



**National
Transportation
Safety Board**

NTSB School Bus Investigations Baltimore, MD /Chattanooga, TN

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Agenda

- Who is the NTSB?
- Most Wanted List
- Baltimore, MD
- Chattanooga, TN
- Q & A

Who is the NTSB?

- Independent Federal Agency
- Headquartered in Washington, DC
- Non-enforcement
- 400 staff nationwide
- Mission: Probable cause and issue safety recommendations



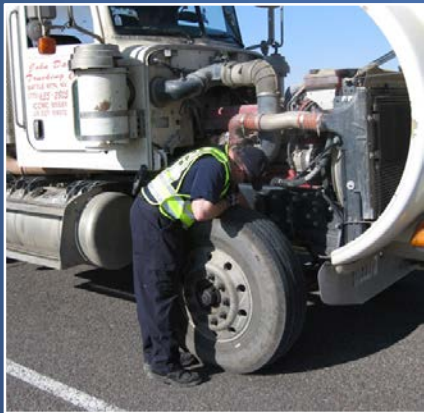


Multimodal



Office of Highway Safety

- 32 total staff
- Response Operations Center
- Go-Team Ready to “launch” 24 / 7



Types of Crashes

- School bus, motor-coach, transit bus, mini bus, van
- Tractor-trailer
- Railroad grade crossing
- Highway bridge collapse
- Most Wanted
- Congressional
- High media
- Special Study:
 - Bicycle
 - Pedestrian
 - Motorcycle
 - Tires



NTSB 2019–2020

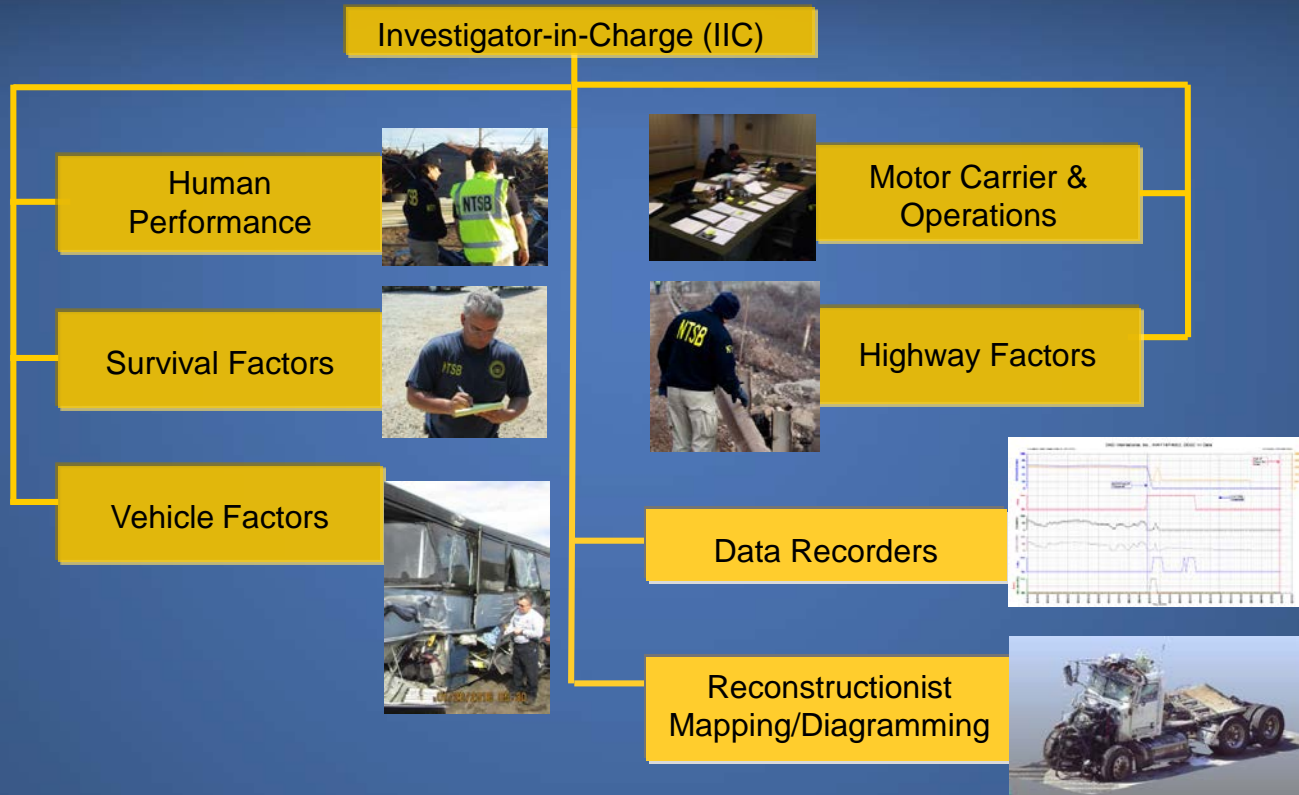
MOST WANTED LIST

OF TRANSPORTATION SAFETY IMPROVEMENTS

- End Alcohol and Other Drug Impairment
- Eliminate Distractions
- Ensure the Safe Shipment of Hazardous Materials
- Require Medical Fitness-Screen and Treat Obstructive Sleep Apnea
- Implement a Comprehensive Strategy to Reduce Speeding-Related Crashes
- Increase Implementation of Collision Avoidance Systems in All New Highway Vehicles
- Improve the Safety of Part 135 Aircraft Flight Operations
- Reduce Fatigue-Related Accidents
- Strengthen Occupant Protection
- Fully Implement Positive Train Control



Highway's Multidisciplinary Go-Team



Special Investigation Report

Baltimore, MD

Chattanooga, TN

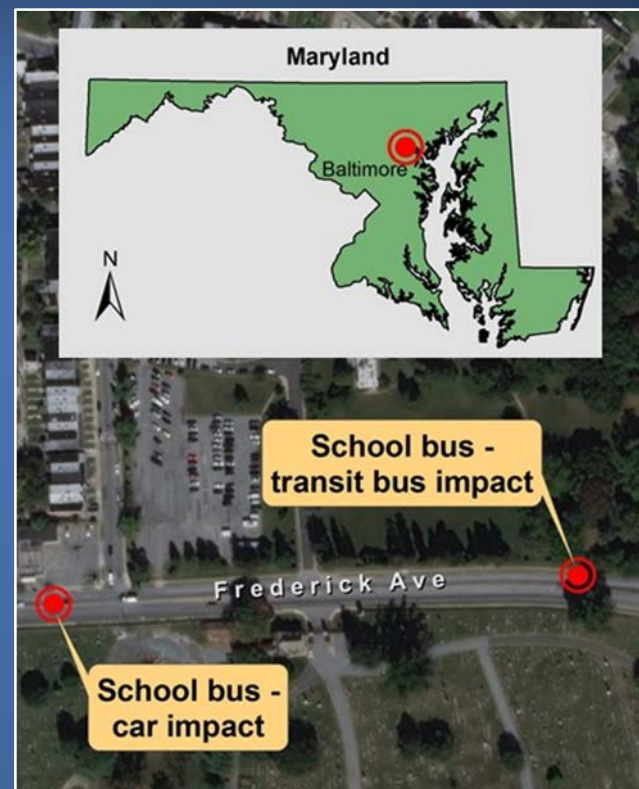
- | | | |
|---|----------------------|---|
| ✓ | Bus driver oversight | ✓ |
| ✓ | Carrier oversight | ✓ |
| ✓ | Crash prevention | ✓ |
| | Seatbelts | ✓ |

Selective Issues in School Bus Transportation Safety: Crashes in Baltimore, Maryland, and Chattanooga, Tennessee



Baltimore, Maryland

- November 1, 2017 @ 6:30 a.m.
- 2015 IC school bus
 - 67-year-old driver, bus aide
 - AAAffordable Transportation LLC / BCPS
- 2012 Ford Mustang
 - 51-year-old driver
- 2005 New Flyer transit bus
 - 33-year-old driver, 13 passengers
 - Maryland Transit Administration



Crash Sequence



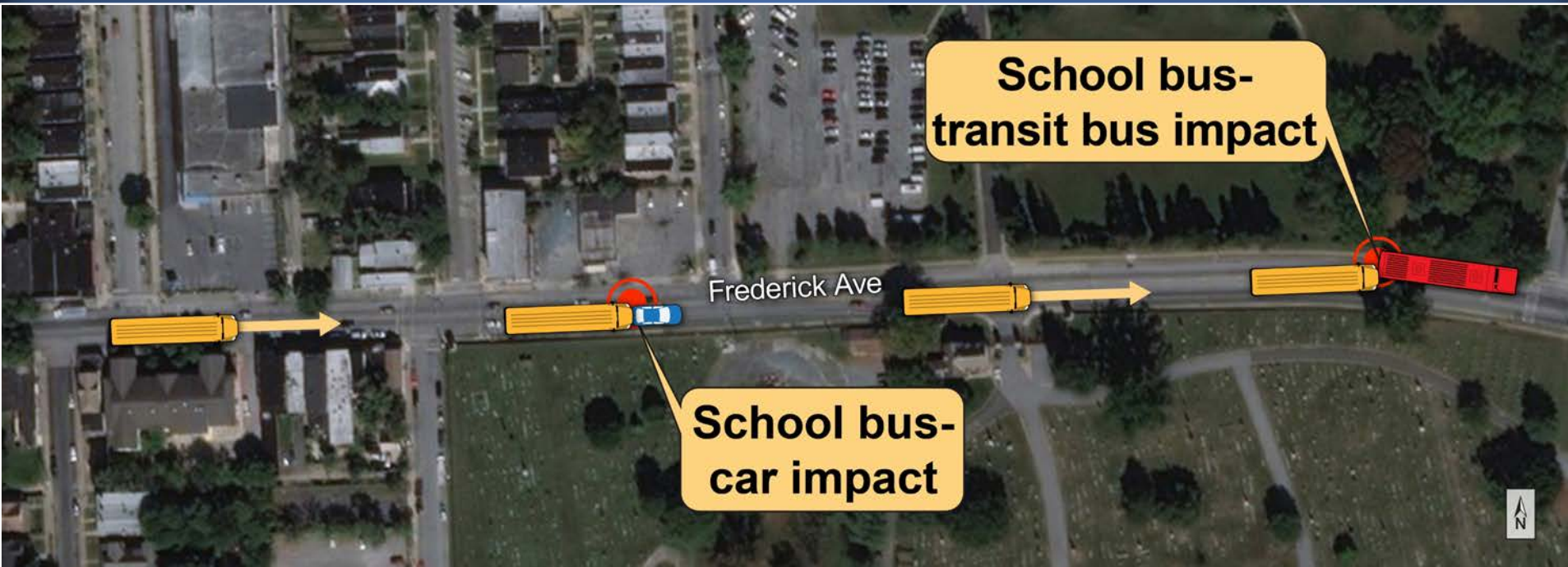
Crash Sequence



Crash Sequence



Crash Sequence





11/01/2016 02:59



090

2289

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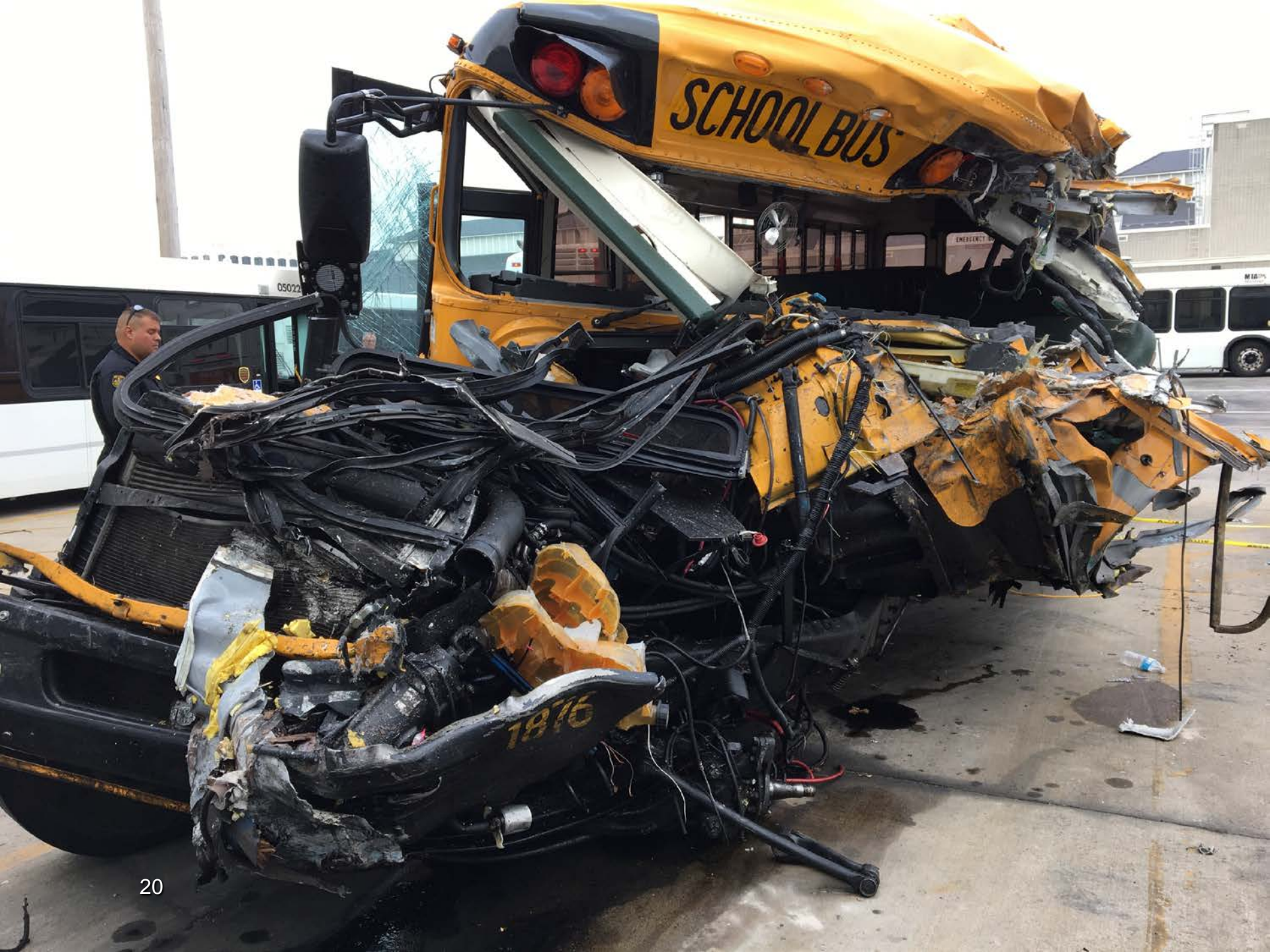
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1876

AA AFORDABLE
TRANSPORTATION LLC
410.945.9001

11/01/2016 02:33



Crash Scene & Injury Information



- **Fatalities** (2 bus drivers, 4 transit passengers)
- **Serious injuries** (5 transit passengers)
- **Minor injuries** (school bus attendant, 4 transit passengers, car driver)

Baltimore City Public Schools (BCPS)

- 95% school bus contracted
- Heavily involved with daily operations
- Transportation department maintained all documentation (application, CDL, medical, training etc)
- 2008–2016 driver worked for 5 contractors
- Accident reports - 5 school bus crashes
 - October 2011 “*passed out*”
 - No follow-up or action taken

AAAffordable Transportation

- Hired in May 2014 (left in April 2016)
- Reliable Transportation April–May 2016
 - Staff witnessed seizure
- AAAffordable rehired driver in August 2016
 - No background check
- October 24 (1 week prior to crash) had seizure
 - Witnessed by dispatcher
- Dispatched for 5 days until crash without doctor's release

Baltimore School Bus Driver

- Seizures since childhood
 - Sudden, unpredictable, loss of consciousness
- Forget to take RX as required
- Incapacitated by a seizure led to crash
- Falsified long form - denied seizures to get medical card
- Fraudulently obtained CDLs
- No one reported him to Maryland MVA



Findings: AAAfordable & BCPS Poor Oversight

- AAAfordable allowed medically unfit driver to operate school bus
- BCPS failed to recognize driver high risk
 - Failed to follow its own SOPs
 - Crash reports incomplete
 - Lacked threshold for crashes
 - Failed to follow COMAR

Crash Prevention Technologies

- Collision avoidance systems mitigate or prevent crashes by detecting vehicles ahead
- Automatic emergency braking intervenes regardless of driver vigilance



Baltimore: with CAS and AEB

- Impact with transit bus would not have occurred, saving lives

Probable Cause

The National Transportation Safety Board determines that the probable cause of the *Baltimore, Maryland*, school bus crash was (1) the loss of vehicle control due to incapacitation of the bus driver because of a seizure stemming from a long-standing seizure disorder; (2) the bus driver's continued operation of a school bus with a disqualifying medical condition and a fraudulently obtained commercial driver's license; and (3) the failure of AAAfordable Transportation and the Baltimore City Public Schools to provide adequate bus driver oversight, allowing the medically unfit driver to drive a commercial vehicle with a medical condition that they knew, or should have known, could lead to the unsafe operation of the school bus. Contributing to the severity of the crash was the lack of a collision avoidance system with automatic emergency braking on the school bus.

Recommendations

- **Baltimore City Public Schools:** request an independent 3rd party audit of your transportation department. Review bus drivers who may have disqualifying conditions under Maryland Code of Regulations (COMAR). Take corrective action of stated recommendations from audit
- **Maryland Dept of Education:** Clarify definitions of disqualifying conditions for driver pre-employment screening

Recommendations Continued

- **FMCSA** – certified medical examiners request complete list of current medical conditions and medications when obtaining supplemental information from a commercial driver's health care provider
- **Maryland Motor Vehicle Administration** – Continue the facial recognition program to prevent CDL fraud
- **Maryland DOE** – publicize to school districts methods available to report drivers with medical conditions that may affect their ability to operate a school bus



National Transportation Safety Board

Chattanooga, TN

Chattanooga, Tennessee



- November 21, 2017
- 2008 Thomas Built school bus
 - 24-year-old driver
 - 37 students
- Durham School Services
- Hamilton County Department of Education

Crash Sequence



- 3:13 pm. departed Woodmore Elementary School
- Traveled south on Talley Road

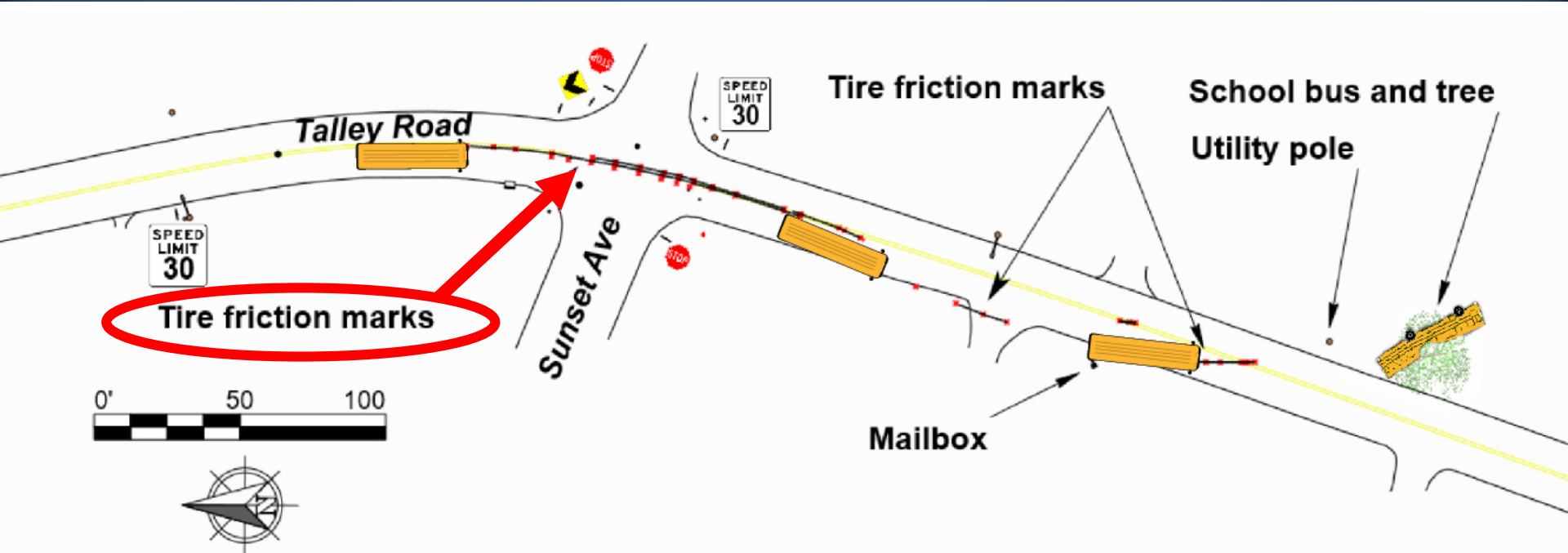
Crash Sequence



Crash Sequence



Crash Sequence



Video Analysis, Crash Simulation



- Bus at 52-mph
- 30-mph speed limit zone
- On cellphone
- Excessive speed resulted in loss of control

- Students: 6 fatally injured, 26 serious-to-minor injuries
- 5 students and driver uninjured

Chattanooga, TN Driver

- Driver experience
 - Hired in 2016, had driven few weeks total before crash
- Job performance
 - Previous crashes, numerous complaints

Date	Complaint	Source
August 11	Speeding	Durham School Services
August 12	Speeding	Durham School Services
August 18	Crash in bus (not reported)	Durham School Services
September 20	Crash in bus	Durham School Services
September 28	Intentionally makes students fall by erratic driving	Woodmore Elementary School (parents)
October 27	Speeding	Durham School Services
October 28	Speeding	Durham School Services
November 8	Speeding	Durham School Services
November 16	Erratic driving	Woodmore Elementary School (students)
November 18	Speeding	Woodmore Elementary School (principal)

Durham, HCDE Oversight

- Hamilton County Dept. of Education
 - Contracted Durham but had limited oversight
 - Forwarded all complaints to Durham
- Durham School Services
 - Lacked systematic complaint tracking
 - Failed to provide adequate driver oversight



Summary

- Durham School Services
 - Lacked systematic complaint tracking
 - Failed to provide adequate oversight
- Durham and Hamilton County School District
 - Lack of documentation and resolution
 - Failed to remove unsafe driver



Electronic Stability Control (ESC)

- Ensures automatic emergency braking benefits
- Evaluates, intervenes in loss of control events
- 2015 *FMVSS 136*
 - excludes school buses
- 2017 Canadian *CMVSS*
 - includes school buses



Chattanooga:

- ESC could have assisted in maintaining control & mitigated crash severity



NTSB

Crash Prevention Technologies

- Can prevent or mitigate crash severity
- Requirement is long overdue
- Some manufacturers installing technologies
- Can industry adopt ahead of a mandate

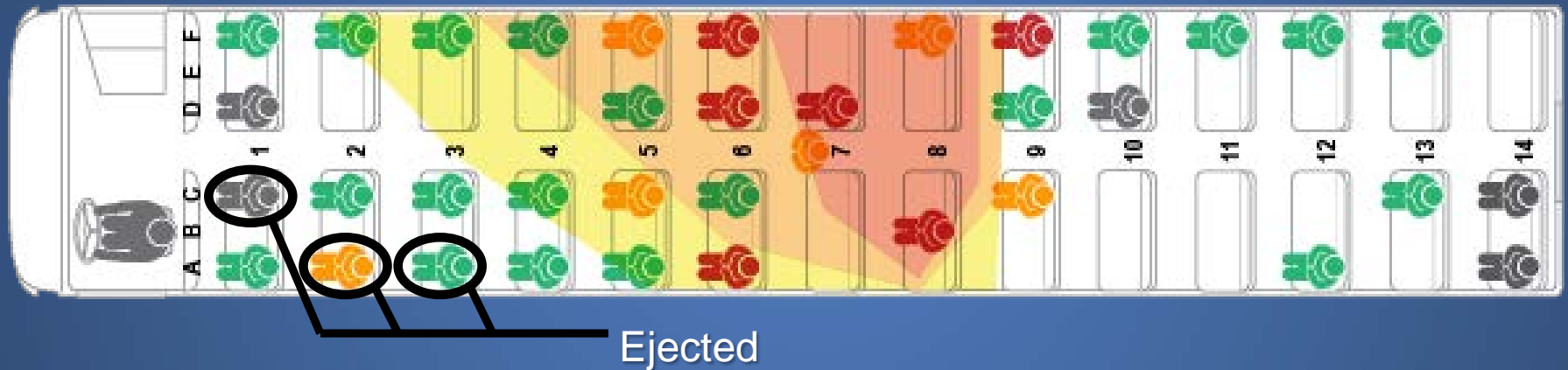
Crash Sequence Effect

- Evidence from roadway, witnesses, video system
- Loss of control over 300 feet prior to impact
- Bus beginning to roll prior to impact with utility pole
- Bus overturned onto passenger side
- Passengers thrown from seats prior to rollover/impact



Chattanooga School Bus

Roof crush Severity: mild, moderate, severe



Injury severity: fatal (red), serious (orange), minor (green), none (gray)

37 passengers: 6 fatal, 6 serious, 20 minor, 5 uninjured

Roof Crush, Intrusion, Injuries



Injury from occupant flailing / impact, ejection, intrusion



NTSB

Chattanooga Crash Outcomes

- Passengers in front of bus vulnerable to ejection
- All vulnerable to secondary impact
- More students thrown *into* not out of intrusion zone
- Loss of benefits of compartmentalization

Seat Belts on Large School Buses

- Federal Motor Vehicle Safety Standard 222
 - Established performance standards for voluntary installation of lap/shoulder belts on large school buses
- Compartmentalization inadequate
- Lap/shoulder belts provide best protection
- Recommend states require lap/shoulder belts
- Recommend manufacturers install lap/shoulder belts as standard (not optional) equipment



Findings

None of the following were primary or contributing factors in the Chattanooga, Tennessee, crash:

(1) school bus driver licensing or medical certification; (2) substance impairment, medical condition, or driver fatigue; (3) mechanical condition of the school bus; (4) weather; or (5) roadway design or conditions.

Probable Cause

- The National Transportation Safety Board determines that the probable cause of the *Chattanooga, Tennessee*, crash was (1) the school **bus driver's excessive speed and cell phone use**, which led to the loss of vehicle control; (2) Durham School Services' **failure to provide adequate bus driver oversight**, allowing an inexperienced driver to operate a commercial vehicle with escalating risky driving behaviors that it knew, or should have known, could lead to the unsafe operation of the school bus; and (3) the Hamilton County Department of Education's **lack of followup to ensure that Durham had addressed a known driver safety issue**. Contributing to the severity of the crash was the **lack of passenger lap/shoulder belts on the school bus**.

Recommendations

- **National Express LLC** - Implement a process to track driver complaints from initial call to case resolution throughout your student transportation service provider companies, including Durham School Services.
- Use industry best practices to establish resolution accountability for serious or recurring safety violations, to include effective remediation of unsafe driver behavior

Positive Actions

- Durham and National Express
 - Improved driver monitoring (camera systems, training)
 - Database for complaint resolution
- Tennessee
 - Law enacted for oversight of contracted transportation service providers by local education authorities and school districts
 - Annual training for transportation supervisors
 - Formal policy for bus safety complaint resolution

Driver Behavior Monitoring Systems

- Precrash
 - Limited video available
 - Only supervisor reviewed, no resolution tracking
- Postcrash
 - New camera systems installed
 - Third-party reviewers
 - Durham notified of unsafe events

July 2018 News Reports

“Electronic Stability Control Now Standard on IC School Buses”

New CE and RE Series diesel buses with air brakes feature ESC and collision mitigation technology as standard. ESC will be available for IC’s propane and gasoline buses with air brakes in 2019.

“Thomas Built Buses Makes Electronic Stability Control a Standard Feature”

ESC will be standard on all new Saf-T-Liner C2 diesel and CNG school buses produced on or after July 23

Positive Actions

- States, school districts with lap/shoulder belts
 - Reduced driver distraction, improved student behavior
- NHTSA to study additional benefits of seatbelts
 - Reduced driver distraction, improved student behavior

School Bus Safety Act, H.R. 6773

September 2018 - Senator Tammy Duckworth and Representative Steve Cohen introduced legislation to require the U.S. DOT to issue rules that require all newly manufactured and purchased school buses to not only be equipped with standard three-point seat belts but also automatic emergency braking systems, event data recorders and electronic stability control (ESC).

August 2018

New Jersey Law to Require 3-Point Seat Belts on New School Buses

Gov. Phil Murphy signs a law that upgrades the requirement for seat belts on new school buses from lap-only belts to lap-shoulder belts. The law applies to school buses manufactured on or after 180 days of Murphy's signature.

Conclusions

- Every day 600.000 buses carry more than 25 million students to and from school and activities.
- School buses are still *the safest* means of transportation to and from school
- There is always room for improvement, and more can be done

"From tragedy we draw knowledge to improve the safety of us all."

Emblazoned on NTSB Training Center



NTSB Reports and Documents – www.nts.gov

The image shows a screenshot of the National Transportation Safety Board (NTSB) website. At the top left is the NTSB logo, featuring an eagle with a shield. To its right, the text "NATIONAL TRANSPORTATION SAFETY BOARD" is displayed. A search bar with the placeholder "Search this site..." and a "Search Site" button is located in the top right corner, with a link to "Advanced Search" below it. A horizontal navigation menu contains the following items: HOME, NEWS & EVENTS, SAFETY ADVOCACY, INVESTIGATIONS, DISASTER ASSISTANCE, LEGAL, ABOUT, and PUBLICATIONS. The "INVESTIGATIONS" menu item is highlighted, and a dropdown menu is open, listing: The Investigative Process, Accident Dockets, Data & Stats, Accident Reports, Aviation Database, and General Aviation Safety. The "Accident Dockets" and "Accident Reports" items are circled in red. Below the navigation menu is a large banner area. On the left, there is a map showing a road with a yellow circle around a point labeled "Object detected as bicycle". On the right, there is a "B News" section with a blue "Read More" button. At the bottom of the page, there is a footer with the text "NTSB Response Operations Center" and a "News @ NTSB" link accompanied by social media icons (RSS, Twitter, Facebook, YouTube, LinkedIn, Email), which is also circled in red.