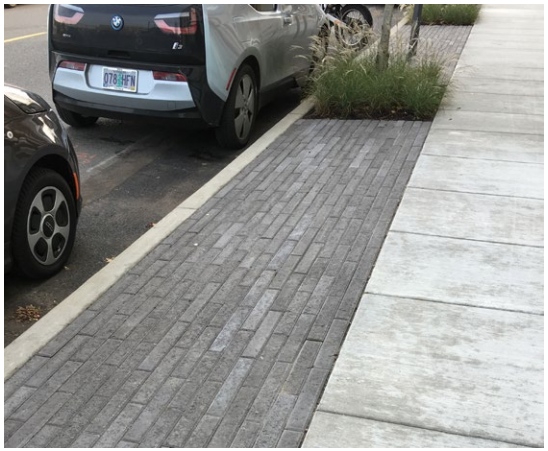
Streetscape and Roadway Design Toolkit

MAIN STREETS ON HALSEY
March 2023



City of FAIRVIEW

City of Wood Village

THE CITY OF TROUTDALE OREGON

Multnomah County

KITTELSON & ASSOCIATES

GREENWORKS

About This Report

A successful streetscape is a place that helps foster strong, livable communities, is physically comfortable and safe, bolsters economic growth and stability, and helps improve our environment. It is accessible to everyone, it can facilitate chance meetings, and it promotes activities that bring people together. It should accommodate different modes of transportation and ease traffic congestion. It should reflect the spirit and identity of a community.

This document is intended to be used as a project resource to spark creative ideas for developing planning, design, and implementation standards to facilitate the orderly redevelopment of Halsey Street as a well-connected, inviting, safe and sustainable multi-modal facility.

The document provides the user with a Streetscape Design Toolkit, which is broken into seven sections: Traffic Calming Features, Intersection Treatments, Pedestrian Treatments, Pedestrian Amenities, Bicycle Facilities, Civic Identity and Wayfinding, and Green Street Strategies. Each of these sections provide descriptions and photos of physical elements that, when used together, can make a great street.

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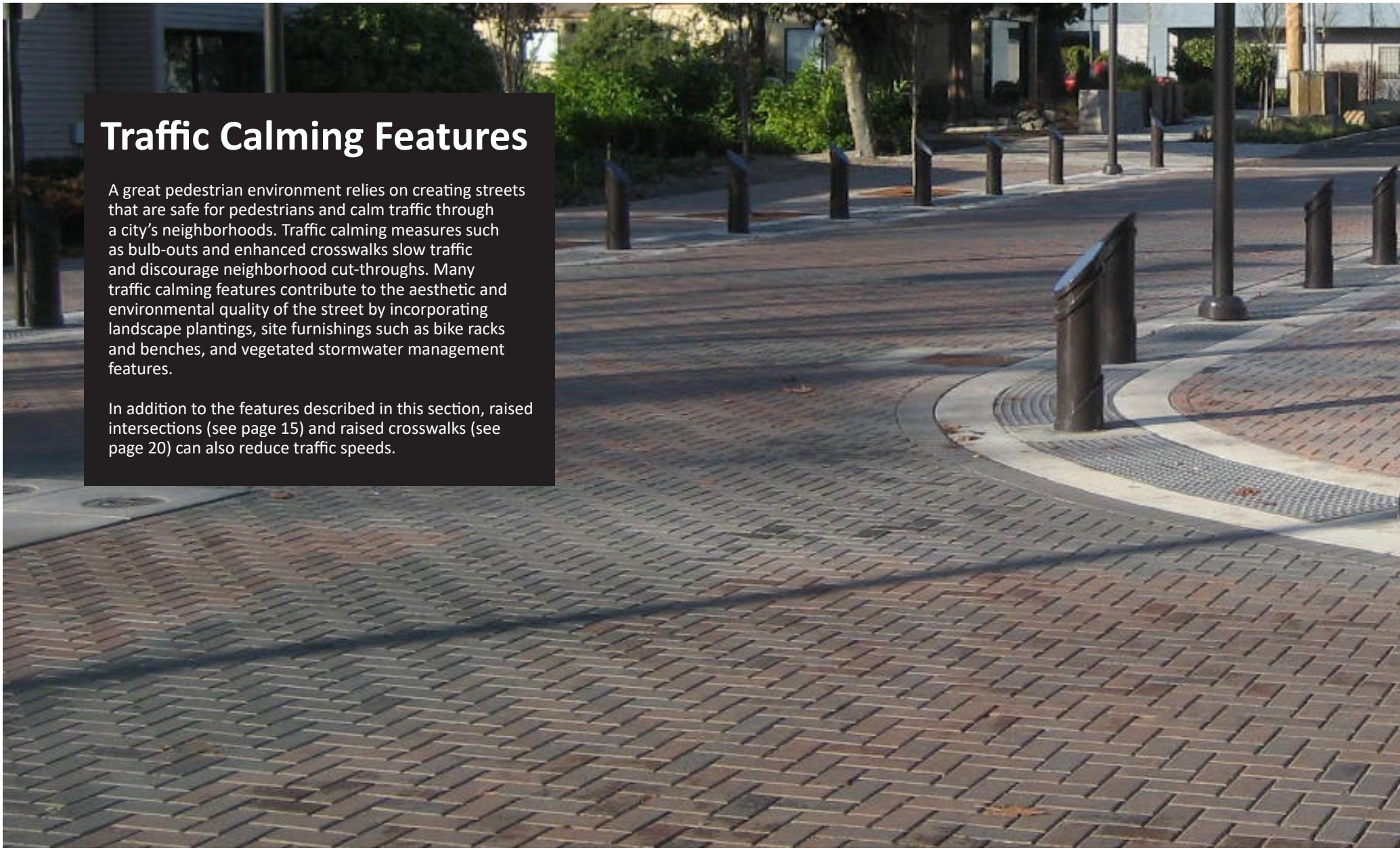
Streetscape and Roadway Design Toolkit



Traffic Calming Features

A great pedestrian environment relies on creating streets that are safe for pedestrians and calm traffic through a city's neighborhoods. Traffic calming measures such as bulb-outs and enhanced crosswalks slow traffic and discourage neighborhood cut-throughs. Many traffic calming features contribute to the aesthetic and environmental quality of the street by incorporating landscape plantings, site furnishings such as bike racks and benches, and vegetated stormwater management features.

In addition to the features described in this section, raised intersections (see page 15) and raised crosswalks (see page 20) can also reduce traffic speeds.


STOP

Curb Extensions (Bulb-Outs)

Curb extensions (also known as bulb-outs) extend the sidewalk into the parking lane to narrow the roadway and provide additional pedestrian space at critical locations. They improve pedestrian safety by increasing pedestrian visibility, slowing vehicular traffic, and shortening crossing distance.

Curb extensions can be located at street corners, or mid-block, and can be lengthened along the roadway to increase usable public space for community gathering and socializing. They can also accommodate transit shelters, benches, landscaping, and other pedestrian furnishings and amenities.

Other additional benefits of curb extensions include a reduction in illegally parked cars at corners and crosswalks, an increased ability to provide two curb ramps per corner, and potential for tightening corner curb radii that slow turning vehicles. They can also provide ideal spaces for stormwater planters or rain gardens, as shown below.

Many potential locations for curb extensions exist throughout the project area, primarily at block corners. Strategic planning could determine feasible mid-block curb extension locations. Curb extensions are only appropriate on streets with on-street parking.

Bulb-out with stormwater facility and crosswalk

Neighborhood planter in curb extension

Landscaping and signage in bulb-out

Seating area located in curb extension

Raised Median Islands

A raised median island is an elevated surface along the centerline of a roadway that provides separation between opposing vehicle travel lanes. It provides an opportunity for landscaping or other visual enhancements to a roadway corridor and a place of refuge for a pedestrian crossing a multi-lane street. The median planting space can also potentially be used for stormwater management.

A raised median island is most effective when it is defined by a raised curb and landscaped to further reduce the open feel of a roadway. A raised median island can often double as a pedestrian refuge island if a cut in the island is provided along a marked crosswalk (see pages 21 and 23 for examples). Where there is an existing midblock crosswalk, it is desirable to locate the median island at the crosswalk.

When placed at or near the entrance to a neighborhood or corridor, a raised median island provides a visual cue to the motorist about the preferred vehicle speed. If it includes suitable featues like a monument sign and textured pavement, it can serve as a gateway.

Planted median in Seattle, WA

Planted median in Carmel, CA (source: Linda Hartong)

Median with flowering trees (source: Glenn Moore)

Raised median with mature street trees in W. Burnside St., Portland, OR

On-Street Parking

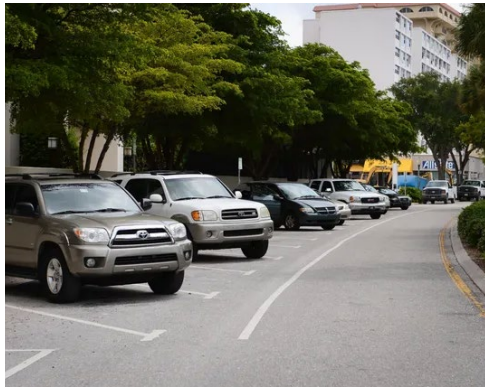
On-street parking can calm traffic by narrowing the roadway travel lanes and by adding side friction to the traffic flow. On-street parking can be allowed on one or both sides of a roadway or can be strategically located on alternate sides to create a chicane effect.

Whether on-street parking can be an appropriate traffic calming measure is a direct function of its actual or potential usage (i.e., parking demand). In order for on-street parking to be an effective and safe traffic calming measure, it must be occupied with parked vehicles during the time when traffic calming is desired.

The different types of on-street parking (parallel and both front-in and back-in angled) have different horizontal width effects and operational effects. Both parallel and angle parking can be protected through the use of complementary traffic calming measures such as a curb extensions, midblock chokers, or chicanes. An important consideration for on-street parking is the type and placement of bicycle and pedestrian facilities. On-street parking should also consider the need for ADA parking and accessibility to/from those stalls.

On-street parallel parking in Portland, OR

On-street parallel parking in Port Townsend, WA



Back-in angled parking (source: Sarasota Herald-Tribune)

Front-in angled parking (source: Royal Oak Tribune)

Pedestrian and Bicycle Facilities

Pedestrian and bicycle facilities can calm traffic in a variety of ways. Pedestrian facilities, such as sidewalks, crosswalks, and raised median islands with pedestrian refuges can calm traffic by increasing driver awareness of the potential for people walking along the roadway, narrowing the roadway travel lanes or creating the perception of narrow travel lanes; and creating potential physical barriers in the roadway that promote slower driving.

Bicycle facilities, such as on-street bike lanes, separated bike lanes, and bike crossings can have a similar effect. Pedestrian and bicycle facilities can also encourage more people to walk and bike along the roadway, further increasing driver awareness and potential yielding behavior.

Pedestrian crosswalk flanked with textured paving

Separated bike lane in Vancouver, BC

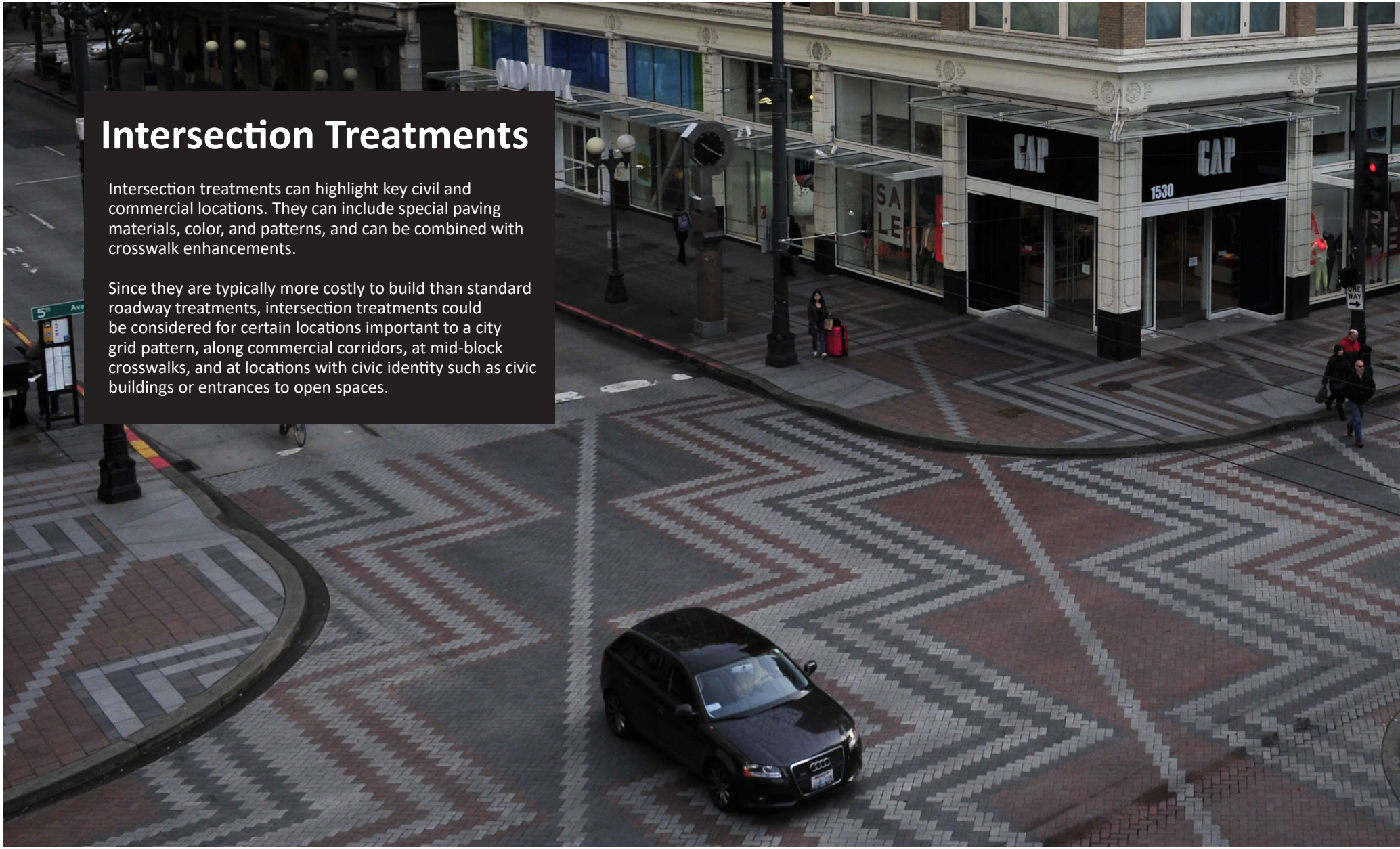
Painted on-street bike lane in Philadelphia, PA

Speed Feedback Signs

Speed feedback signs provide drivers with real-time feedback about their speed in relationship to the posted speed limit. When paired with enforcement, speed feedback signs can be an effective method for reducing speeds at desired locations.

Speed feedback signs are typically used in locations where there is a significant reduction in the posted speed limit and where there is a high frequency of speed related issues. The signs may be permanent installation or temporary for targeted enforcement efforts. It is important to consider setting a maximum speed that's being reported back to the driver to discourage the potential "how fast can you go" driving competition.

Speed feedback sign



Intersection Treatments

Intersection treatments can highlight key civil and commercial locations. They can include special paving materials, color, and patterns, and can be combined with crosswalk enhancements.

Since they are typically more costly to build than standard roadway treatments, intersection treatments could be considered for certain locations important to a city grid pattern, along commercial corridors, at mid-block crosswalks, and at locations with civic identity such as civic buildings or entrances to open spaces.


ALLSAINTS
NO
TURNS
SALE
SALE
50%
Pine

Roundabouts

Roundabouts can improve safety, reduce congestion, encourage a steady flow and calm traffic, relative to stop-controlled intersections. Roundabouts consist of a center island that vehicles drive counter-clockwise around at a slow speed until they reach their desired exit. The raised center island is an ideal location for landscaping, art or a gateway monument.

Because of their design, roundabouts significantly reduce the speed at which traffic travels, decrease the need to install signaled four-way intersections and decrease the likelihood of head-on collisions. Roundabouts can be designed to accommodate trucks with trailers and other large vehicles.

Because there is no signal equipment, roundabouts require less long-term maintenance. However, roundabouts require more right-of-way space than stop-controlled intersections, which may increase the overall cost.

Pedestrians benefit from roundabouts due to the shorter crossing distances, reduced waiting times to cross, and the need to cross only one direction of traffic at a time. Bicycle users and pedestrians both benefit from increased yielding rates, and all users benefit from reduced frequency and severity of crashes.

Art and landscaping featured in a roundabout located in Bend, OR

Sculptural art in a roundabout

Landscaping in a roundabout

Roundabout in Oregon City, OR

Intersection with traffic signal

Traffic Signals

Traffic signals allow opposing streams of traffic to proceed in an alternating pattern. National and state guidance indicates when it is appropriate to install traffic signals at intersections. When used, traffic signals can effectively manage high traffic volumes and provide dedicated times in which pedestrians and bicyclists can cross roadways.

Because they continuously draw from a power source and must be periodically re-timed, signals typically have higher maintenance costs than other types of intersection control.

Signals can improve safety at intersections where signal warrants are met, however, they may result in an increase in rear-end crashes compared to other solutions.

Protected Intersections

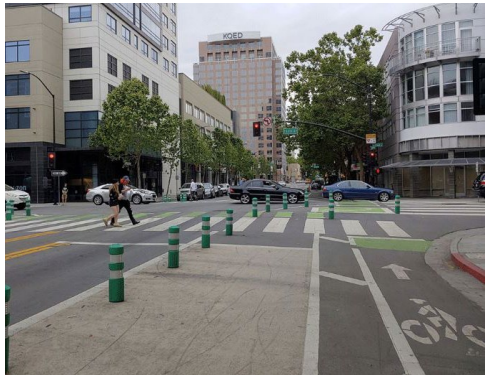
Protected intersections, also known as setback or offset intersections, are designed to maintain the physical separation provided by bicycle lanes up to and through an intersection. The physical separation is intended to control speeds, promote visibility, and reduce conflicts among all road users while increasing comfort for bicyclists and pedestrians.

The main features of protected intersections include set-backs, corner islands, queuing areas, pedestrian islands, and waiting zones.

Bicycles wishing to turn left at a protected intersection, should make a two-stage left turn by first proceeding through the intersection to the far side curb where they can wait behind the corner island for the signal to change and then proceed to cross the rest of the intersection. When the signal changes to green, bicyclists will have a head start to proceed through the intersection and turning motorists must yield to them.

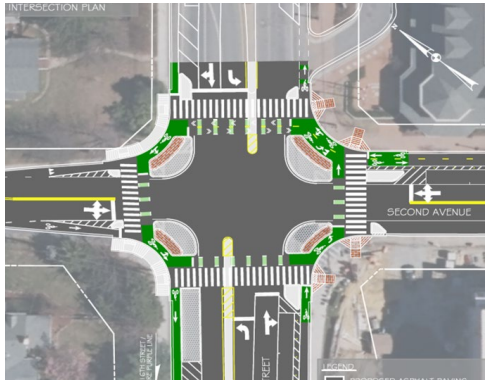
When riding through a protected intersection, bicyclists should stop for crossing pedestrian before proceeding to the queuing area or making a turn.

Protected intersection in Davis, CA



Protected intersection in San Jose, CA (source: NACTO)

Protected intersection design



Protected intersection design

Intersection Enhancements

Like crosswalk enhancements, intersection enhancements can highlight key civic and commercial locations. They can include special paving materials, color, and patterns, and can be combined with crosswalk enhancements. The intersection can also be raised above the surrounding road level, as shown below, to slow traffic and enhance safety.

Since they are typically more costly to build than standard roadway treatments, intersection enhancements could be considered at key locations important to a city grid pattern, along commercial corridors at key intersections, at mid-block crosswalks, or at key civic locations such as civic buildings or entrances to open spaces.

Decorative intersection in Seattle, WA

Change of materials at intersection in Washougal, WA

Intersection enhancments in Eugene, OR

Change of color and materials mark this raised intersection

Pedestrian Treatments

Clear indicators of pedestrian spaces are crucial for safety, and create a welcoming atmosphere for pedestrians. Sidewalks are typically separated from the roadway by curbs, but flush sidewalks may be separated by bollards or other objects. Well-designed crosswalks with appropriate signage and signals alert drivers to the presence of pedestrians, slow traffic, and encourage pedestrians to cross in safer locations. Special paving materials, colors, and textures can be used to delineate pedestrian spaces, while highlighting an important location or create a consistent element along the road.


RANCH GRILL
1912
190

Sidewalks

Sidewalks in a pedestrian-oriented commercial/mixed use zone generally should be at least 10’ wide, with 12’ to 20’ width preferred. That overall width includes three main sidewalk zones:

Furnishing zone: The space closest to the street, the furnishing zone contains furnishings like benches and bike racks, trees and planting, street lights, and utility poles and boxes. The furnishing zone should be at least 4’ wide, but can be much wider where there is available space (such as at a curb extension) to provide room for bigger pedestrian amenities. The paved portions of the furnishing zone typically use a contrasting material, color, or scoring pattern to separate it from the through zone.

Through zone: Located behind the furnishing zone, the through zone should be clear of obstacles, and aligned to crossings. It should be at least 6’ wide, up to 12’ or wider in areas of heavy pedestrian use. The back of the though zone is typically at or near the right-of-way line.

Frontage zone: This is an optional element behind the sidewalk, most often on private property. It provides space for businesses to add seating, signage, and planting. The frontage zone should be at least 4’ wide to be useful for most furnishings.

Sidewalk on NE Fremont St. in Portland, OR

Intensive use of a wide furnishing zone

Sidewalk in Lake Oswego, OR

Sidewalk on NE Fremont St. in Portland, OR

Crosswalks in Minneapolis, MN

Crosswalks

Crosswalks enable people to safely cross streets and can help consolidate crossing activity to one or more locations. Planning for appropriate crosswalks requires the community to balance vehicular mobility needs with providing crossing locations along the desired routes of pedestrians.

Enhanced crosswalk treatments include geometric features such as curb extensions and raised median islands with pedestrian refuges as well as signing and striping, flashing beacons, signals, countdown pedestrian heads, and leading pedestrian intervals. Many of these treatments can be applied simultaneously to alert drivers of the presence of pedestrians in the roadway and increase yielding behavior. The Federal Highway Administration (FHWA) and the National Cooperative Highway Research Program (NCHRP) provide guidance on the types of crosswalk treatments that should be considered at various crossing locations as well as a methodology for evaluating the crossings. The guidance generally considers the physical and operational characteristics of roadways at the crossing location, including number of lanes, traffic volumes, travel speeds, and (in some cases) pedestrian activity. With this information, local agencies can determine the most appropriate treatment for a given crossing.

Unmarked crosswalk in Seattle, WA (source: SDOT)

Unmarked Crosswalks

Under Oregon law, pedestrians have the right-of-way at all unsignalized intersections. On narrow, low-speed streets unmarked crosswalks are generally sufficient for pedestrians to cross the street safely, as the low-speed environment makes drivers more responsive to the presence of pedestrians.

However, drivers are less likely to yield to pedestrians at unmarked crosswalks on high-speed and/or high-volume roadways, even when the pedestrian has stepped onto the roadway. In these situations, enhanced pedestrian crossing facilities are needed to remind drivers that they must yield when pedestrians are present.

Crosswalk marked with painted striping

Marked Crosswalks

Marked crosswalks are painted roadway markings that indicate the location of a crosswalk to motorists. Marked crosswalks can be accompanied by signs, curb extensions and/or median refuge islands, and may occur at intersections or at mid-block locations.

Research has shown that marked crosswalks may not improve pedestrian safety in certain situations. Recent research indicates that on multi-lane roadways (more than two lanes), marked crosswalks should not be installed without accompanying treatments, such as Rectangular Rapid Flash Beacons (RRFBs) or Pedestrian Hybrid beacons. A traffic study would need to be conducted to determine the appropriate treatment.

Raised Crosswalks

Raised crosswalks (also referred to as speed tables) are long, flat speed humps in the roadway at intersection or mid-block crossing locations. They are a visual indicator to drivers that pedestrians may be crossing, and they function as speed humps to lower traffic speeds.

Crosswalk enhancements such as special paving colors, patterns, and textures should be considered for raised crosswalks to increase their visibility. Small, breakaway pedestrian crossing signs can be installed on the road centerline to futher increase visibility, as shown in two of the examples on the right.

Because raised crosswalks deliberately introduce a vertical disruption in the roadway, their use should be confirmed with the fire department and local freight community.

Raised crosswalk in Alexandria, VA (source: FHA)

Raised mid-block crossing for a multi-use path in Appleton, WI

Raised crosswalk leading to pedestrian refuge island

Raised crosswalk with curb extensions (source: PDOT)

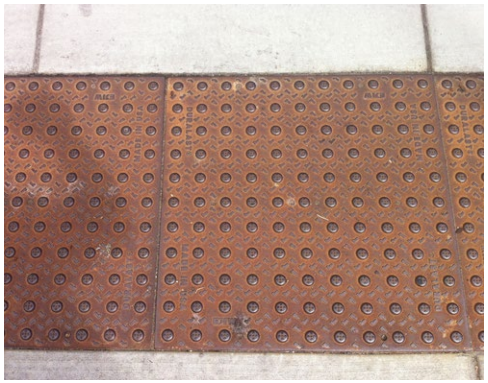
Crosswalk Enhancements

Special paving materials, articulated scoring patterns, integral concrete colors, bollards, lighting, and landscape plantings can significantly enhance the pedestrian experience along a streetscape. These enhancements visually break the monotony of asphalt streets, extend the pedestrian realm, and highlight key civic and commercial areas.

Enhancements should use textures, patterns, and colors to articulate the crossings, but should be slip-resistant, and avoid creating an uncomfortable surface for those using wheelchairs or other mobility devices. Pedestrian crossings should be designed and constructed with paving materials that contrast in color and texture to clearly designate pedestrian paths of travel.

Brick, striping, signage and planters to indicate crossing

Crosswalk enhanced with creative use of color



Detectable warning

Brick and paving bands suggest a change of conditions

Mid-Block Crossings

Streets with long block faces and widely-spaced intersections sometimes limit crossing opportunities for pedestrians. Mid-block crossings can provide convenient crossing opportunities for pedestrians when other crossing opportunities are distant, or where a destination creates a high crossing demand.

Mid-block crossings should be highly visible, and employ markings or materials with high contrast that clearly delineate the edge of the pedestrian zone. Signage and/or signalization, flashing beacons, or other special treatments like special paving materials or raised crossings help increase visibility of crossings.

Site specific analysis and planning would determine feasible locations for mid-block crossings throughout the project area, and should consider whether it could contribute to traffic congestion or delay issues.

Bollards, stone markers and the use of brick makes a mid-block crossing in Lake Oswego, OR more noticeable

Change of materials in crosswalk area

Creative use of paint at crossing

Striping and material change to indicate crossing

Pedestrian Refuge Island

Raised median islands provide a protected refuge in the middle of the roadway where pedestrians can stop while crossing the street. These pedestrian refuge islands allow pedestrians to complete two-stage crossings if needed, and can narrow the vehicle path and slow down traffic along the roadway. Pedestrian refuge islands could be applied along any street where they would not interfere with turning movements at driveways and intersecting roadways. Pedestrian refuge islands are most beneficial on multi-lane roads where the crossing distance is longer and where motorists may not see pedestrians waiting to cross on the opposite side of the road.

In the example below, the crosswalks for each side of the road are offset, effectively making the refuge a chicane in the overall crossing. The chicane forces a pause for safety in the crossing movement, and turns the pedestrian toward a better view of oncoming traffic.

Pedestrian refuge island (source: NACTO)

Pedestrian refuge island

Pedestrian refuge island

A pedestrian refuge in a planted median (source: pedbikeimages.org - Lyubov Zuyeva, 2011)

Rectangular Rapid Flashing Beacon (RRFB)

RRFBs are user-actuated amber lights that have an irregular flash pattern similar to emergency flashers on police vehicles. These supplemental warning lights are used at unsignalized intersections or mid-block crosswalks to improve safety for pedestrians using a crosswalk.

RRFBs could be used at any unsignalized intersection or mid-block crossing that warrants require a higher level of crosswalk protection, based on a traffic study.

Crossing with rectangular rapid flashing beacon

Pedestrian Hybrid Beacon

A Pedestrian Hybrid Beacon (sometimes called a HAWK signal) is a user-actuated signal that is unlit when not in use. It begins with a yellow light alerting drivers to slow, and then displays a solid red light requiring drivers to remain stopped while pedestrians cross the street. The beacon then shifts to flashing red lights to signal that motorists may proceed, after stopping, and after pedestrians have completed their crossing.

A Pedestrian Hybrid Beacon can be used at mid-block crossings or, in some cases, at unsignalized intersections (the MUTCD suggests that the beacons be located at least 100-feet from an intersection). Pedestrian Hybrid Beacons could be used at any unsignalized intersection or mid-block crossing where warrants require a higher level of crosswalk protection, based on a traffic study.

Crossing with pedestrian hybrid beacon

Pedestrian Signal

Signals provide pedestrians with a signal-controlled crossing at a mid-block location or, in some cases at a previously stop-controlled intersection where pedestrian volumes warrant full signalization, based on a traffic study (the MUTCD no longer allows half signals at intersections).

The signal remains green for the mainline traffic movements until actuated by a pushbutton to call a red signal for traffic. They are typically located at midblock crossings with high pedestrian or bicycle demand and/or high traffic volumes, such as where shared-use paths intersect with roadways.

Pedestrian signal at mid-block crossing

Pedestrian countdown head (source: Mike Cynecki, Safe Routes to School)

Pedestrian Countdown Heads

Pedestrian countdown heads inform pedestrians of the time remaining to cross the street with a countdown timer at the signalized crossing. The countdown should include enough time for a pedestrian to cross the full length of the street, or in rare cases, reach a refuge island. The MUTCD requires all new pedestrian signals, and any retrofitted signals to include pedestrian countdown heads.

Crossing with a leading pedestrian interval (source: City of Portland)

Leading Pedestrian Interval

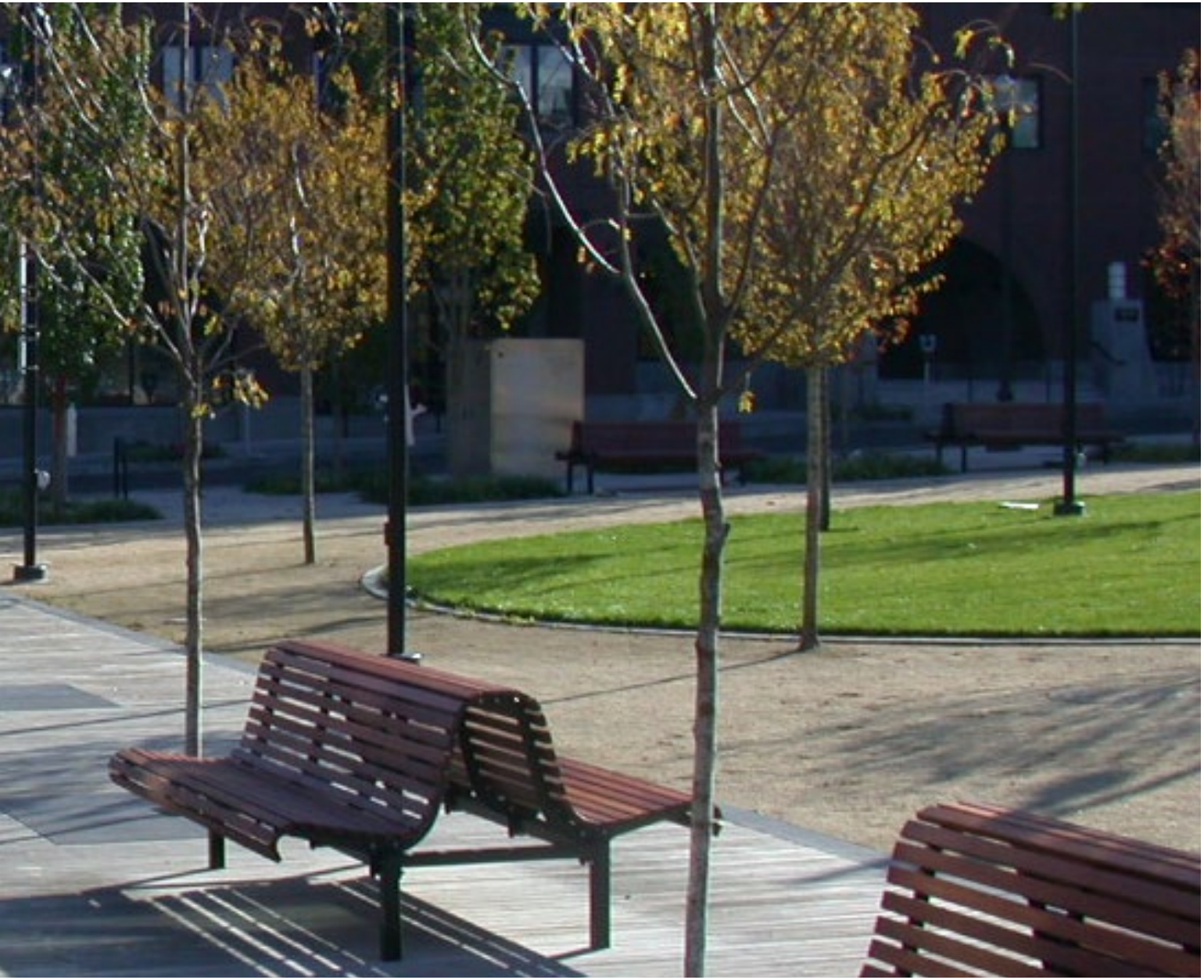
Leading pedestrian intervals (LPI) allow pedestrians to start crossing the street at a signalized intersections five to seven seconds before conflicting vehicles are given a green light and allowed to enter the intersection. They are most commonly used at signalized intersections where left- or right-turning vehicles interfere with pedestrian crossing movements. LPI could be applied at all existing or potential future traffic signals to improve crossing conditions for pedestrians.

Audible Notification

Audible notification at all enhanced pedestrian crossings with signals or beacons is a requirement per state and local standards.

Pedestrian Amenities

Streetscape enhancements like special sidewalk paving, street furnishings, pedestrian-scale lighting, and awnings or building overhangs are important features for pedestrians to feel welcome and that the street is a comfortable place to be. Building overhangs and awnings additionally provide protection from the elements during the wet season. These kinds of amenities add functionality and vitality to the pedestrian realm, and provide visual interest. A vibrant pedestrian realm can increase public safety, enhance the value of adjacent real estate, and sustain the health of local businesses. These kinds of streetscape features can be installed by the City, neighborhood or local business associations, or by individual property owners.



Sidewalk Paving Materials: Concrete

Concrete sidewalks continue to be the default sidewalk surfacing employed in most right-of-way development projects throughout the United States. Compared to asphalt, concrete is comparable in cost, is more durable and attractive than asphalt, can be formed and scored in virtually any pattern, and is more reflective and, therefore, does not contribute as much to urban heat islands.

Additionally, concrete paving can be articulated with different textured finishes (stamped, lightly broomed, floated, exposed aggregate, etc.), which also add a degree of slip-resistance. Integral color concrete is another method for highlighting special pavement areas.

Concrete sidewalks are appropriate throughout the entire project area, though specially articulated concrete is most appropriate along downtown, commercial, and other special or small streets.

Integral color concrete bands

Concrete and aggregate paving

Decorative concrete paving

Scored concrete paving

Sidewalk Paving Materials: Unit Pavers

Special paving treatments can significantly enhance the aesthetics of public spaces in a city, give circulation areas a strong sense of place, and establish a hierarchy of public spaces.

Unit pavers can be selected from a range of options, and include natural stone pavers, concrete unit pavers, asphalt pavers, and clay brick pavers. All of these pavers are typically available in a number of different shapes, colors, and textures. Regardless of the material, unit pavers are typically installed in either sand-set or mortar-set applications.

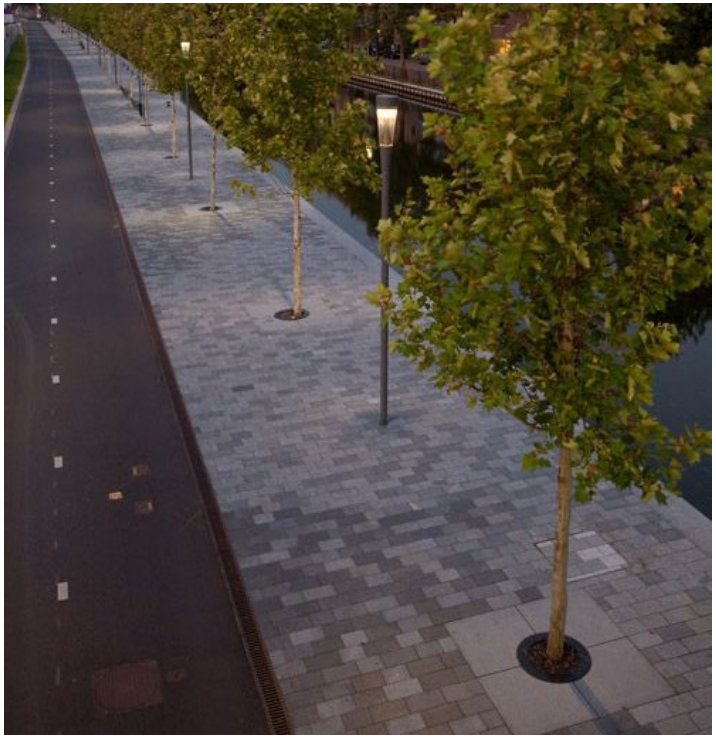
Permeable concrete unit pavers can provide both functional and aesthetic appeal in that they can help manage and treat stormwater runoff. These pavers often have wider joints and thus a more variable surface and should be avoided along primary public circulation routes.

Unit pavers could be employed in a variety of configurations and at a number of different locations in sidewalks and crosswalks throughout the project area.

Concrete unit pavers and cobblestones

Concrete unit pavers

Natural stone unit pavers



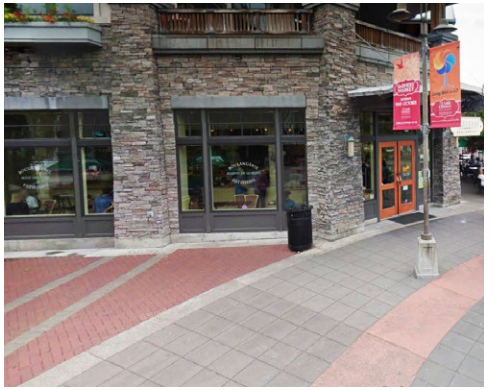
Concrete brick pavers with varying colors

Concrete and stone unit pavers

Sidewalk Paving Materials: Combinations

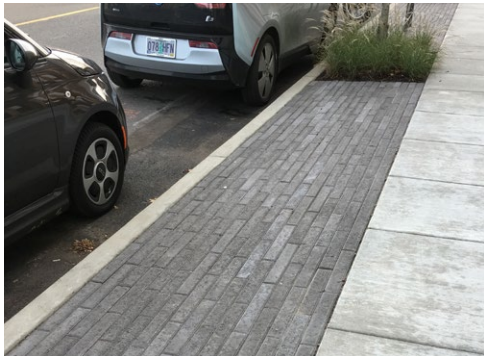
Utilizing special paving treatments like unit pavers or stamped/colored concrete, with standard concrete is another effective tool in improving the sidewalk aesthetics and creating sense of place in public areas while minimizing costs. The combinations can be employed to create a pattern that helps to break up the scale of larger streets to a more pedestrian-scaled experience. The pattern can be informed by other repetitious streetscape elements such street trees and seating areas, or can help to reinforce a "theme" established in certain downtown districts.

Paving surfaces that integrate unit pavers into the design and layout must address potential ADA-related issues regarding slip or trip hazards, potential for vibratory effects on those in wheelchairs, and clarity of the paving surface for those with visual impairment.



Brick and concrete paving

Unit pavers and concrete paving in Pendleton, OR



Concrete and unit pavers

Brick and concrete paving

Sidewalk Paving Materials: Artistic

Pavement with innovative and artistic patterns stamped or painted on the surface can highlight significant civic and/or cultural locations, create a varied and pleasant pedestrian experience, and be expressive of a city's historical or cultural heritage or physical setting.

Stamped concrete paving

Painted asphalt

Stamped concrete paving

Stenciled concrete paving

Pedestrian Lighting

Pedestrian lighting primarily functions to illuminate pedestrian areas such as sidewalks, are less than 18' tall, and typically supplements roadway lighting, which is oriented towards illuminating the roadway, intersections, and crosswalks.

There are a number of benefits associated with pedestrian lighting in the public right-of-way. It can be a key organizing streetscape element that defines a positive daytime and nighttime character of public urban spaces. Well-lit streetscapes can extend the hours that a business district is active, which can promote economic growth and stability. It can provide for better visibility and safety during nighttime hours, improving safety for vehicles and pedestrians. Additionally, it can encourage walking as part of an active lifestyle, and improve access to transit and other services.

The styles and designs of pedestrian light poles and fixtures are virtually limitless, and can help reinforce a neighborhood, district or civic identity. Designers should consider existing maintenance agreements with the local electrical utility or lighting district, which may limit the options available.

Pedestrian lighting can be implemented to help bring the scale down to a pedestrian level in the project areas, encouraging pedestrians to engage with their environment, defining pedestrian routes, and increasing safety.

Custom light fixture in Sisters, OR

Traditional light fixture in furnishing zone

Modern light fixture

Seating: Benches & Seatwalls

An abundance of pedestrian seating fixtures and seating areas along a streetscape creates a comfortable, usable, and active public realm where people can meet and socialize, rest, read, or people-watch. It is a fairly simple and straightforward element that can significantly help to create a sense of place, and encourages people to linger, which is a definitive characteristic of a successful streetscape.

Benches are typically “off the shelf” products purchased from manufacturers in multiple quantities, and are distributed evenly along a streetscape corridor outside of a path of travel, or clustered at a determined special location. They can be made out of wood, metal, precast concrete, or stone, or customized in a variety of ways as a functional art element, or to help reinforce a civic or neighborhood identity. Often times the style of bench in a downtown district belongs to a larger “family” of site furnishings, which include lighting, bike racks, bollards, and waste receptacles that, when used collectively, further unify a streetscape. In other areas, individual benches may be more unique and feature artistic seating created specifically by and for the community.

Seatwalls are typically constructed with a concrete or concrete masonry unit (CMU) base, and can either have an articulated concrete surface, or be clad with other materials such as wood, stone, or precast concrete slabs. They can also be very expressive, and can be functional artistic elements in the landscape that help define pedestrian seating areas. Seating surfaces with dark colors or rough materials should be avoided.

Benches and seatwalls are appropriate along corridor segments, and should be located outside of the path of travel, at transit stops, and at special locations within the project area.

Modern seatwall and bench combination

Steel bench with back support and arms

Custom steel bench in St. Helens, OR

Wood bench with back support and arms

Street Furnishings: Bicycle Racks

Bicycle racks are an essential functional element for those who travel by bike for protections against theft. Additionally, they are an effective aesthetic element that, when part of a site furnishing "family", can help visually unify a streetscape. Ample bicycle parking encourages ridership and facilitates a healthy lifestyle. It is most effective when it is located close to destinations, is easy to find, not hidden from public view, and is accessible.

Bicycle racks should support the bike in at least two places, and be located with ample area for bike parking (typically 2-feet wide by 6-feet deep) on each side of the rack. More space may be needed where larger bicycles (e.g., "cargo bikes") need to be accommodated. They should be located in areas that provide enough room for riders to dismount and manage their cargo, and do not conflict with pedestrian through zones. They are typically constructed of metal, and should be designed and detailed in a way that supports the bicycle, will not damage it with sharp corners, and will fit most U-bar style bike locks. Options for customizing the rack to reflect civic or neighborhood character are available on most bike rack designs.

Bike rack with detail

Modern circular steel bike racks

Custom bike rack

Traditional U-shaped bike racks

Street Furnishings: Waste Receptacles

Modern steel receptacle

Trash and recycling receptacles in the pedestrian right-of-way are essential to maintaining a clean, healthy city. Their presence discourages littering, thereby improving the aesthetics of a streetscape. Though these elements are utilitarian, attention to their design and integration into the overall streetscape character, in addition to careful placement, can enhance the public realm and adds to a sense of place.

Waste receptacles should be considered as one of a "family" of streetscape furnishings, which may also include benches, bike racks, and street lights. They should be made from durable, high quality materials, and should be graffiti resistant as is feasible. If recycling receptacles are provided, they should always be paired with a trash receptacle, and both should be clearly labeled for their intended use.

Metro should be consulted about where waste receptacles are appropriate, and if recycling can be included. Generally, they should be located close to intersections, and out of the sidwalk through zone and other high activity areas. A maximum of one receptacle every 200 feet along a block face, and a maximum of 4 receptacles per intersection (one per corner) is recommended.

Custom waste receptacle

Modern wood receptacle

Wood receptacle with planter

Street Furnishings: Drinking Fountains

Drinking fountains provide drinking water for pedestrians, offer hydration and nourishment, and encourage a healthy lifestyle. They are also an environmentally sound alternative to bottled water, which requires much more energy and materials to distribute.

Drinking fountains should be considered as one of a "family" of streetscape furnishings, which may also include waste receptacles, bike racks, and benches. They should be made from durable, high quality materials, and should be graffiti resistant as is feasible. They should also consider additional bowls that are accessible by those in wheelchairs, as well as optional dog bowls.

Drinking fountains are most appropriate along commercial streets with a pedestrian presence. They should be located within the furnishing zone, outside of the path of travel, and should be located with enough space around them to accommodate wheelchairs. Drinking fountains should also be provided in areas that host special events such as community festivals or activities during warmer months.

Combined drinking and bottle fill station

Artistic fountain

Multi-level fountain

Traditional fountain

Street Furnishings: Bollards

A bollard is a short vertical post or similar element that is most often used to separate pedestrians from a vehicular environment. They can be used to add color and visual interest to streetscapes, and are most effective when used in multiples and lined up to discourage vehicles from encroaching on pedestrian spaces like sidewalks or plazas. They are most often used when the surface of the pedestrian zones are at the same elevation as the adjacent vehicular areas, without curb separation.

Traditional bollards

Wood bollards

Removable bollards

Modern bollards in planting area

Street Furnishings: Tree Grates

Trees need air, soil, water, and space to grow. Unfortunately, soil conditions in most urban environments lack each of these critical elements trees need to thrive. Tree grates provide space for tree roots to grow and allow for air and water to reach the roots, while allowing pedestrian traffic over the tree planting area. This is particularly important along narrow sidewalks where pedestrian space can be limited. They also help to suppress weed growth and trash accumulation in the tree planting areas. Tree grates come in a large array of shapes, sizes, and materials, but should all be ADA-compliant and allow for expansion of the center ring as the trunk grows..

Other materials can be used to protect the tree well, while allowing air and water to reach the roots. Stone, brick, or concrete pavers can be set in the tree well with wider gaps filled with an open-graded aggregate that provides permeability. A newer option is flexible rubber surfacing (such as Flexi-Pave), which is composed of rock aggregate and recycled rubber, with plenty of porosisty to pass air and water. It is installed flush with the sidewalk, and fills the whole space up to the tree trunk, then can be trimmed back over time as the trunk grows.

Decorative steel tree grate

Removable cobblestone tree ring

Flexi-Pave porous rubber surfacing (source: KBI UK)

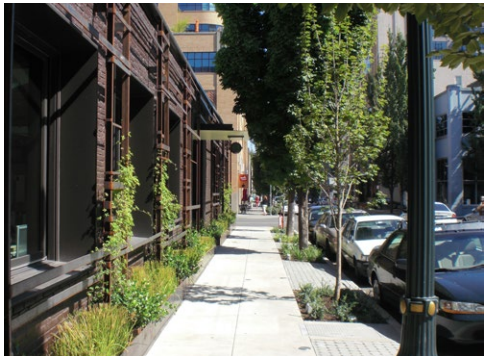
Decorative cast iron tree grate

Planting Areas

Planting areas along streetscape corridors is an effective, attractive way to enhance the pedestrian experience, improve adjacent property values, and indicate a sense of civic care for a neighborhood. Some planting areas can manage stormwater runoff, as described in the last section of this document.

Like street trees, planting areas can take many forms. They can exist at-grade, visually breaking up the paving area and providing focal points of interest, or they can be raised above the grade of the sidewalk in planters to elevate the green to the pedestrian's eye and help to create distinct spaces. They can be containerized, either in pots on or adjacent to sidewalks or elevated in planter baskets that hang off of other streetscape elements like light posts or wayfinding signs. Plantings can also be located in roadway medians at busy highway intersections or crosswalks to help with traffic calming and pedestrian safety. As with installing street trees, certain site conditions may limit the ability to implement planting areas. Shallow basalt bedrock, vehicular sight lines, and narrow rights-of-way all have an impact on where and how planting areas might be located.

Decorative planters



Foundation planting and street trees

Hanging planters

Stormwater planter at Russellville Commons in Portland, OR

Street Trees

Street trees are an integral component of a successful, vibrant, pedestrian friendly streetscape. Their social, economic, and environmental benefits are innumerable, and include softening hard urban edges, reducing heat island effect by shading streets and buildings, enhancing neighborhood beauty, filtering the air, and absorbing carbon dioxide. Trees have also been proven to reduce crime, calm traffic, improve public health, reduce energy consumption, and improve adjacent real estate values.

Street trees come in many shapes, sizes, colors, and textures, and can be used in a variety of ways in groups and as individual specimens to reflect a city's natural setting, create focal points, establish visual rhythm, and provide needed shade in areas with excessive pavement.

Site characteristics can significantly impact the ability to accommodate street trees. Narrow rights-of-way and sidewalks can limit tree placement and form. Overhead utility lines and underground utility pipes present additional challenges to locating street trees.

Special attention should be given to potential "nuisances" created by certain species such as excessive leaf litter, or berries or fruit that either stain concrete or other surfaces or attract unwelcome animals.

Street trees have been known to heave sidewalks due to shallow root systems. To prevent this, certain trees with shallow, aggressive root systems should be avoided, and all trees should be planted with adequate soil volume to accommodate the mature tree's root system. Most street trees have been planted in undersized tree pits, which forces the roots up toward the paving, and decreases the tree's overall health and longevity. Providing adequate soil volume by using larger planters, structural soils, or suspended paving systems will allow trees to achieve their potential size without disrupting the surrounding paving.

Local resources for selecting appropriate tree species include the City of Vancouver, WA street tree list and the City of Portland Street Tree Planting Lists. Ash trees (Fraxinus sp.) should be avoided due to the threat from the Emerald Ash Borer, an invasive insect which has already killed large proportions of urban and native ash trees in other parts of the country.

Common street trees and forms. From L to R: Red Maple, Magnolia, Ginkgo, Honey Locust and Japanese Zelkova


OPEN
24
HOURS

Bicycle Facilities

Properly designed bicycle facilities are key to providing a safe and comfortable environment for cyclists, and can encourage more people to get around by bike.

Where space allows, it can be beneficial to include more than one type of bicycle facility. For example, confident cyclists may prefer to use an on-street bike lane that allows higher speeds, while other cyclists on a more casual ride may prefer a separated path shared with pedestrians.


TOW
AWAY
ZONE

Shared-use Paths and Trails

Shared-use paths and trail are improved (i.e. paved) and unimproved (i.e. dirt and gravel) facilities that serve bicyclists and pedestrians. Shared-use paths and trails can be constructed adjacent to roadways where the topography, right-of-way, or other issues don't allow for the construction of sidewalks and bike facilities. A minimum width of 10 feet is recommended for low-pedestrian/bicycle-traffic contexts; 12 to 20 feet should be considered in areas with moderate to high levels of bicycle and pedestrian traffic. Shared-use paths and trails can be used to create longer-distance links within and between communities and provide regional connections. They play an integral role in recreation, commuting, and accessibility due to their appeal to users of all ages and skill levels.

Shared-use path

Separated Bike Lanes

Separated bike lanes (often called "cycle tracks") are bicycle lanes that are physically separated from motor vehicle traffic by a vertical element. Flexible posts are a commonly used but insubstantial form of separation. Better separation can be achieved by using raised planters, a row of parked cars (including a painted buffer for the "door zone"), or pre-cast curbs. The bike lane can also be separated from the roadway by raising it halfway to sidwalk level with a mountable curb, or level with the sidewalk on a standard curb. Where the bike lane and sidewalk are on the same level, they should be phyiscally separated (for example with a furnishing zone, see page 18), or they should have clear visual demarcation.

One-way separated bike lanes are typically found on each side of the street, like conventional bike lanes, while two-way separated bike lanes are typically found on one side of the street.

Separated bike lane

Buffered Bike Lanes

Buffered bike lanes are enhanced versions of conventional on-street bike lanes that include an additional striped buffer of typically 2-3 feet between the bicycle lane and the vehicle travel lane and/or between the bicycle lane and the vehicle parking lane. They are typically located along streets that require a higher level of separation to improve the comfort of bicycling.

Buffered bike lane

On-Street Bike Lanes

On-street bike lanes are striped lanes on the roadway dedicated for the exclusive use of cyclists. Bike lanes are typically placed at the outer edge of pavement. Bicycle lanes can improve safety and security of cyclists and (if comprehensive) can provide direct connections between origins and destinations.

On-street bike lane

Civic Identity & Wayfinding

Cities thrive when they capitalize on their unique strengths. The manner in which these strengths are represented -- either through gateway monuments, public art, or wayfinding signs -- can strengthen civic identity which gives added value to a downtown area beyond the physical elements that make up that area. A successful civic identity and wayfinding system enhances the visitor's relationship to those downtown areas, resulting in frequent visitation, loyalty, and an ongoing interest in the vitality of that downtown.


character
Dr. Martin Luther King, Jr

Gateway Monuments

Gateway monuments are elements that mark the entrance to a district or neighborhood. They are typically larger in scale, are highly visible, and can take many different forms. Typical gateway monuments range from arched gateway markers that span over the roadway, to sculptural or iconic elements, to expansive landscape areas that visitors pass through. They are typically more sculptural in form and function at a district or neighborhood scale.

Gateway markers should be located at entry points to districts or neighborhoods or at transitions between one roadway or land use type to another. They should be highly visible and attract attention, and integrate culturally relevant elements that are appropriate for the area.

Existing gateway arch in Troutdale

Gateway with sculpture in Tigard, OR

Landscaped gateway in Pendleton, OR

Gateway structure in Atlanta, GA

Signage & Trailheads

Streetscape signage can be an effective tool in unifying the character of a neighborhood or district. They can mark entry points or neighborhood edges, give directions to destinations, include maps and directories, and include relevant neighborhood information. Streetscape signage types include neighborhood orientation signs, directions signs, and interpretive signs, and can significantly enhance a visitor's experience in a downtown area.

Neighborhood orientation signs have a distinctive design and offer neighborhood information including maps and directories that guide people to various neighborhood amenities such as historic buildings and sites, cultural institutions, shopping centers, recreation facilities, and public services such as parking and rest rooms.

Directional signs can include typical street signs and wayfinding signs, and help orient pedestrians to significant destinations. They should include local destination names and directional arrows or markers, and often have maps that clearly show the current location. Furthermore, they should maintain a simple, and coordinated design, be legible from a distance, and reflect the character of the surrounding neighborhood or district.

Interpretive signs provide information about nearby significant cultural, natural, historical, or architectural features or icons. They can be made of many different materials including metal, wood, stone, or acrylic, can be sculptural in form, be a traditional sign, or be installed flush with the paving surface. They should be unique and eye-catching, and capture the character and spirit of the area.

Interpretive element

Trailhead signage

Existing entrance sign in Wood Village

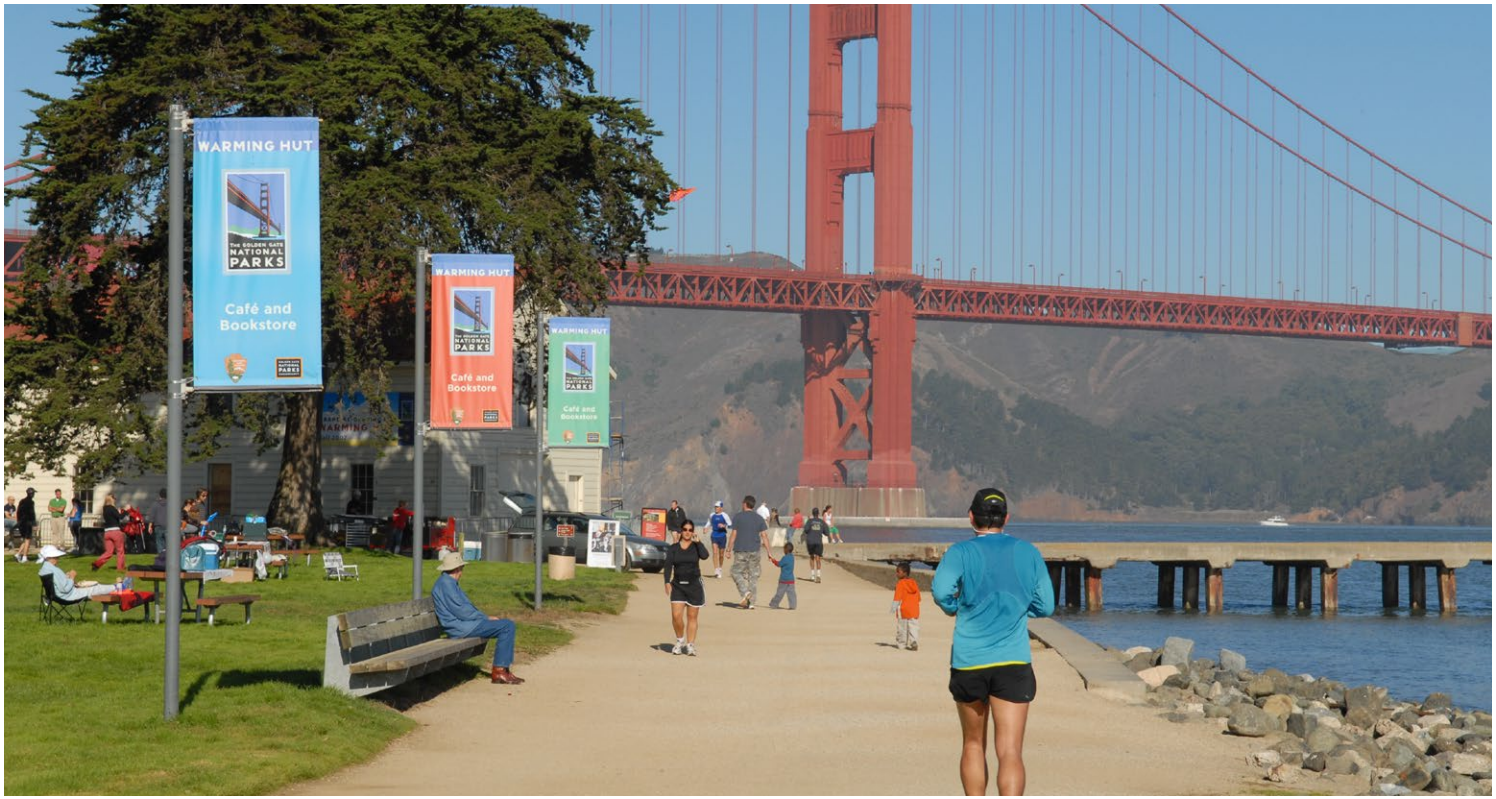
Halsey Parkway wayfinding signage concepts

Banners

Banners can enhance civic identity by adding festiveness and variety to commercial and arterial roadways. They can help distinguish specific neighborhoods, promote cultural awareness, or provide information on civic events.

Banners are typically hung on street lights or utility poles, but can also be mounted on freestanding poles. They should be made of durable, UV-resistant materials such as vinyl or acrylic fabric, though they can also be made out of metal if there is a desire for a customized or artistic appearance.

Banners currently are used along Halsey Street, and could be further enhanced with additional locations and/or a coordinated design/ layout. New banners should be made of a durable material that will not easily damage or wear to prevent frequent replacement.



Banners assist with wayfinding in San Francisco, CA

Banner in St. Helens, OR

Banner in Lake Oswego, OR

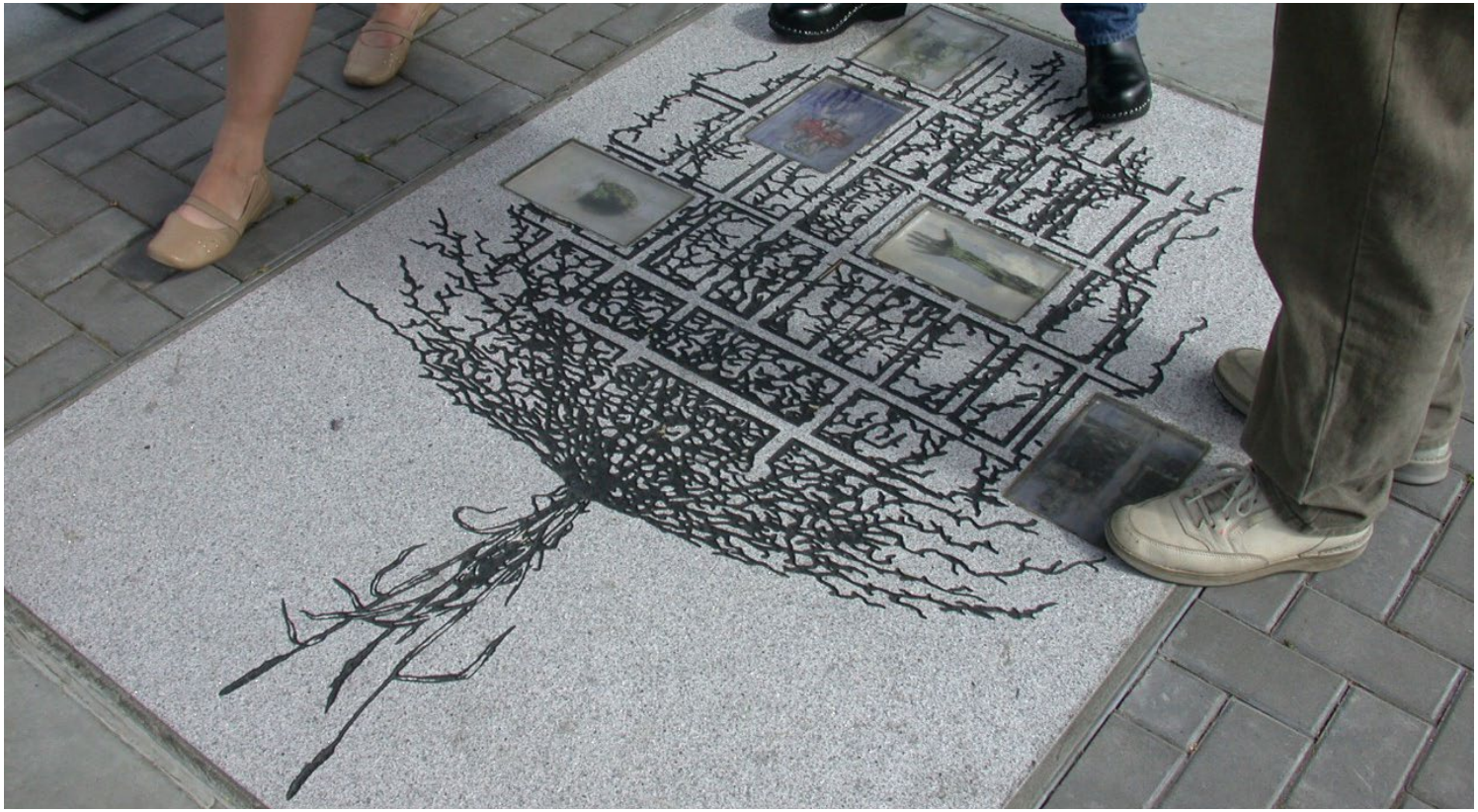
Public Art

Public art can be a significant streetscape component by enhancing civic identity at multiple scales. At the larger scale, it can help to unify an entire district or neighborhood. At the pedestrian scale, it can add aesthetic interest and also functional benefits if incorporated into pedestrian furnishings such as seating or lighting.

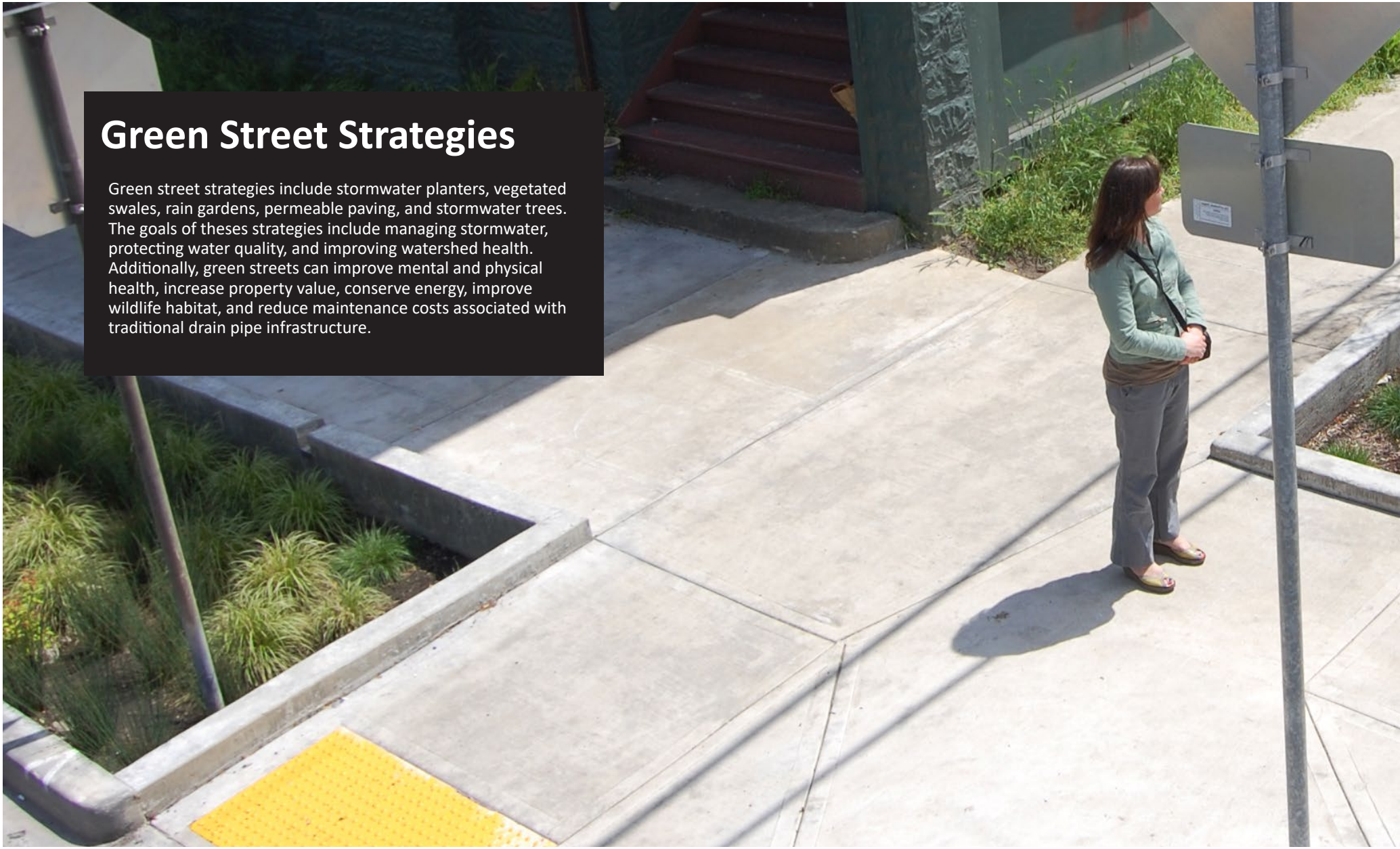
Appropriate locations for public art exist in a number of locations and capacities in the project area. Depending on the proposed art piece, a suitable site should be vetted and analyzed for its feasibility. Public art could be located at key intersections, and be of a larger or smaller scale that is consistent with the scale of the space in which it is placed. In small areas the art can embody the spirit of each neighborhood. In larger areas or along streets art can be of a larger scale and used as an icon for the town.

"Log Dog" sculpture in Portland, OR

Alberta Street Mural in Portland, OR



Public art on the ground plane, on the Max Yellow Line in Portland, OR



Green Street Strategies

Green street strategies include stormwater planters, vegetated swales, rain gardens, permeable paving, and stormwater trees. The goals of theses strategies include managing stormwater, protecting water quality, and improving watershed health. Additionally, green streets can improve mental and physical health, increase property value, conserve energy, improve wildlife habitat, and reduce maintenance costs associated with traditional drain pipe infrastructure.

Stormwater Planters

Stormwater planters typically have vertical walls, and can be located between the curb and sidewalk or in curb extensions. They can either be constructed with “open” bottoms to allow stormwater to infiltrate into native soil (“infiltration planters”), or be lined with an impervious bottom and constructed as a container to temporarily store stormwater to filter sediments and pollutants down through the planter (“flow through planters”). Site conditions will dictate which type of stormwater planter is appropriate.

Stormwater planter with railing in Lake Oswego, OR

Planters and hardscape along SW 12th Avenue in Portland, OR

NE Siskiyou Street planter in Portland, OR

Mature stormwater planter along Water Avenue

Vegetated Swales & Conveyance Channels

Large vegetated swale in north Portland, OR

Vegetated swales are gently sloping, linear depressions planted with dense vegetation that treat stormwater runoff from adjacent roadways, sidewalks, and other impermeable surfaces. They typically accept runoff and allow it to infiltrate, but like stormwater planters, where soils drain poorly, slopes are too steep, or space is confined, swales can be lined and convey runoff to another, different type of drainage facility. Due to their bermed, gently sloping sides, swales can look like typical landscaped areas.

Conveyance Channels move stormwater from one location to another allowing time for water to permeate into the ground without causing erosion or flooding. Conveyance Channels may be lined with vegetation or a permeable material such as river rock and can add to the aesthetic of the overall streetscape.

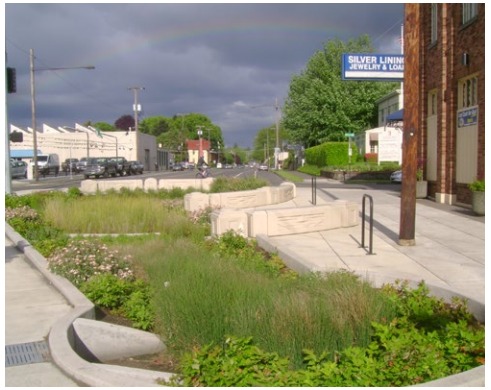
Swale retaining rainwater after a storm event

Artistic rainwater conveyance in Melbourne, Australia

Trees and planting in a stormwater swale enhance the pedestrian experience in Portland, OR

Rain Gardens & Stormwater Basins

Where space permits, rain gardens and stormwater basins provide opportunities to treat stormwater in larger depressions, and can offer opportunities to incorporate other materials such as boulders or large cobbles, small pedestrian foot bridges, art or other interpretive elements to further enhance these facilities. These larger stormwater features typically capture larger volumes of stormwater runoff, and provide opportunities for education and public awareness about their significance.



Rain garden along NE Sandy Boulevard in Portland, OR

The Warner Milne Rain Garden in Oregon City collects stormwater and runoff from adjacent surfaces

Mature swale plantings

Tiered rainwater basin

Permeable Pavement

Porous pavement

Permeable (or “pervious”) pavement allows stormwater to infiltrate directly through the paving medium into a reservoir base of crushed rock and eventually into native soil below. Permeable pavement types include pervious asphalt, pervious concrete, and permeable concrete unit pavers. These pervious materials resemble conventional pavement materials, but contain more air space to allow stormwater to infiltrate through. Because of this the surfacing layer is typically thicker to support the same loads. The base rock is usually thicker too, to provide runoff storage, with a carefully controlled gradation to increase pore space.

Permeable pavement is ideal in low traffic areas such as parking areas, highway shoulders, roadway medians, emergency access roads, and patios. Pervious concrete is best used in sidewalks, however, permeable concrete unit pavers should be avoided since they do not meet ADA requirements. Permeable pavement should not be used within 4’ of bedrock or a water table’s high point, within 100’ of a well, near building foundations, on slopes that exceed 5%, or within close proximity to contaminant sources such as gas stations.

Permeable pavers

Crushed rock paving

Permeable paving parking stalls at Graham Oaks Nature Park in Wilsonville, OR

Stormwater Trees

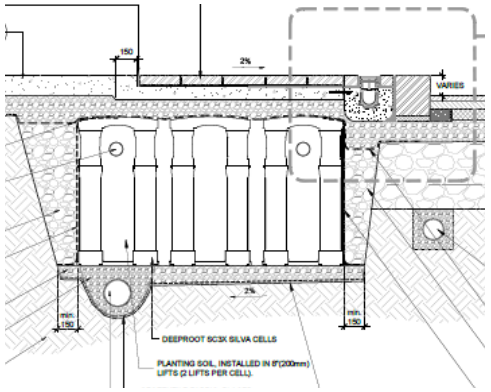
The soil volume for tree roots can potentially be used to manage stormwater. This innovative solution is only starting to be recognized by most municipalities as an approved stormwater management technique, but it functions in a similar way to the more commonly seen rain gardens. Runoff collected in drains is directed to shallowly buried perforated distribution pipes around the stormwater trees. In the example below, the runoff is collected in trench drains. The runoff is filtered as it moves down through the tree's root zone, and depending on local soils, it can directly infiltrate under the tree, or be collected by an underdrain and routed to the storm sewer. The volume of soil around the tree can also store runoff.

All trees intercept some falling rain, and then evapotranspirate soil moisture back into the air. But when street trees are used to more directly treat and store larger volumes of runoff, they free up space that would otherwise be spent on other types of stormwater facilities. Combined with suspended paving systems such as Silva Cells (lower right example), stormwater trees help use limited urban space efficiently.

Source: City of Minneapolis

Stormwater trees in Oakville, Ontario (source: Brook McIlroy, Inc.)

Stormwater tree trench in Vancouver, BC (source: City of Vancouver, BC)



Stormwater trench detail (source: Brook McIlroy, Inc.)