

FHWA: Designing Streets for Pedestrian Safety Training Workshop - January 23-24, 2023







American Planning Association Florida Chapter First Coast

Creating Great Communities for All



FHWA: Designing Streets for Pedestrian Safety 101 Workbook

- Module 1: Introduction: Florida
- Module 2: Walking Along the Road
- Module 3: Street Crossings
- Module 4: Street Crossings: Countermeasures
- Module 5: Intersection Geometry
- Module 6: Signalized Intersections
- Module 7: Interchanges
- Module 8: Roundabouts
- Module 9: Transit
- Module 10: Road Diets

DESIGNING FOR PEDESTRIAN SAFETY

















GHSA Pedestrian Traffic Fatalities by State 2021 Preliminary Report					
1-9					
Sorted by Fatality Rate					
State	Pedestrian Fatalities per 100K Population - 2016				
New Mexico	3.45	Michigan	1.69	Indiana	1.00
Florida	3.22	Arkansas	1.64	Maine	1.28
South Carolina	2.96	Missouri	1.04	Utah	1.28
Arizona	2.85	Missouri	1.03	Washington	1.22
Delaware	2.83	Alaska	1.62	Ohio	1.20
Nevada	2.76	New York	1.61	Massachusetts	1.17
Louisiana	2.73	West Virginia	1.53	Illinois	1.15
Alabama	2.51	Colorado	1.52	Minnesota	1.09
Texas	2.44	Tennessee	1.52	Montana	1.06
California	2.43	Virginia	1.44	North Dakota	0.93
Vermont	2.41	New Hampshire	1.42	Wisconsin	0.85
Oklahoma	2.32	Phode Island	1.42	Wyoming	0.85
Georgia	2.25	Kansas	1.41	lowa	0.73
Hawaii	2.24	Ralisas	1.41	Idaho	0.71
North Carolina	2.00	Pennsylvania	1.35	South Dakota	0.70
Mississippi	1.94	DC	1.32	Nebraska	0.68
New Jersey	1.85			U.S. Average	1.92
Oregon	1.81				
Maryland	1.78				
Connecticut	1.73				
Kentucky	1.69				
































































































































































































































 Fence placement and type impacts pedestrian comfort: the sidewalk on the left is wider, but feels narrow due to high and adjacent chain link fence

















Utilities & poles should not obstruct sidewalk



Recommendations from								
Model Design Manual for Living Streets								
	Boulevard	Avenue	Street			Boulevard	Avenue	Street
/ Medium-Low sity Residential	Not applicable	Frontage: 18" Pedestrian: 5' Furniture: 4', 6'-8' at bus slops and where large trees are destred	Frontage: 18" Pedestrian: 5' Furniture: 4'		Industrial	Frontage: 18" Pedestrian: 5' Furniture: 5' Curb: 18"	Fronlage: 18" Pedestrian: 5' Furniture: 4' Curb: 18"	Frontage: 18" Pedestrian: 5' Furniture: 4' Curb: 18"
Den		Curb: 6" Min. Width: 11'	Curb: 6" Min. Width: 11'			Min. Width: 13'	Min. Width: 12'	Min. Width: 12'
Med / High nsity Residential	Frantage: 18" Pedestrian: 6' Furniture: 5', 6'.8' at bus stops and where large trees are destred Curb: 6"	Frantage: 18* Pedestrian: 6' Furniture: 5', 6'-8' at bus stops and where large trees are de- stred Curb: 6*	Fronlage: 18" Pedestrian: 6' Furniture: 4', 6'-8' at bus slops and where large trees are de- stred Curb: 6"		Jowntown Care ∕ Main Street	Frontage: 30°, 8' with cafe seating Pedestrian: 6' Furniture: 5', 6'-8' at bus stops and where large trees are desired Curb: 6"	Frontage: 30°, 8' with cafe seating Pedestrian: 6' Furniture: 5', 6'.8' at bus stops and where large trees are desired Curb: 6"	Frontage: 30°, 8' with cafe seating Pedestrian: 6' Furniture: 5' Curb: 6"
ථ	Min. Width: 13'	Min. Width: 13'	Min. Width: 12'		<u> </u>	Min. Width: 14'	Min. Width: 14'	Min. Width: 14'
Neighborhood Commercial	Not applicable	Frontage: 18* Pedestran: 6' Furniture: 5', 6'-8' at bus stops and where large trees are de- stred Curb: 6" Min. Wtdth: 13'	Frontage: 18" Pedestran: 6' Furniture: 4', 6'-8' at bus stops and where large trees are de- stred Curb: 6" Min. Wtdth: 12'		Transi+Oriented Districts	Frontage: 30" Pedestrian: 8' Furniture: 5', 6'-8' at bus stops and where large trees are desired Curb: 6"	Frontage: 30" Pedestrian: 8' Furniture: 5', 6'-8' at bus stops and where large trees are desired Curb: 6"	Frontage: 18" Pedestrian: 6' Furniture: 5', 6'-8' at bus stops and where large trees are desired Curb: 6"
General Commercial	Frontage: 18" Pedestran: 6' Furniture: 5', 6'-8' at bus stops and where large trees are destred Curb: 6" Min. Width: 13'	Frontage: 18" Pedestran: 6' Furnitive: 5', 6'-8' at bus stops and where large trees are de- stred Curb: 6" Min. Wridth: 13'	Not applicable		Office Park	Frontage: 18" Pedestrian: 5' Furniture: 5' Curb: 6" Min. Width: 12'	Frontage: 18" Pedestrian: 5' Furniture: 5' Curb: 6" Min, Width; 12'	Not applicable
Mixed / Multi-use	Frantage: 30", 8' with cale seating Pedestrian: 6' Furnitive: 5', 6'-8' at bus stops and where large trees are destred Curb: 6" Min. Width: 14'	Frontage: 30°, 8' with cafe seating Pedestrian: 6' Furniture: 4', 6'-8' at bus slops and where large trees are de- stred Curb: 6" Min. Widih: 13'	Frontage: 18" Pedestrian: 6' Furniture: 4' Curb: 6" Min. Width: 12'		Public Facilities	Frontage: 30" Pedestrian: 8' Furniture: 5', 6'-8' at bus stops and where large trees are desired Curb: 6" Min. Width: 16'	Frontage: 30" Pedestrian: 8' Furnitive: 5', 6'-8' at bus stops and where large trees are desired Curb: 6" Min. Width: 16'	Frontage: 18" Pedestrian: 6' Furniture: 5', 6'-8' at bus stops and where large trees are desired Curb: 6" Min. Width: 13'


















































Pedestrian behavior varies: Some use crosswalks, others don't







- 1. Pedestrians want & need to cross streets safely
- 2. Drivers need to understand pedestrians' intent
- 3. Keep crossings short
- 4. Speed Matters
- 5. Pedestrians will cross where it's convenient
- Good design makes use of these principles





























<section-header> Image: Provide the second state of the seco





City of Jackson

City-wide Speed Reduction Study

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Midblock vs. Intersection

- People choose based on their perceived risk
- $\hfill\square$ The data is inconclusive



35

35 Tampa









Designing for Pedestrian Safety - State Laws





































3. Looking or Not Looking?

Do marked crosswalks increase safety, or encourage people to cross without looking?



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13 Madi


























































Raised Crosswalks



Figure 6. Raised crosswalk and overhead flasher, Towerview Drive, Durham, North Carolina.

- FHWA Study "The Effects of Traffic Calming Measures on Pedestrian and Motorist Behavior" -2001
- Increase pedestrian visibility & likelihood driver yields to pedestrians especially when combined with an overhead flashing light
- Most appropriate low speed local or neighborhood streets

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Raised Crosswalk

□ Traffic Calming ePrimer

<u>https://safety.fhwa.dot.gov/speedmgt/traffic_calm.cfm</u>



























































IA-21 5. Beacon Flashing Requirements

- c. Flash rate of each individual RRFB indication, as applied over the full flashing sequence, shall not be between 5 and 30 flashes per second to avoid frequencies that might cause seizures
- e. Automatic signal dimming device should be used

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7. a. - If speech pushbutton information message is used locator tone shall be provided

7. b. - If speech pushbutton information message is used, the audible information device shall not use vibrotactile indications or percussive indications

7. c. - Speech pushbutton message "Yellow lights are flashing". Message should be spoken twice.



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MUTCD signal warrants

- 1. Eight-hour vehicle volume
- 2. Four-hour vehicle volume
- 3. Peak hour

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- 4. Pedestrian volume*
- 5. School crossing*
- 6. Coordinated signal system
- 7. Crash experience*
- 8. Roadway network
- 9. Intersection near a grade (rail) crossing
 - * = potential ped warrant

2009 MUTCD Chapter 4C











































MUTCD Section 4F.01

- Standard:
- If used, PHBs shall be used in conjunction with signs and pavement markings to warn and control traffic.
- A PHB shall only be installed at a marked crosswalk.
















































































































Reminder – crosswalks are provided:

- 1. To indicate to pedestrians where to cross
- 2. To indicate to drivers where to expect pedestrians























































Honolulu HI Designing for Pedestrian Safety – Intersection Geometry

5-64

Raised islands can improve a large multi-lane intersection

2. Move stop bar forward to improve capacity and safety for motorists



Honolulu HI Designing for Pedestrian Safety – Intersection Geometry

5-65





















- 1. Using good geometric design
- 2. Placing islands to break up complex crossings
- 3. Placing crosswalks in logical locations
- 4. Improving convenience and ease of use of pedestrian pushbuttons and signals
- 5. Using techniques to reduce conflicts with turning vehicles

1, 2 & 3 addressed in earlier module

3



intersections have more crashes than non-signalized









































































Countdown pedestrian signal research results:

- 1. Pedestrians understand how it works
- 2. More people start crossing during clearance phase, but...
- 3. Fewer people initiate walk late in clearance phase
- 4. Very few pedestrians in crosswalk in steady don't walk
- 5. Drivers don't take a cue and accelerate to beat the light



Countdown displays required for new pedestrian signals (except the rare situation where the change interval is 7 seconds or less) Why? Significant reductions in pedestrian-vehicle crashes










ITS Pedestrian Signal

- The controller adds 4 seconds crossing time if pedestrian hasn't finished crossing (8 seconds maximum)
- In this case, the walk phase was prolonged in 20% of crossings, reducing unnecessary traffic delay the other 80% of crossings.



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6-48 Portland OR









* CMF = 0.3 (CRF 70%) (all crashes) converting permissive left turns to protected only left turns















MUTCD Section 2B.54























Exclusive Ped Phases or LPI and Accessible Ped Signals

- Without APS, pedestrians with vision impairments cross by listening to vehicle movement
- With an exclusive ped phase or LPI, the walk signal does not coincide with vehicle movement
- Use APS with LPI or exclusive ped phases





- These peds waited 3 cycles before turning drivers let them cross as legally required. LPI would give them a head start.
- □ CMF = 0.41 (CRF: 59%) Fayish and Gross, 2009

Discussion



Do you restrict right turns on red where appropriate?

Do you use Exclusive Pedestrian Phases or LPIs?

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6-73





Land Use, Vehicles and Pedestrians

 Large commercial tracts generate traffic

7-3 Medford Of

- Employees walk to jobs at retailers, restaurants, service stations, & hotels
- Visitors walk to and from restaurants and hotels
- Pedestrians must cope with vehicles entering and exiting the freeway















































































	Cer	Center Walkway		
	Adv	vantages & C	hallenges	
	Exhibit 3-7. Center walkway pedestrian safety and comfort.			
_		Advantages	Challenges	
		Crossing of the arterial street provided at DDI for full pedestrian access	Crossing of free-flow right-turn movements to/from freeway	
		Crossing one direction of traffic at a time	Pedestrians may not know to look to the right when crossing to center	
	Street Crossings	Short crossing distances	Wait at center island dictated by length of signal phase for through traffic	
		No exposure to free-flowing left turns to freeway	Location of pedestrian signals can conflict with vehicular signals at crossovers	
		Protected signalized crossing to walkway		
		Pedestrian clearance time generally provided in crossover signal phasing		
		Pedestrian delay to center minimized by short cycles at two-phase signals		
		Side walls provide a positive barrier between vehicular movements and pedestrians	Center walkway placement counter to typical hierarchy of street design	
	Walkway	Walls low enough to avoid "tunnel" effect	Potential discomfort from moving	
	Facility	that could impact pedestrian comfort	vehicles on both sides of walkway	
		Recessed lighting can provide good illumination of walkway	Sign and signal control clutter	
nir	ng for Ped	estrian Safety – Interchanges		
















































Problems with Existing Rotary

Image: Segment of the segment of the





A roundabout is not: 2. A Washington DC style circle, with traffic signal controls





































Drivers may take a straighter, faster path on entry and exit, resulting in higher speeds – lane markings are recommended to minimize this









Rectangular Rapid Flash Beacon at Multilane Roundabout



- FHWA study found some benefits to accessibility after RRFB installation at multilane roundabouts
- Other impacts (volume, speeds, configuration) also impact yielding

https://safety.fhwa.dot.gov/intersection/innovative/roundabouts/docs/fhwasa15069.pdf



Case Study: Great Neck Plaza, NY

Great Neck Plaza, NY

Solution

- City received traffic calming grant from state DOT
 - Goal: calm traffic, enhance visibility of pedestrians, & improve crosswalk safety
- 4-way STOP replaced by roundabout
 - Contrasting pavement color, curb extensions, fencing, and islands used to direct traffic
- Other locations: illuminated pedestrian crossings and speed awareness devices installed
- Cost: \$365,000 for the roundabout, \$275,000 for the other improvements





After















Narrow curbside sidewalkEspecialprovides insufficient spacecomes & j

Especially when bus comes & people board



Wide sidewalk is full while people board, blocking access to other pedestrians, but empties out soon

















- Common pedestrian safety issues near transit stations, bus stops, and other transit facilities.
- Descriptions of specific engineering, education, and enforcement programs that have been effectively applied by transit agencies.
- Background information about pedestrian safety and access to transit.
- References to publications, guides and other tools that can be used to identify pedestrian safety problems.



Farside generally preferred at intersections because:

Bus Driver Concern: Farside or Nearside Stops?

- Driver can pull across intersection before light turns red
- $\hfill\square$ Nearside can mean waiting an extra signal cycle
- Farside ensures pedestrians cross behind bus



Farside: Patrons cross behind



Nearside: Patrons cross in front

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- Bus bulbout reduces dwell time because the bus does not need to reenter traffic and patrons board rapidly
- 10 seconds saved per stop adds up to minutes over an entire route















































Before/after studies: Evaluation matrix	
Orlando FL	
Measure of Effectiveness	Objective Accomplished?
Avoid Increasing Traffic On Neighborhood Streets	YES
Reduce Speeding on Edgewater Dr.	YES
Increase Bicyclist Volumes	YES
Increase Pedestrian Volumes	YES
Reduce Crashes	YES
Increase On-Street Parking Use Rates	YES
Increase Pedestrian Satisfaction (Residents)	YES
Increase Parking Satisfaction (Residents)	YES
Also: Noise levels went down	































Instructions: propose pedestrian-friendly designs for the sample cross-sections, taking into account the context; superimpose your proposal over the existing in color, with dimensions

1. Existing: 28' roadway & ditches in 60' row. Context: rural, some residential; ADT 1,800



1a. Existing: 28' roadway & ditches in 60' row. Context: Suburban, residential, ADT 3,600



Instructions: propose pedestrian-friendly designs for the sample cross-sections, taking into account the context; superimpose your proposal over the existing in color, with dimensions

2. Existing: 66' roadway & curbs in 100' row. Context: suburban, commercial; ADT 22,000





Instructions: propose pedestrian-friendly designs for the sample cross-sections, taking into account the context; superimpose your proposal over the existing in color, with dimensions

3. Existing: 60' roadway & sidewalks in 80' row. Context: urban, commercial, buildings at back of walk; ADT 26,000





Instructions: propose pedestrian-friendly designs for the sample cross-sections, taking into account the context; superimpose your proposal over the existing in color, with dimensions

4. Existing: 60' roadway & sidewalks in 100' row. Context: urban, commercial, buildings at back of walk; ADT 26,000

















Jedi Ave between Wakanda St and Avengers Ave Made-up Town, USA

