

B. On-road Bikeway, Trail and Pathway Networks

Overview of the Networks and Maps

The inventory and maps of the Bikeway, Trail and Pathway networks are the heart of the Plan Update project. The maps are a snapshot of the existing and desired future networks of facilities to provide bicycle and pedestrian access to destinations within and to the PACTS region as of October 2009. The bicycle and pedestrian-related facilities identified on the network maps are:

- **On-road Bikeways** – Bicycle lanes, Paved shoulders and Shared lanes
- **Trails** – Regional and Local
- **Shared Use Pathways** – some within their own right of way and some shared with rail and utility rights of way.

Facilities are shown as 'Existing' (solid line) or 'Future' (dashed line). Trails that are local in nature are thin green lines; those that provide regional connections are thicker green lines.

The maps also provide information important to the context of the bicycling and walking networks within the region. This information includes:

- Conservation, Recreation Facilities and Open Space areas – these are often key destinations for cyclists and walkers
- Rail lines – active and inactive, that may be important trail or pathway corridor opportunities, with or without active rail service sharing the corridor
- Bus routes – transit services require quality pedestrian access to be successful and bicycling can extend the effective range of transit services where coordinated
- Intermodal centers – are important destinations for bicyclists and pedestrians
- Park and Ride Lots – can serve bicyclists and pedestrians as transfer points for transit services or carpools/vanpools
- Municipal Growth Areas from approved Comprehensive Plans – bicycling and pedestrian infrastructure is important to support municipal growth management and travel demand management strategies
- Schools – important bicycling and pedestrian destinations for students and the broader community.

The facilities comprising the networks come from a number of sources. The starting point was the 1995 PACTS Plan and the bicycle and trail plans several PACTS towns and cities have undertaken. New facilities were suggested to be added to the networks at the meetings with municipal staff, trails organizations and advocates over the course of the project. Once they were compiled, additional facilities were added to ensure connectivity of the networks between municipalities and broadly within the region. For instance, planned on-road bikeways sometimes did not align at municipal boundaries and some regional destinations, such as state parks, did not have connections.

The network maps are provided at two scales: a regional map (Map B-1) showing the entire PACTS region and sub-regional maps that provide improved legibility. PACTS communities were grouped into four sub-regions:

- **North:** Falmouth, Cumberland, Yarmouth, Freeport, North Yarmouth (Map B-2)
- **Central:** Westbrook, Portland, South Portland, Cape Elizabeth (Map B-3)
- **South:** Scarborough, Old Orchard Beach, Saco, Biddeford (Map B-4)
- **West:** Windham, Gorham (Map B-5).

On-road Bikeways

Different on-road bicycle facilities provide distinct levels of accommodation and perceived safety for cyclists. Their application is dependent upon a roadway's characteristics and its context. Three types of on-road bikeway facilities are included on the inventory: Bicycle lanes, Paved shoulders and Shared lanes.

A large number of variables must be considered and balanced when selecting an on-road bicycle facility for a particular road. These variables include:

- existing road pavement width (and the potential for widening)
- number of travel lanes, their width and their configuration
- traffic volumes – existing and future
- traffic speeds – posted speed limit and actual traffic speed
- composition of the traffic (such as the volume of trucks, buses and RVs)
- the skill level of likely cyclists using the facility
- the presence of on-street parking and its turnover rate
- the continuity of bikeway facility-type that can be achieved (frequent transitions between facility types within short distances should be avoided)
- surrounding land use and environment – urban, suburban, rural and types of activity centers/destinations.

While there is longstanding debate among bicycle planning professionals and advocates about this point, current bicycle facility design guidelines (such as AASHTO's *Guide for the Development of Bicycle Facilities*, 1999) generally call for greater distance separation between cyclists and motorists on roadways, where feasible, as traffic speeds and volumes increase to reduce the amount of interaction between the two. Those that disagree with this general design principle feel that this separation creates a false sense of security for less skilled bicyclists.

Bicycle lanes are designated bikeways that have stenciled bicycle symbol pavement markings and often have accompanying roadside signs. Bicycle lanes are designated for exclusive or preferential use by bicycles. They may be located on streets with or without on-street parking. On streets with parking, the lanes are placed between the travel lane and the parking. An example of urban bicycle lanes with curbing and on-street parking is located on Brighton Avenue in Portland. An example of bicycle lanes on a suburban, uncurbed roadway is Route 88 in Falmouth.



Bicycle lane next to parking lane

The minimum recommended width for bicycle lanes is 4' (AASHTO, 1999). Additional width is recommended when the bicycle lane is located next to curbing or next to on-street parking (5' minimum recommended), or on streets with higher traffic speeds and volumes (possibly up to 6').

The vast majority of bicycle lanes within the region are being created by reallocating existing pavement width to define the bicycle lanes. Space for bicycle lanes can often

found by narrowing travel lanes and parking lanes, or eliminating parking lanes or travel lanes, or a combination.

Paved shoulders are located to the right of the outside travel lane and delineated by a white pavement stripe. They are not designated specifically for use by bicycles but are available for bicycle use and provide room for separation from motor vehicle traffic. Paved shoulders are located on roads with and without curbing. They are distinct from on-street parking lanes.



Paved shoulder on curbed street

The minimum recommended width for paved shoulders (AASHTO, 1999) to provide quality accommodation for cyclists is 4'. Additional width is recommended when the paved shoulder is next to curbing or on streets with higher traffic speeds and volumes. In addition to safety benefits for cyclists, paved shoulders also have motorist safety and pavement preservation benefits. Wide paved shoulder widths (over 6' for instance), especially in combination with larger clear zones along roads, can contribute to increased traffic speeds, diminishing their potential benefits for cyclists.

Local examples of paved shoulders are Route 25 between Gorham and Westbrook and along much of Route 1 in Falmouth, Cumberland and Yarmouth.

Shared Lanes are roadway travel lanes that are shared by motorists and bicyclists. Shared Lanes, as a bicycle facility, are often used where the roadway is not wide enough to provide another facility such as a bike lane. Shared Lane pavement markings, also called Sharrows, may be appropriate if the Shared Lane is part of a designated bicycle route (see F - Design Guidelines). Sharrows are currently an experimental pavement marking and require permission from the FHWA to use. 'Share the Road' signs are often placed along roads where an on-road bicycle facility may transition, due to reduced pavement width, from a bicycle lane or paved shoulder to shared lane facility.

Shared lanes may be of two types:

- typical travel lanes 10' to 12' wide that require motorists to change lanes or cross the center line to safely pass cyclists with 3' of clearance
- *wide curb lanes* that have additional width (13' to 15' wide) and allow motorists to overtake and pass cyclists without changing lanes.



Wide curb lane next to parking lane

Local examples of existing shared lanes are Main Street/Route 1 in Freeport Village, Main Streets in Biddeford and Saco, and West Grand Avenue in Old Orchard Beach. Examples of wide curb lanes are on Broadway south of Millcreek in South Portland and much of Main Street in Westbrook.

Shared Use Pathways are intended for multiple types of path users including bicyclists and pedestrians. They have a firm, compacted surface (paved, stone dust, etc) that serves road bicycles well. Depending upon the type of surface, roller bladers and equestrian users may also use the path. Local examples of paved shared use pathways are the Eastern Promenade Trail (right) in Portland, the South Portland Greenbelt in South Portland, and the Beth Condon Pathway in Yarmouth. An example of a stone dust pathway is the Eastern Trail through the Scarborough Marsh in Scarborough.



Trails are intended primarily for pedestrians. They are distinct from pathways by surface type and width, often with a dirt surface and narrower width. The surface is not generally good for road bicycles but most trails, depending upon topography and where permitted, can be used by mountain bikes. Trails often primarily serve recreation purposes, such as loop trails through conservation lands. Local examples of trails are the Fore River Trail in Portland and the Great Pond Trail in Cape Elizabeth.



On-road Bikeway Network Summary

The regional on-road bikeway network is comprised of approximately 564 miles of bicycle lanes, paved shoulders, and shared lanes. Existing facilities total 224 miles, with 68% paved shoulders. Future facilities total 340 miles, with 82% paved shoulders. Table B-1 describes the distribution of these facilities across the PACTS municipalities.

Table B-1: On-Road Bikeway Network

Municipality	Bicycle Lane		Paved Shoulder		Shared Lane		Total (mi.)
	Existing (mi.)	Future (mi.)	Existing (mi.)	Future (mi.)	Existing (mi.)	Future (mi.)	
Biddeford	0.0	0.0	18.7	10.2	5.9	3.6	38.4
Cape Elizabeth	6.3	0.0	2.4	3.8	3.7	0.0	16.2
Cumberland	0.0	3.2	12.7	18.6	1.6	0.0	36.1
Falmouth	4.0	0.0	10.9	33.5	5.1	0.0	53.5
Freeport	0.0	0.0	16.0	9.6	21.6	0.0	47.2
Gorham	0.0	0.0	32.8	20.7	0.0	0.0	53.5
North Yarmouth	0.0	0.0	2.0	22.5	0.0	0.0	24.5
Old Orchard Beach	1.3	0.0	4.9	4.8	2.3	0.0	13.3
Portland	8.5	15.9	0.0	9.5	3.0	22.0	58.9
Saco	0.0	0.0	20.4	29.3	1.2	0.0	50.9
Scarborough	0.0	0.6	13.4	55.3	1.0	0.0	70.3
South Portland	2.0	6.8	6.8	7.2	4.0	1.7	28.5
Westbrook	0.0	3.3	11.0	16.2	0.4	0.0	30.9
Windham	0.0	0.0	0.0	28.2	0.0	0.0	28.2
Yarmouth	0.0	4.4	0.0	8.5	8.3	0.0	21.2
Totals (mi.)	22.1	34.2	152.0	277.9	58.1	27.3	571.6

Source: On-road Bikeway Network, Map B-1, dated October 30, 2009.

Significant Regional Pathway and Trail Initiatives

A number of regional-scale pathway project initiatives are underway which would link the PACTS region to other regions. These include:

- Mountain Division Trail with Rail, Portland to Gorham (within PACTS) to Fryeburg
- Eastern Trail, South Portland to Biddeford (within PACTS) to Kittery.

Five miles of the Mountain Division Trail is completed and paved in Windham, Gorham and Standish. A significant portion of the Eastern Trail is completed within the PACTS area including most of South Portland and from the Nonesuch River in Scarborough to near Cascade Road in Old Orchard Beach. New sections are to be constructed soon in Old Orchard Beach/Saco and Biddeford south.

The Mountain Division Trail is a substantial portion of the *Sebago to the Sea Trail* initiative to link Sebago Lake to Casco Bay. The Sebago to the Sea Trail branches to two distinct urban routes for the Westbrook to Portland section (a Stroudwater River branch and a Presumpscot River branch).

The East Coast Greenway, an urban greenway planned to stretch from Key West, Florida, to Calais, Maine, traverses the region. It is envisioned to be a network of mostly off-road pathways eventually but there is an on-road network that is designated in the interim. The Eastern Trail is the southerly section through the PACTS region. Streets and pathways from Portland to Freeport comprise the northerly section.

A pathway/trail with rail corridor is suggested for future evaluation linking Portland, from the Eastern Promenade Trail, to Freeport Village Center, adjacent to or within two active rail lines.

The proposed Nonesuch River Trail is a planned significant trail and greenway corridor connecting northern and western Scarborough with northwestern Saco/the Saco Heath Preserve.

A series of connected pathways from Yarmouth village center (extending the Beth Condon Pathway) to Freeport village center is suggested adjacent to and within the Route 1 corridor.

Cost Estimates to Implement the Future On-road Bikeway Network

An order of magnitude cost estimate to establish the Future portion of the on-road bikeway network is approximately \$80.2 million and includes:

- \$1.4 million to create 34 miles of bicycle lanes comprised of constructing 3.2 miles of bike lanes (the marginal cost only) and to sign and stripe an additional 31 miles of bike lanes
- \$78.5 million dollars to add 278 miles of paved shoulder (the marginal cost only)
- \$251,000 to sign and stripe 27 miles of shared lane bikeway facilities.

The largest percentage of this cost (\$78.5 million) is to add paved shoulders to primarily suburban arterials and collector roads. Paved shoulders are rarely added independently of other road work (such as a pavement overlay or road reconstruction/rehabilitation) nor solely for their bicycle and/or pedestrian benefits. The shoulder costs identified are the marginal costs of adding the paved shoulder to a road (PACTS Collector Road Study). This level of investment in paved shoulders, complementary to the investments recommended in the PACTS Collector Road Study (2008), also increases motorist safety and improves pavement preservation and maintenance efforts.

These network costs do not include annual ongoing maintenance and preservation costs, such as pavement re-striping, pavement markings nor pavement resurfacing to maintain the facilities over the long-term.

Typical unit costs are shown in Table B-2.

Table B-2: On-Road Bikeway Unit Costs

Item	Units	Unit Cost	Notes
Bicycle Lane - Urban	Mile	\$9,600	Significant edge striping, pavement markings, signs (A)
Bicycle Lane - Rural	Mile	\$4,800	Less intensive edge striping, pavement markings, signs (B)
Paved Shoulders - 4'	Mile	\$300,000	Add 4' paved shoulders to both sides of road (C)
Paved Shoulders - 5'	Mile	\$360,000	Add 5' paved shoulders to both sides of road (C)
Paved Shoulders - Urban	Mile	\$4,800	Striping and route signage only (B), Portland only
Shared Lane Markings/Sharrows - Urban	Mile	\$9,600	Significant edge striping, pavement markings, signs (A)
Shared Lane - Rural/Suburban	Mile	\$4,800	Striping and Share the Road signage
Notes			
(A). Based upon low bid in 2009 for Forest Avenue, Park Avenue, Deering Avenue bike lane/shared lane project.			
(B). Estimated to be one half of (A) to account for lower road striping and signage requirements.			
(C). Based upon PACTS Collector Road Study estimate of \$6.80/sf for adding paved shoulders.			