STREETSCAPE GUIDELINES FOR BOSTON'S MAJOR ROADS

CITY OF BOSTON
Mayor Thomas M. Menino

BOSTON TRANSPORTATION DEPARTMENT
Commissioner Andrea d'Amato

July 1999 Second Edition

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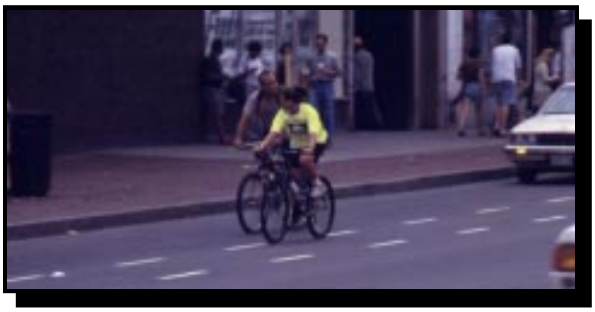

Boston Transportation Department
One City Hall Plaza, Room 721
Boston, MA 02201

CITY OF BOSTON · MASSACHUSETTS

May 1999

To the Citizens of Boston:

We are proud to present to you a report entitled "Streetscape Guidelines for Boston's Major Roads." This report has been prepared for the public, community leaders, public officials, and private developers throughout the Boston region to guide decisions in the design of our streets. The guidelines address fundamental quality of life issues such as safety, accessibility, and public health. They provide a framework that encourages the development of Boston's streets as vital places for residents, tourists, shoppers, and commuters.

The objective of these Streetscape Guidelines is to encourage the creation of an urban environment that supports the co-existence and equitable sharing of various modes of travel. As a result, seamless connections will be reinforced that promote balanced and efficient transportation systems. In addition, the guidelines will inform the community-based design process related to capital improvements slated for Boston's roads.

It is our hope that the Streetscape Guidelines in this report will be a helpful step toward stimulating collaboration and creating transportation partnerships. We are confident that their implementation will enhance Boston's overall transportation system and public environment.

We would like to thank the many citizens, advocacy groups, and agency personnel who have contributed to providing materials for this study and in reviewing its contents. This report represents an exciting opportunity to enhance Boston's unique and historic street network and encourage the compliance of future projects.

Sincerely,

Thomas M. Menino
Mayor of Boston

Sincerely,

Andrea d'Amato
Commissioner

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Streetscape Guidelines for Boston's Major Roads

I. OVERVIEW

1. Creating a Multimodal Street Environment

This document contains streetscape guidelines for construction or reconstruction of Major Roads in Boston. The purpose of these guidelines is to encourage the creation of an urban environment where different modes of travel can co-exist, providing seamless connections, and reinforcing each other to develop balanced and efficient transportation systems. They address fundamental quality of life issues such as safety on the street, connectivity to work and home, access to transportation options, and the creation of a clean and comfortable public environment.

These guidelines have been developed to address the equitable sharing of the public right-of-way of Boston's Major Roads for pedestrians, automobiles, carpools and vanpools, trucks and commercial vehicles, bicycles, and transit vehicles like buses and street cars. The public right-of-way is the publicly owned area between property lines. The guidelines will inform the community-based design process related to anticipated capital improvements projects slated for Boston's Major Roads.

They provide a preliminary design framework which:

- Improves safety on the streets for pedestrians, bicyclists, and for those in motor vehicles.
- Encourages a multimodal use of Boston's streets, including transit, carpools, vanpools, bicycling and walking.
- Optimizes the use of the city's limited street capacity, and seeks to balance competing uses.
- Develops a street environment which is a vital place for residents, tourists, shoppers, and commuters.
- Is in compliance with ADA (Americans With Disabilities Act) requirements.
- Ensures safe and efficient mobility while providing adequate access.
- Supports goods and freight movement crucial to economic development.
- Recognizes different conditions during AM and PM peak and mid-day and weekend use.
- Allows for maintenance, including street sweeping and snow removal operations.
- Minimizes the undesirable impacts of transportation facilities.
- Encourages art in the public right-of-way.

2. Defining Boston's Major Roads

The Streetscape Guidelines in this document are intended for application for Boston's "Major Roads." While recognizing that each street is ultimately unique, the following discussion on the classification of streets is useful to differentiate a "major road" relative to the complete network of streets in Boston.

The standard AASHTO (American Association of State Highway and Transportation Officials) classification identifies four main categories of roadways: regional thoroughfare, arterial, collector, and local. The primary function of thoroughfares is the movement of through traffic. Direct access to adjacent land uses is extremely limited. Many are high capacity radial routes that connect large volumes of traffic entering and leaving the downtown core to the regional highway system. Examples include Interstate 93, Arborway and VFW Parkway. At the other end of the spectrum are local roads. They are mostly neighborhood streets intended for immediate access to residential uses and are characterized by low traffic volumes and speeds. They are usually not wider than two lanes and are not intended for through traffic. Both thoroughfares and local roads, while having a significant presence in Boston's street network, are not the focus of these guidelines.

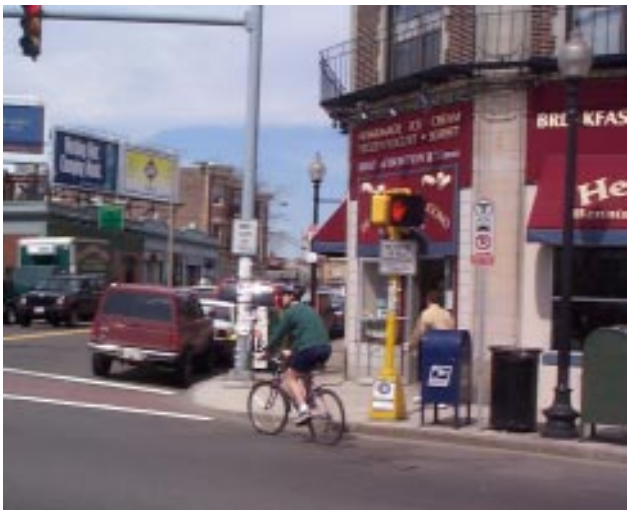
"Major Roads" refers in general then to the second and third category of roadways: arterial and collector. Or, conversely, those roads that are not thoroughfares or local roads. For purposes of these guidelines, the latter definition is the more useful, as it is broad and allows for the incorporation of Boston's complex and unique street network.

The further classification of Boston's Major Roads, or their segments, must take into account a variety of factors. The roadway categories mentioned at the outset of this section are primarily based on automobile and truck volumes and access. Road network hierarchies must also consider pedestrian, bicycle, and transit characteristics. In general, recreational pedestrian and bicycle travel increases as automobile and truck volumes decrease. A street with surface light rail may not be compatible with large automobile or truck volumes. Additionally, an individual street may change character in different neighborhoods due to variations in configuration.

Additional factors that influence road network hierarchies include:

1. Density and type of adjoining land uses;
2. Scale and character of public environment;
3. Connections to activity nodes; and
4. Linkages to overall street/highway network.

3. The Design of Streets (Roadways and Sidewalks)



Streets are not only vehicular thoroughfares that provide transport of goods, services and people from one destination to another, but are places to gather, window shop or pause to survey life passing by. Adequate space should be provided for each transportation mode and integrated with urban design elements such as landscaping, lighting and street furniture, to create a comfortable and safe environment. A quality street design addresses each of these uses and determines, through the necessary planning processes of professional design and public citizen review, what mix of these uses is to be part of a particular street, the combination of which influences its character.

Streets come in all sizes, proportions and uses. The character of a street is dependent on the composition of various uses within the right-of-way space and the types of structures that define the street. Understanding the attributes of the street: the neighborhood that it is located in, the functionality of its uses, the connections that it uniquely provides, the scale and density of the surrounding built environment, and what it can physically accommodate, is an important part of designing a street. The purpose of these guidelines is not to be prescriptive with respect to setting out a formula to achieve a perfect street, but is rather to provide an outline of policy imperatives, minimum and maximum recommended dimensions and clearances, standards of traffic regulation, that are agreed upon as necessary elements of design to create a safe and efficient street.

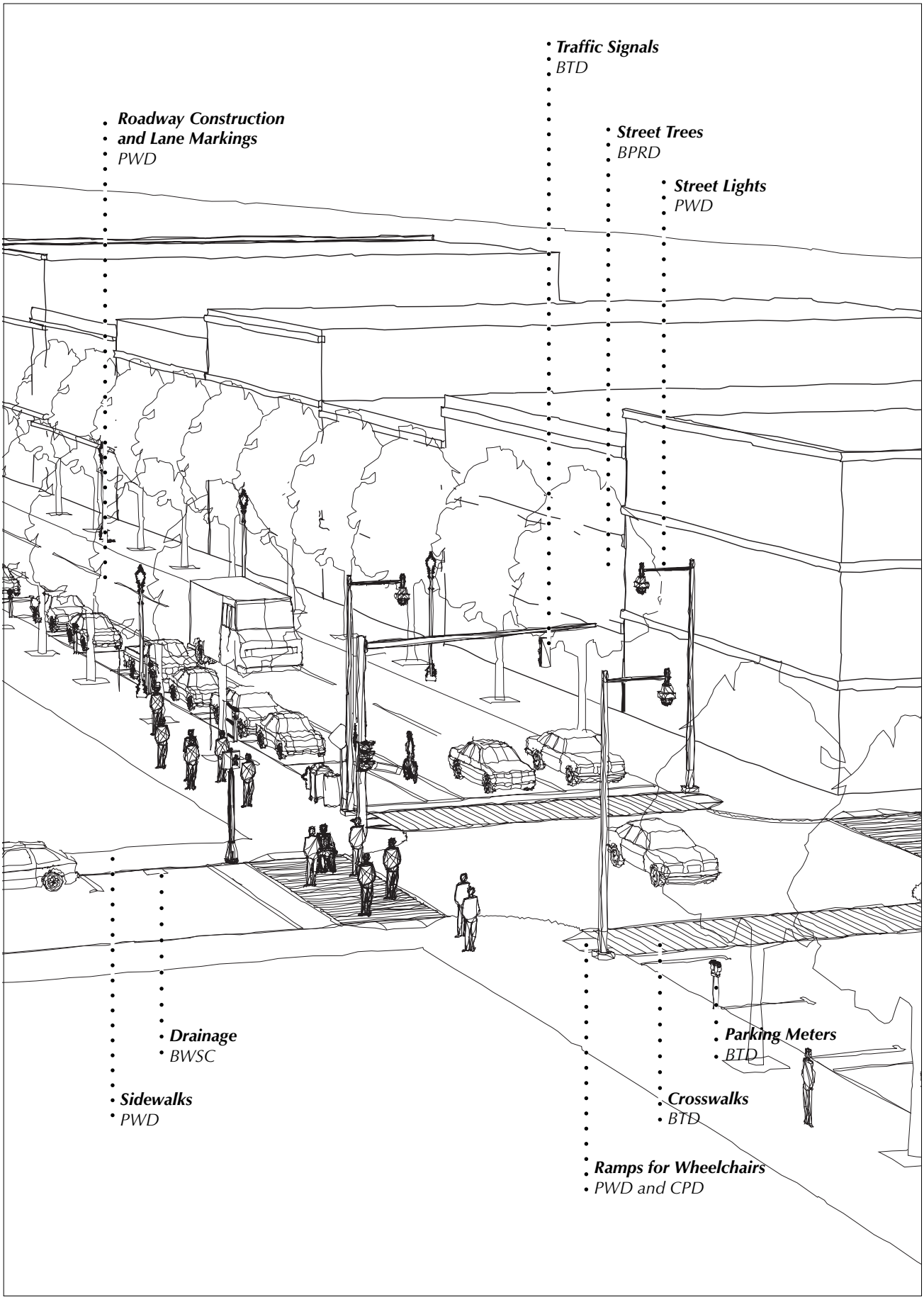
Not all streets can serve all the uses that would be preferred for an ideal multimodal system. A case by case analysis, as part of a larger transportation plan for the city, is absolutely necessary to better assure that a street design balances the needs of the larger network of which it is a part and addresses the specific needs and aspirations of the surrounding neighborhood or district.

4. Incorporating the Local Context

The use of the Streetscape Guidelines outlined in this report will result in consistent base-case streetscape designs that can be further developed to respond to the opportunities and constraints presented by the local context for each street. Abutting land uses, surrounding street networks, neighborhood character, commercial district needs, differences in right-of-way widths between blocks, are all critical components of the urban context which may suggest variations from the preferred Streetscape Guidelines. Ultimately, these guidelines must be applied in a manner that balances the particular priorities of the neighborhoods through which Boston's Major Roads pass with commuting traffic and other regional needs.

Key to the incorporation of the local context is a comprehensive analysis which brings to light the particulars of existing conditions as well as a street's potential. The following is a provisional list of factors contributing to the street environment which should be evaluated when designing a street. The goal of this list is to initiate a discussion leading to an understanding of the streets' functional and civic attributes.

- Vehicle, pedestrian, and bicycle volumes: Existing/anticipated flows along the right-of-way.
- Transit services: Subway stations, major bus or trolley routes.
- Modal deficiencies: Modes of travel that are constrained along the right-of-way.
- Pedestrian and vehicular destinations: Existing or anticipated activity generators along the street, whether office, retail, hotel, tourist, housing, or parkland.
- Handicap Access: Ramps, adequate widths, sight lines, and transitions between surface finishes. Handicap access should be on an unobstructed clear path of travel and on an even surface.
- Pedestrian and vehicle space: Sufficient sidewalk area for the level of pedestrian volume and sufficient lanes for vehicles on the street.
- Vehicle speeds: Existing or desired vehicular speeds on the street.
- Adjoining buildings: Scale, density, and setback distances of buildings bordering the streets.
- Significant citywide facility: Pedestrian generators that draw from a citywide constituency like theaters, sports facilities, shopping centers, etc.
- Historical significance: Historic districts or important historic buildings and landmarks.
- Significant views: Views along the street to important destinations and landmarks.
- Landscaping: Street trees and other plantings.

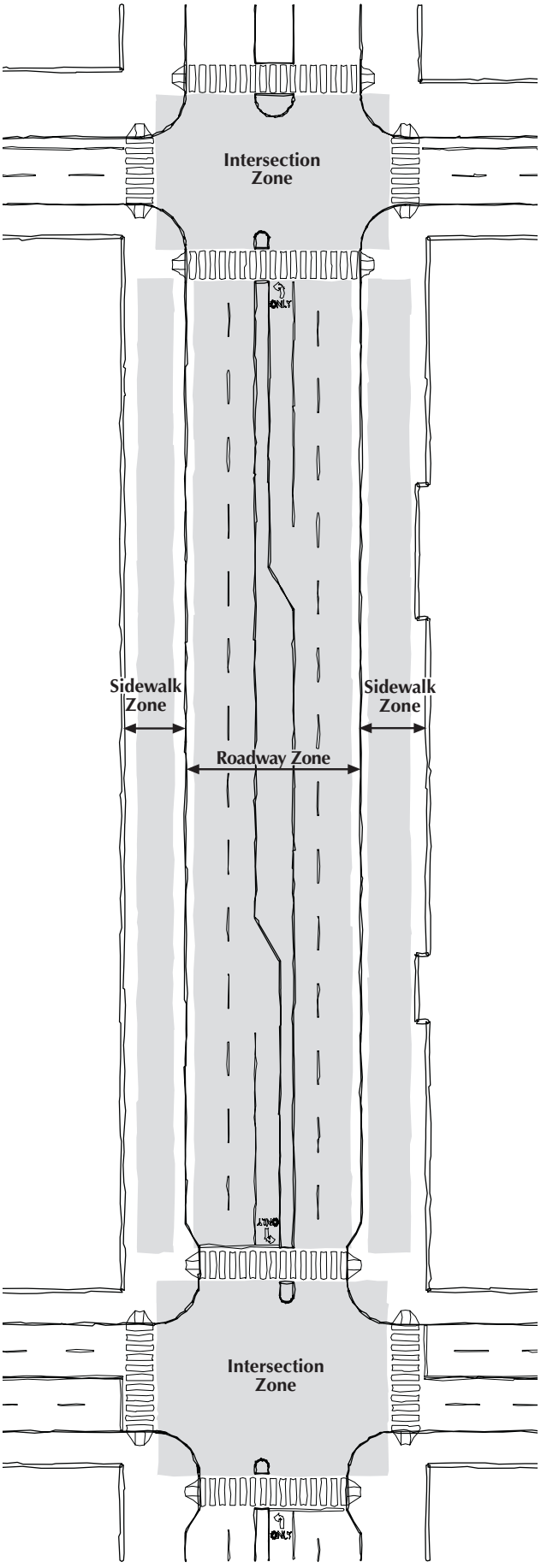

Traffic Signals
BTD
Roadway Construction and Lane Markings
PWD
Street Trees
BPRD
Street Lights
PWD
Drainage
BWSC
Parking Meters
BTD
Sidewalks
PWD
Crosswalks
BTD
Ramps for Wheelchairs
PWD and CPD

City of Boston Street Elements Maintenance and Management Responsibilities

Street Element	*Agency*
Regulatory Signs Directional Signs Traffic Signals Pedestrian Crossing Signals Roadway Lane Markings Parking Meters Crosswalks	Boston Transportation Department (BTD)
Sidewalks Roadway Construction Ramps for Wheelchairs Street Lights Banners	Boston Public Works Department (PWD)
Street Trees and Plantings	Boston Parks and Recreation Department (BPRD)
Drainage	Boston Water and Sewer Commission (BWSC)

City of Boston Commissions Reviewing Street Elements

Commission	*Function*
Public Improvement Commission (PIC)	Reviews and approves all changes to street elements in or affecting the public right-of-way.
Boston Landmarks Commission (BLC)	Reviews and approves street reconstruction if it is adjacent to designated landmarks. National Register review may be required. Review and approval is required in local historic districts: Beacon Hill, Back Bay, South End, Bay Village, Bay State Road/Back Bay West, St. Botolph area, Mission Hill Triangle.
Boston Civic Design Commission (BCDC)	Reviews and recommends changes to design proposals that impact the public realm in coordination with BRA (Boston Redevelopment Authority) staff review.
Boston Parks Commission	Reviews and approves street reconstruction within 100 feet of a public park and proposals for street trees and plantings within all public rights-of-way.
Commission for Persons with Disabilities (CPD)	Reviews street designs to ensure that the city, state and Federal policies and regulations have been adhered to.



Organization of Streetscape Guidelines

The purpose of these guidelines is to provide for the equitable sharing of the public right-of-way between motor vehicles, pedestrians, bicycles, and transit. Rather than discuss each mode in isolation, these guidelines are organized by "zones" that make up the public right-of-way. Accordingly, in subsequent chapters are:
(II) Roadway Design: Accommodating Motor Vehicles, Bicycles and Transit; (III) Sidewalk Design: The Pedestrian Realm; and (IV) Intersection Design: Interaction between Modes of Travel. This organization provides for parity between modes when considering the principal physical or spatial elements of the street environment: roadway, sidewalk and the coming together of all users at their intersections. All guidelines are closely inter-related with each other, and must be interpreted as part of a larger system.

II. ROADWAY DESIGN: ACCOMMODATING MOTOR VEHICLES, BICYCLES AND TRANSIT

Goals:

- Optimize the use of available roadway width to justly accommodate all users: motor vehicles, bicycles and transit.
- Balance safety and congestion.
- Maintain an acceptable level of service.
- Where possible, separate the modes of travel on the roadway by providing dedicated lanes.
- Ensure lane continuity and widths across intersections.
- Design the roadway to support efforts to discourage speeding.

Streetscape Guidelines:

1. Roadway Lanes and Medians

A. The number of lanes should be no more than required to accommodate all user types.

- Volume/Capacity ratios for roadways between intersections should be considered in determining the number of lanes (see also page 24 - 1. Signalization, Section A).

- In some situations the number of lanes between intersections may be less than the number at intersections as the latter may need turning lanes.
- Special consideration should be made to accommodate facility related vehicular and pedestrian flows, for example near sports and theater facilities.

B. Designated and marked lanes should be the preferred means of accommodating bicycles.

- Lanes should be continuous to the extent possible. For example, it is preferred that bicycle lanes are provided for most of the length of a particular arterial than not at all - interrupted bicycle lanes are better than no bicycle lanes.
- Where there are dedicated bicycle lanes, bicycle symbols and directional arrows should be stenciled on the pavement. Bicycle lanes cannot be marked on the pavement where they are shared.
- Drain grate crossings should be bicycle-safe and flush with the pavement.

C. High Occupancy Vehicle (HOV) lanes should be considered on high-frequency routes to enhance the speed and reliability of service.

- Exclusive lanes for High Occupancy Vehicles such as buses and streetcars are most useful in identified transit corridors and when integrated with the area's transit network.
- Where High Occupancy Vehicle lanes are provided they should be designed such that they can access sidewalk stops without undue interference with other lanes.

D. Turning Lanes should be considered when analysis determines that it is necessary to maintain an adequate level of service for the intersection, and where there is a high incidence of rear end collisions and accidents.

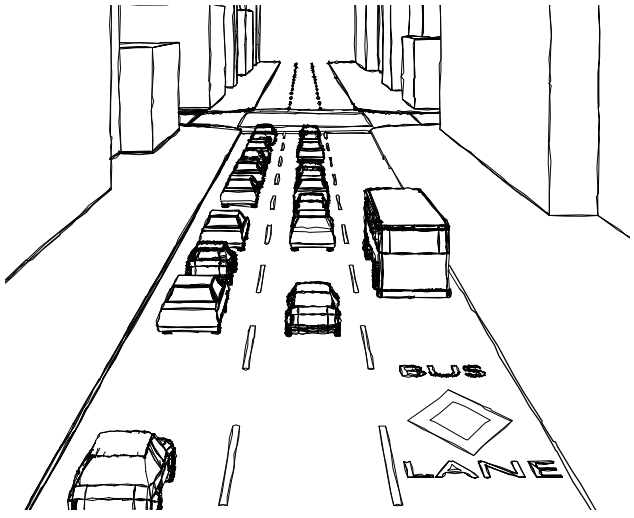
- The length of a turning lane should be minimized without causing cars to queue so that they overflow into travel lanes.

E. Medians should be installed only if there are pedestrian and vehicular safety concerns or as a beautification element to enhance the streetscape.

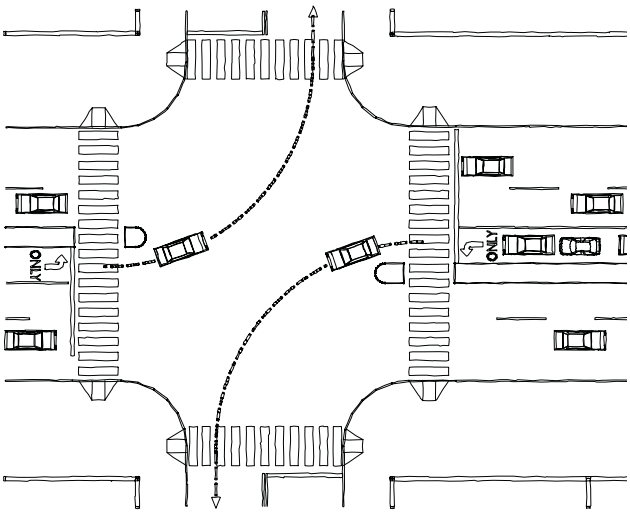
- When medians are provided they should be a minimum of 6 feet (1.8 meters) in order to provide adequate areas of refuge for pedestrians crossing the street.
- Planting is recommended for medians which are greater than 6 feet (1.8 meters) wide. Landscaped medians should be low-maintenance and be equipped with

The number of lanes should accommodate all user types

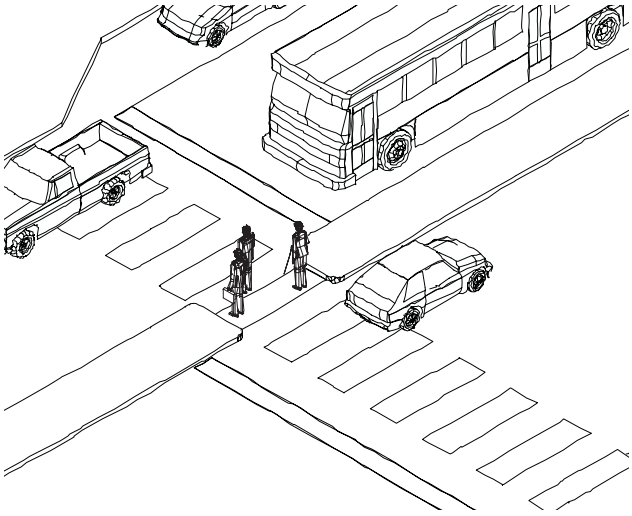

Example of bicycle pavement markings



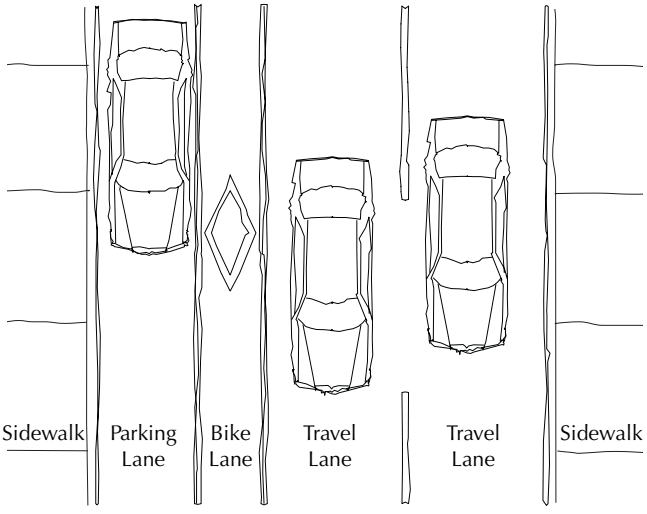
The use of exclusive bus lanes provide more efficient service for transit commuters



Turning lane example



Adequate areas of refuge are important for both comfort and safety



Travel lanes on a one-way street

irrigation systems. Trees may only be feasible where medians are of adequate size (see also page 22 – 4. Landscaping, Sections A and B).

- Flush medians paved with a rough and visually distinguishable material should be considered where medians are required. They provide a more flexible use of street width.
- Contextual issues like adjacent land-uses, length of roadway segment between intersections, and streetscape design must be considered when making median related decisions. For example, a median may be placed in a boulevard and a large sidewalk may be placed in a business district.

2. Travel Lane Widths

A. Travel lanes for straight sections of a roadway should be a minimum of 11.5 feet (3.5 meters).

- According to Massachusetts Highway Department definitions, the minimum width for Urban Arterials is 11.5 feet (3.5 meters) and 11 feet (3.4 meters) for Urban Collectors, with or without a median.

- The above minimum widths are not adequate for curved sections of the roadway. The minimum widths of these curved sections are higher, and is a function of traffic volume, roadway design and design speed.

B. "Shoulders" should be provided along the curb edge.

- The shoulder allows for a safety zone adjacent to curbs and to allow for storage of snow.

C. The preferred roadway design should include dedicated bicycle lanes (for recreational, commuter and work purposes).

- The desired width of a dedicated one-directional bicycle lane is 6 feet (1.8 meters). A minimum of 5 feet (1.5 meters) may be considered based on overall design for a dedicated bicycle lane.
- If the right-of-way is inadequate, then the bicycle lanes should be shared.
- An alternate parallel route should be established only if a bicycle lane cannot be designated or shared on a roadway.
- As an absolute minimum, along all major arterials, when it is not possible to provide a bicycle lane, bicycles should be accommodated by sharing the curb lane of 15 feet (4.6 meters).
- Where High Occupancy Vehicle lanes are provided, consideration should be given to sharing them with bicycles.

3. Parking Lanes, Loading Zones, and Bus Stops

A. Parking lanes should be provided in accordance with neighborhood needs.

- Parking lanes are desirable in neighborhoods or business districts.
- Parking lanes also provide protection for pedestrians from moving vehicles.
- Where handicap parking or loading zones are provided they should be well marked by signs.
- Parking lanes, loading zones, and bus stops should be designed to protect the line-of-sight of pedestrians and motorists at crosswalks.
- "Managed parking" (i.e. parking at off-peak hours) should be considered only when enforcement is possible.
- "Managed parking" lanes should conform to the minimum travel lane width guidelines.

B. Permanent parking lanes should be 8 feet (2.4 meters) wide. If parking lanes are used for loading zones, they should be 10 feet (3.0 meters) wide. Permanent parking lanes should be marked.

C. Adequate curb space should be provided for bus stops.

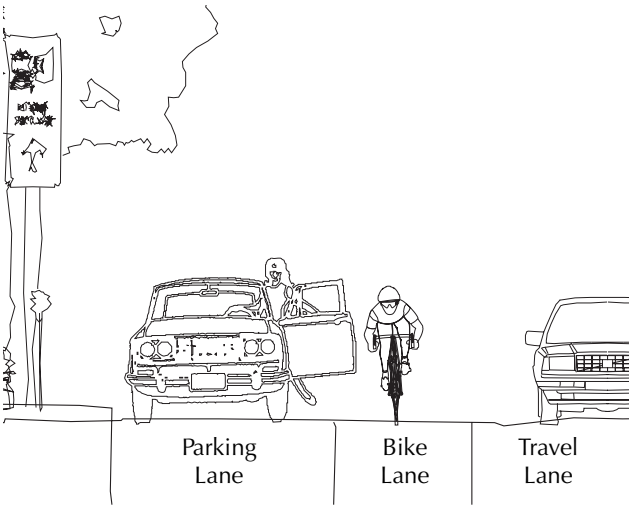
- The MBTA requires bus zones to be 60 feet (18.3 meters) of curb length when adjacent to an intersection and 80 feet (24.4 meters) when located mid-block.
- The location of bus stops on bulb outs should be considered where the curb-lane is a parking lane.

D. The provision of preferential parking for alternative fuel vehicles and vanpools should be considered.

4. Street Cleaning

The proper cleaning of streets is an important step for the enhancement of neighborhood and business districts in Boston and creates a sense of community pride.

Boston's Transportation, Public Works, Police, and Neighborhood Services Departments all work together to keep the city's streets clean. Public Works Department crews operate the mechanical street sweepers, Transportation Department staff and Boston Police officers enforce the parking regulations. Neighborhood Services staff reinforce the street cleaning policies in discussions with residents and local merchants.



Bicycle lane next to parking


Bus stop


Loading zone

Typical speed for dense area

School safety zone speed limit sign and warning light

City of Boston Supports Act to Amend the Speed Limit from 30 Miles Per Hour to 25 Miles Per Hour

The City of Boston supports the proposed state legislation (Chapter 90, Section 17 of Mass. General Laws) to lower the speed limit in thickly settled areas and in business districts from 30 miles per hour to 25 miles per hour.

Currently, the speed limit in thickly settled areas and in business districts is 30 miles per hour, unless otherwise posed on a specific street. A 25 mile per hour speed limit will help reduce the overall speed of vehicles, increase public safety and improve the quality of life for Boston's residents.

Throughout the city, signs are posted indicating the street cleaning schedule for particular streets. Residents and visitors are asked to park in accordance with the posted street cleaning restrictions so that cars do not hinder the quality of the job to be completed.

5. Design Speeds

A. Safety, road functionality, and adjacent land-uses should be considered in addition to the 85th percentile operating speed in setting design speeds.

- The compatibility of adjacent land use and activities bordering the street with different speeds should be considered.
- Pedestrian crossings should be located where sight-distances for both pedestrians and motorists are adequate to allow for safe crossings, and for vehicles to observe other motorists entering the roadway at unsignalized intersections.

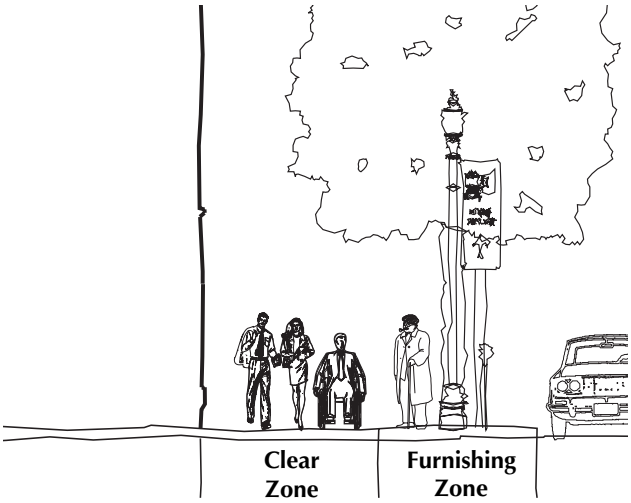
B. In high density areas speed limits should be set at 30 mph (48 kph).

- Speed postings below 30 mph (48 kph) can be posted in school and safety zones, which must be established by the Commissioner of Transportation.
- 30 mph (48 kph) may be an appropriate speed limit for areas where sidewalks, buildings, and areas of human activity are set further back from the street.

III. SIDEWALK DESIGN: THE PEDESTRIAN REALM

Goals:

- Develop a pedestrian friendly environment which encourages sidewalk activity and is both pleasant and comfortable for users by providing wide sidewalk spaces, trees, and places to sit.
- Improve pedestrian safety and mobility by developing standards for sidewalks and crosswalks and by addressing conflicts between pedestrians, vehicles and bicycles.
- Encourage walking as a primary mode by improving safety, accessibility and the aesthetics of the sidewalk environment.
- Design sidewalks to be accessible for persons with disabilities and in conformance with ADA requirements.
- Give particular design considerations to heavily used pedestrian routes and to activity centers like transit stations, parks and urban plazas, and street-side restaurants and markets.
- Develop policies for landscaping, street furniture and lighting which allow for the street-specific community process to inform the street design.
- Develop sidewalks which provide continuous and unobstructed walking.



Typical sidewalk with a clear zone and a furnishings zone

Streetscape Guidelines:

1. Sidewalk Widths and Vehicle Crossings

A. It is desirable that sidewalk widths accommodate a minimum 8-foot (2.4 meter) unobstructed or clear zone for pedestrians in the public right-of-way. The minimum ADA requirement for sidewalk widths is 4 feet (1.2 meters).

- An additional "shy distance" of at least one foot on each side of the clear zone should be considered.
- Ideally, sidewalks should be 12-13 feet (3.7 – 4 meters) wide without trees, and 13-15 (4 – 4.6 meters) wide with trees.
- Where appropriate and where recommended through the public process, wider sidewalks from the above standard should be encouraged in commercial districts to accommodate tables, kiosks, benches, etc.
- Sidewalk widths should be adjusted to provide a continuously aligned curb edge and street wall.

Driveway design integrated with sidewalk

B. Vehicle crossings of the sidewalk at driveways should be designed level with and of the same material as the sidewalk.

- The number of curb cuts across the sidewalk must be minimized and located so as not to conflict with sidewalk activity.
- Where level differences at sidewalk crossings are unavoidable, ramps should be provided for wheelchairs.

C. Sidewalk width should accommodate a "furniture zone" to be located between the pedestrian zone and the roadway pavement for trees, signs, signal control boxes, fire hydrants, etc.

- Necessary fixtures at corners or crossings should be consolidated to keep these spaces clear for pedestrian use (see also page 19 – 3. Lighting and Street Furniture).

Crosswalks on all sides of an intersection

2. Crosswalks

A. Marked crosswalks should be provided at all sides of all major intersections along the arterial, including "T" intersections.

- In some cases, installation of all crosswalks at a "T" intersection could result in either substantial conflict between pedestrians and turning vehicles or require extended wait periods for both pedestrians and vehicles. Decisions should be made on a case-by-case basis.

B. Mid-block crosswalks should only be considered in special situations of heavy pedestrian use.

- Mid-block crossings should also be considered in situations where intersection crosswalks are not easily accessible (long blocks for example) and where there is heavy pedestrian usage.
- For safety reasons mid-block crossings should not be provided where they would interfere with the queue area of an adjacent intersection or if sight distance is substandard.
- Parking should be prohibited in mid-block crossing areas.

A mid-block crossing

C. The length of crosswalks should be reduced by minimizing the number of roadway lanes and widths. Neckdowns, where appropriate, can reduce crossing width. However, the design of neckdowns needs to consider traffic and pedestrian volume, traffic directional flow and

roadway geometry (see also page 26 – 2. Corners – Curb-Radii and Neckdowns).

D. Crosswalks should be at least 10 feet (3 meters) wide and aligned with the approaching sidewalk. In areas of heavy pedestrian use crosswalks could be up to 25 feet (7.6 meters) wide. Crosswalks should be aligned with connecting sidewalks.

E. Crosswalks should be designed to be in compliance with current ADA standards.

F. The sign "State Law - Yield for Pedestrians in Crosswalks" should be installed at appropriate unsignalized intersections.

G. To encourage motorists to stop for pedestrians crosswalks should be of the "ladder" design.

- Crosswalk markings should be provided with materials that are easily maintained.
- Crosswalks should not be constructed with a different material than the rest of the street unless it is durable and will not have joints or cracks that interfere with the safety of pedestrians and bicyclists. For example, uneven materials like cobblestones should be avoided.

Crosswalks should be designed to be in compliance with current ADA standards

3. Lighting and Street Furniture

A. Sidewalk elements like trees, plants, light fixtures, benches, kiosks, mail boxes, and newsstands should enhance the pedestrian environment, making it more enjoyable to pass through as well as to occupy.

- The location, design, and selection or combination of sidewalk elements should be determined through the professional design and public review processes associated with the street.
- Sidewalk elements should not be in the pedestrian right-of-way on sidewalks and at intersections, as outlined in these guidelines.

Provide continuous and unobstructed walking

B. Street furniture should be installed to encourage sidewalk activities such as waiting, meeting, and sitting.

- Typically, street furniture should not obstruct the preferred 8 foot (2.4 meter) pedestrian right-of-way on the sidewalk in accordance with city ordinances governing placement of street furniture.

Sidewalk activities should be encouraged

New fixtures focus light downward minimizing light pollution

City standard bicycle racks

C. Lighting should be provided to enhance safety for vehicles and pedestrians and to promote the use of streets in the evenings.

- Lighting fixtures should respect human scale and be adequate for roadway safety.
- Upward scatter or night sky pollution should be avoided.
- Light fixtures should be approved by the Public Works Department to ensure maintenance.

D. All sidewalk elements should be in conformance with current City of Boston policies and standards and supported by versatile maintenance plans (see also page 11 - agency responsibility table).

E. Bicycle racks should be appropriately spaced and located so as to facilitate access while not blocking bus stops, sidewalks, pedestrian crossings and other facilities. Bicycle rack "type" should be according to City of Boston standards.

F. Attractive bus shelters should be provided at appropriate locations, easily accessible from, while not obstructing sidewalk space. Clear signage with current schedules, route and fare information should be provided at all stops.

A Coordinated Street Furniture Program for Boston

Boston is a walking city with a rich collection of street uses and public spaces where residents and visitors are encouraged to gather and enjoy the city. Mayor Menino is introducing a Coordinated Street Furniture Program which will provide these spaces with basic amenities comparable to that found in many European cities such as Paris and Berlin. The program will be an integrated system of street furniture amenities typically found on streets, such as bus shelters, information kiosks, and public toilets. This program also includes initiating a pilot program for the placement of newspaper vending machines at locations to be determined in the downtown.

Several street furniture vending companies have responded to the Coordinated Street Furniture RFP issued by the BRA in November 1998. These companies are competing for the right to locate their street furniture products free of charge to the City of Boston, in return for the privilege of deriving revenue from the sale of high quality, city approved advertising installed on the products. The vendors will maintain the system at the highest level at their cost. They will employ a fleet of service attendants who will manually clean the facilities regularly.

The Street Furniture Selection Committee, comprised of twelve community professionals, will be issuing their review of the proposals to the Mayor in late spring 1999. Neighborhood groups, business district organizations, and public agencies will be consulted in a public process conducted by the BRA and the City of Boston to determine the design and location of the street furniture.

4. Public Art

The Boston Art Commission, the oldest municipal art commission in the United States, exercises the regulatory authority to approve and site new public art on property owned by the City of Boston. The Commission also preserves and protects all monuments, paintings, statues, fountains and memorials. In addition, the Commission initiates and facilitates community processes where new art is to be sited.

Art in the public right-of-way is strongly encouraged. Sidewalks are viable spaces for artwork that is interesting and engaging for pedestrians and enhances the streetscape. Sculptures, sidewalk inlays and kiosk displays are examples of public art. Other examples of public art can include: paintings, murals, photography, tapestry, glass and works on or of paper.

Placement of art on property owned by the City of Boston should be treated similarly to any other physical element on a sidewalk. The placement of public art:

- Is restricted to sidewalks with sufficient space.
- Is not be a hazard to either pedestrians or vehicles.
- Conforms to the most current requirements of the ADA.
- Considers how the piece impacts the site.
- Considers its appropriateness to the neighborhood.

5. Informational Signage

Signage improves pedestrian orientation and movement, as well as adds visual interest and character to the streetscape. Where possible, signage should incorporate international symbols and languages and be accessible to all pedestrians. Signage should be simple, legible and properly scaled to fit its surroundings.

The following components are various types of informational signage which comes under the jurisdiction of the Boston Art Commission if on public property:

A. Informational and historical plaques at key destinations provide historical and other noteworthy information while also facilitating self-guided tours of significant sites.

B. Maps, placed at key locations help to orient visitors and highlight transit, open space and other destinations.

C. Directional markers or labels placed in the sidewalk surface could be the basis for self-guided walking tours, as well as indicators of primary routes.

6. Landscaping

A. Street tree plantings are desirable urban design elements which provide beauty, shade, a well defined street edge and improve air quality.

- Tree pits should be as large as practical. Optimally a 6' x 6' or 4' x 12' (1.8m x 1.8m or 1.2m x 3.7m) pit is desirable, a 4' x 6' or 5' x 5' (1.2m x 1.8m or 1.5m x 1.5m) pit may be used where limited by spatial restriction. As a minimum dimension for a seven foot sidewalk width 30" x 10' (0.76m x 3m) is allowable with smaller trees. The soil depth must conform to the depth of the tree ball.
- Tree pits should be provided with perforated PVC pipe loops and risers to facilitate aeration and watering.
- Tree pit covering should be bark mulch with or without ground cover or tree grates to allow for air and water penetration. Where tree grates are used they should meet ADA requirements for handicap accessibility. The tree grate opening must be at least 2 feet (.6 meters) square or 2 feet (.6 meters) in diameter to allow for unrestricted tree trunk growth.
- Examples of recommended tree species: Large shade trees – London Plane, Thornless Honeylocust, Oaks, Ginkgo, Cork Tree, Sweet Gum, and Linden. Intermediate sized shade trees – Zelkova, Sophora, Green Ash, and Red Maple. Smaller ornamental street trees – Callery Pear (*Chanticleer* or *Aristocrat* varieties only), Thornless Hawthornes, Tree Lilac, higher branching Crabapples and Cherries, Hedge and Amur Maples.

B. Roadway medians can control pedestrian circulation, enhance safety and protect plants and trees from harmful deicing salt sprays from the roadway surface.

- Medians 6 feet (1.8 meters) in width and wider are suitable for turf and low landscape plantings.
- Medians at least 10 or 12 feet (3 or 3.7 meters) wide are suitable for columnar trees.
- Medians at least 18 or 20 feet (5.5 or 6.1 meters) wide are suitable for larger shade trees.

C. Shrubs like incidental massed evergreen and perennial flowering plants, primarily low-spreading forms, may be used near crosswalks and major intersections for color interest and textural enhancement. Other accent shrubs for seasonal interest might include compact-growing roses, barberry and similar plants.

D. Containerized plantings can be located to highlight neighborhood business districts or nodes along transportation corridors. Medians in commercial districts or other

high visibility areas which require paved surfaces should be landscaped using pots or planters. Plantings should consist of colorful annuals and perennials, along with background foliage plants.

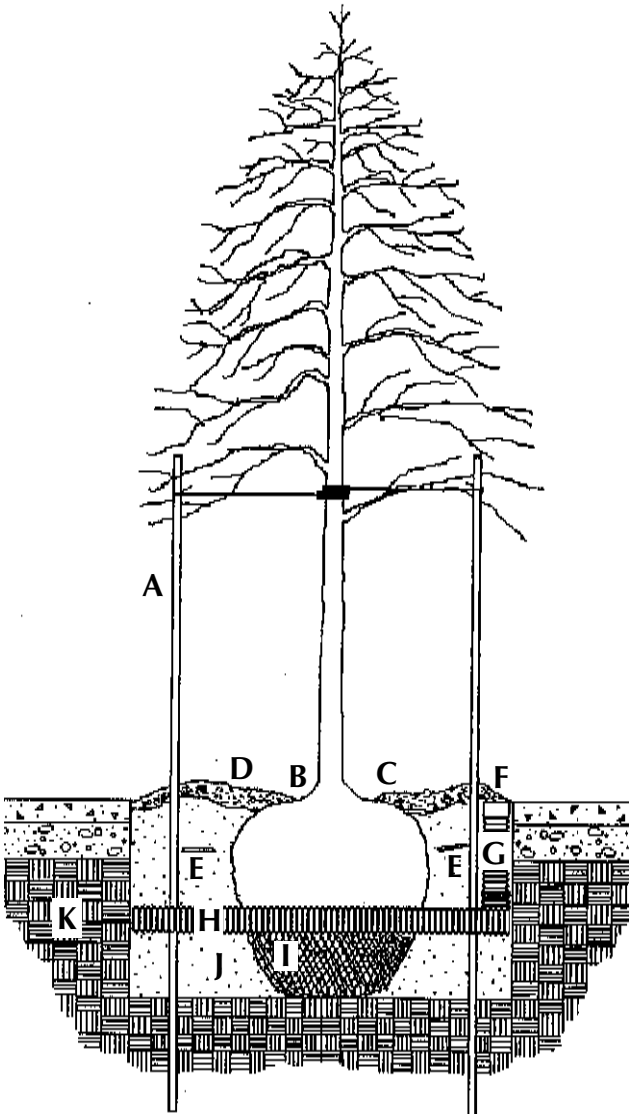
E. Provide loam and sod for grassed lawn median zones (i.e. those not at major intersections and crosswalks or in neighborhood business districts and other heavy use areas) which are 6 feet (1.8 meters) or greater in width.

F. Provisions should be provided for the irrigation of lawns and trees. As a minimum, provide manual hose bib watering cabinets for the watering of trees and plants during drought periods.

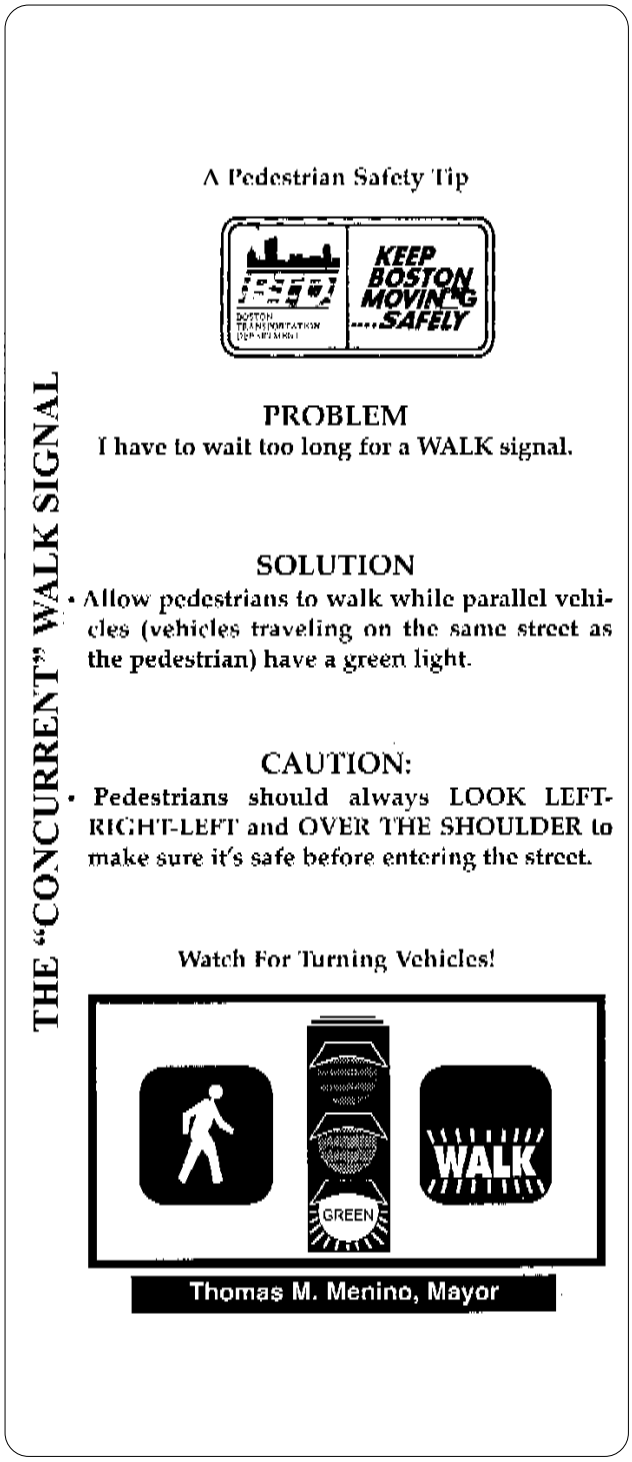
G. Maintenance of Street Trees. There are an estimated 45,000 street trees in the City of Boston with over 1,000 new trees planted each year.

The Parks and Recreation Department is responsible for overseeing externally contracted tree care services for routine pruning and new tree plantings. When a new tree is planted, the contractor is responsible for providing all tree maintenance for one full year, followed by a one year tree replacement warrantee.

Where possible, the Boston Parks and Recreation Department enlists the support of abutters and Parks Friends Groups in the care of existing and newly planted trees.



A Stake and guy tree as directed
B Set root flare 2″ above finished grade of sidewalk
C Spread 3″ mulch layer to full extent of pit leaving 3″ between mulch and root flare
D Form a minimum 4″ saucer around tree for watering
E Place 2 fertilizer packets near but not touching roots, 6″ to 8″ deep
F 4″ poly coupling and drain grate with filter fabric backing set onto 4″ corrugated S&D adapter
G Riser of 4″ black corrugated pipe wrapped in filter fabric set into corrugated tee
H 4″ black corrugated pipe wrapped in filter fabric set into a loop 12″ above sub-base
I Remove top 2/3 of rope and burlap from rootball - remove entirely if nonbiodegradable
J Remove existing soil and replace with plant soil mix to full extent of tree pit
K Undisturbed soil



IV. INTERSECTION DESIGN: INTERACTION BETWEEN MODES OF TRAVEL

Goals:

- Design intersections to provide a safe and efficient flow of vehicles, pedestrians and bicycles.
- Minimize pedestrian wait times at intersections.
- Curb-radii at intersections should be designed to accommodate average turning traffic, without encouraging excessive vehicle speeds.
- At intersections with heavy pedestrian use, maximize pedestrian WALK in the signal phasing cycle.
- Where exclusive lanes are provided, consider special provisions at intersections to prioritize these modes of travel.
- Design signal phases to accommodate differences in traffic conditions during morning and evening peak-times, mid-day, and weekends.
- Install and use equipment with technology that maximizes flexibility in allowing for customized adjustments of traffic signal "timings" at each intersection.
- Consider the volume of elderly, school children, and persons with disabilities in intersection design.

Streetscape Guidelines:

1. Signalization

A. Traffic signal sequence and timing should be designed to provide safe and efficient movement for both pedestrians and vehicles. Vehicle and pedestrian volumes at intersections, existing and anticipated, should inform all designs.

- Signal sequence and timing should be designed to reduce waiting time at the sidewalk for a WALK signal.
- Pedestrian walk displays should be designed to be maximized during the corresponding vehicular movement.
- The signal sequence and timings should be designed for a LOS (Level of Service) "D" of higher for motor- vehicles during peak hours and a V/C (volume over capacity) ratio not to exceed 0.85 for each approach.
- At crosswalks with heavy pedestrian traffic, where it is parallel to the minor vehicle movement, the goal should be to accommodate the pedestrian flow in the signal phase.
- Bicycles should follow traffic signals for vehicles where they share lanes with vehicles. In exclusive lane

situations, where bicycle volumes are heavy, bicycle specific signals and phasing should be considered.

B. Concurrent WALK should be considered where the following criteria are met:

- Warning signs about conflicting moves should be provided for both vehicles and pedestrians.
- At intersections where conflicting turning volumes are high and potentially dangerous or where sight distance is restricted, unprotected concurrent WALK signals should not be implemented.
- Where conflicts and pedestrian volumes are high, exclusive pedestrian crossings should be considered. Exclusive crossings are useful near facilities with elderly and children uses.
- Vehicle turn-on-red should be evaluated on a case by case basis.

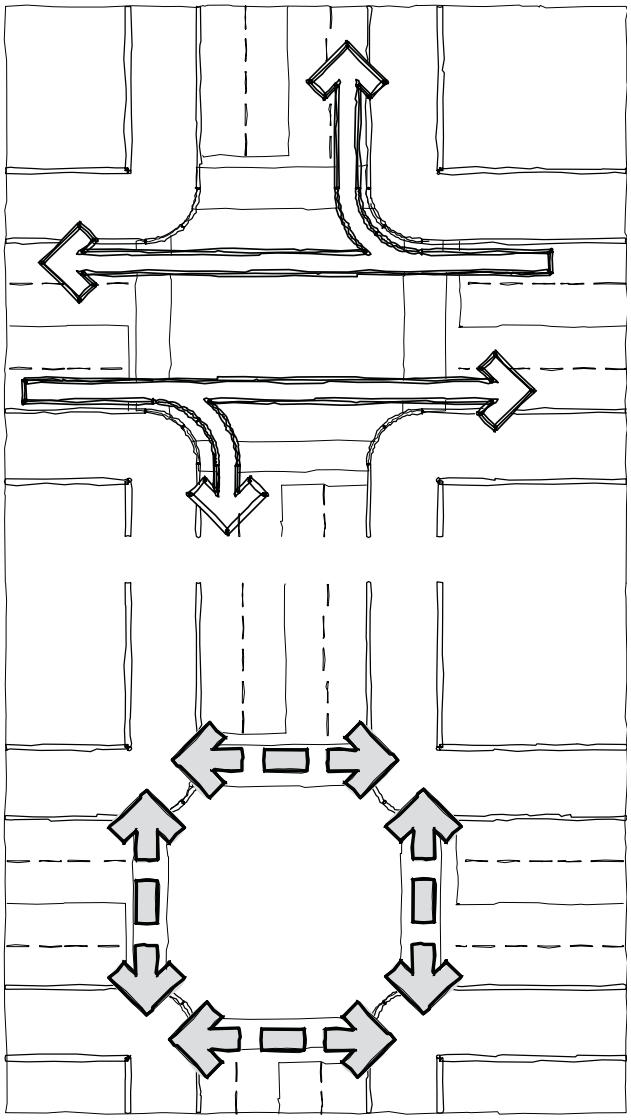
C. Signal cycle lengths should be as short as possible.

- With concurrent WALK, shorter cycle lengths should be the target during off-peak times with acceptable levels of progression.
- At intersections adjacent to major pedestrian generators, signal cycle lengths should be extended to accommodate an exclusive crossing phase and to avoid vehicle queue overflows.
- Off-peak signal cycle lengths should be shortened to reduce pedestrian wait times.
- In those instances where right turn-on-red is allowed, shorter signal cycles may be possible.

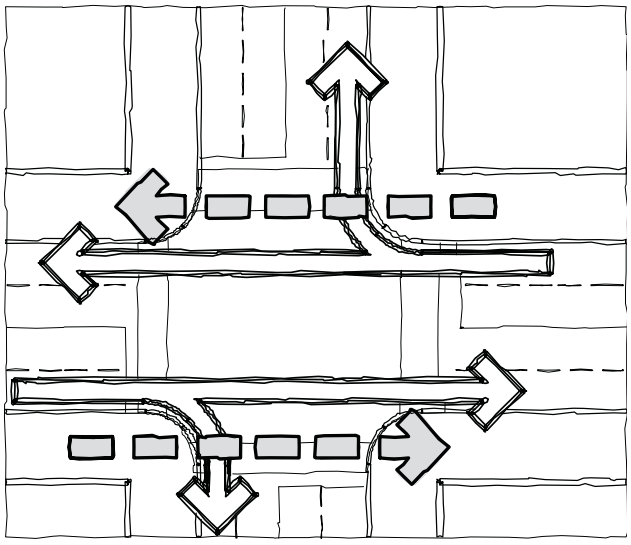
D. Where possible, signals should be timed so that pedestrians can cross the entire street at once. At busy intersections, where this may result in substantial delays due to longer signal cycles, adequate space should be provided for pedestrian refuge at medians. (Medians at crosswalks should have adequate area for pedestrians to wait at with an absolute minimum width of 6 feet (1.8 meters)).

E. Signals should have the capacity to provide automatic pedestrian timing phases at appropriate times of the day.

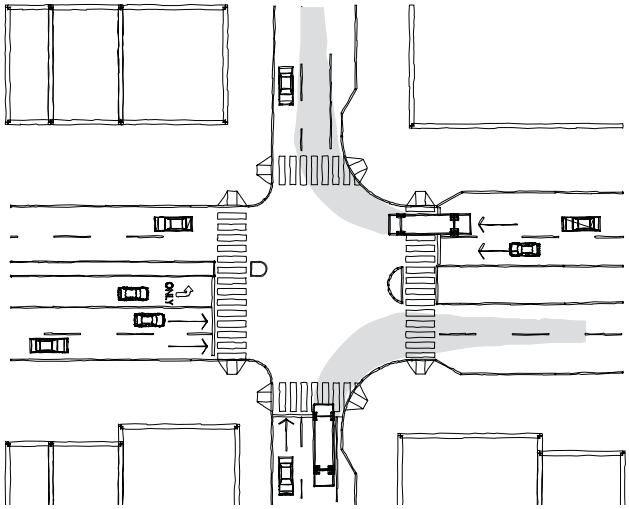
- At off-peak hours, button actuation should be considered at intersections including isolated pedestrian crossings with low volumes and at school zones, elderly housing areas and at mid-block crossings.
- Flashing DON'T WALK time should be calculated as per the MUTCD (Manual on Uniform Traffic Control Devices). The current definition states the duration should be sufficient to allow a pedestrian crossing in the crosswalk to leave the curb and travel to the center of the farthest travel lane before opposing vehicles get a green indication.
- Pedestrian travel speed should normally be assumed



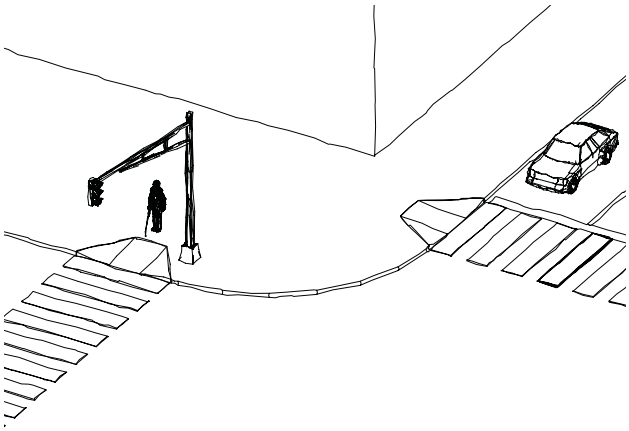
Exclusive Signal - Vehicle phase separate from pedestrian phase



Concurrent Signal - Vehicle and pedestrian phase together



Curb radii that accommodate trucks or buses and provide more space for pedestrians



Correct handicapped ramp arangement at corner

Example of Neckdowns

to be at 4 feet (1.2 meters) per second.

- Under special conditions, such as high concentrations of children or the elderly, speeds of 3.5 feet (1.1 meters) per second are preferred.

F. Equipment technology should allow for maximum flexibility.

- New signals should conform to NEMA TS-2 type technology.
- Loop detectors which are able to detect bicycles should be installed where bicycle lanes are present at intersections.
- All approaches should contain sensors, where appropriate, to detect vehicles.

G. Equipment design must meet ADA requirements.

2. Corners - Curb Radii and Neckdowns

A. Curb radii and sidewalk width should be designed to create spacious sidewalk corners which reasonably accommodate the requirements of all the expected users of the street system in the area.

- Provide adequate curb radii to accommodate truck, bus and emergency vehicle traffic where it is expected to be heavy in addition to heavy pedestrian flow.
- Minimize curb radii where vehicle turning movements need not be accommodated. For example 10 foot (3 meter) radii may be permitted at no-turn corners. Additional sidewalk space should be provided and the length of the crosswalk should be decreased.
- Curb radii should be large enough to prevent trucks from crossing the center line and moving into the opposing traffic line for intersections that involve one-way streets with turning vehicles.

B. Accommodate two handicap ramps at each corner aligned with crosswalks, rather than a single ramp at the center of the curve.

- Locate the handicap ramps to be aligned suitably with the right-of-way on the sidewalk.

C. Coordinate the location of the stop bar on the moving traffic lane with crosswalks and traffic lights.

D. Neckdowns should be installed at intersections where applicable, to improve visibility between moving vehicles and pedestrians, and to reduce crossing distances for pedestrians (see also page 18, 2. Crosswalks, Section C).

- Where there is a parking lane the neckdown should be 2 feet (.6 meters) narrower than the parking lane (extending to no more than 6 feet (1.8 meters) into the street).

APPENDICES

Appendix A

This appendix contains key conditions from the Code of Massachusetts Regulations (Architectural Access Board 521 CMR – February, 1996). For complete direction, refer to the entire document.

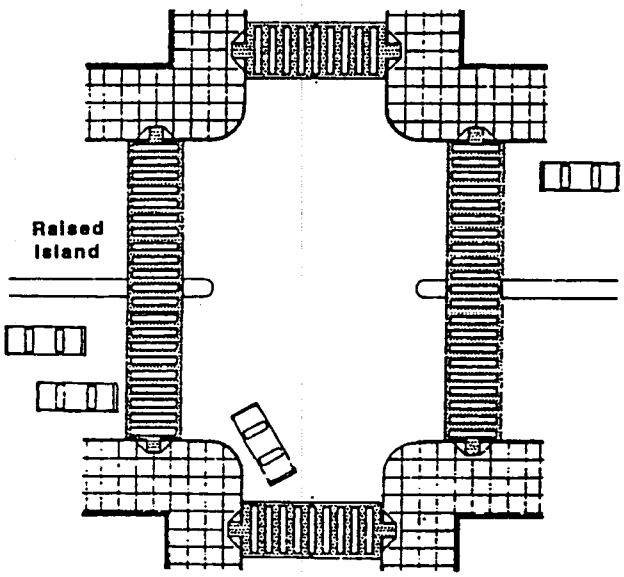
21.1 GENERAL

Whenever *sidewalks*, *walkways*, or curbs on streets and ways are *constructed*, *reconstructed*, or *repaired*, *curb cuts* are required. All *curb cuts* shall comply with the following:

21.2 LOCATION

Curb cuts shall occur wherever an *accessible route* crosses a curb and at the following locations:

21.2.1 *Curb cuts* are required at each corner of each intersection, located within the crosswalk and/or the pedestrian path of travel. *Curb cuts* shall be perpendicular to the curb at street crossings and each shall have a *level* landing at the top. At marked crossings, the bottom of the *ramp* run, exclusive of flared sides, shall be wholly contained with the marked crossing. **See Fig. 21a.** Single (i.e. diagonal or depressed corner) *curb cuts* serving two street crossing directions are not allowed.



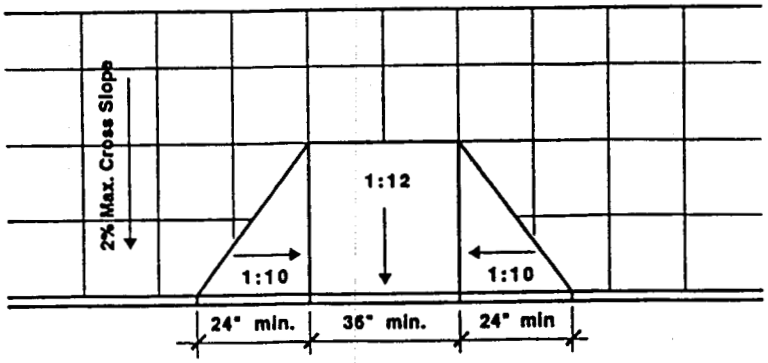
Curb Cuts at Intersection
Figure 21a

Exception: Where pedestrian right of-way established width will not accomodate a perpendicular *curb cut* and landing, a parallel public *sidewalk curb cut* with a *level* landing at its bottom shall be provided instead of a perpendicular *curb cut*.

21.2.2 Reciprocal *curb cuts*: When *curb cuts* or *sidewalks* are being *constructed* or *reconstructed* on one side of the street, and when such *curb cuts* or *sidewalks* are connected to an opposite side of the street by one or more pedestrian paths of travel, then at least one *curb cut* shall be provided on the opposite side of the street where such side is controlled by the same owner.

21.7 FLARED SIDES

Sides of *curb cuts* shall extend at least 24 inches (24" = 610mm) at the curb. The maximum slope of the flare is one-in-ten (1:10) (10%). Curbing at the flared sides must blend with the slope of the flared sides. **See Fig. 21c.**



Curb Cut with Flared Sides
Figure 21c

21.9 BUILT-UP CURB CUTS

Built-up *curb cuts* are allowed only where they do not project into vehicular traffic lanes. **See Fig. 21e.**

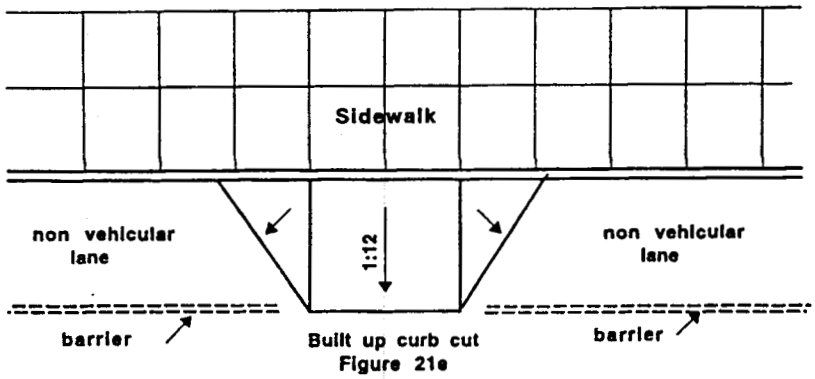


Figure 21e

21.10 PEDESTRIAN STREET CROSSINGS

Where provided, pedestrian street crossings at, above, or below grade shall comply with the following:

21.10.1 Crossing controls shall be raised from or flush with their housings and shall be a minimum of two inches (2" = 51mm) in the smallest dimension. The force required to activate controls shall be no greater than 5 ft-lb (22.2N).

21.10.2 Location: Controls shall be located as close as practicable to the *curb cut* serving the controlled crossing and shall permit operation from a *clear* ground *space*.

21.10.3 Mounting Height: Pedestrian-actuated crossing controls shall be a maximum of 42 inches (42" = 1067mm) above the finished *sidewalk*.

21.10.4 *Clear* ground *space*: A stable and firm area, complying with **521 CMR 6.5, Forward Reach**, or **521 CMR 6.6, Side Reach** shall be provided at the controls. Where a parallel approach is provided, controls shall be within ten inches (10" =254mm) horizontally of and centered on the *clear* ground *space*. Where a forward appproach is provided, controls shall abut and be centered on the *clear* ground *space*.

Appendix B

Table 5.1
RECOMMENDED ROADWAY SECTION WIDTHS

FUNCTIONAL CLASS	U/R	NUMBER OF LANES	TRAVEL LANE (min)		USABLE SHOULDER[3]		
					RIGHT (min)		LEFT (min)
FREEWAY	URBAN	4 - 8	3.75		3.0		1.25[1]
	RURAL	4 - 8	3.75		3.0		1.25[1]
			Desir.	min.	Desir.[2]	min	
ARTERIAL	URBAN	WITH MEDIAN	3.75	3.5	3.0	2.5	1.25[1]
	URBAN	WITHOUT MEDIAN	3.75	3.5	3.0	2.5	N/A
	RURAL	WITH MEDIAN	3.75	3.5	3.0	2.5	1.25
	RURAL	WITHOUT MEDIAN	3.75	3.5	3.0	2.5	N/A
			Desir.	min.			
COLLECTOR	URBAN		3.75	3.25	2.5	1.25	N/A
	RURAL		3.75	3.25	2.5	1.25	N/A
LOCAL	URBAN		3.75	2.75	1.25	0.75	N/A
	RURAL	N/A	3.75	2.75	1.25	0.75	N/A
SPECIAL PURPOSE ROADS		SEE AASHTO DESIGN CRITERIA					

Notes:

1. USE 3.0 METERS WHEN 3 OR MORE LANES IN EACH DIRECTION.
2. WIDTHS ARE TO BE DETERMINED BASED ON TRAFFIC, BICYCLE AND PEDESTRIAN VOLUMES, PARKING REQUIREMENTS, RIGHT OF WAY RESTRICTIONS AND ENVIRONMENTAL IMPACTS. THE WIDER SHOULDER WIDTH IS PREFERRED FOR PARKING AND TURNING, AND/OR BICYCLE OR PEDESTRIAN USE.
3. SHOULDER DIMENSIONS ARE FOR "USABLE" SHOULDER. THE OFFSET DIMENSION (0.5 M MINUMUM) IS TO BE ADDED TO THE USABLE SHOULDER DIMENSION TO ALLOW FOR VERTICAL ELEMENTS (GUARDRAIL, BRIDGE RAIL, CONCRETE BARRIER, ETC.) OVER 200 MM HIGH AT THE EDGE OF THE "GRADED" SHOULDER.
4. DESIGN WAIVERS MUST BE OBTAINED FOR ROADWAY WIDTHS BELOW THESE MINIMUM STANDARDS. SEE CHAPTER EIGHT FOR INFORMATION ON DESIGN WAIVERS.

STANDARD WIDTHS TO BE USED (METERS)

LANES	SHOULDERS	ABSOLUTE MINIMUM OFFSET BEYOND USABLE SHOULDER TO VERTICAL ELEMENT (OVER 200mm) (OR BEYOUND TRAVEL LANE IF USABLE SHOULDER NOT PROVIDED)
3.75	3.50	0.50 m
3.50	3.00	
3.25	2.50	
3.00	1.25	
2.75	0.75	

ACKNOWLEDGEMENTS

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