Lake Oswego to Portland

TRANSIT PROJECT

REFINEMENT PHASE

FINAL REPORT

FINAL DRAFT – JANUARY 19, 2012

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REFINEMENT PHASE
FINAL REPORT

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CONTENTS

LIST OF FIGURES

EXECUTIVE SUMMARY

KEY OBJECTIVES OF REFINEMENT PHASE

- Respond to community concerns regarding cost and impacts, and specific requests from the Lake Oswego and Portland city councils for additional information on project costs, finance plan, schedule and other issues.
- Refine and simplify the project alignment to specifically address issues of project costs by analyzing opportunities to reduce capital costs and local match requirements.

REFINEMENT PROCESS

- The Refinement Phase follows the earlier Federal Draft Environmental Impact Statement (DEIS) phase which was completed in December 2010. This has allowed new and previously discarded ideas to be considered that will reduce project costs and improve compatibility with other projects in the Lake Oswego to Portland transportation corridor. The proposed revisions to the project definition may necessitate further environmental work to comply with federal environmental impact regulations.
- Portland Streetcar, Inc. (PSI), the organization that has overseen design, construction and operation of the existing streetcar lines in Portland for the past 15 years, has taken the lead on this phase of the project.
- Completion of the DEIS and initial steps in the Locally Preferred Alternative (LPA) process resulted in considerable community concerns regarding the cost and impact of the project. The Project Team carefully listened to these concerns and the project has been "rebooted"— resulting in changes to the project definition, and reductions in the cost and impact of the project.

KEY OUTCOMES

Recommended Refinements to the Project Scope

- Further analysis of alignment options in the South Waterfront has resulted in a recommendation to pursue the "Bancroft" option utilizing SW Bancroft St. as the entry/exit point to/from SW Macadam Ave. Based on updated cost estimates, this option is estimated to result in a savings of at least $10.5M (in 2011 dollars) compared to the most expensive option considered in the DEIS. This option would result in improved travel times and other benefits and would likely require the City of Portland to take jurisdiction of Macadam Ave. from ODOT.
- The alignment in Lake Oswego has been shortened by about 3 blocks and the park and ride facilities have been consolidated at a new location near B Ave. consistent with the recently approved Framework Plan for the Foothills District.
- A key recommendation resulting from the refinement work is for the use of a single-track configuration for over a 2-mile stretch of the alignment between a newly proposed station near SW Radcliff St., through Dunthorpe/Riverdale to the Briarwood Station near the Lake Oswego City Line. PSI believes that single tracking in this area can be introduced without impacting overall travel times and ridership and entail far less impact on properties adjacent to the alignment due to reduced grading and construction work.
- PSI recommends the extensive use of paved track rather than the tie-and-ballast trackway assumed in the DEIS. Paved track has a narrower footprint than tie and ballast and provides more stability to the track so it will: a) reduce the need for retaining walls while improving soil stability and drainage; b) enhance the visual appearance of the trackway; c) reduce vibration; d) minimize or eliminate

modifications to existing driveways and adjacent property; and e) reduce on-going maintenance costs.

- In order to further reduce the visual impact of the alignment, PSI recommends extensive use of a single overhead wire, in combination with limited double wire overhead catenary system (OCS), instead of the full-alignment double wire system assumed in the DEIS.
- Based on community feedback during the DEIS phase, stations have been added at SW Pendleton St. and SW Radcliff St.

Revised Engineering and Construction Costs

- The streetcar line to Lake Oswego can be designed and constructed for about **$200M** in 2011 dollars, exclusive of the cost to construct a park and ride facility.
- Including a 400-space park and ride facility in Lake Oswego, the engineering and construction cost would be about **$208M** in 2011 dollars
- A Minimum Operable Segment (MOS) to a station at SW Nevada St. can be designed and constructed for about **$70M** in 2011 dollars.
- Despite the recommended design upgrades developed as part of the refinement process, these costs remain lower than the equivalent costs included in the DEIS because the refined alignment is straighter, shorter and has fewer impacts to be mitigated.

Updated Finance Plan

- A set of preliminary finance plans has been prepared based on the revised project costs outlined in this report. Three (3) alternative finance plans were prepared for: a) a full-length streetcar line between SW Lowell St. and downtown Lake Oswego; b) a full-length project that assumes that certain development costs related to street improvements along the streetcar alignment in the Foothills District in Lake Oswego could be included in a federal grant for the streetcar project; and c) a MOS between SW Lowell St. and SW Nevada St.
- The alternative finance plans result in a range of federal and local funding requirements and serve to layout potential 'targets' for funding the project.
- The finance plans are based, in part, on an updated appraisal for the Willamette Shore Line right-of-way prepared by Gail Webb (December 2011).
- The following table summarizes the potential finance plan options.

SUMMARY OF FINANCE PLAN OPTIONS
In Millions of Year-of-Expenditure Dollars (YOE$)

FINANCE PLAN OPTION	ENGINEERING AND CONSTRUCTION COSTS ($M 2011)	PROJECT[1] COSTS (MILLIONS OF YOE$)	VALUE OF WSL ROW USED FOR PROJECT (MILLIONS OF YOE$)	POTENTIAL FEDERAL SHARE (MILLIONS OF YOE$)	POTENTIAL LOCAL, REGIONAL & STATE FUNDS (MILLIONS OF YOE$)
A - Streetcar to LO	$208.2	$270.6	$58.0	$197.2	$73.4
B - Streetcar to LO + Foothills Infrastructure	$224.8	$293.6	$58.0	$210.9	$82.7
C - MOS to Nevada St.	$69.4M	$90.0	$4.7	$56.9	$33.1

[1] Includes engineering, construction and finance costs.

Note: This table assumes a 60% federal share. If the federal share were reduced to 50%, the local, regional, and state funds needed would be increased.

- A comparison of the preliminary finance plans that resulted from the Refinement Phase work for the basic project between Portland and Lake Oswego to that shown for the "high" estimate shown in the DEIS shows:
  a. The estimated cost of the project has been reduced in cost by over $59M (in 2011 dollars), or 22% less than shown for the "high" cost option in the DEIS[1].
  b. While the value of the Willamette Shore Line (WSL) right-of-way that would be contributed to the project and used for local match purposes has been reduced to $58M (due to a combination of reduced value and less of the right-of-way being included in the project), the overall impact to the finance plan is mitigated by the lower cost of the project.
  c. The refined project as outlined in this report is less expensive and the potential FTA grant for the project would be smaller than projected in the earlier work ($197M versus $275M). However, the total amount of local, regional and state funds does not change appreciably from the earlier work[2]. This is due in part to the WSL right-of-way contributing a smaller amount to local match requirements because of reduced value and the fact that less right-of-way is being used. Also, the marginal amount of funds required from the City of Portland for an option that does not involve the proposed South Portal project increases to $16M from $9M for the MOS to Nevada St. and under the full project to Lake Oswego.

OTHER FINDINGS AND RECOMMENDATIONS

Streetcar Operations Plan

- PSI recommends procurement of four (4) new streetcars as part of the project rather than the six (6) assumed in the DEIS. This recommendation will also result in reduced operating costs and elimination of the cost for a maintenance facility expansion and an additional vehicle storage facility.
- Proposed service on the streetcar line to Lake Oswego would be integrated with existing service from NW 23rd Avenue (soon to be known as the Streetcar "B" Line). The B-Line south terminus would be extended from SW Lowell to Lake Oswego and operated at peak service times at 12-14-minute frequency.

Project Governance

- Portland Streetcar, Inc. should become the lead agency for development of the new line to Lake Oswego. The streetcar vehicles acquired by the project should become an integral part of the Portland Streetcar fleet and they should be maintained and stored in the existing Portland Streetcar Maintenance facility. Integration of the Lake Oswego line with other Portland Streetcar assets and services will result in capital and operations cost savings and help assure maximum rider convenience and access.

[1] Note that DEIS costs were in 2010 dollars.

[2] The DEIS estimated total State, Regional and Local Funds needed for the "High" cost for the Streetcar project at $78.3M (YOE$) [See Table 5.1-8 (page 5-13) of the DEIS]. The updated estimate indicates total State, Regional and Local Funds at $73.4M (YOE$).

INTRODUCTION

KEY OBJECTIVES OF REFINEMENT PHASE

The following were the stated objectives for the Refinement Phase:

- Respond to community concerns regarding cost and impacts and to specific requests from the Lake Oswego and Portland city councils for additional information on project costs, finance plan, schedule and other issues.
- Refine and simplify the project alignment to specifically address issues of project costs by analyzing opportunities to reduce capital costs and local match requirements.
- Respond to specific requests from the Lake Oswego and Portland city councils for additional information on project costs, finance plan, schedule and other issues.
- Design and engineer the Project to position the Project for 60% federal funding.
- Address property owner issues.
- Refine and simplify the project alignment to specifically address issues of project costs by analyzing opportunities to:
    - Reduce capital cost
    - Reduce local match
- Obtain low (good) cost effectiveness rating while addressing:
    - Capital Cost
    - Ridership
    - Park and Ride requirements
    - Capacity
    - Travel times
    - Safety
    - Long-term operations sustainability
- Identify needed environmental steps stemming from the refinement of the project and define the next steps in the environmental and funding processes for the project.
- Address governance and management responsibilities for the project going forward.
- Produce a set of preliminary findings and a preliminary report by 9/30/11 and a final report by 1/31/12.

REFINEMENT PROCESS

The Refinement Phase was initiated in fall 2011 pursuant to the Intergovernmental Agreement between TriMet and Portland Streetcar, Inc. (PSI) dated September 1, 2011. The following summarizes the process undertaken to refine the proposed alignment, costs and preliminary finance plans for the project:

- Portland Streetcar, Inc. (PSI), the organization that has overseen design, construction and operation of the existing streetcar lines in Portland for the past 15 years, has taken the lead on this phase of the project. PSI has brought its construction and operational expertise to the table, along with a fresh perspective on the project.

- The Refinement Phase follows the earlier Federal Draft Environmental Impact Statement (DEIS) phase. This has allowed new and previously discarded ideas to be considered that will reduce project costs and improve compatibility with other projects in the Lake Oswego to Portland transportation corridor. The proposed revisions to the project definition may necessitate further environmental work to comply with federal environmental impact regulations.
- PSI, working with the project consultants, Shiels Obletz Johnsen, Inc. (SOJ), the engineering consultants, URS, Inc. and Stacy and Witbeck, Inc. (SWI), experienced streetcar contractors, identified potential revisions to the project alignment and scope. A series of changes, minor to significant, were introduced, analyzed and eventually costed. A peer review of the proposed revisions was conducted by TriMet prior to issuance of this report.
- SWI developed a new cost estimate based on the revised project definition utilizing highly contemporary streetcar costs grounded in on-going streetcar construction work in Portland.
- PSI was responsible for developing the proposed operating plan for the project based on its experience operating the streetcar lines in Portland over the last 10 years.
- Steve Siegel, an experienced financial consultant to TriMet and other local public agencies, was responsible for revising and updating the preliminary finance plans outlined herein.

KEY OUTCOMES

SUMMARY

Completion of the DEIS and initial steps in the Locally Preferred Alternative (LPA) process resulted in considerable community concerns regarding the cost and impact of the project. The Project Team carefully listened to these concerns and the project has been "rebooted"— resulting in significant changes to the project definition, and reductions to the cost and impact of the project.

ENGINEERING AND CONSTRUCTION COSTS

The project costs outlined in this preliminary report are defined specifically in response to the following question: ***What is the cost to build a streetcar line from Portland to Lake Oswego in 2011 dollars?"*** The costs identified reflect three (3) significant changes to the defined project compared to the project outlined in the DEIS:

- The recommended project largely avoids the City of Portland's proposed South Portal project and thus does not include significant land acquisition and construction costs that were previously included;
- The Sellwood Bridge project is now essentially engineered and includes certain construction elements and costs that were previously considered in the DEIS; and
- There has been a concerted effort to limit the infrastructure costs included in the streetcar cost estimate to those costs associated exclusively with building a streetcar line. This effort removed Foothills related infrastructure costs from the streetcar only project cost estimate.

The streetcar line to Lake Oswego can be constructed for about **$200M** in 2011 dollars, exclusive of the costs to construct a park and ride facility. If a 400-space park and ride facility is included in the project, the estimated cost would be **$208M** in 2011 dollars. A Minimum Operable Segment (MOS) to a station at SW Nevada St. can be constructed for about **$70M** in 2011 dollars. Despite the recommended design upgrades developed as part of the refinement process, these costs remain lower than the equivalent costs included in the DEIS because the refined alignment is straighter, shorter and has fewer impacts to be mitigated.

REFINEMENTS TO THE PROJECT

South Waterfront/North Macadam Revisions

Further analysis of alignment options in the South Waterfront has resulted in a recommendation to pursue the "Bancroft" option utilizing SW Bancroft St. as the entry/exit point to/from SW Macadam Ave. Based on updated cost estimates, this option is estimated to result in a savings of at least $10.5M compared to the most expensive option considered in the DEIS. In addition, this alignment refinement reduces the value of the WSL ROW attributed to the project because it uses less of that alignment. This option eliminates six (6) 90 degree, 5 mph turns in the trackway and will result in improved travel times (up to 3 minutes), reduced wheel 'squeal' caused by the tight radius turns and enhanced rider comfort. The reduction in the number of 90-degree turns will also reduce wear and tear on streetcar vehicles and tracks. This option would likely require the City of Portland to take jurisdiction of Macadam Ave. from ODOT.

Lake Oswego Revisions

The alignment in Lake Oswego has been shortened by about 3 blocks, and the park and ride facilities have been consolidated at a new location near B Ave. consistent with the Framework Plan for the Foothills District approved by the Lake Oswego City Council in December 2011. Key changes to the alignment in Lake Oswego include:

- Moving the terminus from just north of the Albertsons Shopping Center to a location on State St. opposite Millennium Park.
- Adjusting the alignment of the streetcar to conform to the infrastructure plan in the adopted Foothills Master Plan. The streetcar alignment now lines up with the preliminary plans for an extended Foothills Rd., including a new intersection at SW Terwilliger Blvd. and a new structure over Tryon Creek.
- Combining the previously proposed two park and ride facilities, with 300 and 100 spaces each, respectively, into a single 400-space structure near the future intersection of B Avenue and Foothills Rd.

Character-Of-The-Alignment Revisions

The following changes to the design and construction of the streetcar line are recommended:

- A key recommendation resulting from the refinement work is for the use of a single-track configuration for over a 2-mile stretch of the alignment between a newly proposed station near SW Radcliff St., through Dunthorpe/Riverdale to the Briarwood Station near the Lake Oswego City Line. PSI believes that single tracking in this area can be introduced without impacting overall travel times and ridership. In addition, single tracking will entail far less impact on the neighborhoods along the alignment due to reduced grading and construction work within and outside the Willamette Shore Line right-of-way.

Example of double-wire overhead catenary system

- PSI recommends the extensive use of paved track rather than the tie-and-ballast trackway assumed in the DEIS. Paved track is proposed for much of the alignment between SW Carolina St. and Briarwood Stations, a stretch of over 3.8 miles. Paved track has a narrower footprint than tie and ballast and provides more stability to the tracks so it will: a) reduce the need for retaining walls while improving soil stability and drainage; b) enhance the visual appearance of the trackway; c) reduce vibration; d) minimize or eliminate modifications to existing driveways and adjacent property; and e) reduce on-going maintenance costs.
- In order to further reduce the visual impact of the alignment and reduce the complexity and cost of installation, PSI recommends extensive use of a single overhead wire in combination with limited double wire overhead catenary system (OCS) instead of the full-alignment double wire system assumed in the DEIS.

Example of single overhead-wire

- Based on community feedback during the DEIS phase, stations have been added at SW Pendleton St. and SW Radcliff St.

- PSI recommends procurement of four (4) new streetcars as part of the project rather than the six (6) assumed in the DEIS. This is based on PSI's recommended approach for integrating Lake Oswego service with existing streetcar service between NW 23rd Ave. and SW Lowell St. This recommendation will also result in reduced operating costs and elimination of the cost for a maintenance facility expansion and an additional vehicle storage facility.
- The refined alignment is shown in Exhibit A.

HOW HAS THE PROJECT CHANGED FROM THE PROJECT DEFINED IN THE DEIS

Figure 1 provides a comparison of the key changes between the project proposed in the DEIS and the project recommended in this report.

FIGURE 1.
KEY DIFFERENCES BETWEEN DEIS PROJECT AND REFINED PROJECT

SEGMENT	DEIS PROJECT	REFINED PROJECT
1 -South Waterfront (SW Lowell St. to SW Boundary St.)	• Two options considered: one with the South Portal Project and one without. • Both options used a circuitous alignment along the WSL and privately-owned SW Landing Drive to connect to SW Macadam Ave. at SW Boundary St.	• Uses existing intersection at SW Bancroft St. for access to/from SW Macadam Ave. • Allows Streetcar and South Portal projects to be on independent schedules while allowing both projects to proceed largely independent of each other. • Eliminates six (6) 90 degree, 5 mph turns resulting in faster operating speeds (up to 3 minutes faster than DEIS option), with lower noise impacts and greater rider comfort. • Costs associated with the proposed South Portal project eliminated.
2 - Johns Landing North (SW Boundary St. to SW Carolina St.)	• "In-Macadam" option, utilizing existing Macadam Ave. travel lanes adopted by City of Portland and City of Lake Oswego in adopted LPA. • Boundary St. Station-Southbound on SW Boundary. • Future station at SW Pendleton St.	• No change to "In Macadam" Option. • Hamilton St. and both Boundary St. stations now on Macadam Ave., improving access to residential and commercial uses on both sides of Macadam. • Station at SW Pendleton St. included in the project. • Includes allowance for pedestrian improvements along Macadam Ave.

SEGMENT	DEIS PROJECT	REFINED PROJECT
3 - Johns Landing South (SW Carolina St. to SW Nevada St.)	• Double track alignment with ballasted track.	• Double track alignment with paved track to reduce vibration, improve soil stability, management of drainage and enhance maintainability. • Minimum Operable Segment (MOS) recommended at SW Nevada St. • Includes allowance for pedestrian improvements along Macadam Ave. and between Macadam and station locations.
4 – Willamette Park (SW Nevada St. to Sellwood Bridge)	• DEIS considered two (2) options: with and without the Sellwood Bridge project. • Double track alignment with ballasted track. • Construction phase proposed at Sellwood Bridge.	• Sellwood Bridge project has advanced toward construction eliminating the need to consider two options. • Current design parameters for Sellwood Bridge project utilized, e.g., Sellwood Bridge project to construct new bridge over Stephens Creek, retaining walls and deliver right-of-way sufficient for a double track streetcar alignment. • Double track alignment with paved track to reduce vibration, and enhance maintainability.
5 – Powers Marine Park (Sellwood Bridge) to Radcliff Station)	Double track alignment with ballasted track and extensive retaining walls.	• Double track alignment with paved track to significantly reduce need for and quantity of retaining walls, improve soil stability and management of drainage and enhance maintainability.

SEGMENT	DEIS PROJECT	REFINED PROJECT
6 – Dunthorpe/Riverdale (Radcliff Station to Briarwood Station)	• Two (2) options considered in DEIS: WSL and Riverwood Road. • Much of the alignment assumed to be ballasted double track. • Two (2) existing trestles replaced with new, concrete double track trestles. • Overhead electrification assumed to be standard "double wire" overhead catenary system (OCS) with larger support poles resulting in greater visual impacts.	• Riverwood Rd. alignment option eliminated. • Entire segment assumed to be single, paved track to reduce need for retaining walls with reduced vibration, improved soil stability, management of drainage and enhanced maintainability. Paved track results in a more "finished" aesthetic. • Two (2) existing trestles replaced with new, concrete single track trestles. This substantially reduces cost though it is part of the reason for frequency limitations in the long-term (see *Operating Plan* below). • Revised design results in "single wire" electrification with smaller poles and less visual impact.
7 – Lake Oswego North (Briarwood Station to SW B. Avenue)	• Two (2) options considered in DEIS: Foothills Rd. and adjacent to the UPRR tracks. • Foothills District Master Plan uncertain. • 100-space park and ride proposed near existing trolley barn.	• UPRR option eliminated in order to align streetcar project with Foothills Framework Plan. • Foothills District Master Plan has advanced significantly with basic street and development plan established, including recommendations for integration of Streetcar that vary from DEIS. • New intersection at SW Terwilliger Blvd. and new structure over Tryon Creek proposed as part of Foothills Master Plan. Streetcar to be integrated with both. • Potential, 400-space park and ride facility now located at SW B. Ave. to improve synergies with Foothills Plan and emerging development plans west of State St. • More narrowly defines exclusive streetcar construction costs within the Foothills District.

SEGMENT	DEIS PROJECT	REFINED PROJECT
8 – Lake Oswego South (SW B Avenue to Lake Oswego Terminus)	• Two (2) options considered in DEIS: Foothills Rd. and adjacent to the UPRR tracks. • Terminus located immediately north of Albertson's shopping center with 300-space park and ride.	• UPRR option eliminated. • Foothills District Master Plan has advanced significantly with basic street and development plan established, including recommendations for integration of Streetcar that vary from DEIS. • Terminus moved approximately 3 blocks north to location on State Street opposite Millennium Park. • Park and ride moved to B Ave. (see Segment 7 above). • More carefully defines exclusive streetcar construction costs within the Foothills District.
Systems	• 6 streetcars • Expanded maintenance facility • New storage track	• 4 streetcars • No expansion of maintenance facility required • No new storage track required
Trackway	• Mostly double-track configuration • Tie and ballast trackway within Willamette Shore Line	• Extensive use of single-track configuration • Extensive use of paved track within Willamette Shore Line
Overhead Catenary System (OCS)	Mostly double-wire OCS	Mostly single wire OCS

UPDATED ENGINEERING AND CONSTRUCTION COSTS

SUMMARY

As further detailed below, the engineering and construction cost of the refined project outlined herein has an estimated cost of about **$200M** (in 2011 dollars) without a park and ride facility in Lake Oswego and about **$208M** with such a facility. The refined project definition seeks to include all the costs to construct a streetcar line from SW Lowell St. in the South Waterfront to the revised location for the Lake Oswego Terminus. A Minimum Operating Segment (MOS) to a station at SW Nevada St. can be constructed for about **$70M** in 2011 dollars. The revised budget includes:

KEY ELEMENTS OF THE ENGINEERING AND CONSTRUCTION COST ESTIMATE

- Property acquisitions, which have been reduced in scope from the DEIS phase.
- Cost to construct a complete, operable streetcar alignment, including track, overhead electrification, substations, train control and signal system.
- Four (4) new streetcars and required spare parts.
- Certain equipment necessary to maintain the right-of-way.
- Public art.
- Engineering and administration.
- Both estimating and construction contingencies, totaling 25%, consistent with past practice on previous streetcar projects.
- The cost of the proposed, 400-space park and ride facility in Lake Oswego is included as an "alternate cost" to the project. The need for, and ultimate timing of, such a facility requires additional study. Funding for a park and ride could be as part of the streetcar project or shared with other development initiatives in Lake Oswego.
- The revised budget is based on 2011 dollars. Implementation costs will likely increase if the project is significantly delayed.

PROPERTY ACQUISITION

Due to the uncertainties associated with a series of other infrastructure and development projects, the project defined in the DEIS included certain right-of-way acquisition and construction costs on the assumption that the streetcar project could be constructed prior to other projects. Because of alignment changes proposed as part of the refinement process, and advancement of the Sellwood Bridge project and Foothills Framework Plan, the refined project avoids such conflicts. As such, the refined project makes the following key assumptions:

- The use of Bancroft St. as an entry/exit point for Macadam Avenue eliminates significant costs associated with integrating Streetcar with the uncertain South Portal Project. No property acquisition or street costs for the South Portal are included in the Streetcar project.
- The nearly final design for the Sellwood Bridge Project eliminates certain costs that were previously shouldered by the Streetcar project.
- The Foothills Framework Plan process has resulted in recommendations for a shorter alignment, relocation of a park and ride facility and other changes. The Streetcar only project (excluding Foothills infrastructure costs) includes the costs to build the Streetcar alignment (including limited

property acquisition), with the costs to accommodate the future road system along the streetcar line and streetcar connections in Foothills included as part of the development cost for the latter.

- The Willamette Shore Line is already in public ownership and costs associated with the right-of-way are excluded and reflected in the financial analysis below as a potential source of local match for federal funds.

UPDATED ENGINEERING AND CONSTRUCTION COST ESTIMATES

Figure 2 summarizes the engineering and construction cost for the full alignment to Lake Oswego which results in a cost of $198.8M (2011 dollars) without the cost of a park and ride facility in Lake Oswego and $208.2M (2011 dollars) including such a facility.

FIGURE 2.
REFINEMENT BUDGET – SW LOWELL ST. TO LAKE OSWEGO TERMINUS

Segment	Cost Component (2011$)	Component Cost ($M)	Total Cost ($M)
	Direct Construction Cost:		
1	South Waterfront (SW Lowell to SW Boundary)	$12.0	
2	Johns Landing North (SW Boundary to SW Carolina)	9.5	
3	Johns Landing South (SW Carolina to SW Nevada)	5.5	
4	Willamette Park (SW Nevada to Sellwood Bridge)	5.5	
5	Powers Marine Park (Sellwood Bridge to Radcliff Station)	10.4	
6	Dunthorpe/Riverdale (Radcliff Station to Briarwood Station)	28.8	
7	Lake Oswego North (Briarwood Station to B Ave.)	15.9	
8	Lake Oswego South (B. Ave. to L.O. Terminus)	2.9	
	SUBTOTAL		**$90.5**
	General Requirements and Contractor Fee		21.7
	SUBTOTAL DIRECT CONSTRUCTION COSTS		**$112.2**
	Property Acquisition		**$1.4**
	System Costs:		
	Maintenance Equipment	$0.8	
	Vehicles (4) and Spare Parts	17.6	
	Art	0.5	
	SUBTOTAL		**$18.9**
	Other Project Costs:		
	Engineering and Administration (20%)	$26.5	
	Contingencies (25%)	39.8	
	SUBTOTAL		**$66.3**
	TOTAL ENGINEERING AND CONSTRUCTION COST (2011$)		**$198.8**
	Lake Oswego Park and Ride Facility (400 Spaces)		9.4
	TOTAL ENGINEERING AND CONSTRUCTION COST WITH PARK AND RIDE (2011$)		**$208.2**

The Portland City Council requested information concerning a potential Minimum Operable Segment (MOS) within the City of Portland. The MOS, which would extend the existing streetcar line from SW Lowell St. to SW Nevada St., can be an interim measure in the event that the full project to Lake Oswego cannot proceed in the near term. Figure 3 estimates the cost of designing and constructing a MOS to SW Nevada which results in an estimated cost of $69.4M in 2011 dollars.

FIGURE 3.
REFINEMENT BUDGET – SW LOWELL ST. TO SW NEVADA ST. (MINIMUM OPERABLE SEGMENT)

Segment	Cost Component (2011$)	Component Cost ($M)	Total Cost ($M)
	Direct Construction Cost:		
1	South Waterfront (SW Lowell to SW Boundary)	$12.0	
2	Johns Landing North (SW Boundary to SW Carolina)	9.5	
3	Johns Landing South (SW Carolina to SW Nevada)	5.5	
4	Willamette Park (SE Nevada to Sellwood Bridge)	0.8	
	SUBTOTAL		**$27.8**
	General Requirements and Contractor Fee		8.5
	SUBTOTAL DIRECT CONSTRUCTION COSTS		**$36.3**
	Property Acquisition		$**0.1**
	System Costs:		
	Maintenance Equipment	$0.8	
	Vehicles (2) and Spare Parts	8.8	
	Art	0.3	
	SUBTOTAL		**$9.9**
	Other Project Costs:		
	Engineering and Administration (20%)	$9.2	
	Contingencies (25%)	13.9	
	SUBTOTAL		**$23.1**
	TOTAL ENGINEERING AND CONSTRUCTION COST (2011$)		**$69.4**

UPDATED FINANCE PLAN

SUMMARY

The finance plan options outlined below utilize engineering and construction costs (see Figures 2 and 3 above) which are estimated in 2011 dollars. For finance plan purposes, project costs are inflated in year-of-expenditure dollars based on construction cost indices provided by Stacy and Witbeck and other escalation factors. For the purposes of this analysis, the costs outlined in Figure 4 are assumed:

FIGURE 4.
ENGINEERING AND CONSTRUCTION COST ASSUMPTIONS USED IN FINANCE PLAN OPTIONS

FINANCE PLAN OPTION	ENGINEERING AND CONSTRUCTION COSTS ($M 2011)[1]	ENGINEERING AND CONSTRUCTION COSTS (YOE$)[2]
A-Streetcar to LO (Figure 4)	$208.2	$270.6M
B-Streetcar to LO + Foothills Infrastructure (Figure 5)	$224.8[3]	$293.6M
C-MOS to Nevada St. (Figure 6)	$69.4M	$90.0M

[1]Excludes finance costs.
[2]Includes finance costs.
[3]Includes $16.7M (2011 dollars) for infrastructure improvements in the Foothills District that may be eligible for federal funding as part of the streetcar project. Foothills infrastructure cost estimates provided independently by Williams, Dame & White.

IMPACT OF REDUCED FEDERAL SHARE OF PROJECT FUNDING

Congressional and Federal Transit Agency (FTA) policy for funding of new streetcar projects is still emerging. Current guidance suggests that a small project, such as that proposed herein, could be eligible for 60 percent FTA funding. However, should future policy-making result in a lower federal share for funding of such projects (e.g., 50 percent federal share), the amount of local cash funds required for the project would increase proportionately. For the three finance plans outlined in Figures 5-7 below, the *additional* amount of local cash funds would be, respectively, $29.8M, $31.7M and $8.8M.[3]

FINANCE PLAN FOR STREETCAR PROJECT FROM PORTLAND TO LAKE OSWEGO

Figure 5 outlines a preliminary finance plan for a streetcar line between SW Lowell St. in the South Waterfront to downtown Lake Oswego. Note that all costs are in year-of-expenditure dollars and reflect proposed funding targets for major financing sources. None of these sources of funding have been committed to the project at this time, with the exception of the MTIP regional flexible funds which have been set aside by regional agreement.

[3] Assuming no change in non-city cash resources, the amounts needed from the cities of Portland and Lake Oswego could increase to $31M for each city for the full length project to Lake Oswego; $31M for Portland and $41M for Lake Oswego for the full length project including Foothills infrastructure costs; and $24.7M for the City of Portland for the MOS.

FIGURE 5.
PRELIMINARY FINANCE PLAN A - STREETCAR ONLY TO LAKE OSWEGO

POTENTIAL FUNDING SOURCE	MILLIONS OF YOE$
CASH SOURCES FOR PROJECT COSTS:	
New Starts FTA Grant (At 60% Share)	$197.2
State Lottery Bond Proceeds	25.0
MTIP-GARVEE Bond Proceeds	6.0
Flexible Federal Funds (ODOT)	4.0
City of Portland[4]	16.0
City of Lake Oswego[5]	16.0
Revenues for Construction-Period Interest on Borrowings for Local Match	6.4
SUBTOTAL CASH SOURCES	**$270.6**
Value of Contributed WSL Right-of-Way (Non-Cash)	58.0
TOTAL REVENUES AND IN-KIND (NON-CASH) CONTRIBUTIONS	**$328.6**

Note: This table assumes a 60% federal share. If the federal share were reduced to 50%, the local, regional, and state funds needed would be increased.

IMPACTS OF INCORPORATING FOOTHILLS INFRASTRUCTURE COSTS IN STREETCAR PROJECT

The Project Team assessed the impact of including certain costs for future public infrastructure in the Foothills District based on the Framework Plan approved by the Lake Oswego City Council in December 2011. For these purposes, the Finance Plan shown in Figure 6 includes $16.7M[6] (in 2011 dollars) of infrastructure improvements along the streetcar alignment that could be funded with New Starts funds (at a 60 percent federal share as part of the streetcar improvements). At this time, it has not been determined whether these infrastructure improvements meet the requirements for FTA funding at this level. Note that all costs are in year-of-expenditure dollars and reflect proposed funding targets for major financing sources. None of these sources of funding have been committed to the project at this time, with the exception of the MTIP regional flexible funds which have been set aside by regional agreement.

[4] City of Portland funds could come from a number of non-General Fund sources.
[5] City of Lake Oswego funds could come from a variety of local sources, including local improvement districts, right-of-way dedications, system development charges, urban renewal district funds, etc.
[6] Foothills infrastructure cost estimates provided independently by Williams, Dame & White.

FIGURE 6.
PRELIMINARY FINANCE PLAN B - STREETCAR + FOOTHILLS INFRASTRUCTURE

POTENTIAL FUNDING SOURCE	MILLIONS OF YOE$
CASH SOURCES FOR PROJECT COSTS:	
New Starts FTA Grant (At 60% Share)	$210.9
State Lottery Bond Proceeds	25.0
MTIP-GARVEE Bond Proceeds	6.0
Flexible Federal Funds (ODOT)	4.0
City of Portland[7]	16.0
City of Lake Oswego[8]	24.2
Revenues for Construction-Period Interest on Borrowings for Local Match	7.4
SUBTOTAL CASH SOURCES	**$293.5**
Value of Contributed WSL Right-of-Way (Non-Cash)	58.0
TOTAL REVENUES AND IN-KIND CONTRIBUTIONS	**$351.5**

Note: This table assumes a 60% federal share. If the federal share were reduced to 50%, the local, regional, and state funds needed would be increased. Foothills infrastructure cost estimates provided independently by Williams, Dame & White.

FINANCE PLAN FOR MINIMUM OPERABLE SEGMENT (MOS)

Figure 7 presents a Preliminary Finance Plan for a Minimum Operable Segment that would be constructed between SW Lowell St. and SW Nevada St. This proposal would have a significantly lower project cost, but would also not benefit from the use of the value of the existing WSL right-of-way as a source for local match. This is because only two, relatively short segments of the WSL would be used in the revised alignment proposed. Note that all costs are in 2017 dollars and reflect proposed funding targets for major financing sources. None of these sources of funding have been committed to the project at this time, with the exception of the MTIP regional flexible funds which have been set aside by regional agreement.

[7] City of Portland funds could come from a number of non-General Fund sources.

[8] City of Lake Oswego funds could come from a variety of local sources, including local improvement districts, right-of-way dedications, system development charges, urban renewal district funds, etc.

FIGURE 7.
PRELIMINARY FINANCE PLAN C - STREETCAR ONLY TO SW NEVADA ST.

POTENTIAL FUNDING SOURCE	MILLIONS OF YOE$
CASH SOURCES FOR PROJECT COSTS:	
New Starts FTA Grant (At 60% Share)	$56.9
State Lottery Bond Proceeds	10.0
MTIP-GARVEE Bond Proceeds	3.0
Flexible Federal Funds (ODOT)	2.0
City of Portland[9]	15.9
City of Lake Oswego	0.0
Revenues for Construction-Period Interest on Borrowings for Local Match	2.3
SUBTOTAL CASH SOURCES	**$90.1**
Value of Contributed WSL Right-of-Way (Non-Cash)	4.7
TOTAL REVENUES AND IN-KIND CONTRIBUTIONS	**$94.8**

Note: This table assumes a 60% federal share. If the federal share were reduced to 50%, the local, regional, and state funds needed would be increased.

CONCLUSION

A comparison of the preliminary finance plans that resulted from the Refinement Phase work shows:

- The estimated cost of the project has been reduced in cost by over $59M (in 2011 dollars), or 22%, less than shown for the "high" cost option in the DEIS[10].
- While the value of the Willamette Shore Line (WSL) right-of-way that would be contributed to the project and used for local match purposes has been reduced to $58M (due to a combination of reduced value and less of the right-of-way being included in the project), the overall impact to the finance plan is mitigated by the lower cost of the project.
- The refined project as outlined in this report is less expensive and the potential FTA grant for the project would be smaller than projected in the earlier work ($197M versus $275M). However, the total amount of local, regional and state funds does not change appreciably from the earlier work[11]. This is due in part to the WSL right-of-way contributing a smaller amount to local match requirements because of reduced value and the fact that less right-of-way is being used. Also, the marginal amount of funds required from the City of Portland for an option that does not involve the proposed South Portal project increases to $16M from $9M for the MOS to Nevada St. and under the full project to Lake Oswego.

[9] City of Portland funds could come from a number of non-General Fund sources.

[10] Note that DEIS costs were estimated in 2010 dollars. Some costs for street and infrastructure improvements along the streetcar alignment in Foothills were included in the DEIS cost estimate.

[11] The DEIS estimated total State, Regional and Local Funds needed for the "High" cost for the Streetcar project at $78.3M (YOE$) [See Table 5.1-8 (page 5-13) of the DEIS]. The updated estimate indicates total State, Regional and Local Funds at $73.4M (YOE$).

PROPOSED STREETCAR OPERATING PLAN

ROUTING

Currently PSI operates 7 cars during peak mid-day hours with 12-14-minute frequencies for service between NW 23rd and SW Lowell in South Waterfront (which will be known as the "B Line" when the Eastside Loop Project opens in September 2012; service on the Loop from SW 10th and Market across the Broadway Bridge to the eastside and OMSI terminus will be the "A-Line".) The B-Line round trip travel time from NW 23rd to SW Lowell is scheduled at 68 minutes or a total of 78 minutes when including the 10-minute layover for operator relief and schedule makeup, temporarily at the stop on SW Bond at SW Gibbs. The layover point will be relocated to SW Lowell when construction of adjacent buildings is completed.

Under the Proposed Refinement Phase Plan, the B-Line south terminus would be extended from SW Lowell to Lake Oswego and operated at peaks at 12-14-minute frequency.

Currently on the B-Line, peak service occurs from 11:00 AM to 7:00 PM on Weekdays and Saturdays. Seven (7) vehicles are required to maintain the 12-14 minute peak service. During off-peak hours the B-Line service drops to as few as four (4) vehicles. The peaks for the service south of Portland to Lake Oswego are expected to be different from the current B-Line peaks. With demand much more weighted toward traditional peak-hour commuters, the peaks for trips south of Portland are expected to be between 7:00 AM and 9:00 AM and between 4:00 PM and 6:00 PM. In the Sellwood Bridge to Lake Oswego segment, the Proposed Refinement Phase Plan envisions that initially 12-14 minute service will be provided during peak hours and that service will be reduced to 24-28 minute frequency during off peaks.

Given the difference in the existing Portland and the likely Lake Oswego line peak hours, some inbound and outbound vehicles will be turned back short of the NW 23rd and Lake Oswego termini. Lake Oswego inbound service during the morning peak (7:00 AM to 9:00 AM) and Portland outbound service during the Portland peak and the Lake Oswego off-peak (from 11:00 AM to 4:00 PM and 6:00 PM to 7:00 PM), every other vehicle will be turned back short of their respective termini. During other hours, the evening Lake Oswego peak (4:00 PM to 6:00 PM) and during many of the Portland and Lake Oswego off-peak hours, all vehicles will operate the full distance between the two termini.

Ideally, both inbound and outbound turn-backs would be located where departures at the turn-back can be efficiently collated with ongoing through-service and, in the case of the outbound turn-back, where suitable layover facilities can be provided. The DEIS recommends an inbound turn-back at SW 10th and Market.[12] Another possible location may be the PSU Urban Center, far enough inbound to provide

[12] *Lake Oswego to Portland Transit Project, Transportation Technical Report*, November 2010, TriMet and Metro, page 16

riders from Lake Oswego excellent access to PSU and transfers to MAX light rail, continuing Streetcar Line A and B service and buses on 5th and 6th. And with completion of the Oregon Sustainability Center, a turn-back could be accomplished at PSU without additional track modifications and Project cost. The outbound turn-back for trains from NW 23rd could occur at SW Lowell or, if operating budget allows, further to the south at Carolina, Nevada or Sellwood Bridge, improving service to the Johns Landing, Macadam and the Corbett/Terwilliger communities. Details of the service and the turn-back locations will be determined by further analysis of the operating budget, travel times, scheduling, public review and comments and other factors during subsequent phases of the Project design.

TRAVEL TIME

Travel times were estimated in the DEIS Transportation Technical Report. It was estimated that the alignment option that follows the Willamette Shore Line right-of-way (WSL) from Bancroft to just south of the Briarwood stop (Option A) would have a round-trip travel time of 37 minutes. The alignment option that is in the WSL (and new right-of-way) from Bancroft to SW Boundary, in SW Macadam and then in the WSL between SW Carolina to just south of Briarwood (Option B) was estimated to have a 44 minute round-trip travel time.[13] The travel time estimates were based on a terminus in Lake Oswego approximately 760 feet south of the Refined Design terminus location which would reduce these round trip travel times by just less than 1 minute to 36 and 43 minutes, respectively.

Using similar criteria to those used in the DEIS estimates and adjusting for the new closer-in terminus, the Refinement Phase Design alignment would have just under a 40-minute round-trip travel time. The 2-3 minute travel-time savings in the Refined Design travel time over Option B is principally due to the elimination of six (6) minimum radius 5 MPH curves between Bancroft and Boundary in Option B and the higher speed limit in the Macadam section between Bancroft and Boundary. In the end, these savings are offset by the addition of two stops, Pendleton and Radcliff, not included in either the Option A or B designs and by the use of more conservative travel time assumptions set out below.

The Refinement Phase travel time analysis suggests that the round trip travel time for the Refined Design alignment will be approximately 44 minutes between SW Lowell and Lake Oswego. The analysis is based on the following assumptions:

- Streetcars would travel at a maximum of 5 MPH less than the posted speed limit on streets with mixed traffic, a maximum of 30 MPH on Macadam and 20 MPH on streets in South Waterfront and in the Foothills development in Lake Oswego.
- Streetcars would travel at a maximum of 20 MPH in the WSL except up to 35 MPH through Powers Marine Park and up to 30 MPH from the Riverwood stop south through the tunnel to the beginning of in-street operations in the Foothills development south of Briarwood. Thus, the streetcar speed will be limited to a maximum of 20 MPH in sections of the WSL where

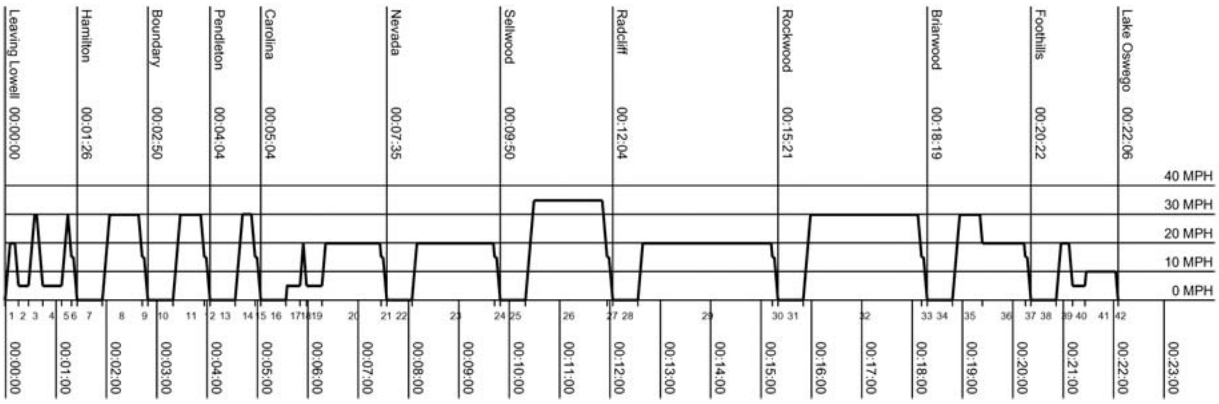
[13] *Transportation Technical Report*, page 7, Table 1-2

buildings, business and homes are in close proximity and where there are frequent driveway and road crossings.

- Streetcar travel speed will be reduced to a maximum of 15 MPH on approaching stop platforms.
- Streetcar speed will be reduced to a maximum of 5 MPH on 90-degree 25-35 meter radius turns of which there are four each in the outbound and inbound directions.
- Dwell-times at stops will average 30 seconds. Dwell-time is a function of the number of boarding and de-boarding passengers and traffic signal timing. Stops on Macadam and in Lake Oswego will occur at signalized intersections and are expected to receive heavier use than those that are south of the Sellwood Bridge stop and before arriving at the Foothills stop at Lake Oswego B Street. Stop times in the WSL south of the Sellwood Bridge stop might average as short as 15 to 20 seconds. It is possible that at times there will be no need to stop at all because there are no boarding or de-boarding passengers.
- Traffic signal controls at critical intersections will be programmed to respond to streetcar requests for priority at Bancroft and Bond, Bancroft and Moody, Bancroft and Macadam, Macadam and Hamilton, Macadam and Boundary and Macadam and Carolina.
- Streetcar will accelerate and decelerate at 5 feet/second/second.

FIGURE 8.

LAKE OSWEGO TO PORTLAND STREETCAR - ESTIMATED OUTBOUND TRAVEL TIME



Just as with any transit vehicle schedule, actual travel times may vary hour to hour depending on passenger loads, traffic and other scheduled and unscheduled factors. Round-trip travel time on the NW 23rd to SW Lowell B-Line, scheduled for 68 minutes, can vary as much as plus or minus 5 minutes or even more in extraordinary situations. To the extent possible, the headways are maintained by varying the layover times. Additional travel time analysis should be carried out when more details are defined about alignment characteristics and other factors during engineering phases of the Project.

STREETCAR VEHICLES

The DEIS cost estimate included the acquisition of six (6) vehicles at startup and eleven (11) vehicles in year 2035.[14] The Refinement Phase analysis suggests that four (4) vehicles will be adequate at startup. The following is the basis for this conclusion:

The round-trip travel times between NW 23rd and Lake Oswego are estimated to be:

NW 23rd to SW Lowell (existing B-Line)	68 Minutes
SW Lowell to Lake Oswego	44 minutes
Operator relief/schedule makeup layover	10 minutes
TOTAL	**122 MINUTES**

Ten (10) vehicles will be adequate to maintain 12-14 minute peak hour service between 23rd and Lake Oswego, a 3-car increase.

Spare cars are needed for rotation to carry out routine maintenance and repairs and in emergencies. Except for brief periods, Portland Streetcar has maintained at least 20% of the fleet available as spares during all hours. The four (4) vehicle acquisition in the Proposed Refinement Phase Plan will allow one spare car. Assuming that the four (4) cars are integrated into the Portland Streetcar fleet and that the cars are fungible, an additional 4 cars will bring the fleet to 14 cars independent of other cars for the Eastside Loop Project scheduled for delivery of 6 vehicles in late 2012, the Prototype vehicle scheduled for delivery in early 2012 and any others that might be ordered for future streetcar extensions. With 14 cars and 10 in use, 4 spares equals more than 28%, well within the 20% policy ratio.

The DEIS recommends construction of a facility for vehicle maintenance and storage with an 8 vehicle capacity under the Marquam Bridge.[15] The Refinement Phase Plan proposes that the additional 4 vehicles will be stored in the current maintenance facility storage yard recently expanded for a 25-car capacity. This will reduce capital and operating cost, operations staff inconvenience and security requirements.

TriMet tallies rider boardings on the current streetcar line every 3 months. The counts average between 11-12,000 passenger boardings per day during weekdays and Saturdays, making the line competitive with TriMet's highest ridership "Frequent Service" lines. The DEIS suggests that in year 2035 streetcar ridership for the Lake Oswego line will experience 13,666 and 12,784 boardings and de-boardings for Options A and B, respectively.[16] Rounding, this suggests that there will be about 6,000 additional boardings as a result of adding the Lake Oswego service.

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[14] *Order of Magnitude Cost Estimate*, May 2011 revision, URS Corporation, Sheet 1

[15] *Transportation Technical Report*, page 16

[16] *Transportation Technical Report*, page 41, Table 2.3-7

Without an analysis of the locations of the boardings (and de-boardings) and the distribution of them over the hours of the average day, it is difficult to translate the projected ridership increase into vehicle capacity requirements. However, given the likely commuter characteristic of the Lake Oswego ridership, in 2035 it is possible there will be pressure on vehicle capacity even with 7.5 minute frequencies. At some future point it could become necessary to implement a strategy to increase capacity, such as adding new vehicles and/or retrofitting existing vehicles used on the Lake Oswego line to enable coupling of two vehicles (as currently is the case with light rail vehicles). This would require modifications to existing stop platforms.

SINGLE-TRACK OPERATIONS

Single-track operation is recommended between Radcliff and Riverwood stops and the Riverwood and Briarwood stops. While the introduction of single track operations will reduce capital cost, more importantly it will greatly reduce or eliminate the physical and visual impacts of the streetcar through the Dunthorpe/Riverdale residential neighborhoods particularly when built with a single overhead wire system and a concrete track slab design. Construction can be contained within the existing WSL eliminating or significantly reducing additional property acquisition, and on and off-right-of-way grading, drainage and reconstruction at existing road and driveway crossings.

However, the single-track sections will present some operational challenges and limitations, particularly as ridership grows and more frequent service is required. The Radcliff to Riverwood and Riverwood to Briarwood single-track sections are approximately 0.9 miles and 1.1 miles, respectively, both with estimated travel times of just under 3 minutes. These sections include two single-track trestles so potential for future retro-fitting to double-track is limited. Operational considerations include the following:

- Without controls or special procedures, delays of up to three minutes are possible while one vehicle waits to enter a single track section while another clears it.
- To avoid or minimize delays in the single track sections, the goal will be to schedule inbound and outbound service so that “meets” occur in double track segments. With 12-14 minute frequencies, meets will have to occur either at the Riverwood stop or near the Radcliff or Briarwood stops to avoid delays. For frequencies less than 12 minutes, vehicles will have to meet at the Riverwood stop. While schedules will be designed to achieve this, schedules cannot always be maintained. Particularly problematic in this regard will be the outbound service coming from NW 23rd, having travelled over 6 miles mostly through mixed traffic before arriving at Radcliff and the beginning of the single track sections. Controlled departures of inbound service from the Lake Oswego terminus will be needed to avoid conflicts due to unscheduled variations of outbound arrivals at the single track sections.
- The Portland Streetcar fleet is currently equipped with GPS locators and radios for communication with the Portland Streetcar operations office. With 12-14 minute frequencies, simple procedures and existing operations personnel and equipment should be adequate to control timed departures from the Lake Oswego terminus. A random and periodic delay of a minute or more at the Radcliff, Riverwood or Briarwood stop may even prove acceptable without any special control procedures.

- The single-track sections will limit frequencies to no less than 6-7 minutes, regardless of the controls or operating procedures. Even if possible, frequencies below 6-7 would pose other operational problems such as increased hazard of rear-end collisions and congestion on the trackways in Portland where Line A and B join together as well as significant, additional operational costs.
- The DEIS projects that 7.5 minute frequencies will ultimately be required to meet 2035 ridership forecasts.[17] While approaching the limit, 7.5 minute frequencies can be achieved by the use of existing or available procedures and equipment.
- At startup, the single-track sections will not require any special controls or procedures in order to maintain 24-28 minute service frequencies during all hours of the day except for the two 2-hour Lake Oswego peaks.

The single track sections create a potential safety consideration that must be addressed. Vehicles will have to be controlled so that they cannot enter single-track sections when they are occupied, despite the action of the operators. Signals will be included, but operators heeding them will not be relied upon as the sole protection. All streetcar vehicles will be equipped with Automatic Train Stop (ATS) equipment that will force a speed reduction as vehicles approach the three single-track transition stops (Radcliff, Riverwood and Briarwood) and will stop the vehicle well short of switch mechanisms that would allow entry into an occupied single-track section.

The entire Portland Streetcar fleet will soon be retrofitted with ATS to insure protective separation between light rail and streetcar vehicles that will share use of the Willamette River Milwaukie Light Rail Bridge trackway. Any additional vehicles procured for this or other projects will be equipped with ATS.

[17] *Transportation Technical Report*, page 7, Table 1-2

PROJECT GOVERNANCE

Portland Streetcar, Inc. should become the lead agency for development of the new line to Lake Oswego. Streetcar service to Lake Oswego will be fully integrated with existing Portland Streetcar. The Lake Oswego line will be operated as an extension of the Portland Streetcar (soon to be designated as the B-Line) now running from NW 23rd to SW Lowell in the South Waterfront area. The streetcar vehicles acquired by the Lake Oswego to Portland Transit (LOPT) Project will become an integral part of the Portland Streetcar fleet. They will be maintained and stored in the existing Portland Streetcar Maintenance facility. Integration of the Lake Oswego line with other Portland Streetcar assets and services will result in capital and operations cost savings and help assure maximum rider convenience and access (see Operations above).

The City of Portland (Portland) owns Portland Streetcar and all of its assets. Portland budgets and pays for all direct costs associated with operating Portland Streetcar. The Streetcar operates under three Intergovernmental Agreements (IGAs) between Portland and TriMet. These agreements provide for TriMet to: 1) make payments to Portland for a share of the annual operating cost, 2) to assign employees (Operators, Maintenance Technicians and Superintendents) and City to pay TriMet for the cost of these employees; and 3) to provide specialized electrical systems and track maintenance services performed by TriMet personnel and Portland to pay TriMet for the cost of these services.

Portland Streetcar Inc. (PSI), a non-profit public service corporation was selected by Portland in 1996 to act on its behalf in planning, designing, constructing and operating the Portland Streetcar. PSI has a volunteer unpaid Board of Directors that includes representatives of properties and businesses, institutions, neighborhoods, local governments (including Portland, Lake Oswego and TriMet) and other community interests. PSI has contracts with consultants to administer its corporate business and to oversee the day-to-day streetcar operations. PSI also contracts for professional services to design extensions of the Streetcar system; and to manage contracts awarded by Portland for construction and vehicles, equipment and other procurements.

Presently, the Portland Streetcar operations staff includes Portland, TriMet and consultant employees. TriMet employees include Operators, Maintenance Technicians and Superintendents. All are Amalgamated Transit Union (ATU) members assigned to Portland Streetcar under one of the IGAs between Portland and TriMet mentioned above; and a side agreement between ATU and PSI providing for certain minor exceptions from provisions of the labor agreement between ATU and TriMet. These TriMet employees work under the direction of the Operations/Safety and Maintenance Managers, both Portland employees. The Operations/Safety and Maintenance Managers work under the direction of the PSI Executive Director.

Portland and PSI regularly seek assistance from TriMet on numerous matters including administration of federal grants and requirements; fare structures; public service alerts and notifications; community relations; ridership counts; use of specialized TriMet maintenance and equipment; technical reviews, counsel and advice; and many others.

PSI is in the process of reorganizing for the commencement of the extension of service when the Eastside Loop Project opens for revenue service in September 2012. The changes will be significant. The annual operating budget will increase from $5.2 M to $8.6M per year. The number of operators, maintenance specialists and other personnel on the current Streetcar staff will be nearly doubled. As a part of the reorganization, PSI is in the process of hiring employees to carry out certain of its corporate and operations functions that heretofore have been handled by consultants, including in the longer term, the PSI Executive Director.

PSI has had design and management responsibility for streetcar capital projects under agreements with Portland. Portland has conducted open selection processes for professional design and management consultant services that in the recent case of the Eastside Loop Project conform to federal requirements. These consultants are assigned to and retained by PSI to carry out the professional services required for the projects. A similar selection and assignment process was used by TriMet for the LOPT Refinement Design consultant contract. Selection of and contracting with CM/GC, general contractors, vehicle manufacturers and equipment suppliers has remained with Portland. PSI has assisted Portland in carrying out these processes and PSI consultants have administered these contracts.

In the recent IGA between TriMet, Lake Oswego and Portland for the LOPT Project Refinement Phase work, it was acknowledged that PSI will likely be the operating "entity" for the completed project, a role that the PSI Board has expressed its willingness to accept, subject to details. Accordingly, the following is recommended with regard to designing and building the LOPT Project:

- The TriMet role recognizes that the LOPT Project is a regional project with much of the alignment outside the City of Portland. TriMet should act as the capital grant recipient and should serve as the contracting agency for LOPT Project design, management, CM/GC or general construction and for vehicle and equipment acquisition particular to the Project. TriMet should contract with PSI for project management services due to its depth of knowledge and experience. As part of these services, PSI would assist with design, engineering, project management and construction of the Project.
- Through an IGA with Portland, TriMet should assign its interests in the completed project assets within the City of Portland to the City and should agree to pay funds to Portland for a negotiated share of the incremental operating costs associated with the Lake Oswego line.
- Portland should remain the responsible agent for Streetcar operations and should continue to contract with PSI to assist with and oversee operations, maintenance, community relations and other operating related services.
- Portland, TriMet and PSI should continue their close cooperation to maximize integration of all public transportation in the region. Lake Oswego should increase its involvement in this effort. Also, membership on the PSI Board and the Portland Streetcar Advisory Committee should be expanded to reflect the enlarged service area.
- In the event that the LOPT Project cannot be built in its entirety; and must be built incrementally to a first phase Minimum Operating Segment (MOS) terminus within the City of Portland, then federal grant funds received by TriMet should be passed through to the City of Portland. In this circumstance, the City of Portland should be responsible for project design, construction and

operations in a manner determined to be appropriate by the project partners, giving strong consideration to the methods used in past Portland Streetcar extension projects.

NEXT STEPS

POTENTIAL NEXT STEPS IN DEVELOPMENT OF THE PROJECT

It will be up to the key regional partners in the project, the cities of Portland and Lake Oswego, Metro and TriMet to decide what to do with the information in this report and to determine where the project goes from here.

The refined project outlined in this report results in a project that is faster, less impactful and less costly—all factors that could make the project attractive for FTA funding. At the same time, there is considerable additional work—and time—required to advance the project through the process of local, regional, state and federal approvals. Typically, transit investments in Portland take 10 years or more to advance through the approval process. This project is currently over 3 years into the development process.

If the project partners decided to continue the project in the short-term, the following summarizes the key steps and milestones necessary to advance the project to construction:

Short-Term (1-3 years) Actions:

- Conduct additional public process on the "Bancroft Option" in South Waterfront and Johns Landing.
- Undertake Advanced Conceptual Engineering to incorporate the revisions outlined in this report.
- Confirm with FTA any additional requirements for revisions to previous environmental work on the project, e.g., need for a Supplemental Draft Environmental Impact Statement or other environmental document.
- Complete approvals of a Locally Preferred Alternative (LPA).
- Prepare an application to the FTA for Preliminary Engineering Approval, including risk assessment and cost estimate review; secure FTA approval.

The cost to perform the work during this "Advanced Conceptual Engineering Phase" is currently estimated at $500,000.

Medium-Term (4-5 years) Actions:

- Undertake Preliminary Engineering and completion of any required environmental documents.
- Develop detailed project finance plan and secure preliminary commitments at the local, regional and state level.
- Prepare an application to the FTA for Final Engineering Approval; secure FTA approval.
- Undertake Final Engineering.

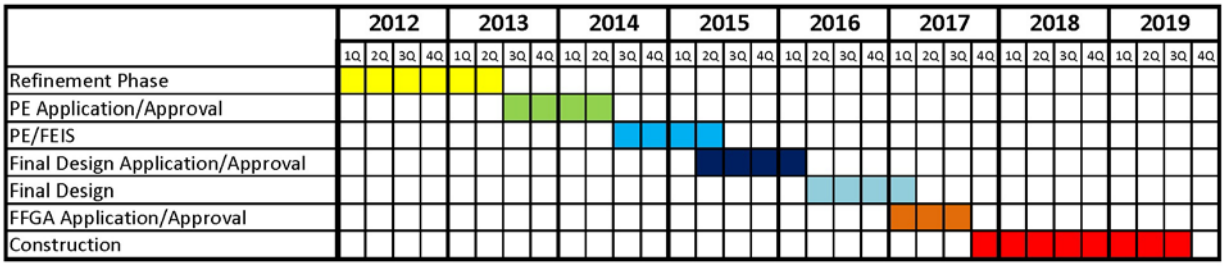
Long-Term (6-8 years) Actions:

- Complete a Finance Plan for the Project, including firm commitments for local, regional and state funding.
- Prepare an application to FTA for a Full Funding Grant Agreement (FFGA); secure FTA approval.
- Select a construction contractor and commence construction of the project.

- Complete construction and commence revenue operations.

An updated conceptual schedule for the project is shown in Figure 9 below.

FIGURE 9.
UPDATED CONCEPTUAL PROJECT SCHEDULE

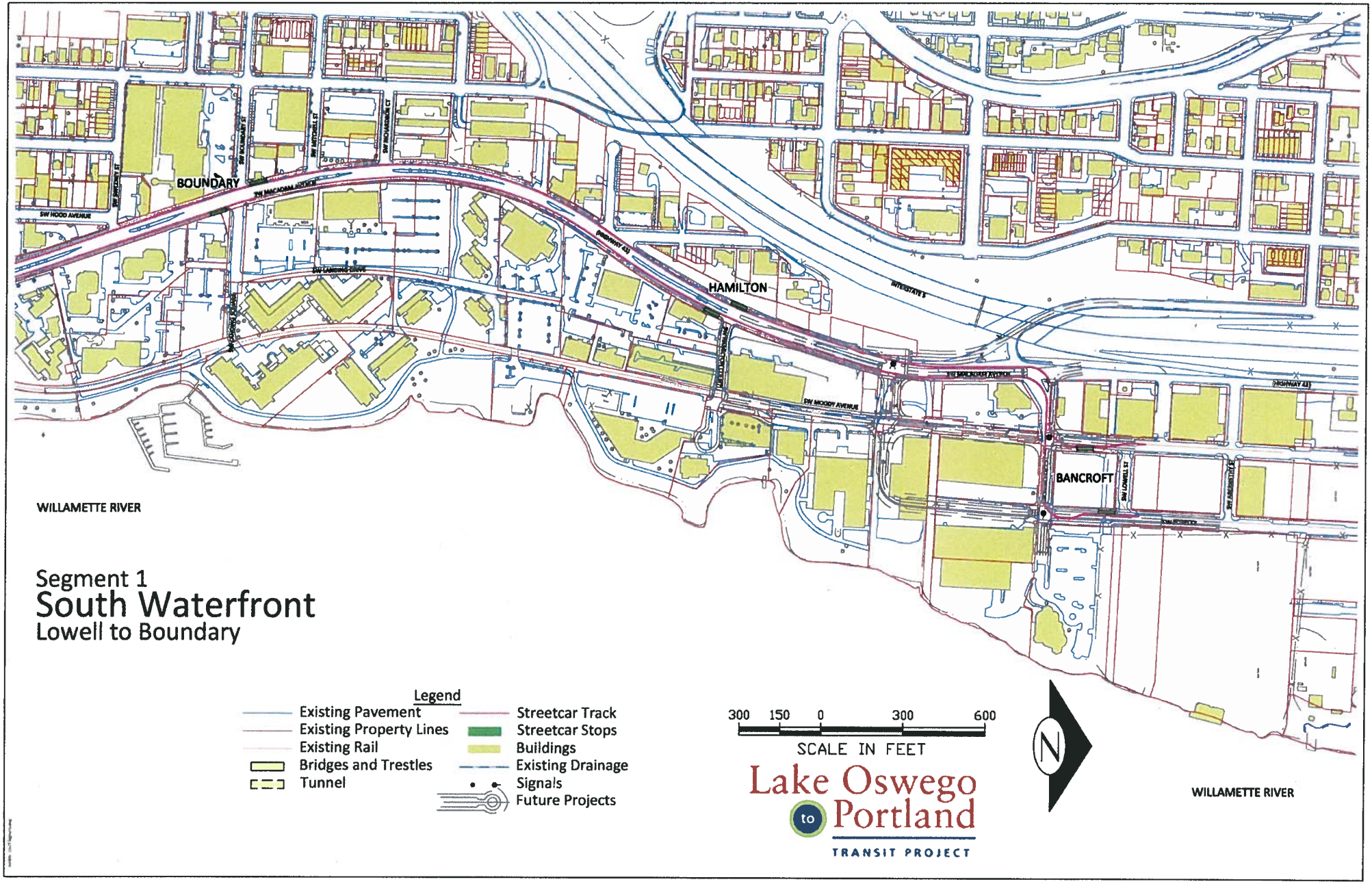


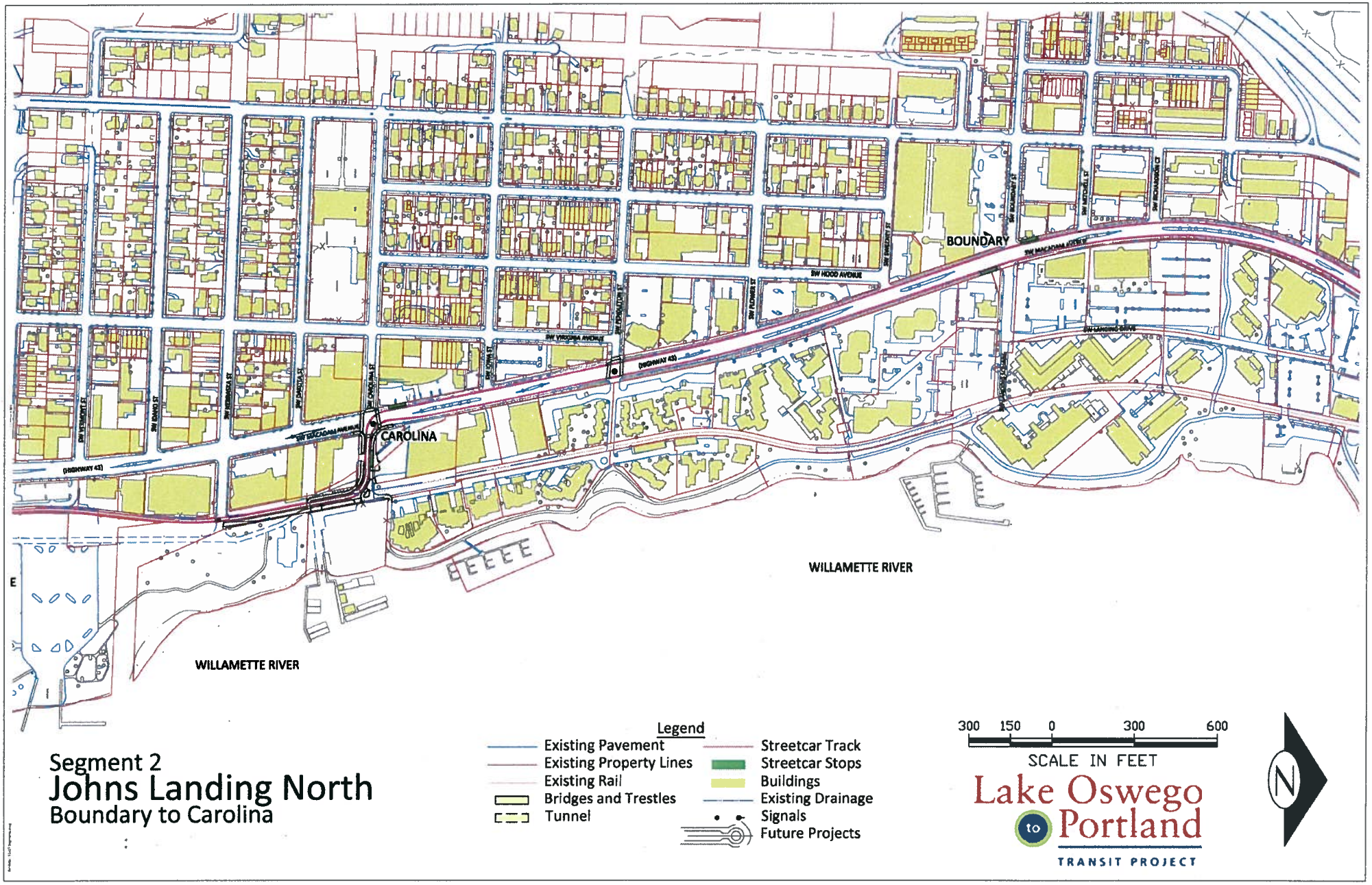
EXHIBITS

EXHIBIT A.

CONCEPTUAL ALIGNMENT PLANS

[See following pages]


BOUNDARY
HAMILTON
BANCROFT
WILLAMETTE RIVER
WILLAMETTE RIVER
Segment 1
South Waterfront
Lowell to Boundary
Legend
Existing Pavement
Existing Property Lines
Existing Rail
Bridges and Trestles
Tunnel
Streetcar Track
Streetcar Stops
Buildings
Existing Drainage
Signals
Future Projects
300 150 0 300 600
SCALE IN FEET
N
Lake Oswego to Portland
TRANSIT PROJECT

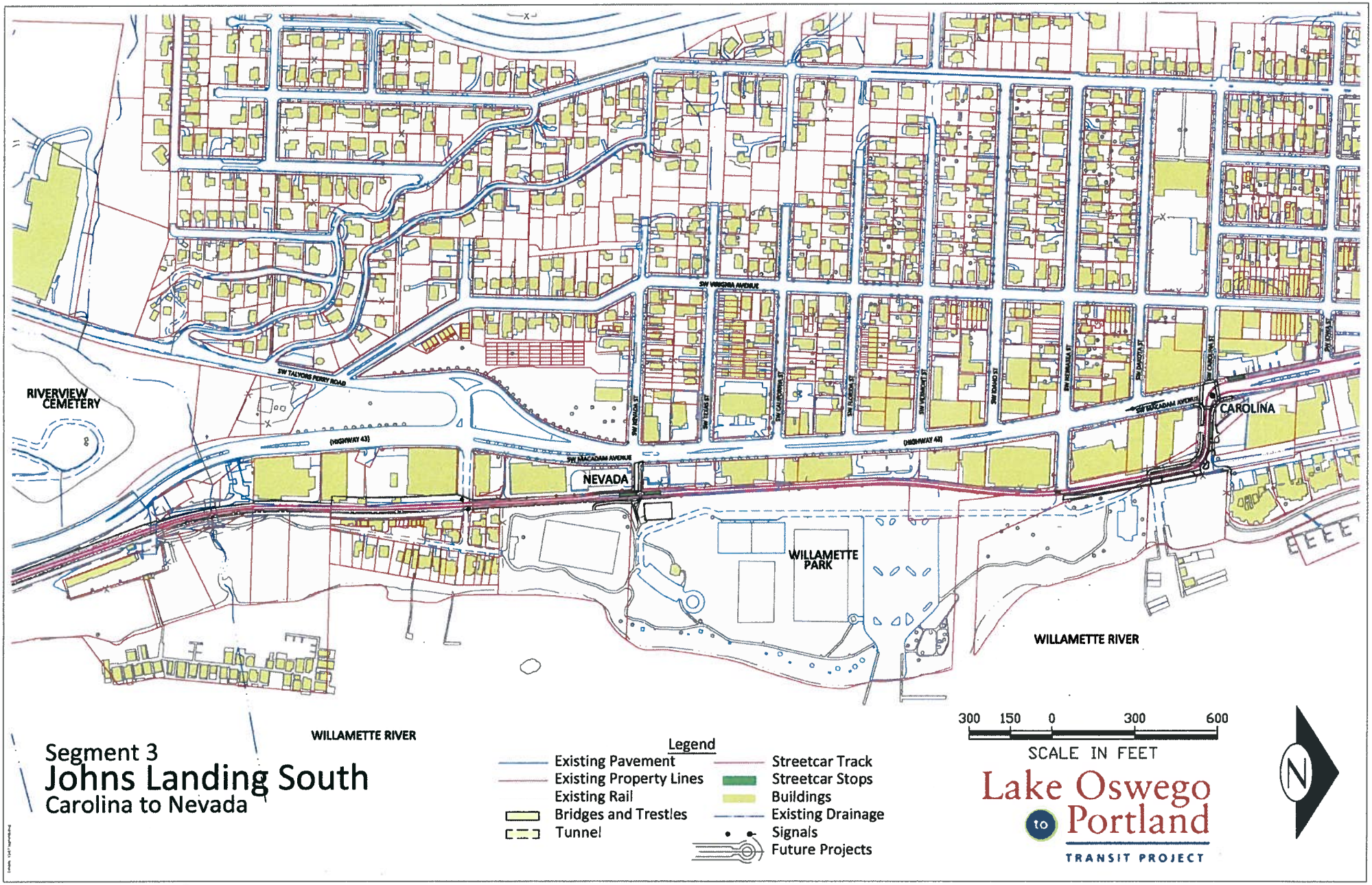


Segment 2

Johns Landing North

Boundary to Carolina

Lake Oswego to Portland TRANSIT PROJECT

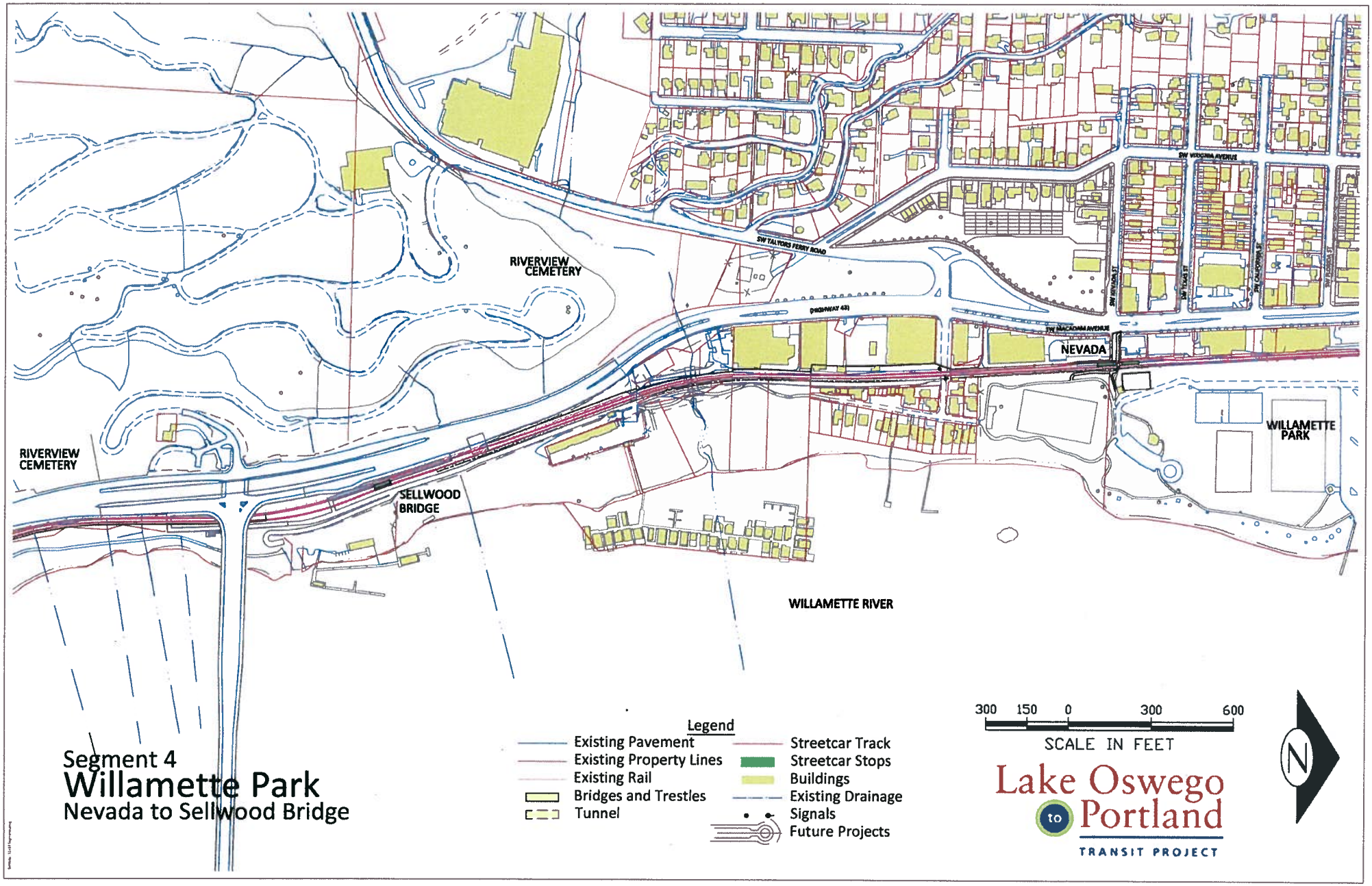


Segment 3

Johns Landing South

Carolina to Nevada

Lake Oswego to Portland TRANSIT PROJECT

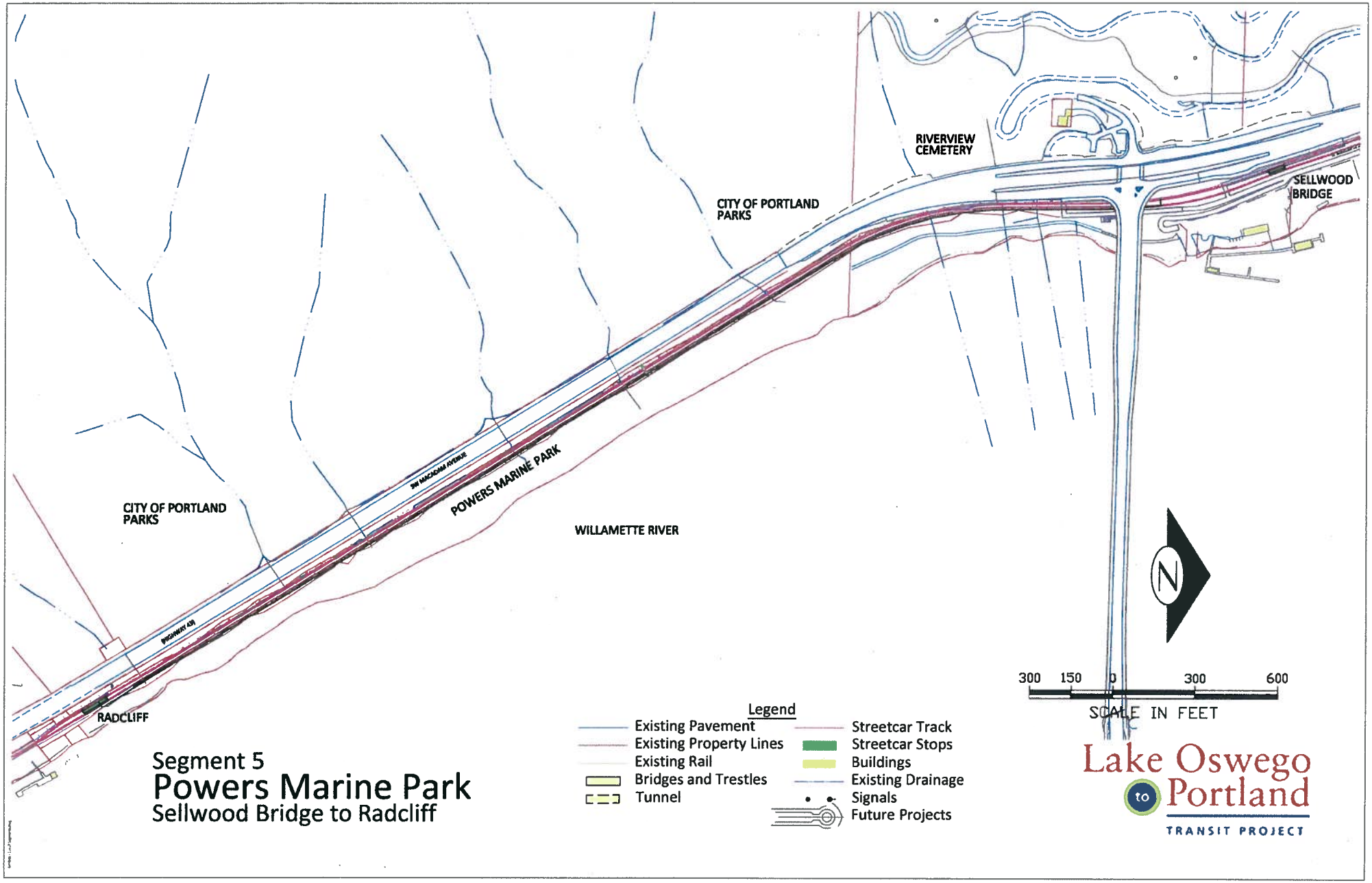


Segment 4

Willamette Park

Nevada to Sellwood Bridge

Lake Oswego to Portland TRANSIT PROJECT

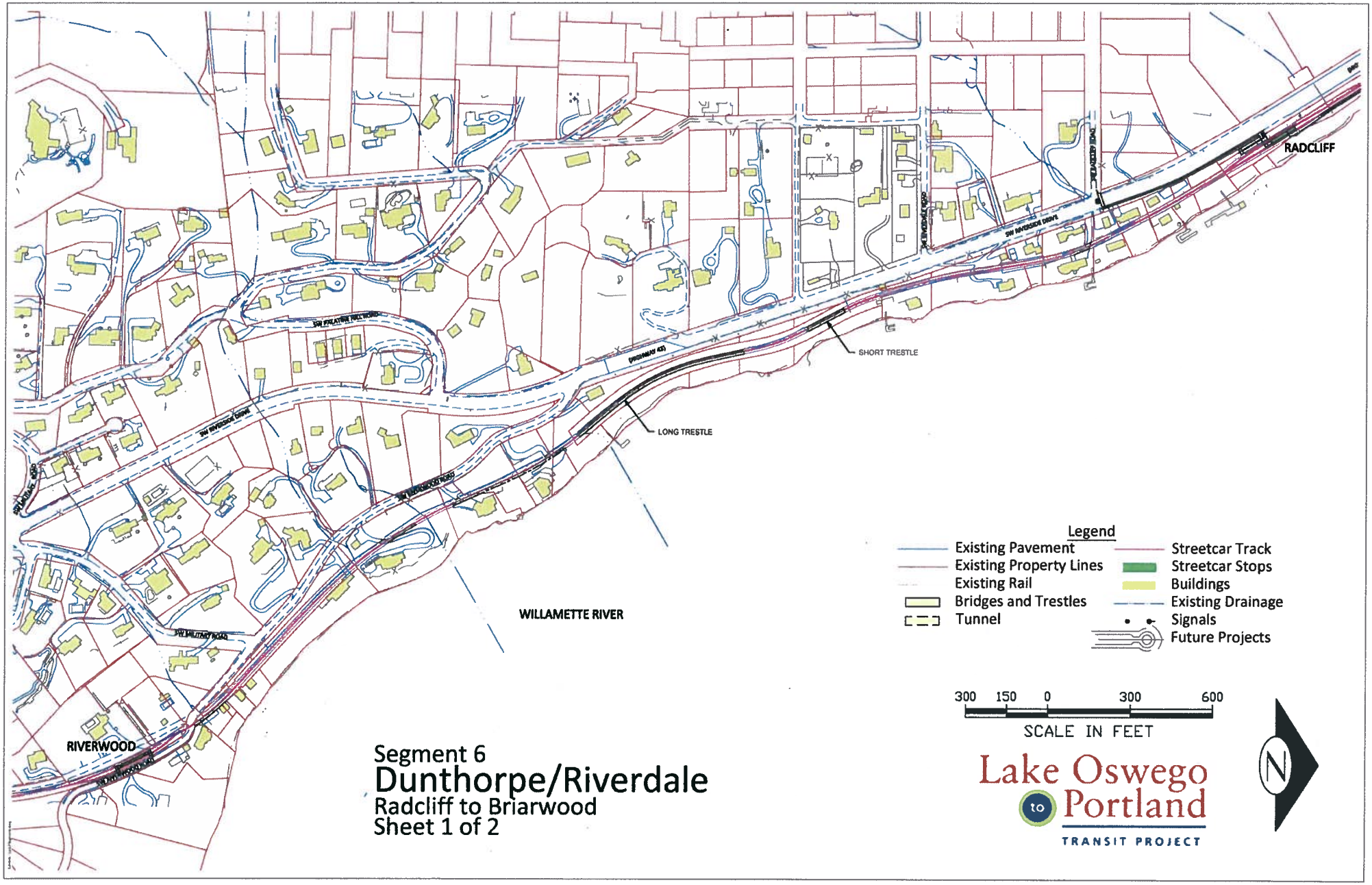


Segment 5

Powers Marine Park

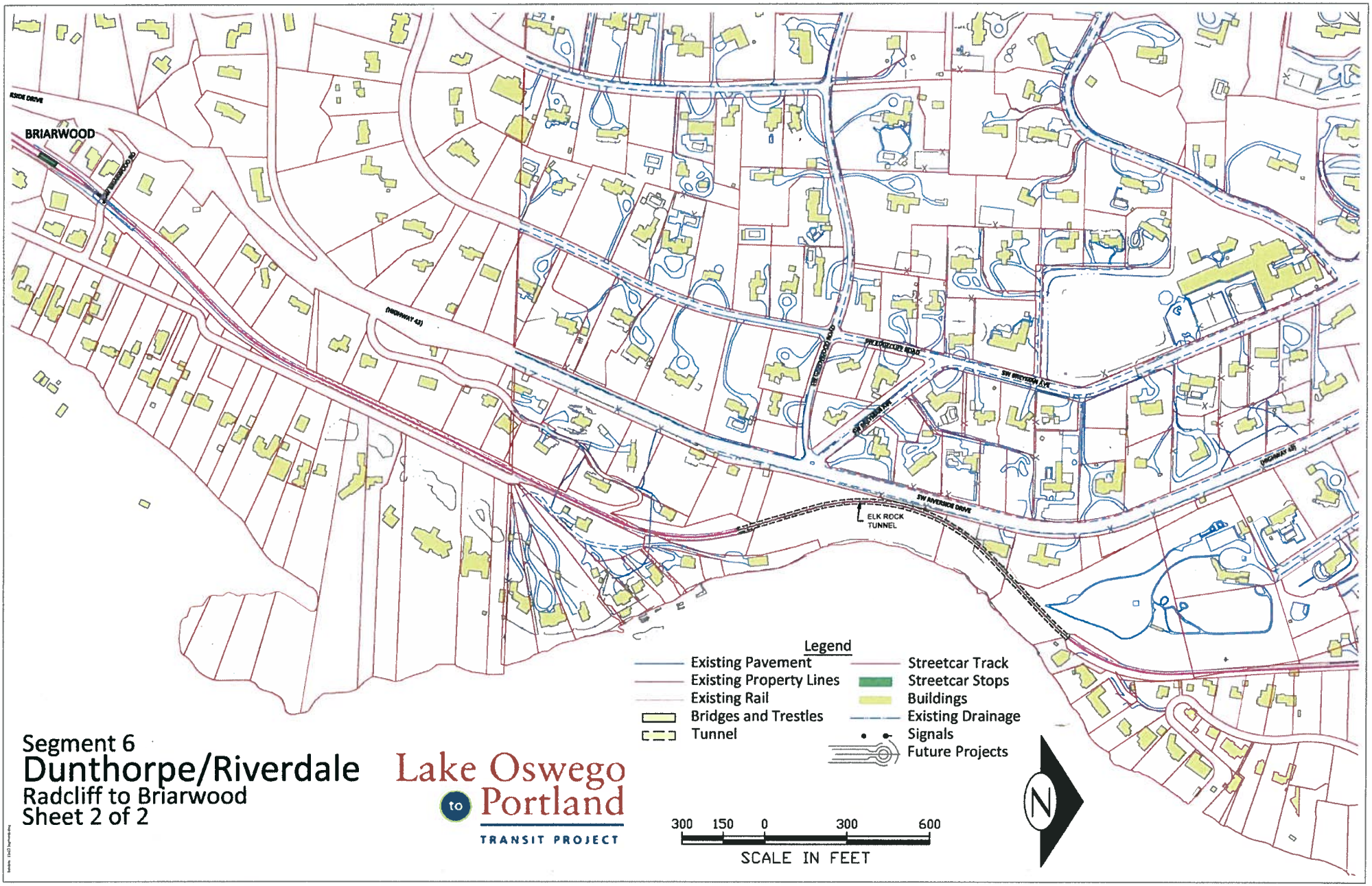
Sellwood Bridge to Radcliff

Lake Oswego to Portland TRANSIT PROJECT



Segment 6
Dunthorpe/Riverdale
Radcliff to Briarwood
Sheet 1 of 2

Lake Oswego to Portland
TRANSIT PROJECT



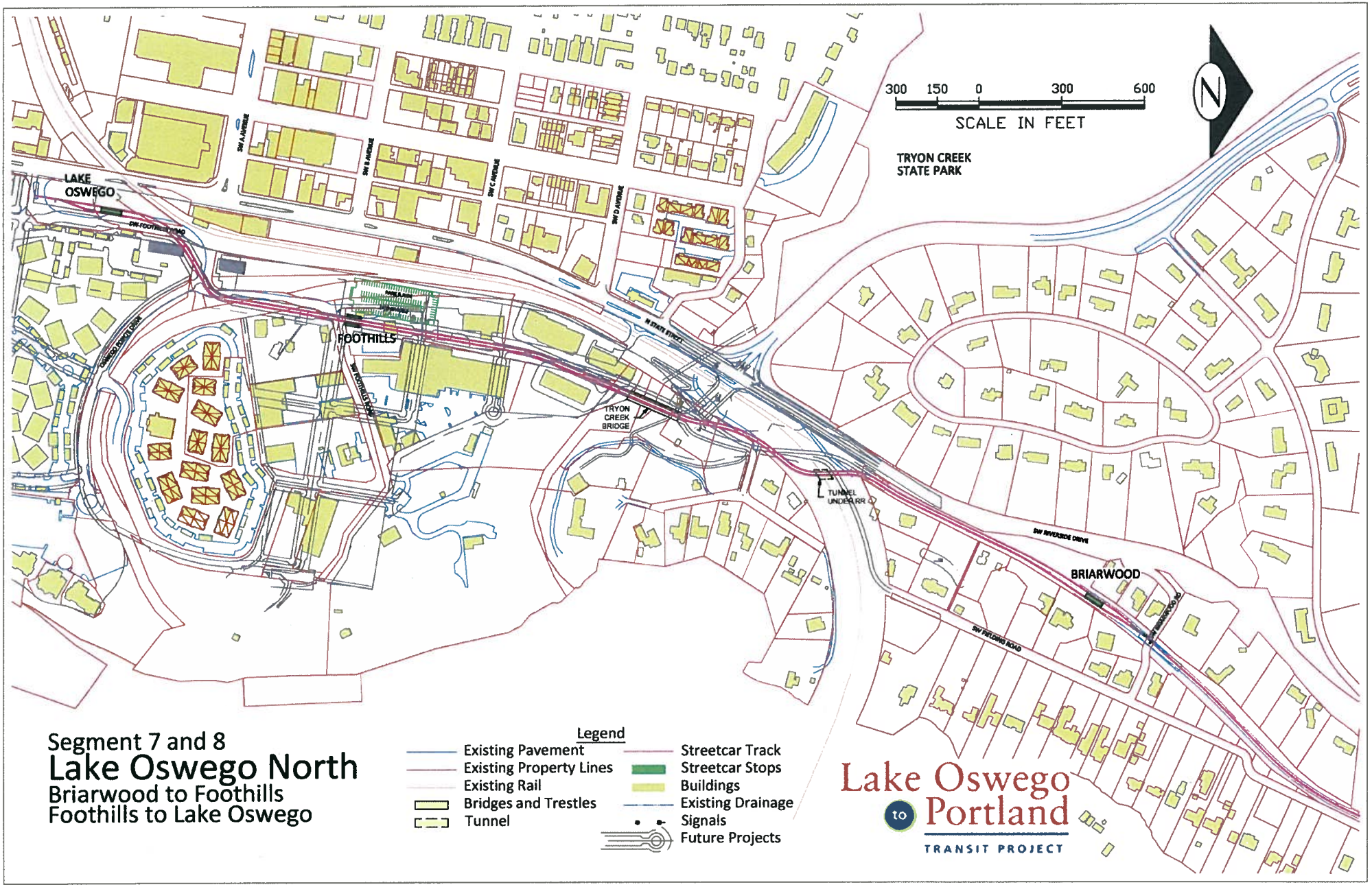
Segment 6

Dunthorpe/Riverdale

Radcliff to Briarwood

Sheet 2 of 2

Lake Oswego to Portland TRANSIT PROJECT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SCALE IN FEET
N
TRYON CREEK
STATE PARK
LAKE
OSWEGO
FOOTHILLS
TRYON
CREEK
BRIDGE
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BRIARWOOD
SW RIVERSIDE DRIVE
SW TAYLORS ROAD
Segment 7 and 8
Lake Oswego North
Briarwood to Foothills
Foothills to Lake Oswego
Legend
Existing Pavement
Existing Property Lines
Existing Rail
Bridges and Trestles
Tunnel
Streetcar Track
Streetcar Stops
Buildings
Existing Drainage
Signals
Future Projects
Lake Oswego
to Portland
TRANSIT PROJECT

EXHIBIT B.

SEGMENT-BY-SEGMENT PROGRAM NARRATIVE

[See following pages]

Lake Oswego to Portland Transit Project

REFINEMENT PHASE - PROGRAM NARRATIVE

SEGMENT #	SEGMENT DEFINITION	OPTION/SUB-SEGMENT	STATIONING	PROGRAM DESCRIPTION
1	**SOUTH WATERFRONT** - SW LOWELL TO SW BOUNDARY -	Option 1 [Boundary]	5000+00 to 5038+00	South Portal/ Streetcar plan per DEIS, i.e., extend existing alignment on SW Moody Ave. and SW Bond Ave. to new Moody/Bond couplet and continuing in WSL to SW Landing Drive with **access to Macadam Ave. at SW Boundary**. Provide station pairs at SW Moody and Bond south of Bancroft and north of SW Hamilton Ct. and at SW Boundary St. as shown in DEIS.
		Option 2 [Bancroft]	5000+00 to 5038+00	Southbound: Extend existing southbound alignment in SW Moody Ave. to SW Bancroft St. and **enter SW Macadam Ave. southbound at Bancroft** in outside lane. Northbound: Extend existing northbound alignment in SW Bond Ave. to connect to SW Bancroft St. with connection to southbound track in outside lane of SW Macadam Ave. northbound. Provide station pairs at SW Moody and Bond south of Bancroft and north of SW Hamilton Ct. and at SW Boundary St. on Macadam Ave. (southbound south of SW Boundary and northbound north of SW Boundary).
2	**JOHNS LANDING NORTH** *- SW BOUNDARY TO SW CAROLINA -*	2A	5038+00	Continue in SW Macadam using "Macadam In-Street" option per DEIS to SW Carolina St.
		2B	5052+00	Provide for typical "urban street" station at SW Pendleton St.
		2C	5060+00 to 5063+00	Provide southbound station at SW Carolina St. on west side of SW Macadam per DEIS plans, including streetcar signal phase; provide northbound station on north side of SW Carolina St. east of SW Macadam as shown in DEIS plans
		Other	5035+00 to 5060+50	Provide $1M allowance for improvements to east side sidewalks and pedestrian crossings.

SEGMENT #	SEGMENT DEFINITION	OPTION/SUB-SEGMENT	STATIONING	PROGRAM DESCRIPTION
3	**JOHNS LANDING SOUTH** *- SW CAROLINA TO SW NEVADA -*	3A	5065+00	Continue double track alignment into WSL while maintaining access to Willamette Sailing Club per DEIS design.
		3B	5063+00 to 5085+00	Continue double track to station at SW Nevada St.
		3C- Nevada Street Station Definition	5060+00 to 5085+00	150' long x 8' wide island platform with standard Streetcar shelter and amenities.
		Segment 3 - Other	5060+00 to 5085+00	Provide $500,000 allowance for pedestrian improvements on SW Macadam Ave. between SW Carolina St. and Nevada Street Station.
4	**WILLAMETTE PARK** *- SW NEVADA TO SELLWOOD BRIDGE -*	4A	5085+00 to 5114+34(Sta. EQ = 2000+00)	Assume current Sellwood Bridge Design, including new access to Willamette Moorage, a new bridge over Stephens Creek and right-of-way adequate for double tracking between Nevada St. Station and Sellwood Bridge Station. New bridge at Stephens Creek and ROW acquisition to be part of Sellwood Bridge project. Cost of retaining walls, pedestrian ramps will be by Sellwood Bridge.
		4B	5085+00 to 5114+34(Sta. EQ = 2000+00)	Continue double track to Sellwood Bridge Station (potential interim terminus). See below for station definition.
		4C - Sellwood Bridge Station Definition	5112+00	o 12'x 60' Center island platform with standard Streetcar shelter and amenities. o Location TBD. Special Improvements. Pedestrian connection improvements assumed to be in Sellwood Bridge project.

SEGMENT #	SEGMENT DEFINITION	OPTION/SUB-SEGMENT	STATIONING	PROGRAM DESCRIPTION
5	**POWERS MARINE PARK** *- SELLWOOD BRIDGE TO RADCLIFF STATION -*	5A	2000+00 to 2045+00	Continue double track through Powers Marine Park to Radcliff Station at approximately Station 2050+00. Provide platform as described below.
		5B	2049+00	Extend double track approximately 400' south of Radcliff Station
		5C - Radcliff Station Definition	2049+00	o 70' long x 12' wide platform with standard Streetcar shelter and amenities. o Located ~600' north of Radcliff Drive in WSRR right-of-way south of Powers Marine Park. o Special Improvements. Pedestrian connection improvements from Radcliff to the station across HWY 43.
6	**DUNTHORPE/RIVERDALE** *- RADCLIFF STATION TO BRIARWOOD STATION -*	6A	2049+00 to 2062+50	Provide turnout approximately 200' south of Radcliff Station and commence single tracking. Provide single-track segment through narrow right-of-way between Radcliff station and Short Trestle.
		6B - Short Trestle Definition	2062+50 to 2064+40	Continue single track to "Short Trestle". Demolish existing and construct new 18' wide concrete deck trestle structure for single DF track and 4' emergency/maintenance walkway one side and 1' barrier on both sides within the existing WSL right-of-way.
		6C - Long Trestle Definition	2066+70 to 2074+10	Continue single track to "Long Trestle". Demolish existing and construct new 18' wide concrete deck trestle structure for single DF track and 4' emergency/maintenance walkway one side and 1' barrier on both sides within the existing WSL right-of-way.

SEGMENT #	SEGMENT DEFINITION	OPTION/SUB-SEGMENT	STATIONING	PROGRAM DESCRIPTION
6 (con't)		6D Riverwood Station Definition	2092+00	Continue single track to Riverwood Rd. Station. Provide standard RR crossing at Riverwood Rd. Riverwood Station: o Provide southbound station south of Riverwood Rd. and northbound station south of Riverwood Rd. including 150' long x 8' wide island platform with standard Streetcar shelter and amenities. o Located immediately south of the Rockwood Road rail crossing within the WSL right-of-way. o Special track work: 100' of tangent track both south and north of the platform, leading to motorized switch transition to single tracks.
		6E - Tunnel Definition	2111+00 to 2125+00	Continue single track through Elk Rock Tunnel. Provide: • Lighting • Intrusion detection • Evacuation sidewalks • Emergency telephones • Other TBD
		6F	2125+00 to 2155+00	Continue single track Briarwood Rd. At Briarwood Rd. overpass, retain and repair as required.

SEGMENT #	SEGMENT DEFINITION	OPTION/SUB-SEGMENT	STATIONING	PROGRAM DESCRIPTION
		6G - Briarwood Station Definition	2155+00	o After overcrossing of SW Briarwood Rd., transition to double track through Briarwood Rd. Station. o 60' long x 12' wide island platform with standard Streetcar shelter and amenities. o Located immediately south of the Briarwood trestle crossing within the 60' wide WSL right-of-way. o Special track work: 100’ of tangent track north of the platform and beyond to motorized switch transition to single track just south of the trestle. o Special Improvements. 8' wide concrete ramp x 320’ long at 8% grade with landings every 16’; sloping from ~ 46’ to 66’ elevation for pedestrian access from Briarwood Road to Stop platform; within the 60’ wide WSL right-of-way. Retaining wall required.
		Segment 6 - Other		Assume stop sign control for all private crossings. Assume private driveway crossings are asphalt.
7	**LAKE OSWEGO NORTH** *- BRIARWOOD STATION TO B AVENUE -*	7A	3000+00 to 3011+00	After Briarwood Station, continue double tracking to new undercrossing of P&W/UPRR tracks; provide minimum 30' clear in undercrossing.
		7B	3011+00 to 3018+00	Continue double tracking to new 200' long structure over Tryon Creek and new intersection at SW Terwilliger Blvd. extended. Assume proportional cost of bridge structure necessary for "Streetcar Envelope" (i.e., two tracks and one 8' sidewalk (additional width for roadway improvements by others)).
		7C	3018+00 to 3022+50	Continue double track alignment in the vicinity of existing Public Storage (PS) facility using alignment that minimizes impacts to existing PS facility.
		7D	3022+50 to 3028+40	Continue double track in new SW Foothills Rd. Assume proportional cost for paved trackway and OCS; roadway improvements and pedestrian facilities by others. Assume adjacent property owners dedicate right-of-way necessary for construction of SW Foothills Rd.

SEGMENT #	SEGMENT DEFINITION	OPTION/SUB-SEGMENT	STATIONING	PROGRAM DESCRIPTION
		7E	3029+00	Provide station improvements at SW B Ave. Northbound station south of SW B. Ave.; southbound station south of SW B Ave. At B Avenue, provide provisions for up to a 400-space parking garage located west of SW Foothills Rd. and south of SW B. Ave.
8	**LAKE OSWEGO SOUTH**	8A	3028+40 to 3036+00	Continue double track in SW Foothills Rd. Assume street improvement beyond "Streetcar Envelope" by others; assume electrical substation acquisition and other ROW in this area to be acquired by City of Lake Oswego.
	- B AVENUE TO L.O. TERMINUS -	8B	3036+00 to 3041+04	Provide Lake Oswego Station and Terminus adjacent to SW State St. as shown in Foothills Master Plan. Provide minimum 100' of tail track south of Lake Oswego Station.

EXHIBIT C.

COMPARISON OF REFINEMENT PHASE AND DEIS PHASE COST ESTIMATES

The current estimate of just under $200M represents the estimated cost, in today's dollars, to build a fully operational streetcar line from SW Lowell St. in Portland to downtown Lake Oswego (or $70M for a Minimum Operating Segment to SW Nevada St.).

The $458M number shown in the DEIS was the upper end of a range (low to high), and represents a "worst case" estimate, of how the federal government would look at the project from the perspective of a potential federal grant for the project. This number included some scope that is not an actual cost to the project and reflects an estimate of the cost at a future point in time (2017 in some cases and 2035 in others). In short, this number was really a *financial planning* number more than it is a cost estimate.

Here is what made up the $458M:

- Direct construction cost, initially in 2010 dollars (see inflation below). This is the cost to build the streetcar line, assuming the "worst case" of a large number of permutations given the DEIS studied multiple construction options in 5 locations (South Waterfront, Macadam Ave., Sellwood Bridge, Dunthorpe and downtown Lake Oswego). Included in the estimate were costs to construct certain other infrastructure (structures, roads) on the assumption that the streetcar project was built before other projects in the South Waterfront, Sellwood Bridge and Lake Oswego. In the current estimate, many of these costs are avoided (South Waterfront) or are part of the scope of other projects, and, therefore, the responsibility of other jurisdictions (Multnomah County for Sellwood Bridge and City of Lake Oswego for costs in the Foothills District.).
- Also included was over $27M of land acquisition costs in anticipation of the streetcar going first. This is no longer the case in all instances.
- Consistent with federal policy, the DEIS estimate included all the streetcar vehicles needed in 2035 (11), even though only 6 were assumed to be needed at opening in 2018. The current estimate includes 4 vehicles.
- The DEIS figure included about $80M for the Willamette Shoreline right-of-way which was necessary to show as a "cost" only to make sure, consistent with federal policy, that 40% of the value could be treated as local match (or source of funding) for the federal grant. This leverages up the federal grant by including 60% federal funding for the ROW value. This is allowed by the federal government. This does not mean that the ROW needed to be paid for again as it has been in public ownership for two decades. Again, the $80M is really just part of a finance plan 'formula' and is not an actual "cost" to the project.
- The DEIS figure included over $111M in construction inflation and financing costs alone, assuming the project would be built in 2017. This is essentially the 'carrying cost' from 2010 dollars to 2017. Inflation rates are lower today than those assumed in the DEIS.

The following figure compares the refinement phase budget to the "High" estimate included in the DEIS. Note that this table includes both the 2010/2011 cost estimate for the project along with the "Project Cost for FTA Grant Purposes", which is the total project funding amount that includes the benefit of including previously incurred right-of-way acquisition costs for the WSL for the purposes of leveraging FTA funding of the project.

REFINEMENT BUDGET/COMPARISON TO DEIS COSTS

	REFINEMENT PHASE BUDGET (2011$)		DEIS PHASE BUDGET-HIGH ESTIMATE (2010$)[18]			
Cost Component	**Component Cost ($M)**	**Total Cost ($M)**	**Component Cost ($M)**	**Total Cost ($M)**	**DIF ($M)**	**DIF (%)**
Direct Construction Cost:	$112.2		$126.1			
Property Acquisition (w/o WSL)	1.4		27.4			
Maintenance Equipment	0.8		0.0			
Vehicles	17.6		48.4[19]			
Art	0.5		0.0			
SUBTOTAL		**$132.5**		**$201.9**	**-$69.4**	**-34.4%**
Engineering and Administration	$26.5		$41.2			
Contingencies	39.8		12.9			
SUBTOTAL		$66.3		$54.1	$12.2	**22.5%**
ENG.& CONST. COST (2011 $)		**$198.8**		**$256.0**	**-$57.2**	**-22.3%**
Lake Oswego Park & Ride Facilities (400 Spaces)		9.4		11.1		
ENG. & CONST. COST WITH PARK & RIDE FACILITIES (2011 $)		**$208.2**		**$267.1**	**-$58.9**	**-22.1%**
Inflation and Finance Costs to 2017		63.8		110.9		
TOTAL ENG. & CONST. COST FOR FTA GRANT PURPOSES (2017 $)		**$272.0**		**$378.0**	**-$106.0**	**-28.0%**
Value of Contributed WSL Right-of-Way (Non-Cash)		58.0		80.3		
TOTAL ENG. & CONST. COST FOR FTA GRANT PURPOSES (2017 $)		**$330.0**		**$458.3**	**-$128.3**	**-28.0%**

[18] Some costs for street and infrastructure improvements along the streetcar alignment in Foothills were included in the DEIS cost estimate.

[19] Per FTA requirements, the DEIS estimate included the number of streetcars needed for projected operations in 2035 (11 vehicles). Only six (6) vehicles were projected to be needed at opening.

EXHIBIT D.

METRO MEMORANDUM CONCERNING NEPA IMPLICATIONS OF REFINED PROJECT (DRAFT)

600 NE Grand Ave.
Portland, OR 97232-2736
www.oregonmetro.gov

Metro | *Memo*

Date: Thursday, October 12, 2011
To: Elissa Gertler, Deputy Director and Bridget Wieghart, Transit Project Manager
From: Jamie Snook, Principal Planner
Subject: Lake Oswego to Portland Transit Project, NEPA Implications - DRAFT

The purpose of this memorandum is to identify the NEPA implications, necessary work and timing associated with various changes in the project definition and locally preferred alternative (LPA) under consideration. Potential changes to the Lake Oswego to Portland Transit Project as it is defined in the Draft Environmental Impact Statement (DEIS) may include:

- South Waterfront Segment: South Portal (Moody/Bond Couplet) or Willamette Shore Line right of way;
- Johns Landing Segment: New entry/exit onto Macadam Avenue;
- Johns Landing Segment: Addition of Pendleton Station;
- Sellwood Bridge Segment: Preferred alignment;
- Sellwood Bridge Segment: Addition of Radcliffe Station;
- Dunthorpe/Riverdale Segment: Riverwood Rd or Willamette Shore Line right of way;
- Lake Oswego Segment: Foothills planning/coordination ;
- Additional single track sections; and
- Sellwood Bridge minimum operable segment (MOS)/phasing option.

If there are changes to the project definition or LPA:

- Changes can be covered in the project refinement/preliminary engineering phase.
- Any choices being made during this process need to be made based on relevant information and disclosed to the public and the decision makers.
- Analyze the change in impacts and disclose any new information as part of the LPA process prior to the LPA recommendation and adoption.
- New adverse impacts that rise to the level of significance may require a supplemental draft environmental impact statement.
- Substantive changes in the no-build should be disclosed during the LPA process.
- Information should be out and available to the public before a recommendation is made – so not to appear arbitrary and capricious.

- If a decision is not recommended during this process, the LPA should be written in a way that allows for flexibility, but is clear for the decision makers and the public.
- Any comments received by the Metro Council, during the LPA process would be included in the FEIS.

South Waterfront Segment: South Portal (Moody/Bond Couplet) or Willamette Shore Line right of way

The DEIS describes the South Portal or Moody/Bond Couplet extension as a construction phasing option in *Chapter 3, Section 3.17 Phasing Effects*. The Moody/Bond couplet extension is identified in the Financially Constrained Regional Transportation Plan (RTP) and the DEIS assumes that it is constructed by 2035. Since the portal project is assumed as part of the no-build condition, the DEIS identified two interim phasing options to be considered, if the full construction scenario was not realized: 1) the streetcar alignment and its required infrastructure improvements would be constructed, consistent with the alignment under the full project construction option (Moody/Bond couplet), but other non-project roadway improvements would be constructed at a later date by others; or 2) a different streetcar alignment using the Willamette shore Line right of way would be initially constructed, until the South Portal improvements are constructed.

The phasing options would not change the basic characteristics of the streetcar alternative studied. The direct effects of the streetcar alternative would remain unchanged under the phasing options (compared to the full project construction phasing options), except that there would be 0.3-acre increase in fill in the 100-year floodplain. The DEIS identifies the changes with the different construction phasing options (see page 3-229 in Section 3.17 Phasing Effects).

Next steps: This phasing option is described in the DEIS. It would not be unreasonable to revisit this option; however, we will need to clearly articulate the tradeoffs and differences in the project description prior to selecting the LPA. Prior to selecting the LPA:

- Identify changes to the no-build
- Coordinate with the City of Portland South Portal project - participate and share information.
- Identify new environmental impacts: water quality, floodplain, right of way, traffic, cost
- Confirm that there are no new adverse impacts
- Coordinate with FTA
- Share information with decision-makers to allow for an informed decision
- Disclose as part of the LPA process, prior to LPA recommendation and adoption

Johns Landing Segment: New entry/exit onto Macadam Avenue

The traffic analysis in the DEIS shows that the intersection of SW Boundary Street at Macadam Avenue represents a potential area requiring significant modification to address future traffic congestion issues. While the DEIS identified that this intersection would require additional modification, it did not explicitly identify a new location to enter/exit onto Macadam Avenue.

This option would not change the basic characteristics of the streetcar alternative. The potential impacts would be similar to existing alignment along SW Boundary. Engineering and traffic analysis should be conducted to determine impacts and benefits.

Next steps: This option would be considered as mitigation for the congestion at SW Boundary and SW Macadam intersection. To move this option forward, the project would need to:

- Identify as mitigation and disclose impacts: traffic, cost, right of way, parking, travel time
- Confirm that there are no new adverse impacts
- Coordinate with FTA
- Share information with decision-makers to allow for an informed decision
- Disclose as part of the LPA process, prior to LPA recommendation and adoption

Johns Landing Segment: Addition of Pendleton Station

Chapter 2 of the DEIS describes Pendleton Station (as well as the E Avenue Station) as an optional station, but was not fully documented in the DEIS. Without the Pendleton Station there is a gap between stations along the critical stretch of alignment (about half mile) on SW Macadam Avenue between SW Boundary and SW Carolina Streets. Based on the comments received after publication of the DEIS, there appears to be support in the community for adding a station on the streetcar alignment at SW Pendleton St.

Locating a station at SW Pendleton St would need to include coordination with the ODOT (owner of the facility) and City of Portland as well as engineering feasibility and transit benefits. A streetcar station would include a relatively small footprint (smaller than a light rail station but larger than a bus stop), therefore it is believed that the station would fit within the existing road right of way. Additional engineering study would need to confirm this. Adding a station could also have implications to the travel time and ridership.

Next steps: This option could be deferred to PE. However, if the desired outcome is to choose during this refinement phase, then the project would need to:

- Identify and disclose impacts or changes: ridership, cost, right of way, travel time
- Confirm that there are no new adverse impacts
- Coordinate with FTA
- Share information with decision-makers to allow for an informed decision
- Disclose as part of the LPA process, prior to LPA recommendation and adoption

Sellwood Bridge Segment: Preferred alignment

The DEIS describes the alignments in this segment as two potential construction phasing options: New Interchange or the Willamette Shore Line phasing options in *Chapter 3, Section 3.17 Phasing Effects*. The phasing options are not a choice of the transit project but are completely dependent upon how construction of the Sellwood Bridge and west interchange project progresses.

During the time that the Lake Oswego to Portland Transit project and DEIS were being developed, the Sellwood Bridge project was wrapping up their DEIS and FEIS for FHWA. Since the completion of the Sellwood Bridge EISs, the alignment of the replacement bridge and west interchange has changed slightly. The Lake Oswego to Portland transit project would need to react to the changes. Generally speaking, it is believed that we would be constructed in the Willamette Shore Ling right of way and may have a lesser amount of impact than originally considered. However, additional engineering study would need to be conducted to confirm. One

area of concern is the relationship between the streetcar alignment, the bridge replacement, the west interchange construction, the proposed regional trail and the Powers Marine Park.

Next steps: This phasing option is described in the DEIS, which described this option as being dependent on the Sellwood Bridge project causing changes to the project definition. This can be deferred to PE. However, as part of the LPA discussions, the City of Portland Parks it was revealed that there are concerns regarding the cumulative effects of the transit project, the regional trail and the Sellwood Bridge replacement project. The parks department has also identified the desire for single track in this section. These discussions and this analysis will be an important part of the NEPA process. During this phase, the project should disclose any and all known changes:

- Identify cumulative effects of the transit, trail and Sellwood Bridge projects – this could happen now or during PE depending if this information is needed to answer questions from the Portland City Council.
- Discuss and document potential right of way solutions to allow for all three projects to exist in this geographically constrained area.
- Confirm that there are no new adverse impacts
- Coordinate with FTA
- Share information with decision-makers to allow for an informed decision
- Disclose as part of the LPA process, prior to LPA recommendation and adoption

Sellwood Bridge Segment: Addition of Radcliffe Station

This station was not proposed as part of the transit project and was not included in the DEIS. Without the Radcliffe Station there is a gap between the Sellwood Bridge and the Dunthorpe neighborhood. The gap between the Sellwood Bridge and Riverwood Rd stations is over a mile and half away. A station in this location would provide access to the neighborhood to the west of Highway 43 and potentially Lewis and Clark College. Based on the comments received after publication of the DEIS, there appears to be support in the community for adding a station on the streetcar alignment at/near SW Radcliff Rd.

Locating a station at SW Radcliffe Street would need to include coordination with the ODOT (owner of the facility) and City of Portland as well as engineering feasibility and transit benefits. At initial glance, it looks like the station may fit within the existing Willamette Shore Line right of way located at the southern end of Powers Marine Park.

Next steps: This option could be deferred to PE. However, if the desired outcome is to choose during this refinement phase, then the project would need to:

- Identify and disclose impacts or changes: ridership, cost, right of way, travel time
- Confirm that there are no new adverse impacts
- Coordinate with FTA
- Share information with decision-makers to allow for an informed decision
- Disclose as part of the LPA process, prior to LPA recommendation and adoption

Dunthorpe/Riverdale Segment: Riverwood Rd or Willamette Shore Line right of way

The DEIS identified two potential design options in the segment: the Riverwood and the Willamette Shore Line design options. The Riverwood design option was a result of early

discussions with potentially impacted property owners who were interested the pros and cons of an alignment located within Riverwood Rd. With the Willamette Shore Line design option, streetcar would be constructed in close proximity to several homes in this segment. The Riverwood Rd design option would locate streetcar in Riverwood Rd and away from the homes in this area.

To reach consensus between the two design options, addition technical work would need to be performed. The Riverwood Rd design option has some support with the community, however there are some concerns regarding the closure of Highway 43 and Riverwood Rd intersection in order to accommodate the streetcar alignment. An engineering study would be conducted to determine the feasibility or keeping the intersection of Highway 43 and Riverwood Rd open. With the Willamette Shore Line design option, additional technical to look at mitigation measures for access, noise and vibration. Based on the technical and engineering work, additional stakeholder outreach would need to be conducted.

Next steps: The current LPA does not make a recommendation between these two options. If a decision is being made between these options, the project would need to perform the additional engineering and technical work identified to help local decision-makers:

- Identify the opportunity to keep the intersection of Highway 43 and Riverwood Rd open with the Riverwood design option.
- Identify the potential mitigation measures for access and noise and vibration with the Willamette Shore Line design option.
- Identify the benefits and constraints with single track in this section with a balance between environmental and neighborhood impacts as well as ridership, travel time, headway and future expansion perspective.
- Confirm that there are no new adverse impacts
- Coordinate with FTA
- Share information with decision-makers to allow for an informed decision
- Disclose as part of the LPA process, prior to LPA recommendation and adoption

Lake Oswego Segment: Foothills planning/coordination

The DEIS identified the two design options in this segment as both design options and construction phasing options: Foothills Rd and UPRR design options. These are both considered design options because it is a choice of the project and community to decide to which location would best meet the needs of the community. The Foothills Rd is considered a phasing option because the Foothills alignment is dependent upon the results of the Foothills District Framework Plan.

The DEIS evaluated a wide footprint for the Foothills Rd alignment due to the uncertainties of the exact alignment of the new Foothills Rd. The Framework plan, which is currently underway, will help solidify the location of the new Foothills Rd and the streetcar alignment. Current designs have shown an alignment different from what was studied in the DEIS, including terminating the alignment at/near B Avenue instead of moving south to Albertsons (about a third of a mile difference). The new proposed alignment is also looking at a smaller number of park and ride spaces and one less station. While the impacts of the alignment may be less, because the alignment is shorter, the alignment could result in different travel times and different ridership.

Next steps: These design options are described in the DEIS as both design options and phasing options. However, the alignment is dependent on the Foothills Framework Plan to know exactly where the streetcar should be constructed. There are a lot of moving parts in this segment and there needs to be strong coordination between the two projects to ensure success for both. Changes in the project definition should not significantly change the findings of the DEIS. If any new adverse impacts are identified or that the changes significantly change the project definition a supplemental DEIS may be warranted. As outlined in the original LPA recommendation, this could be deferred to PE. However, it is important for the decision-makers to understand changes in benefits and impacts, as well as, confirm that a supplemental DEIS is not needed to proceed to PE/FEIS. During this refinement phase, then the project would need to:

- Alignments in this area are dependent on the Foothills Framework Plan and Lake Oswego's needs and goals for this district.
- Coordinate with the City of Lake Oswego Foothills Framework plan - participate and share information.
- Identify new environmental impacts: floodplain, right of way, travel time, ridership, park and ride and station changes, cost
- Confirm that there are no new adverse impacts
- Coordinate with FTA
- Share information with decision-makers to allow for an informed decision
- Disclose as part of the LPA process, prior to LPA recommendation and adoption

Additional Single track sections

During the LPA phase of the project, there were many discussions regarding the cost of the streetcar alignment which resulted in a strong desire to identify potential cost savings to make for a more cost effective project. Therefore, the project team will look at ways to reduce the capital/construction costs by reducing the overall footprint and including additional single track sections.

A reduction of single track section may not warrant additional environmental evaluation if it doesn't change the basic characteristics of the streetcar alternative. If the single track sections change the operations and characteristics of the project by changing the headways/capacity or impacting the travel times and ridership, this may warrant a supplemental DEIS to document the changes.

Next steps: This has been identified as a potential cost saving measure as well as to reduce or mitigate any potential environmental impacts identified in the DEIS. This could be done during PE; however, it is important to build community support by making the project footprint smaller. Therefore, if the project is looking to include this in the LPA recommendation, then the project would need to:

- Identify and disclose impacts or changes: water quality, ecosystem, parks, right of way, ridership, cost, travel time, headways
- Confirm that there are no new adverse impacts
- Coordinate with FTA
- Share information with decision-makers to allow for an informed decision
- Disclose as part of the LPA process, prior to LPA recommendation and adoption

Sellwood Bridge minimum operable segment (MOS)/phasing option

The DEIS identified two different types of phasing options: 1) those related to the project finance plan (i.e., full project construction and the Sellwood Bridge MOS construction); and 2) those related to coordination between this project and other capital project in three of the project segments (i.e., South Waterfront, Sellwood Bridge and Lake Oswego segments – all mentioned above).

A Sellwood Bridge MOS construction phasing option was identified in Chapter 3, Section 3.17 Phasing Effects of the DEIS as an option that would address potential cash flow issues and would result in a phased opening of the project. This option was not analyzed throughout the DEIS and did not include an analysis of ridership or travel time.

Next steps: As mentioned in the DEIS, would require additional analysis of environmental impacts resulting from the interim project alignment or Sellwood Bridge MOS would be needed. If this is going to be included in the LPA recommendation, the project would need to:

- Identify and disclose impacts or changes: timing/phasing, ridership, cost, travel time
- Confirm that there are no new adverse impacts
- Coordinate with FTA
- Share information with decision-makers to allow for an informed decision
- Disclose as part of the LPA process, prior to LPA recommendation and adoption

EXHIBIT E.

LOPT - FOOTHILLS FEDERAL SCOPE DEFINITION

[See following page]

LOPT - FOOTHILLS FEDERAL SCOPE DEFINITION

SCOPE ITEM	STREETCAR SCOPE	STREETCAR COST = "X"*	FOOTHILLS "FEDERAL:" SCOPE	FOOTHILLS "FEDERAL" COST = "Y"*
Streetcar Terminus and Plaza	• Tracks • Platforms (2) • Station amenities, .e.g., shelters, trash receptacles • Tail track	$0.6M	• Plaza substructure and finishes • Area lighting • Other transit-related amenities • Bus transfer improvements	$2.0M
"B" Avenue Pedestrian connection between State St. and Foothills Rd.	• See Park & Ride	See Park & Ride	• Stairway from State Street to Foothills Rd.	$1.7M
Park and Ride parking structure	• Complete park and ride facility identified as a "Optional Cost" • Includes elevator located to serve parking structure and ADA accessibility between State St. and Foothills Rd.	$9.4M	• Possible cost sharing TBD	$0
Foothills Rd –Retaining Walls, Fill, Roadway Structure Over Tryon Creek and Connection to Stampher Rd.	• Complete paved trackway (at current grades) ready for streetcar operations; includes bridge structure necessary for two streetcar tracks and 8' sidewalk	$33.2M	• Retaining walls and fill necessary for roadway and sidewalks improvements at desired grades, exclusive of streetcar portion; cost to complete roadway curb-to-curb exclusive of streetcar trackway; Additional structure needed to carry designed travel lanes; new connection to Stampher Rd.	$13.75M (12' sidewalks both sides)

SCOPE ITEM	STREETCAR SCOPE	STREETCAR COST = "X"*	FOOTHILLS "FEDERAL:" SCOPE	FOOTHILLS "FEDERAL" COST = "Y"*
Foothills Rd –Retaining Walls, Fill, Roadway Structure Over Tryon Creek and Connection to Stampher Rd.	• Complete paved trackway (at current grades) ready for streetcar operations; includes bridge structure necessary for two streetcar tracks and 8' sidewalk	$33.2M	• Retaining walls and fill necessary for roadway and sidewalks improvements at desired grades, exclusive of streetcar portion; cost to complete roadway curb-to curb exclusive of streetcar trackway; Additional structure needed to carry designed travel lanes; new connection to Stampher Rd.	$13.75M (12' sidewalks both sides)
Foothills Rd. Utility Costs	• None	None	• All relocations of existing utilities necessary for construction of Foothills Rd.	$2.0M
Property Acquisition	• Property acquisition exclusively necessary to accommodate streetcar trackway. Assume dedication of some private property and "net costs" for right-of-way in the event that larger parcels are acquired.	$1.9M	• Property acquisition exclusively necessary to accommodate construction of Foothills Rd. Assume dedication of some private property and "net costs" for right-of-way in the event that larger parcels are acquired.	$0
TOTAL		**$45.10M**		**$16.65M**

***2011 Dollars**

Updated January 4, 2011