CRASH DATA RESEARCH CENTER

Calspan Corporation Buffalo, NY 14225

NOT-IN-TRAFFIC SURVEILLANCE CALSPAN ON-SITE FRONT OVER INVESTIGATION

SCI CASE NO: CA09027

VEHICLE: 2008 LEXUS RX350

LOCATION: NEW YORK

INCIDENT DATE: APRIL 2009

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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This on-site investigation focused on the circumstances surrounding the death of a 2-year-old male struck and fatally injured during a front over incident in the driveway of his home.

16. Abstract

This on-site investigation focused on the circumstances surrounding the death of a 2-year-old male struck and fatally injured during a front over incident in the driveway of his home. The child was struck by the front of a 2008 Lexus RX350 driven by his mother. The child was in the care of his grandmother at the time of the incident. As the mother approached the residence, she remotely opened the garage door with the in-vehicle transmitter. The child, apparently hearing the garage door opening, exited the house into the attached garage. The child emerged from the garage, unknown to the driver, directly into the path of the Lexus. The left frontal area of the Lexus struck and ran over the child. The child sustained a fatal head injury and was pronounced deceased upon arrival at the hospital. The Lexus was towed from the scene and impounded by the police as part of their investigation.

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NOT-IN-TRAFFIC SURVEILLANCE CALSPAN ON-SITE FRONT OVER INVESTIGATION SCI CASE NO: CA09027

VEHICLE: 2008 LEXUS RX350 LOCATION: NEW YORK INCIDENT DATE: APRIL 2009

BACKGROUND

This on-site investigation focused on the circumstances surrounding the death of a 2-year-old male struck and fatally injured during a front over incident in the driveway of his home. The child was struck by the front of a 2008 Lexus RX350, **Figure 1**, driven by his mother. The child was in the care of his grandmother at the time of the incident. As the mother approached the residence, she remotely opened the garage door with the in-vehicle transmitter. The child, apparently hearing the garage door opening, exited the house into the attached garage. The



Figure 1: Front left oblique view of the Lexus RX350.

child emerged from the garage, unknown to the driver, directly into the path of the Lexus. The left frontal area of the Lexus struck and ran over the child. The child sustained a fatal head injury and was pronounced deceased upon arrival at the hospital. The Lexus was towed from the scene and impounded by the police as part of their investigation.

This April 2009 incident was identified by the Calspan Special Crash Investigations (SCI) team through local news coverage and was forwarded to the Crash Investigation Division (CID) of the National Highway Traffic Safety Administration (NHTSA) on May 1, 2009. The CID assigned an investigation of the incident the same day due to the Agency's interest in Not-In-Traffic incidents. The efforts for this investigation encompassed an interview with the police investigator, an inspection of the Lexus and incident site, and documentation of the front visibility of the Lexus RX350. The driver of the Lexus declined to participate in the investigation.

SUMMARY

Vehicle Data

The 2008 Lexus RX350 was identified by the Vehicle Identification Number: 2T2HK31U18C (production sequence deleted). The power train consisted of a 3.4-liter, V6 engine linked to a five-speed automatic transmission. The tires were Michelin MXV4 P235/55R18 mounted on OEM alloy wheels and were the proper size recommended by the vehicle manufacturer. The window glazing consisted of an AS1 laminated windshield, AS2 first row glazing, and AS3 second row, rear and backlight glazing. There were no visual obstructions and the glazing clarity was clear. The open/closed status of the windows, at the time of the incident, was unknown. The vehicle was configured for five-passenger seating. The front bucket seats were equipped with adjustable head restraints each adjusted to the full-down position. The second row consisted of a split-bench seat with adjustable head restraints. The second row head restraints

were in the full-down position. The vertical clearance heights for various components measured from the ground are listed in the following table:

Component	Clearance Height
Beltline	114 cm (45.0 in)
Height of the hood face	99 cm (39.0 in)
Top of front bumper	70 cm (27.5 in)
Bottom of front bumper	48 cm (19.0 in)
Valence below bumper	36 cm (14.0 in)
Suspension control arm	22 cm (8.5 in)
Cross member	20 cm (8.0 in)

Incident Site

The incident occurred during the daytime hours of April 2009 in the driveway of a private residence. At the time of the incident, the weather conditions were clear and dry. The single-family dwelling was located on the west side of a two-lane north/south road. An asphalt driveway was located to the right of the two-story house and the attached side-loading garage. The garage doors faced north, perpendicular to the east/west driveway. **Figure 2** is a westward view along the driveway.



Figure 2: West view along the driveway

Driver Data

The driver of the Lexus was a 29-year-old female, the mother of the non-motorist. Her demographic data is unknown.

Non-Motorist Data

The non-motorist was a 2-year-old male. The police investigator reported that the autopsy record indicated that his height was 94 cm (37 in). His weight was unknown. The child sustained a fatal head injury as a result of the incident.

Incident Sequence Pre-Incident

A schematic of the incident is attached to the end of this narrative report as **Figure 8**. Prior to the incident, the driver was conducting errands. The non-motorist was in the home under the supervision of his grandmother. When the driver returned and was approaching the garage, the driver activated the motorized garage door with the remote control located in the vehicle. The police investigator reported that the non-motorist heard the garage door opening, exited the home through an entry door and entered the garage. The driver was operating the Lexus westward along the driveway and initiated a left turn to enter the garage. She was unaware of the non-motorist's presence.

Incident

As the child emerged from the garage, the front left area of the vehicle struck and knocked the non-motorist to the ground. The vehicle continued forward and the left front tire ran over the child. The driver stated to the investigating police officer that she believed the vehicle had run over a toy. She stopped, placed the Lexus in reverse and began a backing maneuver. She subsequently ran over the non-motorist a second time with the front left tire.

Post-Incident

The driver exited the vehicle and observed the non-motorist under the vehicle. Police and emergency medical personnel were summoned to the incident site. A neighbor, who was a physician, responded to the incident and began treating the child. The incident site was located in a new development which resulted in the delayed arrival of the police and emergency medical personnel. The emergency medical personnel placed the child in an ambulance and transported him to a local hospital where he was pronounced deceased of a head injury four minutes after arrival.

Vehicle Contact Damage/Evidence

The SCI team inspected the Lexus during its storage in the police impound. There was no physical evidence of its contact with the non-motorist on the vehicle's bumper, tire or undercarriage components.

Front Visibility

The front visibility of the vehicle was measured of a level surface using a substitute driver. The substitute driver had a seated eye height of 137 cm (54 in). The driver's eye height is unknown. Five 71 cm (28 in) tall red reflective targets were used to identify the location of the front blind zone around the vehicle. The targets were located outboard the left mirror, at the front left, the forward centerline, the front right, and The locations of the outboard right mirror. targets were adjusted outboard the vehicle, along the substitute driver's sight line, to a point where the driver indicated that he could first identify the target. The driver was asked to remain seated in a normal driving position. The target locations



Figure 3: Driver interior view to the forward centerline target.

were then measured with respect to the vehicle. **Figure 3** is a driver view through the windshield to the centerline target. The longitudinal distance from the front bumper fascia to the centerline target in the figure measured 142 cm (56 in). **Figures 4 - 6** are exterior views depicting the locations of the forward blind zone targets around the Lexus. **Figure 7** attached to the end of this report is a scaled overhead visibility schematic depicting the blind zone forward of the vehicle. Cooperation with the driver could not be obtained. Details of the regarding the garage lighting and layout were not obtained.



Figure 4: Front left oblique view of the Lexus and front visibility targets.



Figure 5: Front right oblique view of the Lexus and front visibility targets.



Figure 6: Right view of the Lexus and the target locations.

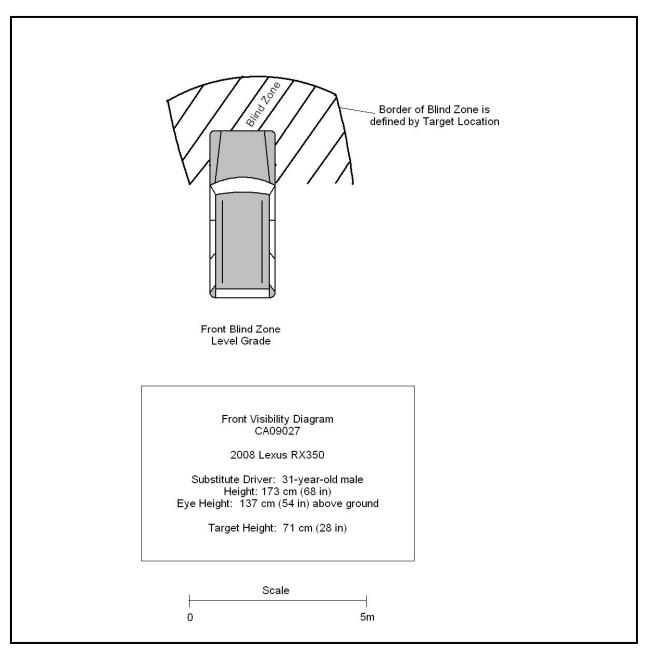


Figure 7: Front visibility diagram.

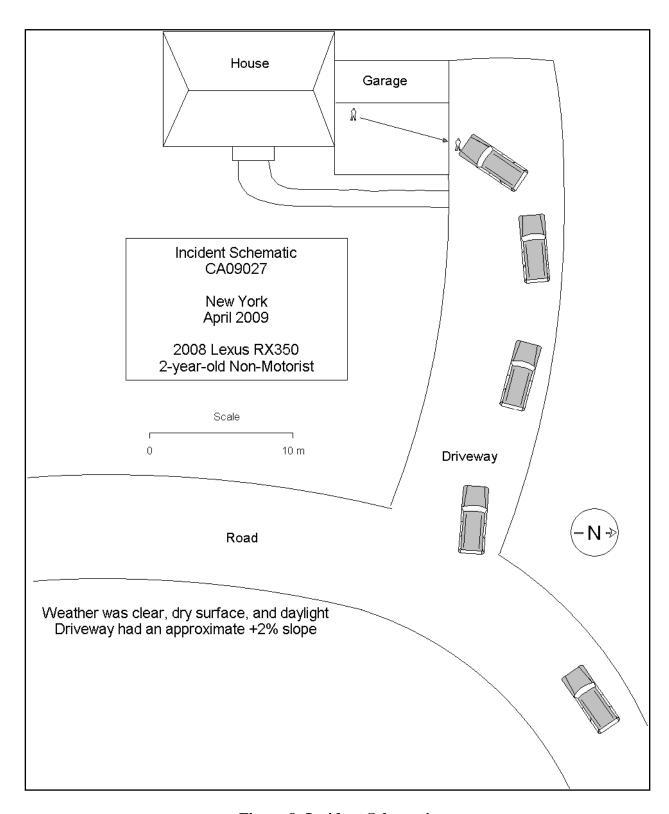


Figure 8: Incident Schematic

ATTACHMENT A

Not-In-Traffic Surveillance Forms

SCENE FORM

	SCENE INFORMATION
Case Number	7. Type of area in which crash occurred (Select all that apply)
	O Single family residential
IDENTIFICATION	O Row houses/townhouses
	O Multi family housing O Commercial
2. Date of Crash/	O Industrial
	O Rural O Unknown
3. Time of Crash	Olikilowii
	8. Driver exterior sightline obstructions
Code reported military time of crash.	(Select all that apply)
NOTE: Midnight = 2400	O None O Utility poles
Unknown = 9999	O Other vehicles O Signs O Building O Glare
	O Trees O Unknown
AMBIENT CONDITIONS	O Shrubbery O No driver present
4. Light Conditions	O Other (specify)
	9. Crash location
O Daylight O Dark	O Driveway O Road / street
O Dark but lighted	O Parking Lot O Roadside / shoulder
O Dawn O Dusk	O Sidewalk O Other (specify)
O Unknown	O Alley O Unknown O Intersection of driveway and sidewalk
- 4	·
5. Atmospheric Conditions (Select all that apply)	Non motorist sightline obstructions (Select all that apply)
O Clear-No adverse conditions O Cloudy	O None O Other vehicles
O Rain	O Building
O Snow O Fog, Smog, Smoke	O Trees O Shrubbery
O Sleet, Hail (freezing rain or drizzle)	O Utility poles
O Blowing Snow	O Signs
O Severe Crosswinds O Blowing Sand, Soil, Dirt	O Glare O Other (specify)
O Other (specify):	O Unknown
O Unknown	+ / - 11. Grade at parked position %
6. Temperature	· · · · — — —
O Below 0 degrees Celsius (Below 32 F)	12. Estimated distance from parked position to impact
O 1-10 degrees Celsius (33-50 F)	m
O >10-24 degrees Celsius (51-75 F) O Over 24 degrees Celsius (Over 75 F)	13. Estimated speed at impactm kmph
O Unknown	+/ -
	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 IDEN	TIFICATION			
2. VIN	·					
3. Model Ye	ear					
4. Vehicle N	Make (specify	/):			_	
5. Vehicle N	Model (specif	y):			_	
		GLAZI	NG			
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 D	ATA			
6. Vehicle	Manufactu	rer 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

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					
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)					

Back Up / Parking Aid Form

1. Case Number	Video image quality under scene lighting conditions
PARKING AID PRESENCE 2. Type of backing/parking aid present	O None present O Good O Average O Poor (specify): O Unknown
O OEM camera O OEM ultrasonic/radar sensor O OEM combination camera-ultrasonic/radar sensor O OEM Fresnel lens O OEM interior mirrors O Aftermarket camera O Aftermarket ultrasonic/radar sensor O Aftermarket combination camera-ultrasonic radar sensor O Aftermarket Fresnel lens O Aftermarket interior mirrors O Other (specify):	8. Was the camera functioning properly O None present O Yes O No, poor image quality due to glare O No, poor image quality due to atmospheric conditions O No, camera turned off O No, camera inoperable O Unknown ULTRASONIC/RADAR SENSOR Specify object detection range on diagram
CAMERA INFORMATION	System make/model
Specify field of view measurements on diagram	
3. System make/model 4. Video monitor type O None present O LCD (color) O CRT (black & white) O Unknown 5. Video display size cm (Diagonal) 6. Camera location O None present O Bumper O License plate O Trilleto (Latab Trunk	10. Auditory warning illumination O No sensor present O Yes O No O Unknown 11. Number of sensors 12. Sensor locations (Select all that apply) O No sensor present O Left bumper O Center bumper O Right bumper O License plate area O Tailgate/Hatch/Trunk
O Tailgate/Hatch/Trunk O Other (specify):	13. Was warning system functioning properly O No sensor present O Yes, system alerted driver O No, system did not alert driver O No, system turned off O No, system inoperable O Unknown

Spe	ecial Crash Investigations – Not In Traffic Surveill	ance:	: Ba	ck Up	Parkin	g Aid I	Form	Page 2
14.	Did driver react to warning							
	O No sensor present O Yes O No O Unknown							
15.	Did driver report common false warnings							
	O No sensor present O Yes O No O Unknown							

DRIVER FORM

Case Number	10. Driver entry interruption (Select all that apply)
DRIVER PROFILE 2. Driver's Age 99 = Unknown 3. Driver's Sex O Male O Female O Unknown 4. Driver's Height 999 = Unknown	O Direct trip from building to vehicle O Loaded items into vehicle O Spoke with family O Spoke with neighbors O Spoke with contacted nonmotorist O Return trip (backing into driveway/lot) O Other (specify): O N/A Unknown 11. Purpose of backing
5. Driver's Weight 999 = Unknown 6. Driver eyewear worn (Select all that apply) O None O Eyeglasses O Sunglasses O Contacts O Unknown	O Leaving parking space in parking lot O Backing onto roadway from driveway O Entering parking space in parking lot O Backing into driveway from roadway O Other (specify): O N/A Unknown 12. Where was driver going Description:
7. Driver vision deficiency condition (Select all that apply) O None O Near sighted O Far sighted O Astigmatism O Other (specify) O Unknown	13. Driver in a hurry O Yes N/A O No Unknown O Unknown 14. How did driver check behind (rear area of vehicle)
8. Non motorist's relationship to driver O No relationship O Child O Grandchild O Sibling O Neighbor O Friend O Other (specify): O Unknown DRIVER ACTIONS	after vehicle entry (Select all that apply) O Did not look O Checked mirrors O Turned right and looked back O Turned left and looked back Viewed Camera Listened for auditory/visual warning from system
9. Driver approach to vehicle for entry From left front O From left O From left rear O From right rear O From right front O Circled vehicle O Return trip (backing into driveway/lot) O Other (specify): O N/A O Unknown	O Other (specify): N/A Unknown 15. Estimated time between vehicle entry and start of backing O 0-10 Seconds O 11-30 Seconds O 31-60 Seconds Unknown

	January Commence		
16.	What direction was the driver looking during backing maneuver	19.	Did driver see struck non motorist prior to impact (Select all that apply)
	(Select all that apply) O Straight ahead O Right O Left O Rearward		O No, never saw non motorist O Saw non motorist prior to entering vehicle O Saw non motorist after entering vehicle O Other (specify): Unknown
	O At object inside the car	00	
	O At mirrors O Other (specify):	20.	Est time between start of backing and impact
	O N/A		O <2 or = 1 second O 2-5 seconds
17	Unknown Was the driver distracted during back up		O 6-10 seconds
17.	maneuver		O > 10 seconds
	(Select all that apply)		O N/A Unknown
	O No non-driving activities External	21.	Driver interior sightline obstructions (Select all that apply)
	O Looking at other vehicles O Looking at other non motorist O Looking at intended turn destination		O Pillar O Other occupant O Headrest O Other (specify)
	O External focus, not specified		O Cargo O Unknown None
	O Other external focus (specify): Internal	22.	Recent experience driving this vehicle
	 O Looking at other occupant O Talking to passenger O Dialing phone O Talking on phone O Listening to radio/cd/portable playback device O Adjusting radio/cd player 		O More than 10 times the last three months O 6-10 times the last three months O 2-5 times the last three months O Less than 2 times the last three months O First time driving this vehicle O N/A
	O Adjusting climate controls O Using a device/controls integral to vehicle	23.	Unknown Frequency of driving in this parking lot/driveway
	(specify): O Reading/adjusting navigation system O Eating or drinking O Smoking related O Retrieving fallen object (specify): O Internal focus, not specified O Focused on other internal object		O Daily O Weekly O Several times a month O Monthly O Rarely O First time in lot/driveway O N/A Unknown
	(specify):	24	Driver Impairment
	O N/A Unknown	۷٦.	(Select all that apply)
18.	Driver avoidance actions prior to impact (Select all that apply)		O No drugs or alcohol present O Alcohol present (specify BAC):
	O None O Braking		O Drugs present (specify):O Unknown
	O Steering left O Steering right	25.	Source of alcohol/drug results
	O Accelerating O Other (appoint):		O Police reported
	O Other (specify):O N/A		O Medical record O Other (specify)
	Unknown		O Not Tested
			Unknown if tested

Non Motorist Form

1. Case Number	11. Non-motorist motion
NON-MOTORIST PROFILE	O Not moving O Walking slowly O Walking rapidly
2. Non-motorist's Age Years 99 = Unknown	S O Running or joggingO Skipping/Hopping/JumpingO Falling/Stumbling/Rising
3. Non-motorist's Sex O Male O Female O Unknown	O On skates/skateboard O On bike/scooter O Other (specify): O Unknown
4. Non-motorist's Height cm 999 = Unknown	12. Non-motorist approach relative to rear of vehicle
5. Non-motorist's Weight kg999 = Unknown6. Medical outcome	O Stationary O From left O From right O From behind O Other (specify):
O Not injured O ER only O Hospitalized 1-4 days	O Unknown 13. Non-motorist first avoidance action
O Hospitalized 5 days or moreO Treatment laterO FatalO Unknown	O No avoidance actions O Stopped O Accelerated pace O Ran away (along vehicle path)
7. Source of most severe injury Bumper O Tire O Undercarriage O Other Specify: O Ground	O Jumped O Turned away from vehicle O Turned toward vehicle and braced O Dove or fell away from vehicle O Other (specify): O Unknown
O N/A Unknown	14. Non-motorist primary focus of attention
8. Non-motorist impairment (Select all that apply) O No drugs or alcohol present O Positive for alcohol (specify BAC): O Positive for drugs (specify): O Unknown	O Striking vehicle O Play object O Person O Surrounding traffic O Animal O Handheld electronic (phone, MP3 player, etc.)
Source of alcohol/drug results Police reported Medical Report	O Other Object (specify) O Unknown 15. Were any other Non-motorists present?
O Other (specify) O Not Tested O Unknown if tested	(Select all that apply) O Alone
NON-MOTORIST ACTIONS	O One adult present O One other child present
10. Non-motorist attitude	O Multiple adults present O Multiple children present O Unknown
O Standing O On skates/skateboard O Bending at waist O On bike/scooter O Sitting O Other (specify) O Crouching O Unknown O Kneeling	O Ulikilowii

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	Short Sleeve				
P P	Long Sleeve				
E R B	Light Jacket				
	Heavy Jacket				
O D	Other (Specify):				
Y					
L O	Shorts				
W E R	Pants				
	Shoes				
В О	Other (specify):				
D Y					