An Overview of FHWA’s Nine Proven Safety Countermeasures

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Acknowledgements

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FHWA Office of Safety
http://safety.fhwa.dot.gov/provencountermeasures/
Crash Videos

http://youtu.be/4phFYiMGCIY
http://youtu.be/UY_HfsXcGWw

Crash Data tells us that...

- Roadway Departure crashes account for approximately 53% of fatal crashes each year
- 700 people are killed annually in red-light running collisions
- 28% of all fatal crashes occur on horizontal curves
- Crashes involving edge drop-offs are two to four times more likely to include a fatality than other crashes on similar roads
- More than 80% of pedestrians hit by vehicles traveling at 40pmh or faster will die
Support data-driven approach to safety improvements

Countermeasure selection based on analytical techniques

Strengthen evidence-based decision making processes as highlighted in the Highway Safety Manual

Continue systematic planning approaches to make improved safety investment decisions

FHWA Guidance Memorandum on Proven Safety Countermeasures
January 2012

Highlights:
- Roadway Departure
- Operations
- Intersections
- Pedestrian Safety
Proven Countermeasures

- Road Safety Audits
- Rumble Strips and Rumble Stripes
- Median Barriers
- Safety Edge
- Roundabouts
- Left- and Right-Turn Lanes
- Yellow Change Interval
- Pedestrian Refuge Areas
- Walkways

2012
- Backplates with Retroreflective Borders
- Longitudinal Rumble Strips and Stripes in Two Lane Roads
- Enhanced Delineation and Friction for Horizontal Curves
- Safety Edge
- Roundabouts
- Corridor Access Management
- Yellow Change Interval
- Pedestrian Refuge Areas
- Road Diet (Roadway Reconfiguration)

CMF Clearinghouse

Web-based database of CMFs to help transportation engineers identify the most appropriate countermeasure for their safety needs.

- [http://www.cmfclearinghouse.org/](http://www.cmfclearinghouse.org/)
Roundabouts

- Geometry results in a low-speed environment
- Entering traffic yields to vehicles in the circulatory roadway
- Entrance channelization designed to be effective in reducing conflict
- Offer greater operational advantages over all-way stop control

Roundabaaouts

- By converting from a two-way stop mechanism a location can experience:
  - 82% reduction in severe (injury/fatal) crashes
  - 44% reduction in overall crashes

- By converting from a signalized intersection a location can experience:
  - 78% reduction in severe (injury/fatal) crashes
  - 48% reduction in overall crashes
Longitudinal Rumble Strips and Stripes on Two-Lane Roads

- Milled or raised elements on the pavement that cause vibration and sound, serving to warn inattentive drivers that the vehicles have left the travel lane

- Shoulder rumble strips
- Edge line rumble strips
- Center line rumble strips
- Rumble stripes
  - 44% reduction of head-on fatal and injury crashes on rural two-lane roads
  - 64% reduction of head-on fatal and injury crashes on urban two-lane roads
  - 36% reduction of run-off road fatal injury crashes
Safety Edge<sup>sm</sup>

- A paving technique which forms a 30-degree sloped wedge at the edge of the pavement
- Mitigates the effects of pavement drop offs which can occur over time
- Minimal cost

Safety Edge<sup>sm</sup>

- Estimated reduction in 6% in total crashes on two-lane highways
- Use whenever pave surface meets non-paved shoulder
- Graded shoulders must be brought up after paving
Enhanced Delineation and Friction for Horizontal Curves

- Enhanced signing treatment such as larger chevron signs with enhanced retroreflectivity

- Availability of a variety of high friction surface treatments

Enhanced Delineation and Friction for Horizontal Curves

- Installing chevron signs, curve warning signs, and/or sequential flashing beacons can result in a 38-43% reduction in all fatal and injury crashes

- Upgrading existing curve signs to fluorescent sheeting can result in 25% reduction in non-intersection fatal and injury crashes
Road Diet
(Roadway Reconfiguration)

- Converting an undivided four lane roadway into three lanes
- ROW reallocated to other uses such as bike lanes, pedestrian crossing islands, and/or parking
Road Diet (Roadway Reconfiguration)

- Provides room for pedestrian crossing island
- Opportunity for on-street parking
- Reduce rear-end and side swipe crashes
- Traffic Calming: Improve speed limit compliance and reduce crash severity
- 29% Reduction in all roadway crashes

Road Diet (Roadway Reconfiguration)

- Can be low cost if planned in conjunction with reconstruction or simple overlay projects
- Very good results in roads with 15,000 ADT or less
- Very compatible with Single Lane Roundabouts

Need to consider:
- driveway density,
- transit routes,
- number and design of intersections along the corridor
- operational characteristics
- Input from the community stakeholders
Corridor Access Management

- Design, Implementation and Control of entry and exit points along a roadway
- Goal is to improve mobility and reduced crashes by having fewer vehicle conflicts
- Establish a balance between Safety, Mobility, and Access Needs
- 5-23% reduction in all crashes along two-lane rural highways
- 25-31% reduction in severe crashes along urban/suburban arterials

Corridor Access Management

- Driveway closure, consolidation, or relocation
- Restricted movement designs for driveways
- Raised medians that prevent cross-roadway movements
- Constructing parallel, lower speed one-way or two-way frontage roads for access
Pedestrian Hybrid Beacon

- Also known as the High Intensity Activated crossWalk (HAWK)

- Pedestrian activated warning device located on the roadside or on mast arms over midblock pedestrian crossings

- Midblock locations account for more than 70% of pedestrian fatalities
Pedestrian Hybrid Beacon

- Up to 69% reduction in pedestrian crashes
- Up to 29% reduction in total roadway crashes

Many people are not familiar with this new device so recommend to perform outreach to the public before implementation.

Use only in conjunction with a marked crosswalk
Should be use if:
- gaps in traffic are not adequate to cross
- Vehicle speeds on the major street are too high to permit pedestrian to cross
- Pedestrian delay is excessive
Follow Chapter 4F of MUTCD guidelines

Medians and Pedestrian Crossing Islands in Urban and Suburban Areas

- May reduce pedestrian crashes by 46%
- May reduce vehicle crashes by up to 39%
- Enhance the visibility of the pedestrian crossings
- Can be used for access management for vehicles (right-in/right-out turning movements)
Backplates with Retroreflective Borders

- Improve visibility of the illuminated signal face with controlled-contrast background
- Backplate made more conspicuous by framing the backplate with a retroreflective border
- Advantageous during power outages
- May result in 15% reduction in all crashes at urban, signalized intersection
PRHTA & FHWA Project Level Success

- Roundabouts
  - PR53 Ramp
  - PR17 & PR19 Intersection
  - Tiger III Caparra Interchange
- Signal Backplates with Retroreflective Borders
  - PR-3 & PR-1 corridors
- Safety Edge
  - All PRHTA paving projects as applicable
- Pedestrian Beacon (HAWK)
  - PR-1 San Juan
- Median and Ped X-Islands
  - Design practice where ROW permits
- Longitudinal Rumble Strips
  - Toll Roads in PR completed shoulder rumble strips
  - Centerline rumble strips in PR-114

Work to do....

- Adopt as Design Policy the use of CMFs analysis/evaluation
- Ensure current local regulations do not prohibit the implementation of the Road Diet concept
- Training to localities and decision makers