CRASH DATA RESEARCH CENTER
Calspan Corporation
Buffalo, NY 14225

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

SCI CASE NO: CA06-024

VEHICLE: 2003 CHEVROLET AVALANCHE
LOCATION: VIRGINIA
CRASH DATE: OCTOBER, 2006

Contract No. DTNH22-01-C-17002

Prepared for:

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

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

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

TECHNICAL REPORT STANDARD TITLE PAGE

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16. Abstract

This investigation focused on the pre-crash circumstances, the crash dynamics, injury sources, and rear visibility of a 2003 Chevrolet Avalanche that was involved in a Not-In-Traffic backover crash with a 6 year old male. The Avalanche was not equipped with any type of rear parking aid. The Chevrolet Avalanche was driven by a 49 year old male and he was the sole occupant of the vehicle. The driver was in the process of backing the Chevrolet into his driveway from a shared private access road at the time of the crash. The 6 year old was wearing a bike helmet and was riding a bicycle immediately prior to the event. The neighborhood children routinely used the private access road to ride their bicycles and used the driveways at the end of the road to turn around. The reconstruction of the crash determined the child rode his bicycle down the road unknown to the driver, lost control of the bicycle, and then fell. The child was lying on the ground approximately 4 m (12 ft) behind the Chevrolet as the vehicle began to back-up. Due to the close proximity between the child's location and the rear of the vehicle, the child was not visible to the driver. The center undercarriage of the Chevrolet then backed over the child and bicycle. The child suffered a police reported skull fracture, a right orbital fracture and associated facial abrasions and contusions from probable contact with the differential/rear axle and pavement. The child was transported to a regional trauma center and hospitalized for treatment. A full recovery was anticipated

17. Key Words Not-In-Traffic Backover Not Equipped with a Parking Aid Rear Visibility Skull fracture Non-fatal		*18. Distribution Statement* General Public	
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TABLE OF CONTENTS

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BACKGROUND

This investigation focused on the pre-crash circumstances, the crash dynamics, injury sources, and rear visibility of a 2003 Chevrolet Avalanche that was involved in a Not-In-Traffic backover crash with a 6 year old male. The Avalanche was not equipped with any type of rear parking aid. **Figure 1** is an on-scene view of the vehicle at final rest. The Chevrolet Avalanche was driven by a 49 year old male and he was the sole occupant of the vehicle. The driver was in the process of backing the Chevrolet into his driveway from a shared private access road at the time of the crash. The 6 year old was wearing a bike helmet and was riding a bicycle immediately prior to the event. The neighborhood children routinely used the private access road to ride their bicycles and used the driveways at the end of the road to turn around. The reconstruction of the crash determined the child rode his bicycle down the road unknown to the driver, lost control of the bicycle, and then fell. The child was lying on the ground approximately 4 m (12 ft) behind the Chevrolet as the vehicle began to back-up. Due to the close proximity between the child's location and the rear of the vehicle, the child was not visible to the driver. The center undercarriage of the Chevrolet then backed over the child and bicycle. The child suffered a police reported skull fracture, a right orbital fracture and associated facial abrasions and contusions from probable contact with the differential/rear axle and pavement. The child was transported to a regional trauma center and hospitalized for treatment. A full recovery was anticipated.

Figure 1: Final rest of the Chevrolet.

This crash was identified by the Crash Investigation Division of the National Highway Traffic Safety Administration through an Internet News article posted on October 11, 2006. The NHTSA subsequently assigned an on-site crash investigation to the Calspan Special Crash Investigations team the same day. Calspan SCI initiated follow-up investigation and established cooperation with the police investigator and the subject driver. The vehicle was available for inspection at the driver's residence and the bicycle was retained by the police investigator. The bicycle was inspected at the police impound. The on-site portion of the investigation took place October 13, 2006. This crash was documented by the County Police on the Commonwealth of Virginia Traffic Crash Report Form.

SUMMARY

VEHICLE DATA

2003 Chevrolet Avalanche

Figure 2: 2003 Chevrolet Avalanche.

The 2003 Chevrolet Avalanche, **Figure 2**, was identified by the Vehicle Identification Number (VIN): 3GNEK13T73G (production sequence deleted). The five passenger, four-wheel drive, ½ ton sport utility vehicle was configured on a 330 cm (130 in) wheelbase. The power train consisted of a 5.3 liter/V8 engine linked to a four-speed automatic transmission. The service brakes were a four-wheel disc system with ABS. The leather upholstered interior was configured with two front row bucket seats and a second row 60/40 split bench seat. The head restraints for all the seats were in the full down position. The driver seat was adjusted to a mid-track position that measured 11 cm (4.5 in) forward of full rear. The total seat track travel measured 22 cm (8.5 in). The front row windows were AS-2 tempered glazing. The rear windows and backlight were OEM AS-3 (tinted) glazing. The Avalanche was equipped with P265/70R17 tires. The installed tires were the OEM recommended tire size for this vehicle. Inspection of the undercarriage did not find any evidence of after-market modification, i.e. lift kits or altered suspension. The Chevrolet was not damaged in the crash. There was no damage or contact evidence to the rear bumper or undercarriage. The ground heights of the rear bumper and undercarriage components were measured. The clearance heights are summarized below:

- Height of rear deck: 140 cm (55 in)
- Height at top of bumper: 71 cm (28 in)
- Bumper bottom clearance: 43 cm (17 in)
- Trailer hitch clearance: 36 cm (14.2 in)
- Spare tire (aft) clearance: 36 cm (14.2 in
- Spare tire (forward) clearance: 29 cm (11.5 in)
- Sway bar clearance: 29 cm (11.5 in)
- Differential clearance: 22 cm (8.5 in)

Huffy Free Style Bicycle

The Huffy bicycle, **Figure 3**, was examined at the police impound. The bicycle frame measured 51 cm (20 in) in height and was constructed of tubular steel. The tires measured 46 cm (18 in) in diameter. The wheelbase measured 82 cm (32.2 in). The handle bars measured 56 cm (22 in) across its width. The seat was adjusted to a ride height of 64 cm (25 in) above the ground. The front brake was out of adjustment. The pads did not retard the front wheel when the brake was depressed. The rear caliper brake was operational and locked the freewheeling tire.

The only noted damage to the bicycle was the orientation of the handle bars relative to the front wheel and a scuff/abrasion to the vertical surface of the left pedal. The handle bars were rotated approximately 30 degrees clockwise. The vertical (outboard) surface of the pedal was scuffed

and abraded from contact with the driveway, **Figure 4**. These damages were caused during the backover and are further explained in the *Reconstruction* section of this report.

Figure 3: Huffy Bicycle.

Figure 4: Left pedal abrasion.

CRASH SITE

The crash occurred in a residential subdivision during the driver's normal afternoon commute home from work. At the time of the crash, it was daylight and the weather was sunny and mild. At the crash site, a 3.6 m (12 ft) wide north/south private road branched off from a cul-de-sac. The private road measured 76 m (250 ft) in length and provided access to two properties located north of the cul-de-sac. At its north end, the access road fanned out into a 12.8 m x 8.5 m (42 ft x 28 ft) common area. The common area was predominately level. Two 5.5 m (18 ft) wide driveways then branched from the common area and led to the garage of each property. The crash occurred in the common area as the Chevrolet was backing westward into the driveway on the left. The slope of the driveway was an estimated 2 percent, positive to the west. An attached double garage was under-construction at the west end of the subject driveway. The area in front of the new construction was filled with rafters, bricks and other random construction related obstructions. A schematic of the crash scene is included at the end of this narrative report, **Figure 9**. **Figures 5 and 6** are northward trajectory views of the Chevrolet.

Figure 5: Northward approach.

Figure 6: Northward approach near the common area.

CRASH SEQUENCE

Pre-Crash

The driver of the Chevrolet was returning home from work and stopped at the south end of the private access road. He exited the vehicle, retrieved the mail, and stopped to speak with his neighbor. At this time, the driver recalled standing to the left side of the vehicle with the neighbor. Both front windows of the Chevrolet were down. The left rear window was down approximately 10 cm (4 in). The radio was off. During the conversation, the neighbor's 6 year old son rode up on his bicycle from the cul-de-sac area. The adults acknowledged his presence and continued the conversation for a short time. The child remained with the adults throughout the conversation. At conclusion of the conversation, the neighbor went into his house and the driver entered the Chevrolet. The driver was not aware of the actions taken by the child.

The day of the crash was also refuse pick-up day and the driver wanted to retrieve his empty wheeled dumpster. To do so, the driver pulled the wheeled dumpster along side the vehicle with his left hand and drove the Chevrolet with his right hand north along the access road. The driver had purchased groceries on the way home and intended to back into his driveway to unload. At the north end of the road, the driver slowed and left the refuse container at the common area/road junction and turned the vehicle to the right. He drove forward approximately 8.5 m (28 ft) and stopped. The Chevrolet was facing eastward. The driver shifted into reverse, checked his mirrors, and began to back his vehicle into the driveway. The driver was not specific about a time frame and estimated several seconds between each action. During the process of operating the vehicle and checking his mirrors, the driver did not realize the child had followed the Chevrolet down the access road on his bicycle

The 6 year old child was riding a 51 cm (20 in) Huffy bicycle northward on the access road. He reportedly had the training wheels removed approximately one year prior to the crash. It was common for all the neighborhood children to ride their bicycles on this access road and to use the driveways at its end to loop around in a figure-eight pattern to return south to the cul-de-sac. Its use was known by all the home owners in the area and it was approved.

As the 6 year old entered the common area, he lost control of the bicycle and fell. It has been theorized that he lost control due to the presence of the Chevrolet and the construction obstacles that were present in the left driveway. The child may have perceived that the location of these objects did not leave enough room for a turning maneuver causing the child to panic and fall. The child was located approximately 4 m (12 ft) behind the Chevrolet on the approximate center line of the Avalanche. The bicycle was facing southward on its left side. The child was reportedly still straddling the bike. His head was oriented to the east.

The driver began to back the Chevrolet into the driveway. He used the left mirror and referenced the location of the left rear tire relative to the driveway edge to maneuver the vehicle. The backing speed was slow, an estimated 1.6 km/h (1 mph).

Crash

The driver reported that as he backed up he heard a "pop" and stopped. He did not feel anything but it was the sound that caused him to stop. The driver thought that the contractors had left

some construction debris in the driveway and that he had backed over it. He exited the vehicle to check and realized that the backover crash had occurred. The child and bicycle were found under the rear aspect of the Chevrolet. The child's head was in close proximity to the differential and the inboard end of the right axle shaft. **Figure 7** is a close-up on-scene view of the bicycle and undercarriage.

Figure 7: View of the undercarriage and bicycle.

Post-Crash

The driver immediately called 9-1-1 via his cell phone and notified the emergency responders. Reportedly, the first responders were on-scene within several minutes. A responding fire station was located within 0.8 km (0.5 mile) of the scene. The child was conscious and moaning. The EMS cut-off the child's clothing, placed him on a back-board, and slid him out from under the vehicle. He was not trapped or entangled in the undercarriage. The child was transported by helicopter to a regional pediatric trauma center and admitted into the intensive care unit. Police reported data indicated he suffered a skull fracture, a right orbital fracture and right facial abrasions. The facial abrasions resulted from probable ground contact. The skull fracture and orbit fracture resulted from contact with the vehicle's undercarriage/differential area transmitted through the bicycle helmet. The bicycle helmet was fractured during the crash. Over the course of his treatment, it was determined that the child did not suffer a brain injury and a full recovery was expected.

RECONSTRUCTION

After the child was removed by the EMS, the police documented the scene. Figure 7 is a view depicting the orientation of the bicycle and the undercarriage of the Avalanche. An inspection/examination of the rear bumper cover revealed the fascia was not damaged. The police investigation documented scuff marks in the area of the rear axle/differential that possibly resulted from the contact with the bicycle helmet. After documentation the bicycle was slid out from under the vehicle. The bicycle was not entangled with the undercarriage but was simply pulled out. The lack of vehicle damage and entanglement with the undercarriage indicated that the rear aspect of the vehicle had passed over the top of the child and bicycle. Then as the rear axle/differential contacted the bicycle helmet, the helmet crushed and the child was injured.

A 61 cm (24 in) scratch was identified on the driveway oriented in an ease/west direction. The scratch was in alignment with the left pedal of the bicycle. **Figure 8** is a view of the scratch location relative to the reconstructed position of the Avalanche. As the Chevrolet backed up, the

Figure 8: Scratch location relative, to the Chevrolet.

bicycle was pushed westward. This action abraded the left pedal and scratched the asphalt surface of the driveway. During this movement, the handle bars of the bicycle contacted the undercarriage and the bars rotated approximately 30 degrees about the center pivot.

During the SCI inspection, the driver was instructed to operate his vehicle in a manner that duplicated his actions the day of the crash. The driver came down the access road, turned, and was told to stop where he did before. The rear tires of the Avalanche were marked at that location. The distance between the east end of the scratch and the Chevrolet's rear tires at its reconstructed position (prior to backing) measured 5.3 m (17.3 ft).

REAR VISIBILTY

2003 Chevrolet Avalanche

The rear visibility of the Chevrolet was measured with the vehicle located at the point it first began to back up. The actual driver involved in this backover crash was used in this study. 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 over his right shoulder. The centerline visibility distance was measured from the rear bumper. A second measurement was taken with the target placed at ground level. The measured distance is summarized below:

- Sight distance to 71 cm (28 in) target: 11.2 m (36.8 ft)
- Sight distance to ground level target: 17.4 m (57.1 ft)

Cones of visibility were also established using the outside mirrors. A 4.6 m (15 ft) distance from the rear bumper was used as an arbitrary reference location. The driver was asked to locate the 71 cm (28 in) target laterally relative to the centerline in a normal seated position. The cone for the left mirror began 0.8 m (2.75 ft) left of center and ended 3.0 m (9.7 ft) left of center. The cone for the right mirror began 1.2 m (3.8 ft) right of center and ended 5.2 m (17.2 ft) right. These visibility measurements are depicted graphically at the ended of this report. The measured visibility fields confirmed the fallen bicyclist was not visible to the driver as the Chevrolet backed up.

DRIVER DEMOGRAPHICS

Age / Sex:	49 year old / Male
Height:	183 cm (72 in)
Weight:	95 kg (210 lb)
Seat Eye Height:	103 cm (40.4 in) measured vertically above the sill
Seat Track Position:	11 cm (4.5 in) forward of full rear

CHILD DEMOGRAPHICS

Age / Sex:	6 year old / Male
Height:	119 cm (47 in) estimated by driver
Weight:	20 kg (45 lb) estimated by driver
Clothing:	Beige shirt and blue or black shorts, white sneakers

CHILD INJURY

Injury	***Injury Severity (AIS 98 Update)***	***Injury Source***
Skull fracture, NFS	Moderate (150400.2,9)	Rear axle
Right orbit fracture, NFS	Moderate (251200.2,1)	Rear axle
Right facial abrasions, NFS	Minor (290202.1,1)	Ground

Note: the above injuries were identified during the interview of the driver and police investigator.

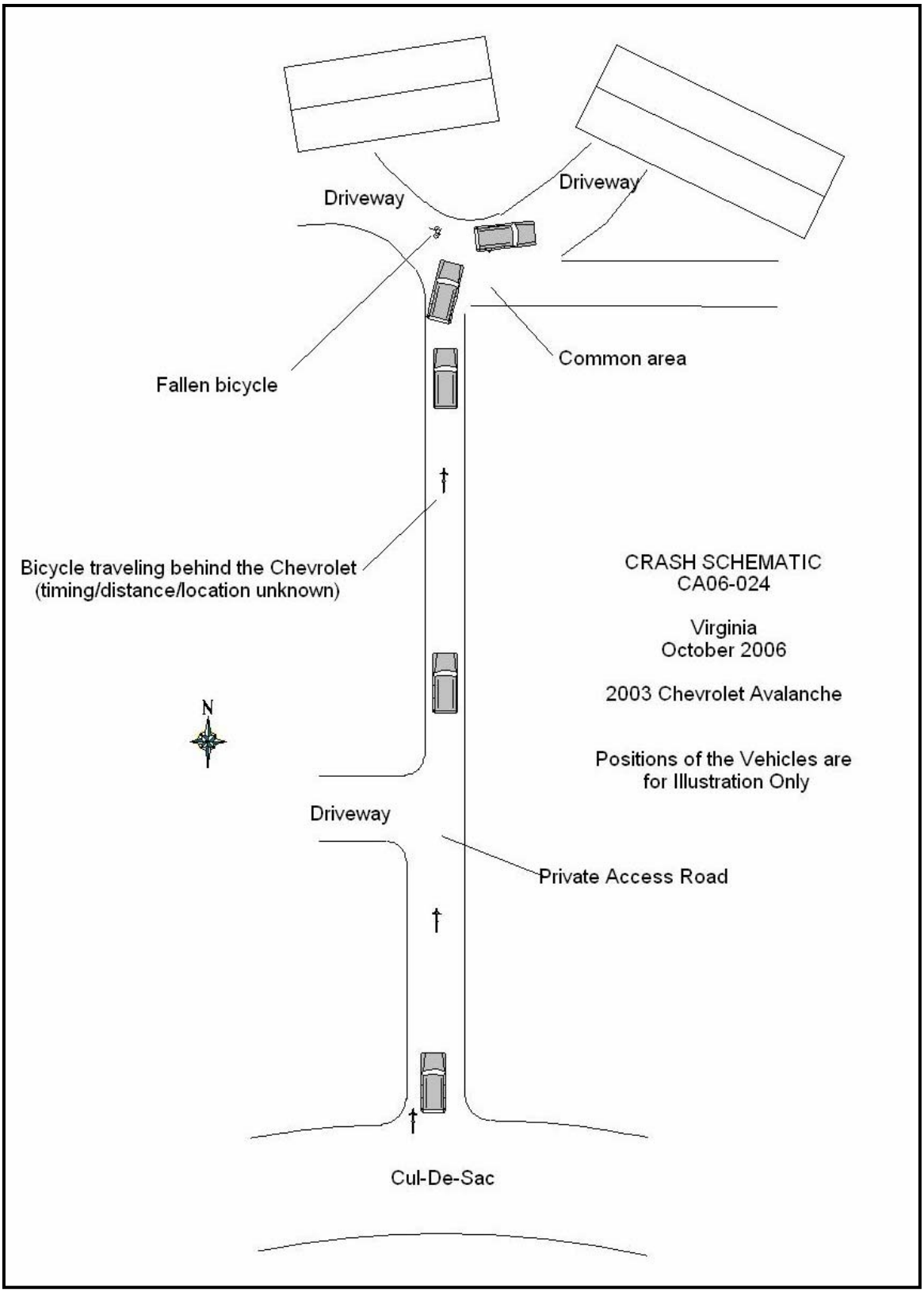


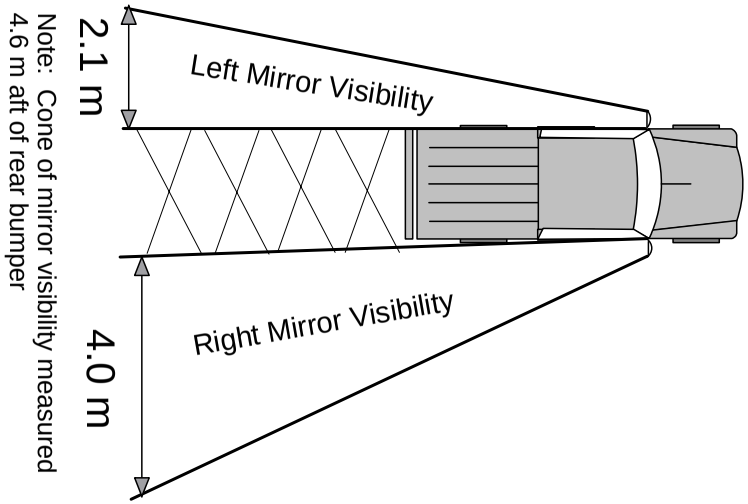
Figure 9: Crash schematic.

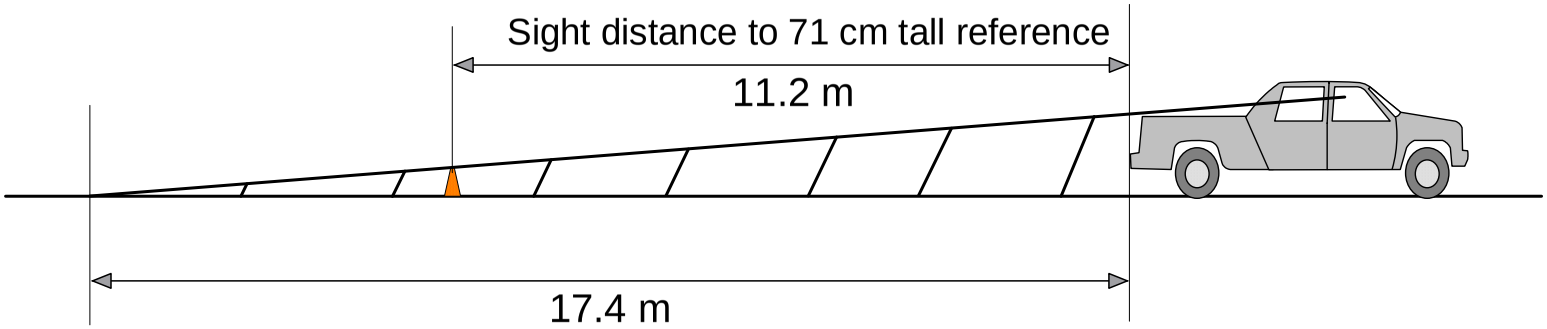
ATTACHMENT A

Visibility Diagram

On-Site Rear Visibility Diagram
CA06-024

2003 Chevrolet Avalanche
Driver: 183 cm tall





ATTACHMENT B

Not-In-Traffic Surveillance Forms

Not Applicable ☐

Reset Values

Print Forms

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

SCENE FORM

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number

C A 0 6 0 2 4

IDENTIFICATION

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

3. Time of Crash 1 7 4 2

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 3 . 7 m

13. Estimated speed at impact 0 0 2 kmph

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

15. Estimated distance from impact to vehicle final rest

0 0 0 . 6 m

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

Not Applicable ☐

Reset Values

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

VEHICLE FORM

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number C A 0 6 0 2 4

VEHICLE IDENTIFICATION

2. VIN 3 G N E K 1 3 T 7 3 G X X X X X X

3. Model Year 2 0 0 3

4. Vehicle Make (specify): CHEVROLET

5. Vehicle Model (specify): AVALANCHE

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 P265/70R17

7. LF Tire Size P265/70R17

8. LR Tire Size P265/70R17

9. RF Tire Size P265/70R17

10. RR Tire Size P265/70R17

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		☐	☐ Full Down / ☐ Mid / ☐ Full Up	
Front Right	1	☑	☑ Full Down / ☐ Mid / ☐ Full Up	
2nd Left	7	☑	☑ Full Down / ☐ Mid / ☐ Full Up	
2nd Middle	7	☑	☑ Full Down / ☐ Mid / ☐ Full Up	
2nd Right	7	☑	☑ Full Down / ☐ Mid / ☐ Full Up	
3rd Left		☐	☐ Full Down / ☐ Mid / ☐ Full Up	
3rd Middle		☐	☐ Full Down / ☐ Mid / ☐ Full Up	
3rd Right		☐	☐ 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 w/ separate back cushions
5 = Bench w/ folding back
6 = Split bench w/ separate back cushions
7 = Split bench w/ folding back
8 = Pedestal (i.e. column supported)
9 = Box mounted (i.e. van type)
10= Other seat type (specify)
99= Unknown seat type

VEHICLE MEASUREMENTS

Clearance Heights		Measurements (all from ground, and in centimeters	NOTES
Beltline		140	
Top of trunk/tailgate		140	
Bottom of bumper		43	
Trailer hitch (if applicable)		36	
Undercarriage			
	Sway bar	29	
	Axle	29	
	Differential	22	
	Other (specify): _SPARE_	36	
Sensor Height (if equipped)		N/A	
Camera Height (if equipped)		N/A	

Not Applicable ☑

Reset Values

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

Back Up / Parking Aid Form

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number

C A 0 6 0 2 4

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

Not Applicable ☐

Reset Values

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

DRIVER FORM

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number

C A 0 6 0 2 4

DRIVER PROFILE

2. Driver's Age 4 9
   99 = Unknown

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

4. Driver's Height 1 8 3 cm
   999 = Unknown

5. Driver's Weight 0 9 5 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:

    RETURNING HOME DELIVERING GROCERIES

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

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

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

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

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

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

- ◉ No non-driving activities

External

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

Internal

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

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

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

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

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

20. Est time between start of backing and impact

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

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

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

22. Recent experience driving this vehicle

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

23. Frequency of driving in this parking lot/driveway

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

24. Driver Impairment
(Select all that apply)

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

25. Source of alcohol/drug results

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

Not Applicable ☐

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

Non Motorist Form

Reset Values

Special Crash Investigations
Not In Traffic Surveillance

1. Case Number
C A 0 6 0 2 4

NON-MOTORIST PROFILE

2. Non-motorist's Age — 0 6 ◉ Years ○ Months
99 = Unknown

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

4. Non-motorist's Height — 1 1 9 cm
999 = Unknown

5. Non-motorist's Weight — 0 4 5 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) Fallen off b
○ 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): Fell off bike, stationary
○ Unknown

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

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

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

NON MOTORIST CLOTHING

NOTES:

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

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

	Clothing	Color	Fabric	Texture	Weight
HEADWEAR	Hat				
	Helmet	Orange/white			
	Hood				
	Other (specify): _____				
UPPER BODY	Short Sleeve	Beige	Unknown	Soft	Light
	Long Sleeve				
	Light Jacket				
	Heavy Jacket				
	Other (Specify): _____				
LOWER BODY	Shorts	Blue/black	Unknown	Soft	Light
	Pants				
	Shoes	White sneakers			
	Other (specify): _____				