

National Transportation Safety Board

Office of Highway Safety

Washington, DC 20594



HWY23MH015

SURVIVAL FACTORS

Group Chair's Factual Report

TABLE OF CONTENTS

- A. CRASH..... 3
- B. SURVIVAL FACTORS GROUP..... 3
- C. CRASH SUMMARY..... 3
- D. DETAILS OF THE INVESTIGATION 3
 - 1.0 SCENE 3
 - 2.0 VEHICLES 4
 - 2.1 2014 Prevost X3-45 Exterior Damage..... 4
 - 2.1.1 Prevost Windows 6
 - 2.2 2014 Prevost Interior Damage 7
 - 2.2.1 Prevost Seating 8
 - 2.3 Seating Chart..... 13
 - 2.3.1 Pre-Trip Safety Briefings 14
 - 2.4 Egress, Entrapment and Ejection..... 14
 - 2.5 Injuries to Motorcoach Occupants 14
 - 2.5.1 Triage on Scene 18
 - 2.5.2 Transportation of Injured 18
 - 2.5.3 Madison County Treating Hospitals..... 19
 - 3.0 2019 FREIGHTLINER TRUCK-TRACTOR IN COMBINATION WITH A 2024 VANGUARD SEMI-TRAILER 20
 - 4.0 2000 KENWORTH TRUCK-TRACTOR IN COMBINATION WITH A 2007 BENSON SEMI-TRAILER 21
 - 5.0 2023 MACK TRUCK-TRACTOR IN COMBINATION WITH A 2019 GREAT DANE SEMI-TRAILER 22
 - 6.0 EMERGENCY RESPONSE..... 22
 - 6.1.1 Communications..... 25
 - 7.0 INTERVIEWS..... 26
 - 7.1 Interview Synopsis 26
 - 7.1.1 First Responder Interviews 26
 - 7.1.2 Passenger Interviews..... 28
- E. DOCKET MATERIAL..... 29

A. CRASH

Location: Highland, Madison County, Illinois

Date: July 12, 2023

Time: 1:48 a.m. CDT

B. SURVIVAL FACTORS GROUP

Group Chair Ronald Kaminski
National Transportation Safety Board
Washington, D. C.

Party Member Chief Phil Decker
Highland-Pierron Fire Protection District
Highland, Illinois

Party Member Chief Chris Straub
Highland Fire Department
Highland, Illinois

C. CRASH SUMMARY

For a summary of the crash, refer to the *Crash Information and Summary Report*, which can be found in the NTSB docket for this investigation.

D. DETAILS OF THE INVESTIGATION

The survival factors investigation focused on the interior damage sustained to the 2014 Prevost X3-45 motorcoach, hereafter referred to as a motorcoach, the sustained injuries, the restraint systems, and the timeliness of the emergency response. Additionally, three combination units, all consisting of a truck-tractor in combination with a semi-trailer, that were parked on the shoulder were impacted by the motorcoach. Their post-crash damage will also be discussed. The vehicle descriptions refer to the left-side (driver-side) and right-side (passenger-side).

1.0 Scene

An inspection of the scene was conducted on July 13, 2023. The approximate latitude and longitude of the crash scene location was: 38.787691°, -89.684213°. This crash occurred on Interstate 70 at the off ramp from I-70 westbound to the Silver Lake rest area in Madison County. At the location of this crash, the exit ramp consists of a single lane with a paved right shoulder. At the time of this crash, it was dark with

overhead lighting. Refer to **Figure 1** below for initial view taken of scene the day after the crash.



Figure 1. Post-crash view of scene showing start of tire mark from motorcoach.

2.0 Vehicles

For uniform description, “left” will refer to the driver’s side, and “right” will refer to the passenger’s side of the motorcoach.

2.1 2014 Prevost X3-45 Exterior Damage

The 2014 Prevost X3-45 50-passenger motorcoach was examined at Petroff’s Towing in Caseyville, IL July 13-15, and 17-18, 2023.

The motorcoach’s impact with three tractor-trailer combination units resulted in catastrophic damage to the motorcoach’s front end with the deformation extending down the right (passenger) side approximately 292 inches. Contact damage to the front bumper was 27 inches wide. The narrow front-end engagement resulted in the right sidewall and the first six rows of seats on the right side being sheared from the floor anchorage, as shown in **Figures 2-3**. The windshield was shattered and completely displaced. The right A-pillar, roof header and loading door frame were torn away with contact damage to the privacy panel at the entry stairwell. The impact with the parked trailers resulted in a loss of passenger occupant compartment integrity down the right side of the passenger seating compartment leaving an opening over 24 feet wide and 6 feet high. The roof’s side rail and vertical window frames were sheared away and severely deformed, and the entire roof sustained a combination of contact

(right side) and induced damage. The narrow impact resulted in buckling of the left side roof line. The motorcoach was equipped with a Ricon wheelchair lift, and door located in the rear portion of the motorcoach on the right side, below seat Rows 5-6, that sustained damage as a result of the crash.¹



Figure 2. Front angle view of damage to motorcoach.



Figure 3. Right side view of damage to motorcoach.

¹ ([Ricon: Innovation in Access - Homepage \(riconcorp.com\)](http://Ricon: Innovation in Access - Homepage (riconcorp.com)))

2.1.1 Prevost Windows

The motorcoach was equipped with nine windows on both sides of the vehicle. All the side windows were double paned with the exterior layer being EXCEL tinted and tempered windows with the interior window being laminated and stamped with M293233-293705 AS-3 DOT 517 PRELCO. Seven of the nine windows on the left side were emergency exit windows while windows #2, 3, 4, 6, 7, and 8 on the right side were emergency exit windows. Window #5 on the right side was in the wheelchair access door and did not swing open. Window #1 on the right side was not an emergency exit window. All the emergency exit windows were marked with instructions.² All the emergency exit windows on the right side measured 57 inches wide and 36 inches in height. Window #5 in the wheelchair access door measured 43½ inches wide and 36 inches in height.

The condition of the windows on the left side of the motorcoach is summarized in **Table 1**. The window adjacent to the driver's seat position was comprised of three separate windows including two smaller windows under a larger window. One of the two smaller windows could be slid open.

Table 1. Motorcoach Left Side Window Observation.³

Driver's Side Window	All three driver windows were broken out.
Window #1	Entire window completely displaced.
Window #2	Emergency Exit. No damage. Window had been pushed open.
Window #3	Emergency Exit. No damage.
Window #4	Emergency Exit. No damage.
Window #5	Emergency Exit. No damage.
Window #6	Emergency Exit. No damage. Window had been pushed open.
Window #7	Emergency Exit. No damage.
Window #8	Emergency exit. Entire window completely displaced. Not displaced by first responders.
Window #9	No damage. Not an emergency exit.

On the right side of the motorcoach, seven of the nine windows were emergency window exits. The condition of the windows on the right side of the motorcoach is documented in **Table 2** below.

Table 2. Motorcoach Right Side Window Observations.

Window #1	Entire window completely displaced.
Window #2	Entire window completely displaced.
Window #3	Entire window completely displaced.
Window #4	Entire window completely displaced.

² All the emergency exit windows on both sides utilized a flip up latch system that required the passenger to flip up the horizontal bar at the base of the window in order to push open the window, which was hinged at the top.

³ Windows are referenced by number where #1 is the furthest forward and #9 is the furthest aft.

Window #5	Entire window completely displaced.
Window #6	Entire window completely displaced.
Window #7	Entire window completely displaced.
Window #8	Entire window completely displaced.
Window #9	Exterior window completely displaced. Interior window cracked.

2.2 2014 Prevost Interior Damage

The motorcoach sustained catastrophic interior damage along the right side starting from the windshield back to Row 8. The front corner of the windshield header and A-pillar was bent under and folded back into the right-side passenger seating area extending to Row 3, resulting in approximately 30 inches of vertical intrusion. Examination of the interior of the motorcoach also revealed catastrophic lateral intrusion primarily along the right sidewall back to Row 7. The first six rows of seats were sheared away at the base of the frames. The extent of interior deformation and intrusion are shown in **Figure 4**. Firefighters stated that they did not cut out any of the right-side seats. Contact damage from striking the other trucks and trailers extended to the seatback in Row 8 on the right side as shown in **Figure 5**. Examination to the motorcoach driver's lap and shoulder belt found the driver's latchplate still inserted into the driver's seat belt buckle and the webbing for the lap and shoulder belt portions cut as shown in **Figure 6**.



Figure 4. View of interior deformation and six missing seat rows on right side.



Figure 5. View of deformed seats at Rows 7-8 on right side.



Figure 6. View of motorcoach driver's seat belt latchplate still buckled with webbing cut.

2.2.1 Prevost Seating

All 50 seat positions in the motorcoach were equipped with lap/shoulder belts. The shoulder belts were positioned over the occupants left shoulder on the left side of

the motorcoach and the right shoulder on the right side of the motorcoach. The shoulder portion of the seatbelts was equipped with a height adjuster on the outboard portion of each seatback. There was seatbelt use reminders stitched into the base of the majority of seatbacks, as shown in **Figure 7** explaining the two-step process for putting on the seat belts. The first step is to put the seat belt on, and the second step is to adjust the shoulder height adjuster so that the shoulder belt is tight to the top of the occupant's shoulder.



Figure 7. View of stitched in seat belt reminder to base of seatback.

The driver seating area was surrounded by a thick plexiglass security cage that was partially displaced and twisted, but still intact. The driver's seat was manufactured by USSC Group and model ALX9100. 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. Each set of seats had a fold down armrest in the aisle, middle and window positions, and all seats had integral headrests. The seat pans had an angle of 10 degrees (upwards from horizontal) and the seatbacks were angled at 28 degrees (rearwards from vertical). Each seatback reclined another 16 degrees (for a total of 44 degrees). Each seat had a spring latch under the seat pan that allowed the seat pan to fold up flat against the seatback. Each seat row was equipped with 110-volt electrical plugs positioned in the center of the lower cross member of the seat pan frame.

The passenger seats were manufactured by Indiana Mills Manufacturing Inc. (IMMI).⁴ The seats were IMMI's Premier seats with a dual frame, which is marketed as providing protection to the belted occupant in front and to a potentially unbelted occupant behind. The inner frame is designed to support the lap/shoulder belt and, during loading, allows the seat belt to rotate the inner frame forward, thereby absorbing energy. The outer frame is designed to remain in the original upright

⁴ ([Homepage - IMMI Bringing Safety to People | IMMI \(imminet.com\)](http://www.imminet.com))

position to aid in containing a potentially unbelted occupant behind and to help protect the restrained passenger from any unrestrained passengers behind.

Examination of the SmartFrame seats that remained in the motorcoach identified numerous deformed seatbacks. The damage to seatbacks caused several of the dual frame seats to separate. The lap/shoulder belt webbing in the aisle seat in row 11 on the left side was extended with evidence of loading/cupping to webbing. The other seat belt that showed evidence of usage was in the window seat in row 9 on the right side. The shoulder portion with latchplate was extended and an area of cupping near the latchplate location. Documentation of the motorcoach seats and restraint systems is in **Table 3**.

The driver's seat belt was a Type 2 lap/shoulder belt.⁵ The webbing of the driver's lap and shoulder belt were cut near the buckle and the lap belt webbing showed evidence of loading with cupping and striations to the webbing in the area his latchplate location would have been.

The accessibility of the seat belt and seat belt buckle was also examined. The majority of inspected seat belts had a 3-inch-long mark that appeared to be a storage mark. The seat belt buckles for the window seats on both sides of the motorcoach were attached to the end of a rigid stalk of cable and was designed to protrude from between the seat pans. The majority of passenger seat belt buckles in the window seats were found pushed down between the seats on the left side making them difficult to access. Staff was able to access the buckles by sliding two fingers between the seat pans and curl them under the buckle stalk and then pull the stalk upwards until it was accessible. The examination showed all the seat belt buckle covers remained attached and were operable. Documentation of the motorcoach seats and restraint systems is shown in **Table 3**.

Examination of displaced seats in Rows 1-6 on the right side was conducted outside the motorcoach. Staff determined which seats were in each row by matching the pattern of damage to the torn floor anchorages. The lock down mechanisms in Row 7 on the right side remained intact but the entire seat and seatback were pushed/slid back approximately 5 inches. The lock down mechanisms in Rows 5-6 on the left side were still engaged and the cotter pins were still inserted.

All the IMMI seats except in Rows 5-7 on the right and Rows 5-6 on the left were attached to the floor with four cam screws, two forward and two aft that locked into the seat rail on the floor.⁶ In addition, all the seats except in Rows 5-7 on the right and 5-6 on the left were attached to the sidewall with two forward and two aft cam screws. All of the seat pans were able to be flipped up by using the springed lever mechanism underneath the seat pan. Examination of the passenger seat attachment points to the

⁵ Type 2 seat belt assembly is a combination of pelvic (lap) and upper torso (shoulder) restraints.

⁶ Also referred to as cam lock-nuts.

floor and sidewall on the left side showed no indications of deformation or separation. Seat Rows 8-12 on the right side also remained attached to the floor and sidewall. Seat Row 8 on the left side was cut out by first responders while seat Row 9 was deformed also due to first responders extricating a deceased passenger that came to rest under Row 9 on the left side.

The motorcoach was equipped with an Americans with Disabilities Act (ADA) compliant wheelchair access door with an electrical lift adjacent to Row 5 on the right side.⁷ The sliding base of the Premier IMMI seats in Rows 5 and 7 on the right and 5-6 on the left was manufactured by Standard Seating. These sliding seats can be unlocked and either slid forward or completely removed to allow for a wheelchair to be secured. Under these seats and attached to the floor were Q'Straint wheelchair lockdown hooks in addition to shoulder belts attached to the side wall for use by passengers using a wheelchair.

Table 3. Motorcoach Seats and Restraint System Observations

Window Seat	Aisle Seat	Row #	Aisle Seat	Window Seat
Seat pan flipped up. Seat belt was fully retracted. Window seat belt buckle was pushed down between the seats and not easily accessible.	Seatback frame within a frame was slightly separated. Seat belt was partially pulled out and appeared to have evidence of loading on the webbing. Privacy panel behind driver was partially displaced.	1	Seat row displaced from motorcoach.	Seat row displaced from motorcoach.
Window seat belt buckle was down and not easily accessible.	Seatback of 1B appears to have deformation. Seat belt partially pulled out. No definitive evidence of loading. Water bottle in cup holder.	2	Seat row displaced from motorcoach.	Seat row displaced from motorcoach.
Window seat belt buckle was down and not easily accessible.	Top of seatback appears to be twisted inboard.	3	Seat row displaced from motorcoach.	Seat row displaced from motorcoach.
Window seat belt buckle was down	Seatback of 3B appears to have deformation.	4	Seat row displaced from motorcoach.	Seat row displaced from motorcoach.

⁷ The electrical wheelchair lift platform is located underneath the floor of the MCI just below the ADA door.

and not easily accessible.				
Window seat belt buckle was up and usable	Seatback reclined. Seatback of 4B appears to have deformation. Seat belt pulled out slightly and twisted at shoulder/D-ring.	5	Sliding seat displaced from motorcoach.	Sliding seat displaced from motorcoach.
Window seat belt buckle was up and usable. Scuff mark on seatback of row 5.	Seatback reclined. Seatback of 5B appears to have deformation.	6	Sliding seat displaced from motorcoach.	Sliding seat displaced from motorcoach.
Window seat belt buckle was down and not easily accessible. Slight separation of seatback from rear frame.	Seatback of 6B appears to have deformation.	7	Sliding seat damaged and shoved back 5 inches. Seat pan bent downward. Armrest bent inboard.	Sliding seat. Seatback severely damaged and bent aft to ~60 degrees. Entire seat row shoved back 5 inches. Seat pan bent downward. Seat belt buckle was pushed down between seats and not easily accessible. Seatback frame slightly separated.
Seat row removed by first responders for extrication.	Seat row removed by first responders for extrication.	8	Seatback upright.	Seatback frame within a frame was slightly separated. Seatback severely damaged and bent aft >40 degrees. Seat belt buckle was pushed down between seats and not easily accessible.
Seat row and this seat was damaged by first responders.	Seat row damaged by first responders. Seatback of 8B appears to have deformation. Seatback shows minor separation.	9	Seatback reclined.	Window seat belt buckle was down and not easily accessible. Seat belt shoulder webbing pulled out. Seatback bent back >30 degrees and twisted inboard. Slight seat frame separation.

Seat belt buckle was pushed down between seats and not easily accessible. Bottle in cupholder.	Seat back slightly reclined.	10	Possible deformation to 9C seatback.	Seat belt buckle was pushed down between seats and not easily accessible.
Seatback reclined. Seat belt buckle was down and not easily accessible	Seat belt webbing extended with evidence of loading to webbing. Seatback shows no separation.	11	Seatback of 10C was deformed.	Seat belt buckle was pushed down between seats and not easily accessible. Seatback of 10D was deformed. Seat belt wrapped over top right outboard corner of seatback.
Seat belt buckle was pushed down between seats and not easily accessible. Seatback reclined.	Seatback was reclined.	12	Seat belt slightly extended. Seatback upright.	Seat belt buckle was pushed down between seats and not easily accessible.
Seat pan detached from seat frame at the seat bite. Seat belt Buckle was pushed down between seats and not easily accessible.	Seat pan detached from seat frame at the seat bite. Possible contact to seatback in 12B.	13	Rest Room	

2.3 Seating Chart

An accurate seating chart of each passenger seat location at the time of the crash could not be completed. Based on Illinois State Police interviews and NTSB staff interviews with 2 of the 18 surviving occupants, only the driver and 9 passengers could be placed in a specific seat in the 50-passenger motorcoach. The three fatally injured passengers were seated in the window seats in Rows 2, 4, and 7 on the right side.

According to Greyhound, they have recently begun assigning seats at some of the terminals. The Greyhound Indianapolis terminal produced a manifest with names and seat assignments. According to the one passenger that was interviewed, the motorcoach driver allowed passengers to change seats to open seat rows.

2.3.1 Pre-Trip Safety Briefings

Both of the interviewed passengers stated that they did not recall the motorcoach driver conducting a pre-trip safety briefing or providing other instructions on window exits before departing Indianapolis, IN. Both passengers only recalled the driver telling them he could not be disturbed when he's driving because there is construction along the route to St. Louis.

According to Greyhound, the driver is supposed to do the safety briefing every time there is a change of driver and at every large terminal. The driver can either use his company issued mobile phone with a recorded message or do it verbally. If the driver is picking up passengers late at night and most passengers are asleep, the driver might elect not to do a pre-trip briefing. Late night safety briefings are at the discretion of the driver.

Illinois' seat belt use laws apply to motorcoach passengers, through primary enforcement.⁸

2.4 Egress, Entrapment and Ejection

According to passenger interviews, the majority of passengers exited the motorcoach out the opening on the right side. One deceased passenger was found under debris in the aisle near Row 6. The deceased passenger seated on the right-side window seat in Row 7 was found restrained but partially ejected with his head and arms hanging out over the side of the motorcoach.

2.5 Injuries to Motorcoach Occupants⁹

The motorcoach was occupied by 20 passengers and the driver. Three passengers sustained fatal injuries and were transported to the Madison County Coroner's office for autopsy examinations. Six passengers sustained serious injuries, the motorcoach driver and five passengers sustained minor injuries, and six passengers refused treatment.

Autopsy records were obtained for the three passengers that sustained fatal injuries in the crash.

⁸ <https://www.ilga.gov/legislation/ilcs/fulltext.asp?DocName=062500050K12-603.1>

⁹ The injury levels were evaluated according to 49 Code of Federal Regulations (CFR) 830.2, which defines fatal injury as "any injury which results in death within 30 days of the accident" and serious injury as "any injury which: (1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, or tendon damage; (4) involves any internal organ; or (5) involves second- or third-degree burns, or any burn affecting more than 5 percent of the body surface."

MC1- 47-year-old male passenger was seated in the window seat on the right side in Row 2. The Forensic Pathologist found that the passenger sustained bilateral flail chest ribs 1-12, 9th thoracic vertebra fracture with spinal cord transection, thoracic aorta transection, bilateral hemothorax, liver and spleen lacerations, small and large bowel lacerations and avulsion, pelvis fractures, transection of abdominal aorta and inferior vena cava with bilateral abrasions and lacerations to head, chest and extremities. The Forensic Pathologist determined the cause of death was Thoracoabdominal Blunt Trauma.

MC2- 71-year-old male passenger was found seated and restrained by his available lap/shoulder belt in the window seat in Row 7 on the right side. His seatback was bent back, and his head and arms were leaning outside of the motorcoach. The Forensic Pathologist found that the passenger sustained a skull fracture, a subarachnoid hemorrhage, atlanto-occipital dislocation fracture with spinal cord transection, bilateral clavicle fractures, bilateral rib fractures, pelvic fractures, right humerus fracture, right femur fracture, left tibia/fibula fractures, multiple lacerations and abrasions to head and extremities. Coroner photographs showed a seat belt abrasion across his abdomen. The Forensic Pathologist determined the cause of death was craniocerebral blunt trauma with atlanto-occipital dislocation fracture and thoracoabdominal blunt trauma.

MC3- 34-year-old male passenger was seated in the window seat in Row 4 on the right side and was found by first responders upside down stuck partially under the aisle seat in Row 8 on the left side. The Forensic Pathologist found that the passenger sustained multiple skull fractures, subarachnoid and subdural hemorrhage, bilateral rib fractures 1-6, thoracic vertebra fracture, liver lacerations, mandible fracture, left ulna and radius fracture, multiple abrasions and lacerations to head and extremities. The Pathologist included evidence of Mechanical Asphyxia that included bulbar eyes with palpebral conjunctival hemorrhages, frothy fluid in oral cavity and trachea, and brain swelling. The Forensic Pathologist determined the cause of death was craniocerebral, thoracic, and abdominal blunt trauma with mechanical asphyxia.

Medical records were obtained for all occupants that were transported to area hospitals.

MC4- 59-year-old restrained motorcoach driver was flown from the scene to the Barnes-Jewish hospital in St Louis, MO. Video from an arriving ISP trooper's bodycam revealed audio of the Mack truck driver telling the ISP trooper that when he looked into the motorcoach drivers seating area immediately after the crash, the motorcoach driver was sitting upright and when he was found by first responders he had moved. First responders described the driver's position as still being partially seated with his right buttocks on the seat cushion and his head and right upper body lying on the floor to the right towards the loading door. He was extricated through the windshield. The

driver was treated and admitted for two nights due to his altered mental status. The driver was then discharged to a rehabilitation facility. According to his medical records he had diffuse abdominal tenderness, complained of pain and tenderness to his right wrist, bilateral shoulders, thoracic and lumbar spine, bilateral hips, left femur, left knee, left tibia and fibula and left chest wall.

MC5- 49-year-old male passenger was flown from the scene and hospitalized at St. Louis University hospital for two weeks. He sustained a right lung contusion, right pneumothorax, fractured right radius, 1 fractured right 2nd rib, fractured right olecranon, displaced fracture of right clavicle, bilateral temporal bone fractures, sphenoid sinus fracture, mildly displaced type III avulsion fracture of the left occipital bone, compression fracture L1 vertebra, displaced fracture of C6-7 transverse process, a subdural hematoma, fractured nose, laceration of the right frontoparietal occipital scalp, and right cheek laceration with a scalp hematoma.

MC6- 67-year-old female passenger was transported from scene by ambulance to Anderson hospital where she was treated and transferred to St. Louis University hospital. According to her medical records, she sustained fractures to right 10th-11th ribs, neck strain, and a right cheek abrasion. This passenger was reportedly seated on the left side in the window seat of Row 7.

MC7- 37-year-old male passenger was transported from scene by ambulance to Anderson hospital where he was treated and released. According to his medical records he was wearing his seat belt at time of crash. He sustained a contusion to his left ribcage, and a bruised left ankle and soreness to his neck.

MC8- 22-year-old male passenger was transported from scene by ambulance to Anderson hospital where he was treated and released. According to his medical records he sustained lacerations to right hand and pain and stiffness to right arm, right knee, and lower back.

MC9- 35-year-old male passenger was transported from scene by ambulance to Anderson hospital where he was treated and transferred to St. Louis University hospital where he was hospitalized. According to his medical records he sustained a basilar skull fracture, rupture of tympanic membranes, right clavicle fracture, 2 right rib fractures, 2 left rib fractures, and a laceration to his left ear, contusion to upper lobe of right lung, lumbar strain, multiple abrasions to face, arms, elbows, and knees.

MC10- 38-year-old male passenger was transported from scene by ambulance to St. Joseph's hospital where he was treated and released. According to his interview he sustained a C6 spinous process fracture, a concussion and multiple contusions. The passenger stated that he was seated on the driver's side in the 5th or 6th row in the aisle seat. He said he not wearing his seat belt and egressed out the right-side opening.

MC11- 37-year-old female passenger was transported from scene by ambulance to St. Joseph's hospital where she was treated and released. According to her medical records, she sustained a chest contusion to her chest wall. She told ER nurses she was sleeping when the crash occurred. This passenger was seated in the 5th or 6th row on the driver's side in the window seat. Her partner seated next to her told NTSB investigators that she egressed out the right-side opening with him.

MC12- 34-year-old female passenger was transported from the scene by ambulance to St. Joseph's hospital where she was treated and released. According to her medical records, she sustained contusions to her right hip, right shoulder, and right lower leg. In addition, she had a small piece of glass caught in her right eye. She told ER nurses she was sleeping towards the rear of the motorcoach when the crash occurred and woke up in the aisle.

MC13- 53-year-old female passenger was transported from scene by ambulance to St. Joseph's hospital where she was seen and then transferred to St. John's where she was treated and released. According to her medical records, she was restrained and sustained fractures to her left zygomatic arch and left orbital wall, a large avulsion laceration to the left side of her face and a laceration to her left thigh. In addition, she had a small piece of glass caught in her left eye. According to her interview with NTSB investigators, she stated that she was in the second row behind the driver laying on the seat with her knees bent and her feet toward the window and had her head on the armrest out towards the aisle. The passenger stated that after the crash she ended up on the floor and egressed out the large hole on the right side of the motorcoach.

MC14- 25-year-old female passenger was transported from scene by medical helicopter to St. Louis University hospital where she was hospitalized and released 41 days post-crash. According to her medical records, she sustained a right dorsal foot avulsion and partial amputation with fractures of first, second, and third digits, bilateral acetabular fractures, multiple sacral fractures, 2 right rib fractures with pneumothorax to right lung and 3 left rib fractures with hemothorax to left lung, avulsion fracture to left L2 transverse process, extensive liver lacerations, spleen lacerations, bruising and abrasion to left hip, and an abrasion to right eyebrow. This passenger was seated in the third-row right side aisle seat.

MC15- 23-year-old female passenger was transported from scene by medical helicopter to St. Louis University hospital where she was hospitalized and released 28 days post-crash. According to her medical records, she sustained a comminuted fracture to left nasal bone and right condyle mandibular fracture, small subdural hemorrhage to right posterior parietal lobe, scattered subarachnoid hemorrhages, mild diffuse brain edema, right vertebral artery injury at V2-V3 segments, atlanto-occipital instability, C2-3 lateral mass fracture, liver laceration, fractures to 3 ribs on

right side, right hip fracture, right clavicle fracture avulsion laceration to upper right arm, several open and deep facial lacerations (left lip and left eyelid).

2.5.1 Triage on Scene

In a Mass Casualty Incident, the IC is responsible for managing and directing all aspects of an incident, ensuring the safety of all personnel involved, establishing objectives and priorities, developing an Incident Action Plan, ensuring effective resource utilization, and maintaining effective communication with all parties involved.¹⁰

According to the first arriving first responder, which happened to be the HPVFPD Chief/IC, when he looked into the driver's seating area of the motorcoach, he saw the driver partially seated with his upper torso (head/right shoulder) laying on the floor towards the loading stairwell. The IC said due to the motorcoach driver's positioning and deformation to the loading stairwell, he was not able to physically check the driver for a pulse. The IC stated that he didn't see him breathing and was able to shake his leg and got no response. The IC stated that because of the driver's odd positioning he assumed the driver was deceased. According to the IC, he was just starting his walk-around evaluation and had no time to climb into the motorcoach to physically check the driver's vitals. It was approximately 35 minutes after the IC arrived before paramedics worked their way forward through the wreckage and determined the driver was alive.¹¹ Due to the catastrophic deformation, the motorcoach driver was extricated/lifted out the displaced windshield and taken to the medical helicopter.

2.5.2 Transportation of Injured

The motorcoach driver and three passengers were airlifted from the crash scene by four medical helicopters to three trauma hospitals in St. Louis MO. Eleven ambulances from seven different surrounding fire departments responded to the mutual aid call and transported eight passengers to two local hospitals by ground ambulance as shown in **Tables 4-5**. The six passengers that refused treatment were picked up by another Greyhound motorcoach and taken to the Greyhound terminal in St. Louis to continue their travel.

Table 4. Hospitals that Received Patients with Number of Patients in Parentheses

Barnes-Jewish Hospital (1) Saint Louis, MO. 63110	St. Louis University Hospital (3) St Louis, MO 63104
St. Joseph's Hospital (4) Highland, IL 62249	Anderson Hospital (4) Maryville, IL 62062

¹⁰ <https://www.firehouse.com/home/article/10545444/duties-responsibilities-of-the-incident-commander>

¹¹ Driver was subsequently diagnosed with minor physical injuries.

Table 5. Responding Ambulances and Occupants Transported

Agency	# Ambulance Responded	# Transported
Highland EMS	2	0
RuralMed EMS	2	3
Glen Carbon Fire Department EMS	2	3
Edwardsville Fire Department EMS	2	0
Breese EMS	1	1
Pocahontas-Old Ripley EMS	1	1
Sugar Creek EMS	1	0
Totals	11	8

2.5.3 Madison County Treating Hospitals

There were two hospitals in Madison County, Anderson Hospital and St. Joseph's hospital, that each received four injured patients, and only St. Joseph's hospital enacted their MCI plan.

The St. Joseph's hospital MCI plan defines a Mass Casualty Incident (MCI) by 1) the total number of patients at an incident, 2) the severity of the patients at an incident 3) the requirement of special resources to treat or to gain access such as technical rescue, HazMat response, and or enhanced scene security.

The plan outlines what responsibilities should be completed such as setting-up Incident Command, Triage using the Simple Triage and Rapid Treatment (START) system, a treatment area, staging area for responding units and resources, and a specified area for transport. One of the plans phases of operation specifies that the *Incident command should be established by the first arriving unit. This person will remain in command until relieved by a person of higher rank, training, and or experience. Regardless of who the incident commander is they should not be directly involved in patient care or triage.*

An After-Action Review (AAR) and Improvement Plan (IP) was conducted by St. Joseph's hospital and obtained by NTSB staff. The report found only one area that needed improvement. This one issue involved the need to follow up with on scene personnel in attempt to receive initial triage count for quicker Incident Command response. The report gave the following positive findings:

- SJH had the needed resources in house to be able to treat for the incoming patients.
- All patients were treated effectively and timely. Interfacility transfer was established for beyond facility capabilities.

3.0 2019 Freightliner Truck-tractor in Combination with a 2024 Vanguard Semi-trailer

The Freightliner truck-tractor in combination with a 2024 Vanguard semi-trailer was the first parked combination vehicle struck by the motorcoach. The Vanguard trailer sustained extensive deformation as a result of the impact as shown in **Figure 8**. The combination vehicle was pushed forward into the back of the Kenworth truck-tractor combination and subsequently jackknifed off the shoulder into the grass. As shown in **Figure 9**, the front end of the truck sustained moderate damage and was towed from the scene.



Figure 8. View of damage to Vanguard trailer.



Figure 9. Frontal view of damage to Freightliner.

4.0 2000 Kenworth truck-tractor in combination with a 2007 Benson semi-trailer

The 2000 Kenworth truck-tractor in combination with a 2007 Benson semi-trailer was the second parked combination vehicle struck by the motorcoach. The Benson flatbed trailer sustained minor deformation as a result of the impact as shown in **Figure 10**. The truck-tractor sustained minor sideswipe type damage as shown in **Figure 11**.



Figure 10. Left rear angle view of damage to trailer.



Figure 11. View of damage to left side of Kenworth.

5.0 2023 Mack truck-tractor in combination with a 2019 Great Dane semi-trailer

Not inspected. Driven from crash scene.

6.0 Emergency Response

The Madison County Sheriff's Office (MCSO) dispatchers were notified of the crash through the 911 system at 1:51:28 a.m. by a truck driver that was inside one of the impacted truck-tractors that were parked on the shoulder.¹² The truck driver described being T-boned in the back by a Greyhound motorcoach. The initial dispatch was for a semi vs bus with an injured person complaining of back pain. The MCSO dispatcher toned out¹³ the Highland-Pierron Volunteer Fire Protection District (HPVFPD) at 1:53:23 a.m. and the Chief was enroute at 1:57:13 a.m. The HPVFPD Chief was the first to arrive on scene at 2:04 a.m. and assumed Incident Command (IC).

The first two Illinois State Police (ISP) units were dispatched at 1:56 a.m. with the first Trooper arriving on scene 11 minutes later, followed by other ISP units and the Traffic Crash Reconstruction Unit (TCRU).¹⁴ An event timeline is shown in **Table 6**.

According to the HPVFPD Incident Commander (IC), after completing his 360 size-up of the scene, he declared the scene as a Mass Casualty Incident (MCI). The MCSO's CAD Log has the time listed at 2:13 a.m. During operations and the triage processing of the confirmed deceased and how many triage level red/yellow patients they had, they realized that the current number of ambulances that were already on scene or enroute, would be able to manage the scene but did not cancel the MCI.¹⁵ There were eleven ambulances that responded to the scene that transported eight occupants. Additionally, four medical helicopters (two Air Methods and two Air Evac) transported four injured occupants to St. Louis area Trauma hospitals (three to St. Louis University hospital and one to Barnes-Jewish hospital).

The Highland Fire Department (HFD) set-up their staging area on I-70 along the north shoulder, near the entrance ramp to the Silver Lake rest area. As ambulances were needed, they would be requested to pull up to the triage area set-up in the rest area where the patient was loaded into the ambulance and would depart using the rest area re-entry ramp to Westbound I-70.

¹² Refer to *Survival Factors Attachment - Madison County Sheriff's Call-For-Service Log*.

¹³A "tone-out" in the context of emergency response refers to a specific set of audio tones used by fire departments to alert firefighters to an emergency. These tones are transmitted via fire pagers or communication systems and serve as a unique identifier for each fire station or group of firefighters. <https://worldrescuers.com/fire-tones/>

¹⁴ Refer to *Survival Factors Attachment - Illinois State Police Call-for-Service Log*.

¹⁵ Triage tags contain four colors so treatment and transport crews can see at a glance which patients have been triaged to which level. GREEN - Minor injury (walking wounded), YELLOW - Delayed- can wait, RED - Immediate, BLACK - Deceased.

Table 6. Event Timeline

Dispatch Time	Responding Agency/Dispatch Notes from both HPVFPD, HFD, and ISP	Arrival Time On-scene
1:51 a.m.	Truck driver from one of the impacted trailers calls 911 says he's been struck in the back by a Greyhound bus.	
1:53 a.m.	Highland-Pierron Volunteer Fire Protection District (HPVFPD) toned out.	
1:53 a.m.	HPVFPD- Greyhound bus struck trailer with multiple injuries.	
1:55 a.m.	ISP contacted and told TTST vs Bus with an injured person having back pain and other injuries	
1:56 a.m.	HPVFPD Chief/Incident Commander (IC) dispatched	2:04 a.m.
1:56 a.m.	ISP dispatches Units 115 and 117 to crash. Unit 117 arrives first.	2:07 a.m.
1:56 a.m.	Highland EMS Unit 1541 dispatched	2:06 a.m.
1:57 a.m.	HFD dispatched for mutual aid for semi vs bus	
1:57 a.m.	HPVFPD Engine 4011 dispatched	2:07 a.m.
1:58 a.m.	HPVFPD Chief request more ambulances just in case	
1:59 a.m.	HFD EMS 411 enroute	
2:00 a.m.	HFD Chief dispatched	2:18 a.m.
2:05 a.m.	IC hearing radio traffic request they send 3-4 more ambulances to I-70	
2:06 a.m.	IC requested medical helicopters.	
2:07 a.m.	ISP Unit 89 dispatched	
2:08 a.m.	ISP Unit 115 arrives on-scene.	
2:08 a.m.	Edwardsville FD dispatched.	
2:10 a.m.	ISP advised IDOT that they are shutting down I-70 to land Helos	3:45 a.m.
2:10 a.m.	Glen Carbon Ambulance Unit 1941 dispatched	2:33 a.m.
2:10 a.m.	Glen Carbon Ambulance Unit 1944 dispatched	2:34 a.m.
2:10 a.m.	Edwardsville Fire Department Ambulance Unit 1342 dispatched	2:27 a.m.
2:11 a.m.	HFD EMS Unit 1527 dispatched	2:18 a.m.
2:11 a.m.	Pocahontas - Old Ripley EMS is dispatched	2:27 a.m.
2:11 a.m.	ISP dispatches their Traffic Crash Reconstruction Unit	
2:12 a.m.	Stage HFD Engine 1517 at entrance ramp and bring crew forward	
2:13 a.m.	Arch Air has 2 Helo's enroute. No ETA	
2:13 a.m.	HPVFPD IC declares incident an MCI	

2:13 a.m.	Glen Carbon sending 2 ambulances.	
2:15 a.m.	HPVFPD Unit 4051 dispatched	
2:18 a.m.	Edwardsville Fire Department Ambulance Unit 1344 dispatched	2:51 a.m.
2:21 a.m.	Interstate shut down by firefighters and ISP for Helo's	
2:24 a.m.	ISP's Traffic Crash Reconstruction Unit enroute.	
2:27 a.m.	Air Evac Unit 156 lands and departs scene with 1 patient at 2:51 a.m.	
2:27 a.m.	Pocahontas - Old Ripley Fire Rescue and EMS arrives.	
2:30 a.m.	3 Helicopters on the ground on Interstate 70.	
2:30 a.m.	IC request Madison County Coroner respond to scene.	
2:33 a.m. 2:34 a.m.	Glen Carbon Fire Protection District EMS Unit 1941 arrives on scene followed by EMS Unit 1944 and were in staging area for 7 minutes prior to being requested by Transport Officer to drive up to the crash scene. and Unit 1944 transported 1 patient to Anderson hospital.	
2:44 a.m.	At least 3 triage level Black tagged patients.	
2:47 a.m.	AirEvac Unit 137 is requested for motorcoach driver transport.	
2:49 a.m.	AirEvac 16 minutes ETA	
2:50 a.m.	Arch Air medical helicopter departs scene with 1 seriously injured occupant.	
2:52 a.m.	Edwardsville Unit 1344 starts triaging motorcoach driver after being extricated.	
2:54 a.m.	IC requesting EMA	
2:57 a.m.	Pocahontas - Old Ripley EMS transports 1 patient to Highland - St. Joseph's Hospital.	
3:00 a.m.	Requested Grantfork FD be dispatched for apparatus and manpower to scene.	3:11 a.m.
3:02 a.m.	St. Jacobs Fire department dispatched, sent to staging.	3:23 a.m.
3:03 a.m.	Glen Carbon Unit 1941 transported 2 patients to St. Joseph's Hospital	
3:05 a.m.	3 rd Medical Helicopter has left scene.	
3:09 a.m.	Illinois Department of Transportation (IDOT) on scene.	
3:16 a.m.	ISP calling Greyhound customer service	
3:17 a.m.	Madison County Coroner dispatched.	4:19 a.m.
3:18 a.m.	AirEvac Unit 137 arrives on scene and departs to Barnes-Jewish hospital with injured motorcoach driver at 3:39 a.m..	
3:40 a.m.	Marine Fire department dispatched to scene.	4:00 a.m.
4:07 a.m.	Greyhound sending motorcoach to pick up remaining passengers.	
5:17 a.m.	HFD, HPVFPD, and GFD start extrications of deceased.	
7:46 a.m.	All fire department units cleared from crash scene.	

8:17 a.m.	The last ISP TCRU member departed scene.	
-----------	--	--

The HFD set up a Landing Zone (LZ) on the westbound lanes of I-70 near the rest area re-entry ramp to westbound I-70 for the requested medical helicopters. All four medical helicopters landed and departed at the LZ without incident. The first medical helicopter AirEvac 156 arrived at 2:27 a.m. and departed with a patient at 2:51 a.m. The last medical helicopter AirEvac 137 that transported the motorcoach driver arrived at 3:18 a.m. and departed with patient at 3:39 a.m.

At least 18 local and State service agencies responded to the crash scene.

Responding agencies:

- Illinois State Police and their Traffic Crash Reconstruction Unit
- Highland Fire Department
- Highland EMS
- Highland-Pierron Volunteer Fire Protection District
- Madison County Sheriff’s Office
- Madison County Medical Examiner’s Office
- Illinois Department of Transportation (IDOT)
- Arch Air- sent 2 medical helicopters
- Air Evac - sent 2 medical helicopters
- Grantfork Volunteer Fire Department
- Marine Volunteer Fire Department
- Rural Med Ambulance Service
- Glen Carbon Fire Protection District EMS
- Edwardsville Fire Department EMS
- Breese EMS
- Pocahontas-Old Ripley EMS
- Sugar Creek EMS
- St. Jacob Fire Department

A copy of the responding fire department’s Brief Field Incident Report was obtained, and the information is included in this report.¹⁶

6.1.1 Communications

Illinois has a number of channels that are utilized for state-wide mutual aid. Fire Departments across the state utilized a variety of frequencies (VHF, UHF, and STARCOM) for their day-to-day operations. The MABAS state-wide fireground (6 of them) red, blue, white, gold, black, and gray are designed for communications on the fireground between companies - licensed at low power to prevent dispatch centers

¹⁶ Refer to Survival Factors Attachment - Fire Department Reports

from being on these channels. These are state-wide frequencies that are licensed under MABAS-IL and those agencies that sign the master agreement automatically are authorized to use the frequencies. The Madison County Sheriff's Office dispatch center and MABAS Red fireground were utilized between fire companies and MABAS Blue fireground was utilized for all ground medical transport.

According to the IC, for this crash, they used their own repeater channel called HIPERS (Highland-Peirron Emergency Radio System) to communicate with dispatch. Dispatch stayed on HIPERS throughout the entire incident. After arriving on scene all fire units moved to MABAS red for fire only. The IC stated that he has a radio strap with two radios. One radio stayed on HIPERS and the second radio was on MABAS red. Once the MCI was established all EMS communications was switched to MABAS blue.

IREACH has been designated at the statewide channel to communicate between law enforcement agencies, fire, and air medical. Majority of the state utilizes this channel for communications with incoming air medical regardless of which service is incoming. For this incident, IREACH was utilized to set up LZ's and communicate with the medical helicopter crews. The IC stated that he was in charge of the communication with the medical crews.

7.0 Interviews

Interviews were obtained with the Highland-Pierron Volunteer Fire Protection District Chief and Incident Commander who also was the initial first responder to arrive on-scene, Chief Chris Straub with the Highland Volunteer Fire department, three Highland EMS EMT's/Paramedics, and nine firefighters that responded to the crash scene. Interviews were also conducted with two passengers on the motorcoach. All interviews were recorded, and the full transcripts are in the docket for this investigation.

7.1 Interview Synopsis

7.1.1 First Responder Interviews¹⁷

Below are statements made by first responders.

IC HPVFPD Chief

- I was the first one on scene and did a 360 of the wreck and quickly realized this was a multi-casualty incident.
- Saw a truck driver with extinguisher working on front tire of bus. Never saw a fire just extinguisher dust/smoke.

¹⁷ Refer to *Survival Factors Attachment - First Responder Interview Transcripts*.

- Had initial arriving engine set up a hose line to make sure tire fire was out.
- Saw bus driver slumped over towards stairwell partially on floor. I did shake him, he was laying back far enough, I couldn't really reach for a pulse, and he didn't appear to be breathing, and I just moved on.
- Upon arrival I saw people jumping out the opening.
- Initially requested 2 Helos for transport and later requested 2 more.
- Put HVFD Asst Chief in charge of transportation.
- We set-up staging on I-70 at ramp entrance to rest area.
- Requested mutual aid and declared an MCI to get more ambulances.

Highland Volunteer Fire Department Chief

- Arrived on-scene and talked to Chief/IC and got an overview of incident.
- I stayed with unified command and dealt with the fire units and Chief/IC handled the EMS side.

Highland-Pierron Captain

- I arrived in POV and initially helped with triage.
- I helped lift the bus driver out of the bus.
- I assisted with the extrication of the deceased that was stuck under a seat on the driver side about ¾ of the way back.

Highland-Pierron Firefighter on Engine 4011

- On arrival the Chief instructed us to pull out a water line and make sure the tire fire was out.
- I ended up going into bus on driver side in the last window.
- I initially didn't see anyone and as I walked forward, I saw a deceased that was headfirst under a seat with their legs sticking up.
- Saw another passenger in aisle with debris on top of her that was still alive.

Highland Volunteer Fire Department Lt. on Engine 1517

- I helped set-up the Landing Zone on the Interstate.
- I helped the medics on the passenger side doing triage.
- Saw a deceased passenger seated in first row behind the torn-out seats. They were wearing seatbelt.
- I helped remove bus driver.

Highland Volunteer Fire Department Captain

- Helped remove bus driver.
- Helped a female with head trauma onto Helo.

Highland-Pierron Fire Protection District Captain on Engine 4010

- We arrived behind 4011 an HP Engine.
- Was instructed to go to back window with ladder and help Jessica get in.
- Helped one man be removed out the rear window on driver side.

- Did a second assessment on bus driver and found that he was still breathing.
- We cut out one seat row in order to remove deceased on driver side.
- Took deceased out opening on right side.

Highland-Pierron Fire Protection District Firefighter

- Arrived on first engine on scene.
- Chief instructed me to charge a line and check on the tire fire.
- Went to rear window on driver side that was already open and put-up ladder.
- Moved ladder to a window towards front that was open and propped it open because there was no latch to keep it open. It was very heavy.
- Helped older man with head wound and fractured right arm out back window.

Highland EMS EMT

- We responded as a precaution when we heard the Chief say there was at least one triage level Black tagged patient.¹⁸
- Helped a pregnant woman with an avulsed head wound.
- A Hispanic man said his shoulder and chest hurt from wearing his seat belt.

Highland EMS EMT

- Troy took control as IC for Transport.
- Started triage and had 6 refusals.

Highland EMS Paramedic

- On way out to crash I called St. Joes and told them what we had.
- Started calling Helos.
- I was in charge of Transport.

7.1.2 Passenger Interviews¹⁹

The following are statements were made by the two passengers interviewed by NTSB Staff.

53-year-old female seated in Row 2 left side

- Started Boarding in Indianapolis around 11:05 p.m.
- She originally sat down in Row 5 behind the driver in the window seat, but a lady came on and said she was in her assigned seat. She then moved to her assigned seat (3D) and a lady was seated there so she ended up sitting in 2A on driver side.

¹⁸ Triage system involves a color-coding scheme depending on injury level using red, yellow, green, white, and black tags. Black Tag - (expectant) are used for the deceased and for those whose injuries are so extensive that they will not be able to survive given the care that is available.

¹⁹ Refer to *Survival Factors Attachment - Passenger Interview Transcripts*.

- The driver said that there was a lot of construction and a lot of traffic, so if any of us had any questions, he wanted us to talk to him right then, because he didn't want us to bug him while he was driving.
- She laid on the seat with her feet towards the window and her head on the aisle armrest.
- The driver kept hitting those bumps on the side of the road. (rumble strips)
- The passenger recalled that at one point, the driver was driving down the middle of the road, in between the two lanes like with the center strip going down the middle part.
- She fell asleep and the next thing she recalls is waking up on the floor in between the two seats.
- With someone helping her, she climbed out the big opening.

38-year-old male seated in Row 6 on the left side in aisle seat

- According to this passenger, he was sleeping and looked up, and the driver wasn't trying to correct the path of the bus whatsoever, not turning the steering wheel. And then, he heard the other tires, hit those rumble strips and he looked up and I saw the tractor trailer, the back of it, a white one, coming towards us. And he immediately knew they were going to hit.
- He remained in his original seat.
- He did not recall the driver giving any kind of safety pre-trip briefing at all.
- Driver hit those rumble strips off and on during the trip.
- He exited the bus out the huge, gaping hole right next to him and then came back in the bus and helped people out.

E. DOCKET MATERIAL

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

LIST OF ATTACHMENTS

Survival Factors Attachment - Madison County Sheriff's Call-For-Service Log
 Survival Factors Attachment - Illinois State Police Call-For-Service Log
 Survival Factors Attachment - Fire Department Reports
 Survival Factors Attachment - First Responder Interview Transcripts
 Survival Factors Attachment - Passenger Interview Transcripts

Submitted by:

Ronald Kaminski
 Senior Survival Factors Investigator