Median Barrier Program

Tuesday, July 31, 2018
Newark Senior Center
Agenda

• Strategic Highway Safety Plan Overview
• Emphasis Areas
• Median Barrier Program
• Other Roadway Departure Countermeasures
• Next Steps
Strategic Highway Safety Plan (SHSP) Overview
What is an SHSP?

- Comprehensive transportation safety plan with a goal of reducing highway fatalities and serious injuries on all public roads

- Establishes consistent statewide goals, objectives, emphasis areas, priorities, and countermeasures with stakeholders and other transportation plans

- Makes effective use of State, regional, and local crash data and determines priorities based on crash data

- Addresses engineering, management, operation, education, enforcement, and EMS
Key Federal Requirements

- SHSP must be evaluated and updated regularly (full updates at least every 5 years)

- States must develop the SHSP in consultation with the stakeholders

- To identify safety problems and priorities, States should analyze crash (both fatalities and serious injuries), roadway, and traffic data

- Coordinate SHSP with other transportation and safety plans

- States must set performance-based goals
Stakeholder Involvement

**CORE COMMITTEE**
- DeIDOT Traffic
- OHS
- DSP

**STAKEHOLDER COMMITTEE**
- City of Wilmington
- DE Office of Highway Safety
- DE Office of Emergency Medical Services
- DE Department of Justice
- DeIDOT - DMV
- DeIDOT Planning
- DeIDOT Traffic
- DELJIS
- DE Police Chiefs’ Council
- Delaware State Police
- DSP Truck Enforcement Unit
- DART/DTC
- Dover/Kent County MPO
- FHWA
- FMCSA
- NHTSA
- New Castle County PD
- Ocean View PD
- Sussex County
- UD T2 / LTAP Center
- WILMAPCO

**Emphasis Area Teams**
- Emphasis Area 1
- Emphasis Area 2
- Emphasis Area 3
- Emphasis Area ...

The Delaware Strategic Highway Safety Plan: Toward Zero Deaths aims to eliminate fatalities and serious injuries on Delaware’s roadways through a multi-agency approach that utilizes education, enforcement, engineering and emergency medical service strategies.

The goal of the Delaware Strategic Highway Safety Plan: Toward Zero Deaths is to achieve a reduction of at least 3 fatalities and 15 serious injuries annually and continue to reduce the total number of fatalities and serious injuries to achieve at least a 50 percent reduction by 2035.
2015 SHSP Overall Goal
(Combined Fatalities & Serious Injuries)

2015 SHSP Goal:
- Reduce 3 fatalities per year
- Reduce 15 serious injuries per year
- 50% reduction by 2035

Source: CARS (2017 data is preliminary)
Number of Fatalities

Historical CY Data
2015 SHSP Goal
CY '00 - '14 Linear Trend

Source: CARS (2017 data is preliminary)

Goal: ↓ 3 per year

Goal Met

Goal Not Met
Number of Serious Injuries

Year

Historical CY Data


Number of Serious Injuries

Goal: ↓ 15 per year

Source: CARS (2017 data is preliminary)

Goal Met

Goal Not Met
2015 SHSP Overall Goal
(Combined Fatalities & Serious Injuries)

Combined Number of Fatalities and Serious Injuries

Goal: ↓ 18 per year

Year

Historical CY Data
2015 SHSP Goal
CY '05 - '14 Linear Trend

Source: CARS

✓ Goal Met  × Goal Not Met
# 2018 Fatalities
(as of July 24, 2018)

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
<th>2018 - 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Fatalities</strong></td>
<td>49</td>
<td>62</td>
<td>+13 (+27%)</td>
</tr>
<tr>
<td><strong>Person Type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle Occupants</td>
<td>24</td>
<td>39</td>
<td>+15 (+63%)</td>
</tr>
<tr>
<td>Seat Belts Worn</td>
<td>9</td>
<td>17</td>
<td>+8 (+89%)</td>
</tr>
<tr>
<td>Seat Belts Not Used</td>
<td>14</td>
<td>19</td>
<td>+5 (+36%)</td>
</tr>
<tr>
<td>Seat Belt Use Unknown</td>
<td>1</td>
<td>3</td>
<td>+2 (n/a)</td>
</tr>
<tr>
<td>Motorcyclists</td>
<td>7</td>
<td>7</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Pedestrians</td>
<td>15</td>
<td>13</td>
<td>-2 (-13%)</td>
</tr>
<tr>
<td>Bicyclists</td>
<td>3</td>
<td>3</td>
<td>0 (0%)</td>
</tr>
<tr>
<td><strong>Crash Involvement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol/Drug Related</td>
<td>29</td>
<td>10</td>
<td>-19 (-66%)</td>
</tr>
<tr>
<td>Roadway Departure</td>
<td>17</td>
<td>27</td>
<td>+10 (+59%)</td>
</tr>
<tr>
<td>Work Zones</td>
<td>0</td>
<td>3</td>
<td>+3 (n/a)</td>
</tr>
</tbody>
</table>

Source: OHS and DelDOT based on analysis of CARS and fatal crash notices;
Current year count is unofficial and could rise as fatal investigations are completed
Emphasis Areas
Delaware’s 2015 SHSP Emphasis Areas (EA)

Emphasis Areas Ranked by Fatalities and Serious Injuries (2007 - 2014)

- Intersections: 36% (41%)
- Roadway Departure: 24% (18%)
- Impaired Driving: 21% (17%)
- Unrestrained Motorists: 13% (11%)
- Motorcycles: 12% (11%)
- Speeding: 10% (8%)
- Pedestrians: 10% (11%)

*Head-On & Cross Median: 10%

- Distracted Driving: 9%
- Heavy Vehicles: 8%
- Older Drivers & Peds: 8%
- Young Drivers: 7%
- Bicyclists: 3%
- Fatigued Driving: 2%
- Work Zone: 1%

* Considered as part of the Roadway Departure EA

Account for
94% (91%) of fatalities and
81% (75%) of serious injuries

(2007 – 2014 data)
(2015 – 2017 data)
SHSP EA 2: Roadway Departure
(Combined Fatalities and Serious Injuries)

<table>
<thead>
<tr>
<th>Year</th>
<th>Historical CY Data</th>
<th>2015 SHSP Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>207</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>185</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>171</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>151</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>165</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>113</td>
<td>✓</td>
</tr>
<tr>
<td>2016</td>
<td>161</td>
<td>✓</td>
</tr>
<tr>
<td>2017</td>
<td>149</td>
<td>✓</td>
</tr>
<tr>
<td>2018</td>
<td>153</td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td>149</td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>2021</td>
<td>171</td>
<td></td>
</tr>
</tbody>
</table>

Goal: ↓ 4 per year

Source: CARS
SHSP EA 2: Roadway Departure

- 77% were single-vehicle crashes
- 68% were male
- 58% occurred along collector and local roadways
- 55% occurred in rural areas
- 43% occurred during dark, unlit conditions
- 37% involved impaired driving
- 36% occurred on a Saturday or Sunday
- 28% were 20 to 29 years old
- 27% were unrestrained motorists
- 19% occurred on wet/snowy/icy roadways
- 18% involved speeding
- 21% occurred between 12 AM and 3 AM
- 19% involved striking a tree(s)
- 6% were cross median crashes
Median Barrier Program
AASHTO Roadside Design Guide (2011) establishes guidelines to determine the need for median barrier on freeways based on average daily traffic (ADT) and median width:

- Median width > 50 ft, barrier is optional
- Median width < 30 ft, barrier is recommended
- Median width between 30 and 50 feet, barrier should be considered
- ADT < 20,000, barrier is optional, regardless of median width
Median Barrier Program

- Median barrier existed along many freeway segments prior to inception of SHSP; the first high tension cable barrier installation was in 2009 along SR 1

- Prioritization Process
  - Assessment of potential locations for median barrier along freeway sections of SR 1 and I-95 was initiated in 2014
  - Considered all freeway segments that did not have existing or planned median barrier
  - Locations were ranked based on daily traffic volumes, horizontal curvature, and crash history from 2005 to 2013

<table>
<thead>
<tr>
<th>Segment</th>
<th>Begin Description</th>
<th>End Description</th>
<th>Begin MP</th>
<th>End MP</th>
<th>Length (mi)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-95 - 7</td>
<td>0.43 mile south of Harvey Road</td>
<td>0.1 mile south of Darley Drive</td>
<td>20.87</td>
<td>22.51</td>
<td>1.64</td>
<td>1</td>
</tr>
<tr>
<td>I-95 - 9</td>
<td>0.12 mile south of SR 92/Naamans Road</td>
<td>DE/PA State Line</td>
<td>20.20</td>
<td>21.43</td>
<td>1.23</td>
<td>2</td>
</tr>
<tr>
<td>SR1 - 6</td>
<td>0.07 mile north of Black Diamond Road</td>
<td>0.17 mile north of US 13</td>
<td>3.93</td>
<td>5.67</td>
<td>1.74</td>
<td>3</td>
</tr>
<tr>
<td>I-95 - 1</td>
<td>0.08 mile north of MD/DE State Line</td>
<td>0.06 mile south of Otts Chapel Road</td>
<td>0.08</td>
<td>0.41</td>
<td>0.27</td>
<td>4</td>
</tr>
<tr>
<td>SR1 - 1</td>
<td>0.87 mile south of SR 9</td>
<td>0.64 mile north of SR 9</td>
<td>13.66</td>
<td>15.18</td>
<td>1.52</td>
<td>5</td>
</tr>
<tr>
<td>I-95 - 6</td>
<td>0.21 mile north of Shipley Road</td>
<td>0.08 mile south of Silverside Road</td>
<td>18.73</td>
<td>20.31</td>
<td>1.58</td>
<td>6</td>
</tr>
<tr>
<td>I-95 - 4</td>
<td>0.14 mile south of SR 273</td>
<td>0.11 mile south of SR 273</td>
<td>6.49</td>
<td>6.52</td>
<td>0.03</td>
<td>7</td>
</tr>
<tr>
<td>SR1 - 2</td>
<td>0.26 mile south of S. Bay Road</td>
<td>0.08 mile south of White Oak Road</td>
<td>17.80</td>
<td>20.55</td>
<td>2.75</td>
<td>8</td>
</tr>
<tr>
<td>SR1 - 8</td>
<td>0.08 mile north of Pine Tree Road</td>
<td>HTC terminus located south of SR 299</td>
<td>8.18</td>
<td>11.28</td>
<td>3.10</td>
<td>9</td>
</tr>
<tr>
<td>SR1 - 4</td>
<td>Bridge east of Garrison's Lake</td>
<td>0.21 mile north of SR 6/13 Commerce Street (i.e., Kent/New Castle County Line)</td>
<td>27.10</td>
<td>31.77</td>
<td>4.67</td>
<td>10</td>
</tr>
<tr>
<td>I-95 - 5</td>
<td>0.34 mile south of Talley Road</td>
<td>0.16 mile south of Talley Road</td>
<td>17.68</td>
<td>17.86</td>
<td>0.18</td>
<td>11</td>
</tr>
<tr>
<td>SR1 - 3</td>
<td>0.15 mile north of Leipsic Road</td>
<td>Bridge east of Garrison's Lake</td>
<td>22.47</td>
<td>26.87</td>
<td>4.40</td>
<td>12</td>
</tr>
<tr>
<td>I-95 - 6</td>
<td>0.09 mile north of Darley Drive</td>
<td>0.19 mile north of Darley Drive</td>
<td>22.71</td>
<td>22.81</td>
<td>0.10</td>
<td>13</td>
</tr>
<tr>
<td>SR1 - 5</td>
<td>0.5 mile north of SR 67/E. Commerce Street (i.e., Kent/New Castle County Line)</td>
<td>0.06 mile south of Black Diamond Road</td>
<td>0.20</td>
<td>3.80</td>
<td>3.60</td>
<td>14</td>
</tr>
<tr>
<td>I-95 - 2</td>
<td>0.45 mile north of SR 72</td>
<td>Salem Church Road</td>
<td>3.56</td>
<td>5.06</td>
<td>1.50</td>
<td>T15</td>
</tr>
<tr>
<td>SR1 - 7</td>
<td>0.58 mile north of US 13</td>
<td>0.08 mile south of Pine Tree Road</td>
<td>5.88</td>
<td>8.02</td>
<td>2.14</td>
<td>T15</td>
</tr>
<tr>
<td>I-95 - 3</td>
<td>0.42 mile south of SR 273</td>
<td>0.36 mile south of SR 273</td>
<td>6.21</td>
<td>6.27</td>
<td>0.06</td>
<td>17</td>
</tr>
</tbody>
</table>

TOTAL LENGTH: 25.27
Median Barrier Options

• Concrete barrier (rigid)
  ✓ Less maintenance required when struck
  ✓ Can be used in very narrow medians
  ✗ Least forgiving upon impact
  ✗ Most expensive to install

• Steel guardrail (semi-rigid)
  ✓ Less expensive to install compared to concrete barrier
  ✗ More expensive to install compared to cable barrier
  ✓ More forgiving upon impact compared to concrete barrier
  ✗ Less forgiving upon impact compared to cable barrier
  ✓ Can be used in narrow medians and for protection of fixed objects

• High tension cable barrier (HTCB)
  ✓ Less expensive to install than steel guardrail (typically)
  ✓ More forgiving upon impact (reducing the potential for injury or fatality)
  ✓ Easier to maintain compared to steel guardrail and concrete barrier
  ✗ Used in wider medians due to the greater deflection on impact; not typically used for protection of fixed objects
Concrete Barrier Crash Testing
Median Barrier Implementation

- Median barrier installations since 2009:
  - SR 1 – 4.2 miles of HTCB from SR 299 to SR 896 (2009)
  - SR 1 – 2.9 miles of steel guardrail from north of Tybouts Corner to north of SR 273 (2009/2010)
  - I-495 – 0.85 miles of HTCB from I-95 to US 13 (2013)
  - SR 1 – 2.3 miles of HTCB from Roth Bridge to US 13 (2014)
  - I-95 – 1.2 miles of steel guardrail from north of Rest Area to north of SR 273 (2017)

- Additional median barrier design underway/planned:
  - I-95 – Approx. 2.5 miles from ½ mile south of Harvey Rd to the PA State Line
  - SR 1 – Approx. 12 miles from south of SR 9 to south of Smyrna
  - SR 1 – Approx. 11.5 miles from Smyrna to Odessa
  - SR 1 – Approx. 1 mile from north of SR 896 to south of Biddles Toll Plaza
  - Installations will be primarily HTCB with small sections of steel guardrail
  - Construction will occur in segments under on-call contract
Implementation to Date

DeIDOT Freeway Median Barrier Installations since 2009
Other Roadway Departure Countermeasures
Rumble Strips

• Rumble Strip Open-End Contract:
  • 223 miles of center line installed
  • 133 miles of edge line installed

• Upcoming testing of new, quieter rumble strip design
High Friction Surface Treatments (HFST)

- Candidate locations identified using data-driven process and screening based on several factors

- After testing, 34,500 SF was installed at over 25 locations (thru 2017)

- Before/after evaluation
  - Reduced wet-weather crashes per year by 55%
  - Reduced total crashes per year by 21%
  - Reduced roadway departure crashes by 56%

- DelDOT is currently evaluating the durability of the locations with HFST and pending those findings, will award a new open-end contract for installation

National Roadway Safety Award for Infrastructure and Operational Improvements Award Winner
Other Roadway Departure Initiatives

- Horizontal Curve Safety Project (ongoing)
  - Arterial and collector roadways with greater than 1,000 daily traffic volume
  - 3,400 locations statewide
- Investigating feasibility/benefits of increasing yellow centerline width to 10” within curves (pilot will be implemented at a speed transition area)
- DelDOT working with utility companies to relocate and/or improve delineation of utility poles in locations with crash histories
Next Steps
Next Steps

• **Median Barrier Program**
  
  • Complete design and construct median barrier:
    • I-95 – ½ mile south of Harvey Rd to the PA State Line
    • SR 1 – Smyrna to Odessa
    • SR 1 – South of SR 9 to south of Smyrna
    • SR 1 – North of SR 896 to south of Biddles Toll Plaza
  
  • Begin design of median barrier at remaining locations along I-95

• **Strategic Highway Safety Plan**
  
  • Continue to implement roadway departure countermeasures
  
  • Spring 2019: SHSP Core Agencies (DelDOT, OHS, DSP) initiate 2020 SHSP development
  
  • Spring 2020: Crash data review
  
  • September 2020: Adopt 2020 SHSP
Thank You