

# **Virginia Association for Pupil Transportation**

2010 Annual Meeting,

Richmond, Virginia

June 24, 2010

## **Seat Belt Pilot Study Update: Countdown to Final Report**

**The Governor's Task Group on School Bus Seat Belts  
and the Alabama State Department of Education**

Joe Lightsey

Director of Pupil Transportation

Alabama State Department of Education



## The Beginning, November 2006

- 71-passenger IC school bus with 42 students aboard crashed over an interstate bridge barrier and 30 feet to the ground below.
- Bus rode guard rail for 117 ft.
- 4 fatalities and 37 injuries, 23 students treated and released
- **Driver was not wearing seat belt!**



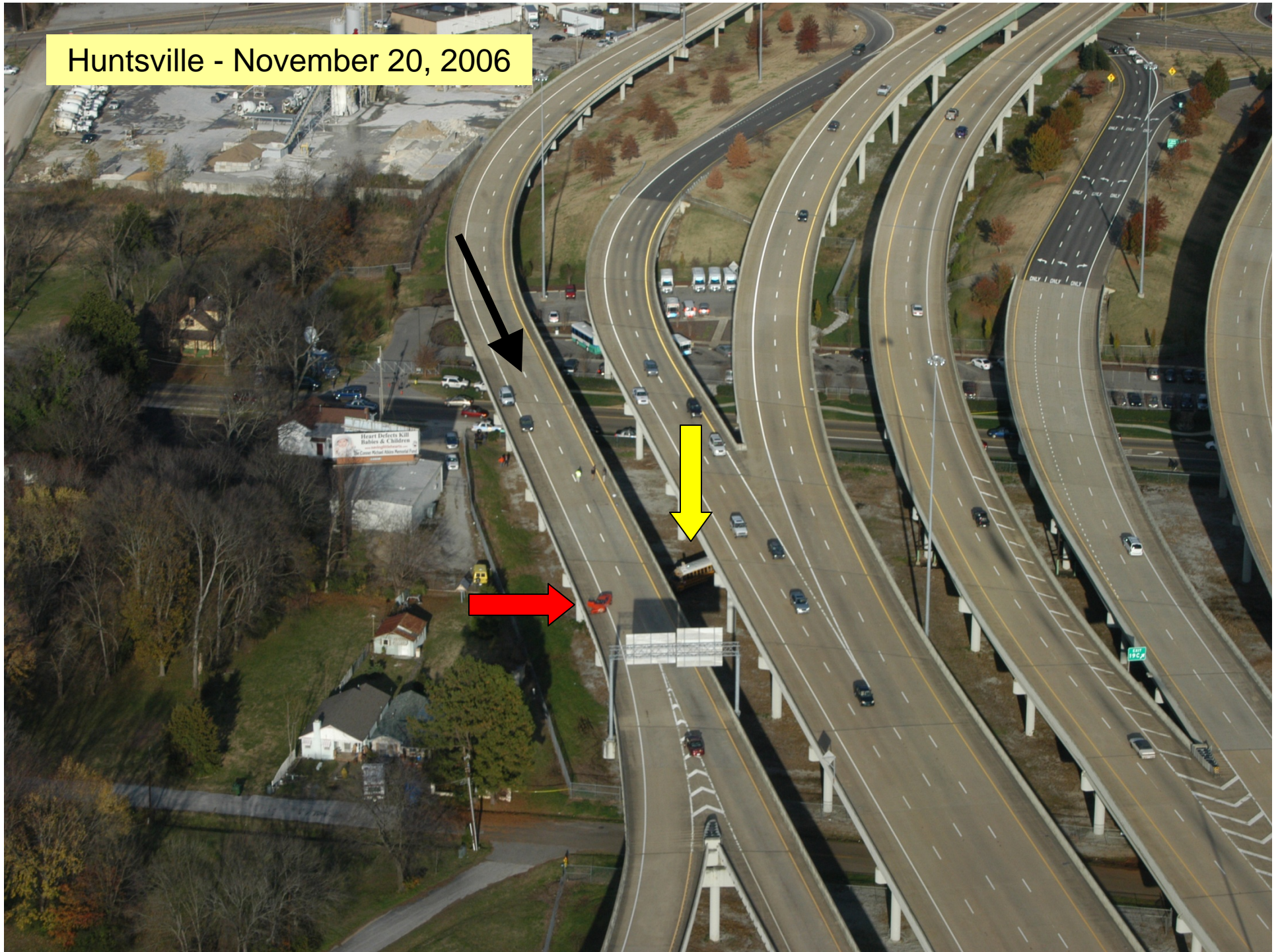


Huntsville - November 20, 2006



School Bus Wheel Impacted Car

Huntsville - November 20, 2006



Huntsville - November 20, 2006





School Bus Driver Ejected



Huntsville - November 20, 2006



Huntsville - November 20, 2006



Huntsville - November 20, 2006



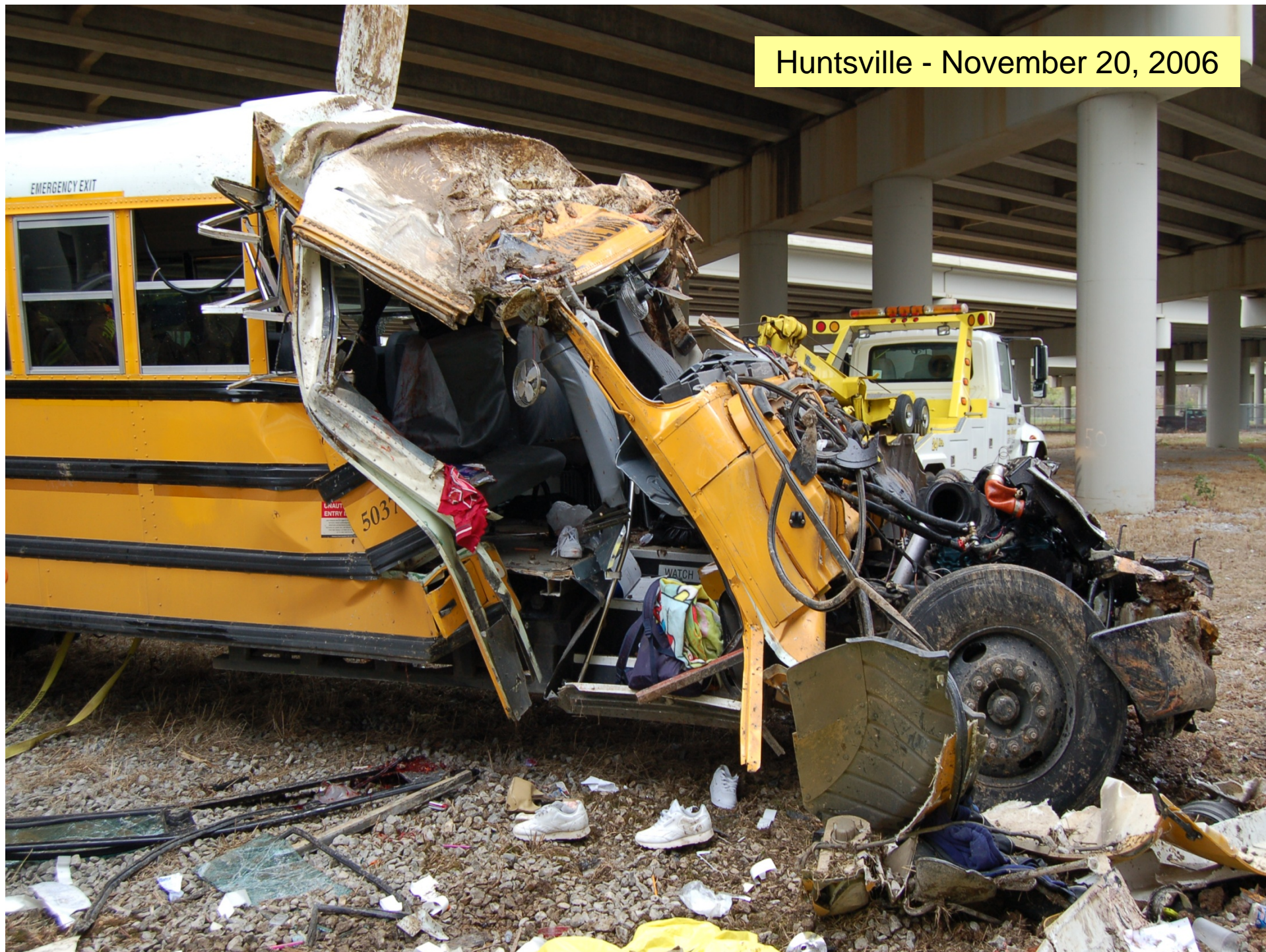
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Huntsville - November 20, 2006



Huntsville - November 20, 2006





## **Governor's Study Group on** **School Bus Seat Belts**

- *State Superintendent of Education*
- *State Board Member*
- *Director of Alabama DOT*
- *Superintendent of Huntsville City Schools*
- *Commissioner of Children's Affairs*
- *Director of Alabama DPS*
- *Director of SDE Pupil Transportation*





## Governor's Study Group on School Bus Seat Belts

- Thoughtful approach, no useful previous studies
- Federal agencies did not know answers
- **DO NO HARM!**
- Recommendations:
  - Push NHTSA on safety and performance standards.
  - Conduct a pilot study to gather own data. (\$1.4 million)



## Seat Belt Pilot Study

- Overall goal: *Assess impact of installation of lap/shoulder seatbelts on a limited number Alabama school buses.*
- 10 school systems
- 12 buses (*3 manufacturers, 3 seat types, 3 digital camera systems, 6 buses with aides, etc.*)
- Well-designed study

# Alabama School Bus Facts

- 9,400 buses (89% < 10 years old)

**Alabama school bus passenger fatalities**

**5 since 1969**

\$875 annual cost per student

# National School Bus Facts

- **20 pupil fatalities/year (75% are pedestrians loading or unloading the bus)**
- **In parent's vehicle: 8 times more likely to die than on a school bus (NHTSA)**
- Safety via large, heavy, rugged, compartmentalized vehicle with trained drivers



## Seat Belt Pros and **Cons**

- *They work in cars.*
- *Children should be trained to wear seat belts in every vehicle.*
- *Little advancement in passenger vehicle safety since 1977 (compartmentalization)*
- *Little scientific research to demonstrate significant reduction in deaths or injuries*
- *Compartmentalization currently provides excellent safety for child passengers*
- *Safest form of student transportation*

# State Seat Belt Legislation

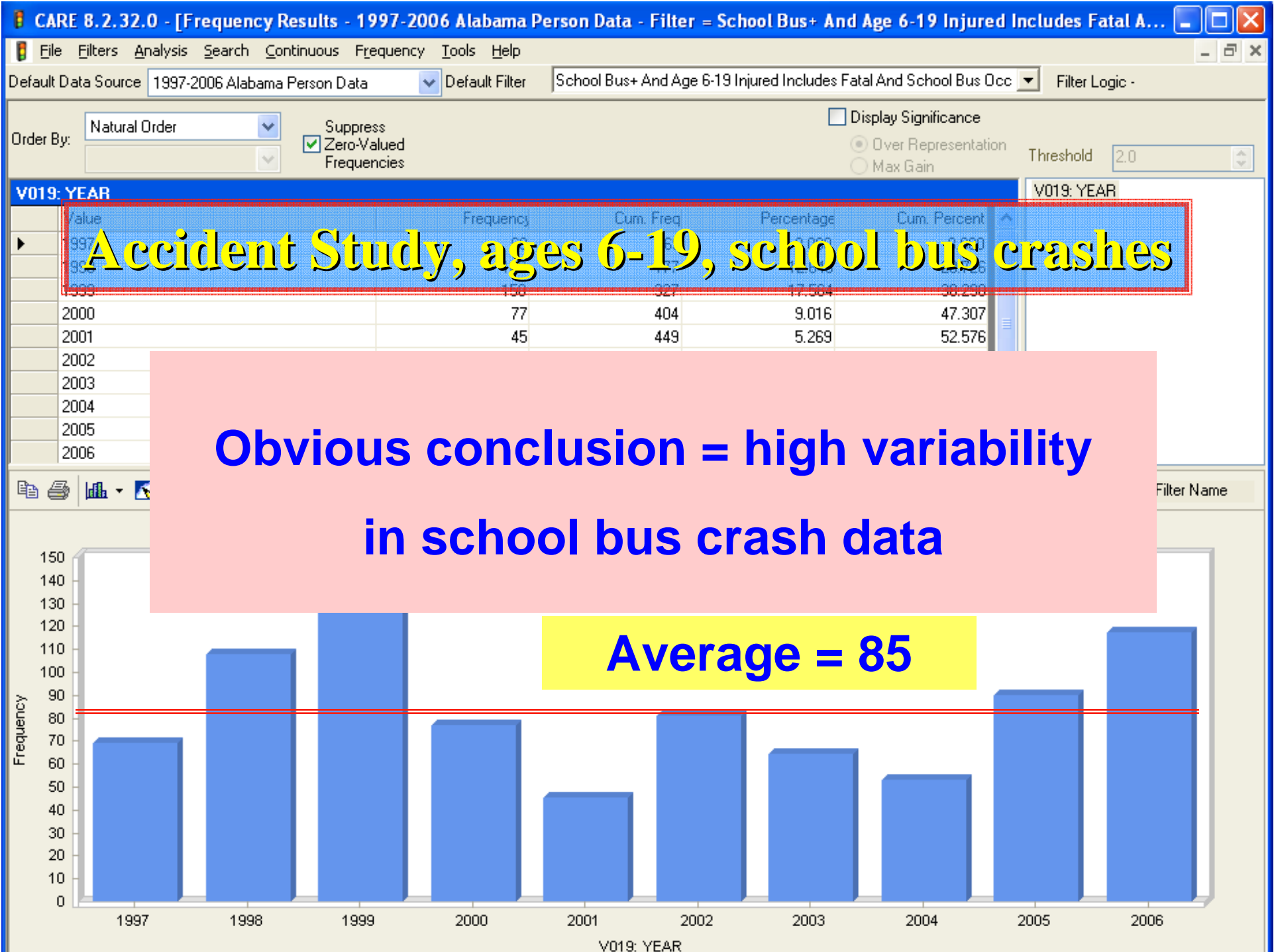
- **New York:** 1984 made use optional (2-point belts)
- **New Jersey:** 1992 made belt use mandatory
- **Florida:** buses purchased after Dec 31, 2000 to be equipped with safety belts
- **California:** 2004 – lap/shoulder belts required on all new buses
- **Louisiana:** 2006 - seat belts required on new buses, when Legislature provides funds
- **Texas:** 2007 - lap/shoulder belt required on buses purchased after Sept. 1, 2010

# The Alabama Pilot Project

Will answer **national questions**.  
Most comprehensive and expansive to date.

Today is a look at the “almost finished” results.







## Estimate Reduction in Fatalities Due to Seat Belts

- Use most recent 10 years. (5 fatalities in Alabama)
- Estimate future fatalities by comparing to national (NHTSA) studies/data.
- But there is no school bus safety belt factor!
- Borrow credible car seat belt safety factors -- 50% for frontal impacts (*conservative due to other bus safety features*); less effective for side and rear impacts
- As an example:

# 5 Alabama pupil lives lost in past 10 years.

How might have could have been saved with seat belts?

	<u>Estimated Fatalities</u>
Front	2.05
Side	0.69
Non Collision	0.02
Rear	2.21
Top/Bottom	<u>0.02</u>
Total	5.00

**Now account for  
seat belt use rate**

**AL rate 63%**



# Capacity Study

Seat widths, thicknesses, and spacing

*Will changes in seat configuration and spacing  
cause a loss of school bus capacity?*

ROLINA PUBLIC SCHOOLS  
WAKE COUNTY

1142



# Capacity – *based on human seat width*

- 13” = 10 year old
- 15” = 14 year old male
- 18” = 18 year old male

**What is the trend in pupil body size over the last 25 years?**



SOURCE - Child Anthropometry for Restraint System Design.  
June 1985 University of Michigan, Ann Arbor

## Capacity Loss

Now:

With Seat B

Wow! We will  
need a lot more  
school buses!

2 rows =  
high school

rows =  
middle /high school

- *Installing seat belts will not overload all buses.*
- *Some buses do not currently carry a full load.*
- *For buses that are overloaded, some pupils can go to other routes.*
- *Possible result: need somewhere between 3 and 20% more buses.*

# One Possible Solution

## Flexible Seating

Seat fits 3 elementary or  
2 middle/high school

(minimum of 40 pounds  
and four years of age)

(maximum of 70 pounds  
in center position)



**Problem solved....or maybe not.....**

## Another Issue – Thicker Seat Backs

Seat padding is thicker, going from 3" thick to 5"-7"  
= less leg room? = loss of one row?

Possible solution:

Lengthen bus a couple of feet and move rear axle back.

But changing rear axle changes bus handling =  
larger turning radius, rear bumper drag, crushed  
tailpipes, etc.





## Other Cost and Capacity Reduction Studies

Study	Cost per Bus
NHTSA Report to Congress '02	\$2,440 to \$3,550
Indiana School Bus Study '05	-
NC School Bus Study '07	\$7,700
CRS Report to Congress '07	\$8,000 to \$15,000
Texas Leg. Budget Study '09	\$9,300 to \$14,000

# Alabama Capacity Investigation

## DOE Survey

- 30% of current bus routes and pupil loadings, by school age group, by order of schools serviced
- Four seating configurations investigated
  - 1) Current 3/3 seating with 12 rows
  - 2) 3/3 seating with 11 rows; approximates flexible seating and thicker seat backs.
  - 3) 3/2 seating with 12 rows; lose one seat per row.
  - 4) 3/2 with 11 rows; lose one row and one seat/row
- Determine % current buses with insufficient capacity after seat belt installation

# Alabama Capacity Investigation

## Results with Seat Belt Installation

Seat/Row Configuration	Buses Not Meeting Capacity
3/3 - 12 rows	68 (3%)
3/3 - 11 rows	365 (16%)
3/2 - 12 rows	145 (6%)
3/2 - 11 rows	445 (20%)

Estimated Error 2% or Less

Many buses are overloaded by only a few pupils

# UTCA Evaluation of Seat Belt Use

## 1) Opinions Of Stakeholders

Parents, students, drivers, principals, and supervisors.

## 2) Observation Of Pupils



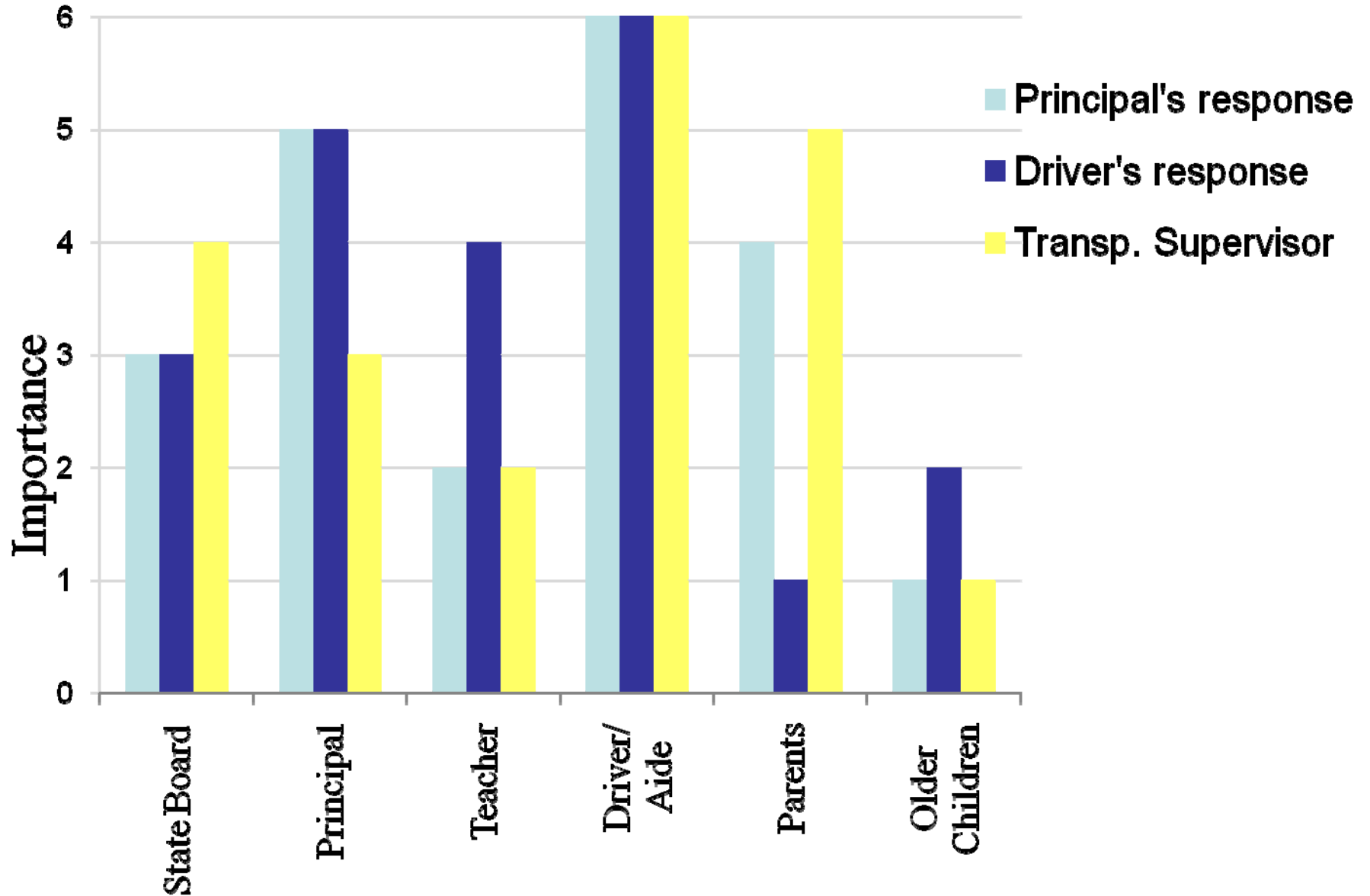
# PARENT'S OPINIONS

## (prior to installation)

Statement	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
<b>Bus, now safe – crashes</b>	40%	50%	4%	4%	2%
<b>Bus, now safe – bullying</b>	27%	42%	13%	13%	5%
<b>Belts: make trip safer</b>	54%	28%	11%	3%	4%
<b>Parents are more concerned about discipline than safety</b>					
<b>Belts: less bullying</b>	45%	20%	15%	7%	5%
<b>Belts: better discipline</b>	36%	34%	15%	9%	6%
<b>My child buckles up in my car</b>	75%	20%	4%	1%	1%

## EXPECTATIONS FOR SEAT BELT USE

*Who is responsible for pupils' use of belts on bus?*



# COMMENTS AND CONCERNS

## **Parents – negative comments**

- It will take a whole lot longer in getting off the bus.
- I have concerns about how the belt fits on my child who is small. She says it rubs her neck.
- I believe seatbelts could cause serious injury to the students.
- I do not believe safety belts will alter behavior.
- Getting out in case of fire. Being pinned with seat belts.

## Principals

- If belts are used discipline should improve. The parents are the ones to instill this habit in children.
- I whole-heartedly believe lap/shoulder belts would have a major (positive) impact on student safety.



## Drivers/Aides

- Seats are entirely too high. Can't see students especially middle school & elementary.
- Very hard for a driver to make sure that the student will keep them on. There has to be an aide.
- My concern is if the bus were to catch on fire or end up in a body of water or some other extreme disaster, I would not be able to get all children out of their belts.

## Supervisors

- High & middle school students will have difficulty fitting because of limited space on the seat.
- No way to make sure all students will use the seat/lap belts. The driver cannot be held responsible.
- School buses are the safest vehicles with or without seat belts.

# Perspective

**Change is good. You go first.**

*Dilbert*

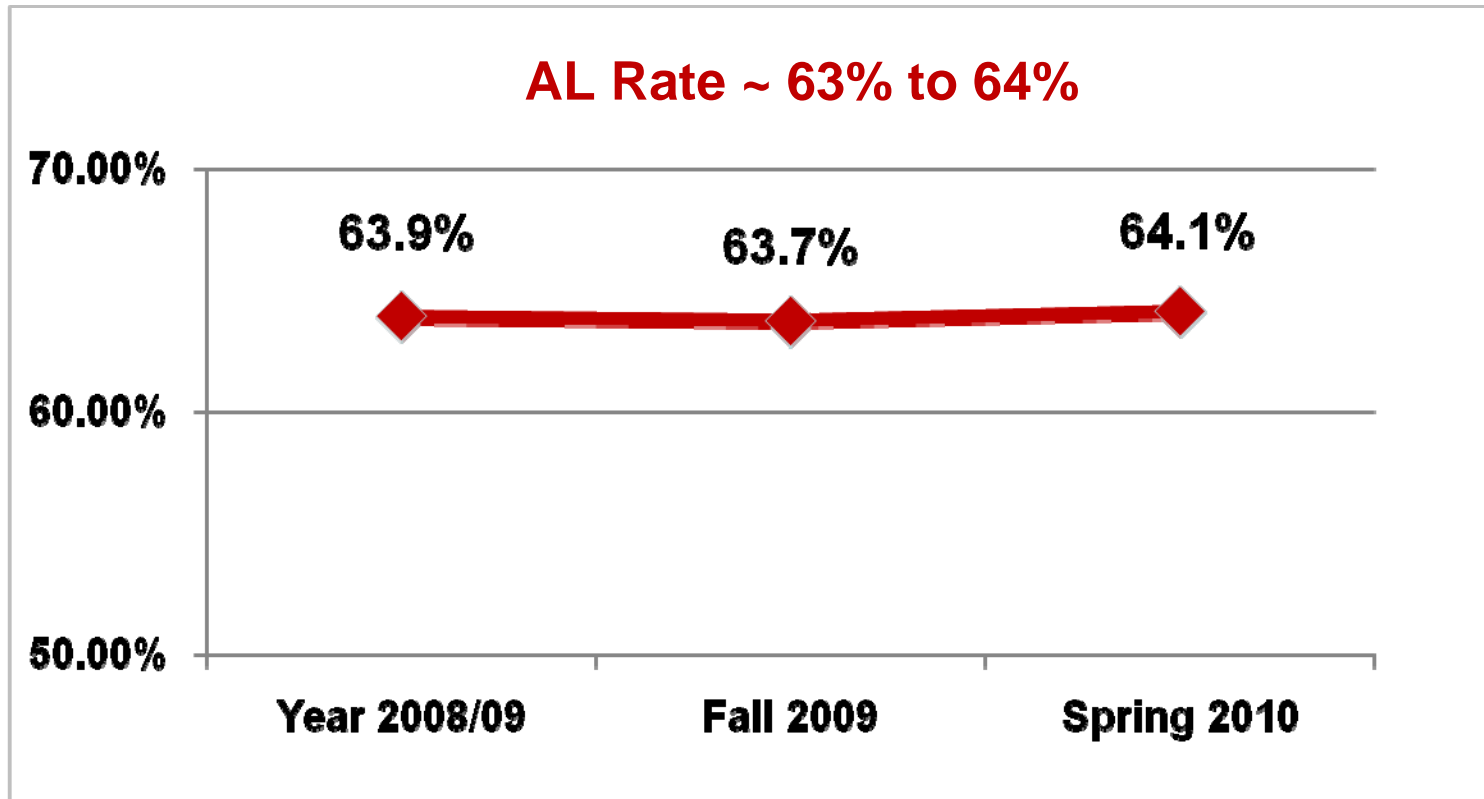
# **Seat Belt Use Rates**

## School Bus Seat Belt Use Observations (2008-09)

Bus	Pupils Observed	Proper Use	Improper Use	N
Bus A	24,851	88%		
Bus B (Aide)	6,705	77%		
Bus C (Aide)	2,093			
Bus D (Aide)				3%
Bus E (Aide)			3%	81%
Bus F			3%	58%
Bus G		9%	3%	89%
Bus H (Aide)	7,742	79%	5%	16%
Bus I	5,438	5%	2%	93%
Bus J (Aide)	3,588	59%	20%	22%
Bus K	3,617	73%	24%	2%
Bus L	952	21%	6%	74%
<b>Total</b>	<b>64,242</b>	<b>40,351</b>	<b>5,023</b>	<b>18,870</b>

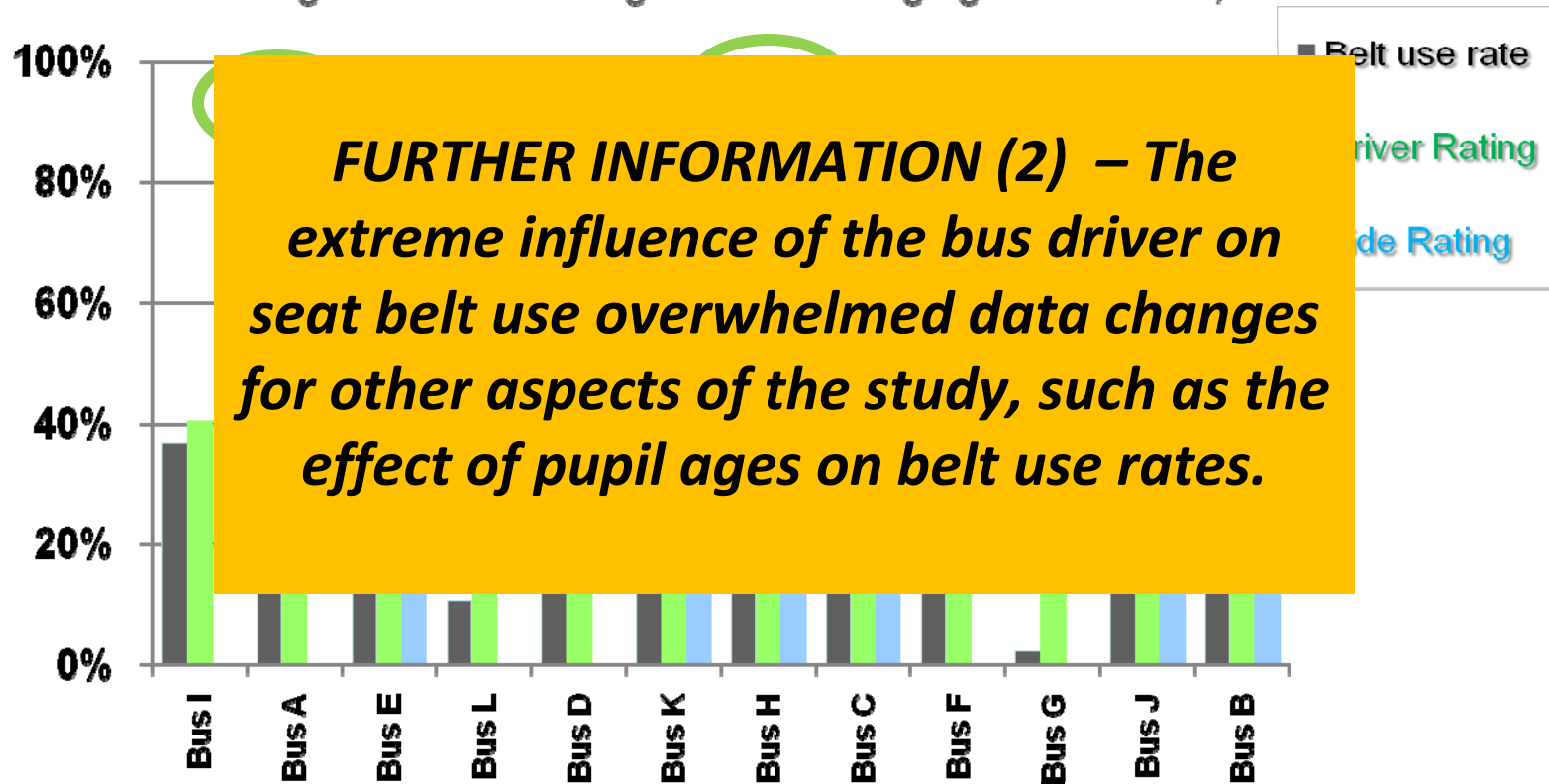
Biggest Finding  
 Extreme Bus to Bus Variability

## Seat Belt Used Appropriately, 2008-10 School Years



# Effect of Driver/Aide on Seat Belt Use Rates

Rating was based on degree of encouraging seat belt use, Fall 2009



**Clear Effect of Driver** – seatbelt use rate is almost always close to the driver’s rating.

**Effect of Aide** – mixed, seatbelt rate is often close, but 2/3 of aide ratings < belt rate.

# **Seat Belt Use Photos**

**Some Good, Some Not so Good...**

UA Graduate and Undergraduate  
Research Assistants have made  
over 150,000 observations of seat  
belt use by individual pupils

**And they would like to share a few  
of their favorites!**





UTCA





OAZ BUS 4

008/08/26 15:11:17 13.9V

0MPH



# Good seating, Afternoon Route



# Empty seats, full aisle



# No Belt



**Just  
Stretching?**

**Bowling  
Practice?**





# Bus in motion.



4

**Flex seats are very comfortable**

0MPH

09 10

13.5V 2010/02/24 15:44:07



4

0MPH

14.0V 2010/04/07 15:15:04

**Aide**

**Inappropriate  
use, twisting  
in seat**



???



# Improper seating, no belt use



Exceptional  
belt use



## Summary of “Intermediate” Results

- School buses are already they safest way to transport pupils to school
- Changing seat and seatbelt systems will cost money
- Changing to seatbelts will reduce school bus capacity
  - Four configurations were tested with current pupil loads
  - 3% to 20% of buses will be overloaded after belts are installed, depending on the configuration
- About 63-64% of Alabama pupils used seat belts appropriately



## Summary of “Intermediate” Results (cont’d)

- Drivers have great effect on seat belt use rates; aides have a lesser effect
- Drivers are less able to see pupils when a seat belt system is installed
- A cost-effectiveness study in progress
- Decision: How should scarce safety dollars be spent?

**Our Challenge:** *work as hard  
and as smart as we can to  
transport pupils safely and  
efficiently*

**We can and we will do it!**



**Have a safe trip home!**