



**SURVIVAL FACTORS GROUP CHAIRMAN'S
FACTUAL REPORT**

Flushing, NY

HWY17MH015

(20 pages)

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

**SURVIVAL FACTORS GROUP CHAIRMAN'S
FACTUAL REPORT**

A. CRASH INFORMATION

Location: Intersection of Northern Boulevard and Main Street, Flushing, NY
Vehicle #1: 2015 Motor Coach Industries Motorcoach
Operator #1: Dahlia Group Inc., of Flushing, NY
Vehicle #2: 2015 New Flyer Transit Bus
Operator #2: New York City Transit
Vehicle #3: 2009 Honda Odyssey
Operator #3: Parked at curb, not running; unoccupied
Vehicle #4: 2002 Toyota Sequoia
Operator #4: Parked at curb, not running; occupied by two passengers (one in the driver's seat and one in the right-front passenger seat)
Date: Monday, September 18, 2017
Time: 6:16 a.m. Eastern Daylight Time (EDT)
NTSB #: **HWY17MH015**

B. SURVIVAL FACTORS GROUP

Thomas Barth, Survival Factors Investigator, Group Chairman
NTSB Denver Regional Office, 4760 Oakland St. Suite 500, Denver, CO 80239

Sheryl Harley, Witness Group Investigator
NTSB 490 L' Enfant Plaza SW, Washington, DC 20594

Troy Lloyd, Accident Investigator, Federal Transit Administration
1200 New Jersey Ave, NE, Washington, DC 20590

Ramon Paez, New York City Transit Metro Transit Authority (MTA), 2 Broadway, New York, NY 10004,

Kerry Legg, Vehicle Safety and Regulatory Compliance Manager
New Flyer Industries Canada ULC, 711 Kernaghan Ave, Winnipeg, MB, R2C 3T4 Canada

George Brown, Technical Solutions Manager, Motor Coach Industries
1700 East Golf Road, Suite 300, Schaumburg, Illinois 60173

C. CRASH SUMMARY

The crash involved an MCI motorcoach occupied by the driver that traveled through an intersection and struck a New Flyer transit bus occupied by a driver and 16 passengers. The transit bus struck 2 parked vehicles, one of which had 2 occupants, and struck 3 pedestrians and then a restaurant.

For a summary of the crash, refer to the Crash Summary Report in the docket for this investigation.

D. DETAILS OF THE SURVIVAL FACTORS INVESTIGATION

The Survival Factors Group investigation collected evidence pertaining to the vehicles, the occupants, and the emergency response.

1. MCI Motorcoach

The motorcoach was inspected at the College Point Automotive Pound, located at 31-22 College Point Blvd, Flushing NY.

The motorcoach was a 2015 MCI J4500 with a Vehicle Identification Number (VIN) of VIN# 2MG35M1A0FXXXXXX.¹

1.1. Exterior

The motorcoach was severely damaged at the front end, with the entire front portion of the motorcoach forward of the front tires destroyed. The middle area of the coach (just above the wheels) was crushed aft with the dashboard structure pushed aft to the aft loading door frame and the first passenger windows. The forward door frame was crushed aft such that the lower portion and stairwell were partially intact, the middle and upper portion were in contact with the aft door frame, and there was no space to enter the motorcoach. There were large areas with blood and tissue residue at the exterior right front corner of the motorcoach and in the stairwell. The center section of the front structure was crushed aft to the position of the spare tire, which was also displaced some distance aft. The windshield and driver window were destroyed, and the vertical support structure aft of the driver window cut away by responders.

The first and second passenger windows on the driver side, and the first passenger window on the passenger side were broken from impact. The first passenger windows on both sides had deformed window frames and the outer class missing and the inner glass shattered. The 4th and

¹ The last 6 digits of the VIN were replaced with X.

6th window frames on the driver side were also broken, with the 4th window, both inner and outer panes broken out (and used as an access point for responders). Figure 1 provides a view of the right front portion of the motorcoach, illustrating the damage to the front and to the loading door. Figure 2 provides a view of the left front and left side of the motorcoach, illustrating damage to the front and to the windows along the left side.



Figure 1: Right Front View of the Motorcoach Figure 2: Left Front View of the Motorcoach

Aft of the loading door and driver area, the motorcoach sustained little damage, except for the locations which had been accessed by first responders, including the engine cover at the back, windows on the sides, and the left side sidewall. Refer to the Vehicle Group Chairman's Factual Report for further information.

1.2. Interior

The motorcoach had 15 Rows of seats on the left (driver's) side and 13 Rows of seats on the right (passenger) side. There was no rear ADA/wheelchair access door. There were 7 Rows of windows on each side of the motorcoach (excluding the operator's window). Window numbers 3 to 6 were emergency exit windows, all were clearly marked and all placards were in place. Window numbers 2 to 6 were 64 inches in length along the bottom rail measured from the frame edge to frame edge, and these windows were 35 inches in height, top to bottom. Window number 7 on both sides was 48 inches in length across the bottom and 35 inches in height.

Window number 1 on both sides had sustained damage which deformed the window frames. They were roughly 64 inches in length and at the rearward most point and 35 inches in height. The loading door frame was displaced aft. The seatbacks of the front row passenger side seats were used as a reference point, as the outboard seat did not appear to be significantly deformed. The backrest of the inboard passenger side seat was deformed aft (as if reclined) about 5 inches as measured from the top, and was at an angle of about 10 degrees from vertical. The manual locking handle of the loading door was 26 inches forward of the center of the seatback. The front pillar of the loading door was displaced inward and aft, and was in a location 24 inches from the seatback. The windshield frame beam was displaced aft, and was measured to be 28 inches forward of the seatback. The passenger side privacy panel was displaced aft and was measured to be 17 inches forward of the front seatback at the outboard edge of the outboard seat;

it was 25 inches forward of the seatback at the location between the passenger seats, and it was 26 inches forward of the inboard edge of the inboard passenger seatback.

The frontal impact crushed the front of the motorcoach and the entire driver seat was displaced rearward and separated from the floor at the interface to the adjustable seat rails. The driver seat impacted the privacy divider. Both the driver seat and the driver side privacy divider were found approximately in the middle of the passenger cabin of the motorcoach. The front row seat on the driver side was positioned by design with an offset about 11 inches aft of the passenger side. Figure 3 provides a view of the driver seat area of an exemplar motorcoach. Figure 4 provides a view of the driver seat area of the accident motorcoach. The steering wheel hub is visible just forward of the front row of left side passenger seats. The driver seat and left side privacy panel are missing from the view, as noted above. Figure 4 also shows the inboard portion of the right side privacy panel, which is in contact with the front row of right side passenger seats.



Figure 3: Driver Area of Exemplar Motorcoach Figure 4: Driver Area of Accident Motorcoach

Figure 5 shows the driver seat after removal from the interior of the motorcoach. The backrest was deformed aft. Inspection of the driver seatbelt indicated no evidence that it was worn at the time of the crash. Figure 6 shows a view of the steering wheel, which was cut from the steering column by responders. The wheel was crushed as shown in Figure 6.



Figure 5 Driver Seat

Figure 6 Steering Wheel

The entrance handle mounted on the dashboard at the center of the motorcoach (at the top of the loading stairs) was displaced aft to a location in line with the center of the aisle, and 3 inches aft of the front edge of the passenger side seat cushions. There was a support pole at the

center of the motorcoach, and the top was 5 inches forward of the front corner of the driver side front edge of the driver seats. The floor mounted pole mounting bolts were intact, but the pole was displaced to an angle of about 20 degrees aft. The floor bolts were 14 inches forward of the front edge of the driver side seats. There was blood at the trim panels around the dash in front of the driver, and on the steering column, and at the inboard front row driver side seat and on the floor in front of the front row seats. The front edge of the outboard driver side seat cushion was displaced aft at the center with impact marks on the seat frame. The outboard wall mount was displaced with the forward mounting bolt pulled out, the aft location sidewall mount and the floor mounts were intact. The left (driver) side seats in rows 11, 12 and 13 were removed by fire department. The other seats were intact. The first and second passenger windows on the left side were broken, apparently from the collision, the third window was intact, the fourth had the both the exterior and interior panes broken out, the fifth window had the exterior pane shattered with the interior pane intact, the sixth had been cut and removed by fire department, and the seventh window on the left side was intact. The right (passenger) side seats were intact. The first passenger window on the right side (aft of the loading door) was broken with the frame bent and deformed in crash. The second through sixth right side passenger windows were intact, and the seventh had a hole cut by first responders.

2. New Flyer Transit Bus

The transit bus was inspected on September 20-21, 2017 at the East Chester MTA Bus Depot, located at 3320 Tillotson Ave, Queens NY, 10475. The bus was a New Flyer Xelsior Diesel (XD) 40 foot, or XD40. It was frame number 37692 and had DOT number 7430 and Sales Release number SR1953, and was completed in October 2015. It had VIN# 5FYD8FV01BXXXXXX and a GVWR of 42,540 pounds.² Technical assistance was provided by the New Flyer Industries Vehicle Safety & Regulatory Compliance Manager.

Under the Federal Motor Vehicle Safety Regulations (FMVSRs) Title 49 Code of Federal Regulations, Part §390.3(f)(2), the transit bus was exempt and not required to meet standards addressing occupant protection (FMVSS 201 Occupant Protection in interior Impact and FMVSS 202 Head Restraints), or crash protection for the occupant compartment (FMVSS 208 Occupant Crash protection- Driver only).

2.1. Exterior

The front of the transit bus exhibit little damage other than a broken but intact right side windshield pane as shown in Figure 7. The right side of the bus, forward of the rear axle, was not damaged. The rear of the bus aft of the rear axle was crushed forward, with the aft windows on broken but with the glass remaining in place. The deformation at the rear from the impact was more severe on the lower half of the bus. The aft side panels were partially dislodged and damaged, as shown in Figure 8.

² The last 6 digits of the VIN were replaced with X.



Figure 7: Right Front of the Transit Bus



Figure 8: Right-Rear of the Transit Bus

The forward half of the left side of the transit bus was not damaged, as shown in Figure 9. The rear half had damage to the windows and extensive damage aft of the passenger windows. The side panels extending from the roof to the bottom of the bus were damaged or displaced, as also shown in Figure 9.



Figure 9: Left Side View of the Transit Bus

There was a driver window followed by six passenger windows on the left (driver) side of the bus. The first through third windows were intact. The fourth window glass was broken but remained. The entire fifth window was missing, and the frame was displaced and there was extensive damage to sidewall. The sixth window had the lower portion of the window smashed and bowed inward, and the upper portion of the window was missing. There was extensive deformation and intrusion at this location, which was at the point of impact with motorcoach.

2.2. Interior

The transit bus had the driver seat and a loading area across from it at the front, and another loading stairway in the middle of the bus on the right side. Aft of the driver seat was an electronics cabinet, and across from it was an empty space above the right front wheel well, which was labeled for no seating or luggage. The engine compartment was at the back. The

interior layout is shown in figure 10, with passenger seat positions numbered and arrows depicting the direction of the groups of seats.

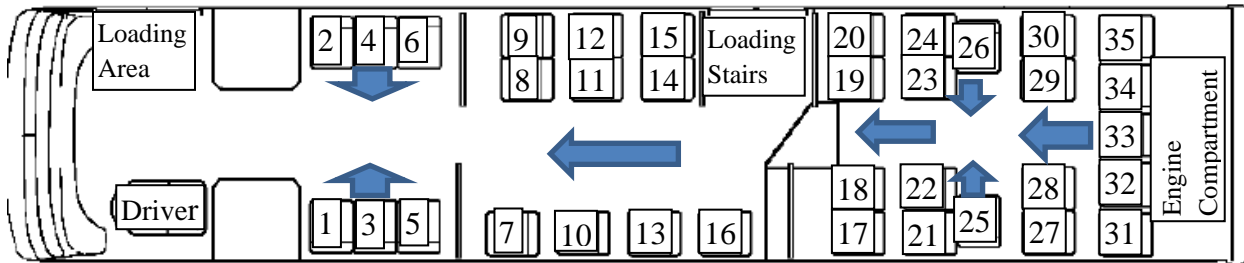


Figure 10: Transit Bus Interior Layout

The driver seat compartment was not damaged. The driver seat was a suspended seat with a two point lapbelt. The lapbelt was found buckled in place, as shown in figure 11. Behind the driver's compartment was an electronics cabinet, which contained equipment for the video camera system and other electronics, as shown in figure 12 with the door of the cabinet open.

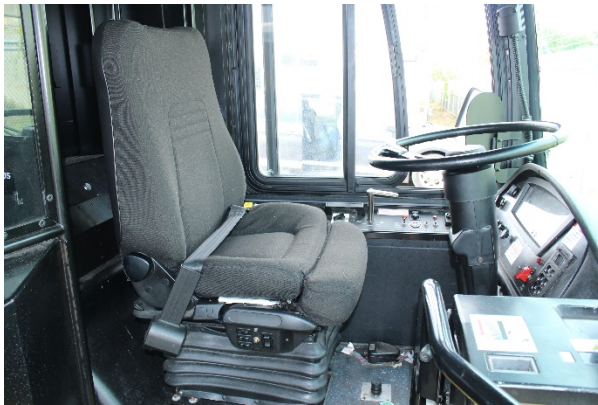


Figure 11: Transit Bus Driver Seat Area



Figure 12: Transit Bus Electronics Cabinet

The transit bus interior seating arrangement is shown in Figures 13 and 14. Figure 13 is a view from the front looking back, and Figure 14 is a view from the back looking forward. Behind the electronics cabinet were three inward facing seats. There were barriers separating the inward facing triple seat assemblies from the seats further aft. The triple seat assemblies are labeled 1,3,5 (left side) and 2,4,6 (right side) in Figure 10. These seats fold up to allow for wheel chair access, and wheel chair tie down straps are mounted to the floor and the barriers in this area. There were also barriers separating the loading stairways and elevated seating area. The last row of seats was comprised of five forward facing seats. The three center seats were one assembly which was hinged at the top of the seatbacks, which allowed the front of the seats to be lifted upward giving access to the engine compartment from the interior of the bus.



Figure 13: Transit Bus Interior, Looking Aft Figure 14: Transit Bus Interior, Looking Forward

2.2.1. Damage Description, Left (Driver) Side

The seats near the front, which included the set of three inward facing seats (1,3,5) and all four single-place forward facing seats (7, 10, 13, 16) were undamaged. The first elevated double seat on the left side (seat positions 17, 18) was intact, and the yellow metal support bar was shifted forward and upward so that bar was raised slightly out of center metal securement collar. There was a small amount of gray hair found on rear seatback. The second elevated row of double seats (21, 22) were intact, but the sidewall of the bus was deformed and bowed outward adjacent to the window seat.

Aft of the first two sets of elevated double seats on the left side was a single elevated inward facing seat (25), followed by another set of forward facing double seats (27, 28), and finally then the most aft row of seats (31-35). There was also a floor access panel in between the two inward facing single seats. The yellow metal support bar next to the single seat in this area was shifted upward and displaced from the metal securement collar attached to the seat frame. The set of double seats with seat positions 27 and 28 was undamaged but shifted forward due to deformation of floor in this region. The yellow metal support pole was shifted backward adjacent to upper securement point at ceiling level.

The last row of 5 seats had the driver side window seat frame fractured from being shifted to the right and slightly upward, due to the left rear corner of bus intruding into occupant space at this location. The set of 3 seats in the center (32, 33, 34) was found in the raised position, and contained biological material (blood) located on the under sides of the seats. The access panel to engine compartment was partially open and torn away, with the metal deformed and bolts fractured. The inspection panel in the floor was missing the cover. Figures 15 and 16 provide views of the seats and floor at the rear of the bus.



Figure 15: Rear Seat Row of the Transit Bus Figure 16: Floor and Rear Seats of the Transit Bus

2.2.2. Right (Passenger) Side

The three inward facing seats in the front portion of bus (seat positions 2, 4, 6) were undamaged. The next three sets of double forward facing seats (8, 9, and 11, 12, and 14, 15) were undamaged. The first elevated double seat (19, 20) located aft of the middle loading stairway was intact, but the yellow metal support bar was shifted forward. The second set of double seats on the right side (23, 24) was intact and undamaged. The single inward facing seat (26) was also intact and undamaged. The last row of double forward facing seats on the right side (29, 30) were intact but the inboard side of the aisle seat was cracked between the seatpan and seatback. There was a blood stain in this area. The yellow metal support bar at this seat location was cut by first responders during rescue efforts. It was cut at the seat and at the ceiling level. The seat at position 35 was undamaged.

2.2.3. Exits

The loading doors and the front and middle right side of the bus were not damaged and functional. The condition of the window glass was described in section 2.1. There were 6 passenger windows on the left (driver) side. The first was fixed and was next to the electronics cabinet. The second, and fourth were emergency exits and were clearly marked, placarded and functional. There were 5 passenger windows on the right side. The first was not an emergency exit. The second and third were emergency exits and were clearly marked, placarded, and functional. The last two passenger windows on both sides (5 and 6 on the left and 4 and 5 on the right) were not emergency exits and were placarded with “NEAREST EMERGENCY EXIT LOCATED AT REAR DOOR”.

3. Occupant Information

The crash involved 22 people from 4 vehicles and the street. Table 1 summarizes the injury severity for those involved and Table 2 provides information about the location of those involved. There were 3 passengers who were on the bus that left the scene and are listed as unknown.

Table 1. Injury Table

Injuries ³	Drivers	Passengers or Pedestrians	Total
Unknown	0	4	4
Minor	1	8	9
Serious	0	7	7
Fatal	1	2	3
Total	2	21	23

Table 2. Location of People Involved

Vehicle or Location	Driver	Passengers or occupant	Pedestrian	Total
MCI Motorcoach	Fatal 1	None	NA	Fatal 1
New Flyer MTA transit bus	Minor 1	Unknown 4 Minor 5 Serious 6 Fatal 1	NA	Unknown 4 Minor 6 Serious 6 Fatal 1
Honda	None	None	NA	None
Toyota Sequoia	(occupant not driving)	Minor 2	NA	Minor 2
Street	NA	NA	Minor 1 Serious 1 Fatal 1	Minor 1 Serious 1 Fatal 1
				Unknown 4 Minor 9 Serious 7 Fatal 3 Total (23)

3.1. MCI Motorcoach Occupants

The motorcoach was occupied by the driver, a 49 year old male who was transported to Elmhurst General Hospital. The EMS notes indicated He arrived at 7:27 a.m. and he was intubated at the emergency department. Cardiac resuscitation was unsuccessful and he was

³ Title 49 CFR 830.2 defines a fatal injury as: any injury that results in death within 30 days of the accident. A serious injury as: an injury which requires hospitalization for more than 48 hours commencing within seven days from the date the injury was received; results in a fracture of any bone (except simple fractures of the fingers, toes, or nose); causes severe hemorrhages, nerve, muscle, or tendon damage; involves any internal organ; or involves second or third degree burns, or any burns affecting more than 5 percent of the body surface.

pronounced deceased at 7:56 a.m. The medical records noted a pelvic fracture and a right hand fracture.

The autopsy report, Medical Examiner (ME) case Q17-020785 listed his height as 5 feet 6 inches and weight at 119 pounds. A toxicology test was performed and was negative.⁴ Final diagnoses was summarized as follows: blunt force trauma to the head and neck with abrasions and lacerations, subgaleal and subdural hemorrhages, neck and muscle hemorrhages, separation of the cervical spine, softening of spinal cord; blunt force trauma to the torso with abrasions lacerations, fractures of the sternum and thoracic spine (T4), softening of the spinal cord; blunt force trauma to extremities with abrasions, lacerations, and contusions, fractures of femurs and right tibia and fibula. The cause of death was listed as blunt force trauma.

3.2. New Flyer Transit Bus Occupants

The transit bus was occupied by the driver and 16 passengers, as evident obtained by review of data obtained from the on-board video camera system.⁵

3.2.1. Transit Bus Seating Positions

The transit bus seats that were occupied, as well as the gender of the occupants were established from the video evidence as described below. The identity of all the occupants relative to their seat position was not established. Table 3 provides a summary of the occupants and the injury severity for those who's seat position was established.

Table 3: Transit Bus Seat Position with Gender, Age, and Injury Severity

<u>Position</u>	<u>Gender / Age</u>	<u>Injury Severity</u>
Driver:	Male, 45 years old	Minor Injuries
Seat 1:	Female, 55 years old	Serious Injuries
Seat 4:	Male	[identity not established]
Seat 6:	Male	[identity not established]
Seat 7:	Male	[identity not established]
Seat 8:	Male	[identity not established]
Seat 9:	Male	[identity not established]
Seat 10:	Male	[identity not established]
Seat 12:	Male	[identity not established]
Seat 14:	Male, 56 years old	Serious Injuries
Seat 16:	Male	[identity not established]
Seat 17:	Male	[identity not established]
Seat 20:	Male, 43 years old	Minor Injuries
Seat 22:	Male, 55 years old	Fatal Injuries
Seat 23:	Male	[identity not established]
Seat 30:	Male, 25 years old	Serious Injuries
Seat 31:	Male, 50 years old	Serious Injuries

⁴ Refer to the Human Factors Group Chairman Factual Report.

⁵ Refer to the Recorders Group Chairman Factual Report.

3.2.2. Transit Bus Occupant Injury Descriptions for Known Seat Positions

The Driver of the transit bus was a 45 year old male who suffered minor injuries. He was transported to Elmhurst General Hospital by EMS vehicle 52F2. The EMS notes indicated that the patient was found sitting on the ground near a light pole, and that he said he had crawled out of the bus and called 911. His medical records indicated that he was admitted at 7:31 a.m. and discharged at 10:45 a.m. His height was recorded as 5 feet 6 inches and his weight was 220 pounds. He denied loss of consciousness. He was treated for right shoulder pain.

Seat position number 1 was occupied by a 55 year old female who suffered serious injuries. She was transported to Flushing Hospital. The medical records noted that she arrived via Flushing Ambulance at 8:22 a.m., and listed her height at 5 feet 2 inches and weight at 104 pounds. A hand filled out PCR noting agency ID 0502 and vehicle 52G1 was also included with times cited as: call was received at 6:18 a.m., dispatched and enroute at 6:18 a.m., on scene at 6:19 a.m., patient contact at 6:20 a.m., left scene at 6:36 a.m., at destination 6:38 a.m. Her injuries included closed fracture of multiple ribs on the left side with no head trauma or loss of consciousness. This included a displaced fracture of the 4th left rib and non-displaced fractures of the 3rd, 5th and 6th left ribs.

Seat position number 4 was occupied by a male who's identity was not established.
Seat position number 6 was occupied by a male who's identity was not established.
Seat position number 7 was occupied by a male who's identity was not established.
Seat position number 8 was occupied by a male who's identity was not established.
Seat position number 9 was occupied by a male who's identity was not established.
Seat position number 10 was occupied by a male who's identity was not established.
Seat position number 12 was occupied by a male who's identity was not established.

Seat Position number 14 was occupied by a 56 year old male who suffered serious injuries. He was transported to Presbyterian Hospital and arrived at 6:45 a.m. The medical records indicated that his height was 5 feet 8 inches and his weight was 132 pounds. His injuries included intracranial injury with LOC, multiple closed left rib fractures (nondisplaced 9th and displaced 10th, 11th, 12th), pleural effusion, closed fracture of the L2, L3 vertebrae, laceration of the scalp.

Seat position number 16 was occupied by a male who's identity was not established.
Seat position number 17 was occupied by a male who's identity was not established.

Seat Position number 20 was occupied by a 43 year old male who suffered minor injuries. He was transported to Elmhurst General Hospital. The medical records indicated that he arrived at 7:47 a.m. and was discharged at 3:38 p.m. His height was recorded as 6 feet 1 inch and his weight was 176.5 pounds. The notes indicated that the patient was standing on the bus and during the crash fell down and hit his head. He denied loss of consciousness. He suffered scattered superficial cuts to his right forehead, right chin, and a right inner lip laceration of 3 centimeters in length, and a right supraorbital laceration of 1 centimeter.

Seat Position number 22 was occupied by a 55 year old male who suffered fatal injuries. He was transported to Presbyterian Hospital. The medical records indicated that the EMS was

notified at 6:53 a.m., arrived on-scene at 6:56 a.m., arrived at hospital at 7:00 a.m., and was pronounced deceased at 7:13 a.m. His medical records described his injuries as cardiac arrest, a fracture of the right lower leg, intra-abdominal injuries, a laceration of the right eyelid and periocular area, abrasions of the left and right upper arms. The autopsy report, ME case Q17-020773 listed his height at 6 feet 1 inches and weight at 208 pounds. The final diagnoses is summarized as follows: blunt force trauma to the head with abrasions and lacerations of skin, fractures of the nasal bone and right orbital plate, subscapular contusion, subdural and subarachnoid hemorrhages; blunt force trauma to the neck with abrasions of skin, cervical spinal fracture and dislocation, spinal cord injury; blunt force trauma to torso with abrasions and contusions of skin, fractures of the right first and eleventh ribs and the left seventh rib, lacerations of liver, dislocation of ninth and tenth thoracic vertebrae, right hemothorax; blunt force trauma to extremities with abrasions, lacerations, and contusions of skin. The cause of death was listed as blunt force trauma to head, neck, torso, and extremities.

Seat position number 23 was occupied by a male who's identity was not established.

Seat Position number 30 was occupied by a 25 year old male who suffered serious injuries. He was transported to Presbyterian Hospital. The medical records indicated his height was 5 feet 6 inches and his weight was 203 pounds. The PCR was included which listed the agency name as FHMC, vehicle unit 52A1, and the following response times: call received/dispatched/enroute at 6:26 a.m., on scene 6:32 a.m., patient contact at 6:34 a.m., left scene 6:42 a.m., at destination 6:50 a.m. His injuries included traumatic subdural hemorrhage without LOC, multiple left side rib fractures (4th through 10th), displaced fracture of the 1st cervical vertebra, closed fractures of the 4th and 5th lumbar vertebrae, closed fracture of the T5 and T6 vertebrae, closed left side zygomatic fracture, closed left side maxillary fracture, laceration of the scalp, small left pleural effusion, very small left pneumothorax.

Seat Position number 31 was occupied by a 50 year old male who suffered serious injuries. He was transported to Presbyterian Hospital. The medical records noted that he arrived via Presbyterian Ambulance, and listed his height at 5 feet 11 inches and weight at 251 pounds. The PCR was included and noted that the EMS call was dispatched/enroute/on scene at 6:19 a.m., patient contact at 6:47 a.m. The notes on the PCR indicated he was found unresponsive and pinned in the rear of the bus. His medical records described his injuries as a subarachnoid hemorrhage with loss of consciousness, a pneumothorax, a laceration of the liver, a minor fracture of the vault of the skull (closed), Traumatic Brain Injury (TBI), a laceration of the left kidney, multiple fractures of the bilateral ribs, a displaced fracture of the coracoid process, a left shoulder fracture of the base of the skull, a fracture of the left radius, lacerations of the right wrist and hand, and acute respiratory failure

3.2.3. Transit Bus Occupant Injury Descriptions for Unknown Seat Positions

The following were occupants of the transit bus, but their seat position on the bus was not established. There was no information found on 4 passengers who left the scene of the crash.

The 43 year old male was an occupant of the transit bus in an unknown seat position and suffered serious injuries. The medical records noted that he arrived via FDNY Ambulance at 8:09 a.m., and listed his height at 5 feet 3 inches and weight at 154 pounds. PCR noting agency

ID 0502 and vehicle 52G1 was also included with times cited as: call was received at 6:18 a.m., dispatched at 6:18 a.m., enroute at 6:18 a.m., on scene at 6:19 a.m., patient contact at 6:20 a.m., left scene at 6:36 a.m., at destination 6:38 a.m. His injuries included closed fractures of multiple left ribs (1st, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th), small left pneumothorax, small left pleural effusion, possible pulmonary contusion, acute fractures of the left-side transverse processes of the lumbar spine (L1, L2, L3, L4), focal hematoma along the superolateral aspect of the left gluteus maximus at the level of the left iliac crest, small left adrenal gland nodule, forehead abrasion.

The 40 year old male was an occupant of the transit bus in an unknown seat position and suffered serious injuries. He was transported to Presbyterian Hospital and the medical records noted that he arrived via Ambulance at 6:40 a.m. He was discharged from the hospital on November 17, 2017. His injuries included a comminuted and displaced fracture of the left distal femur, a laceration of the left forehead (5 cm), and a nondisplaced left frontal calvarial (skull) fracture.

The 39 year old male was an occupant of the transit bus in an unknown seat position and suffered minor injuries. The medical records noted that he arrived via FDNY Ambulance at 8:05 a.m., and listed his height at 5 feet 6 inches and weight at 165 pounds. The PCR from unit 46E2 was included and noted that the EMS call was received at 6:17 a.m., dispatched at 6:32 a.m., enroute at 6:35 a.m., on scene at 6:47 a.m., patient contact at 6:50 a.m. His injuries included an abrasion/laceration of the right scalp and right shoulder pain, and no loss of consciousness.

The 45 year old male was an occupant of the transit bus in an unknown seat position and suffered minor injuries. The medical records noted that he arrived via FDNY Ambulance at 8:05 a.m., and listed his height at 5 feet 8 inches and weight at 173 pounds. The PCR from unit 46E2 was included and noted that the EMS call was received at 6:17 a.m., dispatched at 6:32 a.m., enroute at 6:35 a.m., on scene at 6:47 a.m., patient contact at 6:50 a.m. His injuries included a soft tissue hematoma on the left frontal parietal, right shoulder pain and right knee pain with no deformities or abrasions, and no loss of consciousness.

The 51 year old male was an occupant of the transit bus in an unknown seat position and suffered minor injuries. The medical records noted that he arrived via Flushing Ambulance at 8:08 a.m., and listed his height at 5 feet 8 inches and weight at 230 pounds. The PCR from unit 46E2 was included and noted that the EMS call was received at 6:17 a.m., dispatched at 6:32 a.m., enroute at 6:35 a.m., on scene at 6:47 a.m., patient contact at 6:50 a.m. His injuries included pain to the left side of the head, bilateral knee pain with no deformities or abrasions, headache, no loss of consciousness. A head CT revealed a 1.4 cm hyperdensity, most likely a hemorrhagic contusion to the right posterior lobe, and left frontal temporal subcutaneous soft tissue swelling.

The 64 year old male was an occupant of the transit bus in an unknown seat position and suffered minor injuries. The medical records noted that he arrived via FDNY Ambulance at 8:05 a.m., and listed his height at 5 feet 5 inches and weight at 120 pounds. His injuries included a left facial premaxillary subcutaneous soft tissue swelling, neck pain, left shoulder pain, left upper back pain, no loss of consciousness.

3.2.4. Toyota Sequoia Occupant Injury Descriptions

The 55 year old male was seated in the front driver seat of the Toyota Sequoia that was parked. He suffered minor injuries. The medical records noted that his means of arrival was “other” at 8:16 a.m. His height was listed at 5 feet 5 inches and weight at 150 pounds. The computer generated PCR from NY Presbyterian EMS, unit 5202 was included and noted that the EMS call was received at 6:17 a.m., dispatched at 6:53 a.m., enroute at 6:53 a.m., on scene at 6:54 a.m., patient contact at 7:12 a.m.. The notes on the PCR indicated that the patient was assessed and then care was transferred to C532 and FDNY MERV. His injuries included mild head and neck pain, bilateral shoulder pain, and no loss of consciousness.

The 61 year old female was seated and indicated she was belted in the front passenger seat of the Toyota Sequoia that was parked. She suffered minor injuries. The medical records noted that she arrived via Flushing Ambulance at 8:20 a.m., and listed her height at 5 feet 5 inches and weight at 145 pounds. The computer generated PCR from NY Presbyterian EMS, unit 5202 was included and noted that the EMS call was received at 6:17 a.m., dispatched at 6:53 a.m., enroute at 6:53 a.m., on scene at 6:54 a.m., patient contact at 7:12 a.m.. The notes on this (computer generated) PCR indicated that the patient was assessed and then care was transferred to C532 and FDNY MERV. A hand filled out PCR was also included in the medical records. It noted the agency ID 0502 and vehicle 52G1 with times cited as: call was received at 6:18 a.m., dispatched at 6:18 a.m., enroute at 6:18 a.m., on scene at 6:19 a.m., patient contact at 6:20 a.m., left scene at 6:36 a.m., at destination 6:38 a.m. Her injuries included headache, neck pain, bilateral shoulder pain, and no loss of consciousness.

3.2.5. Pedestrian Injury Descriptions

The 67 year old male was a pedestrian struck by one of the vehicles in the collision. He was fatally injured. The autopsy report, ME case Q17-020792 listed his height as 5 feet 8 inches and weight at 155 pounds. A toxicology test was performed and was negative.⁶ Final diagnoses is summarized as follows: blunt impact to the head and neck with multiple abrasions and lacerations of the face and neck, left frontal scapular contusion/hemorrhage, complete upper cervical dislocation (C1-C2) with cervical cord amputation and slight subarachnoid hemorrhage of the base of the brain and upper cervical spinal cord; blunt impact to the torso with multiple abrasions, multiple skeletal fractures – right ribs 1-10 multifocal and anterior pelvis, lacerations of the right hemidiaphragm and liver with right hemothorax; blunt impact to extremities with multiple cutaneous abrasions and lacerations, avulsion fractures of the right foot with multiple skeletal dislocations and disarticulations, fracture of the left fibula. The cause of death was listed as blunt force trauma of the neck.

The 62 year old female was a pedestrian struck by one of the vehicles in the collision. She suffered serious injuries and was transported to Presbyterian Hospital. The medical records indicated that she arrived at 6:39 a.m., and recorded her height at 5 feet 6 inches and 129 pounds. Her injuries included contusions of the intra-abdominal organs, a pulmonary embolism, a minor laceration of the inferior vena cava, a displaced fracture of the 2nd cervical vertebra, a displaced fracture of the right femur, a fracture of the left side orbital floor, acute respiratory failure, a

⁶ Refer to the Human Factors Group Chairman Factual Report.

laceration of the small intestine, a laceration of the left lower leg, an open tibia fracture, and a right closed left femur fracture.

The 25 year old male was a pedestrian walking on the sidewalk during the crash. He noted that he ran out of the way and avoided being hit by any vehicles, but fell to the ground. He suffered minor injuries. The medical records noted that he arrived via private Ambulance at 8:06 a.m., and listed his height at 5 feet 7 inches and weight at 175 pounds. His injuries included multiple abrasions to bilateral knees, abrasions to the right elbow, right hand, no loss of consciousness.

4. Law Enforcement Information

4.1. New York City Police Department (NYPD)

The crash occurred in the 109th NYPD Precinct in the Borough of Queens. The NYPD Event Chronology report number D17091803885 was obtained.⁷ The preliminary NYPD police accident report for accident number MV-2017-109-005314 was also obtained.⁸ It established the vehicles and drivers involved in the crash. The preliminary NYPD Collision Investigation Squad (CIS) report for case number 717-44 was also obtained.⁹ This report expanded the information to include the victims injured in the crash. Note that the NYPD CIS preliminary report was issued while the crash was being investigated and information about the number and location of people involved reflected the best information known at the time.

The NYPD Event Chronology report indicated that a 911 call was received at 6:16:42 a.m., and then the event was created by a different dispatcher, who received a call from police officers of unit 109RES4, who had been at the location of the crash at 6:16:44 a.m. The event identified that there were injured and trapped victims, and the Fire Department of New York (FDNY) and Emergency Medical Services (EMS) acknowledged notification of the event at 6:16 a.m. Notification that an NYPD unit was on scene also occurred at 6:16 a.m. and this unit was reassigned to this event. Other NYPD units were called, with the first (other than the one already at the scene) arrived at 6:17 a.m.; a sergeant unit was dispatched and enroute at 6:18 a.m., and a captain unit was dispatched and enroute at 6:19 a.m., with the unites of all three types (officers, sergeant, captain) all arriving at 6:20 a.m.. The first Emergency Services Unit (ESU) was requested and enroute at 6:17 a.m. and arrived on scene at 6:21 a.m..¹⁰

Multiple 911 calls of the event were received within the first few minutes and the location of the event was confirmed. EMS units were requested at 6:17 a.m. and EMS and FDNY and were assigned by 6:18 a.m. Notification that 2 buses had collided and then ran into a building was sent out at 6:18 a.m. At 6:18 a.m., EMS was estimated to arrive at 6:22 a.m., and then at 6:19 a.m., another estimated arrival time for EMS was noted as 6:33 a.m. The first EMS

⁷ SF Attachment: NYPD Event Chronology Report.

⁸ SF Attachment: Preliminary NYPD Police Accident Report.

⁹ SF Attachment: Preliminary NYPD CIS Report

¹⁰ An ESU is a police unit such as a van or truck with specialized equipment and capabilities.

unit arrived on scene at 6:20 a.m.¹¹ The event was established as a Level 1 mobilization event at 6:20 a.m.¹²

Notification of structural damage to the building and the need for resources was established at 6:23 a.m. Notification that water was coming out of the building was made at 6:24 a.m. The request for units to conduct traffic and crowd control occurred at 6:25 a.m. Request for power shut off to building due to water issues was done at 6:28 a.m. The highway Crash Investigation Squad (CIS) was requested at 6:36 a.m. and arrived on scene at 6:53 a.m. Coordination of the arrival of CIS occurred at 6:59 a.m., and further coordination of EMS and other activities occurred over the next 3 hours (see sections 5 and 6 for more detail). Summaries of the victim status was being discussed at 10:07 a.m. The scene was secured at 3:35 p.m, and the event was closed at 3:50 p.m.

4.2. New York City Metro Transit Authority (MTA)

The MTA conducted an investigation of the crash, and the Supervisor's Accident Investigation Report IOD Control Number 17-2884 was obtained.¹³ The report provides information about the location, vehicles, and people involved in the crash. The MTA investigator arrived on scene at 6:30 a.m. and provided a basic narrative description of the vehicle locations and damage post crash.

5. Fire/Rescue Information

The New York Fire Department (NYFD) was the responding fire/rescue agency, and was dispatched by the 911 system. The Full Complaint History report was obtained.¹⁴ The call was received by the Northern Blvd and Main St. alarm box at 6:16 a.m. Units were assigned starting at 6:17 a.m. and the EMS job identification as a trauma event was also established at 6:17 a.m. EMS coordination was taking place immediately, see section 6 for EMS information.

The NYFD called for a supervisor and assigned 8 fire units to the event at 6:17 a.m. The first fire truck arrived on scene at 6:20 a.m. It was reported that an unknown number of people were trapped in the vehicles at 6:21 a.m. and that there was smoke coming from one of the vehicles. It was updated at 6:22 a.m. indicating that 2 patients were pinned. It was advised that there was structural damage to the building at 6:23 a.m., and that water was coming out of the building at 6:24 a.m. Multiple other fire units were assigned at 6:24 a.m. A request for the power to be shut off to the building due to the water was requested at 6:28 a.m. It was noted that there were multiple chiefs and resources on scene at 6:35 a.m., and that there was a person pinned in the building. Another person was identified as pinned in the city bus at 6:40 a.m. Patients were being extricated at 6:59 a.m., and extrications were noted to be complete at 7:01 a.m. But then an additional patient was identified and being extricated at 7:25 a.m. An update of persons involved was noted at 10:07 a.m. with 19 total patients, 9 to Flushing, 3 to Elmhurst including both drivers, and 6 to memorial, and 1 fatality on scene. Fire operations were noted as ongoing at

¹¹ Refer to section 6 of this report for more information about the EMS response.

¹² There are 4 levels of mobilization with increasing participation of task forces. Level 1 involves the task force from the burrow for that precinct. Higher levels involve more task forces from more areas.

¹³ Attachment: MTA Accident Investigation Report.

¹⁴ SF Attachment: FDNY Incident History Report.

11:00 a.m. with removal of debris and securing the scene. At 2:26 pm fire operations continued and some staff were being relieved. Fire operations were concluded at 5:29 pm.

A 28 year old male fire fighter who worked the accident was injured while responding to the crash. He suffered minor injuries. The medical records noted that he arrived via Flushing Ambulance at 9:22 a.m. The records noted a BMI of 27.3, but a specific reference to his height and weight were not included. The records note that the patient complained of ankle pain after twisting his ankle while stepping off the bus while working as a fireman at an accident. A hand filled out PCR listed the agency name as FHMC, the agency ID as 7308, vehicle unit as 52A2, and the following response times: dispatched/enroute 8:47 a.m., on scene 8:50 a.m., patient contact 8:51 a.m., left scene 9:02 a.m., at destination 9:20 a.m. His injuries included a left ankle sprain.

6. Emergency Medical Services (EMS)

The emergency medical services were dispatched through the 911 system and were provided by a combination of the FDNY and privately contracted services. The private contracted EMS were from NY Presbyterian and Flushing Hospital. The EMS activities were captured in the NYPD Event Chronology report. Selected EMS line items from this as well as notes from PCRs obtained from the medical records were extracted and summarized.¹⁵ A request for “a dozen buses” (EMS units) was issued at 6:19 a.m.; an EMS supervisor was requested at 6:22 a.m., and another call for additional EMS units was issued at 6:23a.m.

The first EMS units were assigned and dispatched at 6:18 and 6:19 a.m. Another group of 7 EMS units were dispatched by 6:23 a.m., and an additional group of 11 EMS units were dispatched by 6:32, with additional units at various times after that. In all, 36 EMS units responded, although many were providing support and did not transport patients, and some were recalled.

The first EMS units were on-scene at 6:19 a.m., 6:22 a.m., 6:23 a.m., 6:25 a.m., 6:27 a.m., and then more following throughout the morning. The first patient transports began at 6:36 with the first patient arriving at the hospital at 6:40 a.m. Several patients arrived at the hospital around 8:00 a.m. or later, depending on extrications, treatments, and transport priorities on scene. Most EMS units were cleared by 9:00 a.m., with a few remaining on scene. The EMS event was closed at 3:35 pm.

7. Hospital Information

7.1. NY Presbyterian

NY Presbyterian Hospital, located at 56-45 Main Street, Flushing, New York, received 6 patients. One of the 6 was pronounced deceased shortly after arrival, 3 were admitted to the ICU, and 2 were treated and released.

¹⁵ SF Attachment: Selected EMS Items from NYPD Event Chronology report and PCRs.

7.2. Flushing

Flushing Hospital, located at 4500 Parsons Blvd, Flushing New York, received 10 patients including 9 involved in the crash and the fire fighter who was injured while responding.

7.3. Elmhurst

Elmhurst General Hospital, located at 79-01 Broadway, Elmhurst New York, received 3 patients, one of whom was pronounced deceased shortly after arrival.

E. INTERVIEWS

NTSB investigators interviewed 2 passengers of the bus, an FDNY captain, and an FDNY lieutenant.¹⁶

F. DOCKET MATERIAL

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

LIST OF ATTACHMENTS

SF Attachment: NYPD Event Chronology Report
SF Attachment: Preliminary NYPD Police Accident Report
SF Attachment: Preliminary NYPD CIS Report
SF Attachment: MTA Accident Investigation Report
SF Attachment: FDNY Incident History Report
SF Attachment: EMS Event Chronology and Patient Care Notes
SF Attachment: NTSB Interviews

END OF REPORT

Thomas Barth, Ph.D.
Senior Survival Factors Investigator / Biomechanics Engineer

¹⁶ SF Attachment: NTSB Interviews