Small Town and Rural Multimodal Networks

NHDOT Workshop

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Bike-Walk Alliance of NH educates, advocates and agitates to improve conditions for walking & biking statewide.

How do we get more people walking and bicycling?

- Create interconnected, complete streets and trails that provide a low stress network for walking and bicycling
- Provide NH residents with daily destinations located within convenient biking or walking distance
- Allow NH residents to feel that biking and walking are safe and rational options for transportation and recreation
- Educate NH residents about the clear economic and health benefits of biking and walking
Alta’s New England Experience

- Quechee VT Ped/Bike Plan
- WOW Trail Feasibility Study
- Keene Cheshire Rail Trail
- Regional Ped/Bike Guidelines
- Norwalk River Valley Trail
- Waterbury Greenway
- Regional Naugatuck River Greenway
- Walk/Bike Northampton Master Plan
- Greenfield Complete Streets Plan
- Charles R. Basin Connectivity Plan
- Ashland Upper Charles Trail Study
- Woonsocket Downtown Walk/Bike Plan
- Portsmouth and Hampton SRTS Travel Study
- Scarborough ME Ped Plan
- Quincy Bike Plan
- Scituate MA Walkability Plan
Alta’s Local Design Guide
Experience

Portland ME Regional Pedestrian/Bicycle Facilities Design Guide

Hampshire County Suburban and Rural Complete St’s Guide

Portsmouth Complete Streets Guidelines
Presentation Outline

• Purpose
• Structure
• Sources
• Applications
• Benefits
• Project Examples
History and Context
Rural Practice and Multimodal Design Guidelines
FHWA Policy Statement (2010)

“Walking and bicycling foster safer, more livable, family-friendly communities; promote physical activity and health; and reduce vehicle emissions and fuel use. “

“... DOT encourages transportation agencies to go beyond the minimum requirements, and proactively provide convenient, safe, and context-sensitive facilities that foster increased use by bicyclists and pedestrians of all ages and abilities...”

United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations

Signed on March 11, 2010 and announced March 15, 2010

Purpose

The United States Department of Transportation (DOT) is providing this Policy Statement to reflect the Department’s support for the development of fully integrated active transportation networks. The establishment of well-connected walking and bicycling networks is an important component for livable communities, and their design should be a part of Federal-aid project developments. Walking and bicycling foster safer, more livable, family-friendly communities; promote physical activity and health; and reduce vehicle emissions and fuel use. Legislation and regulations exist that require inclusion of bicycle and pedestrian policies and projects into transportation plans and project development. Accordingly, transportation agencies should plan, fund, and implement improvements to their walking and bicycling networks, including linkages to transit. In addition, DOT encourages transportation agencies to go beyond the minimum requirements, and proactively provide convenient, safe, and context-sensitive facilities that foster increased use by bicyclists and pedestrians of all ages and abilities, and utilize universal design characteristics when appropriate. Transportation programs and facilities should accommodate people of all ages and abilities, including people too young to drive, people who cannot drive, and people who choose not to drive.

Policy Statement

The DOT policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects. Every transportation agency, including DOT, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide — including health, safety, environmental, transportation, and quality of life — transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes.

Authority

This policy is based on various sections in the United States Code (U.S.C.) and the Code of Federal Regulations (CFR) in Title 23—Highways, Title 49—Transportation, and Title 42—The Public Health and Welfare. These sections, provided in the Appendix, describe how bicyclists and pedestrians of all abilities should be involved throughout the planning process, should not be adversely affected by other transportation projects, and should be able to track annual obligations and expenditures on nonmotorized transportation facilities.
ITE Walkable Urban Thoroughfares (2010)

FHWA Design Flexibility Memo (2013)

FHWA supports “taking a flexible approach to bicycle and pedestrian facility design. ... The NACTO Urban Bikeway Design Guide, [the Urban Street Design Guide,] and the ITE Designing Walkable Urban Thoroughfares guide build upon the flexibilities provided in the AASHTO guides, which can help communities plan and design safe and convenient facilities for pedestrian and bicyclists. FHWA supports the use of these resources to further develop nonmotorized transportation networks, particularly in urban areas.”
Recent FHWA Reports

- 2014 Road Diet Handbook
- 2014 Pedestrian Hybrid Beacon Guide
- 2015 Separated Bike Lane Planning and Design Guide
- 2016 Achieving Multimodal Networks
- 2016 Incorporating On-Road Bicycle Networks into Resurfacing Projects
Small Town and Rural Multimodal Networks (2017)

The multimodal design guidelines for the rest of us.
Where did the guide come from - Sources

- AASHTO Flexibility Guide 2004
- AASHTO Bike Guide 2012
- AASHTO Pedestrian Guide 2004
- AASHTO Green Book 2011
- AASHTO Low Volume Roads 2001, 2017
- FHWA Achieving Multimodal Networks 2016
- FHWA Resurfacing Guide 2016
- FHWA MUTCD 2009
- FHWA Separated Bike Lane Guide 2015
- PROWAG 2011, 2013, 2014
- BIKESAFE 2014
Small Town/Rural Transportation

Needs and Opportunities
Small Town/Rural Needs

ONE SIZE DOES NOT FIT ALL.

LONGER NON-LOCAL TRIP DISTANCES

HEALTH DISPARITIES

HIGHER CRASH RATES

(60% of traffic fatalities in rural areas where 19% of the population lives)

INCOME DISPARITIES
Small Town/Rural Challenges

- Main Street is frequently a state highway through the downtown
- Many roadways carry agricultural equipment
- At the edges of public lands with high industrial/recreational use
- Lack of transit and other options
- Many winding roads with constrained terrain
- Motor vehicle oriented roads
Small Town/Rural Opportunities

- **Hanover, NH**
  - Population: 11,260

- **Palmer, AK**
  - Population: 6,250

- **Rushford, MN**
  - Population: 2,102

- **Ukiah, CA**
  - Population: 15,956
• Average US walking trip: 1.2 mi
  • (50% are < 0.5 mi)
• Average US bicycling trip: 4.0 mi
  • (50% are < 2.0 mi)
• Hanover to Lebanon
  • 5.0 miles
• Hanover to West Leb.
  • 4.0 miles
Guide Content

Treatments and Design Topics
Guide Structure

1. Introduction
2. Mixed Transportation Facilities
3. Visually Separated Facilities
4. Physically Separated Facilities
5. Key Network Linkages
6. Planning and Project Development

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Multimodal Facilities

- Application
- Benefits
- Guidance
  - Geometric Design
  - Markings
  - Signs
  - Intersection treatment
  - Implementation
  - Accessibility
- Case Studies
Focus on Complete Networks of Facilities

Networks are interconnected pedestrian and/or bicycle transportation facilities that allow people of all ages and abilities to safely and conveniently get where they want to go.

Facility Categories:
• Mixed Traffic
• Visually Separated
• Physically Separated
Speed and Volume
Most appropriate on streets with low to moderate volumes and moderate speed motor vehicles.

Network
Applies to constrained connections between built-up areas.

Land Use
For use outside, between and within built-up areas with bicycle and pedestrian demand and limited available paved roadway surface.
Applications

Mixed Traffic

Visually Separated

Physically Separated
Mixed Traffic

Yield Roadway
Bicycle Boulevard
Advisory Shoulder
Yield Roadway

- Shared Space
- Residential Context
- Unpaved Roadside
- Narrow Two-way Travel Area
Yield Roadway

Traffic

Network

Land Use
Yield Roadway – Geometric Design

Two-way Travel Lane
• Total traveled way width may vary from 12 ft (3.6 m)–20 ft (6.0 m).
• When < 15 ft (4.5 m) provide pull-out areas every 200-300 ft.
• Refer to AASHTO Low Volume Roads 2001

Roadside
• Parking may be located outside of the paved roadway, and/or serve as a pull-out area while yielding.
• Trees may be planted within the roadside area at regular intervals
Yield Roadway – Markings and Signs

Markings
• No markings are necessary to implement a yield roadway.
• Do not mark a center line within the travel area.

Signs
• Use signs to warn road users of the special characteristics of the street.
Sisters, OR
Population: 2,170
Bicycle Boulevard
Bicycle Boulevard

Speed Reduction Measures

Mixed Traffic

Route Markings
Bicycle Boulevard

Traffic

Network

Land Use
Bicycle Boulevard – Geometric Design

• Combine pavement markings, traffic calming measures, and crossing improvements to enhance bicyclist comfort
Bicycle Boulevard – Markings and Signs

Markings

• Do not mark a continuous center line on bicycle boulevard facilities.

• Shared lane markings (SLMs) are the standard marking shared roadway conditions.

• Place SLMs in the center of the travel lane to minimize wear and encourage riding a safe distance from parked cars.

MUTCD Figure 9C-9
Bicycle Boulevard – Signs

Signs

- Route wayfinding is critical on bicycle boulevards when located along local routes with circuitous network connections. There are three functional types of wayfinding signs:
  - Confirmation Signs
  - Turn Signs
  - Decision Sign
Advisory Shoulder
Advisory Shoulder
How Does it Function?

- Establishes a shoulder on an otherwise too narrow road
- Delineated by pavement markings
- Colored pavement optional

- Must exit shoulder to overtake bicyclists
- Must enter shoulder when yielding to oncoming traffic
Advisory Shoulder

Traffic

Network

Land Use
Advisory Shoulder

- The preferred width of the advisory shoulder space is 6 ft (2.0 m). Absolute minimum width is 4 ft (1.2 m) when no curb and gutter is present.

Two-way Center Travel Lane

- Preferred two-way center travel lane width is 13.5–16 ft (4.1–4.9 m) although may function with widths of 10–18 ft (3.0–5.5 m).
Advisory Shoulder

• A broken lane line used to delineate the advisory shoulder.

• Where additional edge definition is desired, stripe a normal solid white edge line in addition to the broken advisory shoulder line.

In general, do not mark a center line on the roadway. Short sections may be marked with center line pavement markings to separate opposing traffic flows at specific locations, such as around curves, over hills, on approaches to at-grade crossings, and at bridges.

• At these locations, widen the paved roadway surface to provide space for paved shoulders.
Advisory Shoulder - Signs

**Advisory Shoulder**

Use signs to warn road users of the special characteristics of the street.

- Use an unmodified Two-Way Traffic warning sign (W6-3) to clarify two-way operation of the road.

- Use a NO CENTER LINE warning sign (W8-12) to help clarify the unique striping pattern.

- Use a NO PARKING ON PAVEMENT (R8-1) to discourage parking within the advisory shoulder.
Hanover, NH
Population: 11,000
Edina, MN
Population: 49,300
5 MINUTE BREAK
Visually Separated
(where volumes exceed 3,000 AADT)
Paved Shoulder
Bike Lane
Pedestrian Lane*

*The Pedestrian Lane treatment is located in chapter 5 of the Small Town and Rural Multimodal Networks document, but is included in this category for informational purposes.
Paved Shoulder
Paved Shoulder

Traffic

Network

Land Use
Paved Shoulder – Geometric Design

Shoulder

• To accommodate bicyclists and pedestrian use of the shoulder, **provide a minimum width of 4 ft (1.2 m)** adjacent to a road edge or curb, exclusive of any buffer or rumble strip.

• Where possible, provide greater width for added comfort, user passing, and side-by-side riding.

Rumble Strips

• Rumble strips are an **FHWA Proven Safety Countermeasure** for reducing roadway departure crashes.

• Installing rumble strips can reduce severe crashes but may negatively impact bicycle travel if they are poorly constructed.
Paved Shoulder – Design

Rumble Strips
- 12 inch spacing center-to-center
- 6–8 inches long, perpendicular to roadway
- 6 inch wide, measured parallel to roadway
- 3/8 inch deep
- Provide a “Bicycle gap pattern”
- Apply as rumble “stripes”
Paved Shoulder – Markings

Robust Marking Options

• A wide 8 in (200 mm) white line.

• A narrow buffer space—two normal 4 in (100 mm) solid white lines separated by an 18 in (0.45 m) or greater space.
Paved Shoulder – Markings

Robust Marking Options

• A wide buffer space—two normal solid white lines, separated by a 4 ft (1.2 m) or greater space and optional crosshatch markings.
D'Iberville, MS
Population: 10,300
Townsend, MT
Population: 7,700
Bike Lane
Paved Shoulder

Traffic

Network

Land Use
Bike Lane - Geometric Design

Bike Lane

• The preferred minimum width of a bike lane is 6.5 ft (2.0 m).

• Absolute minimum bike lane width is 4 ft (1.2 m) when no curb and gutter is present or 5 ft (1.5 m) when adjacent to a curbface, guardrail, other vertical surface or on-street parking stalls (AASHTO Bike Guide 2012).
Old Rte. 66 in Wildwood, MO
Population: 35,000
Silver Street
Dover NH
Population: 30,700
Lyndonville, VT
Population: 1,200
Pedestrian Lane
Pedestrian Lane
Pedestrian Lane

Double Solid Line

Pedestrian Lane Markings (wide enough for two-way pedestrian traffic)

High Visibility Crosswalk

Bicyclists in Roadway

Pedestrian Lane Markings (wide enough for two-way pedestrian traffic)
Pedestrian Lane Challenges

As part of the planning process, agencies should explore issues and the potential challenges a pedestrian lane may face, including:

- Detectability by people with vision disabilities
- Undesired use by bicyclists
- Accessible cross-slope requirements
- Maintenance strategies, such as sweeping and snow removal
Pedestrian Lane/Paved Shoulder

Traffic

Network

Land Use

![Graph showing motor vehicle volume and operating speed](image)

![Network diagram with local, collector, and highway lines](image)

![Land use diagram](image)
Pedestrian Lane - Geometric Design

• Pedestrian lanes should be designed to support and promote side-by-side walking within the lane. Because of the lack of physical separation, additional width beyond this should be included for added comfort.

Width
• 8 ft (2.4 m) width is preferred
• 5 ft (1.5 m) width is the minimum to allow for side-by-side walking and maneuverability by users of mobility devices.
Pedestrian Lane – Geometric Design

Disclaimer:

Pedestrian lanes provide interim or temporary pedestrian accommodation on roadways lacking sidewalks. They are not intended to be an alternative to sidewalks and often will fill short gaps between other higher quality facilities. As part of the planning process, agencies should explore issues and the potential challenges a pedestrian lane may face, including:

- Detectability by people with vision disabilities
- Undesired use by bicyclists
- Accessible cross-slope requirements
- Maintenance strategies, such as sweeping and snow removal
Pedestrian Lane - Markings

- Use a double white line for extra emphasis
- Consider a buffer to increase separation
- Use a PED ONLY legend marking; consider turning it 180 degrees on occasion so it doesn’t imply directionality
Pedestrian Lane - Signs

- Pedestrian Warning Sign (W11-2) paired with an “ON ROADWAY” legend plaque may be used to indicate to drivers to expect pedestrians within the paved road surface.
Detroit, OR
Population: 200
Montpelier, VT
Population: 7,700
Waco, TX
Population: 130,000
Physically Separated
(where volumes exceed 10,000 AADT and with higher speeds)

Sidewalk
Shared Use Path
Sidepath
Separated Bike Lanes
Sidewalk
Pedestrian Zone
The pedestrian through zone is the clear width needed for pedestrian travel activity
• The pedestrian through zone should be at least 5 ft wide. This permits side-by-side walking and meets accessibility guidelines for turning and maneuvering.

Furnishing Zone
• Furnishing zone is closest to the street
• A furnishing zone of 4–6 ft is preferred; it allows for trees, benches, and other large furnishing items.
Sidewalk

• Sidewalks on roads with curbs may feature an unpaved or paved furnishing zone separation.

• Offering separation from the roadway is preferred in most areas for user comfort and design flexibility at intersections.
Denmark, SC
Population: 3,400
Shared Use Path

Crossing Enhancements

Path Priority
Shared Use Path

Traffic

Network

Land Use
Shared Use Path – Geometric Design

- 8’ to 14’ wide depending on available space, volume and mix of pedestrians and bicycles

- A 2 ft (0.6 m) shoulder should be provided on each side of the path, kept clear of vertical elements or obstructions.

- Wider paths are useful to accommodate maintenance vehicles; on steep grade to allow for comfortable passing; and through curves to provide more operating space.
Shared Use Path – Intersections

**LEGEND**
- Green circle: Candidate for marked crosswalks
- Yellow circle: Probable candidate for marked crosswalks. May benefit from additional crossing enhancements.
- Red circle: Marked crosswalks alone are insufficient. Requires crossing enhancements.
Shared Use Path – Intersections

Marked Crosswalk

Rapid Flashing Beacon

Median Safety Island

Pedestrian Hybrid Beacon
Windham, NH
Population: 13,600
Bentonville, AR
Population: 40,000
Sidepath

Unpaved Separation

Wide Separation at Intersection

Minimized exposure

High Visibility Crosswalk
Sidepath

Traffic

Network

Land Use
Sidepath – Geometric Design

Pathway

- Minimum recommended pathway width is 10 ft (3.0 m).
- In low-volume situations and constrained conditions, the absolute minimum sidepath width is 8 ft (2.4 m).
- Provide a minimum of 2 ft (0.6 m) clearance to signposts or vertical elements.

Roadway Separation

- Preferred minimum separation width is 6.5 ft (2.0 m). Minimum separation distance is 5 ft (1.5 m).
- Separation narrower than 5 ft is not recommended, although may be accommodated with the use of a physical barrier between the sidepath and the roadway.
Physical Barrier
The barrier and end treatments should be crashworthy which may introduce additional complexity if there are frequent driveways and intersections.
Markings
• Edge lines should be marked on paths expecting evening use.
• Paths with a high volume of bidirectional traffic should include a centerline. This can help communicate that users should expect traffic in both directions and encourage users to travel on the right and pass on the left.

Signs
• Shared use paths are bidirectional facilities and signs should be posted for path users traveling in both directions.
• It is important for signs that only apply to the path to not be interpreted as a guidance for roadway travel lanes.
Sidepath - Transitions
Sidepath - Intersections
Separated Bike Lane
Separated Bike Lane

Clear Sight Distance

Pedestrian/Bicyclist Separation
Separated Bike Lane

Traffic

Network

Land Use
Shared Use Path – Geometric Design

- Pedestrian Separation
- Separated Bike Lane: 5-7 ft (1.5-2.1 m)
- Roadway Separation
Separated Bike Lane
Separated Bike Lane – Intersections

Bend In

• Position bicyclists closer to turning vehicles to increase visibility prior to the turn.
Separated Bike Lane – Intersections

Bend Out

• Provide space for right-turning vehicles to yield to bicyclists.
Separated Bike Lane – Intersections

Mixing Zone

- Shared turn lane with motor vehicles and bicyclists. Shared turn lane with motor vehicles and bicyclists.
Separated Bike Lane – Intersections

Protected Signal Phase

• Separate conflicting movements in time.
Jackson Hole, WY
Population: 9,600
Russelville, AR
Population: 28,500
Portsmouth, NH
Population: 21,600
Graphic: courtesy of GPI Engineers
Network Opportunities

Gaps, Focus Areas and Network Development Opportunities
Network Opportunities

- Speed Management
- School Connections
- Multimodal Main Street
- Access to Public Lands
- Bridge Retrofits
School Connections

• Schools are key destinations in communities of all sizes. This is particularly true in small and rural places, where they often play a prominent role in the community as centers of activity for people of all ages and abilities.

• It is essential to provide separation from motorized traffic, controlled crossings, and wayfinding.
Multimodal Main Streets
Access to Public Lands

• Scenic places, sometimes unique need for wayfinding

• Opportunities for more diverse funding sources:
  • Federal Lands Transportation Program (FLTP)
  • Federal Lands Access Program (FLAP)

Colorado Riverway Path
near Moab, UT
Population: 5,046
Speed Management

![Graphs showing chances of survival for pedestrians hit by vehicles at different speeds.](image-url)
Bridges (New)

- Separation
- Prioritize
- Awareness
- Continuity
- Anticipate the future
- Flexibility
Constrained Bridges
Constrained Bridges
Constrained Bridges
Constrained Bridges
FHWA Publication Distribution

PDF Download:

https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/

Publication No: FHWA-HEP-17-024
Welcome to the Small Town and Rural Design Guide — an online design resource and idea book, intended to help small towns and rural communities support safe, comfortable, and active travel for people of all ages and abilities.
A yield roadway is designed to serve pedestrians, bicyclists, and motor vehicles when used in the same road travel lane. Yield roadways are bilateralized motor vehicle traffic without lane markings in the roadway travel area.

**Two-Way Travel Lane**

The two-way travel lane should be narrower to encourage slower travel speeds and ensure courtesy yielding when vehicles traveling in opposite directions meet.

- **Travel lane width**: The travel lane width may vary from 12 ft (3.6 m) to 14 ft (4.2 m). The minimum lane width should be 12 ft (3.6 m) or greater for secondary roads and should be 14 ft (4.2 m) or greater for primary roads.

**Roadside**

If desired, parking may be located on the paved roadway surface, on gravel or soil shoulders, or outside the paved roadway. The parking lane may also serve as a pull-off area while yielding.

- When possible, the parking lane should be constructed with a contrasting material to differentiate it from the travel area.
- Bumpouts, crushed stone, gravel, and soft shoulders should be used as transitional materials to the travel area.
- The edge of the roadway should be within the out-of-service area at regular intervals to visually and physically narrow the corridor, add to the aesthetic environment, and encourage slow speeds.

**Markings**

No markings are necessary to implement a yield roadway.

- **Do not mark a center line** within the travel area. The single two-way lane introduces potential confusion and ambiguity, contributing to a disorienting operating environment.

**Signs**

Use signs to make road users aware of the special character of the street. Signs include:

- Pedestrian (W1-1) sign with ON ROADWAY legend plaque. See Figure 2-3.
- Use a Two-Way Traffic Warning (W9-J) to identify two-way operations of the street. See Figure 2-3.
- Pedestrian (W1-1) sign with ON ROADWAY legend plaque. See Figure 2-3.

**Intersections**

As uncontrolled crossings of local streets, the special design is necessary. The additional space within the intersection area offers significant advantages when vehicles traveling in opposite directions meet.

- Consider parking prohibitions of 25-50 ft (7.6-15.2 m) in advance of intersections. This helps create space for larger vehicles turning movements.
- Provide adequate stopping sight distance around curves and at uncontrolled intersections. Values of stopping sight distance for two-way single lane roads should be twice the stopping sight distance for a comparable two-lane road.
Implementation

In rural communities with a disconnected road network, local streets are the only viable connection to a scene of an emergency. Implementing agencies should work closely with emergency response stakeholders.

Accessibility

Yield roadways allow motor vehicles, bicyclists, and pedestrians to share the same space. On very low-volume and low-speed streets, pedestrians and bicyclists may be comfortable using the roadway with the occasional vehicle. If this facility is intended for use by pedestrians, it must meet accessibility guidelines for roadways.

Selected Examples

![Map showing selected examples](image)

Works Cited


THANK YOU!
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