City of Lake Stevens

Trails Master Plan

July 2020

Acknowledgments

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CITY OF LAKE STEVENS

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Table of Contents

*The City of Lake Stevens' **FIRST** Master Plan for Trails*

1. Introduction & Context

Planning Context

This is the City of Lake Stevens' first Trails Master Plan. The document represents a major step toward creating an interconnected system of trails that provide multi-modal, non-motorized options that people can use for travel and recreation.

As part of the 2015 Lake Stevens Comprehensive Plan, the city conducted a Parks & Recreation Survey and subsequently completed a needs assessment. Through this process, residents identified the need for more trails, walking paths, and open space amenities.

The city additionally established a Level of Service goal for multi-use trails, which aims to have at least one trail within one mile of all residential areas. The Trails Master Plan has been created to meet this goal and address residents' desire for more trails.

Plan Purpose

Lake Stevens is surrounded by natural beauty--it lies adjacent to the Lake from which it takes it's name and is situated between the Cascade Mountains and Puget Sound. The city's location and proximity to these features provides abundant opportunities for outdoor adventure. The city's strong outdoor culture includes approximately 5 miles of trails, including the popular regional Centennial Trail, 1.7 miles of which run along the eastern side of the city.

The Trails Master Plan builds upon the existing trails and places an emphasis on creating a spine of trails across the city that can serve as focal points for more localized neighborhood connections. This planned network of trails will also connect to the growing regional trail system in Snohomish County.

The Trails Master Plan provides a vision and action plan that will guide the City's decisions on future trail investments. The plan helps coordinate and maximize limited public resources towards projects that can have the greatest impact. The plan also works as a mechanism to incrementally implement trail segments either as roadway reconstruction or private development occurs or as capital improvement projects are completed. The Trails Master Plan works as a flexible guide for implementation.

What's in the Plan?

The Lake Stevens Master Trails Plan is organized into five chapters, each of which address different topics related to analysis, recommendations drafting, and implementation. The chapters contained within this Master Trails Plan include the following:

1) Introduction & Context: provides background information on the City of Lake Stevens, the purpose and use of the plan, and the Plan's vision and goals.

2) Existing Conditions: describes existing trail conditions, along with physical constraints and opportunities.

3) Proposed Trail Network & Amenities: provides the proposed trail network with detailed information about the major trail connections.

4) Trail Design & Best Practices: describes and defines best practices for trail facilities and amenities.

5) Implementation: provides a framework for how plan objectives can be forwarded.

Plan Implementation

Benefits of Trails

Trails provide a number of community benefits. The following are some of the most notable benefits that an interconnected trails network can bring to Lake Stevens.

Multimodal Transportation

A network of trails that connect to various destinations provides people with multiple options for getting around the city. Paved trail networks dramatically expand opportunities for walking, biking, and other non-motorized forms of transportation for all users and abilities. The most fundamental benefit of having safe, comfortable, enjoyable, and useful trails is the ability to choose to travel in multiple ways.

Health

Trails can increase levels of physical activity, which is a major component of a healthy lifestyle. Trails are often located in or near nature, which can improve mental health. Trails can also increase community well-being through reduced car trips, which improves air pollution and reduces potential crashes.

Environment

Vehicle emissions contribute the most to Washington state's greenhouse gases. By offering safe and convenient travel options, trails can reduce motor vehicle trips, which can thus improve air quality and reduce an individual's carbon footprint.

Studies have shown that trails can **lower blood pressure, create positive emotions, and increase physical**

One study found that **25% of trail users *became* physically active for the first time once a trail was built.**

Quality of Life

Trails improve a community's quality of life by providing more opportunities for recreation, access to nature, physical activity, commuting, and social connections. People are attracted to and continue to live in communities that they feel pride for and a connection with. Trails provide opportunities for families and neighbors to connect creating social ties among residents leading to a greater sense of belonging with the community as a whole.

Economic Benefit

Many studies have shown that trails have the potential to increase the value of adjacent properties due to the perceived benefit of having recreational facilities nearby. Due to the accessibility and recreational benefits of living nearby trails, they also can help to maintain longevity and viability of nearby residential areas for investment and re-investment.

Equity

A connected network of trails can provide safe, comfortable, and useful ways of travelling for all ages and abilities. Trails also expand access to destinations such as schools, jobs, homes, and parks. These non-motorized connections can be particularly beneficial for those experiencing economic hardship, providing a safe facility for travel by foot or bike. A network of trails connecting all neighborhoods of the city provides many more people with access to the health, environmental, quality of life, and economic benefits that trails can bring.

"Trail users identify ***fitness and health, relaxation and solitude, fun and enjoyment, seeking a challenge or personal control, and being outdoors and learning about nature*** as benefits...associated with using trails."

A study in Methow Valley, WA found that **homes located within 1/4 mile of a trail were sold at 10% higher prices** compared to the rest of the area.

Setting

The City of Lake Stevens is located in Snohomish County between Puget Sound to the west and the Cascade mountains and Mt. Baker-Snoqualmie National Forest to the east. Nearby cities include Everett and Marysville to the west and northwest of Lake Stevens and Snohomish to the south. Seattle, the nearest major city, is located just over 30 miles to the south.

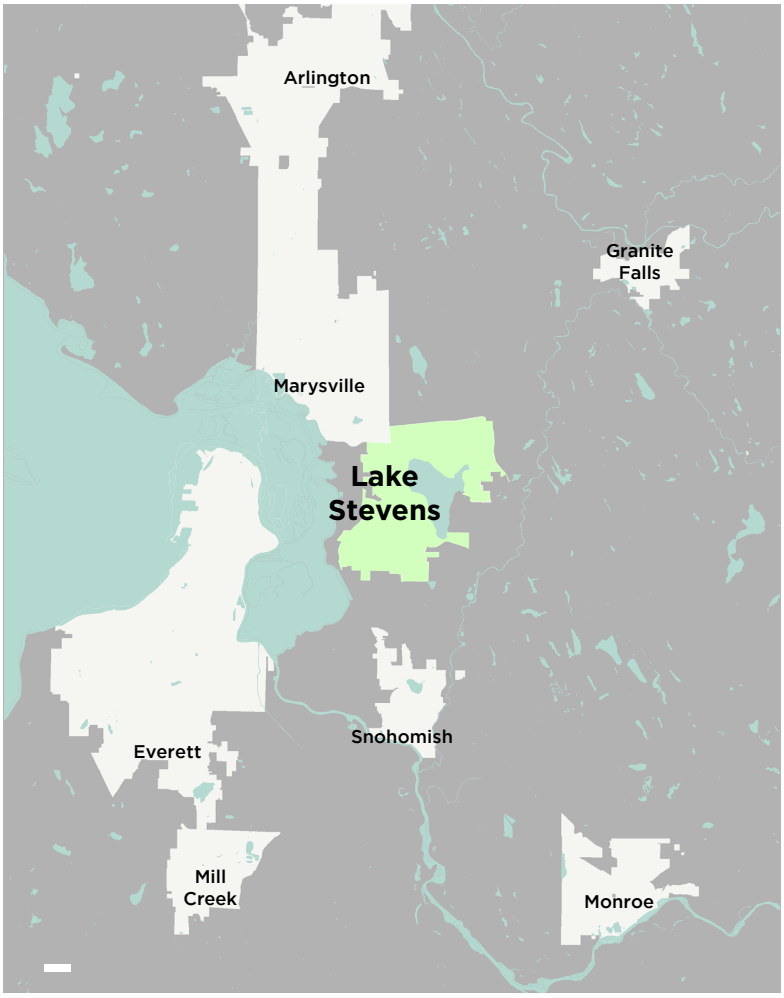
Lake Stevens surrounds the largest lake in Snohomish County, from which the city is named. On land originally settled by the Snohomish Tribe and other indigenous populations, Lake Stevens eventually became a mill town in the late 19th and early 20th centuries, and grew as a popular residential and resort destination beginning around 1925. The City of Lake Stevens officially became incorporated in 1960 and has continued to grow into the thriving lakeside community it is today.

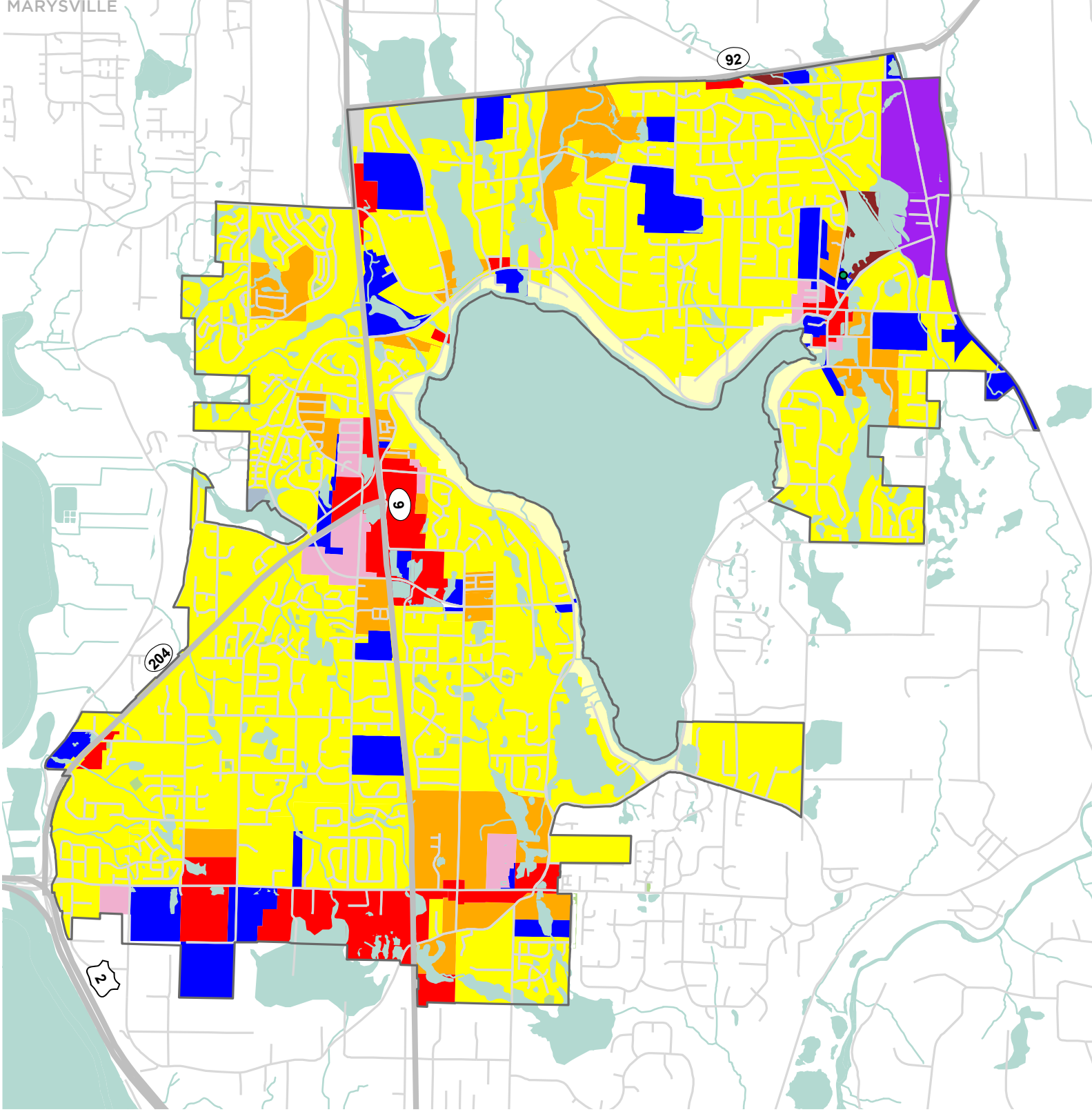
City Characteristics

Lake Stevens is a family-oriented community with suburban characteristics. The Existing Land Use Map provides and overview of the existing land use framework which shows that the majority of the community is comprised of single-family residential neighborhoods, another indication of the large number of families that call Lake Stevens home.

Commercial corridors are mostly located along major arterials and highways, with the exception of Downtown Lake Stevens, which is expected to grow as a mixed use destination. The primary commercial and job centers include Downtown Lake Stevens, the Hartford Industrial District, Lake Stevens Center and the 20th Street SE Corridor.

Additionally, the City of Lake Stevens has a rich outdoor and recreation culture with many activities and events centered on the lake as well as surrounding parks and trails.





LAKE STEVENS EXISTING LAND USE

EXISTING LAND USE

- Commercial
- Industrial
- High Density Residential
- Med Density Residential
- Waterfront Residential
- Mixed Use
- Planned Business District
- Public / Semi-Public

BACKGROUND

- City Boundary
- Streets
- Highways
- Water

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N

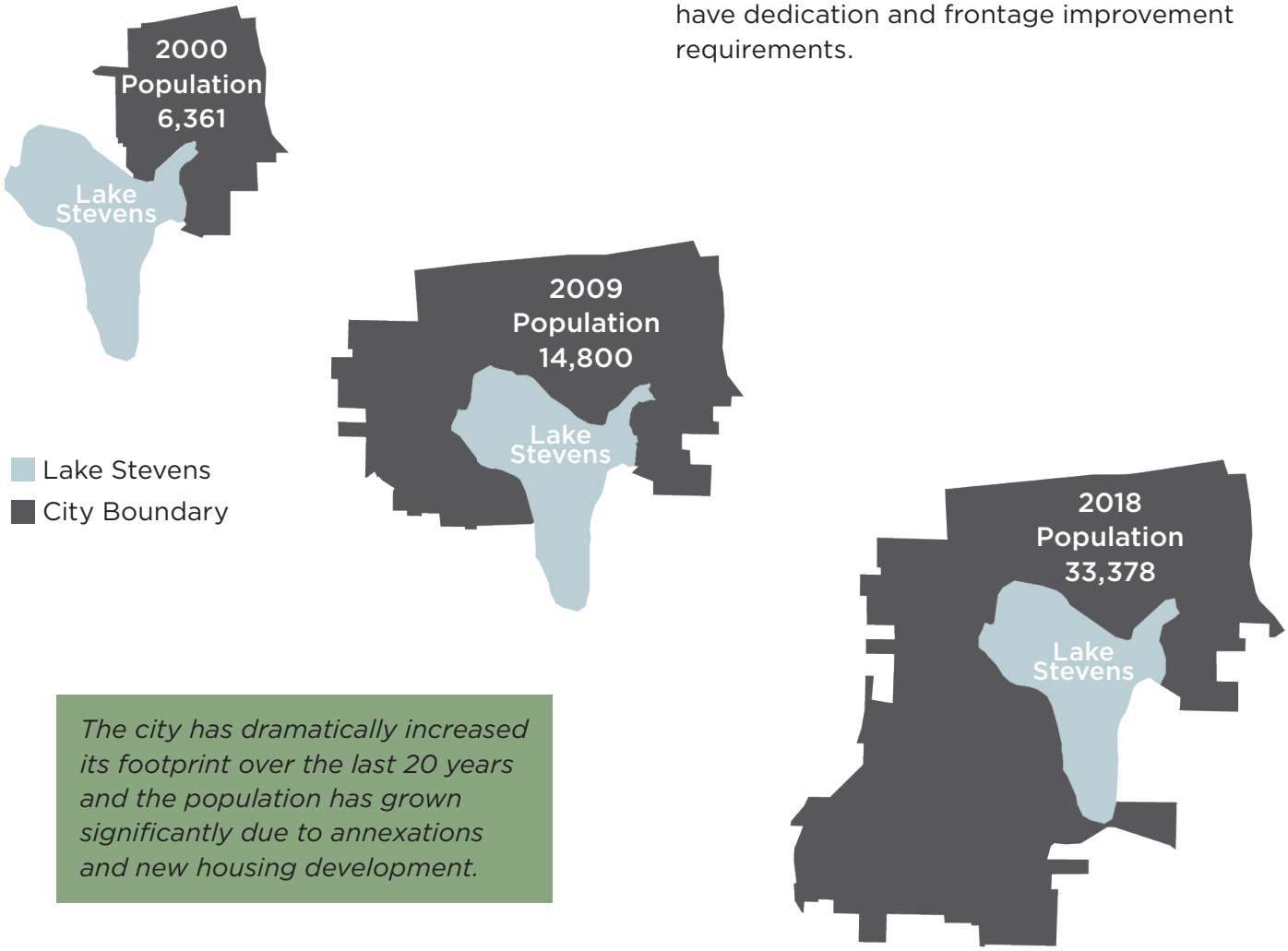
Data provided by the [DATA SOURCE].
Map produced [MONTH] [YEAR].

Population & Physical Growth

The city's population has grown dramatically over the past 20 years. According to the 2000 Census, the City of Lake Stevens had a population of 6,361 and a land area of 2.16 square miles. In 2010 the population grew to 28,069 - a growth of 341% - with a land area of 8.9 square miles. The City of Lake Stevens continues to grow with a 2018 population estimate of 33,378 and, according to the 2016 Snohomish County Growth Monitoring Report, the city is projected to grow to 39,340 by the year 2035.

Much of this population growth can be attributed to the city's proactive annexation and rapid new residential growth . The graphic below reflects the growth of the city's physical area and population over the past 20 years. Between 2000 and 2009, the City underwent expansive growth from an incorporated area centered around downtown, to the entire northwest side of the lake. Even more dramatic growth and expansion occurred between 2009 and 2018 with the city reaching a population growth of over 33,000, a significant population milestone.

With increased land and population comes the opportunity and need to plan for more trails and open space to meet new residential demands for recreation As the city continues to grow and mature, the city has the opportunity to integrate an interconnected system of trails into the physical framework, providing recreational, accessibility, and quality of life enhancements for its growing population. The implementation of the trail network as development occurs is also a major opportunity for Lake Stevens as many annexed areas redevelop at higher residential densities in the form of new subdivisions that have dedication and frontage improvement requirements.



The city has dramatically increased its footprint over the last 20 years and the population has grown significantly due to annexations and new housing development.

Demographics

According to the 2017 American Community Survey estimates, the City of Lake Stevens is a predominantly white community (77%) with a relatively young average age (33.5) and an above average median household income ($82,500) compared to the county and state.

The population pyramid below shows that Lake Stevens has a large population of kids high school aged and younger and a large population of people in between the ages of 25 and 59. The community profile and age breakdown of Lake Stevens shows that the city has a large number of families with school-aged children present in the home. This profile highlights the need for safe and connected recreational facilities. Trails are a great way for families to stay active together, have fun, and safely travel around the city.

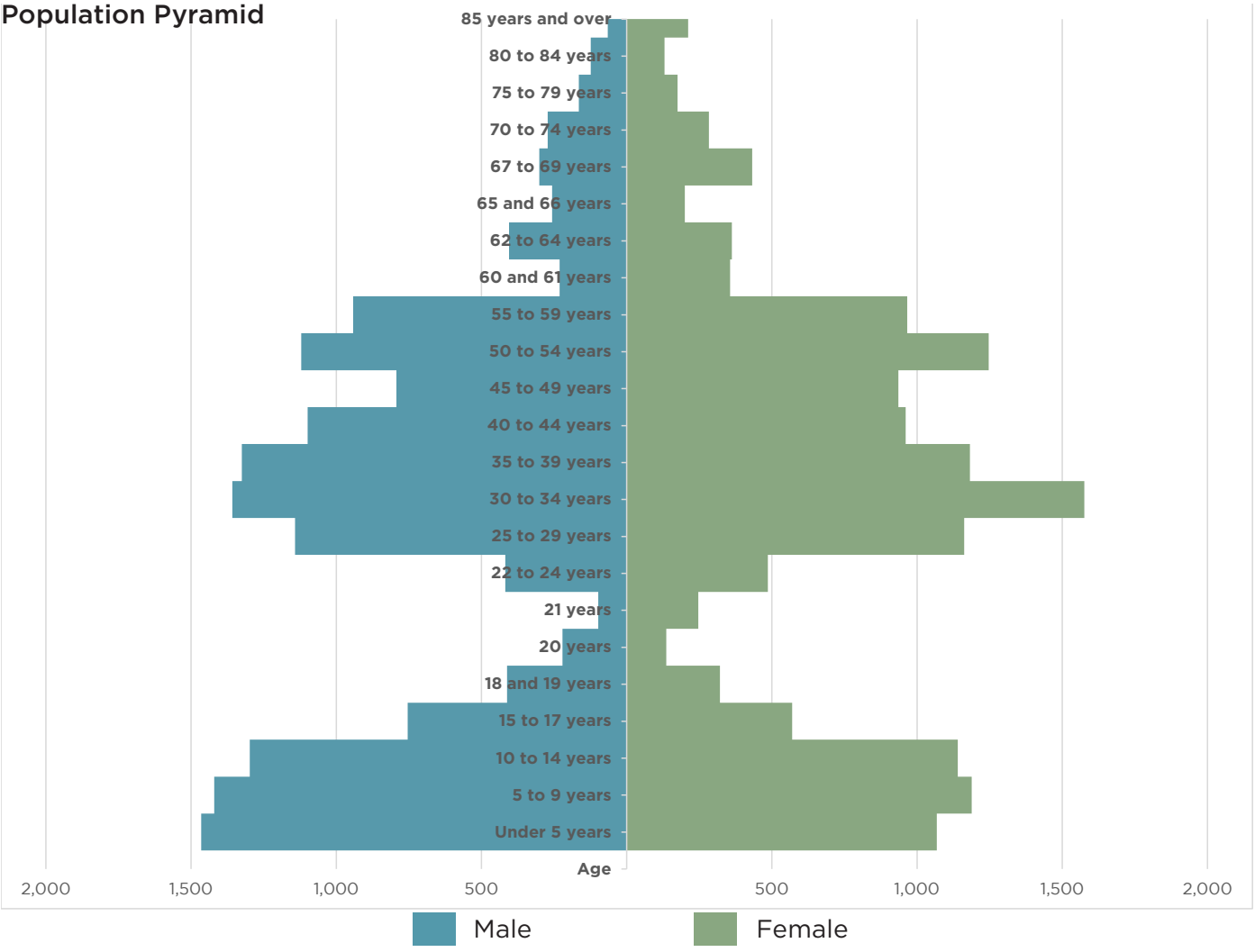
The City of Lake Stevens has

2.9

persons per household,

which is 20% higher than the Seattle metropolitan area and Washington state indicative of a higher number of families with children present at home.

Population Pyramid



These population numbers are from the ACS 2017 Population Estimates.

Public Input

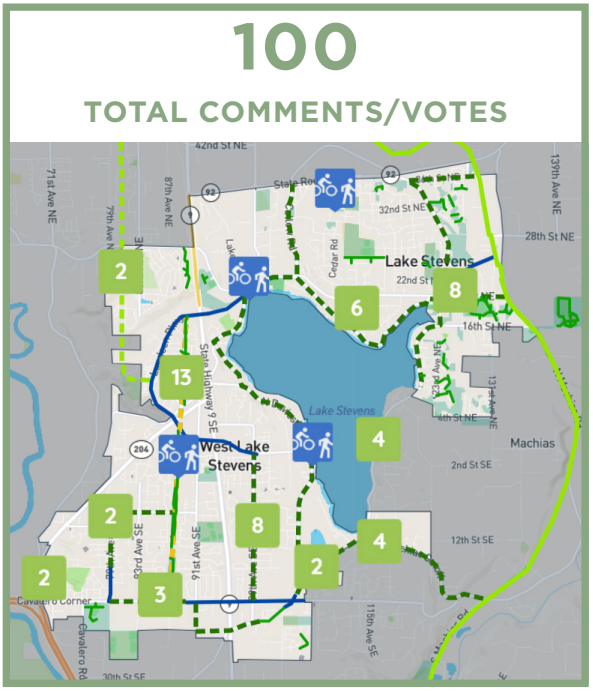
To inform the proposed trail network, people who live, work, and spend time in Lake Stevens provided their input through an online webmap, an online survey, and a community meeting. The public shared feedback on the existing walking, biking, and trail conditions as well as opportunities for future trails.

Online Webmap

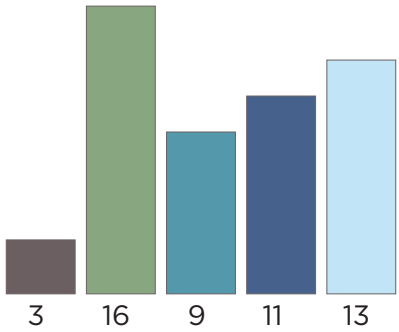
Between October 7th and November 22nd the City of Lake Stevens published a publicly accessible web map that allowed residents to indicate the following:

- Destinations I currently or would like to access
- Bicycle or walking routes that I currently use
- Opportunity for a future trail route
- Challenging locations for walking and biking

There were 100 total comments and votes and consistencies in the routes that were interactively drawn by participants, shown below. . Most comments expressed barriers to walking in Lake Stevens, followed by existing and desired walking and biking routes.



Breakdown of Comments by Topic



- Route
- Future Trail Route
- Current or Future Destinations
- Barrier to Walking
- Barrier to Biking

56 total comments/votes wanted improved or added sidewalks along certain routes

50 total comments/votes expressed desire fore improved routes along the lake

20 total comments/votes related to desired biking routes or conditions

Online Survey

Between October 7th and November 22nd the City of Lake Stevens published a publicly accessible, non-statistical survey that allowed residents to rate the following:

- How they felt about existing and potential future trails
- How they use the trails today
- The barriers that prevent them from using trails

Most people were not satisfied with the existing trails and expressed a desire for a connected, city-wide network.

89%

of respondents are motivated to use trails for health & exercise and recreation.

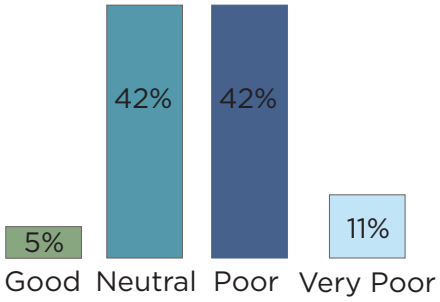
Community Meeting and Proposed Facilities Webmap

A community meeting was held on December 5th that allowed the community to view the results from the webmap and survey, see the preliminary trail opportunities, and offer their feedback and suggestions on future trail alignments.

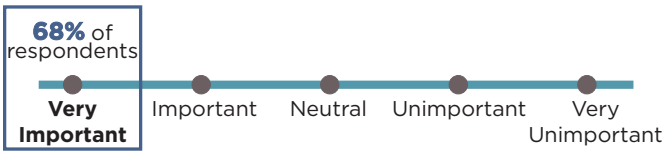
Due to limited turnout at the public meeting, a second interactive webmap was launched that provided the proposed trail alignments for public input. The webmap received great participation and feedback was overwhelmingly positive on the proposed trail alignments. Most comments were associated with three particular trail recommendations:

- **Westside Trail:** A proposed off-street trail that would traverse the large utility easement to the west of Highway 9.
- **99th Avenue Trail:** A proposed multiuse trail adjacent to the roadway.
- **Lakeshore Drive/Lake Adjacent Trail:** A proposed combination of temporary and future trail facilities that would enhance recreation near the lake.

How would you rate the City's current trail network?



How important is it for the City to invest in a connected city-wide trail network?



Vision

The City of Lake Stevens will expand its current recreational trails and create a system of quality and safe interconnected trails that increase recreational options, provide citywide access, enhance multimodal connectivity, and facilitate social connection.

Goals

- Provide a comprehensive network of multi-use trails for pedestrians, bicycles and skating using alignments along the public rights-of-way, through public landholdings as well as across cooperating private properties, which link residential neighborhoods to community facilities, parks, special use areas, commercial areas and the waterfront that meets the following level of service: one trail within one mile of residential areas.
- Provide for a comprehensive city trail system linking the downtown area, schools, parks, and the Centennial Trail.
- Establish a multi-use trail around the lake utilizing a combination of temporary facilities supplemented with longer-term capital facility planning.
- Design and construct the Westside Trail on the western side of the City, utilizing the extensive utility corridor and easement, extending from 20th Street SE northward to the northern extent of Lundeen Parkway.
- Create a trail connection to Marysville to facilitate the creation of an additional regional trail facility in addition to the Centennial Trail.
- Establish a multiuse trail along 24th Street SE and South Lake Stevens Road that will eventually connect to the Centennial Trail as identified in the 20th Street SE Corridor subarea plan.
- Establish, expand and/or improve nature trails and boardwalks through open spaces with an emphasis on Eagle Ridge Park, Catherine Creek Park, Centennial Woods, Mill Cove Reserve, and the Grade Road Open Space.
- Establish and expand regional trail opportunities by connecting with the City of Marysville's trail network.
- Establish and expand local residential access to trails through facilities on 20th Street SE, North Davies Road, and Grade Road, using a combination of separated multi-use trals, sidewalks, and bicycle lanes.
- Establish a mountain biking park at the northern terminus of the Westside Trail.
- Increase the safety and accessibility for all trail users and support trail programming and education.

2. Existing Conditions

Existing Trail Network

The City of Lake Stevens currently has approximately 5 miles of trails, most of which are within existing parks and do not connect to other bicycle and pedestrian facilities. The existing trail network consists of paved and unpaved trails, a sidepath, and on-street bike lanes. Most of the trails are short segments of unpaved trails within parks. For example, Catherine Creek Park has a short trail within the park and the utility corridor that runs north-south on the western side of the lake has fragmented segments of unofficial unpaved trails. Hartford Drive has a paved shoulder, a type of facility directly adjacent to and separated from the roadway by paint striping, that connects the regional Centennial Trail to downtown Lake Stevens, but there is limited access to that sidepath from downtown.

On-street bike lanes exist along Lundeen Parkway and Market Place for a little over 2 miles. Other shorter segments of bike lanes exist along S Lake Stevens Road, Fairview Drive, and 20th Street SE. These bike lanes provide some connectivity from residential areas to parks but are mostly disconnected, providing limited access to destinations.

Regional Trail Network

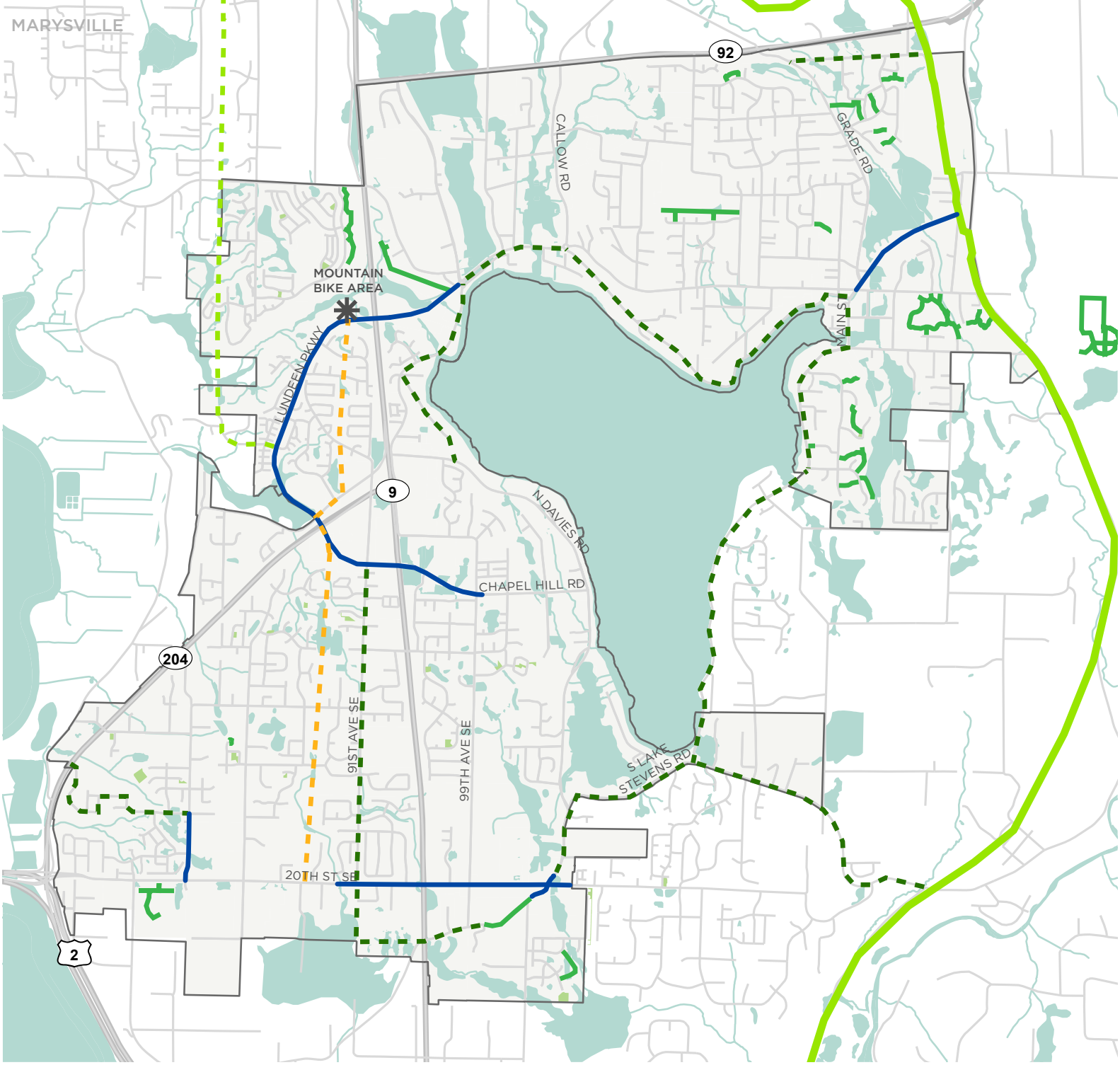
The Centennial Trail is a popular Snohomish County trail that runs for 1.7 miles through the City of Lake Stevens. The entire length of the trail runs for 30 miles from the Skagit County line in Arlington south to Snohomish. The trail will eventually connect further south to Woodinville in King County.

The City of Marysville has a growing network of trails including the 3 mile Bayview Trail. Marysville has plans to eventually connect this trail further south into the City of Lake Stevens. The City's opportunities for regional trail connections will greatly expand if connected to Marysville's trail network.

Adjacent to new development, the City has recently installed a multiuse path trail along S Lake Stevens Road just south of 20th Street SE.

The Centennial Trail is a popular county-wide trail that runs trhough Lake Stevens, north-east of downtown.

Photos: Alta Planning + Design



LAKE STEVENS TRAIL OPPORTUNITIES

EXISTING FACILITIES
& FUTURE OPPORTUNITIES

- Trail Opportunities
- Westside Trail Opportunity
- Lake Stevens to Marysville Connector Opportunity
- Existing Facility
- Existing Trails
- Existing Centennial Trail

BACKGROUND

- City Boundary
- Streets
- Highways
- Water

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0 0.5 1 MILES

Physical Constraints

When identifying potential networks and specific routes for trails, physical constraints such as narrow right-of-way, challenging topography, and gaps in sidewalks can limit implementation. For trails outside of the public right-of-way, land acquisition can also be a constraint.

Narrow Right-of-way

As noted in Chapter 01, the city has gone through a period of extensive annexations. Much of the land that the city now owns was originally subdivided and platted under a rural framework. These rural characteristics contribute to the prevalence of narrow rights-of-way which often complicate the ability to add trail facilities adjacent to roadways without property acquisition. There are areas, however, where sufficient right-of-way for a trail exists, such as Lake Stevens Drive where a trail facility is being constructed as part of a major roadway reconstruction project. These types of improvements, however, are costly and require capital project planning and are often supplemented by grant funding.

Challenging Topography

One of Lake Stevens' most attractive features, it's topography and higher points around the lake, also pose difficulties with designing trails and facilities that can be comfortably used by people. Generally speaking, trails are designed to not exceed a five percent slope – anything under five percent is seen to be comfortable for users, with a target of less than three percent. Building an interconnected trail system that serves all ages and abilities becomes even more difficult when evaluating connections that meet these criteria. Chapel Hill Road is a prime example of a roadway that could continue the bicycle and pedestrian facilities currently present on Lundeen Parkway/Market Place down to lake access at Willard Wyatt Park, however steep grades do not make this pathway a viable option for most users. These types of considerations are critical components of the overall trail planning process.

Sidewalks only exist along one side of the street. Photo: Alta Planning + Design

Due to narrow right-of-way, a sidepath was the best option for a trail on Hartford Drive in Lake Stevens. Photo: Alta Planning + Design

Chapel Hill Road provides a direct connection from the bicycle facility on Lundeen Parkway to the lake, but the steep grades do not make this pathway a viable option. Photo: Alta Planning + Design

Established Neighborhoods

Much of the city has established neighborhoods that present challenges for off-street trail connectivity since it is difficult, extremely costly, and often infeasible to navigate a trail through established neighborhoods due to the unavailability of land within the existing development framework. Established neighborhoods without an interconnected system of open spaces, such as buffers associated with linear creeks, are generally barriers for trail implementation.

The image above shows a dead-end street in an established neighborhood. There are limited options for trails through these already-built neighborhoods.

Trail Opportunities

Frontage Improvements

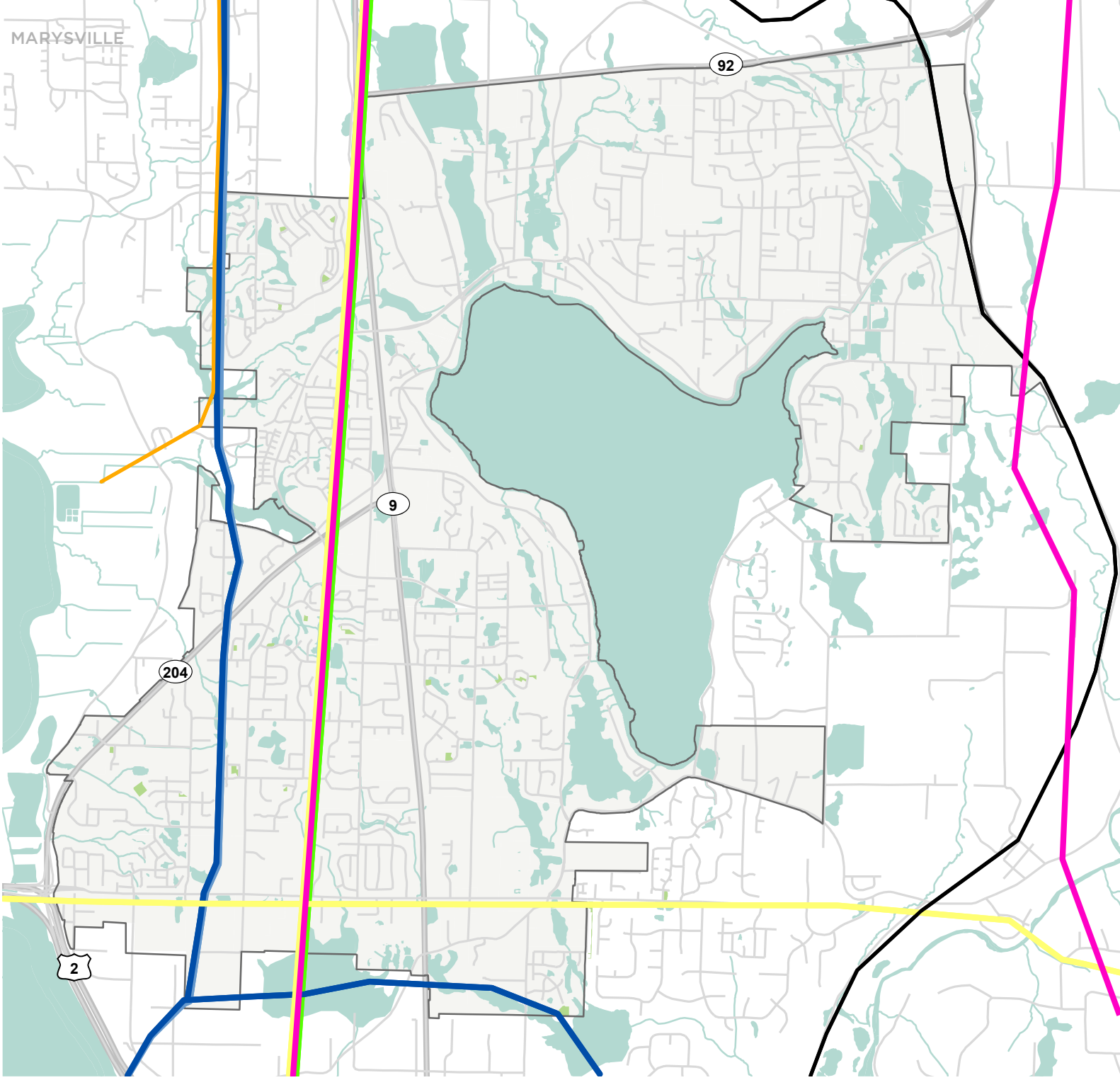
Mentioned previously, it is often difficult to retroactively create an interconnected trail framework after community buildout has occurred. Luckily, Lake Stevens has not reached buildout and there are still areas, particularly where future growth is projected, that can be capitalized on for facilities. 99th Avenue SE is one of the City's prime opportunities to implement a trail through frontage improvements since it is located in an area where new residential growth is occurring. As the road is incrementally built, frontage improvements can implement the formalized trail and gaps between improvements can utilize a well-marked widened shoulder.

The image above shows a section of [insert street name here] with new development and frontage improvements including a multiuse trail.

Utility Corridors

Perhaps the greatest opportunity for trail implementation at the city-wide scale lies within utility corridors. The city has a number of large utility corridors on the western side of the community where city acquisition of land has already begun near 20th Street SE. These corridors are owned or encumbered by utility easements that prohibit development. They are, however, often utilized for trail facilities with some restrictions on vertical elements, particularly when underneath powerlines. Memorandums of Understanding (MOU) and other agreements between local jurisdictions, utility purveyors, and, if applicable, owners are regularly created to allow for use, construction, and maintenance of trails. Trail facilities can also serve as maintenance roadways for utilities needing access to infrastructure.

The city's largest utility corridor, pictured above, provides one of the greatest opportunities for trail implementation.



LAKE STEVENS UTILITY CORRIDORS

EXISTING UTILITY CORRIDORS

- Bonneville Power Administration
- Centennial Trail
- High Pressure Water Pipeline
- Olympic Pipeline
- Puget Sound Energy
- Seattle City Light
- Snohomish County PUD

BACKGROUND

- Streets
- Highways
- City Boundary
- Water

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3. Proposed Trail Network

Building upon the existing conditions analysis and public input, the purpose of the following chapter is to present the proposed trail network for the City of Lake Stevens, focusing on trail routes and the preferred facility types for each of these routes. The chapter will introduce the proposed trail network, the associated trail classifications, and will discuss the opportunities and challenges for the major north-south and east-west trails.

The proposed trail network consists of the north-south and east-west trails that make up the core *spines* of the network, as well as the major neighborhood-level connections. The focus of the proposed trail alignments will be on the spines, with neighborhood-level connections covered in less detail.

Trail *routes* are the emphasis of the proposed network, while facility types are flexible in how they are implemented. The facility types for each of the proposed trails reflect the optimal choice based upon existing conditions. The City may choose, however, any of the other facility types listed in this plan should additional right-of-way or funding become available. Design and implementation are further covered in chapters 4 and 5.

Photo: Photo Credit

Proposed Network

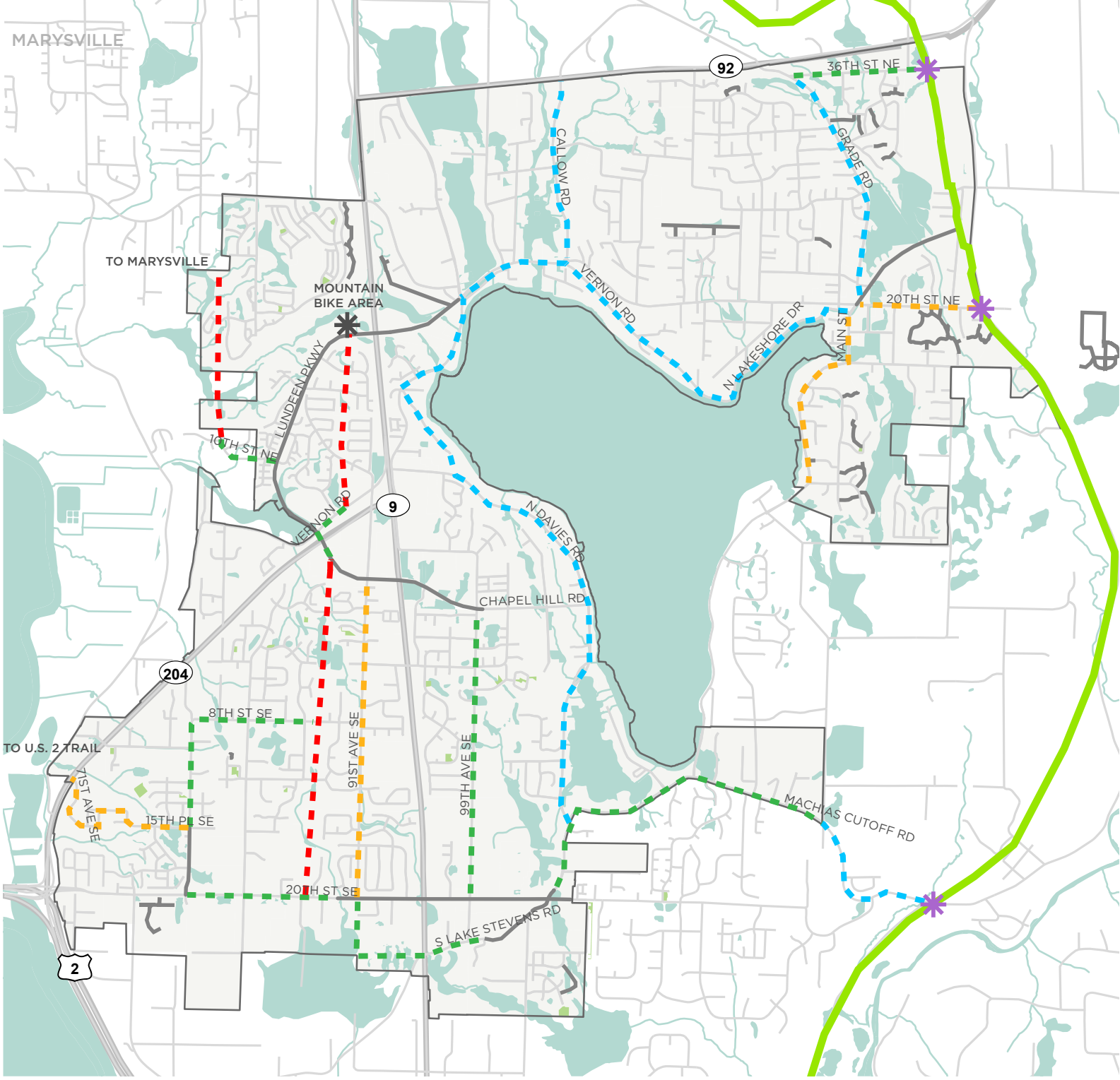
The Proposed Trail Facilities Map depicts the proposed city-wide trail network for Lake Stevens. It is a system of various trail facility types that specifically consider some of the constraints identified within previous chapters of this plan, such as topography and limited right-of-way space. The proposed trail facilities are also a reflection of many of the public input themes identified through the plan's virtual engagement efforts.

In terms of trail routes, public input from the online webmap and survey showed a strong desire for a path around the lake as well as safe, connected north-south and east-west routes through the city. These types of routes were consistently identified by the public in the interactive webmap that allowed residents to draw in the routes they felt were the most needed.

The public input was supplemented with assessing existing conditions to identify the feasibility of implementing trails in areas identified as potential trail opportunities. Areas in SW Lake Stevens have the greatest ability to be implemented as frontage improvements are made as part of new development. In more established areas of the community where right-of-way constraints are much more prominent, striped sidepaths and bicycle facilities are a more immediate opportunity to create connectivity. These sidepaths and striping facilities can be improved in the future as part of larger capital projects.

Two major off-street trails proposed for Lake Stevens include the Marysville Connector Trail and the Westside Trail. The Marysville Connector is a proposed trail alignment that can connect Lake Stevens to the Bayview Trail which is being incrementally built within a utility corridor in Marysville. The proposed Westside Trail has the opportunity to be a signature trail in the community, connecting numerous residential neighborhoods, parks and recreation facilities, and commercial centers. The following chapter provides greater detail into the proposed trail network.

A rendering of the proposed Westisde Trail, a cornerstone of the proposed facilities, discussed in greater detail in this chapter.



LAKE STEVENS PROPOSED TRAIL FACILITIES

EXISTING & PROPOSED TRAILS

- Bike Facility & Sidewalk
- Off Street Trail
- Multiuse Trail
- Sidepath
- Existing Trail Facility
- Existing Centennial Trail

BACKGROUND

- Centennial Trail Connection
- City Boundary
- Streets
- Highways
- Water

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0 0.5 1 MILES

Lake Stevens to Marysville Connector

The Lake Stevens to Marysville Connector is a proposed trail that connects the bike lanes on Lundeen Parkway along 10th Street NE and into a utility corridor north to Marysville. The trail would eventually connect to Marysville's Bayview Trail that runs along the same utility corridor. The Lake Stevens to Marysville Connector would expand Lake Stevens' access to the region through the City of Marysville and its growing network of trails. As noted in the following section regarding the Westside Trail, this trail is the preferable route north to connect into Marysville instead of continuing the Westside Trail north of Lundeen Parkway. The Lake Stevens to Marysville Connector provides less topography and a direct connection into Marysville's planned Bayview Trail extension. Coordination would be necessary between unincorporated Snohomish County, Snohomish County PUD, and the City of Marysville.

The existing Bayview Trail that runs along the utility corridor in Marysville. Source: City of Marysville

Lakeshore Drive Trail

The proposed trail along Lakeshore Drive provides a direct east-west connection between the Westside Trail, through Lundeen Parkway's bike lanes, to the Centennial Trail, through Downtown Lake Stevens. This trail is preferable to 20th Street NE because it has less traffic and meets the goal of having a route along the lake. Both 20th St NE and Lakeshore Drive have relatively narrow right-of-way width, however, given the local traffic and residential character of the street, there is more design flexibility along Lakeshore Drive.

The most immediate solution to make Lakeshore Drive a safe route for people walking and biking is to continue the pedestrian sidepath and add shared-lane markings, also called sharrows, in the travel lanes for bicycle traffic.

The image above shows a section of Lakeshore Drive with a pedestrian sidepath.

The image above shows a sharrow on a two-lane road.

Lakeshore Drive has relatively high traffic volumes for a residential street, as people like to cut through from Lundeen Parkway to Main Street, bypassing 20th Street NE. Some residents have expressed the desire for traffic calming to slow speeds along Lakeshore Drive. As a result of these conditions and feedback, traffic calming measures should be added to Lakeshore Drive--in addition to striped sharrows and the continuation of the sidepath to create safe conditions for people walking and biking.

Lakeshore Drive is currently too narrow to keep the two travel lanes and add separated space for bicyclists and pedestrians. Another option is an advisory shoulder, which creates room for bicyclists and pedestrians when streets are otherwise too narrow. Two-way streets with one travel lane in each direction, such as Lakeshore Drive, are converted to one shared two-way travel lane to create room for shoulders. Cars share the center lane and bicyclists and pedestrians are encouraged to use the shoulders. With one shared travel lane, cars are shown to travel more slowly and can encroach into the advisory shoulders when needed to pass.

An advisory shoulder is an inexpensive option, but requires roadway users to learn new behavior. This option would also require traffic calming to deter through traffic and high speeds.

The image above shows a sharrow and a speed bump for traffic calming.

The image above shows an example of an advisory shoulder.

The above diagram is the advisory shoulder concept along Lakeshore Drive. Implementation would require major traffic calming to reduce traffic speeds and volumes.

Westside Trail

The most significant trail opportunity in Lake Stevens is the Westside Trail. The proposed trail would utilize a large utility corridor currently utilized by the Bonneville Power Administration, Seattle City Light, and Snohomish County PUD. The trail is proposed to extend from 20th Street SE northward to Lundeen Parkway.

Context

A trail along the utility corridor that runs parallel to State Route 9 in Lake Stevens was included in the Lake Stevens Center Subarea Plan (2012), the 20th Street SE Corridor Subarea Plan (2012), and the Lake Stevens Comprehensive Plan (2015). The utility corridor currently has a series of informal unpaved paths, generally utilized for access by utility operators, as well as a playground and sports field in Frontier Heights Park. The City has been acquiring parcels for park development near 20th Street SE which can jointly be used to facilitate trail construction.

As discussed previously, it is difficult to build city-wide trails without using either existing rights-of-way along roadways, which are often constrained and narrow, or utility corridors. The Westside Trail is a prime north-south corridor that could be the primary north-south trail spine on the western side of the City. Building a trail will require partnerships and agreements with the current utility purveyors along the trail, including Bonneville Power Administration and Seattle City Light, and easements from several homeowner associations along the trail.

Challenges

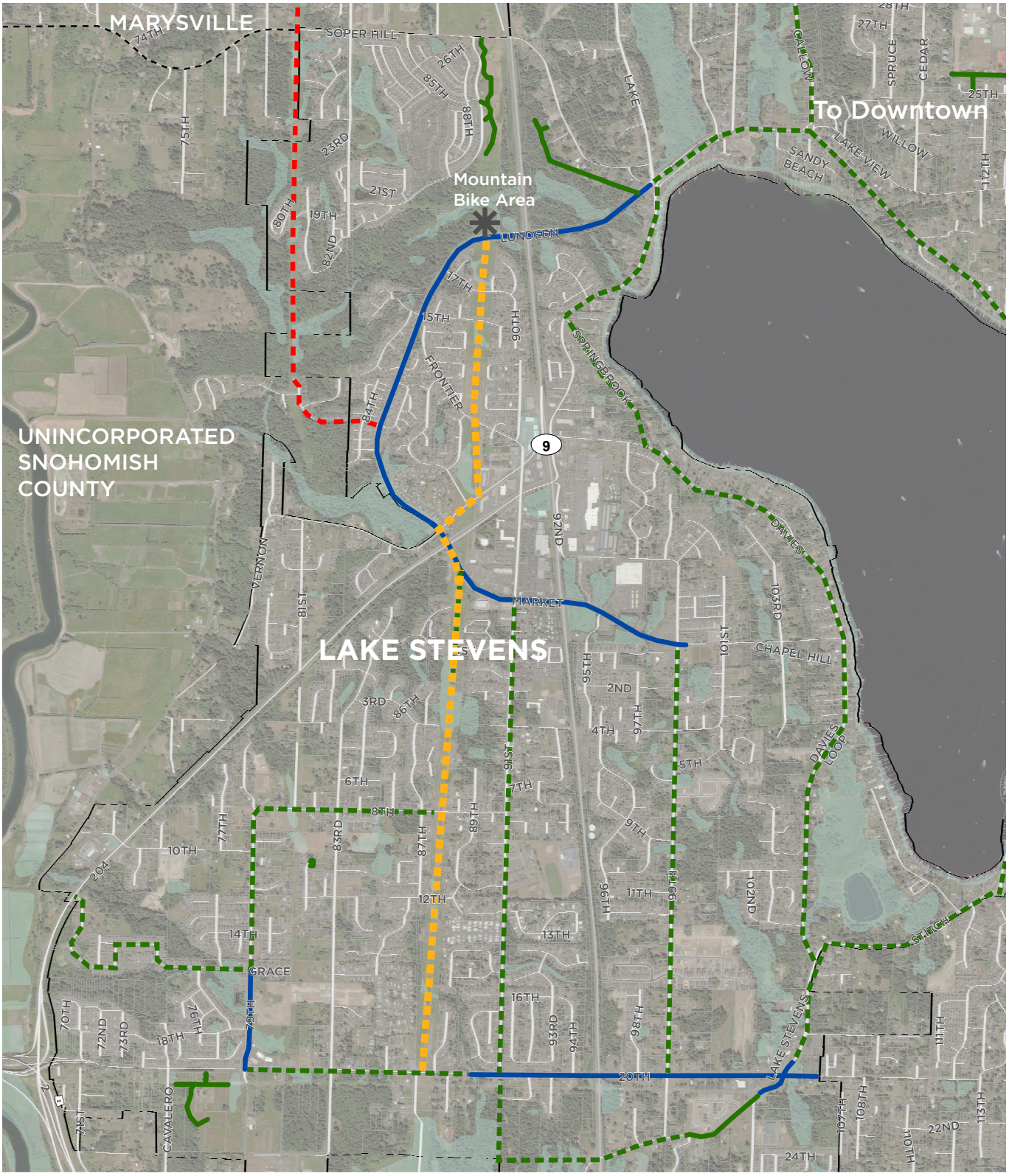
Discussed in more detail to follow, one of the primary challenges to realizing the Westside trail lies in the multifaceted ownership and operation of land along the corridor. By nature, utility corridors are complex and often exist through a combination of direct ownership by utility purveyors or through usage easements across parcels owned by others. These easements grant purveyors the ability to regulate the type of disturbances that occur within the easement with primary consideration given to the impact on their utilities. While utilities generally work with local entities to allow for trail construction, they typically have strict standards against vertical elements along trails, limiting the types of amenities that can occur.

An additional challenge along the utility corridor are areas of topography. A major ravine exists at the far northern area of the proposed trail, north of Lundeen Parkway. This topography limits the ability of the trail to extend northward from this point. Due to this major ravine, an alternate connector to Marysville has been proposed. The other area of topography is just south of Market Place, near the SH 204 crossing.

Opportunities

The Westside Trail is a big opportunity for a north-south trail spine that provides an off-street trail for users of all ages and abilities. The trail has the potential to attract a variety of users because it connects the 20th Street SE Corridor and the Lake Stevens Center, both areas with existing and planned future business, retail, and housing development, and runs through residential areas. Residents would have enhanced access to jobs, shopping, and recreational opportunities.

At the northern extent of the Westide Trail, Lundeen Parkway would provide connectivity to the proposed Marysville Connector Trail on the west, and provides access to downtown via Lakeshore Drive. To the south at 20th Street SE, the trail can connect with proposed east-west facilities south of the lake, including the S. Lake Stevens Road multiuse trail. The City has acquired property within the utility easement between 20th Street SE and 8th Street SE which could be the first major segment of the trail for implementation. The City is currently building sports fields, for example, within the utility corridor right-of-way near 20th Street SE. Additionally, mountain biking trails in the northern ravine leverage topographic constraints for recreation.



WESTSIDE TRAIL & CONTEXT

- Proposed Westside Trail
- Proposed Trails
- Proposed Lake Stevens to Marysville Connector
- Existing Bike Lanes
- Existing Trails

BACKGROUND

- City Boundary
- Elevation Contours (5 ft)
- Lake Stevens Parcels
- Wetlands

0 0.25 0.5 MILES

Physical Evaluation

A high-level engineering evaluation was performed along the full extent of the proposed Westside Trail. The high-level assessment indicated that the utility corridor is well-suited overall to accommodate the proposed Westside Trail. The land is generally flat with a gentle slope, with the exception of areas mentioned previously, and the utility corridor provides almost direct access to schools, jobs, and shopping.

Listed below are some key physical considerations for the future trail alignment:

- Residents and the utility company have already made some physical improvements to the utility corridor, such as clearing the corridor of major vegetation to provide maintenance vehicle access. Future trail construction should connect, where feasible, to these existing areas where clearing has already occurred. Cleared areas converted to a trail can be leveraged by utility purveyors as maintenance roadways, providing a benefit to utilities.
- Directly north of 8th Street SE, on the east side of the utility easement, three homes appear to take direct access from a shared driveway within the utility corridor. This access would require preservation; however, a maintenance roadway appears to provide an alternate route for the Westside Trail.
- The Westside trail crossing of SR 204 would need to be carefully designed to prioritize the safety of people walking, biking, and rolling. The preferred, lower-cost option would be an at-grade crossing at the existing signal at SR 204 and Market Place.
- Intersection improvements would be needed at both ends of the trail - at both 20th Street SE to the south and Lundeen Parkway to the north - to ensure that users have safe and comfortable trail access.

The image above shows Frontier Heights Park within the utility easement, directly north of Pioneer Circle.

The image above depicts a cleared area utilized by maintenance vehicles near 15th Street NE.

The image above depicts an example of the recommended trail crossing at SR 204.

Crossing at SR 204

As shown on the Westside Trail & Context Map, the trail crossing at SR 204 is the most significant crossing along the extent of the trail. A combination of the high cost of constructing a vertical crossing over SR 204, along with the limitations of vertical structures within the utility easement, make any physical crossing structure at this location unlikely. A better alternative is to enhance the SR 204 and Market Place signalized intersection to function as the trail crossing of SR 204.

To the north of SR 204, the trail would transition from an off-street trail to a multi-use trail along Vernon Road, keeping with trail width standards of a minimum of 10' in width, preferably 12 feet. The trail would cross Lundeen Parkway and continue southward on the west side of the roadway, keeping with a minimum width of 10 feet. The presence of stormwater detention facilities on the western side of Lundeen Parkway may present opportunities to accommodate the trail with landscape separation from Lundeen Parkway.

The trail would utilize the pedestrian interval for the crossing of SR 204, with traffic control changes that would limit vehicular turns during this crossing cycle for additional user protection. The trail would continue southward on the west side of Market Place, continuing at a minimum of 10' width with landscaping separation from Market Place, where able. The trail would then re-connect with the utility easement and transition back to an off-street trail southward.

As part of the evaluation, the western side of Lundeen Parkway / Market Place was seen as more optimal for trail construction. The widening of existing sidewalks from 5 feet to a minimum of 10 feet would likely require additional right of way.The presence of stormwater detention facilities and available right-of-way directly south of SR 204 present an opportunity for cost reductions, along with an opportunity to include trail separation from the adjacent roadway, helping to provide a more comfortable and safe crossing for all users and abilities.

20th Street SE looking northward over Westside Trail

Ownership Evaluation

The parcel ownership exhibit provides an overview of current ownership patterns along the extent of the proposed Westside Trail, broken into the following categories:

- Private Ownership: These parcels represent areas of direct ownership, generally by a single interest. These parcels are generally divided into parcels that are vacant and parcels that have a structure but have granted an easement for utility purveyors. Vacant areas represent opportunities for potential acquisition and parcels where an easement has been granted from a private owners present an opportunity for either purchasing of a portion of the land for the trail, or working with the property owner for a trail easement.
- City Ownership: These parcels are currently owned by Lake Stevens. These are the most obvious areas for trail operation, but will still require an agreement with the utility purveyors for trail construction.
- Purveyor Ownership: These are parcels that are currently owned by a utility operator. These areas are confined to the SH 204 crossing vicinity. This portion of the proposed trail will utilize a Vernon Road to Lundeen Parkway crossing of SH 204, making only the purveyor ownership area directly north of Vernon Road applicable to the trail. This parcel could be considered for acquisition by the city, for an extension of Frontier Heights Park. Alternatively, the city would have high probability of acquiring a trail easement from the purveyor at this location.
- Shared Interest / HOA Ownership: These are parcels owned in common by a homeowners association (HOA). The city has an opportunity to construct extensive areas of the trail by acquiring easements from the underlying HOA, typically requiring voting and approval by a percentage of homeowners.

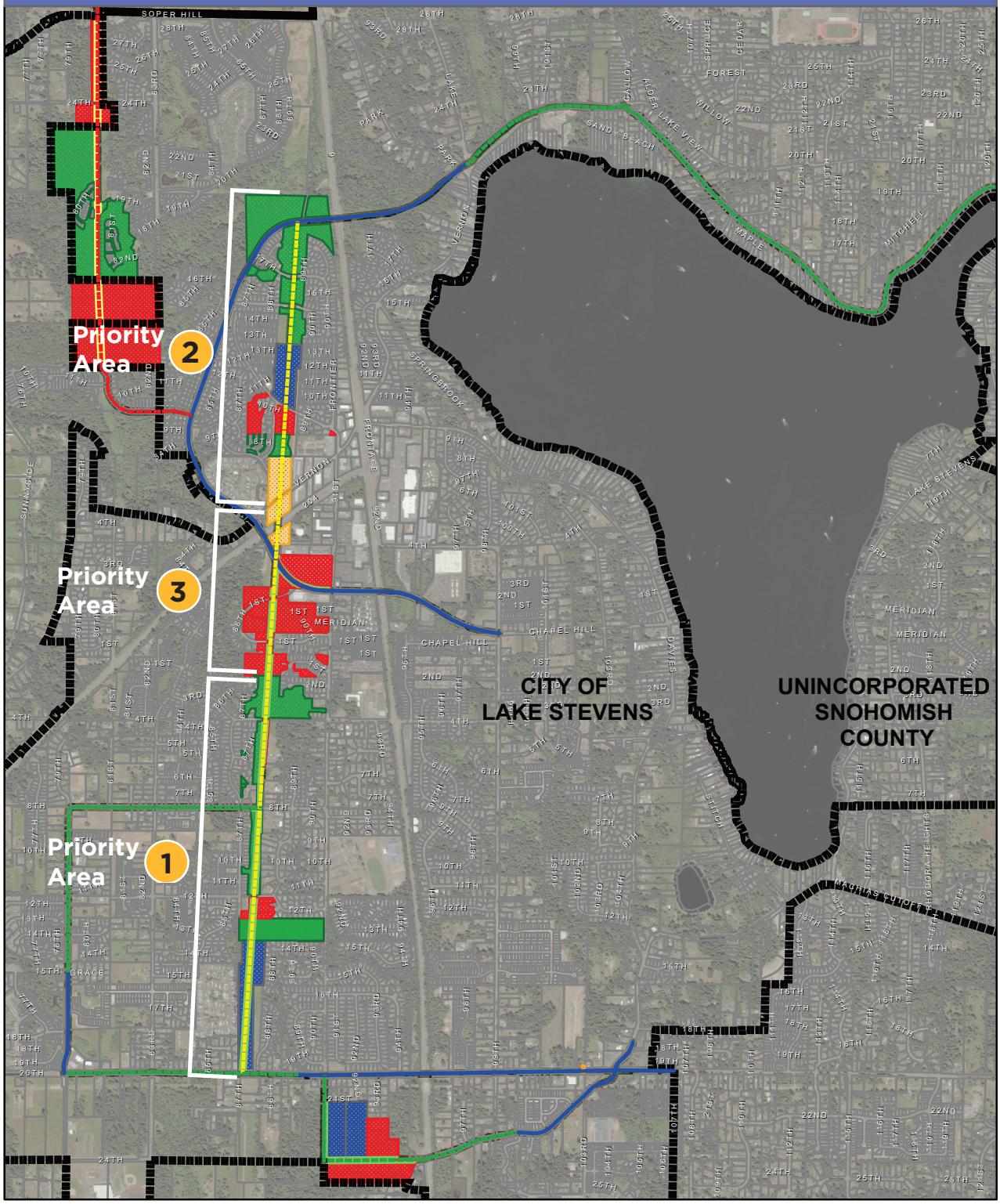
Trail Implementation Phasing

The parcel ownership exhibit reveals a number of important phasing realities. First, the city has been proactively acquiring land at the southern extent of the trail. Directly to the north of the acquired land lies several small parcels under individual ownership where easements can potentially be acquired. The remainder of the trail alignment south of 4th Street SE is generally owned by only two HOA's. Conversations with these two HOA's could lead to phase 01 trail implementation between 4th Street SE and 20th Street SE.

Second, the city owns a portion of the alignment north of Frontier Circle. Areas north of this area of ownership are generally all owned by HOA's, representing a second opportunity for easement acquisition and trail construction, including implementation of the mountain bike park. The area north of Vernon Road presents an optimal Phase II implementation strategy.

Finally, the remaining area of the alignment between Vernon Road and 4th Street SE is generally owned by a number of different separate owners. Vacant parcels could be incrementally acquired by the city, as opportunities present themselves. Additionally, easements could be incrementally acquired from sites that currently have existing structures in anticipation of the future trail connection. Due to fragmented ownership, along with the expenses associated with the trail improvements needed at the SH 204 crossing, this portion of the trail is recommended for phase 03 implementation.

PROPOSED TRAIL NETWORK: PARCEL RECOMMENDATION



EXISTING AND PROPOSED FACILITIES

- EXISTING BIKE LANE
- PROPOSED LAKE STEVENS TO MARYSVILLE CONNECTOR
- PROPOSED WESTSIDE TRAIL
- TRAIL OPPORTUNITIES

LAND OWNERSHIP TYPE

- Private
- City
- Purveyor
- Shared Interest/HOA
- Primary Route
- Secondary Route
- CITY LIMITS

N

0 0.25 0.5 Miles

LDC Surveying Engineering Planning

alta PLANNING + DESIGN

Neighborhood Connections

The Lakeshore Drive Trail and Westside Trail provide the north-south and east-west spines of the proposed trail network within Lake Stevens. The Lake Stevens to Marysville Connector is a major regional trail. In addition to these major contributors to the Lake Stevens trail network, there are a series of neighborhood trails that connect to these major trails as well as other destinations such as parks and businesses. Below is a list of all of the trail segments and their significance to the trail network. The segment numbers are associated with the numbers on the map.

1. **Planned Development Trail**
   This trail is already planned as part of the new commercial development along 20th St SE and will connect to the trail and bike facility along S Lake Stevens Rd.

2. **20th St SE**
   This section of trail will connect existing bike facilities on 20th St SE and Fairview Dr. It also connects to the proposed Westside Trail and the existing Cavalero Park.

3. **Fairview Dr & 8th St SE**
   This trail segment connects the existing bike lanes on Fairview Dr to the proposed Westside Trail, giving residents in this area more access to the network.

4. **99th Ave SE**
   This trail segment gives residents east of State Route 9 access to the trail network This route connects the bike facilities on 20th St SE and Lundeen Parkway as well as to businesses north of Market Pl.

5. **S Lake Stevens Rd to Machias Cutoff**
   This trail segment residents in West and South Lake Stevens to the regional Centennial Trail.

6. **N Davies Rd**
   This trail segment contributes to the goal of providing a path around the lake. A potential trail connection would need to be made between N Davies Rd and Springbrook Rd.

7. **Callow Rd**
   This trail segment connects residents north of the lake, which includes a new planned development, to the Lakeshore Drive trail.

8. **Grade Rd & 36th St NE**
   This trail segment provides residents north of the lake to Downtown and the Centennial Trail.

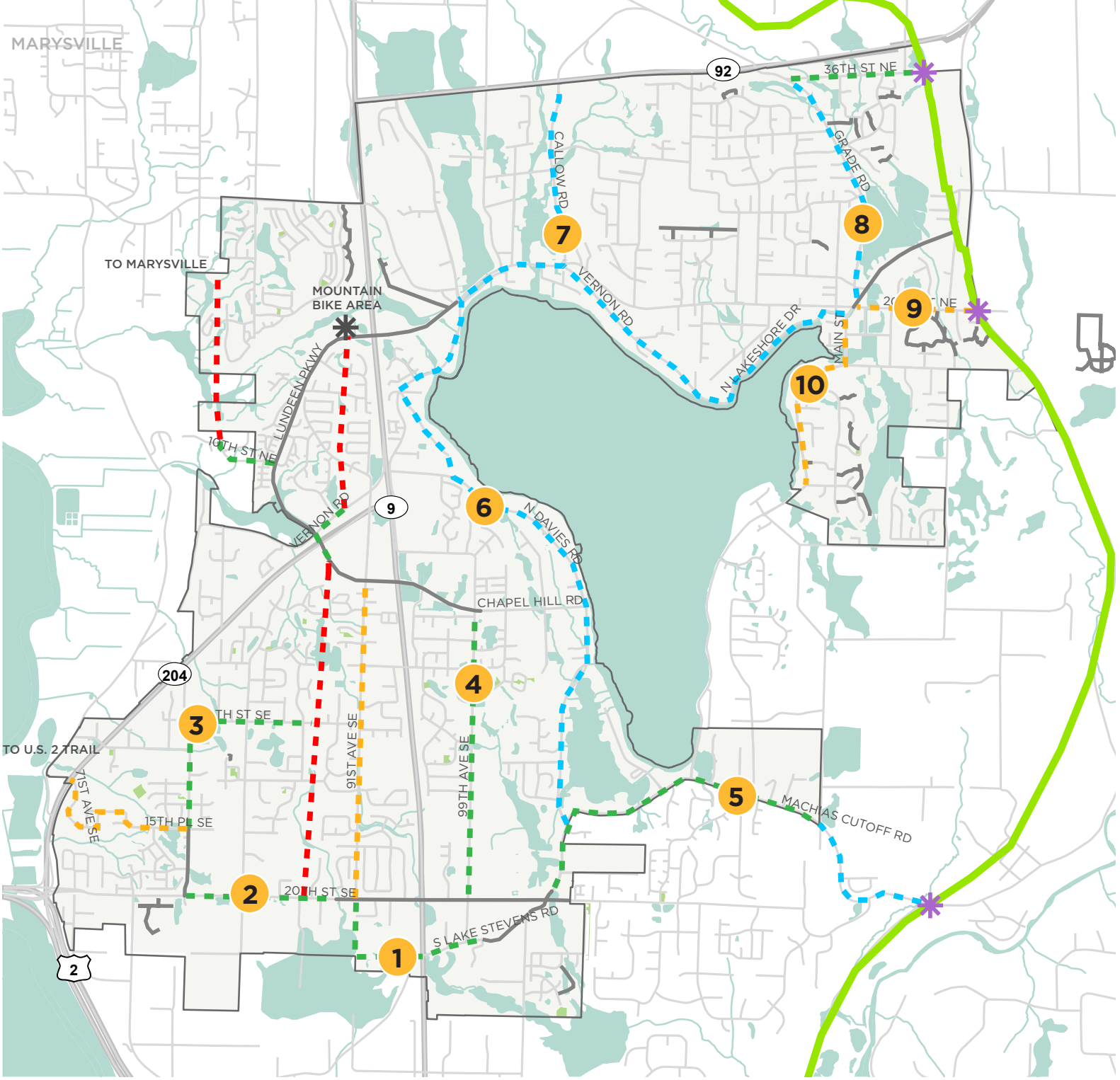
9. **20th St NE**
   This trail segment provides a more direct route from Downtown to the Centennial Trail and connects to Mt. Pilchuck Elementary and Catherine Creek Park.

10. **Main St & E Lake Stevens Rd**
    This trail segment reflects the community's desire to have more access along the lake and gives residents east of the lake to Downtown.

From Trail Opportunities to Proposed Trail Network

The trail opportunities map, as mentioned at the end of Chapter 2, was a preliminary map showing possible routes before public input. The map was based upon an initial look at existing conditions as well as previous community feedback from the 2019 Parks and Recreation Survey.

The major differences between the two maps is that most of the neighborhood connections were added in response to public input from the webmap and further existing conditions analysis. E Lake Stevens Rd, while fulfilling the desire for a route around the lake, was excluded because it lies outside of city limits. This route could be considered in the future upon further collaboration with Snohomish County.



LAKE STEVENS PROPOSED TRAIL SEGMENTS

EXISTING & PROPOSED TRAILS

- Bike Facility & Sidewalk
- Off Street Trail
- Multiuse Trail
- Sidepath
- Existing Trail Facility
- Existing Centennial Trail

BACKGROUND

- Centennial Trail Connection
- City Boundary
- Streets
- Highways
- Water

CITY OF LAKE STEVENS

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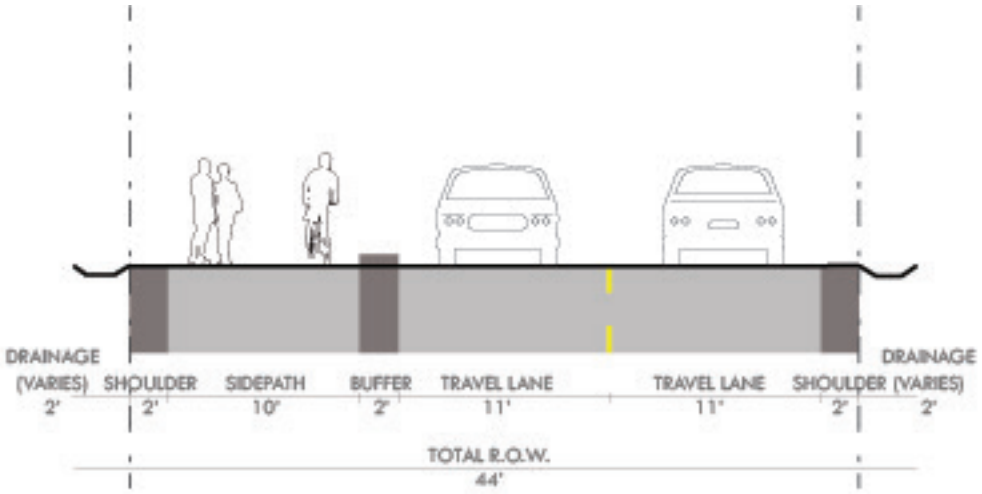
0 0.5 1 MILES

Trail Classifications

Sidepath



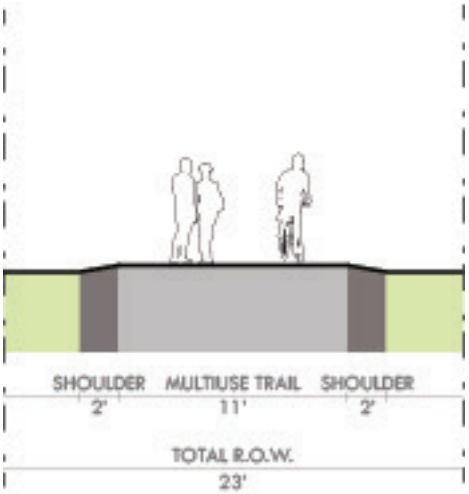
Description

A sidepath a path directly adjacent to the street shared by people walking, bicycling, or rolling. In Lake Stevens, this is a common sidewalk application and can be found on various segments of Lakeshore Drive, 99th Ave SE, and E. Lake Stevens Road. The cross-section above depicts an application on a roadway with a wide shoulder, but applications in Lake Stevens are often much more narrow. The image to the right shows an application along Hartford Drive which connects downtown Lake Stevens to the Centennial Trail.

Design Considerations

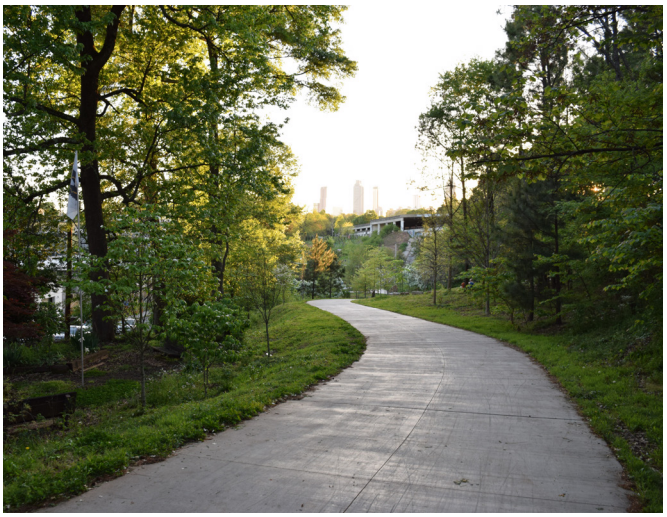
The application of sidepaths across Lake Stevens are generally varied and range in widths. Sidepaths should be implemented as a temporary solution and should be upgraded as capital projects occur. A sidepath should have a minimum width of five feet. It is important that sidepaths have frequent pedestrian markings and be accompanied by signage alerting traffic to the presence of pedestrians. As frontage improvements are made to include a higher quality network, sidepaths can also be used to temporary link together new infrastructure segments.

Off-Street Trail



Description

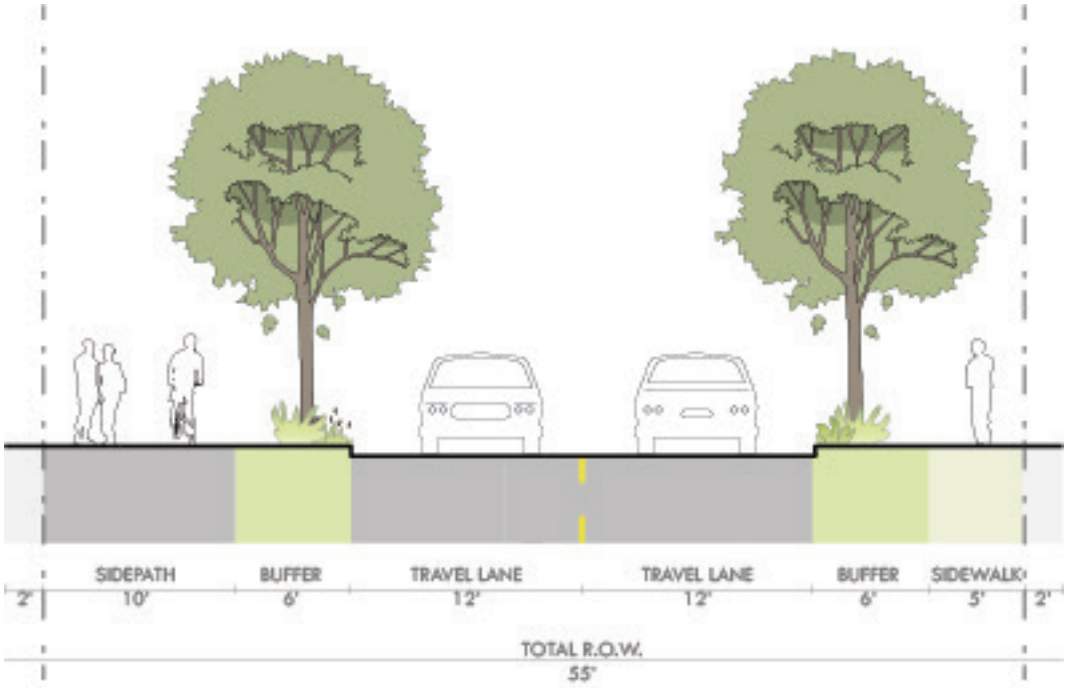
An off-street multiuse trail provides direct, mostly uninterrupted connectivity along stretches of land such as utility corridors or railroad tracks. This type of trail is typically surrounded by nature and open space and is shared by all non-motorized users. In Lake Stevens, the two primary off-street trails in the proposed network include the proposed Westside Trail and the proposed Marysville Connector Trail.



Design Considerations

Off-street trails should have frequent access points from the roadway network and be accompanied by visible trailheads at trail entrances. Wayfinding signage should clearly direct users in both directions. Trail users should be highly visible and have the right-of-way at street crossings.

Multiuse Path



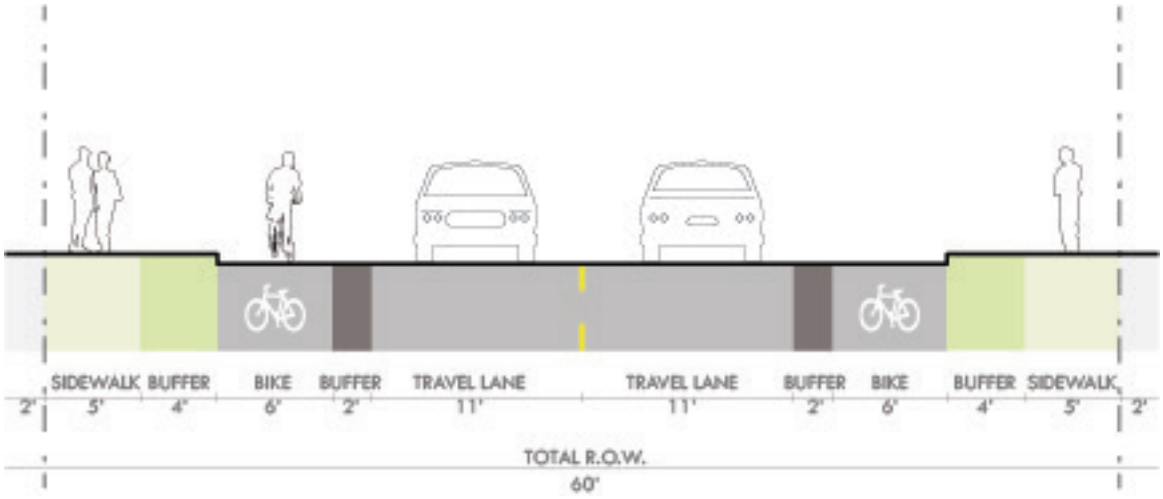
Description

A multiuse paths typically adjacent to the street but with substantial separation from motor vehicles; vegetation such as trees can enhance the user experience. The path is shared by people walking, biking, or rolling. The Lake Stevens multiuse pathway, shown to the right, is an example of this type of facility. Other opportunities for Multiuse trails include 99th Ave SE, 8th Street SE, and Fairview Drive. These are growing areas of Lake Stevens where frontage improvements can incrementally implement roadway adjacent multiuse trails.

Design Considerations

Multiuse paths are recommended along higher speed roadways and/or where significant right-of-way exists to allow for greater comfort and separation from motor vehicle traffic. Similar to sidepaths, multiuse paths are recommended along roadways with minimal driveways or street crossings. National standards generally suggest 5 feet of separation between the trail and roadway, however reductions in this amount of space are common.

Bicycle Facility



Description

A bicycle facility has numerous design incorporations, but is typically incorporated as a 6-foot lane adjacent to vehicular traffic. A buffered bicycle lane, as shown to the right, provides an additional 2 to 3 feet of space between a person riding a bike and vehicular traffic. Due to right-of-way constraints in many areas of Lake Stevens, trail connections can be facilitated through a combination of sidewalks and bike lanes in lieu of a 12-foot multiuse trail.

Design Considerations

Bicycle facilities should be a minimum of 6-feet wide and should be clearly marked through striping and inclusion of the helmeted bicyclist symbol. When possible, buffered bicycle lanes should be considered. Bicycle lane striping should continue and remain visible through driveways and intersections. Additionally, signage should clearly alert vehicular traffic to the presence of people riding bikes along the corridor.

Alternative: Sharrow

A roadway marking known as a sharrow is often utilized in lieu of a formal bike lane when roadway constraints exist. In Lake Stevens, roadways such as Lakeshore Drive do not have the right-of-way or pavement width to incorporate a bicycle lane. In these situations, a sharrow would be a painting treatment that would designate space for people riding bikes. Application should target speed limits at or below 25 mph and should consider incorporating traffic calming, such as periodic speed humps or chicanes.

In Lake Stevens, the sharrows can be used in combination with sidepaths for trail implementation. Sidepaths would provide a zone for pedestrians and the sharrows would provide space for people riding bikes. It is important to also include frequent signage along routes, along with frequent sharrow markings, to ensure that vehicular traffic is aware of the presence of cyclists and the ability for them to utilize travel lanes.


THE
MAIN STREET
CENTER

4. Trail Design & Best Practices

To ensure that future trails in Lake Stevens are appropriately designed for all types of users, this chapter presents trail design best practices to be used as guidelines in conjunction with existing city design guidelines.

Trail User Needs

Trails attract a variety of users with different needs and expectations. Important design characteristics for different users are width, surface material, sight distances, clearances, and trail amenities. The following section provides the framework for incorporating standards and guidelines for trail design and planning. Trail users include:

- **Pedestrians**—joggers, walkers, baby strollers, pet walkers, nature watchers
- **Bicyclists**—commuters, recreational riders, touring riders
- In-line **skaters** and skateboarders
- **Wheelchair users** and users of other mobility devices, such as Electronic Personal Mobility Devices (EPMD)

User Behavior

The flexibility of trails draws many different users, and accommodating a safe and predictable environment for all is an important issue in trail planning, design, and development. Within a given trail width, there will be different user types traveling at different speeds, potentially large groups traveling together, and/or high volumes of people. Trail users should recognize and anticipate other user behaviors unique to user type to avoid potential conflicts. The potential user-type behavior conflicts are indicated in **Table 1**.

Trail user behavior can be managed through safety programs that provide the individual user with a **Code of Conduct** for the trail, sometimes called a **Trail Ordinance**. Several communities across the U.S. have adopted progressive trail ordinances for public use. Other factors which lead to user conflicts, including the design and engineering of a trail, are discussed further in following sections of this chapter.

Table 1 - User Type Potential Conflicts With Other Users

PEDESTRIANS (includes any users on foot)
Multiple pedestrians may walk more than two abreast, making it difficult for other users to pass
Children may wander unpredictably on the trail
Pet owners may not exercise on-leash etiquette, and pets may wander unpredictably on the trail
May stop or turn suddenly, before other users can react
May not keep to the right, making it difficult for other users to pass
BICYCLISTS
Have tendency to startle other users if not using voice or bell when passing
May ride more than two abreast, making it difficult for other users to pass
May not obey posted speed limits
May frighten wildlife
SKATERS
Have tendency to startle other users if not using voice or bell when passing
May use a wider portion of the trail for sweep width, making it difficult for other users to pass
May frighten wildlife
WHEELCHAIR USERS
May not keep to the right, making it difficult for other users to pass

Photo: Photo Credit Attribution

Design Needs of Pedestrians

Aside from space requirements related to pedestrian-specific activities such as pet walking or running, pedestrians have a wide variety of physical characteristics determining user needs and abilities. Age is one major factor that affects pedestrians' walking speed and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of cognitive development. Older adults walk more slowly and may require assisting devices for walking stability, sight, and hearing. **Table 2** below summarizes common pedestrian characteristics for various age groups. As a rule of thumb, the MUTCD recommends a normal walking speed of three and a half feet per second for calculating the time needed for pedestrian crossings at traffic signals. Average walking speed is lowered to three feet per second in areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the trail system should accommodate these users to the greatest reasonable extent at trail intersections, sharp turns, overpasses, and underpasses.

Table 2 - Pedestrian Characteristics by Age

AGE	CHARACTERISTICS
0-4	Learning to walk Require constant adult supervision Developing peripheral vision and depth perception
5-8	Increasing independence, but still require supervision Poor depth perception
9-13	Susceptible to "dart out" or intersection dash Poor judgment Sense of invulnerability
14-18	Improved awareness of traffic environment Poor judgment
19-40	Active, fully aware of traffic environment
41-65	Slowing of reflexes
65+	Difficulty crossing street in time Vision loss Difficulty hearing vehicles approach from behind

Design Needs of Dog Walkers

Dog walking is a common, anticipated use on trails. Dog sizes vary largely, as does leash length and walking style, leading to wide variation in possible design dimensions. Trails designed to accommodate wheelchair users are likely to provide the necessary dimensions for the average dog walker. Amenities such as dog waste stations at trailheads enhance conditions for dog walkers.

Design Needs of Runners

Running is an important recreation and fitness activity commonly performed on trails. Many runners prefer softer surfaces (such as rubber, bare earth, or crushed rock) to reduce impact. Among hardened surfaces, asphalt is preferred over concrete because it is more forgiving on joints. Runners can change their speed and direction frequently. Typical running speed is 6.2 miles per hour (mph).

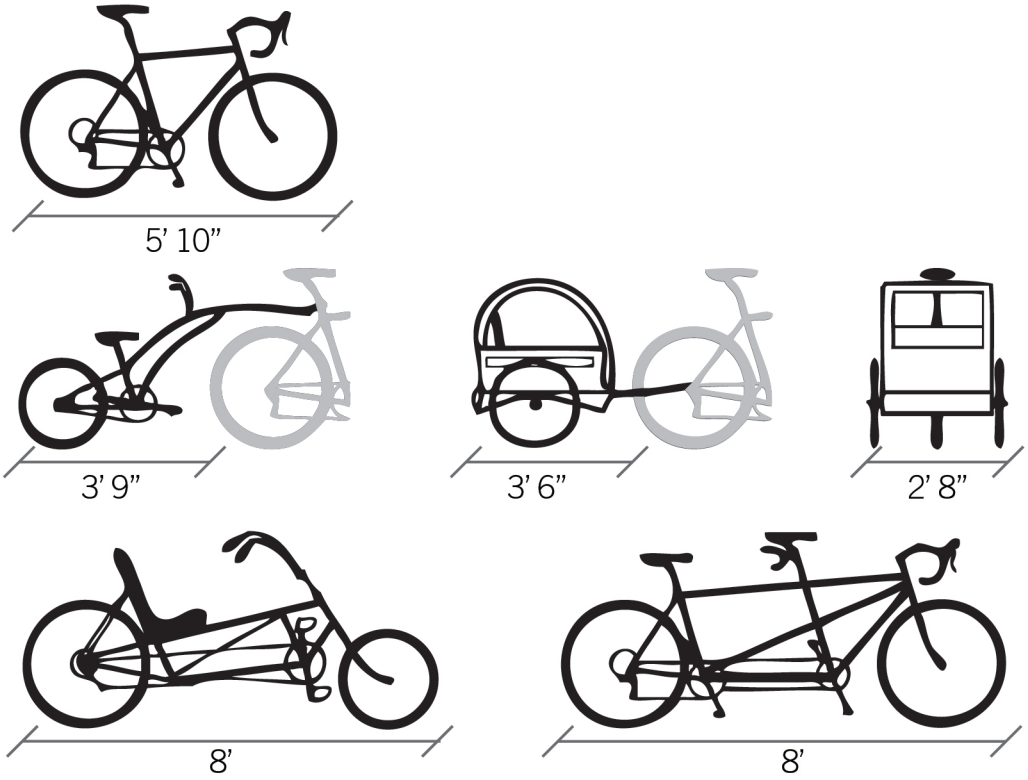
Design Needs of Strollers

Strollers are wheeled devices pushed by pedestrians to transport babies or small children. Stroller models vary greatly in their design and capacity. Some strollers are designed to accommodate a single child; others can carry three or more. Design needs of strollers depend on the wheel size, geometry, and ability of the adult who is pushing the stroller. Strollers commonly have small pivoting front wheels for easy maneuverability, but these wheels may limit their use on unpaved surfaces or rough pavement. Curb ramps are valuable to these users. Lateral overturning is one main safety concern for stroller users.

Design Needs of Bicyclists

Bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle, or a tricycle) and behavioral characteristics (such as the comfort level of the bicyclist). The design of a trail should consider expected bicycle types on the facility and utilize the appropriate dimensions. **Figure 1** below illustrates the varying dimensions of bicycles. Bicyclists require clear, open space with no visual obstructions to operate within a facility. The minimum operating width is greater than the physical dimensions of the bicyclist to allow the bicyclists shy distance from vertical obstacles and to allow maneuvering space around uneven pavement or other obstructions. Bicyclists prefer five feet or more operating width, although four feet may be minimally acceptable. Bicyclist speeds range from 8-15 mph on a paved level surface. Uphill speeds range from 5-12 mph, and downhill bicyclist speeds can reach 20-30 mph. A design speed of 10 mph is used for bicycle signage and crossings.

Figure 1 - Typical Bicycle Dimensions Source: AASHTO 3.2



Design Needs of Skaters

In-line skates are commonly used for recreational and transportation purposes. They typically have three to five wheels of three to four inches diameter, aligned in a straight line. Operational characteristics vary by skill level. Novice skaters travel more slowly and have a narrower sweep width from advanced skaters. Novice users may also have trouble making sharp turns and stopping quickly, particularly on steep grades. In-line skates are nearly impossible to use on unpaved surfaces and can be uncomfortable and difficult to operate on rough pavements, such as asphalt with large aggregate. In-line skaters have a typical speed of 10 mph.

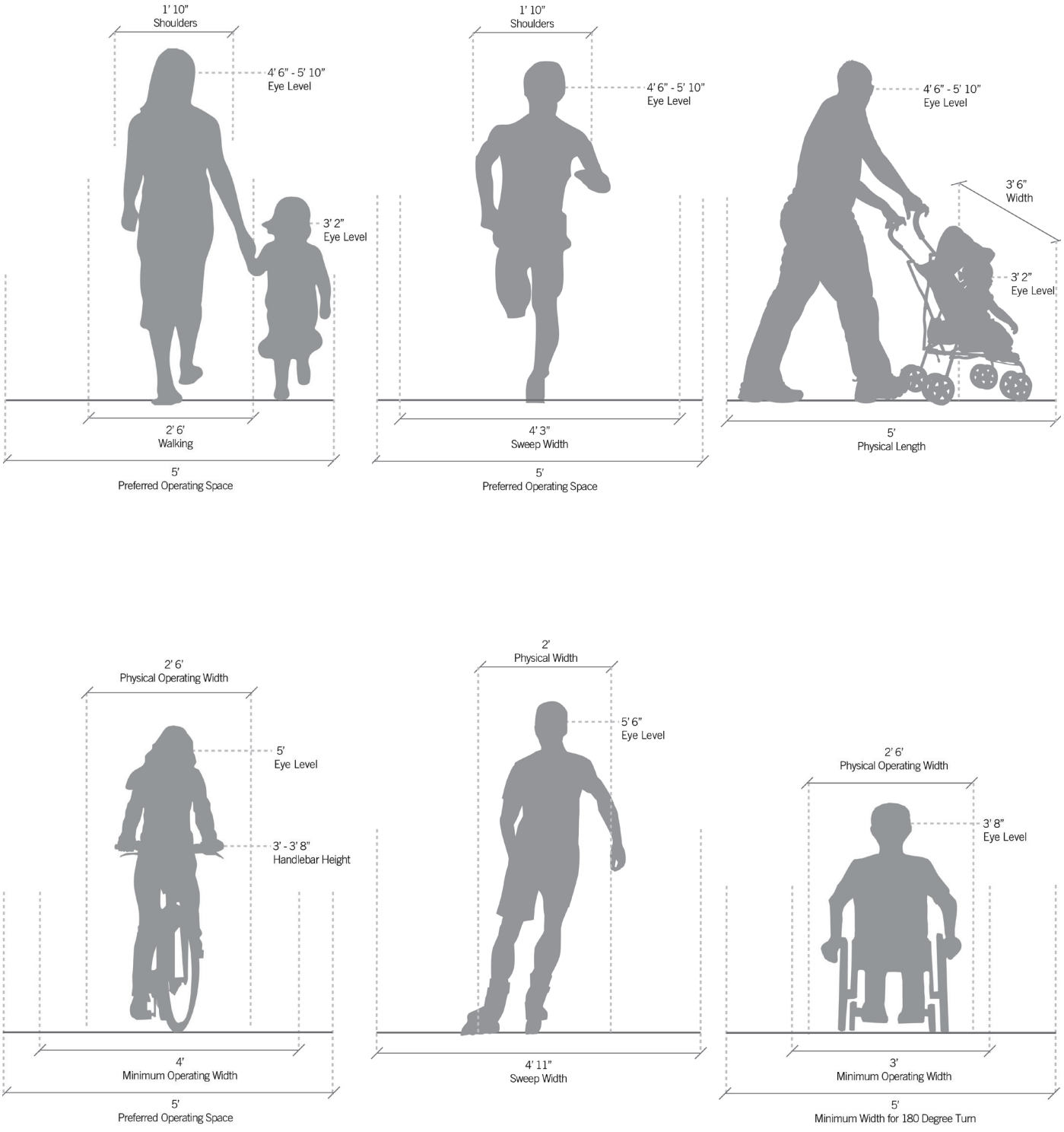
Design Needs of Wheelchair Users

As the population ages, the number of people using mobility assistance devices increases. Manual wheelchairs are self-propelled by the user's hands and arms by pushing rims attached to the wheels. Braking is done through resisting wheel movement with the hands or arm. Alternatively, a second individual can control the wheelchair using handles attached to the back of the chair. Typical speed for manual wheelchair users is 3.6 mph. Power wheelchairs use a battery powered motor to move. The size and weight of power wheelchairs limit their ability to negotiate obstacles without a ramp. Various control units are available that enable users to control the wheelchair movement, based on user ability (e.g., joystick control, breath controlled). Typical speed for power wheelchair users is 6.8 mph. Maneuvering around turns requires additional space for both types of wheelchair devices. Providing adequate space for 180° turns at appropriate locations is an important element for accessible design.

Trail User Dimensions

Figure 2 below illustrates the spatial needs of the trail user groups discussed. Note that the preferred operating width for all user types is approximately five feet.

Figure 2 - Trail User Dimensions



Trail Surface

When determining surface type for paved trails, consider topography, surrounding landscape, underlying soils, and user needs. All surfaces have advantages and disadvantages, and each must be analyzed to determine which surface is appropriate in any given location. American Disabilities Act Accessibility Guidelines (ADAAG) compliant trails require firm, stable, slip resistant surfaces, which in most instances is a paved surface for access and ease of use.

Paved Surface Materials

For paved trails, a proper foundation will increase the longevity of the trail surface. Two inches of surfacing material over six inches of base course gravel over geotextile fabric is recommended for construction.

Asphalt is a common surface for trails, offering substantial durability for the cost of installation and maintenance. Asphalt is popular with users for its smooth, continuous surface and has the benefit of lower cost, but requires more upkeep than concrete. As a flexible pavement, asphalt can also be considered for installing a paved trail on grades steeper than 3%. If constructed properly on suitable sub-grade, asphalt has a life span of about half that of concrete, or 10 to 15 years.

Concrete can last twenty five years or more when properly constructed and maintained on a regular basis,. The high cost of concrete is often the most limiting factor. It is recommended that concrete be used for its superior durability and lower maintenance requirements in areas prone to frequent flooding, and for intensive urban applications. To prevent expansion joints from jarring cyclists or in-line skaters, 1/4 inch saw cut concrete joints rather than troweled improve user experience.

Permeable paving is twice the cost of asphalt to install. Permeable paving should only be used in areas with proper drainage, and is not suitable in floodplain or areas with ponding or sedimentation. Permeable paving also requires a maintenance schedule for vacuuming debris.

Width

Eight feet is the absolute minimum width allowed for a shared use trail and is only recommended in constrained conditions for short distances. The AASHTO defined minimum width for a two-way trail is 10 feet. However, 12 feet (and in very heavy trail use, fourteen feet or more) is recommended for trails with moderate to high concentrations of users and/or variety of users. A separate soft surface track (five feet minimum) can be provided adjacent to a paved shared use path for pedestrian use where right-of-way permits.

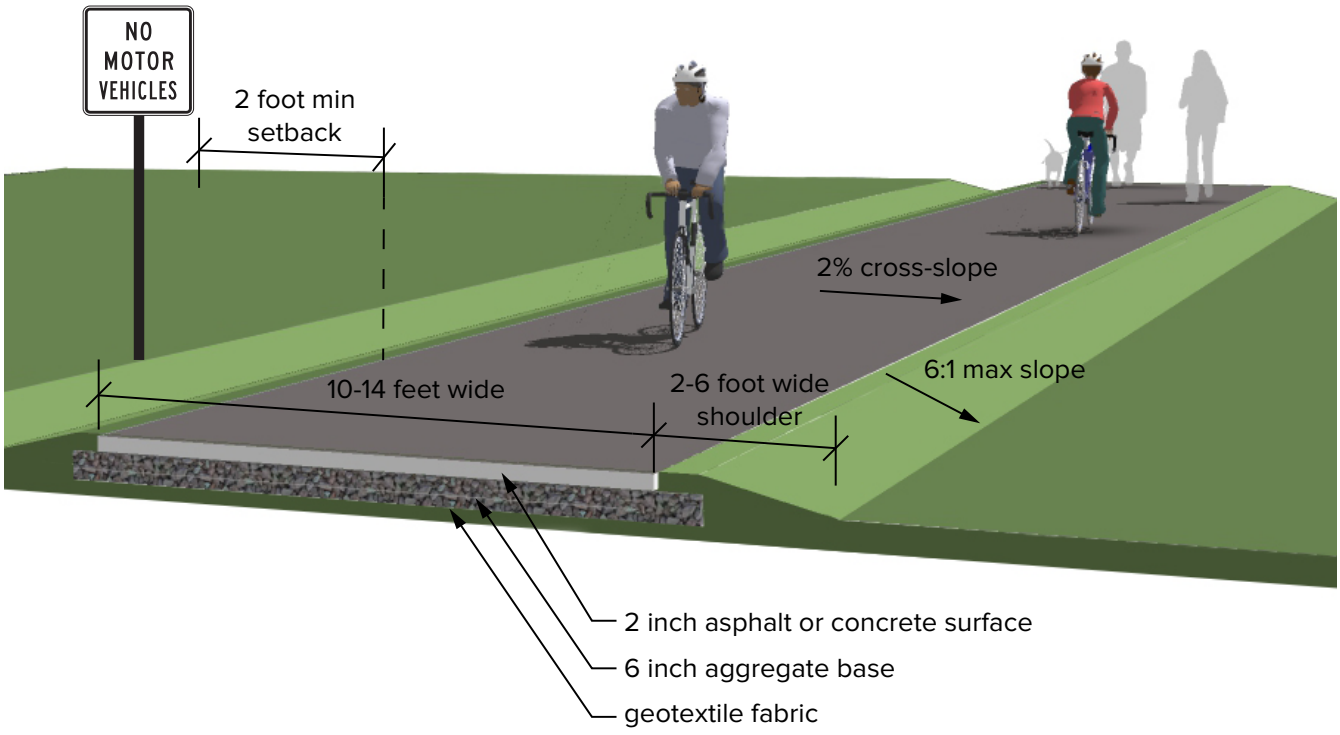
Clearances

A two foot minimum graded shoulder should be provided on both sides of the trail for clearance from lateral obstacles such as signs, vegetation, bridge abutments, or other obstructions. Ideally, shoulders are three to five feet wide with a maximum cross slope of 1V:6H (AASHTO, Section 5.2.1).

Clearance to overhead obstructions should be 10 feet, and an absolute minimum of eight feet only in constrained conditions. Note that higher clearances may be necessary for maintenance or emergency vehicle access.

Cross-Slope

Trails should provide a 2% cross slope from crown of trail in both directions to provide positive drainage off the trail as conditions allow. The cross slope should be no greater than 5% for accessibility requirements.



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Accessible Trail Design

The United States Access Board ADA accessibility guidelines apply to trails and outdoor recreational access routes. In addition to the surface and cross-slope requirements described prior, accessible trails require the following:

Clear tread width: three feet minimum for low-volume, pedestrian-only facilities; 10 feet minimum for multi-use facilities. Where trail width is less than 60 inches, passing space must provided at least every 1,000 feet.

Low longitudinal slope: 5% or less. Steeper slopes may be used if resting intervals of no less than five feet long and equal to the width of the trail are provided at the bottom and the top of the slope in the intervals listed below. No more than a third of the total trail length may exceed a running slope of 8.33%.

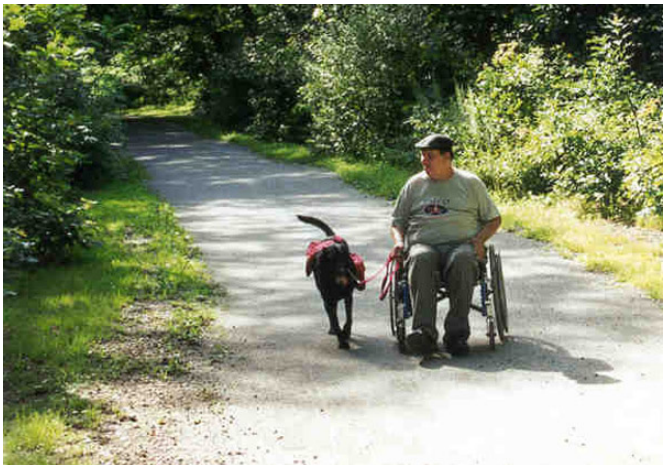
Up to 8.33% for a maximum of 200 longitudinal feet

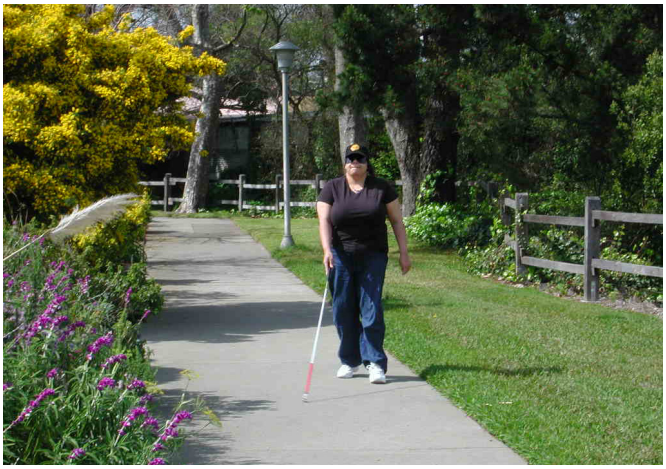
Up to 10% for a maximum of 30 longitudinal feet

Up to 12.5% for a maximum of 10 longitudinal feet

Consistent smooth surface: 0.5 inches is the maximum vertical discontinuity, and any disruption greater than 0.25 inches high shall be beveled to avoid trip hazards

Detectable pavement changes: provided at curb ramps, before entering roadways, and at rail crossings





Crime Prevention Through Environmental Design (CPTED) Principles For Trails

Personal safety, both real and perceived, heavily influences a trail user's decision to use a facility and a community's decision to embrace the trail system. CPTED is a proactive approach of using design principles to deter undesired behavior.

Principle #1: Natural Surveillance

Principle #2: Natural Access Control

Principle #3: Territorial Reinforcement

Principle #4: Maintenance

These principles can be applied to trail facility design, management features, and trail amenities:

Sight lines: Where possible, trails should be located near buildings with windows facing the trail, or adjoining properties with open views to the trail. Convex mirrors should be provided at blind corners and at the approaches to underpasses with poor sight lines.

Fencing: Where feasible, fencing installed along trails should not obstruct the view of trail users. Permeable fencing of four feet tall or less can provide a barrier sufficient to denote property boundaries or deter access. Opaque fencing or walls can degrade the experience of trail users, obscure views, and create a "tunnel" effect that can cause users to feel "trapped." Where the trail is fenced for long stretches, intermittent openings allow users to access the trail at locations with good visibility from the surrounding neighbors.

Vegetation: All ground cover and shrubs along trails should be trimmed to a maximum height of three feet above ground level. Trees should be limbed-up to provide 10 feet of vertical clearance over the trail within the trail corridor. Tree canopies should not obstruct pathway illumination. Hostile native landscaping material (e.g. vegetation with thorns) can be used in strategic areas to discourage unauthorized use and eliminate entrapment areas.

Lighting: Light quality is as important as the quantity. Poor lighting, whether too bright or not bright enough, can diminish safety. Where lighting is installed on trails, the illumination should be adequate to identify a face up to 20 yards away. The lighting should provide uniform coverage and good color rendition. The use of metal halide or light emitting diode (LED) lamps are recommended, as they provide excellent color rendition. Color rendition is especially important when describing identifying features such as hair, clothing, and vehicle color.

Maintenance: Signage should be placed at trailheads indicating a contact number to report graffiti, suspicious behavior, and maintenance issues. Add anti-graffiti application to retaining walls or other blank surfaces where appropriate. A maintenance schedule should be established to regularly monitor trail conditions.

Striping and Pavement Markings

Striping and pavement markings are particularly beneficial in areas of limited sight distance, high traffic areas, intersection approaches, and in areas where night time use is anticipated. All markings should be non-slip or non skid material, and shall be retroreflective per the MUTCD. High visibility thermoplastic is the most durable and visible material for trail applications.

Under most conditions, trail centerline markings are not necessary. However, per AASHTO guidelines, "on pathways with heavy peak hour and/or seasonal volumes, or other operational challenges such as sight distance constraints, the use of a centerline stripe on the path can help clarify the direction of travel and organize pathway traffic." (5.2.1) A four to six inch dashed yellow centerline stripe should be used where passing is allowed, and a solid stripe should be used where passing is discouraged. Solid centerlines should be provided on tight or blind corners and on the approaches to roadway crossings.

Four inch solid white edgeline striping should be provided on trails with anticipated nighttime use. White edge lines can also be used on intersection approaches to highlight changing trail conditions, or to delineate a separation of path users (AASHTO, 5.4.1).

Pavement markings are commonly used to reinforce signs along a trail, however, pavement markings should not be used to replace signs altogether. Instead, pavement markings should be used to call additional attention to a possible problem area, such as trail access points, roadway intersections or bridges, or converging trails. Possible pavement markings for trails include the pedestrian and bicycle symbols, yield lines, stop bars, and the word markings "Stop," "Yield," and "Slow." Due to slower travel speeds, word pavement markings should not be elongated, should read in conventional order, and should be scaled minimally as to not overwhelm the pathway.

Trail Edge Definition

Vegetation, topography, ditches, fencing, railings, or walls may be used to clearly mark trail edges beyond the shoulder. These features can serve multiple purposes, including:

- Providing visual separation/privacy screens
- Delineating public from private property
- Discouraging unauthorized foot trails
- Separating users from hazardous drop-offs or adjacent non-compatible land use

Wildlife passage and safety for trail users are important factors in determining trail edge treatments. If separation is desired for privacy reasons, native vegetation buffers or the use of topography are recommended. For separation to prevent trespassing or guard against hazardous slopes, consider the use of topography, ditches, semi-transparent fencing or railings, and hostile vegetation.

Drainage and Erosion Control

Drainage and erosion control are necessary to ensure a stable and low maintenance facility. Excessive soil erosion near a trail is usually the result of water collecting and flowing along the trail edge or onto the surface with enough volume and velocity to carry away soil. This impacts trail width, trail surface quality, and degrades adjacent habitat or downstream water resources. Designing the trail to follow natural land contours and planting low ground cover vegetation up to the edge of the trail help prevent and reduce erosion. Proper trail drainage can be ensured with a 2% cross slope for the paved tread and trail shoulders. A 1:6 slope is allowable for shoulders, but 2% is preferred. When managing storm water along trails, use dispersed infiltration systems such as vegetated swales or engineered storm water control structures such as storm drains and catch basins for reduced maintenance and improved aesthetic.

For sections of trail where uphill water is collected in a ditch and directed to a catch basin, water should be directed under the trail in a drainage pipe.

Vegetative Screening

The presence or absence of vegetation and the type of vegetation present in a trail corridor impacts habitat quality, ecological sustainability, and the aesthetic experience for the trail user. Trees and shrubs on trails can serve as habitat for wildlife, stabilize erodible soils, and shelter trail users from the sun and rain. Vegetation is also an effective means of establishing trail boundaries while maintaining visual permeability. Strategic placement of bushes and plantings can deter users from using unauthorized foot trails, access points, or exits. When using vegetative screening, ground cover and shrub height should be a maximum of two feet above ground level to maintain an open line of sight on the trail. Similarly, trees should be trimmed to provide a minimum of eight feet of vertical clearance for trail circulation and to avoid obstructing trail lighting.

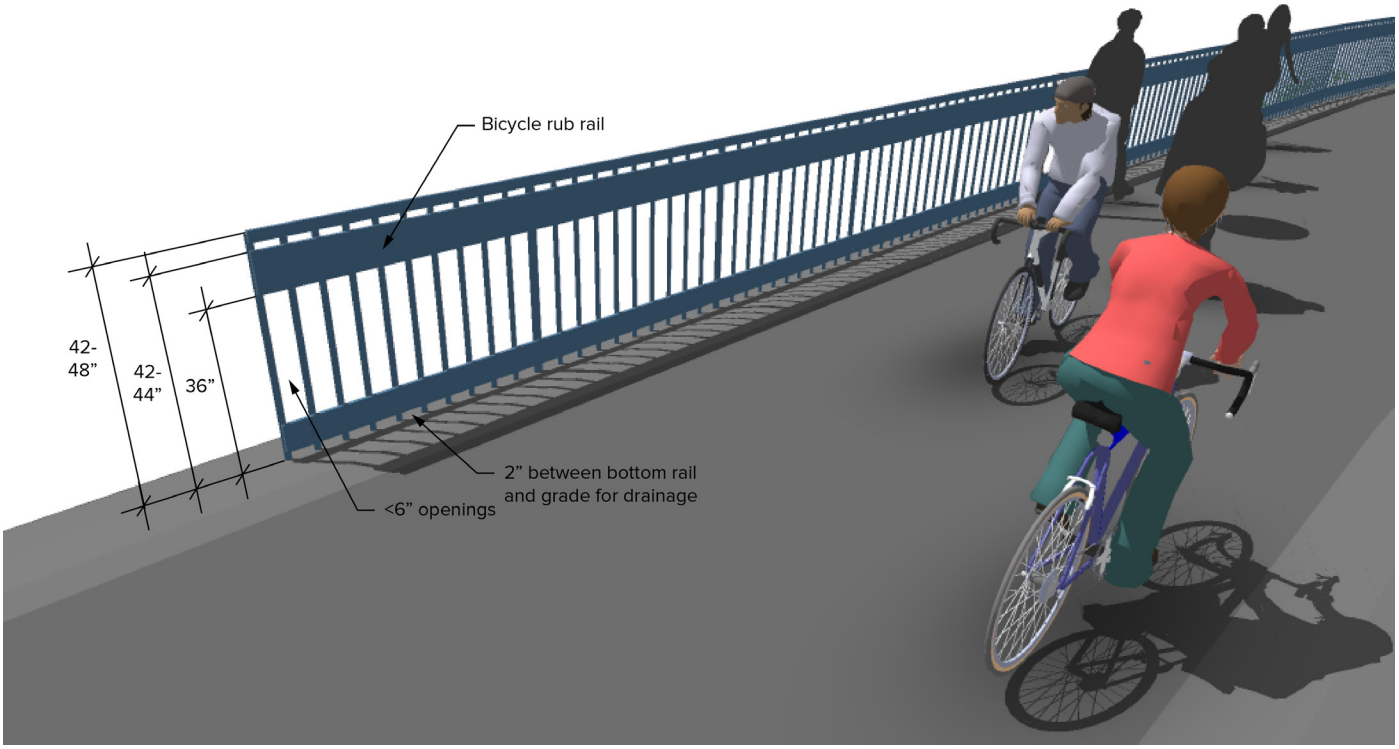
In locations where trees and shrubs are lacking and can be planted, native species are the most ecologically sustainable choice. As a group, native species require less maintenance than horticultural plantings and often provide wildlife with a food source. Topography and soil moisture regime largely determine where different plant species occur. Competing invasive vegetation should be removed regularly and replaced with mulch to conserve water. Trail vegetation should be selected and placed to provide seasonal comfort: shade in the warmer months and sunlight in colder months. Seeds and plants should be placed either right before or during the rainy season to take advantage of seasonal rainfall (spring and fall). Note that larger plants require more water to survive than seeds and smaller plants. Fertilizing native plants is only necessary in extreme cases when the condition of the soil is in need of repair.

Railings and Fences

Railing and fences are important features on bridges, some boardwalks, or in areas where there may be a hazardous drop-off or incompatible adjacent land uses. By AASHTO standards, where there is a side slope or considerable vertical drop within six feet of the edge of the trail, a 42 inch safety rail is required:

- Slope is greater than or equal to 3:1 and drop of six feet
- Slope is greater than or equal to 2:1 and drop of four feet
- Slope is greater than or equal to 1:1 and drop of one foot

Railings may need to be as tall as 48 inches where more hazardous conditions exist, such as a bridge over a highway. At a minimum, railings and fences should consist of a horizontal top, bottom, and middle rail. The middle railing functions as a 'rub rail' to reduce the risk of bicycle handlebars getting caught by a railing. Middle rails should be located 36 inches to 44 inches above the finished grade. The bottom rail should be two inches above finished grade to allow for drainage. Openings between horizontal or vertical members on railings should be small enough that a six inch sphere cannot pass through in the lower 27 inches. This is to prevent children from falling through the railing openings. For the portion of railing higher than 27 inches, openings may be spaced such that an eight inch sphere cannot pass through. Local, state, and/or federal regulations and building codes should be consulted to determine when it is appropriate to install a railing and comply with current standards.



Access + Intersections

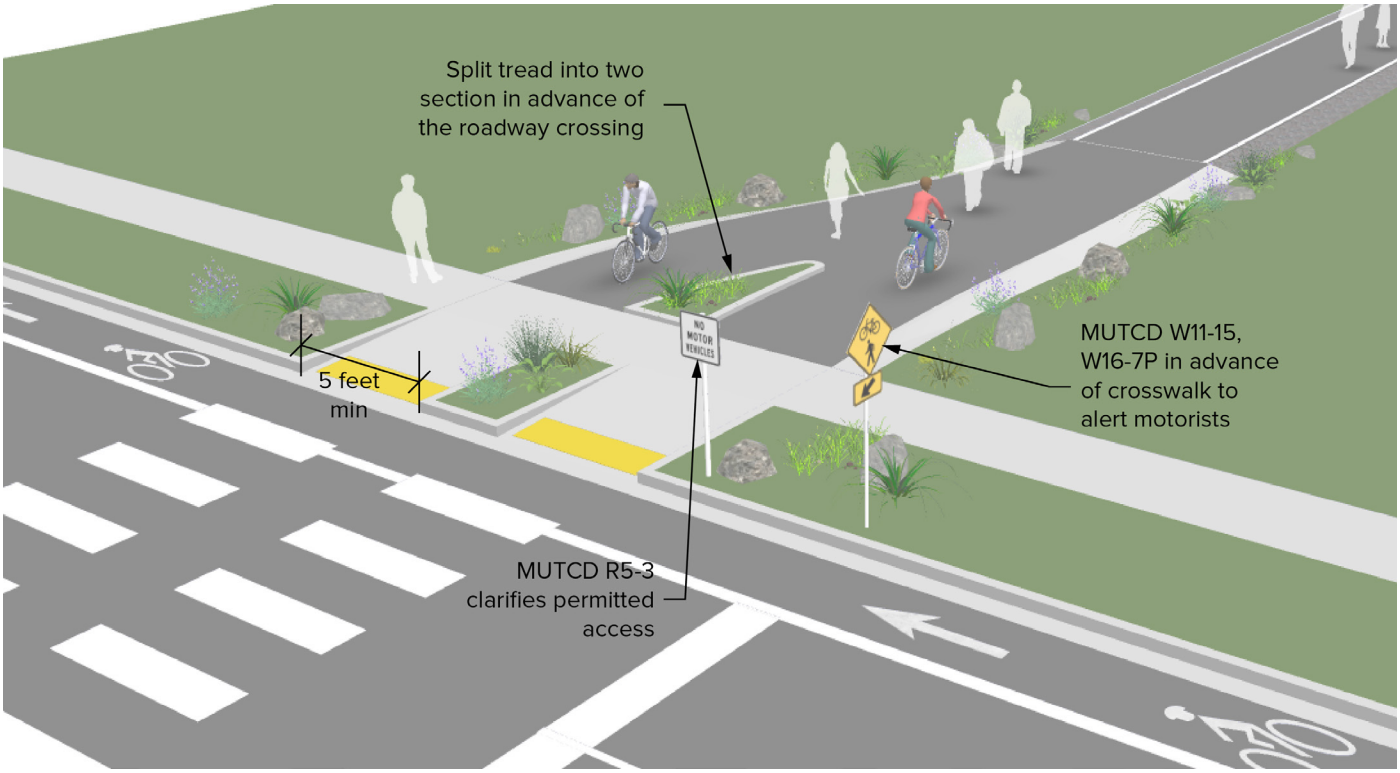
Roadway and trail crossings can create potential conflict points; however, well-designed crossings can mitigate many operational issues and provide a higher degree of safety and comfort for all users. Generally speaking, trail facilities require additional considerations due to the higher travel speed of bicyclists versus other trail users. The sign types, pavement markings, and treatments will vary based on the roadway type the trail crosses. Proper signage and pavement markings alerting trail users of at-grade crossings must also be utilized. This section details crossing treatments for the following contexts:

- Trail Entry Control
- Local or Collector Street Crossings
- Arterial Crossings
- Intersections with other Trails
- Railroad Crossings
- Underpasses and Overpasses

Trail Entry Control

A variety of physical barriers and design strategies are employed to restrict motor vehicle access to trails. A common treatment is the bollard post; however the bollard presents numerous safety hazards to trail users, and their use should be discouraged. Potential hazards include inconsistent and unpredictable placement, broken fold-down posts that often do not fold back up, removable posts lacking flush sleeves, or removable posts with theft preventing chains that dangle onto the trail surface. If bollards are used at intersections and access points, they should be adequately spaced and brightly colored and/or supplemented with permanent reflective materials to be visible at night. Removable barriers should leave a flush surface to prevent tripping hazards.

Physical barriers should only be considered when other measures do not adequately control unauthorized vehicles, or where the danger posed by unauthorized vehicles exceeds the safety risks to trail users by the barriers themselves. Alternative design strategies to control shared-use path entry include signage indicating "No Motor Vehicles" (MUTCD R5-3) placed at the trail access point, separating the trail into two treads in advance of the crossing so that the curb cuts are not conducive to motor vehicle access, and including a landscaped median to act as an access barrier. Note that there should be a minimum of five feet clearance for each tread for trail user access.



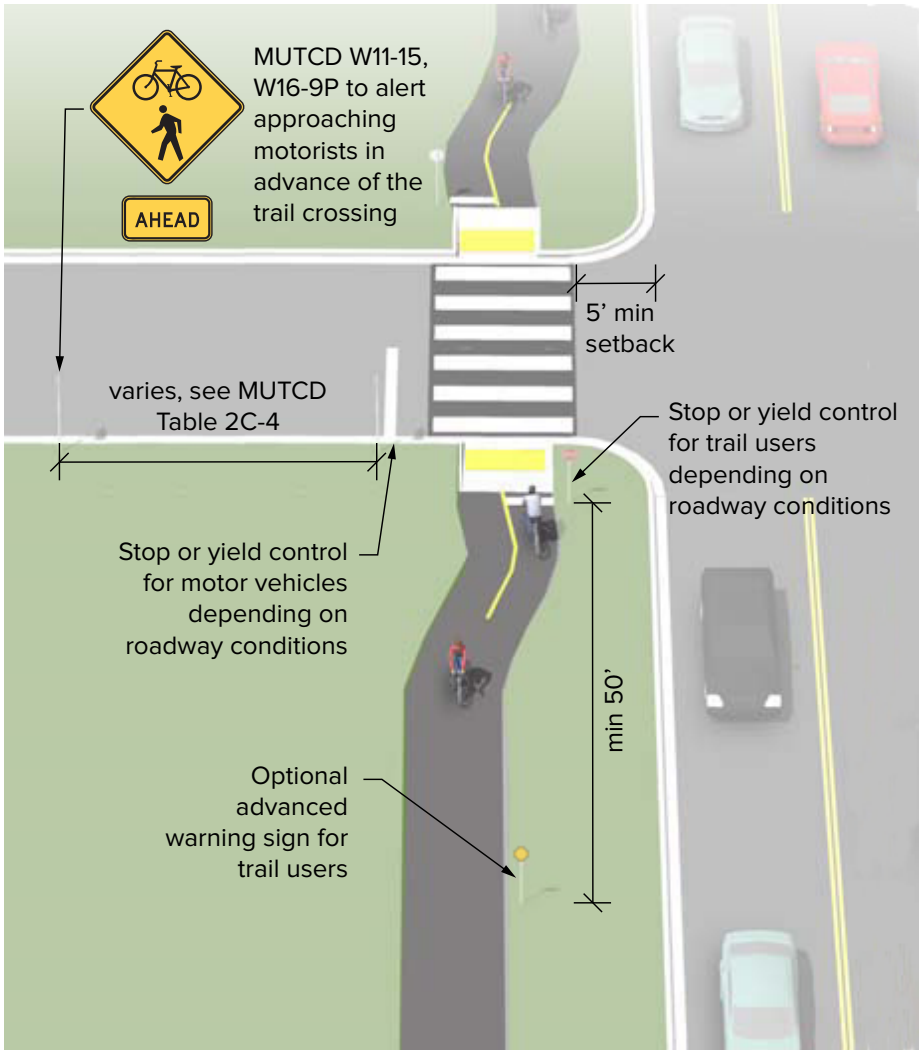
Sidepath Roadway Crossings

Where trails are located adjacent to roadways, also called sidepaths, there must be a minimum buffer setback of 5 feet the trail from the roadway (AASHTO, 5-11). However, a larger setback at roadway crossings can emphasize the conspicuity of trail users as vehicles approach the trail crossing. A 25 foot setback separates the vehicle turning movements and the trail roadway crossing into two distinct movements so that the driver's attention is focused on one conflict point at a time.

The sidepath and roadway crossing can give priority to either trail users or to motor vehicle traffic. Determining user priority will be determined by roadway speeds, roadway volumes, and trail user volumes.

Where possible, such as at driveway crossings and low volume roadway crossings, trail users should be given priority. Priority is assigned by use of stop or yield control traffic devices. Refer to AASHTO Section 5.3.2 for various configurations. In all cases, the roadway crossing should be marked with high visibility crosswalk markings.

On the trail, a centerline stripe , advance warning signs, and or pavement markings can alert trail users of the roadway crossing. On the roadway, MUTCD W11-15 warning plaques with an optional W16-9P plaque can be placed in advance of the trail crossing. Vehicles and trail users can be yield or stop controlled at the crossing, with the appropriate signs and pavement markings.

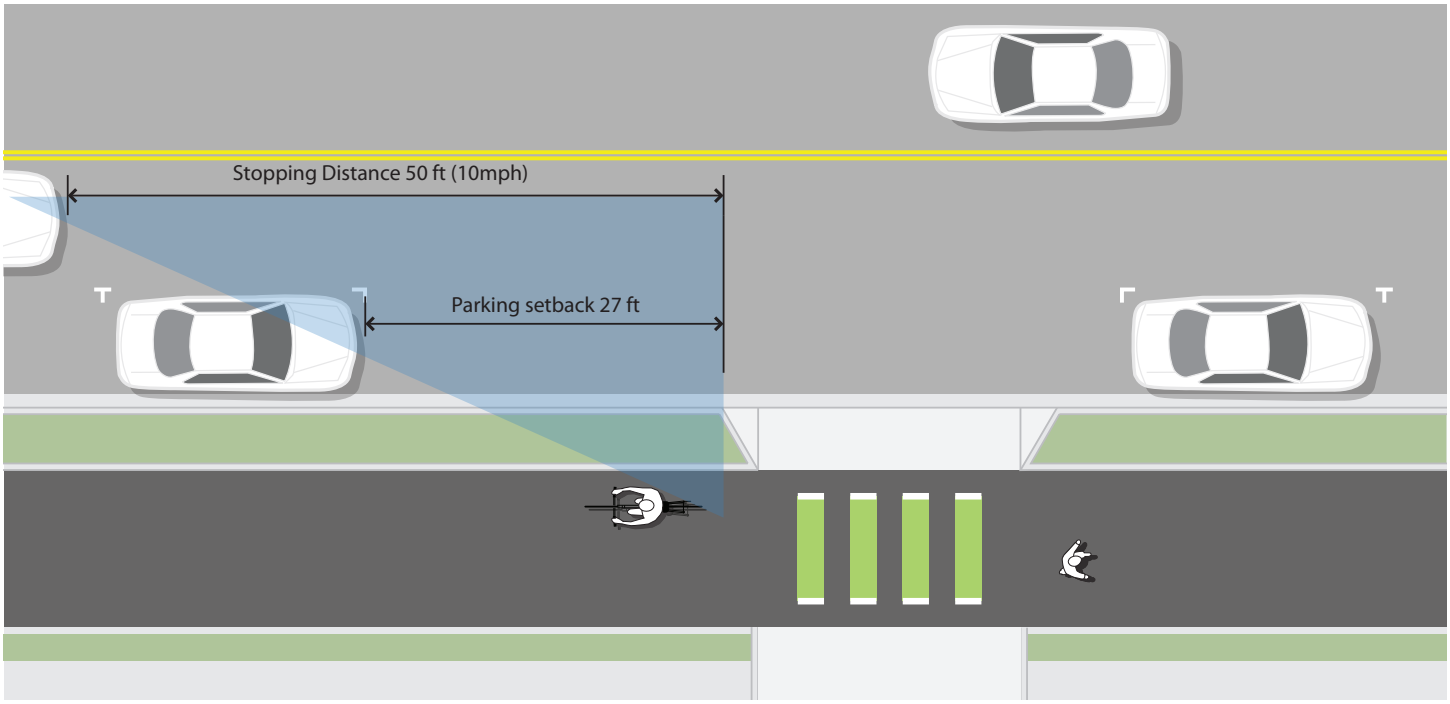


Sidepath Driveway Crossings

Ideally, sidepaths are along roadway corridors with few driveway or side street crossings to minimize the number of potential conflicts between trail users and motor vehicle drivers. However, at driveway crossings, the conspicuity of the trail can be increased by ensuring clear sightlines for both motor vehicle drivers and trail users. The stopping sight distance for vehicles and necessary clear setback from driveway entries for sightlines can be found in Table 9-21 in the AASHTO Policy on Geometric Design of Highways and Streets.

Further conspicuity can be brought to driveway crossings by advance warning signs directed towards trail users and motor vehicles, such as MUTCD W11-15, R10-15MOD, or W2-1. At driveway entrances with a large number of vehicle crossings, such as a commercial center, colored pavement markings can be added to the trail surface. This treatment is not recommended for individual residence driveways.

At driveway crossings, priority should be given to the trail users. Driveway crossings can be raised so that motor vehicles must slow down on the approach to the driveway. The width of driveways can also be narrowed to reduce the potential conflict area, and turning radii can be decreased to also slow vehicle speeds.

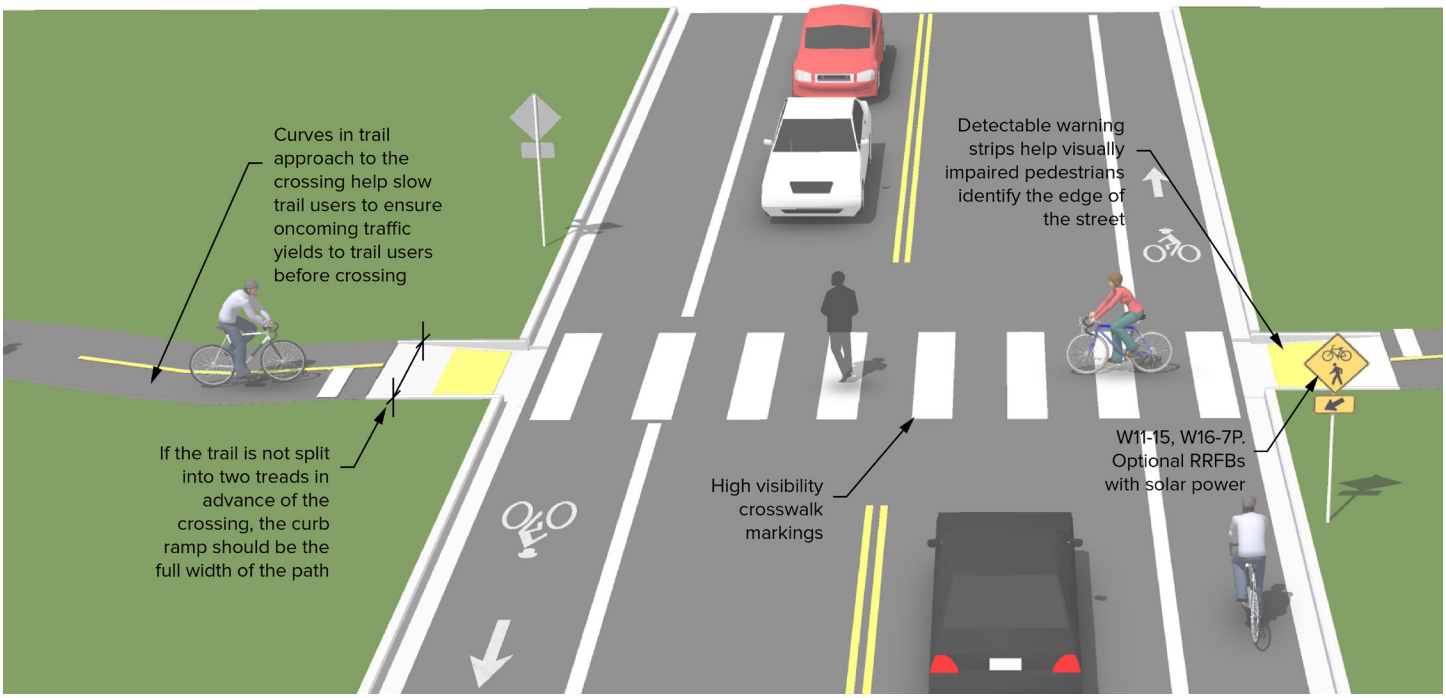


Local and Collector Street Crossings

Marked Unsignalized Crossings

The design of trail crossings of local and collector streets depends on an evaluation of vehicular traffic, sight lines, trail volumes, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions. An unsignalized crossing typically consists of a marked crossing area, with signage and other markings to slow or stop traffic. Marked crosswalks statistically increase motorists yielding the right-of-way to pedestrians (Mitman). High-visibility crosswalk markings are the preferred marking type (FHWA) as transverse lines are essentially not visible when viewed from a standard approaching vehicle (McGrane).

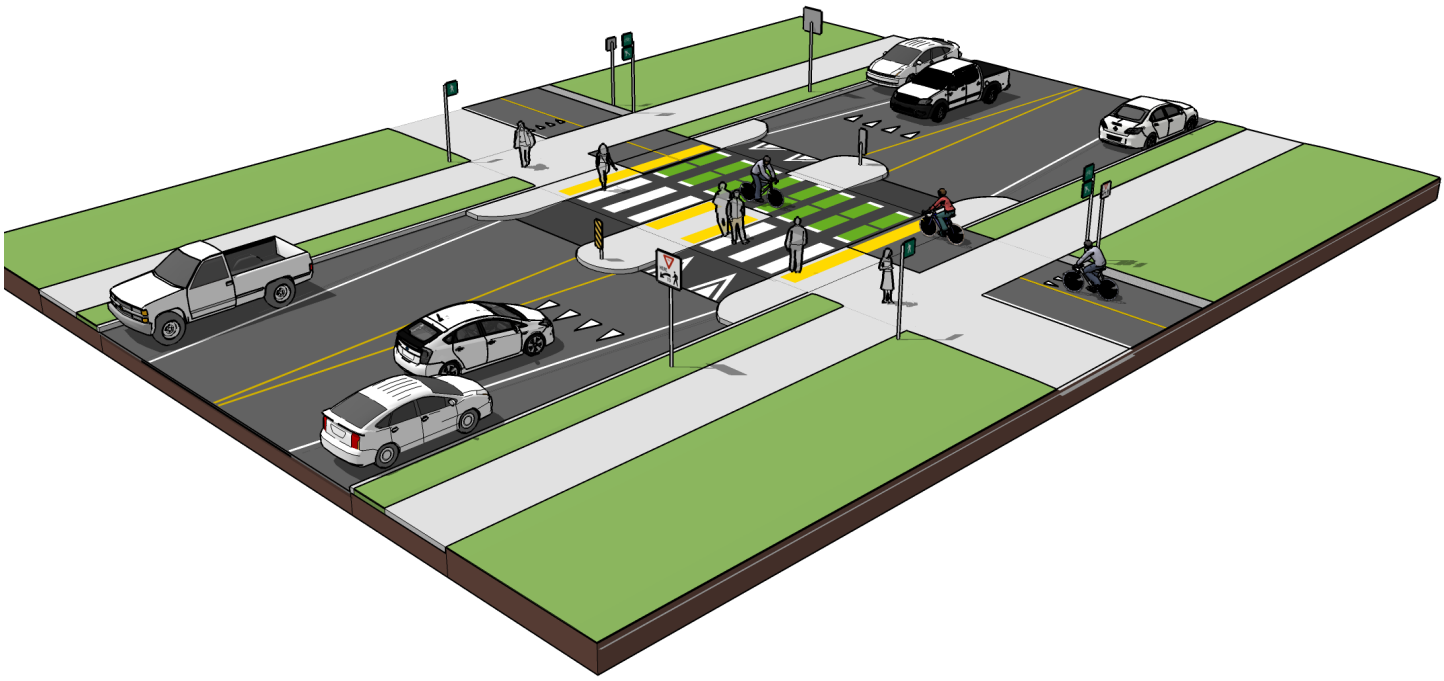
Locate crosswalk markings out of wheel tread when possible to minimize wear and maintenance costs. Stop or Yield lines may be used on the roadway 25 feet in advance of crosswalks where right-of-way priority is given to path users. A yield line must be paired with a Yield (R1-2) or Yield Here To Pedestrians (R1-5) sign. In roadway Yield to Pedestrians (R1-6) signs may be used along the centerline point of a crosswalk. On the trail, add detectable warning strips at the roadway crossing to help visually impaired pedestrians identify the edge of the roadway.



Median Refuge Islands

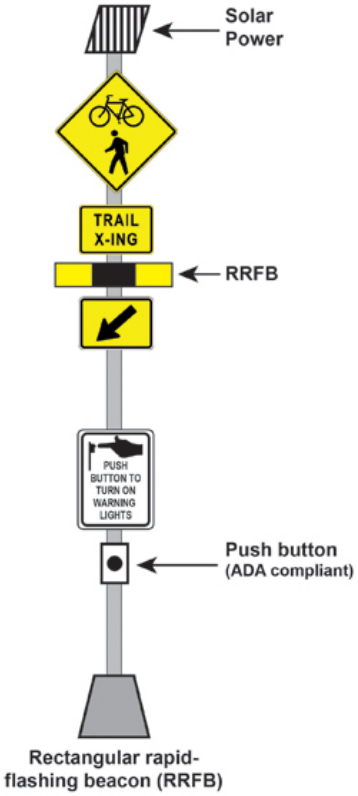
When space is available, using a median refuge island can improve user safety by providing pedestrians and bicyclists space to perform the safe crossing of one side of the street at a time. Refuge islands minimize user exposure by shortening crossing distance and increasing the number of available gaps for crossing. The waiting area should eight feet wide or wider to allow for a variety of bicycle types and multiple trail users. The refuge island must be accessible, preferably with an at-grade passage through the island rather than ramps and landings. To promote yielding to trail users, the median safety island should be designed to require horizontal deflection of the motor vehicle travel lanes. If a refuge island is landscaped, the landscaping should not compromise the visibility of trail users crossing in the crosswalk.

Consider the use of landscaping with low-growing, minimally-spreading native shrubs and ground cover that require little maintenance and are no higher than 18 inches. Note that refuge islands may collect road debris and may require somewhat frequent maintenance. For separated use trail crossings, the crossing should maintain user separation. The pedestrian path should use crosswalk markings and the bicycle path should use green colored pavement.



Rectangular Rapid Flashing Beacons (RRFBs)

RRFBs alert drivers that path users wish to cross and promote yielding. This treatment provides similar yielding rates to that of a conventional traffic signals. Passive (loop) detection technology or active push buttons can activate warning beacons for oncoming path users. Push buttons should be no higher than four feet above the ground for ADA accessibility.



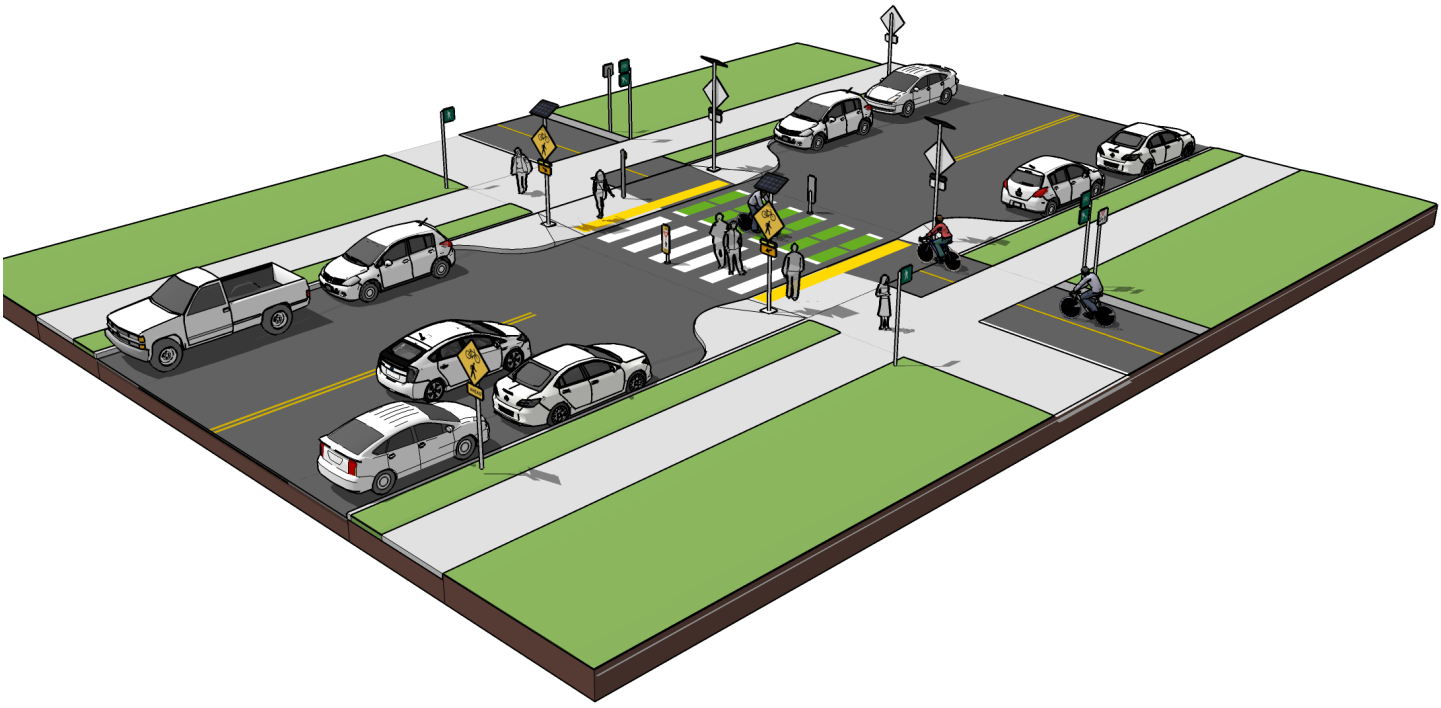
Rectangular rapid-flashing beacon (RRFB)

Bulb-outs

Curb extensions, or bulb-outs, shorten crossing distance and position users in a visible location. They also visually narrow the roadway to slow motor vehicles approaching the crossing.

Raised Crosswalks

Vertical deflection can slow drivers to prepare them to yield to trail users. Raised crossings should raise six inches above the roadway with a steep 1:6 (16%) ramp. Advisory speed signs may be used to indicate the required slow crossing speed.



Arterial Crossings

Signalized crossings provide the most protection for users through the use of a red-signal indication to stop conflicting motor vehicle traffic. Trail crossings within approximately four hundred feet of an existing signalized intersection with crosswalks are typically diverted to the signalized intersection to avoid traffic operation problems when located so close to an existing signal. If possible, route users directly to a signalized crossing. If the diversion to a signalized intersection is perceived out of the direct line of travel, trail users can be expected to cross at unmarked locations, which is hazardous for all users. If no signalized crossings are within the vicinity of the trail, use an appropriate crossing treatment as described in the previous section.

Signalized crossings are normally activated by push buttons or detection loops. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street.

Intersections with Other Trails

At the intersection of two trails, users should be aware that they are approaching an intersection and of the potential for encountering different user types from a variety of directions. This can be achieved through a combination of regulatory and wayfinding signage and unobstructed sight lines.

Trails should be aligned to intersect at 90° angles when possible, or consider off-setting the trail intersection and creating two three-way intersections rather than one four-way intersection. Merging paths should be avoided, and the connection should be configured as a T-intersection. Where merges are unavoidable or necessary for other reasons, an open sightline of 75 feet from the merge point should be provided between paths.

A roundabout may be a viable design option to slow speeds and clarify expected operation. If a roundabout design is used, consider the use of landscaping with low growing (no more than 24 inches high) and minimally spreading native shrubs and ground cover that require little maintenance and provide clear sight lines. Other material can be used within roundabouts such as boulders and public art to discourage shortcut paths through the central island as long as clear sight lines under three feet are maintained.

Railroad Crossings

Locations where trails must cross railroad tracks are problematic for pedestrians, particularly for those with mobility or vision impairments. Wheelchair casters and bicycle wheels can easily get caught in the flange-way gap, and slippery surfaces, degraded rough materials, or elevated track height can cause tripping hazards for all users. Angled track crossings also limit sight triangles, impacting the ability to see oncoming trains.

The crossing should be as close as practical to perpendicular with tracks. Ensure clear lines of sight and good visibility so that trail users can see approaching trains. The crossing must be level and flush with the top of the rail at the outer edge and between the rails. Flange-way gaps should not exceed two and a half inches (three inches for tracks that carry freight.) Concrete or rubber is the best material for pedestrian railroad crossings.

Bells or other audible warning devices may be included in the flashing-light signal assembly to provide additional warning for pedestrians and bicyclists. In areas with frequent train movements, pedestrian automatic gate arms or manually operated swing gates may help control trail user movements when a train is approaching.

Crossing design and implementation is a collaboration between the railroad company and the highway agency. The railroad company is responsible for the cross-bucks, flashing lights and gate mechanisms, and the highway agency is responsible for advance warning markings and signs. Warning devices should be recommended for each specific situation by a qualified engineer based on various factors including train frequency and speed, path and trail usage, and sight distances.

Amenities

When designing functional, attractive, and inviting trails, the small details matter. Elements such as a lighting fixtures, public art, benches, and other amenities help create a unique identity for a trail. It is important that these details work together to create a complete experience for all users. This section discusses the following amenities:

- Minor Access Points
- Major Trailheads
- Art
- Lighting
- Signage and Wayfinding

Photo: Photo Credit Attribution

Minor Access Points

Trail access points can occur at parks, residential developments, or other logical points of interest. Any access point to the trail should be well-defined with appropriate signage designating the corridor as a shared-use trail and prohibiting motor vehicles. Well defined trail access points can prevent the development of informal "social" trails which can follow poorly executed routes and trample floodplain vegetation or sensitive areas. Typically, trail access points have very minimal infrastructure, possibly including a small parking lot, drinking fountains, benches, trash and recycling receptacles, an information kiosk, or wayfinding signage about the trail network.

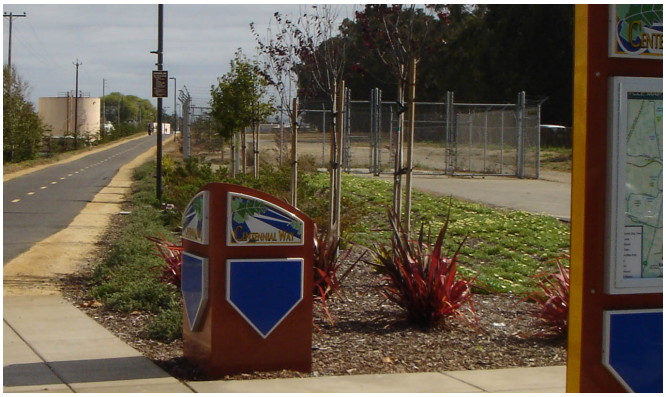
Trailheads

Trailheads should be established near large residential developments, commercial areas, and transportation nodes to be highly accessible to the surrounding community and to the trail system. There is no prescription for the frequency of trailheads. Conduct user counts, vehicle counts, and surveys across the trail network at peak hours of use to determine parking and access demand. There may be opportunities to locate trailheads at existing public facilities or created through partnerships with owners of existing parking areas. Trailheads can include many amenities such as: automobile parking, bicycle parking, comfort stations, drinking fountains, trash and recycle receptacles, dog waste stations, bicycle repair stations, wayfinding and informational signage shelters, and picnic areas. Trail amenities should be placed no higher than four feet off the ground for accessibility. Trailhead signage should provide accessibility information, such as trail gradient/profile, distances, tread conditions, location of drinking fountains, and rest stops.

Parking

Major trailheads can provide parking for 10 to 40 vehicles, depending on availability of land and anticipated level of use of the trail. Minor access points can have small lots accommodating up to 10 vehicles. Typically trailhead parking lots are paved to accommodate vehicles year round. Parking lots should be located in existing disturbed areas to minimize environmental impacts, and vegetative screening can be used to reduce the visual impact of parking areas. Consider one-way vehicle circulation to reduce parking area size. Where major trailheads are located in or near neighborhoods, provide user access from local streets crossing the trail, and possibly install "No Parking" signs to minimize parking impacts on local streets.

Trailheads should provide emergency and maintenance vehicle access and turnaround. Place ADA accessible parking spaces near the site's accessible route, at a rate of one accessible space per 25 standard spaces. ADA parking spaces and access aisles should not exceed 2% slope in any direction, and the remainder of the lot surface should never exceed 5% slope in any direction.



Comfort Stations

There are a number of factors to consider before locating comfort stations, including available land, size of trailhead, existing comfort station facilities, utility availability, maintenance vehicle access, and user need. Prior to undertaking any comfort station building design, consultation with a structural and civil engineer, state building codes, health and safety codes, ADAAG and Public Rights-of-Way Accessibility Guidelines (PROWAG) standards, and local development codes is required.

The space required for each comfort station building depends on the number of toilets to be provided. Prioritize location of comfort stations at trailheads within existing parks and review gaps for placement at other trailheads or locations within the system. If other comfort station facilities are available within the park and trail system, use wayfinding signage along trails to direct users appropriately. Comfort station structures should be located adjacent to vehicular access points for security, maintenance, and access to water and sewer. Composting toilets should be considered in remote areas or where utility connections are unavailable. Always provide comfort station facilities outside of flood-prone areas.

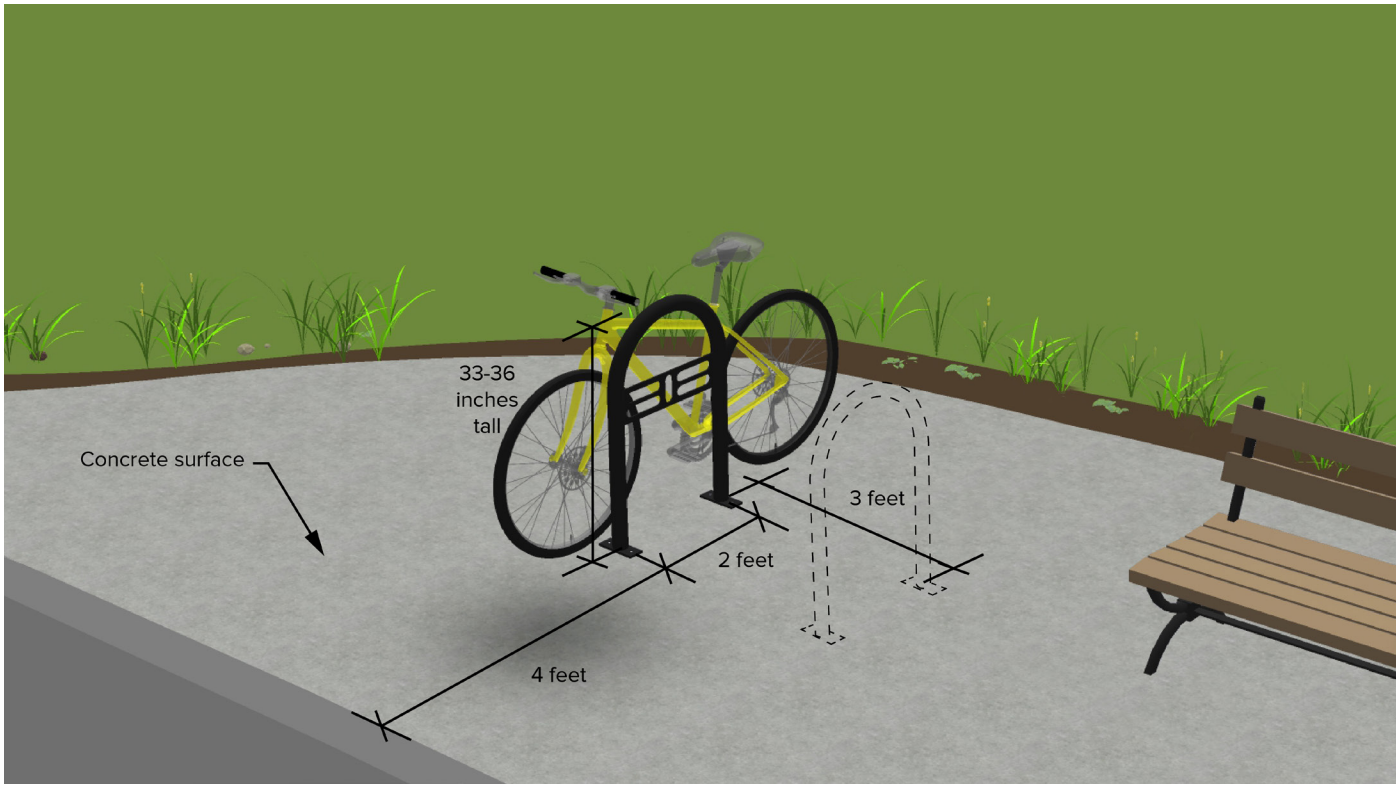
Comfort stations should also make use of natural light and ventilation to the extent possible, and should be constructed of durable materials resistant to vandalism. Bicycle parking should be provided close to comfort station structures so that bicyclists do not have to prop unsecured bicycles against comfort station buildings.

Bicycle Parking

Bicycle parking should be convenient, highly visible, and easily accessible from the trail. Bicycle parking should be located at comfort stations, select trailheads, points of interest, and rest stops. Signage may be desired to direct users to designated bicycle parking areas. Bicycle racks should be located on a hardscape surface and not be located directly in front of other trail amenities. Ideal rack location is parallel along the trail approach, no more than 25 feet from trail ingress/egress points and at least five feet from the edge of trail to avoid trail user conflict. Consideration should be given to avoid emergency ingress/egress, service access, and vehicular conflict areas.

The bicycle rack should support the bicycle in at least two places, preventing it from falling over, and the rack should allow locking of the frame and one or both wheels with a U-lock. Consider bicycle racks that resist cutting, rusting, bending, and deformation. A "staple" rack is an ideal rack type as it is easily recognizable, can accommodate bicycles of all sizes, and allows secure locking techniques.

When installing racks, ensure the rack is securely anchored to ground to prevent bicycle theft. On concrete surfaces, use .375 inch anchors to plate mount and shim as necessary to ensure vertical placement. When installing racks on pavers or other non-stable surfaces, embed the rack into the material base with core holes no less than three inches in diameter and 10 inches deep.



Bicycle Repair Stations

Bicycle repair stations are small kiosks designed to offer a complete set of tools necessary for routine bicycle maintenance and minor repairs. Popular locations for placement include major or minor trailheads and rest stops trails. Bicycle repair station tools are secured by high security cables, but will still be an attractive target for theft. Kiosks should be placed in areas of high activity to reduce potential vandalism. Consider grouping repair stations together with other amenities.

Drinking Fountains

Drinking fountains provide opportunities for users to replenish fluids and potentially extend their trip. Locate drinking fountains near comfort stations, at trailheads, parks, and other public gathering places along the trail. Drinking fountains should be placed at least five feet from trail edge, and no higher than four feet off the ground to be ADA compliant. Drinking fountains should be placed on a well-drained surface (2% sloped concrete slab). Consider the use of durable and vandalism-resistant materials such as steel or stone.

Seating

Seating along trails provides a place for users to rest and enjoy art, nature, and interpretive elements throughout a trail. Benches can be designed to create trail identity or be strictly utilitarian. Picnic tables provide places for trail users to congregate for meals or to relax. Locate seating along the trail at one mile intervals or where there is a demand by users. Seating within half-mile of trailheads is recommended. Provide benches and picnic tables in areas that provide interesting views, are close to an interpretive element, and offer shade or shelter from wind. Benches and other site furniture should be located a minimum of three feet from the edge of the trail, a minimum of four feet from comfort stations and drinking fountains, or a minimum of two feet from trash and recycling receptacles, lighting poles, and sign posts.

Wheelchair access should be ensured by providing compact, level surfaces at picnic tables and alongside benches. To prevent vandalism, seating should be securely anchored to hardened surfaces such as concrete or asphalt. Consider durable or native materials such as boulders that are

Trash Receptacles

Trash and recycle receptacles are necessities for trail maintenance and appearance. Trash and recycling receptacles should be prioritized along more heavily used trail sections, at each trailhead, and each seating area (one per every one picnic table, one per every two benches). Placement of other receptacles will depend upon the location of concessions, facilities and areas of group activities. Receptacles need to be accessible to maintenance personnel and should be set back a minimum of three feet from the edge of the trail. For recycling receptacles, signage should be provided indicating which recyclables are accepted. Consider including educational signage about the importance of recycling and the environmental benefits.

Receptacles should be selected for the expected trash/recycling amount, maintenance and collection program requirements, durability, and animal-resistance. In areas with adequate sunlight, consider compacting receptacles for trash and recyclables that use smart technology.

Art

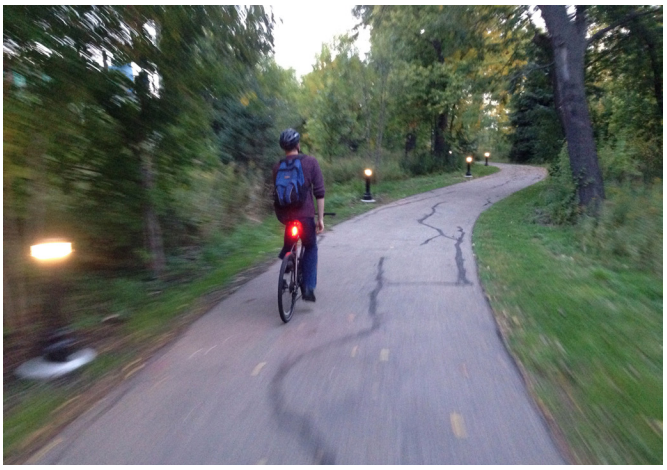
Including public art on trails can engage the local community and create an identity for the trail. Public art can be aesthetic or functional, doubling as seating or shelter, and depending on the scale and form, an activity in itself to serve as a public attraction. Memorable art installations can act as landmarks and serve as valuable wayfinding tools. Public art can also be a used as an interpretive device for telling a compelling story about the trail and area history.

Art can be placed at one or multiple locations along trails. Provide art displays on trails with anticipated high use and user exposure. Key locations such as turns or landscape changes could be areas to highlight through the inclusion of public art. When appropriate, artists can be engaged as part of the corridor planning and development process.

Artists should be encouraged to produce artwork in a variety of materials for sites along the corridor. Consider developing furnishings and amenities with artistic intent and providing continuity between elements while maintaining the unique styles of multiple artists. Community-based art and temporary installations are also effective ways of integrating public art into a trail.

Lighting

Lighting for trails should be analyzed on a case-by-case basis with full consideration of the maintenance commitment lighting requires. Lighting can improve visibility for day time use in tunnels and underpasses, and night-time use along the trail and intersection crossings. Lighting can provide extended operation hours for all trail users, which should be considered particularly during winter months when trips to and from work are often made before sunrise and after sunset. Dependent upon trail hours, consider lighting in urban and/or commercial land use areas. Recommended locations for lighting include trailheads and parking areas, comfort stations, trail intersections, entrances and exits of bridges and underpasses and in tunnels, and street crossings. Lighting spacing along trails depends on the type and intensity of lights, though thirty to fifty feet spacing is common for pedestrian scale lighting. Solar powered lighting is available where utility collection is difficult or when alternative energy sources are desired. Lighting is generally not appropriate for trails in remote areas, trails with low use, or where there is little to no development.



Lighting should respond to the conditions of the site and meet the minimum standards set forth by the Illuminating Engineering Society of North America (IESNA). Full cut-off fixtures, or luminaries with no direct uplight, should be used to reduce light pollution. These fixtures also limit direct glare or excessive illumination on to adjacent properties, streets, or sidewalks.

Trail lighting should be at pedestrian scale, but avoid light fixtures at eye level that could impair visibility. Pedestrian scale lighting is typically about 15 ft tall, has lower levels of illumination, and closer spacing to avoid dark zones between lights. Pedestrian scale light fixtures are typically high pressure sodium vapor or metal halide lamps, which produce better "white light" than sodium vapor lamps. LEDs are the preferred lighting bulb as they offer a wide range of light levels and can reduce long term utility costs. Average horizontal illumination levels are 0.5 to two foot candles or five to 22 lux (AASHTO, Section 5.2.12).

Signage and Wayfinding

A comprehensive system of signage ensures that information regarding the safe and appropriate use of all facilities, both on-road and on shared-use paths. The bicycle and trails networks should be signed seamlessly with other alternative transportation routes, such as bicycle routes from neighboring jurisdictions, trails, and local transit systems. Signage includes post- or pole-mounted signs and pavement markings. Signage is further divided into information signs, wayfinding signs, regulatory signs, and warning signs. All signage should conform to the Manual on Uniform Traffic Control Devices and the American Association of State Highway Transportation Official Guide for the Development of Bicycle Facilities.

Wayfinding Signage

The ability to navigate through a city or across a trail network is informed by landmarks, natural features, and other visual cues. Wayfinding signs indicate:

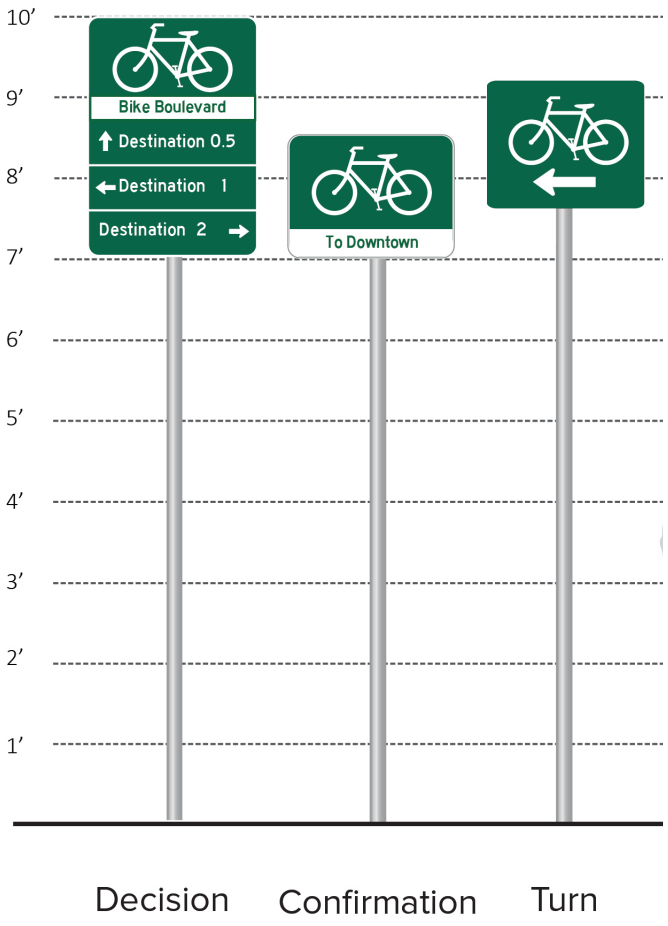
- Direction of travel
- Location of destinations
- Designated bike routes or trails

Wayfinding signage serves many purposes, including familiarizing users with a trail system, helping users and emergency responders identify locations, marking designated bike routes, and labeling trail access points. Wayfinding signs also visually cue motorists that they are driving near a trail corridor and should use caution.

There are three general types of wayfinding signs:

- **Decision Signs** mark the junction of bikeways and/or trails and inform users of the route options to access key destinations. Destinations, arrows, distances, and travel times are included on decision signs.
- **Confirmation Signs** indicate to bicyclists that they are on a designated bikeway and make motorists aware of the bicycle route. This signage can indicate a single regional destination and distance/time, but does not include arrows or a full list of destinations.
- **Turn Signs** indicate with arrows where a bikeway turns from one street onto another street or trail. This signage can be used in conjunction with pavement markings.

Section 1A.12 of the MUTCD establishes the general meaning for sign colors. Green is the color used for directional guidance and is the most common color of bicycle wayfinding signage in the US. Custom community wayfinding signs may use other MUTCD allowed colors, and include pedestrian-oriented travel times and designs such as local town logos or sponsorship branding.



Sign Placement

Signs are typically placed at decision points such as the intersection of two or more bikeways or trails, and at other key locations leading to and along bicycle and pedestrian routes. It can be useful to classify a list of destinations for inclusion on the signs based on their relative importance to users throughout the area. A particular destination's ranking in the hierarchy can be used to determine the physical distance from which the locations are signed. For example, primary destinations (such as the downtown area) may be included on signage up to five miles away. Secondary destinations (such as a transit station) may be included on signage up to two miles away. Tertiary destinations (such as a park) may be included on signage up to one mile away.

Decision Signs are placed on the near-side of intersections in advance of a junction with another bicycle route, and along a route to indicate a nearby destination.

Confirmation Signs are placed every quarter to half mile on off-street facilities and every two to three blocks along on-street bicycle facilities, unless another type of sign is used (e.g., within one hundred fifty feet of a turn or decision sign). Confirmation signs should be placed soon after turns to confirm destination(s). Pavement markings can also act as confirmation that a bicyclist is on a preferred route.

Turn Signs are placed on the near-side of intersections where bike routes turn (e.g., where the street ceases to be a bicycle route or does not go through). Pavement markings can also indicate the need to turn to the bicyclist.

Regulatory Signs

Regulatory signs give a direction that must be obeyed, and apply to intersection control, speed, vehicle movement, and parking. The examples below are types of regulatory signs that could be integrated into a signage program. Smaller scale signs or plaques may be used for trail applications. See the MUTCD 9B for a detailed list of regulatory sign application and guidance.

Etiquette Signage

Informing trail users of acceptable etiquette is a common issue when multiple user types are anticipated. Yielding the right-of-way is a courtesy and yet a necessary part of a safe trail experience. The message must be clear and easy to understand. The most common trail etiquette systems involve yielding of bicyclists to pedestrians. Trail etiquette information should be posted at access points and periodically along the trail.

Interpretive Signage

Interpretive displays provide trail users with information about the surrounding environment or site, wildlife, vegetation, history, and the significance of cultural elements. Interpretive displays may also be combined with public art and sculpture opportunities along the trail. Consider the character of the trail and surrounding elements when designing these signs. Work with experts specific to the information you are conveying on the signs such as historians, ecologists, or artists. Separate interpretive signage panels from the main trail circulation so that users can stop and not impede traffic Consider including interpretive signage at rest stops or areas of congregation. Panels must be ADA accessible. Consider use of technology for interpretation.

Informational Kiosks and Message Centers

Kiosks and message centers provide trails users with information to orient themselves, learn of areas of interest, read the rules and regulations of the trail system, and find the hours of operation. Kiosks should be installed at each major and minor trailhead. When locating kiosks next to parking facilities, set the units back far enough from traffic and protect the support posts or structure with appropriately sized barriers. Evaluate the use of emerging technology options for implementation of information and messages as part of the signage program.


ATLAS

5. Implementation

Implementing the City's trail network will be an incremental process that involves a variety of partners and funding sources. This implementation chapter is a guide for the planning and budgeting of the trail network and includes priorities based on public feedback, estimated planning costs for budgeting, and potential funding sources that can be used to help implement the trail network.

Cities typically rely heavily on external funding for trail implementation - it is not realistic to expect Lake Stevens to fund all trail improvements on its own. The State of Washington provides numerous funding opportunities for jurisdictions seeking to implement their trail network. These funding opportunities are contingent on having an adopted citywide master trails plan. The completion of this citywide network and an assessment of logical and opportunistic routes will help Lake Stevens complete for funding from these types of funding sources.

In addition to implementation through other funding sources, the trail network can be incrementally built through frontage improvements as development occurs in rapidly growing areas of Lake Stevens. Updating the city's development code to reference the trail master plan as a frontage improvement consideration can be an additional tool for trail network implementation.

The following section discusses the trail segments, prioritization, and these types of tools in more detail.

The photo above shows a 10- foot multiuse path at Lundeen Parkway and Vernon Road.

Project Segments

The following are the primary trail segments recommended for implementation. Chapter 03 provides additional planning information on the purpose that each of these connections serve. The letters in each segment's heading correspond to their locations on the Proposed Trail Segment Map on page 82.

Westside Trail (F,G,H,I)

The Westside Trail is the highest priority for implementation. Aa an off-street trail utilizing an existing utility corridor, the city has the greatest likelihood of implementing a safe and all-user friendly recreational trail across the western side of Lake Stevens. As discussed in chapter 03, the trail is recommended for three phases of development. The first should leverage existing land acquisition near 20th Street SE and secure easements from homeowners associations to extend the trail northward to 1st Street SE. The second phase should extend from Vernon Road northward to Lundeen Parkway. The final third phase is the most technically complex, requiring the implementation of a multiuse path adjacent to the city's roadway network that utilizes the Lundeen Parkway intersection as a signalized crossing for SH 204. Constructing this trail spine will significantly enhance non-motorized connectivity in Lake Stevens and future network improvements can leverage the Westside Trail spine.

Marysville Connector (J,K)

The Marysville Connector is the second off-street trail proposed in Lake Stevens. The trail begins as an multi-use trail adjacent to 10th Street NE and proceeds as an off-street trail northward to Marysville, utilizing an existing utility corridor. In Marysville, segments of the Bayview Trail are being implemented within this utility corridor as new development occurs. The City should work with Marysville and Snohomish County to establish the importance of this segment as a regional connection. The partnership could be leveraged to secure grant funding for construction. This is a long-term priority contingent upon partnerships and updates to include the segment in all jurisdictions' master plans.

Lakeshore Drive / Vernon Road (E)

Lakeshore Drive / Vernon Road is a high implementation priority. It was derived directly from extensive public feedback indicating the desire for a trail around the lake. The existing roadway is constrained with narrow pavement and will require construction for a continuous, protected trail. A 4 foot sidepath without separation is present, but not continuous. A short-term facility opportunity is to include shared lane markings along Lakeshore Drive / Vernon Road giving people riding bicycles a visible priority to share the roadway. Traffic calming, such as speed humps, should also be added to lower traffic speeds and encourage alternate routes for pass-through traffic. The current pedestrian sidepath can be extended as funding is available to continue to enhance pedestrian travel. A more permanent multiuse facility that is separated from the roadway will be a significant expense, but any future roadway reconstruction should have a significant level of bicycle and pedestrian design.

N Davies Road (A, B, C)

Davies Road is a continuation of a segment of the lake-adjacent trail network. Route implementation along Davies Road is similar to that along Lakeshore Drive where a narrow roadway is surrounded by residential development. The relatively built-up characteristics make land acquisition for a separated trail facility costly. A roadway-adjacent sidepath extends along portions of Davies Road and is heavily used by pedestrians. No formal bicycle facilities are present. It is recommended that shared lane markings be added along Davies Road, along with traffic calming enhancements. Extending the pedestrian sidepath should be a high priority, but will require the addition of new pavement in many locations. While separation between pedestrians and vehicular traffic is preferred, this continued extension of the pedestrian sidepath can be an interim opportunity. More significant

reconstruction of the roadway will be required to implement any formal and separated facility which will be a long-term objective. Near the 96th Ave NE intersection, an off-street linkage could be acquired that would route non-motorized users to Springbrook Road where it would connect to Vernon Road at the north. Traffic volumes on Springdale Road are low and would allow for non-motorized users to share the roadway with appropriate signage. The implementation of first stage improvements, such as shared lane markings, is a high priority project.

91st Ave SE (P)

This roadway has periodic bike lanes and sidewalks, particularly near Lake Stevens Middle School and Hillcrest Elementary School. Due to the proximity of the schools, it is important to provide sidewalks, preferable with the use of curb and gutter for vertical separation. Sidewalks can be supplemented with a standard bicycle lane. This is a low priority corridor.

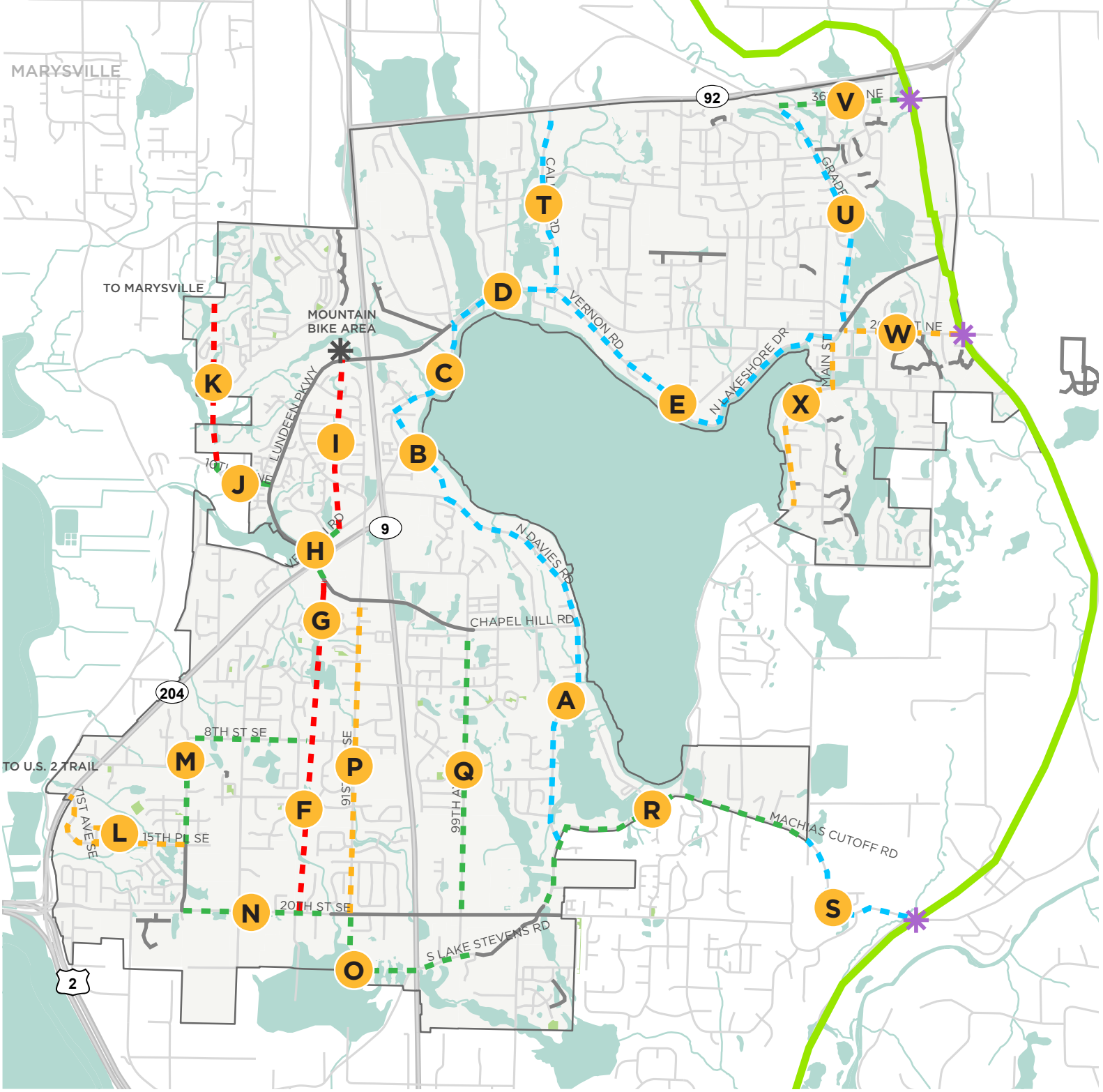
99th Ave SE (Q)

A multiuse trail is depicted for the future build-out of 99th Ave SE. This is a primary north to south corridor to the west of Highway 9 and provides a spine similar to the Westside Trail. This is an area experiencing rapid new development presenting an opportunity for the multiuse trail to be incrementally implemented with frontage improvements. In areas where new development has occurred and sidewalks are under the 10 foot minimum standard for trails, a standard bicycle lane can be added. Future capital projects may expand the sidewalk to meet the multiuse trail standard. This is a medium-priority project beginning with gradual implementation through frontage improvements. This roadway has periodic bike lanes and sidewalks, particularly near Lake Stevens Middle School and Hillcrest Elementary School. Due to the proximity of the schools, it is important to provide sidewalks, preferable with the use of curb and gutter for vertical separation. Sidewalks can be supplemented with a standard bicycle lane. This is a low priority corridor.

Pedestrians utilizing a sidepath segment along Davies Road

Pedestrians using a sidepath along 99th Avenue

People riding bikes on Main Street in Downtown Lake Stevens



LAKE STEVENS PROPOSED TRAIL SEGMENTS

EXISTING & PROPOSED TRAILS

- Bike Facility & Sidewalk
- Off Street Trail
- Multiuse Trail
- Sidepath
- Existing Trail Facility
- Existing Centennial Trail

BACKGROUND

- Centennial Trail Connection
- City Boundary
- Streets
- Highways
- Water

CITY OF LAKE STEVENS

alta PLANNING + DESIGN

LDC Surveying Engineering Planning

0 0.5 1 MILES

20th Street SE (N)

While S. Lake Stevens Road will provide a multiuse trail connection across southern Lake Stevens, 20th Street SE provides a direct east to west pathway that connects several planned trail segments. Facility implementation on 20th Street SE should include sidewalks with separation from the roadway, and a standard or buffered bicycle lane. Due to planned redesign and roadway reconstruction, this is a high priority project.

S Lake Stevens Road (O, R)

A multiuse path is recommended for S. Lake Stevens Road, a continuation of what has been planned and incrementally implemented along the corridor to date. An important extension of the multiuse trail, however, will be the roadway's eventual construction to the west of Highway 9. A continuation of the multiuse trail will provide a safe continuation of non-motorized travel to the Westside Trail, via an additional connection. This is a high priority for design and implementation leveraging planned commercial development planned for the general vicinity. This is a high priority project.

N Lake Stevens Road (X)

A portion of N. Lake Stevens Road lies within current city limit boundaries. This corridor is one of the most constrained in the city due to vary narrow right-of-way and higher traffic volumes. The portion in Lake Stevens has a periodic roadway-adjacent pedestrian sidepath with no separation. Due to the constraints, any significant facility improvements will be very costly and will likely need to occur with a larger capital project in the long-term future. Short-term facilities can include a continuation of the pedestrian sidepath, preferably with pylons for visual separation due to higher traffic volumes. Shared lane markings can be utilized for bicycle travel if supplemented with traffic calming and/or speed controls to keep traffic under 35 mph.

Main Street (X)

Main Street through downtown Lake Stevens currently has sidewalks with sidewalk segments being enhanced as new development occurs. People riding bikes have generally used Main Street, or parallel roadways to the east, as connections to 20th Street NE which connects to the Centennial Trail. It is recommended that shared lane markings be added to Main Street through Lake Stevens in addition to the continued enhancement of sidewalks.

20th Street NE (W)

This corridor located to the north and east of downtown Lake Stevens, is the most direct connection to the Centennial Trail; however, non-motorized users also have the ability to utilized a marked sidepath on Hartford Drive as an additional connection. Due to space constraints on 20th Street NE, particularly at the bridge to the west of the Centennial Trail connection, a separated multiuse trail would be costly. A more immediate recommendation is to continue enhancing the sidewalks on the south side of 20th Street NE including repainting sidewalk crossings and widening sidewalks as funding is available. The sidewalks are not conducive for bicycle and pedestrian travel, particularly on days with numerous users; therefore, shared lane markings are an option to formalize bicycle travel. Should roadway widening occur, bicycle lanes can be added.

15th Pl to Highway 204 (L)

This is a minor but vital connection to the Highway 2 trail which connects to the city of Everett. WSDOT allows for non-motorized travel on the shoulders of Highway 204 and public input indicated that long-range cyclists and commuting cyclists use this route to access the Highway 2 trail. Due to the residential nature of this link, no facilities are proposed. Wayfinding signage, however, should be utilized to direct users to Highway 02 trail. Additionally, signage should be used to alert vehicular traffic to the periodic presence of cyclists.

Lundeen Parkway (D)

Lundeen Parkway between Highway 9 and Vernon Road is a critical connection between western Lake Stevens and downtown, which includes access to the Centennial Trail. Due to the importance of this trail spine, and the higher traffic volumes, a multiuse trail is proposed as the ultimate buildout facility. The right-of-way is also less constrained, providing room to incorporate a multiuse trail which has already been implemented around and near roundabouts at Lake Drive and the Vernon Road junction. Interim facilities can include a sidepath along shoulders (some widening required),with pylons for vertical separation.

Callow Road (U, V) / Grade Road (T)

Callow Road and Grade Road are relatively flat connection to northern neighborhoods in Lake Stevens. They are both located in areas where rapid growth is occurring creating more recreational and non-motorized transportation demand. A sidepath is present in some areas, particularly along Grade Road, and frontage improvements are incrementally implementing sidewalks along with wider roadway pavement, often used for parking. In the short term, a sidepath should be extended to provide contiguous linkages for pedestrians. Shared lane markings can be implemented for bicyclists. As residential growth occurs, public trails can help to provide off-street facilities through natural areas. Additionally, bike lanes and sidewalks should be incporated as part of frontage improvements to provide non-motorized linkages on the roadways themselves.

Machias Cutoff Road (S)

While outside of city limits, this section provides a direct connection to the Centennial Trail and may be used by more experienced bicyclists and runners, particularly those traveling eastbound to the Centennial Trail. A westbound sidepath or marked shoulder could elevate the notice of the presence of non-motorized users. Any markings or enhancements would be through Snohomish County since the section lies in their jurisdiction.

Cost Estimates

Planning-level cost estimates were prepared for the segments described previously to assess potential costs associated with implementing the city-wide trail network. It is important to note that the cost estimates included in this section are at the planning level and are intended to portray the estimated city-wide funding needs for trail implementation. The numbers are based on the following facility assumptions described in detail in Chapter 03:

- **12’ Off-Street Trail**: Cost estimates assumed asphalt construction through varied topography, 4 wayfinding signs per mile, 4 benches per mile, standard street crossings, and permitting estimates. The estimate does not include property acquisition.
- **10’ Multiuse Trail**: Assumptions include asphalt construction, ADA compliance, enhanced crossings, a five-foot landscaped parkway, and 10 wayfinding/regulatory signage per mile. Assumptions also assume that stormwater drainage and curb and gutter are already in place since locations where this is proposed within Lake Stevens areas where this infrastructure is existing, or where frontage improvements will require construction to this standard.
- **6’ Sidepath**: Cost estimates assumed varied topography, asphalt construction, no physical barrier between the sidepath and vehicular traffic, no amenities, and no lighting. A contingency was added to account for stormwater treatment that would likely be required with an increase in pervious surfaces.
- **Bike Facilities**: Estimates were divided into bike lanes and shared lane markings (sharrows). Estimates assumed application on existing roadway surfaces through paint and do not include physical improvements to roadways.

The cost estimate summary table below includes the project segments described in the previous pages further broken down by facility type. The Westside Trail, for example, is divided into numerous segments to reflect both the different facility applications along with priority for implementation.

The planned trail network is approximately 20 miles in length and represents a system of off-street trails, multiuse trails, sidepaths, and bicycle markings on existing roadways. Planning level estimates indicate that the total cost for these initial improvements is approximately $14.9 million. This estimate utilized a cost per linear foot for each planned facility across the calculated length of the trail and does not take into consideration specific characteristics and circumstances unique to each segment. For example, some existing facilities are already in place along the trail corridors - these existing facilities were not removed from the linear calculations prior to estimates due to the corridor-wide nature of the cost estimates.

Sidepaths, in particular, are the most variable due to challenges with construction in narrow rights-of-way. While a six-foot minimum sidepath is recommended, in many areas this may not be achievable. A large contingency was assumed for this reason and varying application of this temporary infrastructure is likely.

Multiuse paths in SW Lake Stevens will likely be implemented through frontage improvements. City costs, therefore, may be lower than what is estimated for these facility types, but is included as part of citywide cost

Table: Cost Estimates Summary

Project ID	Street Name/Location	Extent	Length (feet)	Facility Type	Cost Estimate	Priority
A	N Davies Road	S Lake Stevens Road to Springbrook Road	9,628	Sidepath	$1,222,000	Medium
B	Springbrook Road	N Davies Road to Vernon Road	2,411	Sidepath	$306,000	Long
C	Vernon Road	Springbrook Road to Lundeen Parkway	2,720	Sidepath	$345,000	Medium
D	Lundeen Parkway	Vernon Road to Vernon Road	2,636	Sidepath	$335,000	Short
E	Vernon Road/N Lakeshore Drive	Lundeen Parkway to Main Street	8,594	Sidepath	$1,091,000	Short
F	Westside Trail	20th Street SE to 1st Pl SE	5,926	Off Street Trail	$1,204,000	Short
G	Westside Trail	1st Pl SE to Market Pl	2,037	Off Street Trail	$414,000	Long
H	Westside Trail	Market Pl to Vernon Road	1,534	Multiuse Trail	$299,900	Long
I	Westside Trail	Vernon Road to Lundeen Parkway	3,926	Off Street Trail	$797,900	Medium
J	10th Street NE	Lundeen Parkway to Marysville Connector	1,509	Multiuse Trail	$295,100	Long
K	Marysville Connector	10 Street NE to City Limits	3,801	Off Street Trail	$792,900	Long
L	15th Pl SE/14 Pl SE/71st Avenue SE	Fairview Drive to State Route 204	4,394	Shared Lane Markings	$27,000	Short
M	Fairview Drive/8th Street SE	15th Pl SE to Westside Trail	5,153	Multiuse Trail	$1,007,700	Medium
N	20th Street SE	Fairview Drive to 91st Avenue SE	3,385	Multiuse Trail	$662,000	Short
O	New Development (south of 91st Avenue SE)	20th Street SE to S Lake STEVENS Road	4,198	Multiuse Trail	$820,900	Short
P	91st Avenue SE	20th Street SE to Market Pl	7,230	Bike Lanes	$97,100	Long
Q	99th Avenue SE	20th Street SE to Chapel Hill Road	6,508	Multiuse Trail	$1,272,700	Ongoing
R	S Lake Stevens Road/Machias Cutoff Road	20th Street SE to 123rd Avenue SE	7,719	Multiuse Trail	$1,509,528	Short
S	Machias Cutoff Road	123rd Avenue SE to Centennial Trail	3,779	Sidepath	$479,631	Long
T	Callow Road	Vernon Road to State Route 92	4,085	Sidepath	$518,500	Medium
U	Grade Road	20th Street NE to 36th Street NE	5,517	Sidepath	$700,200	Medium
V	36th Street NE	Grade Road to Centennial Trail	3,172	Multiuse Trail	$620,300	Medium
W	20th Street NE	Grade Road to Centennial Trail	2,647	Bike Facility & Sidewalk	$16,300	Short
X	Main Street/E Lake Stevens Road	N Lakeshore Drive to 8th Street NE	4,432	Bike Facility & Sidewalk	$27,300	Short
		Grand Total			**$14,862,200**	

Implementation Tools

Federal Grants

Federal and state grants provide a supplemental funding source for trail implementation. There are a variety of federal grant programs that can provide trail funding support, some of which are listed in the table below. Federal grant funding is often administered by metropolitan planning organizations (MPOs). In this region, the Puget Sound Regional Council (PSRC) does administer grant funding for trails, particularly as part of CMAQ. While federal grant funding is an opportunity to facilitate trail implementation, the funding application and administration process can be extensive and the funding is highly competitive.

Federal Funding Program	Level	Link	Description
Congestion Mitigation/ Air Quality Improvement Program (CMAQ)	Federal (FHWA administers to States and local governments)	https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm	CMAQ provides funding for projects and programs in air quality non-attainment and maintenance areas which reduces transportation related emissions. These funds can be used for bicycle, pedestrian and trail infrastructure.
Highway Safety Improvement Program	Federal (FHWA administers to States and local governments)	https://safety.fhwa.dot.gov/hsip/	HSIP provides $2.4 billion nationally for projects and programs that help communities achieve significant reductions in traffic fatalities and serious injuries on all public roads, bikeways, and walkways.
Community Development Block Grants (CDBG)	Federal (HUD administers to local governments)	https://www.hud.gov/program_offices/comm_planning/	The CDBG program provides money for streetscape revitalization, which can include streets, sidewalks, and recreational facilities.
Rivers, Trails, and Conservation Assistance Program (RTCA)	Federal (National Park Service administers to local governments)	https://www.nps.gov/orgs/rtca/index.htm	RTCA provides technical assistance to establish and restore greenways, rivers, trails, watersheds and open space. The program only provides planning assistance and is not be considered a future capital funding source.
National Highway Performance Program (NHPP)	Federal (FHWA administers to States and local governments)	https://www.fhwa.dot.gov/fastact/factsheets/nhppfs.cfm	NHPP provides funding for construction and maintenance of the National Highway System and can be included for bicycle and pedestrian infrastructure.
Surface Transportation Block Grant Program (STBGP)	Federal (FHWA administers to States and local governments)	https://www.fhwa.dot.gov/fastact/factsheets/stbgfs.cfm	Flexible transportation funding for a wide variety of projects including for recreational trails and bicycle infrastructure.
Transportation Alternatives Program (TAP)	Federal (FHWA administers to States and local governments)	https://www.fhwa.dot.gov/fastact/factsheets/	Transportation Alternatives (TA) includes the Safe Routes to School and the Recreational Trails Program . Funds may be used for a variety of pedestrian, bicycle, and streetscape projects including sidewalks, bikeways, multi-use paths, and rail-trails.
Federal Transit Administration (FTA) Metropolitan Planning	Federal (FTA administers to States who then administer to MPOs)	https://www.transit.dot.gov/CIG	This program provides funding for metropolitan coordinated transportation planning. Eligible activities include bicycle planning to increase safety for non-motorized users and to enhance the interaction and connectivity of the transportation system across and between modes.
Better Utilizing Investments to Leverage Development (BUILD)	Federal (U.S. DOT administers to States and local governments)	https://www.transportation.gov/BUILDgrants	A competitive grant program that can be used for bicycle and pedestrian projects.

State Grants

There are numerous state grants that can be leveraged by the city as it seeks to implement the trail network. Some of the most significant funding allocations are administered by the Recreation and Conservation Office (RCO) through numerous individual grant programs. Having an adopted master trails plan gives Lake Stevens the opportunity to apply for many state grant funding opportunities. Generally speaking, there are recurring application deadlines on an annual basis. It's important to note that many grant programs, such as the Washington Wildlife & Recreation Program, are extremely competitive. For this reason, relying on grant funding for implementation should not be the sole basis for implementation. The table below includes some of the most notable state grant funding opportunities.

Capital Funding

Most jurisdictions implement trail programs through capital funding, which is city-funded implementation. Capital funding for trail implementation can be challenging, particularly with a variety of competing demands for funding. A diversified tax base and sales tax revenue provide additional funding for quality of life enhancements, such as trails. Other proactive and citizen-approved initiatives, such as parks & recreation levies, can provide a meaningful source of funding for trail facilities.

In addition to budgeting and voter-approved levies, trail projects can be implemented through roadway capital improvement projects. As roadway improvements are planned for corridors where trail facilities are recommended, design should place special consideration on incorporating non-motorized transportation facilities.

State Funding Program	Level	Link	Description
Pedestrian and Bicyclist program	State (Administered by WSDOT)	https://www.wsdot.wa.gov/LocalPrograms/ATP/funding.htm	Eligible: 1) Pedestrian/bicyclist safety and/or mobility infrastructure improvements (may include PE); 2) Design-only projects that will result in a ready to construct pedestrian or bicycle improvement project.
Safe Routes to School Program	State and Federal Funding (administered by WSDOT)	https://www.wsdot.wa.gov/LocalPrograms/SafeRoutes/default.htm	Increase the number of children walking and biking to school safely. Eligible: Infrastructure improvements within two miles of a school and/or local transportation safety programs (education and encouragement activities) serving children kindergarten to 12th grade that will improve safety and/or increase the number of children walking and biking to school. 24/120 requested applications receiving. Funding $21.15M. 75% of those projects target low-income schools
Washington Wildlife & Recreation Program - Recreation, Trails Category	State (administered by RCO)	https://rco.wa.gov/grant/washington-wildlife-and-recreation-program-recreation/#eligible-projects	Grants to provide public trails open to pedestrians, equestrians, or bicyclists. Project must be accessible. Project scope can include design and construction. Can be for acquisition, development or both. Biannual. In 2018, 8 of 29 project applications were funded. Application involves 2 rounds of application and presentation.
Transportation Improvement Board	State	http://www.tib.wa.gov/grants/grants.cfm	Relevant categories: -Urban Arterial Program - Project must score well in one of these: safety, growth & development, physical condition, mobility. Eligible projects must be in a federally classified route (principal, minor, collector) -Urban Sidewalk Program - The intent of the project must be transportation and not recreation. Projects improve pedestrian safety, access, connectivity, and address system continuity. All projects must be transportation related on a federally classified route and be consistent with the American with Disabilities Act (ADA).
Land and Water Conservation Board (LWCF)	State (administered by RCO)	https://rco.wa.gov/grant/land-and-water-conservation-fund/	Funding to buy and improve parks, trails, wildlife lands, and other outdoor recreation resources. Project must be accessible.

Developer Participation

Another implementation method, particularly in rapidly growing communities, is through development participation and frontage improvements. As new development occurs, the City of Lake Stevens requires developers to provide street frontage improvements. When development occurs adjacent to an existing or planned trail segment, new development should trail access and/or trail implementation. Development review should consider whether a trail segment can be achieved through the new development. There are several roadways identified as candidates to include trail facilities where these forms of developer participation can occur.

Multiuse path along S. Lake Stevens Road

Another form of developer participation is through park impact fees and payment-in-lieu fees. These types of fees are collected as development occurs and must be used for park improvements within a set timeframe. The fees can be used for trails and are an additional funding mechanism to preserve and enhance quality of life as communities grow.

The City of Lake Stevens currently has a Park Impact Mitigation Fee that requires all new residential development to either pay a fee or dedicate land to help implement the "capital facilities and parks and recreation elements of the comprehensive plan," which can include parks, recreation, open space, and trail facilities. Similarly, a Traffic Impact Mitigation Fee requires new residential development to pay a fee or dedicate land for capital improvement projects related to streets. Given the City's rapid growth, Lake Stevens should continue to collect and utilize these fees to implement the proposed trails network.

A 12-foot multiuse path along 91st Avenue SE near Hillcrest Elementary School provides a safe walkway for students

Utility Coordination

Due to the opportunity to utilize utility easements through Lake Stevens for off-street trails, outreach to the utility purveyors that operate within the major utility corridors was performed to assess trail construction requirements within easements. Generally speaking, utility purveyors do not object to the public trails within their easements, but do regulate grading and vertical structures or amenities, particularly when the trail is located directly beneath overhead power lines. The following is a summary of information received from each utility purveyor.

Bonneville Power Administration

The Bonneville Power Administration (BPA) allows for the construction of trails within their easements through a BPA Land Use Agreement. Any style of trail is allowed, but the trail must withstand HS-20 loading requirements for maintenance vehicle access. Amenities can be proposed as long as clearance limits near facilities are met. The BPA does collect fees for operating within easements. Implementation of the Westside Trail will require approval of BPA.

Seattle City Light

Seattle City Light (SCL) permits the construction of trails within its utility easements through a SCL Consent Application. All types of trails are permitted, as long as the trail provides sufficient width and support for department vehicles and equipment. SCL does not permit any buildings, structures, or park facilities within its easement. Implementation of the Westside Trail will require approval by SCL.

Olympic Pipeline

The Olympic Pipeline does not permit any trail structure or amenity within 30 feet of the pipeline and does not allow for grading over the pipeline, except when a crossing is necessary and in which case coverage requirements apply. Trail approval is required through a Permitted Facilities Agreement and an Engineering Approval Letter. Concrete pavement is discouraged and often is not allowed. Implementation of the Marysville Connector will require Olympic Pipeline approval. The Olympic Pipeline is not located in the Westside Trail corridor.

SnoPUD / PSE

While multiple attempts to contact Snohomish County PUD and Puget Sound Energy were made, no feedback on trail construction requirements was obtained. Trails have been constructed by other jurisdictions within the utility easements of each, indicating that they are permitted. It is likely that the same considerations of limited amenities and vehicular weight requirements apply.

The images above shows a segment of the Westside Utility Corridor.

Counts & Data Collection

Trail count programs provide a means for assessing use of existing facilities while also allowing for assessment of benefits associated with trail development. [a state-wide count program and methodology does not exist at this time for Wisconsin]. Various jurisdictions [in Snohomish County?] have conducted bicycle and pedestrian counts on trails but without consistent methodology among locations.

It is recommended that Lake Stevens develop a trail count program to better assess demand for trails over time and across seasons. The count program should employ methods that are repeatable across the jurisdiction and, given the nature of Appleton's network, are appropriate for both on and off-street facilities. A growing range of methods and devices provide options of varying cost, duration, and reliability. If less permanent options are selected, a strict methodology regarding location, duration, and frequency should be developed in order to provide for data that can be compared over time.

Implementation of counting hardware may provide more reliable usage data and better capture use over time as opposed to manual count methods. However, manual count methods can provide several benefits including: a method for engaging community advocates, a method for assessing placement of automated devices, and an opportunity to gather additional feedback on existing trails.

Lake Stevens can gather input from trail users about the network through user surveys. Surveys can cover a range of topics, including purpose of trip, frequency of use, assessment of trail quality, and travel to and from the trail. By intercepting residents on the trails, the city can capture feedback from those using the facility.

Encouragement Programs

Investment in active transportation infrastructure is further enhanced through the education, encouragement, and enforcement of appropriate facility use. Programs can range from community workshops and individualized marketing campaigns to Safe Routes to School and safety marketing campaigns. Education and encouragement programs help connect residents with the tools they need to learn about the facilities available to them, to gain the skills required to safely utilize the network, and to pursue a more active, sustainable lifestyle. Programs can partner with schools, employers, and other community organizations to reach a wide audience and better understand the needs of various user groups.

Further, enforcement programs reinforce appropriate behavior and improve personal safety on the trails and across the city. Few opportunities exist to provide additional education to all modes, and programs such as traffic citation diversion courses can be one method for all modes to learn the legal rights and responsibilities when walking, bicycling, and driving. Programs can target all modes, and in partnership with the police department, can aim to curb behavior specifically known to endanger bicyclists and pedestrians. Enforcement can also include programs such as a volunteer trail steward program, where groups of volunteers bicycle along the trail network to enhance safety through additional observation as well as can answer questions regarding the network.

Vision Into Action

Lake Stevens has experienced dramatic change over the past 20 years and it's population and land area has increased considerably. As the community continues to grow, the city has the opportunity to enhance recreational activities for existing and future residents through trails. In the future, the Westside trail will provide a comfortable facility with natural elements that can be used by all ages and abilities. Lakeshore Drive will provide a sidepath for pedestrians and shared lane markings will allow people riding bicycles to more comfortably use the roadway for lakeside travel. New development in SW Lake Stevens will gradually create a multiuse pathway separated from the roadway that will allow residents to walk, run, bike, and roll safely along 99th Avenue, Fairview Drive, and 8th Street SE. A sidepath and shared lane markings along Davies road will give people walking and biking a more comfortable experience as they travel lakeside to Willard Wyatt Park. And in the future, the Marysville Connection can provide a western link between Lake Stevens and Marysville, integrating the two cities' networks.

These improvements, among others included in this plan, are the vision for recreational trails and non-motorized accessibility across Lake Stevens. Realizing this vision will take a combination of public and community support, diverse sources of funding, patience, and time. The facilities and alignments recommended in this plan are a guide and a framework for implementation and should be used accordingly, recognizing when other opportunities exist and when alignments can be better incorporated within new residential development.

Each incremental action to stripe a roadway, add sidepath pavement, implement a capital roadway project, or construct a frontage improvement is one step closer to achieving the citywide trail network. The citywide trail network will continue to enhance Lake Sevens' quality of life and provide active recreation