BICYCLE AND PEDESTRIAN NETWORK PLAN UPDATE

June 2025

BICYCLE AND PEDESTRIAN MASTER PLAN UPDATE

Portsmouth, NH

Prepared for:
City of Portsmouth

Adopted by City Council (DATE)

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Section 1
Executive Summary

EXECUTIVE SUMMARY

The City of Portsmouth is proud to present this update to the Bicycle and Pedestrian Plan. This Plan outlines strategies that will enable the City to fulfill a vision of comfortable walking and biking for all who live, work, and visit Portsmouth. This Plan was developed over the course of a year between April 2024 and April 2025 and was informed by data-driven metrics as well as input from members of the community, including representatives from City departments, public schools, advocacy organizations, state government, local businesses, and regional agencies, among other organizations. It reflects best practices in bicycle and pedestrian facility design, which have evolved since the last Plan was completed in 2014.

The Plan's key components are:

- Public Outreach Summary
- Existing Conditions
- Common Challenges for Walking and Biking
- Facilities Toolkit
- Recommendations
- Implementation Framework
- Funding Opportunities

This document can be used as a resource by City staff, elected officials, businesses, and residents alike. It will serve as a blueprint for the next ten years of bicycle and pedestrian planning in Portsmouth. As with the 2014 Plan, the City may revisit the recommendations and implementation framework over time, as projects are completed or as new opportunities arise. However, the vision will remain the same: that walking and biking will be a part of Portsmouth's culture, making the City a healthy and vibrant place to live.

Section 2
Vision and Goals

VISION AND GOALS

The vision and goals build on the previous goals of the 2014 Bicycle and Pedestrian Plan. Through iterative engagement with the working group and public input, these updated goals reflect Portsmouth's ongoing commitment to improving walking and bicycling while also contributing to the City's priorities for equitable access, affordable housing, and climate action. This update represents a holistic approach to improving walking and bicycling and addresses new needs and priorities from the community that were not part of the previous Plan.

Vision

Portsmouth residents, workers, and visitors will view walking and bicycling as comfortable and convenient ways to get around the City. Walking and bicycling will be a part of Portsmouth's culture, making the City a healthy and vibrant place to live.

Goals

GOAL 1: Improve the safety and awareness of walking and bicycling in Portsmouth for all ages and abilities.

GOAL 2: Increase the number of walking and bicycling trips in Portsmouth.

GOAL 3: Advance Portsmouth's reputation as a City where walking and bicycling are a visible part of everyday and year round life and there are high-quality facilities that are well-maintained.

GOAL 4: Improve connectivity for walking and biking throughout Portsmouth and equitable access to key destinations like employment, schools, and transportation.

GOAL 5: Reduce greenhouse gas emissions and household transportation costs through the implementation of walking and biking improvements, and support complementary City priorities such as the Climate Action Plan's climate targets and supporting affordable housing.

Section 3
Public Outreach

PUBLIC OUTREACH SUMMARY

What We Heard from the Public

Members of the public played an important role in shaping the focus of the Plan and were crucial to the Plan's success. The City engaged area residents, businesses, and property owners through a variety of in-person, on-site, and online events and resources to reach as broad a cross section of the community as possible. Outreach was designed to inform the public, vet existing conditions, solicit input on the community's vision for walking and biking in Portsmouth, and identify issues and opportunities related to active transportation.

ONLINE SURVEY

442 total responses to the online survey

6% of respondents reported being slow and steady walkers who need to rest often.

2% of respondents reported using a mobility device or having a disability.

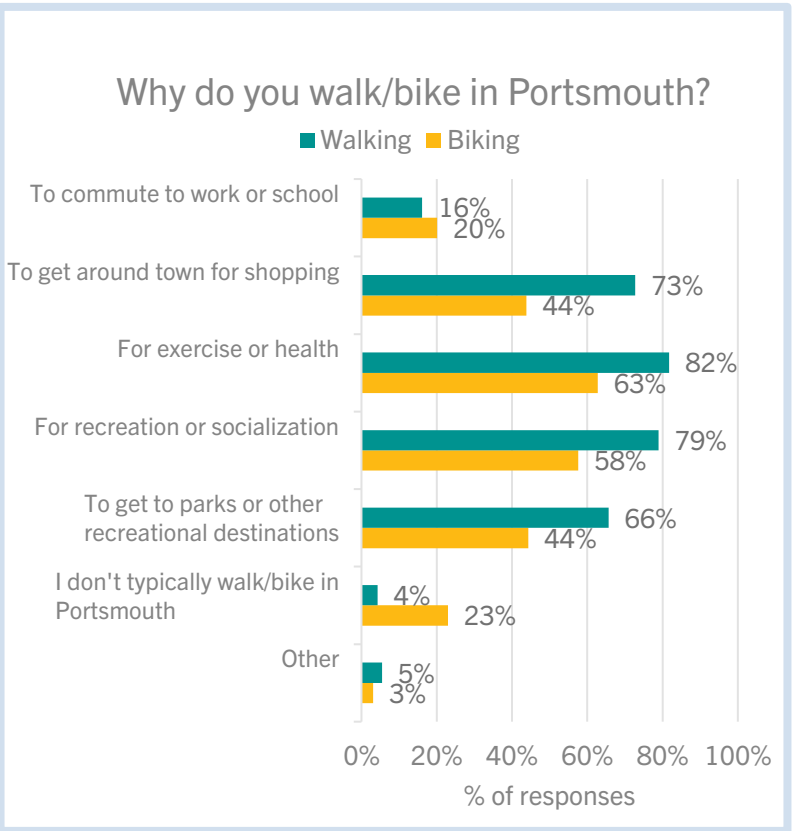
13% of respondents reported walking with a stroller or children often.

WHO WAS SURVEYED?
97% of survey respondents reported being White or Caucasian. **54%** of respondents identified as female. **45%** identified as male. **1%** identified as non-binary or other. **71%** of respondents were over the age of 45.

58% of respondents are willing to bike or interested in biking if there is some formal or high-quality bike infrastructure in place.

9% of respondents currently bike with their children.
11% would like to bike with their children but are concerned.

Ranked as the most important aspects of the walking and biking network:
1. Availability of continuous sidewalks or bike facilities
2. Access to other parks and recreational opportunities
3. Separation from vehicles



ONLINE INTERACTIVE MAP

An online interactive map was open for public comment from July 7, 2024 to October 14, 2024. The map allowed users to indicate current walking and biking routes, locate key destinations often accessed by bike or on foot, and identify challenging routes or destinations to walk or bike to or through. Users could also express support for others' contributions by "liking" or adding an additional comment to an existing entry. Some of the top comments are highlighted below. The interactive map with all comments can be referenced in **Appendix A.**

314 total comments on the interactive map

"Most of the **sidewalks from Elwyn to Lafayette are in very poor shape** and are right beside high-speed traffic. Drivers take high speed turns at the frequent curb cuts."

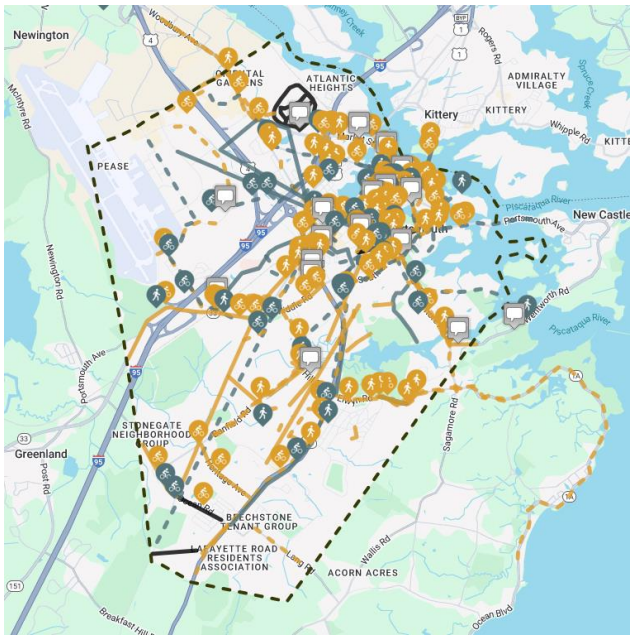
"I walk with a baby stroller now and the sidewalks along [Maplewood Ave] are in awful condition for anyone that uses wheels for transportation."

"Woodbury Ave is an essential corridor to bike to jobs, shopping, and housing, but multiple lanes of fast traffic make it very unsafe. We should prioritize separated bike facilities here."

"If we want to be a walkable city, and a winter city, we need to commit to it year-round."

"[Islington Street is] not safe for bikes: Cars go too fast, too many distractions, complicated traffic patterns, (in some segments: too many lanes)"

"While [Banfield Road] looks like a bikeable alternative to Route 1, you are taking your life into your hands if you take this road: Lack of shoulder, many curves/hills, cars going too fast on this road."



POP-UP EVENTS AND PUBLIC MEETINGS

A pop-up meeting was held at the Portsmouth Farmer's Market on July 13th, 2024. The project team shared information about the project and gathered input from the community.

78 comments gathered calling for:

- More protected bike lanes
- Better signage and wayfinding
- Clearer right-of-way and priority along roads
- More safe network connections
- More short-term or interim improvements
- Continuing Safe Routes to School Activities
- More amenities along the Rail Trail
- More bike parking throughout the City
- Better maintenance of sidewalks
- Better education and awareness of bicyclists for motorists

Members of the public provided suggestions for recommendations at a Farmer's Market pop-up.

WORKING GROUP

The 2025 Bicycle and Pedestrian Plan Update Working Group is composed of members representing the following Portsmouth area organizations:

- Department of Planning and Sustainability*
- Department of Public Works*
- Planning Board*
- Sustainability Committee*
- Seacoast Area Bicycle Riders
- New Franklin School
- New Hampshire State Legislature
- Seacoast Greenways Alliance
- Cooperative Alliance for Seacoast Transportation (COAST)
- Parking and Traffic Safety Committee*
- RadMoto (Local Business Owners)
- Rockingham Planning Commission

**City Department or committee*

The Working Group served as local experts on the experience of walking and biking in Portsmouth. This group met three times throughout the project. The responsibilities for Working Groups members included:

- Promoting engagement opportunities
- Attending and helping to facilitate engagement events
- Vetting existing conditions data and providing nuanced local knowledge
- Guiding the development of vision and goals
- Providing feedback on draft Plan deliverables
- Attending and participating in project meetings

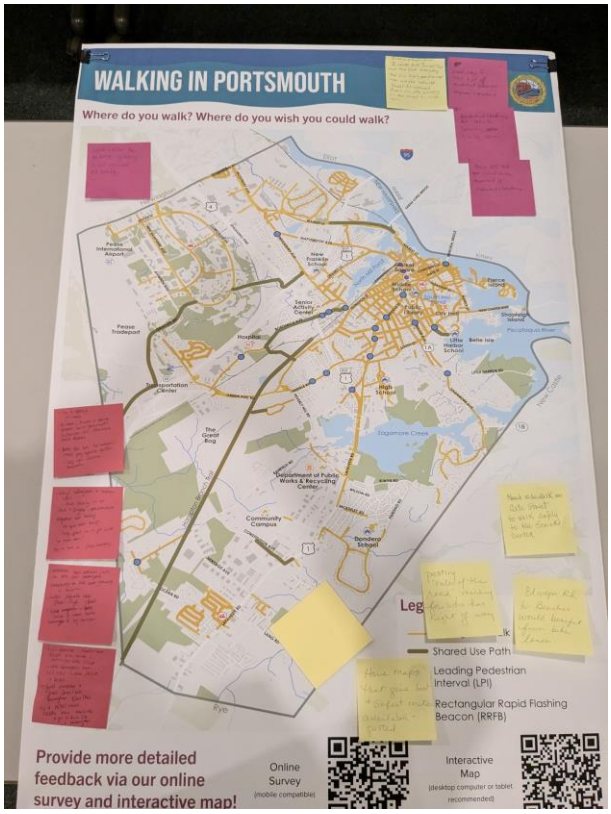
Working Group members conducted a tour of Portsmouth at the first meeting in a COAST bus.

FOCUS GROUPS

The project team worked with the City and Working Group to identify critical stakeholders for small-group meetings. These focus groups supplemented parallel outreach by connecting with specific groups of stakeholders particularly affected by access to walking and biking in Portsmouth. The project team ultimately hosted three focus groups in Winter 2025, targeting youth and access to schools, seniors, and residents of the area around Lafayette Road. These focus groups were hosted at Portsmouth High School, the Portsmouth Senior Activity Center, and virtually, respectively.

PUBLIC MEETINGS

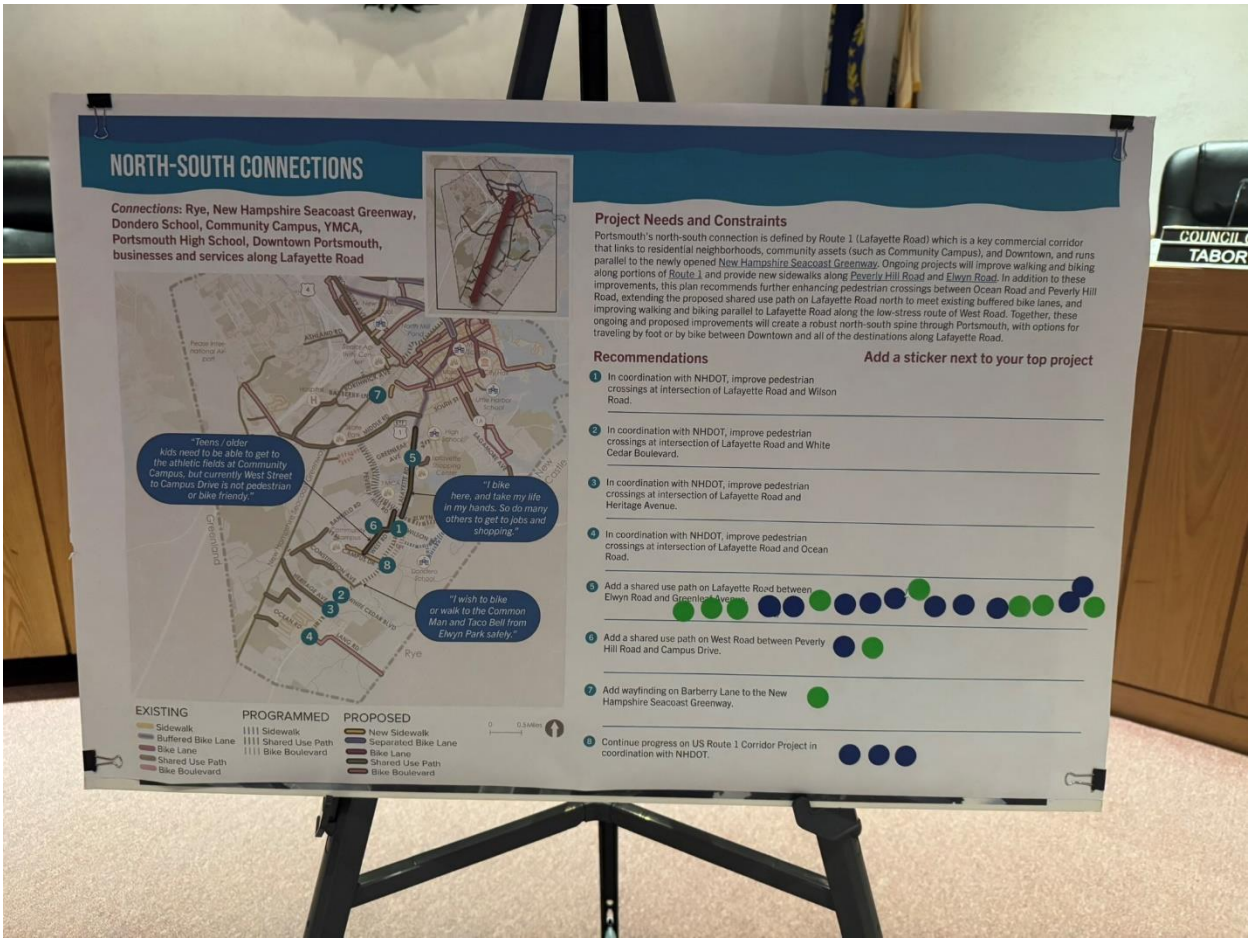
The City hosted two in-person public meetings for this project. The first was held on September 30, 2024 at the Portsmouth Public Library. Attendees learned about the project, initial results from the online survey and mapping, and then interacted with the project team in an open house format. Specifically, attendees were asked to weigh in on the draft Vision and Goals, review existing conditions information, and provide feedback on issues and opportunities for walking and biking in Portsmouth.



Public Meeting 1 was held at the Public Library

A second public meeting was held on March 10, 2025 at Portsmouth City Hall. At this meeting, attendees were given a project update and then asked to provide feedback on the proposed infrastructure and non-infrastructure projects in an open house format. Attendees were asked to vote on their top projects for each priority connection (see **Infrastructure Recommendations**) and for each category of non-infrastructure recommendations (see **Non-Infrastructure Recommendations**). The voting results can be found in **Appendix A**.

Public Meeting 2 was held at City Hall



The most popular recommendation for north-south connections is to construct a shared use path on Lafayette Road between Elwyn Road and Greenleaf Avenue.

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Section 4
Existing Conditions

EXISTING CONDITIONS

Overview

Progress has been made, but the state of practice has evolved.

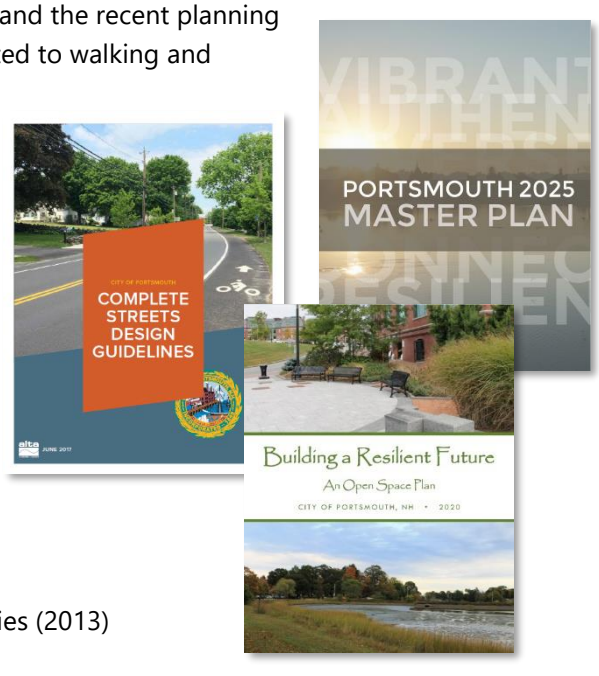
In 2014, the City completed the Portsmouth Bicycle and Pedestrian Plan as a comprehensive strategy to make bicycling and walking safe, comfortable, and convenient for people of all ages and abilities. As the current state of practice has evolved, a comprehensive update to the Plan was conducted to determine the status of implementation and to provide opportunities for the community to offer input into necessary updates for future improvements.

As a crucial first step of this planning update, the City compiled the following existing conditions data and analyses to understand the current issues and opportunities when it comes to biking and walking in Portsmouth and the progress made since the 2014 Plan. As a part of the existing conditions report, the City performed a comprehensive document review of recent policies and plans, analyzed existing land use, socioeconomic, and demographic Census data, and reviewed existing pedestrian and bicycle facilities, roadway network characteristics, transit connections, and crash history. The results of this review are summarized below and the full existing conditions report can be referenced in **Appendix B**.

People are walking and biking more!
From 2021 to 2023, on average, there was a **33% increase** in bicycle volumes and an **8% increase** in pedestrian volumes at key intersections.

POLICIES AND PLANS

The City reviewed relevant policies and plans to understand the recent planning history within Portsmouth and any existing policies related to walking and biking. The following documents were reviewed and the objectives and recommendations of each were incorporated into the updated Plan:



- City of Portsmouth Capital Improvement Plan (CIP) FY 2025-2030 (2024)
- New Hampshire Pedestrian and Bicycle Plan (2023)
- Open Space Plan (2020)
- Complete Streets Design Guide (2017)
- Portsmouth 2025 Master Plan (2017)
- Portsmouth Bicycle and Pedestrian Plan (2014, 2018 update)
- Wayfinding Plan (2014)
- Bicycle Friendly and Walk Friendly Community Policies (2013)
- Safe Routes to School Action Plan (2010)

PORTSMOUTH AT A GLANCE

The City reviewed and summarized Portsmouth's socioeconomics, demographics, land use, transportation network, and crash history to gain a better understanding of the general landscape and help identify high priority locations in need of biking and walking improvements. High-level takeaways are summarized below and a more detailed existing conditions report and maps can be referenced in **Appendix B**.

Socioeconomics and Demographics

Socioeconomic and demographic data were pulled from the ACS 5-year estimates from the 2022 U.S. Census and represent high level analysis across census tracts 0.6% of households in Portsmouth do not own a car.

Up to 20% of households located in neighborhoods along Gosling Road and Woodbury Avenue, within the downtown core, and south of Lang Road along Route 1 do not own a car.

20% of the population is 65 years of age or over.

3.7% of households in Portsmouth have income below the poverty level.

Crash History

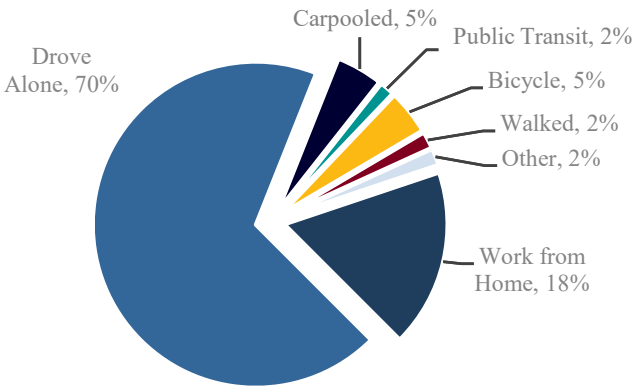
From 2009-2013, there were 34 reported crashes in Portsmouth involving pedestrians; no information on cyclist crashes was reported. From 2019-2024, there were 43 reported crashes involving non-motorists, 32 pedestrian and 11 cyclist crashes. Crashes occurred more often during the midday and evening rush hour and were concentrated within the downtown core and other commercial areas such as Lafayette Road and Woodbury Avenue.

2009-2013	2019-2024
34 crashes involving a pedestrian	32 crashes involving a pedestrian
Crashes involving cyclists were not reported	11 crashes involving a cyclist

Priority Areas Identified from Crash History:

- **Lafayette Road**
- **Islington Street**
- **Northern Woodbury Avenue**
- **Downtown Streets with high pedestrian**
- **and bicyclist volumes**

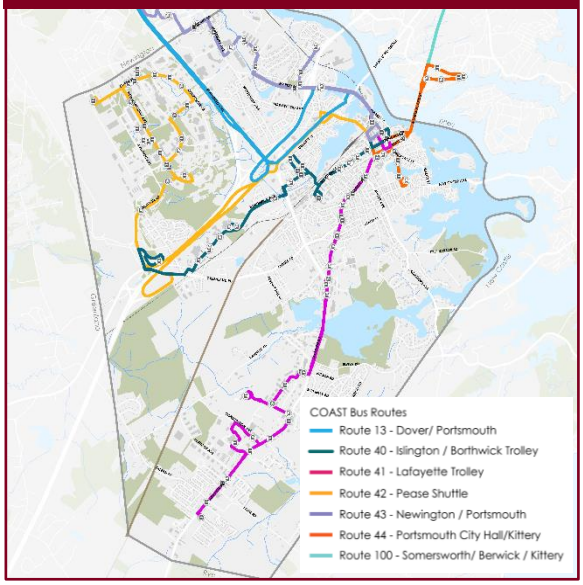
Commuter Modes in Portsmouth



Source: US Census Bureau, ACS 5-Year Estimates 2022,

Transit Network

Public transit in Portsmouth is mainly provided by COAST bus service with seven bus routes that connect Portsmouth to Dover, Pease, Newington, Kittery, Somersworth, and Berwick. Wildcat Transit also has one route through Portsmouth on Route 4, connecting Downtown Portsmouth to University of New Hampshire (UNH).



PROGRESS IN THE LAST TEN YEARS

Since the 2014 Plan, the City has made major strides in its goals of improving walking and biking in Portsmouth. Through dedicated policy and programming, expanding the network connected infrastructure, and other supportive non-infrastructure actions, the City has prioritized walking and biking in Portsmouth in accordance with recommendations from the 2014 Plan. Highlights of the last ten years of progress are summarized below. A more in-depth look at the progress can be found in **Appendix B**.

Policy and Programming Updates

- Created **Complete Streets Design Guidelines in 2017**, building off the Complete Streets Policy adopted in 2013, which has informed the development of all street projects since.
- Achieved **Bronze Level Bicycle Friendly Community** Designation from the League of American Bicyclists in 2019 (renewed in 2024) and **Silver Level Walk Friendly Community** by the Walk Friendly Communities program.
- Provided **dedicated funding** for bicycle and pedestrian projects in the City's annual capital budget.
- Continued to support and promote **Walk and Bike to School Days**.
- Created a policy to guide the installation and use of **vehicle speed feedback signs**.

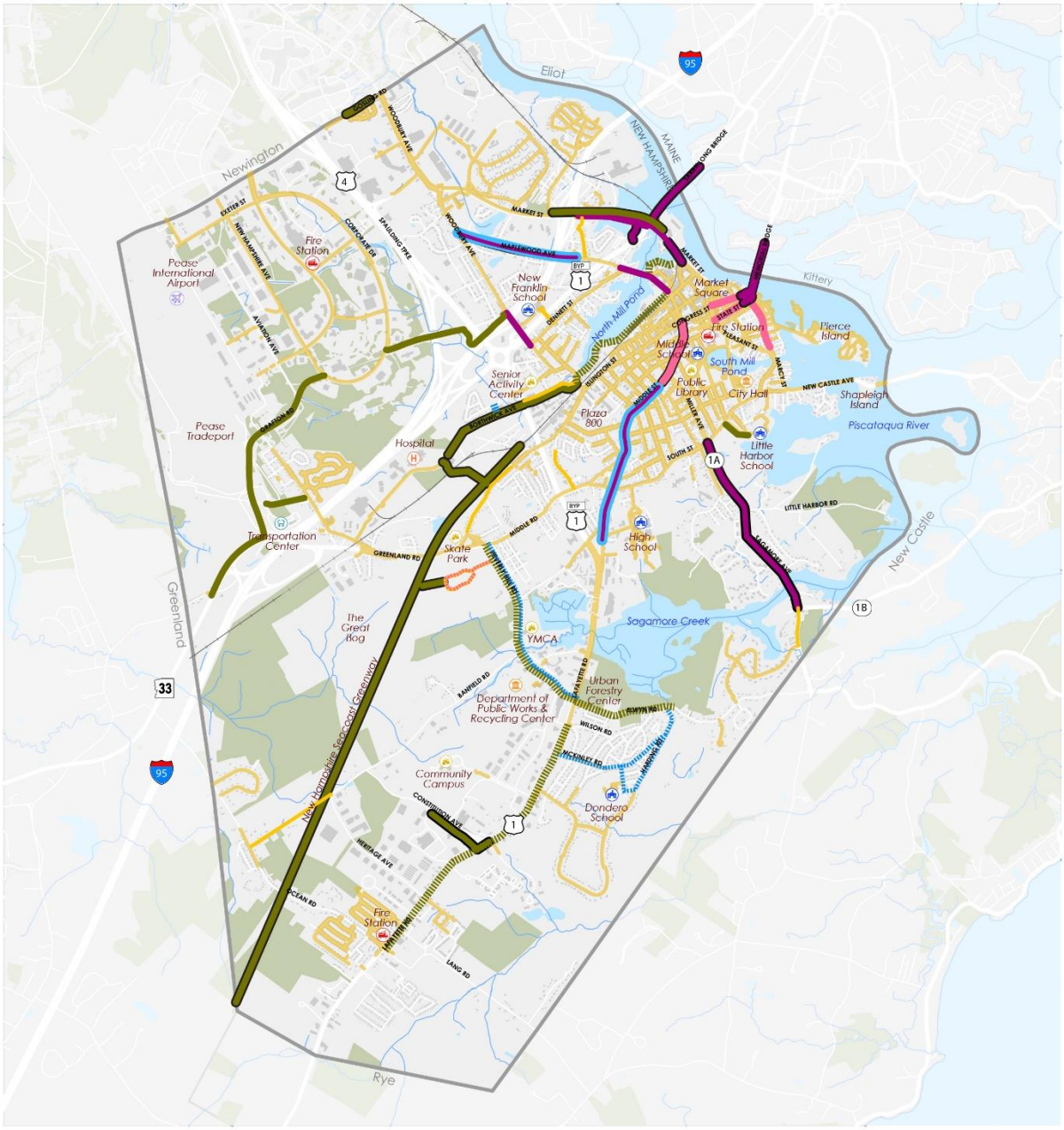
Expanded Network Connectivity

In the past ten years, the City has expanded Portsmouth's bicycle and pedestrian network connectivity through nearly 8 miles of on- and off-street bicycle facilities and over 7,000 feet of new sidewalks. Portsmouth has completed several projects from the 2014 Bicycle and Pedestrian Plan, and there are several others in design, programmed or partially complete. **Figure 1** highlights completed and programmed projects including the following segments:

- New bike lanes/shared use paths on Market Street, Maplewood Avenue, Hodgdon Way, Middle Street, Gosling Road, Borthwick Avenue, and portions of Route 1.
- Bicycle boulevard on Lincoln Avenue.
- Improved pedestrian network along Islington Street, Market Street, Sagamore Avenue, Spinney Road, Pannaway Manor, Greenland Road/Borthwick Avenue, McDonough Street/Hanover Street neighborhood, lower State Street, Pleasant Street, Cutts Street, Woodbury Avenue retail area, and Banfield Road.
- Side path planning and design on Elwyn Road and Peverly Hill Road.
- Construction of Seacoast Greenway Trail and connections.
- Expanded bike parking locations around the City.

These infrastructure investments have addressed major gaps in the network, however, there continues to be opportunities for upgrading facilities to expand the high-comfort network and connecting low speed and low volume local streets.

Figure 1. Existing and Programmed Bicycle and Pedestrian Facilities



Non-Infrastructure Recommendations

In the past ten years, the City has accomplished the following one-time non-infrastructure recommendations detailed in the 2014 Plan:

- Installed **bike racks on all COAST buses**.
- Created a **bike parking ordinance** for new developments to require bicycle parking onsite.
- Installed **speed feedback signs** at various locations in the City, with emphasis on school zones or locations with reported excessive speeds.
- Updated pedestrian and bicycle **design practice at signalized crossings**. All signals now have pedestrian countdown timers or will be upgraded when new signals are installed. Accessible Pedestrian Signals (APS) have been installed at all intersections with the exception of four remaining locations that are in the works. The City has also worked to incorporated Leading Pedestrian Interval (LPI) and Rectangular Rapid Flashing Beacons (RRFB) at multiple locations.
- Updated pedestrian and bicycle **design practice for signing and pavement** markings to align with current Manual on Uniform Traffic Control Devices (MUTCD) requirements.
- Implemented **Portsmouth Click N'Fix**, an online citizen request service that enables anyone to request public works maintenance service.
- Created a **shared parking ordinance** as part of site planning regulations to optimize parking supply.

Many of the non-infrastructure recommendations from the 2014 Plan were on-going policies and procedures. The following were successfully adopted and are now a part of standard City procedures. These recommendations will be carried forward as ongoing priorities for the City to continue:

- Require traffic management plan during construction to provide for pedestrian and bicycle travel.
- Continue periodic inspection of condition of sidewalks, side paths, and pedestrian ramps as part of Pavement Condition review.
- Inspect bicycle and pedestrian facilities annually for restriping and maintenance.
- Include on- and off-road bicycle facilities in maintenance programs, e.g., to clear debris and snow.
- Use the Bicycle and Pedestrian Plan for project and development review.
- Conduct feasibility study for bike share.
- Collect and analyze bicycle count data annually.
- Collect bicycle and pedestrian crash data annually.

Common Challenges for Walking and Biking

Through the existing conditions review, public engagement comments, and in-person field reviews, the City has identified many common challenges for walking and biking present around Portsmouth, as summarized in **Figure 2**. These challenges such as high speeds, lack of frequent crossings, lack of dedicated walking and biking facilities, and more are gaps in the existing network that create uncomfortable conditions and discourage people from walking and biking. Identifying these common challenges can inform the recommended facilities and toolkit resources that are most applicable for creating a safe, connected, and comfortable network for active transportation.

Figure 2. Common Challenges for Walking and Biking

Lack of sidewalk

Narrow sidewalk or obstructions

Lack of frequent crossings

Long crossings, faded markings

High-volume, high-speed traffic

Poor pavement quality

Narrow shoulders

Lack of dedicated bicycle facilities

Poor visibility, turning conflicts

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Section 5
Facilities Toolkit

FACILITIES TOOLKIT

Design Resources

All projects should be designed according to the current best practices. For local projects, Portsmouth draws from a combination of national, state, and local guidelines and standards listed in Table 1.

Table 1. Design Resources

Document	Description
National	
Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)	A compilation of national standards for all traffic control devices, including road markings, highway signs, and traffic signals.
AASHTO Guide for the Development of Bicycle Facilities, Fifth Edition (2024)	Guidance for the planning, design, and operation of bikeways and off-street paths in urban, suburban, and rural settings.
Public Rights of Way Access Guide (PROWAG) Final Rule (2023)	Guidance for ensuring infrastructure such as sidewalks, crosswalks, curb ramps, pedestrian signals, and on-street parking in the public right-of-way are accessible and usable by people with disabilities.
NACTO Urban Bikeway Design Guide	Guidance for creating bikeable cities for people of all ages and abilities. It covers policy, network planning, program and project evaluation, facility and intersection design, curb management, maintenance, and operations.
NACTO Designing for All Ages & Abilities	Guidance for high-comfort bicycle facilities by establishing criteria for selecting and implementing bike facilities based on contextual factors.
NACTO Don't Give Up at the Intersection	Guidance for improved intersection design treatments and signal strategies to reduce vehicle-bike and vehicle-pedestrian conflicts.

Document	Description
FHWA Small Town and Rural Multimodal Networks (2016)	Guidance for managing pedestrian and bicycle design and trade-offs outside of an urban context, where existing infrastructure can be lacking.
FHWA Bikeway Selection Guide (2019)	Guidance for identifying the most appropriate bike facilities for user and roadway characteristics. It provides detailed information about policy and project identification, feasibility, and selection.
FHWA Field Guide for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations	Guidance for selecting pedestrian crash countermeasures based on criteria established in published literature, best practices, and national guidance.
NCHRP 1036: Roadway Cross-Section Reallocation: A Guide	A report that describes how street design decisions impact communities and clarifies how different street elements influence not just transportation outcomes, but liveability, economic and environmental health, equity, and many other concerns.
New Hampshire Department of Transportation (NHDOT)	
NHDOT Highway Design Manual	Guidance and requirements on current highway design methods and policies in New Hampshire. This Manual is intended to be used in conjunction with AASHTO and FHWA guidance.
New Hampshire Pedestrian and Bicycle Plan (2023)	The New Hampshire Pedestrian and Bicycle Plan outlines a 10-year vision to make walking and biking safer and more accessible for communities across the state. It outlines the "Bicycle Level of Traffic Stress Analysis" methodology to assess how comfortable it is to bike on a road based on factors such as number of lanes and traffic volume. This information can be used to inform bicycle facility selection and design.

Document	Description
Local	
Complete Streets Design Guidelines (2017)	A resource for the City of Portsmouth, private developers, and residents for how to accommodate all users on existing and future city streets. It classifies every street in the City into seven distinct groups, each with its own user priorities, specifications, and design options.
Wayfinding Plan (2014)	Guidance for appropriate wayfinding types, messaging, and locations in a uniform and recognizable design menu that is unique to the City of Portsmouth.

Facilities Toolkit

Portsmouth has implemented a variety of measures to enhance safety, connectivity, and experience for people walking and biking. This section of the Plan outlines design treatments and other strategies, some of which are new to Porsmouth, that can be considered for different locations.

Each of these treatments is supported by the best practice guidance or standards listed in Table 1, including the latest edition of the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), the Public Rights of Way Access Guide, (PROWAG), and American Disabilities Act (ADA).

Table 2 lists the treatments included in the toolkit and is organized by whether the treatment is most applicable at the corridor level or as spot improvements. Corridor treatments are often applied to a whole street, along multiple blocks, while spot improvements are more limited in scope and may be implemented at limited locations or key intersections or crossings. The Pedestrian and Bicycle columns indicate whether the treatment will primarily benefit people walking, biking, or both.

Table 2. Corridor and Spot Improvements

Treatment	Pedestrian	Bicycle
	Corridor Improvements	
Pedestrian Street	Primary	Secondary
Shared Street	Secondary	Primary
Sidewalk	Primary	No
Shared-Use Path	Primary	Primary
Separated Bike Lane	No	Primary
Buffered Bike Lane	No	Primary
Bike Lane	No	Primary
Bike Boulevard	No	Primary
Traffic Calming	Secondary	Primary
	Spot Improvements	
Intersection Tightening	Primary	Primary
Protected Intersection	Secondary	Primary
Trailhead	Primary	Primary
High-Visibility Crossing	Primary	Primary

Treatment	Pedestrian	Bicycle
Curb Extension (Bump Out)	Primary	Secondary
Curb Ramp	Primary	Secondary
Pedestrian Crossing Island	Primary	Secondary
Raised Crossing or Intersection	Primary	Secondary
Pedestrian-Scale Lighting	Primary	Primary
Restricted Vehicular Access	Primary	Primary
Signalization	Primary	Primary
Pedestrian Beacons	Primary	Primary
Bike Lane Intersection Striping	No	Primary
Bike Box	No	Primary
Bicycle Parking	No	Primary
Bike Maintenance Station	No	Primary
Parklet	Primary	Secondary
Traffic Garden	Secondary	Primary
Bus Stop Enhancements and Accessibility	Primary	Secondary

PEDESTRIAN STREET

Portsmouth Summer in the Streets (Market Square)

Source: Pro Portsmouth Inc.

A pedestrian street, or pedestrian zone, is a street or area closed to vehicle traffic and used primarily by pedestrians. These areas are often in corridors with commercial activity, drawing pedestrians to enjoy local businesses and restaurants. Other non-motorized modes are often allowed. Pedestrian streets can be permanent or temporary.

Benefits

- Expands space available to people walking
- Encourages "staying" activities such as relaxing, eating, and socializing
- Provides flexible event space

Constraints

- Limits vehicle circulation
- Potential to restrict emergency vehicle access

Typical Applications

- Streets with high pedestrian volumes
- Streets with alternative routes for vehicles
- Commercial districts

Design Considerations

- Demand and alternatives for commercial loading
- Access for delivery vehicles, programming-related vehicles, and emergency vehicles

Permanent Pedestrian Street Typical Signing	
NO MOTOR VEHICLES	MUTCD R5-3
BIKES YIELD TO PEDESTRIANS	MUTCD R9-6
Portsmouth Branded Wayfinding Signs	

SHARED STREET

A shared street is a low-volume street where pedestrians, cyclists, and motorists share the right of way. Shared streets may function as a public space for recreation, socializing, and leisure. Shared streets are often characterized by a lack of vertical separation between modes (e.g., curbs or sidewalk).

Benefits

- Reduces sidewalk crowding
- Encourages "staying" activities such as relaxing, eating, and socializing
- Mixed use encourages slower driving speeds

Constraints

- Placement of traffic calming treatments and street furniture may require loss of on-street parking

Typical Applications

- Low-speed (target speed of 10 mph or less[1]) or limited access streets with narrow or no sidewalks

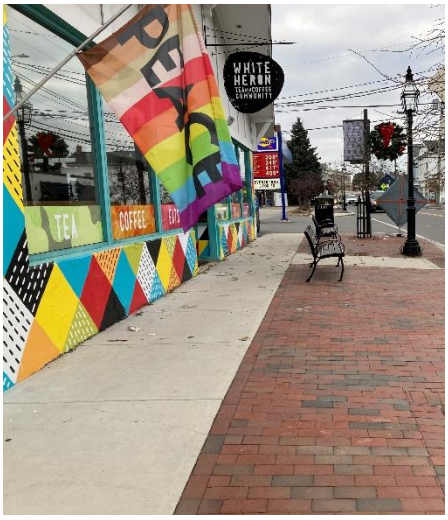
Design Considerations

- A shared street sign or "Yield to Pedestrians" sign (MUTCD 2B-2) may be used at the entrance
- Street furniture, such as bollards, benches, and planters, can help define a shared space by subtly delineating the traveled way from the pedestrian-only space

Shared Street Typical Signing	
YIELD TO PEDESTRIANS	MUTCD R1-9
Portsmouth Branded Wayfinding Signs	

[1] NACTO Urban Bikeway Design Guide Third Edition, 2025

SIDEWALK



A sidewalk is a dedicated pedestrian facility adjacent to the roadway and separated from traffic by a curb. Sidewalks may also have an additional buffer zone between the roadway and the walking area.

Benefits

- Provides separation from vehicle traffic
- Provides means of mobility for people using wheelchairs, strollers, or others who may not be able to travel on an unpaved surface

Constraints

- Retrofitting sidewalks onto facilities that do not currently have them may require additional right-of-way or road-narrowing strategies

Sidewalk Typical Dimensions (ft)	
Constrained (e.g., pinch point)	3′
Min	4′
Preferred	5′+

Typical Applications

- Most streets, except for limited access freeways
- Typically added to areas as redevelopment occurs

Design Considerations

- Must meet minimum dimensions, cross-slope, and smoothness for ADA compliance
- Consider wider widths (10+ feet) in areas with high existing or anticipated pedestrian volumes
- A 2-foot buffer from traffic is preferred
- Landscaped buffer or wider sidewalks may be desirable depending on surrounding land use context
- Maintenance of buffer zone is responsibility of the adjacent landowner
- Bricks require frequent maintenance to maintain a level surface

SHARED-USE PATH

A shared use path, also called a multi-use path, is fully separated from the road and shared between cyclists, pedestrians, and other non-motorized modes. Side paths and rail trails are two specific types of shared use paths.

Shared Use Path Typical Dimensions	
Minimum	8 ft
Preferred	11 – 20 ft
Total preferred envelope	15 – 24 ft

Benefits

- Combined facility for bicyclists and pedestrians
- Provides separation from vehicle traffic
- Designed for all ages and abilities

Constraints

- Requires substantial buffer to separate from roadways
- Unlit paths may not be comfortable for users
- Potential conflicts with vehicle or other crossings

Typical Applications

- Links between communities and for recreation
- Parallel alternative route to roads in areas where sidewalks or on-street facilities are not provided
- Best for areas where crossings can be minimized

Design Considerations

- Apply high-visibility treatments where there are crossings
- Generally, should be designed with a width of 10 feet
- Preferred width varies from 11-20 feet with an additional 2 feet of lateral clearance on either side (1-foot minimum clearance)[2]
- Path width should be informed by the expected volume of users and the mix of cyclists and pedestrians
- Often installed along utility easements, streams, rivers, or other linear features

Side Path

Side paths are two-way paths, adjacent to a roadway, open to pedestrians, cyclists, and most other non-motorized users. They are typically 10-14 feet wide with a wide 5-foot buffer.

Rail Trail

Rail trails are two-way paths installed along active or abandoned rail corridors. Like all Shared-Use Paths, rail trails are open to pedestrians, cyclists, and most other non-motorized users.

[2] NACTO Urban Bikeway Design Guide Third Edition, 2025

EXCLUSIVE BIKE FACILITIES

Exclusive bike facilities vary by directionality, width, and level of separation from vehicle traffic.

Facility Characteristic	Description
Direction	Bike lanes may be one-way, two-way, or contraflow. **Contraflow bike lanes** allow cyclists to ride in the opposite direction of vehicle traffic, converting a low-speed and low-volume one-way traffic street for cars into a two-way street for bikes. **Two-way bike lanes,** also known as two-way cycle tracks, serve bidirectional bicycle travel on one side of the street.
Width	The minimum width for a bike lane is 5 feet when against a curb and 6 feet when against parking. Additional width depends on various factors such as vehicle speeds, traffic volume, and elevation. For example, **climbing bike lanes** provide extra space for cyclists to manoeuvre when riding uphill.
Level of Separation	Bike lanes are often described by the level of separation the facility provides. **Separated bike lanes** have a vertical separation achieved with grade separation, curbing, flex posts, or other vertical elements. **Buffered bike lanes** have a striped buffer to create space between bikes and vehicle traffic. A bike lane is striped for exclusive use by cyclists but is not buffered or physically separated from traffic or parking.

Separated Bike Lane

Sidewalk-level Separated Bike Lane

Source: NACTO, Raised Cycle Tracks

Parking-Protected Bike Lane

Separated bike lanes (SBL), also called protected bike lanes, have vertical separation between bikes and vehicle traffic. Separation could be achieved with grade separation, curbing, flex posts, planters, or even a parking lane (parking-protected bike lanes). Separated bike lanes can be one-way or two-way.

Benefits

- Separates bikes from vehicle traffic
- Less chance of "dooring" – opening a door into a bicyclist, when parked cars are present

Constraints

- Challenging winter maintenance and plowing
- Existing roadway width

Typical Applications

- Links with adequate right-of-way or where a road diet can be implemented
- Critical bike network segments where additional protection is warranted

Design Considerations

- Intersections should be designed for visibility of bicyclists and may warrant separate signal phasing depending on context
- Buffer type varies depending on application, presence of parking, and available right-of-way
- Must be sufficiently wide at all points to allow for a sweeper to pass (approx. 5')
- Parking-protected bike lane must have at least a 3-foot buffer to allow vehicle doors to open

Parking Protected or Parking Separated Bike Lane Typical Dimensions (NACTO)				
	Unidirectional SBL	Buffer	Buffer adjacent to parking	Bidirectional SBL
Constrained				8 ft
Minimum	5 ft	2 ft	3 ft	13 ft
Preferred	6-9 ft	2-5 ft	3-5 ft	13+ ft
Total Facility Width (Unidirectional)	8-12.5 ft			

Buffered Bike Lane

A buffered bike lane is an on-street facility that provides an additional striped buffer of typically 2-3 feet. A buffer may be used between the bike lane and the travel lane, between the bike lane and a parking lane, or both.

Buffered Bike Lane Typical Dimensions[3]	
Minimum	4 ft
Preferred	6 ft
Buffer	2-4 ft
Buffer adjacent to parking	3 ft

Benefits

- Less chance of "dooring", opening a door into a bicyclist, when parked cars are present
- Added separation from vehicles

Constraints

- Does not provide physical protection
- Vehicles may use additional buffer width as parking or standing zone

Typical Applications

- Links with moderate vehicle speeds or volumes
- Streets with adequate right-of-way to provide a buffer
- Important links within and between communities

Design Considerations

- Buffer may consist of diagonal striping or rumble strips to deter vehicles from using the buffer space

[3] NACTO Urban Bikeway Design Guide Third Edition, 2025

Bike Lane

A bike lane is an on-street facility that provides space reserved for bicyclists, delineated with pavement markings.

Benefits

- Provides a designated space for people biking
- Increases visibility for people biking
- Inexpensive treatment when width is available

Constraints

- Greater change of "dooring," opening a door into a bicyclist
- Does not provide physical protection
- Vehicles may use additional buffer width as parking or standing zone
- Not suitable for all ages and abilities

Bike Lane Typical Dimensions[4]	
Constrained	4 ft
Minimum	6 ft
Preferred	7 ft
Preferred adjacent to parking (bike lane and buffer)	7-9 ft from edge of parking lane

Typical Applications

- Streets without sufficient right-of-way or pavement width to provide buffered or separated bike lanes

Design Considerations

- Should only be used when other forms of exclusive bike facilities are infeasible
- Striping can add visibility and awareness at intersections

[4] NACTO Urban Bikeway Design Guide Third Edition, 2025

BIKE BOULEVARD

A bike boulevard is a bike route on a low speed, low volume, and high comfort local street and is supplemented with traffic calming. The network role is emphasized with wayfinding signs and shared lane markings.

If vehicle speeds and volumes on a corridor are outside of the appropriate range for a bike boulevard, traffic calming and circulation strategies must be used before designating a route as a bicycle boulevard. See the *Bicycle Facility Selection* for more information on whether a corridor is appropriate for a bike boulevard.

Bike Boulevard Typical Signing[6]	
BIKE ROUTE	MUTCD D11-1
BICYCLES ALLOWED USE OF FULL LANE (supplemental)	MUTCD R9-20
Portsmouth Branded Wayfinding Signs	

Bike Boulevard Roadway Characteristics[7]	
Vehicle operating speeds (if dissimilar to posted speeds)	< 20 mph
Vehicle volumes	< 2,000 ADT

Benefits

- Communicate and increase awareness of preferred cycling routes without major infrastructure investment
- Additional benefits to the neighborhood from traffic calming

Constraints

- "Invisible" bicycle routes are less intuitive to new cyclists
- Do not provide designated space or protection for cyclists

Typical Applications

- Bicycle corridors through neighborhoods, often forming the bulk of a low stress cycling network

Design Considerations

- May include sharrows and advisory bike lanes throughout, and bike boxes and lanes at difficult links and intersections
- Centerline stripes should be omitted midblock where possible and are optional as channelization on intersection approaches
- Typically includes cycling-specific wayfinding elements
- Traffic calming should include physical elements such as speed humps, chicanes, and diverters to reduce vehicle speeds to a target speed of 20 mph or less[5]

[5] NACTO Urban Bikeway Design Guide Third Edition, 2025
[6] NACTO Urban Bikeway Design Guide Third Edition, 2025
[7] FHWA Bikeway Selection Guide, 2019

TRAFFIC CALMING

Traffic calming treatments are physical elements like speed humps, chicanes, hardened centerlines, and slow-turn wedges can be added to the street to create friction, which slows vehicle speeds, and enhance visibility. Some elements can be designed to accommodate emergency response vehicles.

Chicanes

Source: City of Seattle Design Standards

Chicanes and pinch points are curb extensions, planters, or other installations intended to narrow or shift the roadway; these counteract the fact that wide, open, and straight roadways encourage high driver speeds.

Speed Cushion

Source: VDOT[8]

Speed cushions are speed humps or speed tables that include wheel cutouts to allow large vehicles, such as emergency vehicles, trucks, and buses, to pass unaffected.

Benefits

- Reduces driver speeds
- Increases attentiveness in critical areas
- Low-cost and simple implementation

Constraints

- Possible effects to drainage
- Consideration of emergency vehicles and heavy vehicles when selecting vertical or horizontal treatments

Typical Applications

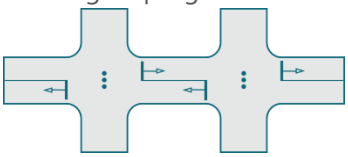
- Vertical deflection typically not considered on roads with speeds greater than 30 mph or volumes greater than 9,000 ADT
- Vertical deflection treatments should be avoided on bus routes, except in the case of speed cushions which are designed to allow large vehicles to pass unaffected
- See also **Portsmouth Complete Streets Guide**

Design Considerations

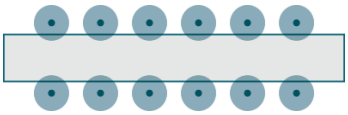
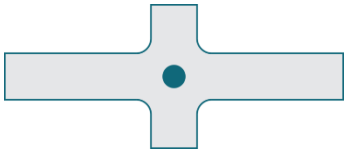
- Traffic calming measures should be applied consistently along a corridor or throughout a neighborhood to be most effective and legible to community members (for example, a series of curb extensions is more predictable than a variety of one-off treatments)
- Treatments can be combined (for example, a series of speed cushions along with lane narrowing)
- Horizontal deflection should be designed considering taper lengths for the corridor's speed
- See **Table 3** for different treatments

[8] VDOT Traffic Calming Fact Sheet. https://www.vdot.virginia.gov/media/vdotvirginiagov/about/programs/neighborhood-traffic/TrafficCalmingFACTS_acc09132024_RM.pdf

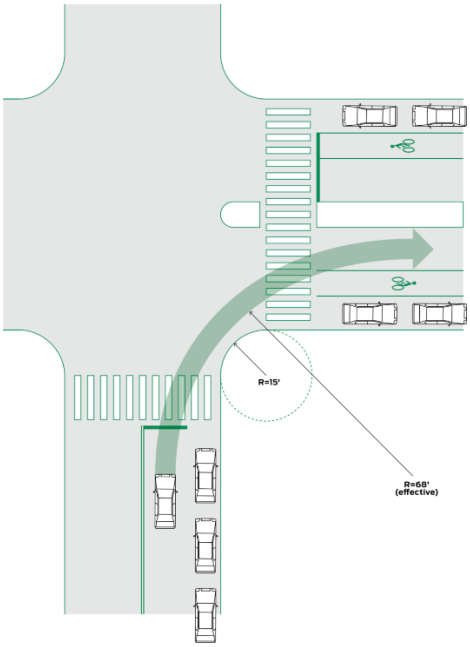
Table 3. Traffic Calming Treatments

Type	Description	Examples[9]
Horizontal deflection	Slow vehicles by requiring drivers to move with caution through narrow or deflection points and can help reduce pedestrian crossing distances.	Median  ***See also Pedestrian Crossing Island***
		Neckdown 
		Chicane 
		Lane Shift  ***See Curb Extension (Bump Out)***
Vertical deflection	Vertical deflection treatments are only comfortable for drivers to go over at around 20 mph.[10] Elevating pedestrians at crossing locations helps improve visibility.	***See Raised Crossing or Intersection***
		Speed humps, tables, or cushions 
Circulation and operations	Diverters and circulation changes can be used to limit vehicle traffic on a specific corridor or reduce cut through traffic. Coordinated signals can be timed to encourage a set driving speed.	Diverter 
		Signal progression 
Narrowing		Street trees

[9] Images from NACTO Urban Street Design Guide
[10] City of Boston, About Speed Humps. https://www.boston.gov/departments/transportation/making-neighborhood-streets-safer

Type	Description	Examples[9]
	Narrowing travel lanes reduces operating space. Visual cues encourage slower driving speeds.	
		On-street parking 
		Narrow travel lanes
Intersections	Tighter turning radii require drivers to make turns more slowly and improves sightlines with crossing pedestrians and bicyclists.	***See Intersection Tightening***
		See Protected Intersection
		Hardened centerline
		Roundabout 

INTERSECTION TIGHTENING



Source: NACTO Urban Design Guide

Intersection tightening involves reducing corner radii to create an overall smaller intersection footprint.

Benefits

- Slower vehicle speeds when turning
- Improved intersection visibility
- Shorter pedestrian crossing distances
- Can create opportunities to expand and enhance the pedestrian realm

Constraints

- Can result in drivers oversteering or cutting corners into opposing lanes

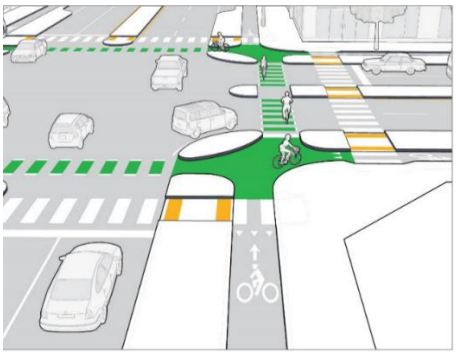
Typical Applications

- Highway Safety Improvement Program (HSIP) cluster intersections
- Roadways with high traffic volumes and/or pedestrian activity

Design Considerations

- Use the smallest radius possible for the design vehicle
- Design so that emergency vehicles can use the full area of the intersection for making turns, thus permitting overall tighter design.
- Consider truck aprons that can be mounted by large vehicles
- Recessed stop bars can mitigate potential oversteering conflicts
- Remove slip lanes where possible

PROTECTED INTERSECTION



Source: County of Arlington, VA

A protected intersection is designed to physically separate cyclists and pedestrians from cars where the potential for conflict is highest. Right-turning vehicles are provided with a yield zone and crossing cyclists and pedestrians are physically separated by a cornerstone, or buffer, from right-turning vehicle traffic.

Benefits

- Clarify the preferred path of travel through the intersection to help avoid potential conflicts
- Allows right-turn-on-red for cyclists

Constraints

- May add to delays for intersections at capacity
- May require additional right-of-way

Typical Applications

- Any intersection with separated bike lanes or shared-use path approaches
- While the geometric elements of a protected intersection can be applied at unsignalized intersections for greater protection, slower vehicle turning speeds, and improved visibility, a fully protected intersection requires signalization to separate cyclists and pedestrians completely from vehicle movements

Design Considerations

- Protected intersections should be combined with high-visibility crosswalk markings and separated bike lanes
- May be combined with other pedestrian crossing counter measures such as crossing islands and leading pedestrian interval (LPI)

TRAILHEAD

Source: City of Framingham, MA

A trail head is a signed location along a shared-use path that provides amenities such as maps, wayfinding, trash cans, seating, shelter, drinking fountains, and restrooms.

Benefits

- Provides wayfinding and directions to users
- Offers a place to relax or meet before or after trail use

Constraints

- Requires maintenance to ensure functionality

Typical Applications

- Streets, paths, or parks where a path or trail is accessed

Design Considerations

- Trailheads should be highly visible and signed

HIGH-VISIBILITY CROSSWALK

Crosswalk Typical Dimensions	
Minimum	6 ft

High visibility crosswalks are reflective roadway markings that may be accompanied by signage at intersections and priority pedestrian crossing locations.

Benefits

- Provides awareness to drivers that people may be crossing
- Requires motorists to stop for people walking in crosswalk
- Relatively low cost

Constraints

- Compliance not as high at uncontrolled locations compared to other treatments
- Most effective with other types of traffic control

Typical Applications

- Intersections of vehicle facilities with moderate to high vehicle volumes and speeds
- Midblock locations, particularly when implemented with other treatments

Design Considerations

- Minimum width is 6 feet, but wider crossings may be preferred in areas with a high number of people walking
- Crosswalks must be paired with reciprocal ADA accessible curb ramps
- High-visibility crosswalk striping may be paired with other visibility enhancements, such as pedestrian warning signs, in-street signage, advance stop bars, and/or parking restrictions near intersections (daylighting)
- Restrict on-street parking for 20 feet in advance of a crosswalk to provide “daylighting” that improves pedestrian and driver sightlines

CURB RAMP

Source: City of Portland, OR

A curb ramp provides a smooth, accessible transition between the sidewalk and the street for people crossing. Many intersections in the study area do not currently have them.

Benefits

- Provides accessible crossings for people with low vision and people using wheelchairs, strollers, and other mobility devices
- Required to comply with the ADA

Constraints

- ADA design requirements can be complex to achieve

Typical Applications

- Any intersection of a street with a sidewalk or multi-use path
- Typically added to areas as redevelopment occurs

Design Considerations

- Design must follow ADA design requirements

CURB EXTENSION (BUMP OUT)

Concrete Curb Extension

Quick-Build Curb Extension

Curb Extension Typical Dimensions	
Typical Width	6 ft

A curb extension, also known as a bump out, is an extension of the sidewalk into the street at a crossing. It narrows the vehicle traveled way and the crossing distance for people walking and increases visibility between people walking, biking, and driving.

Benefits

- Shortens crossing distances
- Reduces vehicular turning speeds
- Increases visibility between people driving and walking

Constraints

- Can only be used on streets with on-street parking
- Greater cost to install than standard crosswalks
- May conflict with bike or transit lanes

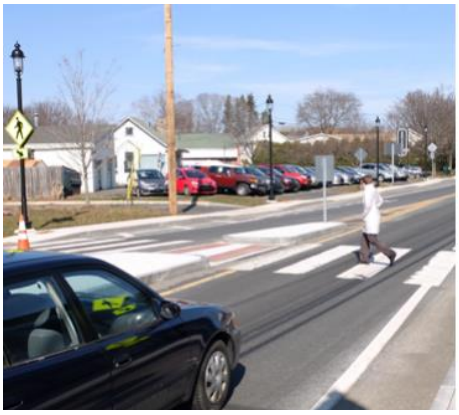
Typical Applications

- Midblock or intersection pedestrian crossings or transit stops
- Streets with on-street parking

Design Considerations

- Design vehicle for the street will determine the curb radius
- Provide accessible curb ramps and detectable warnings
- Impacts or opportunities for landscaping or green infrastructure should be considered
- Can be applied midblock and/or combined with raised crossings
- Curb extensions are typically 6 feet wide, filling most of a travel lane

PEDESTRIAN CROSSING ISLAND



Source: MassDOT Municipal Resources Guide for Walkability

Pedestrian Crossing Island Typical Dimensions	
Minimum	6 ft

A pedestrian crossing island is a protected area in the middle of a crosswalk that provides refuge and narrows the space pedestrians have to cross.

Benefits

- Reduces exposure of people walking
- Requires shorter gaps in traffic to cross street
- Allows people to cross in two stages

Constraints

- Available right-of-way or existing pavement width may not provide adequate space to add a median island
- If included, landscaping requires an agreement on maintenance responsibility

Typical Applications

- Midblock for areas with large distances between crossings
- Intersections with high traffic volumes or with a notable crash history
- Intersections with medians or unused center turn lanes

Design Considerations

- Must have 6 feet of clear width to accommodate people in wheelchairs
- Tactile warning panels are needed within the pedestrian crossing island
- A median with width less than 6 feet can be used as a traffic calming strategy, but is not considered a refuge

RAISED CROSSING OR INTERSECTION

Source: Streetsblog Mass

Crosswalks or intersections may be raised to the elevation of the sidewalk, effectively creating a speed hump to slow approaching drivers, increasing pedestrian visibility, and allowing pedestrians to cross without changing grade.

Benefits

- Adds further conspicuity to crosswalks
- Encourages slow vehicle speeds at pedestrian crossings
- More accessible to a wider range of pedestrians

Constraints

- More expensive than other crosswalk treatments
- Impacts to drainage

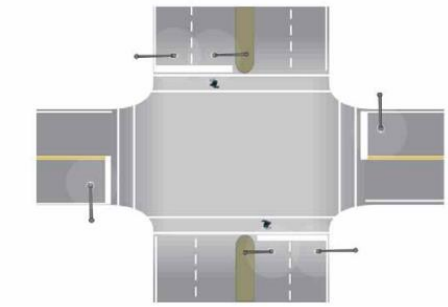
Typical Applications

- Low-speed facilities with a high volume of crossing pedestrians
- Locations where pedestrians with mobility needs are present, such as older adults, people with strollers, and people in mobility devices

Design Considerations

- Replaces the need for curb ramps when a retrofit to install them is warranted
- Entire intersections may be raised as well
- Tactile surfaces should be placed at the entrance to the crosswalk to alert pedestrians with low vision
- Bollards or other vertical elements can be installed to prevent vehicles entering the sidewalk
- Lower-angle approaches required to address bottom-out concerns for buses and damage from snowplows
- A raised crossing must have a level path at least 3 feet wide

PEDESTRIAN-SCALE LIGHTING



Source: FHWA Informational Report on Lighting Design for Midblock Crosswalks

Pedestrian-scale lighting illuminates pedestrian facilities such as sidewalks, paths, and crossings. Pedestrian-scale lighting is typically closer to the ground than roadway lighting. Pedestrian lighting along a facility may also improve pedestrians' level of perceived safety of the facility. Pedestrian lighting at a crossing may make it easier for drivers to see pedestrians during dark or poor weather conditions.

Benefits

- Improves the visibility of people walking and biking in crosswalks
- Enhances drivers' sight distance
- Encourages foot traffic and can make local establishments inviting

Constraints

- Requires space in potentially busy areas, such as sidewalks or intersections

Typical Applications

- Areas of high traffic for people biking and walking, such as bus stations, shopping centers, schools, and shared use paths
- Corridors with commercial activity

Design Considerations

- Lighting fixtures should not be placed where they block entrances or inhibit pedestrian flow
- Size and type of light fixture may vary depending on the surrounding context and available space

RESTRICTED VEHICULAR ACCESS

Splitter Island

Source: Weston & Sampson, Inc.

Splitter islands, gates, or bollards limit vehicle access while allowing pedestrian and cyclist passage, as well as emergency and maintenance vehicle access.

Benefits

- Reduces the likelihood of unauthorized vehicle access on streets and paths with bike- or pedestrian-only right-of-way

Constraints

- Bollards and gates can inconvenience cyclists

Typical Applications

- Entrances to shared-use paths, pedestrian streets, or closed through-streets

Design Considerations

- Splitter islands or landscaped median islands are the preferred treatment
- Bollards must be high visibility to mitigate risk to cyclists
- Bollards and gates must be designed to permit a range of bicycle sizes and turning ability (e.g., bike trailers)
- Use signing to indicate that the path or roadway is open to cyclists and pedestrians and closed to vehicular access

SIGNALIZATION

Source: Youtube.com

Signalization separates vehicle, pedestrian, and bicycle movements in time at high volume or complex intersections. Signal design should establish clear multimodal goals so that the needs of pedestrians, bicyclists, and transit riders are prioritized in addition to vehicle through-put.

Benefits

- Ability to completely separate movements at complex or dangerous intersections
- Coordinated signals can be used to control vehicle speeds along a corridor

Constraints

- May add to delay
- Existing equipment may limit complex signaling and phasing

Typical Applications

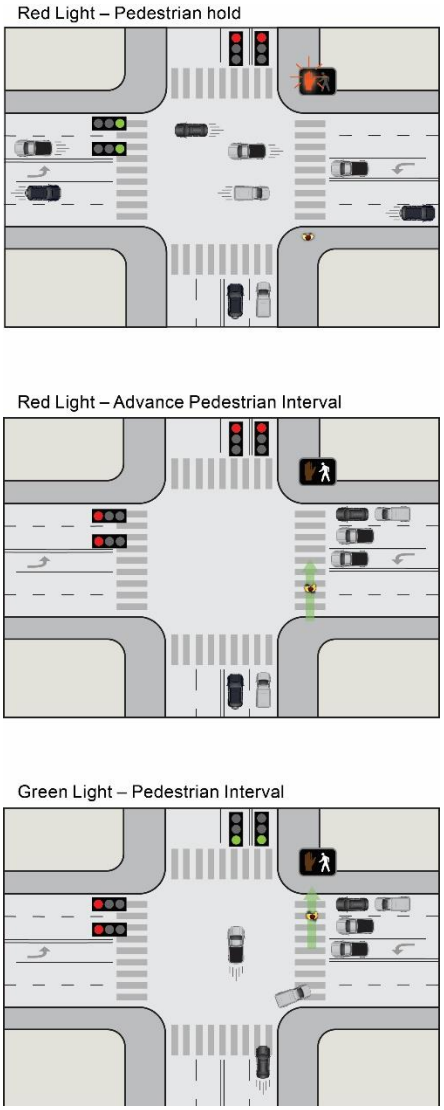
- Intersections with a history of vehicle-pedestrian or cyclist crashes
- Intersections where right-turning vehicles do not yield to pedestrians or cyclists
- Intersections that meet signal warrants

Design Considerations[11]

- Include pedestrian countdown signal head and APS
- Should be applied in combination with other treatments
- Shorten signal cycles to increase turnover, thus minimizing delay
- Prioritize walking, bicycling, and transit (for example, transit signal priority on priority bus routes)
- Keep the number of signal phases to a minimum

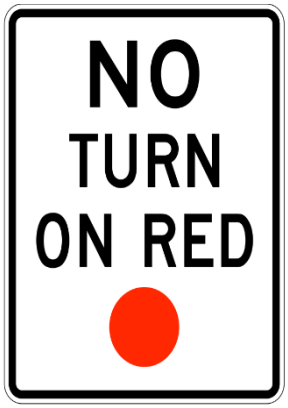
[11] See also NACTO Urban Street Design Guide

Leading Pedestrian Interval



A leading pedestrian interval is a signal modification that allows pedestrians to begin crossing before concurrent green phases with same-direction traffic. It is intended to reduce potential conflicts between vehicles and pedestrians at the start of the signal cycle.

No Right Turn on Red



Source: Manual on Uniform Traffic Control Devices (MUTCD)

No right turn on red is signage placed at a signalized intersection to restrict drivers from turning right during a red light.

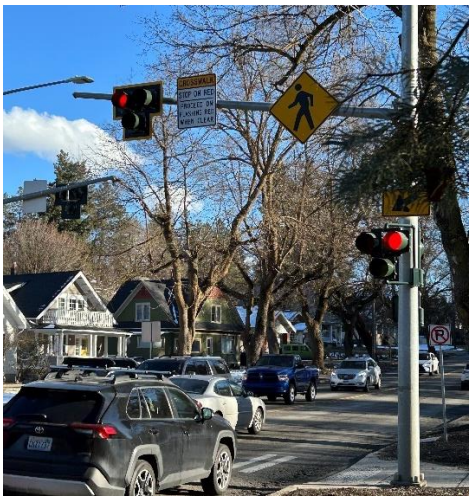
Bike Signal

Source: City of Cambridge, MA

A bike signal is intended for the exclusive use of bicycle traffic. It is used to provide phasing for bicycle traffic at complex or high-volume intersections. It may also be applied at intersections with travel patterns unique to bicyclists (e.g., contraflow or protected bicycle facilities).

PEDESTRIAN BEACONS

Pedestrian Hybrid Beacon



A pedestrian hybrid beacon (PHB, also called a HAWK signal) is a pedestrian-activated signal. It begins with a yellow light alerting drivers to slow, then displays a solid red light to allow people walking to cross the street. Flashing red indications signal to drivers that they may proceed with caution after people have finished crossing.

Benefits

- High rate of driver yielding behavior
- Improves safety for people walking and reduces pedestrian crashes

Constraints

- Must be activated by people walking
- Can be more costly than other crossing treatments

Typical Applications

- Midblock crossings with high pedestrian or bicycle demand and high traffic volumes or speeds
- Shared use path crossings of larger roadways

Design Considerations

- Push button placement should be easily accessible to people walking, in wheelchairs, and bicycling

Rapid Rectangular Flashing Beacon (RRFB)

Source: MassDOT Municipal Resources Guide for Walkability

A Rapid Rectangular Flashing Beacon (RRFB) includes signs that have a pedestrian-activated flashing light to attract driver attention and provide awareness of people walking or biking crossing the roadway.

Benefits

- Provides a visible warning to drivers at eye level
- Increases driver yielding behavior at crossings
- Allows drivers to proceed after yielding

Constraints

- Must be activated by people walking
- Driver compliance may be lower than when compared with a traffic signal or HAWK signal

Typical Applications

- Midblock crossings with high pedestrian or bicycle demand and high traffic volumes
- Crossing treatment for shared use paths

Design Considerations

- Push button placement should be easily accessible to people walking, in wheelchairs, and bicycling
- Can be added in median island for multi-stage crossings

BIKE LANE INTERSECTION STRIPING

Pavement markings are used to continue a bike lane through an intersection or "conflict zones", such as passing a s or driveway entrance.

Benefits

- Increases driver awareness of people biking
- Aids bicyclists in knowing where to cross

Constraints

- May require additional maintenance due to vehicles crossing pavement markings more frequently

Typical Applications

- Intersections and conflict zones

Design Considerations

- White dashed lines should be used at a minimum to extend a bike lane through an intersection or across a conflict zone
- Dashed green pavement can enhance driver awareness and bicyclist visibility

BIKE BOX

Bike boxes use paint to allow cyclists to position ahead of vehicles at signalized intersections.

Benefits

- Increases driver awareness of people biking
- Reduces delay and complexity for cyclists at difficult intersections
- Reduces vehicle encroachment on crosswalk

Constraints

- Requires no-turn-on-red restriction
- Potential reduction in vehicle throughput when there is a high volume of right turns

Typical Applications

- Signalized intersections with high volumes of bicycles and vehicles, especially those with left-turning bicyclists and/or right turning motorist

Design Considerations

- Green paint with bicycle legend is used to stripe the bike box
- Stop bar for vehicles is in advance of the bike box, requiring drivers to stop and wait behind cyclists at the light
- Bike box should span the full width of the approach lanes and have a preferred depth of at least 12 feet
- Two-stage turn boxes may also be used to help facilitate left turns
- Bike boxes that extend across more than one lane must be accompanied by countdown pedestrian signals for the crosswalk or pedestrian crossing movement that crosses the approach

Two-Stage Turn Box

BIKE PARKING

Bike parking provides space for people to store bicycles at or near destinations. Parking facilities include racks, lockers, and covered areas. The type of bike parking depends on the anticipated duration of stay, type of destination, and security needs.

Benefits

- Formalizes and organizes bike parking instead of *ad hoc* parking along street signs and railings
- Prevents bicycle theft
- Sheltered parking protects bikes from the elements

Constraints

- Can be challenging to site on narrow sidewalks
- Periodic maintenance needed to remove abandoned bikes

Typical Applications

- Areas with a high potential for cycling activity such as commercial districts, parks and recreation sites, schools, transit centers, libraries and community destinations
- Covered bike parking is best for locations where patrons will be parked for longer periods

Design Considerations[12]

- **Short-term bike parking**: Bike parking should be highly visible and conveniently located near entrances of the destinations being served
- **Long-term bike parking**: Security and weather protection are more important than visibility and convenience for bikes being stored across multiple hours
- Suitable bike racks allow bikes to be locked via the frame
- Use "inverted U" or "post and loop racks" for secure and space-efficient bike parking
- Typical dimensions are 6x2 feet for a single rack
- Parking siting should ensure that the pedestrian path is not blocked, including space for parked bikes
- Avoid siting parking too close to walls or other obstructions that can limit the direction or type of bicycle that can be locked

[12] See also APBP Essentials of Bike Parking, 2015

BIKE MAINTENANCE STATION

Source: MA-PA Heritage Trail

Bike maintenance stations provide common bicycle maintenance equipment, such as an air hose, a repair stand, wrenches, and screwdrivers, for impromptu bicycle repairs.

Benefits

- Allows cyclists to perform minor repairs or fill tires with air
- Increases the visibility of bicycling

Constraints

- Requires maintenance to ensure functionality

Typical Applications

- Bike parking areas, trailheads, or adjacent to bike shops

Design Considerations

- Station siting should ensure that the pedestrian path is not blocked, including space for a bike
- Bike maintenance stations should be located with adequate lighting to prevent theft or vandalism
- Stations with shelter are beneficial during inclement weather

PARKLET

Source: Street Lab Project

A parklet is a permanent or temporary gathering area installed in the street adjacent to the curb. It provides additional sidewalk space and is often used for outdoor dining.

Benefits

- Extends the pedestrian realm
- Provides placemaking and streetscaping opportunities
- Encourages leisure and street activation
- Increase revenues for local businesses

Constraints

- May require curbside parking removal
- Seasonality

Typical Applications

- Streets with high pedestrian volumes
- Commercial districts
- Streets with high demand for seating or landscaping
- Often constructed with non-permanent features and can be year-round or seasonal

Design Considerations[13]

- Usually the width of a parking lane (7-9 feet) and the length of one or more parking spaces (20+ feet)
- Can also be installed as part of T-ing up or tightening an intersection
- Can be managed publicly or through agreements with businesses and abutters

[13] See also NACTO Urban Street Design Guide

TRAFFIC GARDEN

Source: Knight Creative Communities Institute

A traffic garden, sometimes called a "safety town", is a miniaturized street network complete with scaled traffic elements designed to teach young children the rules of the road and provide a car-free space for walking and biking.

Benefits

- Promotes traffic safety skills
- Creates a comfortable space for children learning to bike
- Repurposes empty parking lots

Constraints

- Rely on coordination with landscape architects, community groups, non-profits, or artists to design and implement

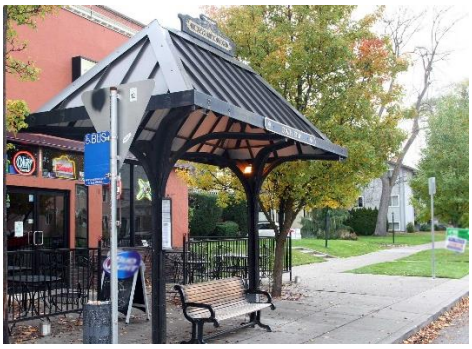
Typical Applications

- Underutilized parking lots, parks, and school playgrounds

Design Considerations

- Should not be in the path of travel for any vehicles

BUS STOP ENHANCEMENTS AND ACCESSIBILITY



Source: City of Spokane, Browne's Addition

Source: Everett Transportation Strategy

Bus stop enhancements such as seating, shade, shelter, bike parking, and trash cans improve the transit customer experience. Elements such as a level landing zone, bus bulbs, and floating bus islands can make it easier for passengers to board and alight.

Benefits

- Provides protection from elements and gives people a place to sit while waiting
- Reduces perceived wait times
- In-lane bus stops can help maintain efficient transit operations

Constraints

- More costly than a standard bus stop
- Requires additional sidewalk space beyond standard 6 feet

Typical Applications

- Stops with higher levels of activity or nearby land uses like senior communities, schools, or major trip generators

Design Considerations

- Shelters and trash cans should be cleaned and maintained regularly
- Opportunity to collaborate with COAST on existing plans for added stop shelters
- Accessible boarding areas are typically 8x5 feet wide
- Consider interactions between cyclists and buses, as well as cyclists and passengers boarding and alighting when bike facilities are adjacent to bus stops

Pedestrian Crossing Treatment Selection

Selecting an appropriate treatment for an uncontrolled pedestrian crossing depends on several factors including the number of lanes, traffic volume (shown as "Vehicle AADT", meaning annual average daily traffic, in the table below), and vehicle speeds. FHWA outlines which countermeasures should be considered based on these roadway characteristics in **Figure 3**. Similarly, **Figure 4** describes FHWA guidance for selecting pedestrian countermeasures based on existing safety issues.

Figure 3. Application of Pedestrian Crash Countermeasures by Roadway Feature

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	● ○ 2 4 5 6	● 5 6 7 9	○ 5 6 ● 9	● 4 5 6	● 5 6 7 9	○ 5 6 ● 9	● 4 5 6 7 9	○ 5 6 7 9	○ 5 6 ● 9
3 lanes with raised median (1 lane in each direction)	● ○ 2 3 4 5	● ● 5 7 9	○ ● 5 ● 9	○ 3 4 5 7 9	○ ● 5 ● 9	○ ● 5 ● 9	○ ● 4 5 7 9	○ ● 5 ● 9	○ ● 5 ● 9
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	● ○ 2 3 4 5 6 7 9	● ● 5 6 7 9	○ ● 5 6 ● 9	○ 3 4 5 6 7 9	○ ● 5 6 ● 9	○ ● 5 6 ● 9	○ ● 4 5 6 7 9	○ ● 5 6 ● 9	○ ● 5 6 ● 9
4+ lanes with raised median (2 or more lanes in each direction)	● ● 5 7 8 9	● ● 5 7 8 9	○ ● 5 8 ● 9	○ ● 5 7 8 9	○ ● 5 ● 8 9	○ ● 5 8 ● 9	○ ● 5 ● 7 8 9	○ ● 5 8 ● 9	○ ● 5 8 ● 9
4+ lanes w/o raised median (2 or more lanes in each direction)	● ● 5 6 7 8 9	○ ● 5 ◆ 7 8 9	○ ● 5 ◆ 8 ● 9	○ ● 5 ◆ 7 8 9	○ ● 5 ◆ ● 8 9	○ ● 5 ◆ 8 ● 9	○ ● 5 ◆ ● 7 8 9	○ ● 5 ◆ 8 ● 9	○ ● 5 ◆ 8 ● 9

Given the set of conditions in a cell,

- # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2. Raised crosswalk
3. Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4. In-Street Pedestrian Crossing sign
5. Curb extension
6. Pedestrian refuge island
7. Rectangular Rapid-Flashing Beacon (RRFB)**
8. Road Diet
9. Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

**It should be noted that the PHB and RRFB are not both installed at the same crossing location.

This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerwey, J. Feaganes, and B.J. Campbell. (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. http://www.cmfclearinghouse.org/; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). http://www.pedbikesafe.org/PEDSAFE/; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

FHWA Field Guide for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations

Figure 4. Safety Issues Addressed per Countermeasure

Pedestrian Crash Countermeasure for Uncontrolled Crossings	Safety Issue Addressed				
	Conflicts at crossing locations	Excessive vehicle speed	Inadequate conspicuity/ visibility	Drivers not yielding to pedestrians in crosswalks	Insufficient separation from traffic
Crosswalk visibility enhancement	✓	✓	✓	✓	✓
High-visibility crosswalk markings*	✓		✓	✓	
Parking restriction on crosswalk approach*	✓		✓	✓	
Improved nighttime lighting*	✓		✓		
Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line*	✓		✓	✓	✓
In-Street Pedestrian Crossing sign*	✓	✓	✓	✓	
Curb extension*	✓	✓	✓		✓
Raised crosswalk	✓	✓	✓	✓	
Pedestrian refuge island	✓	✓	✓		✓
Pedestrian Hybrid Beacon	✓	✓	✓	✓	
Road Diet	✓	✓	✓		✓
Rectangular Rapid-Flashing Beacon	✓		✓	✓	✓

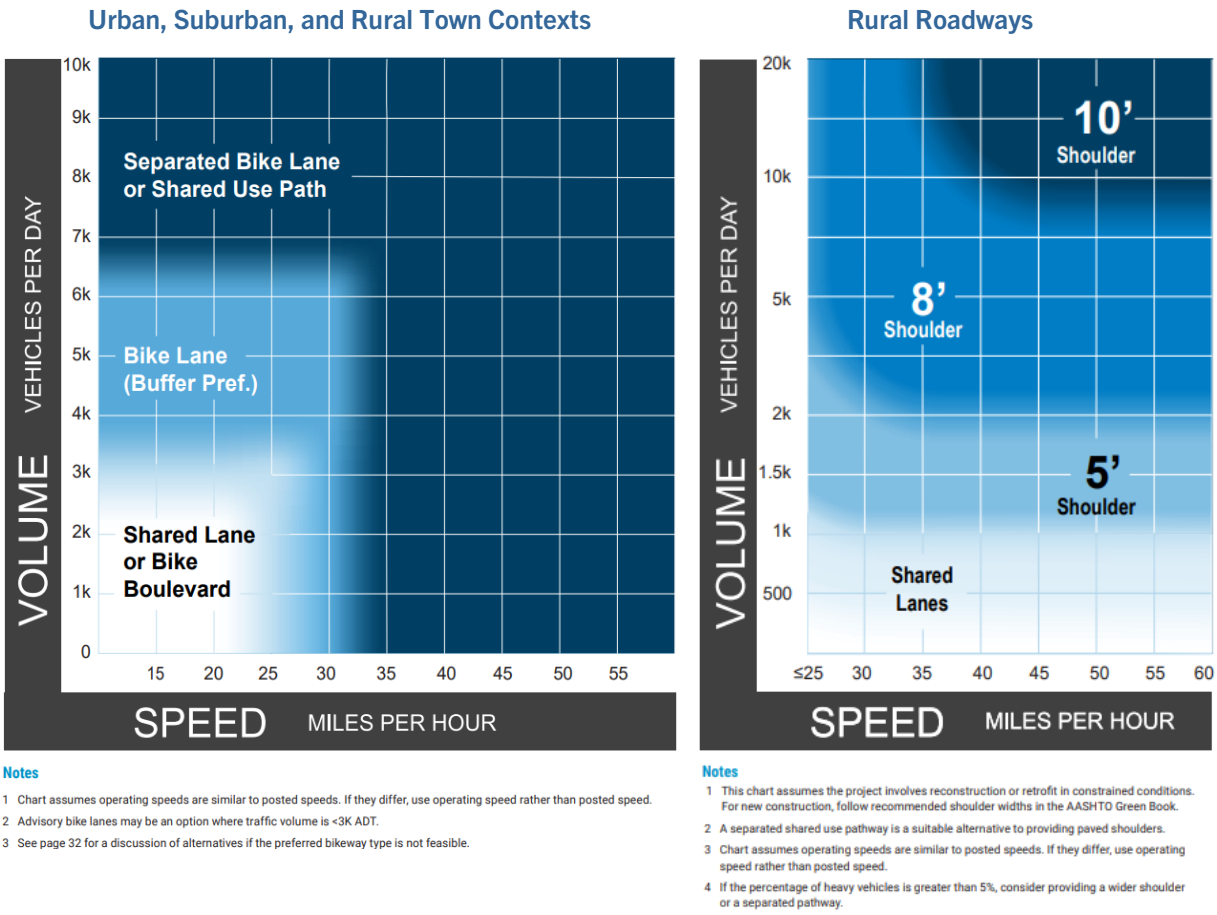
*These countermeasures make up the STEP countermeasure "crosswalk visibility enhancements." Multiple countermeasures may be implemented at a location as part of crosswalk visibility enhancements.

Source: FHWA Field Guide for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations

Bicycle Facility Selection

Bicycle facility selection is also based on the roadway characteristics of vehicle speed and volume. FHWA facility selection guidance for urban, suburban, and rural contexts, as shown in **Figure 5**, should be followed. In some cases, it may be possible to use traffic calming or circulation strategies to reduce either vehicle speeds or volumes on a corridor to align with a desired bicycle facility type.

Figure 5. Preferred Bikeway Types



FHWA Bikeway Selection Guide

Wayfinding

Bicycle and pedestrian wayfinding should be clear, simple, consistent, and visible. Wayfinding signs should be interpretable even by people with limited literacy or whose primary language is not English. Wayfinding is primarily communicated with signs but can also be supplemented with paint or pavement markings to provide route confirmation.

The City's Wayfinding Plan identifies design typologies for different types of wayfinding signs (**Figure 6**). The Wayfinding Plan and sign typologies are generally oriented to pedestrian and vehicle routing but can also be applicable to bicycling as well. The Wayfinding Plan also provides examples of bicycle-route signing (**Figure 7**), although these are not specific to Portsmouth.

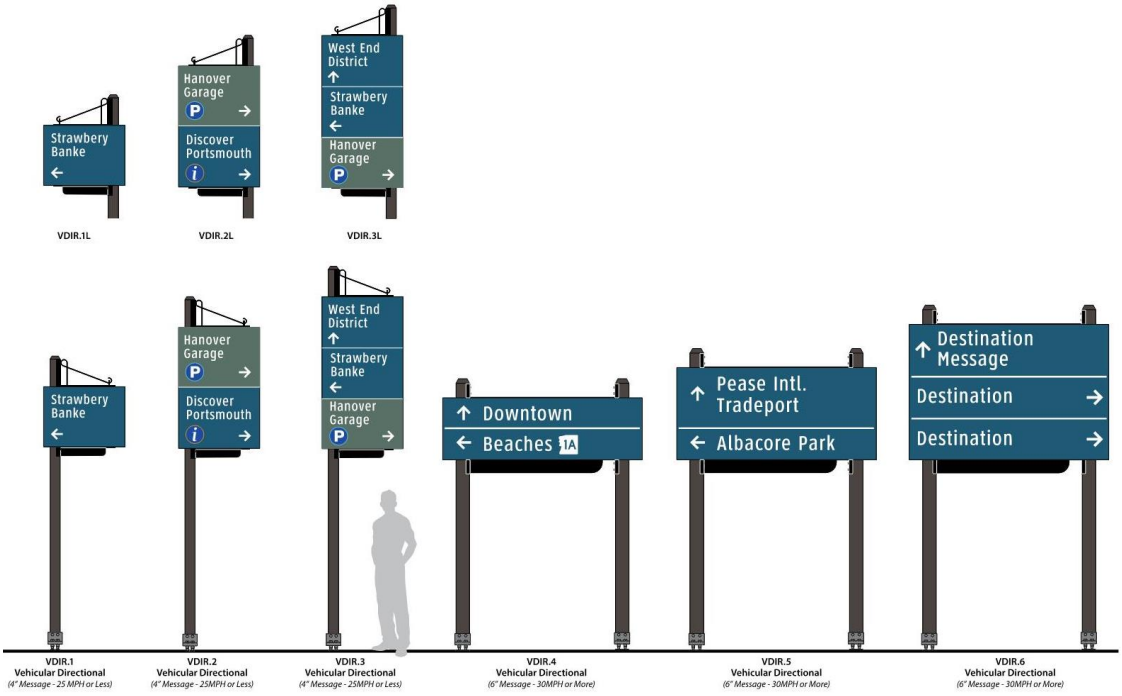
Table 4 describes the typical sign types and applications for pedestrian and bicycle wayfinding.

Wayfinding should be provided at arrival points and transitions. The Wayfinding Plan highlights the following relevant arrival points for people walking and biking:

- Natural pedestrian arrival, e.g., simply walking into Downtown
- Auto to pedestrian transition
- Public transportation to pedestrian transition
- Bicycle to pedestrian transition
- Water to pedestrian transition.

These arrival or transition points should include information for pedestrians and bicyclists at locations such as parking garages and parking lots, COAST and Wildcat Transit stops, bike racks, trailheads, and at bike shops or rental locations, and at appropriate City docks.

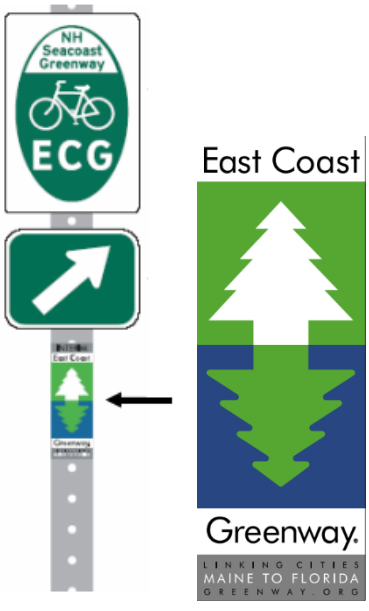
Figure 6. Portsmouth Wayfinding Typology Examples



Source: City of Portsmouth Wayfinding Plan

Figure 7. Bike Route Wayfinding Examples

Gresham, OR
Examples of bicycle/pedestrian sign system components.



SeaCoast Bike Route Signage
Directional signage includes East Coast Greenway identification.

Source: City of Portsmouth Wayfinding Plan

Table 4. Pedestrian and Bicycle Wayfinding Sign Types

Sign Type	Description	Example
	Pedestrian Wayfinding	
Pedestrian Direction	Directs to destinations within pedestrian zones. Located at intersections and/or street corners.	
Information Kiosks	Located at key gathering points. Includes logo, maps, brochures, directions and other information for visitors.	
Interpretive Signage	Provides a graphic and written narrative on historical context, data, and interesting facts regarding a site or destination	
Trail Signage	Identifies trails and directs to destinations within pedestrian zones. Located along trails and at intersections and/or street corners.	

Sign Type	Description	Example
	Bicycle Wayfinding	
Confirmation Signs	Indicate to bicyclists that they are on a designated bikeway and help make motorists aware of the bicycle route. Signs include distance and time but do not include arrows. Placement occurs about every 2 to 3 blocks along bicycle routes.	
Turn Signs	Indicate where a bikeway turns from one street onto another streets. They can also be accompanied by pavement markings. Placement occurs on the near-side of intersections where bike routes turn, i.e., where the street ceases to be a bicycle route or does not go through.	
Decision Signs	Mark the junction of two or more bikeways and inform bicyclists of the designated bike route to access destinations. Signs include destinations and arrows. Including distances and travel times are recommended. Placement occurs on the near-side of intersections in advance of a junction with another bicycle route and along a route to indicate a nearby destination.	

Sources: City of Portsmouth Wayfinding Plan; MassTrails Wayfinding Design Guide

While the Wayfinding Plan does provide some guidance for bicycle route signing, the Plan is primarily focused on pedestrian and driver applications. Additional guidance specific to bicycle wayfinding can be found in documents like the MassTrails Wayfinding Design Guide.

Figure 8, for example, illustrates preferred distances for directional signs and **Figure 9** provides an example signing layout for a shared use path midblock crossing.

Figure 8. Hierarchy of Destinations by Distance

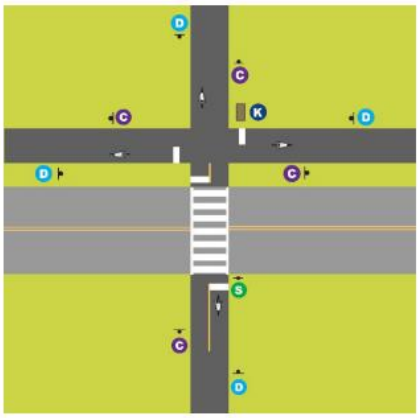
LEVEL 1
Cities, towns, and nationally or regionally significant destinations including landmarks and natural/recreation areas and paths

LEVEL 2
Districts and neighborhoods, downtowns, historic areas, seaports, transit stations

LEVEL 3
Local landmarks and cultural attractions, food/restroom/service areas, local parks, civic buildings, Councils on Aging, recreation areas, and libraries

Source: MassTrails Wayfinding Design Guide

Figure 9. Path Junction & Midblock Crossing



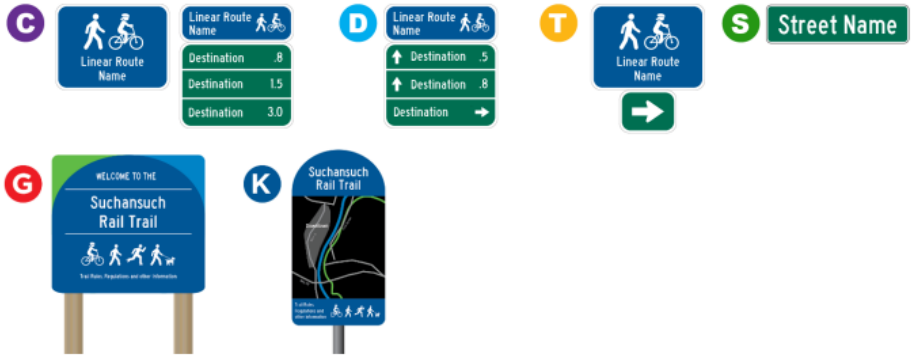


Figure 47. "C" - Confirmation/identification signs; "D" – Decision sign; "T" – Turn sign; "S" – Street sign; "G" – Gateway sign; "K" – Map kiosk

Source: MassTrails Wayfinding Design Guide

Regulatory and Warning Signs for Bicycles

The following MUTCD signs shown in Table 5 are relevant for bicycle network and facility design.

Table 5. Applicable Bikeway Regulatory Signs

Sign Image	Sign Name	Typical Application and Design Guidance
Corridor Regulatory Signs		
	SHARED-USE PATH RESTRICTION SIGN (R9-7)	- Apply in conjunction with pavement markings to delineate pedestrian and bicycle user envelopes. - These signs supplement white striping separating users and should not be applied without clear separated spaces for people walking and biking
	KEEP RIGHT EXCEPT TO PASS (R4-16)	
	SLOWER TRAFFIC KEEP RIGHT (R4-3)	- Apply regularly along the Bikeway, with additional applications at trailheads, access points, and following intersections. - These signs communicate the expectation that users keep right unless passing, which they should do with care. - Since bicyclists are typically traveling at higher speeds than pedestrians, they are expected to yield to the slower users until it is safe to pass them.
	PASS WITH CARE (R4-2)	
	YIEILD TO PEDS (R9-6)	
	DO NOT PASS (R4-1)	- Apply in areas where passing is not encouraged, such as on approaches to intersections or where sight distance is limited.

Sign Image	Sign Name	Typical Application and Design Guidance
Intersection Regulatory Signs - Bikeway		
	STOP (R-1)	- Apply at stop-controlled intersections between the Bikeway and an intersecting roadway. - Should be paired with a stop line.
	YIELD (R1-2)	- Apply at yield-controlled intersections between the Bikeway and an intersecting roadway. - May also apply at access points to direct people entering the Bikeway to yield to existing traffic. - May be paired with yield pavement markings.
	NO MOTOR VEHICLES (R5-3)	- Apply at intersections with roadways to communicate to drivers that motor vehicles are not permitted on the Bikeway (does not apply to electric bicycles)
	PUSH BUTTON FOR GREEN (R10-4)	- Apply at crossings where path users are required to push a button to request green
	TO REQUEST GREEN WAIT ON SYMBOL (R10-22)	- Apply at crossings where bicyclists are required to wait on the bicyclist symbol to request green
	PUSH BUTTON FOR GREN LIGHT (R10-24)	- Apply at crossings where bicyclists are required to push a button to request green
	BICYCLIST USE PED SIGNAL (R9-5)	- Apply at crossings where bicyclists need to use the pedestrian signal

Sign Image	Sign Name	Typical Application and Design Guidance
Intersection Regulatory Signs - Bikeway		
	BICYCLING SIGNAL (R10-10b)	- Apply at crossings where a bicycle signal directs bicyclists
	LEFT/RIGHT TURN MAY USE TURN BOX (D11-20)	- Apply at crossings with two-stage bicycle turn boxes
	YIELD HERE TO BICYCLES AND PEDESTRIANS (R1-5 ALT. B)	- Apply at midblock crossings where yield lines are provided ahead of a crosswalk across two or more traffic lanes traveling in the same direction. The sign and yield line denote the location for vehicles to yield to path users in the crossing. - These signs are not required if the crosswalk extends across a single lane of traffic in each direction and should not be used in locations where sign clutter is an issue.
	STOP HERE FOR BICYCLES AND PEDESTRIANS (R1-5B)	- Apply at midblock crossings where vehicle traffic is stop-controlled or required to stop for activated PHBs.
	TURNING VEHICLES YIELD TO BICYCLE AND PEDESTRIANS SIGN (R10-15 ALT.)	- Apply at side path intersections to notify drivers taking permissive left- or right-turns of the requirement to yield to people biking at the crossing. - For left turns, the sign should be mounted on the far side of the intersection to improve visibility.

Table 6. Applicable Bikeway Warning Signs

Sign Image	Sign Name	Typical Application and Design Guidance
Corridor Warning Signs		
	CURVE (W1-2)	- Apply at locations where the Bikeway curves significantly, necessitating a reduction in speed
	REVERSE CURVE (W1-4)	- Apply in locations where the Bikeway has a reverse curve, requiring a reduction in speed
	NARROW BRIDGE (W5-2)	- Apply at bridge crossings where the effective width of the Bikeway is reduced
	PATH NARROWS (W5-4A)	- Apply at locations where the Bikeway narrows considerably
	BICYCLE SURFACE CONDITION, SLIPPERY WHEN WET (W8-10, W8-10P)	- Apply at locations where the surface conditions are consistently hazardous and where bicyclists should take caution
	STOP AHEAD (W3-1)	- Apply ahead of stop-controlled intersections between the Bikeway and an intersecting roadway - Apply at least 50 feet in advance of the intersection

Sign Image	Sign Name	Typical Application and Design Guidance
Corridor Warning Signs		
	YIELD AHEAD (W3-2)	- Apply ahead of yield-controlled intersections between the Bikeway and an intersecting roadway - Apply at least 50 feet in advance of the intersection
	SIGNAL AHEAD (W3-3)	- Apply ahead of signalized intersections between the Bikeway and an intersecting roadway - Apply at least 50 feet in advance of the intersection
Intersection Warning Signs - Roadway		
	BICYCLE/PEDESTRIAN WARNING SIGN (W11-15)	- Apply at uncontrolled midblock crossings (i.e., where roadway users have priority) to alert drivers of approaching path users. - Can be combined with an RRFB.
	TRAIL CROSSING PLAQUE (W11-15p)	- Apply at uncontrolled midblock crossings as a supplemental plaque to BICYCLE/PEDESTRIAN WARNING (W11015).
	AHEAD PLAQUE (W16-9p)	- Apply as an advanced warning to uncontrolled midblock crossings as a supplemental plaque to BICYCLE/PEDESTRIAN WARNING (W11-15)

Section 6
Recommendations

RECOMMENDATIONS

Prioritization

While each recommendation in this Plan plays an important role in accomplishing the stated goals, the City will need to implement recommendations in phases, and expects to work towards this Plan's vision over the course of a decade. To aid in this long-term planning process, the City applied a prioritization process to each recommendation, leading to an overall ranking of low, medium, or high, which will be used to guide implementation timelines and funding priorities.

In addition to prioritization criteria, the City also separately considered organization criteria, which do not affect the prioritization ranking, but rather provide another reference point for informing project scheduling and cadence. The criteria used by the City to assess non-infrastructure projects are listed in **Table 7** and the criteria used to assess infrastructure projects are listed i**n Table 8**. The overall prioritization level is included in the recommendation tables below (**Table 9** and **Table 10**). See **Appendix C** for a full breakdown of the rankings of each individual prioritization and organizing criteria.

GOAL 1: Improve the safety and awareness of walking and bicycling in Portsmouth for all ages and abilities.

GOAL 2: Increase the number of walking and bicycling trips in Portsmouth.

GOAL 3: Advance Portsmouth's reputation as a City where walking and bicycling are a visible part of everyday and year round life and there are high-quality facilities that are well-maintained.

GOAL 4: Improve connectivity for walking and biking throughout Portsmouth and equitable access to key destinations like employment, schools, and transportation.

GOAL 5: Reduce greenhouse gas emissions and household transportation costs through the implementation of walking and biking improvements, and support complementary City priorities such as the Climate Action Plan's climate targets and supporting affordable housing.

Table 7. Non-Infrastructure Recommendations Criteria

Prioritization Criteria	Related Goals	High	Medium	Low
Safety	1	Direct impact on safety	Indirect impact on safety	Little impact on safety
Promote Walking and Biking	1, 2, 3, 5	Broad impact on awareness of walking and biking	Moderate impact on awareness of walking and biking	Limited impact on awareness of walking and biking
Remove Barriers	1, 2, 3, 4, 5	Direct impact on removing barriers to walking and biking	Indirect impact on removing barriers to walking and biking	Little impact on removing barriers to walking and biking
Organizing Criteria				
Feasibility	N/A	No known organizational or technical barriers	Either an organizational or technical barrier (but not both)	Both organizational and technical barriers
Cost/Level of Effort	N/A	Significant labor or capital costs for implementation and maintenance	Moderate labor or capital costs for implementation and maintenance	Limited labor or capital costs for implementation and maintenance

Table 8. Infrastructure Recommendations Criteria

Prioritization Criteria	Related Goals	High	Medium	Low
Safety	1	Direct safety impact	Indirect safety impact	Little safety impact
Connectivity	1, 2, 3, 4, 5	Fills a network gap or creates a critical connection	Expands or upgrades the existing network	Not a critical connection or requires other projects to be completed to connect to the network
Equity	3, 4, 5	Direct connections to or through areas or destinations with higher expected rates of youths or seniors, or low income or zero vehicle households	Indirect connections to or through areas or destinations with higher expected rates of youths or seniors, or low income or zero vehicle households	Little connection to or through areas or destinations with higher expected rates of youths or seniors, or low income or zero vehicle households
Public Realm Enhancement	1, 3	Direct opportunities to install amenities and enhance the experience for people walking or biking	Moderate opportunity to install amenities and enhance the experience for people walking or biking	Little or no opportunity to install amenities and enhance the experience for people walking or biking
Organizing Criteria	**Related Goals**	**High**	**Medium**	**Low**
Feasibility	N/A	Minimal design barriers	Some design barriers	Significant design challenges (new signals, ROW implications, constrained locations)
Implementation Timeframe	N/A	Potential for implementation in the next three years (little to no constructed elements)	Potential for implementation in the next five years (some constructed elements or minor signal modifications (changes to phasing, installation of beacons)	Potential for implementation beyond five years (significant design and construction)
Lifecycle Cost	N/A	Significant labor or capital costs for implementation and maintenance	Moderate labor or capital costs for implementation and maintenance	Limited labor or capital costs for implementation and maintenance

Non-Infrastructure Recommendations

The following non-infrastructure recommendations, listed in **Table 9**, are organized by the "5 E's", which are as follows:

- Education
- Encouragement
- Enforcement
- Engineering
- Evaluation

These broad categories all play an important role in enabling safer walking and biking and some recommendations include components of more than one E. The recommendations below reflect the category each one mainly falls into, along with the lead jurisdiction, associated City department, and the frequency of each effort.

Table 9. Non-Infrastructure Recommendations

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
High	**Provide bicycle safety classes for adults.** Classes should include education on safe riding skills, bicycle safety checks, rules of the road for bicyclists, and bicycle facilities and infrastructure. Provide support and partnership to organizations like SABR who provide these classes.	Education	Community	Planning Department	Ongoing	High	Low
High	**Provide bicycle safety classes for children on a regular cycle.** Courses should instruct children how to ride a bicycle, complete a bicycle safety check, safe riding skills, and the rules of the road. Schools should offer bicycle safety courses as part of the Safe Routes to School program or through other programming. Identify opportunities for key partners beyond schools.	Education	City	School Department	Ongoing	Medium	Low
Medium	**Distribute informational brochure on bicycling rules and responsibilities.** Provide support and partnership to BWANH and	Education	City	Planning Department	Ongoing	High	Low

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	SABR to distribute brochures to realtors, businesses, schools, and City departments with information and education about bicycle facilities, laws, and safe riding. Promote the brochures through a City web page dedicated to bicycle safety in Portsmouth.						
Medium	**Provide bicycle maintenance classes for youths and adults.** Bicycle maintenance classes provide the basic skills needed for casual riders to maintain bicycles for transportation and recreation. Provide support and partnership to organizations like SABR who provide these classes.	Education	Community	Planning Department	Ongoing	Medium	Low
Medium	**Provide education and training to City staff on bicycle and pedestrian planning and engineering.** Education may include online or in-person training from Association of Pedestrian and Bicycle Professionals, Pedestrian and Bicycle Information Center, American Planning Association,	Education	City	Public Works Department	Ongoing	High	Low

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	Institute of Transportation Engineers, or other organizations. Host mandatory training sessions on an annual basis. Identify opportunities to collaborate with outside partners to provide trainings.						
Low	**Provide education and ongoing training to law enforcement personnel on bicycle and pedestrian rights and responsibilities.** Education may include online or in-person training from Association of Pedestrian and Bicycle Professionals, Pedestrian and Bicycle Information Center, American Planning Association, Institute of Transportation Engineers, or other organizations. Provide resources for optional training in addition to ongoing informal roll call settings related to safety for people walking and biking.	Education	City	Police Department	Ongoing	High	Low
High	**Develop biking and walking maps.** Printed and online version	Encouragement	City	Planning Department	5 years	Medium	Medium

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	should be developed and include information such as preferred bike routes, walking paths and trails, distances between major destinations, sites of interest, transit stops, and other amenities such as public restrooms and water fountains. Maps can be distributed at events, civic and social services, schools, and local businesses.						
High	**Promote Safe Routes to School program.** Safe Routes to School participation can take the form of organizing annual walk events (such as International Walk to School Day), data collection, walking school buses, bike trains, walking and biking curricula, and monthly walk to school events. Update City web page to reflect integration of SRTS into the Transportation Alternatives Program (TAP) and current information.	Encouragement	City	School Department	Ongoing	Medium	Medium
Medium	**Leverage the City's wayfinding program to better promote**	Encouragement	City	Planning Department	Ongoing	Medium	Medium

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	walking, biking, and transit directions. The City adopted a Wayfinding Plan in 2014. Wayfinding helps people, especially those not familiar with Portsmouth, know their transportation options and will increase the visibility of walking and biking in Portsmouth. As the bike and shared use path networks in Portsmouth expand, updating maps and signing to incorporate and direct people to these facilities.						
Medium	**Organize and promote regular biking groups and special biking events.** These may include open streets events, midnight bicycle rides, Bike to Work day, or other events that celebrate biking encourage participation, and enhance the visibility of bicycling. Provide support and partnership to bike shops who host regular recreational biking groups and organizations like SABR who organize special biking events.	Encouragement	Community	Recreation Department	Ongoing	High	Medium

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	Publicize and expand these groups and events to reach various groups around the City and introduce new people to bicycling.						
Medium	**Organize and promote regular walking groups and special walking events.** The Senior Services Center holds regular walking groups for seniors. The City and other organizations should expand walking groups around other demographics, geographic location, or interests (e.g. mom & baby, Pease lunchtime walks, Strawbery Banke weekly walks, seniors walk with kids to school). Special walking events may include holiday or seasonal themed walks with businesses, walking challenges (distance over time), Walk to Work Days, International Walk to School Day, or other events that encourage people of all ages and abilities to walk. Identify opportunities to collaborate with the Recreation Department and	Encouragement	Community	Recreation Department	Ongoing	High	Medium

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	schools on regular walking groups or special events.						
Medium	**Promote/Expand Commuter Choice Program.** Encourage businesses to promote commuting options for employees through development agreements or voluntarily. Programs may include incentives for walking and biking, a guaranteed ride home program, flexible hours, or other programs to encourage employees to include walking or biking in their commutes. Businesses can join the commuteSMART Seacoast Transportation management Association (TMA) to take advantage of their emergency ride home program and other tools and resources.	Encouragement	Community	Economic Development	Ongoing	Medium	Low
Medium	**Provide bike valet service at City-hosted events.** Volunteers can valet bicycles to temporary parking for events, helping reduce overflow of bicycle parking and illegal bicycle parking, and helping	Encouragement	Community	Public Works Department	Ongoing	High	Low

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	to increase the visibility of bicycling.						
Medium	**Provide resources in the form of guidance or program for amenities.** In retail districts, amenities such as benches, planters, or bike parking can be provided by businesses individually or coordinated as a street furniture program. Beautification projects can be supported through the Adopt-A-Spot Program.	Encouragement	City	Planning Department	Ongoing	Medium	High
Low	**Maintain Walk- and Bike-Friendly Community designations.** Walk- and Bike-Friendly Community (WFC and BFC) designations can be earned from the League of American Bicyclists and the Pedestrian and Bicyclist Information Center.	Encouragement	City	Planning Department	Ongoing	Medium	Low
Low	**Organize regular Open Street events.** During these events, such as the "Summer in the Street" events, streets are closed to traffic and open to the community for exercise, recreation, shopping, and	Encouragement	City	Planning and Public Works Department	Annual	High	Medium

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	general enjoyment during open street events. These events are an opportunity to promote walking and biking education and build visibility for walking and biking programs.						
Low	**Promote Bike Benefit program for shoppers.** SABR operates a Bike Benefits program that entitles bicycle riders to discounts from local retailers. Bike Benefit programs may also include special hours on bike event days or special events promoting biking to retail.	Encouragement	Community	Planning Department and Economic Development	Ongoing	Medium	Low
Low	**Promote Bike-Friendly Business program.** Bike-friendly business programs recognize businesses that offer programs and amenities to employees to encourage bicycling or walking to work, such as financial incentives, bicycle parking, and office shower facilities. Organizations like CommuteSMART Seacoast could organize their own program or encourage businesses to apply for an existing bike-friendly	Encouragement	Community	Planning Department and Economic Development	Ongoing	High	Low

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	recognition program (such as the League of American Bicyclists Bike Friendly Business program).						
Medium	**Establish policies to guide the use of e-mobility devices and other motorized devices.** As more devices become available on the market, determine acceptable classifications of e-mobility devices for bicycle facilities, shared use paths, and other mixing areas. Electric devices are banned from sidewalks. The City should determine regulations for the use of electronic devices on roadways, bicycle facilities, and shared use path facilities. All regulations and etiquette should be clearly communicated to the public with signing and online resources.	Enforcement	City/State	Planning Department and Public Works Department	Once	Medium	Low
High	**Require traffic management plans during construction to provide for pedestrian and bicycle travel.** The City should review traffic management plans for signs, detours, and temporary accommodations that maintain	Engineering	City/State DOT	Public Works Department	5 years	High	Low

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	ADA-compliant pedestrian and bicyclist access around construction zones. Review should adhere to the most recent MUTCD.						
High	**Use the Bicycle and Pedestrian Plan for project and development review.** Compare all proposed capital projects and development reviews to the infrastructure recommendations in the Bicycle and Pedestrian Plan for opportunities to implement recommendations.	Engineering	City	Public Works Department and Planning Department	Ongoing	High	Low
Medium	**Complete transit access study focused on the siting and conditions of transit stops.** Transit stops should be accessible to disabled persons and connect to sidewalks. Stop locations should be audited for crosswalks and warning signage to improve the visibility and safety of pedestrians using the transit stop. Opportunities for partnership between Rockingham Planning Commission (RPC), COAST, and the City.	Engineering	Rockingham Planning Commission	Planning Department	5 years	High	Low

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
Medium	**Continue to coordinate with COAST to conduct spot improvements at transit stops.** Improvements may include upgrading signage, installing shelters or seating, lighting, route maps, and schedules.	Engineering	COAST	Planning Department and Economic Development	Ongoing	Medium	High
Medium	**Create a bicycle parking program.** The City should create a bike parking request system and install new bike racks and bike parking corrals in areas of high demand.	Engineering	City	Public Works Department	Annual	Medium	Medium
Medium	**Improve snow clearance procedures.** Continue to modify snow clearance activities to improve access to pedestrian ramps and crosswalks at intersections and to improve access to pedestrian activation buttons. Encourage voluntary snow clearance by residents and local businesses.	Engineering	City	Public Works Department	Seasonal	Medium	High
Medium	**Include on- and off-road bicycle facilities in maintenance programs.** Bike lanes and off road	Engineering	City	Public Works Department	Once	Medium	High

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	paths should be cleared of debris and snow, year-round. Bicycle facilities should be added to street sweeping and snow clearance programs.						
Medium	**Install bicycle and pedestrian wayfinding.** Bicycle and pedestrian wayfinding should include navigation to popular destinations, time and/or distance to destination. This should be integrated with Citywide Wayfinding Plan for all transportation modes.	Engineering	City	Public Works Department	Ongoing	Medium	Medium
Medium	**Install public bike maintenance stations.** Public maintenance stations allow bicyclists to fill tires with air and complete minor repairs. These stations offer convenience to bicyclists and increase the visibility of bicycling in the community.	Engineering	City	Public Works Department	Ongoing	High	Medium
Medium	**Purchase necessary equipment to plow sidewalks and bike facilities.** Narrow plows are be used on both sidewalks and	Engineering	City	Public Works Department	Once	Medium	Medium

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	separated bike facilities to support clear pathways for year-round use.						
Medium	**Require installation of wheel guards on municipally-owned or contracted heavy vehicles.** Wheel guards prevent bicyclists from being pulled under the wheels of heavy vehicles in a crash. The City should retrofit vehicles operated by the City or under contract with the City, such as waste removal, construction or maintenance vehicles.	Engineering	City	Public Works Department	Ongoing	Medium	Medium
Medium	**Require restoration of all pedestrian and bicycle pavement markings after street utility repairs.** Include pavement markings as part of inspection list for utility repairs. Supply pavement marking plans with street opening permits.	Engineering	City	Public Works Department	Ongoing	Medium	Low
Low	**Organize volunteer path maintenance events.** The City should partner with local organizations such as New Hampshire Seacoast Greenway	Engineering	City/State	Planning Department/Conservation Commission	Seasonal	Medium	Low

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	(NHSG) and SABR to have volunteers conduct seasonal maintenance on off-road paths. Maintenance may include trash pickup, sweeping, cleaning of vandalism, and reporting areas in need of more serious maintenance.						
High	**Adopt a Safe System Approach.** A Safe System Approach is a guiding paradigm adopted by the U.S. DOT's National Roadway Safety Strategy that focuses on both human mistakes and human vulnerability to design a system with many redundancies in place to protect all road users. Safety programs should be focused on infrastructure, human behaviour, responsible oversight of the vehicle and transportation industry, and emergency response. This approach is also complementary to Portsmouth's Complete Streets Policy.	Evaluation	City	Planning Department	Once	Medium	Low
High	**Establish a standing pedestrian and bicycle advisory committee.**	Evaluation	City	Planning Department	Ongoing	Medium	Low

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	A bicycle and pedestrian advisory committee can assist the City in evaluating and sustaining walking and biking policies and programs.						
Medium	**Establish quick build program to review recommended spot improvements and proposed bike boulevards for potential near-term trial improvements.** Some recommendations may be candidates for temporary or low-cost interim improvements. This will allow the City to try out recommendations before construction funding is available.	Evaluation	City	Planning Department	Ongoing	Medium	Medium
Medium	**Collect and analyze bike counts.** The City should complete annual counts of bicyclist volumes at key locations throughout the City to track bicycle use. Counts can be collected through electronic data from built-in detectors at signals and spot counts can be conducted as needed.	Evaluation	City	Public Works Department	Annual	High	Medium
Medium	**Collect bicycle and pedestrian crash data annually.** The City	Evaluation	City	Police Department	Annual	High	Low

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	should collect bicycle and pedestrian crash data and regularly monitor and assess locations and conditions of bicycle and pedestrian crashes to identify crash trends.						
Medium	**Conduct a feasibility study for a privately-operated bike share.** Bike share programs can increase bicycle mode share, provide an amenity to visitors, and complement existing transit.	Evaluation	City	Planning Department	Once	Medium	Medium
Medium	**Create and maintain a database of local, state, and federal funding sources and grant opportunities for tracking.** Tracking regular funding opportunities and deadlines will help the city more effectively identify and secure pathways towards implementation.	Evaluation	City	Planning Department and Public Works Department	Ongoing	High	Medium
Medium	**Establish a vehicle miles travelled (VMT) reduction target.** The City should set a target VMT reduction percentage by a specific date. This will provide a	Evaluation	City	Planning Department	5 years	High	Low

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
	benchmark for the Complete Streets policy. VMT may be measured by annual average daily traffic (AADT). Targets should correspond with emission reduction goals of the Climate Action Plan. Targets should correspond with emission reduction goals of the Climate Action Plan.						
Medium	**Establish bicycle and pedestrian mode share target goals.** The City should set target mode shares for walking and biking. Mode share can be tracked through census data or local surveys. Targets should correspond with emission reduction goals of the Climate Action Plan.	Evaluation	City	Planning Department	5 years	High	Low
Medium	**In accordance with the Complete Street policy, provide an annual status report on the impact of same policy.** Audit complete projects and note the frequency and type of exemptions.	Evaluation	City	Planning Department	Annual	High	Medium

Priority	Recommendation	5 E's	Lead Jurisdiction	Associated City Department	Frequency	Feasibility	Cost/Level of Effort
Medium	**Review the Bicycle and Pedestrian Plan and provide a status report every two years.** Regular review of the Plan will help inform ongoing initiatives and long-term project planning. Status reports can include performance metrics to measure the progress of recommendations from the Plan.	Evaluation	City	Planning Department	Every two years	High	Medium

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Infrastructure Recommendations

The following sheets illustrate the locations of the proposed infrastructure projects. Each sheet is organized to support a Key Connection:

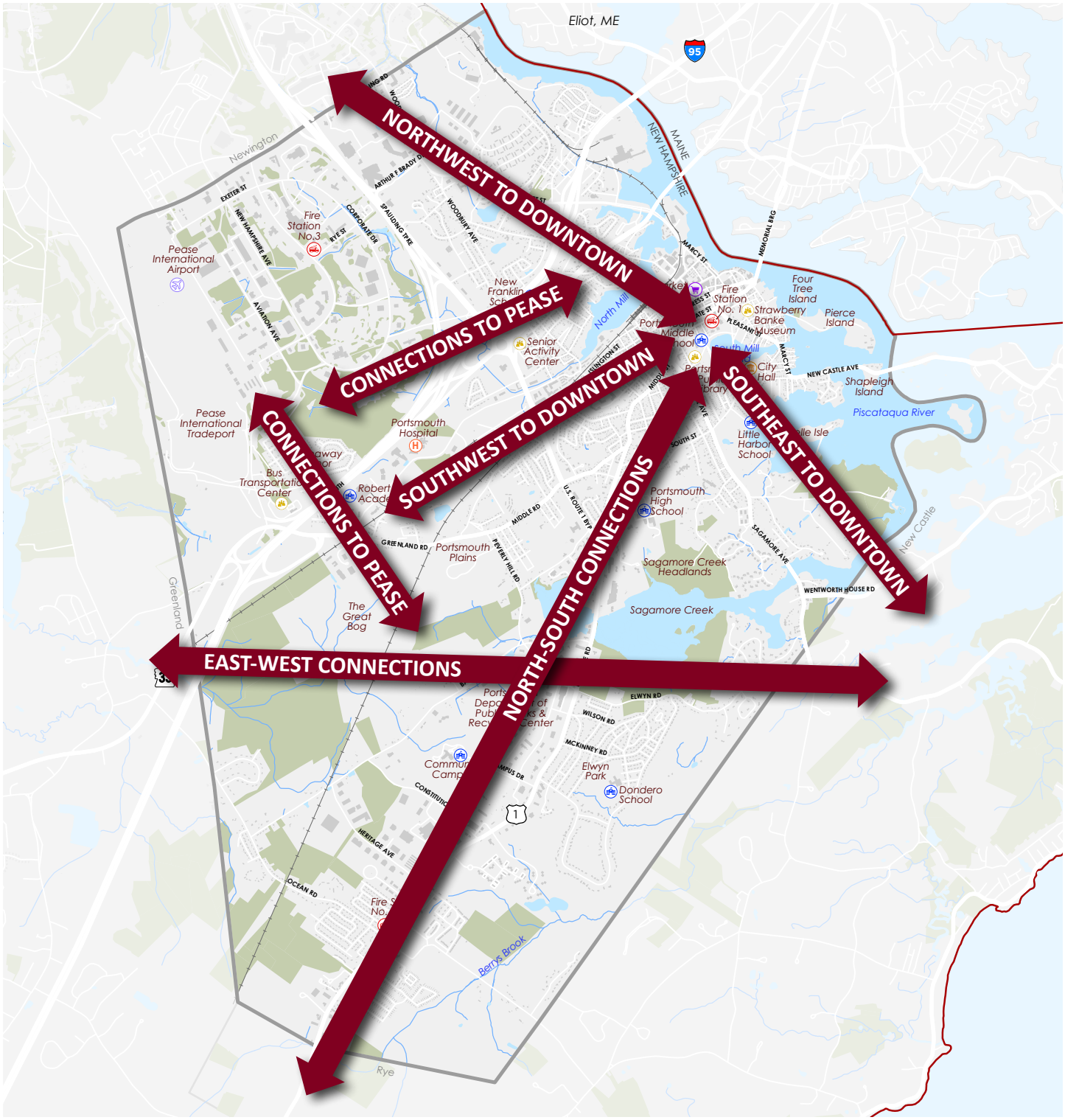
- Southeast to Downtown
- Southwest to Downtown
- Northwest to Downtown
- North-South Connections
- East-West Connections
- Connections to Pease

Each of these key connections represents a general path of travel for different geographic areas within Portsmouth and provides a framework for presenting the recommendations for specific components of the network. **Click on each Key Connection** on the front map to jump to the corresponding project summary sheet.

The infrastructure recommendations are also listed in **Table 10** organized by key connection and summarizing the prioritization criteria, feasibility, and planning level opinion of probable cost.

The top project priorities resulting from Public Meeting 2 are indicated in **Table 10** with a callout box. More information on community project priorities can be found in **Appendix A Public Engagement**:

PORTSMOUTH NETWORK RECOMMENDATIONS

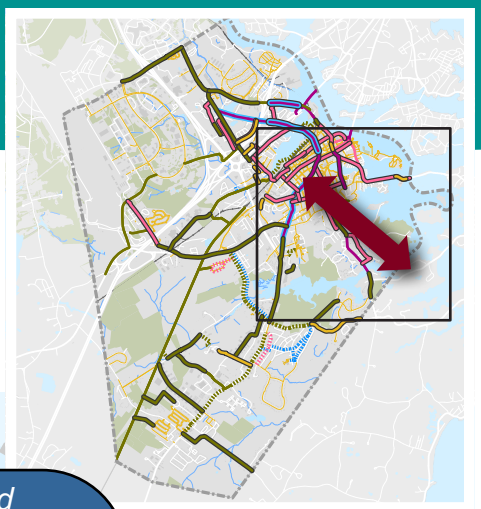


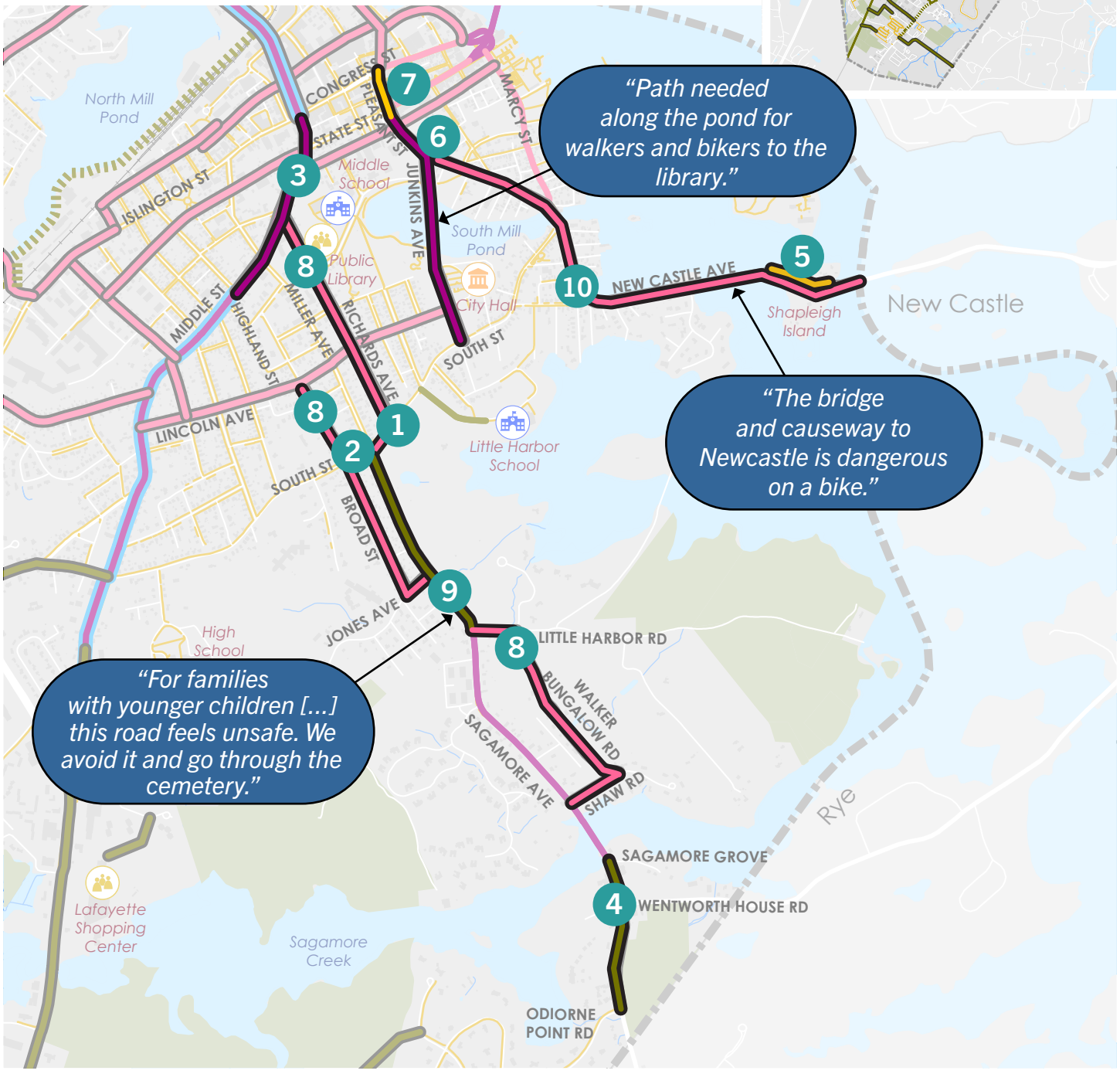
Bicycle & Pedestrian Network Key Connections

Portsmouth NH Bike Pedestrian Plan Update 2024

SOUTHEAST TO DOWNTOWN

Connections: **Rye, New Castle, Downtown Portsmouth, City Hall, Portsmouth Public Library, Little Harbour School, Portsmouth Middle School, and Portsmouth High School**





Bicycle and Pedestrian Network - Southeast to Downtown

0 0.5 Miles

Project Needs and Constraints

The area between southeast Portsmouth and Downtown is characterized by high population density and a concentration of key destinations. However, narrow roadways and limited routes require creative solutions and the identification of alternative, lower-stress streets that can connect people to their common destinations. For example, Sagamore Avenue is the main route between southeastern neighborhoods, the neighboring town of Rye, and Downtown. While a shared use path is recommended in the long term where possible, this plan identifies the parallel, lower-stress routes of Walker Bungalow Road and Broad Street as recommended bike boulevards as an interim condition and as parallel alternatives in constrained conditions. Additional recommendations for this connection include filling sidewalk gaps, extending existing bike lanes, upgrading shared lane markings to dedicated facilities, improving pedestrian crossings, and prioritizing pedestrian access in the Downtown.

Recommendations

1. Add pedestrian crossings across South Street at Richards Avenue and the Cemetery entrance.
2. Upgrade pedestrian curb ramps at the intersection of South Street and Broad Street and add a Rectangular Rapid Flashing Beacon across South Street.
3. **Upgrade existing bike boulevard to bike lanes on Middle Street between Highland Street and Congress Street.***
4. Widen sidewalk to a shared use path on west side of Sagamore Avenue between Odiorne Point Road and Sagamore Grove. Add a pedestrian crossing across Sagamore Avenue at Wentworth House Road.
5. Complete sidewalk across Shapleigh Island.
6. Add bike lanes on Pleasant Street/Junkins Avenue between State Street and South Street.
7. Eliminate one left turn lane from northbound Pleasant Street between Congress Street and State Street. Widen sidewalks and enhance public realm.
8. Designate as a bike boulevard on Walker Bungalow Road, Broad Street, and Richards Avenue as low-stress alternative routes for Sagamore Avenue and Miller Avenue.
9. Upgrade existing bike lanes to shared use path on Sagamore Avenue between South Street and Little Harbor Rd.
10. Designate as a bike boulevard on Pleasant Street/Marcy Street/New Castle Avenue between Junkins Avenue and the Portsmouth border.

***Top project for the community**

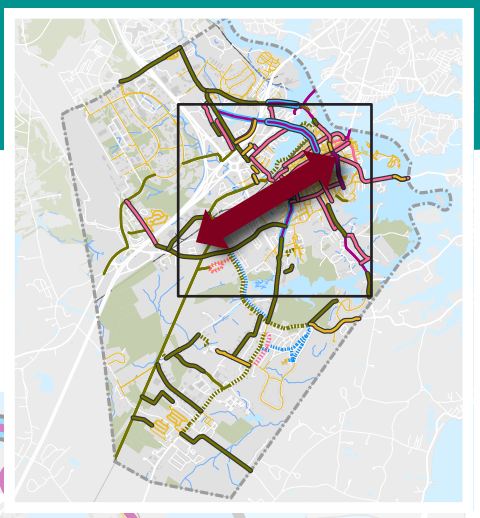
EXISTING
- Sidewalk
- Buffered Bike Lane
- Bike Lane
- Shared Use Path
- Bike Boulevard

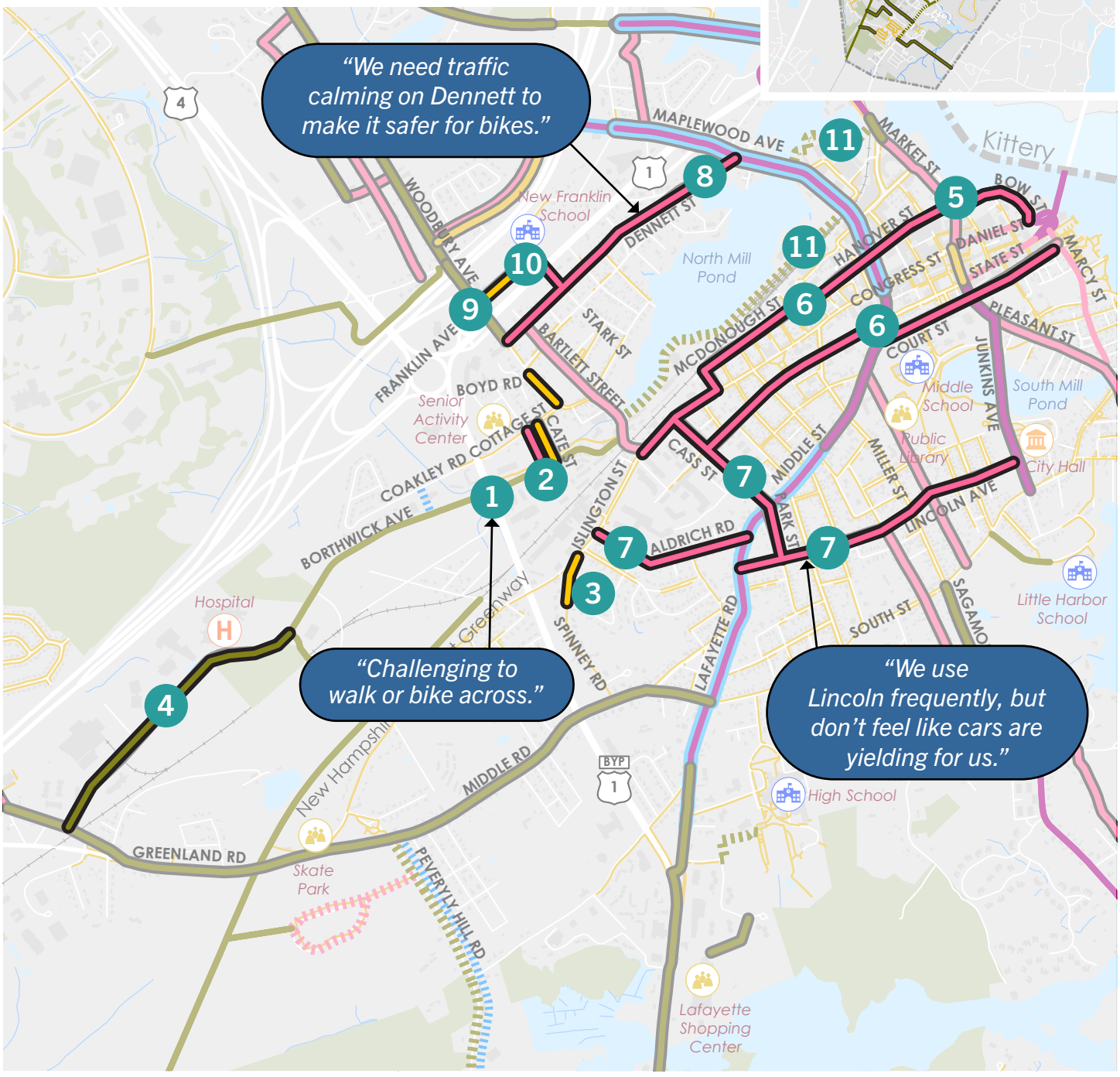
PROGRAMMED
- Sidewalk
- Shared Use Path
- Bike Boulevard

PROPOSED
- New Sidewalk
- Separated Bike Lane
- Bike Lane
- Shared Use Path
- Bike Boulevard

SOUTHWEST TO DOWNTOWN

***Connections*: New Hampshire Seacoast Greenway, Portsmouth Senior Activity Center, Downtown Portsmouth, Kittery, Portsmouth Regional Hospital, Portsmouth Middle School, City Hall**





Bicycle and Pedestrian Network - Southwest to Downtown

0 0.5 Miles

Project Needs and Constraints

While the New Hampshire Seacoast Greenway provides the most continuous and direct connection between southwest Portsmouth and Downtown, the path only takes people as far north as Barberry Lane. Since a direct extension north along the rail corridor is not possible, a network of parallel routes, bike boulevards, and shared use paths will enable path users and nearby neighbors to continue their journey on foot or by bike to major destinations Downtown. The upcoming North Mill Pond Path will play a key role in enhancing this connection, and the addition of a Downtown bike boulevard network can help to improve direct access to destinations off the path. Additional recommendations for southwest to Downtown connections include filling sidewalk gaps, improving connections to the New Franklin School, and adding a shared use path on Borthwick Avenue.

Recommendations

1. Enhance pedestrian crossings across Route 1 Bypass at Borthwick Avenue.
2. Complete sidewalk gap on Cate Street between Hodgdon Way and Cottage Street and on the west side of Woodbury Avenue from Boyd Road to Cottage Street. Add a pedestrian crossing across Cottage Street at Cate Street to access the Senior Activity Center. Designate as a bike boulevard on Cate Street to access Senior Activity Center.
3. Complete sidewalk gap on Spinney Road between Islington Street and Sewall Road.
4. Continue shared use path on Borthwick Avenue to Greenland Road. Address pedestrian crossings and visibility, particularly at Hospital entrance.
5. Designate as a bike boulevard on Bow Street between Daniel Street and Market Street.
6. Designate as a bike boulevard on Court Street between Marcy Street and Middle Street, on State Street between Middle Street and Cass Street, and on Hanover Street/McDonough Street/Islington Street between Market Street and Bartlett Street as lower-stress alternative routes through Downtown.
7. Designate as a bike boulevard on Park Street/Cass Street and on Aldrich Road between Islington Street and Lincoln Avenue/Middle Street. Enhance existing bike boulevard on Lincoln Avenue between Junkins Avenue and Middle Street.
8. Designate as a bike boulevard on Dennett Street between Woodbury Avenue and Maplewood Avenue.
9. Complete and upgrade sidewalk on Franklin Drive.
10. Convert Stark Street to a bicycle boulevard to improve access to New Franklin School.
11. **Continue design of North Mill Pond Trail and New Hampshire Seacoast Greenway.***

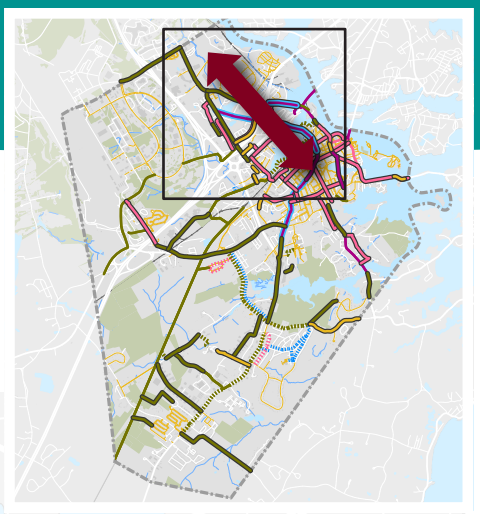
***Top project for the community**

EXISTING
- Sidewalk
- Buffered Bike Lane
- Bike Lane
- Shared Use Path
- Bike Boulevard

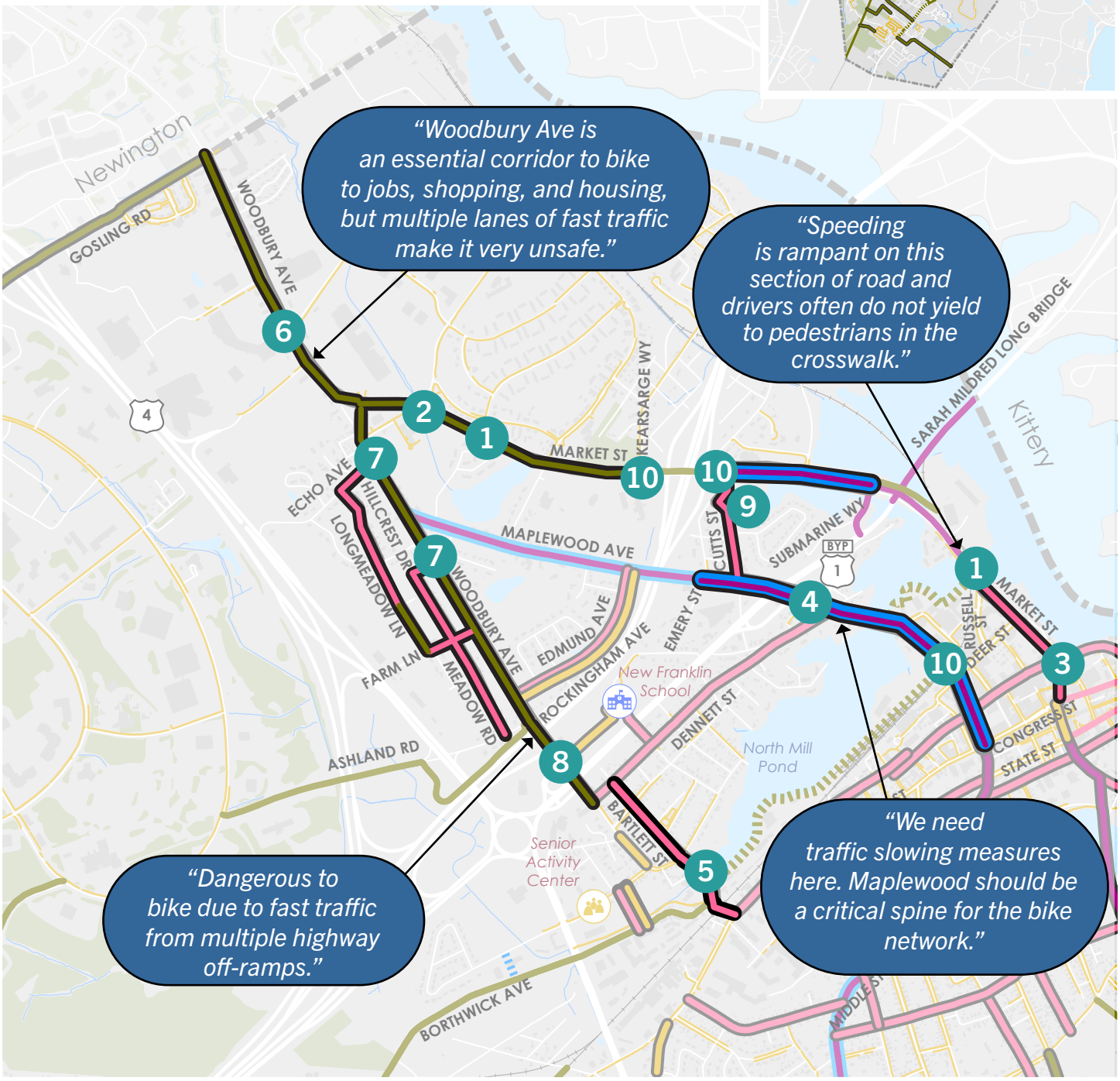
PROGRAMMED
- Sidewalk
- Shared Use Path
- Bike Boulevard

PROPOSED
- New Sidewalk
- Separated Bike Lane
- Bike Lane
- Shared Use Path
- Bike Boulevard

NORTHWEST TO DOWNTOWN



***Connections*: Newington, Downtown Portsmouth, Woodbury Avenue Commercial Area, Bohenko Gateway Park, New Franklin School, Senior Activity Center, Gosling Meadows**



Bicycle and Pedestrian Network - Northwest to Downtown

0 0.5 Miles

Project Needs and Constraints

This area is characterized by three main corridors: Market Street, Maplewood Avenue, and Woodbury Avenue. Each has its own character but together, they provide important connections to residential neighborhoods, commercial destinations, and recreational amenities. Importantly, they also all cross two major barriers: Interstate 95 and the Route 1 Bypass. Recommendations include upgrading existing bicycle facilities with more separation where space allows, formalizing key connections (such as the shared use path from Market Street to Cutts Street), and proposing parallel routes on lower-stress streets. For example, a shared use path is recommended in the long-term on Woodbury Avenue. As an interim treatment, parallel bike boulevards are proposed as low-stress alternatives on neighborhood streets.

Recommendations

1. Continue existing shared use path on Market Street between Woodbury Avenue and Kearsarge Way and between railroad tracks and Russell Street. Upgrade existing bike lanes on Market Street between Cutts Street and Submarine Way to separated bike lanes. Maintain existing shared use path between Kearsarge Way and Cutts Street. Tighten intersection geometry and stripe bicycle markings through Market Street and Russell Street intersection.
2. Rehabilitate pedestrian bridge on Market Street.
3. Designate as a bike boulevard on Market Street between Russell Street and Congress Street.
4. Perform study to explore separated bike lanes on Maplewood Avenue between Emery Street and Dennett Street and between Deer Street and Congress Street/Islington Street. Enhance existing bike lanes between Dennett Street and Deer Street.
5. Designate as a bike boulevard on Bartlett Street/Dennett Street between Woodbury Avenue and Islington Street.
6. **Add shared use path on Woodbury Avenue between Portsmouth border and Market Street.***
7. Add a shared use path on Woodbury Avenue between Market Street and Rockingham Avenue. In the interim, designate bike boulevards on Echo Avenue, Hillcrest Drive/Longmeadow Lane, Maple Street/Meadow Road, and Farm Lane and add a shared use path connection on the unimproved ROW between Longmeadow Lane and Farm Lane as lower-stress alternative routes for Woodbury Avenue.
8. Convert bike lanes to a shared use path on east side of Woodbury Avenue between Rockingham Avenue and Dennett Street.
9. Add wayfinding and bike boulevard on Cutts Street and add curb cuts and ramps between Cutts Street path and Market Street.
10. Add warning signs for cyclists at approaches to rail tracks on Maplewood Avenue and Market Street.

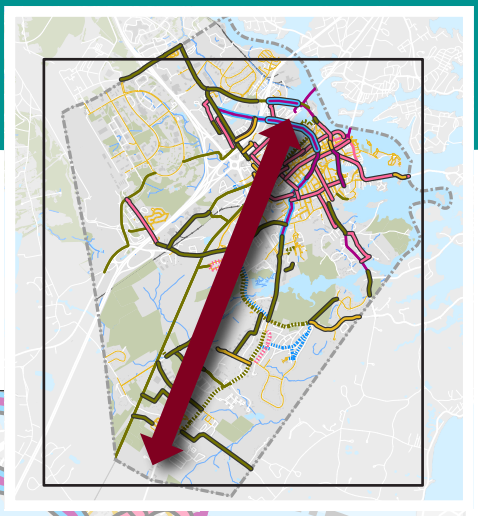
***Top project for the community**

EXISTING
- Sidewalk
- Buffered Bike Lane
- Bike Lane
- Shared Use Path
- Bike Boulevard

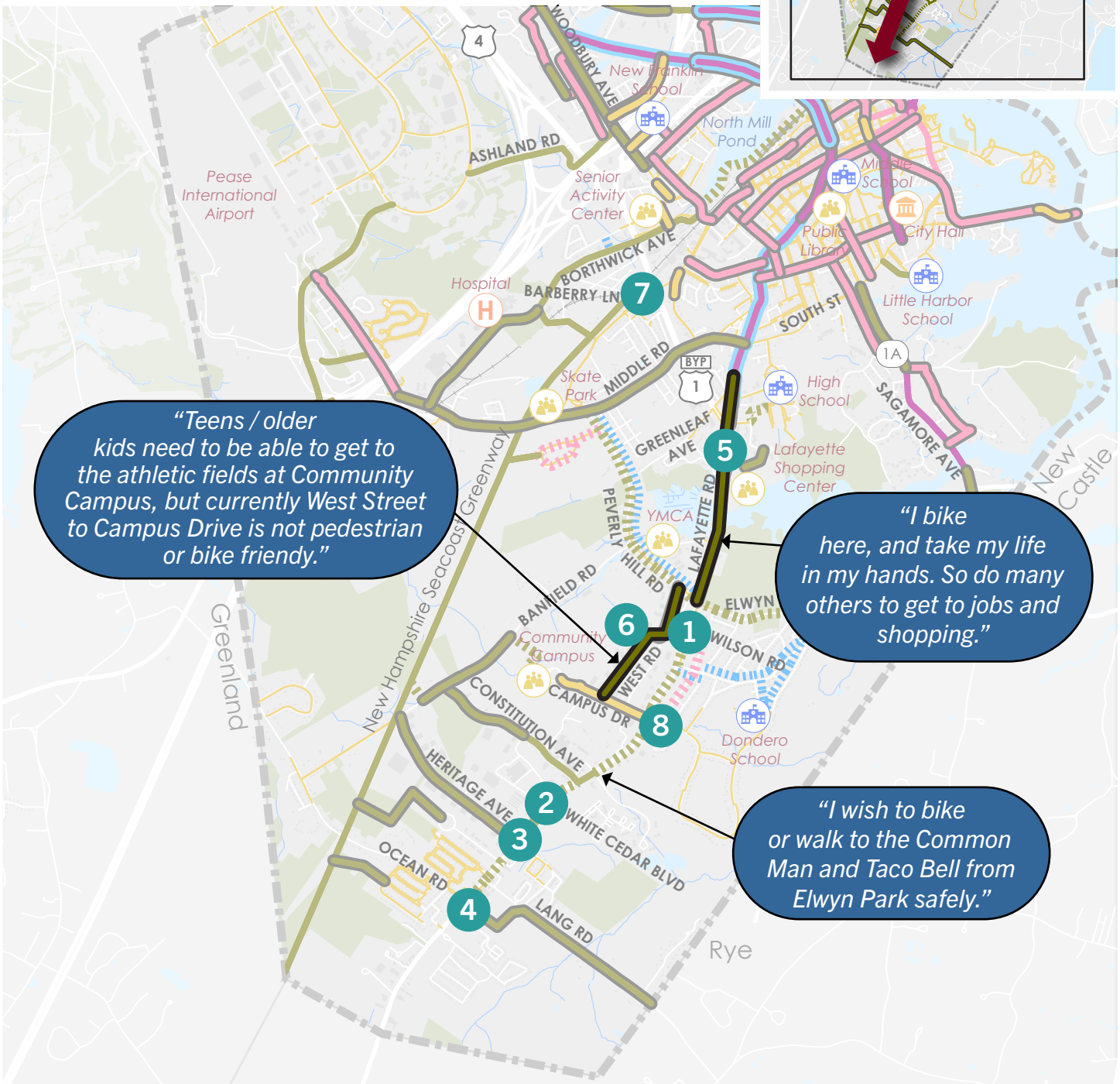
PROGRAMMED
- Sidewalk
- Shared Use Path
- Bike Boulevard

PROPOSED
- New Sidewalk
- Separated Bike Lane
- Bike Lane
- Shared Use Path
- Bike Boulevard

NORTH-SOUTH CONNECTIONS



***Connections*: Rye, New Hampshire Seacoast Greenway, Dondero School, Community Campus, YMCA, Portsmouth High School, Downtown Portsmouth, businesses and services along Lafayette Road**



Bicycle and Pedestrian Network - North-South Connections

0 0.5 Miles

Project Needs and Constraints

Portsmouth's north-south connection is defined by Route 1 (Lafayette Road) which is a key commercial corridor that links to residential neighborhoods, community assets (such as Community Campus), and Downtown, and runs parallel to the newly opened New Hampshire Seacoast Greenway. Ongoing projects will improve walking and biking along portions of Route 1 and provide new sidewalks along Peverly Hill Road and Elwyn Road. In addition to these improvements, this plan recommends further enhancing pedestrian crossings between Ocean Road and Peverly Hill Road, extending the proposed shared use path on Lafayette Road north to meet existing buffered bike lanes, and improving walking and biking parallel to Lafayette Road along the low-stress route of West Road. Together, these ongoing and proposed improvements will create a robust north-south spine through Portsmouth, with options for traveling by foot or by bike between Downtown and all of the destinations along Lafayette Road.

Recommendations

In coordination with NHDOT, improve pedestrian crossings along Lafayette Road at 1 Wilson Road, 2 White Cedar Boulevard, 3 Heritage Avenue, and 4 Ocean Road intersections.

5 **Add a shared use path on Lafayette Road between Elwyn Road and Greenleaf Avenue.***

6 Add a shared use path on West Road between Peverly Hill Road and Campus Drive.

7 Add wayfinding on Barberry Lane to the New Hampshire Seacoast Greenway.

8 Continue progress on US Route 1 Corridor Project in coordination with NHDOT.

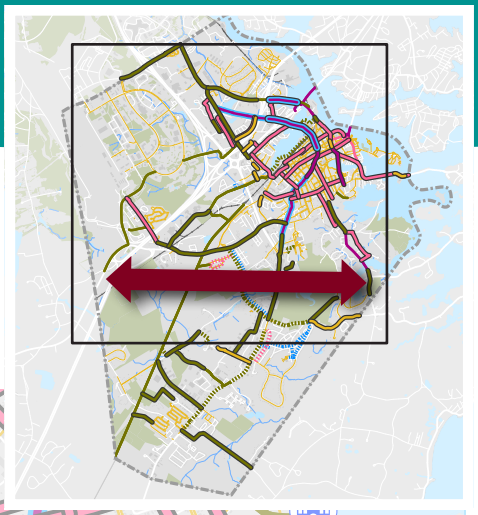
***Top project for the community**

EXISTING
- Sidewalk
- Buffered Bike Lane
- Bike Lane
- Shared Use Path
- Bike Boulevard

PROGRAMMED
- Sidewalk
- Shared Use Path
- Bike Boulevard

PROPOSED
- New Sidewalk
- Separated Bike Lane
- Bike Lane
- Shared Use Path
- Bike Boulevard

EAST-WEST CONNECTIONS



***Connections*: Greenland, Rye, New Hampshire Seacoast Greenway, Dondero School, Portsmouth High School, Community Campus, Skate Park, Downtown Portsmouth**

Bicycle and Pedestrian Network - East-West Connections

0 0.5 Miles

Project Needs and Constraints

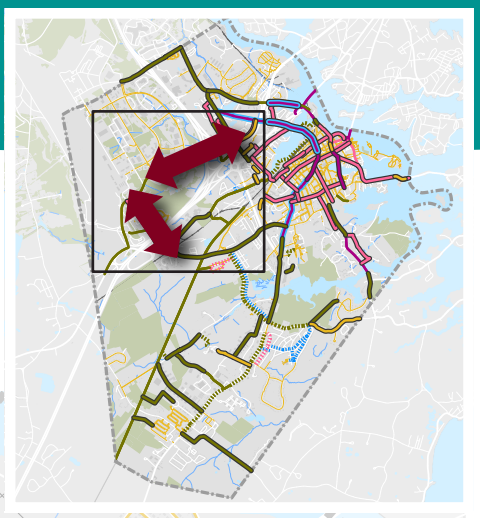
Improving Portsmouth's east-west connections will be key to building out a comprehensive walking and biking network that allows travel in all directions and not just to/from Downtown. A network of east-west shared use path connections, as well as new sidewalks on Campus Drive, will mean that people who live and work in Portsmouth will be able to more directly access resources like the New Hampshire Seacoast Greenway and the Community Campus on foot or by bike. Recommendations along and parallel to Elwyn Road will link to other improvements recommended between southeast Portsmouth and Downtown. Where space is more limited Downtown, the addition of bike boulevards will help to slow speeds and communicate the presence of bicyclists to drivers.

Recommendations

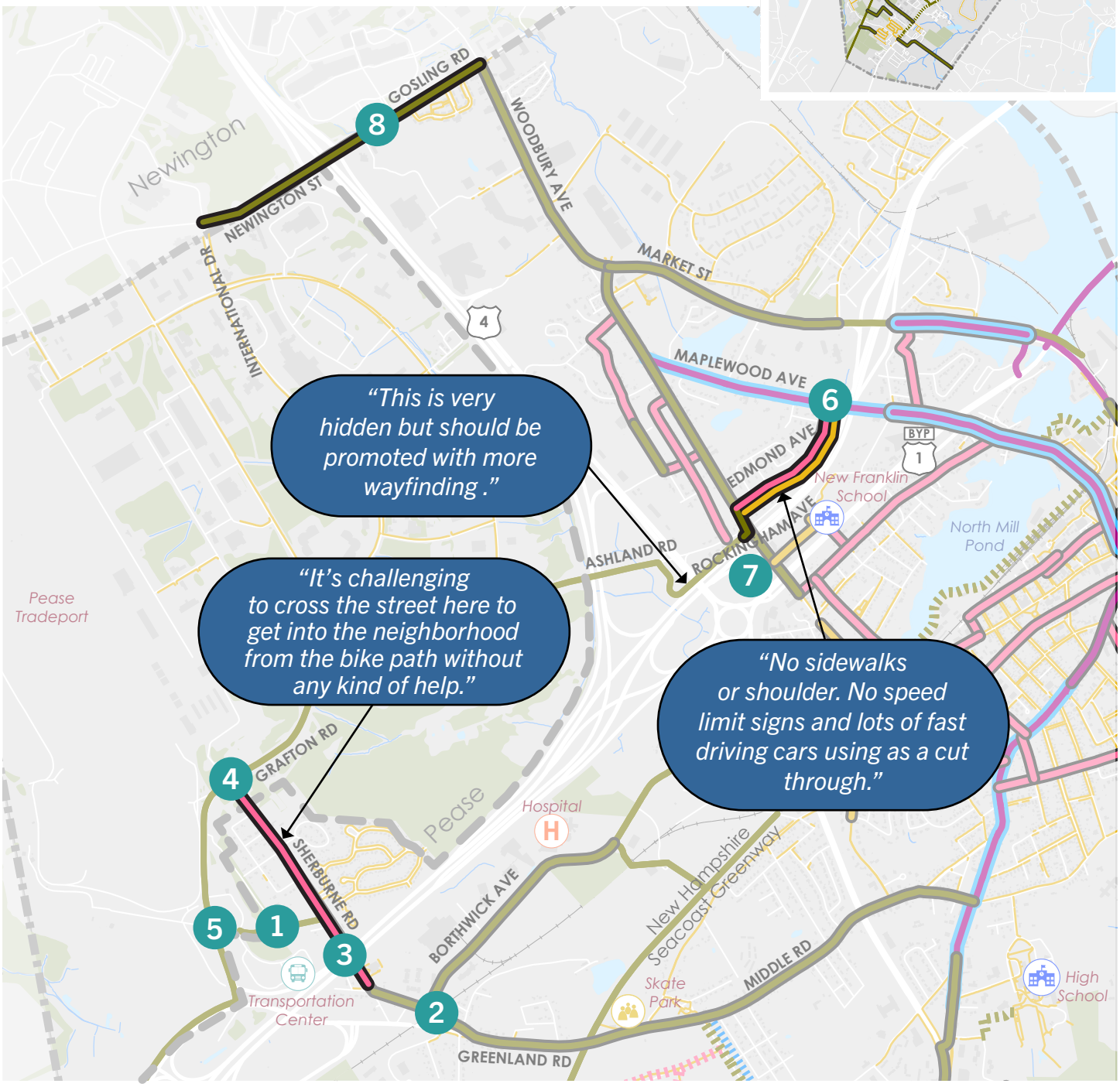
1. Improve crossing at Elwyn Road/Peverly Hill Road and Lafayette Road.
2. Add shared use path on Greenland Road between Sherburne Road and Peverly Hill Road and on the north side of Middle Road/South Street between Peverly Hill Road and Lafayette Road.
3. Continue shared use path on Constitution Avenue between Lafayette Road and Banfield Road.
4. Add shared use path to Heritage Avenue between Lafayette Road and Banfield Road.
5. Add off-road connections between Freedom Circle and the New Hampshire Seacoast Greenway and between Nathaniel Drive and the New Hampshire Seacoast Greenway.
6. Add sidewalks on Elwyn Road to Rye border and improve off-road connection between Elwyn Road and Odiorne Point Road. Continue to progress Elwyn Road crossing at Harding Road.
7. Add sidewalk on Campus Drive to fill gaps.
8. Add a shared use path connection on Longmeadow Road/Lang Road between Lafayette Road and the Rye border.
9. Formalize off-street connection between Lafayette Plaza Shopping Center parking lot and Ledgewood Drive.
10. **Add shared use path connection on Banfield Road between New Hampshire Seacoast Greenway and Campus Drive off-road connectors. Add a trailhead connection to the New Hampshire Seacoast Greenway.***
11. Continue progress on Elwyn Road Side Path, Elwyn Park Sidewalks and Traffic Calming, and Peverly HIll Road Complete Street projects.

***Top project for the community**

CONNECTIONS TO PEASE



***Connections*: Pease, Newington, Portsmouth Transportation Center, New Hampshire Seacoast Greenway, Skate Park, New Franklin School, Gosling Meadows**



Bicycle and Pedestrian Network - Connections to Pease

0 0.5 Miles

Project Needs and Constraints

While this plan does not include recommendations within Pease Tradeport, connections to and from the area are important for access to the Tradeport as well as to broader links to Newington, the Transportation Center, and across major barriers like Interstate 95. Formalizing a route along Greenland Road to Sherburne Road will allow people traveling to or from Portsmouth by bus to more easily access the City or reach the Transportation Center by bike. This connection also leads directly to the existing shared use path on Grafton Road and will link to other improvements recommended along Greenland Road/Middle Road for east-west connectivity. Similarly, formalizing the connection from Woodbury Avenue to the existing Ashland Road path via Edmond Avenue will increase access to the Transportation Center and popular recreational riding routes from the north.

Recommendations

1. Add bike route wayfinding to and from the Transportation Center.
2. Update pedestrian bridge at Greenland Road to accomodate bicycles.
3. Formalize bike boulevard and path connection on Sherburne Road between Grafton Road and Greenland Road.
4. Coordinate with the Pease Development Authority to add an enhanced pedestrian crossing across Grafton Road at Sherburne Road path.
5. Coordinate with the Pease Development Authority to add a crossing across Grafton Road at the Portsmouth Transportation Center.
6. **Complete sidewalk on Edmond Avenue and convert into a Neighborhood Slow Street by removing the center line and designating as a bike boulevard, enabling a low-stress connection to Ashland Road path.***
7. Add wayfinding on Edmond Avenue and Rockingham Avenue to and from the Ashland Road path. Add a Rectangular Rapid Flashing Beacon to enhance the pedestrian crossing at Rockingham Avenue and Woodbury Avenue for connection to the bike path.
8. Add shared use path on Gosling Road/Newington Street between Woodbury Avenue and International Drive.

***Top project for the community**

EXISTING
- Sidewalk
- Buffered Bike Lane
- Bike Lane
- Shared Use Path
- Bike Boulevard
- Pease Boundary

PROGRAMMED
- Sidewalk
- Shared Use Path
- Bike Boulevard

PROPOSED
- New Sidewalk
- Separated Bike Lane
- Bike Lane
- Shared Use Path
- Bike Boulevard

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Table 10. Infrastructure Recommendations

Priority	ID	Recommendation	Feasibility	Timeframe	Planning Level Cost	Key Connection
High	4	Widen sidewalk to a shared use path on west side of Sagamore Avenue between Odiorne Point Road and Sagamore Grove. Add a pedestrian crossing across Sagamore Avenue at Wentworth House Road.	Low	Long	$690,000	Southeast to Downtown
High	8	Designate as a bike boulevard on Walker Bungalow Road, Broad Street, and Richards Avenue as low-stress alternative routes for Sagamore Avenue and Miller Avenue.	High	Short	$180,000	
High	9	Upgrade existing bike lanes to shared use path on Sagamore Avenue between South Street and Little Harbor Road.	Low	Long	$2,000,000	
Medium	2	Upgrade pedestrian curb ramps at the intersection of South Street and Broad Street and add a Rectangular Rapid Flashing Beacon across South Street.	Medium	Short	$100,000	
Medium	**3**	**Upgrade existing bike boulevard to bike lanes on Middle Street between Highland Street and Congress Street.**	**Medium**	**Short**	**$100,000**	
Medium	5	Complete sidewalk across Shapleigh Island.	Medium	Medium	$240,000	
Medium	6	Add bike lanes on Pleasant Street/Junkins Avenue between State Street and South Street.	Medium	Low	$60,000	
Medium	10	Designate a bike boulevard along Pleasant Street/Marcy Street/New Castle Avenue between Junkins Avenue and the Portsmouth border.	High	Short	$120,000	

Priority	ID	Recommendation	Feasibility	Timeframe	Planning Level Cost	Key Connection
Low	1	Add pedestrian crossings across South Street at Richards Avenue and the Cemetery entrance.	High	Short	$100,000	Southeast to Downtown
Low	7	Eliminate one left turn lane from northbound Pleasant Street between Congress Street and State Street. Widen sidewalks and enhance public realm.	Medium	Medium	$3,000,000	
High	4	Continue shared use path on Borthwick Avenue to Greenland Road. Address pedestrian crossings and visibility, particularly at Hospital entrance.	Medium	Medium	$1,580,000	Southwest to Downtown
High	**11**	**Continue design of North Mill Pond Trail and New Hampshire Seacoast Greenway.**	**Medium**	**Long**	**See CIP and NHDOT STIP**	
Medium	2	Complete sidewalk gaps on Cate Street between Hodgdon Way and Cottage Street and on the west side of Woodbury Avenue from Boyd Road to Cottage Street. Add a pedestrian crossing across Cottage Street at Cate Street to access the Senior Activity Center. Designate as a bike boulevard on Cate Street to access Senior Activity Center.	Medium	Medium	$390,000	
Medium	3	Complete sidewalk gap on Spinney Road between Islington Street and Sewall Road.	Medium	Medium	$180,000	
Medium	6	Designate as a bike boulevard on Court Street between Marcy Street and Middle Street, on State Street between Middle Street and Cass Street, and on Hanover Street/McDonough Street/Islington Street between Market Street and Bartlett Street as lower-stress alternative routes through Downtown.	High	Short	$210,000	

Priority	ID	Recommendation	Feasibility	Timeframe	Planning Level Cost	Key Connection
Medium	7	Designate as a bike boulevard on Park Street/Cass Street and on Aldrich Road between Islington Street and Lincoln Avenue/Middle Street. Enhance existing bike boulevard on Lincoln Avenue between Junkins Avenue and Middle Street.	High	Short	$90,000	
Medium	9	Complete and upgrade sidewalk on Franklin Drive.	Medium	Medium	$270,000	
Low	1	Enhance pedestrian crossings across Route 1 Bypass at Borthwick Avenue.	Medium	Medium	$90,000	
Low	5	Designate as a bike boulevard on Bow Street between Daniel Street and Market Street.	High	Short	$30,000	Southwest to Downtown
Low	8	Designate as a bike boulevard on Dennett Street between Woodbury Avenue and Maplewood Avenue.	High	Short	$80,000	
Low	10	Convert Stark Street to a bicycle boulevard to improve access to New Franklin School.	High	Short	$10,000	
High	**6**	**Add shared use path on Woodbury Avenue between Portsmouth border and Market Street.**	**Medium**	**Long**	**$2,000,000**	
High	1a	Continue existing shared use path on Market Street between Woodbury Avenue and Kearsarge Way and between railroad tracks and Russell Street. Maintain existing shared use path between Kearsarge Way and Cutts Street. Tighten intersection geometry and stripe bicycle markings through Market Street and Russell Street intersection.	Low	Long	$4,000,000	Northwest to Downtown

Priority	ID	Recommendation	Feasibility	Timeframe	Planning Level Cost	Key Connection
High	1b	Upgrade existing bike lanes on Market Street between Cutts Street and Submarine Way to separated bike lanes.	Medium	Medium	$170,000	Northwest to Downtown
High	7a	Add a shared use path on Woodbury Avenue between Market Street and Rockingham Avenue.	Medium	Long	$4,000,000	
Medium	4	Perform study to explore separated bike lanes on Maplewood Avenue between Emery Street and Dennett Street and between Deer Street and Congress Street/Islington Street. Enhance existing bike lanes between Dennett Street and Deer Street.	Low	Medium	$50,000	
Medium	8	Convert bike lanes to a shared use path on east side of Woodbury Avenue between Rockingham Avenue and Dennett Street.	Low	Long	$2,000,000	
Medium	7b	In the interim, designate bike boulevards on Echo Avenue, Hillcrest Drive/Longmeadow Lane, Maple Street/Meadow Road, and Farm Lane and add a shared use path connection on the unimproved ROW between Longmeadow Lane and Farm Lane as lower-stress alternative routes for Woodbury Avenue.	Medium	Short/ Medium	$500,000	
Medium	2	Rehabilitate pedestrian bridge on Market Street.	Medium	Medium	$3,450,000	
Low	3	Designate as a bike boulevard on Market Street between Russell Street and Congress Street.	High	Short	$40,000	
Low	5	Designate as a bike boulevard on Bartlett Street/Dennett Street between Woodbury Avenue and Islington Street.	High	Short	$50,000	

Priority	ID	Recommendation	Feasibility	Timeframe	Planning Level Cost	Key Connection
Low	9	Add wayfinding and bike boulevard on Cutts Street and add curb cuts and ramps between Cutts Street path and Market Street.	High	Short	$60,000	Northwest to Downtown
Low	10	Add warning signs for cyclists at approaches to rail tracks on Maplewood Avenue and Market Street.	High	Short	$20,000	
High	**5**	**Add a shared use path on Lafayette Road between Elwyn Road and Greenleaf Avenue.**	**Low**	**Long**	**$4,000,000**	North-South Connections
High	6	Add a shared use path on West Road between Peverly Hill Road and Campus Drive.	Medium	Long	$2,500,000	
High	8	Continue progress on US Route 1 Corridor Project in coordination with NHDOT.	Medium	Medium	See CIP and NHDOT STIP	
Medium	1	In coordination with NHDOT, improve pedestrian crossings along Lafayette Road at Wilson Road.	Medium	Short	$90,000	
Medium	2	In coordination with NHDOT, improve pedestrian crossings along Lafayette Road at White Cedar Boulevard.	Medium	Short	$90,000	
Medium	3	In coordination with NHDOT, improve pedestrian crossings along Lafayette Road at Heritage Avenue.	Medium	Short	$90,000	
Medium	4	In coordination with NHDOT, improve pedestrian crossings along Lafayette Road at Ocean Road.	Medium	Short	$90,000	
Low	7	Add wayfinding on Barberry Lane to the New Hampshire Seacoast Greenway.	High	Short	$10,000	

Priority	ID	Recommendation	Feasibility	Timeframe	Planning Level Cost	Key Connection
High	1	Improve crossing at Elwyn Road/Peverly Hill Road and Lafayette Road.	Medium	Medium	$90,000	East-West Connections
High	2	Add shared use path on Greenland Road between Sherburne Road and Peverly Hill Road and on the north side of Middle Road/South Street between Peverly Hill Road and Lafayette Road.	Medium	Long	$3,390,000	
High	3	Continue shared use path on Constitution Avenue between Lafayette Road and Banfield Road.	Medium	Long	$1,000,000	
High	4	Add shared use path to Heritage Avenue between Lafayette Road and Banfield Road.	Medium	Long	$3,000,000	
High	5	Add off-road connections between Freedom Circle and the New Hampshire Seacoast Greenway and between Nathaniel Drive and the New Hampshire Seacoast Greenway.	Medium	Long	$1,930,000	
High	8	Add shared use path connection on Longmeadow Road/Lang Road between Lafayette Road and the Rye border.	Low	Long	$2,070,000	
High	**10**	**Add shared use path connection on Banfield Road between New Hampshire Seacoast Greenway and Campus Drive off-road connectors. Add a trailhead connection to the New Hampshire Seacoast Greenway.**	**Medium**	**Long**	**$1,530,000**	
High	11	Continue progress on Elwyn Road Side Path, Elwyn Park Sidewalks and Traffic Calming, and Peverly Hill Road Complete Street projects.	High	Long	See CIP	

Priority	ID	Recommendation	Feasibility	Timeframe	Planning Level Cost	Key Connection
High	6a	Add sidewalks on Elwyn Road to Rye border.	Medium	Medium	$2,710,000	East-West Connection
High	6b	Improve off-road connection between Elwyn Road and Odiorne Point Road.	High	Medium	$450,000	
Medium	7	Add sidewalk on Campus Drive to fill gaps.	High	Medium	$2,710,000	
Medium	9	Formalize off-street connection between Lafayette Plaza Shopping Center parking lot and Ledgewood Drive.	High	Short	$470,000	
Medium	6c	Continue to progress Elwyn Road crossing at Harding Road.	High	Short	See CIP	
Medium	2	Update pedestrian bridge at Greenland Road to accommodate bicycles.	Medium	Medium	$2,000,000	Connections to Pease
Medium	3	Formalize bike boulevard and path connection on Sherburne Road between Grafton Road and Greenland Road.	High	Short	$80,000	
Medium	5	Coordinate with the Pease Development Authority to add a crossing across Grafton Road at the Portsmouth Transportation Center.	Medium	Short	$100,000	
Medium	**6**	**Complete sidewalk on Edmond Avenue and convert into a Neighborhood Slow Street by removing the center line and designating as a bike boulevard, enabling a low-stress connection to Ashland Road path.**	**Medium**	**Short**	**$660,000**	

Priority	ID	Recommendation	Feasibility	Timeframe	Planning Level Cost	Key Connection
Medium	8	Add shared use path on Gosling Road/Newington Street between Woodbury Avenue and International Drive.	Low	Long	$3,000,000	Connections to Pease
Low	1	Add bike route wayfinding to and from the Transportation Center.	High	Short	$60,000	
Low	4	Coordinate with the Pease Development Authority to add an enhanced pedestrian crossing across Grafton Road at Sherburne Road path.	Medium	Short	$100,000	
Low	7	Add wayfinding on Edmond Avenue and Rockingham Avenue to and from the Ashland Road path. Add a Rectangular Rapid Flashing Beacon to enhance the pedestrian crossing at Rockingham Avenue and Woodbury Avenue for connection to the bike path.	High	Short	$120,000	

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Section 7
Implementation

IMPLEMENTATION FRAMEWORK

Project Development Process

The recommendations within this Plan represent an important step to help the City work toward fulfilling the vision of a bikeable and walkable Portsmouth. However, this Plan only represents two stages of a longer project development process, shown in **Figure 10**. The Plan responds to the questions: what issues need to be addressed; what could address the issues; and what is feasible at a planning level? More specific project engineering, design, and programming will be required before reaching the construction stage. The City is committed to working through these remaining steps in this process over the next several years to help ensure that this Plan's vision comes to fruition.

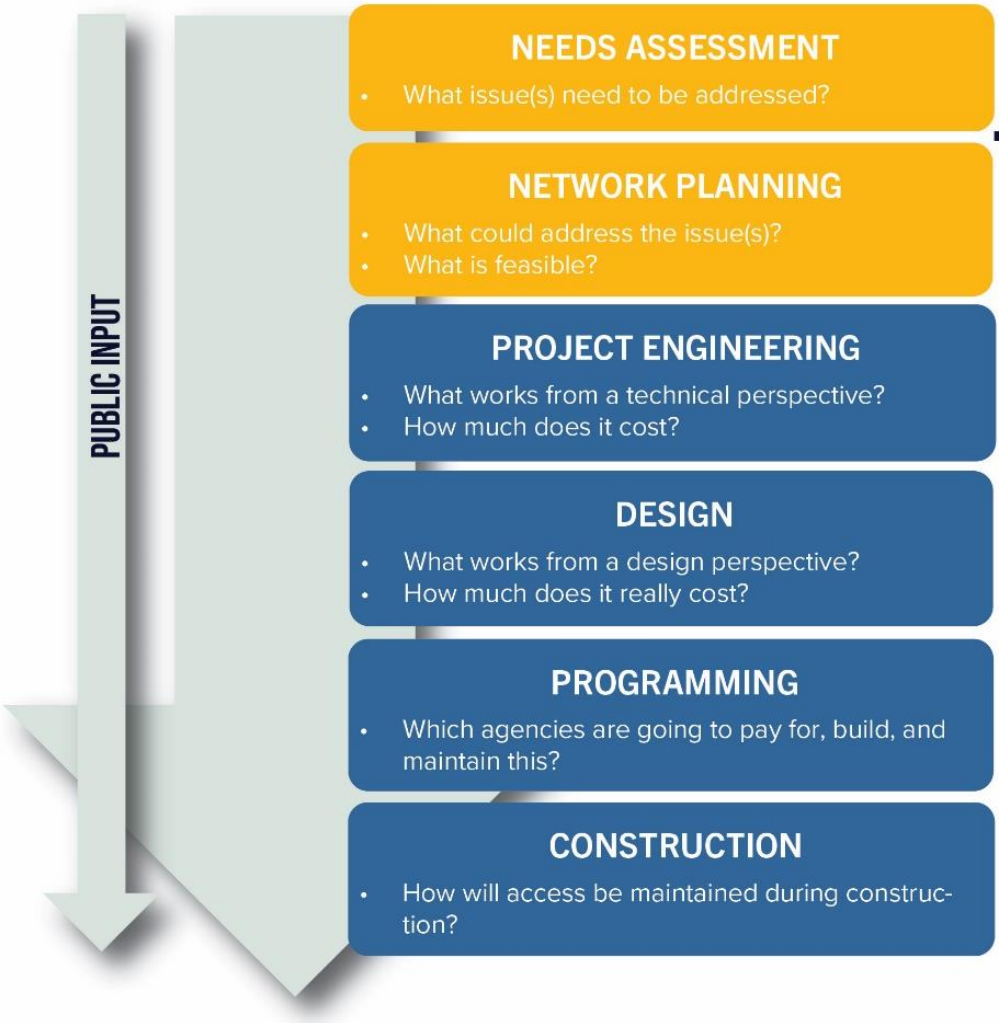


Figure 10. Project Development Process

Implementing the recommendations in this Plan will require working through obstacles, overcoming constraints, and ultimately making trade-offs. Per the City's 2013 Complete Streets Policy, Portsmouth has committed to "approach every transportation improvement and project phase as an opportunity to create

safer, more accessible streets for all users." The following sections include resources to help in this decision-making process and to measure implementation progress along the way.

Performance Metrics

Performance metrics are a way for the City to track progress towards the Plan's goals. The following example metrics listed in Table 11 can be assessed with existing data collection methods, such as crash data, vehicle speeds and volumes, or regular pedestrian and bicycle counts, through tracking of completed infrastructure projects, or by periodically conducting community, household, or business surveys.

Table 11. Performance Metrics

Goal	Suggested Performance Metrics[14]
GOAL 1: Improve the safety and awareness of walking and bicycling in Portsmouth for all ages and abilities.	Reduction in quantity and severity of crashes involving non-motorized users
	Slower vehicle speeds
	Increased public perception of safety and comfort
	Increased participation in Bike Benefits and Commuter Choice programs
	Complete installation of APS technology and increase percent of street crossing, sidewalk miles, and bus stops meeting ADA accessibility standards
GOAL 2: Increase the number of walking and bicycling trips in Portsmouth.	Increased pedestrian and bicyclist volumes and overall mode share
	Increased number of trips to school taken by walking or biking
	Increased participation in walking and biking-related public events

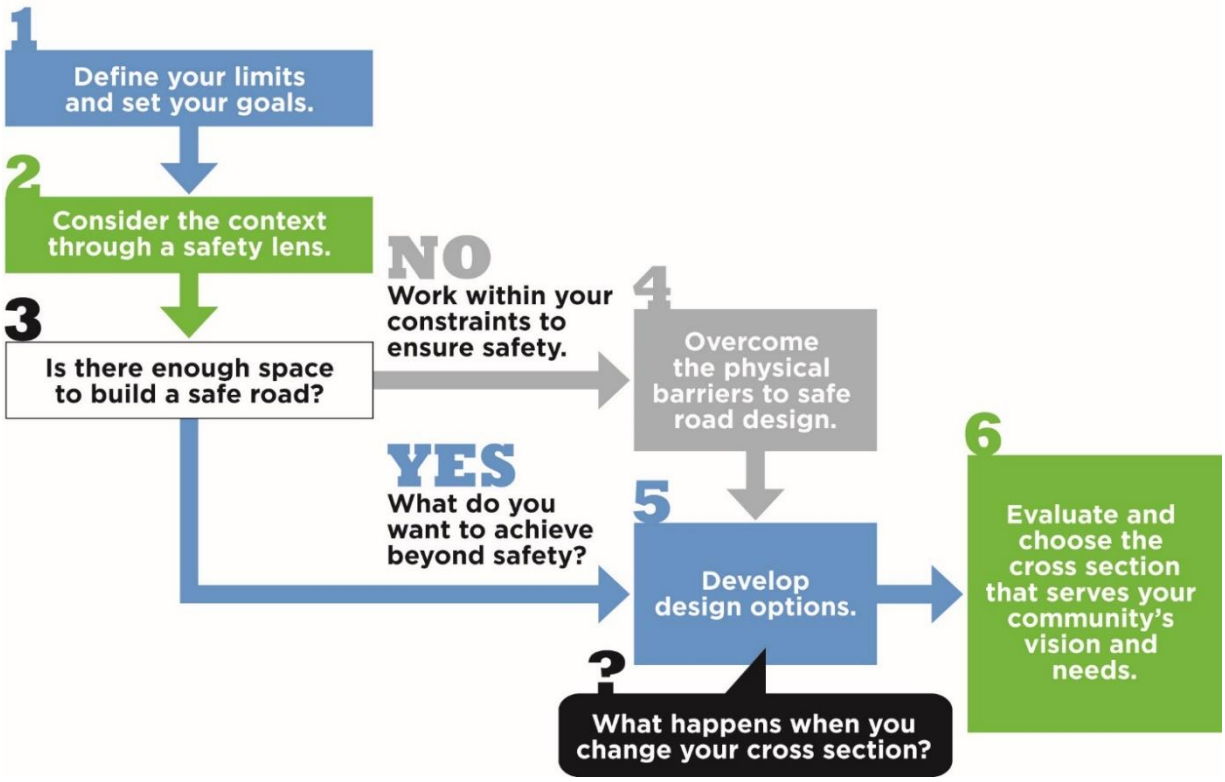
[14] See strategies for 'How to Track" in FHWA Guidebook for Developing Pedestrian & Bicycle Performance Measures, 2016. https://www.pedbikeinfo.org/cms/downloads/pm_guidebook.pdf

Goal	Suggested Performance Metrics
GOAL 3: Advance Portsmouth's reputation as a City where walking and bicycling are a visible part of everyday and year-round life and there are high-quality facilities that are well-maintained.	Consistent public events that emphasize walking, biking, or Open Streets
	Increased participation in Bike Benefits and Commuter Choice programs
	Increased resources for walking and biking available on the City's website
	Enhanced maintenance of walking and biking facilities year-round
GOAL 4: Improve connectivity for walking and biking throughout Portsmouth and equitable access to key destinations like employment, schools, and transportation.	Number of pedestrian crossing improvement projects
	Decreased average distance between pedestrian crossings on arterials and collectors
	Miles of connected low-stress walking and biking facilities
	Increased proportion of population (residences) connected to the low-stress walking and biking network
	Increased access to jobs via low-stress walking, biking, or transit facilities
	Increased proportion of youths and seniors and low-income and zero vehicle households that are connected to the low-stress walking and biking network
GOAL 5: Reduce greenhouse gas emissions and household transportation costs through the implementation of walking and biking improvements, and support complementary City priorities such as the Climate Action Plan's climate targets and supporting affordable housing.	Decreased vehicle miles travelled
	Reduction in household transportation costs
	Safe walking and biking connections to priority locations and affordable

Constrained Conditions

The reality of a historic city like Portsmouth is that existing roadways simply may not have enough space to accommodate high-quality, separated walking, biking, and driving facilities everywhere that they are merited. A recently published federal research guide – Roadway Cross-Section Reallocation: A Guide[15] – provides a useful decision-making framework for designing complete streets in constrained environments that reflect community priorities, mobility needs, and transportation safety (see **Figure 11**). Importantly, this framework puts safety first and requires thinking through how constraints can be overcome to still achieve a roadway design that serves the community's vision and needs. This framework can serve as a tool for the City as it moves to implement the recommendations within this Plan.

Figure 11. Cross Section Decision-Making Framework



[15] NCHRP Research Report 1036 Roadway Cross-Section Reallocation: A Guide, 2023. https://nap.nationalacademies.org/catalog/26788/roadway-cross-section-reallocation-a-guide

Quick Build Projects

Quick build projects make use of lower-cost, easily implementable materials and processes to more quickly advance long-term community goals for safer streets and intersections. In contrast to more permanent capital projects, which can be resource and time intensive, quick build projects let communities test and implement improvements on a faster timeline with less effort and at a lower cost. These projects often focus on filling short gaps in facilities, testing out or building support for longer-term installations, or providing safety improvements at key locations on an accelerated timeline. While quick build installations can have an open-ended timeline, they are often installed on a more limited basis, anywhere from a few months to a year, or can sometimes be used for just week-long or day-long demonstration events.

Figure 12. Quick-Build Separated Bike Lane

Source: Kittelson & Associates, Inc.

One of this Plan's non-infrastructure recommendations proposes that the City establish a quick build program to facilitate near-term trial improvements to improve walking and biking. This program could enable the City to pilot different configurations or materials, to evaluate the impacts of changes, and to seek feedback from the community ahead of more permanent installations.

There are a number of guides on the topic of quick build that the City can draw from to begin building a regular practice of quick build installation. A few examples are listed in **Table 12**.

Table 12. Quick Build Guides

Source	Document	Link
People for Bikes	Quick Build for Better Streets: A New Project Delivery Model for U.S. Cities, 2016	https://nacto.org/wp-content/uploads/2016PeoplefoBikes_Quick-Builds-for-Better-Streets.pdf
Burlington, VT	Quick Build Design + Materials Standards	https://www.burlingtonvt.gov/DocumentCenter/View/1252/Quick-Build-Project-Materials-Guide-PDF
Orlando, FL	Quick Build Guide, 2023	https://www.orlando.gov/files/sharedassets/public/v/1/transportation/quick-build/orlandoquickbuildguide06-28-2023.pdf buildguide06-28-2023.pdf

Funding Opportunities

In addition to City funding, some programs provide dedicated funding to support bicycle and pedestrian infrastructure and non-infrastructure projects, as summarized below in **Table 13.**

Table 13. Funding Sources

Source	Eligibility/Requirements/Purpose
Transportation Improvement Program (TIP)	TIP projects are federally funded or regionally significant projects that are updated biennially by the Rockingham County Metropolitan Planning Organization (MPO) as part of the State Ten Year Plan update process. Every two years, the MPO solicits project proposals from communities and other local & regional organizations to be considered for funding through the regional transportation planning process. The MPO then applies a set of project selection procedures and criteria to assist in setting regional priorities for transportation improvements that will be included in the TIP. The State Transportation Improvement Program (STIP) is compiled from the regional TIPs for a fiscally constrained list of highest priority projects for the first four upcoming years.

Source	Eligibility/Requirements/Purpose
Transportation Alternatives Program (TAP)	Funds may be used for a variety of non-motorized transportation projects including sidewalks, bikeways, side paths, and rail-trails. In NH, the TAP funding allocation is administered by the NHDOT and municipalities are eligible to apply for funding for specific projects during each grant round, which occur approximately every 4 years[16].
Congestion Mitigation/Air Quality Program (CMAQ)	Funding for projects and programs which would result in air quality benefit. Eligible projects include transportation-focused (non-recreational) bicycle transportation and pedestrian improvements that provide a reduction in single-occupant vehicle travel. In NH, the CMAQ funding allocation is administered by the NHDOT and municipalities are eligible to apply for funding for specific projects during each grant round, which occur approximately every 4 years.[17].
Safe Streets and Roads for All (SS4A)	Established by the Bipartisan Infrastructure Law (BIL), SS4A provides funding to either develop, complete, or supplement a comprehensive safety action plan or to implement projects and strategies identified in an existing Action Plan to address a roadway safety problem. Local governments may apply directly[18].
Recreational Trails Program (RTP)	Funding allocated by FHWA and administered by the NH Bureau of Trails for the construction, restoration and maintenance of nonmotorized and motorized recreational trails (paved or unpaved) and trail-related facilities[19].
AARP Community Challenge Grant	AARP launched a grant program in 2017 to fund projects that support nationwide liveability. Relevant opportunities include demonstration projects that enhance pedestrian safety, capacity-building microgrants for training resources related to walk and bike audits and grants up to $25,000 to improve public places and transportation[20].

[16] TAP. https://www.dot.nh.gov/projects-plans-and-programs/programs/transportation-alternatives-program
[17]CMAQ. https://www.dot.nh.gov/projects-plans-and-programs/programs/congestion-mitigation-and-air-quality-cmaq-program
[18] SS4A. https://www.transportation.gov/grants/SS4A
[19] RTP. https://www.nhstateparks.org/find-parks-trails/find-trails-maps-clubs/grants/recreational-trails-program
[20] AARP. https://states.aarp.org/new-hampshire/aarp-nh-announces-grant-opportunity-for-quick-action-community-improvement-projects-for-2025

Source	Eligibility/Requirements/Purpose
Rails to Trails Conservancy (RTC)	The RTC's trail grant programs provide funding to local agencies and nonprofits with funding up to $25,000 for projects that build trail networks through visioning, coalition building, filling gaps (e.g., acquisition strategies), mapping and analytics, identifying and pursuing funding opportunities, and engagement[21].
Smart Growth America	Technical assistance funding including evaluating, refining, developing, and implementing transportation policies to improve connectivity, accessibility, and performance[22].

[21] RTC. https://www.railstotrails.org/grants/eligibility/
[22] Smart Growth America. https://smartgrowthamerica.org/work-with-us/workshop-types/