CRASH DATA RESEARCH CENTER
Calspan Corporation
Buffalo, NY 14225

NOT-IN-TRAFFIC SURVEILLANCE

CALSPAN ON-SITE BACKOVER CRASH INVESTIGATION

SCI CASE NO: CA12011

VEHICLE: 2003 HYUNDAI SANTA FE

LOCATION: TENNESSEE

CRASH DATE: FEBRUARY 2012

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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16. Abstract This on-site investigation focused on the circumstances, injury sources, and rear visibility of a 2003 Hyundai Santa Fe that was involved in a Not-In-Traffic backover crash with a 63-year-old male non-motorist. The crash occurred in the parking lot area of a fuel station/commercial plaza. A 25-year-old male operated the Hyundai at the time of the crash, accompanied by a 25-year-old female in the front right passenger's position. The 63-year-old male non-motorist was walking across the parking-lot area toward the front entrance of the convenience store, a trajectory which crossed behind the rear plane of the Hyundai. The 25-year-old male began backing the Hyundai from its parked position and struck the non-motorist with the rear plane of the vehicle. As a result of the crash, the non-motorist was transported to a local hospital for evaluation and treatment of his injuries. He was released from the emergency department within 24 hours.			
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BACKGROUND

This on-site investigation focused on the circumstances, injury sources, and rear visibility of a 2003 Hyundai Santa Fe (**Figure 1**) that was involved in a Not-In-Traffic backover crash with a 63-year-old male non-motorist. This crash was identified through the weekly sampling activities of the National Automotive Sampling System (NASS). Subsequently, the Police Crash Report (PAR) was forwarded to the Crash Investigation Division (CID) of the National Highway Traffic Safety Administration (NHTSA). It was determined that the incident met the qualifications of the Not-In-Traffic Surveillance (NiTS) backover study, and the PAR was provided to the Calspan Special Crash Investigations (SCI) team on April 2, 2012 for follow-up. The SCI team immediately contacted the driver of the Hyundai and established cooperation to inspect the vehicle and perform the rear visibility study. Based on the driver's availability, the on-site portion of this investigation took place on April 6, 2012. This included the inspection and rear visibility study of the Hyundai with appropriate measurements, interviews of the non-motorist and driver, and the documentation of the crash site.

Figure 1: Left rear oblique view of the Hyundai

The crash occurred in the parking lot area of a fuel station/commercial plaza. A 25-year-old male operated the Hyundai at the time of the crash, accompanied by a 25-year-old female in the front right passenger's position. The 63-year-old male non-motorist was walking across the parking-lot area toward the front entrance of the convenience store, a trajectory which crossed behind the rear plane of the Hyundai. The 25-year-old male began backing the Hyundai from its parked position and struck the non-motorist with the rear plane of the vehicle. As a result of the crash, the non-motorist was transported to a local hospital for evaluation and treatment of his injuries. He was released from the emergency department within 24 hours.

CRASH SUMMARY

Crash Site

This backover crash occurred within the parking lot area of a fuel station/convenience store/fast-food restaurant plaza in a suburban commercial setting. The parking-lot included ten parking stalls and one designated loading/walkway area directly in front of the commercial building. **Figure 2** depicts an overall view of the plaza and parking lot. The plaza building itself was 31.5 m (103.3 ft) long. Its interior was divided into a 20 m (65.6 ft) wide convenience store and an 11.5 m (37.7 ft) wide fast-food restaurant. The convenience store was offset 1.2 m (3.9 ft) rearward of the fast-food restaurant. A 2 m (6.6 ft) wide pair of outward-swinging doors provided entry and exit for the convenience store, beginning 12.3 m (40.4 ft) north of the store's southwest corner. A singular outward, right-hand door provided entry and exit for the fast-food restaurant at the northwest corner of the building.

Figure 2: Overall view of the private parking lot and commercial plaza.

A 1.7 m (5.6 ft) wide concrete sidewalk bordered the front of the fast-food restaurant, which continued into a 2.9 m (9.5 ft) wide sidewalk in front of the convenience store. It featured a curb to its west that ran north-south in a straight line, providing for a 20 cm (8 in) downward step onto the asphalt-surface of the parking area. In a similar fashion, the sidewalk wrapped around the southwest corner of the building and continued as a 1.7 m (5.6 ft) wide sidewalk along the building's south exterior wall. This south sidewalk also featured a 20 cm (8 in) tall curb that stepped down into five parking stalls.

The ten parking stalls and singular designated walkway in front of the building were oriented in an east-facing direction. From the south, there were seven non-designated stalls in front of the convenience store, each of which was 2.7 m (8.9 ft) wide. The eighth stall was a 2.4 m (7.9 ft) wide designated handicapped stall, with 2.4 m (7.9 ft) designated loading/walkway area to its north. North of this area was a second 2.4 m (7.9 ft) wide designated handicapped stall, with the tenth stall being a 2.9 m (9.5 ft) wide non-designated stall to its north. All parking stalls were delineated by single-solid yellow lines, and were 5.3 m (17.4 ft) in length.

A triangular island with planted vegetation was located at the southwest corner of the building, separating the west parking stalls from the south parking stalls. South and west of this vegetation island was an open area permitting traffic to navigate the parking area. Approximately 10 m (32.8 ft) southwest of the vegetation island was a curbline that encompassed the available area, south of which was further vegetation.

The fuel station's pump terminal consisted of three islands, each with two pump stanchions with refueling capabilities on both sides, for a total of twelve available filling locations. The three 1.1 m (3.6 ft) wide islands were located 18.2 m (59.7 ft) west of the sidewalk curb, centered 7.5 m (24.6 ft) apart. They were covered by a large, rectangular shelter with support posts in each island. There was no posted speed limit within the private commercial parking area. A Crash Diagram is included on page 9 of this technical report.

Pre-Crash

The crash occurred during the afternoon hours of February 2012. The environmental conditions were daylight, clear, and dry. The weather station-reported temperature was 23.3 Celsius (73.9 Fahrenheit) degrees with south-southwest winds at 25.9 km/h (16.1 mph). The 25-year-old male driver of the Hyundai was traveling with the 25-year-old female front right occupant. The couple entered the parking-lot area and the driver maneuvered the Hyundai into the fourth parking stall from the south, directly in front of the convenience store. It was the driver's intent to park the vehicle and allow his passenger to exit.

The female exited the vehicle and entered the convenience store to purchase miscellaneous items. Due to the expected duration of her shopping experience within the convenience store, the male driver turned the Hyundai's ignition to the "Off" position and remained restrained within the left front seating position to await her return.

The 63-year-old male non-motorist arrived at the same parking lot in an uninvolved vehicle as its front right passenger. The driver of that vehicle observed that all of the available parking stalls to the west and south of the convenience store/fast-food restaurant plaza were already occupied by other vehicles. Due to excessive traffic engaged in refueling activities, the driver of the uninvolved vehicle elected to park along the southwest curb of the parking-lot area, southwest of the building. The 63-year-old non-motorist exited the uninvolved vehicle and began walking toward the building across the parking lot area. He intended to enter the convenience store to purchase a hot beverage.

The non-motorist walked in a northerly direction toward the vegetation island at the southwest corner of the building. He discovered that there was no available path to reach the sidewalk, and subsequently elected to continue north toward the front door of the convenience store with the intent of walking between any of the parked vehicles that had sufficient space to allow safe passage. The non-motorist's travel path is depicted in **Figure 3**.

Figure 3: Non-motorist's walking trajectory.

The female front right passenger exited the convenience store. In seeing her return, the driver of the Hyundai turned the vehicle's ignition to the "On" position and started the Hyundai as she re-entered through the right front door. Meanwhile, the non-motorist began crossing behind the Hyundai's rear plane, still focused on locating a path to the sidewalk and front door of the convenience store. The Hyundai driver looked into both the right and left side mirrors, respectively, while simultaneously shifting the vehicle's automatic transmission into reverse.

Figure 4: West-backing trajectory view of the Hyundai.

Having not detected any pedestrian or vehicular traffic, the Hyundai driver released the pressure of his foot from the brake pedal and allowed the Hyundai to begin moving in reverse. Vehicles parked adjacent to the Hyundai partially obscured the driver's view of the cross-path behind the parking stalls. **Figure 4** is a west-facing view of the Hyundai's backing trajectory. In this manner, the rear plane of the Hyundai approached the right flank of the non-motorist. The Hyundai moved backward at idle speed over a 0.9 m (3 ft) distance prior to impact.

Crash

The crash occurred as the left aspect of the Hyundai's rear plane contacted the non-motorist's right flank. The driver of the Hyundai detected an audible sound that he described as a "thud" related to this contact and subsequently re-applied pressure to the brake pedal and immediately brought the Hyundai to a controlled stop within a distance of 0.3 m (1 ft). In an attempt to locate the source of the audible sound, the driver again looked through both side mirrors and observed the non-motorist in the Hyundai's left side mirror, lying on the ground.

At impact with the Hyundai's rear plane, the non-motorist was redirected from his standing position and initiated a left lateral trajectory. Accordingly, the non-motorist lost his balance and fell to the ground. His left flank and head contacted the asphalt surface of the parking lot.

Post-Crash

Multiple calls were received by the local Emergency Response System from people within the convenience store, fast-food restaurant, and fuel pump terminal. Local law enforcement and Emergency Medical Services (EMS) personnel subsequently responded to the crash. The non-motorist sustained police-reported incapacitating injuries as a result of the fall. He was transported to the local hospital by a ground ambulance, where he was treated and released from the emergency department in less than 24 hours. According to his medical records, the non-motorist was treated for a left elbow abrasion, left knee abrasion, and lower back pain.

2003 HYUNDAI SANTA FE

Description

The 2003 Hyundai Santa Fe (**Figure 5**) was identified by the Vehicle Identification Number (VIN): KM8SB12B13Uxxxxxx. The front wheel drive, sport utility vehicle was configured on a 262 cm (103.1 in) wheelbase. Its powertrain consisted of a 2.4 liter, 4-cylinder gasoline internal combustion engine linked to a 4-speed automatic transmission. The Hyundai's service brakes were a four-wheel disc system with ABS. Equivalent in size to the manufacturer's recommendation, the Hyundai was equipped with Firestone Destination tires of size P225/70R16. Inspection of the undercarriage did not yield any evidence of after-market modification (i.e. lift kits or altered suspension). The Hyundai was not equipped with an electronic parking aid (i.e. back-up camera or sensor system).

Figure 5: Front right oblique view of the 2003 Hyundai Santa Fe.

Inside of the Hyundai were two front row bucket seats and a second row folding/split bench seat. All four outboard seating positions were equipped with adjustable head restraints, which were all adjusted to their respective full-down positions. Glazing included AS2 tempered for the front row and AS3 tempered-tinted (original) for the second row, rear quarter panel, and backlight. All glazing were closed and/or fixed at the time of the crash. The driver reported to the SCI Investigator that all window glazing were hazy with dust, dirt, and water residue at the time of the crash, though he denied that this condition imposed a visibility issue.

Ground clearance measurements and the heights of rear bumper and undercarriage components were as follows:

Height of beltline at the driver window:	114 cm (44.9 in)
Height of the tailgate:	116 cm (45.7 in)
Bottom of bumper:	44 cm (17.3 in)
Trailer hitch receiver clearance:	Not equipped
Rear axle clearance:	26 cm (10.2 in)
Suspension arm clearance:	19 cm (7.5 in)

Exterior Damage

The subject vehicle was not physically damaged in the crash. An area of fingerprints on the left lower aspect of the backlight glazing was referred to by the driver at the time of the vehicle inspection; However, due to the time elapsed between the crash and the SCI vehicle inspection, any fingerprint or contact evidence was long since masked by water, dust, and dirt residue. **Figure 6** depicts the rear plane of the Hyundai at the time of the SCI inspection.

Figure 6: Rear plane of the 2003 Hyundai at the time of the SCI inspection.

Figure 7: Image through the center mirror to the reference targets positioned aft of the Hyundai.

Rear Visibility

The Hyundai's rear visibility was measured utilizing the driver in a vacant, level parking lot. The driver's eye height measured 76 cm (30 in) above the seat cushion with the seat adjusted to the same settings as it was at the time of the crash. This included the seat track at a middle position, the seat back slightly reclined, the head restraint fully down, and the driver restrained by the 3-point lap and shoulder safety belt with the D-ring adjusted to its full-down position.

A 71 cm (28 in) tall red reflective target was placed on the vehicle's centerline and moved rearward to a location where the driver could first see the red target by looking through the rear view mirror (**Figure 7**). The centerline distance measured from the rear bumper to the reflector was 6.1 m (20 ft). The driver's line of sight through the rear view mirror projected to the ground was an additional 10.1 m (33.1 ft) for a total distance of 16.2 m (53.1 ft). Cones of visibility were established using the outside mirrors. These lateral visibility measurements were established at the centerline reference distance of 6.1 m (20 ft). By using the mirrors, the driver located the 71 cm (28 in) targets that were placed laterally relative to the centerline from his normal seated position. The visibility for the left mirror began 0.8 m (2.6 ft) left of center and ended 3.2 m (10.5 ft) left of center. The cone for the right mirror began 1 m (3.3 ft) right of center and ended 5.3 m (17.4 ft) right of center.

Figures 8 and 9 depict the location of the targets relative to the parked Hyundai. These visibility measurements are depicted graphically in a Rear Visibility Diagram on Page 10 of this technical report.

Figure 8: Oblique view depicting the distance from the Hyundai's rear bumper to the reference targets.

Figure 9: View along the extended centerline of the Hyundai depicting the reference target locations.

2003 HYUNDAI SANTA FE OCCUPANT DATA

Driver Demographics

Age / Sex:	25 years / Male
Height:	185 cm (73 in)
Weight:	98 kg (215 lb)
Eyewear:	Prescription sunglasses
Seat Type:	Bucket
Seat Track Position:	Middle track position
Manual Restraint Usage:	3-point lap and shoulder safety belt
Usage Source:	Interview
Air Bags:	None deployed
Alcohol/Drug Data:	None
Egress from Vehicle:	Exited vehicle without assistance through left front door
Transport from Scene:	None
Medical Treatment:	None

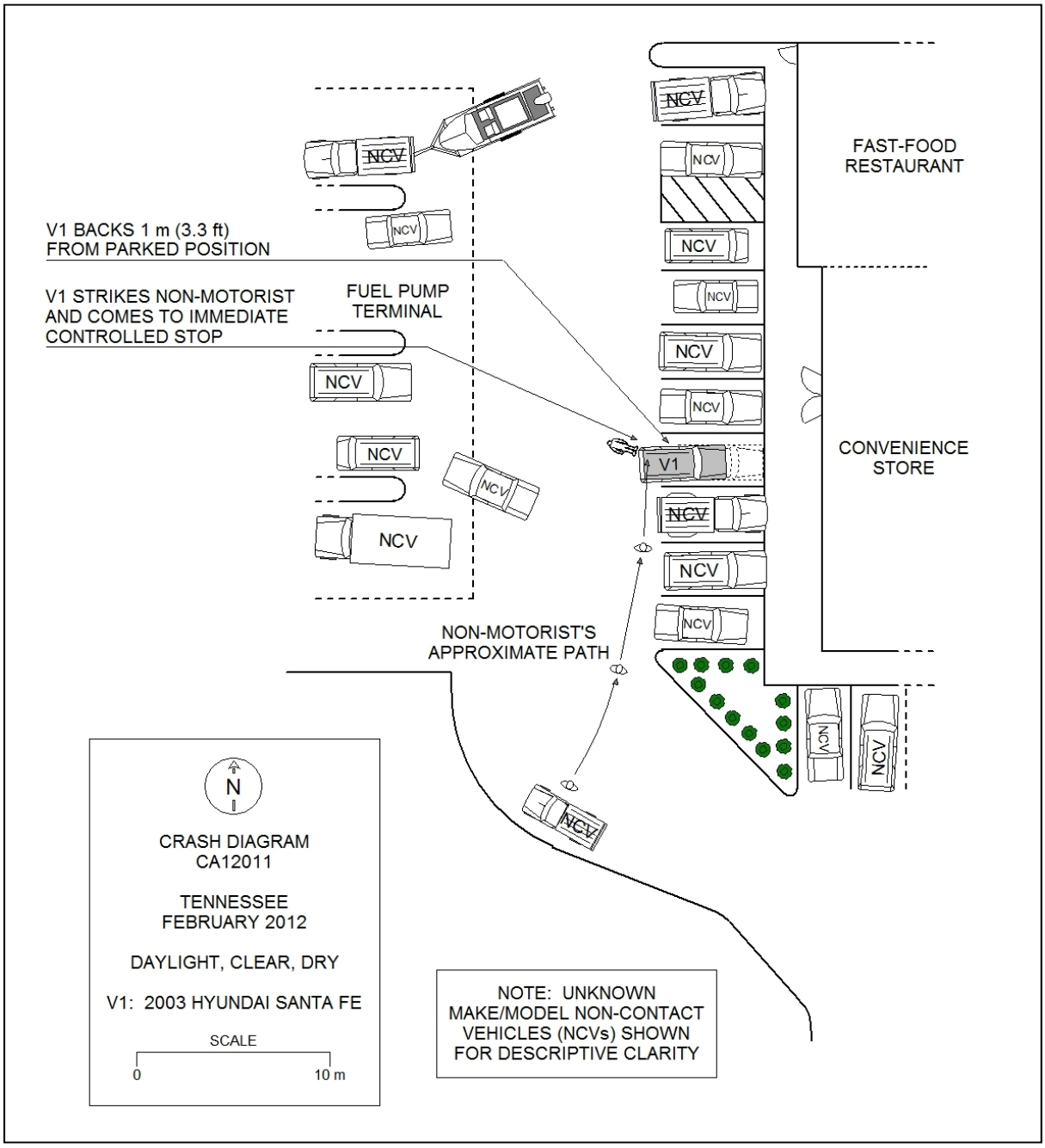
Passenger Demographics

Age / Sex:	25 years / Female
Height:	Unknown
Weight:	Unknown
Eyewear:	None
Seat Type:	Bucket
Seat Track Position:	Rear track position
Manual Restraint Usage:	3-point lap and shoulder safety belt
Usage Source:	Interview
Air Bags:	None deployed
Alcohol/Drug Data:	None
Egress from Vehicle:	Exited vehicle without assistance through right front door
Transport from Scene:	None
Medical Treatment:	None

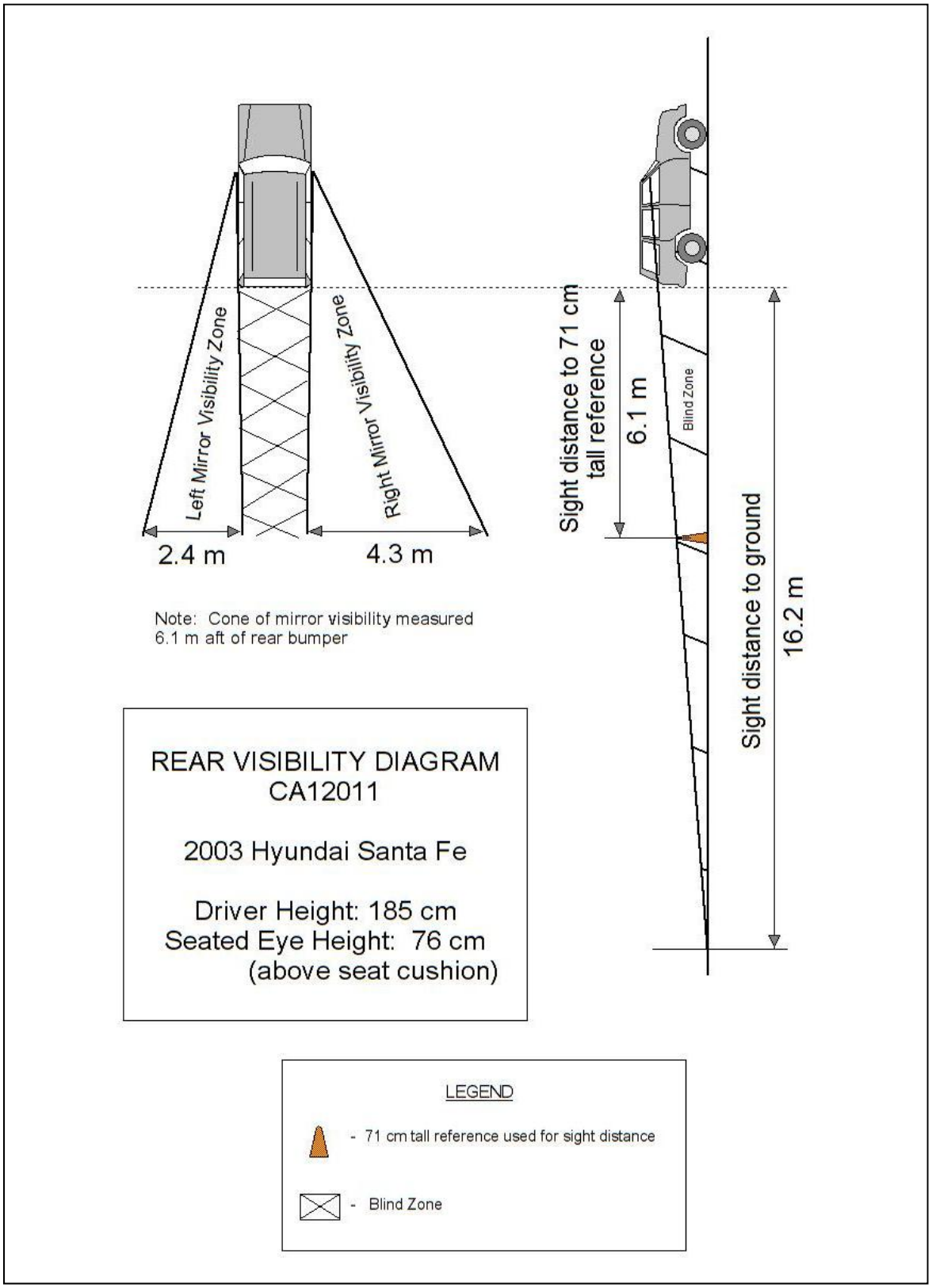
NON-MOTORIST DATA

Age / Sex:	63 years / Male
Height:	178 cm (70 in)
Weight:	83 kg (182 lb)
Clothing:	Blue pants, White cotton T-shirt, Gray sneakers (no headwear)
Transport from Scene:	Ground ambulance to a local hospital
Medical Treatment:	Treated for left elbow abrasion, left knee abrasion, and lower back pain; released from the emergency department within 24 hours

CRASH DIAGRAM



REAR VISIBILITY DIAGRAM



ATTACHMENT A:

Not-In-Traffic Surveillance Forms

Not Applicable ☐

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

SCENE FORM

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number

C A 1 2 0 1 1

IDENTIFICATION

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

3. Time of Crash 1 4 5 9

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)_____
- ☐ 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 + / - 0 0 0 %

12. Estimated distance from parked position to impact

0 0 1 . 0 m

13. Estimated speed at impact 0 0 1 kmph

14. Grade at impact +/ - 0 0 0 %

15. Estimated distance from impact to vehicle final rest

0 0 0 . 1 m

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

Not Applicable ☐

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

VEHICLE FORM

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number C A 1 2 0 1 1

VEHICLE IDENTIFICATION

2. VIN K M 8 S B 1 2 B 1 3 U x x x x x x

3. Model Year 2 0 0 3

4. Vehicle Make (specify): HYUNDAI

5. Vehicle Model (specify): SANTA FE

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 P225/70R16

7. LF Tire Size P225/70R16

8. LR Tire Size P225/70R16

9. RF Tire Size P225/70R16

10. RR Tire Size P225/70R16

Seats / Head Restraint Data

Seat Position	Seat Type (Select from below)	Head Restraint (Check if available)	Head Restraint Adjustment (select)	NOTES:
Front Left	1	☑	☑ Full Down / ☐ Mid / ☐ Full Up	
Front Middle	0	☐	☐ Full Down / ☐ Mid / ☐ Full Up	
Front Right	1	☑	☑ Full Down / ☐ Mid / ☐ Full Up	
2nd Left	4	☑	☑ Full Down / ☐ Mid / ☐ Full Up	
2nd Middle	4	☐	☐ Full Down / ☐ Mid / ☐ Full Up	
2nd Right	4	☑	☑ Full Down / ☐ Mid / ☐ Full Up	
3rd Left	0	☐	☐ Full Down / ☐ Mid / ☐ Full Up	
3rd Middle	0	☐	☐ Full Down / ☐ Mid / ☐ Full Up	
3rd Right	0	☐	☐ Full Down / ☐ Mid / ☐ Full Up	

Seat Type codes:

0 = No seat or seat folded down
1 = Bucket
2 = Bucket w/ folding back
3 = Bench
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
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		114	Other (specify): SUSPENSION ARMS
Top of trunk/tailgate		116	
Bottom of bumper		44	
Trailer hitch (if applicable)		N/A	
Undercarriage			
	Sway bar	N/A	
	Axle	26	
	Differential	N/A	
	Other (specify): SUSPENS	19	
Sensor Height (if equipped)		N/A	
Camera Height (if equipped)		N/A	

Not Applicable ☑

Undo Not Applicable

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 1 2 0 1 1

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
- ☐ Sensor present, did not sound

15. Did driver report common false warnings

- ☐ No sensor present
- ☐ Yes
- ☐ No
- ☐ Unknown

Not Applicable

No Driver Present ☐

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

DRIVER FORM

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number

C A 1 2 0 1 1

DRIVER PROFILE

2. Driver's Age 2 5
   99 = Unknown

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

4. Driver's Height 1 8 5 cm
   999 = Unknown

5. Driver's Weight 0 9 8 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:

BACKING UP FROM PARKING SPACE WITH INTENT OF LEAVING COMMERCIAL PROPERTY PREMISES.

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

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number
C A 1 2 0 1 1

NON-MOTORIST PROFILE

2. Non-motorist's Age — 6 3 ☐ Months ☉ Years
99 = Unknown

3. Non-motorist's Sex
☉ Male
☐ Female
☐ Unknown

4. Non-motorist's Height — 1 7 8 cm
999 = Unknown

5. Non-motorist's Weight — 0 8 3 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) PATH TO DOOR
☐ 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)			
Pink				

	Clothing	Color	Fabric	Texture	Weight
HEADWEAR	Hat				
	Helmet				
	Hood				
	Other (specify): _____				
	Unknown				
UPPER BODY	Short Sleeve	White	Natural	Soft	Light
	Long Sleeve				
	Light Jacket				
	Heavy Jacket				
	Other (Specify): _____				
	Unknown				
LOWER BODY	Shorts				
	Pants	Dark blue	Blend	Coarse	Medium
	Shoes	Lt gray/silver	Synthetic	Coarse	Medium
	Other (specify): _____				
	Unknown				