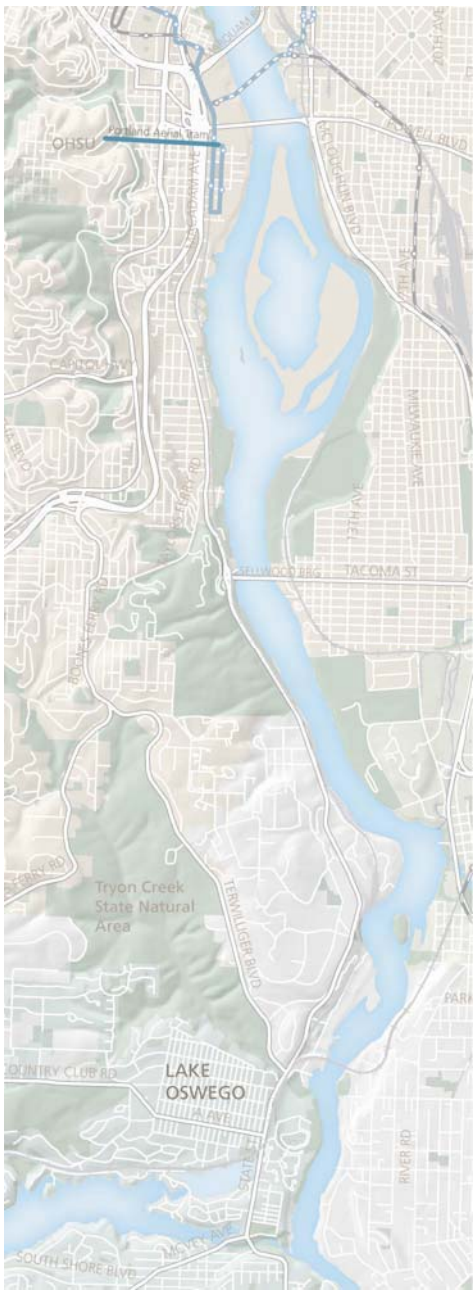
Lake Oswego to Portland Trail



December 2010

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2009 Trail Refinement Working Group
Joseph Auth, ODOT
Basil Christopher, ODOT
Ralph Drewfs, ODOT
Roger Geller, City of Portland
Nancy Gronowski, City of Portland
Michelle Healy, North Clackamas Parks and Recreation
Mel Huie, Metro
Mauricio Leclerc, City of Portland
Brian Monberg, Metro
Joe Recker, TriMet
Erica Rooney, City of Lake Oswego
Jamie Snook, Metro
Natalie Strom, City of Lake Oswego

2009 Lake Oswego to Portland Transit Project Management Group
Elissa Gertler, Clackamas County
Rick Gustafson, Portland Streetcar Inc.
Neil McFarlane, TriMet
Doug Obletz, Project Manager, Shiels-Obletz Johnsen
Ross Roberts, Metro
Paul Smith, City of Portland
Brant Williams, City of Lake Oswego
Rian Windsheimer, ODOT Region 1

2009 Lake Oswego to Portland Project Steering Committee
Mayor Sam Adams, City of Portland
Metro Councilor Carlotta Collette, committee co-chair
Judie Hammerstad, Portland Streetcar Inc.
Fred Hansen, TriMet
Mayor Jack Hoffman, City of Lake Oswego
Commissioner Deborah Kafoury, Multnomah County
Metro Councilor Robert Liberty, committee co-chair
Chair Lynn Anne Peterson, Clackamas County
Michael Powell, Portland Streetcar Inc.
Jason Tell, ODOT Region 1

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For more information on this study, please
contact Metro Regional Government:
trans@oregonmetro.gov
(503) 797-1756

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Executive Summary

This report provides a strategy to develop a trail from Lake Oswego to Portland's South Waterfront District.

A proposed trail connection adjacent to the Willamette Shore Line right-of-way has long been included in regional and local plans. This project involves a key trail gap on the Willamette River Greenway and the potential to connect existing trail systems in Lake Oswego and Portland. From 2005-2007 an Alternatives Analysis study of transit options in the corridor included an examination of trail alignments. In 2007, the Lake Oswego to Portland Transit Steering Committee adoption of the Locally Preferred Alternative (LPA) directed the project to provide further refinement on the trail concept for the corridor. Specifically, the work program included:

- Development of a trail alignment with lower capital costs, and a phasing strategy
- Identification of a trail sponsor to further project development for the trail
- Consideration of funding opportunities for the trail project

In 2009, Metro convened a trail refinement process to respond to the work program. A working group comprised of jurisdictional transportation and park staff has met throughout the refinement to evaluate and recommend a strategy for future trail development in the corridor. This report is the culmination of the refinement work. In September 2009, the Lake Oswego to Portland Transit Project Steering Committee accepted the trail development strategy.

Study Area

The Project Study Area is located between Downtown Lake Oswego and Portland's South Waterfront District. For the purpose of the study, the area was divided into three study sections; a North Section between SE Lowell Street and the Sellwood Bridge; a Central Section from the Sellwood Bridge to SE Terwilliger Blvd; a Southern Section from SE Terwilliger Boulevard to the proposed streetcar terminus site adjacent to Albertsons Grocery in Lake Oswego. Each area provides for unique opportunities and constraints in existing land uses, topography, and design challenges.

Trail alignment and phasing

Project staff proposed three phases for the trail alignment. Early phases will develop the trail in north section (Johns Landing) and extend the trail system in the south section (downtown Lake Oswego). Later phases will complete design work in central section and construct central section. Details of the phasing strategy are found in Chapter 6.

Phase I: Connections in Johns Landing and Lake Oswego
This phase will leverage future investment in transit stops at the northern and southern ends of the corridor. In the north, improvements in Johns Landing will provide connections from

South Waterfront to the Sellwood Bridge. In the south, current projects underway such as the bridge over the mouth of Tryon Creek will provide new connections to the Foothills District and Foothills Park, critical locations along the Willamette River.

Phase II: Complete Johns Landing; Central and South Engineering and Development
The second phase of the project would complete the connection between South Waterfront and the Sellwood Bridge. With its proximity to the Portland Central City and connections to existing trails, this key connection will increase bicycle and walk trips significantly. In addition, Phase II would involve additional design work to be conducted along the OR 43 corridor. Phase II trail segments provide scenic recreational rides, increase the distance trail users could travel along the route, and connect to streetcar stops. This phase will also fill in key gaps in the Foothills District and connect Tryon Cove Park to areas north.

Phase III: Complete Central and South Sections
The final Phase of the Lake Oswego to Portland Trail will complete the corridor connection from Lake Oswego to Portland. This phase includes completing the gap in the central section, with either a facility adjacent to Riverwood Road and the Willamette Shore Line (including a tunnel through Elk Rock) and/or a facility adjacent to OR 43.

Project development

The trail working group recommends a multi-party partnership with Metro and others, including Portland Bureau of Transportation, Portland Parks, Multnomah County, Clackamas County, City of Lake Oswego, TriMet and ODOT. Metro should convene the regional corridor vision, continue to pursue funding opportunities, and support the decision making body. Partner agencies, including Metro, would continue project development in their jurisdiction per the work plan outlined in Chapter 6.

Project governance and decision making

Project staff recommends a Trail Committee that is separate but linked to the Lake Oswego to Portland Transit Project Steering Committee. The Trail Committee would include members of the Transit Steering Committee, and would convene on the same dates as the Transit Committee. The Trail Committee would include additional membership, and the two committees would convene and adjourn immediately following each other.

Funding for the trail

Project staff has identified several potential funding sources. Most promising opportunities include funding in conjunction with other capital projects underway as well as the Active Transportation program. Other funding sources could include the State Transportation Improvement Program and the Highway Safety Improvement Program. More details on funding are included in the trail final report. This project is listed in the 2035 Regional Transportation Plan Financially Constrained list as project ID 10087, nominated by the City of Lake Oswego. More details are found in Chapter 6, implementation.

Public outreach

This study refined the work during the Alternatives Analysis, which including public workshops and open houses considering a wide range of trail alternatives in the corridor. Project staff held two open houses during this refinement phase of the project to receive trail input. Project staff also held stakeholder meetings with advocacy groups. Project staff is preparing additional outreach with neighborhood groups and bicycle and pedestrian advisory committees as the project moves forward.

Next Steps

The project will pursue the work program outlined in Chapter 6. The Lake Oswego to Portland Trail Project should continue to coordinate with partner agencies and project development in the following areas:

Coordination with Lake Oswego to Portland Transit Project:
- Lowell Street to Hamilton Street (PBOT South Portal Project area)
- Powers Marine Park
- Short and Long Trestles
- Riverwood Road
- Elk Rock Tunnel
- UPRR railroad berm and Tryon Creek

The objective of this coordination will be to assure that the transit project does not preclude concurrent or future construction of the trail.

Coordination with Oregon Department of Transportation (ODOT):
- Macadam Avenue (OR 43) between Julia Street and Carolina Street
- OR 43 at the Sellwood Bridge interchange and south of Sellwood Bridge

Coordination with Multnomah County:
- Sellwood Bridge Interchange Area

Coordination with City of Portland:
- Lowell Street to Hamilton Street (PBOT South Portal Project area)
- Willamette Park
- Sellwood Bridge Interchange Area
- Powers Marine Park

Coordination with City of Lake Oswego:
- Pedestrian bridge over the mouth of Tryon Creek
- Foothills District Planning

Chapter 1. Introduction

The Lake Oswego to Portland corridor is a critical gap in the regional trail system. Long identified in the regional plans, this project follows the Willamette River, a natural treasure of statewide significance, and connects neighborhood redevelopment projects in downtown Lake Oswego's Foothills District and Portland's South Waterfront and Johns Landing districts. Both the City of Portland and the City of Lake Oswego have extensive trail systems, and this corridor can provide the critical regional connection between them. It passes Tryon Creek State Natural Area and several local parks with recreational and ecological restoration opportunities. Perhaps most significantly, there is no existing bicycle and pedestrian facility along much of the corridor. This project can implement much needed safety improvements and provide additional travel options along the constrained OR 43 corridor.

Overview of the corridor

There are two primary transportation facilities in the Lake Oswego to Portland corridor. Oregon Route 43 (OR 43) is an Oregon state highway owned and operated by ODOT that serves as the primary north/south route for motor vehicles, transit and freight between Portland and Lake Oswego. The Willamette Shore Line railroad right-of-way was purchased in 1988 by a consortium of seven government agencies (ODOT, Metro, TriMet, Cities of Portland and Lake Oswego, and Multnomah and Clackamas Counties). The Consortium purchased this right-of-way with the intent to preserve it for future passenger rail service. Since 1990, Lake Oswego has leased the right of way to operate recreational trolley service on the rail line. Lake Oswego maintains the operations and maintenance rail right of way and TriMet manages the capital improvements and acts as right-of-way agent.

Regional Policy

This project has been identified as a key improvement at the local, regional and state level. Relevant plans and policies include:

- State Goal 15: Willamette River Greenway
- Regional Transportation Plan 2035 Financially Constrained System
- Regional Trails System
- Part of the Metro "Great Eight Trails"; a priority area for the 2006 Bond Measure
- Part of the 20 Metro "Connecting Green" trail packages in 2008
- Clackamas County Comprehensive Plan
- Multnomah County Bicycle Master Plan
- Portland Bicycle Plan for 2030
- Portland Recreational Trails Strategy
- Lake Oswego Trails and Parkways Master Plan
- Lake Oswego Transportation System Plan
- Part of the original 40-Mile Loop vision for the Portland metropolitan region

Refinement Phase Goals

From 2005-2007 an Alternatives Analysis study of transit options in the corridor included funding to examine trail alignments in the corridor. The project was charged with determining if a continuous trail between Lake Oswego and Portland can be constructed in conjunction with the transit alternatives. A wide range of trail alignments were considered. More detail can be found in the *Lake Oswego to Portland Transit and Trail Study: Evaluation Summary* (Metro, 2007). In 2007, the Lake Oswego to Portland Transit Steering Committee adoption of the Locally Preferred Alternative (LPA) directed the project to provide further refinement on the trail concept for the corridor. Specifically, the work program included:

- Development of a trail alignment with lower capital costs, and a phasing strategy
- Identification of a trail sponsor to further project development for the trail
- Consideration of funding opportunities for the trail project

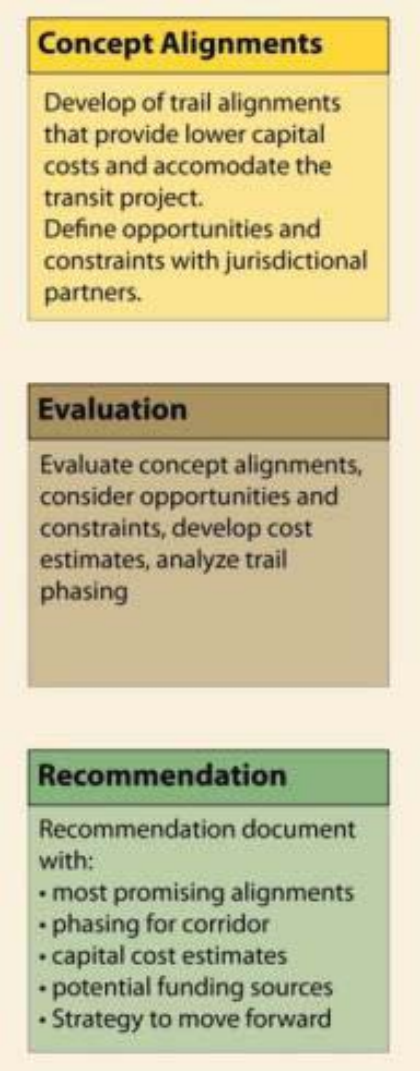
Refinement Process and Designs Developed

Metro initiated the trail refinement process in the spring of 2009. The refinement process consisted of three main phases: The development of Concept Alignments; an Evaluation of the alignments developed; and a Recommendation of the most promising alignments, with phasing, cost estimates, funding sources, and a strategy to move the trail forward.

A working group was established comprised of jurisdictional staff from Metro, Portland Bureau of Transportation, Portland Parks and Recreation, Lake Oswego, North Clackamas Parks and Recreation, Clackamas County, ODOT, and TriMet.

The working group established evaluation criteria to rate the trail segments developed by the design team, evaluated the various trail alignments, and provided guidance on trail phasing, project development, and potential funding sources.

Project staff in the working group developed a preferred alignment and phasing strategy that was accepted by the Project Management Group. In September 2009, the Lake Oswego to Portland Transit Project Steering Committee accepted the trail development strategy. Details of the recommendation and future project implementation can be found in Chapter 6.



Chapter 2. Existing Conditions

Location

This 5.7-mile long corridor connects Portland Central City with the Lake Oswego Town Center. The corridor contains two main public rights-of-way, OR 43, and the Willamette Shore Line railroad alignment. The highway is constrained by steep topography to the east and to the west. There is currently a transit project underway that will provide a transit connection between Lake Oswego and the Portland Central City.

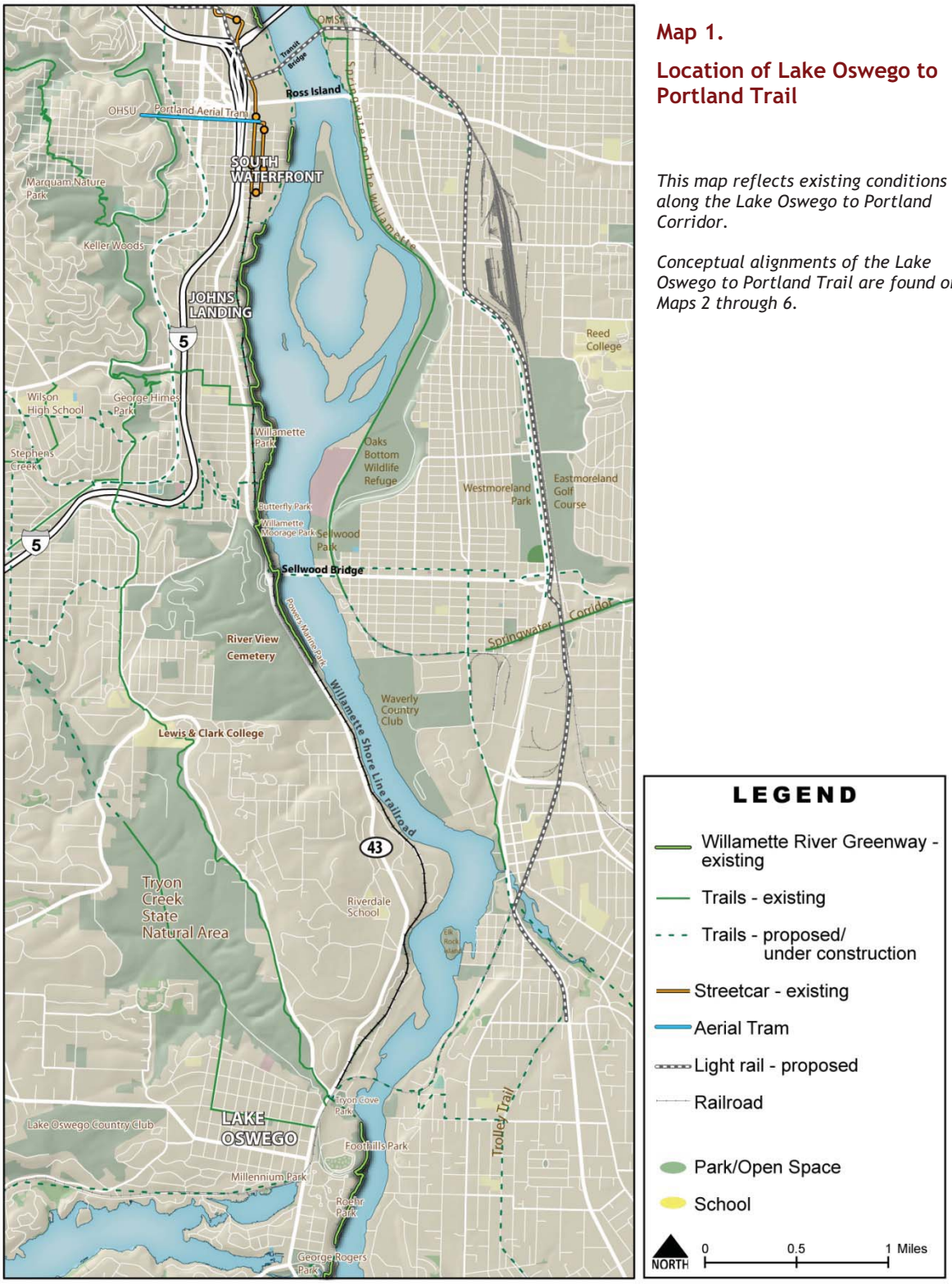
Destinations

The proposed Lake Oswego to Portland Trail has the opportunity to provide numerous connections to trail systems and the existing bicycle and pedestrian network in Portland and Lake Oswego. The trail's north end links to the existing regional Willamette Greenway Trail, with connections to downtown Portland and Tom McCall Waterfront Park. Within the South Waterfront District, the aerial tram provides a direct connection to the Oregon Health and Science University (OHSU), the largest employer in the Portland. Future connections include a new Willamette River Transit Bridge, a transit/bicycle/pedestrian bridge that connects to Oregon Museum of Science and Industry (OMSI), and the Gibbs Street Bridge, which will provide access across Interstate 5 to the South Portland neighborhood. In Johns Landing, Willamette Park includes connections to the Southwest Portland trails system. Existing portions of the Willamette Greenway trail extend from roughly SW Bancroft Street south to Powers Marine Park.

Located near the middle of the proposed trail, the Sellwood Bridge is currently under redevelopment and will provide connections to the Sellwood neighborhood and Southeast Portland. Westbound from the Sellwood Bridge is the River View Cemetery, a popular bicycling route to Taylor's Ferry Road, the South Burlingame neighborhood, and Southwest Portland. The corridor also includes connections to Lewis & Clark College.

In the southern section of the corridor, the trail would link to downtown Lake Oswego and Foothills Park, a riverfront park completed in 2005. Tryon Creek State Natural Area is located on Terwilliger Boulevard just north of downtown. Related projects look to complete a trail connection on the Willamette River just north of George Rogers Park that will extend the corridor south to Marylhurst University and as far as West Linn and Oregon City. A proposed trail bridge across the Willamette River at the existing railroad bridge will connect Lake Oswego to the Trolley Trail and the City of Milwaukie.

Because of the steep terrain and proximity to the Willamette River, there are few options in this corridor to provide an easy, direct, and intuitive route between Lake Oswego and Portland.



Map 1.

Location of Lake Oswego to Portland Trail

This map reflects existing conditions along the Lake Oswego to Portland Corridor.

Conceptual alignments of the Lake Oswego to Portland Trail are found on Maps 2 through 6.

Chapter 3. Opportunities and Constraints

The proposed Lake Oswego to Portland Trail is an important connection between the South Waterfront/Willamette River Greenway trail and the Lake Oswego Town Center that will be a high-quality regional transportation and recreational facility. The trail will encourage bicycling and walking trips to jobs and parks, as well as connecting residential and commercial areas. This section highlights some of the important opportunities for encouraging bicycling, providing key connections, and using existing publicly-owned land, as well as identifying potential constraints for the project.

The project team gathered data for this opportunities and constraints report using the following methodologies:

- **Field Research.** The project team was able to visit the study area frequently to document opportunities and constraints in the project area.
- **Document Research.** The project team conducted document research in order to determine the location of some opportunities and constraints. Documents reviewed included relevant plans, maps, historical documents, and environmental impact reports.

Opportunities

Opportunities are defined as unique conditions that will facilitate implementation of the Lake Oswego to Portland Trail, and/or enhance the operations and user experience of the trail.

Existing Greenway Trail

Existing portions of the Willamette Greenway trail extend from roughly SW Bancroft Street south to Powers Marine Park. With a variety of design types, including winding, narrow alignments and non-paved portions in Powers Marine Park, the existing trail currently has substandard conditions for bicycle commuters and creates conflicts with pedestrians. The proposed Lake Oswego to Portland Trail will provide an opportunity to separate bicycle and pedestrian traffic and provide for more efficient transportation connections. This project can also provide for connections south of the Sellwood Bridge where none currently exist.

Activity Centers

The City of Portland is planning future development in the South Waterfront District and Johns Landing neighborhood. In Lake Oswego, plans are underway to redevelop portions of the Foothills District and provide better connections to downtown. This project will enhance connections between these areas of future economic development.

Population Growth

Future population growth in Portland and Lake Oswego will lead to a growing potential trail user base. While the proposed trail will provide recreational benefits for all residents of both cities, some demographic groups will particularly benefit from a multi-use, non-motorized trail. Commuters will particularly benefit from trail development, as the area currently lacks a direct bicycle route. A comprehensive pathway system linked from the South Waterfront (and Portland's Central Eastside via the future Willamette River Transit Bridge) to the Tryon Creek Park Trail will improve recreational and transportation options for neighboring residents, and will be particularly beneficial to the population who travel by foot, bicycle, and other non-motorized mobility devices. The Sellwood Bridge Project will provide new bicycle and pedestrian connections, opening up this corridor to additional users on the east side of the Willamette River.

Parks

The study area runs along the South Willamette Greenway and is in close proximity to a number of parks, including Willamette Park, Willamette Moorage Park, Butterfly Park, Powers Marine Park, Tryon Cove Park, Tryon Creek State Natural Area and Foothills waterfront Park. A potential bridge across the Willamette River near the south end of the trail could provide a connection to River Vila Park. One option identifies locating a significant portion of the middle of the trail through Powers Marine Park.

Schools

In the north, existing connections to OHSU, the future Schnitzer Campus and Portland State University will provide increased access in the City of Portland designated Innovation Quadrant. Lewis and Clark University in located in the central section and maintains a boat ramp just south of Powers Marine Park. Riverdale Elementary School is located on Breyman Avenue. Marylhurst University is located south of downtown Lake Oswego.

Constraints

Constraints are defined as conditions that may negatively impact the feasibility, enjoyment, and/or operation of the Lake Oswego to Portland Trail.

Willamette Shore Line Constraints

The Willamette Shore Line railroad right-of-way varies between 17 and 80 feet, and includes trestles in several locations. Elk Rock Tunnel, located approximately one mile north of Lake Oswego is a 1395 foot long, 18-foot wide railroad tunnel that poses a significant barrier. In addition to narrow right-of-way, the Shore Line includes a variety of easements, some of which are for rail purposes only. Trail alignments adjacent to the Shore Line would require additional right-of-way acquisition, as well as securing or resolving easements for public use along the rail corridor.

OR 43 Constraints

The existing OR 43 roadway is narrow through much of the study corridor, particularly south of the Sellwood Bridge, where alignment alternatives consider a cycle track on the east side of the roadway. OR 43 narrows to as few as two lanes in sections of the corridor, and has existing retaining walls on either or both sides of the travel lanes. Cyclists and pedestrians currently using OR 43 rely on the roadway shoulders, which vary from eight feet to under one foot in width.

Figure 1. Several locations along OR 43 have retaining walls on both sides

In addition, in several areas private properties located along the highway present additional challenges to roadway widening (Figure 2), and driveway crossings. Table 1 shows the number of driveway conflicts along OR 43, where a cycle track barrier must be reduced to allow automobile access. See Appendix B for more details on OR 43, including the current lane configuration.

Figure 2. Several houses located along OR 43 present challenges to widening the roadway

Source: Google StreetView

Table 1. OR 43 Constraints

Trail Option*	East Side	West Side
2.3	4 driveways; 4 houses close to roadway Retaining wall	Private residences – fences & vegetation directly adjacent to roadway 400' of bridge (ends at Riverwood)
2.4b	9 driveways Retaining wall 5 houses close to roadway Roadway narrows to two lanes	100' of private residence close to roadway at steep drop 150' of stone retaining wall (south of Palatine Hill Rd) 750' of stone retaining wall (Greenwood to City Line)
3.1b	4 driveways 2 houses close to roadway Briarwood intersection	750' of stone retaining wall (City line to north of Elk Rock Rd) Private residences – fences & vegetation directly adjacent to roadway Steep slopes directly adjacent to roadway 500' of stone retaining wall (Briarwood to end of segment)
3.2c	Stampher intersection 1,000' of bridge at Tryon Creek	Median; divided highway Businesses directly adjacent to roadway

**Refer to Maps 2 through 6 for location of these options.*

Existing Greenway Trail Constraints

The existing greenway trail is substandard width throughout most of its length, and in some locations little space exists between private property and the river's edge.

Private Property Issues

At both the northern and southern ends of the trail, significant private property issues exist. Experience with the existing greenway trail indicates a need to consider private residences along the north end of the corridor. Widening the currently substandard corridor may prove challenging in several locations, particularly along Sections 1.3 and 1.4b.

Topography

In several locations, the Lake Oswego to Portland Trail will be located between OR 43 and the Willamette River. South of the Sellwood Bridge, the embankment begins to incline, and the space between the highway and the river is steep and narrow. A tunnel or retaining wall will be required to make the connection between Riverwood and Fielding (Segment 2.4a), while the on-street option would require retaining walls and roadway widening (Segment 2.4b).

Road Crossings

Several roadways cross through the study area. Table 2 summarizes the road crossings and the potential crossing treatments.

Table 2. Potential Crossing Treatments

Trail Option*	Road	Potential Treatment
1.5a & 1.5b	Nebraska	Signage, striping
1.7a	Miles	Signage, striping
1.7a	Macadam Bay	Signage, striping
2.3/2.4b	Riverwood	Signage, striping
2.4b	Military Road	Signage, striping
2.4b	Midvale/Elk Rock	Signage, striping
2.5	Terwilliger	Signage, striping
2.5	B Street	Existing signal; signage

**Refer to Maps 2 through 6 for location of these options.*

Evaluation Criteria

The trail evaluation rating criteria are intended to aide in the comparison of project alternatives as they relate to various concerns and comments raised during the initial public outreach for the feasibility study. The rating criteria are separated into the general categories of property owner considerations, trail user considerations, public safety, environmental considerations, and municipal operations. Some comments or concerns raised by the public may not be directly measurable. Examples include effect upon neighborhood privacy, tranquility and property values. In those cases, the criteria consider measurable trail characteristics such as the relative setback or buffer of trail alternatives to private yard areas.

Table 3 summarizes the evaluation criteria and how each criterion is measured. If the answer to the given question is yes, the proposed alignment received a "+" rating. If the answer is no, the trail received a "-" rating, and if the alignment does not clearly rate positively or negatively on a criterion, it received a "o." These ratings were then added to determine the recommended alignment.

Table 3. Evaluation Criteria

Rating Criteria		Does the Alignment…
Property Owners	Compatibility with Nearby Property	Provide a separation or buffer between existing buildings and trail or trail access points?
	Parking	Minimize impacts to existing off-street public parking?
	Property Owner Aesthetics	Minimize the impacts of cuts, fills, walls or structures?
	Availability of Right-of-Way	Reclaim encroachments in right-of-way prior to using other public right-of-way?
Trail Users	Trail User Comfort	Minimize overall grades and user exposure to steep slopes (i.e. is the alignment ADA accessible)?
	User Conflicts	Minimize conflicts between commuter and recreational cyclists and cyclists and pedestrians?
	Transportation System Performance	Provide direct connections between key destinations and other bikeways?
	Recreation Facility Performance	Result in a continuous off-street facility with well-distributed access points?
	Trail User Aesthetics	Minimize trail user exposure to busy roadways and maximize connections to the natural environment?
Public Safety	Natural Surveillance	Support visibility of trail and minimizes exposure to dark or confined crossings?
	Emergency response	Provide access points for emergency vehicles?
Environmental	Habitat & Wildlife	Minimize the potential for impact to sensitive environmental resources or floodplain through location?
	Exposure to hazards	Minimize exposure to noise & air pollution?
	Environmental Interpretation	Afford opportunities for enjoyment of natural resources/interpretation?
Municipal Operations	Consistency with Local, State and Regional Plans	Achieve consistency with Local, State and Regional adopted plans?
	Cost Efficiency	Result in a cost efficient facility that is feasible to construct, maintain and provide essential public services to?
	Engineering Feasibility	Minimize need for retaining walls, drainage, tunneling and other engineering requirements?
	Public Support	Have substantial support from the public, City staff and elected officials?

Property Owners

This set of criteria evaluates the impacts of the alignment alternatives on neighboring property owners. It includes consideration of trail compatibility with nearby property, parking concerns, aesthetics and availability of right-of-way.

Alignments considered compatible with nearby properties provide a separation or buffer between sensitive uses (including industrial land) and the trail or trail access points. Parking concerns evaluate aim to minimize impacts to existing off-street public parking. If the proposed alignment requires cuts, fills, walls or other structures, it receives a poor aesthetics rating, as the trail would be less natural. Finally, availability of right-of-way prioritizes reclaiming encroachments in the right-of-way over using other right-of-way. The fewer acquisitions or easements needed, the more favorable the alignment is rated. Willingness of the property owner to grant easements is taken into consideration.

Trail Users

This set of criteria includes trail user comfort, user comfort, transportation system performance, recreation facility performance and trail user aesthetics. Trail user comfort is measured by grades that will present challenges to bicyclist riding on the trail. User conflicts may arise on a narrow trail where slower pedestrians mingle with recreational and commuter bicyclists. Conflicts can be minimized through trail width and the provision of a separated facility for pedestrians and bicyclists, particularly for park users and through-travelers.

The transportation system performance criterion measures the connectivity and access to other trails or bikeways, schools, parks, residential, commercial, or employment areas. High priority is given to alignments that provide direct access to schools, parks, commercial centers, and other community attractors. Alignments that result in a continuous off-street facility with well-distributed access points are rated higher on the recreation facility performance criterion.

Trail user aesthetics considers trail users' exposure to busy roadways as opposed to parks and the Willamette River.

Public Safety

Several factors are considered under the heading of public safety, including the potential for public visibility of the trail and accessibility by emergency vehicles. An alignment has public visibility if the trail is visible along its length and minimizes exposure to dark or confined crossings. For example, trail segments that are not visible from a roadway score lower on this criterion.

Potential alignments that provide a greater degree of safety for trail users receive a higher evaluative score.

Environmental

These criteria account for environmental impacts the trail will have on the Willamette River corridor. An alignment that travels through an environmentally sensitive area scores lower on the habitat and wildlife criterion than an alignment that uses an existing disturbed area or

avoids sensitive areas completely. Flooding potential, impacts to sensitive areas or habitats and disturbance of mature trees and shrubs are factors that are considered when evaluating the environmental impact of each alignment.

The exposure to hazards criteria considers whether the potential alignment minimizes exposure to noise and air pollution for trail users. Finally, the environmental interpretation criterion measures whether the alignment provides opportunities for enjoyment of natural resources or interpretive information for trail users.

The determination that a trail alternative has a lesser or greater environmental effect is based on the information available at this time and will be further evaluated in future environmental analysis.

Municipal Operations

The municipal operations criterion is comprised of consistency with local, State and regional plans, cost efficiency, engineering feasibility and public support of the alternative.

The consistency with local plans criterion determines the compatibility or conflict of a potential alignment with existing regional or local plans and projects. Alignments following (or roughly paralleling) proposed trails in adopted or approved plans receive higher scores.

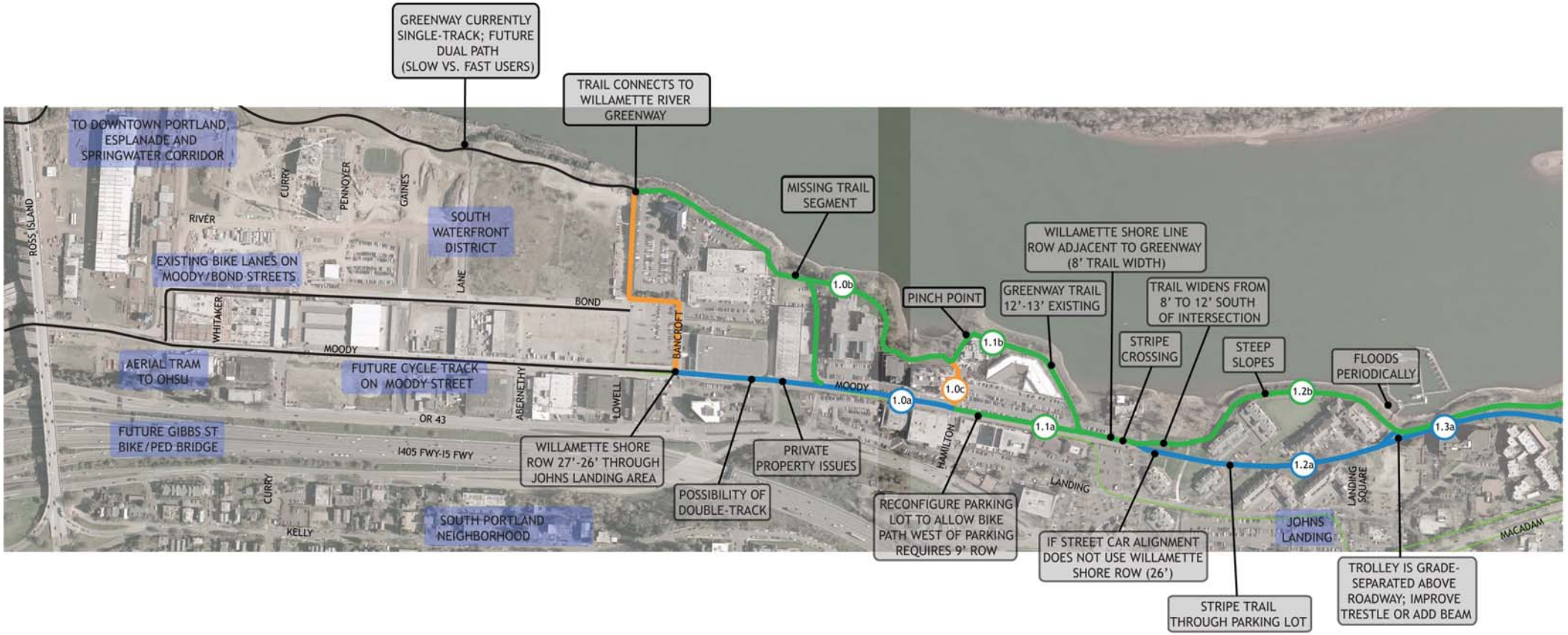
The cost efficiency criterion evaluates the relative cost for alignments, including the cost of design, engineering, and construction. Segments that require crossing improvements, long ramps, boardwalks, retaining walls, or other expensive infrastructure improvements rate lower than segments that require minimal improvements.

Engineering feasibility considers the need for retaining walls, drainage, tunneling, bridges and other expensive engineering requirements.

Finally, the public support criterion evaluates if the alignment has substantial support from the public, City staff and elected officials.

Conceptual Trail Alignment Maps

The following pages contain alignments developed during the refinement process. They reflect information known as of summer 2009.



Map 2. Alternative Alignments Section 1. Johns Landing to the Sellwood Bridge, Sheet 1

Lake Oswego to Portland Trail Alternatives Analysis

Source: Data obtained from Metro
Author: HK
Date: June, 2009

Willamette Shore Line Right-of-Way
Greenway Off-Street Path
On-Street Facility
Existing Trail
Streetcar option

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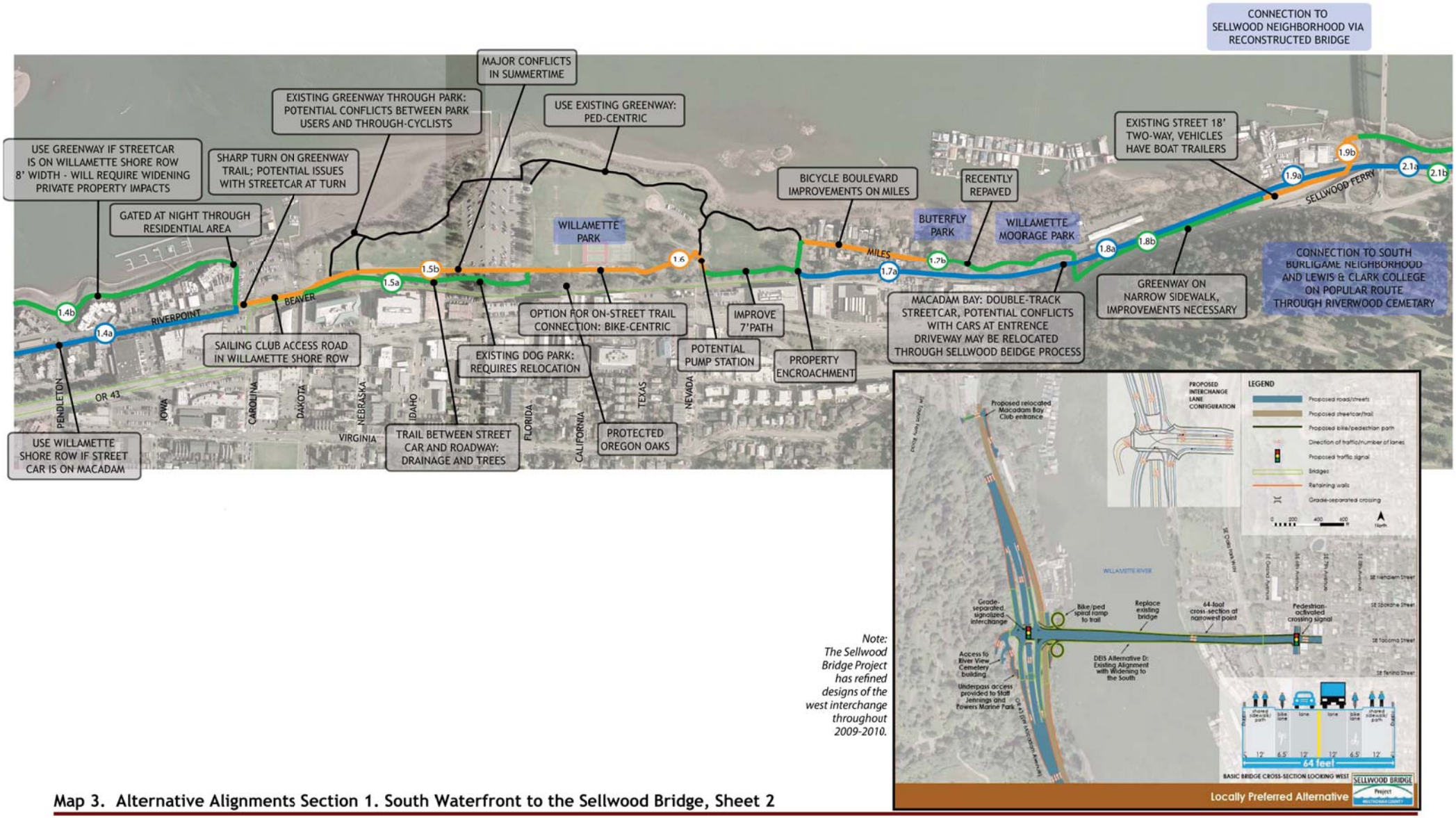

Note: The Sellwood Bridge Project has refined designs of the west interchange throughout 2009-2010.

Map 3. Alternative Alignments Section 1. South Waterfront to the Sellwood Bridge, Sheet 2

Lake Oswego to Portland Trail Alternatives Analysis

Source: Data obtained from Metro
Author: HK
Date: June, 2009

- *Willamette Shore Line Right-of-Way*
- Greenway Off-Street Path
- On-Street Facility
- *Existing Trail*
- Streetcar option

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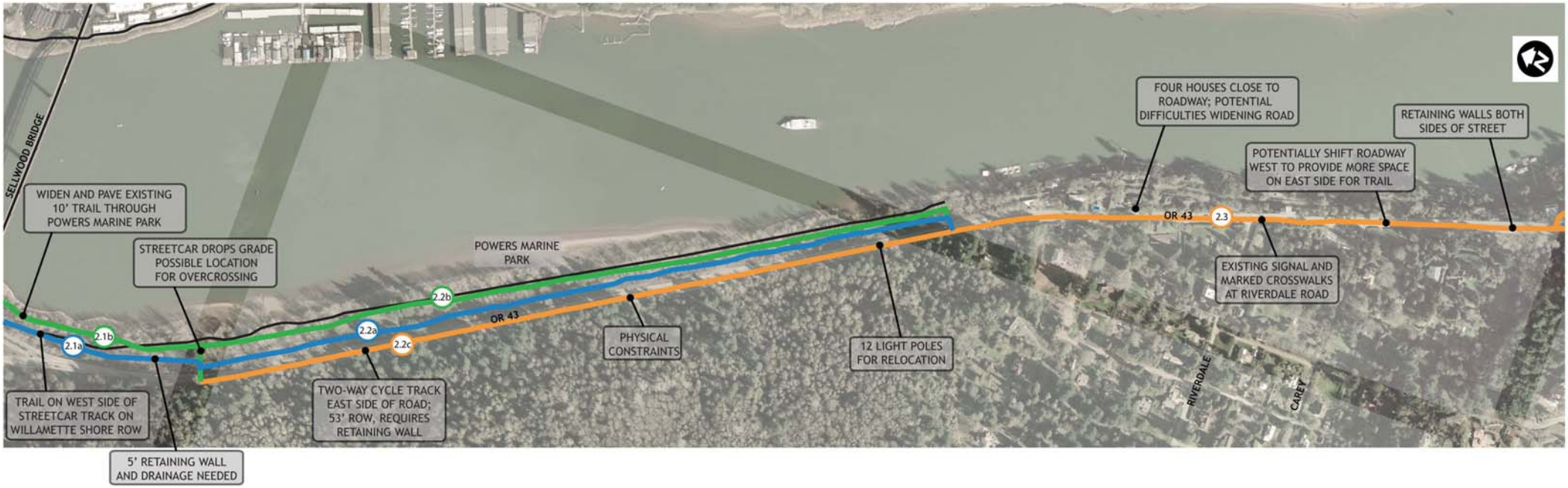

Map 4. Alternative Alignments Section 2. Sellwood Bridge to Lake Oswego, Sheet 1

Lake Oswego to Portland Trail Alternatives Analysis

Source: Data obtained from Metro
Author: HK
Date: June, 2009

Willamette Shore Line Right-of-Way
Greenway Off-Street Path
On-Street Facility
Existing Trail

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Map 5. Alternative Alignments Section 2. Sellwood Bridge to Lake Oswego, Sheet 2

Lake Oswego to Portland Trail Alternatives Analysis

Source: Data obtained from Metro
Author: HK
Date: June, 2009

Willamette Shore Line Right-of-Way
Greenway Off-Street Path
On-Street Facility
Existing Trail

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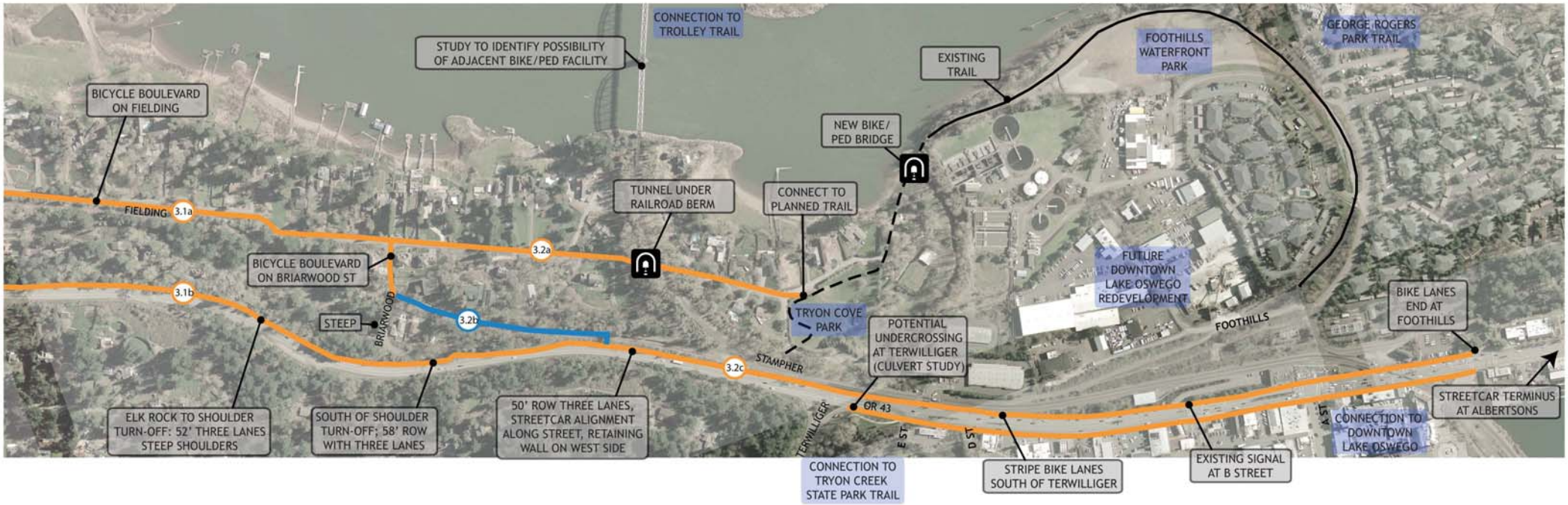


Map 6. Alternative Alignments Section 3. Lake Oswego, Sheet 1

Lake Oswego to Portland Trail Alternatives Analysis

Source: Data obtained from Metro
Author: HK
Date: June, 2009

Willamette Shore Line Right-of-Way
Greenway Off-Street Path
On-Street Facility
Existing Trail

alta PLANNING + DESIGN

Chapter 4. Trail Design Elements

The recommended design options for the trail will depend on whether the preferred alignment for a given trail segment is off-street or on-street; if on-street, speed and volume of traffic will determine design. Segments where the trail uses the Willamette Shore Line right-of-way, an improved existing greenway, or is a new off-street path, an off-street path treatment is appropriate. Along a low-speed, low-volume street, Bicycle Boulevard treatments will facilitate a feeling of continuity along the route. Three options for bicycle facilities along OR 43 include: a shoulder bikeway, a buffered bike lane, and a cycle track. This section describes these types of bikeway facilities in more detail.

Off-Street Paths

Shared-use paths facilitate travel by various non-motorized users, including pedestrians, cyclists, in-line skaters and runners. Pathways are typically paved (asphalt or concrete) but may also consist of an unpaved smooth surface as long as it meets ADA standards.

In general, pathways are desirable for slower-speed recreational cycling, particularly by families and children. Shared use paths can provide a desirable facility particularly for novice riders, recreational trips, and cyclists of all skill levels preferring separation from traffic. However, they can also be used extensively by utilitarian cyclists for at least part of their commute. Given the potential mix of users, there is potential for conflicts on heavily-used pathways, necessitating lower bicycle speeds on these paths. Pathways are preferred by bicyclists because the corridors have few intersections or crossings, which reduce the potential for conflicts with motor vehicles.

A shared-use path should be 12-14 feet wide, with two-foot shoulders on either side (see Figure 3). Ten feet is the minimum allowed for a two-way shared use path and is only recommended for low traffic situations. Clearance to overhead obstructions should be 8' minimum, or 10' recommended.

Where a shared use path must be adjacent to a roadway, a five foot minimum buffer should separate the path from the edge of the roadway, or a physical barrier of sufficient height should be installed.

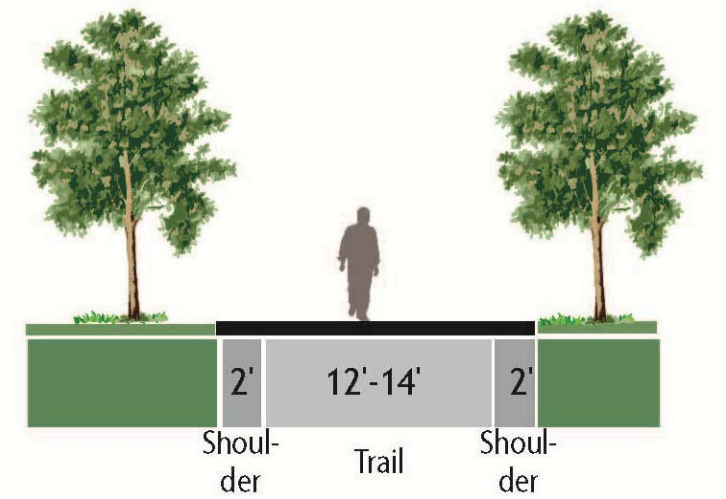


Figure 3. Off-Street Trail Design Option

Shared Use Path Adjacent to Streetcar

In locations where the trail alternative is located alongside a double-track streetcar, 42-44' minimum right-of-way is required, which includes 26' of streetcar and a 12-14' trail with 2' buffers on each side (see Figure 4).

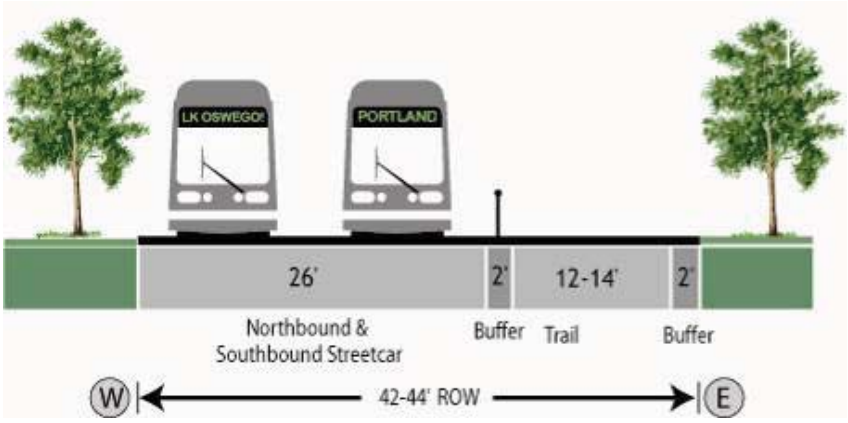


Figure 4. Willamette Shore Line Alignment with Streetcar Design Option

A physical separation between the trail and streetcar would be required for safety and to increase comfort of trail users. Separators could include fencing, railings, bollards or vegetation, shown in Figure 5 through Figure 8.

Figure 5. Fencing

Figure 6. Railing

Figure 7. Bollards

Figure 8. Vegetation

Off-street path design treatments will be used where the preferred trail alternative is located in the Willamette Shore Line right-of-way, where it uses improved greenways, and where a new greenway is constructed.

In addition, bicycle wheels and tires are very susceptible to getting caught within the gap of a streetcar track flange. This situation occurs when a bicyclist is required to cross the tracks at less than a 60 degree angle, where the wheel can slip into the groove of the track. The trail should never cross the streetcar tracks at less than a 60 degree angle, 90 degrees preferred. Placing obstacles or an off-set crossing forces cyclists to slow down prior to making the crossing, which prevents potential crashes between trail users and the streetcar.

Figure 9. Bike route crossing MAX tracks on Interstate at off-set intersection

Bicycle Boulevards

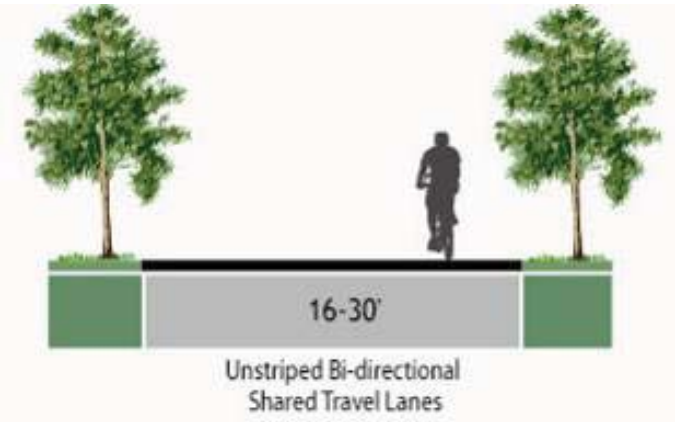


Figure 10. Bicycle Boulevard Design Option

Bicycle Boulevards provide safe and convenient bicycle travel by slowing vehicle traffic through a combination of traffic calming measures and other streetscape treatments. Appropriate treatments depend on traffic volumes, vehicle and bicycle circulation patterns, street connectivity, street width, physical constraints, and other parameters. Bicycle Boulevards are appropriate facility types in urban residential areas, where traffic volumes are low, but cross-traffic or motorist turning activities can become a safety concern.

Treatments for Bicycle Boulevards fall within five main "application levels" based on their level of physical intensity, with Level 1 representing the least physically-intensive treatments that could be implemented at relatively low cost. Identifying appropriate application levels for individual Bicycle Boulevard corridors provides a starting point for selecting appropriate site-specific improvements.

The five Bicycle Boulevard application levels include the following:

- **Level 1: Signage** facilitates cyclists' transition from an off-street path, provides wayfinding and warns motorists to slow down and watch for cyclists (Figure 11).
- **Level 2: Pavement markings** can include wayfinding arrows and markers to guide cyclists (Figure 12).
- **Level 3: Intersection treatments** can include stop signs, marked crosswalks (Figure 13), curb extensions (Figure 14), stepped-crossings, pedestrian- or bicyclist-activated signals and other features that can be implemented at reasonable cost and enable emergency vehicle accessibility.
- **Level 4: Traffic calming** involves treatments, such as traffic circles (Figure 15) and chicanes, which encourage motorists to drive slowly along the roadway. A 20 mph speed limit should be considered on designated Bicycle Boulevards.
- **Level 5: Traffic diversion** allows bicyclists and pedestrians to travel straight through an intersection while automobiles are prohibited.

Figure 11. Signage

Figure 12. Pavement Markings

Figure 13. Intersection with crosswalk and bollards

It should be noted that many bicycle boulevard treatments can also benefit pedestrians. Curb extensions, for instance, can reduce vehicle speeds on a street by creating a visual "pinch point" for motorists. They also improve the pedestrian environment by shortening the pedestrian crossing distance.

Figure 14. Curb Extension

Figure 15. Traffic Circle

Figure 16 shows how various types of treatments can improve conditions for bicyclists along a residential street.

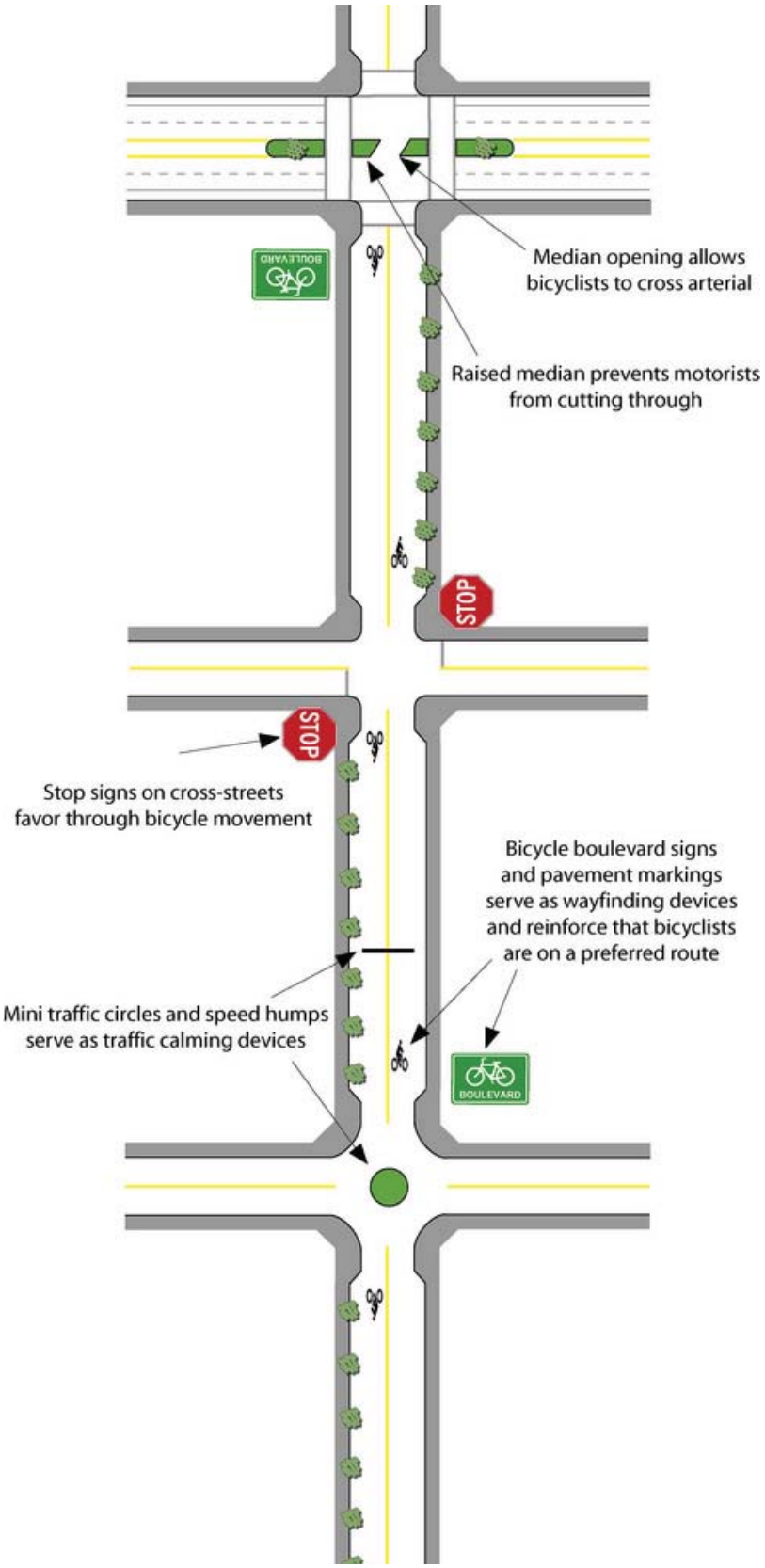


Figure 16. Bicycle Boulevard Corridor Design Option

OR 43 Bicycle Facility Options

Through the study corridor, OR 43 is characterized by significant automobile traffic volumes and speeds. South of the Sellwood Bridge, traffic counts along roadway were greater than 23,000[1] vehicles. This section addresses the universe of options for bicycle facilities that may be appropriate on the corridor; they range from minimal improvements for an enhanced shoulder bikeway, to a buffered bike lane offering additional protection from traffic, to a fully protected cycle track facility.

Enhanced Shoulder Bikeways

Typically found in areas of lower-density, shoulder bikeways are paved roadways with striped shoulders wide enough for bicycle travel, or four feet minimum on each side. Shoulder bikeways often include signage alerting motorists to expect bicycle travel along the roadway (Figure 17).

While experienced cyclists may not have a problem riding on this type of facility, the treatment may discourage less-comfortable cyclists. In addition, four feet does not provide sufficient space for passing, and cyclists would have to merge into traffic to pass each other.

Figure 17. Signage should alert motorists to the presence of bicyclists

Buffered Bike Lanes

Designated exclusively for bicycle travel, bike lanes are separated from vehicle travel lanes with striping and also include pavement stencils. Bike lanes are appropriate on streets where higher traffic volumes and speeds indicate a need for greater separation. Buffered bike lanes provide additional protection by including a 1.5' painted line between the cyclists and automobile traffic.

A four-foot wide bike lane (exclusive of the gutter pan) adjacent to the curb may be used in constrained locations. The recommended width for a bike lane is 5-feet. Travel lanes adjacent to a bike lane should be at least 11' in width. Figure 18 shows a typical cross-section of a roadway with buffered bike lanes.

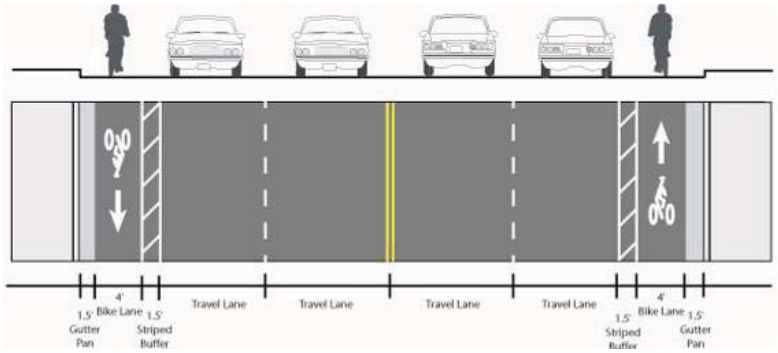


Figure 18. Buffered Bike Lane Design Option

[1] Counts from 3/10/2006. http://www.trans.ci.portland.or.us/trafficcounts/SearchTrafficCounts.htm

Cycle Tracks

A cycle track provides space exclusively or primarily for bicycles and is separated from vehicle travel lanes, parking lanes and sidewalks. Cycle tracks can be either one-way or two-way, on one or both sides of a street, and can be separated from vehicle traffic by a barrier or through grade-separation (see Figure 19). Physical barriers include bollards, a planter strip, an extruded curb, or parking. Cycle tracks using barrier separation typically share the same elevation as adjacent travel lanes. Cycle tracks should be a minimum of seven feet wide to allow bicyclists to pass each other, or 12 feet minimum for a two-way facility.

Figure 19. Cycle Track Buffered By Parking and Street Trees

Figure 20. Cycle Track dropping to a marked bike lane at an intersection

This treatment is particularly appropriate along streets with few crossings, as potential conflicts exist wherever drivers cross the cycle track facility. Openings in the barrier or curb are needed at driveways or other access points to allow vehicle crossings (Figure 20). Grade-separated cycle tracks should either incorporate a rolled curb, which enables motorists to cross at certain locations, or provide curb ramps and high-visibility intersections. It is also important to provide locations where cyclists can exit the cycle track and make a left-hand turn, which requires a curb ramp and marked crosswalk.[2]

Figure 21 shows a typical cross-section of OR 43 with a cycle track.

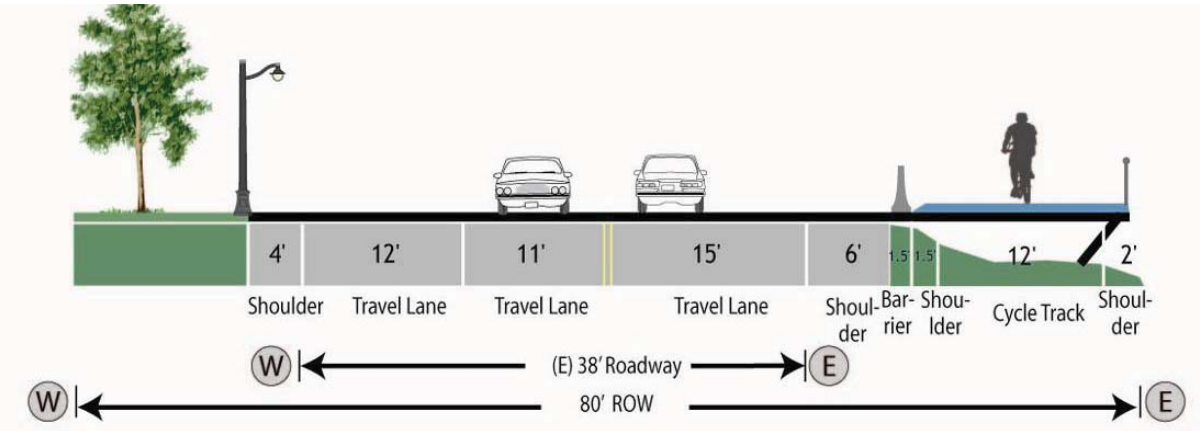


Figure 21. Cycle Track Design Option

[2] Additional information and design guidance about cycle tracks in available on the Alta Planning and Design Website: http://www.altaplanning.com/App_Content/files/pres_stud_docs/Cycle%20Track%20lessons%20learned.pdf

Cycle tracks have been found to increase bicycling in less-confident or beginner cyclists; Danish research has shown that cycle tracks can increase bicycle ridership 18 to 20 percent, compared with the five to seven percent increase found resulting from bicycle lanes.[3] This research indicates that a cycle track is most appropriate for a regional bikeway facility, which will be used by commuters and recreational riders of all skill and comfort levels.

OR 43 Design Recommendation

Oregon Route 43 is an 11.60 mile long state highway from I-5/US 26 in Portland (northern terminus) to 99E (5th Street) in Oregon City (southern terminus). Between the Sellwood Bridge and the City of Lake Oswego, the pavement width varies between 40 and 100 feet. Bicyclists and pedestrians currently use the shoulders of the highway, which vary from eight feet to under one foot in width. See Appendix B for more details on OR 43 existing conditions.

Concerns for bicycle travel along the OR 43 corridor include both protection from traffic and cyclists' ability to pass each other while riding on the steep uphill or downhill slope of the roadway. Vehicle volumes and speed are disincentives to bicycle and pedestrians using the corridor. The existing width of the roadway does not sufficiently accommodate bicyclists in the roadway without changing the current lane width or configuration, nor is it wide enough to construct any of the discussed options without retaining walls and other construction and acquisition.

This report examines the possibility of adding a bicycle and pedestrian facility to OR 43 without altering the current lane configuration. The project team met with ODOT several times during the refinement process. This study did not examine reconfiguring the current roadway lane configurations. Due to vehicle speeds, volumes, and topography, a two-way cycle track on the east side of the street is examined in this report. In addition, a crash-worthy barrier, such as a Jersey barrier, is recommended to protect cyclists from fast-moving traffic along the corridor. This report also recommends a two-foot buffer from vehicle traffic, not included in the 12-14 foot regional trail width.

[3] Jensen, Søren Underlien, Claus Rosenkilde and Niels Jensen. Road safety and perceived risk of cycle facilities in Copenhagen. *Available at: http://www.ecf.com/files/2/12/16/070503_Cycle_Tracks_Copenhagen.pdf*

Chapter 5. Trail Design Alignments and Recommendation

The alignment alternatives were developed to accommodate transit projects concurrently being developed by Lake Oswego to Portland Transit Project design team. Trail alternatives consider:

- **Use of the Willamette Shore Line right-of-way.** In locations where the streetcar options do not include use of the Willamette Shore Line, segments were explored for shared-use path treatments. In locations where right-of-way allows, options were explored for combined rail and shared-use path treatments.
- **Improvements to existing greenways or new off-street paths.** In some potential alignments, existing greenway trails can be upgraded to accommodate the use anticipated of the Lake Oswego to Portland Trail. Trails that can be improved as part of this corridor include the South Waterfront/Willamette Greenway Trail (through John's Landing and north of the Sellwood Bridge) and the Powers Marine Park Trail (south of the Sellwood Bridge). In other locations, a new off-street shared-use path alignment could be developed.
- **Use of Bicycle Boulevard treatments on low traffic streets.** On a number of segments in the study corridor, the trail users could be directed to use bike facilities on existing streets. On low-speed streets, such as Miles, Riverwood, and Fielding, bicycle boulevard treatments are sufficient to accommodate bicyclists comfortably.
- **Use of cycle tracks along OR 43.** On higher-speed streets, the recommended design is a two-way cycle track facility on the east side of the street. This treatment will require a retaining wall or other engineering solution to implement where the roadway is narrow, as existing conditions do not provide adequate space for bicyclists.
- **Bike lanes on OR 43 in Lake Oswego.** At the south end of the study area, roadway constraints and several cross-streets and driveways support bike lane facilities on OR 43.

Alignment alternative maps of the study area are available in Chapter 3. On the maps, the above facility types are differentiated by coloration; alignments in the Willamette Shore Line Right-of-Way are in blue, alignments using an off-street greenway are shown in green, and on-street alignments are shown in orange. Final recommended alignments will depend upon the location of the streetcar, which is as of yet undetermined.

The study corridor was divided into three sections for consideration, discussed in the next section.

Johns Landing (South Waterfront to Sellwood Bridge)

The northernmost section of the trail corridor, Johns Landing connects to the recent South Waterfront development. This segment will provide access to trail connections and destinations as outlined in Table 4.

Table 4. Northern Trail Connections and Destinations

Connection	Destinations
The Willamette Greenway Trail & bike lanes on Moody/Bond Streets	South Waterfront neighborhood and Downtown Portland
Planned Gibbs Street Bridge over Interstate-5	South Portland Neighborhood (formerly the Corbett-Terwilliger-Lair-Hill Neighborhood)
Portland Aerial Tram	Oregon Health and Science University
Planned Willamette River Transit Bridge	Eastbank Esplanade and Central Eastside
Sellwood Bridge	Sellwood neighborhood and Southeast Portland
Bike route through River View Cemetery	South Burlingame neighborhood and Southwest Portland

This area is characterized by multi-family housing in the South Waterfront District, commercial areas in Johns Landing and significant traffic, particularly on I-5 on- and off-ramps and on OR 43.

Trail alignment alternatives identified through this area include:

- Using the Willamette Shore Line right-of-way where the streetcar is not planned as double-track (Sections 1.0a, 1.2a, 1.4a, 1.5a, 1.7, 1.8a and 1.9a)
- Widening an existing greenway (Sections 1.0b, 1.1, 1.2b, 1.3, 1.4b, 1.7b, and 1.8b)
- Reconfiguring a parking lot to accommodate the trail off-street (Section 1.1a)
- Creating a new greenway adjacent to the streetcar north of Willamette Park (Section 1.5a)
- Accommodating the trail on-street via bicycle boulevard treatments on the Willamette Park access road (Section 1.5b), Miles Street (Section 1.7b), and Sellwood Ferry Road (Section 1.9b)

Sellwood Bridge to Lake Oswego

Between the Sellwood Bridge and Riverwood Street, the trail alternatives include:

- Constructing a trail adjacent to the streetcar in the Willamette Shore Line right-of-way (Sections 2.1a, 2.2a, and 2.3a)
- Developing an improved greenway trail through Powers Marine Park (Section 2.1b)
- Providing cycle tracks on OR 43 (Sections 2.2b and 2.3b)

Little development or cross-streets complicate trail alignment along this section of the study corridor. However, the Willamette River embankment is quite steep, and in several locations the roadway narrows to three lanes due to space constraints.

South of Riverwood, the two options are:

- Include bicycle boulevard treatments on Riverwood, join the Willamette Shore Line where Riverwood veers east, bench into the side of the embankment until south of the streetcar tunnel, where the trail will continue as a bicycle boulevard on Fielding (Section 2.4a).
- Continue the trail as on–street cycle tracks on the east side of OR 43, requiring the trail to be benched into the side of the bank (Section 2.4b)

This section is mainly residential in character, with low-volume streets along Section 2.4a. Private property concerns may be an issue for this alignment along both options.

Lake Oswego

From the Lake Oswego city line crosses the study area south of where 2.4a connects with Fielding Street. The alignment options that continue to downtown Lake Oswego are:

- Continue on Fielding, with bicycle boulevard improvements (Section 3.1a). From Fielding, the two sub-options are:
    - Veering west on Briarwood and re-joining the Willamette Shore Line (Section 3.1.1a to 3.1.2)
    - Continuing on Fielding to the existing railroad trestle; provide an undercrossing below the berm and connect to the Foothills Waterfront Trail (Section 3.1.1b)
- Continue the trail as on-street cycle tracks on OR 43 to B Street (Section 3.1b)

Both of these options require continuation from the previous section; i.e. there is no opportunity to switch the trail from the Riverwood/Fielding alignment to OR 43, or vice versa.

OR 43 has few cross-streets that would complicate the cycle track facility. In a few locations, houses are located close to the roadway, and a roadway crossing will be required at Terwilleger, to connect with the Tryon Creek State Park trail.

Table 5 shows the trail connections and destinations that the southern terminus of the trail connects to.

Table 5. Southern Trail Connections and Destinations

Connection	Destinations
Tryon Creek State Park Trail	Tryon Creek and Southwest Portland
Foothills Waterfront Trail	Foothills Waterfront Park and the Foothills District
B Street designated bicycle route	Downtown Lake Oswego
Proposed bike/ped bridge adjacent to existing railroad bridge from the park on the west bank of the Willamette River	River Vila Park and the east side of the Willamette River
Planned Trolley Trail	Milwaukie and Southeast Portland

The alignment options for the Lake Oswego to Portland Trail are summarized by their respective segments on the maps and summary sheets at the end of this document. The summary sheets include key information about each segment such as the land use connections, roadway crossings, and a description of each option.

Cost Estimates

The cost estimates for each of the options do not include costs for right-of-way acquisition, which may be required in some locations along OR 43. Acquiring right-of-way can be costly and difficult, especially on fully-developed properties that characterize most of the study area. As an alternative, the City of Lake Oswego could pursue easement donations or require roadway frontage improvements as redevelopment occurs. It should also be noted that the cost opinions do not include costs for permitting or more-detailed studies (e.g., drainage) which may be necessary as bicycle/pedestrian facilities design takes on a higher level of detail. The costs are categorized as shown in Table 6.

Table 6. Cost Estimate Categories

Cost Range (millions)	Symbol
Less than $0.5	$
$0.5-$1	$$
$1-$10	$$$
$10-$20	$$$$
$20+	$$$$$

SECTION 1. Johns Landing

Lowell to Hamilton	1.0a

Summary

Both options on this segment connect to the southern end of the Willamette River Greenway Trail in the South Waterfront District. A primarily complete but substandard trail exists through this section, and the streetcar alignment options include a double-track streetcar in the Willamette Shore Line right-of-way. Option 1.0c is a connection from the Greenway Trail option to the Willamette Shore Line.

Option 1.0 a (on-street/Willamette Shore Line):

This option uses a bicycle boulevard on Lowell/Bancroft to connect from the existing Willamette River Greenway Trail to the Willamette Shore Line right-of way. There is a likelihood of a double-track if the streetcar is in the ROW, which would require acquiring an additional 16' of right-of-way.

Length:	2,140 ft
Cost Estimate:	$

Willamette Shore Line at Bancroft

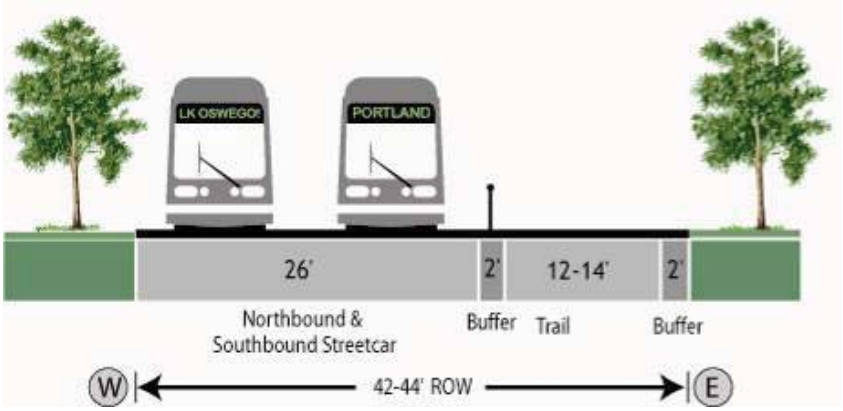


Figure 22. Section 1.0a Willamette Shore Line with Double-track Streetcar

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Lowell to Hamilton — 1.0b

Option 1.0b (greenway):

A substandard trail exists through all but 300' of this section. The preferred alternative is to widen this existing trail to regional trail standards; however improvements may not be possible or feasible given various constraints.

Length:	1,750 ft
Cost Estimate:	$

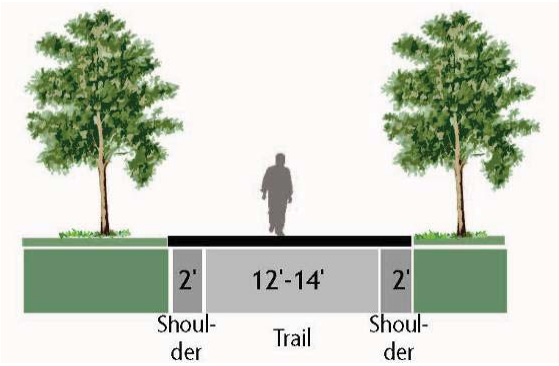


Figure 23. Section 1.0b Widen Existing Greenway Trail

Lowell to Hamilton — 1.0c

Option 1.0c (on-street):

Connection from greenway trail (Option 1.0b) to Willamette Shore Line right-of-way (Option 1.0a) on Hamilton.

Length:	359 ft
Cost Estimate:	$

Source: Google StreetView

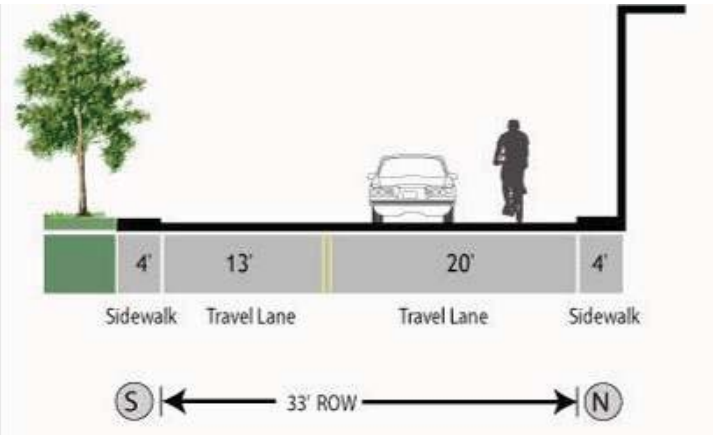


Figure 24. Section 1.0c Optional Connection to Willamette Shore Line on Hamilton.

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Hamilton to Julia | 1.1a

Summary

Existing greenway trail through this section. A parking lot could be reconfigured to accommodate the trail adjacent to the streetcar – this would require acquiring nine feet to accommodate the trail. The options merge where the greenway trail is next to the streetcar.

Option 1.1a (new greenway adjacent to Willamette Shore Line):

The streetcar is likely double track through this option. The parking lot can be reconfigured to allow a bike path west of parking by acquiring nine feet.

Length:	760 ft
Cost Estimate:	$

Source: Google Street View

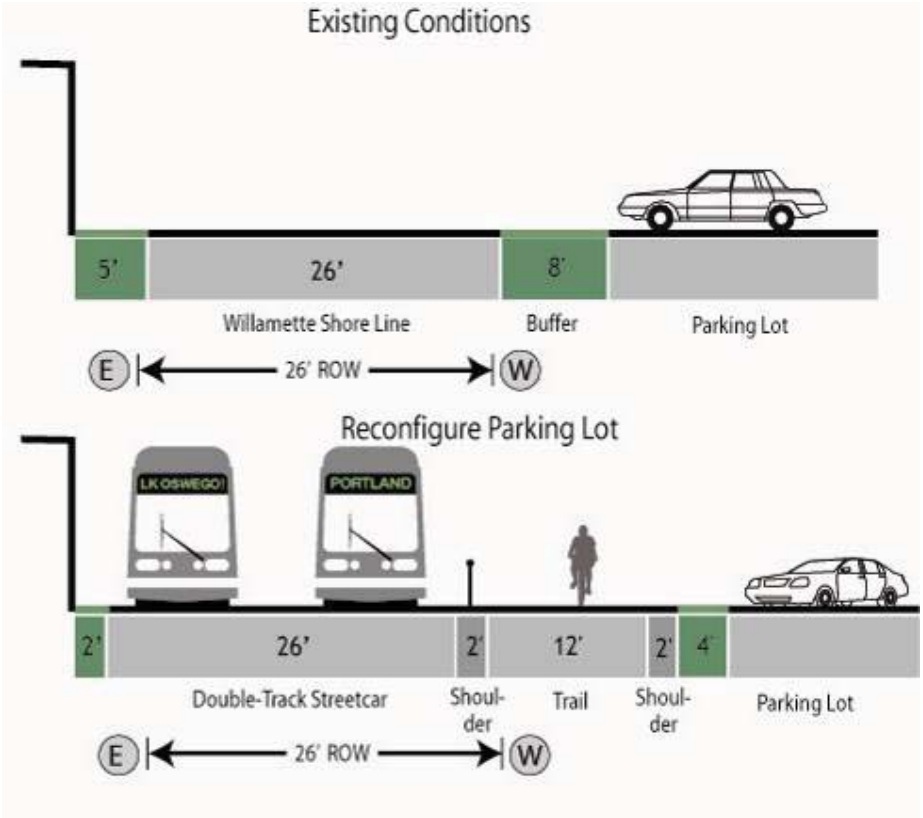


Figure 25. Section 1.1a Willamette Shore Line with Double-track Streetcar

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Hamilton to Julia | 1.1b

Option 1.0b (greenway):

This section has a pinch point between a steep embankment and existing buildings, then widens to 12-13' for 540'. The preferred alternative is to widen this existing trail to regional trail standards; however, improvements may not be possible or feasible given various constraints.

Length:	1,050 ft
Cost Estimate:	$

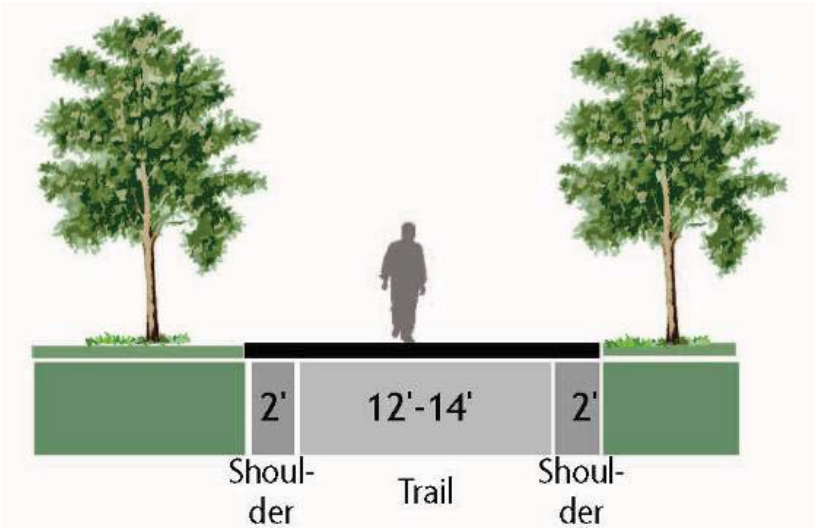


Figure 26. Section 1.1b Widen Existing Greenway Trail

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Julia to South of Landing Square | 1.2a

Summary

The Willamette Shore Line option passes diagonally through a parking lot. The existing greenway trail narrows through this section, with steep slopes on the eastside.

Option 1.2 a (Willamette Shore Line):

This option is only a possibility if the streetcar is not located within the Willamette Shore Line ROW. Additional consideration for the trail through the parking lot will be required to ensure safety and comfort for trail users.

Length:	1,845 ft
Cost Estimate:	$

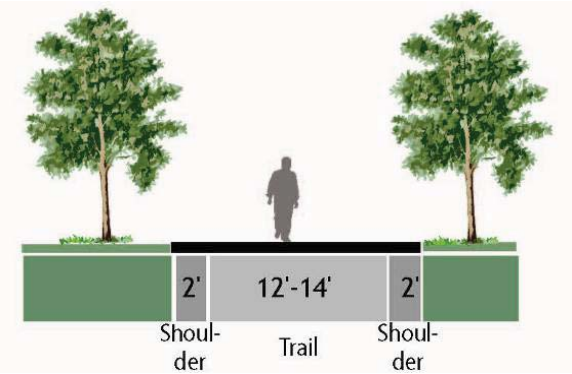


Figure 27. Section 1.2a Trail Only in Willamette Shore Line

Julia to South of Landing Square | 1.2b

Option 1.2b (greenway):

This area floods periodically and steep slopes preclude widening on east side of existing trail. The trail is existing 12' wide for 1,260' of this option.

Length:	1,300 ft
Cost Estimate:	$

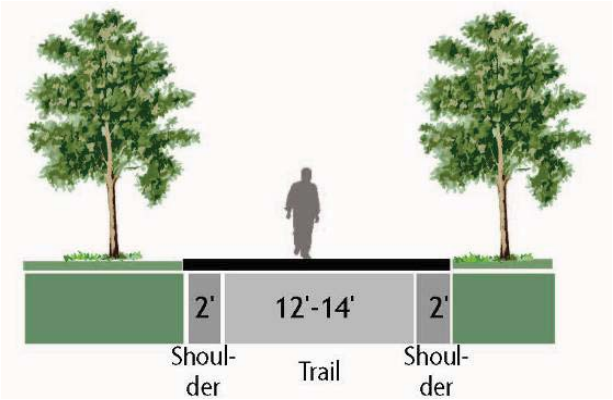


Figure 28. Section 1.2b Improvements to Existing Greenway Trail

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

South of Landing Square to Split — 1.3a

Summary

Streetcar and trail adjacent.

Option 1.3 a (Willamette Shore Line):

Trolley is grade-separated; improve trestle or add berm for trail. This option is only possible if the streetcar is not using the Willamette Shore Line alignment.

Length:	690 ft
Cost Estimate:	$

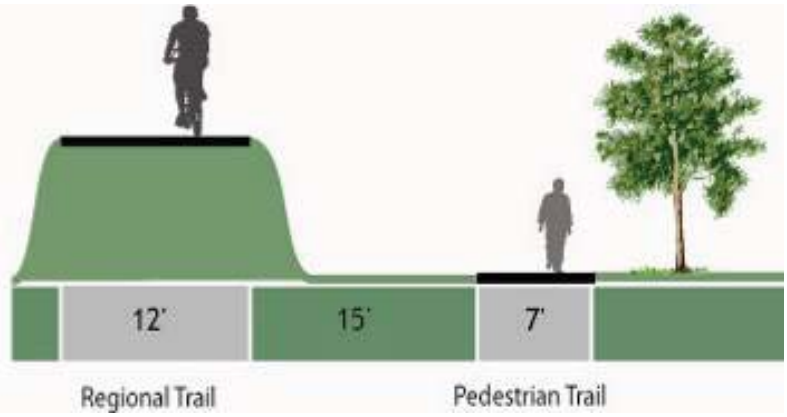


Figure 29. Section 1.3a Trail on Existing Trestle in Willamette Shore Line

South of Landing Square to Split — 1.3b

Option 1.3b (greenway):

The existing trail narrows to 7' width through this area. The preferred alternative is to widen this existing trail to regional trail standards; however improvements may not be possible or feasible given various constraints.

Length:	690 ft
Cost Estimate:	$

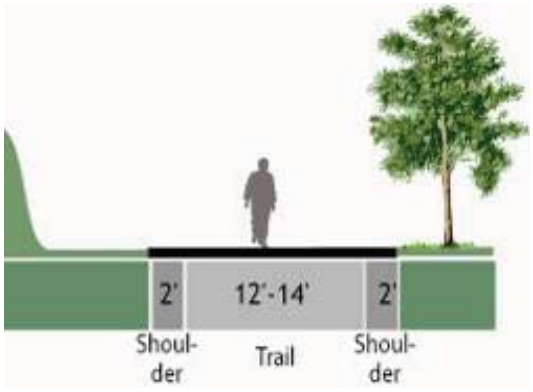


Figure 30. Section 1.3b Improvements to Existing Greenway Trail

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Split to North of Carolina | 1.4a

Summary

The streetcar may be on OR 43 south of Pendleton. If the streetcar is in the Willamette Shore Line, Option 1.4a is not a possibility. The existing greenway trail is narrow and runs close to a residential property around a tight corner.

Option 1.4 a (Willamette Shore Line):

This option is only a possibility if the streetcar is on OR 43.

Length:	1,430 ft
Cost Estimate:	$

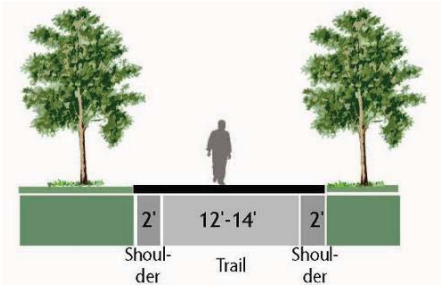


Figure 31. Section 1.4a Trail Only in Willamette Shore Line

Split to North of Carolina | 1.4b

Option 1.4b (greenway):

Existing eight foot greenway is gated at night through a residential area. The trail narrows and turns sharply before continuing on-street on Beaver. It will be challenging to get a permit to widen the trail through this area.

Length:	1,675 ft
Cost Estimate:	$

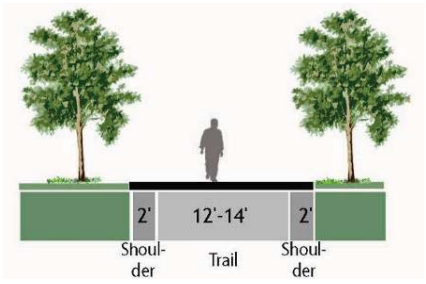


Figure 32. Section 1.4b Improved Greenway Trail

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

North of Carolina to Willamette Park Parking Lot — 1.5a

Summary

Begins on-street on Beaver, continues as off-street path alongside streetcar, and ends at the parking lot. Pedestrians can use the existing park trail through Willamette Park.

Option 1.5a (on-street/greenway):

Trail adjacent to Willamette Shore Line in planting area; will require tree removal. The recommended option transitions to on-street at the parking lot in order to minimize mature tree removal.

Length:	1,343 ft
Cost Estimate:	$

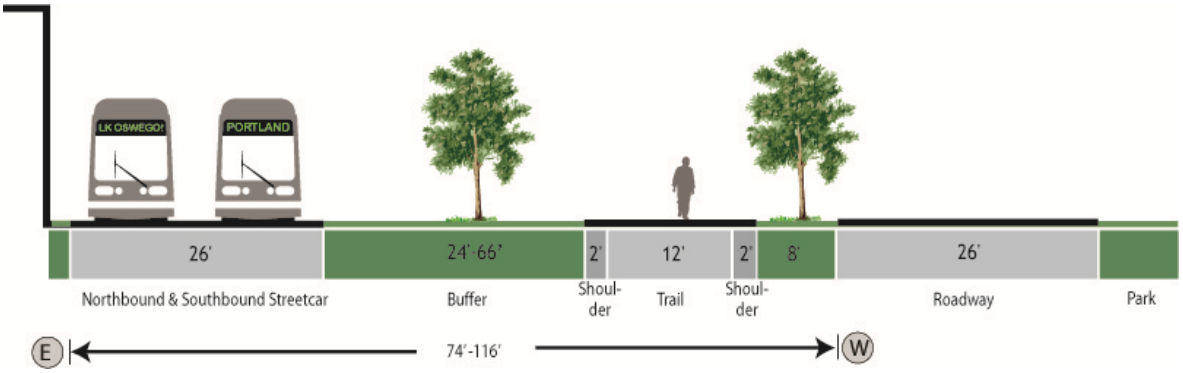


Figure 33. Section 1.5a1 Willamette Shore Line with Double-track Streetcar

North of Carolina to Willamette Park Parking Lot — 1.5b

Option 1.5b (on-street):

This option continues on Beaver/Willamette Park access road as a shared facility, and merges with Option 1.5a south of the parking lot. There is considerable traffic on this road to the Willamette Park parking lot during summer months.

Length:	1,343 ft
Cost Estimate:	$

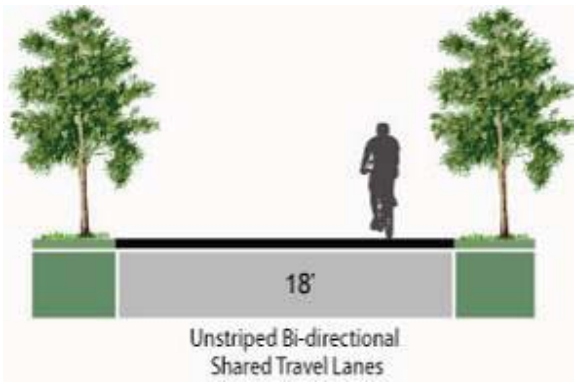


Figure 34. Option 1.5b. Beaver Bicycle Boulevard

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Willamette Park Parking Lot to Miles | 1.6

Summary

The trail continues as a Bicycle Boulevard on Willamette Park Road south of the parking lot, then uses an improved seven foot path through the west side of Willamette Park. Pedestrians will be directed to use the east side trail, minimizing conflicts with bicyclists on the regional trail.

Length:	1,271 ft
Cost Estimate:	$

Source: Google StreetView

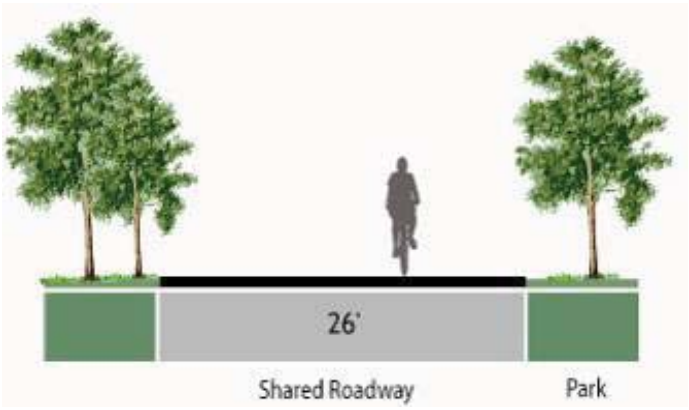


Figure 35. Section 1.6.1 Bicycle Boulevard on Willamette Park Road south of parking lot

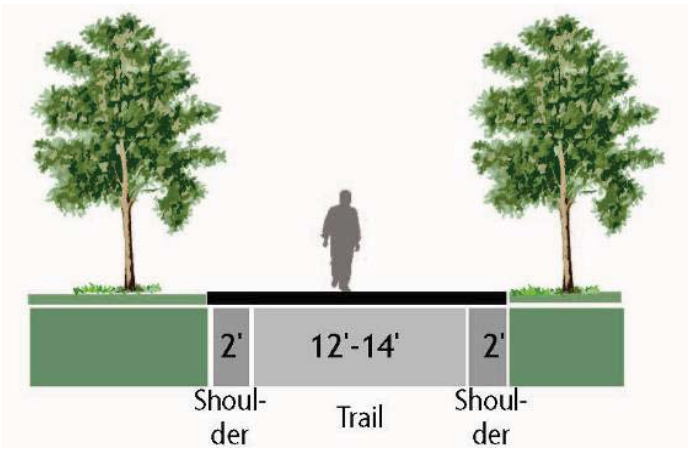


Figure 36. Section 1.6.2 Improved Greenway Trail

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Miles to Macadam Bay | 1.7 a

Summary

ROW is constrained through this area. The Willamette Shore Line option would require acquiring land to accommodate the trail next to double track streetcar. The existing greenway guides trail users along Miles, a low-traffic street that could be improved with Bicycle Boulevard treatments.

Option 1.7 a (Willamette Shore Line)

Streetcar will be double track through this area. This option would require the acquisition of right-of-way.

Length:	1,300 ft
Cost Estimate:	$

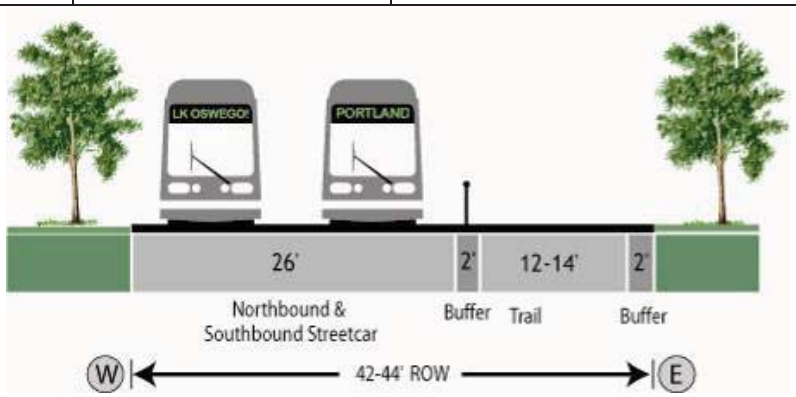


Figure 37. Section 1.7a Trail in Willamette Shore Line with Double Track Streetcar

Miles to Macadam Bay | 1.7 b

Option 1.7b (on-street/greenway):

Trail uses Bicycle Boulevard improvements on Miles Street and connects to an existing 10' path, which was recently repaved.

Length:	1,450
Cost Estimate:	$

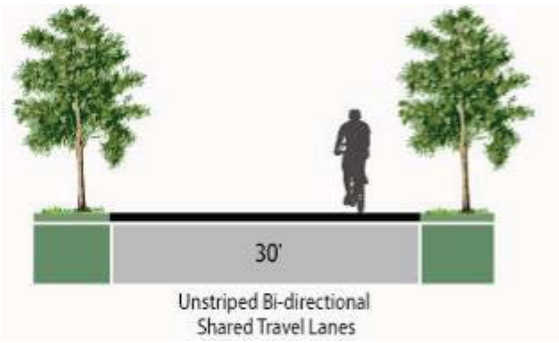


Figure 38. Section 17b Bicycle Boulevard on Miles

Macadam Bay to Sellwood Ferry Rd	**1.8a**

Summary

Section to be coordinated with Sellwood Bridge Project, including the Sellwood Bridge Interchange Access Management Plan (IAMP). Driveway for residences at Macadam Bay may be relocated through this area to minimize conflicts through Willamette Moorage Park.

Option 1.8a (Willamette Shore Line)

Trail crosses streetcar to continue on west side of double-track streetcar in Willamette Shore Line, continues as Option 1.9a.

Length:	930
Cost Estimate:	$

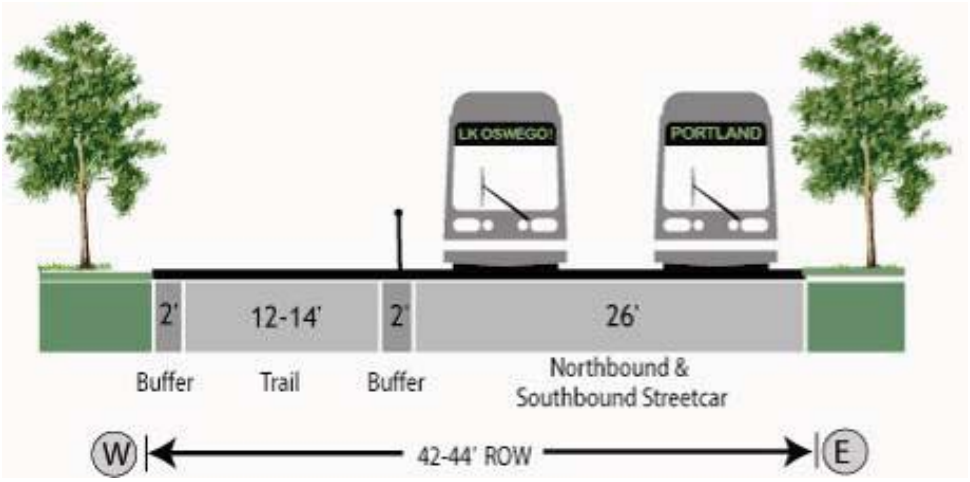
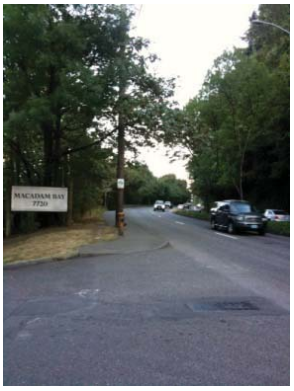


Figure 39. Section 1.8a Willamette Shore Line with Double-track Streetcar

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Macadam Bay to Sellwood Ferry Rd		1.8b
Option 1.8b (on-street/greenway):		 
Greenway on narrow sidewalk, improvements necessary.		
Length:	930	
Cost Estimate:	$	

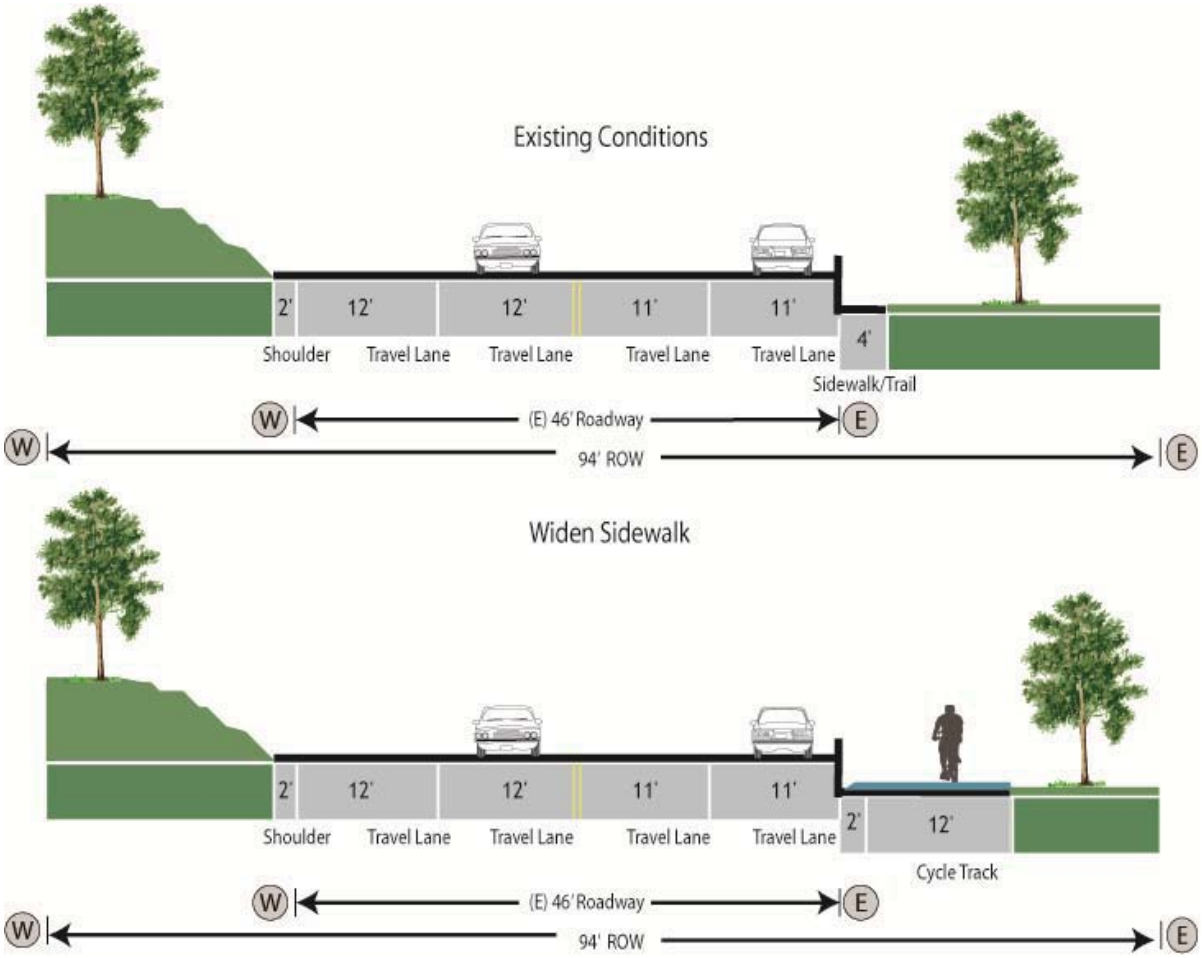


Figure 40. Section 1.8b – Cycle Track on OR 43 – Widen Trail 10'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Sellwood Ferry Rd to Sellwood Bridge — 1.9a

Summary

Constrained ROW, connections to Sellwood and Riverview Cemetery. Section to be coordinated with Sellwood Bridge Project, including the Sellwood Bridge Interchange Access Management Plan (IAMP).

Option 1.9 a (Willamette Shore Line)

Trail adjacent to double-track streetcar in Willamette Shore Line. Continues as Option 2.1a.

Length:	700 ft
Cost Estimate:	$

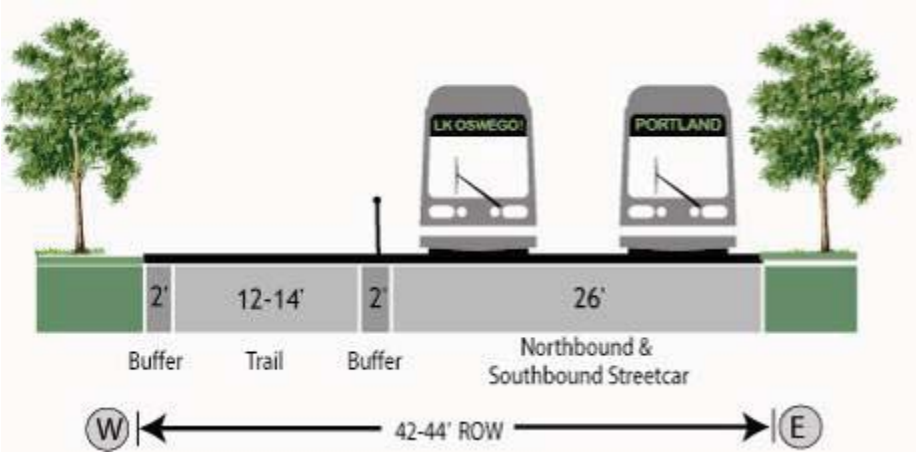


Figure 41. Section 1.9a Willamette Shore Line with Double-track Streetcar

Sellwood Ferry to Sellwood Bridge — 1.9b

Option 1.9b (on-street):

Trail along Sellwood Ferry Road, visibility issues, connects to parking lot under bridge. Continues as Option 2.1b.

Length:	730
Cost Estimate:	$

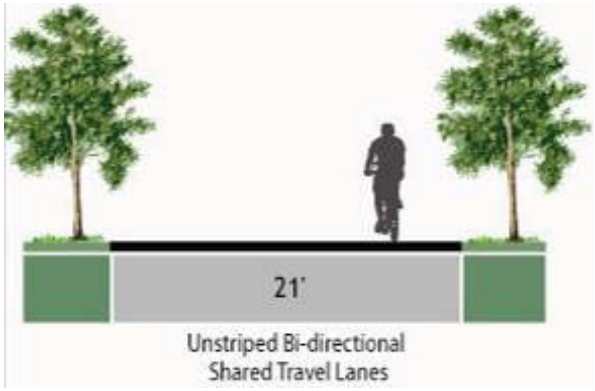


Figure 42. Option 1.9b Bicycle Boulevard on Sellwood Ferry Road

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

SECTION 2. Sellwood Bridge to Lake Oswego

Sellwood Bridge to Hill in Powers Marine Park | 2.1a

Summary

South of the Sellwood Bridge, the trail will continue either along the Willamette Shore Line right-of-way adjacent to the streetcar, or on improvements to the existing greenway trail through Powers Marine Park. A small hill in the park may provide an opportunity to cross over the streetcar to access OR 43 to continue the trail as a cycle track on the eastside of the roadway.

Option 2.1 a (Willamette Shore Line):

A continuation of Option 1.9a, the trail would be located on the west side of the streetcar track. Drainage issues require additional engineering. Optional transition to 2.2c from south end of segment.

Length:	950’
Cost Estimate:	$$

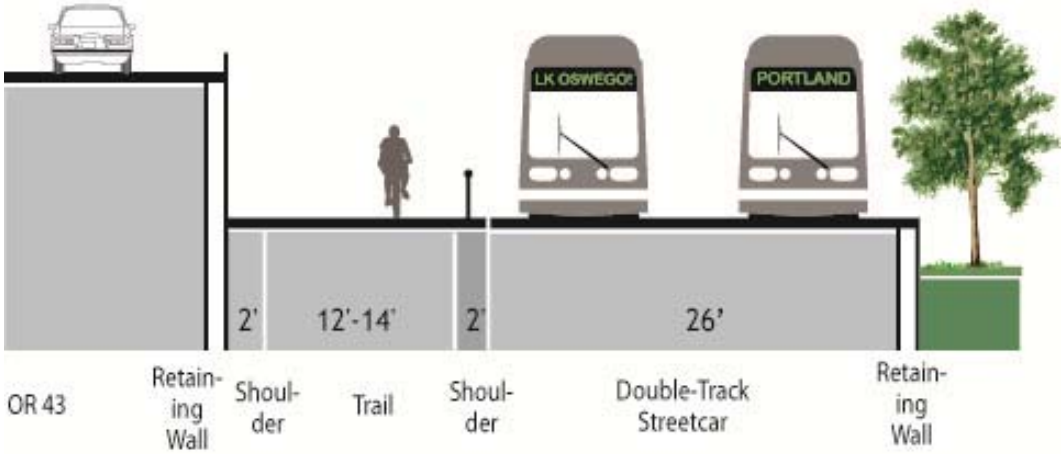


Figure 43. Section 2.1a Willamette Shore Line with Double Track Streetcar

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Sellwood Bridge to Hill in Powers Marine Park | 2.1b

Option 2.1b (greenway):

This option is a continuation of Option 1.9b and would require widening and paving the existing trail through Powers Marine Park. A small hill within the park provides an opportunity for the trail to cross over the streetcar and continue either along the Willamette Shore Line on the west side of the streetcar (Option 2.2a) or continue as a cycle track on the east side of OR 43 (Option 2.2c).

Length:	950’
Cost Estimate:	$

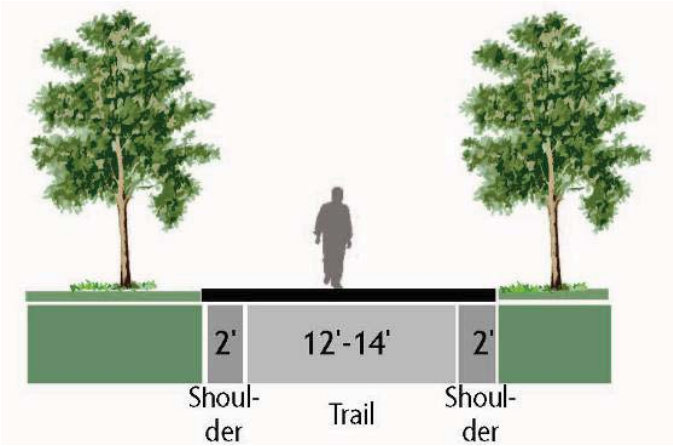


Figure 44. Section 2.1b Widen Existing Greenway Trail through Powers Marine Park

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Hill in Powers Marine Park to End of Park | 2.2

Summary

Topographically challenging as corridor narrows.

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Hill in Powers Marine Park to End of Park — 2.2a

Option 2.2a (Willamette Shore Line):

Trail on west side of streetcar track. Trail within flood plain -requires 8' retaining wall and drainage piping, catch basins. Continues as cycle track on OR 43 (Option 2.3).

Length:	3,300 ft
Cost estimate:	$$$

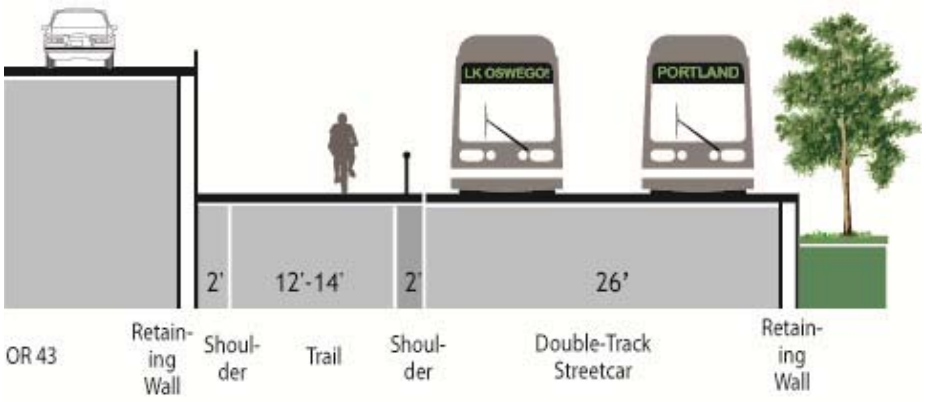


Figure 45. Section 2.2a Willamette Shore Line

Hill in Powers Marine Park to End of Park — 2.2b

Option 2.2b (Greenway):

Widen and pave existing trail through Powers Marine Park. Provide streetcar crossing at south end of park. Continues as cycle tracks on OR 43 (Option 2.3).

Length:	3,300 ft
Cost estimate:	$

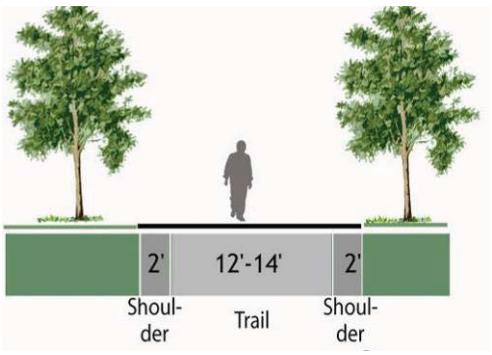


Figure 46. Section 2.2b Improvements to Existing Greenway Trail

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Hill in Powers Marine Park to End of Park | 2.2c

Option 2.2c (OR 43):

This option calls for a two-way cycle track on the east side of OR 43. Conflicts with parking may arise where people park on-street to access Powers Marine Park. In addition, widening OR 43 will require upgrading drainage elements on the roadway and acquiring updated environmental permits, which will likely be expensive.

Length:	3,300 ft
Cost estimate:	$$$

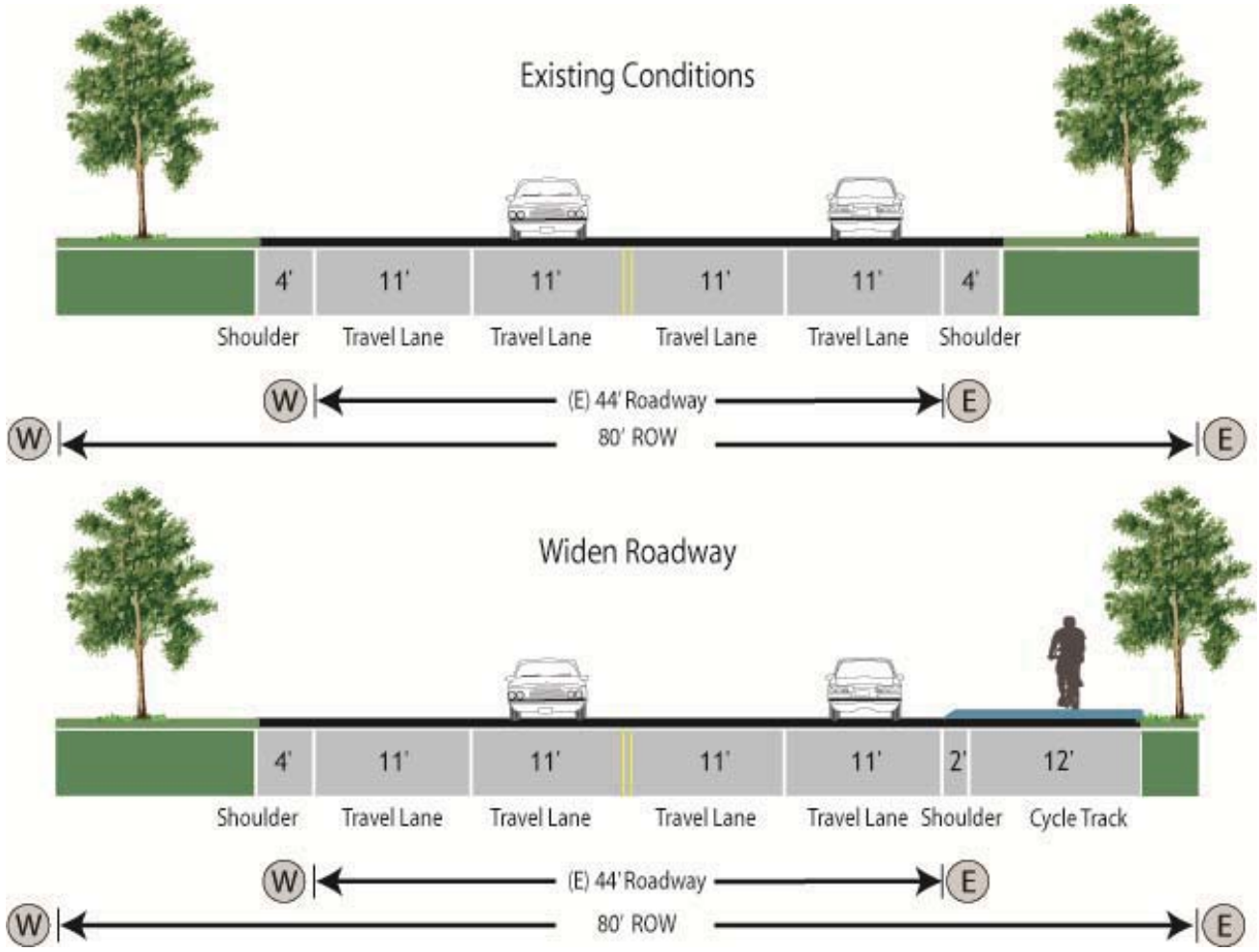


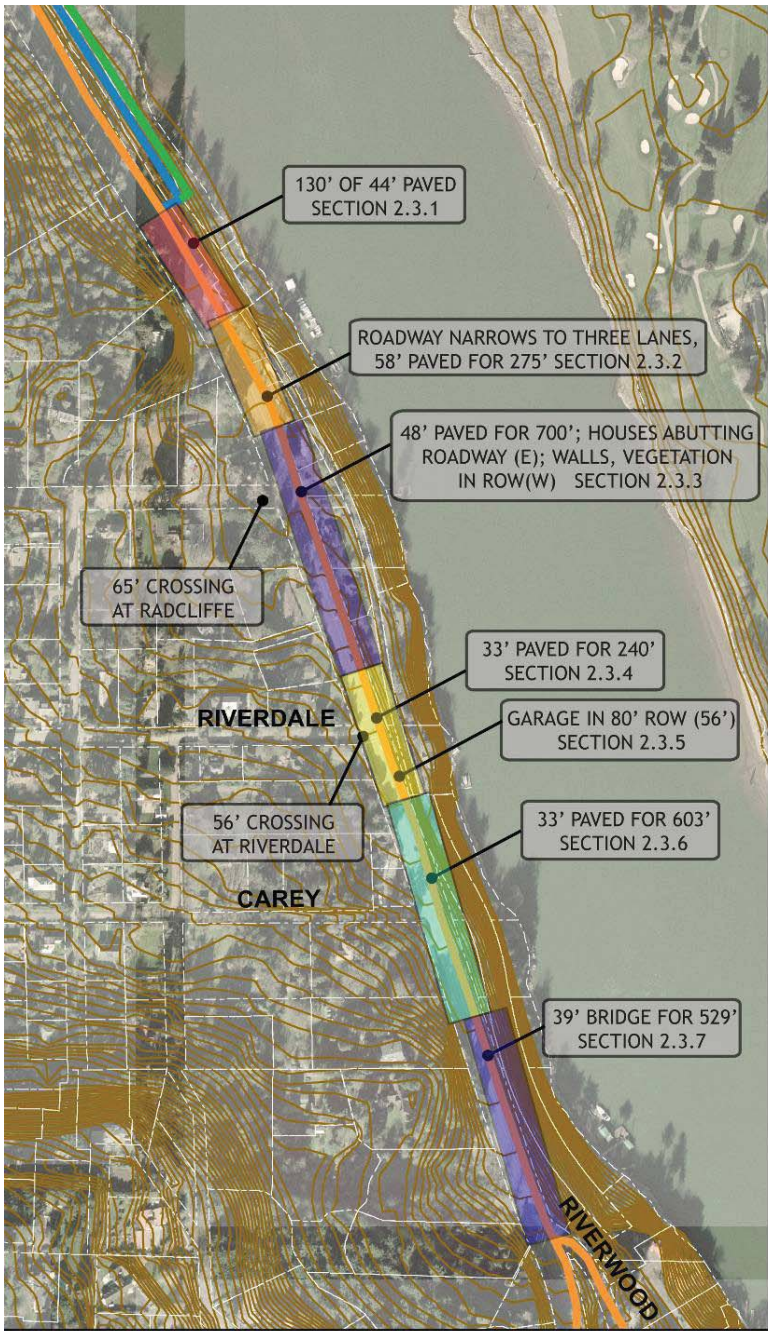
Figure 47. Conceptual Section 2.2c Cycle Track on OR 43 – Widen Trail 10' East for 3,300'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

End of Powers Marine Park to Riverwood Road | 2.3

Summary

Through this area, the Willamette Shore Line is narrow and constrained by houses and slopes. The only trail option is the cycle track facility on OR 43. This alignment will be challenging due to a garage, fencing and landscaping located within the right-of-way. Most options widen the roadway on the west side and re-stripe to accommodate the cycle track on the east side.



NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

End of Powers Marine Park to Riverwood Road | 2.3

Option 2.3 (On-Street):

Existing signalized crossing at Riverdale Road and Radcliffe. Houses close to roadway along east side: cycle track should break to allow access to four driveways. Several fences are within the 80' ROW to the west, and one house to the east. South of Riverdale, roadway becomes a narrow bridge. Cost estimates include widening and re-striping roadway, where widening would occur on the west side of the roadway due to steep grades and right-of-way encroachment constraints.

Length:	2,630 ft
Cost estimate:	$$$$

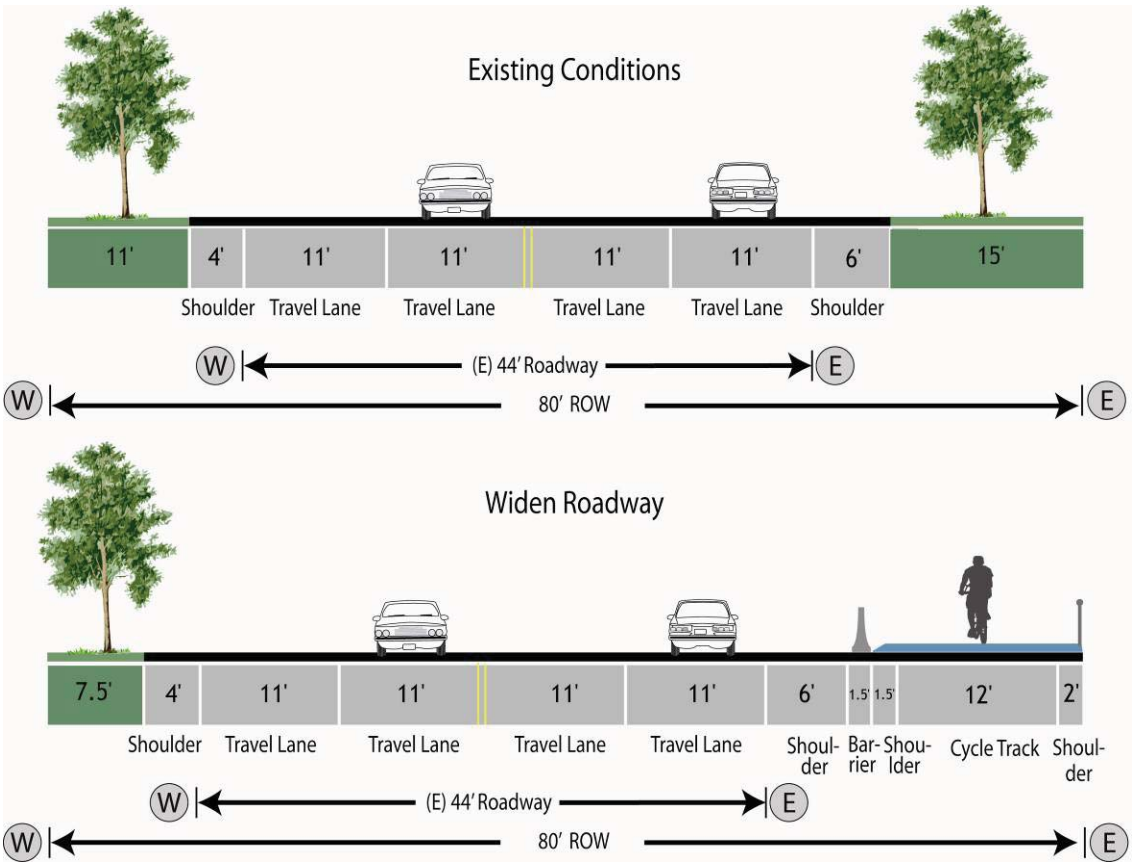


Figure 48. Conceptual Section 2.3.1 - Widen Trail 15' (E), Widen Roadway 3.5' (W), Restripe for 130'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

End of Powers Marine Park to Riverwood Road (continued) | 2.3

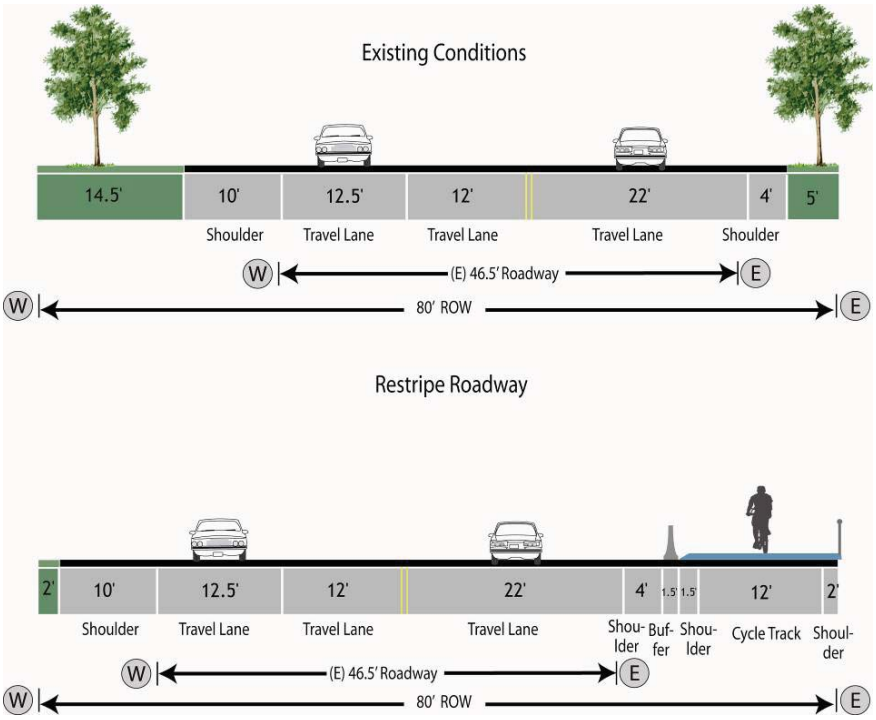


Figure 49. Conceptual Section 2.3.2- Widen Trail 5' (E), Widen Roadway 12.5' (W), Restripe 275'

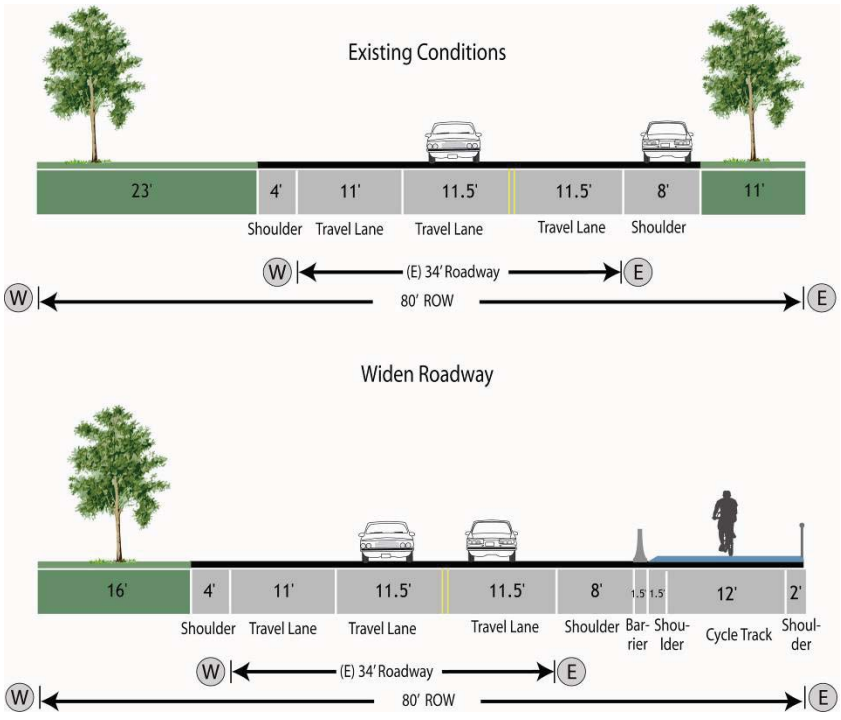


Figure 50. Conceptual Section 2.3.3 - Widen Trail 11'(E), Widen Roadway 7'(W), Restripe 700'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

End of Powers Marine Park to Riverwood Road (continued) 2.3

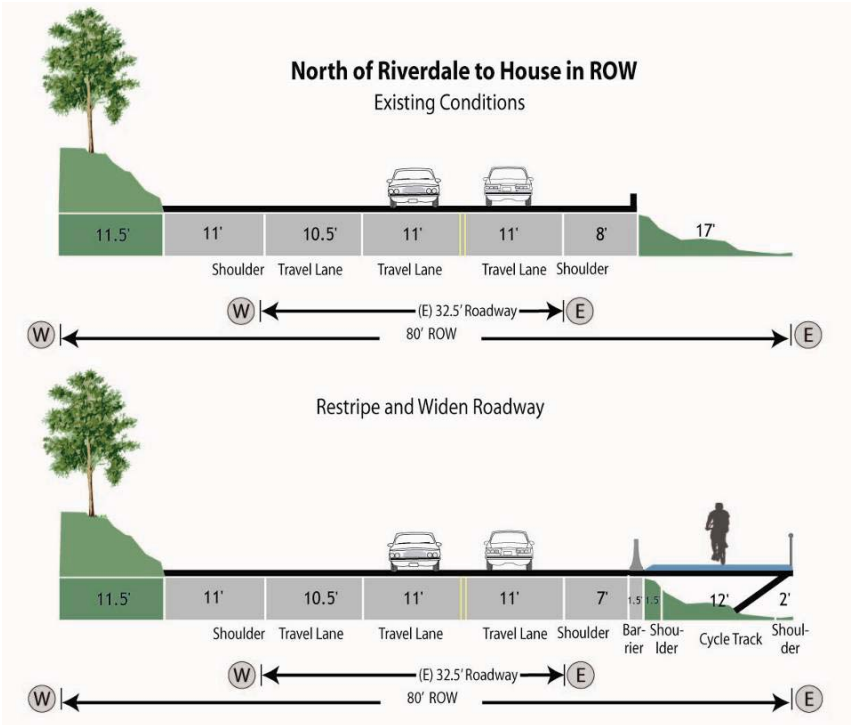


Figure 51. Conceptual Section 2.3.4- Bench Trail onto Roadway for 240'

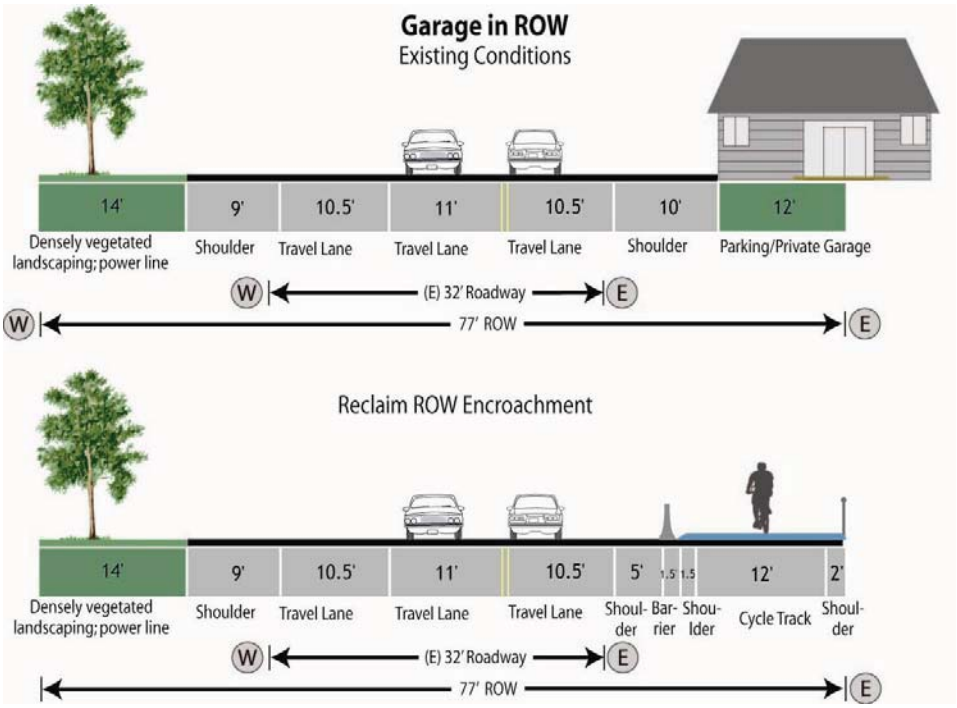


Figure 52. Conceptual Section 2.3.5 - Reclaim Encroachment for 56'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

End of Powers Marine Park to Riverwood Road (continued) 2.3

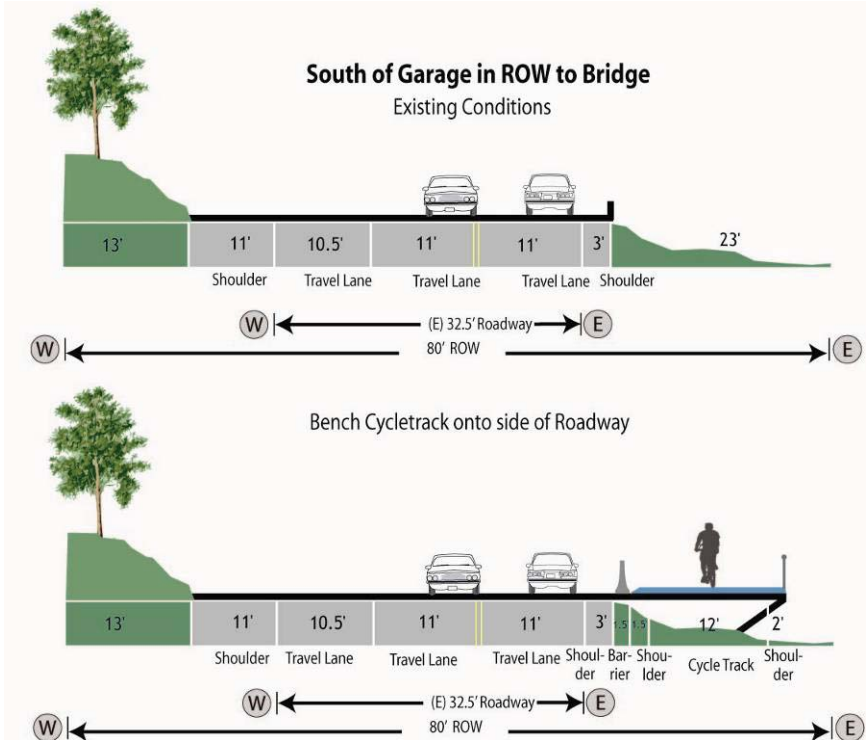


Figure 53. Conceptual Section 2.3.6 – Bench Trail onto Roadway 603'

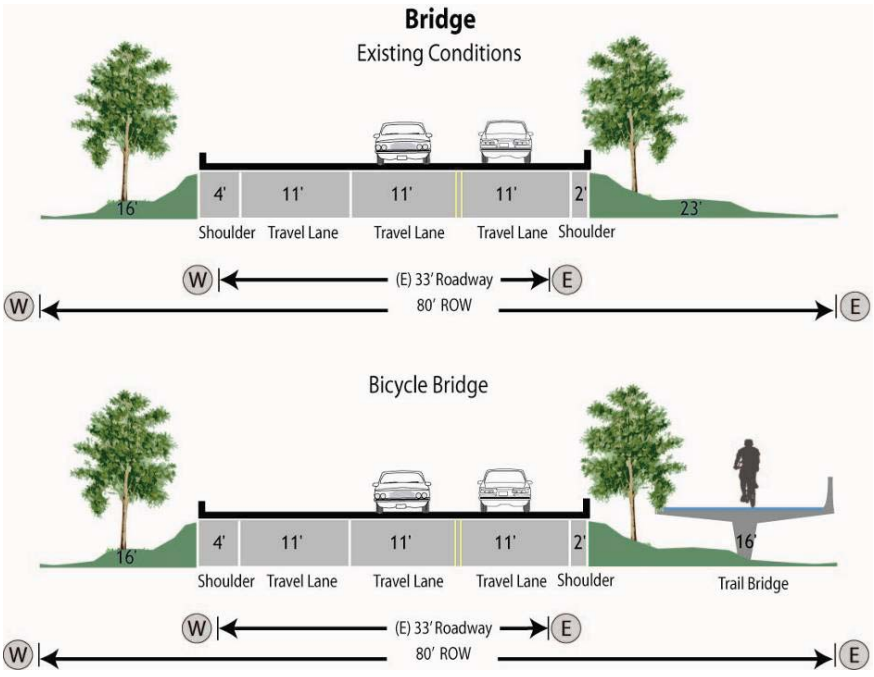


Figure 54. Conceptual Section 2.3.7 – Trail Bridge for 529'

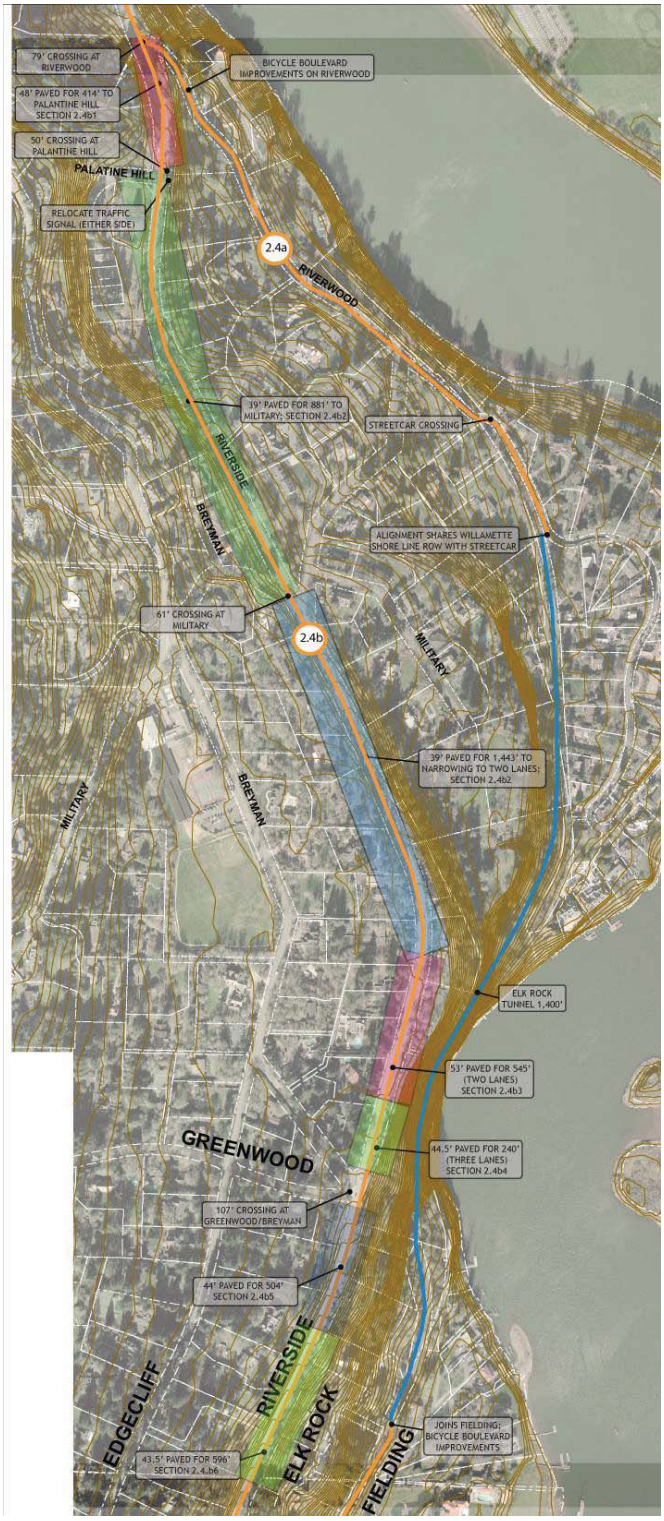
NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Riverwood Road to Lake Oswego City Line

2.4

Summary

Highly constrained – Option 2.4a requires retaining walls and a tunnel, while the on-street option would require significant acquisition and construction.



NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Riverwood Road to Lake Oswego City Line	2.4a

Option 2.4a (On-Street/Willamette Shore Line):

Bicycle Boulevard improvements on Riverwood (30' ROW). Trail crosses streetcar tracks at Riverwood Road stop, continues on Willamette Shore Line where Riverwood Road bends east (30' ROW). New trail tunnel required to cross at Elk Rock.

Length:	6,184 ft
Cost estimate:	$$$$$

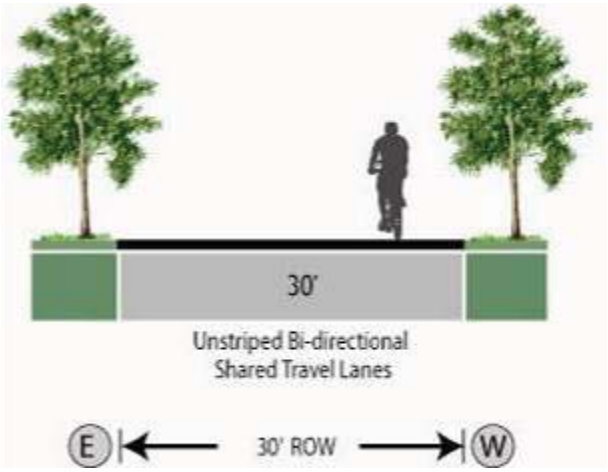


Figure 55. Conceptual Section 2.4a1 Bicycle Boulevard Improvements on Riverwood

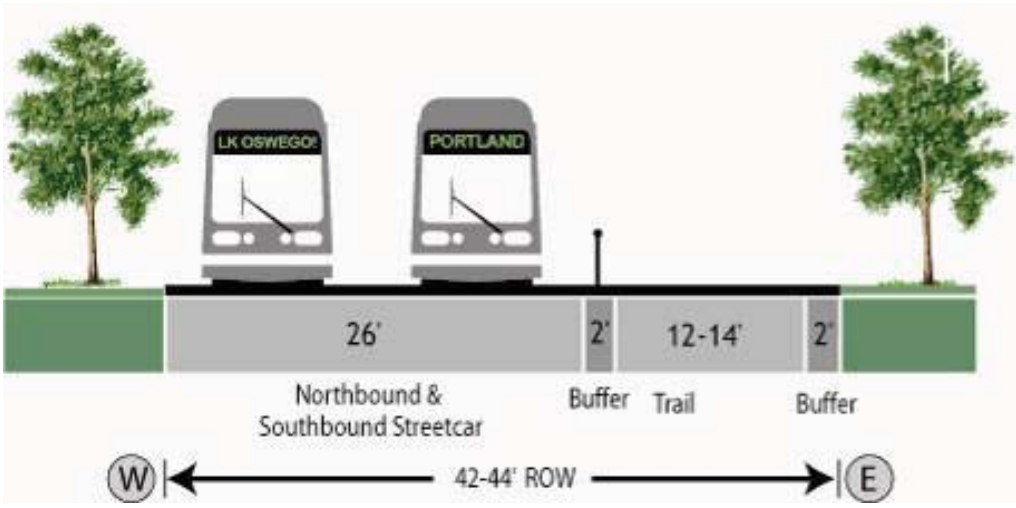


Figure 56. Conceptual Section 2.4a2 Trail Adjacent to Double-Track Streetcar in Willamette Shore Line

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Riverwood Road to Lake Oswego City Line		2.4b
Option 2.4b (On-Street):		
Continue cycle track on east side of OR 43 (38'-56' ROW); requires moving existing retaining walls. Houses close to road in some locations. Crossings at Military and Mid Vale Roads.		
Length:	5,628 ft	
Cost estimate:	$$$	

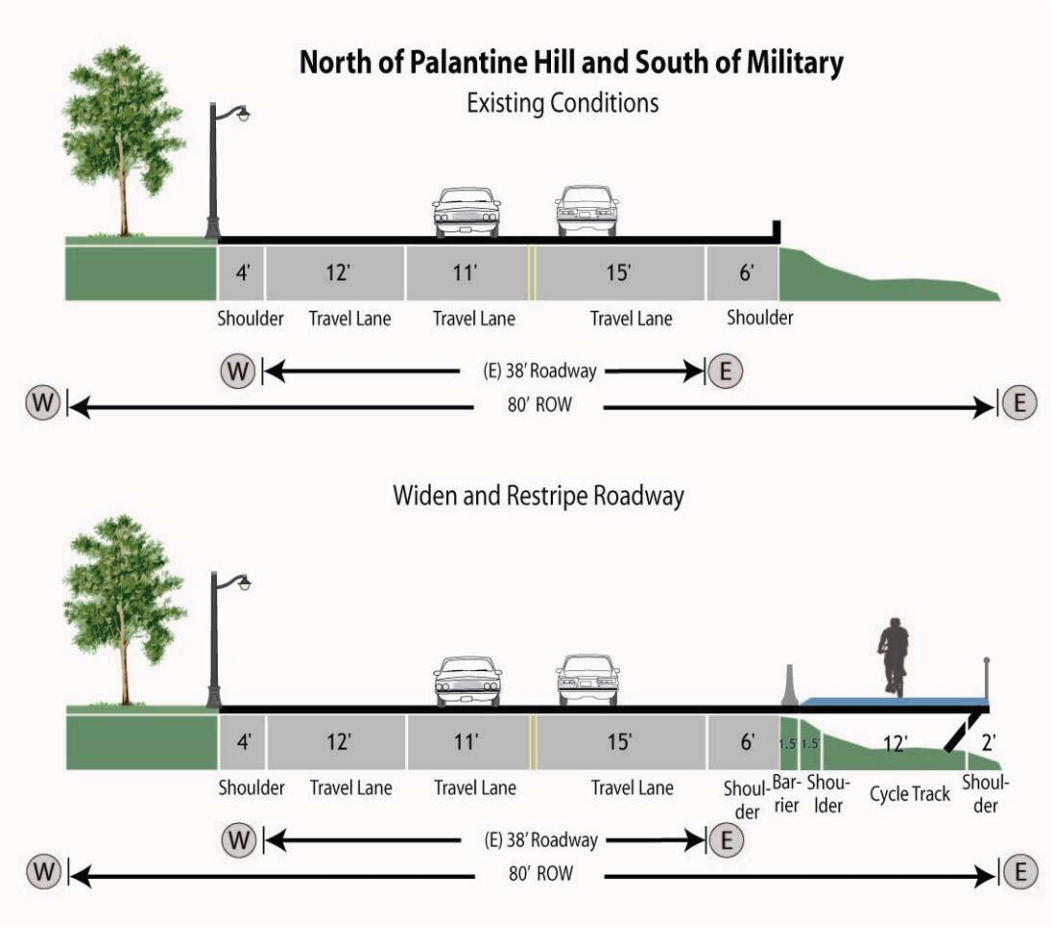


Figure 57. Conceptual Section 2.4b1 – Bench Trail onto Roadway for 414'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Riverwood Road to Lake Oswego City Line (continued) | 2.4b

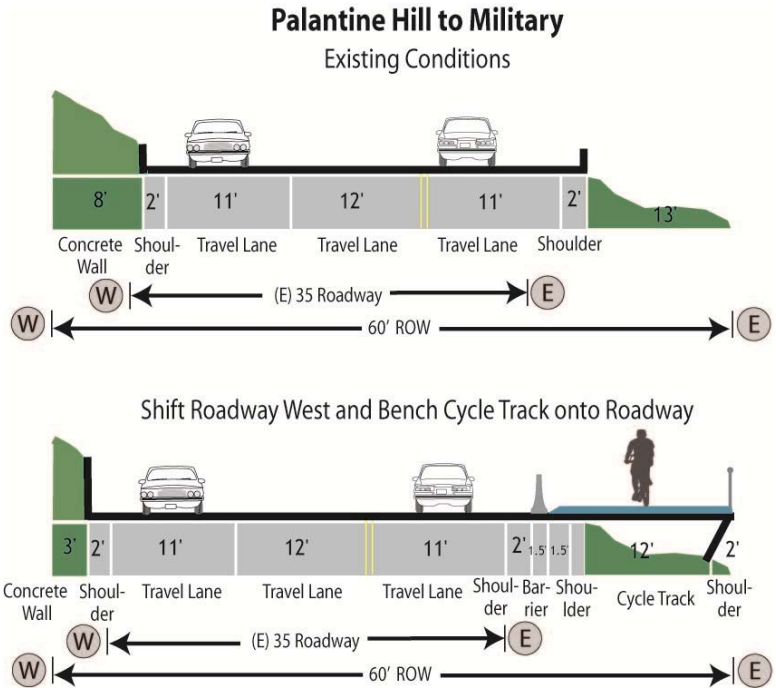


Figure 58. Conceptual Section 2.4b2 - Widen Roadway 5' (W), Bench Cycle Track onto Roadway, Move Concrete Wall , Restripe for 2,324'

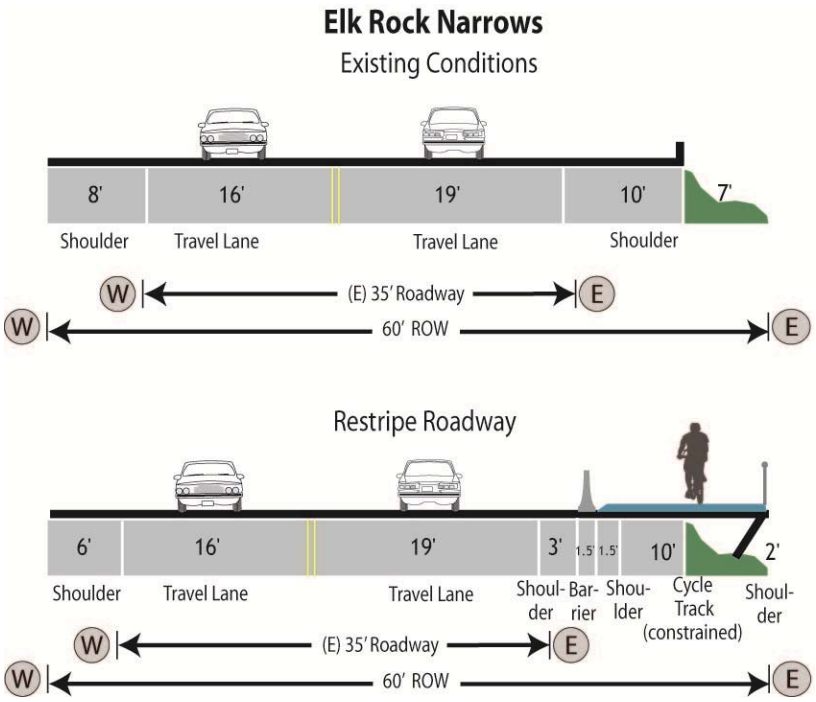


Figure 59. Conceptual Section 2.4b3- Widen Bench Cycle Track onto Roadway, Restripe for 525'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Riverwood Road to Lake Oswego City Line (continued) | 2.4b

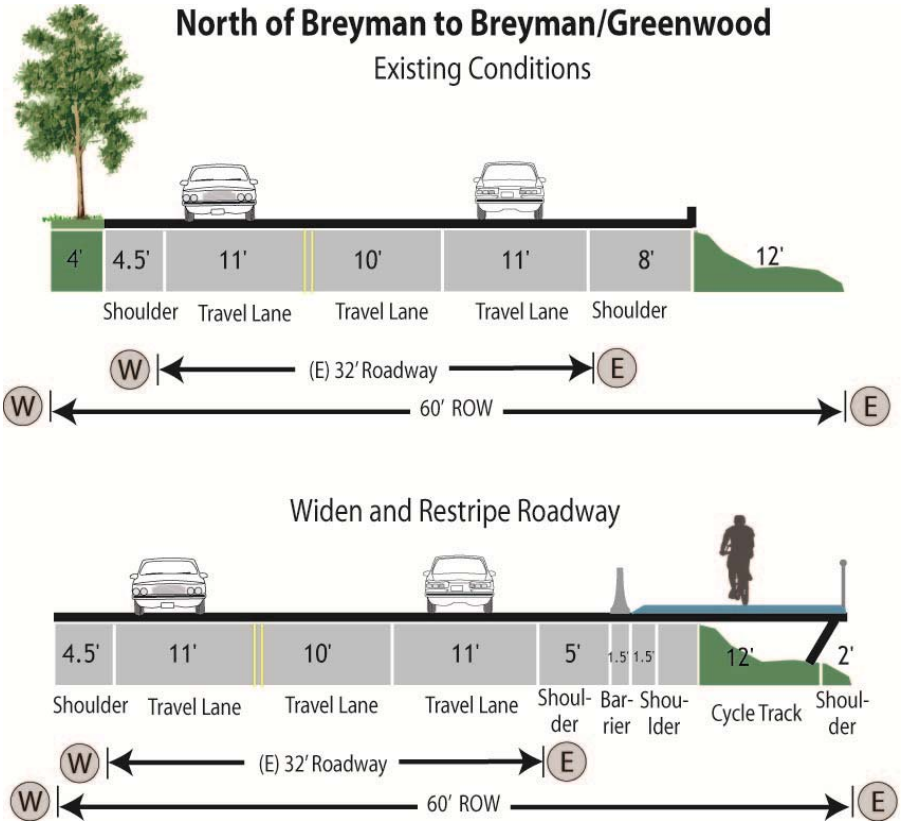


Figure 60. Conceptual Section 2.4b4 - Widen 4' (W), Bench Cycle Track onto Roadway, Restripe for 240'

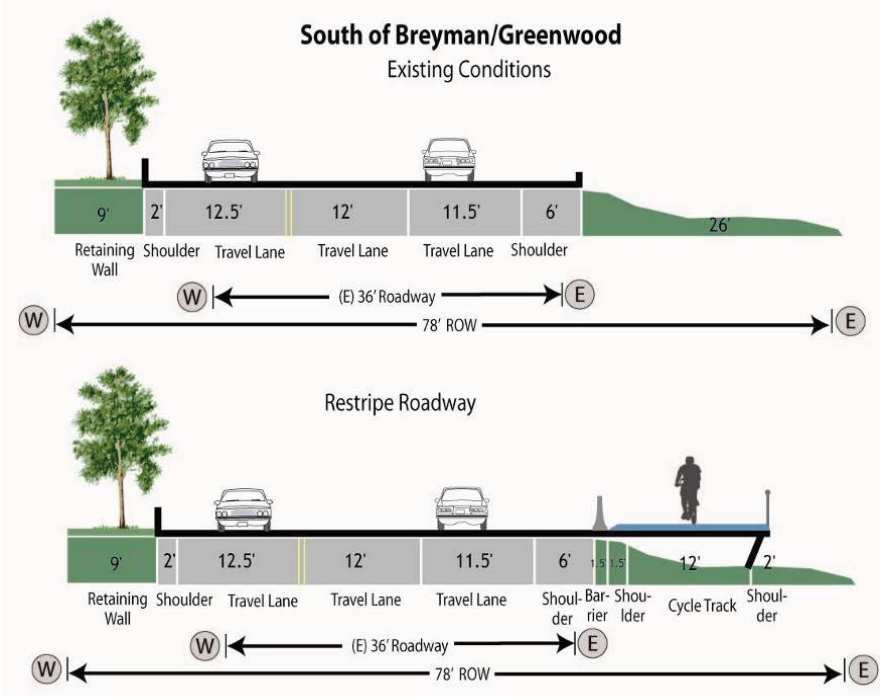


Figure 61. Conceptual Section 2.4b5- Bench Trail onto Roadway for 504'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Riverwood Road to Lake Oswego City Line (continued) | 2.4b

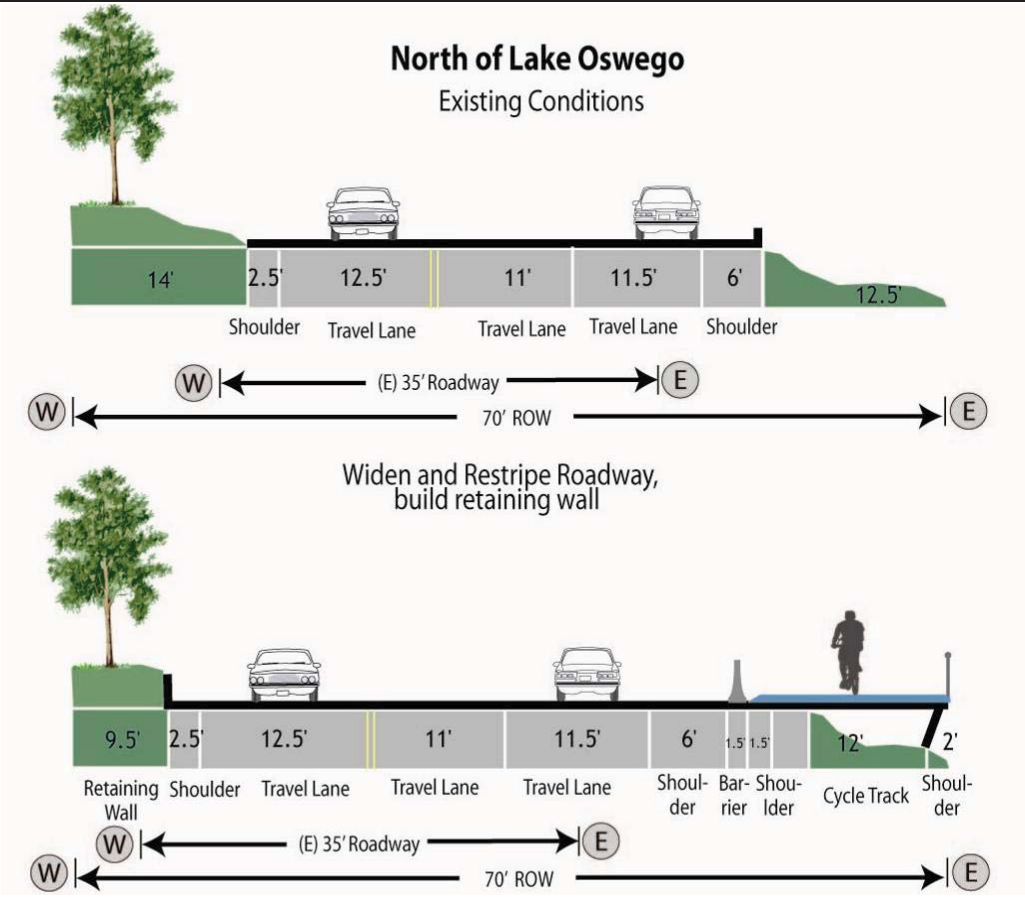


Figure 62. Conceptual Section 2.4b6- Widen Roadway 5' (W), add Retaining Wall, Bench Cycle Track onto Roadway and Restripe for 596'

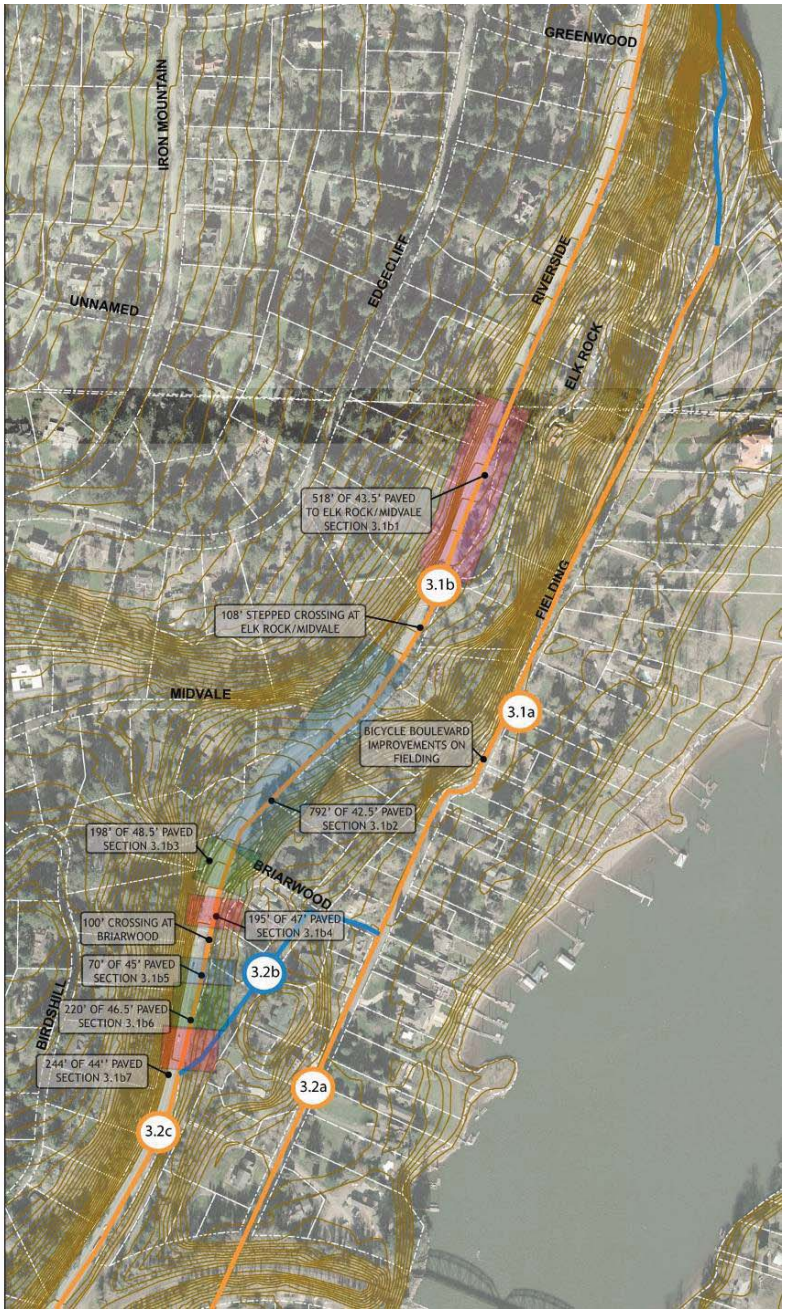
NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

SECTION 3. Lake Oswego

Lake Oswego City Line to Briarwood | 3.1

Summary

Constrained, private property issues on both options.



NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Lake Oswego City Line to Briarwood — 3.1a

Option 3.1a (On-street):

Bicycle Boulevard improvements on Fielding (16'-18' ROW).

Length:	1,766 ft
Cost estimate:	$

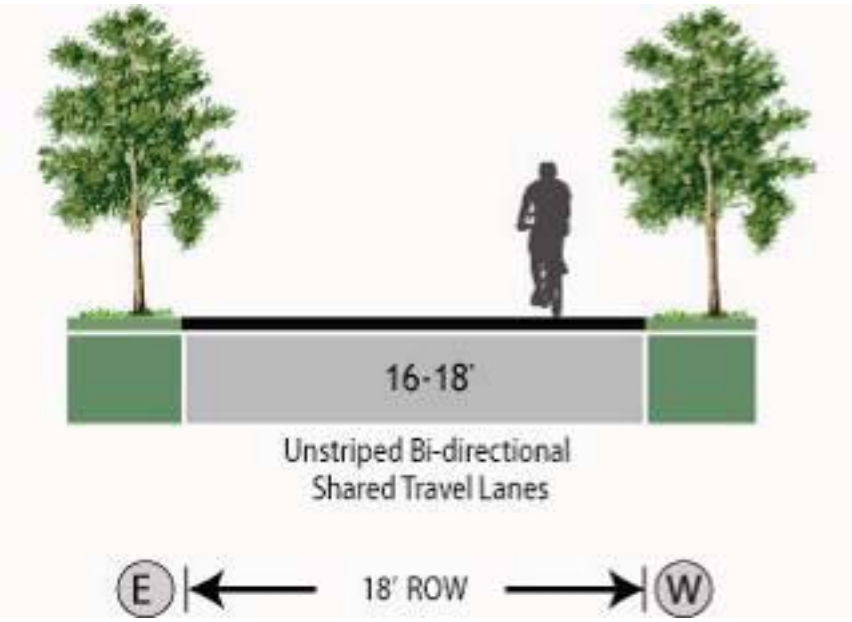


Figure 63. Section 3.1a Bicycle Boulevard Improvements on Fielding

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Lake Oswego City Line to Briarwood	3.1b

Option 3.1b (on-street):

Continue cycle track on east side of OR 43 (38'-56' ROW); requires moving existing retaining walls. Houses close to road in some locations.

Length:	2,232 ft
Cost estimate:	$$$

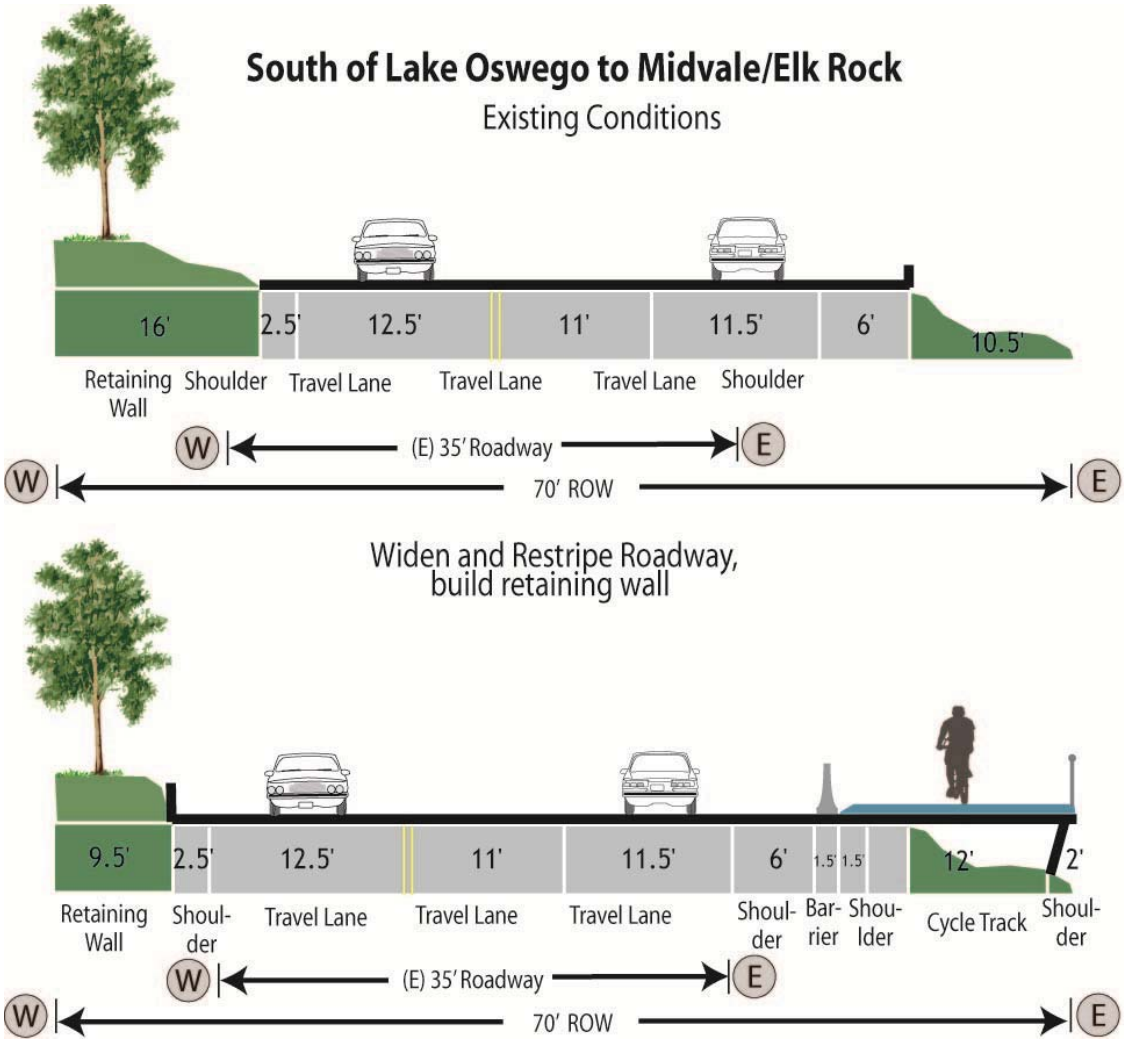


Figure 64. Conceptual Section 3.1b1- Widen Roadway 6.5' (W), Add Retaining Wall, Bench Cycle Track onto Roadway and Restripe for 518'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Lake Oswego City Line to Briarwood (continued) | 3.1b

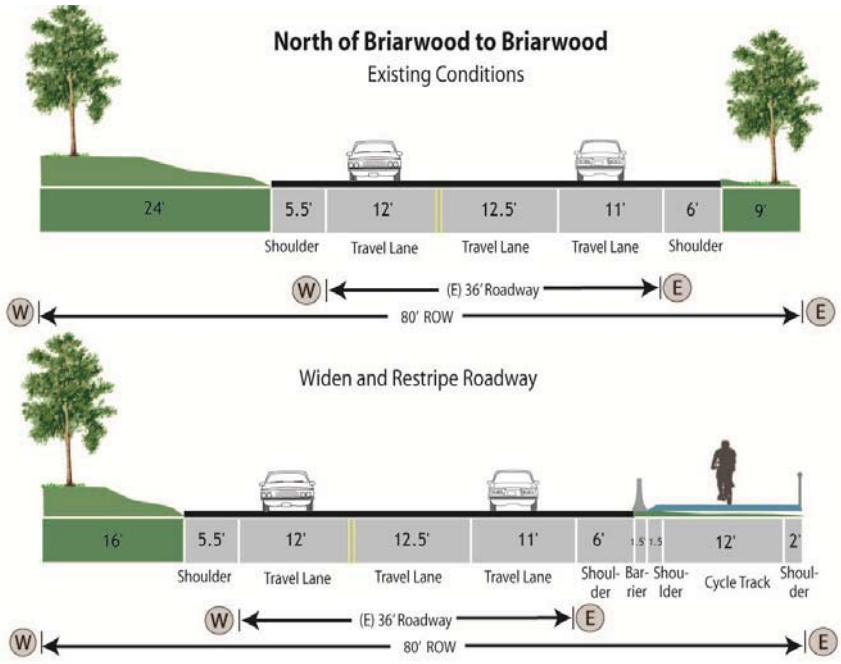


Figure 65. Conceptual Section 3.1b2- Widen Roadway 6' (W), Widen Trail 11' (E), Restripe 792'

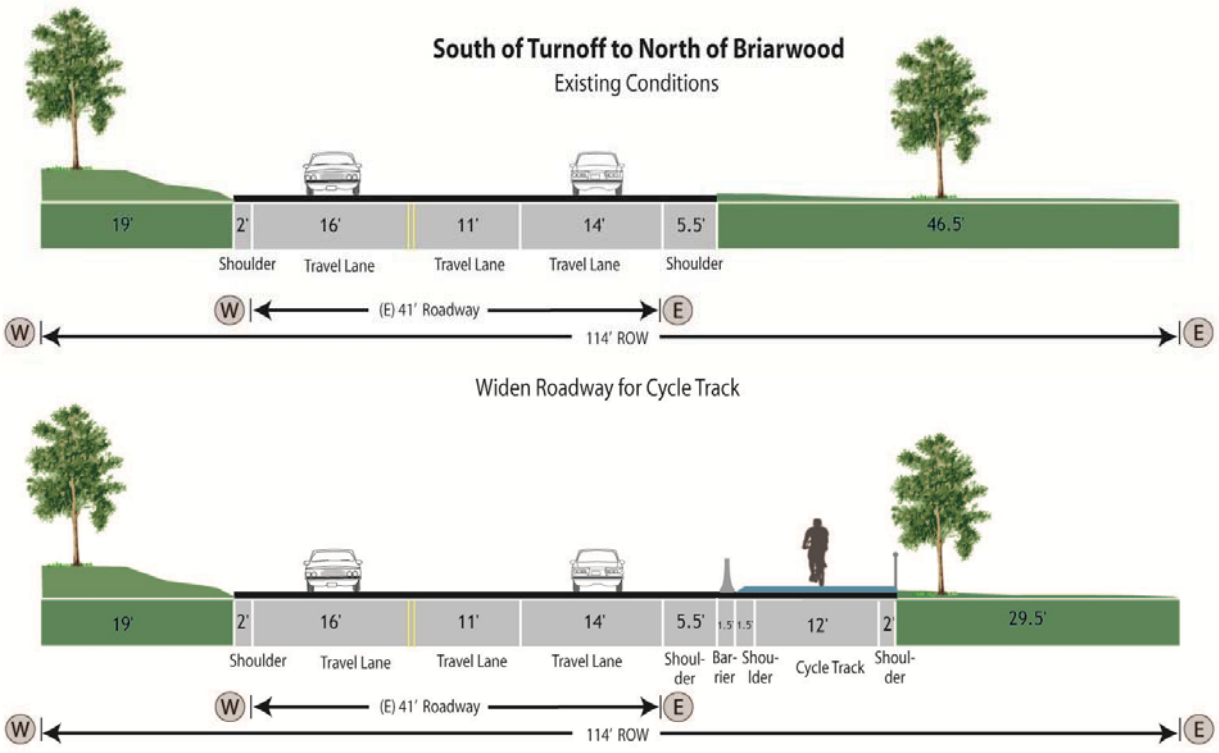


Figure 66. Conceptual Section 3.1b3 – Widen Trail 17' (E) for 198'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Lake Oswego City Line to Briarwood (continued) 3.1b

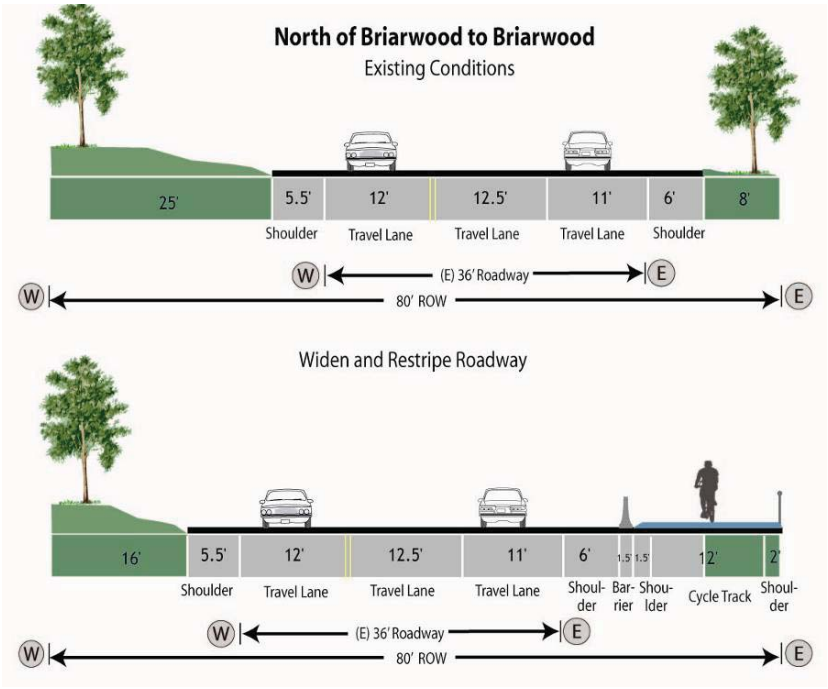


Figure 67. Conceptual Section 3.1b4- Widen Trail 8' (E), Widen Roadway 9' (W), Restripe for 195'

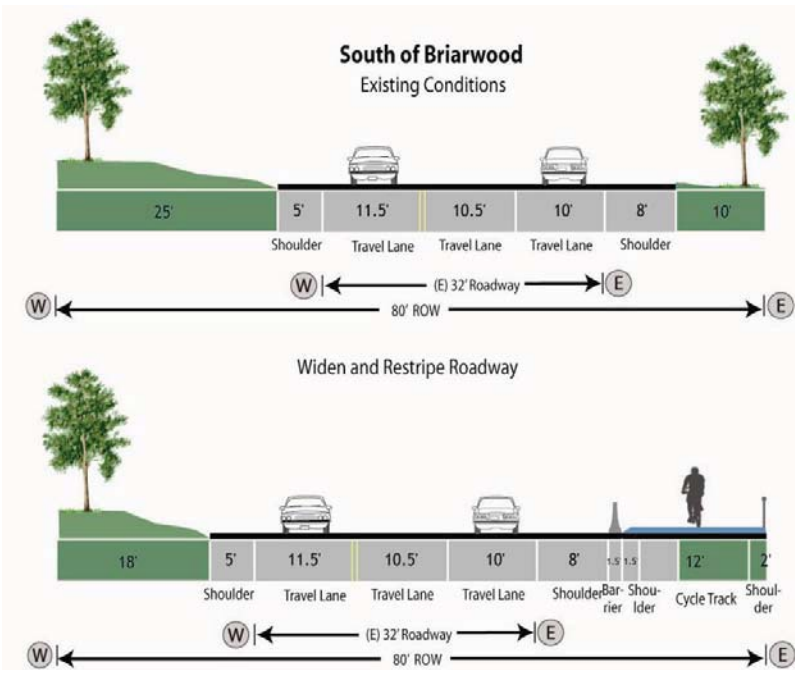


Figure 68. Conceptual Section 3.1b5 – Widen Trail 10' (E), Widen Roadway 7' (W), Restripe 70'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Lake Oswego City Line to Briarwood (continued) | 3.1b

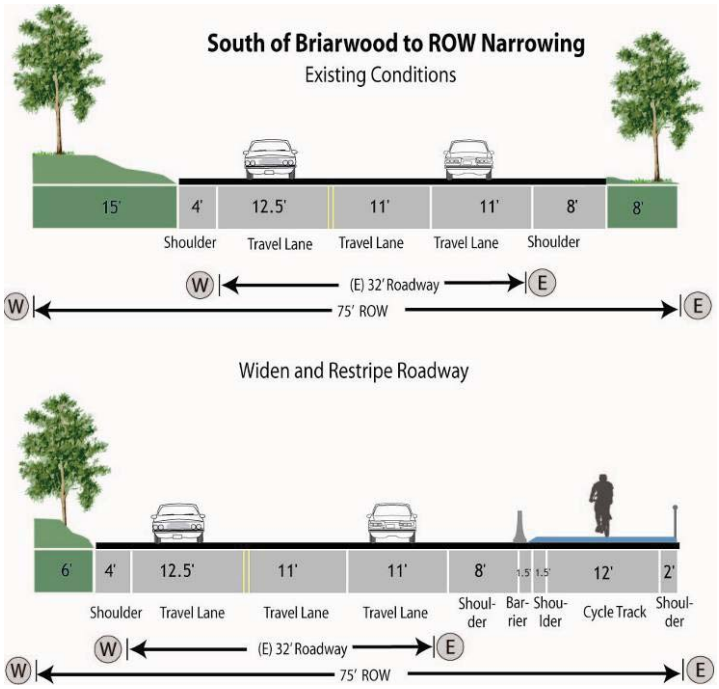


Figure 69. Conceptual Section 3.1b6- Widen Trail 8' (E), Widen Roadway 9'(W) and Restripe 220'

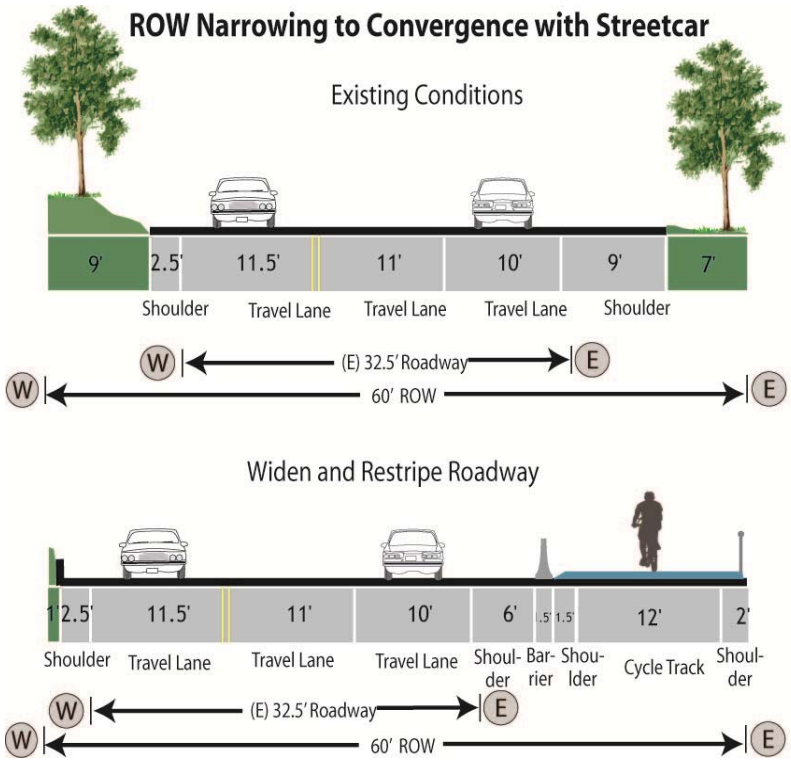


Figure 70. Conceptual Section 3.1b7- Widen Trail 7' (E), Widen Roadway 8' (W), Restripe for 244'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Briarwood to B Street | 3.2

Summary

Streetcar parallels an active freight rail line through this section. The on-street option becomes constrained by a raised median as well as several commercial buildings abutting the street. Coordinate with city projects for Tryon Creek Culvert and Tryon Creek Pedestrian Bridge.

Briarwood to B Street — 3.2a

Option 3.2a (on-street):

Trail continues on Fielding/Stampher to tunnel underneath railroad trestle, connecting to Foothills Waterfront Park Trail on a future bridge over the mouth of Tryon Creek and to a potential future bicycle/ pedestrian bridge over Willamette at railroad bridge.

Length:	1,620’ ft
Cost estimate:	$$$

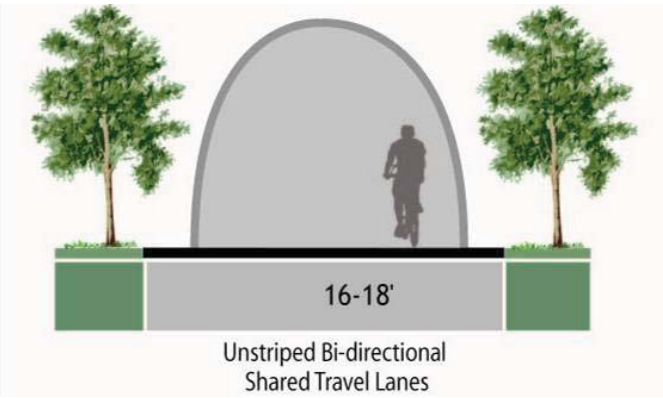


Figure 71. Section 3.2a Bicycle Boulevard Improvements on Fielding

Briarwood to B Street — 3.2b

Option 3.2b (Willamette Shore Line/Briarwood):

Trail continues west on a Bicycle Boulevard on Briarwood Street and turns north to travel alongside the streetcar in the Willamette Shore Line. The alignment meets up with OR 43 and continues on Option 3.2c.

Length:	880’ ft
Cost estimate:	$

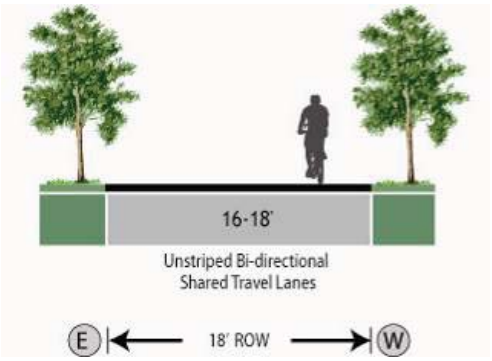


Figure 72. Section 3.2b1 Bicycle Boulevard Improvements on Briarwood

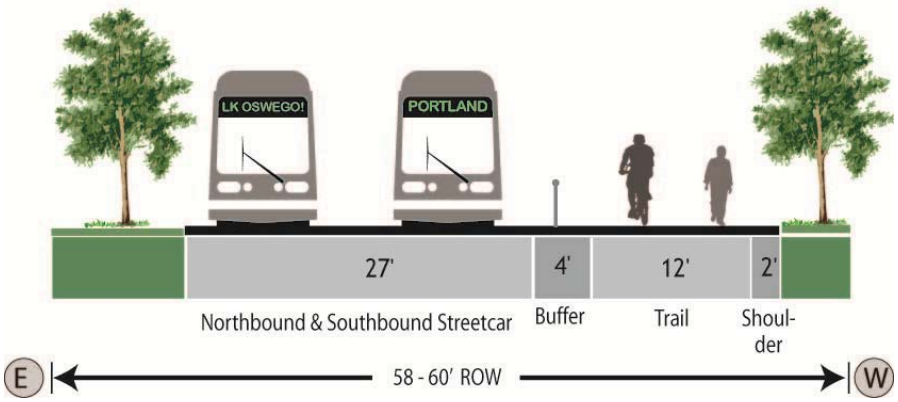


Figure 73. Section 3.2b2 Trail Alongside Double Track Streetcar

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Briarwood to B Street | 3.2c

Option 3.2c (on-street):

Continue cycle track on east side of OR 43 between OR 43 and streetcar alignment. The railroad converges and follows OR43 through part of this area. Further study will be required to determine if the trail can be accommodated between the roadway and the rail with a minimum 25' setback from centerline.

At Terwilliger, the trail will connect under OR 43 based on culvert study, and will continue southbound as 5' bike lanes on either side of the street. However, south of E Street, the minimum 5' bike lanes cannot be accommodated without narrowing lanes smaller than 11' or removing a lane of travel.

Length:	2,640' ft
Cost estimate:	$

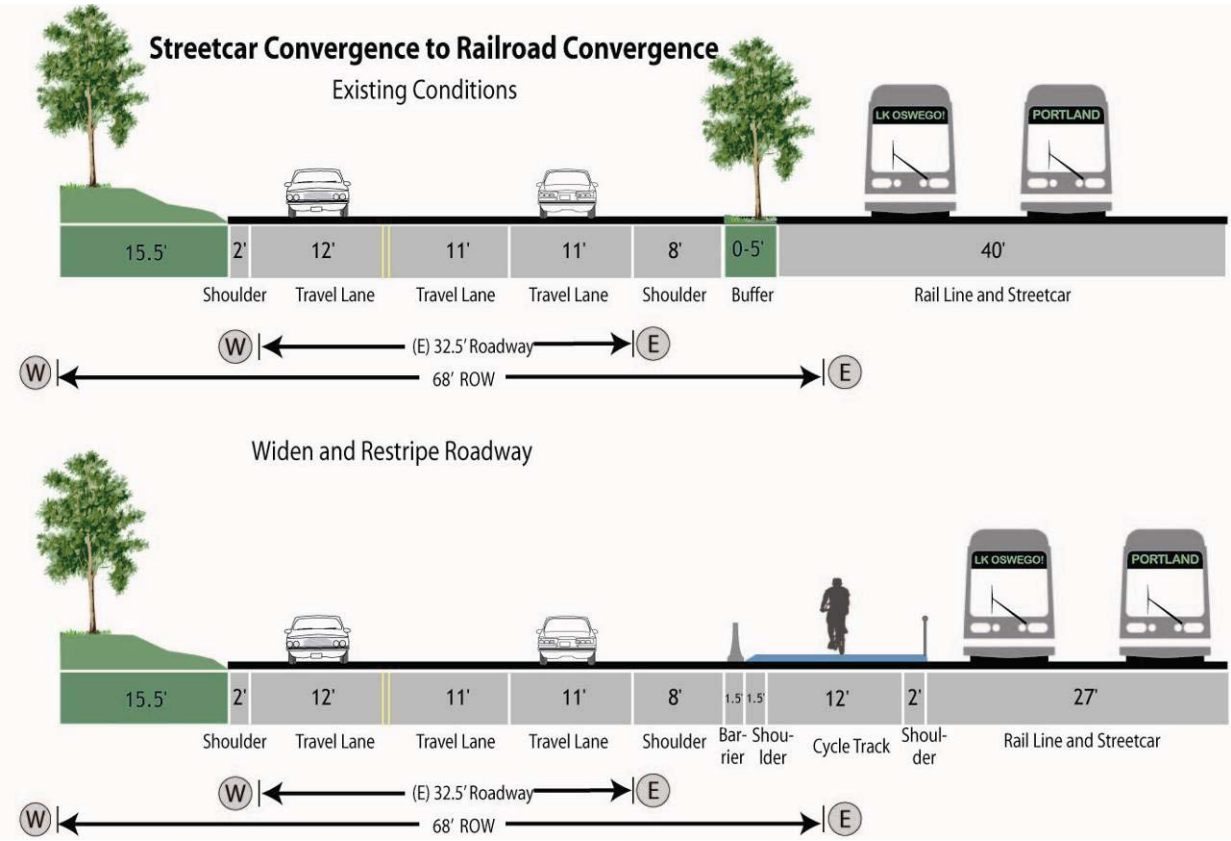


Figure 74. Conceptual Section 3.2c1- Cycle Track between Roadway and Streetcar for 600'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Briarwood to B Street (continued) 3.2c

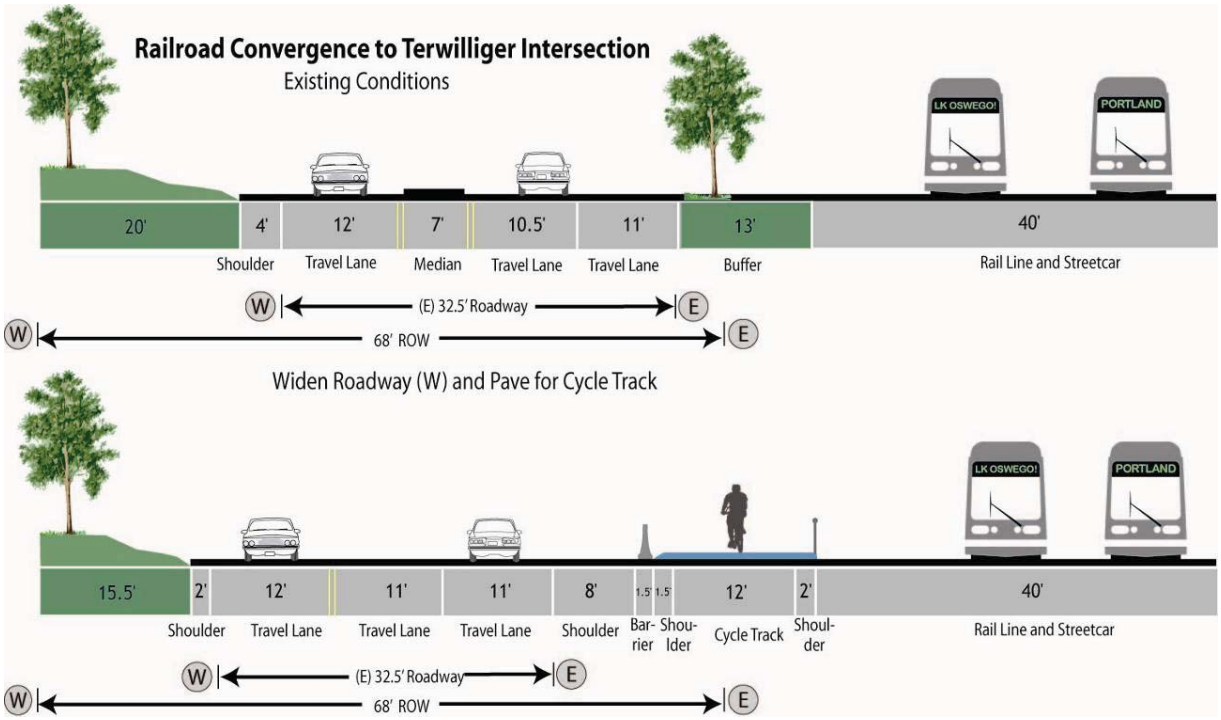


Figure 75. Conceptual Section 3.2c2 – Cycle Track between Roadway and Streetcar/ Railroad 256'

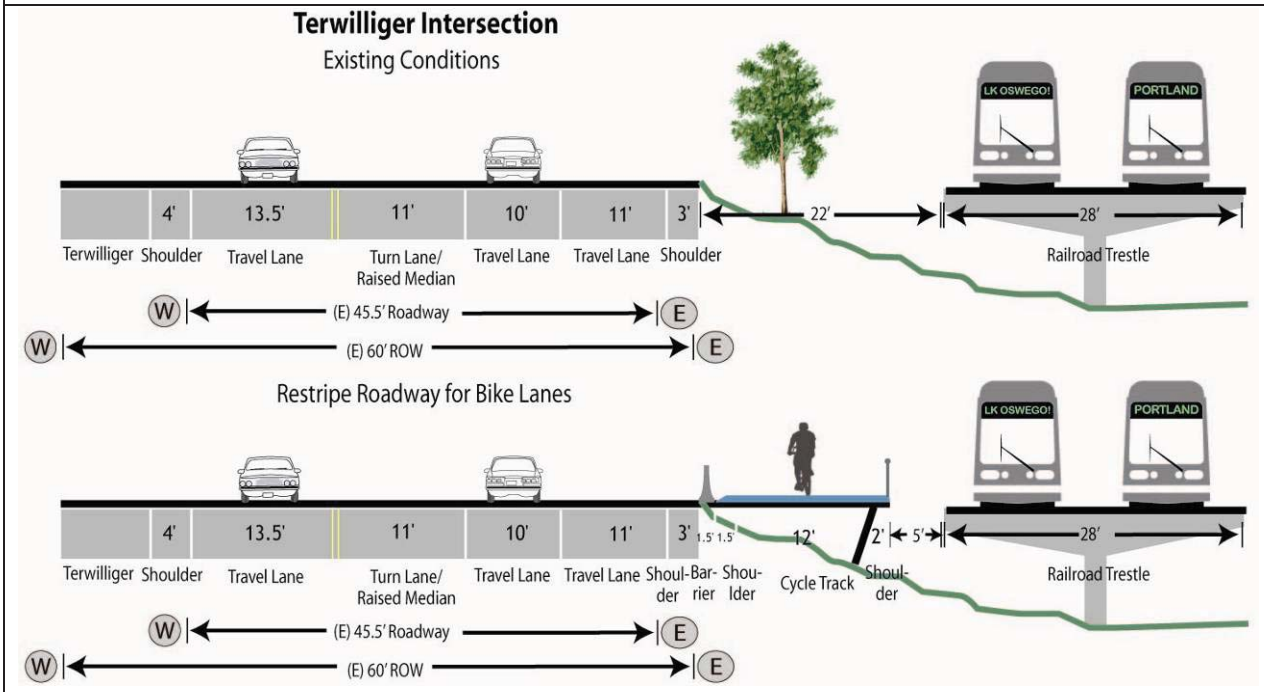


Figure 76. Conceptual Section 3.2c3 – Cycle Track between Roadway and Streetcar/ Railroad 114'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Briarwood to B Street (continued) | 3.2c

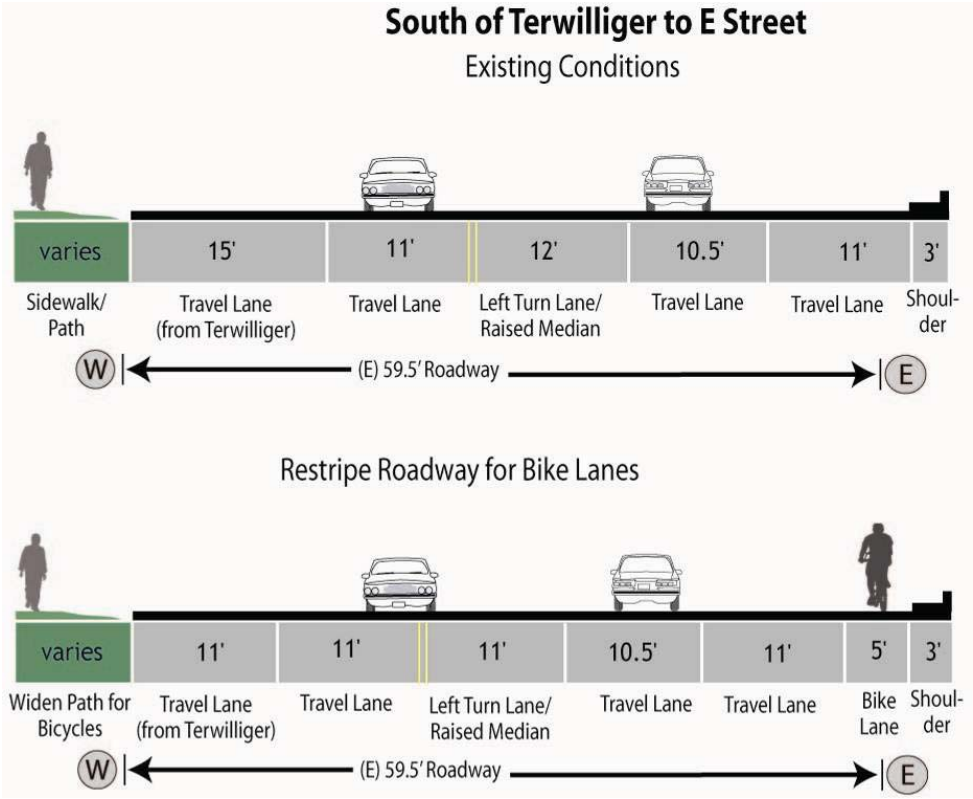


Figure 77. Conceptual Section 3.2c4 – Narrow Lanes and Restripe Roadway for Bikelanes for 326'

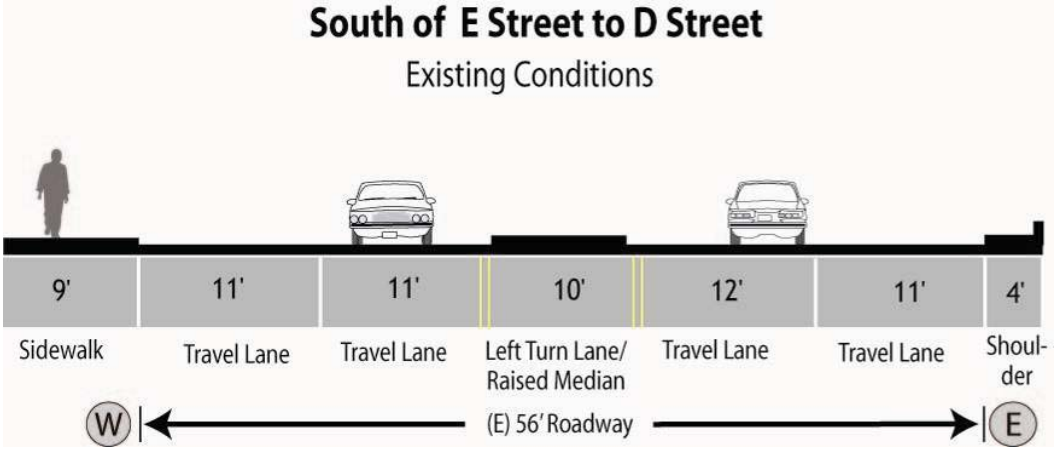


Figure 78. Conceptual Section 3.2c5 – BIKE LANES CANNOT BE ACCOMODATED for 210'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Briarwood to B Street (continued) | 3.2c

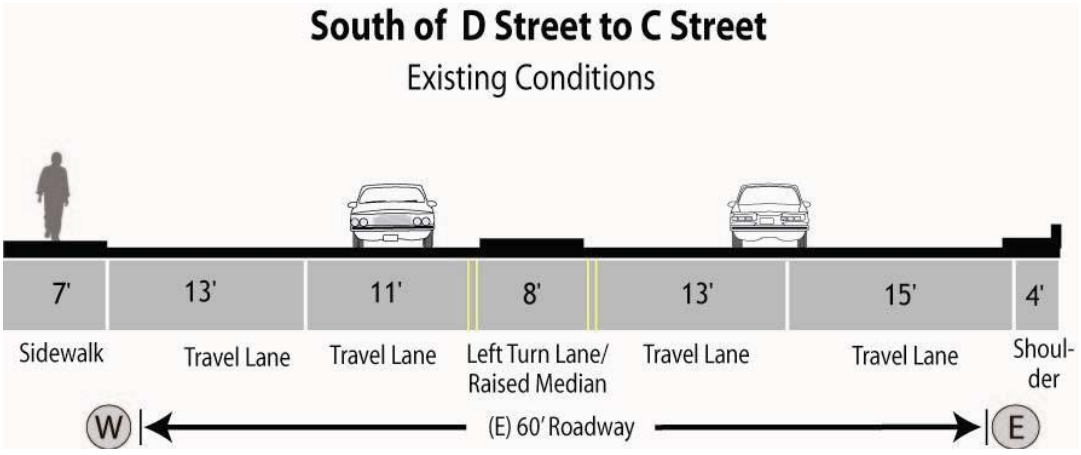


Figure 79. Conceptual Section 3.2c6 – BIKE LANES CANNOT BE ACCOMODATED for 543'

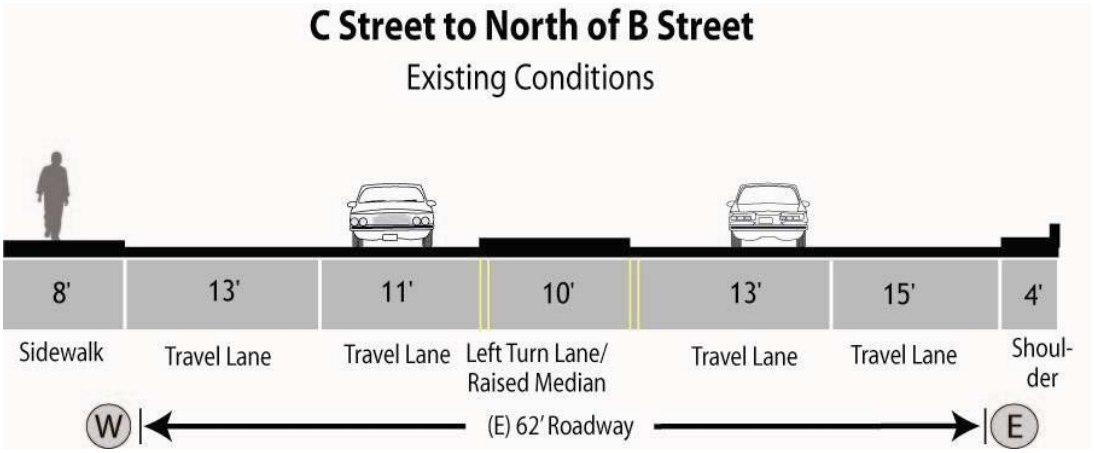


Figure 80. Conceptual Section 3.2c7 – BIKE LANES CANNOT BE ACCOMODATED for 430'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Briarwood to B Street (continued)	3.2c

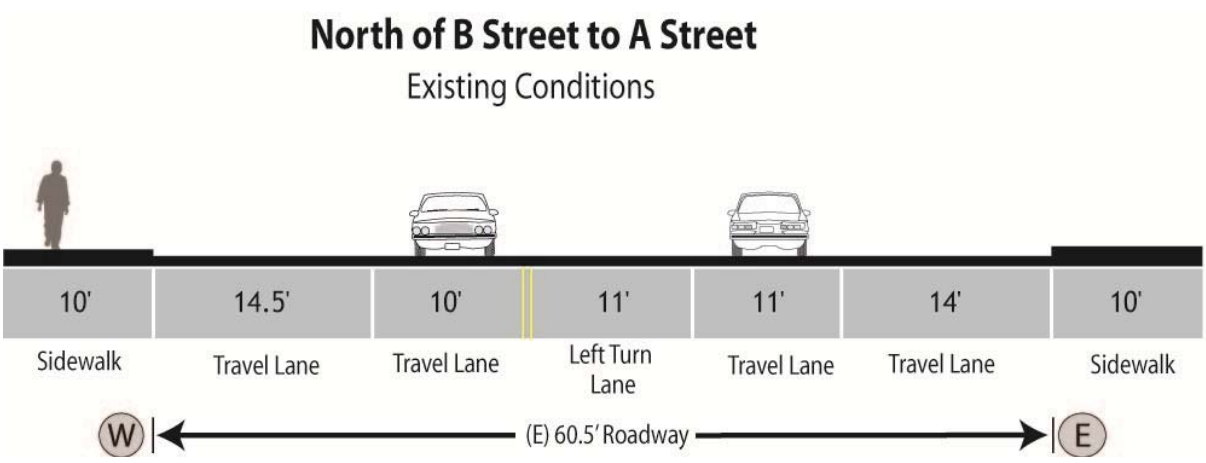


Figure 81. Conceptual Section 3.2c8 – BIKE LANES CANNOT BE ACCOMODATED for 395'

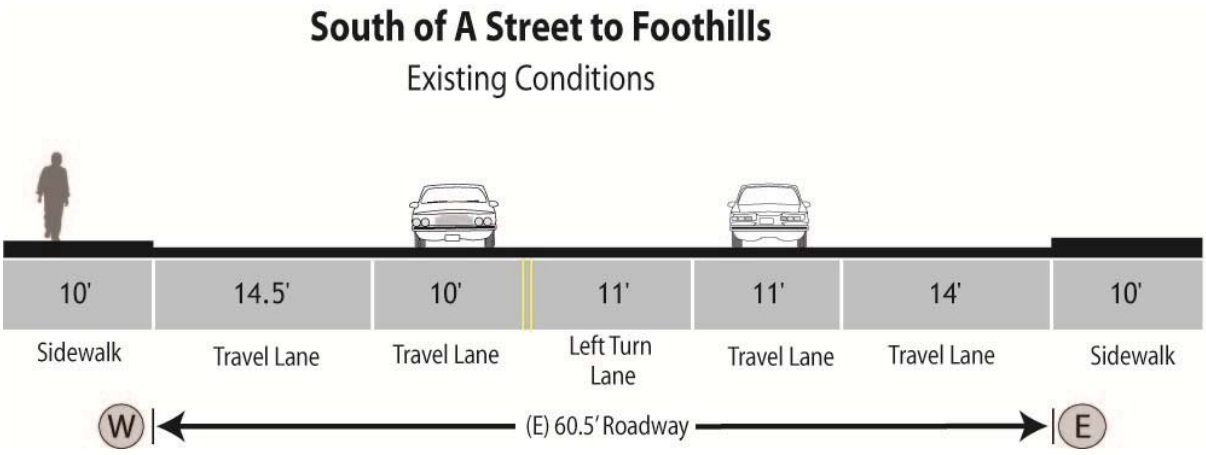


Figure 82. Conceptual Section 3.2c9 – BIKE LANES CANNOT BE ACCOMODATED for 119'

NOTE: These cross sections are conceptual, and have not been approved or permitted by agencies, including ODOT.

Recommendation

The Lake Oswego to Portland Trail Working Group reviewed the alignments outlined in this chapter and evaluated them based on the approved evaluation criteria. The results can be found in Table 7.

The alignments recommended for project implementation can be found in Maps 7, 8, and 9.

		Property Owners				Trail Users					Public Safety		Environmental			Municipal Operations			
		Compatibility with Nearby Property	Parking	Property Owner Aesthetics	Availability of ROW	Trail User Comfort	Trail User Conflicts	Transportation System Performance	Recreation Facility Performance	Trail User Aesthetics	Natural Surveillance	Emergency Response	Habitat & Wildlife	Exposure to hazards	Environmental Interpretation	Consistency with Local, State, and Regional Plans	Cost Efficiency	Engineering Efficiency	Public Support
SEGMENT 1: South Waterfront to Sellwood Bridge																			
1.0 Lowell to Hamilton																			
1.0a	Willamette Shore Line	+	o	o	-	+	+	+	+	o	+	o	+	+	o	+	o	o	
1.0b	Greenway	+	o	+	o	+	-	-	-	+	+	o	o	+	+	+	+	o	
1.0c	On-Street Connector	+	-	o	+	+	o	o	+	o	+	o	+	+	o	o	+	+	
1.1 Hamilton to Julia																			
1.1a	new greenway adjacent to Shore Line	-	-	o	-	+	+	+	+	o	+	o	+	+	o	+	+	+	
1.1b	Greenway	+	o	+	+	+	-	-	-	+	+	o	o	+	+	+	+	o	
1.2 Julia to South of Landing Square																			
1.2a	Willamette Shore Line	o	-	o	-	+	+	+	+	o	+	o	+	+	o	o	o	o	
1.2b	Greenway	+	o	o	o	+	-	+	+	+	+	o	o	+	+	+	+	o	
1.3 South of Landing Square to Split																			
1.3a	Willamette Shore Line	o	o	-	-	+	+	+	+	o	+	o	o	+	o	o	+	o	
1.3b	Greenway	+	o	+	-	+	-	+	-	+	+	o	o	+	+	+	+	o	
1.4 Split to North of Carolina																			
1.4a	Willamette Shore Line	o	-	o	-	+	+	+	+	+	+	o	o	+	o	o	o	o	
1.4b	Greenway	+	o	+	-	+	-	-	-	o	+	o	o	+	+	+	+	o	
1.5 North of Carolina to Nevada																			
1.5a	On-street/Greenway	o	o	o	+	+	+	+	+	+	+	o	o	+	+	o	+	o	
1.5b	On-street (Willamette Park)	o	o	o	+	+	+	+	+	+	+	o	o	+	+	o	o	+	
1.6 Nevada to Miles																			
1.6	Greenway	+	o	o	+	+	+	+	+	+	+	o	o	+	+	o	o	+	
1.7 Miles to Macadam Bay																			
1.7a	Willamette Shore Line	o	o	o	-	+	+	+	+	+	+	o	-	+	+	o	+	o	
1.7b	Greenway	-	o	-	o	+	-	-	+	+	+	o	-	+	+	+	o	o	
1.8 Macadam Bay to Sellwood Ferry																			
1.8a	Willamette Shore Line	o	o	o	-	+	+	+	+	+	+	o	-	o	+	o	o	o	
1.8b	Greenway	o	o	o	o	-	-	+	-	-	+	o	-	-	+	+	+	o	
1.9 Sellwood Ferry to Sellwood Bridge																			
1.9a	Willamette Shore Line	o	o	o	-	+	+	+	+	+	+	o	-	o	+	+	o	o	
1.9b	On-Street (Sellwood Ferry)	o	o	o	o	+	-	+	-	-	+	o	-	-	+	-	o	o	
Segment 2: Sellwood Bridge to Lake Oswego																			
2.1 Sellwood Bridge to Hill in Powers Marine Park																			
2.1a	Willamette Shore Line	o	o	o	o	+	+	+	+	+	-	o	o	+	+	o	-	-	
2.1b	Greenway	o	o	o	o	+	-	+	+	+	-	o	-	+	+	+	+	+	
2.2 Hill in Powers Marine Park to End of Park																			
2.2a	Willamette Shore Line	o	o	o	o	+	+	+	+	+	-	o	o	+	+	o	-	-	
2.2b	Greenway	o	o	o	o	+	-	+	+	+	-	o	-	+	+	+	-	+	
2.2c	On-Street (OR 43)	-	-	-	-	-	o	-	-	-	+	o	+	-	-	-	-	-	
2.3 End of Greenway to Riverwood Road																			
2.3	On-Street (OR 43)	-	o	-	-	-	o	-	-	-	+	o	+	o	o	o	-	-	
2.4 Riverwood Rd to Lake Oswego City Line																			
2.4a	On-Street (Riverside/Willamette Shore Line)	o	o	-	-	+	o	+	o	+	o	o	o	o	+	o	-	-	
2.4b	On-Street (OR 43)	-	o	-	-	-	o	-	-	-	+	o	+	+	-	o	-	-	
Segment3: Lake Oswego																			
3.1 Lake Oswego City Line to Briarwood																			
3.1a	On-Street (Fielding)	o	o	-	-	+	o	+	+	+	+	o	o	o	o	+	+	+	
3.1b	On-Street (OR 43)	-	o	-	-	-	o	-	-	-	+	o	+	+	-	-	-	-	
3.2 Briarwood to B Street																			
3.2a	On-Street (Fielding/Stampher)	o	o	o	o	+	o	+	+	+	+	o	o	o	o	+	-	-	
3.2b	On-Street (Briarwood)	+	o	+	+	+	o	o	+	-	+	o	+	o	o	o	+	+	
3.2c	On-Street (OR 43)	-	o	-	-	-	o	+	o	-	+	o	+	+	-	-	-	-	

Lake Oswego to Portland Trail - SOUTH WATERFRONT TO SELLWOOD BRIDGE

Phase I North Section Improvements:

Planning and Development:

- Finalize trail alignment in conjunction with Portland Bureau of Transportation South Portal project
- Finalize trail alignment in Sellwood Bridge Project Area with Multnomah County
- Finalize trail improvements in Willamette Park with Portland Parks
- Finalize trail improvements between Julia and Carolina Streets (area with streetcar design options)

Construction/Implementation:

- Construct trail improvements in Willamette Park
- Construct trail improvements between Julia and Carolina Streets (area with streetcar design options)

Phase II North Section Improvements:

Construction/Implementation:

- Construct trail alignment in conjunction with Portland Bureau of Transportation South Portal project
- Construct trail improvements alignment in Sellwood Bridge Project Area with Multnomah County

NORTH 0 0.25 Miles

Trail Project Connection
multi-use trail or cycle track
bike lane or bicycle boulevard

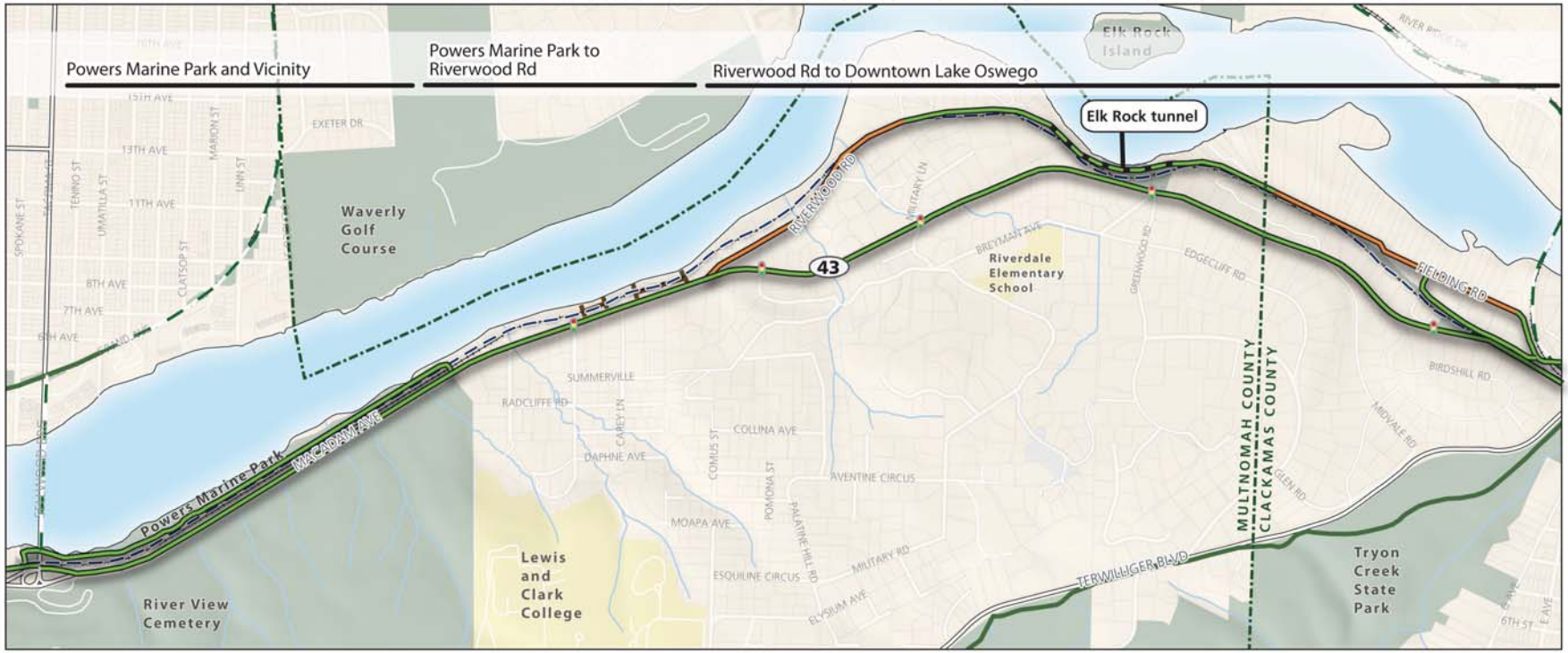
Existing trail
Planned trail
Trail connection gap

Streetcar: existing
Streetcar: design option

Park/Open Space
School

1/10/2010

Lake Oswego to Portland Trail - SELLWOOD BRIDGE TO LAKE OSWEGO



Phase I Central Section Improvements:

Planning and Development:

- Finalize trail alignment in Powers Marine Park vicinity with Portland Parks.

Phase II Central Section Improvements:

Planning and Development:

- Complete design work along OR 43 to develop a bicycle and pedestrian connection.
- Complete design work for Elk Rock Tunnel and connections adjacent to Willamette Shore Line.

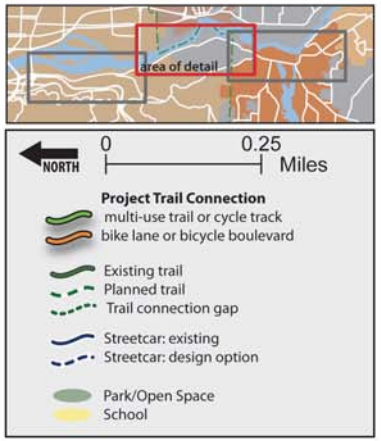
Construction/Implementation:

- Construct trail alignment in Powers Marine Park vicinity with Portland Parks.

Phase III Central Section Improvements:

Construction/Implementation:

- If feasible, construct a facility adjacent to OR 43 to Lake Oswego.
- If feasible, construct a multi-use tunnel through Elk Rock and associated improvements adjacent to the Willamette Shore Line to Fielding Rd.



1/10/2010

Lake Oswego to Portland Trail - DOWNTOWN LAKE OSWEGO

Phase I South Section Improvements:

Planning and Development:

• Finalize trail improvements as part of Foothills District master planning.

Construction/Implementation:

• Construct the bridge over the mouth of Tryon Creek.

Phase II South Section Improvements:

Planning and Development:

• Complete designs for a tunnel located under the UPRR existing railroad berm.

• Complete design work along OR 43 to develop a bicycle and pedestrian connection.

• Complete designs for bicycle and pedestrian improvements along State Street in Lake Oswego.

Construction/Implementation:

• Construct a continuation of the Foothills Waterfront Park Trail and the Bicycle Boulevard improvements on Stampher Road.

Phase III South Section Improvements:

Construction/Implementation:

• Construct bicycle and pedestrian improvements along State Street in Lake Oswego.

• Complete designs for a tunnel located under the UPRR existing railroad berm.

• If feasible, construct a facility adjacent to OR 43 to Lake Oswego.

NORTH 0 0.25 Miles

Project Trail Connection
multi-use trail or cycle track
bike lane or bicycle boulevard

Existing trail
Planned trail
Trail connection gap

Streetcar: existing
Streetcar: design option

Park/Open Space
School/Community Center

1/10/2010

Chapter 6. Project Implementation

The Lake Oswego to Portland Trail Study provides the long-term vision for the development of a regional trail that can be used by residents of all skill levels for trips to parks, retail, employment and community centers, trails and other non-motorized transportation facilities. Implementation of the plan will occur in several steps over many years. The following action plan is provided to guide project development toward the vision identified in this Plan and to provide a framework for alternative selection, design and construction.

This chapter has three parts: project phasing and design considerations examine how the trail project can target design, permitting and agency coordination to build support for trail development. The second part of this chapter outlines cost estimates for the alternatives, and the third section discusses funding sources that may be available to construct the trail.

Project Phasing

The primary purpose for a trail phasing plan is to ensure a logical sequence of implementation that provides a high degree of success as each phase is built. Success is directly correlated with a substantial level of use, strong public and political support, and proven effective management of the trail as each phase is implemented. This project is proposed to be completed in three phases. Table 6 provides a detailed description of the project work to be completed in each phase. The project seeks to leverage projects already underway in Johns Landing and Lake Oswego to complete portions of the trail in early phases. The opportunity to complete these sections provides important connections in the most traveled sections of the corridor, and will build support for completing the central section in the third phase. Refer to the Lake Oswego to Portland Trail Project maps for a geographical overview of these areas.

Phase I: Connections in Johns Landing and Lake Oswego

This phase will leverage future investment in transit stops at the northern and southern ends of the corridor. In the north, improvements in Johns Landing will provide connections from South Waterfront to the Sellwood Bridge. In the south, current projects underway will provide new connections to the Foothills District and Foothills Park, critical locations along the Willamette River.

Phase II: Complete Johns Landing; Central and South Engineering and Development

The second phase of the project would complete the connection between South Waterfront and the Sellwood Bridge. With its proximity to the Portland Central City and connections to existing trails, this key connection will increase bicycle and walk trips significantly, and is recommended to build public support for the project to secure funding for the most expensive sections of the corridor. In addition, Phase II would involve additional design work to be conducted along the OR 43 corridor. Phase II trail segments provide scenic recreational rides, increase the distance trail users could travel along the route, and connect to streetcar stops. This phase will also fill in key gaps in the Foothills District and connect Tryon Cove Park to areas north.

Phase III: Complete Central and South Sections

The final Phase of the Lake Oswego to Portland Trail will complete the corridor connection from Lake Oswego to Portland. This phase includes completing the gap in the central section, with either a facility adjacent to Riverwood Road and the Willamette Shore Line (including a tunnel through Elk Rock) or a facility adjacent to OR 43.

Table 8. Proposed Phasing Strategy

	Phase 1	Phase 2	Phase 3
North Section (South Waterfront to Sellwood Bridge)	**Planning and Development:** •Finalize trail alignment in conjunction with Portland Bureau of Transportation South Portal project •Finalize trail alignment in Sellwood Bridge Project Area with Multnomah County •Finalize trail improvements in Willamette Park with Portland Parks •Finalize trail improvements between Julia and Carolina Streets(area with streetcar design options) **Construction/Implementation:** •Construct trail improvements in Willamette Park •Construct trail improvements between Julia St. and Carolina St. (area with streetcar design options)	**Construction/Implementation:** •Construct trail alignment in conjunction with Portland Bureau of Transportation South Portal project •Construct trail improvements alignment in Sellwood Bridge Project Area with Multnomah County SECTION COMPLETE IN PHASE 2	SECTION COMPLETE IN PHASE 2
Central Section (Sellwood Bridge to Lake Oswego)	**Planning and Development:** •Finalize trail alignment in Powers Marine Park vicinity with Portland Parks	**Planning and Development:** • Complete design work along OR 43 to develop a bicycle and pedestrian connection. •Complete design work for Elk Rock Tunnel and connections adjacent to Willamette Shore Line **Construction/Implementation:** •Construct trail alignment in Powers Marine Park vicinity with Portland Parks	**Construction/Implementation:** •If feasible, construct a facility adjacent to OR 43 •If feasible, construct a multi-use tunnel through Elk Rock and associated improvements adjacent to the Willamette Shore Line to Fielding SECTION COMPLETE IN PHASE 3
South Section (Downtown Lake Oswego)	**Planning and Development:** •Finalize trail improvements as part of Foothills District Master Plan **Construction/Implementation:** • Construct the bridge over the mouth of Tryon Creek • Acquire or secure easement and develop the four parcels along the Willamette River between Roehr Park and George Rogers Park	**Planning and Development:** • Complete designs for a tunnel located under the UPRR existing railroad berm. • Complete design work along OR 43 to develop a bicycle and pedestrian connection. • Complete designs for bicycle and pedestrian improvements along State Street in Lake Oswego **Construction/Implementation:** • Construct a continuation of the Foothills Waterfront Park Trail and the Bicycle Boulevard improvements on Stampher.	**Construction/Implementation:** • Construct bicycle and pedestrian improvements along State Street in Lake Oswego• Complete designs for a tunnel located under the UPRR existing railroad berm. • If feasible, construct a facility adjacent to OR 43 to Lake Oswego. SECTION COMPLETE IN PHASE 3

Design Considerations

This section outlines the alignment identified for the trail and key actions for implementation.

North Section (Between South Waterfront and Sellwood Bridge)

The north section of the trail can be developed in conjunction with other concurrent transportation projects. This section has four areas, divided by street names:

- Lowell Street to Julia Street: Trail will be developed in conjunction with the City of Portland South Portal project.[4] South Portal Project includes extending bike lanes from on Moody/Bond south to Hamilton Street and has opportunity to fill in gap in current waterfront trail.
  Considerations: South Portal project not yet funded. Design considerations with streetcar should be resolved as part of concept design. Trail design should be coordinated with local property owners to ensure access and parking in the area.
  Action:
  1. City of Portland South Portal Project will include sidewalks and bike lanes on the street network. South Portal project should secure right-of-way to close trail gap on existing greenway.
  2. In the interim, Lake Oswego to Portland Transit Project will replace existing trail between Lowell Street and Bancroft Street.

- Julia Street to Carolina Street:
  - If a transit project locally preferred alternative selects alignment for streetcar on Macadam Avenue, project will consider developing the Willamette Shore Line in this section for a trail.
    Considerations: Need to secure public easement for trail use on Shore Line. Many adjacent homeowners to-date support a trail on the Shore Line, if a streetcar is located on Macadam Avenue. Trail project will need to secure funds for trail construction, maintenance, and operations in this segment.
    Action:
    1. Lake Oswego to Portland Trail Project should pursue public easement for trail along Willamette Shore Line right-of-way. Trail project should coordinate with transit project through the selection of a preferred alternative and engineering.

  - If a locally preferred alternative selects alignment for streetcar on the Willamette Shore Line, trail project should consider improvements to existing greenway in this section.
    Considerations: Trail in this section is narrow and sensitive to environmental constraints.
    Action:
    1. Lake Oswego to Portland Trail Project will develop trail improvements along existing greenway.

[4] See Portland Bureau of Transportation *South Waterfront District Street Plan,* October 2007

- Carolina Street to Miles Street: Trail will be located on Beaver Avenue and within Willamette Park.
  Considerations: On Beaver Avenue, collaboration is needed with streetcar project and Willamette Sailing Club to maintain access and parking for sailing club. In Willamette Park, collaboration with Portland Parks is needed to finalize trail alignment in park that minimizes conflicts with vehicles accessing park.
  Action:
  1. Lake Oswego to Portland Trail Project should work with transit project to include bicycle and pedestrian connections on Beaver Avenue.
  2. Lake Oswego to Portland Trail Project should work with Portland Parks to improve bicycle and pedestrian connections through the park, including new trail improvements located on western boundary of park.

- Miles Street to Sellwood Bridge: There is an existing trail connection on Miles Place and a trail in Butterfly Park. Project will develop a new trail connection adjacent to Willamette Shore Line in conjunction with Sellwood Bridge Project.
  Considerations: Trail project should work with Portland Parks to minimize natural resources impact on Butterfly Park and Willamette Moorage Park. Trail project should work with Macadam Bay property owners to minimize impacts to parking. Project should work with Sellwood Bridge Project through final design to coordinate trail development and connections to bridge.
  Action:
  1. Lake Oswego to Portland Trail Project should continue to work with Multnomah County Sellwood Bridge Project and City of Portland to develop a trail connection between Miles and the Sellwood Bridge. This trail is currently defined in the Sellwood Bridge Interchange Access Management Plan (IAMP).

Central Section (Between Sellwood Bridge and Terwilliger Boulevard)

This section has significant design challenges. Trail project is still considering potential designs adjacent to OR 43 or adjacent to the Willamette Shore Line right-of-way. There are three areas in this section.

- Powers Marine Park: Trail to be developed in Powers Marine Park and/or adjacent to Willamette Shore Line right-of-way.
  Considerations: Trail project should work with Sellwood Bridge Project to ensure connections to trail. Trail project should work with Portland Parks to determine final route and design of trail. Portland Parks has identified Powers Marine as a passive use park, and has concerns about increasing public use of the park. Elevation changes between eastern end of park and OR 43 must be considered to site best location for trail. Much of park is located in the flood plain. Project should work with ODOT on potential connections between trail and OR 43.
  Action:
  1. Trail Project should work with Sellwood Bridge Project to ensure connections to trail.
  2. Trail Project should work with Portland Parks to determine final route and design of trail.
  3. Transit Project could accommodate a future trail between the Willamette Shore Line and OR 43 right-of-way.

- End of Powers Marine Park to Riverwood Road: Trail connection to be adjacent to OR 43. OR 43 is three lanes in this section. A two-way separated path on the east and west side of the roadway has been studied in this section. Trail project will need to confirm preferred alignment in this section.
  Considerations: ODOT has concerns about trail in this area due to physical constraints (narrow right-of-way, slope, residences and driveways), environmental constraints (storm water, drainage, slope), and vehicle capacity on OR 43. Trail final design still to be determined. Project must coordinate adjacency to residences and driveways. A significant portion of OR 43 in this section is on structure.
  Action:
  1. A OR 43 study could look at bicycle and pedestrian connections adjacent to OR 43.
  2. Trail Project should collaborate with ODOT to create most appropriate trail connection in this section.
- Riverwood Road to Terwilliger Boulevard: Trail needs additional design work to determine a preferred route on either: OR 43 to downtown Lake Oswego; or adjacent to Willamette Shore Line (Riverwood Road to Elk Rock Tunnel and Fielding Road to downtown Lake Oswego).
  - If a trail is adjacent OR 43: Project must finalize trail design adjacent to OR 43.
    Considerations: ODOT has concerns about trail in this area due to physical constraints (narrow right-of-way, slope, residences and driveways), environmental constraints (stormwater, drainage, slope), and vehicle capacity on OR 43. Trail user experience (the slope, proximity to vehicle speeds, and width of path) must be considered for user comfort for both pedestrians and cyclists.
    Action:
    1. A OR 43 study could be initiated to study bicycle and pedestrian connections adjacent to OR 43.

  - If a trail is considered adjacent to Willamette Shore Line: Trail would have bicycle boulevard treatments on Riverwood Road, a connection to new multi-use path through Elk Rock tunnel, and bicycle boulevard treatments on Fielding Road. A new connection will be created from Fielding Road to Stampher Road and the Foothills District.
    Considerations: Trail project must address design constraints and user comfort through Elk Rock Tunnel. To date, there is not a similar shared rail transit/multi-use path through a tunnel of this length in the United States. Project must include additional public outreach to local property owners for trail in this section. Project will work with transit project for trail location in relation to Union Pacific RR right-of-way and existing railroad berm.
    Action:
    1. If short and long trestle are not used for transit project, trail project should consider them for future trail use. If short and long trestle are reconstructed for trail project, transit project could consider widening to include trail use if feasible and funding available.
    2. Trail project should develop bicycle boulevard treatments on Riverwood Road. Transit project design options using Riverwood Road should accommodate bicycle and pedestrian connections.
    3. Transit project design options including single track streetcar could accommodate pedestrian/bicycle connection through the tunnel. Transit design options including double track streetcar and widening of the tunnel should not preclude a future trail connection via Elk Rock if feasible and funding/cost-sharing available.
    4. Trail project should study design connection to the north and south entrances of Elk Rock Tunnel.

South Section (Downtown Lake Oswego and Foothills District)

- Terwilliger Boulevard to Downtown Lake Oswego and Foothills District:
  - Fielding/Stampher to Foothills Park: Trail project will develop a connection via bicycle boulevard on Fielding and Stampher Road. A pedestrian bridge over the mouth of Tryon Creek will be developed by City of Lake Oswego project.

    Considerations: Trail project will work with transit project for trail location in relation to Union Pacific RR right-of-way and existing railroad berm. Foothills District planning is still underway, and trail project could enhance existing bicycle and pedestrian facilities in the district, including connections to the riverfront and downtown Lake Oswego.

    Action:

    1. Trail project should work with City of Lake Oswego to construct pedestrian bridge over the mouth of Tryon Creek.
    2. Trail project should study connections to Fielding Road and Stampher Road to the existing trail connections in Foothills Park.
    3. If transit project builds a connection through the UPRR railroad berm to Foothills District, the connection could be wide enough to include a bicycle/pedestrian connection. If transit project builds structure over Tryon Creek, it could be wide enough to include a bicycle/pedestrian connection.

  - OR 43/State Street between Terwilliger Boulevard and Foothills Road: Project must finalize design adjacent to OR 43.

    Considerations: ODOT has concerns about trail in this area due to physical constraints (narrow right-of-way, slope, residences and driveways), environmental constraints (stormwater, drainage, slope), and vehicle capacity on OR 43. Trail connection to Tryon Creek State Park would greatly enhance trail project. Trail project will work with transit project for trail location in relation to Union Pacific RR right-of-way and existing railroad berm. Narrow right-of-way on State Street in downtown Lake Oswego provides limited availability for bike lanes.

    Action:

    1. A OR 43 study could be initiated to study bicycle and pedestrian connections adjacent to OR 43.

Project development

Project staff recommends a multi-party partnership with Metro and others, including Portland Bureau of Transportation, Portland Parks, Multnomah County, Clackamas County, City of Lake Oswego, TriMet and ODOT. Metro should convene the regional corridor vision, continue to pursue funding opportunities, and support the decision making body. Partner agencies, including Metro, would continue project development in their jurisdiction per the work plan outlined above.

Project governance and decision making

Project staff recommends a Trail Committee that is separate but linked to the Lake Oswego to Portland Transit Project Steering Committee. The Trail Committee would include members of the Transit Steering Committee, and would convene on the same dates as the Transit Committee. The Trail Committee would include additional membership, and the two committees would convene and adjourn immediately following each other.

Cost Estimates

The cost opinions do not include costs for right-of-way acquisition, which may be required in some locations along OR 43. Acquiring right-of-way can be costly and difficult, especially on fully-developed properties that characterize most of the study area. As an alternative, the City of Lake Oswego could pursue easement donations or require roadway frontage improvements as redevelopment occurs. It should also be noted that the cost opinions do not include costs for permitting or more-detailed studies (e.g., drainage) which may be necessary as bicycle/pedestrian facilities design takes on a higher level of detail.

Permitting

It is recommended for the project to acquire permits for the entire project corridor as quickly as possible, in order to ensure that the project is prepared if funding becomes available.

Funding Sources

Acquiring funding for projects and programs is considerably more likely if it can be leveraged with a variety of local, state, federal and public and private sources. This section identifies potential matching and major funding sources available for bicycle and pedestrian projects and programs, as well as their associated need and criteria.

Federal Funding Sources

Federal funding is primarily distributed through a number of different programs established by the Federal Transportation Act. The latest act, The Safe, Accountable, Flexible, Efficient Transportation Equity Act – a Legacy for Users (SAFETEA-LU) was enacted in August 2005 as Public Law 109-59. SAFETEA-LU authorizes the Federal surface transportation programs for highways, highway safety, and transit for the five-year period 2005-2009.

In Illinois, Federal funding is administered through the State (IDOT). Most, but not all, of these funding programs are oriented toward transportation versus recreation, with an emphasis on reducing auto trips and providing inter-modal connections. Federal funding is intended for capital improvements and safety and education programs, and projects must relate to the surface transportation system.

H.R. 1, The American Recovery and Reinvestment Act of 2009

The *American Recovery and Reinvestment Act* is commonly referred to as the 'Stimulus Bill' and was signed into law on February 13, 2009. The Act provides $64.1 billion for transportation and infrastructure investment "to enhance the safety, security and efficiency of our highway, transit, rail, aviation, environmental, inland waterways, public buildings and maritime transportation infrastructure."

Local governments can use highway program funds for projects eligible for Surface Transportation Program funds (described later), including bicycle and pedestrian infrastructure. In addition, three percent or $10 million of the highway program funds are allocated to Transportation Enhancements (TE, also described later), including bicycle and pedestrian infrastructure. These funds will be administered through the TE committee, and will go through TE or similar grant processes.

SAFETEA-LU

There are a number of programs identified within SAFETEA-LU that provide for the funding of bicycle and pedestrian projects, described in the following section.

Surface Transportation Program

The Surface Transportation Program (STP) provides states with flexible funds which may be used for a wide variety of projects on any Federal-aid Highway including the National Highway System, bridges on any public road, and transit facilities.

Bicycle and pedestrian improvements are eligible activities under the STP. This covers a wide variety of projects such as on-street facilities, off-road trails, sidewalks, crosswalks, bicycle and pedestrian signals, bike parking, and other ancillary facilities. SAFETEA-LU also

specifically clarifies that the modification of sidewalks to comply with *Americans with Disabilities Act* requirements is an eligible activity.

As an exception to the general rule described above, STP-funded bicycle and pedestrian facilities may be located on local and collector roads which are not part of the Federal-aid Highway System. In addition, bicycle-related non-construction projects, such as maps, coordinator positions, and encouragement programs, are eligible for STP funds.

Highway Safety Improvement Program

This program funds projects designed to achieve significant reductions in traffic fatalities and serious injuries on all public roads, bikeways and walkways. This program includes the Railway-Highway Crossings Program and the High Risk Rural Roads Program and replaces the Hazard Elimination Program from TEA-21.

Transportation Enhancements

Administered by IDOT, this program is funded by a set-aside of STP funds. Ten percent of STP funds are designated for Transportation Enhancement Activities (TEAs), which include "provision of facilities for pedestrians and bicycles, provision of safety and educational activities for pedestrians and bicyclists," and the "preservation of abandoned railway corridors (including the conversion and use thereof for pedestrian and bicycle trails." (23 USC Section 190 (a) (35)). The Illinois Transportation Enhancement Program (ITEP) provides funding for community-based projects that "expand travel choices and enhance the transportation experience by improving the cultural, historic, aesthetic and environmental aspects of our transportation infrastructure."

ITEP provides 80 percent reimbursement for project costs to project sponsors. Projects must provide a mode of transportation or make a facility more accommodating for pedestrians or bicyclists, be included in a local, regional or statewide plan, and include signing in bikeway projects for directions, permitted users and rules. These funds can be used to build a variety of pedestrian, bicycle, streetscape and other improvements that enhance the cultural, aesthetic, or environmental value of transportation systems. Projects must have a local government or state agency sponsor, and the statewide grant process is competitive.

Recreational Trails Program

The Recreational Trails Program of the Federal Transportation Bill provides funds to states to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Example trail uses include hiking, bicycling, in-line skating, and equestrian use. These funds are available for both paved and unpaved trails, but may not be used to improve roads for general passenger vehicle use or to provide shoulders or sidewalks along roads.

Recreational Trails Program funds may be used for:

- Maintenance and restoration of existing trails
- Purchase and lease of trail construction and maintenance equipment
- Construction of new trails, including unpaved trails
- Acquisition or easements of property for trails

- State administrative costs related to this program (limited to seven percent of a State's funds)
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a State's funds)

New Freedom Initiative

SAFETEA-LU creates a new formula grant program providing capital and operating costs to provide transportation services and facility improvements that exceed those required by the Americans with Disabilities Act.

Transportation, Community and System Preservation Program

The Transportation, Community and System Preservation Program provides Federal funding for transit-oriented development, traffic calming and other projects that improve the efficiency of the transportation system, reduce the impact on the environment, and provide efficient access to jobs, services and trade centers. The program is intended to provide communities with the resources to explore the integration of their transportation system with community preservation and environmental activities. The Transportation, Community and System Preservation Program funds require a 20 percent match.

The National Scenic Byways Program

Administered by the Federal Highway Administration (FHWA), the National Scenic Byways Program funds 80 percent of an eligible project's costs. Projects must be along a designated scenic highway and meet accessibility guidelines under ADA. Eligible projects include, "Improvements for enhancing access to a recreation area include bicycle and pedestrian facilities … to the extent that the project and recreational area have a clear, demonstrated role in enhancing the byway traveler experience (rather than primarily serving the existing customer base of the operator of the recreational area)."

State Funding Sources

Statewide Transportation Improvement Program

The Statewide Transportation Improvement Program (STIP) is ODOT's short-term capital improvement program, providing project funding and scheduling information for the department and Oregon's metropolitan planning organizations. It is a four-year program developed through the coordinated efforts of ODOT, federal and local governments, Area Commissions on Transportation, tribal governments and the public.

In developing this funding program, ODOT must verify that the identified projects comply with the Oregon Transportation Plan (OTP), ODOT Modal Plans, Corridor Plans, local comprehensive plans, and SAFETEA-LU planning requirements. The STIP must fulfill Federal planning requirements for a staged, multi-year, statewide, intermodal program of transportation projects. Specific transportation projects are prioritized based on Federal planning requirements and the different State plans. ODOT consults with local jurisdictions before highway-related projects are added to the STIP.

Bicycle and Pedestrian Program Grants

The Pedestrian and Bicycle Grant Program is a competitive grant program that provides approximately $5 million every two years to Oregon cities, counties and ODOT regional and district offices for design and construction of pedestrian and bicycle facilities. Proposed facilities must be within public rights-of-way. Grants are awarded by the Oregon Bicycle and Pedestrian Advisory Committee.

Local Funding Sources

Active Transportation Partnership

Metro has convened partners to develop Active Transportation projects. The partnership seeks funding from a variety of federal, state, local, and private funding sources. The Lake Oswego to Portland Trail Project is a corridor identified in the region for targeted funding. Coordinating with regional partners, the active transportation partnership will increase the metro region's effectiveness in securing funding to complete a region wide network of on-street and off-street bikeways and walkways integrated with transit and supported by educational programs.

Local Bond Measures

Local bond measures, or levies, are usually initiated by voter-approved general obligation bonds for specific projects. Bond measures are typically limited by time based on the debt load of the local government or the project under focus. Funding from bond measures can be used for right-of-way acquisition, engineering, design and construction of pedestrian and bicycle facilities.

System Development Charges/Developer Impact Fees

System Development Charges (SDCs), also known as Developer Impact Fees, are typically tied to vehicle trip generation rates and traffic impacts produced by a proposed project. A developer may reduce the number of vehicle trips (and hence impacts and cost) by paying for on- or off-site pedestrian improvements that will encourage residents to walk, bike or use transit rather than drive. In-lieu parking fees may be used to help construct new or improved pedestrian facilities. Establishing a clear nexus or connection between the impact fee and the project's impacts is critical in avoiding a potential lawsuit.

Because SDC programs can only charge developers for new growth, it is essential to calculate what portion of the needs are growth-related. In most cases, bicycle or pedestrian projects will comprise less than 100 percent due to the existing back-log of projects that are needed regardless of whether new development occurs. One way of including SDCs as a funding source is to compare the needed bicycle or pedestrian projects to the projected growth in the area under focus.

Other Funding Sources

American Greenways Program

Administered by The Conservation Fund, the American Greenways Program provides funding for the planning and design of greenways. Applications for funds can be made by

local, regional or statewide non-profit organizations and public agencies. The maximum award is $2,500, but most awards range from $500 to $1,500. American Greenways Program monies may be used to fund unpaved trail development.

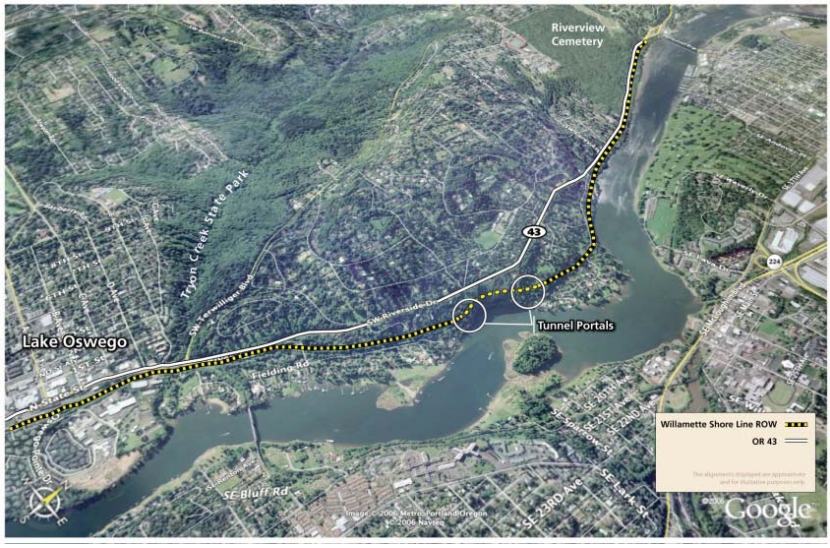
Bikes Belong Grant Program

The Bikes Belong Coalition of bicycle suppliers and retailers has awarded $1.2 million and leveraged an additional $470 million since its inception in 1999. The program funds corridor improvements, mountain bike trails, BMX parks, trails, and park access. It is funded by the Bikes Belong Employee Pro Purchase Program.

Appendix A. Considerations for Elk Rock Tunnel

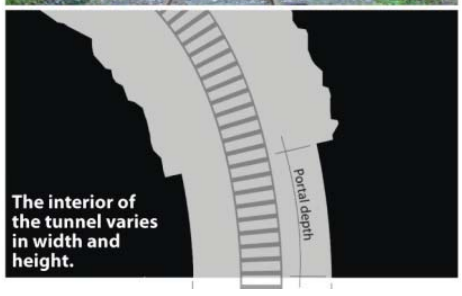
Overview

Elk Rock Tunnel is a curved, single track railroad tunnel that extends through a prominent rock outcrop in a residential area one mile north of Lake Oswego. The tunnel, located at Mile Post 769.2 of the Willamette Shore Line, is 1,395-feet long and 18-feet wide at the portal entrance. It was completed in 1921, replacing a trestle previously constructed for the railroad because of rock fall. Properties above the tunnel include The Bishop's Close of Elk Rock Gardens, the City of Portland Peter Kerr property, and private residences.



Map A.1

Elk Rock Tunnel Location



Design Considerations

During the Lake Oswego to Portland Transit and Trail Alternatives Analysis, several options were considered for potential transit and trail use. The design recommendation was to construct a separate tunnel for trail use rather than expand the current rail tunnel or construct a new trestle. Reasons included cost and overall engineering feasibility.

Table A.1. Elk Rock Trail Alternatives Considered

Alternative	Considerations
Trail inside current tunnel adjacent to rail	Width; cost; rail operations
New tunnel for trail	Cost; rail operations; user experience
Trail inside current tunnel on structure above the rail alignment	Cost of structure; additional right-of-way needed to accommodate structure; engineering challenges for portals to get structure ADA compliant; user experience of structure inside a tunnel above active rail use
New trestle outside Elk Rock	Environmental concerns, including piers in Willamette River, affect on river, current of river; visual affects; geotechnical challenges and rock fall; steepness of rock; cost
New bridge at River level outside Elk Rock	Natural resources challenges, including piers in Willamette River, effect on river, current of river; visual affects; geotechnical challenges of rock fall; steepness of rock
Connection adjacent to OR 43	Significant elevation change (150 feet) over limited distance; right-of-way constraints; private property impacts; potential impacts to historic and/or park resources; cost
Streetcar operations – bikes on streetcar through this location	Vehicle design to maximize accommodation for bicycles; wayfinding at stations

Additional engineering feasibility must be done to define the best trail alignment.

User Experience and Comfort

During the Trail refinement study, the working group listed several considerations involving user comfort and community affects. If a tunnel is to be developed, it must provide a safe and comfortable user experience and address community concerns. Even if a technical design is feasible, would the tunnel be preferable to a bicycle and pedestrian facility on OR 43? Would users choose a long tunnel? Can a new tunnel provide for lighting, safety and security, proper management, and be compatible with the neighborhood? The trail working group did not find clear consensus on this issue. Further design engineering and public discussion is needed to develop consensus that the proposed tunnel is desirable and will be utilized if constructed.

Comparisons

During the trail refinement study, a survey of similar tunnel projects was conducted. *Tunnels on Trails*, a Rails-to-Trails Conservancy report, examined 78 tunnels on 36 trails in the United States. Rail-with-trail tunnels adjacent to active rail corridors do exist (The Howard Tunnel on the York County Heritage Trail, York County, PA). There are also trails in longer tunnels (The Snoqualmie Tunnel in Iron Horse State Park, WA is over 2 miles long; the Mt. Baker Ridge bike/Pedestrian Tunnel on I-90 in Bellevue, WA is over 1500 feet.). Currently, no tunnel that includes active rail with an adjacent trail longer than 1,100 feet currently operates in the United States. But there are several examples of tunnels that are well maintained and provide important commuter connections and recreational opportunities. For more information, see:
http://www.railstotrails.org/ourWork/trailBuilding/toolbox/informationSummaries/tunnels.html

Marin County California constructed a rail-with-trail tunnel for future commuter rail. The Cal Park Tunnel Pathway Project opened in December of 2010. Paralleling US 101, this project is part of a larger trail system that will be linked to commuter rail in Marin and Sonoma Counties. At approximately 1,100 feet, the tunnel includes a 12-foot two-way multi-use trail and single track rail for future commuter rail. At a cost of approximately $27 million, this project has received funds from a variety of sources, including tolling and federal funds for non-motorized facilities. For more information, see *Partnerships in Sustainability: Rail Tunnel Adaption for Transit, Pedestrians and Bicyclists*:
http://www.tam.ca.gov/index.aspx?page=184

Conclusions

A trail through Elk Rock could be a recreational resource unparalleled in the Portland region, and unique in the United States. It would provide for greater neighborhood connectivity, as well as a critical link on the Willamette River Greenway. Further design engineering and public outreach is needed to develop, fund, and build this proposed connection.

Appendix B. Considerations for OR 43

Overview

Oregon Route 43 is an 11.60 mile long state highway from I-5/US 26 in Portland (northern terminus) to 99E (5th Street) in Oregon City (southern terminus). OR 43 provides connections between two Interstate Highways (Interstate 5 and Interstate 205).

The 2006 Oregon Highway Plan (OHP) identifies OR 43 as a *District Highway* between the northern terminus and Lake Oswego, and a *National Highway System Statewide Highway* (NHS) from Lake Oswego to the southern terminus. OR 43 is not designated a freight route in the Oregon Highway Plan.

Designation as part of the NHS system allows for financing not otherwise available, including more flexible match, innovative finance, etc. Failure to meet Federal standards can also lead to loss of NHS funding, or Federal civil action against the state. In Oregon, most attention is paid to freight routes, which excludes OR 43.

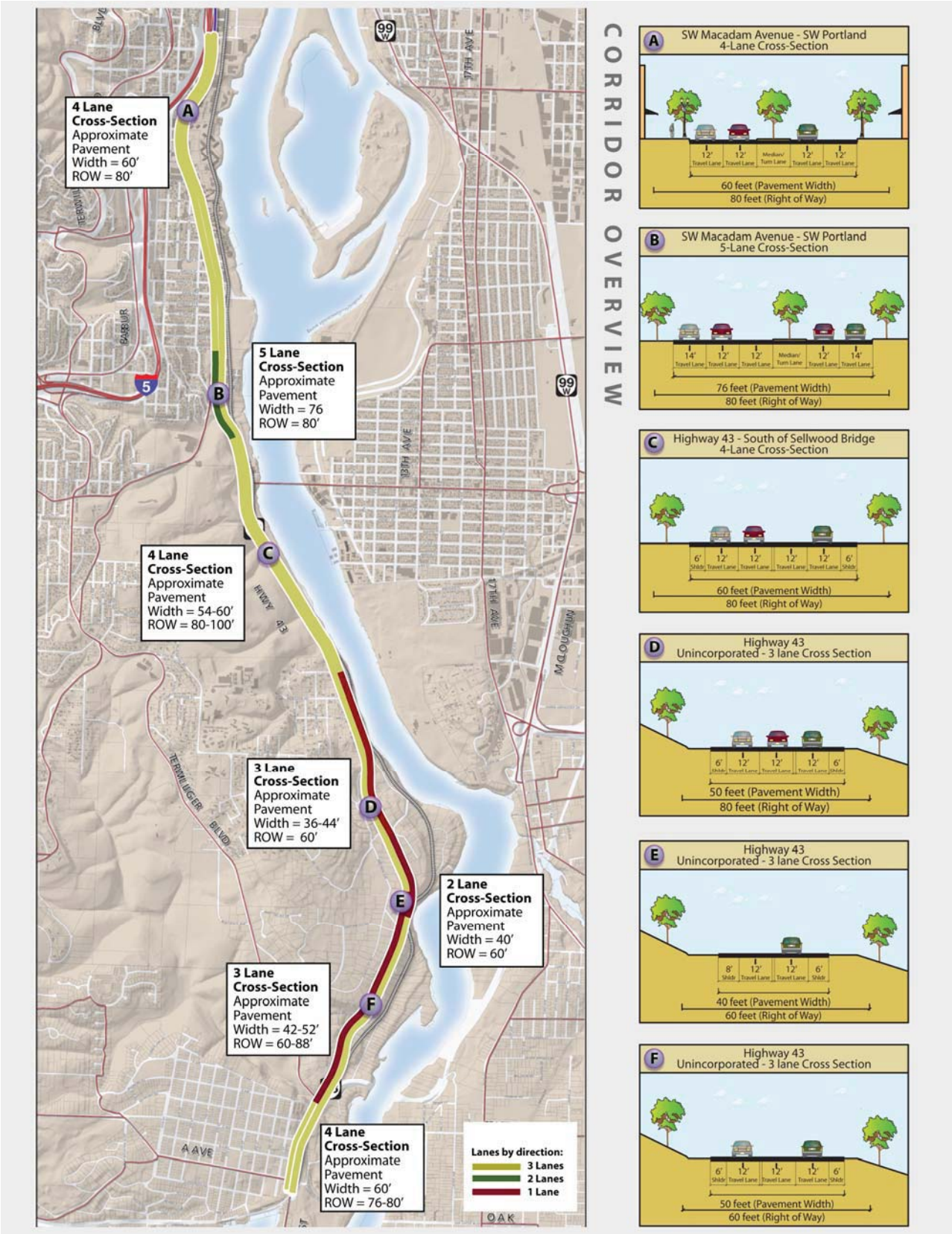
There are three Special Transportation Areas (STA) on OR 43. In Johns Landing, OR 43 is designated a STA on Macadam Avenue between Bancroft Street and Taylors Ferry Road. In Lake Oswego, OR 43 is designated an STA on State Street between Terwilliger Boulevard and Green Street. In Oregon City, OR 43 is a STA on Main Street. STAs look like traditional "Main Streets" and are generally located on both sides of a state highway. The primary objective of an STA is to provide access to and circulation amongst community activities, businesses and residences and to accommodate pedestrian, bicycle and transit movement along and across the highway. See: *Policy Element of Oregon Highway Plan:* http://www.oregon.gov/ODOT/TD/TP/docs/orhwyplan/hwyplan/PolicyElement.pdf

The 2035 Regional Transportation Plan (RTP) identifies OR as a Multi-Modal Major Arterial. The RTP Regional System Design identifies OR 43 as a Regional boulevard in the Special Transportation Areas. OR 43 is not designated as a freight route of any type in the Regional Freight Plan. See: *2035 Regional Transportation Plan:* http://www.oregonmetro.gov/index.cfm/go/by.web/id=25037

The City of Portland Transportation System Plan (TSP) identifies OR 43 as a Major City Traffic Street and a Major Truck Street. Major Truck Streets are intended to provide truck mobility within a Transportation District, and access to commercial and employment uses along the corridor. Through-trips are to be discouraged; design should accommodate all truck types, as practical. The Street Design Classifications identifies Macadam Avenue between Bancroft Street and Taylor Ferry Road as a Regional Main Street. See: *City of Portland Transportation System Plan:* http://www.portlandonline.com/transportation/index.cfm?c=39112
The City of Lake Oswego Transportation System Plan (TSP) identifies OR 43 as a Major Arterial. See: http://www.ci.oswego.or.us/plan/Comp%20Plan/default.htm

Map B.1

Oregon Route 43 Location and L ane configuration from South Waterfront to Lake Oswego



Strategic Planning and related planning in the corridor

In addition to the Lake Oswego to Portland Trail Project, the following are a list of projects currently underway along the corridor:

Lake Oswego to Portland Transit Project: Metro, TriMet, and regional partners are studying future transit improvements along the OR 43 corridor and the Willamette Shore Line rail right-of-way. Project is publishing a Draft Environmental Impact Statement. See**:** http://www.oregonmetro.gov/index.cfm/go/by.web/id=227

South Portal Project: City of Portland South Portal project would extend Moody/Bond couplet south to Hamilton St. This would also realign the intersection with Macadam/Hood Ave. This is intended to provide more capacity in and out of the South Waterfront District, as well as improve the safety and sight distance. See: http://www.portlandonline.com/transportation/index.cfm?c=50535

Sellwood Bridge Project replacement/interchange: The projected cost to replace the Sellwood Bridge and the interchange with OR 43 is $321 million, in 2012 dollars. A locally preferred alternative for a new bridge was approved by local jurisdictions in early 2009. Federal approval is expected in 2010. Bridge engineering and right of way acquisition are expected to begin in 2010, with construction starting in 2012. If the county can secure all project funds, the bridge and interchange should be completed by 2015. See: http://sellwoodbridge.blogspot.com/search/label/Problems

OR 43 at Greenwood and Breyman (Multnomah County): This project proposes to upgrade the intersection to reduce driver confusion and minimize potential vehicle conflicts. At this location, there are several phases of work that took place from August through December 2010. These include installing erosion control devices, stormwater pipe and inlets, electrical conduit, and digging the pole footings; installing new signal poles and pole wiring; retaining wall work, new curb installation, ramps, paving and striping; seeding. See: http://www.oregon.gov/ODOT/HWY/REGION1/trafficsignal_unit4/

Tryon Creek @ HWY 43 Culvert Alternatives Analysis: A City of Lake Oswego study conducted in 2007 recommended replacing the current 400 foot culvert at Hwy 43 with an alternative structure to achieve the goals of 1) being passable to fish, 2) providing for safe wildlife movement between the Tryon Creek confluence with the Willamette River and the Tryon Creek State Natural Area Park, and 3) meeting transportation-related objectives for the area which have been identified as a high priority for the City of Lake Oswego. See: http://www.fws.gov/oregonfwo/ToolsForLandowners/UrbanConservation/Greenspaces/Documents/Projects/2003/6505.0309%20Mouth%20of%20Tryon%20Creek/Tryon%20Creek%20Hwy%2043AltAnal.pdf

City of West Linn OR 43 Conceptual Design Plan: This cooperative project by the City of West Linn and the Oregon Department of Transportation will result in a conceptual design for improving State OR 43 (Willamette Drive) from the Lake Oswego City Limits to the Oregon City City Limits. The project design will accommodate vehicular, pedestrian and bicycle travel needs and support adjacent land uses. It is anticipated that the conceptual design will be consistent with the recommendation in the Regional Transportation Plan that OR 43 consist of two travel lanes with a center turn lane or median where warranted, and continuous sidewalks and bike lanes. See: http://westlinnoregon.gov/planning/highway-43-conceptual-design-plan