



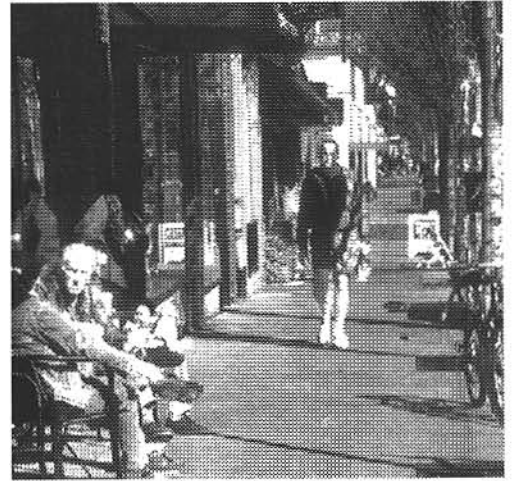
# Portland Pedestrian Design Guide

City of Portland  
Office of Transportation  
Engineering and Development  
Pedestrian Transportation Program



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# The Portland Pedestrian Design Guide

## Introduction

### THE PURPOSE OF THE *PEDESTRIAN DESIGN GUIDE*

The public right-of-way houses many transportation activities, including walking, bicycling, transit, freight movement, and automobile travel. It harbors the hardware, such as traffic signals and street lights, that supports those activities. In many cases the right-of-way also contains public utilities.

Each of these functions has specific design needs and constraints. The variety of functions is administered by people in several agencies, both inside and outside the City of Portland. In the past, conflicts between the design needs of competing functions occasionally have produced conditions that discourage pedestrian travel.

The purpose of Portland's *Pedestrian Design Guide* is to integrate the wide range of design criteria and practices into a coherent set of new standards and guidelines that, over time, will promote an environment conducive to walking.

### DEVELOPING THE GUIDELINES

The guidelines in the *Pedestrian Design Guide* were developed through a consensus-building process involving participation by each of the programs and agencies responsible for the form and function of the right-of-way.

The initial task of assessing and documenting existing practices and organizing the first draft of the guidelines was undertaken in 1995 with the assistance of a consultant team. This was followed by a lengthy process of revision and refinement, advised by a Technical Advisory Committee and a dedicated citizens' working group. The section on alternative pathways was developed through a parallel process with a different consultant. The final set of guidelines in this design guide represents a thorough analysis and integration of many practices.

Throughout, the guidelines attempt to balance pedestrian needs with the design needs and constraints of each of the other uses of the right-of-way. In a few cases this balance resulted in

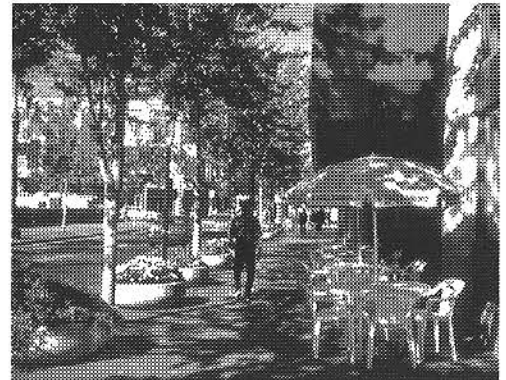


Good pedestrian design encourages walking.

### Principles for Pedestrian Design

The following design principles represent a set of ideals which should be incorporated, to some degree, into every pedestrian improvement. They are ordered roughly in terms of relative importance.

- 1. The pedestrian environment should be safe.**  
Sidewalks, pathways and crossings should be designed and built to be free of hazards and to minimize conflicts with external factors such as noise, vehicular traffic and protruding architectural elements.
- 2. The pedestrian network should be accessible to all.**  
Sidewalks, pathways and crosswalks should ensure the mobility of all users by accommodating the needs of people regardless of age or ability.
- 3. The pedestrian network should connect to places people want to go.**  
The pedestrian network should provide a continuous direct routes and convenient connections between destinations, including homes, schools, shopping areas, public services, recreational opportunities and transit.
- 4. The pedestrian environment should be easy to use.**  
Sidewalks, pathways and crossings should be designed so people can easily find a direct route to a destination and delays are minimized.
- 5. The pedestrian environment should provide good places.**  
Good design should enhance the look and feel of the pedestrian environment. The pedestrian environment includes open spaces such as plazas, courtyards, and squares, as well as the building facades that give shape to the space of the street. Amenities such as street furniture, banners, art, plantings and special paving, along with historical elements and cultural references, should promote a sense of place.
- 6. The pedestrian environment should be used for many things.**  
The pedestrian environment should be a place where public activities are encouraged. Commercial activities such as dining, vending and advertising may be permitted when they do not interfere with safety and accessibility.
- 7. Pedestrian improvements should be economical.**  
Pedestrian improvements should be designed to achieve the maximum benefit for their cost, including initial cost and maintenance cost as well as reduced reliance on more expensive modes of transportation. Where possible, improvements in the right-of-way should stimulate, reinforce and connect with adjacent private improvements.



*The pedestrian environment should provide good places.*

# Guidelines for Sidewalk Corridors

## Section A

### A1 INTRODUCTION

The Sidewalk Corridor is the portion of the pedestrian system from the edge of the roadway to the edge of the right-of-way, generally along the sides of streets, between street corners. The Sidewalk Corridor functions to provide an environment for walking that is separated from vehicle movement.

#### A1.1 Attributes of Good Sidewalk Corridors

**Accessibility** — *The Sidewalk Corridor should be easily accessible to all users, whatever their level of ability.*

**Adequate Travel Width** — *In most areas, two people walking together should be able to pass a third person comfortably, and different walking speeds should be possible. In areas of intense pedestrian use, sidewalks should be wider to accommodate the greater volume of walkers.*

**Safety** — *Sidewalk Corridors should allow pedestrians to feel a sense of safety and predictability. Sidewalk users should not feel threatened by adjacent traffic.*

**Continuity** — *The walking route along a Sidewalk Corridor should be obvious and should not require pedestrians to travel out of their way unnecessarily.*

**Landscaping** — *Plantings and street trees in the Sidewalk Corridor should create desirable microclimates and should contribute to the psychological and visual comfort of sidewalk users.*

**Social Space** — *Sidewalk Corridors should provide places for people to interact. There should be places for standing, visiting, and sitting. The Sidewalk Corridor should be a place where children can safely participate in public life.*

**Quality of Place** — *Sidewalk Corridors should contribute to the character of neighborhoods and business districts, and strengthen their identity.*



Two people walking together should leave room for a third person to pass.



Sidewalk Corridors should provide places for interaction between people.



- minimum clear passage of 915 mm (3'-0") required
- no limit on running slope or requirement of intermediate landings for a public sidewalk when it follows the grade of the street
- maximum cross-slope for the sidewalk of 1:50 (at least within the minimum clear passage width)

For the complete requirements, consult the ADA Accessibility Guidelines for Buildings and Facilities, Section 14: Public Rights-of-Way.

## A2 REQUIRED SIDEWALK IMPROVEMENTS

### A2.1 Construction of New Streets in New Rights-of-Way

All construction of new public streets will include sidewalk improvements on both sides.

Exception:

For new streets, provision of a sidewalk improvement on only one side will be considered under the following conditions:

- right-of-way has severe topographic or natural resource constraints; or
- street is a cul-de-sac with four or fewer dwelling units.

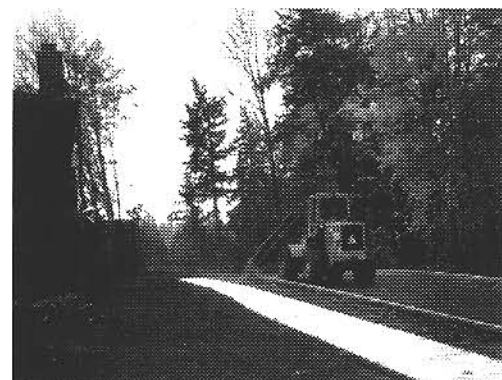
### A2.2 Street Improvements to Existing Rights-of-Way

All improvements to existing streets will include sidewalk construction. Street improvements will be provided with sidewalk improvements on both sides of all streets in Pedestrian Districts and on all City Walkways, and on both sides of most Local Service Walkways.<sup>7</sup>

When the existing right-of-way is too narrow to accommodate both street and sidewalk improvements, the following steps to allow room for a sidewalk improvement should be pursued:

- acquire additional Right-of-Way or Public Walkway Easement
- narrow existing roadway in accord with established minimum roadway standards

<sup>7</sup> Pedestrian Districts, City Walkways, and Local Service Walkways are street classifications for pedestrian use in the Transportation Element of Portland's Comprehensive Plan.



*A new sidewalk constructed as part of a Local Improvement District project.*

there is no pattern of existing sidewalk improvements in the area.

### A3 DESIGNING AND IMPLEMENTING SIDEWALK CORRIDOR IMPROVEMENTS

#### A3.1 Zones in the Sidewalk Corridor

The Sidewalk Corridor is typically located within the public right-of-way between the curb or roadway edge and the property line. The Sidewalk Corridor contains four distinct zones: the *Curb Zone*, the *Furnishings Zone*, the *Through Pedestrian Zone*, and the *Frontage Zone*.

Each of these four zones is discussed in detail in the sections that follow. Table A-1 provides guidelines for recommended widths of these zones under various street conditions.

##### A3.1a Constraints in the Sidewalk Corridor

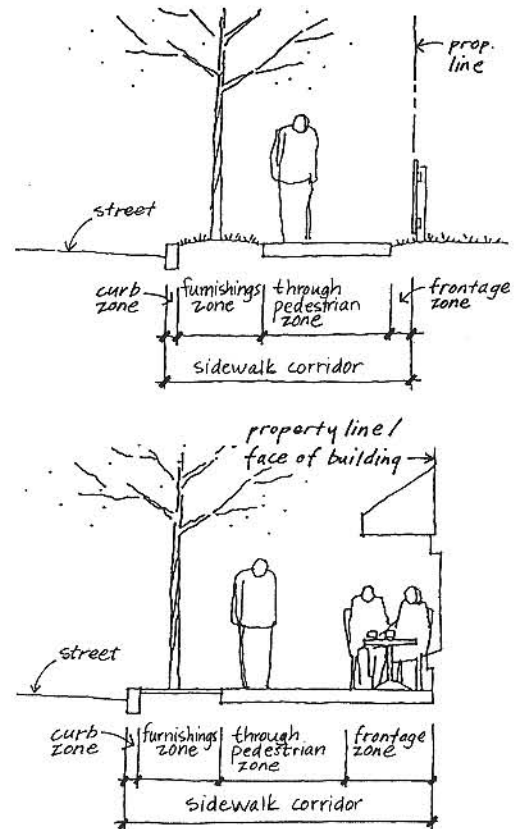
Most of Portland's street system has already been built, and in many cases the existing Sidewalk Corridor is too narrow to accommodate the recommended zone widths. Competing needs for space in a constrained Sidewalk Corridor can be resolved in either of two ways: by compromising on the minimum required clearance for some or all of the zone or by increasing the dimensions of the Sidewalk Corridor.

The resolution of such conflicts in any given case must be based on considerations of balancing the conflicting uses and adjusting the magnitude of the solution to fit the magnitude of the project.

Table A-1, on p. A-12, shows two constrained Sidewalk Corridor conditions that are commonly encountered on existing streets and gives the recommended zone widths for these conditions. In addition, Table A-2, beginning on p. A-14, gives siting criteria for many individual elements normally located within the Sidewalk Corridor of the right-of-way, such as utility poles, signals, signs, etc., with suggested contingency measures where siting criteria cannot be met.

##### A3.1b Widening the Sidewalk Corridor

In some cases, it is possible to increase the dimensions of the Sidewalk Corridor, either through acquisition of right-of-way or public walkway easements, or by reallocation of the overall right-of-way (such as by narrowing travel lanes or reducing the number of lanes). As part of a roadway reconstruction project on a street



Typical sections of Sidewalk Corridor in residential zone, top, and commercial zone, bottom sketch.

purpose. At the corner, the curb is an important tactile element for pedestrians who are finding their way with the use of a cane.

Unless specified otherwise for a special district, the curb should be 150 mm (0'-6") in width, 150 mm (0'-6") in height in residential areas, and 175 mm (0'-7") in height for commercial areas.<sup>13</sup> In order to prevent vehicular movement onto the sidewalk area, it is recommended that the curb height be no less than 100 mm (0'-4") following routine asphalt overlays of the street. An exception to this recommendation is at corners, where the landing height may be reduced in order to accommodate curb ramps.<sup>14</sup>

### A3.3 The Furnishings Zone

The Furnishings Zone buffers pedestrians from the adjacent roadway, and is also the area where elements such as street trees, signal poles, utility poles, street lights, controller boxes, hydrants, signs, parking meters, driveway aprons, grates, hatch covers, and street furniture are properly located. This is the area where people alight from parked cars.

Wherever it is wide enough, the Furnishings Zone should include street trees. In commercial areas, this zone may be paved, with tree wells and planting pockets for trees, flowers and shrubs. In other areas, this zone generally is not paved except for access walkways, but is landscaped with some combination of street trees, shrubs, ground cover, lawn, or other landscaping treatments.

Separating pedestrians from travel lanes greatly increases their comfort as they use the Sidewalk Corridor. This buffer function of the Furnishings Zone is especially important on streets where traffic is heavy, yet along many of these streets the existing Sidewalk Corridor is narrow. Where possible, additional width should be given to this zone on streets with traffic speeds over 55 km/h (35 mph).

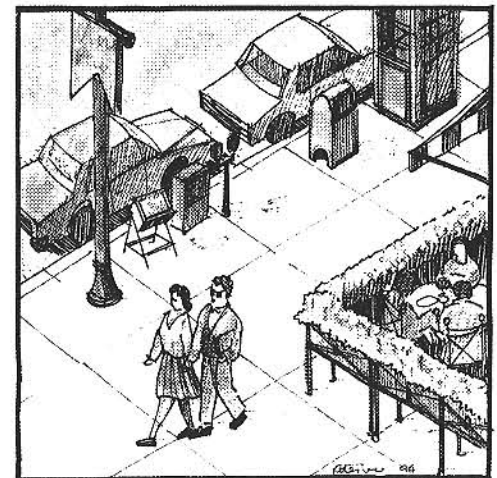
Vending carts may occupy a portion of the Furnishings Zone as permitted under Title 17.25 and 17.26.

#### A3.3a Grates

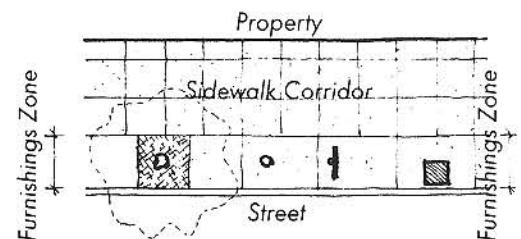
All grates within the sidewalk shall be flush with the level of the surrounding sidewalk surface, and shall be located outside the Through Pedestrian Zone. Ventilation grates and tree well grates shall have openings no greater than 13 mm (0'-1/2") in width.<sup>15</sup>

<sup>13</sup> Standard Plan Nos. 3-130, 3-131, 3-132

<sup>14</sup> See Section B2.5c, Recommended Landing Height at Corners



The Furnishings Zone buffers pedestrians from the roadway and is the place for elements such as street trees, poles, parking meters and street furniture.



Typical alignment of the Furnishings Zone within the Sidewalk Corridor



For a discussion of these and other materials, see Appendix on Materials.

The surface of concrete sidewalks should be scored to match historic patterns within a neighborhood or district where appropriate.<sup>20</sup>

### A3.4b Running Grade

While running grade for accessible routes on private property is limited to 1:20, or 1:12 for ramps, sidewalks in the public right-of-way (or public walkway easement) may be steeper than 1:20, provided they are no steeper than the adjacent roadway.

### A3.4c Cross Slope

Walking surfaces should be relatively level. The preferred cross slope for the entire paved sidewalk corridor is 1:50. If a greater slope greater is anticipated because of unusual topographic or existing conditions, the designer should maintain the preferred slope of 1:50 within the entire Through Pedestrian Zone, if possible.

This can be accomplished either by raising the curb so that the cross-slope of the entire sidewalk can be 1:50, or by placing the more steeply angled slope within the Furnishings Zone and/or the Frontage Zone (see illustration).

If the above measures are not sufficient and additional slope is required to match grades, the cross slope within the Through Pedestrian Zone may be as much as 1:25, provided that a 900 mm (3'-0") wide portion within the Through Pedestrian Zone remains at 1:50 cross slope, as shown in the illustration.

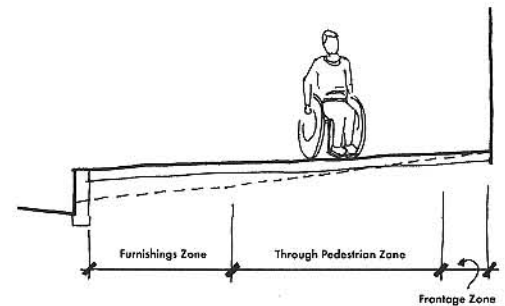
### A3.5 The Frontage Zone

The Frontage Zone is the area between the Through Pedestrian Zone and the property line. This zone allows pedestrians a comfortable "shy" distance from the building fronts, in areas where buildings are at the lot line, or from elements such as fences and hedges on private property.

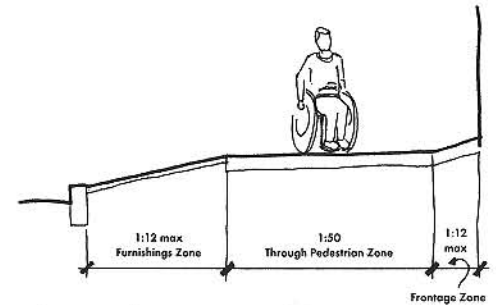
Where no Furnishings Zone exists, elements that would normally be sited in that zone, such as transit shelters and benches, telephone kiosks, signal and street lighting poles and controller boxes, traffic

<sup>20</sup> Standard Plan No. 3-125

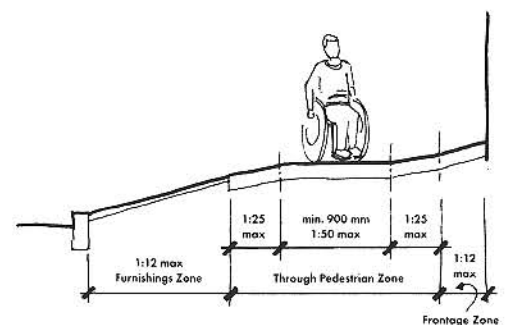
## Sidewalk Corridors



Raising the curb is one approach to maintaining the preferred cross-slope.



The Furnishings Zone and the Frontage Zone may be sloped more steeply, provided the preferred cross-slope is maintained in the Through Pedestrian Zone.



If necessary, the Through Pedestrian Zone may contain slopes up to 1:25, provided a 900 mm (3'-0") wide area with a cross slope of no more than 1:50 is maintained within the zone.

### A3.6 Driveways

#### A3.6a Driveway Aprons

Wherever possible, driveway aprons should not intrude into the Through Pedestrian Zone.

#### A3.6b Preferred Driveway Condition in Sidewalk Corridors

In the preferred condition, the Through Pedestrian Zone is maintained at the sidewalk cross slope of 1:50 across the entire driveway, and is scored with a sidewalk pattern. The sloped portion of the driveway apron is located entirely within the Furnishings Zone and should be sloped to the maximum allowable slope of 1:10 to minimize the width of the sloped apron. Where necessary to keep the driveway apron slope from exceeding 1:10, the sidewalk may be partially dropped to meet the grade at the top of the apron. This is preferred to extending the sloped apron into the Through Pedestrian Zone.<sup>22</sup>

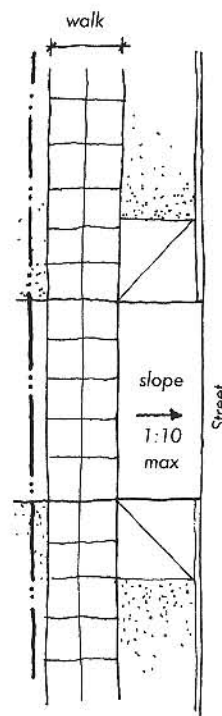
#### A3.6c Constrained Condition for Driveways in Sidewalk Corridors

In cases where sidewalk widths are too constrained for the preferred condition, a “dropped driveway” may be used to meet ADA requirements. Typically, this design will be appropriate only where the Sidewalk Corridor width is less than 2.4 m (8'-0"). The sidewalk scoring grid should be continued across the driveway in the Through Pedestrian Zone.<sup>23</sup>

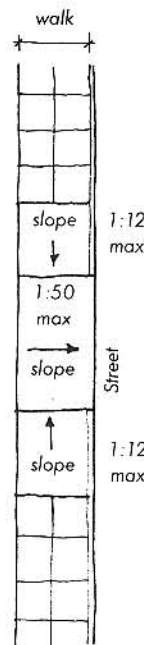
An alternate approach to the constrained condition is to provide a bypass walk at the top of the driveway. However, as this results in a slight detour for the pedestrian, designers should consider this option only where there are problems with the dropped driveway, such as steep grades, or where the dropped driveway results in stormwater drainage problems like puddling or drainage onto private property.<sup>24</sup>

#### A3.6d No Pedestrian Signals on Sidewalks

Occasionally a driveway must be signaled. In such cases, the design treatment of the driveway apron should avoid the appearance of a continuation of the sidewalk. In general, pedestrians do not expect to be controlled by pedestrian signal indications on a sidewalk.



Preferred driveway condition



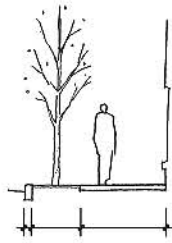
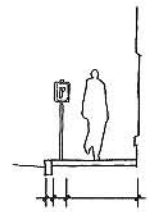
Dropped driveway in constrained width situation (scoring should continue across drive).

<sup>22</sup> See Standard Plans 3-103, 3-104, 3-105B, 3-106, and 3-107B.

<sup>23</sup> See Standard Plans 3-105A and 3-107A.

<sup>24</sup> See Standard Plans 3-105C and 3-107C.

**Table A-1 Recommended Widths for Sidewalk Corridor Zones, continued**

Sidewalk Corridor	Application	Recommended Configuration			
2.7 m (9' - 0")	<p><b>NOT RECOMMENDED</b> for new construction or reconstruction.  <b>Accepted</b> in existing constrained conditions when increasing the Sidewalk Corridor is not practicable.  <i>Note: Minimum Sidewalk Corridor for placement of street trees. Street trees not allowed in Furnishing Zone less than 900 mm (3'-0").</i></p>				
		Curb Zone	Furnishings Zone	Through Pedestrian Zone	Frontage Zone
		150 mm (0' - 6")	900 mm (3' - 0")	1650 mm (5' - 6")	0 m (0' - 0")
less than 2.7 m (9' - 0")	<p><b>NOT RECOMMENDED.</b>  <b>Accepted</b> in existing constrained conditions when increasing the Sidewalk Corridor width is not practicable.</p>				
		Curb Zone	Furnishings Zone	Through Pedestrian Zone	Frontage Zone
		150 mm (0' - 6")	600mm (2' - 0")	1650 mm (5' - 6")	0 m (0' - 0")
			450mm (1' - 6")	1500 mm (5' - 0")	
			300 mm (1' - 0")	1350 mm (4' - 6")	
0 m	1350 mm (4' - 6")				

Note: Metric and English units are not equivalent. Use metric units for metric projects and English units for English projects.



Table A-2. Elements in the Right-of-Way, continued

<b>Controller Boxes, Signal</b>	
<b>Responsibility:</b> Bureau of Traffic Management	<b>Footprint:</b> 430 mm x 500 mm (1'-5" x 1'-8") to 600 mm x 750 mm (2'-0" x 2'-6")
<b>Reference:</b> Standard Construction Specifications section 310	<b>Vertical Profile:</b> 1.0 m (3'-4") tall, typically located on pole with top of box at about 1.75 m (5'-10")
<b>Siting Criteria:</b> Located on signal pole, sited so electrician can see the signals from the controller box, and parallel to walkway. Centered in Furnishings Zone when zone is 900 mm (3'-0") wide or greater.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Placing at back of walk, on acquired R.O.W. or easement if necessary, provided there is no building there and zoning does not permit or require future building at the right-of-way line.</li> <li>• Where a high speed travel lane adjacent to curb would make parallel mounting unsafe, cabinet may be mounted perpendicular to walkway provided maximum possible clearance for the Through Pedestrian Zone is maintained.</li> </ul>	
<b>Drinking Fountains</b>	
<b>Responsibility:</b> Bureau of Water Works	<b>Footprint:</b> 300 mm (1'-0") diameter
<b>Reference:</b> Standard Plan 5-107 or 5-655	<b>Vertical Profile:</b> c. 600 mm (2'-0") tall
<b>Siting Criteria:</b> Located within Furnishings Zone.	
<b>Elevator Doors</b>	
<b>Responsibility:</b> Bureau of Buildings	<b>Footprint:</b> Varies
<b>Reference:</b> Title 24.65.030	<b>Vertical Profile:</b> Flush with sidewalk
<b>Siting Criteria:</b> Locate in Furnishings Zone if wide enough to accommodate.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Elevator doors may encroach into through zone if minimum through zone clearance is maintained; elevator doors which encroach into Through Pedestrian Zone should have same surface coefficient of friction as adjacent sidewalk.</li> </ul>	
<b>Fire Hydrants</b>	
<b>Responsibility:</b> Bureau of Water Works	<b>Footprint:</b> 300 mm (1'-0") diameter
<b>Siting Criteria:</b> Located within Furnishings Zone when zone is 1.2 m (4'-0") wide or greater. Located behind the sidewalk with a minimum of 1.8 m (6'-0") clear for the Through Pedestrian Zone for sidewalks adjacent to curb.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Placing at back of walk, on acquired R.O.W. or easement if necessary, provided there is no building there and zoning does not permit or require future building at the right-of-way line.</li> <li>• Locating hydrant in new curb extension</li> </ul>	
<b>Grates, Tree</b>	
<b>Responsibility:</b> Urban Forestry Manager, Development Services Division	<b>Footprint:</b> 1.2 m x 1.2 m (4'-0" x 4'-0") or 900 mm x 1.5 m (5'-0")
<b>Reference:</b> Design Guide for Public Street Improv. p. 6-39	<b>Vertical Profile:</b> flush
<b>Siting Criteria:</b> Required in Central Business District, Lloyd District, and shopping areas. See also "Street Trees" entry.	

Table A-2. Elements in the Right-of-Way, continued

<b>Poles, Light – Twin Ornamental Style</b>	
<b>Responsibility:</b> Bureau of Traffic Management, Street Lighting Division	<b>Footprint:</b> 600 mm x 600 mm (2'-0" x 2'-0")
<b>Siting Criteria:</b> Centerline of pole 750 mm (2'-6") from face of curb, or centered in Furnishings Zone, whichever is greater; poles and lights aligned along street corridor.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• On a large project, acquiring additional R.O.W. or easement so criteria can be met.</li> <li>• On a large project, developing curb extensions for fixtures like light poles.</li> </ul>	
<b>Poles, Signal</b>	
<b>Responsibility:</b> Bureau of Traffic Management	<b>Footprint:</b> 535 mm x 535 mm (21" x 21") pad maximum
<b>Reference:</b> Title 17.64	<b>Vertical Profile:</b> varies
<b>Siting Criteria:</b> Centerline of pole 750 mm (2'-6") from face of curb., or centered in Furnishings Zone if Furnishings Zone is greater than 1.5 m (5'-0").	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Setting pole closer to curb</li> <li>• Placing at back of walk, on acquired R.O.W. or easement, provided there is no building there and zoning does not permit or require future building at the right-of-way line.</li> <li>• Siting in curb extension on new project</li> </ul>	
<b>Poles, Utility</b>	
<b>Responsibility:</b> Street Management Systems; PGE, Pacific Power	<b>Footprint:</b> 400 mm - 450 mm (16" - 18") diameter
<b>Reference:</b> Street Management Systems Procedures Manual	<b>Vertical Profile:</b> varies
<b>Siting Criteria:</b> 600 mm (2'-0") centerline of pole to face of curb (450 mm [1'-6"] min) with 1.8 m (6'-0") min. clear Through Pedestrian Zone for Pedestrian Districts and City Walkways and 1.5 m (5'-0") min clear for Local Service Walkways (see TE for locations). Place pole on extended property line unless there is a conflict; other placement requires property owner consent.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Setting pole closer to curb</li> <li>• Placing at back of walk, on acquired R.O.W. or easement if necessary, provided there is no building there and zoning does not permit or require future building at the right-of-way line.</li> <li>• On larger project, siting within curb extension</li> <li>• Reduce clear Through Pedestrian Zone to 4'-6" where Sidewalk Corridor (curb to ROW) is 6'-0" wide or less</li> </ul>	

Table A-2. Elements in the Right-of-Way, continued

<b>Signs, Street</b>	
<b>Responsibility:</b> Bureau of Maintenance, BTM	<b>Footprint:</b> 65 mm (0'-2 1/2") diameter support
<b>Reference:</b> Standard Construction Specifications 310.3.02	<b>Vertical Profile:</b> Bottom of sign typically 2.1 m (7'-0") above sidewalk or roadway
<b>Siting Criteria:</b> Within the Furnishings Zone if zone is 900 mm (3'-0") wide or greater.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Placing signs at back of walk</li> <li>• Mounting signs on building under agreement from owner</li> </ul>	
<b>Signs, Traffic</b>	
<b>Responsibility:</b> Bureau of Traffic Management	<b>Footprint:</b> Traffic Control: Support 65 mm (0'-2 1/2") diam., signs vary to 750 mm (2'-6") Directional: Varies
<b>Reference:</b> BTM Rules and Procedures Manual; Manual on Uniform Traffic Control Devices	<b>Vertical Profile:</b> Bottom of sign typically 2.1 m (7'-0") above sidewalk or roadway
<b>Siting Criteria:</b> support located in Furnishings Zone with street edge of sign 300 mm (1'-0") from face of curb when zone is 900 mm (3'-0") wide or greater.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Flag mount traffic signs with support closer to curb than centerline of sign in order to maintain Through Pedestrian Zone</li> <li>• Placing traffic sign at back of walk, provided sidewalk is attached and less than 1.8 m (6'-0") wide</li> <li>• If building is located at back of R.O.W. and there is an on-street parking lane, remove parking and construct curb extension to site traffic signs</li> <li>• If building is located at back of R.O.W. and no parking is at curbside, mount signs on building under agreement from owner</li> </ul>	
<b>Signs, Transit</b>	
<b>Responsibility:</b> Tri-Met	<b>Footprint:</b> 65 mm (0'-2 1/2") diameter support, signs 300 mm (1'-0") wide
<b>Reference:</b> "Bus Stop and Passenger Amenities Guidelines," Tri-Met, June 1995	<b>Vertical Profile:</b> Typically 2.1 m (7'-0") to bottom of sign
<b>Siting Criteria:</b>	
<ol style="list-style-type: none"> <li>1. Use existing sign post or utility pole if possible for sign placement.</li> <li>2. For new posts, centerline of post 450 mm (1' - 6") from face of curb. Street edge of sign minimum 300 mm (1'-0") from face of curb. Bottom edge of sign 2.1 m (7'-0") minimum height above sidewalk.</li> </ol>	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Center post 450 mm (1'-6") from face of curb to obtain minimum clearance.</li> <li>• Placing signs at back of walk on acquired R.O.W. or easement.</li> <li>• If building is located at back of R.O.W., mount signs from building under agreement from owner.</li> </ul>	



Table A-2. Elements in the Right-of-Way, continued

<b>Trash Receptacles</b>	
<b>Responsibility:</b> Bureau of Maintenance (siting), Bureau of Environmental Services (collection).	<b>Footprint:</b> 810 mm (2'-8") diameter
<b>Siting Criteria:</b> Centered in Furnishings Zone when zone is 900 mm (3'-0") wide or greater. Adjacent to narrow side of shelter when transit shelter is present.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Provide receptacles with narrower footprint to maintain Through Pedestrian Zone.</li> </ul>	
<b>Utility Vaults</b>	
<b>Responsibility:</b> Street Systems Management, Bureau of Water Works, utility companies	<b>Footprint:</b> varies
<b>Reference:</b> Street Opening Permit	<b>Vertical Profile:</b> no above ground structures are permitted in the ROW
<b>Siting Criteria:</b> Centered in Furnishings Zone when zone is 900 mm (3'-0") wide or greater. Vaults not permitted in Through Pedestrian Zone. Air vents for Utility Vaults should also be located within the Furnishings Zone.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Provide vault location on private property</li> </ul>	
<b>Water Meters</b>	
<b>Responsibility:</b> Bureau of Water Works	<b>Footprint:</b> varies
<b>Reference:</b> Standard Plan 5-201	<b>Vertical Profile:</b> flush
<b>Siting Criteria:</b> Located within Furnishings Zone, typically 450 mm (1'-6") from face of curb to water service in vault.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Locate meter within Through Pedestrian Zone with slip-resistant meter cover.</li> </ul>	
<b>Water Quality Sampling Stations</b>	
<b>Responsibility:</b> Bureau of Water Works	<b>Footprint:</b> 175 mm x 175 mm (0'-7" x 0'-7")
<b>Reference:</b> Standard Plan 5-108	<b>Vertical Profile:</b> 450 mm (1'-6")
<b>Siting Criteria:</b> Located within Furnishings Zone when zone is 900 mm (3'-0") wide or greater.	
<b>If the Siting Criteria can't be met, consider:</b>	
<ul style="list-style-type: none"> <li>• Placing at back of walk, on acquired R.O.W. or easement if necessary, provided there is no building there and zoning does not permit or require future building at the right-of-way line.</li> </ul>	

# Guidelines for Street Corners

## Section B

### B1 INTRODUCTION

Pedestrian activities are concentrated at street corners. These are the places where ways converge, where walkers wait for crossing opportunities, and where people are most likely to stop and converse with others.

Corners are also the place where access between the crosswalk at street grade and the (usually) raised sidewalk must be provided.

Street corners are important in the larger scheme of street systems. They are the logical location for hardware such as street name signs and traffic control signs or traffic signal bases. The design of the corner affects the speed with which turning traffic can maneuver through an intersection. Visibility at the corner is an issue for all users of the street system.

#### B1.1 Attributes of Good Street Corners

There are five attributes of good street corners within the pedestrian transportation network:

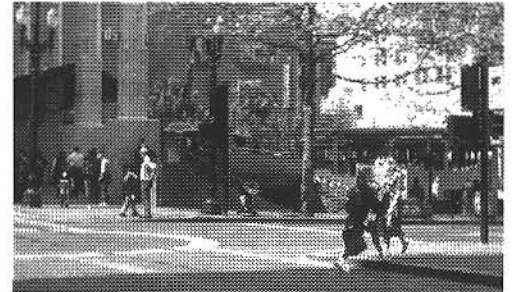
**Clear Space** — *Corners should be clear of obstructions, and have enough space to accommodate the typical number of pedestrians waiting to cross. They should also have enough room for curb ramps, for transit stops where appropriate, and for street conversations.*

**Visibility** — *It is critical that pedestrians on the corner have a good view of the travel lanes and that motorists in the travel lanes can easily see waiting pedestrians.*

**Legibility** — *Symbols, marks, and signs used at corners should clearly indicate what actions the pedestrian should take.*

**Accessibility** — *All corner features, such as ramps, landings, call buttons, signs, symbols, marks, textures, etc., must meet accessibility standards.*

**Separation from Traffic** — *Corner design and construction must be effective in discouraging turning vehicles from driving over the pedestrian area.*



*Corners are the places where ways converge, where walkers wait to cross, and where people stop to converse or get their bearings.*



*Corners should be accessible, clear of obstructions, and provide good visibility and separation from traffic for pedestrians.*

**B2.1b Exceptions to Obstruction-Free Area**

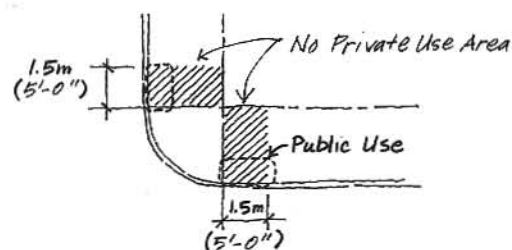
Exceptions to the obstruction-free guideline include bollards to separate pedestrians from traffic, and low posts for pedestrian call buttons at actuated signal controls.

**B2.1.c Utility Poles**

Frequently there are existing utility poles at the corners. Ideally, when a utility pole within the Obstruction-Free Area is to be replaced, it would be replaced outside the area. In many cases, the pole at the corner is associated with lines running on both streets of the intersection and it may be difficult to relocate the pole. If possible, two poles should be employed so that the single pole can be removed from the Obstruction-Free Area.

**B2.2 "No Private Use" Area**

To provide enough space for all the hardware that must be accommodated near the corner area, and to ensure good visibility at the corners, private temporary uses such as street vendors, sidewalk cafes, A-boards and newspaper vending machines are not permitted in an area 1.5 m (5'-0") back from the extension of the property line at any corner, as shown in the adjacent illustration.



"No private use" area on either side of a corner. Public uses are encouraged to locate within the Furnishings Zone of this area.

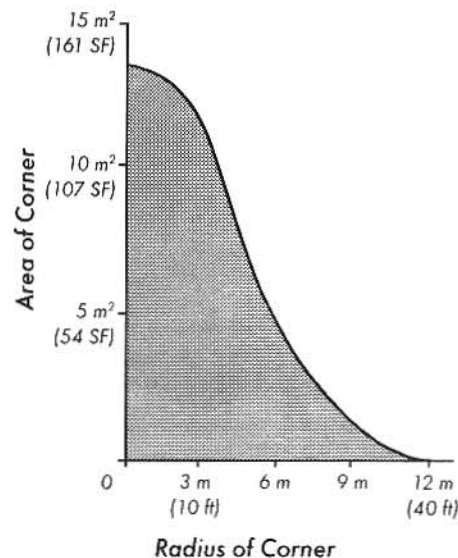
**B2.3 Adequate Pedestrian Area at Street Corners**

Street corners should be large enough to adequately serve their multiple public functions. They must accommodate pedestrians walking through, those waiting to cross, and those who meet and stop to talk. The greater the pedestrian volume, the greater the area needed at each corner. Corners in Pedestrian Districts and corners that accommodate transit stops require the greatest area.

Unfortunately, other design considerations sometimes erode the space available for pedestrian activities at corners. Of particular concern is the choice of curb radius. As curb radius increases, the area of the corner decreases, as shown in the graph at the right.

**B2.3a Determining Adequate Pedestrian Area**

Several factors determine the ideal pedestrian area at the street corner. Among these are the expected volume of pedestrians on each sidewalk, the length of the expected pedestrian waiting time at the corner, and the size of the Through Pedestrian Zone



Graph showing how pedestrian area is reduced by increasing the curb radius at a typical corner where two 3.7 m (12 ft) sidewalks intersect. Note that pedestrian area begins to fall off sharply as the radius gets larger than 3 m (10'-0").

whether there is parking or a bike lane (or both) between the travel lane and the curb.

The designer must balance all the factors, keeping in mind that the chosen radius should be the smallest possible for the circumstances. The radius may be as small as 900 mm (3'-0") where there are no turning movements, or 1.5 m (5'-0") where there are turning movements and there is adequate street width and a larger effective curb radius created by parking or bike lanes.

**B2.4c Parking Control and Corner Radii**

Designers sometimes consider that on-street parking will begin or end at the point of tangency or point of curvature of the corner radius. In practice, however, this point is not always evident in the field. Parking control should not be a factor in selecting curb radius.

**B2.5 Curb Ramps**

Curb ramps are the design elements that allow all users to make the transition in grade from the street to the raised sidewalk. There are a number of factors to be considered in the design and placement of curb ramps at corners.

**B2.5a Ramps and Landings**

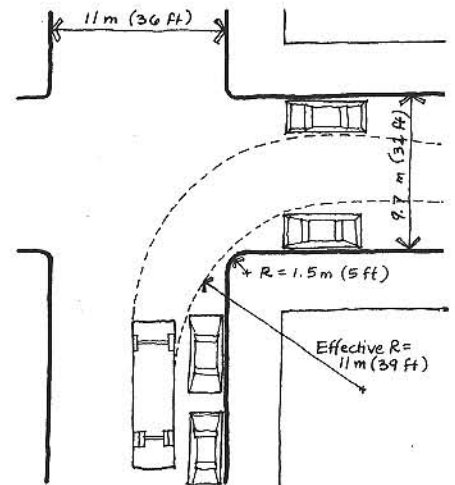
The ADA defines two types of curb ramp systems, "perpendicular ramps" and "parallel ramps." The first has a ramp into a crosswalk, while the second has a ramp into a landing that is flush with the street surface, sometimes called a "dropped landing." There are so many hybrid possibilities between these two types that it is perhaps easier to conceptualize in terms of simple ramps and landings. Refer to Table B-1 for Typical Curb Ramp Systems.

The basic principle is that every ramp must have a landing at the top and at the bottom. The maximum ramp slope in the right-of-way is 1:12 with a cross slope of no more than 1:50. The minimum width of a ramp is 915 mm (3'-0").

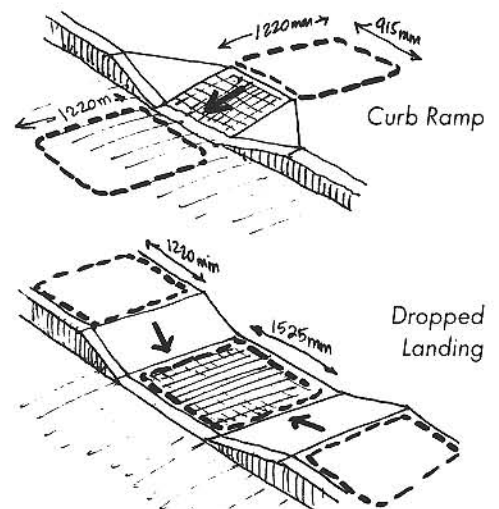
The landing at the top of a ramp should be at least 1220 mm (4'-0") long and at least the same width as the ramp itself. It should slope no more than 1:50 in any direction.

If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway. The landing, 1220 mm (4'-0") long,

**Street Corners**



Where there is an effective curb radius sufficient for turning vehicles, the actual curb radius may be as small as 1.5 m. (5 ft).



Basic principle: Provide a landing at the top and bottom of every ramp.



A transition from the curb height along the sidewalk corridor may be achieved through the use of a parallel ramp (see b, Table B-1), or by raising the level of the street in the intersection slightly. Many existing corners in Portland have curb heights of 75 mm or less due to pavement overlays.

The low-landing strategy involves tradeoffs, since the reduced curb height provides less protection from storm water and from turning vehicles than a higher curb. Care in locating inlets can solve drainage problems. A higher curb may be desired where low-floor transit stops are sited, or where vehicle speeds are high, or in the vicinity of rail crossings.

Given the advantages of a curb as noted in A3.2, it is not recommended to drop the curb to street level for the entire corner area.

**B2.5d Number of Ramps**

Ideally, there should be a separate curb ramp for each crosswalk at a corner; that is, two ramps at most corners. It is also preferred to use curb ramps rather than dropped landings. However, there are a number of factors that influence the number and design of curb ramps at a corner, including sidewalk width, corner radius, adjacent materials, and crosswalk location.

In the case of large radius corners, it may be possible to use two ramps only if the crosswalks are moved away from the direct line of the sidewalk corridor. This design has the disadvantage of moving the stop line farther back, but the advantage that the pedestrian in the crosswalk has turning cars approaching from the side rather than the rear.

A number of typical design placements of curb ramps are shown in Table B-2.

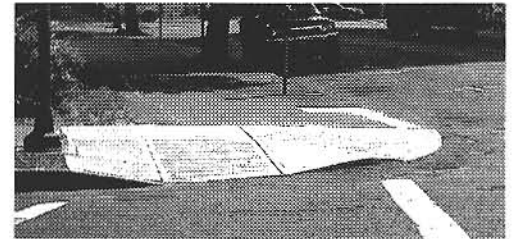
**B2.5e Ramp Orientation**

Ideally, the curb ramp is oriented so that the fall line of the ramp is both parallel to the crosswalk and perpendicular to the curb. Where other conditions are not constrained, the designer should locate the ramp so that both conditions can be met.

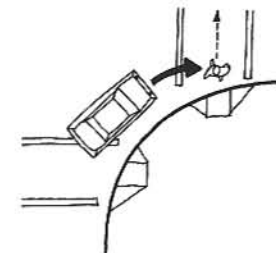
Where the curb radius is 3 m (10'-0") or less, and the sidewalk corridor on each intersecting street is 3 m (10'-0") or more, the fall lines of the ramp should be parallel to the crosswalks. Where curb radii are larger, or sidewalk corridors are narrower, curb



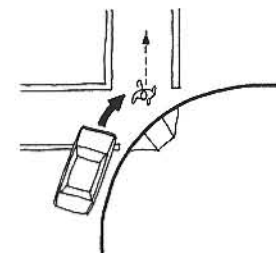
*In the past, many corners in Portland were built with a single diagonal ramp.*



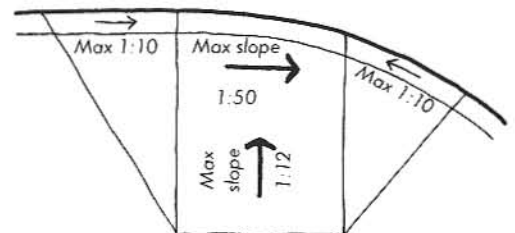
*Two ramps is the preferred design.*



*Turning vehicle approaches pedestrian from the side where ramps are separated.*



*Turning vehicle approaches pedestrian from the rear at a single diagonal ramp.*



*When curb radius is 3 m (10'-0") or less, the curb ramp should be oriented parallel to the crosswalk*

provide additional space at the corner (simplifying the placement of elements like curb ramps), and allow pedestrians to see and be seen before entering the crosswalk.

### ***B2.7a Locations for Curb Extensions***

Curb extensions may be used at any corner location, or at any mid-block location where there is a marked crosswalk, provided there is a parking lane into which the curb may be extended. Curb extensions are not generally used where there is no parking lane because of the potential hazard to bicycle travel.

In Pedestrian Districts, curb extensions are a preferred element for corner reconstruction except where there are extenuating design considerations such as the turning radius of the design vehicle, or transit and on-street parking factors.

### ***B2.7b Design of Curb Extensions***

Curbs may be extended into one or both streets at a corner. The principles of an Obstruction-free Area and No Private Use Area also apply to the curb extension.

The design of curb extensions is guided by Standard Plan No. 3-126. Additional guidelines can be found in Table C-2, Crosswalk Toolbox.

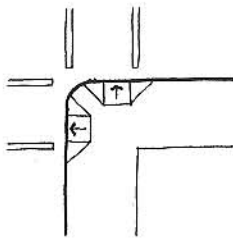
Curb extensions may include transit stops, eliminating the need for the bus to pull out of the travel lane to load and unload passengers. For design of transit curb extensions, consult the *Tri-Met Planning and Design for Transit Handbook*.<sup>3</sup>



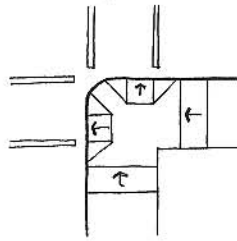
Curb extensions shorten the crossing distance and allow pedestrians to see and be seen before entering the crosswalk.

<sup>3</sup> *Planning and Design for Transit Handbook: Guidelines for implementing transit supportive development*. January, 1996. Tri-Met (Tri-County Metropolitan Transportation District of Oregon, 4012 SE 17th Ave., Portland, Oregon 97201).

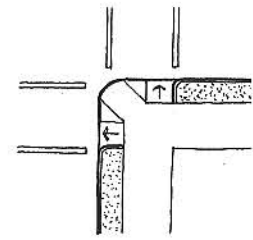
**Table B-2. Typical Curb Ramp Placements**



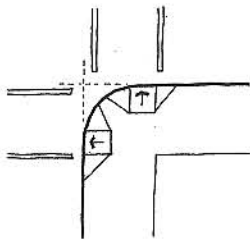
a. With a 1.5 m (5 ft) radius on a typical 3.7 m (12 ft) sidewalk corridor and a 75 mm (3 in) landing height, placing two ramps is easy.



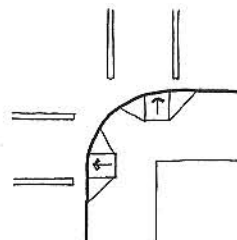
b. A 75 mm (3 in) landing height can be achieved by ramping the entire sidewalk corridor down in advance of the corner.



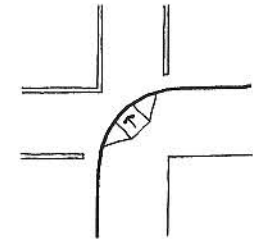
c. Curb ramps may have returned curb in place of a side wing where the adjacent area is not paved for pedestrians.



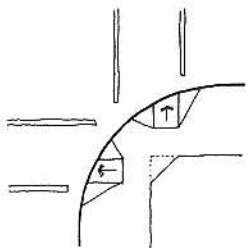
d. 3 m (10 ft) radius on 3.7 m sidewalk corridor allows two ramps with a slight crosswalk offset.



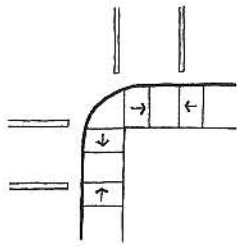
e. 4.6 m (15 ft) radius with two ramps, offset crosswalk.



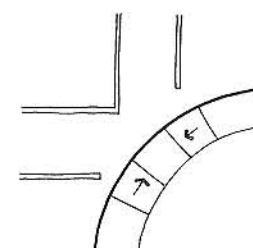
f. 4.6 m (15 ft) radius with a single diagonal ramp, minimum 1220 mm (4 ft) landing length required in crosswalk. Not recommended for new construction.



g. 7.6 m (25 ft) radius on 3.7 m (12 ft) sidewalk corridor, two ramps are possible. Note additional 1.5 m x 1.5 m (5 ft x 5 ft) triangle of R.O.W. required for adequate passage. Not recommended.



h. 2 m (7 ft) sidewalk corridor with 3 m (10 ft) radius; two dropped landings. Not recommended. The preferred design would acquire additional R.O.W.



i. 2 m (7 ft) sidewalk corridor and 9 m (30 ft) radius, with a single dropped landing. Not recommended. The designer may consider using a slip lane with a refuge island if this radius is necessary.

# Guidelines for Crosswalks

## Section

# C

### C1 INTRODUCTION

Crosswalks are a critical element of the pedestrian network. It is of little use to have a complete sidewalk system if pedestrians cannot safely and conveniently cross intervening streets. Safe crosswalks support other transportation modes as well. Transit riders, motorists, and bicyclists all may need to cross the street as pedestrians at some point in their trip.

#### C1.1 Attributes of Good Crosswalks

There are several attributes of good crosswalks. These can be realized through a variety of tools and designs. Some of these tools are described in the guidelines that follow.

**Clarity** — *It is obvious where to cross and easy to understand possible conflict points with traffic.*

**Visibility** — *The location and illumination of the crosswalk allows pedestrians to see and be seen by approaching traffic while crossing.*

**Appropriate Intervals** — *There is a reasonable match between the frequency of good crossing opportunities along a street and the potential demand for crossing.*

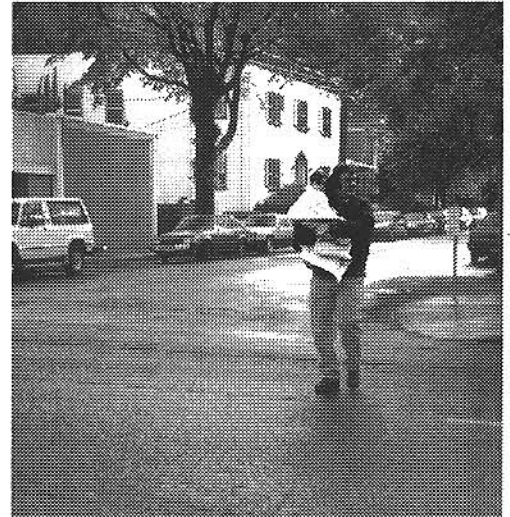
**Short wait** — *The pedestrian does not have to wait unreasonably long for an opportunity to cross.*

**Adequate crossing time** — *The time available for crossing accommodates users of all abilities.*

**Limited exposure** — *Conflict points with traffic are few and the distance to cross is short or is divided into shorter segments with refuges.*

**Continuous path** — *The crosswalk is a direct continuation of the pedestrian's travel path.*

**Clear crossing** — *The crosswalk is free of barriers, obstacles and hazards.*



Almost every pedestrian trip includes crossing the street.



## C2 DESIGNING AND IMPLEMENTING CROSSWALK IMPROVEMENTS

### C2.1 Crossing Treatments

In these guidelines, the term “crossing treatment” refers to physical treatment of a crosswalk to make it safer and more convenient for pedestrian travel. A crossing treatment may include the use of such tools as *median refuges*, *curb extensions*, or *pavement markings* at crosswalks. Many of these tools are presented in detail in **Table C-2, Crosswalk Toolbox**, beginning on p. C-14.

Designers should examine the need for crossing treatments in all new projects or retrofits to existing streets.

### C2.2 Frequency of Crossing Opportunities

In general, whatever their mode, people will not travel out of direction unless it is necessary. This behavior is observed in pedestrians, who will cross the street wherever they feel it is convenient.

The distance between comfortable opportunities to cross a street should be related to the frequency of uses along the street that generate crossings (shops, transit stops, etc.). In areas with many such generators, like Pedestrian Districts, opportunities to cross should be very frequent. In areas where generators are less frequent, good crossing opportunities may also be provided with less frequency.

Where:	Generally not farther apart than:	Generally not closer together than:
In Pedestrian Districts and Main Street Pedestrian Design Areas	60 - 90 m (200 - 300 ft) (where blocks are longer than 120 m [400 ft])	45 m (150 ft)
On City Walkways	Varies, based on adjacent uses. Do not prohibit crossing for more than 120 m (400 ft)	45 m (150 ft)

**Table C-1, Frequency of Crossing Treatments**

What constitutes a short crossing distance will vary given the surroundings. In general, 15 m (50'-0") is the longest uninterrupted crossing a pedestrian should encounter at an unsignalized crosswalk<sup>8</sup>.

There are several tools that the designer can employ to minimize crossing distance. One of the simplest is to use a small radius for the corner (see section B2.4). Use of other tools is discussed below, and specific information about each tool can be found in Table C-2, Crosswalk Toolbox.

### ***C2.5a Curb Extensions***

Curb extensions (also sometimes called "curb bulbs" or "bulb-outs") are one way to reduce the crossing distance for pedestrians. Curb extensions allow pedestrians to move safely beyond a lane of parked cars to a position where they can see and be seen as they begin their crossing.

Curb extensions can also provide an area for accessible transit stops and other pedestrian amenities and street furnishings.

### ***C2.5b Refuge Islands***

Refuge islands allow pedestrians to cross one segment of the street to a relatively safe location out of the travel lanes, and then continue across the next segment in a separate gap. At unsignalized crosswalks on a two-way street, a median refuge island allows the crossing pedestrian to tackle each direction of traffic separately. This can significantly reduce the time a pedestrian must wait for an adequate gap in the traffic stream.

### ***C2.5c Grade Separation of Pedestrians***

Because pedestrians tend to cross where it is most convenient, grade-separated crossings are rarely successful where there is any possibility of gaps in the traffic stream that are adequate for crossing at grade.

Use grade-separated crossings only where it is not possible to provide an at-grade facility. Examples include crossing a freeway or major highway, a rail yard, or a waterway. See Table C-2 for guidelines on grade-separated crossings.

<sup>8</sup> The 15 m (50 ft) distance is a rough rule-of-thumb is based on discussions with assorted practitioners. Crossing distance may be reduced for distances less than this.



*Very long crosswalks discourage pedestrian travel. Designers should avoid making crosswalks longer than 15 m (50'-0"). For wider streets, consider the use of median refuge islands.*



*Curb extensions can shorten crossing distance.*

to step off the curb and begin crossing. The length of the clearance interval should be calculated based on crossing the entire street from curb ramp to curb ramp with an assumed crossing speed of 1.2 m/s (4 ft/sec). This assumed crossing speed may be reduced to 1.1 m/s (3.5 ft/sec) for pedestrians with disabilities.

Generally, the WALK interval is made as long as possible given the length of the green signal phase for traffic in the same direction; that is, the WALK interval is equal to the length of the green signal minus the clearance interval. Where the green signal phase for traffic would otherwise be shorter, the minimum time required to operate the WALK interval and clearance interval may control the length of the phase.

### ***C2.7b Conflicting Movements of Pedestrians and Vehicles at Signals***

Conflicts between vehicle movements and pedestrian movements at signals should generally be avoided, where possible.

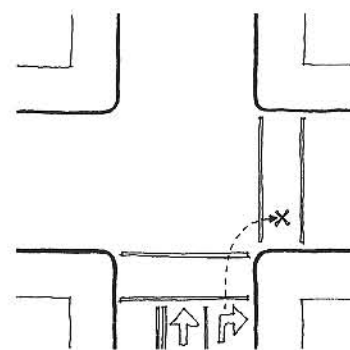
In the case where an arrow signal is used to indicate a mandatory traffic turning movement, the green arrow phase is never actuated at the same time as the walk signal for the adjacent crosswalk across which the traffic will turn.

In other cases, such as at a “T” intersection or a turn-only lane, the traffic may have an ordinary green signal (as opposed to a mandatory arrow), and both the green signal and the walk signal are actuated simultaneously. Motorists are expected to yield to pedestrians in the crosswalk in this situation, but do not always recognize their duty, especially during the pedestrian clearance interval.

A dedicated pedestrian-only phase may be considered to alleviate these potential conflicts, depending on the length of the signal cycle, the traffic impacts and the relative traffic and transit classifications of the street. This treatment is especially appropriate in Pedestrian Districts.

### ***C2.7c Pedestrian-Only Signals***

Pedestrian-only traffic control signals are used at midblock location, where pedestrian volumes meet the warrants established in the Manual on Uniform Traffic Control Devices (4C-5). Pedestrian-only signals are always pedestrian-activated.



*The movements of traffic in turn lanes may conflict with pedestrian crossing.*

believe the button is inoperative. Uncertainty about the length of delay is one factor in the perception that push buttons are pedestrian-unfriendly.

There may be technological solutions to the uncertainty problem. One possibility is to have a lighted call button (similar to an elevator call button) to let pedestrians know their request for a walk signal has been received. Such devices are commonly used in Europe, but are not without their technical difficulties.

A lighted call button could also be useful in those locations where the signal is operated in different modes depending on the time of day. In some locations, the call button is only needed during peak hours; at other times the signal operates in a fixed-time mode. In this case, the call button might be lighted at all times when the WALK phase will occur on every cycle.

Another possibility for reassuring pedestrians that their call for a walk signal has been received is to install an LED display above the existing pedestrian signal. The display could count down the number of seconds remaining to the WALK signal.

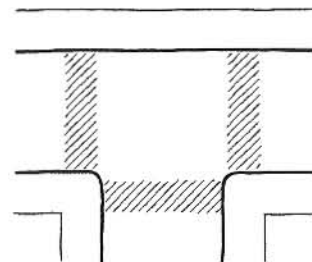
The use of passive detection for pedestrians waiting to cross could help to reduce frustrations for both pedestrians and motorists. The pedestrian needs to take no action in order to get a WALK phase. The passive detector can also sense if the pedestrian crosses in a gap before the WALK is actuated, and cancel the call for WALK, so that traffic is not stopped unnecessarily.

Passive detection may also be useful for detecting pedestrians who need more time to cross. The detection could cause either the WALK or the clearance interval to be extended until a slow-moving pedestrian has completed crossing.

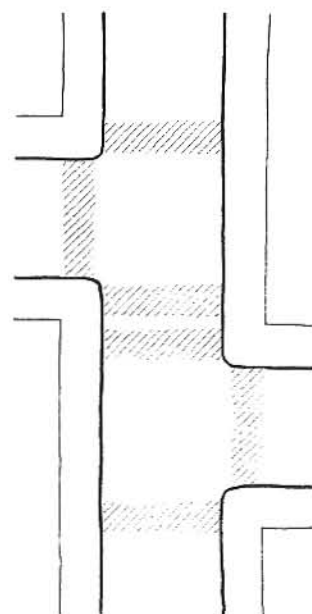
Currently, there is some concern that the passive detector may not detect all waiting pedestrians, or conversely, may be oversensitive and detect “phantom” pedestrians. Passive detection technology is fairly new and is likely to improve in the future.

### C2.8 Crosswalks at “T” and Offset Intersections

This section addresses the special crossing conditions encountered at “T” and offset intersection with guidelines for pavement markings, curb ramps, parking control, pedestrian signals, and reduction of excess crosswalks.



Typical “T” intersection, showing all legal crosswalks



Typical offset intersection, showing all legal crosswalks



In general, enhancement of the outer crosswalks and elimination of the inner crosswalks would be the preferred design at most offset intersections. However, other configurations may be chosen based on the particular site.

The pavement markings alone are enough to eliminate the crosswalks that are not marked, under ORS 801.220. The use of “No Pedestrian Crossing” signs is strongly discouraged. However, a sign encouraging pedestrians to use the enhanced crosswalks, “Pedestrians Use Marked Crosswalk,” may be used.

**C2.8c Curb Ramps at “T” and Offset Crosswalks.**

At “T” and offset crosswalks, as at all crosswalks, a curb ramp should be located at each end of each legal crosswalk.

*Exception:*

Where curb ramps are installed as part of a project along existing streets with frequent “T” or offset intersections, if the cost of installing a ramp at every crosswalk is out of proportion to the cost of the project, it is acceptable to install curb ramps for one crosswalk of each pair. It is not necessary to prohibit crossing at the parallel crosswalk. For any crosswalk where ramps are not installed, there must be an accessible crosswalk within 30 m (100'-0”).

**C2.8d Parking Control at “T” and Offset Intersections**

At “T” and offset intersections, additional attention to the control of parking through signage may be warranted. See Table C-2, Crosswalk Toolbox, *Parking Control*.

**C2.8e Pedestrian Signals at “T” and Offset Crosswalks**

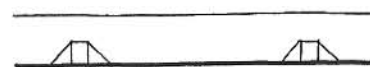
At a “T” intersection, all traffic from the “T” street must make a turning movement. There may be a perceived conflict between the turning movements on a green signal and pedestrians crossing on the WALK signal at the same time, although the traffic is supposed to yield to the pedestrians.

One design to reduce this conflict, where there is enough room, and where there is no adverse impact on pedestrian line of travel, is to have the crosswalk land on a refuge island between the right-turn and left-turn lanes.

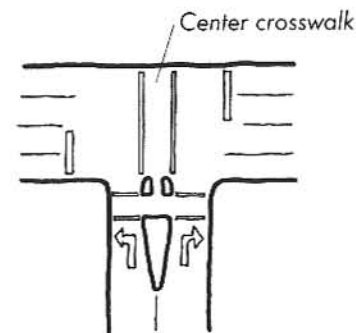
**Crosswalks**



Sign for use where crosswalks are removed by enhancing adjacent crosswalks.



Curb ramps are located at each end of each crosswalk at a “T”



To avoid conflict between pedestrian crossings and turning movements at a “T” intersection, the crosswalk can land on a refuge island between the right- and left-turn lanes.

**C2.9b Modern Roundabouts**

The modern roundabout is an intersection treatment that appears to have some benefits in terms of traffic operation and safety over conventional signalized intersections. However, the benefits of roundabouts for pedestrian safety and convenience are not clear.

Of particular concern is the ability of visually impaired pedestrians, trained to use audible cues from the traffic movements, to judge when it is safe to cross.

A second concern is the distance pedestrians may need to travel out of direction to negotiate the roundabout.

The typical modern roundabout includes approach median islands (sometimes called splinter islands), which should serve as pedestrian refuges at the crosswalks. Crosswalks should be marked to show pedestrians and motorists the correct pedestrian crossing location.

**C2.9c Traffic Circles**

Traffic circles are used as traffic calming devices to slow traffic speeds. The circles are typically placed in the center of intersections.

Pavement markings should be used where necessary to indicate offset locations of crosswalks around traffic circles. This may be needed to guide pedestrians away from the vehicle travel path around the circle.

**C2.9d Slow Points**

Slow point treatments are used as a traffic calming device to slow traffic speeds by narrowing the travel lanes, usually with a center median. This type of treatment can be installed at a midblock crosswalk, providing a refuge island for crossing pedestrians.

**C2.9e Traffic Diverters and Street Closures**

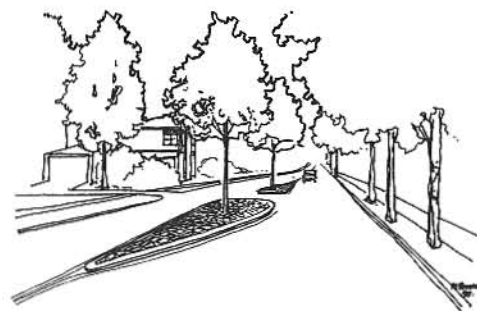
Where traffic diverters or street closures are used for traffic management, pedestrian access needs to be considered and, where possible, should be maintained.

**C2.10 Prohibiting Pedestrian Crossing**

Typical intersections should allow pedestrians to cross in all the normal alignments. Prohibiting crossing should be considered only in limited circumstances. See Table C-2, Crosswalks Toolbox, *No Pedestrian Crossing*.



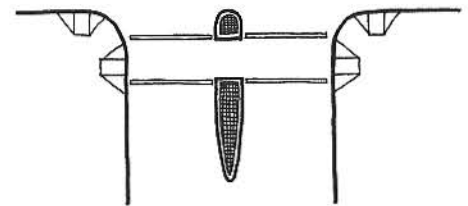
Traffic circle



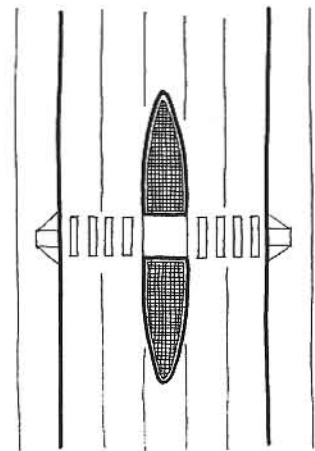
Slow point

<h3>Grade-separated crossing</h3> <p><b>Purpose:</b> To completely separate pedestrian travel from vehicular travel</p> <p><b>Where to use:</b> Use only where it is not possible to provide an at-grade facility. Examples include crossing a freeway or major highway, a rail yard, or a waterway.</p> <p><b>Guidelines:</b></p> <ul style="list-style-type: none"> <li>• The crossing must be accessible.</li> <li>• Grade changes should be minimized to the greatest extent possible.</li> <li>• Shared bicycle/pedestrian facilities should have a clear passage width of at least 3.7 m (12'-0").</li> </ul>
<h3>Median refuge island</h3> <p><b>Purpose:</b> To minimize pedestrian exposure during crossing by shortening crossing distance and increasing the number of available gaps for crossing.</p> <p><b>Reference:</b> MUTCD, Part V</p> <p><b>Where to use:</b> Appropriate where the roadway to be crossed is greater than 15 m (fifty feet) wide or more than four travel lanes; can be used where distance is less to increase available safe gaps. Use at signalized or unsignalized crosswalks.</p> <p><b>Guidelines:</b></p> <ul style="list-style-type: none"> <li>• The refuge island must be accessible, preferably with an at-grade passage through the island rather than ramps and landings.</li> <li>• A median refuge island should be at least six feet wide between travel lanes and at least twenty feet long. On streets with speeds higher than 40 km/h (25 mph) there should also be double centerline marking, reflectors, and "KEEP RIGHT" signage.</li> <li>• If a refuge island is landscaped, the landscaping should not compromise the visibility of pedestrians crossing in the crosswalk. Tree species should be selected for small diameter trunks and tree branches should be no lower than 4.3 m (14'-0"). Shrubs and ground plantings should be no higher than 450 mm (1'-6").</li> <li>• Refuge islands at intersections should have a median "nose" that gives protection to the crossing pedestrian (see illustration).</li> </ul>
<h3>Midblock crosswalk</h3> <p><b>Purpose:</b> o provide a crossing opportunity where there is no intersection</p> <p><b>Reference:</b> Rule OPR-4401 of the BTM Rules and Procedures Manual</p> <p><b>Where to use:</b> At midblock locations, crosswalks are marked where</p> <ul style="list-style-type: none"> <li>• there is a demand for crossing, and</li> <li>• there are no nearby marked crosswalks.</li> </ul> <p><b>Guidelines:</b> Midblock crosswalks are always indicated with pavement markings and warning signs.</p>

**Table C-2**  
**Crosswalk Toolbox,**  
*continued*



*Typical median refuge island at an intersection, with median nose and at-grade passage for crosswalk*



*Typical median refuge island at midblock, with at-grade passage for crosswalk*

## Pavement markings for crosswalks

**Purpose:** To indicate to pedestrians the appropriate route across traffic, to facilitate crossing by the visually impaired, and to remind turning drivers of potential conflicts with pedestrians

**Reference:** MUTCD (3B-18), the Oregon Vehicle Code (ORS 811.550(17)), and Rule OPR-4401 of the BTM Rules and Procedures Manual

**Where to use:** At signalized intersections, all crosswalks should be marked.

At unsignalized intersections, crosswalks should be marked when they

- help orient pedestrians in finding their way across a complex intersection, or
- help show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts, or
- help position pedestrians where they can best be seen by oncoming traffic.

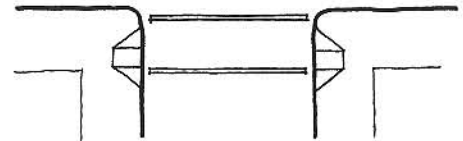
At midblock locations, crosswalks are marked where

- there is a demand for crossing, and
- there are no nearby marked crosswalks.

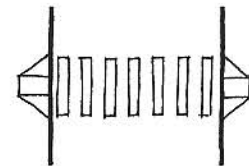
### Guidelines:

- Use parallel pavement markings for signalized or stop-controlled crosswalks. A parallel pavement marking consists of two 300 mm (1'-0") wide stripes placed 3 m (10'-0") apart (inside dimension) to delineate the outside edges of the crosswalk, parallel to pedestrian travel. Where there is a compelling reason to narrow the crosswalk, the inside dimension between stripes may be reduced to as narrow as 1.9 m (6'-0").
- Use ladder pavement markings for crosswalks at school crossings, across arterial streets for pedestrian-only signals, at midblock crosswalks, and where the crosswalk crosses a street not controlled by signals or stop signs. A ladder pavement marking consists of 600 mm (2'-0") wide, 3 m (10'-0") long bars on 1.5 m (5'-0") centers, with the bars placed perpendicular to pedestrian travel.
- Where the Sidewalk Corridor is wider than 3.7 m (12 ft) the crosswalks may be wider than the standard width to match the Sidewalk Corridor.
- At midblock locations, marked crosswalks are always accompanied by signing to warn drivers of the unexpected crosswalk.
- The crosswalk should be located to align as closely as possible with the Through Pedestrian Zone of the Sidewalk Corridor.
- Where traffic travel lanes are adjacent to the curb, crosswalks should be set back a minimum of 600 mm (2'-0") from the edge of the travel lane.

**Table C-2**  
**Crosswalk Toolbox,**  
*continued*



*Parallel pavement markings*



*Ladder pavement markings*



**Table C-2**  
**Crosswalk Toolbox,**  
*continued*

<p><b>Porkchop refuge island</b> (see Median refuge island)</p>
<p><b>Purpose:</b> to shorten crossing distances and provide a refuge for pedestrians between separated traffic movements</p>
<p><b>Where to use:</b> Use with right turn slip lanes, modern roundabouts, or other intersection treatments where pedestrians benefit from a refuge. Can also use at "T" intersections between right-turning and left-turning travel lanes. Note that right-turn slip lanes are not recommended in areas of high pedestrian use.</p>
<p><b>Guidelines:</b></p> <ul style="list-style-type: none"> <li>• Refuge must be accessible.</li> <li>• Crosswalks should be indicated with pavement markings to show pedestrians and motorists the correct crossing location.</li> <li>• Generally, the crosswalk should be set back 6 m (20 ft) from the point where the traffic merges, so that pedestrians cross behind the first vehicle, and should be oriented perpendicular to the line of vehicle travel.</li> </ul>
<p><b>Raised crosswalk or raised intersection</b></p>
<p><b>Purpose:</b> to eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street</p>
<p><b>Where to use:</b> use only in very limited cases where a special emphasis on pedestrians is desired; review on case-by-case basis</p>
<p><b>Guidelines:</b></p> <ul style="list-style-type: none"> <li>• Use detectable warnings at the curb edges to alert vision-impaired pedestrians that they are entering the roadway.</li> <li>• Approaches to the raised crosswalk may be designed to be similar to speed humps, or may be designed so they do not have a slowing effect (for example, on emergency response routes).</li> </ul>

# Guidelines for Pathways and Stairs

## Section D

### D1 INTRODUCTION

Pathways and stairs differ from the City's public sidewalks in a number of ways. While the City's sidewalks are clearly defined as public walkways, the public nature of pathways and stairs is sometimes less obvious. In some cases, they use different materials. The selective use of pathways and stairs allows us to address constraints in our transportation system so that opportunities for public pedestrian access are not lost.

Pathways and stairs can serve as pedestrian connections, to shorten walking trips in places where the street system is discontinuous or where blocks are large. They may be located in unimproved street rights-of-way, in public walkway easements on private property, or on off-street paths in parks or other open space areas.

Pathways can also serve in place of a standard sidewalk along a roadway in certain cases. There are many instances in Portland where providing the full urban standard of concrete curb and sidewalk is difficult due to factors such as steep terrain, inadequate roadway drainage, significant mature trees, and right-of-way constraints.

Where there are existing roadways without pedestrian improvements, these alternative pathways can be provided as interim improvements, using techniques or materials that are alternatives to the City standard of a concrete sidewalk with curb and storm drain. Alternative pathways can be used on arterial streets where it is not anticipated that a full urban standard will be built in the foreseeable future, if at all.

This section lays out guidelines, first for pathways and stairs that serve as pedestrian connections, and then for alternative pathways along a roadway.

#### D1.1 Attributes of Good Pathways and Stairs

**Security** -- *Stair and path placement, landscaping, and lighting all contribute to making walkers feel safe as they traverse the connection, and visibility to and from the connector is maintained to ensure "eyes on the path."*



*The use of pathways and stairs in the pedestrian network ensures that opportunities for public access are not lost.*

“Sidewalk” is defined in Titles 16 and 17 of the City’s Code, and the definitions are slightly different. In Title 16, the term refers to the area between the curb or roadway edge and the property line, whether or not it is improved. In Title 17, the term is used to refer to the sidewalk improvement itself.

Pathways will require some level of ongoing maintenance, and maintenance of sidewalks is also defined in the City Code, Chapter 17.

Under Chapter 17.28, responsibility for the construction, reconstruction, maintenance, and repair of the sidewalk improvement, as well as liability for any damages or injuries resulting from defective conditions of the sidewalk, is assigned to the abutting property owner. Authority is delegated to the City Engineer to require the repair or construction where it is needed.

The Bureau of Maintenance, as a matter of policy, assumes responsibility for inspection and maintenance of public stairs.

Title 18, Chapter 18.03, Nuisance Abatement, notes the abutting property owner’s responsibility for ensuring that the sidewalk is kept clear of debris and projecting bushes and limbs up to 2.3 m (7'-6") from the sidewalk surface and that the roadway is kept clear of debris and project bushes and limbs up to 3.4 m (11'-0") from the roadway surface on local streets and 4.3 m (14'-0") from the roadway surface along arterials, one-way streets, and streets where parking has been prohibited.

### ***D1.2b Pathways, Stairs and the Americans with Disabilities Act (ADA)***

#### ***Continuous Passage***

A continuous passage is defined under ADA as "A continuous unobstructed pedestrian circulation path within a public sidewalk connecting pedestrian areas, elements, and facilities in the public right-of-way to accessible routes on adjacent sites."<sup>2</sup>

#### ***Surface***

The ADA requires that "public sidewalk surfaces be stable, firm, and slip-resistant and lie in a single plane with minimal warping."<sup>3</sup>

<sup>2</sup> The Federal Register. Vol. 59, No. 117, Monday, June 20, 1994. Rules and Regulations. 14.1.1 (p. 31778).

<sup>3</sup> Ibid., 14.2.1(3) Surfaces (p. 31727).

## D2 THE DESIGN AND IMPLEMENTATION OF PUBLIC CONNECTOR PATHWAYS AND STAIRS

Public pathways and stairs help shorten walking distances in many parts of the City where undeveloped rights-of-way, steep terrain, public walkway easements or a combination of these factors suggest a different approach to providing pedestrian access. Perhaps the most typical examples found in the City are the numerous stairs found in the West Hills, which provide direct connections across difficult terrain and shorten walking distances significantly.

In other parts of the City where terrain is more gentle, pathways provide connections between streets, and take many forms -- sometimes a well-maintained concrete or asphalt walk, sometimes a beaten dirt path. Whatever their form, these pathways, like stairs, can shorten walking distances and provide important access between public streets or various destinations.

There are a few basic types of connector pathways, each of which has unique characteristics. Some pathways are intended to be shared with bicyclists, requiring additional width and a reasonably even grade with no abrupt grade changes. Other connectors are intended to be used only by pedestrians, and may or may not be accessible. Some connector pathways include public stairs.

### D2.1 General Guidelines for Public Pedestrian Connections

#### D2.1a Right-of-way/Easement Widths

Minimum widths for connectors help to provide adequate width for the pathway, space to maintain the path, space to clear significant vegetation or other natural features, and buffer area between the pathway and adjacent uses.

Where the path is to be shared by pedestrians and bicyclists, a minimum R.O.W. or easement width should be 7.6 m (25'-0"). This width would easily accommodate a 3.7 m (12'-0") path.<sup>6</sup>

For connectors which are not intended for shared use by bicyclists and/or which also have stairs as part of the route, a minimum R.O.W. or easement width should be 4.5 m (15'-0"), which would easily accommodate a 1.8 m (6'-0") pathway.



Numerous public stairs are found in Portland's West Hills.

<sup>6</sup> Refer to City of Portland Standard Construction Specifications. Standard Plan No. 3-139. Bicycle Path Construction.



### ***D2.1e Lighting***

Lighting considerations will vary depending on the site and expected use. Generally, connector pathways and stairs should be lit sufficiently to help avoid tripping accidents and to provide security and visibility at night. At a public stair, the top and bottom of each stair should be adequately lit so that the first step is obvious to the pedestrian and the railing is visible.

### ***D2.1f Signage***

Where a public connector pathway or stair is within a public right-of-way, or an easement which follows a vacated right-of-way, standard street signage can be used to help identify the connector as well as to communicate that the connector is public. Signage should also be provided which informs users about where the connector leads to, e.g., "To SE 55th Avenue," or "Public Stairway - to NW Vista."

Where a connector pathway or stair provides pedestrian access between dead-end or cul-de-sac streets, signage to that effect should appear near the "Dead End" warning sign.

## **D2.2 Guidelines for Connector Pathways**

### ***D2.2a Materials***

Connector pathways should be built with materials in accordance with the Appendix on Materials in this Guide. In general, accessible pathways should be built to meet ADA standards and should be easily maintained over time. Non-accessible pathways may be built with alternative materials like asphalt or crushed rock, but concrete is still the preferred material for construction.

## **D2.3 Guidelines for Public Stairs**

### ***D2.3a Setback from Existing Public Sidewalks***

The first riser at the bottom of a stair should be no closer than 750 mm (2'-6") to the sidewalk, and at the top no closer than 450 mm (1'-6") to the sidewalk. This is suggested because almost all public stairs will require handrails, and to meet ADA the handrail must extend beyond the top and bottom steps. At the top the handrail must extend 305 mm (1'-0"), while at the bottom it must extend 305 mm (1'-0") plus the width of the first tread. The placement of the stair and handrail should accommodate the existing sidewalk, future sidewalk, or anticipated future sidewalk widening.

### D3.1 Application of Alternative Pathways along Roadways

In defining when and where to use the various pathway approaches defined in the guidelines, a hierarchy of treatments and materials was developed to help guide development of pathways throughout the City. As diagrammed in the adjacent figure, different pathway and material treatments fall on a continuum of most to least preferred. The most preferred treatment is the City standard, which requires a concrete sidewalk separated physically from the roadway by a concrete curb and, preferably, a planting or furnishing zone.

Other treatments are allowed, but not preferred to the current City standard. **These alternative treatments are not intended for use to fulfill development requirements for street improvements.**

In cases where an alternative pathway solution is used, some treatments, like separated pathways, are preferable to others, such as widened shoulders, because of the physical separation provided between the pedestrian and traffic. Additionally, vertical separation such as curbs may be preferred over horizontal separation.

Selecting a preferred treatment for pathway development must be predicated on a number of different criteria, including, but not limited to:

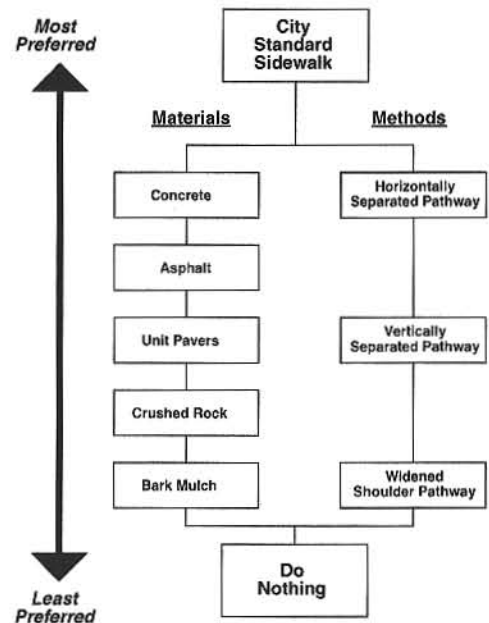
**Safety** -What is the 85th percentile speed of the traffic on the adjacent roadway? What is the sight distance? Is the path location on a curve? Are there areas for the pedestrian to escape an oncoming vehicle?

**Durability** -Is the proposed treatment and material durable enough to continue to provide a firm, level walking surface over an extended amount of time?

**Maintenance** -Is the proposed treatment easily maintained? Is the property owner or the City responsible for maintenance of the pathway? Can a property owner either maintain the improvement or hire someone to maintain the improvement?

**Amount of Use** -How many pedestrians are likely to use the new pathway?

## Pathways and Stairs



Hierarchy of preferred alternative pathway treatments.

### D3.3 Widened Shoulder Pathways

Widened shoulder pathways provide an alternative to separated pathways where physical space within the right-of-way is limited by features such as steep slopes, existing vegetation or significant structures. By providing a wider area at the side of the road for pedestrians to use, this type of pathway can usually be constructed around the existing drainage facilities using roadway construction methods.

Some advantages of widened shoulder pathways include minimal impact on existing right-of-way features; maintenance as part of routine roadway maintenance by the City (for arterial streets); and the potential to widen the roadway for use by bicycles as well.

Widened pathway solutions must be applied carefully to ensure that the end result is a net increase in safety for pedestrians over the existing condition. **For this reason, widened shoulders are seen as the least preferable of pedestrian facility options, and should be used only when other alternatives are not practicable.**

As with the guidelines for separated pathways, each of the widened shoulder solutions outlined in Table D-1 has a list of recommended materials and comparative cost. The costs are provided to help understand how these solutions compare to each other and to a City standard sidewalk.



*A widened shoulder on SW Sunset Blvd. might be an improvement over the current lack of any pedestrian facility, but widened shoulders remain the least preferred option for pedestrian facilities, to be considered only when other alternatives are not practicable.*

**Separated Pathway on Fill or Wall, with Swale**

**Purpose:** Provide separation between pathway and travel lanes by building up a level area for the pathway and using a swale to convey stormwater.

**Where to use:** Downhill side of roadway where preserving existing vegetation or other features is desired or where inadequate space for grading is available; adequate R.O.W is required.

- Guidelines:**
- Adequate space is required (2.4-3.0m (8-10 feet)) and swale should be planted with grass if it is to be used for water quality.
  - Pathway should slope towards swale.
  - Street trees would not be allowed in swale.
  - Railing may be required at back of walk, depending on wall height.

- Possible materials for use:**
- Concrete (preferred)
  - Concrete/Asphalt Unit Pavers (acceptable)
  - Asphalt (acceptable in R.O.W. or public walkway easements)
  - Crushed Rock (acceptable in undeveloped R.O.W./public walkway easements where other accessible and reasonably direct routes are available)
  - Concrete, Rock, Masonry, or Keystone Type Units (acceptable for wall)

**Comparative cost:** \$272/lin m (\$ 83/lin ft)

**Separated Pathway Below Road Grade**

**Purpose:** Provide separation between pathway and travel lanes by providing a level area on the downhill side of the roadway.

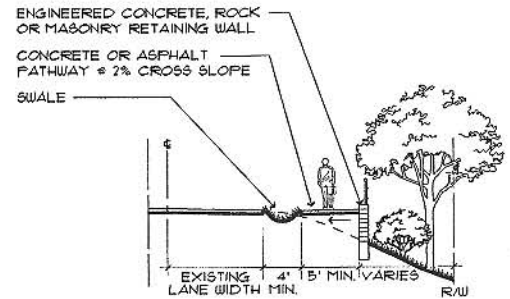
**Where to use:** Areas where a path is desired on the downhill side of the road and walls are not desired or required or where holding street grade would destroy existing features; areas where significant vegetation adjacent to the roadway is to be maintained; adequate R.O.W is required.

- Guidelines:**
- Pathway should be no more than 1.2m (4 feet) below road grade in order to ensure visibility to and from the path.
  - Pathway may need to drain towards adjacent property or to swale on roadway side of path.
  - Trees and other vegetation should be encouraged in the area between pathway and road. Maintain good visibility between path and road to provide a sense of security.
  - Pathway may need to come back to road grade for driveway crossings.
  - Guardrail may be required at edge of roadway depending on steepness of side slope and/or roadway alignment.

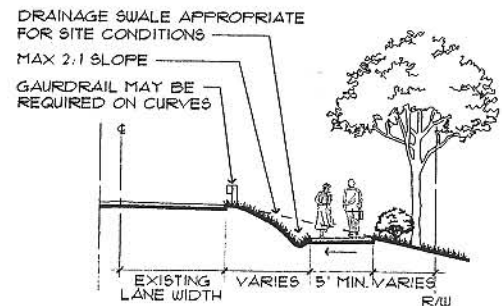
- Possible materials for use:**
- Concrete (preferred)
  - Concrete/Asphalt Unit Pavers (acceptable)
  - Asphalt (acceptable in undeveloped R.O.W. or public walkway easements)
  - Crushed Rock (acceptable in undeveloped R.O.W./public walkway easements where other accessible and reasonably direct routes are available)

**Comparative cost:** \$80/lin m (\$24/lin ft)

**Table D-1**  
**Alternative Pathway Concepts,**  
**continued**



Separated Pathway on Fill or Wall, with Swale



Separated Pathway below Road Grade



### Separated Pathway on Boardwalk

**Purpose:** Provide vertically separated pathway over difficult slope areas by building a wooden structure to support a boardwalk.

**Where to use:** Short segments where existing conditions make it impossible and potentially more expensive to provide a pathway on grade.

**Guidelines:**

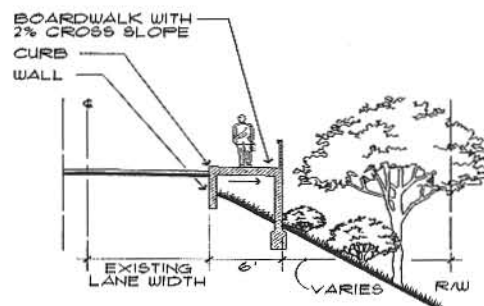
- Separate boardwalk from roadway with a standard concrete curb.
- Curb concentrates stormwater; use this solution for short sections (under 30m (100 feet)) or collect stormwater and convey it to a standard storm system.
- Railing will be required at back of path.
- Driveway crossings require standard concrete apron.
- Non-skid surfaces are preferred to wood decking to prevent slipping on a wet or leaf-covered pathway.

**Possible materials for use:**

- Treated Lumber
- Non-skid Metal Decking

**Comparative cost:** \$1115/lin m (\$340/lin ft)

**Table D-1**  
**Alternative Pathway Concepts,**  
**continued**



Separated Pathway on Boardwalk

### Widened Shoulder with Ditch or Swale

**Purpose:** Provide widened shoulder for additional walking space at side of roadway, with existing ditch/swale moved to new edge of roadway.

**Where to use:** Areas where site conditions (topography, vegetation, or significant structures) do not allow a separated pathway to be installed and where adequate space exists to provide a ditch or swale at the new edge of roadway.

**Guidelines:**

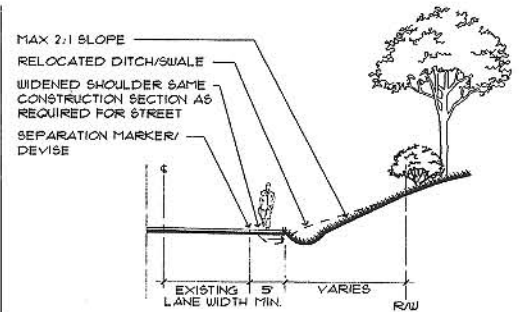
- Consider moving path to back side of swale as preferred option.
- Ditch/swale will require culvert at driveway crossings.
- Minimum width is 1.2m (4 feet) although a wider area may be required depending on traffic speed, roadway curves, and amount of use.
- Widened area must meet structural cross section of adjacent roadway.
- Finished asphalt surface should be as smooth as possible to accommodate bikes, wheelchairs, strollers, and other similar vehicles.
- Clear signage and markings are required for widened shoulders to restrict parking from pathway area.
- Raised 4" buttons, guardrails, or a standard curb and sidewalk may be required in areas where safety issues such as speed, sight distance or roadway alignment dictate additional safety measures.

**Possible materials for use:**

- Asphalt (Required for widened shoulder)
- 3M Stamark tape or equivalent at edge of roadway (for detectable separation)
- Raised 4" buttons (optional)

**Comparative cost:** \$75/lin m (\$23/lin ft)

**Table D-1**  
**Alternative Pathway Concepts,**  
**continued**



Widened Shoulder with Ditch or Swale

**Note:** The widened shoulder is the least preferred option for pedestrian facilities, to be considered only when other alternatives are not practicable.

## Concrete

**Where to Use:** Preferred material for use on sidewalks or on alternative pathways separated from the road by a curb and/or planting strip or swale. Not for use as a material for widened shoulder alternative pathways.

**Construction Technique:** 100 mm (4 inches) of 23 MPa (3300 psi) Portland cement concrete on compacted subgrade; 100 mm (4 inches) of compacted aggregate can also be used as a base where needed.

**Property Owner Maintenance:** Relatively easy to maintain, either by property owner or by hired contractor.

**Maintenance Life:** 75 years plus.

**Comparative cost:** \$35.00/sq m (\$29.25/sq yd)

**20 year cost:** \$9.33/sq m (\$7.80/sq yd)

## Asphalt

**Where to Use:** Preferred material for use on any widened shoulder alternative pathway. Acceptable but not preferred as a material for separated alternative pathways or connector paths. Unacceptable for use for City standard sidewalk.

**Construction Technique:** 100 mm (4 inches) of asphalt concrete in two 50 mm (2 inch) lifts on 100 mm (4 inches) of compacted aggregate base.

**Property Owner Maintenance:** The City will be responsible for maintaining widened shoulders. For separated pathways, asphalt is fairly difficult to maintain for a property owner since hot mix asphalt is required for patching.

**Maintenance Life:** 40 years plus.

**Comparative cost:** \$30.00/sq m (\$25.00/sq yd)

**20 year cost:** \$15.00/sq m (\$12.50/sq yd)

## Concrete Pavers

**Where to Use:** Acceptable material for use on sidewalks, in the Furnishings Zone, and on alternative pathways separated from the roadway by a curb and/or planting strip or swale. Not for use as a material for widened shoulder alternative pathways.

**Construction Technique:** Concrete unit pavers (varying size) on 25 mm (1 inch) of sand and 100 mm (4 inches) compacted aggregate base; pavers to be placed hand tight and the joints swept with sand. Alternatively, pavers can also be set on a 25 mm (1 inch) mortar bed, either hand tight or with mortared joints. Geotextile fabric is recommended between the aggregate base and the sand layer.

**Property Owner Maintenance:** Relatively easy to maintain, either by property owner or by hired contractor.

**Maintenance Life:** 20 years plus.

**Comparative cost:** \$60.00/sq m (\$50.00/sq yd)

**20 year cost:** \$60.00/sq m (\$50.00/sq yd)

## Portland Pedestrian Design Guide

# Glossary

**Accessible route** - in the ADA, a continuous route on private property that is accessible to persons with disabilities. There must be at least one accessible route linking the public sidewalk to each accessible building. See also "Continuous path."

**Actuated signal** - a signal where the length of the phases for different traffic movements is adjusted for demand by a signal controller using information from detectors.

**ADA** - Americans with Disabilities Act of 1990; broad legislation mandating provision of access to employment, services, and the built environment to those with disabilities.

**Alternative Pathway** - a design for a pedestrian facility along a roadway that is an alternative to an urban standard sidewalk with curb.

**Arterial Street** - any street with the ASCP Traffic Classification of Neighborhood Collector or higher in the Transportation Element.

**ASCP** - Arterial Streets Classifications and Policies; the City of Portland's policies for appropriate use of the right-of-way for each mode on every street as embodied in the Transportation Element of the Comprehensive Plan.

**Attached sidewalk** - a sidewalk with one edge adjacent to the back of the street curb. An attached sidewalk may or may not have intermittent planting of street trees in wells along its length.

**Audible pedestrian signals** - pedestrian signal indicators that provide an audible signal to assist visually impaired pedestrians in crossing the street.

**BOM** - Bureau of Maintenance (Portland Office of Transportation).

**BTM** - Bureau of Traffic Management (Portland Office of Transportation).

**BTED** - Bureau of Transportation Engineering (Portland Office of Transportation).

# A

# B



pedestrian crossing distance. Also called “bulb-out” or “curb bulb”.

**Curb radius** - the length of the radius of the curve where a curb turns a street corner.

**Curb ramp** - a combined ramp and landing to accomplish a change of level at a curb in order to provide access to pedestrians using wheelchairs.

**Curb Zone** - the portion of the Sidewalk Corridor that physically separates the sidewalk from the roadway.

**Detached sidewalk** - a sidewalk that is separated from the curb by a linear planting strip. (see Separated sidewalk.)

**Dropped landing** - accessibility element in which the sidewalk ramps down to a landing at street level. Used only in constrained circumstances where a standard curb ramp can't be accommodated.

**Fixed-time signal** - a signal that operates on a regular fixed cycle and has no actuated phases.

**Frontage Zone** - a linear portion of the Sidewalk Corridor, adjacent to the edge of the right-of-way (or property line).

**Fully-actuated signal** - a signal where all signal phases are actuated. (See “Actuated signal.”)

**Furnishings Zone** - a linear portion of the Sidewalk Corridor, adjacent to the curb that contains elements such as street trees, signal poles, utility poles, street lights, controller boxes, hydrants, traffic signs, street signs, parking signs, parking meters, driveway aprons, planting strip, or street furniture.

**Grade separation** - the separation of a pedestrian facility from facilities for vehicular movement by placing the facilities at different vertical elevations. Examples include pedestrian overpasses and underpasses.

**Intersection** - the area of a roadway created when two or more public roadways join together at any angle.

**Landing** - the level area at the top (or bottom) of a curb ramp.

**Local Service Walkway** - pedestrian classification in the Transportation Element of the Comprehensive Plan. Local Service Walkways are intended to provide safe and convenient access to local destinations such as residential neighborhoods.

D

F

G

L

**Pedestrian District** - districts characterized by dense mixed-use development with a concentration of pedestrian-generating activities. These districts are identified and classified in the Transportation Element to insure that improvements in the right-of-way provide for the ease of pedestrian movement through the use of appropriate design treatments.

**Pedestrian signal indication** - the lighted WALK/DON'T WALK (or walking man/hand) signal that indicates the pedestrian phase.

**Perpendicular curb ramp** - ADA term for a curb ramp in which the slope of the ramp is generally perpendicular to the line of the curb. This guide uses the term "curb ramp" to refer to such elements. See also "Parallel curb ramp" and "Dropped landing."

**Public stair** - a public facility of more than three steps, either in public right-of-way or a public walkway easement, for the use of the public.

**Public walkway easement** - an easement granted by a property owner to the City for the purpose of providing public access to pedestrians. Construction and maintenance of the sidewalk or walkway facilities in the easement is the responsibility of the adjacent property owner, just as it is with walkways in the right-of-way.

**Refuge island** - a raised island in the roadway that separates a crosswalk into discrete legs and provides a refuge for crossing pedestrians.

**Right-of-way** - an easement held by the City over land owned by the adjacent property owners that allows the City to exercise control over the surface and above and below the ground of the right-of-way. Property owners are typically responsible for the construction of transportation improvements adjacent to their property. The City maintains the street, while the property owner is responsible for maintaining the sidewalk.

**ROW** - see "Right-of-way."

**Running grade** - the slope of the sidewalk or roadway along the line of travel.

**Semi-actuated signals** - signals where only some phases (usually the side street) are actuated. (See "Actuated signals.")

**Separated sidewalk** - a sidewalk separated from the curb by linear planting strip which may include lawn or groundcover and street trees. (see "Detached sidewalk.")

R

S

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