Lake Oswego to Portland Transit Project

Public Safety and Security

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TriMet and Metro

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1. INTRODUCTION

This report contains the detailed analysis and documentation that is the basis for Chapter 3, Section 3.14 Public Safety and Security of 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 (JPACT), 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 of 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 (see Table 1-1). 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.

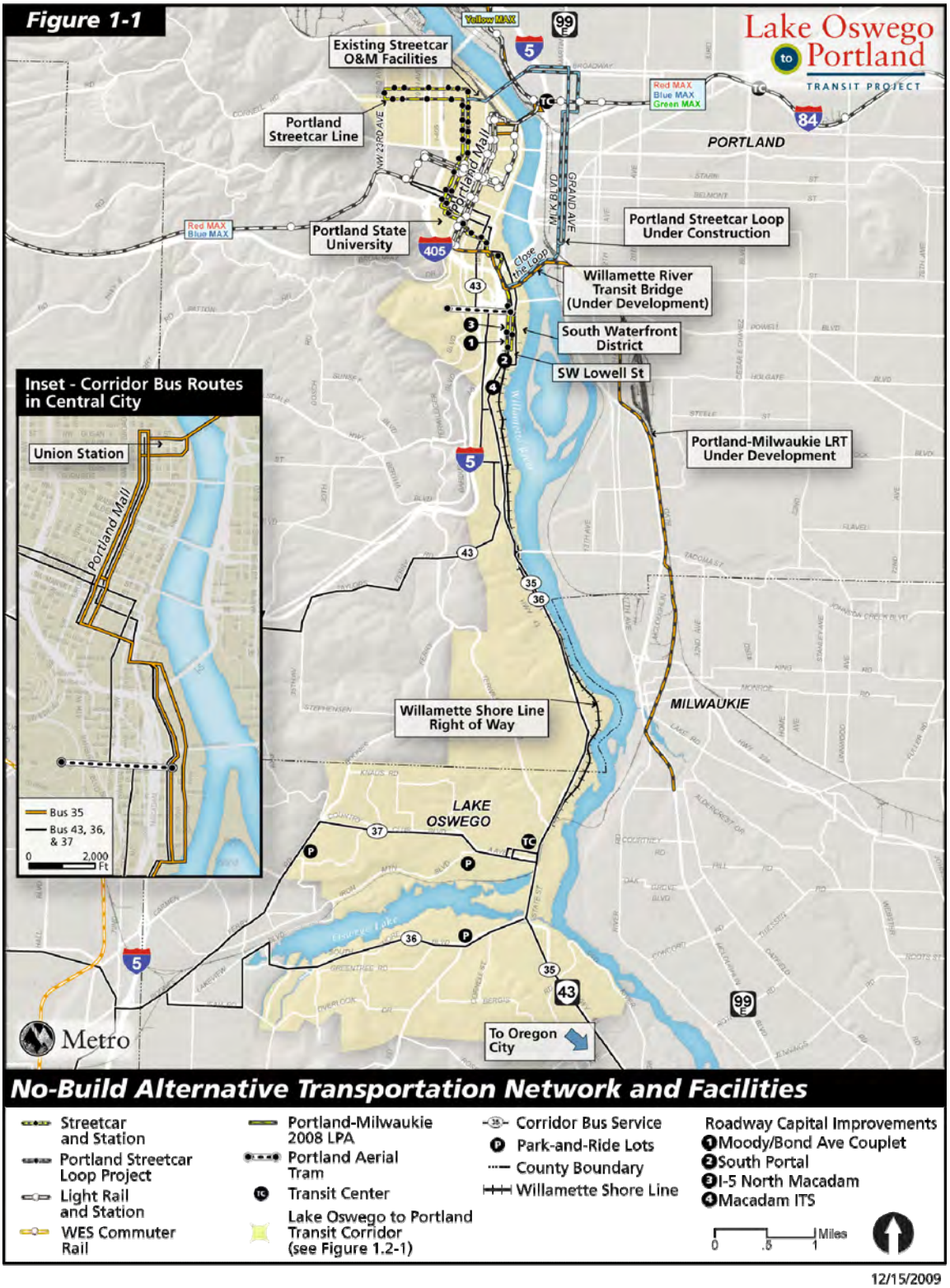

FIGURE 1-1 NO-BUILD ALTERNATIVE TRANSPORTATION NETWORK AND FACILITIES

- **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 are 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 proportionately 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.

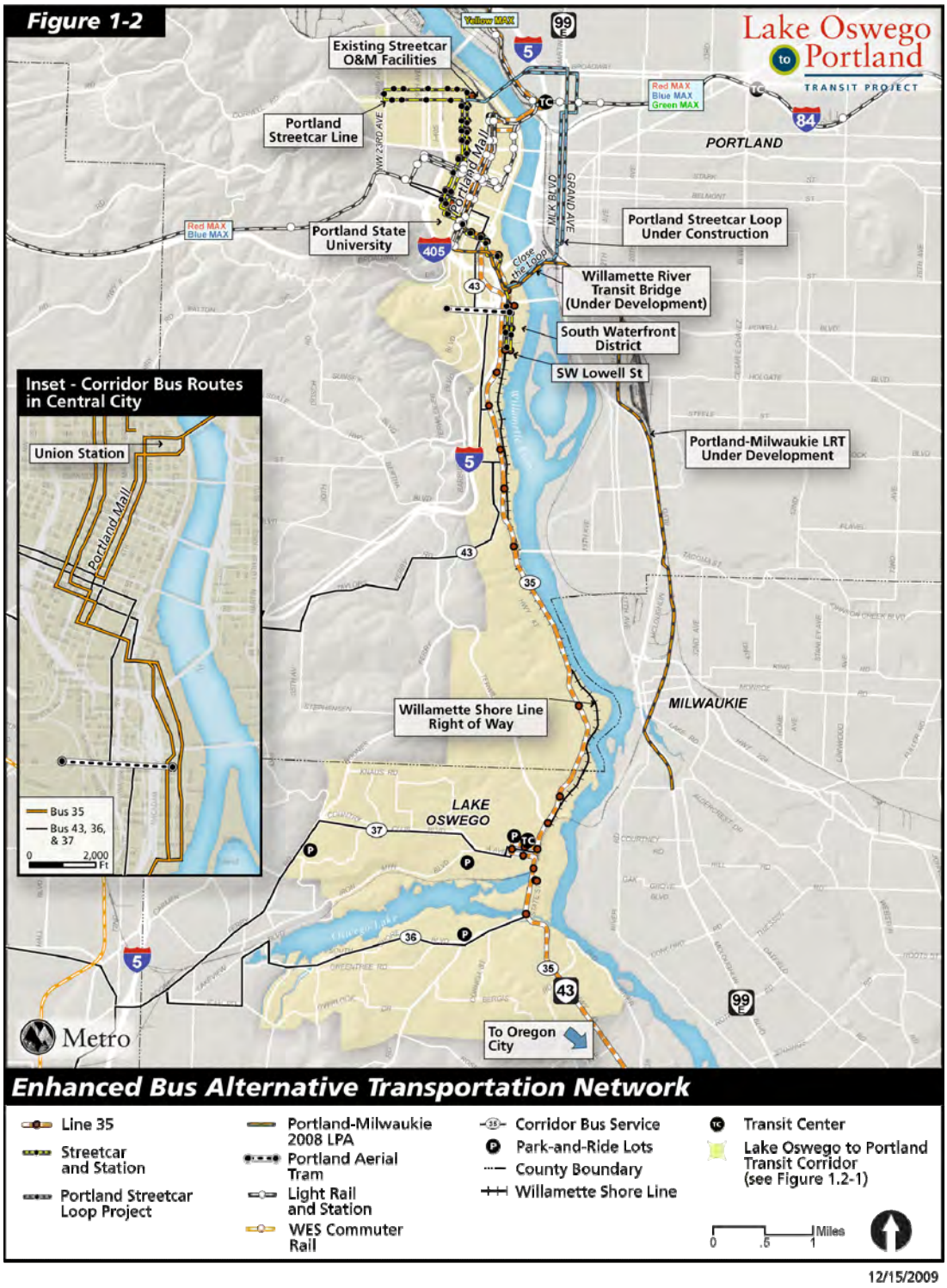

FIGURE 1-2 ENHANCED BUS ALTERNATIVE TRANSPORTATION NETWORK

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 changes to the bus capital improvements under the Streetcar Alternative would not vary by any of the design options under consideration.

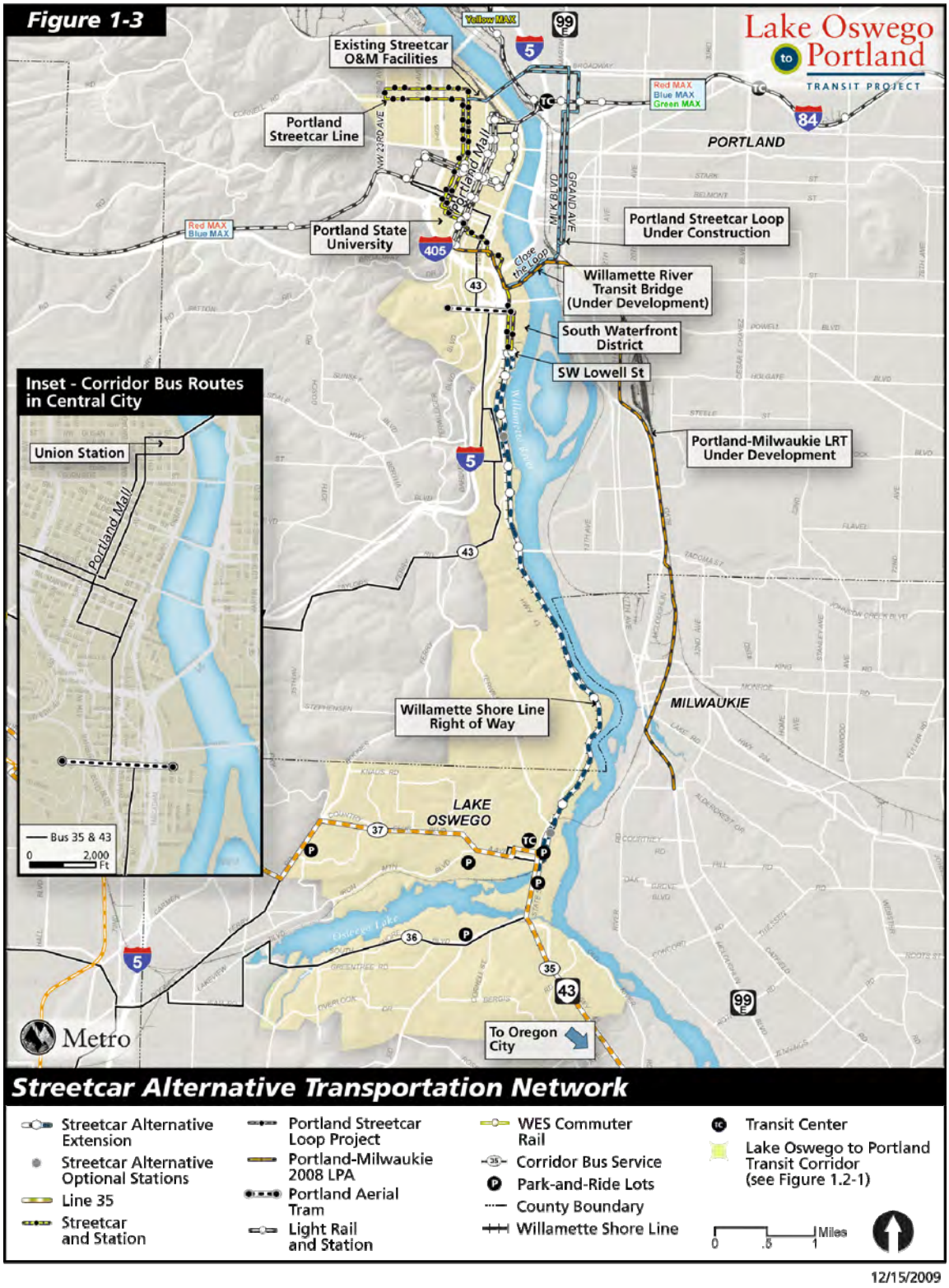

FIGURE 1-3 STREETCAR ALTERNATIVE TRANSPORTATION NETWORK

- **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.

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.

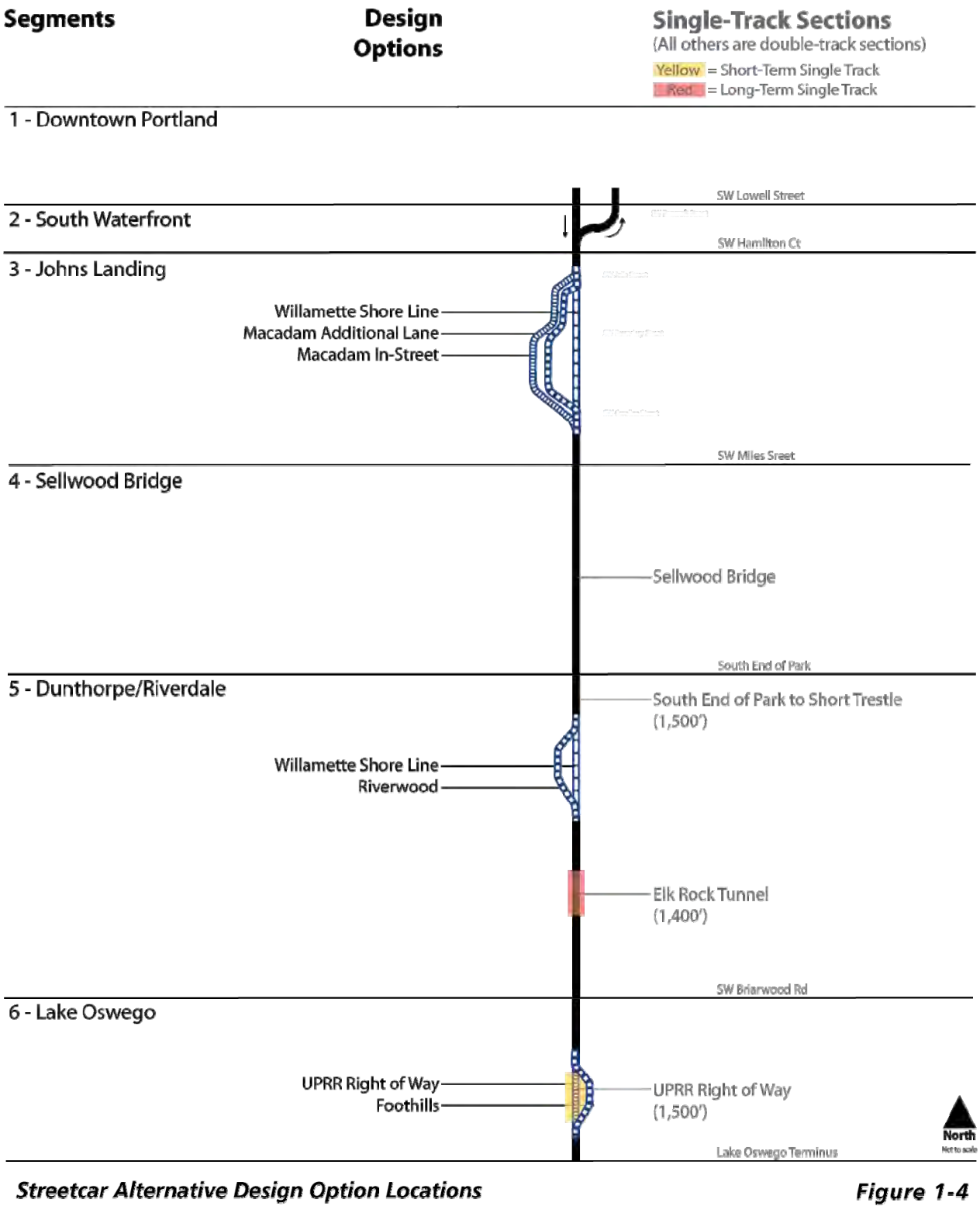

FIGURE 1-4 STREETCAR ALTERNATIVE DESIGN OPTION LOCATIONS

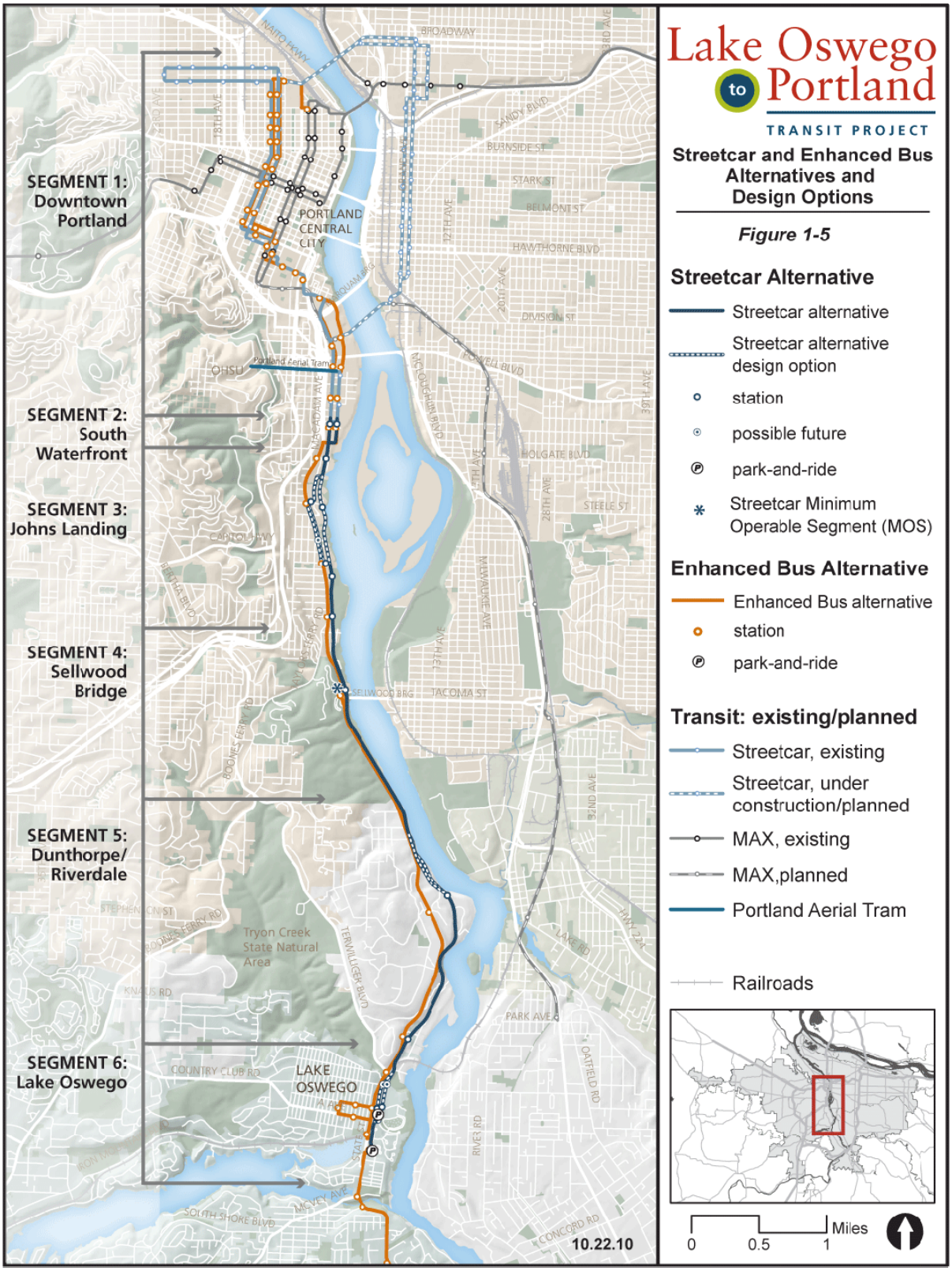

FIGURE 1-5 STREETCAR AND ENHANCED BUS ALTERNATIVES AND DESIGN OPTIONS

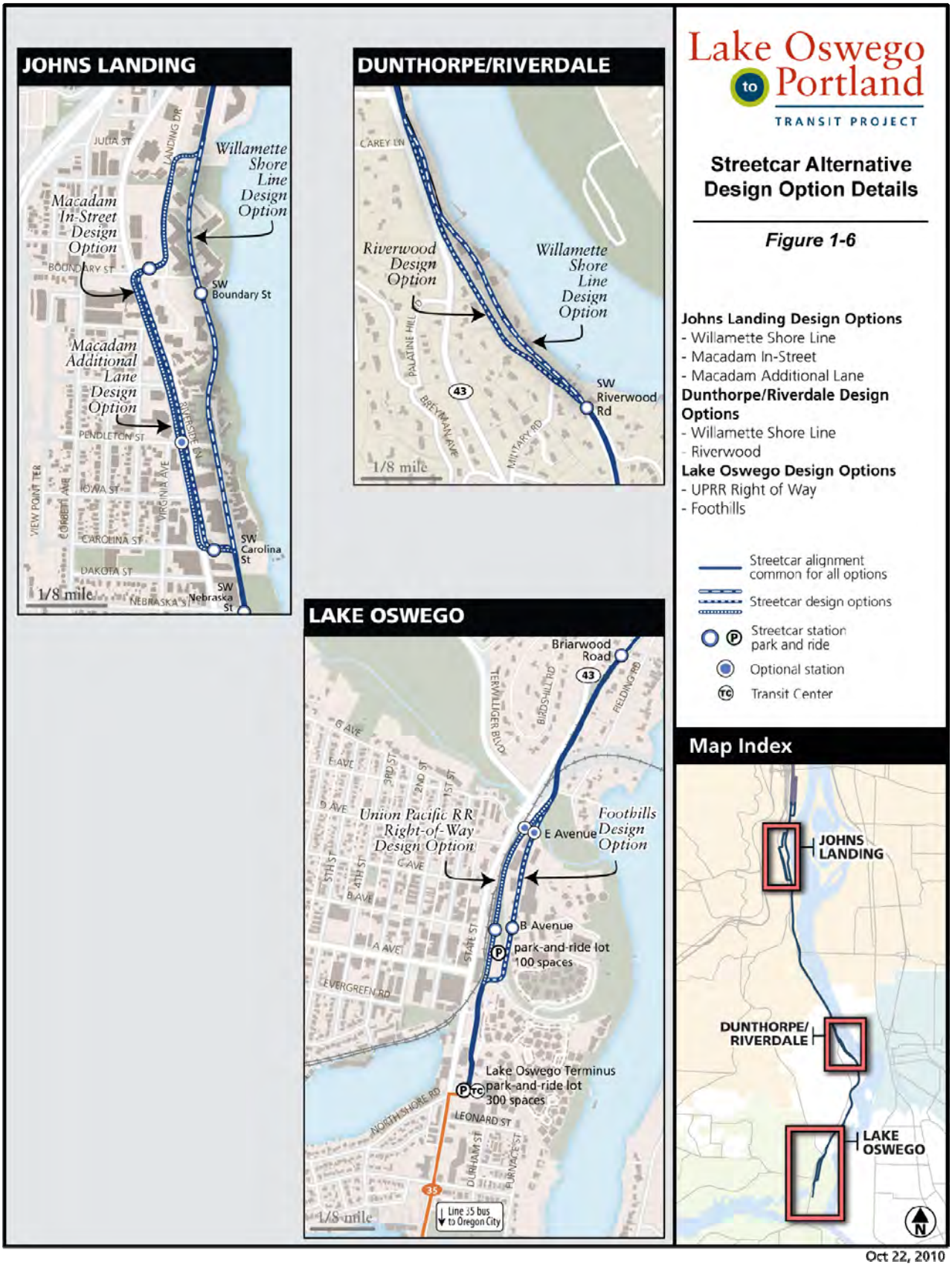

FIGURE 1-6 STREETCAR ALTERNATIVE DESIGN OPTION DETAILS

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 In-Street 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 (UPRR ROW) 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 ROW 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

This section describes the methods used to collect data and evaluate impacts to public safety and security for the Lake Oswego to Portland Transit Project. This analysis was developed to comply with the National Environmental Policy Act (NEPA), state and local policies, standards and regulations, and to respond to concerns raised by the community through the public and community involvement processes.

The safety and security section of the DEIS documents potential safety and security issues and impacts and the project's design, operational and mitigation measures to minimize transit related impacts to public safety and security. Public safety and security includes potential damage or loss of property as well as potential harm or injury to members of the public, arising through the construction and operation of the transit system and its facilities. The DEIS has a related section on Neighborhoods, Displacements and Relocations and Environmental Justice which contains discussion about public services, such as fire, police, emergency medical services, and hospitals. The public safety analysis, by contrast discusses how the potential location of transit facilities might change public safety conditions based on transit related crime statistics and accident rates.

This section is also intended to communicate programs already in place and assumed to be part of the project alternatives, but which may not be readily understood by the general public. For instance, TriMet and Portland Streetcar Inc. have developed and adopted a system-wide Transit Security Plan that also includes community policing goals and transit security techniques. The study includes evaluation of the existing policies as they relate to the unique character of this corridor as a sometimes lesser-developed area including natural areas, steep slopes, trestles and a tunnel. Elements of the plan would be incorporated into the design and operation of the Lake Oswego to Portland Transit Project.

Local police and emergency response services would support transit activities, such as:

- In house training of transit district employees to increase awareness of and prevention of criminal activities;
- Coordination with local law enforcement and emergency services agencies and personnel;
- Facility design and operations standards, principles and guidelines that would improve visibility at transit stations, reduce conditions that could encourage crime, and facilitate effective security enforcement and emergency response; and
- Emergency communication, tracking and surveillance technology.

2.2 Related Laws and Regulations

This section describes laws, regulations and other guidance that will guide data collection and the criteria for gauging potential project effects.

A. Federal

National Environmental Policy Act (NEPA) as implemented through 40 CFR 1508. Issues raised during scoping should be addressed in the DEIS.

Federal Transportation Administration regulations and guidelines implementing fire/life/safety measures applicable to the project.

B. Local

Local jurisdiction plans and polices regarding emergency service operational goals and service standards that would be used to evaluate effects and impacts including facilities and response times. These plans often establish long range goals, strategies and service standards that will be used to evaluate programs and approaches to minimize public safety concerns.

2.4 Data Collection

The project team collected information from:

- FTA's National Transit Database (NTD) reporting program for transit-related crime and public safety incidents
- TriMet and Portland Streetcar, Inc., including programs and proposals to enhance transit security and in response to directives in SAFETEA-LU
- Transportation Security Administration (TSA), which administers grants and programs under the Department of Homeland Security
- Statistical information on crime occurrences and security measures in the corridor and on the existing transit system available information from the cities of Lake Oswego and Portland, Multnomah and Clackamas Counties, the State of Oregon and TriMet.

The study also relied on information gathered from other technical analyses, such as accident location reporting in the Transportation section of the DEIS, and analysis of potential impacts to emergency response times, which are discussed in the public services section of the Neighborhoods, Displacements and Relocations and Environmental Justice section(see Section 3.3).

3. CONTACTS, COORDINATION AND CONSULTATION

The study includes data from or coordination with facility staff or representatives from the following agencies and service districts/providers:

- Oregon State Police Patrol Services Division
- Lake Oswego Police
- Clackamas County Sheriff's Office
- Multnomah County Sheriff's Office
- Portland Police, Central Precinct
- Portland Fire and Rescue
- Lake Oswego Fire Department
- Riverdale Dunthorpe Patrol, Inc.

4. AFFECTED ENVIRONMENT

Figures in the Neighborhoods, Displacements and Relocations and Environmental Justice section show the location of fire, emergency services, law enforcement, and other public service providers found in the study area.

4.1 Law Enforcement, Fire and Emergency Medical Services

Oregon State Police (OSP) Patrol Services Division provides a uniformed presence and law enforcement services throughout the state, with a primary responsibility for crash reduction, crime reduction, and other transportation safety issues; as well as to respond to emergency calls-for-service on Oregon's state and interstate highways. The study area is located in the Willamette Patrol Area headquartered in Milwaukie. One trooper is assigned to the patrol area which includes Highway 99E and Interstate 205 in western and southern Clackamas County. Within the study area OSP has primary responsibility for a short segment (one-half mile) of Highway 43 in the area between Lake Oswego and the Multnomah County line. City agencies assume primary enforcement responsibilities for Highway 43 within their jurisdictions, with backup and other cooperation from OSP.

The City of Portland Police Bureau (PPB) is the largest city law enforcement agency in Oregon. The Police Bureau has approximately 1,000 full-time officers, up to 100 reserves, 50 cadets, and 300 civilian positions. The PPB provides law enforcement services in three precincts: Central, North, and East. A portion of the Lake Oswego to Portland Transit Project will be located within the Central Precinct which covers 32.4 square miles with an estimated residential population of 99,174 as of 2000.

City of Portland Fire and Rescue (PF&R) is Oregon's largest fire and emergency provider. PF&R has 30 stations, two of which serve areas adjacent to the proposed light rail alignment: Station 4 (Portland State University) serves downtown Portland and the South Portland (formerly Corbett-Terwilliger-Lair Hill) and Homestead neighborhoods; and Station 10 (Burlingame) on SW Taylors Ferry Road serves the South Burlingame, Collins View, Arnold Creek and Johns Landing neighborhoods. While each station is responsible for specific parts of the city, stations support one another to provide 24-hour emergency operational readiness.

Multnomah County Sheriff's Office (MCSO) provides patrol, incarceration, civil process, and search and rescue services for over 17,000 residents in 291 square miles within Multnomah County. The MCSO employs 28 patrol officers and up to 75 law enforcement personnel. In addition to enforcing state statutes and county ordinances, patrol deputies provide direct assistance to city residents as well as routine and emergency back-up for city police officers and specialized units. One patrol car is normally assigned to the 65 square mile Westside Patrol District which includes the Riverdale and Dunthorpe neighborhoods, an area in the middle of the project area bounded to the north by Portland's southern city boundary, to the south by the northern boundary of Clackamas County, and to the east by the Willamette River. Patrol deputies may be dispatched out of the sheriff's office at NE 122nd Avenue and NE Glisan Street.

Clackamas County Sheriff's Office (CCSO) provides patrol, incarceration, civil process, and search and rescue services for approximately 1,893 square miles within Clackamas County with approximately 90 patrol officers. In addition to enforcing state statutes and county ordinances, patrol deputies provide direct assistance to county residents as well as routine and emergency back-up for city police officers and specialized units. The Wilsonville patrol district covers the Birdshill neighborhood, a small triangular area in the southern end of the project area bounded to the north by

the Clackamas County boundary, to the southwest by Lake Oswego's northern city boundary, and to the east by the Willamette River. Patrol deputies may be dispatched out of the Wilsonville, South Station in Oregon City and Oak Lodge substation. The Lake Oswego Police Department provides police services for a small portion of this area[2].

City of Lake Oswego Police Department (LOPD) provides law enforcement within the jurisdiction of Lake Oswego, back-up to the Clackamas County Sheriff's Office, response to major crimes in Clackamas County, and direct support to the City of Portland. In addition to areas within the city, the Lake Oswego Police Department responds to calls in the Birdshill[3] neighborhood north of the city. Lake Oswego's Police Station is in City Hall at 380 A Avenue, on the corner of Fourth Street and A Avenue, approximately one-third mile west of the project corridor. The LOPD has 43 officers including 29 patrol officers and serves an area of 11.5 square miles with a population of approximately 36,700 (2009). As part of their commitment to addressing local criminal issues quickly and fully, the City of Lake Oswego also has a municipal court which handles local jury trials each Monday and all other cases on Wednesdays.

Lake Oswego Fire Department (LOFD) provides fire, rescue and emergency medical response to approximately 37,000 citizens within the City of Lake Oswego and three adjoining contract districts, including Riverdale/Dunthorpe Fire District within the project corridor. The department has 51 fire fighters serving 15 square miles. Fire Station 214, Lake Oswego's Main Fire Station is at 300 B Avenue in Lake Oswego, about one-third mile west of the project corridor. Fire Station 212 serving the southern tip of the corridor is at 1880 South Shore Boulevard.

Riverdale Dunthorpe Patrol, Inc. is a private security patrol company serving individual families and homeowners in Dunthorpe and surrounding neighborhoods. It has no responsibility to a homeowners association or neighborhood organization. Response to enforcement or emergency situations is exactly like a citizen reporting an incident.

4.2 Safety Statistics by Neighborhood

City of Portland, Multnomah County, City of Lake Oswego and Clackamas County crime statistics for the project area are shown in Table 4.2-1.

Table 4.2-1
Number of Crimes in Portland, Multnomah County, Lake Oswego and Clackamas County
January 2009 through December 2009

	Part I Crimes	Part II Crimes	Part III Crimes	Total
Portland				
South Portland (formerly Corbett-Terwilliger- Lair Hill)	228	125	81	434
Multnomah County				
Dunthorpe-Riverdale	12	7	5	24
Clackamas County				
Birdshill	2	14	0	16

[2] Some parcels in the Birdshill neighborhood are within the Lake Oswego city limits. The unincorporated areas are in Clackamas County.
[3] See note above.

Lake Oswego				
Birdshill	1	0	12	13
Foothills	30	44	162	236

Source: Portland Police Bureau, 2010. Multnomah County Sherriff's Office, 2010. Lake Oswego Police Department, 2010. Clackamas County Sherriff's Office, 2010.

The area patrolled by the Portland Police Bureau falls entirely within the South Portland neighborhood in the Central Precinct. The population of the neighborhood was 6,877 (2000 Census). Part I Crimes[4] account for 53 percent of the reported crimes in the neighborhood.

The area patrolled by the Multnomah County falls entirely within the Dunthorpe/Riverdale Neighborhood in the Westside Patrol District. The population of the neighborhood was 1,025 (2000 Census). Part I Crimes account for 50 percent of the reported crimes in the neighborhood.

The area patrolled by Clackamas County includes the unincorporated portion of the Birdshill Neighborhood (population 215). Part I Crimes account for 13 percent of the reported crimes in the neighborhood.

The area patrolled by the Lake Oswego Police department includes a portion of the Birdshill (population 215), and Foothills (population 413) neighborhoods. Part I Crimes account for 12 percent of the reported crimes in the neighborhoods.

TriMet's service district covers 575 square miles in the urban portions of the tri-county area. TriMet's 52-mile light rail system and 81 bus routes provide about 322,900 rides each weekday. Streetcars operated by Portland Streetcar Inc., run on an 8.0-mile continuous loop (4.0-mile in each direction) from NW 23rd Avenue, through the Pearl District, downtown Portland, Portland State University, to the South Waterfront District at SW Lowell and Bond and back. The streetcar system provides approximately 10,000 rides each day. On average about three incidents are reported per day for the entire transit system. Generally, these are non-weapon and non-violent incidents.

4.3 Transit Safety and Security

The Department of Homeland Security provides guidance on safety and security that apply to TriMet and Portland Streetcar Inc., and both agencies collaborate with state and local agencies to coordinate fire and life safety policies. TriMet and Portland Streetcar Inc. take the following steps to implement safety and security measures for major new capital facilities:

- Prepare a Safety and Security Management Plan. This plan would define the safety and security activities and methods for identifying, evaluating and resolving potential safety issues and security vulnerabilities, and establish responsibility and accountability for safety and security during each project phase— preliminary engineering through startup. A Safety and Security Certification Program, also a required element, would verify that identified safety-critical items

[4] Each agency labels crimes slightly differently; this analysis classifies Part I Crimes as: aggravated assault, arson, burglary, homicide, larceny, rape, robbery, theft from vehicle and vehicle theft. Part II Crimes include: drugs, embezzlement, forgery, fraud, prostitution, sex crime, simple assault, stolen property vandalism and weapon. Part III Crimes include Curfew, DUI, trespass, disorderly conduct, gambling, kidnapping, liquor laws, offense against family, runaway, and other less serious crimes such as traffic or fish and game violations.

have been designed and constructed into the system. These plans are reviewed by the FTA Project Management Oversight Committee and FTA staff.
- Meet regularly with a Fire, Life and Safety Committee comprised of police, fire, and safety personnel along with transit operations staff to ensure safe project operations.
- Review procedures, staffing levels, and safety and security measures with the Fire, Life and Safety Committee during on-going operations. This allows transit agencies and their partners to identify and respond to localized security concerns that may occur over time.

TriMet and Portland Streetcar Inc. consider safety and security management as an integral part of their mission to develop and operate an effective transit system. Safety and security are key factors in the planning and design of transit stations and other facilities. The agencies use a combination of design, public education, and operations measures to lower the potential for crime and to minimize potential conflicts among trains, buses, people, and other vehicles.

While safety and security are terms that are often used interchangeably, they have distinct meaning and each needs to be addressed with a unique approach. Safety can be described as freedom from unintentional danger, whereas security represents freedom from intentional danger.

From a transit system perspective, safety focuses on elements of the system such as vehicle operations, station area function, pedestrian movements, crossings and emergency response. Safety measures aim to reduce potential conflicts related to interactions among transit, autos, bicyclists and people. Transit agencies prepare an annual system-wide safety plan that reinforces safety as a core value and defines safety requirements, lines of authority, accountability, and documentation.

Transit system security starts with facility design and is achieved by establishing appropriate policies and procedures, optimizing the use of human resources, technology, and equipment, and by establishing strong partnerships among the community, transit operators, and law enforcement. Transit agencies prepare an annual security plan that establishes systemwide security goals aimed at enhancing facility design, increasing employee and public awareness, reducing unlawful behavior and facilitating emergency preparedness.

Security improvements are affected by system design and maintenance, technology, community outreach, and enforcement. While enforcement is critical, a design that deters misconduct and promotes safety is of utmost importance. In planning the proposed enhanced bus and streetcar alternatives, the project team proposes facility designs to be responsive to the neighborhood context and to maximize community benefits.

To allow crime prevention principles to be fully incorporated into a project, safety and security considerations are evaluated when making choices about station siting, layout, platform design, and park-and-ride facilities, beginning with the project's earliest planning stages. TriMet and Portland Streetcar Inc. consider best practices related to security when designing transit facilities and especially stations.[5] The best practices are derived from Crime Prevention Through Environmental Design[6] (CPTED) concepts, which provide guidelines to deter unlawful activity in a number of areas, described as follows:

[5] TriMet Report to the Legislature, Light Rail Safety & Security, February 7, 2008.
[6] International CPTED Association.

- **Design and Maintenance.** Station security starts with good design and upkeep. Generally, well-kept and well-lit neighborhoods, office and industrial parks, good building stock, and few vacant spaces correlate with fewer security issues. Good maintenance and timely response to repairs also demonstrates capable guardianship of transit property, deterring adverse behavior.
- **Natural Surveillance**. The activity levels on surrounding streets or neighborhoods, the presence of passersby, transit personnel, and other riders waiting at a station or parking area all contribute to the number of "eyes on the street," helping to reduce the potential for security concerns. Strategies include good platform visibility, street-level windows, adequate lighting, and pedestrian friendly designs.
- **Territorial Reinforcement.** A sense of ownership among users translates into a deterrent to intruders. Features that define property lines and distinguish public from private spaces through the use of plantings, landscaping design, pavement materials, and fencing are common tools to create ownership. Features that suggest community ownership or pride in place such as neighborhood specific art or interpretive elements, message centers or furnishings, can also create this feeling.
- **Natural Access Control**. Guiding people to safe access routes and denying access to potential targets creates a sense of risk in potential offenders. This is achieved by clearly delineating public routes through landscaping and design, and preventing access to private property through physical barriers.
- **Target Hardening**. Managing entry and access means including features that make it more difficult to vandalize improvements, things like graffiti-resistant surfaces. It could also include emergency call-boxes and/or closed circuit television (CCTV).

According to these CPTED principles, station areas should be easily accessible to law enforcement personnel and should maximize opportunities for natural surveillance. The design of the station and its surroundings should promote personal safety and security by providing good sight-lines and avoiding conditions such as tall landscaping or other features that could obscure the presence of individuals on transit property. Well-lit, bright environments with high degrees of visibility from nearby streets or public areas also help deter vandalism and increase the perception of security. Though the lights from stations should be shielded from adjacent neighborhoods, the safety of pedestrians walking to those neighborhoods must be considered in design. Bright designated station areas and walkways with appropriate landscaping, free of entrapment areas, deter unlawful behavior. Stations should be kept clean, and signs of vandalism should be removed immediately to send the message that the community is in control.

Based on TriMet and Portland Streetcar Inc. experience with their existing systems and on national information, crime levels along rail transit project corridors are typically closely related to the existing conditions that prevail in the surrounding community[7]. A study of' the Los Angeles Green Line light rail revealed that inner city stations showed a decrease in crime that generally followed a decrease throughout Los Angeles County and crime in the higher income western suburbs did not increase after the Green Line was built[8]. In 2006, the Denver Regional Transportation District

[7] Numerous reports have been written and studies conducted across the U.S. and Europe regarding general crime patterns and criminal behavior. A study of transit security by the U.S. Department of Transportation noted that transit stations with high crime rates are generally located in neighborhoods with high crime rates (USDOT: Transit Security: A Description of Problems and Countermeasures Mauri, Ronald et al October 1984, reprint May 1985).

[8] Liggett, R, Loukaitou-Sideris, A, and Isek, H, Journeys to Crime: Assessing the Effects of a Light Rail Line on Crime in the Neighborhoods, 2002.

(RTD), which administers the FasTracks light rail system, conducted a review of one Denver light rail station that revealed that crime rates at the station directly correlated to the amount of crime occurring in the surrounding neighborhood[9]. In addition, in the ten years following station opening, crime rates in the neighborhood decreased.

[9] Denver Regional Transportation District, Technical Memorandum: Neighborhood vs. Station Crime Myths and Facts November 16, 2006.

5. ENVIRONMENTAL CONSEQUENCES

TriMet and Portland Streetcar Inc. develop and operate transit projects to provide a transportation benefit to the community, to support long-range land use plans and economic development goals, and to minimize other environmental impacts.

Public safety and security planning are major considerations in the development of transit projects such as the Lake Oswego to Portland Transit Project. Public involvement efforts for transit projects have also highlighted a number of questions and issues from the community about how transit projects are implemented, including:

Safety

- The need for lighting at transit stations and park-and-ride lots
- Interaction at vehicular, pedestrian and bike crossings along the transit alignment
- Interaction between children or pets and transit vehicles and the transit right of way

Security

- Passenger security and/or nuisance behavior aboard transit vehicles
- Incidence of misconduct along the transit corridor, including car or bike prowls, theft or graffiti near transit station locations
- Streetcar station placement and access, especially in less active areas or near schools
- The public's perception of security near parks, trails, and the Willamette River within vicinity of proposed stations
- Neighborhood visibility and/or access from the transit line

5.1 Long-Term Impacts

A. No-Build Alternative

With future growth in households and employment at the north and south ends of the corridor, demand for emergency services and law enforcement services would increase over time. As the population grows, there would be a corresponding demand for public safety and security services. Increased traffic would be a byproduct of growth and would be likely to increase congestion on roadways, which has the potential to slow emergency response times, as discussed in more detail in Chapter 4, Transportation, and Section 3.3 of this DEIS. Because no new streetcar stations or bus facilities would be built along the corridor with the No-Build Alternative, local opportunities to improve safety conditions through transit-related improvements to streets, intersections, sidewalks, and lighting would not occur. Improved security through overall higher activity levels would also not occur.

B. Enhanced Bus Alternative

Household and employment growth is forecast to be the same under all of the alternatives. As with the No-Build Alternative, regionally and locally there will be increased demand for public safety and security services to meet the demands of growth. Increased traffic would also occur at levels similar to No-Build, which would be likely to increase congestion on roadways and slow emergency response times, as discussed in more detail in Chapter 4, Transportation, and Section 3.3.

Safety. Considering operational safety, the Enhanced Bus transit stops would all be street-oriented stations and transit centers. The lighting and amenities at the Lake Oswego Park-and-ride located near Albertsons east of State Street in downtown Lake Oswego, taken with the higher activity levels that would accompany Enhanced Bus operation, would be an improvement over existing transit stops. Remaining bus stops would not be altered.

Buses accessing the park-and-ride location could increase the potential for transit – pedestrian and transit – auto conflicts.

Security. Considering system security, the facilities proposed in the Enhanced Bus Alternative are at locations with existing TriMet bus stops where TriMet's Transit Police Division already provides security, as they do throughout the transit system. Maintaining security and providing for emergency responses at all of the transit stops would be handled through TriMet's Transit Police Division and established fire, life and safety programs, which feature cooperative and ongoing planning between TriMet and local jurisdictions. This allows TriMet and its local partners to identify and address security concerns and response needs at all phases of systems development and operation.

The Lake Oswego Park-and-ride would be in an area with a relatively low incidence of crime. State Street (Highway 43) is an active roadway. The station and park-and-ride would also benefit from the 6:00 AM to midnight activity at the grocery store because retail patrons may observe a more irregular schedule than park-and-ride patrons, providing passive surveillance of the area at times when the parking area may otherwise be unoccupied. The principles of passive surveillance suggest illegal activities are less likely to be carried out when they might be observed by others. As with other facilities in the transit system, the stations and park-and-ride would be designed to maximize visibility, provide for safe and convenient access for patrons, and reduce potential property loss or damage to parked vehicles. Other potential measures could include access controls, emergency call boxes, the use of CCTV, and security patrols.

C. Streetcar Alternative

As with the No-Build Alternative, there will be increased regional and local demand for public safety and security services to meet the demands of growth. Increased traffic would also occur at levels similar to No-Build, which is likely to increase congestion on roadways and slow emergency response times, as discussed in more detail in Chapter 4, Transportation, and Section 3.3.

Safety. Streetcar safety is related to function and operation. The stations and crossings for the streetcar would incorporate a combination of design, education and operating measures to minimize potential safety concerns to anyone who may access the streetcar or cross the corridor. Outreach and education programs would be targeted directly to community members and nearby schools to help them better understand streetcar operation and safety issues.

The streetcar alternative and design options include segments running in the street as well as within separated right of way. These variables and the transitions between them present safety challenges that are addressed through audible warnings, signing, striping, signalization, enforcement and education. Signals would be the primary method for accommodating transitions between in-street and separated segments, offering a protected signal phase for the streetcar to enter and leave the roadway. Within the roadway, the streetcar vehicles would operate similar to buses.

Station access would be oriented to streets and sidewalks and all crossings would be clearly designated. The station and the streetcar alignment would feature physical barriers to discourage people from crossing directly across the tracks from the station or onto private properties.

Thirty-five public and private roadway, railroad and pedestrian track crossings have been identified in the proposed alignment. Proposed crossing treatments include closure or relocation, grade separation, stop signs, gates, traffic signals and pedestrian Z-crossings. Treatment selection criteria include sightlines, traffic volumes and speeds, transit vehicle speed, proximity and suitability of alternative routes, and convenience for pedestrians and transit patrons.

Security. Streetcar security is focused at stations. Except for the stations at SW Nebraska Street and SW Nevada Street, all the proposed stations in Johns Landing for all design options would be street-oriented in areas that currently have mixed-use environments, with residential and commercial uses nearby and high levels of activity.

The proposed stations adjacent to Willamette Park at SW Nebraska Street and SW Nevada Street are within sight of SW Macadam Avenue and would be located next to a large, heavily programmed regional park and nearby office buildings that provide natural surveillance. Collaboration with City of Portland Parks and Recreation on streetcar station design elements, including the lighting and amenities at the stations, with the higher activity levels that accompany streetcar operation, would create an improvement over existing conditions.

The proposed Sellwood Bridge station would be located on currently active transit routes 35 and 36 adjacent to Highway 43 at the west end of the Sellwood Bridge. The lighting and amenities at the station, with the higher activity levels that accompany streetcar operation, would be an improvement over existing conditions. With the expected replacement of the Sellwood Bridge, possibly open in 2016, bus transfers will occur at this station, further increasing station activity.

The proposed Riverwood and Briarwood stations are surrounded by single-family neighborhoods that are not anticipated to change character or redevelop as a result of transit improvements. These station sites are close to neighborhood roadways, which provide opportunities for natural surveillance from surrounding uses. The Riverwood Station would be more visible to travelers on Riverwood Road, compared to the Briarwood Station which is above Briarwood Road. The Riverwood and Briarwood stations are located in a neighborhood with very low incidence of crime. Design and operating measures are available for either station to provide patrons with well-lit and visible station areas and accessways. Note that lighting will be limited to the station area and access routes from the nearest roadway, and surrounding homes will be shielded from glare.

The B Avenue Station and park-and-ride would be located in an area that currently includes industrial uses, although commercial areas are located nearby and the area is anticipated to redevelop with a mix of land uses. While State Street (Highway 43) and Foothills Road are active roadways, activity levels in the area surrounding the B Avenue Station and park-and-ride are currently relatively low outside of daytime hours. As a result, design and operating measures would be considered to provide visible, well-lit station areas and accessways. With redevelopment, activity levels are expected to increase, providing more “eyes on the station”.

The Lake Oswego Terminus Station and park-and-ride would be located adjacent to a commercial shopping center with a high level of activity. As with other facilities in the transit system, the station and park-and-ride would be designed to maximize visibility, provide for safe and convenient access

for patrons, and reduce potential property loss or damage to parked vehicles. Other potential measures could include access controls, emergency call boxes, the use of CCTV, and security patrols.

Streetcar Design Options (Safety).

Streetcar operations and safety issues would be addressed, somewhat differently based on design option.

Johns Landing Design Options.

The Wi1lamette Shore Line Design Option would operate on the existing Willamette Shore Line right of way through Johns Landing. This alignment would operate in an exclusive transit alignment through commercial and residential areas. The residential areas include condominiums that have lawn and other landscaping surrounding the existing rail right of way. The streetcar would operate at a relatively low speed through these residential areas that would allow the driver sufficient time to react to any right of way encroachments. Pedestrian crossing treatments would include signage and Z-crossings.

Both the Macadam In-Street and the Macadam Additional Lane design options would veer southwest off of the Willamette Shore Line and operate in mixed traffic on SW Landing Drive, SW Boundary Street, SW Macadam Avenue and SW Carolina Street. For in-street operations, special traffic signals, improved pedestrian crossings and signage would be used to facilitate safe movements among auto, bicycles, pedestrians and transit. Stations at SW Boundary Street and SW Carolina Street would increase pedestrian activity on adjacent sidewalks on neighborhood streets and on SW Macadam Avenue.

Dunthorpe/Riverwood Design Options.

The Willamette Shore Line design option would operate on the existing Willamette Shore Line right of way through this segment. Approximately five private crossings would be included with this design option, most typically a driveway or access road crossing where the right of way is between SW Riverwood Road and garages and homes on the east side of the Willamette Shore Line. Appropriate private crossing treatments would be developed in conjunction with individual property owners.

This Riverwood design option would operate in mixed traffic on SW Riverwood Road. The streetcar would not exceed the existing speed limit of 25 mph. This design option would close the access for Riverwood Road to Highway 43 which would reduce the amount of traffic on Riverwood Road in this vicinity. The Riverwood Road streetscape would include sidewalks and bike lanes, increasing potential for “eyes on the street”.

Lake Oswego Design Options.

Both the Foothills and UPRR design options would operate in a similar manner through this segment and have similar safety and security treatments.

In summary, the Streetcar Alternative is not anticipated to create unique concerns.

5.2 Indirect and Cumulative Impacts

Secondary impacts are reasonably foreseeable effects that occur as a result of an action or not doing an action, but which are removed from the direct impacts of a project in place or time. Cumulative impacts are the sum of effects from past, current and other expected improvements or public actions. Safety and security issues related to construction are addressed in Section 3.16 Construction Approach and Effects.

Streetcar projects typically encourage nearby development. Current streetcar alignments have contributed to public and private redevelopment investments occurring, for instance, in the developments in South Waterfront, including projects underway (see Section 3.1 Land Use). According to existing plans and policies, development or redevelopment in this corridor would be focused in Johns Landing and Lake Oswego and is not anticipated in the Dunthorpe/Riverdale or Birdshill areas.

In station areas that do experience redevelopment, future uses would typically be denser and involve higher levels of activity, greater design attention to personal security and renewed levels of maintenance. All of these elements contribute to more “eyes on the street”, improvements in defensible space and a better sense of personal security; according to above CPTED principles for safety and security.

6. POTENTIAL SAFETY AND SECURITY MITIGATION MEASURES

There are different approaches to provide transit safety and security mitigation. The current Portland Streetcar Inc. model uses the Portland Police Bureau in Portland's downtown. TriMet uses a dedicated transit police force and support personnel. A hybrid approach that fits the context of each segment of this corridor is likely to mix elements from Portland Streetcar and TriMet approaches to address safety and security needs throughout the transit system and in the Lake Oswego to Portland corridor. The approaches will respond to public issues and questions regarding safety and security related to specific conditions affecting the Lake Oswego to Portland Transit Project.

The public involvement programs for similar projects in the region have generated constructive feedback on:

- Use of CPTED principles throughout the design process
- Incorporating design principles to enhance safety and security at station areas
- Including a multidisciplinary review of safety and security design and operations practices prior to final design and construction
- Evaluating station locations, overall alignment issues and operations as they relate to safety and security
- Location of ticket machines away from platforms, so anyone on the platform will already have purchased a ticket
- Clear delineation of platform area and communication that riders must have a fare in the platform areas, if station access is not restricted
- Consideration of emergency call boxes and CCTV cameras at stations
- Way-finding at platforms to help pedestrians find bus connections and other destinations
- Work with freight railroads to adopt industry standards for safe operations in shared corridors
- Safety and security outreach and education upon construction and operation of the system

6.1 Safety Measures

TriMet and Portland Streetcar Inc. are committed to making continued improvements to help maintain a safe transit system. Potential measures to address safety issues along the Lake Oswego to Portland Transit Project are shaped by comments and suggestions from the project team, local jurisdictions and the public and could include the following:

- To address streetcar safety for school children, new users, especially children, would be educated on how to be safe around its system, particularly before opening a new streetcar extension. By collaborating with teachers and parents, extensive safety outreach programs would reach schools located close to the new transit service.
- To address safe roadway crossings, the public would be alerted to the fact that streetcars pass through crossings with a brief signal cycle. The system would operate with computer controls and operator procedures that minimize the potential for conflicts.
- To address safe pedestrian crossings, the pedestrian and bicycle network along the proposed transit alignment would be evaluated and Z-crossings or other crossing treatments added where needed. After station platforms have been sited, the pedestrian network may be re-evaluated and the pedestrian crossings refined. Z-crossings control movements of pedestrians by turning pedestrians toward the direction of approaching trains before they cross each track. Z-crossings may be used at locations where pedestrians are likely to cross the tracks, such as at isolated,

midblock or pedestrian-only crossings. Other crossing treatments are being considered and may be evaluated to address other crossing needs in the corridor.
- For streetcar operations within Highway 43 (SW Macadam Avenue), safety and security measures would include traffic signals, signage, station design, pedestrian crossings and other features that contribute to a safe and pedestrian-oriented streetscape.

6.2 Security Measures

Security measures would be addressed by applying established policies, procedures and responsibilities appropriate to the Lake Oswego to Portland corridor. The following describes the Portland Streetcar Inc. and TriMet approaches to system security.

Portland Streetcar Inc. Safety and Security Plans are reviewed at least annually. The transit system organizational structure includes safety committees to evaluate the effectiveness of the system safety and security programs and activities. Throughout the design process, the project team conducts safety and hazard analysis of the alignment, including identification of traffic conflicts and development of mitigation strategies, analysis of pedestrian and bicycle safety, and design of a safe interface between streetcars and other transit. Portland Streetcar certifies that new extensions are operationally ready before entering service. Managers of transit operations and safety coordinate with local governments, Department of Homeland Security and other agencies to ensure emergency responders are familiar with transit equipment and property and that personnel are trained to perform satisfactorily in emergency situations. Portland Streetcar Inc. relies on the City of Portland Police Bureau to respond to safety and security issues and questions.

TriMet's Transit Police Division (**TPD**) is a special unit within the Portland Police Bureau with cooperating agreements with the police agencies in the region including Multnomah and Clackamas County Sheriff's Offices. To provide more focused deployment and presence, four precincts have been established with offices in Hillsboro, Gresham, Clackamas Town Center and downtown Portland. The TPD currently (2010) consists of 58 sworn officers. Transit security efforts are supplemented by contract security personnel, 30 fare inspectors and 46 field supervisors as well as operators, customer service staff and maintenance workers. TriMet's Director of Safety and Security and the TPD commander meet regularly with various community members, law enforcement agencies and security partners to evaluate issues and collaborate on solutions. TriMet also has an established transit rider security program that combines enforcement with public safety resources from community organizations.

Based on transit system experience, specific security measures include the following:

- To address vandalism and graffiti, quick clean-up response times will be maintained. Murals, etched glass and other techniques may be used at station platforms to deter vandalism.
- To address passenger safety on streetcars at night, riders would be encouraged to implement personal safety strategies such as choosing to sit near the driver in the front of the train.
- TriMet employs more than 2,600 staff members and Portland Streetcar Inc. employs 40 staff who receive system safety and security training. Most of the employees work in the community, serving as "eyes and ears" and visible deterrents to crime.

If the Enhanced Bus Alternative or No-Build Alternative is chosen as the locally preferred alternative, TriMet would continue with its existing safety and security policies and practices while working with the local jurisdictions and communities. If the Streetcar Alternative is selected as the

preferred alternative, TriMet and Portland Streetcar Inc. would continue to develop and refine specific safety and security measures in consultation with the local communities and jurisdictions through preliminary engineering, the final EIS and final design.

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