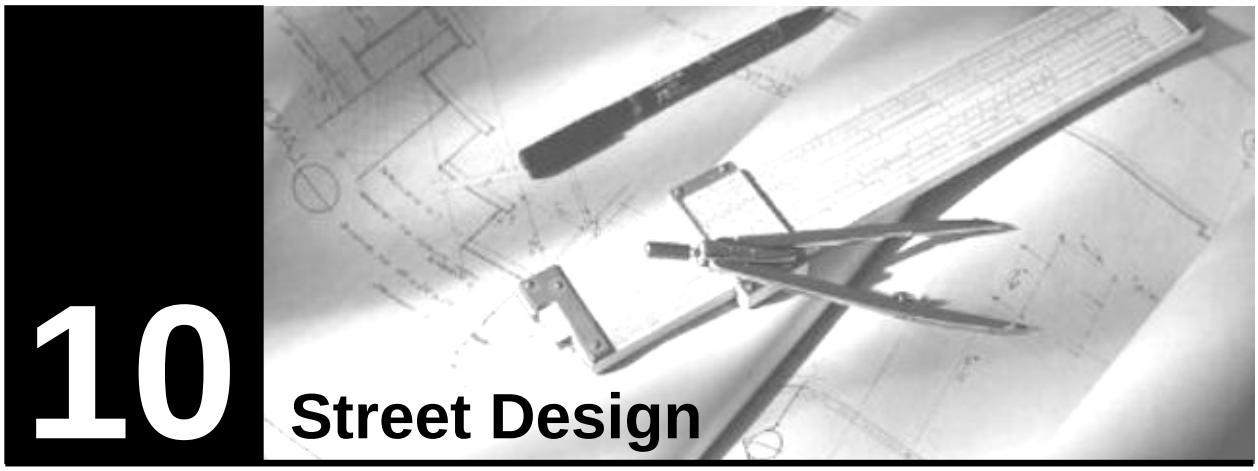


# 10 Street Design

This chapter describes the importance of street design, why it matters, and the street design options available in Milwaukie. This chapter also explores the benefits of a well-designed street and illustrates the relationship between street design, functional classification, and land use. Street design recommendations in this chapter are policy-based, not project-based. They direct the City to implement balanced and flexible street design standards that reflect the community's vision and include new and innovative design options.

## GOALS AND POLICIES

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Listed below are the specific TSP Goals that guide the City's policies on street design:

- **Goal 1 Livability** guides the City to design and construct transportation facilities in a manner that enhances livability.
- **Goal 2 Safety** guides the City to design safe transportation facilities.
- **Goal 4 Quality Design** guides the City to design streets to support their intended users and calls for the implementation of street design standards that promote context-sensitive transportation facilities that fit the physical context, respond to environmental resources, and maintain safety and mobility.
- **Goal 6 Sustainability** guides the City to take the natural environment into account when planning and designing transportation facilities.

## STREET DESIGN

### What is Street Design

A street's design determines how it will look and function. How a street looks and functions is ultimately dependent upon which street elements are included, their dimensions, and how they relate to each other. Street elements may include, but are not limited to: travel lanes, parking

lanes, bicycle lanes, green zones,[1] pedestrian facilities, traffic-calming devices, and green street treatments. A street with two travel lanes and a gravel shoulder, for example, looks very different than one with four travel lanes and sidewalks. These two types of streets also function differently. The two-lane street likely has lower traffic volumes but, without pedestrian facilities, does not support safe pedestrian travel. The four-lane street likely has higher traffic volumes and, with sidewalks, supports safe pedestrian travel; however, without bike lanes, it probably does not support safe bicycle travel.

Since different streets serve different purposes, a functional classification system, which is a hierarchy of street designations, provides a framework for identifying which street elements to include in a street's design. A street's functional classification does not dictate which street elements to include. It does, however, provide a framework for determining the size and type of street elements to consider.

The City's functional classification system is used to balance the opposing needs for both mobility and access. These functions are opposing, since high speeds and continuous movement are desirable for mobility, while low speeds and traffic breaks are desirable for access to private property. Streets with a higher classification, such as arterial streets, emphasize a higher level of mobility for through-movement. They look and function very differently than streets with a lower classification, such as local streets, which emphasize the land access function. The different functional classifications are more fully discussed in Chapter 8.

## Why Milwaukie Has Street Design Options

The City's street design standards are contained in and/or referenced by the Milwaukie Municipal Code which is the City's main regulatory document. As required by the Code, street design standards are applied to new streets and to existing streets when development triggers the need for additional public street improvements. Since the majority of land in Milwaukie has already been developed, street design standards are most frequently applied to existing streets, many of which were only partially improved when constructed.[2] Many of the city's residential streets, for example, were constructed without bicycle, pedestrian, or stormwater facilities. Retrofitting an existing street with needed improvements is typically a much more complicated process, both in terms of design and construction, than constructing a new street.

The City has some flexibility when applying its existing design standards. The addition, alteration, or elimination of most street elements requires extensive review. When this type of review occurs, the City's existing design standards identify the elements that should be included and their required and minimum allowed dimensions. They also identify which elements are most important to include when right-of-way is insufficient or which elements are most appropriate to alter or eliminate in certain situations.

The City's existing street design standards allow for more innovative types of designs, such as skinny streets, green streets, and alternative pedestrian facilities, all of which the community strongly supports. Green street development, in particular, has far reaching benefits for the region and the city. In addition to reducing stormwater runoff to streams and rivers, which improves water quality and wildlife habitat in general, green street development would help recharge the local aquifer, the city's main water supply.

[1] The green zone is the area between the curb and sidewalk and is commonly called a landscape strip.
[2] Partially improved streets are often referred to as incomplete streets.

For these reasons, the City has flexibility when applying existing street design standards, more design guidance, and more street design options. Three of the main reasons are summarized below.

- When making improvements to existing streets, existing street design standards often need to be modified to "fit" the existing street conditions.
- Even when a typical street design would work, more environmentally friendly designs and alternative pedestrian facilities may be appropriate.
- More design flexibility and options enable the City to allow street improvements that respond to the character of the surrounding natural and built environments.

The City recognizes the diversity of public opinion and development patterns that exist within Milwaukie and acknowledges that street design should not be a "one size fits all" approach. That is why the City has multiple street design options that support a street's intended users and its functional classification while also responding to adjacent land uses, neighborhood character, and environmental considerations.

## Why Street Design Matters

Streets are the cornerstone of our transportation network. They are used by all modes of travel for a wide variety of commercial, recreational, and travel purposes. Since they traverse the entire city they also greatly influence neighborhood character. Street design matters because well-designed streets are a significant community asset. Poorly designed streets, on the other hand, can have a detrimental effect on commercial activities, recreational opportunities, personal mobility, emergency response, and property values. Since the design of a street is so closely tied to how it performs and how people experience the city, it is important for the City to carefully consider how it wants its streets to look and function and to design them accordingly.

## Benefits of Good Street Design

The benefits of good street design occur on many levels. Benefits vary depending on the function of the street and the type of design implemented, but may include:

- Improved livability.
- Increased safety for pedestrians, bicyclists, drivers, and transit riders.
- Increased pedestrian and bicycle activity.
- Increased social and recreational opportunities.
- Decreased environmental impacts through localized stormwater management or reduced stormwater runoff.
- Enhanced air and water quality.
- Street beautification.
- Increased property values.

Many of these benefits come from enhancements to pedestrian and green zones, which are the areas between the curb (or edge of roadway where no curb exists) and the outer edge of the right-of-way (see Figure 10-1). The green zone acts as a buffer between motor vehicle traffic and pedestrian traffic. This buffer area increases pedestrian comfort and safety, reduces the affect of road spray on pedestrians, allows for more separation between pedestrians and vehicle exhaust fumes, and when combined with mature street trees, can reduce vehicle speeds by giving the appearance of a narrower street. Reduced vehicle speeds are a safety benefit for all modes of travel, and an environment that supports walking, creates opportunities for social

contact, reduces motor vehicle reliance, and contributes to healthier and more active communities.

As its name implies, the green zone provides a space for street trees and other plantings that benefit the environment through improved air and water quality. When appropriately designed, green zone plantings can also manage local stormwater runoff, which reduces the transportation system's impact on local streams and rivers. The green zone also provides a space for placement of utilities, fire hydrants, and other street furniture, so that the sidewalk can remain uncluttered, allowing for unimpeded pedestrian passage. Additionally, this area can be used for the placement of transit shelters and benches, which increases the safety and comfort of transit users.

# STREET DESIGN ELEMENTS

The purpose of this chapter is to create a policy framework that will guide street design decisions to meet the needs and values of the community. The first step in this process is to describe the different street elements, which are listed below. This is followed by a discussion about which elements are optional and which are required (see the Street Design Cross Sections section) and what alternative design options are available and preferred by the community (see the Street Design Alternatives section).

All streets are composed of a number of different elements; however, not all elements are included on all streets. A street's functional classification, adjacent land uses, and available right-of-way width all influence which elements are included. When a specific element is included, it is generally located in the same location on the street relative to other elements. However, an element's design, dimension, and relationship to adjacent elements can and should vary depending upon neighborhood character, traffic management needs, and/or social, cultural, or environmental factors.

The following is a description of the different street elements or zones that comprise most streets.

## Development Zone

The development zone is not in, but adjoins, the public right-of-way. In commercial or industrial zones, a building face may clearly define the edge of the right-of-way. In residential zones, the outer edge of the right-of-way is often not clearly or accurately marked. Access to the development zone is almost always through the public right-of-way in the form of a driveway or sidewalk.

## Pedestrian Zone

The pedestrian zone is the public space between the development zone and the green zone. This area should support pedestrian activities by providing a comfortable space for walking, socializing, and accessing private property and buildings in the development zone. The needs for this space, its width and lighting, for example, depend upon the functional classification of the street and adjacent land uses. In general, pedestrian zones should be wider in dense commercial zones and on streets with high traffic volumes and speeds and may be narrower on local streets with low traffic volumes.

A typical pedestrian zone is at least five feet wide when adjacent to a green zone and at least six feet wide when adjacent to a street zone.

### Green Zone

The green zone is the public space that separates the pedestrian zone from the street zone. It functions as a buffer between pedestrians and motor vehicle, bicycle, and other street zone users. It also offers a place to locate street trees, bike racks, street furniture, transit amenities, utilities, and plantings designed to manage stormwater runoff. The green zone can provide visual appeal for all users by balancing the hard concrete and asphalt surfaces from which a street is constructed. A green zone with mature street trees has the added benefit of framing the street and shielding pedestrians from the elements.

A typical green zone is at least five feet wide.

### Street Zone

The street zone may contain many or few elements, depending on its functional classification. Typical elements include parking lane(s), turning lane(s), travel lane(s), and bike lane(s) or mixed vehicle lane(s) that include bicycles. Skinny streets or one-way streets offer different street zone variations as well. In general, the street zone serves as a conduit for mobility and access to private property. Streets that serve an important mobility function (e.g., arterials and collectors) are typically wider than streets that primarily exist to provide access to property (e.g., local).

Typical lane widths:

- Parking lane, 6-8 ft.
- Bicycle lane, 5-6 ft.
- Travel lane, 9-12 ft.[3]
- Shared travel lane, 14-16 ft.

In addition to vehicle and bicycle traffic, the street zone also contains pedestrian traffic at street intersections and midblock pedestrian crossings. To enhance pedestrian safety at intersection crosswalks and midblock locations, crossing locations should be visible and clearly understood by both drivers and pedestrians. The street zone may also contain green street treatments or traffic management devices to slow traffic or deter cut-through traffic. (See Chapter 11 for additional discussion of neighborhood traffic management.)

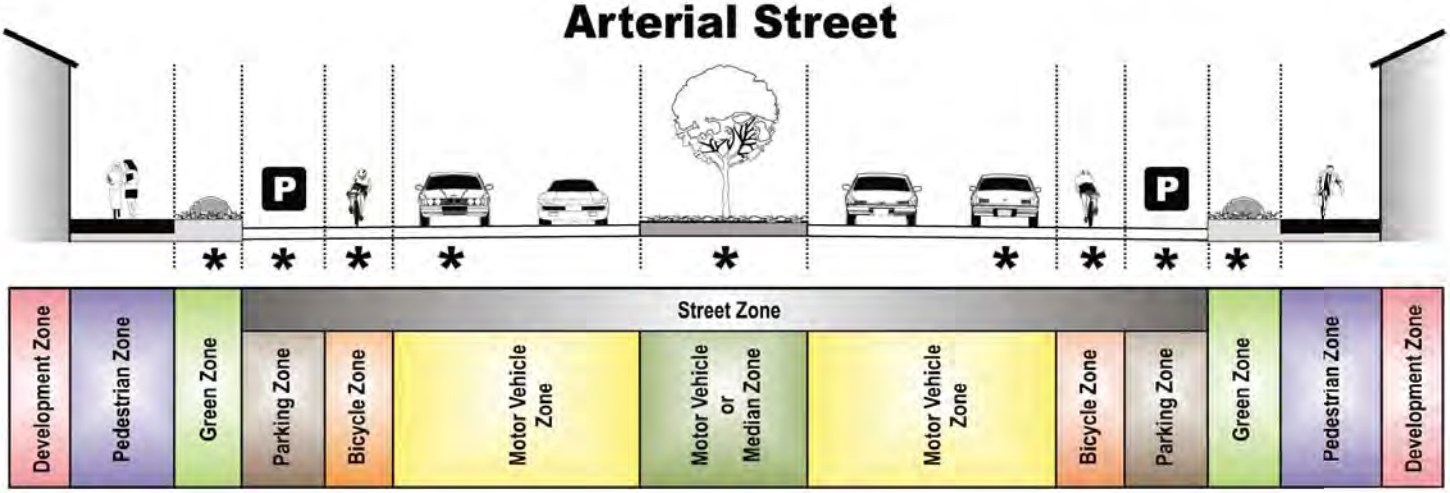
## STREET DESIGN CROSS SECTIONS

Figure 10-1 contains cross sections for four of the City's street functional classifications. This figure lays the foundation for more flexible design standards. Street design elements marked with asterisks are optional when right-of-way width is insufficient to include all elements. Elements not marked with asterisks are required under all circumstances. The local and neighborhood street cross section, for example, indicates that, at a minimum, one travel lane and one pedestrian facility is required if there is truly insufficient right-of-way width to accommodate any other elements.

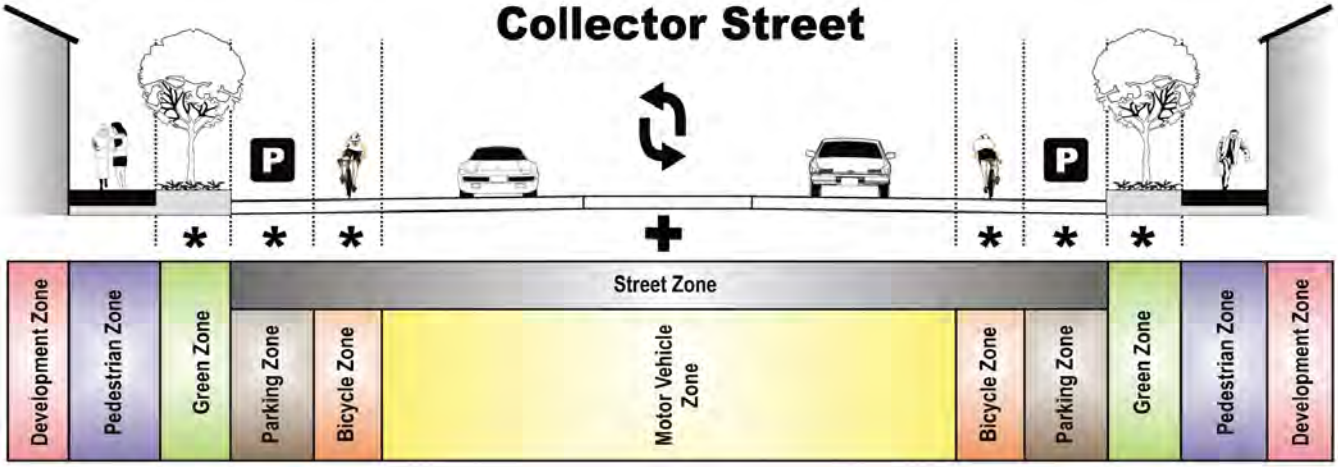
The local and neighborhood cross section also includes a skinny street option since a skinny street can contain all of the same elements as a local or neighborhood street. The difference between a skinny street and a local or neighborhood street is that a skinny street typically has narrower elements and/or overlapping parking and mixed travel zones.

[3] A typical travel lane is between 10 and 11 feet wide. Narrower lane widths are appropriate on lower-volume streets; wider lane widths are appropriate on higher-volume streets and on freight and transit routes.

## Arterial Street

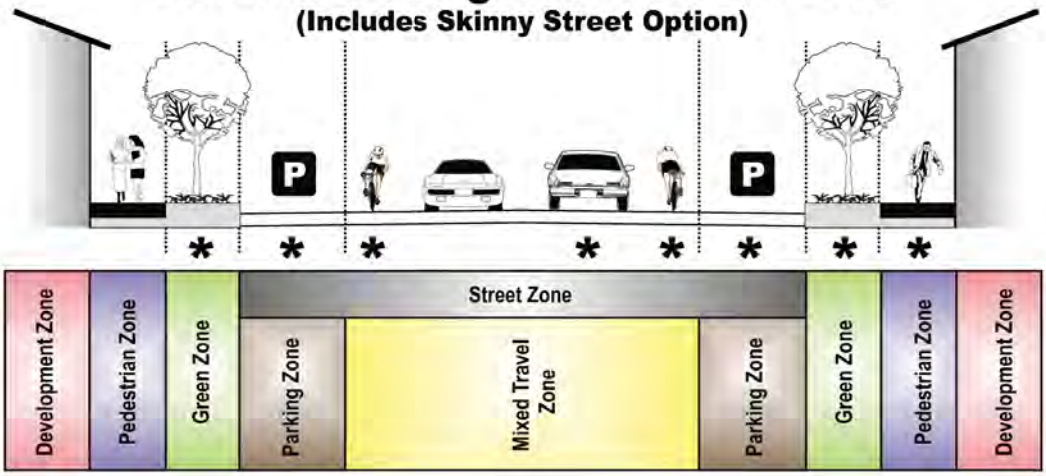



## Collector Street




## Local and Neighborhood Streets

**(Includes Skinny Street Option)**




DKS Associates

**LEGEND**

* -*Constrained Right-of-Way Optional Element*

✚ -*Where Warranted*

Information Sources: DKS Associates

**STREET DESIGN CROSS SECTIONS BY FUNCTIONAL CLASSIFICATION**

**FIGURE 10-1**

Variations to these cross sections may also be welcomed and/or required by the City when:

- Environmentally beneficial or green street treatments are proposed or needed.
- A street is an identified bikeway or pedestrian walkway in the TSP master plan.
- Existing structures are unusually close to the right-of-way.

The cross sections in Figure 10-1 are shown without dimensions, as the intent is to provide a policy framework—not specific design details—for more flexible street design standards.

# STREET DESIGN ALTERNATIVES

## Pedestrian Facilities

Three pedestrian facility design alternatives are shown in Table 10-1.

***Table 10-1 Pedestrian Facility Design Alternatives***

| Design Alternative | Description | |
|---|---|---|
| Vertical and Horizontal Separation | Separation from the street zone both vertically by a curb and horizontally by a green zone. This design alternative can incorporate green street treatments as outlined in the following section on green street design. |  |
| Horizontal Separation | Separation from the street zone horizontally by a green zone or other horizontal element or barrier. The pedestrian zone is at the same grade as the street zone. This design alternative can incorporate green street treatments as outlined in the following section on green street design. |  |
| Vertical Separation | Separation from the street zone vertically by a curb. The pedestrian zone is located "curb tight" against the street zone with no horizontal separation. Pedestrians could still be buffered from vehicular traffic in the street zone by on-street parking and/or bicycle lanes. If wide enough, this design alternative could incorporate tree wells for street trees. |  |

**Source:** DKS Associates

Vertical and horizontal separation is the community preferred pedestrian facility design in most situations and especially on streets with higher traffic volumes and speeds. Where traffic volumes and speeds are low, horizontal separation is preferred by the community over vertical separation, especially in neighborhoods that desire a less traditional sidewalk design. Two-sided pedestrian facilities are preferred, but one-sided pedestrian facilities are acceptable and even desirable under certain circumstances. When utilizing pedestrian facility design standards, it will be essential that the City identify the circumstances and the process by which one design alternative is chosen or required over another.

It is worth noting that the two preferred pedestrian facility designs include a green zone. In addition to horizontally separating pedestrians from the street zone, the pedestrian facilities that

include a green zone are preferred because of the additional aesthetic and environmental benefits the green zone provides pedestrians and the street as a whole.

## Green Streets

A traditional stormwater management system for a street uses a curb and gutter to capture and convey stormwater runoff to a catch basin and then a pipe. Piped runoff is then discharged offsite into a stream or river. A green street uses a different stormwater management approach. Instead of discharging stormwater offsite, a green street incorporates a stormwater management system into the right-of-way that allows most stormwater runoff to remain onsite, where it is absorbed and cleansed through natural biological processes. Green street treatments capture and treat stormwater runoff locally, thereby protecting streams, groundwater, and wildlife habitat. Additionally, since Milwaukie's water supply comes from local wells, it is in the city's best interest to incorporate green zones and green street treatments into its streets as much as possible to protect and maintain the local groundwater supply—a vital city resource.

Most green street treatments have all of the benefits associated with the green zone but require regular maintenance to maintain their functionality and appearance. However, unlike traditional piped stormwater systems, maintenance usually does not require specialized equipment or training. Since some treatments can easily be incorporated into green zones, center medians, or the area usually occupied by parking lanes, streets can often be retrofitted with green street treatments without having to substantially alter any existing street elements or the right-of-way width.

Green street treatments are not dependent upon functional classification and can be incorporated into all street types. Table 10-2 below shows the different green street treatments and the zones in which they may be applicable.

***Table 10-2 Green Street Design Treatments[4]***

| Treatment | Application | How it Works | Application Zone | | |
|---|---|---|---|---|---|
| | | | Pedestrian | Green | Street |
| | | | ■ Recommended ⊡ Optional ☐ Not Recommended | | |
| Rainwater Harvesting | Aboveground or subgrade containers that capture and reuse stormwater runoff for landscape irrigation. | Stormwater is conveyed to storage facilities during the wet season for use during the dry season. | ■ | ■ | ⊡ |
| Permeable Paving | Replacement of impermeable surfaces with permeable materials, such as permeable pavement, concrete, or paving blocks. | Permeable materials allow water infiltration through the surface to the subgrade. | ■ | ■ | ■ |

[4] The soils within an area where green street treatments could be implemented need to be tested to determine the rate of infiltration they can sustain. In addition to green street treatments, traditional stormwater management facilities need to be designed to control overflow if the capacities of the green street treatments are exceeded.

| Treatment | Application | How it Works | Application Zone | | |
|---|---|---|---|---|---|
| | | | Pedestrian | Green | Street |
| | | | ■ Recommended ⊡ Optional ☐ Not Recommended | | |
| Bio-retention (Raingardens) | Aboveground or subgrade containers that promote infiltration and evapotranspiration of stormwater. | Engineered or amended soils and vegetation are used to promote these processes. | ☐ | ■ | ☐ |
| Bio-swales | Subgrade channels with vegetation that convey and treat stormwater. | Vegetation is used to control flow velocities and settle pollutants. | ☐ | ■ | ☐[5] |

When utilizing green street design standards, it will be essential that the City identify the circumstances under which green street treatments would be required or recommended. Additionally, the City should ensure that green street treatments receive ongoing maintenance to preserve their functionality and appearance.

## Skinny Streets

A skinny street is narrower than a normal street and is typically constructed when less paved surface area is desired or in areas with limited rights-of-way or physical constraints. Skinny street designs are typically only considered for streets that have lower traffic volumes and speeds, such as local or neighborhood streets, or in one-way couplet situations. Skinny streets function like regular streets and often have the following additional benefits:

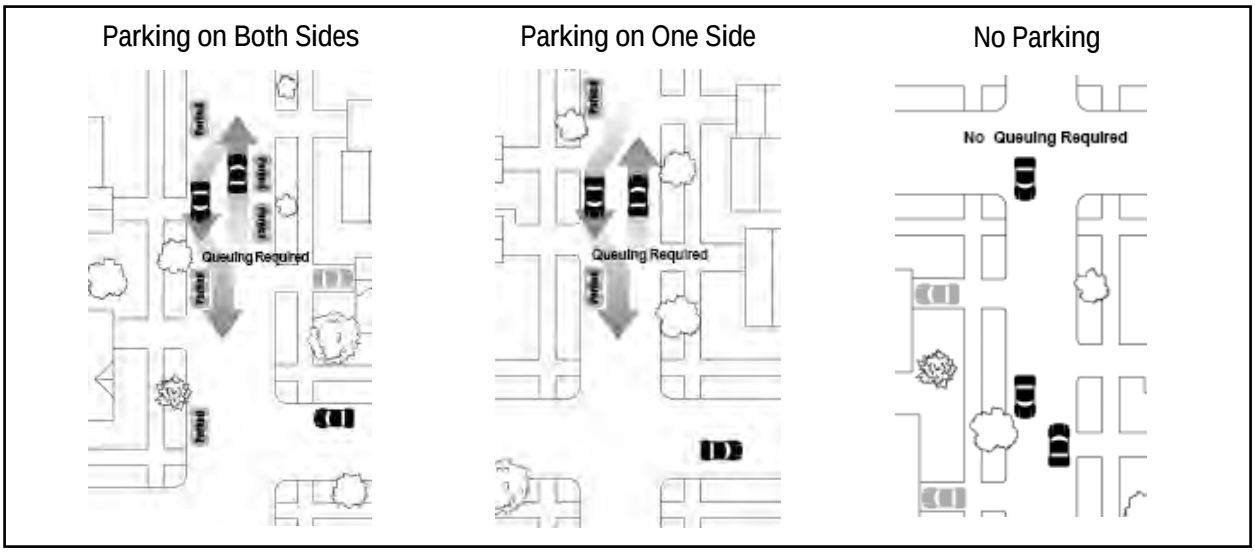
- Slower vehicle speeds.
- Enhanced bicycle and pedestrian safety due to slower vehicle speeds.
- Reduced right-of-way impacts on adjacent properties.
- Reduced stormwater runoff and other environmental impacts due to reduced impervious surface area.

For emergency service personnel to be able to respond to emergencies in a timely manner, the Fire Code recommends that street zones have a minimum width of 20 feet to allow for passage and equipment set up.[6] Solid waste collectors and delivery trucks have similar needs.

Figure 10-2 illustrates three possible skinny street design options. These design options include parking on both sides of the street, parking on one side of the street, or parking on neither side of the street. The design option with parking on both sides of the street requires the widest paved street zone, and the design option with no parking requires the narrowest paved street zone. The design options with parking have overlapping travel and parking lanes. As a result, queuing may be required, which is where one vehicle waits in an open parking area or driveway for the other vehicle to pass.

[5] With the exception of medians.
[6] *Neighborhood Street Design Guidelines, An Oregon Guide for Reducing Street Widths*. State of Oregon. November 2000.

***Figure 10-2 Skinny Street Design Options***




When utilizing skinny street design standards, it will be essential that the City identify under what circumstances skinny street designs would be required or recommended.

# RECOMMENDATIONS

In summary, the recommended actions and policy directions listed below call for the City to utilize balanced and flexible street design standards that reflect the community's vision and that include new and innovative design options, including green streets, skinny streets, and alternative pedestrian facility designs.

## Design Standards

### Recommended Action

Maintain a baseline cross section for each street functional classification (with preferred dimensions for all street elements) and a street design prioritization approach when the baseline elements do not fit. Maintain street design standards for green streets, skinny streets, and alternative pedestrian facilities and identify under what circumstances alternative designs would be required or recommended. Maintain a list of alternative materials, such as permeable pavers, and identify situations in which alternative materials would be suitable and desirable.

### Policy Direction

- Maintain flexibility in street design standards to allow for local design preferences and to avoid costly and time-consuming variance process requirements.
- Balance citywide needs, local design preferences, and best practices when utilizing street design standards.
- Provide for public involvement in the utilization of street design standards and during the design phase of street-related Capital Improvement Projects.
- Consider maintenance costs and issues when utilizing design standards.
- Utilize design standards, including alternative designs, which accommodate emergency response routes and needs.

- Require a minimum of one-sided pedestrian facilities on all streets.
- Require green zones and green street treatments where appropriate and practical.
- Maintain design consistency along a street's length where appropriate.

## Green Zone and Green Street Plantings

### Recommended Action

Develop a list of appropriate, low-maintenance plant species for use in green zones and green street treatments. Develop street tree replacement policies and regulations.

### Policy Direction

- Ensure green zones and green street treatments are planted with appropriate, low-maintenance species.
- Preserve and expand the city's tree canopy.

## Maintenance

### Policy Direction

- Ensure that green street treatments receive ongoing maintenance to preserve their functionality and appearance.
- Ensure that landscaping in green zones and medians is properly maintained.
- Ensure that street design elements and treatments function as intended.