

5.0 Circulation Design Standards

Introduction

The image of the MSP Redevelopment District will be greatly determined by the design and location of roadways, walkways, and parking lots. The primary roadway system and parking lots utilize considerable amounts of land and are a visually dominant element of any development. The location of the plan’s primary circulation elements are shown on the Master Plan presented in Chapter 1 and further illustrated in this Chapter. This section discusses the details of circulation design and impacts.

The circulation system provides a primary vantage point from which to view all aspects of the MSP Redevelopment District. Safe and efficient vehicular movement results in better orientation and contributes to the development of a positive environment for workers and visitors alike. The circulation component is used to assess the circulation elements of the District and identify specific characteristics that provide visual continuity and theme identity.

Roadways, pedestrian walkways, and bicycle trails will be designed to provide a hierarchy of circulation and carrying capacity. Functionally, a hierarchical network can be created that separates incompatible types of traffic. This separation of traffic promotes sustainability because it results in more efficient energy consumption.

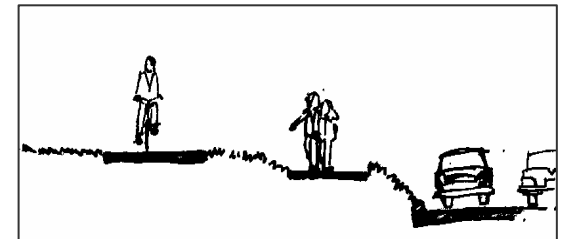
Visually, the circulation hierarchy can be reinforced through design, planting, signage and lighting to promote a more attractive visual experience and promote a sense of orientation.

Circulation Objectives

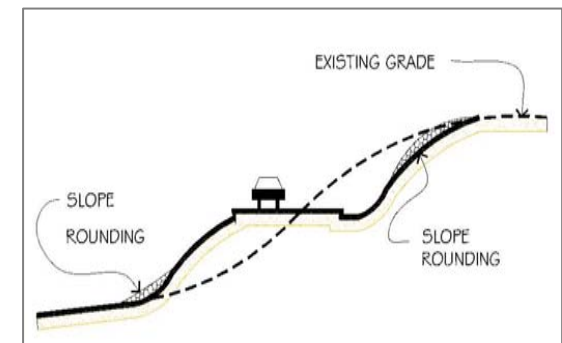
The goal for the circulation system on the installation is to establish a sustainable system that promotes aesthetic appeal, environmental preservation, and energy conservation



Vehicular/Pedestrian System



Provide Pedestrian/Bicycle/ Vehicular Access

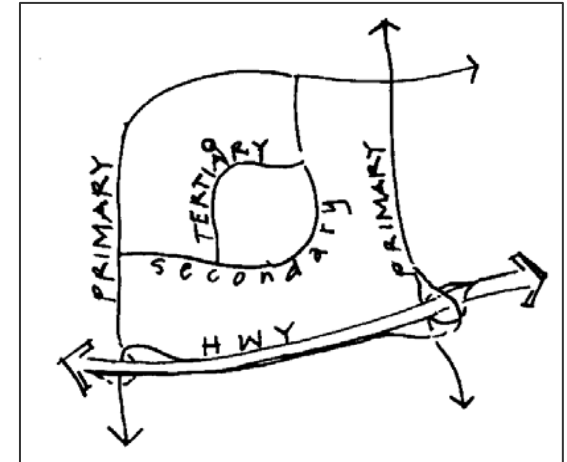


Adapt Circulation to Topography

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while providing safe and efficient circulation. The objectives below should be followed to achieve a sustainable circulation system:

- Provide circulation that meets security requirements and promotes and enhances public health and safety.
- Provide a system of circulation that includes all forms of vehicular and pedestrian circulation.
- Provide a system that includes hierarchies of vehicular and pedestrian traffic flow.
- Adapt the circulation system to the natural conditions of the site.
- Improve the existing circulation network for expansion, safety, way finding and appearance.
- Promote maintenance and repair of existing and proposed circulation systems.



Roadway Hierarchy

Roadway Hierarchy

The roadway network should functionally and visually reflect a logical hierarchy of traffic circulation. The network should separate types of traffic by function and volume, ranging from through traffic to local traffic. The visual character of each segment of the network should appropriately convey its role and function within the overall network. The basic network is classified in terms of the type, character, and appearance.

Highways provide primary high-speed traffic access to, and around an area. The Whitton Expressway provides highway access to the MSP Redevelopment District and will provide the



Roadway Classification

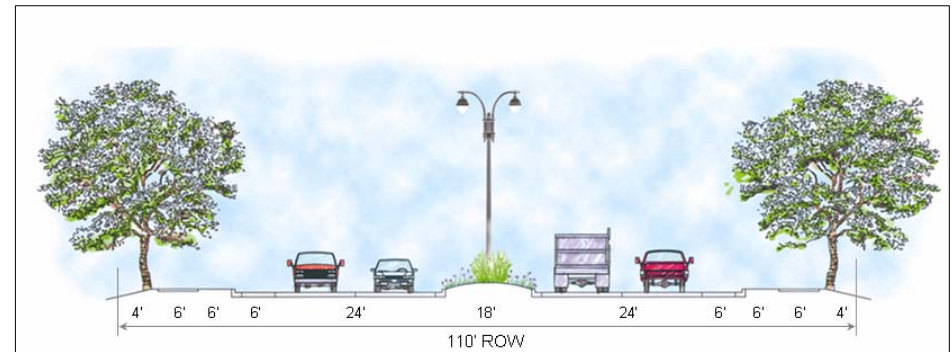
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first impression of the District to all arriving via the highway. Plantings, lighting and signage should be coordinated with City, County and State officials in the future redesign of the expressway.

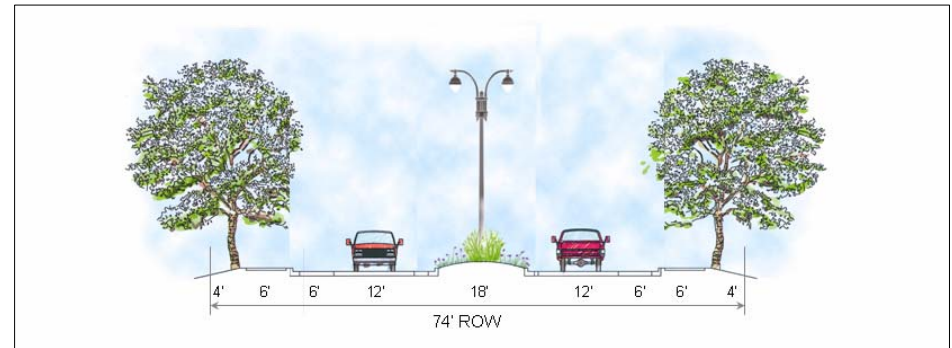
Primary Roadways are arterial routes that connect major activity centers, provide the primary access through the area and provide the means by which most people will view the District. The MSP Parkway, the Lafayette Street entrance and the

Chestnut Street entrance are classified as primary roadways. These roadways will carry the heaviest volume of traffic that results in high visibility corridors. Primary roadways are designated as boulevards, parkways or avenues. Design characters include:

- Continuous, through-traffic alignments that are relatively straight or large-radii curvilinear to handle moderate to heavy traffic.
- Alignments that form the boundary between different land uses are preferable to alignments that transect a land use zone.
- Controlled access and a minimum of curb cuts limited to entranceways to major facilities or building groups.
- At-grade intersections with signal controls.
- On-street parking prohibited.
- Medians, street lighting, signage, and planting that enforces the importance of the road.
- Concrete curbs, gutters, sidewalks and asphalt roadway pavement.



Primary Road at MSP Parkway



Primary Road at Chestnut Street and at Lafayette Street

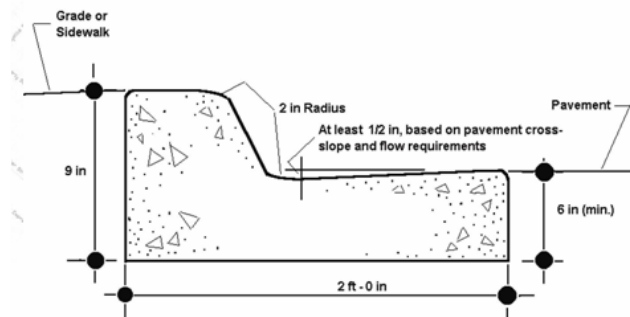


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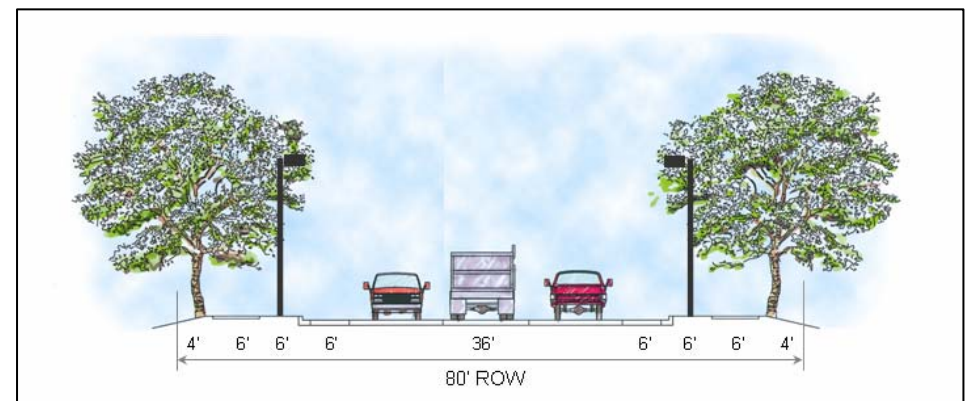
- Bike Lanes in each direction.

Secondary Roadways serve as connectors between primary roads and tertiary roads and typically connect primary roads to adjacent land use zones. Secondary roads accommodate moderate to slow traffic speeds with one moving lane in each direction. On-street parking should be prohibited and left-turn lanes provided at intersections with primary roads. Design characteristics include:

- Continuous through-traffic alignment between primary roads, either straight or curvilinear based upon the design speed topography and land pattern.
- Direct access to abutting sites.
- On-street parking generally prohibited.
- Street lighting, signage, and planting that reflects the moderate-to-slow speed nature of traffic and the character of the land use.
- Concrete curbs, gutters, sidewalks and asphalt roadway pavement.
- Bike Lanes in each direction.



Roadway Classification



Secondary Road

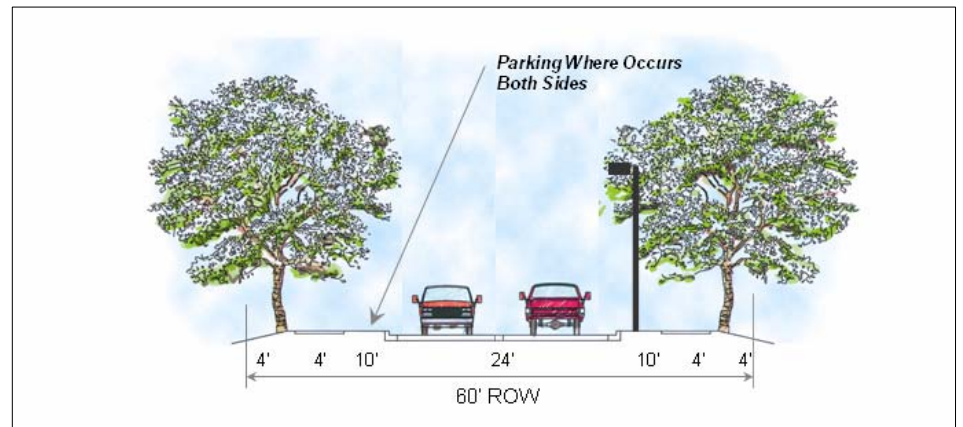
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Tertiary Roadways provide access to individual facilities, parking and service areas. They are designed to handle low speed, low volumes of traffic, with one lane in each direction. Tertiary roadways make use of “T” intersections and cul-de-sacs to reduce through traffic, promote safety, and limit noise impacts from truck traffic. Design characteristics include:

- Alignments designed to discourage through-traffic.
- Alignments are relatively short, straight or curvilinear keeping with topography, land use, and slow speed nature of traffic.
- Generally a maximum of one moving traffic lane in each direction.
- On-street parking generally prohibited, however may occur in select locations.
- Sidewalks maybe limited to only side, depending upon need.
- Concrete curbs, gutters, sidewalks and asphalt roadway pavement.



Roadway Classification



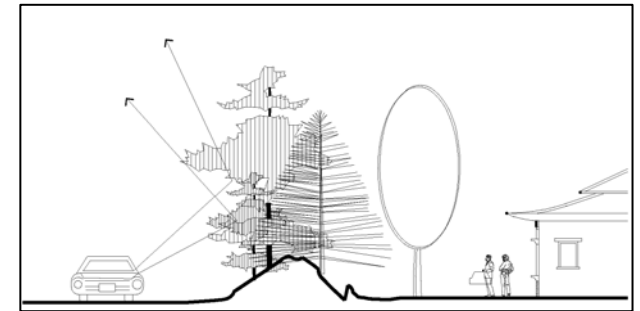
Tertiary Road

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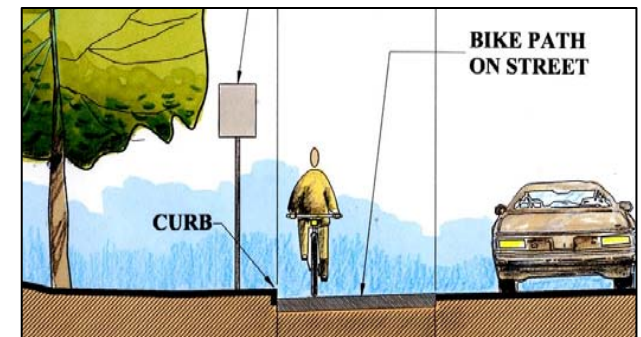
Roadway System Design

The location and design of new circulation system alignments as well as improvements to the existing system should be prepared to promote development sustainability. They should be designed to minimize impacts, relieve driver monotony, and provide a positive visual experience for the user, without compromising safety. The following design techniques should be applied to circulation system design.

- Mold cut and fill slopes to blend into the natural landform.
- Minimize pedestrian and bikeway crossings.
- Use natural topographic conditions to create grade separated pedestrian and bikeway road crossings wherever possible.
- Adapt circulation to preserve vegetation. Design roads, walkways, and bike paths to minimize disturbance to existing vegetation, encourage re-vegetation in disturbed areas, and reduce the visual impact of landscape disturbance.
- Minimize cut and fill to reduce the limits of clearing.
- Clear only for sight distances rather than uniform right-of-way clearing.
- Utilize tree wells or retaining walls to preserve specimen trees or significant vegetation areas.
- Provide optimum conditions for re-vegetation by following proper planting and maintenance techniques.
- Restore vegetation to disturbed areas using naturalistic plantings of native plant material.
- Minimize adverse impacts on adjacent land uses.
- Roads and parking should be physically separated from other land uses utilizing noise abatement techniques such as berms, walls and plant material to reduce noise levels.



Landscape and Berm Buffer



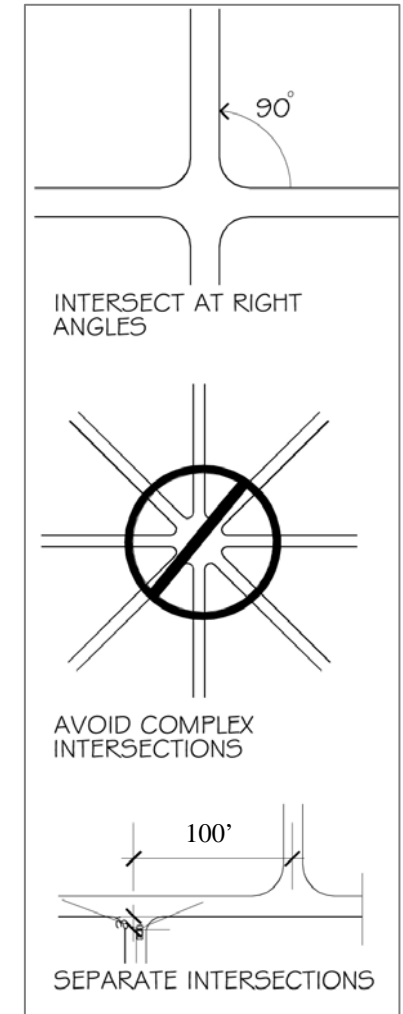
Dedicated Bike Lane

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Intersections

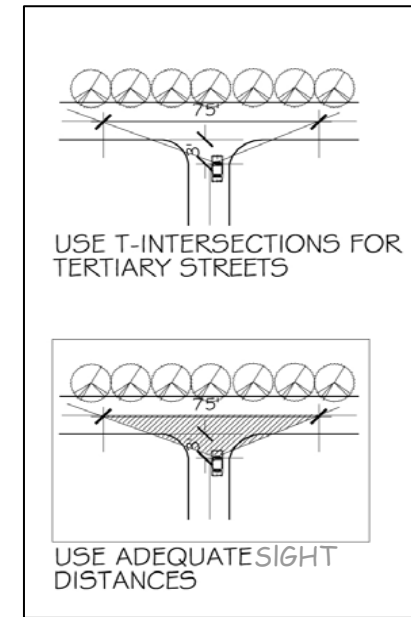
Intersections are the most dangerous areas of a circulation system. They should be planned or improved to provide safe and efficient traffic flow for both pedestrian and vehicular traffic. The following design techniques should be used to plan or improve intersections:

- All roadways should intersect at right angles (90 degrees), although 85-95 degrees is acceptable.
- Avoid dangerous, complex intersections of more than two streets intersecting at one point or offset intersections.
- Eliminate intersections that are in close proximity to one another. They should be no closer than a minimum distance of 100 feet.
- Use T-intersections for tertiary road intersections with secondary or primary roads to reduce conflict and promote safety.
- Provide turning lanes at all intersections along primary roads to eliminate interference with through traffic flow.
- Minimize intersections along primary roads to reduce points of conflict and increase safety.
- Include adequate sight distances to meet minimum standard requirements at all intersections. The sight distance triangle is formed from the location from where the driver is waiting to cross or enter a traffic lane to a point 75 feet down the centerline to the right and the left.



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- Minimize pedestrian and bicycle intersections with primary streets.
- Provide crosswalks at all intersections where necessary, marked with paint or vinyl strips or identified with a different paving surface.
- Provide pedestrian access to persons with disabilities in accordance with the Americans with Disabilities Act Accessibility Guidelines (ADAAG).



Entrance Feature

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Roundabouts

There are two roundabouts located within the MSP Redevelopment District. One is located at the intersection of the MSP Parkway and Chestnut, the other is located at the intersection of Lafayette and the MSP Parkway. While each roundabout is unique, they contain several common design goals including:

- They must accommodate tractor trailer truck traffic.
- They need to incorporate pedestrian and bicycle traffic crossing.
- The roundabouts should be considered as entry features, containing decorative paving, planting, lighting and water features.

The roundabout at Lafayette Street does not have a planted center island, instead it will contain decorative pavement patterns to direct the vehicular traffic. The north one quarter of the round about will contain a portico feature to establish its identity as a main entrance and to direct views to the river valley beyond. The roundabout at Chestnut Street contains a combination water feature and planting area within the circle, and decorative paving delineating the traffic lanes. The roundabouts will be designed to Federal Highway Administration standards.



Roundabout Locations



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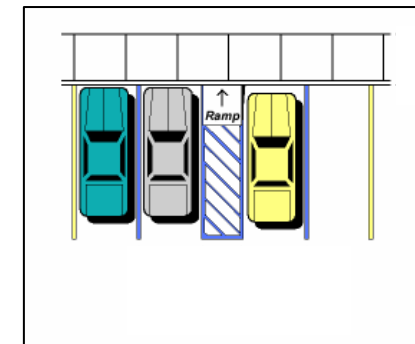
Parking Requirements

The total quantity of parking in any one location will vary with the needs of the adjacent facilities. The following are general parking requirements.

- All parking lots will be accessible to persons with disabilities. The number of accessible spaces shall be provided in conformance with the required minimum number of accessible spaces shown below.
- For initial planning and programming, allocate 400 square feet of parking lot area per car. The total provides adequate minimum space for the parking spaces, access drives, and planting islands that make up a parking lot.
- Promote means of access other than vehicular such as walkways and bikeways.

Total spaces in parking area	Required minimum number of accessible spaces
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1000	2% of total
1001 and up	20 plus 1 for each 100 over 1000

Required Minimum Number of Accessible Parking



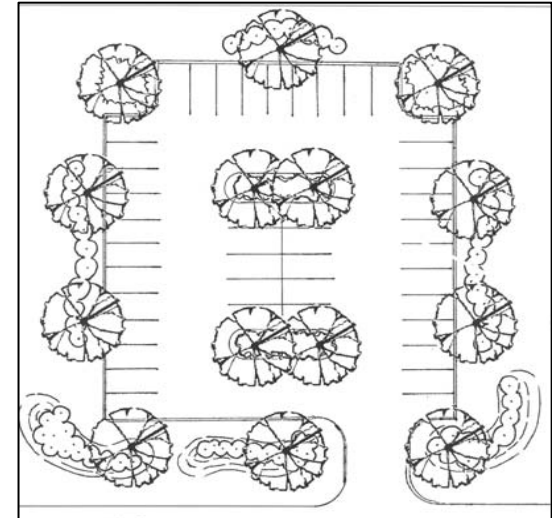
Accessible Parking Space

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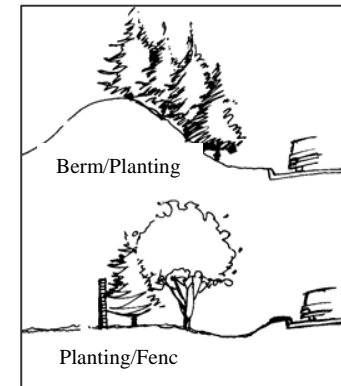
Parking Lot Location and Design

Parking areas can be designed and enhanced to provide a more pleasing impact and a more comfortable physical experience for the user. The following design techniques should be used to create more aesthetically pleasing, physically comfortable parking lots.

- Locate parking lots between and behind buildings to reduce the visual impact.
- Design parking lots to be efficient in the design and placement of access drives and parking spaces. All drives providing direct access to parking spaces should provide spaces on both sides of the drive.
- Provide planting areas at the ends of all rows of parking spaces. Provide islands with trees within the main parking lot to soften the visual expanse of the parking lot, provide shade and/or wind breaks.
- Use natural topography and existing trees to visually screen parking areas from adjacent facilities and other parking bays.
- On street parking along primary and some secondary streets should be avoided.
- Parking lots should be paved with asphalt with white markings and contain concrete curb and gutter.



Provide Tree Islands to Soften Views



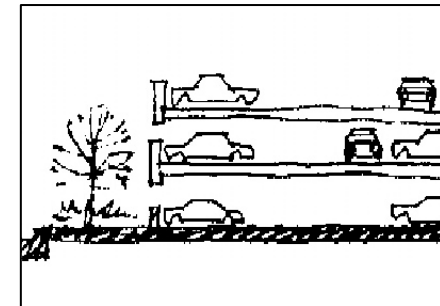
Trees/Berms/Walls Screen Parking Lot

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Parking Structures

Parking structures, both below grade and above grade, provide for greater parking capacity in densely developed areas where available land is scarce. Parking structures are expensive, but they provide a number of benefits including efficient land use, reduced visual impact and protection of vehicles from inclement weather.

- Materials of the parking structure should be compatible with adjacent architectural facilities and elements
- Preferred construction materials include concrete structure with brick (and/or) limestone articulation on highly visible elevations and architectural concrete finish elsewhere.
- Minimize height, three levels above grade maximum.
- Highly visible areas of the structure should be architecturally enhanced.
- Roof-top and wall planters.
- Use landscape materials to blend and soften the visual impact of the parking structure.



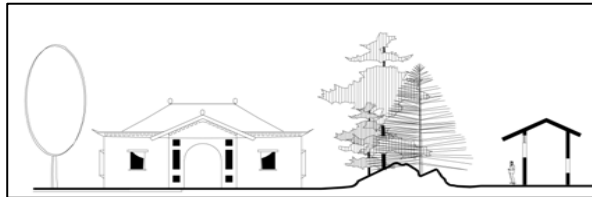
Parking Structures are Desirable



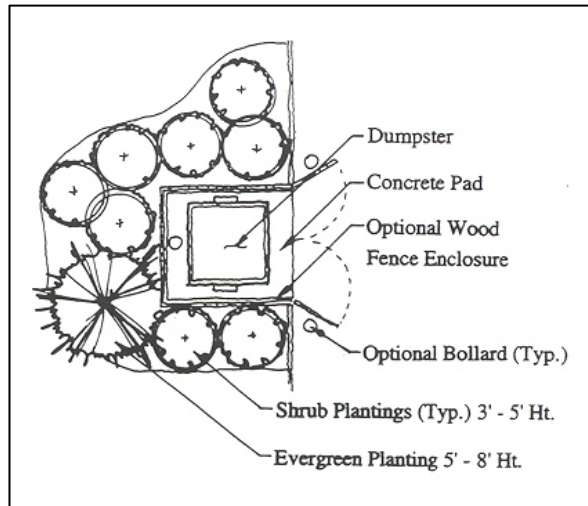
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Service Areas

Facilities that require pickup and deliveries should have a service area that allows for easy access to a loading dock exclusively for service vehicles. These areas should be designed to provide direct, easy access for vehicles. They should be screened from public view to reduce negative visual impacts.



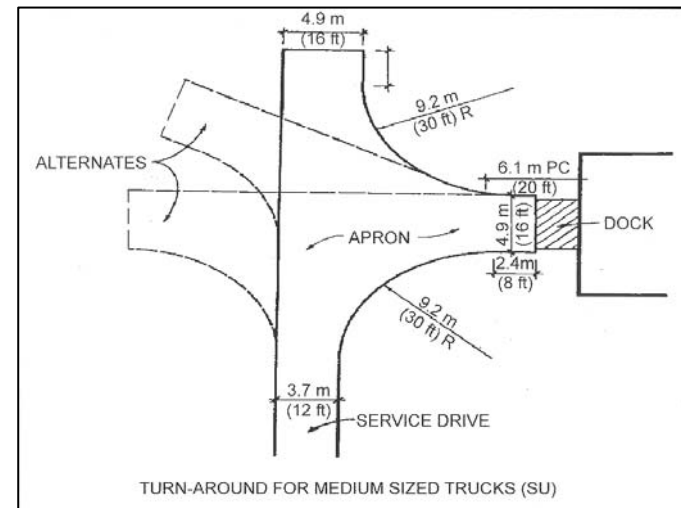
Trees/Berm Screen Service Area



Typical Dumpster Area



Service Areas



Typical Loading Area

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Drop-Off Areas

Facilities that include a high percentage of persons arriving by vehicle should include a vehicle drop-off area for users.

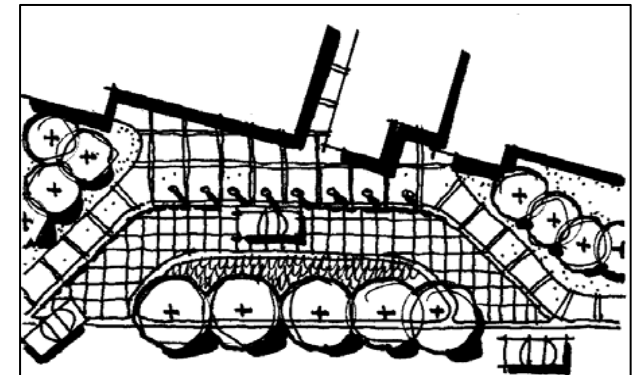
- Use physical barriers to define the area.
- Barriers may include curbing, planters, or other barriers together with signage to identify and restrict access.
- The driveway shall be configured so that vehicles can be restricted if necessary.
- ADA Compliant.
- The material and character shall be compatible with the building Architecture.
- Pavement material shall be compatible with the architectural character of the building.
- Comply with current safety and security measures.



Drop Off Area Locations



Office Campus Drop Off Area



Drop Off Area Enhancements

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Walkways and Pedestrian Circulation

Walkways provide connections for pedestrians between buildings, parking lots and other areas. Well designed and located pedestrian walkways also provide a desirable alternative to total dependence on motor driven vehicles.

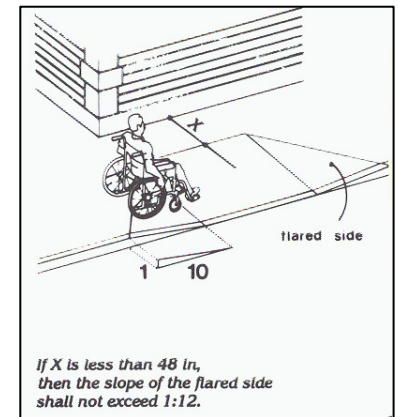
The goal is to encourage the use of walkways as an alternative means of circulation. Pedestrian walkways should be designed and located to provide a comfortable, enjoyable experience for the user. The use of walkways within the District promotes development sustainability by conserving energy, reducing air pollution, and decreasing the land requirement for parking. Walkways provide a means to increase physical fitness as well.

In order to achieve this goal the following objectives must be met:

- Provide walkways that are designed at a pedestrian scale to be comfortable and pleasant.
- Provide safe and secure pedestrian facilities that are separate from vehicular and railroad traffic.
- Provide amenities for pedestrians.
- Provide accessibility to all users, including physically impaired or challenged persons. All street and driveway crossings shall be ramped, marked, and accessible to persons with disabilities in accordance with ADA requirements.
- Provide links to major attractions and generators of pedestrian traffic.
- Provide design consistency throughout the walkway.
- Bike Lanes in each direction.



Alternate Means of Access Other Than Vehicular



Provide Accessible Routes

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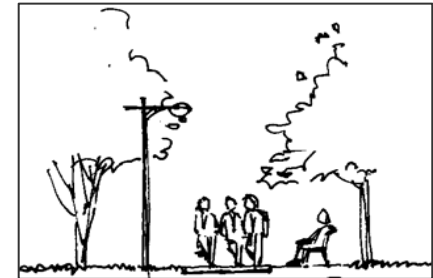
Walkway Network Hierarchy

Sidewalks are classified to conform to the roadway system hierarchy - Primary, secondary, and tertiary walkways. Non- roadway oriented sidewalks should be sized and placed where people will use them rather than creating worn “shortcut” paths.

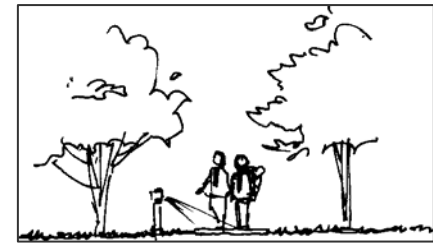
Primary walkways should be placed along both sides of primary roadways, wherever possible. These walkways are also used for high volume pedestrian routes to facilities and should be designed along axis lines relating to adjacent building entries, plazas, or streets. They should be paved with concrete or decorative pavers. Primary walkways should be sized to accommodate anticipated pedestrian use. They should have a minimum width of 6 feet and a maximum width of 10 feet in high use areas.

Secondary walkways should be provided along one or both sides of secondary and tertiary streets. They are designed to carry moderate volumes of pedestrians between activity centers. They should provide access to building entrances, plaza areas, or streets. They should be paved with concrete. These walkways should be sized to accommodate anticipated pedestrian use, but not less than 6 feet wide.

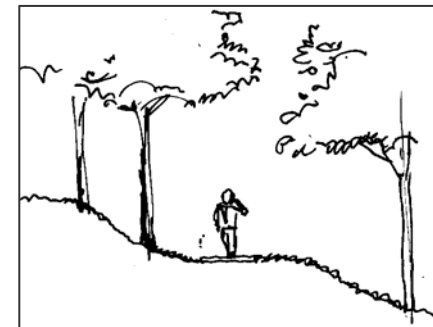
Tertiary walkways provide pedestrian walkways in the Natural Resources Area for casual walking and hiking. They can be paved with bituminous asphalt or constructed with gravel or woodchips. The layout of the walkway should have a meandering and curvilinear alignment. Walkways should have a minimum width of 4 feet. Gravel and wood chip trails should have a minimum width of 4 feet. Where paths are designated for use by bicyclists and pedestrians, these widths should be increased to a minimum width of 8 feet.



Primary Walkways



Secondary Walkways



Tertiary Walkways

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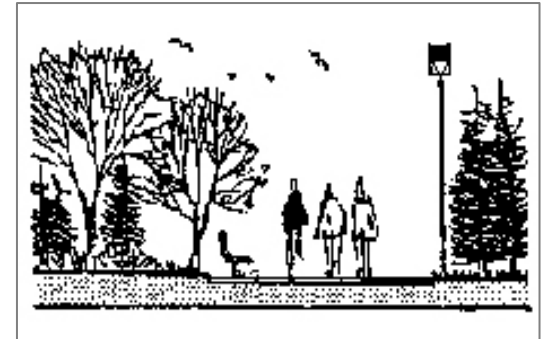
Site Amenities at Walkways

Utilize site furnishings to reinforce the walkway system hierarchy. Provide directional and informational signage, where appropriate. Locate site furnishings, such as benches, tables, waste receptacles, drinking fountains, and signage in response to travel distance and traffic volume.

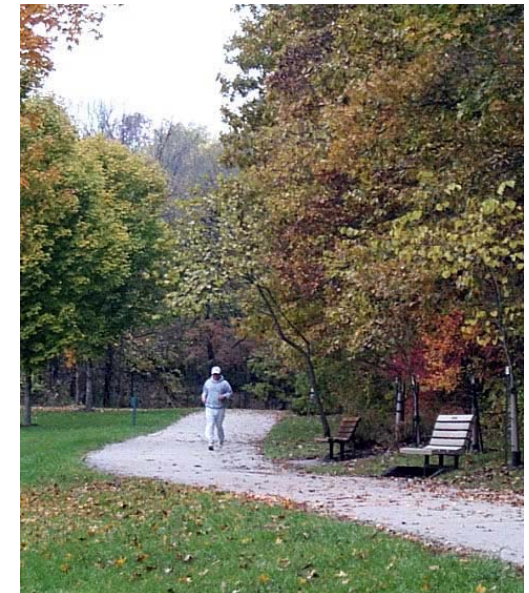
Site furnishings should be placed at regular intervals along walkways, parallel to the walk and facing the flow of pedestrian traffic.

Landscaping at Walkways

Use a combination of canopy and ornamental trees along sidewalks to provide shade, define the path, provide visual interest, and discourage the creation of “shortcuts.” Utilize evergreen buffer plantings to screen harsh winds and undesirable views. Discourage the use of flowering/fruit bearing trees and shrubs along walkways because of threat of insects or other problems.



Place Landscape and Site Furnishings Along Walkways



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Bikeways

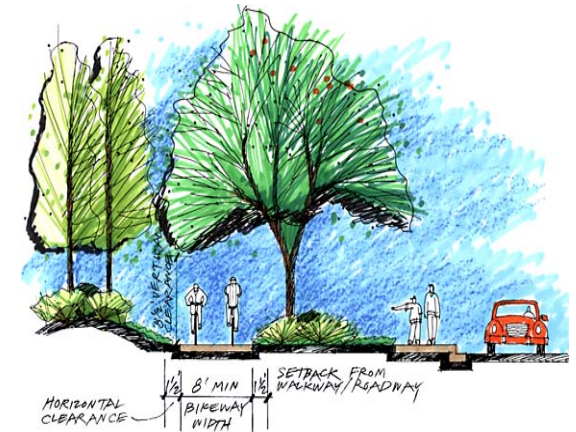
The use of bicycles as alternatives to the automobile has become more acceptable to the general public and a method of reducing the automobile vehicle trips within an workplace environment thus reducing the need for greater carrying capacity of streets and parking areas. Also, cycling is a popular recreation activity that is enhanced by the availability of a safe and well planned system of bike trails.

A bikeway system should provide direct routes between primary traffic and destination within the District. This network should be continuous and minimize conflicts between bikes, pedestrians, and vehicles. Bikeways should be planned and designed according to the classifications that define the level of separation they maintain from roadways and walkways. The ideal solution for the development of bikeways is to physically separate them from both roadways and walkways.

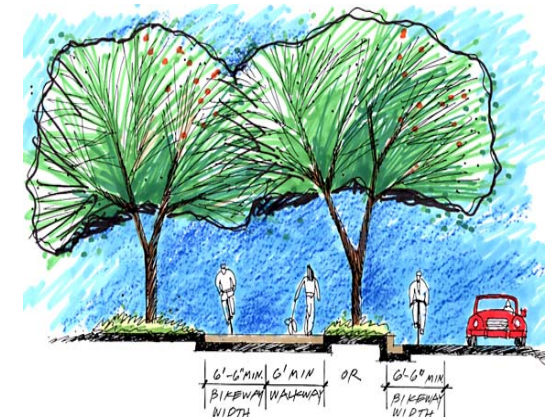
Bikeways are design according to the following classifications:

Class I Bikeway. A Class I Bikeway is intended for the exclusive use of bicycles. While it may parallel a roadway, it is physically separated by distance or a vertical barrier. Class I Bikeway considerations include:

- A class I Bikeway provides the safest and most efficient means of bicycle travel and is the preferred option for bikeway development.
- Crossing of a Class I Bikeway by pedestrians, train, or automobile should be minimized.
- If a Class I Bikeway does not closely parallel a roadway, it should be designed to provide appropriate bikeway gradient and curvature.
- Class I Bikeways require the greatest amount of space and advance planning to reserve land and assure appropriate routing.



Class I Bikeway



Class II Bikeway

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Class II Bikeways. A Class II Bikeway shares the right-of-way with a roadway or walkway. It is indicated by a bikeway pictograph on the pavement and a continuous stripe on the pavement or separated by a continuous or intermittent curb or other low barrier. Class II Bikeway considerations include:

- Because some separation is provided for bicycle travel, a Class II Bikeway provides some level of safety for the bicyclist and pedestrian.
- While crossing by pedestrians or automobiles are discouraged, they are not as controllable as they are on a Class I Bikeway because the Class II Bikeway is adjacent to the walkway or roadway.
- Because Class II Bikeways are tied to the adjacent roadway or walkway, route selection is important to maintain appropriate bikeway gradient and curvature.
- Class II Bikeways generally require less space than Class I Bikeways because they follow the alignment of and share the right-of-way with a roadway or walkway.
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Class III Bikeways. A Class III Bikeway shares the right-of-way with a roadway or walkway. It is not indicated by a continuous strip on the pavement or separated by any type of barrier, but it is identified as a bikeway with signs. Class III Bikeway considerations include:

- Because no separated is provided, there is a higher potential for safety conflicts between automobiles and bicycles and between bicycles and pedestrians.
- Class III Bikeways provide continuity within the bikeway network and designate preferred shared routes to minimize potential conflicts. To maintain safety for bicyclist and pedestrians, Class III Bikeways should be developed, if possible, only where automobile and pedestrian traffic is moderate to light.



Class III Bikeway

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- Because Class III Bikeways share the roadway or walkway, route selection is important to maintain appropriate bikeway gradients and curvature.
- Class III Bikeways require the least space because they share the pavement with a roadway or walkway.

General Guidelines.

Wherever possible, provide a designated right-of-way for bike traffic, separate from vehicular and pedestrian routes.

Locate bikeway crossings away from vehicular intersections with crossings marked on the street pavement.

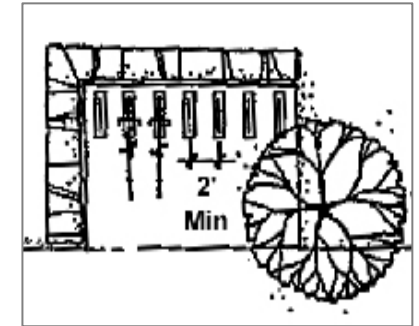
When separate bicycle right-of-ways are not feasible, designate bikeway lanes with paint on the right-hand side of roadways.

Bikeways should never share undesignated space with roadways except at crossings.

Bicycle facilities shall be in conformance with the Guide for the Development of Bicycle Facilities – AASHTO 1999 (or current version)

Bikeway Furnishings. Encourage use of the bicycle system by making trails visually attractive and providing pedestrian amenities in appropriate locations. Provide site furnishings such as benches, tables, waste receptacles, drinking fountains, and signage along paths. Location of these amenities should be in response to travel distance and traffic volume.

Bicycle Storage. Provide bicycle storage racks in areas that can be visually supervised and in close proximity to building entrances, high activity areas, major workplaces, and recreational facilities, while avoiding conflicts with pedestrian circulation.



Provide Convenient Bicycle Storage

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Landscaping. Use a combination of canopy and ornamental trees along bicycle paths for shade, route definition, and visual interest. Provide evergreen buffers to screen harsh winds and undesirable views.

Crosswalks. Provide crosswalks at all intersections of roads and walkways/bikeways. When laying out the crosswalk, consider the following:

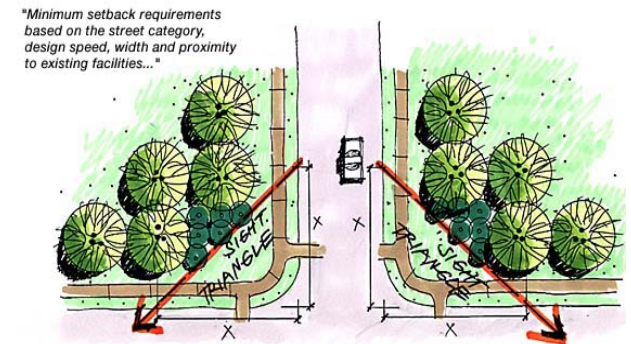
- Extend walk's paving across the road in heavily used areas.
- Provide a clear line of sight for motorist and pedestrians. Do not plant in sight lines. Walkways should meet the road at 90 degree angles.
- Adequate light should be provided.
- Provide barrier-free access at all intersections.

Walkway and Bikeway Lighting Design

Roadway lights and building exterior lights can serve also as walkway and bikeway lights. Maximum use will be made of multi-purpose lighting systems.

Values are dependent upon whether walkways and bikeways are adjacent to roadways or are isolated from vehicular traffic.

When adjacent to roadways, walkways and bikeways will be illuminated to not less than one-half the maintained illumination required for adjacent roadways. Areas having in grade, such as stairs and ramps, will require special treatment. Crosswalks in the middle of the block will be illuminated to 1.5 to 2 times the normal roadway lighting level.



Adequate Sight Lines Give Pedestrians an Unobstructed View of Crosswalks

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When remote from roadways, walkways and bikeways will have a minimum of 5 lux (.5 footcandle) average illumination measured in lo-foot levels. Pedestrian tunnels will have 40 lux (4.0 footcandles), stairways will have 6 lux (0.6 footcandles), and overpasses will have 3 lux (0.3 footcandles) illumination.

Where pole mounted light illuminate only walkways or bikeways, shorter poles are most suitable, but luminaire height will not be less than 10 feet. Construction will be such as to minimize vandalism by use of break-resistant lenses, tamperproof screws, and sturdy poles.

The federal Manual of Uniform Traffic Control Devices (MUTCD) provides standards signs and markings for bicycle lanes and related bicycle facilities. See the MUTCD, Chapter 9 and any applicable amendments for traffic controls for bicycle facilities standards.

Circulation System Materials

The Material Schedule table provides guidance for the selection of materials for the District’s circulation system. Exceptions to these options should be avoided and only allowed for temporary facilities that will be replaced within a one year time period.

Vehicular & Pedestrian Circulation System Material Schedule	Concrete	Decorative Pavers	Asphalt	Gravel	Woodchips
Vehicular Circulation					
Primary Streets			X		
Secondary Streets			X		
Tertiary Streets			X		
Parking Lots			X		
Curbs & Gutters	X				
Round-a-bout	X	X			
Motor Court	X	X			
Drop-off Areas	X	X	X		
Service Drives			X		
Pedestrian Circulation					
Primary Walks	X	X			
Secondary Walks	X				
Tertiary Walks			X	X	X
Primary Cross Walks		X			
Secondary Cross Walks			X		
Tertiary Cross Walks			X		
Courtyards		X			
Plazas		X			
Building Entry Plaza		X			
Secondary Building Entry	X				