



**National  
Transportation  
Safety Board**

# Updates Regarding NTSB School Bus Investigations

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# Outline

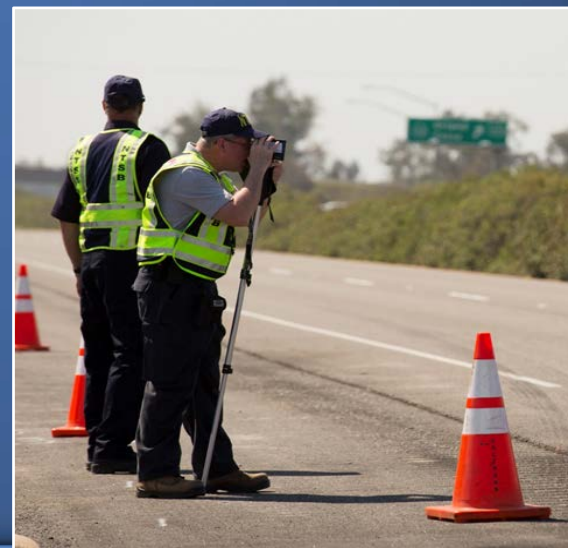
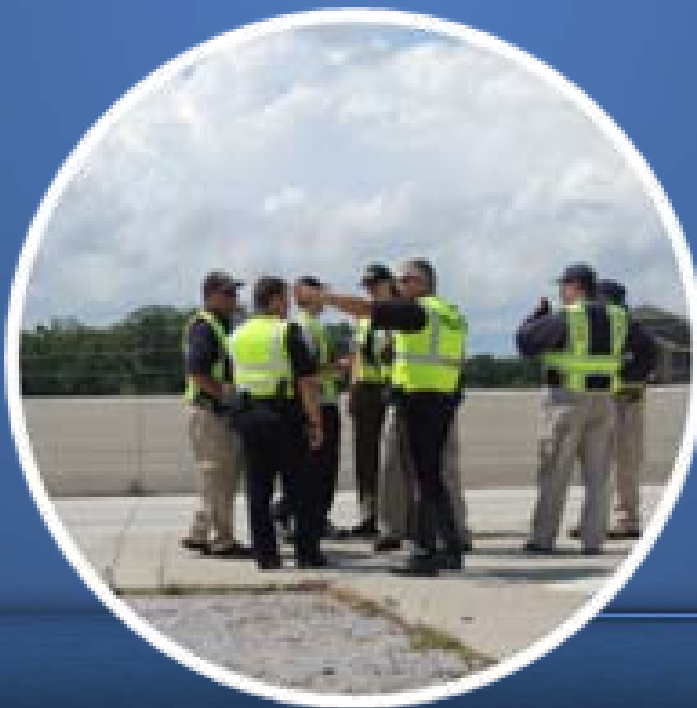
- Who is NTSB ?
- Current Investigations
- Special Investigation Report
  - *Baltimore, MD & Chattanooga, TN crashes*
- Discussion

# NTSB



# *Independently Advancing Transportation Safety*

- 32 Office of Highway Safety staff
- Response Operations Center
- Ready to “launch” 24 / 7



# What types of highway crashes do we investigate?




# Board Meeting

- Public meeting in Washington, DC
- Webcast
- Staff presentations
- Board member deliberations
- Official adoption of:
  - Report
  - Findings
  - Probable cause
  - Safety recommendations



# Most Wanted List 2018-2019



**Require medical fitness**

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**Increase implementation of collision avoidance technologies**

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**Strengthen occupant protection**

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**Eliminate distractions**

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# Current School Bus Investigations

- *Helena, Montana* (November 2017)
  - Side impact crash, rollover
- *Oakland, Iowa* (December 2017)
  - Run-off-road, postcrash fire
- *Mesquite, Texas* (October 2018)
  - Run-off-road, postcrash fire



# Helena, Montana

- November 27, 2017 about 7:13 a.m.
- 2011 Chevrolet Express school bus (belt equipped)
- Helena School District (driver, 3 students)
- Stop sign intersection, left side impact



Source: Independent Record



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# Mesquite, Texas

- October 3, 2018 about 3:56 p.m.
- 2019 IC Bus (lap/shoulder belts)
- Mesquite ISD (driver, 42 passengers)
- Run-off-road, rollover with postcrash fire



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# Oakland, Iowa

- December 12, 2017 about 6:52 a.m.
- 17000 Block 480<sup>th</sup> Street
- 2004 International school bus
  - 74 year-old driver
  - 16 year-old passenger
- 2 fatal



# Oakland, Iowa



# Oakland, IA



Driver side - rear



Loading door side



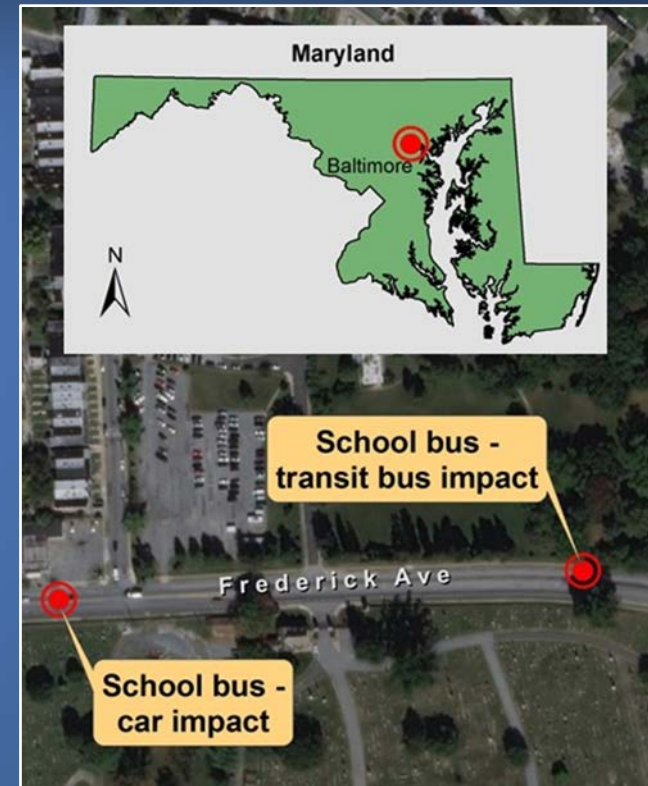
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## *Selective Issues in School Bus Transportation Safety*

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





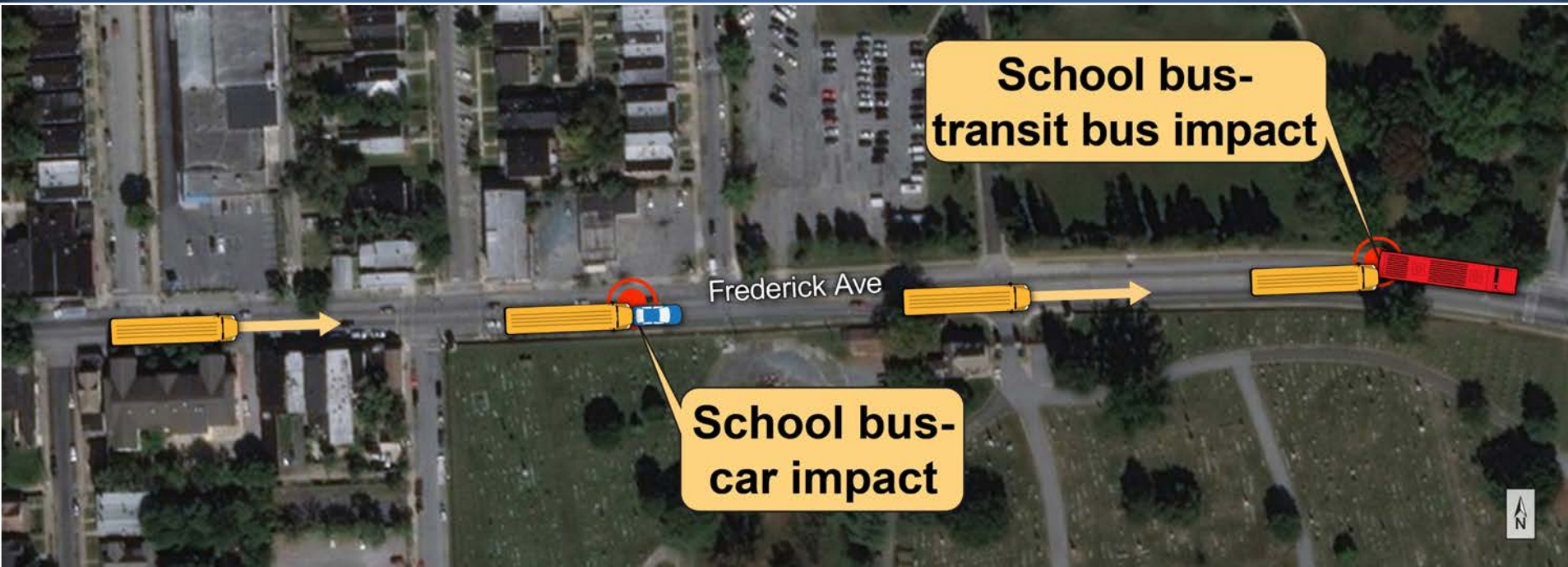
# Crash Sequence



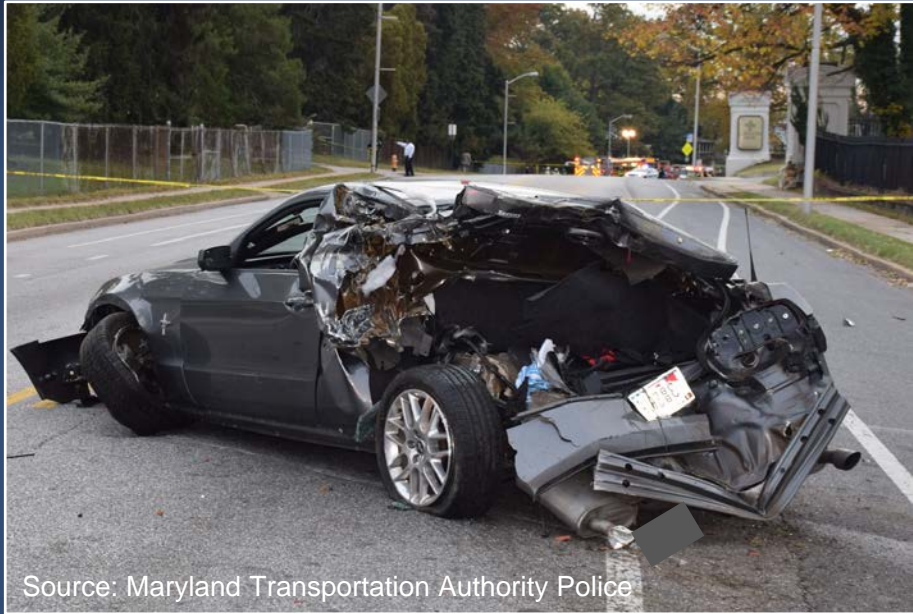
# Crash Sequence



# Crash Sequence



# 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)

# Chattanooga, Tennessee



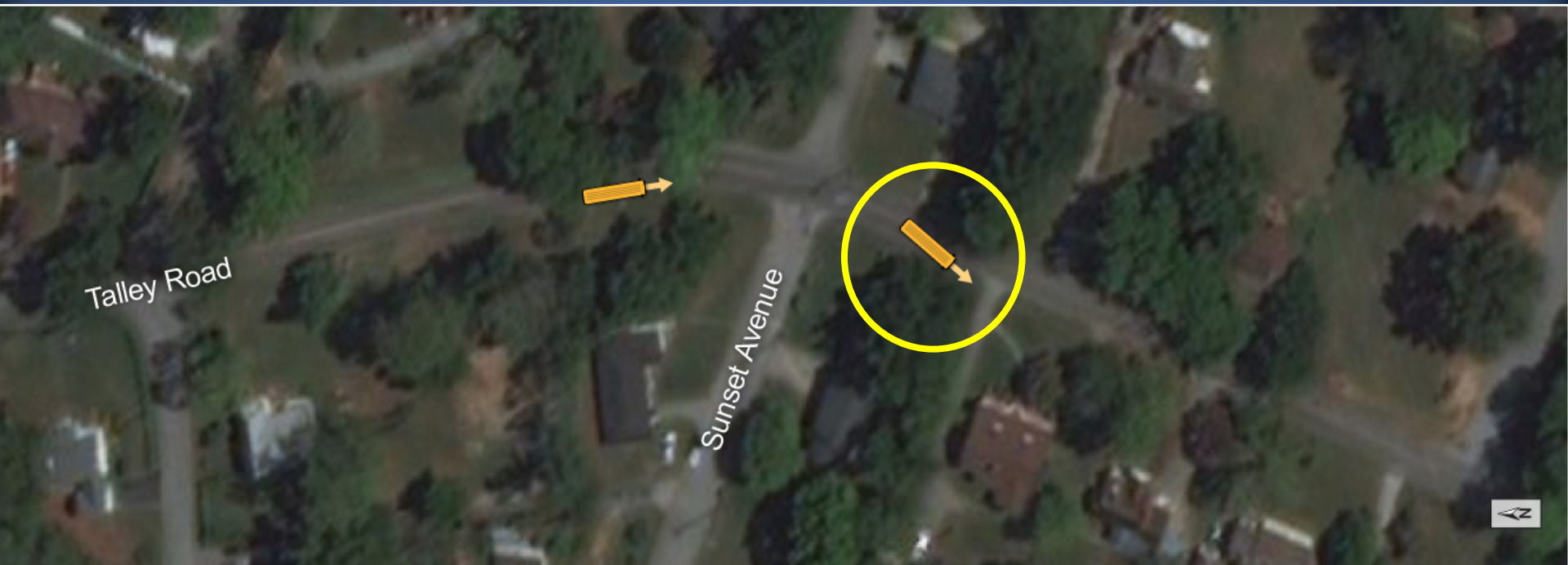
- November 21, 2017
- 2008 Thomas Built school bus
  - 24-year-old driver
  - 37 students
- Durham School Services
- Hamilton County Department of Education

# Crash Sequence



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

# Crash Sequence

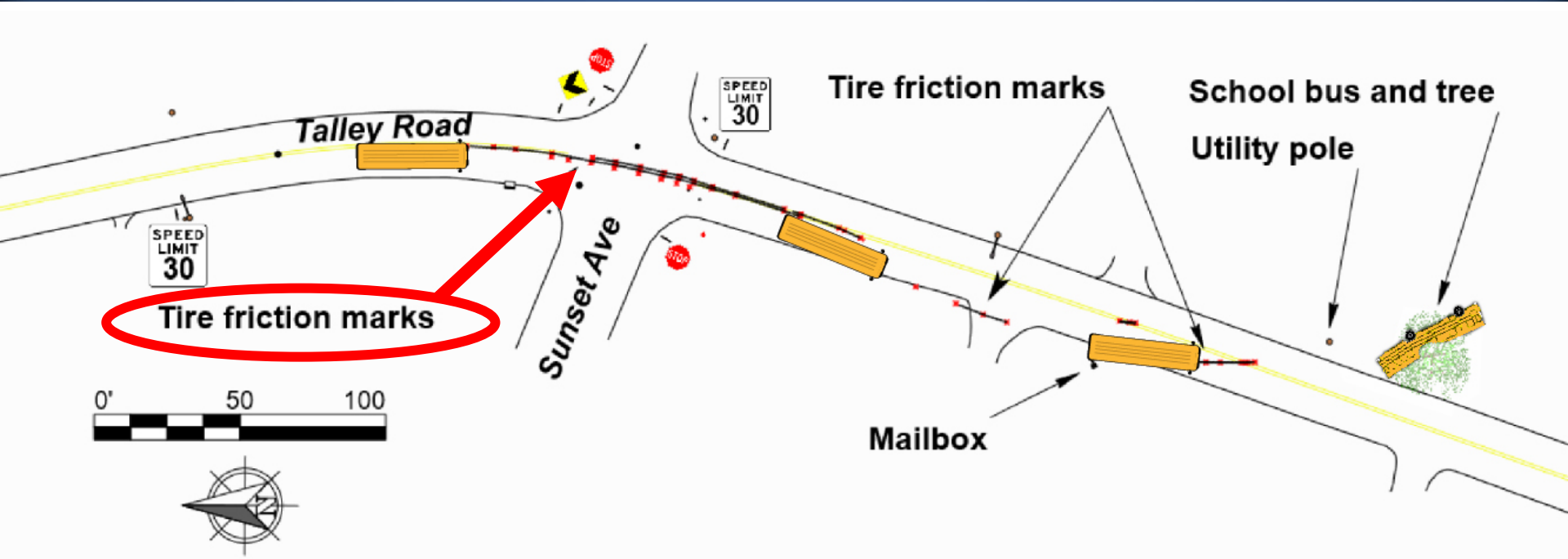


# Crash Sequence





# 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

# Special Investigation Report

*Baltimore, MD*

*Chattanooga, TN*

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

# Baltimore School Bus Driver

- Seizures since childhood
  - Sudden, unpredictable, neurologic episodes
  - Loss of consciousness, uncontrolled movements
- Incapacitated by a seizure led to crash
- Denied seizures to get medical card
- Fraudulently obtained CDLs
- Additional effort needed to increase referral of medically unfit drivers to MVA

# AAAfordable Transportation

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

# Baltimore City Public Schools (BCPS)

- Heavily involved with daily operations
- Maintained all documentation
- 2008–2016 driver worked for 5 contractors
- 5 school bus crashes
  - October 2011 “*passed out*”
  - No followup or action taken

# AAAfordable & BCPS 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

# 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



# 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

# 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



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# 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





# 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

# Positive Actions

- Code of Maryland Regulations modified
- 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

# 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

- 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."***

*Questions?*



# National Transportation Safety Board

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