DART Bus Crash Analysis

typical scenarios associated with selected crash types
Crash Types Studied in Detail

**Crash Percentages by Type**

- Side Swipe: 30.32%
- Fixed Object: 22.21%
- Turning: 15.67%
- Rear End: 14.09%
- Angle: 7.52%
- Backing: 3.44%
- Parked Car: 2.72%
- Pedestrian/Bicycle/Motorcycle: 2.08%
- Animal: Less than 1%
- Opening Door: Less than 1%
- Head On: Less than 1%
- U-Turn: Less than 1%
- Misc.: Less than 1%
Analysis Methodology

- 5 Categories – 70% of all crashes
- 500 Crashes
- Proportionally sampled
- Matrix developed – recorded for each crash
- Typical scenarios developed
Sideswipe Crashes
(30% of Total)

Three typical scenarios

1. Non-DART Vehicle traveling in the same direction (over 90%)
   
   a. Bus moving straight
   b. Bus stopped
   c. Bus turning left

   • Trucks 68%
     • Passenger truck/van/suv 51%
     • Semi’s 12%
     • Delivery 5%

   • 51% in 3 lane roads
Sideswipe Crashes

1. Non-DART Vehicle Travelling in the Same Direction (93%)
   a. Bus Moving Straight (55% of the incidents in this category)
      • 63% of 1a incidents occur when non-DART vehicle is also moving straight or it is passing the DART bus
      • 15% of 1a incidents occur when non-DART vehicle makes an unsafe lane change
Sideswipe Crashes

1. Non-DART Vehicle Travelling in the Same Direction (93%)

   b. Bus stopped
   (21% of the incidents in this category)

   • 84% of 1b incidents occur when non-DART vehicle moves straight past or passes a DART bus
Turning Crashes
(16% of Total)

typical scenario

1. Non-DART Vehicle Travelling in the Same Direction (almost 90%)
   a. Bus moving straight
   b. Bus turning right
   c. Bus turning left
Turning Crashes

1. Non-DART Vehicle Travelling in the Same Direction (88%)

a. Bus moving straight
(53% of the incidents in this category)

• 68% of 1a incidents occur when non-DART vehicle attempts right turn from left of the bus
Turning Crashes

1. Non-DART Vehicle Travelling in the Same Direction (88%)

b. Bus turning right
   (19% of the incidents in this category)

   • 50% of 1b incidents occur when non-DART vehicle is also turning right (i)
   • In some cases, the non-DART vehicle is moving straight and attempts to pass the turning bus (ii)
Turning Crashes

1. Non-DART Vehicle Travelling in the Same Direction (88%)

c. Bus turning left
   (17% of the incidents in this category)

• 55% of 1c incidents occur when non-DART vehicle is also turning left
Three typical scenarios

DART rear-ends (30%)

Non-DART rear-ends (70%)
  a. Bus stopped
  b. Bus moving straight
Non-DART Rear-Ends

Non-DART Rear Ends
(70% of all rear-end crashes)

1. Non-DART Vehicle traveling in same lane (86%)
   a. Bus stopped
      (84% of incidents in this category)

- 71% of 1a incidents occur when non-DART vehicle is moving straight
- 57% at bus stop
- 91% on 2 or 3 lane
  - 55% on 3
  - 17% wet or ice
Angle Crashes
(8% of Total)

Three typical scenarios

1. Non-DART Vehicle Approaching From Right
   a. Bus moving straight
   b. Bus stopped

2. Non-DART Vehicle Approaching From Left
   a. Bus moving straight
Angle Crashes

1. Non-DART Vehicle Approaching From Right (45%)

   a. Bus Moving Straight
      (80% of the incidents in this category)

      • 54% of 1a incidents occur when non-DART vehicle disregards traffic signal
Angle Crashes

1. Non-DART Vehicle Approaching From Right (45%)
   
   b. Bus stopped (13% of the incidents in this category)
   
   • Non-DART vehicle exiting a parking lot or private drive

[Diagram of angle crash with a car approaching a bus from the right]
Angle Crashes

2. Non-DART Vehicle Approaching From Left (31%)

   a. Bus moving straight (76% of the incidents in this category)

   • 43% of 2a incidents occur when non-DART vehicle disregards traffic signal
Pedestrian Crashes
(2% of Total)

Four typical scenarios

1. Pedestrian Crosses or Enters Street
   a. Bus moving straight
   b. Bus turning left
   c. Bus turning right

2. Pedestrian Stationary
   a. Bus moving straight
1. Pedestrian Crosses or Enters Street (63%)

a. Bus moving straight (60% of the incidents in this category)

- 56% of 1a incidents occur when pedestrian is crossing the street
- 44% - enters street to stop bus steps off the curb for various (e.g., to pick up something from the street).
1. Pedestrian Crosses or Enters Street (63%)

b. Bus turning left (20% of the incidents in this category)

- 100% of 1b incidents occur when pedestrian is already crossing the street
- 67% of 1b incidents occur in Quad 3
Pedestrian Crashes

1. Pedestrian Crosses or Enters Street (63%)

b. Bus turning left
(20% of the incidents in this category)

• 100% of 1b incidents occur when pedestrian is already crossing the street

• 33% of 1b incidents occur in Quad 1
Pedestrian Crashes

1. Pedestrian Crosses or Enters Street (63%)
   
   c. Bus turning right
      (13% of the incidents in this category)
      
      • 100% of 1c incidents occur when pedestrian is already crossing the street
Pedestrian Crashes

2. Pedestrian Stationary
   (33%)

   a. Bus moving straight
      (100% of the incidents in this category)

   • 75% of 2a incidents occur when pedestrian unloading (or loading) a bike
Next Steps

- Select Three (✓)
- Contact peer agencies/ lit. review
- Observe buses in operation
- Develop countermeasures
  - Devices
  - Operating procedures
- Rate countermeasures
  - Ease of implementation
  - Likelihood of success
- Implement
- Evaluate
Countermeasures?

• You got ‘em
• We want ‘em
• CASE
• No idea rejected

• Let’s Talk!

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