



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



DOT HS 813 455

July 2023

# **Special Crash Investigations: Remote Move Over Law Crash Investigation; Vehicle: 2016 Dodge Charger Pursuit; Location: Nevada; Crash Date: April 2021**

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## Technical Report Documentation Page

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| <b>15. Supplementary Notes</b><br>Each crash represents a unique sequence of events and generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicles or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was published.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                             |                                                                                                                                                                                                                                                                        |                  |
| <b>16. Abstract</b><br>This report documents the remote investigation of a Move Over Law crash that occurred at night in the northbound lanes of a north/south Interstate highway in Nevada. Conditions were dark with artificial spot lighting and dry with clear visibility. The struck vehicle was an unoccupied 2016 Dodge Charger Pursuit fully marked State Police vehicle stopped in the first northbound lane from the right with its rear-facing emergency lights activated. The male State police officer had responded to a call reporting a disabled vehicle and was standing on the right shoulder. The disabled vehicle was a 2021 Porsche 911 Turbo S with its emergency flashers activated that was stopped facing northbound on the right shoulder approximately 9.0 m (30 ft) north of the Dodge. The driver had exited the vehicle and was standing on the roadside. The striking vehicle was a 2004 Hyundai Elantra driven northbound in the first northbound lane from the right by a belted 32-year-old male at a police-estimated speed of 113- to 129 km/h (70- to 80 mph). The Hyundai driver braked before the front of his vehicle struck the back of the Dodge (Event 1), displacing it forward where the right plane of the Dodge struck the left plane of the Porsche (Event 2). The police officer and driver of the Porsche were not contacted or injured. The Hyundai driver sustained a police-reported "C" type (claimed) injury but was not transported. After submitting to field sobriety tests and by his own admission, police determined the driver was positive for alcohol and drug involvement and was traveling too fast for conditions. He was cited for the vehicle code violation "Failure to use due care." The three vehicles were towed on orders of police. |                                                             |                                                                                                                                                                                                                                                                        |                  |
| <b>17. Key Words</b><br>move over law                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                             | <b>18. Distribution Statement</b><br>Document is available to the public from the DOT, National Highway Traffic Safety Administration, National Center for Statistics and Analysis,<br><a href="https://crashstats.nhtsa.dot.gov">https://crashstats.nhtsa.dot.gov</a> |                  |
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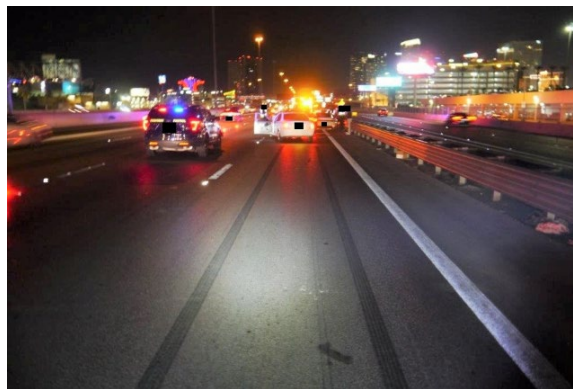
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**Special Crash Investigations**  
**Remote Move Over Law Crash Investigation**  
**Case No. DS21004**  
**Vehicle: 2016 Dodge Charger Pursuit**  
**Location: Nevada**  
**Crash Date: April 2021**

## **Background**

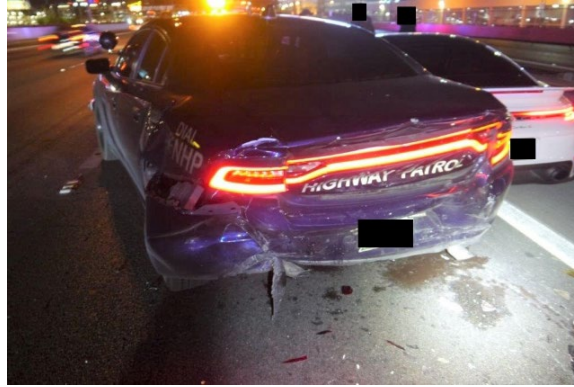
This report documents the remote investigation of a crash selected by the Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration to be included in its Move Over Law investigations. The investigation used data obtained from local authorities including the police report, on-scene police photos and other sources. These were used to document the facts of the case and reconstruct the causal factors of the crash relative to the Nevada 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 emergency lights activated. This investigation was initiated by SCI in response to a notification sent by the SCI team containing an online news release and video. The case was assigned to Dynamic Science, Inc., in July 2021. The SCI team obtained the police report and on-scene police photos in July 2021, and obtained a partial interview with the on-duty highway patrol supervisor in December 2021.

The crash occurred at night in April 2021 in Nevada. The crash site was the northbound lanes of a physically divided north/south interstate highway (Figure 1). Conditions at the time of the crash were dark with artificial lighting and dry with clear visibility. The posted speed limit was 105 km/h (65 mph).



*Figure 1. Crash site, approach to striking vehicle looking north (police photo)*

The struck subject vehicle was an unoccupied 2016 Dodge Charger Pursuit fully marked State Police vehicle (Figure 2) that was stopped facing north in the first northbound lane from the right with its rear-facing emergency lights activated. The driver, a male State Police officer, had responded to a 911 call reporting a disabled vehicle and was standing on the right shoulder.



*Figure 2. Struck subject vehicle, 2016 Dodge Charger, looking north (police photo)*

The unoccupied disabled vehicle, a 2021 Porsche 911 Turbo S, was stopped facing north, partially on the right shoulder and partially in the first lane from the right, approximately 9.0 m (30 ft) north of the Dodge. The driver told police that while traveling northbound the vehicle lost power and would not restart after several attempts. He activated the vehicle's 4-way flashing emergency lights, exited the vehicle, called 911, and waited on the roadside for police to arrive.

The striking vehicle was a 2004 Hyundai Elantra driven northbound in the first northbound lane from the right by a belted 32-year-old male at a police-estimated speed of 113-to 129 km/h (70-to 80 mph). The Hyundai driver braked prior to impact, and the vehicle deposited 27.0 m (89 ft) of locked-wheel skid marks while staying in its original lane. The front plane of the Hyundai struck the back plane of the Dodge (Event 1) and displaced it forward into a secondary collision, the right plane of the Dodge striking the left plane of the Porsche (Event 2). The police officer and driver of the Porsche were not struck or injured. The Hyundai driver sustained a police-reported "C" type (claimed) injury but was not transported. After submitting to field sobriety tests and by his own admission, police determined the driver was positive for alcohol and drug involvement. Police determined he was traveling too fast for conditions and cited him for the vehicle code violation "Failure to use due care." The three involved vehicles were towed on orders of police. The Porsche was repaired and sold. The post-crash status of the other vehicles was unknown.

## Summary

### Crash Site

The crash site was the northbound lanes of a physically divided north/south interstate highway. The asphalt roadway had five lanes each measuring 3.6 m (12.0 ft) wide separated by dashed white painted stripes. The fifth lane to the left was a high occupancy vehicle lane separated by a double solid white painted stripe. The roadway was bordered on the left edge by a solid yellow painted fog line, a paved shoulder measuring 2.3 m (7.5 ft) wide and a concrete jersey type barrier. It was bordered on the right edge by a solid white painted fog line, a paved shoulder measuring 2.0 m (6.5 ft) wide, a concrete jersey type barrier and a guardrail. No rumble strips were present in this area. The roadway was straight and level with a posted speed limit of 105 km/h (65 mph). The crash site was in an interchange area, with a northbound lane merging into the first lane from the right approximately 80.0 m (262.0 ft) north of the area of impact. Conditions at the time of the crash were dark with artificial lighting, and dry with clear visibility. No supplemental warning devices were in use at the site prior to the crash. A crash diagram and crash site satellite view are included at the end of this report.

### Pre-Crash

The Dodge was stopped facing north in the first northbound lane from the right with its rear-facing emergency lights activated. The driver, a male State Police officer, had exited the vehicle and was standing on the right shoulder after responding to a prior 911 call reporting the disabled Porsche. The Porsche was stopped with its 4-way flashing emergency lights activated facing north approximately 9.0 m (30 ft) north of the Dodge, partially in the first lane from the right and partially on the right shoulder. The driver had exited the vehicle and was standing at an unspecified location on the roadside. The Hyundai was traveling northbound in the first northbound lane from the right at a police-estimated speed of 113- to 129 km/h (70- to 80 mph). Prior to impact, the Hyundai driver braked hard, locking up the left and right wheels and depositing a set of skid marks measuring approximately 27.0 m (89 ft) long.

### Crash

The crash included two events. Initially, the front plane of the Hyundai struck the back plane of the Dodge (Event 1). Police identified the point of impact using pre-impact skid marks and post-impact scuff marks deposited by the Hyundai on the roadway. Using an inline momentum formula, the SCI team calculated the Hyundai's impact speed to be 98.0 km/h (60.9 mph),<sup>1</sup> with speed loss sustained during pre-crash braking. Impact force pushed the Dodge in a northbound trajectory and its right plane struck the left plane of the Porsche in a secondary, swiping-type impact (Event 2). The Dodge came to rest facing north in the first lane from the right and approximately 12.0 m (39 ft) north of its original location (Figure 3). The Porsche came to rest facing north partially in the first lane from the right and partially on the right shoulder near its original parked location. The right plane of the Dodge and the left plane of the Porsche remained

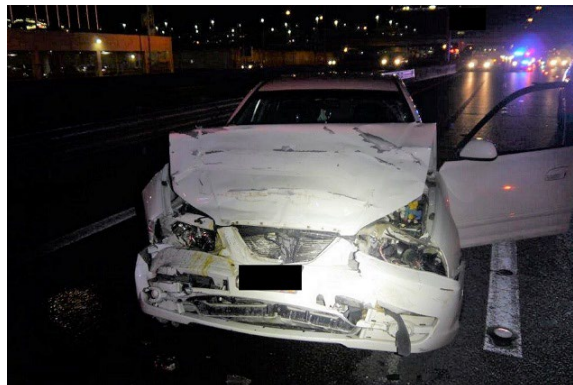
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<sup>1</sup> Assumptions: Impact speed for the Dodge is 0 mph. Post-impact speed for the Dodge is 27.57 mph, with 0.65f and 39 feet travel post-impact. Post-impact speed for the Hyundai is 17.10 mph, with 0.65f and 15 feet travel post-impact. See Appendix for calculation.

in contact at final rest. The Hyundai traveled northbound approximately 4.6 m (15 ft) and came to rest facing north in the first lane from the right (Figure 4).



*Figure 3. Struck subject vehicle, 2016 Dodge Charger, at final rest looking east (police photo)*



*Figure 4. Striking vehicle, 2004 Hyundai Elantra, lookback view from final rest looking south (police photo)*

## Post-Crash

The drivers of the Dodge and Porsche were not contacted, injured or transported. The Hyundai driver sustained a police-reported “C” type (claimed) injury but was not transported. He exited the vehicle in an unknown manner. After submitting to field sobriety tests and by his own admission, police determined he was positive for alcohol and unspecified other drugs. He was cited for a moving vehicle code violation. The police report did not mention charges related to the alcohol or drug involvement. All three involved vehicles were towed on orders of police.

## Move Over Discussion

According to a State government website, since 2003 Nevada law has required drivers to slow down, proceed with caution, and when possible, move to the far lane when passing an official emergency response vehicle stopped on the roadside with its flashing amber lights activated. Beginning July 1, 2017, the law expanded to lawfully require drivers to do the same for State department of transportation vehicles stopped on the roadside with their flashing amber or non-flashing blue lights activated. The law also includes Nevada’s freeway service patrol (FSP) fleet vehicles, which help keep traffic moving smoothly through the larger cities. All FSP vehicles are equipped with flashing emergency lights, traffic control equipment, pop-up arrow boards, push bumpers, and basic automotive repair equipment. Some are capable of towing disabled vehicles from freeway travel lanes and placing them at the nearest secure locations. A driver found guilty of violating the move over law can be charged with a misdemeanor. Since October 2017, the move over law further applies to any traffic incident including stalled vehicles and debris on the roadway. According to an online source, the Nevada move over law fine is \$395. If the offense occurs in a work zone, the fine is up to \$790. If the violation results in injury or death, the fine may be even higher. In addition to the fine, a violation also includes the possibility of jail time.

The Hyundai driver did not move to an adjacent lane; he did brake in an attempt to avoid the crash. It is unknown if the driver was familiar with the move over law and the actions required of drivers in such circumstances. Based on his actions prior to impact, he appears to have observed the Dodge’s presence in the lane ahead but, due to unknown reasons, braked too late. Instead, he

braked hard, locking up the left and right wheels and struck the Dodge with sufficient force to push the vehicle approximately 12.0 m (39 ft) forward. The investigation determined that speed, and possibly the presence of alcohol and unspecified drugs in his system, were likely factors in the causation of the crash.

## 2016 Dodge Charger Pursuit

### Description

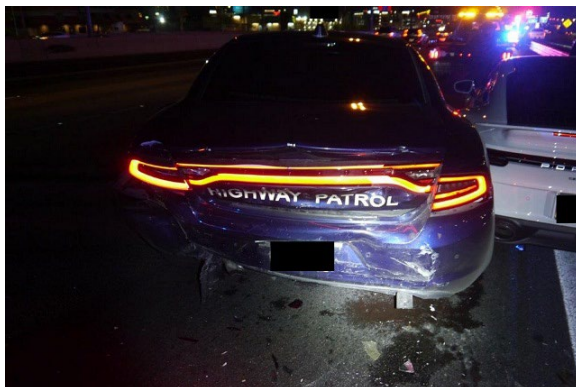
The struck subject vehicle was a 2016 Dodge Charger Pursuit State Police vehicle identified by police using the Vehicle Identification Number (VIN) 2C3CDXATXGHxxxxxx. The manufacture date was unknown. Standard equipment for the vehicle included a 5.7-liter, 8-cylinder, gas engine, rear-wheel drive, automatic transmission, power steering, tilt and telescoping steering functionality and power windows. The vehicle manufacturer recommended size P245/45R20 tires for the front and rear. The Dodge was a fully marked police vehicle, blue in color, with “HIGHWAY PATROL” in retroreflective yellow lettering positioned above the bumper on the back plane.

### Emergency Lighting Discussion

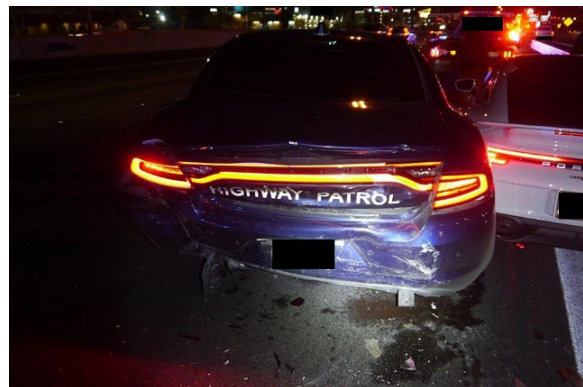
The Dodge had red and blue forward-facing and rear-facing emergency lighting. It had two forward-facing amber light bars mounted on the windshield. It had 4-way traffic advisor amber emergency flashers on the front and rear. When stopped, the vehicle’s brake lamps flash in an alternating pattern. White LED lamps were installed on the front push bar. The vehicle was not equipped with a roof-mounted light bar.

The SCI team interviewed an on-duty highway patrol supervisor to obtain the State highway patrol’s emergency lighting protocols. On-scene police images were used to obtain emergency lighting equipment and activation specific to this crash. According to the police officer interviewed, officers stopped on the side of the roadway while working an incident or traffic stop are required to have emergency lighting activated; however, during a DUI investigation, they turn their forward-facing emergency lighting off. Activating the vehicle’s 4-way traffic advisor amber emergency flashers is not a requirement by the agency while working an incident or traffic stop.

The Dodge had its headlamps, rear brake lamps, and 4-way amber emergency lamps activated (Figures 5 and 6). The 2021 Porsche 911 Turbo stopped ahead of the Dodge had its brake lamps and amber 4-way emergency flashers activated prior to impact.



*Figure 5. Rear emergency lights in flash mode looking north, 2016 Dodge Charger Pursuit and 2021 Porsche 911 Turbo (police photo)*



*Figure 6. Rear emergency lights in flash mode looking north, 2016 Dodge Charger Pursuit and 2021 Porsche 911 Turbo (police photo)*

## **Exterior Damage**

The Dodge sustained damage to the back and right planes during the crash. The SCI team used on-scene police photos to assess the damage. Direct damage caused in the Event 1 impact with the Hyundai was distributed across the back plane, primarily at bumper level. The estimated collision deformation classification (CDC)<sup>2</sup> for the Dodge in Event 1 was 06BDEW1. The vehicle sustained minor swiping-type damage to the right plane in the Event 2 impact with the Porsche. The estimated CDC for the Dodge in Event 2 was 12RPES1.

## **Event Data Recorder**

The Dodge was equipped with an air bag control module with event data recorder (EDR) capability. Efforts were unsuccessful to determine if police imaged the vehicle's ACM following the crash.

## **NHTSA Recalls and Investigations**

Searches in December 2021 and April 2023 using the Dodge's VIN revealed no incomplete recalls.

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<sup>2</sup> CDC J224 May2022

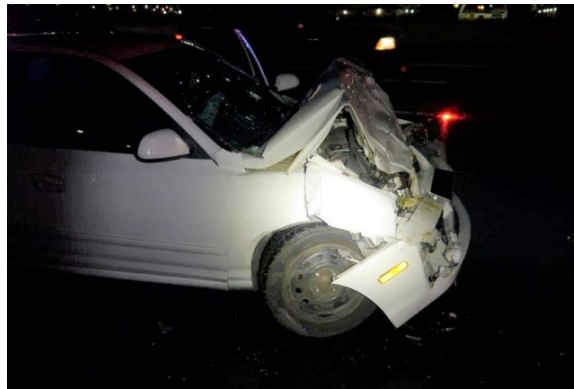
## 2004 Hyundai Elantra

### Description

The 2004 Hyundai Elantra was identified by police using the VIN KMHDN46D54Uxxxxxx. The manufacture date was unknown. The Hyundai was a 4-door compact sedan with front-wheel drive and five-passenger seating. Standard equipment included a 4-cylinder, 2.0-liter gas engine and automatic transmission. The vehicle manufacturer recommended size P195/60R15 tires for the front and rear. The vehicle's ACM was not supported by commercially available software and no EDR report was obtained.

### Exterior Damage

The Hyundai sustained damage to the front, top, left and right planes in the crash with the Dodge. The SCI team used on-scene police photos to assess the damage. Direct damage was distributed on the front plane from bumper corner to bumper corner. The front bumper and grille were crushed and the hood was crumpled. The right front fender was crumpled and the right front tire appeared in photos to be restricted. The left front fender was crumpled by indirect contact. The estimated CDC for the Hyundai in Event 1 was 12FDEW2 (Figure 7).



*Figure 7. 2004 Hyundai Elantra at final rest looking west (police photo)*

### Interior Damage

The vehicle inspection was based on police photos. The deployed driver's frontal air bag was the only damage visible in the photos. No intrusions were visible.

### Supplemental Restraint Systems

The Hyundai had dual frontal air bags and front outboard seat-mounted side impact air bags. Only the driver's frontal air bag deployed.

### NHTSA Recalls and Investigations

Searches in December 2021 and April 2023 using the Hyundai's VIN revealed no incomplete recalls.

## **2004 Hyundai Elantra Occupant**

### **Driver Demographics**

|                            |                                                                         |
|----------------------------|-------------------------------------------------------------------------|
| Age/sex:                   | 32 years/male                                                           |
| Height:                    | Unknown                                                                 |
| Weight:                    | Unknown                                                                 |
| Eyewear:                   | Unknown                                                                 |
| Seat type:                 | Bucket                                                                  |
| Seat track position:       | Unknown                                                                 |
| Manual restraint usage:    | Lap and shoulder belt used                                              |
| Usage source:              | Police report                                                           |
| Air bags:                  | Frontal air bag deployed, seat-mounted side impact air bag not deployed |
| Alcohol/drug data:         | Positive for alcohol and unspecified drugs, per police report           |
| Egress from vehicle:       | Unknown                                                                 |
| Transport from scene:      | None                                                                    |
| Type of medical treatment: | Assessed on-scene                                                       |

### **Driver Kinematics**

The driver was belted in a bucket seat. Police reported that he braked prior to impact. At impact with the other vehicle, his frontal air bag deployed and he was displaced forward in response to the direction of force. His chest likely loaded the shoulder portion of the seat belt and his face, neck and chest likely loaded the deployed air bag. His injury status was assessed on-scene. According to the police report, he was determined to be positive for alcohol and drug involvement.

### **Driver Injuries**

The driver claimed to have an unspecified injury. He was not transported, according to the police report.

## 2021 Porsche 911 Turbo S

### Description

The 2021 Porsche 911 Turbo S was identified by police using the VIN WP0AD2A91MSxxxxxx. The manufacture date was unknown. The Porsche was a 2-door sub-compact coupe with all-wheel drive and four-passenger seating. Standard equipment included a 6-cylinder, 3.8-liter gas engine and automatic transmission. The vehicle manufacturer recommended size P245/35R20 tires for the front and size P305/30R20 tires for the rear. The Porsche was equipped with an ACM with EDR capability. Efforts were unsuccessful to determine if police imaged the vehicle's ACM following the crash.

### Exterior Damage

The Porsche sustained minor damage to the left plane in the secondary crash with the Dodge (Figure 8). The SCI team used on-scene police photos to assess the damage. Direct damage was located on the left rear quarter-panel and the estimated CDC for the Porsche in Event 2 was 06LBES1. The vehicle was towed due to a prior disabling issue not related to this crash.

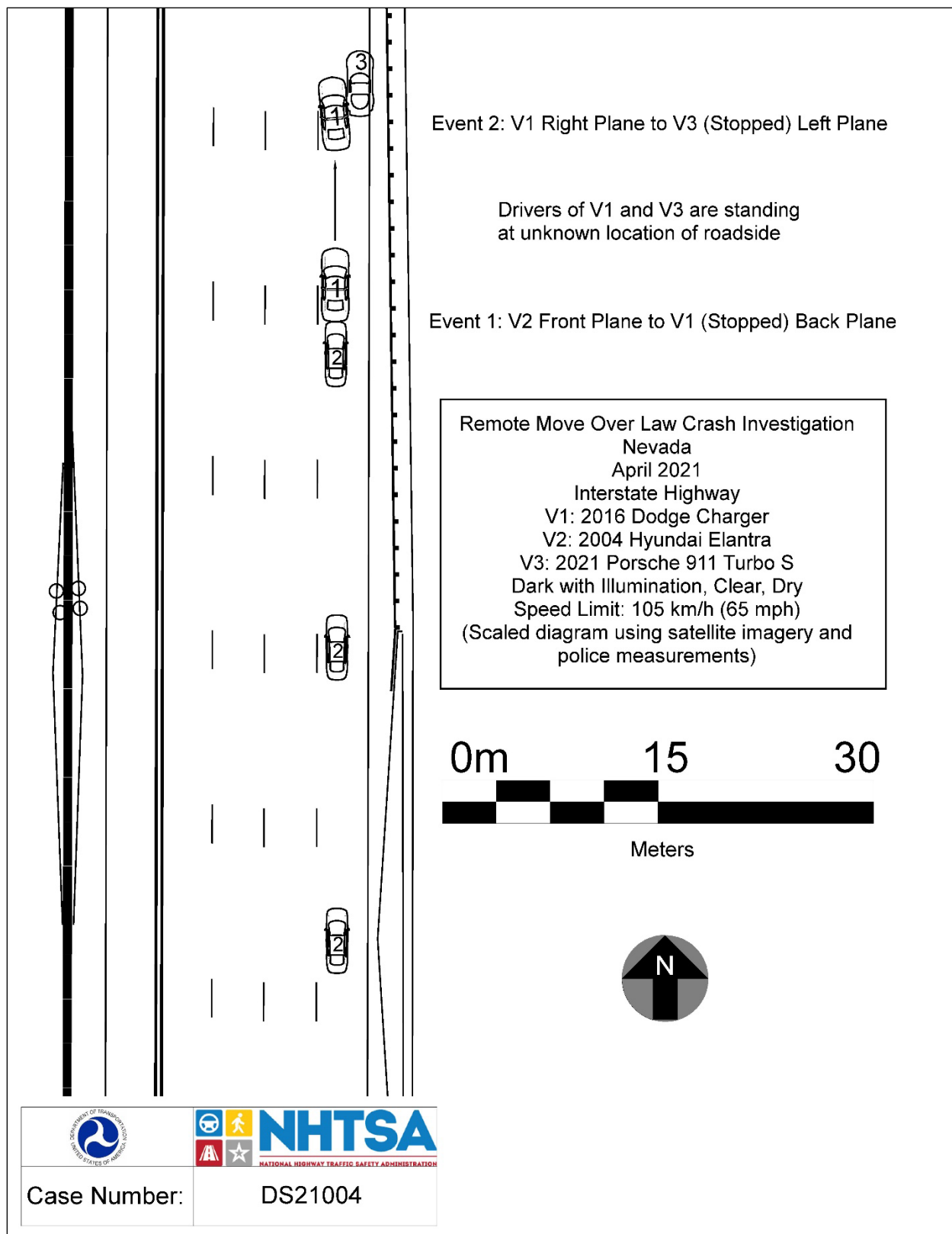


*Figure 8. Porsche 911 Turbo S (right) and 2016 Dodge Charger Pursuit (left) at rest looking north (police photo)*

### NHTSA Recalls and Investigations

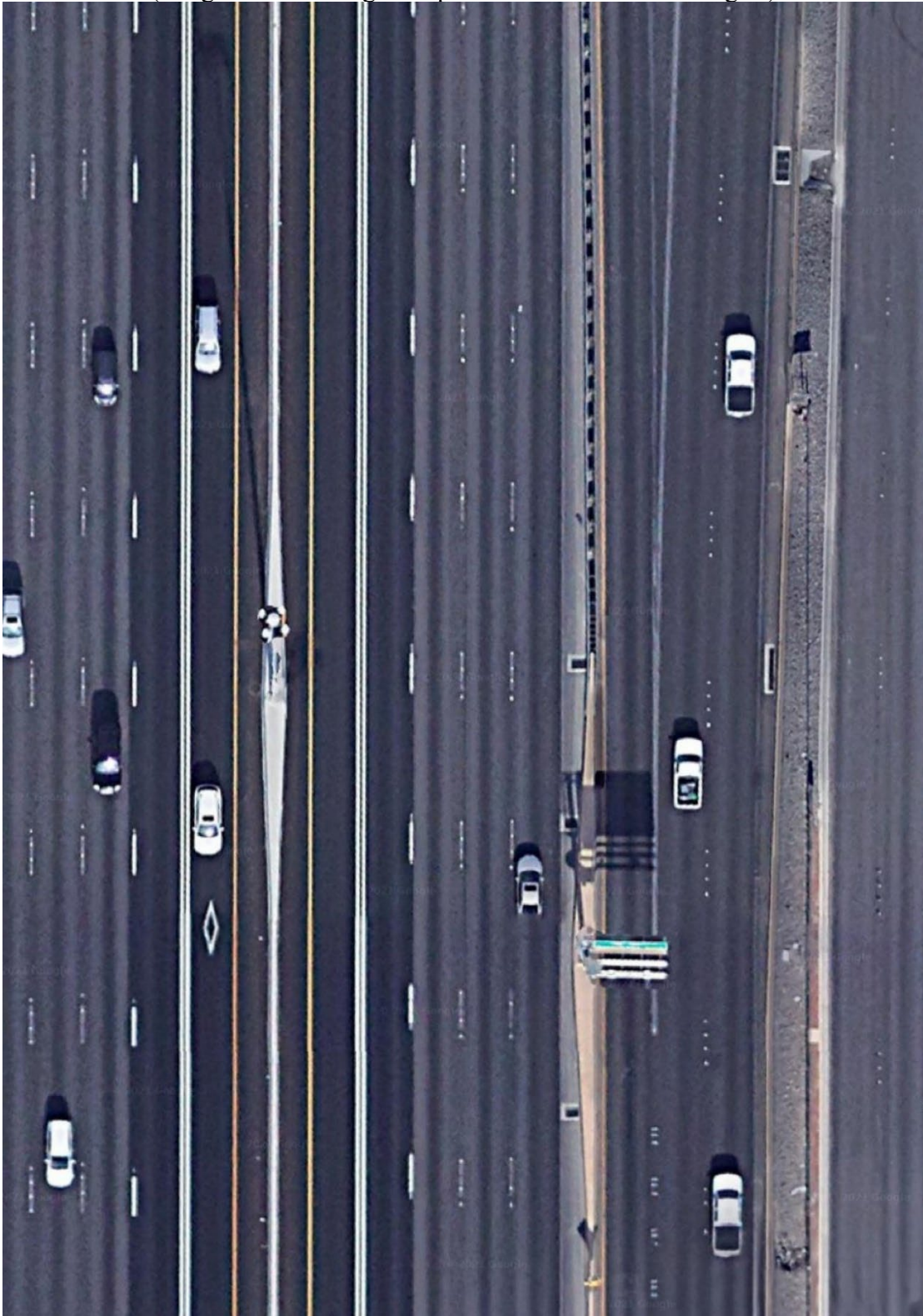
Searches in December 2021 and April 2023 using the Porsche's VIN revealed no incomplete recalls.

## Crash Diagram



## Crash Site Satellite View

(Image source: Google Maps ©2023 Maxar Technologies)



## **APPENDIX A. Impact speed calculation for 2004 Hyundai Elantra**

# COLLINEAR MOMENTUM

Find the Impact Speed of Vehicle 1 with In-Line Momentum.

$$\begin{aligned}(W_1 \times V_1) + (W_2 \times V_2) &= (W_1 \times V_3) + (W_2 \times V_4) \\(2683.00 \times V_1) + (4263.00 \times 0.00) &= (2683.00 \times 17.10) + (4263.00 \times 27.57) \\(2683.00 \times V_1) + 0.00 &= 45879.30 + 117530.91 \\(2683.00 \times V_1) + 0.00 &= 163410.21 \\(2683.00 \times V_1) &= 163410.21 - 0.00 \\(2683.00 \times V_1) &= 163410.21\end{aligned}$$

$$V_1 = \frac{163410.21}{2683.00} \quad V_1 = 60.90$$

Formula Inputs:

|                                     |         |
|-------------------------------------|---------|
| The Wt of Veh 1 (lbs) is:           | 2683.00 |
| The After Impact Speed of Veh 1 is: | 17.10   |
| The Wt of Veh 2 (lbs) is:           | 4263.00 |
| The Impact Spd of Veh 2 is:         | 0.00    |
| The After Impact Speed of Veh 2 is: | 27.57   |

Formula Results:

|                             |       |
|-----------------------------|-------|
| The Spd of Veh 1 in MPH is: | 60.90 |
| The Vel of Veh 1 in FFS is: | 89.32 |

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July 2023



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

