May 20, 2025 Highway Investigation Report HIR-25-02

Collision of Motorcoach with Combination Vehicles Parked Along Exit Ramp to I-70 Rest Area

Highland, Illinois
July 12, 2023

Abstract: On Wednesday, July 12, 2023, about 1:48 a.m. central daylight time, a 2014 Prevost 50-passenger motorcoach with 21 occupants was westbound on Interstate 70 (I-70), near Highland, Madison County, Illinois. The motorcoach, owned and operated by Greyhound Lines, Inc., was on a scheduled route from Indianapolis, Indiana, to St. Louis, Missouri. Near the Silver Lake Rest Area, the motorcoach departed I-70 onto the rest area exit ramp, where it collided with three truck-tractor/semitrailer combination vehicles parked on the ramp's right shoulder. As a result, three motorcoach passengers were fatally injured. The driver and 11 passengers sustained injuries ranging from minor to serious. The three truck drivers, who were inside their vehicles at the time of the crash, were uninjured. The safety issues identified in this investigation are motorcoach driver fatigue; deficient driver oversight by Greyhound, including lack of a progressive discipline policy, lack of adequate record-keeping, and lack of policies for implementing driver monitoring systems; insufficient federal guidance on safety management, driver coaching, and fatigue mitigation; lack of seat belt use by the motorcoach passengers; and crash risk from lack of truck parking availability along the National Highway System. The NTSB makes new recommendations to the US Department of Transportation, the Federal Motor Carrier Safety Administration, Greyhound Lines, Inc., the National Coalition on Truck Parking, the American Bus Association, and the United Motorcoach Association. The NTSB also reiterates a recommendation to the Federal Motor Carrier Safety Administration and reiterates and classifies a recommendation to the Federal Motor Carrier Safety Administration.

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Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ABS	antilock braking system
AHI	apnea-hypopnea index
BASICs	Behavior Analysis and Safety Improvement Categories
CDL	commercial driver's license
CMV	commercial motor vehicle
CPAP	continuous positive airway pressure
CR	compliance review
DMS	driver monitoring system
DOT	Department of Transportation
ELD	electronic logging device
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FMP	fatigue management program
HOS	hours of service
HPVFPD	Highland-Pierron Volunteer Fire Protection District
I-5	Interstate 5
I-70	Interstate 70
IDOT	Illinois Department of Transportation
ISP	Illinois State Police
LDP	lane departure prevention (system)
MCMIS	Motor Carrier Management Information System

MCSO	Madison County Sheriff's Office
NAFMP	North American Fatigue Management Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
OSA	obstructive sleep apnea
OSHA	Occupational Safety and Health Administration
SMC	*Safety Management Cycle*
TPIMS	Truck Parking Information Management System
USDOT	US Department of Transportation

Executive Summary

What Happened

On Wednesday, July 12, 2023, about 1:48 a.m. central daylight time, a 2014 Prevost 50-passenger motorcoach with 21 occupants was westbound on Interstate 70 (I-70), near Highland, Madison County, Illinois. The motorcoach was owned and operated by Greyhound Lines, Inc., and was on a scheduled route from Indianapolis, Indiana, to St. Louis, Missouri. As the motorcoach approached the westbound Silver Lake Rest Area near mile marker 27.4, the motorcoach departed I-70 onto the rest area exit ramp, where it collided with three combination vehicles that were parked on the ramp's right shoulder. As a result, three motorcoach passengers were fatally injured. The driver and 11 passengers sustained injuries ranging from minor to serious. The three truck drivers, who were inside their vehicles at the time of the crash, were uninjured.

What We Found

We found that none of the following led to the crash: highway design; weather and roadway conditions; the motorcoach's mechanical condition; the motorcoach driver's medical qualification, training and experience, cell phone use, use of alcohol or other drugs, or a sudden incapacitating medical event. We also found that the emergency response was timely and adequate. In addition, we found that the crash dynamics and passenger statements indicate that the motorcoach driver was fatigued; Greyhound's variable scheduling practices led to his irregular sleep schedule and resulting fatigue. Also, the motorcoach driver's prolonged time awake, his decision not to use provided rest facilities, and possibly his medical conditions contributed to his fatigue at the time of the crash. We found that had Greyhound implemented a comprehensive fatigue management program, the likelihood of fatigued driving and the crash risk would have been reduced. Also, despite initial positive action by Greyhound in response to previous NTSB recommendations, Greyhound over time reverted to unsafe practices; had Greyhound implemented a progressive discipline policy, the motorcoach driver's unsafe driving could have been mitigated before the crash. Further, we found that Greyhound's incomplete and paper-based personnel records likely contributed to insufficient driver oversight and a lack of disciplinary actions for the motorcoach driver. In addition, we found that Greyhound did not use its driver monitoring system to its full potential with regard to disciplinary policy, fatigued driving detection, and real-time driver alerts, and thus the company missed identifying that the motorcoach driver was at high risk for a crash. Further, we found that applying *Safety Management Cycle* processes for all safety policies would allow Greyhound and other motor carriers to mitigate deficiencies and encourage safety beyond compliance with federal regulations. Also, we found that

federal guidance on using driver monitoring systems in driver coaching can encourage motor carriers to implement policies that reduce unsafe driver behaviors that can lead to crashes. We found that hours-of-service regulations for commercial drivers would be more effective if they addressed the risk of driving at night during drivers' circadian low. Further, we found that had the seriously injured motorcoach passengers been properly belted, some of the injuries would have been reduced; and had the motorcoach driver instructed the passengers pretrip to wear the available seat belts, they would more likely have been properly belted and their injuries reduced.

We found that combination vehicles routinely park on the Silver Lake Rest Area exit ramp shoulder because of limited truck parking, which increases the risk of collision. The three crash-involved combination vehicles were parked in the highway clear zone, which decreased the motorcoach driver's ability to stop or return his vehicle to the roadway. In addition, we found that the limited truck parking and subsequent unsafe parking is consistent with lack of long-term truck parking spaces on the National Highway System, as reported by Jason's Law-related surveys. Further, we found that continued deployment of the Truck Parking Information Management System can improve truck parking access and the expansion of access and usage, although it is not a standalone solution. In addition, we found that truck parking shortages require solutions that increase parking capacity as well as information about parking availability along the nation's highway system. Finally, we found that although state efforts to improve truck parking information and capacity are positive, a centralized effort can more broadly address the safety risk caused by lack of truck parking nationwide.

The National Transportation Safety Board determines that the probable cause of the Highland, Illinois, crash was the motorcoach driver's departure of the motorcoach from the travel lanes onto the shoulder of the exit ramp due to fatigue. Contributing to the motorcoach driver's fatigue was his irregular work-rest schedule and prolonged time awake. Contributing to the crash was the failure of Greyhound Lines, Inc. to mitigate the motorcoach driver's recurring unsafe driving behaviors. Also contributing to the crash were the three combination vehicles parked on the shoulder of the exit ramp, although prohibited by Illinois Statute Section 11-1303, due to the recurring lack of available truck parking. Contributing to the injury severity for some of the motorcoach passengers was their lack of seat belt use.

What We Recommended

As a result of this investigation, we recommended that the US Department of Transportation expand the use of the Truck Parking Information Management System to identify the need for additional truck parking and pursue available options to expand commercial vehicle parking, such as grants for states, local governments, and

other entities to increase parking and cover parking facility maintenance costs, ending restrictions on private development, and seeking additional Congressional appropriations. We also recommended that the Federal Motor Carrier Safety Administration provide guidance for passenger motor carriers to implement *Safety Management Cycle* processes and reassess these processes during changes in ownership/management and periodically after implementation of new safety policies or technologies. Further, we recommended that Greyhound Lines, Inc. establish a fatigue management program based on the North American Fatigue Management Program to educate its drivers and other personnel about fatigue; revise its scheduling policies to reduce irregular work-rest cycles; create an electronic personnel file management system that is easily accessible to terminal managers and safety personnel, both on and off site; incorporate driver monitoring systems in safety and disciplinary policies to address unsafe driver behaviors; establish written policy to proactively apply *Safety Management Cycle* processes when new safety policy or technology is adopted; and require pretrip safety briefings for passengers at every terminal, covering requirements to wear seat belts and ways to address urgent onboard safety concerns and information about emergency equipment/exits. We also recommended that the National Coalition on Truck Parking publish an updated report that proposes solutions to the truck parking shortage (at a minimum, expanding grants and funding, ending restrictions on private development, and enhancing the Truck Parking Information Management System coverage) and also projecting future truck parking needs. Finally, we recommended that the American Bus Association and the United Motorcoach Association inform their members about this crash and urge them to develop fatigue management programs based on the North American Fatigue Management Program.

In addition, we reiterated an existing recommendation to the Federal Motor Carrier Safety Administration to incorporate fatigue mitigation in its regulations for passenger-carrying drivers operating at night during circadian lows, and we reiterated and classified an existing recommendation to the Federal Motor Carrier Safety Administration to provide guidance to motor carriers in using onboard video recorders to aid driver training and compliance with safety regulations.

1 Factual Information

1.1 Crash Narrative

On Wednesday, July 12, 2023, about 1:48 a.m. central daylight time, a 2014 Prevost 50-passenger motorcoach, operated by Greyhound Lines, Inc., was traveling west on Interstate 70 (I-70) near Highland, Madison County, Illinois.[1] The motorcoach was occupied by the driver and 20 passengers and was enroute from Indianapolis, Indiana, to St. Louis, Missouri. As the motorcoach approached the Silver Lake Rest Area near mile marker 27.4, the motorcoach departed the travel lanes of I-70 onto the exit ramp to the rest area and then onto the right shoulder of the ramp.[2] The rest area was not a scheduled stop on the route. The motorcoach then struck three truck-tractor/semitrailer combination vehicles that were parked on the right shoulder of the exit ramp: first, a Freightliner truck-tractor in combination with a Vanguard semitrailer; then, a Kenworth truck-tractor in combination with a Benson semitrailer; and last, a Mack truck-tractor in combination with a Great Dane semitrailer. Figure 1 shows an annotated aerial view of the rest area and I-70 with the crash location noted.

[1] Visit ntsb.gov to find additional information in the public docket for this NTSB accident investigation (case number HWY23MH015). Use the CAROL Query to search safety recommendations and investigations.

[2] Throughout this report, "the exit ramp" refers to the exit from I-70 to the Silver Lake Rest Area. "The entrance ramp" refers to the entrance to I-70 from the Silver Lake Rest Area.

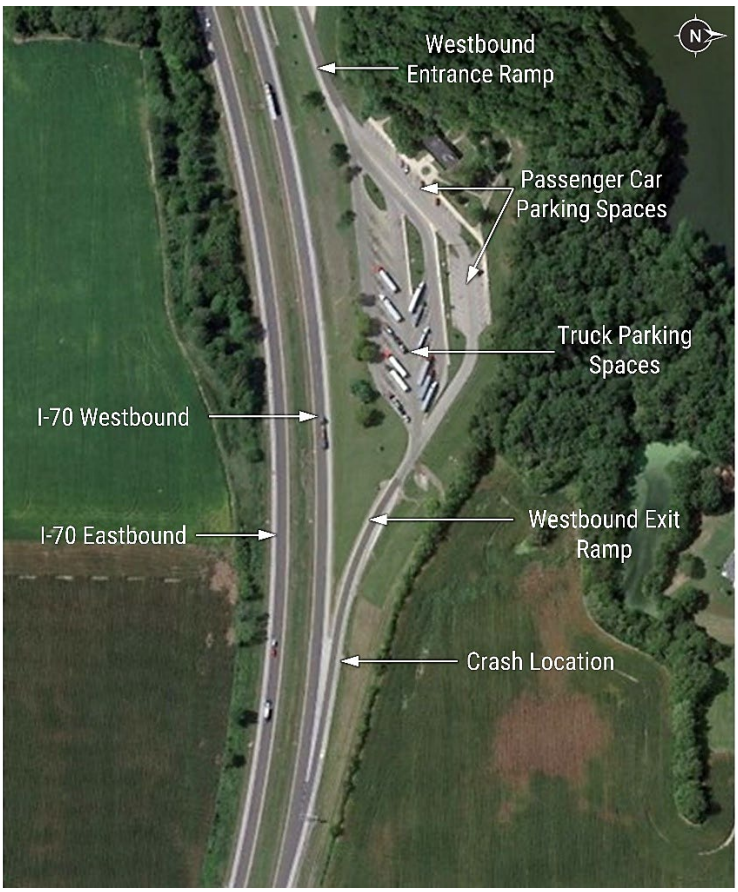

Figure 1. Aerial photo of the westbound Silver Lake Rest Area, including the exit and entrance ramps, truck parking spaces, passenger car parking spaces, and crash location relative to I-70. (Source: Google Earth; annotations by NTSB)

The posted speed limit on I-70 in the vicinity of the crash location was 70 mph, with an advisory speed of 40 mph posted on the rest area exit ramp. Electronic data from the onboard driver monitoring system and wi-fi service showed that, leading up to the collision, the motorcoach was traveling about 60 mph. Road evidence showed that the motorcoach driver did not take evasive action until making a leftward steering maneuver just before colliding with the Freightliner vehicle; no evidence suggests he braked. The motorcoach's collision with the Freightliner vehicle's left rear corner forced the semitrailer forward and induced a clockwise rotation. The Freightliner vehicle then struck the Kenworth vehicle parked ahead of it and subsequently jackknifed. The rear of the Freightliner truck-tractor and front of the semitrailer departed the pavement to the right as the vehicle came to rest.

The motorcoach continued forward after striking the Freightliner vehicle and sideswiped the left side of the Kenworth vehicle, including the left rear of the semitrailer and left side of the truck-tractor. The Kenworth vehicle was pushed forward but did not strike the Mack vehicle parked ahead of it.

After sideswiping the Kenworth vehicle, the motorcoach continued forward and struck the left rear of the Mack vehicle. The semitrailer intruded into the right front of the motorcoach, which likely exacerbated the already crash-compromised motorcoach body structure. After striking the Mack vehicle, the motorcoach came to final rest after having traveled about 197 feet from the initial collision with the Freightliner vehicle. Figures 2 and 3 show the positions of the four vehicles at final rest.

Figure 2. Overhead photo of the four crash-involved vehicles at final rest. (Source: Illinois State Police aerial drone photographs; edited by the NTSB photogrammetry software and annotations)

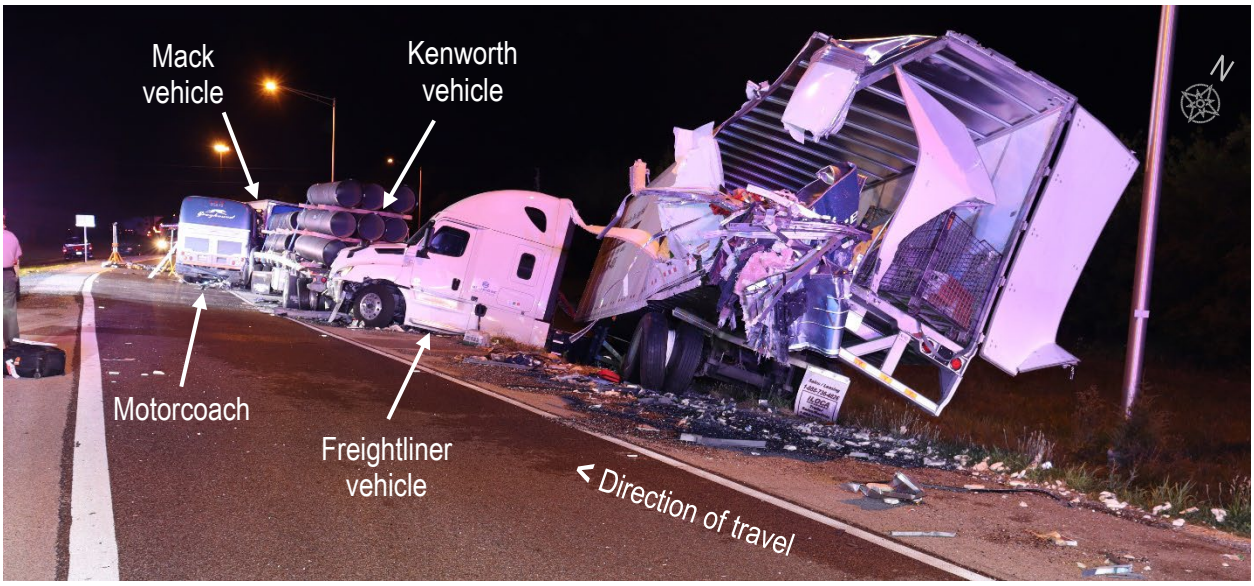

Figure 3. Crash scene photo of the motorcoach at final rest with the three combination vehicles. (Source: Illinois State Police; annotations by NTSB)

Conditions at the time of the crash were dark with highway lighting present; the weather was clear and the roadway was dry.

1.2 Injuries and Emergency Response

1.2.1 Injuries

The motorcoach was occupied by 20 passengers and the driver. Three passengers sustained fatal injuries, seven passengers sustained serious injuries, the motorcoach driver and four passengers sustained minor injuries, and six passengers declined medical treatment. The three truck drivers were uninjured. The motorcoach driver was airlifted from the scene and treated for his injuries at a hospital in St. Louis.

Postcrash, personnel at the Greyhound Indianapolis terminal produced a manifest with names and seat assignments. According to a passenger interview, the motorcoach driver allowed passengers to change seats to open seat rows. After review of Illinois State Police (ISP) interviews, and NTSB interviews with two of the 18 surviving motorcoach occupants, the general seating locations of eleven of the passengers could be determined. Table 1 lists the seating locations, if known, for the passengers.

The motorcoach sustained intrusion into the passenger compartment along the right sidewall, extending back to row 7 (refer to section 1.4.1.4 for further motorcoach damage description).[3] The three fatally injured passengers were seated in the window seats of rows 2, 4, and 7 on the right side of the motorcoach. Row 7 is denoted as pillar G in figure 9 in section 1.4.1.4. Four of the seven passengers who sustained serious injuries were also seated on the right side of the bus in the intrusion zone. The remaining passengers who were medically treated postcrash (or transported to a medical facility; three seriously injured and four with minor injuries) were seated outside of the intrusion zone.[4] As shown in table 1, one fatally injured and one other injured passenger were known to be wearing the available lap/shoulder belt at the time of the crash. The motorcoach driver, who sustained minor injuries, was wearing the available lap/shoulder belt at the time of the crash. The seating locations and seat belt use for the passengers who declined medical treatment are not known.

[3] Unless otherwise noted, "left" means the driver's side of the vehicles, and "right" means the passenger side.

[4] Serious injuries outside the intrusion zone included head and neck injuries consistent with striking the seat in front, or otherwise being unbelted.

Table 1. Passenger information including injury, seating location, and seat belt use.

Injury	Seating Location	Lap/Shoulder Belt Status
Fatal	Intrusion zone (right side rows 1–7)	Unrestrained
Fatal	Intrusion zone (right side rows 1–7)	Unrestrained
Fatal	Intrusion zone (right side rows 1–7)	Belted
Serious	Intrusion zone (right side rows 1–7)	Unrestrained
Serious	Intrusion zone (right side rows 1–7)	Unrestrained
Serious	Intrusion zone (right side rows 1–7)	Unrestrained
Serious	Intrusion zone (right side rows 1–7)	Unrestrained
Serious	Left side	Unrestrained
Serious	Left side	Unrestrained
Serious	Left side	Unrestrained
Minor	Unknown	Belted
Minor	Unknown	Unknown
Minor	Left side	Unrestrained
Minor	Unknown	Unknown
Declined treatment	Unknown	Unknown
Declined treatment	Unknown	Unknown
Declined treatment	Unknown	Unknown
Declined treatment	Unknown	Unknown
Declined treatment	Unknown	Unknown
Declined treatment	Unknown	Unknown

1.2.2 Occupant Protection

1.2.2.1 Motorcoach Occupants

Illinois state law requires all vehicle occupants, including motorcoach passengers, to wear seat belts.[5] As noted, only the driver and two passengers could be confirmed as having worn their seat belts.

The motorcoach had 13 rows of two-person seats on the left side and 12 rows of two-person seats on the right side forward of the lavatory. All 50 passenger seats were equipped with lap/shoulder belts. The NTSB examined the seat belts postcrash and determined that they all functioned properly and were accessible to passengers. The shoulder portion of the seat belts was equipped with a height adjuster on the outboard portion of each seatback. Labels reminding passengers to wear the seat belt were stitched into the base of most seatbacks, with at least one label visible in each two-person seating area. The labels illustrated the two-step process for fastening the seat belts: first, putting the belt on, and second, using the shoulder height adjuster so that the shoulder belt was adjusted to the top of the occupant's shoulder (figure 4).

Figure 4. Left, lap/shoulder belt for motorcoach passenger use; right, label stitched onto the back of passenger seats, illustrating the two-step process, visible to passengers seated behind this seat, for fastening the seat belt.

[5] For more information, see Illinois Statute 625 ILCS 5/12-603.1. In addition, the state of Indiana, where the crash trip originated, requires motorcoach passengers to wear seat belts; the state of Missouri, where the crash trip was scheduled to end, does not. Only the following states and the Commonwealth of Puerto Rico require seat belts to be worn on motorcoaches through primary enforcement: Alaska, California, Delaware, Illinois, Indiana, Maine, Minnesota, Oregon, Rhode Island, Utah, and Washington.

The driver seating area was surrounded by a thick plexiglass security compartment that, after the crash, was found partially displaced. The seat frame was twisted but still intact. The driver's seat was equipped with a lap/shoulder belt that the motorcoach driver was wearing at the time of the crash; responders had to cut his seat belt near the buckle to extricate him from the motorcoach, and his belt webbing showed evidence of loading.

1.2.2.2 Pretrip Safety Briefings

Although not required by regulation, the Federal Motor Carrier Safety Administration (FMCSA) recommends that passenger carriers conduct pretrip safety briefings to improve passenger safety.[6] Pretrip safety briefings inform passengers about safety features on the motorcoach, including availability of seat belts and the locations of emergency exits. Briefings may also remind passengers that some states have primary enforcement laws for seat belts, which apply also to motorcoach passengers.[7]

According to communications from Greyhound, its motorcoach drivers are required to conduct a safety briefing every time there is a change of driver and at every large terminal except during late nights. It is up to the individual driver whether to give nighttime briefings, as many passengers are asleep. Drivers can either play a prerecorded message using their company-issued cell phone or give the briefing orally.

Two passengers interviewed by the NTSB stated that they did not recall the motorcoach driver conducting a pretrip safety briefing before departing the Indianapolis terminal at 11:30 p.m. They recalled that he told passengers not to disturb him while driving because of construction along the route to St. Louis.

1.2.3 Emergency Response

The Freightliner driver, whose parked vehicle was the first to be struck, placed the initial 911 call at 1:51:28 a.m., which alerted the Madison County Sheriff's Office (MCSO) to the crash. The MCSO dispatcher notified the Highland-Pierron Volunteer Fire Protection District (HPVFPD) at 1:53 a.m. The HPVFPD chief was the first to arrive on scene at 2:04 a.m. and assumed incident command. ISP units were dispatched at 1:56 a.m., with the first trooper arriving on scene 11 minutes later, followed by other

[6] For more information, see https://www.fmcsa.dot.gov/safety/passenger-safety/pre-trip-safety-information-motorcoach-passengers.

[7] *Primary enforcement* seat belt use laws allow law enforcement officers to ticket drivers and/or vehicle occupants for not wearing seat belts without having committed any other traffic offense. Illinois has primary enforcement of seat belt use.

ISP units and the Traffic Crash Reconstruction Unit. At 2:12 a.m., the incident commander declared the crash a mass casualty incident. The incident commander conducted initial triage of the scene as the first responder on site.

Eleven ambulances responded to the scene and transported eight injured motorcoach occupants. Additionally, four medical helicopters transported four injured occupants to St. Louis-area trauma hospitals.

1.3 Highway Factors

1.3.1 Roadway Design, Markings, Lighting, and Crash History

I-70 was constructed in 1962 as a four-lane divided highway, two lanes in each direction, separated by a depressed earthen median. The total width of the travel lanes in each direction is about 24 feet. In the westbound direction, each travel lane is 12 feet wide, separated by 10-foot-long dashes with 30-foot spacing supplemented with clear retroreflective pavement markers. The highway marking separating the paved shoulder from the leftmost travel lane consists of a 6-inch-wide solid yellow line. The highway marking separating the paved shoulder from the rightmost travel lane consists of a 6-inch-wide solid white line.[8]

The NTSB documented four horizontal curves, located ahead of and after the crash location: two curves on I-70 and two curves on the westbound rest area exit ramp.[9] The curve sequence is shown in figure 5.

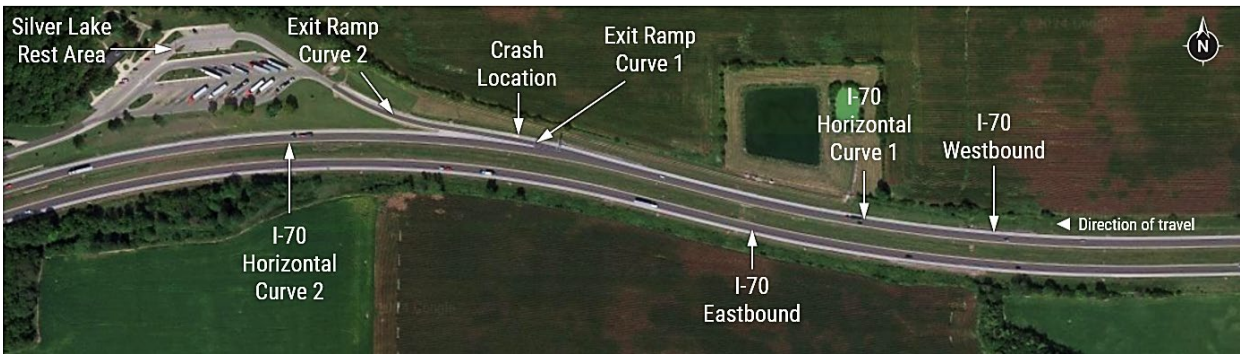

Figure 5. Horizontal curves on I-70 and the exit ramp to westbound Silver Lake Rest Area before and after the crash location. (Source: Google Earth; annotations by NTSB)

The vertical alignment for I-70 in the vicinity of the crash location consists of an upgrade slope of 0.26% for motorists traveling in the westbound direction. The

[8] A 6" width is considered wide for pavement markings and is consistent with the standards specified in the *Manual on Uniform Traffic Control Devices*.

[9] *Horizontal curves* are those that change the alignment or direction of a roadway.

vertical alignment for the exit ramp to the westbound Silver Lake Rest Area at the crash location consists of an additional upgrade slope of 0.05%.

At the exit ramp, a gore area separates the westbound travel lanes from the approximately 14-foot-wide exit ramp.[10] The right shoulder of the exit ramp is about 9 feet wide. Near the crash location, the highway marking separating the exit ramp to the westbound Silver Lake Rest Area from the right paved shoulder consists of a 6-inch-wide solid white line. The highway marking separating the exit ramp from the gore area consists of an 8-inch-wide solid white line that is reflective. Figure 6 shows an overhead view of the exit ramp and travel lanes.

Figure 6. Overhead photo of the Silver Lake Rest Area exit ramp, noting the main roadway, gore area, and shoulder.

Two regulatory speed limit signs are posted about 2.3 miles ahead of the crash site, stating that the maximum speed limit was 70 mph and the minimum speed was 45 mph. About 350 feet before the crash site, a 40-mph advisory speed limit sign is posted for the westbound exit ramp to the Silver Lake Rest Area.

[10] A *gore area* is a triangle-shaped boundary created by white lines marking an area of pavement formed by the convergence or divergence of a mainline travel lane and an exit/entrance lane. It is not intended for vehicle travel.

The paved shoulders adjacent to the rightmost and leftmost travel lanes feature milled rumble strips about 16 inches long and 7 inches wide, spaced about 12 inches apart.[11] The rumble strips terminate in the paved shoulder adjacent to the rightmost travel lane, about 560 feet before the crash site, and about 197 feet from the start of the exit ramp gore area. Rumble strips were not installed in the paved shoulder for the exit and entrance ramps next to the rightmost travel lane in accordance with Illinois Department of Transportation (IDOT) standards.[12]

A single line of light poles is positioned about 32 feet from the edge of the westbound exit ramp lane marking; the lights were illuminated at the time of the crash. The light poles are about 50 feet high, spaced 200–250 feet apart, and have 400-watt high-pressure sodium luminaires attached to the mast arm.[13]

Review of records for the 10 years before the crash shows two previous crashes involving parked combination vehicles at the Silver Lake Rest Area: one crash in the eastbound direction and one in the westbound direction. Neither crash had injuries or fatalities.

1.3.2 Rest Area Truck Parking Availability

As of the date of this report, the Silver Lake Rest Area has 21 parking spaces for commercial trucks and 43 parking spaces for passenger cars. Since the original construction in 1973, no additional truck or passenger car parking spaces have been added to the westbound Silver Lake Rest Area.[14]

Due to insufficient truck parking, the three commercial trucks involved in the crash parked on the shoulder, although doing so was prohibited by Illinois Statute Section 11-1303, to comply with rest requirements, as the next available rest area on westbound I-70 is located 76 miles away in Wright City, Missouri. The shoulder of the exit ramp has no signage indicating that parking is prohibited there, nor is such signage required. Illinois Statute Section 11-1303 prohibits parking a vehicle on any

[11] *Milled rumble strips* are grooved patterns in the pavement surface that alert drivers (through sound and vibration) when their vehicles depart the travel lane.

[12] According to the Illinois DOT, rumble strips are constructed along high-speed roadways (50 mph and greater). It is typical for state DOTs not to extend the rumble strips in the paved shoulder along exit and entrance ramps.

[13] The highway design, markings, lighting, and signage conformed to appropriate design guidance published by the American Association of State Highway and Transportation Officials (AASHTO 2018).

[14] According to the Bureau of Transportation Statistics, the total volume of combination vehicles on all US roadways increased from 905,782 in 1970 to 2,979,277 in 2020. For more detail, visit https://www.bts.gov/topics/national-transportation-statistics.

controlled-access highway, except to avoid conflict with other traffic or to comply with law enforcement.[15] Because the Silver Lake Rest Area exit ramp and shoulder are part of a controlled-access highway, vehicle parking is prohibited.

The NTSB observed vehicles parked on the shoulder several times while on scene during the investigation. Three days after the crash, the NTSB observed five combination vehicles parked on the shoulder to the westbound Silver Lake Rest Area. Figure 7 shows two of the vehicles.

Figure 7. Photo of two of the five combination vehicles parked on the shoulder of the exit ramp, Saturday, July 15, 2023, about 9:30 p.m.

[15] (a) A *controlled-access highway* is a type of highway that has been designed for high-speed vehicular traffic, with all traffic flow (ingress and egress) regulated. A controlled-access highway provides unhindered flow of traffic, with no traffic signals, intersections, or property access. It is free of any at-grade crossings with other roads, railways, or pedestrian paths, which are instead carried by overpasses and underpasses. Entrances and exits to the highway are provided at interchanges by exit and entrance ramps. On the controlled-access highway, opposing directions of travel are generally separated by a median. (b) IDOT considers interchange ramps and ramps leading to and from rest areas part of a controlled-access highway.

1.3.3 Clear Zone Concept

The Federal Highway Administration (FHWA) defines clear zones as unobstructed and traversable roadway areas that allow drivers to stop safely or regain control of a vehicle that has left the roadway. On high-speed roads such as interstates, including exit and entrance ramps, the width of the clear zone is usually 30 feet.[16] Any obstacle beyond 30 feet is not required to be shielded. As noted in the *Roadside Design Guide*, published by AASHTO a distance of 30 feet permits about 80% of vehicles that depart the roadway to recover (AASHTO 2011).

As shown in figure 8, the clear zone begins at the rightmost edge of the exit ramp travel way. The left edge of the parked trucks was approximately 1 foot from the edge of the ramp travel way. The three crash-involved combination vehicles parked on the exit ramp shoulder were then inside the 30-foot clear zone and would be considered obstacles.

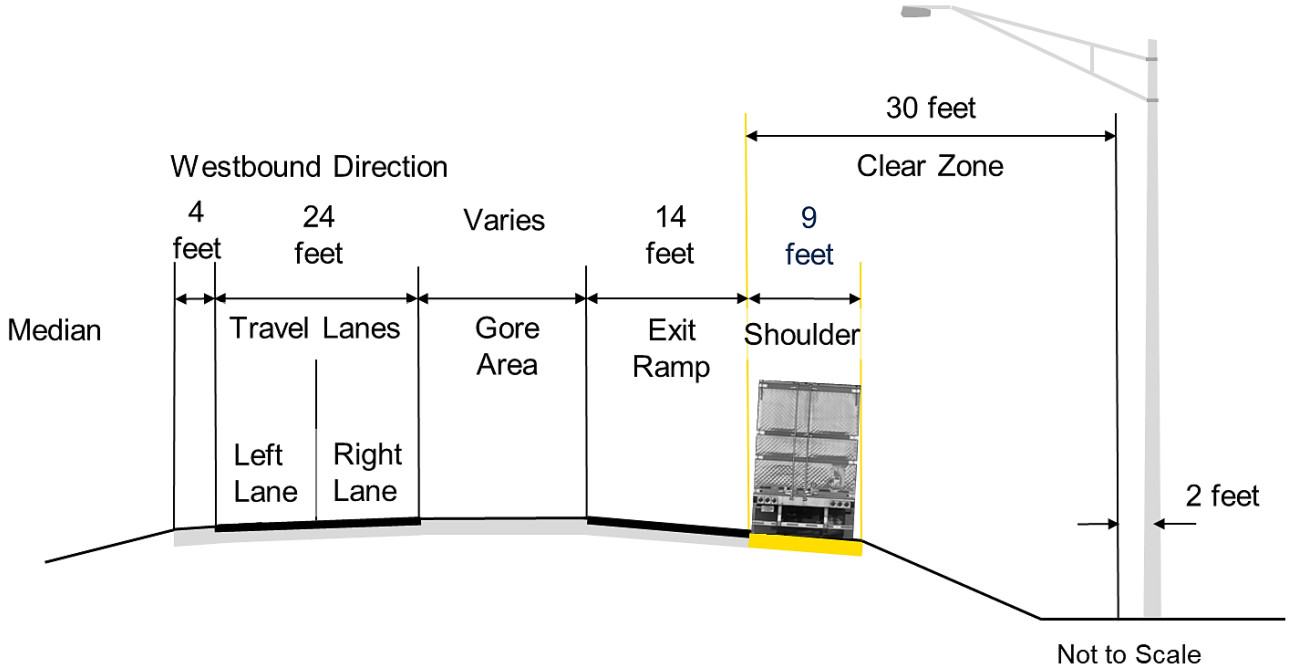

Figure 8. Diagram of the I-70 westbound travel lanes and exit ramp, including the 30-foot clear zone, near the crash site. The combination vehicles were parked on the shoulder as marked in yellow.

[16] The 30 feet is measured from the edge of the paved travel way, or the intersection of the paved travel way and shoulder.

1.4 Vehicle Information

1.4.1 Motorcoach

1.4.1.1 General Description

The 2014 Prevost X3-45 motorcoach could transport up to 50 passengers and had a gross vehicle weight rating of 53,000 pounds.[17] It was equipped with a 435-horsepower Volvo D13H engine, an Allison 6-speed automatic transmission, and air-operated disc brakes with antilock braking system (ABS). The NTSB inspected all major mechanical systems, including steering, braking, electrical, and suspension systems, and observed no defects. A brake hose was observed with chafing present, which is an out-of-service violation; however, the brake systems were functional. Figure 9 shows an exemplar motorcoach.

Figure 9. Image of an exemplar Prevost motorcoach.

1.4.1.2 Advanced Driver Assistance Systems

The motorcoach was equipped with the Prevost Electronic Stability Program, which is designed to mitigate rollover and loss-of-control scenarios. The motorcoach also had a Bendix Wingman BX161502L forward-looking radar unit as part of the Prevost Aware adaptive cruise control system.

As of February 2020, Prevost provides an optional safety suite known as Prevost Driver Assist.[18] The system integrates a forward-looking radar, camera, braking, and driver communication technologies to offer frontal collision mitigation,

[17] *Gross vehicle weight rating* is the total maximum weight that a vehicle is designed to carry when loaded, including the weight of the vehicle itself plus fuel, passengers, and cargo.

[18] For more information, see Prevost Launches Driver Assist Electronics Suite For Peace-of-mind | Prevost.

vehicle braking in response to stationary vehicles or large objects, lane departure warning, adaptive cruise control with braking, and following-distance alerts, in addition to ABS and electronic stability. Prevost Driver Assist is available for Prevost model years 2021 and later and can be retrofitted on motorcoaches with certain ABS systems back to model year 2018. Prevost Driver Assist was not available as a standard or optional feature on the subject 2014 Prevost motorcoach. Further, the motorcoach was not equipped with lateral assistance systems such as lane-keeping or lane-centering assistance.

1.4.1.3 Data Recording

The motorcoach was equipped with several systems and modules capable of recording data, such as an event data recorder, engine control module, motorcoach transmission module, and ABS controller. As noted previously, it also had a Bendix Wingman BX161502L forward-looking radar unit with recording capability. The NTSB obtained data from these systems, and only the data from the engine control module were pertinent to the crash. The engine control module recorded vehicle speed, accelerator pedal position, engine speed, service brake, parking brake, clutch position, engine brake, cruise control, and key switch status for an acceleration triggered event that corresponded to the crash time. The vehicle speed data were recorded as near zero and thus inconsistent with the crash dynamics; however, the engine speed was consistent with the motorcoach traveling at highway speeds.[19]

Further assessments of the motorcoach speed were conducted using the motorcoach's Lytx SF300 inward- and outward-facing camera and its telematics driver monitoring system (DMS) capable of recording audio, video, and data related to programmed triggers (the DMS is discussed further in section 1.6.3). The DMS was damaged in the crash and sent to a Lytx forensic laboratory in San Diego, California, for data recovery before the NTSB arrived at the crash scene. The NTSB requested to see all available data; however, Lytx was unable to recover any crash-related video or audio files from either the inward- or outward-facing cameras. Lytx was able to recover telematic data, such as the vehicle's latitude and longitude with a timestamp; the last data point was recorded at 1:46 a.m., 2.2 miles east of the crash site. The average speed for the final 22 minutes of data was about 60 mph. The NTSB used timestamped GPS position data, recorded by an Icomera mobile wireless internet system installed on the motorcoach, to derive the velocity of the motorcoach and confirm its speed. It showed the motorcoach traveling about 60 mph just before the crash.

[19] The investigation did not determine the cause of the inconstant speed value.

1.4.1.4 Damage

Figure 10 shows an exemplar motorcoach (top) and the crash-damaged motorcoach (bottom) with support pillars annotated by letters A through L and the windows of the exemplar motorcoach numbered 1 through 10. The motorcoach's collision with the three combination vehicles resulted in catastrophic damage to the motorcoach's front end, with deformation extending about 24.3 feet along the right side. The top of the motorcoach's front bumper was rotated forward, and the right side was pushed rearward. The right headlight assembly was damaged. The entrance door was sheared off and missing. The front of the motorcoach's right skirt rail was damaged and pushed rearward. The right-side-rail was damaged and pushed rearward from the front of the motorcoach to the C-pillar (seating row 2). The right-side waist rail was missing from the front of the motorcoach to the H-pillar (seating row 9).[20] The right A-pillar was detached from the base and was pushed rearward to the F-pillar (seating row 5). The left A-pillar showed crash-induced damage and was bent rightward while still attached to the roof support. Right-side pillars B, C, D, E, and G were missing; pillars F and H were severed and pushed rearward; and pillars I, J, K, and L remained intact, as observed in figure 10.

[20] The *waist rail* is the longitudinal structural part of the bodywork below the side windows.

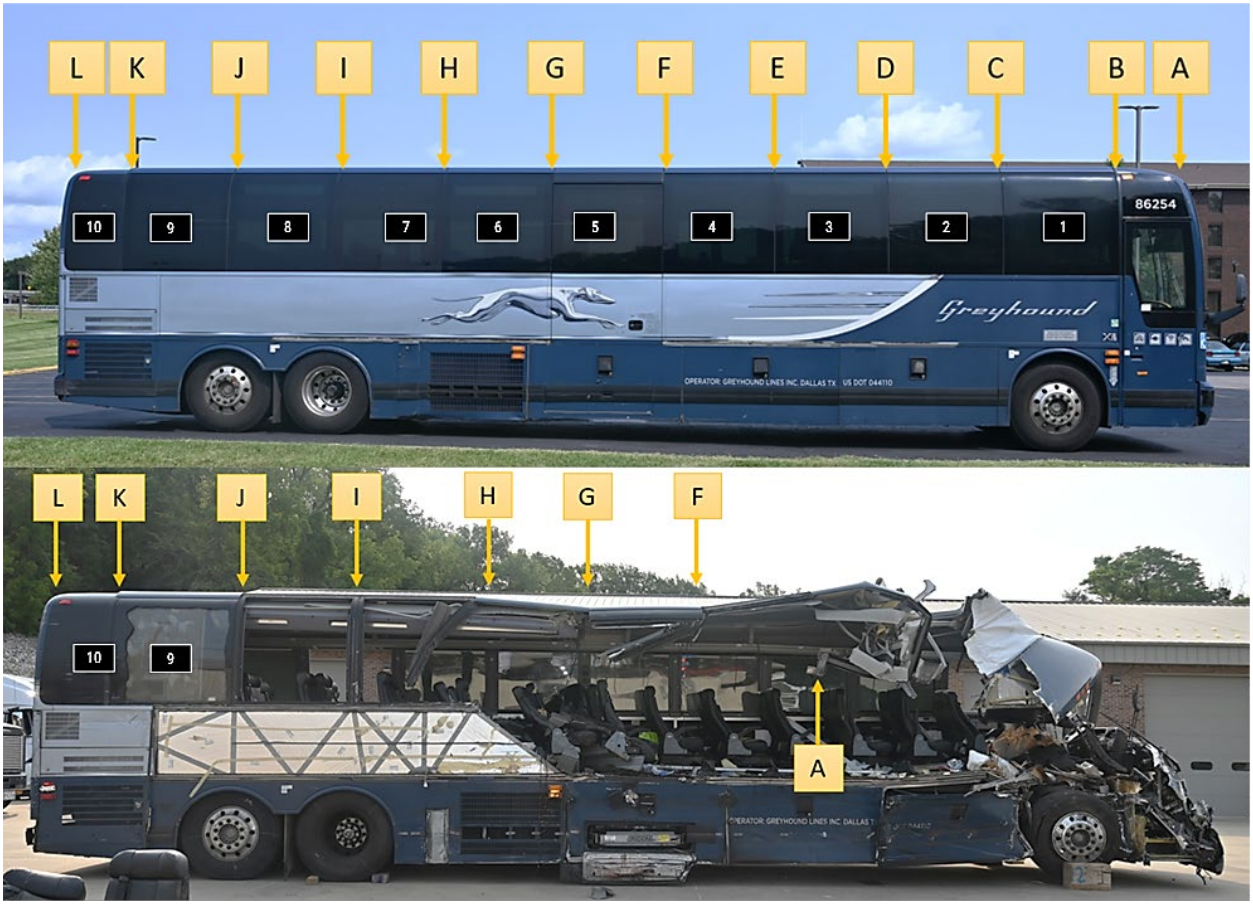

Figure 10. The crash-damaged motorcoach (bottom) and exemplar motorcoach (top). Letters denote corresponding body pillars between the exemplar motorcoach and the crash-damaged one. Windows are numbered in the exemplar motorcoach and corresponding intact or partially intact windows are numbered in the crash-damaged one. In the photo of the crash-damaged motorcoach, the fatally injured passengers were seated in the area extending back to pillar G (row 7).

The right side of the motorcoach body was compromised, the right front tire was torn and flat, and the interior was exposed from the front of the motorcoach to the H-pillar (approximately seating row 9). The storage door covers between the curb rail and the side rail were pushed inward and showed dark-colored paint transfer. The right-side paneling between the waist rail and the side rail were missing from the front of the motorcoach to the H-pillar and the exterior skin was missing between the H-pillar and the engine compartment. The wheelchair accessory door was damaged, stuck open, and hanging from the motorcoach. The windshield was missing. The first eight right-side windows were missing and the remaining two windows on that side were broken. Left-side windows 1 and 2 were missing; left-side window 9 was broken. The right side of the roof's leading edge was rotated downward and rightward. The roof was torn in the approximate area of pillar B (approximately seating row 2). From pillar B to pillar F (approximately seating row 5), the roof sustained crash-induced

damage and was rotated clockwise and upward. The fatally injured passengers were seated in rows 1–7, from approximately pillar B to pillar G.

1.4.2 Freightliner Vehicle

The Freightliner vehicle consisted of a 2019 Freightliner Cascadia truck-tractor in combination with a 2024 Vanguard semitrailer; the semitrailer was carrying US Postal Service mail. This vehicle was parked the farthest east on the exit ramp and was the first vehicle struck by the motorcoach. Based on body camera footage from first responders, the semitrailer's rear-facing running lamps were illuminated.

Images of the damaged semitrailer and truck-tractor are shown in figure 11. The rear portions of the semitrailer's structural support rails were damaged and displaced. Several roof bows and floor rails were damaged. The left rear of the semitrailer was displaced upward and rightward. Axle 5's left outside tire was damaged and had an approximately 4-inch cut, several small cuts, and abrasion marks located on the exterior of the sidewall. Axle 5's left outside wheel was deformed. The semitrailer also had an approximate 15-foot opening on the left side where several side skin panels were missing, extending to the rear of the trailer.

Figure 11. The Freightliner vehicle's semitrailer (left) and truck-tractor (right).

The Freightliner truck-tractor sustained damage to the front and front right of the vehicle. The front bumper was pushed downward and was peeled away from the right bumper support. The left headlight assembly was cracked and the right headlight assembly was damaged and separated from the vehicle. The front grille was pushed rearward. The left-side fiberglass hood was cracked.

1.4.3 Kenworth Vehicle

The Kenworth vehicle consisted of a 2000 Kenworth truck-tractor in combination with a 2007 Benson semitrailer; the semitrailer was a flatbed trailer loaded with pipe cargo. This vehicle was the second vehicle parked along the exit ramp and was struck from behind by the Freightliner truck-tractor and pushed forward; the Kenworth vehicle was also struck by the motorcoach as the motorcoach continued forward on the exit ramp. The damage to the left rear of the Kenworth vehicle is shown in figure 12. The semitrailer sustained contact damage to the left taillight assembly, the left mudflap and tire (missing from trailer), and the left-side tie-down assemblies, 4 feet of which were damaged and separated from the trailer. The truck-tractor sustained semi-horizontal scrape marks to the left fender, damage to the driver's entry and exit steps, and inward denting and horizontal scraping to the left side of the fuel tank. In addition, the fuel tank was punctured in the crash and fuel dripped onto the ground. The left-side exhaust stack was torn away from the truck cab.

Figure 12. Damage to the left rear of the Kenworth vehicle's semitrailer.

1.4.4 Mack Vehicle

The Mack vehicle consisted of a 2023 Mack truck-tractor in combination with a 2019 Great Dane semitrailer; the semitrailer was refrigerated and carried food items. This vehicle was the third vehicle parked along the exit ramp and was struck on the left rear of the semitrailer by the motorcoach. The Mack vehicle was removed from the scene and released before the NTSB's arrival at the crash location. Investigators therefore used ISP-provided photographs to determine the damage (figure 13), which was localized to the rear left of the semitrailer, where the motorcoach's front right struck it. The left side of the semitrailer's rear underride protection guard was bent, and the left rear portion of the trailer body sustained a horizontal tear about 2 feet long. At final rest, the motorcoach and the Mack vehicle's semitrailer remained in contact, with the semitrailer intruding into the motorcoach.

Figure 13. Damage to the left rear of the Mack vehicle's semitrailer. (Source: ISP)

1.5 Human Performance Factors

1.5.1 Motorcoach Driver's Licensing, Experience, and Driving Record

The motorcoach driver, a 59-year-old male, held a valid Missouri class B commercial driver's license (CDL) with passenger endorsement and corrective lens restriction.[21] His driver qualification file, provided by Greyhound, included his application for employment, a copy of his driver's license, an annual review of his driving record, his US Department of Transportation (USDOT) medical certificate, and a previous employment background check.[22] His qualification file met the regulatory requirements under 49 *CFR* 391.51.

Greyhound also provided the NTSB with the motorcoach driver's employment records, which showed that he was an experienced commercial driver before his employment with Greyhound, including 6 years as a transit bus driver. He was first hired by Greyhound in 2018 and drove for Greyhound until 2021 when he requested a leave of absence for personal reasons. He was rehired in 2022. The driver was placed on administrative leave by Greyhound after the crash, pending the results of a workers' compensation claim.

According to the Commercial Driver's License Information System, the motorcoach driver did not have any suspensions, withdrawals, restrictions, or crashes for the prior 3 years.[23] However, data from Greyhound (table 2) revealed mishaps, including a reportable crash in 2018 in which he rear-ended a moving combination vehicle on Interstate 15 in California.[24] The police report noted that he was traveling at an unsafe speed for the traffic conditions and was fatigued. Other documented crashes were minor.

[21] A Missouri class B CDL covers any single vehicle with a gross vehicle weight rating (GVWR) of 26,001 or more pounds or any such vehicle towing a vehicle not in excess of 10,000 pounds GVWR. *Gross vehicle weight rating* is the total maximum weight that a vehicle is designed to carry when loaded, including the weight of the vehicle itself plus fuel, passengers, and cargo. For more information about Missouri's CDL requirements, see https://dor.mo.gov/forms/CDL%20Manual.pdf.

[22] In accordance with 49 *CFR* 391.41, commercial drivers are required to have medical certification.

[23] The Commercial Driver's License Information System is a nationwide computer system that enables state driver licensing agencies to ensure that each commercial driver has only one driver license and one complete driver record.

[24] Reportable crashes are those with fatalities and/or injuries or those that include $1,500 or greater in damage.

Table 2. Motorcoach driver's crash history, provided by Greyhound.

Date	Commercial vehicle	Incident description	Severity
5/02/2022	Yes	Pick-up truck struck bus rear	No injuries
3/11/2020	Yes	Truck struck bus side mirror	No injuries
8/02/2019	Yes	Bus struck construction barrier	No injuries
5/19/2018	Yes	Bus struck rear end of truck	1 injured
4/16/2017	No	Non-commercial motor vehicle rear-end crash	N/A

1.5.2 Motorcoach Driver's Training

According to Greyhound records, the motorcoach driver completed the company's driver training program in March 2018. Drivers are required to take this training upon hiring and must complete it before transporting passengers. The training is divided into three phases. The first phase consists of 10 hours of computer-based training, which covers topics such as the basics of safe driving, navigating railroad crossings, merging, passing, driving in adverse weather, navigating intersections, and pedestrian awareness. Included in this training is instruction on fatigue management (see section 1.6.2.4 for additional information on fatigue management training). The second phase consists of at least 40 hours of behind-the-wheel time and 13 days of classroom training (52 hours), which covers topics such as USDOT regulations, pre- and post-trip inspections, and completing logs. The final training phase consists of at least 70 additional hours of behind-the-wheel time and 10 hours of computer-based training on topics such as substance abuse, bloodborne pathogens, hazard communication, and security awareness. Each training phase ends with a proficiency test, where students must score at least 70% accuracy to pass. The motorcoach driver attended further standard training in 2020 and 2021, which included Americans with Disabilities Act training, defensive driving, and hazard communication.

1.5.3 Motorcoach Driver's Route History and Schedule

According to the motorcoach driver's logs and payroll records, he had operated three routes for the 3 months before the crash:

- St. Louis, Missouri to Abeline, Kansas – layover (26 hours) and return – 6 hours; 404 miles one way.
- St. Louis, Missouri to Nashville, Tennessee – layover (12.5 hours) and return – 4 hours 35 min; 311 miles one way.
- St. Louis, Missouri to Indianapolis, Indiana – layover (4.5 hours) and return – 3 hours 44 min; 244 miles one way.

Greyhound provides rest facilities for drivers during layovers; the company reserves hotel rooms at the layover site and provides company-paid transportation to and from the hotel. Drivers may also use the breakroom at the layover site terminal. The motorcoach driver used hotel facilities regularly on the Kansas and Nashville routes. Review of hotel logs for the Indianapolis route showed that he checked into the hotel once in the year prior to the crash, on June 25, 2023.

According to electronic logging device (ELD) data, for the 2 months leading up to the crash, the motorcoach driver did not make any unscheduled stops at the Silver Lake Rest Area while on the St. Louis–Indianapolis route.[25] A diagram of the route is shown in figure 14.

Figure 14. Route (in orange) from the Greyhound terminal in Indianapolis to the Greyhound terminal in St. Louis, including the crash location at the Silver Lake Rest Area. (Source: ArcGIS; annotations by NTSB)

Figure 15 summarizes the motorcoach driver's on- and off-duty status for the month before the crash. The driver logs showed that he had a shift work schedule in which he would shift between the three assigned routes and would go on duty at any time during a 24-hour period.[26] His off-duty time and days off would also vary from week to week.

[25] Greyhound uses an ELD by Saucon. For more information, see Electronic Driver Logs - Saucon.

[26] *Shift work* denotes a work schedule occurring outside of traditional daytime hours, such as an evening, rotating, or on-call shift.

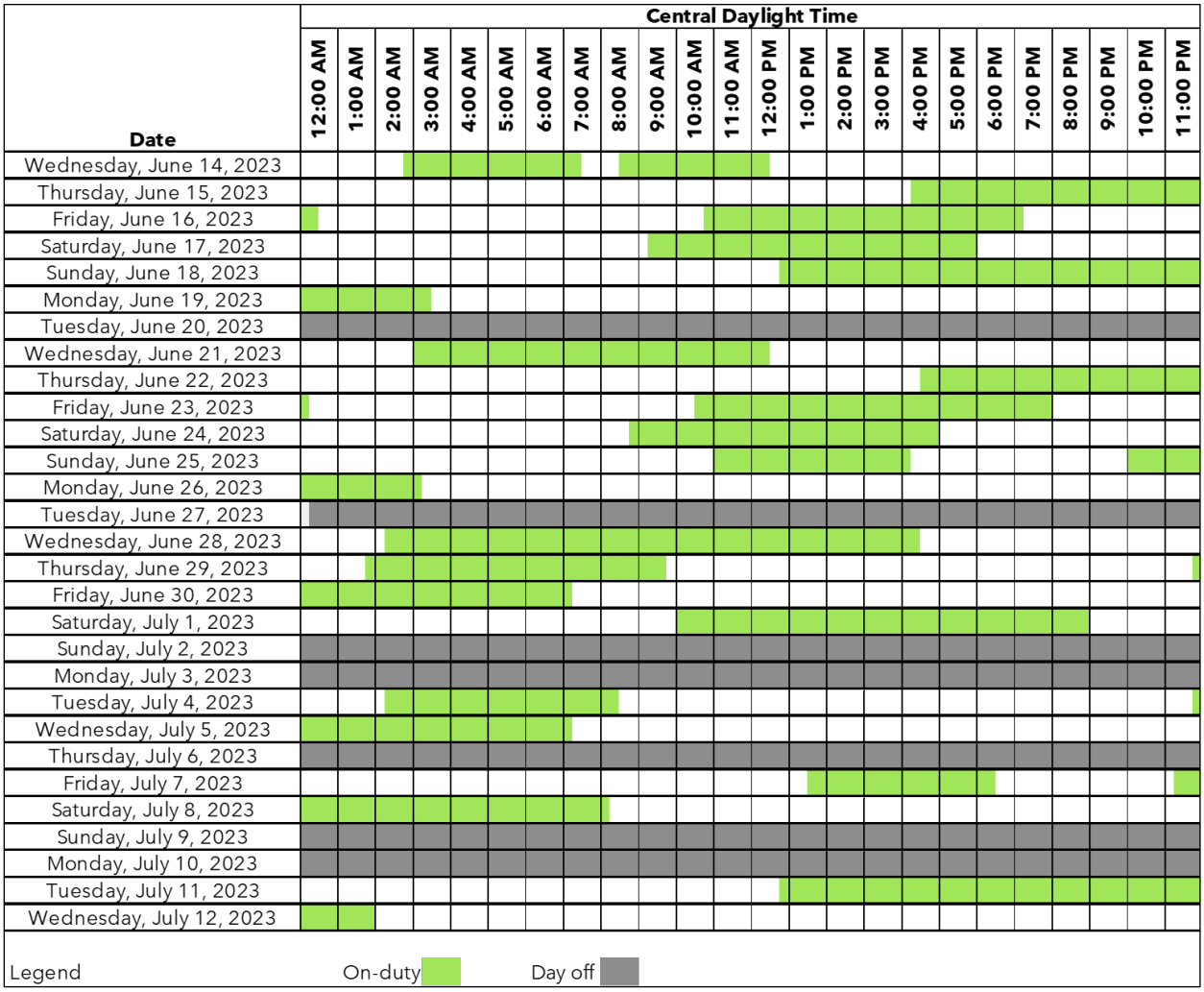

Figure 15. Approximate on-duty times for the motorcoach driver, in 15-minute increments, during the month before the crash. Increments shorter than 15 minutes are not shown.

1.5.4 Motorcoach Driver's Precrash Activities

According to the motorcoach driver's ELD data, he was off duty on July 9–10, 2023. Based on review of the times he used his prescribed continuous positive airway pressure (CPAP) device and his cell phone activity, he returned to a schedule during his off-duty time of being active during the day and sleeping at night (see figure 16).[27] Figure 16 also includes annotations of his CPAP use as recorded by the CPAP

[27] (a) *CPAP* uses air pressure delivered through a mask or nasal device to help keep a person's airway open during sleep (also see section 1.5.5). (b) Phone use includes active use of the phone (such as texting, phone calls, and active application use) and does not include passive data transfers such as automatic updates. The NTSB reviewed data extractions from the motorcoach driver's personal and work cell phones, provided by the ISP.

device.[28] He went back on duty in the St. Louis area at 12:51 p.m. on July 11, 2023. It is not known at what exact time the motorcoach driver awoke that day. However, according to cell phone data obtained by the NTSB, he used an internet application at 9:39 a.m., indicating that he awoke earlier. He began driving at 1:29 p.m. and drove until reaching Effingham, Illinois, where he logged in as "on-duty not driving" for 20 minutes. He then drove to Terre Haute, Indiana, where he logged in as "on-duty not driving" for 2 minutes. He changed his status to "on-duty not driving" in Indianapolis at 5:54 p.m. and he did not resume driving for about 4 hours 30 minutes. It is not known what the motorcoach driver did during that time, aside from his phone activity. He used his personal phone to make an outgoing call at 6:07 pm; at 8:21 p.m., he downloaded photos from an application, and at 10:09 p.m., he made another outgoing call.

The motorcoach driver did not use the Greyhound-provided rest facilities. Review of hotel records indicated that he had not checked into the provided hotel. Greyhound also stated that the Indianapolis terminal had a break room that drivers could use during layovers; again, no evidence indicated that the motorcoach driver used the break room.[29] In addition, his CPAP device did not record use during this time.[30] He began driving at 10:23 p.m. and drove 3 hours 25 minutes until the crash occurred.

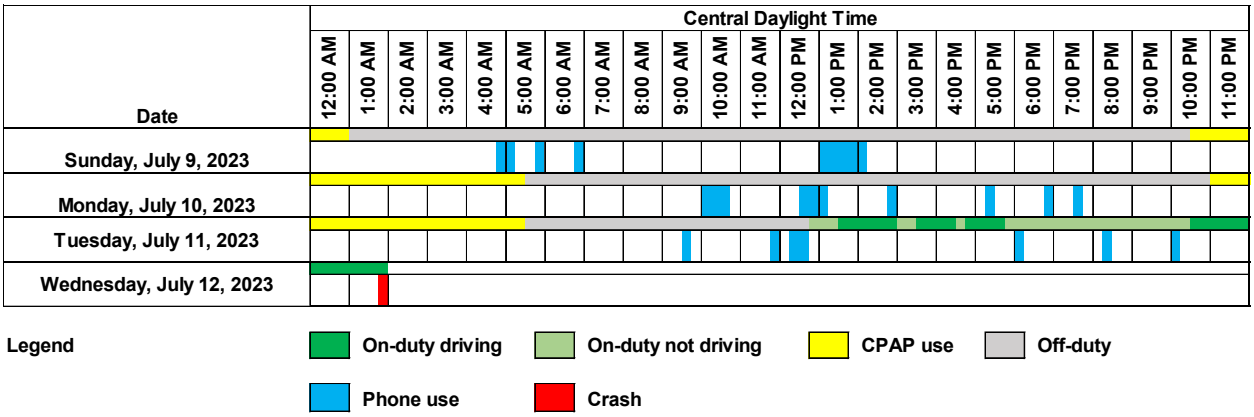

Figure 16. Times when the motorcoach driver used his personal or work phone (including texts, calls, web use, and photos) during the 3 days before the crash. Phone use is based on records and forensic data downloaded from the motorcoach driver's cell phones. Phone use is shown as a contiguous block if fewer than 15 minutes separated the time between outgoing texts or phone calls. Phone records obtained from Greyhound begin at 4:54 a.m. on July 9, 2023 (phone use after the crash is not shown).

[28] Time-of-day values recorded by the CPAP device were not validated by additional sources.

[29] The NTSB reviewed video footage of the Greyhound terminal break room and interviewed break room staff to confirm that the motorcoach driver did not use those facilities.

[30] Whether the driver had his CPAP device with him in Indianapolis is unknown.

1.5.5 Motorcoach Driver's Medical History

The NTSB reviewed several precrash records related to the motorcoach driver's medical history, including records from the urgent care clinic that conducted his most recent USDOT driver medical fitness examination, records from his primary care physician, pharmacy records, and other medical records related to his May 2018 crash.[31] According to the records, the motorcoach driver had a history of high blood pressure treated with one prescription medication, diabetes treated with one prescription oral medication that has low risk of causing low blood sugar, and high cholesterol treated with one prescription medication. He also was diagnosed with obesity and had obstructive sleep apnea (OSA) treated with a CPAP device.

The motorcoach driver's most recent USDOT medical fitness examination before the crash took place on April 24, 2023, and the examining physician reviewed the driver's CPAP adherence records from the preceding 90 days. The physician found that the motorcoach driver met the standards for medical certification, wearing corrective lenses, with periodic monitoring required for high blood pressure. The driver was issued a 1-year medical certificate. His most recent primary care visit before the crash took place in May 2023, for routine follow-up of his diabetes. His hemoglobin A1c, an indicator of blood sugar control, was at acceptable levels at that time, and his high blood pressure was documented as being stable with the prescribed treatment.

In addition, the NTSB reviewed medical records from after the motorcoach driver's May 2018 crash. Following that crash, the driver was admitted to the hospital because of confusion. No acute abnormalities were found, but tests revealed evidence of chronic cerebral small vessel disease.[32] An electroencephalogram performed on the 2018 crash date was normal, without evidence of seizure activity. The driver's confusion was attributed to head injury with concussion sustained in the 2018 crash, and he was discharged home after 2 days in the hospital. Records from an urgent care visit the day after his discharge and a neurology visit in June 2018 documented persistent cognitive and behavioral symptoms. He was given instructions for additional testing and neurology follow-up, but this investigation found no evidence that such follow-up occurred. At his next commercial motor vehicle (CMV) driver medical examination in September 2018, he was noted to be asymptomatic from his head injury. However, the workers' compensation dispute that

[31] The USDOT medical certification met the requirements outlined in 49 *CFR* 391.43.

[32] *Cerebral small vessel disease* is disease related to the small blood vessels of the brain. Such disease commonly is seen with aging and in people with high blood pressure, and is associated with increased risk of stroke and cognitive impairment. Cerebral small vessel disease may also increase risk of fatigue.

the driver raised with Greyhound related to the 2018 crash regarding permanent disability status was unresolved as of the 2023 crash date.

1.5.5.1 Precrash CPAP Compliance

The NTSB requested that the motorcoach driver's CPAP supplier generate a CPAP compliance report covering the 2 weeks leading up to the crash (from June 27, 2023, through July 12, 2023). This report indicated that the driver used the CPAP for at least 4 hours on 64% of the nights before the crash.[33] The reported apnea-hypopnea index (AHI) during this date range was normal on the CPAP.[34] According to the driver's CPAP records, before the crash, he last used the device for almost 6.5 hours in the early morning of July 11 (from shortly past 11 p.m. on July 10 to about 5:30 a.m. on July 11). He also used his CPAP for about 7 hours the previous night (from shortly past 10:00 p.m. on July 9 until shortly past 5:00 a.m. on July 10). Note that these windows of CPAP usage may or may not reflect actual sleep times.

1.5.5.2 Postcrash Toxicology and Medical Evaluations

At the request of the NTSB, the Federal Aviation Administration (FAA) Forensic Sciences Laboratory performed toxicological testing of blood and urine specimens collected during the motorcoach driver's initial postcrash medical care. The FAA testing detected the driver's prescribed blood pressure and diabetes medications in blood and urine; these medications are not generally considered impairing. All other detected substances could be attributed to medications administered to the driver during his initial postcrash care, as corroborated by review of his postcrash treatment records.

After initial treatment for minor injuries, the motorcoach driver was then admitted to the hospital because he had difficulty walking. No major laboratory or imaging abnormality was identified during this hospitalization. While in the hospital,

[33] This is the information that the CPAP device recorded during the 14 noon-to-noon periods leading up to the crash. No FMCSA standard exists for minimum CPAP compliance in CMV drivers with OSA. In 2016, the FMCSA Motor Carrier Safety Advisory Committee and Medical Review Board jointly recommended that CPAP usage of at least 4 hours per night on 70% of nights be considered a minimum threshold for adequate adherence to treatment, but this recommendation was advisory only. A Greyhound-developed safety manual documented the company's internal policy that, for its drivers with OSA, all CPAP compliance reports must "be at a minimum of 70% before [medical] cards can be issued."

[34] With OSA, a person's upper airway soft tissues collapse during sleep, causing the person to have repeated episodes during which breathing temporarily stops (apnea) and/or becomes ineffective (hypopnea). Often, the severity of OSA is classified by the AHI, which is the number of apnea and hypopnea episodes that occur per hour of sleep. An AHI of less than 5 is normal. Mild OSA corresponds to an AHI of 5 to less than 15, moderate OSA corresponds to an AHI of 15 to 30, and severe OSA corresponds to an AHI of more than 30.

he was noted to have impaired cognition and diminished functional status and mobility. He was subsequently discharged to a rehabilitation hospital on July 14, 2023, where he was treated for these issues. His cognitive impairment and initial diminished consciousness after the crash were attributed to effects of a concussion sustained in the crash. Sixteen days after the crash, he underwent tests that showed no acute findings, but indicated cerebral small vessel disease and an old stroke (a thalamic lacunar infarct), which was noted to be an incidental finding. The motorcoach driver was discharged 3 weeks after admittance to the rehabilitation hospital.

1.5.6 Truck Drivers

All three truck drivers held valid Class A commercial driver's licenses and medical certificates. All trucks were parked on the right shoulder of the Silver Lake Rest Area exit ramp, and the drivers were asleep in their respective vehicle sleeper berths during the crash.

1.5.7 Postcrash Interviews

The NTSB made numerous attempts to interview the motorcoach driver; however, his attorney stated that he would not provide an interview.

1.5.7.1 Passenger Interviews

Five motorcoach passengers interviewed by the ISP said that the motorcoach driver had drifted out of the travel lane several times during the trip. One passenger stated that although he had been asleep at the time of the crash, he was awoken about four or five times during the trip when he heard the motorcoach run over the rumble strips on the edge of the roadway. A second passenger stated through an interpreter that about an hour into the drive, the motorcoach started to leave the roadway. He said that this happened a few more times during the trip. He stated that he woke up about 10 minutes before the crash and put his seat belt on because he was afraid of how the driver was operating the motorcoach. A third passenger stated through an interpreter that an hour before the crash, the driver was falling asleep and drifted out of the travel lane about three times.

Two additional passengers interviewed by the NTSB reported similar experiences. One of them stated that the motorcoach driver had instructed the passengers to ask him any questions before departing the Indianapolis terminal because he did not want to be bothered when driving due to the number of construction projects along the route. However, she stated that even when not in a construction area, the motorcoach driver would drift over the rumble strips and she wondered if the drifting was due to crosswinds. The other passenger stated that the

motorcoach driver would override the rumble strips and correct but that just before the crash, the driver did not try to correct the path whatsoever despite the tires overriding the rumble strips as the motorcoach approached the exit. The passenger stated, "I looked up, and I saw the tractor-trailer, the back of it, a white one, coming towards us. And I immediately was like, okay, we're going to hit."

1.5.7.2 Freightliner Driver

The ISP interviewed the Freightliner driver beginning about 3 hours after the crash. He stated that he was resting in his sleeper berth when the collision occurred. He said that he normally parked inside the rest area, but when he arrived about 10 p.m. on July 11, the parking was full, so he parked on the ramp with the other trucks.[35] He stated that he awoke when the bus collided with his truck. He made the first 911 call after the crash.

1.5.7.3 Kenworth Driver

The NTSB interviewed the Kenworth driver on July 13, 2023. He had been employed by Richard Wolf Trucking for 6 months at the time of the crash and was traveling from Coshocton, Ohio, to Kansas City, Missouri. He was familiar with I-70 and the rest stops along the highway, which he described as "good" but that they could get crowded at night. He said he entered the Silver Lake Rest Area at approximately 10:30 p.m. on the evening of the crash because he had reached the maximum limit of his hours of service (HOS).[36] When he arrived, he saw trucks parked along the ramp and thus assumed that the rest area parking for commercial vehicles was full. He said, "you can't get a parking spot at night. You got to get there early to find a parking spot . . . Anything after eight p.m. is too late." He stated that his parking lights were activated at the time of the crash to aid with his truck's visibility and that he was asleep in his sleeper berth. During the crash sequence, he fell to the floor but was not injured. He exited the truck and tried to render aid.

1.5.7.4 Mack Driver

The ISP interviewed the Mack driver beginning about 4 hours after the crash. He stated that he arrived at the Silver Lake Rest Area about 8:20 p.m. on July 11 and was asleep at the time of the crash.[37] He said that the collision dazed him and that

[35] It is unclear whether the Freightliner driver assumed that the rest area was full or if he had advance knowledge of the lack of parking availability that evening.

[36] Arrival times for the combination vehicles are approximate and were given to the ISP as part of on-scene interviews; they were not corroborated with electronic logging data or other information sources. Given the orientation of the vehicles, the Kenworth vehicle likely arrived before the Freightliner vehicle even though the Freightliner driver reported an earlier arrival time.

[37] The Mack driver did not state why he parked on the exit ramp that evening.

when he exited the truck he realized that a bus had hit his vehicle. He said he called 911 and walked back to the motorcoach, where some passengers were exiting, and he helped extricate others.

1.6 Motor Carrier Factors

The motorcoach was owned and operated by Greyhound Lines, Inc., which is an intercity bus common carrier that operates fixed routes and charter service throughout the United States. Greyhound is registered as a "For-Hire Passenger" motor carrier and operates from its principal place of business in Dallas, Texas. At the time of the crash, the carrier had active operating authority.[38]

Greyhound's corporate structure includes a chief operating officer, vice president of operations, director of safety and security, and director of maintenance. The company is divided into four divisions: Customer Service/Field Operations, Maintenance Operations, Food Service, and Support. Each division is headed by a regional vice president. Per carrier officials, at the time of the crash, the company operated 1,023 motorcoaches, employed 1,054 drivers, and owned 22 terminals throughout the United States. Greyhound operated 592 fixed US routes. Per Greyhound's most recent update to the FMCSA, as of March 2025, the company operates 872 motorcoaches and employs 1,160 drivers.

In October 2007, Greyhound was acquired by a subsidiary of a Scotland-based transportation company, FirstGroup. On October 21, 2021, Flix SE, a Germany-based transportation company, acquired Greyhound Lines, Inc. from FirstGroup. Since July 2022, the Dallas-based entity Flix North America, Inc., manages operations for both Greyhound and FlixBus across North America. The Greyhound chief operating officer serves as part of the corporate leadership of Flix North America; the corporate structure was otherwise unchanged due to the acquisition.

As a condition of the purchase agreement, FirstGroup sold to Flix all of its motorcoaches, equipment, routes, and other assets except for the Greyhound terminals. Flix was given a 3-year term lease to continue using the bus terminals, and then the terminals and land would be sold. As a result of the acquisition, Greyhound had been systematically closing bus terminals throughout the United States and relocating operations to new facilities.

In the United States, Flix North America operates with an "asset light" business model, aside from its ownership of Greyhound.[39] As part of this model, Flix works with

[38] For more detail regarding for-hire-passenger rules and operating authority, see 49 *CFR* Parts 374 and 365.

[39] For more information, see https://www.flixbus.com/company/about-us.

regional partners in the United States: the regional partners operate and maintain vehicle fleets, and Flix provides marketing, sales/ticketing, and technology solutions to the regional partners. As such, Flix North America is not a motor carrier itself.

1.6.1 Federal Oversight

The FMCSA regulates commercial motor vehicle carriers. The Motor Carrier Management Information System (MCMIS) is an electronic system operated by the FMCSA and contains comprehensive safety data on interstate and intrastate commercial carriers.[40] According to MCMIS, Greyhound's latest FMCSA documentation was filed on April 27, 2023, and reflected annual mileage of 67,125,600 miles.

Since 1989, Greyhound has had 34 FMCSA compliance reviews (CR). A CR quantifies a carrier's performance in seven Behavior Analysis and Safety Improvement Categories (BASICs)—unsafe driving, HOS compliance, driver fitness, controlled substances and alcohol, vehicle maintenance, hazardous materials compliance, and crash indicator. The last CR was conducted June 9, 2023, and resulted in a Satisfactory safety rating.[41] Vehicle and driver inspection data for the most recent 24 months are included in table 3.

[40] According to the FMCSA's Motor Carrier Management Information System (MCMIS), Greyhound was issued USDOT number 44110. Its motor carrier number (MC) was 1515.

[41] The FMCSA inspector evaluates safety fitness and assigns one of three safety ratings (*satisfactory*, *conditional*, or *unsatisfactory*) to motor carriers operating in interstate commerce. This process conforms to 49 *CFR* 385.5 -- Safety fitness standard and 49 *CFR* 385.7 -- Factors to be considered in determining a safety rating.

Table 3. Inspection data for Greyhound for the 24 months before March 2025.

	Vehicle Inspection	Driver Inspection
Inspections	308	811
Out-of-Service Inspections[42]	19	7
Total Inspections	327	818
Out Of Service Percentage	6.2%	0.9%
National Average (as of 2/28/2025)	22.6%	6.7%

An FMCSA investigator was present throughout the on-scene phase of the Highland investigation and conducted a postcrash review of possible violations committed by the motorcoach driver. That investigation did not identify any violations, and the FMCSA took no enforcement action nor did it expand the investigation into a full CR.

1.6.1.1 Hours of Service

FMCSA regulations restrict the number of hours drivers may operate while transporting passengers under 49 *CFR* 395.5. In summary, carriers may not allow drivers to drive more than 10 hours at a time, nor be on duty for more than 15 hours. Drivers may not be on duty for more than 70 hours in 8 consecutive days, provided the carrier operates 7 days per week. If the carrier does not operate every day of the week, the limitation is 60 hours in any 7 consecutive days.

In addition, drivers must take a 30-minute break when they have driven for a period of 8 cumulative hours without at least a 30-minute interruption. The break may be satisfied by any non-driving period of 30 consecutive minutes (i.e., on duty not driving, off duty, sleeper berth, or any combination of these taken consecutively).

The NTSB reviewed the motorcoach driver's HOS. He used his company-issued cell phone to log in to a daily-record-of-driving application to start his workday. This cell phone was also used to scan passenger tickets and to start the motorcoach. A review of the driver's ELD showed that he had exceeded the 10-hour driving limit by 49 minutes on July 8, 2023; however, he annotated the violation stating he

[42] For more information, see Out-of-Service Criteria.

encountered "adverse conditions" due to a non-related accident and traffic delay.[43] No other HOS violations were identified for the crash-involved driver.

1.6.2 Carrier Policies

Greyhound policies and procedures are described in documents such as a safety manual, driver rule book, and union contract (subsequent sections further describe these policies). Greyhound also provided the NTSB with a copy of its 2023 safety plan, which was formatted as a series of presentation slides.

Between 2013 and 2015, Greyhound had installed, on its entire fleet, DMSs with inward- and outward-facing cameras to evaluate driver behavior (see section 1.6.3 for more information about Greyhound's use of DMS).

1.6.2.1 Greyhound Safety Manual

The *Greyhound Safety Manual* consists of 75 policies and was last revised on October 1, 2015. These company-specific policies take into account USDOT regulations, such as drivers' HOS and drug testing, as well as guidelines established by the Occupational Safety and Health Administration (OSHA) that include topics related to safe work practices. The safety manual did include policies for screening for and detection of OSA but did not include any standalone policies on fatigue management or requirements to use provided rest facilities during layovers.

1.6.2.2 Greyhound Driver's Rule Book

All Greyhound drivers receive training and a copy of the 29-page *Greyhound Driver's Rule Book*, which was last revised February 2019. The rule book has five sections: 1. General Rules, 2. Driver Behavior and Image, 3. Schedule Performance, 4. Customer Service, and 5. Bus Operations/Safety. The General-Rules section describes disciplinary actions, stating that "drivers may be disciplined or discharged for any violation or infraction of any company policy, or violation of any federal, state/provincial, or local law or regulation." (The motorcoach driver's speeding violations are discussed further in section 1.6.4.) An excerpt about speeding from Section 5-15 of the rule book states:

[43] Title 49 *CFR* 395.1(b)(1), *Adverse driving conditions.* Except as provided in paragraph (h)(3) of this section, a driver who encounters adverse driving conditions, as defined in 395.2, and cannot, because of those conditions, safely complete the run within the maximum driving time or duty time during which driving is permitted under 395.3(a) or 395.5(a) may drive and be permitted or required to drive a commercial motor vehicle for not more than two additional hours beyond the maximum allowable hours permitted under 395.3(a) or 395.5(a) to complete that run or to reach a place offering safety for the occupants of the commercial motor vehicle and security for the commercial motor vehicle and its cargo.

> Buses are not to be operated in excess of the posted speed limit. Regardless of the governed setting on the bus or posted speeds that exceed 70 mph, the bus should never be operated in excess of 70 mph. It will be the driver's responsibility to maintain the bus's speed on downhill grades in accordance with these guidelines.

The rule book contained no rules or policies related to progressive discipline policy for violating rules, fatigue management, or use of provided rest facilities during layovers.

1.6.2.3 Drug and Alcohol Testing

Greyhound has an established random drug and alcohol-testing program in accordance with 49 *CFR* Part 382. The crash-involved motorcoach driver had two pre-employment and four random USDOT drug tests on file; all results were negative.

1.6.2.4 Greyhound's Fatigue Management and Scheduling

In 2002, following a crash involving a Greyhound motorcoach near Burnt Cabins, Pennsylvania, Greyhound hired an outside consultant to help implement a fatigue management program and to suggest changes to driver scheduling practices.[44] As a result, all drivers receive instruction on fatigue during the initial driver training program with additional fatigue management training in recurring biannual driver training. The training module was last updated in 2008.

The training materials described fatigue as "a significant decrease in alertness, an increase in sleepiness and an all-around lack of energy due to several factors." The factors listed in the training materials include insufficient or poor-quality sleep due to work patterns, lifestyle, or an untreated sleep disorder; long continuous hours of wakefulness; disrupted body clock; the use of alcohol, drugs, or medications that disrupt sleep or wakefulness; or environmental factors. After their initial hiring, drivers received fatigue management training biannually during their training refresh cycle.

Greyhound informed the NTSB during this investigation that the company structures its routes so that commute time is accounted for, driver layovers are included where required, and routes do not exceed HOS regulations. The drivers'

[44] On June 20, 1998, near Burnt Cabins, Pennsylvania, a 47-passenger Greyhound motorcoach departed the right travel lane of the Pennsylvania Turnpike into an emergency parking area, where it struck a parked combination vehicle, which was then pushed forward into a second parked combination vehicle (NTSB 2000a). Of the 23 people on board the motorcoach, the driver and 6 passengers died; the other 16 passengers were injured. The two occupants of the first combination vehicle were also injured. The NTSB determined that the probable cause of the Burnt Cabins crash was the motorcoach driver's reduced alertness from taking a sedating antihistamine and his fatigue resulting from Greyhound scheduling irregular work-rest periods.

schedules are created by Greyhound corporate officials, with input from the drivers' union.

1.6.2.5 Union Contract

Greyhound drivers and non-management personnel have a union contract (effective October 1, 2022, to September 30, 2025) regarding benefits, wages, job duties, bidding procedures for routes, recognition of seniority, driver rest, safety and discipline, and other operational measures. The following sections highlight some of the guidelines in the union contract.

1.6.2.5.1 Article G-7 – Discipline

When disciplining employees, any complaint, disciplinary action, or record brought to the attention of the company 24 months before the current incident will not be used to determine guilt or penalty. This provision does not apply to safety-related activities, including speeding violations, chargeable accidents (only preventable accidents will be charged against a driver's record), damage to property, personal injury, and use of alcohol or illegal substances.

1.6.2.5.2 Article G-17 – Safety

The safety guidelines are divided into four sections. Section A outlines Greyhound's requirements for adhering to USDOT medical examinations, stating that USDOT physicals must be conducted by a company-selected physician. It also outlines driver requirements and consequences for failing to adhere to the policy. Section B outlines the requirements for random drug and alcohol testing, applicable to drivers and maintenance employees. Section C outlines safe maintenance of equipment and machinery, stating that Greyhound agrees to maintain all equipment in a safe and sanitary condition. Finally, Section D outlines safety and service awards, stating that Greyhound may provide awards for safety and service.

1.6.2.5.3 Article O-4 – Rest

The union contract provided a section on "rest," which stated that regular drivers must have 8 hours off duty between signoff and sign-on for their runs, in accordance with federal regulations. Any regular drivers working extra hours and any on-duty standby/substitute drivers must have 9 hours off duty between signoff and the time at which they are called to report for work. However, drivers may be assigned to the second half of a regular straight-away run if they complete the first portion of the same run, subject to USDOT regulations; those drivers can work after 8 hours of rest.

1.6.3 Driver Monitoring System

The crash-involved motorcoach was equipped with the Lytx DriveCam SF300 inward- and outward-facing camera system.[45] The DMS used these cameras in combination with telematic sensors to identify risky driving behaviors, such as speeding, following another vehicle too closely, or failure to stop at intersections. The DMS reported instances when drivers exceeded operational thresholds set by Greyhound, such as hard braking (a 9-mph deceleration within 1 second), exceeding the posted speed limit, and exceeding a 70-mph fleetwide speed limit set by Greyhound. The DMS was also capable of detecting driver behaviors such as cell phone use and lack of seat belt use. The DMS was designed to notify the driver in real time via an audible alert and was also capable of submitting 20-second recordings of triggered events (10 seconds before and 10 seconds after the event) to Greyhound for review.

In a presentation provided to the NTSB, Greyhound mentioned driver coaching and reduction of coachable events as benefits of the DMS. However, the Greyhound safety manual, driver handbook, and union contract did not describe any policies, procedures, or benefits regarding the use of the DMS for training, coaching, or discipline. According to the motorcoach driver's training records, he acknowledged having received an interoffice memorandum stating: "tampering with or blocking the driver monitoring camera or those that blatantly violate our rules of the road, using your cell phone or not using your seat belt while driving, may result in disciplinary action."

According to company records, Greyhound began a DMS pilot program in 2011 and implemented it company-wide between 2013 and 2015. The company reported significant decreases in collisions and near-misses since deploying the DMSs in the fleet. Greyhound also reported decreases in other risky driving behaviors, such as incomplete stops and unsafe following distances, after implementation.

1.6.4 Motorcoach Driver Discipline and Policy Violations

The NTSB requested records to examine the DMS data along with disciplinary records for the motorcoach driver but received an incomplete accounting of his disciplinary infractions that had been recorded on paper forms. Although no descriptions of a progressive discipline policy were included in Greyhound's policy

[45] For additional information, see Lytx's Comprehensive fleet and compliance management solutions.

documentation, the disciplinary form stated that future similar occurrences would include progressive discipline up to and including termination.

Greyhound located written records of 13 policy violations that the motorcoach driver had committed, including DMS violations, between February 2019 and October 2021. Nine of these violations involved speeding; the other four pertained to an HOS violation, late departure from the terminal, following too closely, and colliding with property. These violations occurred on different routes and were documented by several terminal managers. Finally, three violations were listed in the motorcoach driver's personnel record from May 2018 to February 2019, including the 2018 crash noted in section 1.5.1, for which Greyhound provided no written disciplinary files. These violations are summarized in table 4. No violations after 2021 were recorded.

Greyhound's fragmented personnel records for the crash-involved driver created unnecessary obstacles and delays in this investigation. Greyhound was unable to supply the NTSB with records of disciplinary action taken for any of these policy violations in the year leading up to the crash. Greyhound stated the reason was that the paper records were lost when the terminal locations changed in February 2021 under new ownership, and no electronic system was in place to access the disciplinary records. It is not known whether the motorcoach driver had been disciplined for these violations and the records were simply lost, or whether he faced no disciplinary action. In May 2023, he was one of 20 drivers with the highest policy violation scores among Greyhound's 1,054 drivers. These violations were not documented on his official record nor were written reprimands provided.

Table 4. Motorcoach driver's violations of Greyhound policy, May 2018 – September 2021.

Date	Violation	Description
5/17/2018[a]	Not mentioned	DMS
1/25/2019	Not mentioned	No further information
2/17/2019	Not mentioned	DMS
3/9/2019	Speeding	DMS. Exceeded speed limit by 19 mph
3/21/2019	Speeding	DMS. Exceeded speed limit by 22 mph
7/19/2019	Speeding	DMS. Exceeded speed limit
8/2/2019	Property damage	Made wrong turn and damaged bus
11/30/2019	HOS violation	Accepted work assignment before having 8 hours off duty
1/14/2020	Schedule	Late departures and arrivals during past week
1/17/2020	Following distance	DMS. Following Distance: ≥ 1 sec to < 2 sec
6/2/2020	Speeding	DMS. Exceeded speed limit by 13 mph
8/2/2020	Speeding	DMS. Exceeded speed limit by 14 mph
10/20/2020	Speeding	DMS. Exceeded speed limit by 11 mph
2/27/2021	Speeding	DMS. Exceeded speed limit by 18 mph
3/4/2021	Speeding	DMS. Exceeded speed limit by 12 mph
9/14/2021	Speeding	DMS. Exceeded speed limit by 15 mph

[a] The reported date of violation on Form HR-02 was overwritten, making it difficult to decipher. The date of the violation might have been May 17, 18, or 19, 2018.

As summarized in table 5, the motorcoach driver had 71 other reportable events recorded by the DMS from July 2022 to July 2023 (the year leading up to the crash). The events were automatically rated by the DMS system as they occurred, using thresholds provided by Greyhound. The event scores range from 0 to 10 for severity, with 10 being the most severe. The motorcoach driver scored a 10 on seven occasions, all for violating the posted speed limit and/or the company's speed policy of 70 mph.[46]

[46] Multiple categories for speeding violations, including different assigned scores, are included in the record. Greyhound coordinated with Lytx as to the violation definitions, thresholds, and assigned scores, which are reported here.

Table 5. Motorcoach driver's violations of Greyhound policy, July 2022 – July 2023.

Driver violation (as listed in the DMS report provided by Greyhound)	Number of occurrences	Assigned score (set by Greyhound)
Posted speed violation, speed policy violation	7	10
Speed policy violation	4	5
Posted speed violation	2	5
Failed to stop [at stop sign or light]	13	5
Failed to stop, other communication device	1	5
Following distance: < 1 second	5	5
Red light [braking response]	1	5
Following distance: ≥ 1 sec to < 2 sec	20	4
Late response [braking]	1	4
Incomplete stop [at stop sign or light]	5	3
Incomplete stop, other comm device	1	3
Late departure	1	3
Handheld device	1	3
Other concern [lane departure]	1	3
Other communication device	2	0
Lens obstruction	4	0
Near collision - unavoidable	1	0
Collision	1	0

The NTSB also found that Greyhound lacked disciplinary policies to remediate poor behavior or to justify termination when investigating a 2016 crash in San Jose, California, in which a motorcoach operated by Greyhound entered an unmarked gore area rather than the intended lane and collided with a crash attenuator (NTSB 2017a).[47] For further discussion about the San Jose investigation and the NTSB's resultant safety recommendations, see sections 2.3.1 and 2.3.2.

1.7 Millersburg, Oregon, Investigation

About 2 months before the Highland, Illinois, crash, the NTSB investigated a crash that occurred near a rest area in Millersburg, Oregon, that also involved a combination vehicle parked on the highway shoulder. On Thursday, May 18, 2023,

[47] A *crash attenuator* is a device intended to reduce the damage to structures, vehicles, and motorists resulting from a crash. It is designed to absorb the colliding vehicle's kinetic energy.

about 2:05 p.m. Pacific daylight time, a 2018 Freightliner truck-tractor in combination with a 2014 Utility soft-sided semitrailer was northbound on Interstate 5 (I-5) north of Millersburg, Marion County, Oregon. A 2001 Ford Econoline van, towing a small utility trailer, was parked on the 25-foot-wide right shoulder north of the highway exit ramp leading to the North Santiam rest area. The van was occupied by 10 passengers; the driver was outside the vehicle checking on the trailer. A 2023 Freightliner Cascadia truck-tractor in combination with a 2023 Utility semitrailer was also parked on the right northbound shoulder in front of the van. The Freightliner Cascadia driver was on his required 30-minute rest break. He had parked on the shoulder because he did not want to take up a parking space in the rest area in case another truck driver needed the space for a 10-hour break. He was in the driver's seat, in the process of putting on his seat belt, when the crash occurred. The 2018 Freightliner departed the highway travel lanes while approaching the location of the parked vehicles and collided with the rear of the van and its trailer. The van was subsequently pushed forward into the rear of the parked combination vehicle. As a result of the crash, seven van occupants were fatally injured, three were seriously injured, and the van driver sustained minor injury. The two truck drivers were not injured.[48]

Parking on the shoulder was not permitted per Oregon's Vehicle Code parking regulation 811.555.[49] Similar to the Highland crash, the vehicles were parked within 30 feet of the highway clear zone and no signage was in place to state that parking on the shoulder was prohibited.

[48] Visit ntsb.gov to find additional information in the public docket for this NTSB accident investigation (case number HWY23FH013).

[49] For more information, see https://oregon.public.law/statutes/ors_811.555.

2 Analysis

2.1 Introduction

On Wednesday, July 12, 2023, about 1:48 a.m., a Greyhound motorcoach was traveling westbound on I-70 near Highland, Illinois, when it crashed into three combination vehicles parked on the shoulder of the Silver Lake Rest Area exit ramp. As a result of the crash, three motorcoach passengers died and 11 other passengers plus the driver were injured.

The analysis examines factors that can be excluded as causal or contributory to the crash and discusses the following safety issues:

- Motorcoach driver fatigue (section 2.2)
- Deficient driver oversight by Greyhound, including lack of a progressive discipline policy, lack of adequate record-keeping, and lack of policies for implementing driver monitoring systems (section 2.3)
- Insufficient federal guidance on safety management, driver coaching, and fatigue mitigation (section 2.4)
- Lack of seat belt use by the motorcoach passengers (section 2.5)
- Crash risk from lack of truck parking availability along the National Highway System (section 2.6)

As a result of this investigation, the NTSB established that the following factors did not cause or contribute to the crash:

- *Highway design, markings, lighting, and signage:* The roadway design conformed to appropriate federal and state design guidance and the pavement markings were retroreflective and in good condition. Highway lighting was present and illuminated in the vicinity of the crash, and the posted speed limit and advisory speed limits were clearly marked. The crash location had only two reported non-injury crashes involving parked combination vehicles in the past 10 years.
- *Weather and roadway conditions:* The weather was clear and the roadway was dry at the time of the crash.
- *Motorcoach steering, brakes, suspension, tires, wheels, electrical systems, and occupant protection:* Mechanical inspection of the motorcoach revealed no

pre-existing defects in these systems that would have contributed to the collision or to the severity of injuries.

- *The motorcoach driver's medical qualification, training and experience, cell phone use, or alcohol or other drug use:* The motorcoach driver was medically qualified to operate a commercial vehicle, including normal vision and hearing. He was trained and had experience driving commercial vehicles, and he was not using his cell phone for texting or calls at the time of the crash. In addition, his postcrash toxicological testing did not detect alcohol or provide any evidence that he had used other impairing drugs before the crash.

- *A sudden impairing or incapacitating medical event affecting the motorcoach driver:* Although the motorcoach driver had medical conditions that increased his risk of a sudden impairing or incapacitating medical event, based on reviewed postcrash medical records, no such event was identified as having occurred during the crash trip. His initial diminished consciousness observed at the scene was attributed to the concussion he sustained in the crash.

The NTSB therefore concludes that none of the following were factors in the crash: (1) highway design, markings, lighting, and signage; (2) weather and roadway conditions; (3) the motorcoach's mechanical condition; (4) the motorcoach driver's medical qualification, training and experience, cell phone use, or use of alcohol or other drugs; and (5) a sudden impairing or incapacitating medical event affecting the motorcoach driver.

In addition, the first 911 call was received at 1:51 a.m., and first responders began to arrive on scene within about 13 minutes of that call. Occupants were triaged efficiently and timely, and prompt medical transportation was provided to area hospitals. The NTSB concludes that the emergency response was timely and adequate.

2.2 Motorcoach Driver's Actions and Fatigue Assessment

The motorcoach driver departed the westbound I-70 travel lanes onto the exit ramp of the Silver Lake Rest Area, and then departed the travel lane of the exit ramp onto the shoulder, all at a speed of about 60 mph. At this speed, the motorcoach traversed the 350 feet from the ramp entrance to the crash location in about 4 seconds.[50] Because the DMS sustained damage in the crash, it is not known exactly when the motorcoach departed the travel lane and entered the paved shoulder. However, analysis of the vehicle damage indicated that, before impact, the

[50] This is the distance between the advisory speed limit sign and the crash location. The advisory speed limit sign was attached to an overhead gantry at the beginning of the exit ramp.

motorcoach crossed about 3 feet onto the paved shoulder and then struck the first parked combination vehicle in an offset fashion. Figure 17, a 3-dimensional scan image of the damaged vehicles, shows the likely positions of the motorcoach and the Freightliner vehicle at impact. The offset strike indicates that the motorcoach driver was not "following" the parked trucks and would not have experienced a visual looming cue from the rear of the trailer.[51] Roadway evidence indicated that, just before this initial collision, the motorcoach driver made a leftward steering maneuver. No braking was noted. The motorcoach's drift from the travel lane is consistent with the driver being in a diminished state of alertness, such as while impaired or fatigued. No evidence exists of impairment from alcohol or other drugs or of an incapacitating medical event; therefore, fatigue is the more likely cause.

Figure 17. Illustration of vehicle impact orientation, using 3-dimensional scans.

Accounts from surviving motorcoach passengers suggest that the motorcoach driver was fatigued. Passengers indicated that the motorcoach driver had been drifting in the travel lane as well as departing the lane and contacting highway rumble strips throughout the drive. After the crash, the ISP took possession of the

[51] *Looming* is the visual signal of an object increasing in size as an observer nears the object.

motorcoach's DMS and then transferred it to Lytx for data retrieval. Lytx informed the NTSB that the data were unrecoverable due to damage. It is possible that the DMS was not programmed to respond to fatigued driving. Greyhound did provide the NTSB with information showing that its DMSs were capable of identifying fatigue-related driving, but no Greyhound policy was in place to collect and analyze such data.

The I-70 road geometry may explain how the fatigued motorcoach driver could follow the exit ramp instead of staying on I-70. Just before the exit ramp, I-70 makes a horizontal curve to drivers' right. The travel lanes of I-70 continue past the exit ramp to the rest area, curving back to the driver's left; however, continuing straight will take a vehicle onto the exit ramp to the rest area. The motorcoach driver successfully navigated the first curve, but failed to follow the second, instead proceeding straight and onto the offramp (both horizontal curves were noted in figure 5). Figure 18 shows an overhead photo of the crash location, facing east, toward the direction of the motorcoach's travel. The crash site is located immediately after exit ramp curve 1, as shown in figure 18, which the motorcoach driver also failed to navigate, leaving the exit ramp travel lane onto the paved shoulder where the combination vehicles were parked. The illuminated parking lights may have resembled highway traffic, particularly if the driver had lapses in attention due to his fatigued state. The NTSB concludes that the crash dynamics, failure to navigate the roadway geometry, and passenger statements are consistent with a fatigued motorcoach driver.

Figure 18. Overhead photo of I-70 and the exit ramp to the Silver Lake Rest Area in the vicinity of the crash. Annotations of the horizontal curves on I-70 and the exit ramp leading up to the crash location are included.

The motorcoach was not equipped with a lane departure prevention (LDP) system, which can detect lane markings using cameras.[52] However, because the motorcoach did not cross any lane markings until immediately before striking the semitrailer, an LDP system would most likely not have prevented the initial departure onto the exit ramp.

Several factors can influence an individual's risk of fatigued driving, including shift work, time asleep, time awake, health, medications, and prior history of fatigued driving (Stutts and others 2003). The following subsections discuss in more detail the motorcoach driver's risk factors for fatigued driving and how deficiencies in Greyhound's policies contributed to the risk of fatigue.

[52] A solid white line extended from the right side of the travel lane on I-70 and along the exit ramp, and no markings were present across the entrance to the ramp.

2.2.1 Motorcoach Driver's Medical Risk Factors for Fatigue

The motorcoach driver had health conditions that increased his risk of fatigue and drowsiness. The driver had OSA that was being treated with a CPAP machine. If inadequately treated, OSA may contribute to excessive daytime sleepiness and diminished attention.[53] During vigilance tasks like driving, people with sleepiness from OSA may be at increased risk of experiencing episodes during which changes in brain activity cause attention lapses lasting several seconds at a time, and such lapses, called microsleeps, often go unnoticed by affected individuals (Risser, Ware, and Freeman 2000). Effective use of CPAP can significantly reduce daytime sleepiness. The percentage of CPAP users who achieve normal levels of daytime sleepiness increases with longer durations of CPAP use, up to a threshold beyond which further improvements are unlikely (Weaver 2024). One study estimated this threshold as 4 hours for subjective and 6 hours for objective assessments (Weaver and others 2007).[54] Benefits of CPAP treatment typically are gained or lost within days or weeks of starting or discontinuing CPAP. Daytime sleepiness may improve significantly after just one night of CPAP treatment, and skipping just one night of CPAP treatment may reverse improvements in sleep and daytime alertness (Tregear and others 2010, Kribbs and others 1993).

The motorcoach driver's CPAP record from the 2 weeks leading up to the crash indicated borderline CPAP compliance during that time, with less than 70% of the 24-hour periods having a total of at least 4 hours of use.[55] His last two sessions of CPAP use before the crash were longer (6–7 hours each), in the early morning hours of July 10 and 11. On July 12, he was driving in the early morning hours when the crash occurred. Based on these data, the effectiveness of his OSA treatment as of the crash date is undetermined.

The motorcoach driver had other medical conditions that may also be associated with increased fatigue and drowsiness. Obesity can cause excessive daytime sleepiness, independent of increased OSA risk (Fernandez-Mendoza and others 2015). Also, diabetes commonly causes fatigue and may do so even if blood

[53] As used in this report, "excessive daytime sleepiness" refers to excessive sleepiness during the time of day when an individual usually should be awake and alert, regardless of whether that time is during daylight hours.

[54] In the study, subjective daytime sleepiness was measured by the Epworth Sleepiness Scale, which is a questionnaire on which individuals subjectively rate their likelihood to doze off or fall asleep in each of eight hypothetical situations. Objective daytime sleepiness was measured by the Multiple Sleep Latency Test, which measures the time required for an individual to fall asleep for a daytime nap when attempting to do so, averaged across multiple nap opportunities 2 hours apart.

[55] The FMCSA Motor Carrier Safety Advisory Committee and Medical Review Board jointly recommended that CPAP usage of at least 4 hours per night on 70% of nights be considered a minimum threshold for adequate adherence to treatment, but this recommendation was advisory only.

sugar is generally controlled (Ba, Chen, and Liu 2021). In addition, cerebral small vessel disease may be associated with fatigue, excessive daytime sleepiness, and abnormal sleep/wake patterns (Zhao and others 2022). The motorcoach driver's medical conditions may have increased his fatigue and drowsiness at the time of the crash, but the overall contribution of these conditions cannot be determined. The NTSB concludes that the motorcoach driver's medical conditions increased his risk of fatigue at the time of the crash.

2.2.2 Motorcoach Driver's Prolonged Period Awake

The motorcoach driver did not use his cell phone for about 14 hours from the night of July 10 until the morning of July 11, which suggests that he had ample opportunity for sleep the night before his shift started on the afternoon of July 11. Cell phone records indicate he awoke at or earlier than 9:39 a.m. on July 11, thus he would have been awake for about 17 hours and on duty for about 13 hours at the time of the crash. Research has found that prolonged wakefulness can lead to a decline in cognitive and motor function similar to alcohol use, with one study reporting that 17 hours of sustained wakefulness equated to a blood alcohol concentration of 0.05% (Dawson and Reid 1997).[56]

The motorcoach driver had a 4.5-hour layover in Indianapolis on July 11, between 5:54 p.m. and 10:23 p.m. During this time, he could have rested in the Greyhound-provided rest facilities; however, no evidence indicates that he used the breakroom or checked into the provided hotel. All that is known about his activities during that time was that he used his personal phone to make an outgoing call at 6:07 pm; at 8:21 p.m., he downloaded photos from an application, and at 10:09 p.m., he made another outgoing call. Active use of his phone during the layover suggests that he did not rest, and furthermore, as was shown in figure 16, his CPAP records did not show use during his layover period.

The driver regularly used hotels on other layovers, but did not routinely use the hotel on the crash route. Under typical sleep/wake routines, the layover period fell during a period of higher alertness, and the driver may have found sleeping difficult during this time without regularly adhering to a nocturnal schedule. Therefore, the timing of this layover may have been challenging for the driver given his schedule (also see next section 2.2.3). The short duration of the layover on the day of the crash compared to other dates may also have played a role in his decision not to use the provided rest facilities. Nonetheless, commercial drivers do need to take personal responsibility in ensuring they receive their rest when it is made available. The NTSB

[56] Sleeping fewer than 7 hours per day on a regular basis is associated with adverse health outcomes and increased crash risk (Watson and others 2015). Even short-term sleep fragmentation can result in cognitive and performance deficits (Medic and others 2017).

concludes that the motorcoach driver's prolonged period awake, including his decision not to use provided rest facilities, contributed to his fatigue at the time of the crash.

2.2.3 Greyhound's Fatigue Management

Greyhound's fatigue management policies consisted of training provided to drivers (last updated in 2008) and OSA screening guidance. Greyhound provided rest facilities for drivers to use during layovers, but did not have a policy that required their use. While these approaches do manage some of the risks of fatigue, they were insufficient in preventing this crash. Managing fatigue is critically important for commercial driving, and guidance is available for the commercial driving industry to do so. The North American Fatigue Management Program (NAFMP) provides tools for organizations to manage risks for fatigue. The NAFMP was developed by US and Canadian regulators, carriers, and researchers, and is hosted and promoted by the Commercial Vehicle Safety Alliance.[57] The NAFMP is a free, interactive, web-based educational and training program designed to help commercial truck and bus companies increase awareness among drivers, safety managers, shippers/receivers, and family members of factors contributing to fatigue and its effects on performance. The NAFMP incorporates scientific research and industry best practices that companies can use to develop comprehensive fatigue management programs (FMP) that consider factors like circadian rhythms, sleep disorders, scheduling practices, company policies and procedures, and various other factors influencing driver alertness.[58] A 2009 study, in which two motor carriers participated, examined the impact of implementing an FMP for commercial drivers in the United States and Canada (Smiley and others 2009). The results showed comprehensive improvements following the FMP intervention: drivers obtained longer and higher quality sleep, reductions in self-reported fatigue, and reductions in critical events (nod-offs or close calls). Drivers treated for OSA showed improvement on the psychomotor vigilance task.[59] One of the two motor carriers also reported that its crash rates and driver absenteeism declined.

[57] See North American Fatigue Management Program (nafmp.org).

[58] *Circadian rhythms*, or *circadian cycles*, are 24-hour cycles that are part of the body's internal clock and that carry out essential functions and processes. Alertness, hormone regulation, digestion, body temperature, and so on, are all affected by circadian rhythms. For more information, see Circadian Rhythm: What It Is, How it Works, and More.

[59] A *psychomotor vigilance task* measures a subject's sustained attention using a motor skill, such as the ability to repeatedly press a button in response to a light illuminating on a computer screen. The task gives a numerical measure of a subject's sleepiness by counting the number of lapses in attention.

Overall, the Highland investigation showed that Greyhound had implemented only some elements of fatigue management, and Greyhound would have benefited from a comprehensive FMP. For example,

- The 3-hour driver training module provided by NAFMP is more thorough than that currently provided by Greyhound, covering topics such as overall health effects of sleep deprivation and characteristics of fatigue-related crashes. Greyhound's program did not include such detail.

- The NAFMP also features a 3.5-hour training segment for safety managers and other trainers called "Train-the-Trainer for Driver Education and Family Forum." Greyhound's fatigue program did not feature such specific training.

- The NAFMP also includes a specific training module for driver family education, covering the importance of family members to be aware and aid in ensuring that drivers receive rest and managing their schedules. This training segment alone is 45 minutes in duration. Greyhound's program did not cover fatigue awareness for driver families.

Had the motorcoach driver received this more comprehensive and specific training that the NAFMP provides, he might have been more likely to manage his off-duty time to match his on-duty time. However, Greyhound's scheduling practices would have made this more difficult as his schedule was variable.

Review of the motorcoach driver's schedule during the month before the crash showed that he worked a variable schedule that required work start times during both day- and nighttime, consistent with the definition of shift work. The schedules for the Greyhound drivers are created by Greyhound corporate officials with input from the union to meet HOS regulations, driver availability at each terminal, and routing needs across the country. Greyhound did not specify whether the carrier considers shift regularity or otherwise considers fatigue in its scheduling, which the NAFMP guidance states to consider. As part of a comprehensive FMP, driver scheduling and route planning practices are critical. The NAFMP provides training modules for dispatchers and managers to mitigate the risks of fatigue when planning routes and creating schedules. Had Greyhound dispatchers received fatigue training, layover times and scheduling may have helped the motorcoach driver better manage fatigue. Although he was within HOS requirements, his variable schedule was inconsistent with a comprehensive FMP. Further, as noted above, the driver's schedule on the day of the crash provided him only with a rest period during which he would have likely had difficulty sleeping. Because he did not obtain sleep during that period, he was awake for an extended length of time, which led to his fatigue.

The NTSB has previously examined the effects of irregular sleep schedules caused by shift work, most notably in its 1995 safety study on heavy truck crashes (NTSB 1995). The study found that for the subset of the crashes for which sleep data were available, about 67% of the drivers (43 of 64) with irregular schedules were involved in fatigue-related crashes, compared with about 38% of drivers (9 of 24) with regular schedules. The NTSB found that variable schedules could result in more hours awake than normal and, without careful planning, could prevent drivers from obtaining adequate sleep.

Investigating the 1998 Burnt Cabins, Pennsylvania, crash involving a Greyhound motorcoach, the NTSB found that the driver's on-duty time began anywhere between 9:00 p.m. and 1:30 a.m., and his off-duty time began anywhere between 9:00 a.m. and 12:30 p.m. (NTSB 2000a). As a result of determining that fatigue was a causal factor in the Burnt Cabins crash, the NTSB recommended that Greyhound revise its driver scheduling practices to reduce scheduling variability that results in variable work-rest cycles (Safety Recommendation H-00-6). The recommendation was classified Closed—Acceptable Action in 2008 after Greyhound updated its scheduling practices, operations, and driver training on fatigue. However, the work schedule for the driver in the Highland crash is strong evidence that Greyhound has reverted to its previous practice of using unsafe variable work schedules for its drivers.

The shift work schedule of the Highland motorcoach driver was more variable than that of the Burnt Cabins driver. For example, on June 21, the Highland motorcoach driver began working about 3 a.m. and worked about 9.5 hours. On June 22, he began his shift at 4:30 p.m. and worked about 8 hours into the early morning of June 23. On June 23, he began his shift about 10:30 a.m. and worked about 9.5 hours. On June 24, he began his shift just before 9 a.m. and worked about 8 hours. Finally, on June 25, he began his shift about 11 a.m. and worked just over 5 hours before taking off almost 6 hours, then starting another 5-hour shift about 10 p.m. The likely result of this work-rest variability was constant lack of synchronization between the driver's work hours and his normal circadian rhythm, making him constantly at risk to the effects of fatigue while on duty.

Research has also shown that performing shift work, in this case driving between midnight and 7:00 a.m., is associated with an increase in fatigue-related crashes (Lee and others 2016; Bharadwaj and others 2021; Stutts and others 2003; Åkerstedt and Wright 2009). Studies have shown that individuals engaged in shift work experience more sleepiness and disturbed sleep than daytime workers, due to lack of synchronization with the body's circadian rhythms (Rosa and Colligan 1997, Kryger and others 2005, Drake and others 2004). The body's physiological processes, such as hormone secretion, body temperature regulation, and metabolism, are all regulated by these rhythms.

As part of current best practices for fatigue management in the NAFMP, individuals who undertake shift work that may disrupt their circadian rhythms should adapt their off time to match their work time to lessen fatigue. The motorcoach driver was off duty for more than 72 hours before the crash trip. Although he did not use his personal phone often during this time, his pattern of phone and CPAP usage suggests a schedule where he was awake during the day and asleep at night. During this time, his circadian rhythms likely returned to a normal day/night schedule. This meant that at the time of the crash, around 2 a.m., he was fatigued.

The NTSB concludes that Greyhound's variable scheduling practices led to the motorcoach driver's irregular sleep schedule, resulting in his fatigued state. The NTSB further concludes that had Greyhound implemented a comprehensive FMP, the likelihood of fatigued driving and the crash risk would have been reduced.

The NTSB therefore recommends that Greyhound develop and implement an FMP based on the NAFMP to educate its drivers, dispatchers, and other employees about fatigue, its causes, and its countermeasures. As part of the overall FMP, the NTSB further recommends that Greyhound revise driver scheduling policies to reduce scheduling variability that results in irregular work-rest cycles. In addition, trade organizations such as the American Bus Association and the United Motorcoach Association represent the interests of large and small motor carriers spanning the bus industry. These organizations can be instrumental in informing carriers and drivers about the vital importance of counteracting fatigue. The NTSB therefore recommends that the American Bus Association and the United Motorcoach Association inform their members about the Highland, Illinois, crash and urge them to develop FMPs based on the NAFMP to educate drivers and other employees about fatigue, its causes, and its countermeasures.

2.3 Deficient Greyhound Oversight of Motorcoach Driver

The investigation into the Highland crash showed that Greyhound's oversight of the motorcoach driver was lacking. Greyhound had taken positive steps toward driver oversight, including equipping its fleet with DMS, but had not fully implemented company policies that removed drivers who repeatedly violated company safety policies.

2.3.1 Progressive Discipline

Although the primary factor in this crash was fatigue, the motorcoach driver had a history of other types of risky driving that Greyhound did not address or correct. The motorcoach driver had accumulated 71 violations recorded by the DMS in the previous year for infractions such as speeding and following too closely.

Greyhound did not have a progressive discipline policy specified in any of the policy documents the company provided to the NTSB.

Progressive discipline is a management tool for dealing with job-related behavior that does not meet expected and communicated performance standards. A progressive discipline policy provides a basic framework for handling employee problems fairly and consistently by prescribing a series of consequences, increasing in severity, for any negative behavior including misconduct, poor performance, violations of company policy, absenteeism, and tardiness (National Academies of Sciences, Engineering, and Medicine 2012).

In general, it is important that companies follow a progressive discipline program.[60] The approach usually consists of the following steps:

Verbal warning and counseling – This should be documented in writing with the employee's supervisor. The employee should sign, acknowledging understanding of the issues and corrective action. This step should also outline potential actions for continued noncompliance.

Written warning – The supervisor and a manager should schedule a meeting with the employee to (1) review prior relevant conduct and corrective action; and (2) inform the employee of the consequences of their continued failure to meet conduct expectations. A formal plan to improve the employee's performance should be issued in a given timeframe (i.e., 5 business days) and be signed by the employee. The employee should be informed that continued misconduct and failure to immediately implement the corrective action plan will result in additional discipline, up to termination.

Suspension – For some incidences, the most appropriate action is the temporary removal of the employee. Suspension may last one or several days. A suspension typically results in lost wages.

Termination – Depending on the nature of the misconduct, the employee may be terminated without prior notice and disciplinary action.

As noted earlier in this report, the NTSB also found after the 2016 San Jose crash that Greyhound lacked disciplinary policies to remediate poor behavior or to justify termination. That investigation revealed that Greyhound lacked a clear policy regarding repeated safety violations for its drivers, and the NTSB therefore issued Safety Recommendation H-17-10:

[60] For more information, see, as an example, progressive discipline policy resources.

Use industry best practices to establish a policy to more adequately address recurring unsafe driver behavior, to include effective remediation of behavior and establishment of suspension of thresholds for termination.

The NTSB classified Safety Recommendation H-17-10 Closed—Acceptable Action based on Greyhound's response that the carrier had incorporated industry best practices for suspension thresholds for events captured by a DMS. However, despite Greyhound 's response to the recommendation, it is clear that Greyhound was not following progressive disciplinary practices with regard to the Highland motorcoach driver, which is contrary to industry best practices. Per Greyhound's employee rulebook, "buses are not to be operated more than the posted speed," and speeding violations are a serious offense. Several of the motorcoach driver's written reprimands that the NTSB reviewed stated that, should the behavior continue, it would result in disciplinary action up to and including termination. However, the written warnings had little or no effect on the Highland motorcoach driver's behavior; his unsafe driving continued after the reprimand letters. Furthermore, instead of Greyhound progressing to further disciplinary measures, the carrier continued to dispatch the driver despite his company policy violations. Without consequences for poor behavior, driver behavior change is not incentivized. The NTSB concludes that had Greyhound implemented a progressive discipline policy, the company could have mitigated the motorcoach driver's unsafe driving behavior before the crash.

2.3.2 Greyhound's Record-Keeping

The Highland investigation found that the motorcoach driver's disciplinary records were missing and that his log of disciplinary infractions was inaccurate. As stated above, he had 71 safety policy violations in the year leading up to the crash and had other performance-related issues, including crashes in a Greyhound motorcoach. The NTSB specifically asked Greyhound whether the motorcoach driver was disciplined for the 2018 crash. Greyhound stated that he received a written reprimand after the 2018 crash; however, the company was unable to locate that reprimand. Greyhound uses an internal document (HR-02 form) to record all official personnel actions. The paper-based HR-02 form for the motorcoach driver had only three entries related to DMS data: the May 2018 crash, a January 2019 disciplinary entry, and a February 2019 disciplinary entry. Greyhound was unable to explain why the HR-02 form was not properly updated with the other infractions. Inadequate record-keeping prevents Greyhound terminal managers from accurately assessing driver performance.

Furthermore, for the available records, different terminal managers were responsible for addressing the driver's infractions. Paper-based records were stored at individual bus terminals and were therefore inaccessible across terminals and to

corporate safety officials unless records were specifically requested, and in such case, the records had to be physically copied and transported to the requesting official.

Again, the NTSB found similar issues with Greyhound following the 2016 San Jose crash. The NTSB found that Greyhound's paper-based record system for driver performance was inadequate and the NTSB therefore issued Safety Recommendation H-17-9 to Greyhound:

> Create a personnel file management system that, at a minimum, (1) allows for driver records to be accessed by terminal and corporate officials; and (2) includes provisions and safeguards to ensure accuracy, security, backup, and proper maintenance.

Safety Recommendation was classified Closed—Acceptable Action in 2021 based on communications from Greyhound that the company had created an electronic file system for its driver qualification files, with plans to also include personnel records. In addition, before closing the recommendation, the NTSB visited Greyhound facilities and confirmed that the system for driver qualification files was in place. Greyhound also stated that the company had updated its disciplinary policies and had incorporated DMS-captured violations into its driver evaluations. In 2021, when Greyhound was implementing new administrative changes and taking corrective action to address Safety Recommendations H-17-9 and -10, the parent company FirstGroup (Scotland-based) was in the process of selling the company to the Germany-based company Flix. Greyhound terminals where personnel records were stored were not included in the sale of the company, which might have led to the loss of these records.

Whether related to the ownership change, loss of physical records, or other reason, the Highland investigation suggests that Greyhound did not follow through with incorporating personnel records into an electronic system or developing disciplinary policies for DMS-captured violations. The NTSB concludes that Greyhound's incomplete and paper-based personnel records likely contributed to insufficient driver oversight and a lack of disciplinary actions for the motorcoach driver.

Therefore, the NTSB recommends that Greyhound create an electronic personnel file management system to ensure that all driver records—including those pertaining to disciplinary action—are easily accessible to terminal managers and safety personnel, both on and off site.

2.3.3 Driver Monitoring Systems

A DMS can alert drivers and motor carriers to unsafe driving behaviors such as speeding or a fatigued driver's inability to stay in the travel lane. The technology incorporates in-vehicle recording capabilities that can continuously measure and record the driver's performance. Flagging safety-related events allows safety managers to later review the data with drivers to pinpoint what happened so that they ideally can prevent similar future events. A video-based DMS also allows safety managers to review event footage together with the drivers. Further, a DMS can feed into performance management software, enabling motor carriers to track driver performance over time to identify risky drivers who may require coaching or removal.

Research evaluating the safety benefits of a video-based DMS found that the combination of a DMS with driver feedback and coaching resulted in a 52.2% reduction in safety-related events per 10,000 miles. Further, the most severe safety-related events were reduced by up to 59.1% (Hickman and Hanowski 2010). Other research modeled the potential safety benefits of a video-based DMS on all CMVs in the United States (Soccolich and others 2014). The research found that a video-based DMS paired with driver coaching had the potential to prevent an average of 727 fatal truck and bus crashes (20.5% of the total fatal crashes) and save 801 lives (20.0% of the total fatalities), reduce an estimated 25,000 truck and bus injury crashes (35.2% of the total injury crashes), and eliminate about 39,000 injuries (35.5% of the total injuries) each year.

Greyhound had equipped its fleet with DMSs capable of recording risky driving behaviors and had reported a marked decrease in these behaviors and incident severity since the installations. Noted behaviors included speeding, following too closely, and collisions. In general, as noted in section 2.3.1, Greyhound did not use the DMSs in a way that improved the behavior of or otherwise removed drivers with repeated violations from service. Furthermore, Greyhound reported to the NTSB that DMSs could also detect behaviors related to fatigued driving such as weaving within the lane of travel or crossing lane markings. However, the investigation did not find evidence that the DMS captured these behaviors during the crash trip, during which passengers reported the driver repeatedly departing the lane and crossing over the rumble strips along the highway. No events related to fatigued driving were included in the violations captured by the DMS that were provided to the NTSB. The NTSB therefore concludes that Greyhound was not using its DMS to its full potential for driver oversight, such as incorporating a progressive discipline policy, detecting driver behavior indicative of fatigued driving, and providing real-time driver alerts; therefore, the company missed the opportunity to identify that the motorcoach driver was at high risk for a crash. The NTSB recommends that Greyhound incorporate recorded DMS events into safety and disciplinary policies, including:

- detection and prevention of fatigued driving;
- allowable number of critical safety violations a driver can have in a specific time frame (such as per month, per quarter); and
- procedures to hold poorly performing drivers accountable, to include both coaching and disciplinary action up to and including termination for exceeding established thresholds.

2.4 Insufficient Federal Guidance on Safety Management, Driver Coaching, and Fatigue Mitigation

As covered in the previous sections, the investigation showed that Greyhound's driver safety policies were lacking, as were Greyhound's fatigue management policies. Greyhound had not implemented processes to review policies and monitor for deficiencies, find areas of improvement, and modify policies or implement new ones—all of which are elements of a robust safety culture. However, the Highland investigation showed that Greyhound nonetheless operated in accordance with federal regulations: Greyhound had no BASICs violations leading up to the Highland crash, and the postcrash FMCSA review did not progress to a full CR because few violations were found. Given this discrepancy, Greyhound could apply strategies used to comply with regulations to go beyond compliance and to improve its safety culture.

The FMCSA publishes the *Safety Management Cycle* (SMC) to help motor carriers implement policies that allow them to meet federal safety regulations.[61] Application of the SMC includes the following processes:

- Policies and procedures to establish guidelines for behavior and action and what actions should be taken to implement procedures
- Roles and responsibilities to clearly define what employees should do to implement the policies and procedures
- Qualifications and hiring of qualified applicants for roles

[61] The NTSB recommended that the FMCSA publish this information on its website as part of Safety Recommendation H-12-19, which was classified Closed—Acceptable Action in 2013. The general approach to SMC application is discussed in this report. All guides, including those for specific driving elements, are available at https://csa.fmcsa.dot.gov/HelpCenter/Resources.aspx?type=topic&vID=44546.

- Training and communication so that everyone understands expectations and has adequate skills and knowledge
- Monitoring and tracking of employee performance so that compliance of employees and the operation as a whole is understood
- Meaningful actions to correct deficiencies observed

The published guidance is intended to guide motor carriers in addressing issues uncovered during CRs. However, the guidance is also applicable in general to create a robust safety culture. Applying these processes would help motor carriers successfully implement safety policies. In its current SMC guidance, the FMCSA encourages motor carriers to apply the SMC processes "periodically" on their own. This general encouragement could be supplemented with guidance for carriers to revisit SMC guidance proactively during critical junctures, such as during a change in ownership or implementation of new safety technologies or policies. This guidance could be published as a passenger carrier safety publication on the FMCSA's passenger carrier safety information webpage.[62] Although a definitive reason as to why Greyhound's policies were lacking was not determined, they were nonetheless lacking: DMSs were implemented without fully articulating a policy for use, and the company did not have a written progressive discipline policy. Had guidance been available, deficiencies in safety policies might have been mitigated during a recommended review period, such as during the change in ownership.

The NTSB concludes that proactive application of SMC processes for all safety policies would allow Greyhound and other motor carriers to mitigate deficiencies and encourage robust safety culture, beyond compliance with federal regulations. The NTSB therefore recommends that the FMCSA provide guidance through a passenger carrier safety publication on its website, encouraging passenger motor carriers to implement SMC processes and reassess these processes during changes in ownership or executive management, and periodically after implementation of new safety policies or technologies.

Although the recommended FMCSA guidance would encourage carriers to implement SMC processes, Greyhound should also take the initiative to implement safe processes and address the deficiencies described in this report. Therefore, the NTSB further recommends that Greyhound establish a written policy to proactively apply SMC processes beyond CRs to assess the ongoing effectiveness of new safety policies and technologies after they are adopted.

[62] For more information, see https://www.fmcsa.dot.gov/safety/passenger-safety/passenger-carrier-safety-information.

The Highland investigation also showed that Greyhound had not articulated a clear policy for proactive coaching as part of driver oversight. The NTSB previously issued Safety Recommendation H-22-4 to the FMCSA as a result of our investigation of the January 5, 2020, multivehicle collision in Mt. Pleasant Township, Pennsylvania (NTSB 2022). One of the vehicles, a FedEx combination vehicle, was voluntarily equipped with an onboard video event recorder system that provided critical information about the crash-initiating vehicle (a motorcoach). The video recording also captured the FedEx driver's quick response to spotting the motorcoach; his prompt reaction reduced the severity of his vehicle's collision with the motorcoach, compared to the other vehicles' subsequent collisions. The NTSB concluded that if onboard video event data recorder systems were available on all CMVs, that tool—combined with a driver management or coaching program—could be used proactively by motor carriers to aid in driver training and address driver behaviors that have crash risks associated with them. As a result, the NTSB issued Safety Recommendation H-22-4 to the FMCSA:

> Provide guidance to motor carriers to proactively use the onboard video event recorder information to aid in driver training and ensure driver compliance with regulatory rules essential for safe operation. (Open—Acceptable Response)

The NTSB subsequently reiterated Safety Recommendation H-22-4 as part of its investigation of a December 16, 2022, crash in Williamsburg, Virginia (NTSB 2024). As of January 2025, the FMCSA has incorporated the recommendation into its Phase II Techcelerate Now program, initiated in September 2023, with analysis of the first year's efforts expected in November 2025. The Techcelerate Now program is a joint effort between the FMCSA and the Intelligent Transportation Systems Joint Program Office to accelerate the adoption of advanced driver assistance systems in the commercial motor vehicle industry.[63] Although the NTSB supports and encourages broader adoption of safety technologies for motor carriers, the delay in providing guidance on proactive driver coaching using onboard recording systems is unnecessary, given the known benefits of coaching and driver feedback as previously noted in this report. Further, installation of technologies alone is insufficient without adequate processes to ensure effective implementation.

The NTSB concludes that federal guidance on proactively using DMSs to provide driver coaching can encourage motor carriers such as Greyhound to implement effective policies that reduce unsafe driver behaviors that can lead to a crash.

[63] For more information, see Techcelerate Now – Accelerating the adoption of advanced driver assistance systems (ADAS) in the commercial motor vehicle (CMV) industry.

Because the Highland crash provides yet another example where onboard video would have identified unsafe driver behavior that the motor carrier should address to ensure compliance with safety policies, the NTSB again reiterates Safety Recommendation H-22-4 to the FMCSA. The NTSB also classifies the recommendation Open—Unacceptable Response.

In addition, although the motorcoach driver in the Highland crash was within his HOS limit during the crash trip, he was nonetheless at his circadian low and fatigued when the crash occurred.[64] As a result of a 2011 Doswell, Virginia, crash in which a motorcoach driver fell asleep due to poor sleep management practices (NTSB 2012), the NTSB issued Safety Recommendation H-12-30 to the FMCSA:

> Incorporate scientifically based fatigue mitigation strategies into the HOS regulations for passenger-carrying drivers who operate during the nighttime window of circadian low.

In 2017, the NTSB reiterated Safety Recommendation H-12-30 in the Livingston, California, crash investigation (NTSB 2017b) and also classified it Open—Unacceptable Response because of lack of implementation by the FMCSA. Based on the most recent FMCSA communication (September 2024), the FMCSA does not plan to implement Safety Recommendation H-12-30.[65] As in the Livingston reiteration of the recommendation, the NTSB again concludes that the CMV HOS regulations for motorcoach and bus drivers would be more effective if they addressed the scientifically established risk of drivers operating during the nighttime window of circadian low. Because implementing Safety Recommendation H-12-30 is still vital to safety, the NTSB reiterates it in this report.

2.5 Lack of Seat Belt Use by Motorcoach Passengers

All of the motorcoach's seats were equipped with working lap/shoulder belts, but three unrestrained passengers seated outside of the intrusion zone suffered serious injuries, consistent with striking the seats in front of them and/or leaving the seating compartment, because they did not wear the seat belts.[66] One passenger told the ISP that he fastened his seat belt during the crash trip because of the motorcoach

[64] *Circadian low* refers to a period of reduced alertness that occurs during late night hours under typical circadian cycles. This period is associated with reduced overall performance and increased fatigue. For more information, see again, Circadian Rhythm: What It Is, How it Works, and More.

[65] The FMCSA stated that implementing H-12-30 would require a rulemaking procedure, including public commentary, and that not enough available data supported a cost/benefit analysis. For more information, see the advance notice of proposed rulemaking and the subsequent withdrawal.

[66] The catastrophic deformation of the motorcoach and the intrusion zone extending back to row 7 was outside of occupant protection standards, and the resulting fatalities and injuries would likely have been sustained regardless of seat belt use.

driver's erratic driving. This passenger was seated outside of the intrusion zone and sustained only minor injuries while belted. The effectiveness of seat belt use in reducing injuries and injury severity is well known; according to the National Highway Traffic Safety Administration (NHTSA), buckling up is the single most effective thing you can do to protect yourself in a crash.[67] The NTSB therefore concludes that had the seriously injured motorcoach passengers seated outside the intrusion zone properly worn the available lap/shoulder belts, they would have been more likely to stay in their seating compartments, which would have reduced their injuries.

The purpose of pretrip safety briefings is to inform and educate passengers about the onboard safety features. When new passengers first board motorcoaches, regardless of the time, they should be informed of the safety features (seat belts and emergency exits) in the same way that airlines conduct pretrip safety briefings on every flight regardless of departure time. Such briefings can serve as simple reminders of the lifesaving benefits of seat belts and may increase the likelihood of their use. The FMCSA includes these briefings in its pretrip safety guidance for motor carriers and even provides prerecorded briefings for use.[68] However, the driver did not conduct a pretrip safety briefing about the benefits of seat belts and their required use under Illinois state law.

As a result of the 2016 Greyhound crash in San Jose, California, the NTSB issued Safety Recommendation H-17-12 to Greyhound (NTSB 2017a):

> Provide pretrip safety briefings at all stops prior to departure when taking on new passengers, which describe the use of the emergency exits and the benefits of wearing seatbelts.

Safety Recommendation H-17-12 was classified Closed—Acceptable Action on December 3, 2021, based on Greyhound's statement that it had provided all drivers with a prerecorded announcement (in English and Spanish) that could be played on the motorcoaches' public address system using the drivers' company-issued cell phones. Greyhound also stated that the announcement was to be played at all major stops and pickup locations along the route.

The Highland investigation showed that Greyhound subsequently changed its policy on pretrip safety briefings, but the investigation was unable to determine why. Currently, Greyhound drivers are supposed to conduct the pretrip safety briefing every time there is a change of driver and at every large terminal, but no longer after

[67] For more information, see Seat Belt Safety: Buckle Up America | NHTSA.

[68] For more information, see https://www.federalregister.gov/documents/2016/08/26/2016-20493/amended-pre-trip-safety-information-for-motorcoach-passengers and https://www.fmcsa.dot.gov/safety/passenger-safety/pre-trip-safety-information-motorcoach-passengers.

pickup points enroute. The Highland crash trip was an express route with no scheduled stops between Indianapolis and St. Louis; the motorcoach driver therefore should have provided a safety briefing in Indianapolis before departure. He did not.

Drivers can still use their mobile phones with a recorded message or give the briefing orally. However, when drivers depart a terminal or pick up passengers late at night and most passengers are asleep, they have the option to not conduct a pretrip safety briefing. Thus, Greyhound allows for late-night safety briefings to be conducted at the discretion of the driver. However, because doing so is now optional, passengers boarding at night and not receiving the safety briefing may be less aware of the safety features on board, such as the available lap/shoulder belts and the locations of the emergency exits. Passengers may also be in violation of the law if they unknowingly travel through a state with primary seat belt laws, such as Illinois.

The NTSB concludes that had the motorcoach driver conducted a pretrip safety briefing to the passengers when they departed Indianapolis, informing them of the availability of the seat belts and the legal requirement to wear them, passengers might have been more likely to be belted when the crash occurred, and their injuries reduced. The NTSB therefore recommends that Greyhound establish policies to require pretrip safety briefings every time there is a change of driver, at every terminal before departure regardless of departure time, and every time the motorcoach takes on new passengers. This should include driver briefings for awareness on which states they will be driving through that have mandatory enforcement of seat belts. At a minimum, briefings should include the following information:

- the availability of seat belts, the potential legal requirement to wear them in mandatory enforcement states, and how to fasten them;
- ways to address urgent onboard safety concerns, including dialing 911; and
- the location and use of the fire extinguisher and the emergency exits.

2.6 Limited Availability of Truck Parking

The Highland crash involved combination vehicles parked on the shoulder in the highway clear zone as opposed to in designated parking spaces in the nearby rest area. Recall that the North Santiam crash in Millersburg, Oregon also involved a commercial vehicle parked on the highway shoulder within the clear zone (see section 1.7 of this report). In the Highland crash, the vehicles were parked for a several-hours-long off-duty period, while in Millersburg, the vehicle was parked for a 30-minute rest break. These recent crashes highlight the safety risk of parking on shoulders.

As the truck drivers in the Highland crash mentioned in their interviews with the NTSB, truck parking in the Silver Lake Rest Area was known to be limited and, during peak hours, at full capacity (21 truck parking spaces total). An IDOT 2018 Rest Area Study categorized the Silver Lake Rest Area at 100–150% utilization, and in the days after the crash, the NTSB observed several combination vehicles parked on the same shoulder as the crash-involved vehicles due to unavailable truck parking.[69] The NTSB therefore concludes that combination vehicles routinely park on the shoulder of the exit ramp to the Silver Lake Rest Area due to recurring lack of available truck parking, which increases the risk of them being struck by an errant highway vehicle.

In this crash, the motorcoach driver departed the travel lanes of I-70, proceeded onto the exit ramp to the Silver Lake Rest Area, and subsequently departed the travel lane onto the shoulder due to his fatigued state. Because clear zones are meant to provide a recovery area for errant vehicles, the presence of the three combination vehicles parked on the shoulder, within the 30-foot clear zone, impeded any chance the motorcoach driver may have had to stop the motorcoach or otherwise safely return his vehicle to the travel lane after departing the roadway. The NTSB therefore concludes that the combination vehicles were unsafely parked in the highway clear zone of the exit ramp to the Silver Lake Rest Area, decreasing the motorcoach driver's ability to stop or return his vehicle to the roadway after it departed the travel lane.

Lack of available and safe truck parking is not just limited to the Silver Lake Rest Area in Illinois or the North Santiam rest area in Oregon; the trucking industry and truck drivers have long identified the lack of parking as a top national concern, affecting the safety of truck drivers and other roadway users (NTSB 2000a & b). According to the Bureau of Transportation Statistics, the total volume of combination vehicles on all US roadways increased from 905,782 in 1970 to 2,096,619 in 2000, and to 2,979,277 in 2020. Under the current HOS regulations, property-carrying commercial drivers are required to take a 10-hour rest period after 11 hours of driving or 14 hours on duty. If the nearest rest area is full, drivers face a dilemma. They are permitted to use the option of personal conveyance to seek a rest location once they have reached their 14th hour of driving.[70] However, issues such as distance to the next parking area or scheduling requirements imposed by their employers can make this option difficult to use and therefore incentivize truck drivers to park in the first accessible location (such as on the shoulder), despite it not being a designated parking area. Furthermore, the USDOT mandated that commercial drivers' 30-minute breaks count toward/be subtracted from the 14-hour driving window, which therefore reduces their available driving time. This may further incentivize truck drivers to park

[69] For more information, see IDOT Statewide Truck Parking Study.

[70] *Personal conveyance* is the movement of a CMV for personal use while off duty. For more information, see General Information about the ELD Rule | FMCSA (dot.gov).

in the first available space, even if it is a non-designated parking area, instead of spending time searching for another parking space.

Law enforcement officers face a similar dilemma with combination vehicles parked in non-designated parking areas. They must weigh the hazard of a vehicle parked in the highway clear zone with the alternative of forcing a commercial driver who may be fatigued or may need to stop due to HOS rules to continue driving to find a safe parking location. Although no signage was posted prohibiting shoulder parking at the Silver Lake Rest Area, trucks were not permitted to park on the shoulder per Illinois Statute Section 11-1303. Should law enforcement order fatigued drivers to clear out of the shoulder area, the drivers would then be forced to drive under personal conveyance until finding another place to park.

The NTSB has a long history of investigating the safety issues related to limited truck parking availability. The 1998 Burnt Cabins crash revealed safety issues related to inadequate parking availability for combination vehicles along interstates or other fully controlled-access highways. The NTSB issued to the Pennsylvania Turnpike Commission Safety Recommendation H-00-3 to prohibit parking in unsafe areas and Safety Recommendation H-00-4 to increase the number of safe parking spaces. Both recommendations are classified Closed—Acceptable Action.[71] Findings from the Burnt Cabins investigation are also applicable to the Highland crash; for example, as the NTSB stated in the Burnt Cabins report:

> The lack of adequate rest area parking spaces can also lead to overflow situations in which drivers are being compelled to park on the shoulder of rest area exit and entrance ramps. This situation is unacceptable for several reasons. First, it limits the acceleration rate of the drivers who are parked on the [entrance/]exit ramp shoulder, creating the possibility that their trucks' speed may be significantly lower than that of the traffic on the main roadway. Second, it creates a dangerous dilemma between high-speed vehicles decelerating into or accelerating out of the rest area and slow-moving vehicles pulling out from parking on the shoulders. Finally, the shoulders are not protected from errant vehicles.

In 2000, following a 1998 directive by the US Congress for the NTSB to review the conditions and causes of truck- and bus-related crashes in the United States, the NTSB published a special investigation report titled *Truck Parking Areas* (NTSB 2000b). The report highlights the dangers of parking on the shoulders of entrance and exit ramps, including details from a crash in Jackson, Tennessee, in which an

[71] The Pennsylvania Turnpike Commission resolved Safety Recommendation H-00-3 primarily by installing "no parking" signs in roadway pull-off areas, and resolved Safety Recommendation H-00-4 primarily by expanding the truck parking capacity in the Allentown, New Stanton, and South Somerset locations.

errant combination vehicle left the highway and collided with another combination vehicle parked on the shoulder of a rest area exit ramp. In addition, based on testimony collected during public hearings, the report concluded that not enough truck parking spaces were available in certain locations. The focus of the NTSB recommendations issued in the special investigation report was improving information about truck parking availability; at the time of the report, GPS maps were not widely used commercially, and most information was available only via paper maps and booklets.

Section 1401 of the Moving Ahead for Progress in the 21st Century (MAP-21, Public Law 112–141, July 6, 2012) is commonly referred to as "Jason's Law."[72] Jason's Law expressed a Congressional concern that addressing the shortage of long-term parking for CMVs on the National Highway System is a national priority, and that addressing the parking shortage will improve the safety of motorized and non-motorized users and for CMV operators. Jason's Law required the USDOT to survey the capability of each state to provide adequate parking and rest facilities for freight trucking, assess the volume of freight trucking traffic in each state, and develop a system of metrics to measure the adequacy of freight truck parking facilities in each state. The initial survey was conducted and published in 2015 (FHWA 2015, updated in 2020). The most recent survey of state DOTs found that 36 of 50 states reported problems with truck parking availability in their state, with Illinois having such a problem.[73] Other key findings included that the number of public truck parking spaces nationally was 308,920; 36,222 (12%) were public spaces in rest areas, and 272,698 spaces (88%) were in alternative spaces. *Alternative parking* typically refers to private truck stops, but also includes restaurants, travel plazas, gas stations, or other private parking facilities. Private development in rest areas has generally been prohibited by federal law dating to 1960.[74] The results from the Jason's Law surveys suggest that public truck parking spaces have not kept up with the increased volume of traffic.

The NTSB concludes that the limited truck parking capacity and subsequent unsafe parking observed at the Silver Lake Rest Area were consistent with a lack of access to long-term parking spaces for combination vehicles on the National Highway System, as reported by surveys resulting from Jason's Law.

[72] *Jason's Law* is named for truck driver Jason Rivenburg, who in 2009 spent the night in his truck cab in the lot of an abandoned gas station and was murdered the next morning. His murder revived a national policy debate about the safety concerns of long-haul truckers, who often must pull over by the side of the road to sleep.

[73] The peak use of commercial parking was between midnight and 1 a.m.

[74] Some exceptions exist for facilities constructed prior to this law. For more information, see Title 23 *United States Code* 111.

2.6.1 Efforts to Increase Truck Parking Access

Certain research has shown that scheduling driver routes so that rest periods fall during off-peak parking demand can help alleviate the demand and allow for easier parking (Vital and Ioannou 2021). This may not be feasible for all carriers due to logistical reasons and may also require drivers to operate opposite their normal circadian cycles, which can contribute to fatigued driving, as previously noted for the motorcoach driver in this crash. Aside from planning and scheduling, approaches to increasing parking access for commercial vehicles generally fall into two categories: applying technological solutions to better use existing parking, and increasing capacity by building spaces.

Increasing access to information about truck parking availability may reduce the prevalence of trucks parking in non-designated areas. The FMCSA has supported states installing the Truck Parking Information Management System (TPIMS).[75] The TPIMS is integrated into parking infrastructure to determine near-real-time availability of truck parking and disseminate that information to drivers. Following passage of the Infrastructure Investment and Job Act (Public Law 117-58), the FMCSA in 2024 awarded $88.4 million in grants, which included increased funding to address the needs of the trucking industry, including grants for the TPIMS. The primary method for TPIMS dissemination is using variable message signage. As shown in figure 19, roadside signage can be updated to show truck parking availability in near-real time.

[75] For more information about the TPIMS, see Trucks Park Here.

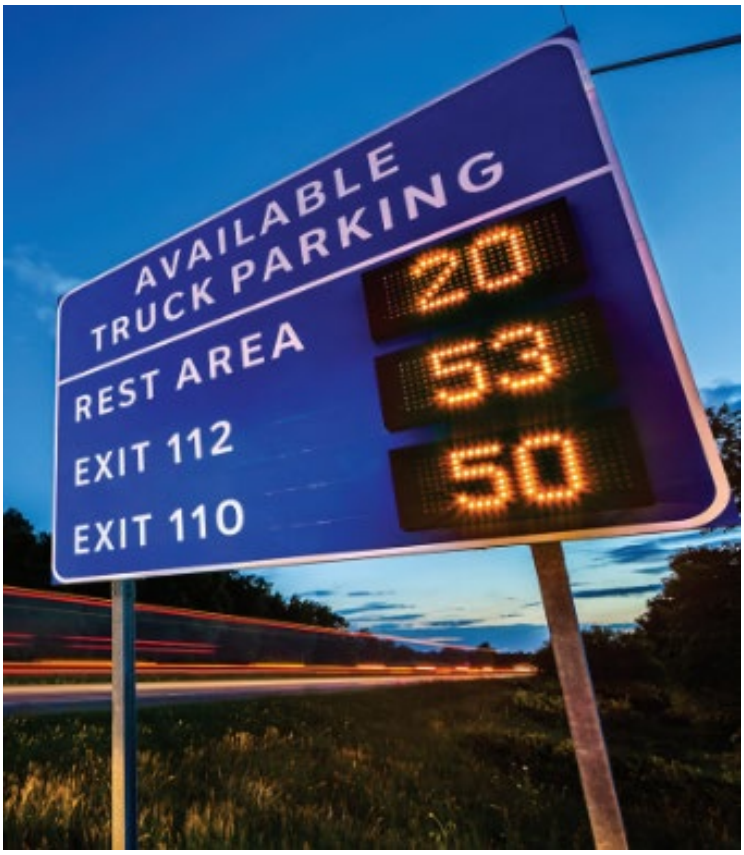

Figure 19. Photo of an exemplar variable message sign that shows availability of truck parking. (Source: National Coalition on Truck Parking)

Additionally, information generated by TPIMS can be combined with user-generated data from third-party smartphone applications; the applications also provide information about truck parking.[76] However, a downside to these applications is that truck drivers must be parked to use them, as phone use is prohibited for truck drivers while underway.

Information about full truck parking areas can also identify locations that need additional truck parking and have high rates of parking in non-designated areas. A recent study used the TPIMS combined with parking application-based data in Iowa and Wisconsin to demonstrate how truck parking data helped pinpoint areas in critical need of additional truck parking (Prozzi and others 2024). Using up-to-date information to target areas of greatest safety concern can allow for the most efficient use of limited funding. The NTSB concludes that continued deployment of the TPIMS can improve access to truck parking and allow for targeted expansion of access and usage, although it is not a standalone solution. The NTSB recommends that the

[76] Examples include Trucker Path | Technology Built for the Trucking Industry and Truck Parking Near Me | TruckParkingClub. Also see the Smart Parking initiative by the USDOT's Intelligent Transportation Systems Joint Program Office.

USDOT expand efforts to use the TPIMS to identify rest areas in critical need of additional truck parking.

Although information technologies can help improve access to truck parking, 72% of respondents to a survey by the American Transportation Research Institute on technological solutions still recommended increasing truck parking (ATRI 2021). Certainly, efforts that provide up-to-date information about truck parking availability should be pursued, along with logistical efforts to avoid peak parking times when possible. Still, these strategies can only partially mitigate the lack of available truck parking, because access to up-to-date information about truck parking availability does not help drivers if the most up-to-date information states that the truck parking is full. The National Cooperative Highway Research Program recently published a comprehensive guide for implementing the TPIMS, aimed at state DOTs and other stakeholders, which noted that the TPIMS cannot solve an insufficient-capacity problem, and therefore consideration should be given to implementing the TPIMS in conjunction with parking capacity expansion (NCHRP 2025). The NTSB concludes that truck parking shortages require solutions that increase parking capacity as well as information about parking availability along the nation's highway system.

Although federal agencies provide funding support to increase parking capacity, state DOTs typically manage truck parking and efforts to improve truck parking at public rest areas in their respective states. State efforts include expanding TPIMS to best use existing parking areas and building new parking capacity where possible. State efforts also highlight ways to increase capacity by using all available facilities for parking. For example, North Carolina's efforts include removing parking restrictions from weigh stations when not in use and allowing truck parking in car- and recreational-vehicle parking sections of rest areas if the facility configuration allows (NCDOT 2020).

Using results from the 2015 Jason's Law Survey, Illinois implemented plans to increase available truck parking spaces at public rest areas. Since 2018, Illinois has identified 218 new public truck parking spaces as completed or in-progress across the state, an increase of 60% from the previous 146 public truck parking spaces available.[77] Additionally, as of the date of this report, IDOT is installing TPIMS at all rest stop locations to convey the status of real-time truck parking availability (at least two locations have already completed the installation) via dynamic signage. IDOT is currently working with the Mid-America Association of State Transportation Officials to share parking availability data from Illinois with other neighboring states.

[77] The Silver Lake Rest Area is not included in this list; the survey identified other rest areas with more critical parking limitations.

In 2020, Oregon completed a statewide assessment of all truck parking.[78] The report included an inventory of about 5,500 truck parking spaces across 107 facilities (39 rest areas, 62 truck stops, and 6 ports of entry). The report identified the prevalence of parking in non-designated areas at the North Santiam rest area (the location of the Millersburg crash) and surrounding highway shoulders. The report recommended establishing TPIMS and expanding parking capacity at rest areas by using excess right-of-way areas and restriping to maximize the number of available spaces. The progress on increasing the number of parking spaces at rest areas has not been updated since the 2020 report; however, Oregon is currently implementing a regional TPIMS system in coordination with Washington and California along the I-5 corridor, to include the North Santiam rest area.[79]

The NTSB concludes that state efforts to implement the TPIMS and increase truck parking capacity, such as in North Carolina, Illinois, and Oregon, are positive; however, individual states are limited in what they can do, and a centralized effort can more broadly address the safety risk caused by lack of available truck parking throughout the country.

Adding parking capacity is a significant undertaking at both the state and federal level primarily due to the cost of construction and maintenance of facilities. The USDOT, through the FHWA, addresses truck parking capacity by issuing grants to fund additional parking construction and in 2022 published a truck parking handbook to aid in developing additional truck parking.[80] US House of Representatives bill H.R. 1659, titled the *Truck Parking Safety Improvement Act* and introduced February 27, 2025, would authorize appropriation totaling $755 million for the USDOT to provide competitive grants to construct or improve truck parking facilities. As of the date of this report, the bill has not passed the US House of Representatives or the US Senate.

Should increased funding become available, statutory limitations restrict how the funding can be used. For example, construction grants are typically "one time" sources of funding and allow for constructing new parking facilities or expanding existing ones. In meetings with FHWA and FMCSA representatives, the NTSB learned that although the FHWA can administer grants for states to *construct* new parking facilities, the individual states or localities must fund the actual operation and maintenance of those facilities from other budgetary sources. Therefore, states might

[78] For more information, see https://www.oregon.gov/odot/Planning/Documents/OCTPS_final_report_with_Appendices_and_exec_summary-Full_Report.pdf.

[79] For more information, see https://content.govdelivery.com/accounts/ORDOT/bulletins/387fa51.

[80] As of the date of this report, the 2022 FHWA *Truck Parking Development Handbook* is no longer available online.

be forced to build fewer parking spaces than the grants allowed for, due to limited state funding to operate and maintain them. Amending grant programs to allow funds to be spent for operating and maintaining the parking facilities could help address this concern. Further, eliminating the prohibition against private development of rest areas could lead to public/private partnerships to fund maintenance and operations.[81]

The shortage of truck parking has been documented for at least 25 years yet remains an ongoing and persistent safety concern for all road users in 2025. The NTSB therefore recommends that the USDOT pursue available options to increase commercial vehicle parking capacity on highways; such as establishing a grant program for states, local governments, and other eligible entities to increase parking for commercial motor vehicles; assessing the feasibility of expanding eligibility for grant programs to allow for parking facility maintenance costs; evaluating the benefits of ending restrictions on private development of rest areas; and seeking additional Congressional appropriations as necessary.

In August 2015, the FHWA and the FMCSA, together with several stakeholder organizations, established a public/private partnership, the National Coalition on Truck Parking (Coalition), in response to the documented need for truck parking solutions identified as part of Jason's Law. The Coalition stakeholders represent the trucking industry, commercial vehicle safety advocacy groups, state DOTs, and owners and operators of commercial truck stops. The five core Coalition partners are:

- American Association of State Highway and Transportation Officials
- American Trucking Associations
- Owner-Operator Independent Driver Association
- National Association of Truck Stop Operators
- Commercial Vehicle Safety Alliance

The *National Coalition on Truck Parking Activity Report, 2015–2016* (FHWA 2017) documented the first year of Coalition activities and documented suggestions from participants to address truck parking problems across the nation in the areas of parking capacity, technology and data, funding and regulation, and state and local government coordination. A key point highlighted in the report is that initiatives to address truck parking should be implemented through collaborative effort of the various Coalition member organizations. The report also noted that truck

[81] As noted, private development of rest areas is generally prohibited, dating back to the 1960s. In 2000, the NTSB recommended that the FHWA explore the benefits of ending this prohibition (Safety Recommendation H-00-17). The FHWA ultimately determined that such action was unnecessary and, in 2009, the NTSB classified H-00-17 Closed—Alternative Action.

parking projects compete for highway funding with other transportation needs, such as pavement and bridge maintenance, other safety improvements, and capacity enhancements. Since the release of the initial report, the Coalition has held several meetings but has not released any additional publications.

As described above, the Coalition was established to help address the shortage of truck parking, and its members include federal agencies, safety advocacy organizations, and representatives of the commercial trucking industry. The recommended USDOT actions could be supplemented with input from Coalition stakeholders. The Coalition has not produced an updated report on its activities since 2016, and last held a meeting in December 2023. As such, the NTSB recommends that the National Coalition on Truck Parking publish an updated report that proposes solutions to truck parking capacity shortages, including expanding grant programs and funding of maintenance costs, ending restrictions on private development at rest areas, enhancing the TPIMS coverage to identify areas in critical need of additional parking, and projecting future truck volume and parking needs.

3 Conclusions

3.1 Findings

1. None of the following were factors in the crash: (1) highway design, markings, lighting, and signage; (2) weather and roadway conditions; (3) the motorcoach's mechanical condition; (4) the motorcoach driver's medical qualification, training and experience, cell phone use, or use of alcohol or other drugs; and (5) a sudden impairing or incapacitating medical event affecting the motorcoach driver.

2. The emergency response was timely and adequate.

3. The crash dynamics, failure to navigate the roadway geometry, and passenger statements are consistent with a fatigued motorcoach driver.

4. The motorcoach driver's medical conditions increased his risk of fatigue at the time of the crash.

5. The motorcoach driver's prolonged period awake, including his decision not to use provided rest facilities, contributed to his fatigue at the time of the crash.

6. Greyhound's variable scheduling practices led to the motorcoach driver's irregular sleep schedule, resulting in his fatigued state.

7. Had Greyhound implemented a comprehensive fatigue management program, the likelihood of fatigued driving and the crash risk would have been reduced.

8. Had Greyhound implemented a progressive discipline policy, the company could have mitigated the motorcoach driver's unsafe driving behavior before the crash.

9. Greyhound's incomplete and paper-based personnel records likely contributed to insufficient driver oversight and a lack of disciplinary actions for the motorcoach driver.

10. Greyhound was not using its driver monitoring system to its full potential for driver oversight, such as incorporating a progressive discipline policy, detecting driver behavior indicative of fatigued driving, and providing real-time driver alerts; therefore, the company missed the opportunity to identify that the motorcoach driver was at high risk for a crash.

11. Proactive application of *Safety Management Cycle* processes for all safety policies would allow Greyhound and other motor carriers to mitigate deficiencies and encourage robust safety culture, beyond compliance with federal regulations.

12. Federal guidance on proactively using driver monitoring systems to provide driver coaching can encourage motor carriers such as Greyhound to implement effective policies that reduce unsafe driver behaviors that can lead to a crash.

13. The commercial motor vehicle hours-of-service regulations for motorcoach and bus drivers would be more effective if they addressed the scientifically established risk of drivers operating during the nighttime window of circadian low.

14. Had the seriously injured motorcoach passengers seated outside the intrusion zone properly worn the available lap/shoulder belts, they would have been more likely to stay in their seating compartments, which would have reduced their injuries.

15. Had the motorcoach driver conducted a pretrip safety briefing to the passengers when they departed Indianapolis, informing them of the availability of the seat belts and the legal requirement to wear them, passengers might have been more likely to be belted when the crash occurred, and their injuries reduced.

16. Combination vehicles routinely park on the shoulder of the exit ramp to the Silver Lake Rest Area due to recurring lack of available truck parking, which increases the risk of them being struck by an errant highway vehicle.

17. The combination vehicles were unsafely parked in the highway clear zone of the exit ramp to the Silver Lake Rest Area, decreasing the motorcoach driver's ability to stop or return his vehicle to the roadway after it departed the travel lane.

18. The limited truck parking capacity and subsequent unsafe parking observed at the Silver Lake Rest Area were consistent with a lack of access to long-term parking spaces for combination vehicles on the National Highway System, as reported by surveys resulting from Jason's Law.

19. Continued deployment of the Truck Parking Information Management System can improve access to truck parking and allow for targeted expansion of access and usage, although it is not a standalone solution.

20. Truck parking shortages require solutions that increase parking capacity as well as information about parking availability along the nation's highway system.

21. State efforts to implement the Truck Parking Information Management System and increase truck parking capacity, such as in North Carolina, Illinois, and Oregon, are positive; however, individual states are limited in what they can do, and a centralized effort can more broadly address the safety risk caused by lack of available truck parking throughout the country.

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of the Highland, Illinois, crash was the motorcoach driver's departure of the motorcoach from the travel lanes onto the shoulder of the exit ramp due to fatigue. Contributing to the motorcoach driver's fatigue was his irregular work-rest schedule and prolonged time awake. Contributing to the crash was the failure of Greyhound Lines, Inc. to mitigate the motorcoach driver's recurring unsafe driving behaviors. Also contributing to the crash were the three combination vehicles parked on the shoulder of the exit ramp, although prohibited by Illinois Statute Section 11-1303, due to the recurring lack of available truck parking. Contributing to the injury severity for some of the motorcoach passengers was their lack of seat belt use.

4 Recommendations

4.1 New Recommendations

As a result of this investigation, the National Transportation Safety Board makes the following new safety recommendations:

To the US Department of Transportation:

Expand efforts to use the Truck Parking Information Management System to identify rest areas in critical need of additional truck parking. (H-25-5)

Pursue available options to increase commercial vehicle parking capacity on highways; such as establishing a grant program for states, local governments, and other eligible entities to increase parking for commercial motor vehicles; assessing the feasibility of expanding eligibility for grant programs to allow for parking facility maintenance costs; evaluating the benefits of ending restrictions on private development of rest areas; and seeking additional Congressional appropriations as necessary. (H-25-6)

To the Federal Motor Carrier Safety Administration:

Provide guidance through a passenger carrier safety publication on your website, encouraging passenger motor carriers to implement *Safety Management Cycle* processes and reassess these processes during changes in ownership or executive management, and periodically after implementation of new safety policies or technologies. (H-25-7)

To Greyhound Lines, Inc.:

Develop and implement a fatigue management program based on the North American Fatigue Management Program to educate your drivers, dispatchers, and other employees about fatigue, its causes, and its countermeasures. (H-25-8)

Revise driver scheduling policies to reduce scheduling variability that results in irregular work-rest cycles. (H-25-9)

Create an electronic personnel file management system to ensure that all driver records—including those pertaining to disciplinary action—are easily accessible to terminal managers and safety personnel, both on and off site. (H-25-10)

Incorporate recorded driver monitoring system events into safety and disciplinary policies, including:

- detection and prevention of fatigued driving;
- allowable number of critical safety violations a driver can have in a specific time frame (such as per month, per quarter); and
- procedures to hold poorly performing drivers accountable, to include both coaching and disciplinary action up to and including termination for exceeding established thresholds. (H-25-11)

Establish a written policy to proactively apply *Safety Management Cycle* processes beyond compliance reviews to assess the ongoing effectiveness of new safety policies and technologies after they are adopted. (H-25-12)

Establish policies to require pretrip safety briefings every time there is a change of driver, at every terminal before departure regardless of departure time, and every time the motorcoach takes on new passengers. This should include driver briefings for awareness on which states they will be driving through that have mandatory enforcement of seat belts. At a minimum, briefings should include the following information:

- the availability of seat belts, the potential legal requirement to wear them in mandatory enforcement states, and how to fasten them;
- ways to address urgent onboard safety concerns, including dialing 911; and
- the location and use of the fire extinguisher and the emergency exits. (H-25-13)

To the National Coalition on Truck Parking:

Publish an updated report that proposes solutions to truck parking capacity shortages, including expanding grant programs and funding of maintenance costs, ending restrictions on private development at rest areas, enhancing the Truck Parking Information Management System coverage to identify areas in critical need of additional parking, and projecting future truck volume and parking needs. (H-25-14)

To the American Bus Association and the United Motorcoach Association:

Inform your members about the Highland, Illinois, crash and urge them to develop fatigue management programs based on the North American Fatigue Management Program to educate drivers and other employees about fatigue, its causes, and its countermeasures. (H-25-15)

4.2 Previously Issued Recommendation Reiterated in This Report

The National Transportation Safety Board reiterates the following safety recommendation:

To the Federal Motor Carrier Safety Administration:

Incorporate scientifically based fatigue mitigation strategies into the hours-of-service regulations for passenger-carrying drivers who operate during the nighttime window of circadian low. (H-12-30)

Safety Recommendation H-12-30 is reiterated in section 2.4 of the report. Its status since 2017 is Open—Unacceptable Response.

4.3 Previously Issued Recommendation Reiterated and Classified in This Report

The National Transportation Safety Board reiterates and classifies the following safety recommendation:

To the Federal Motor Carrier Safety Administration:

Provide guidance to motor carriers to proactively use the onboard video event recorder information to aid in driver training and ensure driver compliance with regulatory rules essential for safe operation. (H-22-4)

The classification status of Safety Recommendation H-22-4 is hereby changed from Open—Acceptable Response to Open—Unacceptable Response. The recommendation is reiterated in section 2.4 of the report.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

JENNIFER L. HOMENDY
Chairman

MICHAEL GRAHAM
Member

THOMAS CHAPMAN
Member

J. TODD INMAN
Member

Board Member Statements

Chairman Jennifer L. Homendy filed the following concurring statement on May 27, 2025.

Every roadway death is a preventable tragedy. It's even more painful when decades of inaction play a contributing role. Such is the case in this crash, which left three families grieving the loss of a loved one.

The NTSB has documented the dangers of insufficient truck parking for nearly 30 years. Among many others, this includes a 1998 Pennsylvania crash that killed seven people and injured 18 others (NTSB 2000a), a 1999 collision in Tennessee where five people died and two were injured (NTSB 2000b), and a crash in Oregon that claimed seven lives and injured four others just 2 months before the Highland tragedy (see section 1.7).

Adding to our outrage is that we haven't been a lone voice calling for action. Congress, the US Department of Transportation, the American Association of State Highway and Transportation Officials, and the members of the National Coalition on Truck Parking (to name just a few) have issued numerous studies, surveys, and whitepapers — all of which amplify the NTSB's concerns.

Even so, we're facing the same issue year after year, in crash after crash: the supply of parking spaces hasn't kept up with demand. When truck drivers are unable to find safe, authorized parking, there's undeniable safety risks; they may park in unsafe or illegal locations or may violate federal hours-of-service rules and continue to drive fatigued while searching for alternatives.

Our collective failure to learn from the past must end now. Highland can be… *must be*… the last crash we're called to investigate where the truck parking shortage plays a deadly role. Increased and dedicated federal funding for truck parking infrastructure across the country that Congress is pursuing (H.R. 1659) would make that possible. Whether in the form of standalone legislation or part of a broader reauthorization package, additional funding for truck parking capacity will have an immediate, meaningful safety benefit.

We owe it to those who died in this crash — indeed to *every* road user — to remedy this issue once and for all.

Member Thomas Chapman filed the following concurring statement on May 21, 2025.

I concur and join in the Board's unanimous adoption of the investigation report.

Based on Greyhound's explicit representations to the NTSB, we have closed prior recommendations made to Greyhound that directly addressed four key safety issues implicated in this tragedy – variable work hours, driver discipline policies & practices, improving Greyhound's outdated paper-based driver records system, and pretrip safety briefings. Yet Greyhound has reverted to its previous flawed approach in each of these areas.

I am confident my colleagues on the Board share my concern regarding Greyhound's lack of continuity. It is essential that Greyhound demonstrate its long-term commitment to safety by implementing our recommendations and addressing the significant areas of weakness highlighted in the investigation report.

Appendixes

Appendix A: Investigation

The National Transportation Safety Board was notified of the Highland, Illinois, crash on July 12, 2023, and an investigative team was dispatched to the scene. The team investigated human performance, conducted technical reconstruction, and examined survival, highway, vehicle, and motor carrier factors. The on-scene investigative staff was supported by staff from the NTSB's Office of Research and Engineering and Transportation Disaster Assistance Division. Thomas Chapman was the NTSB board member on scene.

Parties to the investigation were the Federal Motor Carrier Safety Administration, the Illinois State Police, the Illinois Department of Transportation, the Highland-Pierron Fire Protection District, the City of Highland Fire Department, and Greyhound Lines, Inc.

Appendix B: Consolidated Recommendation Information

Title 49 *United States Code* 1117(b) requires the following information on the recommendations in this report.

For each recommendation—

(1) a brief summary of the Board's collection and analysis of the specific accident investigation information most relevant to the recommendation;

(2) a description of the Board's use of external information, including studies, reports, and experts, other than the findings of a specific accident investigation, if any were used to inform or support the recommendation, including a brief summary of the specific safety benefits and other effects identified by each study, report, or expert; and

(3) a brief summary of any examples of actions taken by regulated entities before the publication of the safety recommendation, to the extent such actions are known to the Board, that were consistent with the recommendation.

To the US Department of Transportation:

H-25-5

Expand efforts to use the Truck Parking Information Management System to identify rest areas in critical need of additional truck parking.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.6.1, Efforts to Increase Truck Parking Access. Information supporting (b)(1) can be found on pages 64-69; (b)(2) can be found on pages 64-69; and (b)(3) is not applicable.

H-25-6

Pursue available options to increase commercial vehicle parking capacity on highways; such as establishing a grant program for states, local governments, and other eligible entities to increase parking for commercial motor vehicles; assessing the feasibility of expanding eligibility for grant programs to allow for parking facility maintenance costs; evaluating the benefits of ending restrictions on private development of rest areas; and seeking additional Congressional appropriations as necessary.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.6.1, Efforts to Increase Truck Parking Access. Information

supporting (b)(1) can be found on pages 64-69; (b)(2) can be found on pages 64-69; and (b)(3) is not applicable.

To the Federal Motor Carrier Safety Administration:

H-25-7

Provide guidance through a passenger carrier safety publication on your website, encouraging passenger motor carriers to implement *Safety Management Cycle* processes and reassess these processes during changes in ownership or executive management, and periodically after implementation of new safety policies or technologies.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.4, Insufficient Federal Guidance on Safety Management, Driver Coaching, and Fatigue Mitigation. Information supporting (b)(1) can be found on pages 55-58; (b)(2) can be found on pages 55-58; and (b)(3) is not applicable.

To Greyhound Lines, Inc.:

H-25-8

Develop and implement a fatigue management program based on the North American Fatigue Management Program to educate your drivers, dispatchers, and other employees about fatigue, its causes, and its countermeasures.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.2.3, Greyhound's Fatigue Management. Information supporting (b)(1) can be found on pages 47-50; (b)(2) can be found on pages 47-50; and (b)(3) is not applicable.

H-25-9

Revise driver scheduling policies to reduce scheduling variability that results in irregular work-rest cycles.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.2.3, Greyhound's Fatigue Management. Information supporting (b)(1) can be found on pages 47-50; (b)(2) can be found on pages 47-50; and (b)(3) is not applicable.

H-25-10

Create an electronic personnel file management system to ensure that all driver records—including those pertaining to disciplinary action—are

easily accessible to terminal managers and safety personnel, both on and off site.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.3.2, Greyhound's Record-Keeping. Information supporting (b)(1) can be found on pages 52-54; (b)(2) can be found on pages 52-54; and (b)(3) is not applicable.

H-25-11

Incorporate recorded driver monitoring system events into safety and disciplinary policies, including:

- detection and prevention of fatigued driving;
- allowable number of critical safety violations a driver can have in a specific time frame (such as per month, per quarter); and
- procedures to hold poorly performing drivers accountable, to include both coaching and disciplinary action up to and including termination for exceeding established thresholds.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.3.3, Driver Monitoring Systems. Information supporting (b)(1) can be found on pages 54-55; (b)(2) can be found on pages 54-55; and (b)(3) is not applicable.

H-25-12

Establish a written policy to proactively apply *Safety Management Cycle* processes beyond compliance reviews to assess the ongoing effectiveness of new safety policies and technologies after they are adopted.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.4, Insufficient Federal Guidance on Safety Management, Driver Coaching, and Fatigue Mitigation. Information supporting (b)(1) can be found on pages 55-58; (b)(2) can be found on pages 55-58; and (b)(3) is not applicable.

H-25-13

Establish policies to require pretrip safety briefings every time there is a change of driver, at every terminal before departure regardless of departure time, and every time the motorcoach takes on new passengers. This should include driver briefings for awareness on which states they will be driving through that have mandatory enforcement of seat belts. At a minimum, briefings should include the following information:

- the availability of seat belts, the potential legal requirement to wear them in mandatory enforcement states, and how to fasten them;
- ways to address urgent onboard safety concerns, including dialing 911; and
- the location and use of the fire extinguisher and the emergency exits.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.5, Lack of Seat Belt Use by Motorcoach Passengers. Information supporting (b)(1) can be found on pages 58-60; (b)(2) can be found on pages 58-60; and (b)(3) is not applicable.

To the National Coalition on Truck Parking:

H-25-14

Publish an updated report that proposes solutions to truck parking capacity shortages, including expanding grant programs and funding of maintenance costs, ending restrictions on private development at rest areas, enhancing the Truck Parking Information Management System coverage to identify areas in critical need of additional parking, and projecting future truck volume and parking needs.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.6.1, Efforts to Increase Truck Parking Access. Information supporting (b)(1) can be found on pages 64-69; (b)(2) can be found on pages 64-69; and (b)(3) is not applicable.

To the American Bus Association and the United Motorcoach Association:

H-25-15

Inform your members about the Highland, Illinois, crash and urge them to develop fatigue management programs based on the North American Fatigue Management Program to educate drivers and other employees about fatigue, its causes, and its countermeasures.

Information that addresses the requirements of 49 *USC* 1117(b), as applicable, can be found in section 2.2.3, Greyhound's Fatigue Management. Information supporting (b)(1) can be found on pages 47-50; (b)(2) can be found on pages 47-50; and (b)(3) is not applicable.

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