Disclaimer: Research Interest on Work Zone Safety

The opinions, findings, and conclusions expressed in this presentation are those of the researcher and not necessarily those of the State of Florida Department of Transportation or other agencies.

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CARS – WZ 2011 – 2017
Safety Clock: Work Zone Crashes in Florida

On average, in 2016-2017:

- A work zone crash occurred once every hour in Florida.
- Every day, 9 work zone crashes occurred that resulted in at least one injury.
- Every week, 1 work zone crash occurred that resulted in at least one fatality.

National Work Zone Safety Information Clearinghouse

- In 2014, Florida has the 3rd highest number of fatal traffic crashes in work zones in the nation.
- In 2016, Florida has the 2nd highest number of fatal traffic crashes in work zones in the nation.

Agenda

- Trend – Temporal and Spatial
- Crash Characteristics
- Drivers’ Characteristics
- Vehicular Characteristics
- Driver Injury Severity in Single-Vehicle Crashes in Work Zone
- Conclusions
- Possible Countermeasures/Recommendations
Context for Work Zone Safety in Florida

- About **20 percent** of the National Highway System is under construction annually during the peak summer road work season, with over 6,400 estimated highway work zones. (Wunderlich and Hardesty, 2003).

- Unexpected driving conditions inside work zone or construction areas very likely interrupt the **expectancy** of the drivers resulting in unexpected **traffic delays** and **erratic maneuvers** which results in safety concerns for overall traffic as well as for the workers.

- From the traffic operation and management perspective, as noted by Federal Highway Administration (FHWA) study that work zone is likely to build **traffic congestions** that influences an increase in **crash rates**.

Trend Analysis – Florida: 2011 – 2017

![Graph showing trend analysis of total work zone crashes from 2011 to 2017]

- Total Work Zone Crashes
- Average Line

- Crash rates increased from 2011 to 2017.
- Peak in 2016.
- Average line indicates steady increase.

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**Context for Work Zone Safety in Florida**

- **20 percent** of National Highway System under construction annually.
- 6,400 estimated highway work zones during peak summer.
- Unexpected driving conditions create safety concerns.
- FHWA study indicates increased traffic congestions in work zones.

**Trend Analysis – Florida: 2011 – 2017**

- Graph illustrating total work zone crashes (2011-2017).
- Increase from 2011 to 2017.
- Peak in 2016.
- Average line indicates consistent trend.

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Graph showing trend analysis of total work zone crashes from 2011 to 2017. Peak in 2016. Average line indicates steady increase.
WZ Crashes by Months in Florida: 2011 - 2017

WZ Crashes by Time of Day in Rural Florida: 2011 – 2017

WZ Crashes by Severity in Florida: 2011 - 2017
WZ Crash Distribution (%) in Florida Districts: 2011 – 2017

D1 = 10%
D2 = 12%
D3 = 5%
D4 = 20%
D5 = 19%
D6 = 17%
D7 = 18%

WZ Crashes by Districts in Florida: 2011 – 2017
WZ Crash Severity by Florida Districts: 2011 – 2017

WZ Crashes by County & % Share in Florida: 2011 – 2017
WZ Crashes by Land Use in Florida: 2011 – 2017

- Urban: 90% - Rural: 10%
- Urban: 85% - Rural: 15%
- Urban: 87% - Rural: 12%
- Urban: 89% - Rural: 11%
- Urban: 85% - Rural: 15%

WZ Crashes by Land Use in Florida Districts: 2011 – 2017

- Urban: 12% - Rural: 88%
- Urban: 32% - Rural: 68%
- Urban: 16% - Rural: 84%
- Urban: 2% - Rural: 98%
- Urban: 7% - Rural: 93%
WZ Injury Severity by Land Use in Florida: 2011 – 2017

Rural Roadways in Florida
- K + A: 52%
- B + C: 35%
- PDO: 13%

Urban Roadways in Florida
- K + A: 34%
- B + C: 59%
- PDO: 7%

WZ Crashes by Florida Urban Road: 2011 – 2017

- Freeway/Expressway: 38%
- Principal Arterial: 53%
- Collector: 54%
- Local: 62%

- 2011: 62%
- 2012: 53%
- 2013: 47%
- 2014: 43%
- 2015: 42%
- 2016: 33%
- 2017: 62%
WZ Crashes by Florida Rural Road: 2011 – 2017

<table>
<thead>
<tr>
<th>Year</th>
<th>Freeway</th>
<th>Principal Arterial</th>
<th>Collector</th>
<th>Local</th>
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<tbody>
<tr>
<td>2011</td>
<td>60%</td>
<td>37%</td>
<td>57%</td>
<td>60%</td>
</tr>
<tr>
<td>2012</td>
<td>58%</td>
<td>40%</td>
<td>53%</td>
<td>58%</td>
</tr>
<tr>
<td>2013</td>
<td>57%</td>
<td>36%</td>
<td>63%</td>
<td>43%</td>
</tr>
<tr>
<td>2014</td>
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<td>36%</td>
<td>67%</td>
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<td>2015</td>
<td>67%</td>
<td>32%</td>
<td>67%</td>
<td>30%</td>
</tr>
<tr>
<td>2016</td>
<td>70%</td>
<td>32%</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>2017</td>
<td>67%</td>
<td>30%</td>
<td>57%</td>
<td>40%</td>
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</tbody>
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Work Zone Types (Adopted from MUTCD, 2009)

- Lane Closure
- Work on Shoulder/ Median
- Lane Shift/ Cross Over
- Intermittent
**WZ Crashes by WZ Types in Florida Districts: 2011 – 2017**

- Lane Closure
- Lane Shift/Crossover
- Work on Shoulder or Median
- Intermittent
- Other

**WZ Crashes by Functional Class in Florida Districts: 2011 – 2017**

- Local
- Collector
- Principal Arterial
- Freeway/Expressway

Lane Closure
Lane Shift/Crossover
Work on Shoulder/Median
Intermittent
**WZ Crashes by Shoulder Width in Florida Districts: 2011 – 2017**

- Intermittent: 12% 33% 34% 59%
- Work on Shoulder/Median: 13% 26% 44% 34%
- Lane Shift/Cross Over: 28% 31% 34% 9%
- Lane Closure: 32% 26% 33% 9%

**WZ Crashes by Location in Florida Districts: 2011 – 2017**

- N = 1251, 3%
- N = 33019, 66%
- N = 8647, 17%
- N = 4254, 9%
- N = 2809, 6%
WZ Crashes by Drivers’ Age in Florida Districts: 2011 – 2017

WZ Crashes by Drivers’ Actions in Florida Districts: 2011 – 2017
WZ Crashes by Vehicle Involved in Florida Districts: 2011 – 2017


Conclusions – Historical Crash Data: 2011 – 2017 (CARS)

- Trend – Temporal/ Spatial
  - 2015 – 2017 average WZ crashes increased from 2012 – 2014 average
  - WZ during Feb – Apr and Jul – Sep relatively higher crashes
  - WZ during 9 AM – 12 PM and 2 PM – 4 PM has relatively higher crashes
  - WZ crashes in District 4 indicated higher share (followed by District 5 and 7)
  - WZ on rural highways resulted in relatively more severe crashes
  - WZ in activity area resulted in higher frequency of crashes
  - WZ with 6–10 ft right shoulder resulted in relatively higher crashes

- Drivers’ and Vehicle Type
  - Driver’s of age group between 30 to 49 years are over represented
  - Aggressive driving inside [in close proximity] WZ needs attention
  - Passenger vehicle and heavy vehicles (GVWR>10000 lbs) are important
Conclusions – Historical Crash Data: 2011 – 2017 (CARS)

Work Zone Crash Data

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<td>Yes</td>
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Contributing Circumstances: Road

<table>
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<tr>
<td>Work Zone</td>
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</tr>
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<table>
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<th>Work Zone Crash Data</th>
<th>Work Zone related Crashes</th>
<th>%</th>
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<tbody>
<tr>
<td>Work Zone as Contributing Factor (Road)</td>
<td>1 (NO)</td>
<td>2 (YES)</td>
</tr>
<tr>
<td>1 (NO)</td>
<td>13,150</td>
<td>26%</td>
</tr>
<tr>
<td>4 (YES)</td>
<td>50,084</td>
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Possible Countermeasures for Work Zones in Florida

- Work on Shoulder/ Median needs to be properly designed and managed with enforcement.
- Work zones in rural highways need higher priority (higher severity).
- Work zones in rural freeway highways need higher priority.
- Work zones in urban principal arterials need higher priority.
- Roadway with narrow shoulder width needs higher attention (design, enforcement).
- Dissemination of knowledge – driving with caution (speed limit) is critical (more communication to curb out the unexpectancy: "Don’t Be THAT Driver.")
- Efficient deployment of ITS applications (DMS) to activity area (enforcement)
- Access control for heavy commercial vehicles in urbanized areas.
References


Thank You!

Questions!
Comments!!
Suggestions!!!

WORK ZONE SAFETY:
EVERYBODY’S RESPONSIBILITY

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