FHWA Proven Safety Countermeasures

Ohio Transportation Engineering Conference
October 3, 2018
Agenda

• Setting the Context

• History of Proven Safety Countermeasures

• New Countermeasures
National Safety Goal

“To achieve a significant reduction in traffic fatalities and serious injuries on all public roadways.”

23 U.S. Code § 150 (b)(1)
U.S. Traffic Fatality Data

2017 Nationally
37,150 fatalities (preliminary estimate)

Up 14% from 32,479 in 2011

Down 32% from 54,589 in 1972

1/3 were motorcyclists, pedestrians or bicyclists
Safe Systems Approach

• Based on Sweden’s “Vision Zero”
  ➢ Australia, New Zealand and Canada

• Principles
  1. Acknowledge a shared responsibility for safety
     • Human – Vehicle – Infrastructure
  2. Accept that crashes will occur
     • Reduce opportunities for driver error
  3. Manage the energy of crashes to reduce severity
     • Reduce speeds and impact angles
History of PSC

• Proven Safety Countermeasures
  ➢ Strategies proven to reduce severe crashes
  ➢ Proven, but underutilized
    • Case studies of success
  ➢ Systemic implementation
    • Also spot and systematic
<table>
<thead>
<tr>
<th><strong>Systemic</strong></th>
<th><strong>Spot</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Widespread (System wide)</td>
<td>Localized (Hot Spots)</td>
</tr>
<tr>
<td>Risk-based (Roadway features)</td>
<td>Event-based (Crashes)</td>
</tr>
<tr>
<td>Proactive (Potential crashes)</td>
<td>Reactive (Actual crashes)</td>
</tr>
</tbody>
</table>
Systemic Safety

- Crashes are random, but crash types are predictable
History of PSC

• Version 1.0 debuted in 2008

➢ First nine “proven safety countermeasures”
  1. Road Safety Audits (RSAs)
  2. Rumble Strips and Rumble Stripes
  3. Median Barriers
  4. SafetyEdge
  5. Roundabouts
  6. Left and Right Turn Lanes at Stop-CONTROLLED Intersections
  7. Yellow Change Intervals
  8. Medians and Pedestrian Refuge Areas
  9. Walkways
History of PSC

• Version 1.0

➢ Road Safety Audits (RSAs)
History of PSC

• Version 1.0
  ➢ Rumble Strips and Rumble Stripes
History of PSC

- Version 1.0
  - Median Barriers
History of PSC

• Version 1.0
  ➢ SafetyEdge
History of PSC

• Version 1.0

➤ Roundabouts
History of PSC

• Version 1.0

- Left and Right Turn Lanes at Stop-Controlled Intersections
History of PSC

• Version 1.0

➢ Yellow Change Interval
History of PSC

• Version 1.0

➢ Medians and Pedestrian Refuge Areas
History of PSC

• Version 1.0

➢ Walkways
History of PSC

• Version 2.0 released in 2012

➢ Retained four of original nine
  1. Rumble Strips and Rumble Stripes
  2. Safety Edge
  3. Roundabouts
  4. Medians and Pedestrian Refuge Areas

➢ Added five new countermeasures
  5. Corridor Access Management
  6. Signal Backplates with Retroreflective Borders
  7. Enhanced Delineation and Friction for Horizontal Curves
  8. Pedestrian Hybrid Beacons
  9. Road Diets
History of PSC

• Version 2.0

➢ Corridor Access Management
History of PSC

• Version 2.0
  ➢ Signal Backplates with Retroreflective Borders
History of PSC

• Version 2.0

  ➢ Enhanced Delineation and Friction for Horizontal Curves
History of PSC

• Version 2.0

➢ Pedestrian Hybrid Beacons
History of PSC

• Version 2.0

➢ Road Diets
History of PSC

• Version 3.0 released September 28, 2017
  ➢ 6 new countermeasures
  ➢ 20 total countermeasures
  ➢ Intersections, RwD, Ped/Bike, Cross Cutting
PSC Version 3.0

1. Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections
2. Reduced Left-Turn Conflict Intersections
3. Roadside Design Improvements at Curves
4. Leading Pedestrian Intervals
5. Local Road Safety Plans
6. USLIMITS2
1. Systemic Application of Multiple Low Cost Countermeasures at Stop-Controlled Intersections

- Mostly signing & pavement marking enhancements
- Best suited < 20,000 AADT
- Economy of scale
New PSC – Intersections

2. Reduced Left-Turn Conflict Intersections (R-CUT and MUT)

• Alters how left-turn movements occur
• Reduces conflicts related to turning
Reduced Left-Turn Conflict Intersections

Problem: Far-Side Right-Angle Collisions
Reduced Left-Turn Conflict Intersections

- Minor street re-routed to downstream U-turn
- Major street treatment optional
- Intersections can be either signalized (“Superstreet”) or not (“J-Turn”)
Reduced Left-Turn Conflict Intersections

<table>
<thead>
<tr>
<th>Vehicle-Vehicle Conflict Points</th>
<th>Conventional</th>
<th>MUT</th>
<th>RCUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossing</td>
<td>16</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Merging</td>
<td>8</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Diverging</td>
<td>8</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>16</td>
<td>14</td>
</tr>
</tbody>
</table>

RCUT Safety Performance
- 54% decrease F&I Crashes.
- 35% decrease All Crashes.

MUT Safety Performance
- 30% decrease F&I Crashes.
- 16% decrease All Crashes.

Sources: FHWA-SA-14-069, FHWA-SA-14-070
New PSC – Roadway Departure

3. Roadside Design Improvements at Curves

• Increase the clear zone
  ➢ Recommended by AASHTO RDG
  ➢ Proven to reduce crashes

• Improve traversability
  ➢ Add or widen shoulders
  ➢ Flatten slopes

• Reconsider when to install barrier
  ➢ Criteria based on tangents
  ➢ May be needed on curves
New PSC – Pedestrians & Bicycles

4. Leading Pedestrian Interval

• Pedestrians get “WALK” signal before vehicles get green light
  ➢ 3 to 7 second head start

• Pedestrians establish presence in crosswalk before vehicles begin to turn

• 60% reduction in crashes at signalized intersections
New PSC – Crosscutting Strategies

5. Local Road Safety Plans

• Plan for reducing fatalities and serious injuries on local roads within a jurisdiction.

  ➢ Has local safety goals, objectives & emphasis areas
  ➢ Utilizes the 4 E’s as appropriate
  ➢ Is flexible

• SHSP at the local level
New PSC – Crosscutting Strategies

6. USLIMITS2

• Tool for setting speed limits
• Considers all factors impacting the speed of road users
  ➢ Speeds (85th and 50th), volumes, hazards, development, ped/bike, parking, crashes
• Free, easy to use web-based tool
• FHWA supported, AASHTO funded
Proven Safety Countermeasures

- Roadside Design Improvement at Curves
- Reduced Left-Turn Conflict Intersections
- Systemic Application of Multiple Low Cost Countermeasures at Stop-Controlled Intersections
- Leading Pedestrian Interval
- Local Road Safety Plan
- USLIMITS2
- Enhanced Delineation and Friction for Horizontal Curves
- Longitudinal Rumble Strips and Stripes on Two-Lane Roads
- Median Barrier
- Safety Edge™
- Backplates with Retroreflective Borders
- Corridor Access Management
- Dedicated Left- and Right-Turn Lanes at Intersections
- Roundabouts
- Yellow Change Intervals
- Medians and Pedestrian Crossing Islands in Urban and Suburban Areas
- Pedestrian Hybrid Beacon
- Road Diet
- Walkways
- Road Safety Audit
PSC Resources

http://safety.fhwa.dot.gov/provencountermeasures

• 1-page flyers
• Webinar recording and slides
• Links to additional resources
NHTSA Countermeasures That Work

1. Impaired Driving
2. Seat Belts
3. Speed Management
4. Distracted Driving
5. Motorcycles
6. Young Drivers
7. Older Drivers
8. Pedestrians
9. Bicyclists
Very Low Cost Countermeasures

• Clear the vegetation
  ➢ Signs, signals, intersections, driveways and sidewalks

• Observe and adjust signal timing
  ➢ Particularly off-peak
Ron Garczewski, PE, PS
FHWA Ohio Division
614-280-6840
ron.garczewski@dot.gov