

INDIANA UNIVERSITY

TRANSPORTATION RESEARCH CENTER

School of Public and Environmental Affairs
501 S. Madison Street-Suite 105
Bloomington, Indiana 47403-2452
(812) 855-3908 Fax: (812) 855-3537

ON-SITE SIDE IMPACT INFLATABLE OCCUPANT PROTECTION INVESTIGATION

CASE NUMBER - IN08031
LOCATION - TEXAS
VEHICLE - 2008 HONDA ACCORD EX-L
CRASH DATE - June 2008

Submitted:

August 11, 2009



Contract Number: DTNH22-07-C-00044

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
National Center for Statistics and Analysis
Washington, D.C. 20590-0003

DISCLAIMERS

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no responsibility for the contents or use thereof.

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the National Highway Traffic Safety Administration.

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.

Technical Report Documentation Page

1. <i>Report No.</i> IN08031		2. <i>Government Accession No.</i>		3. <i>Recipient's Catalog No.</i>	
4. <i>Title and Subtitle</i> On-Site Side Impact Inflatable Occupant Protection Investigation Vehicle - 2008 Honda Accord EX-L Location - Texas			5. <i>Report Date:</i> August 11, 2009		
			6. <i>Performing Organization Code</i>		
7. <i>Author(s)</i> Special Crash Investigations Team #2			8. <i>Performing Organization Report No.</i>		
9. <i>Performing Organization Name and Address</i> Transportation Research Center Indiana University 501 S. Madison Street-Suite 105 Bloomington, Indiana 47403-2452			10. <i>Work Unit No. (TRAIS)</i>		
			11. <i>Contract or Grant No.</i> DTNH22-07-C-00044		
12. <i>Sponsoring Agency Name and Address</i> U.S. Department of Transportation (NVS-411) National Highway Traffic Safety Administration National Center for Statistics and Analysis Washington, D.C. 20590-0003			13. <i>Type of Report and Period Covered</i> Technical Report Crash Date: June 2008		
			14. <i>Sponsoring Agency Code</i>		
15. <i>Supplementary Notes</i> On-site side impact air bag deployment investigation involving a 2008 Honda Accord EX-L, 4-door sedan, with manual safety belts and dual front and side impact and curtain air bags, and a 1991 Honda Accord EX, 4-door sedan					
16. <i>Abstract</i> This report covers an on-site investigation of a side impact air bag deployment crash that involved a 2008 Honda Accord EX-L and a 1991 Honda Accord EX. The focus of this case was on the 2008 Honda because the vehicle was equipped with front seat back-mounted side impact air bags and the driver's side air bags deployed as a result of the crash. This right-angle type collision occurred within a 4-leg intersection. The left front of the 2008 Honda was impacted by the front of the 1991 Honda. The 2008 Honda's driver (45-year-old, female) was seated and restrained by her lap-and-shoulder, safety belt system. According to her interview and her medical records, the driver sustained only minor soft tissue injuries as a result of this crash. The front right passenger (42-year-old, female) was also seated and restrained by her lap-and-shoulder, safety belt system. According to the interview with the driver and her medical records, the front right passenger sustained a minor strain and a contusion.					
17. <i>Key Words</i> Side Air Bag Deployment			Motor Vehicle Traffic Crash Injury Severity		18. <i>Distribution Statement</i> General Public
19. <i>Security Classif. (of this report)</i> Unclassified	20. <i>Security Classif. (of this page)</i> Unclassified		21. <i>No. of Pages</i> 12	22. <i>Price</i>	

TABLE OF CONTENTS

IN08031

Page No.

BACKGROUND. 1

CRASH CIRCUMSTANCES. 1

CASE VEHICLE: 2008 HONDA ACCORD EX-L. 3

 CASE VEHICLE DAMAGE. 4

 MANUAL RESTRAINT SYSTEM. 6

 AUTOMATIC RESTRAINT SYSTEM. 6

 CASE VEHICLE KINEMATICS–OVERVIEW. 9

 DRIVER KINEMATICS. 9

 DRIVER INJURIES. 10

 FRONT RIGHT PASSENGER KINEMATICS.. . . . 10

 FRONT RIGHT PASSENGER INJURIES. 11

OTHER VEHICLE: 1991 HONDA ACCORD EX. 11

CRASH DIAGRAM. 12

This crash was brought to this contractor's attention on August 8, 2008 by the sampling activities of the National Automotive Sampling System. This crash involved a 2008 Honda Accord EX-L and a 1991 Honda Accord EX. The crash occurred in June 2008, at 1058 hours, in Texas and was investigated by the applicable city police department. This crash is of special interest because the 2008 Honda was equipped with front seat back-mounted side impact air bags which deployed as a result of the crash. This contractor inspected the 2008 Honda on August 18, 2008 and scene on August 20, 2008. The 1991 Honda was not inspected because it had been sold for salvage it could not be located. This contractor interviewed the driver of the 2008 Honda on October 9, 2008. This report is based on the police crash report, interviews with the driver of the 2008 Honda and the investigating police officer, scene and vehicle inspections, occupant kinematic principles, occupant medical records, and this contractor's evaluation of the evidence.

CRASH CIRCUMSTANCES

Crash Environment: The trafficway on which the 2008 Honda was traveling was a 7-lane, divided, state highway, traversing in a east-northeasterly and west-southwesterly direction, and the Honda was approaching a 4-leg intersection (**Figure 1**). On the eastern and western legs of the intersection, both roadways had 3 through lanes and an opposing left turn lane. The trafficway on which the 1991 Honda was traveling was a 3-lane, undivided, city street, traversing in a north-northwesterly and south-southeasterly direction, and the Honda was approaching the same 4-leg intersection (**Figure 2**). Both the northern and southern legs of the intersection had 1 through lane in each direction, while the northern leg had 1 right-hand turn lane.

The state highway on which the 2008 Honda was traveling was curved slightly to the left for easterly traffic and level at the area of impact. The pavement was concrete, but travel-polished, and the width of the center east-northeasterly travel lane was 3.7 meters (12.1 feet). The trafficway was bordered by curbs with associated concrete rain gutters. There was a 1.5 meter (4.9 foot) raised concrete median separating the eastern and western roadways. Pavement markings for the eastern roadway consisted of a solid yellow edge line next to the median on the northern side and a solid white edge line on the southern side.



Figure 1: 2008 Honda's east-northeast travel path, while negotiating slight left-hand curve, in inside lane approaching 4-leg intersection; arrow indicates approximate point of impact with 1991 Honda



Figure 2: 1991 Honda's south-southeastern path of travel after starting from STOP sign on north leg of intersection; impact occurred near front of truck traveling eastward through intersection

In addition, the through lanes were divided by dashed white lines and the left-hand turn lane was separated from the through lanes by a solid white lane line. There were no visible traffic controls in the immediate area of the crash. The statutory speed limit was 72 km/h (45 mph). No regulatory speed limit sign was posted near the crash site.

The city roadway the 1991 Honda was traveling on was straight and level at the area of impact. The pavement was concrete, but travel-polished, and the width of the roadway on the northern leg was 12.4 meters (40.7 feet). The roadway consisted of a right-hand turn lane and a through lane in each direction. The south-southeasterly roadway was bordered by curbs with associated rain gutters. No pavement markings were present. Furthermore, no edge lines were present. Traffic controls consisted of a regulatory STOP sign (Manual on Uniform Traffic Control Devices, R1-1) located at the corner of the intersection. The statutory speed limit was 40 km/h (25 mph). No regulatory speed limit sign was posted near the crash site.

At the time of the crash the light condition was daylight, the atmospheric condition was clear, and the roadway pavement was dry. Traffic density was moderate, and the site of the crash was urban commercial; see the **CRASH DIAGRAM** on page 12.

Pre-Crash: The 2008 Honda was traveling east-northeast in the center through lane (**Figure 1**) of the eastern roadway and the driver intended to continue straight through the intersection. The 1991 Honda which had been stopped on the northern leg, entered the intersection traveling south-southeast in the southerly through lane (**Figure 2**), intending to continue straight through the intersection. According to the driver's interview, she attempted to steer to the right and brake, just prior to the crash. The crash occurred in the 4-leg intersection of the two trafficways.

Crash: The left front of the 2008 Honda (**Figure 3**) was impacted by the front right of the 1991 Honda (event 1), causing the 2008's driver and front right passenger air bags to deploy. Furthermore, the left front, seat back-mounted side impact air bag and the left side curtain air bag also deployed. After the initial impact, the 2008 Honda rotated approximately 45 degrees clockwise while the 1991 Honda rotated approximately 45 degrees counterclockwise. The left rear of the 2008 Honda impacted the right rear of the 1991 Honda (event 2) in a side-slap type impact (**Figure 4**). As a result, the 2008 Honda continued in an east-southeasterly direction and impacted the curb (event 3) on the eastern quadrant of the intersection with its right front wheel (**Figure 5**). The 2008 Honda came to rest near the curb of the



Figure 3: 2008 Honda's left front damage from impact by front of 1991 Honda



Figure 4: Damage to 2008 Honda's left side from impacts with 1991 Honda; initial impact to left front and subsequent side slap impact to left rear

eastern quadrant, heading in a east-southeasterly direction. According to the police schematic, the 1991 Honda came to rest in an oblique orientation, straddling the center and outside through lanes of the eastern roadway, also heading in an east-southeasterly direction.

Post-Crash: The driver of the 2008 Honda and the front right passenger were not ejected and remained inside the vehicle at final rest. The driver and front right passenger were able to exit their vehicle without any assistance. The investigating police agency was notified of the crash within 17 minutes post-crash and arrived on-scene

5 minutes later. Traffic control procedures were established and emergency medical and towing services were called to assist. The driver was transported by ambulance to a medical facility with a police-reported “B” (non-incapacitating-evident) injury. The front right passenger was also transported by ambulance to a medical facility with a police-reported “C” (possible) injury. Following the police investigation, both vehicles were towed due to damage from the scene.

CASE VEHICLE

The 2008 Honda Accord EX-L was a front-wheel drive, 5-passenger, 4-door sedan (VIN: 1HGCP36838A-----) equipped with a 3.5L, V-6 engine and a 5-speed automatic transmission. This vehicle was manufactured during March 2008. Braking was achieved by a power-assisted, front and rear disc, 4-wheel, anti-lock system with electronic brake force distribution and braking assist. The Honda’s wheelbase was 280 centimeters (110.2 inches), and the odometer reading at inspection is unknown because the vehicle was equipped with an electronic odometer.

This vehicle’s frontal air bags were manufacturer Certified Advanced 208-Compliant. The 2008 Honda was equipped with multi stage driver and front right passenger air bag inflators, traction and stability controls, and front seat whiplash protection systems. There was an occupant weight sensor for the front right passenger seating position. The 2008 Honda was equipped with front seat back-mounted side impact air bags and right and left side inflatable curtain air bags protecting all outboard seating positions. The 2008 Honda was also equipped with height adjustable head restraints for all positions, Lower Anchors and Tethers for Children (LATCH) system features, and a tire pressure monitor.



Figure 5: Damage to 2008 Honda’s right front wheel from curb impact



Figure 6: Close-up of damage to 2008 Honda’s left front from impact with front of 1991 Honda; arrows mark cut in tire’s sidewall

Exterior Damage: The 2008 Honda’s initial contact with the 1991 Honda involved the left side (event 1) with the damage distributed on approximately the front third (Figures 3, 4, and 6). Direct damage began at the left front bumper corner and extended 137 centimeters (53.9 inches) along the left side. The direct damaged ended 214 centimeters (84.3 inches) forward of the left rear axle. Residual maximum crush was measured as 15 centimeters (5.9 inches) at C₃-C₄. The 2008 Honda’s side slap contact with the 1991 Honda involved the left side (event 2) with the damage distributed on approximately the back third (Figure 7). Direct damage began 30 centimeters (11.8 inches) forward from the left rear axle and extended 125 centimeters (49.2 inches) to the left rear bumper corner. Residual maximum crush was measured as 9 centimeters (3.5 inches) at C₂. The table below shows the case vehicle’s crush profile.

Units	Event	Direct Damage		Field L	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆	Direct	Field L
		Width CDC	Max Crush								±D	±D
cm	1	137	15	137	0	6	15	15	4	3	150	150
in		53.9	5.9	53.9	0.0	2.4	5.9	5.9	1.6	1.2	59.1	59.1
cm	2	125	9	125	5	9	5	2	1	0	-177	-177
in		49.2	3.5	49.2	2.0	3.5	2.0	0.8	0.4	0.0	-69.7	-69.7



Figure 7: Side slap damage to 2008 Honda’s left rear from impact with right side of 1991 Honda

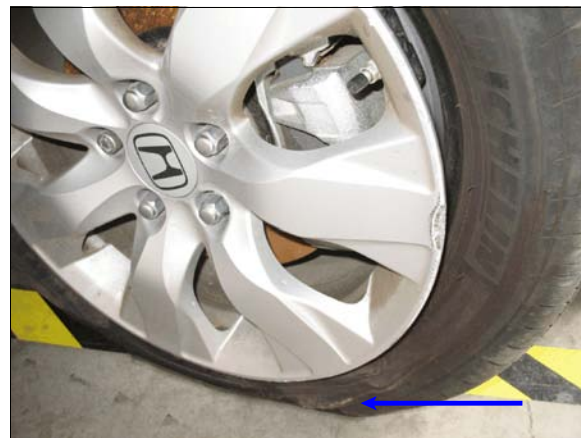


Figure 8: Rim and tire damage to 2008 Honda’s right front wheel; arrow indicates cut in sidewall

The wheelbase on the Honda’s left side was shortened 2 centimeters (0.8 inches) while the right side was shortened 5 centimeters (2.0 inches). During the initial impact the Honda’s left front bumper fascia, left fender, and left front door were directly damaged and crushed inward. The left front wheel assembly was damaged and crushed backward and the front of the wheel was rotated outward. As a result of the side slap impact, the Honda’s left quarter panel and left rear bumper fascia were directly damaged and crushed inward. When the Honda impacted the curb (event 3), the right front wheel assembly was directly damaged and crushed rearward and the front of the tire was rotated outward (Figure 8). As a result of the crash, there was induced damage

to the front bumper fascia and hood (i.e., pushed rightward—**Figures 3 and 5**). No obvious induced damage or remote buckling was noted to the remainder of the Honda's exterior.

The Honda manufacturer's recommended tire size was P225/50R17, and the Honda was equipped with the proper sized tires. The Honda's tire data are shown in the table below.

Tire	Measured Pressure		Vehicle Manufacturer's Recommended Cold Tire Pressure		Tread Depth		Damage	Restricted	Deflated
	kPa	psi	kPa	psi	milli-meters	32 nd of an inch			
LF	flat	flat	221	32	6	8	Rim impacted; cut in sidewall	No	Yes
LR	165	24	221	32	8	10	None	No	No
RR	flat	flat	221	32	7	9	None	No	Yes
RF	flat	flat	221	32	8	10	Rim scraped; cut in sidewall; bead separated	No	Yes

Damage Classification: Based on the vehicle inspection, the Collision Deformation Classifications for the Honda were: **11-LYEW-1 (330 degrees)** for the initial impact (event 1), **09-LBEW-2 (270 degrees)** for the side slap impact (event 2), and **12-FRWN-3 (0 degrees)** for the wheel impact (event 3). The Missing Vehicle algorithm of the WinSMASH reconstruction program was used on both this Honda's highest and second highest severity impacts. The Total, Longitudinal, and Lateral Delta Vs for the highest severity impact were, respectively: 9.0 km/h (5.6 mph), -7.8 km/h (-4.8 mph), and 4.5 km/h (2.8 mph). Based on this contractor's experience, this collision fits the reconstruction model, but the calculated longitudinal and lateral Delta Vs appear to be low because the wheel assembly is stiffer than the normal side structures and a significant portion of the impact occurred at the wheel assembly. The results for the side slap impact were, respectively: 6.0 km/h (3.7 mph), 0.0 km/h (0.0 mph), and 6.0 km/h (3.7 mph). These results appear reasonable.

Interior Damage: Inspection of the 2008 Honda's interior revealed that all the doors remained closed and operational. There was no evidence of occupant contact on the interior surfaces of the Honda (**Figure 9**). There was no evidence of intrusion to the interior, no of compression to the energy absorbing shear capsules in the steering column, and no deformation to the steering wheel rim.



Figure 9: 2008 Honda's front seating areas

The Honda’s manual restraint systems are shown in the table below.

	Left	Center	Right
First Row	Continuous loop, lap-and-shoulder, safety belt system with upper anchorage adjustor for the D-ring located in its middle-up position (3/4); retractor-mounted pretensioner without force limiter, housed within the B-pillar; sliding latch plate with ELR		Continuous loop, lap-and-shoulder, safety belt system with upper anchorage adjustor for the D-ring located in its upmost position; retractor-mounted pretensioner without force limiter, housed within the B-pillar; sliding latch plate with switchable retractor
Second Row	Continuous loop, lap-and-shoulder, safety belt system without upper anchorage adjustor for the D-ring; sliding latch plate with switch-able retractor type; lower anchor present; top tether anchor located behind the seat back	Continuous loop, lap-and-shoulder, safety belt system; sliding latch plate with switch-able retractor type; no lower anchor present; top tether anchor located behind the seat back	Continuous loop, lap-and-shoulder, safety belt system without upper anchorage adjustor for the D-ring; sliding latch plate with switch-able retractor type; lower anchor present; top tether anchor located behind the seat back
ELR = Emergency Locking Retractor Switchable = either ALR = Automatic Locking Retractor			

Both front row seat belts exhibited indications of recent usage. There were no occupants in this vehicle’s second row. The inspection of the safety belt webbing, D-ring, and latch plate for both the driver and front right passenger revealed that each pretensioner had actuated and that the webbing was frozen in position. This indicates that each belt was in use at the time of the crash.

AUTOMATIC RESTRAINT SYSTEM

The 2008 Honda was equipped with dual-stage frontal air bags at the driver and front right passenger positions. The Honda’s frontal air bags are certified by the manufacturer to be compliant to the Advanced Air Bag portion of Federal Motor Vehicle Safety Standard (FMVSS) No. 208. There was an occupant weight sensor for the front right passenger seating position. Based on the manufacturer’s website, the multi-stage frontal air bag system senses the severity of a crash, then determines if the air bags should be deployed and whether a full or less-than-full amount of inflation is needed. The front right passenger sensing system automatically switches the front right passenger air bag “On” or “Off” based on the passenger’s weight and the type of pressure on the seat.

In addition, the vehicle was equipped with front, seat back-mounted, side impact air bags and side curtain air bags which were designed to deploy from the roof side rails. Both frontal air bags deployed as a result of the right angle impact with the 1991 Honda.

The driver air bag was located in the steering wheel hub. An inspection of the air bag module's cover flaps and the air bag's fabric revealed that the cover flaps opened at the designated tear points. There was no evidence of damage during the deployment to the air bag or the cover flaps. The driver's air bag was designed with two tethers. The driver's air bag had two vent ports, located on the backside near the center at the 10 and 2 o'clock positions. The deployed driver's air bag was round with a diameter of 59 centimeters (23.2 inches). An inspection of the driver's air bag fabric revealed multiple deployment scuffs but no contact evidence apparent on the air bag's fabric (**Figure 10**).



Figure 10: Honda's deployed driver air bag showing only deployment scuffs on bag's surface

The front right passenger's air bag was located in the top of the instrument panel (**Figure 9**). An inspection of the front right air bag module's cover flaps and the air bag's fabric revealed that the cover flaps opened at the designated tear points. There was no evidence of damage during the deployment to the air bag or the cover flaps. The front right passenger's air bag was designed without any tethers. The front right air bag had two vent ports, located at the 10 and 2 o'clock positions. The deployed front right air bag was rectangular with a height of 60 centimeters (23.6 inches) and a width of 52 centimeters (20.5 inches). An inspection of the front right passenger's air bag fabric revealed no contact evidence on the air bag's fabric (**Figure 11**).



Figure 11: 2008 Honda's deployed front right passenger air bag showing no obvious occupant contact evidence

The Honda's driver and right front side impact inflatable occupant protection systems (air bags) were located along of the driver's and front right passenger's seat backs, respectively. The air bags were mounted at the top of the seat back and extended downward approximately 50 centimeters (19.7 inches). The bags were attached within the seat back near its outside surface and deployed through a front tear seam (**Figures 12 and 13**).



Figure 12: Location of 2008 Honda's deployed driver side impact air bag



Figure 13: Location of 2008 Honda's non-deployed right front side impact air bag

The driver's side air bag was designed with two inflation chambers and the top chamber had a stitched oval area that served to tether the air bag (**Figure 14**). The air bag had one vent port, located at the 12 o'clock position on the outboard surface when viewed from the left side of the vehicle. The deployed side impact air bag was elliptical with a height of 60 centimeters (23.6 inches) and a width (i.e., forward excursion) of approximately 25 centimeters (9.8 inches). An inspection of the driver's air bag fabric revealed no occupant contact evidence on either the outboard or inboard surfaces. A scuff on the outboard surface was present, probably from contact with the interior door surface.

The Honda's right and left side curtain air bags were located under the headliner, along the right and left roof side rails, respectively (**Figures 9 and 15**). The left curtain air bag was tethered internally to and extended from the A- to the C-pillar. It was designed to provide occupant head



Figure 14: Interior surface of 2008 Honda's deployed driver side impact air bag showing no apparent evidence of occupant contact

protection during a side impact. The left curtain air bag was essentially rectangular with a length of approximately 200 centimeters (78.7 inches) and a height of 38 centimeters (15.0 inches).

The side curtain air bag was designed with inflation chambers adjacent to the driver and second row left seat positions. There were no external vent ports. Inspection of the air bag revealed no evidence of damage due to deployment on either the outboard or inboard surfaces and no occupant contact evidence on the interior surfaces of the air bag's fabric (**Figure 16**).



Figure 16: Inboard surface of 2008 Honda's other side inflatable (curtain) air bag showing no apparent occupant contacts along driver's seating portion of bag's surface

CASE VEHICLE KINEMATICS—OVERVIEW

The 2008 Honda's driver indicated that she attempted to steer to the right and brake, just prior to the crash. The driver also indicated that she didn't see the converging vehicle until just prior to the crash. Based upon the available evidence and independent of their use of the available safety belts, the pre-impact body positions of the Honda's occupants probably did not change just prior to impact. The 2008 Honda's impact with the 1991 Honda induced the 2008 Honda's occupants to continue forward, leftward, and slightly upward along a path opposite the 330 degree Direction of Principal Force as the Honda decelerated. Following maximum engagement, the Honda rotated approximately 50-55 degrees clockwise and was redirected in an east-southeasterly direction. As a result, the Honda's occupants were redirected forward and leftward. The side slap impact probably had little effect on the movement of the occupants. As the 2008 Honda continued to the east-southeast and impacted the curb on the eastern quadrant of the intersection, the occupants were directed forward and slightly upward.

DRIVER KINEMATICS

Based on the vehicle inspection, the interview with the driver, and this contractor's investigative experience, the 2008 Honda's driver [45-year-old, female; 152 centimeters and 52 kilograms (60 inches, 115 pounds)] was seated in a reclined posture with her back against the seat back, her left foot on the floor, her right foot on the accelerator, and both of her hands braced against the steering wheel at the 10 and 2 o'clock positions. Her seat track had an electronic adjuster and was estimated to be located between its middle and rearmost positions. The seat back was slightly reclined, the tilt steering column was located in its full-down position, and the telescoping adjustment was in a full-forward position.

Based on this contractor's vehicle inspection, the Honda's driver was restrained by her lap-and-shoulder safety belt system; furthermore, there was no mention by the driver of belt pattern bruising and/or abrasions to her torso. As a result of this vehicle's primary impact, the driver loaded the safety belts and probably contacted the deploying driver air bag. Together these restraints limited her forward movement. The side impact and side curtain air bags which also

deployed during the initial impact together served to further limited the driver's movement. It is unclear if the driver contacted the side air bags during the primary impact. As a result of the side slap impact, the driver loaded the deployed side impact and side curtain air bags and they further enabled her to remain slightly forward and leftward of her pre-impact position. As the vehicle impacted the curb and came to final rest, the driver probably further loaded her safety belts which retained her safely in the driver's seating area.

DRIVER INJURIES

The driver was transported by ambulance to the hospital. She sustained minor soft tissue abrasions and contusions and was treated and released.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source	Source Confidence	Source of Injury Data
1	Abrasion nose, not further specified	minor 290202.1,4	Air bag, driver's	Probable	Interviewee (same person)
2	Abrasion, large, 10.2 x 3.8 cm (4 x 1.5 in) dorsal ¹ left forearm; scabbed	minor 790202.1,2	Air bag, driver's side inflatable curtain	Probable	Emergency room records
3	Contusion with swelling dorsal ¹ left forearm, not further specified	minor 790402.1,2	Air bag, driver's side inflatable curtain	Probable	Emergency room records

FRONT RIGHT PASSENGER KINEMATICS

The 2008 Honda's front right passenger (42-year-old, female) was seated in a reclined posture with her back probably against the seat back and her feet on the floor, but the exact position of her hands is unknown. Her seat track had an electronic adjuster and was estimated to be located between its middle and rearmost positions, and the seat back was slightly reclined.

The Honda's front right passenger was restrained by her lap-and-shoulder, safety belt system. As a result of this vehicle's primary impact, the front right passenger loaded the safety belts and almost certainly contacted the deploying front right air bag. Together these restraints limited her forward movement. As a result of the side slap impact, the front right passenger moved slightly to her left toward the center console and driver, but there is no evidence that contact with either occurred. The front right passenger remained slightly forward and leftward of her pre-impact position. As the vehicle impacted the curb and came to final rest, the front right passenger probably further loaded her safety belts which retained her safely in the front right seat.

¹ The following terms are defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:

dorsal (dor'sal): 1. pertaining to the back or to any dorsum. 2. denoting a position more toward the back surface than some other object or reference; same as posterior in human anatomy....

dorsum (dor'sem): 1. the back. 2. the aspect of an anatomical part or structure corresponding in position to the back; posterior, in the human.

FRONT RIGHT PASSENGER INJURIES

IN08031

The front right passenger was also transported by ambulance to the hospital. She sustained minor soft tissue injuries and was treated and released. Specifically, she sustained a sprained left arm and a contused left hip.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source	Source Confidence	Source of Injury Data
1	Strain left arm {triceps muscle}, with swelling, not further specified	minor 740402.1,2	Floor-mounted transmission selector lever	Probable	Emergency room records
2	Contusion {bruise} left hip, not further specified	minor 590402.1,2	Lap portion of safety belt system	Probable	Interviewee (driver)

OTHER VEHICLE

Based on the VIN and manufacturer's specifications, the 1991 Honda Accord EX was a front wheel drive, 5-passenger, 4-door sedan (VIN: 1HGCB7669MA-----) equipped with a 2.2L, I-4 engine, 4-speed automatic transmission, and passive restraints (i.e., no air bags). The 1991 Honda's pre-crash wheelbase was 272 centimeters (107.1 inches).

1991 Honda's Occupant:

According to the police crash report, the 1991 Honda's driver (24-year-old, female) was restrained by her lap-and-shoulder, safety belt system. The driver was not transported by ambulance to the hospital, and she did not sustain any police-reported injuries as a result of this crash.

