Survival Factors Group

Chesterfield Township, NJ.
Factual Report of Investigation

(Number of pages including this cover sheet – 27)

National Transportation Safety Board
Office of Highway Safety
Washington, DC 20594

Survival Factors Group Chairman's Factual Report

A. ACCIDENT

Type:	School Bus, Roll-Off Truck Intersection Related Accident
Date and Time:	February 16, 2012 8:15 AM. EDT
Location:	Bordentown-Chesterfield Rd (Burlington County Route 528) and Old York, Rd (Burlington County Route 660) Chesterfield Township, Burlington County, New Jersey
Vehicle #1:	2012 International 54-Passenger School Bus
Motor Carrier:	Garden State Transport Inc.
Vehicle #2:	2004 Mack Granite Roll Off Truck
Motor Carrier:	Herman's Trucking, Inc
NTSB #:	HWY-12-MH-007

B. SURVIVAL FACTORS GROUP

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C. ACCIDENT SUMMARY

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

D. DETAILS OF THE INVESTIGATION

The Survival Factors Group investigation focused on the following:

1. Documentation of the exterior and interior damage to the 2012 International 54-Passenger School Bus (VIN: 4DRBUAAP7CBxxxxxx),
2. Documentation of the exterior and interior damage to the 2004 Mack Granite Roll Off Truck (VIN: 1M2AG11C54Mxxxxxx),
3. Emergency response,
4. Interviews with first responders and witnesses.

1. 2004 MACK GRANITE ROLL-OFF TRUCK

1.1 Exterior Inspection

The front end of the red roll-off truck with the yellow plow attachment sustained a single impact.

The frontal impact resulted in deformation to the front bumper, grille/radiator, red fiberglass hood, and the snowplow mount. Direct damage to the front end started at the right (passenger side) front bumper corner and continued across the front of the vehicle 77 inches. Maximum crush was approximately 10 inches with 7 inches of crush to the grille/radiator. Deformation to the front bumper with the snowplow mount was not uniform across the front end. The frontal impact resulted in the protruding snowplow mount being twisted towards the driver side[1]. A measurement taken of the protruding snowplow mount from the pointcloud created by the 3D laser scanner was approximately 6.1 inches. The lower mounting pin for the hydraulic ram used to raise and lower a snowplow as well as the pin attachments, were bent. The lower mounting hole on the hydraulic ram was elongated. The upper mounting pin for the hydraulic ram appeared straight and

[1] Refer to Survival Factors Group Photos #1.

undamaged where it connected to the lifting plate. The rear of the lifting plate, however, was bent and displaced from its original location. The left and right steel plates that hold the ends of the pin for the rear of the lifting plate were bent outward. The pin itself had broken free on the right end, and allowed the lifting plate to become detached from the snowplow mount, and only remained connected to the vehicle through the hydraulic ram. Using the same measurement technique, the snowplow's lifting plate protruded outward 39 inches. An undamaged snowplow mount on an exemplar vehicle protrudes approximately 29 inches beyond the front bumper.

1.2 Interior Inspection

The interior of the roll-off truck was equipped with two seats. There was no damage to the interior of the cab. The truck cab was not equipped with an air bag. Both seats had three-point lap and shoulder restraints attached to the B-pillar of the cab. The driver's seat belt showed evidence of prior usage. An inspection of the driver's D-ring showed no evidence of a friction rub however there was a 3 inch area on the belt webbing just above the latch that showed evidence of a friction rub but no cupping/stretching.

The interior inspection of the cab showed no visible occupant contact points.

2. 2012 INTERNATIONAL 54-PASSENGER SCHOOL BUS

2.1 Exterior Damage

The school bus sustained two impacts, one to each side towards the back of the bus behind the rear wheels.

The direct damage from the initial left (drivers) side impact by the Mack truck began 54 ½ inches behind the left rear axle and extended towards the rear bumper[2]. The width of the direct damage was measured at 73 ½ inches. Maximum crush extended approximately 17 inches into the passenger compartment and approximately 21 inches along the underside of the bus where it contacted the bus' exhaust pipe. There were red paint transfers to the side of the bus extending vertically 67 inches. In addition, there were yellow paint transfers on the bus extending vertically 71 inches.

There was direct damage from the bus' right (passenger) side impact with the traffic beacon support pole, that began 24 inches behind the right rear axle and extended towards the rear 30 inches[3]. In addition, the direct damaged extended vertically from the base of the frame to the roof top of the school bus. Maximum crush to the right side of the school bus was 10.4 inches with the greatest deformation towards the roof line.

[2] Refer to Survival Factors Group Photos #2.
[3] Refer to Survival Factors Group Photos #3.

The impacts resulted in the bus body being displaced forward from the bus frame approximately 3 inches with the greatest forward displacement being near the right rear of the school bus (Refer to Vehicle Group Chairman's Factual report).

The school bus' electric loading door[4] was found damaged and would not close properly due to a parent on-scene forcing the door open with his hands when the bus driver was not able to open the door. Just forward of the loading door was an exterior key hole covered by a threaded rubber cap with a sticker underneath it saying "Entrance Door Release". A check of the two keys on the key ring in the bus' ignition revealed that neither key operated the exterior door release. According to representatives with the bus manufacturer, IC/Navistar, this key hole labeled "Entrance Door Release" is used by the bus driver to lock the doors when leaving the bus unattended during field trips or other activities away from the school. In addition the representative said that the "Entrance Door Release" label is an informational label for the driver as are other labels (i.e., Use Ultra Low Diesel fuel, Ignition, Fan, and battery) throughout the bus to identify items. It's an aide to the driver entrance door release such that he/she is not searching around as it may be in differing locations from bus to bus and sometimes non-existent. A check with the owner of the school bus revealed that the key for the "Entrance Door Release" is only attached to the keys rings of the select buses that travel to field trips or on overnight trips.

2.2 Interior Damage

The interior damage was primarily to the rear seating area on both the right and left sides near the rear wheel well area. The front of the bus and driver's seating area were undamaged.

Above the front loading door inside the school bus was an emergency release lever to open the front loading door. A white sticker with red lettering attached to the side wall forward of the latch read, "Emergency Use Only Move Handle Forward Push Forward Door"[5]. An inspection revealed it was operational; however, as previously mentioned the loading door would not fully close[6] due to damage sustained from a parent on-scene that grabbed and pried the doors open when the driver couldn't figure out the proper way to open the front loading doors after the accident when he turned off the ignition. The rear emergency door was inspected and was found to be operational.

According to IC/Navistar representatives, the electrical loading door is capable of being opened when the ignition is turned off by using the emergency release lever directly above the loading door.

[4] Refer to Vehicle Group Chairman Factual regarding description of electrical system on bus.
[5] Refer to Survival Factors Group Photo #4.
[6] Refer to Survival Factors Group Photo #5.

Several weeks following the on-scene accident investigation, Safety Board staff and representatives from IC/Navistar met at Navistar's testing facility in Fort Wayne, Indiana to conduct a quasi-static test on an exemplar loading door in order to determine the force needed to open the front loading doors. The test results showed it took 350 pounds of force to pull open the loading doors 9 ¼ inches[7]. This distance is also the approximate distance the doors were found at post-crash after a parent on-scene pried the doors open and shimmied inside when the bus driver was incapable of opening the door following the accident.

The IC/Navistar representative also noted that when the key is in the ignition, the rear emergency exit door is capable of being opened from the outside by first responders or parent on-scene in cases where the bus driver may be incapacitated and unable to open the front loading doors.

The vehicle was equipped with a bucket seat with cushion springs for the driver. Behind the driver's seat were ten rows of three-person bench seats and an eleventh row being a two-person seat. The right side had eleven rows of two-person bench seats. All the three-person bench seats were 45 inches wide with the seatbacks 28 ½ inches high. The two-person bench seats were 30 inches wide and 28 ½ inches high. There were two floor anchors and two wall anchors for each seat. All the floor and wall anchors remained secured on both sides except for the forward wall anchors for the a two-person seat in row eight on the right side and the three-person bench seat in row nine on the left side. The forward wall anchor on the right side seat in row eight was sheared off during the pole impact and the forward wall anchor on the left side seat in row nine was torn away during the truck impact and subsequent intrusion. The forward and rearward floor posts in row eight on the right side were bent laterally inwards, due to the lateral side wall intrusion from the pole impact[8]. All the seat pans remained attached however; the seat pan in row nine on the left side was shifted laterally approximately 4 inches into the aisle and the seatback was bent back longitudinally into the occupant space in row ten and also displaced vertically approximately 4 inches.

The roof was buckled downward into the passenger space approximately 5 inches above rows 8- 11 on both sides. Intrusion into the passenger compartment was documented in rows 7-10 on the right side and rows 8-10 on the left side. Maximum side wall intrusion was 10.4 inches on the right side was at row 8 due to the pole impact[9]. In addition the floorboard adjacent to the side wall in row 9 on the left side had an approximate 12 x 12 inch hole and also intruded into the occupant space[10]. The floor was buckled vertically in rows 7-10. The maximum vertical displacement was 10 inches.

[7] Refer to Survival Factors Attachment 1. IC/Navistar Loading Door Test.
[8] Refer to Survival Factors Group Photo #6.
[9] Refer to Survival Factors Group Photo #7.
[10] Refer to Survival Factors Group Photos #8-9.

Inspection of the vehicle's interior revealed several areas indicating occupant contact. Listed below are the areas of probable occupant contact:

- Row 7 on the left side, long vertical scuff to back of row 6 seatback.
- Row 8 on the left side, lower window broken out.
- Row 9 left side, large approximate 12 x 12 inch penetrating hole near the joint of the wall and floor with large area of blood.
- Row 9 left side, large area of blood on seat pan.
- Row 10 left side, blood smear on seatback.
- Row 10 left side, hair strand stuck in screw on window pillar.
- Emergency exit door window, dark scuffing and long hair stuck in upper outside corner of window gasket near row 11 on right side.
- Row 11 left side, blood on seatback and seat pan in dripping pattern down side into aisle.
- Row 11 right side, several long hairs in upper corner near where the back wall and side wall meet.[11]
- Row 11 right side, blood at base of seat in aisle.

The bus was equipped with a driver's sliding window plus 11 windows including 1 emergency exit window (#6) on the left (driver) side and 11 windows including 1 emergency exit window (#5) on the right (passenger) side. Each of the emergency exit windows had instructions in big block lettering posted below it on how to open the window. At the time of the inspection, the top half of the window #1 on the left side was open. The lower half of the window (#8) on the left side was broken out as well as both the upper and lower windows on row nine on the right side.

Additional safety equipment in the bus included the two emergency roof hatches above rows three and nine[12]. The front hatch was fully operational while the rear hatch was popped open due to side impacts and roof buckling and could not be closed. Located in the front of the bus were the First Aid kit, a Safe Lite Triangle kit Model 711 containing 3 collapsible triangles, and an Amerex 5 pound ABC fire extinguisher Model # B402. According to the inspection sticker the fire extinguisher was last inspected in July 2011 and was set to expire one year after that date. The First Aid kit was attached to the front header, above the windshield, on the right side near the loading doors. The outward latch connection could not be opened due to it being installed in a place that prevented the latch from being fully released.

The school bus was equipped with lap belts in all seat positions. On the drivers' side there were three lap belts in each seat position except for row 11 where there were two for the two seat position. On the passenger side there were two lap belts for each of the two-person bench seats. Every belt in each seat position was colored

[11] Refer to Survival Factors Group Photo #10.
[12] Specialty Manufacturing Serial #'s H-10-114660 and H-10-114661

with the window seatbelt being burgundy in color, the center belt being gray in color, and the aisle belt being rust colored. The passenger side had two lap belts, a burgundy belt in the window seat position and a rust colored belt in the aisle seat position. All the seat belts were manufactured by AmSafe, and the latches all had the same model/lot number 100521 on the back with the date of 10/04/01. The buckles were also AmSafe products and had seven different model/lot numbers (C052210, C052110, C52310, C53110, C052610, C060110, and C052410). Refer to Table 1 below for individual inspection notes on each lap belt. Belts with presence of any load marks and/or lap belt still buckled (4) are highlighted in light grey. Unique positions or other observations concerning the belts are also noted.

Table 1.

Driver Webbing creased 2 ½ inches above latch and buckle connection			Row #		
Latch webbing pinched between the wall and the seat pan	Indentation 9 1/4 inches from the bite seat bite on the latch webbing[13]	Seat belt buckled, very slight tear to the latch webbing, indentation 9 1/2 inches from the seat bite on the latch webbing	1	Indentation on the latch webbing 9 1/2 inches from the seat bite[14]	Latch webbing was pinched between the seat pan in the wall
No evidence	Loading mark on latch webbing 11 1/2 inches from the seat bite	Seat belt still buckled. No evidence of loading found on belt webbing.	2	Latch was found 12 1/2 inches from the seat bite and appeared to have a load mark under the latch.	Latch was in the extended position on the webbing and pinched between the forward seat back and side wall
No evidence	No evidence	No evidence	3	No evidence	No evidence
No evidence	No evidence	No evidence	4	Latch on webbing not fully extended nor was it in a smaller child position. Load mark 27 3/4 inches from the seat bite.	No evidence
No evidence	No evidence	Light load mark on latch webbing 18 inches from the seat bite.	5	No evidence	No evidence
Seat belt was fully extended position and pinched between seatback and side wall	No evidence	Seat belt buckled but in the fully extended position. Plastic molded housing cracked on latch.	6	Latch webbing in extended position with loading mark 31 inches from the seat bite.	No evidence
Latch webbing extended and pinched between the seatback and side wall	No evidence	Latch webbing pinched in the seat bite and hanging in the aisle. Significant load mark on latch webbing 32 inches from the seat	7	No evidence	No evidence

[13] These indentations appeared to result from draping the belt over the top of the seat back.
[14] IBID

		bite.			
Latch webbing pinched between the seatback and the side wall	Latch almost in the fully extended position. Loading mark on the latch webbing 33 inches from the seat bite.	No evidence	8	Seat belt buckled and the webbing was pinched in the seat bite and hanging into aisle in the fully extended position. There was a light load mark 35 inches from the seat bite.	No evidence
No evidence	No evidence	Buckle housing is broken/separated[15]. Blood on the housing. Latch plate webbing stuck in the seat bite and hanging into the aisle. Load mark on the latch webbing 18 1/2 inches from the seat bite[16].	9	No evidence	No evidence
Latch webbing pinched between the seatback and the side wall.	Latch webbing pinched between the seatback and the side wall.	Latch under the seat between an opening in the seat between the seat pan and seatback which is open due to deformation from the side wall impact. Load mark 20 1/4 inches from the seat bite.	10	Latch webbing pinched in the seat bite. Blood on the latch which was lying on the floor in the fully extended position. Load mark on the latch belt webbing at 35 inches from the seat bite.	Latch webbing pinched between the seatback and the side wall.
No evidence	Latch webbing pinched in seat bite and latch not in fully extended position. No evidence of loading on webbing.	NO SEAT	11	Latch webbing pinched in the seat bite. Latch in the fully extended position with latch and webbing covered with blood. No visible load mark seen on the latch webbing.	No evidence

2.3 Seatbelt Usage

A detailed interior inspection of all the lap belts on the school bus revealed that seven lap belts (, 4RA, 6LA, 6RA, 7LA, 8LC, 8RA, and 10RA) showed evidence of usage by having distinctive loading marks on the webbing although the latch was in or close to the fully extended position on the webbing. Another six lap belts (1LA, 2LC, 2RA, 5LA, 9LA, and 10LA) showed slight loading marks on the webbing with the belt in 1LA having still been buckled and three (2LC, 2RA, and 5LA) having the latch shortened to the size of how a small child may have worn it. A total of four belts were buckled at the time of the inspection (1LA, 2LA, 6LA, and 8RA). The webbing of the latch portion of the lap belt in 1LA had a ¼" tear.

Medical records indicated that ten student passengers were wearing their seat belts with two of the ten having seat belt related contusions and another complaining of pain in her abdomen from her seat belt. The remaining seven responded "Yes" when asked by the physician or nurse if they had been wearing it.

[15] Refer to Survival Factors Group Photos #11-12.
[16] Refer to Survival Factors Group Photo #13.

Responses from the questionnaires given to the students indicated that of the twenty-one students that filled out the questionnaire[17], twenty claimed to have been wearing their lap belt at the time of the accident. Ten of the eighteen student passengers stated that they were wearing their seat belts loosely and five said they were wearing it snug or tight. Two student passengers stated that their lap belts tore apart and one said it broke/ripped on both sides. One student passenger commented that a student seated in front of her had her lap belt unhooked during the accident but that student did not mention any problem with her belt. One student admitted to not wearing their lap belt at the time of the accident.

Table 2.

Seat Position	Presence of Load Marks and/or Lap Belt Buckled	Medical or First Responder Reported Seat Belt Use	Respondents Seat Belt Use
Row 1 L Window	No	Med is Silent	No
Row 1 L Center	No	Med is Silent	Yes, Loosely
Row 1 L Aisle	Yes	Med is Silent	Yes
Row 1 R Aisle	No	Med -Yes	Yes, Snug
Row 2 L Window	No	Med -Yes	Yes, Snug
Row 2 L Center	Yes	Med is Silent	Yes
Row 2 L Aisle	Yes	Med is Silent	Yes, Loosely
Row 2 R Aisle	Yes	Med is Silent	Yes, Tightly
Row 3 L Aisle	No	Med is Silent	Yes, Loosely
Row 3 R Aisle	No	Med -Yes	Yes, Snug
Row 4 R Aisle	Yes	Med -Yes	Yes, Loosely
Row 4 R Window	No	Med is Silent	Yes, Loosely
Row 5 L Aisle	Yes	Med -Yes	Yes, Snug
Row 5 R Aisle	No	Med -Yes	Yes, Loosely
Row 6 L Aisle	Yes	Med -Yes	Yes, Loosely
Row 6 R Aisle	Yes	Med is Silent	Yes, Loosely
Row 7 L Aisle	Yes	Witness -Yes	Yes
Row 8 L Window	No	Med is Silent	Unknown
Row 8 L Aisle	No	Med is Silent	Yes, Loosely
Row 8 R Aisle	Yes	Med -Yes	Yes
Row 9 L Aisle	Yes	Med -Yes	Yes*****
Row 10 L Aisle	Yes	Med is Silent	Not sure
Row 10 R Aisle	Yes	Med -Yes	Yes, Loosely
Row 11 L Aisle	No	Autopsy Silent	Yes*****
Row 11 R Aisle	No	Responder -Yes	Yes*****

***** Per family attorney

2.4 Seatbelt Evaluation

The indication of possible buckle release and the seat belt release questions rose in the questionnaire from one occupant in this accident investigation and also in the Port St. Lucie, Florida[18] school bus accident investigation that prompted a closer evaluation.

[17] Refer to Survival Factors Attachment 3 for the twenty-one questionnaire responses.
[18] Port Saint Lucie, FL; March 26, 2012, HWY-12-FH-008

The objective of the evaluation were to determine if the buckles were susceptible to inertial release or if they incorporated shock proof features, and to evaluate the potential for inertial release.

Seatbelts of each type installed on the bus were obtained from the accident involved school bus. Each type of seat belt was visually inspected and x-rayed[19] in order to identify the design configuration and latching mechanism. A function test was also performed.

The inspection of the buckles indicated that they were simple designs that did not incorporate g-blocking features. However, the testing resulted in no inertial release of inspected seatbelts.

3. EGRESS

Based on twenty-one questionnaires[20] received back from student passengers, interviews with emergency responders, and parent's who were on-scene prior to the children exiting the bus, the majority of passengers exited the 2012 International school bus through the front loading door. At least one passenger and four of the five seriously injured passengers were either carried or jumped out through the back emergency door. The fifth seriously injured passenger was taken out a side window.

According to statements taken from the first few witnesses/parents on-scene, when the bus came to a stop, the bus driver was attempting to take out the gasket and kick out the lower windows on the loading door. When this didn't work, a parent who witnessed the accident grabbed the forward most loading door with his two hands and pried it open.

According to the owner of Bus Company and the Transportation Director of the Northern Burlington Regional School District (NBRSD), the driver's using buses equipped with electrical loading doors would use the emergency release lever located above the loading door on a daily basis. They use this lever to disengage the electric door motor at the end of the work day so they can operate the door manually. After entering the bus in the morning, they would use the lever again to re-engage the electric door motor.

All the students who submitted questionnaires indicated that they had received emergency evacuation drills at least once earlier in the school year or in the year

[19] Several X-Ray images and photos of some of the buckles are contained in the NTSB Docket Management System (DMS).

[20] Letters were sent to the parents of the twenty-one student passengers who were not hospitalized asking permission for the school counselors to interview their child. Refer to Survival Factors Attachment 2 for the letters sent to parents and the blank questionnaire.

prior. Several students mentioned that the evacuation drills only consisted of them going out the back door.

3.1 New Jersey Emergency Evacuation Statutes

The New Jersey Department of Education has four Statutes related to school bus emergency evacuation and safety[21].

6A:27-11.1 Emergency Procedures

(a) District boards of education shall establish policies and procedures to be followed by the school bus driver in the event of an emergency.

(b) District boards of education and school bus contractors shall establish policies and practices to ensure that school bus drivers employed by them comply with all applicable rules of this chapter.

6A:27-11.2 Evacuation Drills and Safety Education

(a) School administrators shall organize and conduct emergency exit drills at least twice within the school year for all students who are transported to and from school.

1. All other students shall receive school bus evacuation instruction at least once within the school year.

(b) The school bus driver and bus aide shall participate in the emergency exit drills.

(c) Drills shall be conducted on school property and shall be supervised by the principal or person assigned to act in a supervisory capacity.

(d) Drills shall be documented in the minutes of the local board of education at the first board meeting following the completion of the emergency exit drill. The minutes shall include, but are not limited to, the following:

1. Date of the drill;
2. Time of day the drill was conducted;
3. School name;
4. Location of the drill;
5. Route number(s) included in the drill; and
6. Name of school principal, or person(s) assigned, who supervised the drill.

6A:27-11.3 Training

(a) Employers shall ensure that all school bus drivers and school bus aides are properly trained for the functions of their positions.

(b) Employers shall administer a safety education program for all permanent and substitute drivers and aides. At a minimum, this training shall include:

1. Student management and discipline;
2. School bus accident and emergency procedures;

[21] http://www.state.nj.us/education/code/current/title6a/chap27.pdf

3. Conducting school bus emergency exit drills;
4. Loading and unloading procedures;
5. School bus stop loading zone safety;
6. Inspecting the school vehicle for students left on board at the end of a route; and
7. The use of a student's education records, including the employee's responsibility to ensure the privacy of the student and his or her records, if applicable.

(c) In addition to the training requirements in (b) above, employers shall administer a safety education program for school bus a driver which includes defensive driving techniques and railroad crossing procedures.

6A:27-11.4 Student Safety Education

District boards of education shall provide a safety education program to public school students, which include pedestrian safety and rules for riding the school bus.

According to the Northern Burlington Transportation Director and the Driver Handbook[22], the emergency evacuation drills consist of the following;

- How to turn off the ignition key,
- Secure the vehicle. How to set "brakes" (floor brake, air brake or emergency hand brake),
- Set emergency 4-way flashers, on steering wheel- red button or dashboard type,
- How to open front door[23] and rear emergency doors,
- Location of kick-out windows and windshield (all windows mounted in heavy black rubber),
- How to open windows and use as emergency escape,
- Location of all emergency equipment, first aid kit, fire extinguisher, crow bar, flags and flares,
- Stress the importance of getting out quickly, quietly and safely,
- Instruct students on two-way radio usage.

According to the Superintendant and Principal of the Chesterfield Township School District, emergency evacuation drills for the elementary students were conducted on October 11, 2011 and May 29, 2012. The drill in October 2011 involved just the students that rode the bus while the drill in May 2012 involved all

[22] Refer to Motor Carrier Group Chairman's Attachment 17A.
[23] According to the Motor Carrier Group Chairman, when the owner of the bus company and the Transportation Director of the Northern Burlington Regional School District (NBRSD) were asked if a demonstration of how to use the Emergency Lever to manually open the front loading door in an emergency situation is done during the evacuation drill, both stated, "No". In a follow-up conversation, the Transportation Director of the NBRSD stated that the use of Emergency Lever located above the loading door is demonstrated during emergency evacuation drills for the middle school and high school students only not grade school students.

the students in attendance that day. The Superintendant added that the first three items and last item listed above (turning off ignition, setting emergency brakes, putting on the emergency 4-way flashers, and using the two-way radio) are not covered due to these being kindergarten through sixth graders.

The National Highway Traffic Safety Administration (NHTSA) has Highway Safety Program Guideline No. 17, "Pupil Transportation Safety" that requires state programs to instruct student passengers in safe riding practices and on the location and operation of emergency exits.

In May 2010 the 16th National Congress of School Transportation (NCST) updated the document titled, National School Transportation Specifications and Procedures[24] (NSTSP) includes a discussion of the need for emergency evacuation drills. The NSTSP manual list the following recommended instructions for student passengers during Emergency Evacuation Drills[25]:

- Turn off ignition switch/shut down engine;
- Set emergency brake;
- Summon help when and where needed;
- Use kick out windows[26] or emergency escape exits;
- Set warning devices;
- Open and close doors and account for all students passing the station;
- Help small students off the bus;
- Perform other assignments; and
- Use of electronic voice equipment to summon help.

As previously mentioned, the bus driver attempted to remove the rubber gasket and kick out the loading door windows after being unable to open the electric loading door. According to the bus driver[27], he was instructed that the windows with gaskets (i.e., windshield, loading door, and rear emergency exit door) could be kicked out in case of emergencies. According to a representative for IC/Navistar, these windows are not designed to be kicked out.

According to a representative with the New Jersey Department of Education, he was not sure where this "kick out window" requirement originated and added that the windows could not be kicked out.

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[24] *National School Transportation Specifications and Procedures.* Adopted by the Fifteenth National Congress on School Transportation, Warrensburg, Missouri May 16-20, 2010.
[25] Emergency Exit Drills B. 6. d. page 376 of the 2010 NSTSP
[26] Appendix D School Bus Operations; Emergency Exit Drills B. 6. d. page 376 of the 2010 NSTSP, the term kick out windows is used and that term is not in the Terms & Definition Section Appendix A. However, according to several school bus manufacturers this term "Kick-out Windows" is sometimes used as a synonym with push-out side emergency escape windows.
[27] Refer to Human Performance Group Chairman's Factual Report.

Discussions with members of the School Bus Manufacturing Technical Committee (SBMTC) revealed that the reference to "kick out windows" needed to be removed from both some manufacturers' descriptions of the side push-out emergency exit windows since it is often used as a synonym and instructions for student passengers during Emergency Evacuation Drills.

Federal Motor Vehicle Safety Standards 217[28] (FMVSS 217), Bus Window Retention and Release exist 1) to minimize the likelihood of occupants being thrown from the bus and 2) to provide a means of readily accessible emergency egress.

4. SCHOOL BUS SAFETY

According to the School Bus Informational Council, each weekday during the school year, school transportation systems in the United States operate approximately 440,000 yellow school buses to provide safe and reliable transportation for more than 24 million school-aged children[29]. This large transportation system is considered the largest mass transit program in the nation, with more than 55 million student trips per day[30], which equates to approximately 10 billion student trips per year[31].

Every year, on average, 20 school-aged children (i.e., younger than 19) are fatality injured as the result of school transportation-related[32] incidents. However, the school transportation system is considered one of the safest forms of transportation[33], with the National Safety Council reporting an overall school bus accident rate of 0.01 per 100 million vehicle-miles traveled, as compared with 0.04 for trains, 0.06 for commercial aviation, and 0.96 for other passenger vehicles[34].

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[28] See 49 Code of Federal Regulations 571.217.

[29] School Bus Informational Council Washington, D.C., *National Statistics: Unequaled Safety Record,* 2008 [Online]. Available: http://sbi.elitedecision.com/index.php?option.com_ content&task.view&id.13&Itemid.28

[30] "School Bus Safety Overview" *School Transportation News,* 2008 [Online]. Available: www.stnonline.com/stn/ datastatistics/safetyoverview/index.htm

[31] Pupil Transportation Facts, National Association for Pupil Transportation Foundation, Albany, N.Y., 2008 Online]. Available: www.naptfoundation.org/facts.html

[32] "School Transportation-Related Crashes", *Traffic Safety Facts,* National Center for Statistics and Analysis, National Highway Traffic Safety Administration, Washington, D.C., 2006

[33] Pupil Transportation Facts, National Association for Pupil Transportation Foundation, Albany, N.Y., 2008 Online]. Available: www.naptfoundation.org/facts.html

[34] "School Bus Safety Overview" *School Transportation News,* 2008 [Online]. Available: www.stnonline.com/stn/ datastatistics/safetyoverview/index.htm

4.1 Previous NTSB Safety Recommendations

In its 1999 special investigation report on bus crashworthiness,[35] the Safety Board addressed the limitations of compartmentalization, and issued Safety Recommendations H-99-45 and H-99-46, which stated:

> H-99-45
> In 2 years, develop performance standards for school bus occupant protection systems that account for frontal impact collisions, side impact collisions, rear impact collisions, and rollovers.

NHTSA has partially satisfied the language of Safety Recommendation H-99-45, in that school bus occupant protection standards have been developed and guidance is provided to implement those standards in new large school buses. Therefore, Safety Recommendation H-99-45 is classified "Closed—Acceptable Alternate Action."

> H-99-46
> Once pertinent standards have been developed [or school bus occupant protection systems, require newly manufactured school buses to have an occupant crash protection system that meets the newly developed performance standards and retains passengers, including those in child safety restraints systems, within the seating compartment throughout the accident sequence in all accident scenarios.

Because NHTSA's actions did not address the intent of Safety Recommendation H-99-46, this recommendation is classified "Closed—Unacceptable Action."

In March of 2000, the Safety Board investigated an accident in Conasauga, Tennessee in which a freight train struck the passenger side of a school bus at a railroad/highway grade crossing near Conasauga[36], Tennessee that resulted in two fatalities to school bus passengers. In that accident, the NTSB found that exemptions of the sidewalls, sidewall components, and seat frames from passenger protection standards may place occupants at risk inside the bus during lateral impacts by striking the rigid side components. As a result of investigation the Safety Board made the following Safety Recommendation to NHTSA;

> H-01-40
> Develop and incorporate into the Federal Motor Vehicle Safety Standards performance standards for school buses that address passenger protection for sidewalls, sidewall components, and seat frames.

[35] National Transportation Safety Board *Bus Crashworthiness.* Highway Special Investigation Report NTSB/SIR-99/04 (Washington, DC: NTSB, 1999).
[36] NTSB/HAR-01/03 PB2001-918203

NHTSA is currently testing methods to provide passenger protection to these surfaces. As a result of NHTSA's continuing research in this area, Safety Recommendation H-01-40 remains classified "Open—Acceptable Response."

4.2 School Bus Seat Belt Laws

Currently six states [New York, New Jersey, Florida, California, Louisiana, and Texas] have required seat belts on school buses. NHTSA continues to assert that compartmentalization, as defined by Federal Motor Vehicle Safety Standard No. 222, provides effective safety for large school bus occupants[37]. NHTSA is currently conducting crash tests of large school buses to determine the effectiveness of shoulder-lap belt combinations.

California and Texas are the only states requiring lap-shoulder belts on new buses. New York, New Jersey, Louisiana, and Florida require lap belts on new buses.

New Jersey has a seat belt law for school buses. The provisions of the New Jersey[38] seat belt law are:

- **39:3B-10. School bus seats, seat belts, child restraint systems, regulations**
  1. In addition to the requirements in Federal Motor Vehicle Safety Standard No. 222 (49 CFR s.571.222) concerning school bus passenger seating and crash protection, each school bus as defined in R.S.39:1-1 shall be equipped with seats of a minimum seat back height of 28 inches, or 24 inches as measured from the seating reference point, and seat belts of the lap belt type for each seating position on the bus or other child restraint systems that are in conformity with applicable federal standards. The design and installation of seat belts or other child restraint systems that are in conformity with applicable federal standards shall conform to the regulations promulgated by the State Board of Education, in consultation with the Director of the Division of Motor Vehicles in the Department of Law and Public Safety. The State board shall promulgate regulations, pursuant to the "Administrative Procedure Act," P.L.1968, c.410 (C.52:14B-1 et seq.), for the design and installation of seat belts or other child restraint systems that are in conformity with applicable federal standards.
- **39:3B-11. Seat belts, child restraint systems, use required, liability**
  2. Beginning on September 1 of the second year next following the year of enactment of P.L.1992, c.92 (C.39:3B-10 et seq.), each passenger on a school bus which is equipped with seat belts shall wear a properly adjusted

[37] Transportation Research Board 1989; Booz, Allen & Hamilton and E. A. Williams & Associations, Inc. 1987

[38] New Jersey Statutes - Title 39 Motor Vehicles and Traffic Regulation - 39:3B-10 and 39:3B-11 School bus seats, seat belts, child restraint systems, regulations

and fastened seat belt or other child restraint system that is in conformity with applicable federal standards at all times while the bus is in operation. Nothing in this section shall make the owner or operator of a school bus liable for failure to properly adjust and fasten a seat belt or other child restraint system that is in conformity with applicable federal standards for a passenger who sustains injury as a direct result of the passenger's failure to comply with the requirement established by this section.

5. EMERGENCY RESPONSE

5.1 Initial Response

The Burlington County Central Communications dispatcher[39] was notified of the accident through the County's 911 system at 8:16:52 am and prior to the first call from dispatch going out to the Chesterfield Township Police Department at 8:20:28 am, an officer with the Chesterfield Township Police Department drove up on the scene at 8:19:26 am and advised dispatch that there were several children unconscious. The Chief of the Chesterfield Township Police Department arrived on-scene at 8:20:50 am followed by two more Chesterfield units at 8:21:08 am. The Mansfield Township Ambulance and Crosswicks Fire Company[40] were notified at 8:20 am and both their first units arrived on-scene at 8:22 am. At 8:29 am the EMS Incident Commander (IC) requested a Strike Force team respond which automatically dispatches an additional 5 ambulances. The EMS IC ultimately requested 2 Strike Force response teams (10 ambulances). The New Jersey State Police (NJSP) was notified of the accident at 8:53 am and their first unit arrived on-scene at 8:55 am.

At 8:26 a.m. north and southbound traffic on the Bordentown-Chesterfield Road/C.R. 528 was closed and at 8:40 am the traffic on Old York Road/C.R. 660 was closed.

Two fire departments with 3 rescue/engine units and 14 ambulances responded to the scene with all 14 ambulance units being utilized to transport occupants. Two air medivac helicopters were dispatched at 8:27 am and due to the enclimate weather, arrived on-scene at 9:04 am but did not transport any injured persons.

A stress debriefing was held by the responding agencies the evening of Monday February 20, 2012. No notes or documents were transcribed due to it being an informal debriefing only.

On April 4, 2012 a critique was held between the EMS and Chesterfield Police responders. The primary focus of the discussion was the difficulties in communication between police and EMS. Although this posed a challenge during

[39] Refer to Survival Factors Attachment 4 New Jersey State Police and Burlington County Police Departments Dispatch Logs.
[40] Refer to Survival Factors Attachment 5 Burlington County Fire and EMS Dispatch Logs.

the incident, the use of unified command with each Chief present to oversee their operation facilitated a workable solution. EMS discussion focused on their implementation of the incident command system and on efficiencies that could have been used once adequate resources were present.

The critique concluded that in an incident such as this one that is above the magnitude that most of the responders were accustomed to, they provided rapid, effective care and transport of the injured, and were able to, with the school's resources, adequately identify and log those patients and provide the lead agencies in law enforcement the necessary information.

Responding agencies:

New Jersey State Police
Crosswicks Fire Company[41]
Chesterfield Hose Company[42]
Florence Police Department
Bordentown Police Department
Chesterfield Township Police Department

Agencies that responded to the scene in order to transport injured passengers;

Mansfield Township Ambulance Service
Springfield Township Ambulance Service
Westampton Emergency Squad
America Emergency Squad
Capital Health BLS (Robbinsville)
Willingboro Emergency Squad
Robert Wood EMS Hamilton
Lourdes EMS
Jacobstown Fire Department EMS
Bordentown EMS
New Egypt First Aid
Virtua Health MICU

5.2 Burlington County Emergency Management Agency

The Burlington County's current Standard Operating Procedures (SOP) for handling Mass Casualty Incidents[43] (MCI) was been obtained and it was noted that the plan was in the process of being updated. The state of New Jersey is going to be shifting from a larger volunteer response system to a smaller paid response system which will make for a more immediate response to incidents and will provide better coverage to rural areas. New Jersey has a State wide Mutual Aid System in place and each county has EMS Coordinators responsible for operations.

Based on interviews with Burlington County EMS Coordinator and first responders, the incident was handled as a unified command with the Chesterfield Township and Florence Police Departments doing the investigation and mapping of the accident and the Crosswicks Fire Company and Mansfield Township EMS[44] handling the rescue and transportation. All interviewed first responders commented

[41] Refer to Survival Factors Attachment 6 for the Crosswicks Fire Company Incident Report.
[42] Refer to Survival Factors Attachment 6 for the Chesterfield Hose Company Incident Report.
[43] Refer to Survival Factors Attachment 7 for County MCI Plan.
[44] The Mansfield Township EMS is contracted by Chesterfield Township to handle all ambulance runs.

that the rescue and recovery aspects went smooth and all the responding agencies worked well together.

6. MEDICAL AND PATHOLOGICAL INFORMATION

Table 3. INJURY ICAO[45] CODES[46]

INJURIES	DRIVER	PASSENGERS	TOTAL
FATAL	0	1	1
SERIOUS	0	5	5
MINOR	1	10	11
NONE	1	9	10
TOTAL	2	25	27

6.1 Injury Information[47]

According to the non-invasive autopsy[48] reports, the deceased 11-year-old female school bus passenger sustained a laceration and fracture to the posterior skull, a tiny abrasion under the point of the chin, and superficial abrasions across the backs of both lower legs.

Based on the medical records obtained, the five seriously injured passengers sustained brain injuries, or skull, humerus, and clavicle fractures. Ten passengers and the bus driver sustained minor injuries which consisted of strains, contusions, and lacerations. Nine passengers with no injuries complained of general soreness or headaches. The dump truck driver did not sustain any injuries.

[45] International Civil Aviation Organization

[46] 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.

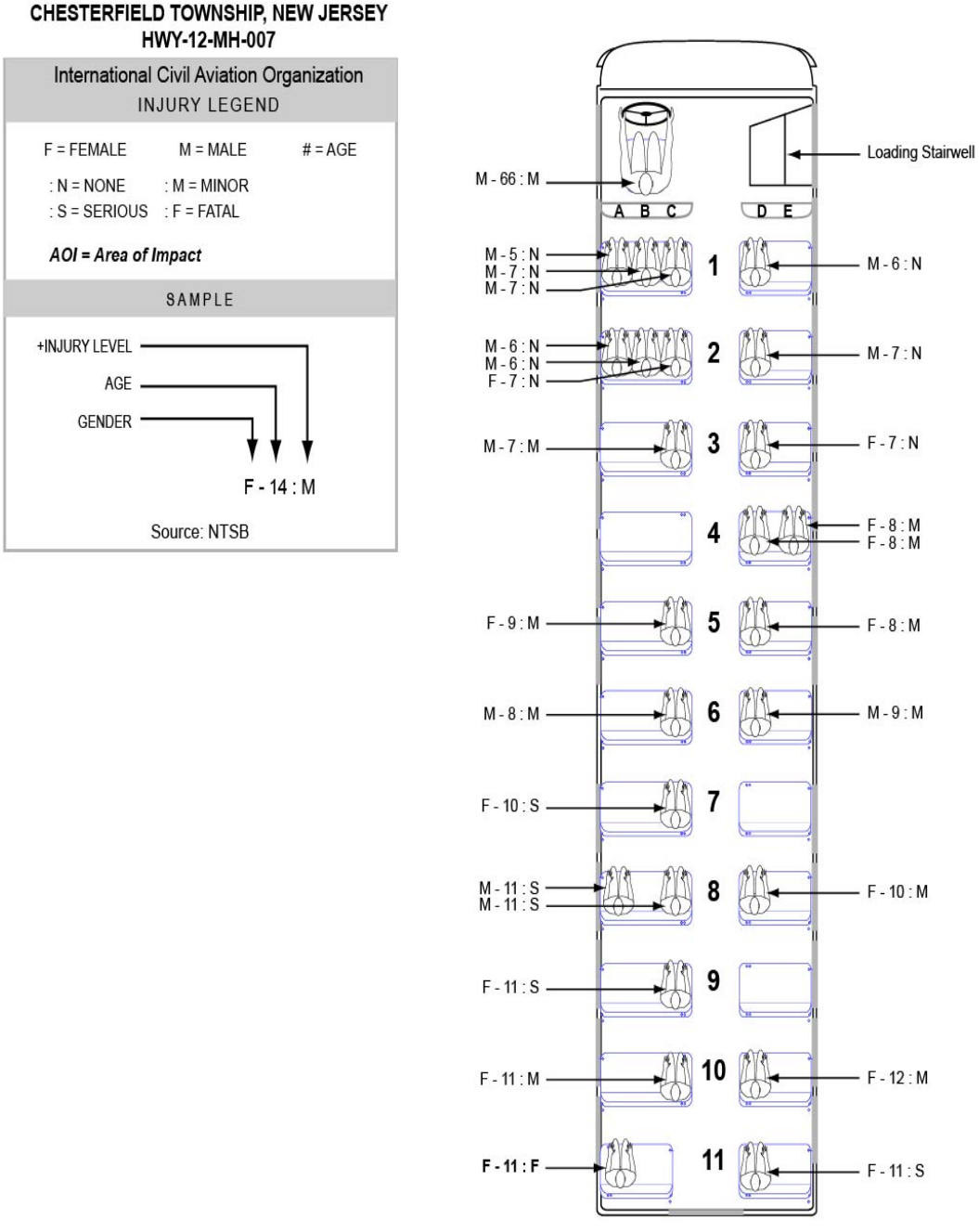
[47] Refer to Survival Factors Attachment 8 for entire listing of passenger injuries.

[48] Non-invasive autopsies consisted of visual examinations.

6.2 Seating Chart

Seat positions are based on passenger questionnaires, Northern Burlington County Regional School District seating chart, witness, and first responder interviews. Total weight of the driver and twenty-five passengers was 2008 pounds.

Figure 1.



6.3 Hospital Information

According to the EMS IC, all 25 student passengers and the school bus driver were transported by ambulance. However, prior to or after transport the parents of six students refused medical treatment[49]. All occupants were evaluated at either their personal physicians or at four hospitals and were either treated and released or transferred to higher trauma hospitals. The treating facilities are as follows:

Cooper University Hospital Camden, New Jersey (Level 1 Trauma Facility) (856) 342-2000	Capital Health Regional Medical Center Trenton, New Jersey (Level 2 Trauma Facility) (609) 394-6000
Robert Wood Johnson University Hospital in Hamilton Hamilton, New Jersey (609) 586-7900	Virtua Memorial Hospital Mount Holly, New Jersey (609) 267-0700
Burlington County Medical Examiner Dr. Ian Hood (609) 702-7030 Conducted 1 Non-Invasive Autopsy	

7 INTERVIEWS

Interviews were conducted with Chief of the Crosswicks Fire Company (Incident Commander) and several of his firefighters/EMT's, also the first two on-duty patrolmen to arrive on-scene, and the first two Paramedics that climbed into the school bus. In addition, interviews were conducted with several witnesses that saw the accident, and/or initially helped assist with the student evacuation. These interviews[50] are summarized below.

7.1 First Responder Interviews

- When they arrived, there were still approximately 20 students on the bus with some being in critical condition.
- There was a noncritical girl in the last row with her back against the seat pan on the driver side and her legs were under about four or five other children.
- There was also a boy that was in critical condition still in a seat, on the driver side behind the rear tire area and area of impact area with the dump truck. (The FF/EMT didn't see if the boy had a seat belt on.)
- There was one critical girl that still had her seat belt on and she was hanging into the aisle because her belt was very loose. She was in the last row passenger-side bleeding from the ears and it appeared she had a severe

[49] Several parents picked their child/children up from scene and signed a Refused Medical Attention (RMA) release form or picked their child/children up from the hospital and signed an RMA form.
[50] Refer to Survival Factors Attachment 9 for entire interviews.

fracture of her right arm and had obvious left leg trauma because her jeans were blood soaked.

- There was a fatally injured girl on top of several other students in the back.
- There were some students already out of the bus but the bus driver was still in the bus and stayed in until everyone was out.
- Most of the students came out the front loading door and the critical children were taken out the back.
- Initially the helicopters give an ETA of 15 minutes but due to weather delays, the helicopter arrived 25 minutes after being dispatched. Therefore, all the passengers were transported by ambulance to the hospitals.
- A Patrolman initially on-scene said he didn't notice belt usage on any of the students.
- Another Patrolman initially on-scene said he didn't recall seeing any students with their seat belts on.
- Both EMT's initially on-scene said they never noticed any children with their seat belts on.

7.2 Witness Interviews

- Witness 1, an off-duty County Detective said that when the row of vehicles stopped at the intersection he looked down for something in his book bag and when he looked up he saw the roll-off truck come through the intersection and strike the bus and the bus go up in the air. Initially he wasn't sure if it was the same bus his boys were on since he thought there was another smaller bus in the row of vehicles in front of him. He said he watched the bus rotate into the pole and for a second he thought it may roll over. He said after the bus came to rest, he noticed the bus driver's bald head and knew immediately it was his children's bus.
    - He said after witnessing the accident, he immediately pulled out and drove into the intersection and blocked traffic. He then called dispatch and told the dispatcher that he was at a truck versus school bus crash and gave them the location. He got out of his vehicle and ran to the front loading door of the bus still talking with the dispatcher. There was another woman who had been in a black SUV also at the loading door telling the driver to open it. He said he initially tried pulling at the doors and momentarily confirmed with the dispatcher his location. When he got off the phone, he said the bus driver was attempting to kick out the lower windows of the bus and when that didn't work, he grabbed the doors with both hands and pried them open enough to where he could shimmy his upper body between the loading doors. He said he then bench pressed the doors further apart, enough for him to be able to enter the bus.
    - He said when he got on the bus he saw his boys seated behind the bus driver and saw that that the children forward of row 5-6 were still seated and most of the children towards the back were piled up in the aisle.

- He noticed one girl towards the back, next to where the pole impact was, still seated.
- He walked towards the back, and came across a pile, of what he initially thought was one child on top of book bags, but then realized that it was three children.
- The off-duty County Detective said he never physically saw any children with their seat belts on.

- According to Witness 2, she was stopped at the stop sign on Old York Rd facing the bus at approximately 8:14 or 8:15 am. She said that due to a big blind spot on both sides, both she and the bus had to pull forward a little past the white line. She said she looked to her right and saw the truck coming but it wasn't right on them. Then when she looked straight ahead she saw the bus start pulling away and thought the bus was going real slow and thought "Oh My God" he's not going to make it. The next thing she saw was the impact.
  - After the impact she slammed on her brakes jumped out and ran to the bus door. She said another man also ran to the bus and was at the door trying to get it open. They both started yelling at the bus driver to open the door but he couldn't do it, so then the bus driver started kicking the door to get it open.
  - She said they got the door open and when she on the bus she could see that the children in the front were fine but the children in the back were piled up.
  - She said that she saw a little girl lying in the aisle with her seat belt on still on about 5 rows from the back, just forward of the truck impact area (drivers' side).
  - She also said she didn't notice anyone else with their seat belts on other than the one little girl in the aisle.

- According to Witness 3, she is a teacher at the Elementary school and was on her way to the school and ended up directly behind the bus on Old York Rd as it made stops picking up the children. She said she remained behind the bus as it came up to the intersection where the accident occurred.
  - She said she saw the bus come to a stop then pull forward.
  - Due to being blind in her left eye and having a prosthetic, she never saw the truck coming but did see the bus pull out and heard and saw it get hit by the truck and then saw the bus swing into the pole.
  - She said she called 911 then put her car in park and ran to the bus.
  - When she got on the bus, she said there was already another woman on the bus and went down the aisle as far as she could and saw a girl lying on the floor with her seat belt still on.
  - She said the majority of the children went out the front door.
  - She didn't recall seeing anyone else with their seat belt on but didn't go all the way towards the back.

- According to Witness 4, a retired firefighter, he was traveling east on Old York Road a few cars behind the bus. He saw the bus stop and then proceed across the intersection and he assumed that the bus was going straight across. The next thing he saw was the dump truck hitting the bus and the bus swing into the pole.
    - When he got to the bus he went in the front door which was already open.
    - When he got on he saw a bunch of children towards the front standing up and saw a bunch of kids near the back door. He said the back door was already open when he looked towards the back.
    - He didn't notice any of the children with their seatbelts on.

- According to Witness 5, she was three cars behind the bus and there was a truck in front of her. They all came up to a stop on CR528 and while waiting she saw this huge truck come across the intersection from the left. The next thing she saw was debris flying and the bus swing around and go into the pole. She said she didn't see the big truck swerve and she couldn't see the impact.
    - She put her car in park and got out, calling 911. She said that by the time she got off the phone talking to the 911 dispatcher, she saw a Chesterfield police squad pull up. She went back to her car, backed up into a dirt road adjacent to Old York Road and got out. She said she went to the bus and saw children standing towards the back of the bus and gathered them up to move them away from the bus. She didn't recall the back door being open yet.
    - This witness said that most of the children she saw had just cuts and scrapes.
    - This witness said that a man, who lives across the street, came and offered all of them to come back inside his house.
    - She said she stayed around and tried calling a male students parents but couldn't get through, so when the ambulances came she went with him in the ambulance to the hospital.

- According to Witness 6, he was stopped three cars behind the school bus on Old York Road just prior to the accident.
    - He said when the bus started to pull out, it got about half way into the intersection when he saw the truck come from behind the trees and hit the bus. He said the bus swung around and hit the pole.
    - He said everyone got out of their cars and ran towards the bus. He said he was going to call 911 but could hear everyone else calling so he didn't.
    - According to this witness, as he got up to the bus a Bordentown police squad pulled up and told him to stay back so he went back to his car. A while later an officer came up and gathered his contact information and told him when traffic cleared to go to the police station and give a statement of what he witnessed.

7.3 High School Passenger on Earlier Bus Route

A female interviewee was a bus passenger on an earlier route the morning of the accident, with the same accident involved bus driver. She described several incidents that occurred during her drive on the school bus. She did not report these incidences to the School District but her parents called the police department later after the accident occurred. She said she was seated on the driver's side of the bus for the entire trip that morning.

- According to this interviewee, the bus came up to the intersection of Meany Road and County Road 528. There was a Stop sign on Meany and the bus driver looked both ways but still rolled through the Stop sign. She said as they proceeded through the intersection, there was a green Jeep up approaching and the Jeep had to hit the brakes to avoid striking the bus on the passenger side. She said that the children on the bus started screaming at the driver and asking him, did you not see the car? Did you not see the sign that said stop? According to this interviewee, the driver responded, "I know, I know, but we made it.
- She said, that same morning when they were at the intersection at CR528 and CR537, they were going to make a left-hand turn off of CR528 onto CR537, the bus driver failed to yield the right-of-way to car coming the opposite direction. The bus driver continued making his left turn and the other car had to beep its horn.
- She said, the final incident that morning occurred in the school parking lot when the bus driver drove past their normal parking spot and he almost it the bus head-on. The other bus stopped and then the accident bus driver ended up backing into the normal parking spot.

According to an investigator with the Burlington County Prosecutors office, no final determination was made regarding this interview and another interview with a high school student that made similar allegations against the bus driver. The investigator added that because they focused their investigation on the circumstances surrounding the accident the claims made by the high school girls did not play a role in determining who was at fault in the accident.

END OF REPORT

Attachments

1. Survival Factors Group Attachment 1. IC/Navistar Loading Door Test.
2. Survival Factors Group Attachment 2. Parent Letter and Student Questionnaire.
3. Survival Factors Group Attachment 3. Student Questionnaire Responses.
4. Survival Factors Group Attachment 4. New Jersey State Police and Burlington County Police Departments Dispatch Logs.
5. Survival Factors Group Attachment 5. Burlington County Fire and EMS Dispatch Logs.
6. Survival Factors Group Attachment 6. Chesterfield Hose Company and Crosswicks Fire Company Incident Reports.
7. Survival Factors Group Attachment 7. Burlington County EMS Mass Casualty Incident Plans.
8. Survival Factors Group Attachment 8. Student Injury List.
9. Survival Factors Group Attachment 9. First Responder and Witness Interviews.
10. Survival Factors Group Attachment 10. Northern Burlington County Regional School District seating chart.
11. Survival Factors Group Exterior and Interior Photographs (13) of 2004 Mack Granite Roll Off Truck and 2012 International 54-Passenger School Bus.

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Survival Factors Group Chairman