Tryon Creek Cove Trail Master Plan

Prepared for

Metro
600 NE Grand Ave.
Portland, OR 97232

and

Oregon Department of Transportation
123 NW Flanders St.
Portland, OR 97209

Prepared by

Parametrix
700 NE Multnomah, Suite 1000
Portland, OR 97232-4110
T. 503.233.2400 T. 360.694.5020 F. 1.855.542.6353
www.parametrix.com

December 2018 | 274-2395-101

CITATION

Parametrix. 2018. Tryon Creek Cove Trail Master Plan.
Prepared by Parametrix, Portland, OR. December 2018.

For more information and/or questions, please contact
Metro Parks and Nature at 503-797-1545.

ACKNOWLEDGEMENTS

Project Advisory Committee

Project Advisory Committee

- Jeff Gudman, Lake Oswego City Council
- Ivan Anderholm, City of Lake Oswego
- Bruce Powers, City of Lake Oswego
- Mike Ward, City of Lake Oswego
- Amin Wahab, City of Portland, Bureau of Environmental Services
- Marc Peters, City of Portland, Bureau of Environmental Services
- Robert Pyle, City of Portland, Bureau of Environmental Services
- Jennifer Coker, City of Portland, Bureau of Environmental Services
- Seth Brumley, Oregon Department of Transportation
- Karen Buehrig, Clackamas County Transportation Planning
- Blair Whiteman, Oregon Parks and Recreation Department
- Patty Freeman, The Street Trust
- Charles (Skip) Ormsby, Birdshill Neighborhood Association
- Craig Stephens, Lake Oswego Old Town Neighborhood Association
- Terri Preeg Riggsby, Tryon Creek Watershed Council

Metro Staff

- Mel Huie, Project Manager
- Jeff Merrill, Natural Resource Scientist
- Laura Oppenheimer, Communications Team
- Erich Pacheco, Communications Team
- Max Woodbury, Data Resource Center
- Ann Toledo, Administrative Team

Consultant Team

Parametrix

- John Cullerton, Project Manager
- Jim Rapp, Lead Trail Planner
- Michael Pyszka, PE, Costing and Bridge and Structure Analysis Lead
- Ryan LeProwse, Highway Crossing Analysis Lead

- Becky Mellinger, Publications Lead
- Sarah Hale, Graphics
- Sara Granberg, Graphics

JLA

- Jeanne Lawson, Communications Manager
- Tracie Heidt, Project Coordinator

MZLA

- Marianne Zarkin, Landscape Architecture/Trail Design

Geotechnics

- André Maré, PE, GE

TABLE OF CONTENTS

EXECUTIVE SUMMARY ES-1

1. BACKGROUND 1

1.1 General Location 1
1.2 Site History 1
1.3 Study Area 1
1.3.1 Jurisdictional Boundaries 1
1.3.2 Property Ownership 1
1.4 Community Engagement 4
1.4.1 Project Advisory Committee 4
1.4.2 Open Houses and Online Surveys 5
1.4.3 Public Information 6

2. EXISTING CONDITIONS 7

2.1 Prior Plans, Policies, Studies and Actions 7
2.1.1 Tryon Creek Pedestrian Bridge Study (OBEC, 2006) 7
2.1.2 Lake Oswego to Portland Trail Study (Alta, 2009) 8
2.1.3 Willamette River Greenway 8
2.1.4 Tryon Creek/OR 43 Culvert Replacement 9
2.1.5 Tryon Cove Site Conservation Plan 9
2.1.6 Tryon Creek Confluence Habitat Enhancement Project (2008 to 2010) 10
2.1.7 Other Metro Plans 10
2.1.8 Oak Grove-Lake Oswego (OGLO) Pedestrian/Bicycle Bridge Feasibility Study 10
2.1.9 Lake Oswego Foothills District Framework Plan 11
2.1.10 Lake Oswego Transportation System Plan (TSP) 11
2.1.11 Lake Oswego Community Development Code (Chapter 50) 11
2.1.12 Other City of Lake Oswego Plans 12
2.1.13 BES Headworks Project 12
2.2 Natural Resource Conditions 13
2.2.1 Streams 13
2.2.2 Topography 15
2.2.3 Unstable Slopes 15
2.2.4 Floodplain 15
2.2.5 Wetlands 15
2.2.6 Vegetation 15
2.2.7 Fish and Wildlife 16
2.3 Built Conditions 16
2.3.1 Transportation Features 17
2.3.2 Land Uses and Zones 18
2.3.3 Major Built Structures 20

TABLE OF CONTENTS (CONTINUED)

2.3.4 Major Utilities 20

3. CROSSING AND ALIGNMENT ALTERNATIVES 21

3.1 Highway Crossing Solutions 21
3.1.1 Oregon 43 Crossing Options 24
3.2 Tryon Creek Crossing Options 26
3.2.1 Oregon 43-UPRR/Willamette Shore Trolley Rail 26
3.2.2 Mid-Point between the Mouth of Tryon Creek and OR 43 26
3.2.3 Mouth of Tryon Creek 26
3.3 Connecting Trail Pathways 26
3.3.1 Trail Types 28
3.4 Trail Alignment/Type Mitigating Factors 28
3.5 Stampher Road Improvements 29

4. PRE-ENGINEERING EVALUATIONS 32

4.1 OR 43 Crossing Alternatives 32
4.1.1 Full Signal – OR 43 at Stampher Road and Terwilliger Boulevard 32
4.1.2 Tunnel 30
4.2 Tryon Creek Crossing and Foothills Park Trail Extension 32
4.2.1 Design Details and Assumptions 32
4.2.2 Constructability Considerations 34
4.3 Tryon Cove Park Pathways 35
4.3.1 Multiuse Pathway 35
4.3.2 Phased Multiuse Trail Development 36
4.3.3 Nature Pathway 36

5. PRE-ENGINEERING COST ESTIMATES 41

6. TECHNICAL EVALUATION PROCESS 43

7. IMPLEMENTATION 45

7.1 Phasing Concepts 45
7.2 Additional Phasing Opportunities 45
7.3 Funding 45
7.4 Operation and Maintenance 46

LIST OF FIGURES

1 Trail Study Area Vicinity 2
2 Trail Study Area 3
3 Lake Oswego Resource Protection Areas 12
4 Natural Conditions 14

TABLE OF CONTENTS (CONTINUED)

5 Land Use Zones 19
6 Alternative 1 and Alternative 2 22
7 Alternative 3 and Alternative 4 23
8 Creek Crossing Options 27
9 Tunnel Cross Section Under OR 43 32
10 Bridge Cross Section 34
11 Multiuse Pathway 35
12 Nature Pathway 36
13 Traffic Signal/Stampher Road Crossing 37
14 Highway/Rail Tunnel Undercrossing 38
15 Full Signal Alternative – OR 43 Lane Changes/Improvements 39
16 Connections to Foothills Park Trail and Proposed Cove Trails 40

LIST OF TABLES

1 Standards for Key Trail Facilities 31
2 Cost Summary 41
3 Comparison of Signal and Tunnel Options 44

APPENDICES

In addition to the following appendices, Metro has a range of site photographs taken during this Master Plan project. Contact Metro for more information or access to these photographs.

A PAC Meeting and Open House records
B Local newspaper articles on the Master Plan project
C Project Survey Results
D Input from Stampher Road Homeowners Group

EXECUTIVE SUMMARY

Background

The Tryon Creek Cove Trail Master Plan study area is located within the northeast section of the City of Lake Oswego, with some smaller areas located in unincorporated Clackamas County. The study area comprises 11.8 acres and includes rail and highway right-of-way, as well as a City of Lake Oswego–owned riverfront public park and boat dock parcel. The center of the study area includes several publicly owned parcels (Lake Oswego, Portland, Metro) north of Tryon Creek known as Tryon Cove Park. Vehicular access to this area is limited to the narrow two-lane Stampher Road which intersects with State Highway 43 (OR 43 or State Street).

Limited areas south of Tryon Creek which are part of the City of Portland's Bureau of Environmental Services (BES) Tryon Creek Wastewater Treatment Plant property are also in the study area. This plant is being upgraded and expanded, including the proposed development of additional floodplain capacity north of Tryon Creek within Tryon Cove Park. See Section 2.1.3 of this Master Plan for further discussion.

Two parallel rail lines bound the west and north sides of the study area – one used by a seasonal trolley operated by the Willamette Shoreline Consortium, and second owned by Union Pacific Railroad (UPRR) and used for freight traffic. See Section 2.3.1.3 of this Master Plan for more information.

Planning Project Goal

The goal of this master planning effort is to establish preferred routes and facilities bringing bicyclists and pedestrians using the Terwilliger Trail and OR 43 across the highway and then to and across Tryon Creek to connect to Lake Oswego's Foothills Park. The study area, jurisdictional boundaries, and property ownership are shown on the following map (Figure ES-1). Some Master Plan recommendations do fall outside of the original study area's south boundary. For full details on existing conditions within the study area – prior plans and activities that may influence trail planning, and natural and built features – see Chapter 2 of this Master Plan.

Figure ES-1. Study Area

Crossing and Alignment Alternatives

OR 43/UPRR Rail Right-of-Way Crossing Solutions

This Master Plan effort initially considered four primary OR 43 crossing options (and briefly reviewed two conceptual bridge overcrossing options). All four primary options include a new bicycle/pedestrian bridge over the mouth of Tryon Creek, a short connecting trail to the existing Foothills Park Trail, and two new trail pathways within Tryon Cove Park (one multiuse and one soft-surface):

- **Full traffic signal for crossing OR 43** (State Street) at-grade at Terwilliger Blvd and Stampher Road. This alternative would direct bicycle and pedestrian traffic down Stampher Road, under the existing UPRR trestle, and into Tryon Cove Park.
- **New bicycle/pedestrian tunnel under OR 43/UPRR rail berm** between Tryon Creek and Stampher Road. The tunnel's east portal would exit directly into Tryon Cove Park.
- **Pedestrian-activated signal at-grade between E and D Avenues**. This option was put aside due to the complexities in following the rail right-of-way (buffers from active rail service, need for retaining walls, etc.) and the high probability that UPRR would not grant permission to do so.
- **On-highway Foothills Park Connection** alternative was *reserved* as possible *interim* solution if other options were found to be infeasible or were long delayed. See additional discussion under Section 3.1.1.4 of this Master Plan.
- **Two OR 43 bridge overcrossing concepts** were also put aside based on technical issues (such as meeting ADA standards) and the probable higher cost of such overcrossings. See Section 3.1.1.5 of this Master Plan for a brief discussion.

Connecting Trail Pathways

Two trail pathway types through Tryon Cove Park were considered. Both types are included in this Tryon Creek Cove Trail Master Plan to diversify trail user experience and provide added trail capacity.

- A paved bicycle/pedestrian multiuse trail conforming to state standards (10 to 12 feet wide) generally following the line of Stampher Road, then continuing through lower portions of the park to the new creek bridge.
- A 3- to 4-foot-wide soft-surface nature pathway generally following the north bank of Tryon Creek between upper Stampher Road and the new creek bridge.

Stampher Road Improvements

Shared-use of Stampher Road is a necessity if the OR 43 full-signal crossing alternative is selected. An improved OR 43 pedestrian and bicycle crossing leading to Tryon Cove Park would increase the use of Stampher Road and potentially increase user conflicts. There are no practical options for *significantly* widening Stampher Road or segregating bicycle/pedestrian and vehicular traffic. Some road improvements could be mandated as part of a new UPRR/ODOT rail crossing order. Safety and functional improvements to consider are listed in Section 3.5 of this Master Plan.

Master Plan Facility Standards

Two alternatives for crossing OR 43 and the rail berm, one alternative for crossing Tryon Creek, and several alternatives for connecting trail pathways were given a more complete pre-engineering analysis and were costed. See Section 1.4 and Chapter 6 of this Master Plan for more information on the technical evaluations and public processes that went into route and facility selection.

- OR 43/Terwilliger Blvd/Stampher Road Full-Signal, including Stampher Road Improvements.
- Tunnel under OR 43 and rail berm between Stampher Road and Tryon Creek.
- Bicycle/Pedestrian Bridge over Tryon Creek and connector pathway to Foothills Park Trail.
- Paved multiuse and soft-surface trail pathways through Tryon Cove Park.

Table ES-1. Standards for Key Trail Facilities

	Width (ft)	Length (ft)	Height (ft)
Tryon Creek Bridge	12–14	220	N/A
Foothills Park Trail Extension	10–12	160	N/A
Multiuse pathway	10–12	897–905[a]	N/A
Soft-surface nature pathway	3–4	780–878[a]	N/A
Tunnel	12	330	>10
Tunnel approach structure (west end)	12	350	N/A

a Range reflects the OR 43 tunnel and signalization options.

The final selection of the preferred OR 43 crossing option (full-signal or tunnel) may have to wait until processes and inputs outside the scope and timeframe of this Master Plan are completed. These processes include:

- Conclusion of BES location and design of an upgraded or new wastewater treatment plant.
- Engineering of the final location and design of the Tryon Creek culvert replacement.
- Requirements generated by a new Stampher Road crossing order issued by UPRR.
- The outcomes of the upcoming Oak Grove-Lake Oswego bicycle/pedestrian Willamette River Bridge feasibility study.

Full Signal – OR 43 at Stampher Road and Terwilliger Boulevard

See Master Plan Figure 13 for an overview of this alternative and Figure 15 for a schematic showing suggested OR 43 improvements.

- Added southbound lane 400 feet north of Terwilliger Boulevard needed to accommodate traffic volumes.
- Sidewalk added on east side between storage unit access and Stampher Road to provide logical connection for pedestrians.
- Ramps to and from Terwilliger Boulevard eliminated to provide a safer bicycle/pedestrian crossing. Crosswalk spanning OR 43 is on north side of intersection.

Tunnel

See Master Plan Figure 14 for an overview of this alternative.

- Bicycle/pedestrian tunnel will be approximately 330 feet long and be sloped at approximately 3 percent. Pathway will be 12 feet wide. Lighting will be provided.
- New bicycle/pedestrian tunnel ramp will connect into an existing pedestrian sidewalk on OR 43 just south of the intersection with Terwilliger Boulevard. Ramp slope meets ADA requirements (8 percent maximum with 5-foot landings every 30 feet).
- The concrete tunnel approach structure and ramp will be approximately 350 feet long (8 percent slope with landings). Pathway within the approach structure will be 12 feet wide and either asphalt or concrete. The approach ramp will require retaining walls cut into the existing hillside on the south side of Tryon Creek.

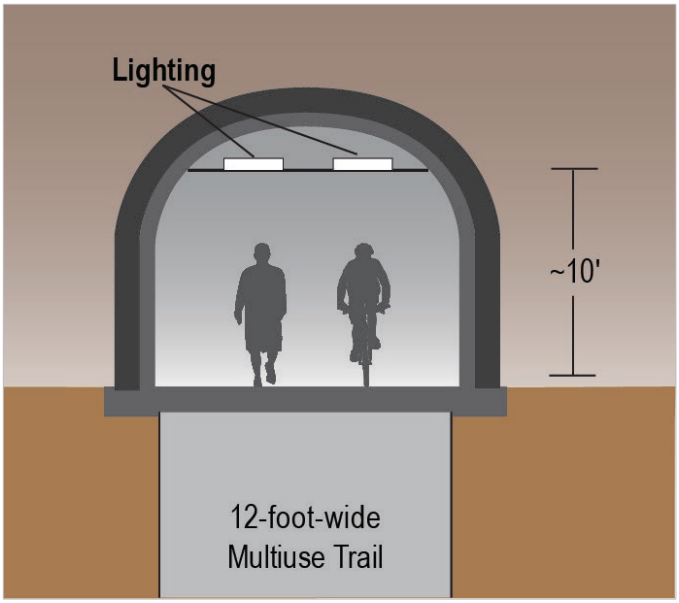


Figure ES-2. Tunnel Cross Section Under OR 43

Tryon Creek Crossing and Foothills Park Trail Extension

The Tryon Creek bicycle/pedestrian bridge and extension of the Foothills Park Trail are illustrated on Master Plan Figure 16.

- The new bicycle/pedestrian bridge will be a prefabricated weathering steel truss bridge.
- The new bridge is conceptually designed to be 220 feet long, consisting of a 130-foot span crossing Tryon Creek and a 90-foot span to land the bridge on a high point on the north bank of Tryon Creek and enter Tryon Cove Park.
- The bridge shall be 12-foot-wide minimum, 14-foot-wide maximum, and have a uniform 5 percent slope to meet ADA requirements.
- The 160-foot-long Foothills Park Trail extension will require a cut section and possibly retaining walls along the east edge of the wastewater treatment plant property.

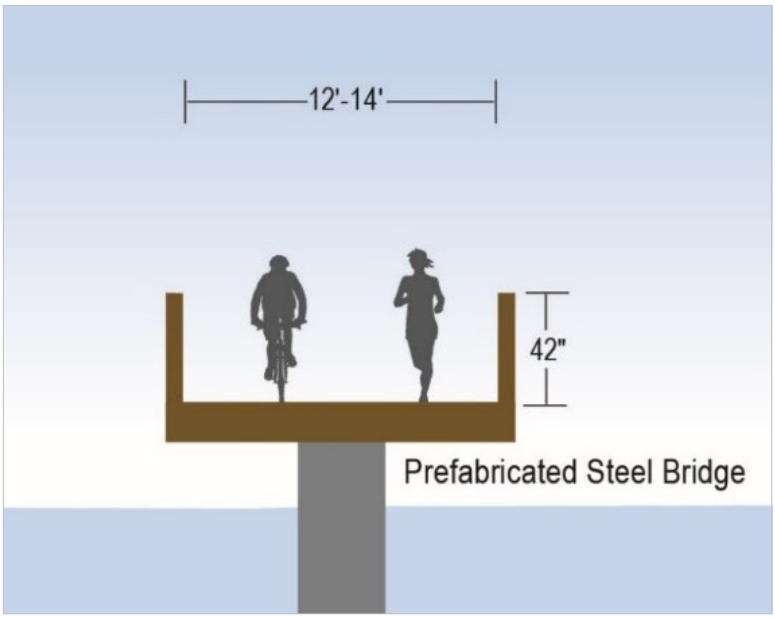


Figure ES-3. Bridge Cross Section

Tryon Cove Park Trail Pathways

Two trail pathways—a paved multiuse trail and a narrower soft-surface pathway—are illustrated that connect the OR 43 crossing alternatives to the north bridgehead of the new Tryon Creek bicycle/pedestrian bridge. These pathway alignments are illustrated on Master Plan Figure 13 and Figure 14. The alignments vary somewhat at the upper end of Tryon Cove Park depending on the OR 43 crossing solution being used.

Multiuse Pathway

The proposed multiuse trail pathway has the following features:

- Paved asphalt multiuse cross-section (10- to 12-foot-wide pathway with 2-foot-wide shoulders). The full-signal multiuse pathway is 897 feet long. The multiuse pathway used for the tunnel option is 905 feet long.
- Maximum grade for both options is 5 percent.
- Alignments stay completely outside of the potential BES floodplain mitigation area.
- Upper section of trail alignment for the OR 43 *full signal alternative* connects to Stampher Road on the east side of the rail berm at the informal parking lot located just after the road goes under the rail berm. This parking lot should be improved as part of this full-signal alternative.

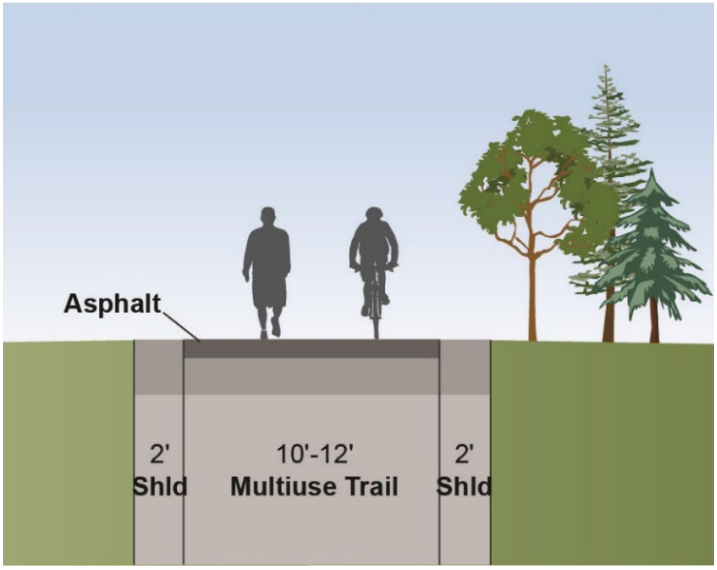


Figure ES-4. Multiuse Pathway

- Upper section of the trail alignment for the *tunnel alternative* connects lower down the slope to the tunnel east entrance. There is a flat area at the east portal that could be developed as a staging area/viewpoint. This will help mitigate for the right angle in the trail alignment.
- As an interim measure until the issues discussed under Chapter 6 of this Master Plan are resolved, the *alignment* of the proposed paved multiuse trail could be used for a soft-surface loop pathway. This phased approach would avoid having to relocate any paved trail through the park that may conflict with final BES wastewater treatment plant designs.

Nature Pathway

The proposed nature pathway has the following features:

- Three- to four-foot-wide soft surface pathway. The full-signal-associated nature trail is 878 feet long. The tunnel-associated nature trail is 780 feet long.
- Aligned along the north bank of Tryon Creek. A very short lower section of this pathway passes through the southeast edge of the BES floodplain mitigation area.
- Trail is steep (8 percent at upper end, 12 percent at lower end). ADA compliance is however not required for this secondary, limited purpose pathway.
- For the full signal, the nature pathway turns northeast and connects to the same Stampher Road parking lot as with the multiuse paved trail. For the tunnel alternative, the nature pathway continues straight north to connect with the tunnel's east portal entrance.

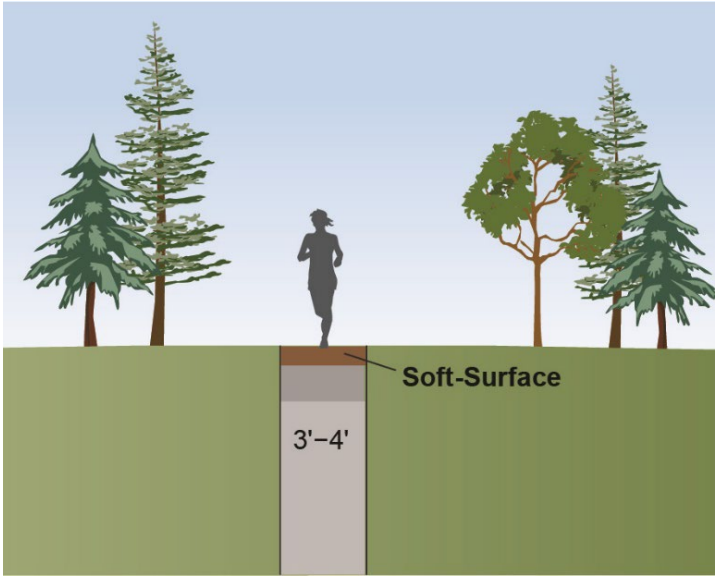


Figure ES-5. Nature Pathway

Cost Estimates

Cost estimates include percentages of the construction cost to account for design, permitting, and construction engineering (25 percent) plus contingencies (30 percent), and also include the following:

- The cost of extending the Foothills Park Trail to the south end of the new Tryon Creek bridge.
- Stampher Road improvements as listed in Master Plan Section 3.5 of this Master Plan. The actual improvements will be subject to future stipulations included in a revised rail crossing order.

The costs of potential right-of-way acquisitions are not included.

Table ES-2. Cost Summary

OR 43 Full Signal	
OR 43 signalization and improvements	$ 4.84 M
Stampher Road improvements[a]	$ 1.56 M
10-foot-wide multiuse pathway[b]	$ 310 K[b]
Soft-surface nature pathway[c]	$ 110 K
14-foot-wide bridge/approaches with Foothills connection	$ 1.35 M
Total	**$ 8.17**

OR 43 Tunnel Undercrossing		
12-foot-wide horseshoe-shaped tunnel/approaches		$ 11.41 M
10-foot-wide multiuse pathway[b]		$ 310 K
Soft-surface pathway[c]		$ 100 K
14-foot-wide bridge/approaches with Foothills connection		$ 1.35 M
	Total	**$ 13.17 M**
Additional Option		
Interim soft-surface pathway on multiuse trail alignment		
	Full signal	$112,000
	Tunnel	$113,000

a Order of magnitude estimate only. Cost is dependent on as-yet-to-be-determined crossing order.

b A 12-foot-wide paved trail would increase the cost by approximately 25 percent (to $390,000).

c Pathway along Tryon Creek only

Phasing Concepts

Phase 1 – Tryon Creek Bridge and Foothills Park Trail Connection

- $1.35 million

Phase 2 – Tryon Cove Park Trail Pathways

- Paved multiuse pathway – 10 to 12 feet wide, $310,000 to $390,000
- Soft-surface nature pathway – 3 to 4 feet wide, $100,000 to $110,000

Phase 3 – OR 43/Railroad Berm Crossing and Terwilliger Trail Connection

- OR 43 full-signal at Terwilliger Boulevard, including Stampher Road improvements – $6.4 million
- OR 43/rail tunnel undercrossing – $11.41 million

Phases 1 and 2 may be combined, at least with respect to building the nature pathway element. The development of the paved multiuse pathway should probably wait until factors impacting the selection of a preferred OR 43 crossing alternative resolved at the *plan* level (see Chapter 7 of this Master Plan).

Additional Phasing Opportunities

- Interim soft-surface pathway following multiuse alignment – $112,000 to $113,000
- Interim OR 43/State Street bicycle/pedestrian improvements – Estimating a cost is outside the scope of this Master Plan. See Section 3.1.1.4 of this Master Plan for a discussion of the factors and issues with this option.

Figure ES-6. Preferred Master Plan Alternatives

This page intentionally left blank.

1. BACKGROUND

1.1 General Location

Much of the Tryon Creek Cove Trail study area is located within the northeast section of the City of Lake Oswego, with some portions located in unincorporated Clackamas County. Tryon Cove Park, a designated park/open space accessed from Stampher Road, is in the central portion of the study area, north of Tryon Creek. The study area, jurisdictional boundaries, and property ownership are shown on Figure 1 or Figure 2.

1.2 Site History

The property that makes up Tryon Cove Park was purchased for parks and open space purposes by the City of Lake Oswego in 2003. This action was in partnership with Metro and the City of Portland (as the wastewater treatment plant operator and property owner on the south side of Tryon Creek).

Prior to residential, industrial and urban development, Tryon Creek was and still is a major salmon stream. It is also very close to the historic Willamette Falls which has been and is a major lamprey fishery of great importance to Native American communities and tribes.

1.3 Study Area

The Tryon Creek Cove Trail study area comprises 11.8 acres and includes rail and highway right-of-way, as well as a City of Lake Oswego–owned riverfront public park and boat dock parcel. The center of the study area includes several publicly owned parcels typically referred to as Tryon Cove Park. Limited areas south of Tryon Creek which are part of the City of Portland's Bureau of Environmental Services (BES) Tryon Creek Wastewater Treatment Plant property are also in the study area. The small storage structure in the park was part of a now-demolished residential estate. This structure is presently leased by Alder Creek Kayak but is scheduled for removal as part of upcoming wastewater treatment plant upgrades.

1.3.1 Jurisdictional Boundaries

Jurisdictional boundaries are shown on Figure 2. Most of the study area is within the City of Lake Oswego, including the area labeled rail right-of-way on Figure 2. Most of the abutting road rights-of-way (OR 43 and Terwilliger Boulevard) are in unincorporated Clackamas County. The riverfront parcel that accesses a public pier and floating dock is also within unincorporated Clackamas County.

1.3.2 Property Ownership

Study area property ownership is also shown on Figure 2.

- The area labeled rail right-of-way is owned by the **Union Pacific Railroad (UPRR)**. It appears that this railroad right-of-way and the OR 43 road right-of-way overlap and/or merge within the study area. The width (approximately 250 feet) of the original rail right-of-way can be inferred by extrapolating from the full width rail right-of-way that is shown on Figure 2 immediately north of the study area.

Figure 1. Trail Study Area Vicinity

8.5x11

Figure 2. Trail Study Area

8.5x11

- A consortium of local governments owns the Willamette Shoreline Trolley (see Section 2.3.1.3) which parallels the west side of the UPRR line.
- **Metro** owns a single parcel that spans the center of the study area from the rail right-of-way to the west side of Stampher Road, opposite unincorporated riverfront residences. A leg of the Metro parcel also wraps along Tryon Creek almost to the leased Alder Creek Kayak building on the Tryon Cove Park site.
- The **City of Lake Oswego** has the largest land ownership in the study area consisting of five individual lots (three north of and two southeast of the Metro parcel).
- One relatively narrow Lake Oswego–owned parcel (public boat dock) is in unincorporated **Clackamas County**, as is the area around the Terwilliger Boulevard/OR 43 intersection.
- **City of Portland BES**, as part of its wastewater treatment plant operation, owns most of the south bank of Tryon Creek east of OR 43.

1.4 Community Engagement

The development of this Master Plan was informed and guided by input from the public and an appointed Project Advisory Committee (PAC), gathered through a proactive community engagement program. Public involvement included the following activities:

- Four Project Advisory Committee (PAC) meetings;
- Two in-person Open Houses;
- Two online surveys;
- Meeting with two Lake Oswego City Councilors;
- Meeting with the Stampher Road Homeowners' Association; and
- Mailings, website, news media and emails to provide broader public information.

The project team received extensive input about the community's preferences for the creek crossing and trail alignments in Tryon Creek Cove Park, as well as for short and long term solutions for crossing OR Highway 43. Throughout this process, we estimate that more than 600 people learned about the Tryon Creek Cove Trail Master Plan project and offered feedback.

1.4.1 Project Advisory Committee (PAC)

Members of the PAC included public agency officials (such as City of Lake Oswego, Oregon Department of Transportation, Clackamas County, City of Portland Bureau of Environmental Services), as well as representatives from local and regional neighborhoods and nonprofit organizations. See the acknowledgement section for names and affiliations of PAC members. The four advisory committee meetings can be summarized as follows:

- In May 2018, the PAC discussed a series of Tryon Creek crossing concepts/options. The bicycle/pedestrian bridge crossing at the mouth of Tryon Creek was preferred.
- In July 2018, the PAC considered four possible OR 43 crossing options and directed that two alternatives – full signal at Terwilliger Boulevard/Stampher Road and a tunnel under OR 43 – be given further analysis. The PAC also specified that both paved multi-use and soft-surface nature trails be considered as features in the park. A public open house was conducted in July 2018 to review and elicit input from the public on trail alternatives.

- In October 2018, the PAC confirmed their final selection of a bridge located at the mouth of Tryon Creek and multi-use and nature trail alignments. The decision on the OR 43 crossing was deferred. A public open house was also conducted in October 2018 to present the PAC choices and ensure these selections were widely consistent with the community's preferences.
- In December 2018, the PAC accepted the recommendations in the draft Master Plan as presented.

See the Master Plan appendices for full PAC and Open House meeting records, as well as for outcomes of the two Online Open House surveys that were conducted.

1.4.2 Open Houses and Online Surveys

Round 1

July 2018

The first in-person Open House took place on July 19th at the Adult Community Center in Lake Oswego. There were 45-50 attendees. The Open House information included: a project overview, alternative routes, and a trail alignment options interactive activity. The public was asked to provide their opinion regarding each of the trail route alternatives, the Highway 43 crossing, and the bridge over Tryon Creek. The Open House was followed by a three-week public comment period via online survey, which received input from 415 participants. The responses at the in-person Open House were consistent with the input obtained through the online survey. At the Open House, a presentation summarizing the project details and the PAC and community choices was given twice, one at 5:40 p.m. and one at 6:40 p.m. Lake Oswego, Metro, and Parametrix staff and committee members were available at each station to answer community questions and elicit additional input.

Round 2

October/November 2018

The second Open House was held on October 30th at Lake Oswego City Hall. Approximately 50 people, the majority of which were Lake Oswego residents, attended the Open House. As with the first event, there was a three-week public comment period via online survey, where 110 participants provided input. Both formats presented the recommended trail and creek crossing location and the findings on the Highway 43 crossing options. The event format was a guided Open House, which provided opportunities for deeper engagement by providing more robust information to participants and allowed the attendees to have direct access to Lake Oswego, Metro, and Parametrix staff. In both the Open House and the online survey there was broad support from the public about the Tryon Creek Trail Bridge location (95% were very satisfied or somewhat satisfied), the trail network alignment (80% were very satisfied or somewhat satisfied), and the phased approach. The most contentious element of the project is the crossing of OR-43. Given funding limitations for building a tunnel in the short-term, participants were asked to provide input on their preferred short-term crossing options. A crossing at A Avenue received negative feedback because of the complexity of the intersection. However, the B Avenue crossing received broad support in the Open House, yet the A Avenue crossing obtained a slightly higher level of support than other options from the online survey participants.

1.4.3 Public Information

Information on the project and notification about the open houses were provided through:

- Metro and Lake Oswego websites
- Articles *in Hello LO* newsletter and *LO Review*
- Metro and Lake Oswego Facebook, NextDoor, and Twitter (LO)
- *LO Review* advertisement
- Metro postcard sent to 8,000 households in July
- Email distribution to stakeholder lists in July and October

2. EXISTING CONDITIONS

2.1 Prior Plans, Policies, Studies and Actions

Key prior planning and other documents or activities that specifically analyzed trail and crossing opportunities in what is now the Tryon Creek Cove Trail study area are described below.

2.1.1 Tryon Creek Pedestrian Bridge Study (OBEC, 2006)

The City of Lake Oswego commissioned this planning-level study that examined three potential bicycle/pedestrian crossings of Tryon Creek. Although titled *Pedestrian Bridge Study*, the body of this 2006 report also refers to proposed trail/bridge options as "multiuse." This 2006 study briefly notes some issues with bicycle/pedestrian crossing solutions at OR 43 and Terwilliger Boulevard but is focused primarily on the bridge crossing of Tryon Creek. The study does not consider or map any trail alignments through the center (Tryon Cove Park) of the current 11.8-acre Tryon Creek Cove Trail study area.

This OBEC study concludes that the East Alternative is the most feasible bridge location (see next page and Figure 8). Only the East Alternative is discussed in any detail. The OBEC study maps new trail alignments from the south (downtown Lake Oswego and Foothills Park) connecting to each of three creek crossing alternatives, but only the West Alternative (see below) suggests any alignments for further trail connections on the north side of Tryon Creek.

These three alternatives are illustrated on Figure 8.

2.1.1.1 West Alternative

This alternative follows the eastern edge of the rail right-of-way paralleling OR 43 between Foothills Road on the south side of Tryon Creek and connecting back to Stampher Road just after this roadway passes under the rail line through a "geometrically deficient undercrossing." The OBEC study *eliminates* this alternative based on rail conflicts, length of the new connecting trail sections needed, construction complexity, and impacts on a new culvert installation under OR 43.

2.1.1.2 Middle Alternative

This alternative follows the western edge of the BES wastewater treatment plant property on the south side of Tryon Creek. The suggested alignment uses a vegetated buffer between the wastewater treatment plant and a storage facility/warehouse parking lot. The Middle Alternative bridge alignment across Tryon Creek spans the creek at a right angle, with the north bridgehead at the northwest edge of an open field next to the Alder Creek Kayak rental warehouse (which will be removed based on current proposed treatment plant improvement plans).

The OBEC study refers to this middle bridge as being "similar to the East Alternative bridge," but does not provide any specifications. Based on schematic drawings published in the OBEC study, this middle bridge appears to be a single span and shorter than the East Alternative bridge. The OBEC study makes no reference to any significant challenges arising from the opposite stream banks being at different elevations at this point, as is the case with the East Alternative which was developed in more detail (see below).

The OBEC study does not specifically eliminate the Middle Alternative, but does list a series of disadvantages. These include wastewater treatment plant impacts, length of the connecting trail to Foothills Road, and excavation for an "underpass" under the two elevated wastewater main interceptors along the south bank of Tryon Creek.

2.1.1.3 East Alternative

The East Alternative is identified in the OBEC study as the preferred Tryon Creek crossing option. An existing paved trail (Willamette River Greenway/Foothills Park Trail) coming out of Foothills Park to the south approaches but does not reach the edge of the south bank of Tryon Creek near the Willamette River confluence. This existing trail is illustrated in the OBEC study as being extended north and connecting to the new East Alternative bridge near the mouth of Tryon Creek.

The OBEC study describes this East Alternative bridge as a 220-foot-long two-span bridge set above the 100-year high-water mark. The bridge width is cited as 12 feet. The cost of this bridge was estimated at the time (2006) at $1.338 million, including engineering, but does not appear to include trail pathway extension costs.

The grade of the East Alternative is 5 percent, the maximum acceptable for Americans with Disabilities Act (ADA) compliance. This grade was at least partly selected to account for the elevation difference in this location between the south and north banks of the creek. Flatter grades may be possible but would probably increase bridge costs.

2.1.2 Lake Oswego to Portland Trail Study (Alta, 2009)

As part of prior Lake Oswego to Portland Transit and Trail Alternatives Analysis, Metro contracted with Alta Planning and Design to prepare a planning-level assessment of possible but complex bicycle/pedestrian trail alignments and treatments for connecting the Sellwood Bridge area to downtown Lake Oswego. Various solutions combined multiuse trails, on-street bike lanes, bicycle boulevards, sidewalks, and cycle tracks. The Alta study primarily examines the extension of bicycle/pedestrian facilities from Tryon Creek Cove Park north toward Elk Rock and the Sellwood Bridge. The Alta study suggests trail alignments that use some combination of OR 43, local streets, and rail right-of-way. Areas north of Stampher Road toward Elk Rock are, however, *not* within the current Tryon Creek Cove Trail study area.

Within what is now the current Tryon Creek Cove Trail study area, this earlier Alta study identifies a new bicycle/pedestrian bridge across the mouth of Tryon Creek. Two multiuse trail alignments through the center of the study area (Tryon Cove Park) are also illustrated: one following Tryon Creek, the second near Stampher Road. References are made in the Alta study to a potential Terwilliger Boulevard and/or OR 43 undercrossing to connect to the Tryon Creek State Natural Area and the Terwilliger Trail.

2.1.3 Willamette River Greenway

The Willamette River Greenway is established by Oregon Statewide Planning Goal 15. The goal for the Willamette River Greenway in the Portland metropolitan area is to "protect fish and wildlife habitat, water quality, and scenic resources and improve public access to the river along the greenway from Wilsonville to the Multnomah Channel."

Based on comparison to other developments allowed within the greenway and the stated greenway goal to "improve public access," a bicycle/pedestrian bridge over Tryon Creek would be consistent with

the intent of the greenway. In fact, the existing Foothills Park trail that the proposed bicycle/pedestrian bridge at the mouth of Tryon Creek would connect to is often labeled *Willamette River Greenway Trail*.

The City of Portland has produced a Willamette River Greenway Inventory (2014) that comprehensively documents the greenway within the Portland city limits. The City of Lake Oswego and Clackamas County do not have comparable documents. The Tryon Creek Cove Trail study area falls within the City of Lake Oswego's Greenway Management Overlay District. The regulated area is 150 feet shoreward from the ordinary low waterline of the Willamette River. Parks and other recreational facilities are allowed in this zone, so the development of a bridge at the mouth of Tryon Creek and an associated multiuse trail pathway are allowed.

2.1.4 Tryon Creek/OR 43 Culvert Replacement

Funding for this long-planned culvert upgrade has been included in the FY 2019 federal budget, but has not yet been appropriated. The existing culvert was constructed in the late 1920s (existing culvert alignment shown on Figure 13 and Figure 14). The culvert only allows limited passage, if any, of salmonids and lamprey. The idea of a dual-use culvert at this location under OR 43 – for stream conveyance and bicycle/pedestrian passage – has long been discussed. This current federal grant funding does not include or permit such a dual use. Improvements arising from trail plan implementation, particularly the option for undercrossing OR 43 and the rail berm with a tunnel, will have to be closely coordinated with creek culvert replacement.

The combination of storm culvert replacement and the construction of a new parallel bicycle/pedestrian tunnel (see Sections 3.1.1.2 and 4.1.2 of this Master Plan) will be a complex undertaking. Although outside the scope of this plan, trail designers and builders may wish to consider a solution that daylights the creek and the future trail by rebuilding OR 43 using a highway bridge solution. This would be a return, in a sense, to the original State Street (now OR 43) bridge crossing solution for Tryon Creek (see historical photograph on the next page).

2.1.5 Tryon Cove Site Conservation Plan

Metro and the City of Lake Oswego are discussing collaboration on the preparation of a Tryon Cove Park site conservation plan. The plan is intended to lay the conceptual framework for the long-term management of the park. Ongoing coordination with Metro and Lake Oswego will be required to ensure consistency between the conclusions of the trail master plan and the site conservation plan.

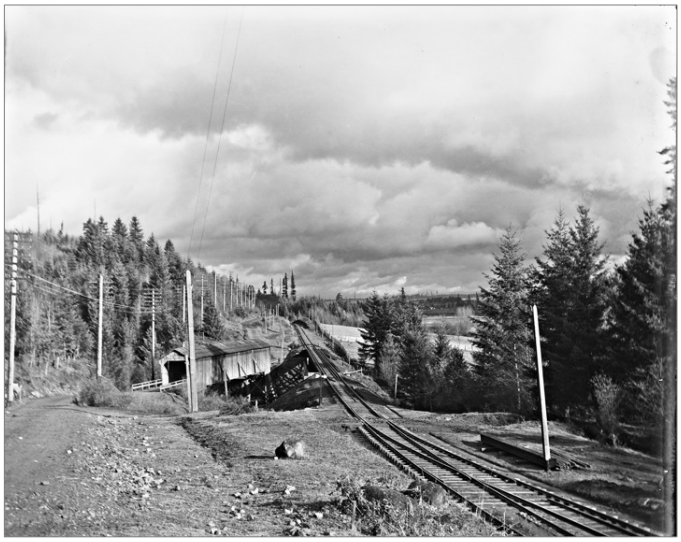
2.1.6 Tryon Creek Confluence Habitat Enhancement Project (2008 to 2010)

This two-phase project completed stream enhancements for 900 linear feet of Tryon Creek from its confluence with the Willamette River to the OR 43 creek culvert. ODOT completed Phase 1 of this effort in 2008. Phase 1 included retrofits to the existing culvert to improve fish passage, as well as some stream enhancements below the culvert. Phase 2 was conducted by BES in 2010. The project installed log and boulder structures to manage flows, increase floodplain capacity, reduce erosion and sedimentation in support of fish populations; conducted invasive species removal and planted native trees and shrubs; and created a small beach at the confluence of the creek and the Willamette River.

2.1.7 Other Metro Plans

The following Metro Plans specifically support a trail to and within the study area:

- Metropolitan Greenspaces Master Plan (1992)
- Bi-State Regional Trails System Plan (2010)
- Metro Regional Trails and Greenways System Plan (2017)
- Regional Transportation Plan (2014)



Historical photo of Tryon Creek State Street and rail line crossing

2.1.8 Oak Grove-Lake Oswego (OGLO) Pedestrian/Bicycle Bridge Feasibility Study

Clackamas County and the City of Lake Oswego are currently working with other partners, including the North Clackamas Parks and Recreation District, City of Milwaukie, and Metro, to study the feasibility of a pedestrian/bicycle bridge across the Willamette River between Oak Grove and Lake Oswego. This study will examine possible bridge locations, connections to existing/planned pedestrian/bicycle systems, and engineering/environmental constraints on such a bridge. The study will also include a broad-based public process to engage the public, community organizations, technical staff, elected officials, and those in historically marginalized communities.

The feasibility study will begin in January 2019. There are no specific bridge locations identified for study at this point. Early in the study, a review will take place to identify possible locations for a pedestrian/bicycle bridge *on public property* along a 1.5-mile length of the Willamette River, south of the existing UPRR railroad bridge across the river. The railroad bridge will not be considered as UPRR has previously declined to permit the use of this bridge for bicycle/pedestrian facilities.

Although Tryon Cove Park is within the study area, it is not known how it will compare to other possible landing sites for a potential bridge. Any discussion of the impact of a possible Oak Grove-Lake Oswego Pedestrian/Bicycle Bridge on the recommendations of this Tryon Creek Cove Trail Master Plan is premature until the OGLO bridge feasibility study has moved forward into study of specific bridge locations.

2.1.9 Lake Oswego Foothills District Framework Plan

This City of Lake Oswego plan proposes a series of land use and transportation initiatives within the Foothills District. Tryon Creek is the north boundary of the Foothills District. Of interest for the purposes of the Tryon Creek Cove Trail Master Plan, and the assessment of options for a safe bicycle/pedestrian crossing of OR 43, is the OR 43/D and E Avenues intersection proposal provided on page 71 of the Foothills District plan. Foothills Road is depicted as extending north through the site of three warehouse/storage buildings. This proposed new section of Foothills Road would intersect with the east (northbound) lanes of OR 43. Cross highway traffic is *not* accommodated by this framework concept, but it may still provide a basis for exploring bicycle/pedestrian highway crossing improvements.

2.1.10 Lake Oswego Transportation System Plan (TSP)

The 2015–2035 City of Lake Oswego TSP includes numerous bicycle and pedestrian projects through the general surrounding area of the Tryon Creek Cove Trail study area, including bicycle lanes on State Street (OR 43) from Terwilliger Boulevard to Oak Street, a trail connection across the Willamette River to Milwaukie on the UPRR bridge, and a pathway north to Portland along the Willamette Shore Trolley line.

Directly applicable to this Tryon Creek Cove Trail Master Plan, the Lake Oswego TSP includes a Tryon Creek bridge crossing from Foothills Park to Tryon Cove Park at the mouth of the creek, and a trail through Tryon Cove Park connecting to OR 43.

2.1.11 Lake Oswego Community Development Code (Chapter 50)

- Tryon Cove Park (green on Figure 3) is zoned as Park and Natural Area (PNA). Tryon Cove Park and Tryon Creek are within a City of Lake Oswego Resource Protection (RP) zone as depicted on Figure 3 (blue-gray area) and as described in Section 50.05.010 - Sensitive Lands Overlay Districts. There are limitations to development within this zone, and the RP zone must be delineated.
- Tryon Creek (purple line on Figure 3) between North State Street (OR 43) and the Willamette River is classified by the City of Lake Oswego as a Class II riparian area. The width of the protected vegetated corridor adjacent to the stream as well as mitigation requirements will be determined by a future delineation of the riparian area as required by Section 50.07.004 – Sensitive Lands Designation and Delineations.
- Gray-hatched shoreline areas shown on Figure 3 are within the Willamette River Greenway Management District (WRGM). This overlay extends 150 feet shoreward from the river's ordinary low waterline.
- The City of Portland wastewater treatment plant on the south side of Tryon Creek is zoned Public Functions (PF). The red-hatched area illustrated on the south bank of Tryon Creek is a riparian/streambank protection buffer on top of the PF zone.

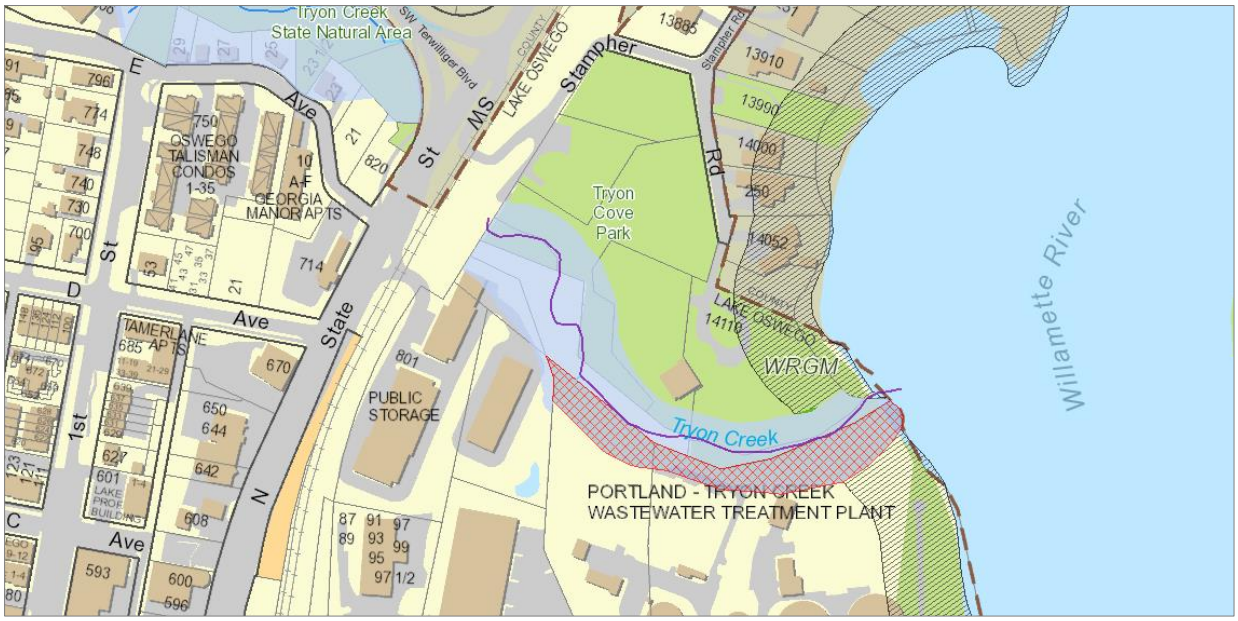


Figure 3. Lake Oswego Resource Protection Areas

2.1.12 Other City of Lake Oswego Plans

- The 2025 Parks Plan lists a trail and bridge across Tryon Creek in its 5-year implementation strategy. This improvement is ranked fifteenth in the City's parks capital improvement program (CIP). The same project is ranked third in the City's transportation CIP.
- The 2003 Trails and Pathways Master Plan and map includes regional trail connections around Tryon Cove Park that link to the City of Portland to the north and Terwilliger Boulevard to the west.

2.1.13 BES Headworks Project

The Portland Bureau of Environmental Resources (BES) is in the midst of a Tryon Creek Wastewater Treatment Plant Headworks/Dry Weather Clarifier Project. The current plant was built in 1964, and the last major expansion was in 1976. The storage building site to the west of the current treatment plant is the primary wastewater treatment plant expansion area. As part of the project, the Alder Creek Kayak–leased building on the north side of Tryon Creek would be demolished and an extensive area abutting this building to the north regraded/excavated to improve floodplain capacity.

Since this Tryon Creek Cove Trail Master Plan was initiated, BES has announced that there is also the possibility that the treatment plant will be moved south, away from the creek. There is also a possibility that the aboveground sewer interceptors on the south side of the Tryon Creek will be relocated and buried on the north side of the creek.

2.2 Natural Resource Conditions

A variety of key natural conditions are illustrated on Figure 4.

2.2.1 Streams

2.2.1.1 Tryon Creek

Tryon Creek flows out of the Tryon Creek State Natural Area, then under OR 43 and the UPRR rail berm within a large but aging culvert before daylighting along the south boundary of the Tryon Creek Cove Trail study area and flowing into the Willamette River.

2.2.1.2 Willamette River

The Tryon Creek Cove Trail study area has two Willamette River frontages:

- At the north end from Stampher Road through a parcel owned by the City of Lake Oswego. This former residential parcel provides access to the City of Lake Oswego pier and small boat dock accommodating transient vessels.
- At the southeast end of the study area at the small beach north of the mouth of Tryon Creek. The beach can be reached downslope from Tryon Cove Park.

Willamette River looking east from the mouth of Tryon Creek

Figure 4. Natural Conditions

2.2.2 Topography

The north side of the Tryon Creek Cove Trail study area is relatively flat with some areas first gradually and then more steeply sloping downhill toward the Willamette River. The west side of the study area climbs steeply (up to greater than 25 percent slope) toward the UPRR rail berm and OR 43, and the northeast corner of the study area drops steeply (up to greater than 25 percent slope) down to a small beach along the Willamette River just north of the mouth of Tryon Creek.

The Tryon Creek streambank is steep on the south side (up to greater than 25 percent slope). See Figure 13 and Figure 14 for detailed topographic information.

Tryon Creek viewed from Tryon Cove Park

2.2.3 Unstable Slopes

Both Tryon Creek streambanks appear to be eroded and somewhat unstable, as might be expected for a major stream that has been greatly disturbed by human occupation and use, and that is subject to periodic flooding from direct stormwater flows into the stream channel and from Willamette River flooding backing up the creek. The two wastewater interceptor main lines located along the south bank of Tryon Creek are elevated aboveground, rather than buried, due to bank and soil instability.

2.2.4 Floodplain

Both sides of the channel of Tryon Creek, and most of the area north of the creek regarded as part of Tryon Cove Park, are within the 100-year floodplain. The rear two-thirds of the Lake Oswego pier/dock access parcel is within the 500-year floodplain, as is property immediately opposite this parcel on the east side of the section of Stampher Road closest to the Willamette River. As the Tryon Creek Cove property climbs toward the UPRR rail berm, it is high enough to be outside of any documented floodplain.

The small portion of the study area south of Tryon Creek does include an area between the storage/warehouse site and the main wastewater treatment plant facility that is within 100-year floodplain. See Figure 4 for floodplain mapping.

These floodplains are included in the City of Lake Oswego's published floodplain map and are subject to the City's floodplain standards.

2.2.5 Wetlands

The only wetlands within the Tryon Creek Cove Trail study area documented by the National Wetlands Inventory are confined to narrow edges along both sides of the Tryon Creek stream channel.

2.2.6 Vegetation

The entire Tryon Creek Cove Trail study area has been greatly disturbed by human occupation and uses over many decades. Presently, about one-third of the portion of the study area north of Tryon Creek

that is designated as Tryon Cove Park is open grassy fields. These fields extend under the adjacent tree cover. There is highly disturbed and intermittent riparian vegetation and tree cover along Tryon Creek, an intermittent band of tree cover that splits the Tryon Cove Park area east to west from the river shore to the OR 43 culvert that carries Tryon Creek, and intermittent wooded areas leading uphill to the UPRR and Willamette Trolley rail lines. Many areas are dominated by invasive vegetation, such as Himalayan blackberry and English ivy.

2.2.7 Fish and Wildlife

The entire Tryon Creek Cove Trail study area, including the Tryon Creek riparian corridor, the Willamette River shoreline, and Tryon Cove Park, has been greatly disturbed by human occupation and uses over many decades. That being so, the confluence of Tryon Creek and the Willamette River, and the stream connection to the nearby Tryon Creek State Natural Area, provides higher quality fish and wildlife habitat than might be otherwise expected for a relatively small open space parcel surrounded by intense urbanization and transportation systems.

Known fish species present in Tryon Creek include pacific lamprey, steelhead, coho salmon, fall-run Chinook salmon, and cutthroat trout. Over 60 species of birds have been recorded along Tryon Creek and in the state natural area. A wide range of mammals also occupy the state natural area, but the wildlife movement barrier created by OR 43 and the UPRR line may limit wildlife presence in the study area, except for those species that reach the creek and Tryon Cove Park from the river side.

2.3 Built Conditions

2.3.1 Transportation Features

2.3.1.1 Highways

OR 43 (named State Street through Lake Oswego) and the Terwilliger Boulevard intersection form the northwest boundary of the Tryon Creek Cove Trail study area. This intersection includes a blinking yellow (caution) light for north- and southbound traffic on OR 43 and a blinking red (stop) for eastbound traffic on Terwilliger Boulevard. A turn ramp is provided for southbound to westbound movements and a second ramp for eastbound to southbound movements.

Bicycle/pedestrian crossing of OR 43 is not accommodated at the Terwilliger Boulevard intersection. Sidewalks along OR 43 between the study area and the intersection with Foothills Road and reasonably continuous at least on one side of the highway. Bicycle lanes are essentially absent. These conditions impact the safety of using OR 43 as an option for the Tryon Creek Cove Trail. See further discussion under Section 3.1.1.4 of this Master Plan.

2.3.1.2 Local Roadways

The only motorized vehicle access to the Tryon Creek Cove Trail study area north of Tryon Creek is via Stampher Road. The Stampher Road/OR 43 intersection is on the east side of OR 43 and opposite the OR 43 southbound ramp to westbound Terwilliger Boulevard. As noted above, there are limited traffic controls at this intersection. Traffic in both directions on OR 43 can operate at relatively high speeds as the highway transitions southbound from 45 mph to 35 mph, and to 25 mph as it enters downtown Lake Oswego. Northbound traffic is typically accelerating at the intersection as it transitions from 25 to 35 mph and eventually to 45 mph.

Intersection of OR 43 and Terwilliger Boulevard with UPRR and Willamette Shore Trolley in the background

The very narrow Stampher Road intersects with OR 43 on a reverse oblique angle with constrained sight lines, especially looking south. Access to Stampher Road from OR 43 southbound requires a left turn across two double yellow lines in a very congested location. Northbound access requires an extremely sharp right turn. Some longer vehicles may require backing up to properly position the vehicle to make the turn.

Stampher Road is further constrained by retaining walls on both sides, with a steep drop down to a narrow and low clearance (12-foot 10-inch) railroad undercrossing. Sharp right-angle turns at the bottom of the road are required to enter or exit the undercrossing.

On the east side of the undercrossing, Stampher Road sharply reverses direction and heads downhill within rail right-of-way but below the actual railroad berm before turning east and accessing several homes, the City of Lake Oswego public pier/dock, and the Alder Creek Kayak building. There are three small gravel or asphalt public parking areas along Stampher Road: one near the rail undercrossing and two near the boat dock.

The addition of a multiuse trail that crosses the creek and intersects OR 43 should provide safer alternative access to Tryon Cove Park, particularly for visitors originating in downtown Lake Oswego and Foothills Park.

2.3.1.3 Rail

The west side of the Tryon Creek Cove Trail study area is defined by OR 43 and by two parallel rail lines, one owned by UPRR and the second owned by the Willamette Shoreline Consortium which currently operates the Willamette Shore historic trolley. The consortium is comprised of seven government agencies (City of Lake Oswego, Metro, Oregon Department of Transportation, City of Portland, TriMet, Clackamas County and Multnomah County) that purchased the rail right-of-way for future transportation purposes in 1987.

The Willamette Shore Trolley operates excursion service between a station in Lake Oswego east of State Street (OR 43) near the foot of A Avenue, to the South Waterfront neighborhood of Portland. Service typically operates on weekends from Memorial Day through Labor Day.

The UPRR line is in regular use by freight rail traffic for the Portland and Western Railroad (PNWR) which operates a short-line freight rail service on over 300 miles of track in Oregon. PNWR uses the UPRR tracks in Lake Oswego to connect its network in the western portion of the metropolitan area to the UPRR mainline in Milwaukie.

2.3.1.4 Transit

TriMet lines 35 and 36 operate along OR 43 connecting the Lake Oswego Transit Center with downtown Portland.

2.3.1.5 Bicycle and Pedestrian

There are no improved bicycle or pedestrian trails, bike lanes, or sidewalks within the center (Tryon Cove Park) of the study area, but many informal pathways crisscross the area. Bicyclists and pedestrians trying to access the Tryon Creek Cove Trail study area must share the very narrow and steep Stampher Road with motor vehicles.

Two major developed trails are, however, at the periphery of this study area:

- The Terwilliger Trail, which connects Lake Oswego to the Tryon Creek State Natural Area along Terwilliger Boulevard west of OR 43, is a key connection for the trail pathway being planned within Tryon Cove Park.
- A developed section of the Willamette Greenway/Foothills Park Trail emerges from Foothills Park and ends just short of the south bank of Tryon Creek above the confluence with the Willamette River. This location was identified by both the OBEC and Alta studies (see Sections 2.1.1 and 2.1.2 of this Master Plan) for a trail extension from Foothills Park and a new bicycle/pedestrian bridge crossing the mouth of Tryon Creek.

2.3.2 Land Uses and Zones

The Tryon Creek Cove Trail study area is primarily zoned Parks and Open Space. Parks and Open Space allows for the development of multiuse and other trails. There are four other land use categories within the study area:

- The City of Lake Owego riverfront parcel that accesses a public pier and floating boat dock – Single Family Residential
- The area of the UPRR right-of way – Single Family Residential
- The study area south of Tryon Creek – Commercial and Industrial (One very small triangle of this Industrial zone extends over to the north side of the creek.)
- The portion of the Willamette Greenway/Foothills Park Trail within the study area – Parks and Open Space
- Along the OR 43 right-of-way south of the Terwilliger Boulevard Intersection – Parks and Open Space, Mixed Use Residential, and Single Family Residential

See Figure 5 for land use zone delineations.

Figure 5. Land Use Zones

8.5x11

2.3.3 Major Built Structures

Within the Tryon Creek Cove Trail study area there is presently only a modest one-story warehouse/storage-type building owned by the City of Lake Oswego. This building is currently leased to Alder Creek Kayak to use for seasonal boat rentals and tours. Planned BES wastewater treatment plant site improvements will remove this building. Outside of but directly abutting the east and north sides of the study area (Stampher Road), there are residential homes sited on five large lots.

Abutting the south side of the study area along bank of Tryon Creek are parcels occupied by three storage/warehouse buildings and the BES wastewater treatment plant. Only the vacant undeveloped north edges of these parcels are within the study area boundary.

Interceptor line carrying wastewater to Tryon Creek Wastewater Treatment Plant

2.3.4 Major Utilities

The scope of the Tryon Creek Cove Trail Master Plan does not require local lateral or distribution utility lines to be identified or mapped. Except for two aboveground wastewater interceptor main lines on the south bank of Tryon Creek (see Section 2.3.4, Wastewater) and buried wastewater lines on the north side, there are no *major* overhead or underground utility lines within the study area. BES *may* relocate and bury the two interceptors to the north side of the creek as part of planned treatment plant upgrades. There is also a 2-inch-diameter water line that follows Stampher Road.

The proposed improvements within the study area that will emerge from this Tryon Creek Cove Trail Master Plan are a new crossing of OR 43 to provide for safer bicycle and pedestrian access between the Tryon Creek State Natural Area, the Terwilliger Trail, and Tryon Cove Park; a bridge structure across Tryon Creek; and a 10- to 12-foot-wide asphalt pathway connecting these two crossings.

None of these planned trail improvements would require any upgrades or relocations of existing major utilities (with one possible exception – see the Wastewater section below). There are no known utility lines, buried at a shallow depth or otherwise, that could not remain in place if crossed by a paved trail pathway (some utilities, such as petroleum transmission lines, are buried at relatively shallow depths, but none are present within the study area).

2.3.4.1 Wastewater

Two major parallel wastewater interceptor lines follow the south bank of Tryon Creek from the northwest corner of the Tryon Creek Wastewater Treatment Plant in the direction of OR 43. These lines are elevated aboveground. This unconventional solution helps mitigate for unstable slope and soil conditions along the south bank of Tryon Creek. There is another major wastewater line that crosses under the creek near to the Alder Creek Kayak building. This is evidenced by manholes on the north bank of the creek.

The elevated wastewater lines could be an impediment to a bridge crossing and/or trail development along this section of the south bank. The OBEC study suggested excavating under these wastewater lines to allow the suggested Foothills Road Trail pathway to underpass the lines and connect to the Middle Alternative bridgehead. This Tryon Creek Cove Trail Master Plan does *not* recommend the Middle Alternative.

3. CROSSING AND ALIGNMENT ALTERNATIVES

3.1 Highway Crossing Solutions

The PAC initially considered four primary OR 43 crossing options (and the briefly reviewed two conceptual bridge overcrossing options). These four primary alternatives are illustrated on Figure 6 and Figure 7.

- Alternative 1 – Full traffic signal
- Alternative 2 – Tunnel
- Alternative 3 – Pedestrian-activated signal
- Alternative 4 – Foothills Park connection

The pedestrian-activated signal option was put aside by the PAC due to the complexities in following the rail right-of-way (buffers from active rail service, need for retaining walls, etc.) and the high probability that UPRR would not grant permission to do so.

The Foothills Park Connection option was *reserved* by the PAC in the sense that it might prove to be a possible *interim* solution if other options were found to be infeasible or were long delayed. See additional discussion under Section 3.1.1.4 of this Master Plan.

These choices generally mirrored the preferences documented at the project's first public open house. The PAC also declined to further consider two OR 43 bridge overcrossing options based on technical issues (such as meeting ADA standards) and the probable high cost of such overcrossings. (See Section 3.1.1.5 for a brief discussion.)

At the third PAC meeting (October 2018), selection of a preferred option between the full-signal and tunnel alternatives was deferred. BES also introduced two possible changes to wastewater treatment plant plans at the third PAC meeting that could alter trail preferences in the future. Preliminarily, the PAC indicated that both the tunnel and full-signal crossing options should be left on the table until BES plans are finalized at some point in the future.

All four primary options, potentially including the Foothills Park Connection alternative, may require new or revised crossing orders from Union Pacific Railroad (UPRR) and the Oregon Department of Transportation Rail Section (ODOT Rail). ODOT Rail indicated that the full signal and tunnel options would require new crossing orders despite going under rather than over the rails at grade. The existing Stampher Road undercrossing is subject to a current crossing order with exceptions. ODOT Rail felt that the changes in volume and type of road users would trigger UPRR review. See additional discussion under Section 3.5 of this Master Plan.

In addition, ODOT Rail confirmed that in its experience, UPRR would not permit a parallel trail to be constructed within its rail right-of-way.

Figure 6. Alternative 1 and Alternative 2

8.5x11

Figure 7. Alternative 3 and Alternative 4

8.5x11

3.1.1 Oregon 43 Crossing Options

3.1.1.1 Full Traffic Signal

Full signalization of the intersection of OR 43 at Terwilliger Boulevard and Stampher Road. Elements of this option include a new four-way signal (with Stampher Road controlled by a loop detector), closure of existing ramps to/from Terwilliger Boulevard, OR 43 bicycle/pedestrian crossing on the north leg of the intersection (to align with Stampher Road), an additional southbound OR 43 travel lane approaching the intersection, and shared-use of Stampher Road to access Tryon Cove Park. See Figure 6 and Figure 15.

3.1.1.2 Tunnel

New tunnel crossing under OR 43 and the UPRR/Willamette Shore Trolley rail lines. The tunnel would be located between Tryon Creek and Stampher Road. The tunnel entrance/exit on the west side of OR 43 may require ADA-compliant switchbacks or ramps and/or new pathway sections to connect to the Terwilliger Trail and to OR 43 and/or Terwilliger Boulevard. See Figure 6.

The existing Terwilliger Trail does not meet ADA grade standards in all respects. Redesigning and rebuilding the Terwilliger Trail up into the Tryon Creek State Natural Area is outside of the scope of this planning effort.

3.1.1.3 Pedestrian-Activated Signal

Crosses OR 43 just south of E Avenue and then follows an industrial access driveway crossing the UPRR/Willamette Shore Trolley rail lines. This driveway accesses existing storage buildings. After crossing the rail lines, the trail pathway would have to backtrack north along the UPRR rail right-of-way to connect to Stampher Road (see Figure 7). This option would have many of the same impediments as the OR 43-UPRR/Willamette Shore Trolley Rail creek crossing alternative described in Section 3.2.1.

This option requires the trail pathway to parallel the rail berm/trestle near Stampher Road, and would likely need retaining walls plus lengthy ramps to get down to the grade of Stampher Road. ODOT Rail advised that UPRR is highly unlikely to permit such a solution.

3.1.1.4 Foothills Park Connection

Utilizes existing sidewalks, shoulders, bike lanes, and the OR 43 signalized crossing at B Avenue to connect Terwilliger Boulevard/Terwilliger Trail to Foothills Road. Once on Foothills Road, existing trail pathways and sidewalks and shared-use roadways would connect bicyclists and pedestrians to Foothills Park, the Willamette River Greenway, and the new bridge crossing at the mouth of Tryon Creek to Tryon Cove Park (see Section 3.2.2).

This alternative has the advantage of using existing infrastructure. This option is, however, significantly out-of-direction for access to Tryon Cove Park. There are also no bicycle lanes or even wide shoulders along OR 43 between E Avenue and B Avenue. See Figure 7.

Improvements to install OR 43 bicycle lanes would entail widening the highway and rebuilding existing sidewalks. Adjacent commercial uses, especially vehicular driveways and parking, would be significantly impacted. Without bicycle lane improvements, designation and signing of this Foothills Park Connection alternative as even a temporary solution could entail significant safety and liability issues. As an interim or permanent solution that avoids major OR 43 improvements, shared use of local streets to the west of OR 43 could also be considered. Such alignments are, however, well outside the study area and the scope of this Master Plan. Metro and the City of Lake Oswego have announced their intentions to engage in discussions on these issues with highway frontage businesses and property owners subsequent to finalization of this Master Plan.

3.1.1.5 Bridge Options over OR 43

- **A single bridge (and potentially new connecting pathways) connecting Terwilliger Boulevard/Terwilliger Trail from the lower end of Tryon Creek State Natural Area over OR 43 and the UPRR and Willamette Shore Trolley rail lines to Tryon Cove Park.** Some analysis was undertaken for this option. To comply with ADA grade standards (under 5 percent) and railroad vertical separation requirements (24 feet), a 50-foot-long portion would have to be built out over the Willamette River. Other parameters are listed below:
  - Bridge structure would be around 500 feet long.
  - Cost around $7.5 million.
  - Bridge structure would be about 60 feet above Stampher Road.
  - To comply with ADA grades, the ramp would have to be 875 to 1,200 feet long.
  - Switchbacks, stairs, and/or an elevator would be required.
  - Structure would have substantial visual and functional impacts on Tryon Cove Park.
- **Two bridges and connecting shared-use streets (First Street and C Avenue).** The first bridge would connect the Terwilliger Trail over Tryon Creek to First Street, then follow shared-use sections of First Street to C Avenue. The second bridge needed for this option would span OR 43 and the rail lines at C Avenue. Once over the rail lines and on the east side, the bridge would "T" into two ramps that parallel the rail lines, the south ramp connected to Lake Oswego's Curleque Trail and the north ramp to Stampher Road. The north ramp would have the same challenges as the OR 43-UPRR/Willamette Shore Trolley Rail creek crossing option and the Pedestrian-Activated Signal option for getting across OR 43, including the distinct probability that UPRR would not approve trail development along the rail right-of-way.

Over the course of the first two PAC reviews of the full set of OR 43 crossing alternatives, these two possibilities for a bridge overcrossing of OR 43 were discussed. The PAC did not recommend that either of the two be considered further.

3.2 Tryon Creek Crossing Options

The PAC reviewed the following three Tryon Creek crossing options (illustrated on Figure 8 derived from the 2006 OBEC study) at its first meeting. The PAC expressed a clear preference for the crossing at the mouth of Tryon Creek. This choice was mirrored by the preferences documented at the project's first and second public open houses and was confirmed by the PAC at its third meeting.

3.2.1 Oregon 43-UPRR/Willamette Shore Trolley Rail

This alternative proposes a new trail pathway that parallels the rail lines and connects Foothill Road and the existing Curlicue Trail to Stampher Road. The crossing of OR 43 for this option would be at Foothills Road (similar to the Foothills Connection OR 43 crossing alternative). Users coming to/from the Terwilliger Trail and Tryon Creek State Natural Area would have to travel significantly out-of-direction to reach Tryon Cove Park. This solution would also require the trail pathway to parallel the rail berm/trestle near Stampher Road and would need retaining walls and ramps (similar to the pedestrian-activated signal OR 43 crossing alternative) to get down to the grade of Stampher Road. Permission from UPRR and ODOT Rail would be required. According to ODOT Rail, permission from UPRR is highly unlikely.

3.2.2 Mid-Point between the Mouth of Tryon Creek and OR 43

Would require a new trail pathway aligned between the City of Portland's wastewater treatment plant and adjacent storage buildings connecting Foothills Road to Tryon Creek. A creek bridge in this location would be constrained on the north bank of the creek by aboveground wastewater interceptor main lines. In addition, the wastewater plant will be undergoing a major upgrade that will include some of the property now occupied by the storage buildings. The current wastewater plant upgrade plan constrains or eliminates previously possible connecting pathway routes, and any trail route in this vicinity would significantly reduce trail user experience (views would be dominated by treatment plant facilities).

3.2.3 Mouth of Tryon Creek

With the addition of a new short paved trail section along the riverfront at the north end of the Foothills Park/Willamette Greenway Trail, this bridge location would be the most direct connection between Foothills Park and Tryon Cove Park. This has been the preferred alternative in both PAC and public open house reviews.

3.3 Connecting Trail Pathways

Two trail pathway types through Tryon Cove Park were considered. Both options are included in this Tryon Creek Cove Trail plan to diversify trail user experience and provide added trail capacity.

A paved bicycle/pedestrian multiuse trail conforming to state standards (10 to 12 feet wide) would generally follow the line of Stampher Road to its end, then continue through lower portions of the park to the preferred location of the new creek bridge at the mouth of the creek.

ODOT has indicated that to be considered a "regionally significant trail," and to thus be eligible for state funding, that the paved multiuse trail should be 12 feet wide with 2-foot-wide shoulders. A narrower multiuse trail would require a design exception.

A 3- to 4-foot-wide soft-surface nature trail would generally follow the north bank of Tryon Creek between upper Stampher Road and the new creek bridge.

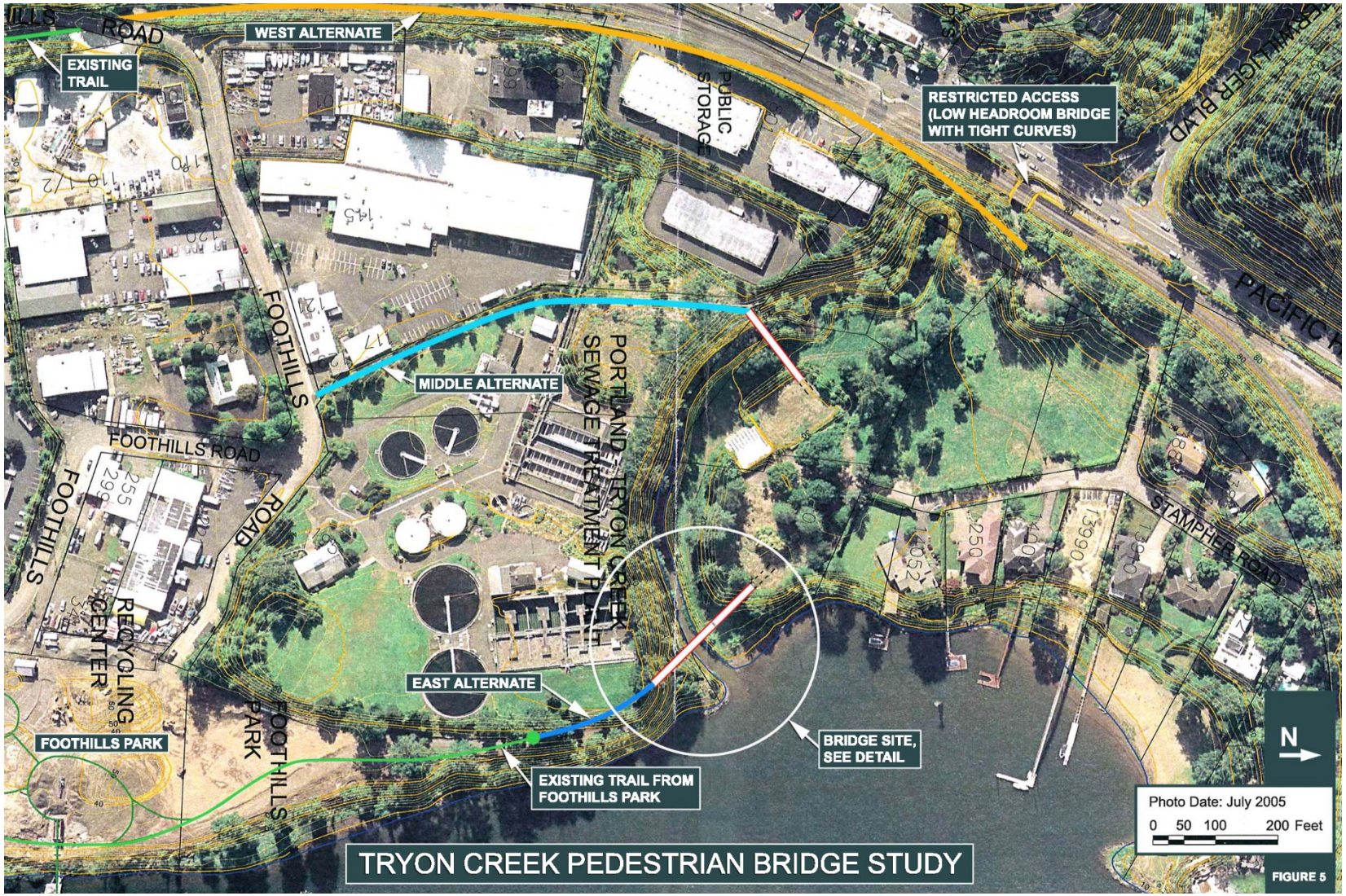


Figure 8. Creek Crossing Options

3.3.1 Trail Types

3.3.1.1 Multiuse Paved Trail

The full-signal and tunnel OR 43 crossing solutions would use a multiuse paved pathway to connect to the preferred bridge crossing at the mouth of Tryon Creek. The multiuse trail associated with the tunnel option would originate from the tunnel's east exit at Tryon Creek and then loop downhill through Tryon Cove Park to the river end of Stampher Road. The alignment associated with the OR 43 full-signal option would share use of Stampher Road until reaching the upper Stampher parking lot (see Figure 13 for location) and then loop through Tryon Cove Park to the river end of the road.

3.3.1.2 Soft-Surface Nature Trail

This trail element would consist of a 3- to 4-foot-wide soft-surface nature trail. For the OR 43 tunnel option, the nature trail would intersect with the multiuse paved trail extending from the east tunnel exit. For the OR 43 signal option, this nature trail would intersect with Stampher Road and the multiuse trail at the small parking lot on the upper east side section of the road. A soft-surface interim treatment on the future multiuse paved trail alignment could also be implemented.

3.3.1.3 Shared Use

Shared use of Stampher Road on the *west side* of the rail lines (between the rail lines and OR 43) is a necessity if the OR 43 full-signal option is selected. There are no practical options for *significantly* widening this road section or segregating bicycle/pedestrian and vehicular traffic (although some incremental capacity and safety improvements are possible, see Section 3.5 below). The shared use of the uppermost section of Stampher Road on the *east side* of the rail lines would also be necessary for the full-signal option.

3.4 Trail Alignment/Type Mitigating Factors

The most current preliminary alignments of the two PAC short-listed Tryon Cove Park pathway alternatives are illustrated on Figure 13 and Figure 14. Final alignments may be subject to three factors:

- **Location and type of OR 43 and Tryon Creek crossings** – The preferred OR 43 crossing will be either a full signal at Stampher Road/Terwilliger Boulevard or a tunnel undercrossing between Stampher and Tryon Creek. The general location of the creek bridge is common to all alternatives and is near the mouth of the creek (see earlier discussion under Tryon Creek Crossing Options).
- **Extent of proposed modifications to Tryon Cove Park to create more floodplain** – The BES Tryon Creek Wastewater Treatment Plant on the south side of Tryon Creek is in the design phase for a major upgrade and expansion. Several new plant structures will be elevated above the floodplain using fill. The City is required to replace this lost floodplain capacity.

  Replacement floodplain capacity could be created by excavation within Tryon Cove Park (see Figure 13 and Figure 14). These current plans for alterations to Tryon Cove Park, while not yet firmly established, should not have significant impact on the two proposed trail pathway alignments. Earlier plans involving storing excavation material at the upper end (nearest to OR 43) of the park would have significantly complicated both trail pathway alignments, but this material storage solution is no longer being actively considered by the City.

- **Wastewater treatment plant location** – The treatment plant may be moved to a new location and/or existing aboveground interceptor lines moved to and buried on the north side of Tryon Creek. Relocation would generally simplify trail development. Buried interceptor lines would also simplify trail pathway development, but may complicate tunnel location.

3.5 Stampher Road Improvements

Stampher Road is currently used by vehicles, bicyclists, and pedestrians. An improved OR 43 pedestrian and bicycle crossing leading to Tryon Cove Park would increase the use of this roadway and potentially increase user conflicts.

The tunnel option would avoid use of the steep, narrow constrained section of this roadway that drops down from OR 43 and under the railroad lines. The trail alignment emerging from the tunnel option would also avoid using the more constrained (width and grade) uppermost sections of Stampher Road on the east side of the rail.

In contrast to the tunnel option, the full signal option would have to use the constrained sections of Stampher Road on both sides of the rail lines. Safety and functional improvements to consider may include the following:

- New road paving and signing
- Redesign and repaving of the upper Stampher Road parking lot
- Repairs and upgrades to the actual rail undercrossing
- User-activated warning lights to alert users that there are bicyclists/pedestrians on the road
- Safety fencing and barriers
- Shoulder widening on the uppermost section of Stampher Road on the east side of the rail lines

Some of these road improvements could be mandated as part of the expected new UPRR/ODOT rail crossing order.

The exact extent of Stampher Road improvements, especially for the full signal option, will greatly depend on what a new rail crossing order stipulates. Therefore, the cost estimate for improving this roadway cannot be precisely calculated at this time. The Stampher Road improvement cost listed in Chapter 5 (Table 2) is order of magnitude only.

There are presently four parking areas along or near to Stampher Road: one on upper Stampher near the rail berm undercrossing; two near the Lake Oswego boat dock; and one near the Alder Creek building. The Alder Creek parking will be eliminated with removal of this building as part of the BES wastewater treatment plant upgrade. Elimination or reduction of the other three parking areas could be considered to discourage visitor vehicular traffic on this road.

This page intentionally left blank.

4. PRE-ENGINEERING EVALUATIONS

4.1 OR 43 Crossing Alternatives

As discussed earlier in this Master Plan, the two OR 43 crossing alternatives advanced by the PAC for more detailed pre-engineering concept design and analysis are Alternative 1 – Full Signal and Alternative 2 – Tunnel.

Neither of these alternatives requires an at-grade crossing of the Willamette Shoreline Trolley or UPRR rail lines.

- A cross-section for the OR 43 tunnel option is shown on Figure 9.
- The new Tryon Cove bicycle/pedestrian bridge and the Foothills Trail extension to the new south bank bridgehead are common to both OR 43 crossing alternatives. See Figure 10 and Figure 16.
- The concept design plan views for each alternative are illustrated on Figure 13 and Figure 14.
- Except for some minor alignment adjustments at the upper end of the study area, the trail pathways connecting both OR 43 crossing alternatives to the new Tryon Creek bridge are common to both alternatives. See Figure 13 and Figure 14.
- The new pattern of OR 43 driving and turning lanes, and sidewalks associated with the full signal alternative are shown on Figure 15.

Order of magnitude cost estimates were prepared for both alternatives based on these concept designs. At this early planning stage, each concept is based on a set of reasonable design assumptions based on experience in similar projects. See Chapter 5, Table 2 of this Master Plan.

Table 1. Standards for Key Trail Facilities

	Width (ft)	Length (ft)	Height (ft)
Tryon Creek Bridge	12–14	220	N/A
Foothills Trail Extension	10–12	160	N/A
Multiuse pathway	10–12	897–905[a]	N/A
Soft-surface nature pathway	3–4	780–878[a]	N/A
Tunnel	12	330	>10
Tunnel approach structure (west end)	12	350	N/A

a Range reflects the particulars of the OR 43 tunnel and signalization options.

4.1.1 Full Signal – OR 43 at Stampher Road and Terwilliger Boulevard

The following summarizes and discusses design details and constructability considerations. See Table 2, Figure 10, Figure 15, and Figure 16 for suggested cross sections and dimensions.

4.1.1.1 Design Details and Assumptions

- Added southbound lane 400 feet north of Terwilliger Boulevard needed to accommodate traffic volumes.
- Sidewalk added on east side between storage unit access and Stampher Road to provide logical connection for pedestrians
- Ramps to and from Terwilliger Boulevard eliminated to provide a safer bicycle/pedestrian crossing. Crosswalk spanning OR 43 is on north side of intersection to line up with Stampher Road.
- A new rail line crossing order will likely be required and would likely include improvements to Stampher Road and the rail undercrossing itself.

See Figure 15 for a schematic showing the suggested OR 43 improvements.

4.1.1.2 Constructability Considerations

- Traffic management plan would be required to ensure safe and efficient traffic operations during construction of the intersection.
- Rock wall excavation to create an additional southbound OR 43 lane could cause some noise impacts to adjacent properties.

4.1.2 Tunnel

4.1.2.1 Design Details and Assumptions

- Bicycle/pedestrian tunnel will be approximately 330 feet long. See Figure 9 for a tunnel cross section illustration.
- Tunnel will be sloped at approximately 3 percent. Pathway will be 12 feet wide. Lighting will be provided.
- Tunnel will begin at 58-foot elevation (west side of OR 43) and end at approximately 50-foot elevation (east side of OR 43).

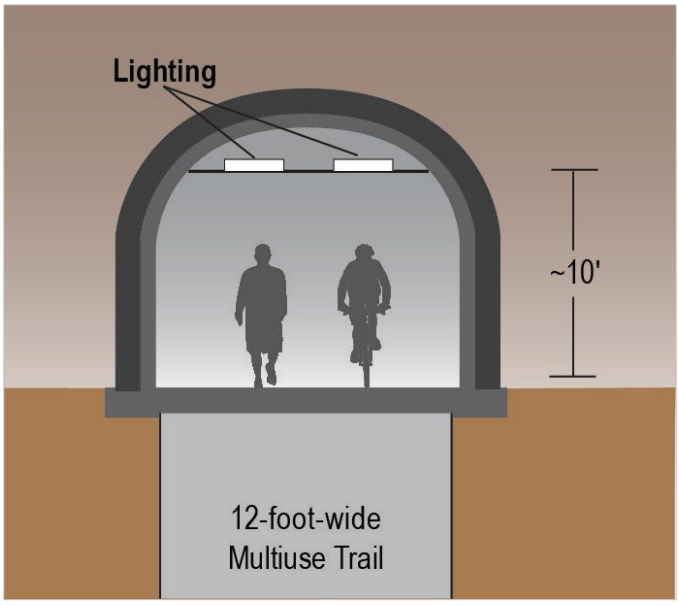


Figure 9. Tunnel Cross Section Under OR 43

- New bicycle/pedestrian ramp to the tunnel on the west end will connect into an existing pedestrian sidewalk on OR 43 just south of the intersection with Terwilliger Boulevard. This ramp will begin at approximately 84-foot

elevation and connect to the new tunnel approach structure entrance at 60-foot elevation. Ramp slope meets ADA requirements (8 percent maximum with 5-foot landings every 30 feet).

- The concrete approach structure and ramp to the tunnel from Terwilliger Boulevard will be approximately 350 feet long (8 percent slope with landings). Pathway within the footprint of the approach structure will be 12 feet wide and either asphalt or concrete.
- The approach ramp will be a concrete structure with side by side ramps and retaining walls cut into the existing hillside on the south side of Tryon Creek.

4.1.2.2 Constructability Considerations

- There are several utilities that cross the alignment of the tunnel. These include three water pipes at approximately 75-foot elevation, and a storm water line at approximately 73-foot elevation.
- There are existing aboveground gravity wastewater interceptor lines running along the south bank of Tryon Creek. These lines may be moved to the north side and close to the tunnel as part of the wastewater treatment plant improvements.
- Tryon Creek flows through an existing culvert below and to the south of the proposed tunnel. This culvert is being upgraded as part of a separate project, and the two projects will need to be closely coordinated.
- Depending on when the existing creek culvert is replaced, the tunnel may be constructed at the same time to reduce cost.
- The tunnel may be installed by either direct burial or micro-tunneling. The existing grades where the bicycle/pedestrian trail will be aligned are steep. Staging equipment and materials will be a challenge.
- The east tunnel portal will require an easement within the existing rail right-of-way. A new rail crossing order may be required for the tunnel but this is not expected to materially impact design or costs (such as would be the case with the probable new crossing order associated with the OR 43 signal options and Stampher Road).
- The west tunnel portal and approach structure will require easements within lands owned by the City of Portland and the Oregon Parks and Recreation Department.

4.2 Tryon Creek Crossing and Foothills Park Trail Extension

The Tryon Creek bicycle/pedestrian bridge and the short extension of the Foothills Park Trail to connect to the south bank bridgehead are illustrated on Figure 13, Figure 14, and Figure 16. Figure 16 shows the most complete detailed mapped information with respect to the bridge location and the alignment of the Foothills Park Trail extension.

Based on recent BES input, this pathway extension alignment has been modified somewhat from earlier illustrations to conform to advancing plans for redevelopment and upgrade of the City's wastewater treatment plant.

See Figure 10 for the new bridge cross section and Figure 16 for the connecting trail extensions to this bridge.

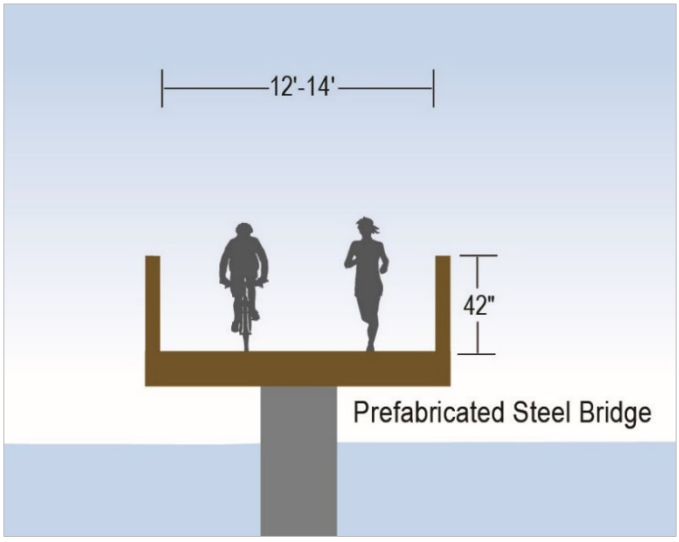


Figure 10. Bridge Cross Section

4.2.1 Design Details and Assumptions

- A new bicycle/pedestrian bridge and a 160-foot-long extension of the existing Foothills Park Trail along the Willamette River to Tryon Cove Park.
- The new bridge will be a prefabricated weathering steel truss bridge.
- The new bridge will begin at 45-foot elevation on the south bank of Tryon Creek and land at 34-foot elevation on the north bank.
- The new bridge is conceptually designed to be 220 feet long, consisting of a 130-foot span crossing Tryon Creek and a 90-foot span to land the bridge on a high point on the north bank of Tryon Creek and enter Tryon Cove Park.
- The bridge shall be graded with a uniform 5 percent slope to meet ADA requirements.
- The bridge shall be 12 feet wide minimum, 14 feet wide maximum.
- The Foothills Park Trail extension will require a cut section and possibly retaining walls along the east edge of the wastewater treatment plant property.

4.2.2 Constructability Considerations

- A cut slope will be needed on the corner of the wastewater treatment plant.
- Construction on the south side of Tryon Creek will be carried out from Foothills Park and construction on the north side of Tryon Creek will be carried out from Tryon Cove Park.

- The Stampher Road access to Tryon Cove Park is extremely limited for the purposes of delivering bridge construction materials and components. Stamper is narrow, crosses under the rail berm with two sharp turns, and with a clearance of only 12 feet 10 inches.
- The Willamette River near-shore along Foothills Park and Tryon Cove Park is too shallow to allow construction materials and components materials to be brought by barge.

4.3 Tryon Cove Park Pathways

Two trail pathways—a paved multiuse trail and a narrower soft-surface pathway—are illustrated that connect the OR 43 crossing alternatives to the north bridgehead of the new Tryon Creek bicycle/pedestrian bridge. These pathway alignments are illustrated on Figure 13 and Figure 14. The alignments do vary somewhat at the upper end of Tryon Cove Park depending on the OR 43 crossing solution being used. Both pathway alignments were reviewed by BES with respect to the planned floodplain mitigation areas within Tryon Cove Park to accommodate improvements increasing floodplain capacity. The possible floodplain mitigation area is illustrated on Figure 13 and Figure 14.

Beyond the constraints imposed by the BES floodplain mitigation area, there are no specific constraints to building the two pathways other than meeting any applicable State or local trail standards, compliance with ADA requirements, and making points of connection to the OR 43 crossing alternatives and the new Tryon Creek bridge. These points of connection are discussed earlier in this chapter.

This project will also entail new pathways and connectors to OR 43 and Terwilliger Trail on the west side of OR 43, and on the south side of Tryon Creek to the Foothills Park Trail and Foothills Park. These specific pathway connectors are discussed elsewhere in this Master Plan and are included in cost estimates.

4.3.1 Multiuse Pathway

The illustrated multiuse trail pathway has the following features and design/constructability issues:

- Standard State-compliant paved asphalt multiuse cross-section (10- to 12-foot-wide paved pathway with 2-foot-wide shoulders). See Figure 11. The full-signal multiuse pathway is 897 feet long. The multiuse pathway used for the tunnel option is 905 feet long between the east tunnel portal and the new Tryon Creek bridge.
- Maximum grade for both the full signal and tunnel iterations of this multiuse pathway is 5 percent, thus fully compliant with ADA grade requirements.
- Alignments stay completely outside of the BES floodplain mitigation area.

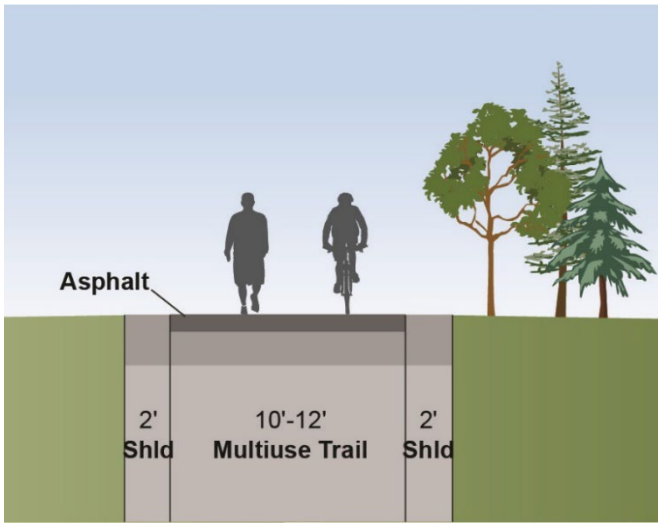


Figure 11. Multiuse Pathway

- Upper section of trail alignment for the OR 43 full signal alternative connects to Stampher Road on the east side of the rail berm at the informal parking lot located just after the road goes under the rail berm. This parking lot should be improved as part of this full-signal alternative.
- Upper section of the trail alignment for the tunnel alternative is lower down on the slope and connects to the tunnel's east entrance.
- For the tunnel option, there is a flat area at the east portal that could be developed as a staging area/viewpoint. This will help mitigate for the right angle in the trail alignment at this point that is dictated by slopes.
- As an interim measure until the issues discussed under Chapter 6 of this Master Plan are resolved, the *alignment* of the proposed paved multiuse trail could be used for a soft-surface loop pathway.

4.3.2 Phased Multiuse Trail Development

The alignment for the multiuse pathway through Tryon Cove Park could be phased. Initial improvements could be limited to a 3- to 4-foot-wide soft-surface pathway. This could be linked to the permanent soft-surface nature pathway that is planned (see Section 4.3.3) to create a loop through the park.

This phased approach would avoid having to relocate any paved trail through the park that may conflict with final BES plans.

4.3.3 Nature Pathway

The illustrated nature pathway has the following features and design/constructability issues:

- Three- to four-foot-wide soft surface pathway. See Figure 12. The full-signal-associated nature trail is 878 feet long. The tunnel-associated nature trail is 780 feet long.
- Trail is steep (8 percent at upper end, 12 percent at lower end). ADA compliance is however not required for this secondary, limited purpose pathway.
- Aligned along the north bank of Tryon Creek. A very short lower section of this pathway passes through the southeast edge of the BES floodplain mitigation area. Prior BES designs illustrated a section of nature pathway within this area, so this is not expected to be an issue.

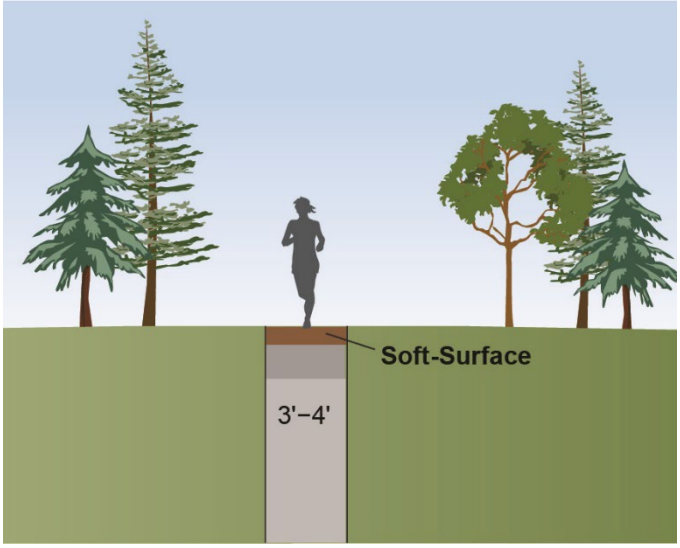


Figure 12. Nature Pathway

- For the full signal iteration of this alignment, the nature pathway turns northeast and connects to the same Stampher Road parking lot as with the multiuse paved trail. For the tunnel alternative, the nature pathway simply continues straight north to connect with the tunnel's east portal staging area and entrance.

Figure 13. Traffic Signal/Stampher Road Crossing

11x17

Figure 14. Highway/Rail Tunnel Undercrossing

11x17

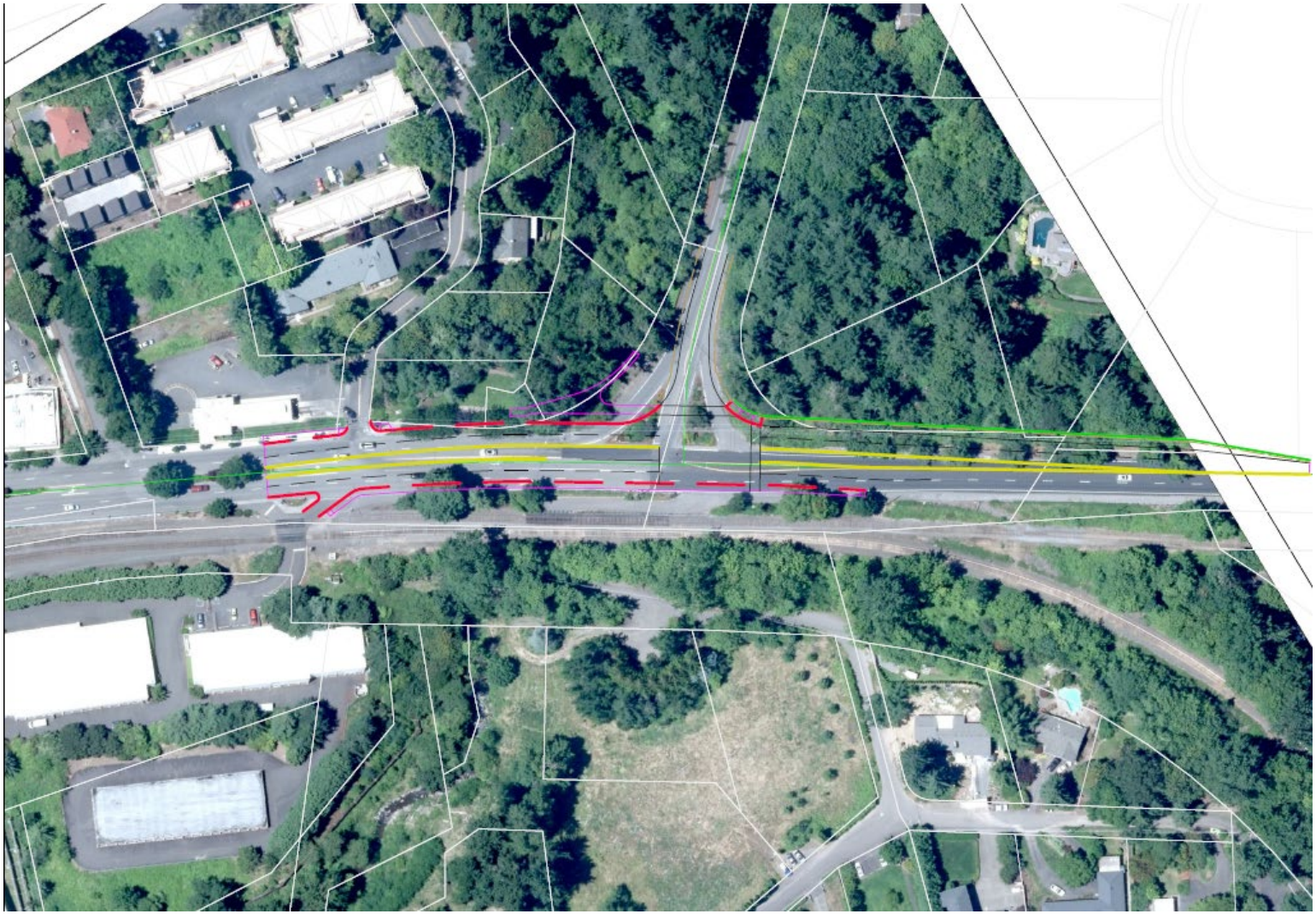


Figure 15. Full Signal Alternative – OR 43 Lane Changes/Improvements

Figure 16. Connections to Foothills Park Trail and Proposed Cove Trails

8.5x11

5. PRE-ENGINEERING COST ESTIMATES

Table 2 enumerates the key cost elements for Alternative 1 – OR 43 Full Signal and Alternative 2 – Tunnel. Cost estimates include percentages of the construction cost to account for design/permitting/construction engineering (25 percent) and contingencies (30 percent). These estimates also include the following:

- The cost of extending the Foothills Park Trail to the new Tryon Creek bridge.
- Possible Stampher Road improvements are listed in Section 3.4 of this Master Plan. The actual improvements will be subject to a great extent to future stipulations from a revised rail crossing order. The listed cost is an order of magnitude placeholder and is subject to change.

New right-of-way may be required for solutions involving improvements to OR 43/State Street. The costs of right-of-way acquisitions are not included in the cost estimates.

Table 2. Cost Summary

Alternative 1 – OR 43 Full Signal	
OR 43 signalization and improvements	$ 4.84 M
Stampher Road improvements[a]	$ 1.56 M
10-foot-wide multiuse pathway[b]	$ 310 K[b]
Soft-surface pathway[c]	$ 110 K
14-foot-wide bridge/approaches with Foothills connection	$ 1.35 M
Total	**$ 8.17 M**
Alternative 2 – OR 43 Tunnel Undercrossing	
12-foot-wide horseshoe-shaped tunnel/approaches	$ 11.41 M
10-foot-wide multiuse pathway[b]	$ 310 K
Soft-surface pathway[c]	$ 100 K
14-foot-wide bridge/approaches with Foothills connection	$ 1.35 M
Total	**$ 13.17 M**
Additional Option	
Interim soft-surface pathway on multiuse trail alignment	
Full signal	$112,000
Tunnel	$113,000

a Order of magnitude estimate only. Cost is dependent on as-yet-to-be-determined crossing order stipulations.

b A 12-foot-wide paved trail would increase the cost by approximately 25 percent (to $390,000).

c Pathway along Tryon Creek only.

This page intentionally left blank.

6. TECHNICAL EVALUATION PROCESS

The following criteria were utilized in evaluating solutions for aligning a multiuse trail though Tryon Cove Park via bicycle/pedestrian crossings of OR 43 and Tryon Creek:

- Safety
- Route directness
- Cost
- Ease of use
- Traffic impacts
- Environmental impacts
- Institutional barriers
- Constructability

The final selection of the preferred OR 43 crossing alternative may have to wait until processes and inputs outside the scope and timeframe of this Master Plan are completed. These processes include the following:

- *Conclusion of BES location and design of an upgraded or new wastewater treatment plant.*
- *Engineering of the final location and design of the Tryon Creek culvert replacement.*
- *Requirements generated by a new Stampher Road crossing order issued by UPRR.*
- *The outcomes of the upcoming Oak Grove-Lake Oswego bicycle/pedestrian Willamette River bridge study may impact Tryon Cove Park, in particular the OR 43 crossing recommendations in this Master Plan.*

The initial evaluation process was qualitative, not quantitative, and was applied to all three creek crossing alternatives, as well as the initial four OR 43 crossing alternatives. Attributes and constraints were cataloged and reviewed with the PAC.

In reviewing trail and crossing options presented in this Master Plan, the PAC met four times and participated in two public open houses. See Section 1.4 of this Master Plan for more information.

Table 3 compares the performance of the OR 43 signalization and tunnel options relative to the evaluation criteria listed above.

Table 3. Comparison of Signal and Tunnel Options

Criterion	Alternative 1 – Full Signal	Alternative 2 – Tunnel
Safety	• Requires shared use of Stampher Rd • Improves vehicle and trail user safety	• Avoids conflicts on Stampher Rd • Concerns over personal safety • Avoids at-grade crossings
Route Directness	• Reasonably direct access to Tryon Cove Park	• Most direct access to Tryon Cove Park
Cost	• Conventional known cost solution • May require Terwilliger ramp removal and added southbound lane	• Higher cost
Ease of Use	• Signal crossing familiar to users	• Tunnel raises concerns over personal safety
Traffic Impacts	• Increases shared use of Stampher Rd • Signal could increase OR 43 congestion	• No adverse operational impacts on OR 43 or Stampher Rd traffic
Environmental Impacts	• Minimal	• Extensive during construction phase • Connection to Terwilliger Trail may impact natural area
Institutional Barriers	• Likely meets ODOT signal warrants • Likely to require revised crossing order from ODOT Rail and UPRR	• Likely to require revised crossing order from ODOT Rail and UPRR
Constructability	• No significant issues	• Construction will be complex but is doable

7. IMPLEMENTATION

7.1 Phasing Concepts

Phasing possibilities were reviewed at the third PAC meeting and at the second public open house. A general consensus emerged:

Phase 1 – Tryon Creek Bridge and Foothills Park Trail connection

- $1.35 million

Phase 2 – Tryon Cove Park trail pathways

- Paved multiuse pathway – 10 to 12 feet wide, $310,000 to $390,000
- Soft-surface nature pathway – 3 to 4 feet wide, $100,000 to $110,000

Phase 3 – OR 43 railroad crossing alternatives and Terwilliger Trail connection

- OR 43 full signal at Terwilliger Boulevard including Stampher Road improvements – $6.4 million
- OR 43/rail tunnel undercrossing – $11.41 million

Phases 1 and 2 may be combined, at least with respect to the nature pathway. The development of the paved multiuse pathway should probably wait until factors impacting the final selection of the OR 43 crossing alternative are at least resolved at the *plan* level (see Chapter 6 for more discussion).

7.2 Additional Phasing Opportunities

- Soft-surface on multiuse alignment – $112,000 to $113,000
- OR 43/State Street bicycle/pedestrian improvements – Estimating a cost is outside the scope of this Master Plan. See Section 3.1.1.4 of this Master Plan for a discussion of the factors and issues with this option.

7.3 Funding

As documented in Chapters 5 and 7 of this Master Plan, the development of the full package of recommended improvements – new Tryon Creek bridge and approach, soft- and hard-surface trail pathways, and either a tunnel undercrossing or at-grade signalization of OR 43 – will require considerable capital funding. The full-signal package is estimated at $8,170,000 to $8,250,000 and includes OR 43 and Stampher Road improvements. The tunnel package is estimated at $13,170,00 to $13,250,000 and includes a major approach structure on the west side of OR 43.

Roadway improvements to OR 43 and Stampher Road contemplated as part of the OR 43 signalization alternative may not be eligible for either Metro or Lake Oswego parks capital funds. ODOT or City capital funding designated for motorized vehicle streets and highways may be required.

Costs for the recommended next steps: Trail Bridge over Tryon Creek and connection to existing Foothills Park Trail - $1.35 million (estimate) and $110,000 (estimate) for soft surface trails in Tryon Cove. These costs will increase with doing the design/engineering/permitting work and inflation.

Three possible sources of *local* capital funding have been identified for master plan implementation.

- **Metro Parks and Nature Bond** – Metro is considering going to the regions voters, in the fall of 2019, to request an extension of the current natural areas bond measure which supports acquisition and park and open space improvements. This measure follows two previous successful parks bond measure authorizations, in 1995 and 2006. While the criteria has not been developed for potential projects which could be funded by this bond measure, the proposed trail system improvements may be eligible for funding, except possibly for improvements to OR 43 (see Figure 15). Potential funding for this project from a 2019 Natural Areas Bond should not be assumed.
- **City of Lake Oswego Parks Bond** – The City is proposing a bond measure for parks improvements for consideration by City voters in spring 2019. The Tryon Creek bridge and pathway connection to the Foothills Park Trail are specifically included in the list of capital projects eligible for this bond funding. Other elements of this Master Plan – new trails within Tryon Cove Park and potentially the tunnel – may also be eligible.
- **City of Lake Oswego Parks System Development Charges (SDC)** – SDC funds are available for development of facilities within the city limits providing extra capacity to the City's parks system. The new Tryon Creek bridge, Foothills Park Trail connection, new trails within Tryon Cove Park, and potentially the tunnel should be eligible for City SDCs.

In addition, multiuse (paved) sections of the new Tryon Cove Park Trail, the tunnel underpass, and bicycle/pedestrian improvements to OR 43/State Street associated with the Foothills Park Connection could be eligible for state funding and pass-throughs from several sources – Connect Oregon, Regional Flex Funds, etc. Eligibility for and use of these funds may trigger state and federal design standards, as well as additional processes. Cost estimates included this Master Plan already assume that such standards would be applied.

7.4 Operation and Maintenance

As all planned Tryon Cove Creek Trail facilities (hard- and soft-surface pathways, bridge, and potentially a tunnel) will be new construction, initial maintenance costs would be relatively low, consisting of vegetation management, surface sweeping, and minor repairs. The future trail operators can anticipate that the soft-surface sections of the trail will require more care from the outset, as well as more frequent minor repairs to maintain the surface. Repair costs should, however, be relatively lower as compared to costs associated with asphalt hard-surface pathway repairs.

The future operators will also have to anticipate the probable frequency and extent of repairs resulting from flood conditions. Significant portions of the study area are within the 100-year floodplain, and proposed improvements to the site as part of BES wastewater treatment plant upgrades will increase floodplain capacity. The conceptual locations of both hard-surface and soft-surface pathways stay above the altered 100-year floodplain, as shown in late-2018 BES plans. The one exception is a short section of the soft-surface nature pathway at the south end of the expanded flood area (see Figure 13 and Figure 14).

Trail design/engineering should determine the need for site stormwater drainage improvements to reduce potential flood and runoff damage.

The trail may have two major features with somewhat different maintenance needs – the bicycle/pedestrian bridge over Tryon Creek and potentially a bicycle/pedestrian tunnel and approach structures under OR 43 and the UPRR berm. Vegetation management would be minimal for these structures, and concrete and steel bridge construction and the weather barrier provided by the tunnel would help reduce maintenance costs.

If the full signal alternative for crossing OR 43 is selected, it is assumed that ODOT will bear any maintenance costs. Stampher Road improvements associated with the full signal alternative should reduce roadway maintenance costs. Stampher Road is currently under City of Lake Oswego jurisdiction.

As the most proximate municipal operator of trails near the study area, the City of Lake Oswego was consulted as to its current trail maintenance budget. The City operates 12 miles of soft-surface trails and just under 6 miles of hard-surface pathways, including the Foothills Trail and Curlicue Trail just south of the Tryon Creek Cove Trail Master Plan study area. The total annual maintenance budget for the Lake Oswego trail system is $74,000 or approximately $4,200/mile. The City does not differentiate hard and soft surfaces in its maintenance program budget or expenditures.

At time of publication of this Master Plan, the public agency ultimately responsible for operating and maintaining the Tryon Creek Cove Trail system has not *been determined.*

January 2019 update:

Phase I: Trail bridge over Tryon Creek and the trails in Tryon Cove Park will be owned and maintained by the City of Lake Oswego. If needed, an Intergovernmental Agreement will be approved by Lake Oswego, Portland and Metro.

Phase II & III: Ownership and maintenance to be determined.