Massachusetts Pedestrian Transportation Plan

1998

Sponsored by:	Federal Highway Administration
Prepared for:	Massachusetts Highway Department
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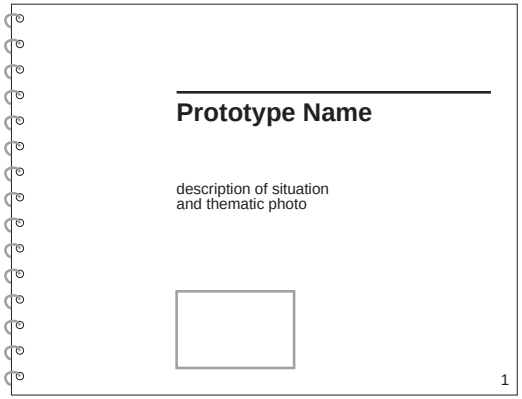
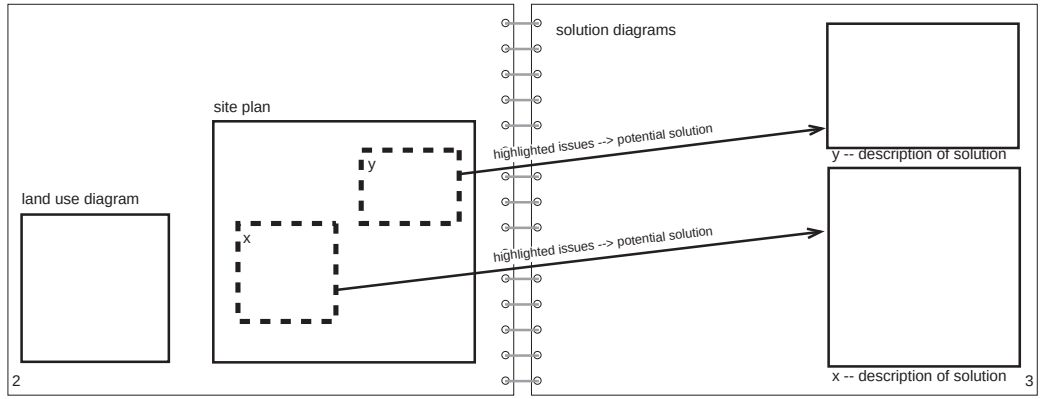
Prototype Layout Key

Chapter 8, pages 8-1 to 8-28, is organized into a series of 4-page layouts, one for each prototype. The first page of each section introduces the prototype and describes its common characteristics. The two center pages illustrate and discuss land use and site planning issues and potential solutions. Possible solutions and improvements are illustrated on the right-hand page for the areas outlined in the site planning diagram on the left-hand page. The outlined areas on the left-hand page are labeled with small letters keyed to the solution diagrams on the right-hand page. The fourth page of each section summarizes the things that communities, business organizations, and interested individuals can do to implement these types of improvements. (The trail and roadway prototypes have a slightly different layout organization.)

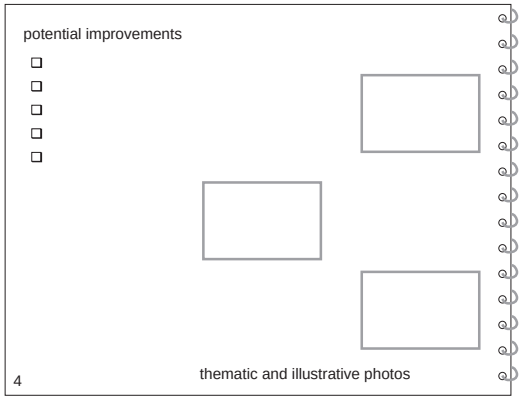
The diagram to the left illustrates the section layouts and provides a key to symbols used in the diagrams.





Site Plan Key

- highlighted area on solution page
- pedestrian desire line
- houses and buildings
- trees and vegetation
- cars and parking lots
- public space / parks
- walkways / paths



List of Acronyms / Glossary

AASHTO	American Association of State Highway and Transportation Officials
BIDs	Business Improvement Districts
CZM	Massachusetts Coastal Zone Management
DEM	Massachusetts Dept. of Environmental Management
DEP	Massachusetts Dept. of Environmental Protection
DHCD	Massachusetts Dept. of Housing and Community Development
DOE	Massachusetts Dept. of Education
DOER	Massachusetts Dept. of Energy Resources
DOI	U.S. Dept. of Interior
DOT	U.S. Dept. of Transportation
DPH	Massachusetts Dept. of Public Health
DPWs	Local Depts. of Public Works
DSS	Massachusetts Dept. of Social Services
EOEA	Executive Office of Environmental Affairs
EOHHS	Executive Office of Health and Human Services
EOPS	Executive Office of Public Safety
EOTC	Executive Office of Transportation and Construction
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
GCPFS	Massachusetts Governor's Committee on Physical Fitness and Sports
GHSB	Massachusetts Governor's Highway Safety Bureau
GIS	Geographic Information System
ISTEA	Intermodal Surface Transportation Effeciency Act of 1991
MAAB	Massachusetts Architectural Access Board
MassHighway	Massachusetts Highway Dept.
MassPike	Massachusetts Turnpike Authority
Massport	Massachusetts Port Authority
MBTA	Massachusetts Bay Transportation Authority
MDC	Metropolitan District Commission
MDED	Massachusetts Department of Economic Development
MEPA	Massachusetts Environmental Protection Act Unit
MHC	Massachusetts Historical Commission
MOBD	Massachusetts Office of Business Development
MOTT	Massachusetts Office of Tourism and Travel
MPOs	Metropolitan Planning Organizations
MRTAB	Massachusetts Recreational Trails Advisory Board
MSOL	Massachusetts Safety Officers League
MUTCD	Manual on Uniform Traffic Control Devices
MWRA	Massachusetts Water Resource Authority
NHI	National Highway Institute
NHTSA	National Highway Traffic Safety Administration
NPTS	Nationwide Personal Transportation Survey
RMV	Registry of Motor Vehicles
RPAs	Regional Planning Agencies
RTAs	Regional Transit Authorities
RTCs	Regional Tourism Commissions
STIP	Statewide Transportation Improvement Program
TDM	Transportation Demand Management
TIP	Transportation Improvement Program (regional)
TMA	Transportation Management Association

Acknowledgments

Technical Advisory Committee

Architectural Access Board
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Central Transportation Planning Staff
Department of Environmental Management
Executive Office of Environmental Affairs
Executive Office of Transportation and Construction
Federal Highway Administration
Governor's Highway Safety Bureau
Metropolitan Area Planning Council
Massachusetts Highway Department
Massachusetts Bay Transportation Authority
Massachusetts Department of Public Health
Massachusetts Office of Tourism and Travel
Massachusetts Association of Regional Planning Agencies

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Table of Contents

Chapter ..... Page

1. Introduction 1-1
2. Achieving the Vision 2-1
3. Who Walks and Why? 3-1
4. Pedestrian Safety 4-1
5. The Potential to Increase Walking 5-1
6. Approaches to Improving Walking 6-1
7. Institutions and Roles 7-1
8. Prototypes 8-1
   - Downtowns 8-5
   - Small Town / Village Centers 8-9
   - Commercial Strip Development 8-13
   - Transit Access 8-17
   - Trails 8-21
   - Roadways 8-25
9. Policy Context 9-1
10. Recommended Actions 10-1

Appendix A - Guidelines and Checklists

Appendix B - Publications and Resources

Appendix C - Regional Planning Agencies

Appendix D - Excerpts of Massachusetts General Laws and Code of Massachusetts Regulations

Appendix E - Funding Sources

List of Figures

1A. Roadway Ownership in Massachusetts 1-3
1B. Massachusetts Population Unable or Unlikely to Drive 1-3

3A. Walk Share by State for All Trips 3-1
3B. Walk Share by Trip Purpose 3-2
3C. Journey to Work Trips in Massachusetts by Mode 3-2
3D. Walk to Work Share by Census Block Group 3-3
3E. Trips by All Modes by Distance 3-4
3F. Walking Distances, Times, and Speeds 3-4
3G. Walk Trips for All Purposes by Trip Duration 3-5
3H. Typical Walking Distances 3-5
3I. Walk Share for All Purposes by Age 3-5
3J. Massachusetts Population Unable or Unlikely to Drive 3-5
3K. Walk Share for All Purposes by Income 3-5
3L. Kilometers of Sidewalk in Massachusetts 3-9
3M. Roadway Functional Classifications in Massachusetts 3-9

4A. Massachusetts Accident Injuries by Mode, 1995 4-2
4B. Pedestrian Fatalities by State 4-2
4C. Historic Trends in Pedestrian Accidents (Mass. and U.S.) 4-3
4D. Massachusetts Pedestrian Accidents by Age 4-3
4E. Common Accident Types and Percent Occurrence 4-4
4F. Chance of Pedestrian Fatality by Vehicle Speed 4-5
4G. Location of Pedestrian at Time of Accident 4-5

5A. Factors Affecting the Decision to Walk 5-2
5B. Example of Effective Walking Radius Analysis 5-6

6A. The “4-Es” and the Physical/Behavioral Spectrum 6-2

7A. Summary of Institutions and Roles for Improving Walking 7-2

8A. Representative Inventory of Prototypes Statewide 8-2
8B. Prototype Key 8-4
Downtown Land Use and Site Plan 8-6
Downtown Solutions 8-7
Small Town or Village Center Land Use and Site Plan 8-10
Small Town or Village Center Solutions 8-11
Commercial Strip Land Use and Site Plan 8-14
Commercial Strip Solutions 8-15
Transit Access Land Use and Site Plan 8-18
Transit Access Solutions 8-19
Trail Examples and Issues ..... 8-22&8-23
Roadway Examples and Issues ..... 8-26&8-27

1 Introduction

Pedestrians are a part of every roadway environment, and attention must be paid to their presence in rural as well as urban areas. -- AASHTO "Green Book"

The Massachusetts Pedestrian Transportation Plan

Mission Statement

The Massachusetts Pedestrian Transportation Plan will serve as a guide to state, regional, and local transportation planning to better serve walkers. The plan's recommendations aim at developing a more pedestrian-focused transportation system throughout the state through government and private sector actions. The intended result is safe, convenient, continuous, coherent, and comfortable walking networks. The plan will provide strategies to improve pedestrian conditions in urban, suburban, and rural areas throughout Massachusetts. Strategies will include physical improvements appropriate to the setting, local and statewide encouragement and education programs, increased adherence to laws, and improvements in the processes that set policy and plan facilities.

Massachusetts is already a walking state. Approximately 10.4 percent of all Massachusetts trips are walking trips, a 44 percent higher proportion than the national average and the fourth highest walking trip share of any state.[1] Massachusetts also has the twelfth lowest pedestrian fatality rate, 1.38 deaths per 100,000 population, 40 percent below the national average.[2]

Massachusetts Ave. in Cambridge at MIT

Because of the demands of vehicular traffic in congested urban areas, it is often extremely difficult to make adequate provisions for pedestrians. Yet this must be done, because pedestrians are the lifeblood of our urban areas, especially in the downtowns and other retail districts. -- AASHTO "Green Book"

Why Walk?

Does an activity seemingly as simple as walking require a transportation plan? This report demonstrates that it does.

Walking is an important activity in at least three different respects:

1. Transportation: Walking is a key to a multimodal transportation system

Walking is a central component of our multimodal transportation system. Walking is part of virtually every trip (including those by automobile) and it is essential for transit use. As conditions for walking are improved and more people are willing to walk short distances to bus stops and train stations, transit can become a better choice for more people. Walking can also directly substitute for automobile trips of short length. The result will be a changed balance of automobile and other modes, with benefits for traffic flow and air quality.

Downtown Amherst

2. Community: Walking contributes to the quality of community life

A significant part of Massachusetts' commerce takes place on the "Main Streets" of its downtowns and town centers. Sidewalks are the infrastructure that directly serves these businesses. Making downtowns and town centers more walkable directly benefits these businesses and the state's economy. Tourism is a major sector of the economy that responds directly to the quality of the walking environment.

In addition to economics, neighborhoods are friendlier and safer if residents walk. Their presence can strengthen neighborhood bonds and help deter crime. The community environment will also be better because more walking can reduce automobile trips, particularly "cold start" automobile trips that have disproportionate air pollution emissions. The result is better air quality and energy conservation.

3. Individual: Walking contributes to personal well-being

The recent Surgeon General's report makes it clear that walking is the key to fitness and health for a majority of Americans. Regular walking reduces the risk of major diseases like coronary heart disease, and also relieves stress and improves mental health. Walking allows people to experience and enjoy their surroundings directly in a unique way.

Walking expands choice. It is an economical way to travel, and especially when combined with transit, can reduce individual and household transportation expenses.

Walking expands personal mobility and choice for those who do not or can not drive, particularly the young, the elderly, and those without cars.

Walking is Local

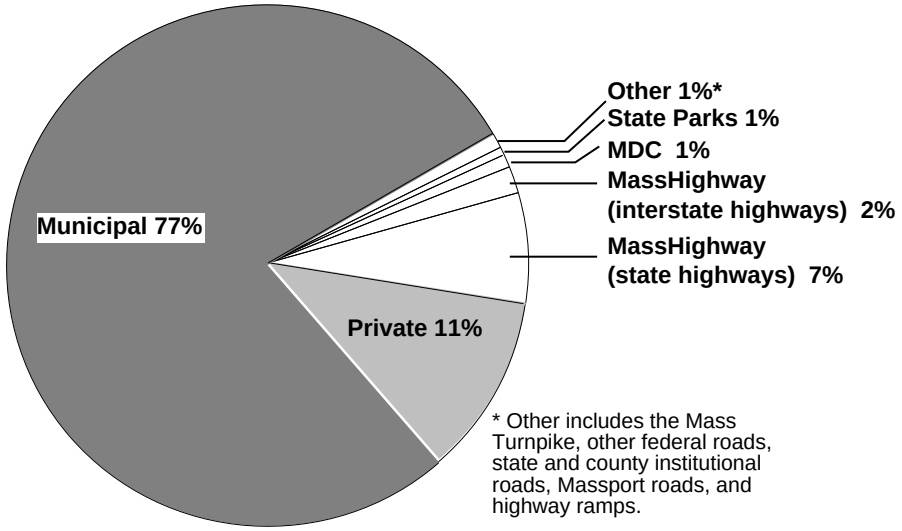
Roadways in Massachusetts are largely under municipal jurisdiction and (77 percent of total roadway length) and in private ownership (11 percent). An even larger percentage of the Commonwealth's sidewalks and other walkways are municipally and privately owned. Thus, both walking and the walkway network are largely, but not exclusively, local. MassHighway and other agencies can help to improve walking in Massachusetts through their planning, funding, and technical assistance roles, as well as in state-owned portions of the transportation system. However, it is in the interest of Massachusetts' cities and towns and the private sector to play a major role in serving the walking needs of their communities.

On locally-owned roads, it is the responsibility of the municipality to ensure sufficient right-of-way and that easements exist to accommodate all uses, including accessible sidewalks. On state highways in developed areas, MassHighway will make every effort to accommodate all uses, including accessible sidewalks, where municipalities agree to be responsible for maintenance. MassHighway will not take right-of-way specifically to provide sidewalks without community support.

What about Bicycles?

Bicycles are another important part of our balanced transportation system. MassHighway has prepared separate bicycle and pedestrian plans recognizing the differences in these modes and the importance of each. The two plans have been coordinated to insure that they are consistent. It is important to recognize that there is no inherent conflict between pedestrians and bicyclists. The transportation system is well served by giving both these modes higher priority. Both bicyclists and pedestrians can benefit from additional operating space.

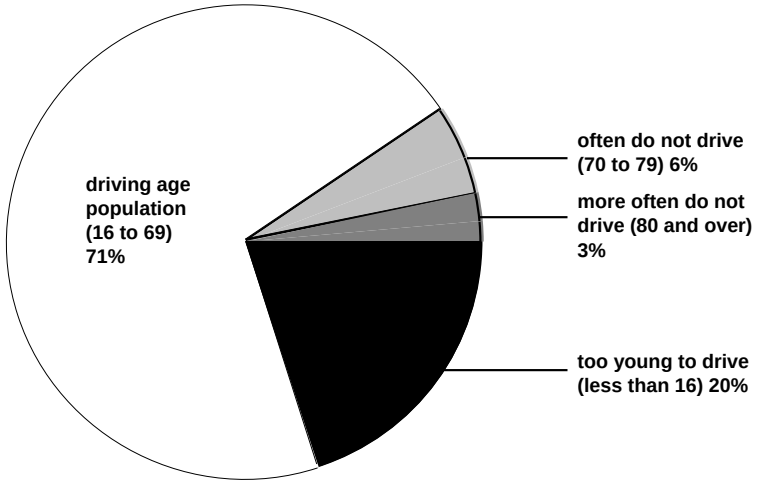
A. Roadway Ownership in Massachusetts



total roadway = 55,000 kilometers (34,000 miles)

Source: Massachusetts Highway Department

B. Mass. Population Unable or Unlikely to Drive



Source: U.S. Census, 1990.

Walking: The Most Basic Form of Transportation

Walking is the most basic form of transportation. Almost everyone walks. Nearly all trips involve at least a walk to or from the car, or walking to or from transit. Many trips are made solely by walking.

People walk more than they realize. When most people measure walking activity they only think about whole trips made by foot. Often people, and especially transportation planners, think of walking to work because it is an activity that the U.S. Census measures and reports every ten years, but in reality most walking is for purposes other than going to work. People walk at lunch-time to do errands, for exercise, to visit friends and neighbors, and to take care of family or personal business. Children walk to school and other locations. In addition to these walk-only trips, people combine walking with other modes of transportation. They walk to transit, they walk from a parking spot to an office or shopping center, and they drive places so that they can then walk for pleasure.

People do not often account for all the walk-trips or trip-segments that they make in a day until they track their daily travel activity in a travel diary. Diary entries might reveal the number of times people walk in a day or as part of a typical trip.[1]

Travel Diary of a Hypothetical Walker*

> **Trip to the grocery store:** *Walked* from house to the car. Drove to the store and parked the car. *Walked* through the parking lot and into store. Continued to walk while shopping. *Walked* back to car. Drove home and parked car. Unloaded groceries; two trips *walking* back and forth between car on street and house.
>
> **A day at work**: *Walked* from the house to the car in driveway. Drove to work and parked car. *Walked* from the parking lot around the corner into the building. *Walked* 10 minutes to meeting at 10 o'clock. *Walked* back to office at 11:15 am. *Walked* to sandwich shop for lunch. Then went for *walk* in the park. *Walked* back to the office from the park. At the end of the day *walked* back to the car and drove home. Parked the car in the neighborhood and *walked* to the house.
>
> **A weekend day**: Woke up and *walked* to the corner, and back, to buy a newspaper. After breakfast *walked* to the car, and drove to the beach. Parked the car and *walked* to the shore. While at the beach went for a 40 minute *walk* with husband to end of beach. At the end of the day *walked* back to the car, drove home. After dinner *walked* to the corner store to get ice cream for dessert. Sat on a bench and ate ice cream while watching people along the street. *Walked* home just after dark.
>
> **A trip to the doctor by bus**: *Walked* from the house to the corner to catch the bus. Took the bus into town. *Walked* from the bus stop to the doctor's office. After the appointment, *walked* down the street to get lunch. *Walked* back to the bus. Took bus home. *Walked* from the bus stop to the house, stopping at store to buy milk.

The only trips that do not include a walk-segment are trips to the drive-through car wash or to a drive-through restaurant. In choosing to use public transit, the distance and quality of the walk portion of the trip may be as important as time and comfort of the transit trip itself.

Most people underestimate walking, both in terms of total walking activity and the potential for making important trips by foot or by a combination of walking and other modes. For both of these reasons, planning and design do not always give sufficient attention to pedestrians. The Massachusetts Pedestrian Transportation Plan is intended to give this crucial mode the attention it warrants as part of a balanced transportation system.

* Sample diary entries are fictitious, but reflect typical walk trip activity.

People with Disabilities

People in wheelchairs are pedestrians. A basic assumption of the *Massachusetts Pedestrian Transportation Plan* is that pedestrians can be said to be accommodated only if all pedestrians are served, including people with walking, sight, auditory and other disabilities. Serving these populations will make walking better and safer for everyone.

End Notes

[1] National Personal Transportation Survey

[2] Accident data from National Highway Traffic Safety Administration

2 ACHIEVING THE VISION

Most walking occurs over short distances and on locally-owned sidewalks. The walking environment, however, is shaped by policies and actions at the federal, state, and local levels of government, and by both the public and private sectors. This plan recognizes the importance of appropriate actions and positive partnerships to improve walking conditions in Massachusetts.

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) envisions a transportation *system* in which all modes of travel are interconnected and in which walking is recognized as a key part. *The National Bicycling and Walking Study* developed a federal, state, and local action plan to promote walking and bicycling and improve safety. It envisions "a Nation of travelers with new opportunities to walk or ride a bicycle as part of their everyday life. ... America will have a changed transportation system - better balanced to serve all travelers." (p. 125.)

Walkway in Downtown Boston

In Massachusetts, Chapter 87 of the Acts of 1996 (H.B. 1940), signed by Governor Weld on May 20, 1996, calls for accommodation of pedestrians and bicyclists in all MassHighway projects, with certain exceptions. The 1995 *Intermodal Transportation Policy Plan for the Commonwealth of Massachusetts* addresses walking as part of the balanced transportation system. One of that plan's goals is to provide pedestrian facilities and to encourage pedestrian travel as a viable alternative mode. (See Chapter 9 of this report.)

This *Massachusetts Pedestrian Transportation Plan* sets forth a vision, goals, and actions for the state, local governments, the private sector, and citizens to improve conditions for walking in Massachusetts.

Vision

As we enter the 21st century, walking in Massachusetts will become a viable transportation choice for *more* trips: to work and school, for shopping, and for visiting friends and family. Increasing numbers of people throughout Massachusetts, residents and visitors alike, will be able to walk safely and conveniently to their destinations. Pedestrians, bicyclists, and drivers will be aware of each other's needs, and will act appropriately for the situation in which they are walking, riding, or driving. Walking will increase, while accidents involving pedestrians will decrease. Street and sidewalk design will accommodate and give greater priority to pedestrians in ways that are responsive to local situations and needs. More people will be involved in their communities to improve conditions and encourage more walking.

Physical improvements will be made to the pedestrian walkway system, encouraging more people to walk. More transit users will have the option to walk to and from local transit stops to more destinations with fewer conflicts and impediments. More malls and shopping centers will be more accessible to pedestrians, and town centers and downtown shopping districts will flourish. More walkers will know how to walk safely on rural roads, and learn how to share paths. More drivers and bicyclists will be aware of pedestrians and share roads and off-road facilities with them. More new development will occur in places that are within walking distance of existing activity centers to create increased opportunities for walking.

Davis-Alewife Linear Park,
Somerville/Cambridge

Achieving the Vision

The Statewide Pedestrian Transportation Plan is part of the evolving process to plan for better walking conditions locally, regionally and statewide in Massachusetts. Implementation will build upon efforts to date in improving walking conditions and will require a concerted effort of state, regional, and local agencies, private organizations and businesses, and the public.

As the agency preparing the plan, MassHighway, working with the User / Focus Group, the Technical Advisory Committee, other agencies and organizations, and the public, has provided specific recommended actions for improving walking conditions which reach beyond the scope of its own jurisdiction. A commitment of other state agencies, as well as regional and local agencies, will be necessary to carry out the recommended actions of the plan.

There is a need to coordinate directly the pedestrian-related activities of state agencies. The Massachusetts Secretary of Transportation may choose to form an implementation committee of the state agencies involved that would develop a phased work plan. The state Secretary of Transportation may also encourage other key agencies to seek funding to realize the objectives of this plan.

Greenfield

Lee

Action Plan

The following *Action Plan* draws from the extensive series of recommended actions that are discussed at length in the plan. While many groups, organizations, and agencies shape walking conditions in Massachusetts, it is also evident that communities play a key role. For this reason, EOTC and MassHighway developed the Recommended Actions to outline specific actions to be taken by Commonwealth agencies and others to advance the pedestrian plan's agenda.

Action Item 1

The Massachusetts Secretary of Transportation will create a Pedestrian Program Office under the state Executive Office of Transportation & Construction (EOTC) by July 1, 1998. The office will report to the Secretary of Transportation. The responsibilities of the Pedestrian Program Office will include, but not be limited to:

- integrating pedestrian considerations into the planning, design, construction, operation, and maintenance of all MassHighway-owned roadways and bridges where walking is legally permitted and where community support exists. The Program manager will also work with the Metropolitan District Commission (MDC) and the Department of Environmental Management (DEM) on their roadways and bridges;
- assisting metropolitan planning organizations, regional planning agencies and municipalities in planning and implementing pedestrian programs and facilities;
- assisting in the establishment of criteria for evaluating applications to expend federal Transportation Enhancement funds and state funds authorized for pedestrian walkways.

Action Item 2

Transportation related pedestrian program activities at the state level will be consolidated under EOTC by July 1, 1998.

Action Item 3

The state Secretary of Transportation will seek and obligate funds from state and local sources to carry out the Pedestrian Program.

Nantucket

Taunton

Action Item 4

The Pedestrian Program Office working with MassHighway will release a rewritten MassHighway *Engineering Directive* E-97-004 and circulate copies to all MassHighway offices, the MDC, the DEM, RPAs, municipal planning and highway departments, and other interested parties who request a copy.

Action Item 5

MassHighway will conduct a statewide inventory of its roadways and bridges where pedestrians are permitted. The inventory will include sidewalk information. Using the results of this inventory, MassHighway will identify those segments of roadways and bridges where pedestrian accommodation does not meet criteria established in Engineering Directives. MassHighway will assess the feasibility of improving pedestrian accommodation on these roadway and bridge segments, with the cooperation of regional planning agencies, cities and towns. Once these data are available, MassHighway will establish goals for increasing the length of roadways with sidewalks. MassHighway will complete these inventory, identification and goal-setting activities and provide a report to the state Secretary of Transportation no later than July 1, 2000.

Action Item 6

The Pedestrian Program Office will update and amend the Statewide Pedestrian Transportation Plan as necessary, and evaluate the programs initiated by this *Action Plan*.

Action Item 7

The Pedestrian Program Office will monitor all applicable roadway, bridge and intersection improvement projects with respect to their conformance with *Engineering Directive* E-97-004 and subsequent Directives. The Pedestrian Program Office will furnish the state Secretary of Transportation with a report every 12 months summarizing projects reviewed for conformance with this directive, including documentation where reasonable pedestrian accommodation was not provided. The first of these reports will evaluate projects reviewed from July 1, 1998, to June 30, 1999, and will be furnished to the Secretary of Transportation no later than September 1, 1999.

Action Item 8

The state Secretary of Transportation, through the Pedestrian Program Office, will work with other agencies in coordinating pedestrian education and community outreach activities. These agencies include MassHighway, the Governor's Highway Safety Bureau, the Department of Public Health, the MDC, the DEM, the RMV, and other Commonwealth agencies. The Pedestrian Program will also advise regional planning agencies and municipalities in the planning and development of pedestrian programs. These activities will begin no later than December 1, 1998.

Action Item 9

The Pedestrian Program Office will work with other appropriate Commonwealth agencies and pedestrian groups in coordinating an annual Pedestrian Education and Safety Conference to facilitate networking and sharing of ideas and programs. The first such conference will be held no later than December 1, 1999.

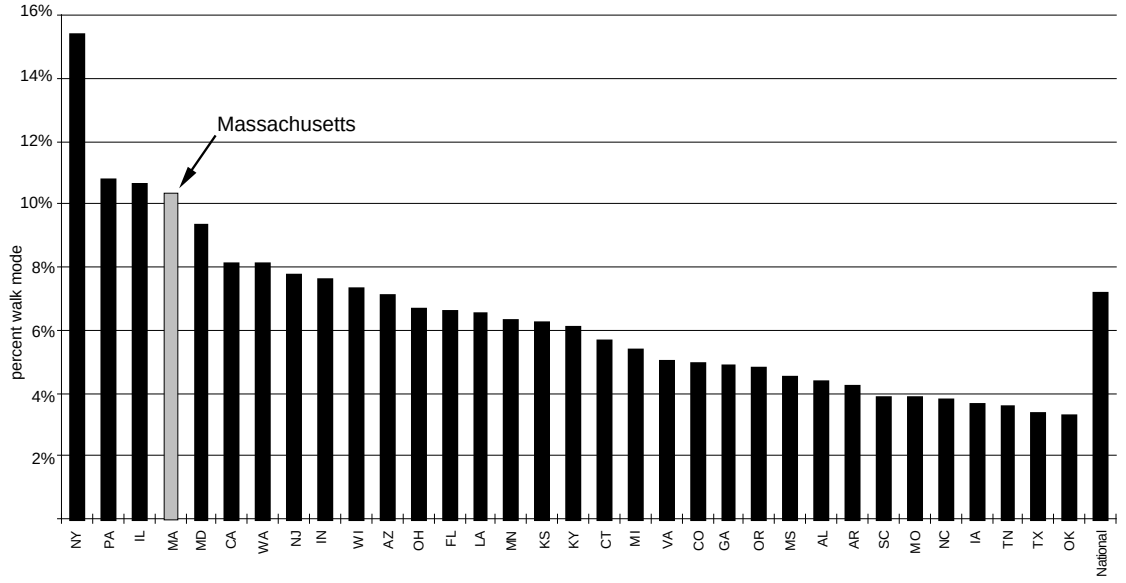
3 Who Walks and Why?

Walking Varies Nationally

Walking accounts for 7.2 percent of all trips made in the United States, for all purposes, according to the 1990 Nationwide Personal Transportation Survey (NPTS). This share does not include walk-access to transit or other trips where walking is a small part of a longer trips. Rather, they are trips where the longest portion, or the entire trip, was made by foot.

In Massachusetts 10.4 percent of all trips are walking trips, 44 percent higher than the national average. The Commonwealth has the nation's fourth highest walk share after New York, Pennsylvania and Illinois (figure A). The state's high walk share is probably attributable to relatively compact development patterns that exist across the state. Raising Massachusetts' rank to second in the nation is an achievable goal.

A. Walk Share by State for All Trips



Source: Nationwide Personal Transportation Survey, USDOT. 1990

Walking Varies by Trip Purpose

Trip purpose refers to the reason a person makes a trip, with several starting locations - such as home, office, or school. Trip destinations include the workplace, shopping, and social and recreational locations.

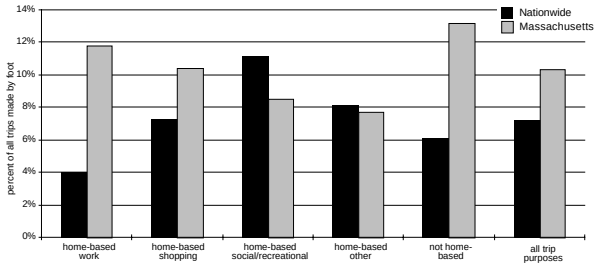
In Massachusetts the walk share for non-home-based trips, such as from work to lunch or from work to business meetings, is a relatively high 13 percent (compared to six percent nationally). For other trip purposes walk shares are lower, about 10.5 percent for shopping and 8.5 percent for social and recreational. All purposes together yield the 10.4 percent statewide walk share (figure B).

Walking to Work

NPTS estimates a 12 percent walk-to- work share in Massachusetts. This number appears high when compared to the Census Journey to Work data in which an estimated 5.4 percent of trips to work in the state are made by foot (only 3.9 percent nationally). These differing estimates are probably due to different sample sizes, survey techniques, and time of year each agency conducts its survey. In both cases Massachusetts has a higher walk-to-work percentage than the national average. In Massachusetts walking is the third most popular way to get to work, after driving alone and car pooling (figure C).

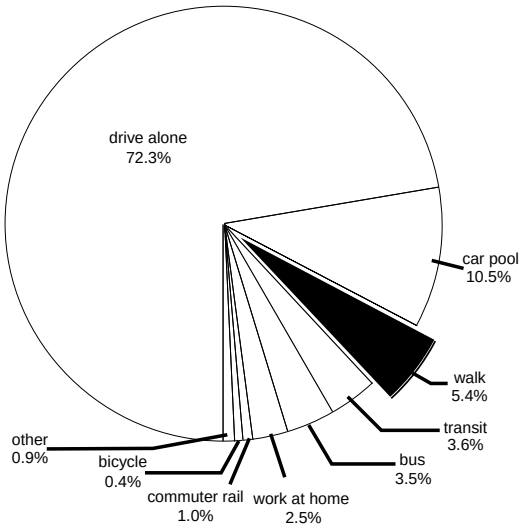
The walk-to-work share is highly dependent on both land use patterns and the relationship between where people choose to live and where they work. Areas of high density provide more opportunities for people to live close enough to walk to work. When walk shares were analyzed by Census block group, it was found that significant portions of people walk to work in all regions of the state although in terms of absolute numbers most people who walk live in urban areas. (figure D). Many rural towns have significant portions of the population walking to work, primarily near town centers. There are opportunities, in all parts of the state, for increased walking to work and for other trip purposes.

B. Walk Share by Purpose



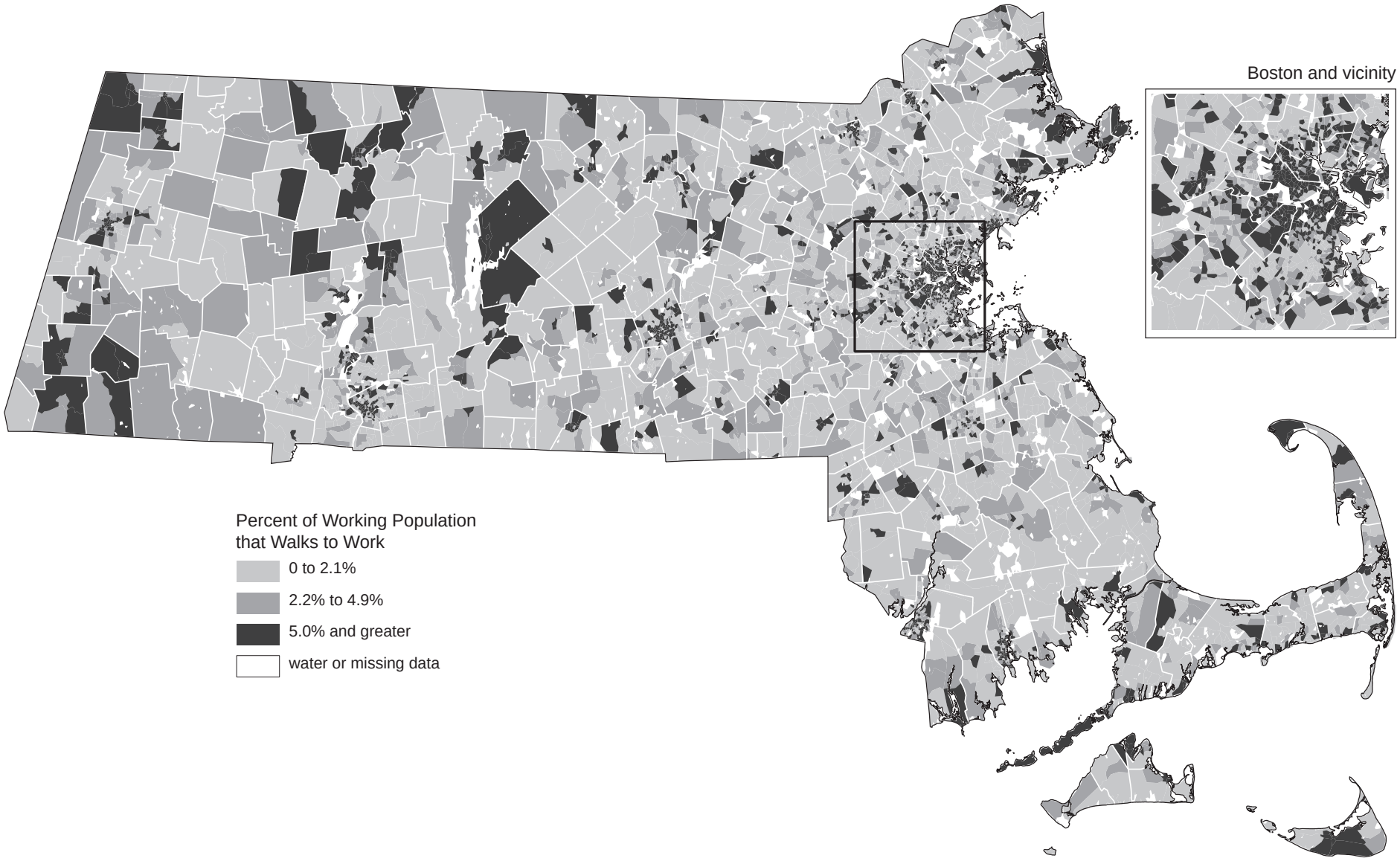
Source: Nationwide Personal Transportation Survey, USDOT, 1990

C. Journey to Work Trips in Mass. by Mode



Source: U. S. Census, 1990

D. Walk to Work Share by Census Block Group



Source: U.S. Census, 1990. MassGIS.

Distance, Time, and Walking Speed

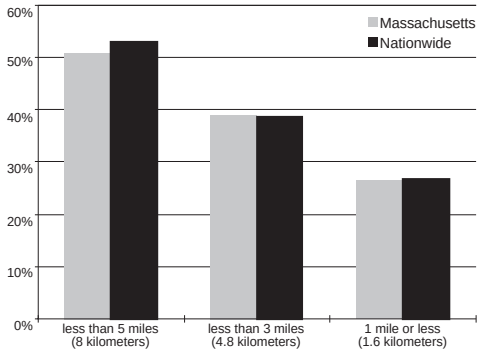
The distance people are willing to walk varies from person to person and among different trip purposes. People who are avid walkers are likely to walk longer distances than those who only walk as a last resort. Many people are willing to commute one hour by car; an avid walker might be willing to walk an hour to work under certain conditions — covering a distance of 4 to 6 kilometers (approximately 2.5 to 4 miles). People walking for exercise might be willing to walk even farther than this. Hikers often walk 16 kilometers (10 miles) in a day, and more.

For utilitarian trips, such as shopping, people typically walk shorter distances. Untermann[1] estimates that the maximum distance people are willing to walk for "general purposes" is about 0.6 kilometer (0.4 mile). The average walker can reasonably be expected to cover this distance in approximately 9 minutes. If a person were planning to buy a week's worth of groceries, however, a 10 minute walk back from the supermarket might be too far; carrying a newspaper and a quart of milk is a more likely walking trip.

In congested cities or suburbs a person can often make a one-kilometer trip (0.6 miles) across town faster on foot than by waiting for a bus, or driving through traffic, looking for a new parking space and then walking to the final destination. In rural areas, where destinations are more spread out, walking is often slower than driving for short trips, yet village centers in rural towns experience significant foot traffic.

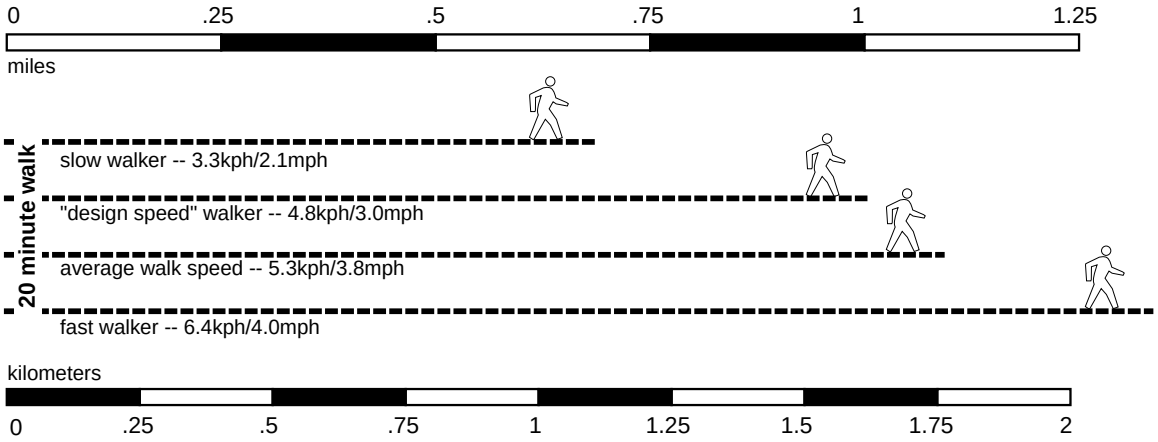
The distance and time people are willing to walk are primary factors in choosing to walk instead of other modes. Walking varies with the age and fitness of the walker, and willingness to walk also depends on weather conditions. In general, if there are opportunities for more short trips, walking will increase.

E. Trips by All Modes by Distance



Note: Survey administered in non-metric units.
Source: Nationwide Personal Transportation Survey, USDOT. 1990

F. Walking Distances, Times, and Speeds



Source: Speeds compiled by PedNet participants, Spring 1996.

In Massachusetts, 27 percent of all trips by *all* modes are 1.6 kilometers (one mile) or less. This large share of trips that can be walked in 20 minutes or less reveals a very significant market for potential walking trips (figures E,F,G, and H).

Some people may be willing to walk about 20 minutes (1.6 kilometers or one mile). Approximately 75 percent of walk trips take less than 20 minutes, but about a third of these are between 10 and 20 minutes or 0.8 to 1.6 kilometers (one-half to one mile) long.

Walking Speed

Walking speed varies from about 3 kilometers per hour to 6 kilometers per hour (2 to 4 miles per hour). The 1990 NPTS estimated that the average walk speed in the U.S. is 5.2 kilometers per hour (3.27 miles per hour), but planners typically use 5 kilometers per hour (3 miles per hour) as a design speed for pedestrian facilities.

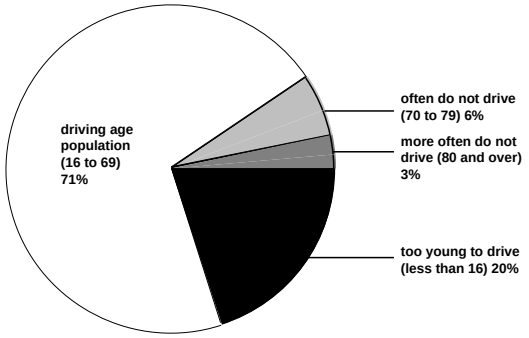
Different segments of the population walk at different speeds. Older people typically walk more slowly and therefore many need more time to cross the street. Young people walk faster and are therefore more likely to jaywalk or cross at unsignalized intersections. People often walk at different speeds depending on the purpose of their trips. If a business woman is walking to a meeting in downtown Springfield, she might be walking fast to get there on time, while if she is visiting her daughter in Northampton on the weekend, they might be strolling at a slower pace and taking in the sights.

Demographics of Walking

Young people, between 5 and 15 years old, walk more than any other age group, most likely because they are too young to drive. People in their 20s also average 14 percent of trips by foot, as many students fall into this group and car ownership rates may be relatively low. As people age, they may have less time and more access to a car, and then tend to walk less. Once people reach retirement age, they may have more free time and in certain situations may prefer not to drive (figures I and J). Because old and young age groups walk more than people in the middle of the age spectrum, areas near senior citizen housing or playgrounds and schools might require special attention in planning and designing for walkers.

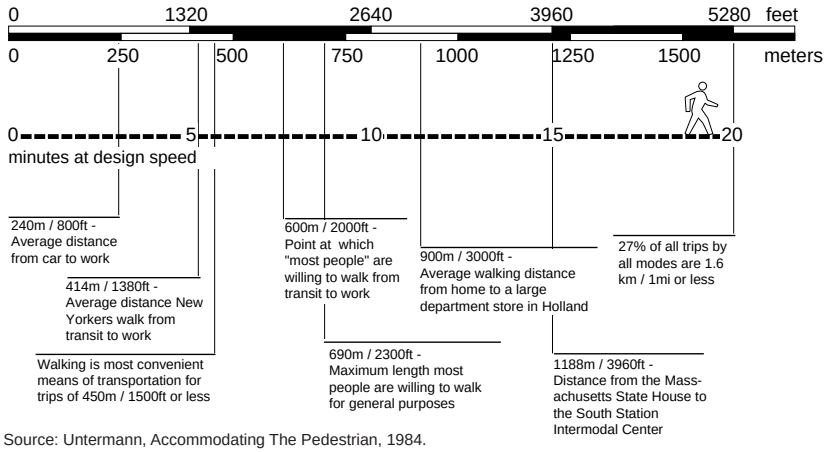
People without cars walk more than people who own cars. Walk share is also dependent on income, probably because of the car ownership levels that are associated with households of different income levels. People in lower income households make a larger share of trips by foot than those in higher income groups. People in households with household incomes less than $20,000 make more than 20 percent of their trips as pedestrians (figure K). In parts of the state where car ownership is low, opportunities for walking to basic services are especially important. In communities where incomes are lower, the infrastructure for walking is particularly important.

J. Mass. Population Unable or Unlikely to Drive



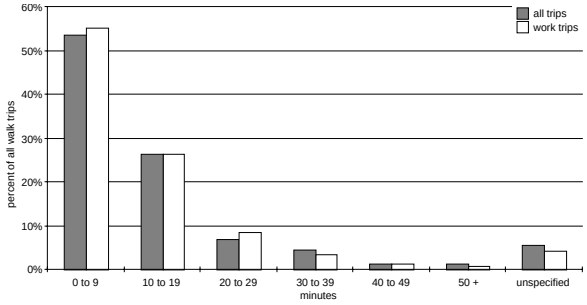
Source: U.S. Census, 1990.

H. Typical Walking Distances



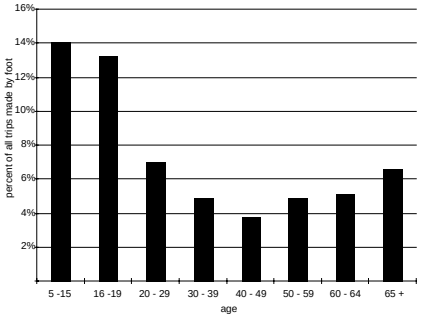
Source: Untermann, Accommodating The Pedestrian, 1984.

G. Walk Trips for All Purposes by Trip Duration



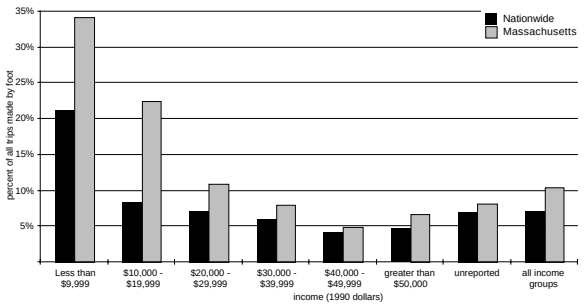
Source: Nationwide Personal Transportation Survey, USDOT. 1990

I. Walk Share for All Purposes by Age



Source: Nationwide Personal Transportation Survey, USDOT. 1990

K. Walk Share for All Purposes by Income



Source: Nationwide Personal Transportation Survey, USDOT. 1990

Transit commuters walk from South Station to final destinations in downtown Boston. Surges of pedestrians should be accommodated with sufficient sidewalk capacity and signal phasing.

Children walk to school in all kinds of weather. Both children and motorists must use extra caution when roads are slippery and visibility is low. (Beverly)

Transit Access by Foot

Walking is essential to transit use, just as transit may be essential to walking. Despite the increasing importance of park-and-ride lots, most people travel to and from the transit service by foot. For every transit trip, there are potentially two walk trips. In cases where there are park-and-ride lots, many people reach the station by car, but "walk-ins" are still an important component of ridership. Most of the transit systems in Massachusetts are bus systems that do not provide significant park-and-ride opportunities. Almost all of the people using these systems walk to and from the bus stop.

There are approximately 700,000 transit trips per day in Massachusetts. About 85 percent of transit use in the state is on the MBTA system serving eastern Massachusetts. Because of the park-and-ride access to the MBTA system, transit users make about 81 percent of access and egress trips by foot. For the other systems in the state, walk access is probably between 90 and 95 percent of users. In total, transit ridership in Massachusetts generates roughly 1.16 million walk access and egress trips per day.[2]

Walking to School

Students in grades kindergarten through 12 often walk to school. Massachusetts state law considers distances of up to 3.2 kilometers (2 miles) reasonable for students to walk if there are sidewalks or pathways that provide safe routes to the school. Approximately 36 percent of school-age students in grades K-12 are "not transported" by school bus, i.e., walk, bike or get a ride from family or friends to school. The state pays a portion of transport cost for the remaining 64 percent of public school children. Similar to other forms of transit, most students who take school buses reach the bus stop by foot. Some students take public transit to school, and reach the train or bus stop as pedestrians.

The policy implications of walking activity associated with walking to school include safety concerns, especially in the area immediately surrounding each school where children converge from many directions, as well as safe access to and from bus stops and major street crossings along the walking routes to school. To encourage more walking to school, important issues are the location of new schools where they can be reached on foot by a large proportion of students in the school district, the provision of walkways and street crossings suitable for children, and snow removal.

Walking for Fitness

A 1996 study by Centers for Disease Control to the U.S. Surgeon General, *Physical Activity and Health*, concludes that daily physical activity is an integral part of health maintenance. It also states that more than 60 percent of all Americans do not include enough physical activity in their daily lives. This unfortunately includes many young people aged 12 to 21 who are not vigorously active according to the report.

Walking is America's most popular exercise. The report recommends "brisk walking" for a half-hour per day as one of many activities that will help achieve and maintain physical fitness. For people who can not devote 30 minutes at one time to walking, multiple shorter episodes (for example, three 10-minute walks) have significant health benefits.[3] People who take transit on a daily basis and walk from the bus stop or train station to work, or those who walk across town for lunch, are accumulating these health benefits, perhaps without even realizing it. These trips can add up to effective exercise if walking is done briskly and on a consistent daily basis. Walking for transportation purposes provides physical fitness benefits, while increased physical fitness makes walking longer distances for transportation purposes easier and more enjoyable.

The Surgeon General's report refers to walking as one of the most popular leisure-time activities among adults in the United States. Much of this leisure-time walking is on trails in parks, along river fronts, on paths through the woods, and on urban and suburban sidewalks. These trips may include a destination (such as the Post Office or coffee shop), in which case they substitute for a potential automobile trip, even though the walker may be motivated to walk primarily as an enjoyable leisure activity or part of a fitness program. People walk in urban areas for exercise and for the pleasure of seeing other people and being part of urban activity. Dog owners in urban and suburban areas often walk their dogs more than once a day. In poor weather some people drive to enclosed shopping malls and then walk around the concourse both to shop and for exercise. (At many malls people gather for fitness walks before many of the stores have opened for business.) Although these forms of walking are not, strictly speaking, a form of transportation, these walkers may have characteristics that are indistinguishable from other pedestrians with transportation-related trip purposes. Walkers share the same sidewalks and walkways regardless of motivation, and they share common concerns such as comfort and safety.

Most important, people who walk for fitness purposes may be more likely to walk for utilitarian purposes. The goal of encouraging walking is served if people are first attracted to walking for its many benefits, and then go on to substitute and add walk trips for other modes in their commuting, shopping, and social trips. Increasing walking for fitness and walking for transportation are thus complementary objectives.

Governor Weld leads the 1996 fitness walk through Boston Common.

Walking to a more distant transit station or bus stop is an easy way for transit users to increase daily exercise.

Tourism and Walking

Tourism is a category of walking that deserves special attention, because walking is often a major component of tourism. Visitors come to Massachusetts from all over the world and do a significant amount of walking once they get here. In fact, Massachusetts' walking-oriented places are a prime source of tourist interest and are often highlighted in tourism promotions. About 26 million people visit Massachusetts each year. In 1995, 40 percent of them spent time shopping, 30 percent visited historic places and museums, 21 percent partook in outdoor activities and 19 percent spent time at the beach[4].

Many small towns attract tourists who walk and shop. In good weather sidewalks can be flooded with walkers. (Rockport)

Tourists use the sidewalk on the historic Congress Street Bridge in Boston for a photo opportunity.

Most visitors experience Massachusetts on foot after reaching their destination by automobile, bus, or train. Nantucket recently instituted transit service that permits visitors to reach areas like Siasconset without bringing their cars to the island. Sidewalk improvements in Lee are part of a revitalization strategy to attract more tourism to the town center.

Walking is often the best or only way to experience many of the state's most visited places, such as the Boston National Historic Park and Freedom Trail, Old Sturbridge Village, Plimoth Plantation, Historic Deerfield, Hancock Shaker Village, old Marblehead, Bearskin Neck in Rockport, and Cape Cod and Island sites. These places have in common closely spaced, small-scale attractions such as historic buildings and shops that are more difficult to appreciate and less practical to visit by automobile.

Often, the walkway is itself part of the historic or natural heritage of the place. The Freedom Trail and the African-American Heritage Tour in Boston, the Bridge of Flowers in Franklin County, the Cape Cod Pathways, and the historic streets of Nantucket are places and activities that attract people specifically to walk.

Streets and places that are actively used by pedestrians derive part of their appeal from that pedestrian activity. Heritage events and festivals attract people who enjoy the activity of walking in a shared pedestrian setting.

Tourism is travel, and walking is part of transportation for most visitors' itineraries, whether they arrive by plane, bus, car, or train. Walking in the state's downtowns, historic village centers, state and national parks, or between convention centers and local restaurants can be a memorable and enjoyable part of their visit. Walk-in business is a major component of sales for stores and restaurants in tourist centers.

Tourists may use a variety of public and private transit services together with walking as their primary means of transportation while visiting. Tourists arriving by air begin their trip to Massachusetts walking through the airport to ground transportation services. Particularly in Boston, many tourists depend on a combination of walking and transit to get around the city. The MBTA, for example, offers 1, 3, and 7 day passes geared to visitors. Commercial tourist trolley services generally allow ticket holders to disembark, walk, and re-board freely at several stops on a fixed route. Many tourists use rental cars, bus, and ferry to reach places throughout Massachusetts which they then explore on foot. Because large numbers of tourists visit places around the state by foot, special attention should be paid to wayfinding aids and information along the street to help visitors enjoy their trip.

Overview of the Existing Walkway Network In Massachusetts

The walkway network in Massachusetts varies from place to place. Conditions vary from nonexistent to enhanced walkways with pavers and planting strips. Between these extremes there are worn paths along the side of the road, paved sidewalks of bituminous or Portland concrete, with or without curbs, in conditions ranging from overgrown to excellent.

There are approximately 55,000 kilometers (34,000 miles) of public roadway in Massachusetts, 88 percent of it under municipal or private ownership. Municipally owned roads include highways classified as serving arterial and collector functions, as well as local streets. Overall, highway categories in all jurisdictions comprise 35 percent of total roadway length, while local streets account for 65 percent.

Over 36,000 kilometers (23,000 miles, 65 percent of total road lengths) are in areas classified as "urban" based on population density. In urban areas, 38 percent of the local roads and 45 percent of the highways have sidewalks on at least one side. Of the approximately 19,000 rural road kilometers (12,000 miles), only 4 percent of local roads and 8 percent of highways have sidewalks. In total there are approximately 16,000 kilometers (10,000 miles) of roadway in Massachusetts with sidewalk on at least one side. In all, there are 28,000 sidewalk kilometers (17,500 miles) in the state. In addition to sidewalks along public highways and local public streets, sidewalks also exist on some private ways (figures K and L)

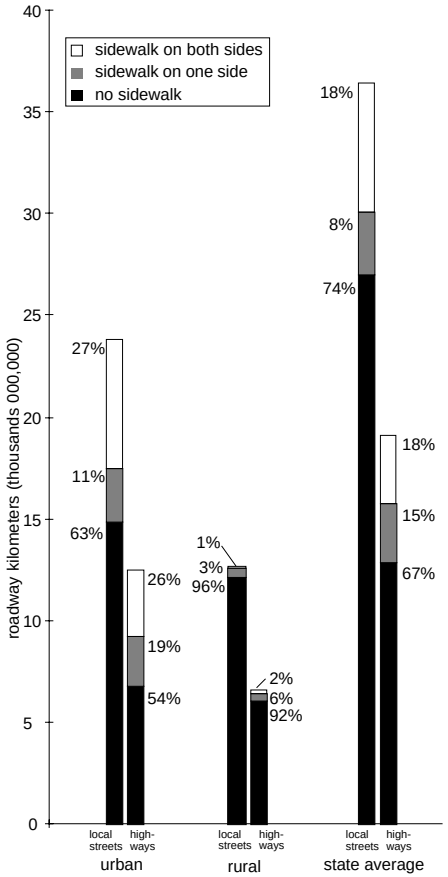
It is a goal of this plan to make the most effective use of resources to improve walking. Providing sidewalks along every kilometer of road in Massachusetts is not a goal. It is most important is that sidewalks be provided at and around activity centers and other selected locations for safety reasons. A local land-use and sidewalk analysis is a helpful tool for communities to accurately identify important gaps in their walkway network and to set priorities for improvement in each city and town.

In addition to walkways and sidewalks, Massachusetts has numerous off-road trails and paths, both paved and unpaved, that people use for many purposes. State, regional, and local agencies (such as the Department of Environmental Management, the Metropolitan District Commission, city parks departments, and town conservation commissions) as well as private trusts and organizations are responsible for the development and maintenance of this network.

Many commercial and institutional campuses (for examples, colleges and hospitals) also have networks of pathways used for walking that are not part of the public street system but serve major populations. These networks are small in terms of length of walkway when compared to the state totals, but they often provide important links to the larger system of sidewalks. Similarly, major developments such as shopping malls and waterfront centers may provide walkways (some with public right of way easements) that are well-used by customers or by the public at large.

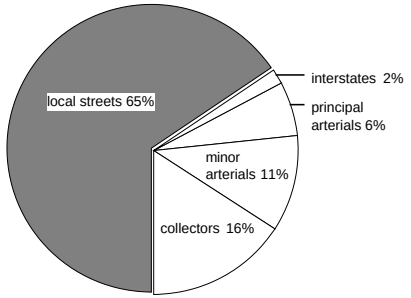
*Source: Massachusetts Highway Department roadway inventory files.

L. Sidewalk Kilometers in Massachusetts



Source: Massachusetts Highway Department

M. Roadway Classifications in Massachusetts



Source: Massachusetts Highway Department

End Notes

[1] Untermann, Richard. "Accommodating the Pedestrian: Adapting Towns and Neighborhoods for Walking and Bicycling." Van Nostrand Reinhold Company: New York. 1984.

[2] Estimated from Massachusetts Transportation Facts, MassHighway 1995 and CTPS / MBTA ridership surveys. The term "linked trips" refers to the entire trip from origin to destination regardless of transfers between transit modes. For example, a trips that involves two buses is one linked trip, but two unlinked trips. All trips are one-way , round trips count as two linked trips.

[3] Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. *Physical Activity and Health: A Report to the Surgeon General, Executive Summary*, 1996

[4] 1995 Domestic Travel TIA / USTEDC Travel Scope. Prepared for the Massachusetts Office of Travel and Tourism by Houston, Herstek, Favat.

4 Pedestrian Safety

Walking brings with it a host of benefits for the community and the user. However, walking can involve risk where roadway design or poor driving and walking habits jeopardize the safety of pedestrians. In 1990, 15 percent of traffic fatalities nationwide involved pedestrians. In 1991 federal transportation officials designated pedestrian safety as a priority for action and asked individual states to take the initiative in solving the problem.

Massachusetts, like many states, currently uses a combination of federal and state funding to supplement local efforts to improve transportation. The National Highway Traffic Safety Administration (NHTSA) apportions Section 402 funds to the states to operate highway safety programs based on population and road mileage data. In Massachusetts, the Governor's Highway Safety Bureau administers these funds. Currently, a statewide network of Regional Traffic Safety Programs is the primary of recipient the NHTSA money. The programs encourage communities to first thoroughly research their traffic safety problems, and then solve them using a comprehensive approach that relies on partnerships. Depending on the community, pedestrian safety may be a top concern. In 1995, GHSB, MassHighway, other state and federal agencies, and safety-oriented groups initiated the "Partners in Highway Safety Committee." The Committee's first action was to coordinate current local and state pedestrian safety efforts. To provide focus and creditability to its efforts, the committee asked then-Governor Weld to designate 1996 "The Year of the Pedestrian." The committee accomplished a series of successful pedestrian safety initiatives during its first year, including the dissemination of pedestrian safety literature and supporting incentives under the slogan "Walk Alert."

Children, elders, and people with disabilities are special system users. All safety improvements and programs should consider the needs of these walkers first.

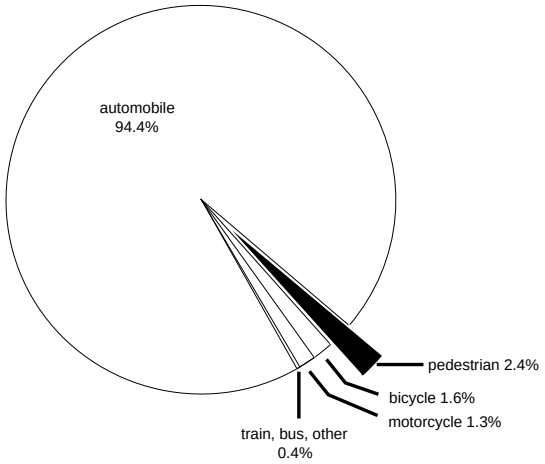
Can Walking Be Made Safer in Massachusetts?

Pedestrian travel in Massachusetts is relatively safe. In 1995, accidents involving pedestrians account for 2.4 percent of total traffic accidents (figure A). Accidents involving bicyclists, motorcyclists and other modes are fewer than those with pedestrians. These comparisons are for all traffic accidents, the majority of which involve only automobiles. However, when a vehicle and pedestrian are both involved the injuries are more likely to occur to, and to be worse for, the pedestrian. Of all accidents involving pedestrians four percent are fatal compared to four *tenths* of a percent fatality rate for automobile passengers in vehicular accidents.

NHTSA tracks motor vehicle deaths by state. Only 11 states have lower pedestrian fatality rates than Massachusetts (figure B). Massachusetts has a pedestrian fatality rate of 1.38 deaths per 100,000 population, which is forty percent below the national average. Southwestern states have pedestrian fatality rates in excess of four to five deaths per 100,000. Delaware and Florida also have relatively high fatality rates. Since 1970 national and Massachusetts fatality rates have been consistently dropping (figure C).

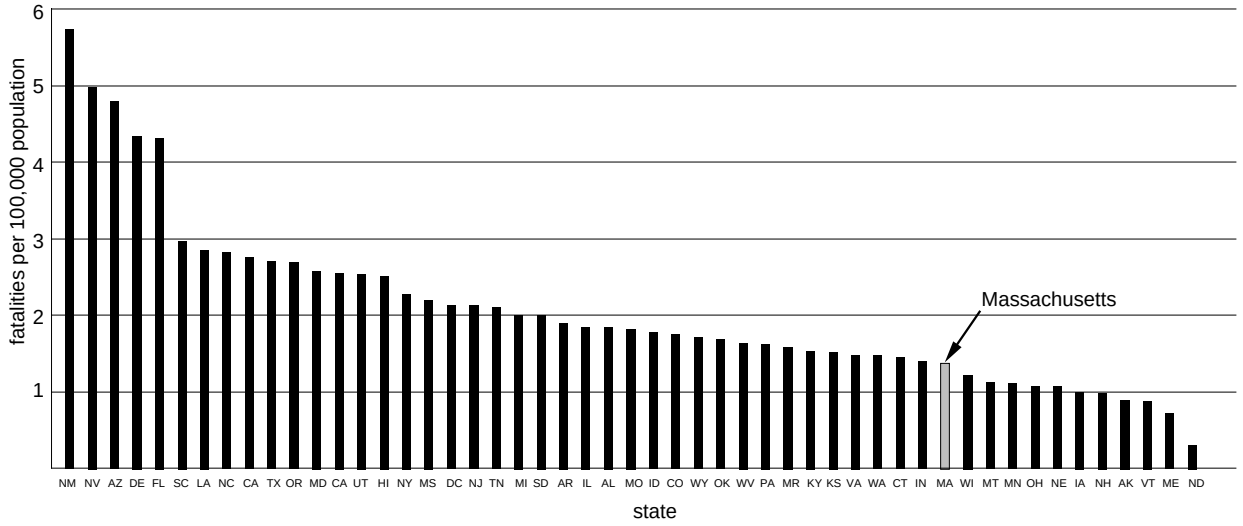
Based on these numbers it appears that Massachusetts is safer for pedestrians than many other states. This does *not* mean that there are no pedestrian safety issues in Massachusetts. There is still a need for the responsible organizations to improve safety for pedestrians, particularly if more walking is to be encouraged. While it is not feasible to achieve a zero injury rate for pedestrians, substantial improvement is possible. Conditions at high incident locations can be improved and efforts to educate high risk groups can be increased.

A. Massachusetts Accident Injuries by Mode, 1995



Source: Highway Management System, Massachusetts Highway Department/ Registry of Motor Vehicles, 1995.

B. Pedestrian Fatalities by State



Source: Accident data from NHTSA and population data from U.S. Census, 1990.

Factors in Pedestrian Accidents

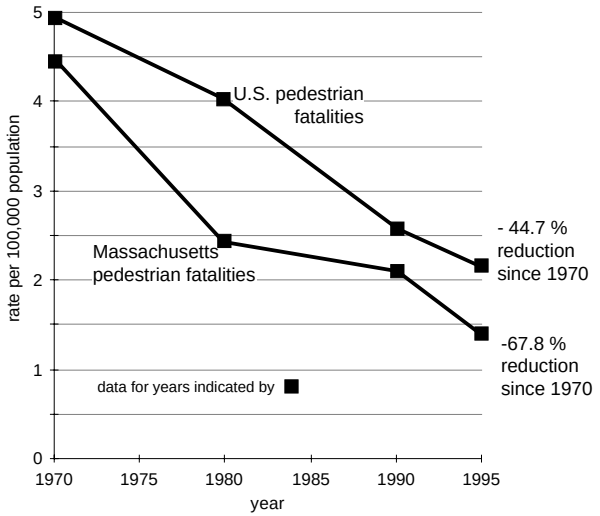
Many conditions can lead to pedestrian accidents, such as roadway design, influence of alcohol, careless actions of drivers or walkers, and weather conditions. The following is an analysis of some of the factors that can lead to pedestrian accidents; it provides a general introduction to these issues and a sampling of available data. Due to the lack of comprehensive Massachusetts-specific data, some of the analysis is state-specific while other analysis summarizes national trends.

Age

The age of pedestrian accidents victims is an important characteristic because education programs can be targeted to the specific groups of people who are most at risk: children and elders. Massachusetts 1995 data show that accidents are concentrated among the young (children under the age of 14). Elder accident rates for those over age 70 are higher than the rates for middle-aged people, and the fatality rates for elders over 70 are the highest for all age groups (figure D). The apparent high incidence of non-fatal injuries to children aged 0-4 may be due to anomalies in the data and could be explained by the way information is collected at the scene. If the reporting officer does not know the age of a victim he or she may report the age as zero, thereby swelling this age category.[1]

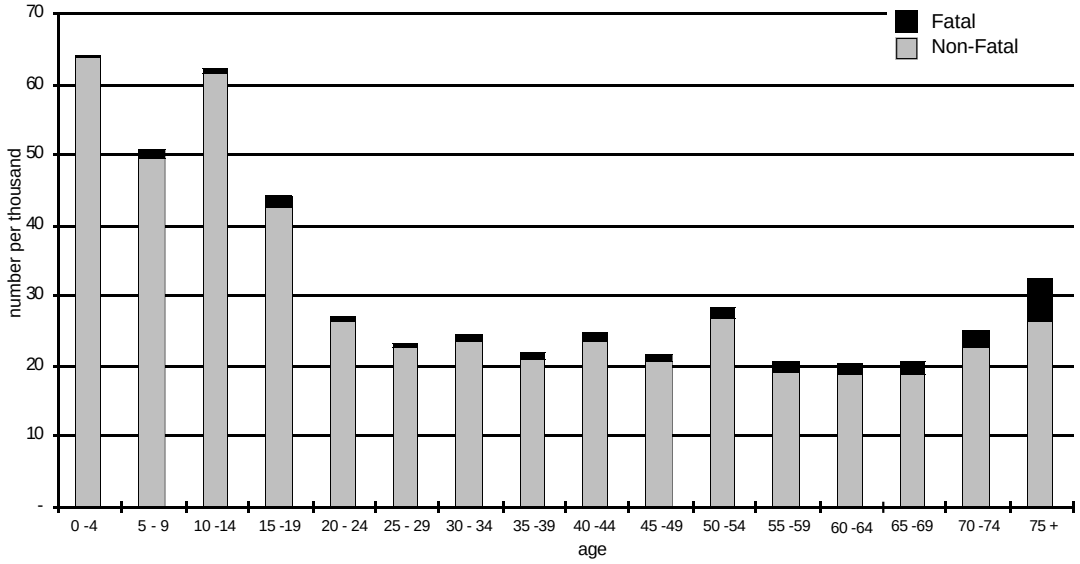
In the nation as a whole, 2.6 percent of pedestrian accidents involving children and teenagers result in death. The resiliency of the young to injury is a partial explanation for this lower rate of fatalities in this age group. Among adults aged 20-64 the rate of death climbs to 6.8 percent of pedestrian accidents, while the elderly (age 65+) have a death rate of 16.1 percent. One explanation may be that the elderly are

C. Historic Trends in Pedestrian Accidents



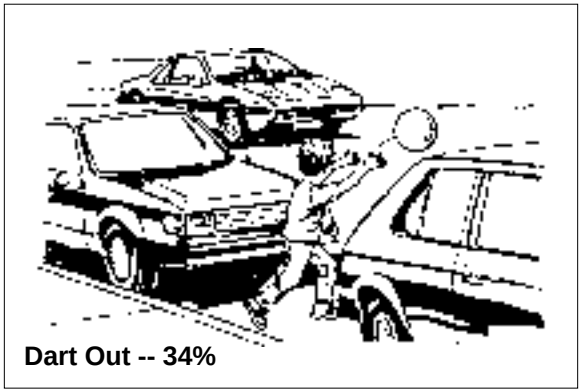
Source: State data from telephone interview with T. Conti, Registry of Motor Vehicles (July 15, 1996). State data for 1970 from Registry of Motor Vehicles via CTPS. The US data are from the National Transportation Statistics 1996, USDOT, Bureau of Transportation Statistics, Washington, D.C., 1996.

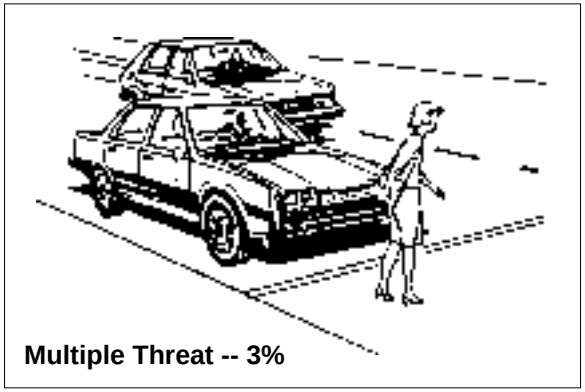
D. Massachusetts Pedestrian Accidents by Age (normalized by population)

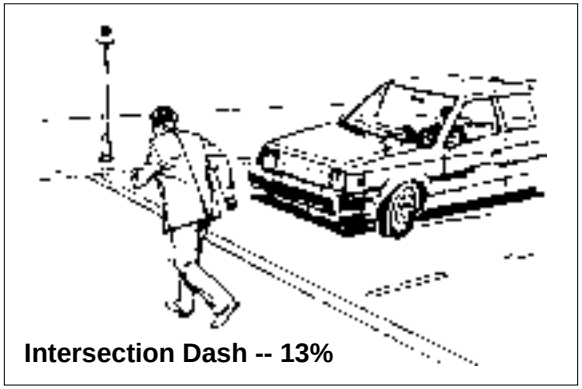


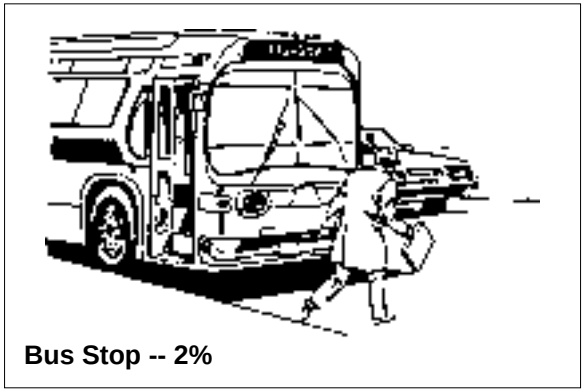
Source: Highway Management System, Massachusetts Highway Department/Registry of Motor Vehicles, 1995. Population data from U.S. Census, 1990.

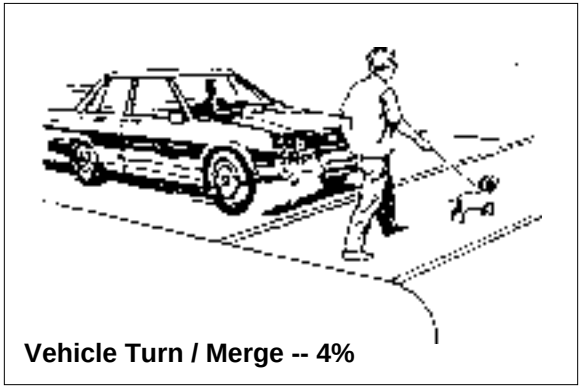
E. Common Accident Types & Percent Occurrence

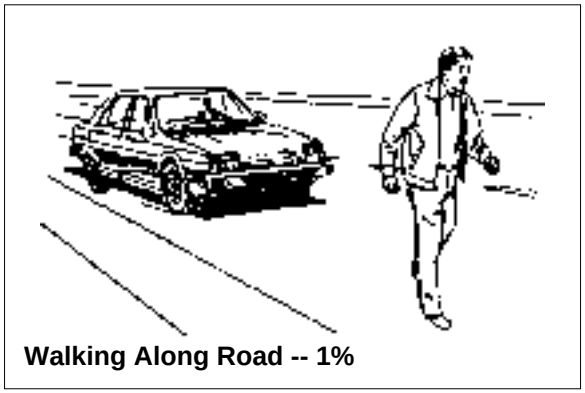

Dart Out -- 34%


Multiple Threat -- 3%


Intersection Dash -- 13%


Bus Stop -- 2%


Vehicle Turn / Merge -- 4%


Walking Along Road -- 1%

Note: "Other" accident types account for remaining 43 percent of accidents.
Source: Safety Effectiveness of Highway Design Features, Volume VI: Pedestrian and Bicyclists, FHWA, USDOT, Washington, D.C., 1992.

less likely to survive when involved in a serious pedestrian accident (Fatal Accident Reporting System (FARS) data for 1990). Clearly, there is a need for walking safety programs for elders.

Time of Day

In Massachusetts the majority of pedestrian accidents occur during hours of darkness. In 1995, 38 percent of the pedestrian *fatalities* happened during the day and 62 percent occurred after dark. Thirty percent of *non-fatal* accidents occurred during the day and 70 percent after dark. Reduced visibility appears to be a significant factor in motor vehicle accidents involving pedestrians. One implication is that pedestrian crossings should be well lighted, and that pedestrians be more visible during hours of darkness.

Influence of Alcohol

Nationally in 1995, 58 percent of pedestrians age 16 and older killed in nighttime motor vehicle accidents had blood alcohol concentrations at or above 0.10 percent, the legal limit for motorists. Intoxicated pedestrians are injured and killed by walking into the street when they are impaired and their capability to perceive vehicle speeds is reduced *(Fatality Facts 1995,* Insurance Institute for Highway Safety, Arlington, VA, August 1996). Police departments and the Registry of Motor Vehicles collect data on the influence of alcohol for vehicle accidents, but these data are not easily cross-referenced to accidents involving pedestrians. Improved Massachusetts reporting of data on alcohol as a factor would be useful in determining the extent of alcohol-related pedestrian accidents in the Commonwealth.

Speed

There is a direct correlation between vehicle speed and stopping distances; and, between vehicle speed and severity of the accident if a car hits a pedestrian. Motorists traveling at higher speeds require more

reaction time to apply the breaks and a longer distance to stop the car. Darkness limits reaction time further and in wet or icy conditions stopping distances are longer than on dry pavement. Severity of injury is directly related to automobile speed. The faster a car is traveling the less likely a pedestrian is to survive an accident. If a car traveling at 50 kmph (30 mph) crashes with a pedestrian there is a 45 percent chance it will be fatal (figure F). At higher speeds the fatality rate goes up drastically. For both these reasons pedestrians are safer if motorists drive slower. Traffic speed control is an important component of any pedestrian safety improvement program.

Trucks and Buses

These modes are addressed in safety initiatives such as training children not to walk in the blind spot immediately in front of a truck or bus stopped for a signal. In bus stop accidents the pedestrian is struck by a second vehicle after emerging from behind a bus. Requiring vehicles to stop for a loading school bus helps address these incidents.

Types of Accidents

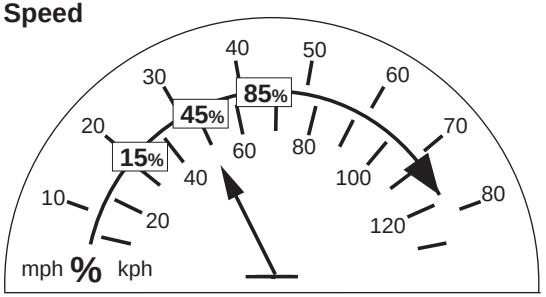
Location of the accident and the action of the vehicle and pedestrian are very important pieces of information for accident analysis and improvement of pedestrian safety. Local police departments across Massachusetts differ in the way these data are reported. There is also no easy way for accident data to be cross-referenced with hospital data to determine the severity of injury beyond the accident report. The Governor's Highway Safety Bureau, the Registry of Motor Vehicles and MassHighway are working to improve accident data collection and distribution. Improvements to the system should be operational by during 1999.

The collision conditions section of the accident report form requires information about the action of the vehicle prior to the accident and location of the pedestrian prior to the accident. Available Massachusetts data show that 83 percent of pedestrian fatalities in 1995 occurred when the vehicle was traveling straight ahead. Six percent of accidents occurred while vehicles were turning. The largest shares of accidents with pedestrians happened when pedestrians were at an intersection, within 300 feet of an intersection, or when a pedestrian was walking in the street (figure G). In about 50 percent of pedestrian accident reports, the location was not categorized. Training and coordination with local police can help to improve reporting of these factors.

The Federal Highway Administration has also classified accident types (figure E). According to national data, 34 percent of accidents involving pedestrians are "dart-out" situations where a person, often a child, appears in the traffic lane with little or no time for drivers to respond. Other common accident types include the "intersection dash," and situations with vehicles turning a corner. Most of these types of accidents would register in the Massachusetts data as at or near an intersection.

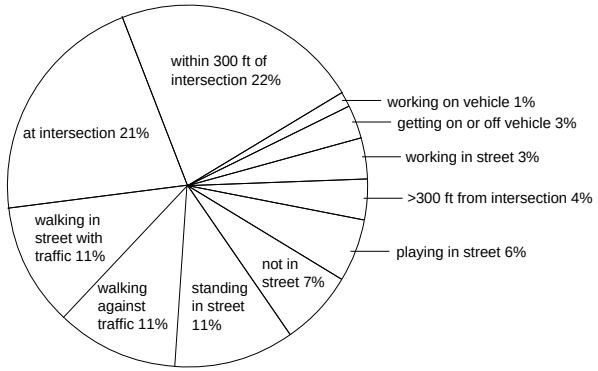
Other national pedestrian accident data from NHTSA suggest that 86 percent of accidents occur in urban areas and 66 percent occur at intersections.

F. Chance of Pedestrian Fatality by Vehicle Speed



Source: "Killing Speed and Saving Lives," United Kingdom Department of Transportation

G. Location of Pedestrian at Time of Accident (Massachusetts)



Note: Sample includes all accidents involving pedestrians where location of pedestrian was indicated. Location was not reported for 46 percent of the accidents.
Source: Highway Management System, Massachusetts Highway Department / Registry of Motor Vehicles, 1995.

End Notes

[1] This interpretation is supported by data from the Uniform Hospital Patient Discharge database which includes 51 instances of non-fatal injuries in the 0 to 4 age group compared to 105 in the 5 to 9 year age group. (The Hospital Discharge database is a subset of the total number of injuries reported to the Registry because injuries treated on an out-patient basis are not included.)

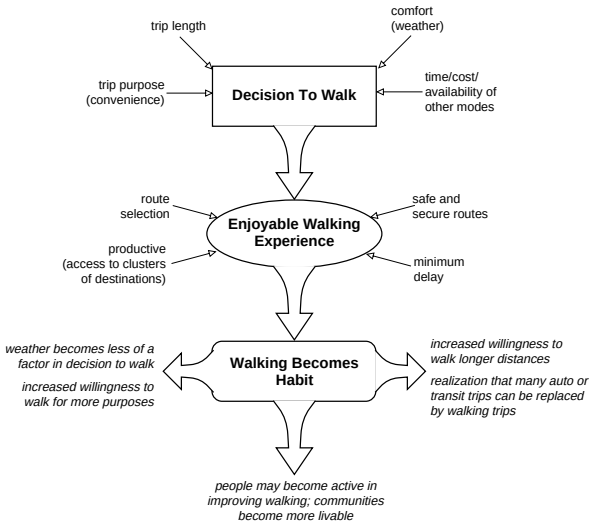
5 Potential to Increase Walking

There are two ways to look at how walking behavior relates to the physical environment. The first is the "wide angle" view represented by the U.S. Census journey-to-work data or actual block-by-block pedestrian counts used in the LUTRAQ Study in Portland, OR, and described later in this chapter. These data can quantify walking but not explain why people are walking. The other view is the "micro" view— from the perspective of an individual deciding whether to drive, walk, bicycle, or use some other mode to make a trip.

The following section examines the walking mode choice from this individual viewpoint.

Downtown North Adams

A. Factors Affecting the Decision to Walk



The Decision to Walk

People choose to walk rather than use another transportation mode based on several factors:

Trip Length

There is a sharp drop-off in the walk share for trips longer than 20 minutes, or about 1.6 kilometers (one mile). (See Chapter 3 and figures 3f and 3g.) Trip length is the basic factor in the decision to walk: a 12 minute walk to a neighborhood convenience store a kilometer (0.6 mile) away is well worth considering, but walking eight kilometers (five miles) to work is not within the realm of choice for the majority of walkers.

Implications: Compact land use patterns and mixed land uses result in a greater range of destinations within a walkable trip length. Low-density development reduces the feasibility of most walking trips.

Costs of Other Modes

Walking has little out-of-pocket cost. In some instances the decision to walk may be an economic choice or an economic necessity. More people might choose walking and / or transit if they considered the monetary cost of other modes.[1]

Implications: As fuel and parking prices continue to rise, walking may become a more attractive option to driving from an economic point of view. Reminding people of these economic costs of driving might be part of a campaign that encourages people to make short trips on foot and to walk to transit instead of driving.

Convenience Relative to Trip Purpose

Convenience is a major consideration in shopping trips, for example, and most people are much more likely to walk for errands and quick convenience shopping than for the weekly grocery shopping which involves transporting several heavy bags. The availability of plentiful parking encourages driving to destinations like commercial strips and shopping malls, while in many downtowns and town centers, the difficulty in parking makes walking and transit more advantageous.

Implications: Encouragement efforts should aim at the trip purposes that are more likely to be considered for walking.

Clustering of Destinations

If a single walking trip can pay off with multiple purposes it is more likely to be considered. For example, one might walk to the town center to visit the Post Office, have coffee, do banking, and return with a newspaper. Walking to these destinations in a town center can be less time consuming than driving and parking for a series of stops at highway oriented commercial establishments.

Implications: Compact and continuous commercial areas like village centers and downtown shopping districts permit multiple stops on the same trip.

Safety and Security

People are much less likely to walk if their route is perceived as dangerous, owing to high traffic speeds, poor sidewalks, difficult crossings of busy streets, or perceived threat of crime, especially after dark.

Implications: A continuous walkway network with good opportunities for crossing streets will foster more walking. Street and intersection design to reduce motor vehicle speeds and provide a buffer between walkway and moving traffic will increase the pedestrian's sense of safety and encourage more walking. Active use will increase security on well-traveled paths.

Comfort

People tend to walk more in late spring, summer, and early fall than in the winter months. The condition of the sidewalk is a significant factor even in dry weather and its condition is compounded in wet weather: broken or uneven pavement is more difficult to walk on, and encroachment due to overgrown shrubs and trees may force the pedestrian off the sidewalk altogether. Snow on the walkway significantly discourages walking. Hilly topography also makes walking more strenuous and may discourage pedestrian trips.

Implications: Good pavement quality, good maintenance of pavement and plantings by abutters, and snow removal in winter months will all encourage more walking. Doing this on walking routes to transit and providing comfortable shelters at transit stations and bus stops will encourage walk-in ridership. Benches in downtown areas provide an opportunity to pause and rest, and opportunities for "people-watching."

Minimizing Delay

Time and directness become bigger factors as more people live busy lives and feel constantly pressed for time. Particularly where there are busy streets to cross, as in a downtown, the prospect of delay at crossings may be perceived as an adverse factor to walking, even if a stop watch revealed total delay to be a small fraction of total trip time. Heavily congested sidewalks are also a negative factor. Delay may particularly dissuade walking during brief lunch periods in downtowns. Long distances between crossings, gaps in the walkway network requiring detours, and circuitous routes (for example, due to the barrier effects of railroads, highways, or waterways) are also perceived as delays.

Implications: intersection design and signal timing to give priority to pedestrians and reduce waiting time will foster more walking, as will adequate lateral sidewalk width free of poles, signs, and street furniture. Gaps and barriers in the network, particularly near transit stations, should be identified and rectified, if possible, through construction or by providing alternate routes.

Route Selection

Pedestrians may select routes that are interesting or appealing to them. For many people this means positive and varied surroundings, as on residential streets with varied housing styles, business districts with street trees and attractive storefronts, wooded environments, or waterside paths. Some people may choose a slightly longer route that better suits their own preferences. For many walkers, the presence of other pedestrians may be a positive quality to be sought in active parts of downtowns and town centers. For others, walking is better enjoyed as a solitary experience.

Implications: City and town planning, real estate development, urban design, landscape design, and other factors may improve the pedestrian scale and increase the attractiveness of routes available to walkers. For example, both historic districts and waterfront walkways can provide attractive walking routes.

Habit

Most people are reluctant to try a new way to make a trip, particularly if time is a factor as in commuting trips. A person who does little walking may face a significant psychological barrier to making the first walking trip for a given purpose. After getting past this hurdle, subsequent walking trips may be easier to consider. A person who regularly walks for a certain purpose is more likely to continue doing so and more likely to consider walking for other purposes.

Implications: Encouragement efforts should specifically aim at getting people to walk under positive conditions and then repeat successful, enjoyable walking trips.

A plaza in downtown Springfield is designed for pedestrians and automobiles to share.

In downtown Beverly sidewalks are lined with storefronts encouraging walking to nearby destinations.

Walking Demand Studies

There have been few quantitative studies of walking demand. Home buyer surveys indicate that large portions of people consider the walkability of their neighborhoods and commercial districts when buying a house. Planners and urban designers have pointed out the effect of streets and public spaces on walking behavior for years. Some recent quantitative studies offer additional insight on walking behavior. The 1993 Land Use Transportation and Air Quality (LUTRAQ) study[2] was prepared for the organization 1000 Friends of Oregon as a land-use alternative to a proposed highway project. It included the adaptation of a regional transportation demand model to account for varying pedestrian conditions. The model estimates travel demand in a way that accounts for pedestrian travel more fairly than most regional models of mode choice. Inputs to the LUTRAQ model include employment and number of households in each traffic analysis zone, as well as an evaluation of "Pedestrian Environmental Factors" in each zone.

The analysis concluded that daily household vehicle trips and vehicle miles traveled (VMT) were significantly lower in zones with more employment, more households, and higher pedestrian environmental factors.

The Pedestrian Environmental Factors for each zone were a composite score from 1 (worst) to 12 (best) based on the following characteristics of each district:

- Ease of crossing the street (width, traffic volumes, signalization)
- Continuity of sidewalk
- Connectivity of street pattern (interconnections, short blocks, fewer dead-ends)
- Topography (degree of hilliness)

Zones which rated 11 or 12 (highest) in these factors had walk shares of 7 to 10 percent, compared to zones which rated under 9, which had walk shares of 1 to 3 percent.

A second LUTRAQ analysis also found that in districts with the majority of commercial buildings at the edge of the sidewalk fewer trips were made by car.

A study of four neighborhoods in Austin, TX, by Katherine Shriver documented the effect of environmental design on walking. She compared traditional and post-World War II suburban neighborhoods and found that most differences in walking depend on "heterogeneous [mixed] land uses and the distances between them" and that both personal attitudes and environmental design characteristics influence walk behavior.

Factors that were valued highly by pedestrians who walked for a variety of purposes were: continuous sidewalks, trees / shade, tranquil places, things to look at, and street furniture. Busy places were much less valued.

Shriver concludes that "The greater frequency and lesser distance and duration of walks in the traditional neighborhoods indicate an ease and convenience that those who walk can and do take advantage of. Pedestrian activity of greater magnitude (multiple destinations per walk trip) occurs in more accessible neighborhoods and appears to measure the ease of reaching a larger potential set of destinations." Shriver also observes that people who value walking often select the traditional neighborhood as a place to live and pay a premium housing cost to do so.[3]

The Effect of Land Use and Street Patterns on Walking: A Spatial Analysis

Land use and roadway patterns determine, to a significant extent, the potential for walking between residential neighborhoods and adjacent commercial districts. MassHighway conducted a sample analysis of the relationship of street patterns, land use, and pedestrian access to provide a quantitative example of one potential way to increase walking. The analysis compared the portion of residents within walking distance to a small downtown (Natick Center) with the portion of residents within walking distance to a commercial strip and office center (Route 9 near Speen Street) using a geographic information system (GIS); (see figure B).

- In the small downtown situation, 78 percent of the residents that live within a 1.6 kilometer (one-mile) radius of the commercial district can walk to downtown within 20 minutes on local streets.
- In the commercial strip and office center scenario only 38 percent of people living within a 1.6 kilometers (one-mile) radius can use local streets to access stores or offices within 20 minutes. The "effective walking radius" is much smaller for residents living within a given radius of these types of uses because the street pattern provides less frequent connections.

In the commercial strip and office center analysis above, almost 36,000 people live within 1.6 kilometers (one-mile) of the commercial/office district yet only 13,600 can get there by walking this distance or less. Although this analysis cannot prove an association, the percentage of people who walk to work in the U.S. Census block group in the town center is higher than for the neighborhood next to the highway-oriented commercial area.

The differences in accessibility provided by the street networks in these two places are particular to the locations chosen for the analysis, but the trend is similar in other place in Massachusetts and other parts of the country. Traditional land use and street patterns provide higher levels of direct access than low density highway-oriented commercial development. Highway-oriented development often occurs in places very close to residential areas, but hierarchical and disconnected street patterns limit opportunities to walk *directly* between two points.

There are many situations where significant numbers of people live within a 1.6 kilometer (one-mile) radius of retail, restaurant, and office destinations but the walking routes are long. The portion of the route in the commercial or office development may also be unfriendly to pedestrians as the discussion in Chapter 7 points out.

Policies that provide more direct walking access in areas that are within a 20 minute walk (1.6 kilometers or one-mile) of significant work and shopping destinations will encourage more walking. Town and city planners might use a GIS analysis like this to aid in the development of zoning by-laws and ordinances that seek increased walking opportunities.

End Notes

[1] The American Automobile Association and CARAVAN estimate that driving alone costs between $0.28 and $0.53 cents per mile depending on the length of the trip. See the "Commute Cost Comparison" brochure.

[2] Parsons, Brinckerhoff Quade and Douglas, Inc. Cambridge Systematics, Inc., and Calthorpe Associates. *The Pedestrian Environment*. (Volume 4A— Making the Land-Use, Transportation, Air Quality Connection) and *Building Orientation* (A Supplement to *The Pedestrian Environment*). Portland, Oregon: 1000 Friends of Oregon. December, 1993.

[3] Shriver, Katherine. *The Influence of Environmental Design on Pedestrian Travel: An Environmental Congruence Study of Four Austin Neighborhoods.* Community and Regional Planning Program, School of Architecture, University of Texas at Austin.

B. Example of Effective Walk Radius Analysis

Source: Land use and road data from MassGIS.

6 Approaches to Improving Walking

The National Bicycling and Walking Study emphasizes that approaches for increasing walking must be multi-disciplinary. Efforts range from physical improvements to the walkway to changes in development patterns, and from education aimed at changing attitudes of both drivers and pedestrians to efforts encouraging more people to walk. Comprehensive efforts to increase walking need to include ways to make walking safer and more convenient, as well as public education efforts and promotion of walking as a viable mode of travel for residents and tourists. The "4Es"— Engineering, Encouragement, Education, and Enforcement — remind us of four different, yet related, ways to categorize types of pedestrian improvement efforts.

Physical Improvements

Engineering encompasses traffic improvements such as roadway geometrics, traffic speed control, and signal timing, but in pedestrian planning terminology engineering also includes the design of sidewalks, curb ramps, buffer strips, and other landscape elements. Engineering must also include broader approaches to improving conditions for walking.

Historic Salem

Key Physical Improvements

- Slower traffic speeds
- Short/frequent/clearly marked crossings
- Sidewalk capacity and quality
- Sidewalk buffered from street

Wide sidewalks separated from the street are desirable places to walk (South End, Boston).

Traffic and Roadway Engineering

There are numerous approaches to providing a more pedestrian-oriented environment. From a pedestrian point of view some frequently requested improvements include reduced traffic volumes and speeds, and/or shorter, more frequent street crossings. On residential streets, engineering responses include narrower travel lanes and carefully placed obstacles to slow traffic. On busy roadways there are often constraints that prohibit these measures, but in some cases lanes can be made to appear narrower than they are (such as through contrasting pavement color along the edges of the road and regularly spaced street trees) to encourage slower driving, while still meeting design guidance. Traffic throughput is maximized at 48 kilometers per hour (30 miles per hour), a speed consistent with pedestrian accommodation.[1]

Crossings are a major issue on busy streets. Signal designers can provide appropriate signal phases to accommodate large volumes of pedestrians or pedestrians that walk slowly. Shorter crosswalks, tighter curb radii, and "Yield to Pedestrians" signs at crosswalks are some of the methods for slowing traffic and providing safer crossings. In some locations devices to warn motorists upstream that pedestrians are crossing the street may be appropriate.

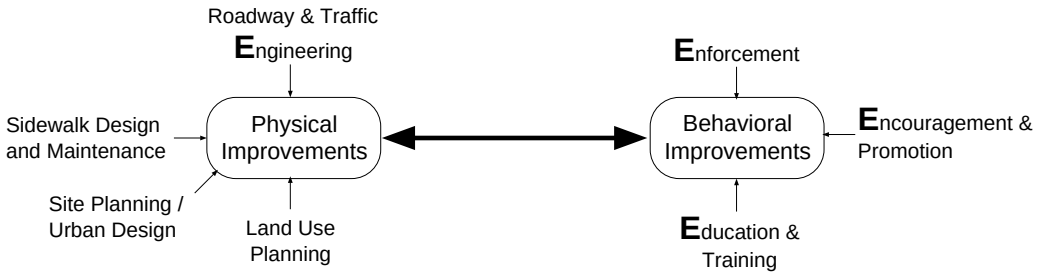
Signs and signalization measures to control right-turns-on-red may also improve pedestrian crossings in some locations.

Sidewalk Design and Maintenance

Well-designed sidewalks are important to all walkers, and are crucial to people with disabilities. Sidewalks should be level with enough effective width, clear of utility poles and street furniture, to provide passage for the expected pedestrian volumes. If possible, sidewalks should be buffered from moving vehicles by planting strips and/or on-street parking. Street trees planted between the walkway and the traffic also provide shade in the summer and the planting strip can be used to store plowed snow in the winter. Other landscape or streetscape features that can improve the walking experience include benches to rest on, pedestrian-level lighting for walking at night, and other features depending on the location of the sidewalk and the surrounding environment.

Well-maintained sidewalks encourage walking and are crucial for elders and people with disabilities who often have trouble stepping, or rolling, over uneven pavement or past overgrown vegetation. Snow should be removed immediately from shopping district sidewalks and priority walking routes.

A. The "4-Es" and the Physical/Behavioral Spectrum of Approaches



Behavioral Approaches

In addition to providing safe, comfortable, convenient places to walk, a comprehensive program to increase walking should also include efforts to change the attitudes and behavior of both walkers and drivers, as well as to improve law enforcement. Education, enforcement, and encouragement efforts will remind people, or teach them for the first time, how to walk and drive safely and encourage them to try walking as an enjoyable and relaxing way to travel short distances.

Education and Training

Education and training can reach both the public and professionals responsible for infrastructure and law enforcement. Public outreach teaches people how to use the pedestrian system safely. Many communities provide this type of training for school children. Adults may also need a refresher in the basics of how to walk, bicycle, and drive safely; some drivers show disregard for pedestrians while driving and then disregard traffic while walking, all within the morning's commute. Seniors are disproportionately at risk and can benefit from refresher courses as their needs change and they begin to walk more.

Training for local planners, public works directors, highway designers, consultants, and other transportation officials will extend their professional capabilities and make them more sensitive to the needs of pedestrians. Special training for law enforcement officers helps them to both enforce traffic regulations crucial to pedestrian safety and to educate the public.

Enforcement

Pedestrian-related traffic rules and regulations in Massachusetts can benefit from increased awareness and enforcement. Opportunities for improvement include better compliance by motorized and non-motorized roadway users with regard to vehicular speed limits and yielding to pedestrians in crosswalks. Pedestrian behavior can also be improved with regard to compliance with pedestrian signals and use of crosswalks. Increased awareness of applicable rules and mutual respect between pedestrians and all roadway users are among the means to secure better compliance.

Enforcement programs can be organized by police departments or by community policing programs such as "Crime Watch" committees. Fines are one enforcement tool and these could be phased in over time to progressively raise the public's awareness of their responsibilities as both motorized and non-motorized roadway users. Possible approaches include: designating high priority enforcement zones; providing crosswalk-alert signs to remind all roadway users that state law requires them to yield to pedestrians in the crosswalk; and correcting pedestrian behavior.

Encouragement and Promotion

More can be done to promote and market walking as a mode of transportation. Many people enjoy walking for fitness but may not realize its potential for accomplishing errands, visiting friends, and making other short trips.

The encouragement campaigns for solid waste recycling provide an excellent example of efforts that have led people to adopt new habits. Encouragement efforts can change people's perceptions by emphasizing the environmental benefits of walking. For example, by pointing out the air quality and energy conservation benefits of substituting a walking trip for a driving trip, and demonstrating that many of their routine destinations are within walking distance, more people may walk more often.

How Can We Improve Walking?

- Better walkways
- Increased priority for pedestrians
- Encourage more people to walk - active pedestrian streets enhance enjoyment and safety
- More direct connections - fill gaps in the walkway network
- Safer walking - through engineering / education / enforcement

The Harvard (Mass. Ave.) bridge provides an important link between Cambridge and Boston. Without well-located bridges over rivers, railroad tracks, and highways, many trips would be too long to walk. MassHighway reconstructed the Mass. Ave. bridge in the late 1980s with increased sidewalk width.

The recent report by the Centers for Disease Control to the United States Surgeon General, *Physical Activity and Health,* is another basis for an encouragement campaign that points out the health and stress reduction benefits of walking. Massachusetts tourism promotion already recognizes the importance of walkable places, and more can be done to market this asset of the state's cities and towns. Local action to improve walking conditions can be founded on events that demonstrate the benefits of walking by doing it.

Potential encouragement programs include: public service announcements; a "Did you walk your mile today?" campaign; tourism promotions featuring historic walks or walkable shopping districts; "neighborhood get-out-and-walk-nights"; twenty-minute walk maps; "on-foot" promotions and incentives to visit multiple stores on foot.

A Comprehensive Approach

A comprehensive approach combines physical and behavioral measures. For example, neck-downs at busy downtown intersections create shorter crossing distances, but education about, and enforcement of, the crosswalk law is needed for the physical improvements to be fully effective.

Commercial development that is well connected to residential areas provides the potential for access, but encouragement is also needed for the new connections to be used. A campaign to bring people out to walk on neighborhood streets will be counterproductive if people perceive that they are threatened by traffic. An effort to help people accept walking for convenience shopping will work only if there are many varied neighborhood stores nearby.

Programs to increase walking might target efforts at different points along the continuum from physical approaches to behavioral approaches. Each situation will require a different combination of measures depending on mobility of the population, local development patterns, and walkway conditions. Recommendations presented in Chapter 10 cover the continuum from physical improvements to changes in behavior. Implementation of this plan should underscore the need to coordinate efforts to make them most effective.

Economic development and walking can be mutually reinforcing. The Downtown Partnership in North Adams is developing an economic development strategy that includes improved walking connections to promote activity and tourism. (Main Street, North Adams)

End Notes

[1] *Highway Capacity Manual, 1985* . Figure 7-2. Also *Traffic Flow Fundamentals*, 1990. Adolf D. May.

7 Institutions and Roles

Many groups, organizations, and agencies shape walking conditions. These players plan, fund, design, construct and maintain walkways, shape land use and development patterns, promote walking, educate travelers, provide technical assistance and training, and enforce the rules of the road. Putting these roles and functions together creates the matrix on the following page.

Farmers' market in Copley Square, Boston.

Planning, Funding, Building and Maintaining Walkways

Cities and towns have jurisdiction over most sidewalks. Private organizations such as colleges and hospitals build walkways to serve their campuses. The state may fund the construction of sidewalks along some roadways, and off-road trails. MassHighway, together with the 13 Regional Planning Agencies (RPAs)/ Metropolitan Planning Organizations (MPOs) plan, coordinates and prioritizes all types of federally and state funded transportation projects, including pedestrian improvements.

Cities and Towns

Cities and towns initiate most projects that serve pedestrians. The state funds municipal roadway and walkway capital projects through Chapter 90 which distributes funds from the State Transportation Bond. The state also provides maintenance, snow removal, and policing funds through Chapter 81. Cities and towns can use this money to build sidewalks on local roads, upgrade existing sidewalks, and do maintenance. It is up to the municipality to prioritize the use of this funding.

Municipal public works and traffic departments construct and maintain most sidewalks. They upgrade sidewalks, maintain crosswalks, and

A. Summary of Institutions and Roles

Agency or Organization		Planning & Design	Construction & Maintenance	Land Use/ Development Guidance & Regulation	Funding Improvements	Safety Education & Enforcement	Promotion of Walking
Federal	DOT	●			●	●	●
	DOI	●			●		
	EPA			●			●
State	MassHighway	●	●		●		●
	MBTA	●	●				
	GHSB					●	
	MEPA			●			
	DEM	●	●		●		
	DEP			●			●
	MDC	●	●				
	MOTT						●
	EOPH					●	●
	GCPFS						●
	DHCD			●	●		
	EOPS					●	
Regional	RPAs/MPOs	●		●	●		●
	RTAs	●	●				
	RTC						
Local	Planning Boards / Depts.	●		●			●
	DPWs	●	●				
	Police Departments					●	
	Schools						●
	Conservation Commissions	●	●		●		
	Recreation Departments					●	●
Private	Advocacy Groups			●		●	●
	Developers	●	●		●		
	Professional Orgs.	●		●			
	Business /Community Orgs.				●	●	●

Glossary:

DEM - Mass. Dept. of Environmental Management
DEP - Mass. Dept. of Environmental Protection
DHCD - Mass. Dept. of Housing and Community Development
DOT - U.S. Dept. of Transportation
DPWs - Local Depts. of Public Works
DOI - U.S. Dept. of Interior
EOPH - Executive Office of Public Health
EOPS - Executive Office of Public Safety
EPA - U.S. Environmental Protection Agency
GCPFS - Governor's Committee on Physical Fitness and Sports
GHSB - Governor's Highway Safety Bureau
MassHighway - Mass. Highway Department
MBTA - Mass. Bay Transportation Authority
MDC - Metropolitan District Commission
MEPA - Mass. Environmental Protection Act Unit
MOTT - Mass. Office of Travel and Tourism
RPAs/MPOs - Regional Planning Agencies / Metropolitan Planning Organizations
RTAs - Regional Transit Authorities
RTC - Regional Tourism Commissions

See glossary on inside cover for other terms used throughout document.

operate traffic signals. Property owners are required in many municipalities to build sidewalks as part of new residential subdivisions and commercial developments. Subdivision streets are sometimes accepted by the municipality as public ways and publicly maintained.

Municipalities may also gain access to federal funds, Greenways and Trails Grants, Urban/Self Help funds, Community Development Block Grant funds, Chapter 90 money and other funding programs to build and improve local sidewalks, walkways, and streetscapes. In most cases municipalities pay for projects through a combination of funding sources. A list of funding sources appears in Appendix E.

Regional Organizations

The 13 Massachusetts Regional Planning Agencies (RPAs) represent the cities and towns in their regions and develop regional transportation plans. A Metropolitan Planning Organization (MPO) differs from an RPA in that it includes representation from a number of transportation agencies and has specific responsibilities under the federal transportation funding system. RPA and MPO boundaries and membership are shown in Appendix C.

RPAs and MPOs play a primary role in prioritizing projects and coordinating state and federal funds for municipal projects. Through the Transportation Improvement Program (the TIP process) MPOs develop a list of projects for funding for a three-year horizon. This process includes all highway and transit projects, many of which include a sidewalk or walkway component, as well as other federally funded projects. Each region works closely with MassHighway to direct funding to projects. MassHighway compiles all regional TIPs and publishes a statewide TIP (the STIP).

State Agencies

MassHighway is responsible for the design, construction, and maintenance of state-owned roads. MassHighway is often willing to build sidewalks along segments of state highways if the municipality agrees to assume responsibility for maintenance. MassHighway reviews both state highway projects and municipal projects with state funding for adherence to design standards that protect safety and advance transportation goals appropriate to the roadway type. Chapters 8 and 10 contain guidelines and recommendations to assist the Commonwealth and its municipalities in implementing a policy of accommodating pedestrians in federally and state funded projects.

The Department of Environmental Management (DEM) and the Metropolitan District Commission (MDC) also build and maintain extensive walkways on property that they manage. In addition, DEM also provides small grants through the Greenways and Trails Demonstration Grants Program to local nonprofit organizations, municipalities, and RPAs.

Cities and towns may qualify for other types of funding from the state, such as Transportation Enhancement programs funded through MassHighway, and Community Development Block Grants (administered by the federal Department of Housing and Urban Development). The Division of Conservation Services administers Self Help and Urban Self Help programs to acquire and improve open space, including trails. The Executive Office of Community Development administers the Downtown Partnership Program, which can include planning improvements to make downtowns more walkable to stimulate economic development.

At the state level, the Executive Office of Environmental Affairs MEPA Unit reviews development projects for environmental impacts. The Massachusetts Environmental Policy Act (MEPA) requires that the proponents of projects that meet certain thresholds (square footage, traffic generation, parking spaces, and other criteria) must analyze the potential impacts of their projects. Pedestrian access is part of transportation, and there are opportunities for more specific consideration of pedestrian access to and within new development.

Land Use Planning Roles that Affect Walking

Cities and towns play the principal role in shaping land use and development patterns through zoning and subdivision regulations. Density controls, building setback requirements, parking requirements, site plan review requirements and provisions for mixing or segregating land uses all affect walking conditions.

In addition to regional development planning, RPAs provide technical advice and promote good planning practice in cities and towns in each region. On Cape Cod and Martha's Vineyard different opportunities for regional land use planning exist because the regional planning commissions play a regulatory role in developments of regional impact.

Public Involvement

Walking has the potential to involve more people, who may come to do more walking for personal reasons such as fitness or environmental concern. As people walk, they may become aware of the potential to improve local walking conditions and become active in their neighborhoods, schools, and communities to do so. As more people walk, the likelihood of improving walking conditions also increases.

Encouragement of Walking

An important goal of this plan is to encourage more people to walk, through a variety of media activities and programs. Statewide publicity and awareness programs can reach the largest number of people, while local programs can build grass-roots involvement.

Key roles at the state level are the Department of Public Health (DPH), the Governor's Committee on Physical Fitness and Sports, the Department of Environmental Management (DEM), and the Massachusetts Office of Travel and Tourism (MOTT). These agencies can forge positive partnerships with the private sector. Together they can help to publicize and promote Massachusetts as a walkable place to visit, encourage people to walk for personal fitness, and promote walking as an alternative to driving short distances.

The MBTA and Regional Transit Authorities (RTAs) work to encourage transit use and can appeal directly to the walking public. Others involved are the cities and towns, some of which have pedestrian committees and coordinators, and in the many Chambers of Commerce, Convention and Tourist Bureaus, Transportation Management Associations (TMAs), as well as citizen's committees and advocacy groups. A TMA is an independent, consensus-oriented, nonprofit organization of three or more business leaders, developers, building owners, local government representatives, civic groups, or others working together to address transportation issues within a specific region, area, or corridor. TMAs may also play an important role in marketing walking and transit as a way to get to work and travel during lunch hour.

Safety Education and Enforcement

Pedestrian safety is a crucial goal that involves not only the design of streets and walkways but also positive efforts to affect the attitudes and behavior of the traveling public. The Partners in Public Safety Committee, and its member organizations (GHSB, MassHighway, and other state and federal agencies) play a lead role in this effort. During the 1996 "Year of the Pedestrian" the Committee was successful with its "Walk Alert" campaign to distribute safety literature.

The Partners in Public Safety Committee is working to advance an agenda of programs for both education and better enforcement of safety laws. Other participants in this committee include the MDPH through its Injury Prevention and Control Division, the Executive Office of Public Safety, which includes the Massachusetts State Police, and private sector organizations concerned with transportation and safety. Activities include the Regional Traffic Safety Program with regional outreach coordinators promoting and providing safety education including walking safety.

Many cities and towns have important outreach and enforcement programs through their police departments, with technical assistance provided by the Massachusetts Safety Officers League. In partnership with schools, teachers and police officers are the front line of enforcement and safety education for children. Schools are an important part of the safety education delivery system, because they must attend to the daily safety of children, who are active pedestrians. Schools also provide most youth with basic instruction in walking safely, and, in high school, learning to drive safely. These efforts are also being extended to senior centers across the Commonwealth to address the safety needs of elders.

8 PROTOTYPES

The six prototypes are:

- Downtowns
- Small Town or Village Centers
- Commercial Strips
- Transit Access
- Trails
- Roadways

What are prototypes and why use them?

Prototypes are typical situations that present similar problems, issues, and opportunities for pedestrians and for pedestrian planning and design. This plan proposes a set of six prototypes as a model for diagnosing situations and recommending improvements. The prototypes apply to locations in all parts of Massachusetts. They provide a basis for pedestrian planning guidelines for these places.

These situations were chosen because they are either:

- places where there are typically high levels of pedestrian activity (for example, downtowns)
- places where high levels of automobile activity create potential conflict with pedestrian activity (for example, commercial strip development)
- places where there are special issues related to walking and its relationship to other modes (for example, at transit stations).

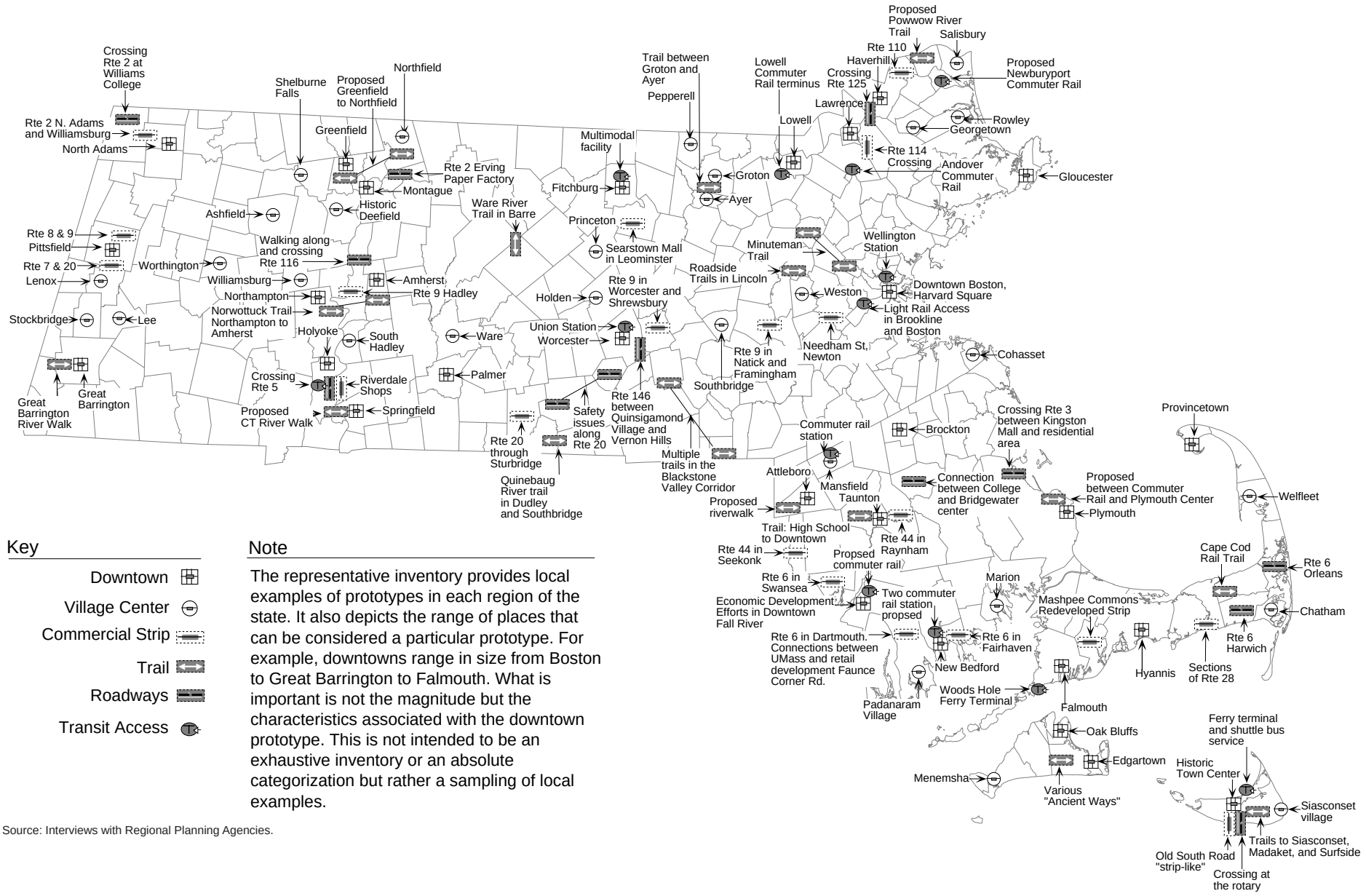
Where do these prototypes exist in Massachusetts?

The inventory of prototypes statewide provides local examples of each type of situation. Although the scale and activity level of each prototype varies in different parts of the state, the issues and opportunities in each prototype are consistent enough to generalize.

Variations abound. Some prototypes overlap each other, while others exist in various forms. For example, the distinction between Downtowns and Small Town Centers is not clear-cut, and some places of intermediate size might have characteristics of both. Trails come in varied dimensions, and people use them for a wide variety of purposes. Highways present issues that depend on whether they are rural collector roads or busy suburban arterials. Generalizing specific local situations in the prototypes will help to identify common issues of concern to pedestrians and provide a guide for their improvement. Potential improvements for each prototype must be adapted to local circumstances.

Note: Prototype diagrams in the following sections are intended to illustrate typical situations and do not represent specific locations.

A. Representative Inventory of Prototypes Statewide



Key

- Downtown
- Village Center
- Commercial Strip
- Trail
- Roadways
- Transit Access

Note

The representative inventory provides local examples of prototypes in each region of the state. It also depicts the range of places that can be considered a particular prototype. For example, downtowns range in size from Boston to Great Barrington to Falmouth. What is important is not the magnitude but the characteristics associated with the downtown prototype. This is not intended to be an exhaustive inventory or an absolute categorization but rather a sampling of local examples.

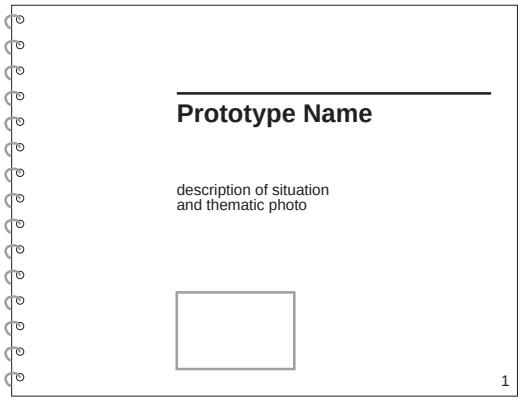
Source: Interviews with Regional Planning Agencies.

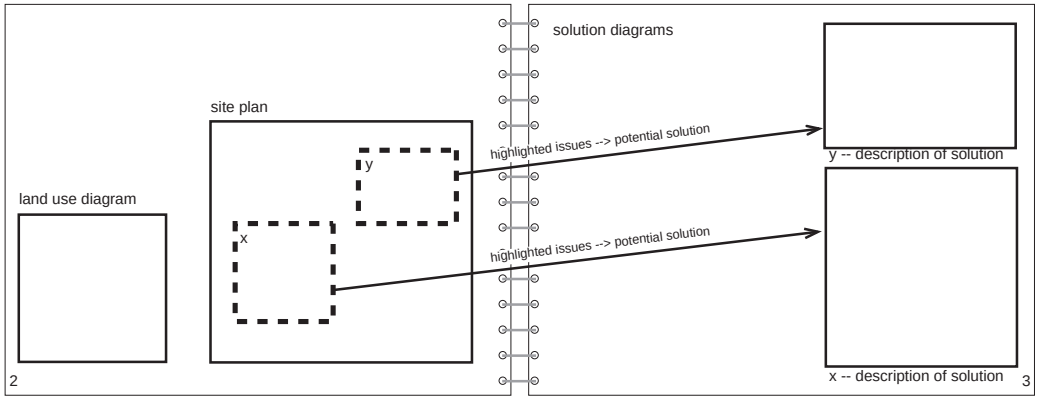
Medford Square sidewalk.

Downtown Northampton.

Plymouth Waterfront.

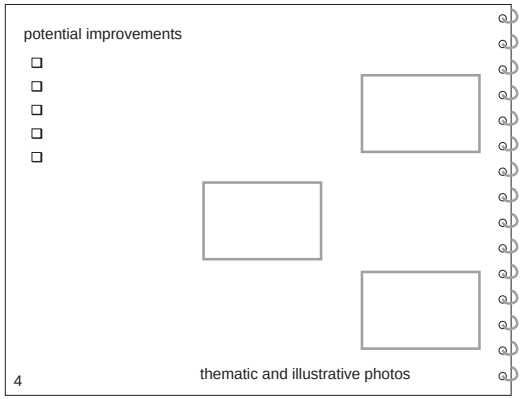
New Bedford wayfinding signs.





Site Plan Key

- highlighted area on solution page
- pedestrian desire line
- houses and buildings
- trees and vegetation
- cars and parking lots
- public space / parks
- walkways / paths



B. Prototype Layout Key

The following pages of prototype situations are organized in four-page spreads. The first page of each section introduces the prototype and describes its common characteristics. The two center pages illustrate and discuss land use and site planning issues and potential solutions. Possible solutions and improvements are illustrated on the right-hand page for the areas outlined in the site planning diagram on the left-hand page. The outlined areas on the left-hand page are labeled with small letters keyed to the solution diagrams on the right-hand page. The fourth page of each section summarizes the things that communities, business organizations, and interested individuals can do to implement these types of improvements. (The trail and roadway prototypes have a slightly different layout organization.)

The diagram to the left illustrates the section layouts and provides a key to symbols used in the diagrams.

8.1 DOWNTOWNS

Downtowns are places where there is concentrated activity. Most downtowns in Massachusetts are very walkable because they developed before automobiles became the primary mode of transportation. The density of people and commercial activities provides many opportunities to walk. There are residential neighborhoods very close to office, retail, and industrial job centers and close to parks and other recreational opportunities. In many cases housing and stores or offices exist in the same building, providing a rich mix of uses that does not occur in any other prototype.

In downtowns motor vehicles, bicycles, and pedestrians operate in close proximity. Buildings are usually located at one edge of the sidewalk and in many places automobiles and trucks park along the other sidewalk edge. The sidewalk thus serves as both a transitional space between streets and buildings and as a transportation network of its own.

Walkers encounter other pedestrians as well as trees, signs, utility poles, and street furniture (such as newspaper boxes and benches), all of which reduce the effective sidewalk width and restrict pedestrian flow. Merchants in downtowns may also use some sidewalk space for displaying goods or to provide outdoor seating and eating areas. People also use sidewalks in downtowns as waiting areas for bus stops and as entrance points for subways. Multiple activities and uses of downtown sidewalks create interesting places to walk (a positive effect) but may also contribute to sidewalk congestion. Sidewalk congestion can also be a problem when transit stations and event venues such as theaters and sports arenas discharge large crowds of spectators onto local streets.

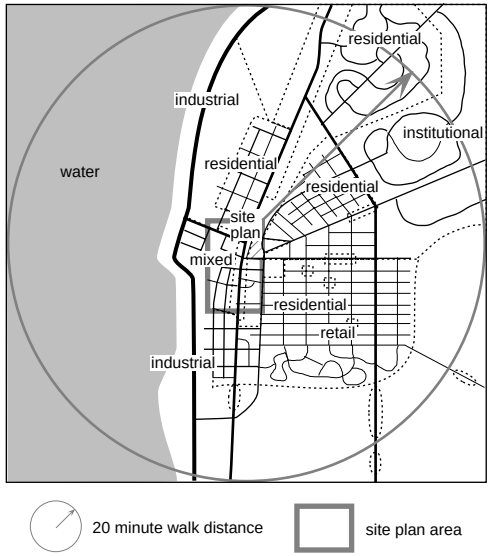
Downtown Newburyport on a busy summer day.

Planning Issues

The largest planning challenge for downtowns is maintaining this historically vibrant mix of uses and activities. Economic competition with surrounding suburbs and other cities is often a problem for aging industrial era cities. Cities may also face dwindling residential populations in neighborhoods that traditionally patronize downtowns. Vacant lots along once active streets create holes in the streetscape along the downtown pedestrian network. Dense downtowns need viable transit systems to bring workers and shoppers into core areas. Buildings on pedestrian-oriented streets should have active ground floor uses such as stores, restaurants, display windows or views into working areas.

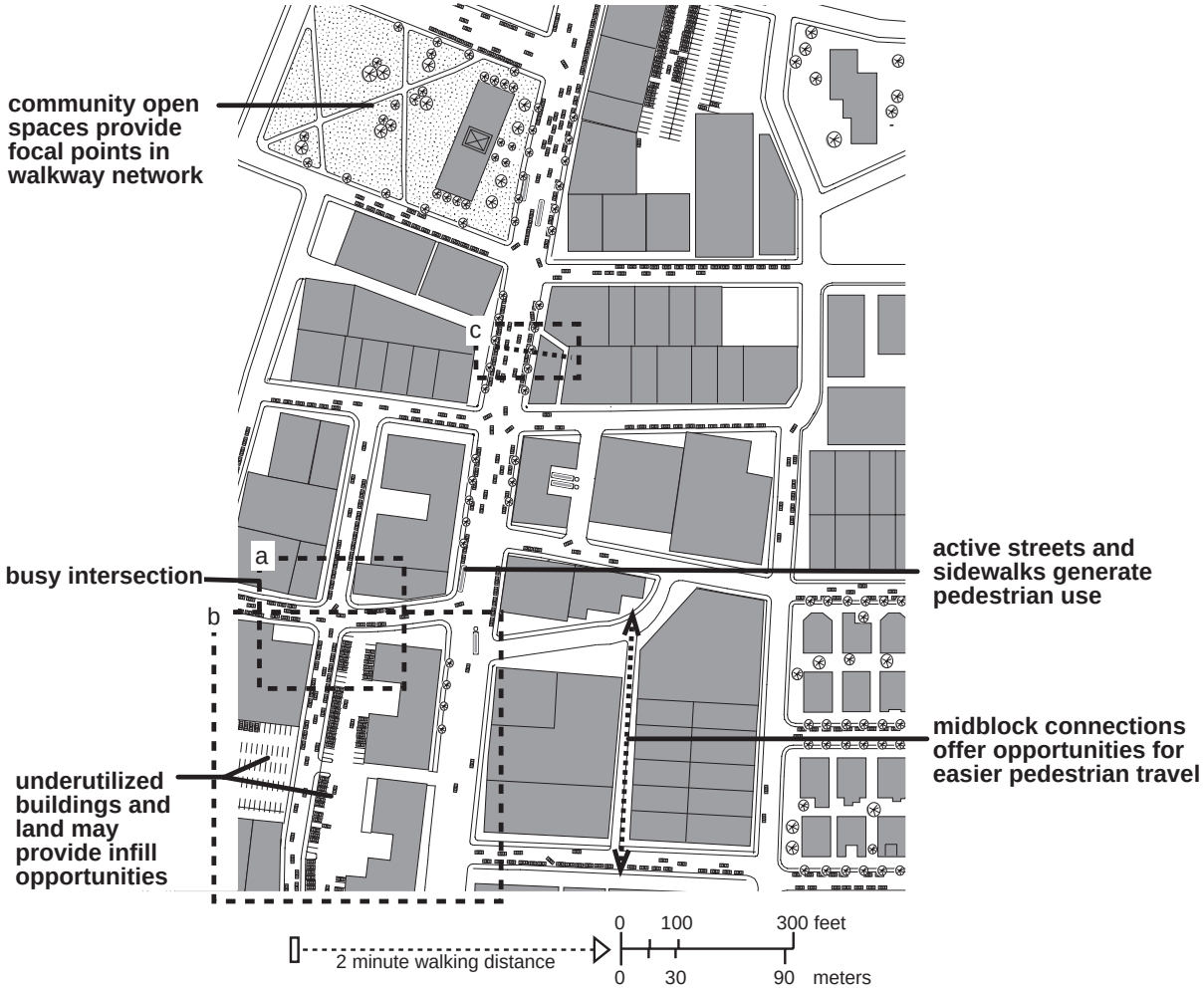
The downtown street system is designed primarily for access to individual properties. A main street can serve this function for both motor vehicles and pedestrians, but if a street is expected to move vehicles through the city at high levels of service, pedestrian mobility and downtown vitality will be compromised by higher traffic speeds and roadway designs that are more like highways. Potential solutions are to route through traffic outside pedestrian-oriented districts or to lower vehicular speeds on roadways that pass through these districts.

Land Uses Surrounding Downtown



Within close proximity to the downtown central business district there are residential neighborhoods, institutions such as colleges and hospitals, industrial land, and in many places, a waterfront.

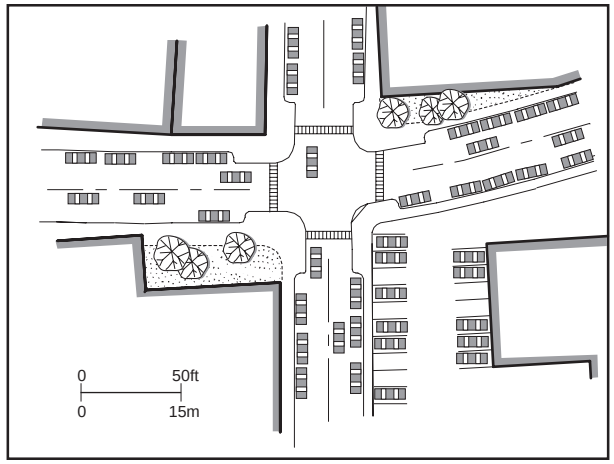
Site Plan: Typical Downtown



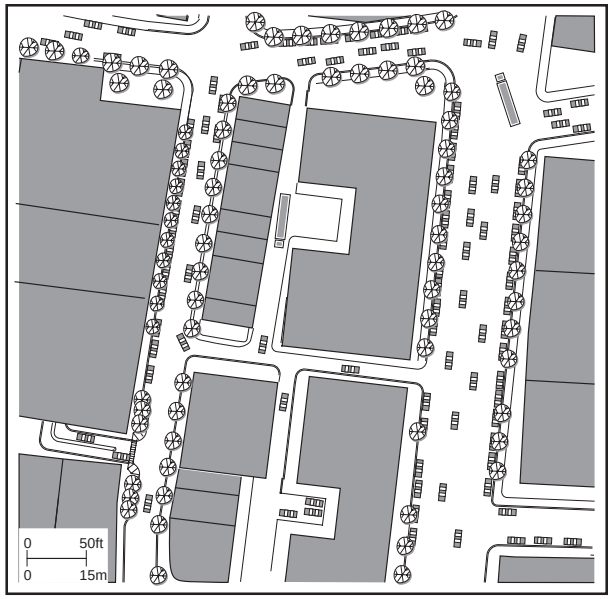
Site Planning and Design Issues

The design needs of downtowns range from streetscape and building facade improvements that provide interesting walking environments, to sidewalk and intersection design that accommodate heavy flows of both walkers and motor vehicles. Heavily used areas of downtowns may require wider sidewalks, pedestrian priority zones, and / or special accommodations at intersections to provide for heavy traffic and pedestrian volumes.

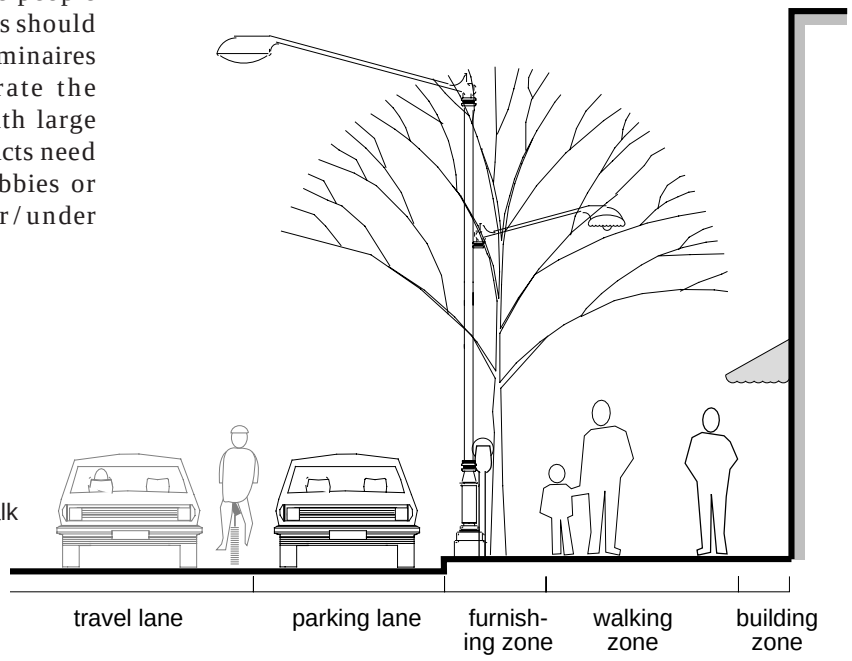
Sidewalks in downtowns should allow clear width for at least two pedestrians side by side while a third passes. Downtowns often are crowded enough that the city or town may need guidelines to control the location of street furniture, outdoor seating, planting, and signs to provide efficient pedestrian flows. Ideal sidewalks have a curb zone for utilities, street trees and street furniture, a travel zone wide enough for three to four persons abreast, and a building zone 0.5 to 1.0 meter (1.6 to 3.3 feet) wide where people can pause to talk or window shop. Sidewalks should be well lighted, preferably with separate luminaires that provide lighting that helps separate the walkway from the street. Downtowns with large blocks or infrastructure that separates districts need pedestrian shortcuts through building lobbies or between buildings, and inviting routes over / under highways, rail lines and other barriers.



a -- Busy intersections can benefit from neck-downs to create shorter crossing distances. Vest-pocket parks provide places for walkers to rest and congregate.



b -- Empty lots can be developed to provide greater continuity in walking routes.



c -- A well-designed sidewalk has a walking zone, a furnishings zone, space along the front of buildings, street trees and pedestrian level lighting.

Mid block connections provide shortcuts through large blocks and often provide spaces for small stores or food shops. (Winthrop Lane, downtown Boston)

Potential Improvements

- ❏ Provide curb extensions (bulb-outs), mid block crossings, enhanced sidewalks and crosswalk markings and other pedestrian-priority designs in districts with high pedestrian volumes.
- ❏ Route traffic and control vehicular speeds to increase pedestrian priority on key downtown streets.
- ❏ Build on existing strengths and expand walkable areas from key routes anchored by shopping, civic buildings, downtown parks, and historic blocks.
- ❏ Use city and town zoning regulations to provide opportunities for office and residential space above street level uses. Cities and towns can also provide incentives for residential development within walking distance of downtowns. Use zoning and incentives to promote mixed use residential and commercial development.
- ❏ Develop local Business Improvement Districts (BIDs) with the help of the Massachusetts Office of Business Development to help plan for and finance streetscape and facade improvements and provide increased maintenance. Transportation Enhancement funds may also be used for streetscape improvements.
- ❏ Accommodate bicycles in the street, and use education and enforcement to prevent riding on sidewalks.

Well-designed intersection in downtown Holyoke.

Food vendors increase activity and attract pedestrians. This sidewalk in downtown Worcester has adequate width to support this use.

Urban neighborhoods provide many walking opportunities close to people's homes. (North End, Boston)

8.2 Small Town or Village Centers

Small town or village centers are similar to downtowns except that they are smaller in size and are usually less densely developed. These centers are typically good places for walking. The traditional development patterns and the human scale of the houses and buildings in these centers were created prior to the advent of automobiles and provide an interesting and comfortable atmosphere for walking. Town centers are often places where people walk from nearby neighborhoods. People may also drive to the center, park once, and then make multiple walking trips to closely spaced destinations.

Many town or village centers have well-known historic qualities and attract many visitors, while others may struggle to maintain economic viability. A small village center might consist only of a church, post office, general store, and houses, while larger town centers could include a block or two of stores and offices. On the outskirts of a town or village center the land is often very rural or lightly developed.

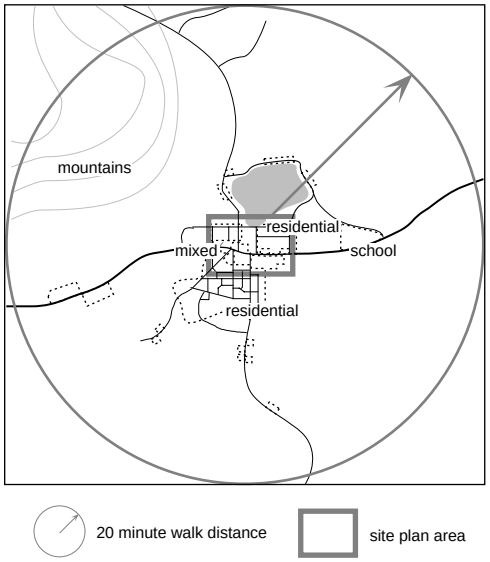
Town centers are often located on arterial highways. Traffic entering the town must decelerate from highway speeds of 64 to 88 kmph (40 to 55 mph) to densely settled area speeds of 40 to 48 kmph (25 to 30 mph). Both enforcement and design of town center main streets can help to control vehicle speeds for pedestrian safety, which will in turn stimulate more pedestrian activity.

Historic Marblehead.

Planning Issues

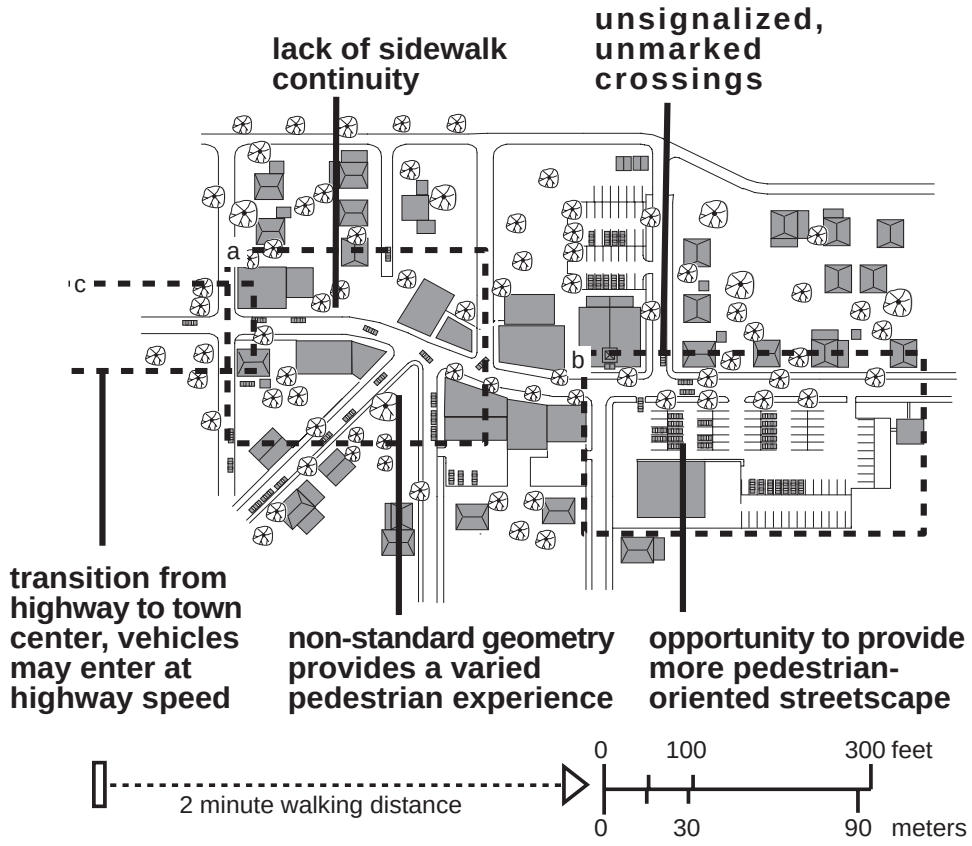
Like downtowns, economic vitality is important to town and village centers. Some village centers can capitalize on their historic qualities and provide opportunities for tourism. In all places town centers must work to maintain a mix of businesses that provide attractive shopping opportunities for local residents. Many larger town centers struggle to provide sufficient parking opportunities without creating congestion or destroying the walkable scale with large parking lots fronting on the main street. Redevelopment in small town centers often introduces small commercial strips that change the pedestrian character of the village and interrupt sidewalk continuity with wide driveways and parking lots. These gaps on walkable streets can be avoided or minimized through site plan review.

Land Uses Surrounding a Village Center



Town or village centers are compact areas of development often set in a rural or semi-rural landscape. Most destinations lie within walking distance.

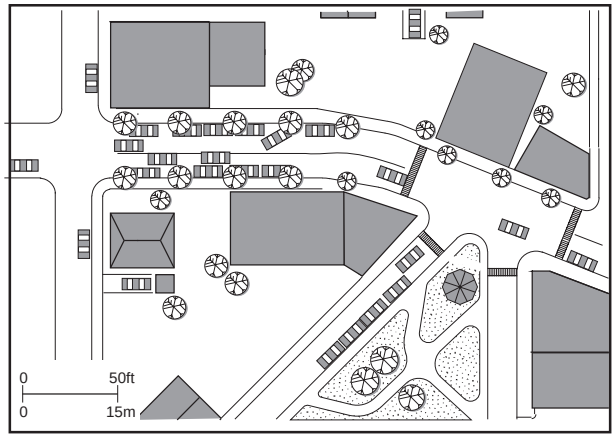
Site Plan: Typical Town or Village Center



Site Planning and Design Issues

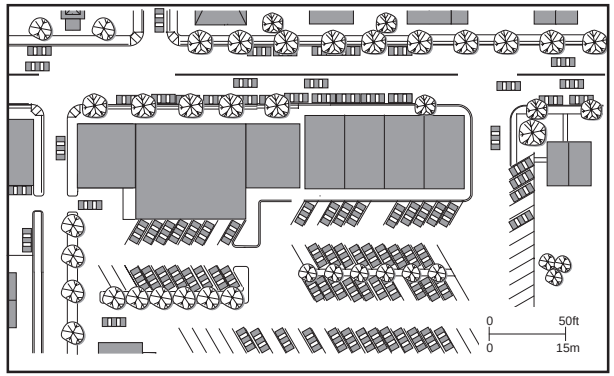
Many town centers are located on state highways and the transition from highway to village center often needs improvement so that motor vehicles do not enter densely settled areas at high speed. In many town centers, the jurisdiction for numbered routes is local.

The walking infrastructure in these places is sometimes inconsistent; some properties have sidewalks while others do not. In places where there is substantial fast motor vehicle traffic entering the center, the presence of sidewalks is more important than in places where traffic is slow or infrequent and pedestrians are relatively safe in the street (for example, Bearskin Neck in Rockport). Town centers often have unsignalized crossings at which motor vehicles are required to yield to pedestrians in crosswalks. If traffic is sufficiently heavy, signalized crossings may be necessary, but in places where drivers expect pedestrians, crossing are well marked and traffic speeds are controlled, signals may not be needed. (Chatham Center during summer months is a successful example.)



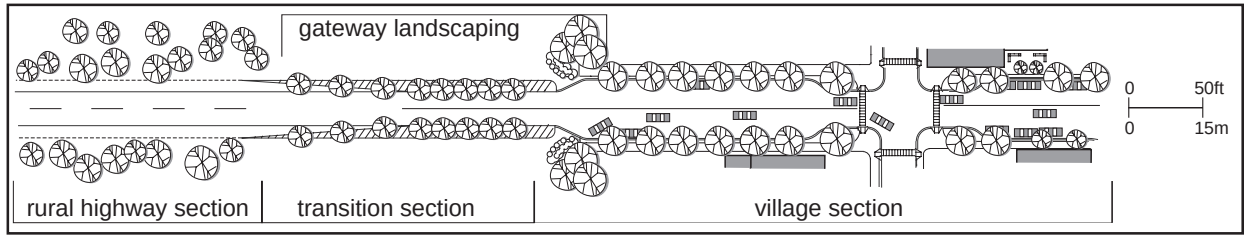
a --Improvements provide sidewalk continuity and street trees. Enhanced open space serves pedestrians.

Ashfield has plans for improvements to discontinuous sidewalks along Route 116.



b -- New development oriented to the sidewalk respects traditional town character. Off-street parking in the rear may serve the entire center.

New development not in character with the surrounding historic town center interrupts the walkway network.



c -- Rural highways make a transition to a densely settled, pedestrian-oriented center. Signs and landscaping communicate the transition to drivers, encouraging them to moderate their speed.

Potential Improvements

- ❏ Most town center main streets should have curbed sidewalks and on-street parking to help buffer the sidewalk and to encourage slower traffic speeds; (this requires local jurisdiction). Well-marked and lighted pedestrian crossings should be conveniently spaced and located in relation to active uses and should have clear sight lines for drivers.
- ❏ Street trees should be maintained and replanted.
- ❏ Roadways entering centers benefit from design clues to make drivers realize they are entering a thickly settled district where pedestrians may be crossing.
- ❏ Development regulations should reflect and be consistent with historic patterns. Site plan review should encourage or require store entrances on sidewalks and avoid parking lots fronting on the main street.
- ❏ Planners, merchants, and property owners should work together to understand and promote the assets that make the center walkable and attract business.
- ❏ If possible, village character should be used as an opportunity to attract visitors as part of tourism promotions or fairs and festivals.
- ❏ Off-street parking should be provided off side streets, where possible, with good walkway connections to main streets.

Shelburne Falls has an ample, continuous sidewalk system, buffered from the street by trees and parking.

Streets in village centers may not need sidewalks if traffic is slow and infrequent and sidewalks would impact the village character. (Bearskin Neck, Rockport)

8.3 Commercial Strip Development

Commercial strips are places along major roadways, often state highways, where retail development is planned primarily for automobile access. Stores are typically set back from the street behind large parking lots, and few pedestrian facilities are provided. Sidewalks along the roadway may be discontinuous and are often not connected to store entrances.

Commercial strips provide a mix of retail services and eating establishments in many towns. Often, they are activity centers that generate many trips. Areas of commercial strip development generate large volumes of traffic, partly as a result of people driving from one store to another, and many left turns make congestion worse.

In many cases zoning and disconnected roadway networks have separated these uses from nearby residential neighborhoods without provisions for walking short distances between home and places of shopping or employment. The development of these commercial districts reflects national trends in life style and consumer preference as well as larger scale retailing strategies over the past four decades. With greater attention to pedestrian needs both in new development and as properties redevelop, these important commercial areas provide opportunities to improve conditions for walking.

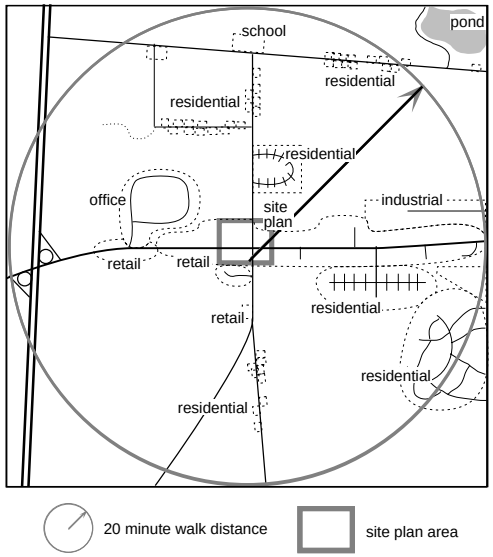
Walking along a commercial strip.

Planning Issues

Connections to surrounding land uses need improvement along many commercial strips. Low density single use sites limit opportunities for accomplishing many tasks in one trip, so more concentrated placement of stores and offices will stimulate more walking between them. In some places the balance between accommodating traffic and providing walking environments could be accomplished through development of boulevard-style roadways with traffic lanes in the center and service roads with parking and sidewalks serving stores. Commonwealth Avenue in Brighton is an example.

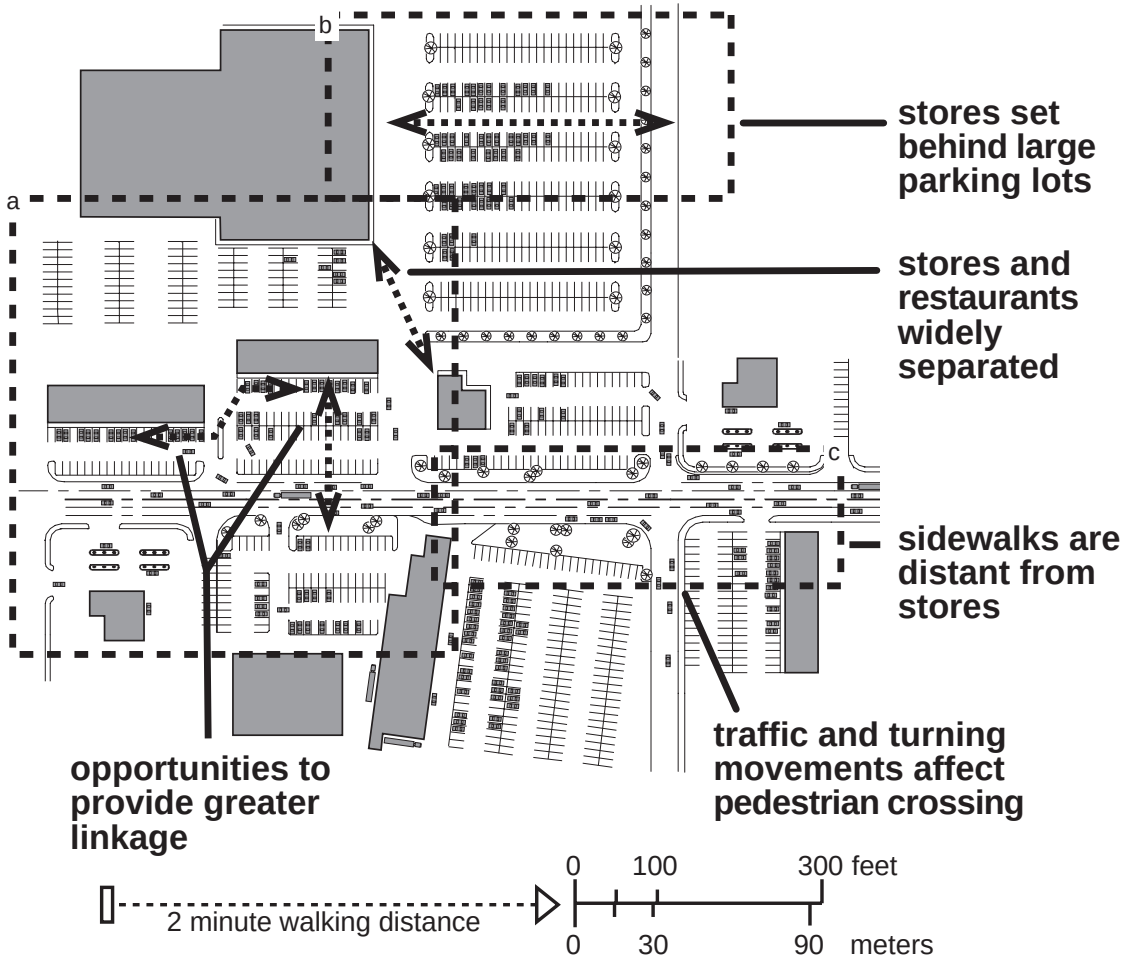
In many places the roadway portion of the commercial strip is controlled by the state while land use and development along the road is governed by the city or town zoning; these multiple jurisdictions require cooperative planning. It should be recognized that encouraging pedestrian trips to multiple stores from a single parking place will improve traffic flow by reducing short in-and-out automobile movements and left turns. If stores are located behind parking, additional sidewalks should be provided connecting groups of store fronts to each other and to the street.

Land Uses Surrounding Commercial Strip



Commercial strips exist along the highway with residential or office land uses often located adjacent, behind the commercial zone.

Site Plan: Typical Commercial Strip Development



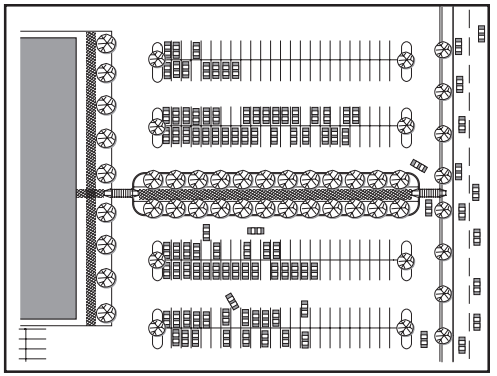
Site Planning and Design Issues

Commercial strips can benefit from retrofit improvements to both the public and private network of streets, sidewalks, and parking lot circulation. In most cases each commercial site has its own driveway connecting to the roadway, its own parking lot, and walkways that do not connect to adjacent sites. Circulation between stores on the same street by automobiles or by foot is more difficult than it needs to be. Local site plan review can encourage or require site circulation that allows shared driveways and off-street walking and driving connections between properties.

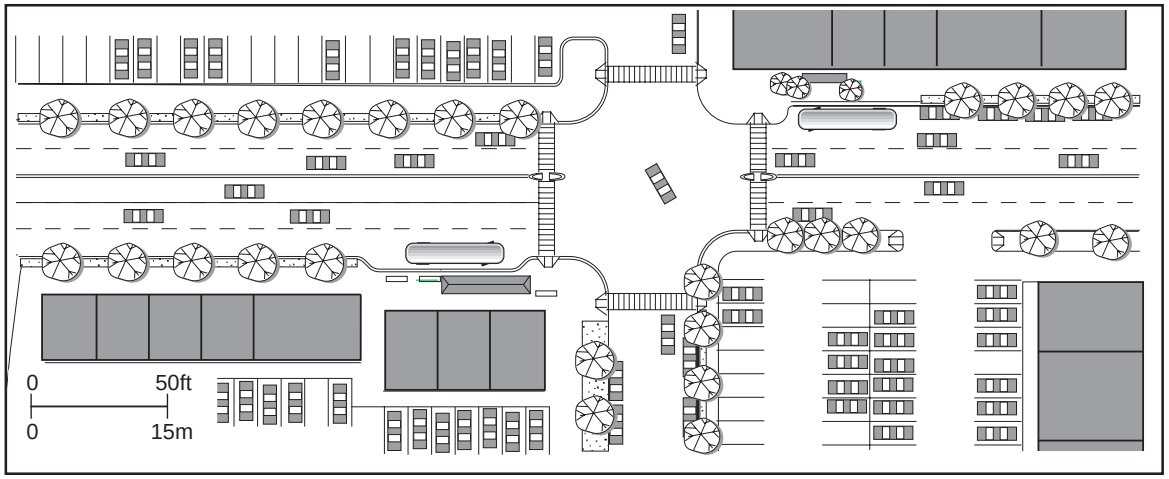
Pedestrian crossings of roadways need special attention because of multiple turning lanes and fast moving traffic. Uncontrolled curb-cuts, multiple lane cross-sections, parallel turning lanes, shared left turn lanes, fenced medians, and other factors make crossing difficult. Well-marked and lighted crossings need to be frequent enough to encourage pedestrians to use them. In heavy traffic situations only signalized crossings will be safe; they should be designed to minimize conflicts with turning traffic. In others situations, a curbed median or refuge island will allow pedestrians to use gaps in traffic to cross the main roadway one half at a time.

A walkway connects the sidewalk to the front door of a supermarket on Harvard Street in Brookline.

a -- Shopping plazas can be retrofitted to provide increased density and opportunities to park once and walk between stores. Redevelopment should occur at the sidewalk edge with parking in the rear. Shared parking lots should be encouraged.



b -- Defined pathways through parking lots, from sidewalks to store fronts, serve the walking public.



c -- Crossings of wide streets need refuge islands for pedestrians. As stores redevelop at the street edge walking distances become shorter. Denser shopping districts can support bus service.

Potential Improvements

- ❏ Redevelop commercial strips with intensified uses as land becomes more valuable. Cities and towns should be prepared to effectively reshape the site to better accommodate all modes, with a combination of public improvements and site plan review of new development.
- ❏ Evaluate sidewalk networks along commercial strips and connections to them from adjacent land uses. Identify and correct missing and/or incomplete links. Include walkways along store fronts connecting to adjacent store fronts.
- ❏ Organize adjacent neighborhoods and business owners and develop district plans as a vision of what the site or district can become. Designate key locations for new buildings and identify uses that will diversify activity along the strip. In general, clustering stores and shopping plazas and removing barriers to walking between sites will make the strip more walkable.
- ❏ Identify and involve the responsible agencies/jurisdiction(s) early in plan development so that transportation needs continue to be met.
- ❏ Work actively with business owners and developers to market the site for new development and provide incentives to developers willing to meet guidelines set out in the district plan.
- ❏ Hold sidewalk sales or other events to raise awareness and get people to identify with the district.

In many commercial strip developments there is no clear path between the sidewalk and stores.

Stores can be oriented to meet the sidewalk. Walkways along storefronts connect to the sidewalk. (Littleton)

Mashpee Commons on Cape Cod is a redeveloped retail center. The master plan includes large and small stores in a pedestrian-oriented atmosphere. Future development proposals include new residential neighborhoods within walking distance of stores.

8.4 Transit Access

Pedestrian access is a particularly important transit issue because most transit users walk at least at one end of their trip. Better pedestrian access can encourage more transit use and better transit service can encourage more walking.

Access to transit includes a wide range of situations: rural roadside bus stops, large intermodal centers, ferry terminals, downtown bus stops, subway stops, and train stations. Bus systems serve most regions of the state and accommodate users with either small shelters or a roadside sign marking the bus stop. In eastern Massachusetts, transit access includes MBTA suburban commuter rail stations, rapid transit and a variety of bus stops. The MBTA, the Steamship Authority, and private companies also operate ferry service between a variety of coastal locations.

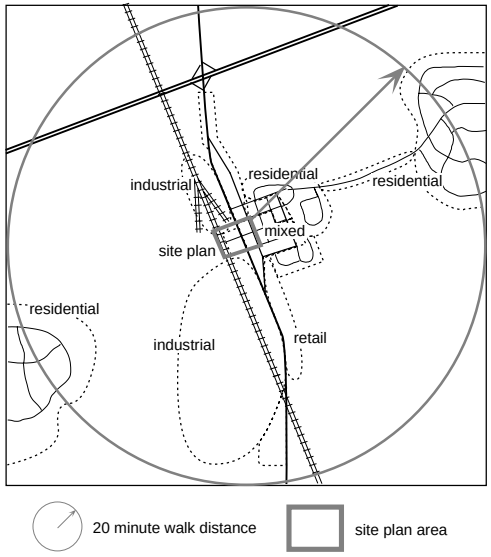
Key aspects of transit access are proximity and connections to residential or commercial areas where trips begin or end, the need for safe and comfortable places to wait, potential sidewalk congestion near downtown bus stops or station entrances, and the need to accommodate large volumes of pedestrians as transit riders disembark and start using area sidewalks.

Bus stop in downtown Worcester

Planning Issues

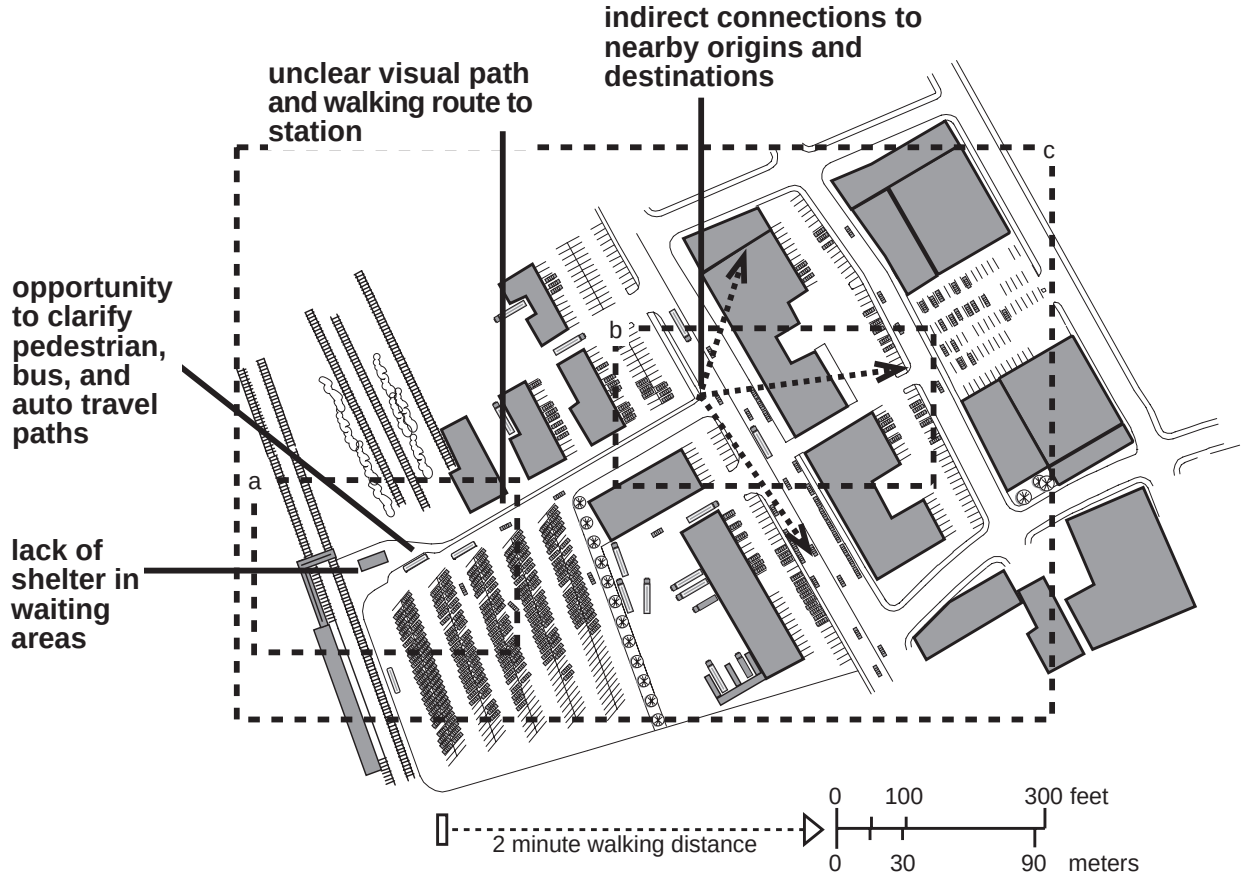
Transit ridership is dependent on mode choice decisions that people make based on service frequency, overall travel time, cost, and ease of access to the station or stop. Many transit stations and stops are located close to residential and commercial districts but the walkway within a half mile radius is often incomplete. Stations located near highways to intercept auto traffic are also often close to suburban neighborhoods, but busy highways and disconnected street systems may form barriers that limit walking opportunities. Bus stops in suburban areas are often located along commercial strips or industrial areas but destinations of interest may be located across large parking lots with few provisions for walking to them. Providing good walkway connections to surrounding land uses addresses these issues and will increase transit patronage and pedestrian safety.

Land Uses Surrounding Transit Station



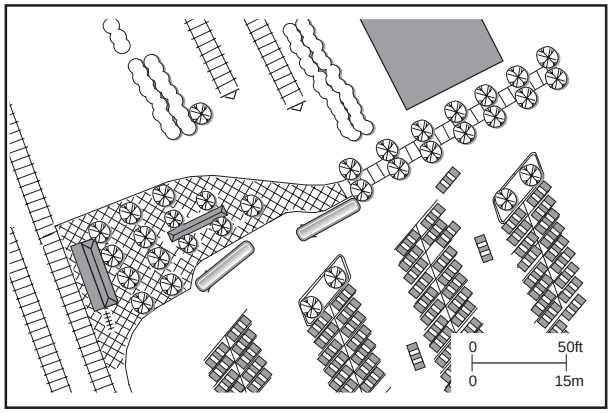
Many transit stations are within walking distances of residential neighborhoods but highways or railroads may create barriers.

Site Plan: Transit Station Located at Edge of Industrial Area

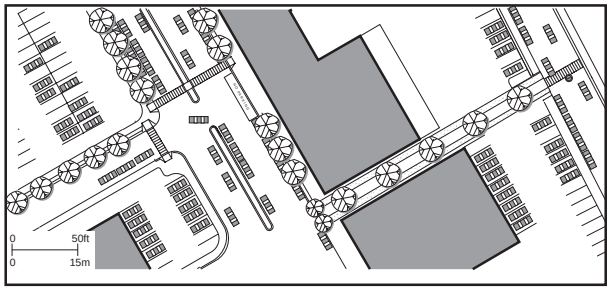


Site Planning and Design Issues

For transit stations that include vehicular access, safe, clear walkways to transit vehicles should always be provided. Crossings and walkway improvements should connect the stations to surrounding destinations. Motor vehicle circulation should not conflict with pedestrian access. In particular, drop-off areas should be located to minimize these conflicts. People who drive to the transit station need clear walking paths to waiting areas. In situations where buses pick people up at curb-side stops, additional sidewalk space is often needed to provide a place for passengers to queue. During rush-hours, sidewalks leading to and from transit stops in downtowns are often congested; increasing effective sidewalk width, organizing street furniture and utilities in a curb zone, and increasing pedestrian crossing priority at intersections can help.

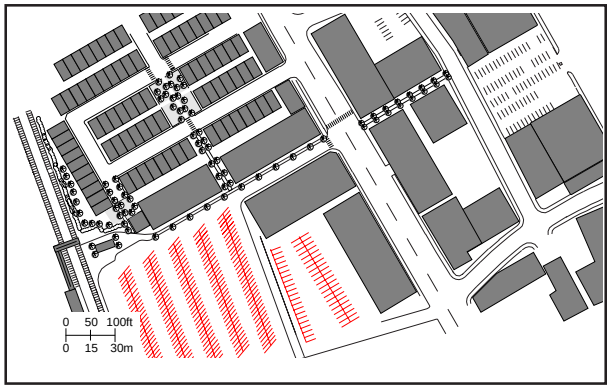


a -- Waiting area provides shelter and security. Bus stop is convenient to train stop. Bike parking provided next to shelter. Pedestrian access from the street is direct and well marked.



b -- Improved, continuous pedestrian links to surrounding land uses provide increased opportunities for walking to transit.

Path approaching Alewife Station, Cambridge.



c -- Station-oriented redevelopment includes mixed land uses and increased density, generating walk-in transit trips that substitute for some automobile trips.

Potential Improvements

- ❏ Cities and towns can work with transit agencies to identify walk-to-transit opportunities within a half mile of existing stops and improve walking routes.
- ❏ Transit agencies should evaluate bus stop locations in relation to surrounding land uses and activity centers and work with cities and towns to ensure that safe walking opportunities exist. Provide well-marked stops with route maps and schedule information.
- ❏ Implement spot improvement programs for transit and park-and-ride stations to improve the path for walk-in transit users.
- ❏ Provide and improve shelters and waiting areas at stations and stops. Include lighting, protection from the weather, benches, trash receptacles, maps and information. Maintain the areas and keep them free of graffiti and litter.
- ❏ Develop partnership between the transit agency and local businesses to provide incentives for people taking transit.
- ❏ Transit authorities should seek and encourage development opportunities at transit stations that provide shopping, dry cleaning, day care, bicycle parking, and other functions that serve commuters.

Passengers boarding the commuter train in Belmont; some walk to the station while others park and ride. All passengers will be pedestrians at some point in their trip.

Riverside station in Newton was recently reconstructed. The new design provides clear pedestrian paths through parking areas to the platforms. At park-and-ride facilities, a balance needs to be struck between space for parked cars and walkways.

Commercial districts surrounding transit stations provide opportunities to combine commuting and shopping trips (Newton Center).

Transit Station Checklist:

- shelter from weather
- maps and schedule information
- appropriate lighting
- benches and trash receptacles
- secure bicycle storage

8.5 TRAILS

Trails, unlike sidewalks, are pathways separated from the street but linked to the larger walkway system. In Massachusetts they have many dimensions. This plan focuses on the paved trials that serve, or have the potential to serve, pedestrians as well as bicyclists, skaters, and other users of non-motorized modes of transportation. The primary issue related to these trails is their connection to adjacent activity centers or destinations of interest (such as transit, schools, and public open space). There are also issues posed by joint use of the pathway by pedestrians of several types and other trail users.

The MDC Charles River Reservation trail system is one of the oldest in the United States.

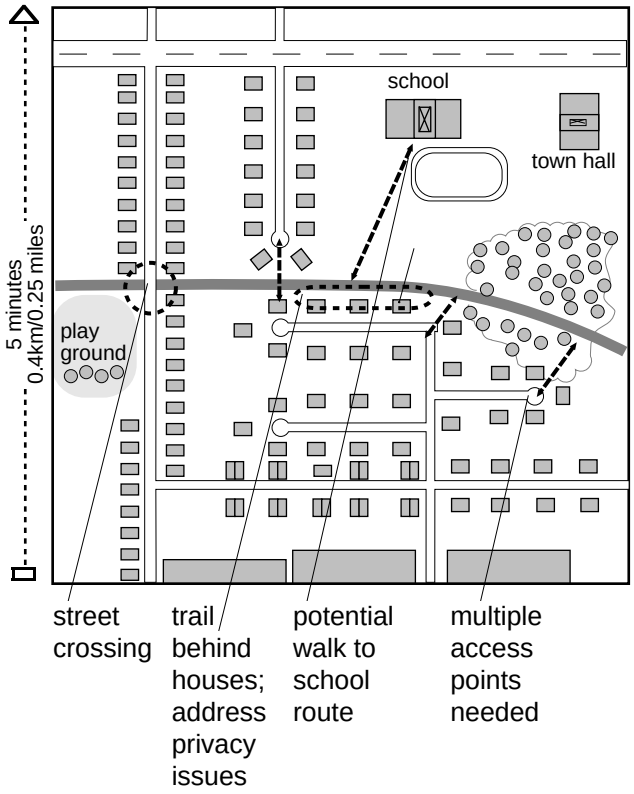
Planning Issues

Trails are often built along former rail rights-of-way or along historic routes that never developed into roadways. Because they are often separated from the roadway system they may pass through the backs of commercial districts and behind houses. This "backyard" alignment can create access, security, and privacy issues while also providing opportunities for trails to provide direct connections for walkers. Connections through adjacent parking lots and woodlands, and from dead-end streets will provide increased opportunities to access the trail and use it for transportation purposes.

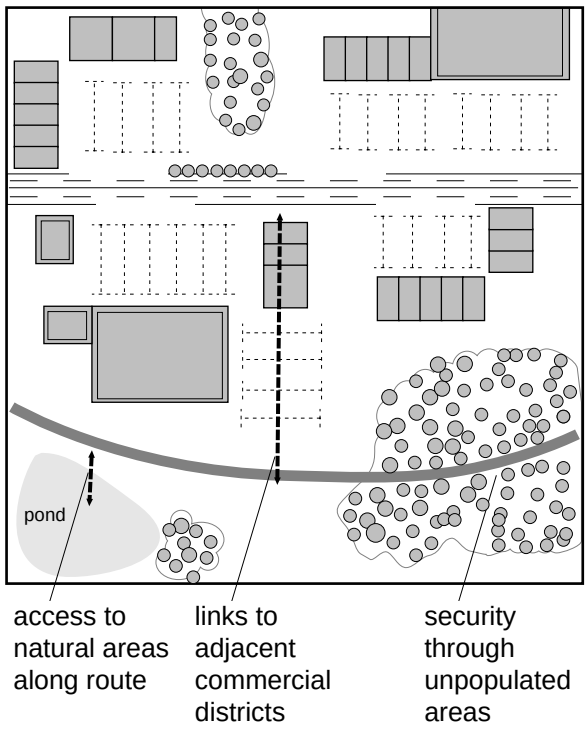
Often the most challenging issues in planning trails and their connections is obtaining concurrence and appropriate easements from neighboring property owners. Involving property owners early in trail planning and design can help to address their concerns about the new facility. Where neighborhood or commercial property connections are opposed after consultation, it may be possible to design the facility for future provision of these connections as opinions change with experience.

Successful trails and paths appear to be self-policing, particularly when they are well used. All trails must be designed to admit emergency vehicles.

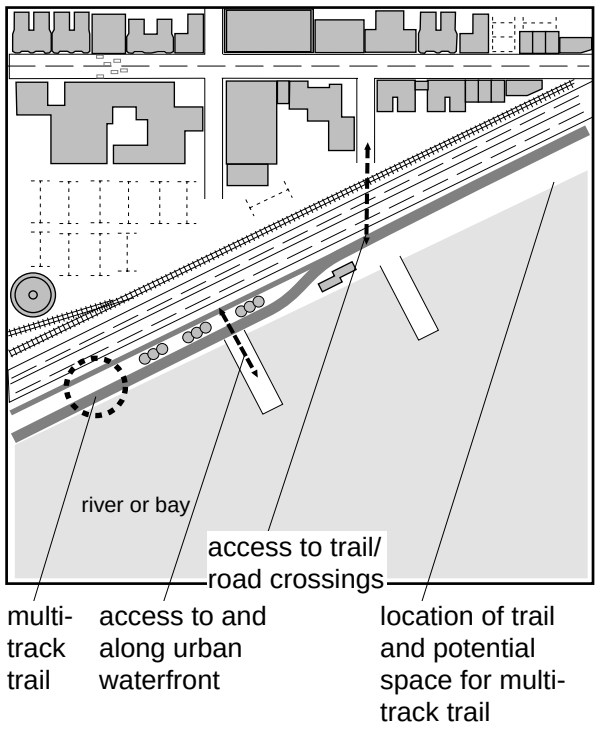
Trail Through Residential Area



Trail Through Commercial Area



Downtown Trail or Riverwalk



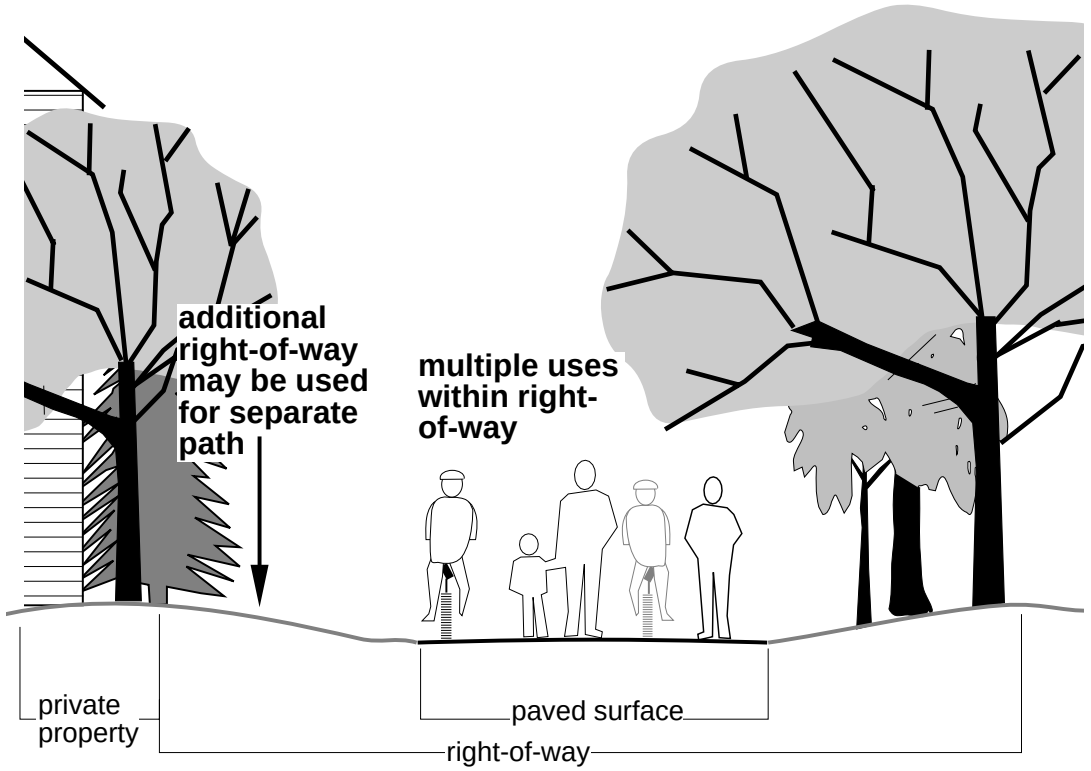
Trail Design Issues

Most trails have multiple users including pedestrians, bicyclists, and skaters, all sharing a single path. On some trails there are posted rules and guidelines that users follow to provide courteous and safe passage. These measures, along with other trail design and management practices, can minimize user conflicts.

There is not yet a national consensus on trail design. In settings that will attract much use, it is wise to provide adequate width at the outset. If it can be accommodated in the right-of-way, recommended trail width should be 3.0 meters (10 feet) or more of paved cross section for heavily used trails, plus a further 1 meter offset from pavement edge to poles and trees.

Where possible, heavily used trail systems should provide completely separate paths for bicycles and walking-only trails for pedestrians. If necessary, a center line can be used in circumstances such as curves and heavy use areas. Connecting trails also need to be designed to provide safety and security for trail users and abutting property owners.

The intersections of streets and trails provide good access points for trail users but crossings must meet criteria for good crosswalks: well marked and lighted, with good sight lines for approaching motorists. Trails may widen at intersections, which provide opportunities for locating trail services, such as benches, drinking fountains, toilet facilities, and informational signs.



Limited rights-of-way may be shared by many trail users.

Potential Improvements

- ❏ Develop local right-of-way inventories to provide a basis to plan trails that have the greatest potential to connect key destinations and serve transportation purposes. Cities and towns should develop trail plans with an eye towards providing missing transportation links.
- ❏ Work with abutting land owners to provide connections to adjacent commercial districts and other important destinations. Help business owners realize the benefits of providing access near their shops — opportunities to capture trail user business.
- ❏ Work with neighboring residents during planning and design, and maintain the privacy of their back yards with fencing and vegetative screening.
- ❏ Establish reasonable path rules that encourage safe and courteous use.

Norwottuck Rail Trail crossing the Connecticut River between Hadley and Northampton.

The Minuteman Commuter Bikeway in Arlington, Lexington, and Bedford is heavily used, especially on weekends. This trail connects to transit and passes through downtown Arlington and downtown Lexington.

Trail through woodland in Brookline.

8.6 ROADWAYS

Walking along and crossing roadways raises safety issues. People currently walk on roadways without sidewalks in many parts of the state. While sidewalks will not be constructed everywhere, they should be provided where land uses generate pedestrian activity in a manner compatible with safety and environmental constraints.

Responsibilities for providing these sidewalks are most often local, but a variety of agencies have responsibility, depending on ownership of the roadway right-of-way. Opportunities to provide sidewalks include roadway reconstruction, new development, and local initiatives (which may include purchasing property easements). New commercial developments could provide sidewalks as a condition of zoning and this should also be considered where appropriate in the permitting process for roadway access (also known as "curb cut" approval).

Pedestrian crossings of the roadway also need to be addressed. Sufficient warning to drivers must be provided in places where land uses lead pedestrians to cross roadways with fast moving traffic.

Where roadway cross-sections are limited by right of way, environmental or historic resource constraints (such as mature trees) potential solutions to accommodate pedestrians include:

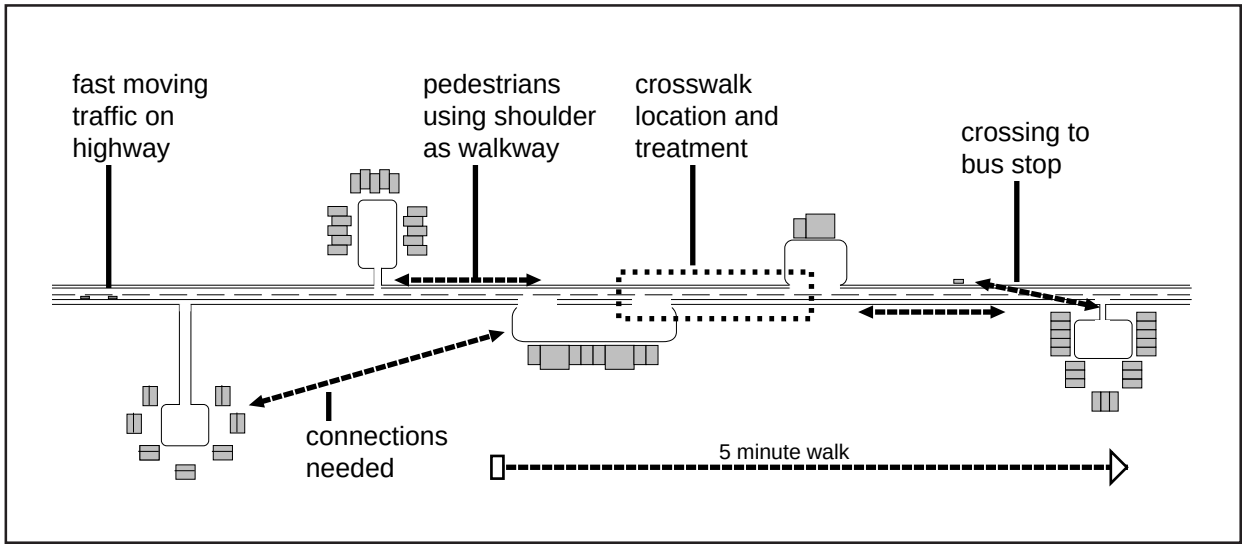
- acquisition of property where not injurious to businesses generating pedestrian volumes.
- provision of sidewalk on one side of roadway only.
- construction of sidewalk or path on easements behind walls or large trees (as, for example, along Route 126 in Lincoln and Sudbury).

Route 119 in Groton with sidewalk and buffer strip.

Planning Issues

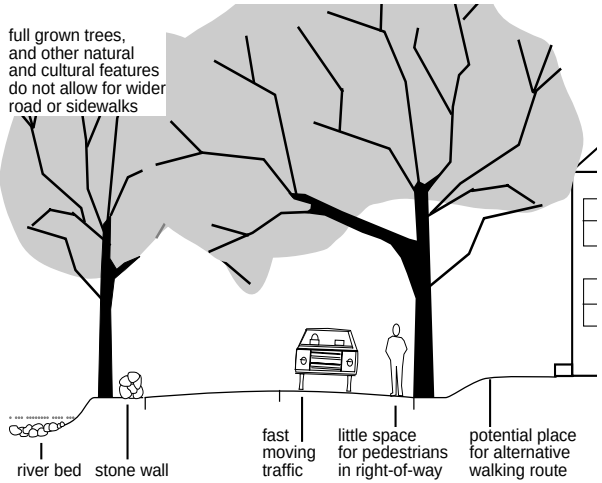
Where commercial development exists along state highways, providing for walking opportunities involves cooperative effort by the city or town and MassHighway. Municipalities have jurisdiction over local zoning and development regulations and therefore control how and where development occurs. Cities and towns can work with together with MassHighway to provide sidewalks when a roadway is reconstructed with state funds. The municipality must acquire right-of-way or easements if necessary and must assume on-going responsibility for maintenance.

Developed Roadway without Sidewalks



Route 116 in Sunderland is a rural highway with sections that include student apartments across the road from restaurants and convenience stores. Sidewalks and more visible crosswalks are needed in situations like this.

Rural Road with Constraints



In constrained situations, solutions may include a path on easements obtained by the town behind trees or stone walls.

This sidewalk detours around a full grown street tree. (Chelmsford)

In undeveloped rural situations, it may be possible to increase graded and / or paved shoulder space, but while shoulder improvements increase safety for all users of the roadway, shoulders should not be deemed to accommodate pedestrians. If pedestrians are regularly present and there is sufficient traffic volume and speed to make walking in the roadway inadvisable, sidewalks should be provided. However, it should be recognized that in many rural situations, pedestrians do not want sidewalks for aesthetic reasons. Safe practice by both pedestrians and motorists may be adequate for these situations if traffic volumes and speeds are low.

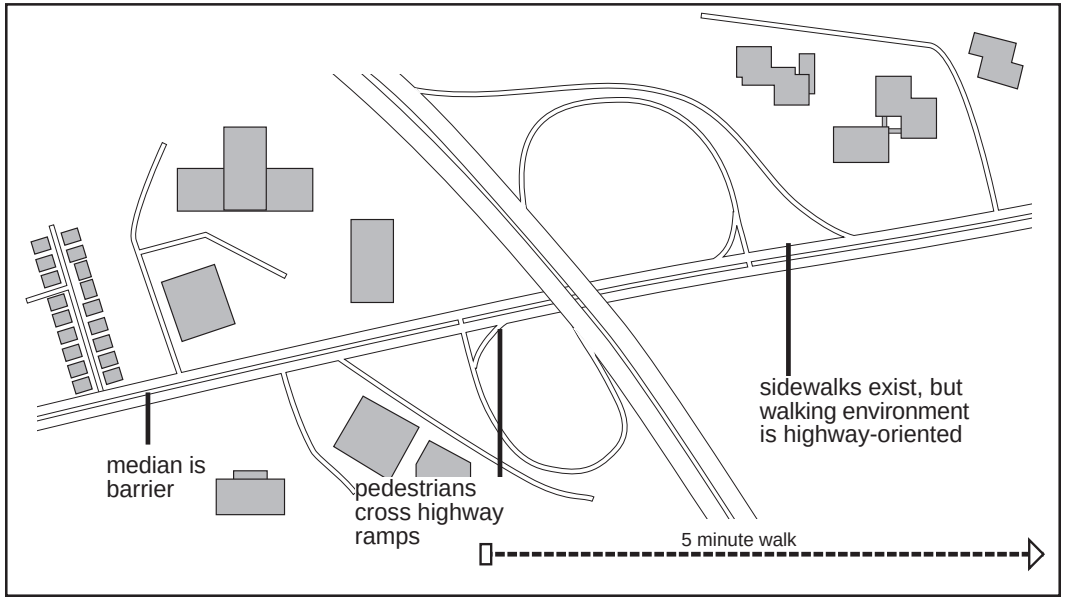
Roadway-Related Design Issues

At least two design issues affect walking conditions at access ramps and on bridges.

In places where highway access ramps intersect sidewalks or potential walking routes, there are pedestrian circulation issues. Older interchanges were built when there was little developed land nearby, but development may have since generated pedestrian trips along the streets to which ramps connect. When opportunities arise to reconstruct these connections, geometric improvements may be considered to slow traffic entering and exiting these ramps; deceleration lanes for traffic entering an on-ramp is one example.

On bridges, additional cross-section adds significantly to cost, but this cost must be weighed against the ability of the bridge to accommodate pedestrians and to carry the walkway network across barriers such as highways, railroads, and rivers. These natural and man-made barriers limit pedestrian access, and sidewalks on bridges are an opportunity to consider in overcoming these barriers.

Highway Ramps Crossing Sidewalks



Sidewalk crossing highway ramp (Highland Ave. on-ramp to I-95 in Needham).

Potential Improvements

- ❏ Towns should work closely with owners of new (and existing) development along highways to provide sidewalks and maintenance. (See the Commercial Strip prototype.)
- ❏ When roadways are reconstructed, the local or state agencies with responsibility should provide sidewalks where reasonable in accordance with the priorities suggested on this page. Sidewalks must meet requirements of the Massachusetts Architectural Access Board and should be protected from traffic by curb, drainage swale, guard rail, and/or planting strip where appropriate. Well marked and lighted crosswalks should be located central to the land uses generating pedestrian activity and at intervals for extended commercial land uses.
- ❏ Crosswalks on roadways should be repainted as often as necessary to maintain visibility.
- ❏ MassHighway, MDC, professional engineering organizations, and others should investigate, test, and standardize enhanced systems of signs, crosswalk striping, lighting, and potential warning systems such as actuated flashers to make crosswalks on busy roadways safer.
- ❏ The priorities on this page for providing sidewalks should be considered in determining whether to provide sidewalks on both sides of new bridges.
- ❏ Highway ramps connecting to streets with sidewalks should be designed, where feasible, to accommodate pedestrian crossings (for example, with right-angle intersections). As opportunities for reconstruction occur, consideration may be given to reconfiguring existing ramps to manage traffic speed transitions through ramp geometry and deceleration lanes. However, ramps must be designed to avoid backups onto travel lanes.
- ❏ Where ramps currently cross sidewalks, suitable measures should be considered to alert both pedestrians and motorists at existing crossing points .
- ❏ Along some rural roads provisions for walking might take the form of a path parallel to the road and located behind historic walls and mature trees rather than as a sidewalk along the road.

Some roads may not need sidewalks if traffic volumes and speeds are low and if sidewalk construction would impact the character of the road. Local residents and police must agree on methods to accommodate pedestrians. (Menemsha, Martha's Vineyard).

Priority Locations for Sidewalks

Agencies responsible for roadways should, where reasonable, construct sidewalks along sections where land uses would generate seasonal or year-round pedestrian traffic. Examples are:

a) Connecting commercial uses and concentrations of employment (50 or more employees) to bus or rail transit stops/stations no more than 1 kilometer (0.6 mile) away.

b) Connecting commercial establishments located within 60 meters (200) feet of each other on the same side of highway.

c) Connecting commercial establishments to residential concentrations (20 or more units) or employment concentrations located within 800 meters (0.5 mile/10 minute walk).

d) Connecting residential concentrations within 800 meters (0.5 mile/10 minute walk) of school bus stops;

e) Filling walkway gaps less than 800 meters (0.5 mile/10 minute walk) long.

f) Connecting schools to residential concentrations within 3.2 kilometers (2 miles), where provision of the sidewalk will render the highway an appropriate walking route to the school.

g) Other areas where there is current evidence of frequent pedestrian use (such as beaten path) or pedestrians observed walking.

A GUIDELINES AND CHECKLISTS

The following appendix includes sample guidelines and check lists to aid planners, engineers and citizens in the design and development of pedestrian facilities and to encourage walking.

- Land Use and Development Check List
- Pedestrian Walkway System Assessment
- Pedestrian Design Guidelines
- Environmental and Site Plan Review Check List
- Design and Engineering Check List
- Performance Measures for Assessing Progress Towards Pedestrian Plan Goals and Objectives

Land Use and Development Regulations Check List

Cities and towns can encourage walking though pedestrian-oriented development. The standard tools municipalities use are zoning and development regulations. The following list provides an overview of the factors town planning boards, planning departments, and development committees should consider.

Cities, towns, responsible agencies, and other organizations may consider developing a check list like this to incorporate into review guidelines. They should tailor it for detailed review of proposals for different types of permits or use it more generally to make sure the appropriate questions concerning pedestrians are being raised.

Mixture of Uses

Mixed land uses provide walkable destinations within short distances and pedestrian activity through more days of the week.

- ❑ Does the zoning encourage a mixture of uses within walkable distances?
- ❑ Does it permit a mixture of uses within downtown buildings?

Increase Density

Higher development densities support transit and walking.

- ❑ Do development regulations require / encourage four or more residential units per acre in neighborhoods near town centers, schools, and transit stops?

Subdivision Regulations

Encourage slow traffic and provision for walkway connections. Subdivision regulations should require sidewalks on all through streets. Required street widths should be considered in terms of vehicular speed.

- ❑ Would a narrower street cross-section with parking permitted on only one side be appropriate?
- ❑ Do regulations require or encourage street systems that provide for direct pedestrian paths to nearby destinations?

Commercial Site Plan Review and Development Regulations

Encourage walkable commercial development through review of building location, parking layout, and site circulation.

- ❑ Do site plan review criteria address pedestrian accessibility and safety? (See commercial strip and downtown / town center prototypes.)
- ❑ Are parking requirements realistic or do they result in parking lots that are larger than needed on most days?
- ❑ Do review criteria provide for continuous paths between buildings and along commercial frontage?
- ❑ Do criteria require or encourage parking behind or to the side of buildings?

Incentives for Additional Pedestrian Provisions

Encourage increased levels of pedestrian accommodation through incentive programs.

- ❑ Do special permit criteria provide incentives such as increased density for developments that go beyond the basic provisions for pedestrians? Such additional provisions include wider sidewalks, buildings at sidewalk edge with parking located in rear, pedestrian-oriented landscaping, clear pedestrian paths through parking lots, and off-site pedestrian access improvements.

Pedestrian Walkway System Assessment

The following five steps provide a local framework for assessing existing pedestrian networks and identifying potential improvements. They point to conditions that should be considered and may deserve additional attention.

Step 1: Identify Key Activity Centers and Priority Routes

Develop a plan for pedestrian priority routes. Identify key activity centers, such as transit stops or stations, shopping areas, schools, concentrations of employment, civic buildings, recreation facilities, and residential neighborhoods. Designate priority walking routes along appropriate streets connecting these generators and attractors of walking activity. Such routes will normally follow arterial and collector streets, but may avoid high speed / high volume roadways if a reasonably direct alternative exists serving the same connection.

Step 2: Identify Gaps and Special Conditions

Perform a walking / driving inventory of sidewalks on these priority walking routes and identify gaps, sections of sidewalk requiring reconstruction, and maintenance issues such as overgrown vegetation requiring pruning. Also identify and inventory locations such as mid-block crossings, and crossings of railroad and highway rights-of-way and waterways that may need special attention.

Step 3: Prioritize the Filling of Missing Links

Set priorities for filling gaps and upgrading other walkway sections, either as part of street reconstruction plans or as sidewalk reconstruction projects.

Step 4: Ensure Adequate Maintenance

Provide municipal, sanding, salting and / or snow removal on priority walking routes. Enforce local ordinances and bylaws regarding maintenance of vegetation that borders sidewalks and prohibitions against plowing or shoveling snow onto the sidewalk or crosswalks. Provide periodic inspection of sidewalks; address uplifted sidewalk panels, etc.

Step 5: Review Bylaws Regarding Provisions for Pedestrian Facilities

If necessary, make ordinance / bylaw changes requiring commercial and residential property developers to provide sidewalks and planting strips in new development.

Cities, towns, responsible agencies, and other organizations may consider developing a check list like this to incorporate into review guidelines. They should tailor it for detailed review of proposals for different types of permits or use it more generally to make sure the appropriate questions concerning pedestrians are being raised.

Pedestrian Design Guidelines

The following are intended for planning and design purposes in connection with various pedestrian facilities. Except where identified as requirements, the guidelines are flexible and should be adapted to project circumstances, such as right-of-way and environmental constraints.

Sidewalk Width

Clear walking space on sidewalks should be between 1.2 meters (4 feet) and 2.4 meters (8 feet) in residential areas and 2.4 meters (8 feet) or greater in commercial areas (AASHTO, p349). Each pedestrian occupies two to three feet of width, therefore, 2.4 meters (8 feet) allows an individual walker to pass a couple comfortably, or two couples to pass with some squeezing together.

Sidewalks should preferably be separated from the street by a buffer area and curbs at least 150 mm (6 inches) high. Curb height should be maintained by milling old pavement before resurfacing. Where curbs are inappropriate, sidewalks may be separated from the roadway by drainage swales or guard rails providing equivalent protection for pedestrians. Sidewalk cross-slope should be 15 mm per meter (3/16 inches per foot) for drainage but not exceed this slope per the Americans with Disabilities Act (ADA) and MAAB regulations.

If no planting strip exists, sidewalks should be at least 0.6 meters (2 feet) wider than the 1.2 to 2.4 meters (4 to 8 feet) clear sidewalk width suggested above (AASHTO, p349). AASHTO states that the width of a planted strip between curb and sidewalk should be at least 0.6 meters (2 feet) where possible (AASHTO, p349). The National Highway Institute suggests that planting/utility areas should be between 1.2 to 3 meters wide (4 to 10 feet) (NHI course book p149). Planting strips do not need to be as wide if curb-side parking is provided because parked cars create an excellent buffer from moving traffic. Street trees require no less than a 1 meter square (10 square feet) to protect their root system; a square or strip 1.3 to 2 meters wide is preferable.

All sidewalks must conform to Americans with Disabilities Act (ADA) and Mass Architectural Access Board (MAAB) requirements. Refer to MassHighway Construction Standards and Department Directives and consult with MassHighway's Handicapped Access Coordinator for more information.

Lateral Clearance

In downtown and village center areas, the sidewalk area described above may also serve as a furnishing zone. This area of roughly 1 meter (3.3 feet) wide should be provided along the street edge for street trees, utility poles, signs, benches, trash receptacles, public telephones, newspaper machines, parking meters, etc. A lateral clearance of 0.6 meters (2 feet)

wide should be provided along the fronts of stores for window shopping and outside displays. In cases where sidewalk width is adequate for travel, this dimension may be widened and used for outside dining.

Trail Widths

Trails should be at least 3 meters (10 feet) wide. AASHTO's *Guide for the Design of Bicycle Facilities* (1991) recommends 3.7 meters (12 feet) paved width when bicycles share paths with other users, plus 0.6 to 0.9 meters (2 to 3 feet) or more graded clear area next to the paved path. Trails may widen at street crossings to provide queuing area for users waiting to cross. On trails with heavy use or situations such as curves, paint stripes to separate travel directions may be considered if necessary. Wider trails or separate pedestrian paths (where practical) are preferable to painted lane markings.

Crosswalks

Pedestrian crossings should be designed to be as short as practicable. Curb extensions ("bulb-outs") and / or tighter turning radii at intersections provide shorter crossing distances and may be appropriate in some situations. According to the MUTCD, crosswalks should be at least 6 feet wide and potentially up to 12 feet wide or more based on adjoining sidewalk width and pedestrian volumes. They should be located at all signalized intersections, at all school crossing locations, and where pedestrians may be confused about the preferred crossing location. Crosswalks should be located in relation to desire lines between nearby activity centers. Crosswalks should be well marked. Upstream signs should be provided warning motorists of pedestrians crossing. Motorist caution signs should be located according to the MUTCD, and other locations where appropriate. Crosswalks should also be well lighted at night. Signs educating motorists of the Massachusetts state law ("Yield to Pedestrian in Crosswalk") may be located at crosswalks and / or at other prominent locations within a municipality.

Cities, towns, responsible agencies, and other organizations may consider developing a check list like this to incorporate into review guidelines. They should tailor it for detailed review of proposals for different types of permits or use it more generally to make sure the appropriate questions concerning pedestrians are being raised.

Design and Engineering Check List

The following check list provides examples of pedestrian accommodation issues to be addressed early in the design process (prior to 25 percent design).

Developed Areas

Suburban areas with development along busy roadways:

Sidewalks:

- ❑ provided on both sides of arterial and collector streets in developed areas
- ❑ protected by curb, swale, or guard rail
- ❑ connect to surrounding pedestrian circulation with crosswalks
- ❑ sidewalks and crossings meet MAAB and ADA criteria (curb ramps, slope, width)
- ❑ includes planting strip with minimum width of 0.6 meters (2 feet), greater width where practical

Crosswalks:

- ❑ at intersections designed to shorten crossing distance
- ❑ between intersections, dependent on land uses, at location compatible with traffic speed, sight lines, roadway width
- ❑ signalized as appropriate
- ❑ median refuge provided where necessitated by number of lanes and traffic volumes
- ❑ well marked
- ❑ motorist caution signs at crosswalk and upstream
- ❑ well lighted

Pedestrian-Oriented Areas

Downtowns and Town or Village Centers:

apply all of the above items for developed areas and the items below

- ❑ roads designed and posted for 40-48 kmph (25-30 mph) speeds
- ❑ provision for on-street parking, street trees, adequate sidewalk width
- ❑ intersections and driveways designed for slow turning speeds
- ❑ intersections designed to minimize crossing distances for pedestrians
- ❑ provision of adequate shared outside lane width for bicycles, or provision of bicycle lanes

Less Developed Areas

Agencies with responsibility should consider the need for sidewalks and where reasonable, construct them along sections where land uses would generate seasonal or year-round pedestrian traffic.

Priority locations for sidewalks are:

- ❑ connecting concentrations of employment (20 or more employees) to bus or rail transit stops / stations no more than 1 kilometer (0.6 mile) away
- ❑ connecting commercial establishments located within 60 meters (200) feet of each other on either side of roadway
- ❑ connecting commercial establishments to residential concentrations (10 or more units) or employment concentrations located within 800 meters (0.5 mile / 10 minute walk)
- ❑ connecting residential concentrations within 800 meters (0.5 mile / 10 minute walk) of school bus stops
- ❑ filling walkway gaps less than 800 meters (0.5 mile / 10 minute walk) long
- ❑ connecting schools to residential concentrations within 3.2 kilometers (2 miles), where provision of the sidewalk will render the roadway an appropriate walking route to the school
- ❑ other areas where there is current evidence of frequent pedestrian use (such as beaten path) or pedestrians observed walking

Mid-block crosswalks should be considered:

- ❑ where any of the above generators of pedestrian activity lie on opposite sides of the roadway. A well marked and lighted crosswalk should, where reasonable, be provided at a location with adequate sight distances [Sec 3.11 of the MassHighway Highway Design Manual] and central to each land use concentration or at intervals of 150 meters (500 feet) in cases where commercial land uses extend along the roadway for 300 meters or more.

Cities, towns, responsible agencies, and other organizations may consider developing a check list like this to incorporate into review guidelines. They should tailor it for detailed review of proposals for different types of permits or use it more generally to make sure the appropriate questions concerning pedestrians are being raised.

Performance Measures for Assessing Progress Towards Pedestrian Plan Goals and Objectives

Measuring the effect of pedestrian projects and programs requires sustained effort to compile and maintain data of several kinds. Some projects or programs have very quantifiable results while others are more qualitative in nature. For example, tracking pedestrian-vehicle accidents statewide or at a particular site is a simple quantifiable measure, while determining the effect of a new zoning ordinance is complicated and dependent on many factors and thus requires judgment that may be difficult to standardize. The measures below represent a range of potential techniques and methods for monitoring the effectiveness of various actions taken to improve walking conditions.

Encourage Walking

- ❑ Pedestrian counts at selected activity centers, such as retail nodes, on a periodic basis by local public works, planning or other agencies.
- ❑ Walk access to transit at selected multimodal stations or systemwide, based on observations and surveys.

Local/Regional Safety Initiatives

- ❑ Trends in accidents involving pedestrians.
- ❑ List of pedestrian safety projects and programs initiated / implemented each year.
- ❑ Spot safety improvement program (e.g., track programs developed and implemented, count number of locations reported and fixed each year).

Development Patterns

- ❑ List of bylaws and regulations adopted each year which facilitate walking. Maintain list of pedestrian-oriented development regulations for use around the state.

Continuous Networks

- ❑ List of projects that fill gaps in the walkway network each year.
- ❑ Cumulative map of network growth.

Design and Maintenance

- ❑ List of projects each year improving the quality and quantity of the walkway system.

Priority and Consideration

- ❑ Number of projects and programs that increase pedestrian priority and amounts spent, monitored by appropriate agencies.
- ❑ Number of intersections where geometry, crosswalks, signals, signal timing were improved to accommodate pedestrians, monitored by appropriate agencies.

Planning Process

- ❑ List of institutional improvements and initiatives to facilitate pedestrian goals in planning and communication among agencies and communities.
- ❑ Efforts to develop / maintain pedestrian data inventories and update performance measures (e.g., programs to share information about pedestrian planning).

Outreach and Partnerships

- ❑ Number of public-private sector partnerships formed and continued each year.
- ❑ Tangible gains from partnership efforts (e.g., mileage of sidewalks designed and constructed).
- ❑ Establishment of Massachusetts Pedestrian Advisory Committee
- ❑ List of local and regional Pedestrian Advisory Committees.

B Annotated Bibliography

The following is a list of sources cited in this document and / or other useful references for pedestrian planning and design. Sources are grouped as follows:

- Documents cited
- Federal, State, Regional, and Local Publications
- Other Pedestrian Planning Sources

Cited Documents

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The study sets national goals for improving walking conditions. Includes national information on current levels of bicycling and walking and provides examples of successful state and local projects programs. Also includes 24 case studies on topics including: promotion of walking and bicycling; impediments to walking and bicycling; funding sources; transportation potential; environmental and health benefits; examples from overseas; environmental design; and others.

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Results of the 1990 Nationwide Personal Transportation Survey. Raw data is also available on CD-ROM. Both printed and digital data can be obtained from the Bureau of Transportation Statistics, Office of Highway Information Management, FHWA, Washington, D.C. 20590.

Physical Activity and Health: A Report of the Surgeon General, Executive Summary. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1996. Washington, DC.

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Safety Effectiveness of Highway Design Features, Volume VI: Pedestrian and Bicyclists. FHWA, DOT, 1992. Washington, DC.

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Policies and practices for improving bicycling conditions in Massachusetts.

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Massachusetts Transportation Facts. 1995. Prepared for EOTC, by Central Transportation Planning Staff.

A fact book about the Massachusetts transportation system. Includes statistics about highway, transit, air, freight, pedestrian, and bicycle transportation in Massachusetts.

Accessing the Future: The Intermodal Transportation Policy Plan for the Commonwealth of Massachusetts. EOTC, 1995.

The mission, policies, goals and objectives for the Massachusetts transportation system. Addresses trends and services in passenger and freight transportation, the regulatory framework, environmental quality, financing, and ISTEA management systems.

Highway Design Manual, 1997 Metric Edition. MassHighway, Boston, MA.

This manual includes design standards for both urban and rural roads along with guidelines for pedestrian and bicycle use.

Wheelchair Ramp Standards. Massachusetts Highway Department, 10/8/97.

Architectural Access Board Rules and Regulations, 521 CMR.

The regulations governing accessible design in Massachusetts.

Community Walking Resource Guide. Prepared for MassHighway by WalkBoston, August 1996. Boston, MA.

Illustrative examples of low-cost, short-term improvements undertaken by cities and towns throughout Massachusetts.

Travel Scope: 1995 Domestic Travel. 1995. Prepared for Massachusetts Office of Travel and Tourism by Travel Industry Association of America / U.S. Travel Data Center

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Traffic Flow Fundamentals. Adolf D. May. Prentice-Hall, Inc. New Jersey 1990. ISBN 0-13-926072.

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The Pedestrian Environment & Building Orientation. December 1993. Prepared for 1000 Friends of Oregon by Parsons, Brinckerhoff, Quade, and Douglas, Inc. Et. Al.

Reports of the LUTRAQ effort in Portland, OR. Discusses modeling procedures and results of intergrating pedestrian factors into regional transportation models.

The Influence of Environmental Design on Pedestrian Travel. 1996. Katherine Shriver. Community and Regional Planning Program, University of Texas at Austin.

A study comparing walking behavior and environmental design in a range of neighborhoods in Austin, Texas.

Accommodating the Pedestrian: Adapting Towns and Neighborhoods for Walking and Bicycling. Richard Untermann. Van Nostrand Reinhold Company, 1984, New York.

A comprehensive manual on pedestrian travel and planning / design guidelines for cities, towns and neighborhoods. Reviews options for adapting neighborhoods, downtowns, and suburban areas for walking. Includes some discussion of bicycling.

State and Local Sources

Regional Transportation Plans. By Massachusetts RPAs / MPOs

Each region prepares a regional transportation plan every three years in accordance with ISTEA. All plans include a pedestrian and bicycle element, and can be obtained for each RPA listed in Appendix C.

The VMT Reduction Workbook. Pioneer Valley Planning Commission. September 1995. West Springfield, MA.

A collection of tools for planners and community organizers to use in promoting development patterns that minimize vehicle use and improve air quality. Includes discussion of implementation through zoning, public / private partnerships, regional planning, and incentives. Not limited to improvements to pedestrian conditions.

Forging a Link Between Land Use and Transportation Planning in the Pioneer Valley Region. Pioneer Valley Planning Commission. February 1995. West Springfield, MA.

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Reviews benefits of expanding the role of pedestrian travel in the transportation system. Discussion of land use, transportation, and urban design factors that influence the decision to walk. Summarizes techniques to redesign streets to increase pedestrian safety and convenience. Although developed for communities in Washington most lessons are transferable to other states. Contact the Washington State Energy Office, 925 Plum St. SE PO Box 43165, Olympia, WA 98584-3156. Phone: 360-956-2068.

Making Streets That Work: A Neighborhood Planning Tool. City of Seattle, Design Commission and Engineering Department, May 1996.

A detailed tool kit for improving walking conditions through the neighborhood planning process in Seattle. Many of the tools have widespread applicability and may be used in cities and towns in Massachusetts. Includes extensive bibliography. Video and report.

Other Pedestrian Planning Sources

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Include a definition of pedestrian level of service, general information on the characteristics of pedestrian travel and elements of pedestrian planning and design. Also includes a chapter on elevators, escalators, moving walkways, and other people movers.

C Regional Planning Agencies

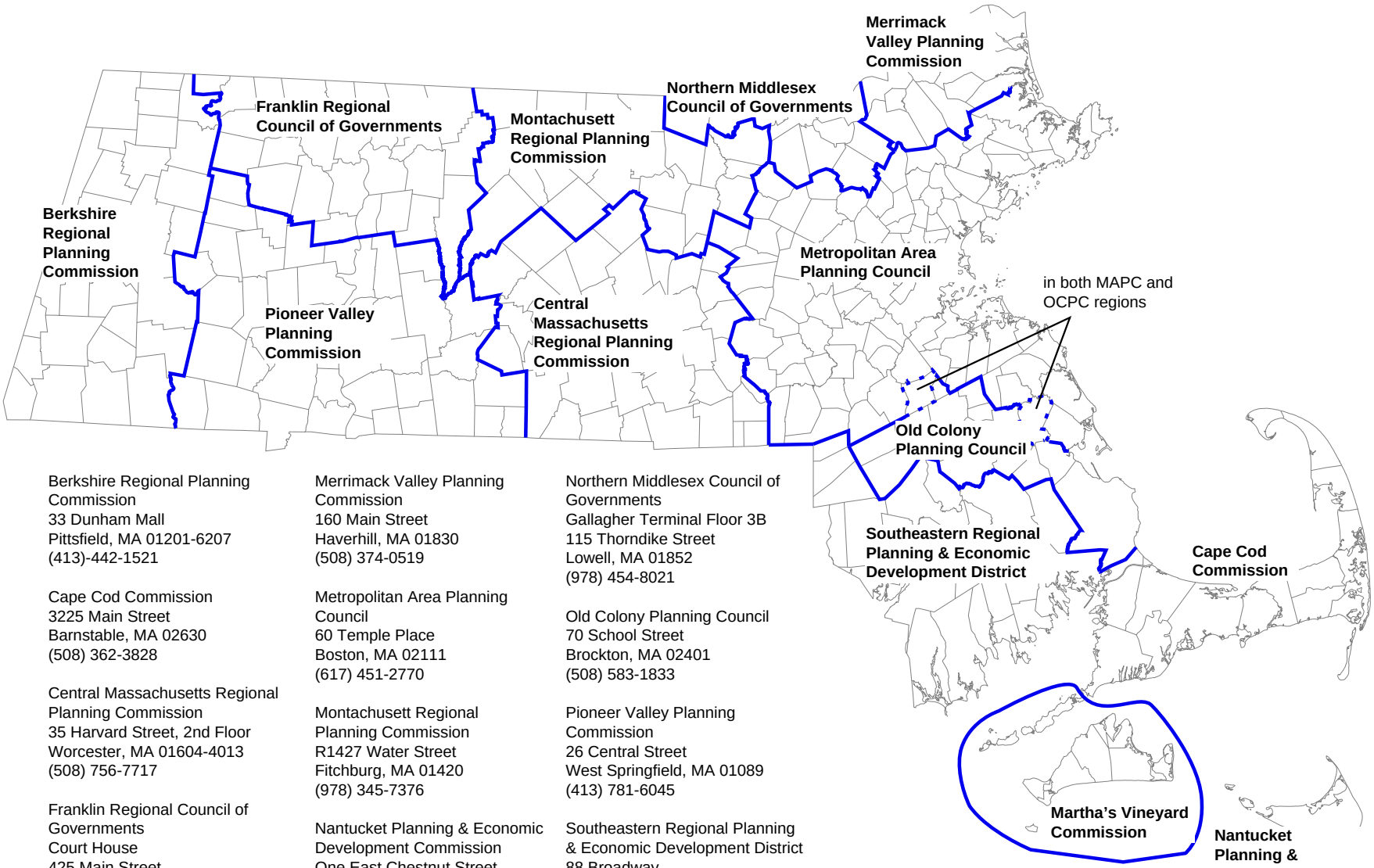
The 13 Massachusetts Regional Planning Agencies (RPAs) represent member cities and towns in all regions of the state. RPAs conduct a variety of activities ranging from land use and environmental planning to growth management and transportation planning. RPAs provide technical assistance to cities and towns and coordinate planning at the regional level.

Metropolitan Planning Organizations (MPOs) are committees of state transportation agencies and local cities and towns that aid in the distribution of federal transportation funds. The Central Transportation Planning Staff (CTPS) staffs the Boston MPO, while all other MPOs have staff that work at the RPAs. Each MPO also maintains a public advisory process through Joint Regional Transportation Committees (JRTCs or JTCs in some regions).

Through the Transportation Improvement Program (the TIP process) RPAs / MPOs develop a list of projects for funding for a three-year horizon. This process includes all highway and transit projects, many of which include pedestrian accommodation. Each region works closely with MassHighway to direct funding to projects. MassHighway compiles all regional TIPs and publishes a Statewide TIP (the STIP). Every three years the RPAs / MPOs also revise their Regional Transportation Plans (RTPs) in accordance with ISTEA. RTPs outline regional policies and potential projects for a 20 year horizon. Each long range plan includes a section or chapter that address pedestrian issues.

For more information regarding the state and regional transportation planning process contact the RPA in your region. The following pages provide contact information for each RPA.

Regonal Planning Agencies in Massachusetts



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Mount Washington
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Provincetown
Sandwich
Truro
Wellfleet
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CMRPC
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Millville
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North Brookfield
Northborough
Northbridge
Oakham
Oxford
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Rutland
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Sturbridge
Sutton
Upton
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Warren
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Mansfield
Norton
Pembroke**
Plymouth
Plympton
West Bridgewater
Whitman

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RPA Acronyms

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CCC
Cape Cod Commission

CMRPC
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FRCOG
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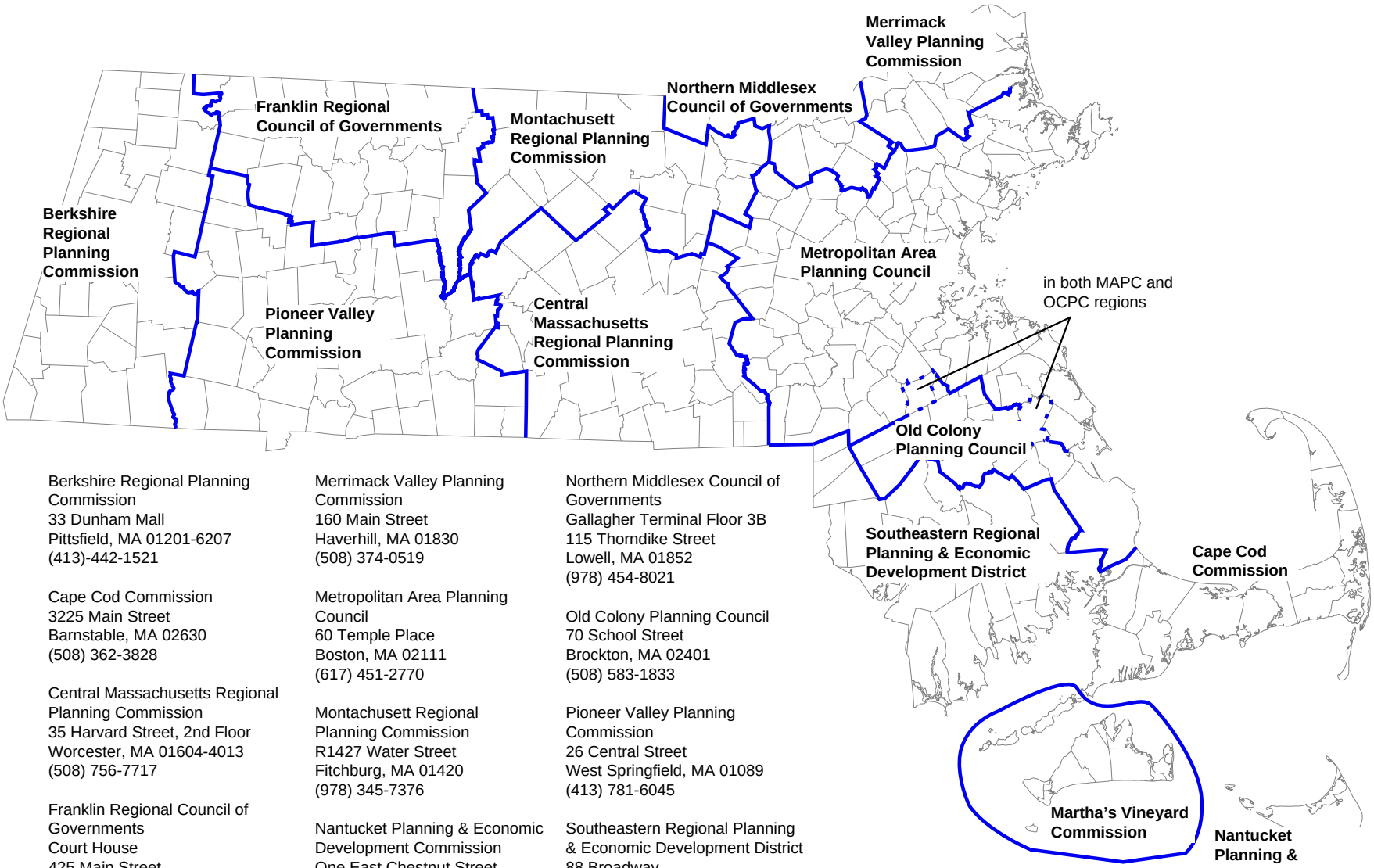

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D EXCERPTS OF MASSACHSETTS GENERAL LAW AND CODE OF MASSACHUSETTS REGULATIONS

The following pages are excerpts of Massachusetts General Law (MGL) and the Code of Massachusetts Regulations (CMR) that are referenced in the proceeding chapters.

- MGL Chapter 40, Section 21: By-laws of Towns; Purposes
- MGL Chapter 85, Section 11B: Bicycles
- MGL Chapter 89, Section 11: Marked Crosswalks
- House Bill 1940, Chapter 87: Public Ways - Bicycle, Pedestrian Access
- Transportation Bond Bill 1994, Section 96 (MBTA)
- CMR Title 720, Chapter 9.09: Pedestrian Regulations

MASSACHUSETTS GENERAL LAWS. PART 1. ADMINISTRATION OF THE GOVERNMENT.

TITLE V11. CITIES, TOWNS AND DISTRICTS

CHAPTER 40. POWERS AND DUTIES OF CITIES AND TOWNS ORDINANCES, BY-LAWS AND REGULATIONS. Sec. 21. By-Laws of Towns; Purposes

Clause (3). For providing for the removal of snow and ice from sidewalks, within the limits of the public way therein to such extent as they deem expedient. The penalty for the violation of such by-laws shall apply to the owner of abutting property or his agent having charge thereof.

TITLE XIV. PUBLIC WAYS AND WORKS

CHAPTER 85. REGULATIONS AND BY-LAWS RELATIVE TO WAYS AND BRIDGES. Sec. 11B. Bicycles; operation and equipment; regulations; federal product safety standards effect; races; violations; penalties.

Every person operating a bicycle upon a way, as defined in section one of chapter ninety, shall have the right to use all public ways in the commonwealth except limited access or express state highways where signs specifically prohibiting bicycles have been posted, And shall be subject to the traffic laws and regulations of the commonwealth and the special regulations of the commonwealth and the special regulations contained in this section, except that: (1) the bicycle operator may keep to the right when passing a motor vehicle which is moving in the travel lane of the way, (2) the bicycle operator shall signal by either hand his intention to stop or turn, and (3) bicycles may be ridden on sidewalks outside business districts when necessary in the interest of safety, unless otherwise directed by local ordinance. A person operating a bicycle on the sidewalk shall yield the right of way to pedestrians and give an audible signal before overtaking and passing any pedestrian.

CHAPTER 89. LAW OF THE ROAD. SEC. 11. Marked crosswalks; yielding right of way to pedestrians; penalty.

When traffic control signals are not in place or not in operation the driver of a vehicle shall yield the right of way, slowing down or stopping if need be so to yield to a pedestrian crossing the roadway within a crosswalk marked in accordance with standards established by the department of highways, if the pedestrian is on that half of the traveled part of the way on which the vehicle is traveling or, if the pedestrian approaches from the opposite half of the traveled part of the way to within five feet of that half of the traveled part of the way on which said vehicle is traveling.

No driver of a vehicle shall pass any vehicle which has stopped at a marked crosswalk to permit a pedestrian to cross, nor shall any such operator enter a marked crosswalk until there is a sufficient space beyond the crosswalk to accommodate the vehicle he is operating, notwithstanding that a traffic control signal may indicate that vehicles may proceed.

Whoever violates any provision of this section shall be punished by a fine of not more than one hundred dollars.

CHAPTER 87. H.B. NO. 1940. PUBLIC WAYS-BICYCLE, PEDESTRIAN ACCESS

An ACT relative to bicycle and pedestrian access in construction of public ways.

Be it enacted by the Senate and House of Representatives in General Court assembled and by the authority of the same, as follows:

Chapter 90E of the General Laws is hereby amended by inserting after section 2, as appearing in the 1994 Official Edition, the following section:

<< MA ST 90E Sec. 2A >>

Section 2A. The commissioner shall make all reasonable provisions for the accommodation of bicycle and pedestrian traffic in the planning, design, and construction, reconstruction of maintenance of any project undertaken by the department. Such provisions that are reasonable shall include, but not be limited to, those which the commissioner, after appropriate review by the bicycle program coordinator, determines would be contrary to acceptable standards of public safety, degrade environmental quality or conflict with existing rights of way.

Approved May 20, 1996

Transportation Bond Bill 1994, Section 96 (MBTA)

The general manager of the Massachusetts Bay Transportation Authority, or a designee of the general manager, is hereby authorized and directed to provide for the accommodation of bicycle patrons and pedestrians in the planning, design, reconstruction and construction of any project undertaken by the authority unless the general manager, or a designee of the general manager, determines that the inclusion of such accommodation in such project would be contrary to acceptable standards of public safety, would degrade environmental quality, or would conflict with existing rights of way.

32293 CODE OF MASSACHUSETTS REGULATIONS. TITLE 720: DEPARTMENT OF HIGHWAYS. CHAPTER 9.00: DRIVING ON STATE HIGHWAYS

Current with Amendments received through Register Number 778

9.09: Pedestrian Regulations

(1) Pedestrians Crossing Ways or Roadways.

Pedestrians shall obey the directions of police officers directing traffic whenever there is an officer directing traffic, a traffic control signal or a marked crosswalk within 300 feet of a pedestrian, no such pedestrian shall cross a way or roadway except within the limits of a marked crosswalk and as hereinafter provided in 720 CMR 9.00.

(2) Pedestrian Actuation.

(a) At a traffic control signal location where pedestrian indications are provided but which are shown only upon actuation by means of a pedestrian push button, no pedestrian shall cross a roadway unless or until the pedestrian control signal push button has been actuated and then cross only on proper pedestrian signal indication. At traffic control signal locations where no pedestrian indication is provided, pedestrians shall cross only on the green indication. If necessary, the green indication shall be actuated by the pedestrian by means of a push button.

(b) At a traffic control signal location, pedestrians shall yield the right of way to vehicles of a funeral or other procession or authorized emergency vehicle while in performance of emergency duties, regardless of the signal indication given, and they shall not attempt to cross the roadway until such vehicles or procession has passed, at which time pedestrians shall then cross the roadway only as provided in 720 CMR 9.00.

(3) Pedestrian Obedience to Traffic Control Signals.

Traffic control signal color indications and legends shall have the pedestrian commands ascribed to them in 540 CMR 3.09(3) and no other meanings and every pedestrian shall comply therewith, except when otherwise directed by an officer.

(a) Red and Yellow or the Word "Walk". Whenever the red and yellow lenses are illuminated together or the single word "walk" is illuminated, pedestrians facing such indication may proceed across the roadway and in the direction of such signal only.

(b) Red Alone or "Don't Walk". Whenever the words "Don't Walk" or any indication other than red and yellow shown together are illuminated in a traffic control signal where pedestrian indications are provided, pedestrians approaching or facing such indication shall wait on the sidewalk, edge of roadway or in the pedestrian refuge area of a traffic island until the proper indication is illuminated in the traffic control signal, but any pedestrian who has partially completed his crossing on the walk indication shall proceed or return to the nearest sidewalk or safety island on the yellow indication,

the red indication or when the words "Don't Walk" are illuminated by rapid intermittent flashes.

*32294 (c) Green Alone. At traffic control signal locations where no pedestrian indication is given or provided, pedestrians facing the signal may proceed across the roadway within any marked crosswalk in the direction of the green indication.

(d) Yellow Alone, Red Alone or Flashing "Don't Walk". Pedestrians approaching or facing a yellow, red or flashing "Don't Walk" illuminated indication shall not start to cross a roadway.

(e) Flashing Red, Yellow or Green. At any traffic control signal location where a flashing red, flashing yellow or flashing green indication is being given facing a crosswalk, pedestrians shall actuate, where provided, the pedestrian signal indication and cross the roadway when such indication is in operation. If no pedestrian signal is provided, pedestrians shall cross within crosswalks with due care.

(4) Pedestrian Crossings and Use of Roadways.

(a) No pedestrian shall suddenly leave a sidewalk or safety island and walk or run into the path of a vehicle which is so close that it is impossible for the driver to yield the right of way.

(b) Pedestrians shall at all times attempt to cross a roadway using the right half of crosswalks.

(c) Where sidewalks are provided, it shall be unlawful for any pedestrian to walk along and upon an adjacent roadway whenever the sidewalk is open to pedestrian use.

(d) Where sidewalks are not provided, any pedestrian walking along and upon an undivided highway shall, when practicable, walk only on the left side of the roadway on its unfinished shoulder facing traffic which may approach from the opposite direction. On any divided highway, pedestrians, not in violation of 540 CMR 3.08(2)(c), shall walk only on the right side of the roadway on the unfinished shoulder.

(e) Persons alighting from the roadway side of any vehicle parked at the curb or edge of roadway in urban areas within 300 feet of a marked crosswalk, shall proceed immediately to the sidewalk or edge of roadway adjacent to vehicle, and shall cross the roadway only as authorized by 720 CMR 9.00.

(f) It shall be unlawful for any person to actuate a pedestrian control signal or to enter a marked crosswalk unless a crossing of the roadway is intended.

(5) Crossing at Non-Signalized Locations.

Every pedestrian crossing a roadway in an urban area at any point other than within a marked crosswalk shall yield the right of way to all vehicles upon the roadway. At a point where a pedestrian tunnel or overpass has been provided, pedestrians shall cross the roadway only by the proper use of the tunnel or overpass.

E Funding Sources

Listed below are selected funding sources available for pedestrian projects. To find out more about each funding source, contact the appropriate agency. Note that these sources are subject to change.

- Federal Sources
- State Sources
- Local Sources

Federal Sources

Intermodal Surface Transportation Efficiency Act

In 1991, Congress passed the International Surface Transportation Efficiency Act (ISTEA, which expired in 1997). This Act provided potential funding for pedestrian improvements through a number of different sources. The following information is from *Bicycle and Pedestrian Provisions* published by the U.S. Department of Transportation.

National Highway System Funds

National Highway System Funds may be used to construct pedestrian walkways on land adjacent to any highway on the National Highway System (other than the Interstate System). These facilities must be principally for transportation rather than recreation. These facilities must be located and designed pursuant to an overall plan developed by each metropolitan planning organization and state.

Surface Transportation Funds

Surface Transportation Program (STP) Funds may be used for either the construction of pedestrian walkway facilities or non-construction projects (such as brochures, public service announcements and route maps) related to safe walking. These projects must be located and designed pursuant to an overall plan developed by each MPO and state.

Ten per cent of each state's annual STP funds are available only for Transportation Enhancement Activities (TEAS). Of the 10 defined TEAS, two are specifically bicycle- and pedestrian-related: "provision of facilities for bicyclist and pedestrians" and "preservation of abandoned railway corridors (including the conversion and use thereof for pedestrian or bicycle trails)".

Congestion Mitigation and Air Quality Improvement Program Funds

Congestion Mitigation and Air Quality (CMAQ) Improvement Program Funds may be used for either the construction of pedestrian walkway facilities or non-construction projects (such as brochures, public service announcements and route maps) related to safe walking. These projects must be principally for transportation rather than recreation. These pedestrian projects must be located and designed pursuant to an overall plan developed by each MPO and state.

Federal Lands Highway Funds

Federal Lands Highway Funds may be used to construct pedestrian walkway facilities in conjunction with roads, highways and parkways at the direction of the department charged with the administration of such funds. These projects must be principally for transportation rather than recreation. These pedestrian projects must be located and designed pursuant to an overall plan developed by each MPO and state.

Scenic Byways Programs Funds

Scenic Byways Programs Funds may be used to construct facilities for the use of walkers.

National Recreational Trails Fund

National Recreational Trails Fund money may be used for a variety of recreational trails programs to benefit walkers. Projects must be consistent with a Statewide Comprehensive Outdoor Recreation Plan

required by the Land and Water Conservation Fund Act. This Fund is administered by DEM with MassHighway oversight.

Section 402 Funding
Pedestrian and bicyclist safety remain priority areas for highway safety program funding. Title II, Section 3002 of the ISTEA addresses the state and highway safety grant program funds. The priority status of safety programs for pedestrians and bicyclists expedites the approval process for these safety efforts.

A program guideline has been developed to offer states guidance in developing and managing a statewide bicycle and pedestrian safety program.

National Park Service
The National Park Service also provides funding for trail development and conservation through the following programs:

Land and Water Conservation Fund

Land and Water Conservation Fund money can be used for the acquisition, development or renovation of park, recreation or conservation areas.

Rivers and Trails Conservation Assistance Program

The National Parks Service offers expertise, skills and resources to eligible communities through the Rivers and Trails Conservation Assistance Program. Examples of assistance include Corridor Studies, Protection and Workshops.

State Sources

Governor's Highway Safety Bureau
Funding from the Governor's Highway Safety Bureau can be used for small-scale physical improvements and for pedestrian safety programs.

Department of Environmental Management
The Department of Environmental Management does not have money earmarked for walking improvements; however, it can acquire and develop abandoned rights-of-ways. DEM also funds walking trail improvements through the National Recreational Trails Fund.

MassHighway
MassHighway will fund walkways in conjunction with other projects if community support exists and if there is a demonstrated need for the project. Projects should be geared primarily for pedestrian transportation. Priority is given to those communities that pay for engineering designs and acquire all necessary permits beforehand.

For additional funding information, see the current Massachusetts Highway Department State Aid Manual.

Local Sources

The potential of raising money within your own community should not be overlooked.

Mailing low-cost brochures to community residents can be an effective part of a fund-raising plan.

Publicize fund-raisers in local newspapers and through outdoor displays, suggesting how much has been raised and how much is needed.

Another option is to "sell" lengths of path to contributors. For instance, each contributor could "buy" a path section for a $25.00 donation. Donors names could be listed in the newspaper. When the project is completed, the contributor list could be placed at the start of the path.

If your community feels it has participated, it will have a stronger sense of ownership. this will greatly aid in the project's long-term success.