NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF HIGHWAY SAFETY
WASHINGTON, D.C.

TECHNICAL RECONSTRUCTION GROUP CHAIRMAN'S FACTUAL REPORT

PHOENIX, ARIZONA – HWY21MH008

A. CRASH INFORMATION & CRASH SUMMARY

Refer to the *Crash Information and Crash Summary Report* in the docket for this investigation.

B. TECHNICAL RECONSTRUCTION GROUP

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490 L'Enfant Plaza, SW
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C. DETAILS OF THE TECHNICAL RECONSTRUCTION INVESTIGATION

The Technical Reconstruction Group for this investigation was convened for the purpose of providing the on-scene documentation of the crash location and involved vehicles, and to assist in the analysis of collision events and causation factors. In support of these tasks the group reviewed documentation provided by the Arizona Department of Public Safety, Arizona Department of Transportation, and certain motor-carrier supplied information.

Factual reports prepared by other NTSB investigative groups should be consulted for information related to other aspects of the investigation, including information used within this report.

1 Introduction

The collision events involved a total of eight vehicles – one commercial motor vehicle and seven passenger vehicles. The events included a rear-end collision followed by subsequent collisions that occurred in quick succession within the eastbound lanes of State Route Loop 202 (Red Mountain Freeway). At final rest the vehicles were spread out within the eastbound lanes of SR-202, the Walker tank trailer which was towed by the Freightliner truck-tractor came to rest in the westbound shoulder of SR-202. The location of the initial impact which involved the Freightliner truck-tractor, and the Ford Fusion was identified by approximate geographic coordinates of 33.455802°N (latitude) and -111.974451°W (longitude). This position was located

approximately 193 feet east of the mile post marker 4.[1] The collision events occurred between the cities of Phoenix and Tempe, as indicated in **Figure 1**.

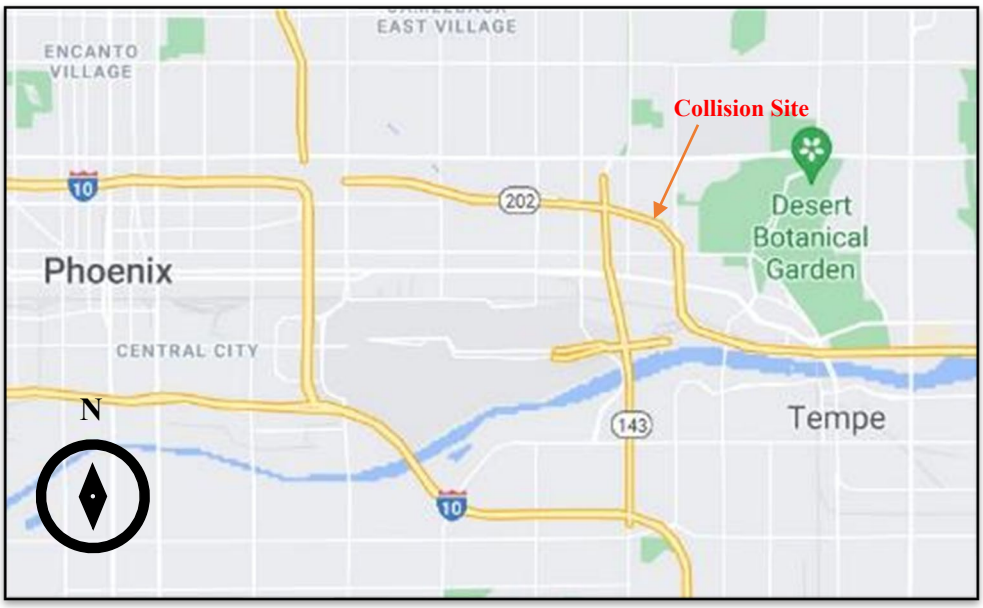

Figure 1*:* Area map of Phoenix/Tempe with approximate location of the crash indicated.

NTSB investigators examined and documented the collision site and other roadway and environmental features on June 13th, 2021, four days after the collision using ground photography and small unmanned aircraft systems (sUAS) platform.[2] Site documentation data acquired by AZDPS investigators before the scene was cleared included sUAS aerial photographs, three-dimensional laser scanning, and ground-based photography.

The collision events were initiated after the operator of the eastbound Freightliner-Walker combination failed to slow and stop for a traffic queue. After colliding with several vehicles, which were lined up in the right lane, the Freightliner-Walker combination veered left crossing all travel lanes of eastbound SR-202 colliding with the median barrier. The impact with the median redirected the Freightliner truck-tractor to the right back into the eastbound travel lanes. The Walker trailer separated from the Freightliner and rolled over the median barrier coming to rest in the left shoulder and left travel lane of westbound SR-202. There were no documented collisions on the westbound lanes. During the collision events, one vehicle, a Chevrolet Equinox became entangled with the front of the Freightliner truck-tractor. At final rest a post-crash fire ensued destroying both vehicles.

1.1 Collision Location and Basic Highway Description

Eastbound SR- 202 is a 5-lane highway. The collision events occurred at the end of a tangent section of highway that was about 1,320 feet in length. There is a rightward curve east of

[1] Mile post marker values increased in the westbound direction.
[2] sUAS – "small- unmanned aircraft system" as defined by 14 CFR part 107.

the collision area that extended about 2,645 feet with a radius of about 2,083 feet. **Figure 2** depicts the approximate area of interest overlaid atop Google Earth imagery. There were streetlights installed along the concrete median at intervals of 200 feet. One streetlight was located at the area of impact.

Figure 2: Modified Google Earth imagery depicting the area of SR-202 in which the collision occurred.

2 Additional Investigative Resources

Data provided by the AZDPS investigators included crash scene photographs, sUAS imagery, and scene 3D scan data. The data provided by AZDPS was supplemented with sUAS imagery acquired by NTSB investigators with the Office of Highway Safety. The sUAS images from AZDPS were rendered through the Pix4DMapper software to render a three-dimensional point cloud for use in analysis.[3] However due to their images being captured in the dark with very limited lighting the software was not able to create the point cloud. **Figure 3** below is a screen capture from the scan data that was provided by AZDPS. The vehicles in the scan have been highlighted for emphasis. Post-collision evidentiary marks are visible and have not been emphasized

[3] Pix4DMapper is a photogrammetry program designed to use overlapping photographs to generate 3D point clouds. Additional outputs include 3D models, terrain models, and 2D orthomosaic maps.

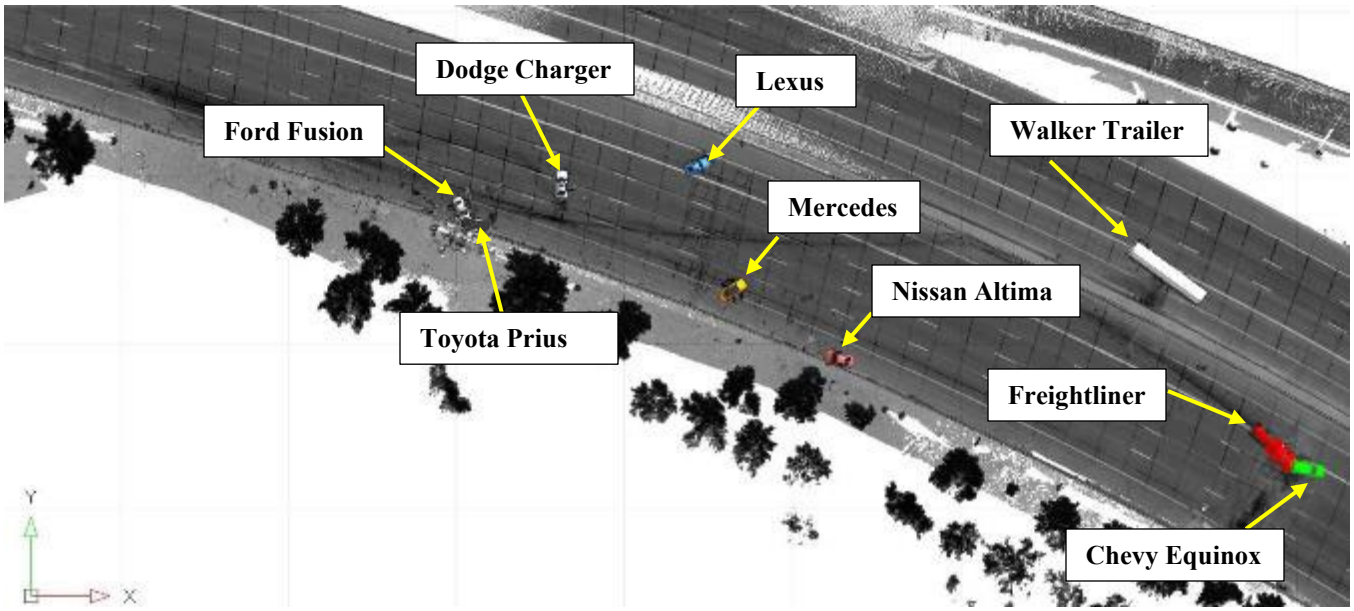

Figure 3: Screen capture from AZDPS 3D scan data with vehicles highlighted for emphasis.

2.1 NTSB sUAS Imagery

NTSB investigators conducted mapping and imagery flights on June 13th, 2021. The flights were flown to map a portion of SR-202 which included the collision site and the roadway leading up to the collision site.

2.1.1 Equipment

Mapping and imagery flights were conducted using the NTSB's DJI Phantom 4 Professional Advanced drone. The drone is equipped a dual GPS/GLONASS receiver which provides georeferenced information on all still photographs. The drone is equipped with an FC6310 camera using the Sony Exmor 1" CMOS sensor, with a focal length of 8.8 mm. Still photograph resolution is 20 megapixels in JPG or RAW format.

2.1.2 Procedures

The sUAS was flown in a series of single grid and orbits at altitudes of 85 feet above ground level (AGL) using Pix4D Capture. The mapping/imagery was done after the vehicles involved in the crash had been removed. Additional sets of still images were taken from additional viewpoints and various locations along the roadway. A total of 5 flights and 792 photographs were captured. Total flight time was approximately 47 minutes.

2.1.3 Processing

Geo-referenced still imagery was processed using Pix4D photogrammetry software to produce a three-dimensional (3D) point cloud and orthomosaic map of the SR-202 collision site. **Figure 4** is a still image of SR-202 looking in a westbound direction. The image was taken east of the Freightliner and Chevrolet final rest. The post-collision evidence can be seen in the eastbound travel lanes.

Figure 4: Aerial image of the eastbound travel lanes of SR-202 looking westbound.

Figure 5 is a screen capture of an overhead view of the rendered 3D point cloud. The NTSB project had captured approximately 1,808 feet of the eastbound travel lanes, the initial area of impact is approximated with the “x”.

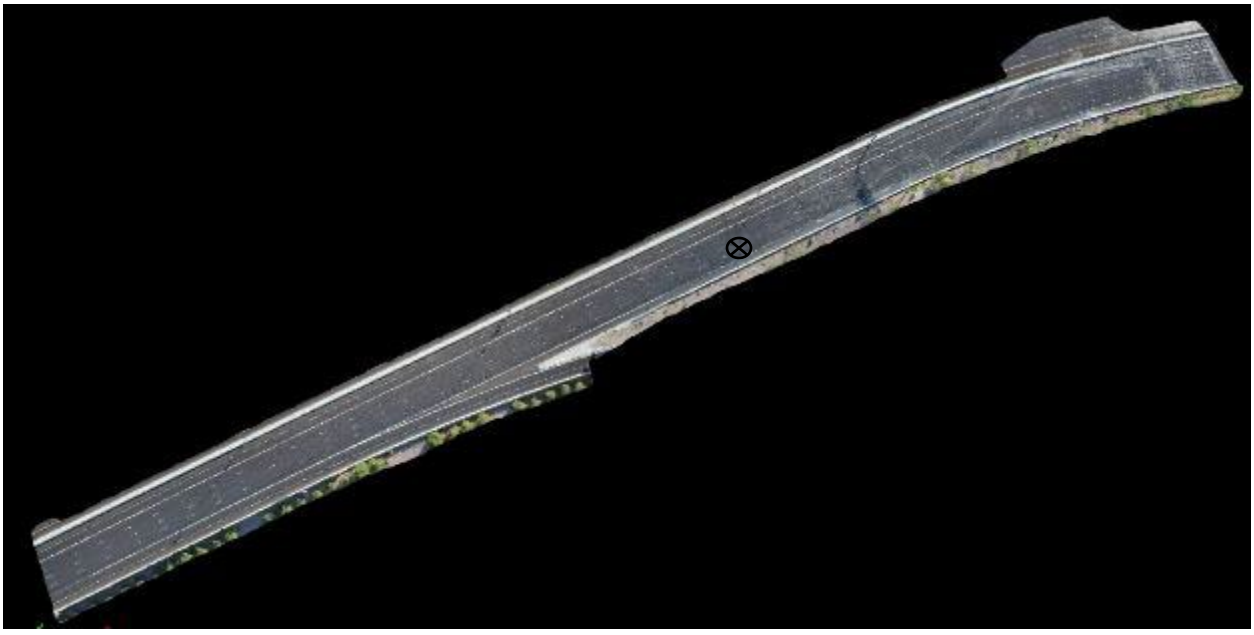

Figure 5: Screen capture of NTSB rendered 3D point cloud. The area of impact is approximated by the "x".

Figure 6 below, is another screen capture of the NTSB rendered 3D point cloud from a different perspective. The initial area of impact is designated by the yellow arrow.

Figure 6: Screen capture of NTSB rendered 3D point cloud with the area of impact approximated by the yellow arrow.

3 Roadway Evidence

The collision events initiated with a rear-end collision followed by subsequent chain reaction, rear-end events that occurred in succession within the eastbound lanes involving a total of eight vehicles. **Figure 7** is an illustration of the initial positions of vehicles involved in the collision prior to impact.

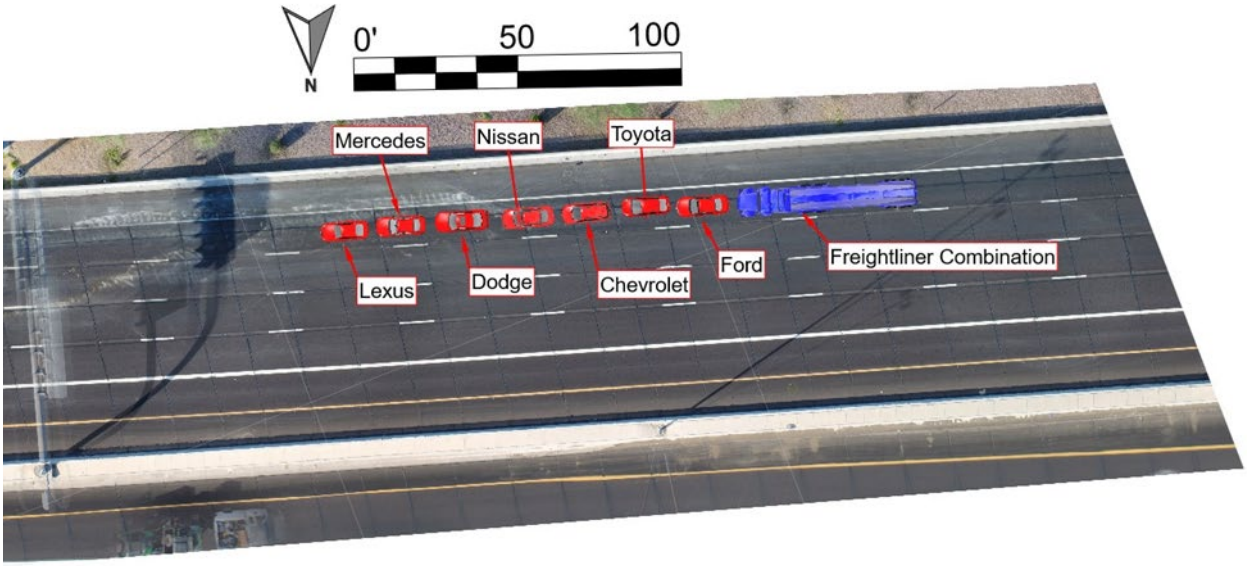

Figure 7. Depicts likely positions of vehicles involved in collision prior to the initial impact.

The first collision between the Freightliner combination and the Ford occurred in the right lane, lane 5[4] of eastbound SR-202. The first area of contact was identified by an area of scrape marks which exhibited a white color on the asphalt surface. Located within the scrape marks was a large gouge. To the left of the gouge was a metal scar that measured approximately 3.4-feet in length and to the left of the metal scar was a tire friction mark which measured approximately 6.2-feet. The initial area of scrape marks extended east for approximately 6.2-feet in length. See **Figure 8**.

Approximately 12.2-feet east of the initial evidentiary marks, was another significant area of scrape and gouge marks. The marks began in the eastbound travel lane and progressed eastward for approximately 40-feet where they began to arc to the right transitioning to the right shoulder.

[4] Travel lanes are numbered beginning with the far-left lane and progressing to the right lane.

Figure 8: Photograph of eastbound SR-202 depicting area of impact. (Photograph courtesy of Arizona Department of Public Safety.)

The marks continued across the shoulder at a relative angle of 22° terminating at the concrete barrier. The mark exhibited an overall length of about 82-feet. There was a second tire friction mark beginning 20-feet beyond the end of the first and extended about 44-feet eastward in the right lane.

The concrete barrier exhibited evidence of contact at the termination of the above-mentioned scrape marks. On the concrete wall was a tire mark that initiated about half-way up the wall and angled upwards to the top of the wall for approximately 11-feet (see figure 8 evidence labeled "A"). East of the tire mark was significant scuffing that exhibited black color and extended east along the wall for about 23-feet (see figure 8 evidence labeled "B"). At the end of the 23-feet another series of scrape marks originated on the asphalt surface beginning at the base of the concrete wall. The scrape marks angled across the shoulder. At the white edge line, the scrape marks straightened out continuing eastbound along the shoulder. The scrape marks traversed the shoulder for about 127-feet. Adjacent to and running parallel with the marks on the shoulder, in the right lane, were additional scrape marks. The marks on the shoulder and the right lane terminated at the final rest location of the Ford and the Toyota.

Located in the eastbound right lane, approximately 55-feet east of the initial collision evidence, began a fluid trail. The fluid trail initially extended from the dashed white line to the white shoulder line. As the fluid trail continued eastbound it narrowed. The fluid trail extended east in the right lane for about 184-feet where it transitioned to a northeasterly direction traversing

all five travel lanes and the left shoulder. The fluid trail was measured at an angle of 26° relative to the direction of the roadway. At the concrete barrier the fluid trail changed direction to the east for approximately 25-feet where it began a southeasterly direction. The fluid trail continued southeast for about 160-feet terminating at the final rest positions of the Freightliner and Chevrolet. The collision site measured approximately 608-feet in length from the area of impact to the final rest of the Freightliner and Chevrolet.

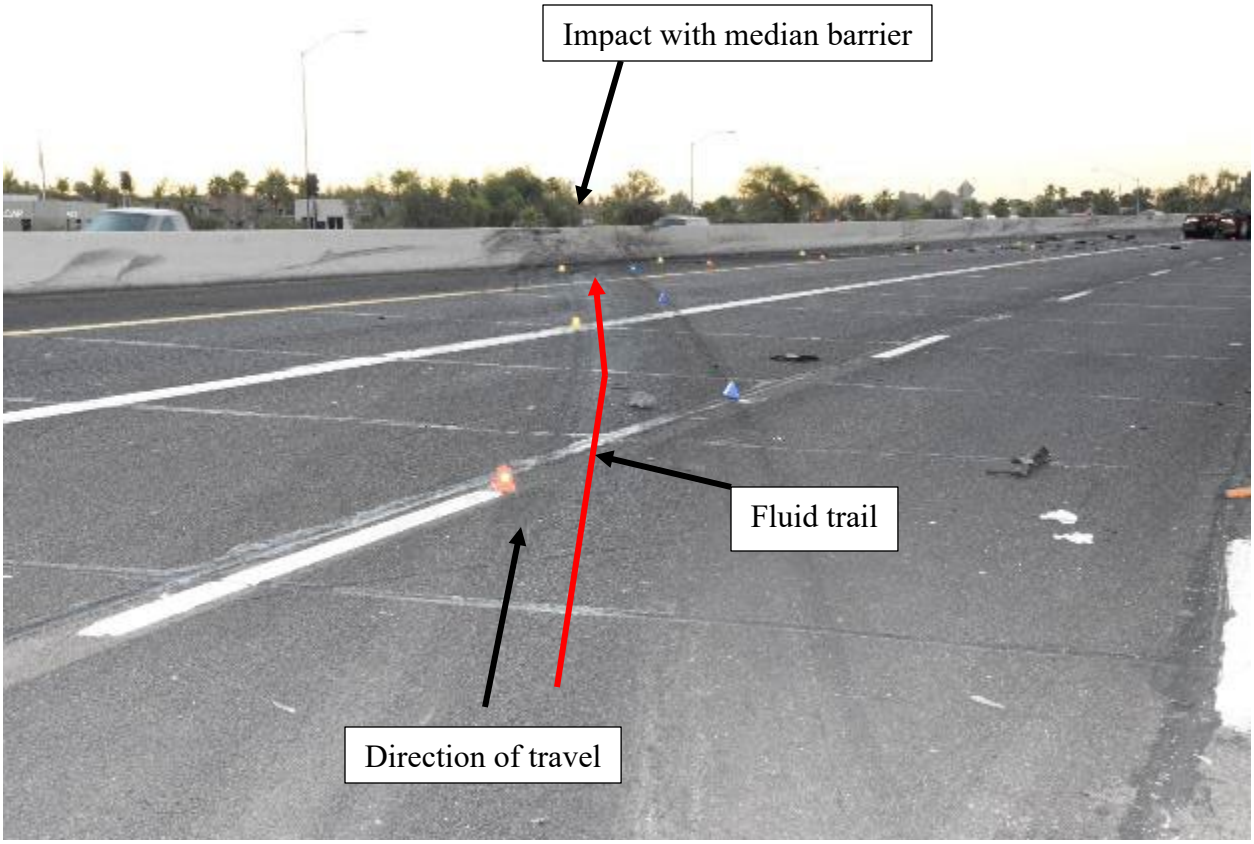

Figure 9 - Photograph depicting fluid trail, indicated by the red line, from Freightliner combination and Chevrolet leading to impact with concrete median barrier. (Photograph courtesy of Arizona Department of Public Safety.)

In the area of the main impact, with the barrier, there was a black tire mark located at the top of the vertical side of the barrier as it terminated on the vertical side it transitioned across the top of the barrier. Scene photographs also identified scrape marks along the top portion of the barrier.

On the westbound side of SR-202 were scrape and gouge marks that led to the final rest of the tank trailer. There were four parallel scrape marks identified on the left westbound shoulder that extended for about 6-feet. Located in the left lane, lane 1 of westbound SR-202 adjacent the yellow lane line was two circular gouges. Encompassing the circular gouges were circular tire marks. Prior to and just after the two circular gouges were several scrape marks. These scrape marks terminated at the final rest of the tank-trailer. In lane one and the shoulder was an area of cargo spill that initiated from the center portion of the trailer.

A second fluid trail appeared about 96-feet east of the beginning of the of the first fluid trail in the right lane. **See Figure 9.** The second fluid trail traveled northeast from the right lane, lane 5, traversed lane 4 and entered lane 3. The fluid trail continued east in lane 3 for about 43-feet where it turned southeast entering back into lane 4. The fluid trail terminated at the final resting position of the Dodge. There were two tire friction marks that originated at the final rest of the Dodge. Onset of the tire friction mark was visible in lane 4. As the mark continued northeast it transitioned into lane 3 where it ended. The tire friction mark exhibited an overall length of about 30-feet. There was a second tire friction mark offset north about 8-feet. It had originated in lane 3 and extended over a length of about 11-feet. The two described tire friction marks traveled towards the final resting position of the Lexus which was located approximately 67-feet northeast of the Dodge. **Figure 10** is a 2D diagram created from the 3D point cloud. The diagram shows the position of rest for the involved vehicles.

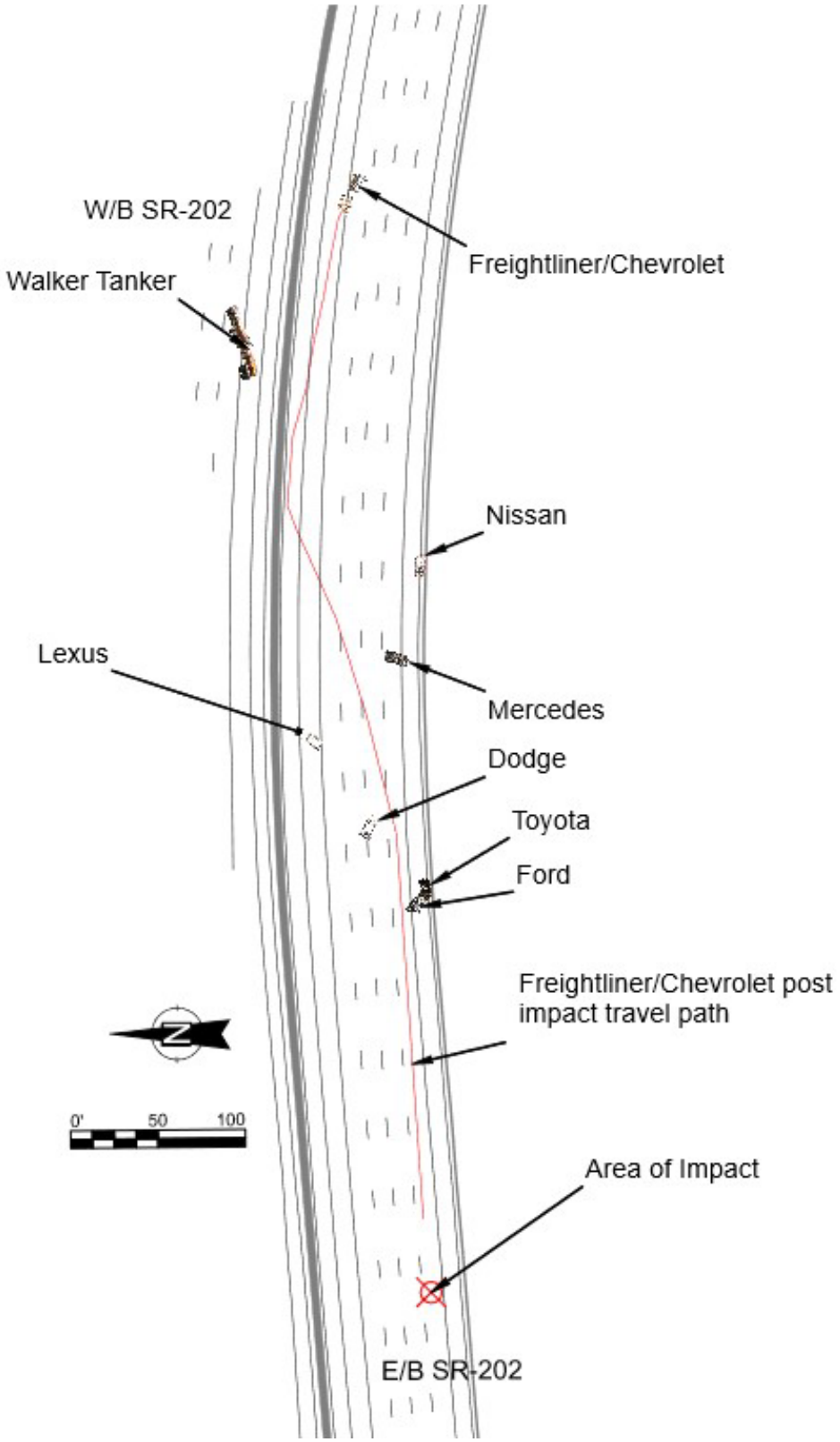

Figure 10: 2D diagram created from the 3D point cloud. Diagram depicts the final resting positions of the involved vehicles. The redline follows the physical evidence created by the Freightliner and Chevrolet.

Scene photographs and scanning depict several other scrapes and scars on the road surface and concrete barrier extending further east in lane 5 and the right shoulder. Those other marks terminated at the final resting positions of the Mercedes and the Nissan.

4 Vehicle Documentation

The Technical Reconstruction Group photographed, and 3D-laser scanned the exteriors of all the vehicles involved in the collision events. The involved vehicles, excluding the tank trailer, had been secured at the AZDPS storage lot. The tank-trailer had been secured at a nearby towing and storage facility directed by AZDPS. A more detailed examination and documentation of the vehicles was undertaken by the NTSB Vehicle Factors Group. Additional information regarding the vehicles is available in the factual reports prepared by the NTSB Vehicle Factors and Survival Factors Groups. The vehicles described below are in the order according to their positioning in the right lane prior to the collision.

4.1 2016 Freightliner Cascadia truck-tractor in combination with a 2015 Walker tank trailer

At its position of final rest following all the collision events, the Freightliner was facing eastbound and occupying both lanes 1 and 2 of eastbound SR-202. The left rear tandems were in lane 1. The front, cab portion, of the Freightliner had sustained catastrophic fire damage. The motor, frame rails, and the wire framing of the interior seats were visible. The Freightliner exhibited contact damage to front bumper and left tandems. The fifth wheel rail was also damaged, and the fifth wheel and fifth wheel plate were detached. There was contact damage to the left side tandems, axles two and three. The outer wheel was bent and exhibited scrapes and scratches on the outer edge. The left side plastic fender which covered axle two dual wheels had been dislodged and the front portion had been melted due to the post-crash fire. **Figure 11** depicts an image of the 3D point cloud as rendered from scans of the Freightliner in the FARO Scene software.

Figure 11: Screen capture depicting the Freightliner left side as viewed in the point cloud rendered from the three-dimensional scans through the FARO Scene software.

As a result of the collision events, the tank-trailer had separated from the Freightliner and the two units came to rest in separate locations. At final rest the front portion of the tank-trailer was resting in lane 1 of westbound SR-202 near the yellow lane line which separated lane 1 from

the left shoulder and was about 65-feet from the rear of the Freightliner located in the eastbound lanes. The rear tandems of the tank-trailer extended into westbound lane 2.

The tank-trailer exhibited overall damage due to the barrier impact, rollover, and slide. When examined at the storage facility the front cap had separated from the cladding of the trailer at the top. Along the right-side of the trailer were angled scrape marks that extended from the front to the rear. The right front and rear fender were bent upwards. The right-side outside wheels on the duals were damaged. The front wheel exhibited scrapes around the circumference of the wheel and the tire was scuffed. There was a small section of the rear wheel that had been bent inwards toward the center hub and the edges were scraped around the circumference of the wheel. Much like the front tire the tire itself was scuffed. The end cap had separated from the cladding and had a significant dent on the left side.

Along the tank-trailer left side were two separate and significant scrape marks. The first scrape mark began at the front of the tank-trailer about midway up. Where the scrape mark initiated, at the front about midway up, the tank-trailer was dented inward. The scrape mark extended at a downward angle ending at the middle of the tank-trailer. There was a ladder attached to the tank-trailer in the middle. The ladder was bent inward toward the tank in line with the scrape mark. The second scrape mark initiated at the top in the middle of the tank. In that location was the cap area, where the tank-trailer would have been loaded as well as a metal standing platform. The metal platform had been bent inwards towards the top to the tank, the scrape extended from the metal platform down around the left side of the tank ending at the rear of the tank-trailer. Just like the first described scrape mark at the end of the second mark there was a dent that pushed inwards.

The trailer king pin was intact, and the fifth wheel coupler was still attached to the kingpin.

Figures 12 and 13 depict images of the 3D point cloud as rendered from scans of the left and right side of the tank-trailer in the FARO Scene software.

Figure 12: Screen capture depicting the tank-trailer's left side as viewed in the point cloud rendered from the three-dimensional scans through the FARO Scene software.

Figure 13: Screen capture depicting the tank-trailer's right side as viewed in the point cloud rendered from the three-dimensional scans through the FARO Scene software.

4.2 2016 Ford Fusion 4-door sedan

The first passenger vehicle involved in the sequence of collisions was a passenger vehicle identified as a 2016 Ford Fusion (Ford). **Figures 14** depicts the three-dimensional scan of the vehicle.

Figure 104: Screen capture depicting the Ford top left side as viewed in the point cloud rendered from the three-dimensional scans through the FARO Scene software.

Overall, the vehicle exhibited catastrophic damage. The rear trunk area had been pushed forward into the rear area of the passenger compartment. The rear seat backs were pushed forward and down and were laying on the rear seat.

The front of the vehicle exhibited impact damage as well. The hood had been pushed up and rearward into the windshield. The top of the radiator was pushed inward towards the motor and the left and right fenders were damaged and pulled away from the Ford.

Scene photographs depict that at final rest, approximately 288-feet from the area of impact, the Ford was oriented southeast on the eastbound right shoulder. The front of the vehicle was in contact with the right-side concrete barrier. A 2013 Toyota Prius was overturned and was resting on the engine of the Ford (see section 4.3 below).

Table 1 provides certain dimensional data for the Ford.[5]

Table 1: Dimensional Data for 2016 Ford Fusion.

	Inches	Feet	
Overall length	192	16.00	
Wheelbase	112	9.30	
Front overhang	37	3.08	
Rear overhang	43	3.58	
Overall width	73	6.08	
Maximum height	58	4.83	
Curb weight			3,427 lbs.

4.3 2013 Toyota Prius 4-door sedan

The second passenger vehicle involved in the sequence of collisions was a passenger vehicle identified as a 2013 Toyota Prius (Toyota).

The Toyota exhibited severe damage to both the front and the rear of the vehicle. The damage to the rear of the vehicle extended the width of the rear of the vehicle. The heaviest damage was localized to the left side. The rear of the Toyota was under-rode and the bumper was down and inward towards the center of the vehicle. The left wheel assembly was pushed forward, reducing the left side wheelbase, and upward. The right-side wheel assembly had also been pushed forward slightly. There was impact damage encompassing the left side of the vehicle.

The damage to the front of the Toyota extended the full width. The front bumper and lower portion of the engine had been pushed down towards the ground. From about the middle of the engine upward had been pushed rearward towards the firewall. The windshield had broken and was collapsed inward. The roofline and drivers side “A” pillar had been pushed inward towards the passenger compartment.

Scene photographs depict that at final rest the Toyota was orientated upside down facing eastward on the eastbound right shoulder. The roof of the Toyota was resting on the engine of the

[5] Reference 4N6XPRT Systems Expert AutoStats v6.1.1 See Reconstruction Group Attachment – Vehicle Specifications Ford Fusion.

Ford. The left side was resting against the concrete barrier. **Figure 15** depicts the three-dimensional scan of the Toyota.

Figure 11: Screen capture depicting the Prius top left side in the point cloud rendered from the three-dimensional scans through the FARO Scene software.

Table 2 provides certain dimensional data for the Toyota.[6]

Table 2: Dimensional Data for 2013 Toyota Prius.

	Inches	Feet	
Overall length	176	14.60	
Wheelbase	106	8.83	
Front overhang	35	2.91	
Rear overhang	35	2.91	
Overall width	69	5.75	
Maximum height	59	4.91	
Curb weight			3,042 lbs.

[6] Reference 4N6XPRT Systems Expert AutoStats v6.1.1 See Reconstruction Group Attachment – Vehicle Specifications Toyota Prius.

4.4 2021 Chevrolet Equinox Sport Utility Vehicle (SUV)

The third passenger vehicle involved in the sequence of collisions was an SUV vehicle identified as a 2021 Chevrolet Equinox (Chevrolet).

The Chevrolet exhibited severe impact damage to the rear and additional impact damage to the front. It had also suffered catastrophic fire damage. The damage to rear was about 4-feet in width as measured from the left side. The rear of the vehicle had been pushed forward into the rear seating area.

The damage to the front of the Chevrolet extended the full width. The hood was buckled with the leading edge of the hood bent upwards. The left rear wheel assembly had been torn off the vehicle while the right wheel assembly was bent under the rear of the Chevrolet.

Scene photographs depict the Chevrolet at final rest in lane 2 of eastbound SR-202 approximately 633-feet from the area of impact. The vehicle was oriented east-northeast and was connected to the front end of the Freightliner. **Figure 16** depicts the three-dimensional scan of the Chevrolet.

Figure 12: Screen capture depicting the Chevy top left side in the point cloud rendered from the three-dimensional scans through the FARO Scene software.

Table 3 provides certain dimensional data for the Chevrolet.[7]

Table 3: Dimensional Data for 2021 Chevrolet Equinox.

	Inches	Feet	
Overall length	183	15.25	
Wheelbase	107	8.91	
Front overhang	37	3.08	
Rear overhang	39	3.25	
Overall width	73	6.08	
Maximum height	65	5.41	
Curb weight			3,465 lbs.

4.5 2015 Nissan Altima 4-door sedan

The fourth passenger vehicle involved in the sequence of events was identified as a 2015 Nissan Altima passenger vehicle (Nissan).

The Nissan exhibited severe damage to the rear as well as significant damage the front of the vehicle. There were scrape marks identified on both the left and right side of the vehicle, right fender, and right side of the hood. The front bumper cover, and grille had been torn from the vehicle. The fenders were pushed inwards toward the motor and exhibited scrape marks. The hood had bent rearward into the windshield. There were scrape marks along the right side "A" pillar, roofline, rear passenger door and quarter panel. Scrape marks along the left side of the Nissan were on the "A" pillar and roofline.

The damage to the rear extended the width of the vehicle. The rear of the vehicle had been uniformly pushed inward collapsing the trunk area.

Scene photographs depict the Nissan at final rest, approximately 417-feet from the area of impact, facing west on the eastbound SR-202 right shoulder. The left side was on top of the barrier wall while the right-side tires where on the asphalt surface. **Figure 17** depicts the three-dimensional scan of the Nissan.

[7] Reference 4N6XPRT Systems Expert AutoStats v6.1.1. Reconstruction Group Attachment – Vehicle Specifications Chevrolet Equinox.

Figure 13: Screen capture depicting the Nissan left side in the point cloud rendered from the three-dimensional scans through the FARO Scene software.

Table 4 provides certain dimensional data for the Nissan.[8]

Table 4: Dimensional Data for 2015 Nissan Altima.

	Inches	Feet	
Overall length	192	16.00	
Wheelbase	109	9.08	
Front overhang	37	3.08	
Rear overhang	46	3.83	
Overall width	72	6.00	
Maximum height	58	4.83	
Curb weight			3,132 lbs.

4.6 2015 Dodge Charger 4-door sedan

The fifth passenger vehicle involved in the sequence of events was identified as a 2015 Dodge Charger passenger vehicle (Dodge).

Scene photographs depict that at final rest the Dodge was oriented southward primarily occupying lanes 3 and 4 approximately 267-feet from the area of impact. The rear wheels were positioned in lane 3 while the remainder to the Dodge occupied lane 4.

The Dodge exhibited severe damage to both the front and rear of the vehicle. The rear trunk and bumper area of the Dodge exhibited direct contact. The rear bumper cover was torn from the bumper and pushed inward into the rear storage compartment. The rear of the trunk lid was dented inward and the lid itself was displaced upward. Both rear quarter-panels were also pushed forward

[8] Reference 4N6XPRT Systems Expert AutoStats v6.1.1 Reconstruction Group Attachment – Vehicle Specifications Nissan Altima.

and upward. The rear axle appeared to be shifted forward reducing the wheelbase of the Dodge. Located on the rear bumper cover was blue paint transfer which consisted of reverse lettering (EA0). The (EA0) matched the first three digits of the Nissan Altima registration plate. Also, located on the lower edge of the trunk lid were areas of red paint transfer.

The front of the Dodge exhibited evidence of direct damage. The front bumper cover, grille, and headlight assemblies were all missing from the vehicle. The center of the bumper was bent inwards towards the engine compartment and exhibited signs of material transfer. The right corner of the bumper, from the frame rail outward, was bent inwards towards the right front tire. The front upper trim piece was pushed down and offset to the left of center was a black scuff mark that was aligned with black paint transfer located on the leading edge of the hood. The hood had been displaced rearward and had crumpled upward along the lateral center line. **Figure 18** depicts the three-dimensional scan of the Dodge.

Figure 14: Screen capture depicting the Dodge left side in the point cloud rendered from the three-dimensional scans through the FARO Scene software.

Table 5 provides certain dimensional data for the Dodge.[9]

Table 5: Dimensional Data for 2015 Dodge Charger.

	Inches	Feet	
Overall length	198	16.50	
Wheelbase	120	10.00	
Front overhang	38	3.16	
Rear overhang	40	2.58	
Overall width	75	6.25	
Maximum height	58	4.83	
Curb weight			3,950 lbs.

4.7 2018 Mercedes Benz C300W 4-door sedan

The sixth passenger vehicle involved in the sequence of events was identified as a 2018 Mercedes passenger vehicle (Mercedes).

Scene photographs depict that at final rest the Mercedes was oriented in a northeastward direction at about a 55° angle relative to the roadway and occupied lane 5 and the right shoulder, approximately 363-feet from the area of impact.

The Mercedes exhibited evidence of contact damage to the front and rear. On the rear of the Mercedes, the bumper cover, bumper, and trunk area were pushed inward towards the passenger compartment. The rear of the trunk lid was pushed inward causing the decklid to be displaced upward. The right quarter-panel, and right rear wheel was pushed forward, and the right-side exhaust was exposed. There was evidence of paint transfer on the rear bumper cover along with the leading edge of the decklid.

The contact damage exhibited on the front of the Mercedes extended the width of the vehicle. The bumper cover, grille, and facia were all missing from the front of the vehicle. The bumper was pushed rearward and upward into the radiator. The hood had been pushed towards the

[9] Reference 4N6XPRT Systems Expert AutoStats v6.1.1 Reconstruction Group Attachment – Vehicle Specifications Dodge Charger.

windshield. The hood displayed severe scrapes and scratches. Scratch evidence extended onto the roofline and both the hood and roofline exhibited evidence of paint transfer.

Figure 19 depicts an image of the 3D point cloud as rendered from scans of the Mercedes in the FARO Scene software.

Figure 159: Screen capture depicting the Mercedes left side in the point cloud rendered from the three-dimensional scans through the FARO Scene software.

Table 6 provides certain dimensional data for the Mercedes.[10]

Table 6: Dimensional Data for 2018 Mercedes Benz C300W.

	Inches	Feet	
Overall length	184	15.30	
Wheelbase	112	9.30	
Front overhang	33	2.75	
Rear overhang	39	3.25	
Overall width	71	5.91	
Maximum height	57	4.75	
Curb weight			3,417 lbs.

4.8 2013 Lexus CT200H 4-door hatchback sedan

The seventh vehicle in the sequence was identified as a 2013 Lexus CT200H passenger vehicle (Lexus).

[10] Reference 4N6XPRT Systems Expert AutoStats v6.1.1 Reconstruction Group Attachment – Vehicle Specifications Mercedes.

Scene photographs depict that at final rest the Lexus was oriented in a northeastward direction at about a 53° angle relative to the roadway and occupied lane 1 of eastbound SR-202, approximately 323-feet from the area of impact.

The Lexus exhibited evidence of contact damage on the left side and rear. The driver's door was pushed inwards covering the entire door including the sill. The front of the door had been pulled rearward from the fender. The driver's side passenger door also exhibited evidence of contact damage. In the lower section extending from before the midline of the door to the sill was a large tear in the sheet metal exposing the interior of the door.

The damage to the rear of the Lexus extended the width of the vehicle as well as the height extending from the bottom of the bumper to the bottom of the rear window. The deformation was greater on the right side. The right quarter-panel was deformed forward into contact with the tire.

Figure 20 depicts an image of the 3D point cloud as rendered from scans of the Lexus in the FARO Scene software.

Figure 20: Screen capture depicting the Lexus from the left side as viewed in the point cloud rendered from the three-dimensional scans through the FARO Scene software.

Table 7 provides dimensional data for the Lexus.[11]

Table 7: Dimensional Data for 2013 Lexus CT200H.

	Inches	Feet	
Overall length	198	16.50	
Wheelbase	120	10.00	
Front overhang	38	3.16	
Rear overhang	40	2.58	
Overall width	75	6.25	
Maximum height	58	4.83	
Curb weight			3,950 lbs.

5 Electronic Event Data - General

During the post-collision inspections, the involved vehicles were examined to identify potential sources of electronic data that could be useful for collision analysis. Various systems in use on motor vehicles can have the capability to report certain parameters and/or event data that can be useful for analyzing a crash event or the vehicle's operating parameters preceding a crash.

Passenger vehicles, such as the seven involved in this collision, are equipped with an airbag control module (ACM). The main function of the ACM is to command the deployment of the vehicles supplement restraint system (SRS). Within the ACM is an event data recorder (EDR) that will record certain parameters in relation to an SRS activation. The passenger vehicles involved in the collision were equipped with pyrotechnically deployed SRS that included frontal airbags and seatbelt pretensioners. In the event of a deployment command, or non-deployment command where the command algorithm has enabled, certain data can be recorded. The recording of certain "event" data defines the capability of the airbag control module (ACM) as an EDR. The EDR functionality is compatible with the requirements of 49 Code of Federal Regulations Part 563.[12]

Pre-deployment, or pre-crash data is reported at discrete intervals extending back from the point where the ACM algorithm was enabled. Pre-crash include certain vehicle performance parameters. Crash data can include parameters such as SRS deployment timing, longitudinal change in velocity (Δv) and lateral acceleration as related to time zero in discrete intervals. The end of an event is typically the moment at which the cumulative Δv within a 20ms time period does not change by more than 0.5 miles per hour or the moment at which the crash detection algorithm of the ACM resets. Some events may lead to the recording of data over different durations as provided for by 49 CFR Part 563.

[11] Reference 4N6XPRT Systems Expert AutoStats v6.1.1 Reconstruction Group Attachment – Vehicle Specifications Lexus.

[12] According to Title 49 *Code of Federal Regulation*, Part 563 event data recorder (EDR) means a device or function in a vehicle that records the vehicle's dynamic time-series data during the time just prior to a crash event (e.g., vehicle speed vs. time) or during a crash event (e.g., delta-V vs. time), intended for retrieval after the crash event. For the purposes of this definition, the event data do not include audio and video data. 49 *CFR* Part 563 applies to vehicles manufactured after September 1, 2012.

AZDPS investigators assisted by NTSB were able to image six of the seven passenger vehicles involved in this collision, those vehicles included the Ford, Toyota, Nissan, Dodge, Mercedes, and Lexus. They imaged the ACM's utilizing the Bosch Crash Data Retrieval tool with software version 21.1.1. As the data was imaged from the ACM it was simultaneously interpreted by the CDR software and output in a user readable format. Regarding the Chevrolet, investigators were not able to image the ACM due to the extensive fire damage.

The commercial motor vehicle involved was powered by a diesel engine manufactured by Detroit Diesel Corporation. The engine is controlled by several controllers which are generally referred to as electronic control modules (ECMs). The ECMs may be capable of recording and storing engine data relating to parameters and event data. Depending on engine and vehicle setup the data may be recorded and stored on a single module or multiple modules. The modules can be imaged through commercially available software or require manufacturer assistance where the data is proprietary.

The Freightliner was equipped with a Detroit Diesel DD15 engine and a DDEC 13 ECM. There are two commercially available software packages authorized by Detroit Diesel – DDEC Reports and Diagnostic Link.[13] The data that is imaged by the software is produced in predefined report formats. The DDEC Reports software will report data related to last stop, hard braking, and fault code events. The data can include up to two hard brake events, one last stop record, and three most current fault codes. Regarding the Freightliner, the engine and cab area were consumed in the post-crash fire including the ECM.

The Freightliner was also outfitted with a Lytx DriveCam fleet management video system. The carrier provided NTSB investigators with a short video that depicted, in part, operation of the truck leading up to the impact with the Ford, which was at the end of the traffic cue, and leading up to the impact with the concrete median barrier. Analysis and other details of the video are addressed in the *NTSB Video Study* prepared by the Office of Research and Engineering.

Lytx DriveCam transmitted telemetry data which included vehicle location (latitude and longitude), speed, time, and heading at certain intervals. The data was conveyed to the NTSB investigators in a .csv file format.

5.1 Event Data Recorders

As documented above, AZDPS investigators imaged the data from the passenger vehicles which was interpreted by the Bosch Crash Data Retrieval software.[14] AZDPS provided NTSB investigators with all six reports for evaluation.

[13] DDEC – "Detroit Diesel Electronic Control". Diagnostic Link is synonymous with Detroit Diesel Diagnostic Link or DDDL.

[14] Software version 21.1.1 was used for the initial imaging and interpretation. A subsequent data interpretation was conducted utilizing version 21.2.1, the results were unchanged.

5.1.1 Ford Fusion Crash Data

For this vehicle the ACM was imaged direct to module[15] by the AZDPS investigators.[16] The data reported two events, that were determined to be associated with the collision events, with multiple restraint devices deployed. The report recorded deployment on the driver side first and second stage frontal airbags, seat belt pretensioner retractor and anchor, side thorax, side curtain, and knee bolster airbags. On the passenger side, first and second stage frontal airbags, seatbelt pretensioner retractor and anchor, side thorax, side curtain, and knee bolster airbags. The reported seatbelt status for the driver and front passenger was "buckled". The longitudinal crash pulse, recorded in 10ms intervals and for 250ms. The peak change in longitudinal velocity was reported as 62.1 miles per hour at 200ms. The lateral crash pulse peaked at 4.3 miles per hour at 130ms. The key-on timer at event time zero was reported as 1,112 seconds. There were no reported diagnostic trouble codes for the first event. The report indicated that the complete file was recorded indicating that the non-volatile memory could not be overwritten or deleted from the EDR.

The pre-crash data reported certain vehicle parameters for up to five seconds before time zero (algorithm enable) at ½ second intervals. While the data is reported at discrete ½ second intervals, it can be received or processed by the ACM asynchronously.

As conveyed in the report, the Ford exhibited constant speed of 0 miles per hour for the five seconds before time zero. The accelerator pedal reported 0%, service brake was "on", and the driver gear was reported as "drive".

Table 8 provides a summary of the Ford Fusion EDR pre-crash data.

Table 8: Summary of select pre-crash data from Ford Fusion ACM image report.

Time	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0
Speed MPH	0.0										
Accelerator Pedal %	0.0										
Service Brake	ON										
Engine RPM	764	762	760	768	760	762	758	762	766	758	766
ABS Activity	Non-engaged										
Drive Gear	Drive										

[15] Direct to module is an imaging process in which the Crash Data Retrieval tool cable is connected directly to the module connections.
[16] See Reconstruction Group Attachment – 2016 Ford Fusion EDR Report.

The second event reported by the ACM occurred 676ms after the first record. The complete file was recorded and the key-on timer at event time zero was reported as 1,113 seconds. There were seven faults present at the start of the event. The first reported fault code was related to the ACM recording the vehicle collision, storing, and locking the data in the EDR. The remaining six fault codes related to the deployment of the driver and passenger SRS.

5.1.2 Toyota Prius Crash Data

The ACM installed in the vehicle was a type 12EDR that had the ability to record and store multiple events. The events include two front/rear impacts, two side impacts, and two rollover events.[17] There were four events reported and were listed as most recent event, 1st prior event, 2nd prior event, and 3rd prior event. The most recent and 2nd prior events were listed as front/rear crash while 1st prior and 3rd prior were listed as side crash.

The ACM download report recorded deployment of the driver side curtain airbag as listed in the 3rd prior event which occurred 31ms after algorithm enable. The driver safety belt status was reported as "ON". The longitudinal crash pulse was reported in 10ms intervals for 250ms. The peak longitudinal velocity change was 50.7 miles per hour and was reported at 293ms.

The final pre-crash data were recorded in 0.5 second increments before module wake-up. As conveyed in the report, the vehicle exhibited a constant speed of 0 miles per hour beginning 4.65 seconds prior to deployment. The accelerator pedal % was 0, and the service brake was reported at "ON" until 0.15 seconds before trigger. At the 0.15 second data the service brake reported as "OFF".

Table 9 provides a summary of the Toyota Prius EDR pre-crash data.

Table 9: Summary of select pre-crash data from Toyota Prius ACM report.

Time	4.65	4.15	3.65	3.15	2.65	2.15	1.65	1.15	0.65	0.15	Trigger
Speed MPH	0										
Accelerator Pedal %	0										
Engine RPM	0										
Service Brake	ON									OFF	
Shift Position	D										

5.1.3 Nissan Altima Crash Data

The ACM for this vehicle was capable of recording two events. The report indicated that there were multiple events associated with the report. For there to be multiple events the two events

[17] See Reconstruction Group Attachment – 2013 Toyota Prius EDR Report.

must have occurred within 5 seconds or less of each other.[18] The report showed that the recording was complete. There were multiple supplemental systems deployed that were related to this collision. On both the driver's and passenger's side it was reported that the first and second stage frontal airbag, side curtain airbag, and seatbelt pretensioners deployed. Deployment for all the devices was triggered at 250ms after algorithm enable. The driver and front passenger seatbelt status was reported as "OFF (Unfastened)". The recorded peak change in longitudinal velocity was 54 miles per hour at 280ms. The recorded peak change in lateral velocity was 2 miles per hour at 297.5ms. The reported ignition cycle at the time of the crash was 13,309.

The pre-crash data was reported for up to five seconds before algorithm enable at 0.5 second intervals. The pre-crash parameters included vehicle speed, accelerator pedal percentage, engine RPM, service brake, and steering input. The Nissan exhibited a constant speed of 0 miles per hour and the service brake was reported as "ON (Brake Activated)".

Table 10 provides a summary of the Nissan Altima EDR pre-crash data.

Table 10: Summery of select pre-crash data from the Nissan Altima ACM report.

Time	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0
Speed MPH	0										
Accelerator Pedal %	0										
Engine RPM	600										
Service Brake	ON										
Steering Input	0										

5.1.4 Dodge Charger Crash Data

The ACM on the Dodge was manufactured by Bosch and could store up to three events. The report indicated there was two events associated with the recording with the second event occurring 0.3 seconds after the first.[19] The two events within the record were labeled as "Most Recent Event" and "1st Prior Event".[20] The ACM reported the system status at event for both records.

During the "Most Recent Event "the driver seatbelt status was "Not Buckled", and the front passenger seatbelt status was "Buckled". There were multiple supplemental systems deployed during this event. The driver's and passenger's 1st and 2nd stage airbags deployed; the 1st stage deployments were triggered at 28ms. The driver's 2nd stage was triggered at 58ms and the

[18] See Reconstruction Group Attachment – 2015 Nissan Altima EDR Report.
[19] See Reconstruction Group Attachment – 2015 Dodge Charger EDR Report.
[20] Most Recent Event – Data associated with the most recent event, typically the last event in a multiple event crash.
1st Prior Event – Data associated with the event prior to the most recent event, typically the first event in a two-event crash.

passenger's 2nd stage at 48ms after algorithm enable. The recorded peak change in longitudinal velocity was -13 miles per hour at 90ms. The recorded peak change in lateral velocity was -0.6 miles per hour at 0ms. The reported ignition cycle at the time of the crash was 13,689. During an event, if power to the ACM is lost, all or part of the event data record may be recorded. The restraint data is recorded first and then vehicle data. The "Most Recent Event" did not record vehicle data.

The "1st Prior Event" reported that the recorded file was complete. The seatbelt status matched the "Most Recent Event". The report showed that during this event both the driver and front passenger buckle and retractor pretensioners fired. The reported peak change in longitudinal velocity was 46 miles per hour at 262ms. The peak lateral change in velocity was reported as -2.5 miles per hour at 298ms.

The pre-crash data was reported for up to five seconds before algorithm enable at 0.1 second intervals. The pre-crash parameters included vehicle speed, accelerator pedal percentage, engine RPM, service brake, and steering input. The Dodge exhibited a constant speed of 0 miles per hour and the service brake was reported as "ON (Brake Activated)".

Table 11 provides a summary of the Dodge Charger EDR pre-crash data.

Table 11: Summary of select pre-crash data from the Dodge Charger ACM report.

Time	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.1
Speed MPH	0										
Accelerator Pedal %	0										
Engine RPM	602	604	605	603	608	594	602	606	610	602	597
Service Brake	ON										
Steering Input	-1										

5.1.5 Mercedes C300W Crash Data

The EDR within the Mercedes ACM has the capability of recording and storing up to six events. An event begin for this module is "time zero" and is initiated by a change in longitudinal velocity that equals or exceeds 0.5 miles per hour over a 20ms time frame. Or a change in lateral velocity that equals or exceeds 0.5 miles per hour over a 5ms time frame. It can also be initiated by the wake-up of the front, side, or rear algorithm. The report indicated that there were four events associated with the recording.[21] The multiple events are reported beginning at "Record 1" and continue in chronological order therefore "Record 1" is the most recent event. The longitudinal and lateral crash pulse, recorded in 10ms intervals and for 250ms.

"Record 4" was the first recorded collision in the multievent. The event type was reported as "rear", the event counter was reported at "1" and the recording was "Completed Successfully".

[21] See Reconstruction Group Attachment – 2018 Mercedes EDR Report.

For “Record 4” the report showed that the driver’s pretensioner was commanded to deploy at 61ms. The seatbelt status of the driver was “Belted”, and the passenger seat was reported as “Empty”. The peak longitudinal velocity change was 41 miles per hour and was reported at 288ms. The peak lateral velocity change was -1.2 miles per hour at 235ms. The recorded ignition cycle at crash was reported at 20,347.

Pre-crash data reported for “Record 4” was recorded for up to 5 seconds at 0.5 second intervals. The pre-crash parameters included vehicle speed, accelerator pedal percentage, and service brake activation. For the 5 seconds before the crash event the Mercedes was at a constant speed of 0 miles per hour. The accelerator percentage was reported to be 0% and the service brake was activated.

“Record 3” was the next event in the recorded multievent. It was reported that the event occurred 302ms after “Record 4”, was a frontal event, with a file recording reported as “Completed Successfully”. The peak longitudinal velocity change was -14.3 miles per hour at 300ms. The peak lateral velocity change was 11.8 miles per hour at 300ms. The report for “Record 3” showed multiple supplemental system deployments. The driver frontal airbag was commanded to deploy, 1st stage at 16ms and the 2nd stage at 21ms. The driver’s side curtain/tube airbag was commanded to deploy at 29ms, and the passenger side curtain/tube airbag deployed at 48ms. The driver’s 3rd pretensioner was deployed at 11ms. The pre-crash data for “Record 3” reported the same data as that of “Record 4”.

The report for “Record 2” showed it was a frontal event which occurred 674ms after “Record 3”. The file recording was “Completed Successfully”. There were no reported deployments of the supplemental systems. The peak longitudinal velocity change was reported as -15.5 miles per hour at 248ms. The peak lateral velocity change was -3.1 miles per hour at 300ms.

Pre-crash data for “Record 2” reported that at time sample 0.0 the vehicle speed was 6 miles per hour and the service brake was reported as “off”. At time sample 0.5 the vehicle speed was reported as 4 miles per hour.

Table 12 provides a summary of Mercedes C300W EDR pre-crash data for “Record 2”

Table 12: Summary of pre-crash data from Mercedes C300W “Record 2”

Time	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0
Speed (MPH)	0									4	6
Accelerator Pedal %	0										
Service Brake	ON										OFF

The final report was “Record 1” or most recent event. The report indicated that the event was a frontal event which occurred 3,460ms after “Record 3”. There were no reported supplemental system deployments associated with this event. The file recorded reported that it was

"Completed Successfully". The peak longitudinal velocity change was reported as -4.3 miles per hour at 158ms with a peak lateral velocity change as -6.8 miles per hour at 208ms.

"Record 1" pre-crash data showed that the Mercedes had accelerated to 35 miles per hour and then decelerated to 6 miles per hour at time sample 0.0. The report showed that at 2.5 seconds after algorithm enable the service brake transitioned from "On" to "Off" and stayed off for the remainder of the record.

Table 13 provides a summary of EDR pre-crash data for Mercedes C300W "Record 1"

Table 13: Summary of pre-crash data from Mercedes C300W "Record 1"

Time	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0.0
Speed (MPH)	0		4	6	11	22	29	35	24	17	6
Accelerator Pedal %	0										
Service Brake	ON			OFF	ON	OFF					

5.1.6 Lexus CT200H Crash Data

The ACM for the Lexus was a generation 13EDR that had the capability of recording multiple events. The report showed there were 3 events stored related to the crash event.[22] There was a front/rear event and two side events. In the report the events are labeled as "Most Recent Event", "1st Prior Event", and "2nd Prior Event". The ignition cycle for all three events was reported as 17,433 indicating that all three recordings are related to the same event. The recording status was "Complete". The driver's seatbelt status was reported as "ON", and the front passenger seat was reported as "Not Occupied".

The "2nd Prior Event" was the front/rear event. The report showed that the peak change in longitudinal velocity was 23.8 miles per hour reported at 160ms. The pre-crash data was recorded in ½ second intervals for five seconds. The report indicated that the time from pre-crash to trigger (time zero) was 1ms. The first-time sample was reported at 0.1 seconds after which the ½ second reporting began for the 5 seconds of pre-crash data. From 4.6 seconds to 0.6 seconds the vehicle was at a constant speed of 0 miles per hour. At 0.1 seconds the vehicle was reported to be traveling 3.1 miles per hour. At time zero the report showed the vehicle traveling at 3.7 miles per hour. The service brake status transitioned from "ON" to "OFF" at 1.1 seconds and stayed "OFF" until time zero.

Table 14 provides a summary of Lexus CT200H EDR pre-crash data from the "2nd Prior Event"

Table 14: Summary of pre-crash data from Lexus CT200H 2nd Prior Event

Time	4.6	4.1	3.6	3.1	2.6	2.1	1.6	1.1	0.6	0.1	Trigger

[22] See Reconstruction Group Attachment – 2013 Lexus EDR Report.

Speed MPH	0		3.1	3.7
Accelerator Pedal %	0	51.5	90.0	96.0
Engine RPM	0		900	
Service Brake	ON	OFF		
Shift Position	D			

The "Most Recent Event" was reported as a left side event. There were multiple deployments of the supplemental restraint system. The report showed that the driver's side airbag, side curtain airbag and pretensioner were all commanded to deploy at 3ms. The lateral acceleration was reported from multiple satellite sensors. Those sensors were located at the front door, B-pillar, C-pillar, and the floor. The floor sensor was located within the ACM. The peak lateral acceleration, as reported by the floor sensor, was 114.9 m/sec^2 at 48ms.

The reported time from pre-crash to trigger (time zero) was 500ms. The pre-crash data began at time zero and then recorded at 0.5 second intervals for five seconds. The vehicles speed was reported at 0 miles per hour until 1 second when it showed 3.1 miles per hour. At 0.5 seconds the report showed the speed at 26.1 miles per hour and at time zero 3.7 miles per hour.

Table 15 provides a summary of Lexus CT200H EDR pre-crash data from the "Most Recent Event"

Table 15: Summary of pre-crash data from Lexus CT200H Most Recent Event

Time	5	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	Trigger
Speed MPH	0								3.1	26.1	3.7
Accelerator Pedal %	0							51.5	90.0	0	
Engine RPM	0								900	1,000	800
Service Brake	ON						OFF				
Shift Position	D										

5.1.7 Freightliner Cascadia Data

Arizona Milk Transport provided NTSB investigators with data received via an onboard video recording device (Lytx DriveCam). The data consisted of vehicle position via GNSS latitude and longitude geographic coordinates, speed in kilometers per hour, time (UNIX) stamp and a vehicle heading in degrees. Refer to *NTSB Video Study* prepared by the Office of Research and Engineering for further details about the video.

It was determined that the data covered approximately 8 seconds of pre-crash data from 10:07:22 PM to 10:07:40 PM on 6/09/2021 when adjusted for the local time zone. Generally, the data was reported at 1 second intervals (50% of the data) although some variance was observed in the last 50% of the data. There were two separate intervals that reported during the same time stamp. The remaining 5 intervals were reported in the 1 second intervals.

The data provided showed that the combination unit had been traveling at an average speed of 63 miles per hour during the 9 seconds prior to the collision. While the speed was reported during the 1 second interval, the reported value was consistent with the calculated average speed between the GPS coordinates which was 62 miles per hour.

The Lytx video system was designed to activate a recording when an event is triggered by a certain incident. The incidents include, hard braking, swerving, or a collision. There was no hard brake event or any significant change in vehicle heading, that would have indicated a swerving event, prior to the collision.

Table 16 depicts data reported during the 9 seconds of pre-crash travel. The GPS locations as reported by the Lytx Drive Cam did not align with eastbound SR-202. However, the intervals between the reported coordinates were consistent with the speed and distance traveled. Also, the path of travel and the indicated speed reduction were consistent with the scene evidence.

Table 16: Freightliner position and speed reported by onboard Lytx video system

Date / Time Stamp	Reporting Interval (sec)	Latitude	Longitude	Reported Speed (mph)
6/7/2021 10:07:22	1	33.72642	-112.5567583	64
6/7/2021 10:07:23	1	33.72634167	-112.5564683	63
6/7/2021 10:07:24	1	33.72626333	-112.5561783	63
6/7/2021 10:07:25	1	33.72618833	-112.5558867	64
6/7/2021 10:07:26	1	33.726115	-112.5555967	63
6/7/2021 10:07:27	1	33.72604167	-112.5553083	62
6/7/2021 10:07:28	1	33.72597	-112.55502	62
6/7/2021 10:07:29	1	33.72589667	-112.5547333	62
6/7/2021 10:07:30	1	33.725825	-112.5544483	62

D. REFERENCES

- NTSB Highway Factors Group factual report
- NTSB Vehicle Factors Group factual report
- NTSB Video Study report

E. DOCKET MATERIAL

The following attachments are included in the docket for this investigation:

Reconstruction Group Attachment – Vehicle Specifications Ford Fusion

Reconstruction Group Attachment – Vehicle Specifications Toyota Prius

Reconstruction Group Attachment – Vehicle Specifications Chevrolet Equinox

Reconstruction Group Attachment – Vehicle Specifications Nissan Altima

Reconstruction Group Attachment – Vehicle Specifications Dodge Charger

Reconstruction Group Attachment – Vehicle Specifications Mercedes

Reconstruction Group Attachment – Vehicle Specifications Lexus

Reconstruction Group Attachment – 2016 Ford Fusion EDR Report

Reconstruction Group Attachment – 2013 Toyota Prius EDR Report

Reconstruction Group Attachment – 2015 Nissan Altima EDR Report

Reconstruction Group Attachment – 2015 Dodge Charger EDR Report

Reconstruction Group Attachment – 2018 Mercedes EDR Report

Reconstruction Group Attachment – 2013 Lexus EDR Report

END OF REPORT

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