

## **CHAPTER 7**

### ***BICYCLE AND PEDESTRIAN TRANSPORTATION***

#### **7.0 Introduction**

Facilities for safe, convenient, and efficient bicycle and pedestrian transportation are key components of a well-balanced regional transportation network. Additionally, these facilities support the implementation of several of the goals and objectives discussed in Chapter 2, including:

- Providing a transportation system that supports the economic vitality of the region.
- Increasing the safety of the transportation system for motorized and non-motorized users.
- Increasing the security of the transportation system for motorized and non-motorized users.
- Increasing accessibility and mobility options for all people.
- Promoting a transportation system that protects and enhances the environment; promotes energy conservation; and improves the quality of life in the region.
- Enhancing the integration and connectivity of the transportation system, across and between a well-balanced network of modes, for people and freight.
- Supporting smart growth principles and provide a transportation system that is regionally coordinated and based on effective transportation and land use planning.

#### Federal Policies

Section 217 of Title 23 of the U.S. Code calls for the integration of bicycling and walking into the transportation mainstream. More importantly, it enhances the ability of communities to invest in projects that can improve the safety and practicality of bicycling and walking for everyday travel.

In 1991, Congress passed landmark transportation legislation, the Intermodal Surface Transportation Efficiency Act (ISTEA) that recognized the increasingly important role of bicycling and walking in creating a balanced, intermodal transportation system.

The National Bicycling and Walking Study, published by the U.S. Department of Transportation in 1994, translated this renewed interest in non-motorized travel into two specific goals: to double the percentage of trips made by foot and bicycle while simultaneously reducing the number of crashes involving bicyclists and pedestrians by 10 percent.

Subsequent legislation provides the funding, planning, and policy tools necessary to create more walkable and bicycle-friendly communities.

A bicycle transportation facility is "a new or improved lane, path, or shoulder for use by bicyclists and a traffic control device, shelter, or parking facility for bicycles." The definition of a pedestrian includes not only a person traveling by foot but also "any mobility impaired person using a wheelchair." 23 USC Section 217 (j) (1)

Bicyclists and pedestrians must be given due consideration in the planning process (including the development of both the Regional Transportation Plan and TIP) and bicycle facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities except where bicycle use and walking are not permitted. Transportation plans and projects must also consider safety and contiguous routes for bicyclists and pedestrians. Safety considerations may include the installation of audible traffic signals and signs at street crossings. 23 USC Section 217 (g)

## State Policies

In 1998, the Commonwealth of Massachusetts through MassHighway developed the Massachusetts Statewide Bicycle Transportation Plan and the Massachusetts Pedestrian Transportation Plan in an effort to provide a vision and strategic action plan for enhancing and maintaining the State's existing infrastructure and developing new infrastructure.

The Massachusetts Pedestrian Transportation Plan serves as a guide to state, regional, and local transportation planning in order to better serve walkers on the transportation network. The Plan's extensive list of recommendations aimed at developing a more pedestrian-focused transportation system throughout the state through government and private sector actions.

Similarly, the Massachusetts Statewide Bicycle Transportation Plan was developed to put forth policies and practices designed to improve conditions for bicycling in the Commonwealth. The Plan consisted of four major components: a vision for the state; current and future demand; opportunities and needs; and recommendations for project and policy implementation.

In 2006, the Executive Office of Transportation began an update of the 1998 bicycle plan. The EOT executed an extensive survey of existing facilities across the state to update its inventory, and created a public participation component that established public forums across the state for residents to review the State's plans and provide input. The update to the Statewide Bicycle Plan is expected to be released in 2007.

### **7.1 Bicycle Transportation**

The bicycle mode of transportation offers personal mobility featuring door-to-door access; often at speeds comparable to auto travel in high-density areas. Transportation is supplied at a relatively inexpensive cost. In recent years, the bicycle has become an increasingly popular alternative means of travel. More individuals have begun to employ bicycles for other than recreational use, including trips to school and work.

The principal drawbacks to reliance on the bicycle for transportation pertain to their unsuitability for travel during inclement weather, and the potential safety problems of traffic situations. The shared use of a roadway can significantly increase the hazards faced by both modes of travel. In addition, the lack of sufficient parking or storage facilities inhibits the effective use of bicycles for other than recreational travel.

While it is only a fraction of the total number of commuters in the region, Census data indicates over 150 people used a bicycle as their mode of travel to work. Table 7-1 lists the number of commuters in each community bicycling to their jobs in 2000. Note that the communities, which had relatively high percentages of those using bikes (Bridgewater, Easton, and Halifax), are communities where development is not quite as dense, motor vehicle traffic volume isn't quite as high, and therefore conditions are somewhat more accommodating to lesser skilled cyclists.

**Table 7-1: Biking To Work In the Region, Census 2000**

	<b>Bike To Work</b>	<b>Total Commuters</b>	<b>% Commute Biking</b>
<b>Abington</b>	11	7,738	0.14%
<b>Avon</b>	0	2,140	0.00%
<b>Bridgewater</b>	33	12,040	0.27%
<b>Brockton</b>	46	40,747	0.11%
<b>East Bridgewater</b>	8	6,444	0.12%
<b>Easton</b>	29	11,692	0.25%
<b>Halifax</b>	19	3,760	0.51%
<b>Hanson</b>	6	4,823	0.12%
<b>Kingston</b>	0	5,401	0.00%
<b>Pembroke</b>	0	8,533	0.00%
<b>Plymouth</b>	8	24,534	0.03%
<b>Plympton</b>	0	1,377	0.00%
<b>Stoughton</b>	7	13,758	0.05%
<b>West Bridgewater</b>	0	3,265	0.00%
<b>Whitman</b>	0	7,277	0.00%
<b>Region</b>	167	153,529	0.11%

Safe, convenient, and well-designed facilities are essential to encourage bicycle use. Roads designed to accommodate bicyclists with moderate skills will meet the needs of most users, according to MassHighway. Young children are primarily the bicyclists who may require special consideration, particularly on neighborhood streets, in recreational areas, and close to schools. Moderate skilled bicyclists are best served by:

- Extra operating space when riding on the roadway such as bicycle lanes, useable shoulders, or wide curb lane.
- Low speed streets (where cars and bicyclists share travel lanes).
- A network of designated bicycle facilities (bicycle lanes, side-street bicycle routes, and shared use paths).

#### Existing Long Distance Routes

The Boston to Cape Cod Bikeway (“Claire Saltonstall Bikeway”) is the major bike route in both the Old Colony region and Massachusetts. This facility is approximately 65 miles from Boston to the Cape Cod Canal, and then runs to both Provincetown (about 70 miles from the canal) and Woods Hole (about 20 miles from the canal). Principally, it accommodates long distance recreational trips.

The Bikeway traverses existing roadways with the bike route marked by road signs. This facility was developed to utilize low volume back roads as much as possible. In addition, the bikeway provides bicyclists with considerable opportunities to visit points of interest such as historical sites, shopping districts, and parks. In the years since the bikeway was planned, some of the roads, such Long Pond Road in Plymouth, have had large increases in traffic volume, and significantly more conflict between bicyclists and motorists could be occurring now. The conflicts are more likely on narrow, country-type roadways.

**Table 7-2: Boston to Cape Cod Bikeway**

<b>Current Alignment of Streets in the region: Boston to Cape Cod Bikeway</b>	
<b>Avon - from Randolph to Holbrook</b>	<i>Continues from left column</i>
North Main Street	Old Plymouth Street
East High Street	Plymouth Street
<b>Holbrook - from Avon to Brockton</b>	Carver Street
High Street	South Street
Spring Street	Franklin Street
South Street	<b>Plympton - from Halifax to Kingston</b>
Linwood Street	Center Street
<b>Brockton - from Holbrook to East Bridgewater</b>	Palmer Road
Boundary Street	Main Street
North Quincy Street	Mayflower Street
Quincy Street	Colchester Street
Crescent Street	Brook Street
West Crook Street	<b>Kingston - from Plympton to Plymouth</b>
Alger Street	Elm Street
<b>East Bridgewater - from Brockton to Halifax</b>	Bishops Highway
Winter Street	<b>Plymouth - from Kingston to Plymouth</b>
Summer Street	Plympton Road
Elm Street	Carver Road
North Central Street	Summer Street
Central Street	Main Street
Chestnut Street	South Street
Bridge Street	Long Pond Road
Crescent Street	Hedges Pond Road
Washington Street	Route 3A
Pond Street	<b>Bourne - from Plymouth to Cape Cod Canal</b>
<b>Halifax - from East Bridgewater to Plympton</b>	Route 3A
Pond Street	Scusset Beach Road
Elm Street	
<b>Source: OCPC</b>	

Existing Local Routes

Several shorter-distance, more localized bikeways are located throughout the Old Colony region. Most of these marked bike paths reside within local or state park lands, such as D.W. Field Park in Avon and Brockton; Myles Standish State Forest in Plymouth; and Ames Nowell State Park in Abington.

**Abington** is the home of Ames Norwell State Park and several town owned parks that encourage off-road bicycling on a network of off-road paths. The town also has many back ways that offer recreational riding. A portion Route 18 in Abington is in the process of being rebuilt to current standards for roadway width; thus, allowing for increased bicycle safety along the major throughway. Abington is interested in the pursuit of a bicycle route connecting Borderland State Park to D.W. Field Park to Ames Norwell State Park in Abington.

**Bridgewater** has an extensive bicycle route network that is mapped and is available on the town's official web page. The route system covers many of the major roads in the town. It also includes a marked bike path that originates at Old Pleasant Street and terminates at Vernon Street.

**Brockton** offers intermodal transportation opportunities and is a major employment center for the region. However, the city is also heavily congested with traffic on narrow roads. The City has several parks that provide biking opportunities.

**Easton** has developed a signed local bike route. This signed facility links the Five Corners area (Route 123 and Route 106) with the town center via Bay Road, Summer, Center, Depot, Purchase, and Washington Streets (Route 138) to Main Street.

From Purchase Street in Easton, a bike route also extends southeasterly through West Bridgewater along West, Lincoln, South Elm and Scotland Streets into Bridgewater. The route continues along Elm Street in Bridgewater, then Pleasant, Prospect and Vernon Streets into Middleboro. Another bicycle route in Bridgewater extends easterly from Vernon, Forest, South, Winter, Conant and Auburn Streets into Middleboro.

**Plymouth** has recently seen tremendous growth. The town's roadway network has seen major expansion and redevelopment. A recently completed Enhancement Project funded through the Transportation Improvement Program is the Plymouth Seaside Bike Trail, along the right of way from Nelson Street to Plymouth center near the harbor.

**West Bridgewater** has a comprehensive, community-based bicycle route system. It includes segments on roads and also separate bicycle paths. It could potentially connect with other facilities in Easton and Bridgewater. The bikeway connects the town center with numerous destinations around the town, and crosses the barrier posed by Route 24 (source: massbike.org). West Bridgewater also has the opportunity to improve its center of town through a major intersection reconstruction that is scheduled for the intersection of Route 106 and 28.

## 7.2 Pedestrian Transportation

All travelers are pedestrians at some point in their trip, and pedestrians are part of every roadway environment. In some cases pedestrians are regular users of the roadway while in others, pedestrians may be using the roadway in emergency circumstances such as a breakdown. Pedestrian facilities include sidewalks, paths, crosswalks, stairways, curb cuts and ramps, and transit stops. In some areas, particularly in suburban and rural communities, pedestrians may be sharing the roadway itself or its shoulders.

It is important to understand that there is no single "design pedestrian" and that the transportation network needs to accommodate a variety of pedestrians, including those with disabilities. For example, children perceive their environment differently from adults and are not able to judge how drivers shall behave. Children typically walk more slowly, have a shorter gait, and have lower eye height than adults. On the opposite end of the spectrum, older adults may require more time to cross a street, desire more predictable surfaces, benefit from handrails in steep areas, and may require places to rest along their route. People who are blind or have limited sight require audible and tactile cues to safely navigate sidewalks and crosswalks. People with limited cognitive abilities may rely on symbols and take longer to cross the street. People using wheelchairs and scooters may be able to cross the street more quickly than someone walking, but may be more difficult to see by a seated driver in a vehicle. It is important to recognize pedestrians exhibit a wide range of physical, cognitive, and sensory abilities, but they all comprise the pedestrians that roadway design needs to accommodate.

As Table 7-3 indicates, nearly two percent of the commuters in the Region walked to work in 2000. The communities with large student populations (Easton and Bridgewater) and those with dense urban development (Brockton) had the highest overall percentage of commuters walking to work.

**Table 7-3: Walking To Work In The Region, Census 2000**

	Walk To Work	Total Commuters	% Commute Walking
<b>Abington</b>	105	7,738	1.36%
<b>Avon</b>	28	2,140	1.31%
<b>Bridgewater</b>	467	12,040	3.88%
<b>Brockton</b>	956	40,747	2.35%
<b>East Bridgewater</b>	40	6,444	0.62%
<b>Easton</b>	463	11,692	3.96%
<b>Halifax</b>	14	3,760	0.37%
<b>Hanson</b>	13	4,823	0.27%
<b>Kingston</b>	28	5,401	0.52%
<b>Pembroke</b>	56	8,533	0.66%
<b>Plymouth</b>	313	24,534	1.28%
<b>Plympton</b>	12	1,377	0.87%
<b>Stoughton</b>	232	13,758	1.69%
<b>West Bridgewater</b>	64	3,265	1.96%
<b>Whitman</b>	104	7,277	1.43%
<b>Region</b>	2,895	153,529	1.89%

### Existing Sidewalks

According to the Massachusetts Road Inventory File, the Old Colony region has over 390 miles of roadway with a left and/or right sidewalk. Most of the main roadways in the region have a sidewalk on at least one side. However, there are many smaller roadways, particularly in more rural areas, where sidewalks are not present. In some cases a worn footpath exists and in others pedestrians share the roadway with vehicles. For existing sidewalks, width, surface type and conditions, and curbing conditions vary. In some cases, sidewalks are in disrepair from weathering and vegetation.

### Existing Walking Paths and Trails

Several parks, nature areas, and recreation areas throughout the region feature walking and shared use paths. These areas include:

- Ames Nowell State Park, Abington.
- Borderland State Park, Easton.
- D.W. Field Park, Brockton and Avon.
- Myles Standing State Forest, Plymouth.

In addition to these major areas, several smaller parks and conservation areas exist in each of the towns, many providing pedestrian trails and paths.

Bridgewater State College has a network of paved footpaths connecting campus buildings, parking areas, and the Bridgewater MBTA Commuter Rail Station.

### **7.3 Pedestrian Activity Centers**

Pedestrian accommodations are a critical component to healthy, vibrant business districts, city downtowns and town centers, and transit oriented development areas. Areas where visitors are able to safely and easily navigate from one business to another are more conducive to the vitality of the district. In contrast, districts with large parking areas separating businesses from one another and the street, or areas that do little to slow motor vehicle traffic and make pedestrian access safer, are likely to become a fragmented area with little neighborhood cohesion.

Through a combination of field observations, historical accounts, and input from the public, several significant pedestrian activity centers in the Region were identified during the development of this Regional Transportation Plan. These are areas that have historically served as central business districts to their respective communities, or have been designated as transit oriented development areas. In the case of Bridgewater and Easton, they are education centers with large populations of resident students, many without cars. These are areas where enhancement of pedestrian infrastructure has been identified as a priority.

#### Abington TOD

The Town of Abington has created a Transit Oriented Development (TOD) around its MBTA Commuter Rail station and the Town's central business district to encourage the development of uses that complement both the existing rail line and the surrounding residential areas. The district encompassed thirty acres around the Commuter Rail station.

The Town of Abington experienced impressive growth between 2000 and 2005 (see Table 4.1 in Chapter 4), and with new medium and high-density residential development occurring, the Town has the potential to become one of the larger communities in the region. The Abington MBTA Station has the potential to become a major intermodal transportation center serving the increasing population and economy of Abington and the surrounding towns by containing the following features:

- Commuter Rail (Existing).
- Medium Capacity Parking Facility (Existing 400+ Lot).
- Enhanced Walkways between Station, Housing, and Central Business District (Existing and Potential).
- Enhanced Pedestrian Amenities at area signalized intersections (Potential).
- Bicycle Lockers (Potential).
- Fixed Route Bus Service by Brockton Area Transit (Potential).

Enhancing pedestrian facilities (well-maintained and lighted sidewalks, pedestrian countdown signals at intersections) between the Target Shopping Center on Route 123, the Abington MBTA Station and TOD Zone, and the Central Business District on Washington Street would, in all likelihood, foster and strengthen high-density development around the Station.

#### Downtown Bridgewater

Downtown Bridgewater is a transportation hub in the region, with the intersection of Routes 18, 28, and 104, as well as the nearby location of the Bridgewater MBTA Commuter Rail Station. Development

patterns in the area feature a New England Village style town center, with a mix of housing, local businesses, and services. Traffic flows around the center in an oblong roundabout-like facility.

Bridgewater State College abuts the town center, and is a major generator of pedestrian traffic. Many students living in nearby off-campus housing commute to class by way of walking or biking, and similarly many on-campus students commute to nearby businesses on foot or bike.

Several municipal buildings, including the Town Hall and Public Library are also located within the center and generate pedestrian and bicycle trips. Due to the scarcity of parking, in some cases automobile borne visitors to the center park some distance away from their destination, and travel from their parking spot to the destination on foot.

Bridgewater is the fourth most populous community in the region with nearly 26,000 residents. Bridgewater State College has consistently grown for the past several years, and conceptual plans have been discussed by officials for the college to become a university- a transition that would likely foster even more growth. Like any college town, Bridgewater has a significant population of people that do not have access to cars and are dependant upon walking, bicycling, and transit to get around. High traffic volumes and congestion in the Downtown Brockton area presents a direct conflict and challenge to the high volume of pedestrians and bicyclists.

The area can be greatly served by enhanced pedestrian amenities, including pedestrian countdown signals at signalized intersections and raised crosswalks at major crossing points. Bicycle lanes may also be considered on the major roadways leading to and from the college, as the college has a significant population of students and faculty alike that live in nearby housing and may be well served by the option to safely bike to the school. The Bridgewater MBTA Station should be included in all bicycle and pedestrian improvements involving the college.

### Downtown Brockton

Brockton is the largest city in the Old Colony region, and is a center of housing, commerce, industry, and government. The Downtown Brockton area contains all of these types of land use within a tight, concentric high-density core that extends between Court Street and Belmont Street from north to south, and Commercial Street and Warren Avenue from east to west.

The Downtown contains apartments and condominiums; numerous small businesses, banks, restaurants, and bars; Brockton City Hall, Police Headquarters, Post Office, and county, state, and federal government offices; industrial uses; large employment centers; Brockton Area Transit's Intermodal Transportation Centre; and the Brockton MBTA Commuter Rail Station. A very large amount of pedestrian trips occur within Downtown Brockton.

Brockton has completed several state funded projects to enhance the downtown area along with the Intermodal Transportation Centre such as sidewalks and pedestrian amenities and condominium projects located near the Centre.

While much has been done already in the Downtown Brockton area, additional facilities could serve to increase safety and security of pedestrians and bike riders in the Downtown area, including:

- Pedestrian countdown signals at Downtown Intersections.
- Better lighting of sidewalks and streetscapes.
- Raised crosswalks on Commercial Street, between the Brockton MBTA Station & BAT Intermodal Centre, and in front of the Post Office.

- Well maintained, brightly painted crosswalks at other locations.
- Bicycle Lockers at Brockton MBTA Station, BAT Intermodal Centre, and various locations downtown.

### Downtown Stoughton

Stoughton Center is a densely developed area around the intersection of Routes 27, 138, and 139. The Stoughton MBTA Commuter Rail Station is also located at Stoughton Center. Development around the Center features a mix of small, local shops; services; municipal facilities; and housing.

Like the Abington MBTA Station, the Stoughton MBTA Station also has the potential to develop into a major intermodal transportation center serving the population and economy of Stoughton and the surrounding towns by containing the following features:

- Commuter Rail (Existing)
- High Capacity Parking Facility (Existing 400+ Lot, Potential for Garage)
- Enhanced Walkways between Station, Housing, and Central Business District (Existing and Potential)
- Enhanced Pedestrian Amenities at area signalized intersections (Potential)
- Bicycle Lockers and Bike Racks (Potential)
- Fixed Route Bus Service by Brockton Area Transit and MBTA (Potential)

### Downtown Plymouth

Downtown Plymouth is less defined than some of the other downtown areas in the region, but generally extends north to south along the waterfront from Samoset Street (Route 44) to Lincoln Street. In addition to the traditional mix of commercial, residential, and municipal uses, the Downtown area of Plymouth also features historic sites and major tourist destinations such as Plymouth Harbor, Plymouth Rock; Pilgrim Hall Museum; and the Mayflower II.

Plymouth Harbor provides seasonal water borne transportation options to Provincetown, and also serves as an operational fishing port.

Plymouth has a parking management system in the Downtown that directs visitors to park at any one among a network of surface parking lots throughout the area, pay for parking, and walk to their destination.

Safe and efficient pedestrian amenities are critical to the vitality of Downtown Plymouth, as many businesses, tourist attractions, and government offices do not have on-site or readily available nearby street parking. The majority of visitors to and employees in Downtown Plymouth must park their cars at satellite municipal parking lots and walk the remainder of the trip to their destination.

The area could be greatly served by the following amenities:

- Bicycle Lockers and Bike Racks around the Downtown.
- Pedestrian countdown signals at signalized intersections.
- Raised Crosswalks at major mid-block crossing points.
- Increased lighting on side streets and alleyways that connect Main Street to Water Street.

## Stonehill College and Route 138

Stonehill College, located on Route 138 in Eason, contains a relatively large on-campus population, and generates some commuting student traffic as well. Immediately to the south of Stonehill College, Route 138 is highly developed with many restaurants, convenience stores and services, and other businesses. This commercial retail generates a large amount of pedestrian traffic originating at Stonehill College, and most of these trips travel back and forth on Route 138.

Safety and security along Route 138 can be enhanced for pedestrians and bicycle riders by:

- Creation of Bicycle Lanes along Route 138 between Stonehill College and through business district.
- Enhancement of traffic signals along corridor.
- Well-lighted walkways and streetscapes.

## **7.4 Bicycle and Pedestrian Safety**

### Bicycle Crashes

In 2003, 622 bicyclists were killed and an additional 46,000 were injured in traffic crashes in the United States. Cyclists accounted for 1 percent of all traffic fatalities and 2 percent of all persons injured in crashes in the United States in 2003. In Massachusetts, the percent of cyclists among all traffic fatalities is higher than the national average: 2.4 percent, or 1.71 cyclist fatalities per million in population. Perhaps a major reason for the higher rate in Massachusetts is the urban nature of development in the state, particularly in the eastern half. According to the National Highway Traffic Safety Administration (NHTSA), cyclist fatalities occurred much more frequently in 2003 in urban areas (69 percent urban areas verse 31 percent elsewhere).

While the average age of cyclists killed in the nation is increasing (35.8 years in 2003 vs. 27.8 in 1993), still over one-fifth of cyclists killed in 2003 were children between the ages of 5 and 15 years old.

Locally within the region, cyclists suffered 1.4 percent of traffic fatalities between 1990 and 2005.

### Crashes Involving Pedestrians

In 2003, 4,749 pedestrians were killed in traffic crashes in the United States, an average of one pedestrian killed every 111 minutes. In addition, 70,000 pedestrians were injured in traffic crashes that same year, an average of a pedestrian hurt in a traffic crash every 8 minutes. Eighty-six (86) of those 4,749 pedestrians killed in 2003 occurred in traffic crashes on Massachusetts roads. Overall, 18.6 percent of the State's traffic fatalities in 2003 were pedestrians.

Like cyclists fatalities, pedestrians are much more likely to be killed in urban areas. Seventy-two (72) percent of pedestrian fatalities in 2003 occurred in an urban area, and 79 percent occurred away from intersections. Approximately one-fourth of pedestrians killed in 2003 were children between 5 and 9 years old, and one-fifth were under 16 years old.

Within the Old Colony region, 65 of the 420 (15.5 percent) persons killed in traffic crashes between 1990 and 2005 were pedestrians.

## Bicycle Transportation Design

Paths for bicyclists (which generally also serve other non-motorized users) supplement the roadway network. Roadway design should consider these factors to best accommodate bicyclists:

- Providing width sufficient for motorists to pass bicyclists without changing lanes or crossing the centerline on high speed and/or high volume roads.
- Removing roadway obstacles that could cause bicyclists to crash.
- Directing bicyclists to scenic and low traffic routes by guide signs and/or pavement markings.
- Providing signalized crossings of major roadways when warranted for those who are not comfortable making left turns in heavy traffic.

When bicycles are used on public streets and roads, bicyclists are subject to the same traffic laws as motor vehicle operators with some exceptions as noted in the Massachusetts General Laws.

Road construction projects in the Old Colony region should be designed and constructed in accordance to the MassHighway Project Development and Design Guide, and controls built to standards set forth in the Manual On Uniform Traffic Controls, to best accommodate bicyclists.

## Pedestrian Transportation Design

Road construction projects in the Old Colony region should be designed and constructed in accordance to the MassHighway Project Development and Design Guide, and controls built to standards set forth in the Manual On Uniform Traffic Controls, to best accommodate pedestrians of all types.

## Safe Routes To School

The Massachusetts Safe Routes to School program promotes healthy alternatives for children and parents in their travel to and from school. The SRTS program educates students, parents and community members on the value of walking, bicycling, carpooling, and taking public transit and the school bus for travel to and from school.

The Safe Routes to School program elements, education, encouragement, enforcement, engineering, and evaluation ensure a comprehensive and successful program to increase walking and bicycling to and from school.

- Education Teaching children and parents about the broad range of transportation choices, instructing them in important lifelong bicycling and walking safety skills, creating awareness among drivers near schools, and improving the health benefits of our children through regular exercise.
  - Physical Health
  - Environmental Health
  - Safety

- **Encouragement** Using events and activities to promote healthy transportation alternatives.
  - Walking
  - Bicycling
  - Multi-family carpooling
  - Riding the bus
  
- **Enforcement** Partnering with local law enforcement to ensure traffic laws are obeyed in the vicinity of schools (this includes enforcement of speeds, yielding to pedestrians in crossings, and proper walking and bicycling behaviors), and initiating community enforcement such as crossing guard programs.
  - Creating awareness
  - Changing driver behavior
  - Offering safety training
  
- **Engineering** Creating operational and physical improvements to the infrastructure surrounding schools that lower speeds, reduce potential conflicts with traffic, and establish safer and fully accessible crossings, walkways, trails, and bikeways.
  - Improvement to physical environments
  - Safer routes for children
  
- **Evaluation** Monitoring outcomes and documenting trends through data collection before and after Safe Routes activities.
  - Student Hand Survey
  - Parent Survey
  - Walkability Checklist
  - Bikability Checklist

## 7.5 Bicycle and Pedestrian Infrastructure Financing

A crucial component of studying and designing proposed bicycle and pedestrian infrastructure projects involves identifying funding for the study of feasibility, planning, design, and construction. The Financial Plan chapter of this document discusses in detail the funding mechanisms for the design and construction of all transportation projects.

Under the SAFETEA-LU federal transportation bill, funding has been made available for bicycle and pedestrian facilities. State and federal funds for the study, design, construction, or improvement of bicycle and pedestrian facilities include the following resources:

- **Transportation Enhancement Program:** Funds are available for the provision of facilities for bicyclists and pedestrians and the reservation of abandoned railway corridors including the use thereof for pedestrian and bicycle trails. Projects should be primarily transportation oriented and be part of a route that connects urban employment centers and other major trip generators. These projects should be listed in the Transportation Improvement Program (TIP), and be consistent with the goals and objectives of the Regional Transportation Plan and the state in order to be eligible for this type of funding. It should be noted, however, that compliance with the above-mentioned conditions does not guarantee that a project will be funded. Projects listed in the TIP compete for funding against all other projects, and all projects are evaluated on a standardized criteria evaluation program.

- **Surface Transportation Program (STP):** This program may be used for construction of bicycle and pedestrian facilities or for safety-related non-construction activities such as maps and brochures. Activities must be primarily transportation oriented (as opposed to recreation oriented) and consistent with the plans of the Region and the State.
- **Highway Safety Improvement Program (HSIP):** This program makes available funds for projects that improve the safety of bicyclists and pedestrians.
- **Congestion Mitigation and Air Quality Improvement Program (CMAQ):** This program is available in Massachusetts since the State has not yet attained the clean air standards established under the Clean Air Act. Funds from this program may be used for activities aimed at increasing the use of non-motorized modes of transportation including bicycle and pedestrian facilities. Activities must be transportation-oriented and consistent with the plans of the Region and State. Activities seeking funding must also demonstrate a projected reduction in airborne pollutants (CO, NO<sub>x</sub>, VOCs) directly related to the proposed activity.
- **National Highway System Funds:** These funds may be used to construct bicycle and pedestrian facilities adjacent to any highway on the National Highway System. Activities under this program must be primarily for transportation purposes and consistent with the plans of the Region and State.
- **Scenic Byways Program:** Funds from this program may be used for bicycle and pedestrian facilities directly related to the program's purpose of supporting and developing state and national scenic byways.
- **Recreational Trails Program:** Funds from this program are for recreation-oriented trails. Thirty (30%) percent of these funds must be used for non-motorized trails, while another forty (40%) is discretionary, and the remaining thirty (30%) for motorized trails. Though administered by the Department of Conservation and Recreation (DCR), proposals are subject to review by the Massachusetts Recreational Trails Board. Activities proposed under this program must be consistent with the Statewide Comprehensive Outdoor Recreation Plan (SCORP).
- **Transportation, Community, and System Preservation Program (TCSP):** Funds from this program may be made available to bicycle and pedestrian projects.
- **Section 402 Highway Safety Program:** This program addresses the State and community highway safety grant funds. The priority status of safety programs for bicyclists and pedestrians expedites the approval process of for these funds. A program guideline (available through the Federal Highway Administration) has been developed to offer states guidance in developing and managing a statewide bicycle and pedestrian safety program.
- **Alternative Transportation in Parks and Public Lands Section 3021:** Funds are available through the Federal Transit Administration to promote alternative transportation modes in or around federally managed parks, recreation areas, or refuges. Alternative transportation modes include all non-automobile forms of transportation.
- **Safe Routes to School (SRTS) Program:** As discussed earlier in this chapter, these funds may be used for infrastructure projects on non-infrastructure projects that enable and encourage children to walk and bike to school.
- **Federal Transit Administration Transit Enhancements Program:** The funds may be used for bicycle and pedestrian improvements related to accessing transit as well as for bicycle parking facilities, shelters in proximity to transit stops, and bicycle storage on mass transit vehicles.
- **Job Access and Reverse Commute (JARC) Grants:** These funds are available to support projects designed to transport welfare recipients and eligible low-income individuals to and from employment. Projects can include bicycle related services.
- **DCR Greenways and Trails Demonstration Grants Program:** The Department of Conservation and Recreation (DCR) awards grants between \$1,000 and \$5,000 for projects that create and promote greenways and trails in Massachusetts (requests up to \$10,000 are

- considered for regional projects). Special consideration is given to projects that involve community youth, highlight river greenways, and feature historic corridors.
- **Local State Aid Chapter 90 Program:** These funds can be used for bike path engineering and right-of-way acquisition, and may be applied as the local match to funding under several of the above-mentioned programs).

## 7.5 Conclusion and Recommendations

**Routinely review project proposals through the MEPA process and other review opportunities to assure that provisions for bicyclists and pedestrians are incorporated into design plans.**

**Plymouth MBTA Commuter Rail Station and Seaside Rail Trail:** Construction of new connections and enhancements to existing ones should be made between the Plymouth Station, the Plymouth Seaside Trail, and the Historic Plymouth Waterfront and Downtown Plymouth. Currently there is some degree of disconnect between these three components to this underutilized transportation corridor.

**Develop a Regional Bicycle and Pedestrian Transportation Plan.** A Regional Bicycle and Pedestrian Transportation Plan will examine the existing infrastructure in the region that supports bicycle and pedestrian transportation, and identify strengths and weaknesses in the system. The Plan will identify key areas to address for the creation of a contiguous, region-wide network of sidewalks, walkways, bicycle paths, and bicycle lanes, as well as identify strategies to accomplish the goals of the plan.

**Encourage/promote bicycle riding as a viable alternative to automobile commuting and as a means to improve air quality.** Where feasible, bicycling to work or to transit facilities instead of driving would reduce “cold starts,” which inject high levels of toxic emissions into the atmosphere with the starting and shutting off automobile engines. A coordinated effort of local officials, the Massachusetts Highway Department, Regional Planning Agencies and interest groups, should encourage and promote the use of existing designated bicycle routes as a viable alternative to automobile commuting through public information and awareness efforts.

**Encourage/promote safe bicycle riding, and reduce the number of injuries and fatalities associated with bicycle crashes.** To help ensure safe travel habits and reduce the number of bicycle crashes, education programs for all road users should be implemented. Coordination of municipalities with the Department of Education, Registry of Motor Vehicles and transportation agencies should be a part of this effort.

**Support bicycle riding as a part of intermodal travel.** Coordination between different modes of transportation should include the improvement of bicycle access to public transportation. This includes, but is not limited to, permits to allow bicycles on train cars; external racks to carry bicycles on buses as done in Portland and San Francisco, and bicycle lockers at park-and-ride lots, train stations and bus terminals

**Identify, designate and implement additional bicycle paths and routes to be used for both commuting and recreation.** Local officials, in concert with state and regional planners, should investigate the development of additional bicycle paths and routes which could safely serve the commuting public. This includes, but is not limited to, the development of abandoned railroad rights-of-way as bicycle paths, and bikeways that connect industrial/business parks, shopping centers, schools and other key destinations.

**Coordinate efforts to improve bicycle facilities with surrounding municipalities and regional agencies.** To help form a more complete and contiguous network of bicycle facilities in the region and southeastern Massachusetts, local agencies should coordinate efforts with agencies and organizations outside the region. This includes, but is not limited to, researching the existing bicycle facilities of surrounding towns before formalizing new bikeways, and coordinating public outreach programs to help minimize the cost of these efforts.

**Support local, regional, and state initiatives and legislation that create or maintain bicycle infrastructure and safety.** To best serve the greater good and needs of the public for a safe and secure transportation system, support and endorsement will be provided to all initiatives and legislation (local/regional/state/federal) that result in the implementation of bicycle facilities, ease congestion, promote recreation, and increase safety and security for bicycle users.

**Enhance bicycle facilities at intermodal facilities (MBTA Stations, BAT Centre, Park and Ride).** The potential for MBTA Stations, the BAT Centre, and MassHighway Park and Ride lots to serve as true intermodal facilities can be maximized by enhancing bicycle facilities, including but not limited to: installation of external bike racks on buses that serve these facilities; the installation of bicycle lockers; and bicycle lanes and paths entering and exiting facilities.

**Continue bicycle and pedestrian transportation safety efforts in Safety Management System.** The Safety Management System promotes and plans for safety improvements throughout all modes on the transportation network.

**Promote the installation of bicycle detection loops at actuated signalized intersection to increase safety for entering bicyclists.** Noting that roadways serve both drivers of motorized vehicles and users of bicycles, actuated traffic signals should include detection loops for bicycles to maximize safety for bicycle riders.

**Enhance pedestrian consideration during the planning and design phases.** Too often municipalities over look the safety and access of pedestrians in areas with high volumes of automobiles. Only as an afterthought, safety amenities are added or design conditions are changed. A coordinated effort of planners, engineers, and local officials, should encourage pedestrian needs to be of higher priority during the initial design process.

**Support local initiatives, which enact, implement and enforce laws and regulations regarding pedestrian traffic.** The responsibility for pedestrian safety ultimately lies with the local jurisdiction. Communities should utilize safety officers to enforce laws/regulations that promote increased pedestrian safety, with emphasis around high activity areas such as transit facilities, schools, and commercial centers. Participants in the process should include police departments, traffic engineers, school and legal system representatives.

**Install physical barriers, pavement marking, and other amenities where needed to maximize pedestrian safety.** Marked crosswalks, safety islands, street lighting, pedestrian underpasses/overpasses, sidewalks, traffic signals and signage all constitute useful techniques to separate pedestrians from hazardous vehicular traffic. Particular attention should be given to high activity areas such as transit facilities, schools, and commercial centers.

**Continue to study/identify additional pedestrian facilities.** Continue to conduct studies in the region as needed to identify, designate, and implement additional pedestrian facilities. These facilities should improve linkages between existing pedestrian walkways, transit facilities, activity areas, and residential neighborhoods, and provide a safe and accessible means of short distance travel and recreation.

**Promote/encourage pedestrian ways as a viable alternative to automobile commuting and means of improving air quality.** Where feasible, walking to work or to transit facilities instead of driving would reduce “cold starts,” which inject high levels of toxic emissions into the atmosphere with the starting and shutting off automobile engines. Support of this alternative includes, but is not limited to, the creation of pedestrian walkway connections between residential areas, transit facilities, industrial parks, shopping centers, schools and other key destinations.

**Promote Installation of Pedestrian Countdown Signals at Signalized Intersections.** A Pedestrian Countdown Signal consists of a standard pedestrian signal with standard shapes and color, with an added display that shows the countdown of the remaining crossing time. Studies have shown that these types of signals dramatically decrease pedestrian-vehicle conflicts and increases safety for crossing pedestrians. By viewing the numeric countdown display, pedestrians gain a new level of self-protection by the ability to determine how long it takes them to cross a street, and knowing precisely how much time exists on the current signal phase before the “Don’t Walk” alert comes on and the signal proceeds into its next phase. According to a January 2006 article in the ITE Journal, San Francisco experienced a 52 percent reduction in pedestrian injury collisions at the 700 intersections it had retrofitted with the countdown equipment. The Regional Planning Agency and Metropolitan Planning Organization should work with the City of Brockton and other towns in the Region to retrofit signalized intersection with pedestrian countdown signals. Pedestrian countdown signals should be considered with all new signalization projects.

**Promote Safer Pedestrian Access Designs in Parking Lots.** Pedestrian consideration is often overlooked in design for parking areas of retail, entertainment, and employment centers. Often the pressure to provide as many parking spots as possible or the minimums for zoning regulations eliminates safe pedestrian accommodations from the design process. Once parked and out of the vehicle, pedestrians are often forced to share driveways with motor vehicles. With the boom in popularity of Sport Utility Vehicles and large profile trucks during the 1990’s and early 2000’s, often-exiting drivers have very little, if any, visibility of the driveway approaches, making pedestrians virtually invisible. Dedicated pathways between the parking area(s) and building(s) should be provided for pedestrian access. Facility owners should also consider the use of pavement markings, textured surfaces, and other traffic calming devices to further enhance pedestrian safety in parking areas.

**Promote Use of Crossing Islands and Medians in Wide Cross-Sections.** According to the MassHighway Project Development and Design Guide, fifty feet is generally the longest uninterrupted crossing a pedestrian should encounter at a crosswalk although islands and medians are also appropriate for shorter distances as well. Many multiple lane roadways exceed fifty feet in cross-section width. Raised medians provide the following benefits to pedestrians on the roadway network:

- Allow pedestrians to cross few lanes at a time, reducing exposure time.
- Provide a refuge so slower pedestrians (older persons, physically disabled, etc) can wait for a break in the traffic stream.
- Allow pedestrians to focus on one direction of traffic at a time.
- Reduce the total distance over which pedestrians are exposed to conflicts with motor vehicles.
- May provide easily accessible location for pedestrians signal call buttons.
- May also further enhance safety by functioning as a traffic-calming device, forcing drivers to reduce speed on approach to the crossing area.

**Promote Pedestrian Level of Service D or Better at Intersections With High Pedestrian Activity.** Pedestrian level of service is defined by the delay experienced by the pedestrian at an intersection, with guidance provided for by the Highway Capacity Manual (HCM). At Level of Service grades A and B, the likelihood of risk taking behavior (accepting dangerously small traffic gap, ignoring signals, etc) is evaluated as “Low” by the HCM. The likelihood of risky behavior increases to “Moderate” at Level of

Service grades C and D. At level of service E, the likelihood of risky behavior increases to “High”. All reasonable efforts should be exercised in planning, design, and construction of pedestrian facilities at intersections to minimize the potential risk taking behavior by pedestrians at intersections.