

6.0 Bicycle and Pedestrian Transportation

6.1 Introduction

Active transportation refers to travel powered by human energy — primarily walking and bicycling. For purposes of this plan, walking and pedestrian refers to anyone traveling on foot or in a wheelchair, or other type of mobility device. A transportation network that facilitates fast and efficient movement of vehicles from origin to destination point is essential for growing the economy and supporting mobility to connect the region to the rest of the world. However, transportation networks in urbanized areas – particularly in neighborhoods and downtowns - require a more multifunctional design to accommodate a greater range of activities and users.

Bicycling and walking are integral components of an efficient transportation network. Appropriate bicycle and pedestrian accommodations provide the public, including the disabled community, with access to the transportation network, connectivity with other modes of transportation, and independent mobility regardless of age, physical constraint, or income. Effective bicycle and pedestrian accommodations enhance quality of life and health, strengthen communities, increase safety for all modes of transportation, reduce congestion, offer recreational benefits, and benefit the environment. Bicycling and walking are successfully accommodated when travel by these modes is efficient, safe, and comfortable for the public.

Figure 6.1

WORKERS USING ACTIVE TRANSPORTATION AS PRIMARY MEANS OF COMMUTING TO EMPLOYMENT 2015				
	Total Workers (16 years +)	Percent of Workers Using Active Transportation		
		Bus	Walk	Bike
Bangor	14,942	1.50%	5.20%	0.20%
Bradley	726	-	1.90%	-
Brewer	4,941	0.50%	0.90%	0.10%
Hampden	4,009	-	0.60%	-
Hermon	3,040	-	-	-
Milford	1,620	-	0.70%	-
Old Town	3,758	0.90%	2.60%	2.30%
Orono	4,617	1.00%	20.60%	1.80%
Orrington	1,887	-	0.90%	-
Penobscot Indian Island	330	0.90%	7.60%	-
Veazie	934	2.60%	0.70%	-
BACTS Total	40,804	0.87%	4.82%	0.50%
Penobscot County	70,797	0.60%	3.90%	0.30%
Maine	635,475	0.60%	4.00%	0.40%

Source: S0801 2011-2015 American Community Survey 5-Year Estimates

Residents of the BACTS area, like many urban areas across the country, are becoming increasingly conscious of the importance of creating a more livable and sustainable community. In order to reach this goal, communities are developing plans to outline ideas for improving mobility. People are beginning to look for alternative modes of travel as the cost of automobile travel increases and the awareness of the environmental effects of motor vehicle travel increases (Figure 6.1). It is important for urban areas to provide adequate facilities for non-motorized travel. A higher percentage of residents in the BACTS area use active transportation as a primary means of commuting to and from work than Penobscot County and the State as a whole, emphasizing the importance and necessity for a well-

designed, safe and accessible pedestrian and bicycle network and associated facilities to be incorporated into transportation projects and plans in the area.

BACTS has made a commitment to develop a multi-modal transportation system, including well-used, safe, and accessible facilities for pedestrians and bicyclists of all ages and abilities that contribute to the region’s economic vitality, health, and quality of life. An expanding network of sidewalks, bikeways and accommodating roadways will provide users with a wide array of safe and secure transportation choices to any destination.

6.2 Issues and Challenges

The lack of designated bikeways and sidewalks is a factor that often prevents people from traveling by bicycle or on foot. Bicycle users prefer a safe, continuous and direct path to their destinations, but many roadways in the region were constructed before local development policies and standards required consideration of bicycle elements. BACTS supports the integration of bicycle and pedestrian accommodations early in planning and design stages, as well as in the implementation in all transportation facilities, whenever possible.

Maintaining active transportation infrastructure is another challenge. Sidewalks, shared-use-paths, and shoulders sometimes are not deemed as high a priority for limited maintenance funds as facilities for automobiles (e.g., highways, arterials and local streets). Communities are encouraged to review maintenance policies and include provisions in local budgets for bicycle/pedestrian system preservation and routine maintenance.

ADA regulations require public agencies to maintain walkways in an accessible condition, with only isolated or temporary interruptions in accessibility. Part of this maintenance obligation includes reasonable snow removal efforts. As part of maintenance operations, public agencies' standards and practices must ensure that the day-to-day operations keep the path of travel on pedestrian facilities open and usable for persons with disabilities, throughout the year. This includes snow removal, as well as debris removal, maintenance of accessible pedestrian walkways in work zones, and correction of other disruptions.

The most current Bicycle and Pedestrian study developed in 2009 provides guidance on design and development of facilities and infrastructure improvements to accommodate bicycle and pedestrian travel; however, it is outdated and does not reflect an adequate inventory and description of current active transportation facilities, improvements and initiatives in the region. Rather than duplicate the 2009 information in this Plan, BACTS has decided to undertake the development of a more comprehensive stand-alone Regional Active Transportation Plan, which will be completed by the end of calendar year 2018. Once completed and approved, this Plan will serve as guidance for short-term and long-term planning and be incorporated into the metropolitan transportation plan by reference.

6.3 Complete Streets

A multimodal transportation system is crucial to the safety and economic vibrancy of businesses, villages, downtowns, neighborhoods, and the rural areas of Maine. Addressing the needs of non-motorized and transit users early in the transportation project planning process is cost-effective, efficient, and critical to the development of a balanced and safe transportation system. Road network design incorporating complete streets policies is often a precursor to the street becoming a place where people want to be, instead of just a corridor to pass through. It reconfigures the road network to best serve the people who need to use it, whether they're drivers, pedestrians, or bicyclists.

The MaineDOT Complete Streets Policy outlines how the State and its project partners will consider the needs of all users when planning and developing projects funded partially or in full through MaineDOT. This includes all MPO and Local Project Administration Program projects, regardless of the reason the project was initiated. The policy must be adhered to for any relevant new construction, rehabilitation and reconstruction projects.

State of Maine DOT Complete Streets Policy: <http://www.maine.gov/mdot/completestreets/>
<http://www.maine.gov/mdot/completestreets/docs/MaineDOTCompleteStreetsPolicyFinal061814.pdf>

MaineDOT Complete Streets Related Policies, Rules and Guides

- [ADA Standards for Accessible Design](#)
- [Entrance Permit Policies and Procedures](#)
- [MaineDOT Bridge Design Guide](#)
- [MaineDOT Design Exception Processes](#)
- [MaineDOT Flexible Design Practices](#)
- [MaineDOT Guidelines on Crosswalks](#)
- [MaineDOT Guidelines for the Use of Traffic Calming Devices](#)
- [MaineDOT Highway Design Guide](#)
- [MaineDOT Local Cost-Sharing Policy](#)
- [MaineDOT Local Project Administration Guide](#)
- [MaineDOT Practical Design Guidance](#)
- [MaineDOT Practical Design Roadway Widths](#)
- [MaineDOT Shoulder Surface Type Policy](#)
- [Traffic Movement Policies and Procedures](#)

6.4 Road Diet

A Road Diet is generally described as “removing travel lanes from a roadway and utilizing the space for other uses and travel modes.” The most common Road Diet reconfiguration is the conversion of an undivided four lane roadway to a three-lane undivided roadway made up of two through lanes and a center two-way left-turn lane. The reduction of lanes allows the roadway cross section to be reallocated for other uses such as bicycle lanes, pedestrian refuge islands, transit uses, and/or parking.

MaineDOT Road Diet Guidelines: <http://maine.gov/mdot/edi/docs/RoadDietGuidelines.pdf>

6.4 Pedestrian Travel

Pedestrians vary significantly in their skills, experience, and willingness to walk different distances. Strong determining factors for pedestrians are the time and mobility required to reach their destinations, particularly if they need to cross high-volume or high-speed roads. Time and mobility constraints also dictate the pedestrian’s usable geographic space. Few urban pedestrians will venture more than one mile from point to point; most actually will only undertake trips shorter than half a mile.

Access to safe sidewalks and roadways allow residents to walk to nearby shops, schools and parks. FHWA’s long-term goal is to increase the percentage of short trips, defined as one mile or less for pedestrians, to 30 percent by 2025.

In 2015, approximately 4.9 percent of the workforce residing in BACTS communities, reported walking as their primary means of transportation to employment, compared to 4.0 percent for the State overall and 3.9 percent in Penobscot County.

The BACTS area sidewalk inventory was last updated in 2010 as part of a project to identify sidewalks within $\frac{3}{4}$ mile of existing bus routes. BACTS is in the process of developing an updated sidewalk inventory to include ADA maintenance and inspection criteria to ensure that projects include and follow ADA guidelines and are responsive in creating an accessible path of travel on sidewalks, curbs, and crosswalks. It is expected the sidewalk inventory update will be completed in 2018-2019, along with identification of marked crosswalks in the BACTS area, and will be incorporated into the BACTS stand-alone Regional Active Transportation Plan.

Each community has different rules and regulations regarding local sidewalk and crosswalk maintenance. Most communities adopt policies which require home and business owners to maintain the sidewalks adjoining their property. Sidewalks that do not adjoin private property are generally the responsibility of the federal, state, or municipal authority that controls the sidewalk. BACTS municipalities are encouraged to develop and adopt local crosswalk standards and policies. MaineDOT Crosswalk Guidelines can be found at http://maine.gov/mdot/edi/docs/2016/crosswalkpolicy%20EI_C6%20revised101316.pdf.

6.5 Bicycle Travel

Bicyclists skill and experience levels vary significantly. To develop a truly functional non-motorized system, transportation facilities must be designed to permit mobility and reasonably safe use for the vast majority of these users. In the BACTS region, .5 percent of residents used bicycled as the primary means of commuting to and from work in 2015. Although, this represents a small percentage of workers, the percentage is higher than Penobscot County (.3%) and the State as a whole (.4%).

FHWA's long-term goal is to increase the percentage of short trips, 5 miles or less for bicyclists, to 30 percent by 2025.

6.6 Bicycle and Pedestrian Infrastructure/Facilities

Sidewalks and Walkways are pedestrian lanes that provide people with space to travel within the public right-of-way that is separated from roadway vehicles. They are typically constructed of concrete and parallel to a street that provides a means for pedestrians to travel within the public right-of-way while physically-separated from vehicular traffic.

Marked Crosswalks indicate optimal or preferred locations for pedestrians to cross and warn motorists to expect pedestrian crossings and designate right-of-way for motorists to yield to pedestrians. Crosswalks are often installed at signalized intersections and other selected locations. Crosswalks are also sometimes supplemented with markings and warning signs and signals for motorists.

Marked Shared Roadways are general purpose travel lanes marked with shared lane markings used to encourage bicycle travel and proper positioning within the lane. In constrained conditions, markings are placed to discourage unsafe passing by motor vehicles. On a wide outside lane, the markings can be used to promote bicycle travel next to (to the right of) motor vehicles.

Signed Shared Roadways are facilities shared with motor vehicles. They are typically used on roads with low speeds and traffic volumes. However they can be used on higher volume roads with wide outside lanes or shoulders. A motor vehicle driver will usually have to cross over into the adjacent travel lane to pass a bicyclist, unless a wide outside lane or shoulder is provided.

Bicycle Boulevards provide a bicycle-priority route designed to offer convenient, low-stress access to local destinations and through neighborhoods. Combinations of access management, traffic calming, and crossing treatments work in concert to enhance the bicycling experience.

Bike Lanes are facilities for exclusive use by bicyclists that is located within or directly adjacent to the roadway and is physically separated from motor vehicle traffic with a vertical element.

Off-road shared use paths are separate paths for bicycles and pedestrians that are at least ten-foot wide with a surface that is ADA compliant. Shared use paths are best used to serve areas that are not served by

streets. Placing shared use paths adjacent to roadways is only advisable where there are no driveways that need to cross the path and the adjacent roadway is not readily appropriate for use by bicyclists. Shared use paths should provide special routes for bicyclists and pedestrians that are not available on the existing roadway system.

Bright, visible **signage** raises awareness of the pedestrian environment and provides guidance to pedestrians and drivers alike.

Pedestrian countdown signals indicate the time remaining for pedestrians to cross the street safely.

Shoulders benefit pedestrians and bicyclists by providing additional space on roadways and enhancing safety and mobility.

Street Furniture provides pedestrians and bicyclists a place to rest and may promote social interaction and an increased sense of community.

6.7 Desire Lines

When planning and designing infrastructure for active transportation desire lines are an indicator of how and where people will reach their destinations. Desire lines track the links between origins and destinations for bicyclists and pedestrians and represent where people want to go.

6.8 Intermodal Connections

Pedestrians and bicyclists can expand their transportation range and options greatly by connecting with other modes such as public transit. It is not unusual for several different municipalities or agencies to maintain independent control over the various facilities that are used by someone walking or cycling to and from a single transit stop. Unless the different parties cooperate in assessing, planning, and enhancing non-motorized transit access, major impediments to pedestrian and bicycle access may persist or grow in severity.

6.9 ADA Compliance

MaineDOT updated its ADA Compliance Policy for Construction and Maintenance in August 2016 to better define MaineDOT's approach to ADA on all projects. Whenever pedestrian walkways or other right-of-way elements intended to assist pedestrian traffic are altered as part of a roadway improvement effort, those walkways and elements must be upgraded to meet current ADA standards. While many maintenance activities are not considered alterations and do not trigger requirements to perform ADA upgrades, most other work, including surface paving treatments and traffic signal replacements, do cause ADA improvements to be made.

There are two regulations addressing accessibility of individuals with disabilities which apply to transportation projects. Section 504 of the Rehabilitation Act of 1973 (Section 504) and Title II of the Americans with Disabilities Act (ADA) (Title II).

If a public entity receives any Federal financial assistance from the Department of Transportation (DOT) whether directly or through another DOT recipient, then the entity must also comply with DOT's Rehabilitation Act of 1973 (Section 504) requirements even if the road alteration project at issue does not use Federal funds.

Title II of the Americans with Disabilities Act (ADA) requires that state and local governments ensure that persons with disabilities have access to the pedestrian routes in the public right of way. An important part of this requirement is the obligation whenever streets, roadways, or highways are *altered* to provide curb ramps where street level pedestrian walkways cross curbs. This requirement is intended to ensure the accessibility and usability of the pedestrian walkway for persons with disabilities.

The public entity performing the alteration is ultimately responsible for following and implementing the ADA requirements specified in the regulations implementing Title II. At the time an alteration project is scoped, the public entity should identify what ADA requirements apply and whether the public entity owns sufficient right-of-way to make the necessary ADA modifications. If the public entity does not control sufficient right-of-way, it should seek to acquire the necessary right-of-way. If a complaint is filed, the public entity will likely need to show that it made reasonable efforts to obtain access to the necessary right-of-way.

Municipalities are responsible for year-round maintenance of all existing, new or replaced/rehabilitated pedestrian facilities. MaineDOT reserves the right to perform maintenance and invoice a municipality if appropriate maintenance is not satisfactorily performed by the municipality.
<http://www.maine.gov/mdot/civilrights/docs/ada/ADACompliancePolicy.pdf>

6.10 Safety

For individuals to feel comfortable walking and spending time on a street, it must be safe. Too many people are killed or seriously injured in non-motorist accidents each year. Together, pedestrian and bicycle fatalities are increasing as a share of total traffic deaths. These conflicts are intensified in urban areas where the numbers of vehicles and non-motorized travelers are higher. Ensuring there is adequate infrastructure for those walking and biking (e.g., sidewalks, protected bike lanes, crosswalks, and medians) is critical to making the street a safe place for all users.

MaineDOT's Safety Office collects data on all traffic accidents, including pedestrian and bicycle crashes. Non-motorized fatal and serious injury statistics show that between the years of 2012 and 2016, the BACTS area experienced 49 serious injuries related to non-motorist accidents and 9 fatalities. Although the total numbers may not seem excessive, when put in perspective as a percentage of all fatalities and serious injuries resulting from all types of crashes (motorist and non-motorist), pedestrian fatalities make up *24.3 percent* of all fatalities; and bike and pedestrian serious injuries make up 20.6 percent of all serious injuries (Figure 6.2). NHTSA National Center for Statistics and Analysis reports that in 2015, pedestrian fatalities accounted for *15 percent* of total crash fatalities.

Figure 6.2

Total Fatalities and Pedestrian Fatalities in Traffic Crashes, 2006–2015

Year	Total Fatalities	Pedestrian Fatalities	Percentage of Total Fatalities
2006	42,708	4,795	11%
2007	41,259	4,699	11%
2008	37,423	4,414	12%
2009	33,883	4,109	12%
2010	32,999	4,302	13%
2011	32,479	4,457	14%
2012	33,782	4,818	14%
2013	32,893	4,779	15%
2014	32,744	4,910	15%
2015	35,092	5,376	15%

Source: Fatality Analysis Reporting System (FARS) 2006-2014 Final File, 2015 Annual Report File (ARF).

In the BACTS area, there were six communities with recorded pedestrian crashes over the five-year period from 2012 – 2016 (Figure 6.3). During that period, there were 151 reported crashes with pedestrians in the BACTS area with 37 serious injuries and 9 fatalities recorded. This accounts for 79 percent of all pedestrian crashes, and 70 percent of the pedestrian fatalities in Penobscot County.

Figure 6.3

Pedestrian Crashes and Fatalities 2012 - 2016														
	2012		2013		2014		2015		2016		5-Year Total		5-Year Average	
	Crashes	Fatalities	Crashes	Fatalities	Crashes	Fatalities								
Bangor	26	2	16	1	14	0	21	2	28	0	105	5	15.00	0.71
Brewer	2	0	4	0	4	1	2	0	5	1	17	2	2.43	0.29
Hampden	0	0	0	0	0	0	1	0	1	0	2	0	0.29	0
Milford	0	0	0	0	2	0	1	0	0	0	3	0	0.43	0
Old Town	3	0	1	0	2	1	2	0	1	0	9	1	1.29	0.14
Orono	5	0	3	1	1	0	2	0	4	0	15	1	2.14	0.14
Total BACTS Communities	36	2	24	2	23	2	29	2	39	1	151	9	30.20	1.80
Penobscot County	45	3	37	3	31	3	31	3	47	1	191	13	38.2	2.6
State of Maine	301	10	256	10	287	8	292	18	254	16	1390	62	278	12.4

Source: <https://mdotapps.maine.gov/MaineCrashPublic/PublicQueryStats#totals>

Between 2012 and 2016, there were 75 reported crashes involving bicyclists in the BACTS area, 84 percent of all the bicyclist crashes in Penobscot County (Figure 6.4). There were 12 serious injuries and no reported fatalities during this timeframe. Serious injuries related to bicycle crashes represent 5.0 percent of all serious injuries resulting from all crashes in the BACTS area during that timeframe. The State of Maine as a whole experienced 11 fatalities as a result of a bicycle crash in the five years between 2012 and 2016.

Bicycle Crashes 2012 - 2016							
Community	2012	2013	2014	2015	2016	5-Year Total	5-Year Average
Bangor	9	12	2	9	9	41	5.86
Brewer	2	3	3	4	1	13	1.86
Milford	0	0	1	0	0	1	0.14
Old Town	2	1	5	1	1	10	1.43
Orono	0	1	4	5	0	10	1.43
Total	13	17	15	19	11	75	15.00

Source: <https://mdotapps.maine.gov/MaineCrashPublic/PublicQueryStats#totals>
 * No bicycle crash fatalities reported from 2012 - 2016 in the BACTS MPO area

Figure 6.4

The number of pedestrian *crashes* in Maine has hovered in the 250 - 300 range for the past 10 years; but pedestrian *fatalities* are on the rise (Figure 6.5). In 2015 and 2016, 19 and 17 pedestrians, respectively,

died as a result of a crash. Senior leadership at MaineDOT, in response to urging from citizens, legislature and the media, has supported the development of demographically targeted initiatives for mitigating non-motorized crash fatalities. The “Heads Up” program targets geographic areas in the State which have experienced a greater than average number of pedestrian and bicycle crashes. The 21 communities identified make up almost 22% of the population in the state and account for one-third of all the fatalities. Four of the 21 identified municipalities are in the BACTS area (Bangor, Brewer, Old Town and Orono).

Figure 6.5

Bicycle Crashes State and Penobscot County 2012 - 2016														
	2012		2013		2014		2015		2016		5-Year Total		5-Year Average	
	Crashes	Fatalities	Crashes	Fatalities	Crashes	Fatalities								
Penobscot County	16	0	22	1	17	0	20	0	14	0	89	1	17.8	0.2
State of Maine	213	1	209	4	207	2	189	0	197	4	1015	11	203	2.2

MaineDOT has developed a five-phase strategy to be implemented over a two-year period beginning in 2017. This strategy includes providing education and outreach, with a pilot project focused on providing tailored programs to population segments identified as the most vulnerable (the homeless population; the elderly and disabled population; and those with limited English comprehension). BACTS will actively participate in these education and outreach programs to assist in raising awareness in all user groups and enforcement officials of the shared rights and responsibilities of bicyclists, pedestrians, and motorists to obey the rules of the road and trails and engage in safe operating behavior.

BACTS will support local, regional and state-wide efforts aimed at decreasing crashes and injuries through better crash investigation and reporting that can reveal existing hazardous areas, stricter enforcement of existing laws and regulations, physical reconfigurations of hazardous conditions, more local regulations that encourage good bicycling and walking environments, and greater awareness of other users of the transportation system.

Safety Performance Targets

FHWA’s long-term goals for pedestrian and bicycle safety is to achieve an 80 percent reduction in pedestrian and bicycle fatalities in 15 years and zero pedestrian and bicycle fatalities and serious injuries in the next 20 to 30 years.

In Maine, non-motorized fatal and serious injury is a complex category that includes both bicycle and pedestrian data and fatal and serious injury outcomes. The five-year average of non-motorized fatalities and serious injuries in Maine for 2016 is reported as 91.2. MaineDOT forecasts 90 fatalities and serious injuries in 2017 and 88 in 2018. The 2018 forecast represents a 1.3% improvement from the 5-year average calculated in 2016. A focused pedestrian outreach program has been developed by MaineDOT with the hope it will provide the information and safety mitigation measures required to reduce the number of pedestrian fatalities currently experienced.

BACTS will be setting safety performance targets for the greater Bangor metropolitan area in early 2018.

6.11 Potential Funding Sources

Funding for bicycle and pedestrian improvements at the local level is vital to improving conditions within Maine communities. Most of the grant programs require a local match either with actual funding, or materials and labor. In addition, because grant funding is competitive and not nearly enough to make all of the improvements necessary, local funding is imperative to improving bicycle and pedestrian connections.

Bicycle and pedestrian system improvements in the BACTS area scheduled in the MaineDOT 2017 to 2019 workplan are shown in Figure 6.6.

Work Plan Year	Town(s)	Asset(s)	Description	WIN/ID	Scope of Work	Highway Corridor Priority	Estimated Funding
2017	Bangor	River Walk	Beginning at Front Street and extending east 0.14 of a mile. A new sidewalk along Front Street for 0.03 of a mile.	021767.00	New Construction	N/A	\$ 461,600
2018/19	Bangor	Bicycle - Pedestrian Trail	Beginning at the end of Sylvan Road and extending west 0.39 of a mile Stillwater Avenue	022208.00	New Construction	N/A	\$ 550,000
2018/19	Bangor	Union Street	Beginning at Vermont Avenue and extending northwest 0.79 of a mile to Griffin Road.	022210.00	Sidewalk Construction	Varies	\$ 389,300
2018/19	Brewer	Riverwalk Trail Phase 2	Beginning at Wilson Street and extending northeast 0.40 of a mile to the Penobscot Bridge, including pedestrian spot improvements in the downtown area.	018858.00	New Construction	N/A	\$ 1,315,300
2017	Orrington	Route 15	Beginning at Pebble Creek Drive and extending north 0.82 of a mile to Harrison Avenue.	018884.00	Bicycle-Pedestrian - PE Only	2	\$ 28,000

6.12 Recommendations:

While there has been much progress in making the BACTS area more bicycle and pedestrian friendly over the last several years, there are still areas or situations where deficiencies exist in the regional system.

- Develop a stand-alone Regional Active Transportation Bike/Ped Plan which, when complete, will complement the Metropolitan Transportation Plan. The Plan will inventory current on-street and off-street pedestrian and bicycle facilities and identify potential improvements to pathways, trails, roadway infrastructure, utility and drainage easements, open spaces and parks. The plan will outline strategies for developing an interconnected transportation network with access to neighborhoods, parks, activity centers, employment centers, parking facilities, bus stops, schools, places of interest, and connectivity to the trails and pathway systems. It will serve as a guide for planning, prioritizing, and for constructing bicycle and pedestrian network improvements in the region.