



Highway Factors Photographs 1 through 18

Fort Worth, TX

HWY21FH005

(19 pages)



Highway Factors Photo 1 - View of I-35W southbound toll lanes standing on the left paved shoulder immediately north of the crash scene illustrating patches of ice on the roadway surface and top of the concrete barrier separating the I-35W southbound toll lanes and I-35W northbound toll lanes with the downtown Fort Worth skyline shown in the background looking to the south (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 7:31 a.m.)



Highway Factors Photo 2 - View of northern end of the I-35W southbound toll lanes crash scene standing on the left paved shoulder of the I-35W southbound general use lanes looking to the south (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 7:33 a.m.)



Highway Factors Photo 3 – Another view of northern end of the I-35W southbound toll lanes crash scene standing on the left paved shoulder of the I-35W southbound general use lanes looking to the south (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 7:34 a.m.)



Highway Factors Photo 4 – View of damaged vehicles at the northern end of the I-35W southbound toll lanes crash scene standing on the left paved shoulder of the I-35W southbound general use lanes looking to the southeast (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 7:35 a.m.)



Highway Factors Photo 5 – Another view of damaged vehicles at the northern end of the I-35W southbound toll lanes crash scene standing on the left paved shoulder of the I-35W southbound general use lanes looking to the southeast (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 7:35 a.m.)



Highway Factors Photo 6 – View of damaged vehicles at the northern end of the I-35W southbound toll lanes crash scene standing on the left paved shoulder of the I-35W southbound general use lanes looking to the northeast (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 7:36 a.m.)



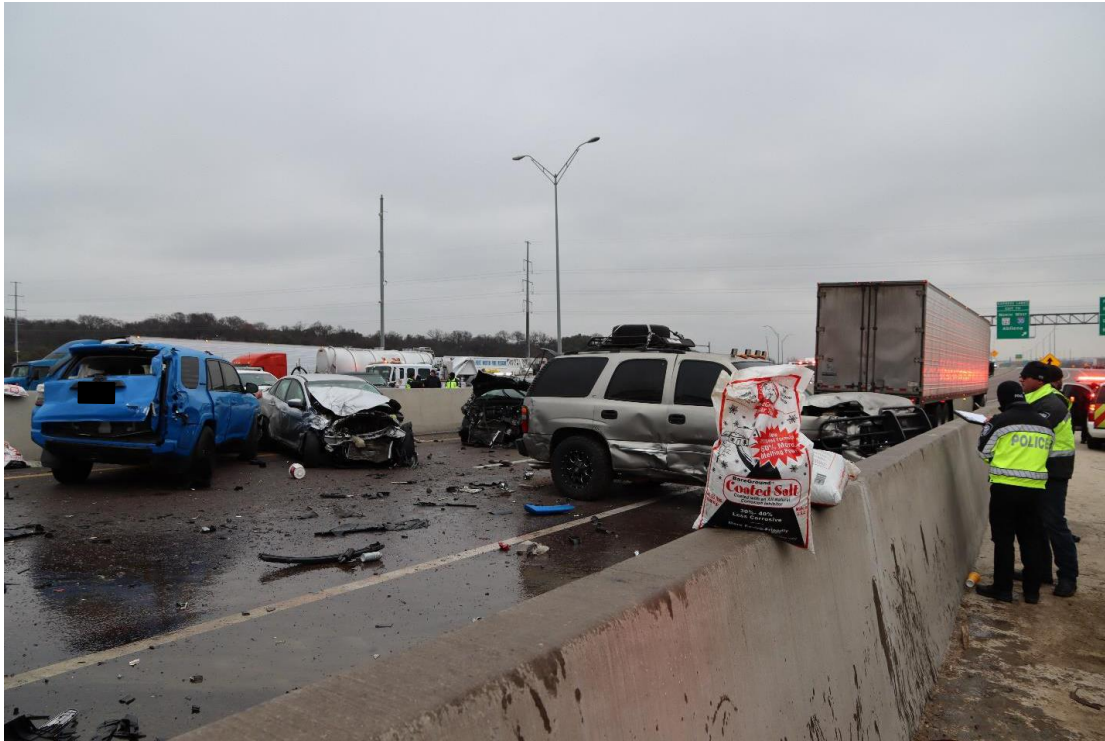
Highway Factors Photo 7 – View of damaged vehicles at the northern end of the I-35W southbound toll lanes crash scene standing above the white pavement marking separating the right paved shoulder from the right travel lane of the I-35W southbound toll lanes looking to the north (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 7:38 a.m.)



Highway Factors Photo 8 – View of damaged vehicles at the northern end of the I-35W southbound toll lanes crash scene standing above the travel lanes of the I-35W southbound toll lanes looking to the south (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 7:39 a.m.)



Highway Factors Photo 9 – View of damaged vehicles at the midsection of the I-35W southbound toll lanes crash scene standing on the left paved shoulder of the I-35W southbound general use lanes looking to the south (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 7:50 a.m.)



Highway Factors Photo 10 - View of damaged vehicles at the southern end of the I-35W southbound toll lanes crash scene standing on the left paved shoulder of the I-35W southbound general use lanes illustrating bags of coated salt on top of the concrete barrier used by first responders to treat ice on the roadway surface looking to the southeast (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 8:03 a.m.)



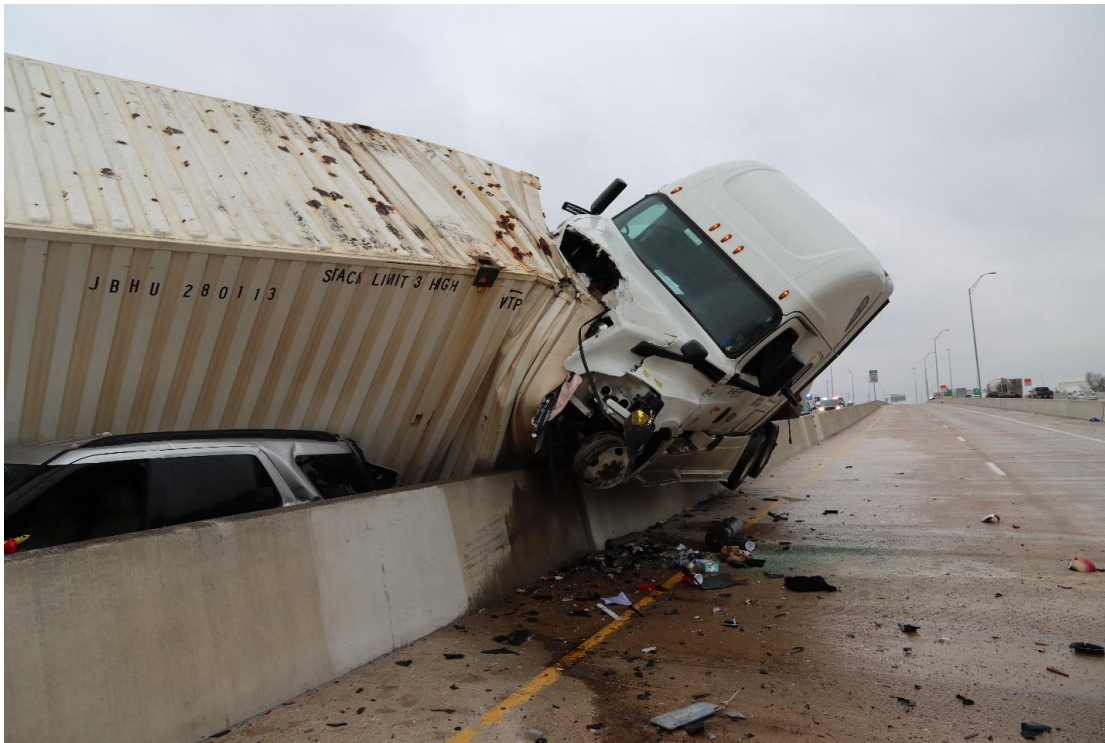
Highway Factors Photo 11 – View of damaged vehicles at the southern end of the I-35W southbound toll lanes crash scene standing on the left paved shoulder of the I-35W southbound general use lanes illustrating bags of coated salt on top of the concrete barrier used by first responders to treat ice on the roadway surface looking to the northeast (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 8:04 a.m.)



Highway Factors Photo 12 – View of damaged vehicles at the southern end of the I-35W southbound toll lanes crash scene standing on the left paved shoulder of the I-35W southbound toll lanes looking to the north (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 8:08 a.m.)



Highway Factors Photo 13 – View of damaged vehicles at the southern end of the I-35W southbound toll lanes crash scene standing on the left paved shoulder of the I-35W northbound toll lanes illustrating bags of coated salt on top of the concrete barrier used by first responders to treat ice on the roadway surface looking to the northwest (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 8:30 a.m.)



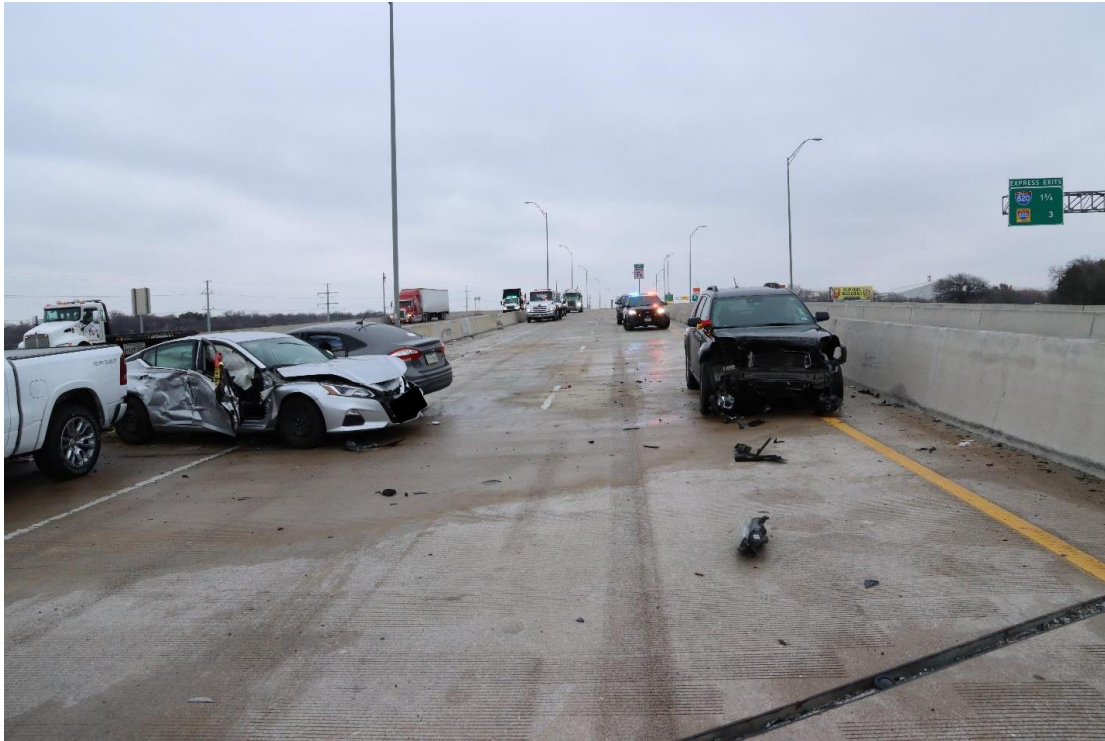
Highway Factors Photo 14 – View of damaged tractor pulling a FedEx trailer hanging over the concrete barrier separating the I-35W southbound toll lanes and I-35W northbound toll lanes standing on the left travel lane of the I-35W northbound toll lanes looking to the north (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 8:38 a.m.)



Highway Factors Photo 15 – View of damaged tractor pulling a FedEx trailer hanging over the concrete barrier separating the I-35W southbound toll lanes and I-35W northbound toll lanes standing on the right travel lane of the I-35W northbound toll lanes looking to the south (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 8:40 a.m.)



Highway Factors Photo 16 - View of damaged tractor pulling a FedEx trailer hanging over the concrete barrier separating the I-35W southbound toll lanes and I-35W northbound toll lanes standing on the left paved shoulder of the I-35W northbound toll lanes looking to the south (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 8:40 a.m.)



Highway Factors Photo 17 – View of damaged vehicles at the northern end of the I-35W southbound toll lanes crash scene standing on the left travel lane of the I-35W southbound toll lanes looking to the north (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 8:51 a.m.)



Highway Factors Photo 18 – View of damaged vehicles at the northern end of the I-35W southbound toll lanes crash scene standing on the right travel lane of the I-35W southbound toll lanes illustrating the ice on the roadway surface looking to the southwest (Source: Fort Worth Police Department. Photo taken on February 11, 2021, at approximately 6:27 p.m.)

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division

April 14, 2022

Video

Specialist's Factual Report By Kyle Garner

1. EVENT

Location: Fort Worth, Texas
Date: February 11, 2021
Vehicle: Multiple
Operator: Multiple
NTSB Number: HWY21FH005

For a summary of the accident, refer to the *Crash Summary Report* which is available in the docket for this investigation.

2. GROUP

A video group was not convened¹.

3. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division received the following video files documenting the accident:

- Four MPEG-4 (.mp4) video files from two traffic cameras located near the accident site
- Two .mp4 video files downloaded from an onboard image recorder installed on a combination vehicle² that was involved in the accident
- One .mp4 video file from a bystander that recorded portions of the accident sequence with their cell phone

3.1. Traffic Camera Videos

Two traffic cameras near the accident site recorded video data leading up to and including the accident. Four video files, two from each camera, were transmitted electronically to the NTSB for review.

The video files contained data from approximately 05:50 to 06:30 central standard time (CST) on the day of the accident. For each camera, approximately 7 seconds of video data were lost between the end of the first file and the start of the second. There was no audio data included in any traffic camera video file. Further information about the video files is provided in Table 1.

¹On August 23, 2021 a meeting with the National Transportation Safety Board's (NTSB) Office of Highway Safety staff was convened to discuss the proposed topic areas of the summary report.

²This specific combination vehicle consisted of a truck tractor pulling a FedEx Ground semi-trailer.

Table 1. Traffic camera video file information.

Camera	Filename	Duration ³	FPS ⁴	Pixel Dimension
1	1539_5226_20210211_0550-610.mp4	00:19:48	30 ⁵	720 x 480
	1540_5226_20210211_0610-0630.mp4	00:19:55	30	
2	1559_5229_20210211_0550-610.mp4	00:20:08	30	1280 x 720
	1560_5229_20210211_0610-0630.mp4	00:20:01	30	

Traffic camera 1 was located on the east side of I-35W, south of the Yucca Avenue exit. Camera 1 could be rotated by an operator remotely to view toward the north or south. Figure 1 is a screenshot of camera 1's view when it was facing toward the south at the beginning of the recording.



Figure 1. View of camera 1 - facing south.

Figure 2 is a screenshot of camera 1's view after it was remotely rotated by an operator and faced toward the north about 22 minutes into the recording.

³Duration in *HH:MM:SS* format, where HH = hours, MM = minutes, SS = seconds

⁴FPS = frames per second, from metadata in file

⁵This video file, as received, was 62fps and 00:09:35 in duration (played at about 2x speed compared to the other files). The file was converted to 30fps to align with the other video files and playback in real time.

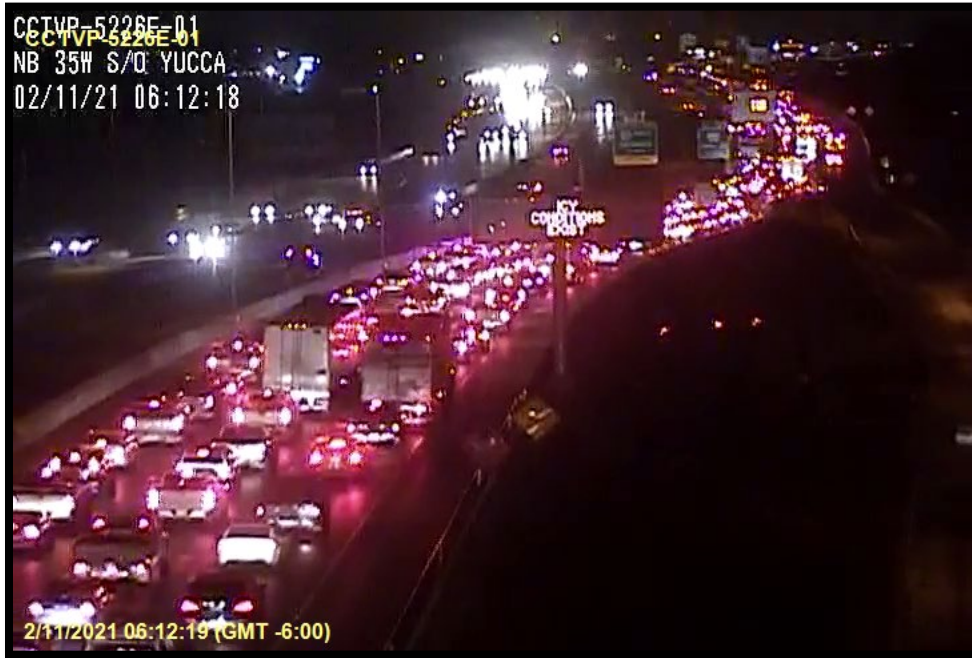


Figure 2. View of camera 1 - facing north.

Traffic camera 2 was located on the east side of I-35W, north of the Yucca Avenue exit. Camera 2 was fixed to view north toward an express lane's electronic variable pricing sign and could not be rotated. Figure 3 is a screenshot of camera 2's view for the duration of the recording.



Figure 3. View of camera 2 for the duration of recording - facing north.

Figure 4 is a map showing the location of the traffic cameras and the extent of the crash scene. The elevated portion of the roadway is also noted for reference.



Figure 4. Traffic camera locations and extent of the accident scene⁶

3.1.1. Time Correlation

The traffic camera videos displayed date, local time, and location information in the upper-left corner and date and local time information in the lower-left corner of the recording. The time stamps were nearly synchronized, however, the time stamp in the lower-left corner changed the second value a few frames faster than the time stamp in the upper-left corner. For this summary, the difference between the two time stamps was not significant and the time stamp in the upper-left corner of the recording, in CST, was used for all observations in Table 2 and Table 3.

⁶Lighting and weather conditions in the Google Earth overlay are not representative of conditions at the time of the accident.

3.1.2. Traffic Camera Videos - Summary of Recorded Events

The following events were observed at the indicated times as shown in Table 2 for traffic camera 1 and traffic camera 2. Only selected events deemed pertinent to the investigation are included in the tables.

In addition, at the start of each recording and every 5 minutes thereafter, a nested table indicating the traffic conditions in each travel lane is provided. The traffic conditions are categorized as follows:

- **Green (G)** – vehicles were moving near or above normal or ‘free-flow’ speeds, with little to no congestion
- **Yellow (Y)** – vehicles were moving slower than normal or ‘free-flow’ speeds, minor congestion
- **Red (R)** – vehicles were completely stopped or in stop-and-go traffic, major congestion

Table 2. Observations from traffic camera 1.

Time, CST	Observation from traffic camera 1												
05:50:05	<p><i>[Start of traffic camera 1, video 1]</i></p> <p>The camera was facing toward the south. The lighting conditions were dark. The left side of the screen was the northbound (NB) general use lanes, and the right side of the screen was the southbound (SB) general use lanes. The tolled NB and SB lanes were located between the general use lanes.</p> <table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use</th> </tr> </thead> <tbody> <tr> <td>G</td> <td>G</td> <td>G</td> <td>G</td> </tr> </tbody> </table> <p>A timestamp in the upper-left corner of the video indicated that the date was February 11, 2021.</p>	SB		NB		General Use	Tolled	Tolled	General Use	G	G	G	G
SB		NB											
General Use	Tolled	Tolled	General Use										
G	G	G	G										
05:55:00	<table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use</th> </tr> </thead> <tbody> <tr> <td>G</td> <td>G</td> <td>G</td> <td>G</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use	G	G	G	G
SB		NB											
General Use	Tolled	Tolled	General Use										
G	G	G	G										
05:59:55	Vehicles traveling in the SB tolled lanes began to use their hazard warning lights.												
06:00:00	<table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use</th> </tr> </thead> <tbody> <tr> <td>G</td> <td>G</td> <td>G</td> <td>G</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use	G	G	G	G
SB		NB											
General Use	Tolled	Tolled	General Use										
G	G	G	G										

Time, CST	Observation from traffic camera 1												
06:00:18	A combination vehicle ⁷ traveling in the SB general use lanes passed the camera with their hazard warning lights on.												
06:00:52	Most of the vehicles traveling in the SB general use lanes came into the camera view with their hazard warning lights on. The speed of the vehicles traveling in the SB general use lanes was greatly reduced compared to the beginning of the video.												
06:05:00	<table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>G</td> <td>G</td> <td>G</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use	Y	G	G	G
SB		NB											
General Use	Tolled	Tolled	General Use										
Y	G	G	G										
06:07:12	An ambulance was seen traveling north in the NB general use lanes.												
06:07:48	Traffic in the NB general use lanes increased in volume and began to slow.												
06:09:52	Additional emergency vehicles were seen traveling north in the NB general use lanes toward the accident site.												
06:09:59	<p>Traffic in the NB general use lanes had slowed to a near-stop. Traffic in the SB general use and SB tolled lanes had slowed considerably compared to the beginning of the video. Traffic in the NB tolled lanes was slower than at the beginning of the video but was otherwise unaffected.</p> <p><i>[End of traffic camera 1, video 1]</i></p>												
06:10:06	<p><i>[Start of traffic camera 1, video 2]</i></p> <p>The camera was facing toward the south. The lighting conditions were dark. The left side of the screen was the NB general use lanes, and the right side of the screen was the SB general use lanes. The tolled NB and SB lanes were located between the general use lanes.</p> <table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>Y</td> <td>G</td> <td>R</td> </tr> </tbody> </table> <p>Traffic in the NB general use lanes was stop-and-go. Multiple emergency vehicles were traveling NB in the NB general use lanes toward the accident site. Traffic in the SB general use and SB tolled lanes was also moving slowly. Most vehicles had their hazard warning lights on.</p>	SB		NB		General Use	Tolled	Tolled	General Use	Y	Y	G	R
SB		NB											
General Use	Tolled	Tolled	General Use										
Y	Y	G	R										

⁷For this report, unless otherwise specified, a *combination vehicle* is defined as a truck tractor pulling a semi-trailer.

Time, CST	Observation from traffic camera 1												
06:11:30	<p>The camera panned to the right and was now facing north toward the accident site. The left side of the screen was the SB general use lanes, and the right side of the screen was the NB general use lanes. The tolled NB and SB lanes were located between the general use lanes.</p> <p>Traffic in the NB general use lanes was stopped. Lights from emergency vehicles were visible in the distance. A variable message sign (VMS) displayed "ICY CONDITIONS EXIST, PLEASE USE CAUTION".</p>												
06:11:44	The camera continued to pan and zoom in to the accident site.												
06:11:55	One vehicle in the SB tolled lanes slid ⁸ , spun 180°, and stopped facing NB toward oncoming traffic. Other vehicles began to maneuver around the stopped vehicle.												
06:12:16	One vehicle in the SB tolled lanes began to slide and spin. The vehicle stopped perpendicular to the direction of the roadway after striking the concrete barrier between the SB tolled lanes and SB general use lanes.												
06:12:20	A vehicle in the SB general use lanes began to spin and traveled across all traffic lanes before striking a concrete barrier. Traffic in the SB general use lanes began to slow to avoid a collision with the disabled vehicle.												
06:13:00	Multiple vehicles in the SB tolled lanes began to slide and crash into the concrete barriers. A combination vehicle (CV 1) began to collide with all the disabled vehicles and came to a stop blocking the SB tolled lanes. Other vehicles and an additional combination vehicle (CV 2) began to slide and collided with vehicles stopped behind CV 1.												
06:13:52	Due to additional collisions, CV 1 was no longer blocking the SB tolled lanes. Vehicles began to pass through the accident site and continue SB in the SB tolled lanes.												
06:15:00	<table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use</th> </tr> </thead> <tbody> <tr> <td style="background-color: red; color: white;">R</td> <td style="background-color: red; color: white;">R</td> <td style="background-color: yellow;">Y</td> <td style="background-color: red; color: white;">R</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use	R	R	Y	R
SB		NB											
General Use	Tolled	Tolled	General Use										
R	R	Y	R										
06:15:01	Additional collisions were noted in the SB tolled lanes. These collisions caused the roadway to be blocked. Additional vehicles traveling in the SB tolled lanes could be seen sliding and crashing into the end of the queue. The SB tolled lanes remained blocked for the duration of the recording.												
06:16:05	Vehicles continued to collide with the queue of previously crashed vehicles in the SB tolled lanes. Emergency vehicles were seen in the SB general use lanes traveling SB toward the accident site.												

⁸For this report, the term *slid* or *slide* is defined as moving smoothly along the roadway surface while maintaining physical contact with it.

Time, CST	Observation from traffic camera 1												
06:16:31	A firetruck was seen traveling north in the NB tolled lanes toward the accident site.												
06:17:01	The firetruck stopped in the NB tolled lanes near the accident site. Traffic behind the firetruck began to slow to a stop. Traffic in the NB tolled lanes remained stopped for the duration of the recording.												
06:20:00 to 06:29:58	<p data-bbox="397 422 1445 485">For the remainder of the recording, all lanes of traffic had stopped. Emergency vehicles continued to travel toward the accident site.</p> <table border="1" data-bbox="418 520 1425 625"> <thead> <tr> <th colspan="2" data-bbox="418 520 922 552">SB</th> <th colspan="2" data-bbox="922 520 1425 552">NB</th> </tr> <tr> <th data-bbox="418 552 670 583">General Use</th> <th data-bbox="670 552 922 583">Tolled</th> <th data-bbox="922 552 1174 583">Tolled</th> <th data-bbox="1174 552 1425 583">General Use</th> </tr> </thead> <tbody> <tr> <td data-bbox="418 583 670 625">R</td> <td data-bbox="670 583 922 625">R</td> <td data-bbox="922 583 1174 625">R</td> <td data-bbox="1174 583 1425 625">R</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use	R	R	R	R
SB		NB											
General Use	Tolled	Tolled	General Use										
R	R	R	R										
06:29:59	<i>[End of traffic camera 1, video 2]</i>												

Table 3. Observations from traffic camera 2.

Time, CST	Observation from traffic camera 2												
05:49:52	<p><i>[Start of traffic camera 2, video 1]</i></p> <p>The camera was facing north. The lighting conditions were dark. An express lanes electronic variable pricing sign obstructed the view of a large portion of the roadway. A timestamp in the upper-left corner of the video indicated that the date was February 11, 2021.</p> <p>The left side of the screen was the SB general use lanes. The tolled SB and NB lanes were located to the right of the SB general use lanes. The NB general use lanes were not visible.</p> <table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use⁹</th> </tr> </thead> <tbody> <tr> <td>G</td> <td>G</td> <td>G</td> <td>N/A</td> </tr> </tbody> </table> <p>Traffic was moving freely in all lanes.</p>	SB		NB		General Use	Tolled	Tolled	General Use ⁹	G	G	G	N/A
SB		NB											
General Use	Tolled	Tolled	General Use ⁹										
G	G	G	N/A										
05:55:00	<table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use⁹</th> </tr> </thead> <tbody> <tr> <td>G</td> <td>G</td> <td>G</td> <td>N/A</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use ⁹	G	G	G	N/A
SB		NB											
General Use	Tolled	Tolled	General Use ⁹										
G	G	G	N/A										
05:59:44	<p>Vehicles in the SB general use lanes began to slide on the roadway. One vehicle struck another, spun 180°, and was facing oncoming traffic. Other vehicles in the SB general use lanes began to slow and pass the vehicles that had collided.</p>												
06:00:00	<table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use⁹</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>G</td> <td>G</td> <td>N/A</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use ⁹	Y	G	G	N/A
SB		NB											
General Use	Tolled	Tolled	General Use ⁹										
Y	G	G	N/A										
06:00:19	<p>A combination vehicle traveling in the SB general use lanes began to slide. The combination vehicle struck a concrete barrier on the right side of the roadway and then started to spin before going off-camera.</p>												
06:00:40	<p>Traffic in the SB general use lanes continued to slow. Traffic in the SB tolled lanes and NB tolled lanes continued normally.</p>												
06:04:21	<p>A vehicle in the SB tolled lanes slid and struck the concrete barrier on the right side of the roadway.</p>												
06:04:51	<p>Traffic in the SB general use lanes had slowed to a near stop.</p>												

⁹The NB general use lanes were not visible in this camera view.

Time, CST	Observation from traffic camera 2												
06:05:00	<table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use¹⁰</th> </tr> </thead> <tbody> <tr> <td>R</td> <td>G</td> <td>G</td> <td>N/A</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use ¹⁰	R	G	G	N/A
SB		NB											
General Use	Tolled	Tolled	General Use ¹⁰										
R	G	G	N/A										
06:06:54	A vehicle in the SB tolled lanes slid and struck the concrete barrier on the right side of the roadway. The vehicle then stopped sliding and continued travel in the right lane of the SB tolled lanes before going off-camera.												
06:07:26	A vehicle in the SB tolled lanes slid and struck the concrete barrier on the right side of the roadway. The vehicle continued to travel down the roadway while spinning before going off-camera.												
06:09:25	A vehicle traveling in the left lane of the SB tolled lanes began to slide. The vehicle traveled across the right lane and struck the concrete barrier on the right side of the roadway. It continued to slide and spin down the roadway before going off-camera.												
06:09:59	<i>[End of traffic camera 2, video 1]</i>												
06:10:07	<p><i>[Start of traffic camera 2, video 2]</i></p> <p>The camera was facing north. The lighting conditions were dark. An express lanes electronic variable pricing sign obstructed the view of a large portion of the roadway.</p> <p>The left side of the screen was the SB general use lanes. The tolled SB and NB lanes were located to the right of the SB general use lanes. The NB general use lanes were not visible.</p> <table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use¹⁰</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>G</td> <td>G</td> <td>N/A</td> </tr> </tbody> </table> <p>Traffic in the SB general use lanes was moving slowly. Traffic in the SB and NB tolled lanes was moving freely.</p>	SB		NB		General Use	Tolled	Tolled	General Use ¹⁰	Y	G	G	N/A
SB		NB											
General Use	Tolled	Tolled	General Use ¹⁰										
Y	G	G	N/A										
06:11:22	A vehicle in the SB general use lanes slowly slid down the roadway, while vehicles behind slowed and maneuvered around the sliding vehicle.												
06:12:04	A vehicle in the right lane of the SB tolled lanes slid and spun down the roadway before going off-camera.												
06:12:15	A vehicle traveling in the right lane of the NB tolled lanes slid across the left lane and impacted the concrete barrier on the left side of the roadway.												

¹⁰The NB general use lanes were not visible in this camera view.

Time, CST	Observation from traffic camera 2												
06:12:51	A vehicle traveling in the SB tolled lanes began to slide and slowed to a stop in the middle of the roadway. Multiple other vehicles traveling in the SB tolled lanes began to slide. The vehicles slid out of camera view.												
06:13:07	A combination vehicle slid sideways down the SB tolled lanes and out of the camera's view. Multiple other vehicles slid and spun down the SB tolled lanes behind the combination vehicle.												
06:13:38	Another combination vehicle slid sideways down the SB tolled lanes, impacted multiple vehicles, and went out of view of the camera. Traffic in the NB tolled lanes began to slow.												
06:15:00	<table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use¹¹</th> </tr> </thead> <tbody> <tr> <td>R</td> <td>G</td> <td>Y</td> <td>N/A</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use ¹¹	R	G	Y	N/A
SB		NB											
General Use	Tolled	Tolled	General Use ¹¹										
R	G	Y	N/A										
06:13:39 to 06:16:44	Vehicles continued to slide down the SB tolled lanes and out of view of the camera. One lane of traffic in the SB general use lanes began to slowly move again.												
06:16:46	A vehicle in the right lane of the SB tolled lanes began to slide toward the left. The vehicle then struck the concrete barrier on the left side of the roadway. The vehicle was then struck by another sliding vehicle behind it. Both vehicles then went out of view of the camera.												
06:17:48	A combination vehicle traveling in the right lane of the SB tolled lanes began to slide. The combination vehicle slid across the left lane of traffic and then struck the concrete barrier on the left side of the roadway. Multiple large sparks when the combination vehicle impacted the barrier were noted. The combination vehicle then went out of view of the camera; however, a portion of the semi-trailer could still be seen stopped in the roadway for the duration of the recording.												
06:18:35	The queue of vehicles in the SB tolled lanes appeared in the lower-left corner of the camera view. Two vehicles traveling in the SB tolled lanes stopped before colliding with the queue.												
06:19:23	A combination vehicle and multiple passenger vehicles slid down the SB tolled lanes and collided with the queue of previously crashed vehicles.												
06:19:52	Another combination vehicle in the right lane of the SB tolled lanes slid down the roadway and collided with the queue of previously crashed vehicles. Other passenger vehicles behind the combination vehicle collided with the rear of the semi-trailer.												

¹¹The NB general use lanes were not visible in this camera view.

Time, CST	Observation from traffic camera 2												
06:20:00	<table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use¹²</th> </tr> </thead> <tbody> <tr> <td>R</td> <td>R</td> <td>R</td> <td>N/A</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use ¹²	R	R	R	N/A
SB		NB											
General Use	Tolled	Tolled	General Use ¹²										
R	R	R	N/A										
06:20:50	A combination vehicle in the SB tolled lanes slid down the roadway, crossed into the left lane, and struck the concrete barrier on the right side of the roadway. As the combination vehicle continued to slide down the roadway it impacted multiple previously crashed vehicles.												
06:21:50	Emergency vehicles arrived and stopped in the SB general use lanes near the accident site. Vehicles in the SB tolled lanes continued to crash into the queue of previously crashed vehicles.												
06:22:45 to 06:29:59	<p>The visible portion of the SB tolled lanes was full of crashed vehicles. Traffic in all visible travel lanes was stopped.</p> <table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use¹²</th> </tr> </thead> <tbody> <tr> <td>R</td> <td>R</td> <td>R</td> <td>N/A</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use ¹²	R	R	R	N/A
SB		NB											
General Use	Tolled	Tolled	General Use ¹²										
R	R	R	N/A										
06:30:00	<i>[End of traffic camera 2, video 2]</i>												

3.2. Combination Vehicle – Onboard Image Recorder

Two videos in .mp4 format from a forward-facing onboard image recorder on a combination vehicle¹³ were sent electronically to the NTSB for review.

Video 1 was one minute in duration. Video 2 was ten seconds in duration and began after video 1 ended. Both videos were recorded at a resolution of 1920 x 1080 pixels and metadata in the file indicated they had a frame rate of 30fps. There was no audio data included in either video.

Figure 5 is a screenshot of the view at the beginning of video 1.

¹²The NB general use lanes were not visible in this camera view.

¹³This specific combination vehicle consisted of a truck tractor pulling a FedEx Ground semi-trailer.



Figure 5. View of combination vehicle's camera – beginning of video 1.

The upper right-hand corner of the recording contained a date and timestamp in CST. Below the date and timestamp was the speed¹⁴ of the vehicle and the speed limit in miles per hour (mph).

3.2.1. Time Correlation

Timing in the summary is local time, CST, taken from the timestamp present in the video.

3.2.2. Summary of Recorded Events

The following events were observed at the indicated times as shown in Table 4. Only selected events deemed pertinent to the investigation are included in the table.

In addition, for selected observations, a nested table indicating the traffic conditions in each travel lane is provided. The traffic conditions are categorized as follows:

- **Green (G)** – vehicles were moving near or above normal or 'free-flow' speeds, with little to no congestion
- **Yellow (Y)** – vehicles were moving slower than normal or 'free-flow' speeds, minor congestion
- **Red (R)** – vehicles were completely stopped or in stop-and-go traffic, major congestion

¹⁴There was latency in the displayed speed. For example, after the truck had collided with the queue of vehicles and came to a rest, as shown in the video, the displayed speed remained non-zero for approximately 3 seconds.

Table 4. Combination vehicle– onboard image recorder observations.

Time, CST	Observation from combination vehicle - onboard image recorder												
06:23:00	<p><i>[Start of combination vehicle video 1]</i></p> <p>The view was a wide-angle forward-facing view out the windshield of the combination vehicle. The combination vehicle was traveling in the right lane of the SB tolled lanes and was located approximately ¼ mile south of the express lane’s exit for Texas 183 – 28th St. Water droplets were visible on the windshield and the windshield wipers were operating. The lighting conditions were dark. High mast lighting could be seen at periodic intervals.</p> <p>Traffic in the SB general use lanes was stopped. The displayed speed of the combination vehicle was 66 mph, under the designated 75 mph speed limit.</p> <table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use¹⁵</th> </tr> </thead> <tbody> <tr> <td style="background-color: red; color: white;">R</td> <td style="background-color: green;">G</td> <td style="background-color: green;">G</td> <td>N/A</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use ¹⁵	R	G	G	N/A
SB		NB											
General Use	Tolled	Tolled	General Use ¹⁵										
R	G	G	N/A										
06:23:28	The combination vehicle passed under the bridge/overpass for N.E. 28 th St. The displayed speed of the combination vehicle was 63 mph.												
06:23:50	<p>A change in the roadway surface indicated the combination vehicle was now traveling on the elevated portion of the roadway. The elevated road surface was shiny/reflective. The displayed speed of the combination vehicle was 60 mph.</p> <table border="1"> <thead> <tr> <th colspan="2">SB</th> <th colspan="2">NB</th> </tr> <tr> <th>General Use</th> <th>Tolled</th> <th>Tolled</th> <th>General Use</th> </tr> </thead> <tbody> <tr> <td style="background-color: red; color: white;">R</td> <td style="background-color: green;">G</td> <td style="background-color: green;">G</td> <td style="background-color: yellow;">Y</td> </tr> </tbody> </table>	SB		NB		General Use	Tolled	Tolled	General Use	R	G	G	Y
SB		NB											
General Use	Tolled	Tolled	General Use										
R	G	G	Y										
06:23:51	Stopped traffic was visible ahead. The displayed speed of the combination vehicle began to decrease from 60 mph, and the vehicle began to maneuver into the left lane.												
06:23:57	The vehicle maneuvered back into the right lane.												
06:23:58	<p>The roadway ahead was blocked with multiple vehicle collisions. The displayed speed of the combination vehicle was 47 mph.</p> <p><i>[End of combination vehicle video 1]</i></p>												
06:23:59	<i>[Start of combination vehicle video 2]</i>												
06:24:03	The displayed speed was 47 mph. The vehicle began to slide into the left lane of the SB tolled lanes.												

¹⁵At the beginning of the video, there was no traffic visible in the NB general use lanes.

Time, CST	Observation from combination vehicle - onboard image recorder
06:24:04	The displayed speed was 47 mph. The vehicle began to slide into the left shoulder of the SB tolled lanes toward a stopped passenger vehicle with brake lights illuminated.
06:24:05	The displayed speed was 46 mph. The combination vehicle collided with the rear of the stopped passenger vehicle and began to travel over the top of it. The combination vehicle then struck the rear of a different semi-trailer.
06:24:06	The combination vehicle came to a stop; however, the displayed speed was 35 mph. The combination vehicle began to tilt to the left and entered the left shoulder of the NB tolled lanes.
06:24:09	The displayed speed was 0 mph.
06:24:10	<i>[End of combination vehicle video 2]</i>

3.3. Bystander Video

A cell phone video from a bystander (hereafter referred to as bystander 1) in .mp4 format was sent electronically to the NTSB for review. The video was two minutes and nine seconds in duration and was recorded at a resolution of 1920 x 1080 pixels. Metadata in the file indicated a frame rate of 30fps.

At the beginning of the video, bystander 1 was standing in the left shoulder of the SB general use lanes adjacent to a concrete barrier approximately 1/3 mile north of Northside Drive/Yucca Avenue (see Figure 6).

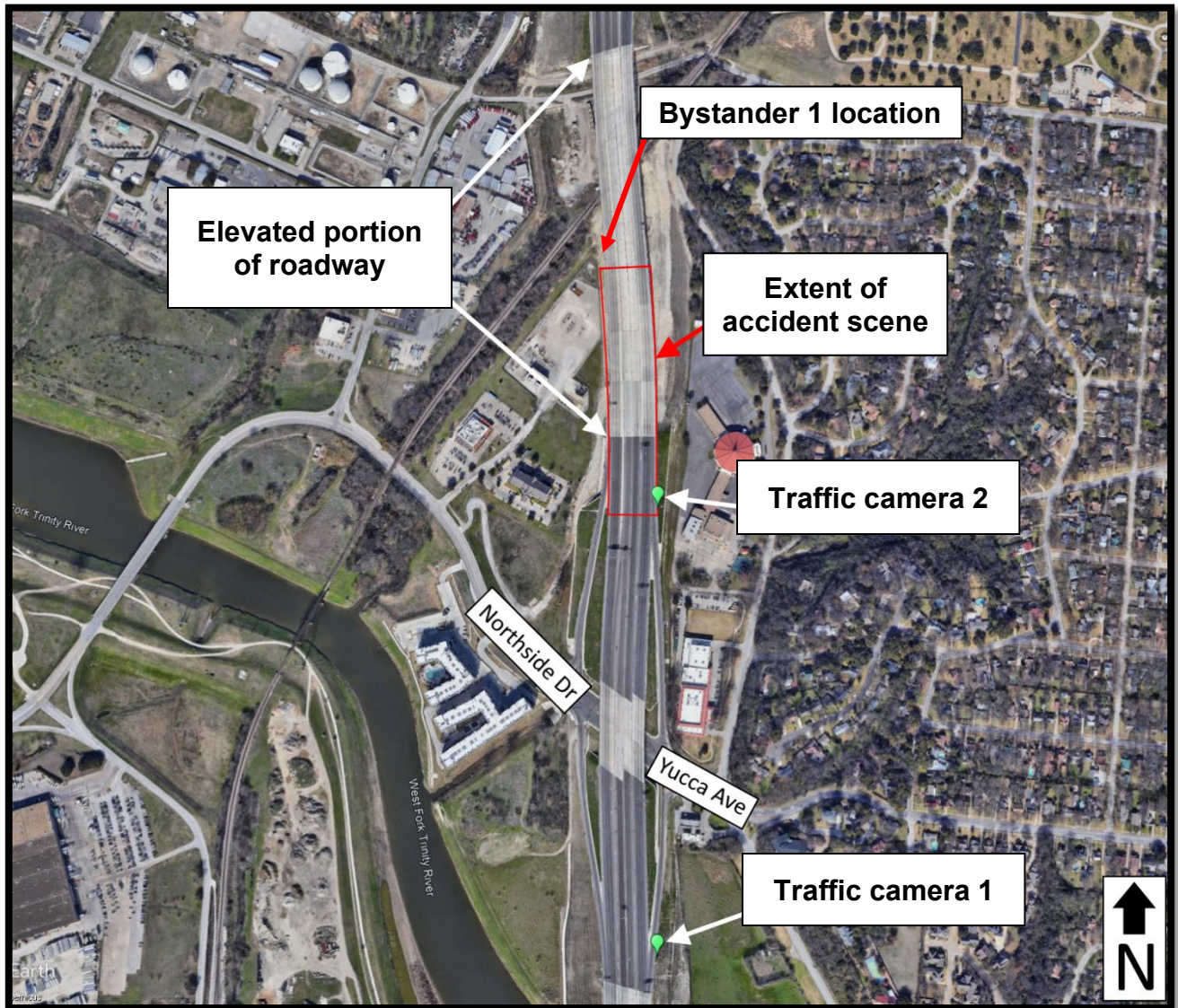


Figure 6. Location of the bystander¹⁶.

3.3.1. Time Correlation

The cell phone video did not contain any reference to local time, thus, timing in this summary is in video elapsed time, which is the time from the beginning of the video recording.

3.3.2. Summary of Recorded Events

Table 5 is a list of the vehicles, in order of their appearance, in the bystander video. Each vehicle was assigned an ID number to reference in the summary of observations in Table 6.

¹⁶ Lighting and weather conditions in the Google Earth overlay are not representative of conditions at the time of the accident.

Table 5. Vehicles in bystander video, listed in order of appearance.

ID	Color	Description
1	Black	Sport utility vehicle (SUV), parked in the right shoulder, right turn signal on
2	Unknown	Pickup truck, parked in the right shoulder, bystander 2 standing next to it on the other side of concrete barrier
3	Black	Pickup truck
4	Silver/grey	SUV, clear taillights
5	Red	Jeep
6	Unknown	Sedan
7	Unknown	SUV
8	Unknown	Combination vehicle carrying military-style vehicles
9	White	Pickup truck, has a decal on the back tailgate
10	Unknown	SUV
11	White	Pickup truck, has a ladder rack
12	Black	Pickup truck
13	White	Combination vehicle with semi-trailer marked "J.B. Hunt Intermodal"
14	White	SUV with pinstriping, parked in the right shoulder
15	Black	SUV
16	Unknown	Sedan
17	White	Pickup truck

The following events were observed at the indicated times as shown in Table 6. Only selected events deemed pertinent to the investigation are included in the table.

Table 6. Observations from bystander video.

Video Elapsed Time, mm:ss	Observation from bystander video
00:01	<p><i>[Start of bystander video]</i></p> <p>Bystander 1 was standing in the left shoulder of the SB general use lanes adjacent to a concrete barrier. The view was south, toward the northernmost accident site in the SB tolled lanes. Vehicle 1 was seen stopped in the right shoulder of the SB tolled lanes.</p> <p>The tops of the concrete barriers and roadway appeared shiny and reflective, consistent with freezing precipitation¹⁷. The lighting conditions were dark. A single line of highway lighting poles could be seen at periodic intervals mounted on top of the barrier separating the SB tolled lanes from the SB general use lanes and another single line of highway lighting poles mounted on top of the barrier separating the NB tolled lanes from the NB general use lanes.</p>
00:08	Bystander 1 started to walk south toward the accident site. Emergency vehicles were noted in the SB general use lanes. Traffic in the NB general use lanes was stopped.
00:35	Bystander 1 walked toward another bystander (hereafter referred to as bystander 2) who was standing in the left shoulder of the SB general use lanes. Bystander 2 was standing on the other side of a concrete barrier from vehicle 2, which was parked in the right shoulder of the SB tolled lanes.
00:37	Vehicle 3 traveling in the SB tolled lanes came into view. The truck was sliding at a high rate of speed toward the previously crashed vehicles that were blocking the roadway.
00:38	Vehicle 3 collided into the queue of other vehicles that had previously crashed.
00:42	Vehicle 4 collided with vehicle 2 and began to spin.
00:44	Vehicle 5 collided with vehicle 4. Both vehicles slid further down the roadway and collided with the queue of vehicles that had previously crashed.
00:47	Vehicle 6 & 7, both sliding at a high rate of speed in the left lane of the SB tolled lanes, collided with the queue of previously crashed vehicles.
00:58	Vehicle 8 appeared. The combination vehicle was sliding in the left lane of the SB tolled lanes and was headed toward the queue of previously crashed vehicles.
01:01	Vehicle 8 collided with the queue of previously crashed vehicles.

¹⁷A METAR report from Fort Worth Meacham International Airport (KFTW), located about 3 nautical miles from the accident location, reported a temperature of 23 degrees Fahrenheit at 05:53 CST on the day of the accident.

Video Elapsed Time, mm:ss	Observation from bystander video
01:03	Vehicle 9 collided with the rear of vehicle 8.
01:05	Vehicle 10 appeared. It was sliding sideways down the roadway toward the accident site. It then collided with the queue of previously crashed vehicles.
01:08	Vehicle 11 collided with the queue of previously crashed vehicles.
01:09	A person was seen exiting a previously crashed vehicle and climbing over the concrete barrier separating the SB tolled lanes and SB general use lanes.
01:14	Vehicle 12 appeared and was sliding down the middle of the SB tolled lanes. The truck then collided with the queue of previously crashed vehicles.
01:23	The video panned to the left and was now facing north, showing the vehicles sliding down the SB tolled lanes before they crashed into the queue. Vehicle 13 was sliding down the middle of the SB tolled lanes.
01:25	Vehicle 13's semi-trailer collided with vehicle 1 and kept sliding.
01:28	Vehicle 13's semi-trailer collided with vehicle 14. Vehicle 13 and the two vehicles it struck (1 and 14) continued to slide down the roadway.
01:32	The video panned to the right and showed the accident site. Vehicles 13, 1, 14, and 15 collided with the queue of previously crashed vehicles.
01:44	Vehicle 16, sliding at a high rate of speed, crashed into the queue of previously crashed vehicles.
01:49	Vehicle 17, sliding at a slow rate of speed, crashed into the queue of previously crashed vehicles.
02:09	<i>[End of bystander video]</i>