

TRAILS MASTER PLAN

OCTOBER 2015



Hillsboro
Parks & Recreation

Acknowledgements

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Thank you to community members who contributed to our process of creating more opportunities for trails in Hillsboro.

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EXECUTIVE SUMMARY



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EXECUTIVE SUMMARY

Trails offer numerous aesthetic and recreational opportunities, as well as travel options within and around the City of Hillsboro. Residents who want to go for a family bicycle ride to the park or library, experience a natural area, or bicycle or walk to work will benefit from a system of safe, well-connected, and maintained trails. The trails system will also benefit people who work in Hillsboro, who can travel to work, and also enjoy the outdoors during work breaks. Trails help raise property values and business investment, provide common space for social interactions, improve overall community safety, and encourage healthy lifestyles. Members of the Hillsboro community envision the following:

A trail system for all that safely connects us to our destinations, each other, nature, and recreation, enabling us to appreciate the assets of our community while elevating the daily quality of life in Hillsboro.

A high-quality trail system is a marker of a community where it is pleasant to live, work, and play. The City of Hillsboro's Trail System Master Plan (referred to as the Plan) uses the term 'trail' to describe shared-use paths, multi-use trails, hiking paths, and a water trail designed for non-motorized recreation and transportation usage. Sidewalks, paths, and bike lanes on or adjacent to roadways are noted when they provide a link between trails or between a trail and a destination. Trail users are anticipated to include but are not limited to: bicyclists, wheelchair users

(both non-motorized and motorized), strollers, in-line skaters, roller skaters, walkers, runners, and nature lovers.

As part of developing this Plan, project staff analyzed the cultural context, previous planning efforts, and physical setting of Hillsboro. An inventory of the existing trail system, circulation patterns, destinations, and environmental features provided a basis for planning a future system. Chapter 1 of the Plan describes the existing conditions affecting the future development of trails in Hillsboro. A summary of relevant planning documents is available within Appendix A.

Input from area stakeholders and community members was a critical aspect of the planning process, which is summarized in Chapter 2. Engagement occurred through a series of community workshops, one on one interviews, a web-based survey, and focused outreach efforts. A Citizen Advisory Committee and Technical Advisory Committee were also established to guide and inform the process. Meeting summaries are available within Appendix B.

The City has many opportunities to enhance its existing trails system. The Plan recommends improvements that will upgrade the existing system where needed, fill in missing gaps, and connect to significant environmental features, schools, public facilities, local neighborhoods, other parks, and business districts throughout the region. Chapter 3 describes the recommended trail network including alignments and typologies. The recommendations within this Plan include 71 miles of new trail facilities resulting in nearly 98 miles of trails to serve the community.

Chapter 4 of this document describes a Vision Plan for the Crescent Park Greenway (CPG). Paralleling several riparian corridors, the CPG will be a loop encircling the City as a premier greenway experience. The CPG will allow community members to experience nature close to home while benefitting the natural environment through habitat restoration, enhancement, and stormwater management.

Rock Creek Trail remains the central spine of the trail network as it diagonals through the City from the Tualatin River and Rood Bridge Park in the south to existing segments within Rock Creek Trail Park in the north. Chapter 5 highlights the opportunities and challenges associated with the regional trail as it follows its namesake Rock Creek, while describing a feasible alignment. Issues of property ownership, topography, floodplain, sensitive natural resource areas, roadway crossings, and community preferences were each taken into consideration with the recommended alignment. The alignment alternatives selection process is described in Appendix C.

This plan further includes guidance on best practices for trail design. The broad functional classifications of regional, community, local, and greenway trails are each described within Chapter 6. Specific design guidance for the following trail typologies are also provided: multi-use, on-street facilities, rail trails, water trails, neighborhood accessways, hiking and walking paths, and mountain bike trails. This chapter also describes essential trail network features, including roadway crossing treatments, bridges, underpasses, and boardwalk design, as well as trail amenities such as trailheads, site furnishings, and public art.

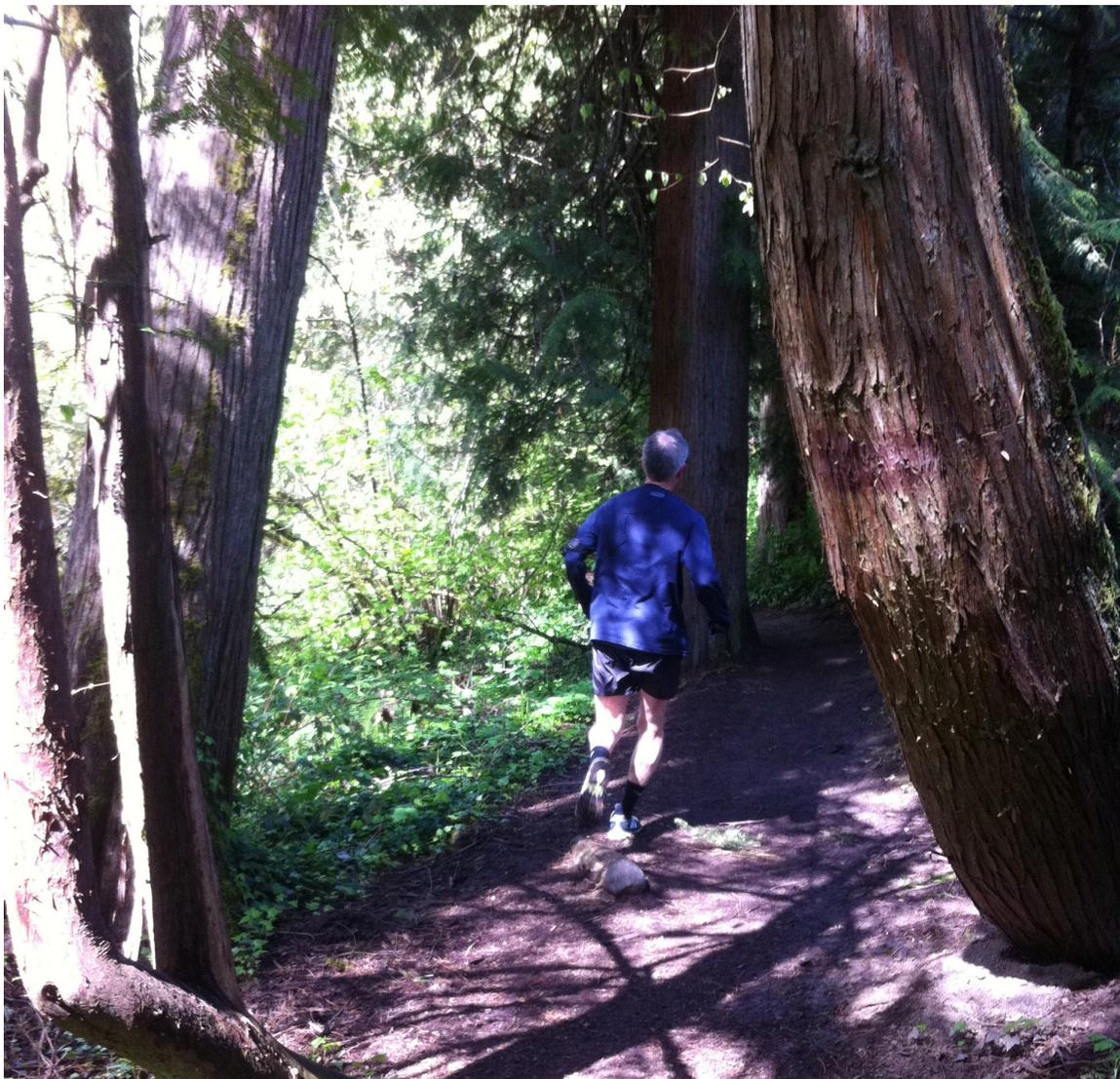


Chapter 7 describes next steps to be taken to move this plan towards implementation, describing the trail development process from master plan, to alignment study, and design development. It includes different means of acquiring property for trail use. Partnerships will be an essential aspect of trail development going forward; several essential partners and their roles with respect to trail development are outlined. Lastly, a cost table and sources of funds are included which may be used to inform budgets and funding in support of the trail development process.

This Plan builds upon the 2010 Parks & Trails Master Plan and Natural Resource Analysis, and is intended as a guide for trail development over the next 25 to 50 years. By taking a long-term view, the Plan includes projects that may be decades away. This long-term view sets forth

the vision, the implementation of which depends on City and resident leadership and support. The City of Hillsboro will adopt the trail alignments into future plans and policy documents including comprehensive plans, zoning codes, and transportation system plans. Segments of the trail network will be constructed in phases, as properties become available and funds are secured. Final trail alignments, designs, and construction will be determined on an individual basis at the appropriate time, while also considering funding, topography, natural resources, safety, existing vegetation, and maintenance.

The trail system will connect community members to neighborhoods, businesses, transit, schools, parks, and natural areas. The network will provide a convenient, comfortable, and safe atmosphere for trail users of all ages and abilities to travel, recreate, and enjoy nature. The Hillsboro Trail System Master Plan has garnered strong support from local leaders, project partners, and community members who will work together to implement this Plan.



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01 EXISTING CONDITIONS



INTRODUCTION

Overview

The primary goal of the Hillsboro Trails System Master Plan is to create a world class system of trails and pathways which respond to the community's needs for connectivity, livability, healthy recreation, and active transportation. The Master Plan will provide guidance to trail corridor development and network expansion in Hillsboro, reflecting changing conditions, anticipated growth, and the desire for connectivity.

The purpose of this Plan is three-fold. First, to develop a Trails System Master Plan that establishes a vision for creating an integrated network of trails that enhances connectivity and livability while providing access to nature for the community of Hillsboro. Second is to develop an alignment plan for the Rock Creek Trail, the city's primary regional multi-use trail corridor. Third is the Crescent Park Community Vision Plan. With each, the City's goal is to achieve a world class trail system.

EXISTING CONDITIONS

Study Area

The City of Hillsboro is located within the Tualatin Valley, west of Portland, Oregon. Hillsboro is dedicated to providing its residents with exceptional opportunities for walking, cycling, and experiencing nature close to home. These opportunities are what make a community vibrant and healthy while contributing to its economic well-being.

Oregon's fifth largest city retains remembrances of its agricultural history alongside an identity as a vital technology and employment center for the state. The City is generally bounded by the Tualatin River to the south, Sunset Highway to the north, the City of Beaverton to the east, and the

regional urban growth boundary to the west. The current City boundaries encompass nearly twenty-four square miles.

The Rock Creek study area extends between the City's boundaries along a Southwest-Northeast diagonal, parallel to Rock Creek. A cohesive trail system with Rock Creek Regional Trail will create an emerald necklace of green infrastructure, enhanced wildlife habitat and water quality, active transportation and recreation opportunities, and community health benefits, all leading to exemplary livability for the region.

Land Use

Planning Context

Dozens of planning documents were reviewed to provide insight into local and regional trail planning efforts. These included the 2010 Parks & Trails Master Plan and Natural Resource Analysis, 2004 Transportation System Plan Update as amended, South Hillsboro Plan, Amberglen Plan, North Hillsboro Plan, and others. According to the Imagine Hillsboro 2035 Community Vision Plan process, a more walkable city with extended sidewalks and trail networks ranked among the top five ideas for members of the community. Appendix A provides an overview of the planning environment affecting trail development within the City of Hillsboro.

Zoning

An area's zoning dictates which land uses may occur on individual parcels, thereby driving the regional development pattern. The identification of residential, open space, commercial, and industrial areas shown in the map on page 1-5 gives a broad view of the land use patterns within the City as well as an idea of where potential trail users may originate and travel.

The northeast area is comprised predominantly of industrially-zoned properties, although a small portion includes the mixed-use neighborhood of Orenco

Station. This mixed-use hub is located along the MAX west transit line. The northeast also includes the Hillsboro airport and large, regional employers such as the Intel Corporation.

Large swaths of the Hillsboro area are zoned for single-family residential, such as the northwest, Brookwood, and Southeast areas. These are car-dependent neighborhoods with a suburban character.

The eastern area of Hillsboro has many zoning uses, including industrial, commercial, multi-family and mixed-use properties. The Tanasbourne neighborhood and the Oregon Health and Science University's West Campus are included in this area. Tanasbourne has a large commercial shopping area with national retailers such as Target.

The central-west area includes downtown Hillsboro and is bisected by the Tualatin Valley Highway to the south. There is a significant mixed-use community as well

as commercial properties in the Central area. City Hall and the Washington County Courthouse are located here. It is bordered by the West area, which is a mixed of both commercial, industrial, and single-family dwellings. South of this is Jackson Bottom Wetland Preserve, bordered by the Tualatin River on the south.

The North Hillsboro area between Sunset Highway and Evergreen Parkway, west of Brookwood Parkway, is ripe for development. Recent expansion of the urban growth boundary to include this area adds to the likelihood of near term development. A vision plan is desired for this area so that it might meet its full potential in terms of land use coupled with active transportation and recreation as well as environmental stewardship. The idea of a trail that is integral to area businesses while providing access to a restored and enhanced Waibel Creek is germinating under the name Crescent Park Trail.



Currently undeveloped lands in Northwest Hillsboro present prime opportunities for development. A vision plan is desired along the Waibel Creek corridor to integrate active transportation and recreational use with future development and environmental stewardship.

Ownership

Public

The City of Hillsboro already owns and maintains hundreds of acres of land within the study area. Parks and natural areas provide desirable amenities favorable for trail development. Publicly managed road rights of way also provide the City with opportunities to provide connectivity between trails where other options are limited. The City Water Department owns properties for both existing and future water reservoirs which may provide opportunities for trails. Metro owns properties primarily along Rock Creek and is a likely partner towards trail development efforts. CWS owns large areas of land adjoining the City ownership of Jackson Bottom Wetland Preserve. The two agencies are working together on future plans and resource management, with potential for connecting trails.

Utilities

Local power and gas companies also own and manage linear corridors. Hillsboro is currently serviced for electricity and gas by Portland General Electric (PGE) and NW Natural. Additionally, the Pearl-Keeler

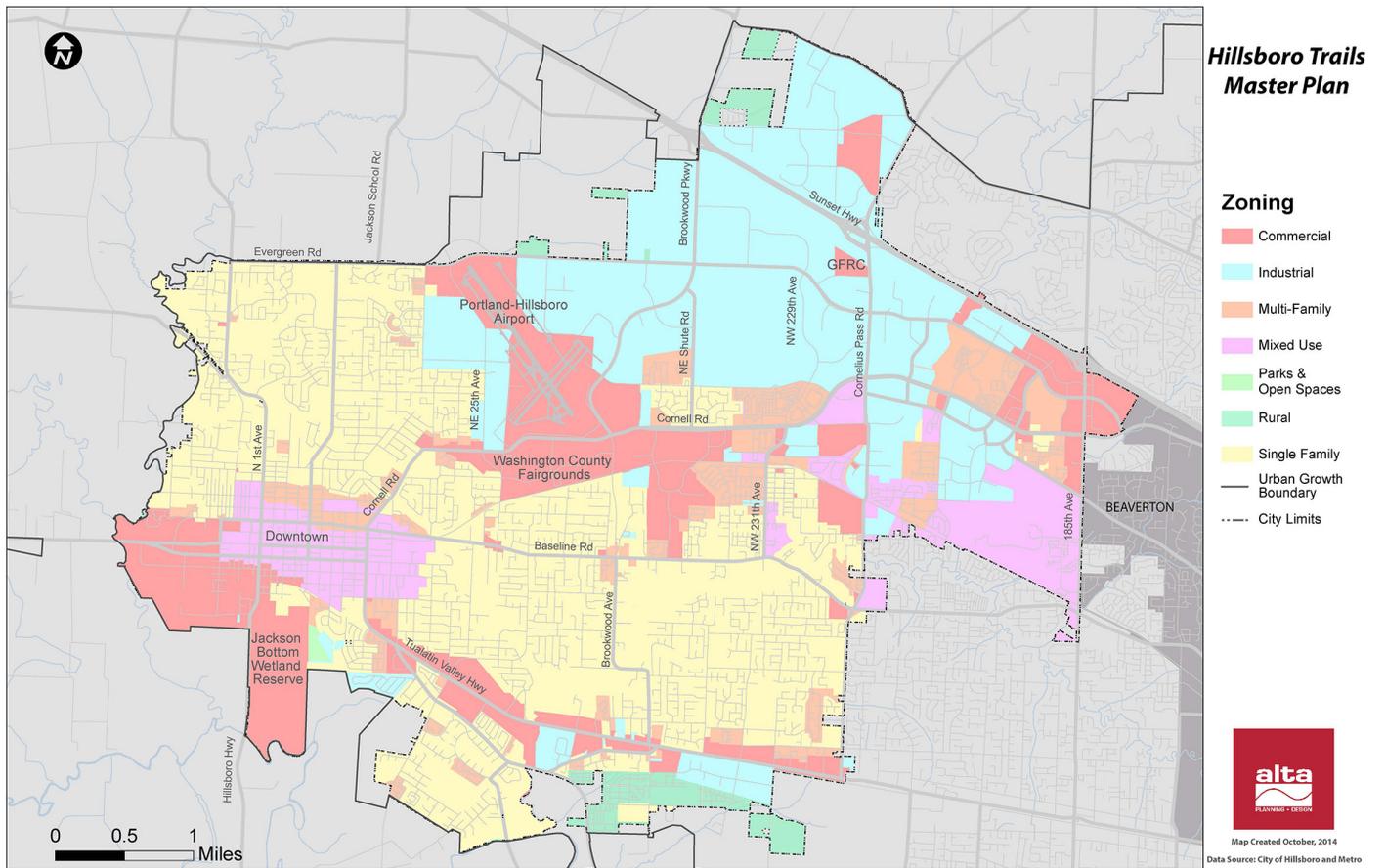
Powerline is a 500-kilovolt electric transmission line operated by the Bonneville Power Administration connecting the Pearl substation in Wilsonville with the Keeler substation along Sunset Highway in Hillsboro. Like many transmission lines, the Pearl-Keeler line runs on easements across underlying properties owned by other entities. Some segments of the power line corridor in Aloha-Reedville, between Baseline Road and TV Highway, are owned by the City of Hillsboro and are referred to as Powerline Park. Portions of these properties host publicly accessible trails and parkland.

Railways

Rail corridors also present potential trail opportunities. The TV Highway Corridor Plan illustrates a potential shared use path design located between the highway and active railroad including fencing and bus stop improvements. Union Pacific Railroad owns the rail line, while Portland and Western Railroad is the local operator. Negotiations with each would be required to move this concept forward.



Linear corridors such as railways, creeks, and utility easements, due to their nature, create opportunities for trails.



Existing trails through private HOA properties that are open to public use create unique challenges.

Other

Currently, there are several Home Owners Associations (HOAs) with public trail easements which allow for public trail use through private lands. Some HOAs have experienced trail-related safety and vandalism issues, making the easements a burdensome responsibility at times. Clear roles and responsibilities can assist the HOAs and the City to address issues as they arise. Joint ventures including volunteer trail watch groups have been used in similar situations by other communities to augment visual surveillance and offset maintenance burdens on cities.

Entities such as schools, churches, cemeteries, hospitals and healthcare facilities have all been known to work in the public interest to provide trail easements and support. Opportunities for conducive partnerships shall be considered throughout the master plan process.

Transportation

Transportation System Planning

The City's 2004 Transportation System Plan (TSP) provides specific information regarding transportation needs to guide future transportation investment and to determine how land use and transportation decisions can be beneficially coordinated. One of the objectives of the TSP is to achieve optimal efficiency for each travel mode (motor vehicle, pedestrian, bicycle, transit) within Hillsboro.

The most important existing pedestrian need in Hillsboro is a connected system of walkways with a quarter mile spacing that provides access to key activity centers such as parks, schools, retail, and transit.

Bikeways are currently provided on several arterials and collectors within the City, forming a basic bikeway network. However, there are many gaps in the bikeway network where bikeways do not exist along arterial and collector roadways, causing significant problems for bicyclists.

Roadways

Within Hillsboro, highways include Sunset Highway (US-26), Tualatin Valley Highway (OR-8), and SW Hillsboro Hwy (OR-219). The Sunset Highway roughly follows the northern City boundary. SW Hillsboro Highway extends from downtown Hillsboro south to the town of Newberg. Commercial destinations are primarily concentrated along the east-west running Cornell Road and Tualatin Valley (TV) Highway, which extends through the southern portion of the study area. This highway connects Hillsboro to Forest Grove to the west and Beaverton to the east.

TV Highway has been the subject of ongoing studies due to a high prevalence of crashes. These include injuries and fatalities involving both cyclists and pedestrians. The March 2013 South Hillsboro Focus Area Plan proposes improvements to this route, including a fourteen foot wide multi-use pathway on the south side of the Highway.

Major roadways present physical and perceived barriers to trail users. Major east-west arterials include NW Evergreen Parkway, NE Cornell Road, and East Main Street/SE Baseline Road. Major north-south



Grade separated crossings, such as the underpass beneath the Sunset Highway, negate safety issues associated with vehicle-trail intersections or crossings.

arterials include North 1st Avenue/SW Hillsboro Highway, Brookwood Parkway, Cornelius Pass Road, and 185th Avenue. Plans for adding a two-way cycletrack on the east side of Cornelius Pass Road are being developed as part of the road widening between Cornell Road and US 26. The City is working towards converting the main roadways of Main and Oak Streets within downtown Hillsboro from a one-way couplet to a standard two-way street system. This change is anticipated to occur in 2016.

Airways

The Hillsboro Airport provides air travel and is operated by the Port of Portland. It is the second-busiest airport in Oregon, following Portland International Airport. It primarily serves pilots and corporate flights as well as aviation training.

Railways and Transit

Several active rail lines are present in the city, including freight service from Portland and Western Railroad. There are interconnections to the BNSF Railway and the Union Pacific Railroad. A former rail station house near downtown appears to be abandoned but also relatively intact.

TriMet's Westside MAX light rail train has connected Hillsboro to the wider Portland region since 1998. The line bisects the city and terminates in downtown Hillsboro. There are nine stations, including transit centers at Willow Creek Station on Hillsboro's east side, and the Hillsboro Central Station in the downtown area.

Rail rights-of-way, due to their long, flat, linear nature, present desirable trail development opportunities. The former rail station house, seen in the distance, could serve a trail support role.



Tualatin Valley Highway is a major vehicle corridor as well as a transit route. Bicycle and pedestrian infrastructure is substandard, and safety has been an issue.



Mid-block crossing improvements enhance trail user safety and comfort at roadway crossings; while push button user-activated signals that are synchronized with traffic signals minimize disruptions to vehicle traffic.



Six bus lines operated by TriMet expand mobility options for pedestrians and cyclists throughout the study area. TriMet has two transit centers within Hillsboro. Hillsboro Central Transit Center, located at Washington and SE 3rd Avenue, provides access to the MAX Blue Line as well as bus lines 46, 47, 48, and 57. The Hillsboro Parking Garage at Hatfield Government Center Station is the nearest Park &

On-Street Bicycle Facilities

Active transportation is about seamlessly connecting bicycling and walking trips from beginning to end. Trail projects for recreational use are also known as “active recreation”. Active transportation and recreation projects like Hillsboro Trail System and Rock Creek Trail will integrate



The Hatfield Station in Hillsboro is the current Western terminus of the MAX blue line.

Ride. Bike racks and lockers are available at Hillsboro Central Transit Center. The Willow Creek Transit Center, located at Willow Creek and SW 185th Avenue, also provides access to MAX Blue Line and bus lines 52, 59, and 88. The Willow Transit Center also has a Park & Ride as well as bike racks and lockers. TriMet is currently considering closing the pedestrian path that leads from the Willow Creek MAX Station to W. Baseline Road due to community security concerns.

walking, bicycling, transit, bike parking, signalization, and wayfinding elements, as well as educational and interpretive signage. Increasing active transportation options benefits the region by reducing greenhouse gas emissions and congestion, providing inexpensive travel options, improving our health and reducing health care costs, and fostering dynamic communities.

The Hillsboro Trail System will support connectivity between neighborhoods and both public and private destinations such

as schools, parks, transit, natural areas, employment, cultural resources and shopping areas. This will improve the viability of walking and bicycling as transportation options as well as recreational activities.

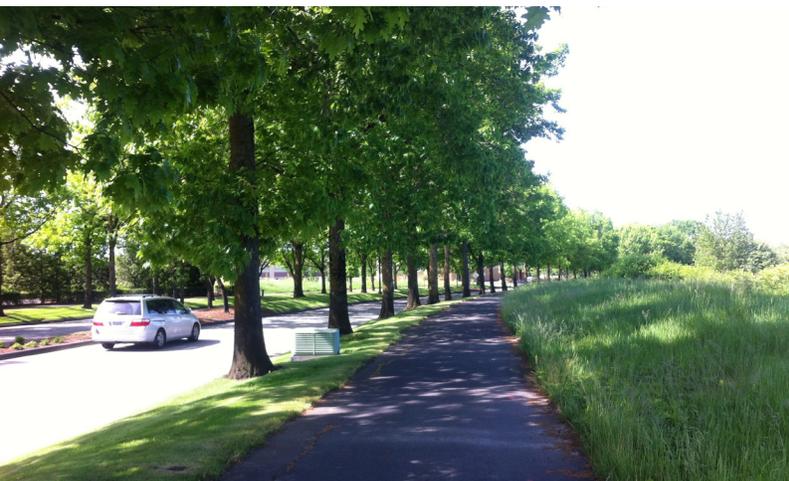
The city has a number of on-street bicycle facilities, with the majority being bike lanes. Where space allows, painted buffers are included. The city has also implemented segments of raised cycle-track. The cycletrack parallels sidewalks on each side of Ronler Drive between NW 229th Avenue and Cornelius Pass Road and along Veteran's Drive between Brookwood Parkway and NE 28th Ave.



The bike lane on NE Harewood Drive in NW Hillsboro is separated from vehicle traffic by a painted buffer.



The eastern terminus of the Tualatin Valley Scenic Bikeway is at Rood Bridge Park in Hillsboro.



Off-street trails recommended in the Trails System Master Plan will need to seamlessly connect to bicycle and pedestrian facilities within the road right-of-way including both multi-use paths (left) and bike lanes (right) as observed on Brookwood Parkway.



Existing Trails

The City's trail system currently includes segments of regional, community, and local trails. These include paved multi-use pathways, powerline trails, neighborhood connections, and intimate natural surface paths close to nature. Recommendations for a trails network are described within the City's 2010 Parks & Trails Master Plan and Natural Resource Analysis.

Rock Creek Regional Trail

Development of the Rock Creek Regional Trail is a priority for the community of Hillsboro as well as for the region. While some segments of this trail are in place, significant gaps need to be completed. Once built, the Rock Creek Regional Trail will form a southwest to northeast diagonal spine to the City's trail network. The Alignment Plan will set the course for implementing over eight miles of continuous trail corridor along Rock Creek.

The City of Hillsboro has achieved progress toward making this trail a reality. The vision for the Rock Creek Trail includes a completed trail segment that follows Rock Creek between the Tualatin River and the proposed Oregon Electric Trail. A developed portion of the trail begins at Sunset Highway and meanders southwest for approximately two miles to NW Wilkins



The Rock Creek Trail currently exists in North Hillsboro for approximately two miles between Rock Creek Boulevard and NW Wilkins Street.

Street. Paved pathways also exist along Rock Creek within Rood Bridge Park. Trail access is currently available at Rock Creek Park (THPRD), Orchard Park, Cherry Lane, and Rood Bridge Park. While trails also exist along Rock Creek within Noble Woods, they are currently appropriate for pedestrian use only. The Rock Creek Trail will be extended through Orenco Woods Nature Park, with development planned for 2016.

As the assumed main spine of Hillsboro's trail system, Rock Creek Trail should be celebrated and enhanced to become a major point of pride for the city. Bold, visionary efforts have been discussed regarding potential improvements. A steady supply of reclaimed water, possibly from nearby industry, could be restored to the creek to provide a year round opportunity to connect with water and nature. The connection to the water could be further augmented by the construction of water access points, wading pools, and view opportunities. Coupled with habitat restoration, Rock Creek could become a premiere venue for wildlife viewing and nature appreciation

Significant challenges exist for the development of the Rock Creek Trail. As much of the corridor is within floodplain, alignment planning efforts must work in conjunction with Clean Water Services



Rock Creek Trail identity sign at the Cherry Lane Trailhead site.

The Rock Creek Trail currently exists in North Hillsboro for approximately two miles between Rock Creek Boulevard and NW Wilkins Street.



Existing segments of the Rock Creek Trail have incorporated wayfinding elements based on Metro's Regional Trail Wayfinding Guidelines. A consistent system of wayfinding elements helps encourage trail use as it clarifies the navigational experience.

to protect natural resources. Flood levels, wetlands, vegetated corridors, and upland habitat areas must be given full consideration. Roadway, rail, and creek crossings, connections to on-street facilities, topography, and property ownership will all significantly affect trail alignment opportunities.

Reedville Trail (Pearl-Keeler Powerline Trail)

Most of the Reedville Trail is undeveloped and outside of Hillsboro's city limits. The trail alignment, formerly known as the BN Powerline Trail, extends south from the existing Rock Creek Trail at NW Wilkins Street. It passes through Reedville and into the South Hillsboro planning area. A portion of the trail is complete on the north and south portions of the Paula Jean Park/Trachsel Meadows Greenway. The proposed trail alignment then connects to the Cooper Mountain Nature Park.

Private property south of Johnson impeding trail development.



A view of the existing Reedville Trail when facing north from SW Johnson Street.



Planned Trails

Tualatin Valley Trail

The Tualatin Valley Trail, formerly called the Turf to Surf Trail, is envisioned as a regional trail along TV Highway. The trail alignment extends between downtown Hillsboro and the City of Beaverton. North of downtown, the alignment connects to the Hillsboro to Banks Trail. The TV Highway Corridor plan shows an alignment on the south side of TV Highway with fencing and bus stop improvements within the rail right-of-way. A second option aligns the trail along Old Hillsboro Highway along the south edge of the railway.

Crescent Park Trail

Potential exists for trail connectivity between McKay Creek Greenway and the Rock Creek Trail Corridor along the proposed Waibel Gulch Greenway. Crescent Park Trail is envisioned to serve as a significant citywide park, trail, and greenway area. Per the 2009 Parks & Trails Master Plan, Waibel Creek “could provide an opportunity for a paved trail or foot path from McKay Creek Greenway through the Gordon Faber Recreation Complex continuing to the Rock Creek Trail. Establishing a foot path in this area could provide low impact recreational trail opportunities.” Development pressure in Hillsboro’s northern employment district necessitates a thoughtful approach to trail alignment and open space planning in the area.

Council Creek Regional Trail

Council Creek Region Trail is anticipated to connect Hillsboro to Cornelius, Forest Grove, and Banks. Downtown Hillsboro is the eastern terminus of the anticipated fifteen mile trail.

Tualatin River Greenway and Water Trail

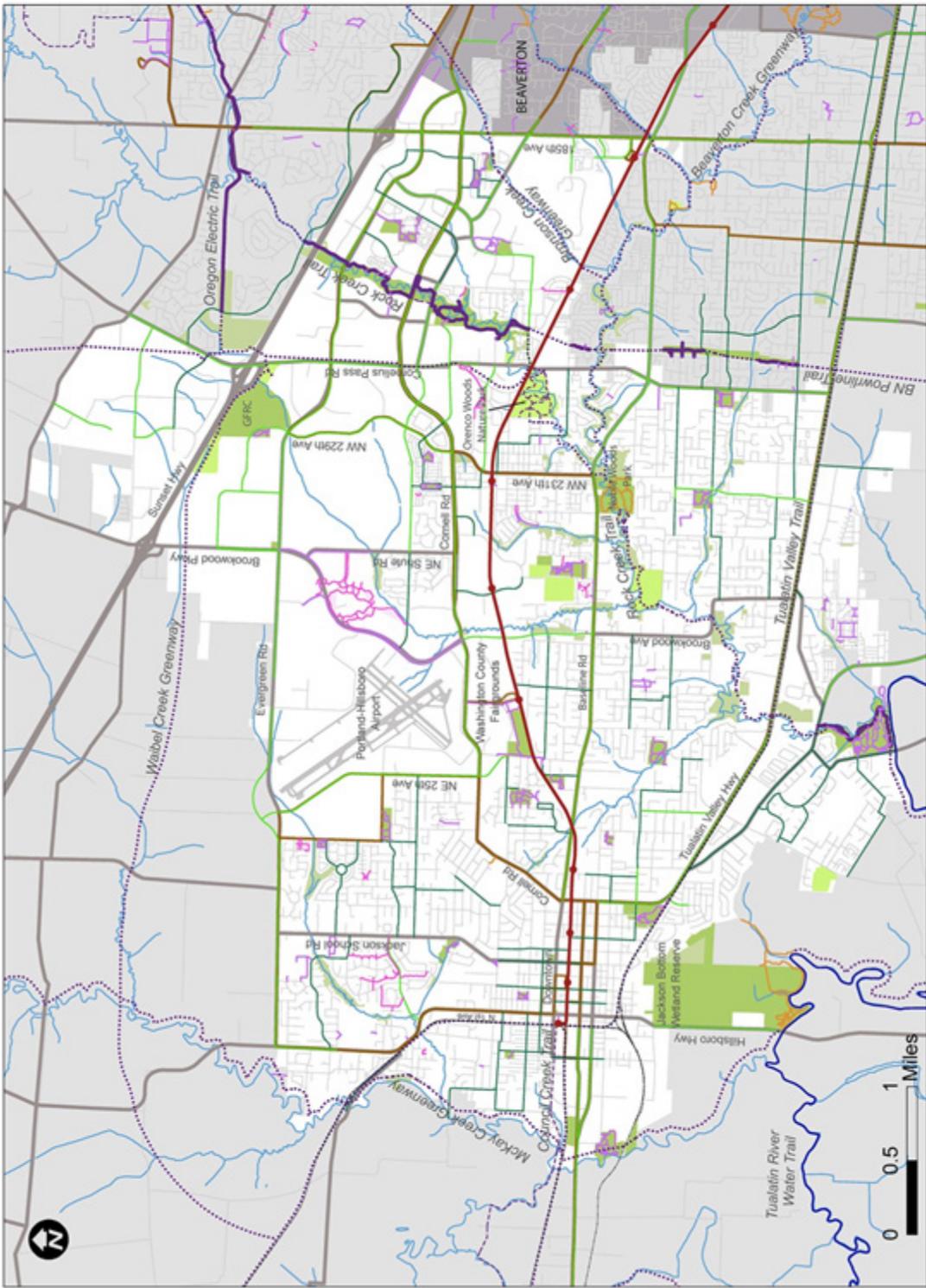
The Tualatin River is recognized as a regional greenway corridor, with support growing for development and recognition as a Water Trail. Within Hillsboro, Rood Bridge Park provides water access with a small craft launch at River Mile 38.4. Metro will develop a launch site 5 miles downstream at their Farmington Road Natural Area in 2016. A coalition of public agencies and non-profit organizations are working together to expand river access on the upper Tualatin, address river management issues, and secure water trail designation for the river.

Hillsboro Trails Master Plan

- Existing Trails**
 - Pedestrian Only Trails
 - Water Trail
- Multi-Use Paths**
 - Regional
 - Local/Other
 - Private
- On-Street Bike Facilities**
 - Bike lane
 - Low traffic through street
- Proposed Trails**
 - Planned Trails
 - Conceptual Trails
- Parks**
 - Developed
 - Open Space
 - Undeveloped
- Bus Routes**
- MAX Stops**
- MAX Blue Line**
- Railroads**



Map Created October, 2014
 Data Source: City of Hillsboro and others



Destinations

Parks and Recreation Amenities

The Department of Parks and Recreation provides a diverse array of recreational and cultural experiences within Hillsboro. Facilities include 27 parks, natural areas, two sport complexes, the Walters Cultural Arts Center, the Shute Park Aquatic & Recreation Center, Jackson Bottom Wetlands Preserve, and three other mixed-use facilities. The total acreage managed or maintained by the department is 1,240 acres. Of this total acreage, 620 acres are developed park lands and nature parks while an additional 168 acres remain undeveloped. The remaining 452 acres are comprised of greenways, open space, and other managed sites such as the Pioneer Cemetery.

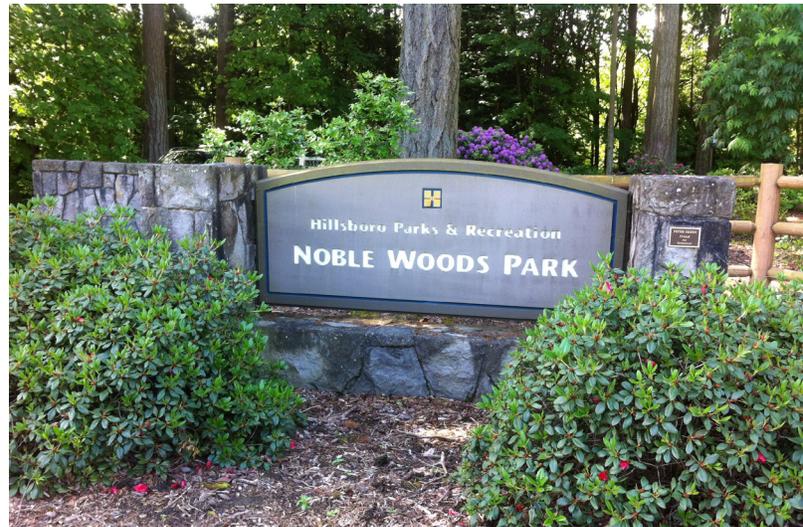
Two golf courses are located in Hillsboro. A minor league baseball team, the Hillsboro Hops, plays at the Ron Tonkin Field within the Gordon Faber Recreation Complex adjacent to the Sunset Highway.

Schools

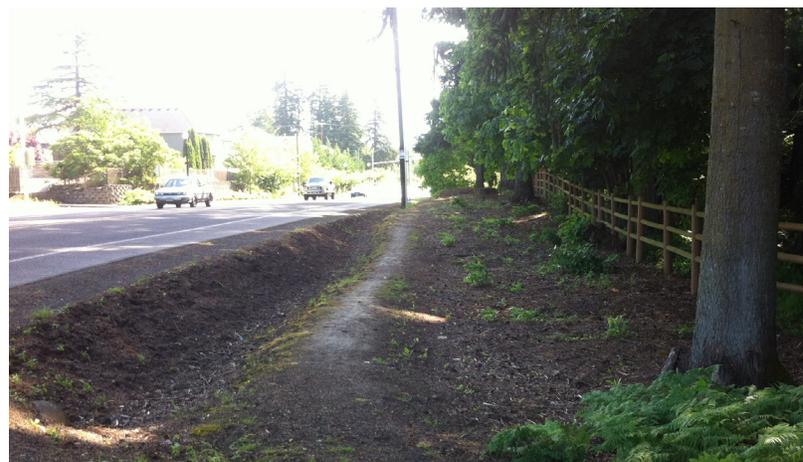
There is a robust public school system within the City of Hillsboro, comprised of 23 public elementary schools, four middle schools, and four high schools. Based on enrollment size, the Hillsboro School District is the fourth largest in the state. In addition to the public schools, there are several private and charter schools.

Oregon Health and Science University has a West Campus located in the study area. Pacific University, based in nearby Forest Grove, operates a satellite campus downtown adjacent to the Taulity Community Hospital. Portland Community College also offers a Work Force Training Center located in Hillsboro.

A worn path along Baseline Road demonstrates an unmet need for non-motorized access to Noble Woods Park. Washington County will be reconstructing Baseline Road to widen the road and add sidewalks and bike lanes in 2015-16.



Noble Woods Park (above) is a 38-acre nature park that includes paved and natural surface trails through open and wooded natural areas. Rood Bridge Park provides a range of recreational opportunities from tennis courts and playgrounds to natural and paved trails (below) and water access.



Historic Properties

Historic properties create opportunities to showcase local history and culture. Ten properties within the study area are included on the National Historic Register. These include the following:

- Imbrie Farm: located near Orenco Station, this farm includes a house built in 1866 and a barn, both of which have been converted into the Cornelius Pass Roadhouse pub.
- Zula Linklater House: located downtown and completed in 1923.
- Manning-Kamna Farm: includes ten structures dating from 1883.
- Old Scotch Church: completed in 1876 in the north area, outside of the City limits.
- Harold Wass Ray House: built in 1935 and located near the Intel Hawthorne Farm campus.
- Richard and Helen Rice House: located northwest of Hillsboro and home of the Rice Northwest Museum of Rocks and Minerals.
- Rice-Gates House: built in 1890.
- Edward Schulmerich House: built in 1915.
- Malcom McDonald House: built in 1912.
- Charles Shorey House: built in 1908.

The Washington County Jail was formerly listed on the National Register of Historic Places, but was removed from the list in 2008. In 2004, the structure was moved from the Washington County Fairgrounds to the Washington County Museum.

There is one other property considered by the Oregon State Historic Preservation Office to be eligible/significant historic resources – the E H Johnson House built in 1951. The historic register nomination for the Masters House was submitted and approval is expected by the end of 2015.



The Farmhouse at Imbrie Farm is part of the Cornelius Pass Roadhouse pub and restaurant.

Cultural Amenities and Services

The City of Hillsboro operates two libraries. Hillsboro Main Library is located on NE Brookwood Avenue in the north-central area of Hillsboro and the branch library is located in Shute Park, in southwest Hillsboro.

In addition to movie theaters and art galleries, cultural opportunities include the Hillsboro Artist's Repertory Theater, Bag 'n' Baggage Theater, Oregon Chorale, and Hillsboro Symphony Orchestra.

The Glenn & Viola Walters Cultural Arts Center features gallery, performance, and instructional space in downtown Hillsboro. There are two museums in the city - the Rice Northwest Museum of Rocks and Minerals to the north and the Washington County Museum located downtown.

Washington County Fairgrounds provides a venue for a range of activities from the annual Washington County Fair to the Oregon Renaissance Festival. Residents have access to four farmers' markets in operation from May through October. Several healthcare facilities, including Tuality Community Hospital in downtown, and Kaiser Permanente in the Tanasbourne area serve residents.

Natural Environment

Future enhancement of existing open space and natural areas in Hillsboro presents an important opportunity to improve ecological functions as well as provide access to nature and recreation. The study area includes the Tualatin River, several creeks, and natural areas that support wildlife and plant diversity within the city.

Riparian areas including Dairy Creek, McKay Creek, Rock Creek, Glencoe Creek, Bronson Creek, Dawson Creek, and Turner Creek are shown on the environmental map below. Creeks act as wildlife corridors for the passage of wildlife species not normally observed in large cities, including deer, coyote, and many woodland and meadow birds. The

natural areas provide food and shelter for deer, coyotes, raccoons, Western gray squirrel, rubber boa, pileated and hairy woodpeckers, white-breasted nuthatch, Western tanager, and many more species of wildlife. The combination of the upland habitats, seasonal wetlands, and streams found within the natural areas of the study area provide forage, perch, roost and nest opportunities for birds, mammals, and reptiles. Access to nature and environmental education should be considered when aligning and developing trails.

While an asset, area creeks and streams have also impacted development patterns and connectivity. Rock Creek physically divides east and west Hillsboro. Few arterials cross Rock Creek and smaller roadways typically do not provide through travel. Bicycle and pedestrian bridges across waterways would enhance connectivity and reduce out-of-direction travel for trail users.

Several of the waterways in the study area have been negatively impacted by urbanization and channelization. The design of trail alignments and details should minimize impacts to these important resource areas.

Development along waterways is regulated by both the City and Clean Water Services. Significant Natural Resource Areas (SNRAs) are designated by the City and generally depicted on the environmental map below. SNRAs receive varying levels of protection based on their sensitivity. Level 1 areas are considered the most sensitive and thus receive the highest levels of protection. Levels 2 and 3 areas are slightly less critical, and thus some development is allowed in these areas. Impact areas are also regulated, but are considered the least sensitive of the SNRAs and thus are the most permissive with respect to development. While the development of low impact recreation facilities and trails is generally permitted within SNRAs, habitat enhancement and mitigation is typically required.

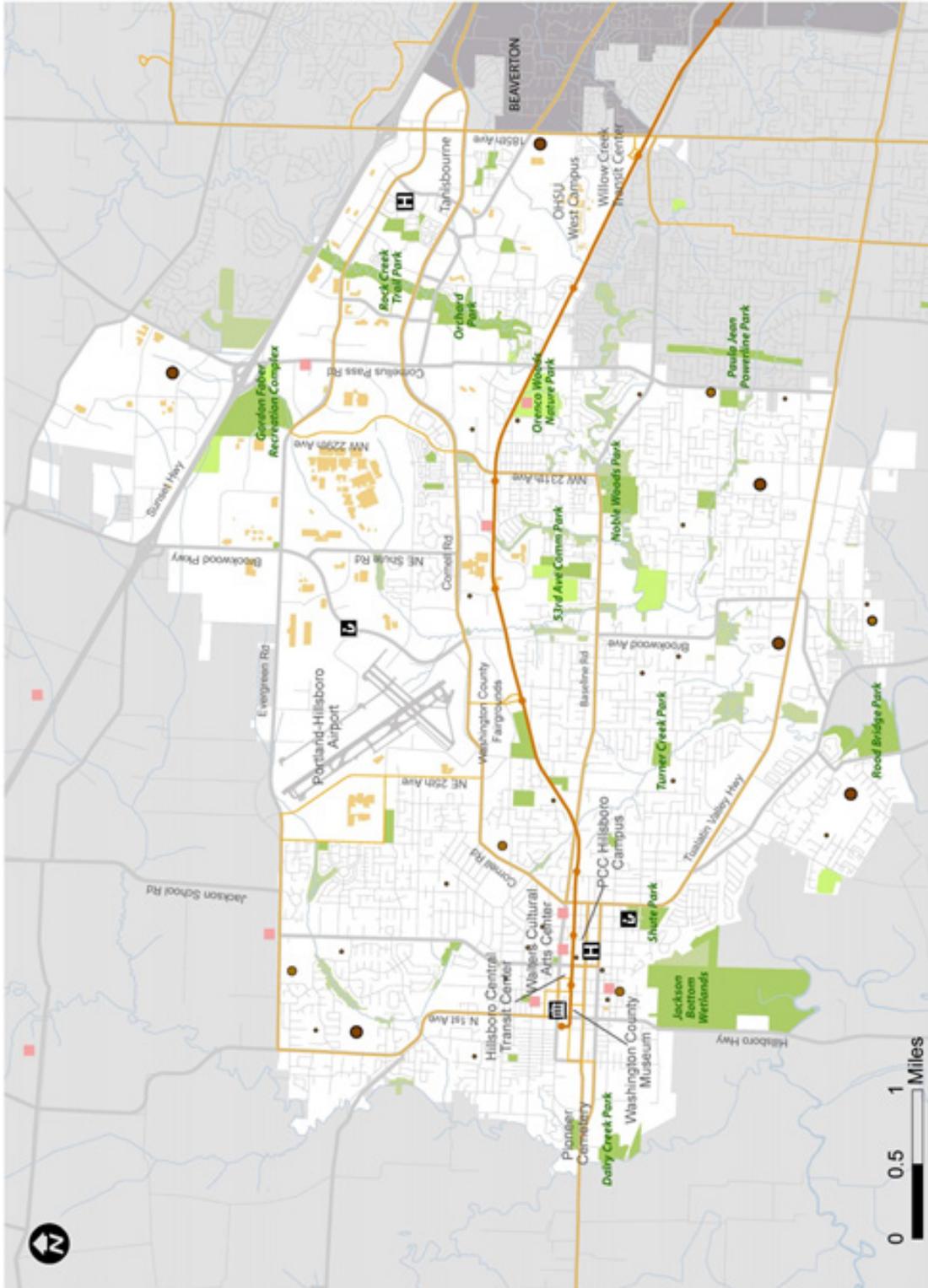
Hillsboro Trails Master Plan

Trip Generators

-  City Hall
 -  Hospitals
 -  Libraries
 -  Top Employers
-
- ### Parks
-  Developed
 -  Open Space
 -  Undeveloped
-
-  High Schools
 -  Middle Schools
 -  Elementary Schools
 -  Historic Properties
 -  MAX Stops
 -  Transit Lines
 -  Streams



Map Created October, 2014
 Data Source: City of Hillsboro and Metra





Areas having poor habitat quality may be enhanced in conjunction with trail development.

Significant challenges exist for the development of the Rock Creek Trail. As much of the corridor is within floodplain, alignment planning must be coordinated closely with Clean Water Services to protect natural resources. Topography, flood levels, wetlands, vegetated corridors, and upland habitat areas must be given full consideration.

In addition to the 808 acres of Hillsboro’s developed park land, there are approximately 772 acres of greenways and open spaces in the park system. The greenways include both built and natural corridors that provide linkages between parks and opportunities for trail related outdoor

recreation. Open space includes undeveloped areas that preserve significant natural resources, such as rivers and streams, wetlands, steep hillsides, environmentally sensitive areas, and wildlife habitats. They do not include any user amenities and serve to preserve green space within the City of Hillsboro.

Hillsboro’s 2009 Parks & Trails Master Plan and Natural Resource Analysis document identifies regional greenways along McKay Creek, the Tualatin River, Beaverton Creek, and Bronson Creek. It further identifies Rock Creek, Glencoe Swale, Turner Creek, and Reedville Creek as potential greenway opportunities. The South Hillsboro plan identifies Butternut Creek and Gordon Creek as planned greenways.

Jackson Bottom Wetlands Preserve (JBWP) spans 725 acres to the southwest of Hillsboro and is one of the largest natural resources in the study area. Approximately 448 acres of land is managed by Hillsboro Parks and Recreation; 241 acres are greenways, and 83 are open space. Wetland areas provide significant areas of wildlife breeding and nesting with dense populations of amphibians, including red-legged frogs. While pedestrians are welcome to walk the many trails within JBWP, bicycles are prohibited. Bicycle access to JBWP is currently substandard; although OR-219 has narrow bike lanes, most of it is built on an embankment with steep slopes.



Fencing along Rock Creek Trail serves as a barrier to wildlife, as well as a maintenance issue. A gap at the bottom of the fence would allow small mammals to pass through while a wider shoulder would better accommodate maintenance equipment.



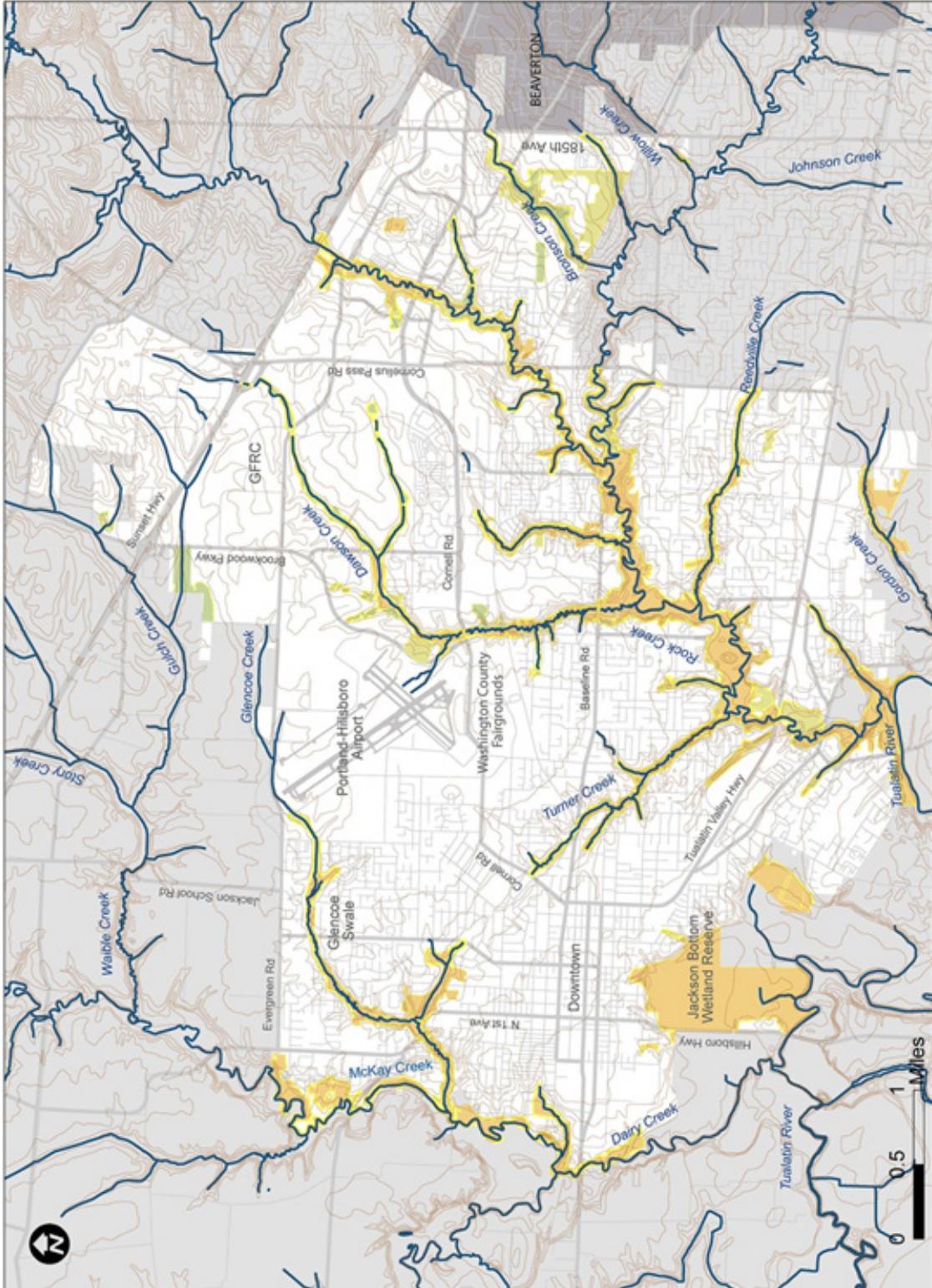
Steep terrain near this tributary to Rock Creek creates challenges for aligning trails that are ADA compliant.

Hillsboro Trails Master Plan

- Environment**
 - Streams/Rivers
- SNRO Level**
 - Level of Protection 1
 - Level of Protection 2
 - Level of Protection 3
 - Impact Area

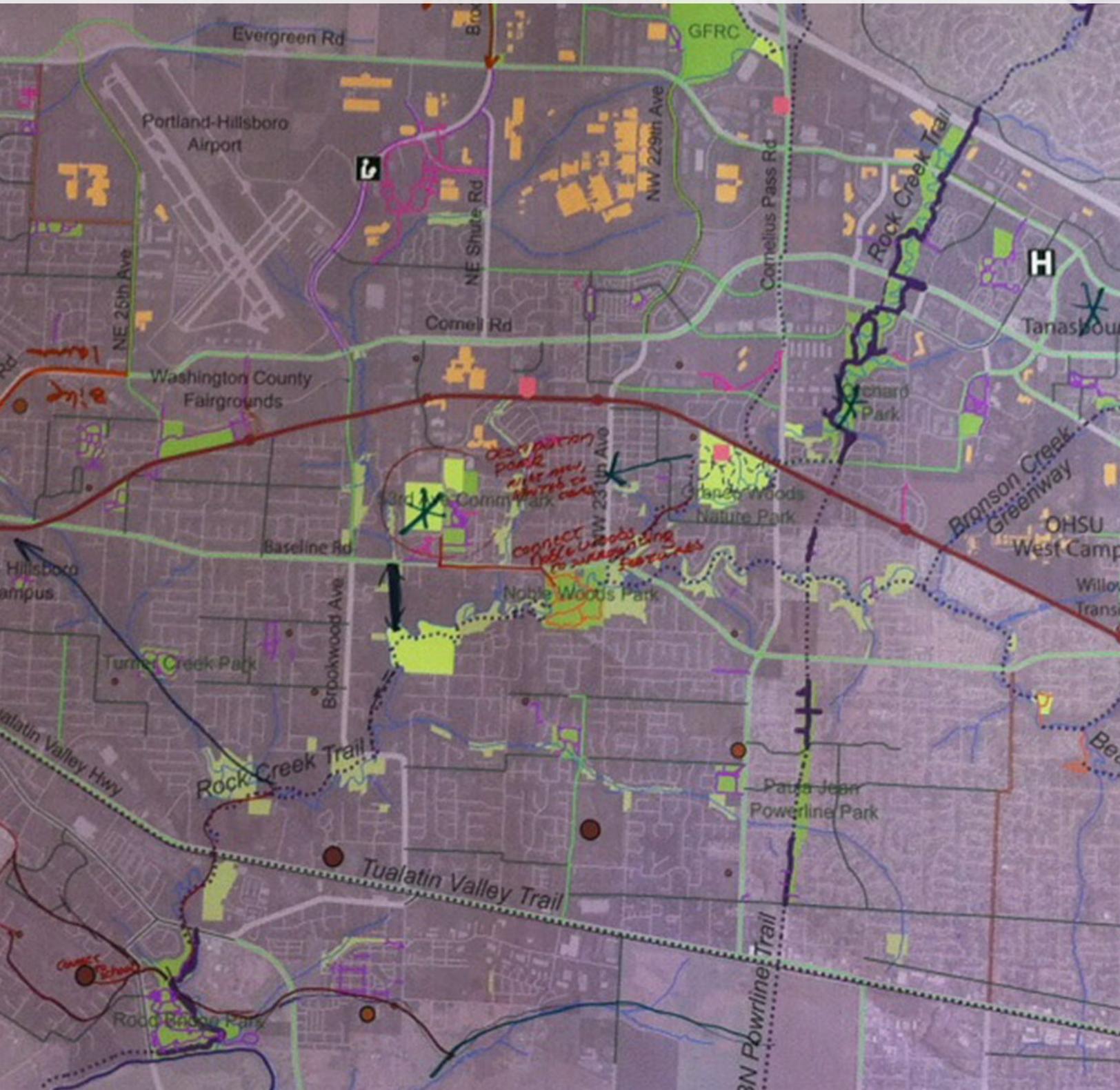


Map Created October, 2014
Data Source: City of Hillsboro and Metris



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02 COMMUNITY OUTREACH AND VALUES



COMMUNITY OUTREACH AND VALUES

Overview

Community input is an essential aspect of every City of Hillsboro planning project. The City provided several opportunities for members of the public to express input and feedback on the Trails Master Plan. Information was gathered from community members via public meetings, an on-line survey, a Citizen's Advisory Committee, and targeted outreach to key stakeholders. This chapter summarizes key findings from community members including their values and priorities for the City's trail system.

Public Meetings

Public meetings were held at the Hillsboro Public Library on NW Brookwood Parkway at key stages of the plan development. At each meeting the following opportunities to engage and provide input were available: exhibit review and comment, overview power-point presentation, and interactive input sessions and questions.

Meeting topics and dates were as follows:

Meeting #1

Project Overview, Visioning, Existing Conditions, Opportunities, and Challenges
Wednesday, November 12th, 2014

Meeting #2

Summary of Public Input and Values, Trail Selection Criteria, Trail Classifications and Design Guidance, Crescent Park Greenway, and Rock Creek Trail Alignment
Wednesday, February 25th, 2015

Meeting #3

Draft Trails Master Plan, Overall Network, Rock Creek Trail Alignment, and Crescent Park Greenway
Wednesday, May 20th, 2015

An additional public meeting was held on January 7th, 2015 to specifically engage the Latino community.

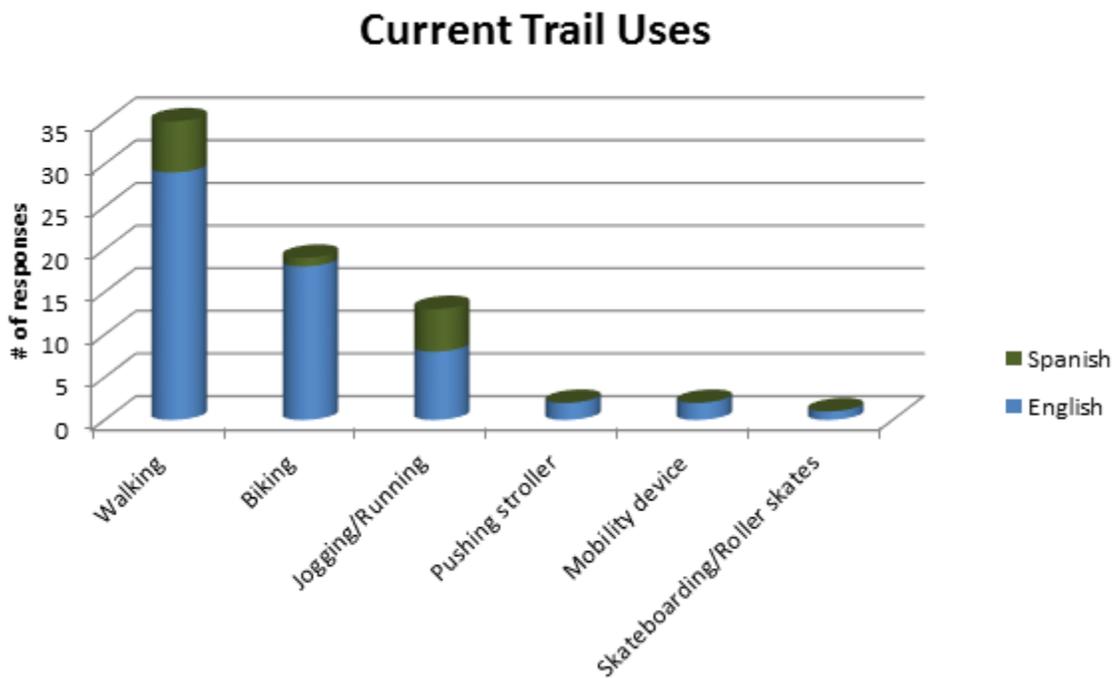
Summaries of key meeting findings and discussions may be found in the appendix of this document as well as in the "Community Values and Priorities" summary within this chapter.



On-line Survey

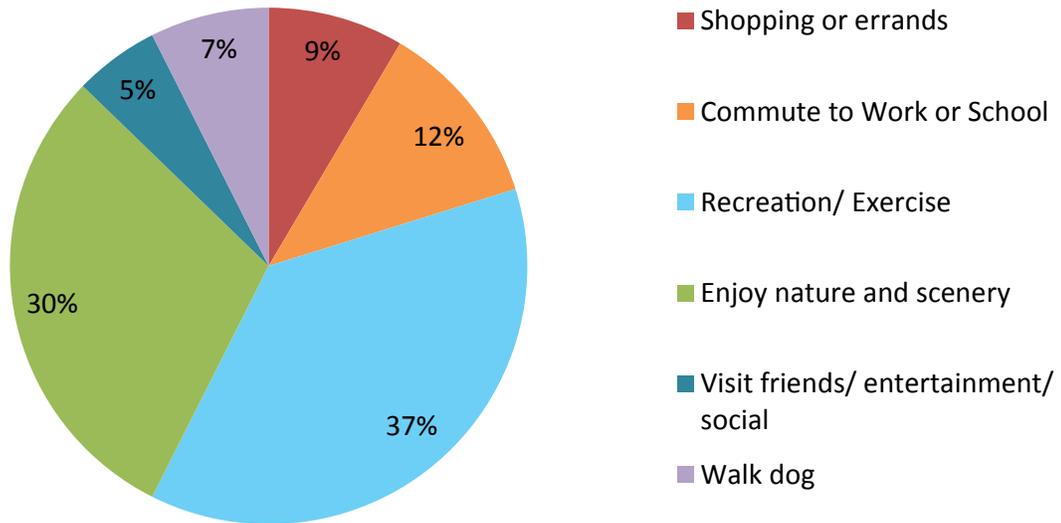
An on-line survey was posted to the City's website in early December and remained open for a period of two months. An email was sent to 7,800 individuals notifying them of the opportunity to provide input on the Trails Master Plan. The survey was available in both English and Spanish. Approximately fifty-five responses were received with nearly one fifth being in Spanish. While the overall number of responses is low, it provides some indication of preferences.

Key findings were as follows:

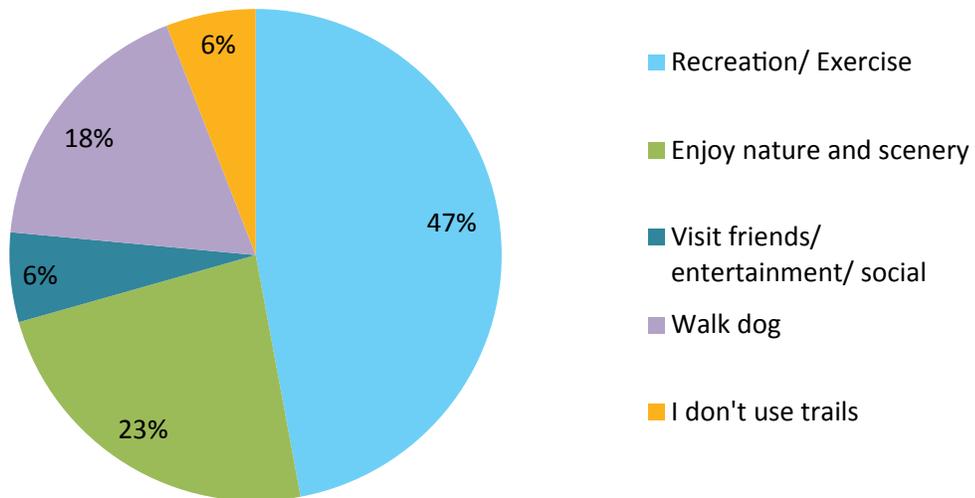


- Ninety percent of respondents already use trails in Hillsboro with the majority using them for walking.
- Primary purpose of trail use:
 - Recreation
 - 30% commute to work or school

Current Trip Purpose - English

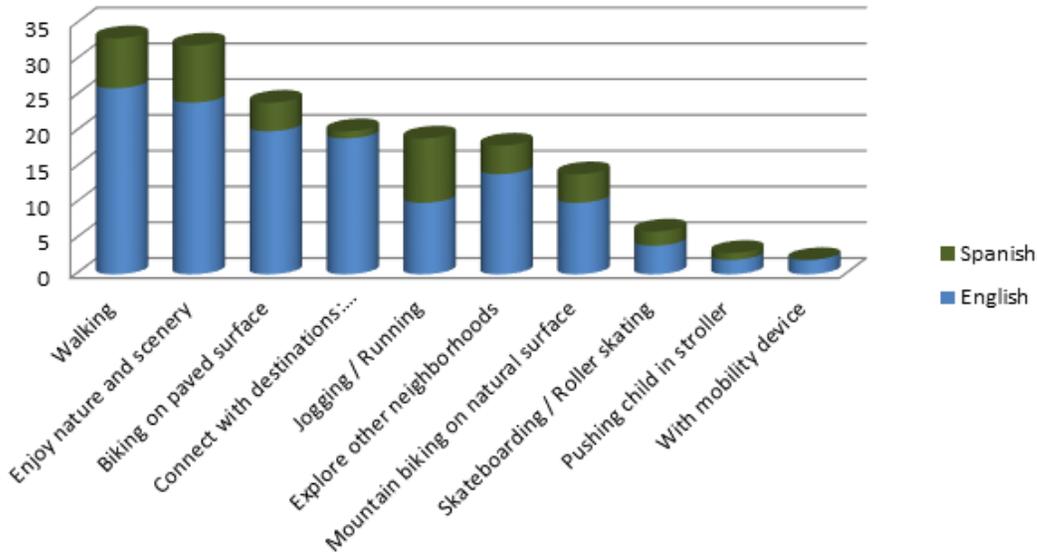


Current Trip Purpose - Spanish

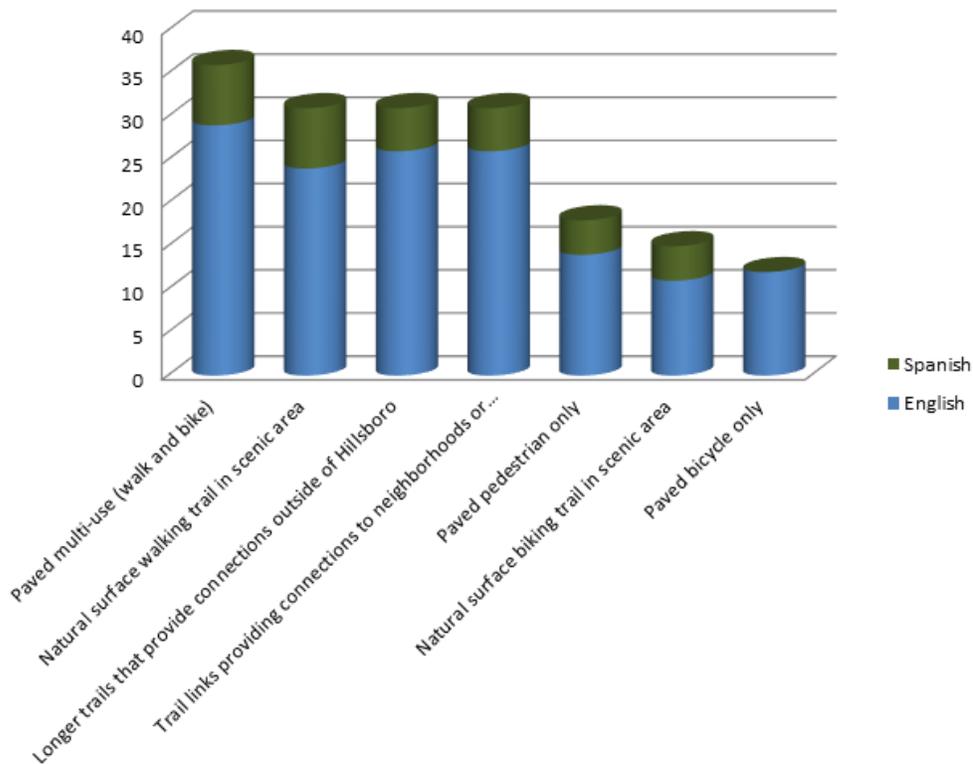


- The primary reasons people currently use trails include recreation/exercise, enjoy nature and scenery, commute to work or school, and walk the dog.
- Respondents would most like to use the trails for walking, to enjoy nature and scenery, to bike on a paved surface and to connect with destinations. Jogging or running was also a strong desired use for Spanish speakers.

How Would You Like to Use Trails?

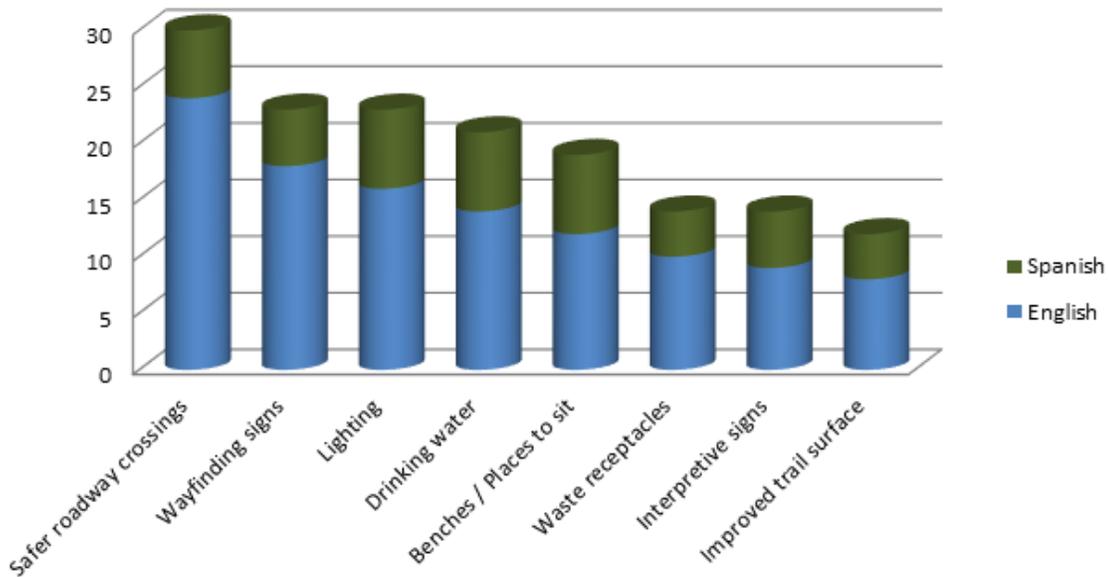


What Kind of Pathways Would You Like?



- The trail typologies most desired include paved multi-use and natural surface pathways for walking in scenic or natural areas.
- Users also favored trails which provide connections outside of Hillsboro as well as those that provide connections to neighborhoods or destinations.

Other Desired Trail Improvements



- The top three trail improvements desired by survey respondents include: improved safety at street crossings, wayfinding and interpretive signage, and lighting. Places to sit, drinking water, waste receptacles are also priorities.

As for reasons why community members don't use trails more often, the most common response was due to lack of a trail facility near home or work.

Advisory Committees

To further augment the Master Plan process, two advisory committees were formed to inform the project consultants as well as review materials and provide feedback. The first committee was a Technical Advisory Committee or TAC. Committee members included: a Regional Trail Planner from Metro Regional Government, Washington County's Bicycle and Pedestrian Program Coordinator, a staff member from Washington County's Public Health Department, a representative of the City of Hillsboro's Transportation Department, and an environmental scientist with Clean Water Services.

The second committee was a Citizen Advisory Committee (CAC). The CAC was composed of a broad spectrum of community representatives. Efforts were made to invite individuals representative of the demographic composition of the City of Hillsboro. Members included: a Park Commission Liaison, walking and bicycling advocate, Latino residents, a health professional, retirees, and students.

Stakeholder Meetings

Meetings were held during April 2015 with several community stakeholders or groups to discuss the Hillsboro Trails Master Plan. Input related to the project vision, community needs, and concerns were discussed. Key stakeholders included: the Hillsboro Chamber of Commerce, the Jackson School Homeowner's Association, Hillsboro School District, and residents of the Camwal neighborhood. Meeting notes summarizing discussions may be found within the appendix of this document.

Chamber of Commerce

The Hillsboro Chamber of Commerce's mission is to promote business prosperity and a healthy, diverse community in greater Hillsboro. From the Chamber's perspective, the primary reasons people choose to invest in Hillsboro are the talent of the workforce, the cost of doing business, quality of life, and employee base. Employees care about schools, parks, and transportation options. Trails and opportunities for walking provide livability to urban areas. The process of trail development should not be onerous for businesses. Trails should be a respectful neighbor and amenity for area businesses and employees.

"Walking and biking are amenities that our community highly values. There are opportunities for employees to get out for breaks, enjoy nature and exercise. Employees from Laika, Intel, and other large businesses are often observed on trails."

*-Deanna Palm
Hillsboro Chamber of Commerce*

Hillsboro School District

The City's Trails Master Plan process focuses on off-street trails, and their connection to on-street pedestrian and bicycle facilities as well as connections to destinations. The School District actively works to provide opportunities for kids to reach school by walking or bicycling.

With respect to trails and schools, there are issues to be aware of. While security is not much of a concern, as kids get older they seek ways to leave school campuses. Trails could provide opportunities for unmonitored behavior. We also recognize that trails provide a learning environment for instruction. Kids don't get out as much to experience nature as they once did. The School District would be open to having new public use trails on their property.

Regarding opportunities for trails, Indian Hills School along the powerline corridor (unincorporated area) has some potential for trail connectivity. The School District had contacted the City regarding the powerline corridor and Safe Routes to School. The City would be happy to partner with Washington County, if the County wished to build and/or maintain new areas of the powerline trail.

Jackson School Homeowner's Association

In 1975 as a condition of approval of Jackson School PUD, a public use easement for a trail through the natural area, was established. At public meetings, support has been voiced for the connection offered by the trails in the Jackson School Homeowner's

“This trail is a source of frustration and expense beyond what was ever envisioned in the initial vision. We also love it. If we did not see to it, we would want some assurance that it would be maintained as a wooded area.”

-HOA member

Association (JSHOA), while also expressing concern for safety. Hillsboro Code enforcement staff patrol the trails on average once a week, and arranges for graffiti abatement, however otherwise the JSHOA is held responsible.

Per the JSHOA, the undesirable public use of the trails and woods including gang activity, graffiti, drugs, litter, transients, etc. are a significant financial commitment for the HOA. In the early 1990s there was conversation between the HOA and City regarding transferring maintenance to City. Currently, the HOA would prefer to no longer be held responsible for the management of the trails and woods.

The City however is less interested now in taking on maintenance responsibility for the trail. An in depth discussion of roles and responsibilities with the City needs to occur.

Camwal Neighborhood

Decades ago, a bridge was installed over Turner Creek within the Camwal Road right-of-way. The bridge is currently closed due to a deteriorated state. At public meetings for the trail plan, there has been public support for enhancing connectivity in the community, especially for pedestrians and bicyclists where connections result in shorter, more direct or scenic routes of travel, away from busy streets. The Turner Creek corridor has no street crossings; Baseline / Main and SE 32nd Ave. The foot bridge in Turner Creek Park connects to the W.L. Henry school, so public use of school property is not permitted during school hours limiting when the park footbridge makes a functional connection.

“The current situation is a liability issue for residents. If someone were to enter my property, even inadvertently, and become hurt, I could be held responsible. There is no clear boundary between public right-of-way and private property.”

-Camwal resident

Residents were asked about their experiences while the bridge was open. One forty-nine year resident said she observed camping, kids, fires, drug activity, and vandalism in relation to the bridge. In her words, “it has not been pleasant.” Since the bridge was closed, maybe two years ago, it has been quiet. She would like it to remain closed for safety reasons. Several neighbors echoed this sentiment.

Another resident who lives on Camwal adjacent to the creek, claimed that she has not encountered any crime in the last ten to fifteen years. Her kids spent their youth playing in the creek, catching crayfish, and she is in favor of the bridge being reopened. Kids in general need more opportunities for walking and connecting to nature.

Latino Outreach Meeting

Priorities and concerns expressed by Latino community members included the following:

- Connectivity is limited within Hillsboro.
- Many people rely on walking and public transportation, and many streets lack sidewalks.

- High school students walk to school during dark months and walk on streets.
- Safety is critical.
- Need enhanced walking to schools, i.e. Ladd Acres, Century high School, TV Fred Meyers.
- Each neighborhood should have nice places to walk, connectivity, and nice loops. This would help us get to know our neighbors. Community is important.
- Let people know how a trail connection can make their lives easier: save time, save money, health, provide a direct route.

COMMUNITY NEEDS

This section provides an overview of community needs identified for the City’s trails system. The existing trails system currently attracts a variety of users, including walkers, runners, those with strollers, as well as both casual bicyclists and commuters. Each of these user groups has different needs—bicyclists, rollerbladers, and those with strollers, prefer smoother, hard surfaced trails, while hikers and runners often prefer a more natural surface environment. A variety of trails shall be provided in order to meet the diverse needs of the community.

Recreational Needs

Recreational trail use generally falls into one of three categories: exercise, passive enjoyment, and sightseeing. Recreational users have varied needs, since they have a broad range of skill and fitness levels, from a bicycle racer who does long rides each weekend, to a family with young children who want to ride a couple of miles down a quiet trail, to a weekend rollerblader out for some fun and exercise. Needs and patterns for recreational trail users include:

- Recreational users range from healthy adults to children to senior citizens with a wide variety of abilities and interests.
- Directness of the route is typically less important than the quality of the trail experience. Visual interest, shade, protection from weather, moderate gradients, and other “comfort” features are also very important.
- People exercising or passively enjoying nature often prefer a loop. Having recreational amenities as well as quiet places to stop and reflect along the route is important for all users. Trail enhancements aimed at providing a comfortable and enjoyable user experience include: drinking fountains, shaded areas, picnic tables, interpretive signs, scenic vistas, and restrooms. Destinations such as parks and schools are also important, as they provide a place to stop, rest, play, and explore.



Utilitarian Needs

Transportation trips are those that are primarily utilitarian in nature, including trips for reaching school and work, shopping, friends, and even to a recreational destination. There are over thirty schools and dozens of parks and recreational facilities within the City. People making utilitarian trips, whether in a car, on foot, or on a bicycle, share common attributes in the facilities they seek to use.

For potential trail users, these attributes include:

- Trip lengths that range from a few blocks to five or more miles.
- Direct routes with limited stopping requirements.
- Travel periods that often coincide with peak traffic volumes and congestion, increasing the exposure to potential conflicts with vehicles.
- Places to rest, drink, and store travel gear at their destination.
- Intersections with no stop signs or signal controls.
- Safe trail crossings over major motorized routes.
- Links to a comprehensive bicycle and pedestrian system.



Trail Access

In order to increase access for a greater number of trail users, connections to trails must be maximized. Within the City, strong links and navigational information between neighborhoods and the trails system are needed to allow trail users to access trails directly from their homes, rather than driving to a trailhead or other access point. In many areas of the City, development patterns include neighborhoods with internal roadway circulation systems coupled with a small number of primary access points to the arterial network. Improving access to trails not only expands recreation and transportation opportunities. Increased perforation also contributes to a safe trail environment. More trail access points allow for more visual surveillance, by trail managers, law enforcement professionals, and area residents and employees.



Connectivity

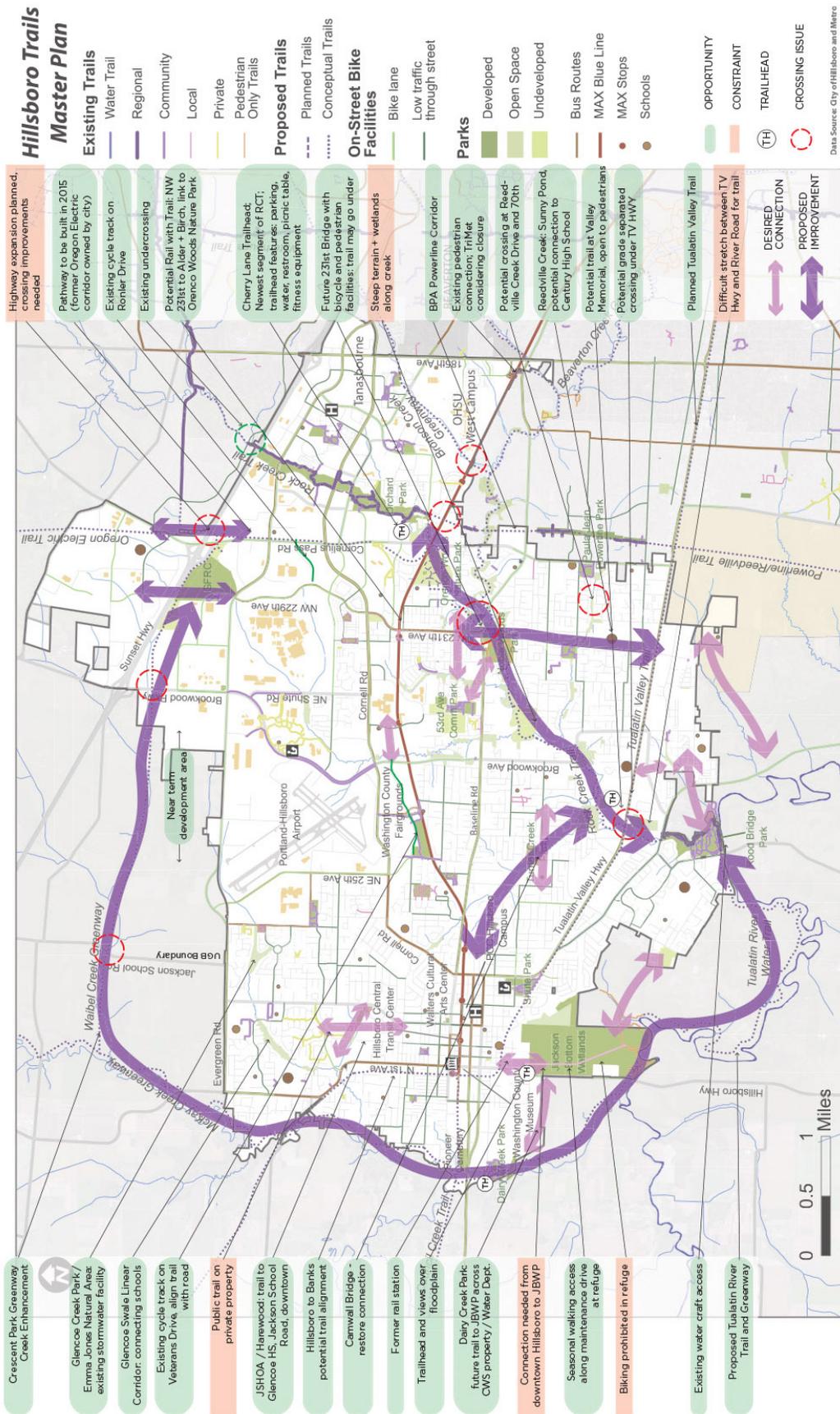
One of the challenges with the current trail system is a lack of continuity and consistency. As noted in the existing conditions chapter, many of the current trail facilities are not yet fully realized. Within Hillsboro, community members want connections to downtown, places of work, shopping and services as well as a direct connection to Jackson Bottom Wetlands Preserve. Connectivity should be considered between the trail network, and on-street bicycle and pedestrian facilities.

Routes connecting the eastern and western portions of the City are also lacking due to a limited number of crossings over waterways such as Dawson, Turner, and Rock Creek. Similarly, the Tualatin Valley Highway is a significant barrier to travel between north and south.

Members of the community have specifically asked for long distance trails that extend beyond the City limits providing regional connectivity. On the western edge of the City, the trails system connects to conceptual segments of the Banks to Vernonia Trail and the proposed Council Creek Trail leading to the Cities of Cornelius and Forest Grove. Along the southern edge, the trails system will connect to the Tualatin River Water Trail and Greenway as well as the potential TV Highway Trail. To the east, existing and proposed segments of the Reedville Trail will connect South Hillsboro to areas north. On the eastern edge, City trails may follow Bronson and Beaverton Creek Greenways providing connectivity the Tualatin Hills Park and Recreation District trails and facilities. In the north, the Rock Creek Trail will one day extend to the Oregon Electric Trail.

Identified opportunities and constraints, including community connectivity priorities are shown on the following map.

OPPORTUNITIES AND CHALLENGES



COMMUNITY VALUES AND PRIORITIES

Through public meetings and the on-line survey, members of the community were asked to identify their values and priorities for trail development within Hillsboro. These values directly inform the selection and prioritization of trail alignments. In order of importance, Hillsboro community members chose the following values to guide the Trails Master Plan:

- Access to and appreciation of nature - Residents appreciate the close connection to natural areas available within and around the City and value access to these places to contemplate, relax, enjoy, and appreciate nature.
- A viable transportation alternative - Members of the community see the trail network as a complimentary alternative to the roadway network.
- Active living / Healthy lifestyle - Active communities are vibrant places to live, work, and play. Residents value the trail network as a component of their healthy lifestyles.
- Connections to destinations - A trail can be a destination in itself, it can also connect us to the places we wish to go including our work places, schools, businesses and services, cultural, and recreational destinations.
- Ease of daily use - The trail network should be welcoming and accessible to all. It should be effortless to incorporate into the numerous aspects of our daily lives.
- Community / Knowing our neighbors - Hillsboro residents appreciate knowing their neighbors, opportunities to interact, and celebrate our diverse cultures.
- Safe routes to schools - Residents benefit from establishing healthy habits early on as well as the sense of independence and confidence that comes with walking and biking to school.

Community Priorities



Vision

Based on community, stakeholder, and City staff discussion and input, the following vision statement was formulated to guide the Hillsboro Trails Master Plan process. Members of the Hillsboro community envision the following:

A trail system for all that safely connects us to our destinations, each other, nature, and recreation, enabling us to appreciate the assets of our community while elevating the daily quality of life in Hillsboro.



03 TRAIL SYSTEM PLAN



RECOMMENDED TRAIL SYSTEM

This chapter contains an overview of the recommended trail system for the City of Hillsboro. It is based on an assessment of existing conditions supplemented by public and stakeholder priorities and values. Each recommended trail serves a specific purpose. However, collectively the system functions as an integrated network providing opportunities for the community to walk, bike, and experience nature close to home.

System Overview

The following tables and accompanying maps illustrate the recommended trail system improvements. The overall trail system map illustrates network improvements including:

- Trail alignment locations
- Trail classifications
- Trailhead locations
- Potential trail connections
- Features including existing trails, parks, natural areas, schools, and major destinations

The accompanying tables provide additional information to augment the features shown on each map including trail segment length, width, surface material, and greenway status. Projected costs are included within the implementation chapter.

Due to the diverse physical landscapes and settings through which the preferred alignments travel, the specific trail facility type will vary by location. The following trail typologies are as described in the design chapter and are included within the Hillsboro Trail System:

- Multi-Use Trails
- Water Trails
- Hiking / Walking Trails
- Neighborhood Accessways
- Mountain Bike Trails
- In road right-of-way facilities

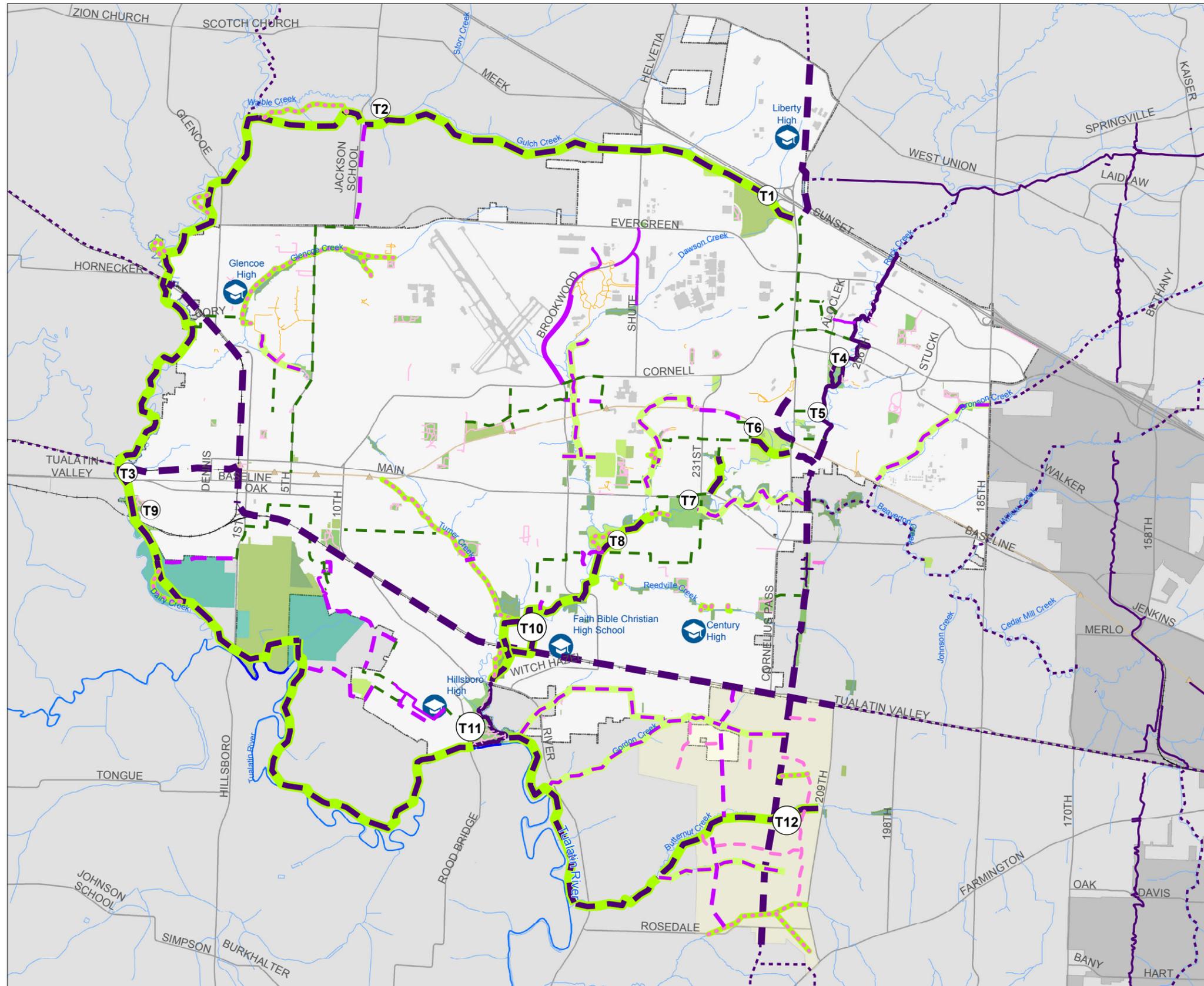
While this section depicts locations of site-specific improvements, the Trail Design Guidelines in Chapter 6 provide more detailed design guidance for the facility types listed above. It should be noted that appropriate design treatments will vary on a case-by-case basis depending on location and further analysis at the time components of the Master Plan are implemented.

The recommended trail system for the City of Hillsboro is described below. Individual trails are organized by their functional class whether regional, community, or local. Functional trail classes are described in Chapter 6. Alignments shown represent the most feasible and publicly supported trail routes at the time of this writing. Routes may change subject to ownership changes, detailed environmental review, final design, and regulatory review. Trail typologies will be further refined as opportunities for trail development occur and more detailed studies are conducted.

Regional Trails

Regional trails, due to their length and likelihood of being implemented in phases, are subdivided into segments. Segments were determined based on existing conditions, common challenges, and anticipated design typologies, as well as logical termini. Nine regional trails are recommended for the City of Hillsboro which will provide community members connectivity within and beyond the City limits.

Hillsboro Trails Master Plan



Recommendations

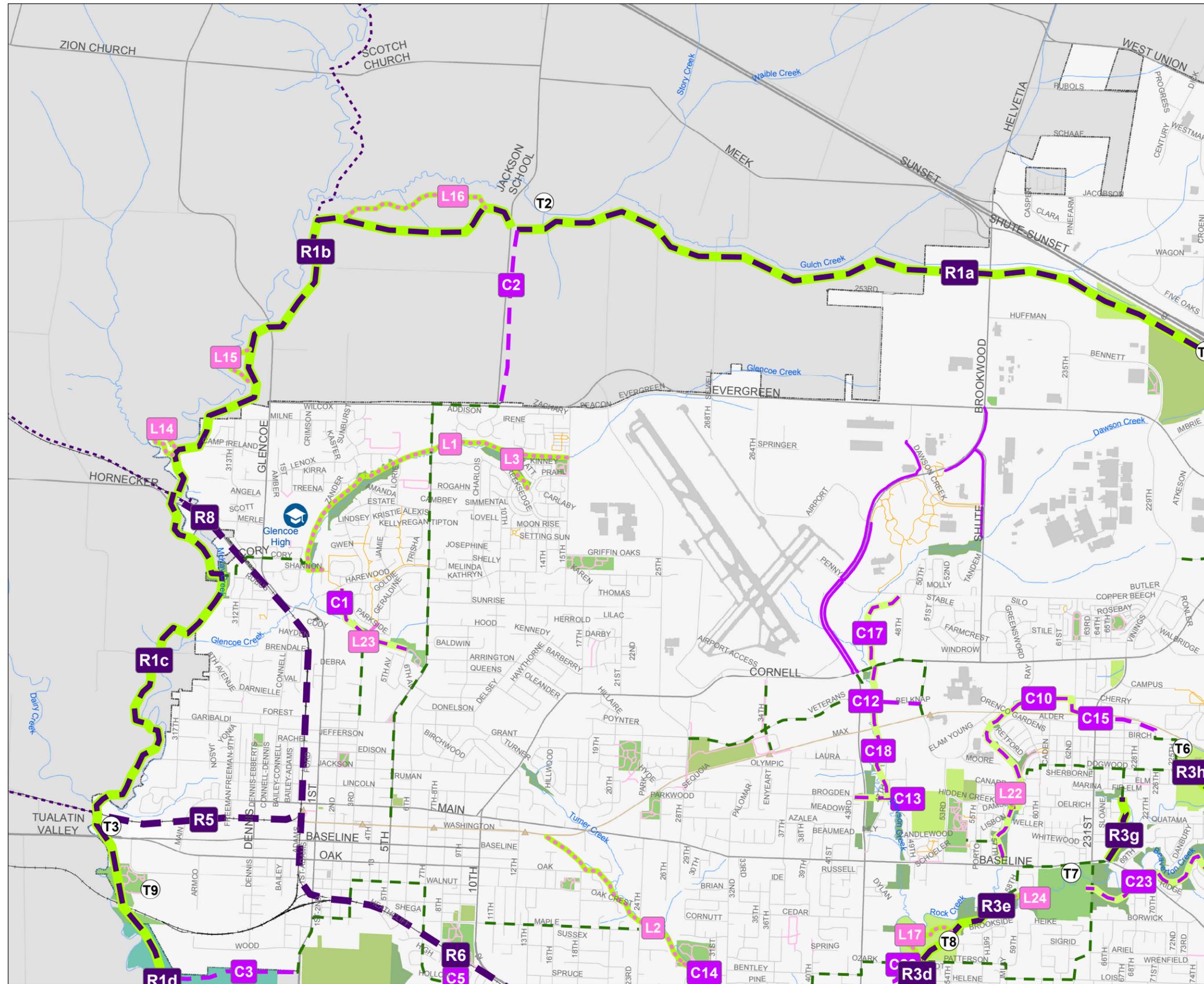
- Regional Greenway
- Regional Trail
- Community Greenway
- Community Trail
- Local Greenway
- Local Trail
- On-street Connector
- Trailheads

Existing Facilities

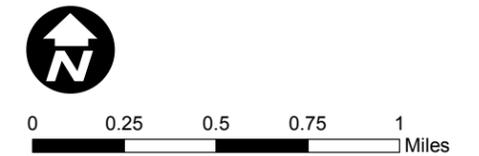
- Existing Regional Trail
- Existing Community Trail
- Existing Local Trail
- Private Trail
- Connecting Regional Trail
- Water Trail



Hillsboro Trails Master Plan NW Quadrant

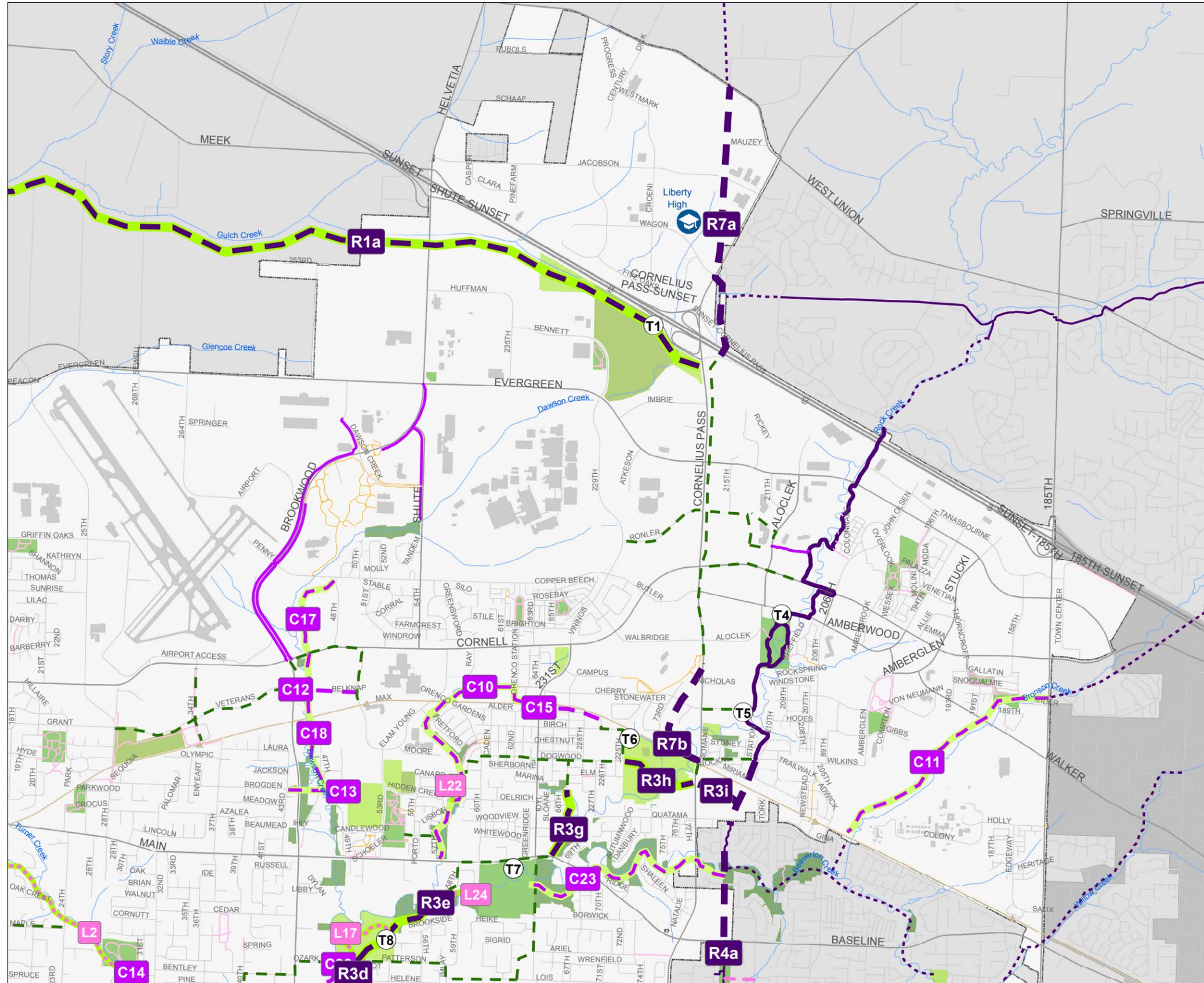


- Recommendations**
- █ Regional Greenway
 - █ Regional Trail
 - █ Community Greenway
 - █ Community Trail
 - █ Local Greenway
 - █ Local Trail
 - █ On-street Connector
 - T Trailheads
- Existing Facilities**
- █ Existing Regional Trail
 - █ Existing Community Trail
 - █ Existing Local Trail
 - █ Private Trail
 - - - Connecting Regional Trail
 - █ Water Trail



Hillsboro Trails Master Plan

NE Quadrant



Recommendations

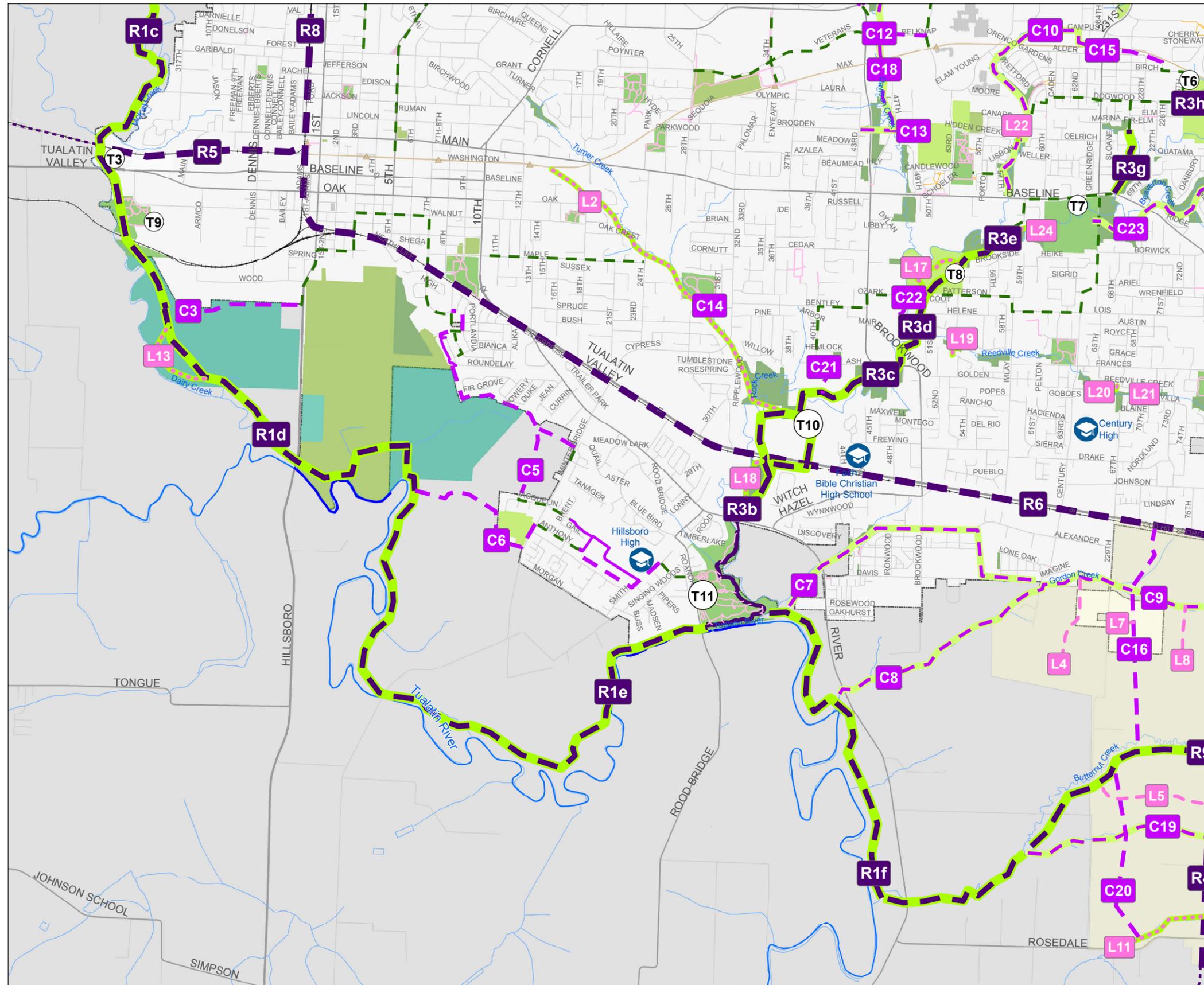
- Regional Greenway
- Regional Trail
- Community Greenway
- Community Trail
- Local Greenway
- Local Trail
- On-street Connector
- Trailheads

Existing Facilities

- Existing Regional Trail
- Existing Community Trail
- Existing Local Trail
- Private Trail
- Connecting Regional Trail
- Water Trail

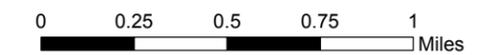


Hillsboro Trails Master Plan SW Quadrant



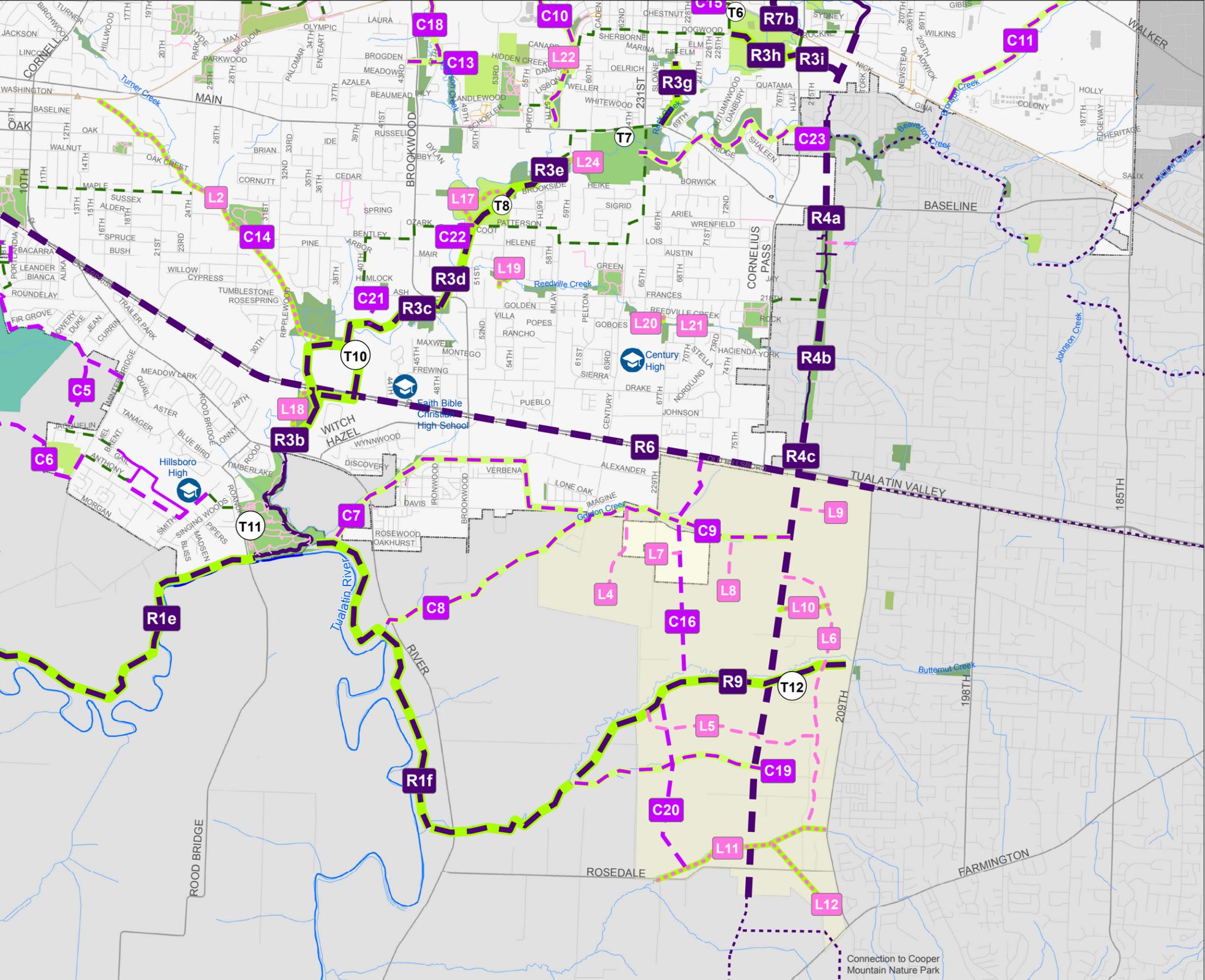
Recommendations

- Regional Greenway
 - Regional Trail
 - Community Greenway
 - Community Trail
 - Local Greenway
 - Local Trail
 - On-street Connector
 - Trailheads
- ## Existing Facilities
- Existing Regional Trail
 - Existing Community Trail
 - Existing Local Trail
 - Private Trail
 - Connecting Regional Trail
 - Water Trail



Hillsboro Trails Master Plan

SE Quadrant

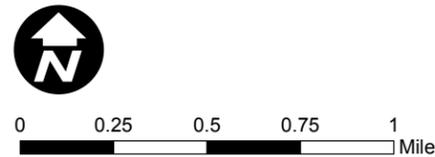


Recommendations

- Regional Greenway
- Regional Trail
- Community Greenway
- Community Trail
- Local Greenway
- Local Trail
- On-street Connector
- Trailheads

Existing Facilities

- Existing Regional Trail
- Existing Community Trail
- Existing Local Trail
- Private Trail
- Connecting Regional Trail
- Water Trail



Regional Trails		Multi-use	Hiking / Walking	Rail-Trail	Powerline	Water Trail	On-street	Boardwalk	Bridge	Roadway Crossing	Greenway	Existing	Width (ft)	Material(s)	Length (miles)
R1	Crescent Park Greenway (CPG)														16.1
R1a	CPG Waibel Creek: Cornelius Pass to Jackson School Road	•	•		•				•	•	•		12-14 (+6-8)	Concrete (natural surface)	3.6
R1b	CPG Waibel Creek: Jackson School Road to NW Hornecker Road	•	•							•	•		12-14 (+6-8)	Concrete (natural surface)	2.7
R1c	CPG McKay Creek: NW Hornecker Road to Dairy Creek Park	•	•					•			•		12-14 (+6-8)	Concrete (natural surface)	2.9
R1d	CPG Dairy Creek: Dairy Creek Park to Jackson Bottom Wetlands		•					•			•		4-6	Natural surface	1.6
R1e	CPG Tualatin River: Jackson Bottom Wetlands to Rood Bridge Park		•					•			•		4-6	Natural surface	3.4
R1f	CPG Tualatin River: Rood Bridge Park to Butternut Creek		•					•			•		12-14 (+6-8)	Concrete (natural surface)	1.8
R2	Tualatin River Water Trail					•					•	•	1.4	Launch in process. Signage.	0.9
R3*	Rock Creek Trail (RCT)														7.9
RE3	RCT: Tualatin River to SE River Road	•									•		6-9	Utilize existing trail	0.9
R3b	RCT: SE River Road to Tualatin Valley Highway	•	•	•						•	•		8-10 (4)	Concrete (natural surface)	0.5
R3c	RCT: Tualatin Valley Highway to SE Brookwood Avenue	•	•				•	•		•	•		8-12	Concrete, natural surface (ex)	1.3
R3d	RCT: SE Brookwood Avenue to SW Ozark Lane	•						•		•	•		12-14	Concrete	0.5
R3e	RCT: SW Ozark Lane to SE 58th Avenue	•	•					•		•	•		12-14 (4)	Concrete (natural surface)	0.5
R3f	RCT: SE 58th Avenue to Century Boulevard						•			•			NA	On-street. Wayfinding.	0.6
R3g	RCT: SE Century Boulevard to Orenco Woods Nature Park	•						•		•	•	•	10-12	Concrete	0.3
R3h	RCT: Orenco Woods Nature Park	•	•										NA (3)	Existing multi-use as of 2017, (natural surface)	0.3
R3i	RCT: Orenco Woods Nature Park to Reedville Trail	•	•										12-14 (+6-8)	Concrete (natural surface)	0.2
RE3	RCT: Orchard Park, NE Wilkins to Highway 26	•								•	•	•	10-14	Existing asphalt, boardwalk	2.7
R4	Reedville Trail (RVT)														5.4
R4a	RVT: Orchard Park to Baseline	•	•		•				•	•			10-12 (+6-8)	Asphalt (natural surface)	0.9
R4b	RVT: SW Jay Street to SW Peggy	•	•		•				•				10-12 (+6-8)	Asphalt (natural surface)	2.2
R4c	RVT: SW Johnson St to South Hillsboro	•	•		•					•			10-12 (+6-8)	Asphalt (natural surface)	2.2
R5	Council Creek Trail	•									•		12	Asphalt rail to trail	1.2
R6	Tualatin Valley Trail	•		•									12	Asphalt, rail with trail, fencing	5.1
R7	Oregon Electric Railway Trail														1.8
R7a	OET: West Union to Sunset Highway		•	•						•			12 (+4)	Asphalt, rail to trail (natural surface)	1.2
R7b	OET: West Union to Sunset Highway		•	•									12 (+4)	Asphalt, rail to trail (natural surface)	0.5
R8	Hillsboro to Banks Trail			•									10-12	Asphalt, rail with trail, fencing	2.0
R9	Butternut Creek Trail	•						•			•		12-14 (+3)	Concrete (natural surface)	2.3
														TOTAL REGIONAL TRAIL LENGTH (MILES)	42.6

* See Rock Creek Trail Alignment chapter for additional information.

In general, regional trails are recommended to be paved and multi-use; however, other typologies occur. Issues such as available right-of-way, topography, or sensitive natural resources will affect both trail width and surface materials. For example, separate alignments are provided to accommodate cyclists and pedestrians near Jackson Bottom Wetland Preserve (JBWP) due to the area having significant habitat. Other physical features such as railways or power lines also influence the recommendations. Greenway trails follow creeks and waterways. As such, features such as boardwalks and bridges will be needed. Each of the recommended regional trails are described below.



R1 Crescent Park Greenway

The overall vision for Crescent Park Greenway is described within Chapter 4 of this document. The route is intended to be primarily recreational in nature following several waterways that surround the City.



R2 Tualatin River Trail

The Tualatin River Trail is already in use. An access point currently exists at Rood Bridge Park and the City is working towards further improving river access. The addition of interpretive, wayfinding, and regulatory signs along this route are recommended.



R3 Rock Creek Trail

An alignment for the Rock Creek Trail is described within Chapter 5 of this document. The Rock Creek Trail is a major spine of the trail network as well as a place of pride for Hillsboro community members. Recommendations include a continuous multi-use trail along Rock Creek between the Tualatin River and Sunset Highway. Several opportunities for parallel natural surface trails are depicted and should be pursued whenever feasible.

R4 Reedville Trail

Several segments of the Reedville Trail are already in place. Gaps in the alignment are identified in order to realize a continuous alignment. A multi-use path is recommended with a parallel natural surface path. Coordination with the local power agency and Washington County will be required to complete these segments in the unincorporated areas.



R5 Council Creek Trail

Council Creek Trail within Hillsboro is envisioned to follow an active railway alignment. The 2015 Council Creek Regional Trail Master Plan anticipates the alignment occurring on the south side of the tracks. Trail design may need to accommodate future extension of the MAX light rail line. If the freight rail line is abandoned in the future, the rail bridge over Dairy Creek could be reused to accommodate the trail.



R6 Tualatin Valley Trail

The Tualatin Valley Trail is located along TV Highway and would provide an efficient connection to downtown Hillsboro. Upgrades to the highway, including bicycle, pedestrian, and trail improvements are being planned by ODOT.





R7 Oregon Electric Trail

Alignment R7 follows a former rail corridor. An off-street bikeway will soon occur on the east side of NW Cornelius Pass. Recommended multi-use trail alignments will extend this bikeway to both the north and the south.



R8 Hillsboro to Banks Trail

This rail with trail would provide a direct route from downtown Hillsboro to the town of Banks. Negotiations with the rail owner and operator would need to occur prior to this alignment going forward.



R9 Butternut Creek Trail

The alignment along Butternut Creek completes the Crescent Park Greenway while connecting the Reedville Trail and South Hillsboro to the Tualatin River. This conceptual alignment was derived from the South Hillsboro Concept Plan and will be further developed as those plans progress.

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		Typologies													
Code	Description	Multi-use	Hiking / Walking	Rail-Trail	Powerline	Water Trail	On-street	Boardwalk	Bridge	Roadway Crossing	Greenway	Existing	Width (ft)	Material(s)	Length (miles)
Community Trails															
C1	Jackson School Woods: NE Harewood Street to NE Jackson School Road	•	•								•		8-10 (+3)	Concrete (natural surface) use existing alignments	0.5
C2	Hillsboro to Banks Trail	•		•						•			10-12	Asphalt, fencing	0.8
C3	Dairy Creek to JBWP connector	•								•			10-12	Concrete	0.6
C5	JBWP to Hill High (north): via Arbor Roses Neighborhood	•											10-12	Concrete	1.3
C6	JBWP to Hill High (south): via Magnolia Estates		•					•		•	•		6-8	Natural surface	1.3
C7	Rood Bridge to SoHi (north): via Gordon Creek and Davis Street	•	•								•		10-12 (+3)	Concrete (natural surface)	1.5
C8	Rood Bridge to SoHi connector (north): via Gordon Creek	•	•					•			•		10-12 (+4)	Concrete (natural surface)	1.3
C9	SoHi (north)	•	•								•		10-12 (+3)	Concrete (natural surface)	0.8
C10	Orenco Creek Trail: SE Baseline Road to Existing Trail	•	•							•	•		10-12 (+4)	Concrete (natural surface)	1.3
C11	Bronson Creek Greenway: MAX line to Amberglen	•	•					•			•		10-12 (+6)	Concrete (natural surface)	1.2
C12	Dawson Creek Connector: NE Veterans Drive to NE Belnap Court	•					•		•		•		12-14	Bridge, on-street	0.3
C13	Dawson Creek Connector: NE Brogden Street to 53rd Avenue Community Park	•					•		•		•		12-14	Bridge, concrete, on-street	0.3
C14	Camwal Bridge								•		•		6-8	Bridge, on-street	0.1
C15	Orenco MAX Trail Connection	•		•					•		•		10-12	Asphalt, rail with trail, fencing	0.4
C16	SoHi (N-S): Tualatin Valley Highway to Rosedale	•											10-12	Concrete	1.1
C17	Dawson Creek (north)	•									•		10-12	Concrete	0.4
C18	Dawson Creek (south)	•									•		10-12	Concrete	0.6
C19	Butternut Creek	•									•		10-12	Concrete	1.0
C20	SoHi (N-S): Tualatin Valley Highway to Rosedale	•											10-12	Concrete	0.8
C21	RCT Connector: to 40th Ave	•											10	Concrete	0.1
C22	RCT Connector: Ozark to Patterson	•							•		•		10	Concrete, retaining walls	0.4
C23	Beaverton Creek		•								•		4-6	Natural surface	1.1
														TOTAL COMMUNITY TRAIL LENGTH (MILES)	17.1

Code	Description	Typologies											Width (ft)	Material(s)	Length (miles)		
		Multi-use	Hiking / Walking	Rail-Trail	Powerline	Water Trail	On-street	Boardwalk	Bridge	Roadway Crossing	Greenway	Existing					
Local Trails																	
L1	Glencoe Swale: NE 15th Avenue to NE Harewood Street		•					•					•		3-6	Natural surface	1.6
L2	Turner Creek		•					•					•		3-4	Natural surface	1.6
L3	Glencoe Creek Park to Park's Edge		•										•		3-6	Natural surface	0.2
L4	SoHi school connection		•												3-6	Natural surface	0.5
L5	SoHi park connection		•												6-8	Natural surface	0.9
L6	SoHi N-S connection		•												6-8	Natural surface	1.3
L7	SoHi E-W west school connection		•												3-6	Natural surface	0.1
L8	SoHi E-W central school connection		•												3-6	Natural surface	0.3
L9	SoHi E-W connection		•												3-6	Natural surface	0.2
L10	SoHi park trail		•										•		6-8	Natural surface	0.2
L11	SoHi E-W connection		•										•		6-8	Natural surface	0.8
L12	SoHi SE spur		•					•					•		3-6	Natural surface	0.4
L13	Dairy Creek Park path		•										•		6-8	Natural surface	0.4
L14	Swallowtail School path		•										•		6-8	Natural surface	0.3
L15	McKay Creek spur		•										•		3-4	Natural surface	0.3
L16	Waibel Creek: West spur		•										•		3-4	Natural surface	0.7
L17	Rock Creek Trail: Blueberry spur		•										•		4-8	Natural surface	0.3
L18	Rock Creek Trail: Deep Dish spur		•										•		4-8	Natural surface	0.3
L19	Reedville Creek Crossing from Pine to Francis		•									•	•		6-8	Bridge, Natural surface*	0.1
L20	Reedville Creek Crossing at Century High School		•									•	•		6-8	Bridge, Natural surface*	0.1
L21	Reedville Creek Crossing at 70th		•									•	•		6-8	Bridge, Natural surface*	0.1
L22	Orenco Creek nature trail		•										•		3-4	Natural surface	0.2
L23	JSHOA Connector: Geraldine to 3rd		•					•	•				•		6-8	Bridge, Natural surface*	0.1
L24	Nobel Woods connector		•					•							3-4	Natural surface	0.1

TOTAL LOCAL TRAIL LENGTH (MILES) 11.3

Community Trails

As per the design guidelines chapter, community trails provide vital connections between neighborhoods or subareas within the City. Community members expressed strong interest in connecting to JBWP, downtown Hillsboro, Crescent Park Greenway, Rock Creek Trail, parks, local businesses and services, schools, and transit stations. Several recommended community trails enhance access to each of these destinations.

Within the City of Hillsboro, recommended community trails often make use of minor creek corridors. This is due to two primary factors. One is the natural linear nature of waterways, the other is the public's strong desire to access and experience nature. As with any trail near a natural resource area, trails along waterways warrant a deliberate design approach that considers opportunities for resource avoidance, mitigation, and enhancement. Considerations for the development of greenway trails or trails occurring near waterways are described within the design chapter of this document.

Local Trails

The finest scale of the trail experience and connectivity occurs via local trails. Local trails may include accessways and connections to larger trail segments or an opportunity for a short, quiet hike. Local trail opportunities further include bridges at key locations in order to provide local connections within neighborhoods.

Local trails are often recommended to be narrow natural surface paths suitable to a leisurely walk. Community members value opportunities to escape the built environment to access nature via small hiking trails. Opportunities for such experiences should be considered in conjunction with future trail opportunities. Several such opportunities are shown as "loop" trails which originate and end at other, larger trails.

Frequent perforation and access to larger trails via local trails is an important aspect to creating a walkable and bikable community. As future developments occur, opportunities for walking and biking access to planned trail alignments should be preserved.

On-Street Connectors

While community members expressed a strong desire for trails, they also see on-street facilities as critical to their walking and bicycling needs. Based on public input, upgraded bicycle and pedestrian facilities on major roadways are especially important. Specific on-street alignments are also included within the maps that follow. These alignments provide interim biking and walking connectivity in areas that are viewed as particularly challenging or long term. Some also represent needed exchange points between on-street and off-street facilities. Others routes represent the opportunity to expand the period of usefulness using alternative alignments in response to seasonal flooding. These alignments should be looked at further as the City further plans its on-street bicycle and pedestrian network.

Trailheads

Trailheads are an important component of any trail system. While each trail trip is not expected to originate by motor vehicle, trailheads offer the opportunity for community members who wish to drive to a trail access point do so. The components and functions of trailhead facilities are further described within the design chapter of this document.

<u>Code</u>	<u>Description</u>	<u>Status</u>
T1	CPG at GFRC	proposed
T2	CPG at Jackson School Road	proposed
T3	CPG at McKay Creek and TW Highway	proposed
T4	RCT at Amberwood	existing
T5	RCT at Cherry Lane	existing
T6	RCT at Orenco Woods Nature Park	complete as of 2017
T7	RCT at Nobel Woods	proposed
T8	RCT at Patterson Street	proposed
T9	CRG at Dairy Creek Park	existing
T10	RCT at Valley Memorial	proposed
T11	RCT at Rood Bridge Park	proposed
T12	CPG at South Hillsboro	proposed

04 CRESCENT PARK GREENWAY VISION





CRESCENT PARK GREENWAY

Members of the Hillsboro community came together to determine the following vision and goals for the Crescent Park Greenway (CPG). While it may take many years to implement, the intent of the Crescent Park Greenway is to provide a continuous green loop around the City with a multitude of recreation and ecosystem functions. This vision is thoughtfully created now in order to spur enthusiasm and provide guidance for its implementation as opportunities arise.

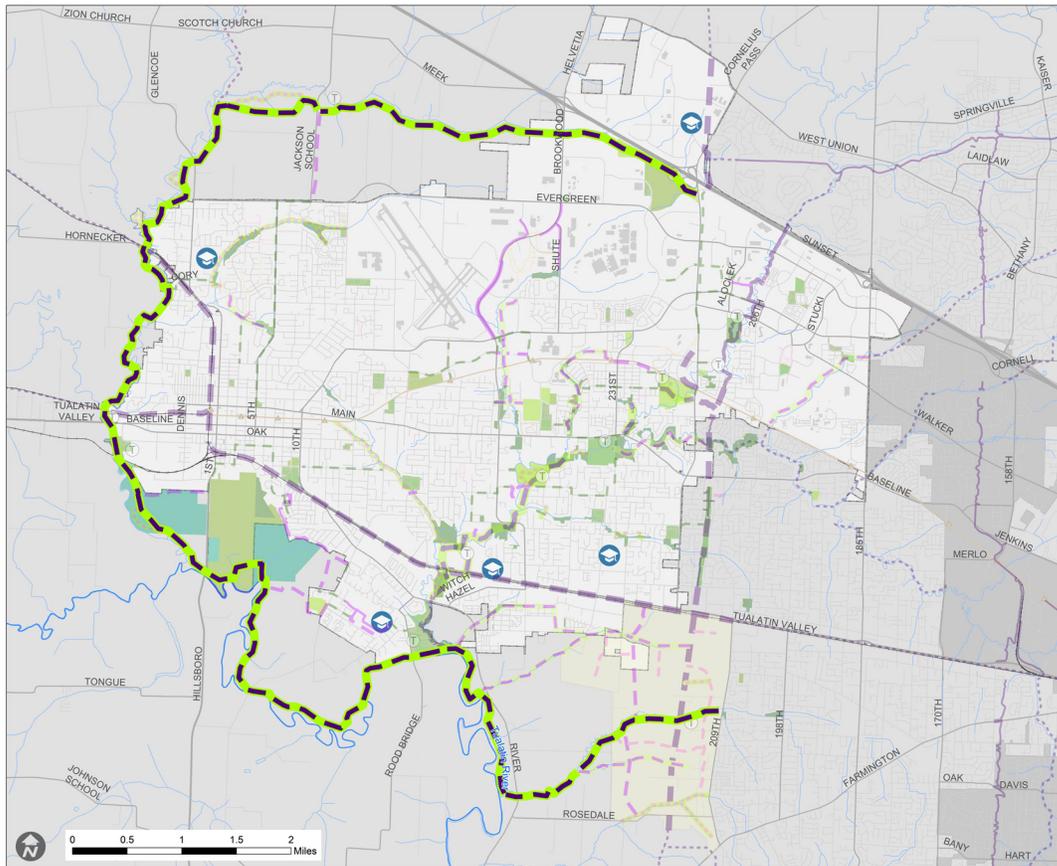
Vision

Crescent Park Greenway is a significant community resource. It couples access to recreation, neighborhoods, employment, and services, in balance with nature, elevating the quality of our daily lives. The Crescent shall complete a greenway loop around the City contributing to a vibrant Hillsboro.

Goals

The following primary goals shall guide decision making with respect to the Crescent Park Greenway. According to City leaders and community members, the CPG shall strive for the following:

- The CPG shall be a resource and destination for the community.
- We envision the CPG as a signature feature of the overall park and trail system.



Crescent Park Greenway follows three of the City's waterways creating a loop around the City.

- The trail design and experience shall respond to the setting unique to each segment whether open and expansive or intimate and meandering.
- The CPG shall meet multiple objectives
 - » Recreation - opportunities to appreciate nature
 - » Natural area restoration and enhancement
 - » Stormwater management
 - » Shall be an asset for future development

Stakeholders predominantly appreciate the Crescent Park Greenway as a recreational asset, a destination trail that provides opportunities to connect with nature. It should be a place where people go with the intention of visiting and spending time, over serving as a transportation corridor.

The Greenway shall meander along with Waibel, McKay, and Dairy Creek, as well as the Tualatin River, connecting each end of the Rock Creek Trail while also extending to South Hillsboro and the Reedville Trail via Butternut Creek to create a continuous greenway loop around the City. Accordingly, it shall offer a natural contrast to the urban experiences available within Hillsboro. The Greenway will change character in response to the specific context at hand with some areas providing an organic and wild experience, while others exhibit a more manicured appearance. The resulting diversity of unique trail settings will enrich the overall trail experience. It naturally shall provide a variety of experiences meeting the multitude of recreational needs of its users.

Opportunities for access and connections include: existing parks such as Dairy Creek Park, Gordon Faber Recreation Complex, Jackson Bottom Wetland Preserve, and Rood Bridge Park, as well as future parks or trailheads appropriately sited along the route.

Ideally, the CPG will offer both a paved trail experience as well as natural surface options to provide a wide range of experiences. The loop should be composed of a main spine augmented by spur trails, as well as viewpoints, boardwalks, and overlooks that appear in celebration of special places such as created wetlands and ponds.



The CPG shall be comfortable and inviting for all. User safety and comfort is important and should be provided via trail improvements including: safe roadway crossings, drinking fountains, wayfinding signage and mile markers, rest rooms, benches or seating and trash receptacles.

The northern reach of the Crescent Park Greenway generally follows Waibel Creek. The area south of US 26 is within the Urban Growth Boundary, and the development of several large parcels is already in process. In this area, Waibel Creek is currently a



The vision for the Crescent Park Greenway in North Hillsboro includes a multi-use pathway and natural surface spur trails along a restored Waibel Creek.

narrow ditch with little wildlife or stormwater management function. As parcels in the area are developed, the amount of surface run-off and stormwater management will grow.

As North Hillsboro develops, the ecosystem functions of Waibel Creek will expand to include the management of stormwater and restored vegetative corridor. Waibel Creek shall be restored to a natural form including a gentle bank slope, functioning vegetative corridor with native plants, and meandering alignment capable of serving stormwater management functions. The enhancement and restoration of the Waibel Creek corridor offers unique opportunities for meeting multiple objectives if carefully and cooperatively planned. Floodplain areas designed to accommodate stormwater are also valuable to wildlife, and provide a scenic setting for the trail. Areas that detain flood waters during the wet season could serve other functions, including recreation, during drier times. Crescent Park Greenway is envisioned as a respectful neighbor and amenity for area businesses and employees.



Along McKay Creek the Crescent Park Greenway shall incorporate trail on boardwalk structures in order to expand trail use during seasonal flood events.

The western portion of the CPG follows McKay Creek. McKay is natural and sinuous in nature with stands of mature trees following its banks. At the edge of the urban growth boundary, it travels through areas of residential and agricultural lands. Although much of the creek is within steep banks, it is prone to flooding.

Along McKay Creek, Crescent Park Greenway provides access to nature at the urban edge. While some areas have gentle slopes and are subject to flooding, others are more steeply embanked. Both situations create challenges for trail development. Trail use in flood prone areas may be extended through the use of elevated boardwalk structures, while smaller scale, pedestrian only trails may be appropriate for areas with more topography and sensitive natural resources.

The southern reach of the Crescent Park Greenway primarily follows the Tualatin River. In this stretch, the alignment is bifurcated to separately serve cyclists and pedestrians due to wildlife needs at JBWP. East of JBWP the Crescent meets Rood Bridge Park where it connects with Rock Creek Trail before it continues along the Tualatin River eastward until Butternut Creek. Following Butternut Creek, the Crescent meets the Reedville Trail, one day resulting in a complete loop around the City.

It is imperative that opportunities to bring this vision to fruition are captured as they present themselves. Development should work in tandem with the goals of this vision so that the multitude of benefits is realized in full. Hillsboro should continue to work with potential partners to help realize this vision.



**05 ROCK CREEK TRAIL
ALIGNMENT**



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ROCK CREEK TRAIL ALIGNMENT

Spanning 7.9 miles, the Rock Creek Trail alignment will provide an active transportation and recreation opportunity for Hillsboro residents, visitors, and employees. The primary goal for the Rock Creek Trail is to provide a multi-use pathway extending through the City of Hillsboro while connecting to regional trails beyond. The alignment should follow its namesake, Rock Creek, as it extends between Rood Bridge Park and the Tualatin River in the south and Orchard park and regional trail connections to the north.

The alignment further connects community members to open space jewels including Rood Bridge Park, Noble Woods Park, and Orenco Woods Nature Park while providing access to nature along Rock Creek. The preferred alignment will provide a convenient and comfortable atmosphere for trail users of all ages and abilities; provide access (but limit impacts) to natural and cultural resources; and enhance non-motorized connectivity in the region. While the main focus of the alignment study is the recreational and transportation spine, opportunities for smaller scale trails that provide opportunities to passively enjoy the natural environment are also described.





Alignment Evaluation

Working with the Technical Advisory Committee, Citizen Advisory Committee, stakeholders and local community members, trail alignment options for Rock Creek Trail were identified and evaluated. The evaluation criteria are based on project goals developed during the project visioning process. Each alignment was considered with respect to fatal flaws reflecting the project evaluation criteria. Alignments without fatal flaws were further evaluated based on the criteria described below. This approach provided an objective means to compare segment options against one another as well as identify specific recommendations for improving alignments. The Project Team vetted the findings of the analysis with stakeholders, local decision makers, and the public, and made refinements to develop the recommended Rock Creek Trail alignment.

Potential Rock Creek Trail alignments were screened using the following evaluation criteria. Tier 1 criteria reflect community values identified as the top priorities by project stakeholders and members of the public. These criteria were weighted higher in the final total score of each alignment. Tier 2 criteria include issues that have an impact on trail feasibility and constructability. Cost considerations are inherently included within several of the categories and thus were not separately evaluated. For example, trails that require bridges or boardwalks will likely require more time in design and permitting and also result in higher construction costs than trails built on open, level ground. However, those features may also enhance the user experience by providing scenic views and proximity to natural areas.

Criteria Definition

Tier 1 Community Values

Connections to Destinations

This criterion evaluates connectivity and directness of route between area destinations. Destinations include schools, parks, residential, commercial and employment areas, as well as access to other trails, bikeways or transit. A high score is given to trail options that provide a direct route between area destinations. A low value is given to circuitous or indirect routes or those not in close proximity to area destinations.

Quality of Experience / Access to Nature

This criterion measures the quality of the proposed trail from the perspective of the user. It identifies the ability of the trail segment to provide opportunities for nature enjoyment, environmental education, and interpretation. It considers potential views, access to natural resource areas such as woodlands, meadows, ponds, wetlands, streams, rivers, and scenic areas, as well as characteristics of the alignment context such as noise, and air quality. For example, an on-street route along a major roadway will receive a lower rating than an off-street route adjacent to a stream or scenic area.

User Safety

This criteria measures the alignments' interactions with vehicle traffic. The assessment considers existing crossing treatments (if any), roadway traffic speed, sight visibility, and traffic volumes. Alignments are further considered with respect to the following safety criteria: screening, visibility, presence of natural surveillance, emergency access, and proximity to hazards. Typically, alignments separate from traffic and having fewer roadway crossings received higher evaluative scores. Alignments within the road right-of-way, those which lack crossing





improvements across roadways or those lacking natural surveillance opportunities are scored lower.

Topography/Accessibility

Site topography is a feature in the study area that affects potential trail alignments, user types, and construction requirements. Steep grades prohibit some user groups from trail use. They also require more site disturbance and infrastructure to implement. Thus, alignments through generally flat areas receive a positive score, whereas alignments in areas with significant slopes receive a negative rating.

Tier 2 Trail Feasibility & Constructability

Environmental Enhancement or Challenges

Alignments are scored based on their potential to positively enhance or negatively impact environmentally sensitive areas. Options which present opportunities for environmental enhancement or benefit, such as improving or enhancing degraded areas, receive a high score. Alignments having a negligible impact on sensitive areas receive a neutral score. Alignments through or near wetlands or other sensitive natural resource areas will be sensitively designed, however, they receive a lower score due to augmented efforts required to sustainably design and permit the alignment.

Public and Political Support

Having the support of local community members and political figures is essential to trail implementation. Alignments that have been favorably received by the general public and that have agency support receive a high rating.

Ownership/Private Property Impacts

Alignments are scored based on their occurrence within parcels owned by public entities versus privately held properties. Trail segments identified as not requiring acquisition of property rights from a private individual or business receive the

highest rating. Alignments on undeveloped properties or those owned by identified willing sellers are given a moderate score, whereas alignments occurring on properties where the willingness of the owner to grant an easement or property sale is unknown receive a lower rating. The nature of possible impacts of trail alignments on private properties is also considered. Alignments with greater impacts on private property current or future uses receive a lower score than alignments with minimal impacts on current or future uses. Alignments crossing numerous private properties, for example, shall receive a lower rating than those occurring in single large taxlots or undeveloped areas.

Operations and Maintenance

Implementation of any trail alignment will require that a trail manager operate and maintain the facility. Alignments having fewer anticipated maintenance requirements (debris removal, resurfacing, flooding) and ready access receive a high rating. Alignments expected to require intensive maintenance investment are scored lower.

Alignment Recommendations

The following pages describe the opportunities, constraints, and recommendations associated with each alignment by segment.



SEGMENT R3A

Tualatin River to SE River Road

THE ALIGNMENT SPANS BETWEEN THE TUALATIN RIVER WATER TRAIL TO SE RIVER ROAD ALONG AN EXISTING PAVED TRAIL ALIGNMENT WITHIN ROOD BRIDGE PARK.	
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • Rood Bridge Park serves as a trailhead with parking. • Paved trail segments exist within Rood Bridge Park and outside of flood area. • The Tualatin River is a resource to be celebrated. • Existing signalized intersection at SE River Road and SE Rood Bridge Road 	<p>CONSTRAINTS</p> <ul style="list-style-type: none"> • Existing alignment is open for seasonal use only due to flooding. • SE River Road has poor sight lines and high vehicle speeds. • An undercrossing of SE River Road would be seasonal only due to flooding. • Visibility and knowledge of the existing park access point on SE River Road is lacking. • SE Rood Bridge Road does not currently include a complete sidewalk network.
<p>RECOMMENDATIONS</p> <p>Alignment to follow existing Rock Creek Trail alignment along Rock Creek within Rood Bridge Park. Other paths outside of the flood area may be used to expand the number of days of use. Provide a seasonal alternative on-street route via SE Rood Bridge Road, and existing signalized intersection crossing at SE River Road. Provide at-grade crossing improvements across SE River Road. Provide an overlook of the Tualatin River with interpretive information. Increase visibility of the northern park access point via wayfinding signs.</p>	



Existing paved trail at Rood Bridge Park could function as the Rock Creek Trail.



Crossing improvements are needed to get users safely across SE River Road

SEGMENT R3B

SE River Road to Tualatin Valley Highway

<p>SEGMENT 2 PROVIDES AN OFF-STREET TRAIL CONNECTION BETWEEN SE RIVER ROAD AND TUALATIN VALLEY HIGHWAY PRIMARILY ALONG PROPERTY OWNED BY THE CITY OF HILLSBORO, EAST OF ROCK CREEK.</p>	
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • Significant City owned property between SE River Road and Tualatin Valley Highway. • Existing 12' wide City interim easement between Witch Hazel Village community and D & G Industrial Park. • Existing Tualatin Valley Highway crossings near Faith Bible High School and SE 32nd. • Existing railway crossings at properties currently occupied by Permapost and Precision Import Repair. • Existing TriMet bus stops on Tualatin Valley Highway. • Potential future Tualatin Valley Trail connection along Tualatin Valley Highway. 	<p>CONSTRAINTS</p> <ul style="list-style-type: none"> • Land use agreement or acquisition needed from at least one private property owner. • Inability to create new railway crossings and limited existing railway crossings. Owners of private railway crossings may not be open to trail use. • Tualatin Valley Highway has high vehicle speeds and volumes, and limited bicycle and pedestrian improvements. • Existing crossing near Faith Bible High School is substandard and requires substantial out-of-direction travel and for use.
<p>RECOMMENDATIONS</p> <p>Align trail along eastern edge of existing City owned property between SE River Road and Tualatin Valley Highway. Add a meandering natural surface spur trail opportunity between Rock Creek and the recommended main trail alignment. Upgrade existing Tualatin Valley Highway crossing near Faith Bible High School.</p>	



City owned property south of Tualatin Valley Highway



Rock Creek passes under Tualatin Valley Highway and a rail trestle.

SEGMENT R3C

Tualatin Valley Highway to SE Brookwood Avenue

<p>ALIGNMENT FOLLOWS EXISTING SERVICE ROADS WITHIN VALLEY MEMORIAL PARK BETWEEN TUALATIN VALLEY HIGHWAY AND ROCK CREEK. THE TRAIL CROSSES TO THE NORTH BANK OF ROCK CREEK AND FOLLOWS THE NORTHERN BANK TO SE BROOKWOOD AVENUE.</p>	
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • Existing trails and serene setting within Valley Memorial Park. • Undeveloped areas of Valley Memorial. • Overlook development may provide opportunities for trail development. • Existing sewer easement at Overlook development north of Rock Creek. • Existing Metro property south of Brookwood. • SE 40th Avenue and SE Bentley Street are low volume, low speed roadways. 	<p>CONSTRAINTS</p> <ul style="list-style-type: none"> • Property easements or agreements needed from at least three private property owners. • Sensitive wetlands present along Rock Creek. Area subject to flooding. • Natural areas require environmentally sensitive design treatments. • Rock Creek crossing needed. • Southern portion of alignment segment does not follow Rock Creek and is indirect. • No existing crossing improvements at Brookwood. • Brookwood undercrossing subject to seasonal flooding.
<p>RECOMMENDATIONS</p> <p>Follow existing service roads within Valley Memorial Park to City owned property. Work with Valley Memorial to develop a trailhead in the NE corner of property. Formalize public use of Valley Memorial Trails. Alignment to cross to north side of Rock Creek north of City property and follow existing sewer easement through Overlook development before continuing on Metro owned property to SE Brookwood. Provide an on-street connection along SE 40th Avenue. Provide at-grade crossing improvements at SE Brookwood Avenue. Provide seasonal on-street connection via SE 40th Avenue and SE Bentley Street. Upgrade at-grade crossing at Bentley and SW Brookwood Avenue. Provide wayfinding signs to clarify route and connections to street network. Areas through sensitive wetlands to be elevated on boardwalk structures.</p>	



Valley Memorial Park has existing trails and offers a serene environment for walking



Metro owned property south of Brookwood has significant wetlands and would necessitate the use of boardwalks to expand months of use

Hillsboro Trails Master Plan Rock Creek Trail Alignment - Map 1/3

Recommended Alignment

-  Primary Trail Route
-  Community Trail
-  On-Street Alternative
-  Regional Trail
-  Local Trail

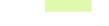
Existing Trails

-  Regional
-  Community
-  Local
-  Water Trail
-  Pedestrian Only
-  Private

Existing On-Street Bike & Transit Facilities

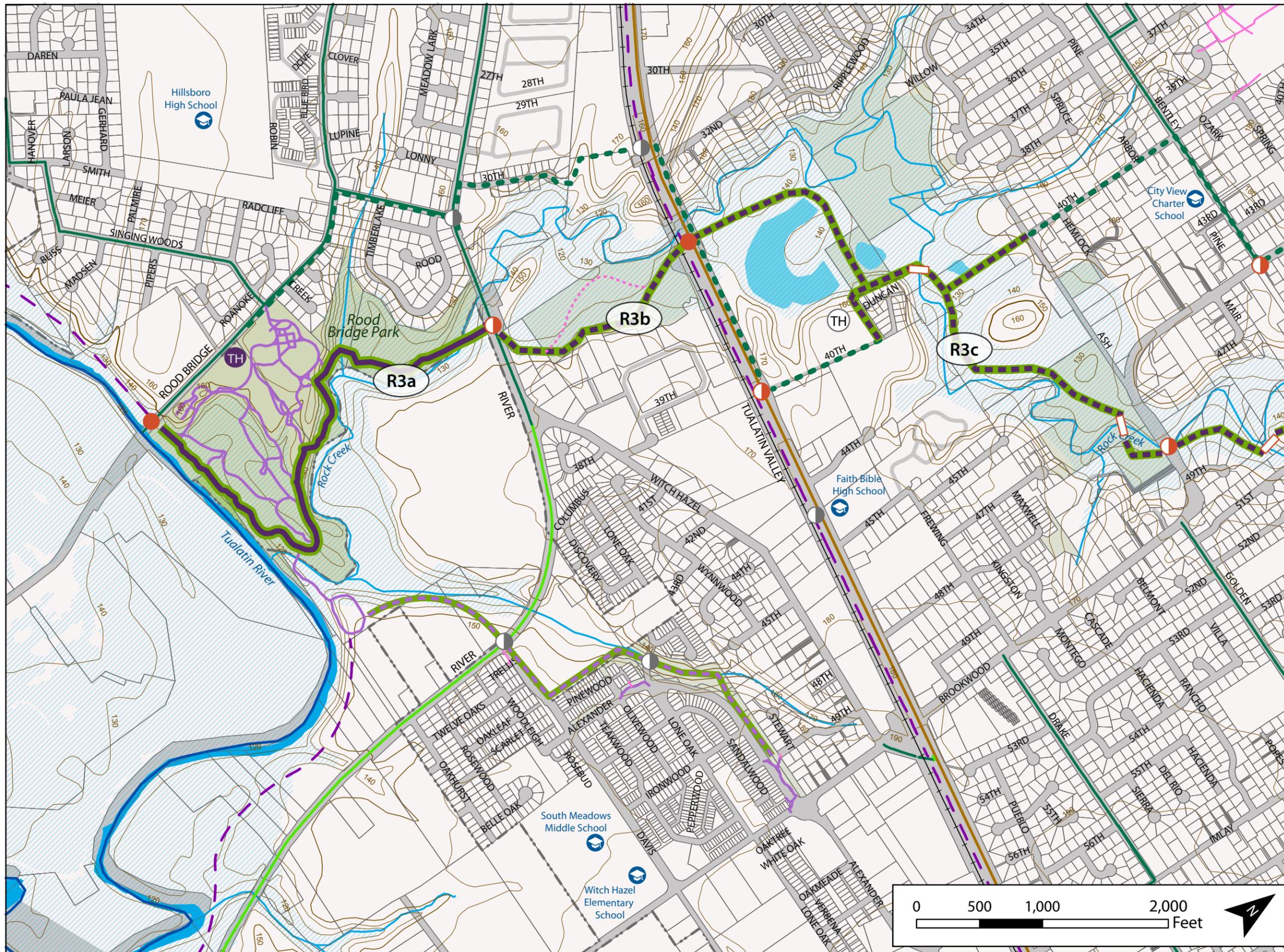
-  Bike Lane
-  Low Traffic Through Street
-  Bus Routes

Parks

-  Developed
-  Open Space
-  Undeveloped
-  FEMA 100 Year Flood Plain

Trail Crossings

-  Existing Bridge
-  Existing At-Grade Crossing
-  Existing Underpass
-  Proposed Bridge
-  Proposed At-Grade Crossing
-  Proposed Underpass
-  Railroad
-  10 Foot Contour Lines
-  City Boundary Line
-  Schools
-  Existing Trailhead
-  Proposed Trailhead



May 2015
Data Source: City of Hillsboro and Oregon Metro



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SEGMENT R3D

SE Brookwood Avenue to SW Ozark Lane / SE Patterson Street

ALIGNMENT FOLLOWS EAST SIDE OF ROCK CREEK BETWEEN SE BROOKWOOD AVENUE AND SE PATTERSON STREET.	
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • SE 40th Avenue, SE Bentley Street . SW Ozark Lane and SE Patterson Street are all low volume, low speed roadways. • Potential connectivity on west side from Ozark Lane. • Potential connectivity on east side from SE Patterson Street or Helene. • Relatively large lot sizes and undeveloped portions of properties suited for conservation. 	<p>CONSTRAINTS</p> <ul style="list-style-type: none"> • No existing right-of-way along Rock Creek. • Several property easements or agreements required from private property owners. • Area subject to flooding and seasonal use only. Natural areas require environmentally sensitive design treatments. • Creek crossing required. • Substantial grade change on the west side between Rock Creek and potential roadway access points. • On-street alternative route is indirect.
<p>RECOMMENDATIONS</p> <p>Alignment follows east side of Rock Creek with one stream crossing. This is alignment is subject to further study. Discussions with land owners to occur to assess most viable route option. Conservation easements to be considered. Provide a creek crossing between SW Ozark Lane and SE Patterson Street to provide an east-west walking and biking connection. Provide wayfinding signs to clarify interim and seasonal on-street routes. Property acquisition to occur as opportunities arise.</p>	



SE Brookwood Avenue could accommodate a trail crossing with improvements including a reduction of vehicle speeds



Property North of Brookwood and West of Rock Creek is subject to flooding



Property North of Brookwood and East of Rock Creek



Opportunities to cross under Brookwood are limited due to seasonal flooding and vertical clearance limitations.

SEGMENT R3E

SW Ozark Lane / SE Patterson Street to SE 58th Avenue

<p>ALIGNMENT OCCURS ON CITY OWNED PROPERTY SOUTH OF ROCK CREEK TO SE 58TH WHERE IT CROSSES ROCK CREEK AND CONNECTS TO ROAD RIGHT-OF-WAY ALONG SE 58TH COURT AND WEST BASELINE ROAD.</p>	
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • City owned property south of Rock Creek between SE Patterson Street and SE 58th. No easement or property acquisition needed. • City owned property provides a trailhead opportunity in addition to future park services and programming. • Several neighborhood connections available via road right-of-way. • Eastern portion of City owned property is outside of flood area. • SE Patterson Street, SE Lois Street, and future SE Century Boulevard are all low volume, low speed roadways, or have planned bicycle and pedestrian improvements. 	<p>CONSTRAINTS</p> <ul style="list-style-type: none"> • Areas east and west of Rock Creek subject to flooding. Natural areas require environmentally sensitive design treatments. • Private properties north of Rock Creek would require negotiations. • More side tributaries present on north side of creek than south. • West and north sides of Rock Creek are steeper than eastern and southern areas • Creek crossing required.
<p>RECOMMENDATIONS</p> <p>Alignment to follow south side of Rock Creek through City owned property. Boardwalk structures to be used through sensitive natural resource areas. Creek crossing to north side of Rock Creek to be provided to connect to SE 58th Court.</p>	



City owned property West of Patterson Street



Patterson is a low stress route which currently ends at Rock Creek

SEGMENT R3F

SE 58th Avenue to SE Century Boulevard

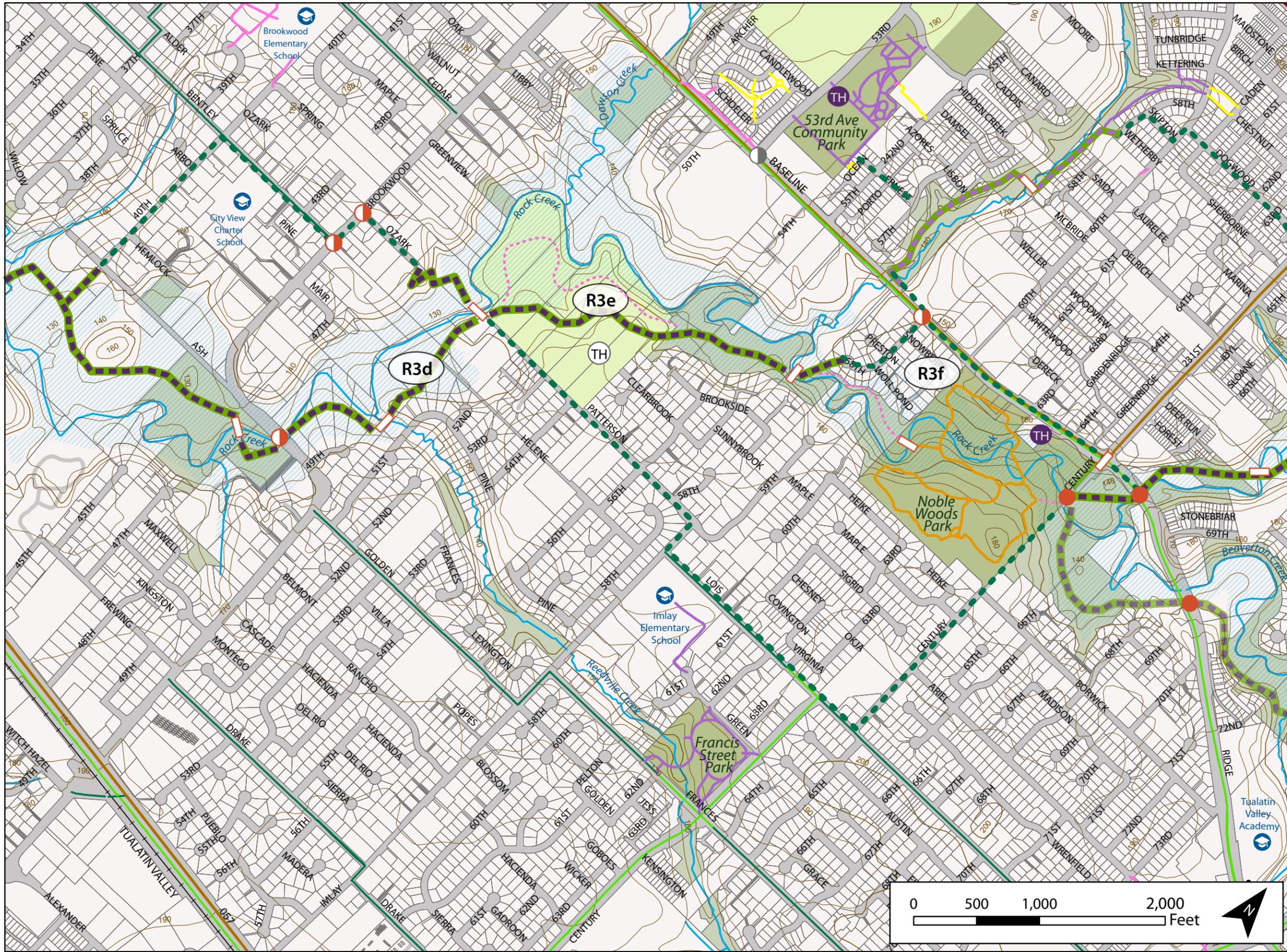
ALIGNMENT FOLLOWS SE 58TH COURT TO SE BASELINE STREET WITHIN ROAD RIGHT-OF-WAY.	
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • Community desire for connection to 53rd Avenue Community Park. • Possible future Baseline Street crossing improvements at SE 58th Court. • Potential connection to Noble Woods Park. • Century Boulevard to be reconstructed as an overpass. Potential for trail route to pass under Century. • Nobel Woods parking areas provide trailhead services. • Southernmost trail within Nobel Woods considered the most viable option for cycling due to topography. 	<p>CONSTRAINTS</p> <ul style="list-style-type: none"> • Baseline is a significant arterial with anticipated growth in vehicle volumes. • Cycling is currently prohibited within Nobel Woods Park. • Community members are divided on providing access to cyclists through Nobel Woods versus preserving the tranquil setting and historic use patterns. • Existing pathway system within Nobel Woods includes steep topography. • Existing paths within Nobel Woods are narrow for bicycle use. • Sensitive natural resource areas present within Nobel Woods.
<p>RECOMMENDATIONS</p> <p>Alignment to occur within road right-of-way along SE 58th Court and SE Baseline Street to SE Century Boulevard. Baseline alignment to be separated from vehicular traffic to the greatest extent possible to retain the quality and comfort of an off-street regional trail facility. Small pedestrian access path to Nobel Woods, with bicycle deterrents provided at western entry point to Nobel Woods.</p>	



Noble Woods Park is a significant destination along the Rock Creek Trail. Historically, bicycles have not been allowed on the path system

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Hillsboro Trails Master Plan Rock Creek Trail Alignment - Map 2/3



- Recommended Alignment**
- Primary Trail Route
 - Community Trail
 - On-Street Alternative
 - Regional Trail
 - Local Trail
- Existing Trails**
- Regional
 - Community
 - Local
 - Water Trail
 - Pedestrian Only
 - Private
- Existing On-Street Bike & Transit Facilities**
- Bike Lane
 - Low Traffic Through Street
 - Bus Routes
- Parks**
- Developed
 - Open Space
 - Undeveloped
 - FEMA 100 Year Flood Plain
- Trail Crossings**
- Existing Bridge
 - Existing At-Grade Crossing
 - Existing Underpass
 - Proposed Bridge
 - Proposed At-Grade Crossing
 - Proposed Underpass
 - Railroad
 - 10 Foot Contour Lines
 - City Boundary Line
 - Schools
 - Existing Trailhead
 - Proposed Trailhead

Oct 2015
Data Source: City of Hillsboro and Oregon Metro



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SEGMENT R3G

SE Century Boulevard to Orenco Woods Nature Park

ALIGNMENT OCCURS ALONG THE NORTHERN BANK OF ROCK CREEK PRIOR TO FOLLOWING A SECONDARY TRIBUTARY AND NW 229TH AVENUE NORTH TO NW DOGWOOD STREET. ALIGNMENT CONNECTS TO ORENCO WOODS NATURE PARK FROM NW DOGWOOD STREET AT EXISTING SEGMENT OF ROCK CREEK TRAIL.

OPPORTUNITIES

- Potential connection to Orenco Elementary School.
- Potential connection to Orenco Woods Nature Park.
- City owned properties both east and west of Rock Creek
- Low volume, low speed roadways connect to existing/assumed Rock Creek Trail connection point at Orenco Woods Nature Park.
- Trailhead services to soon be available at Orenco Woods Nature Park.

CONSTRAINTS

- Properties between Baseline and Orenco Woods Nature Park are constrained by steep topography, flooding and private properties.
- Alignment along Rock Creek would require negotiation with several private property owners.
- County owned Quatama Bridge on 227th does not include bicycle or pedestrian facilities, is constrained in width, and is not anticipated to be upgraded.

RECOMMENDATIONS

Alignment to follow Rock Creek along northern bank to NW 229th Avenue road right-of-way making use of one City owned parcel. Negotiations to occur with private landowners. One stream crossing to be provided. Alignment to continue within road right-of-way along NW 229th and NW Dogwood to existing Rock Creek Trail segment within Orenco Woods Nature Park.



View of City owned property along Rock Creek and north of Baseline Road



View of NW Dogwood from Orenco Woods Nature Park access point



Steep grades are present between Rock Creek and Quatama East of 227th

SEGMENT R3I

Orenco Woods Nature Park to Orchard Park

ALIGNMENT OCCURS WITHIN INDEPENDENT RIGHT-OF-WAY SOUTH OF TRIMET LINE BETWEEN NW CORNELIUS PASS ROAD AND REEDVILLE TRAIL.	
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • Potential connection to Orenco Woods Nature Park and existing segment of Rock Creek Trail. • Potential connection to Orchard Park and existing segment of Rock Creek Trail. • Utilizes planned Cornelius Pass Road at-grade crossing. • NW Wilkins Street has sidewalks and bike lanes and is a low volume, low stress route for near-term connectivity. • Connects to the future Reedville Trail. 	<p>CONSTRAINTS</p> <ul style="list-style-type: none"> • Steep terrain and flooding present along Rock Creek. • NW Cornelius Pass Road has significant traffic volumes and speeds. • No existing crossing improvements at NW Wilkins Street or Cornelius Pass Road and existing portion of Rock Creek Trail.
<p>RECOMMENDATIONS</p> <p>Segment R3H will be built as shown by 2017. Alignment occurs within independent right-of-way south of the TriMet line between NW Cornelius Pass Road and Reedville Trail, connecting existing segments of the Rock Creek Trail.</p>	

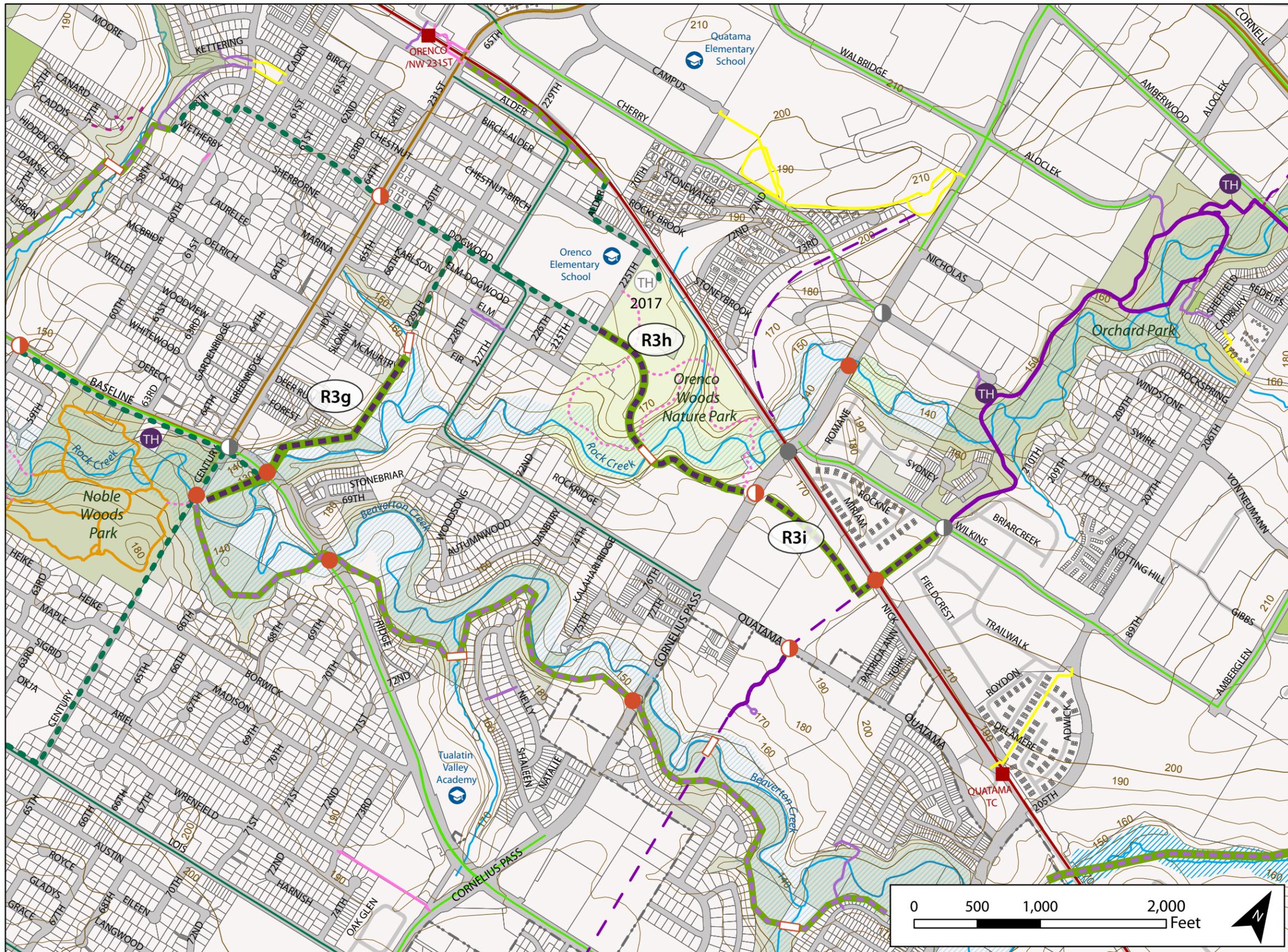


NW Wilkins Street is a low volume, low stress route with bike lanes and sidewalks



A built portion of the Rock Creek Trail in Orchard Park

Hillsboro Trails Master Plan Rock Creek Trail Alignment - Map 3/3



Recommended Alignment

- Primary Trail Route
- Community Trail
- - - On-Street Alternative
- - - Regional Trail
- - - Local Trail

Existing Trails

- Regional
- Community
- Local
- Water Trail
- Pedestrian Only
- Private

Existing On-Street Bike & Transit Facilities

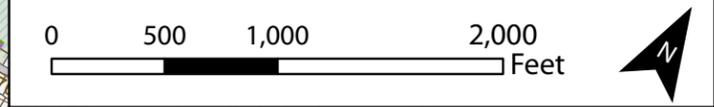
- Bike Lane
- Low Traffic Through Street
- Bus Routes

Parks

- Developed
- Open Space
- Undeveloped
- ▨ FEMA 100 Year Flood Plain

Trail Crossings

- Existing Bridge
- Existing At-Grade Crossing
- Existing Underpass
- Proposed Bridge
- Proposed At-Grade Crossing
- Proposed Underpass
- Railroad
- 10 Foot Contour Lines
- City Boundary Line
- 🎓 Schools
- TH Existing Trailhead
- TH Proposed Trailhead



May 2015
Data Source: City of Hillsboro and Oregon Metro



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06 TRAIL DESIGN GUIDELINES



INTRODUCTION

A complete trail network provides a variety of experiences within a range of settings. Hillsboro's system includes routes that provide recreational opportunities as well as alignments that present viable transportation alternatives. This section recommends three main functional classes of trails for the Hillsboro trails system:

- Regional Trail
- Community Trail
- Local Trail or Connector

Physical and environmental conditions will necessitate a variety of trail types to create a complete and connected trail system for the City of Hillsboro. The Trail Typologies subsection discusses some of the implications to trail development in different contexts.

Note that the recommendations contained within these guidelines describe best practices in a general sense and are not intended to be rigid standards for trail development. Individual trail alignments and treatments will need to be considered in closer detail to determine the most appropriate design for the specific context at hand. Factors such as topography, level of use, and type of users anticipated will shape recommendations for trail configuration and materials. Factors such as roadway speeds, site lines, volumes of vehicular traffic, and engineering judgement will need to be considered when prescribing crossing improvements. In general, the intent of the range of trail widths is to provide wider trails in anticipation of high use numbers. Mid-range widths will be appropriate where future use numbers are moderate. While the use of the narrowest width trails are meant to be used only over short distances at pinch points restricted by obstructions such as existing structures and significant natural resource areas.

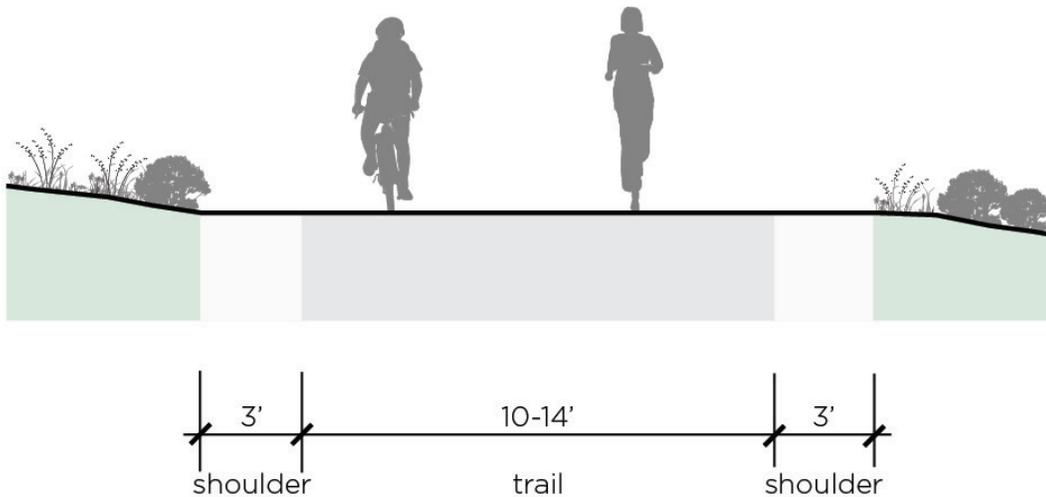
TRAIL CLASSIFICATIONS

Trail classes help guide the implementation of trails that may have differing programs or contexts. At a broad level, trails may be classified as regional, community, or local. Each serves a distinct function. Nuances of trail types are possible within each trail class.

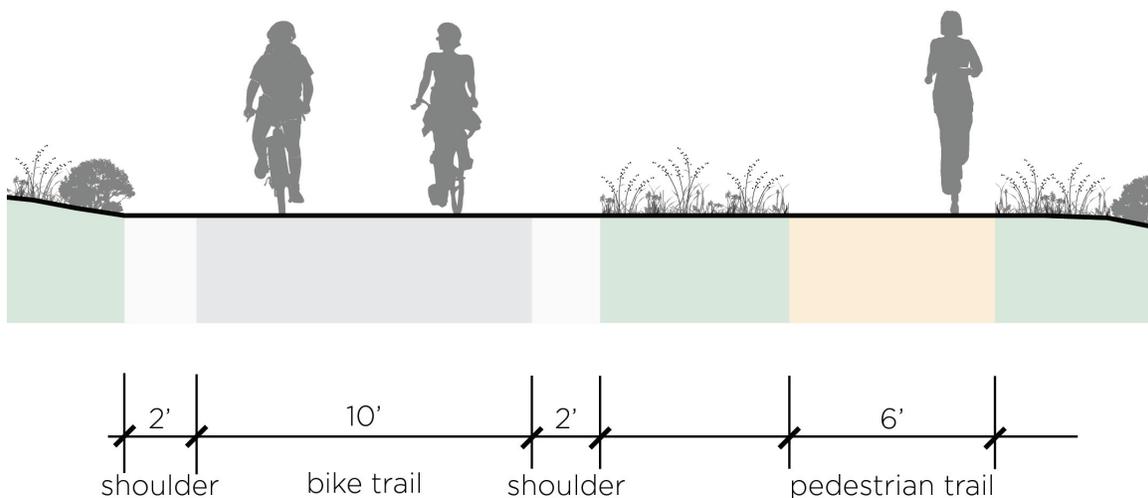
Regional Trail

A regional trail is defined by its length, multi-jurisdictional alignment, and connection to regionally significant features. Regional trails are commonly mixed-use trails used for transportation and recreation. Users can share space on one wide trail tread or be separated onto multiple treads. Regional trails may be terrestrial, for use by a broad spectrum of bicyclists and pedestrians, or aquatic, for use by paddlers.

Regional trail typical section



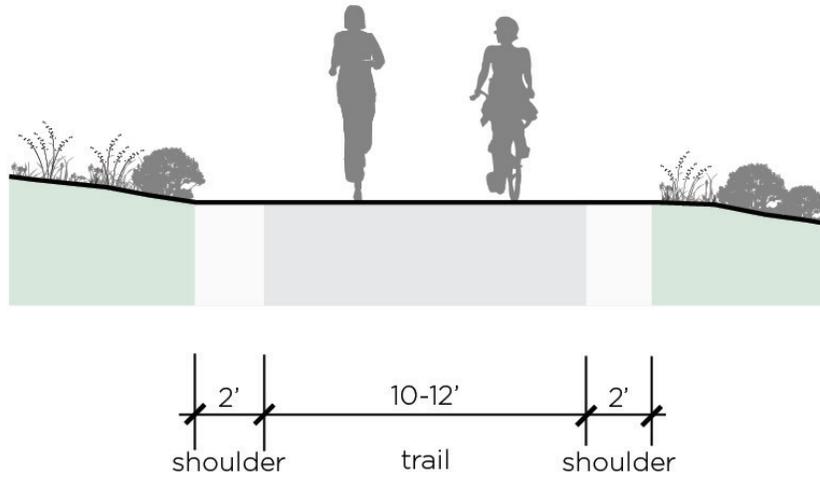
User-separated regional trail typical section



Community Trail

Community trails link important destinations between neighborhoods and across the City of Hillsboro. They function both as transportation and recreation corridors for a variety of users.

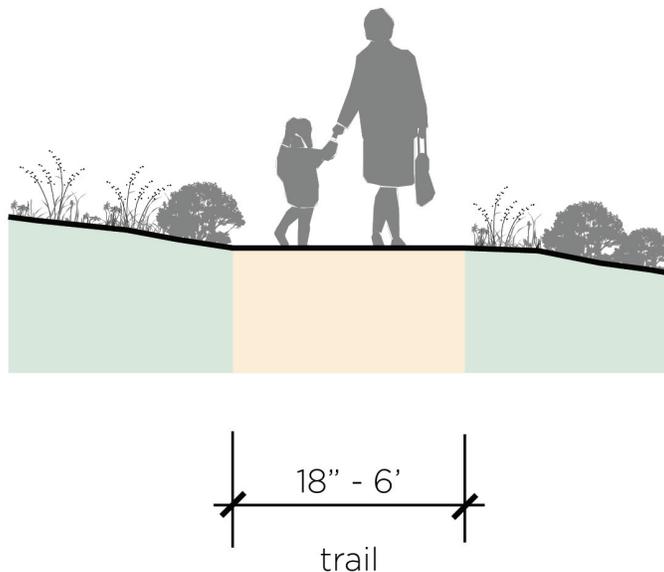
Community trail typical section



Local Trail or Connector

Local trails provide short distance connections to local features such as parks, community centers, and schools. These are primarily walking and hiking trails within parks or natural areas, campus pathways, public alleys, etc.

Local trail typical section



Greenway Trail

A greenway trail designation is an overlay which may be applied to a regional, community or local trail that follows or crosses environmentally sensitive natural spaces. These trails minimize or avoid impacts to sensitive resources to the greatest extent possible. When impacts are unavoidable, trail construction should mitigate their impacts as required by appropriate regulatory agencies. Low impact trail designs include the following:

- Native flora restoration (inclusion of native species, and control or elimination of invasives).
- Support of bird and wildlife habitat.
- Improvement of water quality through stormwater best practices and waterway buffers.
- Minimize barriers to wildlife crossing and movements.

Oftentimes, trail systems follow sensitive riparian features and are open to public access. Because of this, greenways often maximize water quality treatments wherever possible. Additionally, because of their situation in more naturalized areas, there are many opportunities for educational interpretation of local ecosystems and processes.

Trail Classification Matrix

CLASS	FUNCTION	USERS	MATERIALS	WIDTH	MIN WIDTH
Regional	Provides transportation and recreational connectivity at a regional scale.	pedestrians cyclists	asphalt or concrete	14' + 3' shoulders	10' + 2' shoulders
Community	Provides transportation and recreational connectivity at a city scale.	pedestrians cyclists	natural surface or paved	10' + 2' shoulders	8' + 2' shoulders
Local	Provides access or a parallel route to higher level trail facilities.	pedestrians	natural surface or paved	6'	18"
Greenway	Linear natural spaces typically following riparian features and open to public access.*	pedestrians cyclists wildlife	varies	Refer to functional scale	Refer to functional scale

*Note this is a definition of a greenway trail and not a greenway. The greenway designation is an overlay that may be applied to any of the above trail classes.

References

AASHTO. Guide for the Development of Bicycle Facilities. 2012.
FHWA. Manual on Uniform Traffic Control Devices. 2009.

TRAIL TYPOLOGIES

Overview

Trail types and typologies are used to help guide the implementation of trails that may have differing programs, or are located in various contexts.

Multi-Use Trails, Independent Right-of-Way

Using asphalt or concrete surfacing, multi-use trails serve a full spectrum of bicyclists and pedestrians. The trail is ideally 14 feet wide with 3 foot shoulders on each side. A shoulder may serve as a path for runners desiring a natural surface material option. Compacted gravel immediately adjacent to the trail may serve this function. A clear 3 foot wide (or more) area adjacent to the main travel way should be maintained free of vegetation and obstructions. In locations where ample width is available, use types may be on separate parallel tracks with a vegetated buffer between.

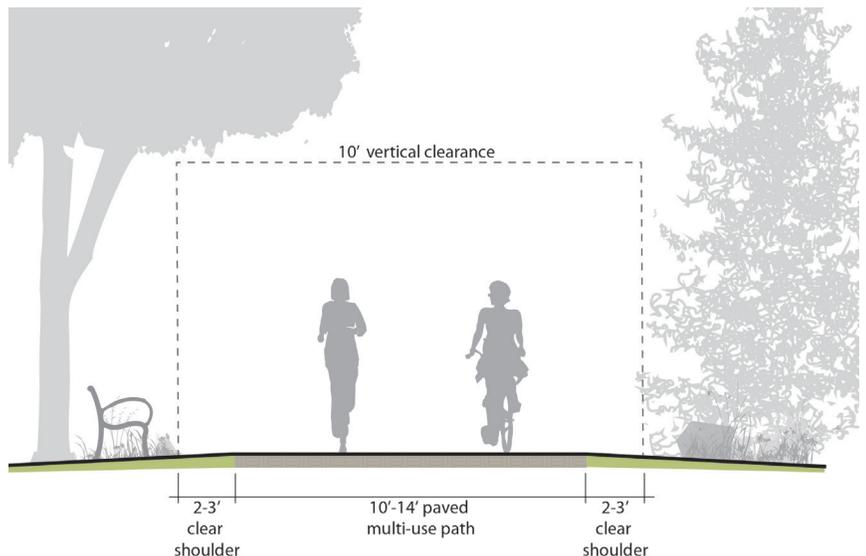
Guidance:

- Preferred width of trails on independent right-of-way is 14 feet of travelway, with 3 feet shoulders. Minimum trail width should be no less than 10 feet of usable surface, with 2 foot shoulders.
- Where possible, a 5 percent maximum running slope should be maintained for the length of any trail to maximize usability for the largest number of trail users.
- Where possible, use durable materials such as asphalt or concrete that provide a smooth contiguous surface.
- Grade a well-draining trail surface to reduce standing water or potential ice patches by maintaining a maximum 2 percent cross-slope.
- Where heavy use is anticipated, striping to separate trail users by mode or direction of travel will reduce conflicts.
- A 10 foot vertical clearance should be maintained, 8 foot minimum.
- A safety railing of 42 inches in height, minimum, should be provided where required by code or where there are steep slopes adjoining the shoulder recovery area.

Multi-Use Trail, Inside Road Right-of-Way

Multi-use paths located within the roadway corridor right-of-way or adjacent to roads provide a comfortable walking space for pedestrians and enable children and recreational bicyclists to ride without the discomfort of riding in a busy street. Physical separation from vehicular traffic is typically provided by curb, guardrail, vegetated buffer, or a combination of these options.

This trail type works best along roadways with limited driveway

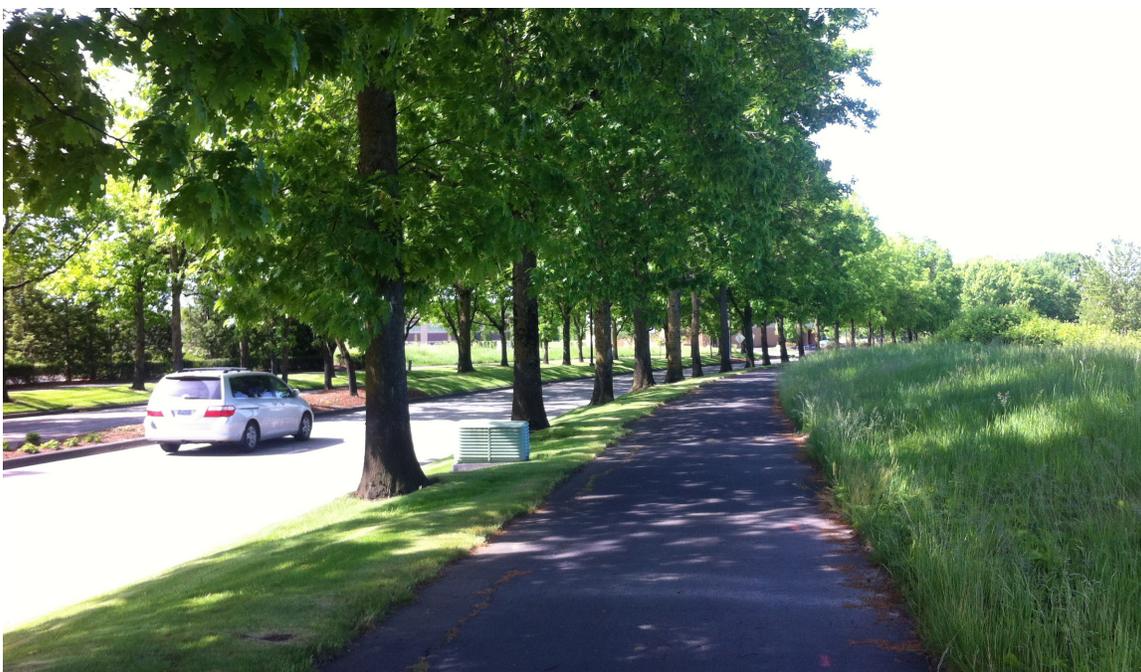


Typical multi-use trail section

crossings and with services primarily located on one side of the roadway, or along a river-front or other natural feature. Constrained right-of-ways may require land acquisition, trail width adjustments, or a rebalancing of vehicle lanes.

Guidance:

- A 12-14 foot minimum travelway width should be maintained to provide enough space for all user types in each direction.
- A minimum of 10 feet is required for bicyclists to pass other users safely on any multi-use path.
- A vegetated buffer of 5 feet or greater should be provided wherever possible, with a minimum of a 3 foot buffer in constrained ROW areas.
- At driveway entrances and other roadway crossings, appropriate regulatory signage and crossing treatments should be provided.



Existing multi-use pathway within the road right-of-way of Brookwood Parkway

On-Street Facilities

On-street facilities for cyclists and pedestrians will be needed both as short-term connections and as a compliment to trail routes closed due to seasonal flooding or night-time closures. On-street facilities are likely to include cycletracks, bike lanes, neighborhood greenways, and sidewalks.

Protected bikeways

A protected bikeway is an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane. A protected bikeway is physically separated from motor traffic and distinct from the sidewalk. Protected bikeways have different forms but all share common elements—they provide space that is intended to be exclusively or primarily used by bicycles, and are separated from motor vehicle travel lanes, parking lanes, and sidewalks. In situations where

on-street parking is allowed, cycle tracks are located to the curb-side of the parking (in contrast to bike lanes).

Bicycle Lanes

A bicycle lane is a portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential use of bicyclists. Bicycle lanes are located on both sides of the road, except on most one-way streets, and carry bicyclists in the same direction as adjacent motor vehicle traffic. Buffered bike lanes are appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic. Recommended bicycle lane design features include the following:

Neighborhood Greenway / Bicycle Boulevard

Neighborhood greenways are low-volume, low-speed streets modified to enhance bicyclist by using treatments such as signage, pavement markings, traffic calming and/or traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.

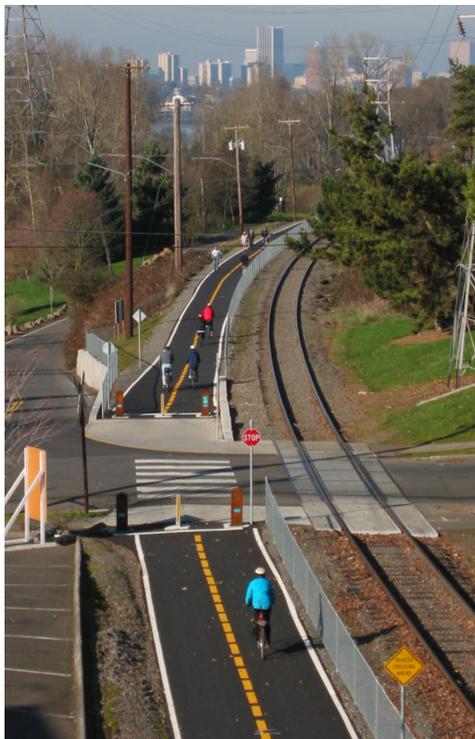
Signs and pavement markings are the minimum treatments necessary to designate a street as a neighborhood greenway. Together, they visibly designate a roadway to both bicyclists and motorists. Signs, and in some cases pavement markings, provide wayfinding to help bicyclists remain on the designated route.

Rail Corridor Trail Condition

Shared use paths in utility corridors should meet or exceed general design standards. If additional width allows, wider paths, and landscaping are desirable.

Currently, there are no national standards that dictate rail-with-trail (RWT) facility design. Ultimately, RWTs must be designed to meet both the operational needs of railroads and the safety of trail users. Due to their nature, rail corridors make good candidates for trail alignment. Generally, they are flatter than the surrounding landscape, with large-radius turns, long sight-lines, and typically long stretches of connected ownership. However, there can also be significant challenges with rail corridor trails, including safety and securing the rights to land use.

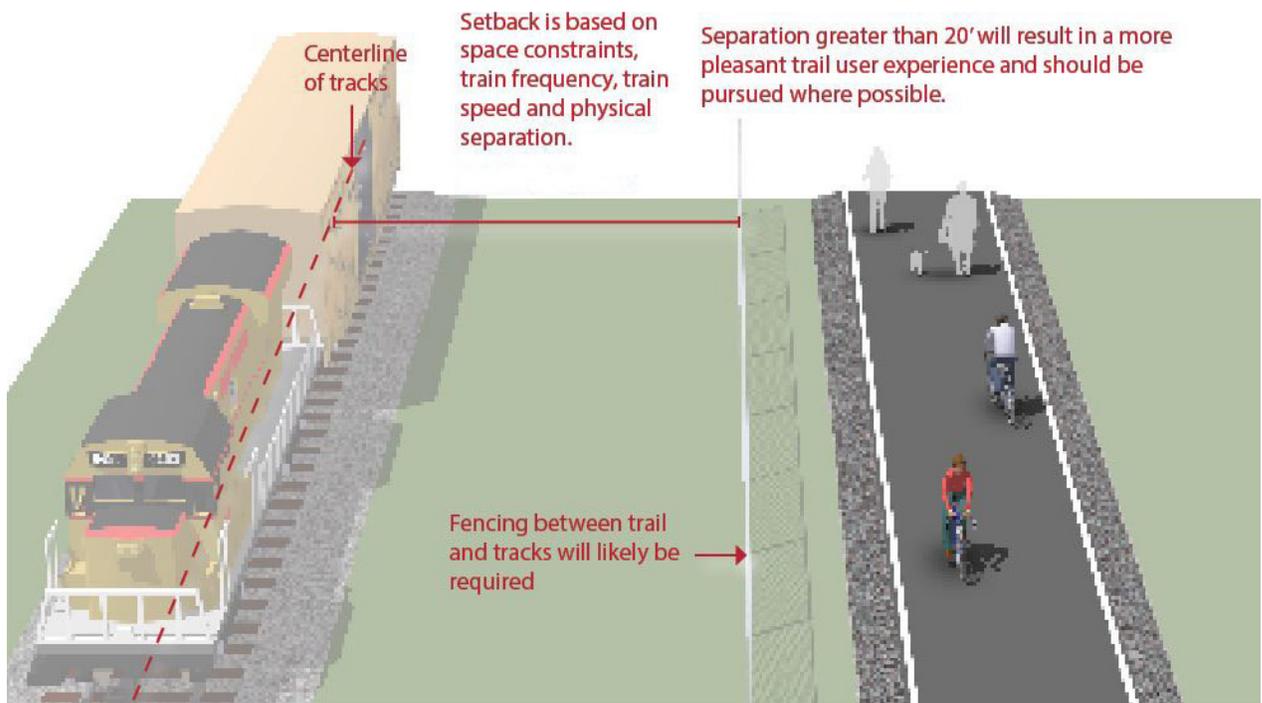
For rail-with-Trail (RWT) conditions, some constraints could impact the feasibility of the trail project. In some cases, space should be preserved for future planned freight, transit, or commuter rail service. In other cases, limited right-of-way width, inadequate setbacks, concerns about safety/trespassing, and numerous crossings may affect the trail alignment and design.



With proper design treatments and agreements with the local rail authority, rail-trail corridors are possible even in very constrained contexts. Springwater Trail, Portland, Oregon

Guidance:

- RWT design should maximize the setback between any RWT and active railroad track. The setback distance should correlate to the type, speed, and frequency of train operations. Due to the lack of consensus on acceptable setback distances in trail design literature, the appropriate distance must be determined on a case-by-case basis. Generally, trail setbacks are based on rail line use type, train frequency, and speed. For more specific information on trail setbacks, see the FHWA guide, Rails-with-Trails, Lessons Learned.
- A feasibility process should be executed that clearly outlines local requirements of the railroad property owners.
- If required by the rail operator, fencing should be included in trail design. If included, any fencing should adhere to 42 inch minimum, 48 inch preferred fence height for bicyclists.



Example of a typical rail with trail condition

Utility Corridor Trail Condition

Many types of utilities, such as water, gas, electric, and others offer good opportunities for trail co-use. Recreational and utility co-use has some complications, including the unique needs of the utility company. However, with strategic maintenance and land agreements, utilities can have a minimal effect on trail users. Additionally, utility companies usually benefit, as well, by having uninterrupted and easily accessible route to their utility service.

Guidance:

- Each utility company has specific design requirements regarding routing, alignment, and landscaping requirements. Confirm current guideline widths with each utility individually.
- Experience has shown that paved paths less than 12 feet wide can break up along the edge as a result of loads from maintenance vehicles.
- Coordination with the utility company will be needed to determine the type and frequency of maintenance vehicle use, which will inform trail design.
- Structures are typically restricted within utility easements. These include signage, lighting, benches, shelters, and restroom facilities.
- User expectations for utility corridors will be similar to those for any multi-use path outside a road ROW, but utility corridor trails will be subject to additional restrictions listed above, as well as closures for utility service maintenance.
- Material selection is important due to potential for nuisance shocks.



Example of a typical Utility Corridor Trail condition.

Bonneville Power Administration (BPA)

Design Requirements for Trails within Power Line Corridors

- Trail alignment
 - » Preferably as close to the edge of power line corridor as possible, and away from power pole bases (there is generally a required 50 foot clear zone from steel transmission towers; 25 foot clear zone from wood poles)
 - » Trail crossings of power line corridors should be minimized; provide the shortest crossing distance as possible where crossings are needed (minimum 60 degree angle)
 - » Should not inhibit maintenance vehicle access to power poles
- Trail surfacing - Must support Highway Standard 20-ton vehicle loading (BPA will use trail to access power poles)
- Lighting—Fixtures should be placed at least 25 feet away from conductors
- Structures—Prohibited within power line corridors
- Vegetation—Limited within power line corridors
- Detailed trail design development should involve BPA to expedite approval process
- Material selection is important due to the potential for nuisance shocks

Water Trails

A water trail is a river, creek or body of water that features launch points, points of interest, and other amenities for kayakers, canoeists and paddle boarders. They are typically recreational trails that encourage appreciation of the natural environment and preservation of wildlife resources. Important features of a water trail include water access points, trailheads, and signage.

- Water access points are the put-in and take-out points along the trail. They come in a variety of types and require the following at a minimum:
 - A stable riverbank or shoreline, hard paved surface preferred for accessibility
 - A path that leads from the access point to the trailhead
 - A space that is 12 feet wide at waterline, tapered to 9 feet wide at top entrance area, and 15 feet in length to allow space for safe put-in or take-out of paddlecraft
 - A maximum 3:1 slope at the stream bank, 15 percent preferred for accessibility

Spacing of water access points can vary depending on context. Paddlers travel between 1 and 5 mph, depending on wind, currents, boat type, and ability level. Access points should be spaced so that paddlers have the opportunity to take trips of varying lengths, from short day trips to longer or overnight trips. Proper spacing of designated access points will also discourage trail users from putting-in or taking-out at illegal locations, which can damage the riparian environment. It is best to coordinate with a group of active paddlers, such as the Tualatin Riverkeepers, on the best spacing and locations for access points.



Paddlers enjoying the enjoying the Willamette River Water Trail. Photo credit: American Trails

Trailheads offer safe and legal parking for trail users. Paddle trips may involve the logistical coordination of one or two vehicles for transporting boats and people. Trailheads may also offer other amenities, such as restroom facilities, opportunities for day activities, or camping.

A comprehensive signage system is a key component to a successful water trail. The amount, size, color, style, location and material of signage should be considered, balancing the need to be visible with the desire to minimize visual intrusion. Several signage types include:

- Roadway and directional signage leading to the trailheads and access points
- Safety and regulatory signs defining the allowable uses along the trail, such as fishing, swimming, or powerboat usage
- Wayfinding on the trail can direct paddlers to proper channels and streams, provide distances to access points or points of interest, or identify navigational hazards
- Interpretive signage may educate users on the local ecology, watershed, or wildlife
- Maps, guides, and websites help paddlers plan their trips

Neighborhood Accessways

Neighborhood accessways provide residential areas with direct bicycle and pedestrian access to parks, trails, greenspaces, and other recreational areas. They most often serve as small trail connections to and from the larger trail network, and typically have their own rights-of-way and easements.

Additionally, these smaller trails may be used to provide bicycle and pedestrian connections between dead-end streets, cul-de-sacs, and access to nearby destinations not provided by the street network.



Neighborhood accessways should be designed into new subdivisions and should be required by City regulations. For existing subdivisions, neighborhood and homeowner association groups are encouraged to identify locations where such connections would be desirable.

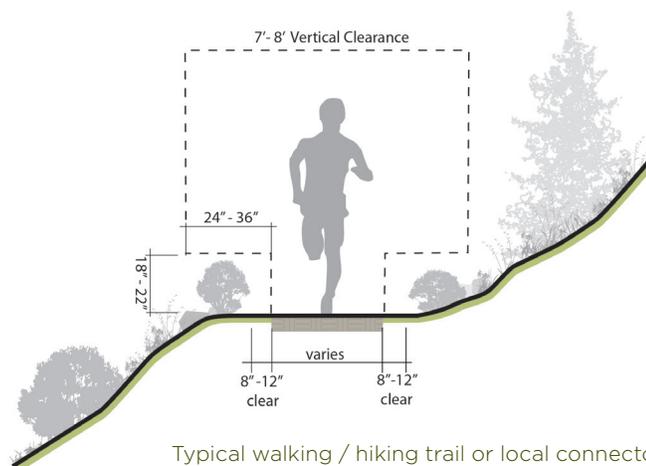
Guidance

- Neighborhood accessways should remain open to the public
- Trail width should be at least 8 feet wide to accommodate emergency and maintenance vehicles
- Meet ADA requirements and be considered suitable for multi-use
- Trail widths should be designed to be less than 8 feet wide only when obstacles are present, these might include mature native trees, wetlands, other ecologically sensitive areas, or pinch points due to infrastructure such as power poles or bridge abutments
- Access trails should slightly meander whenever possible

Hiking / Walking Trails

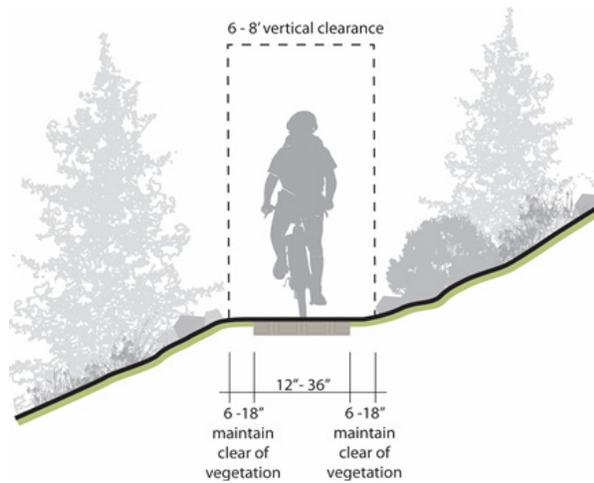
Local trails are small scale pathways that provide a finer grain of connectivity than regional or community trails. They are primarily oriented towards pedestrian users and are recommended to be natural surface pathways of compacted gravel, earth, or wood chips. These paths and trails may also serve as low-impact routes for places with limited development, or where a more quiet and natural experience or environment is desired.

- Path width can vary between 18 inches and 6 feet depending on the setting.
- Regular maintenance practices to include horizontal and vertical vegetation clearing so that site lines and visibility are maintained.
- Maintain 8 feet vertical clearance (7 feet minimum).
- Maintain 8-12 inches clear horizontal space on each side of the treadway.
- Above 18-22 inches from existing ground, increase horizontal clearance to 24-36 inches, if wheel chairs are anticipated, expanded horizontal clearance area should begin 8-10 inches above finish grade.
- The surface treatment will vary, and may be bare earth, rock, or forest litter. Some paths may use crushed stone or screenings that compact with use. Stone materials should not be used in flood-prone areas, environmentally sensitive, and/or areas with steep terrain.
- Provide positive drainage with a consistent cross-slope of 2 percent.
- Where possible the longitudinal grade of the path should not exceed 5 percent.
- Where possible, provide localized stormwater features at small scales to minimize erosion, provide improvements in watershed water quality, and maintain path usability year-round.
- Areas with severe slopes may require engineered structures to construct.
- Bicycles may be prohibited within these segments.



Mountain Bike Trail

Mountain bicyclists have a broad range of riding abilities. This guideline for single track mountain bike-only trails focuses on recreational experience and a range of technical challenge. The International Mountain Bike Association (IMBA) has developed a classification system similar to ski runs, which is indicated by the colored symbols below. These symbols may accompany wayfinding and warning signage to alert bikers of upcoming trail conditions. In addition, mountain bicyclists are typically permitted on shared-use trails all other users.



- Tread width varies from 12 to 36 inches
- 2% cross slope
- Allowance space for passing
- Native natural surface materials
- Obstacles occasionally present
- Blockages cleared to define route and protect resources

Guidance

SKILL LEVEL	TREAD WIDTH	SURFACE	AVERAGE GRADE	MAX GRADE	UNAVOIDABLE OBSTACLES
Easiest ○	≥72"	Hardened or Surfaced	<5%	≤10%	None
Easy ●	≥30"	Firm and Stable	≤5%	15%	≤2"
Moderate ■	≥18"	Mostly stable; some variability	≤10%	≥15%	≤8"
Difficult ◆	≥12"	Variable	≤15%	≥15%	≤15"
Extremely Difficult ◆◆	≥6"	Widely variable & unpredictable	≥20%	20%	≥15"

Greenway Trail

Within the region and according to Metro, Greenways are defined as follows:

Greenways are linear natural spaces that follow creeks and rivers. Some greenways provide public access with environmentally compatible trails, viewpoints, or watercraft launch sites. Other greenways prioritize wildlife habitat protection and do not allow any public access.

-Oregon Metro, Regional Trails and Greenways, pg. 2

When planning the design for an identified greenway trail, a balance must be provided between the protection of natural resources and the public's desire for access to natural resource areas.

Within the most recent Hillsboro Parks and Trails plan, riparian corridors represent a significant amount of the proposed future greenway trails (such as the McKay Creek Greenway and the Beaverton Creek Greenway). Riparian corridors offer substantial recreational and open space preservation opportunities. These corridors include rivers, streams, and wetlands. Greenway trails within riparian corridors should be studied for impacts to natural resource areas, stormwater, flora and fauna, and flood levels.

Considerations For Trail Development Within Greenways:

- Avoid the fragmentation of small habitats.
- Select alignments so as to minimize the number of stream crossings.
- Find opportunities for restoration of poor water quality, habitat areas, and/or stream restoration.
- Choose construction materials with little to no toxicity.
- Follow existing contours to the greatest extent possible. Avoid constructing trails along fall lines that may be more prone to issues with erosion, and may present more maintenance issues over time.
- Wetlands should be avoided, but where they cannot be, the trail should be aligned across the narrowest point, and use elevated tread materials to minimize ecosystem disturbance.
- Concrete is the recommended surface treatment for greenway trails because of its durability and lower maintenance requirements.
- Pervious paving is not recommended in floodplain areas, or areas without proper drainage. Sheet flow and sediment transport clogs porous material and requires vacuuming after major storm events.
- Use natural dispersed infiltration systems such as vegetated swales or infiltration stripes to manage stormwater.
- Provide buffer zones or “vegetated corridors” per Clean Water Services standards. Vegetated corridors should be maintained from creeks, streams, rivers, or sensitive bodies of water. Typically, these consist of a 50 feet wide buffer area from the edge of the natural resource area, but may vary depending on local site conditions. See



Fanno Creek Greenway Trail in Beaverton, Oregon

the Clean Water Services design and construction standards section 3.03 for specific guidance: www.cleanwaterservices.org/PermitCenter/DesignAndConstruction/DandCTable.aspx

- Native plants should be used for landscaping as much as possible.
- Invasive species should be controlled or removed. This may require an on-going efforts.
- Stormwater best management practices should be implemented wherever possible.
- Provisions should be made for the circulation and/or migration of local fauna.
- Sensitive areas, such as wetlands, should be protected using railings, causeways, and/or alternative trail alignments.
- At logical locations, local flora and fauna should be interpreted for educational purposes.



A boardwalk structure is used to span a sensitive wetland area along a greenway trail in Beaverton, Oregon

Accessibility Requirements for Trails

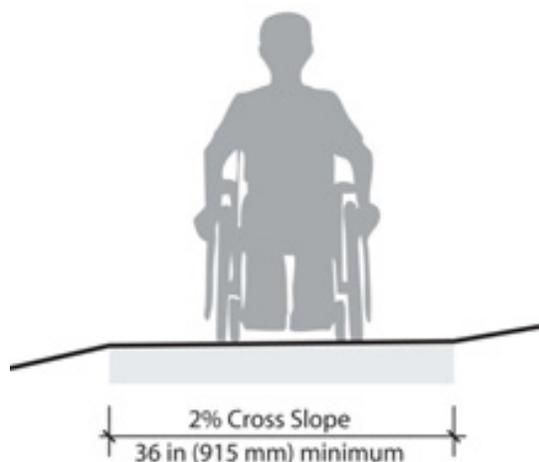
The United States Access Board has approved the Americans with Disabilities Act Accessibility

Guidelines (ADAAG) for trails and outdoor recreational access routes. However, some trails may have limitations that make meeting ADAAG and AASHTO guidelines difficult or prohibitive. Prohibitive impacts include harm to significant cultural or natural resources; requirements of construction methods that are against federal, state, or local regulations; or terrain characteristics that prevent compliance.

Guidance:

- Firm and stable surfaces should be used wherever universal accessibility is a consideration. Appropriate surface options include asphalt, concrete, timber, or compacted gravel.
- Clear tread width should be 36 inches minimum.
- A 60-inch-wide passing space should be provided at a minimum of every 1,000 feet when the trail has a clear tread width that is less than 60-inches-wide.
- Tread obstacles shall be no more than 1/4-inch-high, or up to 2-inches-high when the surface is other than asphalt, concrete, or boards.
- Cross slope shall be 2 percent maximum. Where the surface is other than concrete, asphalt, or boards, cross slopes not steeper than 5 percent shall be permitted when necessary for drainage.

- Longitudinal slope must meet one or more of the following:
 - » 5 percent or less for any distance.
 - » Up to 8.33 percent (or 12:1) for 200-foot maximum with resting intervals no less than 5-feet-long and equal to the width of the trail at both ends.
 - » Up to 10 percent for 30-foot maximum with resting intervals no less than 5-feet-long and equal to the width of the trail at both ends.
 - » Up to 12 percent for 10-foot maximum with resting intervals no less than 5-feet-long and equal to the width of the trail at both ends.



Maximum Running Slope and Length

Running Slope of Trail Segment		Maximum Length of Segment
Steeper than	But not Steeper than	
1:20 (5%)	1:12 (8.33%)	200 feet (61 m)
1:12 (8.33%)	1:10 (10%)	30 feet (9 m)
1:10 (10%)	1:8 (12%)	10 feet (3050 mm)

- No more than 30 percent of the total trail length may exceed a running slope of 8.33 percent.
- Signs are required at trail access points indicating the following (ADAAG, 1017.10):
 - » Trail length;
 - » Surface material;
 - » Typical and minimum tread width;
 - » Typical and maximum running slope; and
 - » Typical and maximum cross slope.
- Detectable pavement changes at curb ramp approaches should be placed at the top of ramps before entering roadways.
- Provide one accessible parking space per every twenty-five vehicle spaces at trailheads.
- Trail amenities, drinking fountains, and pedestrian-actuated push buttons should be placed no higher than 4 feet off the ground.

BEST PRACTICES FOR TRAIL CROSSINGS

Trail crossings and intersections provide unique opportunities and challenges. These include, but are not limited to, trail-trail intersections, trail-roadway crossings, railway crossings, and structured grade-separated trail crossings (over/under roadways, or over sensitive natural areas).

Trail-Trail Intersections

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

Guidance:

- Trails should be aligned to intersect at as close to a 90-degree angle as possible.
- Sight lines should be clear for all users.
- Off-set trail intersections to limit the number of intersecting travelways. For example: create two, three-way intersections versus one, four-way intersection.
- Roundabouts are an effective means of slowing speeds and clarify expected operational movements.
- If a roundabout treatment is used, consider the use of landscaping with low-growing (24 inches maximum) and minimally spreading shrubs and groundcover that require little maintenance. This is intended to maintain safe sightlines across the intersection so that trail users can see other approaching users.
- Other materials may be used in roundabouts such as boulders or public art to discourage shortcut paths through the central island, as long as clear sightlines over 24 to 36 inches are maintained to address real and perceived safety concerns.
- Include directional wayfinding signs at intersections.



Orient angled crossings to approach as close to 90° angles as possible.



Model of a trail roundabout with proper signage, and landscape features that maintain safe sightlines.

Trail-Roadway Crossings

Throughout Hillsboro, the trail system will need to cross roadways. Depending on the existing conditions, trail crossing treatments will vary in level of infrastructure.

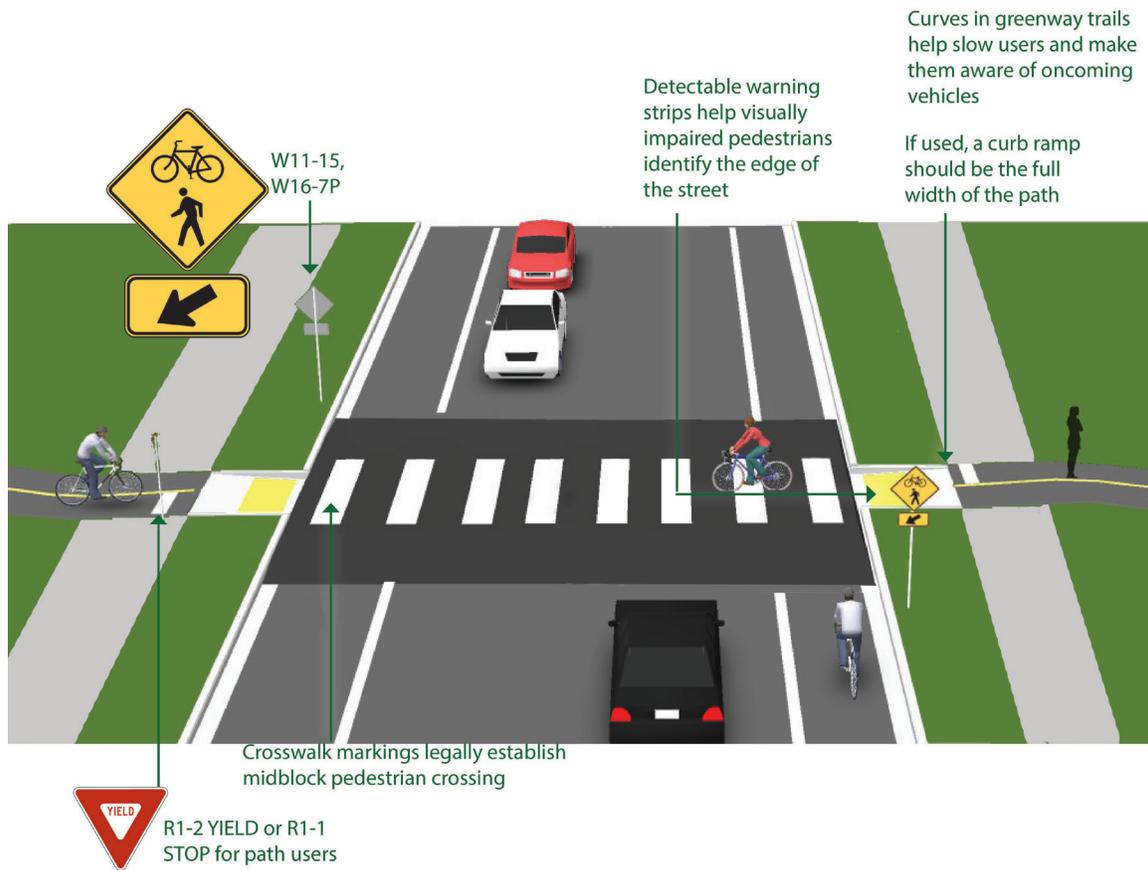
Generally, grade separated crossings such as underpasses and overpasses provide the highest level of user comfort and safety. As grade separated crossings are often cost prohibitive to install at every roadway and crossing, signalized crossings offer the next best level of protection for trail users. Mid-block crossings are advantageous when the nearest intersection is too far away for trail users to reasonably choose that option. Trail alignments may also be routed to existing signals located at existing vehicular intersections.

During the design phase, each crossing type should be analyzed by an engineer for traffic conditions, safety, and proper design. Regulatory traffic control devices should be installed on the trail at every roadway intersection. Roadway markings, including crosswalk striping, will be designed and installed as warranted on a case-by-case basis. AASHTO's Guide for the Development of Bicycle Facilities and the Manual on Uniform Traffic Control Devices (MUTCD) should be consulted for options for signalization, signs, striping, and marking treatments.

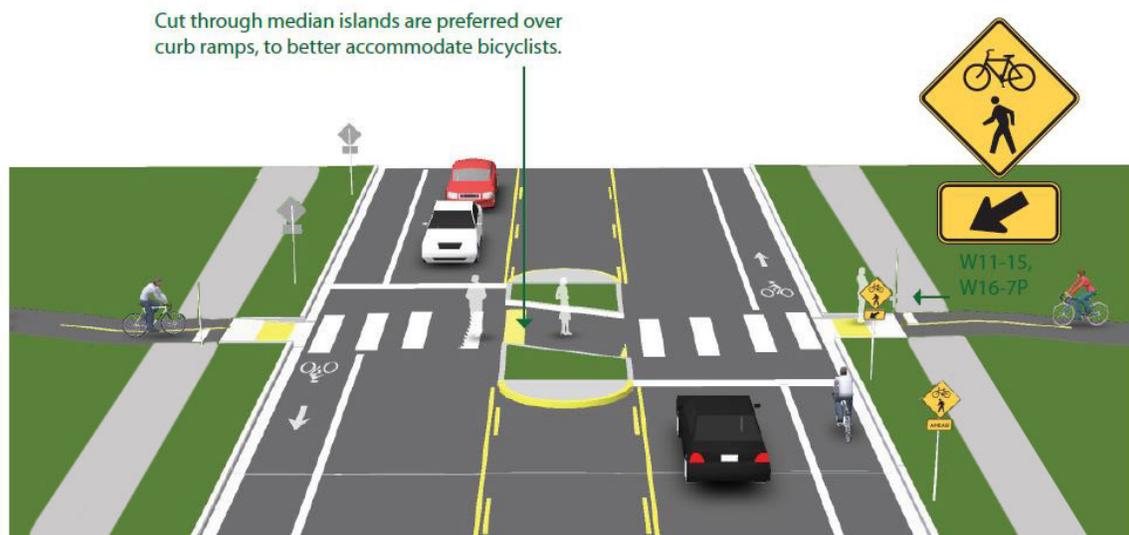


Existing Rock Creek Trail crossing at Evergreen Parkway.

Unsignalized roadway crossing diagram



Unsignalized roadway crossing diagram with refuge island



Roadway Crossings: Unsignalized/Marked

Trail users typically prefer to travel along direct routes. As such, mid-block crossing improvements should be considered. In areas with good sight distance and low traffic volumes and speeds, a signed and striped crossing may be adequate. As the existing conditions become more challenging, treatments such as curb extensions, speed tables, pedestrian refuge islands, and additional signage should be investigated.

Guidance:

- Install crosswalks at all trail-roadway crossings.
- Site the crossing area at a visible location.
- Crossing should be a safe enough distance from neighboring intersections to not interfere (or be interfered) with traffic flow.
- Crossing at a roadway with flat topography is desirable to increase motorist visibility of the path crossing.
- The crossing should occur as close to perpendicular (90 degrees) to the roadway as possible.
- Warn motorists of the upcoming trail crossing and trail users of the upcoming intersections; stop, yield and/or caution signs), changes in pavement texture, raised crossings, and/or striping.
- Maintain visibility between trail users and motorists by clearing or trimming vegetation that obstructs the view between them.
- Intersection approaches should be made at relatively flat grades so that cyclists are not riding downhill into intersections.
- If the intersection is more than 75 feet from curb to curb, it is preferable to provide a center median refuge area; a refuge is needed in conditions exhibiting high volumes, high speeds and/or multiple lanes.

Roadway Crossings: Signalized

When crossing high volume, high speed roadways, the use of a mid-block user-activated pedestrian signal such as a High Intensity Activated Crosswalk (HAWK) or Rectangular Rapid Flashing Beacon (RRFB) may be warranted. Signalized crossings may be necessary on trails with significant usage when intersecting with demanding roadways, however Manual for Uniform Traffic Control Devices (MUTCD) warrants must be met for the installation of a signalized crossing. Consult the MUTCD, and/or the AASHTO Bikeway Design Guide for signal, sign and light placement.

Guidance:

- Bike activated loop detection is recommended at signalized intersections.
- If center medians exist, providing secondary installations of signage warning motorists of the presence of trail users in these locations will improve driver behavior.
- Rectangular Rapid Flashing Beacons (RRFBs) shall always be used in such a way as to supplement standard bicycle and pedestrian crossing signs and markings.
- Advanced warning signs should also be implemented both on the trail and roadway to alert users and motorists of the crossing.



Example of a Rectangular Rapid Flashing Beacon (RRFB) at a pedestrian crossing.

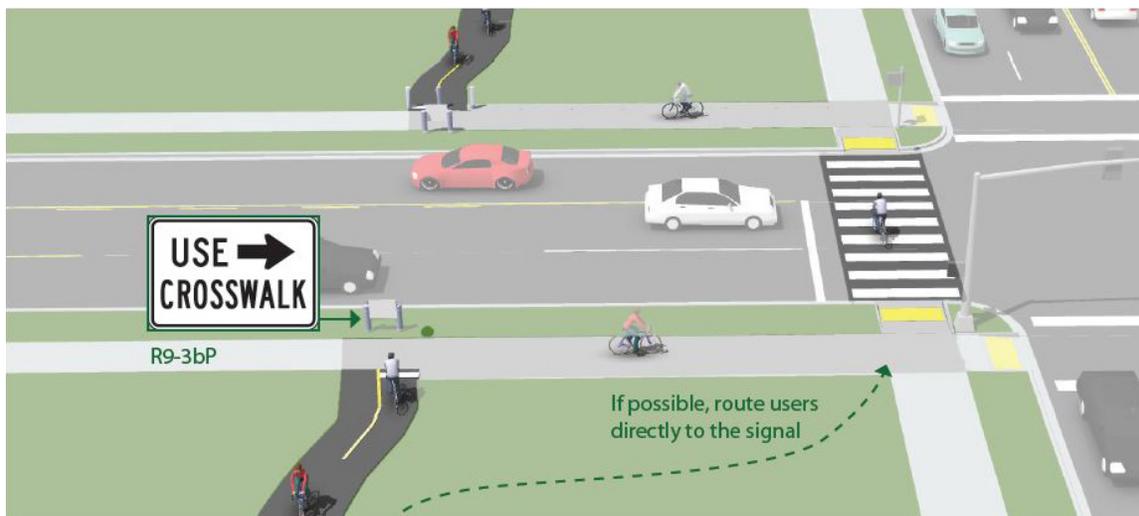


Example of a High-Intensity Activated Crosswalk Beacon (HAWK) signal at a multi-use trail crossing.

Routing to Existing Signals

There are many challenges associated with path crossings at roadway intersections, notably that path crossing movements do not match drivers' ingrained scanning behavior at intersections, causing "blind spots". This can also be exacerbated on wider roads with multiple lanes of traffic in each direction, where vehicles may block other driver's views of approaching trail users. With these and other challenges in mind, the three main countermeasures that will reduce the likelihood and severity of conflicts at intersections are:

- 1) Reduce the speeds of both path users and motorists at conflict points.
- 2) Increase the predictability of driver and trail user behavior through clear and legible design.
- 3) Limit the amount of exposure at these conflict points as much as possible.



When trails are not routed directly to an intersection, means to deter midblock crossings, such as barriers and signs, need to be implemented.

In places where a shared-use path intersects a roadway alignment less than 250 feet from an existing intersection (see figure below), the best practice is to divert the trail users to the intersection and cross at an improved crosswalk.

Guidance:

- Implement access management by limiting the number of driveways or other mid-block crossings of the path.
- Design intersections to reduce driver speed and heighten awareness of path or trail users (e.g. tighter turning radii, center median refuges, etc.)
- Keep approaches to the intersection clear of obstructions, such as parked vehicles, overgrown landscape, etc.

At signalized intersections:

- Institute fully protected and restricted left- and right-turning movements for motorists.
- Provide a leading pedestrian/trail user interval, or exclusive pedestrian phases where there are expected to be high volumes of path users.

Grade-Separated Crossings

Grade-separated trail crossings eliminate potential conflicts between trail users and motorists. This can either be done using a bicycle and pedestrian overpass, or tunnel underneath the roadway. There are advantages and disadvantages to each, and each crossing situation will have a unique set of design challenges.

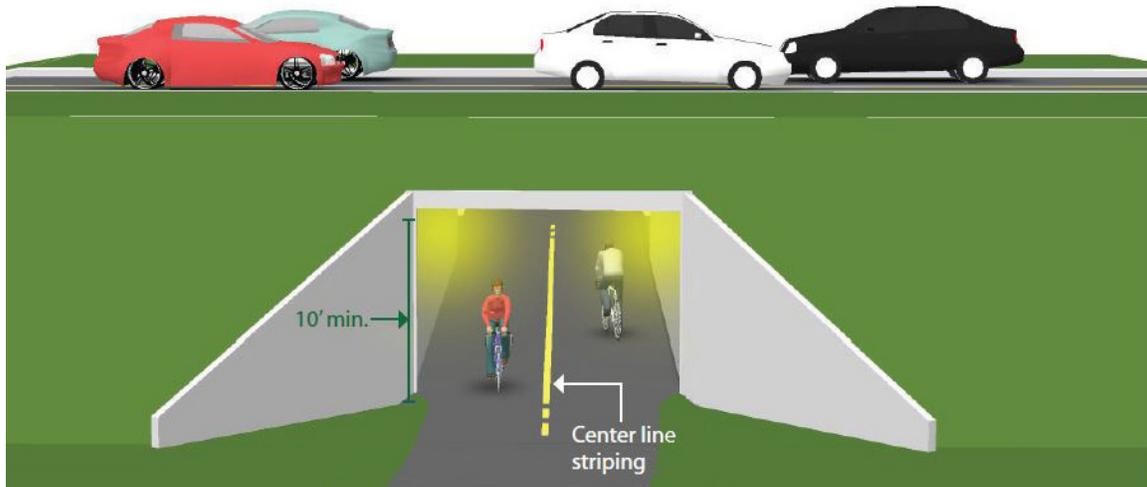
Underpasses

In many cases, an underpass may be advantageous because there are generally fewer elevation (grading) changes that are required when compared to overpasses.

Guidance:

- Sight lines should be unobstructed from both a seated and a standing position. Clear sight lines create safer conditions, and lend themselves to a greater sense of security for trail users.

- Lighting should be bright to accommodate users with vision impairments, and to create a better sense of security for all users. Also, indirect lighting reflected off walls or the ceiling minimizes shadows and glare, which is a benefit for users with visual impairments.
- Vertical clearance should be 10 feet minimum to accommodate both user clearance, and shy distance.
- The horizontal clear width of the underpass should include the clear zone or shoulder width of the approaching trail on each side to accommodate user shy distance.



Overpasses

An alternative to an underpass or an at-grade crossing is to bring users over an existing roadway or barrier. The minimum height of the bottom of the bridge deck will vary depending on the roadway use below. For example, minimum clearances for highways vehicles and railroad trains are 16 feet and 22 feet, respectively.

Specific design and construction specifications will vary for each overpass and can be determined only after all site-specific criteria are known.

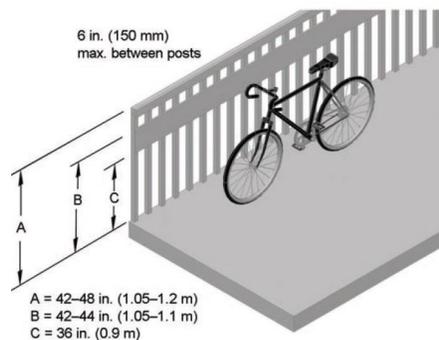
Guidance:

- The receiving clear width of the bridge (the inside dimensions between the bridge railings) should allow 2 feet clearance beyond the trail width to accommodate a horizontal shy distance for bicyclists.
- Access for emergency and maintenance vehicles should be considered in the design of any bike and pedestrian overpass.
- ADAAG strictly limits ramp slopes to 5 percent (1:20) with landings at 400-foot-intervals, or 8.33 percent (1:12) with landings every 30 feet. See Accessible Greenway Trail Design guidelines for more information.
- Bridge railings should be 48 inches high to prevent cyclists from falling over the edge in the event of a crash. Also, the space between railings should be no more than 6 inches up to 27 inches of railing height, and no more than 8 inches above that to prevent a child from slipping through gaps.

- Where cyclists will be riding adjacent to the railing, a rub rail should be installed, with the bottom edge at 36 inches above the bridge deck to prevent a bicyclist's handlebars from slipping through the openings.
- Overpass decking may include centerline striping, and/or striping separating user-types.
- Always consult a structural engineer before completing bridge design plans, before making alterations to an existing bridge, and prior to installing a new overpass.



Best practices for railing design includes the use of rub rails to avoid the potential for handlebars to get caught between posts.



Boardwalks

Boardwalks are structures that provide vertical separation from sensitive natural or inundated areas while limiting the potential for environmental impact. They are typically utilized when crossing small creeks and wetlands.

Boardwalks range in length and can span as little as 10 feet or stretch for longer distances depending on site conditions. Bridges are used where greater span lengths are required and when the objective is to reduce base flood elevations. Boardwalks are usually constructed of timber, concrete, or recycled plastic decking. Recycled systems such as Trex® are popular for their material durability, however they have structural limitations and can be cost prohibitive. Modular concrete boardwalk systems are gaining

popularity due to their low-impact installation methods and durability within wet areas. Permatrak™ is a system being used by the National Park Service.

Guidance:

- When no rail is used, boardwalks should maintain a 10 feet clear width minimum, though a 14 feet width is preferred in areas with higher anticipated use, and whenever railings are used.
- A 6 inch high bull rail or curb is recommended on each side, when the decking is no more than 30 inches from the ground elevation. A 42 inch minimum guardrail is required at locations where the decking surface is greater than 30 inches above finish grade. Maximum openings between railing posts is 4 inches.
- Boardwalks should be designed in response to the anticipated loads.
- Evaluation of boardwalk footings should include uplift as well as loading consideration for flood events.
- Consult a structural engineer for member sizing and post footing design. The foundation normally consists of marine-grade timber posts or auger piers (screw anchors). Screw anchors provide greater support and durability.
- Decking materials should be oriented so that joints run perpendicular to the direction of travel. Any horizontal openings in the decking, or between planks needs to be less than 1/2-inch per ADA.
- Minimize slippery decking surfaces by applying a topcoat of non-skid paint, sandy compounds, or a light asphalt overlay on timber decking. Concrete is the most reliable non-skid surface. The addition of caution signs prior to boardwalks or bridges should be considered where conditions such as frost or frequent moisture potentially create slippery conditions.
- Local, state, and federal permits will be required where a boardwalk is located within wetlands. Any construction in wetlands is subject to regulations and should be avoided or minimized.



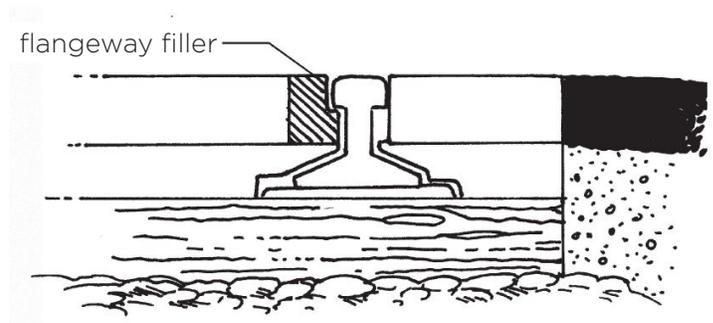
Railway Crossings

Both light and heavy rail lines exist within the City of Hillsboro and trail crossings of the railways is likely. Due to the fall hazard potential created by railroad tracks and wheel channels, best practices for railway crossings include orienting trail alignments to intersect railways at a perpendicular angle. Where this is not possible, it is ideal to cross the railway as closely as possible a perpendicular angle to the rail line.

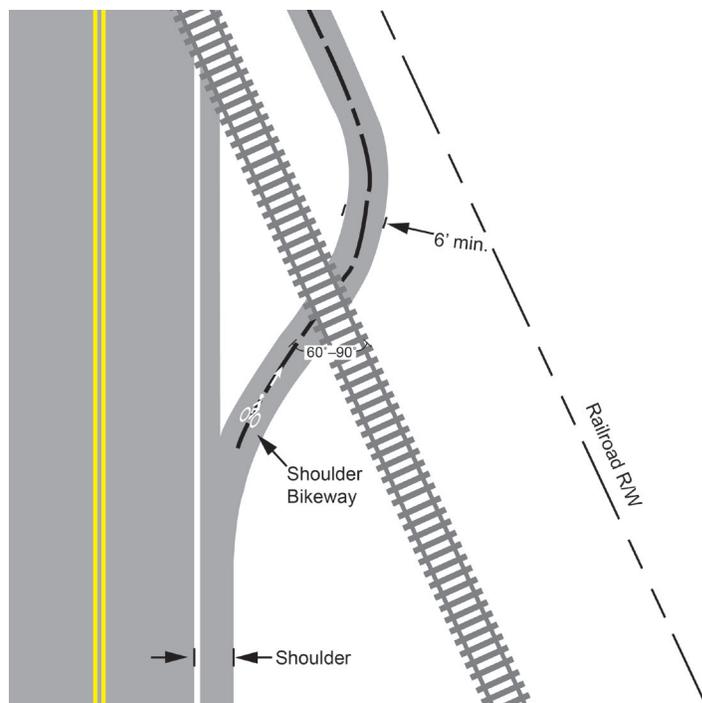
Guidance:

- Cross existing rail lines preferably at 90°, or 60° minimum.
- To eliminate potential issues with tight-radius turns, widen pathway to accommodate better sightlines and turning angles.
- Use durable crossing surfaces, such as concrete, which out-performs most other materials in adverse weather conditions.
- Approaches to the railroad tracks and the areas in between the tracks should be raised to be level with the top of the tracks.
- Where possible, coordinate with the local rail authority to install multi-use trail warning signals.
- Use rail flangeway fillers to minimize gaps associated with the track rails.

Additional information on crossing railways may be found within the FHWA trail crossing design guidelines: www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/pdf/17chapter16.pdf



Flangeway gap fillers are rubber additions that may be used in lower-speed crossing areas that depress under the weight of a train, but rebound to the top elevation of the track.



Example of a trail roadway crossing from the AASHTO Design Guide (section 4.12.1)

TRAIL AMENITIES

Fences

Fences, where needed, are important features along trails. They define the public space and protect trail users in areas where there may be a cliff, steep slope, or hazardous adjacent land use or physical feature. Also, fencing may be necessary in some areas, such as rail corridor trails, or in industrial areas.

- At a minimum, fences should consist of a horizontal top and bottom rail.
- Picket style fencing should be avoided because it presents a safety hazard for bicyclists.
- Maximum fence height should be 4 feet unless a taller fence is required for safety or privacy.
- Wildlife friendly fences should be used in sensitive natural resource areas to separate users from protected habitat and breeding areas.
- In rural areas, 4-foot-high split-rail style fencing should be used.

Lighting

Pedestrian-scaled, low level lighting improves safety, enables the trail to be used year-round and can improve the aesthetic of the trail. As a priority, lighting should be placed at trailheads, bridges, and underpasses.

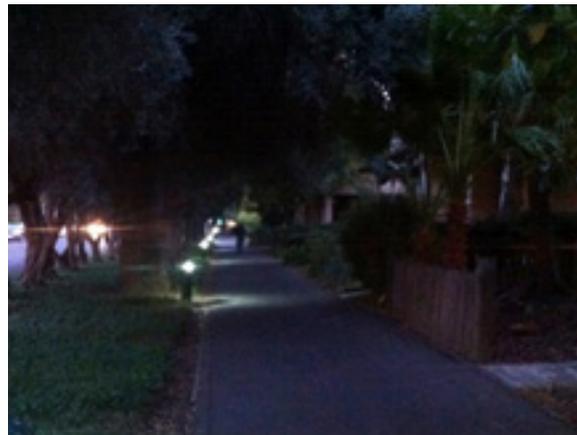
Good lighting provides high-quality illumination without the glare and light pollution that is produced by typical cobra-type street fixtures. The City of Hillsboro strongly encourages all new lighting be dark-sky compliant as well as energy-efficient. Minimal or no lighting should be used in sensitive natural resource areas as it can have negative effects on wildlife. If lighting is required in these areas, full-cutoff fixtures should be used to minimize light pollution.



Wildlife friendly fence with 6 inch vertical gap at the bottom for small animal passage (Springwater Trail).



Split rail fencing is aesthetically compatible with rustic and natural settings.



Low power bollard lights with proximity sensors, Davis, CA

Light fixtures may include motion and light sensors so that they respond to the presence of trail users and ambient light levels while using a modest amount of energy. Solar technology is also advancing so that it can be applicable even in frequently cloudy or shaded areas. Solar has the advantage of not requiring a connection to a power source.

Currently, Hillsboro’s trails are open from dawn to dusk. Lighting could expand the utility of trails used as commuter routes, particularly during the winter season.



Solar powered LED Marks are a new technology being explored to clarify trail routes. Photo credit: Geveko ITS

Bollards

The use of bollards on trails should be minimized to avoid creating obstacles for bicyclists. Bollards, particularly solid bollards, have caused serious injury to bicyclists. Instead, design the path entry and use signage to alert drivers that motor vehicles are prohibited. In cases where bollards must be used, a single post placed in the center of the path entry is preferred, and bollards should be installed to be removed or be flexible to allow passage of maintenance or emergency vehicles. They should also include reflective paint or tape so that they are visible in times of low light.



Public art on Iowa’s Trout Run Trail. Photo credit: Travel Iowa

Public Art on Trails

Efforts should be made to include public art within the overall design of the trail system. Local artists may be commissioned to provide art for the trail system, making it uniquely distinct and memorable. Many trail art installations are functional as well as aesthetic, as they may provide seating or places to play. According to American Trails,

“Art is one of the best ways to strengthen the connection between people and trails. Across America and elsewhere, artists are employing a remarkably wide range of creative strategies to support all phases of trail activities, from design and development to stewardship and interpretation. In particular, art can be an effective tool for telling a trail’s story compellingly and memorably.”

Examples of art programs for trails can be found at: www.americantrails.org/resources/art/ArtfulWays.html.

Trailheads

Major access points should be established near commercial developments and transportation nodes, making them highly accessible to the surrounding communities. Minor trailheads should be simple pedestrian and bicycle entrances at locally known locations, such as parks and residential developments.

A minor trailhead could include parking, drinking fountains, benches, bicycle racks, trash receptacles, pet waste bag dispensers, and an information kiosk. Major trailheads could include all of these plus additional amenities such as rest rooms, shelters, picnic areas, wayfinding / interpretive signs, secure bike parking, a bike maintenance station, a fitness course, and an emergency telephone.

Partnerships could also be sought with owners of existing parking lots near trails. Benefits are threefold—businesses benefit from trail-user patronage; trail owners reduce land acquisition needs; and the environment benefits from less impervious surface in the watershed.

Bicycle Amenities

Bicycle parking should be installed wherever facility users may need to leave their bicycles for a period of time. In general, short term bike parking facilities should be provided where motor vehicle parking is also provided, and where motor vehicle parking is not provided for individual businesses or destinations. The two key components to successful bike parking are location and facility design.

Site location

- Racks aligned side-by-side should be a minimum of 3 feet apart.
- Racks should also be a minimum 3 feet perpendicular from any existing curb, or 2 feet parallel from existing curbs.
- Racks should be a minimum of 4 feet perpendicular to any walls, or 3 feet parallel from existing walls or structures.
- Where possible, it is desirable to site bike racks underneath a structure that protects bikes from rain or other elements.



A major trailhead featuring concessions and bicycle, canoe, and kayak rentals.



A major trailhead with bike racks, air compressor, water, restrooms, phone, and benches.

Bike Rack Design

Racks should be constructed of strong metal tubing, and strongly secured or bolted to the existing grade surface. In all cases the area beneath the racks should be concrete or asphalt. Additional considerations include:

- Racks should support the bike at two points above its center of gravity.
- Accommodate high-security U-locks.
- Do not contain protruding elements or sharp edges.
- Do not bend wheels or parts.

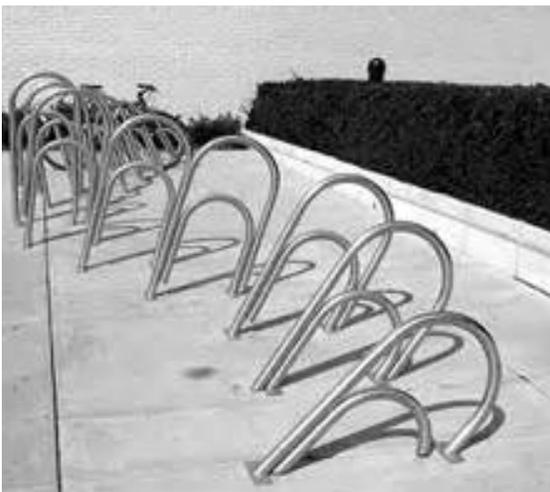
In addition to these, it is desirable to use racks with a thermoplastic coating, or other vinyl, rubber, or enamel material that will minimize scratches.

For more detailed recommendations and guidance regarding bike racks, and information on long-term bike parking guidelines, see the AASHTO Guide for the Development of Bicycle Facilities, section 6.



Sheltered parking and well-spaced staple racks creates a secure and comfortable parking.

Bicycle parking also presents opportunities to be creative or acknowledge trail managers and partners.



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07 NEXT STEPS



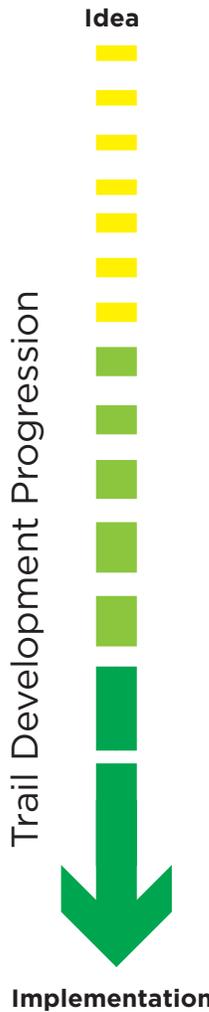
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NEXT STEPS

The implementation of trail improvements is essential to meeting Hillsboro’s goal for a diverse and well connected trails system. Trail projects, however, can take years to grow from concept to reality. Such projects are often quite complex, involve many landowners, cross different land uses and settings, and in some cases occur within multiple jurisdictions. The City of Hillsboro Trail System will be completed in phases as funding becomes available for design and construction, and as trail easements are secured.

High priority trail corridors could be identified based on: funding availability, equity goals, correcting a safety hazard, planning consistency, opportunity due to development, public demand, level of use and political will, synergy, key gap closure, or builds on prior investment. However, each of the alignments within this master plan are desired by community members and thus are a priority. An assessment of “corridor readiness” should be used to identify next actions needed to further trail advancement at each stage. Readiness levels may be defined as follows:

Trail Development Progression



Status	Actions / Needs
<ul style="list-style-type: none"> • Corridor does not occur within existing City Plans • Corridor meets alignment selection criteria as per chapter 5 of this plan • Trail route or alignment is unknown • Public knowledge and support of trail is low 	<ul style="list-style-type: none"> o Investigate trail feasibility o Build public support o Incorporate viable routes into Trail System Master Plan
<ul style="list-style-type: none"> • Trail segment is included in City Trail System Master Plan • Trail routing is largely unknown or conceptual • Trail segment has public support 	<ul style="list-style-type: none"> o Perform due diligence on property o Conduct alignment refinement study o Determine preferred alignment o Identify funding resources
<ul style="list-style-type: none"> • Trail alignment is known • Public is in favor of alignment • Implementation funding is secured 	<ul style="list-style-type: none"> o Conduct design development o Acquire property o Produce design drawings o Bid and construct

Trail Development Progression

Trail Development Process

Typically, trail development is a lengthy process requiring determination, public support, and ability to capitalize on opportunities as they arise. A series of sequential steps should be followed. These include:

Trail Master Planning

This Trails Master Plan serves as the overall guiding vision for the development of Hillsboro's trail network. The City should update and revise it every five years to reflect progress made, evolving community priorities, and new opportunities.

Alignment Studies

Further study of proposed conceptual trails is needed to move each trail alignment closer to implementation. Alignment studies investigate alternative alignments until a feasible and preferred option is determined. The study should include investigation of topography, natural resources, ownership, public support, safety, and connectivity. Studies of specific segments should describe the recommended trail routing, overall design or cross section, associated features, estimated costs, and permitting requirements.

Design Development

Trail design and engineering should follow the alignment study. Final designs will require physical survey, a geotechnical investigation, environmental assessment, design, and engineering.

A permitting process must accompany the design development stage. In most cases, permits will need to be obtained through a number of agencies at the federal, state, and local levels.

Acquisition Strategy

The City of Hillsboro will need to implement trails on property which is owned by others. Several mechanisms of gaining

authority and access are available. These options (purchase, easement, dedication, and memoranda of understanding) offer a range of control of the land and assumed liability.

Purchase

The City may purchase land for trails to ease coordination and implementation efforts, and provide ongoing maintenance. One important benefit of purchasing property has to do with liability. Civil law regarding liability applies differently to government agencies than to private landowners. Generally, government agencies are provided a level of liability immunity against civil actions for injury on public property and/or facilities (i.e. trails). The downside of purchasing property outright is the cost.

Easements

Obtaining easement dedications provides the City with an option to gain control over a desired property without purchasing the property outright. Easements are non-possessory interests to use the real property in possession of another person for a stated purpose. Easements preclude the property owner(s) from developing or engaging in other specified land use activities on the property or the portion of the property encumbered by the easement. Easements are also tied to the land, so changes in property ownership do not impact the validity of an easement dedication.

Landowners can negotiate the terms and price of the easement with the interested agency. Only after an easement dedication is accepted, does the landowner relinquish interest in the property.

Donation

Donations typically include full transfer of property to an agency or non-profit for a specific use or purpose that may be simple or complicated by extensive conditions. Financial incentives in the form of tax credits are available in most cases. The

receiving entity agrees to receive title to a parcel of land or easement at virtually no cost. In most cases, the donor is eligible to receive federal and state deductions on personal income, as describe under bargain sales. In addition, property owners may be able to avoid inheritance taxes, capital gains taxes, and recurring property taxes.

Dedication

An agency may also require developers to dedicate land for trails, parks, and open space. Dedications may be included as conditions of approval of the development. Agencies must prove a connection between the requested dedication and the impacts imposed by new development or sub-divisions.

As developers submit land use permit applications to the City, the Hillsboro Development Code requires development review staff to consult the Trails System Master Plan and require implementation of trail segments where there is a nexus between the trail and the impacts of the development. If an alignment is indicated on a property in question, the Parks Department should have an opportunity to negotiate for trail development.

One cautionary note with regard to developer-driven implementation, is that without additional implementation support from the City, trail segments may be built in isolation and not connect in the short term. This is a phenomenon that often results when developers are required to make public improvements as a condition of development approval (when development occurs incrementally over a long period of time). An alternative to this approach is securing the trail easement and collecting development fees in lieu of building isolated sections of trail. Then, once sufficient length is secured to make it usable and functional, longer connected trails may be built.

Target Partnerships

Segments of trails in the City of Hillsboro will be planned, designed, managed, and maintained by the City, except where other arrangements exist. A critical step in the trail implementation process is to clarify and formalize partner responsibilities for segments occurring on non-city owned parcels or through unincorporated areas. The solution for these segments is likely to involve agreements with target partners. Project partners will include the following entities:

Metro

Metro serves a key role in convening, facilitating, providing funds (e.g. grants/bond funds), and technical assistance in the planning and development of the regional trails system in the tri-county area. As the regional government, Metro assists with planning efforts that span political boundaries. Metro has been a partner in land acquisition efforts as well as regional trail master planning and alignment studies. Metro owns property on which trails occur, however they typically rely on local agencies to build and maintain the facilities.

As a repository for regional information, Metro is a resource for best practices and design guidance related to trail planning and development. Metro also distributes a number of grants to local jurisdictions through a competitive process. This includes federal and state transportation funds as well as local monies.

Washington County

Many proposed trail alignments travel through unincorporated areas of Washington County. Washington County, as an agency, does not build, manage, or maintain trails. Some of these areas may be annexed by the City of Hillsboro at a future time. However, that may not happen before funding is identified to construct trails.

Coordination with the County will be essential to providing connectivity at the

regional level. As part of their recently revised Managing Growth Policy 14, the County considers regional trails and on-site pedestrian and bicycle facilities in the public right-of-way as “essential services.” Per Ordinance 799, Urban Service Agreements address who are the long-term providers of these facilities.

Clean Water Services

Clean Water Services (CWS) regulates impacts to Statewide Planning Goal 5 vegetated corridors around natural resource areas. The introduction of improvements, including trails and associated amenities, will trigger permitting, enhancement, and mitigation requirements. It will be essential to follow the agency’s design manual during trail development. In general, trails occurring outside of vegetated corridor areas are preferred by CWS as they limit impacts to these valuable areas. Once improvements are in place, CWS requires that stormwater easements over the vegetated corridors be conveyed to them.



City Transportation Department

The process for developing the Trails Master Plan has confirmed that Hillsboro community members are highly in favor of trails. However, they also see walking and bicycling facilities within the road right-of-way as critical to their needs. Upgraded bicycle and pedestrian facilities within the road right-of-way could expand the utility and connectivity of the trail network prior to its full build out. Additionally, these on-street facilities could expand the number of days of the year trail connections are possible. Several desired routes which were discovered during this planning process are highlighted in the recommendation maps within this document.

Hillsboro School District

Trail segments may align with school district goals to provide Safe Routes to School. The City should continue to be in communication with the school district as it develops its trail network. At this point in time, the school district is open to allowing the general public to utilize trails occurring on its property.

Railways

Within this document, proposed trail alignments parallel, cross, or occur within railway corridors, including both heavy and light rail lines. With respect to trails, railroads are typically concerned with issues of trespassing and potential liability. Oftentimes, rail owners and operators prefer that trails not occur within their corridors. Sometimes separation techniques such as fencing or physical distance can help assuage concerns. In some instances, public agencies have assumed liability for injuries occurring within rail corridors as a means of gaining easements for trails.

Underutilized railways should be monitored as candidates for railbanking. Without railbanking, if a railway ceases to exist, continuous linear corridors



may revert to underlying ownerships. Railbanking, on the other hand, preserves the linear corridor intact which provides an ideal opportunity for trail development. With railbanking, the future use of a corridor is preserved for rail purposes, while the trail is allowed as an interim use.

With respect to the light rail line, conversations with TriMet should be pursued regarding trail alignments which occur within or across their corridors.

Private Businesses

Trails can be an asset to business owners in terms of attracting a talented work force. While Hillsboro businesses are interested in opportunities for trail connectivity, they have concerns regarding public access near their property. The technology based industry in Hillsboro will be specifically concerned about data security. Fencing and/or controlled access between these businesses and trails will need to be considered.

Homeowner Associations

A number of homeowner associations (HOAs) are found within Hillsboro. Some

HOA communities have trails on their property which they own and operate. In situations where such trails are utilized by members of the public beyond HOA residents, the burden of maintenance has been put into question.

Maintenance requirements should be defined during the development review process. In situations where outdated or substandard agreements exist, efforts should be made to address maintenance in a manner that ensures a safe user experience while being fair to those involved. The City should work with HOAs to find mutually acceptable terms of ownership, control, and maintenance in order to provide long term access and use of trails which are widely used by the general public or essential to community or regional connectivity.

Friends Groups

Forming a Friends of Hillsboro Trails group would help the City maintain and operate the trail network. It taps into latent support for these community assets, and builds a sense of ownership and shared



responsibility. Friends groups are often part of a city’s Adopt-A-Trail program or they can be an independent non-profit organization. The purpose of a friends group is as varied as the citizens who take part in them.

The City currently has an Adopt-a-Park program which many local groups, families, and businesses participate in. The program provides additional resources towards keeping parks, trails, and trail-heads clean and safe. As an existing community resource, the Adopt-a-Park program could naturally expand to the formation of a dedicated friends group.

At its core, a well-run friends group will engage volunteer citizens in a variety of activities and events that build community pride for the trail system, help defer trail maintenance and operation costs, and improve safety for trail users. Programs such as Trail Work, Trail Education Days, Trail Watch, Trail Patrol, Community Outreach and Resource Stewardship are often part of a friends group. They can also organize fun event days or run community facilities along a trail (such as a coffee shop or event space). There are many good examples of existing successful friends groups to draw upon in the region and nationally.

Alternately, a friends group could form on its own and create its own mission and identity. Often, these groups are influential in building support for funding. Sometimes such a group just needs an initial “incubator” type kick-start from a jurisdiction (or group of jurisdictions) to become established.

Trail Costs

Costs to build each trail will vary based on a number of factors. These include material selection, design width and depth, topography, and environmental setting. While concrete surfacing is more expensive initially, life cycle costs tend to be lower than that of asphalt due to durability. Compacted earth, wood chips, and crushed rock are all less expensive but require more frequent maintenance and replacement. Trails accommodating a greater variety of user types are typically wider in order to minimize conflicts between users. Trails occurring in tandem with natural areas may be more expensive due to avoid measures such as boardwalks and bridges, while areas with more topography will require added costs for earthwork services. Improvements such as bridges, underpasses, and at-grade roadway crossings will need to be developed on a case by case basis as these costs vary significantly. Property acquisition, design, engineering, and permitting fees will also be required.

The table below provides a variety of trail material costs. These unit figures and considerations may be used to generate planning level costs to inform future trail efforts. An inflation factor should also be applied to final cost figures based on anticipated construction year.

TRAIL COSTS

TRAIL TYPES	UNIT	MINIMUM COST (LOW COMPLEXITY)	MAXIMUM COST (HIGH COMPLEXITY)
Asphalt (12' wide)	Mile	600,000	3,000,000
Concrete (12' wide)	Mile	700,000	3,500,000
Boardwalk (14' wide)	LF	265	1,325
Earthen (6' wide)	Mile	18,000	30,000
Gravel Rock (6' wide)	Mile	26,000	34,000
Wood Chip (6' wide)	Mile	30,000	40,000

Minimum costs include clearing and grubbing, base preparation and materials, and minor earthwork.

Maximum costs include the same base costs as the minimum option as well as significant topography, earthwork, retaining walls, site demolition or remediation.

ACQUISITION COSTS

PROPERTY TYPE	PER ACRE COST
Unincorporated Rural Reserves (utility corridors)	10,000
Unincorporated Rural Reserves	15,000
Unincorporated Urban Reserves	50,000
Unincorporated future residential in UGB	75,000

Acquisition costs based on 2014 Council Creek Regional Trail Master Plan.

Funding Opportunities

Funding for trail projects may come from a variety of sources including matching grants, sales tax or other taxes, bond measures, or public/private partnerships. Sources of funding for planning, design, implementation, and maintenance of walking and biking improvements have been identified by the Oregon Transportation and Growth Management Program. The descriptions are intended to provide an overview of available options

and do not represent a comprehensive list. It should be noted that this list reflects the funding available at the time of writing. The funding amounts, fund cycles, and even the programs themselves are susceptible to change without notice. More information can be found at: <http://www.oregon.gov/LCD/TGM/docs/WalkBikeFund.pdf>