CRASH DATA RESEARCH CENTER

Calspan Corporation
Buffalo, NY 14225

NOT-IN-TRAFFIC SURVEILLANCE

CALSPAN ON-SITE BACK OVER FATALITY INVESTIGATION

SCI CASE NO.: CA07-023

VEHICLE: 1998 TOYOTA CAMRY

LOCATION: NEW YORK

CRASH DATE: JUNE 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.

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NOT-IN-TRAFFIC SURVEILLANCE
CALSPAN ON-SITE BACK OVER FATALITY INVESTIGATION
SCI CASE NO.: CA07-023
VEHICLE: 1998 TOYOTA CAMRY
LOCATION: NEW YORK
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BACKGROUND

This on-site back over investigation focused on the pre-event dynamics and the rear visibility issues that resulted in the death of a 17-month old male toddler who was struck and subsequently run over by the left rear tire of a 1998 Toyota Camry **(Figure 1)**. The back over event occurred on a private driveway of the driver's residence. There were no visual obstructions along the driver's sight line toward the approaching non-motorist. The 83-year old female driver was the neighbor of the struck toddler.

Figure 1. Subject vehicle 1998 Toyota Camry.

This incident occurred in the state New York and was identified by the Crash Investigation Division (CID) of the National Highway Traffic Safety Administration (NHTSA) through an internet news search. The news article was forwarded to the Calspan Special Crash Investigations (SCI) team on June 26, 2007 for follow-up. The SCI team established cooperation with a family friend on July 11, 2007 to facilitate the inspection of the Toyota and the crash site. Direct cooperation with the driver and family could not be obtained. However, the subject driver consented to a partial inspection of the vehicle provided that the family friend was present. Initial telephone contact with the non-motorist father was positive; however, he did not responded to follow-up calls. The case was assigned as an on-site investigation on July 12, 2007. The inspection of the vehicle and scene were conducted on July 27, 2007. In addition to the on-site investigation, this incident was captured on a security surveillance video. This video was used to aid in the reconstruction of this event. This fatal incident was reported by the police agency using the standard State Police Accident Report which is stored at the investigating Precinct and was reported to the state database.

SUMMARY

Incident Site

This incident occurred during the daylight hours of June 2007. The weather was reported as clear with a high temperature of 30 degrees C (86 degrees F). This incident occurred on a one-lane east/west private residential driveway. **Figure 2** is an overall view of the driveway looking westward. The position of the parked vehicle in **Figure 2** was not related to the pre-event location of the Toyota. The driveway measured 29.6 meters (97 feet) in length and 2.7 meters (8.9 feet) in width. The driveway contained a negative two percent grade which leveled at the sidewalk. The mouth of the driveway sloped to a negative four percent grade at its intersection with the road. A north/south concrete sidewalk traversed the driveway. The width of the sidewalk measured 2.4 meters (7.9 feet).

Figure 2. Overall view of the driveway from the roadway.

The child approached the vehicle from its left side (south) **(Figure 3)**; therefore, the adjacent residence was also documented for visibility purposes. The residence was located 5.3 meters (17.3 feet) west of the curb line. This area consisted of a 2.4 meter (7.8 feet) wide sidewalk, 86 cm (34") diameter tree, and a 1.1 meter (3.6 feet) wide grass area. Located beyond the grass was a shrub landscaped area. The shrub area began 3.5 meters (11.5 feet) west of the curb and ranged in height from approximately 46 cm (18") to 178 cm (70"). The landscaped area terminated 5.3 meters (17.3 feet) from the curb where a raised concrete patio began. The dimensions of the patio were 1.8 meters (5.9 feet) in width and 8.4 meters (27.5 feet) in length. The patio was constructed of brick and concrete and measured 102 cm (40") in height and contained four pillars that extended vertically an additional 114 cm (45"). Wrought iron fencing was mounted to the pillars. Based on the SCI inspection, these objects did not obstruct the driver's visibility.

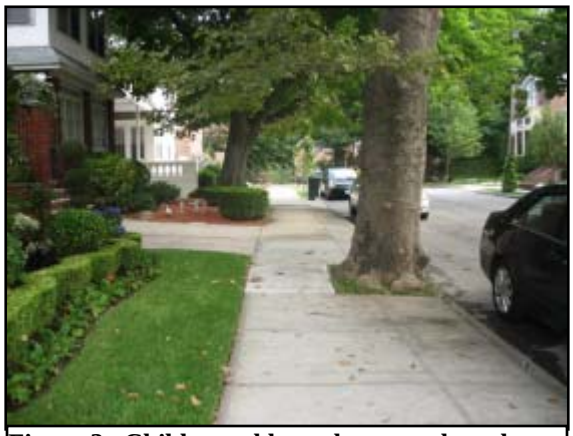

Figure 3. Childs northbound approach to the driveway.

Vehicle Data

The subject vehicle in this incident was a 1998 Toyota Camry, 4-door sedan **(Figure 4)**. The mileage at the time of the incident was unknown. The vehicle was identified by Vehicle Identification Number (VIN): JT2BG22K8W0 (production number deleted). The Toyota was equipped with a 2.2 liter, four cylinder engine linked to a four-speed automatic transmission with a console mounted transmission selector lever and front-wheel drive. The service brakes were front-wheel disc and rear drum with anti-lock.

Figure 4. 1998 Toyota Camry. Note damage to the rear left bumper corner occurred while the vehicle was at an impound area.

The Toyota was equipped with OEM steel rims with plastic wheel covers and P195/70R14 size tires. The OEM tire diameters were 60 cm (23.5") and the tread width was 17 cm (6.5").

The exterior of the vehicle was finished in a gray color with matching bumper fascias. The window glazing was AS1 for the windshield and AS2 for the side and backlight glass with OEM solar tint. At the time of the SCI inspection, the glazing was clear. No aftermarket tint film was present on the glazing. A handicap parking placard was centered at the base of the windshield. The state inspection and registration stickers were affixed to the lower left corner of the windshield. There were no obstructions of the side or rear glazing and no aftermarket modifications to the exterior or interior of the Toyota. The rear left bumper corner contained deformation **(Figure 4)** which occurred while the vehicle was stored at the police impound area.

The ground clearance of the major rear components of the vehicle **(Figures 5 and 6)** were documented and are listed in the following table:

Component	Vertical Measurement
Bottom of rear bumper fascia	37 cm (14.75")
Top of rear bumper fascia	60 cm (23.5")
Top of trunk deck	98 cm (38.5")
Height of backlight glass	105 cm (41.25")
Beltline glass at midpoint of left front door	92 cm (36.25")
Bottom of exhaust tailpipe	25 cm (9.75")
Lowest point of muffler	20 cm (7.75")

Component	Vertical Measurement
Lowest point of right rear control arm	18 cm (7.25”)
Highest point of left control arm	23 (9.25”)
Height of control arm bracket	23 cm (9.25”)
Lowest point of trunk	24 cm (9.5”)
Lowest point of exhaust pipe	14 cm (5.5”)

Figure 5. Rear bumper of the Toyota.

Figure 6. Undercarriage components

Driver Data

The driver of the Toyota was an 83-year old female. Her exact demographics are unknown. It is unknown if the driver wore prescription eyeglasses or sunglasses at the time of the incident.

Pedestrian/Non-Motorist

The pedestrian/non-motorist was a 17-month-old male. He was the neighbor of the driver. His height and weight are not known. A neighbor who observed the child stated that he was dressed in a yellow one piece outfit with yellow footwear.

Incident Sequence

Pre-Incident

This incident was captured on a security surveillance video which aided in the reconstruction of this event. The security camera was mounted to a residence that was located across the street from the subject residence, 11.6 meters (38 feet) south of the driveway. The video was captured with an irregular frame rate; i.e., the motion was recorded as “stop action” video. Therefore, portions of the incident were not recorded. Initially the Toyota was parked on the driveway with rear

Figure 7. Surveillance video pre-incident location of the Toyota and approaching non-motorist.

bumper approximately 3 meters (10 feet) from the road edge. **Figure 7** is a view of the pre-incident location of the Toyota and the approaching non-motorist. In this position, the left front door was located near the patio. The vehicle was occupied by the 83-year-old female driver. At the time of the incident, the 17-month-old male was playing on the sidewalk with another child south of the driveway. The 83-year-old female entered the vehicle to initiate an eastward backing maneuver to exit the driveway of her residence. It was not clear if the driver turned her head or used the rear view mirrors to assist in the backing maneuver. Prior to this maneuver, the non-subject child approached the driveway from the left side of the vehicle crossed the path of the Toyota and stopped on the north side of the driveway. The 17-month-old male was walking a short distance behind the female child. The scene schematic is included in this report as **Figure 9**.

Incident

The 17-month-old male began to traverse the driveway crossing the path of the Toyota as the driver began the backing maneuver. The rear left bumper corner of the vehicle struck the child and knocked him down onto the concrete driveway. This event was not detected by the driver as she continued her backing trajectory. The left rear tire consequently ran over the child's upper torso at the mouth of the driveway. As the vehicle continued rearward, the child was dragged by the undercarriage into the roadway. It could not be determined from the video if the left front tire contacted the child. The driver stopped the vehicle in the center of the 9 meter (29.5 feet) wide roadway where she shifted the transmission into drive and departed the area in a southerly direction. The driver did not appear to be aware of the incident and continued onto her destination. Due to the irregular frame rate, the back over contact was not captured by the video.

Post-Incident

The final rest position of the child was obscured by a parked vehicle **(Figure 7)** and was not determined. The toddler was removed from the roadway by his mother and placed on the sidewalk behind an 86 cm (34") diameter tree. Police and emergency medical personnel responded to the incident site and began resuscitative efforts and continued these efforts during transport to a local hospital. The toddler was pronounced deceased a short time after arrival at the hospital. A neighbor who observed the child post-incident stated to the SCI investigator that the he saw the child in the roadway and he appeared to be convulsing. He further observed that the child did not appear to have external injuries; however, he did note body fluid exiting his right ear. At the request of the family no autopsy was performed; therefore, the specific injuries and cause of death are unknown. The Toyota was towed from the incident site to a police impound area pending the police investigation.

Vehicle Contact Evidence

At the time of the SCI inspection, there was no residual contact evidence to either the bumper or undercarriage of the Toyota. Deformation was noted to the rear left bumper corner of the Toyota that was not related to this incident. A neighbor that was familiar with the vehicle stated to the SCI investigator, that the damage occurred while it was secured at the police impound area.

Rear Visibility

Exemplar 1998 Toyota Camry

The rear visibility of the Toyota was measured in a level parking lot. Based on the surveillance video, it was observed that the subject driver's eyes were at approximately the level of the mid B-pillar. To complete the rear visibility study, a substitute driver with a height of 151 cm (59") was positioned in an exemplar vehicle to simulate the approximate eye height of the subject driver. The eye height was measured at 109 cm (43") above the ground. This placed the substitute driver in the approximate position of the 83-year-old female subject driver.

A 71 cm (28 in) tall red reflective target was placed on the vehicle's centerline and moved rearward to a location where the substitute driver could first see the red target by looking at the rearview mirror. The centerline visibility distance was measured from the rear bumper to the location of the target and to the ground. The visibility distance is summarized below and depicted in a diagram attached to the end of this report (**Figure 8**):

- Sight distance to 71 cm (28 in) target: 5.5 m (18 ft)
- Sight distance to ground level target: 13 m (42.6 ft)

Cones of visibility were also established using the outside mirrors. An 8.5 m (27.8 ft) distance from the outside mirrors was used as an arbitrary reference location. The driver was asked to locate the 71 cm (28 in) target using the outside mirrors. The target location was then measured to the side plane of the vehicle. The cone for the left mirror began inboard the left side plane 0.2 m (0.7 ft) and extended to 2.5 m (8.2 ft) left. The cone for the right mirror began inboard the right side plane 0.1 m (0.3 ft) and extended 3 m (9.8 ft) right.

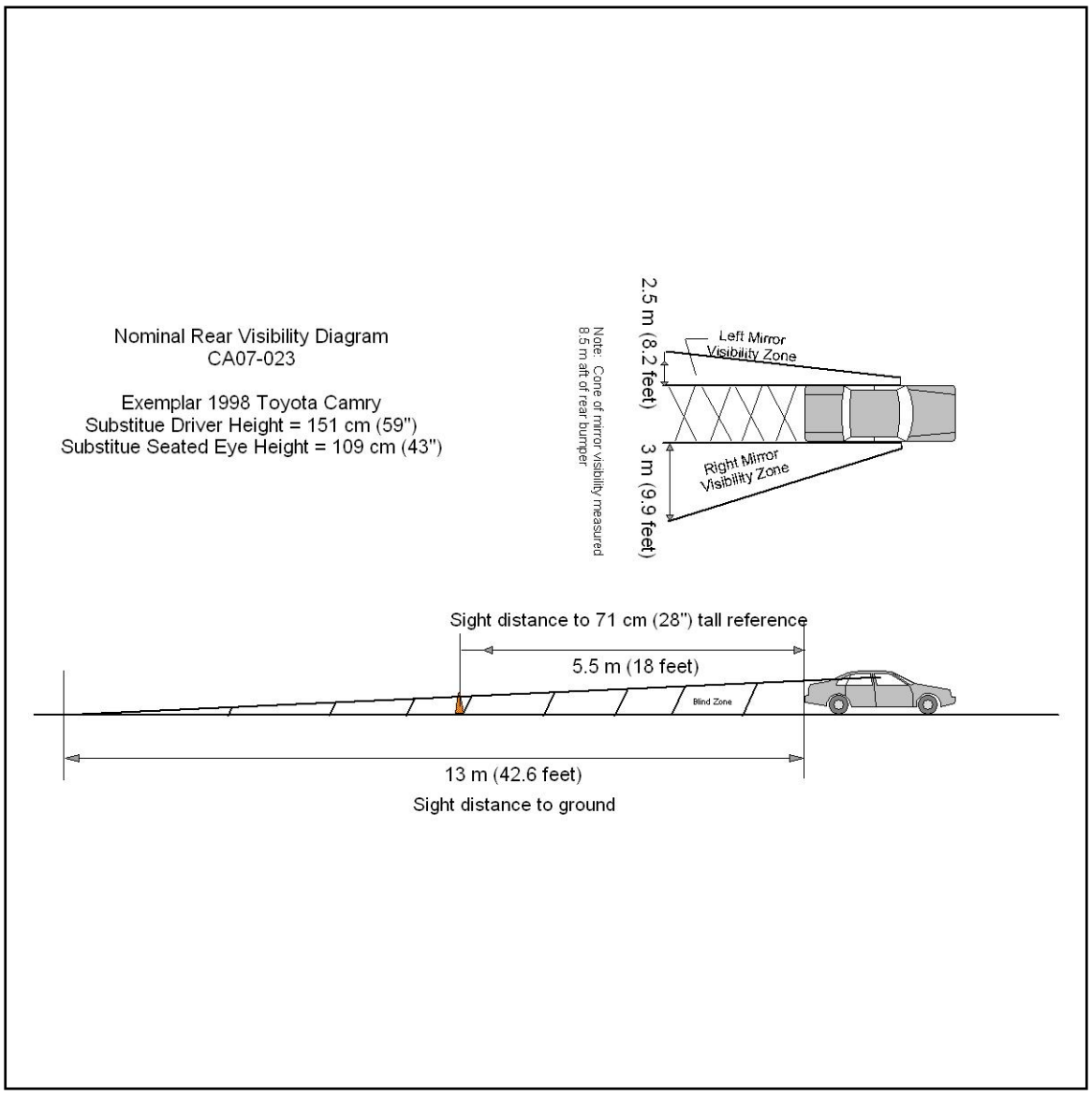

Figure 8: Rear visibility diagram

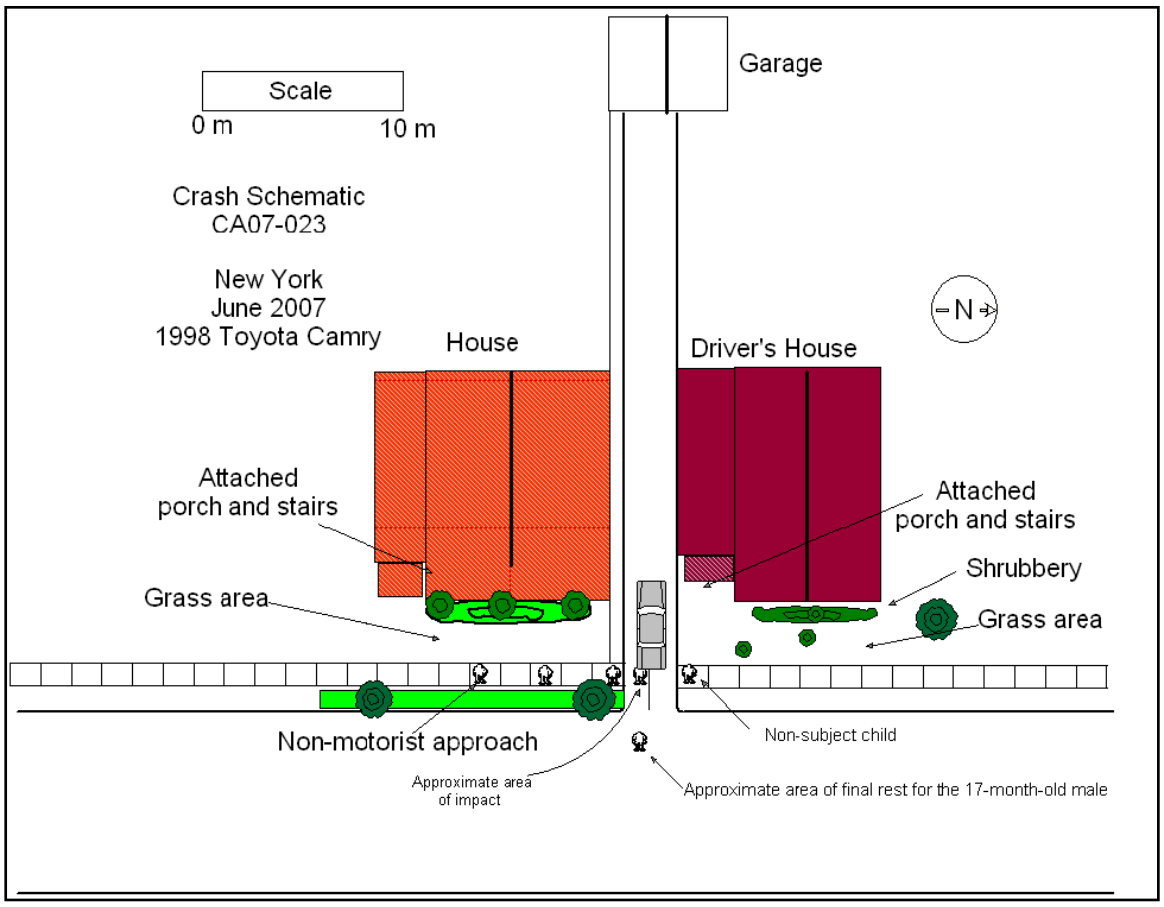

Figure 9: Scene Schematic

Attachment A
Not-In-Traffic Surveillance Forms

No Driver Present ☐

Reset Values

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

DRIVER FORM

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number

C A 0 7 0 2 3

DRIVER PROFILE

2. Driver's Age 8 3
   99 = Unknown

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

4. Driver's Height 9 9 9 cm
   999 = Unknown

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

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

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

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

DRIVER ACTIONS

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

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

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

12. Where was driver going
    Description:

    Driver was going to attend a family gathering.

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

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

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

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

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

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

- ○ No non-driving activities

External

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

Internal

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

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

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

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

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

20. Est time between start of backing and impact

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

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

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

22. Recent experience driving this vehicle

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

23. Frequency of driving in this parking lot/driveway

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

24. Driver Impairment
(Select all that apply)

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

25. Source of alcohol/drug results

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

Not Applicable ☐

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

Non Motorist Form

Reset Values

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number
C A 0 7 0 2 3

NON-MOTORIST PROFILE

2. Non-motorist's Age
99 = Unknown
1 7 ◉ Months ○ Years

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

4. Non-motorist's Height
999 = Unknown
9 9 9 cm

5. Non-motorist's Weight
999 = Unknown
9 9 9 kg

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

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

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

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

NON-MOTORIST ACTIONS

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

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

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

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

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

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

NON MOTORIST CLOTHING

NOTES:

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

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

	Clothing	Color	Fabric	Texture	Weight
HEADWEAR	Hat	None			
	Helmet	None			
	Hood	None			
	Other (specify): _____	None			
UPPER BODY	Short Sleeve	Yellow	Unknown	Unknown	Unknown
	Long Sleeve	None			
	Light Jacket	None			
	Heavy Jacket	None			
	Other (Specify): _____	None			
LOWER BODY	Shorts	One piece outfit	Unknown	Unknown	Unknown
	Pants	None			
	Shoes	Yellow	Unknown	Unknown	Unknown
	Other (specify): _____	None			