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**Special Crash Investigations:
Remote Move-Over-Law Crash
Investigation;
Vehicle: 2016 Chevrolet Silverado
2500;
Location: Washington;
Crash Date: May 2021**

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16. Abstract This report documents the Special Crash Investigations remote investigation of a Move-Over-Law incident where a 2008 Toyota Sienna struck a 2016 Chevrolet Silverado 2500 pickup truck. The Chevrolet used by the Washington State Department of Transportation (WSDOT) incident response team was stopped in the toll (left) lane with its emergency lights and sign board activated while providing support at the site of a prior crash. The belted 54-year-old male WSDOT worker was sitting in the driver seat. According to police, the belted 26-year-old female driver of the 2008 Toyota Sienna traveled through the lane closure striking multiple traffic cones before striking the back plane of the Chevrolet. The Chevrolet driver was transported with police-reported suspected "A" (serious) injuries. The Toyota driver was transported with "C" (possible) injuries and was arrested for vehicular assault.			
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Table of Contents

Background	1
Summary.....	2
Crash Site	3
Pre-Crash.....	3
Crash	3
Post-Crash	4
Move-Over Law Discussion	4
2016 Chevrolet Silverado 2500	6
Vehicle Description	7
Emergency Lighting.....	7
Exterior Damage	7
Interior Damage	8
Manual Restraint Systems.....	8
Supplemental Restraint Systems.....	8
2016 Chevrolet Silverado 2500 Occupant.....	9
Driver Demographics.....	9
Driver Injuries	9
Driver Kinematics	9
2008 Toyota Sienna	11
Vehicle Description	11
Exterior Damage	11
2008 Toyota Sienna Occupant	11
Driver Demographics.....	13
Driver Injuries	13
Driver Kinematics	13
Crash Diagram	15

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Special Crash Investigations
Remote Move-Over-Law Crash Investigation
Case No. DS22005
Vehicle: 2016 Chevrolet Silverado 2500
Location: Washington
Crash Date: May 2021

Background

This report documents the remote investigation of a crash selected by the Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration to be included in its Move-Over-Law investigations. The investigation used data obtained from the police crash report (PCR), on-scene photos, audio/video files, incident logs, and medical records. The source material documents the facts of the case and the causal factors relative to the Washington State Move-Over-Law requiring drivers to slow down, proceed with caution, and when possible, move to the far lane when passing an official emergency response vehicle on the side of the road with its emergency lights activated. SCI initiated this investigation in response to a notification sent by the SCI team in March 2022 with a state crash report and online news report. The case was assigned as a remote investigation in March 2022 subject to the availability of additional data, which was obtained.

The crash occurred in the morning in May 2021. The crash site was in the northbound lanes of a four-lane, divided, north/south interstate highway. Conditions at the time of the crash were daylight, cloudy, and dry. The roadway had three through lanes separated by dashed white painted lines and a toll lane on the far left separated by double solid white painted lines. The roadway was bordered with solid painted fog lines and paved shoulders without rumble strips. The northbound and southbound lanes were divided by a grass median and guardrail. The posted speed limit was 97 km/h (60 mph).

A 2008 Toyota Sienna driven by a belted 26-year-old female struck a 2016 Chevrolet Silverado 2500 pickup truck used by the Washington State Department of Transportation (WSDOT) incident response team (IRT). The driver was a belted 54-year-old male WSDOT worker. The Chevrolet was stopped in the toll lane with its emergency lights and sign board activated while providing support at the site of a prior crash. A toll lane closure was in place with warning signs and traffic cones diverting traffic to the through lanes on the right.

According to the police, the Toyota traveled through the lane closure striking one or more traffic cones before its front plane struck the back plane of the Chevrolet. This caused the Chevrolet to depart the left roadway edge and cross the grass median where its front plane struck an embankment and guardrail where it came to rest facing west (Figure 1). The Toyota traveled off the left roadway edge and came to rest facing east in the center median (Figure 2), and the engine compartment caught fire.

The Chevrolet driver was transported with police-reported “A” (serious) injuries. A responding police officer who was a former drug recognition expert (DRE) spoke with the Toyota driver on-scene. After observing her speech, the appearance of her eyes, and finding a glass pipe with a white powdery substance in the vehicle, he placed her under arrest for driving under the influence and vehicular assault. She was transported with “C” (possible) injuries to a hospital. Both vehicles were towed from the scene and placed into evidence by police.



Figure 1. 2016 Chevrolet Silverado 2500 at rest looking north (police photo)



Figure 2. 2008 Toyota Sienna at rest looking north (police photo)

Summary

Crash Site

The crash site was the northbound lanes of a four-lane divided north/south interstate highway. Conditions at the time of the crash were daylight, cloudy, and dry. The roadway had three through lanes separated by dashed white painted lines and a toll lane on the far left separated by double solid white painted lines (Figure 3). It was straight and level and bordered with solid painted fog lines and paved shoulders. The roadway did not have rumble strips at this location. Based on police photos, the pavement and lane markings were in good condition. The northbound and southbound lanes were divided by a grass median and guardrail. The posted speed limit was 97 km/h (60 mph). A crash diagram is included at the end of this report.

Pre-Crash

The Chevrolet was parked facing north in the left northbound toll lane while providing traffic control for a prior crash. It was stopped approximately 40 m (131 ft) north of the cones marking the lane closure. Its roof-mounted directional board was illuminated and all emergency lighting was activated. The belted 54-year-old WADOT worker was sitting in the driver seat. The Toyota was traveling northbound at an unknown speed in the toll lane. The belted 26-year-old female driver was reportedly under the influence of drugs. The driver did not respond to the lane closure by not slowing her speed or moving to the right lanes. The PCR stated the Toyota driver did not brake prior to impact.

Crash

The front plane of the Toyota struck one or more traffic cones marking the lane closure (Event 1). It continued traveling northbound for approximately 40 m (131 ft) until its front plane struck the back plane of the Chevrolet (Event 2). The damage flow to both vehicles and scrape marks in the pavement at the point of impact (Figure 4) suggested the front end of the Toyota under-rode the back plane of the Chevrolet. Impact pushed the Chevrolet forward and left where it departed the left roadway edge. Its front plane struck the grassy upward sloping embankment in the center median (Event 3) and a wood and metal guardrail (Event 4) where it came to rest facing west with its front plane in contact with the guardrail. The Toyota traveled off the left road edge and came to rest facing east in the center median. The Toyota's post-crash engine compartment fire (Event 5) was extinguished by the first police officer to arrive on-scene.



Figure 3. Crash site looking north at toll lane closure zone (police photo)



Figure 4. Point of impact, Event 2, crash site looking north (police photo)

Post-Crash

An unknown caller requested aid approximately 2 minutes after the crash. The post-crash fire in the Toyota's engine compartment was reported 5 minutes after the crash. The first police officer arrived on-scene 8 minutes after the crash and extinguished the fire. The police officer then approached the Chevrolet and found the driver lying motionless on the front seat. The driver was conscious and able to speak to the officer, who advised him to not to move from his position. When EMS arrived, the Chevrolet driver was transported by ambulance to a hospital where he was admitted for treatment of police-reported injuries including a cerebral concussion, nerve damage to the left shoulder, and soft tissue injuries throughout his body. The police officer found the Toyota driver, who apparently had exited her vehicle under her own power, crawling on the ground in the center median. She was conscious and in conversation with someone on her cell phone. This police officer was a former DRE and, after speaking with the Toyota driver, observing her speech and appearance of her eyes, and observing a glass pipe containing a white powdery substance in the vehicle, he placed her under arrest. The charge was driving under the influence/vehicular assault (Code 46.61.522). By the driver's own admission, she had ingested heroin in "the last couple of days." She was transported by ambulance to a hospital where she was evaluated for minor injuries and released into police custody. The involved vehicles were towed due to disabling damage.

Move-Over-Law Discussion

Washington's Move-Over-Law was passed in 2007 and amended in 2010. In April 2022 the State Patrol website stated that, since 2007, the number of collisions involving emergency vehicles and workers has increased instead of decreasing. The current law enforces an "emergency zone" defined as the adjacent lanes of the roadway 61 m (200 ft or 10 car lengths) before and after a stationary emergency vehicle with flashing lights, a tow truck using red lights, an emergency assistance vehicle using warning lights, or any police vehicle using emergency lights. In the area of the toll lane closure at this crash site, warning signs (Figure 5), traffic cones, and illuminated message boards were in place and vehicle emergency lighting was activated. Given the roadway at this crash site had three additional lanes to the right of the toll lane closure, the appropriate driver response in the emergency zone appears to have been to slow her speed and change lanes to the right. According to the police report, the Toyota driver was under the

influence of drugs. It is unknown if she was aware of the state's Move-Over-Laws and the appropriate driver response to such conditions. It is unknown if she observed the roadside warning signs, traffic cones marking the lane closure, or the presence of the Chevrolet in the toll lane. The PCR stated the driver did not brake prior to impact, and she stayed in her original travel lane after striking one or more traffic cones.



*Figure 5. Warning sign, crash site looking north
(police photo)*

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2016 Chevrolet Silverado 2500

Vehicle Description

The 2016 Chevrolet Silverado 2500 pickup truck had Vehicle Identification Number (VIN) 1GC2KUEG9GZxxxxxx. The manufacture date is unknown. The Chevrolet was an extended-cab pickup truck used by the WSDOT IRT. According to a State government website, the IRT is composed of agencies, vendors, and other resources that respond to, investigate, clean up, and clear traffic incidents. The 4-door vehicle had two rows of seats, 4-wheel drive, 6-liter flexible fuel gasoline/ethanol (E85) 8-cylinder engine, and hydraulic brakes. It had a metal toolbox occupying the entire cargo bed and an unknown brand metal front bumper guard. The vehicle manufacturer recommended size LT265/70R17 tires with a tire pressure of 450 kPa (65 psi) on the front and 520 kPa (75 psi) on the rear. The Chevrolet had Goodyear Wrangler tires of the recommended size.

The Chevrolet exterior was white in color. Spanning the width of the tailgate and the length of the cargo bed on both sides were the words “INCIDENT RESPONSE TEAM” printed in large white letters on a reflective orange background. On the left and right-side doors was the acronym “WSDOT” in large reflective green letters. On the left and right beltline of the cab were reflective green, blue, and orange-colored bands.

Emergency Lighting

The Chevrolet had a LiteReader message board manufactured by LiteSys Inc. mounted to a framework connected to the toolbox extending above the roof of the cab (Figure 6). The message board had two lines of 25 cm (10.0 in) characters illuminated in LED lights. The message displayed at the time of the crash was unknown. During the crash, the message board rotated forward of its original, rear-facing position. The vehicle had emergency responder lamps on the front and rear planes, and four-way amber flashers.

Exterior Damage

The Chevrolet sustained damage to the front, back, left and right planes, and the undercarriage. The back and left plane and undercarriage were damaged in the impact with the front plane of the Toyota in Event 2. Direct damage was present on the tailgate, which was hanging by metal cables. The back bumper was crushed and rotated under the vehicle frame (Figure 7). The left cargo bed was buckled and the left rear axle was displaced forward reducing the length of the left wheelbase. The left plane and undercarriage were damaged by override contact with the Toyota’s front end and hood. It is likely the extent of crush to the back plane was mitigated by the vehicle’s metal toolbox and the underride dynamics of the Toyota. The estimated collision deformation classification (CDC) for the Chevrolet in Event 2 was 06BDEW2. The front plane and possibly the undercarriage were damaged in the contact with the embankment in Event 3. Police reported this contact. The estimated CDC for the Chevrolet in Event 3 was 12FDEW1. The front plane struck a wood and metal guardrail that remained in contact with the vehicle’s front bumper guard at final rest. The front plane of the Chevrolet was shielded by an unknown brand metal bumper guard and crush damage appeared to be minor. The right front fender was slightly crumpled and the bumper guard was slightly bent. The estimated CDC for the vehicle in Event 4 was 12FDEW99.



Figure 6. LiteSys Inc. LiteReader LED message board, 2016 Chevrolet Silverado (police photo)



Figure 7. 2016 Chevrolet Silverado back plane damage to bumper (police photo)

Interior Damage

The Chevrolet sustained interior damage caused by post-crash activities. The second-row left door was removed and the driver's seat belt was cut by emergency responders to extricate the driver. No air bags deployed and no window glazing was damaged.

Manual Restraint Systems

The Chevrolet had lap and shoulder seat belts for all seat positions. It had standard anchor and retractor pretensioners for the front row seats. It is unknown if the driver's belt pretensioners actuated. According to police, the driver was belted at the time of the crash. Emergency responders cut the driver's seat belt.

Supplemental Restraint Systems

The Chevrolet's supplemental restraint systems included driver's and passenger's frontal air bags, outboard seat-mounted side-impact air bags, and front and second-row inflatable curtain (IC) air bags. No air bags deployed during the crash.

2016 Chevrolet Silverado 2500 Occupant

Driver Demographics

Age/sex:	54 years/male
Height:	178 cm (70 in)
Weight:	86 kg (190 lb)
Eyewear:	Unknown
Seat type:	Bucket with adjustable head restraint
Seat track position:	Unknown
Manual restraint usage:	Lap and shoulder belt used
Usage source:	Police report
Air bags:	Frontal, seat-mounted side-impact, and IC air bags available; none deployed
Alcohol/drug data:	None reported
Egress from vehicle:	Removed by emergency responders
Transport from scene:	Ground ambulance to hospital
Type of medical treatment:	Treated for unknown duration

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Cerebral concussion NFS	161000.2	Head restraint	Possible
2	Contusion, axillary nerve, left shoulder	730102.1	Seat back	Possible
	Reported brief loss of consciousness – not medically confirmed			

Source: EMS medical records and police report

Driver Kinematics

The belted driver was seated in an unknown posture. The Chevrolet was parked in the toll lane with its emergency lights activated. At impact with the Toyota, the vehicle was pushed forward and the back end moved upward in response to the underride contact of the other vehicle. The Chevrolet driver moved rearward in response to the direction of force and upward in response to the lateral movement of the vehicle. His head likely contacted the head restraint and possibly the roof, and his back likely contacted the seat back. The Chevrolet traveled forward and left, where it departed the roadway on the left edge before entering the center median. The vehicle's front plane and undercarriage struck the grass embankment of the median, causing the driver's head and neck to be displaced forward, while his torso was held in place by the seat belt. After crossing the median, the Chevrolet's front plane struck a wood and metal guardrail where it came to rest facing west. The driver sustained a head injury described by police as a concussion, an injury to the nerves in his left shoulder, and soft tissue injuries throughout his body. A responding police officer found the driver lying motionless on the front seat. When attempting to communicate, he observed the driver was conscious and able to speak. When paramedics arrived,

he was transported to a hospital where he was treated for an unknown duration. His Glasgow coma scale score assigned while en route to the hospital was 15. SCI requested and obtained the driver's EMS medical records. His hospital medical records were requested but the hospital would not release the records.

2008 Toyota Sienna

Vehicle Description

The 2008 Toyota Sienna XLE had VIN 5TDZK22C68Sxxxxxx. The manufacture date was August 2008. The Toyota was a 5-door minivan with front-wheel drive, automatic transmission, and a 6-cylinder, 3.5-liter gasoline engine. The manufacturer recommended size P225/60R17 tires and a cold pressure of 240 kPa (35 psi). The vehicle had Toyo Eclipse tires of the recommended size that were manufactured in 2015.

Exterior Damage

The Toyota sustained unknown severity crush in the Event 1 impact with traffic cones and severe crush damage to the front plane in the Event 2 impact with the Chevrolet (Figures 8 and 9). The front bumper fascia and grille were missing and the backing bar was bent upward. Longitudinal crush extended into the engine compartment and the radiator was pushed upward. The hood and roof were deformed and the windshield was fractured and holed. The right front axle was moved rearward reducing the right wheelbase, and the right front tire was cut and de-beaded. The right front fender and the right-side doors were deformed. The right front door appeared to have opened, possibly due to latch and post separation. The left plane appeared less severely damaged than the right plane. The left front fender was deformed and the left doors appeared to remain operational. The estimated CDC for the Toyota in Event 1 was 12F9EN99 and the estimated CDC for Event 2 was 12FDEW4. The CDC was based on police photos only.



Figure 8. Front-plane damage, 2008 Toyota Sienna (police photo)



Figure 9. Front-plane damage, top view, 2008 Toyota Sienna (police photo)

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2008 Toyota Sienna Occupant

Driver Demographics

Age/sex:	26 years/female
Height:	160 cm (63 in)
Weight:	73 kg (160 lb)
Eyewear:	Unknown
Seat type:	Bucket with adjustable head restraint
Seat track position:	Unknown
Manual restraint usage:	Lap and shoulder belt used
Usage source:	Police report
Air bags:	Frontal, seat-mounted side-impact, and IC air bags available; frontal deployed
Alcohol/drug data:	Positive, based on DRE observations; toxicology report not obtained
Egress from vehicle:	Exited under own power
Transport from scene:	Ground ambulance to hospital
Type of medical treatment:	Evaluated in emergency department and released to police custody

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Abrasions, chest and	410202.1	Lap and shoulder	Certain
2	abdomen	510202.1	seat belt	

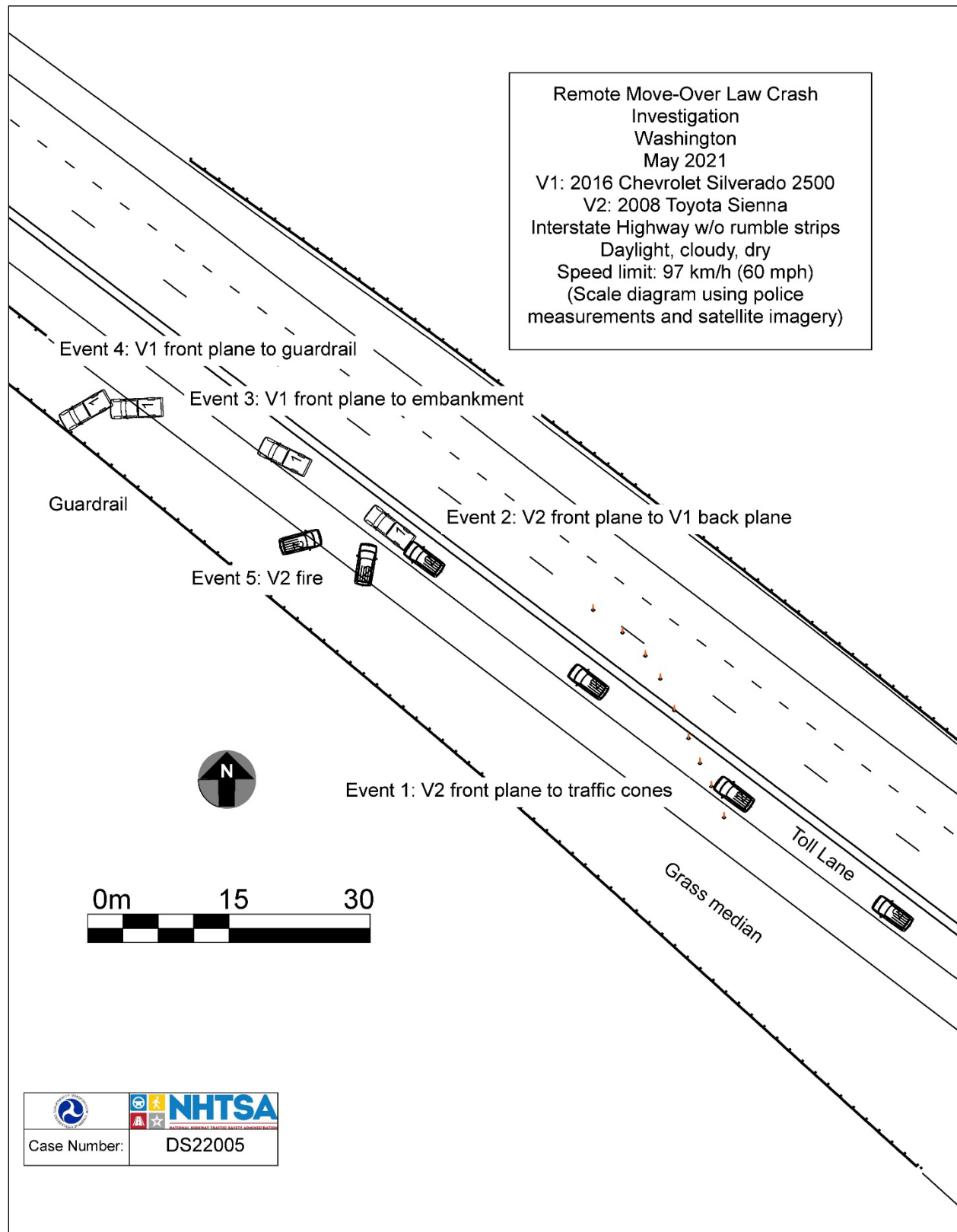
Source: EMS medical records

Driver Kinematics

The belted driver was traveling in the toll lane at highway speed. She was determined to be impaired due to drugs and her awareness of her surroundings was unknown. The impact with the traffic cones had minimal effect on the vehicle or the driver's kinematics. At impact with the back plane of the Chevrolet, the Toyota driver's frontal air bag deployed. The driver was displaced forward in response to the direction of force, and likely loaded the seat belt and deployed air bag. The Toyota initiated a post-impact, clockwise rotation and traveled to the left, departing the roadway and traveling onto the grass median. The driver was held in place by the seat belt. It is unknown if the driver's belt pretensioner actuated. The Toyota came to rest facing east on the center median. Under her own power, the driver unbuckled her seat belt and exited the vehicle through the left side door. The first police officer on-scene found her crawling on the ground and talking on a cell phone. After observing the driver's behavior and documenting the presence of drugs in her vehicle, police arrested her on-scene for vehicular assault. The driver was transported by ambulance to a hospital where she was evaluated for minor injuries in the emergency department, and then taken into police custody. Her EMS medical records noted the presence of seat belt abrasions. The outcome of her arrest was unknown.

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Crash Diagram



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