

Remote Not-In-Traffic Surveillance Falling Vehicle Investigation
Dynamic Science, Inc. (DSI), Case Number DS09009
1997 Dodge Intrepid
Nebraska
February 2009

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

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

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| 16. Abstract This incident occurred in February 2009 at 1512 hours. The subject vehicle was a 1997 Dodge Intrepid. The vehicle was supported by a set of car stands and was being repaired by a 15-year-old male. While the vehicle was on the car stands, the non-motorist began using a small hydraulic jack to shift undercarriage components around. As the weight was lifted off one of the stands, the vehicle fell off the stands and trapped the non-motorist. He was located under the right side of the vehicle by his father and extricated by his father and brother shortly after the incident. He sustained fractures to the jaw and right wrist, and was transported to a local trauma center. | | | | | |
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Dynamic Science, Inc.
Crash Investigation
Case Number: DS09009
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Background

This incident occurred in February 2009 at 1512 hours. The subject vehicle was a 1997 Dodge Intrepid (**Figure 1**). The vehicle was supported by a set of car stands and was being repaired by a 15-year-old male. While the vehicle was on the car stands, the non-motorist began using a small hydraulic jack to shift undercarriage components around. As the weight was lifted off one of the stands, the vehicle fell off the stands and trapped the non-motorist. He was located under the right side of the vehicle by his father and extricated by his father and brother shortly after the incident. He sustained fractures to the jaw and right wrist, and was transported to a local trauma center.



Figure 1. Subject vehicle, 1997 Dodge Intrepid (police photo)

This Remote Not-in-Traffic Surveillance (NiTS) Falling Vehicle Investigation was identified by DSI in an internet news article. The article was forwarded to the National Highway Traffic Safety Administration (NHTSA) on February 28, 2009 and the case was assigned on March 3, 2009. An incident report was obtained in June 2009 and the on-scene photos were requested. According to the police records department, this incident would not be reported to the State as a traffic crash. The following information was obtained from the internet news article, the incident report, police photos, and an interview with the father of the non-motorist.

Summary

Incident Site

The incident occurred in an east/west driveway that intersected a north/south roadway. The driveway was located south of a garage and east of a barn (**Figure 2**). The driveway was of concrete composition and had an estimated negative 3% superelevation to the north. Dirt and grass bordered the south side of the driveway. The temperature at the nearest reporting station was 4 degrees C (39 degrees F) at 1552 hours. The weather was cloudy and the wind was out of the southeast at 24 km/h (15 mph) gusting to 38 km/h (24 mph). The driveway was dry.



Figure 2. Overview of incident scene, looking west (police photo)

Pre-Crash

The Dodge was parked facing west. The vehicle's transmission shift lever had been placed in PARK and the parking brake was engaged. The vehicle's front end was elevated and the front wheels

removed. The rear wheels were not chocked. The vehicle was resting on a pair of ratchet style metal jack stands that had been placed forward of the front axle. According to the owner's manual, the stands should have been placed at or near the vehicle's lift area of the sill flange rearward of the front axles (**Figure 3**). The hood was propped open by a block of wood. The non-motorist was working on the front suspension from the right side of the vehicle. He was lying on his back with his head and torso beneath the vehicle. A hydraulic bottle jack and the vehicle's scissors jack¹ were being used to manipulate an unknown undercarriage component. The interviewee was not sure exactly what his son was trying to do and his son did not provide him with any clarification. As the hydraulic jack lifted the component/vehicle, the weight came off the jacks and the vehicle shifted to the right.

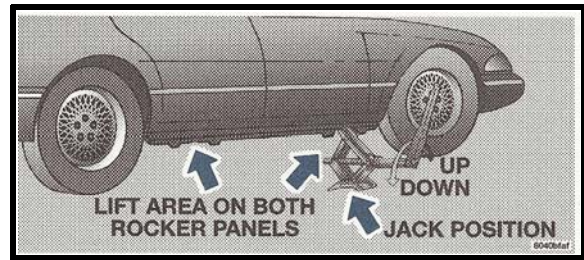


Figure 3. Location of lift areas. Source: 1997 Dodge Intrepid Owner's Manual

Incident

Both jack stands, the hydraulic jack, and the scissors jack all tipped over to the north, and the vehicle fell on the non-motorist. The non-motorist was trapped near the right front wheel (**Figure 4**).

Post-Crash

The non-motorist began screaming as the vehicle trapped him. His screams were heard by his father and his brother. When they saw what had happened, the father used a floor jack and lifted the right side of the vehicle while the brother pulled his brother from beneath the vehicle. He sustained fractures to the jaw and right wrist, and was transported to a local trauma center where he was treated and released.



Figure 4. Area where non-motorist was trapped by vehicle (police photo)

Vehicle Data - 1997 Dodge Intrepid

The subject vehicle in this incident was a 1997 Dodge Intrepid 4-door sedan. The vehicle was equipped with a 3.3-liter, 6-cylinder engine, 4-speed automatic transmission, and front wheel drive.

Vehicle Damage

There was no damage to the Dodge related to the contact with the non-motorist.

¹It is not known if this jack was original equipment or not.

Jack Information

The Dodge was being supported on a pair of metal ratchet-style jack stands. The interviewee indicated that he thought they had a 3-ton capacity. The interviewee was re-contacted by phone and letter to obtain additional jack information. No additional information was provided.

Non-motorist Data

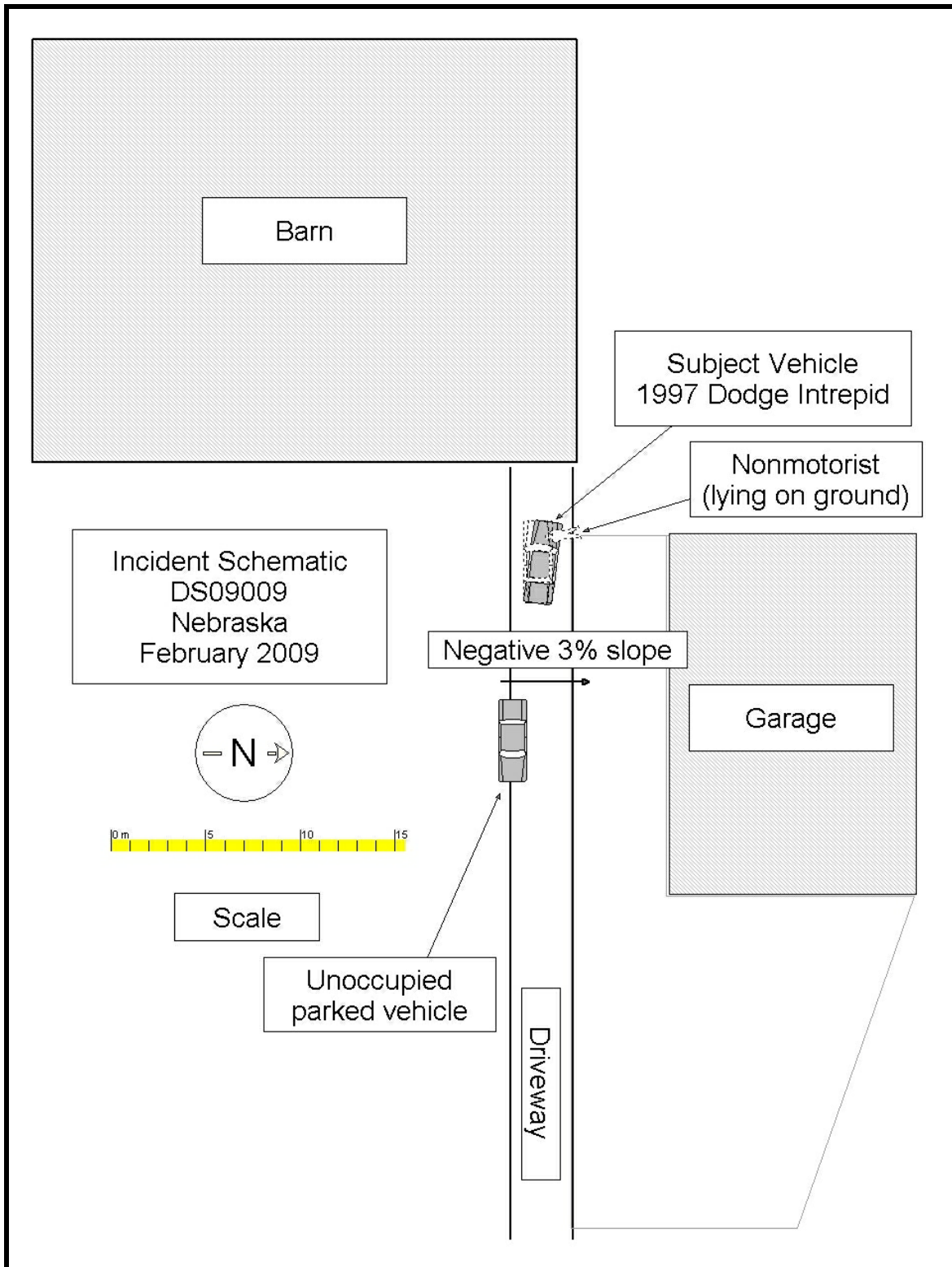
| | |
|----------------------------|--------------------------|
| Age/Sex: | 15/Male |
| Height: | 183 cm (72 in) |
| Weight: | 109 kg (240 lbs) |
| Type of medical treatment: | Transported and released |

Injuries

Non-motorist: Injuries obtained from interviewee.

| <u>Injury</u> | <u>OIC Code</u> | <u>Injury Mechanism</u> | <u>Confidence Level</u> |
|-----------------------|-----------------|-------------------------|-------------------------|
| Fracture, lower jaw | 250600.1,9 | Vehicle undercarriage | Certain |
| Fracture, right wrist | 751800.2,1 | Vehicle undercarriage | Certain |

Attachment 1. Incident Diagram



Attachment 2. Data Forms



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



VEHICLE FORM

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 | Clear / Hazy / Very Dirty | | |
| RF | | Fixed / Closed / Open / Partially Open | Clear / Hazy / Very Dirty | | |
| 2 nd Left | | Fixed / Closed / Open / Partially Open | Clear / Hazy / Very Dirty | | |
| 2 nd Right | | Fixed / Closed / Open / Partially Open | Clear / Hazy / Very Dirty | | |
| 3 rd Left | | Fixed / Closed / Open / Partially Open | Clear / Hazy / Very Dirty | | |
| 3 rd Right | | Fixed / Closed / Open / Partially Open | Clear / Hazy / Very Dirty | | |
| Backlight | | Fixed / Closed / Open / Partially Open | Clear / Hazy / Very Dirty | | |
| Left Backlight | | Fixed / Closed / Open / Partially Open | Clear / Hazy / Very Dirty | | |
| Right Backlight | | Fixed / Closed / Open / Partially Open | Clear / Hazy / Very Dirty | | |
| Roof | | Fixed / Closed / Open / Partially Open | Clear / Hazy / Very Dirty | | |
| Other (specify) | | Fixed / Closed / Open / Partially Open | Clear / Hazy / Very Dirty | | |

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): _____ | | | | |
| | | | | | |