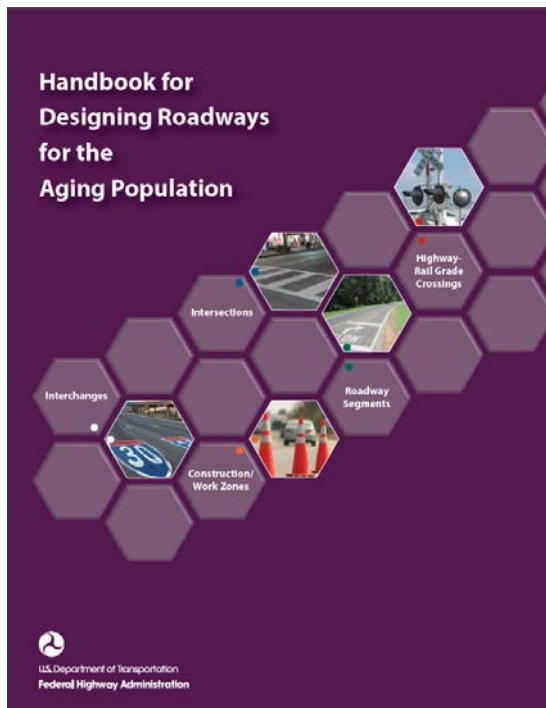


Treatments for Designing Urban Roadways for the Aging Population



5th Urban Street Symposium

*May 22, 2017
Raleigh, NC*



U.S. Department of Transportation
Federal Highway Administration



<http://safety.fhwa.dot.gov>

Today's Presentation

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Acknowledgements

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- Authors of previous draft:
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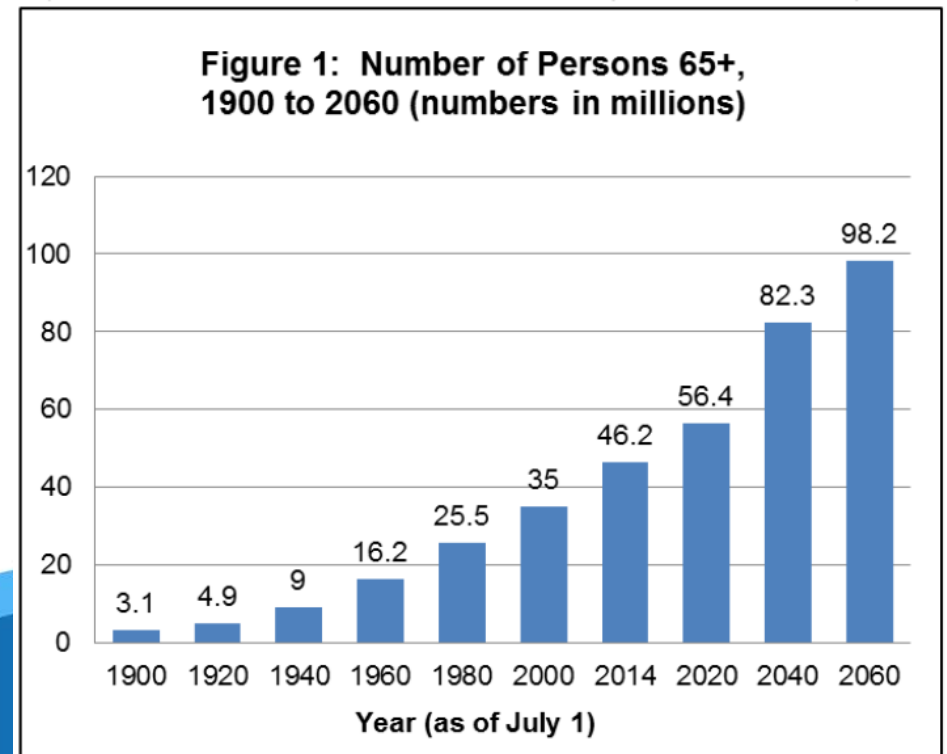


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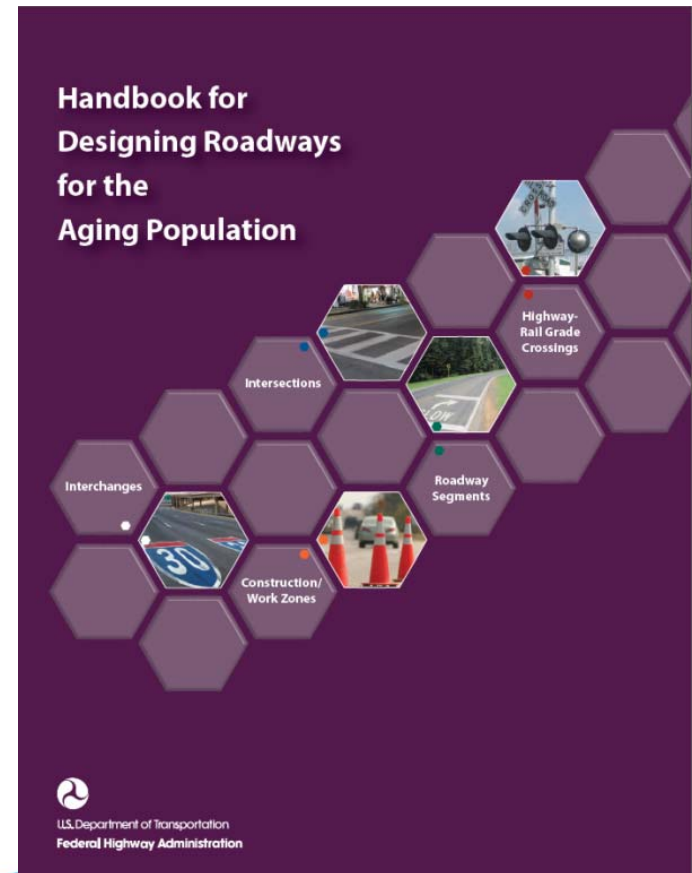
Overview – Brief History

- Increase in aging persons in the population and as road users
- Steadily increasing proportion of drivers and pedestrians with declining abilities to:
 - See and hear
 - Walk or operate a vehicle
 - Process information and make decisions



Overview – *Handbook* Content

- Current *Handbook* is third edition in series
- Key changes
 - New title: *Handbook for Designing Roadways for the Aging Population*
 - Inclusion of newer research
 - True HTML version in addition to print and PDF



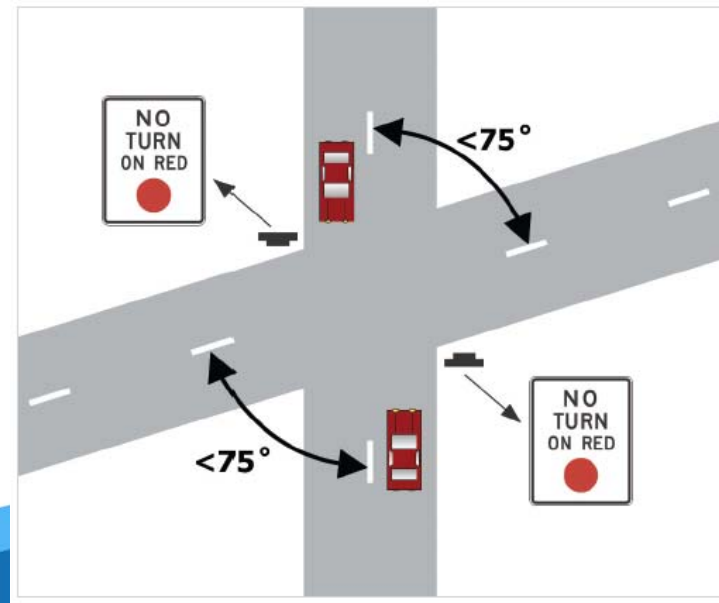
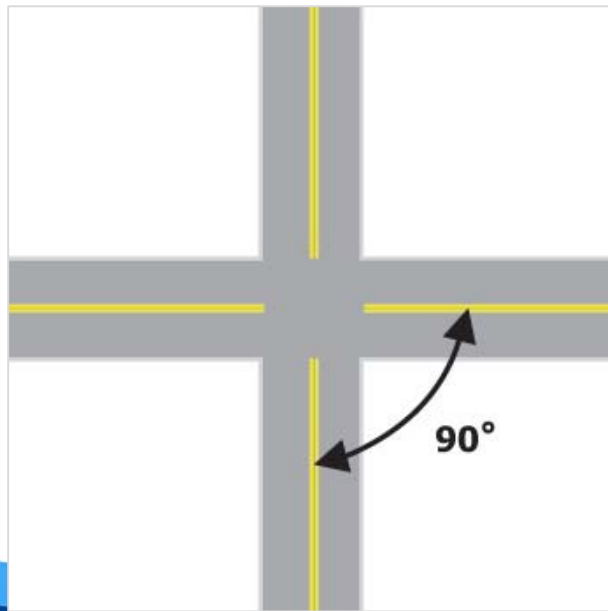
Overview – *Handbook* Content

- Similar layout to previous edition
 - Front matter and Chapter 1: introduction, overview, and worksheets
 - Part I (Chapters 2-6): treatments & recommendations
 - Part II (Chapters 7-11): rationale & supporting evidence
 - Appendices: tech notes, visibility, glossary, references
- Similar focus on five categories of treatments



Chapter 2 – Intersections

- Intersecting Angle
 - 90 degrees is preferred
 - 75 degrees is allowed, but turning restrictions may be needed



Chapter 2 – Intersections

- Channelization

- Raised channelization with sloping curbs for left- and right-turn lane treatments less than 45 mph

- Retroreflective markings for horizontal and vertical curb surfaces of raised channelization

- Contrast level = 2.0 with overhead lighting or 3.0 without

$$\text{Luminance contrast (C)} = \frac{\text{Luminance}_{\text{stripe}} - \text{Luminance}_{\text{pavement}}}{\text{Luminance}_{\text{pavement}}}$$

- Pedestrian refuge provided with channelization treatments

- Raised medians preferred over TWLTL

Chapter 2 – Intersections

- Left-Turn Traffic Control for Signalized Intersections
 - Recommend protected-only wherever appropriate
 - FYA preferred for permissive
 - Use R10-12 sign with permissive green ball
 - Optional advance signing
 - Lead phasing preferred over lag phasing



Image Credit: Marcus Brewer, Texas A&M Transportation Institute

AT SIGNAL

Chapter 2 – Intersections

- Right-Turn Traffic Control for Signalized Intersections
 - Use R10-11 sign where RTOR is prohibited
 - Use R10-15 sign if clear potential for conflicts between right-turns and pedestrians



Chapter 2 – Intersections

- Lane Assignment on Intersection Approach
 - Lane-use control signs (R3-5 and R3-6 series) on mast arm
 - Advance (5 s) use of R3 signs and pavement markings



Image Credit: Alan Pate, Battelle

Chapter 2 – Intersections

- Traffic Signals
 - Consistent implementation of all-red based on ITE
 - Backplates for all signals ≥ 40 mph and where appropriate for signals < 40 mph
 - Optional yellow borders on backplates may be used



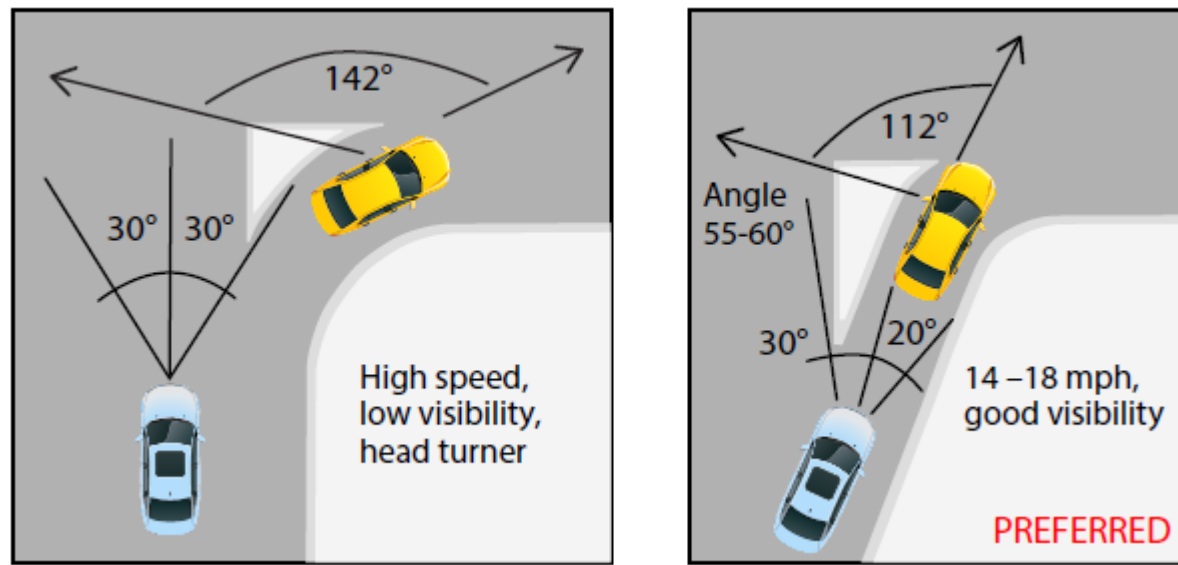
Chapter 2 – Intersections

- Pedestrian Crossings
 - Use walking speed of 3 ft/s and measure crossing distance to begin 6 ft behind curb
 - With channelized right-turn lanes, refuge island conforming to AASHTO and MUTCD, and marked crosswalk one car length from yield line



Chapter 2 – Promising Practices

- Right-Turn Channelization Design
 - Radii for turning speeds of 17-18 mph and optimize line of sight for turning drivers



Chapter 2 – Promising Practices

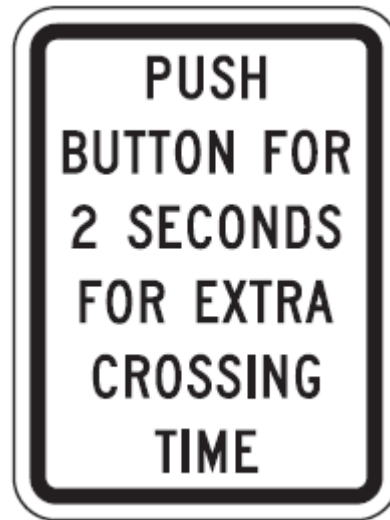
- High-Visibility Crosswalks
 - High-visibility marking patterns (e.g., “ladder”) preferred over standard or continental markings



Image Credit: Kay Fitzpatrick, Texas A&M Transportation Institute

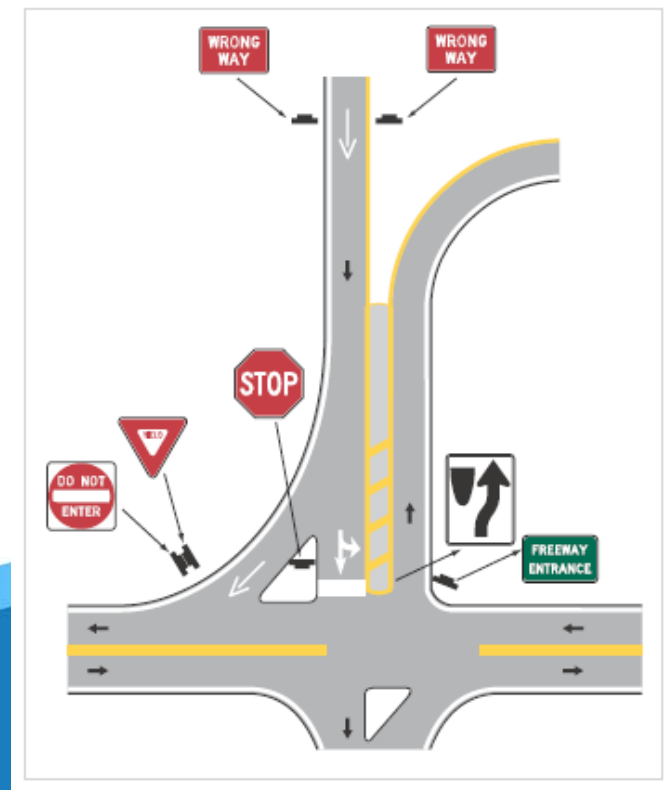
Chapter 2 – Promising Practices

- Accessible Pedestrian Treatments
 - Pushbutton-activated extension of crossing phase
 - Passive pedestrian detection



Chapter 3 – Interchanges

- Freeway Entrance Traffic Control Devices
 - Freeway Entrance guide sign recommended
 - Additional signs & markings for adjacent entrance/exit ramps
 - Diagrammatic entrance signs



Chapter 3 – Promising Practices

- Wrong-Way Driving Countermeasures
 - Additional treatments to counter wrong-way driving by aging drivers (e.g., improved lighting, channelization, signs, and markings)
 - Road Safety Audit to examine performance and determine appropriate countermeasures



Chapter 4 – Roadway Segments

- Vertical Curves
 - Active warning sign for signalized intersection beyond a curve (where the signal becomes visible at a preview distance of 8 s or less)



Chapter 5 – Construction/Work Zones

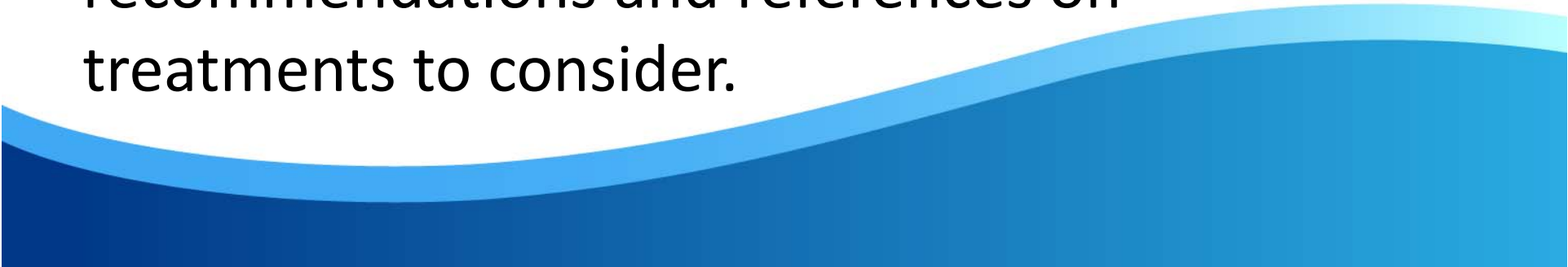
- Portable Changeable Message Signs
 - No more than two phases
 - Each phase displayed ≥ 3 s
 - Units of information:
 - No more than one per line
 - No more than three in single phase
 - No more than four in two phases



Conclusion

The *Handbook for Designing Roadways for the Aging Population* provides an update to a long-standing FHWA resource to help practitioners consider aging road users in their designs.

While the *Handbook* does not constitute a standard, it does provide a wide range of recommendations and references on treatments to consider.





Discussion / Q&A



U.S. Department of Transportation
Federal Highway Administration



<http://safety.fhwa.dot.gov>

Thank you for attending!

- Marcus A. Brewer, P.E., PMP

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- *Handbook*
- *Desk Reference (NEW!)*
- and other resources

– http://safety.fhwa.dot.gov/older_users/#training

