Pedestrian Safety at Signalized Intersections in Florida

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Project Motivation

- One in every five traffic-related fatalities in Florida is a pedestrian
- Florida has the highest pedestrian deaths per capita
- Florida is the most dangerous state in the country for pedestrians

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Pedestrian Fatalities

<table>
<thead>
<tr>
<th>Year</th>
<th>Pedestrian Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>492</td>
</tr>
<tr>
<td>2001</td>
<td>489</td>
</tr>
<tr>
<td>2002</td>
<td>487</td>
</tr>
<tr>
<td>2003</td>
<td>500</td>
</tr>
<tr>
<td>2004</td>
<td>493</td>
</tr>
<tr>
<td>2005</td>
<td>571</td>
</tr>
<tr>
<td>2006</td>
<td>544</td>
</tr>
<tr>
<td>2007</td>
<td>530</td>
</tr>
<tr>
<td>2008</td>
<td>490</td>
</tr>
<tr>
<td>2009</td>
<td>466</td>
</tr>
</tbody>
</table>

Florida vs. Texas Pedestrian Fatalities

- Orange bars represent Florida
- Blue bars represent Texas
Project Goal:
To conduct a comprehensive study to improve pedestrian safety on state roads in Florida

Project Objectives:
- Review and summarize existing pedestrian safety studies
- Identify statewide pedestrian crash patterns and causes
- Identify factors contributing to pedestrian injury severity
- Identify and analyze pedestrian high crash locations for crash causes and potential countermeasures
Data Collection
Crash Data Collection

- 7,630 pedestrian crashes occurred from 2008-2010

- Data were collected on:
  - Pedestrian age
  - Injury severity
  - At-fault road user
  - Crash location
  - Presence and type of crosswalk
  - Pedestrian walking pattern (i.e., crossing the street vs. walking along the roadway)
In-house Application to Collect Data
Signalized Intersection Data Collection

For 8,374 signalized intersections, data were collected on:

- Total number of legs
- Number of legs with pedestrian signals
- Number of legs with pedestrian refuge areas
- Number of legs with the following crosswalks: 
  - Solid
  - Standard
  - Continental
  - Dashed
  - Zebra
  - Ladder
VRICS: Application to Collect Intersection Data
Type of Crosswalk
## Statistics by Crosswalk Type

<table>
<thead>
<tr>
<th>Crosswalk Type</th>
<th>Fatal Crashes</th>
<th>Injury Crashes</th>
<th>Total Crashes</th>
<th>Total Number of Legs</th>
<th>Crashes per Year per 1,000 Legs</th>
<th>Fatal Crashes per Year per 1,000 Legs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>75</td>
<td>1,004</td>
<td>1,185</td>
<td>11,270</td>
<td>35.05</td>
<td>2.22</td>
</tr>
<tr>
<td>Continental</td>
<td>60</td>
<td>616</td>
<td>728</td>
<td>6,211</td>
<td>39.07</td>
<td>3.22</td>
</tr>
<tr>
<td>Ladder</td>
<td>7</td>
<td>173</td>
<td>195</td>
<td>1,474</td>
<td>44.10</td>
<td>1.58</td>
</tr>
<tr>
<td>Solid with Special Surface</td>
<td>7</td>
<td>239</td>
<td>270</td>
<td>1,679</td>
<td>51.63</td>
<td>1.46</td>
</tr>
<tr>
<td>Solid with White Paint</td>
<td>1</td>
<td>10</td>
<td>13</td>
<td>148</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Dashed</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Zebra</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>None</td>
<td>16</td>
<td>140</td>
<td>170</td>
<td>6,293</td>
<td>9.00</td>
<td>0.85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>168</strong></td>
<td><strong>2,208</strong></td>
<td><strong>2,591</strong></td>
<td><strong>27,082</strong></td>
<td><strong>31.89</strong></td>
<td><strong>2.07</strong></td>
</tr>
</tbody>
</table>
## Performance of Different Crosswalk Types

<table>
<thead>
<tr>
<th>Comparison Between Crosswalk Types</th>
<th>% of Fatal Crashes That Occurred at Crosswalk Type A</th>
<th>% of Fatal Crashes That Occurred at Crosswalk Type B</th>
<th>Is Proportion of Fatal Crashes at Crosswalk Type A Significantly Different from those that Occurred at Crosswalk Type B?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>Type B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>Continental</td>
<td>6.33%</td>
<td>8.24%</td>
</tr>
<tr>
<td>Standard</td>
<td>Ladder</td>
<td>6.33%</td>
<td>3.59%</td>
</tr>
<tr>
<td>Standard</td>
<td>Solid with Special Surface</td>
<td>6.33%</td>
<td>2.83%</td>
</tr>
</tbody>
</table>
## Statistics by Crosswalk Type & Lighting Condition

<table>
<thead>
<tr>
<th>Crosswalk Type</th>
<th>Day</th>
<th>Dusk</th>
<th>Dawn</th>
<th>Night</th>
<th>Unk.</th>
<th>Total</th>
<th>Percent of Nighttime Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>657</td>
<td>30</td>
<td>17</td>
<td>474</td>
<td>7</td>
<td>1,185</td>
<td>40.0%</td>
</tr>
<tr>
<td>Continental</td>
<td>391</td>
<td>15</td>
<td>9</td>
<td>307</td>
<td>6</td>
<td>728</td>
<td>42.2%</td>
</tr>
<tr>
<td>Ladder</td>
<td>112</td>
<td>5</td>
<td>2</td>
<td>75</td>
<td>1</td>
<td>195</td>
<td>38.5%</td>
</tr>
<tr>
<td>Solid with Special Surface</td>
<td>158</td>
<td>10</td>
<td>7</td>
<td>93</td>
<td>2</td>
<td>270</td>
<td>34.4%</td>
</tr>
<tr>
<td>No Crosswalk</td>
<td>69</td>
<td>4</td>
<td>0</td>
<td>97</td>
<td>0</td>
<td>170</td>
<td>57.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,402</td>
<td>65</td>
<td>35</td>
<td>1,073</td>
<td>16</td>
<td>2,591</td>
<td>41.4%</td>
</tr>
</tbody>
</table>
At-fault Road User
## Statistics by At-fault Road User

<table>
<thead>
<tr>
<th>At-fault Road User</th>
<th>Fatal Crashes</th>
<th>Injury Crashes</th>
<th>Total Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver</td>
<td>16 (2.2%)</td>
<td>643 (87.8%)</td>
<td>732 (100.0%)</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>105 (7.6%)</td>
<td>1,182 (85.0%)</td>
<td>1,390 (100.0%)</td>
</tr>
<tr>
<td>Both Driver &amp; Pedestrian</td>
<td>2 (8.0%)</td>
<td>20 (80.0%)</td>
<td>25 (100.0%)</td>
</tr>
<tr>
<td>Not Sure</td>
<td>45 (10.1%)</td>
<td>93 (20.9%)</td>
<td>444 (100.0%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>168 (6.5%)</strong></td>
<td><strong>1,938 (74.8%)</strong></td>
<td><strong>2,591 (100.0%)</strong></td>
</tr>
</tbody>
</table>
Contributing Causes

When the **driver was at fault**, the most frequent contributing causes were:

- careless driving
- failed to yield right-of-way
- disregarded traffic signal or other traffic control

When the **pedestrian was at fault**, the most frequent contributing causes were:

- failed to yield right-of-way
- under the influence of alcohol and/or drugs
- disregarded traffic signal or other traffic control
High Crash Locations
Signalized Pedestrian High Crash Locations

- Locations with crash frequency > (avg. freq. + 3× std. dev.) were identified and analyzed
- 622 urban signalized intersections that experienced ≥ 2 pedestrian crashes were analyzed
- 21 signalized intersections experienced ≥ 6 crashes
1. W Oakland Park Blvd and N Andrews Ave (Map)
2. Silver Star Rd and N Pine Hills Rd (Map)
3. W Commercial Blvd and NW 50th St (Map)
4. W Waters Ave and N Florida Ave (Map)
5. Silver Star Rd and N Hiawassee Rd (Map)
Crash Contributing Factors

Prevalent Crash Types and Patterns:

1. Crashes that occurred in the vicinity of bus stops
2. Crashes that involved pedestrians who were not crossing at designated crossing locations
3. Crashes that involved pedestrians in a crosswalk and through traffic
4. Crashes that involved right-turning vehicles
5. Crashes that involved left-turning vehicles
6. Crashes that occurred in left-turning lanes and right-most lanes
1. Crashes That Occurred in the Vicinity of Bus Stops

NW 27th St and NW 183rd St (Map)
1. Crashes That Occurred in the Vicinity of Bus Stops

(Crash ID: 761813570)
1. Crashes That Occurred in the Vicinity of Bus Stops - Countermeasures

- Improve roadway lighting
- Provide curb extensions in the vicinity of bus stops
- If feasible, relocate near-side bus stops to the far-side of the intersection
- Add signs to warn drivers of increased pedestrian activity near bus stops
2. Crashes That Involved Pedestrians Who Were Not Crossing at Designated Crossing Locations

(Crash ID: 906723850)
2. Crashes That Involved Pedestrians Who Were Not Crossing at Designated Crossing Locations

NW 7th Ave and NW 54th St (Map)
2. Crashes That Involved Pedestrians Who Were Not Crossing at Designated Crossing Locations

NW 79th St and NW 7th Ave (Map)
2. Crashes That Involved Pedestrians Who Were Not Crossing at Designated Crossing Locations - Countermeasures

- Extensive pedestrian education campaigns
- Stricter enforcement
3. Crashes That Involved Pedestrians in a Crosswalk and Through Traffic

(Crash ID: 801572120)
3. Crashes That Involved Pedestrians in a Crosswalk and Through Traffic - Countermeasures

- Extensive driver education campaigns that focus on driver compliance with pedestrian right-of-way laws
- Stricter enforcement
Thank you.
Questions?