

August 23, 2023

HIR-23-08

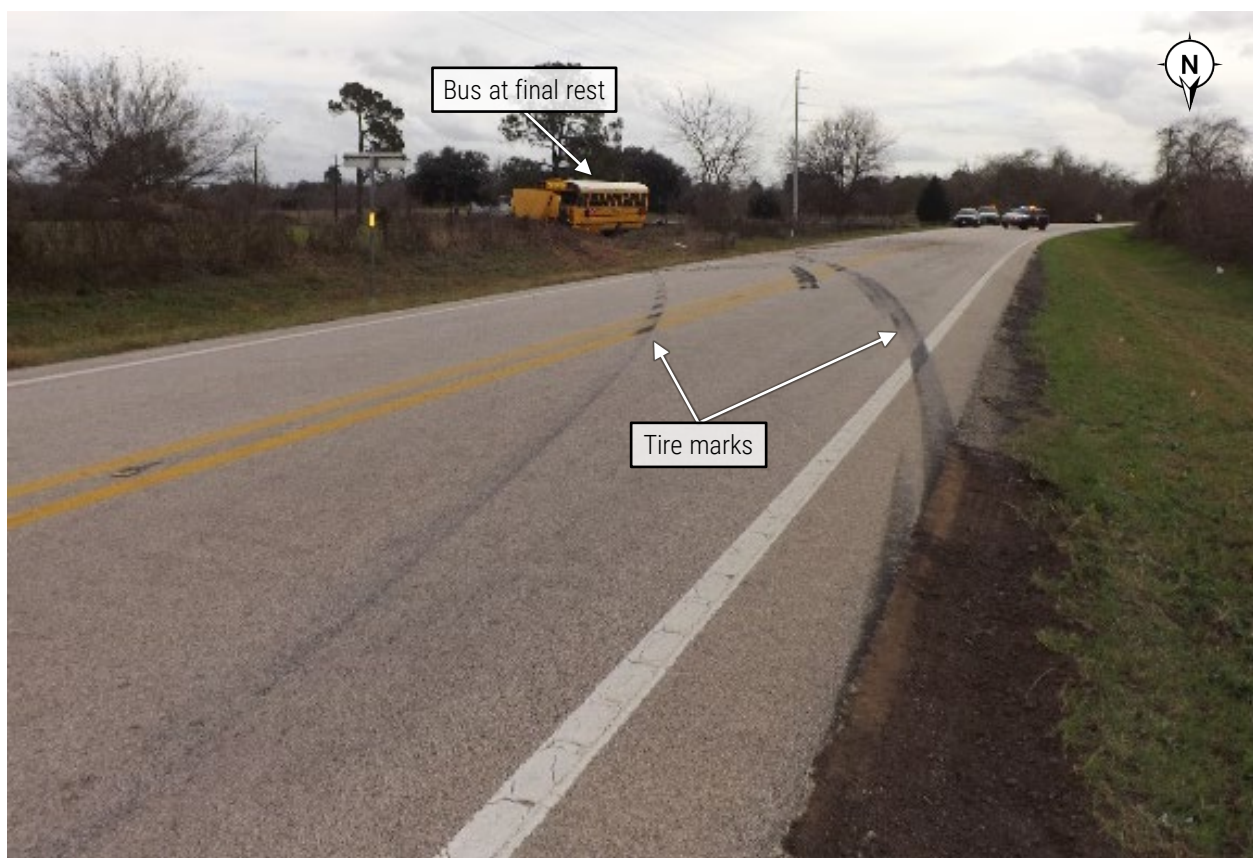
# School Bus Run-Off-Road and Rollover Crash

Monaville, Texas  
December 17, 2021

On Friday, December 17, 2021, about 12:10 p.m., a 2018 IC 43-passenger, lap belt-equipped school bus, operated by Hempstead Independent School District (ISD), was traveling south on Farm to Market Road (FM) 1887 in the unincorporated community of Monaville, Waller County, Texas.<sup>1</sup> The posted speed limit was 55 mph, the weather was clear, and the roadway was dry. After crossing over a bridge near the intersection of Holik Road and FM 1887, the bus departed the southbound lane to the right. The driver initiated a series of steering maneuvers to the left, back to the right, and again to the left, and then lost control of the bus. The bus departed the road and rolled over in one complete rotation. The bus was occupied by a 59-year-old driver, a 59-year-old aide, and four student passengers. As a result of the crash, the aide was ejected and fatally injured. The driver and three student passengers sustained minor injuries. One student passenger, who was restrained in a child safety seat, was uninjured.

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<sup>1</sup> (a) In this report, all times are central standard time. (b) Visit [nts.gov](https://www.nts.gov) to find additional information in the [public docket](#) for this National Transportation Safety Board investigation (case no. HWY22FH002). Use the [CAROL Query](#) to search safety recommendations and investigations.



**Figure 1.** South-facing view from shoulder of FM 1887 showing final rest position of school bus. (Source: Texas Department of Public Safety; annotated by National Transportation Safety Board)

<b>Location</b>	FM 1887, just south of Iron Creek Bridge near intersection with Holik Road, Monaville, Texas
<b>Date</b>	December 17, 2021
<b>Time</b>	12:10 p.m.
<b>Involved vehicles</b>	1
<b>Involved people</b>	6
<b>Injuries</b>	1 fatal (aide), 4 minor (bus driver, unrestrained student passengers), 1 uninjured (student passenger restrained in child safety seat)
<b>Weather</b>	Dry, clear, and daylight
<b>Roadway information</b>	Two-lane, undivided asphalt road with one northbound and one southbound travel lane. Each lane was 11 feet wide with a 2-foot shoulder on each side. Travel lanes were divided by double yellow lane markings. Each travel lane was delineated from the adjacent shoulder by a white pavement edge line.

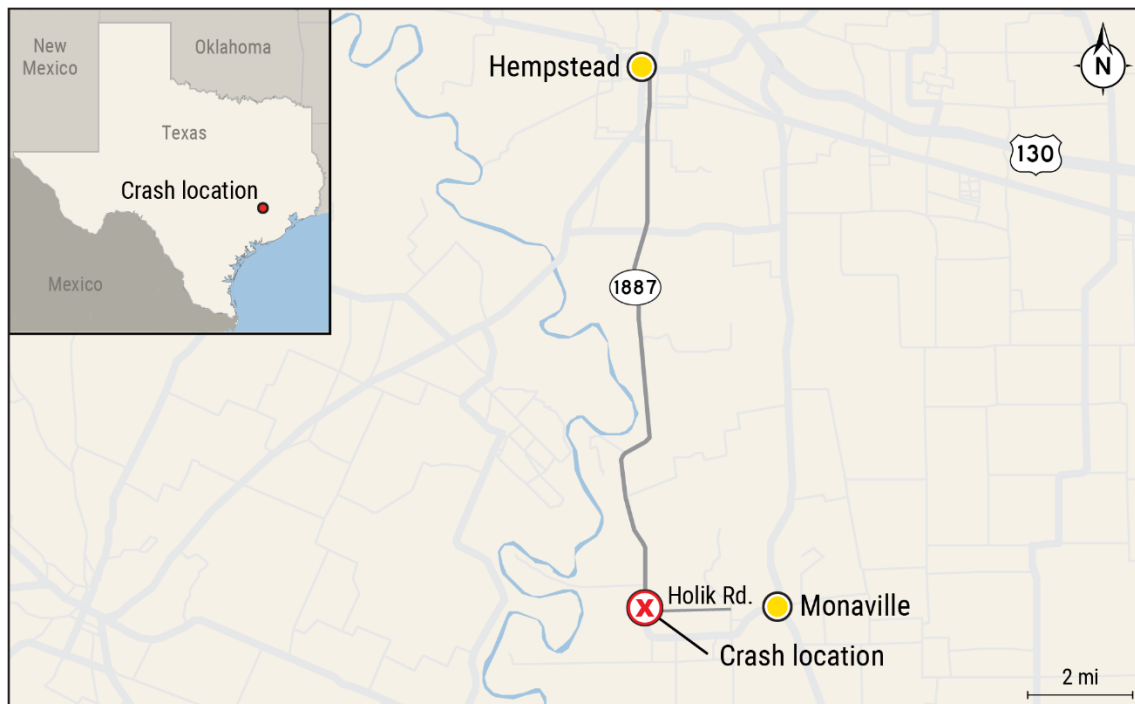


Figure 2. Map showing crash location near intersection of FM 1887 and Holik Road near Monaville, Texas. (Source: HERE Technologies, Esri)

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# 1. Factual Information

## 1.1 Background

The crash occurred during daylight with dry weather and roadway conditions. Investigators conducted a visual examination of the crash scene under similar conditions to those at the time of the crash and did not observe any unusual or distracting environmental features. The only vehicle involved in the crash was a 2018 IC 43-passenger school bus. The driver's seat was equipped with a lap/shoulder belt, and all occupied seats were equipped with functioning lap belts.<sup>2</sup> The bus was configured for use as a special needs bus and was equipped with a wheelchair lift. The bus was also equipped with a continuous onboard video recording system. The recorded video and data were analyzed by the National Transportation Safety Board (NTSB). The bus was not equipped with electronic stability control (ESC) or any other driver assistance features, such as lane departure warning or prevention.<sup>3</sup>

The driver started the afternoon run at approximately 11:45 a.m. due to a scheduled early dismissal of students. The bus was occupied by the driver, an aide, and four student passengers. Only the driver and one of the student passengers were belted. The driver was wearing a lap/shoulder belt and the student passenger was in a child safety seat secured to a bus seat with the seat's lap belt.

## 1.2 Event Sequence

At 12:09 p.m., the bus was traveling south at approximately 63 mph on FM 1887, entering a section of the roadway that curved slightly leftward, north of the intersection of Holik Road and FM 1887. According to the interior camera footage, at 12:09:34 p.m., the driver began looking to her left in the direction of the bus vent window, making several glances of increasing duration over the next 25 seconds. At 12:10:00 p.m., the bus departed the right edge of the roadway.<sup>4</sup> Physical evidence showed tire impression marks off the right shoulder at this location. In response to the road departure, the driver initiated a series of steering maneuvers in a serpentine fashion. First, the driver steered to the left, causing the bus to cross over the double yellow line into the northbound lane.

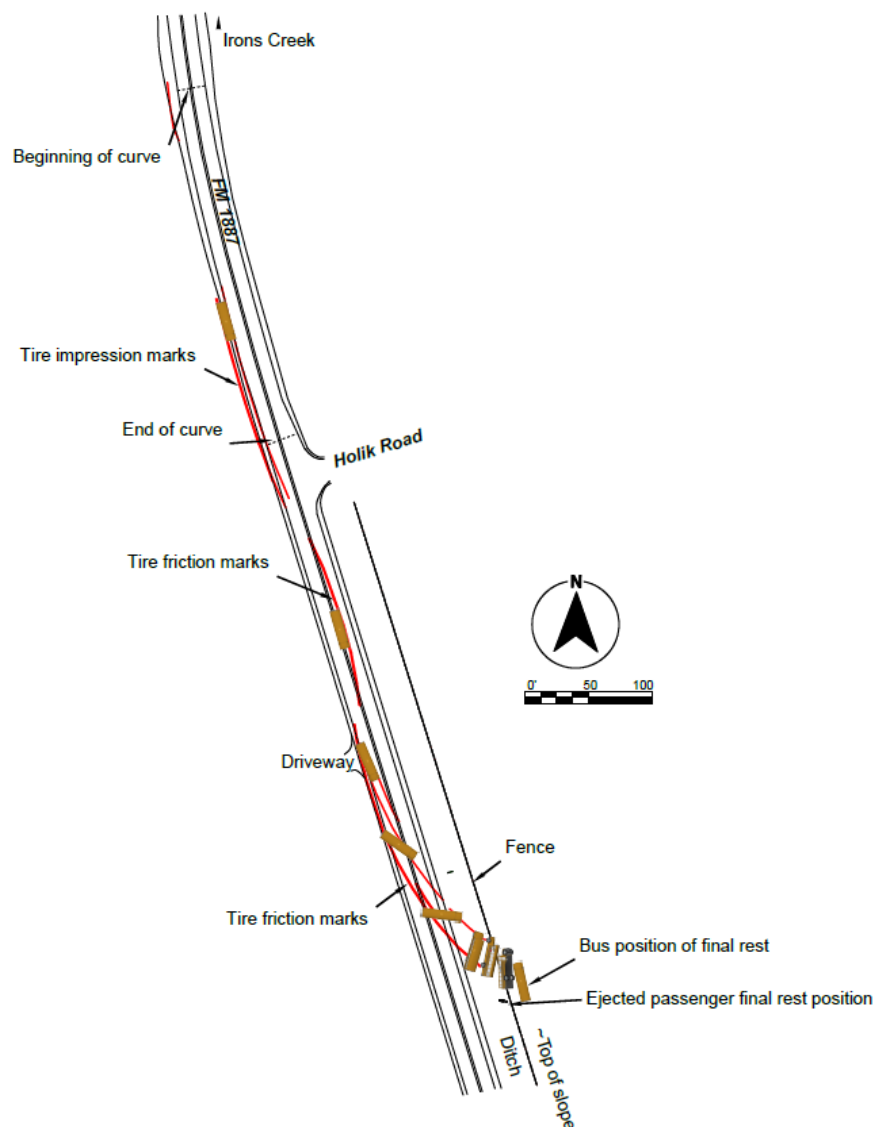
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<sup>2</sup> The latch plate for the lap belt in row 2 on the driver side was missing; this seat was not occupied during the crash trip.

<sup>3</sup> ESC detects loss of traction, applies braking to individual wheels, and reduces engine throttle to assist a driver in maintaining vehicle control.

<sup>4</sup> The timestamps were determined from the school bus's onboard video system and were not correlated with any external time sources (such as police reports).

The driver then steered back to the right, leaving tire friction marks partially in the northbound lane as the bus straddled the center line. The bus veered back into the southbound lane, where it again departed the right side of the roadway. The driver then steered to the left, where video evidence and tire friction marks showed that the bus entered a counterclockwise yaw where it again crossed into the northbound lane of travel and then departed the roadway. Next, the bus entered a ditch adjacent to the northbound roadway and rolled over in one complete rotation, coming to final rest on its wheels and facing north. During the rollover event, the rear emergency exit door of the bus opened, and the aide was ejected from the bus. Figure 3 shows a diagram depicting the travel path and corresponding road evidence including the location of the ejected passenger.



**Figure 3.** Scale diagram of bus path of travel and rollover event with roadway evidence annotated.

The body of the school bus sustained extensive damage during the rollover, with the right edge of its roof shifting to the left. Figure 4 shows front and rear photographs of the bus taken after the crash, including the leftward shift in the roof. Also shown in figure 4 (right) is a view of the emergency door, which came open during the rollover.



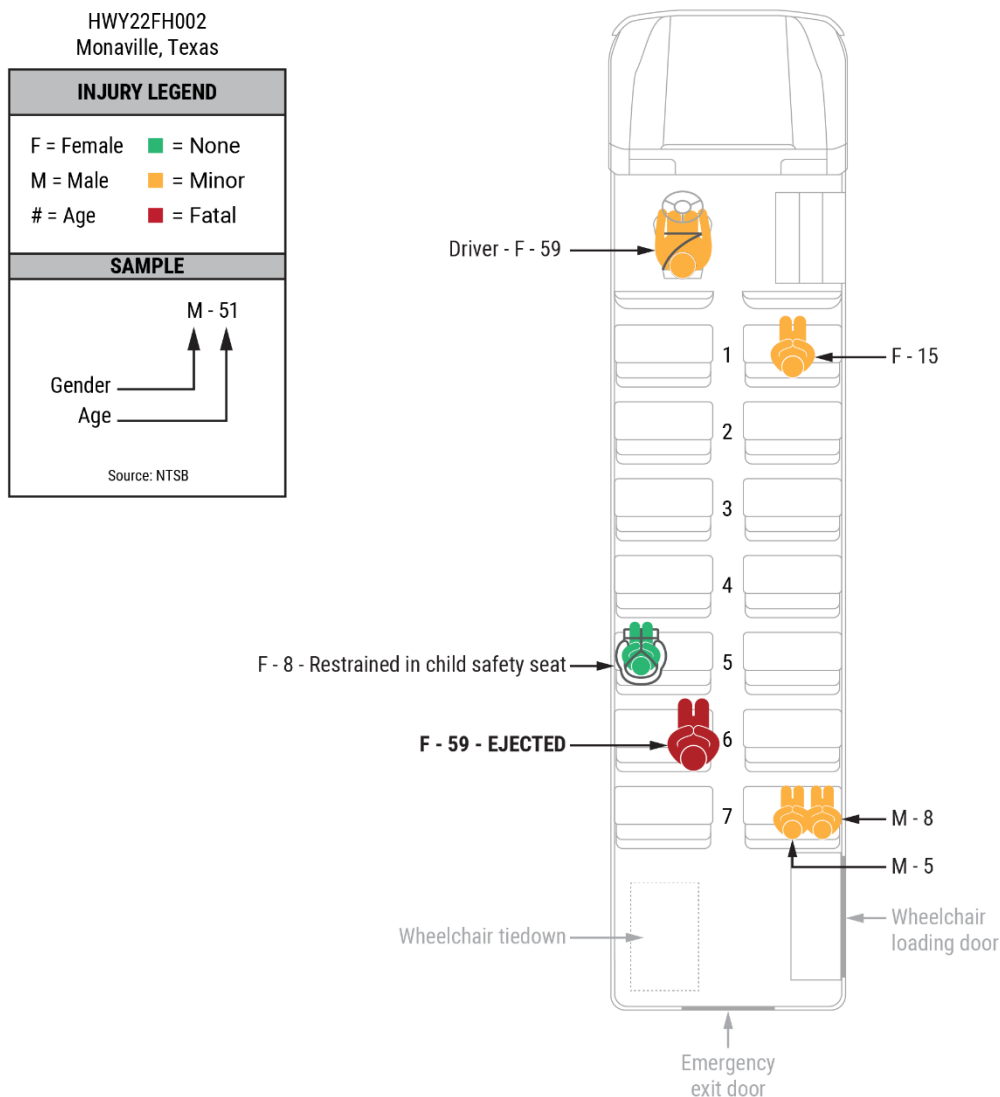
**Figure 4.** Front (left) and rear (right) view of school bus showing roof shift and damage to rear door.

The Waller County Sheriff's Department dispatch was notified of the crash at 12:10 p.m. through the 911 system. The first of eight law enforcement units from the Texas Department of Public Safety (TxDPS) and Waller County Sheriff's Department arrived at 12:17 p.m. Four Waller County Emergency Medical Services units began arriving at 12:25 p.m. Multiple fire units began arriving at 12:26 p.m. No extrication was required for any of the bus occupants, but several occupants were transported to area hospitals.

### 1.2.1 Injuries and Occupant Protection

Seating locations on the bus were identified using the onboard video. Figure 5 shows the seating locations of the driver and all passengers, along with sex, age, and injury information. The driver was wearing a lap/shoulder belt, and one student passenger was restrained in an Evenflo Chase forward-facing child safety restraint system secured to a bus seat in row 5 with the seat's lap belt. All other passengers were unbelted. In addition to being unbelted, the 59-year-old aide in row 6 was seated out of position, with her right leg resting on the seat across the aisle. As a result of the crash, the aide was ejected from the rear emergency exit door and sustained fatal blunt-force trauma injuries.

According to medical records obtained by the NTSB, the bus driver was treated for minor injuries at Memorial Hermann Texas Medical Center and was released the same day. Investigators noted that the safety restraint system for the row 5 student passenger was installed incorrectly in the bus; however, this passenger sustained no injuries in the crash and was driven from the scene by her parents, according to the TxDPS crash report.<sup>5</sup>



**Figure 5.** School bus seating chart including occupants’ sex, age, and injury level. The aide who was ejected was seated out of position in addition to being unbelted.

<sup>5</sup> The safety seat was buckled using a mismatched connection between the left seat buckle and center seat latch plate. The shoulder straps were also positioned in a slot on the safety seat below the shoulders of the occupant instead of at or just above her shoulders, as would be correct for a forward-facing seat.

Memorial Hermann Life Flight was dispatched at 12:40 p.m. and arrived on scene at 12:57 p.m. to transport the injured 15-year-old female student (row 1, right side). Life Flight departed the scene at 1:07 p.m., arriving at Memorial Hermann Texas Medical Center at 1:28 p.m. The student was treated for minor injuries and was discharged at 6:03 p.m. on the day of the crash.

The row 7 passengers (5- and 8-year-old males) sustained non-incapacitating injuries, according to the TxDPS crash report. NTSB investigators requested hospital records for these passengers, but none were found.

## 1.3 Additional Information

### 1.3.1 Driver Information

The bus driver was a 59-year-old female. The driver held a Class B Texas Commercial Driver's License (CDL) with passenger and school bus endorsements. She had 9 years of experience driving school buses, including those similar to the bus involved in the crash. Her license was issued in August 2017 with an expiration date of April 2023. According to records from the Texas Highway Patrol, her driver's license history showed no traffic law violations in the 10 years before the crash. At the time of the crash, the driver did not have a current medical certificate as required for her CDL by Title 49 *Code of Federal Regulations* (CFR) 391.41. The driver's most recent physical examination was on June 16, 2021, but she did not receive her medical certificate on this date.<sup>6</sup> The medical examiner deferred certification pending results of an A1C test.<sup>7</sup> The driver's vision and hearing were within regulatory specifications as recorded during this examination.

Video evidence showed that the driver was alert and did not appear to be experiencing a medical issue prior to the crash. The crash occurred on the driver's normal route. Information obtained from the driver interview as well as her cell phone records indicated that she was not using her cell phone at the time of the crash. The NTSB also obtained records of the driver's work hours. Her typical workday was 4.25 to

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<sup>6</sup> The prior medical examination was conducted on July 27, 2020, and the driver was certified for 1 year after this examination.

<sup>7</sup> The A1C test is a blood test that measures a person's average blood sugar levels over a 3-month period and is commonly used to diagnose prediabetes and diabetes.



4.5 hours, and she did not work more than 4.5 hours on any of the 7 days before the crash or on the day of the crash.<sup>8</sup>

### 1.3.2 Motor Carrier Information

The bus was owned and operated by Hempstead ISD, which consists of five schools, encompasses 190 square miles, and serves 1,514 students. Operation and administration policies for Hempstead ISD are contained in three separate documents. The Employee Handbook documents the responsibilities of employees and includes rules from the school district and the state of Texas. The Transportation Handbook outlines additional duties and responsibilities of transportation personnel for the operation of school buses. Finally, the Student Handbook outlines rights and responsibilities for parents and students. At the time of the crash, oversight of bus operations, including tracking of driver records such as medical certification, was the responsibility of the Hempstead ISD district mechanic.

School bus operations are only subject to a subset of the Federal Motor Carrier Safety Regulations (FMCSR).<sup>9</sup> Title 49 *CFR* 382, *Controlled Substances and Alcohol Use and Testing*, applies to every person and to all employers of such persons who operate a commercial motor vehicle in commerce in any state and whose operations are subject to CDL requirements (FMCSA 2023). School bus operations are also subject to Title 49 *CFR* 383 and 391 for CDLs and driver qualifications. All CDL holders, including school bus drivers, are also subject to distracted driving regulations prohibiting texting (Title 49 *CFR* 392.8) and mobile telephone use (Title 49 *CFR* 392.82). Because of the limited jurisdiction of the Federal Motor Carrier Safety Administration (FMCSA) over school district operations, the agency did not conduct a postcrash investigation or compliance review of Hempstead ISD.

States may adopt portions of the FMCSR in their oversight of school bus operations. The TxDPS has adopted the rules in Title 49 *CFR* 382 requiring school districts to implement a compliant Controlled Substances and Alcohol Use and Testing

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<sup>8</sup> School districts are exempt from the motor carrier regulations found in Title 49 *CFR* 395, *Hours of Service*. As a result, Hempstead ISD did not maintain a record of duty with the exact number of duty hours for its bus drivers. However, the NTSB reviewed payroll records and used the bus driver's timecards to determine her work hours in the days leading up to the crash.

<sup>9</sup> Hempstead ISD is not required to register with the US Department of Transportation and does not have a US Department of Transportation number. Transportation performed by the federal government, states, or political subdivisions of states is generally excepted from the FMCSR. The FMCSR, in general, do not apply to school bus operations, including those performed by Indian Tribal Governments. For more information, see Title 49 *CFR* 390.3T(f)(1).

program.<sup>10</sup> At the time of the crash, Hempstead ISD did not have a compliant drug testing program in place. Hempstead ISD did perform drug testing irregularly when the drivers renewed their medical certificates. The bus driver in this crash had eight medical examinations between 2014 and 2021 but only five drug tests.<sup>11</sup> Hempstead ISD did not perform postcrash drug and alcohol testing as required by Title 49 *CFR* 823.303.

The TxDPS also adopted the federal regulations for vehicle inspection, maintenance, and record keeping (Title 49 *CFR* 396) and specifically stated that these regulations applied to school districts.<sup>12</sup> The school bus in this crash had its last Commercial Annual Inspection on October 12, 2021, at a mileage of 72,844, and passed this inspection.<sup>13</sup> Additional maintenance files requested by the NTSB were incomplete. The TxDPS conducted a postcrash inspection of the vehicle, and the only deficiency listed in the report was that the windows were broken, which occurred during the crash. Postcrash inspection by the NTSB did not uncover any preexisting issues with the vehicle.

In 2007, the state of Texas passed an amendment to the Education Code requiring the use of seat belts by students if available (State of Texas 2007). Based on a review of the Employee Handbook and Transportation Handbook, as well as interviews with Hempstead ISD staff, this law had not been fully incorporated into Hempstead ISD policy at the time of the crash. The requirement for students to wear seat belts when available on school buses was included on page 82 of the Student Handbook. In interviews, the bus driver stated that it was the aide's responsibility to ensure that all students were properly belted during the crash trip. The seat belt requirement did not appear in the other policy documents, and staff who were interviewed did not seem to be aware of the policy.

The Texas Legislative Budget Board (LBB) is a permanent joint committee of the Texas Legislature with a wide range of responsibilities for budget and policy recommendations in the state of Texas, including conducting comprehensive reviews of school districts' educational, financial, and operations programs. A 2015 audit of Hempstead ISD by the Texas LBB found several deficiencies in the areas of Human Resources and Transportation. The following transportation-related findings of the audit

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<sup>10</sup> See Texas DPS Part 382: Controlled Substances and Alcohol Use and Testing in the *Motor Carrier Reports and Attachments* section of the [public docket](#) for this NTSB investigation (case no. HWY22FH002).

<sup>11</sup> Drug testing is not part of the US Department of Transportation medical certification.

<sup>12</sup> See Texas Commercial Vehicle Enforcement Part 396 in the *Motor Carrier Reports and Attachments* section of the [public docket](#) for this NTSB investigation (case no. HWY22FH002).

<sup>13</sup> The most recent mileage entry on the driver's timecard was 76,646 miles on December 16, 2021, the day before the crash.

were similar to problems that were also discovered during the NTSB's investigation of the school bus rollover event:

- Hempstead ISD did not have a seat belt policy mandating seat belt use as required by Texas state regulations.
- Hempstead ISD's Transportation Department lacked written policies and procedures to ensure effective and efficient operations.
- Hempstead ISD did not maximize opportunities to inform and prepare students, parents, and staff for school bus emergency situations.
- Hempstead ISD did not have a postcrash drug testing policy as required by Title 49 *CFR* 382.303.
- Hempstead ISD lacked a centralized records management process to consistently document and track data related to maintenance and repairs, fleet management, accident reports, and student information.

## 1.4 Postcrash Actions

NTSB investigators documented actions implemented by Hempstead ISD after the crash. Hempstead ISD updated its Employee Handbook and Transportation Handbook to include a requirement for seat belts to be properly worn by employees and passengers in all vehicles in which seat belts are available.

Hempstead ISD formalized requirements for bus drivers, including completion of initial training, a driver's license check, and annual physical examinations as required for all Texas school bus drivers. Drivers are required to maintain Texas certification by completing a 20-hour certification course within 6 months of hire and completing an 8-hour recertification course every 3 years or as required by Texas law.

Hempstead ISD created a transportation supervisor position, distinct from the district mechanic position. This position's duties include keeping, monitoring, and storing hiring information, training records, and US Department of Transportation (USDOT) physical records for transportation employees. The transportation supervisor also approves the maintenance process, invoices, and vehicle inspection reports. These duties are now outlined in the revised Transportation Handbook. Hempstead ISD also hired an outside firm to implement a USDOT-compliant drug testing policy for employees. This firm will also oversee USDOT-compliant physical examinations for drivers.

## 2. Analysis

There was no evidence that pavement or roadside conditions contributed to the crash. Weather and illumination were also not factors in the crash. The weather was clear, daylight conditions were present, and the road was dry.

Although maintenance records were incomplete, investigators found no evidence of preexisting mechanical defects or deficiencies on the IC school bus. There was minimal loss of survivable space in the passenger compartment of the bus following the bus rollover; therefore, the crashworthiness of the bus was not a factor in the injury levels resulting from the crash. First responders arrived at the crash scene in a timely manner, and their level of response was adequate.

The driver was not medically certified to operate the bus, which meant that she did not possess a valid CDL. Although this is another example of the lack of oversight by Hempstead ISD, the investigation found no evidence that the bus driver's lack of medical certification was a factor in the crash. The driver's experience, fatigue, vision, and hearing were also not factors. There was insufficient evidence to exclude drugs and/or alcohol as factors in this crash due to the lack of testing for alcohol and the timing of the test that was conducted for impairing drugs.<sup>14</sup>

### 2.1 Driver Distraction and Driver Inputs

Distracted driving raises crash risk by taking a driver's attention away from the driving task. The elimination of distracted driving has been a focus of NTSB recommendations and advocacy for many years (NTSB 2022). The National Highway Traffic Safety Administration (NHTSA) reports that 3,522 lives were lost due to distracted driving in 2020 (Stewart 2023). Although distraction is commonly associated with personal electronic devices and in-vehicle infotainment systems, NHTSA defines distracted driving as "any activity that diverts attention from driving, including talking or texting on your phone, eating and drinking, talking to people in your vehicle, fiddling with the stereo, entertainment or navigation system – anything that takes your attention away from the task of safe driving" (NHTSA 2023). Studies of naturalistic driving behavior show increased crash risk for any activity that takes a driver's eyes away from the road for longer than 2 seconds (Dingus and others 2016). In this crash, the bus driver's long glances toward the vent window observed on the inward-facing video are consistent with the definition of distraction.

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<sup>14</sup> Impairing drug classes are marijuana, cocaine, opiates, amphetamines, and phencyclidine (PCP). See the FMCSA's "[Which Substances are Tested?](#)" webpage for more information.

When interviewed by NTSB investigators, the driver stated that there was a loud noise coming from the vent window. The inward-facing video showed her making multiple glances toward the vent window, and in some cases reaching toward it, before the crash. Forward-facing video during these times showed that the bus encroached on the center line and was exceeding the posted speed limit (traveling about 63 mph on a 55-mph roadway); both behaviors are evidence of driver distraction.<sup>15</sup> The final glance to the left lasted more than 5 seconds and corresponded with the bus's initial roadway departure off the right shoulder. As such, distraction prompted by the vent window was likely the cause of the driver failing to negotiate the roadway curve, leading to the initial road departure.

When a driver departs the roadway, risks include collision with other road users, trees, barriers, guardrails, or other roadside objects. There is also increased risk of rollover when departing the road. Roadway departure crashes in which a vehicle crosses an edge- or center line are a leading cause of single-vehicle crashes in the United States. As reported by the Federal Highway Administration, between 2016 and 2018, an average of 19,158 fatalities resulted from roadway departures, which represents 51% of all traffic fatalities (FHWA 2022). In this crash, the driver's increasingly aggressive steering maneuvers in response to the initial road departure led to loss of control and ultimately the final road departure and rollover.

Under typical driving conditions, steering inputs are proportional to changes in vehicle heading. In this crash, video and roadway evidence showed that the driver's response to the road departure was a series of aggressive oversteering maneuvers. Aggressive maneuvers like those seen in this crash can create a situation of oversteer or understeer in which there is a lag between steering inputs and the resulting changes in vehicle heading, leading to loss of control. The outcome of this driver's aggressive steering maneuvers was that the bus entered an unstable counterclockwise yaw, resulting in the final road departure and rollover event. Although longer wheelbase vehicles are generally more laterally stable than shorter ones, taller and heavier vehicles are more susceptible to rollover due to their raised center of gravity.

## 2.2 Driver Assistance Systems

Given the lack of control followed by incorrect steering inputs, the driver in this crash would likely have benefited from available driver assistance technologies. Lane departure warning (LDW) systems use cameras to detect lane markings and present a visual and audible warning when a driver is about to cross a lane marking. Had the bus

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<sup>15</sup> Given the general lack of oversight by Hempstead ISD, there was insufficient evidence to determine if the bus driver exceeding the speed limit was habitual or unique to this trip.

been equipped with an LDW system, the driver may have been alerted when encroaching on the center line or edge line, and she may have returned her attention to the driving task instead of the vent window. In addition to providing a warning, lane departure prevention (LDP) provides steering inputs to keep a vehicle in its lane of travel. Had the school bus included an LDP system, the initial road departure may have been avoided altogether.

ESC is another vehicle-based technology that could have assisted the bus driver after the lane departure occurred. ESC systems work to automatically intervene in situations in which a deviation from the steered path due to loss of traction is detected. ESC uses differential braking at individual wheels and/or engine throttle adjustments to control the vehicle yaw rate. Had the bus been equipped with ESC, it may have reduced the increasing yaw resulting from the severity of the driver's inputs, potentially preventing the loss of control and subsequent rollover.<sup>16</sup>

The NTSB has previously recommended that NHTSA require LDP systems to be equipped on all commercial motor vehicles weighing more than 10,000 pounds. The NTSB has also recommended that NHTSA develop ESC performance standards for these vehicles.<sup>17</sup> IC school buses manufactured since late 2018 now come with ESC as a standard feature. Although not standard, driver assistance features such as LDW are available as options on new IC buses (Navistar 2023).

### 2.3 Seat Belt Use and School District Policy

As noted previously, Hempstead ISD oversight was deficient in multiple safety-related areas, and most were not factors in the crash. However, the fact that some passengers were unbelted on the school bus was likely a result of Hempstead ISD's lack of a comprehensive seat belt policy.

The safest choice a passenger in any vehicle can make is to wear a seat belt, including in school buses when they are equipped with seat belts. Investigators found that Hempstead ISD had failed to implement changes recommended by the 2015 Texas LBB audit, including implementing a seat belt requirement for all bus passengers as required by the state of Texas. Although the driver and the child in the Evenflo child safety restraint system were belted, no other students nor the aide were wearing the available lap belts. It is well established that belted occupants sustain fewer injuries in motor vehicle crashes. Further, the aide, who was responsible for ensuring that all

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<sup>16</sup> For additional information, see the NHTSA and FMCSA joint notice of proposed rulemaking (NPRM) titled "Heavy Vehicle Automatic Emergency Braking; AEB Test Devices," published at 88 *Federal Register* 43174 on July 6, 2023.

<sup>17</sup> See Safety Recommendation [H-21-1](#) for LDP systems and [H-11-7](#) for ESC performance standards.

passengers were wearing their lap belts, was herself unbelted and sitting out of position. Had she been wearing her lap belt, she would not have been ejected, her injury severity would have been reduced, and she would likely have survived the crash. Updates to Hempstead ISD's safety policy made after the crash should improve passenger safety by requiring the use of passenger seat belts when buses are equipped with them, and thereby preventing fatalities and reducing injuries in the future.

All occupied seats on the bus involved in this crash had functional lap belts, but the safety benefits of seat belts are only realized if they are worn. Hempstead ISD's failure to adopt and enforce regulations from the state of Texas requiring seat belts was contributory to the fatality and injuries in the crash. The NTSB has previously recommended that organizations involved in school bus transport inform their members of the need to periodically review onboard video event recorder information to ensure that staff and students engage in safe transportation behaviors on school buses—including sitting properly in the seating compartment and wearing seat belts, when available—and that the members use this information to improve the bus safety training provided to drivers, students, and parents.<sup>18</sup> Onboard video recordings can be used proactively to aid in driver, student, and parent training to ensure that students and staff on school buses sit properly, use seat belts, and exhibit other safe behaviors. Hempstead ISD did not have a program in place to review its onboard video systems to ensure that occupants were wearing their seat belts.

## 3. Conclusions

### 3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the Monaville, Texas, crash was the bus driver's failure to keep the vehicle in its travel lane due to being distracted by the vehicle's vent window. Contributing to the severity of the injuries was the lack of seat belt use by several school bus passengers.

### 3.2 Lessons Learned: Seat Belt Use and Driver Assistance Systems on School Buses

School buses are among the safest ways to travel, and school bus safety remains among the NTSB's special topics of advocacy (NTSB 2023). Ensuring that all passengers

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<sup>18</sup> See Safety Recommendation [H-22-25](#) to the National Association for Pupil Transportation, National Association of State Directors of Pupil Transportation Services, and National School Transportation Association.

are properly wearing available seat belts further improves the safety of school buses. At the time of the crash, the Hempstead ISD had not implemented a mandatory seat belt policy as required by the state of Texas. Hempstead ISD has now updated its policy to require seat belt use for students and staff. Hempstead ISD has also hired additional staff to oversee necessary maintenance and driver qualification records. The NTSB has previously recommended that associations involved in student transport inform their members that onboard video systems should be used to help ensure that safe transportation behaviors—including sitting properly and wearing seat belts—are followed on school buses. Had the school district implemented a required seat belt policy and conducted periodic reviews of the onboard video, riders would have been more likely to be seated in position and wearing seat belts. Had the available lap belts been worn by all passengers, injuries would have been reduced and the ejection prevented in this crash.

In addition to occupant protection, driver assistance systems would likely have benefited the driver in this crash. Driver assistance features, such as LDW, may have alerted the driver and brought her attention back to the forward roadway instead of the bus vent window. LDP systems may have prevented the road departure altogether by providing steering correction before the bus departed the travel lane. ESC may have assisted the driver in maintaining control of the bus after the initial road departure. The NTSB has previously recommended that NHTSA require LDP systems to be equipped on all commercial motor vehicles above 10,000 pounds. The NTSB has also recommended that NHTSA develop ESC performance standards for vehicles above 10,000 pounds. The IC Bus manufacturing company now includes ESC as a standard feature, and LDP is available as an option for buses manufactured from late 2018 to present.

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NTSB investigators worked with the **Texas Department of Public Safety and the Hempstead Independent School District** throughout this investigation.

The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in the other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)).

For more detailed background information on this report, visit the NTSB investigations website and search for NTSB accident ID HWY22FH002. Recent publications are available in their entirety on the NTSB website. Other information about available publications also may be obtained from the website or by contacting—

National Transportation Safety Board  
Records Management Division, CIO-40  
490 L'Enfant Plaza, SW  
Washington, DC 20594  
(800) 877-6799 or (202) 314-6551