Cadillac Escalade.

An 8-month old male child was seated in an umbrella stroller and was being pushed in a southerly direction on the sidewalk by his grandmother. As the grandmother entered the area of the parking lot, she left the child seated in the stroller on the sidewalk and walked back to a residence to talk to a neighbor. The 37-year old male driver of the Cadillac entered his vehicle and backed in a westerly direction, crossing the sidewalk and striking the stroller. The impact knocked the stroller to the concrete surface of the sidewalk. The driver was unaware of this event and continued to back, running over the child with the left rear tire. The driver was alerted to the event by the grandmother. He immediately stopped the vehicle on the sidewalk, exited the Escalade and observed the child lying under his vehicle forward of the left rear tire. The driver immediately called the 9-1-1 emergency response number to request police and ambulance assistance. The child was transported to a local hospital where he expired within 30 minutes of the incident. A rear visibility study was conducted using a substitute driver. Based on the visibility study, the actual driver should have been able to detect the stroller and the non-motorist if he turned and looked over his right shoulder and should have detected the handles of the stroller in the rear view mirror.

The Calspan Special Crash Investigations (SCI) team identified this case through a news article. Details of the incident were summarized and forwarded to NHTSA's Crash Investigation Division on October 22, 2007. The Calspan SCI team established cooperation with the investigating police detective on October 23 and the case was assigned for on-site investigation. The Cadillac was impounded and secured for the police investigation. The on-site aspects of this SCI investigation, which included the vehicle inspection, documentation of the rear visibility, incident scene documentation and a detailed driver interview, were conducted on October 24. In addition, a surveillance video was reviewed by the SCI investigators that captured the events of this incident.

SUMMARY

Incident Site

This back over incident occurred during daylight hours in October 2007 in an urban area. The Cadillac was parked in a fenced parking lot behind a commercial building (**Figure 2**). The building was located on a corner of two local streets. The parking lot was 18.1 m (59.3') in width (parallel to the street) and 15.2 m (49.9') in depth. The north and west side of the lot were bordered by a 2.4 m (8') chain link fence with privacy slats woven through the links. The west side of the fence was configured with gates that provided access to the lot from the local



Figure 2. Overall view of the parking lot and the approach of the non-motorists.

street. The gates consisted of a hinged gate at the north side that opened outward of the lot toward the street. This gate opened 180 degrees against the fence. A sliding gate opened toward the building that provided a total opening width of 5.5 m (18') for vehicles entering or exiting the lot. A large storage container that measured 2.4 m (8') in width and 12.4 m (40.7') in length was located within the fenced lot and positioned within 1 m (3') of the north fence line and 2.7 m (8.9') east of the sidewalk. The sidewalk was 4.7 m (15.4') in width and extended from the curb line of the street to the fence. The sidewalk was concrete with longitudinal and lateral expansion score lines. As a result of traffic traveling across the sidewalk to access the parking lot, the sidewalk sloped toward the street with an average grade of 3 percent, negative toward the street. The concrete at the fence line was deteriorated with missing pieces. This area was in the path of the right side tires of the backing Escalade. The surface of the parking lot was concrete and was in a worn and cracked condition. The Escalade was parked adjacent to the storage container with the back of the vehicle exposed to the open gate. The street was surfaced with asphalt and was 8.9 m (29.2') in width. The grade of the street was 3 percent, negative to the south. Immediately north of the parking lot, residential row houses bordered the sidewalk. Due to the parked position of the Escalade in relation to the storage container and the privacy fence, the driver did not have a line of sight to his left prior to backing from the lot. His view to his right was limited by the opening of the gate. A schematic of the Incident Site is attached as **Figure 20**.

Vehicle Data

The involved vehicle in this back over fatality investigation was a 2004 Cadillac Escalade, full-size four-door sport utility vehicle. The Cadillac was manufactured in January 2004 and was identified by Vehicle Identification Number (VIN): 1GYEK63N54R (production number deleted). The Cadillac was powered by a 6.0 liter V-8 engine linked to a four-speed automatic transmission with a column mounted shifter. The service brakes were four-wheel disc with anti-lock (ABS). The all-wheel drive Escalade was equipped with traction control, electronic stability control, and a direct Tire Pressure Monitoring System (TPMS). Aftermarket Hankook DynaPro AS all-season tires, size P265/70R17 were mounted on OEM seven-spoke alloy wheels. The manufacturer recommended cold tire pressure for this vehicle was 220 kPa (32 PSI). The

tires were 81 cm (31.9”) in diameter with a tread width of 19.8 cm (7.8”). The specific tire data measured during this SCI investigation were as follows:

Position	Measured Tire Pressure	Measured Tire Pressure	Damage
Left Front	228 kPa (33 PSI)	9 mm (11/32”)	None
Right Front	221 kPa (32 PSI)	9 mm (11/32”)	None
Left Rear	214 kPa (31 PSI)	9 mm (11/32”)	None
Right Rear	228 kPa (33 PSI)	9 mm (11/32”)	None

The Cadillac was equipped with a Class III receiver hitch that was mounted to the rear frame of the vehicle. The ball sleeve was not in place at the time of this back over incident. In addition to the hitch, the Escalade was equipped with self leveling rear suspension (air shocks w/onboard compressor), sill mounted running boards, a roof rack and a sun roof. The window glazing was AS1 for the laminated windshield, AS2 for the front doors with an aftermarket tint film applied to these windows, AS3 deep tint for the rear doors, rear quarter windows and the backlight. The driver stated that all windows were closed during his backing maneuver. The clarity of the glass was clear at the time of this incident. There were no obstructions to the side or back glazing.

The Cadillac was also equipped with the Ultrasonic Rear Parking Assist (URPA) system. The system utilized four sensors incorporated into the lower rear bumper fascia with a warning indicator lights on the interior surface of the upper right D-pillar. This system is discussed in detail the URPA section of this report.

The interior of the Cadillac was configured with bucket-type seats for the first and second rows with adjustable head restraints. The front and rear left head restraints were adjusted 3 cm (1”) above the top of the seat backs. The rear right head restraint was in the full-down position. The third row seat was folded forward and stowed against the back of the second row seats at the time of this event.

The vertical clearance heights of the rear components of the Cadillac were measured from the paved surface of the police impound parking lot and are listed in the following table.

Component	Clearance Height
Beltline	131 cm (51.75”)
Bottom of backlight (visible area)	133 cm (52.5”)
Top of wiper motor housing at backlight	138 cm (54.5”)
Bottom of bumper	48 cm (18.75”)
Top of bumper	74 cm (29”)
Top of bumper step at centerline	58 cm (23”)
Receiver trailer hitch	40 cm (15.6”)
Receiver hitch chain plate	39 cm (15.25”)

Ultrasonic sensor heights	49-54 cm (19.25-21.25")
<i>Undercarriage</i>	
Spare tire – aft edge	40 cm (15.6")
Spare tire – forward edge	35 cm (13.75")
Differential	22 cm (8.75")
Axle tube	32 cm (12.75")
Sway bar at centerline	29 cm (11.4")
Left rear lower shock mount	22 cm (8.5")
Left rear sway bar link	28 cm (11")
Left sway bar bushing	25 cm (10")
Left lower edge of the receiver hitch frame	48 cm (18.75")
Bracket surrounding rear mounted air shock compressor	51 cm (20.25")
Left emergency brake cable	22 cm (8.75")
Right emergency brake cable	24 cm (9.5")
Bumper mounting bracket bolt	49 cm (19.4")

Driver Data

The driver of the Cadillac Escalade was a 37-year old male with a stated height of 173 cm (68") and a weight of 86 kg (190 lb). He was the owner of the business and parking lot where this back over incident occurred. The driver did not require corrective lenses for driving and was not wearing sunglasses during this daytime event. He stated during the interview that as he entered the vehicle, all windows were closed and the radio may have been in the off-position. He could not recall if the radio was on as he entered the vehicle. The driver further stated that he listens to "talk radio" and usually has the volume set low. He also noted that he uses the rear view mirrors exclusively when backing. The driver was very familiar with the area and noted that he backs from this lot numerous times each day. On this particular trip, he was en route to the bank and was not in a hurry to leave the parking lot. The driver stated that the URPA system was turned off prior to the on-set of this trip as he frequently backs in congested areas that trigger false warnings.

Non-Motorist Data

The pedestrian non-motorist was an 8-month old male positioned in a J.Mason (Brand Name) umbrella stroller. The stroller was identified by Model No. 13902. The stroller had a manufacturer listed weight of 3 kg (6.9 lb). It was comprised of a folding tubular frame, a fabric seat to hold the child and dual wheels at the four corners. The front wheels were caster-type that swiveled 360 degrees. The rear wheels were equipped with foot activated brake lock levers. The stroller was equipped with a lap belt and a crotch

strap. Although unknown, it was doubtful that the child was restrained by this strap at the time of the incident. The stroller frame was blue in color and the fabric was red.

Incident Sequence

Pre-Incident

The child non-motorist was seated in the J.Mason stroller and was being pushed on the sidewalk in a southerly direction by his grandmother as depicted in **Figure 3**. While walking, the grandmother stopped at a neighbor's row house and called for the neighbor to come to the door. The neighbor did not immediately respond and the grandmother continued to push the stroller in a southerly direction. As she approached the fenced area for the parking lot, the driver exited his building and walked in a northerly direction on the sidewalk as he approached the open gated area of the parking lot. The driver and the grandmother passed one another as the driver entered the parking lot. The grandmother immediately stopped as she was called by the neighbor. The driver did note during the SCI interview that he observed the grandmother and the stroller, but did not make direct eye contact with her.



Figure 3. Trajectory of the pedestrian non-motorists toward the parking lot gate.



Figure 4. Backing trajectory of the Cadillac Escalade.

The driver approached the Cadillac Escalade from the back right corner and continued to proceed to the left side where he opened the left front door of the vehicle. He entered the Cadillac and closed the door. The actions of the driver were observed from the surveillance tape that captured the incident.

As the driver began to enter his vehicle, the grandmother left the stroller on the sidewalk facing in a southerly direction as she walked back to the row house to talk to her neighbor. It is unknown if she locked the wheels of the stroller. The position of the stroller was approximately 7.6 m (25') from the back of the parked Escalade. The surveillance tape captured the actions of the grandmother. She turned her back to the stroller and walked 14 steps back to the neighbor's residence. As she stopped to talk to the neighbor, the driver started the engine of the Cadillac and began to back from the parking lot. It should be noted that he was parked adjacent to a large container body that was used as warehouse storage for his business. He stated that he checked his rear view mirrors and did not see the grandmother or the stroller. At his point in time, the driver

assumed she continued to walk to the corner of the street as he began to back straight rearward in a westerly direction toward the street (**Figure 4**).

Incident

The child was left in the stroller on the sidewalk directly behind the backing trajectory of the Cadillac Escalade. As the driver began to back, the back plane of the vehicle cleared the fence gate opening and entered the sidewalk. The stroller was positioned approximately 2 m (6.6') outboard of the gate. The vehicle backed approximately 5 m (16.4') from its parked position as it struck the left side of the stroller with the back left area of the bumper.



Figure 5. Rear view of the stroller in relation to the height of the Cadillac.



Figure 6. Lateral view of the stroller in relation to the Escalade.

The impact knocked the stroller to the concrete sidewalk surface. The driver was unaware of this contact as he continued to back and steer the vehicle on a slight counterclockwise arc. The Escalade continued approximately 3 m (9.8') rearward of the initial point of contact. During this backing trajectory, the undercarriage contacted the stroller and the left rear tire ran over the child. The child apparently separated from the stroller during the incident. The child's grandmother ran hysterically toward the Escalade and captured the attention of the driver. He immediately stopped the vehicle to check on the actions of the grandmother. The driver stopped the Cadillac on the sidewalk with the back plane of the vehicle extending approximately 0.6 m (2') into the street. **Figures 7 and 8** are look-back views of the incident site.



Figure 7. Look-back view of the backing trajectory of the Cadillac.



Figure 8. Look-back view of the non-motorist's path of travel.

Post-Incident

As the driver exited the Escalade, he observed the child lying on the sidewalk forward of the vehicle’s left rear tire. He immediately dialed the 9-1-1 emergency response number and requested police and ambulance assistance. Ambulance personnel arrived on-scene and placed the child on a backboard and transported him to a local hospital. Hospital personnel attempted to revive the child, however, he was pronounced deceased within 30 minutes of the incident. The child’s injuries were police reported to have involved the head and upper chest.

Vehicle Contact Damage/Evidence

The Cadillac was inspected by the SCI team at a police precinct where it was impounded for the police investigation. It should be noted that several days had passed from the time of the incident to the time of the SCI inspection. The vehicle was stored outdoors and was not protected from the weather.

Several areas of possible contact to the face of the rear bumper fascia and undercarriage components were noted during the SCI inspection (**Figure 9**). The first area involved a diagonally oriented scratch with multiple laterally oriented scratches within a wipe mark (area where the road film was removed). The wipe mark with scratches was located 11-23 cm (4.25-9”) left of the vehicle’s centerline and 47-57 cm (18.5-22.5”) above ground level. Based on the orientation and cluster of the scratches, it was unlikely that these resulted from this backing incident. The wipe mark; however, was probably related to this event.



Figure 9. Suspected contact evidence to the back bumper fascia.

The second area of possible contact consisted of a wipe mark that was located 67-77 cm (26.25-30.5”) left of center and 50-65 cm (19.5-25.5”) above ground level. The lower aspect of this contact extended onto the ultrasonic sensor for the parking assist system.



Figure 10. Wipe marks to the spare tire and rear sway bar.

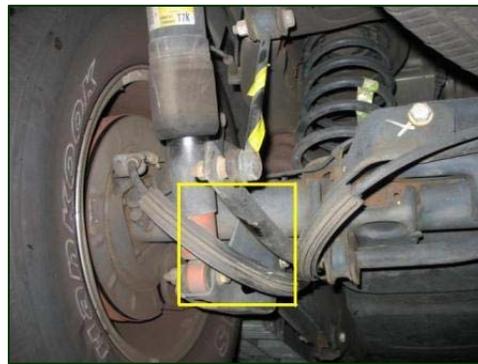


Figure 11. Wipe marks to the sway bar, stabilizer and emergency brake cable.

The undercarriage of the Escalade exhibited several suspected contact areas. Again, these consisted of wipe marks and were isolated to the center and left areas of the undercarriage. The forward aspect of the spare tire sidewall (mounted to the undercarriage) was wiped from possible contact with the stroller. A similar wipe mark was noted to the trailing edge of the sway bar (**Figure 10**) at the centerline of the vehicle. This probable contact was 18 cm (7") in length. The left vertically oriented stabilizer link for the sway bar was wiped clean at two points. These wipe marks were located 53 cm (21") left of center and 37-41 cm (14.5-16") and 44-50 cm (17.5-19.5") above the pavement. Additional wipe marks were noted to the horizontal surface of the sway bar forward of the stabilizer link and to the jacket of the left emergency brake cable (**Figure 11**). Due to the isolated location of these marks, the stroller was the probable source of this contact.

The left rear tire ran over the head and upper chest area of the child. There was no evidence of this interaction on the tire or the alloy wheel.

Ultrasonic Rear Parking Assist (URPA) System

The Cadillac Escalade was equipped with an Ultrasonic Rear Parking Assist (URPA) system that utilized four ultrasonic sensors across the lower rear bumper fascia (**Figure 12**). The sensors were symmetrically positioned 28 cm (11") and 69 cm (27") from the centerline. The inboard sensors averaged 50 cm (19.6") above the pavement of the parking lot while the outboard sensors averaged 53 cm (20.9") in height to the center point of the sensor. The average heights were provided due to irregularities in the surface of the pavement.



Figure 12. Rear ultrasonic sensors.

The system was activated by a hard switch that was mounted to the mid center instrument panel (**Figure 13**). The switch utilized a detent that required finger pressure to turn the system ON or OFF. The detent allowed the system to remain ON at all times or OFF at all times at the decision of the driver. The URPA system did not automatically cycle to ON at each ignition cycle. A small diameter amber light illuminated at the base of the switch when the system was turned OFF (**Figure 14**). The driver stated that the URPA system was turned off prior to the on-set of this trip as he frequently backs in congested areas that trigger false warnings. The driver further stated during the SCI interview that it was his understanding that the system would cycle to the ON position at each ignition cycle. He additionally stated that he would turn the system OFF when backing in close spaces only when he felt it was safe to back without the assistance of the URPA system.



Figure 13. Position of the URPA switch.



Figure 14. URPA switch OFF indicator light.

During the on-site investigation, the URPA was tested with the system turned ON, the ignition in the run position and the transmission selector placed in REVERSE. The URPA indicator display was positioned on the upper interior aspect of the right D-pillar. A series of three lights illuminated with a chime audible warning dependent on the proximity of an object to the rear surface of the vehicle. The system was comprised of three distinct zones that illuminated a single light at approximately 1.5 m (5') from the rear bumper, two lights at the 1 m (3') range and three lights (**Figure 15**) with a flash sequence and a intermittent chime at the 0.3 m (1') location.



Figure 15. URPA indicator warning lights.

The longitudinal and lateral detection zones of the URPA system were measured using a human subject and a substitute driver to identify the illumination and detection of the person. The first zone (most distant to the vehicle) detected the person 1.5 m (4'10") aft of the rear bumper and 1.2 m (3'9") left of the vehicle's centerline. On the centerline, the longitudinal distance was 1.6 m (5'4"). The right location of the first detection zone was 1.4 m (4'6") right and 1 m (3'4") right of center.

The second zone which illuminated two lights on the D-pillar ranged from 0.94 m (3'1") at the left corner of detection to 0.86 m (2'10") at center and right corner locations. The respective lateral locations at the corners were 0.86 m (2'10") and 1 m (3'3") from center, left to right.

The third and closest zone to the rear bumper of the Escalade varied from 0.3 m (1'1") at the left corner, 0.4 m (1'4") at the centerline, and 0.36 m (1'2") at the right corner. The corner locations were measured at 0.76 m (2'6") lateral to the centerline. A schematic of these detection zones scaled to the vehicle is included as **Figure 18** of this report.

Rear Visibility

The vehicle was impounded by the investigating police detective; therefore the vehicle could not be driven to the site of this incident to measure the rear visibility. A substitute driver the same height as the involved driver was positioned in the vehicle to accomplish this task. The driver's seat track was in the full rear position and the adjustable front head restraints were set 3 cm (1") above the seat backs. The second row left head restraint was adjusted 3 cm (1") above the seat back while the rear right restraint was in the full down position.

The rear visibility was measured using an 8 cm (3") diameter reflective red marker that was positioned in a stand and set 71 cm (28") above the ground. The substitute driver was asked to locate the full diameter of the reflective marker in the rear view mirror as it cleared the base of the backlight at the centerline. It should be noted that this was accomplished by positioning the reflective marker rearward of the housing for the rear wiper motor. This housing was 5 cm (2") above the base of the backlight and 13 cm (5") in width.

The substitute driver fully detected the reflective marker in the rear view mirror 8.7 m (28.7') aft of the back bumper. The substitute driver continued a straight line of sight that intersected the ground at a point that was 12.4 (40.8') from the rear bumper. The driver was also asked to turn and look over his right shoulder to locate the reflective marker. He located the full diameter of the marker 6 m (19.7') aft of the bumper (**Figure 16**). Based on the visibility study, the actual driver should have been able to detect the stroller and the non-motorist if he turned and looked over his right shoulder and should have detected the handles of the stroller in the rear view mirror.



Figure 16. Red reflective target visible through centerline of backlight.



Figure 17. Right outside mirror cone of visibility.

Lateral cones of visibility were established using the adjusted positions of the rear view mirrors. The baseline distance of 6 m (19.7') from the back bumper was used for this procedure. The 71 cm (28") high reflective marker was placed at the maximum inboard and outboard positions that were visible to the driver. The left inboard position was located 1.1 m (3.6') left of the vehicle's longitudinal centerline. The left outboard position was 5.8 m (19') left of the referenced centerline resulting in a view width of 4.7 m (15.4'). The right outside mirror yielded the substitute driver a lateral cone of visibility that extended 1 m (3.3') right of the centerline to 6.4 m (21.3') right resulting in

a view width of 5.4 m (18'), 6 m (19.7') aft of the rear plane of the vehicle (**Figure 17**). These lines of sight are illustrated in the attached Rear Visibility Diagram, **Figure 19**.

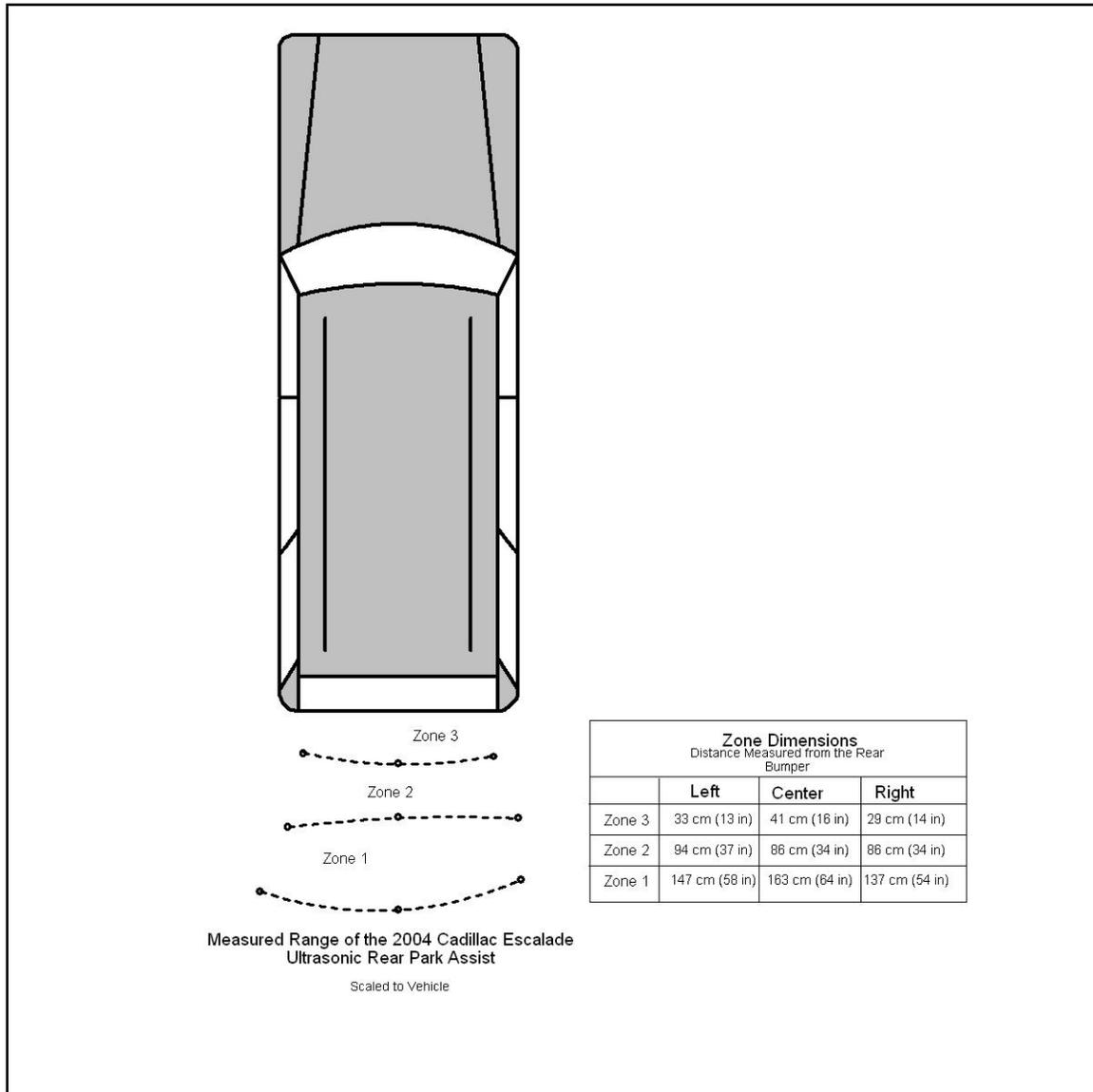


Figure 18. URPA Measured Range

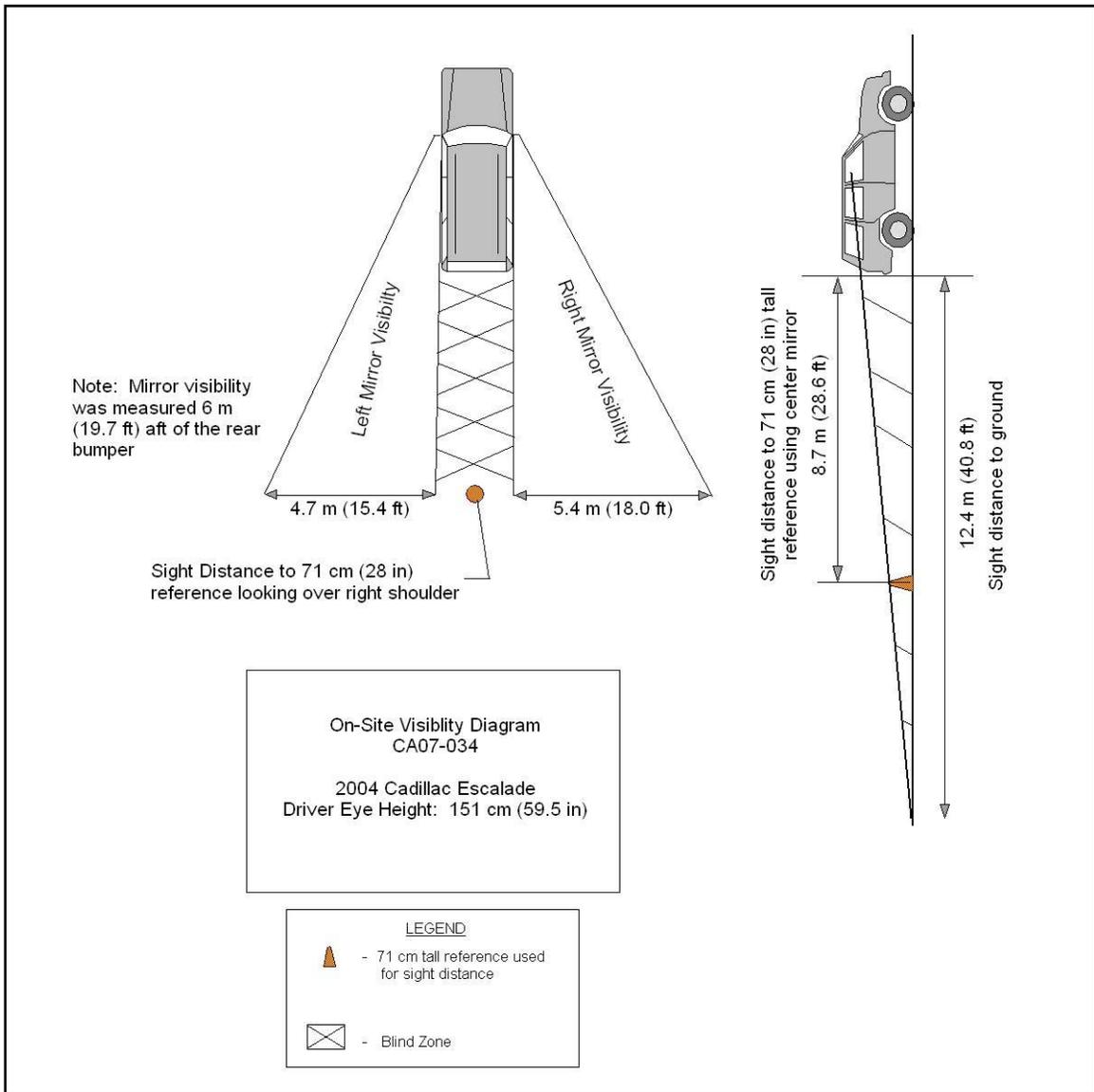


Figure 19. Rear Visibility Diagram

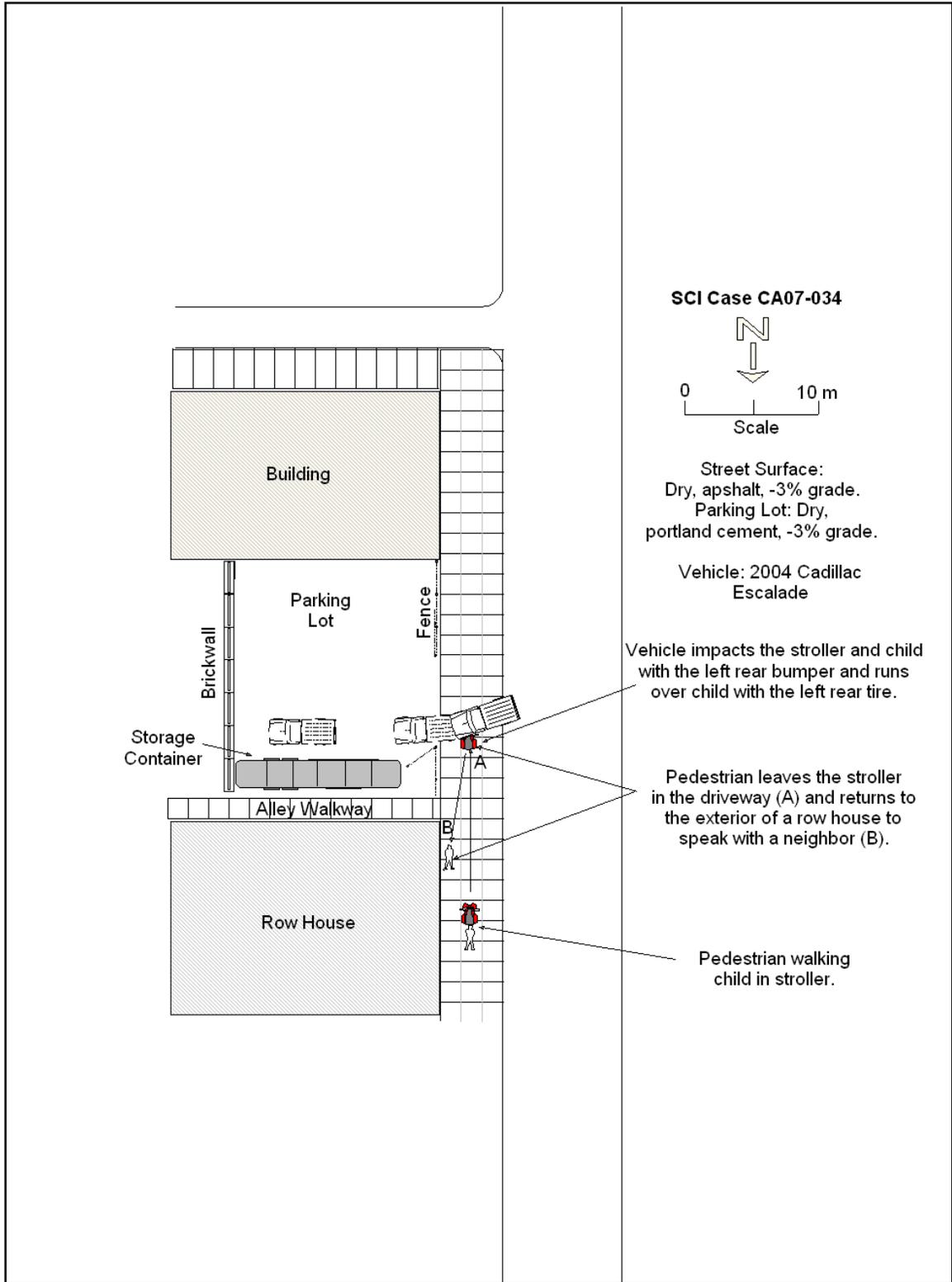


Figure 20. Incident Schematic



1. Case Number

IDENTIFICATION

2. Date of Crash ____ / ____ / ____

3. Time of Crash _____

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
- Shrubby
- Other (specify) _____
- 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
- Shrubby
- Utility poles
- Signs
- Glare
- Other (specify) _____
- Unknown

11. Grade at parked position _____ +/- %

12. Estimated distance from parked position to impact

_____ m

13. Estimated speed at impact _____ +/- kmph

14. Grade at impact _____ +/- %

15. Estimated distance from impact to vehicle final rest

_____ m

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



1. Case Number _____

VEHICLE IDENTIFICATION

2. VIN _____

3. Model Year _____

4. Vehicle Make (specify): _____

5. Vehicle Model (specify): _____

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		
2 nd Left		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
2 nd Right		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
3 rd Left		Fixed / Closed / Open / Partially Open / Unknown	Clear / Hazy / Very Dirty / Unknown		
3 rd 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 _____

7. LF Tire Size _____

9. RF Tire Size _____

8. LR Tire Size _____

10. RR Tire Size _____

Seats / Head Restraint Data

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

Seat Type codes:

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

VEHICLE MEASUREMENTS

Clearance Heights	Measurements (all from ground, and in centimeters)	NOTES
Beltline		
Top of trunk/tailgate		
Bottom of bumper		
Trailer hitch (if applicable)		
Undercarriage		
Sway bar		
Axle		
Differential		
Other (specify):		
Sensor Height (if equipped)		
Camera Height (if equipped)		



1. Case Number

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

4. Video monitor type

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

5. Video display size _____ cm
(Diagonal)

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

10. Auditory warning illumination

- No sensor present
- Yes
- No
- Unknown

11. Number of sensors _____

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



DRIVER FORM

1. Case Number

DRIVER PROFILE

2. Driver's Age _____
99 = Unknown

3. Driver's Sex Male
 Female
 Unknown

4. Driver's Height _____ cm
999 = Unknown

5. Driver's Weight _____ 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:

13. Driver in a hurry
 Yes N/A
 No Unknown
 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 Over 60 Seconds
 11-30 Seconds N/A
 31-60 Seconds 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



Non Motorist Form

1. Case Number

NON-MOTORIST PROFILE

2. Non-motorist's Age _____ Months
_____ Years
99 = Unknown

3. Non-motorist's Sex
 Male
 Female
 Unknown

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

5. Non-motorist's Weight _____ kg
999 = Unknown

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:

	<u>Colors</u>		<u>Fabrics</u>		<u>Textures</u>		<u>Weights</u>
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
H E A D W E A R	Hat				
	Helmet				
	Hood				
	Other (specify): _____				
U P P E R B O D Y	Short Sleeve				
	Long Sleeve				
	Light Jacket				
	Heavy Jacket				
	Other (Specify): _____				
L O W E R B O D Y	Shorts				
	Pants				
	Shoes				
	Other (specify): _____				