Purpose

- Determine if rear-end collisions are increasing
- Conduct an assessment to ascertain the prevalence of rear-end collisions
- Identify conditions that exist when rear-end collisions occur
- Identify mitigation strategies for agencies that have identified rear-end collisions as a major issue
- Assess impact of Yield to Bus and pull out bays on rear-end collisions
- Identify solutions and/or strategies to reduce rear-end collisions
- Examine bus safety legislation in other states and assess whether Florida’s current statutes need to be revised
Major Incident Report – National Transit Database

- NTD Database for Major Incidents
  - Compiles data from all reporting agencies in all 50 states and territories
  - Starting in 2008, included “rear-ended” and “rear-ending” as collision types
- Data was aggregated by FTA Region
- For analysis and comparison, rear-ended and rear-ending collisions as a percentage of total collisions were compiled.
- For comparison, collisions per 100,000 miles was used as a leveling data set for analysis.

Total Annual Motorbus Collisions with Rear-ended and Rear-ending (2008-2012)
Total Annual Motorbus Collisions per 100,000 miles - 2008-2012

Rear-ended and Rear-ending as a Percentage of Total Collisions – 2008-2012
Total Collisions with Rear-ended and Rear-ending by FTA Region - 2012

Annual Motorbus Collisions, All Florida Agencies, 2008-2012
Annual Motorbus Collisions by Collision Type as a Percentage of Total Florida Transit Agency Collisions, 2008-2012

Annual Motorbus Collisions per 100,000 Miles, All Florida Agencies, 2008-2012
Broward County Transit Division: Motorbus Collisions, 2008-2012

Central Florida Regional Transportation: Annual Motorbus Collisions, 2008-2012
Aggregate Total Collisions per 100,000 miles for Florida, Region 4, and the United States plus Territories for the years 2008-2012

Aggregate Total Rear-ended Collisions per 100,000 miles for Florida, Region 4, and the United States plus Territories for the years 2008-2012
Total Motorbus Collisions - Six Most Populous States - 2012

- California: 429
- Texas: 301
- New York: 394
- Illinois: 446
- Pennsylvania: 337
- Florida: 237

Collision Type (Rear-ending) vs. Collision Type (Rear-ended)

Rear-ended and Rear-ending as a Percentage of Total Collisions - Six Most Populous States - 2012

- California: 5.8% Rear-ending, 12.8% Rear-ended
- Texas: 4.0% Rear-ending, 15.9% Rear-ended
- New York: 7.1% Rear-ending, 8.9% Rear-ended
- Illinois: 3.2% Rear-ending, 14.4% Rear-ended
- Pennsylvania: 4.0% Rear-ending, 7.2% Rear-ended
- Florida: 4.2% Rear-ending, 38.0% Rear-ended

Collision Type (rear-ending) as % of Total Motorbus Collisions
Collision Type (rear-ended) as % of Total Motorbus Collisions
Collisions per 100,000 Miles - Six Most Populous States

Review of Collision Files

- Reviewed a total of 55 files of rear-ended collisions at LYNX (CFRTA) from January 2011 through December 2012.
- Reviewed a total of 51 rear-ended collision files at Broward County Transit (BCT) from October 2011 to September 2013.
Factors Coded from Collision Files

- **Route Direction**, direction the bus was traveling when the collision occurred;
- **Roadway surface conditions**, expressed as dry or wet;
- **Lighting conditions**, expressed as light, dark (lighting and no-lighting), dawn and dusk;
- **Weather conditions**, expressed as clear, cloudy or raining;
- **Time factors**, including day of week and time of day;
- **Roadway factors**, which include prevalent rear-ended collision corridors, roadway classifications, ownership, lanes, divided/undivided, jurisdiction, and posted speed limits;
- **Transit factors**, including stop location (near side, far side and mid-block), bus movement at rear-ended collision location, passenger injuries, and estimated damage; and
- **Other vehicle factors**, reported for Broward only and including estimated speed of vehicle rear-ending the bus, distraction, obstructed vision, suspicion of drug and/or alcohol use, and whether the driver of the vehicle was transported for medical treatment.

Principal Collision Facilities with >1 Rear-ended Collision

![Bar chart showing collisions at various locations](chart.png)
Principal Collision Facilities with >1 Rear-ended Collisions

Principal Collision Facilities with >1 Rear-ended Collisions: Percentages
Roadway Jurisdiction at Rear-ended Collision Location

Roadway Jurisdiction at Rear-ended Collision Location: Percentages
Number of Lanes and Divided/Undivided Roadways at Rear-ended Collision Location

Number of Lanes and Divided/Undivided Roadways at Rear-ended Collision Location: Percentages
Vehicle Lanes and Jurisdiction

Vehicle Lanes and Jurisdiction: Percentages
Rear-end Collision Location: US 441 and Copans Road

Stop Type
Stop Type: Percentages

Bus Movement Status at Rear-ended Collision Location
Posted Speed Limit at Rear-ended Collision Location

Posted Speed Limit at Rear-ended Collision Location: Percentages
Technology Improvements

- Reflective Striping - PSTA, LeeTran, HART, RTS
- LED lights – HART, SCAT in Brevard, LeeTran
- Flashing “Stop” signs (Red) – HART, PSTA, LeeTran
- Yield to Bus – Illuminated - LeeTran
- Yield to Bus – Non-illuminated – Pasco County Public Transit
- Cameras/Video – SCAT in Brevard, RTS, HART, PSTA, VOTRAN, LeeTran, Pasco County Public Transit
- Audio (Bus interior) - VOTRAN
- 4 red bars to indicate bus is stopping – SCAT in Brevard
- 2nd Yield to Bus Sign - LeeTran
- Fluorescent lights – Pasco County Public Transit
- Red strobe and amber strobe lights – SCAT in Brevard
Rear Exterior Treatments – LeeTran Bus

PalmTran - Agency with Comparatively High Total Collisions per 100,000 Miles
Total Collisions per 100,000 Miles – Comparison of Aggregate Five-year Agency Data to Florida Aggregate Data, 2008-2012

HART - Agency with Comparatively High Rear-ended Collisions per 100,000 Miles
Rear-ended Collision per 100,000 Miles – Comparison of Aggregate Five-year Agency Data to Florida Aggregate Data, 2008-2012

LYNX - Agency Comparatively High Percentage of Rear-ended Collisions to Total Collisions
Rear-ended Collisions as a Percentage of Total Collisions – Comparison of Aggregate Five-year Agency Data to Florida Aggregate Data, 2008-2012

Average One (1) Total Collision Every "X" Days over Five-year Timeframe
Mitigation Strategies

- Post-collision investigation
- Move/Improve/Remove bus stops
- Post-collision training for individual operators
- Annual in-service training
- Training for operators to maximize technology enhancements
- Every transit system has policies, procedures and training but not all agree on effectiveness
The “It” Questions

What is the factor or what are the factors that contribute to rear-ended bus collisions?

- Is it the amount of service on a facility?
- Is it conditions at the bus stop?
- Is it the design of the road network?
- Is it traffic operations?

Future Research

- Factors that are within the control of the transit agency.
- All collisions and reportable incidents
  - Rear-ended collisions may be most prevalent, but may not be the most expensive
- Best practices in post-collision investigation
- Best practices in risk management
Contact Information

William Morris
wpmorris@cutr.usf.edu

Christopher DeAnnuntis
deannuntis@cutr.usf.edu

Download final report: