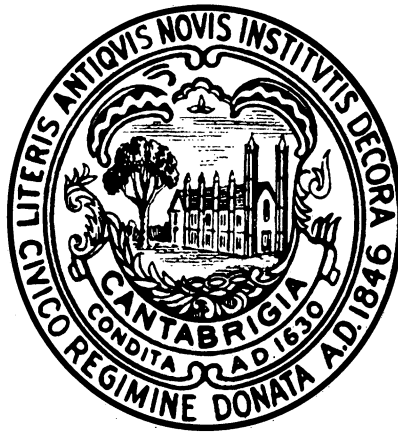


**Pedestrian
Plan**

Pedestrian

Plan

Cambridge Pedestrian Plan



www.ci.cambridge.ma.us/

CITY OF CAMBRIDGE

2 · 0 · 0 · 0

City of Cambridge

Robert W. Healy, City Manager

Richard C. Rossi, Deputy City Manager

Beth Rubenstein, Assistant City manager for Community Development

Malaina Bowker, Deputy Director for Community Development

The Cambridge Pedestrian Plan has been written with considerable input from the following people:

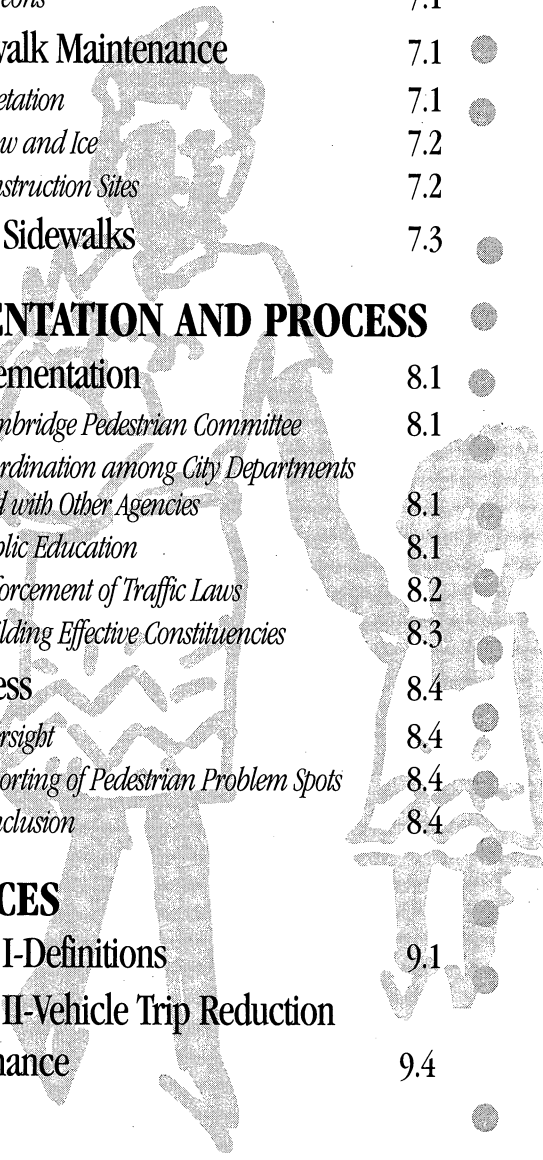
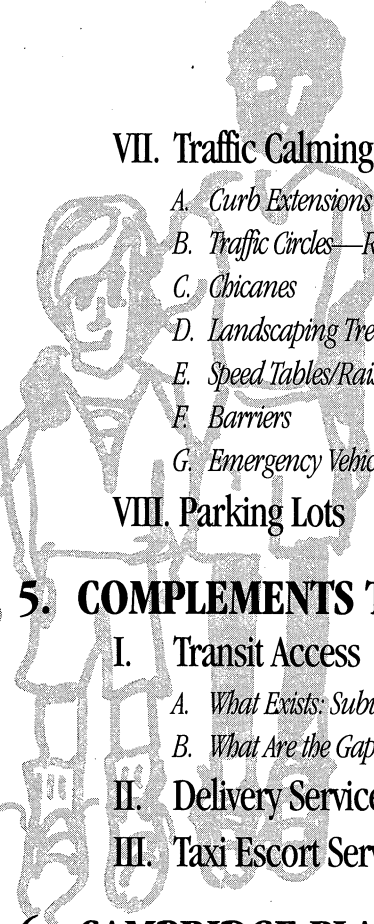
Members of the Cambridge Pedestrian Committee, especially Richard Bock, Astrid Dodds, Doug Lee, and Michael Owu

Community Development Department staff, especially Rosalie Anders, Roger Boothe, Susanne Rasmussen, Cara Seiderman, and Kathy Watkins

Department of Traffic, Parking and Transportation staff, especially Dave Bryant and Sue Clippinger

and the Department of Public Works, especially Ann Daughaday.

Many of the graphics come from *The Oregon Bicycle and Pedestrian Plan* and *The Portland (OR) Pedestrian Master Plan*.



VII. Traffic Calming	4.13
A. <i>Curb Extensions</i>	4.13
B. <i>Traffic Circles—Rotaries and Roundabouts</i>	4.14
C. <i>Chicanes</i>	4.15
D. <i>Landscaping Treatments</i>	4.15
E. <i>Speed Tables/Raised Crosswalks</i>	4.15
F. <i>Barriers</i>	4.16
G. <i>Emergency Vehicles</i>	4.16

VIII. Parking Lots	4.16
---------------------------	------

5. COMPLEMENTS TO WALKING

I. Transit Access	5.1
A. <i>What Exists: Subways, Buses, Paratransit</i>	5.1
B. <i>What Are the Gaps?</i>	5.1
II. Delivery Services	5.4
III. Taxi Escort Services	5.4

6. CAMBRIDGE PLAN

I. Street Classification	6.1
II. Major Nodes	6.1
A. <i>Central Square</i>	6.1
B. <i>Harvard Square</i>	6.2
C. <i>Inman Square</i>	6.4
D. <i>Kendall Square and Environs</i>	6.4
E. <i>Porter Square</i>	6.5
III. Spines	6.5
A. <i>Massachusetts Avenue</i>	6.5
B. <i>Cambridge Street</i>	6.6
IV. Other Major Commercial Areas	6.7
A. <i>Alewife Area</i>	6.7
B. <i>Lechmere/North Point</i>	6.8
V. Neighborhoods	6.9

VI. Pedestrian Network	6.9
A. <i>Paths, Routes through the City</i>	6.9
B. <i>Recreational Areas</i>	6.9

7. POLICIES, REGULATIONS, AND STANDARDS

I. Sidewalk Cleanliness	7.1
A. <i>Litter</i>	7.1
B. <i>Dogs</i>	7.1
C. <i>Pigeons</i>	7.1
II. Sidewalk Maintenance	7.1
A. <i>Vegetation</i>	7.1
B. <i>Snow and Ice</i>	7.2
C. <i>Construction Sites</i>	7.2
III. MDC Sidewalks	7.3

8. IMPLEMENTATION AND PROCESS

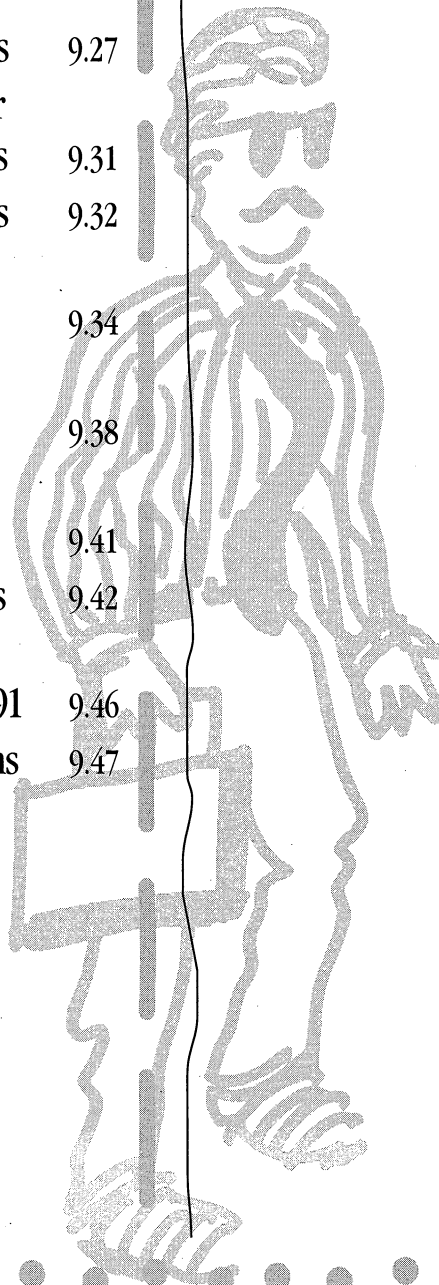
I. Implementation	8.1
A. <i>Cambridge Pedestrian Committee</i>	8.1
B. <i>Coordination among City Departments and with Other Agencies</i>	8.1
C. <i>Public Education</i>	8.1
D. <i>Enforcement of Traffic Laws</i>	8.2
E. <i>Building Effective Constituencies</i>	8.3
II. Process	8.4
A. <i>Oversight</i>	8.4
B. <i>Reporting of Pedestrian Problem Spots</i>	8.4
C. <i>Conclusion</i>	8.4

9. APPENDICES

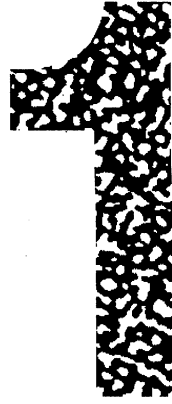
Appendix I-Definitions	9.1
Appendix II-Vehicle Trip Reduction Ordinance	9.4



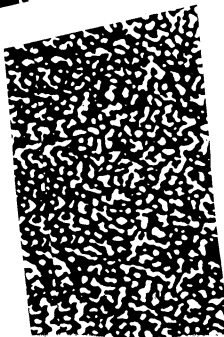
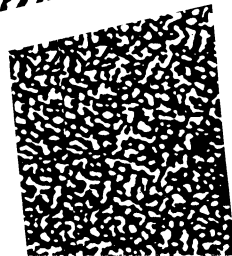
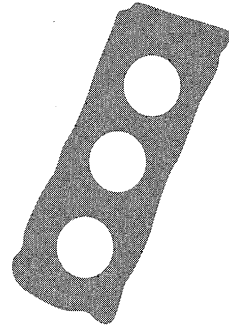
Appendix III-Transportation Cost Comparison	9.16
Appendix IV-Cambridge Households without Cars	9.18
Appendix V-Street Classification System	9.19
Appendix VI-Cambridge Traffic Regulations Related to Pedestrians and Bicyclists	9.20
Appendix VII- LOS Definitions for Pedestrians and for Motor Vehicles	9.27
Appendix VIII-Pavement Marking Plan for Standard Cross Street Intersections	9.31
Appendix IX- Wheelchair Ramp Standards	9.32
Appendix X-Sidewalk Construction Specifications	9.34
Appendix XI-Crosswalk Specifications for Inlays	9.38
Appendix XII-Fixed Obstacle Adjustment Factors for Walkways	9.41
Appendix XIII-Physical Activity and Fitness	9.42
Appendix XIV-Pedestrian Crashes with Automobiles in Cambridge, 1989-1991	9.46
Appendix XV-Cambridge Travel Lane Widths	9.47



O N E



Introduction



1. INTRODUCTION

I. Purpose of the Plan

The pedestrian plan has four major goals:

1. To provide policies and guidelines for facilities that will make walking safer, easier, and more attractive.
2. To provide design standards for physical improvements related to the pedestrian realm.
3. To outline steps to encourage walking as an alternative to automobile travel, as beneficial exercise, and as a benefit to the community.
4. To provide an action plan to create an economical and efficient non-automobile transportation network within Cambridge and connecting to other communities and destinations.

Given the city's age and the variety in its physical space, the plan will best achieve its intended goals if it is applied with sensitivity to the history and idiosyncrasies of each place.

II. Why Cambridge Promotes Walking

A. Federal, State, Regional, and Municipal Mandates, Policies, and Programs

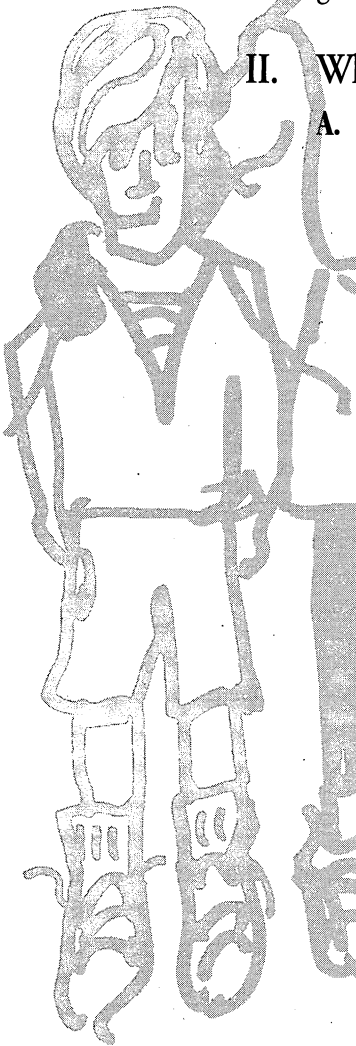
In the 1991 federal transportation appropriations act, known as the Intermodal Surface Transportation Efficiency Act, or ISTEA, Congress ordered a national study to determine current levels of bicycling and walking, both to learn why they are not used more for transportation and to develop a plan to increase their use. The resulting *National Bicycling and Walking Study* presents a plan of action on the federal, state, and local levels to double the current percentage of trips made by walking and bicycling and to reduce deaths and injuries to pedestrians and bicyclists by 10%. The Federal Highway Administration recommends that a pedestrian impact analysis be part of the review of all development plans.

Like ISTEA, its successor, TEA-21, the Transportation Equity Act for the Twenty-first Century, requires that 10% of the highway funds in the Surface Transportation Program component be used for "enhancement activities," which include bicycle and pedestrian facilities.

On the state level, *Accessing the Future: The Intermodal Transportation Policy Plan* calls for development of facilities that will make walking safer and attractive to more travelers. State law (Chapter 87) requires the highway commissioner to "make all reasonable provisions for the accommodation of bicycle and pedestrian traffic in the planning, design, and construction, reconstruction, or maintenance of any project undertaken by the department."

The Metropolitan Area Planning Council, the regional planning agency for Metropolitan Boston, has adopted a regional bicycle and pedestrian plan that calls for increased walking as a share of transportation.

The 1990 federal Clean Air Act Amendments require areas that do not meet clean air standards to adopt measures to improve air quality. The 1992 Vehicle Trip Reduction Ordinance (VTRO) is the legislation the Cambridge City Council adopted to meet these requirements. The ordinance mandates a variety of measures to encourage residents and people commuting to Cambridge to reduce



automobile use; these measures include creation of a pedestrian master plan and development of pedestrian amenities.

B. Cambridge Growth Policies

A city of walkers is integral to the vision for a sustainable Cambridge laid out in the 1994 Cambridge growth policy document, *Toward a Sustainable Future*.

The vision includes “significantly reduced automobile traffic. Walking, carpooling, public transit, bicycling and jitney trips are the norm.”

Good pedestrian facilities are important to realizing other goals articulated in the plan:

- *A vibrant, stable population of diverse races, cultures and viewpoints... where families with children can thrive.* A walkable city is especially important for people with disabilities, the elderly, children, and people who cannot afford to keep a car. Reducing automobile traffic increases children’s opportunities to engage in unstructured, active play with other children in their neighborhood.
- *Pollution prevention . . .* The automobile is the greatest single cause of air, water, and land pollution, and of global climate change. Most car trips in Cambridge are short trips; these create the most air pollution per mile driven and are the trips most easily replaced by walking.
- *A thriving economic base . . .* Good public transportation, which is only possible if many people are willing to walk to and from bus and subway stops to their destinations, is essential to the city’s economy. Cambridge is one of the most densely populated cities in the United States. Much of the conflict between new development and residential needs arises from concerns about automobile traffic and parking.¹
- *Vital and distinctive retail centers . . .* Pedestrians and public transportation are essential for the health of retail centers in Cambridge, where little space for expanded parking is available. Walkability is an important component of the city’s appeal as a tourist destination, especially as visitor parking is scarce in much of the city.
- *Strengthened and stabilized neighborhoods . . .* Studies have shown that the more automobile traffic on a street, the less interaction among neighbors.² Walking is itself a positive force for creating a sense of neighborhood. The more people meet each other on the street, the stronger and safer the neighborhood is.



C. Walking and Health

Evidence is growing that regular exercise is important for positive physical and mental health. Recent studies have suggested that moderate exercise such as walking offers many of the same health benefits as strenuous exercise. Walking helps prevent heart disease, obesity, hypertension,

- 1 In addition, automobile use costs the city money. The Conservation Law Foundation estimates that for every mile a person walks rather than drives alone the public saves \$.11 to \$.17 in tax dollars in direct costs, many of them paid by local communities (see Appendix II). There are also heavy indirect costs related to the effects of pollution on buildings, health, and water supplies.
- 2 Donald Appleyard, *Livable Streets*, Berkeley, U. of California Press (1981), pp. 15-39.

osteoporosis, diabetes, and depression (see Appendix XIII). About 50 percent of all Americans are overweight, and regular exercise is a key component of effective weight-loss programs.

Walking is the most readily available form of exercise; it does not require special preparation, equipment, or locations and can be easily incorporated into most people's daily lives. People are more likely to stick to walking than to other forms of exercise.³



Children need safe walking environments.

3 Paul Z. Siegel, Robert M. Brackbill, and Gregory W. Heath, "The Epidemiology of Walking for Exercise: Implications for Promoting Activity among Sedentary Groups," *American Journal of Public Health* (May 1995).

2. ANALYSIS/CONTEXT

I. The Role Walking Plays in Cambridge

Everyone is a pedestrian sometimes. Even habitual motorists turn into pedestrians when they park their cars. People who take public transportation generally walk some distance at one or both ends of their trips.

Some people depend heavily on walking:

- People who don't own cars**
 Of the city's 39,405 households, 11,107, or 28.2%, have no car, according to the 1990 US Census (see Appendix IV).
- Children and adolescents**
 Children under sixteen can't drive, and many Cambridge high school students over sixteen do not drive or do not have regular access to a car.⁴
- People with disabilities**
 Many people, including many elderly people, have disabilities that preclude driving.

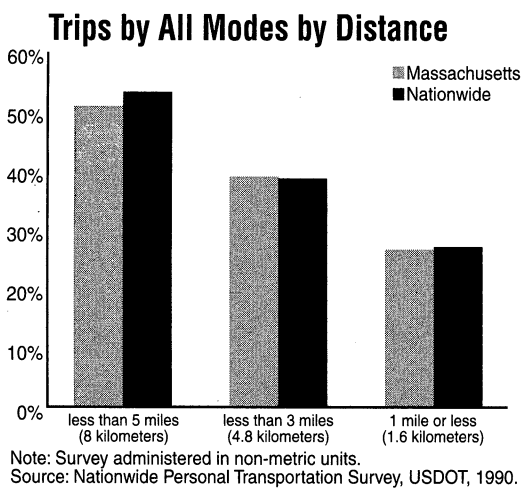


Figure 1: Trips by All Modes by Distance.

- College students**
 Harvard University and Massachusetts Institute of Technology (MIT) actively discourage students from bringing cars to Cambridge.
 Equitable access to the city for everyone who lives or works in Cambridge requires safe, convenient year-round pedestrian facilities.

People walk for many reasons. Among the most prominent are:

- Commuting**
 According to the 1990 US census, 25.4% of Cambridge residents walk to work and 24.5% take transit. This includes college students going to class. Of the 107,000 people who work in Cambridge, 13.3% walk to work, and 21.3% take transit. A 1994 survey found that about 11% of the people who work for the City walk to work.

Walking Distances, Times, and Speeds

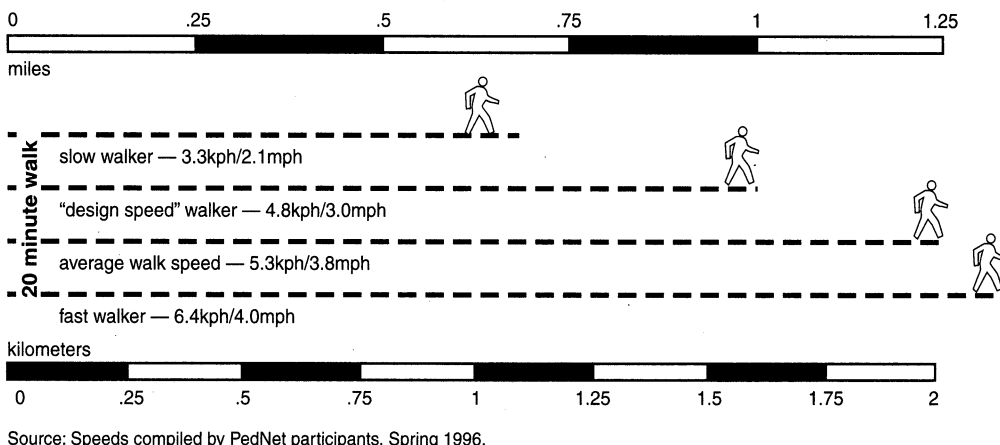


Figure 2: Walking Distances, Times, and Speeds.

4 Children in cities such as Cambridge are often more mobile than suburban children because they can get around more easily on foot, by bicycle, or by transit.

- **Travel to Other Destinations**

Most Cambridge residents live within a half mile of frequent destinations—a store, friend’s house, library, park, etc.—and many people walk regularly to one or more of these destinations.

- **Recreation**

For many people, walking is enjoyable. Walking for recreation is popular because it is relaxing, has health benefits, and offers a chance to be outdoors and to enjoy city life and nature.

II. The Pedestrian Realm

A. What Is Urban Design?

When considering how the city works for pedestrians, urban design is an essential element. In its most complete sense, urban design addresses all the ways that a city is structured. Urban design is often more narrowly defined as involving physical elements in the environment, such as streets and sidewalks, landscaping, lighting, signs, and benches. Both definitions are helpful in developing a pedestrian plan.

B. What Is the Pedestrian Realm?

The pedestrian realm includes walkways and open space. Pedestrian walkways are “prepared exterior routes designed to provide pedestrian accessibility. Walkways are general pedestrian routes, including plazas and courts, and sidewalks are walkways that parallel a vehicular roadway.”⁵

Plazas are outdoor spaces, open to the public, where pedestrians can pass through or gather. Often they are located at the intersection of two or more streets. Courts are indoor gathering places, often privately owned but open to the public.

Crosswalks are where the pedestrian travel path extends across a roadway (see Chapter 4, IV for a detailed description).

⁵ US Dept. of Transportation Federal Highway Administration, Planning, Design and Maintenance of Pedestrian Facilities (March 1989), Publication No. FHWA-IP-88-019, p. 75.

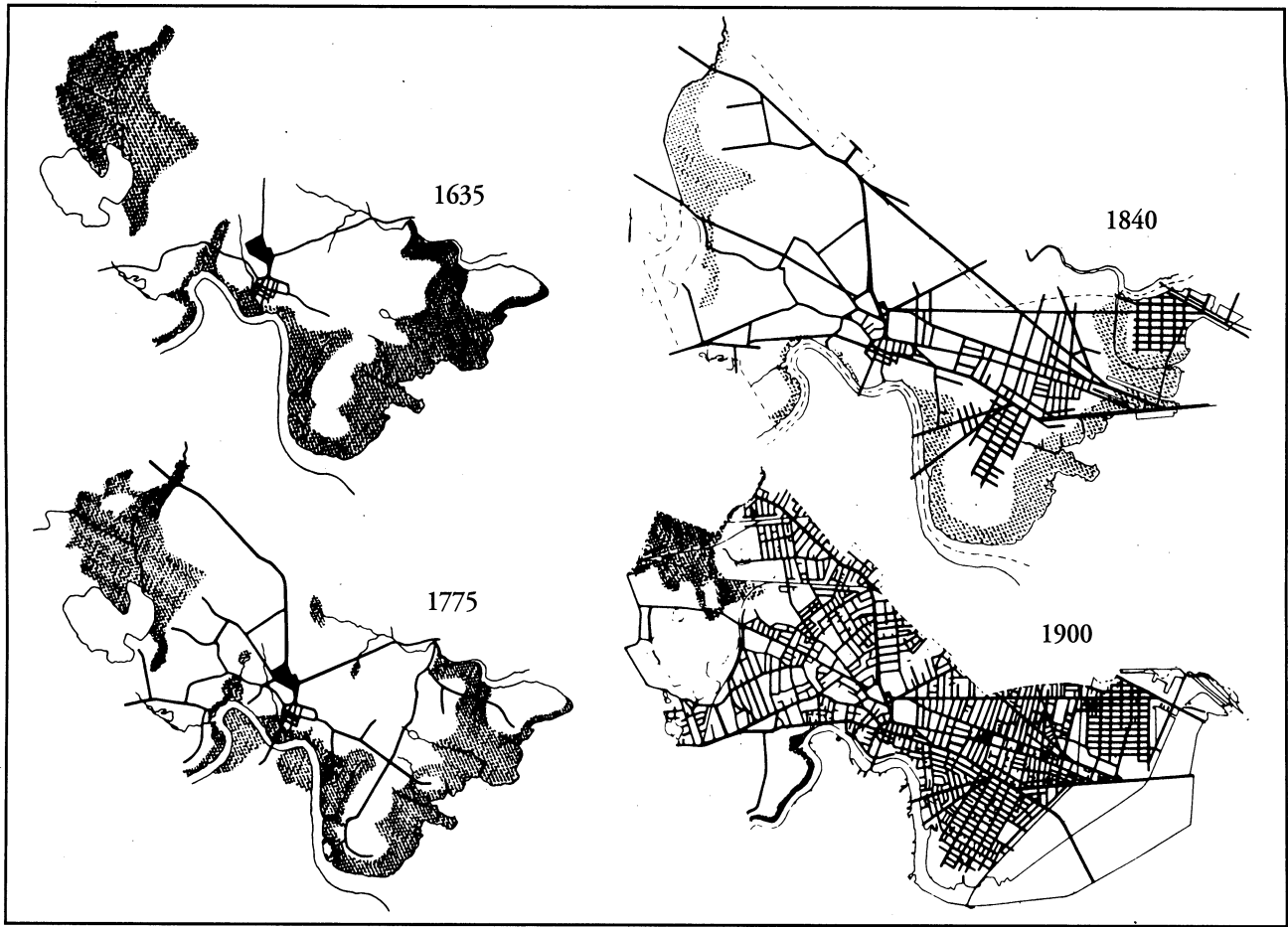


Figure 3: Four maps prepared by the Cambridge Historical Commission show street development of the territory that now makes up the City of Cambridge. The dates are approximate. The shaded areas represent marshes and mudflats that were eventually filled. The 1840 map clearly shows the three independently developing parts: Old Cambridge, Cambridgeport, and, at far right, rimmed by marshes, East Cambridge.

III. The Cambridge Pedestrian Realm

A. Historical Background

Over the past 350 years, Cambridge has grown incrementally, leaving us with varied conditions for walking. Inviting areas such as Harvard Square contrast with some that are quite unwelcoming to pedestrians, such as North Point and Alewife.

European settlement began in 1629, but for over two hundred years there was no city called Cambridge. Newtowne (around Harvard Square) and East Cambridge were independent villages separated by open space and farmlands. Some major streets were built to lead to bridges over the meandering Charles River to Boston. This combination of history and geography led to a layout of fairly long, straight major streets that resembled webs rather than a grid. In 1846 Cambridge was incorporated, and by 1900 the city was much more connected, with the development of fill-in streets in the emerging neighborhoods and railroad lines serving the newly created industrial areas. The city became densely populated, and in recent years the industrial sectors have become high-tech employment centers. The present street pattern reflects the city's evolution.

Because Cambridge was largely developed before the automobile was invented, much of it is built on a scale that accommodates people on foot

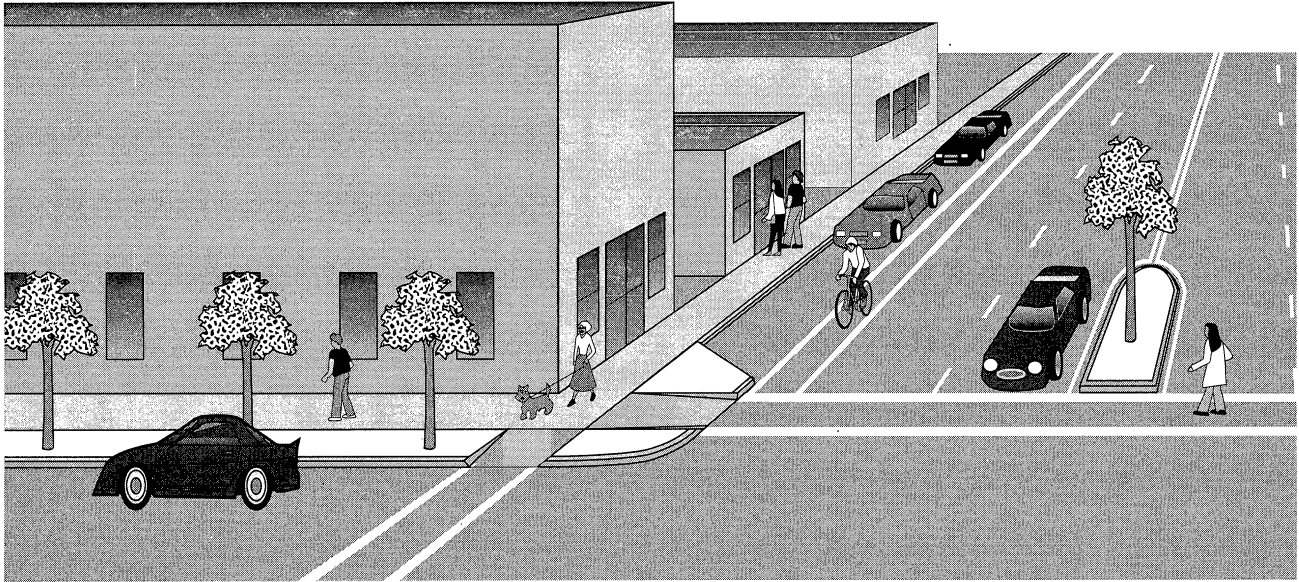


Figure 4: A city street that accommodates all modes of travel.

rather than people in cars. Parking is scarce in many parts of the city. A mixture of land uses means a variety of stores and services are within easy walking distance for most residents. Much of Cambridge is closer to downtown Boston than are some of Boston's own residential neighborhoods.

B. The Cambridge Walkway System

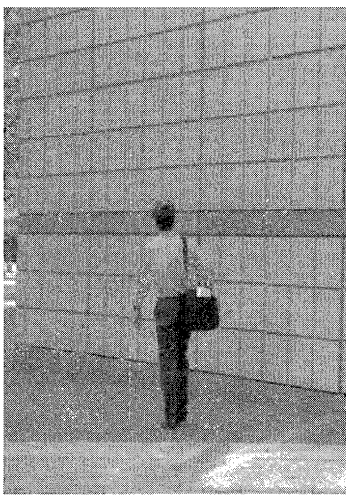
The Cambridge walkway system connects inside and outside as it wends from private lobbies and plazas to public sidewalks, streets, and parklands. To describe how this system should work, it is useful to determine whether there are missing links or opportunities to extend the system. To develop standards for improving the system, it is useful to consider the implications for both public and private spaces.

There are many public spaces such as City Hall and other City office buildings, schools, T stations, libraries, and parks that make up special parts of the public domain. However, most urban space for pedestrians is formed by the coming together of public sidewalks with buildings. While a positive interaction between those components is necessary to make fully livable urban places, the public sector must take the lead in making good walkways.

C. Private Spaces

The most important aspects of the private edges of urban spaces are building entries and facades, ground-floor stores, and placement of parking, service drives, and curb cuts. To the extent possible, private abutters to public spaces should be encouraged to make it possible for "eyes on the street" to provide the informal human surveillance that is so important to safety. Furthermore, spaces are more appealing when there is a visual interconnection between inside and outside. Blank walls do not make good edges for public spaces. Where possible, private walls should include some protection from rain and wind, such as awnings, overhangs, or recessed doorways, especially at places where people gather, e.g., bus stops or building entries.

Cambridge has many private open spaces that function as gathering spaces or important walkways. For example, Au Bon Pain in Harvard Square greatly enlivens the space around it. On a larger scale, the Harvard and MIT campuses are extremely important parts of the Cambridge pathway system. The



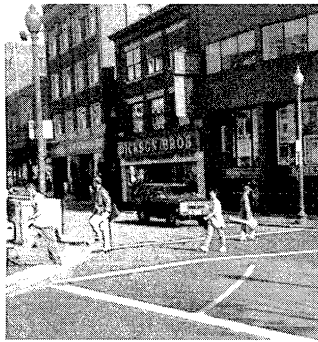
Blank walls create an alienating environment.

universities should be encouraged to continue to make the public feel welcome in these special places.

D. Public Spaces

Unlike many newer American communities, Cambridge already has sidewalks in place on both sides of almost all its streets. Many of these sidewalks need to be improved, however. Sidewalk design should take into account various concerns: width, materials, continuity, appeal, cleanliness, obstructions, amenities (benches, signs, plants, etc.), and bus stops (shelters, signs, maps).

E. Streets



Most Cambridge streets are at a pedestrian scale.

The streets of Cambridge range from multilane roads with heavy through traffic that are part of the principal arterial system (e.g., Msgr. O'Brien Highway at Lechmere or Alewife Brook Parkway) to minor arterial streets (e.g., Cambridge Street or Mass. Ave.) to collector streets (e.g., Harvard Street or Garden Street), to quiet neighborhood streets (e.g., Chestnut or Highland). The issues for pedestrians vary accordingly. A description of the street classification system is in Appendix V.

The pattern of development in Cambridge has led to some complex intersections at which numerous streets come together at complex angles. On the positive side, this condition creates spatial interest, including many buildings with triangular plans and a variety of perspectives that a simpler grid of streets doesn't offer. On the negative side, it is often hard for newcomers or visitors to orient themselves, and it can be difficult to provide traffic signals or other traffic control measures that work well for both pedestrians and vehicles.

Neighborhood Streets

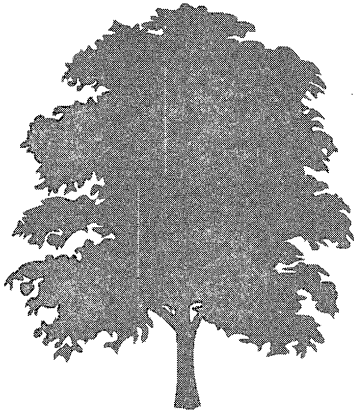
Cambridge has an array of pleasant streets in its historic and varied neighborhoods. These streets are generally quite livable. However, there are some trouble spots that need to be addressed, through physical design, changes in signalization, or in some other way. The City has begun to undertake traffic calming projects—alterations to the road to slow vehicle traffic. These enhancements are intended to help de-emphasize motor vehicle traffic while making streets safer and more walkable. For example, a project at the Garden Street-Concord Avenue intersection at Arsenal Square involved simplifying the intersection by extending the Garden Street sidewalk and blocking the automobile connection from Follen Street. Some measures involve redoing intersections to slow vehicular traffic and reduce the expanse of roadway that pedestrians must cross. (See Chapter 4 for a description of traffic calming measures).

F. Campuses

Harvard, MIT, Lesley College, and myriad smaller institutions help give Cambridge its special character. The Harvard and MIT campuses offer miles of pleasant paths and open spaces. At the same time, opportunities for improvement remain at the public edges of the campuses. For example, the City, Harvard University, and neighborhood residents and business owners worked cooperatively to transform the uninviting expanse of asphalt at Quincy Square into a more attractive open space.

G. Open Space

Cambridge has several kinds of open space: urban wilds (areas of special natural interest), multiuse green space, City parks, MDC recreation areas, and urban public squares.



Urban Wilds

The MDC's Alewife Reservation includes trails but is otherwise without amenities. It provides opportunities for viewing wildlife and enjoying an uncultivated landscape.

Multiuse Green Spaces

The city's major green spaces serve many purposes. Mt. Auburn Cemetery, the nation's first rural garden cemetery, which is partly in Cambridge, is popular for walking and bird watching. Fresh Pond Reservation, which holds the city's drinking water, is heavily used by recreational walkers and runners. The MDC reservation along the Charles River is a major travel corridor for motorists and cyclists and is popular with recreational walkers and inline skaters. It also serves as a destination for passive recreation and a site for special events. Its bicycle path is narrow and often crowded, leading to conflict among user groups (cyclists, pedestrians, inline skaters). Some stretches of Memorial Drive, the MDC road that borders the reservation, are obstacles for people who want to reach the bicycle path and the river.

City Parks

City parks have many designs and serve many purposes. Danehy Park has playing fields and other active recreation facilities. Cambridge Common is a historic site, a travel corridor for pedestrians and cyclists, and a passive recreation site and has an athletic field and a tot lot. Many neighborhood parks have play equipment for young children.

Visual Parks

The city has a number of very small roadside public spaces, many of which are unattractive and rarely used. Some of them could be redesigned to serve as pedestrian rest stops or provide some visual roadside relief. DPW does provide plantings in these areas and plants containers on sidewalks at the request of residents and business owners, who agree in return to maintain them.

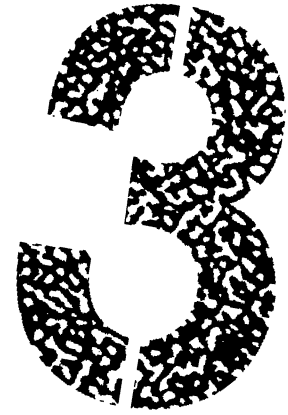
Urban Public Spaces

Harvard, Central, Porter, Kendall, and Inman squares are crossroads—not really squares at all, though most have some gathering space for pedestrians. As described below in chapter 6IIB, Harvard Square's evolution has been particularly complex. Cambridge's younger squares are centers of commerce and transportation, important to their surrounding neighborhoods and to regional users. They are, for the most part, vibrant public spaces. A key consideration for each is how to improve the environment for pedestrians while continuing to accommodate vehicular traffic. While the squares serve people who live or work nearby, they also attract visitors from beyond their immediate neighborhoods. They tend to lack public facilities for these visitors, e.g., rest rooms and pedestrian-oriented signs and maps.

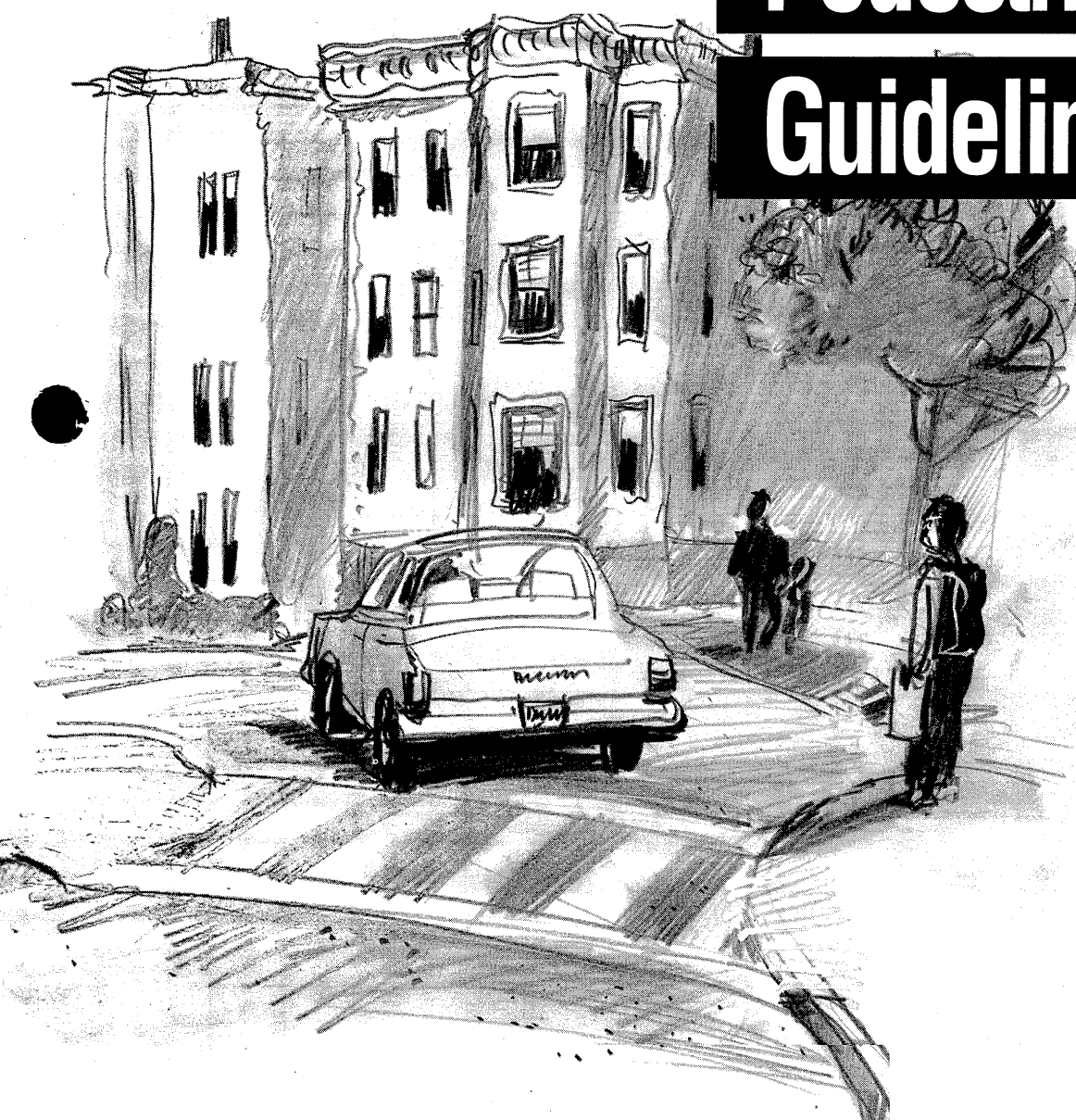


Cafés and street musicians enliven public spaces.

THREE



Pedestrian Design Guidelines



3. PEDESTRIAN DESIGN GUIDELINES

I. State and Federal Guidelines

The design of many streetscape elements is regulated by state and federal law. Traffic control devices must follow the procedures set forth in the Manual of Uniform Traffic Control Devices (MUTCD), while elements such as sidewalks and curb cuts must comply with guidelines implementing the Americans with Disabilities Act (ADA).

A. Manual of Uniform Traffic Control Devices

The City of Cambridge follows the procedures and policies set out in the MUTCD. Traffic control devices include traffic signals, traffic signs, and street markings. The manual covers the placement, construction, and maintenance of devices. Under the guidelines, all devices must

- fulfill a need
- command attention
- convey a clear, simple meaning
- command the respect of all road users
- give adequate time for proper response

The MUTCD emphasizes uniformity of traffic control devices to protect the clarity of their message. A uniform device conforms to regulations for dimensions, color, wording, and graphics. Uniformity also means treating similar situations in the same way.

B. Americans with Disabilities Act

Title II of the Americans with Disabilities Act (ADA), signed into law in 1990, is a civil rights act that prohibits public entities from discrimination on the basis of disability. Newly constructed facilities must be free of architectural barriers that restrict access or use by individuals with disabilities.

The City of Cambridge uses two technical standards for accessible design: the Americans with Disability Act Accessibility Guidelines (ADAAG), adopted by the Department of Justice for places of public accommodation and commercial facilities covered by Title 3 of the ADA, and the Massachusetts Architectural Access Board (MAAB), 521 CMR.

II. The Pedestrian Path of Travel

A. Sidewalk Zones

Many of the design guidelines in this section are for elements that are located in the sidewalk portion of a street's right-of-way. The sidewalk can be divided into three zones; the width of each zone depends in part on the overall width of the sidewalk.

The Curb Zone

The curb zone is the portion of the sidewalk immediately adjacent to the curb. Most street furniture, poles, and plantings are installed in this zone.

The Travel Zone

The travel zone is the portion of the sidewalk that is used for pedestrian travel parallel to the street. This zone should always be kept clear of obstructions.

The Building or Comfort Zone

The building zone, also referred to as the comfort zone, is the portion of the sidewalk that is adjacent to the property line. In business districts, window shoppers often use this zone, as do people waiting for friends or seeking cover from the rain. This zone can also be used for café seating or merchandise displays as long as they do not intrude on the pedestrian path of travel.

B. Sidewalk Width

The Americans with Disabilities Act mandates a minimum width of 3 feet of unobstructed sidewalk passageway. Public sidewalks less than 5 feet wide are required to include a 5-by-5 foot passing space every 200 feet. Most people have at least a temporary disability at some time in their lives, so making sidewalks usable by people with disabilities improves them for everyone.

Options for widening sidewalks and narrowing streets should be considered whenever roads are reconstructed. This is especially important on streets with heavy pedestrian traffic. Sidewalk widening should only be done after ensuring that cyclists are accommodated in the right-of-way, usually with bicycle lanes.⁶

Decisions about changing the width of sidewalks should be made on a street-by-street basis, taking into account cost, drainage, utility locations, heights of thresholds along the sidewalk, vegetation, and other factors. In general, sidewalks on quiet residential streets can be narrower than sidewalks on busy commercial streets.

Mailboxes, signs, posts, benches, trash cans, signal control boxes, and other sidewalk furniture should be placed in the curb zone so they do not interfere with pedestrian traffic or

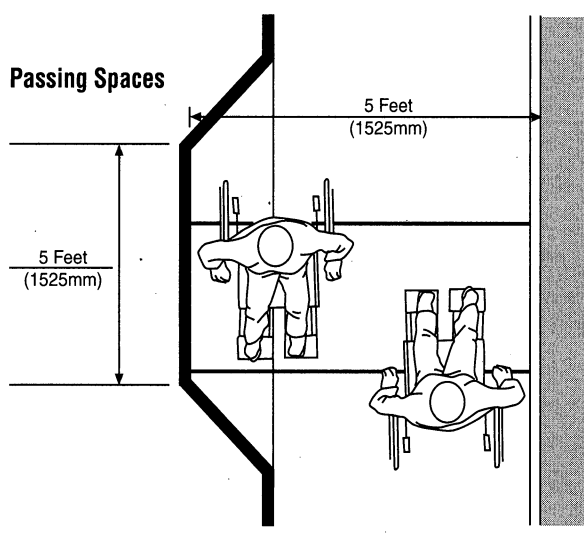


Figure 1: Passing Spaces.

with the ability of pedestrians, including children and people in wheelchairs, to see cars and be seen by motorists at intersections.

It is also important that snow removal be kept in mind when deciding how much space to allot to cars and how much to give sidewalks. Unless snow is hauled away—an expensive proposition—it must be piled up on the side of the street, narrowing the road.

In commercial areas, wide sidewalks are usually important for pedestrians to feel comfortable. People tend to avoid the edges close to the street or to abutting buildings. Generally this means that the comfort zone is about 2 to 3 feet wide (see Appendix XII). People generally keep about 1.5 feet from objects in the curb zone—trees, signposts, etc. Ideally, the travel zone should be at least 8 feet wide, wide enough for two pairs of pedestrians to pass each other comfortably.

City sidewalks are important social spaces as well as travel routes, and space for people to stop and talk or to stand and watch must also be factored into calculations

⁶ Bicycle lanes offer advantages to pedestrians as well as cyclists. They help keep bicycles off sidewalks, they help channel and in some instances slow down automobile traffic, and they can make possible narrower turning radii at intersections, slowing turning traffic and decreasing the crossing distance for pedestrians. They also serve as a buffer between pedestrians and moving cars, which is especially helpful on streets without parking.

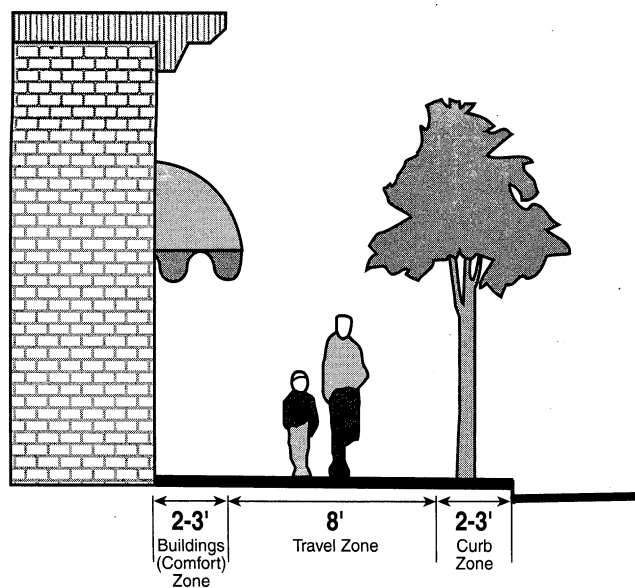


Figure 2: Typical Sidewalk Zones.

of optimal sidewalk widths, especially in commercial areas. Nonetheless, it is not the case that sidewalks should always be as wide as possible: “Having too much space is just as undesirable as having too little. Too much space makes a sidewalk seem ‘empty,’ because people are distributed over too large an area.”⁷ While some traditional pedestrian level of service (LOS) descriptions rate uncrowded sidewalks as “A” and extremely crowded sidewalks as “F,” a level of “C” is often the most desirable for a sidewalk in a commercial area (see Appendix VII for details).

C. Sidewalk Construction

The City must construct sidewalks in compliance with the Americans with Disabilities Act (ADA). The ADA states that “surfaces of public sidewalks shall be stable, firm, and slip-resistant, and shall lie generally in a continuous plane with a minimum of surface warping.” Wheelchair ramps must be made of concrete unless concrete is determined to be an “adverse effect” based on historical preservation regulations (see Appendix IX).

Sidewalk material—brick versus concrete—is a much-debated issue in Cambridge. Brick is warmer looking and generally considered more attractive, and it has historic associations.

Brick sidewalks are now set on a concrete base, instead of in stone dust, to minimize the heaving of bricks, which causes a trip hazard and noncompliance with the ADA.

Unevenness has been a major problem with old brick sidewalks, which were laid over stone dust. These sidewalks have tended to heave over time and are especially a problem for people in wheelchairs or people with visual or mobility difficulties.⁸ Newer sidewalks of brick laid over concrete still have a somewhat uneven surface, and they can be slippery when wet, especially in the fall, when leaves cover them.

Concrete meets ADA specifications better than brick does. However, historical preservation concerns argue for the use of brick for sidewalks in certain locations. (See Appendix X for City sidewalk and curb design standards.)

Asphalt has also been used for City sidewalks in many locations where there is conflict with tree roots. Although most people do not like the appearance of asphalt, it has proven to be the best material to prevent the trip hazards these roots cause.

7 Project for Public Spaces, *The Effects of Environmental Design on the Amount and Type of Bicycling and Walking*, National Bicycling and Walking Study, FHWA Case Study No. 20, U.S. Dept. of Transportation, FHWA-PD-93-037 (April 1993), pp. 17-18.

8 These sidewalks did have the advantage of allowing rain water to seep into the soil, which benefits trees and other plants.

The City faces the problem of continuous sidewalks being constructed with various materials. Many abutters are very concerned about the material used for the sidewalk in front of their property, and some neighborhood sidewalks are a patchwork of brick and concrete. The policy currently used in these areas involves notifying residents that the existing material will be replaced unless the property owner informs the City otherwise. Property owners are notified that a request to change from concrete to brick cannot be implemented without payment for the additional cost of a brick sidewalk. In addition, in the past, private developers sometimes paved driveways with custom material and continued the paving to the street, adding to the patchwork. The City has implemented a site plan review process to standardize sidewalk material installed by developers.

Continued exploration of alternative paving materials is needed. The perfect material, which would be smooth, porous, attractive, slip-resistant, compatible with tree roots, relatively inexpensive, low maintenance, and easy to shovel, has not yet been identified.

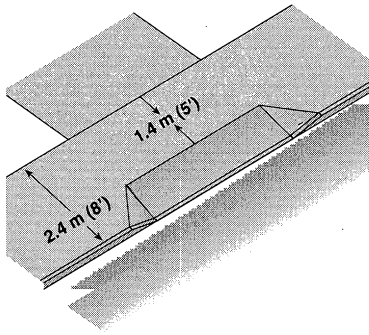


Figure 3: Sidewalk at Driveway.

D. Vehicular Curb Cuts

Vehicular curb cuts allow motor vehicles to cross sidewalks—the pedestrian pathway.⁹ They create the potential for conflict with pedestrians or children playing. They also present potential tripping hazards for pedestrians, especially children and elderly people. As such, vehicular curb cuts should be kept to a minimum in number and width.

Vehicular curb cuts must be installed so that a minimum 3-foot path of travel (maximum 2% cross-slope) is maintained at the same grade across the curb cut as the sidewalk on either side of the curb cut.

In these areas the straight granite curb and concrete should be sloped down to meet the pavement. The adjacent sidewalk material should always be carried across the curb cut to alert drivers that they are crossing a sidewalk.

Whenever possible, vehicular curb cuts should be constructed to leave the pedestrian travel zone free of curbs and grade changes.

The maximum width of a curb cut in residential districts is 20 feet at the street line; in open space, business, and industrial districts, the maximum width is 30 feet. No more than one curb cut per lot is allowed for lots with less than 100 feet of frontage. For lots with over 100 feet of frontage, no more than one curb cut is allowed for every 100 feet or portion of 100 feet.

Driveway curb cuts cannot be closer than 25 feet from an intersection or 15 feet from a crosswalk.

E. Sidewalk Furniture and Amenities

Banners

Banners can be used to identify a special public location or area, or to announce or promote a special public event. When used appropriately, they can add visual interest to the streetscape, making the pedestrian experience more enjoyable.

⁹ The curb cuts discussed here are driveway openings, not the pedestrian ramps that make intersections accessible to people in wheelchairs and easier for many other pedestrians.

Banners must comply with Article 7.000 (Signs and Illumination) of the Cambridge Zoning Ordinance and with the Americans with Disabilities Act with respect to mounting height, clear space, and maximum projection.

Banners should be installed in the curb zone or building zone. They must not be installed where they would interfere with electric bus wires, or where they would obscure street signs, traffic signals, or any other directional or informational graphics.



Street light and bench in Central Square.

Benches

Benches are an important sidewalk amenity, providing pedestrians with an opportunity to sit and rest on a long walk, wait for a bus or to meet a friend, or read the paper.

Benches should only be installed on streets that have adequate sidewalk widths, and they should not interfere with curb ramps, fire hydrants, parking meters, or emergency access ways. Benches should be installed in the curb zone, a minimum of 2 feet from the curb, or in the building zone, as long as they do not obstruct the pedestrian path of travel.

The placement of benches should be site-specific, depending on circumstances. Shelter from the elements and an opportunity to watch pedestrians passing by are both desirable where possible. On streets with very wide sidewalks, benches may be oriented perpendicular to the right-of-way as long as they do not project into the pedestrian travel zone.

Benches should be considered wherever extra sidewalk width offers the opportunity for pocket parks, as has been done, for example, in Central Square.

Private property owners are encouraged to provide benches for use by the public on their land adjacent to the right-of-way.

Seating areas should include trash receptacles where possible.



City bicycle racks.

Bicycle Parking

Bicycle parking installed in the curb zone must be a minimum of 2 feet from the curb and cannot obstruct the path of travel. On narrow sidewalks, bicycle parking is oriented so the locked bicycle is parallel to the pedestrian traffic flow. On streets with very wide sidewalks, bicycle parking may also be oriented with locked bicycles perpendicular to the right-of-way as long as they do not project into the pedestrian travel zone.

Private property owners are also encouraged to provide bicycle parking for use by the public on their land adjacent to the right-of-way. Such parking should be installed so that locked bicycles do not project into the sidewalk. The standard city bicycle parking rings on posts are designed to prevent bicycles from falling and becoming an obstacle to walking.

Bollards

Bollards can be used to restrict vehicular access to pedestrian areas or to protect other street elements from damage. If executed with sensitivity to the surrounding architecture, bollards can be an attractive streetscape element.

Bollards installed in the curb zone should be a minimum of 2 feet from the curb.

Kiosks

Kiosks can be used to provide the public with information such as newspapers, maps, or directions. In business districts, kiosks can also serve as architectural landmarks.

Kiosks should only be installed on streets that have adequate sidewalk widths and must not interfere with curb ramps, fire hydrants, parking meters, or emergency access ways. Kiosks should be installed in the curb zone a minimum of 2 feet from the curb.

Like other street furniture, kiosks should not be installed in a bus stop zone.

Lighting

Good lighting for pedestrians makes many people feel safer at night.

Streetlights are installed in the curb zone, a minimum of 2 feet from the curb to avoid damage from trucks that pass close to the curb. Streetlights at intersections must be placed so that pedestrians are visible to motorists.

Pedestrian light fixtures should direct the light toward the sidewalk.

Trees should be pruned regularly to ensure that branches do not block streetlights.



Newsracks on Mass. Ave.

Newsracks

Newsracks can be useful sidewalk amenities. However, they have proliferated to the point where some are blocking sidewalks and crosswalks, obstructing access to buses, taxi stands, bicycle racks, and other facilities. In addition, many are not properly maintained and collect dirt and graffiti.

To deal with the proliferation of newsracks on the sidewalks, and to improve the appearance of the boxes, the City has established detailed standards for their placement and maintenance. The Department of Public Works is responsible for issuing permits for newsracks.

Planters

Plant material can help create a more attractive streetscape, adding color to the environment, improving air quality, and creating a buffer between pedestrians and automobiles.

Trees should be placed in planters only if they will not survive in the ground.

Planters should only be installed on streets that have adequate sidewalk widths and must not interfere with curb ramps, fire hydrants, parking meters, or emergency access ways. Planters should be installed in the curb zone a minimum of 2 feet from the curb, in the building zone, or within the property line.

The materials used to construct planters should be coordinated with the surrounding sidewalk and building materials.

Plant material should be designed and maintained not to extend beyond the edges of the planter until it has grown to a height of 7 feet above the ground.

Trees

Trees can help create a more attractive streetscape, providing visual relief year round and shade in summer, improving air quality, and creating a buffer between pedestrians and automobiles.

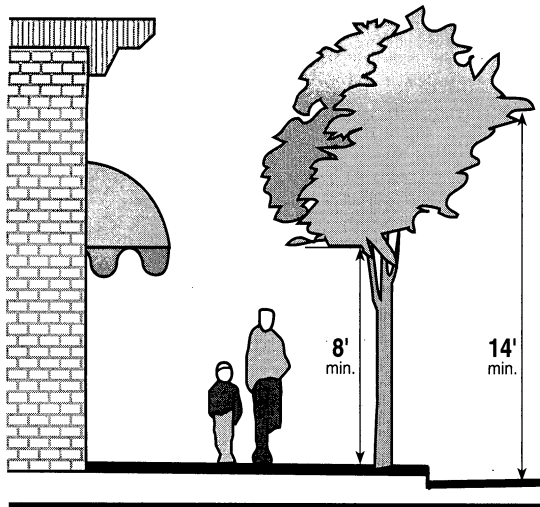


Figure 4: Tree Height Requirements.

Trees should only be planted on streets that have adequate sidewalk widths to maintain a minimum 3 foot path of travel. On sidewalks that are too narrow to accommodate trees without infringing on the pedestrian travel zone or utilities, residents may request that the City plant a tree in their yard near the sidewalk. Trees can be planted in curb extensions provided they do not interfere with the visibility of pedestrians waiting to cross the street or motorists turning corners. Trees should not be planted where they would be in the way of people getting on or off buses or interfere with the operation of utilities.

The selection of trees should be coordinated with the City arborist. Trees with root systems that won't become a trip hazard should be selected. Continued review will be

conducted on types of trees and planting techniques to maintain accessible sidewalks.

Trees should be pruned to ensure that their branches do not interfere with pedestrian and vehicular visibility and movement. On the sidewalk side, 8 feet of clear space above the ground should be maintained; on the roadway side, 14 feet should be maintained.



City Standard Trash Can.

Trash Cans

Trash cans are a necessary element in the streetscape. The City's standard black metal trash can should be used.

Trash cans should be placed in the curb zone at a minimum of 2 feet from the curb, on private property, or in the building zone near a building entrance. Public trash cans should also be placed near food service establishments, bus stops, and seating areas. Public/private trash removal partnerships should be encouraged near food service establishments in particular, where it is not feasible or reasonable for the City to keep up with the volume of trash needing removal.

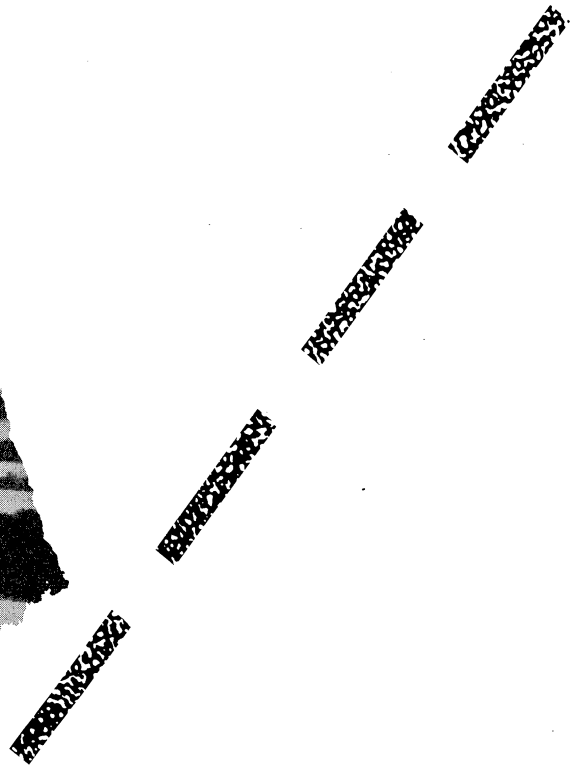
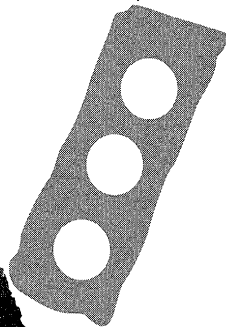
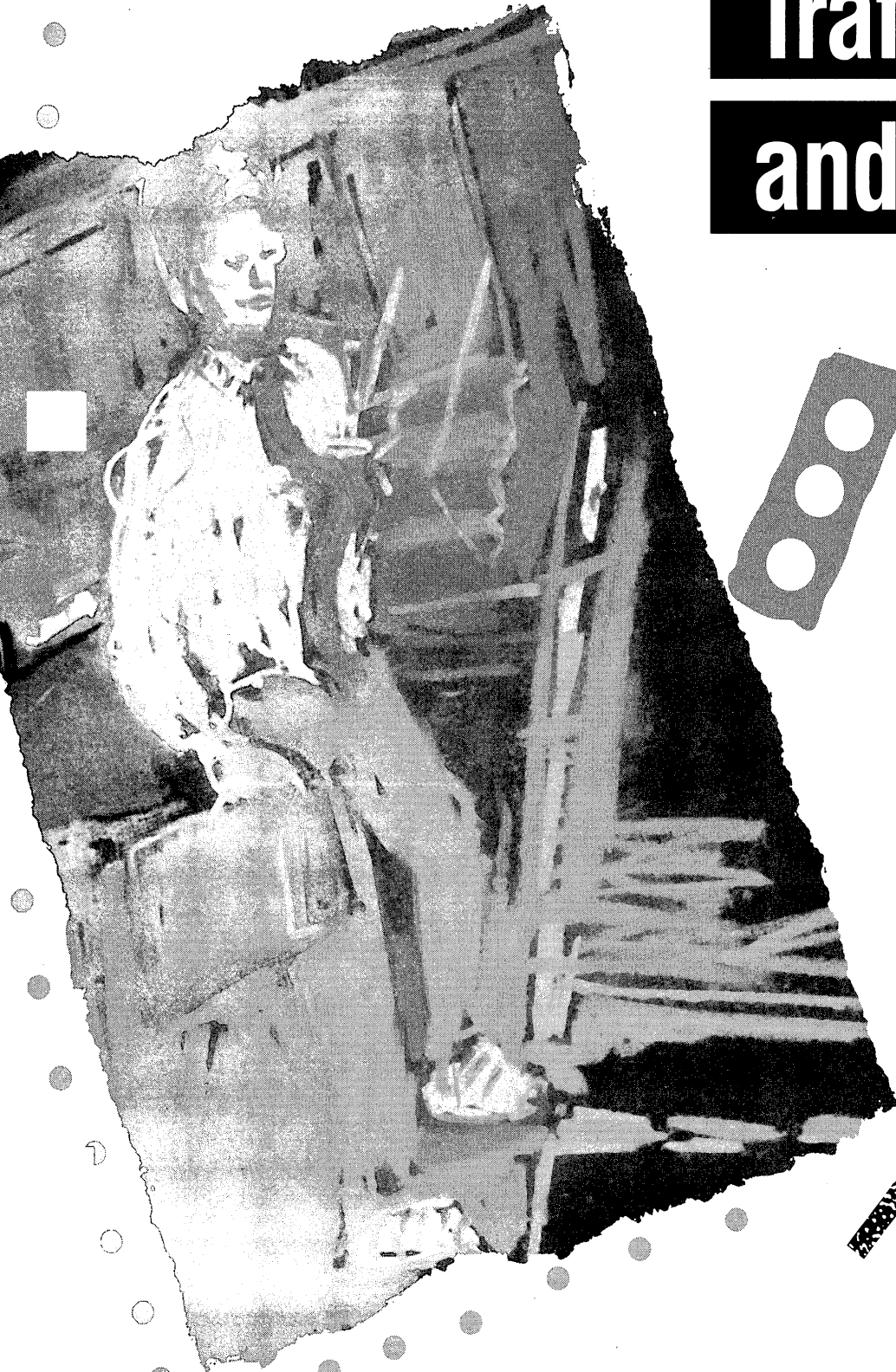
Utility Poles and Structures

The City's underground and overhead network of utility services greatly impacts sidewalks. Utility poles, traffic signals, and fire hydrants should be installed outside the pedestrian travel zone. Electrical boxes should be located on utility and traffic signal poles so they do not create unexpected hazards to pedestrians. Utility vaults and access boxes should be located outside the pedestrian travel zone and be constructed from non-slip materials that are flush with the sidewalk, in conformance with ADA requirements, preferably outside the City right-of-way. The preferred placement is on private property.

F O U R



Traffic Issues and Operations



4. TRAFFIC ISSUES AND OPERATIONS

Of the over 37,000 U.S. fatalities caused by motor vehicles each year, about 14% are pedestrians, and in major urban areas the share approaches 50%.¹⁰ Pedestrian injuries are correspondingly high. Small errors by either pedestrians or motorists can have large adverse consequences. The causes of these crashes¹¹ are many, but the crashes could be greatly reduced without impairing the mobility of either motorists or pedestrians.

Although safety is an important reason to resolve pedestrian-vehicle conflicts, it is only one of several goals. Where motor vehicles and pedestrians come into proximity, the vehicles tend to dominate at the expense of pedestrians. Noise, fumes, dust, speed, and bulk all tend to intimidate and to degrade the pedestrian environment. The purpose of this section is to show how a more pedestrian-friendly balance between vehicular and pedestrian activities can be achieved. If the pedestrian environment is attractive and enjoyable, it is easier to encourage people to take some of their trips on foot rather than in a car.

I. General Considerations

A. Levels of Service

When pedestrians are inconvenienced or suffer noise, stress, and intimidation from vehicular traffic, they tend to become uncooperative and heedless of directions. This increases the dangers to both pedestrians and motorists and causes more delay to vehicles than would be the case if pedestrian needs were better met.

One controversial aspect of traffic and pedestrian management is the issue of how much vehicles and pedestrians should be controlled, as opposed to letting them use their own discretion. This issue influences almost every decision regarding vehicles and pedestrians. Decisions about extreme situations are generally easy to make; for example, pedestrians should not be permitted to walk across expressways, but local streets should be easy to cross.

Between the extremes, however, the choices can be complicated. For example, crosswalks can be regulated with a traffic signal to protect pedestrians. A signal requires pedestrians to wait longer than if the cars stopped when they entered the crosswalk but protects them while crossing. An exclusive pedestrian traffic signal (all cars are stopped and pedestrians can cross in any direction) removes any conflicts between vehicles and pedestrians but requires a longer wait for pedestrians than does a concurrent signal (pedestrians can cross, but vehicles can turn into the crosswalk). Because of the longer wait, many pedestrians at intersections with exclusive pedestrian signals cross illegally.

Vehicle levels of service, based on the delay motorists experience at intersections, are used in transportation planning. Pedestrian levels of service based on the delay pedestrians experience at intersections should also be a major criterion of transportation planning (see Appendix VII). This is an issue of safety as well

10 National Highway Traffic Safety Administration, 1998.

11 Because they believe that in the context of motor vehicles the word “accident” to some people implies a chance event that can’t be prevented rather than an unfortunate event that was unintentional and due to carelessness, unawareness, breaking the law, or other causes, federal authorities now use the word “crash.”

as convenience, since studies show that significant numbers of pedestrians do not wait longer than 30 seconds before crossing.¹²

Pedestrians are often regarded as uncooperative and recalcitrant, but their behavior is reasonably predictable. Pedestrians often ignore traffic signals if they feel they have already waited long enough. If most vehicles fail to stop for pedestrians in crosswalks, pedestrians are more likely to cross anywhere they can. They are more likely to go out of their way to use marked crosswalks if they think they will be rewarded by respect from motorists.

B. Children, People with Disabilities, and the Elderly

These groups warrant special consideration both because inexperience or physical limitations put them at a disadvantage as pedestrians and because they are more likely than others to rely on walking to get around.

Children are harder to see than adults, being smaller, and they are more impulsive. Special care should be given to the designs of streets, sidewalks, and traffic control devices where children gather, such as schools and playgrounds.

People who cannot move quickly need sufficient time to cross the street. Increasing walk times may, however, mean longer waits for pedestrian greens and hence greater disregard for the signals. Generally, Cambridge uses the standard of one second for each 4 feet of crossing. The ADA requires curb ramps at all crosswalks. Audible signals corresponding to visual traffic cycles have been developed and used for people who are visually impaired.

C. Special Locations

Some generators of pedestrian activity warrant special attention to enhance pedestrian safety and ease of crossing:

- Schools, before and after school programs, or centers serving children under twelve with twenty or more children in the program
- Intersections where school crossing guards are assigned
- Elderly housing complexes and senior centers
- Transit stations and major bus stops
- Business districts with heavy motor vehicle and pedestrian traffic

Complex intersections such as rotaries and intersections with more than four legs also need special consideration.

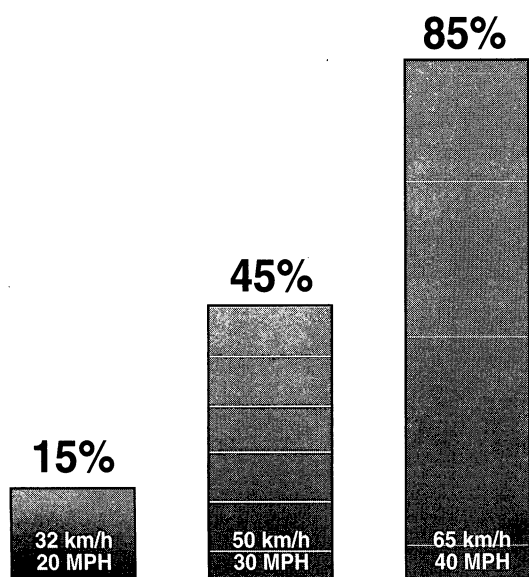
D. Measures for Treating the Pedestrian-Vehicle Interface

Conflict between pedestrians and vehicles has been a concern for a long time, and many ideas have been proposed and tried. Figure 1 lists design and enforcement options that affect pedestrians and vehicles. Some are appropriate in Cambridge; others are not. Many are treated in some detail below.

12 Joseph S. Milazzo, II, et al., "Quality of Service for Interrupted Pedestrian Facilities in the 2000 Highway Capacity Manual," presented at the 1999 Annual Meeting of the Transportation Research Board. Pedestrians are also controlled by intimidation, such as with large volume of traffic or, especially, high speed traffic. Thus pedestrians can be kept on the curb by providing conditions for motorists that encourage them to travel at 35 mph or higher. Only a few of the vehicles need to travel at these speeds to make the street unsafe for pedestrians. Clearly this is not a desirable situation in Cambridge, where walking is an important travel mode and the speed limit is 30 mph or lower.

I: Separate Pedestrian Facilities	
Paths through Block Interiors Pedestrian Overpasses/Underpasses Skyways	Walkways Pedestrian Malls Auto-Restricted Zones (ARZs)
II: Crosswalks and Traffic Controls	
Speed Limits and Enforcement of Traffic Laws Vehicle Channelization Pavement Markings and Treatments Signs Median Barriers Sidewalk Barriers Parking Design Parking Enforcement	Traffic Signals Lighting One Way Streets Reflective Materials Crossing Islands Sidewalk Width and Placement Turning Movements Corner Radii
III: Traffic Calming	
Roundabouts Curb Extensions Raised Crosswalks and Raised Intersections Speed Humps/Tables Chicanes	Traversable Barriers Pavement Treatments Landscape Treatments Woonerfs Crossing Islands

Figure 1: Pedestrian-Vehicle Control Measures.



Pedestrians' chances of death if hit by a motor vehicle
SOURCE: *Killing Speed and Saving Lives*, UK Department of Transportation

Figure 2: The relationship between speed and the pedestrian fatality rate.

II. Vehicle Volumes and Speeds

The heavier the traffic and the higher the speed, the less favorable the environment for pedestrians. Road design has much to do with determining vehicle speed and the feasibility of pedestrian crossings. Lane width, over-all street width, street curvature, turning radii, sight lines, sight distances, adjacent land use activities, and traffic volumes, especially entering and intersecting traffic, all contribute to establishing the “design” speed for a given street or highway. Speed limits have little effect if they are inconsistent with the design speed of the street, and strenuous enforcement is required if speed limits are to have any effect under such conditions.¹³ It is more effective to control speed through roadway design.

¹³ “Drivers consistently drive at speeds which they perceive as reasonable, comfortable, convenient, and safe under the existing conditions, regardless of posted speed limits.” Homburger et al., *Residential Street Design and Traffic Control*, Englewood Cliffs: Prentice Hall (1989), p.39.

Up to about 25 miles per hour, vehicles can stop relatively easily for pedestrians, and explicit or formal control measures are less necessary; from 25 to 35 MPH, however, the danger to pedestrians increases rapidly with speed. Figure 2 shows the relationship of speed and severity of injury. The probability of fatality increases from 3.5% at 15 MPH to 85% at 40 MPH.¹⁴ Stopping distances also increase geometrically with speed.

In Cambridge, the speed limit on all roads except those controlled by the MDC is 30 MPH, unless the City has received state approval to reduce the speed to 25 MPH and has posted it.

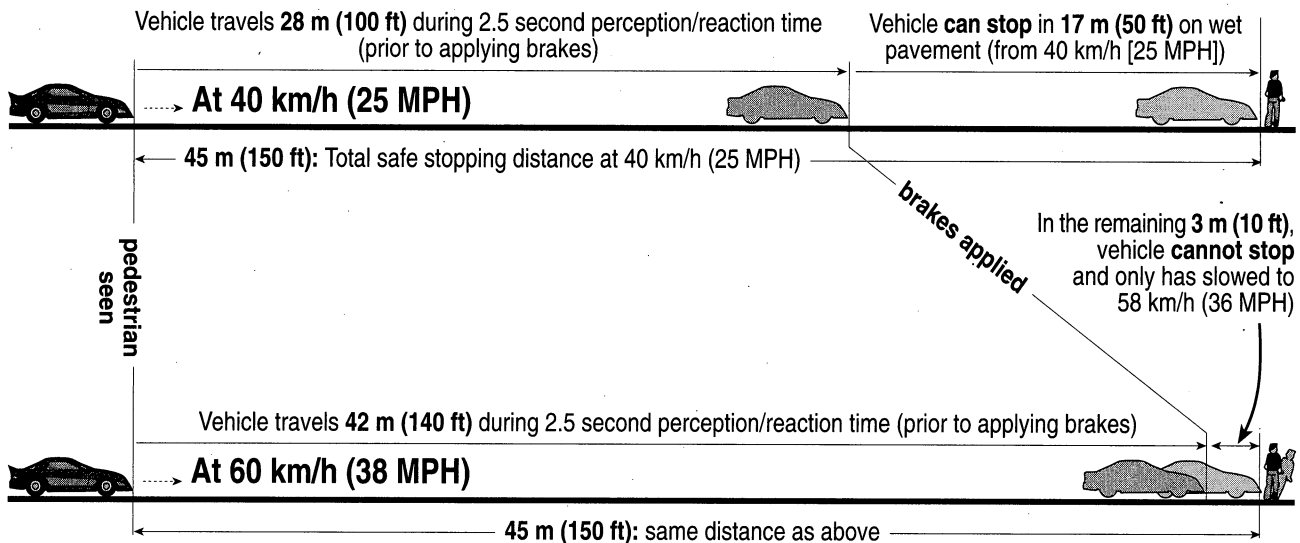


Figure 3: The relationship between safe stopping distance and travel speed.

A. Street Width and Lane Width

Straight streets with wide lanes encourage vehicles to go fast. The wider the street, of course, the longer it takes pedestrians to cross. Since the 1950s, roads in the United States have generally been designed to preset standards; as a result, many of them are wider than necessary. At one time, certain road widths were mandated for projects that received federal funds, but this is no longer the case. See Appendix XV for Cambridge lane width guidelines.

The presence of continuous medians also encourages higher speeds. In some communities, where arterials have a median strip between opposing lanes pedestrian signals are sometimes set so that only half the street can be crossed on one green and pedestrians are stuck on a narrow island with whizzing vehicles on all sides.

Narrower travel lanes tend to reduce speeds, more so if there are parked cars, and more so yet if they are curved. Additional reductions can be achieved by adding bicycle lanes, widening sidewalks, and creating corner curb extensions.

¹⁴ This information is from R. Limpert, "Motor Vehicle Accident Reconstruction and Cause Analysis," 4th ed., Charlottesville, VA: Michie Company (1994), as reported in Burrington and Thiebach, Take Back Your Streets, 2nd ed., Boston, MA: Conservation Law Foundation (1995).

B. Sightlines

Reducing sightlines—e.g., by planting trees—can slow down vehicles, but needs to be done carefully to ensure that drivers can respond correctly to potential risks. Maintaining good views of pedestrians while slowing vehicle speeds requires special care in roadway design.

C. Curves and Turning Radii

Curvature affects the main path of the street as well as turning movements at intersections. Winding streets tend to slow down vehicles, due to the need for cautious maneuvering and to the limited sightlines. Changing the alignment of existing streets is difficult, but there are traffic calming measures that create a winding effect (see Chapter 4, VII).

Curb radii at corners also affect speed, because sharp corners are harder to get around. Figure 4 illustrates the effect of a shorter turning radius that requires vehicles to move more slowly when making turns. The size of trucks and the volume of traffic expected on the street in question affect turning radius requirements for each street.

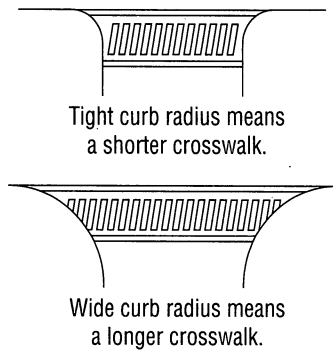


Figure 4A: Curb radii.

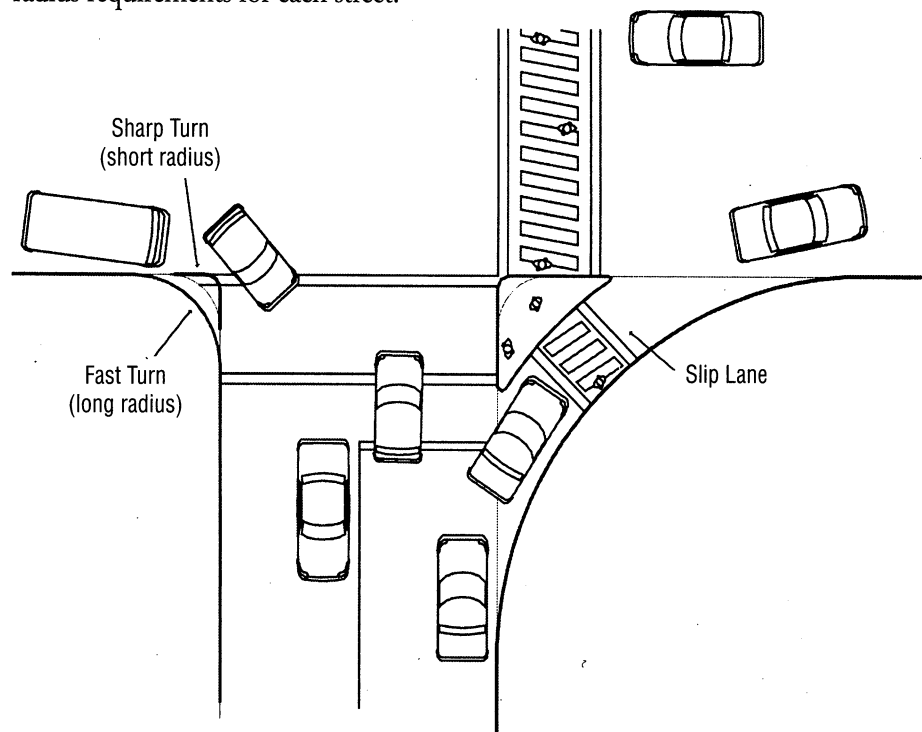


Figure 4: Corner turning radii and slip lanes.

D. Slip Lanes

The opposite effect from slowing traffic is achieved by building right-turn “slip” lanes: vehicle speed is encouraged, often without stopping at red lights, with the only possible pedestrian compensation being a refuge island part way across the intersection. Such special right-turn lanes to facilitate vehicle turning movements are usually undesirable from the pedestrian perspective.¹⁵

Figure 4 shows a common configuration for a slip lane. Central Square before its 1996 redesign had a slip lane for vehicles turning right onto Mass. Ave. from River Street.

¹⁵ In communities where slip lanes are used, they can be designed to allow the free turn in a way that optimizes the motorist’s view of the pedestrian and forces a slower turn.

III. Separate Pedestrian Pathways



A pedestrian pathway in Harvard Square.

A. Paths through Block Interiors

Urban redevelopment in many cities includes creating pedestrian walkways through the middle of blocks, perhaps indoors or perhaps not, often passing shops and restaurants. Such paths may provide a shortcut, protection from the weather, useful services along the way, and interesting sights.

Examples can be found in Boston (Copley Place and Prudential Center) and Cambridge (among others, the Marriott Hotel and outdoor walkways near Harvard Square, Kendall, and Lechmere). Walkways exist in residential neighborhoods as well, often as short cuts to parks and playgrounds. It is important that these are preserved and that necessary easements are obtained.

B. Pedestrian Overpasses/Underpasses

Grade separation for pedestrian-highway intersections is often used to get pedestrians out of the way of automobiles. It is often costly and may not be effective, but there are places where it is useful. Underpasses often end up being dirty and dark and may feel unsafe, though good urban design can help.¹⁶

Pedestrian overpasses are awkward when they require the pedestrian to climb 14 feet or so to clear the road and then descend. Steps on old overpasses can be too steep and slippery with rain or snow. ADA-compliant ramps often require more space than is available. In general, overpasses are inappropriate on city streets.

Crossing an expressway or other very busy road, pedestrians may be induced to use overpasses, especially if the overpass does not take significantly longer than crossing at street level. According to one study, "If an overpass takes 50% longer than crossing at street level, almost nobody will use the overpass."¹⁷

One Cambridge example of an overpass occurs at Memorial Drive at Magazine Street. Across the river there are several over Storrow Drive.

C. Skyways

Some cities, notably Minneapolis, have constructed enclosed skyway systems (elevated walkways) in their major shopping districts. While skyways offer protection from inclement weather and vehicle traffic, they tend to make the streets seem deserted and uninviting.

A small-scale local example can be found at Copley Place in Boston.

D. Walkways/Bikeways

Pedestrian walkways are often appropriate in greenway corridors. While they can be combined with bicycle paths, this can lead to conflict, especially on heavily used routes. The Dr. Paul Dudley White bicycle path along the Charles River is an example of a heavily used path with different kinds of users, including cyclists, pedestrians, and inline skaters. Whenever possible, pedestrians and bicyclists should have separate paths. If there is

16 Steven A. Smith. "Considering the Pedestrian: Site Planning in the Suburbs," TR News, 158 (January-February, 1992), pp. 10-13ff.

17 Institute of Transportation Engineers, Traffic Safety Toolbox (1993), p. 192.

not enough space for separate paths, shared use paths should be striped with a center line and should be wide enough to permit cyclists and inline skaters to pass pedestrians at a comfortable distance. Signs or pavement markings may be used to remind people where to travel.

E. Pedestrian Malls/Auto-Restricted Zones (ARZs)

Variations on downtown pedestrian malls have been tried in many places, sometimes successfully and sometimes not. They generally will not turn around a weak retail market, but they have made for some very pleasant and active city centers.

Downtown Crossing in Boston is a successful ARZ, with a small amount of traffic passing through, and Portland, OR, has created a transit mall, where bus origins, destinations, and transfers take place.

IV. Crosswalks

The Massachusetts Vehicle Code defines a crosswalk as “that portion of a roadway ordinarily included within the extensions of the sidewalk lines, or, if none, then the footpath lines, and, at any place in a highway clearly indicated for pedestrian crossing by lines or markers upon the roadway surface.”

Crosswalks exist where sidewalks intersect the road, whether or not they are marked and whether or not the intersection is signalized. In addition, marked crosswalks can be placed at mid-block locations.

At all marked crosswalks, state law requires that the driver of a vehicle yield the right of way to a pedestrian in the crosswalk, unless the vehicle has a green light and is not turning. Pedestrians should not enter a crosswalk unless it is safe to do so, and they should never assume that a driver will obey the law and stop. Pedestrians should step into the crosswalk to signal their intention to cross, look left, right, then left again, and when vehicles stop, cross.

At all crosswalks, the distance that pedestrians have to cross should be reduced when feasible. For the safety of all modes of travel, streets should intersect at as close to a right angle as possible.

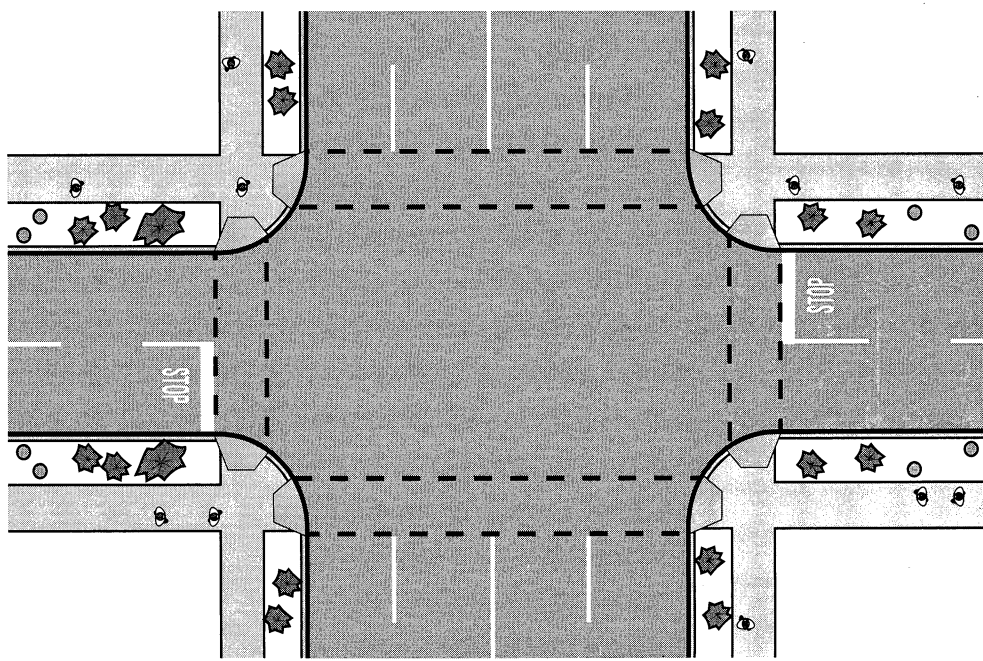


Figure 5: Unmarked crosswalks.

A. Pavement Markings

Crosswalks are marked at intersections where there is substantial conflict between vehicle and pedestrian movements, where significant pedestrian concentrations occur, where pedestrians could not otherwise recognize the proper place to cross, or where motorists need to be reminded to look for pedestrians.

Cambridge uses two types of pavement marking—parallel lines and perpendicular zebra stripes. At a few locations, crosswalks are marked by special pavement materials. The specifications for crosswalk markings are shown in Appendix VIII. Zebra stripes are more visible than parallel lines. The wider the marked crosswalk, the more readily it can be seen. As streets are repaved, parallel lines are being replaced with zebra stripes. (See Appendix VIII for an illustration.)

The marking materials are paint; thermoplastic; or tape, which can be inlay or overlay. Paint is cheapest to install, but it requires redoing twice a year. Thermoplastic and tape are more visible at night and last three to eight years, depending on type, location, and wear pattern.

For all new paving projects, Cambridge uses inlay tape, which is a retroreflective, skid-resistant paint polymer pavement marking. This kind of marking is long lasting and much less slippery than paint or thermoplastic when wet. Inlay tape cannot be applied to existing pavement. (See Appendix XI for details.)

Special pavement materials for crosswalks should only be used in combination with traffic-calming devices; they need to be highly visible and not be a maintenance burden.

By themselves, pavement markings are not enough. The motorist must be able to see the crosswalk. By law, motorists cannot park within 20 feet of an intersection. Drivers need to be able to see pedestrians who have entered the crosswalk or who are about to step off the curb. Both the motion and the posture of pedestrians provide visual cues to motorists. The increasing popularity of vans and sport utility vehicles has increased visibility problems from cars parked close to intersections, especially for children trying to cross the street.

B. Signs

Side-mounted “yield to pedestrian” signs will be installed only at locations where visibility, traffic flow, or other circumstances create special safety problems.

“Pedestrian crossing” signs will be installed where the number of pedestrian crossings is high and motorists cannot easily see pedestrians.

Pedestals with signs reminding motorists to yield to pedestrians will be installed in the middle of two-way streets at unsignalized pedestrian crossings where gaps in traffic are insufficient to allow pedestrians to cross the street; the travel lanes for vehicles should be at least 11 feet wide for each direction of traffic, and the sign must be visible from a distance of no less than 300 feet.

Signage and signals must conform to the Manual on Uniform Traffic Control Devices.

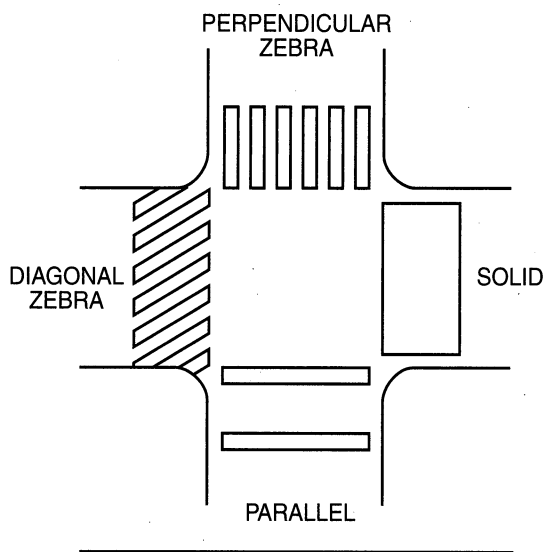


Figure 6: Crosswalk Striping Options.

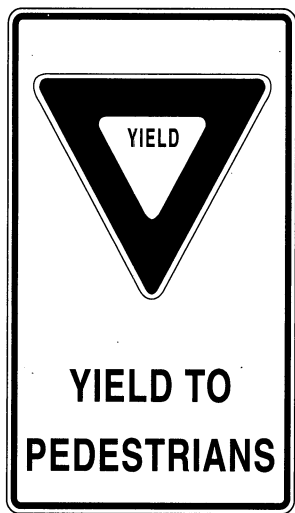


Figure 7: Standard sign.

V. Traffic Signals

Standards for pedestrian treatment at signalized traffic intersections have been developed over a long period of time.

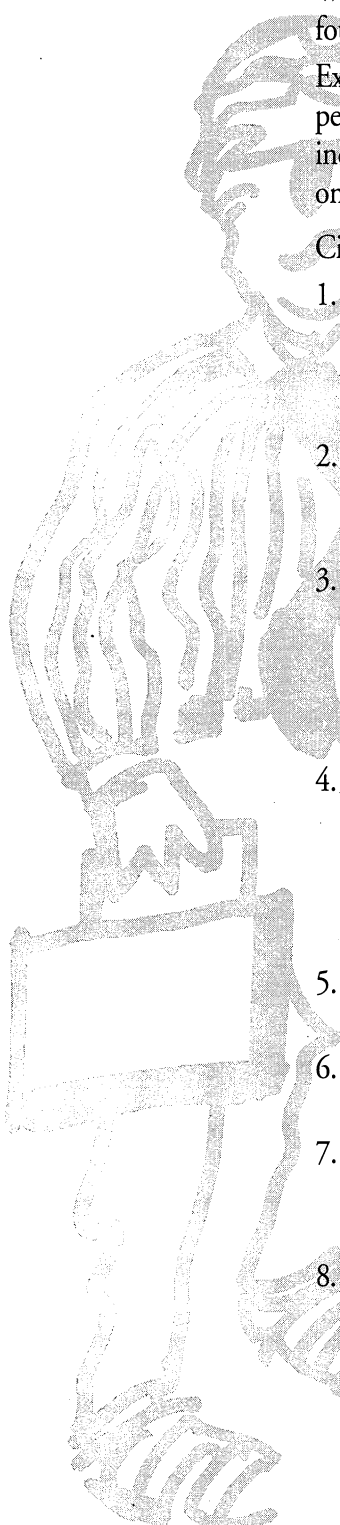
Walk/don't walk signals are often assumed to reduce pedestrian crashes, but research has found no difference between intersections without these signals and those with them.

Exclusive pedestrian phases (all vehicles have a red signal with no turn on red, and pedestrians may cross in any direction) show fewer pedestrian-vehicle crashes but increased pedestrian and vehicle delays, and, typically, a poor level of service for people on foot.¹⁸

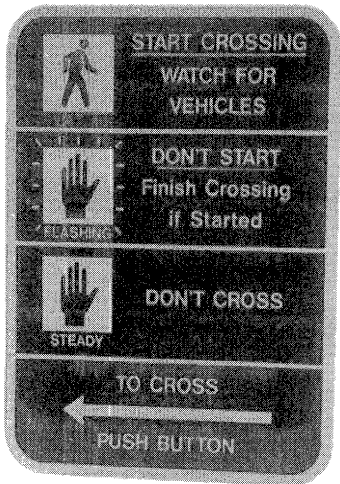
City of Cambridge signal policies are:

1. Whenever possible, total cycle lengths will be a maximum of 90 seconds. When cycle lengths are reduced, the City will examine whether this will divert traffic onto neighborhood streets. When cycle lengths greater than 90 seconds appear to be necessary, the City will assess the impact on pedestrians.
2. The maximum wait for pedestrians between the end of the flashing *don't walk* and the beginning of the next *walk* signal should be no more than 80 seconds. Reduction of wait times for pedestrians is an important element of planning signal timing.
3. Pedestrian buttons at intersections will be phased out wherever possible. Where they exist, they will respond as quickly as possible. In general it is better for pedestrians to be part of the regular traffic signal cycle. Push-button signals generally mean pedestrians wait longer at intersections. Often people push the button, then find an opening in the traffic and cross before the *walk* signal comes up.
4. Concurrent *walk* phases will be used where turning conflicts are well controlled in order to reduce pedestrian wait times. However, some locations will require exclusive *walk* phases due to high vehicular turning volumes. Exclusive *walk* phases will then be used where there is sufficient road capacity for traffic to wait and where the maximum pedestrian wait will not exceed 80 seconds.
5. *Walk* signals will show a continuous permitted *walk* when no vehicle conflicts exist. (In some cases this may require replacing the controller.)
6. Signals will run in progression where groups of signals need to work together to reduce delays and manage traffic volumes effectively.
7. Signals may be traffic semi-actuated where side street volumes are intermittent and light. With this configuration, side street *walks* may be concurrent and exclusive and main street *walks* exclusive with push button actuation.
8. A leading pedestrian interval (LPI) will be considered for concurrent signals to minimize conflict with turning traffic. An LPI is an advance *walk* signal that gives pedestrians a few seconds' head start on vehicles, enabling them to enter the crosswalk before the vehicles begin to turn. This may sometimes require upgrades of traffic signal equipment before it can be implemented.

Audible pedestrian signals will be considered on a case-by-case basis. Other crossing aids for people who are blind or have low vision are being evaluated.



18 Brian L. Bowman, John J. Fruin and Charles V. Zegeer, Handbook on Planning, Design, and Maintenance of Pedestrian Facilities, Federal Highway Administration Report No. FHWA-IP-88-019 (1989), p. 160.



Informational sign posted at Cambridge intersections with push button signals.

A. Pedestrian Signal Phases

The pedestrian signal offers three intervals: *walk*, flashing *don't walk*, and solid *don't walk*. Many people do not know what these phases mean, and some of those who do ignore them. Some people watch the vehicular traffic signal instead. Timing of the pedestrian signals follows the MUTCD.

The flashing *don't walk* phase starts early enough in the cycle to permit slow walkers to cross before the vehicular green if they start before it begins flashing. It assumes a crossing speed of four feet/second to the middle of the last travel lane.

Cambridge has posted pedestrian signal information at intersections.

B. Right Turn on Red

A particular problem at some signalized intersections is right turn on red (RTOR), which permits vehicles to stop at a red light and then turn right if no traffic or pedestrians are in the way. The introduction of RTOR in the 1970s has resulted in an increase in crashes, including crashes involving pedestrians.¹⁹ This is in part because drivers' attention tends to be focused on looking to the left for a chance to turn. In addition, many drivers fail to come to a complete stop before turning right.

At intersections where right-turning vehicle and/or pedestrian volumes are high, the City bans right turns on red to give pedestrians better protection.²⁰

C. Pushbutton-Actuated Signals

There are two kinds of pedestrian-actuated signals: those that are not tied into other traffic signal phases and those that are. The former, which are located at midblock crossings where there is heavy vehicle traffic, can be set to respond almost immediately when pushed as long as no one has just finished crossing. One example is on Cambridge St. at Cambridge Rindge and Latin School; another is on Mt. Auburn at the hospital. These tend to work well because pedestrians know that they will be able to cross right away.

A problem with pushbutton signals that are tied into a signal cycle is that the delayed signal response makes pedestrians wonder how long it will take or whether the button is working, and they may decide not to wait. Many pedestrians push the button with the intention of crossing as soon as they can, regardless of the signal. In general it is better for traffic signals to include a pedestrian phase that comes up without pedestrians having to push a button.

D. Intersection Options

If the volume of vehicle or pedestrian traffic at an intersection does not require a traffic signal with timed cycles, there is a range of other options.

For example, Figure 8 shows four lanes of traffic, opposed directions, parallel parking on both sides of the street, and a one-way "T" exiting the arterial. Neither the volume of left turns off the arterial nor the volume of pedestrian traffic requires a stop light, yet both activities occur at significant levels.

19 Paul Zador, Jack Moshman, and Leo Marcus, "Adoption of Right Turn on Red: Effects on Crashes at Signalized Intersections," *Accident Analysis and Prevention*: Vol. 14, No.3, pp. 219-234 (1984); D.F. Preusser, W.A. Leaf, K.B. Debartolo, R.D. Blomberg, "The Effect of Right-Turn-on-Red on Pedestrian and Bicyclist Accidents," US Dept. of Transportation (1981).

20 The City of Chicago takes another approach; it posts signs at most traffic signals banning RTOR from 7AM to 7 PM. New York City bans RTOR altogether.

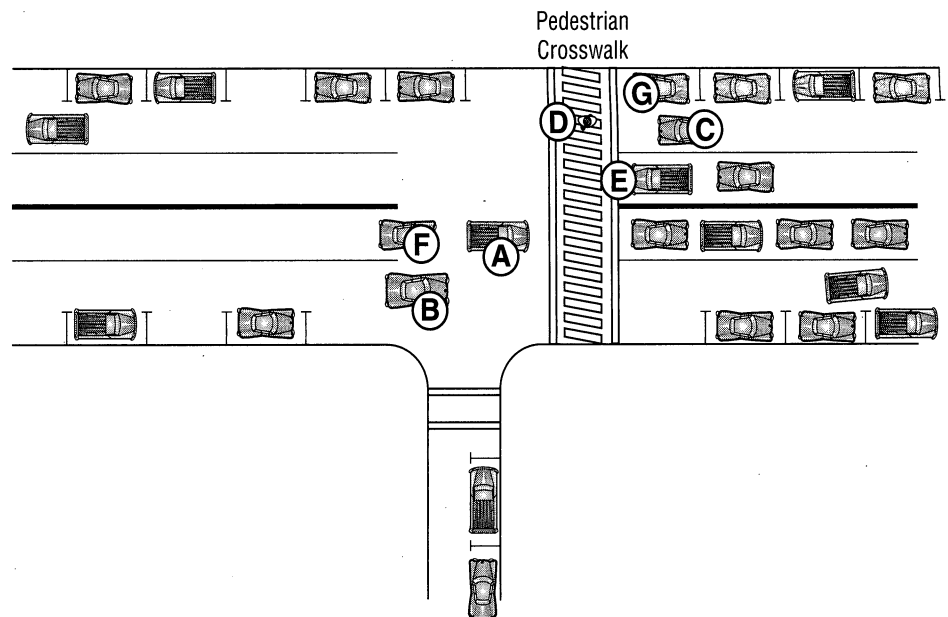


Figure 8: Pedestrian Crosswalk on Multi-Lane Arterial.

Many problems are due entirely or in part to the multiple lanes. Motorists (e.g., at A, B and E) may not be inclined to stop for pedestrians who are in the crosswalk but not in the same vehicle lane, especially if the pedestrians are on the opposite side of the street. Also, motorists may not realize that a vehicle has stopped for pedestrians and may pass the vehicle on the right or left (B and C). A vehicle waiting to make a left turn (at E) can be in the same position as a vehicle stopped for pedestrians, so that an opposing vehicle may make the wrong response to the situation, creating danger for pedestrians or traffic obstruction.

Several traffic signal options can be applied to this situation, none of them completely satisfactory:

A fixed-cycle traffic signal forces vehicles to wait when there are no pedestrians and forces pedestrians to wait longer than if vehicles stopped for pedestrians in the crosswalk.

A push-button signal forces pedestrians to wait until their cycle comes up. Many pedestrians are too impatient to wait, but if used correctly the signal provides better safety for children and elderly walkers.

A blinking yellow light is not a satisfactory solution; it means nothing to motorists and gets lost in the confusion of an urban environment.

Changes to the street such as curb extensions and crossing islands help increase motorists' awareness of pedestrians. It is also important to educate drivers to recognize crosswalks and stop when pedestrians are in them.

VI. Other Intersection Issues

A. Stop Sign Intersections

An advantage of stop signs over traffic signals for pedestrians is that vehicles slow down as they approach the intersection when they have a stop sign. At signalized intersections, many vehicles speed up to "make the light."²¹ It is important to evaluate what traffic control device is appropriate for each intersection.

21 For this reason, Philadelphia has replaced some traffic signals with stop signs. Cambridge did this at the intersection of Granite and Pearl streets in 1998.

B. Mid-Block Crossings on Collectors and Minor Arterials

The effectiveness of pedestrian crosswalks depends on how well the design of the crosswalk matches the specific traffic and road circumstances. Mid-block crosswalks are challenging and require careful review before they are installed.

Midblock crossings should be consistent with MUTCD standards. They can be signalized or unsignalized and marked with zebra stripes; they should only be constructed when pedestrian volumes are high. In general, they should not be less than 300 feet from the nearest intersection.

Midblock crossings are usually on collector streets and minor arterial highways. On local streets they are seldom necessary, and on major arterials it is difficult to interrupt heavy traffic for pedestrians, so they are not generally used unless the blocks are especially long or there is an especially large pedestrian flow at some mid-block point. Figure 9 shows a crossing on a two-way street with two lanes of traffic and parking on both sides. Parking is cleared back twenty feet from the edge of the crosswalk in each direction.

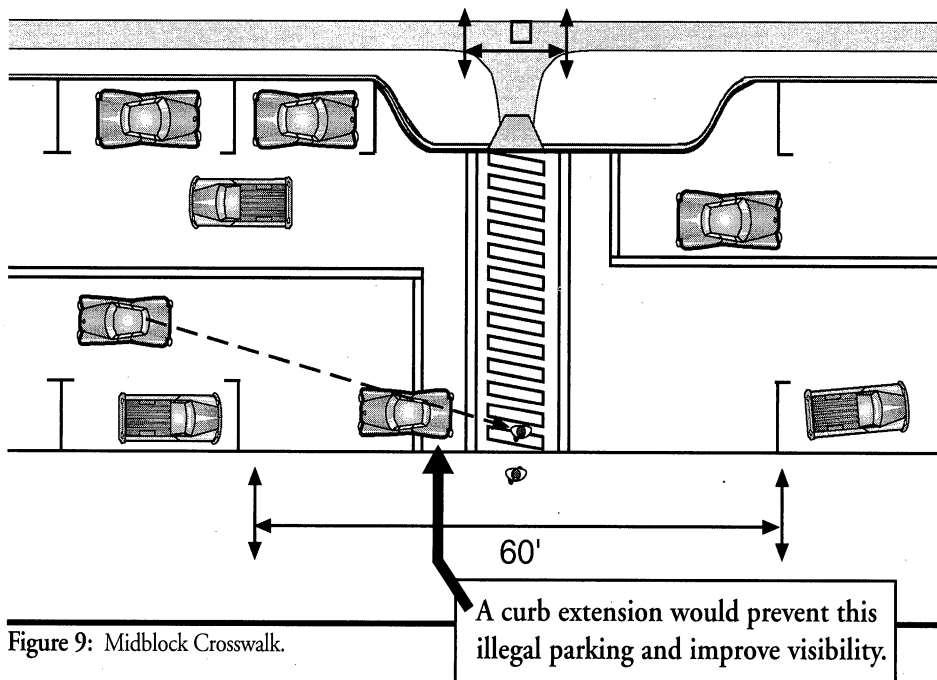


Figure 9: Midblock Crosswalk.

C. Signing and Lighting

Movable stanchions and permanent signs can be used under some circumstances (see Section IV B above). Strong street lighting is effective at night, if distinct from nearby lighting, and is essential if vehicles are expected to stop for pedestrians at night.

D. Barriers

Barriers such as railings that prevent pedestrians from stepping off the curb at points where satisfactory conditions for street crossings cannot or have not been made or barriers along the median of a street are generally to be avoided. They can be unfriendly and unattractive. It is better to design intersections that channel pedestrians by providing convenient crossings where they are safest.

E. Illegal Parking

Double parking and parking within the 20-foot corner clearance are especially dangerous for pedestrians because they block vehicle sight lines. Rigorous enforce-

ment of parking regulations ensures emergency vehicle access as well as enhancing pedestrian and motorist safety. Prevention of parking too close to the corner is one of the benefits of curb extensions.

VII. Traffic Calming

About 90% of automobile/pedestrian collisions involve a pedestrian crossing the street. Traffic calming measures are intended to reduce vehicle speeds and encourage drivers to be sensitive to pedestrians and other non-motorized street users. Its “basic objective is to reduce the adverse effects of road traffic. The approach is to adapt the volume, speed, and behavior of traffic to the primary functions of the streets through which it passes, rather than to adapt streets to the unbridled demands of motor vehicles.”²²

In 1997 Cambridge created a staff position for a traffic calming project manager and identified funds for traffic calming projects. As the City undertakes road reconstruction projects, it introduces traffic calming measures where technically and financially feasible and where they would not create congestion elsewhere.

Various traffic calming measures to slow motorists down in residential or commercial districts have been widely and successfully adopted in parts of Europe and, to a more limited—but increasing—extent, in North America.

Early Cambridge examples include the traffic calming measures taken at Arsenal Square and at Berkshire and York streets. The Arsenal Square project was designed to help pedestrians and bicyclists, as well as cars, navigate what was a difficult intersection. The project at Berkshire and York was designed to slow down traffic in a residential neighborhood with many pedestrians and make it safer for children to get to and from Donnelly Field and the Harrington School.

There are three basic types of traffic calming measures:

- Horizontal shifts in the roadway
- Vertical shifts in the roadway
- Actual or visual narrowing of the roadway

Generally, the best results are achieved when a combination of measures is used.

In residential neighborhoods, local streets can be expected to have low traffic volumes. Under such conditions, pedestrians and vehicles can sometimes share the same space. The nature of the design should be such, however, that vehicles are forced to adapt to the behavior of pedestrians. This is the objective of the *Woonerf*, which originated in Holland in the 1970s. A *Woonerf*, or “street for living,” is a street where pedestrian activities take precedence. Vehicles, though allowed on the streets, are slowed to a walking pace, through various devices. The street can then be used for neighborhood activities with community play space, planting, benches, etc. Variants on the *Woonerf* have been used with success elsewhere in Europe.

A. Curb Extensions

Curb extensions are a narrowing or “necking down” of the opening to a street by extending the curb out from one or both sides. They are also called chokers, neckdowns, or bulbouts. An example is shown in Figure 10.

22 Devon County Council Engineering and Planning, Traffic Calming Guidelines, Devon County Council, UK (1991), p. 27.

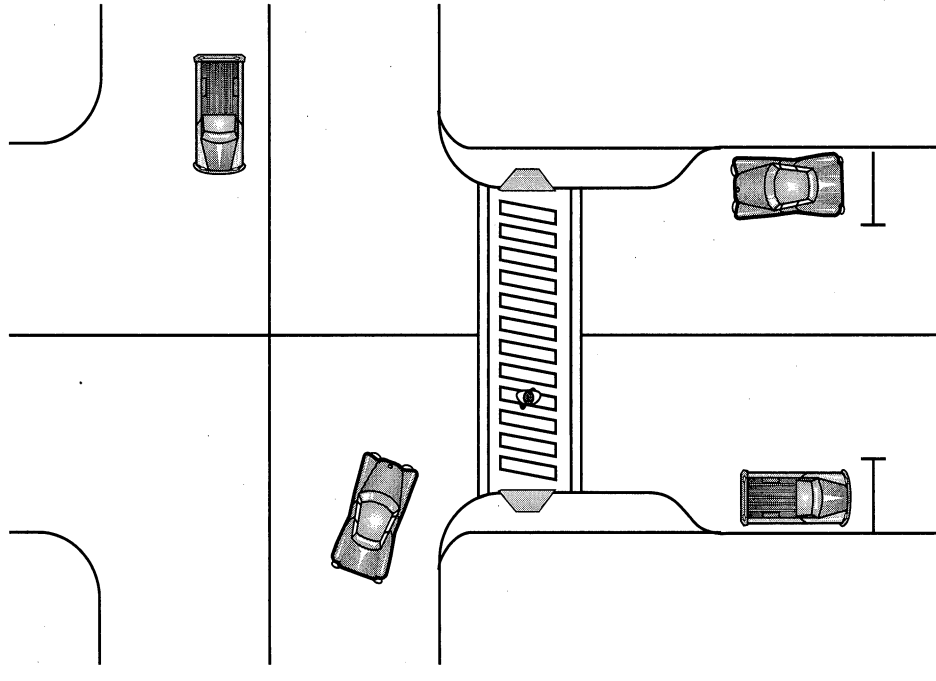


Figure 10: Curb Extension.

Curb extensions have several benefits:

- Vehicles slow down when they approach the narrower passage.
- The distance over which pedestrians are exposed to motor vehicles is reduced.
- Motorists and pedestrians can see each other better.
- Vehicles cannot park illegally at the corner, where they would make it harder for motorists to see pedestrians crossing the street.

Curb extensions must be designed so they do not interfere with bicycle traffic. Generally, because Cambridge has so much on-street parking, bicycle lanes or guidelines can be maintained, as curb extensions do not extend further into the roadway than the parking lane. As roads are reconstructed, the City will continue to seek opportunities to construct curb extensions.

B. Traffic Circles

Traffic circles come in three basic types:

Traffic mini-circles – Mini-circles are raised islands constructed in the center of residential street intersections to reduce vehicle speeds. They force motorists to maneuver around them and have been found to reduce motor vehicle crashes significantly.

Mini-circles can often replace a four-way stop sign, or even a signal. They must be properly designed to benefit pedestrians and cyclists. Adding crossing islands helps pedestrians and controls vehicles entering the intersection but requires more space. The occasional large vehicle going through an intersection with a mini-circle—e.g., a fire truck or moving van—can be accommodated with a mountable curb at the edge of the circle.

Roundabout – A roundabout is a large island located where an arterial street intersects one or more crossing roads. It may replace a traffic signal. As with a mini-circle, vehicles are deflected from their path and must slow down as they

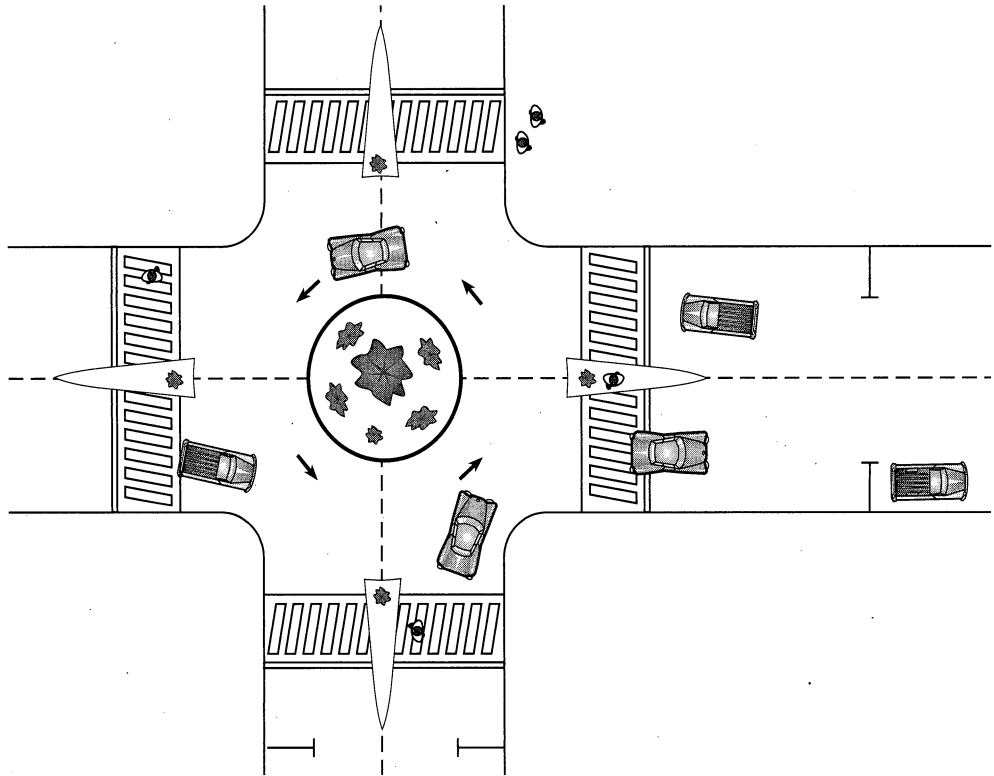


Figure 11: Traffic Roundabout.

turn into the circle but generally do not have to stop. Crossing islands at the approaches help slow down vehicles and allow pedestrians to cross.

Roundabouts should be constructed to accommodate pedestrians and bicyclists. Pedestrians must travel out of their way to cross the streets but often have a shorter wait than with a signal and have only one direction of traffic to watch for. However, visually impaired people have difficulty with roundabouts, and this issue has not yet been adequately addressed.

Rotaries are old-style circular intersections found throughout New England. They are larger than roundabouts and provide little or no deflection for through traffic, leading to excessive vehicle speeds. They also have no provision for pedestrians. Rotaries are no longer considered appropriate roadway design.

C. Chicanes

A chicane is a lateral shift in the roadway alignment. This can be done by altering the side of the street on which parking is permitted, or by installing plantings or other obstructions to travel on alternating sides of the street.

D. Landscaping Treatments

Trees and other plantings can make a roadway seem narrower, which encourages motorists to travel more slowly. They can also make an area seem less dominated by paving and make a road seem less like an arterial.

E. Speed Tables/Raised Crosswalks

Speed tables, or speed humps, are improved versions of the old speed bump. They are broader and flatter so vehicles do not straddle them. They can be used as raised crosswalks. These have several advantages: They slow traffic, they remind drivers of the crosswalk, they encourage pedestrians to use the crosswalk, and pedestrians do not have to contend with curbs.

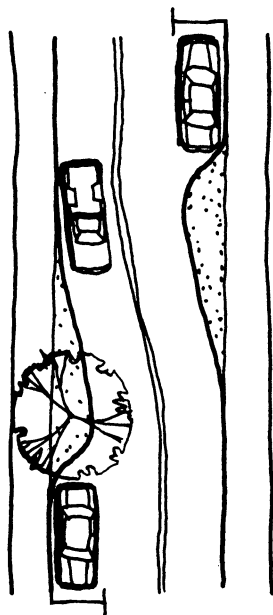


Figure 12: An example of a chicane.

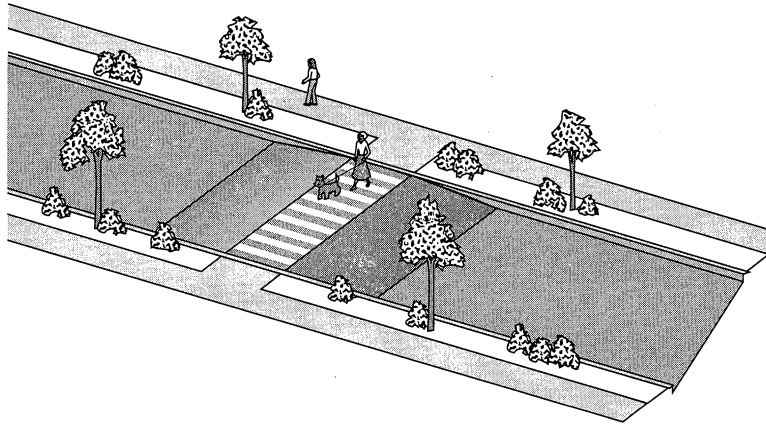


Figure 13: Raised crosswalk also acts as speed hump.

E. Barriers

The most familiar barriers are the posts planted in a street or path that permit pedestrians and bicycles to pass but not cars or trucks. Low barriers can also be used that do not obstruct vehicles with a high undercarriage (such as a fire engine) but do impede automobiles. These latter devices require careful design and installation, including proper warnings. They must be plowable in winter.

Because of concerns about traffic diversion, Cambridge does not close streets to traffic except to address significant safety issues.

G. Emergency Vehicles

The Fire Department is consulted before installing traffic calming devices to ensure that emergency access is not compromised. There is enough experience with traffic calming measures to design good emergency access. Some devices, e.g., curb extensions, can improve emergency access by keeping intersections clear of parked cars.

VIII. Parking Lots

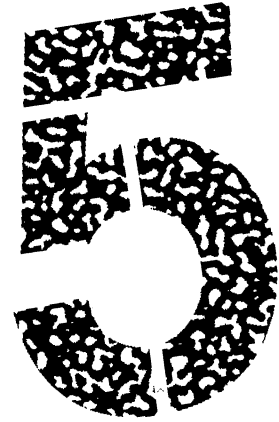
The large expanses of uninterrupted paving found in many parking lots create a visually unpleasant area for people to walk past or through. These parking lots also have negative microclimate effects, often making places windier, therefore colder, in winter, and hotter in summer. Often, no provision is made for pedestrian pathways in parking lots.

The Cambridge Zoning Ordinance requires that parking lots with five or more spaces be screened with a 5-foot strip of vegetation or a fence that is at least 50% opaque. The ordinance also requires landscaping within the lot. However, many parking lots are not required to comply with these regulations because they are pre-existing facilities.

Owners of pre-existing parking lots can be encouraged to comply with the zoning ordinance by planting trees and other vegetation within and at the perimeter of their parking lots and to create safe pedestrian pathways within large lots.



FIVE



Complements to Walking



5. COMPLEMENTS TO WALKING

I. Transit Access

Good walking conditions for pedestrians are important inducements to using public transportation, since most public transit trips include a walk at one or both ends. Conversely, good public transportation, with buses and subways that run frequently and are reliable, is essential to achieving a walkable city.

Good public transportation is a requirement if we are to move away from dependence on the automobile.

A. What Exists: Subway, Buses, Paratransit



Red Line station.



Bus-shelter in Central Square.

Cambridge is well served by fixed-rail transit. Most residents live within a half-mile walk of one of the five Red Line stops or the Lechmere Green Line station. There is one commuter rail connection to trains for the suburbs to the northwest. The Red Line is frequent, rapid, and reliable and the trains and stations are cheerful and reasonably clean. The city's Red Line stations are wheelchair accessible; the Lechmere station is not.

Twenty-nine MBTA bus routes also serve the city. Most are wheelchair accessible. For people whose disabilities prevent them from using regular T service, paratransit is available through The Ride, an MBTA program.

Most Red Line stations have elevators, but it is hard to carry bundles on the bus or on the Green Line. For people who have trouble with stairs, the buses are a problem. Buses do not always pull up to the curb, so passengers often have to step off the curb, then up several bus steps. While buses have kneelers (pistons that lower the bus's front end to reduce the height of the first step), this is an awkward way to move people and their packages and the kneelers aren't used very often.

The "Wave," the shuttle bus between the Kendall station and the Cambridgeside Galleria, has been very successful. In 1994 it carried 746,000 passengers.

Some Cambridge businesses and other institutions provide shuttle services to T stations and other services to encourage employees to use alternatives to single-occupancy vehicles for commuting. The City's Parking and Transportation Demand Management Planning Officer is available to help employers develop alternative transportation programs.

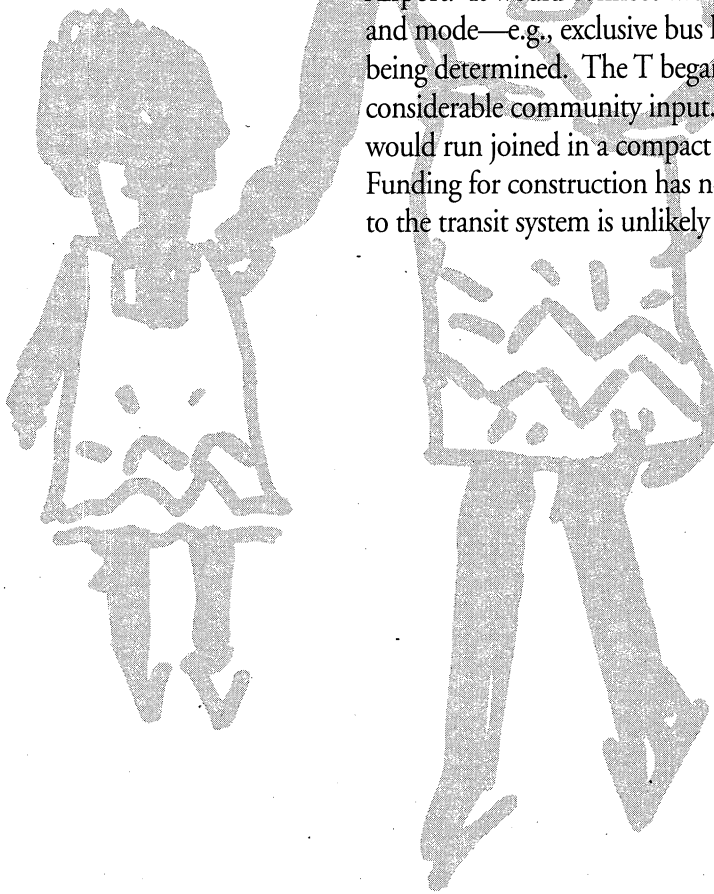
Transportation Management Associations (TMAs) group together several employers to provide shuttle services. They may also provide assistance with carpooling, information about public transportation, bicycle facilities, incentives for walking, etc.

B. What Are the Gaps?

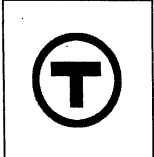
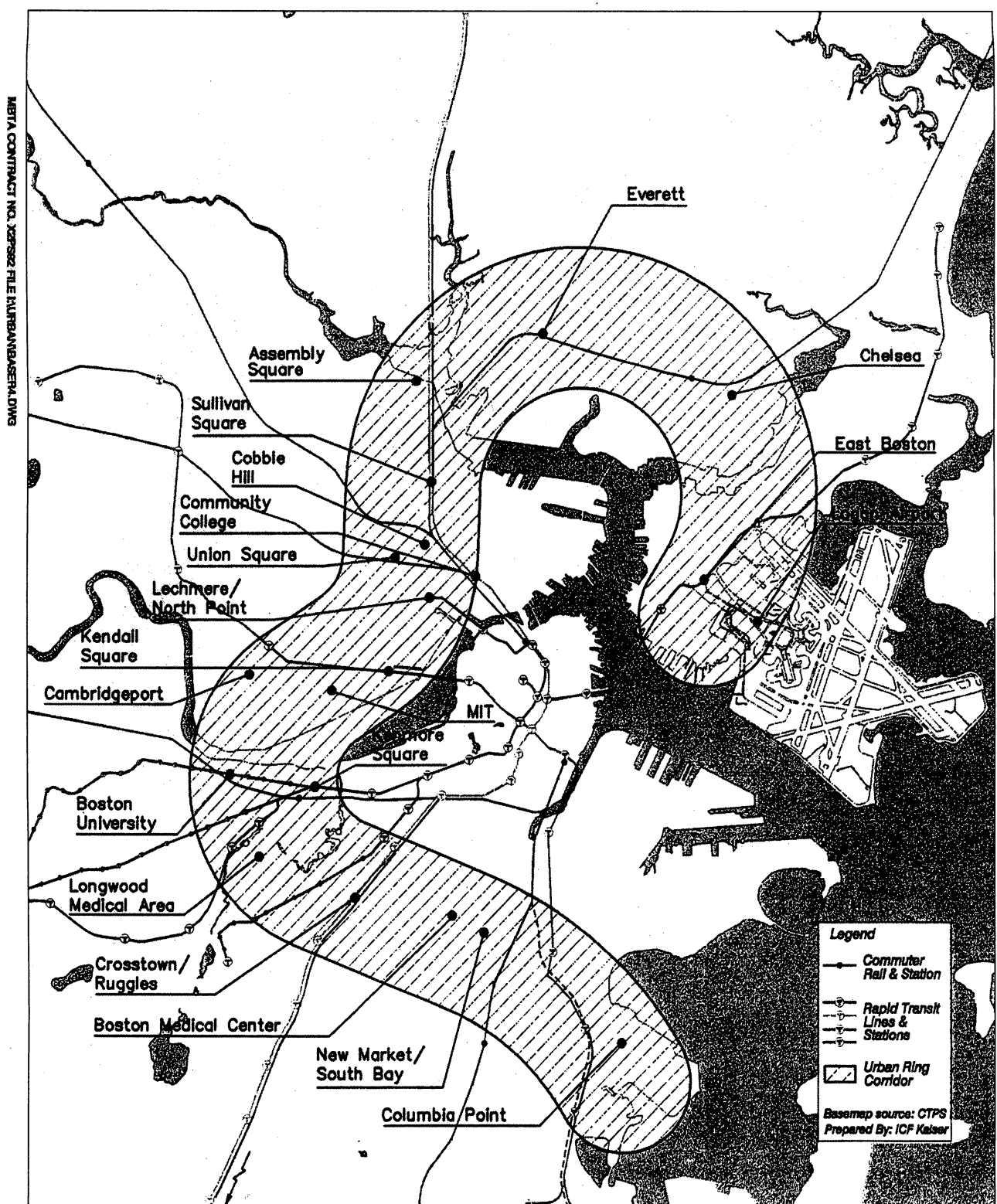
Fixed-rail Service Gaps

- Not all of the city's subway stations are easily accessible to pedestrians. The Porter Square station, for example, is surrounded by streets that are hard to cross (when plans to improve Porter Square for pedestrians are carried out, the station will be more accessible). Much of the area around the Alewife, Kendall, and Lechmere T stations is uninviting for walkers.
- The T is not available between roughly 12:30 AM and 5:00 AM.
- Lack of a circumferential route means Cambridge subway riders often have to go into Boston and out again to reach destinations, especially to and from places to the north and west. For example, it is necessary to take three trains and a shuttle bus to get to the airport from most of Cambridge, an awkward trip with luggage.

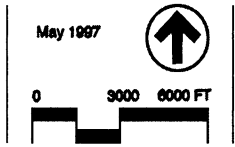
The Urban Ring is a major project that would make it possible to travel to many destinations in metropolitan Boston's urban core without having to go in to Park St. station and out again (see map below). The proposed new service would begin around Columbia Point in Boston, pass through Roxbury and the Longwood medical area, cross the Charles in Cambridgeport, connect with Kendall and Lechmere stations, pass through Somerville, Everett, and Chelsea, and end at Logan Airport. It would connect with all the existing subway lines. The exact alignment and mode—e.g., exclusive bus lane, light rail, heavy rail—of the new service are still being determined. The T began a major investment study in 1997 which included considerable community input. The communities through which the Urban Ring would run joined in a compact to work together to promote its construction. Funding for construction has not yet been identified, and this important addition to the transit system is unlikely to be completed much before 2020.

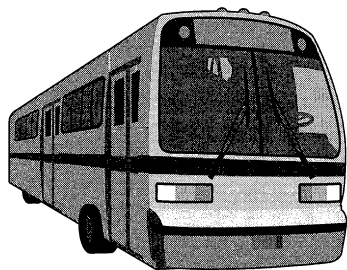


URBAN RING MAJOR INVESTMENT STUDY 



Urban Ring Corridor
Study Area





Gaps in bus service

- Frequency: Only six of the twenty-nine buses that serve Cambridge run every ten minutes or less during the rush hour. During the day, only seven run every twenty minutes or less off-peak. This means long waits, especially on return trips, which can't always be timed precisely. People who have other options rarely use buses that run infrequently.
- Through routing: Most bus routes do not traverse the entire city, so many trips within Cambridge require changing buses. Since most buses run infrequently, this can mean a lot of waiting (as well as an extra fare). Transfers are a major disincentive to taking buses.
- Amenities: Few bus stops have seating or shelter from wind or rain. The City is looking at ways to increase the number of bus shelters in Cambridge.
- Information: Signs designating bus stops can be hard to spot because they look like parking signs. The yellow "tombstone" signs used elsewhere by the MBTA are beginning to be used in Cambridge, which will help. A more serious problem is that at most bus stops there is no indication of which buses stop there, what their routes are, or how often they run. Even in the Harvard Square bus station the signs are inadequate.
- In winter: Bus stops are not routinely shoveled out or salted. This is legally the responsibility of the abutter.
- Bus design issues: The diesel buses currently in use should be replaced by alternative fuel vehicles, to reduce air pollution and noise. Bus and bus stop design that make getting on and off easier and faster should be seriously considered. For bus routes that have relatively few passengers and/or include narrow streets with tight turns, smaller buses should be considered.

II. Delivery Services

Ingenuity will be required to make it easier for people to carry things without using cars. Getting purchases, especially groceries, home can be a major chore for people on foot. For people without washing machines, transporting clothes to and from Laundromats can be difficult.

To help pedestrians in situations like these, the following actions would be helpful:

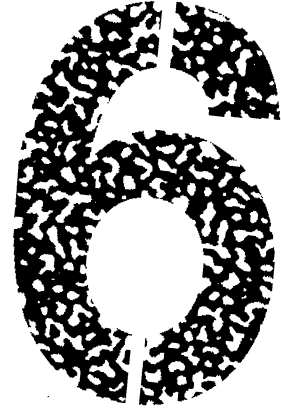
- Incentives for stores to provide more delivery services and less parking
- Encouragement to stores that offer parking validations at garages to offer a free T validation or tokens as well
- Encouragement of grocery delivery services

III. Taxi Escort Services

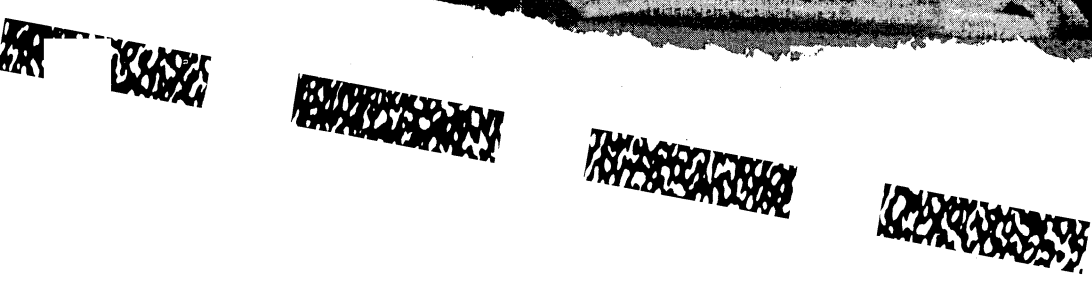
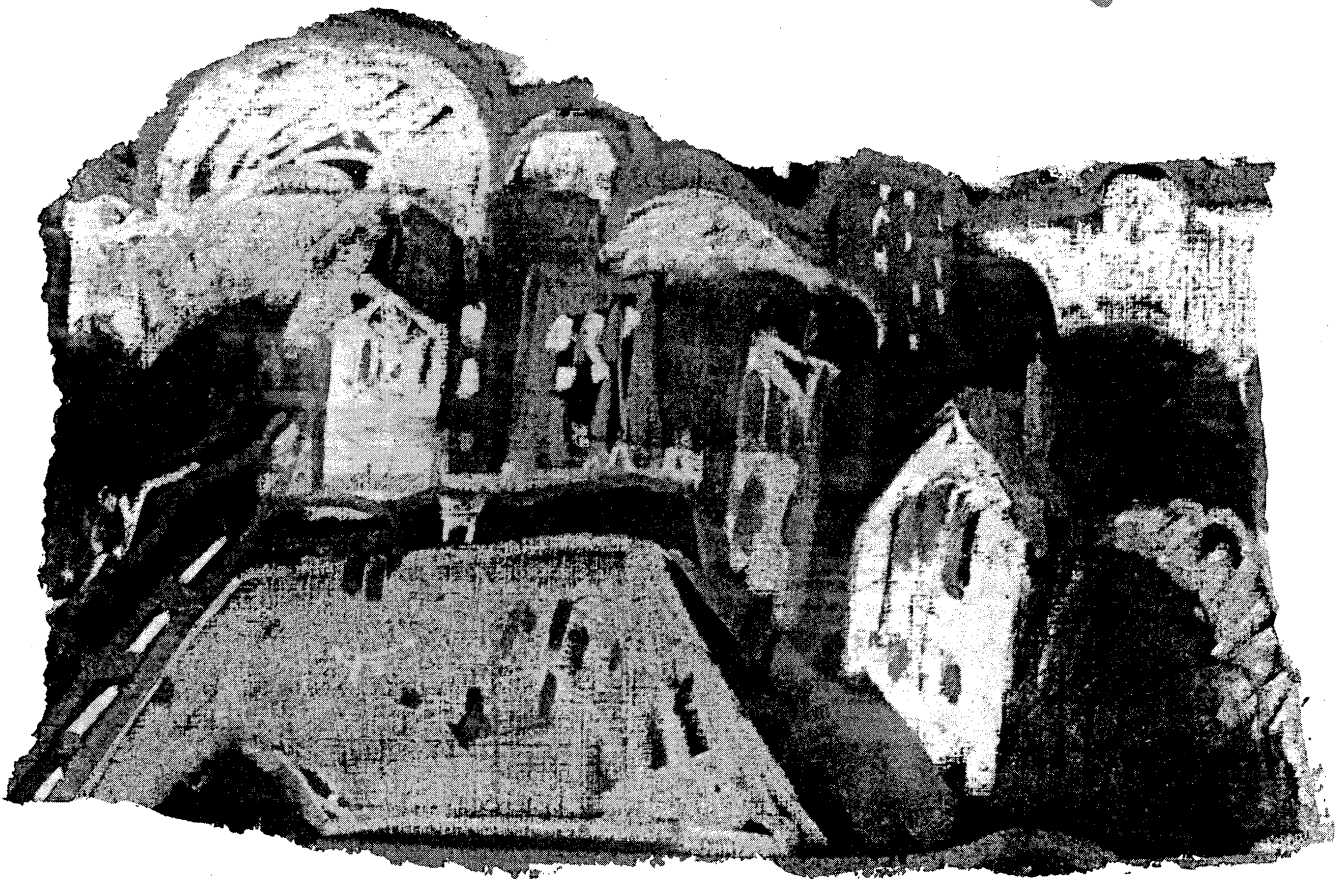
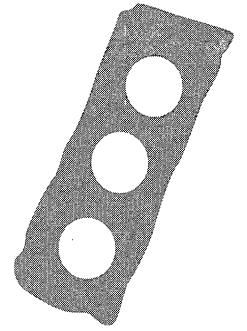
Taxis are an important backup service for pedestrians, especially for those who do not own cars. Taxis can help make the city safer. In Great Britain at night, taxi drivers wait until passengers are inside their doors at their destination before driving off.

The City will work with taxi services to explore ways they can optimize the value of their services in creating a safer city, including provision of accessible services for people with disabilities.

SIX



Cambridge Plan



6. CAMBRIDGE PLAN

The following section describes the city's major nodes, spines, and neighborhoods and makes general recommendations for pedestrian improvements. A comprehensive, specific list of problem intersections or sidewalks has not been included because a list of such problems could not be kept current, and proposed solutions generally require careful evaluation.

I. Street Classification

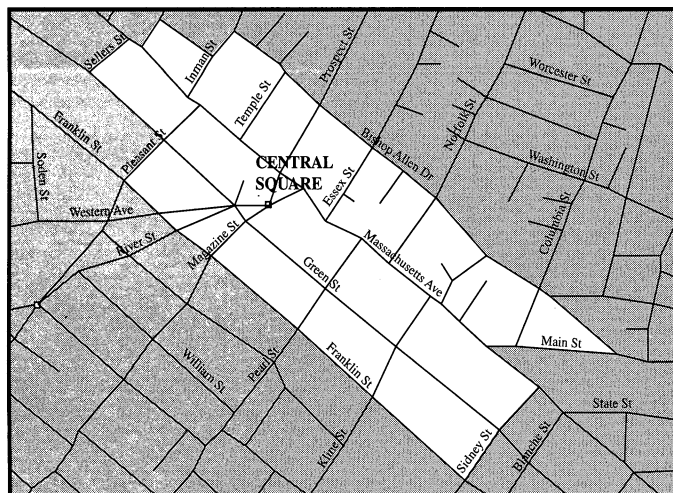
The Federal Highway Administration classifies roads based on their function: ²³

Functional System	Services Provided
Arterial	Provides the highest level of service at the greatest speed for the longest uninterrupted distance, with some degree of control.
Collector	Provides a less highly developed level of service at a lower speed for shorter distances by collecting traffic from local roads and connecting them with arterials.
Local	Consists of all roads not defined as arterials or collectors; primarily provides access to land with little or no through movement.

The purpose of this classification system is to facilitate the design process. Generally, arterial streets have the most travel lanes, heaviest traffic, and widest sidewalks. Local streets tend to be the narrowest, with the lightest traffic. Many Cambridge streets do not fall neatly into any of these street types. For example, some arterial streets have narrow sidewalks, and some residential streets are wider than some collectors are. As such, these are only guidelines for planning. Functional classification is not an exact science, and the function of a particular road can shift as land use patterns change.

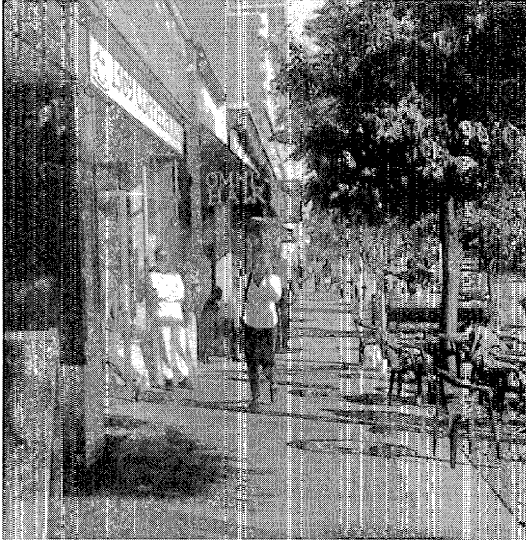
II. Major Nodes

A. Central Square



Central Square serves many functions. City Hall, the police station and senior center, the main post office, and the YMCA and YWCA are among the civic institutions located in or near the square. Its many restaurants and clubs make it a center for Boston-area night life. It is surrounded by ethnically and economically diverse neighborhoods; over half the city's residents live within half a mile of the square. The square's stores are a source of reasonably priced goods for neighborhood residents. Some also attract significant numbers of customers from elsewhere in the area.

²³ Federal Highway Administration, U.S. Department of Transportation, *Flexibility in Highway Design*, Pub. No. FHWA-PD-97-062 (1997), p. 42.



Central Square.

In the 1820s, Central Square was a hay market where the roads leading from three bridges across the Charles River converged. It was separated from Old Cambridge, the village around Harvard Square, by a “mile or so of woods, brush, and pastureland.”²⁴ Manufacturing and commerce characterized the square and its surroundings from the early nineteenth century. In recent years research and development have replaced most of the city’s manufacturing, and Central Square has not escaped this trend. University Park, on the edge of the square, is a major development that is projected to be about 2.3 million square feet when completed, with about 4,000 employees.

Central Square has relatively good public transportation, but its location as a crossroads for the streets that lead across the Charles to Boston and the Mass. Turnpike have led to heavy

automobile and truck through traffic. Following an extensive public participation process, Mass. Ave. and most of Central Square’s sidewalks were redesigned and reconstructed in 1996 and 1997 to make the square more bicycle and pedestrian friendly.

Among the key design ideas carried out in the Central Square renovations were the following:

- Wider sidewalks, allowing more space for landscaping, sidewalk cafés, bicycle parking, benches, etc.
- Curb extensions at crosswalks to reduce the Mass. Ave. crossings from about 70 feet to about 50 feet
- Elimination of the right turn slip lane at Mass. Ave. and Magazine Street to enable pedestrians on the east side of the intersection to cross Mass. Ave. without waiting for two traffic phases and to expand the plaza
- Reworked traffic signals to give more time for pedestrians and reduce jaywalking
- Improved lighting with a two-tiered system: tall roadway lighting supplemented by lower pedestrian-oriented fixtures at frequent intervals
- Improved bus shelters
- Bicycle lanes on Mass. Ave. to improve bicyclist safety and reduce illegal sidewalk cycling

Actions:

- Address problems of continued widespread jaywalking and motorists failing to yield to pedestrians at some crosswalks.
- Provide destination and schedule information at bus stops.

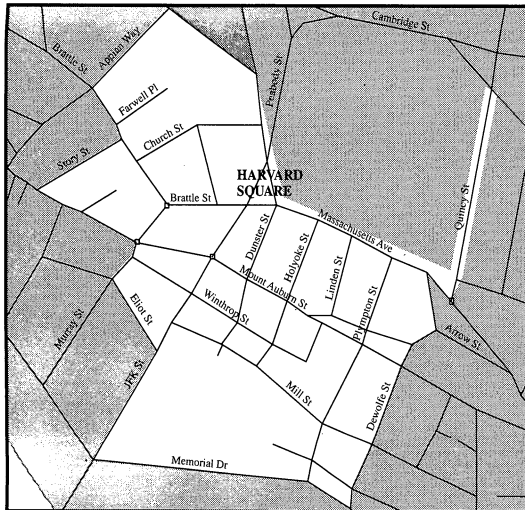
B. Harvard Square

Harvard Square is the commercial center for the Harvard community and a business, entertainment, and shopping center for area residents. It is also one of the Boston area’s major tourist destinations.

In the mid-eighteenth century the area around Harvard Square was a pedestrian-oriented village, but as horse-drawn, then motorized vehicles increased on

24 F. B. Sutton, *Cambridge Reconsidered*, Cambridge, MIT (1976), p. 51.

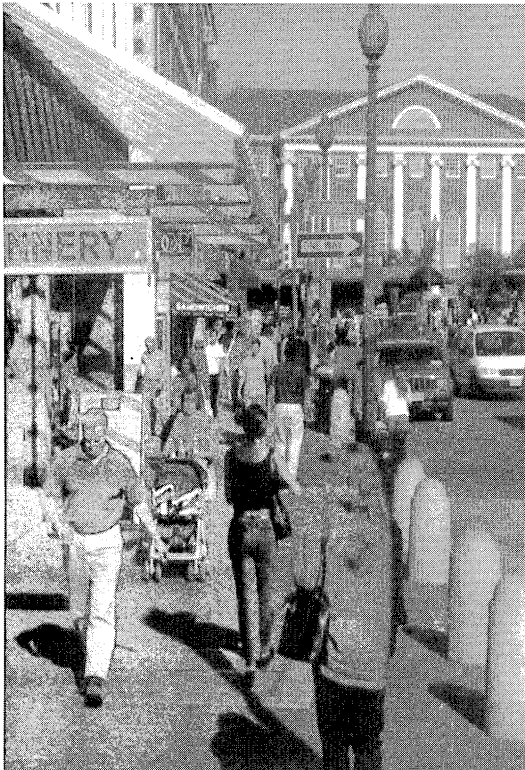
the streets of Harvard Square, pedestrians were left with quite narrow sidewalks and inhospitably wide streets to cross.



In 1912 the Harvard Square MBTA station opened. For 60 years, it was the northern terminus of the Red Line and was supplemented by trolley lines radiating into the community. Harvard Square's role as an important transit node made it possible to construct buildings with much less parking than more suburban locations require. This has helped preserve and strengthen the district's pedestrian-oriented character.

Recent construction has affected the pedestrian realm. One of the most unfriendly structures is the motor inn on Mt. Auburn St., designed for the automobile, turning its back on pedestrians. In 1994 Harvard University convened a group to determine how to make the motor inn fit better into its setting. So far, this goal remains elusive, but the building has been made more accessible to people in wheelchairs and other pedestrians.

The Holyoke Center complex has useful spaces for pedestrians. The passageway through the building is a welcome connection from Mass. Ave. to Mt. Auburn Street. The Mass. Ave. plaza associated with the center was an open space that for years was quiet; with the arrival of the Au Bon Pain café and public seating, the space exploded with activity, and it is now a place for people to enjoy the urban scene. The newer seating area at the rear, on Mt. Auburn St., is also a pleasant space.



Harvard Square.

Pathways of intimate scale through the middle of blocks add to the sense that the square is primarily for pedestrians. Through an informal cooperative effort among several architects a complex of walkways was begun within the block bounded by Brattle, Story, and Mt. Auburn streets. The City followed their lead, and the path was extended to Mt. Auburn, and a new connection between Brattle St. and Mifflin Place was established beside the One Brattle building.

Another positive development has been the connection of the square to the river. Where the Kennedy School of Government and Charles Hotel are now was, not many years ago, the maintenance yard (the "car barns") for the Red Line trains. When the Red Line was extended in the early 1980s, this land became available for redevelopment. Now, it is pleasant to walk from the station to the locust-lined path to JFK Park and the river.

The reconfiguration of the MBTA station and the associated surface-level urban design work had other effects on the pedestrian environment. The old main subway entrance was made into the Out of Town News stand, and what had been a traffic island became a peninsula attached to the sidewalk, creating more space

for pedestrians. Wider sidewalks throughout the project also enhance the urban experience. Especially active is the curving sidewalk leading around to Brattle Street. Harvard Square's green space is Winthrop Square, at the corner of John F. Kennedy and Mt. Auburn streets. The site of a seventeenth century marketplace, it is an intensely used park. The City's renovation in the 1980s was based on the early pathway system, which simply connects the four corners. An abutting project

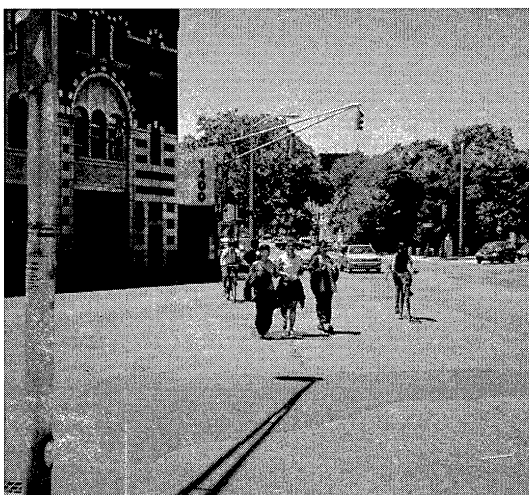
completed in 2000 includes extensive historic renovation of two existing structures and the addition of residential use fronting onto the park. Winthrop Street runs alongside the park, and traffic calming is planned to make this extremely narrow street more pedestrian friendly.

There are still issues in Harvard Square. The passage between the main T entrance and Cambridge Savings Bank is narrow. Opinion is divided on the “pit,” the area behind the main entrance; some people find the young people who congregate there threatening, others enjoy the space. The need for better information for visitors is of concern to the tourism board. Nonetheless, Harvard Square remains one of the nation’s most beloved places for people.

Actions:

- Create a pedestrian-oriented system of informational signs for visitors to Harvard Square.
- Maximize traffic signal time allotted to pedestrians.

C. Inman Square



Inman Square.

Of all the business districts discussed in this section, Inman Square is probably the most neighborhood oriented. It has no subway stop. Its scale is more intimate, with narrower streets and smaller buildings. While it continues to serve the neighborhood, it is also a destination for people interested in patronizing its restaurants. In 1993 the businesses in the square drew up guidelines designed to enhance the architectural character of the structures in the square and to build upon its pleasant qualities. Despite its intimate scale, Inman Square is a busy motor vehicle crossroads. Cambridge, Hampshire, Inman, Antrim, and Springfield streets meet in a complex intersection that is confusing and intimidating for pedestrians. Some improvements are planned in conjunction with the planned Cambridge Street renovations.

Action:

- Continue to study the intersection and pedestrian and vehicular traffic to see if pedestrian circulation can be made more convenient and less intimidating.

D. Kendall Square and Environs



Kendall Square.

A former industrial area that has been radically transformed in recent years, Kendall Square and its surroundings are in great need of better pedestrian accessibility and amenities. While this area has succeeded in becoming economically productive, it has only a few pedestrian-friendly places. The plaza at the MBTA station is lively and attractive, the Sixth Street pedestrian way is a pleasant tree-lined route from the residential neighborhood to the business area, and the perennial garden on Broadway is an oasis of green in this otherwise inhospitable urban office park. Many of the roads are too wide, and there are a number of pedestrian crossings that are difficult.

A series of forums in 1992-1993 pointed to the need for more usable open space at the street level, more ground-floor retail to enliven the streetscape, and housing to help the area attain the mixture of uses that characterizes Cambridge’s more appealing and pedestrian-friendly districts.

With additional major development planned, the need for better pedestrian facilities is increasingly urgent.

Actions:

- Promote development that will provide a better mix of uses in the area and that will improve connections to the historic East Cambridge neighborhood as well as to the MIT campus.
- Examine the roadways and pedestrian crossings to see where roads can be reconfigured and the area can be made more hospitable for pedestrians. Work with developers to achieve these improvements.
- Work with Kendall Square businesses to develop better signage for pedestrians, e.g., signs directing pedestrians to the Galleria shuttle bus, One Kendall Square, and the Kendall Square movie complex.

E. Porter Square



Porter Square.

The addition of a Red Line station in 1984 changed the character of Porter Square, but the automobile continues to dominate the square. Although the station is an important public transportation node, with subway, bus, and commuter rail service, pedestrian access to the station and the surrounding area, especially the shopping center, needs considerable improvement. Unlike the other squares, Porter Square is dominated by a private parking lot. Mass. Ave., Somerville Ave., Elm St., and Beacon St. all carry regional traffic that tends to dominate neighborhood traffic and adversely affect pedestrians.

Opportunities to improve the area include the renovations of the shopping center, with better articulated and more appealing pedestrian walkways, and the anticipated road work on Mass. Ave. north of the square, which offers an opportunity to build pedestrian improvements. A Porter Square citizens advisory

committee worked with staff and consultants to develop ideas to improve the area. Pedestrian improvements are a major component of the planned changes. Plans for the area include reconfiguring the intersection to make it work better for pedestrians.

III. Spines

A. Massachusetts Avenue

Massachusetts Avenue, known as Mass. Ave., is the city's main street. The only street that runs the length of the city, it is a state highway, Route 2A, and links Cambridge to Boston's Back Bay at one end and to Arlington and the western suburbs on the other. Harvard and MIT are both on Mass. Ave., and it passes through Harvard, Central, and Porter squares. It is lined with major destinations: stores, restaurants, office buildings, residential buildings of various sizes, churches, government institutions. Much of the city's commercial, institutional, and recreational life takes place either on or near Mass. Ave.

Mass. Ave. is fairly well served by public transportation. There are three subway stops—Central, Harvard, and Porter—and two others—Davis and Alewife—are nearby. The No. 1 bus runs east from Harvard Square into Boston, frequently enough during peak travel times to be reliable, and the 77 and 77A buses run west from Harvard Square, less often than the No. 1 but more often than most T buses.

Walking conditions along Mass. Ave. vary. The heavy vehicular traffic is a major problem, because of noise and exhaust fumes and because it can be difficult to cross the street. Most people find walking to and from a traffic light several hundred feet away to get to a destination across the street inconvenient and annoying.

Mass. Ave. north of Porter Square will be renovated in conjunction with sewer work. The planning process began in 1997. The proposed renovations would improve walking conditions in several ways:

- More crosswalks, and curb extensions at many crosswalks, would make it easier for pedestrians to cross.
- Replacement of the continuous median with an interrupted median would slow down traffic. The median would remain as pedestrian crossing islands at unsignalized crosswalks and elsewhere.
- Trees and benches would make walking more pleasant.

Actions:

- Work with the MBTA to establish frequent alternative-fuel bus service along Mass. Ave. This would help improve air quality and would be an attractive option for pedestrians.
- Make sure the sidewalks are clear of obstacles. Inform businesses of the importance of keeping a clear path for pedestrians. Install enough bicycle parking facilities to ensure that parked bicycles are not an obstacle.
- Work with the business community and tourism office to develop and implement a plan for public rest room facilities in business districts along Mass. Ave. and elsewhere, possibly by encouraging many stores and restaurants to allow the general public to use their facilities.
- Continue engineering, educational, and enforcement efforts to end illegal sidewalk cycling.

B. Cambridge Street



Cambridge Street.

Cambridge Street is the city's second major commercial street. From Lechmere to Inman Square, it is the commercial and institutional heart of East Cambridge. Small local businesses, including stores, restaurants, and professional offices, line both sides of the street. West of Inman Square public and private institutions predominate: Cambridge and Youville hospitals, Harvard Vanguard, the high school, the main library, and various Harvard facilities.

The eastern section has especially heavy pedestrian travel. The sidewalks are often crowded, and double-parked cars and trucks help make the street difficult to cross at times.

The 69 bus serves Cambridge Street. Except during the rush hour, it runs infrequently—every 23 minutes off-peak and every half hour at night and on Sunday. The street lacks amenities for people waiting for buses.

The Cambridge Street Advisory Committee, consisting of residents, business people, and City staff, has developed goals and recommendations for improving the street's East Cambridge end. These include streetscape improvements such as trees, lighting,

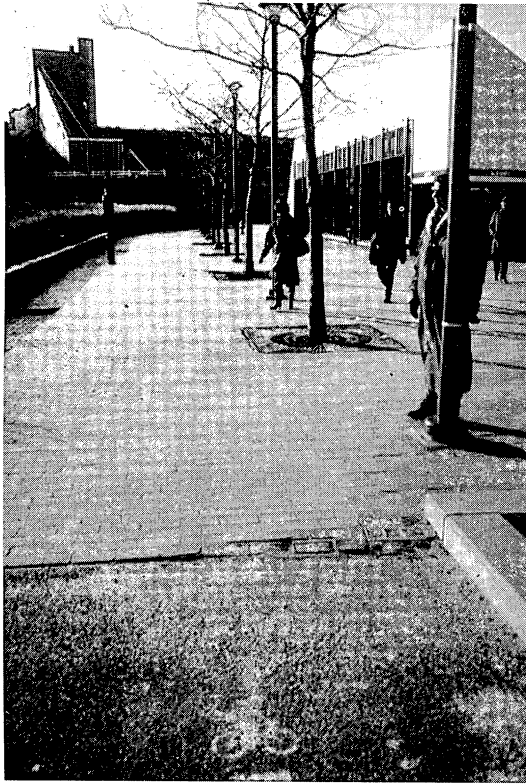
signage, seating, curb extensions, and improvements to open space. They also include recommendations concerning parking and housing.

Action:

- Work with the Cambridge Street neighborhood to achieve the goals laid out in the Cambridge Street Advisory Committee report of July 1997.

IV. Other Major Commercial Areas

A. Alewife Area



Alewife T station.

The City's draft plan, *Alewife: A Plan for Sustainable Development* (October 1993), contains many ideas to make this 370-acre district more user friendly, especially for pedestrians.

Improvements are planned for this gateway to Cambridge, broadly defined as the sequence of entry routes including Route 2, Alewife Brook Parkway and Fresh Pond Parkway (both MDC roads), and Concord Avenue. At present these roads are usable by automobiles but extremely unwelcoming for pedestrians.

The Alewife Red Line Station and the bus routes that terminate at the T station make the area somewhat accessible by public transportation, but it is inhospitable for pedestrians, with a lack of sidewalks, heavy traffic, wide curb cuts, development fronted by parking lots, and few opportunities for pedestrians to cross the street.

The City has developed and negotiated with the MDC a plan for Fresh Pond Parkway, a key access to the area, that will improve the road for pedestrians. Improvements include:

- pathways, with separate pedestrian and bicycle facilities where possible
- crosswalks with push-button signals

- reduced curb cuts
- new lighting and landscaping.

Additional development is planned for the Alewife area. This as well as any redevelopment should be pedestrian oriented.

Actions:

- Pedestrian routes to the T station need to be a priority. Widen sidewalks where possible. Construct separate facilities for bicycles.
- Promote creation of direct, safe, appealing pedestrian routes through parking lots, e.g., to the movie theater.
- Plant as many trees as can be accommodated without compromising pedestrian access and safety. Other greenery can be an amenity, but front lawns wider than 20 feet tend to isolate the buildings that are set back.
- Scale and site street furniture—lighting, benches, signs, trash receptacles—with pedestrians in mind. These elements, especially signage, should also be geared to bicyclists.
- Discourage deep building setbacks and promote pedestrian-friendly construction, with doors and windows on the street and no blank facades. Parking should be located behind or to one side of buildings.

- Encourage ground floor retail use along the primary pedestrian ways.
- Promote creation of pedestrian-oriented destinations, e.g., restaurants, stores.
- Work with private developers and property owners to create stopping places that make a walk more enjoyable. These include pocket parks and other places to sit, including shady spots under a tree but in public view.

B. Lechmere/North Point



Centanni Way.

Across the MDC's Msgr. O'Brien Highway from Lechmere Station is North Point, a 70-acre district equivalent in area to the entire East Cambridge riverfront. This district is bounded by Msgr. O'Brien Highway, the Charles River, the Somerville rail yards, and Charlestown. Many people were unaware that North Point is part of Cambridge until controversy arose in the late 1980s around the proposed construction of the world's largest traffic interchange over the Charles River as part of the Central Artery/Tunnel project. The fourteen-lane Charles River Crossing currently planned, while smaller than Scheme Z, the original design, will include highway ramps on the northeast corner of North Point.

North Point is the Cambridge section of the "lost half mile," a forlorn stretch of river front that has been almost totally inaccessible to pedestrians, as well as to most vehicles, for all of its history as an industrial and railroad corridor. In 1986, prior to the first Charles River Crossing proposals, the City enacted new zoning and urban design guidelines intended to guide the redevelopment of this area over time toward a mix of new private uses relating to a public system of streets and parks. The City's urban design vision is being incorporated into the State and MDC's plans for creating a new Charles River Basin park. Taking into account that this is a long-term project, there are some key features that would make this a welcoming place for pedestrians:

- An attractive new Lechmere Station, for which preliminary designs have been done, to be built on the North Point side of Msgr. O'Brien Highway. This is part of a long-term plan to extend the Green Line into Somerville. An essential feature will be a new intersection of Msgr. O'Brien Highway and First Street, with adequate green time for easy pedestrian crossing of the highway. This will connect development in North Point to the East Cambridge neighborhood as well as to the newer uses along the riverfront.
- Depending on how the areas under the Central Artery are designed, a pathway from Cambridge to Charlestown and across the Charles River to Boston that is as attractive as possible.
- A sidewalk system that provides pedestrians with pleasant, direct routes through North Point.
- A connection from the Museum of Science to North Point via a pedestrian bridge.

Action:

- Work with State, MDC, and MBTA officials to ensure that pedestrian and public transit access are priorities.

V. Neighborhoods

As neighborhood plans are developed, pedestrian routes, pedestrian-oriented traffic calming measures, lighting, and the placement of amenities such as benches should be studied, taking into consideration each neighborhood's pedestrian travel desire lines and the location of gathering places. Traffic should move slowly on local streets.

Actions:

- As road reconstruction is planned, look for opportunities to implement traffic calming measures.
- Work to reduce the state in-city speed limit from 30 to 25 miles an hour.

VI. Pedestrian Network

A. Paths, Routes through the City

When they can, pedestrians generally take the most direct routes between two points. Evidence of this is clear in parks that do not have reasonably direct paved paths. Typically, enough walkers ignore roundabout paths to wear direct paths across the grass. Direct walking routes are an important amenity.

Cambridge does not have the super blocks or residential cul-de-sacs that characterize much American development that has taken place since the automobile became dominant. Nonetheless there are places where pedestrian paths are important because there aren't enough direct routes along roads (e.g., Kendall Square) or because there are a lot of walkers (e.g., Harvard Square).

As buildings are constructed or renovated, it may be possible to include more pedestrian paths.

Actions:

- Designate pedestrian routes of special importance for special treatment. These would include routes that are heavily walked and routes of special historic, artistic, or scenic significance. Consider installing benches and direction signs for pedestrians and look for opportunities for miniparks and linking pathways.
- Work with the Office of Tourism to develop a Cambridge heritage trail, including the present Black Heritage Trail, which should be made more visible.

B. Recreational Areas

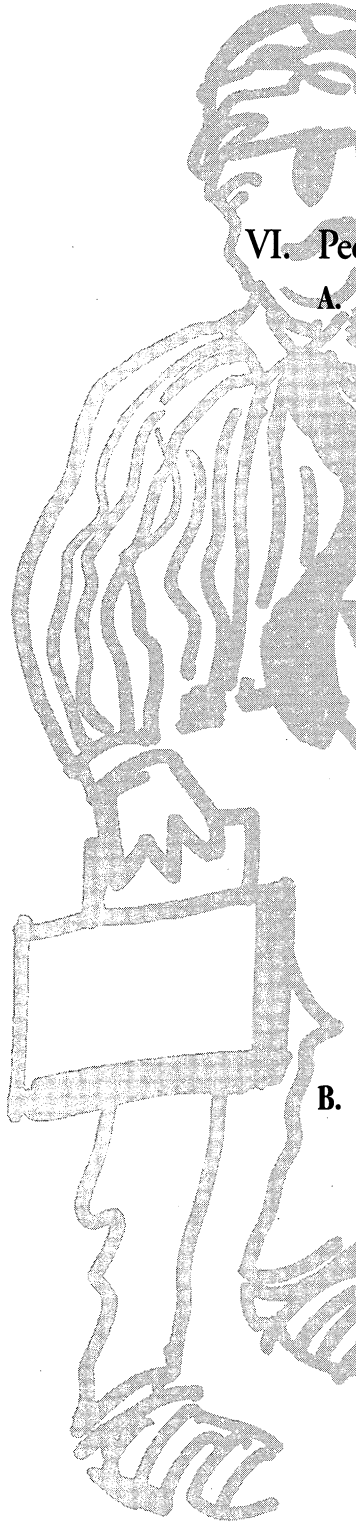
1. Alewife Reservation

This 115-acre MDC reservation on the border of Cambridge, Belmont, and Arlington is a remnant of the Fresh Pond marshes. *An Alewife Area Ecology Guide* describes it as a place that offers “adventure, a touch of wildness and freedom, diverse experiences, and views of water, green, and distant hills.”²⁵

Currently, access to the reservation is not well marked. As with Fresh Pond, issues have been raised about the number of people who can use the reservation without compromising it as a natural resource. Unlike Fresh Pond, it is easy to reach from the Alewife MBTA Station.

Action:

- Work with the MDC and community groups to develop trailhead signage for Alewife Reservation.



25 Stewart Sanders, *An Alewife Area Ecology Guide*, Cambridge, Mystic River Watershed Association (1994).

2. Charles River

The MDC park along the Charles River is popular throughout the year. It is the MDC's most intensely used reservation. The Dr. Paul Dudley White Bicycle Path is heavily used by pedestrians and in-line skaters as well as bicyclists. It is one of the oldest bicycle paths in the United States and is a standard facility. It is too narrow, has some sharp turns at blind corners, and has inadequate road crossings and other problems. While it is one of the city's most important and scenic open spaces, the facilities for pedestrians need improvement. Because it is an MDC park, the City's role is advisory.

In June 1997 the MDC began a planning process to develop a master plan for the Charles River Basin.

Action:

- Work with the MDC to develop ways to minimize conflicts among park users, to improve pedestrian crossings of Memorial Drive, and to increase citizen participation in managing the reservation.

3. Fresh Pond



Path at Fresh Pond.

The 2.4-mile bicycle and pedestrian path around Fresh Pond is popular for recreational walking and for running. Aside from the Alewife Reservation, it is the Cambridge open space that comes closest to offering a wildlife experience. Access to the reservation is difficult and unpleasant for pedestrians. The planned improvements to the Fresh Pond Parkway corridor (see discussion of the Alewife area above) should make it much easier for people to get to the reservation on foot.

Because Fresh Pond holds the city's drinking water, making it easier for more people to use the area needs to be balanced with threats to the water supply that might arise if use of the park space increases dramatically.

Action:

- Continue to work with the MDC to make Fresh Pond accessible for pedestrians and to make Fresh Pond Parkway a safer, more pleasant walking route.

4. New Parks

In the last decade, some much-needed new park facilities have been created on sites that had been unwelcoming to pedestrians. These include the 50-acre Danehy Park on the former City dump, 13 acres of parks on former industrial land in East Cambridge (7-acre Lechmere Canal Park, 1-acre Front Park, 1-acre Charles Park, etc.) and JFK Park near Harvard Square. Linear Park extends from Davis Square in Somerville to Russell Field, where it connects with the Alewife Station. These green spaces are primarily oriented to pedestrians, although some paths are shared with bicyclists, and because the parks are linked to or near important pedestrian pathways, they have opened up new possibilities for adult recreation and pedestrian travel along car-free paths. Linear parks and other scenic pedestrian routes offer opportunities for walking that the city's more compact stand-alone parks do not provide.

Actions:

- Survey and implement opportunities to make existing parks more accessible for pedestrians, including children, and better connected to surrounding uses.

- Continue to support a new connection now under consideration: a pathway along the river side of the Museum of Science parking garage that would link the museum to Lechmere Canal Park. While funding has yet to be identified, there is a great deal of support and interest on the part of the City, the MDC, the museum, and people who live and work in the East Cambridge river front.
- Continue work on projects to link parks and create pedestrian recreational walking routes, e.g., connecting Davis Square to Alewife, to Fresh Pond, to the Charles River.
- Explore potential new off-road multi-use paths, e.g., along the Grand Junction right-of-way through Cambridgeport and East Cambridge.



7. POLICIES, REGULATIONS, AND STANDARDS

I. Sidewalk Cleanliness

A. Litter



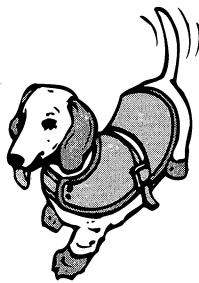
The City Municipal Code bans littering (8.24.170, 180, 190, 200). However, littering is widespread.

According to the code, every owner or occupant of private property is required to maintain his property free of litter and to prevent litter from escaping from his property. Every owner or occupant of private property bordering on a sidewalk is required to keep the sidewalk and the adjoining gutter to the center of the street free of litter.

Actions:

- Publicize responsibilities of people using the sidewalks and of building owners and occupants to keep sidewalks clean. Emphasize quality-of-life benefits of clean sidewalks.
- Trash cans need to be in place near major sources of litter, e.g., outside convenience stores.

B. Dogs

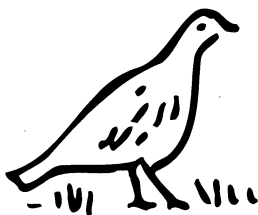


The Cambridge Municipal Code (6.04.060) states:

It shall be the duty of each person who owns, possesses or controls a dog to remove and dispose of any feces left by his dog on any sidewalk, gutter, street or other public area, or on any private property neither owned nor occupied by such person. No such person shall appear with a dog on any sidewalk, gutter, street or other public area, or on any private property neither owned nor occupied by such person without the means of removal of any feces left by such dogs.

The Cambridge Animal Commission has three full-time Animal Control Officers, but it is difficult for them to enforce the ordinance because they can rarely catch dogs in the act. Instead they rely primarily on public education, including written materials sent to owners when they license their dogs.

C. Pigeons



Pigeon excrement on sidewalks can be a problem in some areas. There is no law against feeding pigeons, and as long as they are fed and have shelter they are unlikely to stop congregating in places like Central Square.

Action:

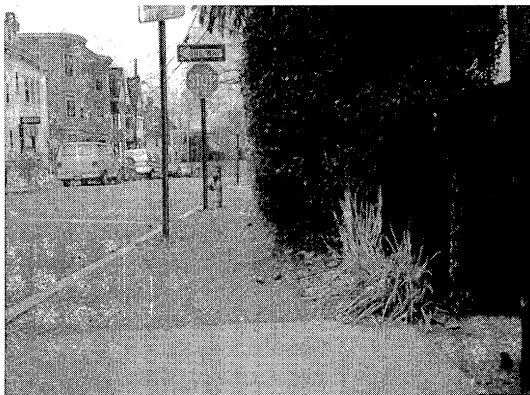
- Public education and social pressure are the best ways to eliminate litter and excrement. Undertake a public relations campaign to remind people of the law and to persuade them that dirtying our sidewalks diminishes the quality of everyone's life.

II. Sidewalk Maintenance

A. Vegetation



Sidewalks should be kept free of impediments such as branches and roots that can impede pedestrians. Residents are expected to consider this when planting trees or bushes and to maintain plantings so they do not interfere with passage on the sidewalk. Inspectional Services is the city department that responds to complaints about botanical obstructions from private property.



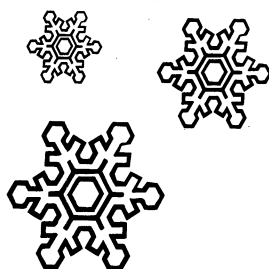
Botanical obstructions.

At the same time, Cambridge is full of old trees that intrude on sidewalk space but add greatly to the quality of life. Recognition of the need for clear passage for pedestrians and the need to accommodate these trees and other important vegetation should be the guiding principles. Some situations may require ingenuity to resolve.

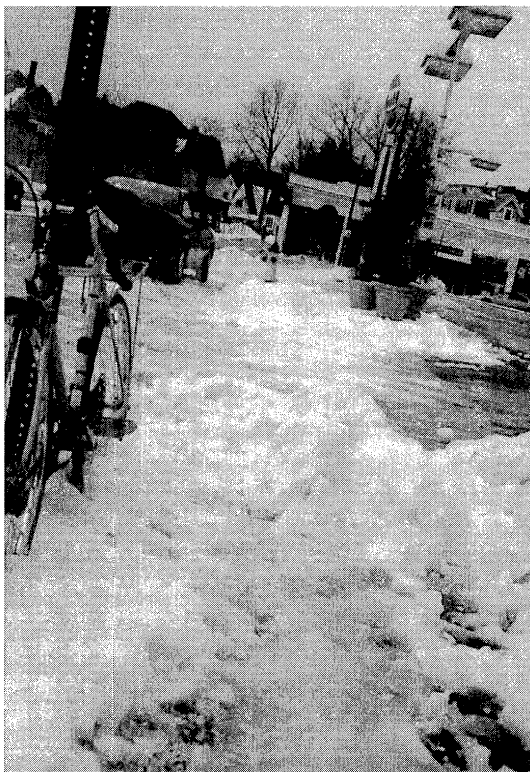
Action:

- Develop planting guidelines for residents and businesses and increase public education about the importance of keeping sidewalks clear.

B. Snow and Ice



By law (City Ordinance 12.16.110), the owner or occupant of property that borders a sidewalk must clear it within twelve hours after snow ceases to fall in the daytime and before 1:00 PM the day after a snowfall during the evening. Building owners and occupants must remove all ice or cover it with salt, sand, or another suitable substance within six hours after the sidewalk becomes icy. For people with corner property, responsibility for shoveling or sanding includes clearing the sidewalk to its intersections with the street. Property owners are also responsible for clearing paths from the sidewalk to the street at bus stops unless other agreements exist.



Uncleared snow is a serious problem for pedestrians.

Currently, compliance is spotty. Except in business districts, it is rare to find a whole block in which the sidewalk has been shoveled the entire length. One short unshoveled stretch can force pedestrians to walk an entire block in the street if they can't climb over snow banks or negotiate icy surfaces. Some homeowners sand or shovel their sidewalks but neglect the portion of sidewalk that crosses their driveway, leaving stretches of sloped, icy sidewalk for pedestrians to navigate. Some people only shovel narrow passageways, leaving insufficient room for baby strollers or wheelchairs or for two people to pass in opposite directions and creating icy conditions when the snow beside the path melts, runs into the cleared area, and freezes.

Persuasion and creation of a public expectation that people will keep sidewalks clear is the first and most important way to deal with uncleared sidewalks. The Department of Public Works has used a variety of means to publicize snow removal regulations and has instituted a 24-hour sidewalk snow removal hot line. People are encouraged to call the hot line and report uncleared sidewalks. Parking Control Officers also do enforcement. The fine for failure to clear a sidewalk is \$25.

The City is responsible for many stretches of sidewalk; some, for example around parks, are long. The first priority for clearing these sidewalks is around public buildings, including schools, but it is important that all sidewalks that the City is responsible for are cleared in a timely manner.

Action:

- Develop additional public education and systematic enforcement to increase awareness and compliance.



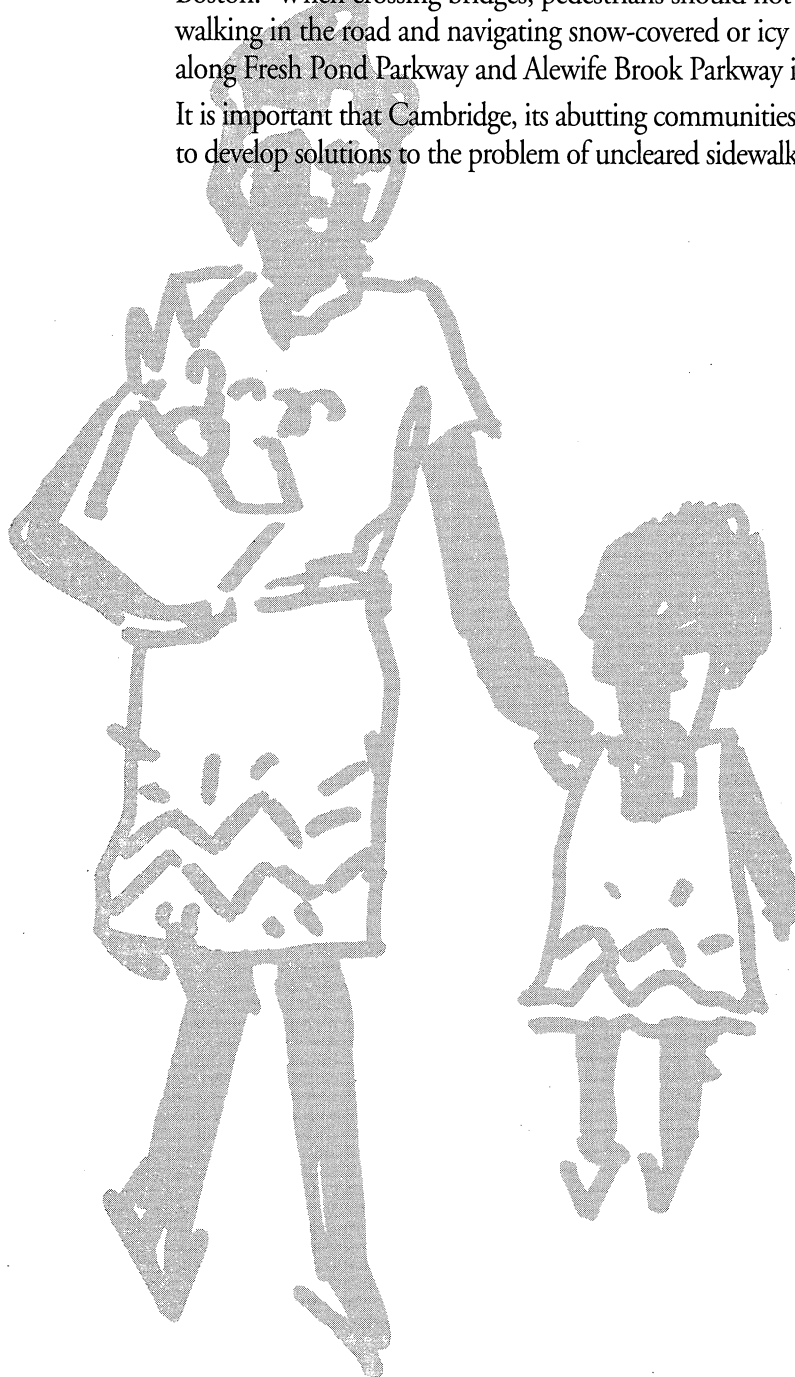
C. Construction Sites

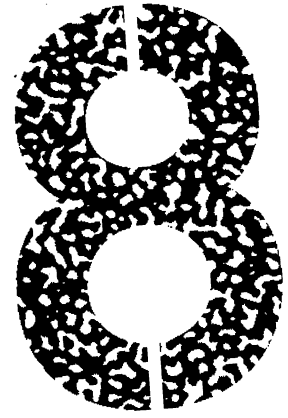
Pedestrian safety will be considered equally with vehicular safety at all construction sites in conformance with the Manual on Uniform Traffic Control Devices. A safe pedestrian walkway will be maintained and signed through all construction areas on City projects. The Department of Public Works will also work with utilities in the city to bring them into compliance with pedestrian safety requirements.

III. MDC Sidewalks

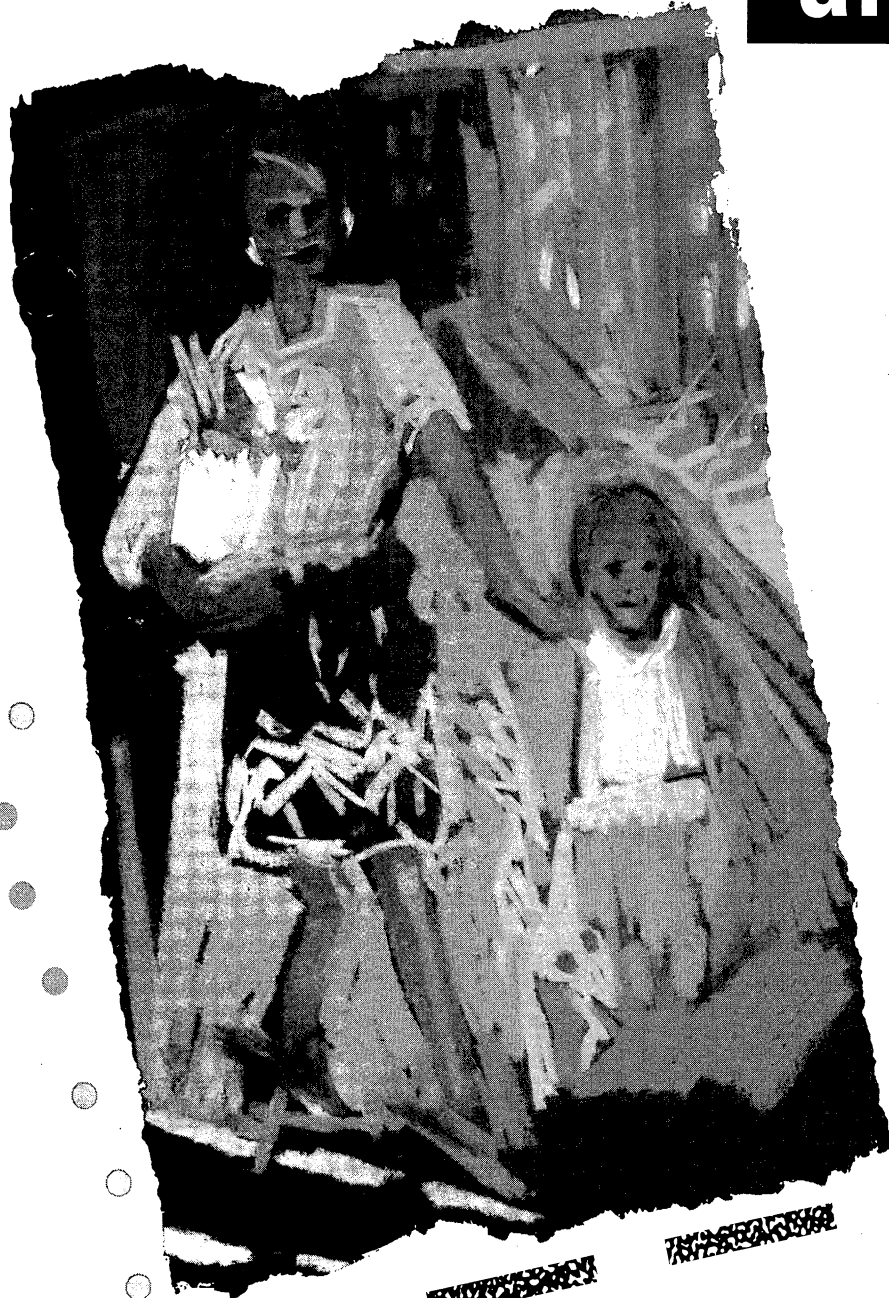
The MDC fails to clear snow and ice off the sidewalks on some of its bridges, including the bridge on Alewife Brook Parkway and bridges over the Charles River, creating a safety hazard for pedestrians. Most of the bridges have heavy vehicular and pedestrian traffic. The bridges over the Charles are the only pedestrian connectors between Cambridge and Boston. When crossing bridges, pedestrians should not be forced to choose between walking in the road and navigating snow-covered or icy sidewalks. Uncleared snow along Fresh Pond Parkway and Alewife Brook Parkway is also a problem.

It is important that Cambridge, its abutting communities, and the MDC work together to develop solutions to the problem of uncleared sidewalks on bridges and MDC roads.





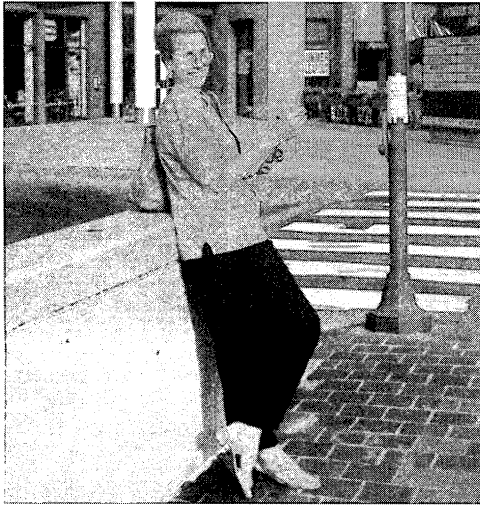
Implementation and Process



8. IMPLEMENTATION AND PROCESS

I. Implementation

A. Cambridge Pedestrian Committee



Pedestrian Committee members help evaluate street conditions.

The Cambridge Pedestrian Committee is appointed by the city manager. It consists of people who live or work in Cambridge and staff from related departments: community development; traffic, parking, and transportation; public works; and the police.

The committee was established to work to improve conditions for pedestrians in Cambridge, to recommend policies affecting pedestrians, to promote walking as a means of transportation, and to make walking safer for everyone. The committee serves in an advisory capacity, providing vision, feedback, ideas, and assistance to City staff and office holders.

People who live or work in Cambridge who are not on the committee are encouraged to participate in various projects related to carrying out the pedestrian plan.

B. Coordination among City Departments and with Other Agencies

Many pedestrian-related issues and projects have overlapping jurisdictions within City departments. To coordinate planning and carrying out transportation projects, Cambridge officials who deal with transportation issues meet monthly. Expanded computer capabilities, especially the Geographic Information System (GIS), are expected to bolster the City's ability to analyze infrastructure needs and coordinate repairs and retrofits.

Coordination and advocacy with other agencies is important as well: with the MBTA to improve services within Cambridge and between Cambridge and other communities; with the MHD concerning highway and bridge issues; with the MDC concerning MDC roads and parks; and with regional planning and transportation agencies.

City officials work with members of the Cambridge Pedestrian Committee and with other community groups to help coordinate communication and advocacy.

C. Public Education

Promoting Walking

It is in the interests of the people who live and work in Cambridge that more people walk. There are many things the City can do to promote walking.

Possible projects include:

- Continue to distribute *How to Get Around in Cambridge* (city map and travel guide).
- Publish and distribute a Cambridge walking guide, covering a variety of pedestrian issues. Include suggested walking routes, walking safety tips, hot line numbers, and pedestrian rights and responsibilities.
- Find and publicize prominent Cambridge walkers.
- Promote neighborhood walks, neighborhood cleanups, historical walks, nature walks, arts walks.
- Create a special marked pedestrian route for tourists.



Cambridge map.

- Promote walk-for-health projects by organizations such as the YMCA and YWCA or by employers. Encourage employers to promote and make it easy for employees to walk to work.
- Make walking promotion a more prominent part of the City's TDM program for City staff.
- Promote the idea that walking is pleasant in almost all weather if you are dressed for it.
- Organize a walk to work week.
- Continue to work with local schools and D.P.W. to promote walking to school.

Action:

- Work with the Cambridge Pedestrian Committee to undertake public education to promote walking.

Safety Education

Safety education for adults and children is needed. Many pedestrians do not know basic safety rules. Many do not understand what *walk* and blinking or steady *don't walk* signals mean.²⁶ Many motorists do not know that the law requires that they yield to pedestrians in marked crosswalks. Many parents do not know how to effectively teach their children street and sidewalk safety.

Substantial numbers of people who know the laws fail to follow them consistently.

Actions:

- Spread information about the rules of the road for drivers and safety tips for pedestrians through:
 - Schools
 - School crossing guards
 - Parent education programs
 - Police
 - Elder services
 - Driver education classes
 - Taxi companies
 - Public service announcements
- Encourage people to report unsafe conditions for walkers. The response to callers should include information about whether or not the problem can be fixed immediately.
- Work to make bicycle and pedestrian collision statistic collection part of the state public health system.
- Work with the Registry of Motor Vehicles to ensure that motor vehicle laws regarding bicyclists and pedestrians are emphasized in driver education materials and driver tests.

D. Enforcement of Traffic Laws

When motorists break the traffic laws they endanger pedestrians and add to an atmosphere that inhibits people from walking and allowing their children the freedom to explore their neighborhoods. Among the most dangerous motorist

26 *Handbook*, p. 158.



Sign in business district.

infractions are failing to yield for pedestrians in crosswalks, speeding, going through red lights, speeding up rather than slowing down at intersections, failing to stop at stop signs, and parking too close to corners.

Errant bicyclists, especially unlighted bicyclists and those who ride in the wrong direction or go through red lights or stop signs, also present a danger to pedestrians as well as to themselves. The City is engaged in a public education campaign to teach bicyclists how to ride legally and safely.

Another difficult issue for pedestrians is bicycles on sidewalks. The sidewalk is an appropriate place for children to ride; adults are generally safer on the street. Bicycle riding is banned on sidewalks in the Harvard Square and Central Square business districts, in Inman Square (Cambridge St. from Camelia Ave. to Prospect St. and Hampshire St. from Prospect to the Somerville line), Mass. Ave. from Wendell/Shepard to Russell/Cogswell and Somerville Ave. to the Somerville line, and Huron Village (Huron Ave. from Fayerweather to Lakeview). If they ride on sidewalks elsewhere, cyclists must proceed at no faster than a normal walking speed, always yield to pedestrians, and give an audible warning when passing (see Appendix VI).

Long waits at some Cambridge intersections may encourage pedestrians to jaywalk. The very short times for *walk* signals in Boston (at most intersections, 7 seconds or less out of an 85 to 90 second signal cycle), along with Boston's heavy reliance on pedestrian push-button signals, may foster a tendency to disregard the signals there. This may also affect people's behavior in Cambridge.

Actions:

- Increase enforcement of traffic laws to discourage speeding, running red lights and stop signs, and parking too close to an intersection.
- Investigate devices that could assist in law enforcement, e.g., the use of cameras at intersections to film cars disobeying traffic signals. Cameras have been shown to have a dramatic effect on motorist behavior. Work to make their use legal in Massachusetts.
- Continue the City's bicycle facilities program to make the streets safer for bicyclists by incorporating bicycle lanes and other improvements into street reconstruction projects.
- Work to change traffic laws that now require motorists and cyclists to yield to pedestrians to instead require that motorists and vehicles stop for pedestrians.
- Conduct a campaign to inform pedestrians that obeying the law is important for their own safety.

E. Building Effective Constituencies

Many people are interested in working on pedestrian issues. People who walk are often the most valuable diagnosticians of problems and evaluators of solutions.

Actions:

- Reach out to the groups that are potential allies for creating a more walkable city: people who enjoy walking, people with mobility impediments, elderly people, advocates for children, crime watch groups, health organizations, bicycle advocates, the universities, neighborhood groups, and clean air groups, among others. With the help of the Cambridge Pedestrian Committee, these groups will be contacted to discuss what they can do, especially in areas that require mobilizing public opinion, such as creating an expectation that residents will comply with sidewalk maintenance ordinances.

- Reach out to potential allies, e.g., business associations and the tourism industry, to discuss the economic benefits of making Cambridge more walkable.
- Work with neighboring communities to help create effective advocacy on a regional and state level.

II. Process

A. Oversight

The pedestrian plan is a working document. It is in loose-leaf form so it can be updated easily. Experience gained from its implementation will be used to improve the plan. To do so requires:

1. Considering, as specifically as possible, what results are expected from an action.
2. Determining how results will be evaluated.
3. Where possible, putting into place mechanisms to monitor results.
4. Determining whether an action has been implemented.
5. Measuring the results of the implementation.
6. Recognizing that many important results may not be directly measurable.
7. Considering, as experience is gained, whether the actions themselves need to be changed—made more specific, modified, maybe scrapped altogether—and what new actions need to be undertaken.

Actions:

- Work with the police to develop optimally useful record keeping on injuries to pedestrians and street crimes against pedestrians.
- Develop a monitoring system for pedestrian improvements, with measurement tools and provision for mid-course correction.



B. Reporting of Pedestrian Problem Spots

The City encourages people to report places and situations that are difficult for pedestrians. Specific issues should be directed to the following telephone numbers:

Traffic signal problems	(617) 349-4700
Sidewalks in need of repair	(617) 349-4800
Vegetation obstructing sidewalks	(617) 349-6100
Sidewalk snow clearance hotline	(617) 349-4903

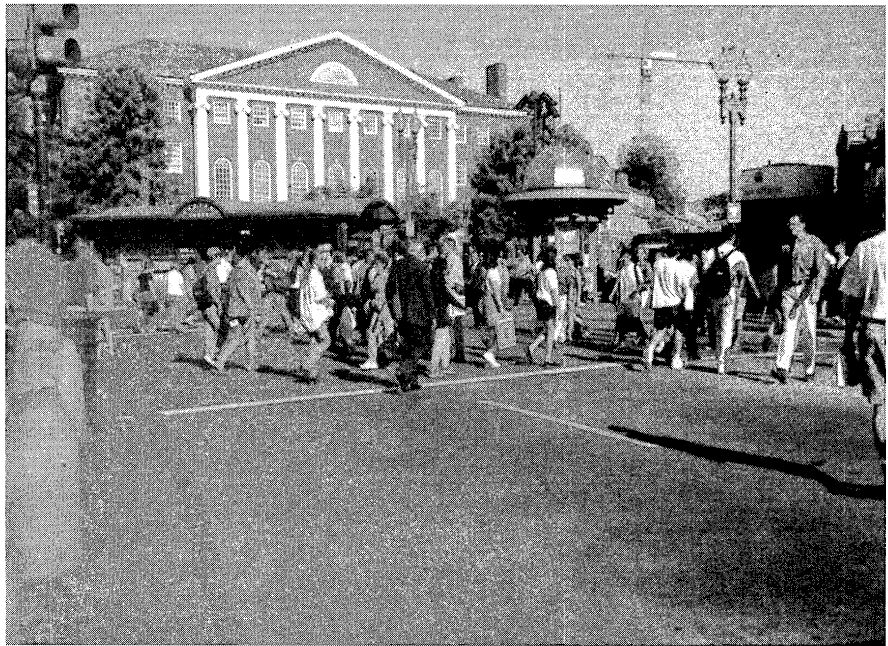
In addition, people are encouraged to call (617) 349-4604 with questions, general issues, and other concerns.

The Cambridge Pedestrian Committee, working with City staff, compiles a list of pedestrian problem spots, intersections or other areas that are difficult for pedestrians and need more than routine maintenance to fix. Everyone who walks in Cambridge is encouraged to contribute to the list.

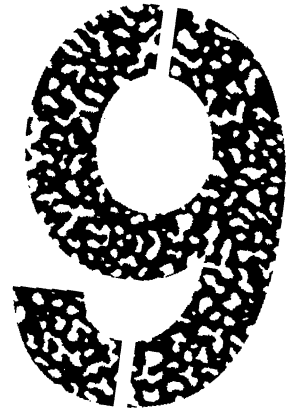
City staff set priorities for projects, based on factors such as the urgency of the need, whether or not the area is scheduled for renovation as part of another project, and the relative ease and cost of fixing the problem.

C. Conclusion

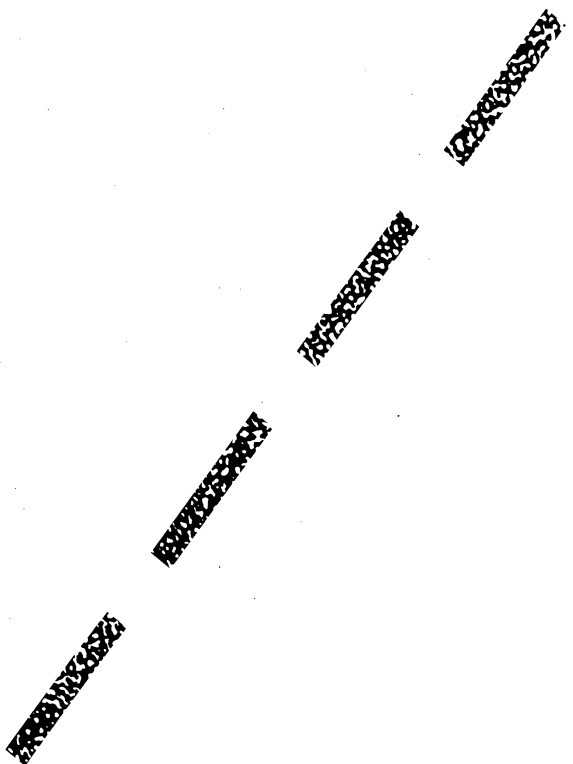
Implementation is the point of the plan. Policies, enforcement, and roadwork projects are primarily the responsibility of City staff. Many of the less tangible things that help make a city a pleasure to walk in are in the hands of all of us who travel through Cambridge. These include courteous behavior on the part of drivers, cyclists, and pedestrians, attention to keeping sidewalks clean and clear of impediments, and the other elements that make walking fun: front-yard gardens, children playing, attractive storefronts, and the opportunity to be part of the community by sharing the sidewalk with others who live, or work, or visit in Cambridge.



N I N E



Appendices



9. APPENDICES

Appendix I – Definitions

General Terms

AASHTO. American Association of State Highway and Transportation Officials.

ADA. Americans with Disabilities Act of 1990. Federal legislation that requires that access to employment, services, and the built environment be provided for people with disabilities.

Building Zone. The portion of a sidewalk adjacent to the property line.

CMAQ. Congestion Mitigation and Air Quality program, a component of ISTEA and TEA 21, federal transportation authorization legislation. CMAQ funds can be used for pedestrian and bicycle facilities.

Cross Slope. The slope of a sidewalk across the travel zone.

Crosswalk. “The portion of a roadway ordinarily included within the extensions of the sidewalk lines, or, if none, then the footpath lines, and, at any place in a highway clearly indicated for pedestrian crossing by lines or markers upon the roadway surface.” (Mass. Vehicle Code)

Curb Cut. A break in the curb to provide for a driveway.

Curb Extension. An area where the sidewalk and curb are extended into the street to increase visibility and shorten the crossing distance for pedestrians.

Curb Zone. The portion of the sidewalk immediately adjacent to the curb.

FHWA. Federal Highway Administration.

Grade Separation. The vertical separation of conflicting travel ways with a structure (e.g., a curb).

Highway. See STREET.

ISTEA. Intermodal Surface Transportation Efficiency Act, federal highway funding authorization act created in 1991 which included funds for pedestrian and other non-motor vehicle facilities. Replaced in May 1998 by TEA 21, Transportation Equity Act for the Twenty-first Century.

Multi-use Path. Pathways, usually paved, shared by cyclists, pedestrians, in-line skaters, runners, and other non-motorized travelers, usually excluding horses.

MUTCD. Manual of Uniform Traffic Control Devices, published by the U.S. Department of Transportation and adopted by the Commonwealth of Massachusetts, giving standards for traffic signals, signs, and street markings.

Pedestrian. A person traveling on foot or by wheelchair. Does not include bicyclists (unless walking their bikes) or inline skaters (in Cambridge).

Reveal. The distance between the top of the curb and the top of the roadway pavement.

Right-of-Way. A general term denoting land, property or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

Roadway. The portion of a right-of-way improved, designed, or ordinarily used for vehicle travel.

Sidewalk. Exterior travel facility paralleling a roadway designed for preferential or exclusive use by pedestrians.

Street or Highway. The entire width between the boundary lines of every publicly maintained travel way when any part is open to public motor vehicle traffic.



TEA 21. Transportation Equity Act for the Twenty-first Century, federal highway funding authorization act for 1998-2003. Includes funds for pedestrian and other non-motor vehicle facilities.

TDM. Transportation Demand Management. Various programs and incentives aimed at reducing the number of trips made by single-occupancy vehicles (SOVs) and increasing the number of trips made by high-occupancy vehicles and non-motorized modes, principally public transit, ridesharing, walking, and bicycling.

Travel Zone. The portion of a sidewalk used for pedestrian travel parallel to the street.

VTRO. Vehicle Trip Reduction Ordinance, legislation the Cambridge City Council adopted in 1992 to meet requirements of the 1990 federal Clean Air Act amendments. The ordinance mandates a variety of measures to encourage residents and people commuting to Cambridge to reduce automobile use; these measures include creation of a pedestrian master plan and development of pedestrian amenities.

Walkway. Pedestrian travel facility. Includes sidewalks, paths, plazas, and courts.

Traffic Signal Terms³⁰

Actuated. Traffic signals are actuated when the presence of vehicles or a pedestrian pushing a pedestrian button triggers the inclusion of the appropriate phase in the signal sequence. If no vehicle is present or a pedestrian does not push a pedestrian button, that phase in the cycle is skipped.

Clearance Interval. A short time during which all signal indications for conflicting movements are red to allow vehicles to safely clear the intersection.

Concurrent. Any movements are concurrent if allowed at the same time. Normally, such movements do not conflict with each other. However, in the case of a concurrent walk phase, the pedestrian crossing operates simultaneously with the parallel vehicle operation. In this case, a turning vehicle must yield to a pedestrian who has a WALK indication.

Controller. The equipment that controls the timing and sequencing of traffic signals.

Cycle. A complete sequence of signal indications or phases, i.e., the time from the start of a particular phase until that phase starts again.

Exclusive. Any movement is exclusive if it is allocated a phase in which there are no conflicting movements. For example, an exclusive left turn is typically provided with a left turn arrow signal that is green only when signals for opposing traffic are red. A WALK phase is exclusive when no conflicting vehicle movements are allowed.

Flashing Don't Walk. The period of time during which the DON'T WALK or red hand symbol flashes is the clearance time for pedestrians to cross the roadway. It indicates to pedestrians that if they have already left the sidewalk they will have sufficient time to complete the crossing, but they should not begin to cross.

The amount of time allocated for flashing DON'T WALK is determined by the width of the roadway and the walking speed of pedestrians. It is usually 1 second for each 4 feet from the curb to the center of the far lane.

Interval. A part of the signal cycle during which the signal indications do not change.

Leading Pedestrian Interval. An advance walk signal that gives pedestrians a few seconds' head start on vehicles traveling in the parallel direction, enabling the pedestrians to enter the crosswalk before vehicles begin to turn into their path.

³⁰ Adapted from a glossary compiled by TAMS Consultants, Inc.

Loop or Detector Loop. An electromagnetic cable buried in the roadway that can detect the presence of a vehicle. Detector loops are used to make traffic signals actuated.

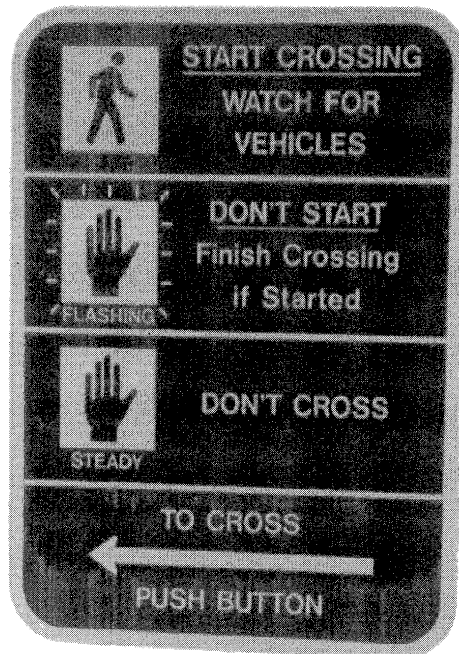
Pedestrian Button. A button at a signal-controlled pedestrian crosswalk that, when pushed, triggers the inclusion of the pedestrian phase in the signal cycle. If the button is not pushed, the pedestrian phase is normally skipped.

Phase. The portion of a signal cycle allocated to any single combination of one or more traffic movements simultaneously allowed during one or more intervals.

Phase Sequence. A predetermined order in which the phases of a cycle occur, i.e., the order in which different movements are allowed.

Semi-actuated. Traffic signals are semi-actuated if not all of the intersection approaches have detector loops. The phase for any non-actuated approach will be included during every signal cycle, whether or not a vehicle is present on that approach.

Walk Indication. The period of time when a pedestrian can leave the sidewalk to cross the roadway. The WALK phase must last at least 4 seconds, although generally the City of Cambridge uses a minimum of 7 seconds.



Appendix II-Vehicle Trip Reduction Ordinance

Chapter 10.17

VEHICLE TRIP REDUCTION ORDINANCE

Sections:

- 10.17.010 Time period of chapter.
- 10.17.020 Findings.
- 10.17.030 Definitions.
- 10.17.040 Expanded commuter mobility program.
- 10.17.050 Bicycle and pedestrian mobility program.
- 10.17.060 Restrictions on visitor passes.
- 10.17.070 Fees for residential parking stickers.
- 10.17.080 Study of zoning revisions.
- 10.17.090 Improved coordination with MBTA.
- 10.17.100 Regulation of idling buses, trucks, and taxis and automobiles.
- 10.17.110 Taxicab improvements.
- 10.17.120 Alewife Station and Garage.
- 10.17.130 Pilot survey of commuting characteristics of City employees and employees of selected employers.
- 10.17.140 Consultation with employers and residents about employer vehicle trip reduction program.
- 10.17.150 Use of fees.
- 10.17.160 Recommendations for a SIP amendment applicable to all communities in the Commonwealth.
- 10.17.170 Municipal vehicle trip reduction plans.
- 10.17.180 Expansion of local employment opportunities.
- 10.17.190 Further expansion of commuter mobility program.
- 10.17.200 Restrictions on parking supply.
- 10.17.210 Promotion of clean fuels.
- 10.17.220 Development of traffic policy.
- 10.17.230 Sunset clause.

10.17.010 Time period of chapter.

Sections 10.17.040 through 10.17.180 of this chapter shall take effect sixty days after final approval by the City Council. The remaining provisions shall not take effect until, and shall at that time supersede and replace Chapter 10.16, sixty days after final approval by the U.S. Environmental Protection Agency ("U.S. EPA") of a SIP amendment for Massachusetts which (i) contains a program of transportation control measures that are imposed equally on all communities in the Commonwealth such as an employer-based vehicle trip reduction program; and (ii) revokes any provisions of 40 C.F.R. Section 52.1135 that are applicable to Cambridge. (Ord. 1139 (part), 1992)

10.17.020 Findings.

The City of Cambridge finds and determines that:

- A. High levels of vehicle traffic and congestion add to air pollution, noise, and inconvenience and erode the quality of the living and working environment.
- B. An increasing number of automobile registrations and jobs in the City has resulted in growth of traffic in and around Cambridge.
- C. While the City has pursued programs to mitigate these conditions, new measures must be implemented by the City and the Commonwealth involving the participation of all sectors of the community on a local and regional bases to make more efficient use of mass transit, bicycling, walking, and other alternatives to trips by single-occupancy vehicles.
- D. The Clean Air Act amendments of 1990 call for the attainment of compliance with the National Ambient Air Quality Standard for Ozone within the Commonwealth by 1999.
- E. Attainment of the Ozone Standard will require increased control of vehicle-related air pollution (“transportation control measures”) throughout the Commonwealth, as well as the Nation.
- F. Throughtrips and other traffic over which Cambridge has no control contribute significantly to the degradation of air quality in the region. The degradation of air quality, particularly ozone, is a regional problem which requires global and regional solutions.
- G. A large portion of vehicle traffic on Cambridge streets is attributable to trips that neither originate nor end in Cambridge (“throughtrips”). The City of Cambridge has virtually no control over these throughtrips. Accordingly, it is imperative that DEP amend the SIP to include transportation control measures applicable equally to all communities in the Commonwealth, including an employer-based vehicle trip reduction program, to achieve reductions in the number of vehicle trips and vehicle miles travelled throughout the region.
- H. Increasing the use of commuting alternatives and reducing the number of trips by single-occupancy vehicles is beneficial for the City and the Commonwealth in reducing vehicle miles travelled, traffic and associated air pollution, fuel use, noise, and congestion.
- I. Programs offered through City Departments, employers, institutions, owners of multiple-tenant buildings and complexes and other organizations to encourage the use of mass transit, bicycling walking, and other alternatives to commuting by single-occupancy vehicles are effective and should be expanded on a citywide and regional basis.
- J. The approach which includes, where consistent with employers’ needs, adoption and enforcement of driving disincentives, particularly those applicable to the regular work-day commuter, and best suited to accommodate the diverse needs and capabilities of the governmental, business and institutional communities in the City, and recommended for adoption by DEP for state-wide application is a flexible approach which establishes performance goals and permits government and private employers, institutions, and automobile owners to select from among a variety of measures designed to contribute toward reaching the goals.
- K. The vehicle trip reduction program recommended for adoption by DEP on a state-wide basis should give credit to those employers which have already made substan-

tial progress in encouraging the use of mass transit, bicycling, walking, and alternative means of commuting and in providing such alternatives.

- L. Measures to discourage, and provide alternatives to, vehicle trips and trips by single-occupancy vehicles made by residents of and visitors to Cambridge are also necessary to further the goals of the Clean Air Act.
- M. Some of the measures contained in this chapter will achieve immediate reductions in vehicle miles travelled; others are designed to collect information and otherwise lay the foundation for future actions to reduce vehicle miles travelled and improve air quality. To maximize air quality benefits, some types of transportation control measures must be adopted and applied on a regional basis. (Ord. 1139 (part), 1992)

10.17.030 Definitions.

- A. “City” means the City of Cambridge, Massachusetts.
- B. “Clean fuel” means any fuel or power source used in a vehicle that complies with the applicable standards for clean fuel vehicles contained in Sections 241-245 of the Clean Air Act, 42 U.S.C. §§ 7581—7595.
- C. “Clean-fuel vehicle” means a vehicle in a class or category of vehicles which has been certified to meet the applicable clean-fuel vehicle standards as defined by and pursuant to the federal Clean Air Act Amendments of 1990.
- D. “Fleet” means ten or more vehicles which are (i) owned, leased, controlled or operated by a single person or entity; or (ii) parked at the same location, excluding vehicles held for lease or rental to the general public, vehicles held for sale by dealers, vehicles used for law enforcement or emergency purposes.
- E. “Ozone standard” means the National Ambient Air Quality Standard for Ozone established pursuant to Section 109 of the Clean Air Act, 42 U.S.C. § 7409.
- F. “Region” means those communities east of, or through which Route 128 passes.
- G. “Selected employers” means those employers in Cambridge who voluntarily agree to participate in the pilot survey of employee commuting characteristics set forth in Section 10.17.130.
- H. “Throughtrips” means vehicle traffic on City of Cambridge streets attributable to trips that neither originate nor end in the City of Cambridge.
- I. “Transportation control measures” are transportation control strategies aimed at reducing transportation related emissions of pollutants and controlling the growth of future vehicle trips and vehicle miles travelled.
- J. “VMT” is an abbreviation for vehicle miles travelled.
- K. “AER” is an abbreviation for automobile efficiency rate, a rate determined as set forth in Section 10.17.130(D).
- L. “Base AER” is a term for the automobile efficiency rate for the City of Cambridge, more fully described in Section 10.17.130(E). (Ord. 1139 (part), 1992)

10.17.040 Expanded commuter mobility program.

In addition to continuing activities currently in progress, the Commuter Mobility Coordinator shall develop and submit to the Assistant City Manager for Community Development and the City Manager a schedule for implementing additional programs including, but not limited to:

- A. A bicycle commuter program, in conjunction with the Traffic and Parking Department and the Bicycle Advisory Committee involving consultation with Cambridge residents and businesses;
- B. A program to assist employers in establishing bicycle commuting incentives;
- C. A feasibility study of the potential use of an in-City paratransit system of jitney services or shuttles to transit locations, areas of major employment, and major commercial/retail destinations; and
- D. A program for publicizing successes achieved by businesses and institutions in decreasing the number of single-occupancy vehicle commuters to their establishments;
- E. An education program, including newspaper articles, cable television programs, and public meetings, to inform residents and employees of the need for, and the benefits to be realized from; changes in commuting behavior;
- F. The beginning of a commuter ride-share program;
- G. A program to encourage businesses to offer discounts on T passes.

The City will provide adequate resources to enhance the ability of the commuter mobility program to work to reduce the vehicle miles travelled in Cambridge.

(Ord. 1139 (part), 1992)

10.17.050 Bicycle and pedestrian mobility program.

The position of Bicycle and Pedestrian Coordinator is created within the Traffic and Parking Department. The City Manager shall, within one month of the effective date of this provision, designate the Bicycle and Pedestrian Coordinator. The Bicycle and Pedestrian Coordinator shall devote at least fifty percent of his/her time to carrying out the tasks required by this provision. The Bicycle and Pedestrian Coordinator shall, in conjunction with the Commuter Mobility Coordinator and the City's existing Bicycle Advisory Committee, (i) design and implement a program to encourage greater use of bicycles as alternatives to single-occupancy vehicles within the city and, (ii) focus the attention of the City on the needs of pedestrians. The program will include, but is not limited to:

- A. Development of a Cambridge Bicycle Master Plan;
- B. Development of a Cambridge Pedestrian Master Plan;
- C. Development and evaluation of recommendations for a regional network of bicycle paths and bicycle priority streets favoring both bicycles and pedestrians;
- D. Consultation with Cambridge residents, businesses, institutions and property owners;
- E. Funding of bicycle amenities and storage facilities;
- F. Funding for pedestrian amenities; and
- G. Provision of bicycles for use by City police and Traffic and Parking Department.

The program shall be funded at an initial level of twenty-five thousand dollars annually; these funds shall be in addition to, and not utilized for, the salary of the Bicycle and Pedestrian Coordinator. (Ord. 1139 (part), 1992)

10.17.060 Restrictions on visitor passes.

- A. Official City Visitor Passes. The Citywide visitor passes that have been distributed to authorized individuals will be invalid thirty days after the effective date of the ordinance codified in this provision. The Traffic and Parking Department is authorized to issue stickers to individuals or organizations or who would be authorized to receive a Citywide visitor pass. A list of all recipients of Citywide visitor passes shall be main-

tained by the Traffic and Parking Department and shall be made available for public inspection upon request. In order to be effective, a sticker must be affixed to a vehicle and must display the vehicle registration number and an expiration date. These stickers shall be easily distinguishable from the stickers issued to City residents. No Official City Visitor Sticker shall be issued that is valid for a time period longer than one year. The names of individuals and organizations shall be available to the public upon request. The list shall be updated by the Department at least quarterly.

- B. Residential Visitor Passes. Beginning on the January first following the effective date of this provision, each residential visitor pass issued by the Traffic and Parking Department shall be designed to display a calendar for the year during which it is valid. To be valid on a given date, the pass must be displayed in the windshield and the date of use must be circled. (Ord. 1146, 1992; Ord. 1139 (part), 1992)

10.17.070 Fees for residential parking stickers.

The fees for residential parking stickers shall be eight dollars per permit per household. (Ord. 1147, 1992)

10.17.080 Study of zoning revisions.

The Cambridge Planning Board (the "Board") shall consider revising the required parking space ratios specified in the City Zoning Ordinance and shall evaluate the effectiveness of such revisions in reducing VMT and traffic congestion and encouraging the increased use of commuting alternatives other than by single-occupant vehicles. The Planning Board shall evaluate the need to reduce the allowed densities to achieve the goal of reduced vehicle miles travelled and shall also consider eliminating the exclusion of parking in the calculation of gross floor area. The Board shall also consider the economic impact of such revisions. Consideration shall be given, without limitation, to such potential revisions as reduction of minimum and maximum parking requirements, special provisions for carpools and vanpools, and encouragement of mixed-use developments.

The Board shall invite testimony from residents, businesses, institutions, and property owners and shall publicly report its recommendations within one year of the effective date of this provision. (Ord. 1139 (part), 1992)

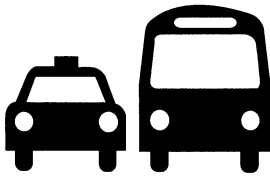
10.17.090 Improved coordination with MBTA.

The City Manager shall initiate meetings with the General Manager of the MBTA to map out a strategy for close cooperation between the City and the MBTA on increasing public transportation services to and within the City. The management of the MBTA will be asked to work to improve existing services and to look into ways in which the MBTA can be of assistance to the City in exploring possible development of a local para-transit system. There shall be a goal of establishing a working joint committee to implement the needed improvements.

The Commuter Mobility Staff shall undertake a survey of residents and commuters to identify barriers to use of the MBTA. The Commuter Mobility Staff shall also conduct widely-advertised public forums in neighborhoods throughout the City. Based on the survey and the results of the public meetings, the Commuter Mobility Staff will make recommendations for improving MBTA service. The recommendations will be available to the public for comment. The Commuter Mobility Staff will request that the MBTA hold one or more public meetings to discuss the recommendations.

The Department of Traffic and Parking and the Commuter Mobility staff shall work with MBTA to (i) improve public transportation schedules and routes; (ii) to improve bus stop signage; and (iii) to review placement of bus stops. The Cambridge Traffic and Parking Department shall also cooperate with the MBTA in an attempt to have the MBTA, at the sites selected by Cambridge, erect bus stop signs that are used in other cities and towns.

Meetings with representatives of the MBTA should also focus on conversion of buses to clean fuels. (Ord. 1139 (part), 1992)



10.17.100 Regulation of idling buses, trucks, and taxis and automobiles.

The Police Department shall promptly review and improve its enforcement of the statutory prohibitions against idling by busses, trucks and taxis and automobiles set forth at G.L., ch. 90, § 16A. Within two months of the effective date of the ordinance codified in this provision, the Commissioner of the Police Department shall report to the City Manager on the Department's implementation of this provision. (Ord. 1139 (part), 1992)

10.17.110 Taxicab improvements.

The License Commission, through the Taxicab Advisory Committee shall consult with the taxicab industry, residents, and commercial establishments in the City and prepare recommendations:

- A. To make taxicabs more accessible for use by multiple passengers with different destinations. The object of this recommendation shall be to decrease single-occupant use of taxicabs by providing monetary incentives for the taxicab drivers and reducing the cost for passengers; and
- B. About the potential role of taxicabs in a paratransit system for the City; and
- C. About conversion of taxi fleets to clean fuels;
- D. for new or relocated taxi stands; and
- E. For policies or actions that would encourage Cambridge residents to use taxicabs that are licensed in Cambridge instead of taxicabs from other cities. (Ord. 1139 (part), 1992)

10.17.120 Alewife Station and Garage.

The Assistant City Manager for Community Development or his designee shall consult with Alewife neighborhood groups, employers, and other interested persons concerning the demand for (i) a commuter rail station at Alewife, (ii) an expansion of the Alewife garage, and (iii) shuttle bus or van service between Alewife Station and nearby employment sites and stores. The Assistant City Manager shall report his findings to the City Council within one year of the effective date of this provision. (Ord. 1139 (part), 1992)

10.17.130 Pilot survey of commuting characteristics of City employees and employees of selected employers.

- A. The City, in consultation with the Selected Employer Steering Committee, shall develop an Employer Survey Kit which may include an Employee Survey Form, administration plan, and Automobile Efficiency Rate ("AER") (defined below) calculation sheet, designed to elicit commuting data from all City employees and employees of Selected Employers which will permit the calculation of an actual AER for each Selected Employer and City Department and will also provide the statistical basis for determining such other characteristics of commuting patterns as may be useful in designing measures to achieve the goals of the Clean Air Act. The Employer Survey Kit shall be prepared and distributed to City Departments and Selected Employers within six months of the effective date of the ordinance codified

in this provision. Each City Department and Selected Employer shall distribute copies of the Employee Survey Form to, and as a goal shall endeavor to collect completed forms from, seventy-five per cent of its employees. Each City Department and Selected Employer shall, no later than three (3) months from the date the Employer Survey Kit is distributed, submit to the Assistant City Manager for Community Development all completed Employee Survey Forms, provided that, any Selected Employer may instead submit a report of the results of the employee survey on a standard AER calculation sheet, signed and certified as to its accuracy by an officer of the Company. A Selected Employer that does not submit the Employee Survey Forms shall retain such forms for a minimum of three years. These forms shall be made available to the Assistant City Manager for Community Development or his designee, upon request.

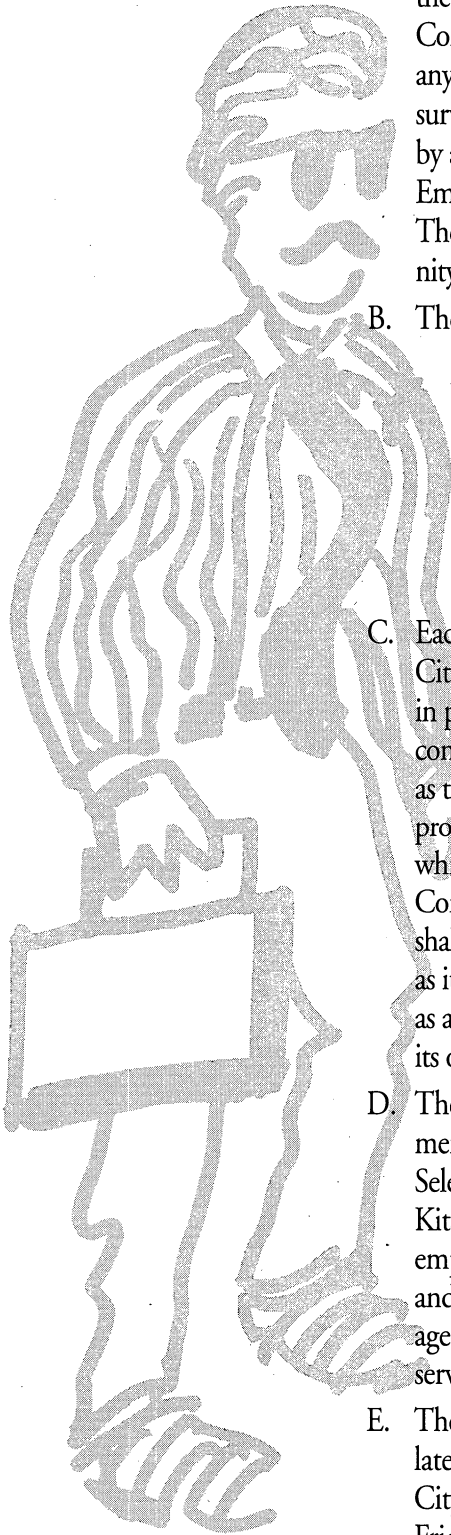
B. The Selected Employer Steering Committee shall:

1. Participate with the City in the design of the pilot survey;
2. Assist in educating and encouraging participation of the selected employer group;
3. Review with the City the results of the pilot survey; and
4. Participate in the design of any City-wide employer based vehicle trip reduction program.

C. Each City Department and Selected Employer shall cooperate with the Assistant City Manager for Community Development and the Commuter Mobility Staff in providing information about plans and programs being utilized to encourage commuter travel modes other than by single occupancy vehicles. At such time as the City implements or enforces an employer-based vehicle trip reduction program on a city-wide basis, each City Department and Selected Employer which has cooperated with the Community Development Department and the Commuter Mobility Staff and which has complied with paragraph "A" hereof shall be entitled to use the AER reflected in its initial Employer Survey Response as its baseline AER regardless of the extent of improvements in its AER produced as a result of its cooperation with the Community Development Department or its own commuter mobility initiatives.

D. The Assistant City Manager for Community Development shall make arrangements with the Commuter Mobility Staff to coordinate: (i) participation of the Selected Employers; (ii) preparation and distribution of the Employer Survey Kits; (iii) calculation of the base AER; (iv) review and tabulation of the pilot employer survey responses; (v) recalculation of the base AER based on review and analysis of the pilot employer survey responses. The Assistant City Manager for Community Development shall have the authority to engage the services of technical consultants to assist with these tasks.

E. The phrase Automobile Efficiency Rate ("AER") shall mean the figure calculated by dividing the number of employees who report to a worksite within the City of Cambridge between six a.m. and ten a.m. (inclusive Monday through Friday to achieve a five consecutive weekday average) by the number of vehicles used by those employees to reach the worksite during those hours. Bicycles, public transit vehicles, and approved clean-fuel vehicles shall be excluded from the vehicles counted. Motorcycles and light trucks shall be included in the vehicles counted.



- F. The City shall define and make calculations of a base AER for the City of Cambridge as a whole. Such base AER shall initially be derived from the 1990 Census modal share data and travel statistics, the results of the pilot survey of selected employers, and such other data as may be relevant. Subsequently, the City may develop other AERs for categories such as geographical areas of the City, employer types, employer sizes, and the like, as may be determined through the consultative process provided for in Section 10.17.140. The City may also, through the same consultative process, periodically recalculate the base AER or such other AERs to reflect additional data or changes in data as become available.
- G. The term “carpool” shall mean a private motor vehicle occupied by two to six employees travelling together for at least seventy-five percent of their commute trip distances.
- H. The term “commute alternatives” shall mean carpooling, vanpooling, private bus service, use of public transit, bicycling and/or walking.
- I. The term “employee” shall mean any person hired by a public or private employer, including part-time and seasonal employees, who reports to work at least two days a week during five or more months of the year.
- J. The term “worksites” shall mean a building or grouping of buildings which are located within the City of Cambridge and are on physically contiguous parcels of land or on parcels separated solely by private or public roadways or rights-of-ways and which are owned, operated, or leased by the same Employer. (Ord. 1139 (part), 1992)

10.17.140 Consultation with employers and residents about employer vehicle trip reduction program.

The Assistant City Manager for Community Development or his designee shall consult with Cambridge businesses, institutions, City departments, the Selected Employer Steering Committee, and residents to evaluate recommendations for a regional employer-based vehicle trip reduction program. During this consultation process, issues to be considered shall include:

- A. Whether different areas of the City should be subject to different AER goals, depending on their proximity to public transit;
- B. What the annual rate of improvement in the AER goal should be;
- C. which, if any of the vehicle trip reduction plan elements identified in Section 10.17.170 should be required to be implemented by all employers in the City;
- D. The definition of base AER and the potential appropriateness and definition of AERs for categories such as geographical areas of the city, employer types, employer sizes, and the like;
- E. Ways to recognize the uniqueness of employers and their differing needs for employee mobility;
- F. Appropriate AER or other references to be used in setting goals for Cambridge employers within a regional vehicle trip reduction program;
- G. Whether employers should be required to achieve a base or other AER goal within a specified time period or whether penalties should only be imposed for an employer’s failure to implement its plan;
- H. Identification and development of mechanisms for transferring and/or sharing use of parking spaces as demand for parking spaces decreases at a given worksite;

- I. Evaluation of potential impacts on employment and economic impacts on affected employers and on the City of any proposed measures; and
- J. Whether any categories of employers should be exempt. (Ord. 1139 (part), 1992)

10.17.150 Use of fees.

One hundred percent of the funds raised through the sale of residential parking stickers shall be used for implementing the tasks and programs specified in this chapter. (Ord. 1139 (part), 1992)

10.17.160 Recommendations for a SIP amendment applicable to all communities in the Commonwealth.

In order to ensure that the vehicle trip reduction measures in the ordinance codified in this chapter achieve their intended effect of reducing vehicle miles traveled and enhancing air quality in the Commonwealth, the City shall include in its submittal to the Metropolitan Planning Organization (“MPO”) and DEP recommendations for an amendment to the State Implementation Plan under the federal Clean Air Act applicable equally to all communities in the Commonwealth. These recommendations shall include, but not be limited to:

- A. A proposal for an employer-based vehicle trip reduction program;
- B. A proposal for measures applicable to new development projects to mitigate the traffic impacts of such projects and reduce vehicle miles travelled to and from such projects;
- C. A proposal for revising state taxing policies concerning employer-paid transportation and parking subsidies;
- D. A proposal for evaluating the utility of imposing fees on single-occupant commuter vehicles and/or commuter parking;
- E. A proposal for achieving appropriate convenient public transportation from the west and north to Cambridge, including but not limited to support of a circumferential transit system;
- F. Preventing the diversion of traffic oriented toward Cambridge to other areas with more limited transit availability;
- G. Assuring that Cambridge is not placed at a competitive disadvantage within the region or the Commonwealth;
- H. Reducing the growth in volume of throughtrips on Cambridge roadways which is outside the control of the City; and
- I. Improved and extended use of water taxis.

Notwithstanding the foregoing, the City in its submittal shall note the absence of consensus about the vehicle trip reduction ordinance as originally proposed. The City shall engage in a further consultation process as outlined in Section 10.17.140. The City shall continue to update the State concerning that process. (Ord. 1139 (part), 1992)

10.17.170 Municipal vehicle trip reduction plans.

Based on its review of the employee survey forms collected pursuant to Section 10.17.130, the Commuter Mobility Staff shall prepare a vehicle trip reduction plan for implementation by City Departments. The plan shall contain a program of measures identical to the program developed after consultation as set forth in Section 10.17.140 which shall be designed to reduce vehicle trips and vehicle miles travelled by municipal employees and thereby improve the City’s AER, as computed on the annual AER calculation sheets. The plan may include a variety of measures including,

but not limited to:

- A. Dissemination and periodic updating of information on all available transit service to and from the worksite;
- B. Advertising, promoting and making available for purchase on the worksite any pass program offered by transit authorities;
- C. Recommendations to individual employees of employee-specific travel options to reduce VMT;
- D. Incentives and assistance for bicycle commuting including secure parking facilities, shower/changing facilities, and education and training programs;
- E. Coordinating, facilitating and providing subsidies for employer-sponsored rideshare programs;
- F. Preferential parking for carpools and vanpools;
- G. Transportation allowances;
- H. Expanding opportunities for alternative work schedules including four-day weeks and flexible schedules to facilitate ridesharing;
- I. Elimination or reduction of parking subsidies for single-occupant vehicles;
- J. Shuttle service to transit stops; and/or
- K. Elimination of employee parking spaces.

After consultation with the Assistant City Manager for Community Development and the City Manager about the plan, the Commuter Mobility Staff shall promptly distribute it to City Departments for implementation. The Commuter Mobility Staff shall assist City Departments with implementation of the plan. (Ord. 1139 (part), 1992)

10.17.180 Expansion of local employment opportunities.

To demonstrate and further its commitment to increase the number of Cambridge residents employed by Cambridge businesses and reduce vehicle miles associated with work commutes, the annual budget for expansion of local employment opportunities shall be increased to two hundred thirty thousand dollars. That budget shall be applied as follows:

- A. To continue and expand the Cambridge Employment Program within the Community Development Department;
- B. To sponsor an annual job fair to inform residents of local employment opportunities;
- C. To sponsor and coordinate educational partnerships between Cambridge employees and schools in Cambridge; and
- D. To develop a Local Employment Opportunity Plan.

These functions shall be coordinated and carried out by the Community Development Department in conjunction with the Department of Human Services and under the supervision of the Assistant City Manager for Community Development. The Local Employment Opportunity Plan shall be developed within one year of the effective date of the ordinance codified in this provision.

[THE FOLLOWING SECTIONS, 10.17.190 THROUGH 10.17.220, ONLY TAKE EFFECT AFTER STATE AND FEDERAL ACTION TO ADOPT A REGIONAL OR STATE-WIDE PROGRAM]

10.17.190 Further expansion of commuter mobility program.

The Assistant City Manager for Community Development, in consultation with the

City Manager, shall have authority to hire additional staff to implement the tasks and programs specified in this Chapter. Within three months of the effective date of this provision, at least one additional Commuter Mobility Staff member shall be hired. The Commuter Mobility Coordinator shall develop and promptly implement additional programs including but not limited to:

- A. A program encouraging the use and sharing of computer ride-sharing information between and among businesses and institutions in the City;
- B. A program to encourage commercial and retail businesses to offer discounts to patrons with MBTA transit passes; and
- C. Implementation of an in-city paratransit system, to the extent funds are available, to supplement MBTA services.

The Commuter Mobility Coordinator shall develop and recommend additional programs, including but not limited to, a residential trip reduction program for apartment and condominium complexes of fifty or more units. (Ord. 1139 (part), 1992)

10.17.200 Restrictions on parking supply.

- A. Expansion of Parking Regulation. Within six months of the effective date of the ordinance codified in this provision, the Traffic and Parking Department shall submit to the City Manager an updated written inventory of all on-street parking spaces specifying the restrictions applicable to each such parking space. As to any space which has not been restricted or removed from the supply of on-street spaces pursuant to Section 10.16.071 of this title, the Traffic and Parking Department shall prepare a recommendation for restriction of each such space to discourage its use for long-term commuter parking. These restrictions may include, without limitation an absolute prohibition against parking, installation of parking meters, imposition of time restrictions, and/or restrictions for use by residents with permits. The Director of Traffic and Parking shall make the recommendations available for public review and shall schedule one or more public meetings, as appropriate, for public discussion of the recommendations. Within one month after the public meetings, the Traffic and Parking Department shall submit its revised recommendation to the City Manager. After consultation with the City Manager, the Traffic and Parking Department shall promptly implement the recommendations.
- B. Municipal Parking Rates. The rates for daily and monthly parking at all City-owned off-street parking facilities shall be increased by twenty-five percent over current rates, to be effective within sixty days of the effective date of this provision.
- C. Exclusive Residential Parking Near MBTA Stations. The Traffic and Parking Department, in consultation with neighborhood groups, residents, commercial establishments, and the City Manager, shall prepare a proposal for establishing exclusive residential parking zones on primarily residential streets located near MBTA stations. The object of the proposal shall be to limit residential parking on targeted streets close to MBTA stations to residents of those neighborhoods by means of appropriate signage and special resident stickers. The Traffic and Parking Department shall convene a public meeting on its proposal within four months of the effective date of this provision. Within one month after such public meeting, and after consultation with the City Manager, the Director of Traffic and Parking shall cause the proposal to be implemented. (Ord. 1139 (part), 1992)

10.17.210 Promotion of clean fuels.

The Department of Public Works shall study, promote, encourage, and identify incentives for the use of clean fuel in fleets of vehicles operating within the City. The study shall include an evaluation of the use of such fuels as methanol, compressed natural gas, and reformulated gasoline based on characteristics of fleets in Cambridge and implementation costs. The study shall also identify reasonably available incentives which could be offered by the City, such as tax credits, to encourage use of clean fuel in fleets of vehicles. The sum of fifteen thousand dollars shall be appropriated for this program. (Ord. 1139 (part), 1992)

10.17.220 Development of traffic policy.

The Assistant City Manager for Community Development and the Director of the Traffic and Parking Department, or their designees, shall within one year of the effective date of this provision, conduct a study of major highways, city through streets, streets with schools, different types of residential streets, and streets at the borders of the City. Based on that study, they shall prepare a written recommendation of:

- A. Appropriate speeds and volumes for Cambridge streets; and
- B. Means of encouraging travel and traffic patterns that reduce VMTs.

This written recommendation shall be submitted to the City Council for review and appropriate action. (Ord. 1139 (part), 1992)

10.17.230 Sunset clause.

The provisions of this chapter shall cease to be effective ninety days after the date the Department of Environmental Protection or the U.S. Environmental Protection Agency adopts a final rule or regulation that imposes transportation control measures including parking supply management measures in Cambridge which do not have an equal impact on the Region. The purpose of this sunset clause is to give the City the opportunity to decide whether to continue to implement the numerous provisions of this chapter in the event that the final rule or regulation puts the City at a competitive disadvantage in the region. (Ord. 1139 (part), 1992)

Appendix III-Transportation Cost Comparison

According to the Sierra Club, major estimates of the total automobile subsidies in the United States range from \$378 billion a year to \$730 billion a year, or \$1,370 to \$4,220 per vehicle.³¹

The Conservation Law Foundation has studied the relative costs of travel in the Boston area, including Cambridge.

	Peak Periods	Off-Peak Periods
Bicycling	13¢	13¢
Walking	14¢	14¢
Commuter Rail	29¢	69¢
Car Pooling	41-43¢	33-40¢
Subways or Streetcars*	64¢	95¢
MBTA Buses*	58¢	\$1.38
Driving Alone*	81¢ expressway 94¢ streets	79¢ expressway 91¢ streets

*If T ridership increases, cost per mile decreases; if driving increases, cost per mile increases.

Figure 1: Cost Per Mile of Travel in the Boston Area.³²

Costs included in the chart:

A. User Costs

Private vehicle ownership and operating costs

- Depreciation and financing
- Insurance
- Registration, inspection, title, and licensing fees
- Motor vehicle taxes
- Gasoline and oil
- Repairs, parts, tires
- Tolls
- Parking—residential and paid
- Accidents

B. Government Costs

- State and federal capital investment in transportation infrastructure
- Local government capital, operations, and maintenance

31 Washington State Energy Office, *Municipal Strategies to Increase Pedestrian Travel: Final Report* (1994), p. 5.

32 Conservation Law Foundation, *Road Kill* (May 1994).

- Department of Motor Vehicles operations
- Police, fire, and courts
- Parking (tax breaks)
- Energy supply subsidies
- Accidents (government share of cost)
- Deferred investment
- Air Pollution (government share of cost)

C. Societal Costs

- Air pollution
- Parking (other than that provided by vehicle owners or government)
- Accidents (beyond insurance, traveler, and government shares)
- Economic impact of importing foreign oil
- Noise

D. Costs That Were not Included

- Sprawl
- Expanding and maintaining infrastructure in low-density areas
- Loss of agricultural land
- Loss of open space
- Wetland destruction
- Lower economic productivity due to less intensive development of areas served only by roads rather than by transit and sidewalks
- Water pollution
- Run-off from roads and parking lots
- Oil spills
- Leaking underground storage tanks
- Solid and hazardous wastes
- Auto bodies, tires, and other materials
- Destruction of the ozone layer
- CFAs from car air conditioners
- Toxic air pollution
 - Benzene
 - Formaldehyde
 - 1,3-Butadiene
 - Acetaldehyde

Also not included are the costs of the Central Artery/Tunnel Project or the possible costs of global climate change.

Appendix IV-Cambridge Households without Cars

Area 4	45%
Riverside	38%
Cambridgeport	33%
Wellington-Harrington	32%
East Cambridge	31%
North Cambridge	29%
Mid-Cambridge	27%
Agassiz	24%
Neighborhood 9	23%
Strawberry Hill	22%
Neighborhood 2/MIT	21%
West Cambridge	16%
Cambridge Highlands	5%

These percentages are based on 1990 US Census percentages for household populations and do not include students in dormitories.

Figure 1: Percentage of Cambridge Households without Motor Vehicles.

Appendix V- Street Classification System

A. Principal Arterial System

The urban principal arterial system serves the major centers of activity, high traffic volumes, the longest trips and carries a high proportion of the total urban area traffic on a minimum of mileage.

Service to abutting land is subordinate to travel service. Any direct access to land should be purely incidental to the primary functional responsibility of this class of roads.

B. Minor Arterial Street System

The minor arterial street system interconnects with and augments the urban principal arterial system. It accommodates trips of moderate length at a somewhat lower level of travel mobility. This system places more emphasis on land access and offers lower traffic mobility for motor vehicles. Such a facility may carry local bus routes and provide intracommunity continuity but ideally does not penetrate identifiable neighborhoods.

C. Collector Street System

The collector street system provides both land access and traffic circulation within residential neighborhoods and commercial and industrial areas. It may penetrate residential neighborhoods, distributing trips from the arterials through the area to their ultimate destination. Collector streets also collect traffic from local streets in residential neighborhoods and channel it into the arterial system. The collector street system may also carry local bus routes.

D. Local Street System

The local street system comprises all facilities not in one of the higher systems. It primarily provides direct access to abutting land and connections to the higher order systems. It covers the lowest level of motor vehicle mobility and usually contains no regular bus routes.

E. Private Way

A private way is a local street that the City Council has not accepted as a public right of way that furnishes the primary means of access to two or more parcels of land.

Appendix VI- Cambridge Traffic Regulations Related to Pedestrians and Bicyclists

ARTICLE I

DEFINITIONS

Sec. 1.4

A. Bicycle

Every device propelled by human power upon which any person may ride, having no more than two tandem wheels either of which is 18" or more in diameter.

B. Bike path

A route for the exclusive use of bicycles separated by grade or other physical barrier from motor vehicles.

C. Bike lane

A lane on a street restricted to bicycles separated by grade or other physical barrier from motor vehicles.

D. Bike route

A roadway shared by both bicycles and other forms of transportation may be designated by means of signs and/or pavement markings.

E. Bicycle parking facility

Any facility for the temporary storage of bicycles which allows the frame and one or both wheels to be locked so as to minimize the risk of theft and vandalism.

Sec. 1.13 Crosswalk

That portion of a roadway ordinarily included within the prolongation or continuation of curb lines and property lines at intersections, or at any portion of the roadway clearly indicated for pedestrian crossing by lines on the road surface or by other markings or signs.

Sec. 1.28 Pedestrians

Any person afoot or riding on a conveyance moved by human power, except bicycles and inline skates.

Sec. 1.50 Vehicle

Every device in, upon or by which any person or property is or may be transported or drawn upon a highway, including bicycles and inline skates when the provisions of these rules are applicable to them, except other devices moved by human power or used exclusively upon stationary rails or tracks.

Sec. 1.52 Inline Skates

Any shoe with an attachment of 4 or more wheels aligned in a linear fashion.

Sec. 1.8 CENTRAL SQUARE BUSINESS DISTRICT

The Central Square Business District for the purposes of these regulations shall be defined as that part of the City of Cambridge included by the following streets or parts thereof:

Bishop Allen Drive.- Main St. to Inman St.

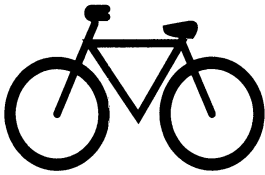
Bigelow St. - Mass. Ave. to the North Curb line of City Hall drive

Brookline St. - Green St. to Mass. Ave.

Central Square

Columbia St. - Bishop Allen Drive to Mass. Ave.

Douglas St. - Bishop Allen Drive to Mass. Ave.



Essex St. - Bishop Allen Drive to Mass. Ave.
 Franklin St. - Pearl St. to Pleasant St.
 Green St. - Sidney St. to Sellers St.
 Inman St. - north curb line of Bishop Allen Drive to Mass. Ave.
 Magazine St. - Franklin St. to Green St.
 Main St. - Mass. Ave. to east curb line of Cherry St.
 Mass. Ave. - west curb line of Sellers St. to the east curb line of Sidney St.
 Norfolk St. - Bishop Allen Drive to Mass. Ave.
 Pearl St. - Franklin St. to Mass. Ave.
 Pleasant St. - Franklin St. to Mass. Ave.
 Prospect St. - Bishop Allen Drive to Mass. Ave.
 River St. - Franklin St. to Mass. Ave.
 Sellers St. - Green St. to Mass. Ave.
 Sidney St. - Green St. to Mass. Ave.
 Temple St. - Mass. Ave. to Bishop Allen Drive
 Western Ave. - Franklin St. to Mass. Ave.

Sec. 1.20 HARVARD SQUARE BUSINESS DISTRICT

The Harvard Square Business District for the purposes of these regulations shall be defined as that part of the City of Cambridge included by the following streets or parts thereof:

Appian Way - Brattle St. to Garden St.
 Bow St. - Mass. Ave. to Mt. Auburn St.
 Brattle Square
 Brattle St. - Appian Way to Mass. Ave.
 Cambridge St. - Broadway to Mass. Ave.
 Church St. - Brattle St. to Mass. Ave.
 DeWolfe St. - Bow St. to Memorial Drive
 Dunster St. - Mass. Ave. to South St.
 Farwell Place - Brattle St. to end of street
 Garden St. - west curb line of Appian Way to Mass. Ave.
 Harvard St. - Quincy St. to Mass. Ave.
 Holyoke St. - Mass. Ave. to Memorial Drive
 John F. Kennedy St. - Mass. Ave. to Memorial Drive
 Linden St. - Mass. Ave. to Bow St.
 Mass. Ave. - north curb line of Cambridge St. to east curb line of Quincy St.
 Mt. Auburn St. - west curb line of Story St. to DeWolfe St.
 Palmer St. - Church St. to Brattle St.
 Peabody St. - Mass. Ave. to Cambridge St.
 Plympton St. - Mass. Ave. to Memorial Drive
 Quincy St. - Broadway to Harvard St.
 South St. - John F. Kennedy St. to Dunster St.
 Story St. - Mt. Auburn St. to Brattle St.

ARTICLE IX**RULES OF THE ROAD****Sec. 9.18 VEHICLE OPERATION AT CROSSWALKS**

- A. When traffic-control signals are not in place or not in operation the driver of a vehicle, which for the purposes of this regulation shall include bicycles, shall yield the right of way, slowing down or stopping if need be so to yield, to a pedestrian crossing the roadway within a marked crosswalk when the pedestrian is upon the half of the roadway upon which the vehicle is traveling or when the pedestrian approaches from the opposite half of the roadway to within 5 feet of that half of the roadway upon which the vehicle is traveling. No operator of a vehicle shall pass any other vehicle which has been stopped at a marked crosswalk to permit a pedestrian to cross a way, nor shall any operator enter a marked crosswalk until there is sufficient space on the other side of the crosswalk to accommodate the vehicle he is operating notwithstanding any traffic-control signal indication to proceed.
- B. The provisions of these regulations and those drafted under the provisions of General Laws, Chapter 90, Section 18A, shall in no way abrogate the provisions of Chapter 90, sections 14 and 14A of the General Laws (Ter. Ed.) which provides: "Precautions for Safety of Other Travelers" and for the "Protection of Blind Persons Crossing Ways." Furthermore, notwithstanding the provisions of these regulations every driver of a vehicle shall exercise due care to avoid colliding with any pedestrian upon the roadway and shall give warning by sounding the horn when necessary and shall exercise proper precautions which may become necessary for safe operation.

ARTICLE XI**PEDESTRIANS' RIGHTS AND DUTIES****Sec. 11.1 PEDESTRIANS CROSSING WAYS OR ROADWAYS**

Pedestrians shall obey the directions of police officers directing traffic; and 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 these regulations. For the purpose of these regulations, a marked crosswalk shall only be construed to be that area of the roadway reserved for pedestrian crossing located between two solid white reflectorized six inch pavement markings, and markings or lines being no less than six feet apart.

Sec. 11.2 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 the 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 these regulations.



Sec. 11.3 PEDESTRIANS SUBJECT TO TRAFFIC-CONTROL SIGNALS

Pedestrians shall be subject to traffic-control signals as heretofore declared in sections 4.5, 4.6 and 4.7 of these regulations, but at all other places pedestrians shall be granted those rights and be subject to the restrictions stated in this article.

Sec. 11.4 PEDESTRIAN CROSSINGS AND USE OF ROADWAY

- 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 a 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.
- E. Persons alighting from the roadway side of any vehicle parked at the curb or edge of roadway shall proceed immediately to the sidewalk or edge of roadway adjacent to vehicle, and shall cross the roadway only as authorized by these regulations.
- 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.

Sec. 11.5 CROSSING AT NON-SIGNALIZED LOCATIONS

- A. Every pedestrian crossing a roadway at any point other than within a marked crosswalk, as referred to in section 1, 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 use of the tunnel or overpass.
- B. No pedestrian shall cross a roadway at any place other than by a route at right angles to the curb or by the shortest route to the opposite curb except in a marked crosswalk.

Sec. 11.6 OBEDIENCE OF PEDESTRIANS TO RAILROAD SIGNALS

No pedestrian shall pass through, around, over, or under any crossing gate or barrier at a railroad grade crossing while such gate or barrier is closed or is being opened or closed.

Sec. 11.7 PEDESTRIANS SOLICITING RIDES OR BUSINESS

No person shall stand in a roadway for the purpose of soliciting a ride, employment, or business from the occupant of any vehicle.

Sec. 11.8 PENALTIES

Any person who violates the provisions of this regulation which deal with the proper use of ways by pedestrians shall be punished as provided in chapter 90, sec. 18A of the General Laws (Ter. Ed.)

ARTICLE XII

REGULATIONS FOR BICYCLES

Sec. 12.1 TRAFFIC LAWS APPLY TO PERSONS RIDING BICYCLES

Every person riding a bicycle upon a roadway shall be granted all of the rights and shall be subject to all of the duties applicable to the driver of a vehicle by the laws of this state declaring rules of the road applicable to vehicles or by the traffic regulations of this city applicable to the driver of a vehicle, except as to special regulations

in this article and except as to those provisions of laws and regulations which by their nature can have no application.

Sec. 12.2 OBEDIENCE TO TRAFFIC CONTROL DEVICES

- A. Any person operating a bicycle shall obey the instructions of official traffic control signals, signs and other control devices applicable to vehicles, unless otherwise directed by a police officer.
- B. Whenever authorized signs are erected indicating that no right or left or U turn is permitted, no person operating a bicycle shall disobey the direction of any such sign, except where such person dismounts from the bicycle to make any such turn, in which event such person shall then obey the regulations applicable to pedestrians.

Sec. 12.3 REQUIRED EQUIPMENT

- A. Every bicycle operated upon a way shall be equipped with a braking system to enable the operator to bring the bicycle traveling at a speed of fifteen miles per hour to a smooth safe stop within thirty feet on a dry, clean, hard, level surface.
- B. Every bicycle when in use during the period from one-half hour after sunset to one-half hour before sunrise, shall be equipped with a lamp on the front which shall emit a white light visible from a distance of at least 500' to the front. To the rear, either a red lamp or a red reflector visible for not less than 600' when directly in front of lawful lower beams of head lamps on a motor vehicle.
- C. The operator shall not carry any package, bundle or article except in a basket, rack, trailer or other device designated for such purpose. The operator shall keep at least one hand upon the handlebars at all times.

Sec. 12.4 RIDING ON BICYCLES

- A. A bicycle operator shall give an audible warning whenever necessary to insure the safe operation of the bicycle; however, the use of a siren or whistle is prohibited.
- B. The operator shall ride only upon or astride a permanent and regular seat attached to the bicycle.

A passenger shall ride only upon or astride a permanent and regular seat attached to the bicycle or to a trailer towed by the bicycle.

- C. Any person twelve years of age or younger operating a bicycle or being carried as a passenger on a bicycle shall wear a helmet which meets the latest standards established by the American National Standards Institute or the Snell Memorial Foundation.
- D. During the period from one-half hour after sunset to one-half hour before sunrise, the operator shall display either on each pedal of their bicycle a reflector or on each ankle reflective material which is visible from all angles for a distance of 600' when directly in front of lawful low beams of headlamps of a motor vehicle.
- E. In the event of a collision between the operator of a bicycle and a pedestrian both parties shall stop and exchange the following information: name, address and location.

Sec. 12.5 RIDING ON ROADWAYS

- A. The bicycle operator shall ride single file on any way except when passing. The bicycle operator may keep to the right when passing a motor vehicle which is moving in the travel lane or the way. The bicycle operator shall not pass to

the right of a bus or minibus stopped at a designated bus stop.

- B. Bicycle operators shall signal by either hand their intention to stop or turn.
- C. Bicycle operators shall not permit their bicycle to be drawn by any other moving vehicle.

Sec. 12.6 EMERGING FROM ALLEY OR DRIVEWAY

The driver of a bicycle emerging from an alley, driveway or building shall upon approaching a sidewalk or the sidewalk area extending across any alleyway, yield the right of way to all pedestrians approaching on said sidewalk or sidewalk area, and upon entering the roadway shall yield the right of way to all vehicles approaching on said roadway.

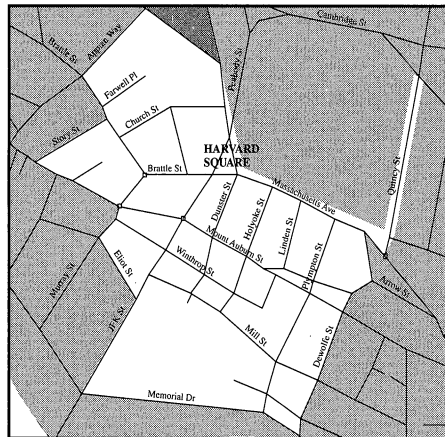
Sec. 12.7 RIDING ON SIDEWALKS

- A. Pedestrians have the right of way on all sidewalks. The operator of a bicycle shall yield to pedestrians in all traffic situations.
- B. The operator of a bicycle shall ride at a speed no greater than an ordinary walk when on a sidewalk or when entering or leaving a sidewalk.
- C. The operator of a bicycle shall give an audible warning before passing a pedestrian far enough in advance to allow the pedestrian time to react.
- D. No one shall operate a bicycle on a sidewalk in a manner that endangers or would be likely to endanger any person or property.
- E. The operator of a bicycle shall comply with all Federal, State and local regulations concerning lighting and helmet use as they apply to roadways when riding on a sidewalk.

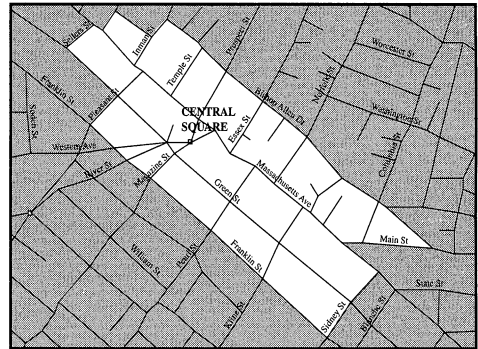
Sec. 12.8 SIDEWALK CYCLING BANNED ON CERTAIN STREETS AND DISTRICTS

- A. No person shall ride a bicycle on any sidewalk within a business district as defined in Article I.
- B. No person shall ride a bicycle on any sidewalk described in schedule 4B attached to and made part of these regulations and which has been posted with appropriate signs.
- C. No person thirteen years of age or older shall ride a bicycle on any sidewalk described in schedule 4C attached to and made part of these regulations and which has been posted with appropriate signs.

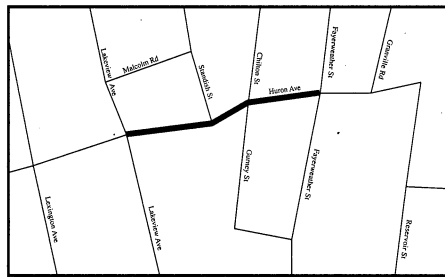
Sidewalk Bicycling Banned Areas



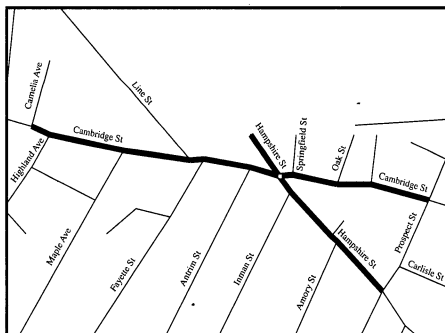
Harvard Square Business District*



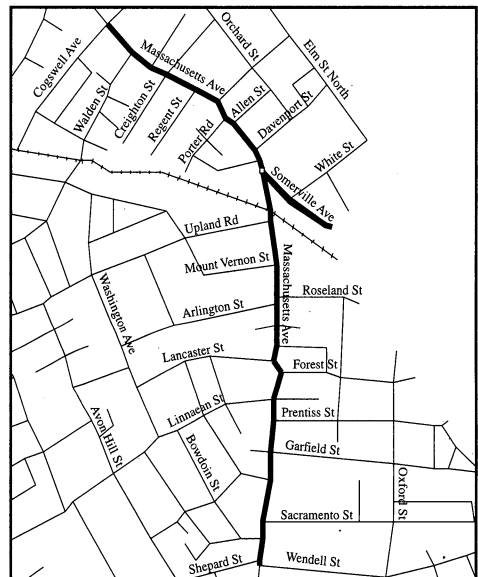
Central Square Business District



Huron Village



Inman Square



Massachusetts Avenue
Russell Street to Wendell Street
(both sides)

*The Harvard Square Business District extends to, but does not include, Memorial Drive.

Appendix VII-LOS Definitions for Pedestrians and for Motor Vehicles

Levels of Service for pedestrians have traditionally been measured in terms of sidewalk crowding. A more significant measure is probably the amount of delay pedestrians experience at intersections. Both measures are described below.

Pedestrian Levels of Service Based on Intersections

— From Joseph S. Milazzo II, et al., *Quality of Service for Interrupted Pedestrian Facilities in the 2000 Highway Capacity Manual*

Recommended HCM 2000 pedestrian Level of Service (LOS) criteria for **signalized** crossing delay

LOS	Average Delay Per Pedestrian (seconds)	Likelihood of Pedestrian Noncompliance
A	< 10	Low
B	10-20	
C	20-30	Moderate
D	30-40	
E	40-60	High
F	60	Very High

Recommended HCM 2000 pedestrian Level of Service (LOS) criteria for **unsignalized** crossing delay

LOS	Average Delay Per Pedestrian* (seconds)	Likelihood of Risk-Taking Behavior by Pedestrians**
A	< 5	Low
B	5-10	
C	10-20	Moderate
D	20-30	
E	30-45	High
F	45	Very High

* Delay includes waiting on one side to begin crossing and/or waiting in the median to complete the crossing
 ** Likelihood of acceptance of short gaps

Pedestrian Levels of Service Based on Sidewalk Crowding

— From U.S. Department of Transportation, *Planning and Maintenance of Pedestrian Facilities*, FHWA-1P-88-019

Walkway Level of Service A

Average Flow Volume: 4 PFM³³ or less

Average Speed: 260 ft./min.

Average Pedestrian Area Occupancy: > 65 sq.ft./person or greater

Description: Virtually unrestricted choice of speed; minimum maneuvering to pass; crossing and reverse movements are unrestricted; flow is approximately 25 percent of maximum capacity.

Walkway Level of Service B

Average Flow Volume: <7 PFM

Average Speed: 25-260 ft./min.

Average Pedestrian Area Occupancy: > 40 sq. ft./person

Description: Normal walking speeds only occasionally restricted; some occasional interference in passing; crossing and reverse movements are possible with occasional conflict; flow is approximately 35 percent of maximum capacity.

Walkway Level of Service C

Average Flow Volume: <10 PFM

Average Speed: 230-250 ft./min.

Average Pedestrian Area Occupancy: > 24 ft./person

Description: Walking speeds are partially restricted; passing is restricted but possible with maneuvering; crossing and reverse movements are restricted and require significant maneuvering to avoid conflict; flow is reasonably fluid and is about 40-65 percent of maximum capacity.

Walkway Level of Service D

Average Flow Volume: <10 PFM

Average Speed: 200-230 ft./min.

Average Pedestrian Area Occupancy: > 15 ft./person

Description: Walking speeds are restricted and reduced, passing is rarely possible without conflict; crossing and reverse movements are severely restricted with multiple conflicts; some probability of momentary flow stoppages when critical densities might be intermittently reached; flow is approximately 65-80 percent of maximum capacity.

Walkway Level of Service E

Average Flow Volume: <25 PFM

Average Speed: 110-200 ft./min.

Average Pedestrian Area Occupancy: > 6 ft./person

Description: Walking speeds are restricted and frequently reduced to shuffling; frequent adjustment of gait is required and passing is impossible without conflict; crossing and reverse movements are severely restricted and conflict

33 Pedestrians per foot width of walkway per minute.

is unavoidable; flow attains maximum capacity under pressure, but with frequent stoppages and interruptions of flow.

Walkway Level of Service F

Average Flow Volume: 25 PFM or more

Average Speed: 0-110 ft./min.

Average Pedestrian Area Occupancy: < 6 ft./person

Description: Walking speed is reduced to shuffling; passing is impossible; crossing and reverse movements are impossible; physical contact is frequent and unavoidable; flow is sporadic and on the verge of complete breakdown and stoppage.

Intersection Levels of Service for Vehicles

— From Milazzo et al.

Levels of Service Definitions for Motor Vehicles

Level of Service (LOS) is used to denote intersection operating conditions for motor vehicles and is represented on a scale ranging from “A” at the highest level to “F” at the lowest level. Levels of service “A” through “D” are generally considered acceptable, while levels “E” and “F” are to be avoided if possible. At level of service “A,” drivers experience little delay and intersections operate under free-flow conditions. Levels of service “B” through “D” represent increasing amounts of delay and increasing numbers of vehicles that are stopped and may have to wait through more than one red signal. At level of service “E” the intersection is approaching capacity and is processing the maximum possible number of vehicles. Long backups and queues of vehicles occur, and many vehicles wait through more than one light cycle. Level of service “F” results from volumes in excess of capacity and is characterized by jammed conditions.

1994 HCM **signalized** intersection Level of Service criteria

LOS	Stopped Delay Per Vehicle (seconds)
A	< 5
B	5-15
C	15-25
D	25-40
E	40-60
F	60

SOURCE: TRB, 1994

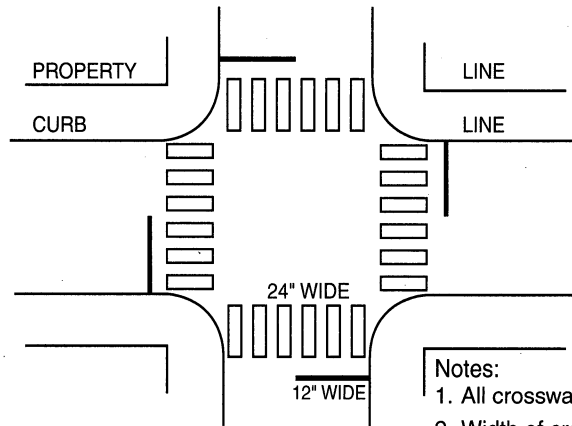
1994 HCM **unsignalized** intersection Level of Service criteria for vehicles

LOS	Average Total Delay (seconds/vehicle)
A	< 5
B	5-10
C	10-20
D	20-30
E	30-45
F	45

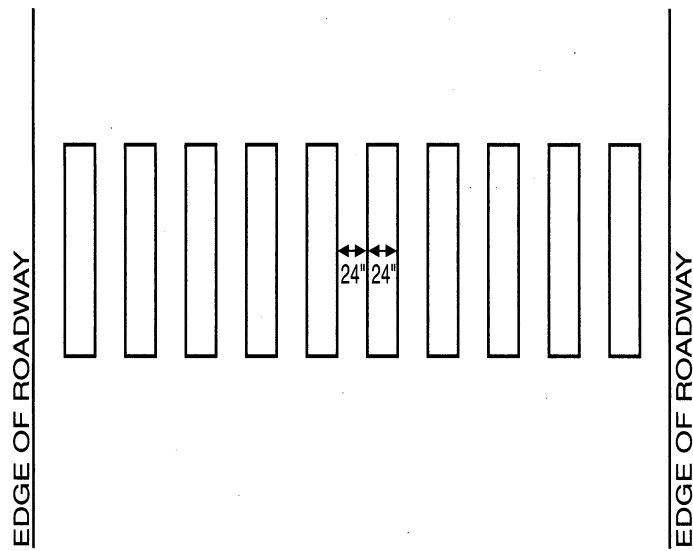
SOURCE: TRB, 1994

Appendix VIII-Pavement Marking Plan for Standard Cross Street Intersections

Cambridge
Pavement Marking
Plan for Standard
Cross Street
Intersection



- Notes:
- 1. All crosswalk lines touch curb
 - 2. Width of crosswalks varies, depending on width of street and traffic volumes
 - 3. 4' of black pavement between stop line and crosswalk
 - 4. Standard crosswalk width is 10-15'



Appendix IX-Wheelchair Ramp Standards

Mass. Highway Dept. Engineering Directive E-97-008 (10/09/97)

In accordance with 521 CMR Rules and Regulations of the Architectural Access Board (AAB) and Americans with Disabilities Act (ADA), the following will be adhered to on all projects:



1. All projects must be designed in accordance with the Wheelchair Ramp Standards booklet effective 10/8/97, and the Construction and Traffic Standard Details, 1996 Metric Edition as revised.
2. All projects which include wheelchair ramps must include construction drawings showing the location of all wheelchair ramps. Projects without construction plans must include these drawings in the Special Provisions of the project.
3. All proposed wheelchair ramp construction plans must use those symbols as shown in the Wheelchair Ramp Standards booklet and the Construction and Traffic Standard Details, 1996 Metric Edition as revised. The selected symbols must be representative of the finished ramp. The wheelchair ramp symbol illustrated in Table 2.1 of the Highway Design Manual showing plan symbols for existing features is sufficient to indicate existing wheelchair ramp locations.
4. The center line of the wheelchair ramp must be perpendicular to the curb. In cases where the crosswalk is skewed to the wheelchair ramp, a 2.2m (diameter) turning area, entirely contained within the crosswalk, must be provided at the base of the wheelchair ramp. If necessary, the crosswalk should be widened to accommodate the turning area.
5. Where grades of cross slopes change significantly and/or in densely populated urban areas where sidewalks significantly change in grade or cross slope, detailed sidewalk and wheelchair ramp grading plans must be developed to minimize impact to driveways and building entrances.
6. It is the responsibility of the design engineer to carefully review all wheelchair ramp locations on site during the design phase and to provide all necessary plans in accordance with AAB and ADA.
7. The entire wheelchair ramp shall be constructed of cement concrete, unless a project review by the Massachusetts Historical Commission under G.L. chapter 9 section 27c or the Federal Government pursuant to section 106 of the Federal Historic Preservation Act requires MassHighway to eliminate, minimize or mitigate said concrete construction as an adverse effect. Limits are defined in MassHighway Construction Standards drawings and in the Wheelchair Ramp Standards booklet effective 10/8/97.
8. Level Landing is defined as an area at the top of each wheelchair ramp consisting of a length no less than 48" (1219 mm) as measured from the back of sidewalk to the start of ramp (or the gutterline if there is no ramp length) and with the combination of cross slope toward the street (for drainage) and the profile grade along the sidewalk such that no grade in any direction on the landing exceeds 1.9% (this includes the steepest diagonal slope of the landing area).
9. The Contract Special Provisions must contain the following statements:
 - A. "Contractors shall establish grade elevations at all wheelchair ramp locations, and shall set transition lengths according to the appropriate table in the Construction Standards (or to the details shown on the plans)."

- B. “All wheelchair ramp joints and transition sections which define grade changes shall be formed, staked, and checked prior to placing cement concrete. All grade changes are to be made at joints.”

The attached revised sheets replace the existing plates of the Massachusetts Highway Department (MassHighway) Construction and Traffic Standard Details 1996 Metric Edition as revised.

City of Cambridge Construction Specifications: 6" Cement Concrete Pedestrian Ramp

Work to be done under this item shall consist of the installation of pedestrian ramps in strict conformance with current Americans with Disabilities Act (ADA) regulations and the specifications for Items 701 and 701.1. Locations shall be as directed by the Engineer.

Prior to excavation, the Contractor shall review the pedestrian ramp location with the Engineer to determine what is necessary to allow for the installation to be compliant with ADA. Fixed objects such as utility poles and fire hydrants must be considered in location of pedestrian ramps. The type of pedestrian ramp may vary based on sidewalk width and slope. Please see details for further specifications.

At intersections, pedestrian ramps shall be located in front of vehicle stop lines and within the pedestrian crosswalk. The ramp shall be constructed so that the finished elevation of the concrete (curb removed) will meet the roadway flush (less than 1/2" lip) for a width no less than forty-two (42) inches. The elevation at this meeting point shall be properly designed to meet the gutter elevation of the road. The pavement gutter shall be patched under Item 472 after the pedestrian ramp has been installed. Pavement patching shall conform to the crown of the road where it meets the pedestrian ramp. Pavement patching shall not be used to create a flush surface with the ramp if it results in a raised portion of the street gutter line. The Contractor shall install pedestrian ramps in a manner which minimizes the potential for puddles in front of them.

Transition curbs shall not exceed one-in-twelve (1:12) and shall blend to meet the roadway gutter flush. Where sidewalks are too narrow to install a straight-in-line curb cut at a slope of one-in-twelve (1:12), transition curbs shall also slope at one-in-twelve (1:12). The Contractor shall use a digital “Smart Level” to check all sub-base grades for compliance prior to installation of concrete. The Contractor shall not proceed with concrete installation on a ramp that is out of compliance without first contacting the Engineer.

The broomed finish on pedestrian ramps shall be perpendicular to the direction of the slope.

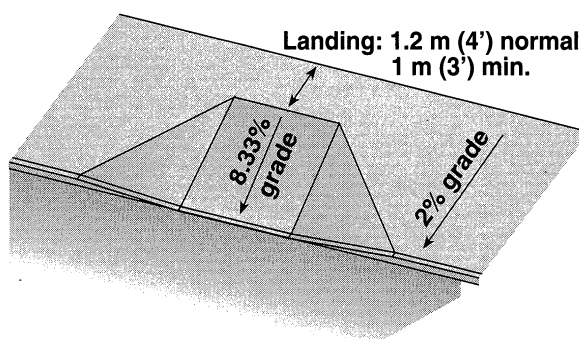


Figure 1: 1 m (3 ft) wide area at 2% cross-slope on sidewalks.

Appendix X- Sidewalk Construction Specifications

ITEM 701.00	4" CEMENT CONCRETE SIDEWALKS	SQUARE YARD
ITEM 701.10	6" CEMENT CONCRETE SIDEWALKS	SQUARE YARD

Work to be done under these items shall conform to the relevant provisions of the 1988 Massachusetts Highway Department Standard Specifications for Highways and Bridges Section 701 and the following:

Excavation and Compaction

This item shall include the excavation and disposal of the existing material and compaction of the sub-base prior to placement of concrete. If the existing material is unsuitable or more material is needed for sub-base, additional material shall be installed and paid for under Item 151 Gravel Borrow as directed by the Engineer. If the existing material is brick, the City reserves the right to have the Contractor truck them to a specified site in the City.

The Contractor shall exercise special care when excavating near trees. When major roots are in the way, the Contractor shall go under or between them. In no case shall the Contractor disturb the root structure of the trees without direction from the City Arborist. Exposed roots shall be covered promptly. Excavation of all tree wells shall be done entirely by hand.

Traffic signs shall be removed during the excavation. Signs to be reused shall be appropriately stored. Traffic signs to be replaced, as directed by the Engineer, shall be disposed of by the Contractor. Reinstallation of traffic signs shall be incidental to this item and done prior to the concrete pour. New traffic signs shall be installed and paid for under Item 877. All regulatory signs shall be maintained throughout construction.

The sub-base shall be prepared at the appropriate elevation for the depth of concrete to be installed. The sub-base shall be graded to allow for sidewalks to be sloped from the City right of way towards the street at 1/8 inch to the foot, or as directed by the Engineer.

The Contractor shall raise all water curb stop boxes to final grade and coordinate raising of other utility boxes prior to pouring of concrete. The contractor shall remove material from curb stop boxes after raising is complete and prior to pouring of concrete with compressed air. Prior to pouring the concrete, the Contractor shall go over locations where curb boxes have been raised with the Engineer.

Proper compaction shall be obtained by means of plate-type mechanical compactors. The material shall be compacted to ninety-five percent (95%) of the maximum dry density at optimum moisture content as determined by the AASHTO Standard Method of Test T99 Method C.

Concrete

Concrete for sidewalks shall conform to the 1988 MHD Standard Specifications, M4.02.00 through M4.02.12. and be 4000 PSI at 28 day test, 3/4 inch coarse aggregate, 610 pounds cement per cubic yard, 6% air entrained (AASHTO - M154), Type A water reducing admixture (AASHTO - M194), 3 to 4 inch slump, and Type II dark-colored by adding 1-1/2 to 2 lbs. of lamp black per cubic yard at the plant.

The concrete shall contain 1 pound of 100% polypropylene micro-fiber per cubic yard. Fiber shall be added during batching at the plant to insure uniform distribution. The micro-fiber shall be W.R. Grace micro-fiber or equal and shall be used in accordance with the supplier's specifications.

Installation

Concrete shall be installed to a depth of 6" across driveways, at street intersection corners (5' beyond the point of tangent on either side of the corner curve), and at other locations as directed by the Engineer. At all other locations, concrete shall be installed to a depth of 4". Pedestrian ramps shall be installed and paid for under Item 701.2.

Finishing shall be as specified in Subsection 701.61B of the 1988 MHD Standard Specifications. Concrete shall be membrane-cured. The curing compound shall not discolor the concrete and shall be applied according to the manufacturer's specifications. The mixture shall be applied immediately after the finishing is complete and free water has left the concrete's surface. The Contractor shall provide the Engineer with the curing compound specification prior to its use.

Expansion joints shall be placed every 30 feet. Expansion joints shall also be placed around all appurtenances such as utility poles, hydrants, manholes, and other obstructions extending into and through the sidewalk. Expansion joints installed around utilities shall be 3/8" foam expansion joint polyethylene at a depth of 4". It is also required that an expansion joint of 1/4" thick foam expansion at 4" deep is placed longitudinally along the granite curb between curb and the concrete and also between building, retaining wall and the concrete as directed by the Engineer. Six inch expansion joints shall be placed at all locations where six inch concrete corner slabs or driveways meet four inch concrete walks. Expansion material protruding above the finished sidewalk shall be trimmed flush with a sharp instrument as soon as the concrete has set.

Between the expansion joints at 30 foot spacings, the sidewalk shall be divided at 5 foot intervals with score joints, made with creasing tools having a penetration depth of minimum 1 1/2" and at 10 foot intervals with construction joints. Joints shall be placed 90 degrees transverse with the direction of traffic and shall be straight within a tolerance of 1/4 inch of a straight edge layed along the joint. Longitudinal joints shall be installed, at the direction of the Engineer, when the sidewalk is greater than 6' wide.

Payment for work under these items shall be at the contract unit price per square yard and shall include full compensation for excavation, removal and replacement of traffic signs, preparation of sub-base, raising of water curb stop boxes, furnishing and placing cement concrete, expansion joint, and any other incidentals necessary for the satisfactory completion of this work as specified.

ITEM 706.10 NEW BRICK WALK ON 4" CONCRETE BASE SQUARE YARD
ITEM 706.20 NEW BRICK WALK ON 6" CONCRETE BASE SQUARE YARD

Work to be done under these items shall conform to the relevant provisions of the 1988 Massachusetts Highway Department Standard Specifications for Highways and Bridges Section 700 and the following:

Placement of the concrete base shall be in conformance with the specifications for Items 701 and 701.1 except:

1. Concrete shall be 3500 psi with no fiber.
2. Final finishing and brooming is not necessary as this is a base course.

The concrete base shall be poured to an elevation which allows for the stone dust setting bed and brick installation to result in the appropriate final elevation. A new brick walk shall be installed on the concrete base in compliance with the following:

Brick

Brick shall be "City Hall Pavers" manufactured by Stiles and Hart, Inc., Bridgewater, MA

or an approved equal. Brick shall have a color range of medium red to dark red, mixed with dark purple. Bricks shall be approved by the Engineer prior to installation.

The paving brick shall be clay brick, uniform in size and evenly burned, and when broken shall show a dense structure free from lime, air pockets, cracks and lamination. Laminated bricks will not be accepted.

The bricks shall be for exterior paving and shall meet the requirements of ASTM C-902-Class SX Type I with average water absorption of not more than 5% with the five hour boil and an average compressive strength of 8,000 PSI or more. Brick shall pass a minimum of 100 freeze thaw cycles.

Stone Dust

The stone dust setting bed shall contain coarse sand aggregates mixed with the fine stone dust as processed by Rowe Contracting Company, Malden, Massachusetts or Quinn Perkins Company, Burlington, Massachusetts or approved equal, in order to add stability to the brick walk so that bricks will not roll, move or rock. The stone dust for joint sweeping shall be mixed with Portland Cement Type II (2 Stone Dust to 1 Portland Cement) and be free of coarse aggregates, enabling the fines to freely fill in around all sides of the bricks.

Iron Edge

Shall be provided where required as directed by the Engineer.

Specifications shall be as follow: Height:1.5", Flange:1.75", Lengths: 6'0" or 8' 0", Thickness:16 gauge, Material: Galvanized steel.

Spikes: 10" Spiral galvanized steel placement every 12" .

Iron Edge Specification: Galvanized steel paver restraint. Sections are to be L-shaped galvanized. Sections are to be notched to provide for smooth curves and crisp angles. Spikes are to be galvanized spiral not less than 10" in length

Iron Edge to be supplied by Border Concepts, Inc., P. O. Box 471185, Charlotte, NC 28241, Telephone numbers: 1-800-845-3343 or 1-704-541-5509, Fax Number: 1-704-541-5610 or approved equal.

Installation

A 1" (+/- 1/2") stone dust setting bed shall be installed on the concrete base.

After all the bricks are in place, stone dust free of coarse aggregates shall be swept into the voids around the bricks.

Payment for work under these items shall be at the contract unit price per square yard and shall include full compensation for excavation, concrete base, new bricks, stone dust, Iron Edge, Portland Cement, labor, tools, equipment, and any other incidentals necessary for the satisfactory completion of this work as specified.

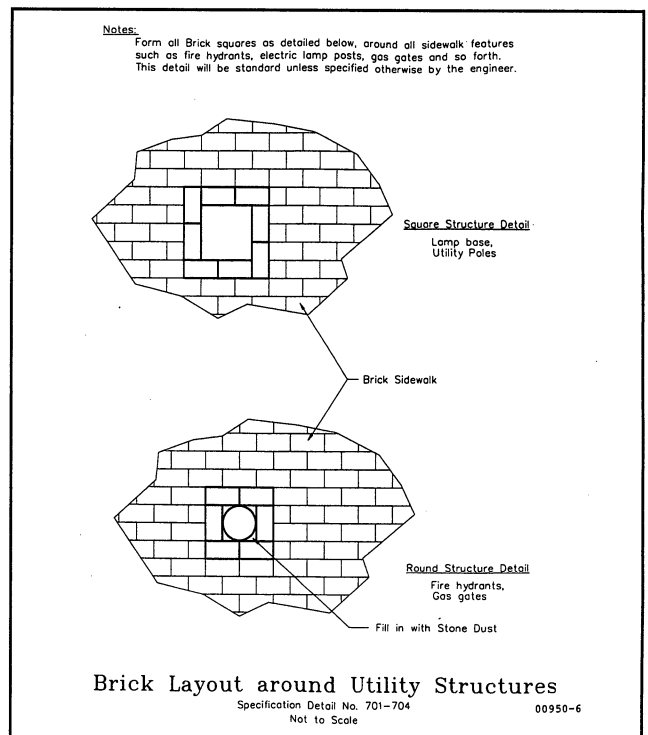
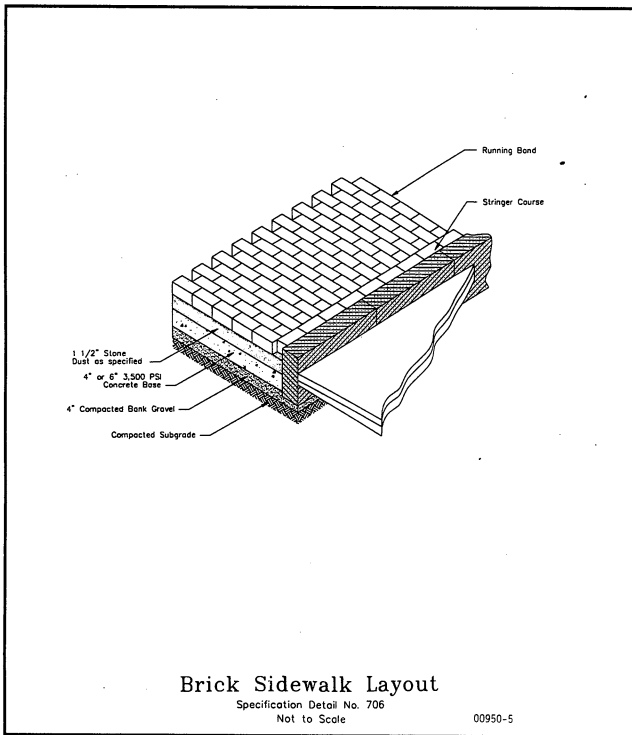
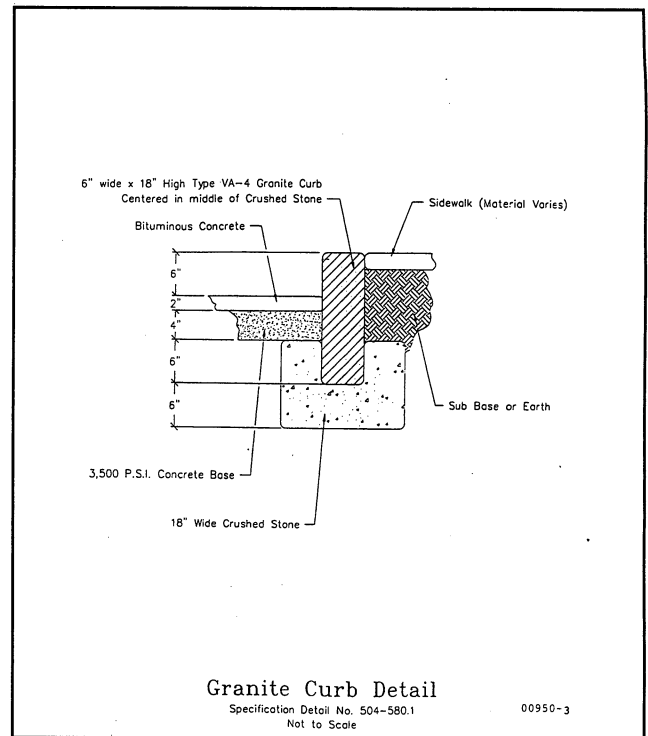
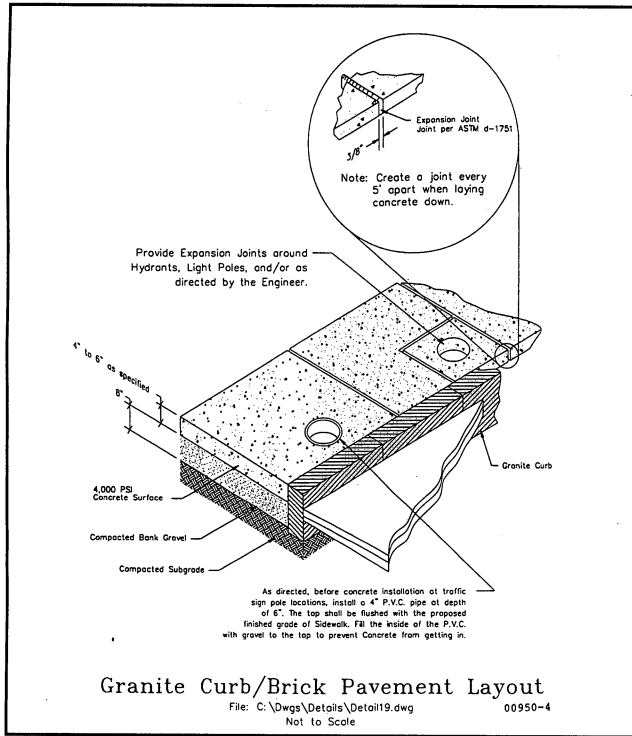


Figure 1: Sidewalk construction details.

Appendix XI-Crosswalk Specifications for Inlays

ITEM 870.40	4" REFLECTORIZED WHITE LINE INLAY	LINEAR FOOT
ITEM 870.50	6" REFLECTORIZED WHITE LINE INLAY	LINEAR FOOT
ITEM 870.60	12" REFLECTORIZED WHITE LINE INLAY	LINEAR FOOT
ITEM 870.70	24" REFLECTORIZED WHITE LINE INLAY	LINEAR FOOT
ITEM 871.4	4" REFLECTORIZED YELLOW LINE INLAY	LINEAR FOOT

This item consists of furnishing and installing retro-reflective preformed inlaid patterned pavement markings.

The work shall be in accordance with this provision. Material shall be 3M Series 380 patterned tape or equal.

DESCRIPTION:

The preformed patterned markings or legends shall consist of white or yellow films with ceramic beads incorporated to provide immediate and continuing retro-reflection and long term durability.

REQUIREMENTS:

Materials:

The preformed pavement markings shall consist of highly durable retro-reflective pliant polymer materials designed for longitudinal and word/symbol markings subjected to high traffic volumes and severe wear conditions such as shear action from crossover or encroachment on typical longitudinal configurations such as edge lines and lane lines.

Composition:

The retro-reflective pliant polymer pavement markings shall consist of a mixture of high quality materials, pigments and glass beads distributed throughout its base cross-sectional area, with a reflective layer of ceramic beads bonded to a durable polyurethane topcoat surface. The patterned surface shall have approximately 50% + or - 15% of the surface area raised and presenting a near vertical face to traffic from any direction. The channels between the raised areas shall be substantially free of exposed beads or particles.

Conformability and Resealing:

The preformed markings shall inlay into the new highway surface by the application procedure prescribed. The pavement markings shall be capable of inlay on new, dense and open graded asphalt concrete wearing courses during the paving operation in accordance with manufacturer's recommendations prior to inlay. After application the marking shall be ready for traffic when the new road surface is ready.

The pavement marking shall be capable of use for patching worn areas of the same type in accordance with manufacturer's instructions.

Color:

The preformed markings shall consist of white and yellow films with pigments selected and blended to conform to standard highway colors. No yellowing on White.

Skid Resistance:

The patterned surface of the retro-reflective pliant polymer shall provide an initial average skid resistance value of 45 BPN when tested according to ASTM E 303 except values will be taken at downweb and at 45 Degree angle from downweb.

These two values will then be averaged to find the skid resistance of the patterned surface.

Thickness:

The patterned material without adhesive shall have a minimum caliper of 0.065" (1.65mm) at the thickest portion of the patterned cross-section and a minimum caliper of 0.02" (.51mm) at the thinnest portion of the cross-section.

Performance Requirements & Material Replacement Obligations:

The bidder shall identify all equipment, solvents and/or primers necessary and provide recommendations for applications that will assure effective product performance. Pre-formed markings for longitudinal lines will offer a minimum of four years warranted service life when in laid within manufacturer's guidelines, and two years for legends and symbols. The manufacturer will replace the material which fails due to loss of adhesion or complete wear through.

A certified manufacturer's installer will do the work subject to the Engineer's or manufacturer's inspection. Contractor will replace material which fails if a certified manufacturer's sub-contractor or a certified contractor is not employed to assure proper application procedures.

The bidder shall identify all equipment, solvents and/or primers necessary and provide recommendations for application that will assure product performance.

INSTALLATION:

Application of Markings:

The markings shall be applied and tamped in accordance with the manufacturer's installation instructions by a certified manufacturer's stripper. Marking configurations shall be in accordance with the "Manual on Uniform Traffic Control Devices."

The manufacturer shall provide application equipment, manual or automatic as necessary for the job requirements. These applicators shall be capable of applying two 4' lines simultaneously with a 4" spacing between lines. These units shall be capable of applying an unlined pre-coated pressure sensitive adhesive pavement marking tape.

When markings are specified in the contract for newly paved asphalt concrete surfaces, they shall be applied before the road is open to traffic. The markings should be inlaid in the fresh surface during final rolling of the mat.

Contractor shall not attempt to apply tape without assistance of manufacturer's representative or a certified manufacturer's local representative a minimum of 10 days prior to application of tape to coordinate all phases of application.

Inlay Procedure:

Inlay involves pressing the tape into the new surface when the pavement is still warm. The speed of the paver shall be such that the temperature of the asphalt is in a range of 120 degrees - 50 degrees F at the time of inlay by the striping crew. A certified manufacturer's installer or manufacturer's representative will have been trained in determining the correct temperature.

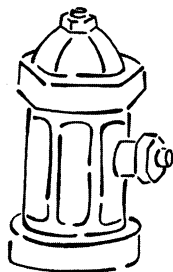
A 10 ton finish roller shall be assigned to the inlay crew at all times.

Application procedure for inlaying the tape shall be per manufacturer's application instructions and in concert with the certified stripper.

The paving and tape installation procedure will be as follows:

1. Paving
2. Compaction
3. Pre-marking the road
4. Tape Application
5. Finish Rolling

Appendix XII-Fixed Obstacle Adjustment Factors for Walkways



Obstacle	Approx. width preempted (ft.) ³⁴
Street Furniture	
Light poles	2.5-3.5
Traffic signal poles and boxes	3.0-4.0
Fire alarm boxes	2.5-3.5
Fire hydrants	2.5-3.0
Traffic signs	2.0-2.5
Parking meters	2.0
Mail boxes (1.7'x1.7')	3.2-3.7
Telephone booths (2.7'x2.7')	4.0
Waste baskets	3.0
Benches	5.0
Public underground access	
Subway stairs	5.5-7.0
Subway ventilation grates (raised)	6.0+
Landscaping	
Trees	2.0-4.0
Planting boxes	5.0
Commercial uses	
News stands	4.0-13.0
Vending stands	variable
Advertising displays	variable
Sidewalk cafes (2 rows of tables)	variable; try 7.0
Building protrusions	
Columns	2.5-3.0
Stoops	2.0-6.0
Cellar doors	5.0-7.0
Standpipe connections	1.0
Awning poles	2.5
Truck docks (trucks protruding)	variable
Garage entrance/exit	variable
Driveways	variable

— Northwestern University Traffic Institute

³⁴ Curb to edge of object, or building face to edge of object. To account for the avoidance distance normally occurring between pedestrians and obstacles, an additional 1.0 to 1.5 feet must be added to the preemption width for individual obstacles.

Appendix XIII-Physical Activity and Fitness

Excerpt from *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*

— U.S. Dept. of Health and Human Services, 1990

Regular physical activity increases life expectancy, can help older adults maintain functional independence, and enhances quality of life at each stage of life. The beneficial impact of physical activity touches widely various diseases and conditions. Regular physical activity can help to prevent and manage coronary heart disease, hypertension, diabetes, osteoporosis, and depression. It has also been associated with a lower rate of colon cancer and stroke, and may be linked to reduced back injury. It is an essential component of weight loss programs.

Physical activity is a complex behavior and its relationship with health is multifaceted. Regular vigorous physical activity promotes cardiorespiratory fitness and helps prevent coronary heart disease. Activity that builds muscular strength, endurance, and flexibility may protect against injury and disability. And any activity that expends energy is important in weight control. Physical activity can also produce changes in blood pressure, blood lipids, clotting factors, and glucose tolerance, that may help prevent and control high blood pressure, coronary heart disease and diabetes.

While activity should be habitual, it need not be unduly strenuous. People who engage daily in light to moderate exercise, equivalent to sustained walking for about 30 minutes a day, can achieve substantial health gains. Increasing evidence suggests that even small increases in light to moderate activity by those who are least active will produce measurable health benefits.

Of particular importance is the role of physical activity in preventing coronary heart disease, the leading cause of death in the United States. A sedentary lifestyle appears to be an independent risk factor for coronary heart disease, nearly doubling a person's risk. Its effect on coronary heart disease risk is almost as great as the better known risk factors, such as cigarette smoking and high blood pressure. Because more people are at risk of coronary heart disease due to physical inactivity than to any other single risk factor, it has an especially great public health impact.

Few Americans engage in regular physical activity despite the potential benefits. Currently, only 22 percent of adults engage in at least 20 minutes of light to moderate physical activity 5 or more times per week, and only 12 percent of the population exercise 3 or more times a week at the more vigorous level necessary to improve cardiorespiratory fitness. Nearly 25 percent of adults report no leisure-time physical activity, and the prevalence of sedentary behavior increases with advancing age.

Introduction to *Physical Activity and Health: A Report of the Surgeon General*

— Donna E. Shalala, Secretary of Health and Human Services, July 1996

... A regular, preferably daily regimen of at least 30-45 minutes of brisk walking, bicycling, or even working around the house or yard will reduce your risks of developing coronary heart disease, hypertension, colon cancer, and diabetes. And if you're already doing that, you should consider picking up the pace: this report says that people who are already physically active will benefit even more by increasing the intensity or duration of their activity.

... We have found that 60 percent—well over half—of Americans are not regularly

active at all. For young people—the future of our country—physical activity declines dramatically during adolescence. These are dangerous trends. We need to turn them around quickly, for the health of our citizens and our country.

We will do so only with a massive national commitment . . . Families need to weave physical activity into the fabric of their daily lives. Health professionals, in addition to being role models for healthy behaviors, need to encourage their patients to get out of their chairs and start fitness programs tailored to their individual needs. Businesses need to learn from what has worked in the past and promote worksite fitness, an easy option for workers. Community leaders need to reexamine whether enough resources have been devoted to the maintenance of parks, playgrounds, community centers, and physical education. And the media and entertainment industries need to use their vast creative abilities to show all Americans that physical activity is healthful and fun—in other words, that it is attractive, maybe even glamorous!

Daily constitutional: Make it two miles

—*Boston Globe*, January 8, 1998, by Richard A. Knox

Simply walking a couple of miles a day can sharply reduce older men's risk of death from all causes, including cancer and heart disease, according to a study published today.

Researchers compared the walking habits of 707 retired men in Honolulu between the ages of 61 and 81, none of them smokers.

Over a 12-year period, 43 percent died among the group who walked less than a mile a day. Among those who walked at least 2 miles a day, only 22 percent died.

The pattern held after researchers accounted statistically for other risk factors, such as high cholesterol levels, obesity, high blood pressure, alcohol consumption and diet.

Cancer death rates were also cut in half by the 2-mile-a-day habit. About 6 percent of those who walked that much died of cancer over the 12-year period, versus 13 percent among those who walked less than a mile daily.

Deaths from heart disease and stroke were 66 percent lower among the two-milers.

Few studies have been done on the benefits of such low-level exercise among older people. A 1993 report from the long-running Harvard Alumni Study found a less pronounced reduction in overall mortality, but it included smokers, non-retired men, and those not physically capable of long walks.

“Low-intensity activity is likely to benefit the health of the elderly,” the researchers, from universities in Virginia, Minnesota and Hawaii as well as various federal agencies, wrote in this week's *New England Journal of Medicine*.

Besides, they added, it may be easier to get people to take long walks than to get them to do more strenuous exercise.

Exercise cuts cancer risk, study finds: A one-hour daily walk is suggested as a deterrent for colon disease

—*Boston Globe*, July 14, 1997, by Ira Dreyfuss

Washington—A daily walk may cut a woman's risk of colon cancer in half, a new study finds.

“Increasing physical activity levels may be an effective approach for reducing the burden of colon cancer in our society,” Harvard researchers wrote in the report, published in the current *Journal of the National Cancer Institute*.

Walking at a normal or brisk pace for one hour a day is associated with a 46 percent reduction in risk of the cancer in women in the United States, the study said. Women who exercise only half as much can still reduce their risk by a quarter, said Dr. Graham A. Colditz, the study's senior author.

The findings add to the reasons, including reduced risk of heart disease, for women to exercise more, Colditz said. "Our data are sufficient, in the context of everything else, to support the recommendation that women increase their activity," he said.

The findings are based on 1986-92 data from the Nurses' Health Study, a leading database of women's health. The researchers analyzed activity levels and other data of 67,802 participants every two years.

The study computed the amount of energy spent in activities and noted 212 cases of colon cancer among the study participants. Walking was the most common activity, reported by 70 percent of the participants.

Women in the upper 20 percent in energy expenditure per week, which required at least brisk walks totaling more than seven hours, had 54 percent less colon cancer risk than did women in the bottom 20 percent, the study found. As the amount of energy used fell, so did the amount of risk reduced.

The benefit is similar to what had already been found in men, Colditz said.

America's kids are more inactive than ever: Walking can make a healthy difference

— by Emily Smith, University of North Carolina Highway Safety Research Center, for the Partnership for a Walkable America

Providing walking places that are safe and accessible for our children can do more than just prevent tragic injuries and deaths.

According to Mark Fenton, editor of Boston-based *Walking Magazine*, if children walk regularly, it can also improve their health and set patterns that will carry them into adulthood.

"These days, in the age of video games and VCRs, children are heavier and more inactive than ever," said Fenton, who is a member of the Partnership for a Walkable America—a coalition of private, state and federal organizations united together with the common cause of increasing public awareness about the benefits of walking.

"We're essentially socializing kids to be inactive," he said. "Kids naturally want to be active. They run around and squeal and make noise and what do we do when we start them in school? One of the first things we say is 'Sit down and don't stand up or wiggle unless you're called upon. Only run around during recess or gym.' Then in life, as they get older, we only ask them to move around *less*."

"The fundamental absurdity is that when schools are low on money, what's the first thing they cut?" Fenton asked.

"Physical education and sports," he said, answering his own question.

"Well, I understand that outfitting a football team is costly, but interestingly enough, taking kids for a walk costs nothing," he said. "If you did institute a walking program in the schools, you could have the walks be part of biology class or sociology class where the kids could look at their communities."

Inactive Lifestyles May Begin in Youth

Obesity is a problem in the United States, according to the National Center for Health Statistics.

According to their data, about one in every three Americans, ages 35 through 45, was obese, as of 1991. The scary part is that this figure is 36 percent higher than it was in 1962. “This obesity seems to be related to physical inactivity,” Fenton said, “and the seeds of the problem we’re seeing may well be sown in youth.”

If the “Youth Risk Behavior Survey” conducted in 1990 by the Centers for Disease Control and Prevention in Atlanta (CDC) is any indication, that may well be the case. The results from this survey indicate that teens spend more time watching television than they do exercising.

CDC, which is a member of the Partnership for a Walkable America, surveyed 11,631 U.S. high school students, grades 9 through 12, and found that just 12.37 percent of the students engaged in 20 minutes of vigorous physical activity three or more times a week. By contrast, about 70 percent of the students surveyed said they watched at least an hour of television every school day. About 35 percent of those surveyed said they watched 3 hours or more of television on each school day.

The survey also found that 43.7 percent of the boys and 52 percent of the girls were not even enrolled in a physical education class.

This inactivity has had repercussions on America’s kids, said Dr. Michael Pratt of CDC. “There was a huge increase in childhood obesity between 1980 and 1990,” said Dr. Pratt, who is the acting chief for the Physical Activity and Health Branch in the Division of nutrition and Physical Activity at CDC.

“Childhood obesity has been relatively stable through the 1960s and 1970s, but now it has become a really critical problem,” he said.

Dr. Pratt attributed the rising number of overweight kids to the increasing amount of high-calorie junk foods kids ingest as well as to the overall decrease in physical activity among children.

“Physical education classes are getting fewer and farther between,” Dr. Pratt said.

“Illinois is now the only state that has mandatory physical education classes for kids grades kindergarten through 12.”

The problem is so alarming that this year CDC joined forces with doctors and researchers from across the United States to form “The Physical Activity and Nutrition Program for Adolescents”—known as the “PAN” program. In coordinating this program, CDC is working in conjunction with Emory University’s Nutrition and Health Sciences Center, the International Life Sciences Institute and the National Foundation for the Centers for Disease Control and Prevention.

“The PAN program is a public/private partnership whose goal is to get at the underlying reasons behind why there is such a problem with adolescent obesity and then develop interventions to combat the problem,” Dr. Pratt said.

Exercise (including walking) can improve health

According to Fenton, it is not just American children and adolescents who are inactive. Fenton says that adults in the United States are more sedentary than ever as well.

“Americans are less active than they ever have been,” he said. “Twenty-five percent of our population is essentially sedentary, fifty-five percent are only sporadically active, and only about ten percent of the population exercises regularly.”

This lack of exercise is killing us, say researchers at the CDC and the American College of Sports Medicine. According to a joint statement they issued this year, approximately 250,000 deaths a year in the United States can be attributed to physical inactivity.

The good news from these organizations is that 30 minutes daily of moderate exercise can promote long-term health.

“Walking is a good way to get that exercise,” Fenton said. “There are dozens of ways that a 30-minute walk can be fit into your day. It doesn’t have to be putting on lycra tights and going out and doing power walking.

“We encourage people to make a walk part of their daily life—to intentionally keep a post office box and walk down there to get the mail, or walk to the video store or to the place where you get your milk or newspaper,” he said.

And kids? How do we get them to walk more?

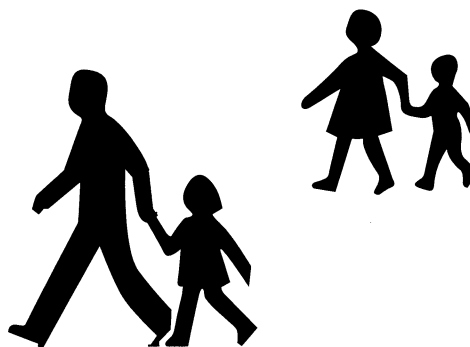
“Role modeling is a very important thing,” Fenton said. “If you’re the kind of parent who actually suggests to their kid that you need not drive the car everywhere and that maybe they could walk back from band rehearsal with a couple of friends instead of you going to get them, that can help set the tone a lot.”

Start a school walking program

Fenton also suggested parents in neighborhoods join together and approach their schools about starting a walking program. He said parents could even organize a “walk to school” week, with different parents from the neighborhood volunteering to be a little late for work one day so as to serve as a volunteer crossing guard in their community for the event.

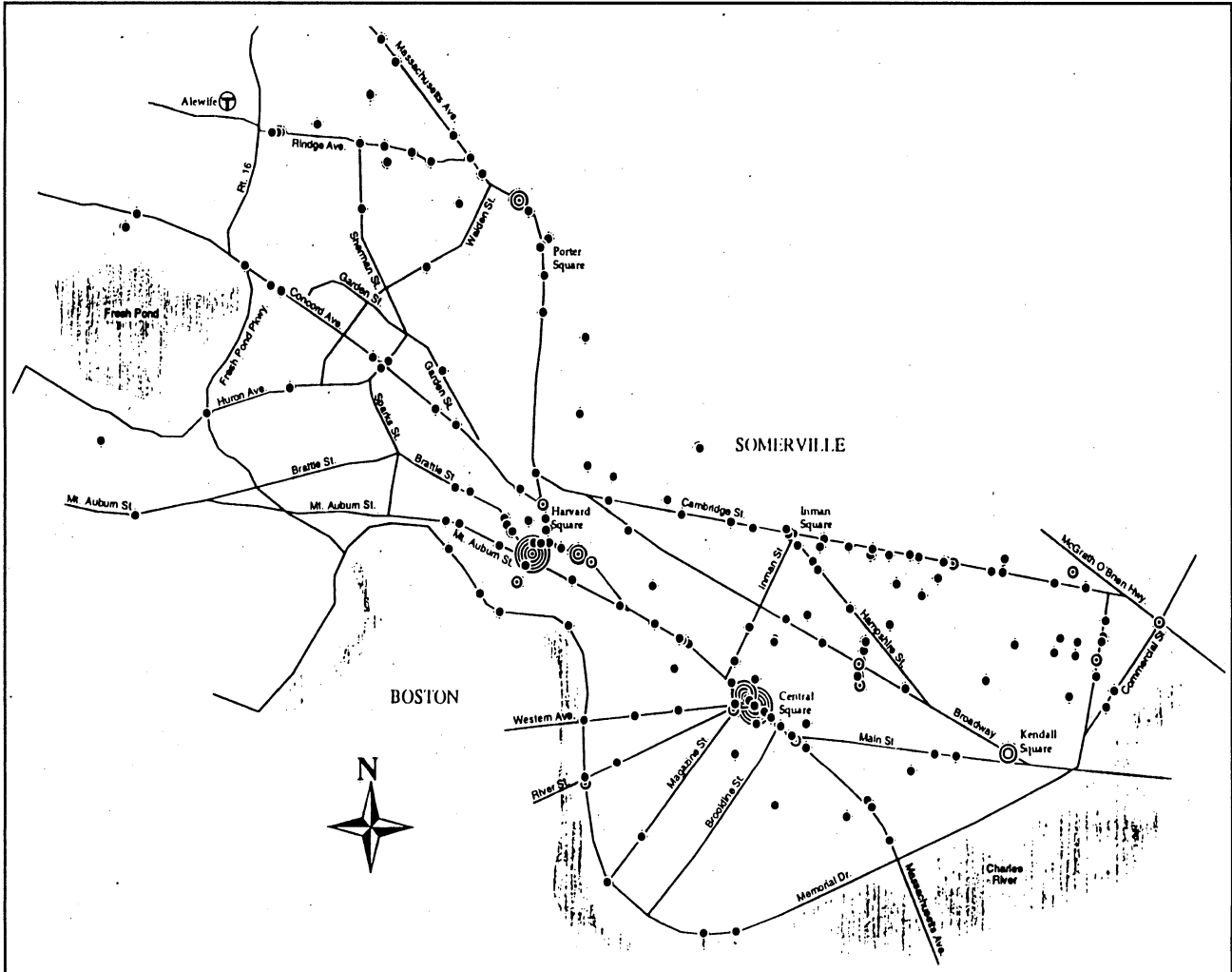
He added that local police could come into the school the week before the program to talk to the kids about pedestrian safety and that the students could make posters announcing the event to hang in their community.

“The point is, there’s a lot that parents and schools can do,” Fenton said. “A parent can walk into a school and say, ‘I’d like to lead a walk’, and if it’s a well thought out program, they’d be delighted.”



Appendix XIV-Pedestrian-Vehicular Crashes with Automobiles in Cambridge

Pedestrian Crashes with Automobiles within the City of Cambridge, as Reported for the Years 1989, 1990, & 1991
(Central Transportation Planning Staff)



LEGEND	
○	Fatal pedestrian accident
●	One pedestrian accident
⊙	Two pedestrian accidents at this location
⊗	Three pedestrian accidents at this location
⊘	Four pedestrian accidents at this location
⊙	Five pedestrian accidents at this location
⊘	Six pedestrian accidents at this location

Appendix XV-Cambridge Travel Lane Widths

FACILITY	STANDARD WIDTH	MINIMUM WIDTH
Vehicular Travel Lane	11 ft. (3.4 meters)	10'8" (3.25 m)
		10' (3 m) allowed in some circumstances
		9'10" (2.9 m) on local residential streets
Wide Travel Lane (with edge lines)	13-15 ft. (3.9-4.5 m)	N/A
Bicycle Lanes	6 ft. (1.8 m)	5 ft. (1.5 m) against parking
		4 ft. (1.2 m) against curb
Parking Lanes	8 ft. (2.4 m)	7'6" (2.3 m) preferred
		7' (2.1 m) allowed in some circumstances
		7'3" (2.2 m) residential streets preferred; 7' (2.1 m) permitted in some circumstances

Figure 1: Cambridge standards for lane widths.

BIBLIOGRAPHY

Note: Additional references along with information on how to obtain publications, internet resources, etc. can be found on the City of Cambridge web site at <http://www.ci.cambridge.ma.us/~CDD/envirotrans>

Anderson, Stanford, ed. *On Streets*. Cambridge: MIT Press, 1986.

Appleyard, Donald. *Livable Streets*. Berkeley: U. of California Press, 1981.

Bicycle Federation of America. *ProBike ProWalk 98 Resource Book* (conference proceedings). 1998.

Bowman, Brian L., John J. Fruin, and Charles V. Zegeer. *Handbook on Planning, Design, and Maintenance of Pedestrian Facilities*. U.S. Dept. of Transportation, Federal Highway Administration Report No. FHWA-IP-88-019. 1989.

Burrington, Stephen H., "Restoring the Rule of Law and Respect for Communities in Transportation." *Environmental Law Journal* 5: 3. (1996).

Burrington, Stephen, and Veronika Thiebach. *Take Back Your Streets*. Boston: Conservation Law Foundation. 1995.

CART - Citizens Advocating Responsible Transportation. *Traffic Calming - The Solution to Urban Traffic and a New Vision for Neighborhood Livability*. Oregon: Sensible Transportation Options for People (STOP). 1993.

Centers for Disease Control and Prevention. *Physical Activity and Health: A Report of the Surgeon General*. Atlanta: CDC. 1999.

City of Portland, Offices of Transportation, Transportation Engineering and Development, Pedestrian Transportation Program. *Portland Pedestrian Master Plan*. Portland: City of Portland. June, 1998.

Conservation Law Foundation. *Road Kill: How Solo Driving Runs Down the Economy*. Boston: CLF. May 1994.

Conservation Law Foundation. *City Routes, City Rights: Building Livable Neighborhoods and Environmental Justice by Fixing Transportation*. Boston: CLF. June 1998.

Corless, James, et al. *Mean Streets 1998*. Washington, D C: Surface Transportation Policy Project. 1998.

County Surveyors Society. *Traffic Calming in Practice*. London: Landor Publishing. 1994. (Available in the United States from the Institute of Transportation Engineers)

Denmark Ministry of Transport. *An Improved Traffic Environment: A Catalogue of Ideas*. Copenhagen: Traffic Safety and Environment, Road Directorate. 1993.

Denmark Ministry of Transport. *Speed Management: National Practice and Experiences in Denmark, the Netherlands and in the United Kingdom*. Copenhagen: Traffic Safety and Environment, Road Directorate, Report no. 167. 1999.

Devon County Council Engineering and Planning. *Traffic Calming Guidelines*. Devon County Council (UK). 1991.

Dreyfuss, Ira. "Exercise Cuts Cancer Risk, Study Finds: A One-hour Daily Walk Is Suggested as a Deterrent for Colon Disease." *Boston Globe*. July 14, 1997.

Engwicht, David. *Reclaiming Our Cities and Towns: Better Living with Less Traffic*. Philadelphia: New Society. 1992.

Florida Dept. of Transportation, Safety Office. *Pedestrian Planning and Design Manual*. 1992.

Gehl, Jan. *Life Between Buildings*. New York: Van Nostrand Reinhold. 1987.



- Homburger et al. *Residential Street Design and Traffic Control*. Englewood Cliffs: Prentice Hall. 1989.
- Institute of Transportation Engineers. *Traffic Safety Toolbox: A Primer on Traffic Safety*. Washington: ITE. 1999.
- Institute of Transportation Engineers, Transportation Planning Council Committee. *Traditional Neighborhood Development: Street Design Guidelines*. Washington: ITE. 1997.
- Jacobs, Allan. *Great Streets*. Cambridge: MIT Press. 1994.
- Jacobs, Jane. *The Death and Life of Great American Cities*. New York: Random House. 1961.
- Knox, Richard A. "Daily Constitutional: Make It Two Miles." *Boston Globe*. January 8, 1998.
- Kunstler, James. *The Geography of Nowhere: The Rise and Decline of America's Man-made Landscape*. New York: Simon and Schuster. 1993.
- Moudon, Anne Vernez, ed. *Public Streets for Public Use*. New York: Van Nostrand Reinhold. 1987.
- Northwestern University Traffic Institute. *Program of Instruction for Pedestrian Planning and Design Workshop*. Evanston: Northwestern University. 1997.
- Oregon Dept. of Transportation Bicycle and Pedestrian Program. *Oregon Bicycle and Pedestrian Plan*. Salem, OR: Oregon DOT. 1995.
- Preusser, D.F., W.A. Leaf, K.B. Debartolo, and R.D. Blomberg. *The Effect of Right-turn-on-red on Pedestrian and Bicyclist Accidents*. U.S. Dept. of Transportation. DOT-HS-6-01411. October 1981.
- Project for Public Spaces. *The Effects of Environmental Design on the Amount and Type of Bicycling and Walking*. U.S. Dept. of Transportation. FHWA-PD-93-037 (National Bicycling and Walking Study 20). April 1993.
- Richards, Brian. *Transport in Cities*. London: Architecture Design and Technology Press, 1990.
- Sanders, Stewart. *An Alewife Area Ecology Guide*. Cambridge: Mystic River Watershed Assoc. 1994.
- Siegel, Paul Z., Robert M. Brackbill, and Gregory W. Heath. "The Epidemiology of Walking for Exercise: Implications for Promoting Activity among Sedentary Groups." *American Journal of Public Health*. May, 1995.
- Smith, Emily. "America's Kids Are More Inactive Than Ever." Washington: Partnership for a Walkable America. N.D.
- Smith, Steven A. "Considering the Pedestrian: Site Planning in the Suburbs." *TR News*. Jan.-Feb. 1992.
- Sutton, F.B. *Cambridge Reconsidered: 3 Centuries on the Charles*. Cambridge: MIT Press. 1976.
- U.S. Dept. of Health and Human Services. *Healthy People 2000: National Health Promotion and Disease Prevention Activities*. Washington: USDHHS. 1990.
- U.S. Dept. of Transportation, Federal Highway Admin. *Flexibility in Highway Design*. FHWA-PD-97-062. Washington: USDOT. 1997.
- U.S. Dept. of Transportation, Federal Highway Administration. *The National Bicycling and Walking Study: Transportation Choices for a Changing America* (final report and 24 case studies). FHWA-PD-94-023. Washington: USDOT. 1994.

- U.S. Dept. of Transportation, Federal Highway Administration. *Planning, Design, and Maintenance of Pedestrian Facilities*. Washington: USDOT. 1989
- U.S. Dept. of Transportation, Federal Highway Administration. *Safety Effectiveness of Highway Design Features Volume VI: Pedestrians and Bicyclists*. Washington: USDOT. 1991.
- U.S. Dept. of Transportation, Federal Highway Administration. *Study Tour Report for Pedestrian and Bicyclist Safety in England, Germany and the Netherlands*. FHWA-PL-95-006. Washington: USDOT. October 1994.
- U.S. Dept. of Transportation, National Highway Institute, Federal Highway Administration and National Highway Traffic Safety Administration. *Pedestrian and Bicyclist Safety and Accommodation*. FHWA HI-96-028. Washington: USDOT. May 1996.
- U.S. Dept. of Transportation, National Highway Traffic Safety Administration. *Traffic Safety Facts 1996: A Compilation of Motor Vehicle Crash Data from the Fatality Analysis Reporting System and the General Estimates System*. Washington: USDOT. 1997.
- United States Department of Transportation and Rails to Trails Conservancy, *Improving Conditions for Bicycling and Walking: A Best Practices Report*. Washington: USDOT. January 1998.
- Washington State Energy Office. *Municipal Strategies to Increase Pedestrian Travel: Final Report*. 1994.
- Whyte, William H. *City: Rediscovering the Center*. New York: Anchor. 1988.
- Whyte, William H. *Social Life of Small Urban Spaces*. Washington, DC: Conservation Foundation. c1980.
- Zador, Paul, Jack Moshman, and Leo Marcus. "Adoption of Right Turn on Red: Effects on Crashes at Signalized Intersections." *Accident Analysis and Prevention*. 14: 3 (1984).



CITY OF CAMBRIDGE
CAMBRIDGE, MASSACHUSETTS 02139

TEL. 349-4300
FAX. 349-4307



EXECUTIVE DEPARTMENT
ROBERT W. HEALY
City Manager

RICHARD C. ROSSI
Deputy City Manager

March 8, 2001

To the Honorable, the City Council

I am pleased to provide you with a copy of the Cambridge Pedestrian Plan, which describes the role of walking in Cambridge, current City policies related to pedestrians, and the direction of future pedestrian improvements.

Creating a pedestrian plan for the city was a provision of the 1992 Vehicle Trip Reduction Ordinance. Developing the plan involved discussions over a three-year period with various City departments, members of the Cambridge Pedestrian Committee, and people in the community to reach a consensus on policies and processes. The plan is intended to help ensure that developments and roadway projects are pedestrian-friendly, to make sure that all relevant City departments are aware of current pedestrian policies, and to give residents information to help them participate effectively in community transportation planning processes. The plan is in loose-leaf form because we intend it to be a working document that will evolve over time.

I hope you will find it useful. Please contact Rosalie Anders in the Community Development Department at X4604 if you would like additional copies.

Very truly yours,

Robert W. Healy
City Manager

1075