Lake Oswego to Portland Transit Project

Hazardous Materials

November, 2010

TriMet and Metro

Shawn Williams, Bruce Cassem, Kimberly Degutis and Samuel Joyce
URS Corporation

The preparation of this report was financed in part by the U.S. Department of Transportation, Federal Transit Administration. The opinions, findings and conclusions expressed in this report are not necessarily those of the U.S. Department of Transportation, Federal Transit Administration.

This page left intentionally blank.

TABLE OF CONTENTS

List of Figures

List of Tables

1. INTRODUCTION

This report contains the detailed analysis and documentation that is the basis for Chapter 3, Section 3.13 on hazardous materials in the Lake Oswego to Portland Transit Project (LOPT) Draft Environmental Impact Statement (DEIS) published by the Federal Transit Administration in December 2010. This chapter of the report includes a summary of the project background, the Purpose and Need, the alternatives/options considered and the description of the alternatives analyzed.

1.1 Project Background

Transit improvements in the Lake Oswego to Portland corridor have been studied several times in recent history. In the 1970s and 80s, a light rail alignment through Johns Landing was studied as part of the Westside Corridor Alternatives Analysis, and in the 1990s potential light rail alignments through Johns Landing were studied as part of the South/North Corridor Study.

The Willamette Shore Line right of way was first established in 1885-1887 as the Portland and Willamette Valley Railroad, which began operation in July 1887. The Southern Pacific Railroad (SPRR) later purchased the railway in 1914. The railroad had a major impact on the development of southwest Portland. Initially, 14 trains operated between Portland and Oswego (as it then was known), and it became the main transportation link for developing residential communities along the route. The line was electrified in 1914 and passenger traffic hit its peak in 1920 with SPRR running 64 daily trains between Portland and Oswego. Passenger service ended on October 5, 1929, while freight service continued until 1983.

In August of 1984, the Interstate Commerce Commission granted SPRR permission to abandon the line. In 1988, the Willamette Shore Line Consortium (the Consortium) purchased the 6.3-mile-long line from SPRR for approximately $2 million. The Consortium, comprised of the City of Lake Oswego, City of Portland, Oregon Department of Transportation (ODOT), Clackamas County, Multnomah County, Metro, and TriMet, purchased the line to preserve it for future passenger rail transit use. TriMet holds title for the Consortium and the City of Lake Oswego provides maintenance services funded by the Consortium.

In 2005, with the endorsement of the Joint Policy Advisory Committee on Transportation, the Metro Council directed staff to initiate the Lake Oswego to Portland Transit and Trail Alternatives Analysis. The alternatives analysis focused on improving the ability to serve travel demand in the corridor through improved transit service and development of a multi-use pathway.

1.2 Purpose and Need

The **Purpose** of the project is to optimize the regional transit system by improving transit within the Lake Oswego to Portland transit corridor, while being fiscally responsive and supporting regional and local land use goals. The project should maximize, to the extent possible, regional resources and economic development opportunities, and garner broad public support. The project should build on previous corridor transit studies, analyses, and conclusions and should be environmentally sensitive.

The **Need** for the project results from:

- Historic and projected increases in traffic congestion in the Lake Oswego to Portland corridor due to increases in regional and corridor population and employment;
- Lengthy and increasing transit travel times and deteriorating public transportation reliability in the corridor due to growing traffic congestion;
- Increasing operating expenses, combined with increasingly scarce operating resources and the demand for more efficient public transportation operations;
- Local and regional land use and development plans, goals, and objectives that target the corridor for residential, commercial, retail, and mixed-use development to help accommodate forecast regional population and employment growth, and previous corridor transit studies, analyses, and conclusions;
- The region's growing reliance on public transportation to meet future growth in travel demand in the corridor;
- The topographic, geographic, and built-environment constraints within the corridor that limit the ability of the region to expand the highway and arterial infrastructure in the corridor; and
- Limited options for transportation improvements in the corridor caused by the identification and protection of important natural, built, and socioeconomic environmental resources in the corridor.

1.3 Alternatives/Options Considered

Metro's 2004 Regional Transportation Plan (RTP) identified the need for a refinement plan for a high capacity transit option for the corridor, which included an analysis of several modal alternatives. Metro initiated the corridor refinement plan in July 2005 and issued the *Lake Oswego to Portland Transit and Trail Alternatives Analysis Evaluation Summary Public Review Draft* in June 2007.

On December 13, 2007, after reviewing and considering the alternatives analysis report, public comment, and recommendations from the Lake Oswego to Portland Transit and Trail Project Citizen Advisory Committee (CAC), the Lake Oswego to Portland Transit and Trail Project Management Group (PMG), Steering Committee, and partner jurisdictions and agencies, the Metro Council approved Resolution No. 07-3887A. The resolution adopted the *Lake Oswego to Portland Transit and Trail Alternatives Analysis: Alternatives to be Advanced into a Draft Environmental Impact Statement and Work Program Considerations* (December 13, 2007). (See Section 2.1 for additional detail on the process used to identify and narrow alternatives.) It also selected the No-Build, Enhanced Bus, and Streetcar alternatives to advance into the project's DEIS for further study, and directed staff to conduct a refinement study to identify design options in the Johns Landing Area and terminus options to advance into the project's DEIS. The resolution called for further refinement of the trail component to move forward as a separate process.

1.3.1 Alternatives Analysis

The project's alternatives analysis process developed a wide range of alternatives for evaluation and early screening, which included: a No-Build Alternative, widening of Highway 43, reversible lanes on Highway 43, river transit (three options), bus rapid transit (BRT) (three options); commuter rail, light rail, and streetcar (a wide range of alignment alternatives and terminus alternatives and options).

Through a screening process that assessed the ability of the alternatives to meet the project's Purpose and Need, the initial range of possible alternatives was narrowed. Appendix C of the DEIS provides a summary of the technical evaluation of the alternatives and options considered during the alternatives analysis phase.

The following alternatives were selected for further study through the alternatives analysis phase: 1) No-Build Alternative, 2) Bus Rapid Transit Alternative, and 3) Streetcar Alternative. Following is a description of those alternatives as they were studied in the alternatives analysis (see the *Lake Oswego to Portland Transit and Trail Study Evaluation Summary Public Review Draft* for more information).

- **No-Build Alternative.** Similar to the project's current No-Build Alternative, as described in Section 1.4.1.

- **Bus Rapid Transit Alternative.** The Bus Rapid Transit Alternative would operate frequent bus service with Line 35 on Highway 43 between downtown Portland and downtown Lake Oswego, generally in mixed traffic, with bus station spacing that would be longer than TriMet typically provides for fixed-route bus service. Transit queue bypass lanes would be constructed at congested intersections, where feasible.

- **Streetcar Alternative.** The Streetcar Alternative would extend the existing Portland Streetcar line, which currently operates between NW 23rd Avenue and SW Lowell Street, to downtown Lake Oswego. Study of this alternative includes an evaluation of whether the Willamette Shore Line right-or-way would be used exclusively of whether it would be used in combination with SW Macadam Avenue or other adjacent roadways.

1.3.2 Scoping/Project Refinement Study

This section describes the alignment and terminus options developed, evaluated, and screened in 2009 as a part of the project's scoping and refinement study phase. In November 2010, Metro published the *Lake Oswego to Portland Transit Project Refinement Report*, which detailed the study's results and summarized public comment. This phase focused on refinements in two areas: 1) alignment options for the Johns Landing area; and 2) terminus options in the Lake Oswego area. In summary, the project's Purpose Statement during the refinement phase was to:

- Optimize the regional transit system;
- Be fiscally responsive and maximize regional resources;
- Maximize the economic development potential of the project;
- Be sensitive to the built and social environments; and
- Be sensitive to the natural environment.

The options, evaluation measures, and results of the Johns Landing streetcar alignment refinement process and the Lake Oswego terminus refinement processes are summarized below.

A. Johns Landing Streetcar Alignment Refinement. For the refinement of streetcar design options within the Johns Landing area, the project used the following criteria: streetcar operations, streetcar performance, financial feasibility, traffic operations, accessibility and development potential,

neighborhood sustainability, and adverse impacts to the natural environment. Measures for each of the criteria were developed and applied to each of the alignment options studied, which included:

- Hybrid 1: Macadam Avenue In-Street
- Hybrid 2: East Side Exclusive
- Hybrid 3: Macadam Avenue with New Northbound Lane
- Willamette Shore Line
- Full Macadam In-Street

B. Lake Oswego Terminus Option Refinement. For the refinement of terminus options in the Lake Oswego area, the project used the following criteria: expansion potential and regional context, streetcar operations, streetcar performance, financial feasibility, traffic operations, accessibility and development potential, and neighborhood sustainability. Measures for each of the criteria were developed and applied to each of the alignment options studied, which included: a) Safeway Terminus Option; b) Albertsons Terminus Option; and c) Trolley Terminus Option.

On June 1, 2009, in consultation with FTA and based on the findings of the analysis, public and agency comment and recommendations from the Lake Oswego to Portland Project Management Group, the Lake Oswego to Portland Transit Project Steering Committee selected the following options in the Johns Landing area to advance into the DEIS: Willamette Shore Line; Hybrid 1 – Macadam Avenue In Street (Boundary Street to Carolina Street); and Hybrid 3: Macadam Avenue with New Northbound Lane (Boundary Street to Carolina Street).

1.4 Description of Alternatives Analyzed in this Technical Report and the DEIS

This section summarizes the roadway and transit capital improvements and transit operating characteristics for the No-Build, Enhanced Bus, and Streetcar alternatives. Table 1-1 provides a summary of the transit capital improvements associated with the three alternatives, and Table 1-2 summarizes the operating characteristics of the alternatives. A more detailed description of the alternatives may be found in the *Lake Oswego to Portland Transit Project Detailed Definition of Alternatives Report* (Metro/TriMet: January 2010). Detailed drawings of the Streetcar Alternative, including the various design options, can be found in the *Streetcar Plan Set*, November 2009.

1.4.1 No-Build Alternative

This section describes the No-Build Alternative, which serves as a reference point to gauge the benefits, costs, and effects of the Enhanced Bus and Streetcar alternatives. In describing the No-Build Alternative, this section focuses on: 1) the alternative's roadway, bicycle and pedestrian, and transit capital improvements; and 2) the alternative's transit operating characteristics. This description of the No-Build Alternative is based on conditions in 2035, the project's environmental forecast year.

1.4.1.1 Capital Improvements

Following is a brief description of the roadway, bicycle and pedestrian, and transit capital improvements that would occur under the No-Build Alternative. Table 1-1 provides a summary of the transit capital improvements associated with the No-Build Alternative and Table 1-2 summarizes the operating characteristics of the alternatives. Figure 1-1 illustrates the location of those improvements.

- **Roadway Capital Improvements**. The No-Build Alternative includes the existing roadway network in the corridor, with the addition of roadway capital improvements that are listed in the financially constrained road network of Metro's 2035 RTP.[1]Following is a list of the roadway projects that would occur within the corridor by 2035.
  - *Moody/Bond Avenue Couplet* (create couplet with two lanes northbound on SW Bond Avenue and two lanes southbound on SW Moody Avenue);
  - *South Portal* (Phases I and II to extend the SW Moody Avenue/SW Bond Avenue couplet to SW Hamilton Street and realign SW Hood Avenue to connect with SW Macadam Avenue at SW Hamilton Street);
  - *I-5 North Macadam* (construct improvements in the South Waterfront District to improve safety and access); and
  - *Macadam Intelligent Transportation Systems* (install system and devices in the SW Macadam Avenue corridor to improve traffic flow).

[1] Metro, 2035 Regional Transportation Plan, approved Dec. 13, 2007.

Table 1-1 Transit Capital Improvements for the No-Build, Enhanced Bus, and Streetcar Alternatives (2035)

Capital Improvements	No-Build	Enhanced Bus	Streetcar[1]
New Streetcar Alignment Length[2]	N/A	N/A	5.9 to 6.0
One-Way Streetcar Track Miles			
Portland Streetcar System	15.7	15.7	26.2 to 27.0
Proposed Lake Oswego to Portland Project	0	0	10.5 to 11.3
Streetcar Stations			
Portland Streetcar System	69	69	79
Proposed Lake Oswego to Portland Project	0	0	10[3]
Streetcars (in service/spares/total)			
Portland Streetcar System	17/5/22	17/5/22	27/6/33
Proposed Lake Oswego to Portland Project	N/A	N/A	10/1/11
Streetcar Operations and Maintenance (O&M) Facilities			
Number of Facilities[4]	1	1	2
Maintenance Capacity (number of Streetcars)	36	36	36
Storage Capacity (number of Streetcars)	25	25	33
Line 35 Bus Stops			
Line 35 Bus Stops (Lake Oswego to SW Bancroft St.)	26	13	0
Buses (in service/spares)			
TriMet Systemwide	607/712	619/725	601/704
Difference from No-Build Alternative	N/A	13	- 8
Transit Centers[5]	1	1	1
Park-and-Ride Facilities			
Joint Use Surface – Lots/Spaces	3/76	3/76	3/76
Surface – Lots/Spaces	0/0	0/0	1/100
Structured – Lots/Spaces	0/0	1/300	1/300

Note: LO = Lake Oswego; O&M = operating and maintenance.

[1] The transit capital improvements of the Streetcar Alternative summarized in this table would not vary by design option, except when shown as a range and as noted for new streetcar alignment length and one-way track miles. The first number listed is under the Willamette Shore Line design option and the second number listed is under the Macadam design options (in the Johns Landing Segment).

[2] Under the No-Build and Enhanced Bus alternatives, the Portland Streetcar System would include two streetcar lines: a) the existing Portland Streetcar Line, between NW 23rd Avenue and SW Bancroft Street, and b) the Portland Streetcar Loop, which is currently under construction and will be completed when the Milwaukie Light Rail and Streetcar Close the Loop project are constructed. The Streetcar Alternative would extend the existing Portland Streetcar line south, from SW Bancroft Street to Lake Oswego. One-way track miles are calculated by multiplying the mileage of double-tracked sections and adding that to the mileage of single-track sections. Alignment length and one-way track miles are presented as a range, because they would vary by design option. The number of streetcar stations, streetcars in service or as spares and the number and size of streetcar O&M facilities would not change by streetcar design option.

[3] Two optional stations are also being considered for inclusion in the Streetcar Alternative (see Figure 1-5 and Figure 1-6): 1) the Pendleton Station under the Macadam In-Street and Macadam Additional Lane design options in the Johns Landing Segment; and the E Avenue Station in the Lake Oswego Segment.

[4] There is an existing streetcar operations and maintenance (O&M) facility at NW 16th Avenue, between NW Marshall and NW Northrup streets; under the Streetcar Alternative, additional storage for eight vehicles would be provided along the streetcar alignment under the Marquam Bridge. There would be no change in the number or size of bus O&M facilities under any of the alternatives or design options. Bus stops are those that would be served exclusively by Line 35 between Lake Oswego and SW Bancroft Street

[5] Under the No-Build and Enhanced Bus alternative, the Lake Oswego Transit Center would remain at its current location (on 4th Street, between A and B avenues); under the Streetcar Alternative, the transit center would be moved to be adjacent to the Lake Oswego Terminus Station.

Source: TriMet, January 2010.

Table 1-2 Streetcar and Bus Network Operating Characteristics of No-Build, Enhanced Bus, and Streetcar[1] Alternatives (2035)

Operating Characteristics by Vehicle Mode	No-Build	Enhanced Bus	Streetcar
Streetcar Network Operating Characteristics[1]			
Weekday Streetcar Vehicle Miles Traveled			
Systemwide	2,180	2,180	3,200 or 3,230
Difference from No-Build Alternative	N/A	0	1,020 or 1,050
Weekday Streetcar Revenue Hours			
Systemwide	267	267	326 or 332
Difference from No-Build Alternative	N/A	0	59 or 65
Corridor Weekday Streetcar Place Miles[2]	N/A	N/A	89,000 or 91,320
Corridor Streetcar Round-Trip Time[3]	N/A	N/A	37 or 44 minutes
Corridor Streetcar Headways[4]			
Lake Oswego to PSU	N/A	N/A	7.5 / 7.5 minutes
Bus Network Operating Characteristics			
Weekday Bus Miles Traveled			
Systemwide	76,560	77,560	75,520
Difference from No-Build Alternative	N/A	1,000	-1,040
Weekday Bus Revenue Hours			
Systemwide	5,300	5,400	5,210
Difference from No-Build Alternative	N/A	100	-90
Line 35 (bus) Weekday Place Miles[2]	37,000	57,840	0
Line 35 (bus) Headways[4]			
Lake Oswego to Downtown Portland	15 / 15 min.	6 / 15 min.	N/A
Oregon City to Lake Oswego	15/15 min.	15/15 min.	15/15 min.

Note: N/A = not applicable; LO = Lake Oswego; O&M = operating and maintenance; PSU = Portland State University.

[1] The operating characteristics of the Streetcar Alternative summarized in this table would not vary by design option, except when shown as a range and as noted for streetcar vehicle miles traveled, place miles, and round-trip time. The first number listed is under the Willamette Shore Line Design Option and the second number listed is under the Macadam design options (in the Johns Landing Segment).

[2] Place miles are a measure of the passenger carrying capacities of the alternatives, similar to airline seat miles. Place miles = transit vehicle capacity (seated and standing) of a vehicle type, multiplied by the number vehicle miles traveled for that vehicle type, summed across all vehicle types. The No-Build Alternative bus place miles are based on lines 35 and 36.

[3] Round-trip run time for the proposed streetcar line would include in-vehicle running time from SW Bancroft Street to the Lake Oswego Terminus Station and back to SW Bancroft Street; it does not include layover time at the terminus.

[4] Headways are the average time between transit vehicles per hour within the given time period that would pass by a given point in the same direction, which is inversely related to frequency (the average number of vehicles per hour in the given time period that would pass by a given point in the same direction). Weekday peak is generally defined as 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m.; weekday off-peak is generally defined as 5:00 to 7:00 a.m., 9:00 a.m. to 4:00 p.m. and 6:00 p.m. to 1:00 a.m. There would be streetcar service every 12 minutes between SW Bancroft Street and the Pearl District (via PSU) under the No-Build and Enhanced Bus alternatives. The peak headways shown for the No-Build Alternative are the composite headways for Lines 35 and 36.

Source: TriMet – January 2010.

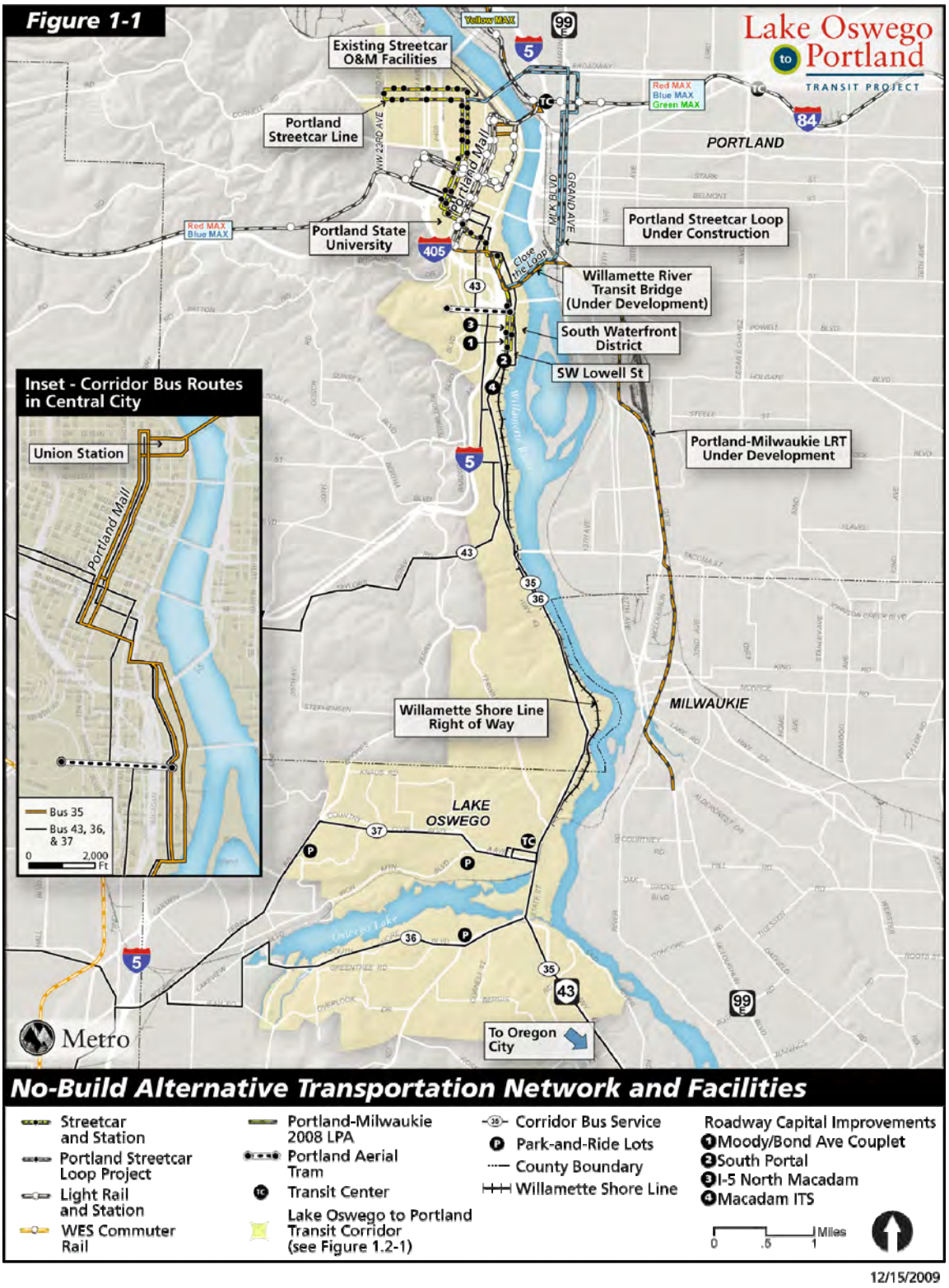

FIGURE 1-1 NO-BUILD ALTERNATIVE TRANSPORTATION NETWORK AND FACILITIES

- **Bicycle and Pedestrian Improvements**. The No-Build Alternative includes the existing bicycle and pedestrian network in the corridor, with the addition of bicycle and pedestrian capital improvements that are listed in the financially constrained road network of Metro's 2035 RTP. Following is a list of the bicycle and pedestrian projects that pedestrian projects proposed to occur within the corridor by 2035.
  - *Lake Oswego to Portland Trail* (extension of a multiuse path between Lake Oswego and Portland);
  - *I-5 at Gibbs Pedestrian/Bicycle Overcrossing* (construct a bicycle and pedestrian bridge over I-5 in the vicinity of SW Gibbs Street); and
  - *Tryon Creek Bridge* (construct a new pedestrian/bicycle bridge near the mouth of Tryon Creek).

- **Bus Capital Improvements.** There are currently two primary bus capital facilities in the corridor: *Lake Oswego Transit Center* (on 4th Street, between A and B avenues); and *Portland Mall* (bus and light rail lanes and shelters on NW/SW 5th and 6th avenues between NW Glisan Street and SW Jackson Street). These bus facilities would remain as-is under the No-Build Alternative. (The financially constrained transit project list of the RTP includes relocation of the Lake Oswego Transit Center to be adjacent to the Lake Oswego to Portland Streetcar alignment, which is also in the financially constrained project list. Neither would occur under the No-Build Alternative.) No additional bus capital improvements are planned for the corridor under the No-Build Alternative by 2035.

- **Light Rail Capital Improvements.** Under the No-Build Alternative, TriMet's existing Yellow Line light rail service would continue to operate on the Portland Mall (with a station at PSU added), across the Steel Bridge and into North Portland. Yellow Line facilities and service would be extended north from the existing Expo Center Station, across the Columbia River into Vancouver, Washington, and south from the Portland Mall, generally via SW Lincoln Street, across the Willamette River to Milwaukie, Oregon. In addition, downtown Portland would be served by the following TriMet light rail lines: Blue Line (Gresham to Hillsboro); Red Line (Beaverton to Portland International Airport); and Green Line (downtown Portland to Clackamas Town Center).

- **Excursion Trolley Capital Facilities.** Under the No-Build Alternative there would be no changes to the existing excursion trolley capital facilities that are located or operate within the corridor. Those excursion trolley capital facilities include approximately six miles of single-tracked Willamette Shore Line tracks and related facilities; stations at SW Bancroft and Moody streets and at N State Street at A Avenue; a trolley barn at approximately N State Street at A Avenue; and typically one vintage and/or other trolley vehicle propelled by externally attached diesel units.

- **Streetcar Improvements and Vehicles.** Under the No-Build Alternative, the existing Portland Streetcar Line would continue to operate between NW 23rd Avenue and SW Lowell Street. In addition, the No-Build Alternative includes the Eastside Streetcar Project (currently under construction), which would extend streetcar tracks and stations across the Broadway Bridge, serving NE and SE Portland on N and NE Broadway and NE and SE Martin Luther King Boulevard and Grand Avenue to OMSI. With the Close the Loop Project, the Eastside Streetcar will be extended across the Willamette River, to complete the planned Streetcar Loop, via a new transit, bicycle, and pedestrian bridge to be constructed under the Milwaukie Light Rail Project,

connecting to the Streetcar line in the South Waterfront District. Under the No-Build Alternative in 2035, there would be 22 streetcars in the transit system (including spares), an increase of 11 compared to existing conditions.

- **Park-and-Ride Facilities.** Under the No-Build Alternative, the park-and-ride facilities in the corridor would be those that currently exist: a shared-use 30-space park-and-ride lot at Christ Church (1060 SW Chandler Road); a shared-use 34-space park-and-ride lot at Lake Oswego United Methodist Church (1855 South Shore Boulevard); and a shared use 12-space park-and-ride lot at Hope Church (14790 SW Boones Ferry Road).

- **Operations and Maintenance Facilities.** Under the No-Build Alternative, there would be one operations and maintenance facility within the corridor, which would be the existing streetcar maintenance building and storage yard on NW 16th Avenue under I-405. With the Streetcar Loop and Close the Loop Projects, the storage yard could accommodate 25 streetcars and the maintenance facility would have the capacity to service 36 streetcars (an increase in capacity of 13 and 18 vehicles, compared to existing conditions, respectively).

1.4.1.2 Transit Operations

This section summarizes the transit operating characteristics that would occur under the No-Build Alternative, focusing on bus and streetcar operations (see Table 1-2). Figure 1-1 illustrates the transit network for the No-Build Alternative in the vicinity of the corridor.

- **Bus Operations.** Bus operations under the No-Build Alternative would be similar to TriMet's existing fixed-route bus network with the addition of improvements included in the 2035 RTP's 20-year financially constrained transportation system (see Figure 1-1). Transit service improvements within the No-Build Alternative would be limited to those that could be funded using existing and readily-foreseeable revenue sources. Systemwide, those bus operations improvements would include: 1) increases in TriMet bus route frequency to avoid peak overloads and/or maintain schedule reliability; 2) increases in run times to maintain schedule reliability; and 3) incremental increases in TriMet systemwide bus service hours consistent with available revenue sources and consistent with the 2035 RTP's 20-year financially-constrained transit network, resulting in annual increases in service hours of approximately 0.5 percent per year. Specifically, the No-Build Alternative would include the operation of the TriMet bus route Line 35 between downtown Portland and Lake Oswego (continuing south to Oregon City).

- **Streetcar Operating Characteristics**. Under the No-Build Alternative, the City of Portland, through an operating agreement with the Portland Streetcar, Inc. (PSI), would continue to operate the existing Portland Streetcar line between Northwest Portland and the South Waterfront District, via downtown Portland (see Figure 1-1). On average weekdays in 2035, the Streetcar line would operate every 12 minutes during the peak and off-peak periods. Further, the City of Portland would operate the Streetcar Loop Project, serving downtown Portland, the Pearl District, northeast and southeast Portland, OMSI and the South Waterfront District. Frequency on the line for an average weekday in 2035 would be every 12 minutes during the peak and off-peak periods.

1.4.2 Enhanced Bus Alternative

This section describes the roadway, bicycle and pedestrian, and transit capital improvements and transit operating characteristics under the Enhanced Bus Alternative, generally compared to the No-Build Alternative. The intent of the Enhanced Bus Alternative is to address the project's Purpose and Need without a major transit capital investment.

1.4.2.1 Capital Improvements

This section summarizes the transit, bicycle and pedestrian, and transit capital improvements that would occur under the Enhanced Bus Alternative, compared to the No-Build Alternative (see Table 1-1 and Figure 1-2).

- **Roadway Capital Improvements.** Except for the addition of a two-way roadway connection between the proposed 300-space park-and-ride lot and Foothills Road, there would be no change in roadway improvements under the Enhanced Bus Alternative, compared to the No-Build Alternative.

- **Bicycle and Pedestrian Improvements.** There would be no change in bicycle and pedestrian improvements under the Enhanced Bus Alternative, compared to the No-Build Alternative.

- **Bus Capital Improvements.** Under the Enhanced Bus Alternative, the 26 bus stops that would be served by Line 35 between downtown Lake Oswego and SW Bancroft under the No-Build Alternative would be consolidated into 13 bus stops, which would continue to be served by the Line 35 (the other 13 bus stops would be removed). The bus stops served by Line 35 between Lake Oswego and Oregon City would be unchanged under the Enhanced Bus Alternative, compared to the No-Build Alternative.

- **Light Rail Capital Improvements.** There would be no change in light rail capital improvements under the Enhanced Bus Alternative, compared to the No-Build Alternative.

- **Excursion Trolley Capital Improvements.** There would be no change in excursion trolley capital improvements under the Enhanced Bus Alternative, from the No-Build Alternative.

- **Streetcar Improvements and Vehicles.** There would be no change in streetcar improvements and vehicles under the Enhanced Bus Alternative, compared to the No-Build Alternative.

- **Park-and-Ride Facilities.** In addition to the park-and-ride facilities included under the No-Build Alternative, the Enhanced Bus Alternative would include a 300-space structured park-and-ride lot that would be located at Oswego Village Shopping Center on Highway 43 in downtown Lake Oswego. The park-and-ride lot would be served by Lines 35 and 36.

- **Operations and Maintenance Facilities.** There would be no changes to the region's operations and maintenance facilities under the Enhanced Bus Alternative, compared to the No-Build Alternative, except that the capacity of TriMet's bus operating and maintenance facilities at either the Center or Powell facility would be expanded to accommodate the additional 13 buses under the Enhanced Bus Alternative (see the *Detailed Definition of Alternatives Report* for additional information).

1.4.2.2 Transit Operations

This section summarizes the corridor's transit operations under the Enhanced Bus Alternative, focusing on bus and streetcar operations. Figure 1-2 illustrates the transit network for the Enhanced Bus Alternative in the vicinity of the corridor.

- **Bus Operations.** Except for changes to the routing, frequency, and number of stops of Line 35 and the elimination of Line 36 service between downtown Portland and downtown Lake Oswego, bus operations under the Enhanced Bus Alternative would be identical to the bus operations under the No-Build Alternative. Under the Enhanced Bus Alternative, Line 35's routing between Oregon City and Lake Oswego would remain unchanged relative to the No-Build Alternative. Further, between Lake Oswego and downtown Portland there would be two routing changes to Line 35, compared to the No-Build Alternative: 1) the bus would be rerouted to serve the new park-and-ride lot at the Oswego Village Shopping Center; and, 2) in downtown Portland, Line 35 would be rerouted to serve SW and NW 10th and 11th avenues, generally between SW Market and Clay streets and NW Lovejoy Street/Union Station to address the travel markets.

- **Streetcar Operating Characteristics.** Under the Enhanced Bus Alternative, there would be no change in streetcar operating characteristics, compared to the No-Build Alternative.

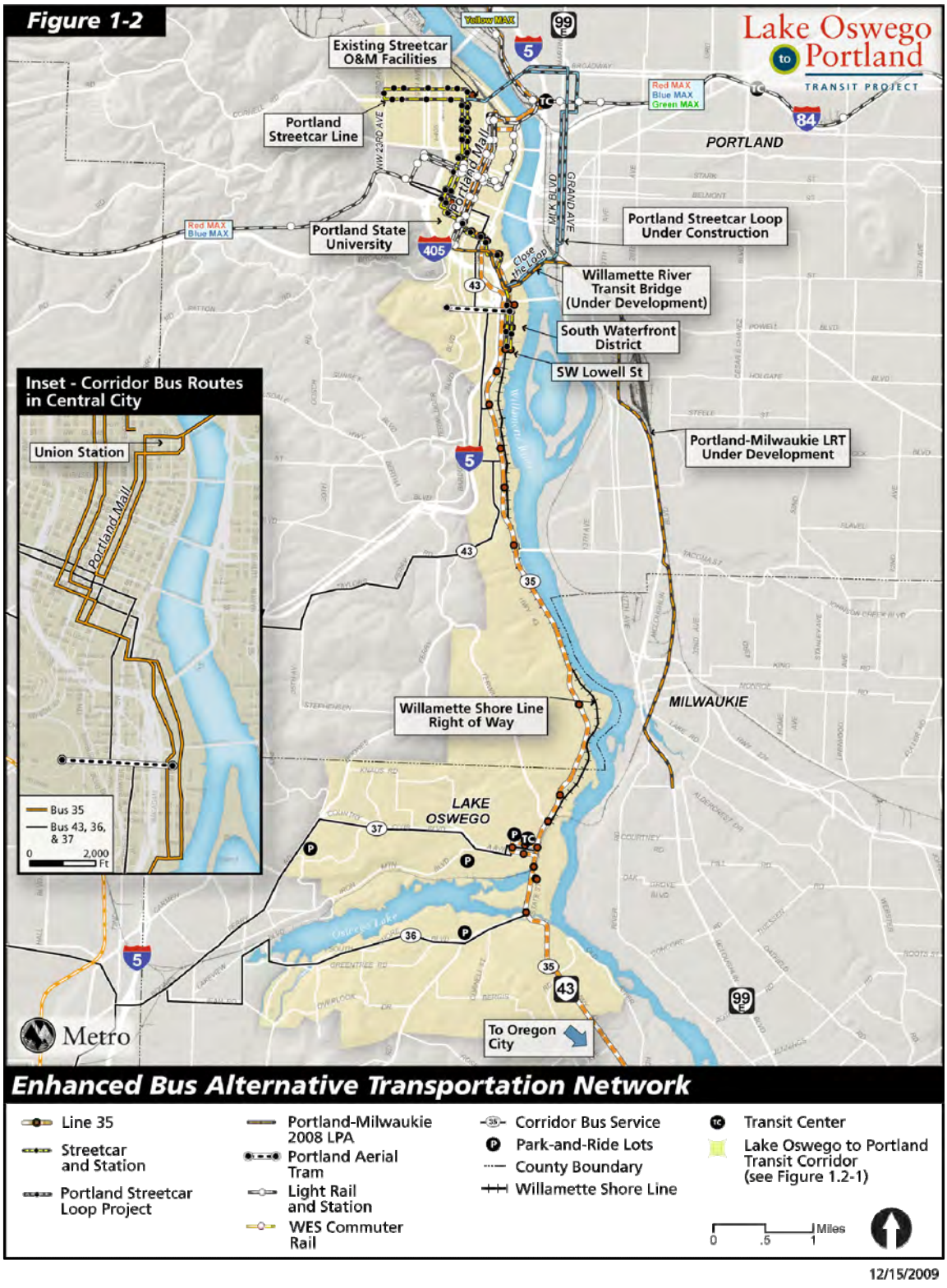

FIGURE 1-2 ENHANCED BUS ALTERNATIVE TRANSPORTATION NETWORK

1.4.3 Streetcar Alternative

This section describes the roadway, bicycle and pedestrian, and transit capital improvements and transit operating characteristics under the Streetcar Alternative, generally compared to the No-Build Alternative.

1.4.3.1 Capital Improvements

This section summarizes the transit, bicycle and pedestrian, and transit capital improvements that would occur under the Streetcar Alternative, generally compared to the No-Build Alternative (see Table 1-1 and Figure 1-3). This section provides a general description of the capital improvements that would occur under the Streetcar Alternative, independent of design option, and it highlights the differences between design options within three of the corridor's segments.

A. Summary Description

Following is a general description of the roadway, bicycle and pedestrian, and transit improvements that would occur under the Streetcar Alternative. The next section provides a description of differences in capital improvements for design options that are under consideration in three of the project's six segments. See Figure 1-4 for an illustration of the project segments and the design options under consideration.

- **Roadway Capital Improvements.** There would be no roadway improvements under the Streetcar Alternative in the following corridor segments: 1) Downtown Portland; and 2) South Waterfront. The roadway capital improvements that would occur under the other corridor segments are described below for those segments. Changes to traffic controls at signalized and non-signalized intersections would occur throughout the corridor to accommodate the safe and efficient operation of the streetcar and local traffic. The *Detailed Definition of Alternatives Report* and the *Streetcar Plan Set* provide additional details on changes to traffic operations at intersections under the Streetcar Alternative.

- **Bicycle and Pedestrian Improvements.** There would be no change in bicycle and pedestrian improvements under the Streetcar Alternative, compared to the No-Build Alternative, except as noted in the following segment-by-segment description.

- **Bus Capital Improvements.** Under the Streetcar Alternative, all 26 bus stops that would be served by Line 35 on Highway 43 between downtown Lake Oswego and the Sellwood Bridge and on SW Macadam Boulevard north of SW Corbett Street under the No-Build Alternative would be removed, because Line 35 service would be replaced in the corridor by streetcar service. The bus stops served by Line 35 between Lake Oswego and Oregon City would be unchanged under the Streetcar Alternative, compared to the No-Build Alternative. In addition, under the Streetcar Alternative, the Lake Oswego Transit Center would be relocated to be adjacent to the Lake Oswego Terminus Station, from its existing location on 4th Street, between A and B avenues. The change to the bus capital improvements under the Streetcar Alternative would not vary by any of the design options under consideration.

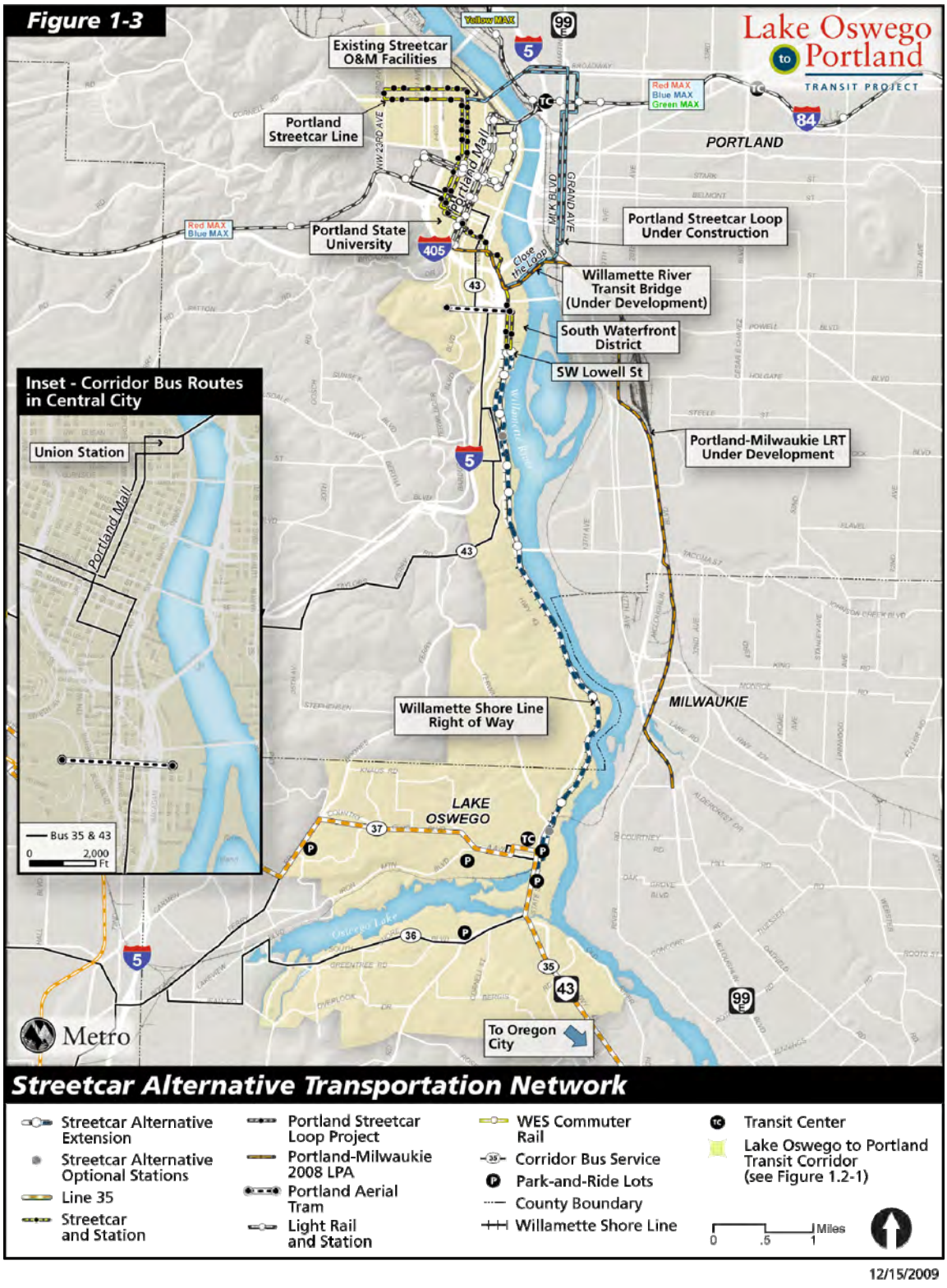

FIGURE 1-3 STREETCAR ALTERNATIVE TRANSPORTATION NETWORK

- **Light Rail Capital Improvements.** There would be no change in light rail capital improvements under the Streetcar Alternative, compared to the No-Build Alternative.

- **Interim Excursion Trolley Capital Improvements.** Under the Streetcar Alternative, there would no longer be an operating and maintenance agreement between the City of Lake Oswego and the Willamette Shore Line Consortium that would allow for the operations of the excursion trolley between SW Bancroft Street and Lake Oswego. Further, the Oregon Electric Railway Historical Society would no longer operate the vintage excursion trolley on the Willamette Shore Line alignment under agreement with the City of Lake Oswego, as they currently do and as they would under the No-Build and Enhanced Bus Alternatives.

- **Streetcar Improvements and Vehicles.** The Streetcar Alternative would extend streetcar tracks and stations south from the existing Portland Streetcar line that operates between NW 23rd Avenue and SW Bancroft Street. Compared to existing conditions and the No-Build Alternative, the Streetcar Alternative would add approximately 5.9 to 6.0 one-way miles of new streetcar tracks and catenary (overhead electrical wiring and support) and ten new streetcar stations between SW Bancroft Street and Lake Oswego. Except when crossing over waterways, roadways, or freight rail lines or through an existing tunnel, the new streetcar line would generally be at the same grade as existing surface streets. Of the approximately six miles of new streetcar tracks, 5.3 miles would be double-tracked (i.e., two one-way tracks) and 0.7 miles would be single-tracked (i.e., inbound and outbound streetcars would operate on the same tracks; see Figure 1-4 for an illustration of the location of single and double-track segments). The new streetcar stations would be of a design similar to the existing streetcar stations in downtown Portland and the Pearl District.

- **Park-and-Ride Facilities.** In addition to the park-and-ride facilities included under the No-Build Alternative, the Streetcar Alternative would include: a) a 100-space surface park-and-ride lot served by the proposed streetcar line at the B Avenue Station; and b) a 300-space structured park-and-ride lot that would be served by the proposed streetcar line at the Lake Oswego Terminus Station. The size and location of these park-and-ride lots would not vary by any of the design options under consideration.

- **Operations and Maintenance Facilities.** With the Streetcar Alternative, a new storage facility that would accommodate eight streetcars would be located adjacent to the streetcar alignment under the Marquam Bridge. The size and location of the streetcar operating and maintenance facilities would not vary by any of the design options under consideration.

B. Segment by Segment Description and Design Option Differences

For the purposes of description and analysis, the Lake Oswego to Portland Corridor has been divided into six segments for the Streetcar Alternative – those segments and design options within three of the segments are illustrated schematically in Figure 1-4. Figure 1-3 illustrates the proposed roadway improvements, streetcar alignment, stations, and park-and-ride lots that would occur in the corridor under the Streetcar Alternative. Figures 1-5 and 1-6 provide more detailed illustrations of the streetcar design options currently under study.

1. Downtown Portland Segment. There would be no roadway or bicycle and pedestrian improvements within the Downtown Portland Segment under the Streetcar Alternative, compared to the No-Build Alternative. Under the Streetcar Alternative, a connection would be added between

westbound streetcar tracks on SW Market Street to southbound tracks on W 10th Avenue, which would allow inbound streetcars from Lake Oswego to turn back toward Lake Oswego, providing increased operational flexibility. There are no streetcar alignment design options within this segment and there would be no new streetcar stations within this segment.

2. South Waterfront Segment. The South Waterfront Segment extends between SW Lowell Street to SW Hamilton Court. Streetcar tracks would be extended south of their existing southern terminus at SW Lowell Street, within the right of way of the planned Moody/Bond Couplet extension, to SW Hamilton Street. There would be two new streetcar stations within this segment (Bancroft and Hamilton stations).

3. Johns Landing Segment. The Johns Landing Segment extends between SW Hamilton Court to SW Miles Street. This segment includes three design options: Willamette Shore Line; Macadam In-Street; and Macadam Additional Lane. Under all options, the streetcar alignment would extend south from SW Hamilton to near SW Julia Street, generally within the existing Willamette Shore Line right of way. The three design options would include two new streetcar stations at varying locations, described below. To the south, all three options would share a common alignment between SW Carolina and SW Miles Street, generally via the existing Willamette Shore Line right of way, and they would share one common station at SW Nevada. Following is a description of how the design options would differ:

a. ***The Willamette Shore Line Design Option*** would continue the extension of streetcar tracks south within the existing Willamette Shore Line right of way from SW Julia Street to SW Carolina Street (extending to SW Miles Street). There would be three new streetcar stations (Boundary, Nebraska, and Nevada stations).

b. ***The Macadam In-Street Design Option*** would locate the new streetcar tracks generally within the existing outside lanes of SW Macadam Avenue, approximately between SW Boundary and Carolina streets. Between approximately SW Julia and Boundary streets, the streetcar alignment would be within the right of way of SW Landing Drive, which would be converted from a private to a public street. There would be three new streetcar stations (Boundary, Carolina, and Nevada stations). An optional station at Pendleton Street is also under consideration.

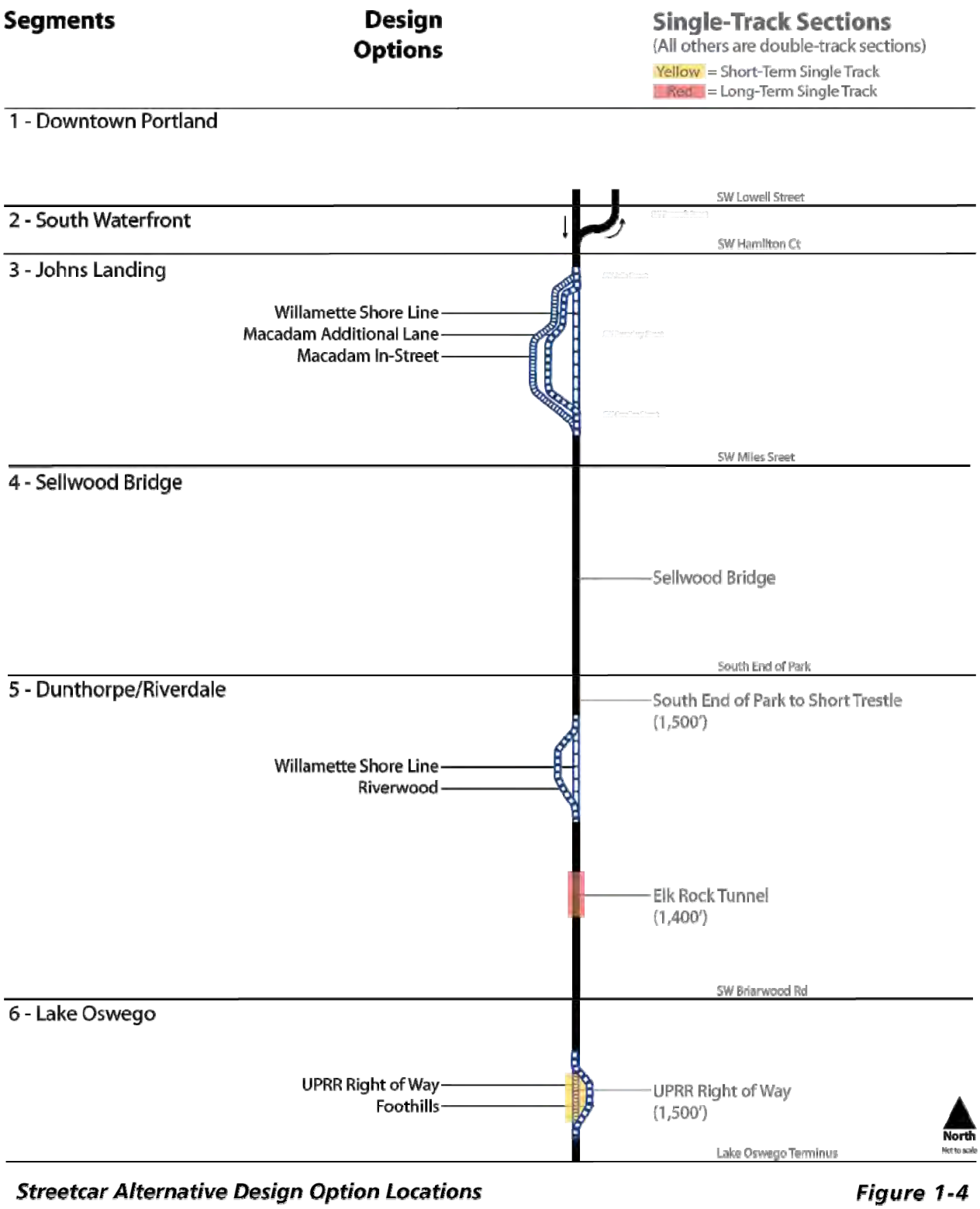

FIGURE 1-4 STREETCAR ALTERNATIVE DESIGN OPTION LOCATIONS

c. ***The Macadam Additional Lane Design Option*** would be similar to the Macadam In-Street Design Option, except that the new northbound streetcar tracks would be located within a new traffic lane just east of the existing general purpose lanes – streetcars would share the new lane with right-turning vehicles. Between approximately SW Julia and Boundary streets, the streetcar alignment would be within the right of way of SW Landing Drive, which would be converted from a private to a public street. There would be three new streetcar stations (Boundary, Carolina, and Nevada stations). An optional station at Pendleton Street is also under consideration.

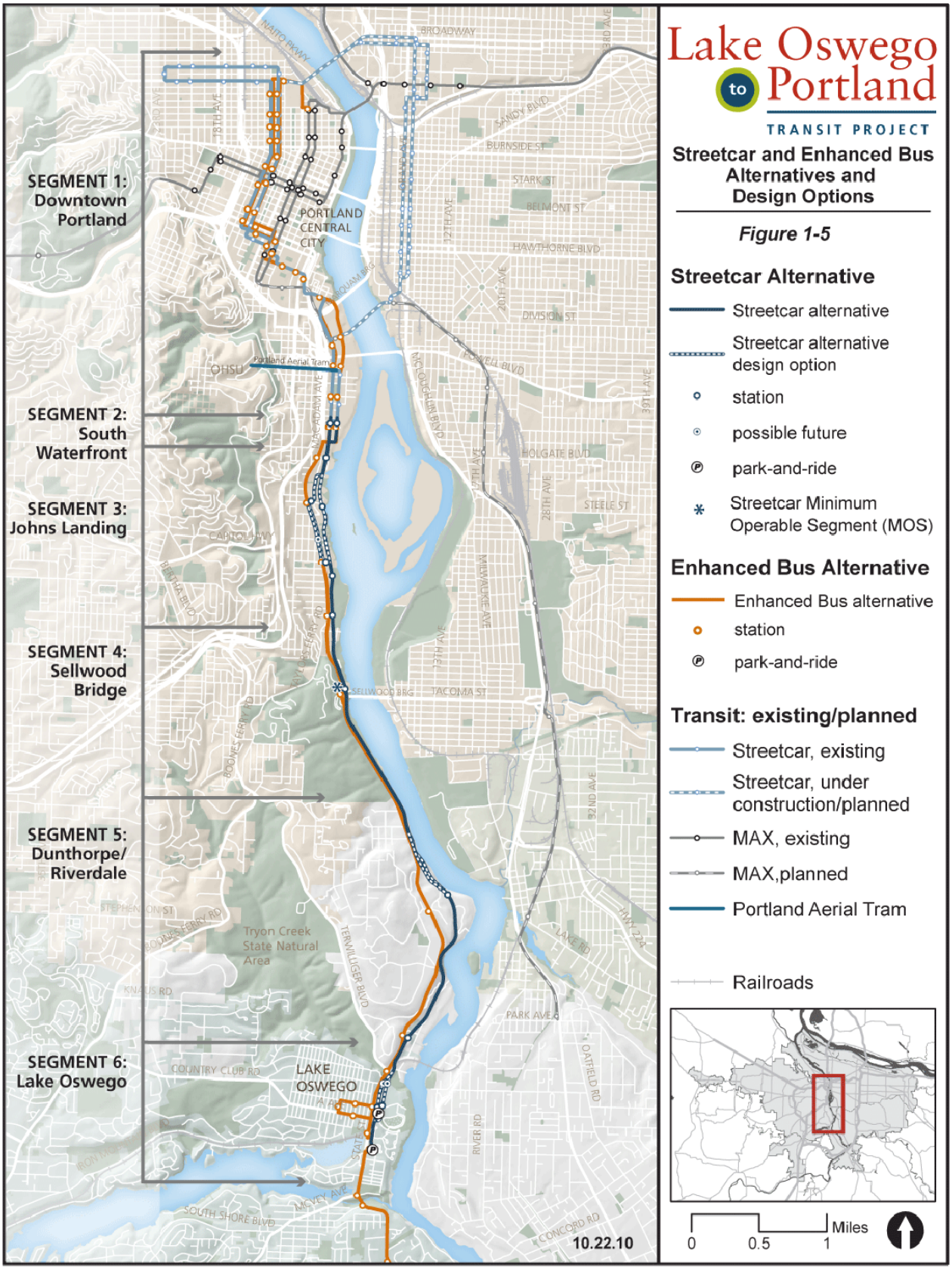

FIGURE 1-5 STREETCAR AND ENHANCED BUS ALTERNATIVES AND DESIGN OPTIONS

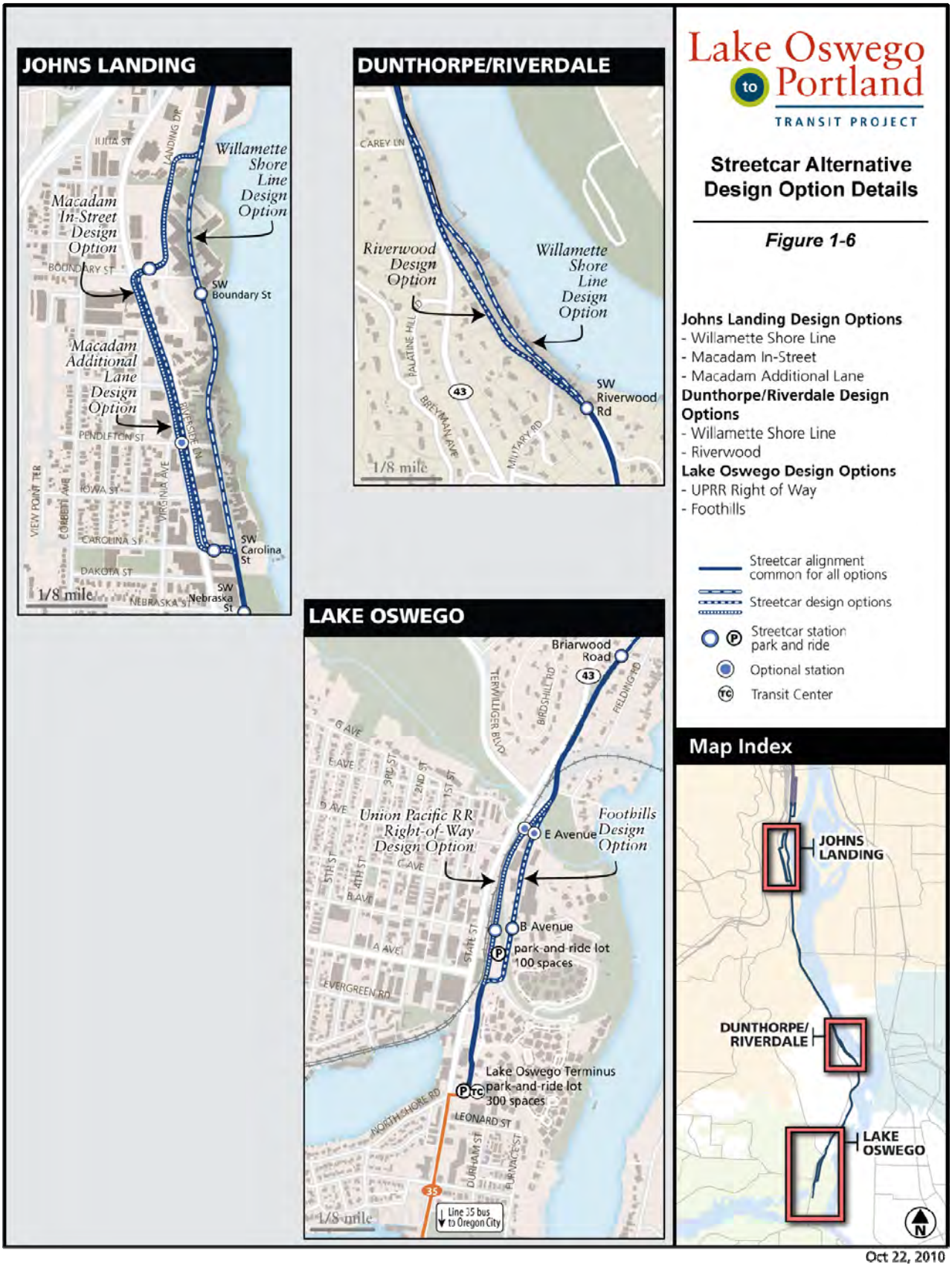

Figure 1-6 Streetcar Alternatives Design Options Details

4. Sellwood Bridge Segment. The Sellwood Bridge Segment extends from Miles Street to the southern end of Powers Marine Park. Generally, the streetcar alignment would be located in the Willamette Shore Line right of way, except for the area between Stephens Creek and approximately 1,200 feet south of the Sellwood Bridge. In this area, the streetcar alignment would be constructed in conjunction with the planned west interchange improvements with the Sellwood Bridge (the streetcar would be located slightly east of the existing Willamette Shore Line right of way). The design and construction of the streetcar alignment under this design option would be coordinated with the design and construction of the new interchange for the Sellwood Bridge. There would be one new streetcar station within this segment (Sellwood Bridge Station).

5. Dunthorpe/Riverdale Segment. The Dunthorpe/Riverdale Segment extends between the southern end of Powers Marine Park and SW Briarwood Road. There are two design options in this segment: Willamette Shore Line Design Option and Riverwood In-Street Design Option. Both options would share a common alignment within the Willamette Shore Line right of way, generally north of where SW Riverwood Road intersects with Highway 43 and generally south of the intersection of SW Military Road and SW Riverwood Road. One new streetcar station is proposed within this segment, generally common to both design options (Riverwood Station). Following is a description of how the design options would differ:

a. ***The Willamette Shore Line Design Option*** would generally locate the new streetcar alignment in the existing Willamette Shore Line right of way between the intersections of SW Riverwood Road and Highway 43 and SW Riverwood Road and SW Military Road.

b. ***The Riverwood Design Option*** would locate the new streetcar alignment generally adjacent to Highway 43, north of SW Riverwood Road, and within the right of way of SW Riverwood Road, generally between where it intersects with Highway 43 (that intersection would be closed) and where it intersects SW Military Road. Except for the closure of the Highway 43 and SW Riverwood Road intersection, SW Riverwood Road would remain open to traffic with joint operation with streetcars.

6. Lake Oswego Segment. The Lake Oswego Segment extends between SW Briarwood Road and the Lake Oswego Terminus Station. There are two design options within this segment: the UPRR right-of-way design option and the Foothills Design Option. Both options would generally be the same in two sections: 1) the new streetcar line alignment would extend south from SW Briarwood Road to where the alignment would cross under the existing UPRR tracks; and 2) the new streetcar alignment would be located within a new roadway that would extend south from SW A Avenue to the alignment's terminus near the intersection of N State Street and Northshore Road. Both options would provide for a new bicycle and pedestrian connection under the existing UPRR tracks. There would be two stations within this segment, one that would be common to the two design options (Lake Oswego Terminus Station). An optional station at E Avenue is also under consideration.

This segment would include two park-and-ride lots, both of which would be generally common to the two design options. Following is a description of how the design options would differ:

a. ***The UPRR Design Option*** would extend the streetcar alignment south, generally in the UPRR right of way, from its under crossing of the existing UPRR tracks to SW A Avenue.

The B Avenue Station would be located on the west side of the 100-space surface park-and-ride lot.

b. ***The Foothills Design Option*** would extend the streetcar alignment south from its under crossing of the UPRR tracks to SW A Avenue generally within the right of way of a new general purpose roadway (Foothills Road), which would be built as part of the Streetcar Alternative.

1.4.3.2 Transit Operations

This section describes transit operations under the Streetcar Alternative, generally compared to the No-Build Alternative (see Table 1-2). Figure 1-3 provides an illustration of the transit lines in the vicinity of the corridor under the Streetcar Alternative. There would be no difference in transit operations under any of the design options under consideration.

The Streetcar Alternative would extend the existing Portland Streetcar line from its current southern terminus at Lowell Street to the Lake Oswego Terminus Station in downtown Lake Oswego, expanding the streetcar length from 4 miles to 9.9 to 10 miles (depending on design option). The total round trip running time of the streetcar line between 23rd Avenue and downtown Lake Oswego (10 miles) in 2035 would be 105 or 112 minutes, excluding layover (based on the Willamette Shore Line and Macadam design options in the Johns Landing Segment, respectively). In comparison, under the No-Build Alternative the round trip running time for the streetcar line between 23rd Avenue and Lowell Street (4 miles) would be 68 minutes.

With the extension of streetcar service to Lake Oswego, Line 35 service between Lake Oswego and downtown Portland would be eliminated. The remainder of Line 35 between Oregon City and Lake Oswego would be combined with Line 78, in effect to create a new route between Oregon City and Beaverton. The new bus route and other TriMet transit routes serving downtown Lake Oswego would be rerouted to serve the relocated Lake Oswego Transit Center, which would be adjacent to Lake Oswego Terminus Station.

1.4.3.3 Construction Phasing Options

This section summarizes Streetcar Alternative construction phasing options currently under consideration – neither the No-Build Alternative nor the Enhanced Bus Alternative include construction phasing options. Currently, there are two types of construction phasing options or scenarios under consideration: 1) finance-related and 2) external project related. The Streetcar Alternative evaluated in this Technical Report and the DEIS is as Full-Project Construction. Should the Streetcar Alternative with phasing be selected as the Locally Preferred Alternative, during preliminary engineering (PE) additional analysis of environmental impacts resulting from the interim project alignment (as opposed to Full-Project Construction) will be conducted and additional opportunity for public review and comment may be required.

A. Finance-Related Phasing Options
Following is a description of the two finance-related phasing options currently under consideration.

- **Full-Project Construction.** Under the first construction phasing option, the project would be constructed and opened in its entirety as described within Section 2.2.2.

- **Sellwood Bridge Minimum Operable Segment (MOS).** Under the Sellwood Bridge MOS phasing option, the Streetcar Alternative would be initially constructed between SW Lowell Street and the Sellwood Bridge, with a second construction phase between the Sellwood Bridge and the Lake Oswego Terminus Station occurring prior to 2035. Under this construction phasing option, there would be no additional park-and-ride facilities in the corridor, compared to existing conditions. Under this phasing option, Line 35 would operate between Oregon City and the Nevada Street Station; frequencies would be adjusted to meet demand. Service and bus stops served exclusively by Line 35 would be deleted between the Nevada Station and downtown Portland.

B. External Project Coordination Related Phasing Options
Following is a description of phasing options related to the coordination of the Streetcar Alternative, if it is selected as the LPA, and other external projects. These external project coordination related phasing options represent interim steps in the construction process that would be taken to implement the Streetcar Alternative.

- **South Waterfront Segment Phasing Options.** If the planned and programmed South Portal roadway improvements are not in place or would not be constructed concurrently with the Streetcar Alternative, there would be two options for proceeding with construction of the streetcar alignment in the segment: 1) a different streetcar alignment using the Willamette Shore Line right of way would be initially constructed within the South Waterfront Segment; or 2) the streetcar alignment and its required infrastructure improvements would be constructed consistent with the alignment under the Full-Project Construction phasing option, but other non-project roadway improvements would be constructed at a later date by others. If the Willamette Shore Line right of way were to be used, then, when the South Portal roadway improvements were made, the streetcar alignment would be reconstructed consistent. The transit operating characteristics of the Streetcar Alternative would not be affected by this phasing option.

- **Sellwood Bridge Segment Phasing Options**. The Sellwood Bridge Segment includes two phasing options for the Streetcar Alternative that reflect two potential phasing options or scenarios for construction of the project in relationship to construction of a proposed new interchange that is planned to occur with the Sellwood Bridge replacement project. If the new interchange is constructed prior to or concurrently with the Streetcar Alternative, the initial and long-term streetcar alignment would be based on the new interchange design. The new interchange design is the basis for the analysis in this technical report and the DEIS. If the proposed interchange is constructed after the Streetcar Alternative, then the initial streetcar alignment to be constructed would be in the Willamette Shore Line right of way. Subsequently, when the proposed interchange is constructed, the Sellwood Bridge replacement project would relocate the streetcar alignment with the new interchange design. Therefore, the long-term streetcar alignment would be the new interchange and the Willamette Shore Line phasing option would only be implemented as an interim alignment. Therefore, the two design options in this

segment do not constitute a choice of alignments – instead they represent two construction phasing scenarios, dependent upon how external conditions transpire.

- The Foothills Design Option. The Foothills design option of the Streetcar Alternative is based on roadway improvements that would occur under the City of Lake Oswego's Foothills redevelopment project. If those roadway improvements are not constructed prior to or concurrently with construction of the streetcar alignment, then the Lake Oswego to Portland Transit Project would construct the streetcar alignment and required infrastructure improvements using the same alignment and the roadway improvements would be added at a later date by others.

2. EVALUATION METHODS

2.1 Introduction to Hazardous Materials Technical Analysis Methods

This section describes the data sources and methods that were used to help identify potential hazardous material or hazardous waste sites within the Lake Oswego to Portland Transit Project corridor. Hazardous wastes are defined in 40 CFR 261.3 as those specifically named in the regulation, or substances exhibiting ignitability, corrosivity, reactivity, or toxicity.

A hazardous material site is a location or facility which has a known or suspect recognized environmental condition (REC). The term "recognized environmental condition" is defined in American Society for Testing and Materials (ASTM) E 1527-05 as:

> *"…the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws.[2] The term is not intended to include de minimus conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies."*

Existing conditions within the project's area of potential effect were assessed for the presence of suspected presence of hazardous substances sites of concern, and to comparatively evaluate the environmental issues likely to be encountered in the construction and operation of the project alternatives. The analysis also identified potential avoidance and mitigation measures, including applicable regulatory standards that can be used to minimize risk. Methods and data sources presented in this report are based on existing information and best professional judgment. However, they may not identify or be inclusive of all RECs in the project area. As the project enters later development stages, including advanced design, property acquisition, and construction, more detailed environmental engineering investigations and analysis may be conducted, including the development of appropriate site-specific management plans.

2.2 Related Federal and State Laws and Regulations for Sites with Potential Hazardous Materials Concern

Federal and state laws regulate the generation, sale, use, transportation and disposal of hazardous materials in the project area, as well as cleanup and reuse of sites contaminated by hazardous materials. Regulatory records were reviewed to determine which sites may impact the study alternatives.

2.2.1 Federal Regulations

The following federal rules and regulations guided data collection for hazardous material site in the study corridor. These rules and regulations are implemented and enforced by the U.S. Environmental Protection Agency (EPA).

[2] Asbestos is not considered a hazardous substance under state rules. Asbestos has been found to be a human carcinogen. There is no regulatory safe level for human exposure to asbestos containing materials (ACMs).

- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 1980. 42 USC 9601 et seq.
- Resource Conservation and Recovery Act (RCRA) of 1976. 42 USC 9601 et seq.
- The Superfund Amendments and Reauthorization Act (SARA) of 1986. 42 USC 9601 et seq.
- The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) of 1972. 7 USC 136 et sec.
- The Toxic Substances Control Act (TSCA). 15 USC (C. 53) 2601-2692.

2.2.2 State Regulations

The following State of Oregon regulations guided data collection for hazardous materials sites in the project area. These rules and regulations are implemented and enforced by the Oregon Department of Environmental Quality (DEQ).

- Hazardous Waste and Hazardous Materials I and Hazardous Waste and Hazardous Materials II. 2003 Oregon Revised Statutes (ORS) 465 and 466, as amended.
- Underground Storage Tank Rules. 1990. Oregon Administrative Rules (OAR) 340-150.
- Residential Heating Oil Underground Storage Tanks. 1998 OAR 340-177.
- Groundwater Quality Protection. 1998. OAR 340-040.
- Environmental Hazards Notice. 1998. OAR 340-130.
- Standards Applicable for Dry Cleaning Stores Facilities and Dry Stores. 2002. OAR 340.124.
- Illegal Drug Lab Cleanup Assistance. 1999. OAR 340-140.
- Hazardous Waste Management System. 2003 OAR 340-100 to 110, 120, 124 and 142.
- Hazardous Substance Remedial Action Rules. 1997. OAR 340-122.

2.3 Data Collection

2.3.1 Federal and State Database Search

A search of federal and state regulatory database records was conducted by Environmental Data Resources, Inc. (EDR) of Milford, Connecticut. The EDR database report meets the government records search requirements of ASTM E 1527-05 Standard Practice for Environmental Site Assessments. A detailed list on environmental databases is presented in Table 2-4. Archived regulatory files are not considered reasonably ascertainable and therefore were not reviewed. The databases shown in the list in Table 2-4 provided information regarding known as well as potential hazardous materials sites.

Table 2-4
Environmental Database Search Data Sources List

Federal ASTM Standard
NPL – National Priority List
Proposed NPL – Proposed National Priority List
CERCLIS – Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP – CERCLIS No Further Remedial Action Planned
CRRACTS – Corrective Action Report
RCRIS-TSD – Resource Conservation and Recover Information System-Transportation, Storage, or Disposal Facilty
RCRIS-LQG – Resource Conservation and Recovery Information System-Large Quantity Generator
RCRIS-SQG – Resource Conservation and Recovery Information System-Small Quantity Generator
ERNS – Emergency Response Notification System

State ASTM Standard

OR SHWS-ECSI – Oregon Environmental Cleanup Site Information

OR SWF/LF – Oregon Solid Waste Facilities List / Landfill Sites

OR LUST – Oregon Leaking Underground Storage Tank Database

OR UST – Oregon Underground Storage Tank Database

OR VCS – Oregon Voluntary Cleanup Program Sites

OR CRL – Oregon Confirmed Release List

OR INDIAN UST – Oregon Underground Storage Tank Database on Indian Land

OR INDIAN LUST – Oregon Leaking Underground Storage Tank Database on Indian Land

Federal ASTM Supplemental

CONSENT – Superfund (CERCLA) Consent Decrees

ROD – Records of Decision

Delisted NPL – National Priority List Deletions

FINDS – Facility Index System / Facility Identification Initiative Program Summary Report

HMIRS – Hazardous Materials Information Reporting System

MLTS – Material Licensing Tracking System

MINES – Mines Master Index File

NPL Liens – Federal Superfund Liens

PADS – PCB Activity Database System

DOD – Department of Defense Sites

RAATS – RCRA Administrative Action Tracking System

TRIS – Toxic Chemical Release Inventory System

TSCA – Toxic Substances Control Act

SSTS – Section 7 Tracking Systems

FTTS – FIFRA/TSCA Tracking System-FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

UMTRA – Uranium Mill Tailings Remedial Action

US ENG CONTROLS – Engineering Controls in Place

ODI – Open Dump Inventory

FUDS – Formerly Used Defense Sites

INDIAN RESERV – Indian Reservations

State or Local ASTM Supplemental

OR SPILLS – Oregon Spill Data

OR AST – Oregon Aboveground Storage Tank Sites

OR HIST LF – Oregon Old Closed Solid Waste Disposal Sites

OR HSIS – Oregon Hazardous Substance Information Survey

OR AOC COL – Oregon Columbia Slough

OR ENG CONTROLS – Oregon Engineering Controls in Place

OR DRYCLEANERS – Oregon Registered Dry Cleaning Facilities

OR HAZMAT – Oregon Spills Reported to Fire Marshall

OR UIC – Oregon Underground Injection Control

OR CDL – Oregon Uninhabitable Drug Lab Properties

EDR Proprietary Historical Databases

OR Coal Gas – Oregon Former Manufactured Gas (Coal Gas) Sites

Brownfield Databases

US Brownfields – Brownfields Projects

US Inst Control – Intuitional Control Site List

OR Brownfields – Oregon Brownfields Projects

OR Inst Control – Intuitional Control Site List

2.3.2 Historic Land Use Research

Historic land use information was reviewed using available and relevant fire insurance maps (Sanborn maps) and aerial photographs. Sanborn maps typically show historic features or former buildings, including hazardous chemical or fuel storage areas, potential release pathways (i.e. drains) and use of properties. Additional information includes site addresses, building materials, property boundaries, utility lines, and underground storage tanks. Aerial photographs can indicate commercial and industrial land uses that have potential to be impacted by the project.

When available, aerial photographs and Sanborn maps were reviewed from mid-1930s to present in approximate10 year intervals. Sanborn maps were ordered from EDR covering a 1 block radius surrounding the study alternatives.

2.3.3 Other Data Sources

As available and appropriate, data from previous technical reports, agency file reviews, field investigations, or other site-specific evaluations that have been completed for other projects in the corridor were examined. For example, information from the following DEQ web sites was researched.

- Environmental Cleanup Site Information (ECSI)
- Leaking Underground Storage Tank (LUST)
- Underground Storage Tank (UST)

2.4 Affected Environment Profile

The area of potential effect (APE) for the identification of potential hazardous material or hazardous waste sites within the area of the study alternatives is adjacent parcels or lands within 500 feet of the study alternatives. As noted earlier hazardous wastes are defined in 40 CFR 261.3 as those specifically named in the regulation, or substances exhibiting ignitability, corrosivity, reactivity, or toxicity.

The EDR database report included the standard ASTM search radii (around the boundary of the study alternatives) for the respective databases. The search area is expanded beyond the APE in order to include sites that may have been incorrectly mapped or sites with contaminated groundwater plumes. URS reviewed the EDR database report for hazardous material sites located within the APE or with contamination potentially entering the APE as defined above.

2.5 Impact Assessment Analysis Methods

The following were considered in evaluating impacts:

1. Would project operations pose a risk to human health or the environment by exposing hazardous substances? This was evaluated using sound environmental practices and strategic goals.
2. Would project construction activities expose or exacerbate contamination, posing a risk to human health or the environment? This evaluation relied on applicable state of federal standards and an assessment of exposure pathways and potential receptors.
3. If the project were to acquire a hazardous materials site, what are the sites that may pose the highest concerns for cleanup, potential project delays, and added costs or liabilities associated with the site cleanup? Could one of the study alternatives or a design option provide an opportunity to avoid or minimize the risk? This evaluation would be based on an assessment of known sites on, adjacent, or near the proposed Streetcar alignment, with a focus on properties to be acquired. The current status of regulatory and cleanup actions will be recorded. The evaluation will also reflect the type of contamination and the media contaminated, and will apply professional judgment to assess the level of concern that contamination may pose for a potential property acquisition, including the level of cost and difficulty in cleanup, and the potential that contamination may have migrated or could still migrate to other properties, such as through groundwater.

An appendix table was generated which includes the hazardous material sites located within the APE as either "near" or "displaced" by the study alternatives (Affected Environment). The term "displaced" refers to sites that could be displaced by or acquired for the study alternatives; the term "near" refers to sites located within the APE.

Using the appendix table, an Affected Environment table was generated showing the number and type of known hazardous material sites located within the APE as either "near" or "displaced".

A review of the DEQ ECSI and LUST web sites was conducted for additional site information which may not be provided in the EDR database report. These web sites provide a summary of the regulatory status (i.e. no further action determination), contaminants of concern, investigation history, and types of media impacted (i.e. sediment, surface water, soil, and/or groundwater). This additional information will be added to the appendix tables.

The impacts of the hazardous material sites was evaluated for each alternative (Environmental Consequences). A table was prepared of the hazardous material sites by each alternative.

2.5.1 Long-Term Impacts Approach

Long-term impacts could include remedial actions to address the exposure or mobilization of contaminated materials. Remedial actions could include deed restrictions, engineering controls, placement of soil caps, or groundwater treatment systems. Remedial actions could impact the project by causing delays, additional costs, or operational conflicts. If a contaminated site is discovered prior to construction (during a pre-construction assessment) the property owner would largely be responsible for remedial actions, including cleanup. It is in the best interest of the project to identify contaminated sites, and either avoid them or identify the property owner prior to acquisition. The project will also explore potential contamination within the Willamette Shoreline right-of-way and assess issues related to cleanup if contamination is found. The analysis will also discuss the use of and policies for managing hazardous materials in the operation and maintenance of Streetcar operations and maintenance facilities.

2.5.2 Short-Term Impacts Approach

Short-term impacts could include increased costs and delays from:

- Notification to regulatory agencies.
- Work stoppage due to potential exposure to construction and excavation workers.
- Identification of and negotiation with potentially responsible parties and/or regulatory agencies.
- Focused investigation/characterization of affected media.
- Implementation of remedial actions.

Construction-related equipment relies heavily on petroleum products. Improper fuel transfers may result in spills to the ground potentially leading to soil and groundwater contamination. Other chemicals are also used during construction activities. Chemical pollutants such as paints, acids for cleaning masonry surfaces, cleaning solvents, asphalt products, concrete-curing compounds, and fertilizers may be used at construction sites and may be carried in runoff. Fertilizers used in landscaping contain nitrogen and phosphorus which, in large doses, can adversely affect surface waters, causing eutrophication (a condition which excessive algal growth occurs and reduces oxygen available to aquatic wildlife). This evaluation considers typical construction techniques and compounds involved, if available, and discusses the potential adverse effects of those compounds if released to the environment.

2.5.3 Cumulative Effects Approach

Numerous project actions could potentially have beneficial and non-beneficial effects on the project area, both during and after the completion of activities. When combined with other projects and potential development, beneficial cumulative effects include:

- Improved public and environmental safety within and adjacent to the project area as a result of subsurface investigations and site-remediation actions necessary for construction activities and risk-based site closures in the area (associated with anticipated projects in the area).
- Better understanding of existing hazardous materials located above and below the ground surface.
- Enhanced understanding of existing geologic conditions due to subsurface investigations and excavations.

The potentially non-beneficial effects include:

- Possible increase to human health and safety hazards due to potential disturbance and exposures to contaminated soil and groundwater during and after construction activities. The level of exposure to construction workers could be minimized with proper training and the use of appropriate protective equipment.
- Potential increased use of hazardous materials in the project area as a result of possible increased commercial development and activity due to project completion. Further development of the area may lead to the likelihood that sites not contaminated with hazardous materials will become contaminated. Further construction of utility corridors and structures on the impacted sites will lead to exposure to construction workers and building occupants.
- Potential increased cumulative demand for impacted soil disposal facilities.

2.6 Mitigation Measures

The acquisition and/or leasing of land containing hazardous materials could incur risk of financial liability if contamination requiring characterization, removal, or disposal were to be discovered. To reduce liability risks, the data compiled in this report would be reviewed and evaluated to identify parcels where hazardous materials are known to exist or may be present.

Prior to acquisition and/or leasing, the appropriate regulatory agencies would be contacted in order to determine whether more recent information is available, and whether further assessment of the parcels is scheduled. Entering into an agreement with a regulatory agency, such as a Prospective Purchase Agreement (PPA) may lessen future liabilities resulting from purchasing impacted properties.

Where potential hazardous materials sites would be displaced or are located in close proximity to the proposed alternative, additional in-depth study would be conducted as needed. This could include conducting geophysical surveys and/or conducting subsurface assessments. A limited sampling and analysis program, coordinated in conjunction with geotechnical investigations, could be developed and implemented on sites with known contamination.

Adverse impacts from contamination during construction would be minimized or avoided. A work plan would be designed for each site, which would include actions to be implemented if construction activities encounter impacted soil and/or groundwater. The contaminated sites must be investigated by a qualified contractor. Controls and measures would be planned, designed and implemented to avoid further exacerbation of impacted sites, and plans and procedures would be prepared to prevent future releases or spills.

Depending on the selected alternative and the potential severity of hazardous materials exposure associated with it, a Health and Safety Plan would be developed for all construction activities consistent with applicable laws in effect at the time of construction.

The closure of impacted soil and/or groundwater areas remaining beneath the newly constructed alternative would be addressed with the appropriate regulatory agencies prior to construction.

Mitigation measures for hazardous material spills will consist of accident prevention and diverting spilled materials away from surface water resources.

The construction contractor will comply with all applicable federal, state, and local laws and regulations as they pertain to the storage, handling, management, transportation, disposal and documentation of hazardous substances (as defined in ORS 465.200); oil and hazardous materials (as defined in OAR 340-108-0002); hazardous waste (as defined in 40 CFR 261 and OAR 340-101-0033); solid waste (as defined in 40 CFR 258, ORS 459 and OAR 340).

For all facilities or residences in the project area that will be renovated, relocated, or demolished, the appropriate governing bodies will be contacted to assure proper handling and disposal of regulated materials. With their approval, the work will be completed in accordance with the appropriate laws, rules, and regulations.

The construction of the preferred alternative may require the demolition of structures. Asbestos-containing materials (ACM) and other hazardous building materials including: lead-containing

paints, polychlorinated biphenyl (PCB) light ballasts, mercury vapor-containing fluorescent light tubes, and mercury halide lights may have been used in these buildings.

For buildings to be relocated or demolished, the DEQ is required to be notified, even for those not containing ACM. Prior to the removal of the buildings in the proposed right of way, an Asbestos Hazard Emergency Response Act (AHERA) accredited asbestos inspector and an Oregon Department of Human Services (DHS) certified lead-based paint inspector will complete a hazardous building materials assessment. If ACM is detected in buildings that will be demolished or removed, the contractor and method of removing, handling, and disposal of the materials will be approved by the DEQ.

2.7 Documentation

The hazardous materials analysis will identify and document known or suspected hazardous materials sites, analyze the data, and compare the study alternatives in relation to potential impacts. Preliminary environmental engineering recommendations (mitigation) will be presented. A technical memorandum may be prepared that would include sections on analysis methods, data collection, agency coordination, affected environment, impacts of study alternatives, and potential mitigation measures. A summary of the data and analysis will be presented in the DEIS.

3. CONTACTS, COORDINATION, AND CONSULTATION

The following agencies are sources of data that are expected to be used for the Hazardous Materials analysis. These agencies may be contacted by project staff to coordinate the collection on data and review the project analyses:

3.1 Federal Agency Coordination

- U.S. Environmental Protection Agency (EPA)

3.2 State Agency Coordination

- Oregon Department of Environmental Quality (DEQ)
- Oregon Water Resources Division
- Oregon Division of Consumer Business Services
- Oregon State Fire Marshall

4. AFFECTED ENVIRONMENT

The hazardous material APE is defined as a 500-foot buffer zone located laterally on each side of the project with the northern terminus at SW Bancroft Street and SW Moody Avenue, and the southern terminus at N State Street and Northshore Road. The project team requested an initial conservative ¼-mile search radius around the project for potentially impacted sites from Environmental Data Resources (EDR).

4.1 Federal and State Data Base Search Results

The affected environment within the APE was assessed by reviewing reasonably ascertainable government database records from federal and state sources. Information for the database review is based, in part, on the EDR report that compiled database records through November 2, 2009. 547 potential hazardous material sites were identified within the initial ¼-mile search of the project. These sites were then individually accessed for their position within the APE. Based on this review, 119 sites were identified as potential hazardous material sites. This is not unusual for an established urban area that includes waterfront, rail corridors, major highways, and a number of industrial areas. Each site has been given a unique site identification number (Site ID) by the project team. In general, Site IDs have been assigned in ascending order from north to south.

Figures 4-1 through 4-3 display the approximate location of identified hazardous material sites. For the purposes of this report, site locations are approximate and do not represent the precise position of the environmental impact.

The potential of a hazardous materials site to cause construction impacts to the proposed project was evaluated using the following criteria:

If property of the identified site is to be acquired for the proposed project
The proximity of the site to the proposed project
If a known or suspected release of a hazardous substance(s) has occurred at the hazardous material site
The current cleanup status of the site
Database listing type(s) and multiple database listings for the site
Land use type

A ranking of the potential for hazardous material impact was then determined based upon the estimated severity of the hazardous material contamination and the potential for disturbance of hazardous materials by project construction activities.

Databases were compared to one another for their potential to cause construction impacts. Identified hazardous material sites were ranked on a scale from 0 (very low probable effect) to 5 (high probable effect) of causing a direct environmental consequence to roadway or transit options. Ranking was based on multiple lines of evidence which include:

Sites ranked 0 to 2:

are located at sufficient distance from the right-of-way or transit design options to avoid major concerns during construction
have database listings that do not indicate a high level of concern for potential impacting the project

Sites with a 0 to 2 rank are not likely to affect the project and are excluded from additional analysis.

Sites ranked 3:

have known releases of hazardous materials but are not proposed for potential acquisition or are not near proposed transit design option

Sites ranked 4 and 5:

have known releases of hazardous materials
have historic land use that pose environmental concerns to the project
are near the right-of-way or a transit design option
are proposed for partial or full acquisition

Sites with a 4 and 5 rank pose the greatest potential to have appreciable adverse construction impacts to the project. The difference between rankings is based on the type of impact (i.e., leaking heating oil tank vs. larger ECSI site), the status of the site (i.e., NFA vs. on-going cleanup), and site location (i.e., acquired vs. nearby). Consequently, ranking is based on best available data and professional judgment

4.1.1 Federal Database

Of the 119 identified potential hazardous material sites within the APE (Appendix A) identified in Federal databases:

1 was identified as CERCLIS-NFRAP (Comprehensive Environmental Response and Liability Information System – No Further Remedial Action Planned)
8 were identified as RCRA-SQG (Resource Conservation and Recovery Act - small quantity generator)
1 was identified as ERNS (Emergency Response and Notification System)
1 was identified as FTTS (Federal Insecticide, Fungicide, Rodenticide Act)
1 was identified as HIST-FTTS (Historical FIFRA/TSCA Tracking System)
2 were identified as ICIS (Integrated Compliance Information System)
1 was identified as PADS (PCB Activity Database)
83 were identified as FINDS (Facility Index System)

Multiple sites maybe listed at one address, and sites may be identified on one or more databases. A summary of the hazardous materials sites is presented in Table 3.13-1.

4.1.2 State Database

Of the 119 potential hazardous material sites within the APE identified in State databases:

16 were identified as ECSI (Environmental Cleanup Site Information System)
6 were identified as OR CRL (Confirmed Release List and Inventory)
1 was identified as UIC (Oregon Underground Injection Control)
51 were identified as LUST (Leaking Underground Storage Tank)
26 were identified as UST (Underground Storage Tank)
3 were identified as AST (Aboveground Storage Tank)
8 were identified as OR MANIFEST
11 were identified as SPILLS
11 were identified as OR HAZMAT
1 was identified as ENG CONTROL (Engineering Controls)
2 were identified as INST CONTROL (Institutional Controls)
6 were identified as VCS (Oregon Voluntary Cleanup Program)
9 were identified as DRYCLEANERS
1 was identified as BROWNFIELDS
3 were identified as NPDES (National Pollutant Discharge and Elimination System)
14 were identified as HSIS (Hazardous Substance Information Survey)

Multiple sites maybe listed at one address, and the same site may be identified by one or more databases. A summary of the hazardous materials sites is presented in Table 3.13-1.

4.1.3 Other Data Sources

Site locations and addresses were verified by reviewing tax lot detail, plotting address information in the Portland Maps website (accessed November 2009) and utilizing the Google Maps website Street View function (accessed November 2009). No file reviews were conducted at the Oregon Department of Environmental Quality (DEQ).

4.2 Affected Environment by Segment

4.2.1 Downtown Portland / Central City Segment

Four of the 24 sites ranked 4 or greater are located within the APE of the Downtown Portland Segment adjacent to SW Lowell Street.

No. 1 ALL DECK BLOCK 39 PROPERTY
No. 3 O S F DESIGN SHOP/SOUTH WATERFRONT CENTRAL DISTRICT
No. 10 PROMETHEUS PROPERTY (site addressed in two sections)
No. 12 MACKENZIE/SAITO PROPERTY (site addressed in two sections)

4.2.2 South Waterfront Segment

Five of the 24 sites ranked 4 or greater are located within the APE of the South Waterfront Segment between SW Lowell Street and SW Hamilton Court. The South Waterfront Segment includes only the Moody/Bond Couplet Extension design option. The Willamette Shore Line option is considered to be a phasing option.

No. 10 PROMETHEUS PROPERTY (site addressed in two sections)
No. 12 MACKENZIE/SAITO PROPERTY (site addressed in two sections)

No. 15 TANIDA, NAMIKO
No. 16 SOUTH OPERATION CENTER/FORMER S. OPS. CENTER BK OF AM
No. 17 SOUTH OPERATION CENTER TAX LOT 87

4.2.3 Johns Landing - Willamette Shore Line Design Option

No sites of concern were identified along the Willamette Shore Line Design Option during any of the office research reviews or field investigations.

4.2.4 Johns Landing - Macadam Additional Lane / Macadam In-Street Design Options

Eleven of the 24 sites ranked 4 or greater are located within the APE of the Johns Landing Segment between SW Hamilton Court and SW Miles Street. Both the Macadam Additional Lane and Macadam In-Street Design Options were evaluated together as they share the same basic alignment.

No. 23 JACOR COMMUNICATIONS
No. 26 JOHNS LANDING CLEANERS
No. 28 JACKPOT FOOD MART/TIME SAVOR AND DELI #3074
No. 29 MULTINOMAH METAL CO., WORKS/FLOWER STREET PROPERTY
No. 35 MACADAM SUNSET FUEL – PACIFIC PRIDE/HUNTINGTON NORTH
No. 38 ARCHER BLOWER FACILITY/JC CLEANERS
No. 39 PACIFIC PRIDE/MACADAM SUNSET FUEL/WILLAMETTE OAKS BUILDING
No. 53 WILLAMETTE OAKS BUILDING/ANKROM MOISAN ASSOCIATED ARCHI
No. 54 RODDA PAINT BUILDING (FORMER)
No. 58 HUNTINGTON RUBBER CORP
No. 60 HEUKER, B/HEUKER PROPERTY (site addressed in two sections)

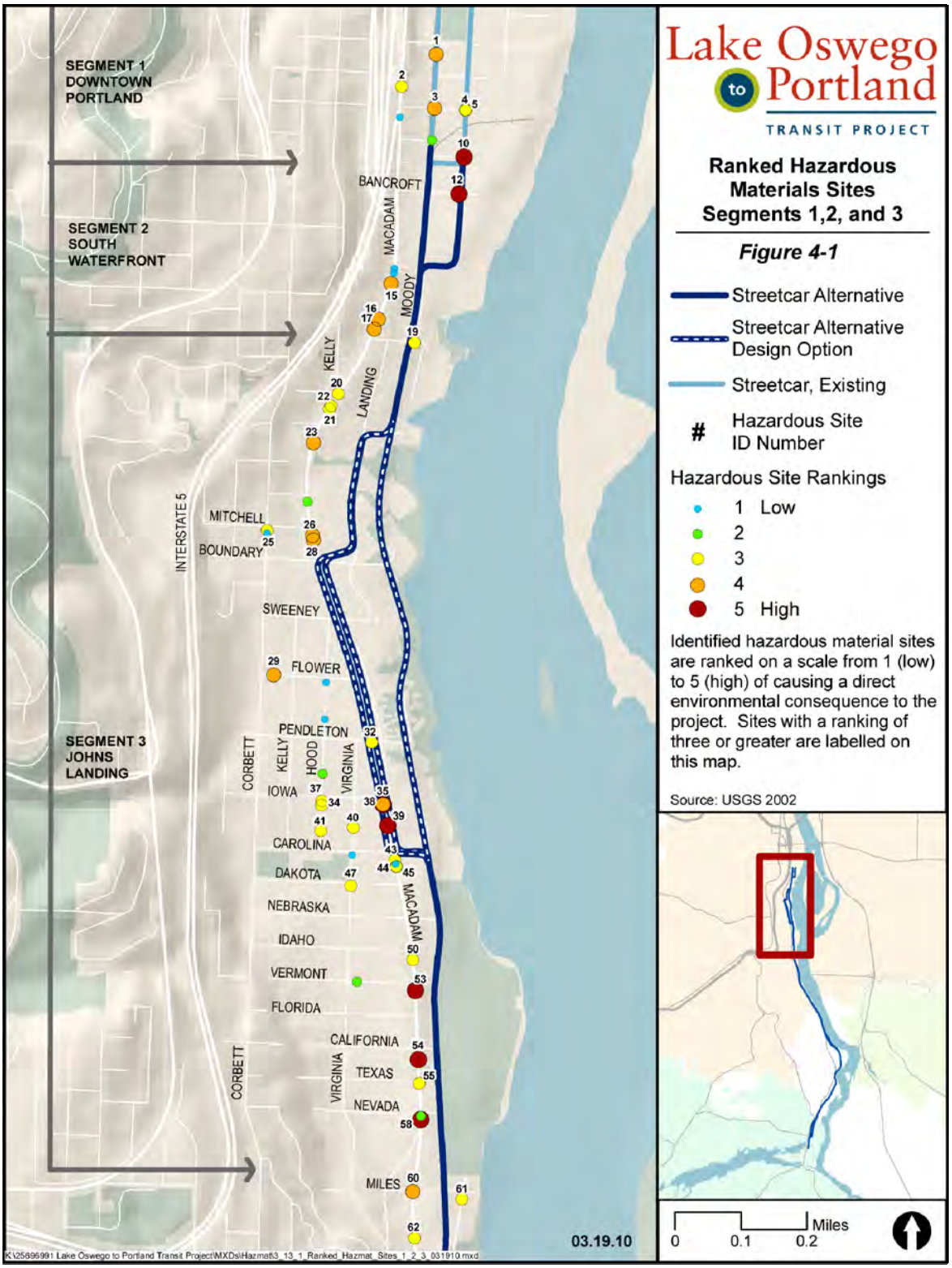

FIGURE 4-1 RANKED HAZARDOUS MATERIALS SITES – SEGMENTS 1, 2, AND 3

4.2.5 Sellwood Bridge Segment

One of the 24 sites ranked 4 or greater are located within the APE of the Sellwood Bridge Segment between SW Miles Street and the south end of Powers Marine Park.

No. 60 HEUKER, B/HEUKER PROPERTY (site addressed in two sections)

4.2.6 Dunthorpe / Riverwood Segment

None of the 24 sites ranked 4 or greater are located within the APE of the Dunthorpe/Riverdale Segment between the south end of Powers Marine Park and SW Brentwood Road. The Dunthorpe/Riverdale Segment includes the Willamette Shore Line and Riverwood In-Street design options.

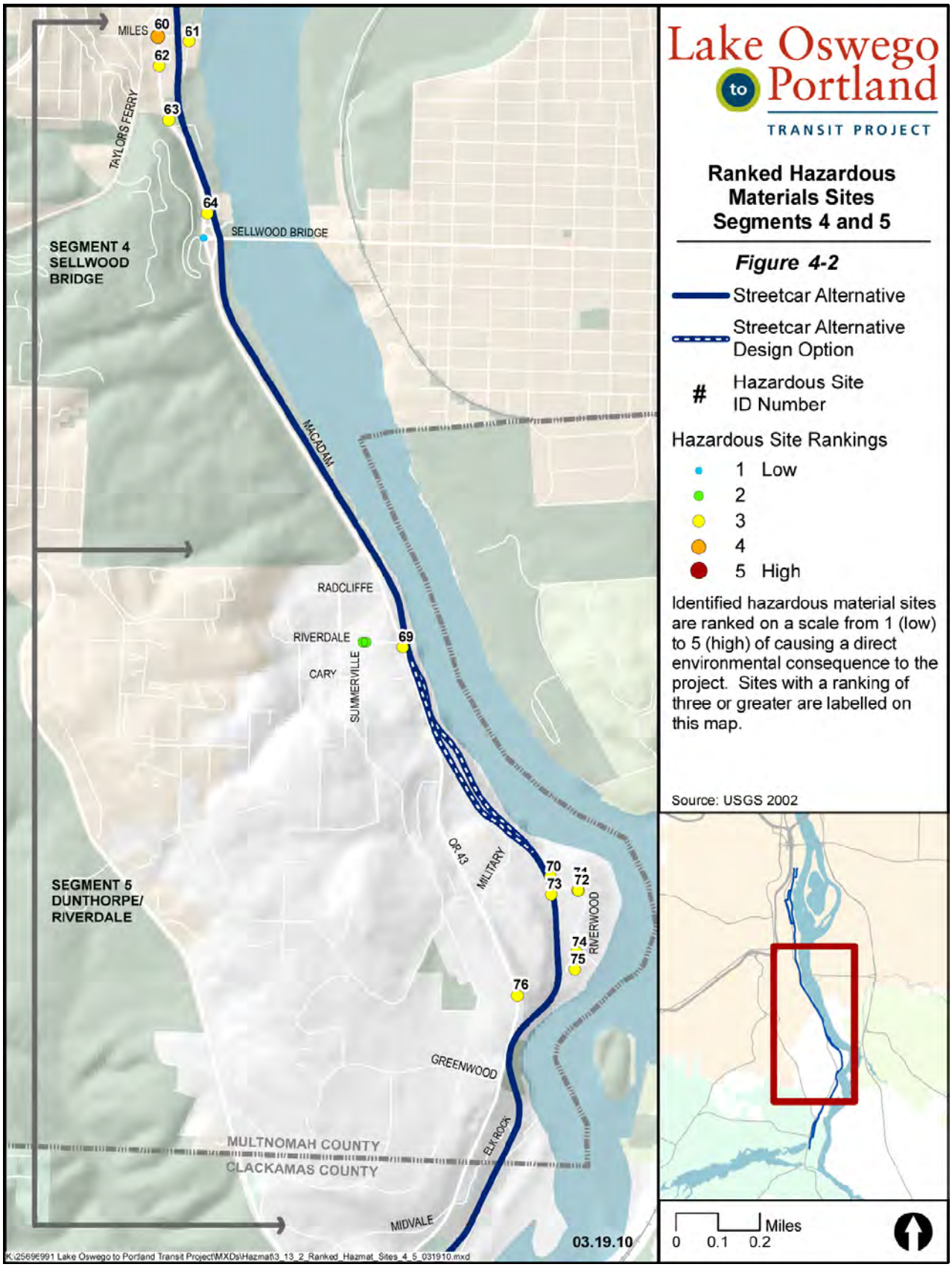

Figure 4-2 Ranked Hazardous Materials Sites – Segments 4 and 5

4.2.7 Lake Oswego City Segment - Foothills Realignment Design Option

Two of the 24 sites ranked 4 or greater are located immediately adjacent to the Foothills Design Option:

No. 98 ERICKSON'S AUTOMOTIVE/BLE INC JEEPERS ITS ERICKSONS (site addressed in Enhanced Bus section)
No. 102 DOBAJ BUSHINGS AT MARTIN ELECTRIC (site addressed in Enhanced Bus section)

4.2.8 Lake Oswego City Segment - Adjacent to UP Tracks Design Option

Four of the 24 sites ranked 4 or greater are located within the UP Tracks Design Option:

No. 84 SHELL STATION #143625/LAKE OSWEGO - #39/TRUAX HARRIS #39/JACKSON FOOD STORES #558
No. 89 ONE STOP MACHINE SHOP (site addressed in Enhanced Bus section)
No. 90 LAKE SHORE CONCRETE COMPANY (site addressed in Enhanced Bus section)
No. 94 LAKE TEXACO SERVICE (site addressed in Enhanced Bus section)

4.2.9 Lake Oswego Park and Ride

Five of the 24 sites ranked 4 or greater are located within the APE of the Lake Oswego Park and Ride. This is the only area that would be affected by the Enhanced Bus Alternative.

No. 89 ONE STOP MACHINE SHOP
No. 90 LAKE SHORE CONCRETE COMPANY
No. 94 LAKE TEXACO SERVICE
No. 98 ERICKSON'S AUTOMOTIVE/BLE INC JEEPERS ITS ERICKSONS
No. 102 DOBAJ BUSHINGS AT MARTIN ELECTRIC

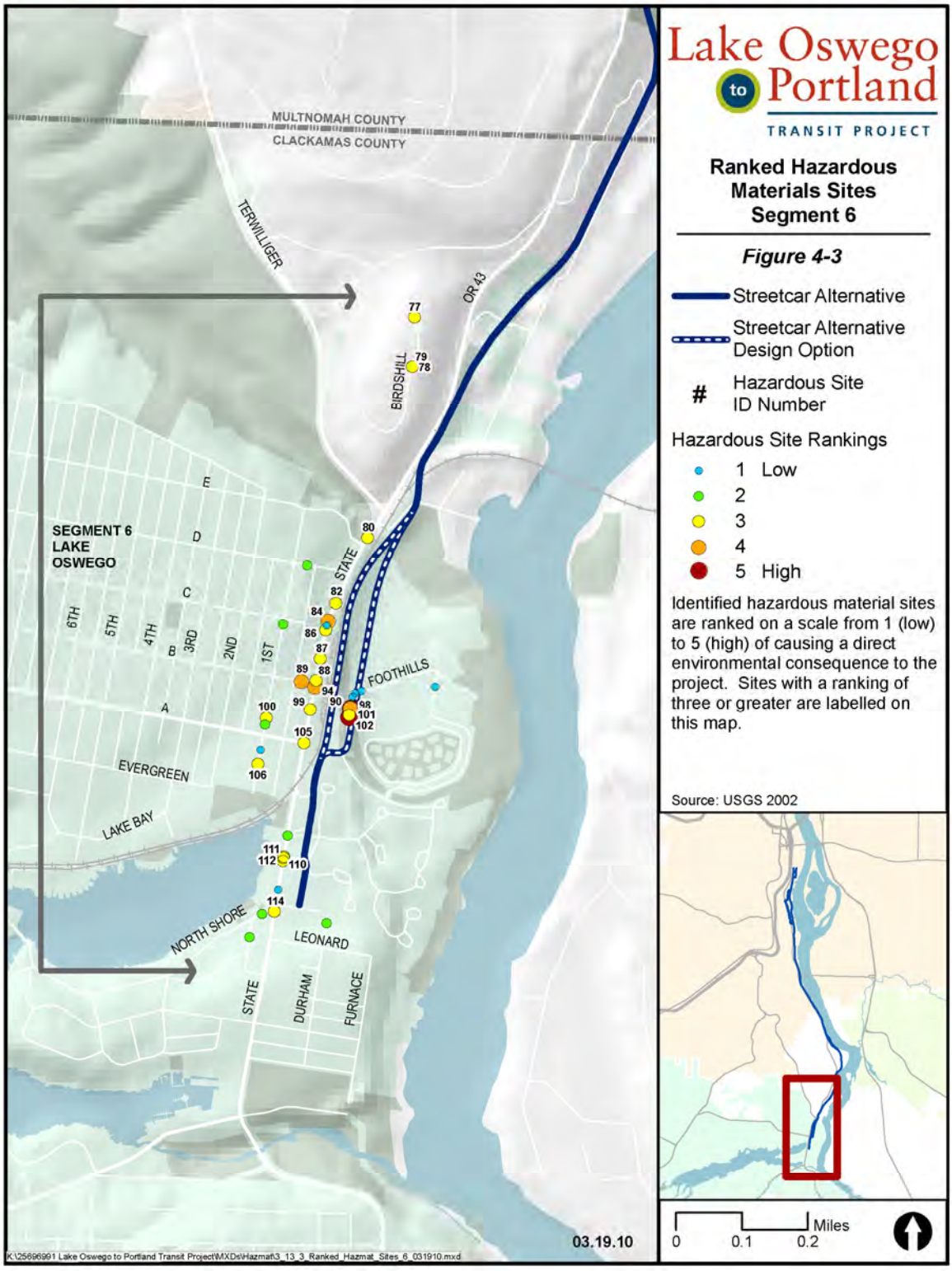

FIGURE 4-3 RANKED HAZARDOUS MATERIALS SITES – SEGMENT 6

5. ENVIRONMENTAL CONSEQUENCES

Environmental consequences included long-term, short-term, and cumulative impacts that would be expected from the project alternatives and design options.

The methods used to evaluate potential short-term effects within the project and its design options that include alternative routing options are summarized in Section 4.1.

Sites with a 4 and 5 rank pose the greatest potential to have appreciable adverse construction impacts to the project. The difference between rankings is based on the type of impact (i.e., leaking heating oil tank vs. larger ECSI site), the status of the site (i.e., NFA vs. on-going cleanup), and site location (i.e., acquired vs. nearby). Consequently, ranking is based on best available data and best professional judgment.

One hundred nineteen ranked sites are identified in the hazardous materials APE. Of these sites, 24 are ranked 4 or greater and have the greatest potential for contamination to be encountered. The 24 sites are described from north to south along the project alignment in the following sections of the report. Figures 4-1 through 4-3 display the approximate location and rank of each potential hazardous material site, and the footprint of each design option.

Multiple sites may be listed at one address, and sites may be identified on one or more databases. A summary of the hazardous materials sites is presented in Table 5-1.

Table 5-1 Hazardous Materials Sites within 500-Feet of Ground-Disturbing Construction Under the Streetcar Alternative, by Segment and Design Option[1]

Segment	Design Option	Hazardous Materials Sites[1]
1 – Downtown Portland	None	4
2 – South Waterfront[2]	None	5
3 – Johns Landing	Willamette Shore Line	11
	Macadam In-Street	11
	Macadam Additional Lane	11
4 – Sellwood Bridge[3]	None	1
5 – Dunthorpe/Riverdale	Willamette Shore Line	0
	Riverwood In-Street	0
6 – Lake Oswego	UPRR	10
	Foothills	10

Source: URS – January 2010.
Note: UPRR = Union Pacific Railroad.
[1] Number of known hazardous materials sites within 500-feet of ground-disturbing construction.
[2] The South Waterfront Segment contains potential construction phasing options associated with the Streetcar alignments. See Section 3.17 Phasing Effects of the *Lake Oswego to Portland DEIS* for more information regarding phasing options and differences between those options.
[3] The Sellwood Bridge Segment contains potential construction phasing options associated with the Streetcar alignments. See Section 3.17 Phasing for more information regarding phasing options and differences between those options.

5.1 No Build Alternative

Under the No-Build Alternative, ground disturbances associated with the project would not occur. The lack of these disturbances would create both potentially adverse as well as beneficial long-term effects associated with the No-Build Alternative. Adverse long-term effects include hazardous materials sites that would not be investigated or subsequently remediated. Such sites would likely continue to pose long-term environmental risk. In addition, adverse effects may be associated with the long-term operation and maintenance of the No-Build Alternative due to increased traffic demands. These effects include but are not limited to bridge, roadway and transit upkeep, incidental spills or releases from vehicles or transit, and stormwater management and treatment. Beneficial long-term effects of the No-Build Alternative include limiting the potential for exacerbating contamination in soil or groundwater because identified and unidentified hazardous material sites would not be aggravated. It is surmised that long-term adverse effects are greater from the No-Build Alternative compared to the build alternatives.

5.2 Enhanced Bus Alternative

The Enhanced Bus Alternative only involves one area, the Lake Oswego Park and Ride, that would have ground disturbances associated with the project, therefore this is the only area that was considered for impacts associated with the Enhanced Bus Alternative. Long-term impacts to hazardous material sites from the Enhanced Bus Alternative may include adverse effects on remedial actions proceeding at hazardous material sites. Remedial actions could include active cleanup, long-term monitoring and maintenance, enforcement, institutional controls (i.e., deed restrictions, restrictive covenants) and/or engineering controls (i.e., soil cap, groundwater pump and treat). Long-term operation of these remedial actions may conflict with operation of the Enhanced Bus Alternative.

Three sites (Map ID #'s 89, 94 and 98) within the APE of the Lake Oswego Park and Ride have been identified; two have been recommended for further action. One site (Map ID # 98) has received No Further Action (NFA) status; one site (Map ID # 102) has received NFA status with engineering controls in place; and one site (Map ID # 90) has an unassigned status. Long-term impacts associated with remedial actions are thought to be minor compared to short-term impacts associated with construction.

Long-term impacts associated with the Enhanced Bus Alternative also include direct and indirect exposure or mobilization of contaminated materials as a result of roadway and transit operation and maintenance. In most locations, it is not anticipated that operation and maintenance associated with the Enhanced Bus Alternative would cause an appreciable increase in incidental spills or releases of hazardous materials from vehicles or transit. (Refer to Figures 4-1 through 4-3 for locations of sites relative to the Enhanced Bus and Street Car Alternatives and Design Options).

5.3 Streetcar Alternative

Long-term impacts associated with the streetcar alternatives are assumed to be similar to those associated with the Enhanced Bus Alternative.

Eight sites (Map ID #'s 10, 12, 26, 29, 35, 39, 89, and 94; 26 and 29 would only impact the Macadam Additional Lane and Macadam In-Street design options) within the APE have been recommended for further action; seven sites (Map ID #'s 1, 16, 17, 23, 38, 84, and 98; 23 would only impact the Macadam Additional Lane and Macadam In-Street design options) have received No Further Action (NFA) status; one site (Map ID # 54) has received a conditional NFA status

involving institutional controls, one site (Map ID # 102, which would only impact the Macadam Additional Lane and Macadam In-Street design options) has received NFA status with engineering controls in place, three sites (Map ID #'s 3, 53, and 58) are in the process of being remediated, and four sites (Map ID #'s 15, 28, 60, and 90; 28 would only impact the Macadam Additional Lane and Macadam In-Street design options) have an unassigned status. Unless otherwise stated, all of the above mentioned sites are within the APE regardless of which design options are chosen. Long-term impacts associated with remedial actions are thought to be minor compared to short-term impacts associated with construction.

5.4 Construction (Short-term) Impacts

Construction impacts are potential direct short-term impacts to resources within the APE that may occur prior to or during construction of the project.

A. Impacts Common to All Design Options

The build alternatives require construction activities in all project segments. Construction impacts may occur due to a variety of construction activities. Construction-related equipment relies heavily on petroleum products. Improper fuel transfers may result in spills to the ground, potentially leading to soil and groundwater contamination. Other potentially hazardous chemicals are also used during construction activities. Chemicals such as paints, acids for cleaning masonry surfaces, cleaning solvents, asphalt products, concrete-curing compounds, and fertilizers may be used at construction sites and may be carried in stormwater runoff.

Construction may require the removal of structures that contain hazardous materials, including creosote, lead, asbestos, and polychlorinated biphenyls (PCBs); all are known carcinogens. Removal and disturbance of creosote, lead, asbestos, and PCBs may cause mobilization of these compounds and can create unacceptable exposure to the public and the environment.

Creosote is a mix of chemicals and organic substances that is used as a wood preservative. It is present in railroad ties and trestles and could negatively impact soil. However creosote is not highly mobile in soil and regulators are unlikely to require corrective action based on the presence of railroad ties.

Lead-based paint was widely used until 1978, when it was phased out of residential and commercial structures. Structures built prior to 1978 may be coated with lead-based paint and may have contaminated soil surrounding the structure with lead. Some industrial and municipal uses continue to be permitted to use lead-based paint, so industrial structures of historic or recent origin may still be coated with paint containing lead.

Laws regulating the use and disposal of asbestos were established in 1977. Building materials consisting of or containing asbestos may include siding, roofing shingles, floor tiles, insulation, ceiling tiles, heating systems, gaskets, pipe wrapping, and duct lining.

PCBs typically occur in transformers manufactured between 1929 and 1977. Transformers containing PCBs can be found in residential, commercial, and industrial buildings constructed before 1978.

Construction of the build alternatives may be directly and indirectly affected by hazardous materials sites. Short-term effects associated with construction of the build alternatives may include increased costs and delays in project schedule resulting from:

notification to regulatory agencies of a potential hazardous exposure
work stoppage due to potential exposure of construction workers or ecological receptors to hazardous materials
identification of and negotiation with potentially responsible parties and regulatory agencies
focused investigation and characterization of affected media
implementation of remedial actions
management and disposal of affected media

Construction activities that disturb contaminated soil or groundwater at a hazardous material site can adversely impact nearby residents and business occupants, affect worker safety, raise project costs, and create project delays.

Any design option that requires additional acquisition of right-of-way or sub-grade excavation would increase the probability of encountering hazardous materials. However, the extent, cost and timeframe of remediation or mitigation required is dependent on site conditions that may be unique to a specific design option.

5.4.1 No Build Alternative

Under the No-Build Alternative, no right-of-way or property acquisition and no construction activities will occur. Therefore, the No-Build Alternative is not anticipated to result in appreciable construction impacts.

5.4.2 Streetcar Alternative – Comparison of Impacts

A comparison of construction impacts was conducted to evaluate relative differences among the various alignment and design options.

5.4.2.1 South Waterfront Segment

The South Waterfront Segment contains three sites with a ranking of 4 and two sites with a ranking of 5. None of these ranked sites in the South Waterfront Segment will likely have any appreciable long-term and construction impacts.

5.4.2.2 Johns Landing Segment - Willamette Shore Line, Macadam Additional Lane, and Macadam In-Street Design Options

Comparison of the design options indicates that Macadam Additional Lane and Macadam In-Street design options are impacted by four sites with a ranking of 4. All of the design options are impacted by two sites with a ranking of 4 and five sites with a ranking of 5.

The ranked sites in the Johns Landing Segment will likely have appreciable long-term and construction impacts to the three design options.

5.4.2.3 Sellwood Bridge Segment

The site with a ranking of 4 in the Sellwood Bridge Segment will not likely have any appreciable long-term and construction impacts.

5.4.2.4 Lake Oswego Segment - Foothills and UPRR Right-of-Way Design Options

Comparison of design options indicates that both options will be impacted by the same ranked sites.

The four sites with a ranking of 4 and two sites with a ranking of 5 in the Lake Oswego Segment will likely have appreciable long-term and construction impacts to the two design options

5.5 Cumulative and Indirect Impacts

The build alternatives or options are not expected to add to the number of hazardous materials sites along the corridor. Existing sites as well as currently unidentified sites, if any, would otherwise be subject to further measures for cleanup activities or contain contaminated sites.

5.5.1 No Build Alternative

It is projected that there will be slow to moderate new development and some redevelopment in the Portland Central City, South Waterfront area, Johns Landing/North Macadam area and in the Lake Oswego Town Center. The Foothills district located within the Lake Oswego Town Center is also expected to redevelop in the future. Future plans include mixed use development with associated urban infrastructure such as new roadway network. Additionally, bicycle and pedestrian facilities associated with the proposed construction of the Portland to Lake Oswego Trail project, may provide non-motorized vehicular facilities within the study area. However, use of such a trail system for peak hour transit is expected to have minimal effects on overall traffic patterns and congestion. Planned future projects also include street improvements and construction of a new bridge over Tryon Creek.

Cumulative effects of the No-Build Alternative may occur as a result of any or all of the past, present, and reasonably foreseeable future infrastructure and development projects. Over time, these factors have reduced the extent and diversity of the region's ecosystems. The No-Build Alternative could exacerbate the decline of ecosystem health by failing to slow the increase in personal automobile usage in the region and encouraging growth in a manner that is inconsistent with regional density goals. As previously discussed, increased motor traffic on Highway 43 may lead to a degradation of wetlands and streams within the project due to increased pollutant loading. The No-Build Alternative would not create opportunities to treat additional runoff prior to discharge to area waterbodies.

5.5.2 Streetcar Alternative

Direct **cumulative impacts** of the Streetcar Alternative could include increased transportation-related disturbance and the potential for the release of additional pollutants into the local environment due to use of the facility (oil, grease). Indirect cumulative impacts include temporary disturbance to soils and potentially suspended hazardous materials due to construction and modification of soils, hydrology, or other existing conditions from other projects. Past projects have developed the area from natural habitats to its current condition. The area will likely continue to develop pursuant to land and zoning regulations, including redevelopment of currently potentially contaminated sites. These potential redevelopments may require clean up actions pursuant to local regulation.

6. POTENTIAL MITIGATION MEASURES

Mitigation measures for the LOTP Project are designed to first avoid and then minimize and compensate for all unavoidable impacts. Impact avoidance and minimization largely are addressed through project design, including alternatives and alignment options that were considered but not advanced due to impacts to sites with potential hazardous waste concerns and other resources.

This section describes potential mitigation measures for short-term and long-term impacts to sites with potential hazardous materials concerns.

6.1 Short-Term Mitigation

A. Mitigation Prior to Construction

Mitigation plans for short-term impacts will be prepared prior to construction activities. The acquisition of properties containing hazardous materials or petroleum products results in legal and financial liability for the purchaser. To reduce the risk of liability, a Phase I Environmental Site Assessment (Phase I ESA) would be completed at each site proposed for acquisition and is typically completed prior to property or easement acquisition. The Phase I ESA is part of the due diligence process and typically includes review of agency files and permits, site inspection, historic land-use review, and interviews with tenants and owners. For any right-of-way acquisition involving underground tanks or hazardous materials, the owner shall have the responsibility to provide the state with a site free and clear of any contaminants and to coordinate a cleanup and closure plan with DEQ, as necessary.

A Phase II ESA is warranted if information obtained from the Phase I ESA indicates uncertainties about the site's environmental condition or the suspected presence of contamination. A Phase II ESA typically includes a focused investigation of the subsurface media through environmental sampling or geophysical techniques.

If contamination is not discovered during the Phase II ESA activities but is discovered at a later date, the property owner may be afforded legal protection under the "innocent landowner defense" of CERCLA. However, "due diligence" must be demonstrated. Impacts would be reduced by conducting due diligence activities prior to any property acquisition where liability for contamination is possible. For example, the Federal Transportation Authority (FTA) requires due diligence to reduce project costs and liabilities and to assure that property appraisals are fully informed during the acquisition process (see FTA Circular 5010.1C, Chapter II. 2, October 1, 1998).

A survey for asbestos containing materials (ACMs) is required for all structures (buildings, bridges, etc.) to be demolished or modified. The survey must be conducted by a certified asbestos inspector. An asbestos abatement plan is required prior to asbestos removal and must be prepared by a licensed abatement contractor. The abatement must be conducted by a licensed abatement contractor using asbestos-trained workers.

A lead-based paint survey is required for all structures (bridges, houses, etc.) that will be leased as residences, burned, or demolished unless air quality monitoring is provided during construction and demolition activities. The project team would review structures proposed for removal to evaluate whether contamination is likely to be present. If contamination exists, the risk of release could be minimized through adherence to environmental performance standards like those developed by the

Oregon Department of Transportation (ODOT) for the Oregon Transportation Investment Act (OTIA) III Bridge program.

6.2 Mitigation During Construction

Direct impacts will be mitigated during construction activities. Mitigation actions will vary depending on site conditions, the nature and extent of contamination, the affected media, and potential receptors. A contaminated soil management plan will be developed as a mitigation tool to minimize exposure to construction and excavation workers and reduce the risk to human health and the environment. The plan will be developed in conjunction with the appropriate regulatory agencies. The plan will provide emergency contact information and describe practices for safe working conditions, such as using personal protective equipment and monitoring for vapors in the breathing zone and for explosive conditions. Site-specific plans will address management, storage and disposal of hazardous substances and petroleum products. A supplemental management plan for groundwater will be developed if dewatering activities occur as part of below-grade construction.

In addition, certain hazardous materials will likely be used during construction, such as asphalt, fuel, raw concrete, striping paint, solvents, spray paint, landscaping chemicals, etc. The safe storage, use, and disposal of these products will be addressed in the contractor's pollution control plan, and Best Management Practices (BMP) will be followed to reduce the risk of spills or leaks of potentially hazardous materials.

6.3 Mitigation for Long Term Impacts

Potential releases of hazardous substances and petroleum products occurring during highway operation and located adjacent to or within the roadway will be mitigated by the applicable federal, state, or local response agency.

Responses by the Oregon State Fire Marshal would be under directive A-206 Issued April 15, 1994; Revised September 14, 2000. This directive is known as “Hazardous Waste Operations and Emergency Response: Responding to Hazardous Substance Releases.”

Project improvements will be constructed to current state and federal standards. Therefore, these improvements will reduce long-term effects of contaminant migration from shallow soil to groundwater and/or surface water, relative to existing conditions.

6.4 Mitigation for Cumulative and Indirect Impacts

Indirect impacts to sites of potential hazardous materials concern may include an exacerbation of existing conditions through disturbance of areas of concern. Such disturbance may provide an alternate migratory pathway for contamination (ie – installation of concrete in an unknown groundwater plume may alter the direction of flow and prevent current, if any, mitigation measures).

Positive cumulative impacts may potentially include remediation of previously unknown sites of concern or areas that may not be cleaned up otherwise.

7. REFERENCES

EDR, 2009a. EDR DataMap Corridor Study. Lake Oswego-Portland Transit Project. Inquiry No. 2627329.2S. November 02.

EDR, 2009b. EDR Sanborn Map Report. Lake Oswego-Portland Transit Project. Inquiry No. 2629917.1. November 03.

University of Oregon Map Library – Historic Aerial Photography. Lake Oswego to Portland Transit Project. November 2009. For years 1936, 1948, 1955, 1963, 1970, 1980, 1990 and 2000.

8. 8. LIST OF PREPARERS

Preparer/Author	Affiliation	Role/Contribution	Credentials
Shawn Williams	URS Corp	Task Lead, Hazmat Co-Author	BS Oregon State University, Marine Microbiology, Naval Science, 1976; Apprenticeship Program, Portland Community College, 1985
Bruce Cassem, PG Senior Geologist	URS Corp	Hazmat Co-Author	BS, Eastern Washington University, Geology, 1984
Kimberly Degutis Senior Ecologist	URS Corp	Hazmat Co-Author	BS Richard Stockton College of New Jersey, Marine Science, 1994; BS, Environmental Studies, 1998 MS Candidate Montclair State University, Environmental Management and Planning, 2005
Samuel Joyce	URS Corp	Hazmat Co-Author	BA, University of Montana, Science Biology
Seth Gallant Transportation Planner	URS Corp	GIS Mapping and Figures	BA Portland State University, Sociology, 1998 MA Portland State University, Urban and Regional Planning, 2001;
Tobin Guthrie Survey Technician/GIS Specialist	DEA	GIS Analysis	BA Colorado College, Psychology, 2003

Appendix A

EDR DataMap™ Corridor Study

(Available on request)