

2014 FHWA Aging Road User Handbook



Recommendations to Accommodate Aging Pedestrians

Lifesaver National Conference

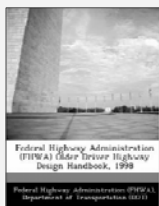
March 17, 2015

Revised June 2014

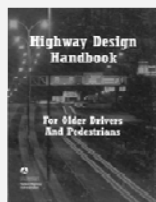
What is the Handbook?



1998
1st Edition



2001
2nd Edition



2014
3rd Edition



- New Title: Handbook for Designing Roadways for the Aging Population

1-2


What is the Handbook?



- Provides information linking aging road user performance to highway design and operations:
 - Proven Practices
 - Promising Practices
- Incorporates new research
- Two Parts I & II
- Supplements existing guidelines
- Format changes (HTML)
- Electronic version

(http://safety.fhwa.dot.gov/older_users/)

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What is in the Handbook? 

Part I – Treatments: 144 Recommendations

Category	Proven Practices	*Promising Practices	Total Treatments
Chapter 2: Intersections	16	8	24
Chapter 3: Interchanges	6	2	8
Chapter 4: Roadway Segments	4	6	10
Chapter 5: Work Zones	5	2	7
Chapter 6: Highway-Rail Grade Crossings	2	0	2
Total	33	18	51

*Promising Practices: Treatments being used by one or more agencies, though not fully evaluated, are believed to benefit aging roadway users.

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What is in the Handbook? 

Part II – Rationale and Supporting Evidence

One treatment category per chapter:

- Chapter 7: Intersections
- Chapter 8: Interchanges
- Chapter 9: Roadway Segments
- Chapter 10: Construction/Work Zones
- Chapter 11: Highway-Rail Grade Crossings

Appendices:

- Supplemental Technical Notes
- Photograph and Image Credits
- Glossary & References

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2014 FHWA Aging Road User Handbook

What is the Relationship Between the Handbook & Existing Design Manuals?

The *Handbook* supplements existing standards and guidelines

The Recommendations do not constitute a new *standard of required practice*

The *Handbook* provides guidance to enhance the safety & ease of use for older drivers and pedestrians

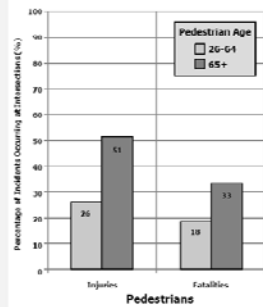


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Intersections – A Specific Older User Problem

Aging pedestrians face a variety of concerns:

- decreased visual acuity
- increased risk of falls
- slower walking speeds
- decreased ability to judge safe gaps and avoid turning vehicles



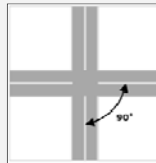
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Chapter 2: Intersections – Proven Practices

1 Intersecting Angle (Skew)

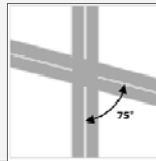
Unrestricted Right-of-Way

- Intersecting roadways should meet at a 90-degree angle



Restricted Right-of-Way

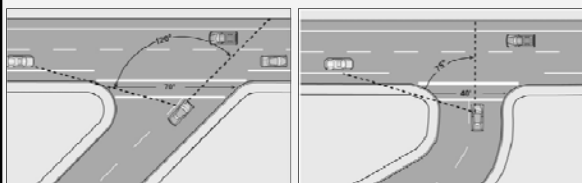
- Intersecting roadways should meet at an angle of not less than 75 degrees



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Chapter 2: Intersections – Proven Practices

- Skew necessitates greater neck turning movement
- Skew lengthens crosswalks & decreases pedestrian visibility



Right angles decrease crosswalk length, increases visibility and requires less of a neck turn

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Chapter 2: Intersections – Proven Practices

1 Intersecting Angle (Skew)

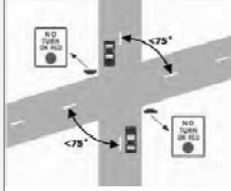




Figure 5. Skewed signalized intersection with prohibition of right turn on red

Signalized Intersections Prohibit RTOR


- Where the approach leg to the left intersects the driver's approach leg at an angle of less than 75 degrees



R10-11



Most effective



Effective with low to moderate volume of RTOR

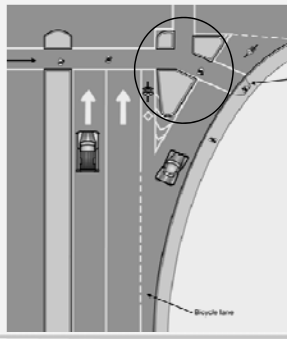
Chapter 2: Intersections – Proven Practices

3 Channelization

Pedestrian Refuge Island

If right-turn channelization is present and pedestrian traffic may be expected:

- Provide an adjacent pedestrian refuge island
- conforming to *MUTCD* and AASHTO specifications



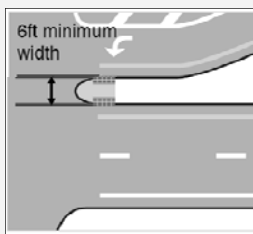
Chapter 2: Intersections – Proven Practices

5 Offset Left-Turn Lanes

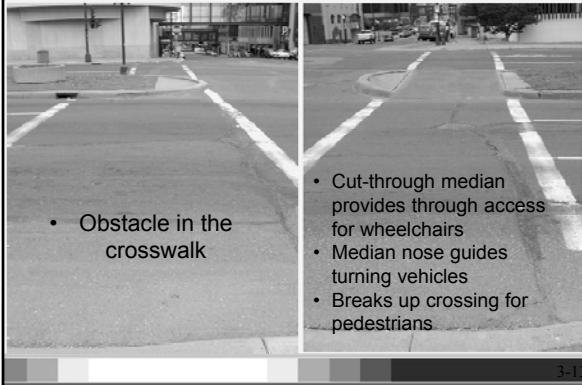
Pedestrian Median Accommodations

Recommend a 6 ft wide pedestrian crossing island (or refuge area):

- Raised channelization:
 - Vertical curbs
 - Sloped curbs on high-speed roadways (45 mph or greater)
- Flush (painted) channelization



Example of Medians with a Crosswalk

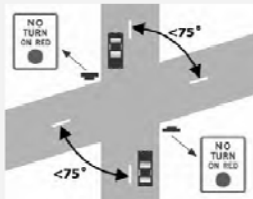


- Obstacle in the crosswalk

- Cut-through median provides through access for wheelchairs
- Median nose guides turning vehicles
- Breaks up crossing for pedestrians

Chapter 2: Intersections – Proven Practices

9 Right-Turn Traffic Control for Signalized Intersections



Right-Turn Prohibition

Use a supplemental NO TURN ON RED sign where it will be most conspicuous
> near or opposite side of the intersection

Skewed Signalized Intersections

Use where the approach leg from the left has an angle of less than 75 degrees

Chapter 2: Intersections – Proven Practices

9 Right-Turn Traffic Control for Signalized Intersections

Pedestrian Protection

MUTCD R10-15 signs are recommended:

- > Use where engineering judgment indicates a clear potential for right-turning vehicles conflict with crossing pedestrians
- > Yellow background color may be used instead of fluorescent yellow-green as shown



MUTCD R10-15

Chapter 2: Intersections – Proven Practices

15 Pedestrian Crossings Walking Speed



Use a walking speed of 3.0 ft/s to calculate total crossing time

Measure crossing distance 6 ft back from the curb or edge of travel lane to the far side of the travel way

- Accounts for shorter stride, slower gait and delayed "start-up time when crossing"

Guidance: 2009 MUTCD
Where pedestrians who walk slower than 3.5 feet per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 3.5 feet per second should be considered in determining the pedestrian clearance time.

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Chapter 2: Intersections – Proven Practices

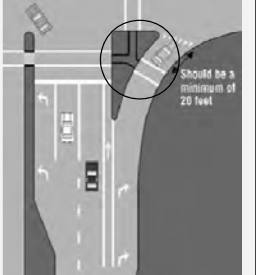
15 Pedestrian Crossings

Channelized Right-Turn Lane

An pedestrian refuge island should be provided

Crosswalk should be located one car length from the yield line:

- allows drivers on the approach leg to look for and yield to pedestrians



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Chapter 2: Intersections – Proven Practices

15 Pedestrian Crossings

Educational Crossing Signs

Where engineering judgment deems a need to improve understanding of pedestrian signals:

- Post appropriate R10-3 educational signs (MUTCD 2B.52)



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Chapter 2: Intersections – Proven Practices

15 Pedestrian Crossings



Leading Pedestrian Interval (LPI)

- At intersections with high turning-vehicle volumes and no turn on red (NTOR) control
- Timed to allow slower walkers to cross at least one moving lane of traffic, (should be a least 3s)

$$LPI = (ML + PL + 6.0) / 3.0$$

ML = width of moving lane in ft
PL = width of parking lane (if any) in ft

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Chapter 2: Intersections – Proven Practices

15 Pedestrian Crossings

Countdown Signals

Countdown pedestrian signals should be installed at all signalized intersections where pedestrian signals are warranted

- *Required* when the Pedestrian Change Interval (PCI) is greater than 7seconds (*MUTCD 4E.07*)
- PCI consists of the flashing UPRAISED HAND phase (symbolizing DONT WALK)



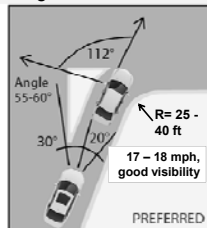
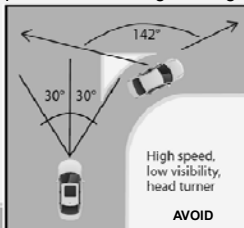
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Chapter 2: Intersections – Promising Practices

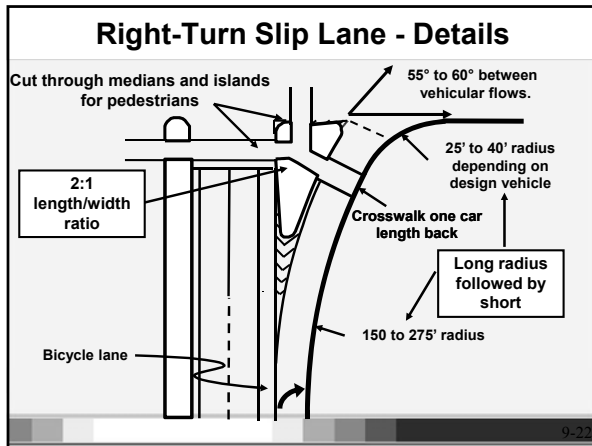
17 Right-Turn Channelization Design

Right-turn channelization with tighter turning radii:

- Slower vehicle turning speeds,
- Shorter Crossing distance
- Improved visibility of pedestrians, and
- Optimizes line of sight of 'right-turning motorists'



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Chapter 2: Intersections – Promising Practices

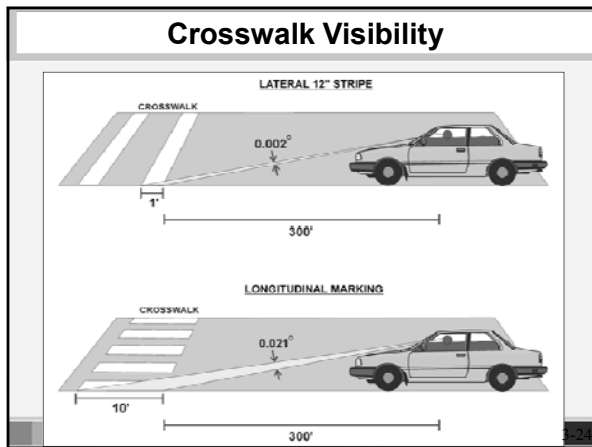
20 High-Visibility Crosswalks

Two examples include:

- White diagonal lines at a 45 degree angle to the crosswalk
- The "ladder" crosswalk design

The diagram shows two types of high-visibility crosswalks: one with white diagonal lines and another with a "ladder" design. A photograph shows a real-world example of a high-visibility crosswalk at night. A note indicates: "Spacing of lines selected to avoid wheel path".

Image Credit: Kay Fitzpatrick, Texas A&M Transportation



Chapter 2: Intersections – Promising Practices

23 Accessible Pedestrian Signal Treatments

Pushbutton-Activated Extended Pedestrian Crossing Phase

- Activated by the pedestrian
- Press and hold for 2 sec for additional preset crossing time



R10-32P

Passive Pedestrian Detection

- Pedestrian does not have to push a button to request a WALK signal or extended crossing time
- Sensors detect presence of pedestrians within crosswalk

3-28

Chapter 4: Roadway Segments – Promising Practices

41 Road Diets

Involves converting an undivided four-lane roadway into three lanes made up of two through lanes and a center two-way left turn lane:

- Reduction of lanes allocates space for other road users (bikes, peds, parking)
- A road diet should be included among the options when performing a safety evaluation or road safety audit



HIGHWAY DESIGN FOR OLDER DRIVERS AND PEDESTRIANS



If you design for the Old
You include the young
If you design for the Young
You exclude the Old

Dr. Bernard Isaacs, Renowned Geriatric Physician and Author

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**Recommendations to Accommodate
Aging Pedestrians**



Thank You!

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