NTTA’s Experience and Endeavors on the Wrong-Way Driving Issue: A 5-Year Review

Presented to: 2014 Traffic Safety Meeting

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Agenda

• Review of Wrong Way Driving (WWD) Incidents on the NTTA System

• Countermeasures and Effectiveness Evaluation

• Ideas for Discussion
Looking Back

• NTTA WWD Task Force was formed in June 2009
• What Happened in 2009:
  – 6 WWD crashes with 4 fatalities during the 1st half of 2009
  – 2 WWD crashes during the 2nd half of 2009
  – WWD crashes accounted for a very small percentage (0.6%) of the overall accidents
NTTA Task Force Key Findings - 2009

- Driver impairment is the overriding factor
- 94% of crashes from 2007 to 2009 occurred between 11:00 PM & 4:00 AM
- No consistent correlation between incident and a particular roadway section or configuration
- All countermeasures evaluated have limitations
- Worldwide long term problem
NTTA Toll Road System

Key Features:

• Expanding throughout Dallas/Ft Worth metro

• All Electronic Toll Collection (ETC) – cashless operation

• High-speed commuter routes to major destinations
Summary of Wrong Way Incidents on NTTA Roadways - 2009

- Fatal Crash
- Non-fatal Crash
Summary of Wrong Way Incidents on NTTA Roadways - 2010

- 67% Video
- 33% Loop Detection
- 36% DPS/Police
- 82% Phone Call
- 10% Crash
Summary of Wrong Way Incidents on NTTA Roadways - 2011

- Fatal Crash
- Non-fatal Crash
- No Crash
Summary of Wrong Way Incidents on NTTA Roadways - 2012

- Fatal Crash
- Non-fatal Crash
- No Crash
Summary of Wrong Way Incidents on NTTA Roadways - 2013

- Fatal Crash
- Non-fatal Crash
- No Crash
WWD Incident Time Pattern

• Previous finding (in 2009):
  - 94% of crashes from 2007 to 2009 occurred between 11:00 PM & 4:00 AM

• Update:
  - 92% of incidents (and all crashes) from 2010 to present occurred between 9PM and 6AM
Wrong Way Driving – Incident Trend Analysis
# Look Back and Around …

## NTTA WWD Summary (2008 - 2013):

<table>
<thead>
<tr>
<th>Year</th>
<th>WWD Incidents</th>
<th>WWD Crashes</th>
<th>WWD Crash Rate</th>
<th>WWD Fatalities</th>
<th>WWD Fatality Rate</th>
<th>Total Fatalities</th>
<th>Total Crashes</th>
<th>Overall Fatality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>5</td>
<td>5</td>
<td>100%</td>
<td>1</td>
<td>20%</td>
<td>7</td>
<td>1368</td>
<td>0.51%</td>
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<tr>
<td>2009</td>
<td>8</td>
<td>8</td>
<td>100%</td>
<td>4</td>
<td>50%</td>
<td>11</td>
<td>1547</td>
<td>0.71%</td>
</tr>
<tr>
<td>2010</td>
<td>50</td>
<td>5</td>
<td>10%</td>
<td>0</td>
<td>0%</td>
<td>8</td>
<td>1639</td>
<td>0.49%</td>
</tr>
<tr>
<td>2011</td>
<td>27</td>
<td>3</td>
<td>11%</td>
<td>0</td>
<td>0%</td>
<td>7</td>
<td>1588</td>
<td>0.44%</td>
</tr>
<tr>
<td>2012</td>
<td>63</td>
<td>5</td>
<td>8%</td>
<td>0</td>
<td>0%</td>
<td>15</td>
<td>2087</td>
<td>0.72%</td>
</tr>
<tr>
<td>2013</td>
<td>69</td>
<td>6</td>
<td>9%</td>
<td>2</td>
<td>33%</td>
<td>16</td>
<td>2424</td>
<td>0.66%</td>
</tr>
</tbody>
</table>

### NTTA Average

<table>
<thead>
<tr>
<th>WWD Incidents</th>
<th>WWD Crashes</th>
<th>WWD Crash Rate</th>
<th>WWD Fatality</th>
<th>Overall Fatality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>5</td>
<td>9%</td>
<td>1</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

### Texas (2012):

- **DUI**: 965 (3.76%)  
  - Total Fatalities: 3018  
  - Total Crashes: 416870  
  - Overall Fatality Rate: 0.7%

### NTSB Report (2012):

- **(in Michigan)**: 260 (22%)  
  - Overall Fatality Rate: 0.3%
NTTA Task Force Recommendations

• 17 Countermeasures evaluated in 2009:
  – 6 deployed immediately
  – 4 rejected at the time of study
  – 3 for pilot testing
  – 3 for further study
  – 1 emerging technology to be monitored

• Three-pronged approach
  – Engineering
  – Enforcement
  – Education
Implemented Countermeasures

• Process enhancements
• Reflective tape on sign post
• RPM Wrong Way arrows
• LED enhanced signs
• Modified pavement markings and lane use signs on cross streets
• Modified roadway median configuration
• Loop detection and notification software
• Law Enforcement and MADD Partnerships
Countermeasure Effectiveness Evaluation

- Qualitative vs Quantitative
- Data Availability and Adequacy
- Control Factor
- Ranking and Selection of Countermeasures
Countermeasure Effectiveness Evaluation (continued)

• Case Studies:
  – Traditional Signs and Stripings
  – Low Mounted Signs Experimentation
Wrong Way Driving – Incident Trend Analysis

WWD Incidents Trend and Countermeasures Deployment on NTTA System

- Enhanced warning signs and RPMs 2009-11
- Detection software implemented 2010-04
- 6 LED-enhanced signs installed for pilot-testing 2010-12
- Median opening reconfigured on Wycliff Avenue 2011-01
- Lowered sign assemblies installed for pilot-testing 2011-07
- Additional pavement markings and warning signs at DNT south end 2012-06
- Requested expansion of the Lowered sign pilot project 2013-08
DNT Southend Improvements

• Increased number of incidents during the first half of 2012
• Unique roadway configurations and adjacent land uses
• Partner with City of Dallas for solutions

• Improvements
  – Stripings (22 lane use legends and center lines on cross streets)
  – Signs (15 additional regulatory signs including 4 Wrong Way signs on signal mast arms)
Before condition at Wolf St

After the Striping Additions at Wolf St
Before condition at Payne St

After the Striping Additions at Payne St
Before condition of Harry Hines at Payne St

After the Striping Additions on Harry Hines at Payne St
Wrong Way Signs on Signal Mast Arms (at two locations)
Effectiveness Evaluation – DNT Southend Improvements

• Number of incidents has decreased significantly after the sign & pavement marking improvements

• Recurring incidents with higher frequency than other locations within the NTTA toll road system

• Multiple countermeasures have been deployed at the same location
Low Mounted Signs Experimentation
Locations of the Low Mounted Signs on NTTA System

Lowered sign test locations

Approved by FHWA for experimentation in June 2011
Lowered sign test locations

“BEFORE” Incident locations
Aug 2010 - Jul 2011
(Total: 28)

“AFTER” Incident locations
(Total: 50)

Incident-related Crash
## Effectiveness Evaluation – Lowered Signs

### WWD Incidents Before and After the Installation of Lowered Signs

<table>
<thead>
<tr>
<th>Roadway:</th>
<th># of Incidents * Aug 2010-Jul 2011 (Before)</th>
<th># of Incidents * Aug 2011-Jul 2012 (1st Year After)</th>
<th>% Difference (from last year)</th>
<th># of Incidents * Aug 2012-Jul 2013 (2nd Year After)</th>
<th>% Difference (from last year)</th>
<th># of Incidents (2 Year Average)</th>
<th>% Difference (before and after)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtotal - Test Locations</td>
<td>9</td>
<td>14</td>
<td>56%</td>
<td>11</td>
<td>-21%</td>
<td>13</td>
<td>39%</td>
</tr>
<tr>
<td>Other Locations</td>
<td>2</td>
<td>13</td>
<td>550%</td>
<td>7</td>
<td>-46%</td>
<td>10</td>
<td>400%</td>
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<tr>
<td>DNT - total</td>
<td>11</td>
<td>27</td>
<td>145%</td>
<td>18</td>
<td>-33%</td>
<td>23</td>
<td>105%</td>
</tr>
<tr>
<td>Subtotal - Test Locations</td>
<td>2</td>
<td>1</td>
<td>-50%</td>
<td>6</td>
<td>500%</td>
<td>4</td>
<td>75%</td>
</tr>
<tr>
<td>Other Locations</td>
<td>12</td>
<td>13</td>
<td>8%</td>
<td>15</td>
<td>15%</td>
<td>14</td>
<td>17%</td>
</tr>
<tr>
<td>PGBT - total</td>
<td>14</td>
<td>14</td>
<td>0%</td>
<td>21</td>
<td>50%</td>
<td>18</td>
<td>25%</td>
</tr>
<tr>
<td>Subtotal - Test Locations</td>
<td>0</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Other Locations</td>
<td>3</td>
<td>9</td>
<td>200%</td>
<td>11</td>
<td>22%</td>
<td>10</td>
<td>233%</td>
</tr>
<tr>
<td>SRT - total</td>
<td>3</td>
<td>9</td>
<td>200%</td>
<td>11</td>
<td>22%</td>
<td>10</td>
<td>233%</td>
</tr>
<tr>
<td>System-wide Test Locations</td>
<td>11</td>
<td>15</td>
<td>36%</td>
<td>17</td>
<td>13%</td>
<td>16</td>
<td>45%</td>
</tr>
<tr>
<td>Other Locations</td>
<td>17</td>
<td>35</td>
<td>106%</td>
<td>33</td>
<td>-6%</td>
<td>34</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28</strong></td>
<td><strong>50</strong></td>
<td><strong>79%</strong></td>
<td><strong>50</strong></td>
<td><strong>0%</strong></td>
<td><strong>50</strong></td>
<td><strong>79%</strong></td>
</tr>
</tbody>
</table>

*The number of incidents are shown for the reported locations, which may not represent the actual point of entry.*
Low Mounted Signs Effectiveness Analysis

• Over the two years, experimental sites experienced smaller % increase of incidents compared to other locations
• System-wide, smaller percentage of incidents were recorded at the experimental sites while overall incident number increased
• Some test sites have fewer but repeated incidents
• It is recommended that the experimentation project be expanded to include more locations
Observation and Points for Discussion

- Murphy’s Law – Anything that can go wrong, will go wrong
- Drivers vs. Facility Operator’s responsibility
- A balance approach within the constraint of available resources
- Maximize the benefits of technology advancement
- Data vs. Information
- Every small improvement counts
Look Forward …

- Think outside of the Engineer’s box
- Think more on Drivers and Vehicles
- Think of Technologies
Summary

• Wrong Way Driving is a world wide long-term challenge to the transportation community

• NTTA is proactively working to reduce incidents with a three-pronged approach:
  – Engineering
  – Enforcement
  – Education

• Partner with other entities for effective solutions
Questions?

- provide a safe and reliable toll road system
- increase value and mobility options for our customers
- operate the Authority in a businesslike manner
- protect our bondholders
- partner to meet our region's growing need for transportation infrastructure.