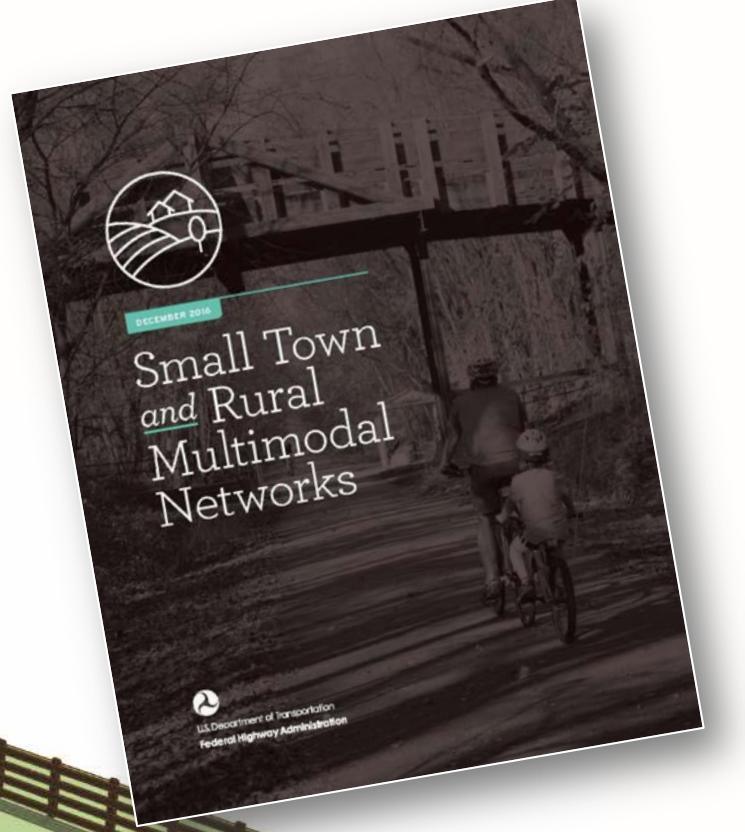
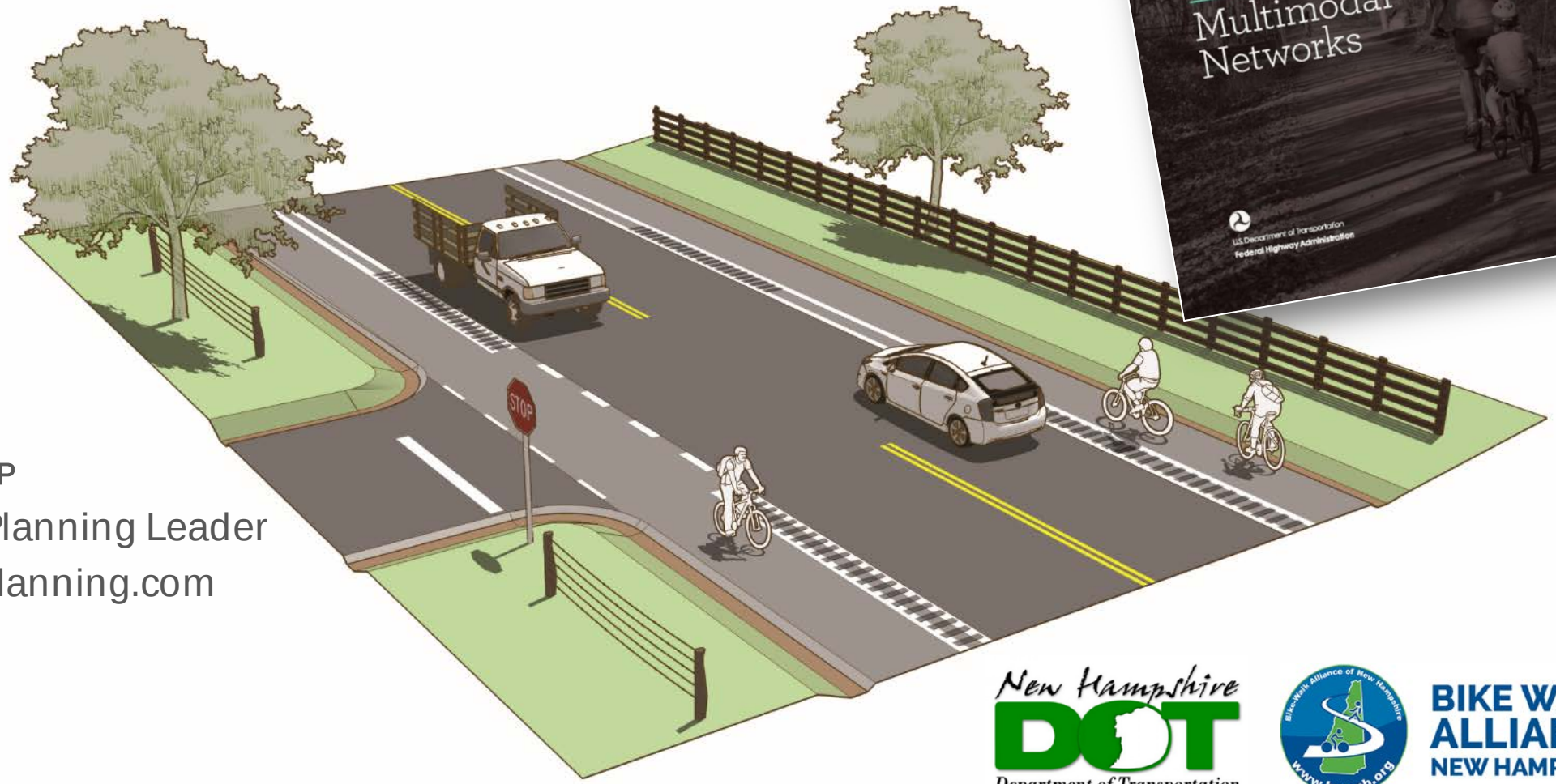
Small Town *and* Rural Multimodal Networks

NHDOT Workshop





June 7, 2017

Phil Goff LEED AP
New England Planning Leader
philgoff@altaplanning.com

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New Hampshire DOT Department of Transportation

Bike-Walk Alliance of New Hampshire www.bwanh.org

BIKE WALK ALLIANCE NEW HAMPSHIRE

Funding Partners

BlueCross BlueShield Minnesota

U.S. Department of Transportation Federal Highway Administration

Project Team

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MONTANA STATE UNIVERSITY | Western Transportation Institute

NACo National Association of Counties

Today's Workshop Co-Sponsors

New Hampshire DOT Department of Transportation

Bike-Walk Alliance of New Hampshire www.bwanh.org

BIKE WALK ALLIANCE NEW HAMPSHIRE

Bike-Walk Alliance of New Hampshire

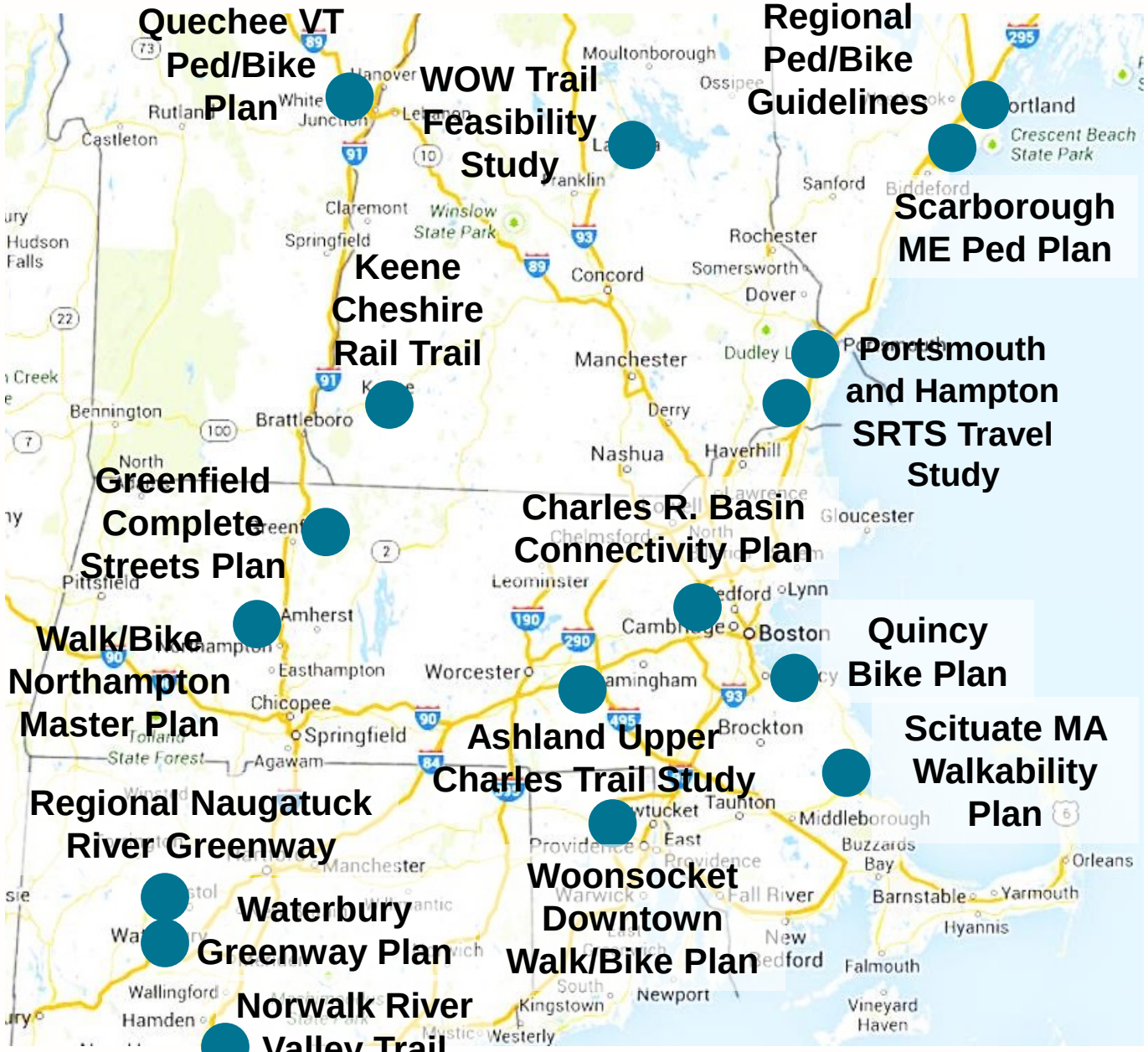
Bike-Walk Alliance of NH educates, advocates and agitates to improve conditions for walking & biking statewide.

Silver Street, Dover

How do we get more people walking and bicycling?

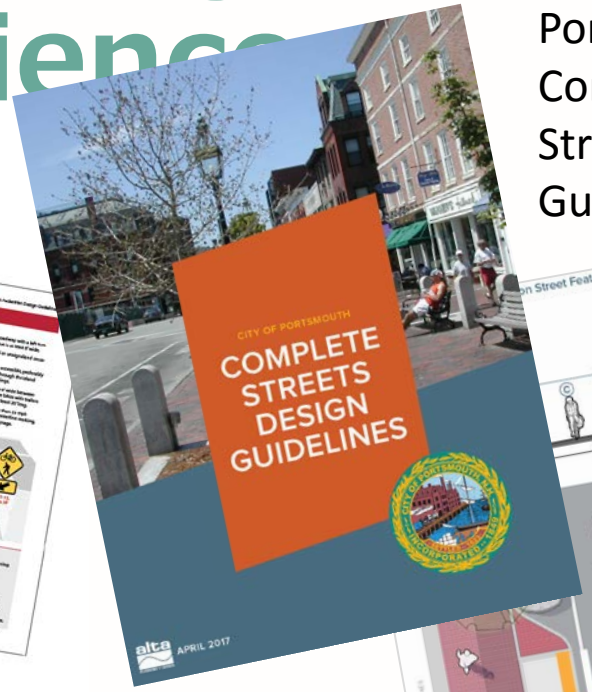
- Create interconnected, complete streets and trails that provide a low stress network for walking and bicycling
- Provide NH residents with daily destinations located within convenient biking or walking distance
- Allow NH residents to feel that biking and walking are safe and rational options for transportation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

Alta's New England Experience

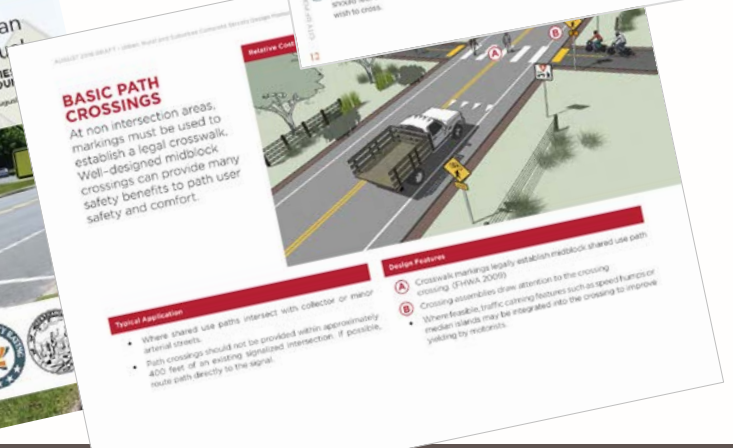


Alta's Local Design Guide Experience

Portland ME Regional Pedestrian/Bicycle Facilities Design Guide



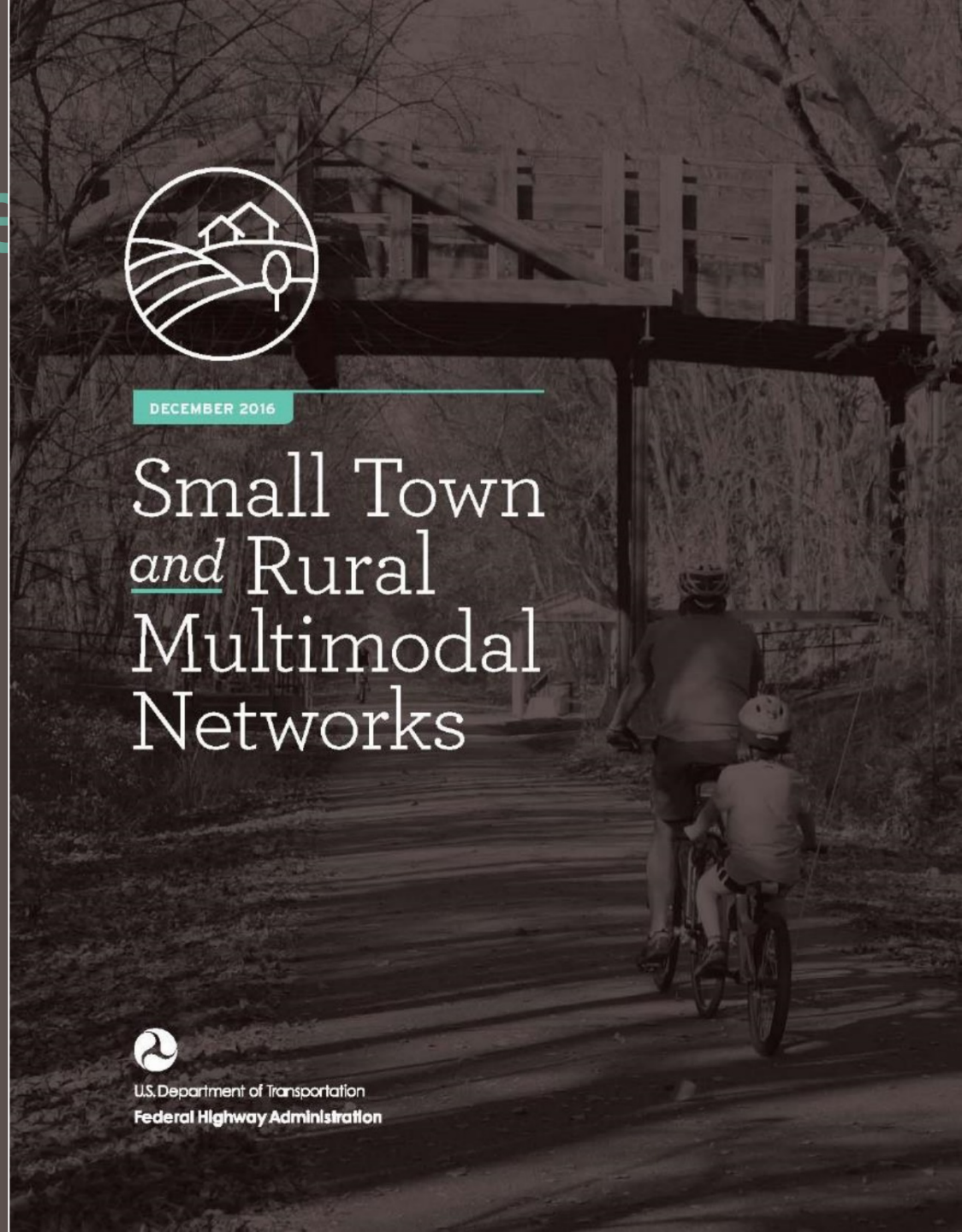
Portsmouth Complete Streets Guidelines



Hampshire County Suburban and Rural Complete St's Guide

Presentation Outline

- Purpose
- Structure
- Sources
- Applications
- Benefits
- Project Examples



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History and Context

Rural Practice and Multimodal Design Guidelines

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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*..."

FHWA. *United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations.* 2010.

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.

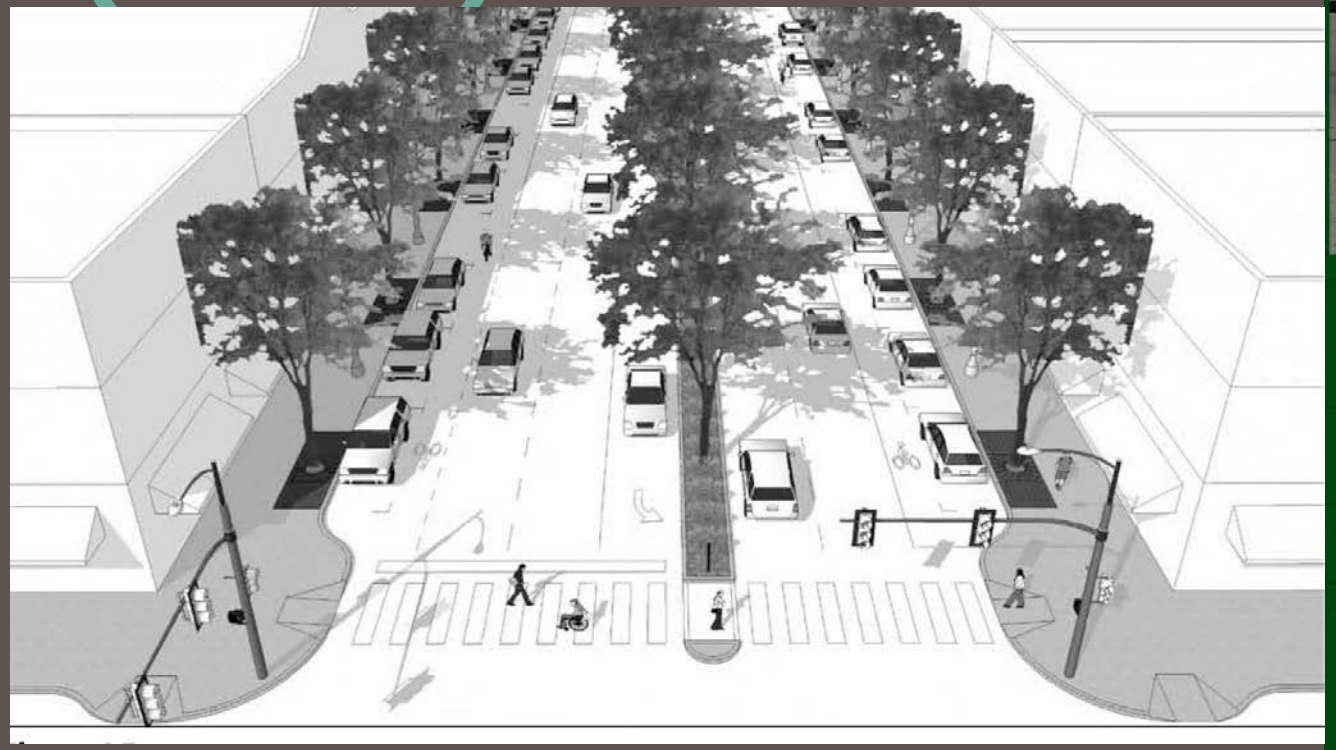
Policy Statement

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.

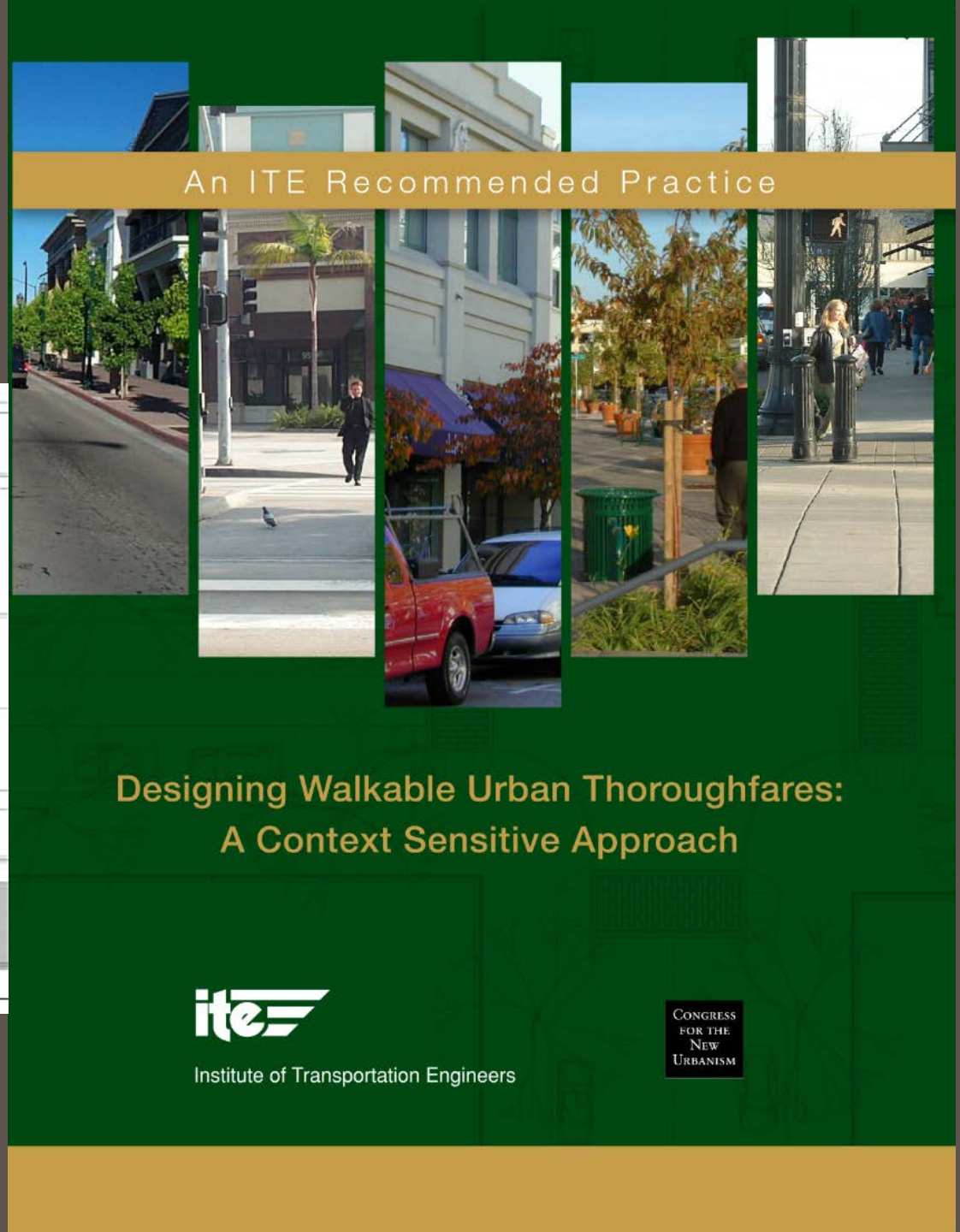
Authority

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)



ITE. *Designing Walkable Urban Thoroughfares: A context Sensitive Approach*. 2010. p. 62



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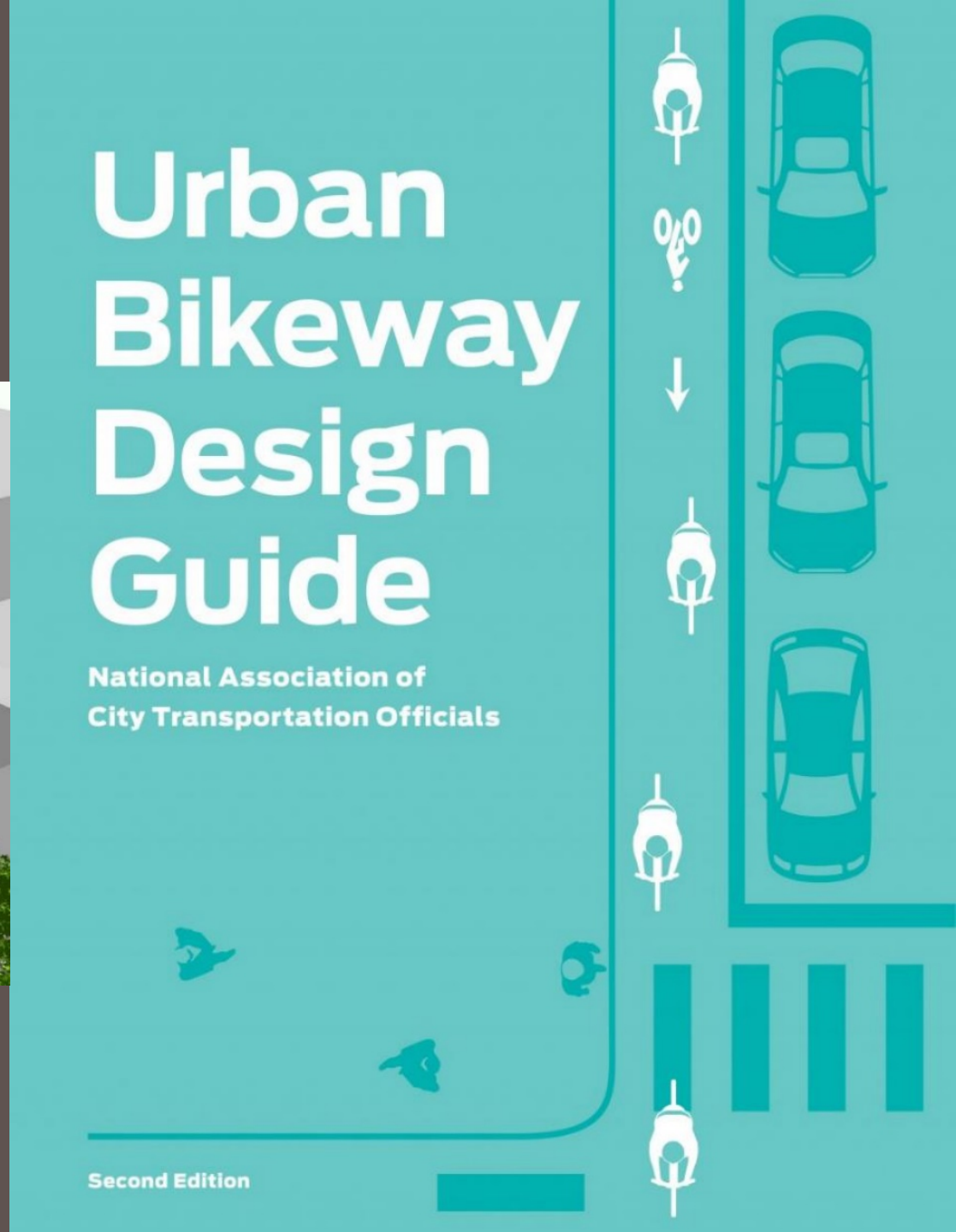
NACTO Urban Bikeway Design Guide (2012)

NACTO. *Urban Bikeway Design Guide, 2nd Edition*. 2014.



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NACTO Urban Street Design Guide (2013)

NACTO. *Urban Street Design Guide*. 2013.

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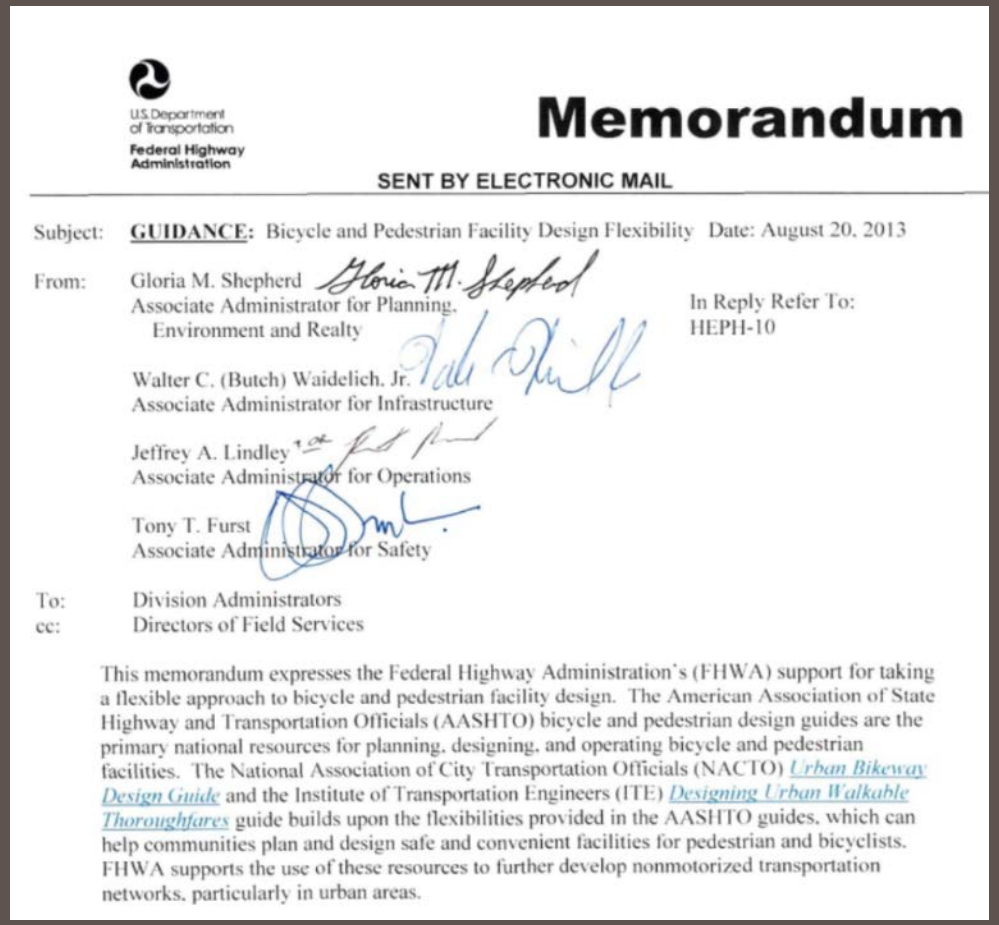
FHWA Design Flexibility Memo (2013)

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."



U.S. Department of Transportation
Federal Highway Administration

Memorandum

SENT BY ELECTRONIC MAIL

Subject: **GUIDANCE:** Bicycle and Pedestrian Facility Design Flexibility Date: August 20, 2013

From: Gloria M. Shepherd
Associate Administrator for Planning, Environment and Realty

In Reply Refer To: HEPH-10

Walter C. (Butch) Waidelich, Jr.
Associate Administrator for Infrastructure

Jeffrey A. Lindley
Associate Administrator for Operations

Tony T. Furst
Associate Administrator for Safety

To: Division Administrators
cc: Directors of Field Services

This memorandum expresses the Federal Highway Administration's (FHWA) support for taking a flexible approach to bicycle and pedestrian facility design. The American Association of State Highway and Transportation Officials (AASHTO) bicycle and pedestrian design guides are the primary national resources for planning, designing, and operating bicycle and pedestrian facilities. The National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide* and the Institute of Transportation Engineers (ITE) *Designing Urban Walkable Thoroughfares* guide builds 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.

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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

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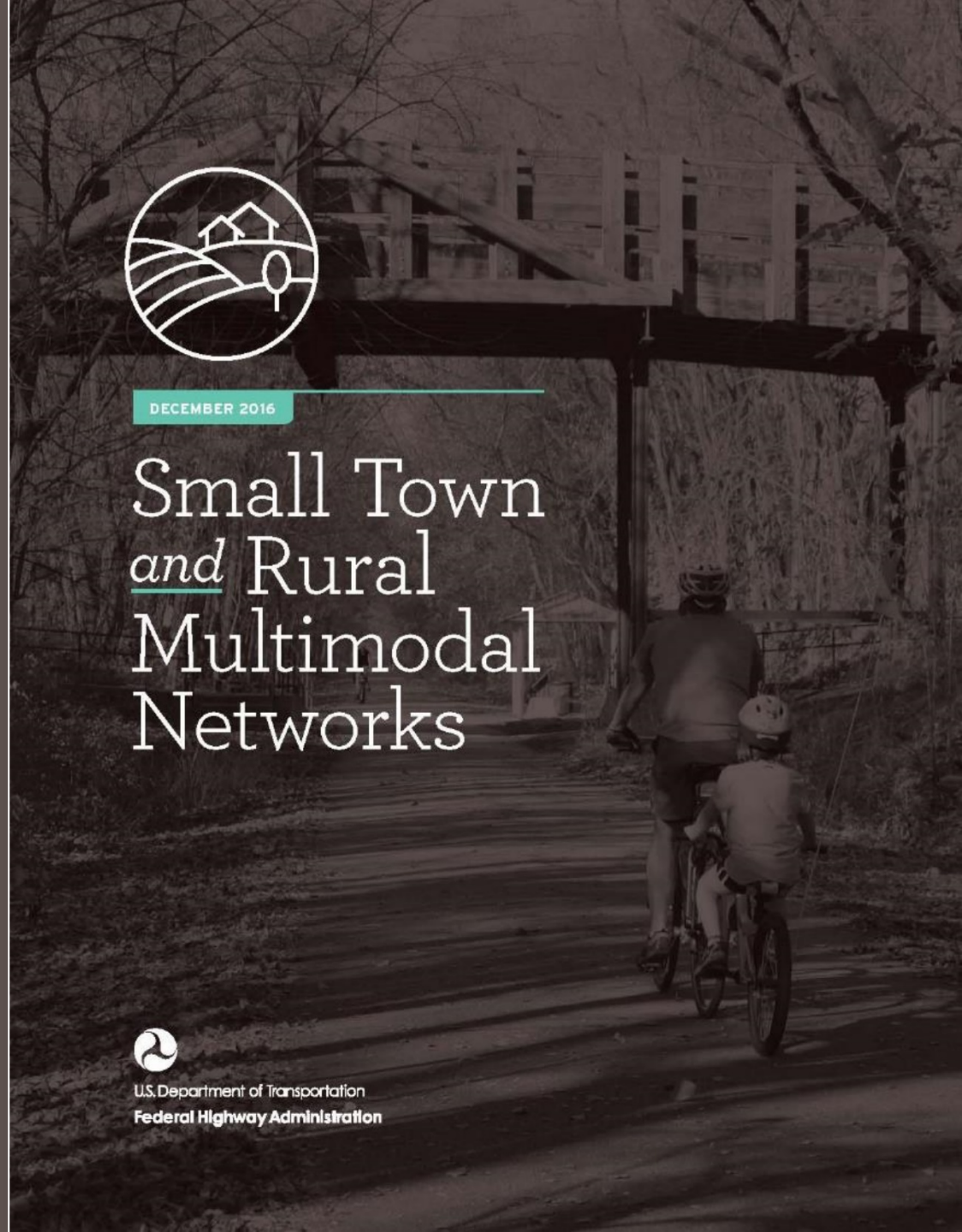
Small Town and Rural Multimodal Networks (2017)

The multimodal design guidelines for the rest of us.



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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

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Small Town/Rural Transportation

Needs and Opportunities

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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

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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

Route 124/202 in Jaffrey

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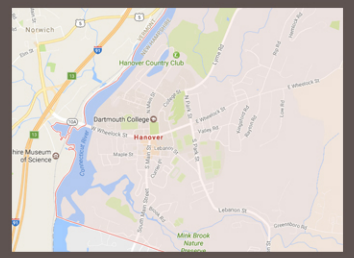
Small Town/Rural Opportunities

2 MILES



Hanover NH

Population 11,260

2 MILES

Palmer, AK

Population 6,250

1.3 MILES

Rushford, MN

Population 2,102

2.3 MILES

Ukiah, CA

Population 15,956

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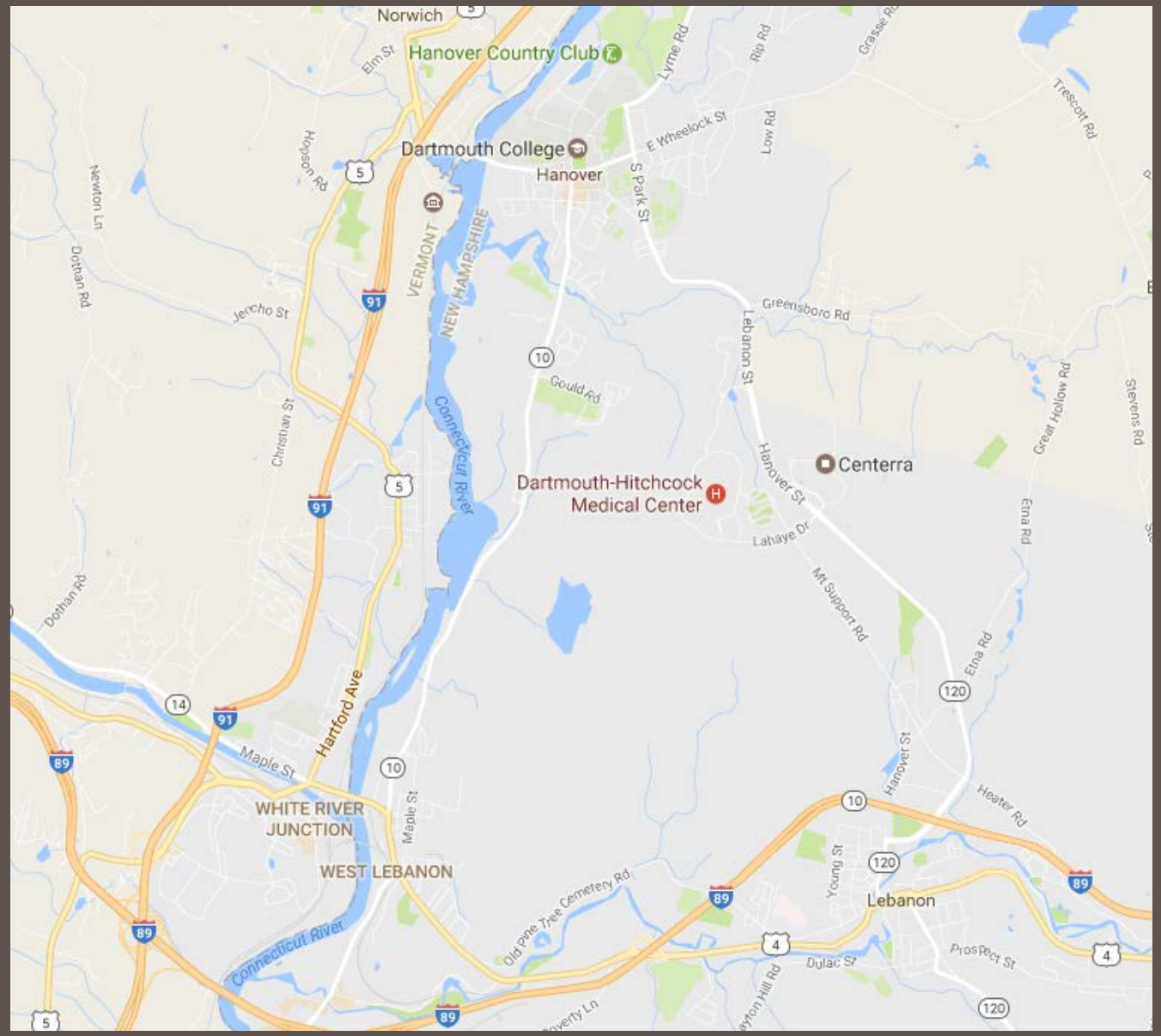
Small Town/Rural Opportunities

- 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



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Guide Content

Treatments and Design Topics

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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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2-9 *Bicycle Boulevard*
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6-6 *What are the Key Products of the Transportation Planning Process?*

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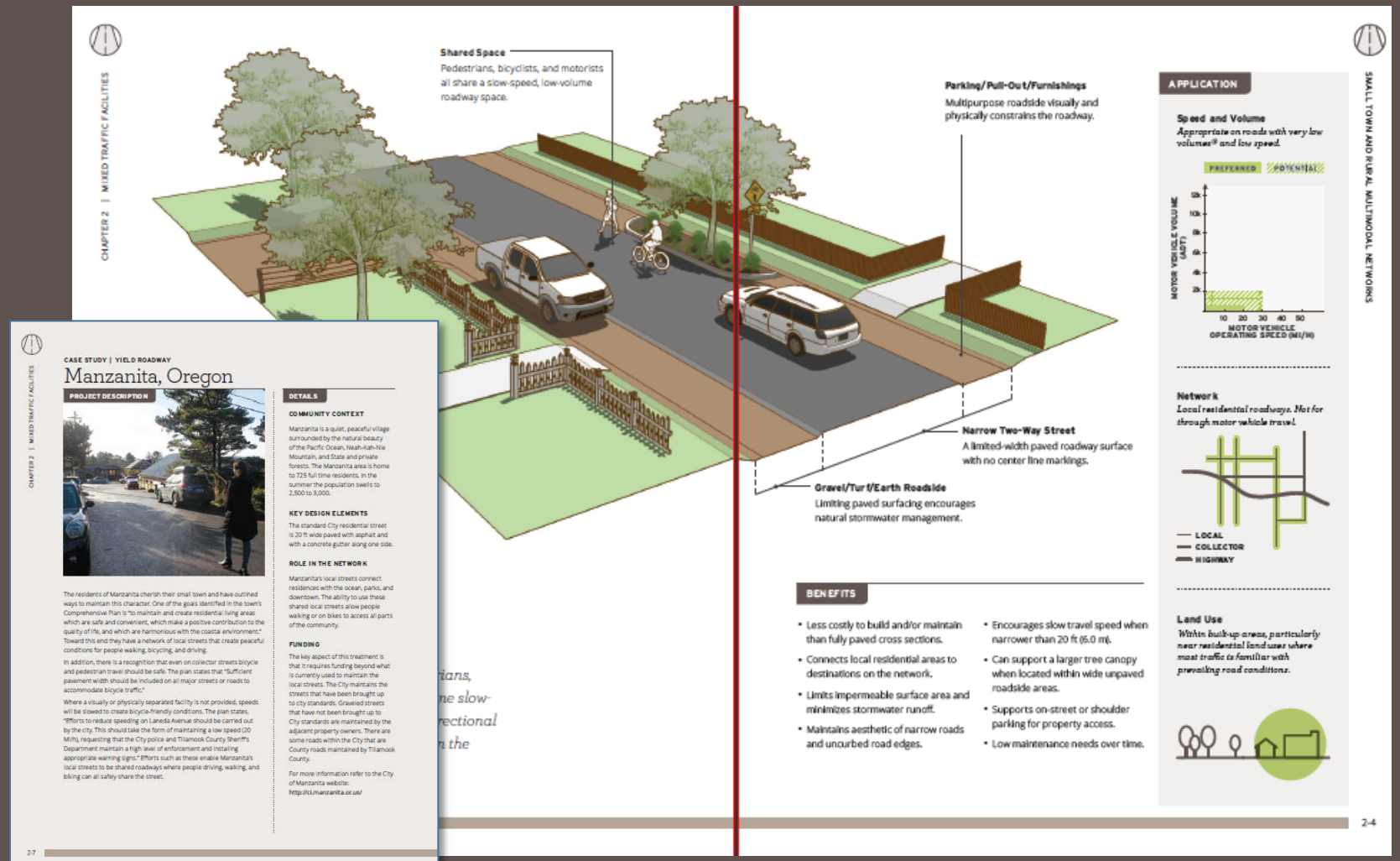
Multimodal Facilities

- Application
- Benefits
- Guidance
  - Geometric Design
  - Markings
  - Signs
  - Intersection treatment
  - Implementation
  - Accessibility
- Case Studies



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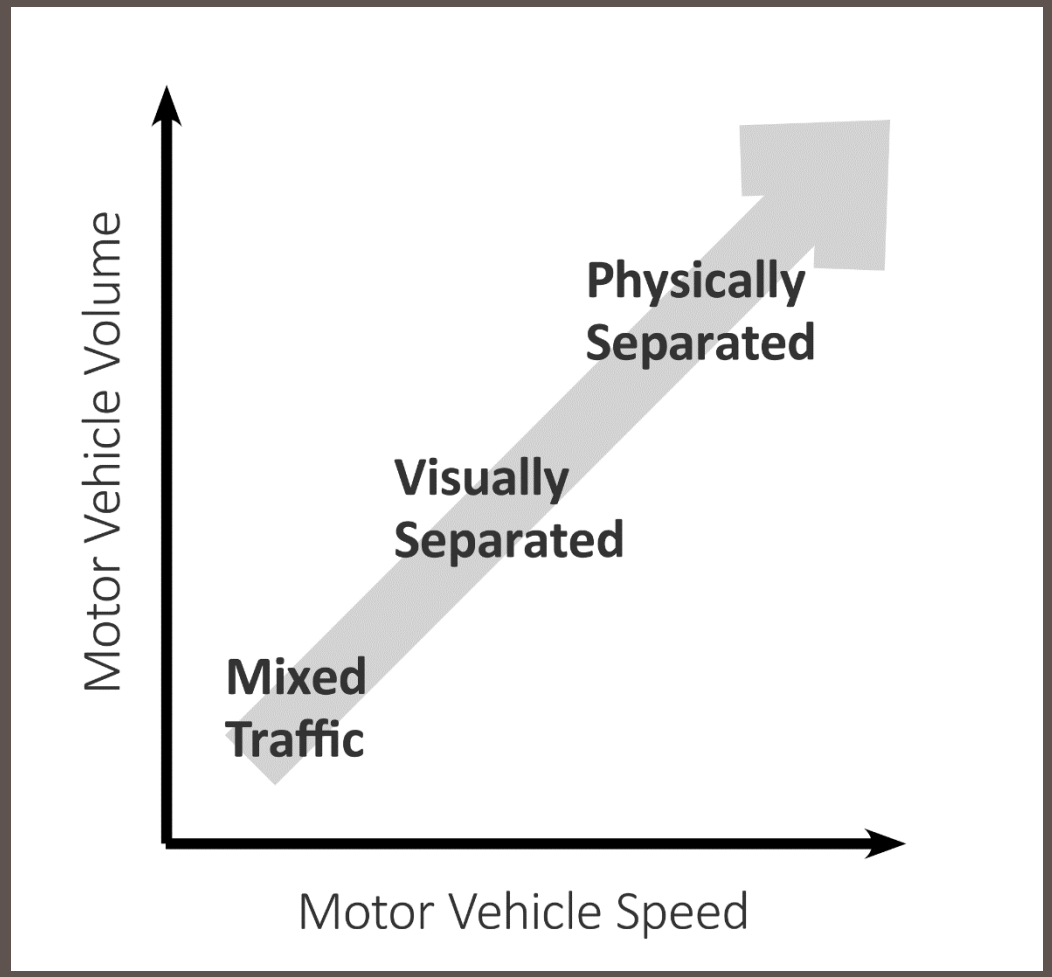
Focus on Complete Networks of Facilities

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



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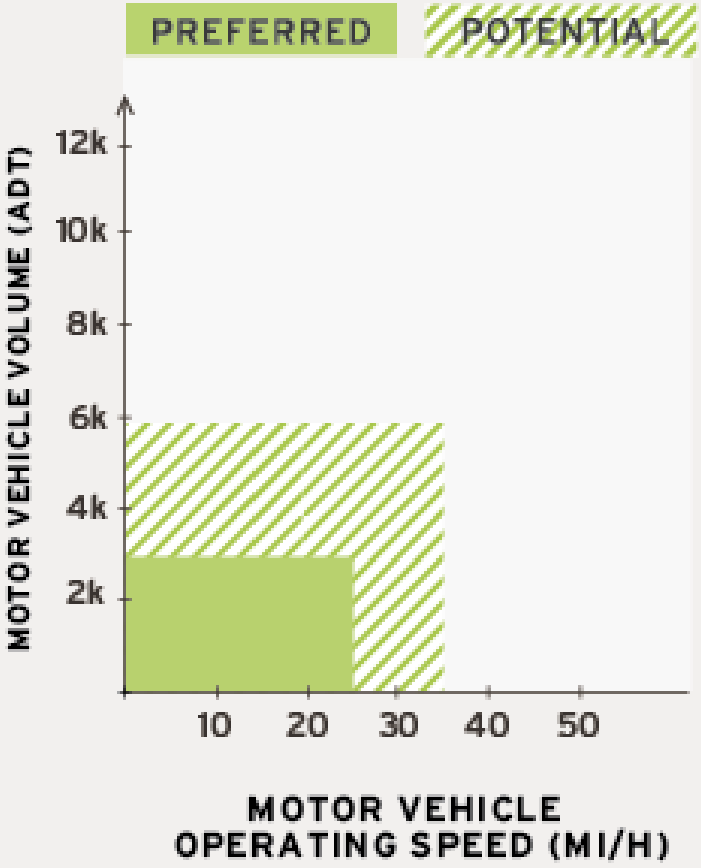
EXAMPLE APPLICATION

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.

LOCAL
COLLECTOR
HIGHWAY

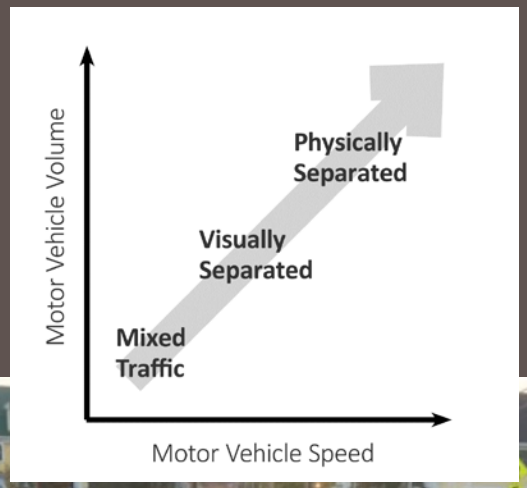
Land Use

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

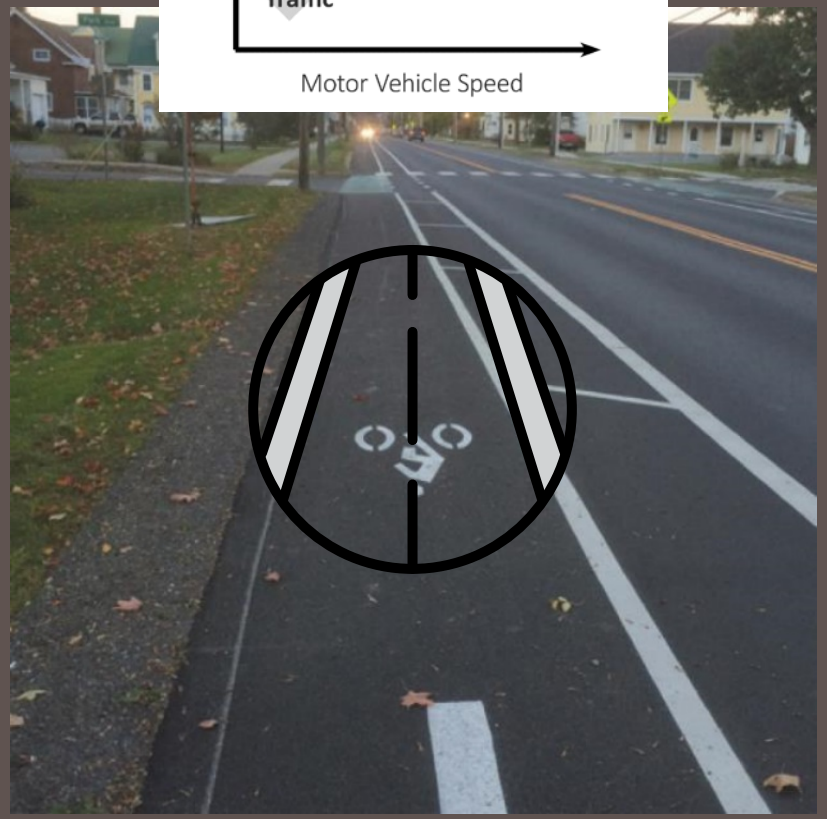
OUTSIDE OF BUILT-UP AREAS

WITHIN BUILT-UP AREAS

Applications



Mixed Traffic



Visually Separated

Physically Separated

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Mixed Traffic

Yield Roadway

Bicycle Boulevard

Advisory Shoulder

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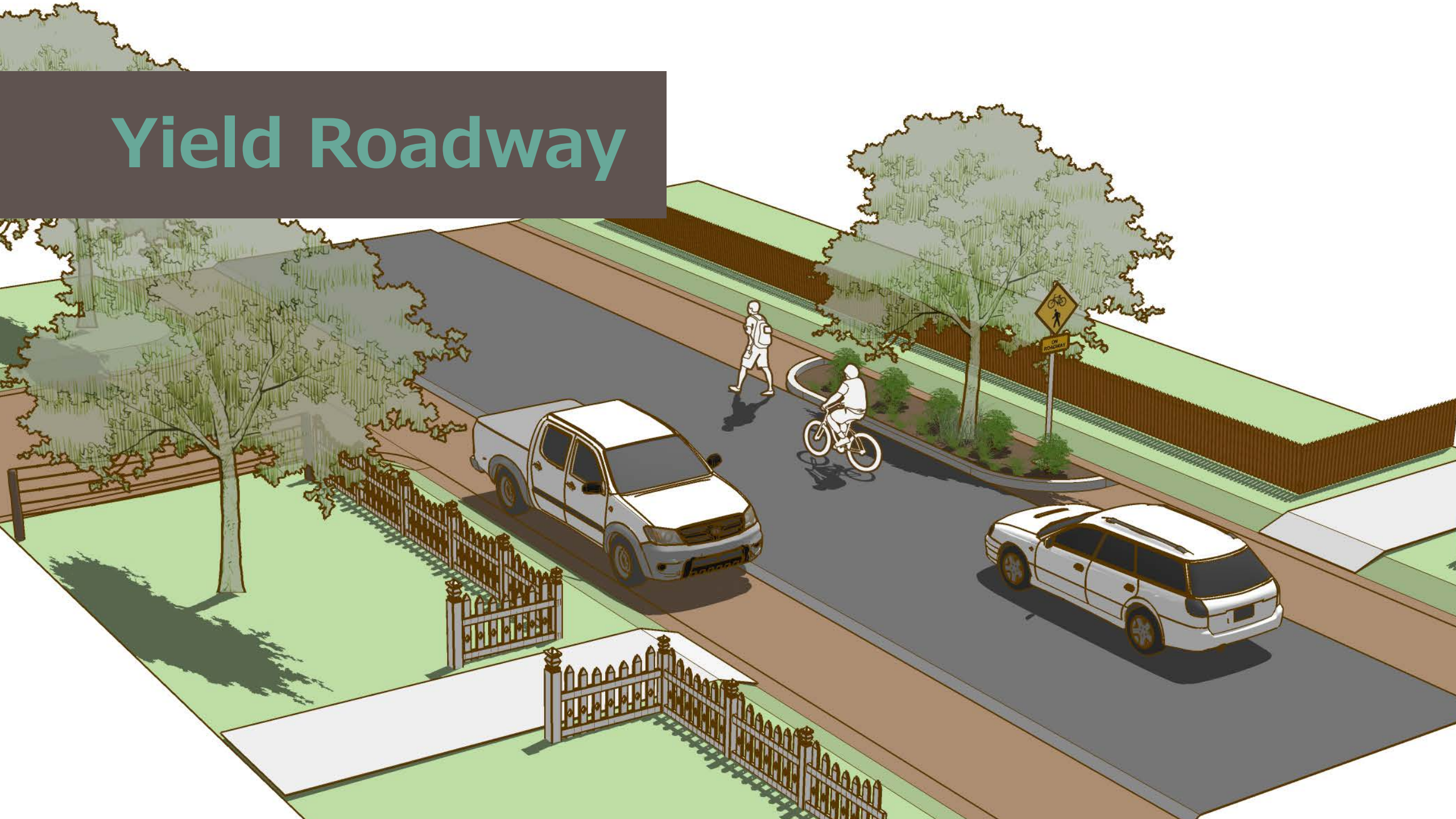
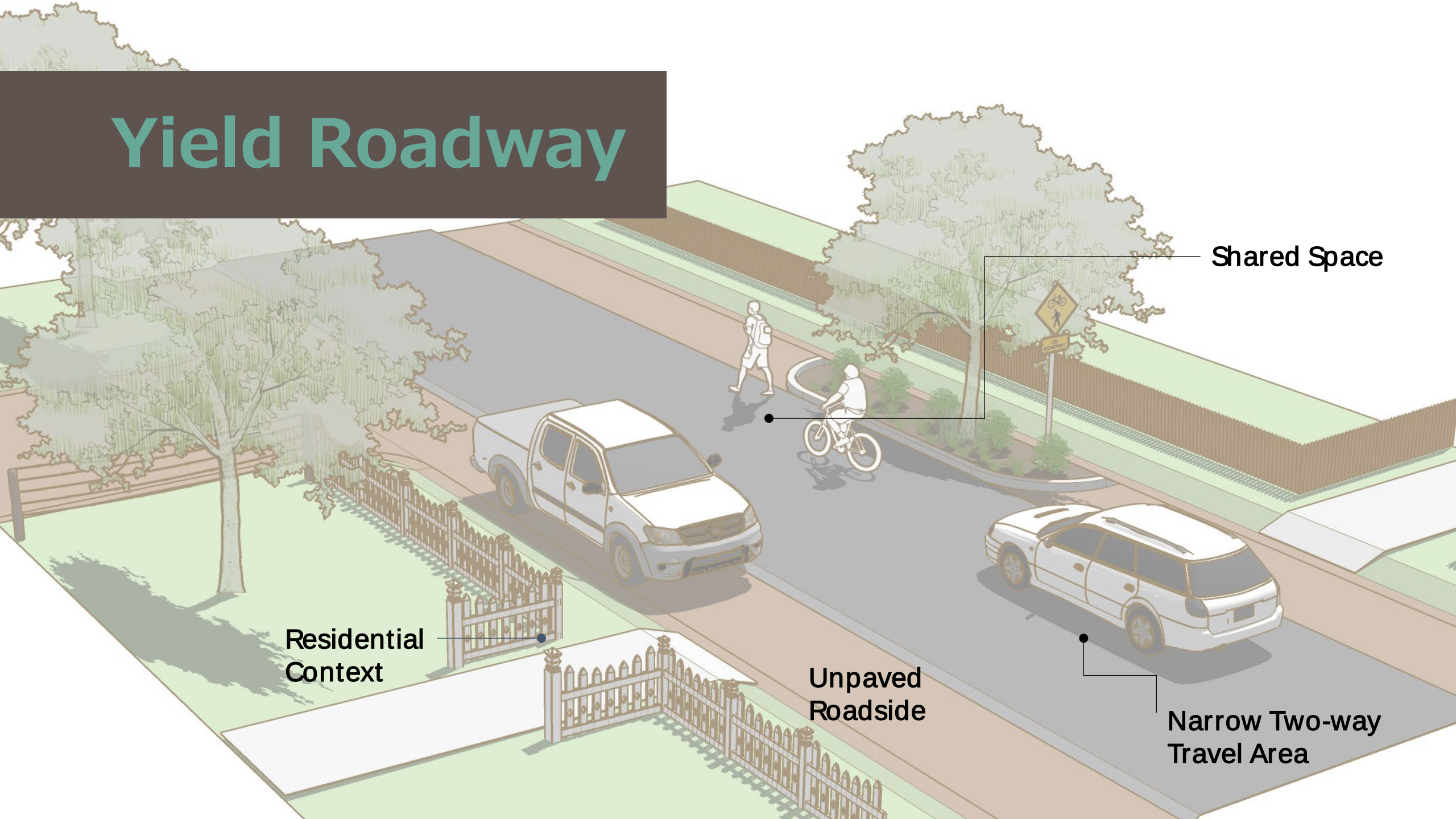
Yield Roadway

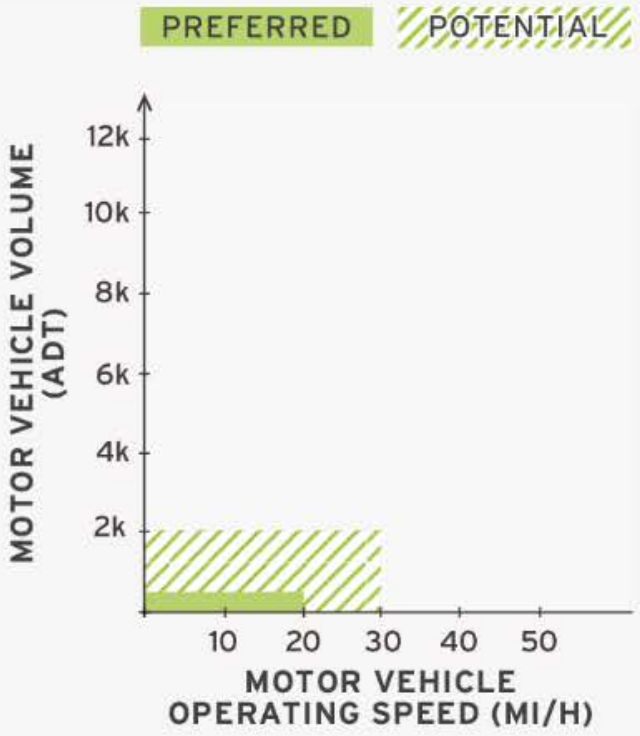


Yield Roadway



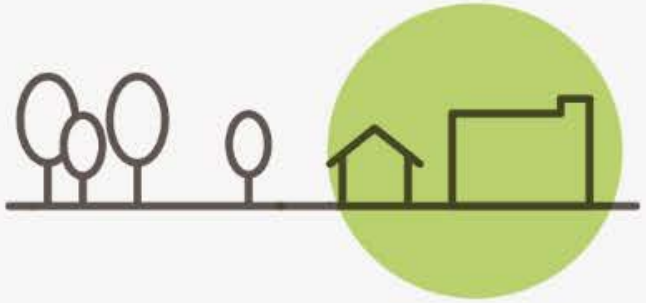
Yield Roadway

Traffic



Network

Land Use



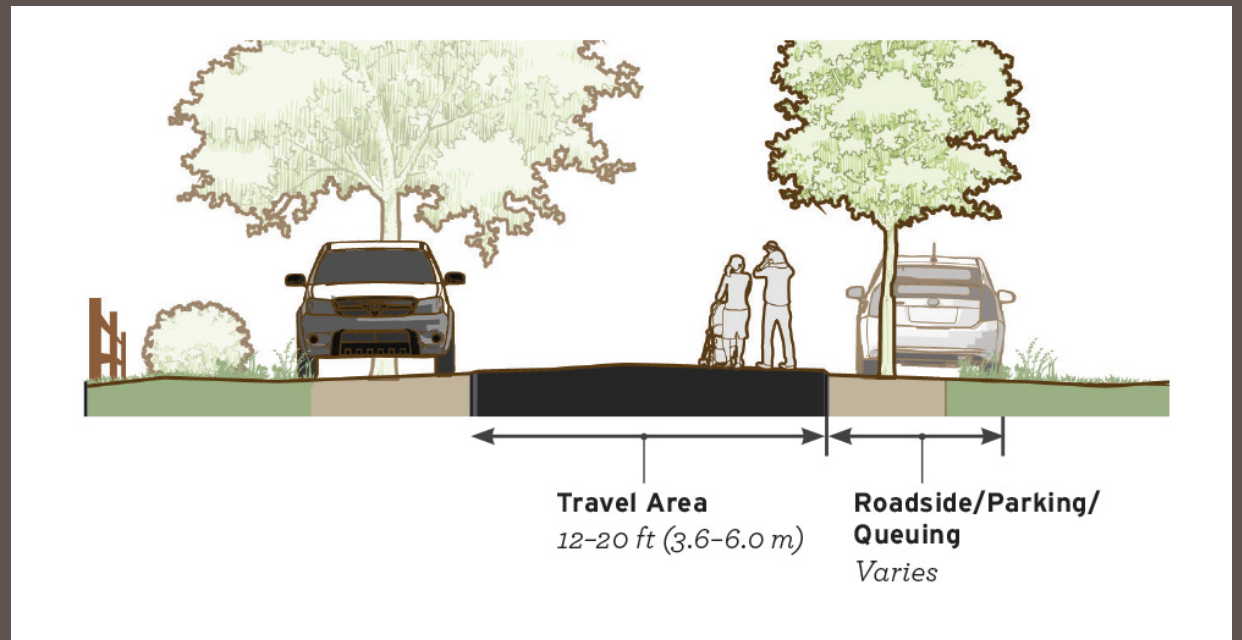
Yield Roadway – Geometric Design

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



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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.

W11-2

W6-3

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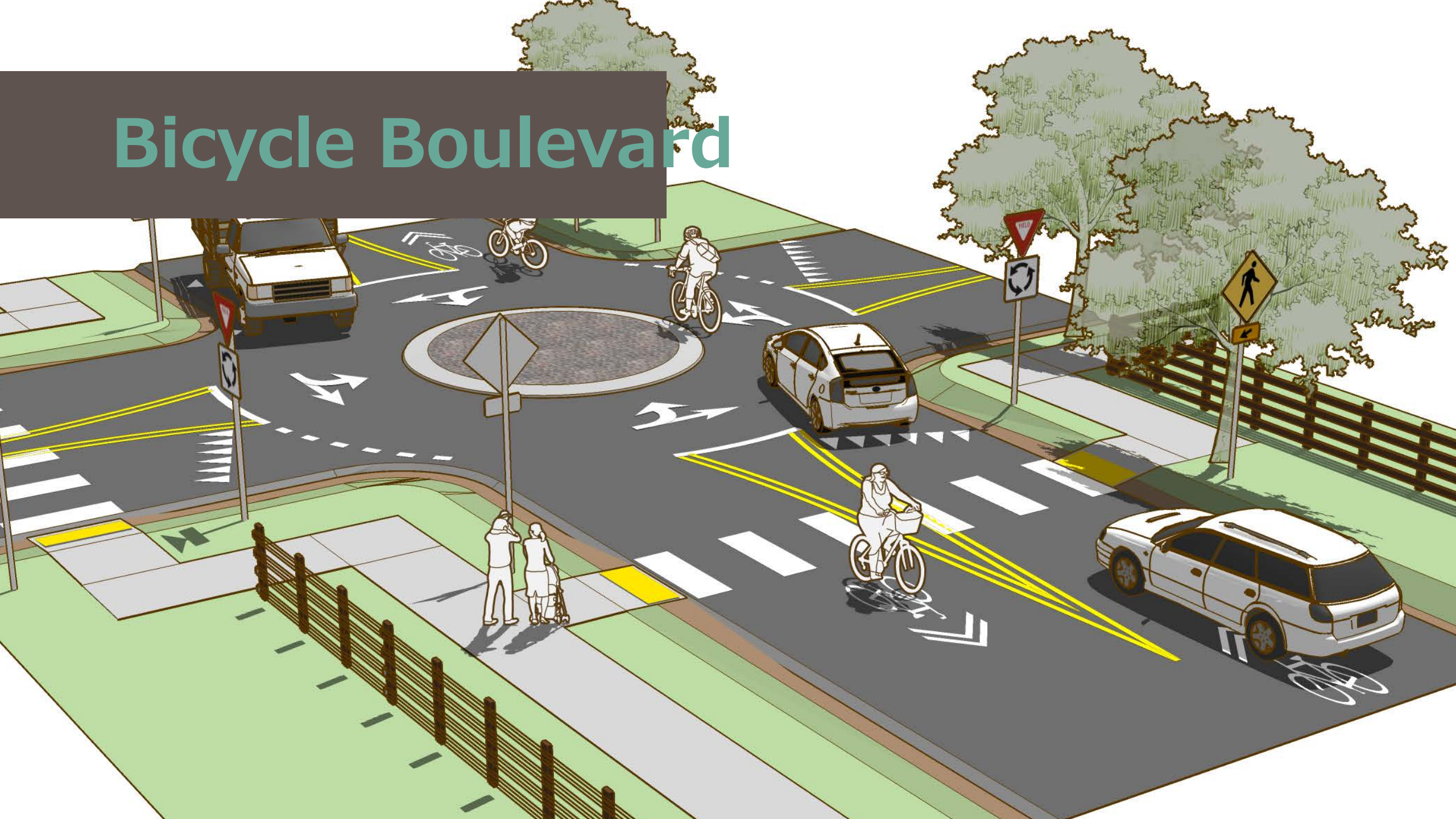
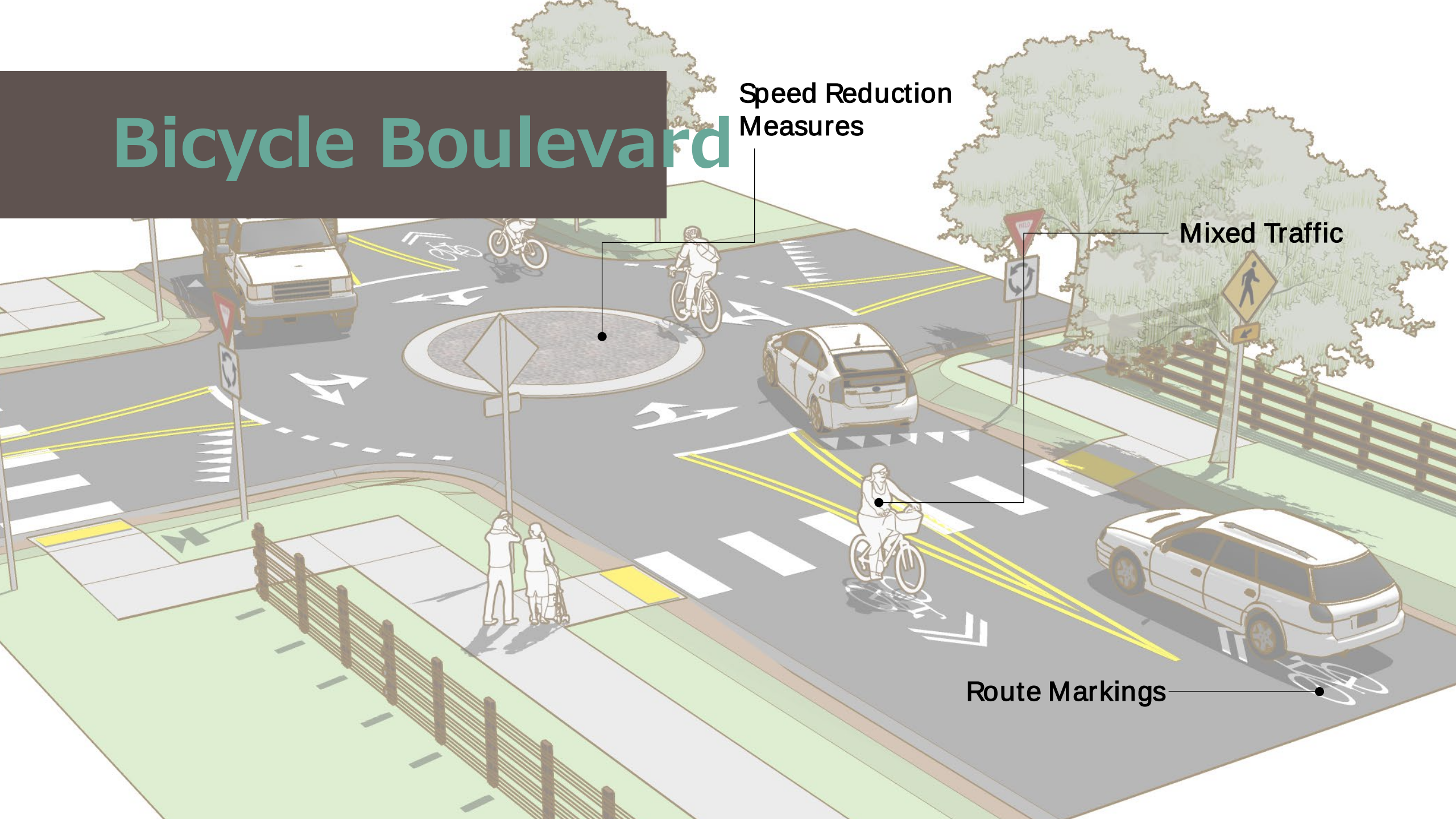
Sisters, OR
Population: 2,170

Bicycle Boulevard

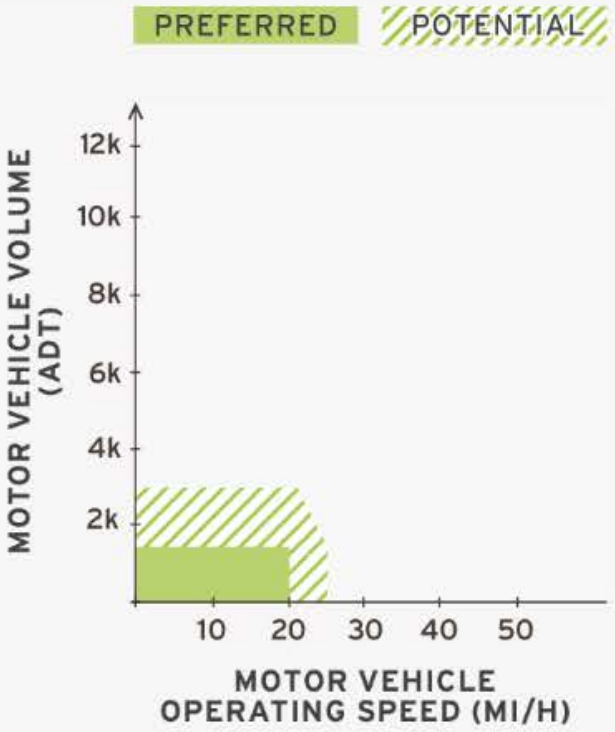


Bicycle Boulevard



Bicycle Boulevard

Traffic



Network

Land Use

Bicycle Boulevard – Geometric Design

- *Combine pavement markings, traffic calming measures, and crossing improvements to enhance bicyclist comfort*

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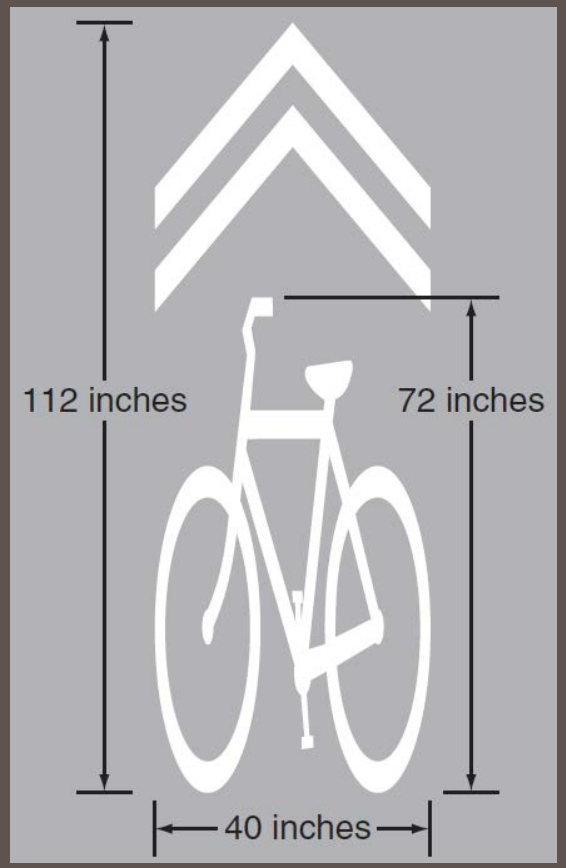
Bicycle Boulevard – Markings and Signs

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

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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

D11-1c

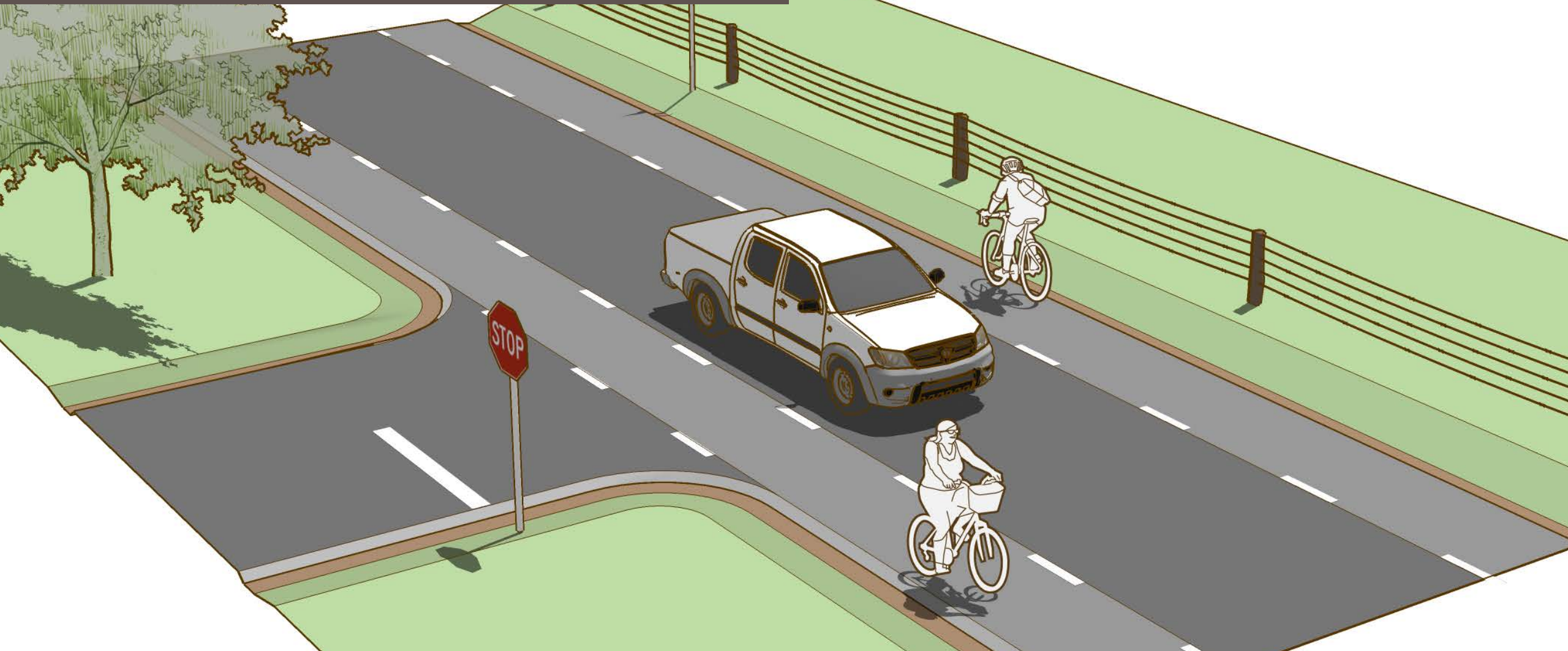
D1-1

D11-1c; D1-3a

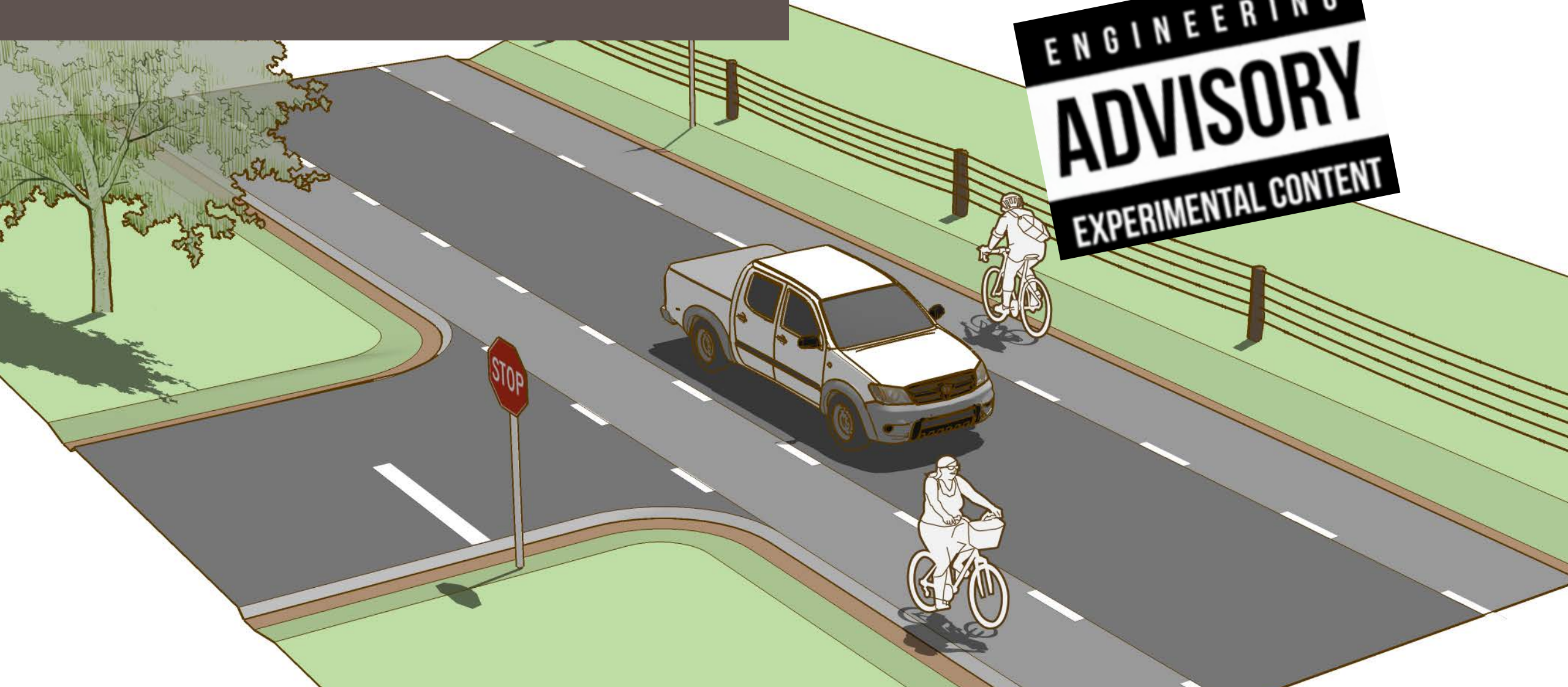
Ocean City, NJ
Population: 11,400

Arcata, CA
Population: 17,700

Advisory Shoulder



Advisory Shoulder



ENGINEERING
ADVISORY
EXPERIMENTAL CONTENT

How Does it Function?

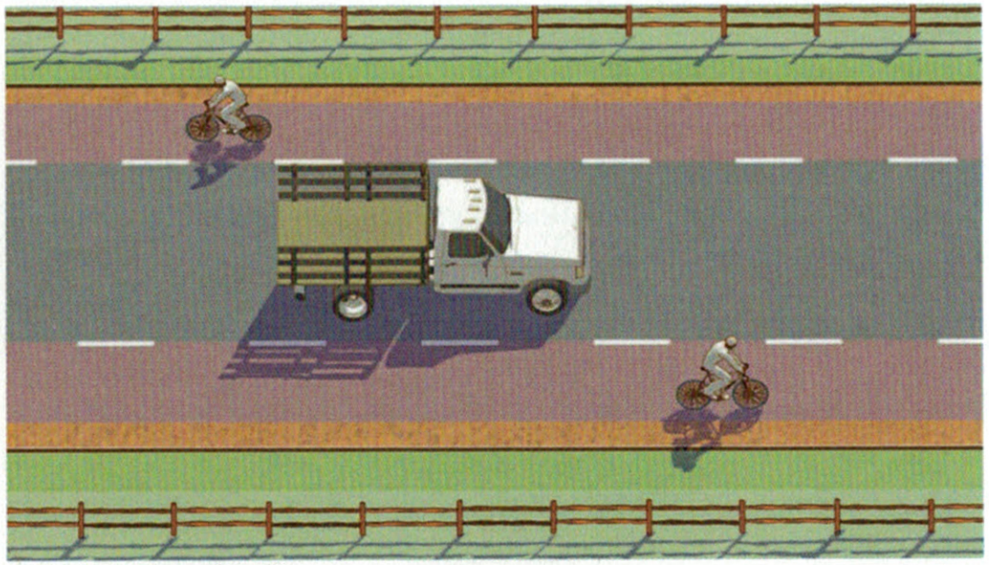


Figure 2-10. *Motorists travel in the center two-way travel lane. When passing a bicyclist, no lane change is necessary.*

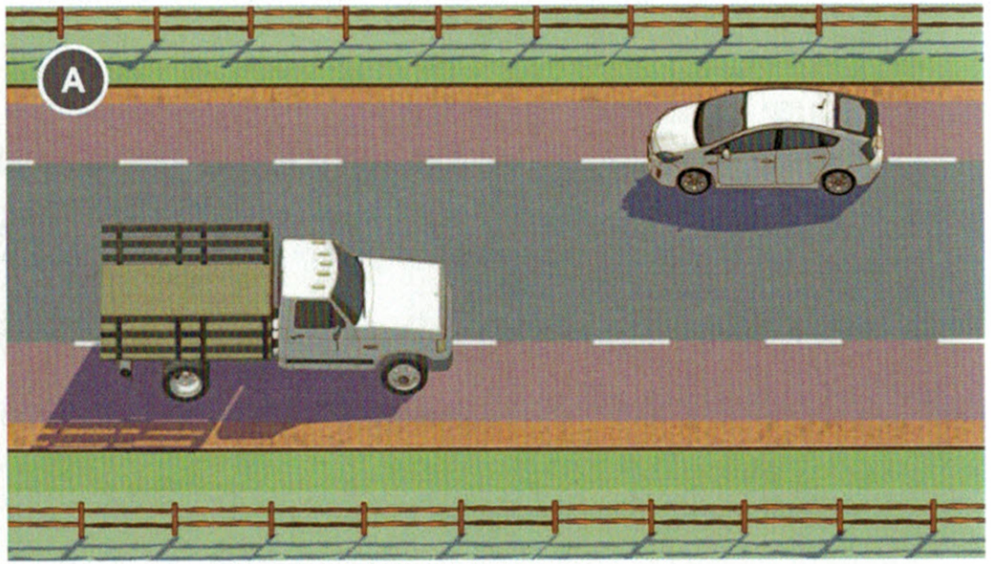


Figure 2-11. *When two motor vehicles meet, motorists may need to encroach into the advisory shoulder space.*

- *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*

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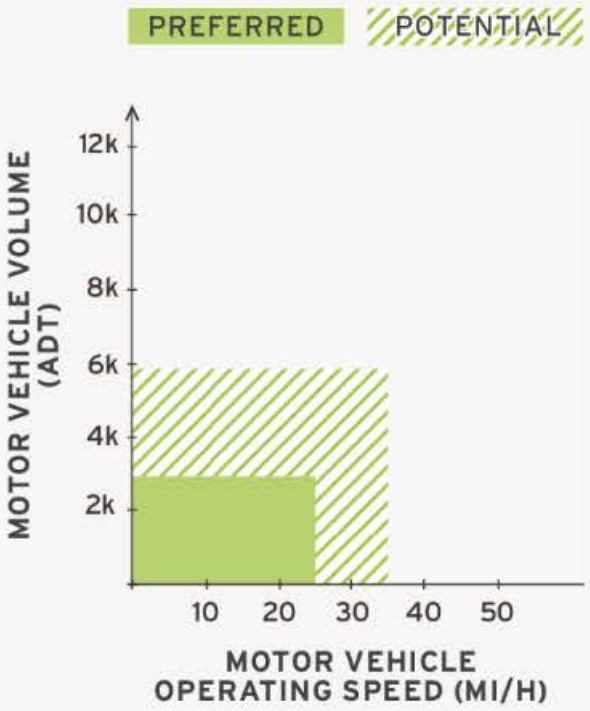
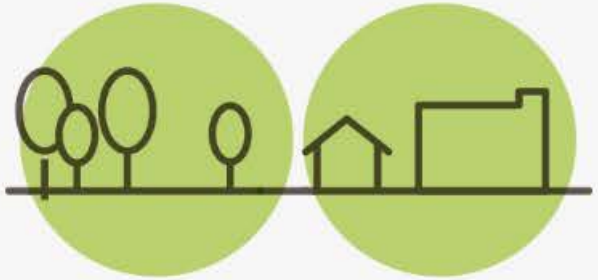
Advisory Shoulder

Traffic



Network

Land Use



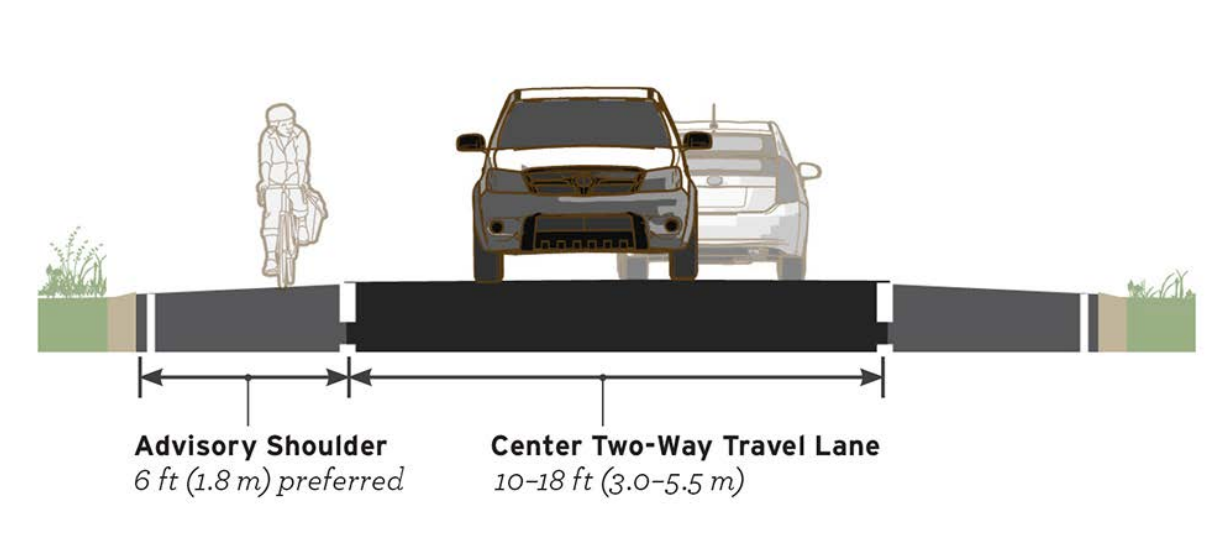
Advisory Shoulder- Geometric Design

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).



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Advisory Shoulder- Markings

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.

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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.

W6-3

alta PLANNING + DESIGN

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.

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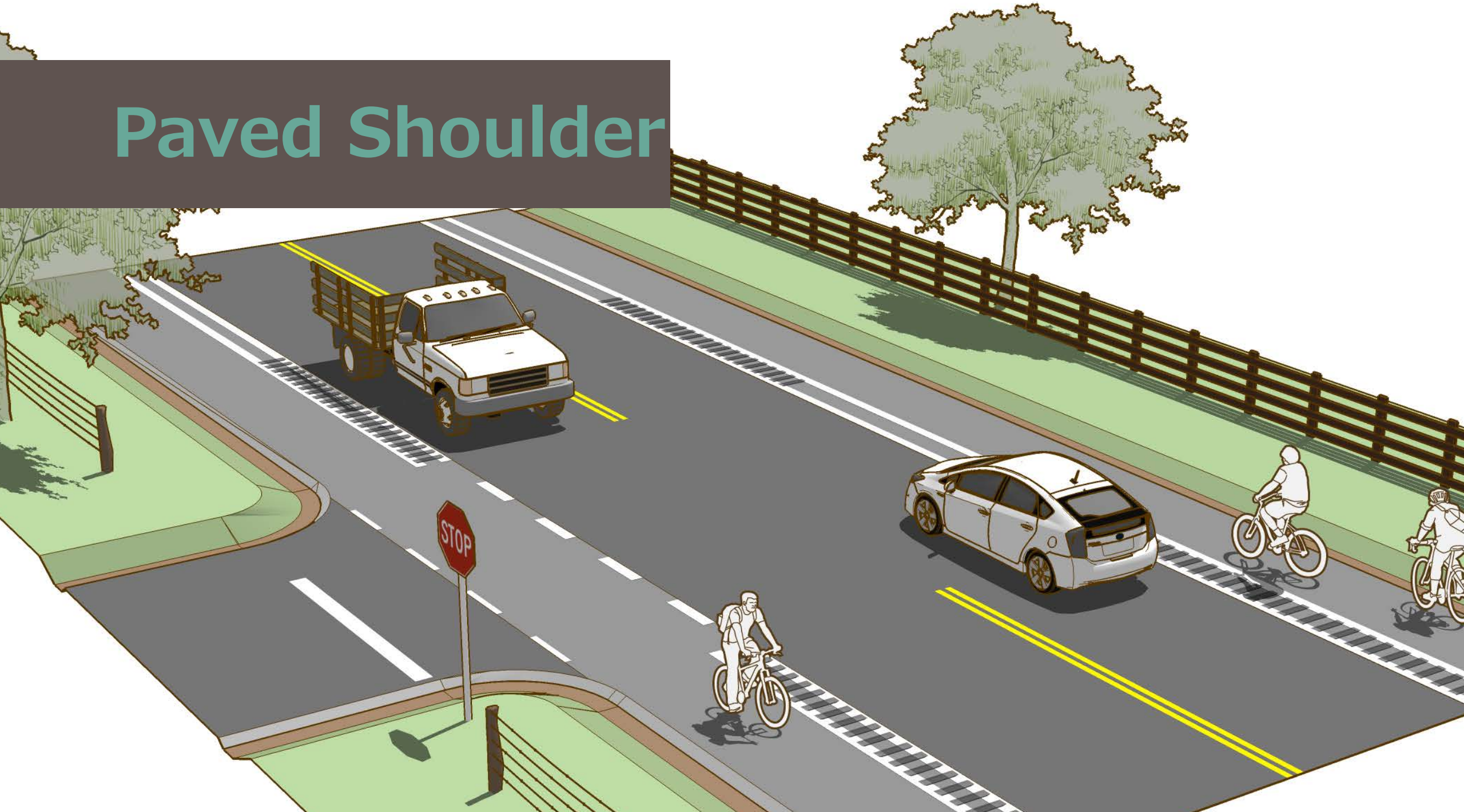
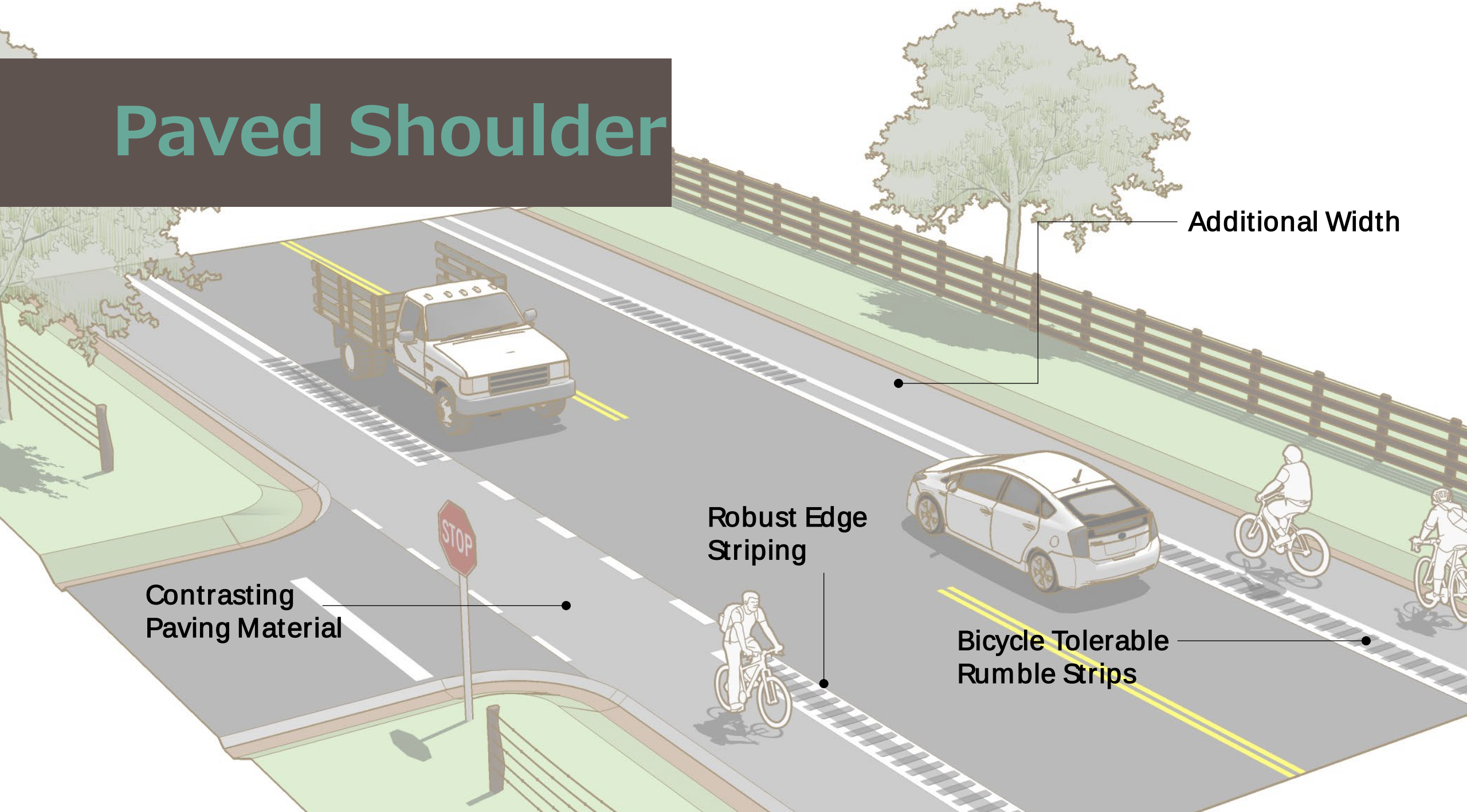
Paved Shoulder

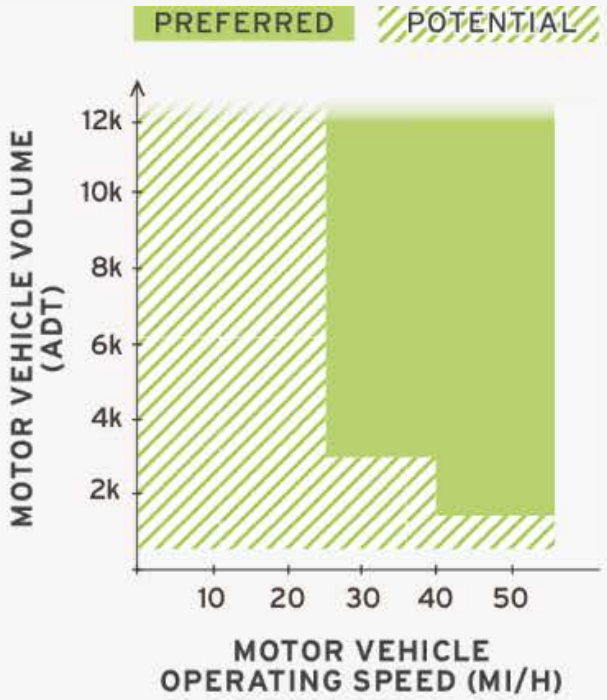


Paved Shoulder



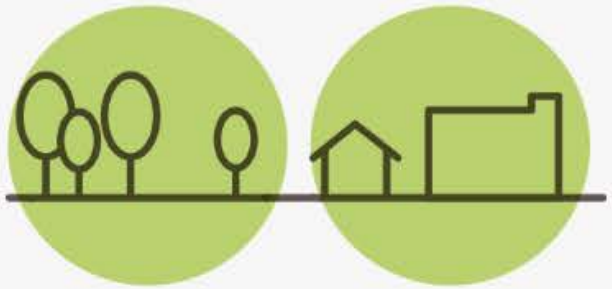
Paved Shoulder

Traffic



Network

Land Use



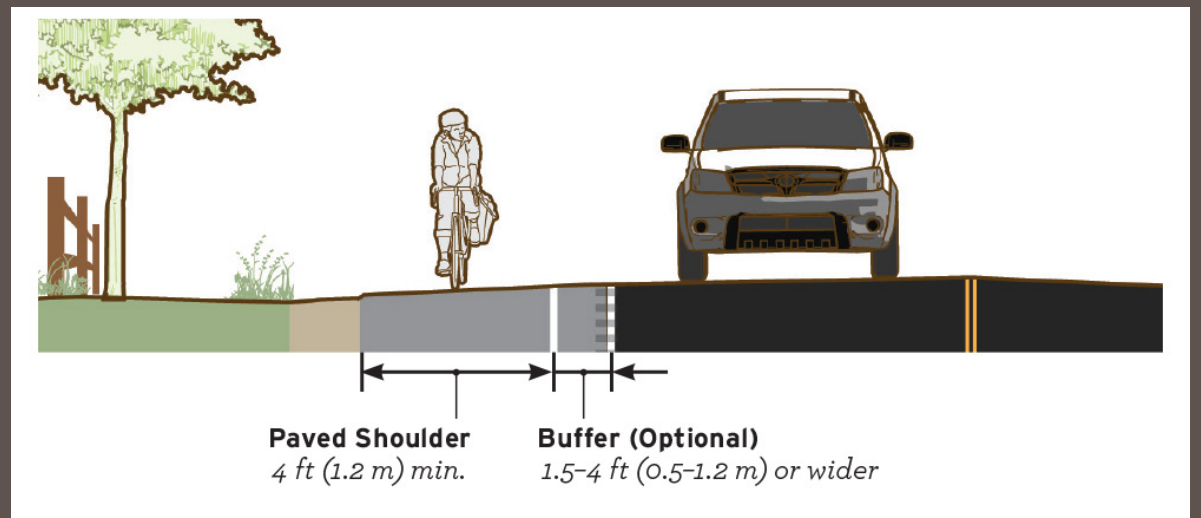
Paved Shoulder – Geometric Design

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.



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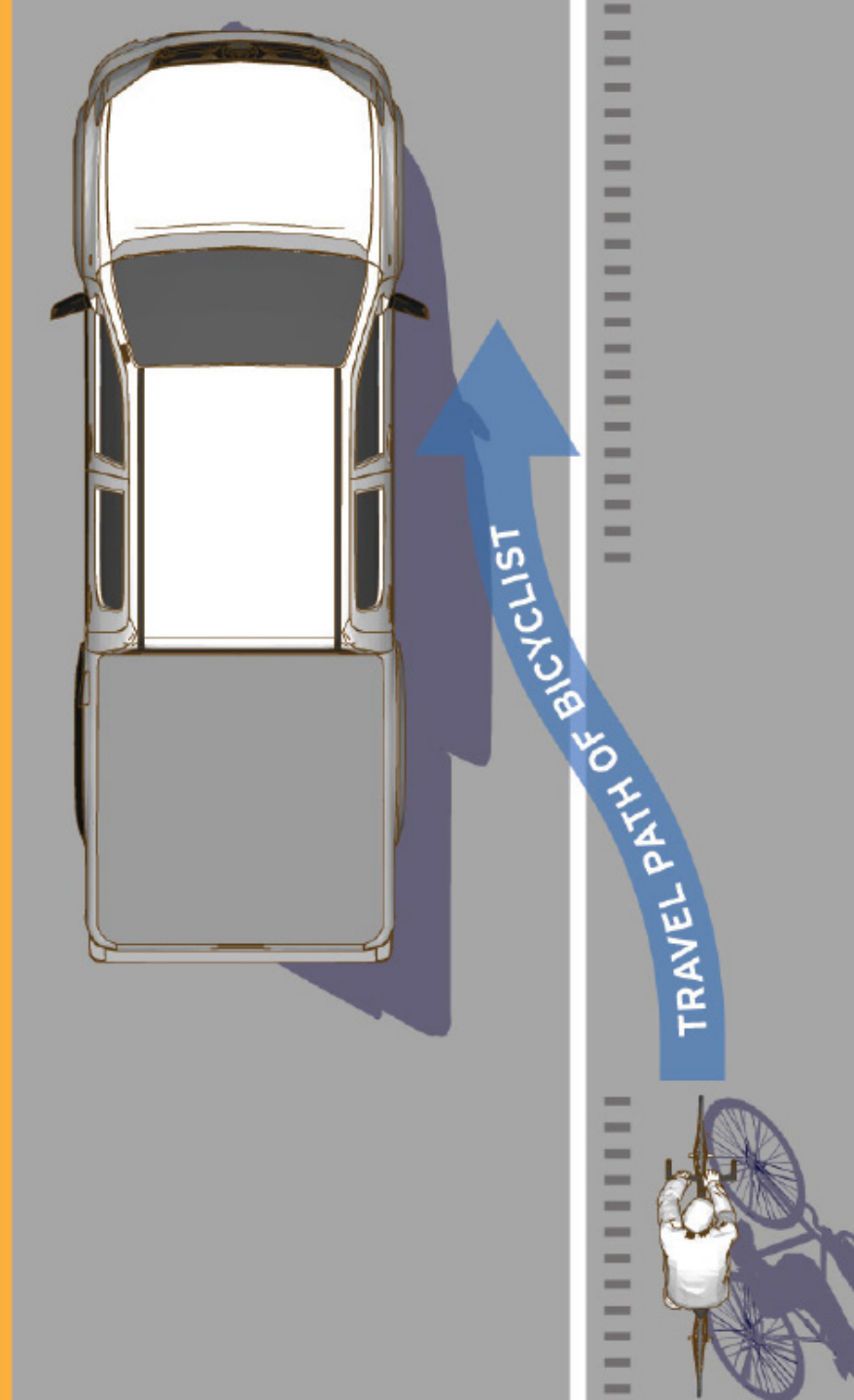
Paved Shoulder – Desi

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”



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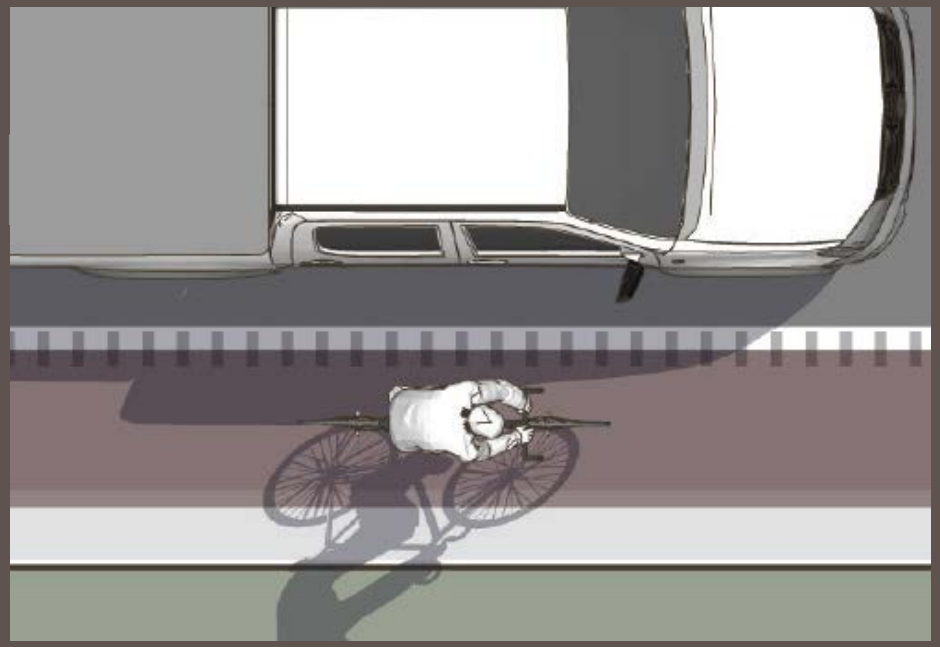
PLANNING + DESIGN

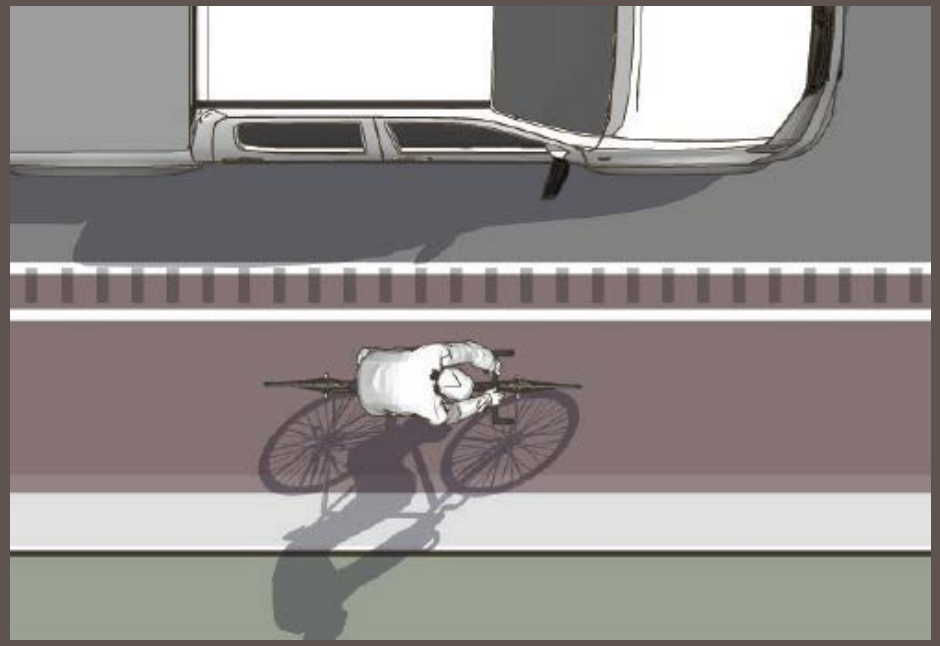
Paved Shoulder – Mar

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.



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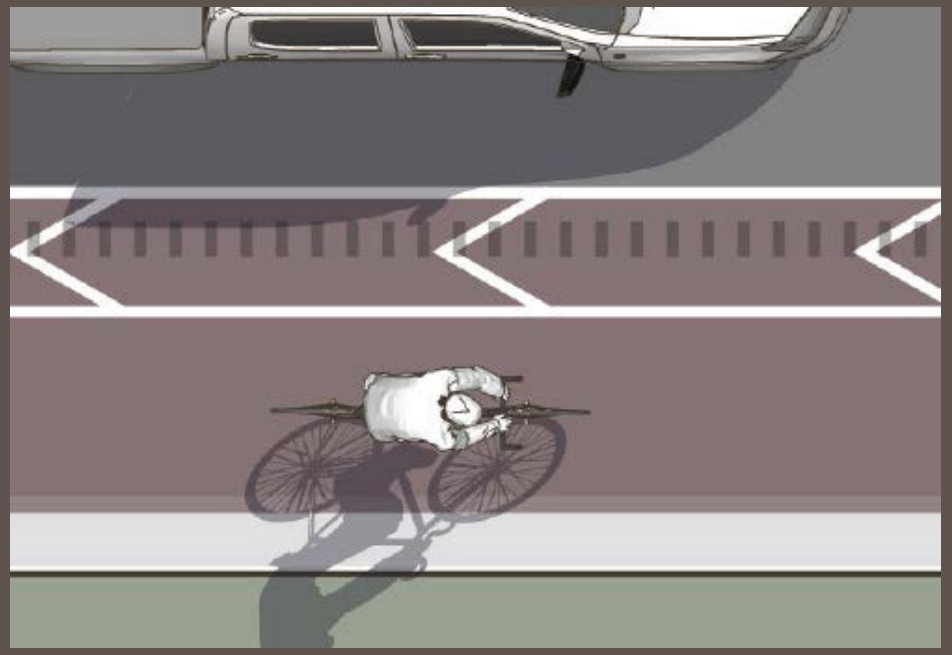
Paved Shoulder – Markings

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.



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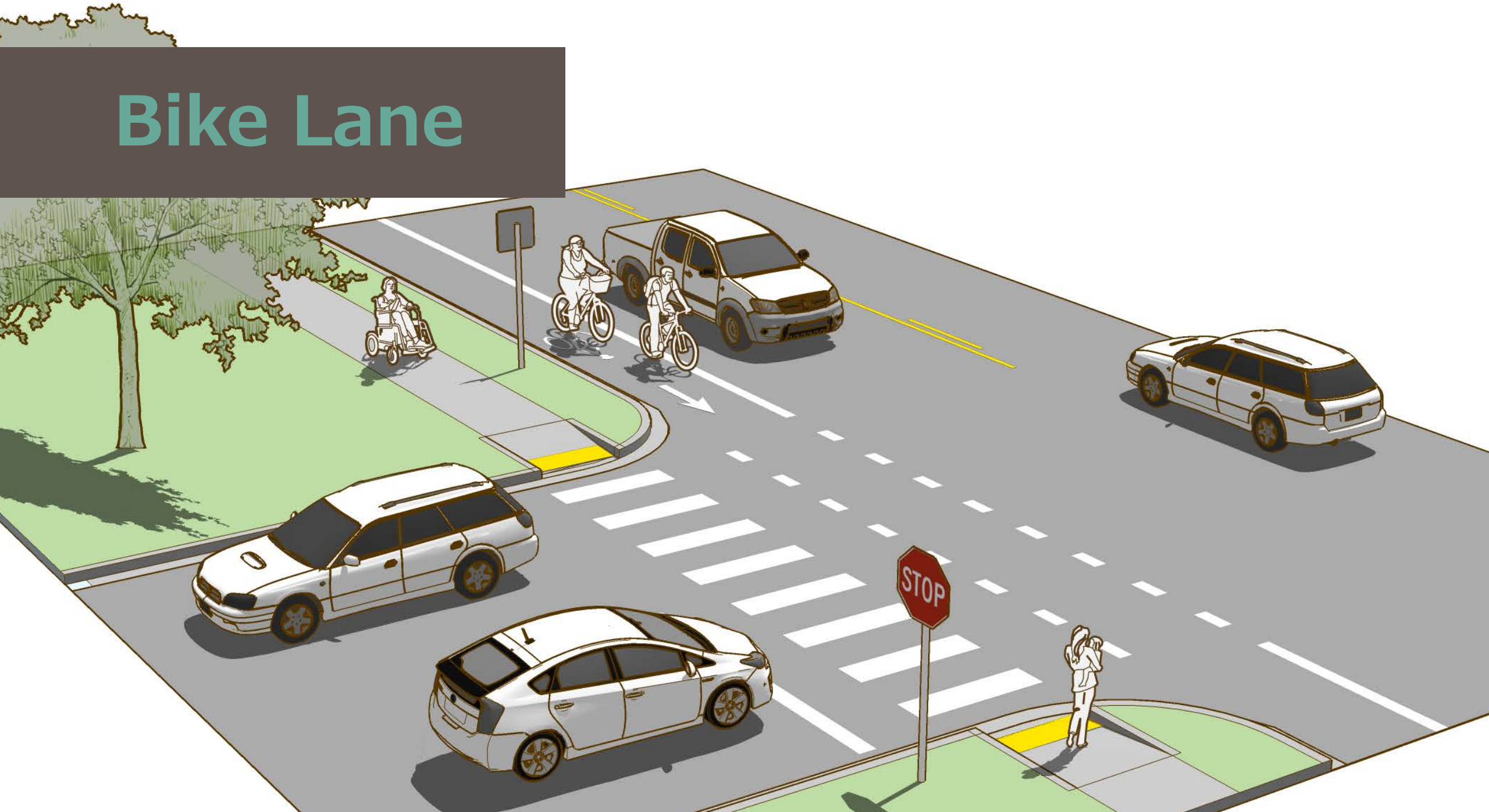
Rt. 103, NH

Capay, CA
Population: 300

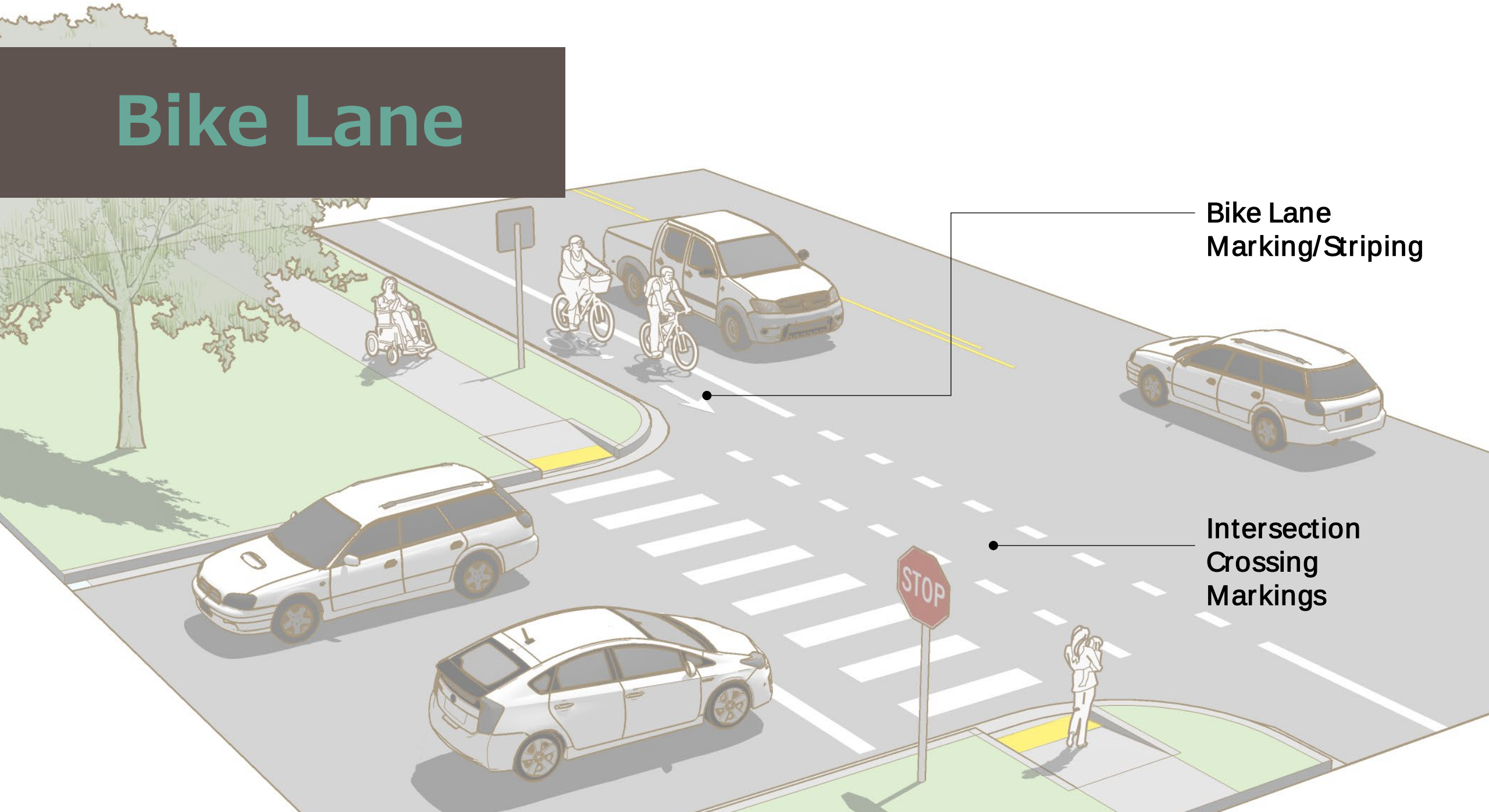
D'Iberville, MS
Population: 10,300

Townsend, MT
Population: 7,700

Bike Lane

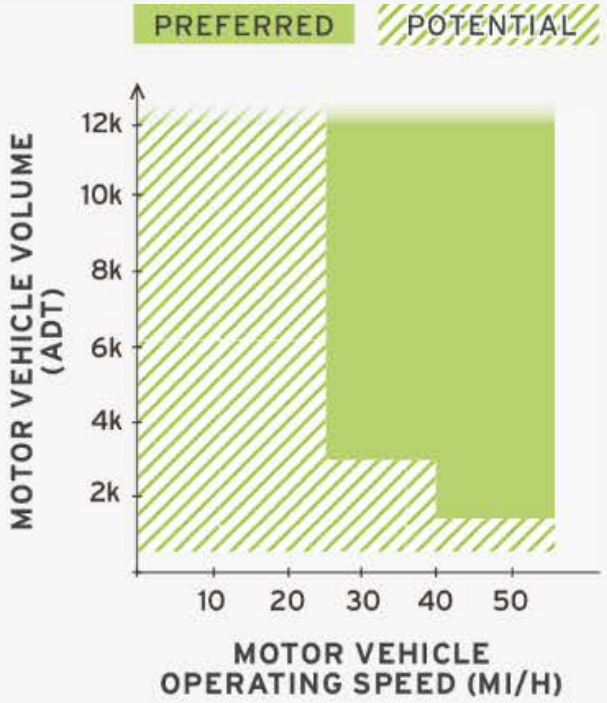


Bike Lane


Bike Lane
Marking/Striping
Intersection
Crossing
Markings
STOP

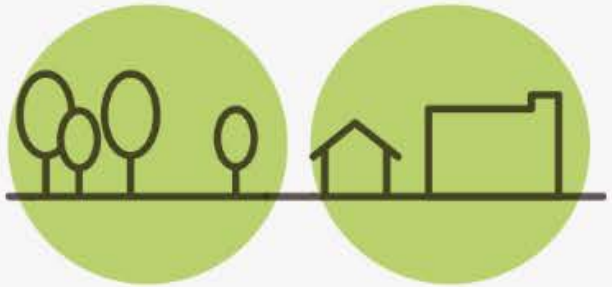
Paved Shoulder

Traffic



Network

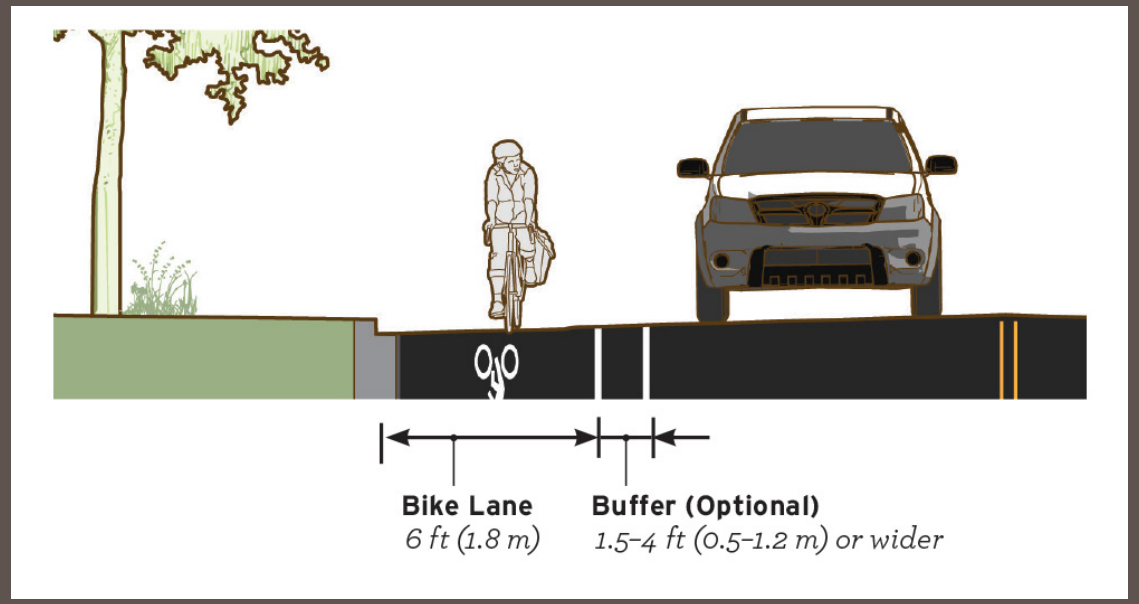
Land Use



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).



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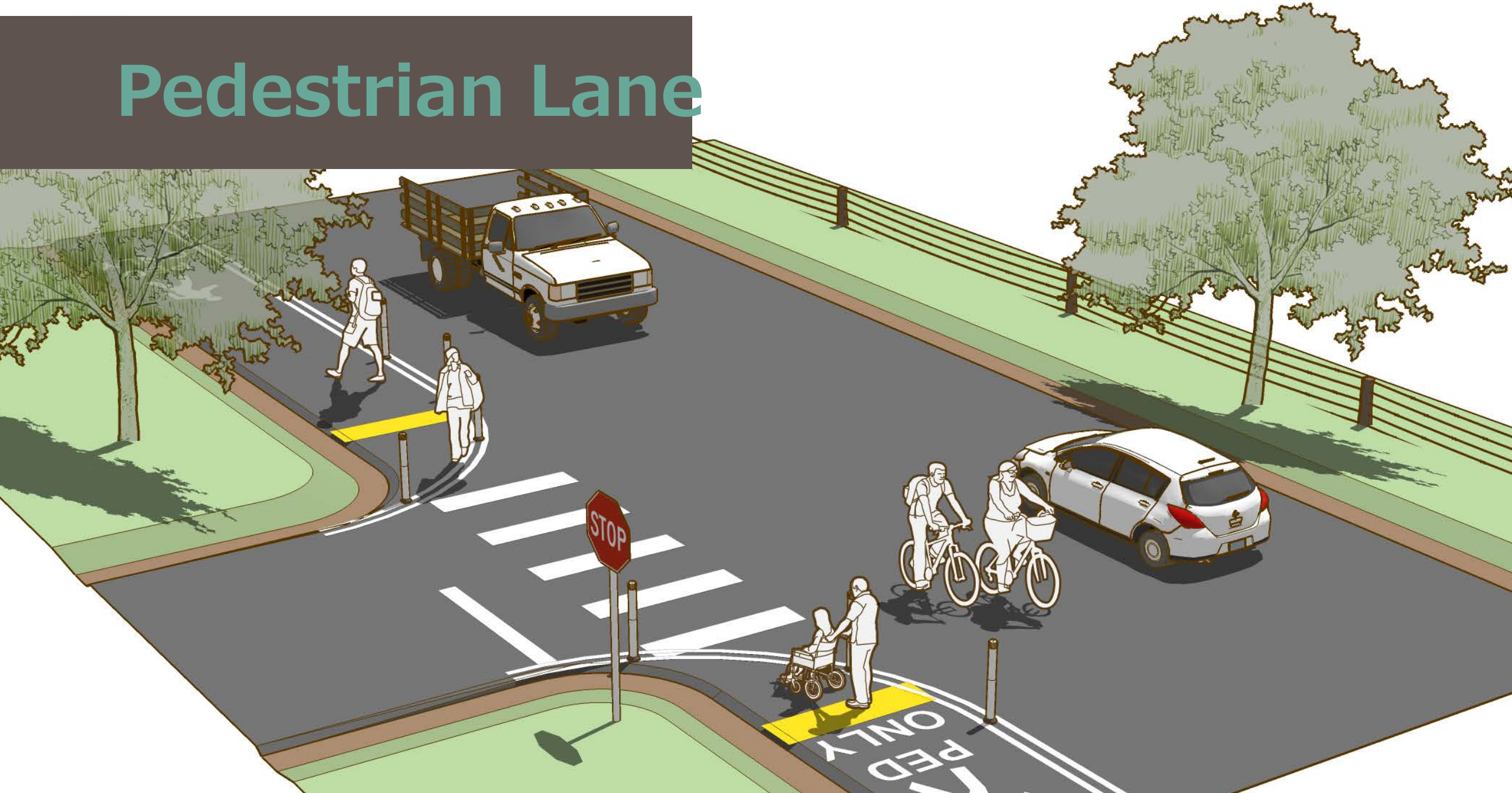
Old Rte. 66 in Wildwood, MO

Population: 35,000

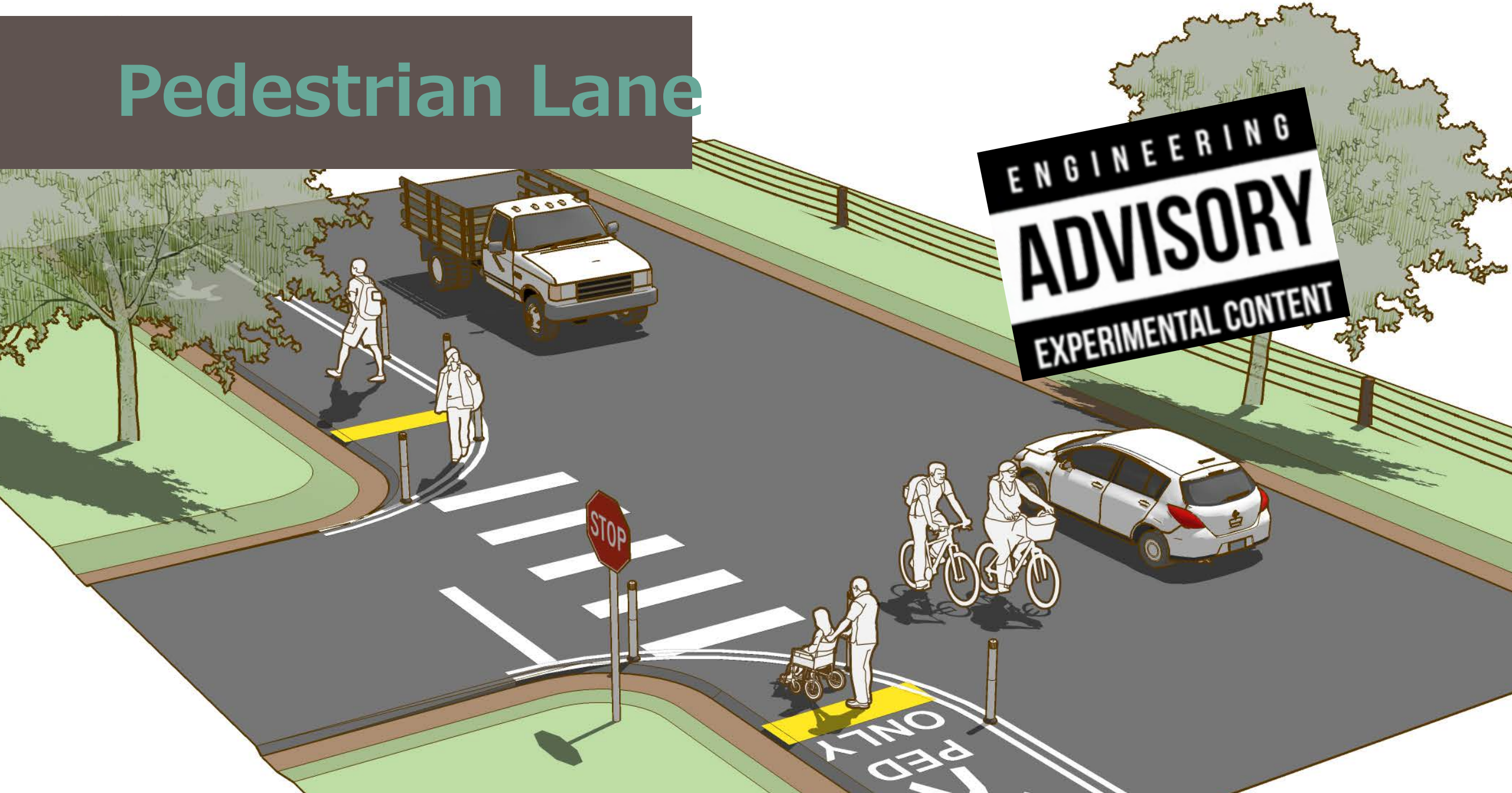
Silver Street
Dover NH
Population: 30,700

Lyndonville, VT
Population: 1,200

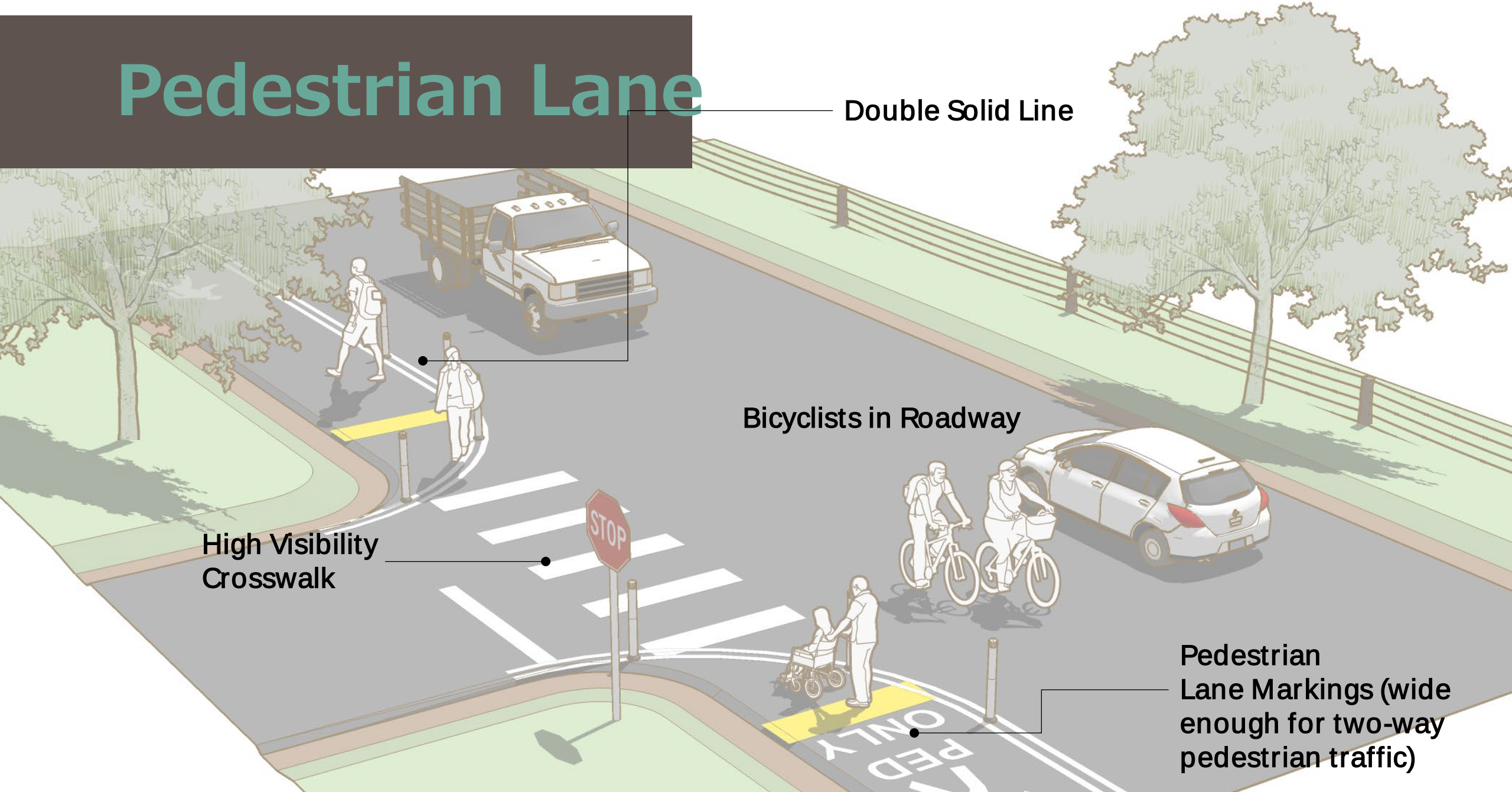
Pedestrian Lane



Pedestrian Lane



Pedestrian Lane



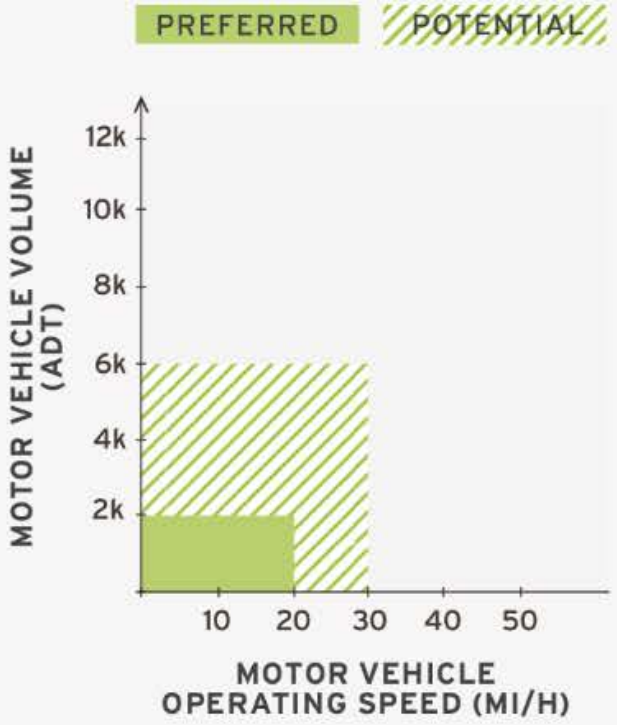
Pedestrian Lane Challenges

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

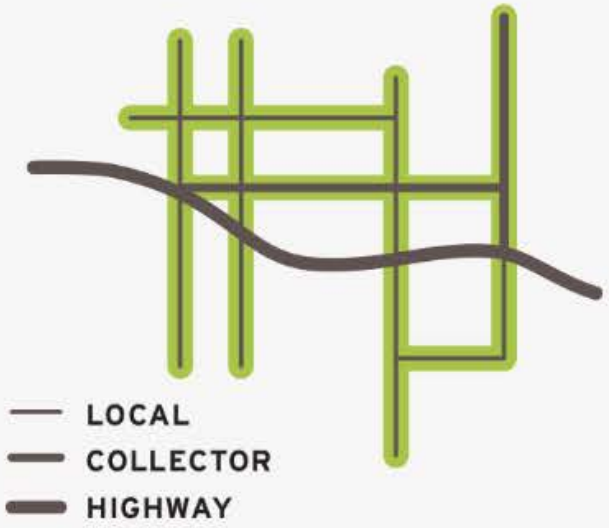
- Detectability by people with vision disabilities
- Undesired use by bicyclists
- Accessible cross-slope requirements
- Maintenance strategies, such as sweeping and snow removal

Pedestrian Lane/Paved Shoulder

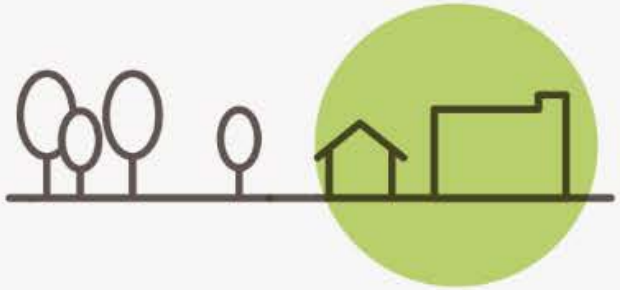
Traffic



Network



Land Use



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.

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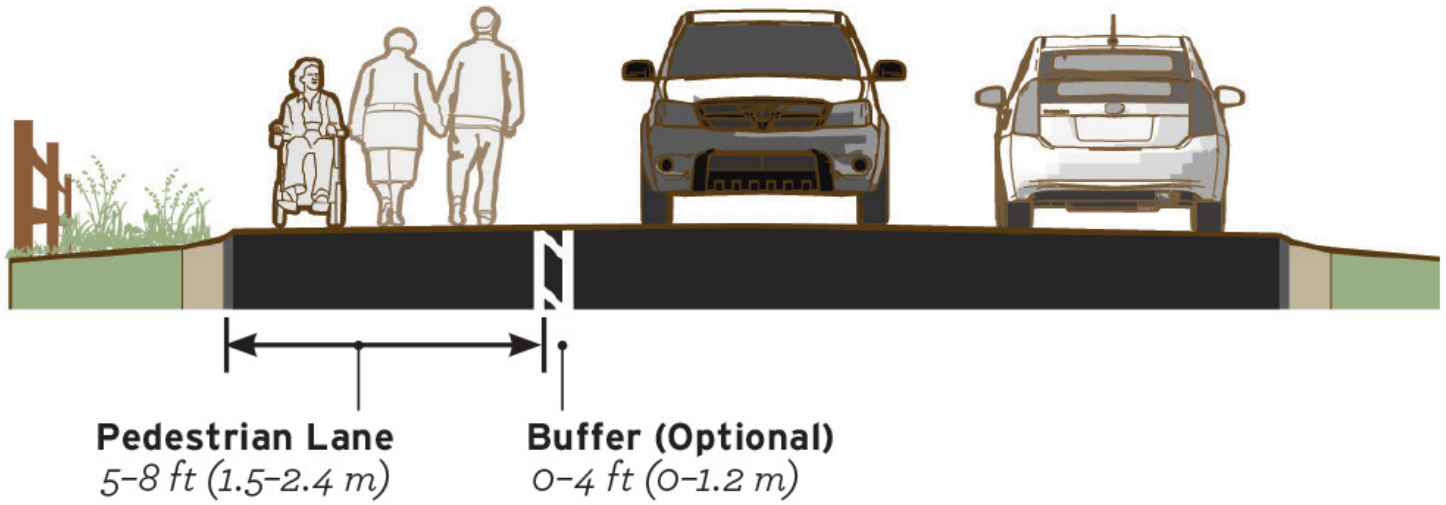
Pedestrian Lane – Geometric Design



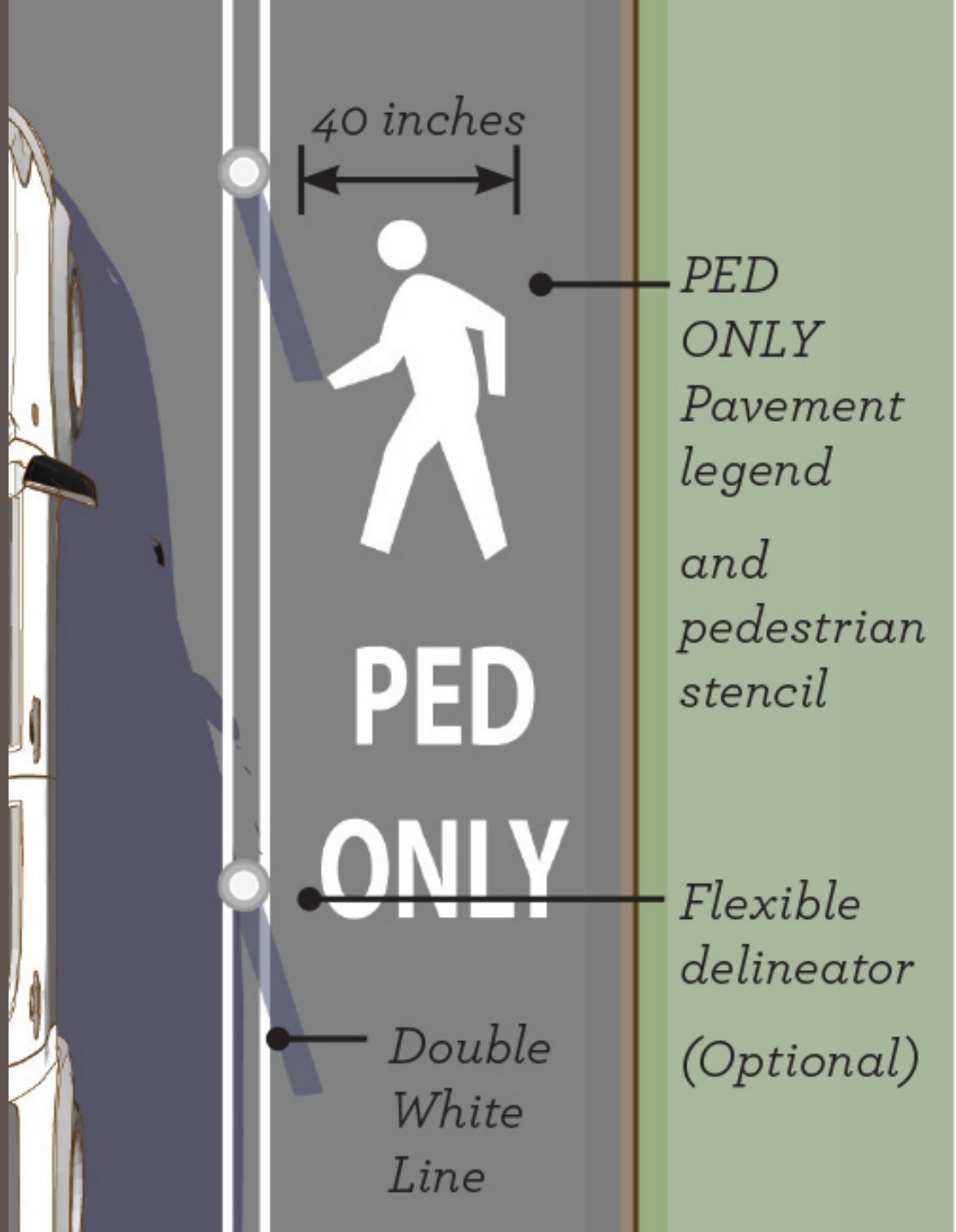
Disclaimer:

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



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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.

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Detroit, OR

Population: 200

Montpelier, VT
Population: 7,700

Waco, TX

Population: 130,000

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Physically Separated

(where volumes exceed 10,000 AADT and with higher speeds)

Sidewalk

Shared Use Path

Sidepath

Separated Bike Lanes

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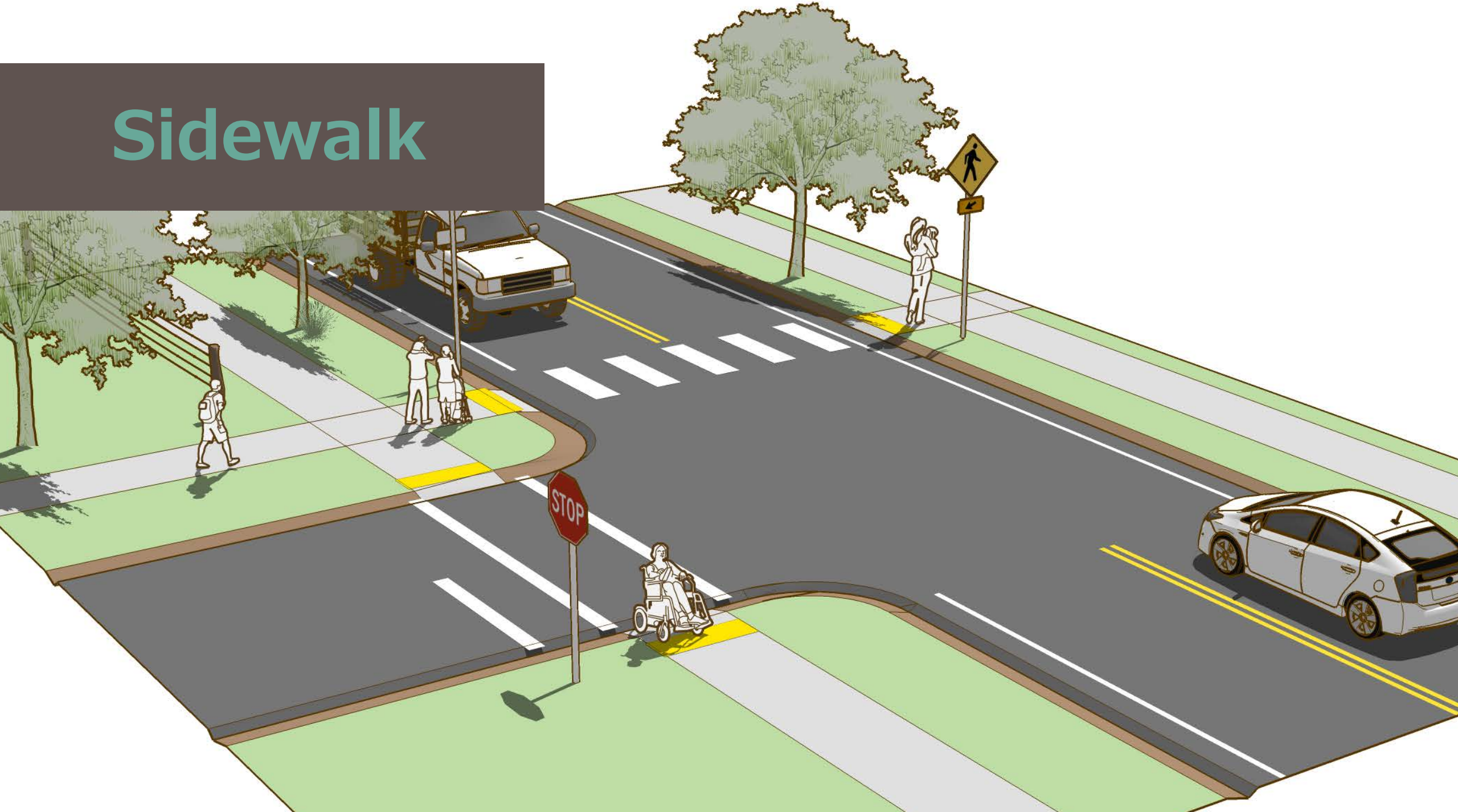
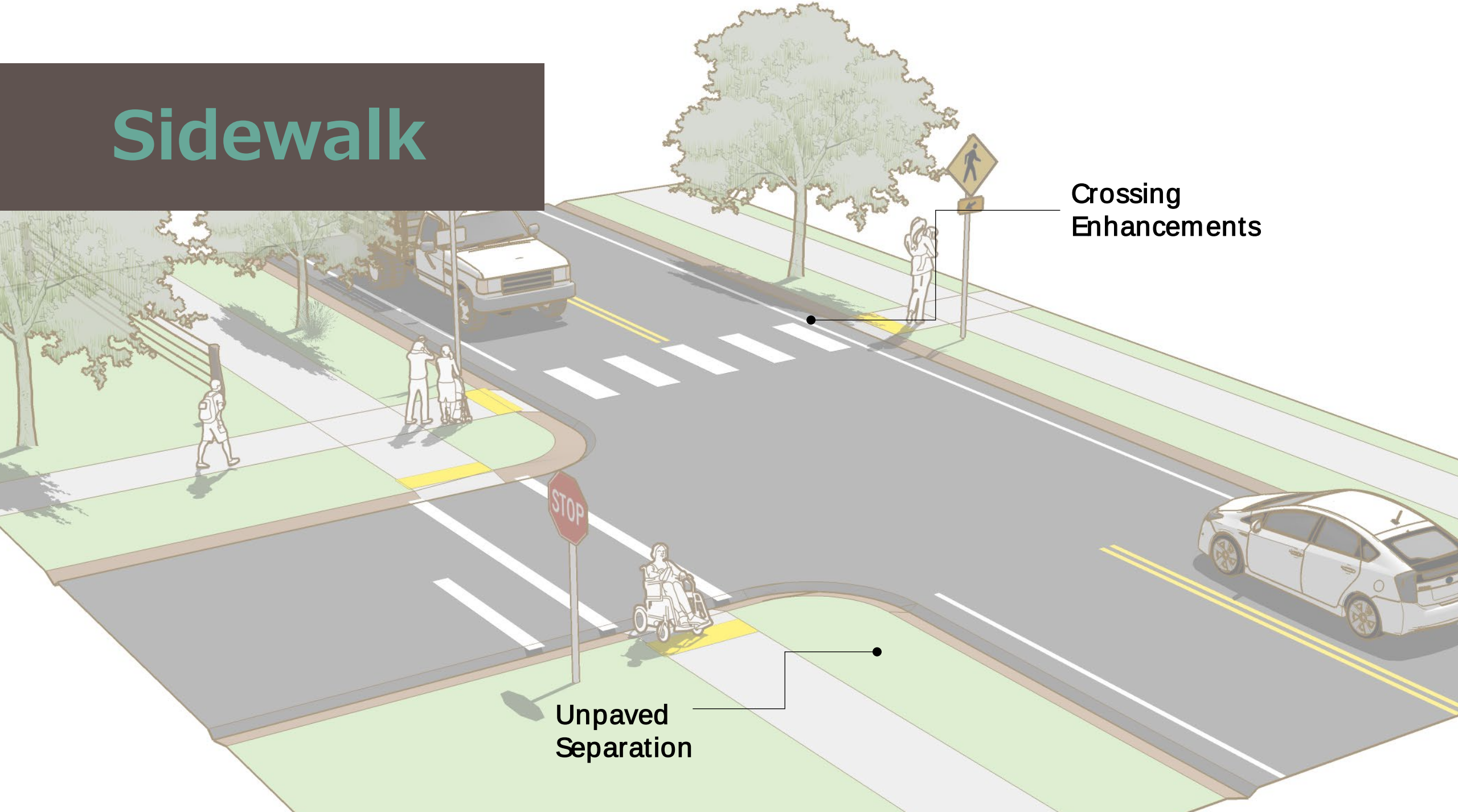
Sidewalk

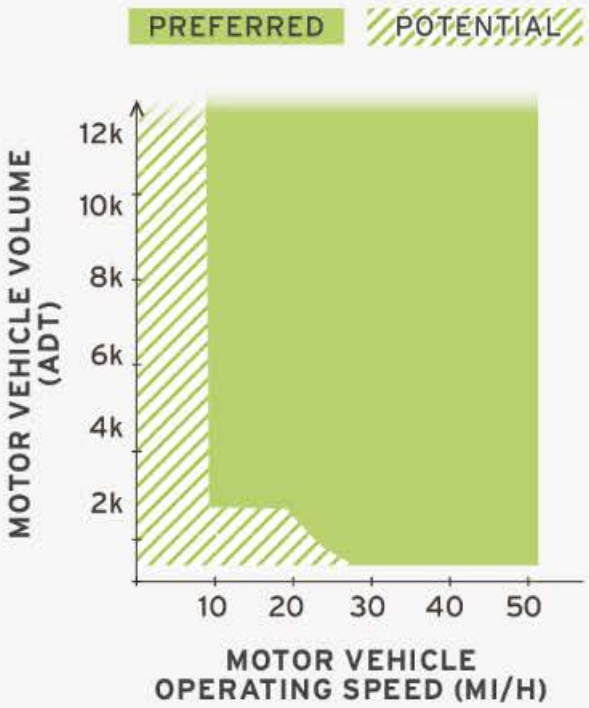


Sidewalk



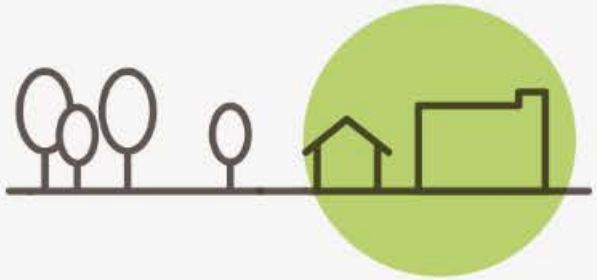
Sidewalk

Traffic



Network

Land Use



Sidewalk – Geometric Design

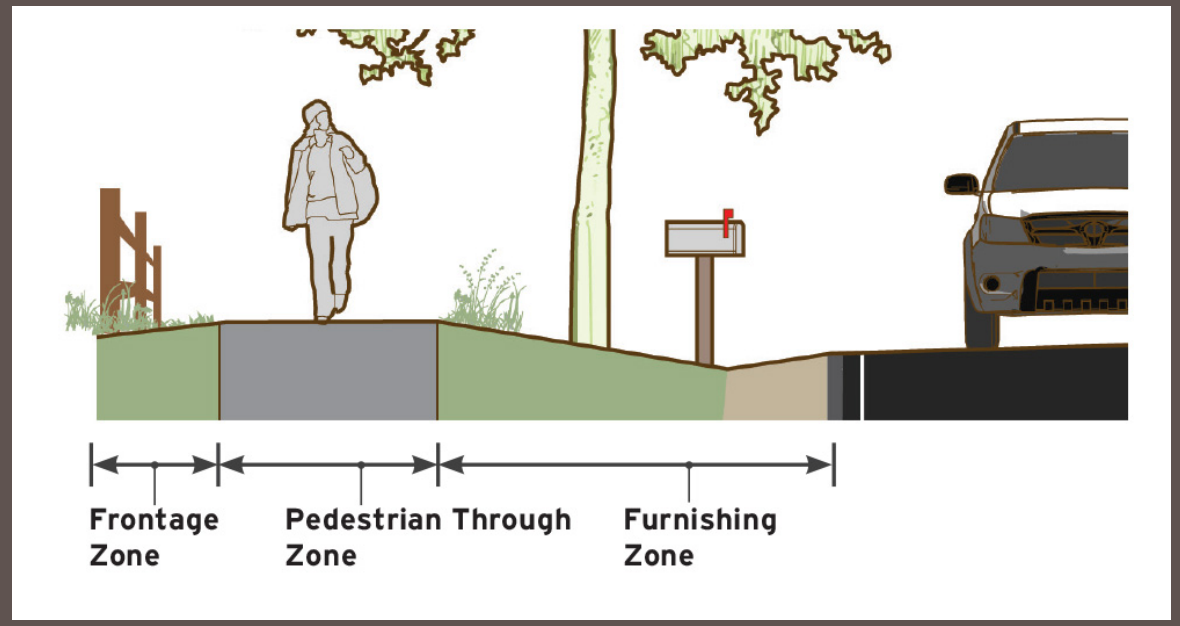
Pedestrian Zone

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.



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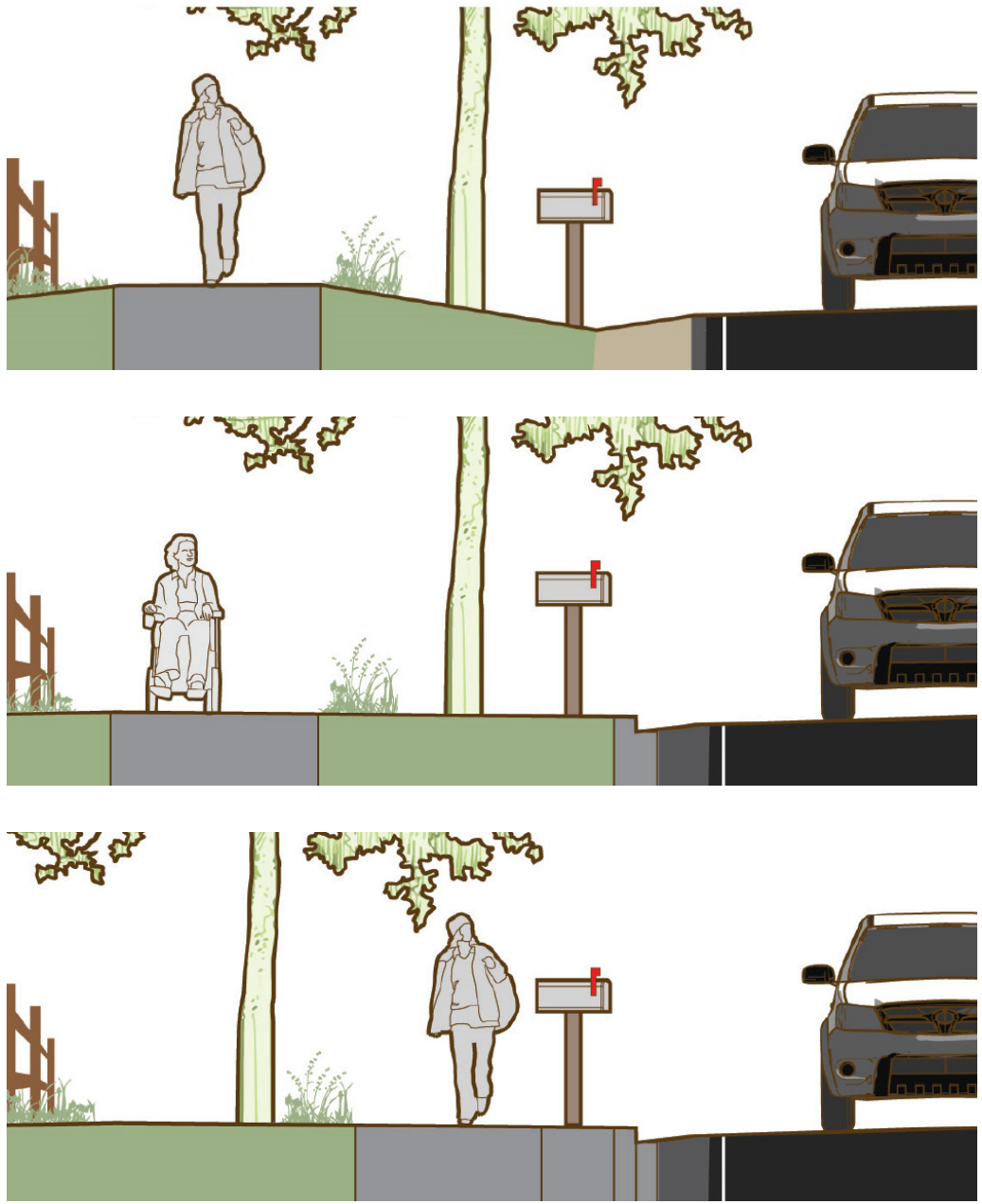
Sidewalk

- 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.



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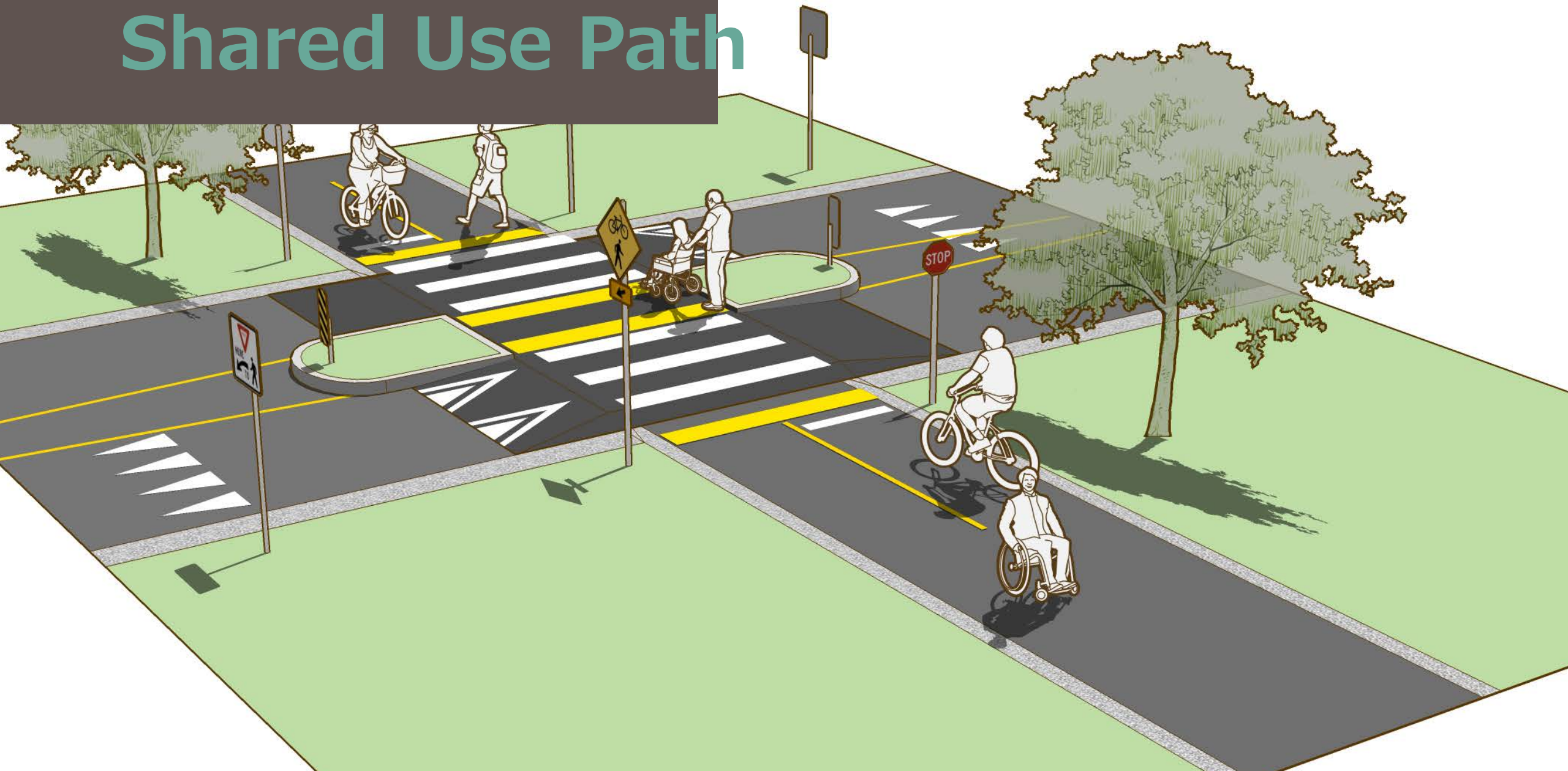
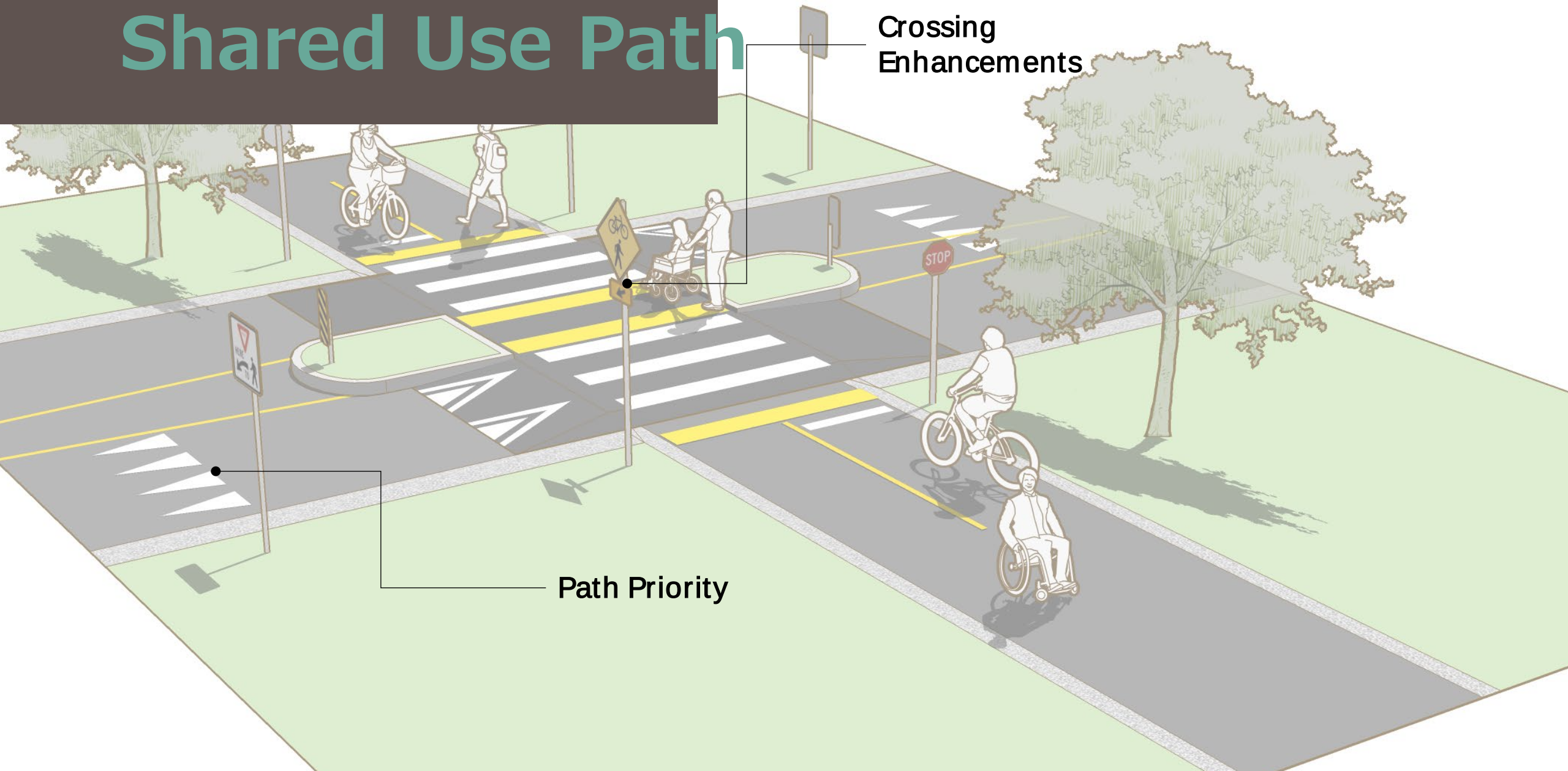
Denmark, SC
Population: 3,400

Shared Use Path

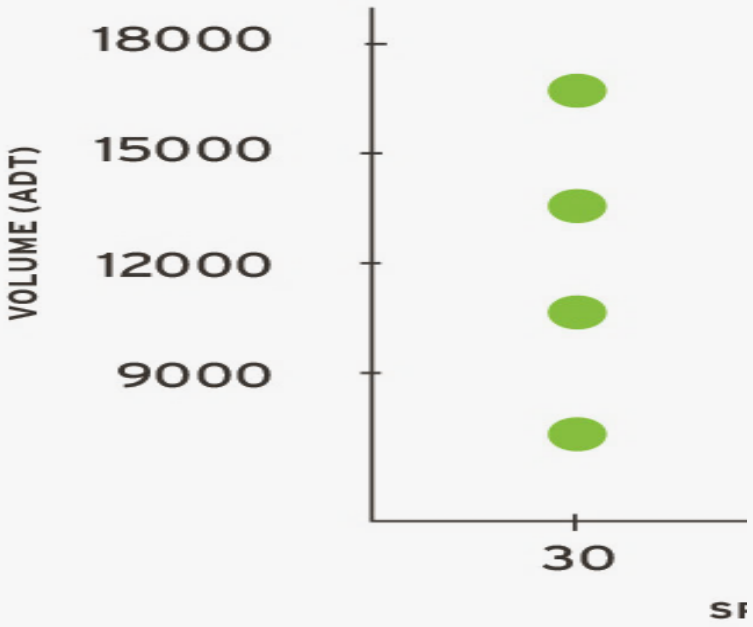


Shared Use Path

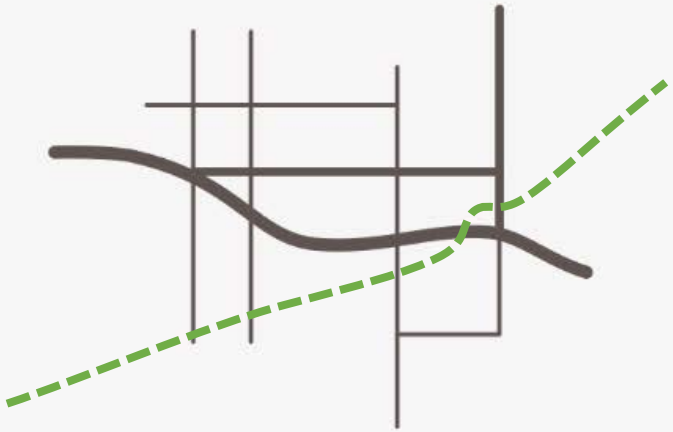


Shared Use Path

Traffic



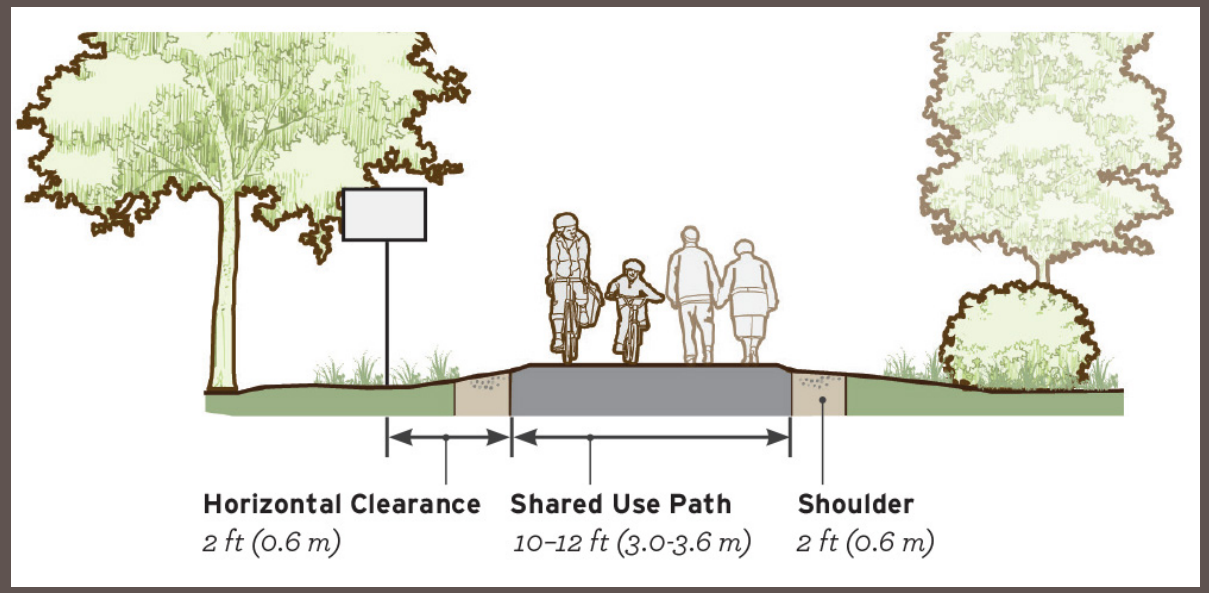
Network



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.



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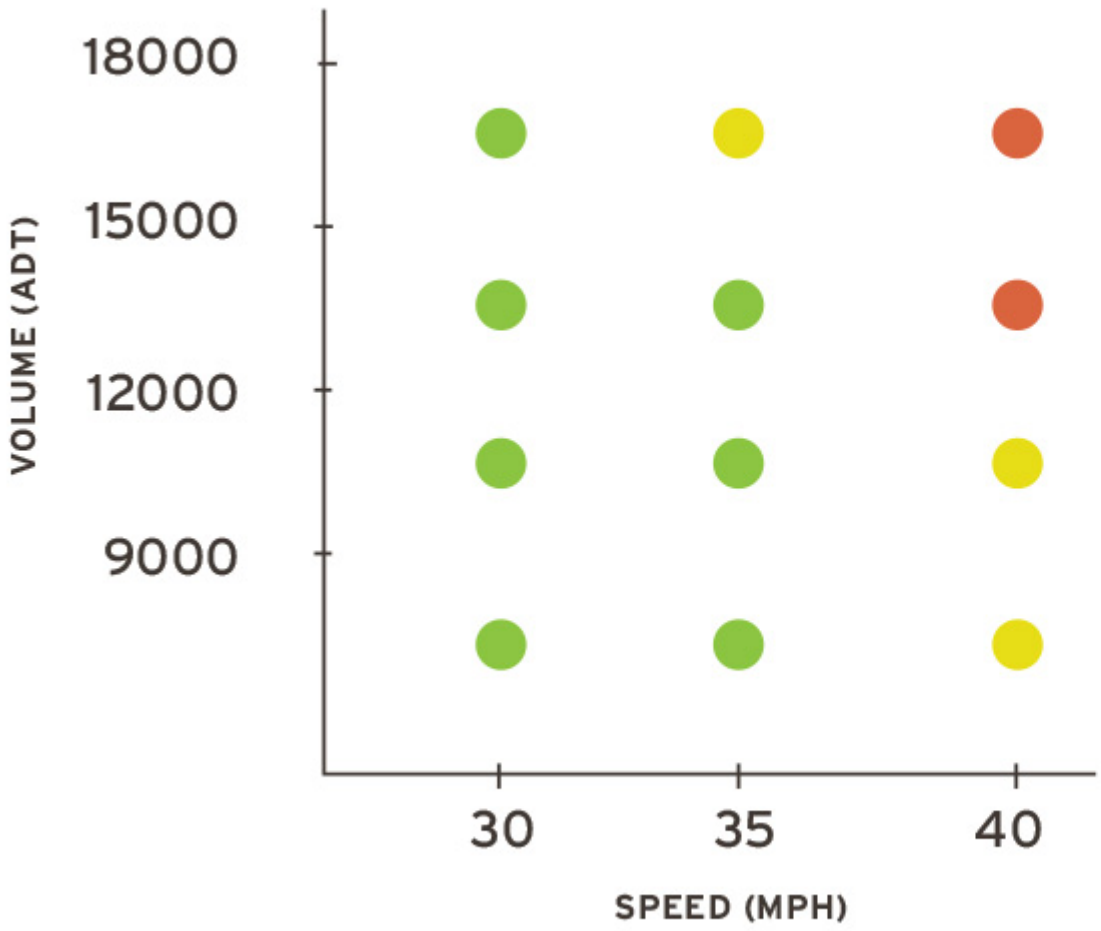
Shared Use Path – Intersections

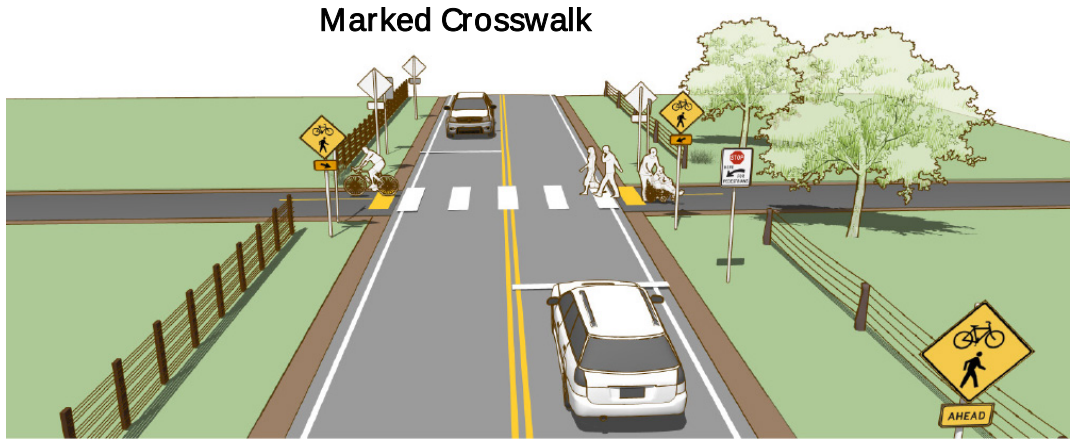


LEGEND

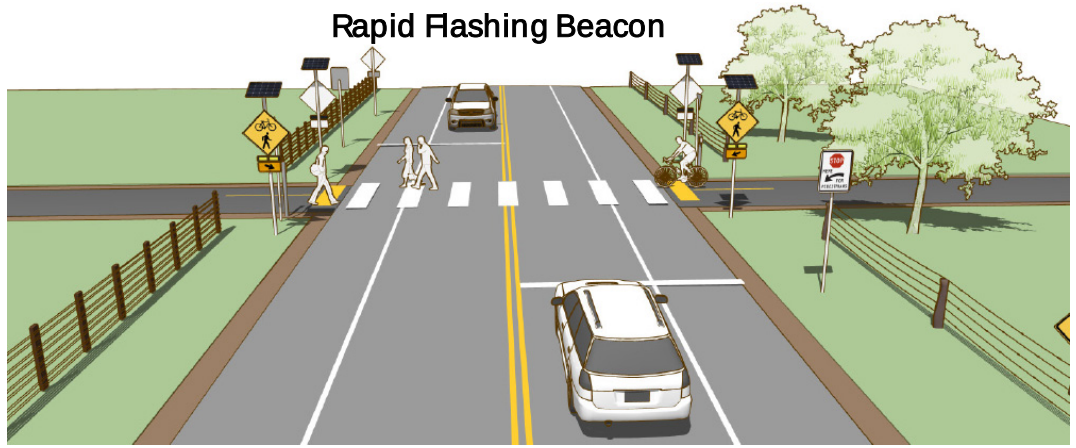
- Candidate for marked crosswalks
- Probable candidate for marked crosswalks. May benefit from additional crossing enhancements.
- Marked crosswalks alone are insufficient. Requires crossing enhancements.

Shared Use Path – Intersections

Marked Crosswalk

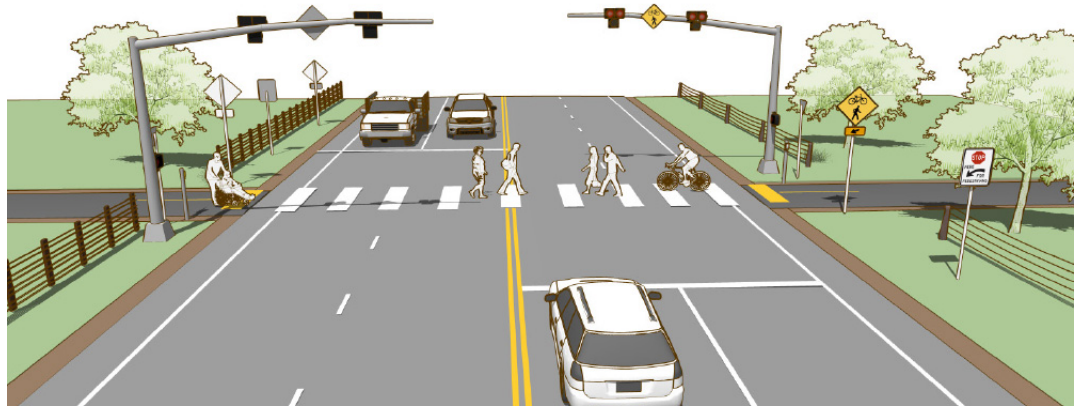


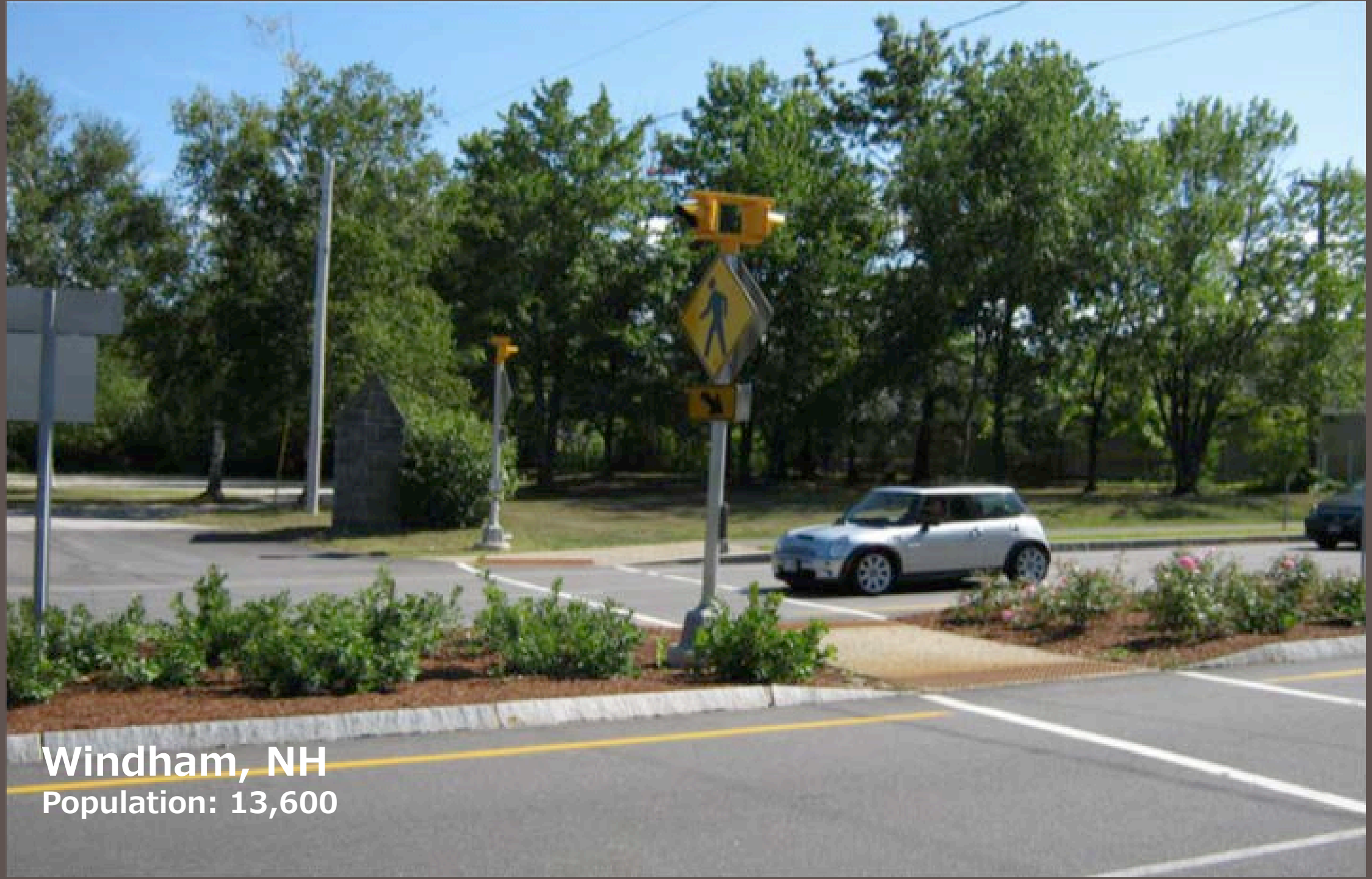
Rapid Flashing Beacon



Median Safety Island

Pedestrian Hybrid Beacon





Windham, NH

Population: 13,600

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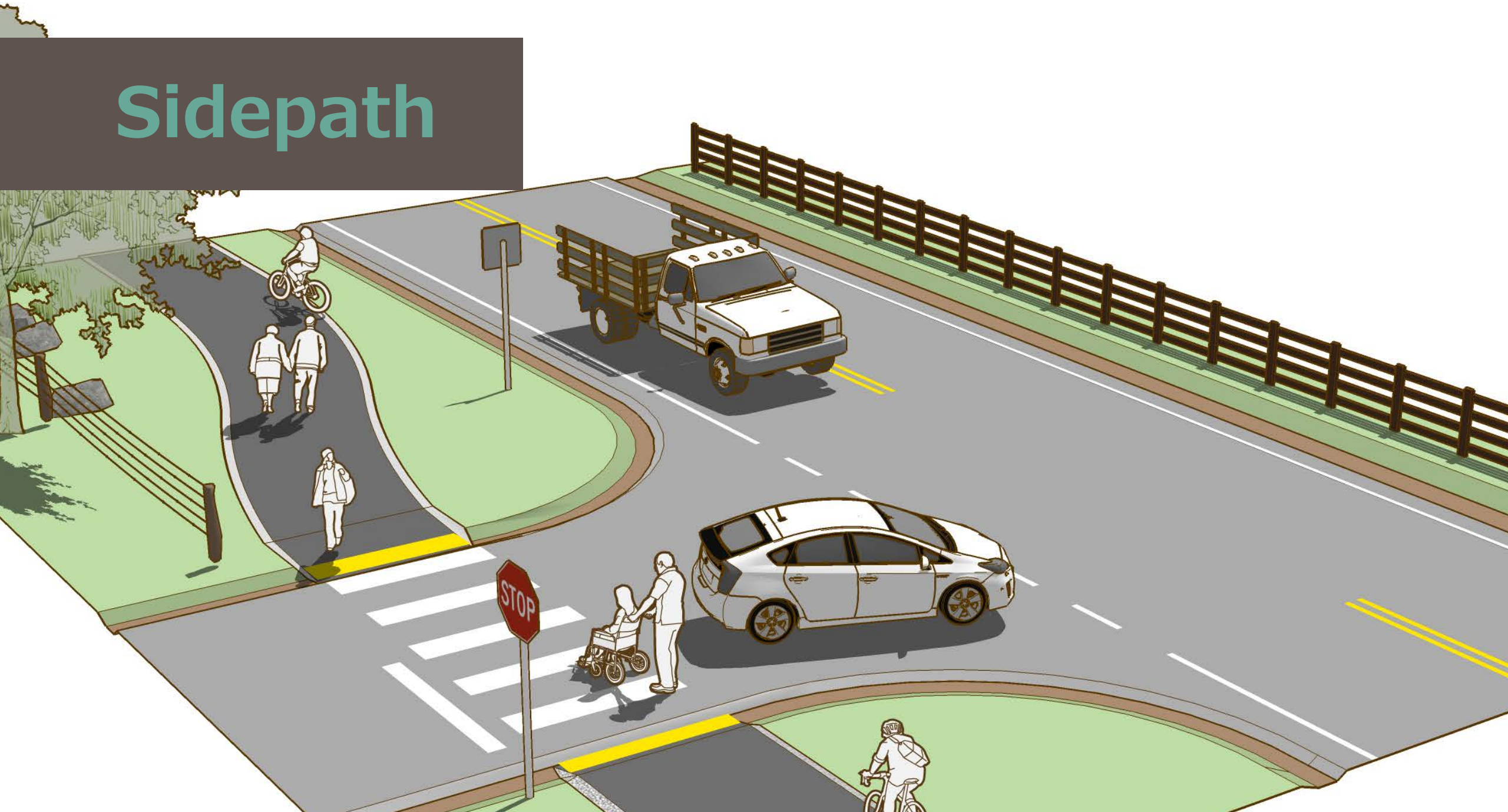
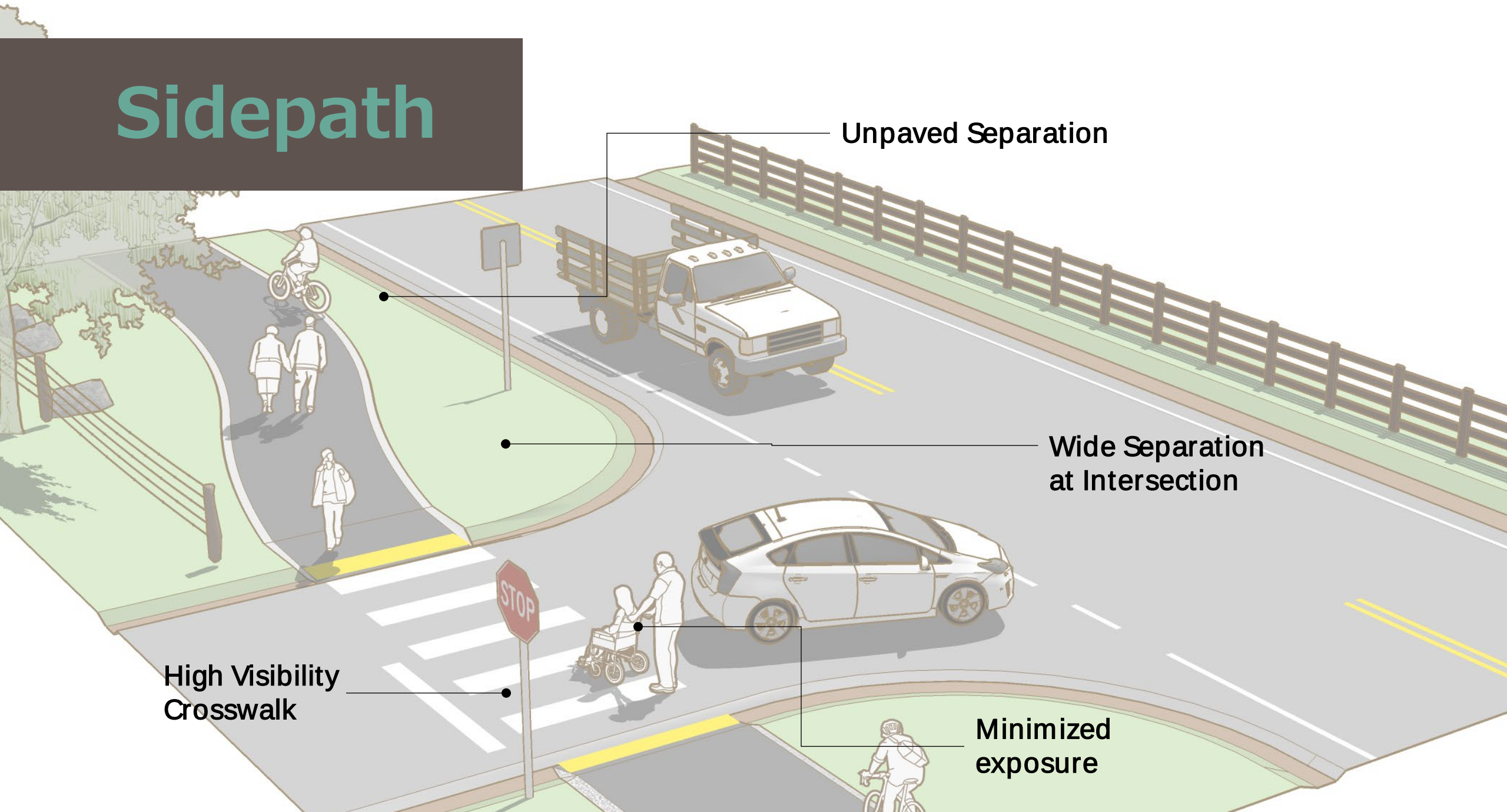
Bentonville, AR
Population: 40,000

Sidepath

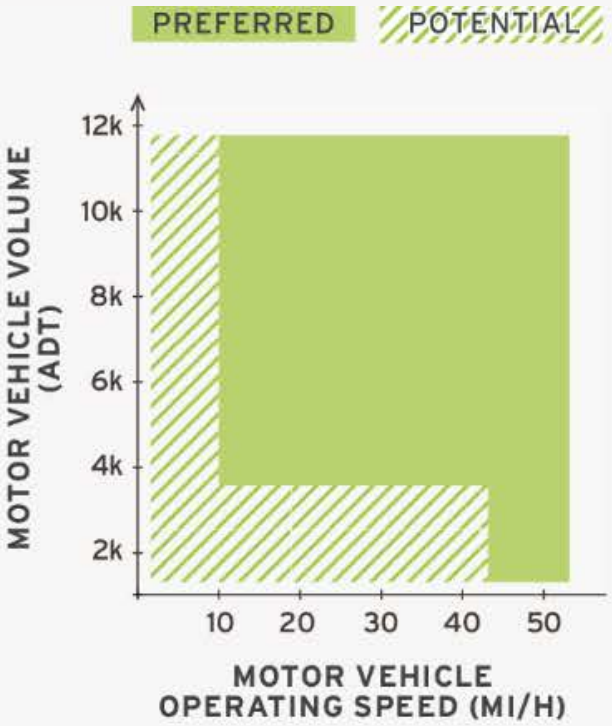


Sidepath


Unpaved Separation
Wide Separation at Intersection
STOP
High Visibility Crosswalk
Minimized exposure

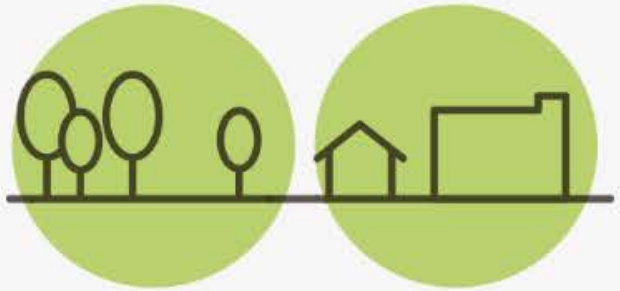
Sidepath

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.

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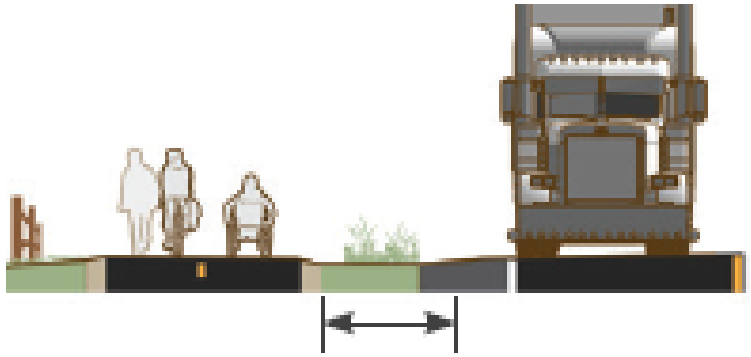
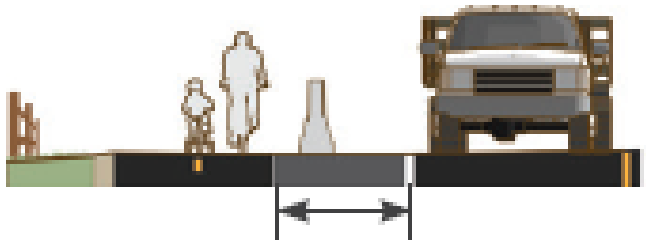
Sidepath – Geometric Design

Physical Barrier

The barrier and end treatments should be crashworthy which may introduce additional complexity if there are frequent driveways and intersections.



5 ft (1.5 m) min



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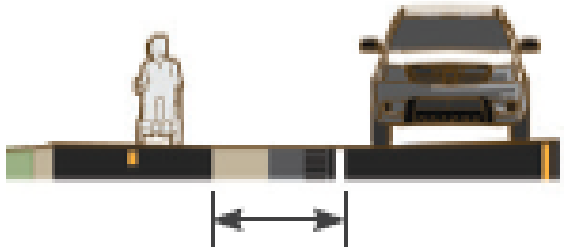

Rumble Strips

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Sidepath – Markings and Signs

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.

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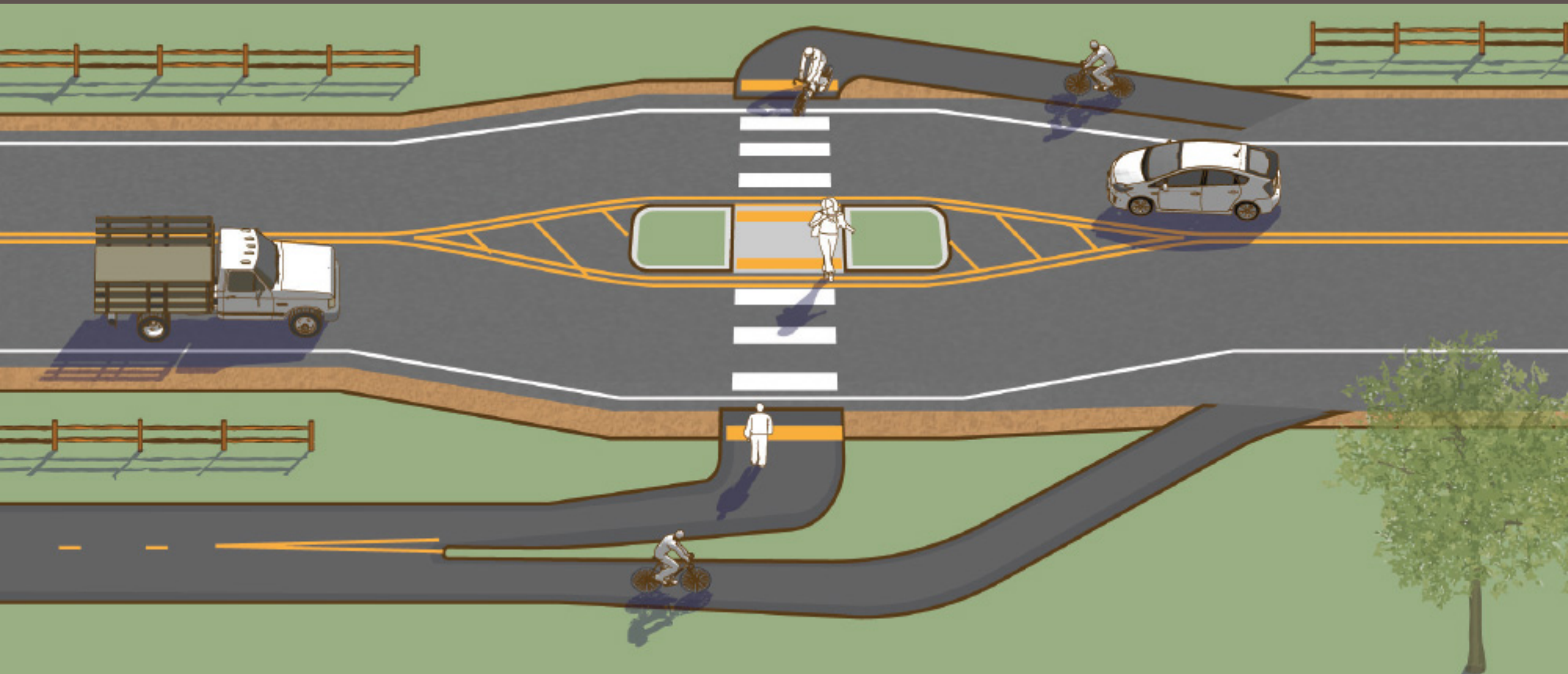
Londonderry, NH

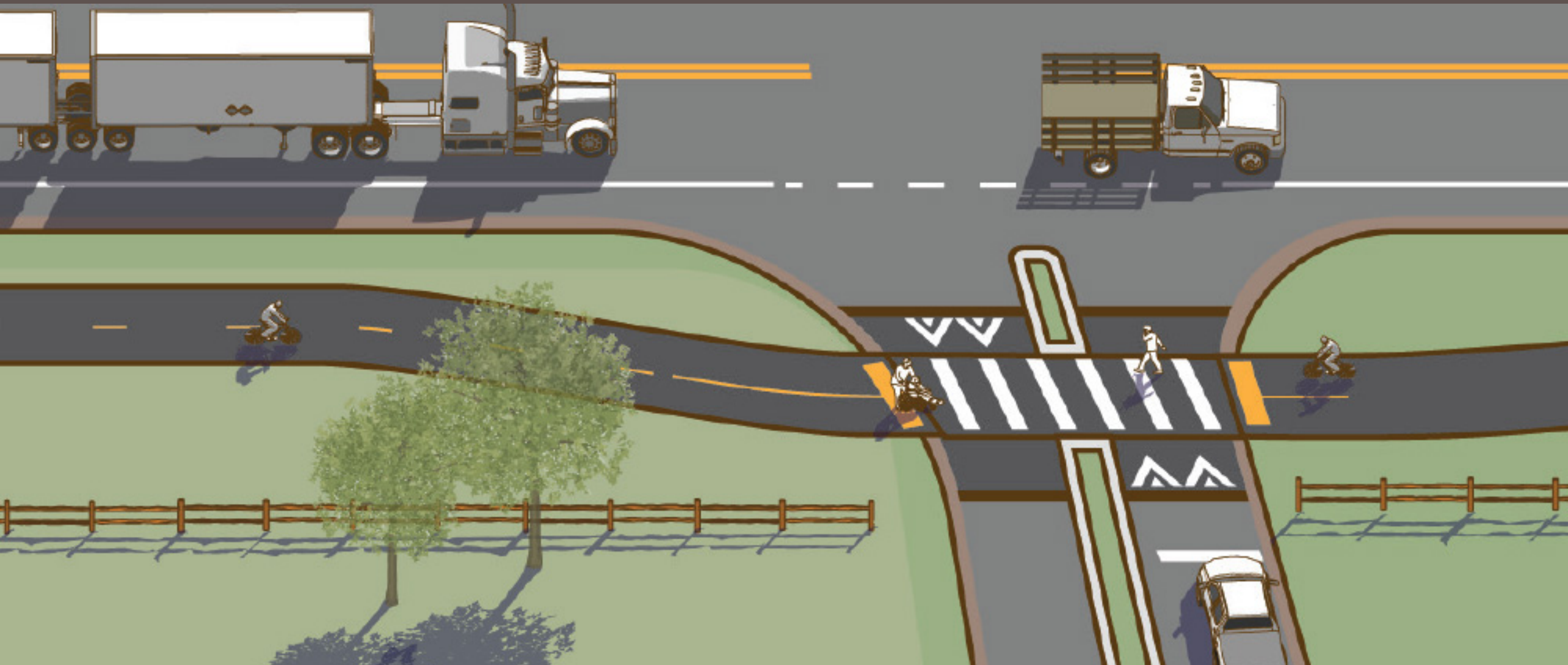
Population: 24,100

Hanover, NH
Population: 11,260

Sidepath - Transitions



Sidepath - Intersections

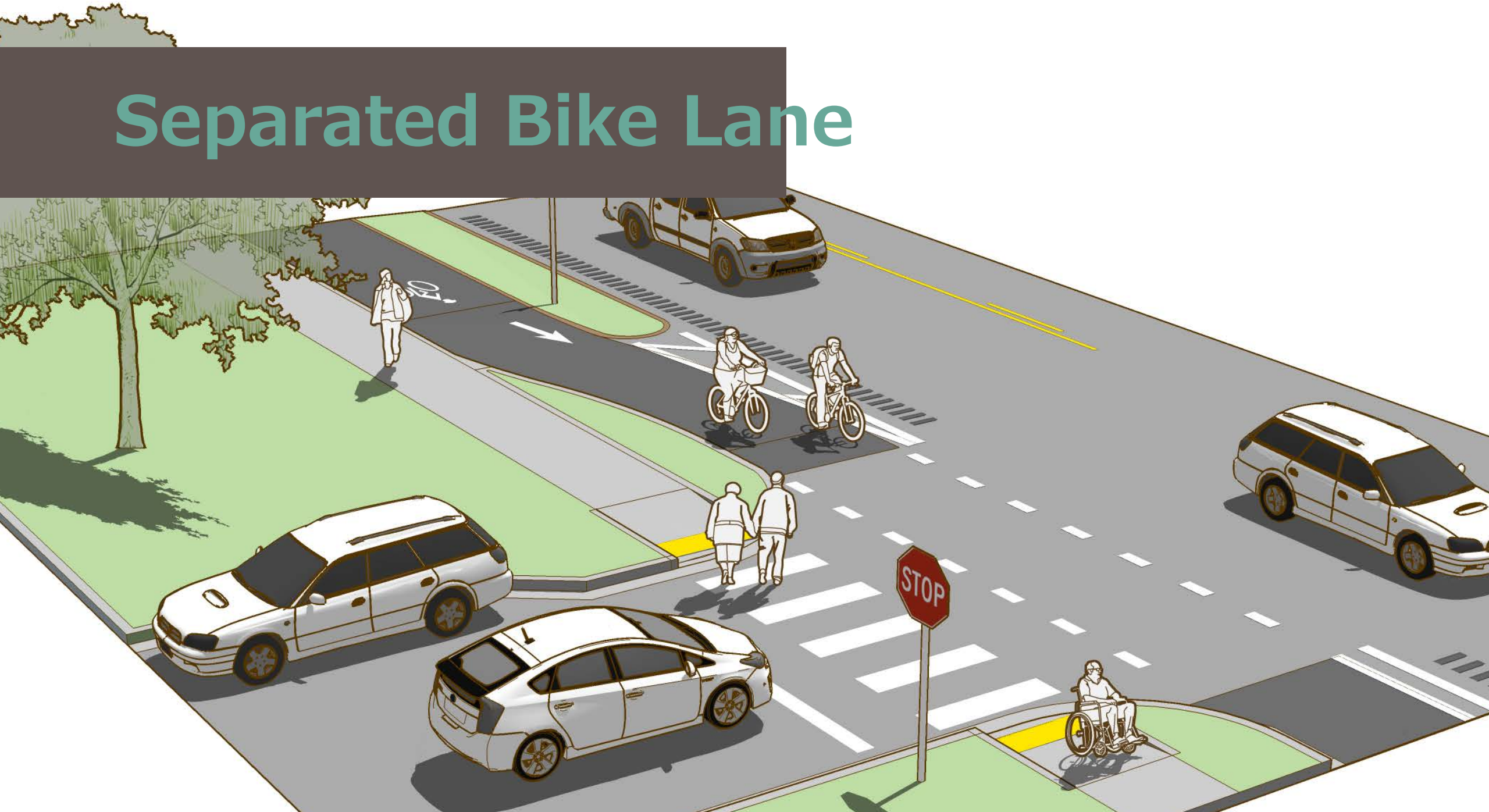


Sidepath
Laporte, CO
Population: 2,600
Google Earth
© 2016 Google

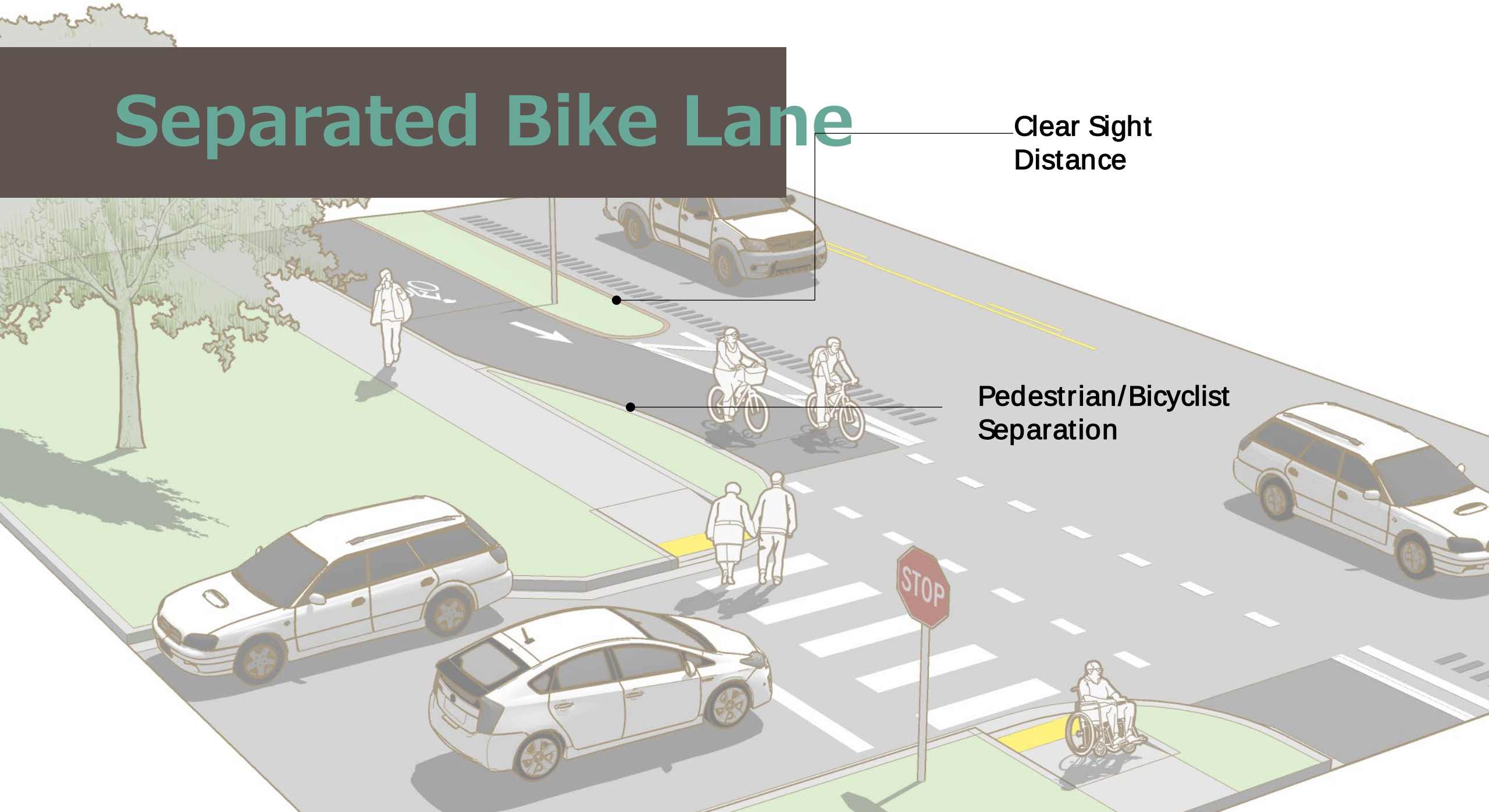
Sidepath
Laporte, CO
Population: 2,600
Google Earth
© 2016 Google

Laporte, CO
Population: 2,600
Google Earth
© 2017 Google

Separated Bike Lane

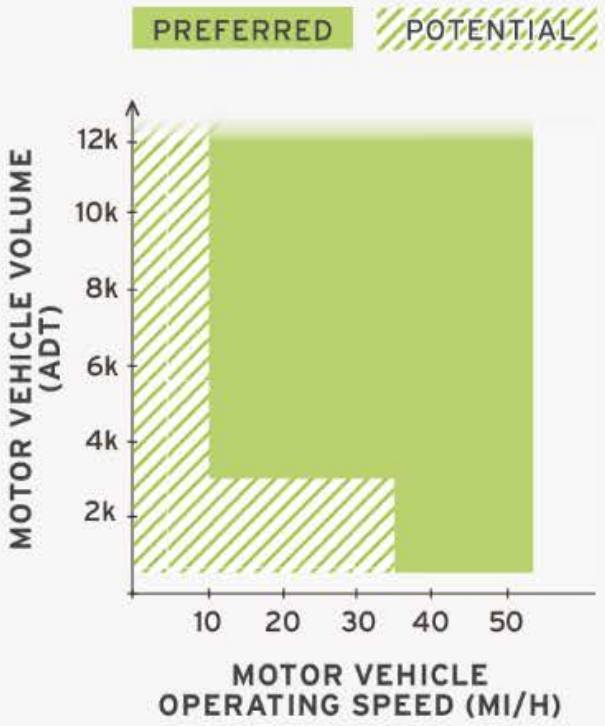


Separated Bike Lane



Separated Bike Lane

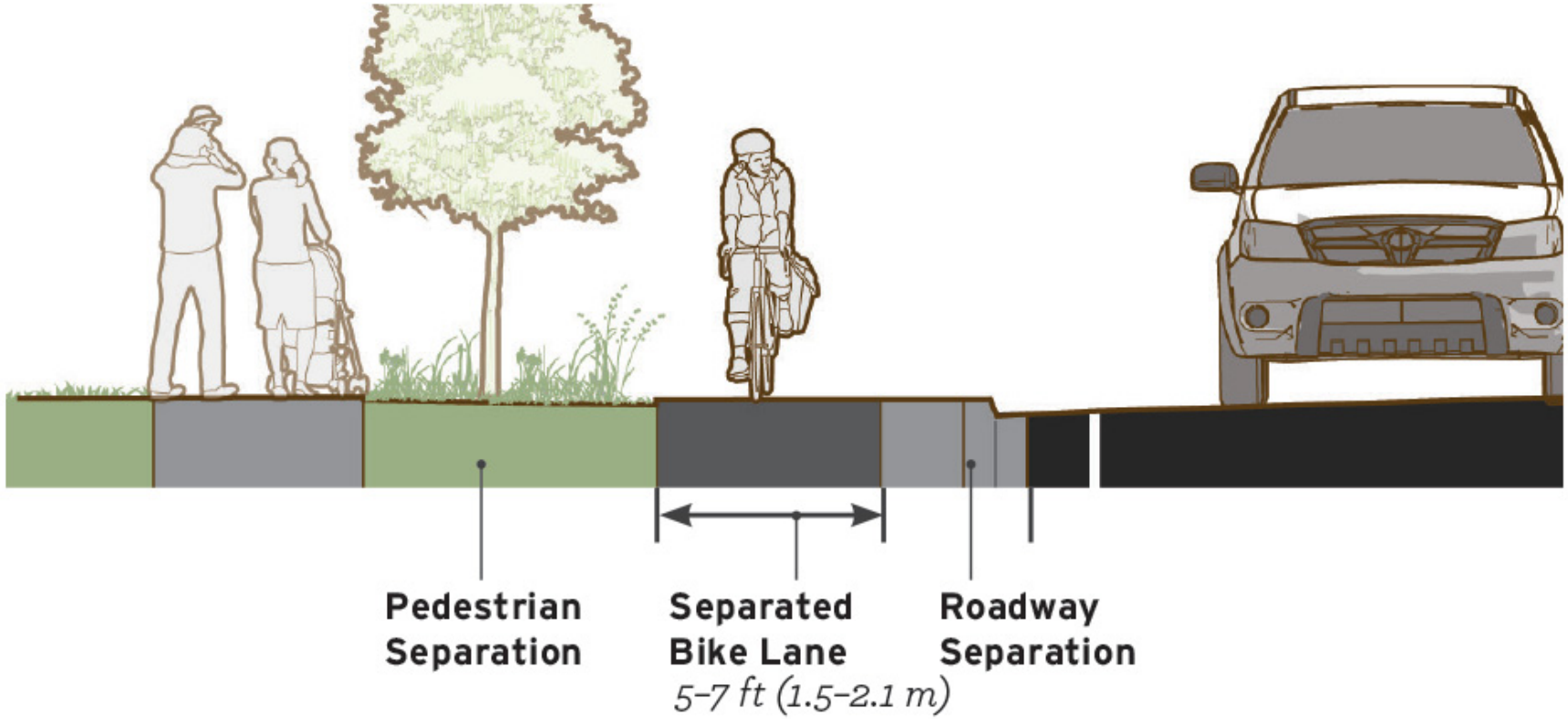
Traffic



Network

Land Use

Shared Use Path – Geometric Design



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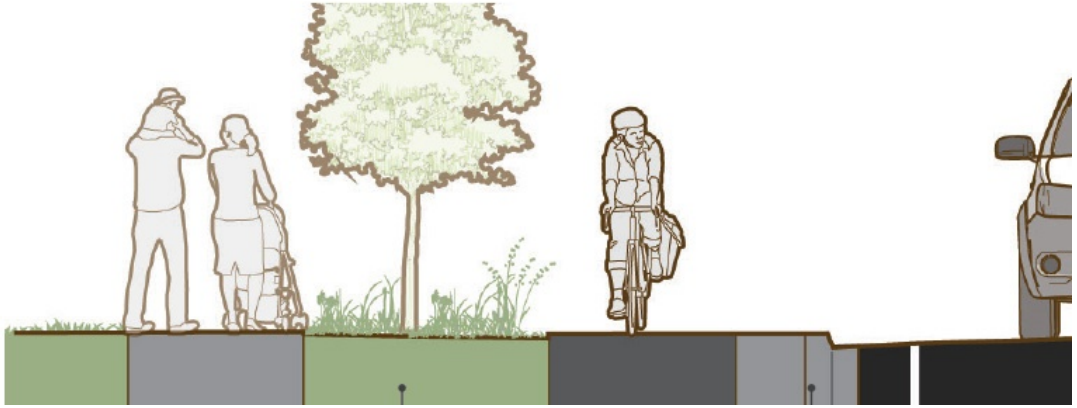

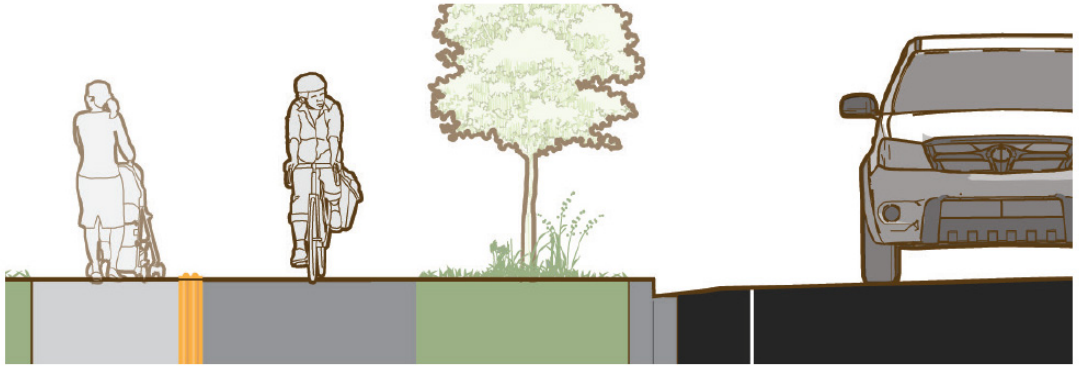

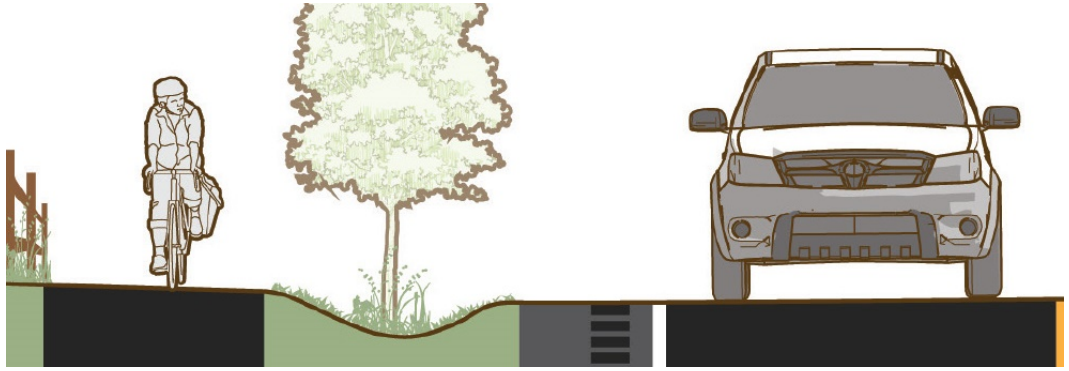

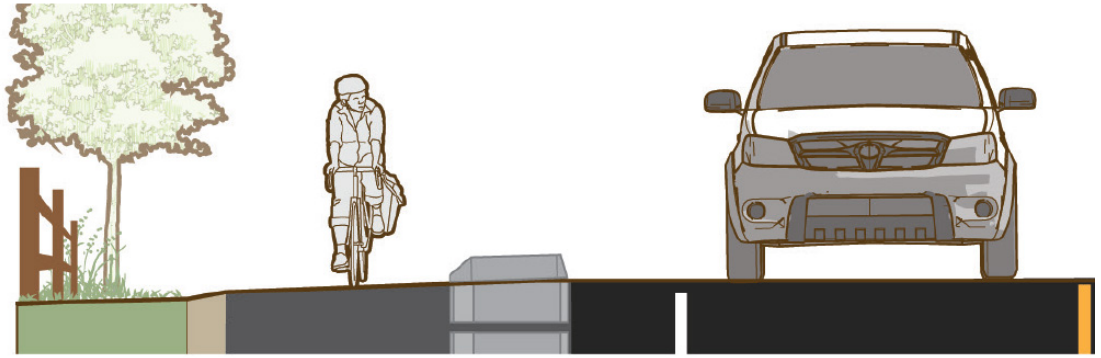

Separated Bike Lane – Intersections

Bend In

- Position bicyclists closer to turning vehicles to increase visibility prior to the turn.

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Separated Bike Lane – Intersections

Bend Out

- Provide space for right-turning vehicles to yield to bicyclists.

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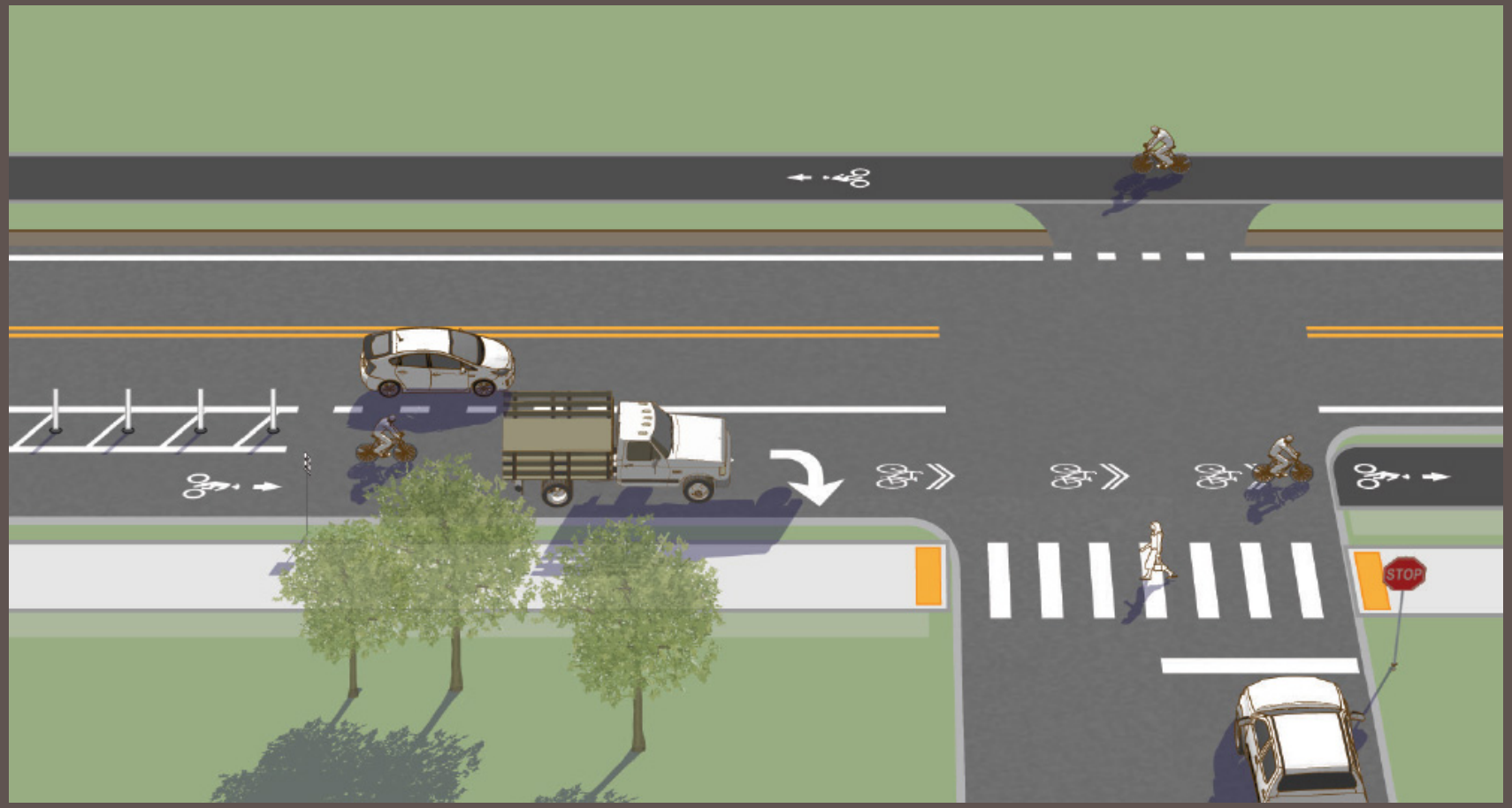
Separated Bike Lane – Intersections

Mixing Zone

- Shared turn lane with motor vehicles and bicyclists. Shared turn lane with motor vehicles and bicyclists.



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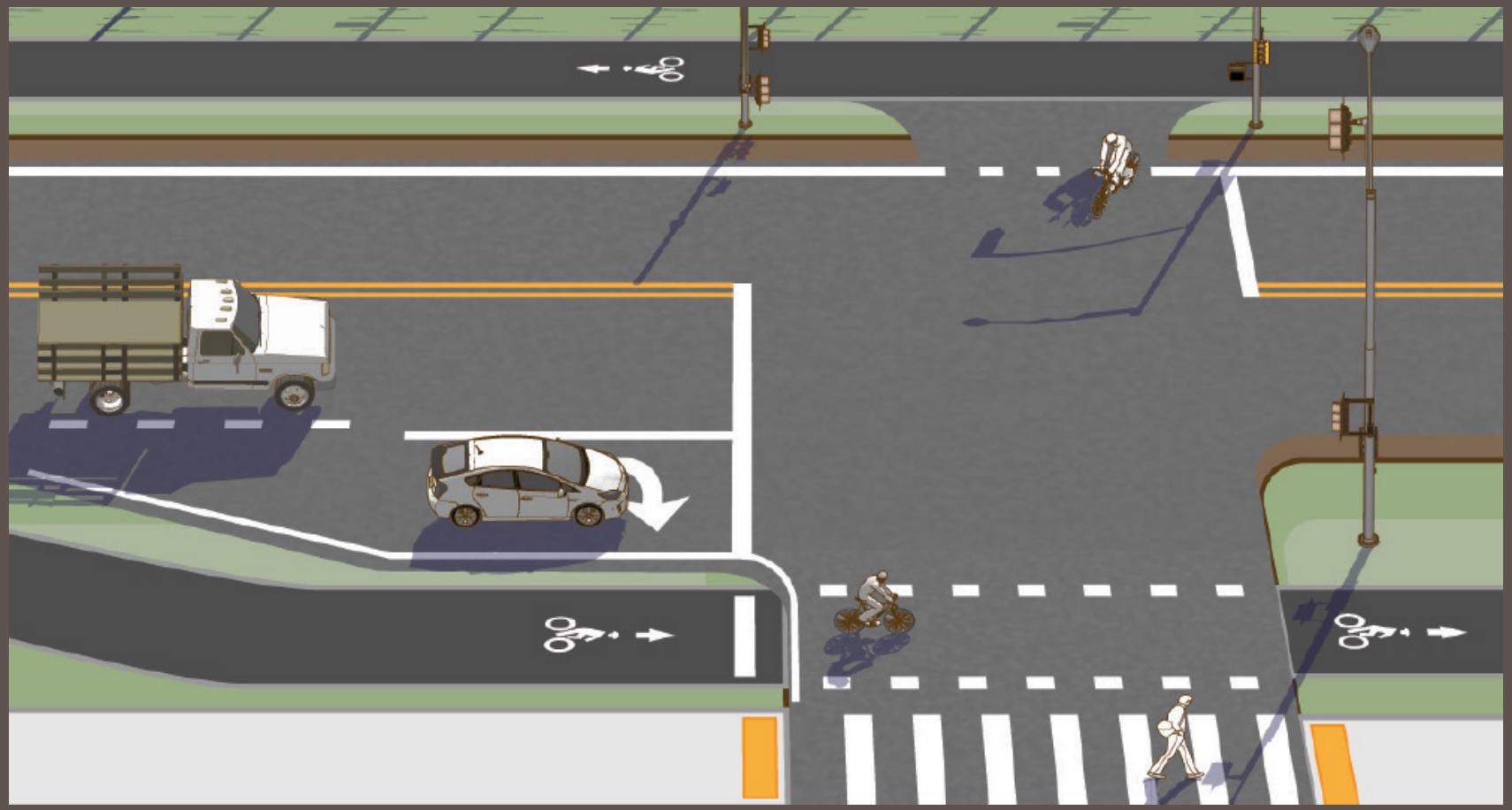
Separated Bike Lane – Intersections

Protected Signal Phase

- Separate conflicting movements in time.



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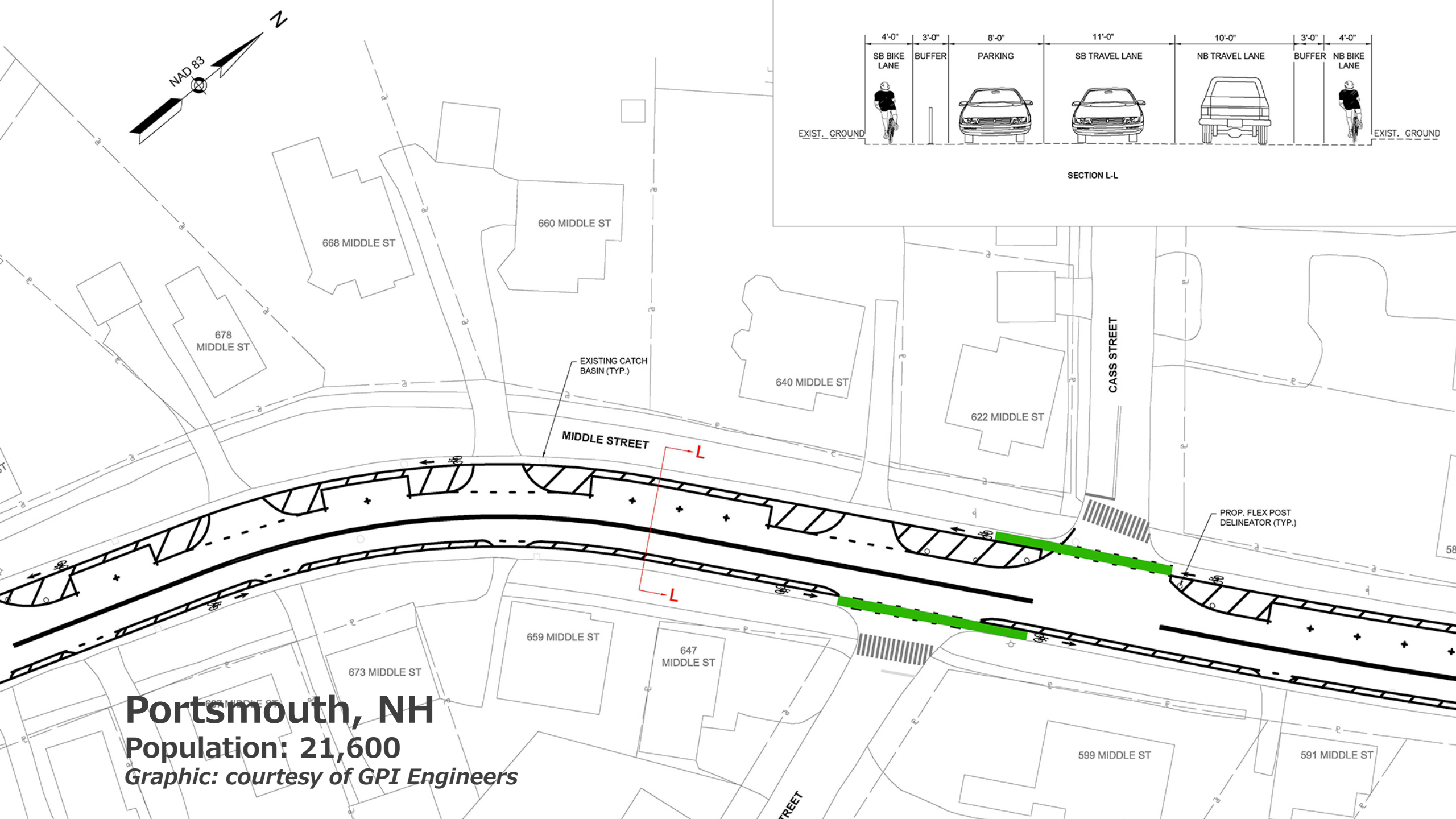
Jackson Hole, WY
Population: 9,600

Russelville, AR
Population: 28,500



Portsmouth, NH

Population: 21,600

Graphic: courtesy of GPI Engineers

Network Opportunities

Gaps, Focus Areas and Network Development Opportunities

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Network Opportunities

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

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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.

Opportunity for activity

Design for children

Centers of community

Multimodal network

School location

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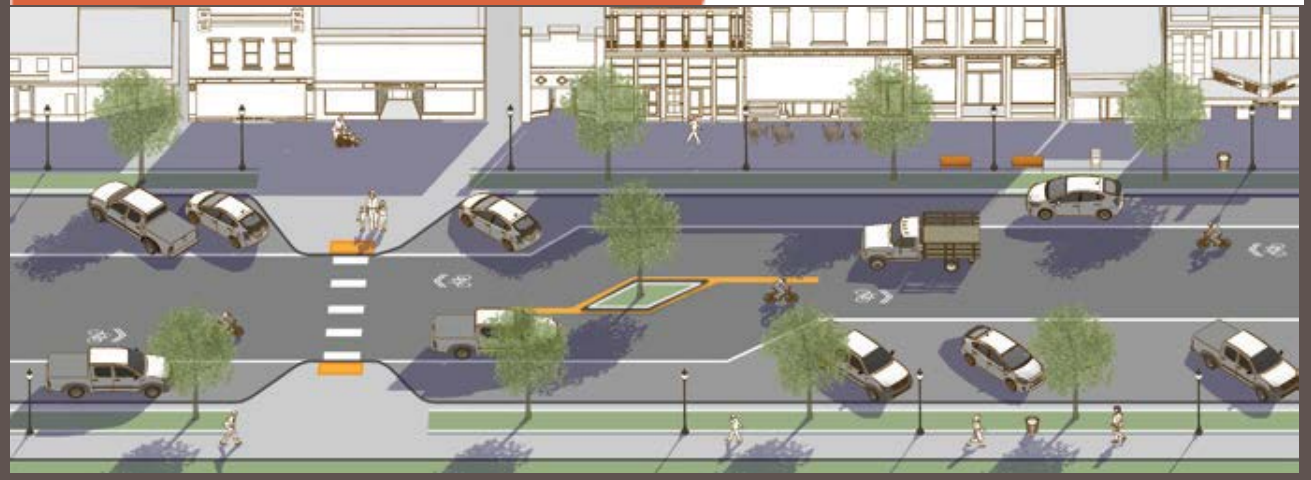
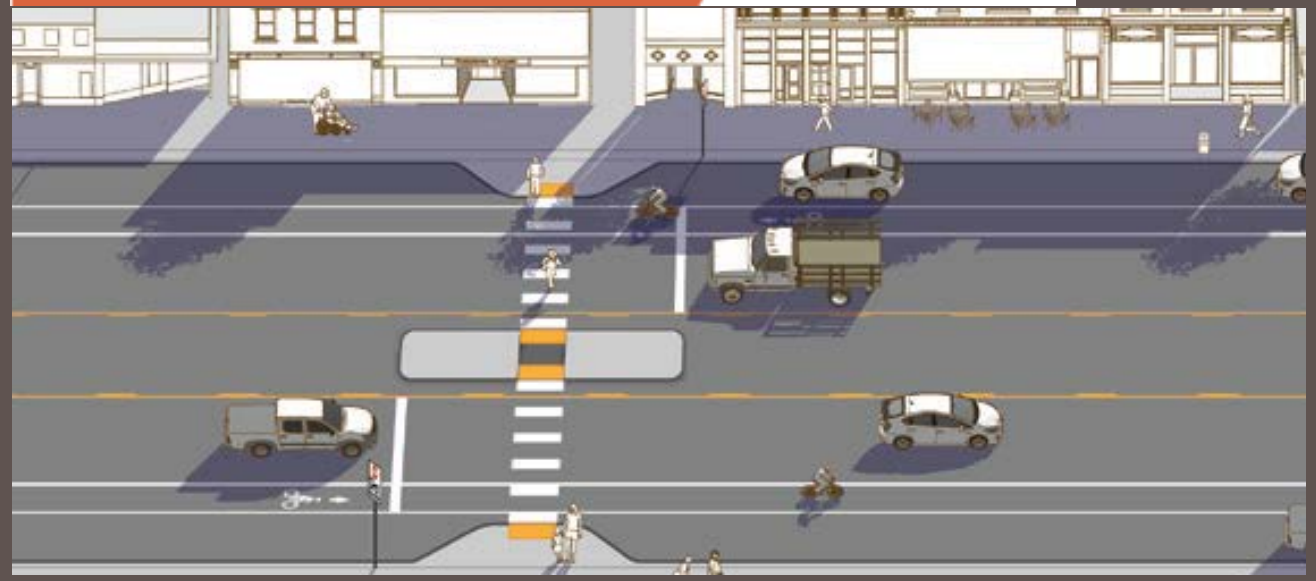
Multimodal Main Streets

TWO-LANE STREET SCENARIOS



FOUR-LANE STREET SCENARIOS



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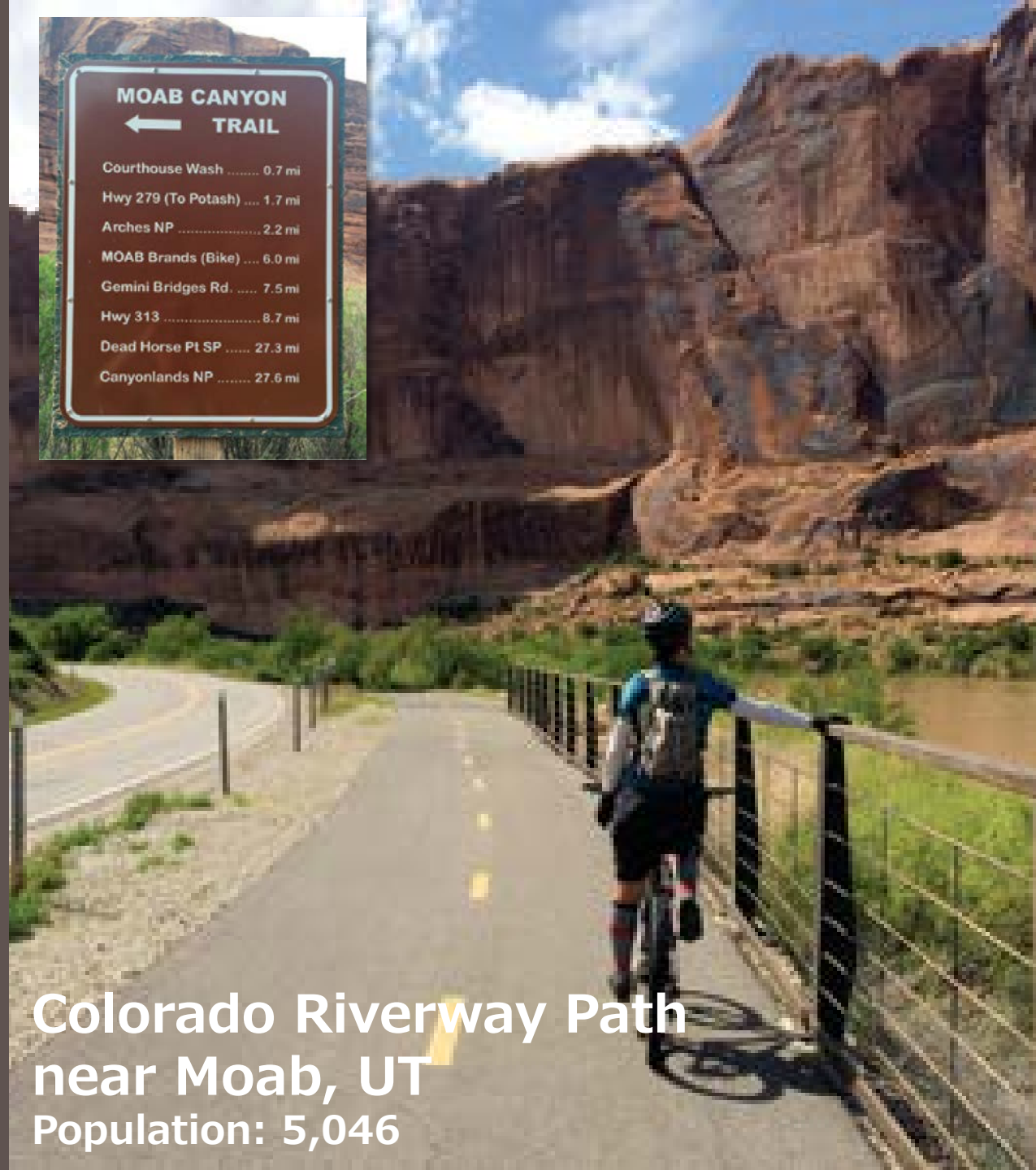
Access to Public Lands

- 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

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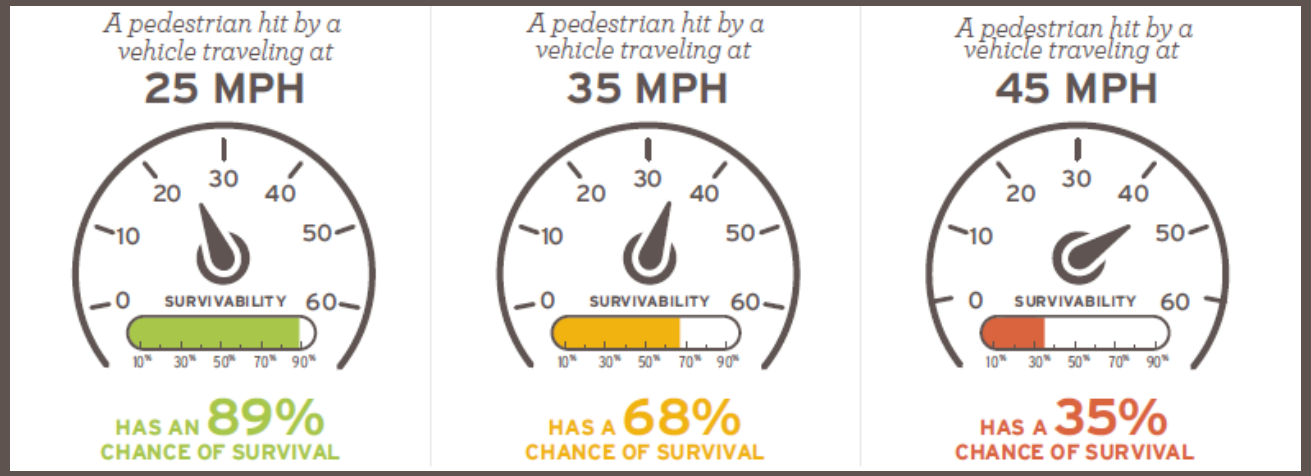
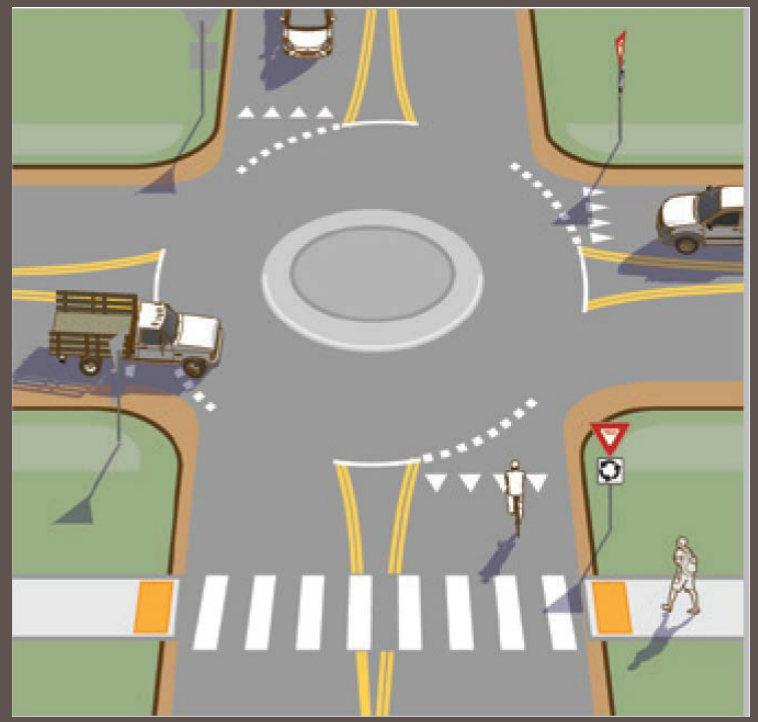
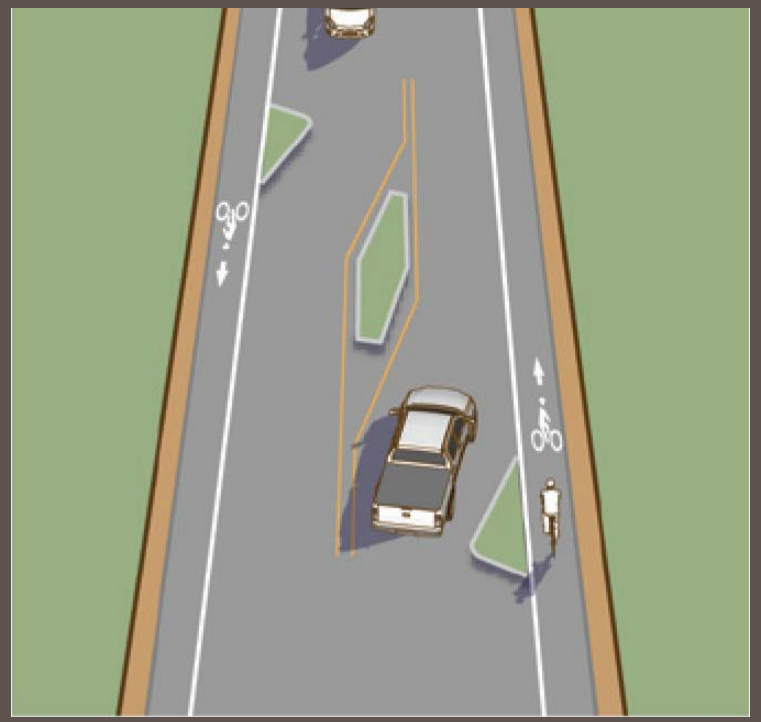
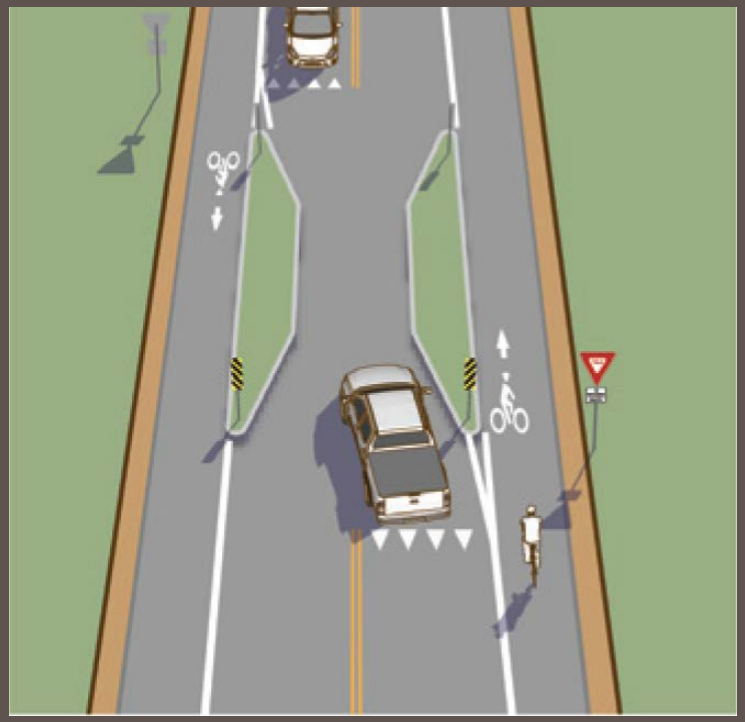
Speed Management









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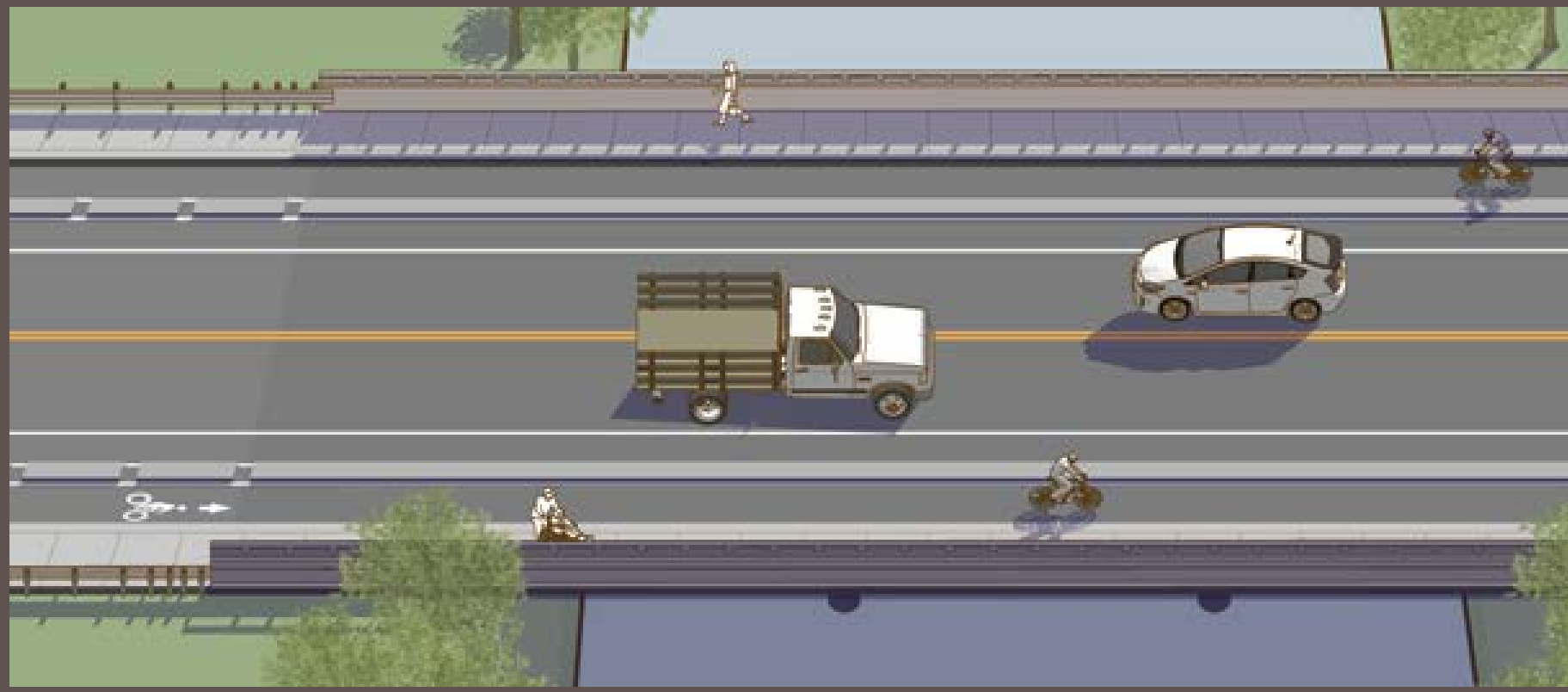
Bridges (New)

- Separation
- Prioritize
- Awareness
- Continuity
- Anticipate the future
- Flexibility



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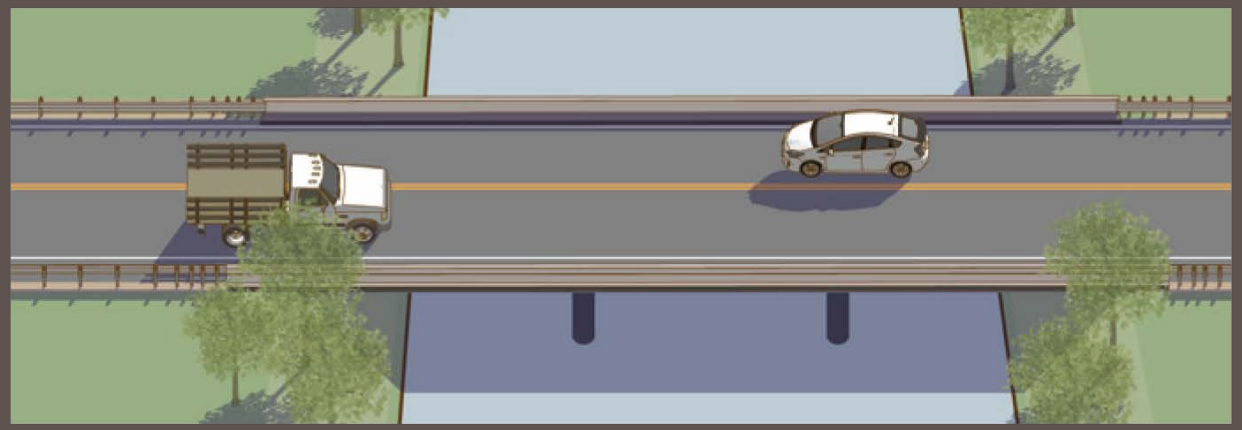
Constrained Bridges



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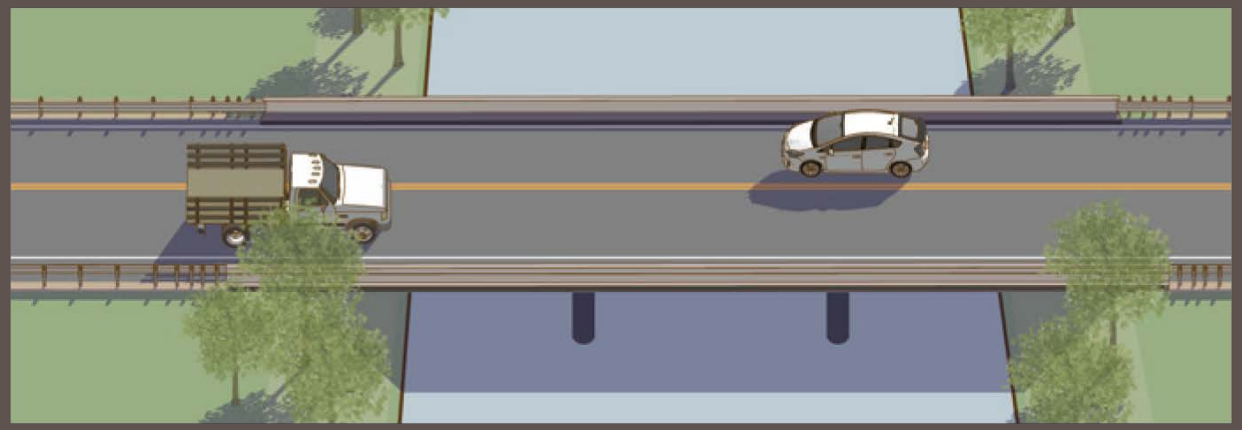
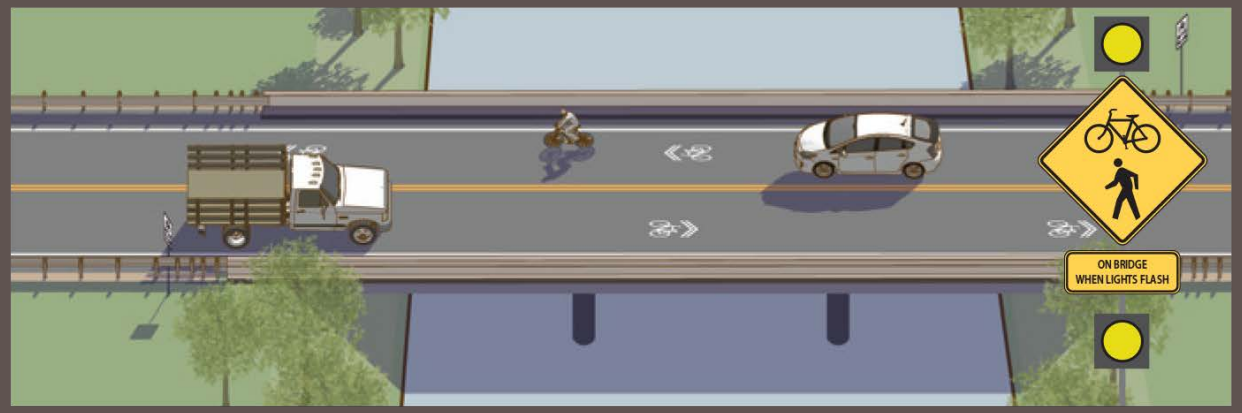
Constrained Bridges





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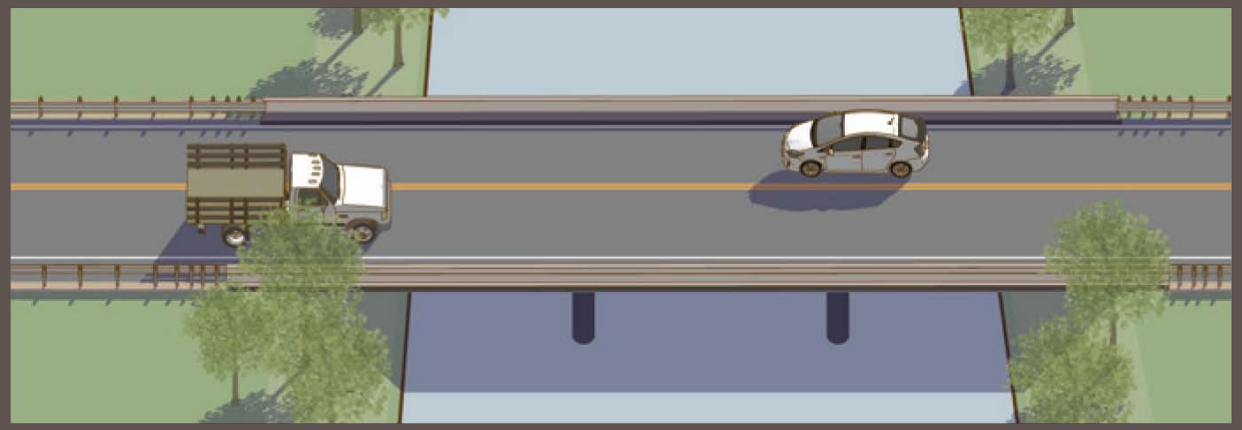

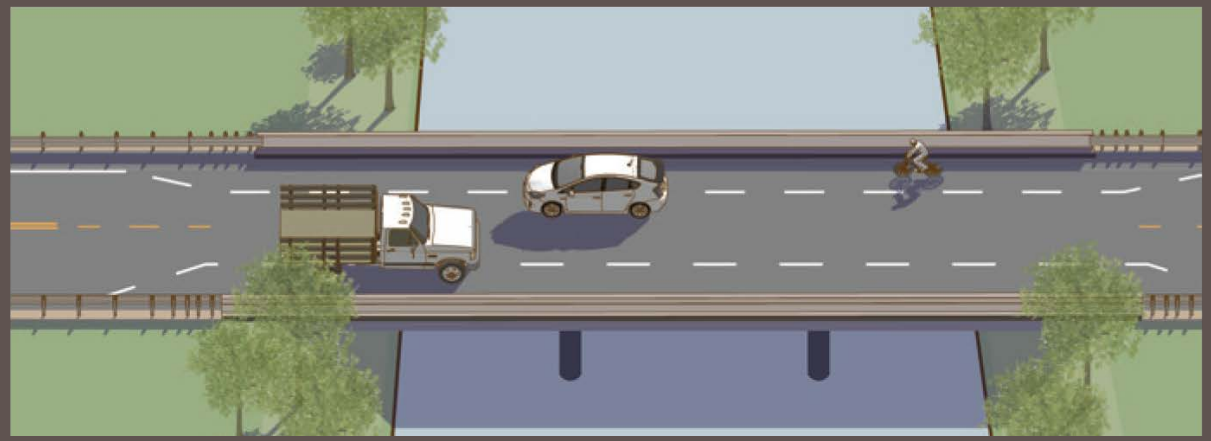

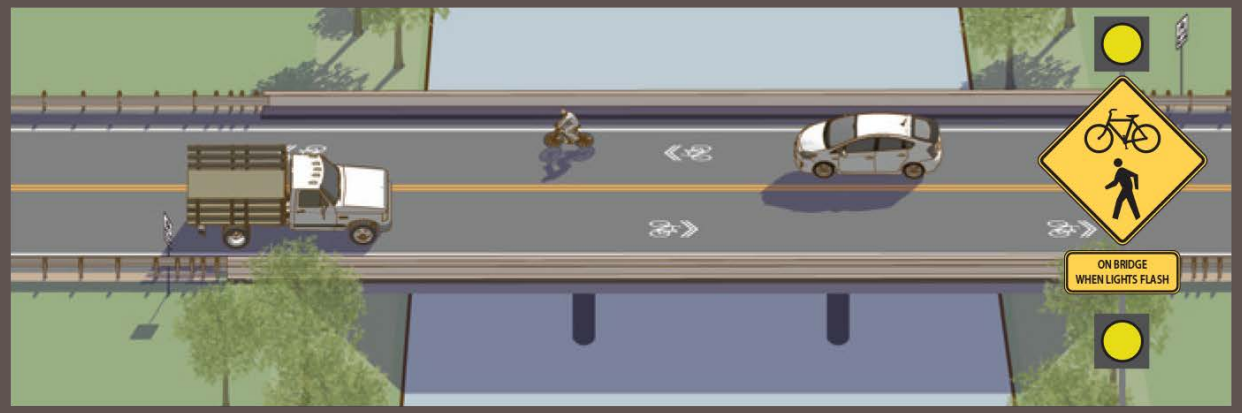

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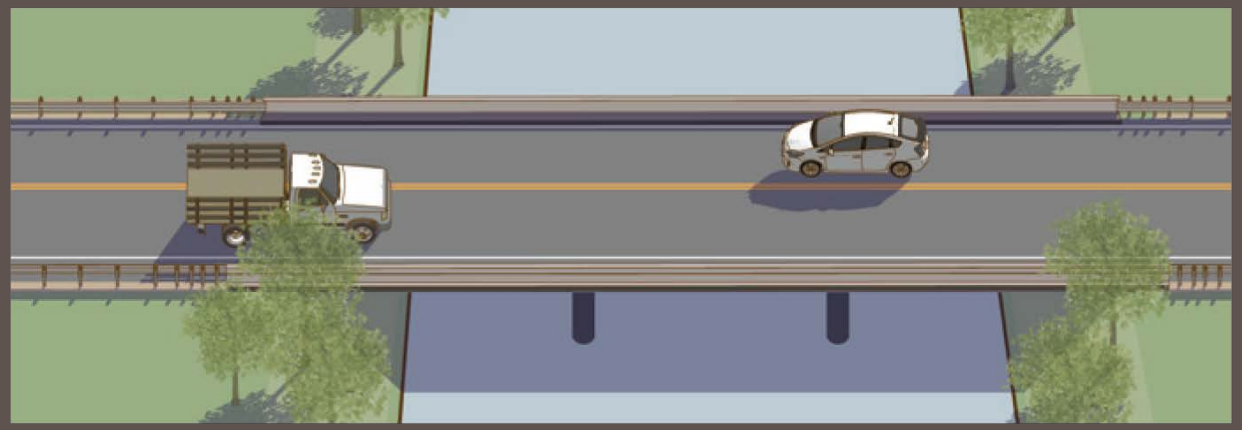
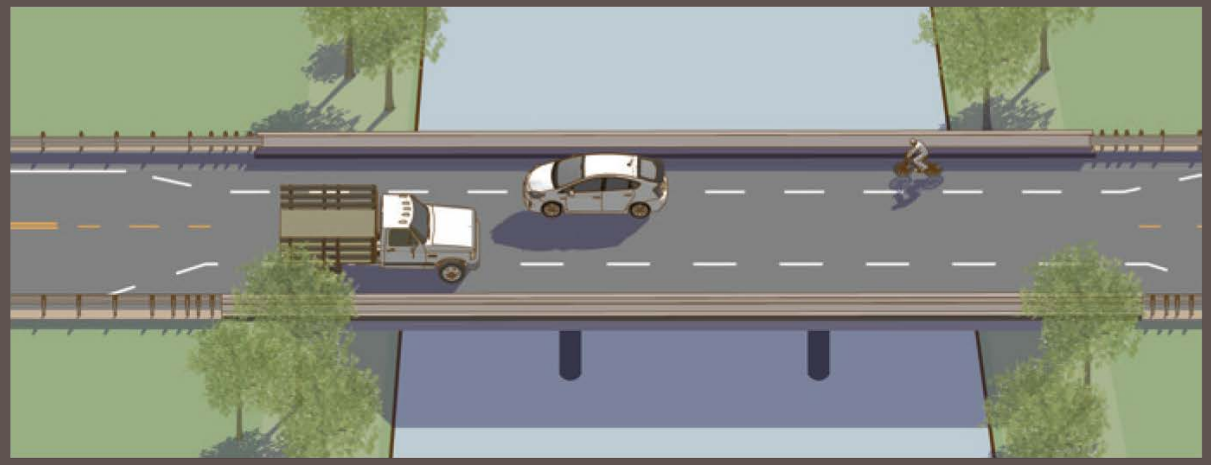
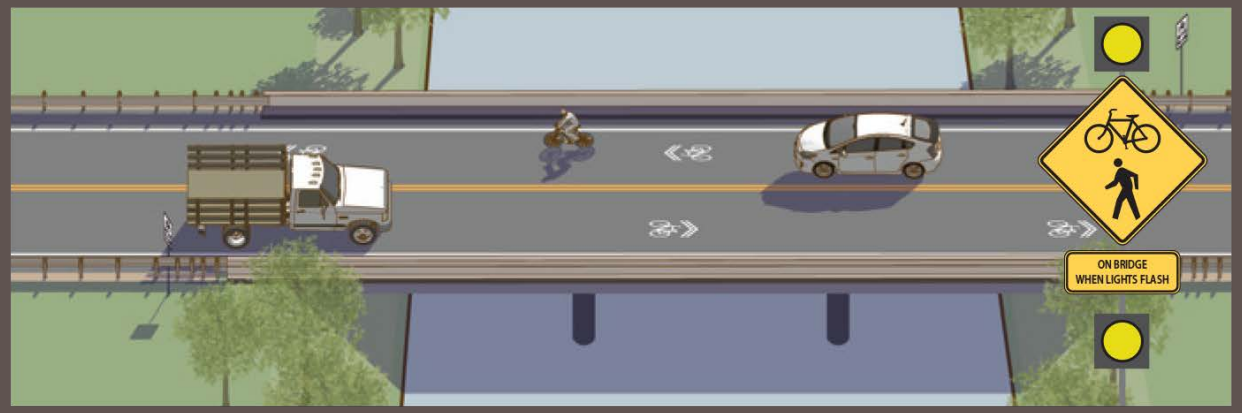
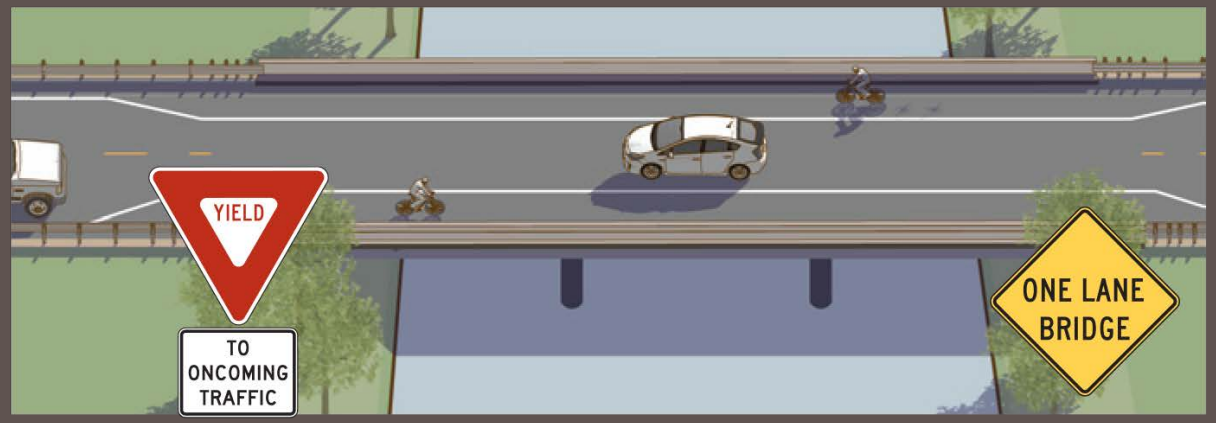
Constrained Bridges









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Guide Availability

For printing and online reference

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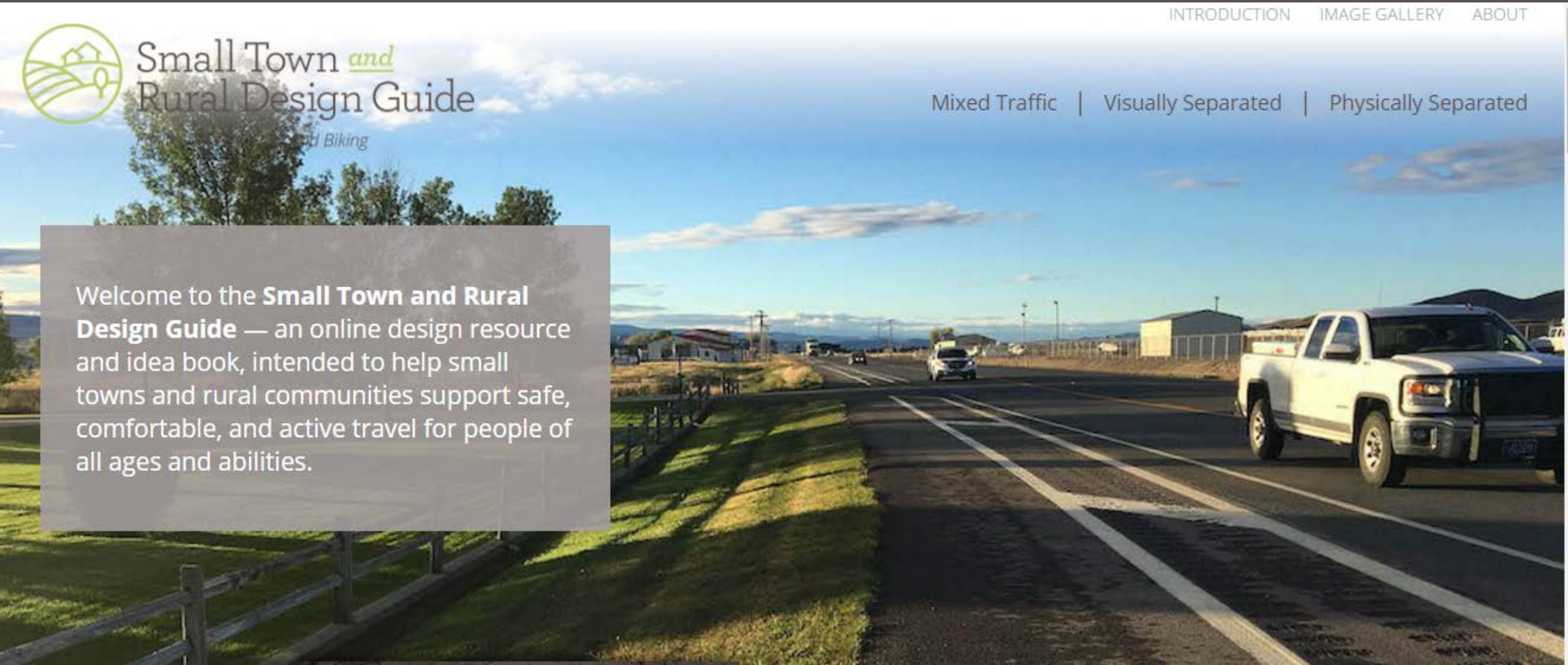


Small Town and Rural Design Guide

Facilities for Walking and Biking

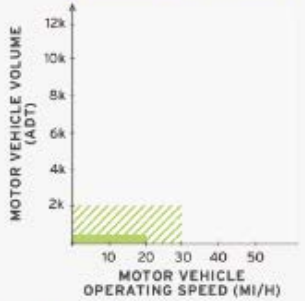
MIXED TRAFFIC

Yield Roadway

A **yield roadway** is designed to serve pedestrians, bicyclists, and motor vehicle traffic in the same slow-speed travel area. Yield roadways serve bidirectional motor vehicle traffic without lane markings in the roadway travel area.

APPLICATION

PREFERRED POTENTIAL



Speed and Volume
Most appropriate on streets with low volumes and low speed.

Network
Local residential roadways. Not for through motor vehicle travel.

Land Use
Within built up areas, particularly near residential land uses where most traffic is familiar with prevailing road conditions.

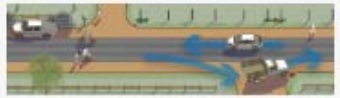
Geometric Design

Two-Way Travel Lane

The paved two-way travel lane should be narrow to encourage slow travel speeds and require courtesy yielding when vehicles traveling in opposite directions meet.

- Total traveled way width may vary from 12 ft (3.6 m)–20 ft (6.0 m).
- Traveled way width below 15 ft (4.5 m) or below function as a two-way singlelane roadway and should follow the guidance of the **AASHTO Low Volume Roads 2001**.
- When width is 15 ft (4.5 m) or narrower, **provide pull-out areas every 200–300 ft** to allow for infrequent meeting and passing events between motor vehicles. Pull-out areas may be established in the parking lane or roadside area.
- Access for emergency vehicles should be provided. There is no single fire code standard for local roads; however, a range of clear widths for parking and deploying fire department apparatus is between 16–20 ft (5.0–6.0 m). Designers should provide an opening of this width every 200–300 ft (600–91 m).

Figure 2-2. *A travel area width of 16–18 ft (4.8–5.5 m) is appropriate for low volumes of twoway traffic and may require slowing when vehicles traveling in opposite directions meet. A travel area of 12–15 ft (3.6–4.5 m) is too narrow for two motor vehicles to pass, and one vehicle may need to pull into a parking lane, pull-out, or driveway area to let the other proceed.*



Roadside

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

- When possible, the parking lane should be constructed with a contrasting material to differentiate the lane from the travel area. Bituminous, crushed stone, gravel, and turf shoulders can be used as contrasting materials to the travel area (**AASHTO Green Book 2011, p. 4-13**).
- Trees may be planted within the roadside 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 helpful traffic friction and ambiguity, contributing to a slowspeed operating environment.

Signs

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

- A PEDESTRIAN (W11-2) warning sign with ON ROADWAY legend plaque. See Figure 2-3.
  - Use a Two-Way Traffic warning sign (W6-3) to clarify two-way operation of the road if any confusion exists. See Figure 2-3.

W11-2

W6-3

Figure 2-3. *Pair a W11-1, W11-2, or W11-15 warning sign with a custom legend plaque to inform road users that shared use by pedestrians and/or bicyclists might occur.*

Intersections

At uncontrolled crossings of local streets, no special treatment is necessary. The additional space within the intersection area offers queuing opportunities when vehicles traveling in opposite directions meet.

- Consider parking prohibitions of 20–50 ft (6.0–15.0 m) in advance of intersections. This is particularly helpful to accommodate large vehicle 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 street network, local streets are the only viable connection to a scene of an emergency. Implementing agencies should work closely with emergency response stakeholders.

Sisters, OR – *Population 2,170*
Western Transportation Institute

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 walkways.

Ennis, MT – *Population 850*
Western Transportation Institute

YIELD ROADWAY CASE STUDY

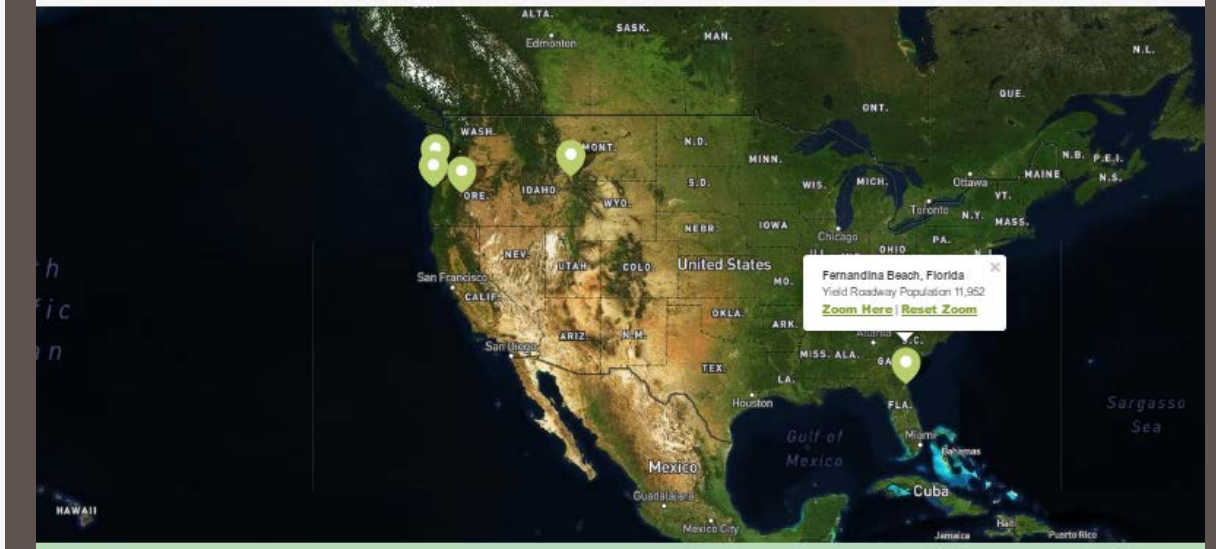
Manzanita, Oregon

The residents of Manzanita cherish their small town and have outlined ways to maintain this character. One of the goals identified in the town's Comprehensive Plan is "to maintain and create residential living areas which are safe and convenient, which make a positive contribution to the quality of life, and which are harmonious with the coastal environment." Toward this end they have a network of local streets that create peaceful conditions for people walking, bicycling, and driving.

In addition, there is a recognition that even on collector streets bicycle and pedestrian travel should be safe. The plan states that "Sufficient pavement width should be included on all major streets or roads to accommodate bicycle traffic."

Where a visually or physically separated facility is not provided, speeds will be slowed to create bicycle-friendly conditions. The plan states, "Efforts to reduce speeding on Laneda Avenue should be carried out by the city. This should take the form of maintaining a low speed (20 Mi/h), requesting that the City police and Tillamook County Sheriff's Department maintain a high level of enforcement and installing appropriate warning signs." Efforts such as these enable Manzanita's local streets to be shared roadways where people driving, walking, and biking can all safely share the street.

Selected Examples



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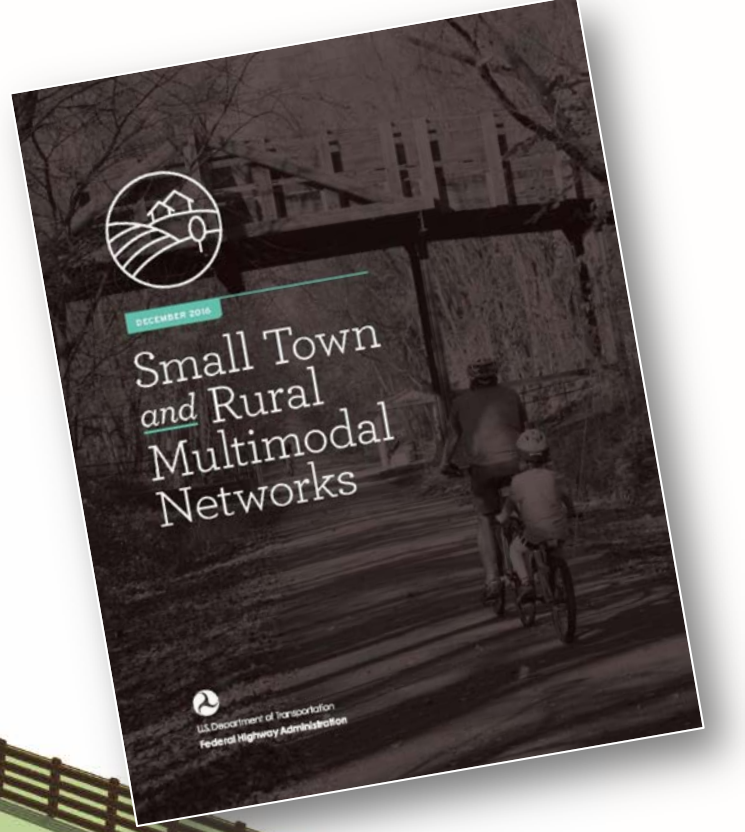
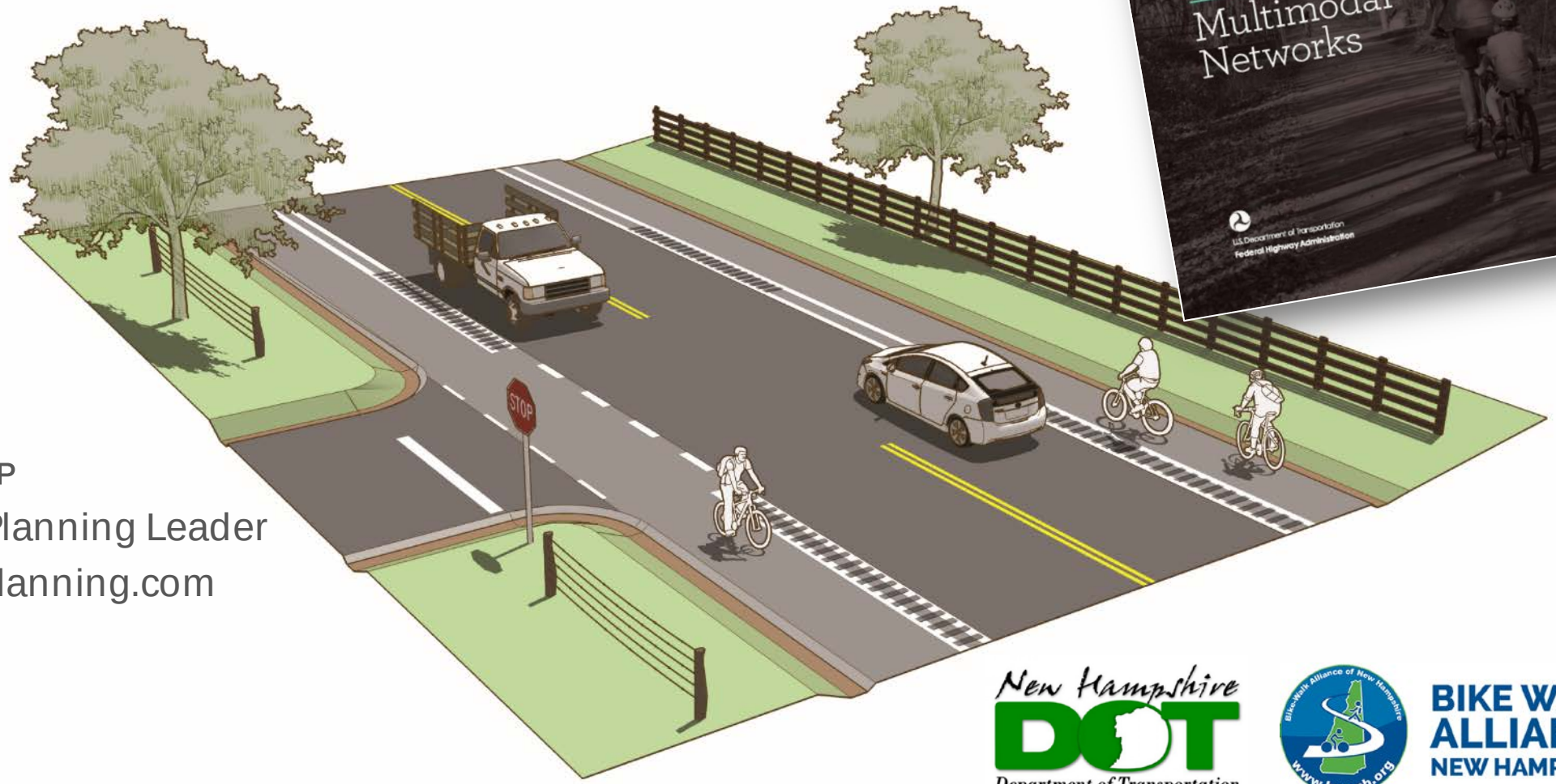
THANK YOU!

Small Town *and* Rural Multimodal Networks

NHDOT Workshop





June 7, 2017

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New Hampshire DOT Department of Transportation

Bike-Walk Alliance of New Hampshire www.bwanh.org

BIKE WALK ALLIANCE NEW HAMPSHIRE