Lake Oswego to Portland Transit Project

Air Quality Technical Report

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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 3.11 on Air Quality analysis in the Lake Oswego to Portland Transit Project (LOPT) Draft Environmental Impact Statement (DEIS) published by the Federal Transit Administration in December 2010. This chapter of the report includes a summary of the project background, the Purpose and Need, the alternatives/options considered and the description of the alternatives analyzed.

1.1 Project Background

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

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

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

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

1.2 Purpose and Need

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

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

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

1.3 Alternatives/Options Considered

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

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

1.3.1 Alternatives Analysis

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

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

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

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

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

- **Streetcar Alternative.** The Streetcar Alternative would extend the existing Portland Streetcar line, which currently operates between NW 23rd Avenue and SW Lowell Street, to downtown Lake Oswego. Study of this alternative includes an evaluation of whether the Willamette Shore Line right 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[4]			
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	90	-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. For this measure, the corridor is defined as the alignment between SW Bancroft and the Lake Oswego terminus station. From RiverPlace station to the southern terminus streetcar place miles would be 119,600 or 122,360 place miles.

[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.

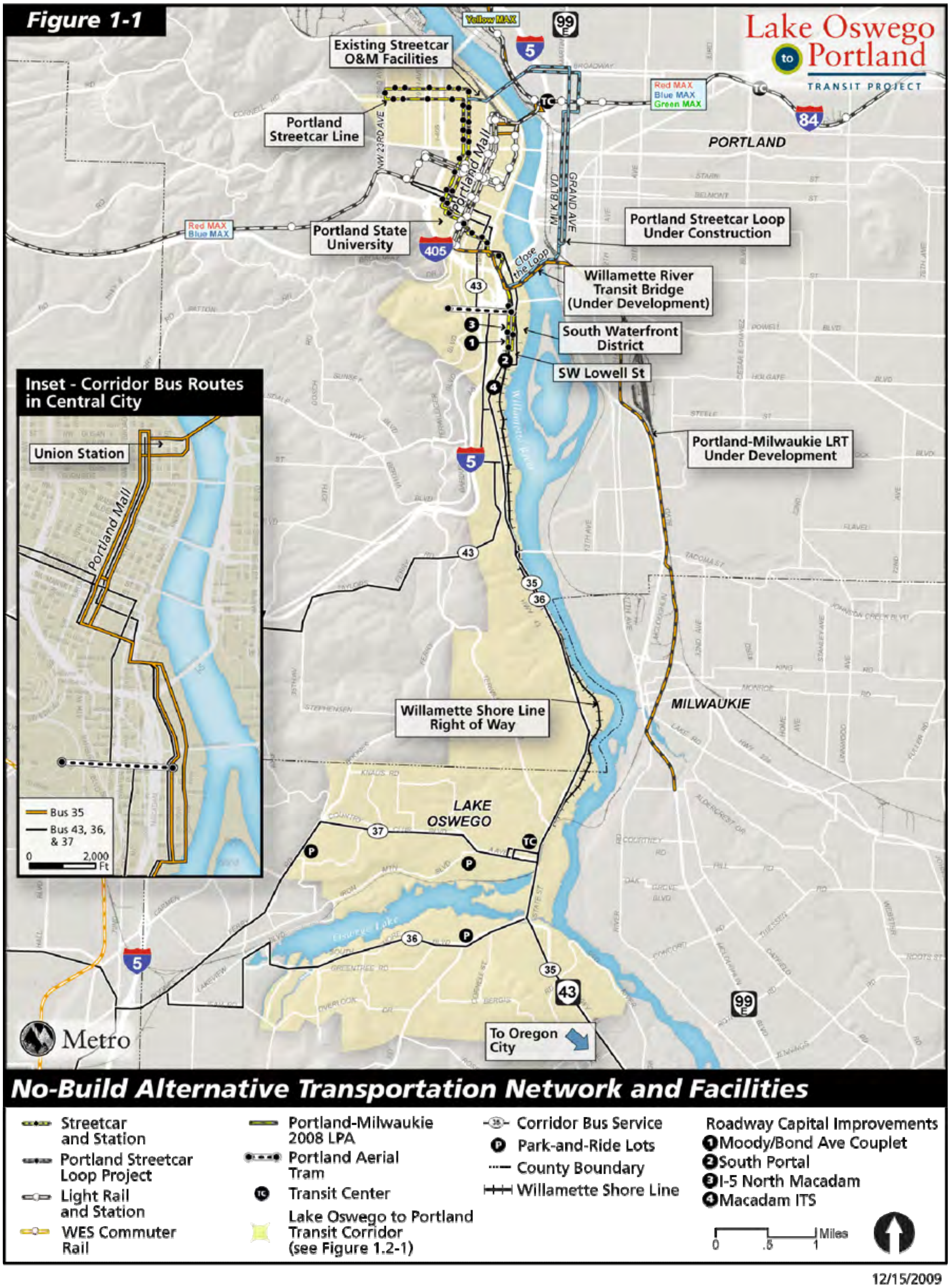

FIGURE 1-1 NO-BUILD ALTERNATIVE TRANSPORTATION NETWORK AND FACILITIES

- **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 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.

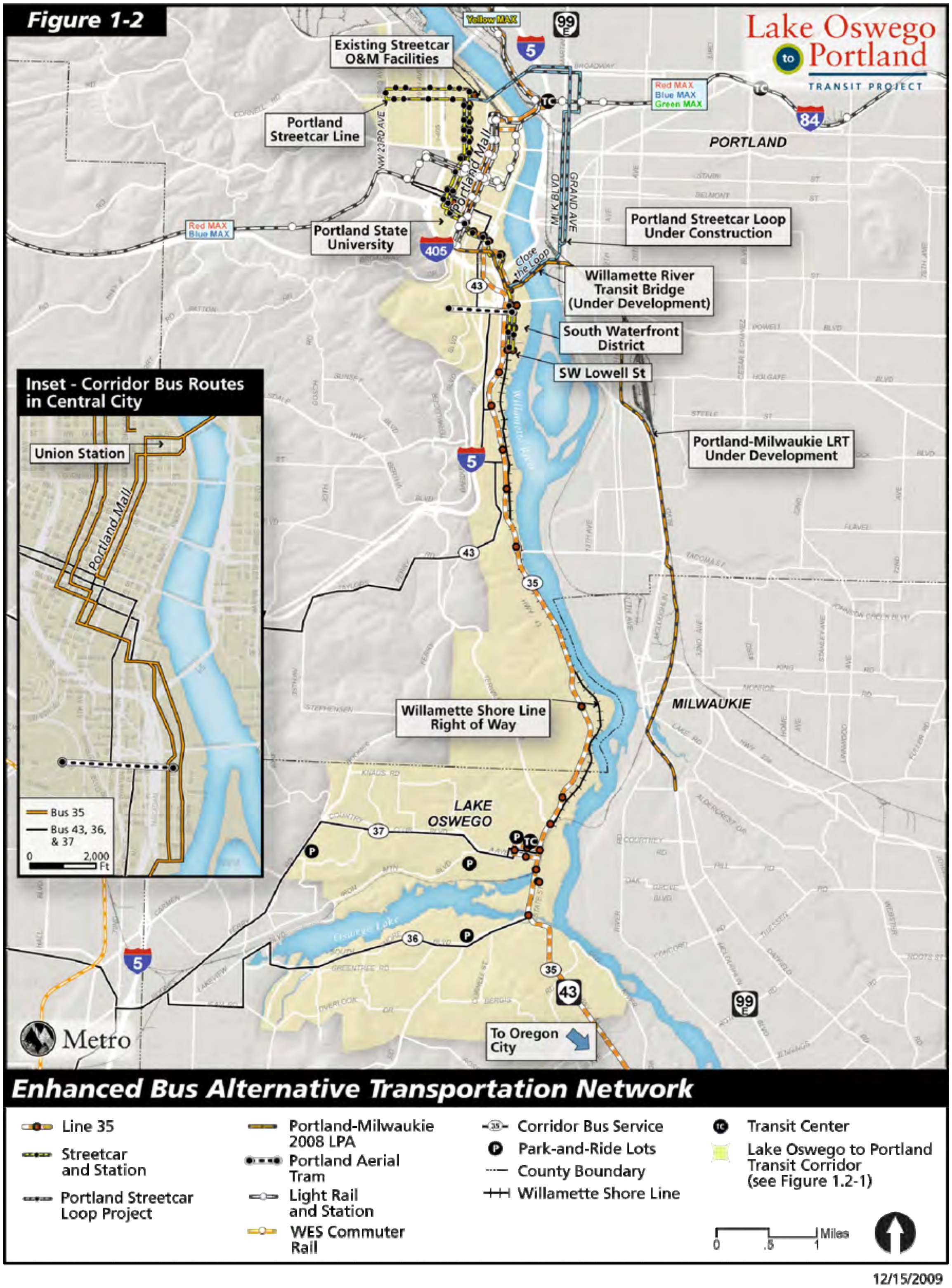

FIGURE 1-2 ENHANCED BUS ALTERNATIVE TRANSPORTATION NETWORK

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.

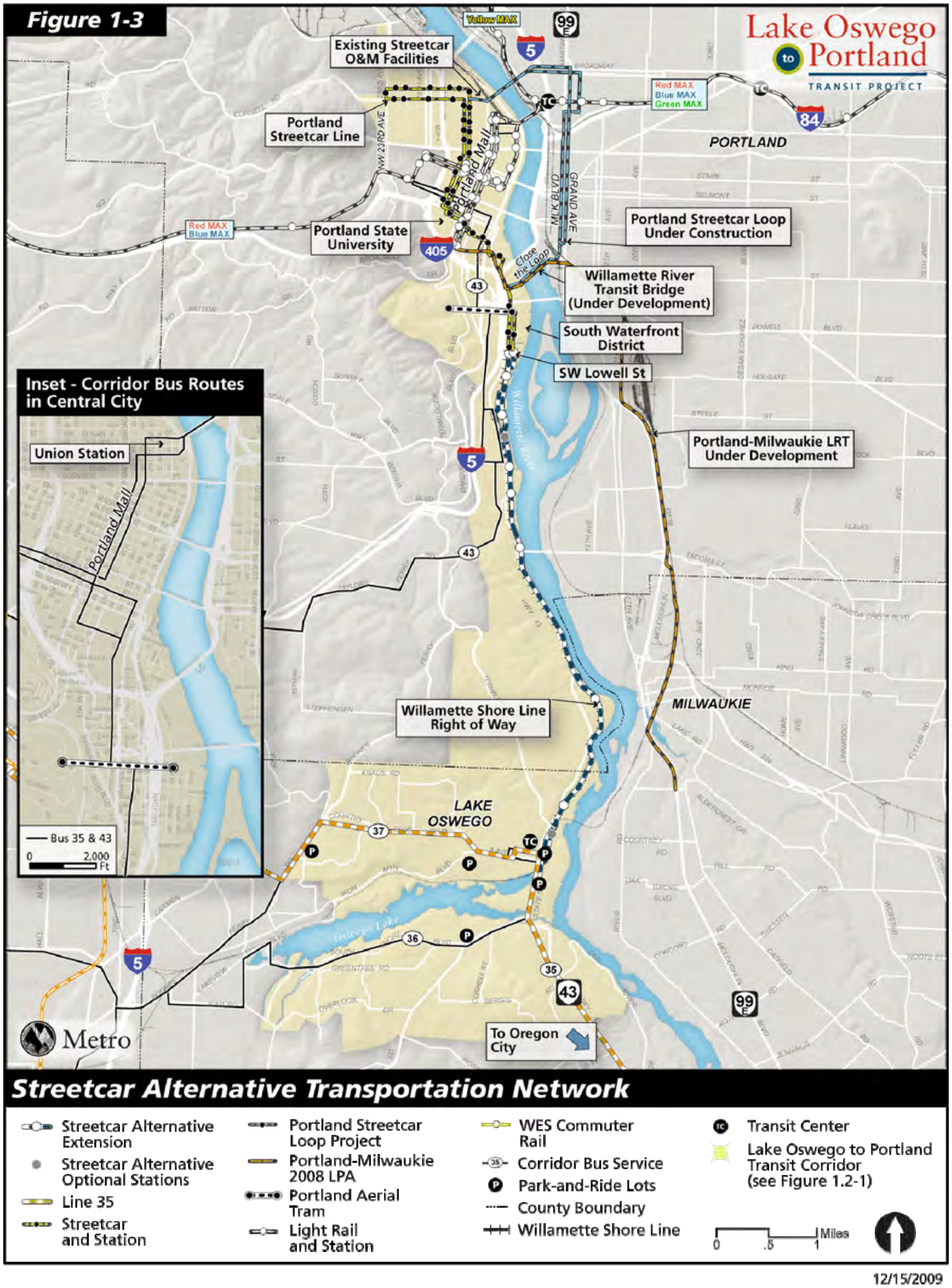

FIGURE 1-3 STREETCAR ALTERNATIVE TRANSPORTATION NETWORK

- **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.

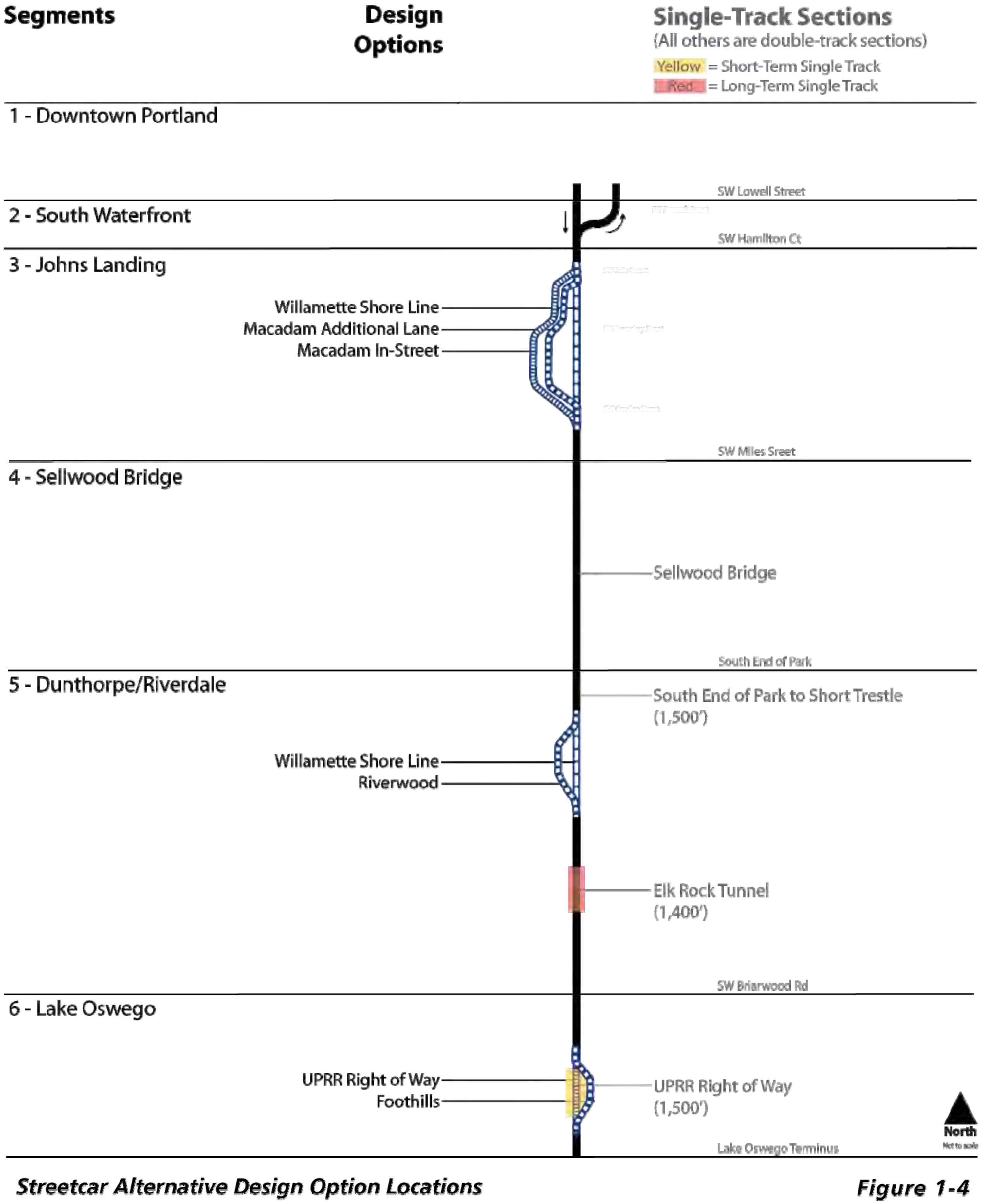

FIGURE 1-4 STREETCAR ALTERNATIVE DESIGN OPTION LOCATIONS

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

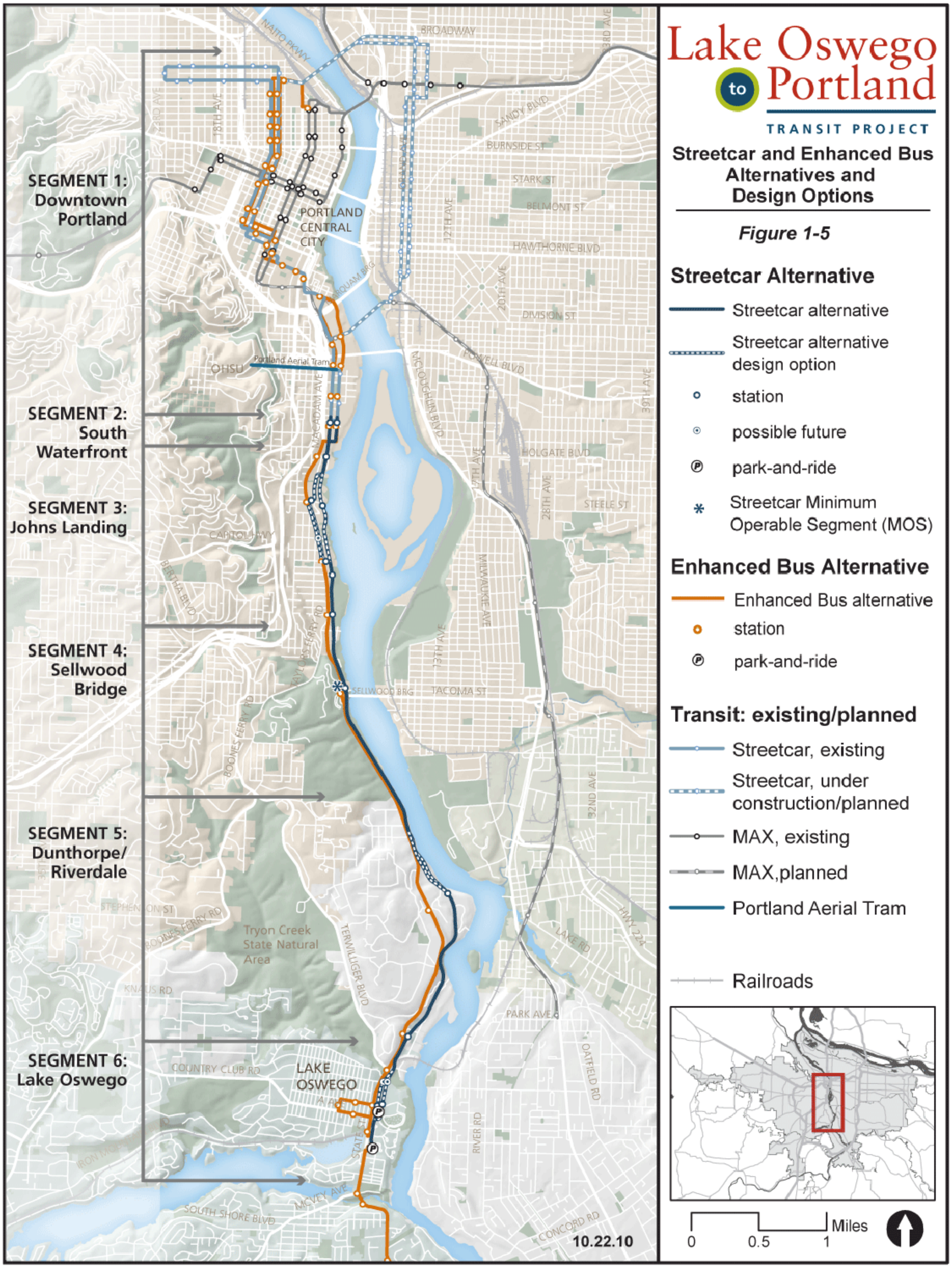

FIGURE 1-5 STREETCAR AND ENHANCED BUS ALTERNATIVES AND DESIGN OPTIONS

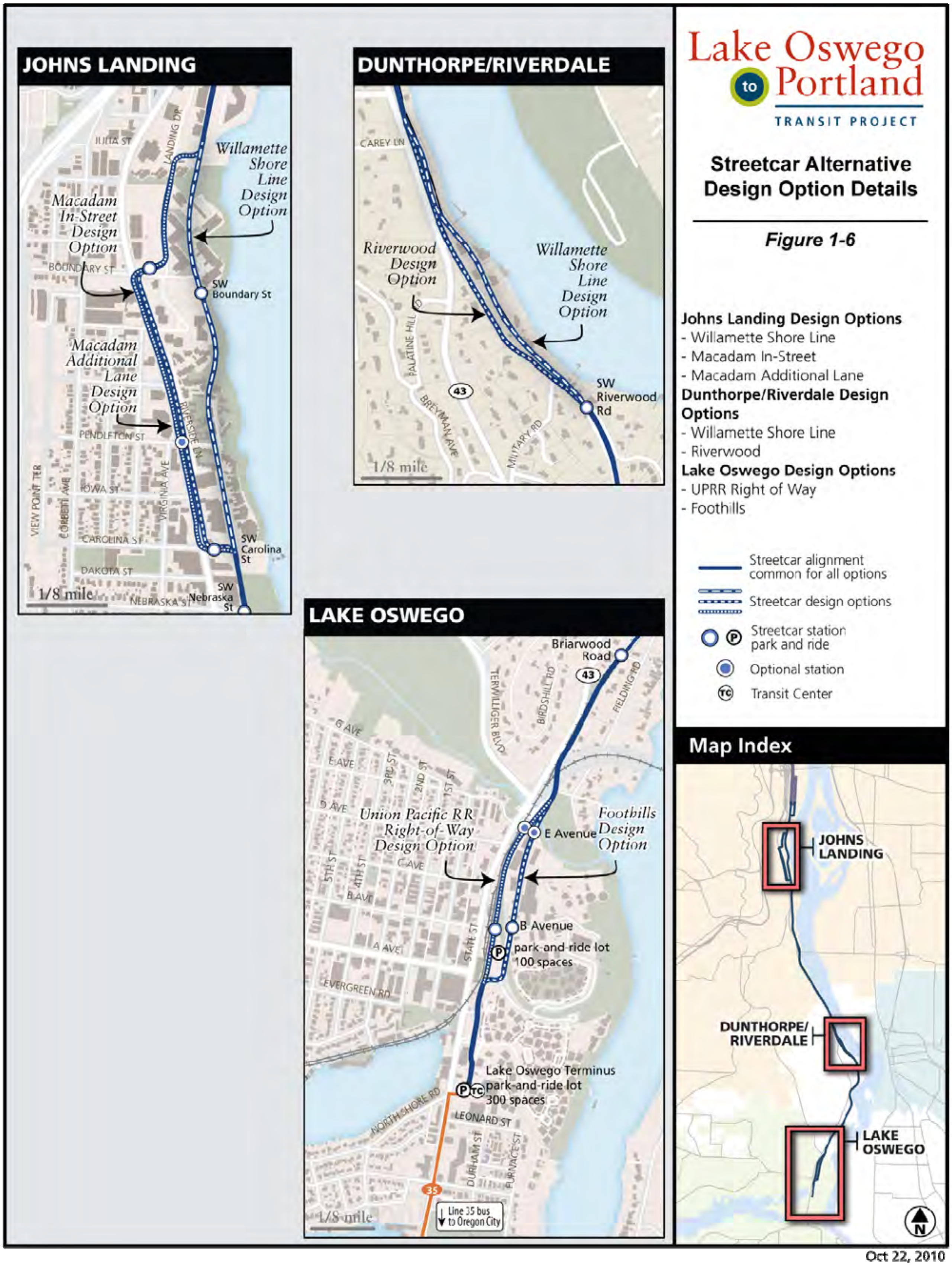

FIGURE 1-6 STREETCAR ALTERNATIVE DESIGN OPTION DETAILS

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 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 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

Proposed surface transportation projects seeking federal funding must meet the Clean Air Act standards and its related rules on a regional level and on a localized (project) level. To meet conformity at a regional level, a project must be included in the Metro 2035 Financially Constrained RTP and demonstrated to meet air quality standards. This air quality conformity is a condition to securing federal funds for surface transportation projects. The RTP and MTIP include a set of regional projects, all of which are analyzed for regional air quality conformity to ensure that the entire package of projects help the region meet federal and state air quality guidelines.

The LOPT Project is within a large metropolitan area and its operation has the potential to impact air quality on both a regional and local scale. Air quality impacts for streetcar projects are typically closely related to traffic impacts. The electrically powered streetcar itself emits no appreciable air pollution. However, there are two potential sources of air pollution associated with the LOPT Project: construction and vehicular traffic (auto, bus and truck operations whose patterns may be different than those in the No-Build alternative). Construction impacts are associated with the build alternatives only. They are temporary, and are expected to be minimal. Most construction emissions (and impacts) are usually generated during earth moving activities. Regional air quality impacts associated with operational activities (vehicular traffic) could occur as a result of the transfer of trips between transportation modes, or the selection of alternatives that either increase or decrease general levels of traffic and congestion and associated air pollution levels. Local air quality impacts associated with operational activities may occur due to modifications in traffic patterns, which can potentially create localized areas of elevated pollution, or “hot spots.” Local impacts could also occur as a result of increased automobile traffic at park-and-ride facilities.

The purpose of the air quality analysis is to compare the existing air quality conditions to the projected conditions of air quality that would be expected with the LOPT alternatives. The analysis of regional impacts will be based primarily on average weekday regional vehicle miles traveled (VMT) and average weekday regional speeds as a surrogate for emissions. The analysis of local impacts will rely on the results of the traffic analysis to identify intersections with potentially high carbon monoxide (CO) concentrations.

2.2 Related Laws and Regulations

The air quality analysis and technical report was prepared following Federal, state, and local regulations and guidelines. The regulations are summarized below:

2.2.1 Federal

2.2.1.1 Clean Air Act and Clean Air Act Amendments

The Clean Air Act (CAA) and the Clean Air Act Amendments (CAAA) form the basis for a broad range of regulations that control allowable emissions and concentrations of air pollutants in the environment.

2.2.1.2 National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) requires that Federal agencies consider environmental impacts before taking actions that could significantly affect the human environment. As interpreted by the Council of Environmental Quality (CEQ), NEPA requires that “reasonably foreseeable" direct, indirect, and cumulative effects of a proposed action be considered in the decision making process. The terms "effects" includes "aesthetic, historic, cultural, economic, social, or health" effects.

2.2.1.3 National Ambient Air Quality Standards

National Ambient Air Quality Standards *(*NAAQS) were established by the Federal government to protect the public from air pollution. These standards are identified in U.S. Environmental Protection Agency (EPA) and Oregon Department of Environmental Quality (ODEQ) rules (EPA Office of Air Quality Planning (http://www.epa.gov/air/criteria.html) and Oregon Administrative Rule (OAR) 340-202-0050 through -0130). The NAAQS specify maximum concentrations of CO, particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), ozone (O_3), sulfur oxides (SO_x), lead (Pb), and nitrogen dioxide (NO_2). Federal and state standards for the five pollutants relevant to vehicular emissions (CO, PM_{10}, $PM_{2.5}$, O_3, and NO_2) are listed below in Table 2-1.

Table 2-1 Ambient Air Quality Standards (AAQS)

Pollutant	Averaging Time	Federal Standard (NAAQS)	State Standard
Carbon Monoxide (CO)	1-hour	35 ppm	35 ppm
	8-hour	9 ppm	9 ppm
Ozone (O_3)	8-hour	0.075 ppm	0.08 ppm
Particulate Matter < 2.5 µm ($PM_{2.5}$)	24-hour	35 µg/m3	--
	Annual	15 µg/m3	--
Particulate Matter < 10 µm (PM_{10})	24-hour	150 µg/m3	150 µg/m3
	Annual	N/A	50 µg/m3
Nitrogen Dioxide (NO_2)	1-hour	0.100ppm	--
	Annual	0.053 ppm	0.053 ppm

Source: EPA Office of Air Quality Planning (http://www.epa.gov/air/criteria.html) and Oregon Administrative Rule (OAR) 340-202-0050 through -0130. [Note: EPA is in the process of revising the ozone standard to between 0.06 and 0.07 ppm. Further, EPA is revising the 1-hour nitrogen dioxide standard at 0.100 ppm, effective April 12, 2010. Oregon is in the process of updating rules to incorporate new lead and $PM_{2.5}$ standards.]

Notes:

µm = microns (for particulate diameter)

µg/m^3 = micrograms of pollutant per cubic meter of air

ppm = parts per million

Geographic areas where concentrations of a pollutant exceed the ambient air quality standards are classified as nonattainment. Previously designated nonattainment areas, now in compliance with air quality standards, are classified as maintenance areas. Areas that meet, and have always met, the standards are classified as attainment. Federal regulations require states to prepare State Implementation Plans (SIPs) that identify emission reduction strategies for nonattainment and maintenance areas. The LOPT Project area lies within the Portland Air Quality Maintenance Area (AQMA) which extends from Portland, south to Wilsonville, east to Gresham, and west past Hillsboro (see Figure 2-1). The Portland area is maintenance for CO and O_3; air quality emissions in the Portland region are currently being managed under the provisions of the SIP, which has adopted the *Portland Area Carbon Monoxide Maintenance Plan* (ODEQ, 2004) and the *Portland-Vancouver*

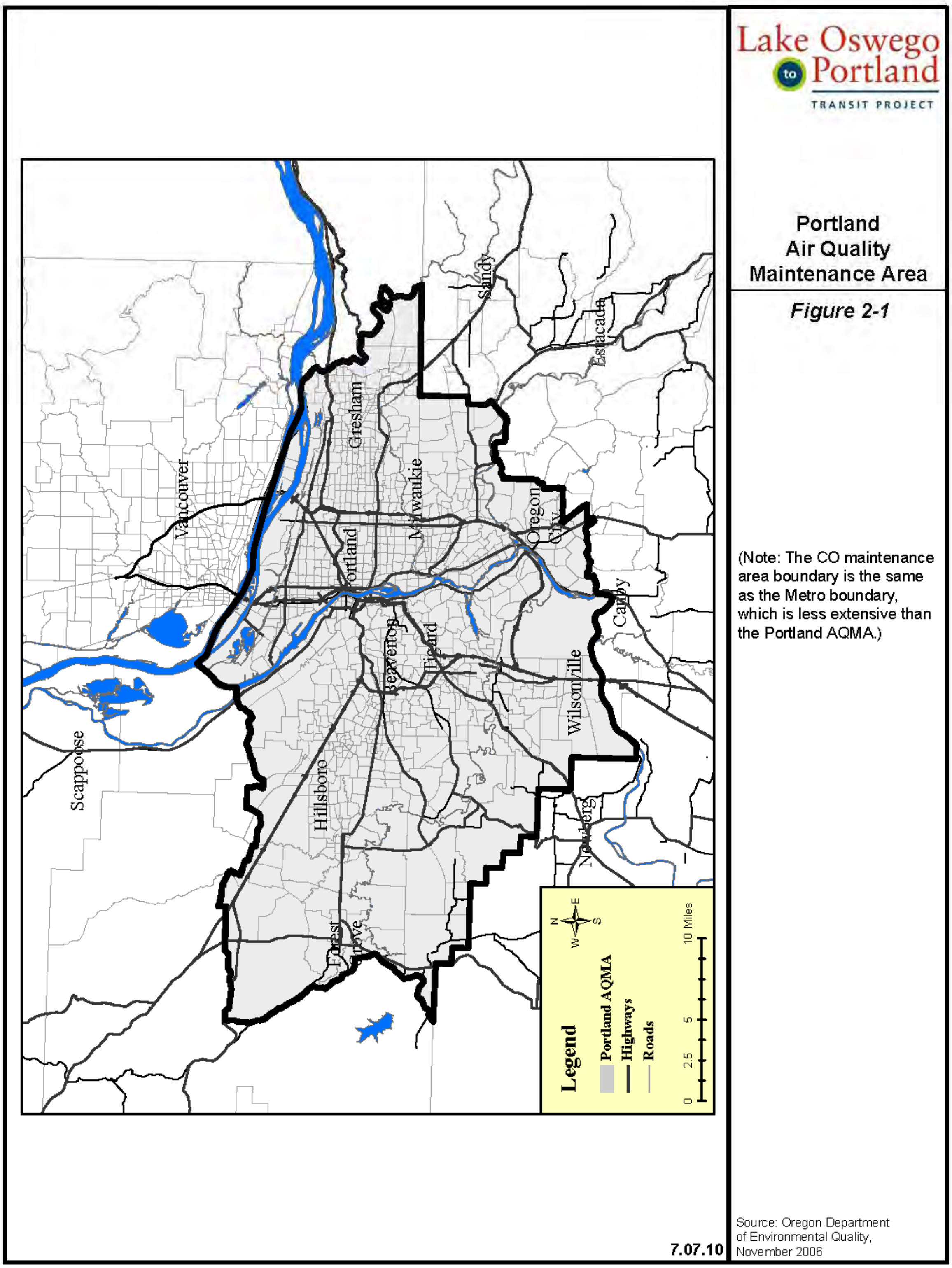

FIGURE 2-1 PORTLAND-VANCOUVER OZONE AND CARBON MONOXIDE MAINTENANCE AREA

Air Quality Maintenance Area (Oregon Portion) and Salem-Keizer Area Ozone Maintenance Plan (ODEQ, 2007). Any regionally significant transportation project in the Portland AQMA must conform to the CO maintenance plan. Conformity is discussed further in Section 2.2.2.2, below. The Portland region is attainment for all other criteria pollutants.

2.2.1.4

Criteria and procedures for determining conformity with SIPs of transportation plans, programs, and projects that are developed, funded, or approved by the U.S. Department of Transportation (USDOT) and by metropolitan planning organizations (MPOs) or other recipients of funds under Title 23 U.S.C. or the Federal Transit Laws are established in the CAA Section 176(c). The conformity regulations are applicable to projects within nonattainment or maintenance areas, such as the LOPT. Generally, conformity is demonstrated by showing that the project would not cause or contribute to any new violation of any NAAQS, would not increase the frequency or severity of any existing violation of any NAAQS, or would not delay timely attainment of the NAAQS. For the Portland Metro region, conformity must be demonstrated for CO only, being in attainment or not having to demonstrate conformity for any other air pollutant for surface transportation projects.

The requirements to demonstrate conformity for a project are twofold. First, it must be included in a conforming RTP to address long-term regional impacts. Metro evaluates the total emissions associated with all planned projects in the Portland area to determine if the projects will cumulatively exceed the emissions budget for on-road mobile sources contained within the air quality SIP. If the emissions are within the budget, then no regional adverse air quality impacts occur as a result of the planned projects, and the RTP is found to conform. When funding is secured for a project it is included in the Metropolitan Transportation Improvement Program and air quality conformity must also be demonstrated. Most large projects are first considered as part of the Financially Constrained System of the RTP and conformed. Accordingly, when a transit project gets a full funding agreement with FTA and all funding is secured and the Project is added to the MTIP, the air quality conformity has already been addressed This region-wide analysis for the Financially Constrained System of the 2035 RTP included the extension of streetcar service (LOPT) was completed by Metro in 2008[2].

The second requirement is that a project hot-spot analysis must be performed for projects located in a CO, PM_{10}, or $PM_{2.5}$ nonattainment or maintenance area for intersections that meet hot-spot analysis conformity criteria. As mentioned above, the LOPT project is located in the Portland CO maintenance area. To meet project level conformity, the results of the hot-spot analysis must demonstrate that the project will not cause or contribute to a violation of the NAAQS in this area.

2.2.1.5 Mobile Source Air Toxics

The CAAA of 1990 identified 188 air toxics, also known as hazardous air pollutants (HAPs). The EPA defines air toxics as pollutants that cause or may cause cancer or other serious health effects. The EPA assessed this list of toxics and identified a group of 21 as Mobile Source Air Toxics (MSATs), which are set forth in an EPA final rule, Control of Emissions of Hazardous Air Pollutants from Mobile Sources (66 FR 17235). From the list of 21 MSATs, EPA identified six toxics as the

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[2] The Metro 2035 RTP was revised in 2010 and the Financially Constrained System continued to include the extension of streetcar to Lake Oswego. On September 20, 2010, The USDOT (Federal Transit Administration and Federal Highway Administration) concurred with the air quality conformity determination of the revised 2035 RTP.

priority MSATs. These are benzene, formaldehyde, acetaldehyde, diesel exhaust (particulate matter / diesel exhaust organic gases), acrolein, and 1,3-butadiene. While these MSATs are considered the priority transportation toxics, the EPA stresses that the lists are subject to change and may be adjusted in future rules.

The EPA is responsible for the establishment of NAAQS, national guidance, and guidelines for the uniform and scientifically reliable study of air pollutants. To date, there are no NAAQS for MSATs and no emission budgets so that there are no established criteria for determining when MSAT emissions should be considered a significant issue. In its February 2006 interim guidance for MSATs in NEPA documents, the Federal Highway Administration (FHWA) has identified three levels of analysis:

1. No analysis for projects with no potential for meaningful MSAT effects;
2. Qualitative analysis for projects with a low potential MSAT effects; or
3. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

Greater potential for MSAT effects typically occurs for roadways with an annual averaged daily traffic (AADT) volume of 140,000 to 150,000 vehicles or more per day in 2030 (design year).

2.2.1.6 Greenhouse Gases

Climate change is a global problem caused by emissions of greenhouse gases (GHG) from every conceivable source in every nation of the world. Transit projects, in general, can both add (e.g., operations of mass transit) and reduce GHG (e.g., the overall reduction of vehicle trips). Studies suggest that transit operation emissions are less than GHG emissions from the operations of other build transportation alternatives (see Figure 2, at http://www.fta.dot.gov/documents/PublicTransportationsRoleInRespondingToClimateChange.pdf). Further, because transit projects funded by the Federal Transit Administration (FTA) vary – e.g., streetcar purchases; vehicle maintenance; construction of transit facilities, to name a few – it is difficult to provide an overall statement of transit projects' impacts on GHG. However, very generally speaking, the (adverse) impact of any one transit project on GHG emissions, even in a cumulative effects evaluation, is miniscule within the global context of the problem. There are no current Federal rules for greenhouse gas reporting, and the proposed rules would likely not apply to the LOPT project, based on source type and threshold emission levels for carbon dioxide (CO_2).

In response to Public Law 110–161, EPA has issued the Final Mandatory Reporting of Greenhouse Gases Rule. The rule requires reporting of GHG emissions from large sources and suppliers in the United States, and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports to EPA. The gases covered by the proposed rule are CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulfur hexafluoride (SF_6), and other fluorinated gases including nitrogen trifluoride (NF_3) and hydrofluorinated ethers (HFE). The final rule was signed by the Administrator on September 22, 2009. However, given the characteristics of the LOPT project, no reporting will be required.

2.2.2 State of Oregon

2.2.2.1 Air Quality Standards

The ODEQ has established state ambient air quality standards (SAAQS) in OAR Chapter 340, Division 202 (OAR 340-202), "Ambient Air Quality Standards and Prevention of Significant Deterioration (PSD) Increments", The SAAQS are at least as stringent as the NAAQS. These standards are identified in EPA and ODEQ rules (EPA Office of Air Quality Planning (http://www.epa.gov/air/criteria.html) and OAR 340-202-0050 through -0130). These standards were provided above in Table 2-1.

2.2.2.2 Conformity

Criteria and procedures for determining conformity with SIPs of transportation plans, programs, and projects in Oregon that are developed, funded, or approved by the USDOT and by MPOs or other recipients of funds. The requirements provided in OAR 340-252, "Transportation Conformity", are essentially identical to those outlined in the federal rules, which are discussed above in Section 2.2.1.4.

2.2.2.3 Permits

The owner or operators of an indirect source, such as a parking facility having 1000 or more spaces and within an applicable CO maintenance area, are required to obtain an Indirect Source Construction Permit (ISCP) under OAR 340-254.

Stationary source of air pollution, such as asphalt and concrete mix plants, may be required to obtain air contaminant discharge permits (ACDP) from ODEQ. If these temporary facilities are used for the project, the operator or contractor would be required to obtain the appropriate permit(s).

2.2.2.4 Nuisance

The operator of a source of fugitive dust, such as occur during construction activities, must take reasonable precautions to prevent dust from becoming airborne, and maintain and operate the source(s) to minimize emissions. Construction contractors are required to comply with OAR 340-208, which addresses visible emissions and nuisance requirements, including limits on fugitive dust that violates other regulations.

2.2.2.5 Greenhouse Gases

Similar to the proposed Federal rule, GHG reporting is also covered under OAR 340-215. The rule does not apply to the LOPT project based on source type and projected emission level increases for CO_2, which are expected to be lower than the Federal standard for threshold emission levels (25,000 metric tons per year).

2.2.3 Local

There are no additional local laws or regulations related to air quality.

2.3 Data Collection

Air quality impacts are closely tied to traffic impacts, therefore, air quality is analyzed using traffic data developed for the Project. Traffic data was obtained from the traffic consultant for the LOPT Project (David Evans and Associates (DEA)). A data request was submitted to the traffic consultant for traffic volumes, and intersection data from Synchro and HCM model outputs. This data is described in detail in the *LOPT Transportation Analysis Technical Report* (DEA, URS, TriMet and Metro, 2010).

Additional traffic data, as necessary for regional analyses, was obtained from Metro and TriMet sources. MOBILE 6.2 emission factor data were also obtained from Metro for the applicable analysis years. Emission factor data is discussed in more detail in Section 2.4.3, below.

Relevant existing air quality data was obtained from ODEQ air quality monitoring reports; data is summarized in Section 4 of this report.

2.4 Analysis Methods

2.4.1 Study Area

The area of potential effect is the study area, which includes existing roadways, planned new roadways, and local, poorly performing intersections where changes in traffic volumes may occur as a result of the Project.

2.4.2 Existing Air Quality

Air quality conditions in the region and in the LOPT project corridor are based on existing ambient monitoring data available from ODEQ (ODEQ, 2008). The entire LOPT project is within the CO maintenance area, which is the pollutant of most concern for this analysis. Other pollutants are not analyzed in detail. Ambient air quality is discussed in Section 4 of this report.

2.4.3 Emission Factors

Emission factors as a function of speed were supplied by Metro for both the regional emissions analysis (using the EPA approved MOBILE6.2 software) and the localized CO impact analyses (using the EPA approved CAL3QHC software). Using the Metro data for calculating the regional emissions ensures that the emission factors used in this analysis are consistent with the emission factors used in the maintenance planning process. Metro developed these emission factors using the MOBILE 6.2 (EPA, 2003a,b). This emissions model is an updated version of the Mobile Source Emission Factor Model program, which the EPA developed to calculate emission factors from highway motor vehicles in grams per pollutant per mile traveled. Because MOBILE 6.2 accounts for gradual replacement of older vehicles with newer, less-polluting vehicles, the predicted emission factors for future years are lower than those of the current year.

Emission factors and idle emission rates are based on average vehicle speeds, regional vehicle registration mixes and annual mileage accumulation rates, the effects of vehicle inspection and maintenance programs, and regional ambient conditions. Emission factors were obtained for the current year (2009) and the future year (2035) analyses, for vehicle speeds of 2.5 mph (for calculating idle emission rates in grams per hour), and for the posted speed(s). [Note: 2007 data was used as a conservative surrogate for 2009, because 2009 data was not available from Metro. The emission factor for 3.0 mph was used as a surrogate for 2.5 mph; Metro only ran the MOBILE6.2 factors for speeds down to 3.0 mph.] An arterial roadway type was assumed, except for freeflow Highway 43 factor at 35 mph for CO, which used the freeway classification to be more conservative. Idle emission factors were calculated by multiplying the 2.5 mph emission rates from MOBILE 6.2 (in gram per mile) by 2.5 (miles per hour), to obtain an idle emission rate in grams per hour, as required for CAL3QHC input. To be conservative, CO emission factors are based on winter temperatures. Table 2-2 shows the emission factors that were used in the air quality analyses. The complete set of MOBILE6.2 emission data from Metro is provided in Appendix A.

Table 2-2 MOBILE 6.2 Emission Factors

2009 Winter Mobile Source Emission Factors[1]		
Travel Scenario	CO	CO_2
2.5 mph (for Idle)[2] (g/mi)	37.444	--
Calculated idle emission rate[3] (g/hr)	93.610	--
20 mph Arterial (g/mi)	17.052	--
35 mph Freeway (g/mi)	16.502	--
35 mph Arterial (g/mi)	16.108	--
2035 Winter Mobile Source Emission Factors		
Travel Scenario	CO	CO_2
2.5 mph (for Idle)[2] (g/mi)	23.308	--
Calculated idle emission rate[3] (g/hr)	58.270	--
20 mph Arterial (g/mi)	10.872	--
35 mph Freeway (g/mi)	10.376	--
35 mph Arterial (g/mi)	10.243	562.489

Source: Metro, 2010.

Notes:

[1] 2007 data used as a conservative surrogate for 2009. Only 2007 data was available from Metro.

[2] No Metro data for 2.5 mph. Used Metro data for 3.0 mph (Freeway) as a surrogate for 2.5 mph.

[3] Idle emission rate (g/hr) = [2.5 mph factor](g/mi) * 2.5 (mph).

2.4.4 Conformity Determination - Regional Impacts (Burden) Analysis

A project area burden analysis is normally conducted to show that project emissions are within the budget accounted for within the SIP, and to compare potential air quality impacts between the No Build and Build Alternatives. As mentioned above, the 2035 RTP includes the LOPT; the Air Quality Conformity Determination (AQCD) for the 2035 RTP and 2008-2011 MTIP was approved by FTA and FHWA on February 29, 2008[3]. A summary of this documentation and air quality conformity determination will serve to demonstrate this aspect of conformity for the project.

[3] As noted earlier, the FTA and FHWA also concurred with the 2035 RTP air quality conformity determination completed in May 2010, which again included streetcar extension to Lake Oswego, on September 20, 2010.

2.4.5 Conformity Determination - Local Impacts (Hot-Spot) Analysis

A local CO hot spot analysis is used to identify when traffic patterns, idle times, queue lengths, and vehicle CO emission rates might lead to elevated CO levels near congested intersections, possibly exceeding the ambient air quality standards (AAQS). A comparative analysis of the local air quality impacts of the No-Build and Build Alternatives is typically performed on the three most congested, highest volume intersections, depending on the representativeness of intersections being modeled.

2.4.5.1 Intersection Identification

Signalized intersections for the CO analysis were selected using traffic data from the LOPT project traffic analysis (DEA, URS, TriMet, and Metro, 2010) following ODOT and EPA guidance (ODOT, 2008 and EPA, 1992, respectively). The guidance recommends ranking intersections based on level-of-service (LOS) and traffic volumes (vph) to select the intersections where CO impacts are most likely to occur. Signalized intersections expected to operate at LOS D, E, or F must be included in the ranking analysis.

Appendix B includes graphic summary pages for the LOPT Project, identifying operations (LOS) and volumes by intersection. These values are summarized in Table 2-3. Using the ranking methodology, the following three intersections were selected as the worst intersections for modeling based upon both the No Build and Build Alternatives' traffic conditions:

- A Avenue and Highway 43
- Foothills and Highway 43
- North Shore and Highway 43

If the three highest volume/most congested intersections are found to meet air quality standards, the other intersections in the Project will also meet these standards. It is expected that the CO impacts at these intersections will be higher than those at all other intersections; therefore, a demonstration of compliance for the modeled intersections will show compliance for all other intersections. The geometry and traffic patterns for each of these intersections are slightly different; therefore, all three were analyzed for hot-spots. Figure 2-2 shows the location of these intersections along the Project corridor. The complete traffic data sets for each of these intersections (Synchro model runs for peak PM hour) are provided in Appendix B.

2.4.5.2 CAL3QHC Model

Carbon monoxide levels near the intersections were predicted using the EPA approved CAL3QHC air dispersion model (EPA, 1995). Project CO impact modeling evaluates PM peak hour estimated traffic counts for existing conditions (2009) and future year (2035) analyses for both the No Build and Build Alternatives. CAL3QHC is a line-source dispersion model that predicts pollutant concentrations near roadways. This model incorporates the CALINE3 line-source air dispersion model with a traffic algorithm that estimates queue lengths at signalized intersections. Intersection signalization parameters were obtained from the draft traffic study; relevant data is provided in Appendix B. CAL3QHC input variables include MOBILE 6.2 free-flow and calculated idle emission factors, roadway geometries, traffic volumes, site characteristics, signal timing, and meteorological conditions. Peak 1-hour concentrations are predicted using stable meteorology and peak-hour traffic flow.

Figure 2-3 shows the typical intersection configuration for CAL3QHC modeling. Receptors are located where the maximum total project concentration is likely to occur, and where the general public is likely to have access (such as sidewalks). Per EPA guidance (EPA, 1992), receptors are not modeled within 3 meters of traveled roadways which comprise the intersection, where vehicle turbulence does not allow current models to make valid concentration estimates. Receptors are located on both sides of the roadways at distances of 3, 25 and 50 m along the roadway as measured from the center of the intersection and at least 3 meters from the edge of the active roadway surface. A breathing height of 1.8 meters is specified as the receptor elevation.

Table 2-3 Intersection Traffic Operations Summary (Morning and Afternoon Peak Hour Conditions)

AM

Intersection and #	Existing Yr 2009			2035 No Build			2035 In-Street			2035 Add. Lane			2035 Will. Shore Line			2035 Enhanced Bus		
(at Hwy 43 unless noted)	**LOS**	**V/C**	**VPH**	**LOS**	**V/C**	**VPH**	**LOS**	**V/C**	**VPH**	**LOS**	**V/C**	**VPH**	**LOS**	**V/C**	**VPH**	**LOS**	**V/C**	**VPH**
2 - Hamilton St.	-	-	2440	D	0.90	**4115**	C	0.89	**4070**	C	0.89	**4070**	C	0.88	**4055**	C	0.89	**4090**
3 - Hamilton Ct.	A	0.71	**2507**	**F**	**1.21**	4005	**F**	1.18	3965	**F**	**1.20**	3965	**F**	**1.20**	3955	**F**	**1.21**	3990
9 - Boundary	B	0.80	**2724**	**F**	**1.32**	**4430**	**F**	**1.28**	**4355**	**F**	**1.27**	**4355**	**F**	**1.30**	**4345**	**F**	**1.31**	**4395**
13 - Pendleton	A	0.70	2451	E	1.09	4002	E	1.06	3922	E	1.06	3922	E	1.06	3907	E	1.08	3967
15 - Carolina	-	-	2406	-	-	4080	**F**	**1.22**	4000	**F**	1.15	4000	-	-	3985	-	-	4040
17 - Nebraska	B	0.81	**2462**	**F**	**1.26**	**4119**	**F**	**1.23**	**4039**	**F**	**1.23**	**4039**	**F**	**1.23**	**4024**	**F**	**1.25**	**4079**
24 - Taylors Ferry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35 - Riverview	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41 - Military	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42 - Breyman/Greenwood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43 - Midvale	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44 - Briarwood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49 - B Ave.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50 - A Ave.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51 - Foothills	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54 - North Shore	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57 - Wilbur (Middlecrest)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58 - McVey/Green	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

PM

Intersection and #	Existing Yr 2009			2035 No Build			2035 In-Street			2035 Add. Lane			2035 Will. Shore Line			2035 Enhanced Bus		
(at Hwy 43 unless noted)	**LOS**	**V/C**	**VPH**	**LOS**	**V/C**	**VPH**	**LOS**	**V/C**	**VPH**	**LOS**	**V/C**	**VPH**	**LOS**	**V/C**	**VPH**	**LOS**	**V/C**	**VPH**
2 - Hamilton St.	-	-	2675	C	0.79	4140	C	0.79	4115	C	0.79	4115	C	0.79	4110	C	0.79	4135
3 - Hamilton Ct.	B	0.54	2699	E	1.09	4140	D	1.08	4110	D	1.08	4110	E	1.07	4100	D	1.08	4140
9 - Boundary	C	0.86	2920	**F**	1.39	4500	**F**	1.26	4460	**F**	1.26	4460	**F**	1.33	4455	**F**	1.39	4485
13 - Pendleton	A	0.66	2632	C	0.99	3897	C	0.97	3842	C	0.97	3842	B	0.97	3837	B	0.98	3872
15 - Carolina	-	-	2562	-	-	3865	D	1.01	3810	D	1.01	3810	-	-	3805	-	-	3840
17 - Nebraska	B	0.68	2628	C	0.98	3960	C	0.96	3905	C	0.96	3905	C	0.96	3900	C	0.97	3935
24 - Taylors Ferry	**D**	0.95	**3391**	**F**	1.14	4855	**F**	1.13	4785	**F**	1.13	4785	**F**	1.13	4775	**F**	1.14	4830
35 - Riverview	C	0.89	2267	**F**	**1.54**	3747	**F**	**1.50**	3682	**F**	**1.50**	3682	**F**	**1.50**	3672	**F**	**1.52**	3712
41 - Military	A	0.69	2137	D	1.19	3635	D	1.13	3570	D	1.13	3570	D	1.12	3560	D	1.15	3600
42 - Breyman/Greenwood	A	0.74	2179	**F**	1.35	3500	**F**	1.32	3435	**F**	1.32	3435	**F**	1.31	3425	**F**	1.33	3470
43 - Midvale	A	0.65	2169	**F**	1.34	3485	**F**	1.31	3420	**F**	1.31	3420	**F**	1.31	3415	**F**	1.32	3450
44 - Briarwood	A	0.76	2194	**F**	1.39	3510	**F**	1.36	3445	**F**	1.36	3445	**F**	1.36	3440	**F**	1.37	3475
49 - B Ave.	C	0.82	2780	**F**	1.24	4460	**F**	1.22	4380	**F**	1.22	4380	**F**	1.22	4375	**F**	1.23	4420
50 - A Ave.	**D**	0.97	**3603**	**F**	**1.83**	**6100**	**F**	**1.81**	**6025**	**F**	**1.81**	**6025**	**F**	**1.81**	**6020**	**F**	**1.83**	**6080**
51 - Foothills	A	0.65	3309	**F**	1.21	**5840**	**F**	1.18	**5775**	**F**	1.18	**5775**	**F**	1.18	**5770**	**F**	1.20	**5830**
54 - North Shore	C	0.88	**3355**	**F**	**1.75**	**5650**	**F**	**1.74**	**5710**	**F**	**1.74**	**5710**	**F**	**1.74**	**5705**	**F**	**1.80**	**5750**
57 - Wilbur (Middlecrest)	A	0.71	3129	**F**	1.21	5015	**F**	1.23	5095	**F**	1.23	5095	**F**	1.23	5090	**F**	1.23	5090
58 - McVey/Green	C	0.93	3316	**F**	1.10	5224	**F**	1.12	5304	**F**	1.12	5304	**F**	1.12	5299	**F**	1.12	5304

Source:
DEA Synchro Model Runs 2/3/10
Notes:
Top three LOS (lowest/worst; D, E, F only), v/c (highest; greater than 1.0), and vph (highest) for each scenario are shown in **bold**.
AM LOS, v/c ratios, and vph not available for the intersections south of Nebraska St. (south end of Johns Landing, Section A in Figure 1-6).

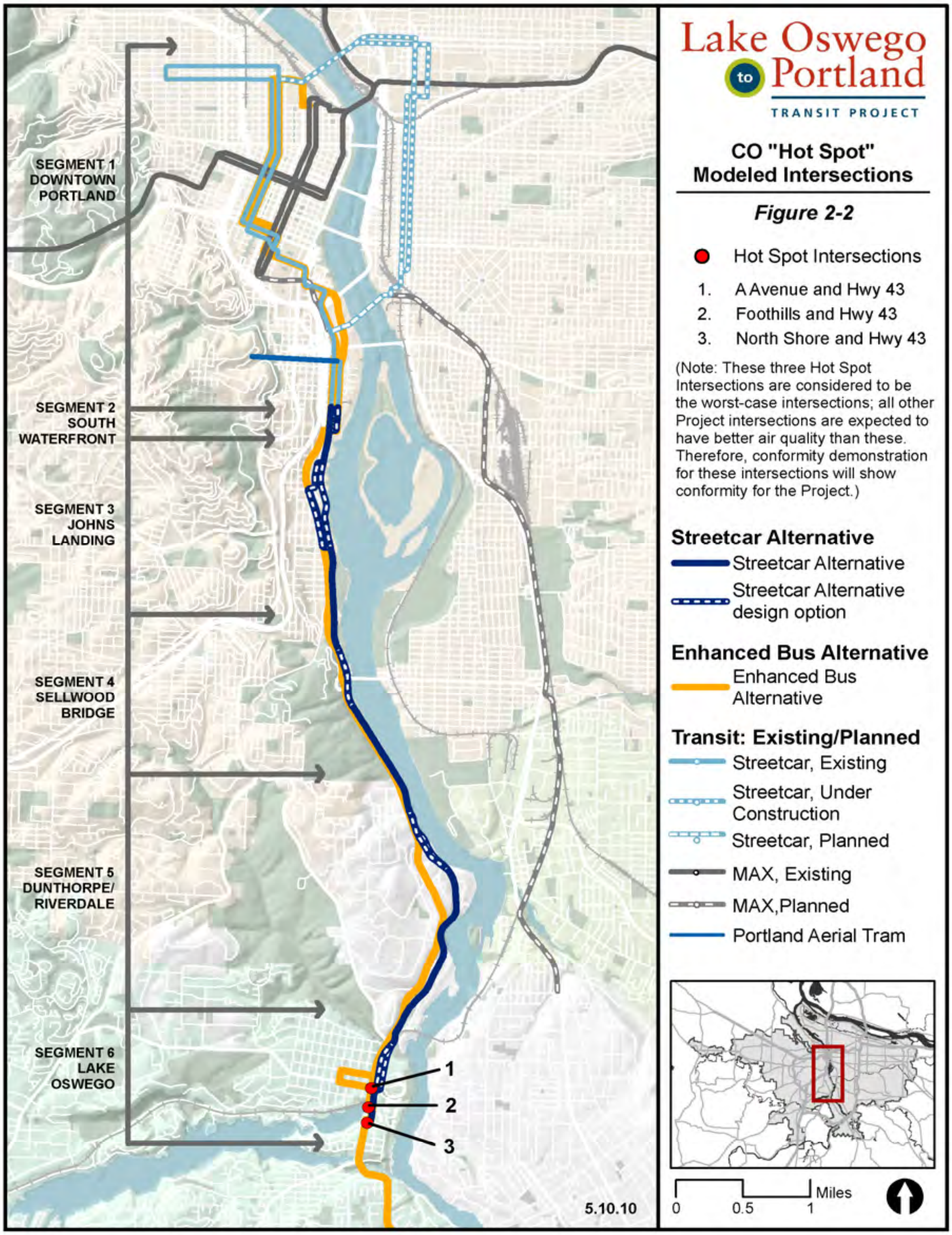

FIGURE 2-2 CO "HOT-SPOT" MODELED INTERSECTIONS

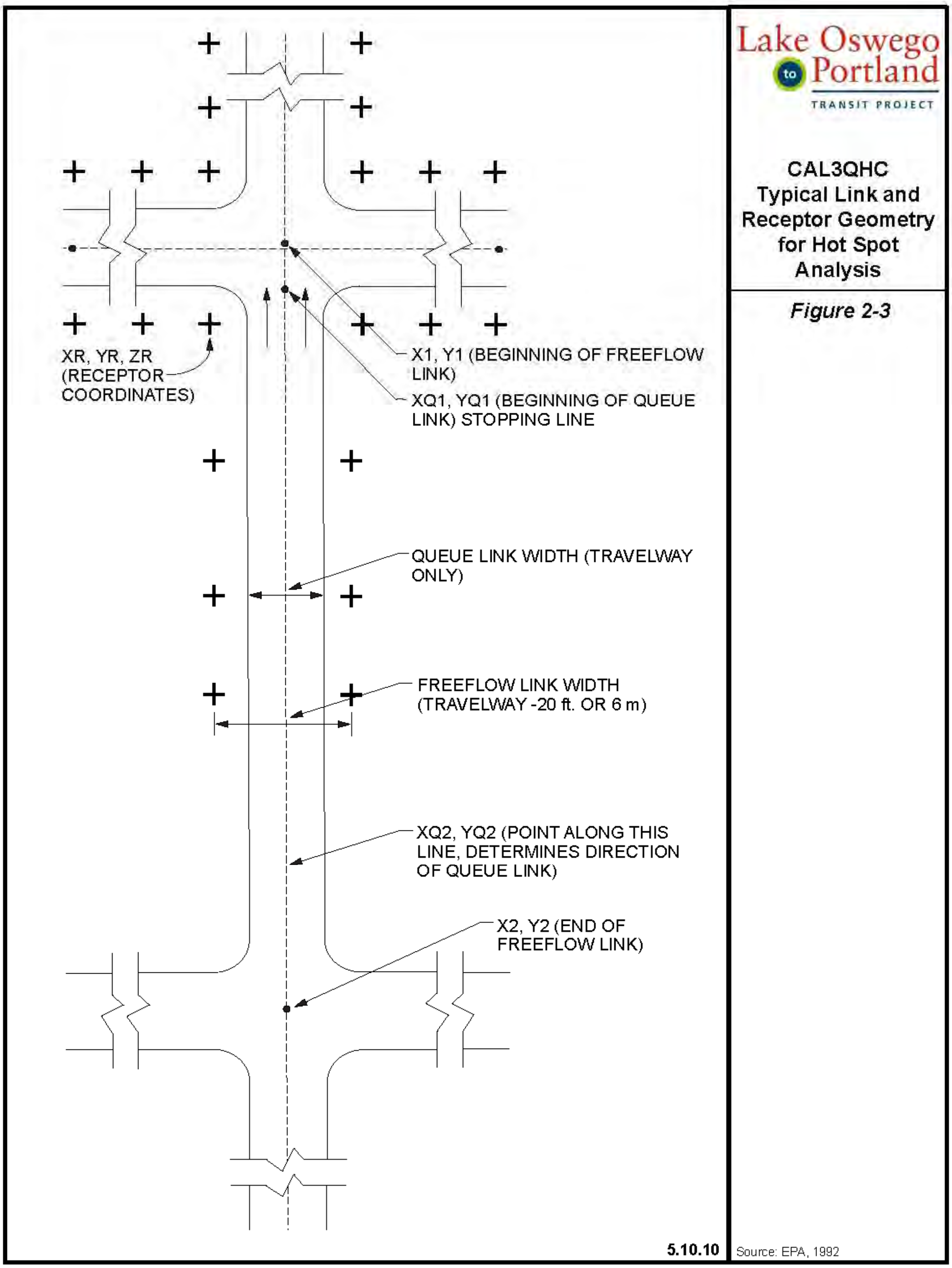

FIGURE 2-3 CAL3QHC TYPICAL LINK AND RECEPTOR GEOMETRY FOR HOT-SPOT ANALYSIS

Default meteorological conditions for an urban site were used, including a wind speed of 1 meter per second (m/s) (approximately 2.2 mph), D stability, and a mixing height of 1000 meters. A surface roughness (z_o) for 'Single Family Residential' (108 cm) was used; this is the lowest (most conservative) z_o in the City Land Use category. Wind directions every 10 degrees, from 0 to 360 degrees, were evaluated. Table 2-4 lists the CAL3QHC input parameters used in all of the modeling analyses. More detailed lane queuing and modeling receptor locations are provided for each intersection and alternative in Appendix C.

Table 2-4 CAL3QHC Input Parameters

Averaging Time	60 minutes (1 hour)
Surface Roughness	108 cm
Wind Speed	1 meter/sec (approximately 2.2 mph)
Wind Angle	0 to 360 degrees, in 10 degree increments
Stability Class	4 (D)
Mixing Height	1,000 meters
Persistence Factor (1-hr to 8-hr conversion)	0.76 (Portland average)
Ambient Background Concentration	2.0 ppm

Source: ODOT, 2008

The evaluation of localized CO impacts is based on winter weather conditions. CO emissions are inversely proportional to temperature, due to less efficient combustion at lower temperatures. In addition, maximum CO concentrations usually occur during winter months when temperature inversions trap vehicle emissions near the ground. For the LOPT Project, 1-hour CO concentrations were predicted using the CAL3QHC model. A background concentration of 2 ppm was used for the 1-hour average (ODOT, 2008). Average 8-hour CO concentrations were then calculated by multiplying the 1-hour concentrations by the average ODOT persistence factor for Portland of 0.76 (ODOT, 2008).

2.4.6 Mobile Source Air Toxics (MSATs)

As discussed above in Section 2.2.1, the level of analysis for MSATs is dependent on the potential for the project to have an impact on MSATs, typically based on project traffic levels. The FHWA's Interim Guidance on Air Toxics Analysis (FHWA, 2006) is used to evaluate MSAT impacts from the LOPT project.

2.4.7 Greenhouse Gases (GHGs)

An estimate of operating GHG emissions is made for the project alternatives following the methodologies used by Metro in their regional analysis for the statewide GHG reduction goals.

2.4.8 Conformity Demonstration

To demonstrate conformity, a project must be included in a conforming RTP and a hot-spot analysis must be performed using federally approved air quality models. Confirmation of the project's inclusion in the RTP was made (See Section 2.4.4). The methodology for the hot-spot analysis is discussed above in Section 2.4.5.

2.4.9 Short-Term (Construction) Effects

The potential for impacts to air quality during construction are addressed qualitatively using standard procedures for transportation projects (ODOT, 2008). Potential construction impacts would likely be expected from clearing, excavation, grading, blasting, and demolition. Short-term impacts may also result from additional traffic congestion during construction.

2.4.10 Cumulative and Indirect Effects

The forecast traffic volumes used to analyze the air quality impacts of the project alternatives include traffic from other sources, and are based on the future expected land use and employment information for the project area (which include expected traffic from development in the region and project area). Background concentrations representing the cumulative emissions of other sources in the area are added into the predicted local concentrations for CO at intersections. Because of these inclusive analysis methodologies, the impacts are representative of cumulative and indirect sources, and no further analysis is conducted.

2.4.11 Summary of Permits Required

As discussed above in Section 2.2.2, the owner or operators of an indirect source, such as a parking facility having 1000 or more spaces and within an applicable CO maintenance area, are required to obtain an ISCP under OAR 340-254. Stationary sources of air pollution, such as asphalt and concrete mix plants, may be required to obtain an ACDP from ODEQ. If these temporary facilities are used for the project, the operator or contractor would be required to obtain the appropriate permit(s). At this time, the LOPT Project is not expected to require any air quality permits.

2.5 Mitigation Measures

Mitigation alternatives are identified and considered where the evaluation of air quality impacts for the LOPT alternatives indicates that potential adverse impacts could result. Potential mitigation measures are described below in Section 6, following standard procedures for air quality mitigation for transportation projects (ODOT, 2008).

3. CONTACTS, COORDINATION AND CONSULTATION

As part of the investigation of air quality issues pertaining to the LOPT Project, personnel coordinated with the project team, including the traffic consultant.

3.1 Federal and State Agencies

As discussed in Section 2.2 above, air quality in the project area is regulated by federal and state agencies (EPA and ODEQ, respectively). In addition, staff gathered information from and/or coordinated with the following Federal, state, and local government agencies:

- United States Environmental Protection Agency (EPA)
- Federal Transit Administration (FTA)
- Federal Highway Administration (FHWA)
- Oregon Department of Environmental Quality (ODEQ)
- Oregon Department of Transportation (ODOT)

3.2 Local Agencies

Metro is the local Metropolitan Planning Organization (MPO) responsible for coordinating the regional transportation planning processes, including performing regional conformity assessments. Metro has provided the regional CO emission factors for use in the local conformity assessment. Traffic data is provided in the *LOPT Project Transportation Analysis Technical Report* (DEA, URS, TriMet and Metro, 2010).

4. AFFECTED ENVIRONMENT

4.1 Regional Climatology

The Portland-Vancouver area is located in the northern Willamette Valley, where the climate is relatively mild throughout the year, characterized by cool, wet winters and warm, dry summers. The climate is influenced by the Pacific Ocean, which is approximately 60 miles west of the project site, and the Coast Range and Cascade Mountains, approximately 40 miles west and 50 miles east, respectively. Major climate controls include the Pacific high pressure system over the eastern Pacific Ocean, and the low-pressure ridge that often develops over the Aleutian Islands in Alaska. In late spring and summer, the Pacific high pressure system prevails, often resulting in dry, stable weather conditions. The dry season peaks near the end of July or the beginning of August. The Columbia Gorge acts as a transport mechanism of weather systems between the eastern and western portions of northern Oregon and southern Washington.

Proximity to the Pacific Ocean, the Columbia and Willamette Rivers, and local topography are the greatest influences on temperature variability in the project area. Extreme temperatures in the Portland-Vancouver area are rare. Days with maximum temperature above 90°F occur only 5-15 times per year on average, and below zero temperatures occur only about once every 25 years. Mean high temperatures range from the low 80's in the summer to mid 40’s (°F) in the coldest months, while average lows are generally in the mid 50's in summer and mid 30's in winter.

The prevailing winds in the project area are east-southeast in the fall and winter months (October through March) and northwest in the spring and summer months (April through September). Mean wind speeds during the fall/winter period are 7-10 mph. Mean wind speeds during the spring/summer period are 7-8 mph.

Like the remainder of western Oregon, the northern Willamette Valley has a predominant winter rainfall climate, generally associated with the passage of Pacific-frontal winter storm systems. Typical distribution of precipitation includes about 50 percent of the annual total from November through February, lesser amounts in the spring and fall, and very little during summer. Rainfall tends to vary inversely with temperatures; the cooler months are the wettest and the warm summer months are the driest. Portland receives an average of 36.3 inches of precipitation per year (30-year normal). Although snow falls locally nearly every year, amounts are generally quite low.

4.2 Regulatory Framework and Pollutants of Concern

To assess whether regional air pollution levels pose potential impacts to public health and welfare, ambient air quality standards have been established. Relevant federal and state ambient air quality standards are listed in Table 2-1.

Historically, concentrations of O_3 and CO in Portland have exceeded the NAAQS. Consequently, pollutants of concern in the Portland area are CO, non-methane hydrocarbons (NMHC), and nitrogen oxides (NO_x). NHMC and NO_x are important because they contribute to the formation of ozone through photochemical reactions in the atmosphere. Ozone is formed in the atmosphere through a complex chemical reaction with NHMC, NO_x, and sunlight. In the Portland area, high ozone levels typically occur quite a distance downwind of the source of the pollutants. Therefore, emissions control strategies must address sources in the entire Portland area. In contrast, high CO volumes are more localized and strongly influenced by emissions of CO from nearby vehicles. Maintenance plans for both pollutants focus on reducing emissions from vehicles, reducing the total miles traveled by vehicles in the area, and reducing congestion conditions.

Prior to 1996, the Portland area was classified by EPA as a “nonattainment status” area for ground level ozone and CO, meaning that the area had historically violated EPA standards for CO (9 ppm during any given eight-hour period) and ozone (0.12 ppm in a one-hour period). CO and ozone levels are considered to be in compliance with the standard if they do not exceed the standard more than once per year on average. During the 1970s, the Portland area exceeded the standards for CO on one day out of every three, and ozone levels were often as high as 50 percent over the federal standard. Programs and regulations implemented to control air pollutant emissions have been effective, and air quality in the area has improved. In 1996, EPA redesignated the area from “nonattainment status” to “maintenance status.”

4.3 Existing Pollutant Levels

Based on available regional data, the proposed LOPT Project site is in attainment of all ambient air quality standards. There are no monitors located directly along the project route. ODEQ maintains a network of air quality monitoring stations throughout the Portland area. In general, these stations are located in areas where the agency believes there are air quality problems, or areas that are designated as nonattainment. Below is a description of each criteria pollutant along with monitored levels and attainment status in the Portland area. A summary of monitored pollutant concentrations is provided in Table 4-1. Data is taken from the *2008 Oregon Air Quality Data Summaries* (ODEQ, 2008).

Ozone

Portland was redesignated as meeting the ozone (O_3) standard in 1996. It is therefore considered an air quality maintenance area for this pollutant. Most ozone is not emitted directly into the atmosphere, but is a secondary pollutant produced through a series of complex photochemical reactions involving hydrocarbons (HC) and NO_x. That is, O_3 is produced when emissions of NO_x and HC (excluding methane and a few specific hydrocarbons) react in the atmosphere with sunlight. Primary emission sources include automobiles, industrial combustion and transfer and use of fuels and solvents. Generally, periods of warm stable atmospheric conditions with clear, sunny skies are most favorable for ozone-producing photochemical reactions to occur. Because O_3 production generally requires about three hours in a stable atmosphere with strong sunlight, it is considered a regional air pollutant. Health effects include eye, nose, and throat irritation; respiratory tract irritation; and cumulative lung damage. In the Portland-Vancouver area, the highest ozone concentrations tend to occur from mid-May until mid-September, when urban emissions are trapped by temperature inversion.

The nearest O_3 monitoring station is at SE Lafayette, approximately 3 miles east of the northern end of the project area. The new ozone standard (8-hour) became effective September 1997. (In 1998 1-hour values were no longer evaluated for attainment purposes.) Attainment of the 8-hour standard is based on the 3-year average of the 4^{th} highest value. The 3-year average (for 2006, 2007, and 2008) at this station was 0.060 ppm. The highest reported value for the Portland area was 0.065 ppm at the Canby site. Both of these meet the standard of 0.075 ppm. However, EPA is in the process of determining new ozone standards and has announced that they are considering a range between 0.06 and 0.07 ppm. These new standards, though not adopted at this time, could become a consideration in the future depending on the standard that EPA approves, and may need to be addressed further in the project’s final environmental impact statement.

Table 4-1 Summary of Maximum Monitored Pollutant Concentrations for the Portland Region

Pollutant	Averaging Time	AAQS	2008	Station
Carbon monoxide	1-hour	35 ppm	7.2 ppm	Old Postal Bldg (PPB)
	8-hour	9 ppm	3.1 ppm	S.E. Lafayette (SEL)
Lead	Calendar Quarter	0.15 µg/m^3	--	--
Nitrogen dioxide	1-hour	0.100 ppm	0.062 ppm	S.E. Lafayette (SEL)
	Annual	0.053 ppm	0.011 ppm	S.E. Lafayette (SEL)
Ozone	1-hour (revoked)	0.12 ppm	0.107 ppm	Carus (SPR)
	8-hour	0.075 ppm	0.084 ppm	Carus (SPR)
$PM_{2.5}$	24-hour	35 µg/m^3	34 µg/m^3	S.E. Lafayette (SEL)
	Annual	15 µg/m^3	8.9 µg/m^3	Hillsboro, Hare Field (HHF)
PM_{10}	24-hour	150 µg/m^3	49 µg/m^3	Transcon Terminal (TTT)
	Annual	50 µg/m^3	20.1 µg/m^3	Transcon Terminal (TTT)
Sulfur dioxide	3-hour	0.50 ppm	0.007 ppm	S.E. Lafayette (SEL)
	24-hour	0.14 ppm	0.004 ppm	S.E. Lafayette (SEL)
	Annual	0.03 ppm	0.0010 ppm	S.E. Lafayette (SEL)

Notes:
µg/m^3 = micrograms of pollutant per cubic meter of air
ppm = parts per million

Carbon Monoxide

Portland was also redesignated as meeting the CO standard in 1996. It is therefore considered an air quality maintenance area for this pollutant. CO is a non-reactive pollutant. The major sources of CO emissions are automobiles. Carbon monoxide concentrations generally follow the temporal and spatial distributions of vehicular traffic and are also influenced by meteorological factors such as wind speed and atmospheric stability. Concentrations of CO are greatest during periods of moderate to heavy vehicular use, and when calm winds and stable atmospheric conditions limit dispersion of CO emissions near the ground surface. These conditions occur most often during the late fall and early winter. The major health effect from exposure to CO is interference with the transfer of oxygen in the blood, which can cause dizziness and fatigue, and can impair central nervous system functions. The nearest CO monitoring station is in downtown Portland (Old Postal Building, at SW 3rd Avenue), approximately 1.5 miles north of the northern end of the project area. The 2nd high monitored 1-hour and 8-hour CO concentrations in 2008 were 2.9 ppm and 2.0 ppm, respectively. The general trend for the Portland stations is a decrease in CO levels. The NAAQS for CO are a maximum 1-hour average of 35 ppm and a maximum 8-hour average of 9 ppm. [Note: In addition to the monitored values, the modeling analysis for this technical report shows that the calculated worst-case CO concentrations for existing conditions (2009) do not exceed the 1-hour or 8-hour average NAAQS for CO at any of the three modeled intersection locations (8-hour concentrations are between 5.4 and 6.2 parts per million (ppm), well below the standard of 9 ppm). See Section 5 (Tables 5-2 and 5-3) for further details.]

Nitrogen Dioxide

The project area is designated as being in attainment for nitrogen dioxide (NO_2) Nitrogen dioxide is a combustion by-product from sources such as power plants, motor vehicles, refineries, industrial boilers, and many other types of combustion sources. Nitrogen dioxide is a reddish-brown colored gas observed during episodes of high air pollution levels. The major health effect from exposure to NO_2 is acute and chronic respiratory disease. There is one NO_2 monitoring station operated in Portland (at SE Lafayette). The NAAQS for NO_2 is 0.053 ppm on an annual average and 0.100 ppm on a 1-hour average. The maximum monitored annual and 1-hour concentrations measured in 2008 were 0.011 ppm and 0.062 ppm, respectively.

Sulfur Dioxide

The project area is designated as being in attainment for sulfur dioxide (SO_2). Sulfur dioxide is a colorless, pungent gas that may cause lung and eye irritation. Chronic exposure to SO_2 can lead to coughs, shortness of breath, fatigue, and bronchitis. Sulfur dioxide can also cause damage to plants and building materials. In addition, sulfuric acid and sulfate particles formed in the atmosphere from SO_2 can also affect respiratory functions and can contribute to haze under certain atmospheric conditions. Diesel fuel and heating oil combustion are the major sources of SO_2 in the project area. Sulfur dioxide monitoring was recently started up again in the Portland area (one station, SE Lafayette). Short-term and annual concentrations measured at this station were well below the air quality standards for SO_2, as shown in Table 4-1.

Particulate Matter

The project area is designated as being in attainment for both fine particulate matter (particulate matter less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$)) and total suspended particulate (TSP). Particulate matter suspended in the atmosphere results from many types of dust and fume-producing industrial and agricultural operations, combustion, and atmospheric photochemical reactions. Demolition, construction, and vehicular traffic are major sources of particulates in typical urban areas. Natural sources of particulates include wind-blown dust and ocean spray. There are harmful effects from breathing particles measuring less than 10 microns in diameter. The nearest $PM_{2.5}$ and PM_{10} monitoring stations to the Project is the SE Lafayette station. The 2nd high (98th percentile for comparison to AAQS) monitored average 24-hour $PM_{2.5}$ concentration at this site in 2008 was 27 $\mu g/m^3$, and the annual concentration was 8.4 $\mu g/m^3$.

The 2nd high monitored average 24-hour PM_{10} concentration in 2008 was 44 $\mu g/m^3$, and the annual concentration was 14.3 $\mu g/m^3$.

Lead

Gasoline-powered automobile engines have been the major source of airborne lead (Pb). Lead can cause hematological (blood-related) effects, such as anemia (iron-deficient blood) and inhibition of enzymes involved in blood synthesis. Lead can also affect the central nervous and reproductive systems. Ambient lead levels have dropped dramatically as the percentage of motor vehicles using leaded gasoline has decreased in recent years. Lead is only monitored at one location in Portland. The Roselawn station, at 24 N. Emerson, records annual average concentrations for the air toxics program. This site is approximately 4.5 miles north of the north end of the project area. The annual average lead concentration at this station in 2008 was 0.0050 $\mu g/m^3$. This is well below the federal and state standard of 1.5 $\mu g/m^3$ on a quarterly basis. Elimination of lead from gasoline fuel has greatly reduced lead exposure nationwide.

Hydrocarbons (non-methane)

Non-methane hydrocarbons (NMHC) are precursors to ozone and photochemical smog. The primary sources of these compounds are motor vehicles, fuel evaporation, coatings industry, and combustion processes. The EPA and ODEQ have repealed their standards for non-methane hydrocarbons. However, hydrocarbon emissions are still controlled because of their contribution to ozone formation.

5. ENVIRONMENTAL CONSEQUENCES

5.1 Regional Analysis

As noted above, when Metro modeled regional air quality, it included the LOPT Project. Regional pollutant emissions, including the effects of the LOPT Project, were demonstrated to be within regionally-allowable amounts.

For comparative purposes, estimates of *regional* motor vehicle CO emissions are shown in Table 5-1 for each of the LOPT alternatives. The table shows a slight decrease in regional vehicular traffic for each of the two Build Alternatives over the No-Build Alternative. The decreases range from .06 to 0.11 percent (for the Enhanced Bus and Streetcar Alternative Willamette Shore Line Design Option, respectively). For regional examination, CO emissions are directly related to VMT, so CO emissions also show a slight decrease due to any of the Build Alternatives over the No-Build Alternative, with the Willamette Shore Line Design Option having the greatest reduction (1,534 lbs/day reduction over the No-Build Alternative). Emissions of other pollutants are also expected to follow this same trend for Year 2035 (comparison of Alternatives), as emissions are directly related to VMT.

Table 5-1 Estimated Regional Average Weekday Pollutant Emissions for Motor Vehicles

Alternative	Daily Vehicle Miles Traveled (VMT)[1]	Carbon Monoxide (CO) (lbs/day)[2]
Existing Conditions (Year 2005)[3]	41,611,800	1,476,394
LOPT Alternatives (Year 2035)		
No-Build Alternative	63,090,900	1,423,436
Enhanced Bus Alternative	63,049,900	1,422,511
Streetcar Alternative		
-with In-Street/Additional Lane Design Options	63,025,500	1,421,961
-with Willamette Shore Line Design Option	63,022,900	1,421,902

Notes:

[1] Source: Metro, TriMet.

[2] Based on MOBILE6.2 data from Metro (2010): emission factors for winter conditions with average speed of 35 mph (Year 2007 - 16.108 gram/mile; Year 2035 - 10.243 gram/mile).

[3] Existing regional VMT data only available for 2005.

5.2 Local Hot-Spot Analysis

The results of the air quality hot-spot analysis are summarized in Tables 5-2 and 5-3. As shown, the maximum predicted 1-hour and 8-hour CO concentrations for the No-Build Alternative and two Build Alternatives were found to be within the air quality standards of 35 ppm and 9 ppm, respectively. Because the LOPT Project would not cause or contribute to any violation of the NAAQS for CO, it would not cause any adverse localized CO Impacts.

With the No-Build Alternative, operations would not change from the existing transit scenario, however, overall traffic volumes (regardless of the Project) are expected to increase in future years. As mentioned above, the Project itself appears to have minimal effect on intersection traffic, causing slightly decreased volumes and v/c as compared to the No-Build Alternative for most intersections. Compared to the No-Build Alternative, operations for the In-Street/Additional Lane and Willamette

Table 5-2 Air Quality Hot-Spot Analysis – Predicted 1-Hour CO Concentrations (ppm)[1]

1-Hour CO Standard	***35 ppm***
Existing Conditions	**2009**
Avenue A and Highway 43	8.1
North Shore and Highway 43	7.1
Foothills and Highway 43	7.4
Alternative	**2035**
No-Build Alternative	
Avenue A and Highway 43	8.1
North Shore and Highway 43	7.2
Foothills and Highway 43	7.4
Enhanced Bus Alternative	
Avenue A and Highway 43	8.1
North Shore and Highway 43	7.2
Foothills and Highway 43	7.3
Streetcar Alternative (in Segment 3 Johns Landing)	
In-Street / Additional Lane Design Options	
Avenue A and Highway 43	8.1
North Shore and Highway 43	7.2
Foothills and Highway 43	7.3
Willamette Shore Line Design Option	
Avenue A and Highway 43	8.1
North Shore and Highway 43	7.3
Foothills and Highway 43	7.3

Source: URS, March 2010.

Notes:

[1] 1-Hour concentration = 1-Hour modeled impact plus background concentration of 2 ppm.

Table 5-3 Air Quality Hot-Spot Analysis[1] – Predicted 8-Hour CO Concentrations (ppm)[2]

8-Hour CO Standard	***9 ppm***
Existing Conditions	**2009**
Avenue A and Highway 43	6.2
North Shore and Highway 43	5.4
Foothills and Highway 43	5.6
Alternative	**2035**
No-Build Alternative	
Avenue A and Highway 43	6.2
North Shore and Highway 43	5.5
Foothills and Highway 43	5.6
Enhanced Bus Alternative	
Avenue A and Highway 43	6.2
North Shore and Highway 43	5.5
Foothills and Highway 43	5.5
Streetcar Alternative (in Segment 3 Johns Landing)	
In-Street / Additional Lane Design Options	
Avenue A and Highway 43	6.2
North Shore and Highway 43	5.5
Foothills and Highway 43	5.5
Willamette Shore Line Design Option	
Avenue A and Highway 43	6.2
North Shore and Highway 43	5.5
Foothills and Highway 43	5.5

Source: URS, March 2010.

Notes:

[1] For the following intersections: Avenue A and Highway 4;, North Shorte and Highway 43; Foothills and Highway 43.

[2] 8-Hour concentration = 1-Hour concentration times persistence factor of 0.76; 1-Hour concentration equals 1-Hour modeled impact plus background concentration of 2 ppm.

Shore Line Design Option, and Enhanced Bus Alternatives are not expected to have significantly different local air quality effects through the design and future analysis years.

By intersections, A Avenue and Highway 43 is predicted to have the highest CO impact (8-hour impact of 6.2 ppm for each Alternative and year). North Shore and Highway 43 has a predicted impact of 5.4 ppm for Year 2009, and 5.5 ppm for each Alternative in Year 2035. Foothills and Highway 43 has predicted impacts of 5.6 ppm for 2009 Existing and 2035 No-Build scenarios, and 5.5 ppm for each Build Alternative in 2035. As noted above, the differences in predicted impacts between the Alternatives are minimal. The Alternatives do not cause any major changes to these worst-case intersections (besides the slight decreases in volumes and v/c); there are no physical lane modifications at any of these intersections. In addition, the similarities between predicted impacts for the alternatives follows along with the regional analysis which showed overall daily VMT to be very similar, especially between the Build Alternatives.

These modeled intersections are expected to be the worst-case intersections for the LOPT Project; all other intersections in the Project area are expected to have impacts/concentrations below these levels. Appendix C provides the CAL3QHC model input and output data.

The modeled intersections include areas affected by the project that are accessible to the general public, and where elevated CO concentrations will be likely to occur. With the streetcar (Build Alternatives), reductions in CO emissions due to the removal of single-occupancy vehicles from surface streets are potentially offset by the increased time the other cars spend idling at red lights waiting for the streetcar to pass. Carbon monoxide levels are approximately the same at each analyzed intersection with or without the streetcar, showing that the LOPT Project has very little effect (positive or negative) on the air pollutant levels. Because the LOPT Project would not cause or contribute to any violation of the NAAQS for CO, it would not cause any adverse localized CO impacts.

5.3 Mobile Source Air Toxics

In addition to the regional effects on criteria pollutants, Mobile Source Air Toxics (MSATs) are also expected to be minimally impacted by Project. Regionally, MSAT emissions are proportional to VMT, however MSAT emission rates are expected to be greatly reduced by technological improvements over the next several years. As shown above in Table 5-1, the differences in regional VMT between the Alternatives is minimal, with each of the Build Alternatives having lower predicted VMT than the No-Build Alternative. The Willamette Shore Line Design Option Alternative has the lowest expected VMT, and therefore, would be expected to have the lowest MSAT emissions.

5.4 Climate Change

Climate change is a global problem caused by emissions of greenhouse gases (GHG) from every conceivable source in every nation of the world. Transit projects, in general, can both add (e.g., operations of buses) and reduce GHG (e.g., the overall reduction of vehicle trips). A study by the American Public Transportation Association (APTA, 2007) suggests that investments in transit generally lead to long-term reduction in the growth of GHG emissions. Further, because transit projects vary, it is difficult to provide an overall statement of transit projects' effects on GHG.

However, very generally speaking, the (adverse) impact of any one transit project on GHG emissions, even in a cumulative effects evaluation, is miniscule within the global context of the problem. Thus, the increased use of transit locally in Portland, and across the United States may have a measurable (positive) impact on the environment from the overall reduction in GHG emissions, but, as a general proposition, the overall increase or decrease in global GHG emissions resulting from an individual transit project is so small that it is not necessarily possible to predict the impact of that project on the global climate. Because of this, historically, climate change has not been considered useful in choosing a preference from among the alternatives considered during the NEPA review of a single proposed transit project.

Recent guidance from the Council on Environmental Quality (CEQ, 2010) states "25,000 metric tons may provide a useful, presumptive, threshold for discussion and disclosure of GHG emissions because it has been used an proposed in rule-makings under the Clean Air Act (eg., EPA's Mandatory Reporting of Greenhouse Gases Final Rule, 74 FR 56260, October 30, 2009). This threshold is used in Clean Air Act rulemakings because it provides comprehensive coverage of emissions with a reasonable number of reporters, thereby creating an important data set useful in quantitative analyses of GHG policies, programs and regulations (see 74 FR 56272). This rationale is pertinent to the presentation of NEPA analysis as well." For the purpose of this DEIS, GHG emissions were calculated to compare the differences for each of the Alternatives (2035 only). Table 5-4 shows effects of the various Build Alternatives as compared to the No-Build Alternative on emissions of CO_2, evaluated as a surrogate for all GHGs, as it is a major component (approximately 95 percent) of transportation-related GHGs. The Build Alternatives are considered to have a slightly beneficial impact on CO_2 emissions, up to an approximate 42 ton per day reduction due to the Willamette Shore Line Design Option Alternative. Over a one year period, this equates to a reduction of approximately 15,375 tons, which is below the CEQ proposed level of 25,000 metric tons (27,560 tons) of CO_2 'equivalents' (includes prorated amounts of other GHG's based on their potency) to require further evaluation for NEPA analysis.

Table 5-4 Estimated Average Daily Difference in Carbon Dioxide (CO_2) Emissions Between LOPT Alternatives

LOPT Alternative (2035)	Difference between No-Build and Build Alternative Daily Vehicle Miles Traveled (VMT)[1]	Difference between No-Build and Build Alternative Carbon Dioxide (CO_2) (tons/day)[2]
No-Build	--	--
Enhanced Bus	-41,000	-25.40
Streetcar with In-Street/Additional Lane Design Options	-65,400	-40.51
Streetcar with Willamette Shore Line Design Option	-68,000	-42.12

Notes:

[1] VMT from Metro, 2010 (see data provided in Table 5-1).

[2] Based on MOBILE6.2 data from Metro (2010): emission factor for winter conditions with average speed of 35 mph (562.489 gram/mile). [Example calculation for Enhanced Bus Scenario: -41,000 (miles/day) * 562.489 (grams/mile)/908000 (grams/ton) = -25.40 (tons/day)]

Apart from the overall reduction in GHG due to the Build Alternatives, public transportation also produces significantly lower GHG emissions per passenger mile than private vehicles; on a national average, CO_2 emissions per passenger mile are approximately 62 percent lower with light rail as they are for average single occupancy vehicles (SOV), and 23 percent lower for large bus systems as compared to SOVs (FTA, 2010).

5.5 Conformity Determination

In summary, the LOPT Project is included in the *2035 RTP*.. Metro has performed an *AQCD for the 2035 RTP and 2010-2013 MTIP*. As shown in the Project's air quality analysis, none of the LOPT Project Alternatives (No-Build or Build) would cause or contribute to any violation of the NAAQS for CO. Therefore, the project would not cause any significant adverse air quality impacts.

5.6 Construction

Construction activities from the Streetcar Alternative, primarily earth moving, have the potential to temporarily create dust and would result in emissions from construction equipment. Construction effects on air quality could include generation of PM_{10} and small amounts of CO and other criteria pollutants from construction machinery exhaust. The sources of particulates would be "fugitive dust" from demolition (removal of existing trackway and rail ties) and earth moving excavation, and combustion emissions (primarily from diesel equipment). Fugitive dust includes fine particles raised by construction activities and is common in dry windy weather. Its dispersion depends on dryness of the soil, the soil texture, and the general weather conditions such as presence or absence of precipitation and wind velocity. It is most common in dry windy weather. Larger particles would settle near the source, whereas fine particles could be dispersed over greater distances.

6. POTENTIAL MITIGATION MEASURES

6.1 Operation

The LOPT Project would meet air quality conformity criteria, as discussed above; therefore no operational air quality mitigation is required.

6.2 Construction

The project has potential for temporary and localized air quality affects from construction activities. The temporary effects would result from activities such as demolition, grading, paving and the use of heavy equipment. The construction contractors would be required to comply with relevant federal, state and local air quality regulations. With the implementation of best management practices (BMPs) for the duration of the project construction, effects on air quality are not anticipated to be significant.

During construction, measures would be implemented to minimize construction effects in the Project vicinity. Measures to minimize construction effects to air quality during construction would include BMPs, including the following:

- Use of water spray as necessary to prevent dust emissions.
- Prompt cleanup of any spills of transported material on public roads by frequent use of a street sweeper machine or other appropriate methods.
- Require contractors to maintain all construction machinery engines in good mechanical condition to minimize exhaust emissions.

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APPENDICES

Appendix A: MOBILE6.2 Data

Appendix B: Traffic Data Used in CAL3QHC Model

Appendix C: CAL3QHC Model Input and Output Files

Appendix A: MOBILE6.2 Data

2007

Ltype	Speed	VOC	NOX	CO	Benzene	MTBE	Butadiene	Formaldehyde	Acetaldehyde	Acrolein	PM10 ecarbon	PM10 exhaust	PM2.5 ecarbon	PM2.5 exhaust
Fwy	3	5.535	3.454	37.444	114.31	0.345	11.145	35.987	22.062	2.028	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	4	3.868	3.3	31.502	97.547	0.293	9.581	31.804	19.198	1.786	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	5	2.869	3.207	27.936	87.489	0.262	8.642	29.296	17.48	1.641	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	6	2.465	2.983	25.359	77.832	0.234	7.723	26.469	15.712	1.475	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	7	2.176	2.821	23.518	70.934	0.214	7.067	24.449	14.45	1.356	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	8	1.959	2.701	22.137	65.761	0.199	6.574	22.936	13.503	1.267	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	9	1.791	2.607	21.063	61.738	0.188	6.19	21.758	12.767	1.198	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	10	1.656	2.532	20.204	58.518	0.179	5.885	20.815	12.178	1.143	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	11	1.564	2.434	19.561	55.382	0.17	5.573	19.683	11.533	1.076	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	12	1.488	2.352	19.026	52.768	0.163	5.314	18.74	10.996	1.021	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	13	1.423	2.283	18.574	50.556	0.157	5.095	17.941	10.541	0.974	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	14	1.368	2.224	18.186	48.661	0.152	4.907	17.258	10.152	0.934	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	15	1.32	2.172	17.85	47.018	0.147	4.745	16.664	9.814	0.899	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	16	1.286	2.154	17.681	46.234	0.144	4.648	16.154	9.572	0.87	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	17	1.256	2.139	17.532	45.542	0.143	4.563	15.704	9.358	0.844	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	18	1.229	2.125	17.4	44.926	0.141	4.487	15.304	9.169	0.82	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	19	1.205	2.112	17.282	44.376	0.139	4.419	14.947	8.999	0.8	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	20	1.184	2.101	17.175	43.881	0.138	4.358	14.624	8.846	0.782	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	21	1.164	2.091	17.076	43.421	0.137	4.3	14.293	8.692	0.762	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	22	1.147	2.081	16.987	43.002	0.136	4.246	13.992	8.553	0.746	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	23	1.13	2.073	16.905	42.62	0.134	4.197	13.717	8.426	0.73	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	24	1.116	2.065	16.829	42.27	0.133	4.153	13.466	8.31	0.716	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	25	1.102	2.058	16.761	41.948	0.132	4.111	13.234	8.202	0.703	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	26	1.09	2.054	16.698	41.649	0.131	4.073	13.007	8.098	0.69	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	27	1.078	2.05	16.641	41.373	0.13	4.036	12.796	8.002	0.678	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	28	1.067	2.046	16.587	41.116	0.129	4.002	12.602	7.912	0.668	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	29	1.057	2.043	16.537	40.877	0.129	3.971	12.42	7.829	0.658	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	30	1.048	2.039	16.491	40.654	0.128	3.942	12.25	7.752	0.648	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	31	1.037	2.039	16.493	40.319	0.127	3.903	12.064	7.659	0.638	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	32	1.027	2.039	16.496	40.004	0.126	3.867	11.89	7.572	0.628	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	33	1.017	2.039	16.498	39.709	0.126	3.833	11.726	7.49	0.619	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	34	1.008	2.039	16.501	39.431	0.125	3.8	11.573	7.413	0.61	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	35	0.999	2.039	16.502	39.17	0.124	3.77	11.428	7.34	0.603	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	36	0.993	2.048	16.593	39.029	0.124	3.751	11.315	7.289	0.596	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	37	0.987	2.056	16.68	38.896	0.123	3.733	11.209	7.241	0.59	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	38	0.981	2.063	16.761	38.771	0.123	3.715	11.108	7.195	0.585	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	39	0.976	2.07	16.839	38.651	0.123	3.699	11.012	7.152	0.579	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	40	0.971	2.077	16.912	38.538	0.122	3.684	10.921	7.11	0.575	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	41	0.966	2.091	17.009	38.414	0.122	3.668	10.837	7.07	0.57	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	42	0.961	2.105	17.101	38.297	0.121	3.653	10.758	7.033	0.566	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	43	0.956	2.118	17.188	38.184	0.121	3.639	10.681	6.996	0.561	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	44	0.952	2.131	17.272	38.078	0.12	3.626	10.609	6.961	0.557	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	45	0.948	2.144	17.353	37.975	0.12	3.613	10.539	6.929	0.553	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	46	0.943	2.165	17.454	37.865	0.12	3.599	10.477	6.897	0.55	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	47	0.938	2.185	17.551	37.759	0.119	3.587	10.418	6.868	0.547	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	48	0.933	2.205	17.645	37.657	0.119	3.575	10.361	6.839	0.544	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	49	0.929	2.224	17.734	37.561	0.119	3.564	10.307	6.812	0.541	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	50	0.926	2.242	17.82	37.467	0.118	3.553	10.255	6.786	0.538	0.015563278	0.025022124	0.014321254	0.023144285

2007

Ltype	Speed	VOC	NOX	CO	Benzene	MTBE	Butadiene	Formaldehyde	Acetaldehyde	Acrolein	PM10 ecarbon	PM10 exhaust	PM2.5 ecarbon	PM2.5 exhaust
Fwy	51	0.92	2.272	17.927	37.367	0.118	3.542	10.211	6.761	0.535	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	52	0.916	2.301	18.03	37.269	0.118	3.532	10.168	6.738	0.532	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	53	0.912	2.329	18.13	37.176	0.118	3.521	10.127	6.715	0.53	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	54	0.908	2.355	18.226	37.086	0.117	3.511	10.088	6.694	0.528	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	55	0.903	2.381	18.318	36.999	0.117	3.503	10.05	6.673	0.526	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	56	0.9	2.422	18.437	36.921	0.117	3.497	10.029	6.658	0.525	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	57	0.897	2.462	18.553	36.846	0.117	3.491	10.01	6.645	0.523	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	58	0.894	2.501	18.664	36.773	0.116	3.487	9.991	6.631	0.522	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	59	0.891	2.538	18.772	36.703	0.116	3.481	9.973	6.618	0.521	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	60	0.888	2.574	18.876	36.634	0.116	3.476	9.955	6.605	0.52	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	61	0.885	2.632	19.005	36.562	0.116	3.473	9.949	6.597	0.519	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	62	0.882	2.687	19.131	36.493	0.116	3.468	9.942	6.588	0.518	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	63	0.88	2.741	19.252	36.426	0.116	3.465	9.936	6.579	0.517	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	64	0.878	2.794	19.369	36.36	0.115	3.461	9.93	6.571	0.516	0.015563278	0.025022124	0.014321254	0.023144285
Fwy	65	0.875	2.844	19.483	36.296	0.115	3.457	9.924	6.563	0.516	0.015563278	0.025022124	0.014321254	0.023144285
Art	3	5.353	3.288	36.308	110.246	0.327	10.744	34.756	21.231	1.968	0.015563278	0.025022124	0.014321254	0.023144285
Art	4	3.737	3.136	30.59	94.099	0.278	9.239	30.745	18.486	1.735	0.015563278	0.025022124	0.014321254	0.023144285
Art	5	2.768	3.045	27.159	84.411	0.249	8.337	28.337	16.839	1.595	0.015563278	0.025022124	0.014321254	0.023144285
Art	6	2.395	2.883	24.897	76.271	0.225	7.545	25.794	15.293	1.445	0.015563278	0.025022124	0.014321254	0.023144285
Art	7	2.128	2.767	23.281	70.457	0.208	6.979	23.979	14.188	1.338	0.015563278	0.025022124	0.014321254	0.023144285
Art	8	1.928	2.681	22.069	66.095	0.196	6.555	22.617	13.359	1.258	0.015563278	0.025022124	0.014321254	0.023144285
Art	9	1.772	2.613	21.128	62.704	0.186	6.225	21.557	12.715	1.196	0.015563278	0.025022124	0.014321254	0.023144285
Art	10	1.648	2.559	20.373	59.99	0.179	5.961	20.71	12.199	1.146	0.015563278	0.025022124	0.014321254	0.023144285
Art	11	1.562	2.474	19.78	57.143	0.17	5.675	19.638	11.599	1.083	0.015563278	0.025022124	0.014321254	0.023144285
Art	12	1.49	2.404	19.287	54.77	0.163	5.436	18.745	11.1	1.031	0.015563278	0.025022124	0.014321254	0.023144285
Art	13	1.429	2.343	18.868	52.763	0.158	5.235	17.99	10.676	0.986	0.015563278	0.025022124	0.014321254	0.023144285
Art	14	1.378	2.292	18.51	51.042	0.153	5.062	17.342	10.314	0.948	0.015563278	0.025022124	0.014321254	0.023144285
Art	15	1.332	2.247	18.2	49.551	0.149	4.912	16.781	9.999	0.915	0.015563278	0.025022124	0.014321254	0.023144285
Art	16	1.291	2.203	17.913	48.199	0.146	4.77	16.184	9.684	0.88	0.015563278	0.025022124	0.014321254	0.023144285
Art	17	1.253	2.165	17.66	47.005	0.142	4.645	15.657	9.405	0.849	0.015563278	0.025022124	0.014321254	0.023144285
Art	18	1.221	2.129	17.435	45.945	0.14	4.534	15.189	9.159	0.822	0.015563278	0.025022124	0.014321254	0.023144285
Art	19	1.192	2.098	17.233	44.996	0.137	4.434	14.77	8.938	0.798	0.015563278	0.025022124	0.014321254	0.023144285
Art	20	1.164	2.071	17.052	44.142	0.135	4.345	14.393	8.738	0.775	0.015563278	0.025022124	0.014321254	0.023144285
Art	21	1.141	2.046	16.901	43.357	0.133	4.26	14.013	8.543	0.754	0.015563278	0.025022124	0.014321254	0.023144285
Art	22	1.12	2.023	16.763	42.643	0.131	4.183	13.667	8.366	0.734	0.015563278	0.025022124	0.014321254	0.023144285
Art	23	1.1	2.002	16.637	41.992	0.129	4.114	13.352	8.204	0.716	0.015563278	0.025022124	0.014321254	0.023144285
Art	24	1.081	1.983	16.521	41.395	0.128	4.049	13.063	8.056	0.7	0.015563278	0.025022124	0.014321254	0.023144285
Art	25	1.065	1.965	16.416	40.845	0.126	3.99	12.797	7.92	0.685	0.015563278	0.025022124	0.014321254	0.023144285
Art	26	1.051	1.951	16.343	40.445	0.125	3.943	12.556	7.803	0.671	0.015563278	0.025022124	0.014321254	0.023144285
Art	27	1.038	1.938	16.277	40.075	0.124	3.899	12.332	7.695	0.659	0.015563278	0.025022124	0.014321254	0.023144285
Art	28	1.027	1.926	16.216	39.73	0.123	3.859	12.126	7.596	0.646	0.015563278	0.025022124	0.014321254	0.023144285
Art	29	1.016	1.915	16.158	39.41	0.122	3.821	11.932	7.503	0.636	0.015563278	0.025022124	0.014321254	0.023144285
Art	30	1.004	1.905	16.105	39.111	0.121	3.787	11.752	7.416	0.626	0.015563278	0.025022124	0.014321254	0.023144285
Art	31	0.994	1.902	16.106	38.769	0.12	3.747	11.568	7.324	0.615	0.015563278	0.025022124	0.014321254	0.023144285
Art	32	0.984	1.899	16.106	38.451	0.12	3.712	11.396	7.237	0.606	0.015563278	0.025022124	0.014321254	0.023144285
Art	33	0.974	1.896	16.107	38.15	0.119	3.677	11.234	7.155	0.597	0.015563278	0.025022124	0.014321254	0.023144285
Art	34	0.965	1.893	16.107	37.868	0.118	3.645	11.081	7.079	0.589	0.015563278	0.025022124	0.014321254	0.023144285
Art	35	0.957	1.89	16.108	37.602	0.117	3.614	10.937	7.006	0.581	0.015563278	0.025022124	0.014321254	0.023144285

2007

Ltype	Speed	VOC	NOX	CO	Benzene	MTBE	Butadiene	Formaldehyde	Acetaldehyde	Acrolein	PM10 ecarbon	PM10 exhaust	PM2.5 ecarbon	PM2.5 exhaust
Art	36	0.951	1.898	16.198	37.468	0.116	3.596	10.827	6.956	0.575	0.015563278	0.025022124	0.014321254	0.023144285
Art	37	0.945	1.906	16.283	37.34	0.116	3.579	10.723	6.91	0.569	0.015563278	0.025022124	0.014321254	0.023144285
Art	38	0.94	1.913	16.363	37.221	0.115	3.562	10.624	6.865	0.564	0.015563278	0.025022124	0.014321254	0.023144285
Art	39	0.934	1.92	16.44	37.107	0.115	3.546	10.53	6.823	0.558	0.015563278	0.025022124	0.014321254	0.023144285
Art	40	0.929	1.927	16.512	36.998	0.114	3.531	10.441	6.782	0.554	0.015563278	0.025022124	0.014321254	0.023144285
Art	41	0.924	1.941	16.608	36.881	0.114	3.516	10.36	6.744	0.549	0.015563278	0.025022124	0.014321254	0.023144285
Art	42	0.919	1.955	16.698	36.769	0.114	3.502	10.282	6.707	0.545	0.015563278	0.025022124	0.014321254	0.023144285
Art	43	0.915	1.969	16.784	36.662	0.113	3.488	10.207	6.672	0.541	0.015563278	0.025022124	0.014321254	0.023144285
Art	44	0.911	1.981	16.867	36.561	0.113	3.475	10.136	6.638	0.537	0.015563278	0.025022124	0.014321254	0.023144285
Art	45	0.907	1.993	16.946	36.463	0.113	3.463	10.069	6.607	0.533	0.015563278	0.025022124	0.014321254	0.023144285
Art	46	0.902	2.014	17.046	36.359	0.113	3.45	10.008	6.577	0.529	0.015563278	0.025022124	0.014321254	0.023144285
Art	47	0.898	2.035	17.142	36.258	0.112	3.439	9.951	6.548	0.526	0.015563278	0.025022124	0.014321254	0.023144285
Art	48	0.893	2.054	17.234	36.162	0.112	3.427	9.896	6.521	0.523	0.015563278	0.025022124	0.014321254	0.023144285
Art	49	0.889	2.072	17.322	36.071	0.112	3.416	9.843	6.494	0.52	0.015563278	0.025022124	0.014321254	0.023144285
Art	50	0.886	2.09	17.406	35.982	0.111	3.406	9.793	6.469	0.517	0.015563278	0.025022124	0.014321254	0.023144285
Art	51	0.881	2.12	17.512	35.887	0.111	3.396	9.75	6.446	0.515	0.015563278	0.025022124	0.014321254	0.023144285
Art	52	0.877	2.148	17.614	35.795	0.111	3.385	9.709	6.423	0.512	0.015563278	0.025022124	0.014321254	0.023144285
Art	53	0.873	2.176	17.712	35.707	0.111	3.375	9.669	6.402	0.51	0.015563278	0.025022124	0.014321254	0.023144285
Art	54	0.869	2.202	17.806	35.622	0.11	3.366	9.632	6.381	0.508	0.015563278	0.025022124	0.014321254	0.023144285
Art	55	0.865	2.228	17.897	35.54	0.11	3.358	9.595	6.361	0.506	0.015563278	0.025022124	0.014321254	0.023144285
Art	56	0.861	2.269	18.015	35.468	0.11	3.353	9.576	6.348	0.505	0.015563278	0.025022124	0.014321254	0.023144285
Art	57	0.858	2.309	18.128	35.397	0.11	3.347	9.558	6.335	0.503	0.015563278	0.025022124	0.014321254	0.023144285
Art	58	0.855	2.347	18.238	35.329	0.109	3.343	9.54	6.322	0.502	0.015563278	0.025022124	0.014321254	0.023144285
Art	59	0.852	2.384	18.345	35.264	0.109	3.338	9.523	6.31	0.501	0.015563278	0.025022124	0.014321254	0.023144285
Art	60	0.849	2.419	18.448	35.2	0.109	3.334	9.507	6.298	0.5	0.015563278	0.025022124	0.014321254	0.023144285
Art	61	0.847	2.476	18.574	35.134	0.109	3.331	9.501	6.291	0.499	0.015563278	0.025022124	0.014321254	0.023144285
Art	62	0.844	2.531	18.698	35.069	0.109	3.327	9.496	6.282	0.499	0.015563278	0.025022124	0.014321254	0.023144285
Art	63	0.842	2.585	18.817	35.007	0.109	3.323	9.49	6.275	0.498	0.015563278	0.025022124	0.014321254	0.023144285
Art	64	0.84	2.637	18.933	34.946	0.108	3.32	9.486	6.268	0.497	0.015563278	0.025022124	0.014321254	0.023144285
Art	65	0.838	2.687	19.045	34.887	0.108	3.317	9.48	6.26	0.497	0.015563278	0.025022124	0.014321254	0.023144285
Local		1.37	1.986	16.339	48.626	0.147	4.9	17.406	10.146	0.95	0.015563278	0.025022124	0.014321254	0.023144285
Ramp		1.075	2.048	21.335	44.566	0.137	4.202	12.324	8.054	0.654	0.015563278	0.025022124	0.014321254	0.023144285

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Ltype	Speed	VOC	NOX	CO	Benzene	MTBE	Butadiene	Formaldehyde	Acetaldehyde	Acrolein	PM10 ecarbon	PM10 exhaust	PM2.5 ecarbon	PM2.5 exhaust	CO2
Fwy	3	2.031	0.747	23.308	41.277	0	4.483	13.677	10.342	0.731	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	4	1.436	0.709	19.764	35.235	0	3.85	12.11	8.98	0.64	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	5	1.08	0.687	17.639	31.609	0	3.47	11.17	8.163	0.586	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	6	0.924	0.625	15.989	27.95	0	3.078	10.053	7.279	0.525	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	7	0.814	0.582	14.81	25.336	0	2.798	9.256	6.648	0.481	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	8	0.731	0.549	13.926	23.376	0	2.588	8.658	6.175	0.449	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	9	0.667	0.524	13.239	21.851	0	2.425	8.193	5.807	0.424	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	10	0.615	0.503	12.688	20.631	0	2.295	7.821	5.512	0.404	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	11	0.578	0.48	12.256	19.447	0	2.164	7.377	5.197	0.38	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	12	0.547	0.459	11.896	18.46	0	2.056	7.008	4.935	0.361	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	13	0.522	0.442	11.591	17.626	0	1.964	6.696	4.713	0.345	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	14	0.5	0.428	11.33	16.91	0	1.886	6.428	4.522	0.33	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	15	0.481	0.415	11.103	16.289	0	1.817	6.196	4.358	0.318	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	16	0.468	0.416	11.011	16.058	0	1.785	6.015	4.263	0.31	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	17	0.458	0.416	10.931	15.854	0	1.756	5.856	4.179	0.303	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	18	0.449	0.417	10.86	15.672	0	1.731	5.715	4.105	0.296	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	19	0.44	0.417	10.796	15.51	0	1.708	5.588	4.038	0.29	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	20	0.432	0.417	10.738	15.364	0	1.688	5.474	3.978	0.284	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	21	0.425	0.418	10.685	15.229	0	1.668	5.354	3.917	0.279	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	22	0.42	0.418	10.637	15.105	0	1.65	5.245	3.863	0.274	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	23	0.414	0.418	10.593	14.993	0	1.633	5.146	3.813	0.269	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	24	0.409	0.419	10.552	14.889	0	1.618	5.055	3.766	0.265	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	25	0.405	0.419	10.516	14.794	0	1.605	4.971	3.724	0.261	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	26	0.399	0.419	10.482	14.705	0	1.591	4.887	3.682	0.257	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	27	0.396	0.419	10.451	14.623	0	1.578	4.809	3.644	0.253	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	28	0.392	0.42	10.422	14.546	0	1.567	4.737	3.608	0.25	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	29	0.388	0.42	10.396	14.475	0	1.556	4.669	3.574	0.247	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	30	0.385	0.42	10.37	14.408	0	1.546	4.607	3.544	0.244	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	31	0.382	0.42	10.371	14.313	0	1.532	4.54	3.507	0.241	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	32	0.378	0.421	10.373	14.222	0	1.52	4.477	3.472	0.238	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	33	0.375	0.421	10.374	14.138	0	1.509	4.418	3.441	0.235	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	34	0.372	0.421	10.375	14.059	0	1.498	4.362	3.41	0.232	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	35	0.369	0.421	10.376	13.984	0	1.488	4.31	3.381	0.229	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	36	0.366	0.422	10.443	13.956	0	1.482	4.269	3.364	0.227	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	37	0.364	0.424	10.507	13.929	0	1.477	4.231	3.346	0.225	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	38	0.363	0.425	10.567	13.905	0	1.473	4.195	3.331	0.224	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	39	0.361	0.426	10.625	13.881	0	1.468	4.161	3.316	0.222	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	40	0.359	0.427	10.679	13.859	0	1.464	4.128	3.301	0.221	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	41	0.358	0.429	10.748	13.836	0	1.459	4.1	3.288	0.22	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	42	0.356	0.431	10.815	13.815	0	1.455	4.071	3.275	0.218	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	43	0.355	0.433	10.878	13.794	0	1.451	4.045	3.262	0.217	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	44	0.354	0.435	10.939	13.774	0	1.448	4.02	3.251	0.216	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	45	0.353	0.437	10.995	13.755	0	1.444	3.996	3.24	0.215	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	46	0.351	0.439	11.067	13.736	0	1.441	3.976	3.23	0.214	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	47	0.35	0.441	11.136	13.718	0	1.439	3.957	3.221	0.213	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	48	0.349	0.444	11.202	13.7	0	1.436	3.938	3.212	0.212	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	49	0.347	0.446	11.265	13.683	0	1.432	3.92	3.203	0.211	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	50	0.346	0.448	11.325	13.667	0	1.43	3.903	3.195	0.21	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	51	0.345	0.451	11.399	13.651	0	1.428	3.89	3.189	0.21	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	52	0.344	0.454	11.471	13.634	0	1.425	3.877	3.182	0.209	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	53	0.342	0.456	11.539	13.619	0	1.423	3.864	3.175	0.208	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	54	0.341	0.459	11.605	13.604	0	1.421	3.853	3.169	0.208	0.001267528	0.001955022	0.000634248	0.001025067	563.257

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Ltype	Speed	VOC	NOX	CO	Benzene	MTBE	Butadiene	Formaldehyde	Acetaldehyde	Acrolein	PM10 ecarbon	PM10 exhaust	PM2.5 ecarbon	PM2.5 exhaust	CO2
Fwy	55	0.339	0.462	11.669	13.59	0	1.419	3.842	3.163	0.207	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	56	0.338	0.465	11.751	13.587	0	1.421	3.843	3.163	0.207	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	57	0.338	0.469	11.83	13.583	0	1.423	3.843	3.163	0.207	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	58	0.337	0.472	11.905	13.58	0	1.424	3.844	3.162	0.207	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	59	0.336	0.475	11.979	13.576	0	1.426	3.845	3.162	0.206	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	60	0.336	0.478	12.05	13.574	0	1.427	3.846	3.162	0.206	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	61	0.335	0.483	12.136	13.572	0	1.429	3.852	3.164	0.206	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	62	0.335	0.488	12.219	13.57	0	1.431	3.858	3.166	0.206	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	63	0.334	0.492	12.3	13.568	0	1.433	3.864	3.168	0.206	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	64	0.334	0.496	12.378	13.566	0	1.435	3.869	3.169	0.206	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Fwy	65	0.334	0.5	12.454	13.565	0	1.436	3.874	3.17	0.206	0.001267528	0.001955022	0.000634248	0.001025067	563.257
Art	3	1.98	0.734	23.013	40.594	0	4.403	13.48	10.179	0.719	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	4	1.401	0.696	19.514	34.64	0	3.78	11.934	8.836	0.63	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	5	1.055	0.674	17.415	31.068	0	3.406	11.006	8.031	0.577	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	6	0.914	0.636	15.975	28.03	0	3.074	10.017	7.275	0.523	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	7	0.813	0.609	14.946	25.861	0	2.837	9.31	6.735	0.485	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	8	0.738	0.589	14.175	24.234	0	2.659	8.779	6.33	0.457	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	9	0.678	0.573	13.575	22.968	0	2.52	8.367	6.015	0.435	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	10	0.632	0.56	13.095	21.956	0	2.41	8.037	5.763	0.417	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	11	0.598	0.541	12.696	20.886	0	2.291	7.619	5.472	0.396	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	12	0.569	0.525	12.362	19.994	0	2.192	7.27	5.23	0.378	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	13	0.545	0.511	12.08	19.24	0	2.108	6.976	5.025	0.363	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	14	0.524	0.499	11.839	18.594	0	2.036	6.723	4.849	0.35	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	15	0.506	0.489	11.629	18.032	0	1.974	6.503	4.697	0.338	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	16	0.489	0.48	11.439	17.532	0	1.916	6.272	4.548	0.327	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	17	0.474	0.472	11.273	17.091	0	1.866	6.067	4.417	0.316	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	18	0.461	0.464	11.124	16.699	0	1.82	5.886	4.301	0.306	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	19	0.45	0.457	10.992	16.348	0	1.78	5.723	4.196	0.298	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	20	0.439	0.452	10.872	16.031	0	1.744	5.577	4.102	0.291	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	21	0.43	0.447	10.769	15.742	0	1.71	5.428	4.01	0.283	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	22	0.422	0.442	10.677	15.479	0	1.679	5.293	3.927	0.277	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	23	0.414	0.438	10.592	15.239	0	1.65	5.169	3.852	0.271	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	24	0.407	0.434	10.513	15.019	0	1.624	5.056	3.783	0.265	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	25	0.401	0.43	10.442	14.817	0	1.599	4.953	3.718	0.26	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	26	0.395	0.427	10.397	14.67	0	1.581	4.857	3.665	0.255	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	27	0.39	0.424	10.356	14.535	0	1.563	4.77	3.617	0.251	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	28	0.386	0.421	10.318	14.408	0	1.547	4.689	3.571	0.247	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	29	0.381	0.419	10.281	14.292	0	1.532	4.612	3.529	0.243	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	30	0.377	0.416	10.248	14.182	0	1.518	4.542	3.489	0.24	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	31	0.373	0.415	10.247	14.073	0	1.504	4.473	3.45	0.237	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	32	0.37	0.414	10.246	13.97	0	1.491	4.408	3.413	0.233	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	33	0.366	0.413	10.245	13.874	0	1.478	4.347	3.379	0.23	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	34	0.362	0.413	10.244	13.783	0	1.467	4.29	3.347	0.228	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	35	0.359	0.412	10.243	13.698	0	1.456	4.236	3.316	0.225	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	36	0.357	0.413	10.309	13.671	0	1.45	4.196	3.299	0.223	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	37	0.355	0.415	10.373	13.645	0	1.445	4.159	3.282	0.221	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	38	0.354	0.416	10.433	13.622	0	1.441	4.123	3.267	0.22	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	39	0.352	0.417	10.49	13.599	0	1.436	4.089	3.251	0.218	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	40	0.35	0.418	10.543	13.578	0	1.432	4.057	3.237	0.217	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	41	0.349	0.42	10.612	13.555	0	1.428	4.029	3.224	0.216	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	42	0.347	0.422	10.678	13.535	0	1.424	4.001	3.211	0.214	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	43	0.346	0.424	10.74	13.515	0	1.42	3.976	3.199	0.213	0.001267528	0.001955022	0.000634248	0.001025067	562.489

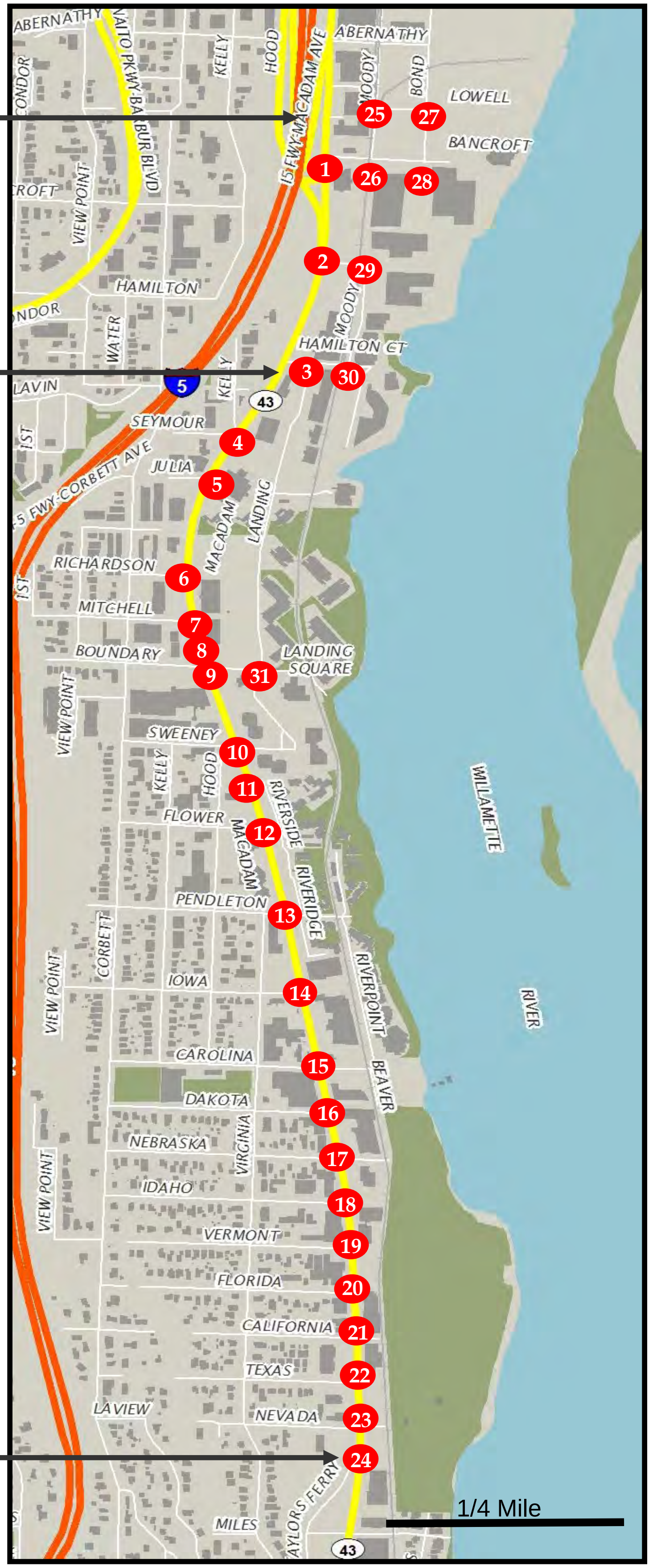
2035

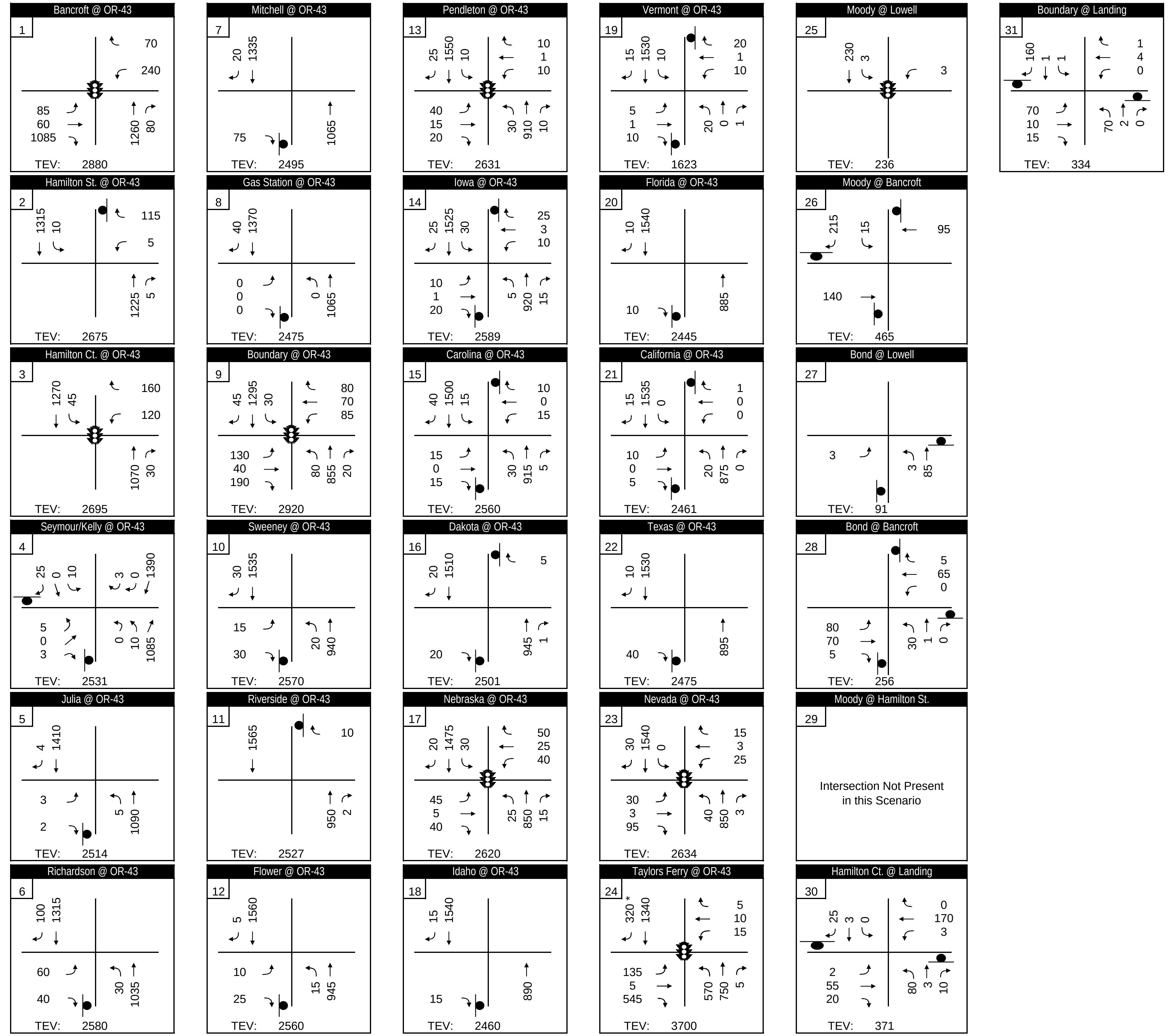
Ltype	Speed	VOC	NOX	CO	Benzene	MTBE	Butadiene	Formaldehyde	Acetaldehyde	Acrolein	PM10 ecarbon	PM10 exhaust	PM2.5 ecarbon	PM2.5 exhaust	CO2
Art	44	0.345	0.426	10.801	13.496	0	1.417	3.951	3.188	0.212	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	45	0.344	0.428	10.857	13.478	0	1.413	3.927	3.177	0.211	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	46	0.342	0.43	10.928	13.459	0	1.41	3.908	3.168	0.21	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	47	0.341	0.432	10.996	13.442	0	1.407	3.889	3.159	0.209	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	48	0.34	0.435	11.061	13.425	0	1.404	3.87	3.15	0.208	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	49	0.338	0.437	11.123	13.409	0	1.401	3.852	3.142	0.207	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	50	0.337	0.439	11.184	13.393	0	1.399	3.836	3.134	0.206	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	51	0.336	0.442	11.257	13.378	0	1.397	3.823	3.128	0.206	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	52	0.335	0.445	11.328	13.363	0	1.394	3.81	3.121	0.205	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	53	0.333	0.447	11.395	13.348	0	1.392	3.798	3.115	0.204	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	54	0.332	0.45	11.46	13.334	0	1.39	3.787	3.109	0.204	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	55	0.331	0.453	11.524	13.32	0	1.388	3.776	3.102	0.203	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	56	0.33	0.456	11.605	13.318	0	1.39	3.777	3.102	0.203	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	57	0.33	0.46	11.683	13.315	0	1.392	3.778	3.102	0.203	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	58	0.329	0.463	11.758	13.313	0	1.393	3.779	3.102	0.203	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	59	0.328	0.466	11.831	13.31	0	1.395	3.78	3.102	0.202	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	60	0.328	0.469	11.902	13.307	0	1.396	3.781	3.102	0.202	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	61	0.327	0.474	11.987	13.306	0	1.399	3.787	3.104	0.202	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	62	0.327	0.478	12.069	13.305	0	1.401	3.793	3.106	0.202	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	63	0.326	0.482	12.149	13.304	0	1.403	3.799	3.108	0.202	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	64	0.326	0.486	12.226	13.303	0	1.405	3.804	3.109	0.202	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Art	65	0.326	0.491	12.302	13.302	0	1.406	3.809	3.111	0.202	0.001267528	0.001955022	0.000634248	0.001025067	562.489
Local		0.532	0.415	11.069	18.436	0	2.035	6.867	4.88	0.355	0.001267528	0.001955022	0.000634248	0.001025067	562.459
Ramp		0.39	0.484	12.745	15.267	0	1.607	4.569	3.642	0.246	0.001267528	0.001955022	0.000634248	0.001025067	562.955

Appendix B: Traffic Data Used in CAL3QHC Model

SEGMENT 2
SOUTH WATERFRONT

SEGMENT 3
JOHNS LANDING





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

Traffic Signal
STOP - Controlled Approach
YIELD - Controlled Approach

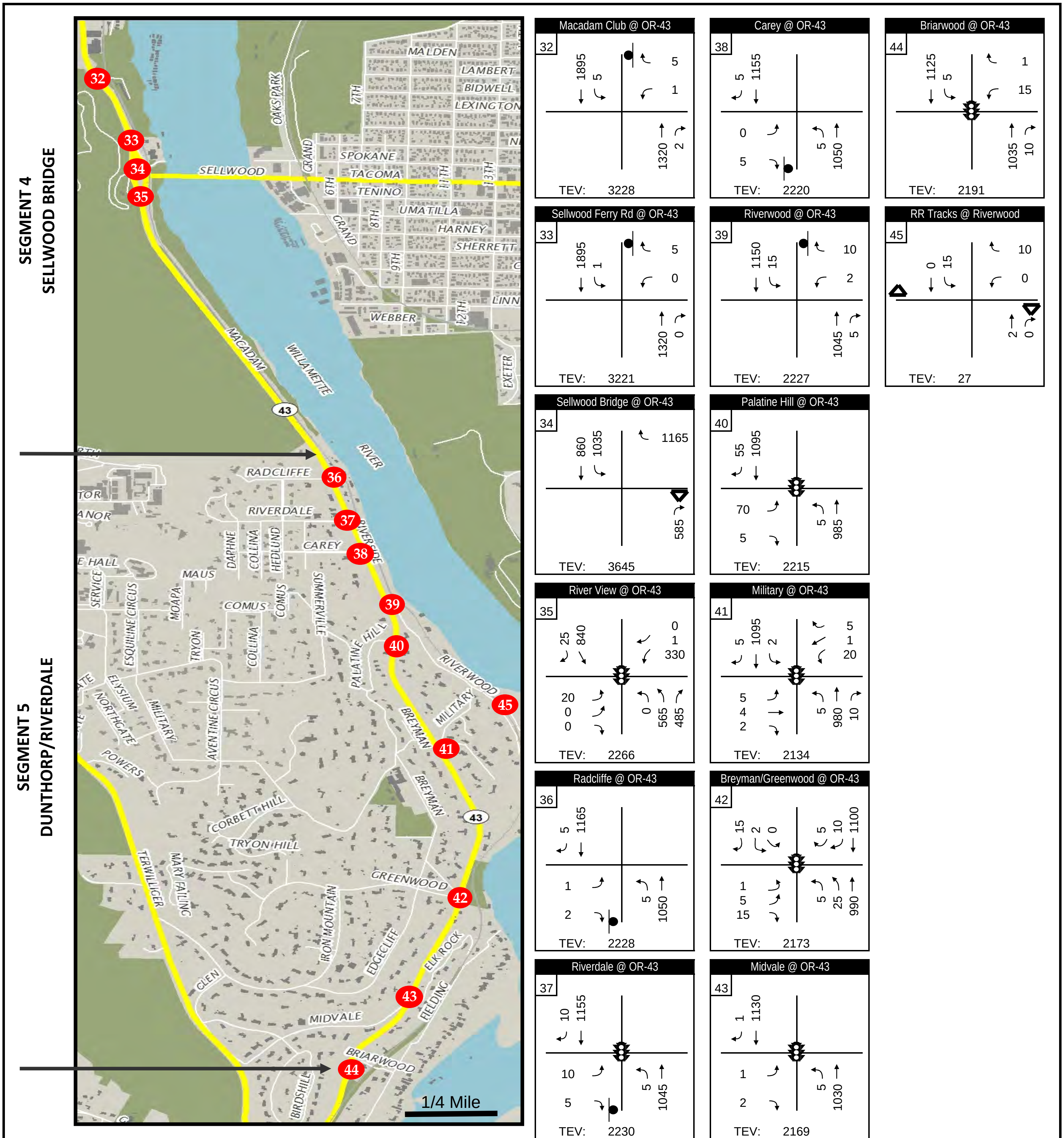
TEV: Total Entering Volume
← Available Turning Movement
\#\# 1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north of the intersection and the right-turn at the signal.

FIGURE

Northern Section (Segments 2 and 3)
Existing PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

	Traffic Signal	TEV:	Total Entering Volume
	STOP - Controlled Approach	←	Available Turning Movement
	YIELD - Controlled Approach	##	1-Hour PM Peak Volume

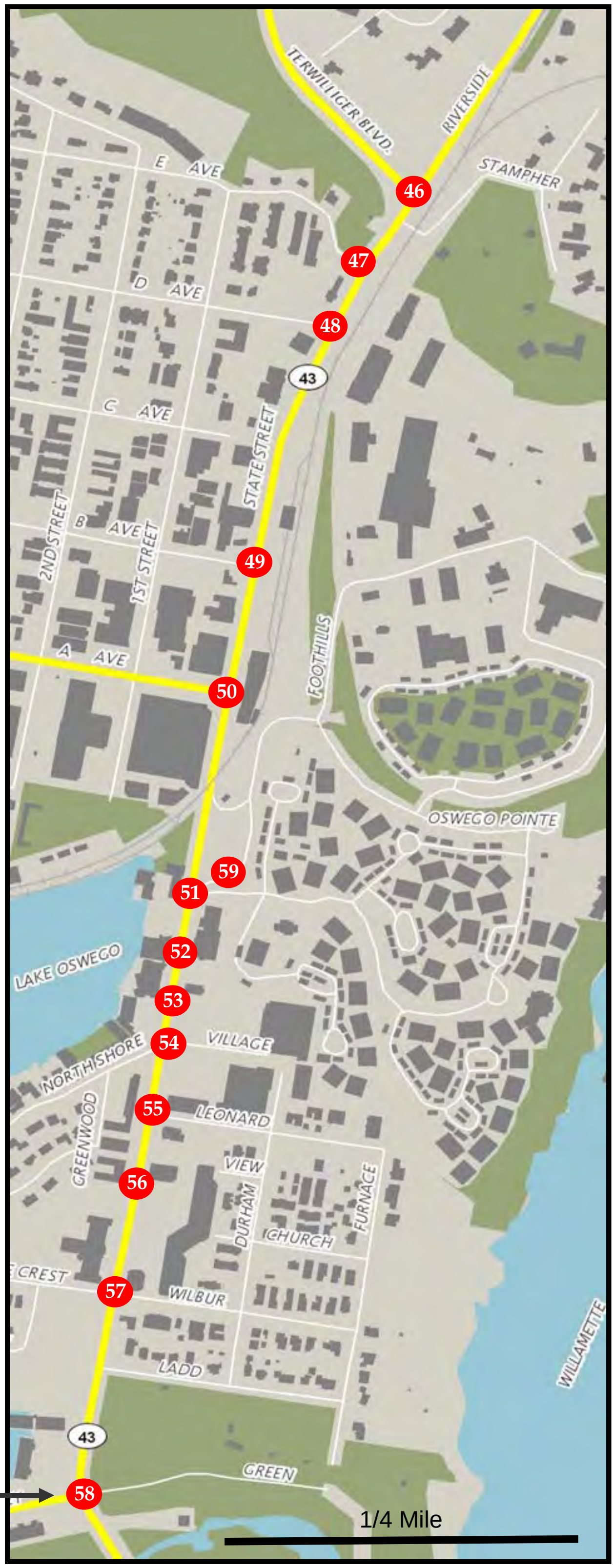
NOTE: Volumes greater than 5 are rounded to the nearest 5.

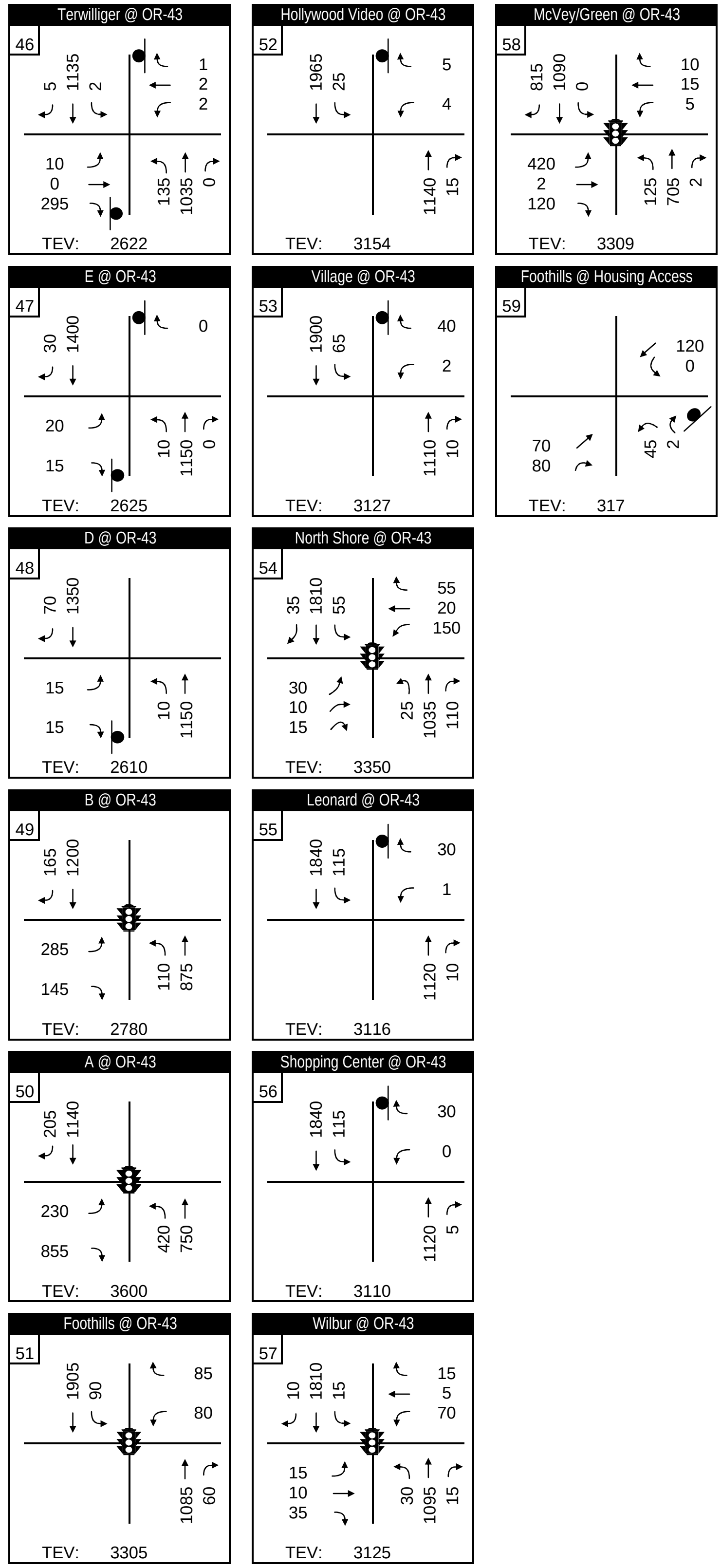
FIGURE

Center Section (Segments 4 and 5)
Existing PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010

SEGMENT 6
LAKE OSWEGO





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland
TRANSIT PROJECT

Legend

	Traffic Signal	TEV:	Total Entering Volume
	STOP - Controlled Approach	←	Available Turning Movement
	YIELD - Controlled Approach	##	1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.

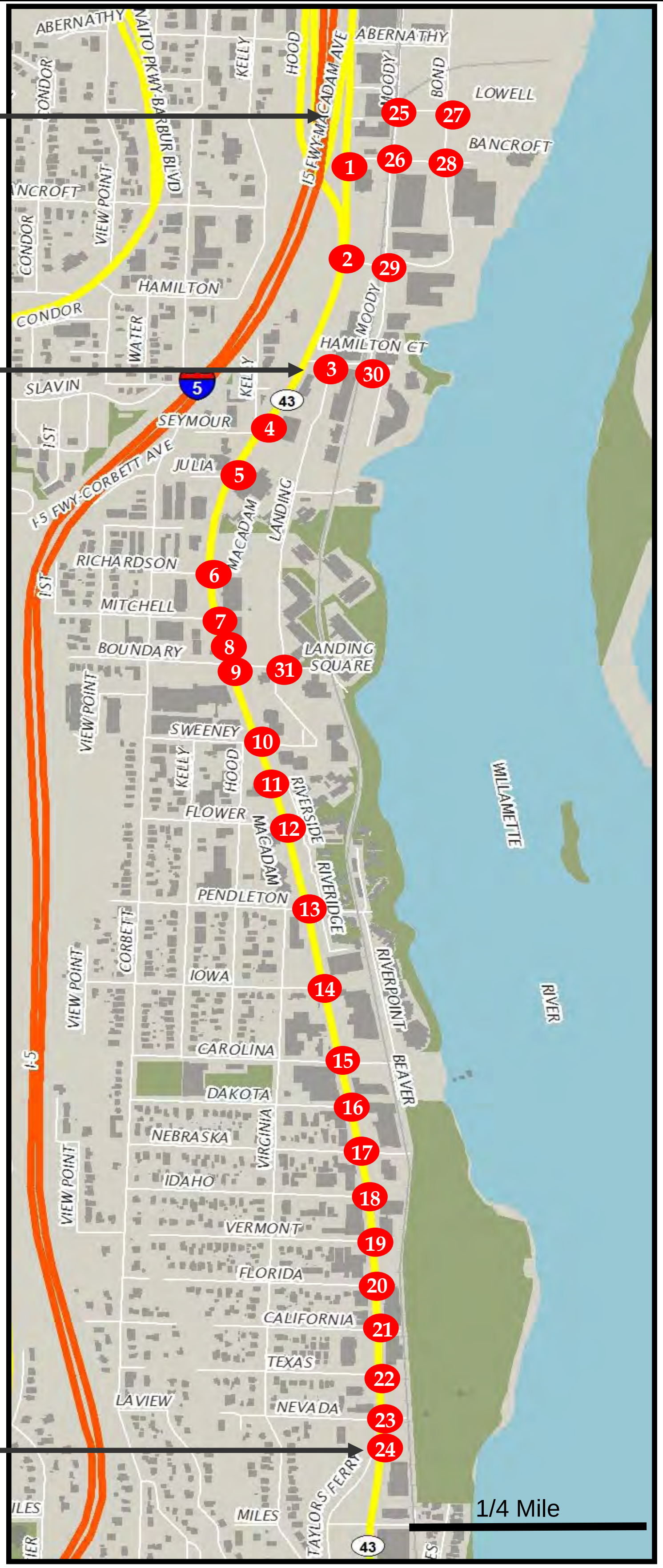
FIGURE

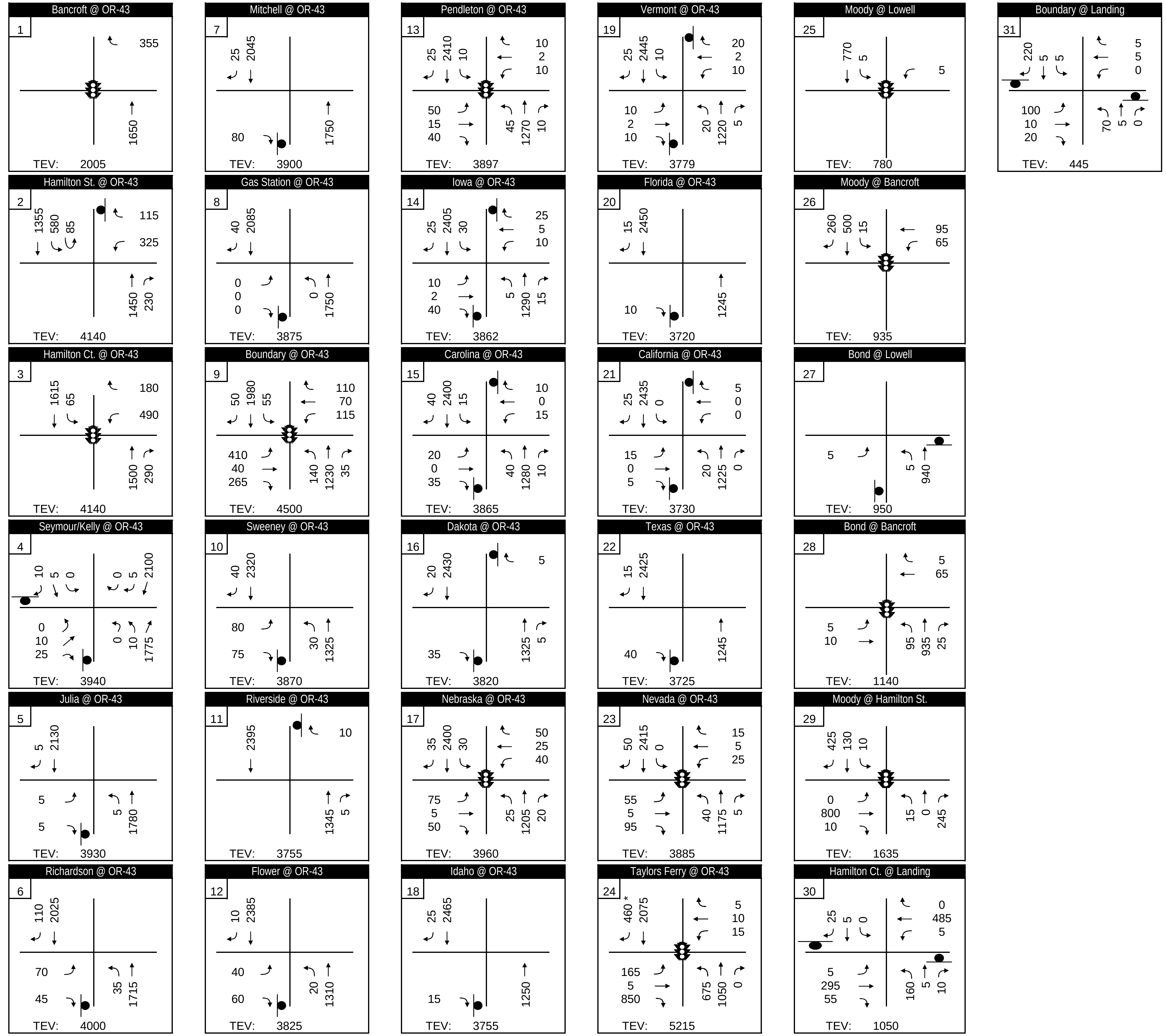
Southern Section (Segment 6)
Existing PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010

SEGMENT 2
SOUTH WATERFRONT

SEGMENT 3
JOHNS LANDING





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland
TRANSIT PROJECT

Legend

Traffic Signal
STOP - Controlled Approach
YIELD - Controlled Approach

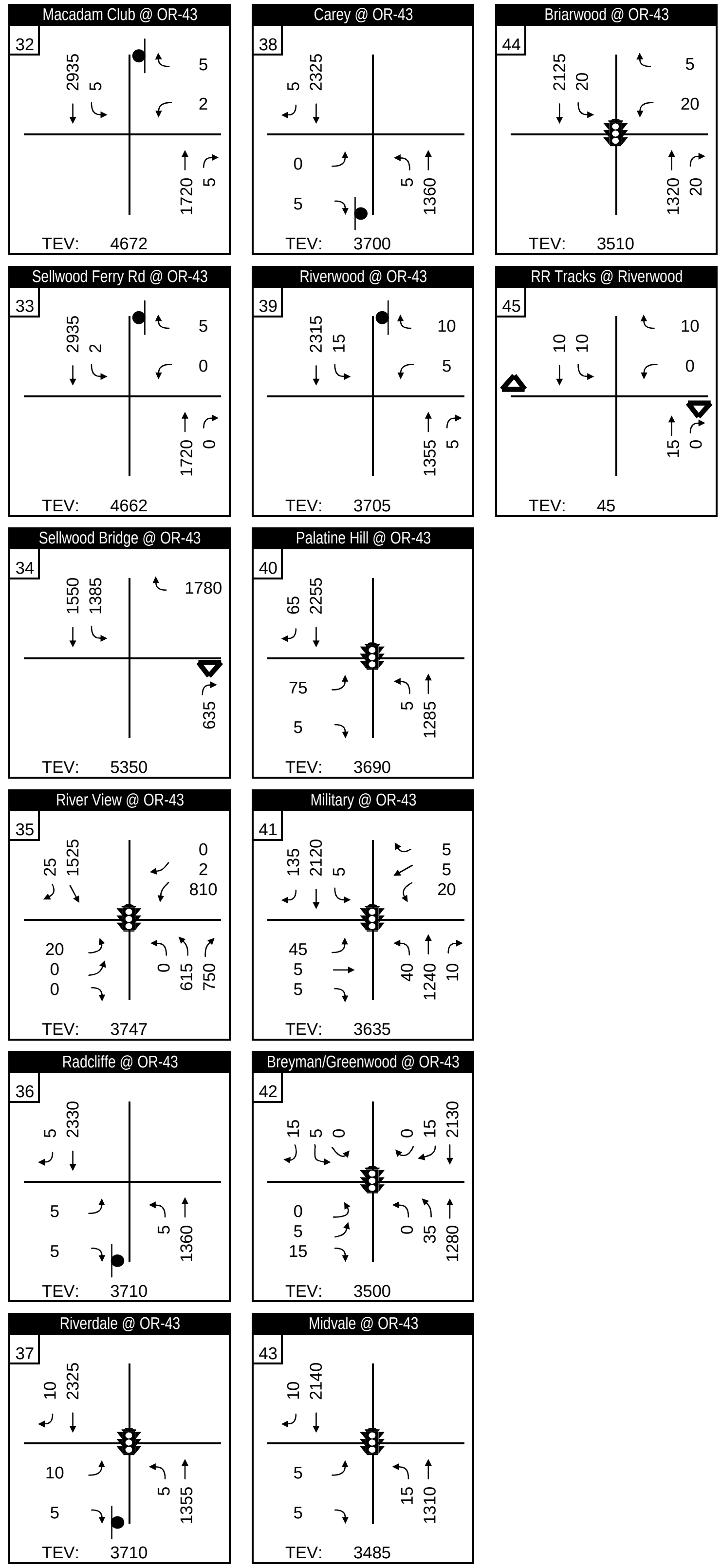
TEV: Total Entering Volume
← Available Turning Movement
1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north of the intersection and the right-turn at the signal.

FIGURE

Northern Section (Segments 2 and 3)
2035 No-Build PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

	Traffic Signal	TEV:	Total Entering Volume
	STOP - Controlled Approach	←	Available Turning Movement
	YIELD - Controlled Approach	##	1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.

FIGURE

Center Section (Segments 4 and 5)
2035 No-Build PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010

SEGMENT 6
LAKE OSWEGO

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Lake Oswego to Portland TRANSIT PROJECT

Legend

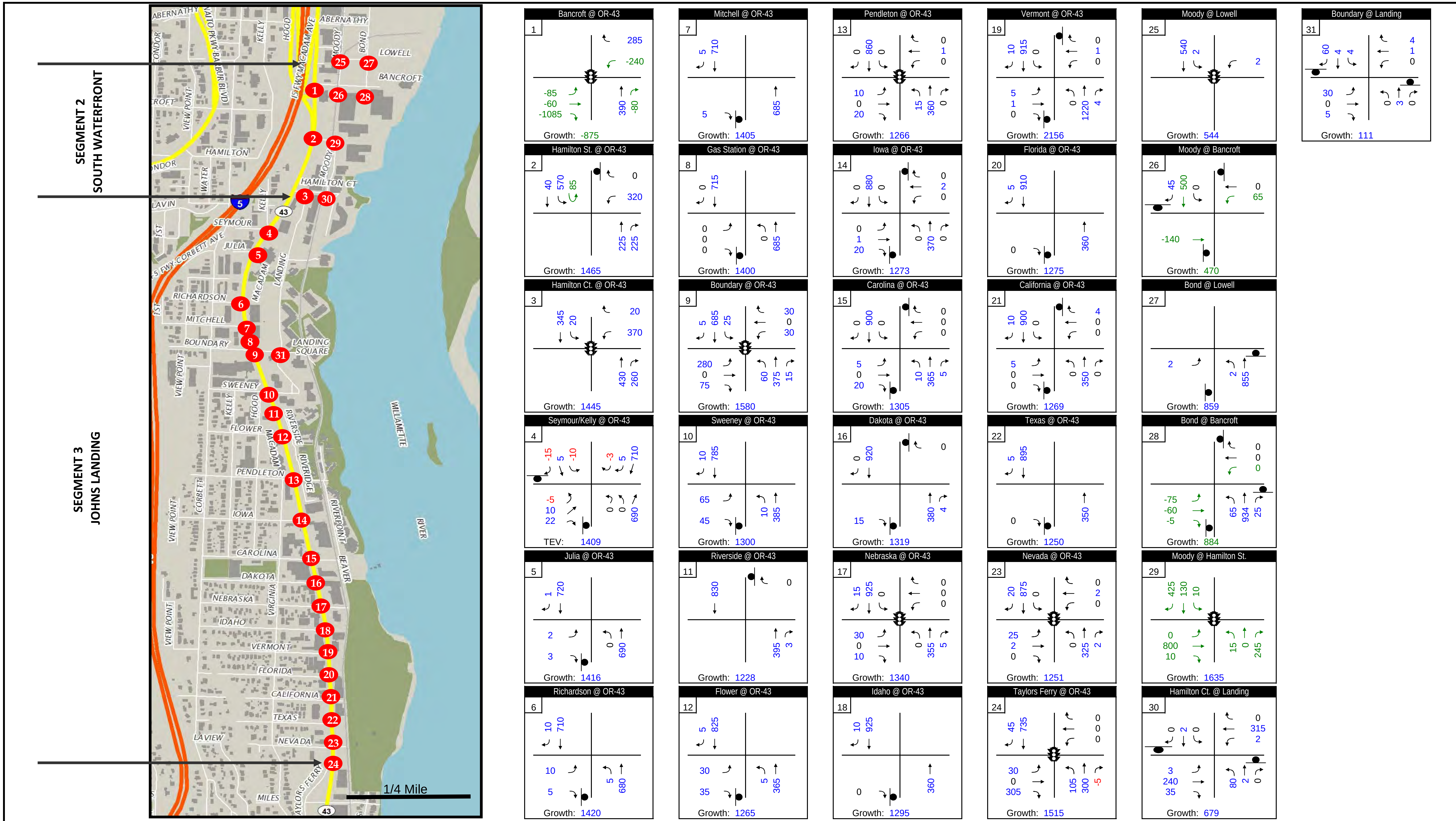
Traffic Signal		TEV:	Total Entering Volume
STOP - Controlled Approach		←	Available Turning Movement
YIELD - Controlled Approach		##	1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.

FIGURE

Southern Section (Segment 6)
2035 No-Build PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

- Traffic Signal
- STOP - Controlled Approach
- YIELD - Controlled Approach

Growth Total Entering Volume

← Available Turning Movement

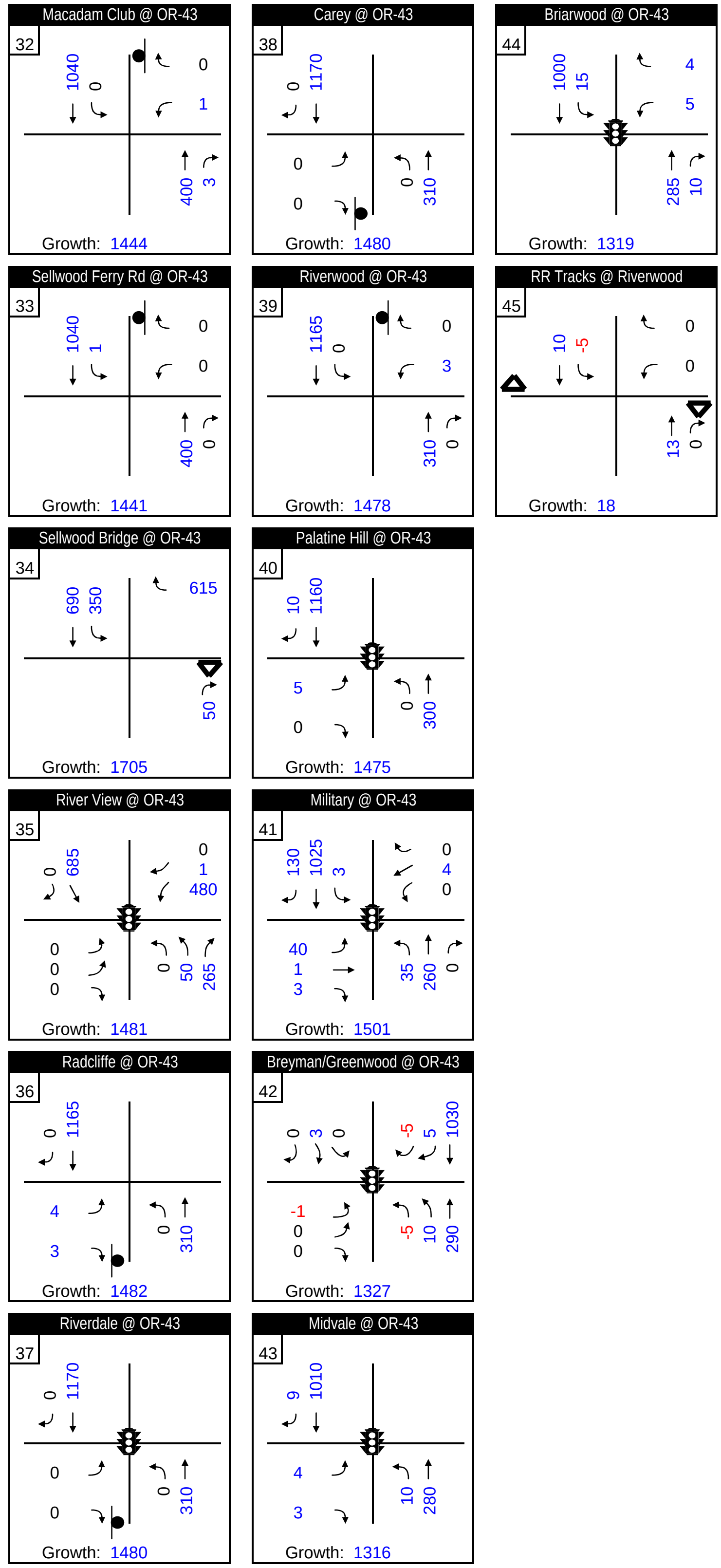
1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north and the right-turn through the signal.

FIGURE

Northern Section
PM Peak Hour
Volume Growth (Existing to No-Build)

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland
TRANSIT PROJECT

Legend

- Traffic Signal
- STOP - Controlled Approach
- YIELD - Controlled Approach

Growth: Total Entering Volume

← Available Turning Movement

\## 1-Hour PM Peak Volume

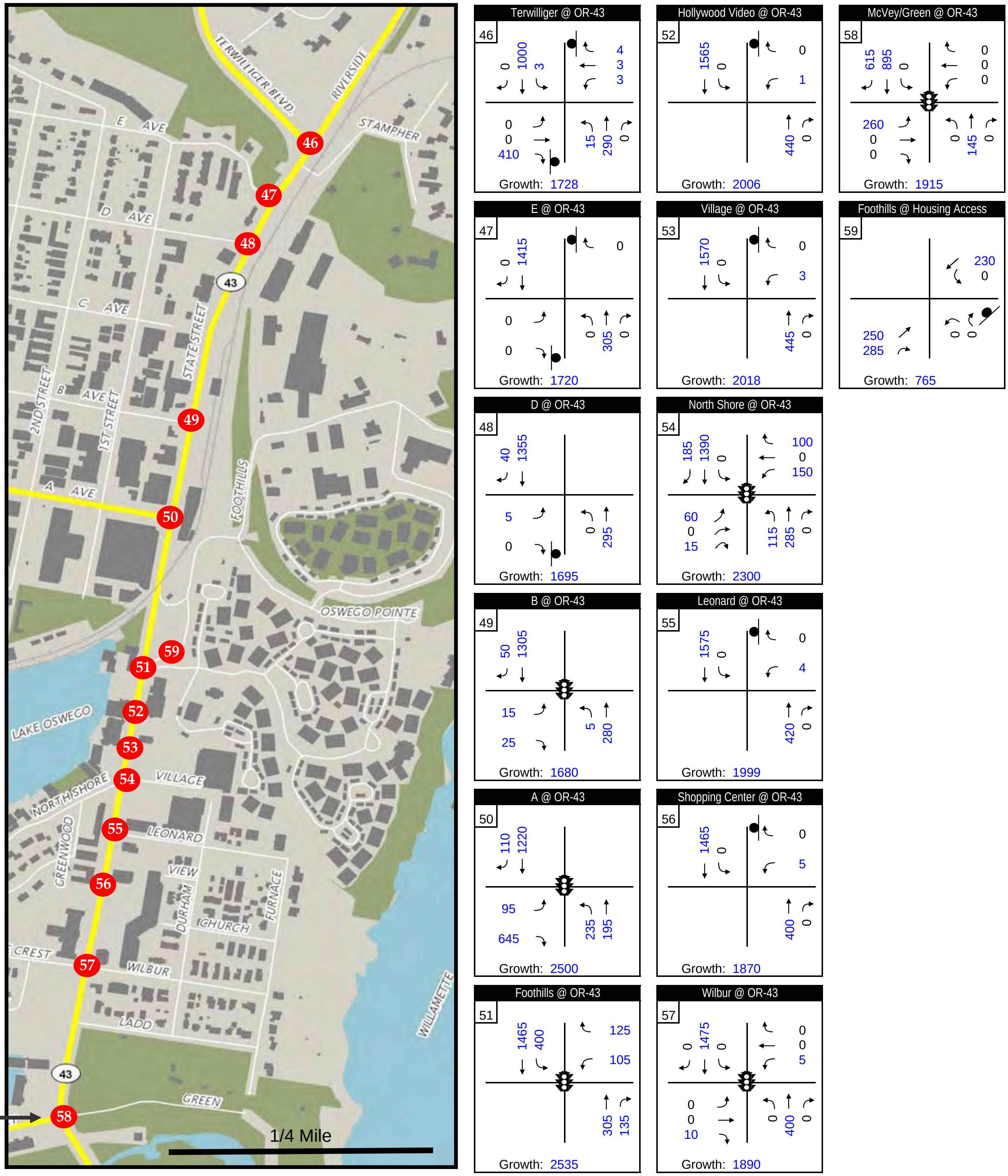
NOTE: Volumes greater than 5 are rounded to the nearest 5.

FIGURE

Center Section
PM Peak Hour
Volume Growth (Existing to No-Build)

Last updated: April 19, 2010

SEGMENT 6
LAKE OSWEGO



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

Traffic Signal

STOP - Controlled Approach

YIELD - Controlled Approach

Growth: Total Entering Volume

← Available Turning Movement

\## 1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.

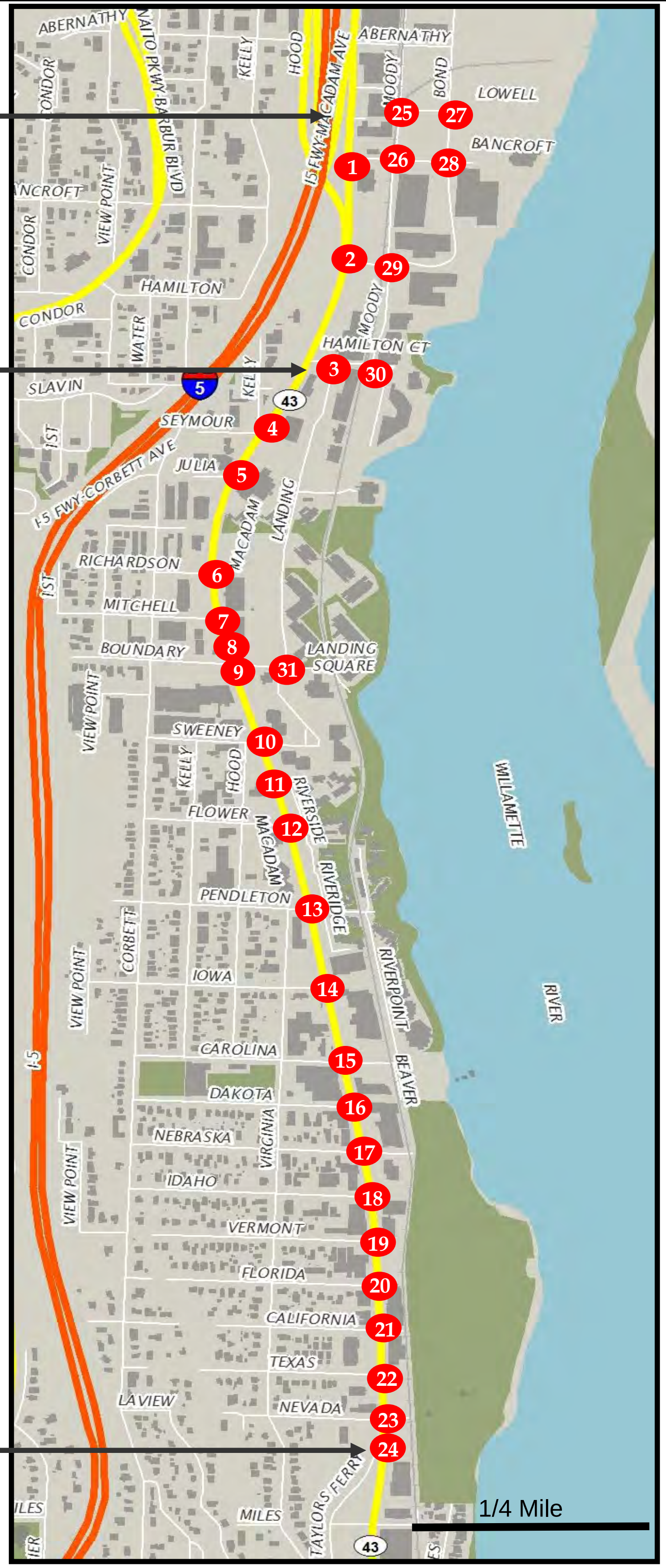
FIGURE

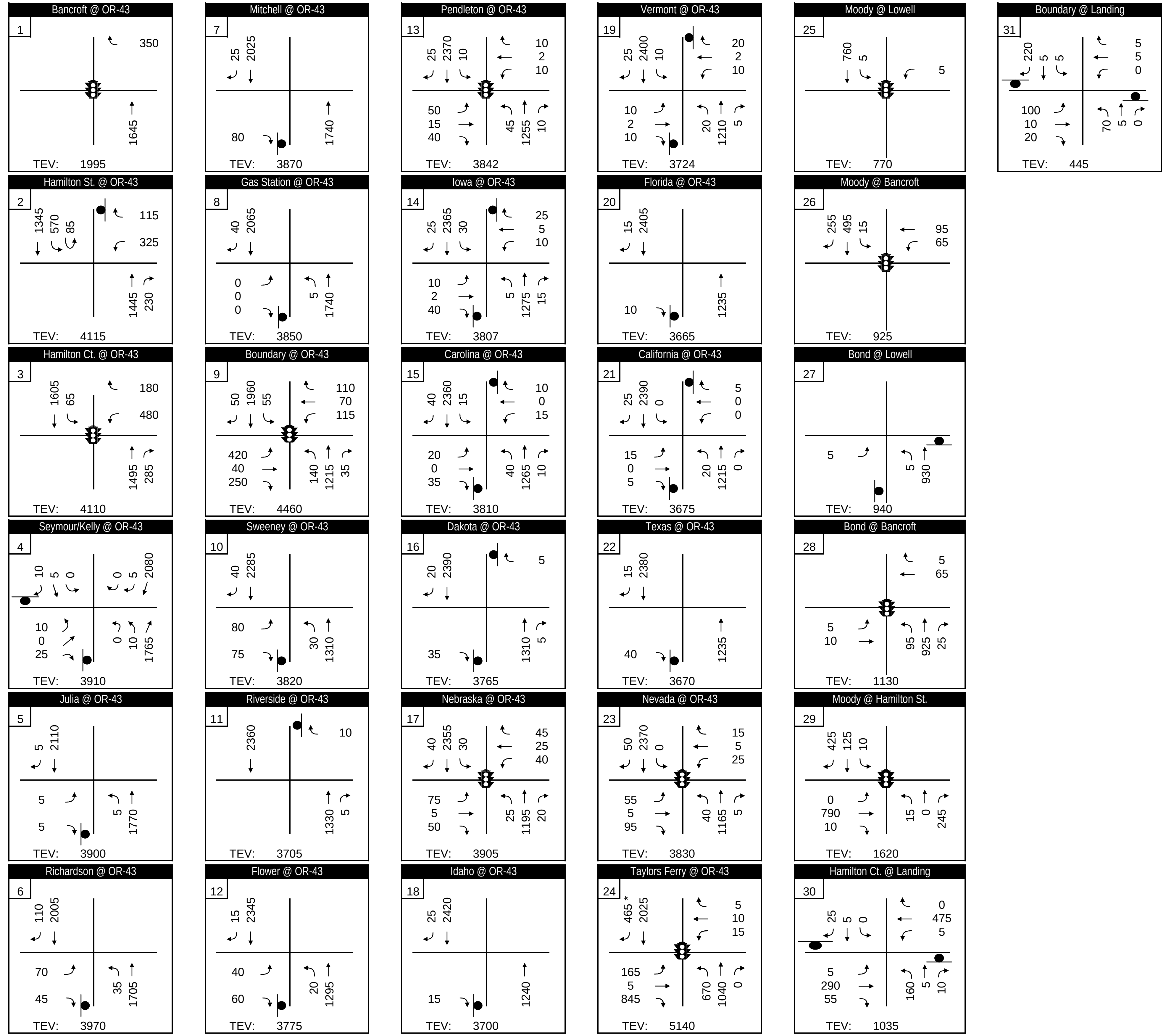
Southern Section
PM Peak Hour
Volume Growth (Existing to No-Build)

Last updated: April 19, 2010

SEGMENT 2
SOUTH WATERFRONT

SEGMENT 3
JOHNS LANDING





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland
TRANSIT PROJECT

Legend

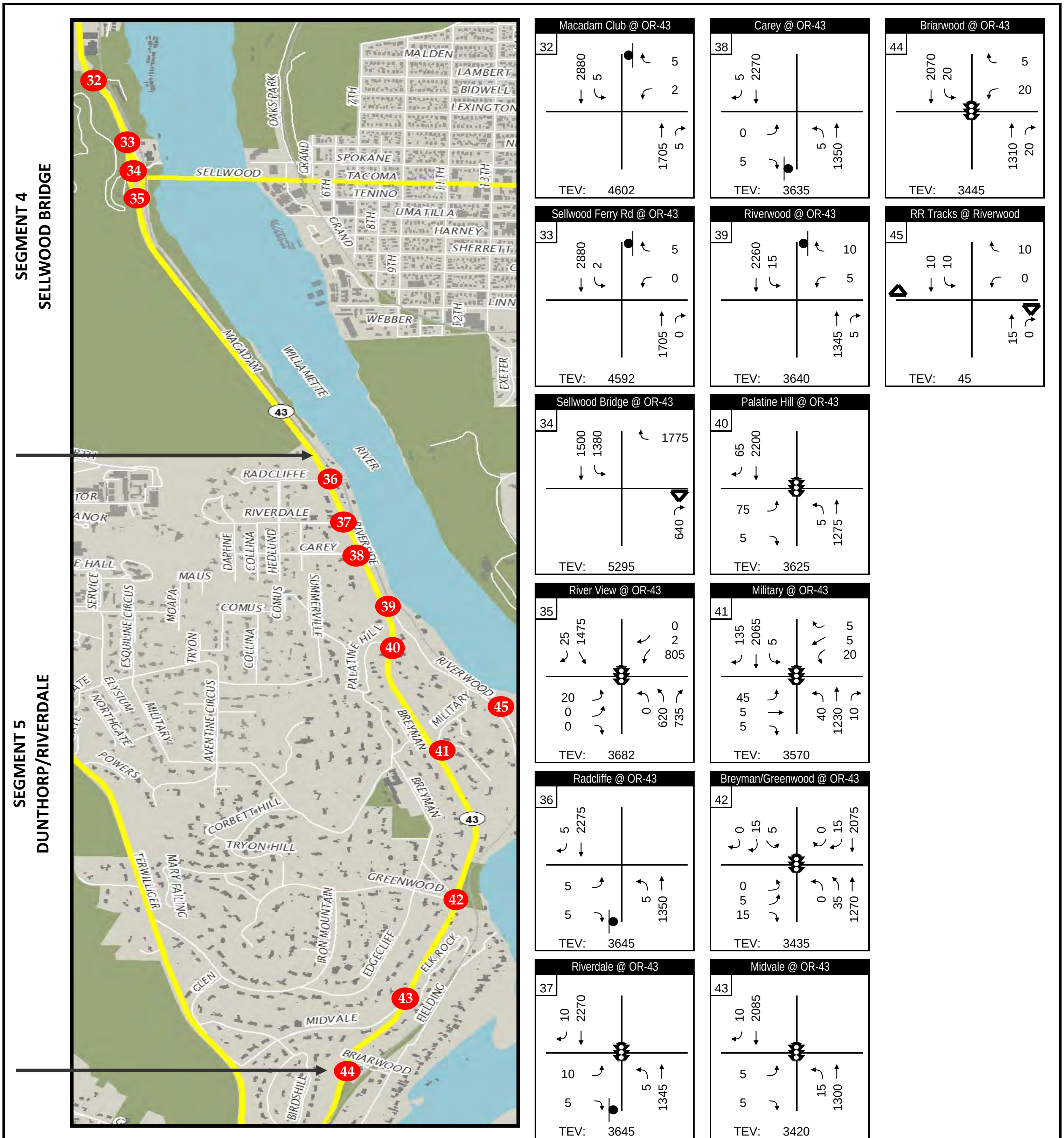
Traffic Signal
STOP - Controlled Approach
YIELD - Controlled Approach

TEV: Total Entering Volume
Available Turning Movement
1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north of the intersection and the right-turn at the signal.

FIGURE
Northern Section (Segments 2 and 3)
2035 Build In-Street and Additional Lane
PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

	Traffic Signal	TEV:	Total Entering Volume
	STOP - Controlled Approach	←	Available Turning Movement
	YIELD - Controlled Approach	##	1-Hour PM Peak Volume

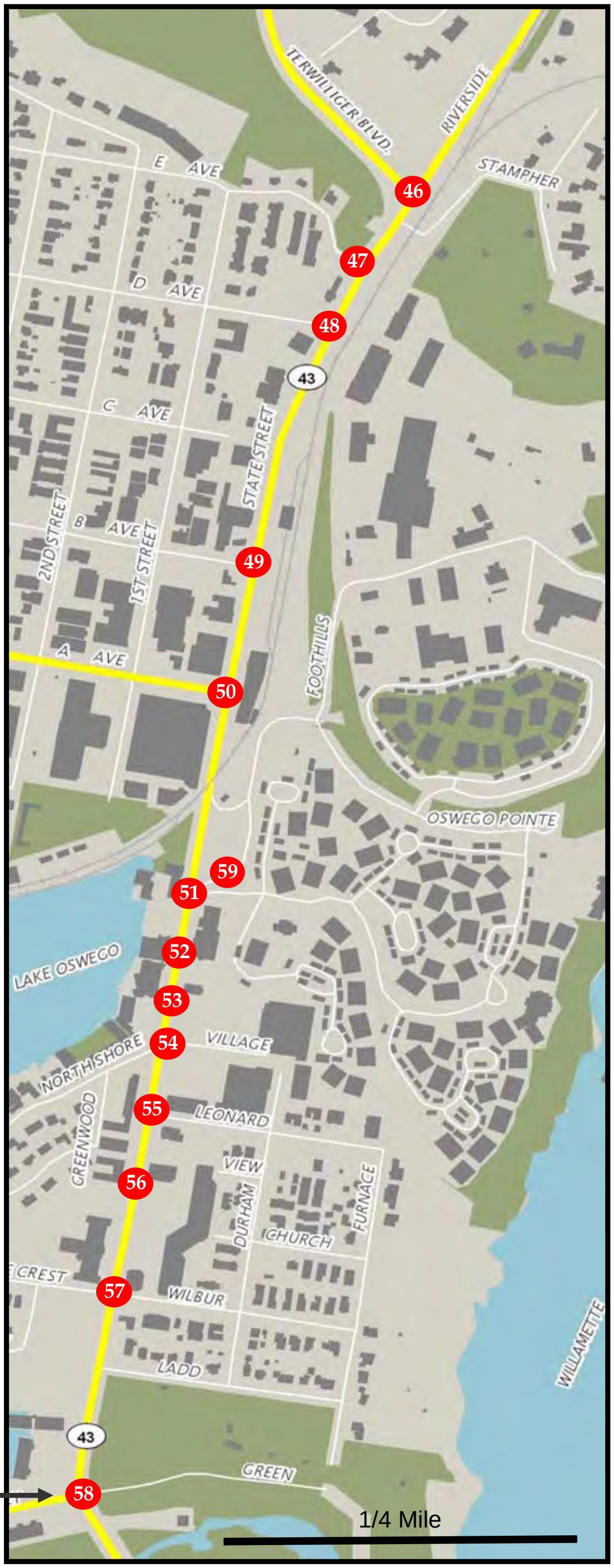
NOTE: Volumes greater than 5 are rounded to the nearest 5.

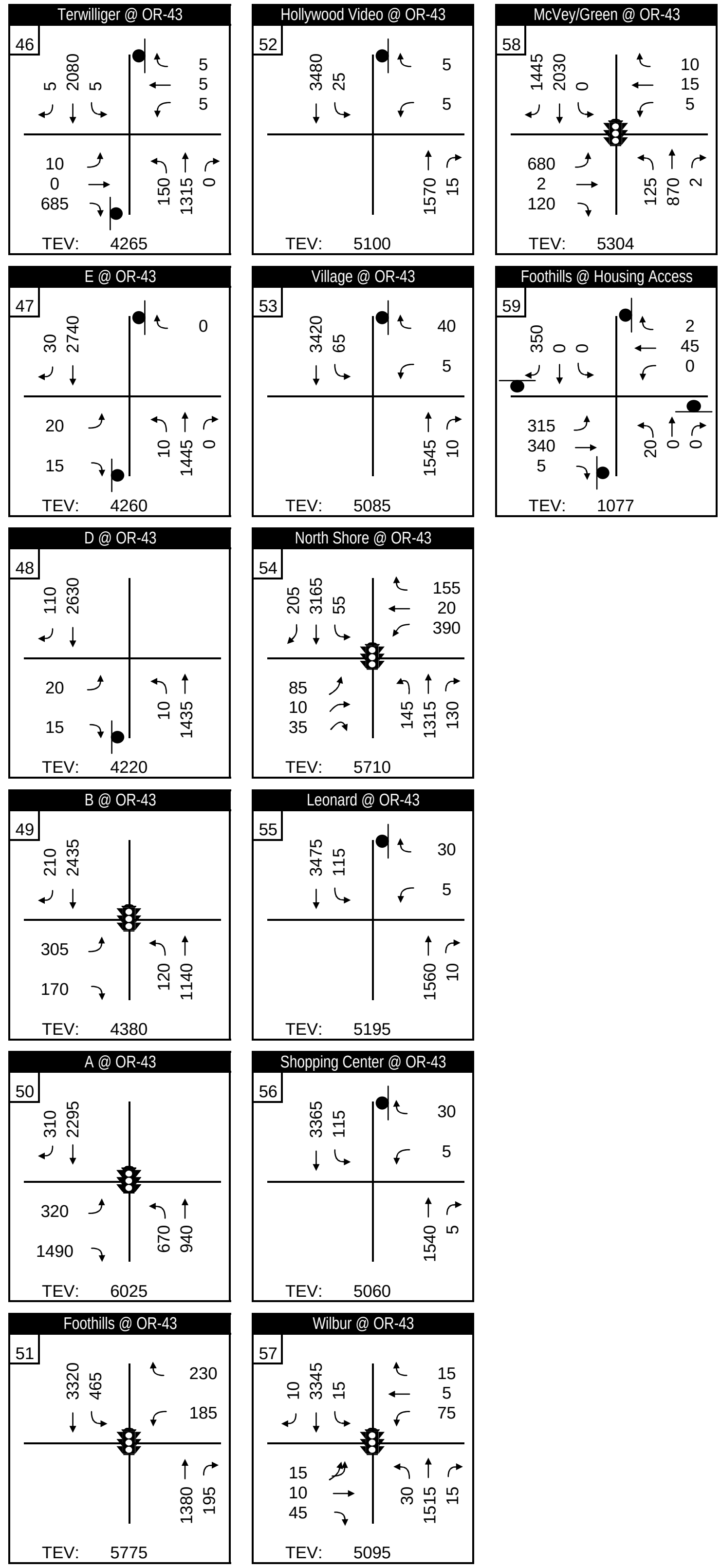
FIGURE

Center Section (Segments 4 and 5)
2035 Build In-Street and Additional Lane
PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010

SEGMENT 6
LAKE OSWEGO





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

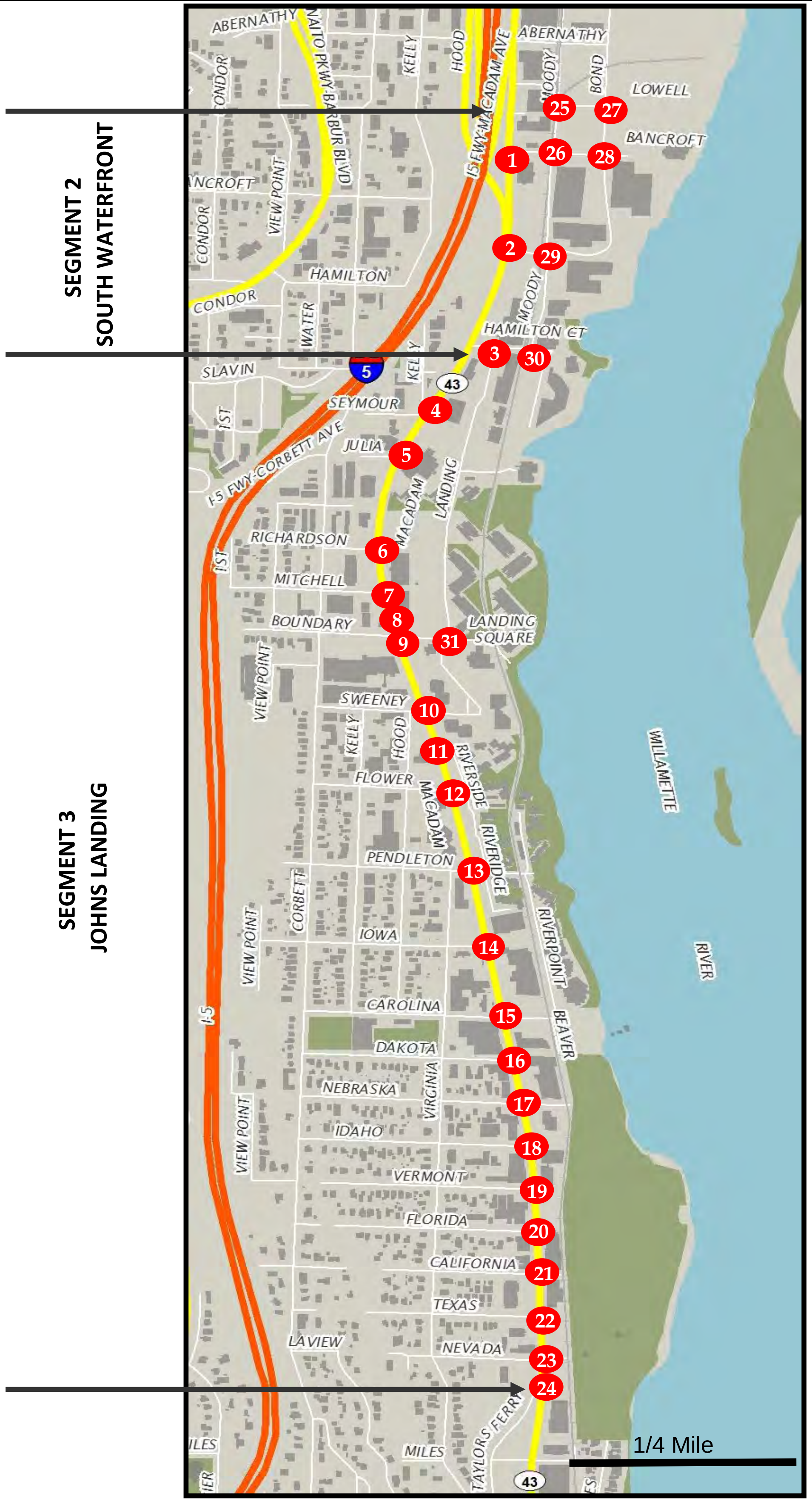
Traffic Signal		TEV:	Total Entering Volume
STOP - Controlled Approach		←	Available Turning Movement
YIELD - Controlled Approach		##	1-Hour PM Peak Volume

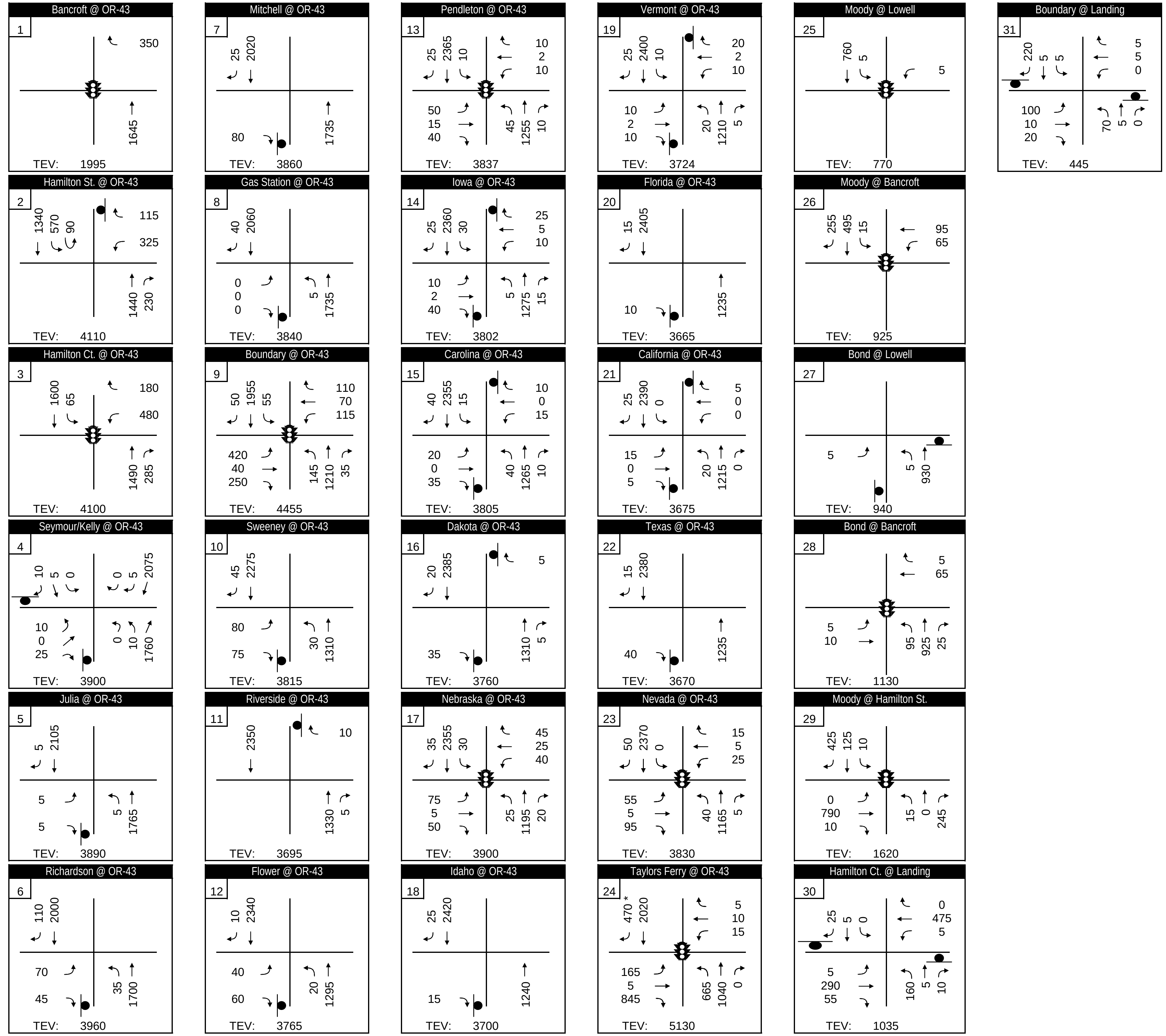
NOTE: Volumes greater than 5 are rounded to the nearest 5.

FIGURE

Southern Section (Segment 6)
2035 Build In-Street and Additional Lane
PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland

TRANSIT PROJECT

Legend

- Traffic Signal
- STOP - Controlled Approach
- YIELD - Controlled Approach

TEV: Total Entering Volume

← Available Turning Movement

\## 1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north of the intersection and the right-turn at the signal.

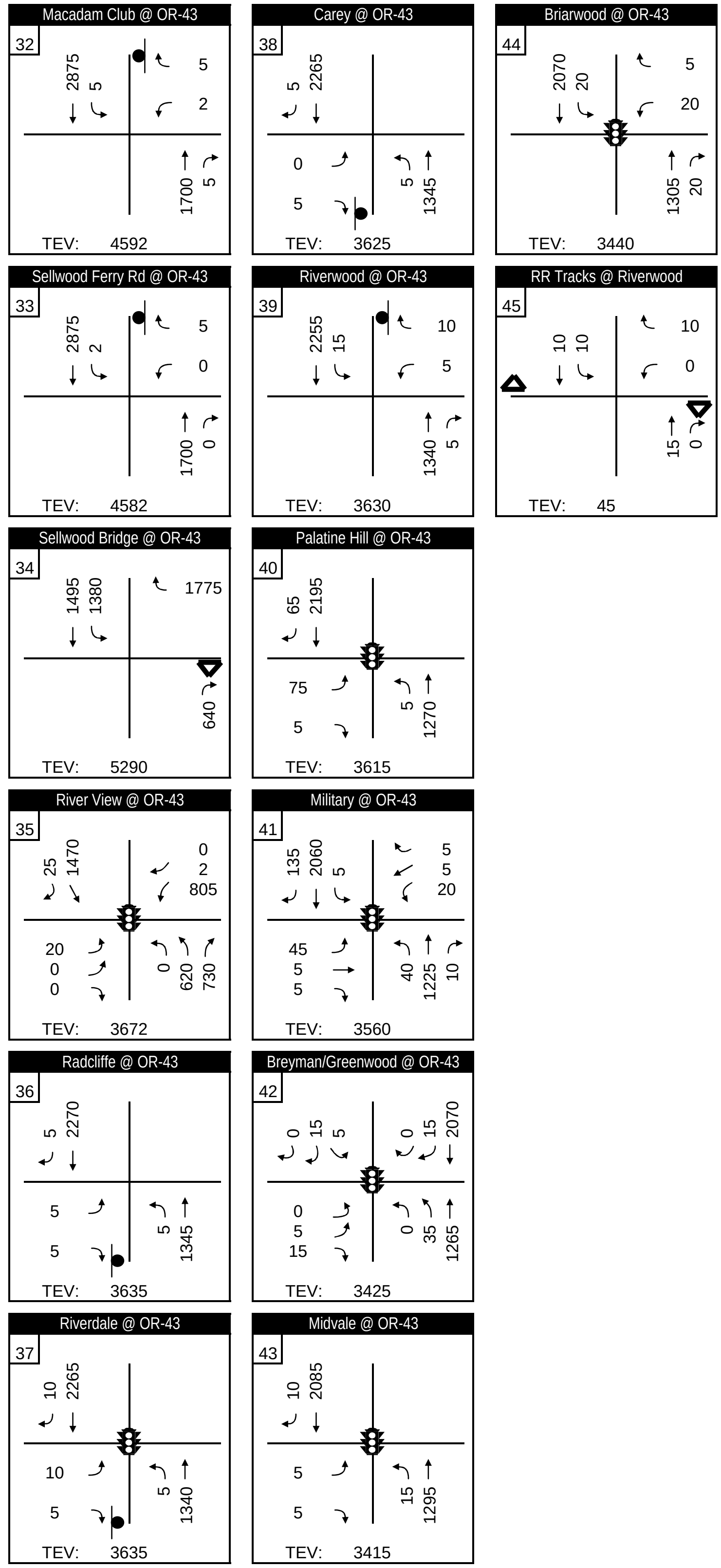
FIGURE

Northern Section (Segments 2 and 3)
2035 Willamette Shore Line PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010

SEGMENT 4
SELLWOOD BRIDGE

SEGMENT 5
DUNTHORP/RIVERDALE



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Lake Oswego to Portland TRANSIT PROJECT

Legend

	Traffic Signal	TEV:	Total Entering Volume
	STOP - Controlled Approach	←	Available Turning Movement
	YIELD - Controlled Approach	##	1-Hour PM Peak Volume

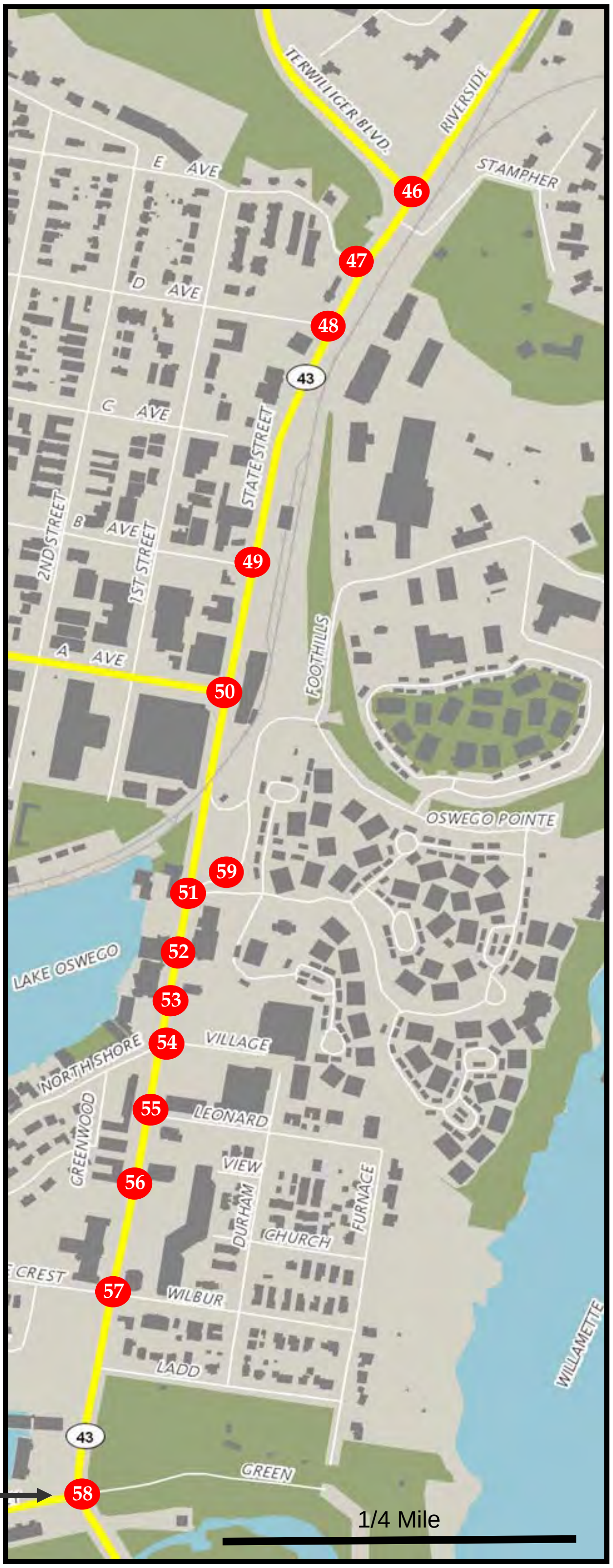
NOTE: Volumes greater than 5 are rounded to the nearest 5.

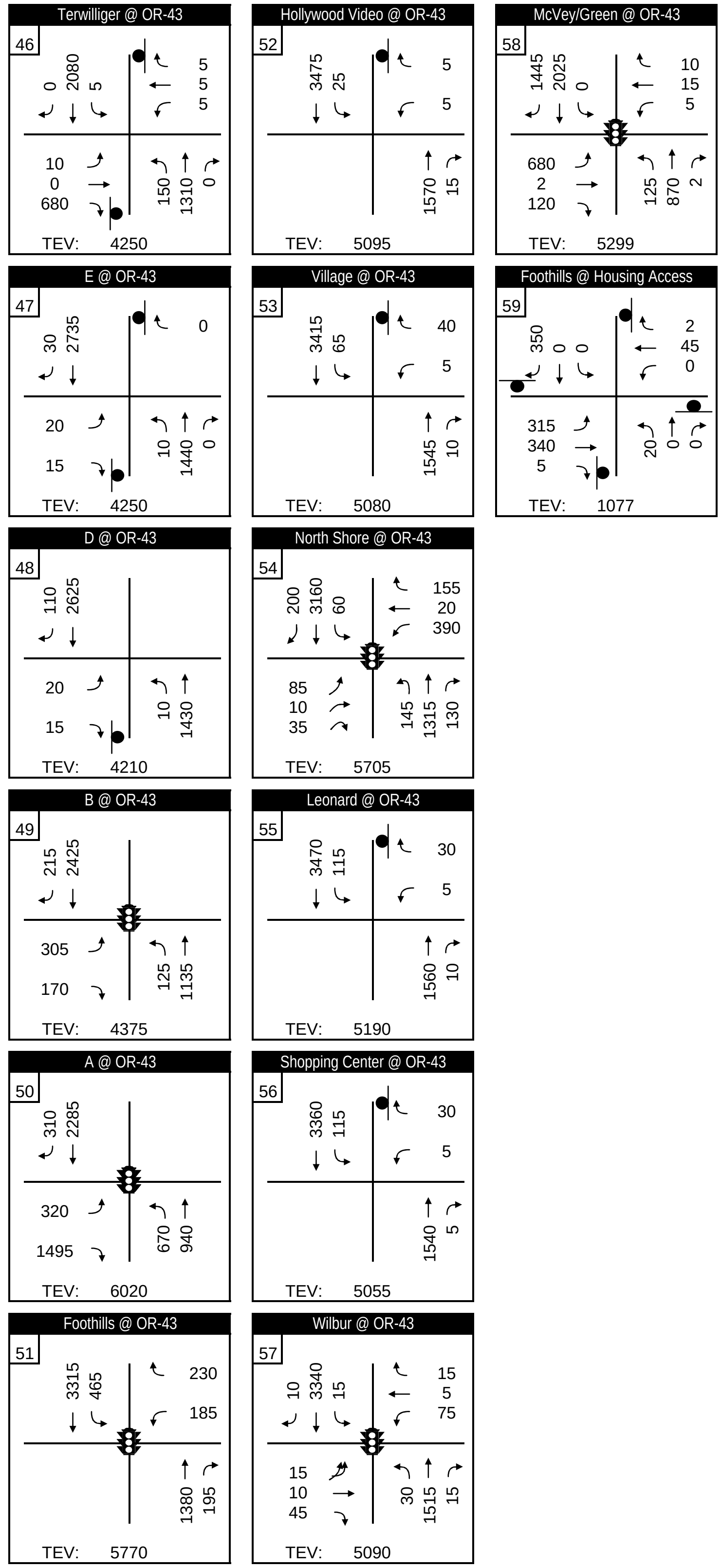
FIGURE

Center Section (Segments 4 and 5)
2035 Willamette Shore Line
PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010

SEGMENT 6
LAKE OSWEGO





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland
TRANSIT PROJECT

Legend

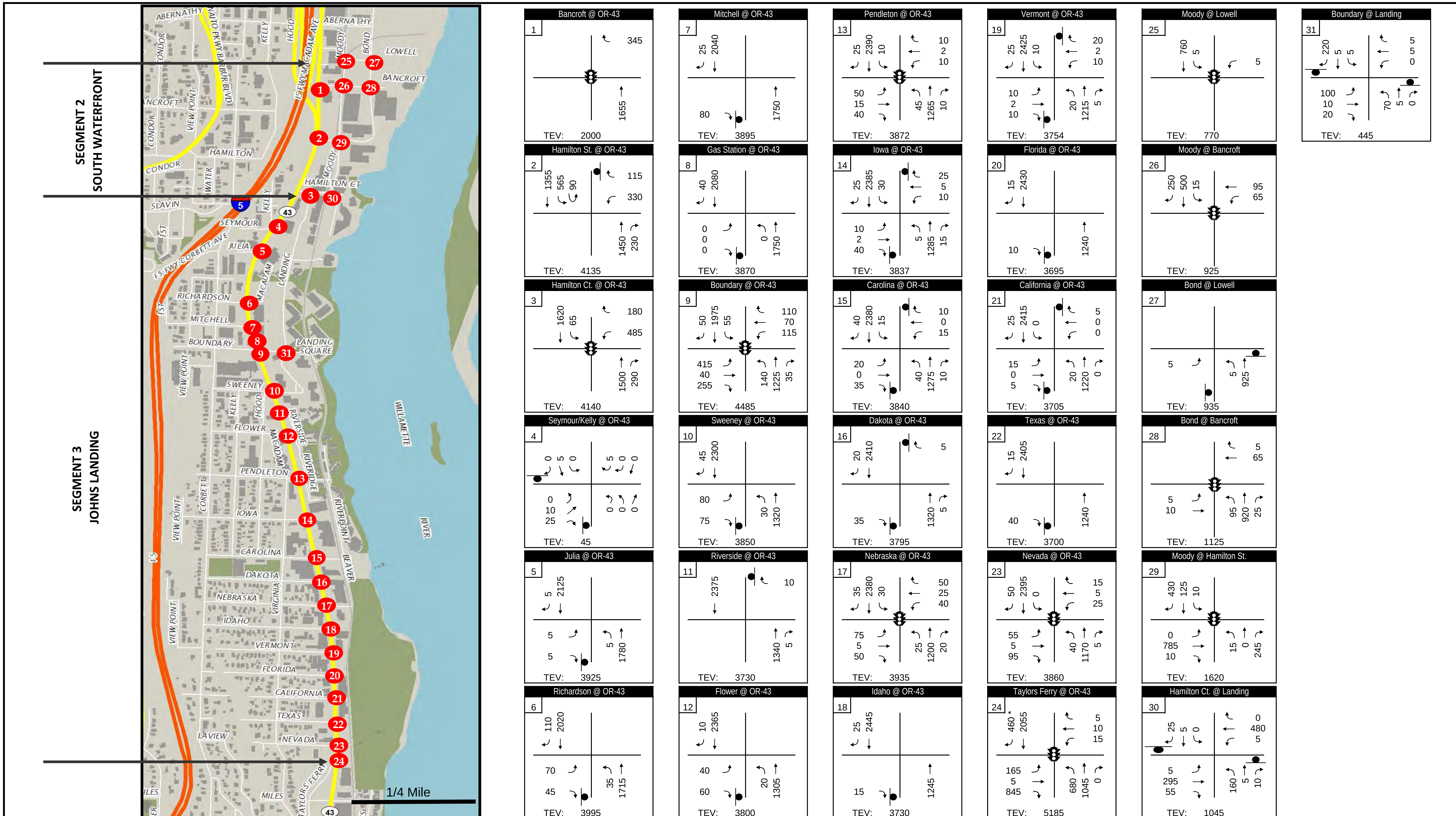
	Traffic Signal	TEV:	Total Entering Volume
	STOP - Controlled Approach	←	Available Turning Movement
	YIELD - Controlled Approach	##	1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.

FIGURE

Southern Section (Segment 6)
2035 Willamette Shore Line
PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

- Traffic Signal
- STOP - Controlled Approach
- YIELD - Controlled Approach

TEV: Total Entering Volume

← Available Turning Movement

1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north of the intersection and the right-turn at the signal.

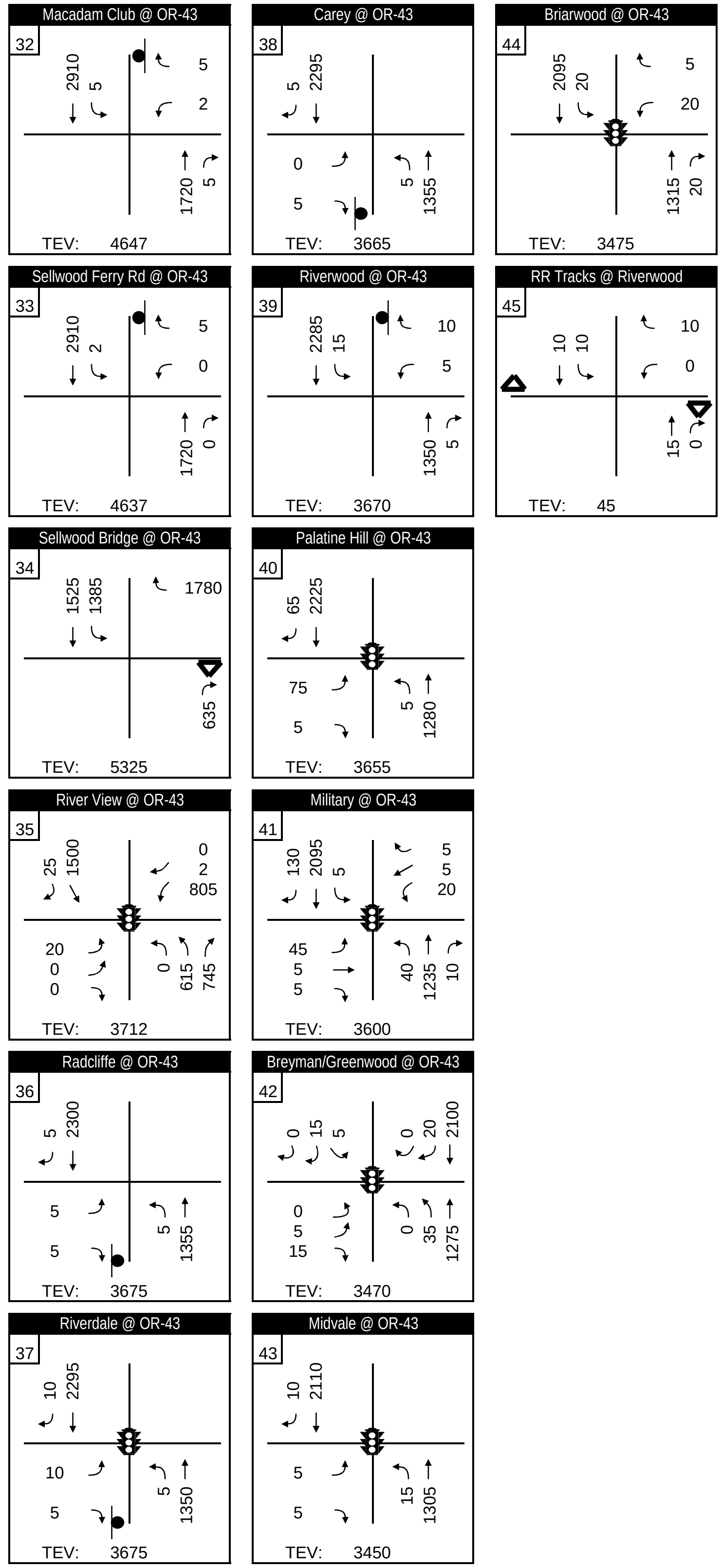
FIGURE

Northern Section (Segments 2 and 3)
2035 Enhanced Bus PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010

SEGMENT 4
SELLWOOD BRIDGE

SEGMENT 5
DUNTHORP/RIVERDALE



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland
TRANSIT PROJECT

Legend

Traffic Signal		TEV:	Total Entering Volume
STOP - Controlled Approach		←	Available Turning Movement
YIELD - Controlled Approach		##	1-Hour PM Peak Volume

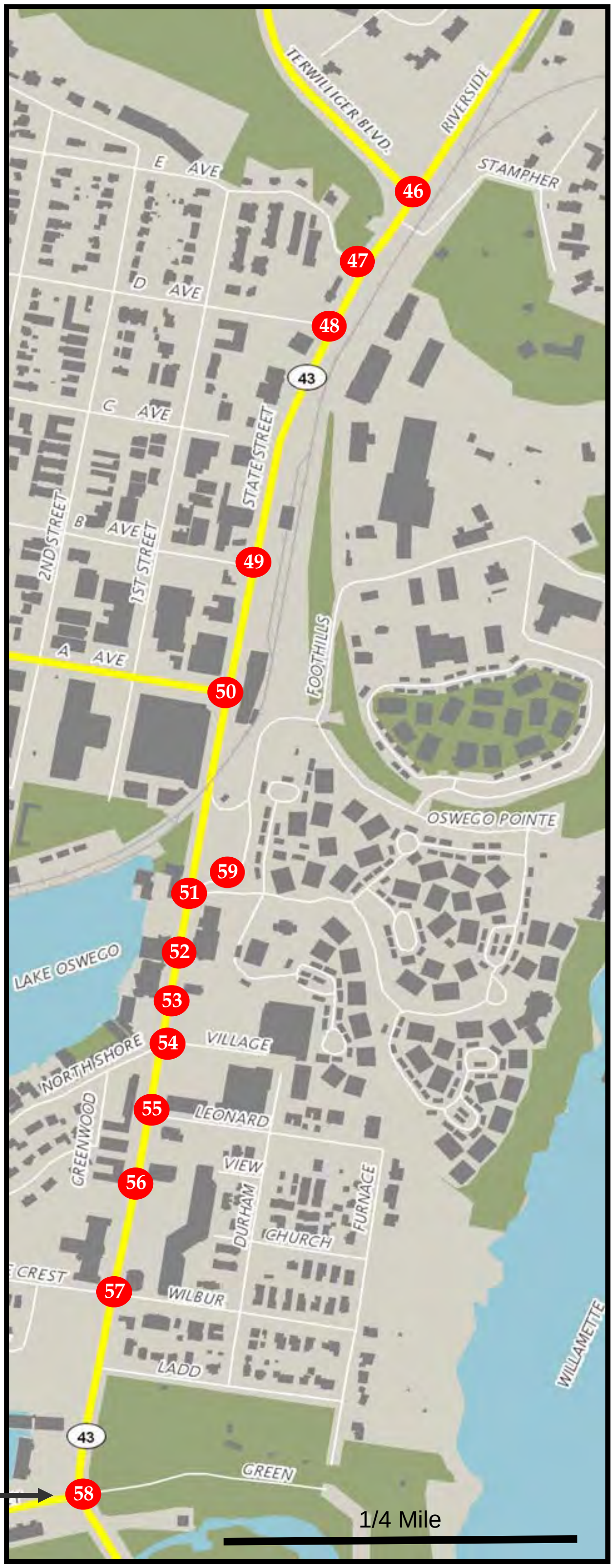
NOTE: Volumes greater than 5 are rounded to the nearest 5.

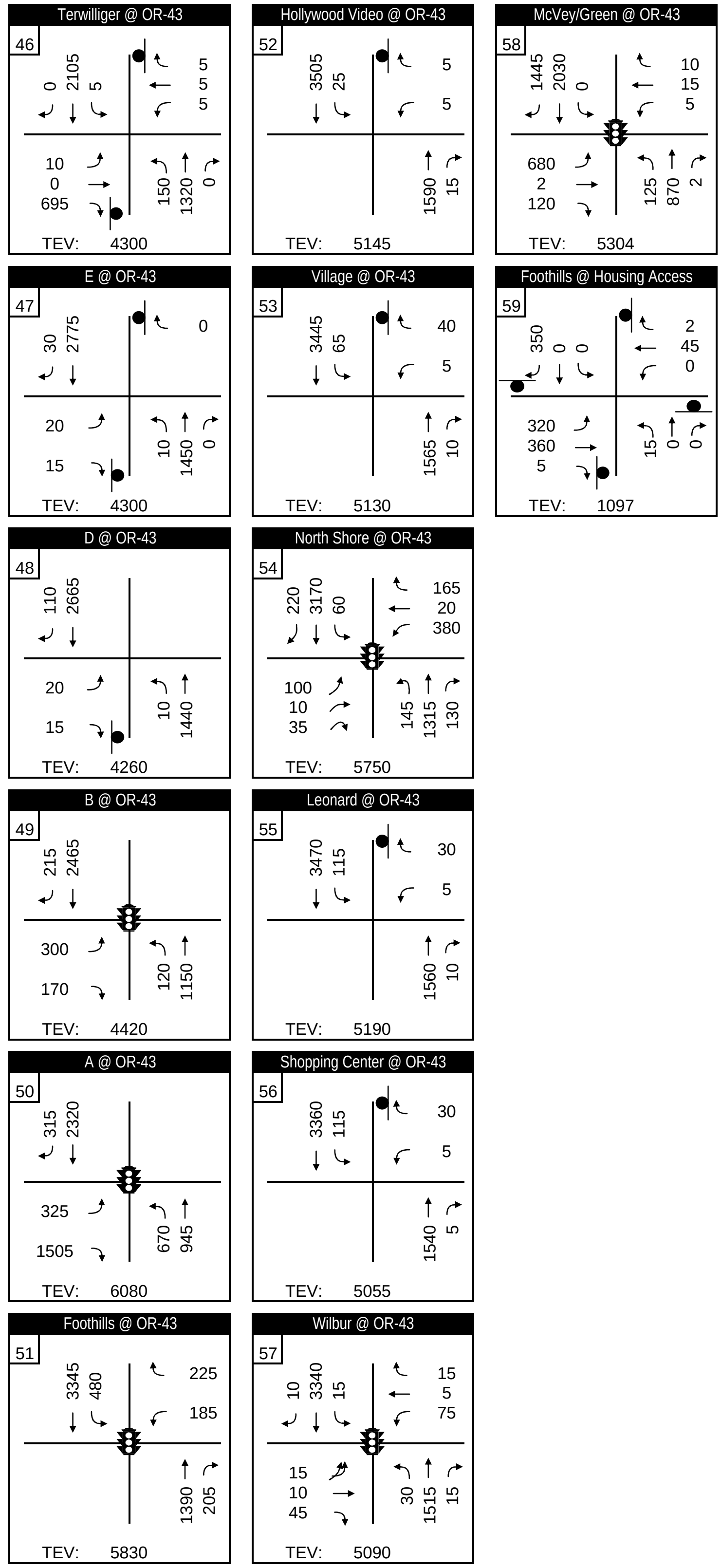
FIGURE

Center Section (Segments 4 and 5)
2035 Enhanced Bus PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010

SEGMENT 6
LAKE OSWEGO





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

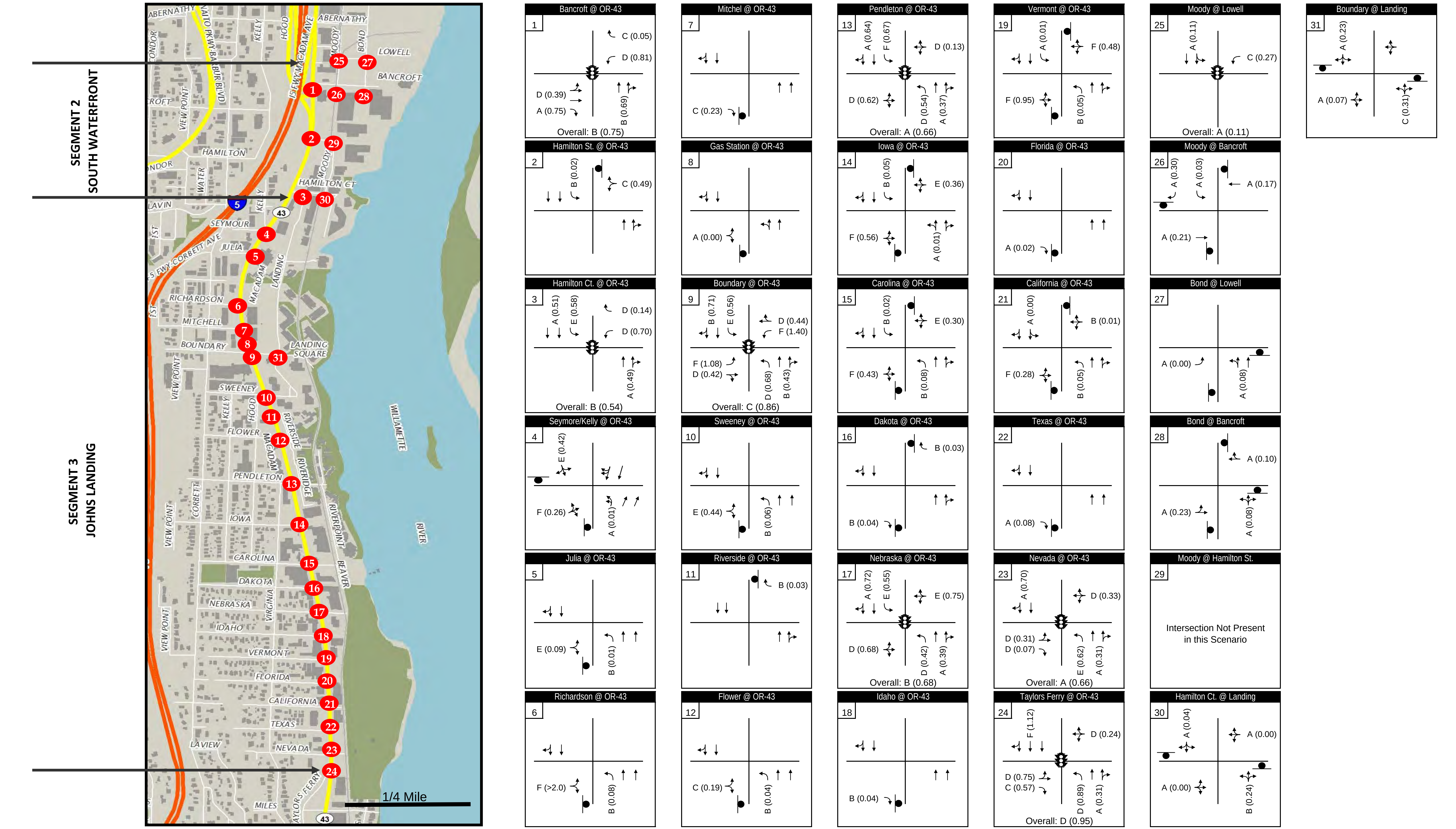
Traffic Signal		TEV:	Total Entering Volume
STOP - Controlled Approach		←	Available Turning Movement
YIELD - Controlled Approach		##	1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.

FIGURE

Southern Section (Segment 6)
2035 Enhanced Bus PM Peak Hour
Turning Movement Volumes

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

- Traffic Signal
- STOP - Controlled Approach
- YIELD - Controlled Approach

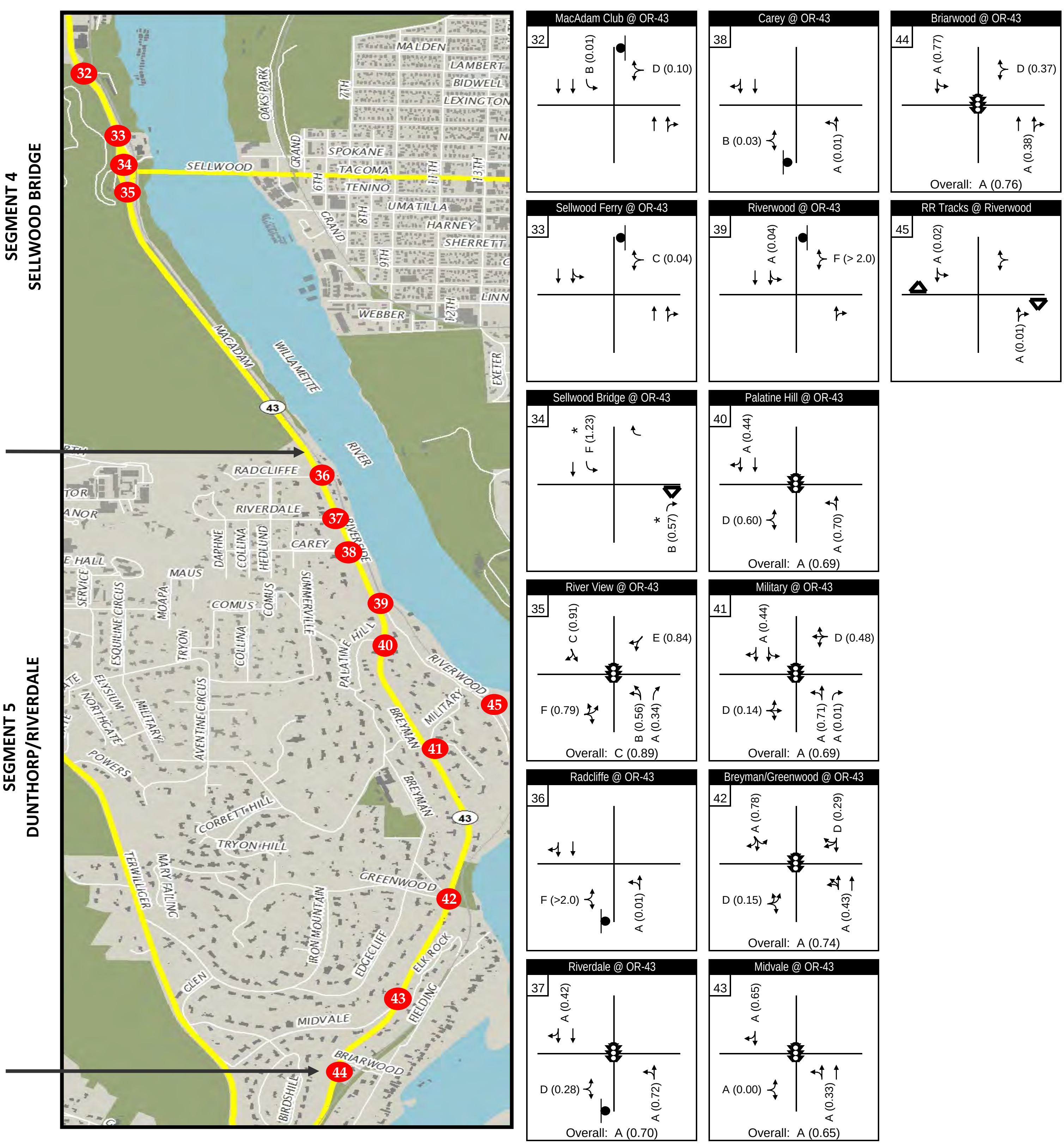
TEV: Total Entering Volume
← Available Movement
\#\# 1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north and the right-turn through the signal.

FIGURE

Northern Section (Segments 2 and 3)
Existing PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



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Lake Oswego to Portland TRANSIT PROJECT

Legend

	Traffic Signal	TEV:	Total Entering Volume
	STOP - Controlled Approach	←	Available Movement
	YIELD - Controlled Approach	##	1-Hour PM Peak Volume

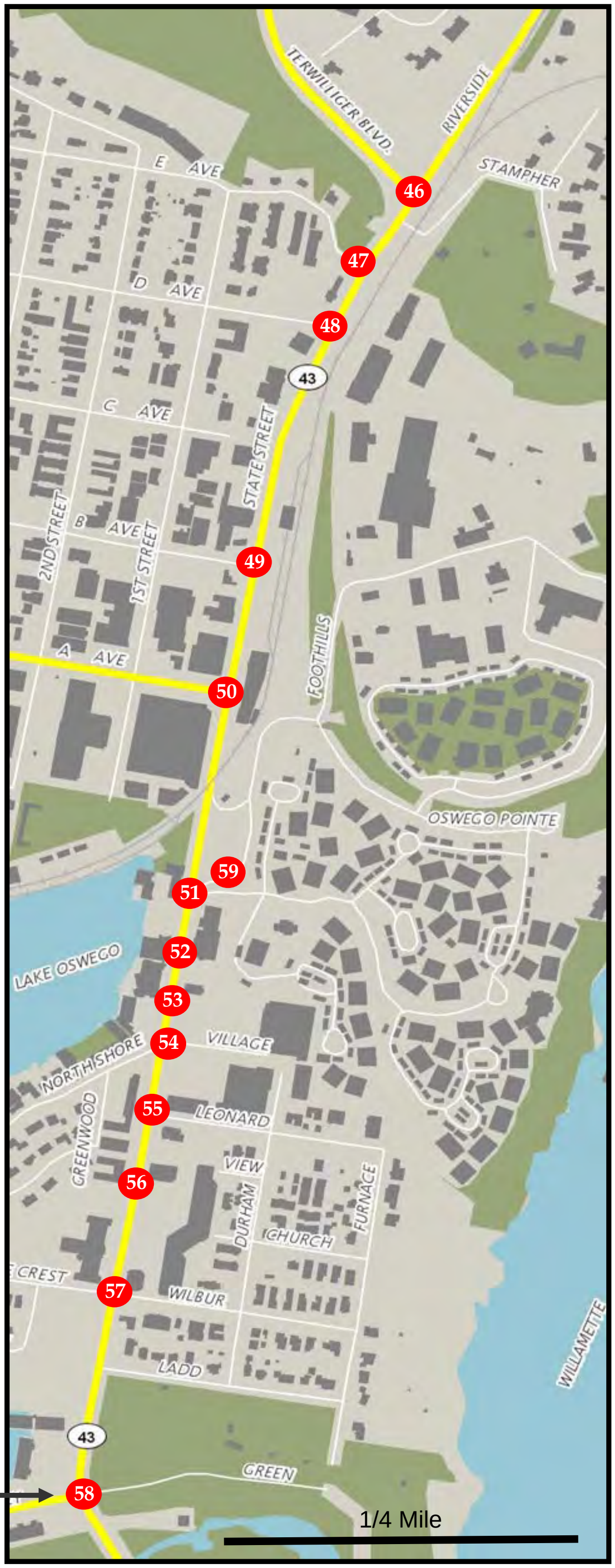
NOTE: Volumes greater than 5 are rounded to the nearest 5.
* Analyzed as stop controlled to represent PM Peak period driver behavior

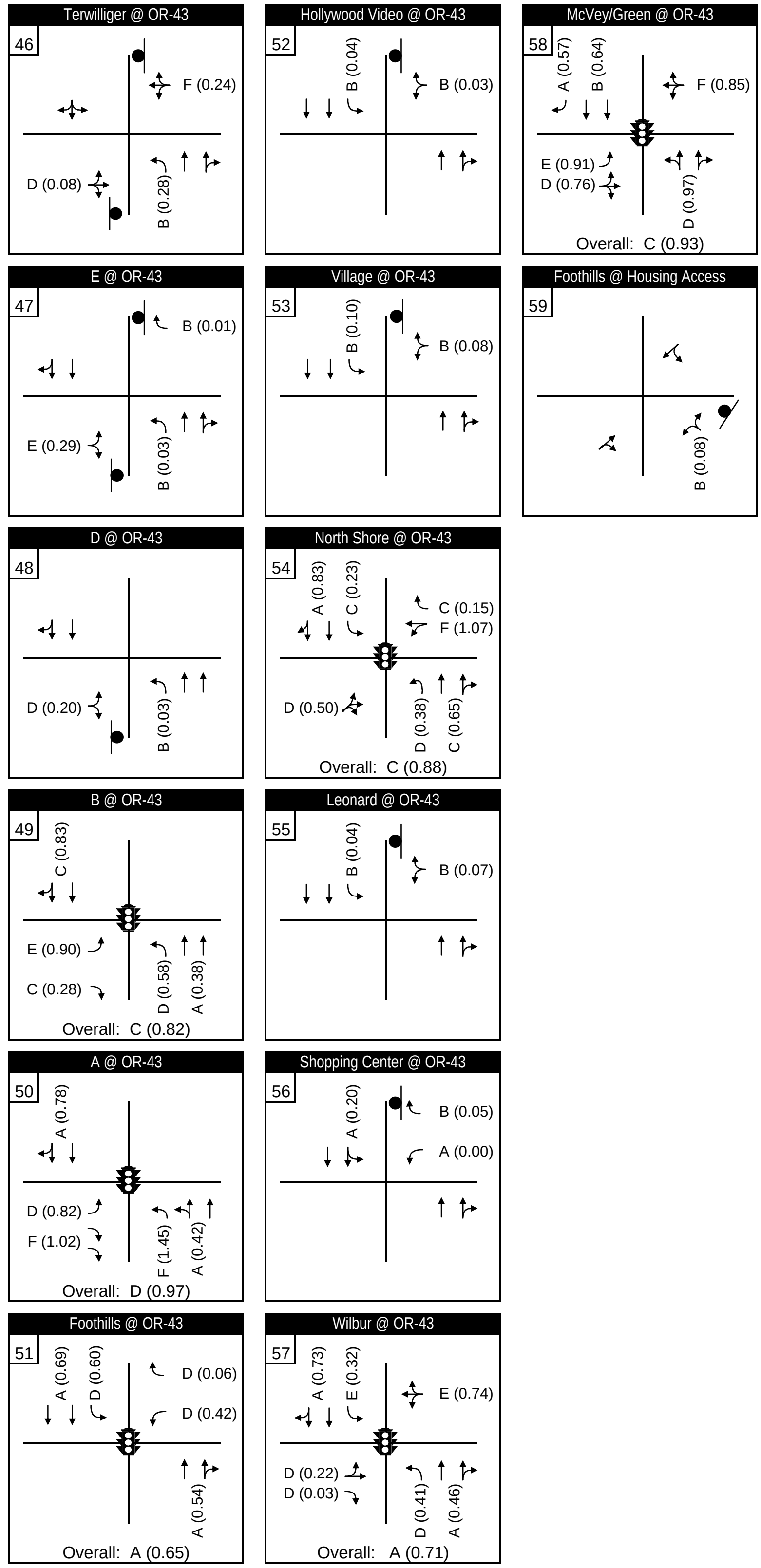
FIGURE

Center Section (Segments 4 and 5)
Existing PM Peak Hour
Intersection Operations

Last updated: April 19, 2010

SEGMENT 6
LAKE OSWEGO





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland
TRANSIT PROJECT

Legend

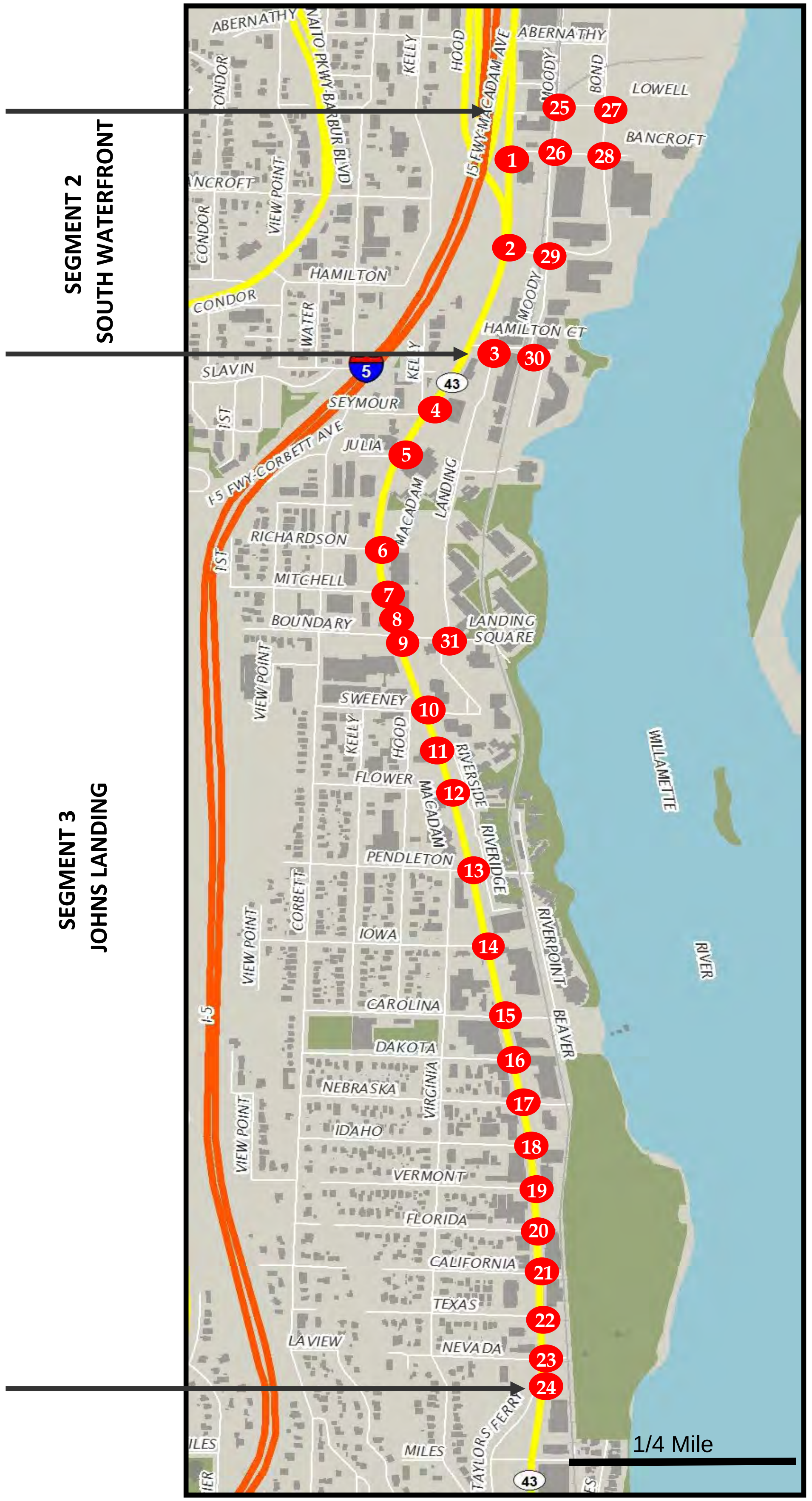
Traffic Signal		TEV:	Total Entering Volume
STOP - Controlled Approach		←	Available Movement
YIELD - Controlled Approach		##	1-Hour PM Peak Volume

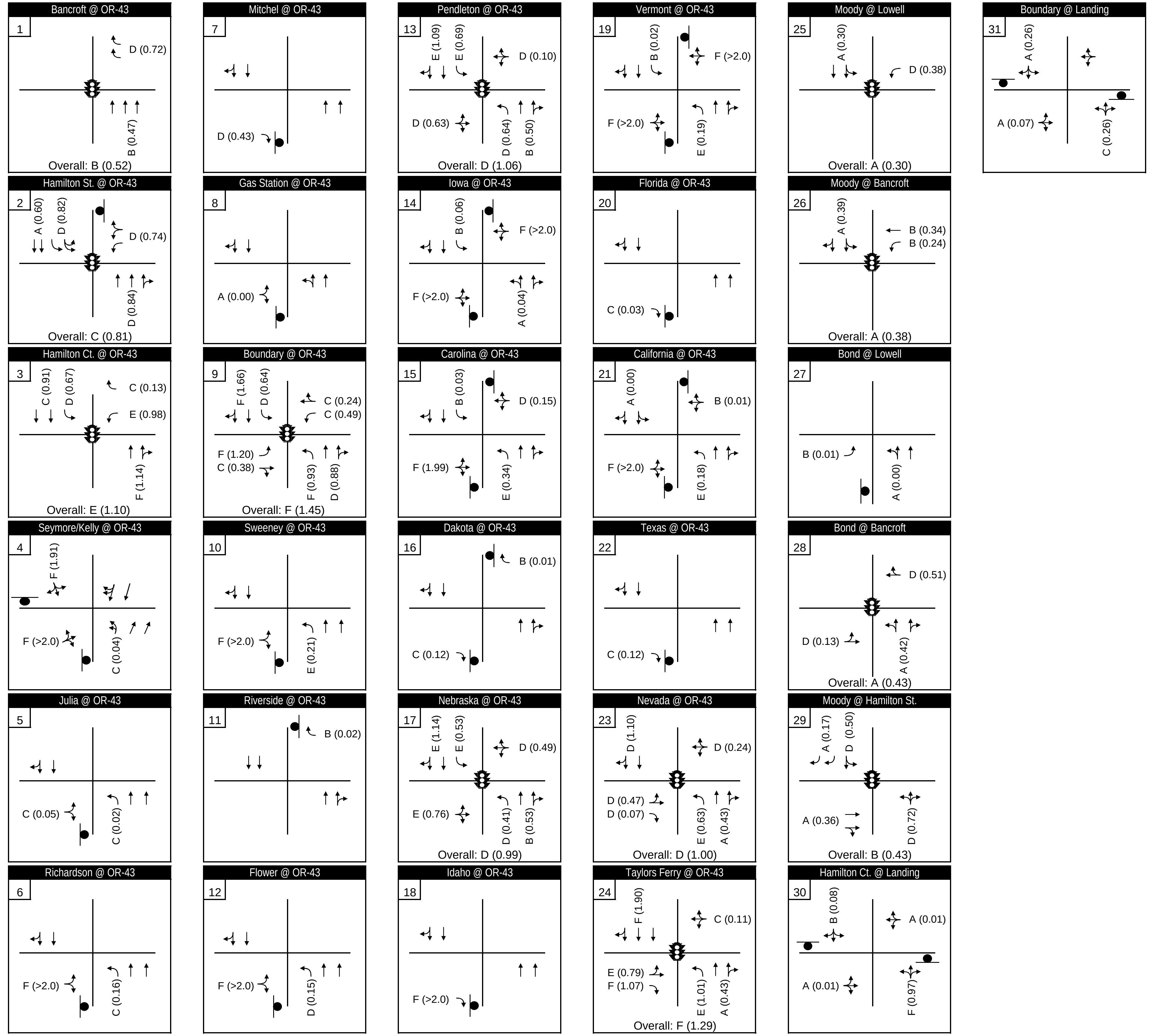
NOTE: Volumes greater than 5 are rounded to the nearest 5.

FIGURE

Southern Section (Segment 6)
Existing PM Peak Hour
Intersection Operations

Last updated: April 19, 2010





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland

TRANSIT PROJECT

Legend

- Traffic Signal
- STOP - Controlled Approach
- YIELD - Controlled Approach

TEV: Total Entering Volume

← Available Movement

\## 1-Hour PM Peak Volume

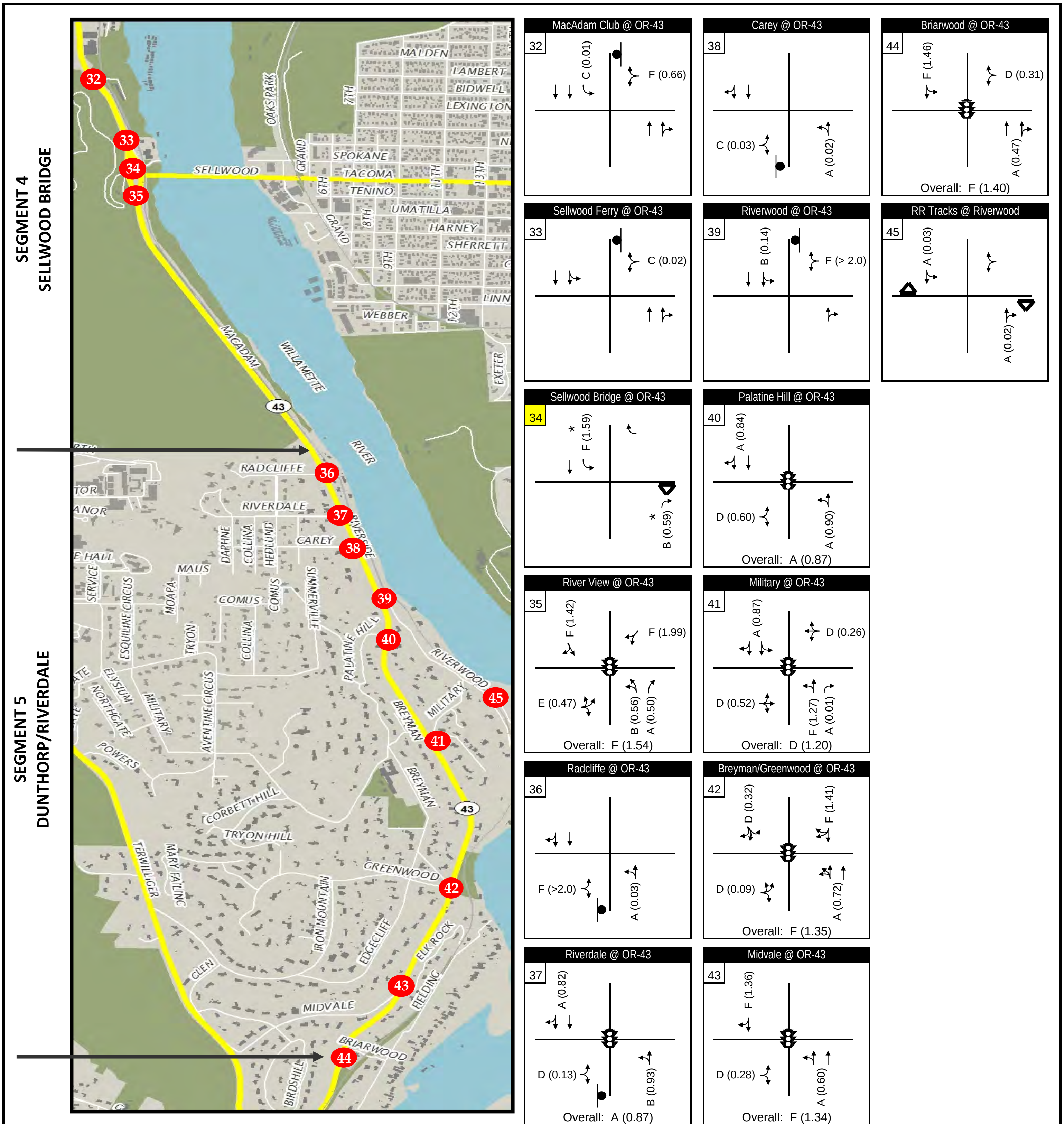
NOTE: Volumes greater than 5 are rounded to the nearest 5.

* This volume is for both the Taylors Ferry Diverge to the north and the right-turn through the signal.

FIGURE

Northern Section (Segments 2 and 3)
2035 No-Build PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



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Lake Oswego to Portland
TRANSIT PROJECT

Legend

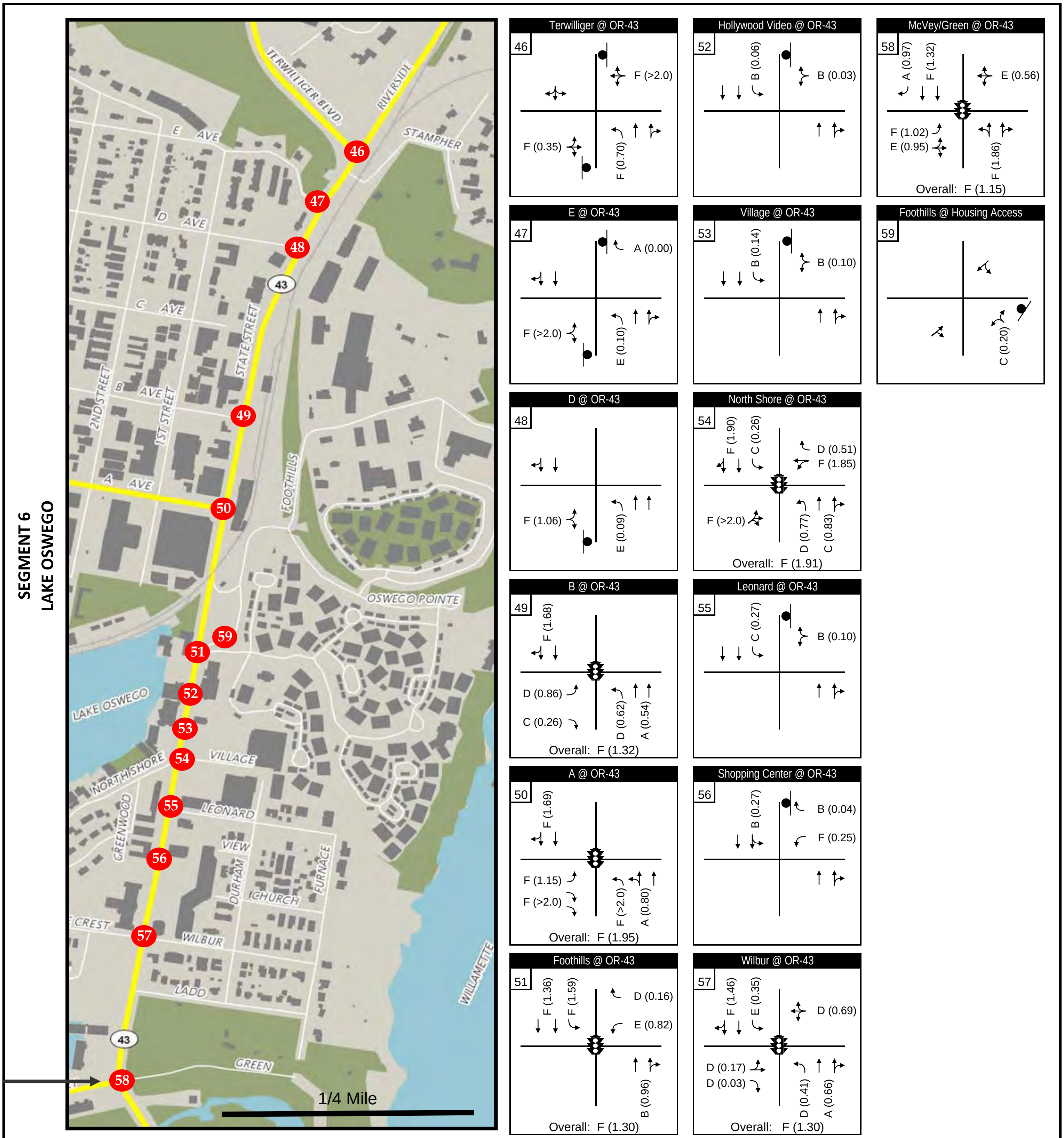
Traffic Signal		TEV:	Total Entering Volume
STOP - Controlled Approach		←	Available Movement
YIELD - Controlled Approach		##	1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* Analyzed as stop controlled to represent PM Peak period driver behavior

FIGURE

Center Section (Segments 4 and 5)
2035 No-Build PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

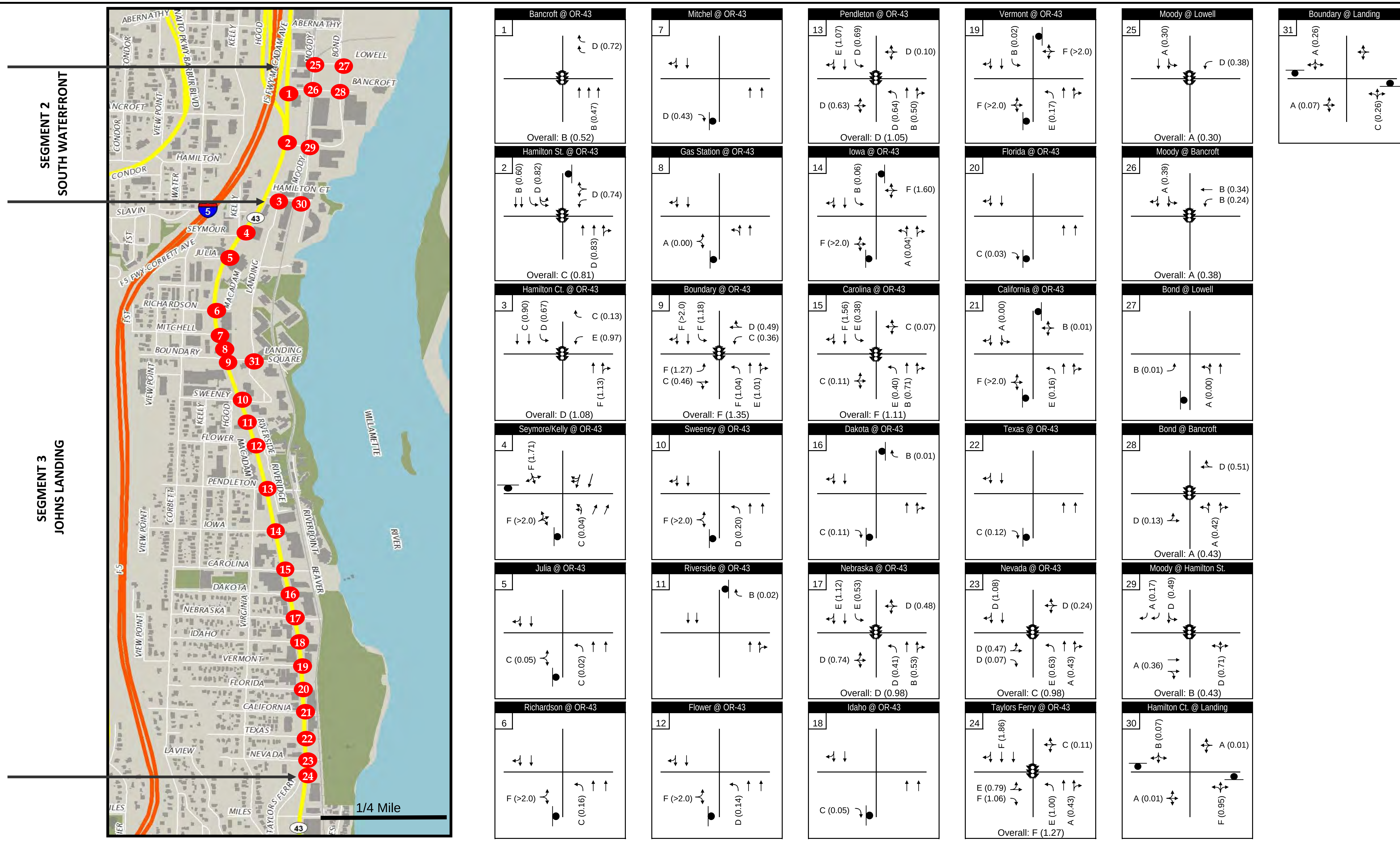
	Traffic Signal	TEV:	Total Entering Volume
	STOP - Controlled Approach	←	Available Movement
	YIELD - Controlled Approach	##	1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.

FIGURE

Southern Section (Segment 6)
2035 No-Build PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



Legend

- Traffic Signal
- STOP - Controlled Approach
- YIELD - Controlled Approach

TEV: Total Entering Volume

← Available Movement

\## 1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north and the right-turn through the signal.

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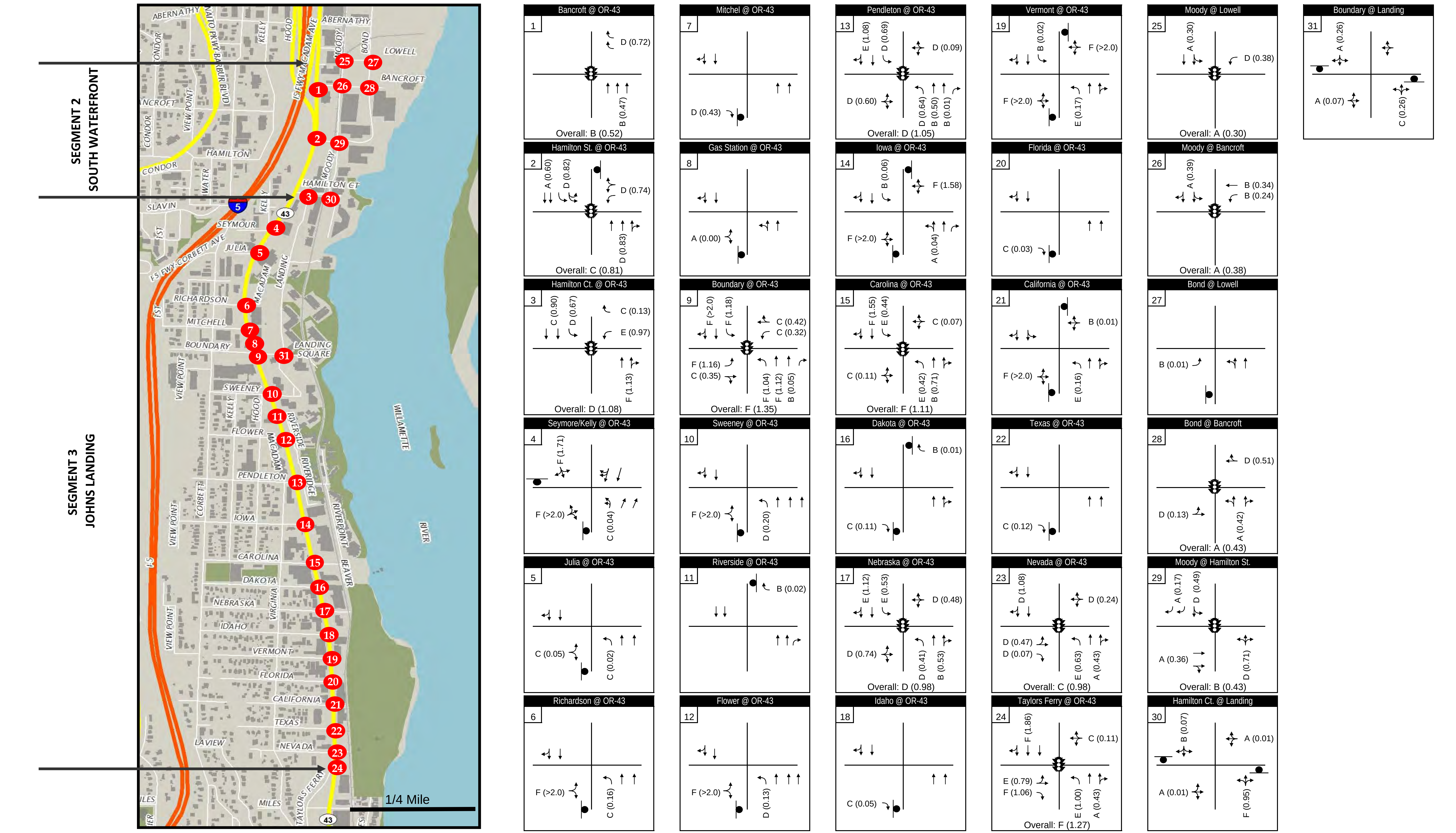
Lake Oswego to Portland TRANSIT PROJECT

FIGURE

Northern Section (Segments 2 and 3)
2035 Build In-Street PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

- Traffic Signal
- STOP - Controlled Approach
- YIELD - Controlled Approach

TEV: Total Entering Volume

← Available Movement

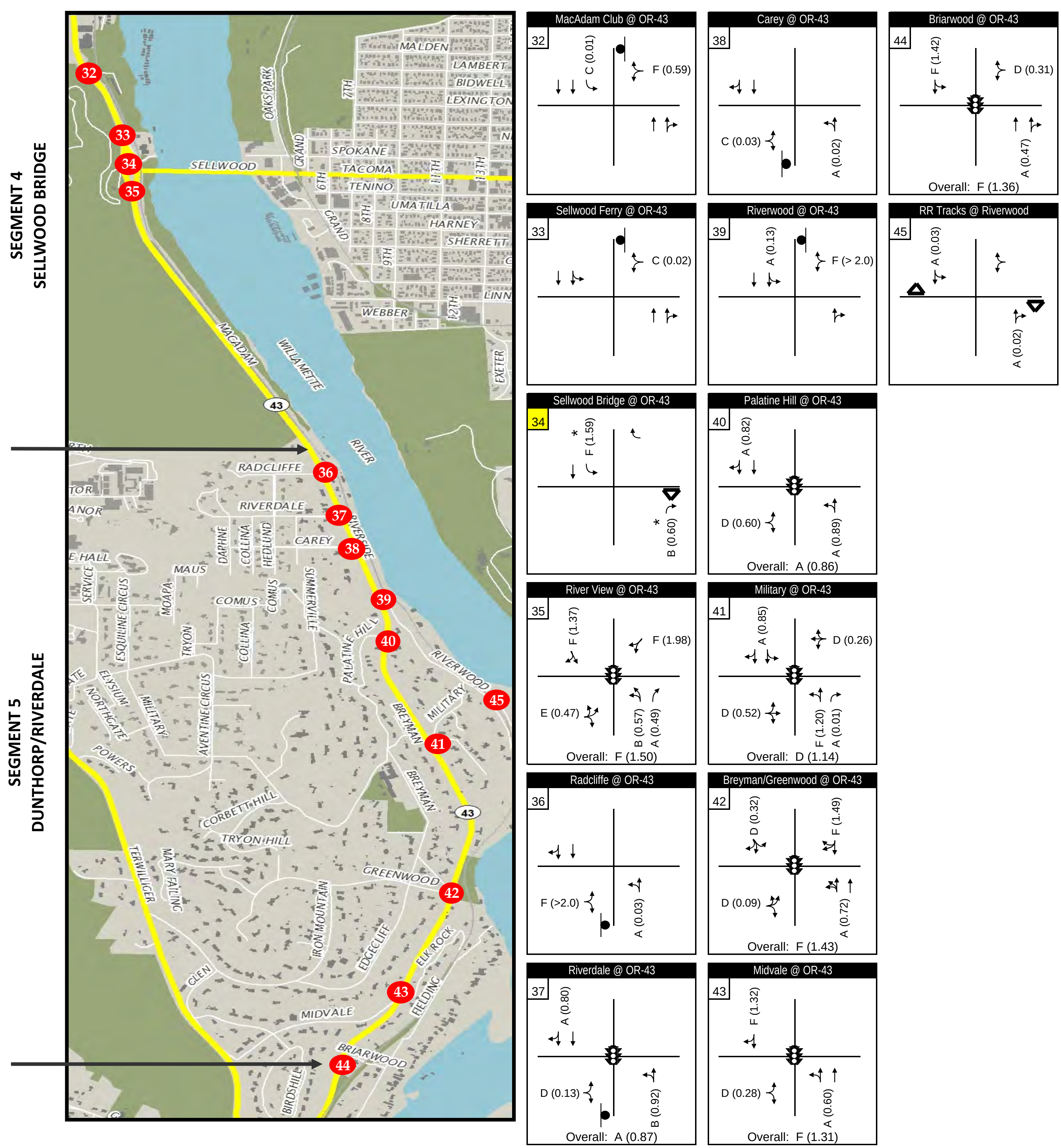
\## 1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north and the right-turn through the signal.

FIGURE

Northern Section (Segments 2 and 3)
2035 Additional Lane PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



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Lake Oswego to Portland TRANSIT PROJECT

Legend

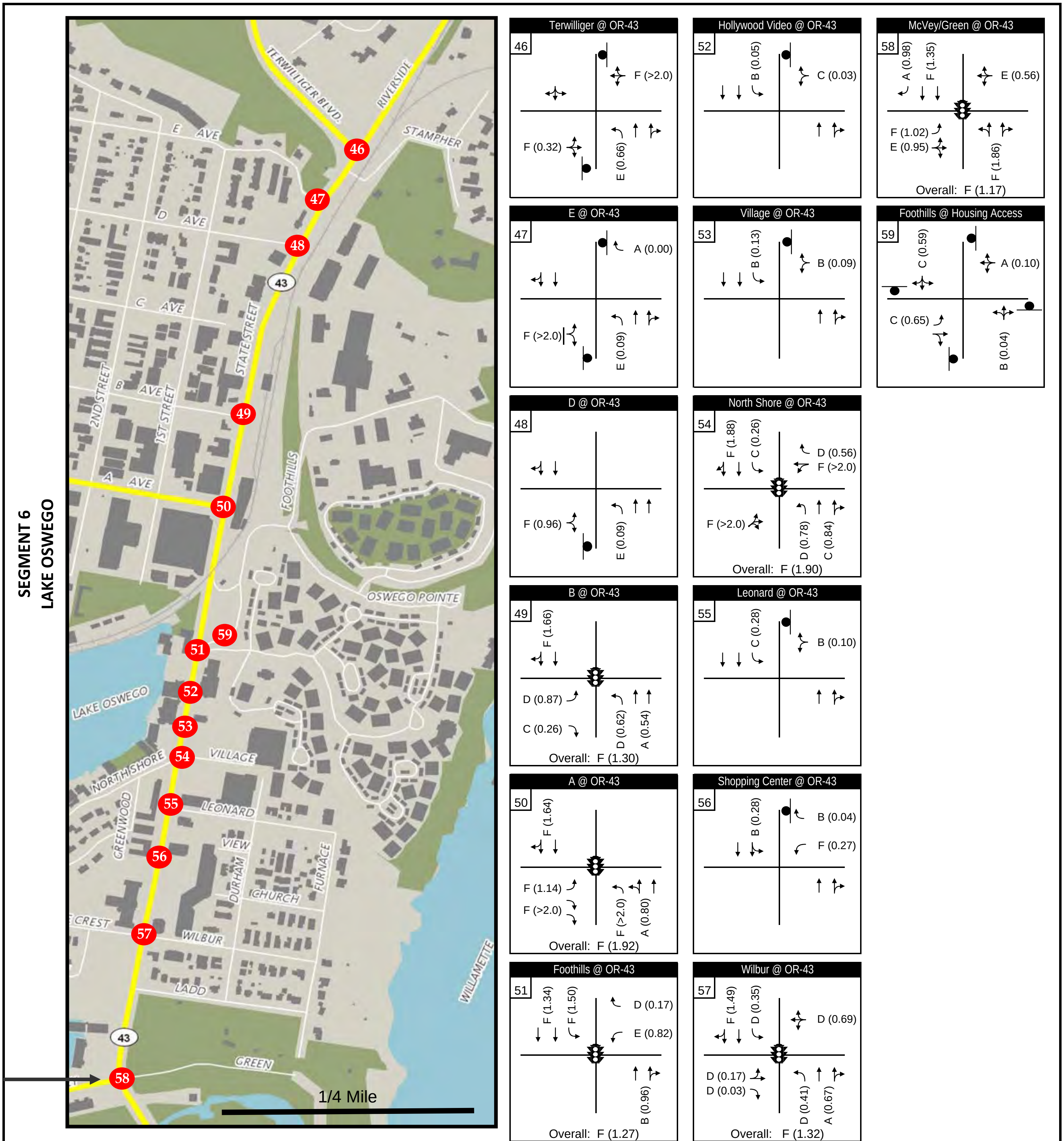
Traffic Signal		TEV:	Total Entering Volume
STOP - Controlled Approach		←	Available Movement
YIELD - Controlled Approach		##	1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* Analyzed as stop controlled to represent PM Peak period driver behavior

FIGURE

Center Section (Segments 4 and 5)
2035 Build In-Street and Additional Lane
PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



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Lake Oswego to Portland TRANSIT PROJECT

Legend

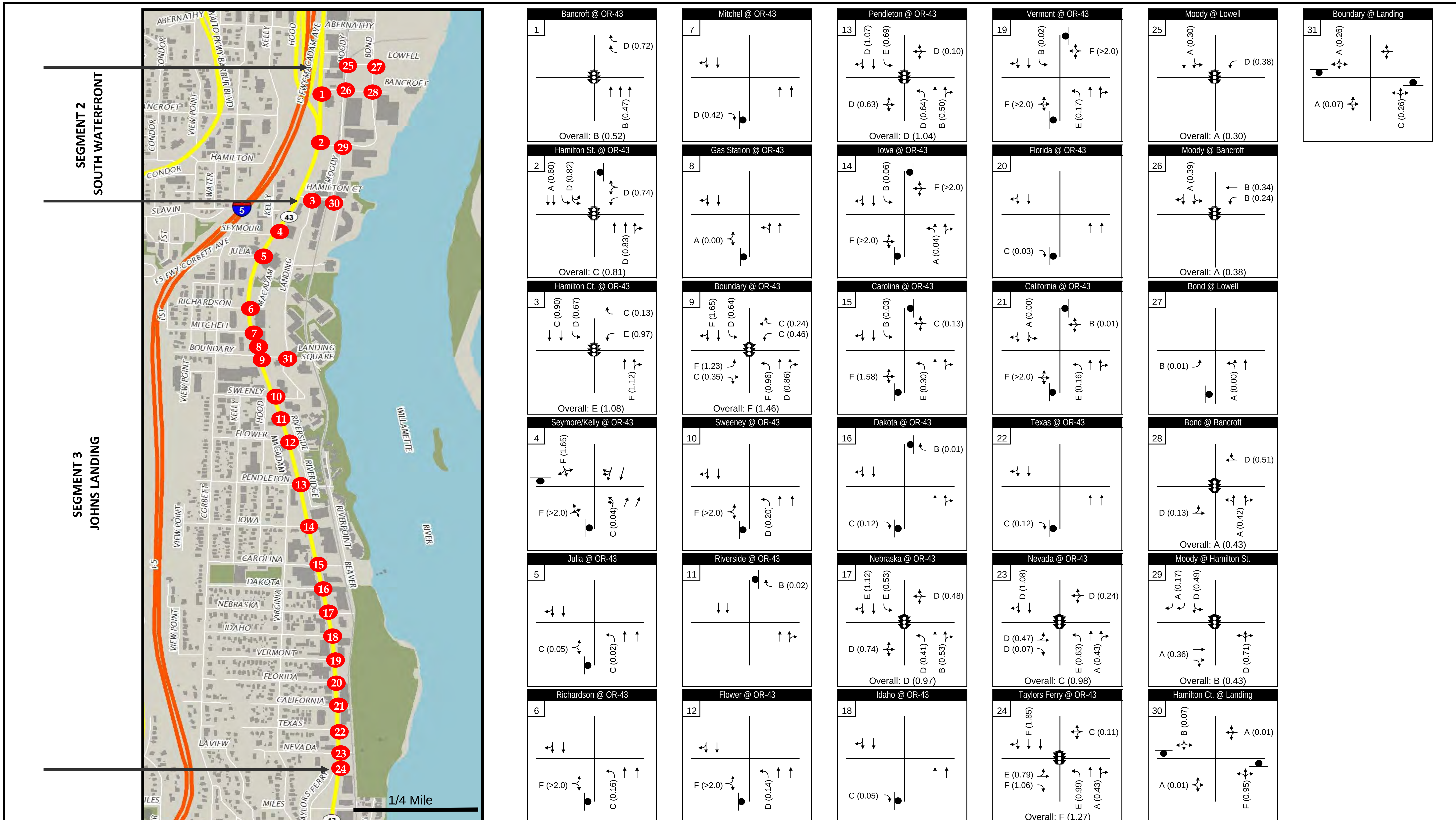
Traffic Signal		TEV:	Total Entering Volume
STOP - Controlled Approach			Available Movement
YIELD - Controlled Approach		##	1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.

FIGURE

Southern Section (Segment 6)
2035 Build In-Street and Additional Lane
PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



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Lake Oswego to Portland
TRANSIT PROJECT

Legend

- Traffic Signal
- STOP - Controlled Approach
- YIELD - Controlled Approach

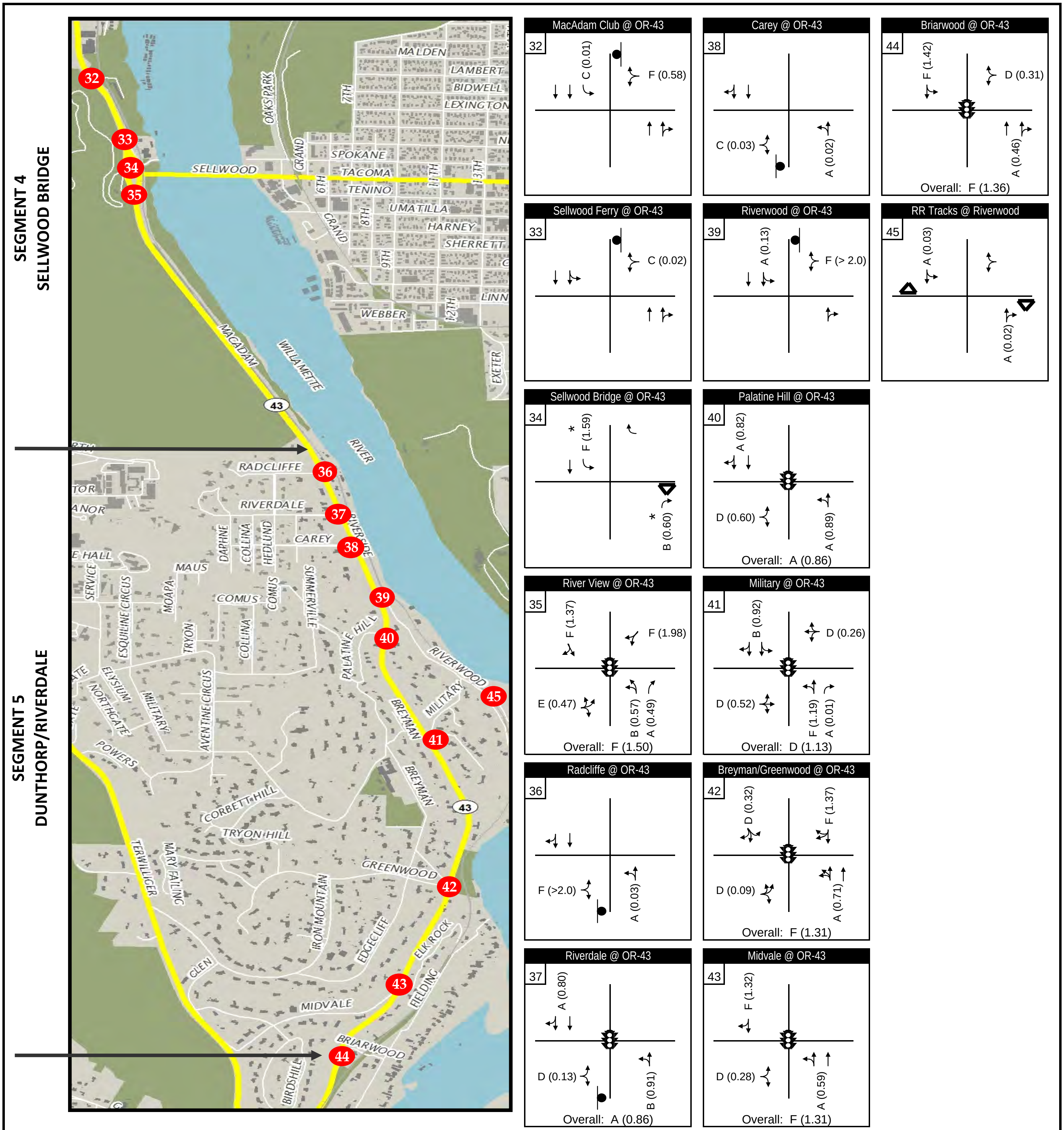
TEV: Total Entering Volume
← Available Movement
1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north and the right-turn through the signal.

FIGURE

Northern Section (Segments 2 and 3)
2035 Willamette Shore Line PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

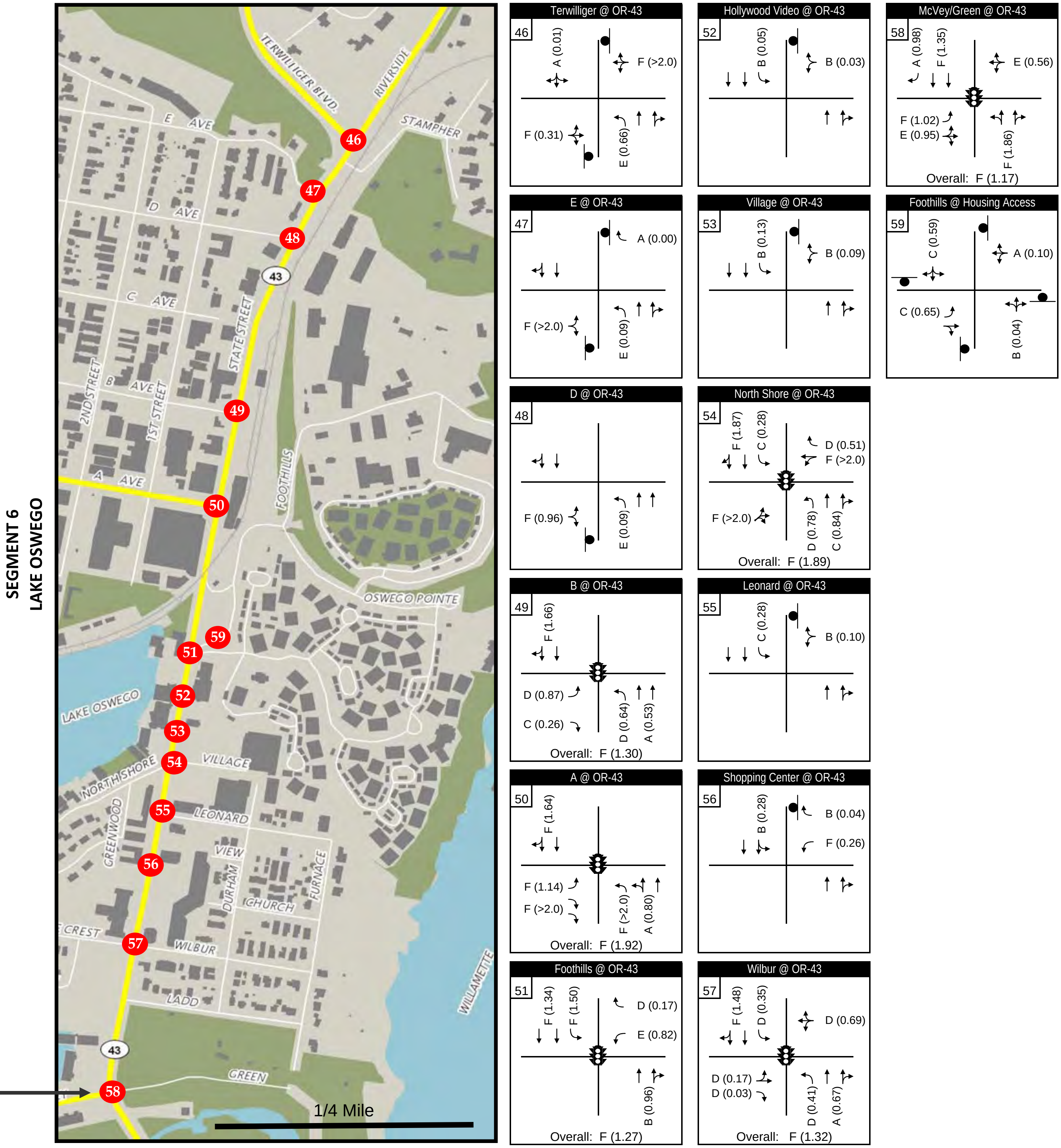
(signal symbol)	Traffic Signal	TEV:	Total Entering Volume
(stop symbol)	STOP - Controlled Approach	←	Available Movement
(yield symbol)	YIELD - Controlled Approach	##	1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* Analyzed as stop controlled to represent PM Peak period driver behavior

FIGURE

Center Section (Segments 4 and 5)
2035 Willamette Shore Line
PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

Traffic Signal

STOP - Controlled Approach

YIELD - Controlled Approach

TEV: Total Entering Volume

Available Movement

\## 1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.

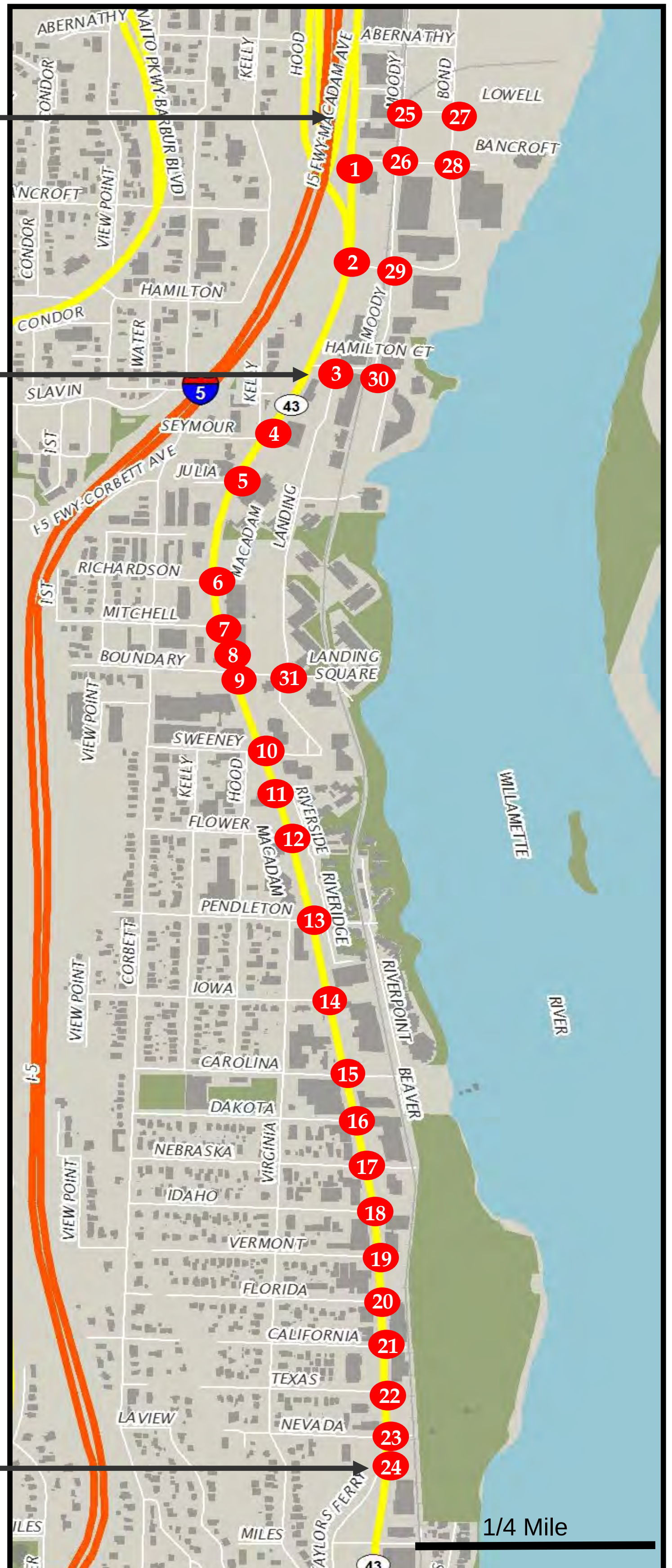
FIGURE

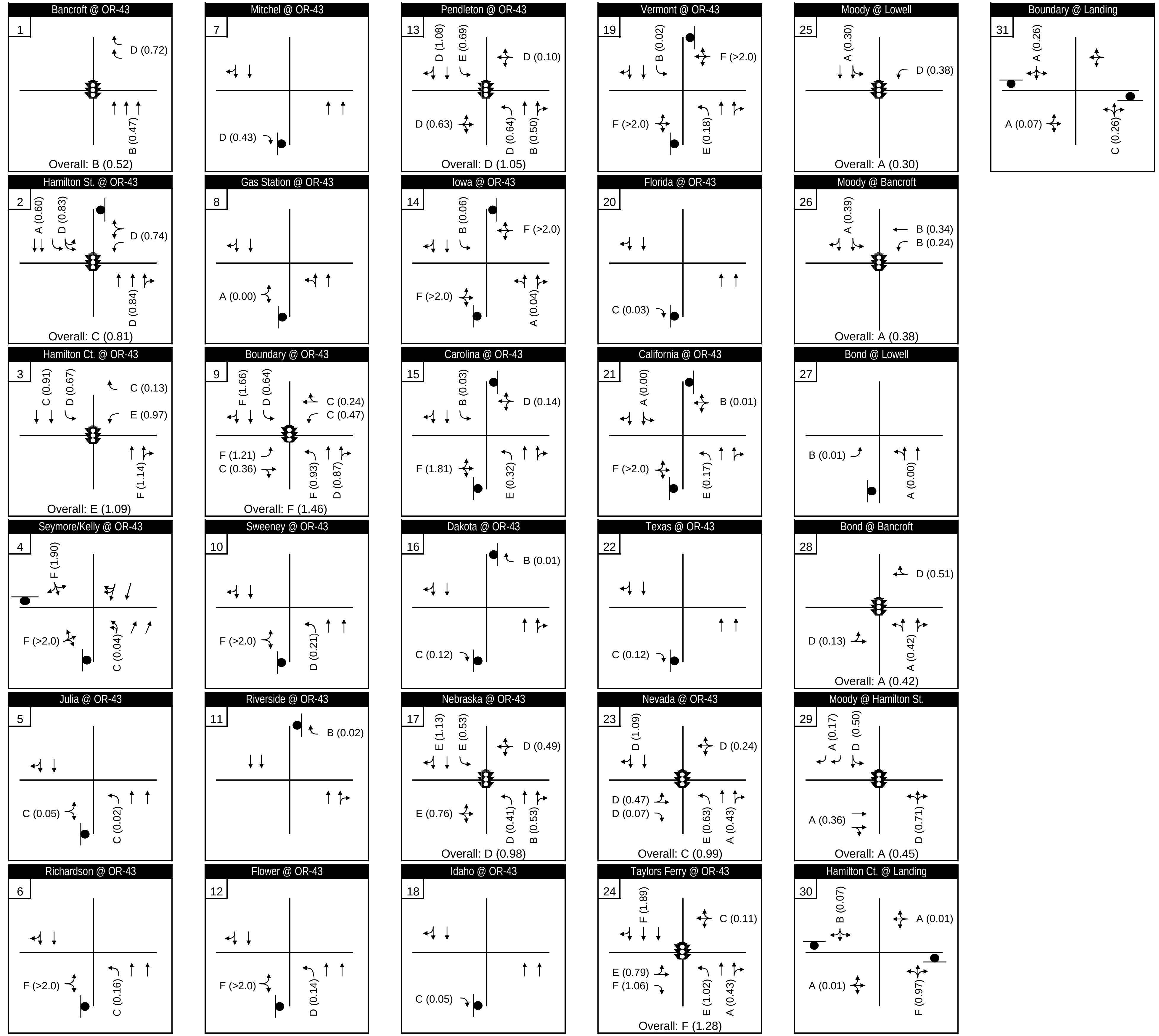
Southern Section (Segment 6)
2035 Willamette Shore Line
PM Peak Hour
Intersection Operations

Last updated: April 19, 2010

SEGMENT 2
SOUTH WATERFRONT

SEGMENT 3
JOHNS LANDING





DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland
TRANSIT PROJECT

Legend

Traffic Signal
STOP - Controlled Approach
YIELD - Controlled Approach

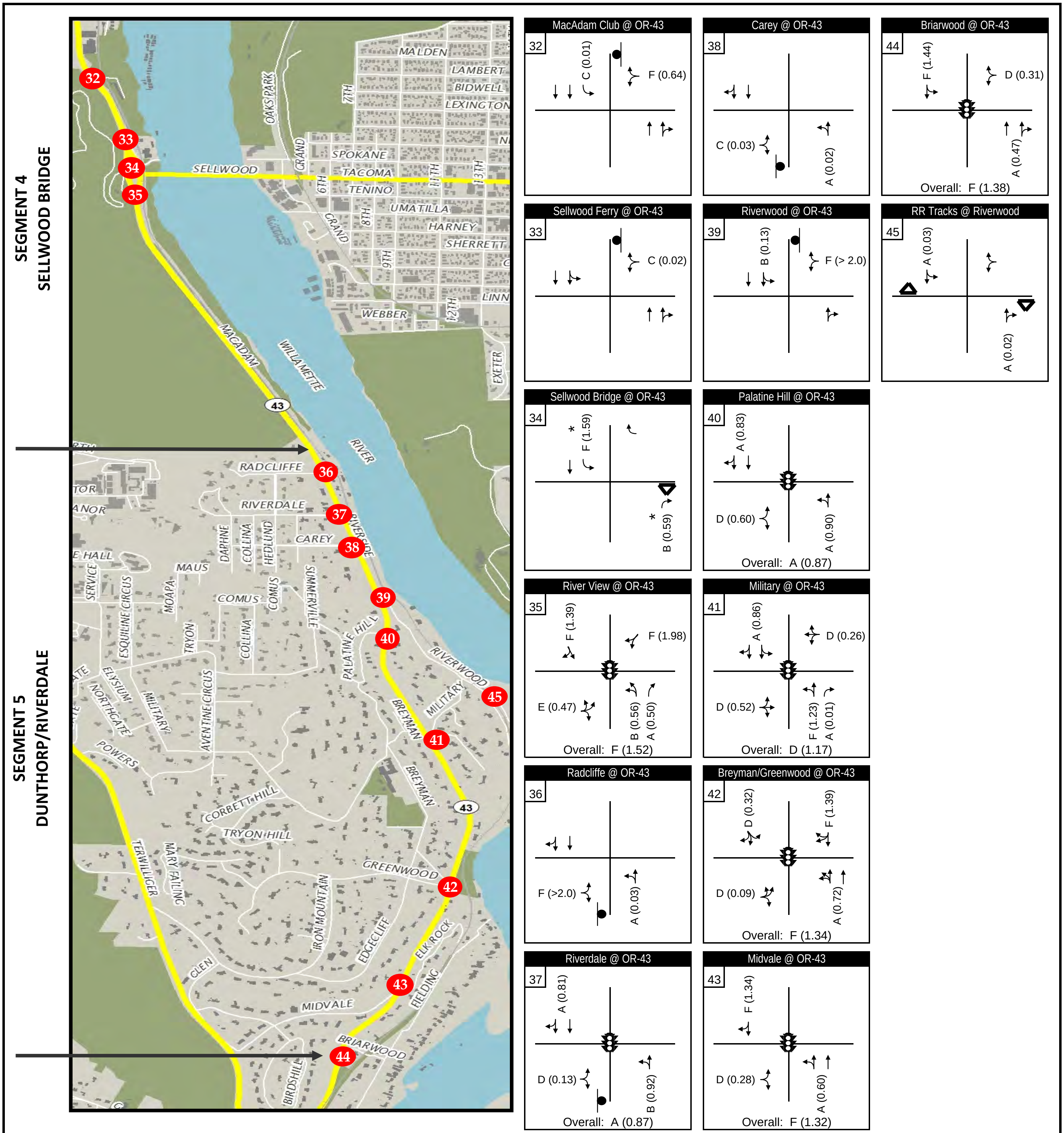
TEV: Total Entering Volume
Available Movement
\## 1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.
* This volume is for both the Taylors Ferry Diverge to the north and the right-turn through the signal.

FIGURE

Northern Section (Segments 2 and 3)
2035 Enhanced Bus PM Peak Hour
Intersection Operations

Last updated: April 19, 2010



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland TRANSIT PROJECT

Legend

Traffic Signal		TEV:	Total Entering Volume
STOP - Controlled Approach		←	Available Movement
YIELD - Controlled Approach		##	1-Hour PM Peak Volume

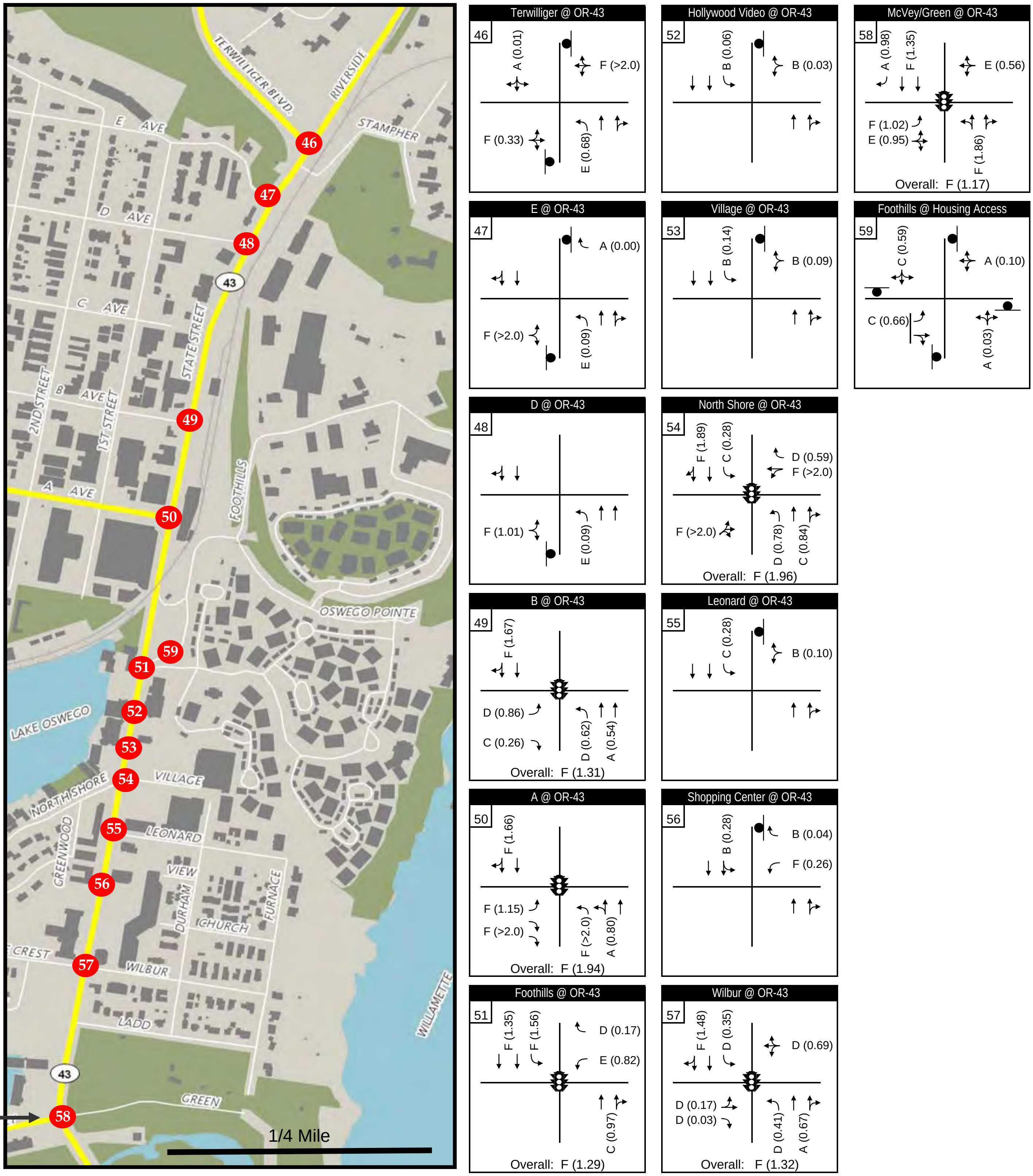
NOTE: Volumes greater than 5 are rounded to the nearest 5.
* Analyzed as stop controlled to represent PM Peak period driver behavior

FIGURE

Center Section (Segments 4 and 5)
2035 Enhanced Bus PM Peak Hour
Intersection Operations

Last updated: April 19, 2010

SEGMENT 6
LAKE OSWEGO



DAVID EVANS AND ASSOCIATES INC.

Lake Oswego to Portland
TRANSIT PROJECT

Legend

Traffic Signal

STOP - Controlled Approach

YIELD - Controlled Approach

TEV: Total Entering Volume

← Available Movement

1-Hour PM Peak Volume

NOTE: Volumes greater than 5 are rounded to the nearest 5.

FIGURE

Southern Section (Segment 6)
2035 Enhanced Bus PM Peak Hour
Intersection Operations

Last updated: April 19, 2010

Appendix C: CAL3QHC Model Input and Output Files

CAL3QHC MODEL RUNS (INPUT-OUTPUT)
EXISTING CONDITIONS

INPUT FILE: A Ave and OR43 Existing 2009

```
'LOPT',60.0,108,0.0,0.0,17,0.3048,1,0
'1',46.00,196.00,5.9
'2',46.00,121.00,5.9
'3',46.00,46.00,5.9
'4',46.00,0.00,5.9
'5',46.00,-46.00,5.9
'6',46.00,-121.00,5.9
'7',46.00,-196.00,5.9
'8',-34.00,-196.00,5.9
'9',-34.00,-121.00,5.9
'10',-34.00,-46.00,5.9
'11',-109.00,-46.00,5.9
'12',-184.00,-46.00,5.9
'13',-184.00,46.00,5.9
'14',-109.00,46.00,5.9
'15',-34.00,46.00,5.9
'16',-34.00,121.00,5.9
'17',-34.00,196.00,5.9
'A Ave and OR43 Existing 2009',11,1,0,'C'
1
'EA','AG',-1000,-12,0,-12,1087,17.052,0,56
2
'EQR','AG',-24,-24,-324,-24,0,24,2
100,76.5,4,856,93.610,1355,2,3
2
'EQL','AG',-24,6,-324,6,0,12,1
100,76.5,4,231,93.610,1770,2,3
1
'NA','AG',18,-1000,18,0,1170,16.502,0,56
1
'ND','AG',24,0,24,1000,981,16.502,0,44
2
'NQTL','AG',24,-36,24,-336,0,24,2
100,19.5,4,960,93.610,1322,2,3
2
'NQL','AG',6,-36,6,-336,0,12,1
100,75.5,5,210,93.610,1610,2,3
1
'SA','AG',-12,1000,-12,0,1346,16.502,0,44
1
'SD','AG',-12,0,-12,-1000,1997,16.502,0,44
2
'SQTR','AG',-12,36,-12,336,0,24,2
100,42.0,4,1346,93.610,1725,2,3
1
'WD','AG',0,24,-1000,24,625,17.052,0,44
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: A Ave and OR43 Existing 2009

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: LOPT RUN: A Ave and OR43 Existing 2009

DATE : 2/26/10
TIME : 15:37:17

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.0 PPM

LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. EA	-1000.0	-12.0	0.0	-12.0	1000.	90.	AG	1087.	17.1	0.0	56.0		
2. EQR	-24.0	-24.0	-2123.3	-24.3	2099.	270.	AG	382.	100.0	0.0	24.0	1.76	106.6
3. EQL	-24.0	6.0	-120.0	6.0	96.	270.	AG	191.	100.0	0.0	12.0	0.73	4.9
4. NA	18.0	-1000.0	18.0	0.0	1000.	360.	AG	1170.	16.5	0.0	56.0		
5. ND	24.0	0.0	24.0	1000.0	1000.	360.	AG	981.	16.5	0.0	44.0		
6. NQTL	24.0	-36.0	24.0	-85.9	50.	180.	AG	95.	100.0	0.0	24.0	0.48	2.5
7. NQL	6.0	-36.0	6.0	-122.1	86.	180.	AG	188.	100.0	0.0	12.0	0.73	4.4
8. SA	-12.0	1000.0	-12.0	0.0	1000.	180.	AG	1346.	16.5	0.0	44.0		
9. SD	-12.0	0.0	-12.0	-1000.0	1000.	180.	AG	1997.	16.5	0.0	44.0		
10. SQTR	-12.0	36.0	-12.0	190.6	155.	360.	AG	211.	100.0	0.0	24.0	0.75	7.9
11. WD	0.0	24.0	-1000.0	24.0	1000.	270.	AG	625.	17.1	0.0	44.0		

JOB: LOPT RUN: A Ave and OR43 Existing 2009

DATE : 2/26/10
TIME : 15:37:17

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EQR	100	76	4.0	856	1355	93.61	2	3
3. EQL	100	76	4.0	231	1770	93.61	2	3
6. NQTL	100	19	4.0	960	1322	93.61	2	3
7. NQL	100	75	5.0	210	1610	93.61	2	3
10. SQTR	100	42	4.0	1346	1725	93.61	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	196.0	5.9
2. 2	46.0	121.0	5.9
3. 3	46.0	46.0	5.9
4. 4	46.0	0.0	5.9
5. 5	46.0	-46.0	5.9
6. 6	46.0	-121.0	5.9
7. 7	46.0	-196.0	5.9
8. 8	-34.0	-196.0	5.9
9. 9	-34.0	-121.0	5.9
10. 10	-34.0	-46.0	5.9
11. 11	-109.0	-46.0	5.9
12. 12	-184.0	-46.0	5.9
13. 13	-184.0	46.0	5.9
14. 14	-109.0	46.0	5.9
15. 15	-34.0	46.0	5.9
16. 16	-34.0	121.0	5.9
17. 17	-34.0	196.0	5.9

JOB: LOPT RUN: A Ave and OR43 Existing 2009

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17
10.	*	2.6	2.6	2.6	2.6	2.5	2.6	2.6	4.9	5.3	6.1	4.7	4.1	2.3	2.5	4.4	4.1	3.8
20.	*	2.2	2.2	2.2	2.2	2.2	2.2	2.1	4.5	4.8	5.6	4.8	4.3	2.3	2.6	4.4	4.1	3.6
30.	*	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.2	4.5	4.9	4.9	4.4	2.5	2.7	4.2	4.1	3.4
40.	*	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.0	4.3	4.5	5.1	4.6	2.4	2.8	4.0	4.0	3.3
50.	*	2.0	2.0	2.0	2.0	2.1	2.1	2.1	3.7	4.1	4.2	5.0	4.6	2.4	2.7	3.8	3.8	3.1
60.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.6	4.0	3.9	4.9	4.9	2.5	2.8	3.6	3.6	3.0
70.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.7	3.7	4.5	4.9	2.6	2.8	3.6	3.6	3.0
80.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.6	3.8	3.9	4.5	2.6	2.9	3.7	3.6	3.0
90.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.5	3.7	3.9	3.5	3.7	3.0	3.0	3.9	3.7	3.2
100.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.5	3.8	3.1	3.1	3.5	3.3	3.7	3.6	3.3
110.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.8	2.8	2.8	3.7	3.5	3.7	3.6	3.4
120.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.6	3.6	4.0	2.9	2.5	4.2	3.9	3.5	3.6	3.5
130.	*	2.0	2.0	2.0	2.1	2.1	2.1	2.1	3.7	3.7	4.1	2.9	2.5	4.2	4.2	3.8	3.8	3.7
140.	*	2.1	2.1	2.1	2.1	2.1	2.1	2.1	3.9	3.9	4.2	2.8	2.6	4.0	4.5	4.0	4.0	4.0
150.	*	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.1	4.1	4.3	2.9	2.6	4.0	4.5	4.4	4.3	4.2
160.	*	2.1	2.2	2.2	2.2	2.2	2.2	2.2	4.4	4.4	4.5	2.9	2.6	3.8	4.4	5.2	4.8	4.6
170.	*	2.7	2.7	2.7	2.7	2.7	2.7	2.7	4.6	4.7	4.7	2.7	2.3	3.6	4.2	5.6	5.2	5.1
180.	*	3.4	3.6	3.7	3.5	3.4	3.4	3.4	4.1	4.2	4.2	2.4	2.1	3.5	4.1	5.5	4.8	4.7
190.	*	4.2	4.2	4.3	4.2	4.0	3.9	3.9	3.0	3.0	3.1	2.1	2.0	3.2	3.6	4.4	3.8	3.5
200.	*	4.3	4.2	4.3	4.3	4.1	3.9	3.9	2.4	2.4	2.4	2.0	2.0	3.2	3.3	3.8	3.1	3.0
210.	*	4.2	4.3	4.0	4.0	4.0	3.6	3.6	2.2	2.2	2.2	2.0	2.0	3.4	3.5	3.8	3.0	2.7
220.	*	4.3	4.2	3.9	3.8	4.1	3.5	3.5	2.1	2.1	2.1	2.0	2.0	3.4	3.4	3.8	3.0	2.7
230.	*	4.1	4.4	4.0	3.7	4.0	3.4	3.4	2.1	2.1	2.1	2.0	2.0	3.5	3.5	3.9	3.0	2.7
240.	*	3.9	4.3	4.4	4.0	3.9	3.3	3.3	2.1	2.1	2.1	2.0	2.0	3.7	3.7	3.9	2.9	2.6
250.	*	4.0	4.3	4.9	4.6	4.1	3.3	3.3	2.0	2.0	2.3	2.3	2.3	3.9	3.9	4.0	3.0	2.7
260.	*	3.6	4.1	5.0	5.6	4.8	3.5	3.3	2.0	2.1	3.0	3.0	3.0	4.0	4.0	4.1	2.8	2.5
270.	*	3.2	3.8	4.6	5.6	5.7	4.0	3.6	2.2	2.5	4.2	4.2	4.2	3.4	3.4	3.4	2.4	2.1

280.	*	3.0	3.3	3.7	4.8	5.8	4.5	3.9	2.6	3.0	4.9	4.9	4.9	2.6	2.6	2.6	2.1	2.0
290.	*	3.0	3.3	3.4	3.8	5.4	4.6	4.0	2.7	3.0	5.0	4.9	4.7	2.1	2.1	2.1	2.0	2.0
300.	*	3.0	3.3	3.4	3.6	4.4	4.6	4.0	2.8	3.1	4.7	4.4	4.4	2.1	2.1	2.1	2.0	2.0
310.	*	3.1	3.4	3.5	3.5	4.1	4.6	4.1	2.8	3.0	4.4	4.2	4.2	2.0	2.0	2.1	2.1	2.1
320.	*	3.2	3.4	3.6	3.5	3.6	4.6	4.2	2.7	3.1	4.4	4.0	4.0	2.0	2.0	2.1	2.1	2.1
330.	*	3.4	3.5	3.7	3.7	3.8	4.6	4.3	2.8	3.2	4.4	3.8	3.8	2.0	2.0	2.1	2.1	2.1
340.	*	3.5	3.5	3.7	3.8	3.8	4.4	4.5	3.1	3.3	4.3	3.9	3.8	2.0	2.0	2.3	2.3	2.2
350.	*	3.5	3.6	3.7	3.8	3.9	4.1	4.2	3.8	3.9	4.9	3.9	3.8	2.0	2.0	2.8	2.7	2.7
360.	*	3.1	3.2	3.3	3.4	3.4	3.4	3.5	4.6	4.8	5.9	4.3	3.9	2.1	2.3	3.8	3.6	3.4
MAX	*	4.3	4.4	5.0	5.6	5.8	4.6	4.5	4.9	5.3	6.1	5.1	4.9	4.2	4.5	5.6	5.2	5.1
DEGR.	*	200	230	260	260	280	290	340	10	10	10	40	60	130	140	170	170	170

THE HIGHEST CONCENTRATION OF 6.10 PPM OCCURRED AT RECEPTOR REC10.

INPUT FILE: Foothills Ave and OR43 Existing 2009

```
'LOPT',60.0,108,0.0,0.0,17,0.3048,1,0
'1',46.00,184.00,5.9
'2',46.00,109.00,5.9
'3',46.00,34.00,5.9
'4',121.00,34.00,5.9
'5',196.00,34.00,5.9
'6',196.00,-22.00,5.9
'7',121.00,-22.00,5.9
'8',46.00,-22.00,5.9
'9',46.00,-97.00,5.9
'10',46.00,-172.00,5.9
'11',-34.00,-172.00,5.9
'12',-34.00,-97.00,5.9
'13',-34.00,-22.00,5.9
'14',-34.00,6.00,5.9
'15',-34.00,34.00,5.9
'16',-34.00,109.00,5.9
'17',-34.00,184.00,5.9
'Foothills and OR43 Existing 2009',11,1,0,'C'
1
'WA','AG',1000,12,0,12,164,17.052,0,44
2
'WQR','AG',36,18,336,18,0,12,1
100,81.6,4,84,93.61,1528,2,3
2
'WQL','AG',36,6,336,6,0,12,1
100,81.6,4,80,93.61,1770,2,3
1
'NA','AG',24,-1000,24,0,1148,16.502,0,44
1
'ND','AG',24,0,24,1000,1170,16.502,0,44
2
'NQTR','AG',24,-12,24,-312,0,24,2
100,27.1,4,1148,93.61,1751.5,2,3
1
'SA','AG',-6,1012,-6,12,1997,16.502,0,56
1
'SD','AG',-12,12,-12,-988,1987,16.502,0,44
2
'SQT','AG',-12,24,-12,324,0,24,2
100,14.4,4,1907,93.61,1769.5,2,3
2
'SQTL','AG',6,24,6,324,0,12,1
100,85.3,4,90,93.61,1770,2,3
1
'ED','AG',12,-6,512,-6,152,17.052,0,32
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: Foothills Ave and OR43 Existing 2009

```
                  CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

  JOB: LOPT                                                 RUN: Foothills and OR43 Existing 2009

  DATE :  2/22/10
  TIME : 10:32:50

     The MODE flag has been set to C for calculating CO averages.

   SITE & METEOROLOGICAL VARIABLES
   -------------------------------
   VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 108. CM
    U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

   LINK VARIABLES
   --------------
     LINK DESCRIPTION     *         LINK COORDINATES (FT)          *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                          *   X1        Y1        X2        Y2     *     (FT)  (DEG)           (G/MI)  (FT) (FT)       (VEH)
  ------------------------*----------------------------------------*--------------------------------------------------------------
   1. WA                  *  1000.0      12.0       0.0      12.0 *    1000.   270. AG    164.  17.1   0.0 44.0
   2. WQR                 *    36.0      18.0      73.2      18.0 *      37.    90. AG    203. 100.0   0.0 12.0 0.42   1.9
   3. WQL                 *    36.0       6.0      71.4       6.0 *      35.    90. AG    203. 100.0   0.0 12.0 0.35   1.8
   4. NA                  *    24.0   -1000.0      24.0       0.0 *    1000.   360. AG   1148.  16.5   0.0 44.0
   5. ND                  *    24.0       0.0      24.0    1000.0 *    1000.   360. AG   1170.  16.5   0.0 44.0
   6. NQTR                *    24.0     -12.0      24.0     -96.7 *      85.   180. AG    136. 100.0   0.0 24.0 0.49   4.3
   7. SA                  *    -6.0    1012.0      -6.0      12.0 *    1000.   180. AG   1997.  16.5   0.0 56.0
   8. SD                  *   -12.0      12.0     -12.0    -988.0 *    1000.   180. AG   1987.  16.5   0.0 44.0
   9. SQT                 *   -12.0      24.0     -12.0      97.0 *      73.   360. AG     70. 100.0   0.0 24.0 0.67   3.7
  10. SQTL                *     6.0      24.0       6.0      65.8 *      42.   360. AG    213. 100.0   0.0 12.0 0.57   2.1
  11. ED                  *    12.0      -6.0     512.0      -6.0 *     500.    90. AG    152.  17.1   0.0 32.0
```

JOB: LOPT RUN: Foothills and OR43 Existing 2009

DATE : 2/22/10
TIME : 10:32:50

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. WQR	100	81	4.0	84	1528	93.61	2	3
3. WQL	100	81	4.0	80	1770	93.61	2	3
6. NQTR	100	27	4.0	1148	1751	93.61	2	3
9. SQT	100	14	4.0	1907	1769	93.61	2	3
10. SQTL	100	85	4.0	90	1770	93.61	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	184.0	5.9
2. 2	46.0	109.0	5.9
3. 3	46.0	34.0	5.9
4. 4	121.0	34.0	5.9
5. 5	196.0	34.0	5.9
6. 6	196.0	-22.0	5.9
7. 7	121.0	-22.0	5.9
8. 8	46.0	-22.0	5.9
9. 9	46.0	-97.0	5.9
10. 10	46.0	-172.0	5.9
11. 11	-34.0	-172.0	5.9
12. 12	-34.0	-97.0	5.9
13. 13	-34.0	-22.0	5.9
14. 14	-34.0	6.0	5.9
15. 15	-34.0	34.0	5.9
16. 16	-34.0	109.0	5.9
17. 17	-34.0	184.0	5.9

JOB: LOPT RUN: Foothills and OR43 Existing 2009

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17
	CONCENTRATION (PPM)																
10.	2.7	2.8	2.8	2.0	2.0	2.2	2.2	3.7	3.0	2.9	4.9	4.8	4.7	4.5	4.5	4.4	4.4
20.	2.2	2.2	2.2	2.0	2.0	2.2	2.2	3.0	2.3	2.3	4.5	4.5	4.6	4.5	4.4	4.2	4.2
30.	2.1	2.1	2.1	2.0	2.0	2.2	2.2	2.7	2.1	2.1	4.2	4.3	4.4	4.4	4.1	3.9	3.9
40.	2.1	2.1	2.1	2.0	2.0	2.2	2.2	2.5	2.1	2.1	3.8	4.2	4.1	4.2	4.0	3.7	3.7
50.	2.1	2.1	2.1	2.0	2.0	2.2	2.2	2.4	2.1	2.1	3.6	3.9	4.0	4.0	3.9	3.5	3.5
60.	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.3	2.0	2.0	3.5	3.7	3.9	3.8	3.8	3.4	3.4
70.	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.3	2.0	2.0	3.4	3.6	4.0	3.9	3.9	3.4	3.4
80.	2.0	2.0	2.1	2.1	2.1	2.3	2.3	2.3	2.0	2.0	3.4	3.6	3.9	4.1	4.0	3.4	3.4
90.	2.0	2.0	2.2	2.1	2.1	2.2	2.2	2.2	2.0	2.0	3.5	3.6	4.0	4.0	4.3	3.5	3.5
100.	2.0	2.0	2.4	2.3	2.3	2.1	2.1	2.1	2.0	2.0	3.4	3.5	3.6	4.0	4.2	3.4	3.4
110.	2.0	2.1	2.5	2.3	2.3	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.6	3.9	4.0	3.5	3.4
120.	2.0	2.0	2.6	2.2	2.2	2.0	2.0	2.0	2.0	2.0	3.5	3.5	3.7	3.7	4.1	3.5	3.4
130.	2.1	2.1	2.8	2.2	2.2	2.0	2.0	2.1	2.1	2.1	3.6	3.6	3.8	3.8	3.7	3.9	3.5
140.	2.1	2.1	2.9	2.2	2.2	2.0	2.0	2.1	2.1	2.1	3.8	3.8	3.8	3.9	3.9	4.4	3.7
150.	2.1	2.1	3.1	2.2	2.2	2.0	2.0	2.1	2.1	2.1	4.0	4.0	4.1	4.1	4.2	4.5	4.0
160.	2.2	2.4	3.3	2.2	2.2	2.0	2.0	2.2	2.2	2.2	4.3	4.3	4.3	4.4	4.3	4.7	4.4
170.	2.8	3.0	4.0	2.2	2.2	2.0	2.0	2.7	2.7	2.7	4.5	4.6	4.6	4.6	4.5	4.7	4.7
180.	3.9	3.9	4.8	2.6	2.4	2.2	2.4	3.6	3.5	3.5	4.0	4.0	4.1	4.1	4.0	4.1	4.1
190.	4.4	4.7	5.4	2.9	2.6	2.3	2.7	4.2	4.0	4.0	3.0	3.0	3.0	3.1	3.0	3.0	2.9
200.	4.3	4.3	5.0	3.1	2.7	2.5	2.8	4.3	3.9	3.9	2.4	2.4	2.4	2.4	2.2	2.3	2.3
210.	4.0	4.2	4.4	3.1	2.7	2.5	2.8	4.1	3.7	3.7	2.2	2.2	2.2	2.2	2.0	2.1	2.1
220.	3.7	4.1	4.0	3.0	2.7	2.5	2.7	4.0	3.6	3.6	2.1	2.1	2.1	2.1	2.0	2.1	2.1
230.	3.5	3.8	3.8	3.1	2.7	2.5	2.8	3.8	3.4	3.4	2.1	2.1	2.1	2.1	2.0	2.1	2.1
240.	3.4	3.5	3.7	3.3	2.8	2.5	2.8	3.7	3.3	3.3	2.1	2.1	2.1	2.1	2.0	2.1	2.1
250.	3.3	3.4	3.5	3.2	2.7	2.6	2.8	3.7	3.3	3.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0
260.	3.3	3.4	3.8	3.2	2.8	2.7	2.9	3.7	3.4	3.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0
270.	3.5	3.5	3.9	3.1	2.7	2.7	2.9	3.6	3.5	3.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0

280.	*	3.3	3.3	3.7	3.0	2.6	2.9	3.2	3.7	3.6	3.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0
290.	*	3.4	3.4	3.8	2.8	2.5	2.8	3.3	3.7	3.6	3.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0
300.	*	3.4	3.4	3.7	2.7	2.5	2.7	3.3	3.7	3.7	3.3	2.1	2.1	2.1	2.0	2.1	2.1	2.1
310.	*	3.5	3.5	3.8	2.8	2.5	2.7	3.2	4.0	3.8	3.4	2.1	2.1	2.1	2.0	2.1	2.1	2.1
320.	*	3.7	3.7	3.9	2.8	2.5	2.7	3.1	4.2	4.1	3.5	2.1	2.1	2.1	2.1	2.1	2.1	2.1
330.	*	3.9	3.9	3.9	2.8	2.6	2.8	3.0	4.4	4.3	3.8	2.2	2.2	2.1	2.1	2.2	2.2	2.2
340.	*	4.2	4.2	4.2	2.9	2.5	2.7	3.1	4.8	4.5	4.0	2.4	2.4	2.3	2.3	2.3	2.3	2.3
350.	*	4.2	4.2	4.2	2.7	2.3	2.6	2.9	5.0	4.7	4.3	3.0	3.0	3.0	2.9	2.9	2.9	2.9
360.	*	3.6	3.6	3.7	2.4	2.2	2.4	2.6	4.6	3.9	3.8	4.2	4.1	4.1	3.9	3.9	3.9	3.9
MAX	*	4.4	4.7	5.4	3.3	2.8	2.9	3.3	5.0	4.7	4.3	4.9	4.8	4.7	4.6	4.5	4.7	4.7
DEGR.	*	190	190	190	240	240	280	290	350	350	350	10	10	10	170	10	160	170

THE HIGHEST CONCENTRATION OF 5.40 PPM OCCURRED AT RECEPTOR REC3 .

INPUT FILE: North Shore and OR43 Existing 2009

```
'LOPT',60.0,108,0.0,0.0,20,0.3048,1,0
'1',46.00,184.00,5.9
'2',46.00,109.00,5.9
'3',46.00,34.00,5.9
'4',121.00,34.00,5.9
'5',196.00,34.00,5.9
'6',196.00,-22.00,5.9
'7',121.00,-22.00,5.9
'8',46.00,-22.00,5.9
'9',46.00,-97.00,5.9
'10',46.00,-172.00,5.9
'11',-34.00,-225.03,5.9
'12',-34.00,-150.03,5.9
'13',-34.00,-75.03,5.9
'14',-79.96,-128.06,5.9
'15',-132.99,-181.09,5.9
'16',-132.99,-92.06,5.9
'17',-79.96,-39.03,5.9
'18',-34.00,14.00,5.9
'19',-34.00,89.00,5.9
'20',-34.00,164.00,5.9
'NorthShore and OR43 Existing 2009',15,1,0,'C'
1
'EA','AG',-707.11,-707.11,0.00,-6.00,57,17.052,0,38
1
'ED','AG',0.00,-6.00,500.00,-6.00,174,17.052,0,32
2
'EQT','AG',-24.00,-6.00,-731.11,-713.11,0,12,1
100.00,76.00,4.00,9.00,93.610,839,2,3
1
'WA','AG',500.00,12.00,0.00,12.00,225,17.052,0,44
1
'WD','AG',0.00,12.00,-707.11,-695.11,85,17.052,0,38
2
'WQTL','AG',36.00,6.00,536.00,6.00,0,12,1
100.00,76.00,4.00,21.00,93.610,1180,2,3
2
'WQR','AG',36.00,18.00,336.00,18.00,0,12,1
100.00,76.00,4.00,55.00,93.610,1400,2,3
1
'NA','AG',18.00,-1000.00,18.00,0.00,1170,16.502,0,56
1
'ND','AG',24.00,0.00,24.00,1000.00,1122,16.502,0,44
2
'NQL','AG',6.00,-12.00,6.00,-1012.00,0,12,1
100.00,89.50,4.00,27.00,93.610,1770,2,3
2
'NQTR','AG',24.00,-12.00,24.00,-1012.00,0,24,2
100.00,38.40,4.00,1035.00,93.610,1735,2,3
1
'SA','AG',-6.00,1000.00,-6.00,0.00,1903,16.502,0,56
1
'SD','AG',-12.00,0.00,-12.00,-1000.00,1974,16.502,0,44
2
'SQL','AG',6.00,24.00,6.00,1024.00,0,12,1
100.00,79.60,4.00,57.00,93.610,1770,2,3
2
'SQTR','AG',-12.00,24.00,-12.00,1024.00,0,24,2
100.00,28.50,4.00,1809.00,93.610,1763,2,3
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: North Shore and OR43 Existing 2009

```
                  CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

      JOB: LOPT                                                 RUN: NorthShore and OR43 Existing 2009

      DATE :  2/20/10
      TIME : 14:41: 1

         The MODE flag has been set to C for calculating CO averages.

       SITE & METEOROLOGICAL VARIABLES
       -------------------------------
       VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 108. CM
        U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

       LINK VARIABLES
       --------------
         LINK DESCRIPTION      *        LINK COORDINATES (FT)         *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                               *   X1        Y1        X2        Y2     *     (FT)  (DEG)           (G/MI)  (FT) (FT)       (VEH)
      ------------------------*--------------------------------------*--------------------------------------------------------
       1. EA                   *   -707.1    -707.1       0.0      -6.0 *     996.    45. AG     57.  17.1   0.0 38.0
       2. ED                   *      0.0      -6.0     500.0      -6.0 *     500.    90. AG    174.  17.1   0.0 32.0
       3. EQT                  *    -24.0      -6.0     -26.6      -8.6 *       4.   225. AG    191. 100.0   0.0 12.0 0.06   0.2
       4. WA                   *    500.0      12.0       0.0      12.0 *     500.   270. AG    225.  17.1   0.0 44.0
       5. WD                   *      0.0      12.0    -707.1    -695.1 *    1000.   225. AG     85.  17.1   0.0 38.0
       6. WQTL                 *     36.0       6.0      44.7       6.0 *       9.    90. AG    191. 100.0   0.0 12.0 0.10   0.4
       7. WQR                  *     36.0      18.0      58.9      18.0 *      23.    90. AG    191. 100.0   0.0 12.0 0.22   1.2
       8. NA                   *     18.0   -1000.0      18.0       0.0 *    1000.   360. AG   1170.  16.5   0.0 56.0
       9. ND                   *     24.0       0.0      24.0    1000.0 *    1000.   360. AG   1122.  16.5   0.0 44.0
      10. NQL                  *      6.0     -12.0       6.0     -25.1 *      13.   180. AG    223. 100.0   0.0 12.0 0.31   0.7
      11. NQTR                 *     24.0     -12.0      24.0    -119.4 *     107.   180. AG    191. 100.0   0.0 24.0 0.53   5.5
      12. SA                   *     -6.0    1000.0      -6.0       0.0 *    1000.   180. AG   1903.  16.5   0.0 56.0
      13. SD                   *    -12.0       0.0     -12.0   -1000.0 *    1000.   180. AG   1974.  16.5   0.0 44.0
      14. SQL                  *      6.0      24.0       6.0      48.6 *      25.   360. AG    198. 100.0   0.0 12.0 0.22   1.3
      15. SQTR                 *    -12.0      24.0     -12.0     162.4 *     138.   360. AG    141. 100.0   0.0 24.0 0.78   7.0
```

JOB: LOPT RUN: NorthShore and OR43 Existing 2009

DATE : 2/20/10
TIME : 14:41: 1

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
3. EQT	100	76	4.0	9	839	93.61	2	3
6. WQTL	100	76	4.0	21	1180	93.61	2	3
7. WQR	100	76	4.0	55	1400	93.61	2	3
10. NQL	100	89	4.0	27	1770	93.61	2	3
11. NQTR	100	38	4.0	1035	1735	93.61	2	3
14. SQL	100	79	4.0	57	1770	93.61	2	3
15. SQTR	100	28	4.0	1809	1763	93.61	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	184.0	5.9
2. 2	46.0	109.0	5.9
3. 3	46.0	34.0	5.9
4. 4	121.0	34.0	5.9
5. 5	196.0	34.0	5.9
6. 6	196.0	-22.0	5.9
7. 7	121.0	-22.0	5.9
8. 8	46.0	-22.0	5.9
9. 9	46.0	-97.0	5.9
10. 10	46.0	-172.0	5.9
11. 11	-34.0	-225.0	5.9
12. 12	-34.0	-150.0	5.9
13. 13	-34.0	-75.0	5.9
14. 14	-80.0	-128.1	5.9
15. 15	-133.0	-181.1	5.9
16. 16	-133.0	-92.1	5.9
17. 17	-80.0	-39.0	5.9
18. 18	-34.0	14.0	5.9
19. 19	-34.0	89.0	5.9
20. 20	-34.0	164.0	5.9

JOB: LOPT RUN: NorthShore and OR43 Existing 2009

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
10. *	2.7	2.7	2.7	2.0	2.0	2.2	2.2	3.2	2.9	2.8	5.0	4.9	4.8	3.1	2.6	2.6	3.1	4.7	4.5	4.3
20. *	2.2	2.2	2.2	2.0	2.0	2.2	2.2	2.4	2.2	2.1	4.7	4.8	4.7	3.2	2.8	2.8	3.3	4.6	4.5	4.1
30. *	2.1	2.1	2.1	2.0	2.0	2.2	2.2	2.3	2.2	2.1	4.2	4.5	4.6	3.1	2.9	2.8	3.2	4.4	4.4	3.9
40. *	2.1	2.1	2.1	2.0	2.0	2.2	2.2	2.2	2.2	2.1	3.9	4.1	4.5	3.2	2.8	2.8	3.2	4.1	4.1	3.6
50. *	2.1	2.1	2.1	2.0	2.0	2.2	2.2	2.2	2.2	2.1	3.7	4.0	4.2	3.3	2.8	3.0	3.0	4.0	3.9	3.5
60. *	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.1	2.0	3.6	3.8	4.0	3.1	2.7	2.8	3.1	3.9	3.8	3.4
70. *	2.0	2.0	2.0	2.0	2.0	2.3	2.4	2.4	2.1	2.0	3.4	3.5	3.9	3.1	2.7	3.0	3.4	3.8	3.7	3.3
80. *	2.0	2.0	2.1	2.1	2.1	2.3	2.3	2.3	2.0	2.0	3.4	3.4	3.7	3.0	2.6	2.8	3.4	3.8	3.7	3.4
90. *	2.0	2.0	2.2	2.2	2.2	2.2	2.3	2.3	2.0	2.0	3.5	3.5	3.8	3.0	2.6	2.8	3.4	3.9	3.8	3.6
100. *	2.0	2.0	2.3	2.3	2.3	2.1	2.1	2.1	2.0	2.0	3.4	3.4	3.7	2.9	2.6	2.8	3.2	3.8	3.8	3.5
110. *	2.0	2.1	2.3	2.3	2.3	2.0	2.0	2.0	2.0	2.0	3.4	3.4	3.7	2.9	2.6	2.6	3.1	3.7	3.8	3.6
120. *	2.0	2.1	2.4	2.3	2.3	2.0	2.0	2.0	2.0	2.0	3.6	3.6	3.8	2.9	2.6	2.6	3.1	3.9	3.9	3.8
130. *	2.1	2.2	2.5	2.3	2.3	2.0	2.0	2.1	2.1	2.1	3.7	3.7	3.8	2.9	2.6	2.6	3.0	3.9	4.3	3.9
140. *	2.1	2.2	2.5	2.2	2.2	2.0	2.0	2.1	2.1	2.1	3.8	3.8	3.9	3.0	2.7	2.7	3.0	4.3	4.4	4.1
150. *	2.1	2.2	2.7	2.2	2.2	2.0	2.0	2.1	2.1	2.1	4.1	4.1	4.1	3.1	2.8	2.8	3.1	4.5	4.4	4.5
160. *	2.2	2.3	2.8	2.2	2.2	2.0	2.0	2.2	2.2	2.2	4.4	4.4	4.4	3.2	2.7	2.8	3.2	4.6	4.7	4.7
170. *	2.8	3.0	3.6	2.2	2.2	2.0	2.0	2.8	2.7	2.7	4.6	4.6	4.6	3.0	2.6	2.7	3.1	4.8	4.6	4.8
180. *	3.9	3.9	4.6	2.6	2.4	2.2	2.4	3.6	3.4	3.4	4.1	4.1	4.1	2.6	2.3	2.4	2.7	4.1	4.2	4.1
190. *	4.4	4.4	5.1	2.9	2.6	2.3	2.7	4.3	3.9	3.9	3.0	3.0	3.0	2.1	2.0	2.1	2.2	3.0	3.0	3.1
200. *	4.4	4.3	5.1	3.1	2.7	2.5	2.9	4.5	4.0	3.9	2.4	2.4	2.4	2.0	2.0	2.1	2.1	2.4	2.3	2.3
210. *	3.9	4.0	4.9	3.2	2.7	2.5	2.9	4.3	3.8	3.6	2.2	2.2	2.2	2.0	2.0	2.1	2.1	2.2	2.1	2.1
220. *	3.8	4.0	4.2	3.1	2.7	2.5	2.8	4.2	3.8	3.5	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1
230. *	3.7	3.8	4.0	3.2	2.9	2.5	2.9	4.0	3.8	3.4	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.1	2.1
240. *	3.6	3.6	3.6	3.1	2.9	2.6	2.9	3.9	3.8	3.3	2.1	2.1	2.3	2.0	2.0	2.0	2.0	2.0	2.1	2.1
250. *	3.4	3.5	3.7	3.1	2.8	2.6	2.9	4.0	3.8	3.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
260. *	3.4	3.5	3.8	3.0	2.8	2.6	3.0	3.8	3.8	3.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
270. *	3.3	3.5	3.8	3.1	2.6	2.8	2.8	3.9	3.8	3.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

```
280.  *   3.3   3.5   3.7   2.9   2.7   2.8   3.0   3.9   3.7   3.3   2.0   2.0   2.0   2.0   2.0   2.0   2.0   2.0   2.0   2.0
290.  *   3.3   3.5   3.7   2.8   2.6   2.7   3.2   3.7   3.8   3.3   2.0   2.0   2.0   2.0   2.0   2.0   2.0   2.0   2.0   2.0
300.  *   3.4   3.6   3.7   2.8   2.6   2.8   3.0   3.9   3.9   3.3   2.1   2.1   2.1   2.0   2.0   2.0   2.0   2.1   2.1   2.1
310.  *   3.5   3.6   3.7   2.8   2.5   2.8   3.1   3.9   4.1   3.4   2.1   2.1   2.1   2.0   2.0   2.0   2.0   2.1   2.1   2.1
320.  *   3.7   3.8   3.9   2.8   2.5   2.7   3.1   4.0   4.1   3.5   2.1   2.1   2.1   2.0   2.0   2.0   2.0   2.1   2.1   2.1
330.  *   3.8   3.8   4.0   2.8   2.5   2.7   3.1   4.4   4.4   3.9   2.2   2.2   2.1   2.0   2.0   2.0   2.0   2.1   2.1   2.1
340.  *   4.0   4.0   4.1   2.8   2.5   2.7   3.0   4.7   4.6   4.2   2.4   2.4   2.3   2.0   2.0   2.0   2.0   2.3   2.3   2.3
350.  *   4.1   4.2   4.2   2.7   2.3   2.5   2.9   4.7   4.5   4.5   3.1   3.0   3.1   2.1   2.0   2.0   2.1   3.0   2.9   2.9
360.  *   3.6   3.6   3.6   2.3   2.1   2.4   2.6   4.1   3.9   3.8   4.3   4.3   4.1   2.5   2.3   2.3   2.5   4.0   3.9   3.8
------*------------------------------------------------------------------------------------------------------------------------
MAX   *   4.4   4.4   5.1   3.2   2.9   2.8   3.2   4.7   4.6   4.5   5.0   4.9   4.8   3.3   2.9   3.0   3.4   4.8   4.7   4.8
DEGR. *  190   190   190   210   230   300   290   340   340   350    10    10    10    50    30    50    70   170   160   170

THE HIGHEST CONCENTRATION OF    5.10 PPM OCCURRED AT RECEPTOR REC3 .
```

CAL3QHC MODEL RUNS (INPUT-OUTPUT)
2035 NO BUILD CONDITIONS

INPUT FILE: A Ave and OR43 No Build 2035

```
'LOPT',60.0,108,0.0,0.0,17,0.3048,1,0
'1',46.00,196.00,5.9
'2',46.00,121.00,5.9
'3',46.00,46.00,5.9
'4',46.00,0.00,5.9
'5',46.00,-46.00,5.9
'6',46.00,-121.00,5.9
'7',46.00,-196.00,5.9
'8',-34.00,-196.00,5.9
'9',-34.00,-121.00,5.9
'10',-34.00,-46.00,5.9
'11',-109.00,-46.00,5.9
'12',-184.00,-46.00,5.9
'13',-184.00,46.00,5.9
'14',-109.00,46.00,5.9
'15',-34.00,46.00,5.9
'16',-34.00,121.00,5.9
'17',-34.00,196.00,5.9
'A Ave and OR43 No Build 2035',11,1,0,'C'
1
'EA','AG',-1000,-12,0,-12,1825,10.872,0,56
2
'EQR','AG',-24,-24,-324,-24,0,24,2
100,76.5,4,1500,58.27,1355,2,3
2
'EQL','AG',-24,6,-324,6,0,12,1
100,76.5,4,325,58.27,1770,2,3
1
'NA','AG',18,-1000,18,0,1600,10.376,0,56
1
'ND','AG',24,0,24,1000,1270,10.376,0,44
2
'NQTL','AG',24,-36,24,-336,0,24,2
100,19.5,4,1273,58.27,835,2,3
2
'NQL','AG',6,-36,6,-336,0,12,1
100,75.5,5,328,58.27,1610,2,3
1
'SA','AG',-12,1000,-12,0,2675,10.376,0,44
1
'SD','AG',-12,0,-12,-1000,3860,10.376,0,44
2
'SQTR','AG',-12,36,-12,336,0,24,2
100,42.0,4,2675,58.27,1735,2,3
1
'WD','AG',0,24,-1000,24,970,10.872,0,44
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: A Ave and OR43 No Build 2035

```
                  CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

  JOB: LOPT                                                    RUN: A Ave and OR43 No Build 2035

  DATE :  2/26/10
  TIME : 15:38:27

     The MODE flag has been set to C for calculating CO averages.

   SITE & METEOROLOGICAL VARIABLES
   -------------------------------
   VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 108. CM
    U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

   LINK VARIABLES
   --------------
     LINK DESCRIPTION     *         LINK COORDINATES (FT)         *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                          *   X1        Y1        X2        Y2    *     (FT)  (DEG)           (G/MI)  (FT) (FT)       (VEH)
  ------------------------*---------------------------------------*--------------------------------------------------------------
   1. EA                  *  -1000.0     -12.0       0.0     -12.0 *    1000.    90. AG  1825.  10.9   0.0 56.0
   2. EQR                 *    -24.0     -24.0   -5502.0     -24.8 *    5478.   270. AG   238. 100.0   0.0 24.0 3.09 278.3
   3. EQL                 *    -24.0       6.0    -293.3       6.0 *     269.   270. AG   119. 100.0   0.0 12.0 1.02  13.7
   4. NA                  *     18.0   -1000.0      18.0       0.0 *    1000.   360. AG  1600.  10.4   0.0 56.0
   5. ND                  *     24.0       0.0      24.0    1000.0 *    1000.   360. AG  1270.  10.4   0.0 44.0
   6. NQTL                *     24.0     -36.0      24.0    -301.5 *     265.   180. AG    59. 100.0   0.0 24.0 1.02  13.5
   7. NQL                 *      6.0     -36.0       6.0    -624.3 *     588.   180. AG   117. 100.0   0.0 12.0 1.13  29.9
   8. SA                  *    -12.0    1000.0     -12.0       0.0 *    1000.   180. AG  2675.  10.4   0.0 44.0
   9. SD                  *    -12.0       0.0     -12.0   -1000.0 *    1000.   180. AG  3860.  10.4   0.0 44.0
  10. SQTR                *    -12.0      36.0     -12.0    4786.1 *    4750.   360. AG   131. 100.0   0.0 24.0 1.48 241.3
  11. WD                  *      0.0      24.0   -1000.0      24.0 *    1000.   270. AG   970.  10.9   0.0 44.0
```

JOB: LOPT RUN: A Ave and OR43 No Build 2035

DATE : 2/26/10
TIME : 15:38:27

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EQR	100	76	4.0	1500	1355	58.27	2	3
3. EQL	100	76	4.0	325	1770	58.27	2	3
6. NQTL	100	19	4.0	1273	835	58.27	2	3
7. NQL	100	75	5.0	328	1610	58.27	2	3
10. SQTR	100	42	4.0	2675	1735	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	196.0	5.9
2. 2	46.0	121.0	5.9
3. 3	46.0	46.0	5.9
4. 4	46.0	0.0	5.9
5. 5	46.0	-46.0	5.9
6. 6	46.0	-121.0	5.9
7. 7	46.0	-196.0	5.9
8. 8	-34.0	-196.0	5.9
9. 9	-34.0	-121.0	5.9
10. 10	-34.0	-46.0	5.9
11. 11	-109.0	-46.0	5.9
12. 12	-184.0	-46.0	5.9
13. 13	-184.0	46.0	5.9
14. 14	-109.0	46.0	5.9
15. 15	-34.0	46.0	5.9
16. 16	-34.0	121.0	5.9
17. 17	-34.0	196.0	5.9

JOB: LOPT RUN: A Ave and OR43 No Build 2035

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17
	CONCENTRATION (PPM)																
10.	2.6	2.6	2.6	2.6	2.7	2.7	2.6	5.3	5.3	6.1	4.4	4.2	2.5	2.7	4.6	4.6	4.6
20.	2.1	2.1	2.1	2.2	2.2	2.1	2.1	5.1	4.9	5.5	4.5	4.2	2.6	2.9	4.5	4.5	4.5
30.	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.6	4.5	5.1	4.6	4.2	2.5	2.9	4.1	4.1	4.1
40.	2.0	2.0	2.0	2.0	2.0	2.1	2.1	4.3	4.3	4.5	4.5	4.3	2.5	2.9	3.9	3.9	3.9
50.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.2	4.2	4.1	4.6	4.4	2.5	2.8	3.7	3.7	3.7
60.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.3	4.4	2.6	2.8	3.6	3.6	3.6
70.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.8	4.1	4.3	2.6	2.7	3.6	3.6	3.6
80.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	3.9	3.8	4.0	2.7	2.9	3.7	3.6	3.6
90.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.1	4.1	4.2	3.4	3.2	2.9	2.9	3.7	3.6	3.6
100.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	3.1	3.0	3.4	3.2	3.7	3.6	3.6
110.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.9	3.0	2.7	3.7	3.4	3.4	3.5	3.6
120.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	3.0	2.7	4.1	3.8	3.8	3.6	3.6
130.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.2	4.2	4.2	3.0	2.7	4.2	4.1	3.9	3.7	3.7
140.	2.0	2.0	2.0	2.1	2.1	2.1	2.1	4.5	4.5	4.5	3.1	2.7	4.2	4.4	4.2	3.9	3.9
150.	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.7	4.7	4.7	3.1	2.8	4.1	4.4	4.6	4.1	4.3
160.	2.1	2.2	2.2	2.2	2.2	2.2	2.2	5.0	5.1	5.1	3.1	2.7	4.0	4.3	5.5	4.9	4.7
170.	2.7	2.7	2.7	2.8	2.8	2.6	2.6	5.2	5.2	5.3	2.9	2.4	3.6	4.1	6.0	5.4	5.1
180.	3.5	3.6	3.8	3.8	3.7	3.6	3.6	4.5	4.5	4.7	2.4	2.1	3.4	3.7	5.7	4.9	4.6
190.	4.2	4.2	4.3	4.4	4.4	4.4	4.2	3.2	3.2	3.4	2.1	2.0	3.2	3.3	4.5	3.9	3.7
200.	4.2	4.1	4.4	4.4	4.5	4.5	4.4	2.4	2.5	2.5	2.0	2.0	3.2	3.2	3.6	2.9	3.0
210.	4.1	4.1	4.0	4.0	4.1	4.1	4.1	2.2	2.2	2.2	2.0	2.0	3.4	3.4	3.6	2.9	2.7
220.	3.9	4.0	3.8	3.9	3.9	3.9	3.9	2.1	2.1	2.1	2.0	2.0	3.5	3.5	3.6	2.9	2.7
230.	3.9	4.1	4.0	3.7	3.9	3.9	3.9	2.1	2.1	2.1	2.0	2.0	3.5	3.5	3.6	3.0	2.7
240.	3.7	4.1	4.2	3.9	3.7	3.7	3.7	2.1	2.1	2.1	2.0	2.0	3.6	3.6	3.7	3.0	2.6
250.	3.7	4.1	4.7	4.5	3.9	3.7	3.7	2.0	2.0	2.2	2.2	2.2	3.8	3.9	3.9	2.9	2.5
260.	3.6	3.9	4.7	5.1	4.4	3.8	3.7	2.0	2.1	2.8	2.8	2.8	3.8	3.8	4.0	2.7	2.4
270.	3.4	3.7	4.6	5.5	5.3	4.2	4.0	2.2	2.4	3.9	3.8	3.8	3.3	3.4	3.4	2.4	2.1

280. *	3.2	3.3	3.6	4.6	5.4	4.5	4.3	2.5	2.8	4.5	4.5	4.4	2.5	2.5	2.5	2.1	2.0
290. *	3.2	3.2	3.3	3.7	5.0	4.7	4.3	2.6	2.9	4.4	4.3	4.3	2.1	2.1	2.1	2.0	2.0
300. *	3.2	3.2	3.2	3.5	4.3	4.5	4.2	2.6	3.0	4.2	4.1	4.0	2.1	2.1	2.2	2.1	2.1
310. *	3.3	3.3	3.3	3.4	4.0	4.6	4.4	2.6	2.9	4.0	3.9	3.9	2.0	2.0	2.1	2.1	2.1
320. *	3.4	3.4	3.4	3.3	3.8	4.6	4.5	2.7	2.9	3.9	3.8	3.8	2.0	2.0	2.1	2.1	2.1
330. *	3.6	3.6	3.6	3.6	3.7	4.7	4.6	2.8	3.0	3.9	3.7	3.7	2.0	2.0	2.1	2.1	2.1
340. *	3.7	3.7	3.8	3.8	3.8	4.4	4.6	3.1	3.2	4.1	3.6	3.6	2.0	2.0	2.4	2.4	2.4
350. *	3.8	3.8	3.8	3.8	3.8	4.2	4.4	3.9	4.1	4.8	3.9	3.7	2.0	2.2	3.1	3.1	3.1
360. *	3.4	3.4	3.4	3.5	3.5	3.4	3.5	4.9	5.1	5.8	4.2	3.9	2.2	2.5	4.2	4.2	4.2
MAX *	4.2	4.2	4.7	5.5	5.4	4.7	4.6	5.3	5.3	6.1	4.6	4.4	4.2	4.4	6.0	5.4	5.1
DEGR. *	190	190	250	270	280	290	330	10	10	10	30	50	130	140	170	170	170

THE HIGHEST CONCENTRATION OF 6.10 PPM OCCURRED AT RECEPTOR REC10.

INPUT FILE: Foothills Ave and OR43 No Build 2035

```
'LOPT',60.0,108,0.0,0.0,17,0.3048,1,0
'1',46.00,184.00,5.9
'2',46.00,109.00,5.9
'3',46.00,34.00,5.9
'4',121.00,34.00,5.9
'5',196.00,34.00,5.9
'6',196.00,-22.00,5.9
'7',121.00,-22.00,5.9
'8',46.00,-22.00,5.9
'9',46.00,-97.00,5.9
'10',46.00,-172.00,5.9
'11',-34.00,-172.00,5.9
'12',-34.00,-97.00,5.9
'13',-34.00,-22.00,5.9
'14',-34.00,6.00,5.9
'15',-34.00,34.00,5.9
'16',-34.00,109.00,5.9
'17',-34.00,184.00,5.9
'Foothills and OR43 No Build 2035',11,1,0,'C'
1
'WA','AG',1000,12,0,12,395,10.872,0,44
2
'WQR','AG',36,18,336,18,0,12,1
100,79.3,4,210,58.27,1528,2,3
2
'WQL','AG',36,6,336,6,0,12,1
100,79.3,4,185,58.27,1770,2,3
1
'NA','AG',24,-1000,24,0,1585,10.376,0,44
1
'ND','AG',24,0,24,1000,1600,10.376,0,44
2
'NQTR','AG',24,-12,24,-312,0,24,2
100,40.0,4,1585,58.27,1729,2,3
1
'SA','AG',-6,1012,-6,12,3860,10.376,0,56
1
'SD','AG',-12,12,-12,-988,3555,10.376,0,44
2
'SQT','AG',-12,24,-12,324,0,24,2
100,16.7,4,3370,58.27,1770,2,3
2
'SQTL','AG',6,24,6,324,0,12,1
100,74.7,4,490,58.27,1770,2,3
1
'ED','AG',12,-6,512,-6,685,10.872,0,32
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: Foothills Ave and OR43 No Build 2035

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                CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

 JOB: LOPT                                                     RUN: Foothills and OR43 No Build 2035

 DATE :  2/22/10
 TIME : 12:27:27

    The MODE flag has been set to C for calculating CO averages.

  SITE & METEOROLOGICAL VARIABLES
  -------------------------------
  VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 108. CM
   U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

  LINK VARIABLES
  --------------
    LINK DESCRIPTION     *         LINK COORDINATES (FT)          *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                         *   X1        Y1        X2        Y2     *     (FT)  (DEG)            (G/MI)  (FT) (FT)       (VEH)
 ------------------------*----------------------------------------*------------------------------------------------------------
  1. WA                  *   1000.0      12.0       0.0      12.0 *    1000.   270. AG    395.  10.9   0.0 44.0
  2. WQR                 *     36.0      18.0     152.5      18.0 *     116.    90. AG    123. 100.0   0.0 12.0 0.92   5.9
  3. WQL                 *     36.0       6.0     115.9       6.0 *      80.    90. AG    123. 100.0   0.0 12.0 0.70   4.1
  4. NA                  *     24.0   -1000.0      24.0       0.0 *    1000.   360. AG   1585.  10.4   0.0 44.0
  5. ND                  *     24.0       0.0      24.0    1000.0 *    1000.   360. AG   1600.  10.4   0.0 44.0
  6. NQTR                *     24.0     -12.0      24.0    -185.2 *     173.   180. AG    125. 100.0   0.0 24.0 0.85   8.8
  7. SA                  *     -6.0    1012.0      -6.0      12.0 *    1000.   180. AG   3860.  10.4   0.0 56.0
  8. SD                  *    -12.0      12.0     -12.0    -988.0 *    1000.   180. AG   3555.  10.4   0.0 44.0
  9. SQT                 *    -12.0      24.0     -12.0    3351.2 *    3327.   360. AG     50. 100.0   0.0 24.0 1.22 169.0
 10. SQTL                *      6.0      24.0       6.0    1653.9 *    1630.   360. AG    116. 100.0   0.0 12.0 1.38  82.8
 11. ED                  *     12.0      -6.0     512.0      -6.0 *     500.    90. AG    685.  10.9   0.0 32.0
```

JOB: LOPT RUN: Foothills and OR43 No Build 2035

DATE : 2/22/10
TIME : 12:27:27

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. WQR	100	79	4.0	210	1528	58.27	2	3
3. WQL	100	79	4.0	185	1770	58.27	2	3
6. NQTR	100	40	4.0	1585	1729	58.27	2	3
9. SQT	100	16	4.0	3370	1770	58.27	2	3
10. SQTL	100	74	4.0	490	1770	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	184.0	5.9
2. 2	46.0	109.0	5.9
3. 3	46.0	34.0	5.9
4. 4	121.0	34.0	5.9
5. 5	196.0	34.0	5.9
6. 6	196.0	-22.0	5.9
7. 7	121.0	-22.0	5.9
8. 8	46.0	-22.0	5.9
9. 9	46.0	-97.0	5.9
10. 10	46.0	-172.0	5.9
11. 11	-34.0	-172.0	5.9
12. 12	-34.0	-97.0	5.9
13. 13	-34.0	-22.0	5.9
14. 14	-34.0	6.0	5.9
15. 15	-34.0	34.0	5.9
16. 16	-34.0	109.0	5.9
17. 17	-34.0	184.0	5.9

JOB: LOPT RUN: Foothills and OR43 No Build 2035

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17
10.	2.9	2.9	2.9	2.0	2.0	2.3	2.5	3.6	3.2	3.3	5.3	5.1	5.4	5.2	5.2	5.2	5.2
20.	2.2	2.3	2.3	2.0	2.0	2.3	2.5	2.9	2.7	2.3	4.8	4.8	5.1	5.1	5.0	5.0	4.9
30.	2.1	2.1	2.1	2.0	2.0	2.4	2.5	2.8	2.5	2.2	4.6	4.6	4.6	4.6	4.5	4.6	4.6
40.	2.1	2.1	2.1	2.0	2.0	2.4	2.5	2.9	2.4	2.2	4.2	4.6	4.2	4.3	4.3	4.3	4.3
50.	2.0	2.0	2.0	2.0	2.0	2.4	2.5	2.9	2.2	2.1	4.0	4.2	4.2	4.1	4.2	4.2	4.2
60.	2.0	2.0	2.0	2.0	2.0	2.6	2.6	3.0	2.2	2.1	3.8	4.0	4.1	3.8	4.0	3.9	3.9
70.	2.0	2.0	2.0	2.0	2.0	2.6	2.6	2.9	2.2	2.0	3.7	3.8	4.3	4.1	3.8	3.8	3.8
80.	2.0	2.0	2.2	2.1	2.1	2.7	2.7	2.9	2.2	2.0	3.7	3.9	4.4	4.3	4.0	3.8	3.8
90.	2.0	2.0	2.5	2.3	2.3	2.5	2.5	2.5	2.0	2.0	3.8	3.8	4.3	4.4	4.3	3.9	3.9
100.	2.0	2.1	2.9	2.6	2.5	2.3	2.3	2.3	2.0	2.0	3.6	3.7	3.9	4.3	4.4	4.0	3.8
110.	2.0	2.2	3.0	2.6	2.4	2.1	2.1	2.1	2.0	2.0	3.5	3.6	3.7	4.1	4.3	4.1	3.8
120.	2.2	2.2	3.0	2.6	2.4	2.0	2.0	2.0	2.0	2.0	3.5	3.7	3.7	3.9	4.3	4.2	4.1
130.	2.1	2.3	3.1	2.7	2.4	2.0	2.0	2.0	2.0	2.0	3.8	4.0	4.0	3.9	4.0	4.5	4.2
140.	2.2	2.4	3.1	2.7	2.4	2.0	2.0	2.1	2.1	2.1	3.9	4.1	4.1	4.1	4.1	4.8	4.5
150.	2.3	2.5	2.8	2.6	2.3	2.0	2.0	2.1	2.1	2.1	4.1	4.2	4.3	4.3	4.3	4.6	4.9
160.	2.3	2.6	3.0	2.6	2.3	2.0	2.0	2.2	2.2	2.2	4.4	4.4	4.5	4.6	4.6	4.7	5.0
170.	3.1	3.2	3.6	2.6	2.3	2.0	2.0	2.8	2.7	2.7	4.7	4.7	4.8	4.8	4.8	4.9	5.1
180.	3.7	4.1	4.5	3.0	2.4	2.1	2.3	3.7	3.6	3.4	4.1	4.3	4.3	4.3	4.2	4.3	4.4
190.	4.5	4.4	5.1	3.4	2.6	2.3	2.7	4.3	4.2	3.9	3.1	3.2	3.2	3.2	3.1	3.1	3.1
200.	4.5	4.3	4.9	3.7	2.8	2.5	2.8	4.4	4.3	3.9	2.4	2.4	2.4	2.4	2.3	2.3	2.4
210.	4.3	4.1	4.4	3.7	2.9	2.6	2.9	4.2	4.1	3.7	2.2	2.2	2.2	2.2	2.1	2.2	2.2
220.	4.1	4.1	4.0	4.0	3.1	2.6	2.9	4.0	4.0	3.7	2.1	2.1	2.1	2.1	2.0	2.1	2.1
230.	3.9	4.0	3.7	3.9	3.0	2.6	2.9	3.8	3.8	3.5	2.1	2.1	2.1	2.1	2.0	2.1	2.1
240.	3.8	3.8	3.5	3.8	3.2	2.6	2.8	3.8	3.7	3.5	2.1	2.1	2.1	2.1	2.0	2.1	2.1
250.	3.7	3.7	3.6	3.6	3.3	2.7	2.8	3.7	3.7	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
260.	3.7	3.7	3.6	3.5	3.1	2.7	2.8	3.6	3.6	3.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
270.	3.8	3.8	3.9	3.1	3.1	3.0	3.1	3.7	3.7	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0

280.	*	3.7	3.7	3.7	3.0	2.8	3.2	3.4	3.8	3.6	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
290.	*	3.7	3.7	3.7	2.8	2.6	3.3	3.5	3.8	3.6	3.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0
300.	*	3.8	3.8	3.9	2.8	2.7	3.6	3.7	3.8	3.7	3.7	2.1	2.1	2.1	2.0	2.1	2.1	2.1
310.	*	3.9	3.9	3.9	3.0	2.7	3.2	3.7	4.1	3.9	3.8	2.1	2.1	2.1	2.1	2.1	2.1	2.1
320.	*	4.1	4.1	4.1	3.1	2.7	3.2	3.9	4.3	4.0	3.9	2.1	2.1	2.1	2.1	2.1	2.1	2.1
330.	*	4.3	4.3	4.3	3.1	2.7	3.1	3.9	4.5	4.2	4.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2
340.	*	4.6	4.6	4.6	3.1	2.7	3.0	3.8	5.0	4.8	4.5	2.4	2.4	2.4	2.3	2.4	2.4	2.4
350.	*	4.6	4.6	4.6	3.0	2.4	2.8	3.6	5.2	4.7	4.8	3.4	3.4	3.4	3.3	3.3	3.3	3.3
360.	*	4.0	4.0	4.0	2.4	2.1	2.5	3.1	4.8	4.5	4.2	4.6	4.7	4.7	4.6	4.6	4.6	4.5
MAX	*	4.6	4.6	5.1	4.0	3.3	3.6	3.9	5.2	4.8	4.8	5.3	5.1	5.4	5.2	5.2	5.2	5.2
DEGR.	*	350	350	190	220	250	300	320	350	340	350	10	10	10	10	10	10	10

THE HIGHEST CONCENTRATION OF 5.40 PPM OCCURRED AT RECEPTOR REC13.

INPUT FILE: North Shore and OR43 No Build 2035

```
'LOPT',60.0,108,0.0,0.0,20,0.3048,1,0
'1',46.00,184.00,5.9
'2',46.00,109.00,5.9
'3',46.00,34.00,5.9
'4',121.00,34.00,5.9
'5',196.00,34.00,5.9
'6',196.00,-22.00,5.9
'7',121.00,-22.00,5.9
'8',46.00,-22.00,5.9
'9',46.00,-97.00,5.9
'10',46.00,-172.00,5.9
'11',-34.00,-225.03,5.9
'12',-34.00,-150.03,5.9
'13',-34.00,-75.03,5.9
'14',-79.96,-128.06,5.9
'15',-132.99,-181.09,5.9
'16',-132.99,-92.06,5.9
'17',-79.96,-39.03,5.9
'18',-34.00,14.00,5.9
'19',-34.00,89.00,5.9
'20',-34.00,164.00,5.9
'NorthShore and OR43 No Build 2035',15,1,0,'C'
1
'EA','AG',-707.11,-707.11,0.00,-6.00,130,10.872,0,38
1
'ED','AG',0.00,-6.00,500.00,-6.00,175,10.872,0,32
2
'EQT','AG',-24.00,-6.00,-731.11,-713.11,0,12,1
100.00,76.00,4.00,10.00,58.270,168,2,3
1
'WA','AG',500.00,12.00,0.00,12.00,475,10.872,0,44
1
'WD','AG',0.00,12.00,-707.11,-695.11,380,10.872,0,38
2
'WQTL','AG',36.00,6.00,536.00,6.00,0,12,1
100.00,76.00,4.00,20.00,58.270,1232,2,3
2
'WQR','AG',36.00,18.00,336.00,18.00,0,12,1
100.00,76.00,4.00,155.00,58.270,1520,2,3
1
'NA','AG',18.00,-1000.00,18.00,0.00,1570,10.376,0,56
1
'ND','AG',24.00,0.00,24.00,1000.00,1565,10.376,0,44
2
'NQL','AG',6.00,-12.00,6.00,-1012.00,0,12,1
100.00,82.40,4.00,140.00,58.270,1770,2,3
2
'NQTR','AG',24.00,-12.00,24.00,-1012.00,0,24,2
100.00,37.60,4.00,1320.00,58.270,1742,2,3
1
'SA','AG',-6.00,1000.00,-6.00,0.00,3475,10.376,0,56
1
'SD','AG',-12.00,0.00,-12.00,-1000.00,3530,10.376,0,44
2
'SQL','AG',6.00,24.00,6.00,1024.00,0,12,1
100.00,80.40,4.00,55.00,58.270,1770,2,3
2
'SQTR','AG',-12.00,24.00,-12.00,1024.00,0,24,2
100.00,35.60,4.00,3200.00,58.270,1748,2,3
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: North Shore and OR43 No Build 2035

```
                 CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

     JOB: LOPT                                                 RUN: NorthShore and OR43 No Build 2035

     DATE :  2/26/10
     TIME : 15:40:38

        The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 108. CM
       U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

      LINK VARIABLES
      --------------
        LINK DESCRIPTION     *         LINK COORDINATES (FT)         *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                             *   X1        Y1        X2        Y2    *     (FT)  (DEG)           (G/MI)  (FT) (FT)       (VEH)
     ------------------------*---------------------------------------*--------------------------------------------------------------
      1. EA                  *   -707.1    -707.1       0.0      -6.0 *     996.    45. AG    130.  10.9   0.0 38.0
      2. ED                  *      0.0      -6.0     500.0      -6.0 *     500.    90. AG    175.  10.9   0.0 32.0
      3. EQT                 *    -24.0      -6.0     -26.9      -8.9 *       4.   225. AG    119. 100.0   0.0 12.0 0.33   0.2
      4. WA                  *    500.0      12.0       0.0      12.0 *     500.   270. AG    475.  10.9   0.0 44.0
      5. WD                  *      0.0      12.0    -707.1    -695.1 *    1000.   225. AG    380.  10.9   0.0 38.0
      6. WQTL                *     36.0       6.0      44.3       6.0 *       8.    90. AG    119. 100.0   0.0 12.0 0.09   0.4
      7. WQR                 *     36.0      18.0     100.4      18.0 *      64.    90. AG    119. 100.0   0.0 12.0 0.57   3.3
      8. NA                  *     18.0   -1000.0      18.0       0.0 *    1000.   360. AG   1570.  10.4   0.0 56.0
      9. ND                  *     24.0       0.0      24.0    1000.0 *    1000.   360. AG   1565.  10.4   0.0 44.0
     10. NQL                 *      6.0     -12.0       6.0     -74.8 *      63.   180. AG    128. 100.0   0.0 12.0 0.66   3.2
     11. NQTR                *     24.0     -12.0      24.0    -145.5 *     134.   180. AG    116. 100.0   0.0 24.0 0.67   6.8
     12. SA                  *     -6.0    1000.0      -6.0       0.0 *    1000.   180. AG   3475.  10.4   0.0 56.0
     13. SD                  *    -12.0       0.0     -12.0   -1000.0 *    1000.   180. AG   3530.  10.4   0.0 44.0
     14. SQL                 *      6.0      24.0       6.0      48.1 *      24.   360. AG    125. 100.0   0.0 12.0 0.22   1.2
     15. SQTR                *    -12.0      24.0     -12.0    6114.4 *    6090.   360. AG    109. 100.0   0.0 24.0 1.55 309.4
```

JOB: LOPT RUN: NorthShore and OR43 No Build 2035

DATE : 2/26/10
TIME : 15:40:38

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
3. EQT	100	76	4.0	10	168	58.27	2	3
6. WQTL	100	76	4.0	20	1232	58.27	2	3
7. WQR	100	76	4.0	155	1520	58.27	2	3
10. NQL	100	82	4.0	140	1770	58.27	2	3
11. NQTR	100	37	4.0	1320	1742	58.27	2	3
14. SQL	100	80	4.0	55	1770	58.27	2	3
15. SQTR	100	35	4.0	3200	1748	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	184.0	5.9
2. 2	46.0	109.0	5.9
3. 3	46.0	34.0	5.9
4. 4	121.0	34.0	5.9
5. 5	196.0	34.0	5.9
6. 6	196.0	-22.0	5.9
7. 7	121.0	-22.0	5.9
8. 8	46.0	-22.0	5.9
9. 9	46.0	-97.0	5.9
10. 10	46.0	-172.0	5.9
11. 11	-34.0	-225.0	5.9
12. 12	-34.0	-150.0	5.9
13. 13	-34.0	-75.0	5.9
14. 14	-80.0	-128.1	5.9
15. 15	-133.0	-181.1	5.9
16. 16	-133.0	-92.1	5.9
17. 17	-80.0	-39.0	5.9
18. 18	-34.0	14.0	5.9
19. 19	-34.0	89.0	5.9
20. 20	-34.0	164.0	5.9

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
10.	2.8	2.8	2.9	2.0	2.0	2.2	2.2	3.3	3.0	2.9	5.2	5.1	5.2	3.3	3.0	2.9	3.3	5.0	5.0	5.0
20.	2.2	2.2	2.2	2.0	2.0	2.2	2.2	2.5	2.4	2.1	4.6	4.9	4.9	3.4	3.1	3.0	3.4	4.7	4.7	4.7
30.	2.1	2.1	2.1	2.0	2.0	2.2	2.2	2.4	2.2	2.1	4.4	4.6	4.6	3.4	3.1	2.8	3.3	4.4	4.4	4.4
40.	2.1	2.1	2.1	2.0	2.0	2.3	2.3	2.5	2.2	2.2	4.0	4.2	4.6	3.3	2.9	2.9	3.3	4.2	4.2	4.2
50.	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.4	2.1	2.1	3.7	4.0	4.4	3.3	2.9	2.9	3.1	3.9	3.8	3.8
60.	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.4	2.1	2.0	3.6	3.9	4.1	3.2	2.8	3.0	3.4	3.7	3.7	3.7
70.	2.0	2.0	2.1	2.1	2.1	2.3	2.3	2.3	2.1	2.0	3.5	3.7	4.0	3.2	2.7	3.2	3.4	3.8	3.7	3.7
80.	2.0	2.0	2.1	2.1	2.1	2.3	2.3	2.3	2.0	2.0	3.6	3.7	4.0	3.1	2.7	3.1	3.5	4.0	3.7	3.7
90.	2.0	2.0	2.3	2.2	2.2	2.2	2.2	2.2	2.0	2.0	3.7	3.8	4.0	3.0	2.7	3.0	3.4	4.0	3.8	3.8
100.	2.0	2.0	2.6	2.3	2.3	2.1	2.1	2.1	2.0	2.0	3.6	3.6	3.9	3.1	2.7	2.9	3.3	3.8	3.8	3.7
110.	2.0	2.1	2.7	2.4	2.4	2.0	2.0	2.0	2.0	2.0	3.5	3.5	3.7	3.0	2.6	2.7	3.3	3.8	3.7	3.6
120.	2.0	2.1	2.6	2.3	2.3	2.0	2.0	2.0	2.0	2.0	3.6	3.6	3.8	3.0	2.7	2.8	3.2	4.0	3.9	3.8
130.	2.1	2.1	2.7	2.3	2.3	2.0	2.0	2.0	2.0	2.0	3.7	3.7	3.9	3.0	2.7	2.8	3.2	4.1	4.1	3.9
140.	2.2	2.2	2.5	2.2	2.2	2.0	2.0	2.1	2.1	2.1	3.9	3.9	4.0	3.1	2.7	2.8	3.3	4.3	4.4	4.3
150.	2.2	2.3	2.5	2.2	2.2	2.0	2.0	2.1	2.1	2.1	4.2	4.2	4.3	3.1	2.8	2.9	3.2	4.7	4.6	4.5
160.	2.1	2.4	2.7	2.2	2.2	2.0	2.0	2.2	2.2	2.2	4.5	4.5	4.5	3.2	2.7	2.9	3.3	4.9	4.8	4.7
170.	2.8	3.0	3.2	2.2	2.2	2.0	2.0	2.7	2.6	2.6	4.8	4.8	4.8	3.1	2.5	2.7	3.2	4.9	4.9	4.9
180.	3.7	3.9	4.2	2.5	2.3	2.1	2.3	3.6	3.4	3.3	4.2	4.2	4.3	2.6	2.3	2.5	2.8	4.2	4.3	4.3
190.	4.4	4.3	5.0	2.9	2.5	2.3	2.7	4.1	3.9	3.8	3.1	3.1	3.2	2.1	2.0	2.2	2.3	3.2	3.2	3.3
200.	4.2	4.4	4.7	3.0	2.7	2.5	2.8	4.2	4.0	3.8	2.4	2.4	2.4	2.0	2.0	2.3	2.3	2.5	2.5	2.5
210.	4.1	4.2	4.7	3.1	2.8	2.6	2.8	4.1	3.9	3.6	2.2	2.2	2.2	2.0	2.0	2.4	2.4	2.4	2.2	2.3
220.	4.0	4.0	4.3	3.2	2.8	2.6	2.9	4.0	3.8	3.5	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.2	2.2	2.1
230.	3.7	3.9	4.3	3.3	2.9	2.5	2.9	4.1	3.8	3.4	2.1	2.1	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1
240.	3.6	3.6	3.8	3.5	3.0	2.6	2.8	4.0	3.7	3.3	2.1	2.2	2.4	2.2	2.2	2.1	2.1	2.0	2.1	2.1
250.	3.5	3.5	3.7	3.3	3.0	2.6	2.9	3.9	3.7	3.3	2.1	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0
260.	3.5	3.5	3.7	3.2	3.0	2.6	2.9	3.8	3.6	3.2	2.1	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0
270.	3.6	3.6	3.7	3.1	2.8	2.7	2.9	3.8	3.6	3.2	2.0	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0

280.	*	3.5	3.5	3.6	3.0	2.7	2.8	2.9	3.9	3.6	3.2	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0
290.	*	3.5	3.5	3.6	2.8	2.6	2.9	3.1	3.9	3.7	3.2	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0
300.	*	3.6	3.6	3.7	2.8	2.6	2.9	3.1	3.9	3.8	3.3	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
310.	*	3.7	3.7	3.7	2.8	2.7	3.0	3.3	3.8	4.1	3.5	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
320.	*	3.9	3.9	3.9	2.9	2.7	3.0	3.3	4.0	4.0	3.6	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
330.	*	4.1	4.1	4.1	3.0	2.7	2.9	3.3	4.3	4.4	4.1	2.2	2.3	2.2	2.1	2.1	2.0	2.0	2.2	2.2	2.2
340.	*	4.4	4.4	4.4	3.0	2.7	2.9	3.3	4.7	4.5	4.3	2.4	2.5	2.4	2.1	2.1	2.0	2.0	2.4	2.4	2.4
350.	*	4.4	4.4	4.4	2.9	2.4	2.6	3.2	4.8	4.5	4.6	3.3	3.4	3.4	2.3	2.2	2.0	2.2	3.2	3.2	3.2
360.	*	3.8	3.8	3.8	2.4	2.2	2.4	2.6	4.2	4.0	3.9	4.6	4.6	4.7	2.9	2.5	2.4	2.8	4.6	4.4	4.3
MAX	*	4.4	4.4	5.0	3.5	3.0	3.0	3.3	4.8	4.5	4.6	5.2	5.1	5.2	3.4	3.1	3.2	3.5	5.0	5.0	5.0
DEGR.	*	190	200	190	240	240	310	310	350	340	350	10	10	10	20	20	70	80	10	10	10

THE HIGHEST CONCENTRATION OF 5.20 PPM OCCURRED AT RECEPTOR REC11.

CAL3QHC MODEL RUNS (INPUT-OUTPUT)
2035 IN-STREET/ADDITIONAL LANE CONDITIONS

INPUT FILE: A Ave and OR43 In-Street/Additional Lane 2035

```
'LOPT',60.0,108,0.0,0.0,17,0.3048,1,0
'1',46.00,196.00,5.9
'2',46.00,121.00,5.9
'3',46.00,46.00,5.9
'4',46.00,0.00,5.9
'5',46.00,-46.00,5.9
'6',46.00,-121.00,5.9
'7',46.00,-196.00,5.9
'8',-34.00,-196.00,5.9
'9',-34.00,-121.00,5.9
'10',-34.00,-46.00,5.9
'11',-109.00,-46.00,5.9
'12',-184.00,-46.00,5.9
'13',-184.00,46.00,5.9
'14',-109.00,46.00,5.9
'15',-34.00,46.00,5.9
'16',-34.00,121.00,5.9
'17',-34.00,196.00,5.9
'A Ave and OR43 In-Street/Additional Lane 2035',11,1,0,'C'
1
'EA','AG',-1000,-12,0,-12,1810,10.872,0,56
2
'EQR','AG',-24,-24,-324,-24,0,24,2
100,76.5,4,1490,58.27,1355,2,3
2
'EQL','AG',-24,6,-324,6,0,12,1
100,76.5,4,320,58.27,1770,2,3
1
'NA','AG',18,-1000,18,0,1610,10.376,0,56
1
'ND','AG',24,0,24,1000,1260,10.376,0,44
2
'NQTL','AG',24,-36,24,-336,0,24,2
100,19.5,4,1275,58.27,841,2,3
2
'NQL','AG',6,-36,6,-336,0,12,1
100,75.5,5,335,58.27,1610,2,3
1
'SA','AG',-12,1000,-12,0,2605,10.376,0,44
1
'SD','AG',-12,0,-12,-1000,3785,10.376,0,44
2
'SQTR','AG',-12,36,-12,336,0,24,2
100,42.0,4,2605,58.27,1735,2,3
1
'WD','AG',0,24,-1000,24,980,10.872,0,44
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: A Ave and OR43 In-Street/Additional Lane 2035

```
                  CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                       PAGE  1

      JOB: LOPT                                                    RUN: A Ave and OR43 In-Street/Additional Lane

      DATE :  2/26/10
      TIME : 15:39: 3

         The MODE flag has been set to C for calculating CO averages.

       SITE & METEOROLOGICAL VARIABLES
       -------------------------------
       VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 108. CM
        U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

       LINK VARIABLES
       --------------
         LINK DESCRIPTION     *         LINK COORDINATES (FT)         *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                              *   X1        Y1        X2        Y2     *     (FT)  (DEG)           (G/MI)  (FT) (FT)       (VEH)
      ------------------------*----------------------------------------*--------------------------------------------------------------
       1. EA                  *  -1000.0     -12.0       0.0     -12.0 *    1000.    90. AG   1810.  10.9   0.0 56.0
       2. EQR                 *    -24.0     -24.0   -5449.6     -24.8 *    5426.   270. AG    238. 100.0   0.0 24.0 3.07 275.6
       3. EQL                 *    -24.0       6.0    -241.0       6.0 *     217.   270. AG    119. 100.0   0.0 12.0 1.01  11.0
       4. NA                  *     18.0   -1000.0      18.0       0.0 *    1000.   360. AG   1610.  10.4   0.0 56.0
       5. ND                  *     24.0       0.0      24.0    1000.0 *    1000.   360. AG   1260.  10.4   0.0 44.0
       6. NQTL                *     24.0     -36.0      24.0    -271.9 *     236.   180. AG     59. 100.0   0.0 24.0 1.01  12.0
       7. NQL                 *      6.0     -36.0       6.0    -697.5 *     662.   180. AG    117. 100.0   0.0 12.0 1.16  33.6
       8. SA                  *    -12.0    1000.0     -12.0       0.0 *    1000.   180. AG   2605.  10.4   0.0 44.0
       9. SD                  *    -12.0       0.0     -12.0   -1000.0 *    1000.   180. AG   3785.  10.4   0.0 44.0
      10. SQTR                *    -12.0      36.0     -12.0    4429.3 *    4393.   360. AG    131. 100.0   0.0 24.0 1.44 223.2
      11. WD                  *      0.0      24.0   -1000.0      24.0 *    1000.   270. AG    980.  10.9   0.0 44.0
```

JOB: LOPT   RUN: A Ave and OR43 In-Street/Additional Lane

DATE : 2/26/10
TIME : 15:39: 3

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EQR	100	76	4.0	1490	1355	58.27	2	3
3. EQL	100	76	4.0	320	1770	58.27	2	3
6. NQTL	100	19	4.0	1275	841	58.27	2	3
7. NQL	100	75	5.0	335	1610	58.27	2	3
10. SQTR	100	42	4.0	2605	1735	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	196.0	5.9
2. 2	46.0	121.0	5.9
3. 3	46.0	46.0	5.9
4. 4	46.0	0.0	5.9
5. 5	46.0	-46.0	5.9
6. 6	46.0	-121.0	5.9
7. 7	46.0	-196.0	5.9
8. 8	-34.0	-196.0	5.9
9. 9	-34.0	-121.0	5.9
10. 10	-34.0	-46.0	5.9
11. 11	-109.0	-46.0	5.9
12. 12	-184.0	-46.0	5.9
13. 13	-184.0	46.0	5.9
14. 14	-109.0	46.0	5.9
15. 15	-34.0	46.0	5.9
16. 16	-34.0	121.0	5.9
17. 17	-34.0	196.0	5.9

JOB: LOPT RUN: A Ave and OR43 In-Street/Additional Lane

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17
10.	2.6	2.6	2.6	2.6	2.6	2.6	2.6	5.2	5.3	6.1	4.4	4.2	2.5	2.7	4.6	4.6	4.6
20.	2.1	2.1	2.1	2.1	2.2	2.1	2.1	5.0	4.8	5.3	4.5	4.2	2.6	2.9	4.5	4.5	4.5
30.	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.5	4.5	5.1	4.6	4.2	2.5	2.9	4.1	4.1	4.1
40.	2.0	2.0	2.0	2.0	2.0	2.1	2.1	4.3	4.3	4.5	4.4	4.3	2.5	2.8	3.9	3.9	3.9
50.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.1	4.1	4.1	4.5	4.4	2.5	2.8	3.7	3.7	3.7
60.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	3.9	4.3	4.4	2.6	2.8	3.6	3.6	3.6
70.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.9	4.1	4.2	2.6	2.7	3.5	3.5	3.5
80.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.8	3.8	3.9	2.7	2.9	3.7	3.6	3.6
90.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.1	3.3	3.2	2.9	2.9	3.7	3.6	3.6
100.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.9	3.1	3.1	3.4	3.2	3.6	3.5	3.5
110.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.9	3.0	2.7	3.7	3.5	3.4	3.5	3.5
120.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	3.0	2.7	4.0	3.8	3.8	3.6	3.6
130.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.1	4.1	4.1	3.0	2.7	4.2	4.1	3.8	3.7	3.7
140.	2.0	2.0	2.0	2.1	2.1	2.1	2.1	4.4	4.4	4.4	3.0	2.7	4.2	4.4	4.1	3.9	3.9
150.	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.5	4.6	4.6	3.1	2.8	4.2	4.4	4.6	4.2	4.2
160.	2.1	2.2	2.2	2.2	2.2	2.2	2.2	5.0	5.1	5.1	3.1	2.7	4.0	4.3	5.4	4.9	4.5
170.	2.7	2.7	2.7	2.8	2.8	2.7	2.6	5.1	5.2	5.3	2.9	2.4	3.6	4.1	6.0	5.5	5.0
180.	3.5	3.6	3.7	3.7	3.7	3.7	3.6	4.5	4.6	4.6	2.4	2.1	3.4	3.7	5.6	4.7	4.6
190.	4.2	4.3	4.3	4.5	4.4	4.4	4.3	3.2	3.3	3.3	2.1	2.0	3.2	3.3	4.5	3.8	3.6
200.	4.2	4.1	4.2	4.4	4.5	4.5	4.5	2.4	2.4	2.4	2.0	2.0	3.2	3.2	3.5	3.0	2.9
210.	4.0	4.0	4.0	4.0	4.1	4.1	4.1	2.2	2.2	2.2	2.0	2.0	3.4	3.4	3.6	2.8	2.7
220.	3.9	3.9	3.8	3.9	3.9	3.9	3.9	2.1	2.1	2.1	2.0	2.0	3.5	3.5	3.6	2.9	2.7
230.	3.9	4.1	4.0	3.6	3.8	3.8	3.8	2.1	2.1	2.1	2.0	2.0	3.4	3.5	3.6	3.0	2.6
240.	3.7	4.1	4.2	3.9	3.7	3.7	3.7	2.1	2.1	2.1	2.0	2.0	3.5	3.6	3.7	3.0	2.6
250.	3.7	4.0	4.7	4.5	3.9	3.7	3.7	2.0	2.0	2.2	2.2	2.2	3.7	3.9	3.9	2.8	2.5
260.	3.5	3.8	4.7	5.1	4.4	3.8	3.7	2.0	2.1	2.8	2.8	2.8	3.7	3.8	3.8	2.7	2.4
270.	3.2	3.5	4.4	5.5	5.3	4.1	4.0	2.2	2.4	3.8	3.8	3.8	3.3	3.3	3.4	2.4	2.1

```
280.  *   3.1   3.2   3.5   4.6   5.4   4.5   4.3   2.5   2.8   4.5   4.4   4.4   2.5   2.5   2.5   2.1   2.0
290.  *   3.2   3.2   3.3   3.7   5.1   4.6   4.3   2.6   2.9   4.5   4.4   4.2   2.1   2.1   2.1   2.0   2.0
300.  *   3.2   3.2   3.2   3.5   4.3   4.5   4.2   2.6   3.0   4.2   4.1   3.9   2.1   2.1   2.2   2.1   2.1
310.  *   3.3   3.3   3.3   3.4   3.9   4.6   4.4   2.6   2.9   4.0   3.9   3.8   2.0   2.0   2.1   2.1   2.1
320.  *   3.4   3.4   3.4   3.3   3.7   4.6   4.5   2.7   2.9   3.9   3.8   3.7   2.0   2.0   2.1   2.1   2.1
330.  *   3.6   3.6   3.6   3.6   3.7   4.6   4.5   2.8   3.0   3.9   3.7   3.7   2.0   2.0   2.1   2.1   2.1
340.  *   3.7   3.7   3.7   3.7   3.8   4.4   4.6   3.1   3.2   4.0   3.6   3.6   2.0   2.0   2.4   2.4   2.4
350.  *   3.8   3.8   3.8   3.8   3.8   4.2   4.4   3.9   3.9   4.8   3.9   3.7   2.0   2.2   3.1   3.1   3.1
360.  *   3.4   3.4   3.4   3.4   3.4   3.4   3.5   4.9   5.0   5.8   4.2   3.9   2.2   2.5   4.2   4.1   4.1
------*------------------------------------------------------------------------------------------------------
MAX   *   4.2   4.3   4.7   5.5   5.4   4.6   4.6   5.2   5.3   6.1   4.6   4.4   4.2   4.4   6.0   5.5   5.0
DEGR. *  190   190   250   270   280   310   340    10    10    10    30    50   130   140   170   170   170

THE HIGHEST CONCENTRATION OF    6.10 PPM OCCURRED AT RECEPTOR REC10.
```

INPUT FILE: Foothills Ave and OR43 In-Street/Additional Lane 2035

```
'LOPT',60.0,108,0.0,0.0,17,0.3048,1,0
'1',46.00,184.00,5.9
'2',46.00,109.00,5.9
'3',46.00,34.00,5.9
'4',121.00,34.00,5.9
'5',196.00,34.00,5.9
'6',196.00,-22.00,5.9
'7',121.00,-22.00,5.9
'8',46.00,-22.00,5.9
'9',46.00,-97.00,5.9
'10',46.00,-172.00,5.9
'11',-34.00,-172.00,5.9
'12',-34.00,-97.00,5.9
'13',-34.00,-22.00,5.9
'14',-34.00,6.00,5.9
'15',-34.00,34.00,5.9
'16',-34.00,109.00,5.9
'17',-34.00,184.00,5.9
'Foothills and OR43 In-Street/Additional Lane 2035',11,1,0,'C'
1
'WA','AG',1000,12,0,12,415,10.872,0,44
2
'WQR','AG',36,18,336,18,0,12,1
100,79.3,4,230,58.27,1528,2,3
2
'WQL','AG',36,6,336,6,0,12,1
100,79.3,4,185,58.27,1770,2,3
1
'NA','AG',24,-1000,24,0,1575,10.376,0,44
1
'ND','AG',24,0,24,1000,1610,10.376,0,44
2
'NQTR','AG',24,-12,24,-312,0,24,2
100,40.0,4,1575,58.27,1732,2,3
1
'SA','AG',-6,1012,-6,12,3785,10.376,0,56
1
'SD','AG',-12,12,-12,-988,3505,10.376,0,44
2
'SQT','AG',-12,24,-12,324,0,24,2
100,16.7,4,3320,58.27,1770,2,3
2
'SQTL','AG',6,24,6,324,0,12,1
100,74.7,4,465,58.27,1770,2,3
1
'ED','AG',12,-6,512,-6,660,10.872,0,32
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: Foothills Ave and OR43 In-Street/Additional Lane 2035

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: LOPT RUN: Foothills and OR43 In-Street/Additional

DATE : 2/22/10
TIME : 12:28:34

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.0 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (FT) X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. WA	1000.0	12.0	0.0	12.0	1000.	270.	AG	415.	10.9	0.0	44.0		
2. WQR	36.0	18.0	200.8	18.0	165.	90.	AG	123.	100.0	0.0	12.0	1.00	8.4
3. WQL	36.0	6.0	115.9	6.0	80.	90.	AG	123.	100.0	0.0	12.0	0.70	4.1
4. NA	24.0	-1000.0	24.0	0.0	1000.	360.	AG	1575.	10.4	0.0	44.0		
5. ND	24.0	0.0	24.0	1000.0	1000.	360.	AG	1610.	10.4	0.0	44.0		
6. NQTR	24.0	-12.0	24.0	-184.1	172.	180.	AG	125.	100.0	0.0	24.0	0.84	8.7
7. SA	-6.0	1012.0	-6.0	12.0	1000.	180.	AG	3785.	10.4	0.0	56.0		
8. SD	-12.0	12.0	-12.0	-988.0	1000.	180.	AG	3505.	10.4	0.0	44.0		
9. SQT	-12.0	24.0	-12.0	3100.3	3076.	360.	AG	50.	100.0	0.0	24.0	1.20	156.3
10. SQTL	6.0	24.0	6.0	1392.9	1369.	360.	AG	116.	100.0	0.0	12.0	1.31	69.5
11. ED	12.0	-6.0	512.0	-6.0	500.	90.	AG	660.	10.9	0.0	32.0		

JOB: LOPT RUN: Foothills and OR43 In-Street/Additional

DATE : 2/22/10
TIME : 12:28:34

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. WQR	100	79	4.0	230	1528	58.27	2	3
3. WQL	100	79	4.0	185	1770	58.27	2	3
6. NQTR	100	40	4.0	1575	1732	58.27	2	3
9. SQT	100	16	4.0	3320	1770	58.27	2	3
10. SQTL	100	74	4.0	465	1770	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	184.0	5.9
2. 2	46.0	109.0	5.9
3. 3	46.0	34.0	5.9
4. 4	121.0	34.0	5.9
5. 5	196.0	34.0	5.9
6. 6	196.0	-22.0	5.9
7. 7	121.0	-22.0	5.9
8. 8	46.0	-22.0	5.9
9. 9	46.0	-97.0	5.9
10. 10	46.0	-172.0	5.9
11. 11	-34.0	-172.0	5.9
12. 12	-34.0	-97.0	5.9
13. 13	-34.0	-22.0	5.9
14. 14	-34.0	6.0	5.9
15. 15	-34.0	34.0	5.9
16. 16	-34.0	109.0	5.9
17. 17	-34.0	184.0	5.9

JOB: LOPT RUN: Foothills and OR43 In-Street/Additional

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17
10.	2.9	2.9	2.9	2.0	2.0	2.4	2.5	3.6	3.2	3.2	5.1	5.1	5.3	5.2	5.2	5.2	5.1
20.	2.2	2.3	2.3	2.0	2.0	2.3	2.5	2.9	2.7	2.3	4.8	4.7	5.0	5.1	5.0	5.0	4.9
30.	2.1	2.1	2.1	2.0	2.0	2.4	2.6	2.8	2.5	2.3	4.6	4.5	4.6	4.5	4.5	4.5	4.5
40.	2.1	2.1	2.1	2.0	2.0	2.4	2.6	2.9	2.4	2.2	4.3	4.6	4.3	4.3	4.3	4.3	4.3
50.	2.0	2.0	2.0	2.0	2.0	2.5	2.7	3.0	2.3	2.1	3.9	4.2	4.1	4.1	4.2	4.2	4.2
60.	2.0	2.0	2.0	2.0	2.0	2.6	2.7	3.0	2.2	2.2	3.9	4.0	4.0	3.8	4.0	3.9	3.9
70.	2.0	2.0	2.1	2.1	2.1	2.6	2.7	3.0	2.2	2.0	3.7	3.8	4.4	4.1	3.8	3.7	3.7
80.	2.0	2.0	2.2	2.2	2.1	2.6	2.7	2.9	2.2	2.0	3.6	3.8	4.4	4.2	4.0	3.8	3.8
90.	2.0	2.0	2.5	2.4	2.3	2.5	2.5	2.5	2.0	2.0	3.7	3.7	4.2	4.4	4.4	3.9	3.9
100.	2.0	2.1	3.0	2.8	2.5	2.3	2.3	2.3	2.0	2.0	3.5	3.6	3.9	4.3	4.4	4.0	3.8
110.	2.1	2.2	3.0	2.8	2.4	2.1	2.1	2.1	2.0	2.0	3.5	3.6	3.6	4.1	4.3	4.0	3.8
120.	2.2	2.3	3.0	2.8	2.4	2.0	2.0	2.0	2.0	2.0	3.5	3.7	3.7	3.9	4.2	4.2	4.1
130.	2.2	2.3	3.1	2.8	2.4	2.0	2.0	2.0	2.0	2.0	3.6	3.8	3.8	3.9	3.9	4.4	4.5
140.	2.3	2.4	3.1	2.8	2.4	2.0	2.0	2.1	2.1	2.1	3.9	4.1	4.1	4.1	4.1	4.7	4.5
150.	2.3	2.5	2.8	2.6	2.4	2.0	2.0	2.1	2.1	2.1	4.1	4.2	4.3	4.3	4.2	4.6	4.8
160.	2.3	2.6	3.0	2.6	2.4	2.0	2.0	2.2	2.2	2.2	4.4	4.4	4.5	4.6	4.6	4.6	5.0
170.	3.0	3.2	3.5	2.6	2.5	2.0	2.0	2.8	2.7	2.7	4.7	4.7	4.8	4.8	4.7	4.9	5.1
180.	3.7	4.1	4.6	3.1	2.8	2.1	2.3	3.7	3.6	3.4	4.1	4.2	4.3	4.3	4.2	4.3	4.4
190.	4.5	4.5	5.0	3.4	2.9	2.3	2.7	4.3	4.2	3.9	3.1	3.1	3.2	3.2	3.1	3.1	3.1
200.	4.4	4.3	4.8	3.7	3.1	2.5	2.8	4.4	4.3	3.9	2.4	2.4	2.4	2.4	2.3	2.3	2.4
210.	4.3	4.1	4.4	3.7	3.2	2.6	2.9	4.2	4.1	3.7	2.2	2.2	2.2	2.2	2.1	2.2	2.2
220.	4.0	4.1	4.0	4.0	3.5	2.6	2.9	3.9	3.9	3.6	2.1	2.1	2.1	2.1	2.0	2.1	2.1
230.	3.9	4.0	3.7	3.9	3.4	2.6	2.9	3.8	3.8	3.5	2.1	2.1	2.1	2.1	2.0	2.1	2.1
240.	3.8	3.7	3.5	3.8	3.5	2.6	2.8	3.7	3.7	3.5	2.1	2.1	2.1	2.1	2.0	2.1	2.1
250.	3.7	3.7	3.6	3.6	3.4	2.7	2.8	3.7	3.6	3.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0
260.	3.7	3.7	3.6	3.5	3.3	2.7	2.8	3.6	3.6	3.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
270.	3.8	3.8	3.9	3.1	3.1	3.0	3.1	3.7	3.7	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0

280.	*	3.7	3.7	3.7	3.0	2.8	3.2	3.3	3.8	3.6	3.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
290.	*	3.7	3.7	3.7	2.8	2.6	3.4	3.5	3.9	3.6	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
300.	*	3.9	3.9	3.9	2.8	2.7	3.6	3.6	3.8	3.7	3.7	2.1	2.1	2.1	2.0	2.1	2.1	2.1
310.	*	3.9	3.9	3.9	3.0	2.7	3.3	3.7	4.1	3.8	3.8	2.1	2.1	2.1	2.0	2.1	2.1	2.1
320.	*	4.1	4.1	4.1	3.1	2.7	3.3	3.9	4.3	4.0	3.9	2.1	2.1	2.1	2.1	2.1	2.1	2.1
330.	*	4.3	4.3	4.3	3.1	2.7	3.3	3.9	4.5	4.2	4.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2
340.	*	4.6	4.6	4.6	3.1	2.7	3.2	3.8	4.9	4.7	4.5	2.4	2.4	2.4	2.3	2.4	2.4	2.4
350.	*	4.6	4.6	4.7	3.0	2.4	3.0	3.6	5.2	4.7	4.7	3.4	3.4	3.4	3.3	3.3	3.3	3.3
360.	*	3.9	4.0	4.0	2.4	2.1	2.6	3.1	4.8	4.5	4.1	4.4	4.7	4.7	4.5	4.6	4.6	4.5
MAX	*	4.6	4.6	5.0	4.0	3.5	3.6	3.9	5.2	4.7	4.7	5.1	5.1	5.3	5.2	5.2	5.2	5.1
DEGR.	*	350	350	190	220	220	300	320	350	340	350	10	10	10	10	10	10	10

THE HIGHEST CONCENTRATION OF 5.30 PPM OCCURRED AT RECEPTOR REC13.

INPUT FILE: North Shore and OR43 In-Street/Additional Lane 2035

```
'LOPT',60.0,108,0.0,0.0,20,0.3048,1,0
'1',46.00,184.00,5.9
'2',46.00,109.00,5.9
'3',46.00,34.00,5.9
'4',121.00,34.00,5.9
'5',196.00,34.00,5.9
'6',196.00,-22.00,5.9
'7',121.00,-22.00,5.9
'8',46.00,-22.00,5.9
'9',46.00,-97.00,5.9
'10',46.00,-172.00,5.9
'11',-34.00,-225.03,5.9
'12',-34.00,-150.03,5.9
'13',-34.00,-75.03,5.9
'14',-79.96,-128.06,5.9
'15',-132.99,-181.09,5.9
'16',-132.99,-92.06,5.9
'17',-79.96,-39.03,5.9
'18',-34.00,14.00,5.9
'19',-34.00,89.00,5.9
'20',-34.00,164.00,5.9
'NorthShore and OR43 In-Street/Additional Lane 2035',15,1,0,'C'
1
'EA','AG',-707.11,-707.11,0.00,-6.00,130,10.872,0,38
1
'ED','AG',0.00,-6.00,500.00,-6.00,195,10.872,0,32
2
'EQT','AG',-24.00,-6.00,-731.11,-713.11,0,12,1
100.00,76.00,4.00,10.00,58.270,325,2,3
1
'WA','AG',500.00,12.00,0.00,12.00,565,10.872,0,44
1
'WD','AG',0.00,12.00,-707.11,-695.11,370,10.872,0,38
2
'WQTL','AG',36.00,6.00,536.00,6.00,0,12,1
100.00,76.00,4.00,20.00,58.270,1197,2,3
2
'WQR','AG',36.00,18.00,336.00,18.00,0,12,1
100.00,76.00,4.00,155.00,58.270,1520,2,3
1
'NA','AG',18.00,-1000.00,18.00,0.00,1590,10.376,0,56
1
'ND','AG',24.00,0.00,24.00,1000.00,1555,10.376,0,44
2
'NQL','AG',6.00,-12.00,6.00,-1012.00,0,12,1
100.00,82.30,4.00,145.00,58.270,1770,2,3
2
'NQTR','AG',24.00,-12.00,24.00,-1012.00,0,24,2
100.00,37.60,4.00,1315.00,58.270,1737,2,3
1
'SA','AG',-6.00,1000.00,-6.00,0.00,3425,10.376,0,56
1
'SD','AG',-12.00,0.00,-12.00,-1000.00,3590,10.376,0,44
2
'SQL','AG',6.00,24.00,6.00,1024.00,0,12,1
100.00,80.40,4.00,55.00,58.270,1770,2,3
2
'SQTR','AG',-12.00,24.00,-12.00,1024.00,0,24,2
100.00,35.70,4.00,3165.00,58.270,1750,2,3
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: North Shore and OR43 In-Street/Additional Lane 2035

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: LOPT RUN: NorthShore and OR43 In-Street/Additional

DATE : 2/26/10
TIME : 15:41:59

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.0 PPM

LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. EA	-707.1	-707.1	0.0	-6.0	996.	45.	AG	130.	10.9	0.0	38.0		
2. ED	0.0	-6.0	500.0	-6.0	500.	90.	AG	195.	10.9	0.0	32.0		
3. EQT	-24.0	-6.0	-26.9	-8.9	4.	225.	AG	119.	100.0	0.0	12.0	0.17	0.2
4. WA	500.0	12.0	0.0	12.0	500.	270.	AG	565.	10.9	0.0	44.0		
5. WD	0.0	12.0	-707.1	-695.1	1000.	225.	AG	370.	10.9	0.0	38.0		
6. WQTL	36.0	6.0	44.3	6.0	8.	90.	AG	119.	100.0	0.0	12.0	0.09	0.4
7. WQR	36.0	18.0	100.4	18.0	64.	90.	AG	119.	100.0	0.0	12.0	0.57	3.3
8. NA	18.0	-1000.0	18.0	0.0	1000.	360.	AG	1590.	10.4	0.0	56.0		
9. ND	24.0	0.0	24.0	1000.0	1000.	360.	AG	1555.	10.4	0.0	44.0		
10. NQL	6.0	-12.0	6.0	-77.0	65.	180.	AG	128.	100.0	0.0	12.0	0.68	3.3
11. NQTR	24.0	-12.0	24.0	-144.9	133.	180.	AG	116.	100.0	0.0	24.0	0.66	6.8
12. SA	-6.0	1000.0	-6.0	0.0	1000.	180.	AG	3425.	10.4	0.0	56.0		
13. SD	-12.0	0.0	-12.0	-1000.0	1000.	180.	AG	3590.	10.4	0.0	44.0		
14. SQL	6.0	24.0	6.0	48.1	24.	360.	AG	125.	100.0	0.0	12.0	0.22	1.2
15. SQTR	-12.0	24.0	-12.0	5921.8	5898.	360.	AG	109.	100.0	0.0	24.0	1.53	299.6

JOB: LOPT RUN: NorthShore and OR43 In-Street/Additional

DATE : 2/26/10
TIME : 15:41:59

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
3. EQT	100	76	4.0	10	325	58.27	2	3
6. WQTL	100	76	4.0	20	1197	58.27	2	3
7. WQR	100	76	4.0	155	1520	58.27	2	3
10. NQL	100	82	4.0	145	1770	58.27	2	3
11. NQTR	100	37	4.0	1315	1737	58.27	2	3
14. SQL	100	80	4.0	55	1770	58.27	2	3
15. SQTR	100	35	4.0	3165	1750	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	184.0	5.9
2. 2	46.0	109.0	5.9
3. 3	46.0	34.0	5.9
4. 4	121.0	34.0	5.9
5. 5	196.0	34.0	5.9
6. 6	196.0	-22.0	5.9
7. 7	121.0	-22.0	5.9
8. 8	46.0	-22.0	5.9
9. 9	46.0	-97.0	5.9
10. 10	46.0	-172.0	5.9
11. 11	-34.0	-225.0	5.9
12. 12	-34.0	-150.0	5.9
13. 13	-34.0	-75.0	5.9
14. 14	-80.0	-128.1	5.9
15. 15	-133.0	-181.1	5.9
16. 16	-133.0	-92.1	5.9
17. 17	-80.0	-39.0	5.9
18. 18	-34.0	14.0	5.9
19. 19	-34.0	89.0	5.9
20. 20	-34.0	164.0	5.9

JOB: LOPT RUN: NorthShore and OR43 In-Street/Additional

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
10.	2.8	2.8	2.9	2.0	2.0	2.3	2.3	3.4	3.0	3.0	5.1	5.2	5.2	3.3	3.0	2.9	3.3	5.0	4.9	4.9
20.	2.2	2.2	2.2	2.0	2.0	2.3	2.3	2.6	2.4	2.2	4.7	4.9	5.0	3.4	3.1	3.0	3.4	4.7	4.7	4.7
30.	2.1	2.1	2.1	2.0	2.0	2.3	2.3	2.5	2.2	2.2	4.4	4.7	4.7	3.4	3.1	2.8	3.3	4.4	4.4	4.4
40.	2.1	2.1	2.1	2.0	2.0	2.3	2.3	2.5	2.2	2.2	4.1	4.2	4.7	3.4	2.9	2.9	3.2	4.2	4.2	4.2
50.	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.4	2.1	2.1	3.9	4.1	4.4	3.3	3.0	2.9	3.1	3.9	3.8	3.8
60.	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.4	2.1	2.1	3.6	3.9	4.1	3.3	2.9	3.0	3.4	3.8	3.7	3.7
70.	2.0	2.0	2.1	2.1	2.1	2.3	2.3	2.3	2.1	2.0	3.6	3.8	4.0	3.2	2.7	3.2	3.4	3.8	3.6	3.6
80.	2.0	2.0	2.2	2.2	2.1	2.3	2.3	2.3	2.0	2.0	3.6	3.7	4.1	3.1	2.7	3.2	3.6	4.0	3.7	3.7
90.	2.0	2.0	2.4	2.3	2.3	2.2	2.2	2.2	2.0	2.0	3.7	3.8	4.0	3.1	2.7	3.0	3.4	4.1	3.8	3.8
100.	2.0	2.1	2.7	2.4	2.3	2.1	2.2	2.2	2.0	2.0	3.6	3.6	3.9	3.1	2.7	2.9	3.3	3.8	3.8	3.7
110.	2.0	2.1	2.7	2.4	2.4	2.0	2.0	2.0	2.0	2.0	3.6	3.6	3.8	3.0	2.6	2.7	3.3	3.8	3.7	3.7
120.	2.1	2.1	2.7	2.4	2.4	2.0	2.0	2.0	2.0	2.0	3.6	3.6	3.8	3.0	2.7	2.8	3.2	4.0	3.9	3.8
130.	2.1	2.1	2.8	2.4	2.4	2.0	2.0	2.0	2.0	2.0	3.8	3.8	4.0	3.0	2.7	2.8	3.2	4.1	4.1	3.9
140.	2.2	2.2	2.6	2.3	2.3	2.0	2.0	2.1	2.1	2.1	4.0	4.0	4.1	3.1	2.7	2.8	3.3	4.4	4.4	4.3
150.	2.2	2.3	2.6	2.3	2.3	2.0	2.0	2.1	2.1	2.1	4.3	4.3	4.4	3.1	2.8	2.9	3.2	4.7	4.6	4.5
160.	2.2	2.4	2.7	2.2	2.2	2.0	2.0	2.2	2.2	2.2	4.5	4.6	4.6	3.2	2.8	2.9	3.3	4.9	4.8	4.7
170.	2.9	3.0	3.2	2.2	2.2	2.0	2.0	2.7	2.6	2.6	4.8	4.8	4.8	3.1	2.5	2.7	3.2	4.9	5.0	4.9
180.	3.8	3.9	4.2	2.5	2.3	2.1	2.3	3.6	3.4	3.4	4.2	4.3	4.3	2.6	2.3	2.5	2.8	4.3	4.4	4.3
190.	4.4	4.4	5.0	2.9	2.5	2.3	2.7	4.3	3.9	3.8	3.1	3.2	3.2	2.1	2.0	2.2	2.3	3.2	3.2	3.3
200.	4.2	4.5	4.7	3.0	2.8	2.5	2.8	4.2	4.0	3.8	2.4	2.4	2.4	2.0	2.0	2.3	2.3	2.5	2.5	2.5
210.	4.1	4.2	4.7	3.2	2.9	2.6	2.8	4.1	3.9	3.6	2.2	2.2	2.2	2.0	2.0	2.3	2.3	2.4	2.2	2.3
220.	3.9	3.9	4.3	3.3	2.9	2.6	2.9	4.0	3.8	3.5	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.2	2.2	2.1
230.	3.7	3.9	4.3	3.5	3.0	2.5	2.9	4.1	3.8	3.4	2.1	2.1	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1
240.	3.6	3.6	3.8	3.7	3.1	2.6	2.8	4.0	3.7	3.3	2.1	2.2	2.3	2.2	2.2	2.1	2.1	2.0	2.1	2.1
250.	3.5	3.5	3.8	3.4	3.1	2.6	2.9	3.9	3.7	3.3	2.1	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0
260.	3.5	3.5	3.7	3.3	3.0	2.7	2.9	3.8	3.7	3.3	2.1	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0
270.	3.6	3.6	3.7	3.1	2.8	2.7	3.0	3.8	3.6	3.2	2.0	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0

280.	*	3.5	3.5	3.7	2.9	2.6	2.9	2.9	3.9	3.6	3.2	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0
290.	*	3.5	3.5	3.6	2.7	2.7	2.9	3.2	3.9	3.8	3.3	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0
300.	*	3.6	3.6	3.7	2.8	2.6	2.9	3.1	3.7	3.8	3.3	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
310.	*	3.7	3.7	3.7	2.8	2.7	2.9	3.3	3.8	4.2	3.5	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
320.	*	3.9	3.9	3.9	2.9	2.7	3.0	3.3	4.1	4.1	3.6	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
330.	*	4.1	4.1	4.1	3.0	2.7	3.0	3.4	4.4	4.3	4.1	2.2	2.3	2.3	2.1	2.1	2.0	2.0	2.2	2.2	2.2
340.	*	4.3	4.3	4.4	3.0	2.7	3.0	3.4	4.8	4.4	4.3	2.4	2.5	2.4	2.1	2.1	2.0	2.0	2.4	2.3	2.3
350.	*	4.4	4.4	4.4	2.9	2.4	2.7	3.2	4.9	4.5	4.6	3.3	3.4	3.4	2.3	2.1	2.0	2.2	3.2	3.2	3.2
360.	*	3.7	3.8	3.8	2.4	2.2	2.5	2.7	4.3	4.0	3.9	4.6	4.7	4.7	2.9	2.5	2.4	2.8	4.5	4.4	4.3
MAX	*	4.4	4.5	5.0	3.7	3.1	3.0	3.4	4.9	4.5	4.6	5.1	5.2	5.2	3.4	3.1	3.2	3.6	5.0	5.0	4.9
DEGR.	*	190	200	190	240	250	320	330	350	350	350	10	10	10	20	20	70	80	10	170	10

THE HIGHEST CONCENTRATION OF 5.20 PPM OCCURRED AT RECEPTOR REC12.

CAL3QHC MODEL RUNS (INPUT-OUTPUT)
2035 WILLAMETTE SHORELINE CONDITIONS

INPUT FILE: A Ave and OR43 Willamette Shoreline 2035

```
'LOPT',60.0,108,0.0,0.0,17,0.3048,1,0
'1',46.00,196.00,5.9
'2',46.00,121.00,5.9
'3',46.00,46.00,5.9
'4',46.00,0.00,5.9
'5',46.00,-46.00,5.9
'6',46.00,-121.00,5.9
'7',46.00,-196.00,5.9
'8',-34.00,-196.00,5.9
'9',-34.00,-121.00,5.9
'10',-34.00,-46.00,5.9
'11',-109.00,-46.00,5.9
'12',-184.00,-46.00,5.9
'13',-184.00,46.00,5.9
'14',-109.00,46.00,5.9
'15',-34.00,46.00,5.9
'16',-34.00,121.00,5.9
'17',-34.00,196.00,5.9
'A Ave and OR43 Willamette Shoreline 2035',11,1,0,'C'
1
'EA','AG',-1000,-12,0,-12,1815,10.872,0,56
2
'EQR','AG',-24,-24,-324,-24,0,24,2
100,76.5,4,1495,58.27,1355,2,3
2
'EQL','AG',-24,6,-324,6,0,12,1
100,76.5,4,320,58.27,1770,2,3
1
'NA','AG',18,-1000,18,0,1610,10.376,0,56
1
'ND','AG',24,0,24,1000,1260,10.376,0,44
2
'NQTL','AG',24,-36,24,-336,0,24,2
100,19.5,4,1275,58.27,841,2,3
2
'NQL','AG',6,-36,6,-336,0,12,1
100,75.5,5,335,58.27,1610,2,3
1
'SA','AG',-12,1000,-12,0,2595,10.376,0,44
1
'SD','AG',-12,0,-12,-1000,3780,10.376,0,44
2
'SQTR','AG',-12,36,-12,336,0,24,2
100,42.0,4,2595,58.27,1735,2,3
1
'WD','AG',0,24,-1000,24,980,10.872,0,44
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: A Ave and OR43 Willamette Shoreline 2035

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                   CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

      JOB: LOPT                                                RUN: A Ave and OR43 Willamette Shoreline 2035

      DATE :  2/26/10
      TIME : 15:39:34

         The MODE flag has been set to C for calculating CO averages.

       SITE & METEOROLOGICAL VARIABLES
       -------------------------------
       VS =   0.0 CM/S      VD =   0.0 CM/S      Z0 = 108. CM
        U =  1.0 M/S        CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

       LINK VARIABLES
       --------------
         LINK DESCRIPTION     *         LINK COORDINATES (FT)         *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                              *   X1        Y1        X2        Y2    *     (FT)  (DEG)           (G/MI)  (FT) (FT)       (VEH)
      ------------------------*---------------------------------------*--------------------------------------------------------------
       1. EA                  *  -1000.0     -12.0       0.0     -12.0 *    1000.    90. AG   1815.  10.9   0.0 56.0
       2. EQR                 *    -24.0     -24.0   -5470.6     -24.8 *    5447.   270. AG    238. 100.0   0.0 24.0 3.07 276.7
       3. EQL                 *    -24.0       6.0    -241.0       6.0 *     217.   270. AG    119. 100.0   0.0 12.0 1.01  11.0
       4. NA                  *     18.0   -1000.0      18.0       0.0 *    1000.   360. AG   1610.  10.4   0.0 56.0
       5. ND                  *     24.0       0.0      24.0    1000.0 *    1000.   360. AG   1260.  10.4   0.0 44.0
       6. NQTL                *     24.0     -36.0      24.0    -271.9 *     236.   180. AG     59. 100.0   0.0 24.0 1.01  12.0
       7. NQL                 *      6.0     -36.0       6.0    -697.5 *     662.   180. AG    117. 100.0   0.0 12.0 1.16  33.6
       8. SA                  *    -12.0    1000.0     -12.0       0.0 *    1000.   180. AG   2595.  10.4   0.0 44.0
       9. SD                  *    -12.0       0.0     -12.0   -1000.0 *    1000.   180. AG   3780.  10.4   0.0 44.0
      10. SQTR                *    -12.0      36.0     -12.0    4378.4 *    4342.   360. AG    131. 100.0   0.0 24.0 1.44 220.6
      11. WD                  *      0.0      24.0   -1000.0      24.0 *    1000.   270. AG    980.  10.9   0.0 44.0
```

JOB: LOPT RUN: A Ave and OR43 Willamette Shoreline 2035

DATE : 2/26/10
TIME : 15:39:34

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EQR	100	76	4.0	1495	1355	58.27	2	3
3. EQL	100	76	4.0	320	1770	58.27	2	3
6. NQTL	100	19	4.0	1275	841	58.27	2	3
7. NQL	100	75	5.0	335	1610	58.27	2	3
10. SQTR	100	42	4.0	2595	1735	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	196.0	5.9
2. 2	46.0	121.0	5.9
3. 3	46.0	46.0	5.9
4. 4	46.0	0.0	5.9
5. 5	46.0	-46.0	5.9
6. 6	46.0	-121.0	5.9
7. 7	46.0	-196.0	5.9
8. 8	-34.0	-196.0	5.9
9. 9	-34.0	-121.0	5.9
10. 10	-34.0	-46.0	5.9
11. 11	-109.0	-46.0	5.9
12. 12	-184.0	-46.0	5.9
13. 13	-184.0	46.0	5.9
14. 14	-109.0	46.0	5.9
15. 15	-34.0	46.0	5.9
16. 16	-34.0	121.0	5.9
17. 17	-34.0	196.0	5.9

JOB: LOPT RUN: A Ave and OR43 Willamette Shoreline 2035

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17
10.	*	2.6	2.6	2.6	2.6	2.6	2.6	2.6	5.2	5.3	6.1	4.4	4.2	2.5	2.7	4.6	4.6	4.6
20.	*	2.1	2.1	2.1	2.1	2.2	2.1	2.1	5.0	4.8	5.3	4.5	4.2	2.6	2.9	4.5	4.5	4.5
30.	*	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.5	4.5	5.1	4.6	4.2	2.5	2.9	4.1	4.1	4.1
40.	*	2.0	2.0	2.0	2.0	2.0	2.1	2.1	4.3	4.3	4.5	4.5	4.3	2.5	2.8	3.9	3.9	3.9
50.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.1	4.1	4.1	4.5	4.4	2.5	2.8	3.7	3.7	3.7
60.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	3.9	4.3	4.4	2.6	2.8	3.6	3.6	3.6
70.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.9	4.1	4.2	2.6	2.7	3.5	3.5	3.5
80.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.8	3.8	3.9	2.7	2.9	3.6	3.5	3.5
90.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.1	3.3	3.2	2.9	2.9	3.7	3.6	3.6
100.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.9	3.1	3.1	3.4	3.2	3.6	3.5	3.5
110.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.9	3.0	2.7	3.7	3.5	3.4	3.5	3.5
120.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	3.0	2.7	4.0	3.8	3.8	3.6	3.6
130.	*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.1	4.1	4.1	3.0	2.7	4.2	4.1	3.8	3.7	3.7
140.	*	2.0	2.0	2.0	2.1	2.1	2.1	2.1	4.4	4.4	4.4	3.0	2.7	4.2	4.4	4.1	3.9	3.9
150.	*	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.5	4.6	4.6	3.1	2.8	4.2	4.4	4.6	4.2	4.2
160.	*	2.1	2.2	2.2	2.2	2.2	2.2	2.2	5.0	5.1	5.1	3.1	2.7	4.0	4.3	5.4	4.9	4.5
170.	*	2.7	2.7	2.7	2.8	2.8	2.7	2.6	5.1	5.2	5.3	2.9	2.4	3.6	4.1	6.0	5.5	5.0
180.	*	3.5	3.6	3.7	3.7	3.7	3.7	3.6	4.5	4.6	4.6	2.4	2.1	3.4	3.7	5.6	4.7	4.6
190.	*	4.2	4.3	4.3	4.5	4.4	4.4	4.3	3.2	3.3	3.3	2.1	2.0	3.2	3.3	4.5	3.8	3.6
200.	*	4.2	4.1	4.2	4.4	4.5	4.5	4.5	2.4	2.4	2.4	2.0	2.0	3.2	3.2	3.5	3.0	2.9
210.	*	4.0	4.0	4.0	4.0	4.1	4.1	4.1	2.2	2.2	2.2	2.0	2.0	3.4	3.4	3.6	2.8	2.7
220.	*	3.9	3.9	3.8	3.9	3.9	3.9	3.9	2.1	2.1	2.1	2.0	2.0	3.5	3.5	3.6	2.9	2.7
230.	*	3.9	4.1	4.0	3.6	3.8	3.8	3.8	2.1	2.1	2.1	2.0	2.0	3.4	3.5	3.6	3.0	2.6
240.	*	3.7	4.1	4.2	3.9	3.7	3.7	3.7	2.1	2.1	2.1	2.0	2.0	3.5	3.6	3.7	3.0	2.6
250.	*	3.7	4.0	4.7	4.5	3.9	3.7	3.7	2.0	2.0	2.2	2.2	2.2	3.7	3.9	3.9	2.8	2.5
260.	*	3.5	3.8	4.7	5.1	4.4	3.8	3.7	2.0	2.1	2.8	2.8	2.8	3.7	3.8	3.8	2.7	2.4
270.	*	3.2	3.5	4.4	5.5	5.3	4.2	4.0	2.2	2.4	3.8	3.8	3.8	3.3	3.3	3.4	2.4	2.1

280.	*	3.1	3.2	3.5	4.6	5.4	4.5	4.3	2.5	2.8	4.5	4.4	4.4	2.5	2.5	2.5	2.1	2.0
290.	*	3.2	3.2	3.3	3.7	5.1	4.6	4.3	2.6	2.9	4.5	4.4	4.2	2.1	2.1	2.1	2.0	2.0
300.	*	3.2	3.2	3.2	3.5	4.3	4.5	4.2	2.6	3.0	4.2	4.1	3.9	2.1	2.1	2.2	2.1	2.1
310.	*	3.3	3.3	3.3	3.4	3.9	4.6	4.4	2.6	2.9	4.0	3.9	3.8	2.0	2.0	2.1	2.1	2.1
320.	*	3.4	3.4	3.4	3.3	3.7	4.6	4.5	2.7	2.9	3.9	3.8	3.7	2.0	2.0	2.1	2.1	2.1
330.	*	3.6	3.6	3.6	3.6	3.7	4.6	4.5	2.8	3.0	3.9	3.7	3.7	2.0	2.0	2.1	2.1	2.1
340.	*	3.7	3.7	3.7	3.7	3.8	4.4	4.6	3.1	3.2	4.1	3.6	3.6	2.0	2.0	2.4	2.4	2.4
350.	*	3.8	3.8	3.8	3.8	3.8	4.2	4.3	3.9	3.9	4.8	3.9	3.7	2.0	2.2	3.1	3.1	3.1
360.	*	3.4	3.4	3.4	3.4	3.4	3.4	3.5	4.9	5.0	5.8	4.2	3.9	2.2	2.5	4.1	4.1	4.1
MAX	*	4.2	4.3	4.7	5.5	5.4	4.6	4.6	5.2	5.3	6.1	4.6	4.4	4.2	4.4	6.0	5.5	5.0
DEGR.	*	190	190	250	270	280	310	340	10	10	10	30	50	130	140	170	170	170

THE HIGHEST CONCENTRATION OF 6.10 PPM OCCURRED AT RECEPTOR REC10.

INPUT FILE: Foothills Ave and OR43 Willamette Shoreline 2035

```
'LOPT',60.0,108,0.0,0.0,17,0.3048,1,0
'1',46.00,184.00,5.9
'2',46.00,109.00,5.9
'3',46.00,34.00,5.9
'4',121.00,34.00,5.9
'5',196.00,34.00,5.9
'6',196.00,-22.00,5.9
'7',121.00,-22.00,5.9
'8',46.00,-22.00,5.9
'9',46.00,-97.00,5.9
'10',46.00,-172.00,5.9
'11',-34.00,-172.00,5.9
'12',-34.00,-97.00,5.9
'13',-34.00,-22.00,5.9
'14',-34.00,6.00,5.9
'15',-34.00,34.00,5.9
'16',-34.00,109.00,5.9
'17',-34.00,184.00,5.9
'Foothills and OR43 Willamette Shoreline 2035',11,1,0,'C'
1
'WA','AG',1000,12,0,12,415,10.872,0,44
2
'WQR','AG',36,18,336,18,0,12,1
100,79.3,4,230,58.27,1528,2,3
2
'WQL','AG',36,6,336,6,0,12,1
100,79.3,4,185,58.27,1770,2,3
1
'NA','AG',24,-1000,24,0,1575,10.376,0,44
1
'ND','AG',24,0,24,1000,1610,10.376,0,44
2
'NQTR','AG',24,-12,24,-312,0,24,2
100,40.0,4,1575,58.27,1732,2,3
1
'SA','AG',-6,1012,-6,12,3780,10.376,0,56
1
'SD','AG',-12,12,-12,-988,3500,10.376,0,44
2
'SQT','AG',-12,24,-12,324,0,24,2
100,16.7,4,3315,58.27,1770,2,3
2
'SQTL','AG',6,24,6,324,0,12,1
100,74.7,4,465,58.27,1770,2,3
1
'ED','AG',12,-6,512,-6,660,10.872,0,32
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: Foothills Ave and OR43 Willamette Shoreline 2035

```
                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

      JOB: LOPT                                                  RUN: Foothills and OR43 Willamette Shoreline

      DATE :  2/22/10
      TIME : 12:29:24

         The MODE flag has been set to C for calculating CO averages.

       SITE & METEOROLOGICAL VARIABLES
       -------------------------------
       VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 108. CM
        U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

       LINK VARIABLES
       --------------
         LINK DESCRIPTION     *        LINK COORDINATES (FT)         *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                              *   X1        Y1        X2        Y2     *     (FT)  (DEG)          (G/MI)  (FT) (FT)       (VEH)
      ------------------------*--------------------------------------*--------------------------------------------------------------
       1. WA                  *   1000.0      12.0       0.0      12.0 *    1000.   270. AG    415.  10.9   0.0 44.0
       2. WQR                 *     36.0      18.0     200.8      18.0 *     165.    90. AG    123. 100.0   0.0 12.0 1.00   8.4
       3. WQL                 *     36.0       6.0     115.9       6.0 *      80.    90. AG    123. 100.0   0.0 12.0 0.70   4.1
       4. NA                  *     24.0   -1000.0      24.0       0.0 *    1000.   360. AG   1575.  10.4   0.0 44.0
       5. ND                  *     24.0       0.0      24.0    1000.0 *    1000.   360. AG   1610.  10.4   0.0 44.0
       6. NQTR                *     24.0     -12.0      24.0    -184.1 *     172.   180. AG    125. 100.0   0.0 24.0 0.84   8.7
       7. SA                  *     -6.0    1012.0      -6.0      12.0 *    1000.   180. AG   3780.  10.4   0.0 56.0
       8. SD                  *    -12.0      12.0     -12.0    -988.0 *    1000.   180. AG   3500.  10.4   0.0 44.0
       9. SQT                 *    -12.0      24.0     -12.0    3070.2 *    3046.   360. AG     50. 100.0   0.0 24.0 1.20 154.7
      10. SQTL                *      6.0      24.0       6.0    1392.9 *    1369.   360. AG    116. 100.0   0.0 12.0 1.31  69.5
      11. ED                  *     12.0      -6.0     512.0      -6.0 *     500.    90. AG    660.  10.9   0.0 32.0
```

JOB: LOPT RUN: Foothills and OR43 Willamette Shoreline

DATE : 2/22/10
TIME : 12:29:24

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. WQR	100	79	4.0	230	1528	58.27	2	3
3. WQL	100	79	4.0	185	1770	58.27	2	3
6. NQTR	100	40	4.0	1575	1732	58.27	2	3
9. SQT	100	16	4.0	3315	1770	58.27	2	3
10. SQTL	100	74	4.0	465	1770	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	184.0	5.9
2. 2	46.0	109.0	5.9
3. 3	46.0	34.0	5.9
4. 4	121.0	34.0	5.9
5. 5	196.0	34.0	5.9
6. 6	196.0	-22.0	5.9
7. 7	121.0	-22.0	5.9
8. 8	46.0	-22.0	5.9
9. 9	46.0	-97.0	5.9
10. 10	46.0	-172.0	5.9
11. 11	-34.0	-172.0	5.9
12. 12	-34.0	-97.0	5.9
13. 13	-34.0	-22.0	5.9
14. 14	-34.0	6.0	5.9
15. 15	-34.0	34.0	5.9
16. 16	-34.0	109.0	5.9
17. 17	-34.0	184.0	5.9

JOB: LOPT RUN: Foothills and OR43 Willamette Shoreline

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17
10.	2.9	2.9	2.9	2.0	2.0	2.4	2.5	3.6	3.2	3.2	5.1	5.1	5.3	5.2	5.2	5.2	5.1
20.	2.2	2.3	2.3	2.0	2.0	2.3	2.5	2.9	2.7	2.3	4.8	4.7	5.0	5.1	5.0	5.0	4.9
30.	2.1	2.1	2.1	2.0	2.0	2.4	2.6	2.8	2.5	2.3	4.5	4.5	4.6	4.5	4.5	4.5	4.5
40.	2.1	2.1	2.1	2.0	2.0	2.4	2.6	2.9	2.4	2.2	4.3	4.6	4.3	4.3	4.3	4.3	4.3
50.	2.0	2.0	2.0	2.0	2.0	2.5	2.7	3.0	2.3	2.1	3.9	4.2	4.1	4.1	4.2	4.2	4.2
60.	2.0	2.0	2.0	2.0	2.0	2.6	2.7	3.0	2.2	2.2	3.9	4.0	4.0	3.8	4.0	3.9	3.9
70.	2.0	2.0	2.1	2.1	2.1	2.6	2.7	3.0	2.2	2.0	3.7	3.8	4.4	4.1	3.8	3.7	3.7
80.	2.0	2.0	2.2	2.2	2.1	2.6	2.7	2.9	2.2	2.0	3.6	3.8	4.4	4.2	4.0	3.8	3.8
90.	2.0	2.0	2.5	2.4	2.3	2.5	2.5	2.5	2.0	2.0	3.7	3.7	4.2	4.4	4.4	3.9	3.9
100.	2.0	2.1	3.0	2.8	2.5	2.3	2.3	2.3	2.0	2.0	3.5	3.6	3.9	4.3	4.4	4.0	3.8
110.	2.1	2.2	3.0	2.8	2.4	2.1	2.1	2.1	2.0	2.0	3.5	3.6	3.6	4.1	4.3	4.0	3.8
120.	2.2	2.3	3.0	2.8	2.4	2.0	2.0	2.0	2.0	2.0	3.5	3.7	3.7	3.9	4.2	4.2	4.1
130.	2.2	2.3	3.1	2.8	2.4	2.0	2.0	2.0	2.0	2.0	3.6	3.8	3.8	3.9	3.9	4.4	4.5
140.	2.3	2.4	3.1	2.8	2.4	2.0	2.0	2.1	2.1	2.1	3.9	4.1	4.1	4.1	4.1	4.7	4.5
150.	2.3	2.5	2.8	2.6	2.4	2.0	2.0	2.1	2.1	2.1	4.1	4.2	4.3	4.3	4.2	4.6	4.8
160.	2.3	2.6	3.0	2.6	2.4	2.0	2.0	2.2	2.2	2.2	4.4	4.4	4.5	4.6	4.6	4.6	5.0
170.	3.0	3.2	3.5	2.6	2.5	2.0	2.0	2.8	2.7	2.7	4.7	4.7	4.8	4.8	4.7	4.9	5.1
180.	3.7	4.1	4.6	3.1	2.8	2.1	2.3	3.7	3.6	3.4	4.1	4.2	4.3	4.3	4.2	4.3	4.4
190.	4.5	4.5	5.0	3.4	2.9	2.3	2.7	4.3	4.2	3.9	3.1	3.1	3.1	3.2	3.1	3.1	3.1
200.	4.4	4.3	4.8	3.7	3.1	2.5	2.8	4.4	4.3	3.9	2.4	2.4	2.4	2.4	2.3	2.3	2.4
210.	4.3	4.1	4.4	3.7	3.2	2.6	2.9	4.2	4.1	3.7	2.2	2.2	2.2	2.2	2.1	2.2	2.2
220.	4.0	4.1	4.0	4.0	3.5	2.6	2.9	3.9	3.9	3.6	2.1	2.1	2.1	2.1	2.0	2.1	2.1
230.	3.9	4.0	3.7	3.9	3.4	2.6	2.9	3.8	3.8	3.5	2.1	2.1	2.1	2.1	2.0	2.1	2.1
240.	3.8	3.7	3.5	3.8	3.5	2.6	2.8	3.7	3.7	3.5	2.1	2.1	2.1	2.1	2.0	2.1	2.1
250.	3.7	3.7	3.6	3.6	3.4	2.7	2.8	3.7	3.6	3.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0
260.	3.7	3.7	3.6	3.5	3.3	2.7	2.8	3.6	3.6	3.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
270.	3.8	3.8	3.9	3.1	3.1	3.0	3.1	3.7	3.7	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0

280.	*	3.7	3.7	3.7	3.0	2.8	3.2	3.3	3.8	3.6	3.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
290.	*	3.7	3.7	3.7	2.8	2.6	3.4	3.5	3.9	3.6	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
300.	*	3.8	3.8	3.9	2.8	2.7	3.6	3.6	3.8	3.7	3.7	2.1	2.1	2.1	2.0	2.1	2.1	2.1
310.	*	3.9	3.9	3.9	3.0	2.7	3.3	3.7	4.1	3.8	3.8	2.1	2.1	2.1	2.0	2.1	2.1	2.1
320.	*	4.1	4.1	4.1	3.1	2.7	3.3	3.9	4.3	4.0	3.9	2.1	2.1	2.1	2.1	2.1	2.1	2.1
330.	*	4.3	4.3	4.3	3.1	2.7	3.3	3.9	4.5	4.2	4.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2
340.	*	4.6	4.6	4.6	3.1	2.7	3.2	3.8	4.9	4.7	4.5	2.4	2.4	2.4	2.3	2.4	2.4	2.4
350.	*	4.6	4.6	4.7	3.0	2.4	3.0	3.6	5.2	4.7	4.7	3.4	3.4	3.4	3.3	3.3	3.3	3.3
360.	*	3.9	4.0	4.0	2.4	2.1	2.6	3.1	4.8	4.5	4.1	4.4	4.7	4.7	4.5	4.6	4.6	4.5
MAX	*	4.6	4.6	5.0	4.0	3.5	3.6	3.9	5.2	4.7	4.7	5.1	5.1	5.3	5.2	5.2	5.2	5.1
DEGR.	*	350	350	190	220	220	300	320	350	340	350	10	10	10	10	10	10	10

THE HIGHEST CONCENTRATION OF 5.30 PPM OCCURRED AT RECEPTOR REC13.

INPUT FILE: North Shore and OR43 Willamette Shoreline 2035

```
'LOPT',60.0,108,0.0,0.0,20,0.3048,1,0
'1',46.00,184.00,5.9
'2',46.00,109.00,5.9
'3',46.00,34.00,5.9
'4',121.00,34.00,5.9
'5',196.00,34.00,5.9
'6',196.00,-22.00,5.9
'7',121.00,-22.00,5.9
'8',46.00,-22.00,5.9
'9',46.00,-97.00,5.9
'10',46.00,-172.00,5.9
'11',-34.00,-225.03,5.9
'12',-34.00,-150.03,5.9
'13',-34.00,-75.03,5.9
'14',-79.96,-128.06,5.9
'15',-132.99,-181.09,5.9
'16',-132.99,-92.06,5.9
'17',-79.96,-39.03,5.9
'18',-34.00,14.00,5.9
'19',-34.00,89.00,5.9
'20',-34.00,164.00,5.9
'NorthShore and OR43 Willamette Shoreline 2035',15,1,0,'C'
1
'EA','AG',-707.11,-707.11,0.00,-6.00,130,10.872,0,38
1
'ED','AG',0.00,-6.00,500.00,-6.00,200,10.872,0,32
2
'EQT','AG',-24.00,-6.00,-731.11,-713.11,0,12,1
100.00,76.00,4.00,10.00,58.270,325,2,3
1
'WA','AG',500.00,12.00,0.00,12.00,565,10.872,0,44
1
'WD','AG',0.00,12.00,-707.11,-695.11,365,10.872,0,38
2
'WQTL','AG',36.00,6.00,536.00,6.00,0,12,1
100.00,76.00,4.00,20.00,58.270,1197,2,3
2
'WQR','AG',36.00,18.00,336.00,18.00,0,12,1
100.00,76.00,4.00,155.00,58.270,1520,2,3
1
'NA','AG',18.00,-1000.00,18.00,0.00,1590,10.376,0,56
1
'ND','AG',24.00,0.00,24.00,1000.00,1555,10.376,0,44
2
'NQL','AG',6.00,-12.00,6.00,-1012.00,0,12,1
100.00,82.30,4.00,145.00,58.270,1770,2,3
2
'NQTR','AG',24.00,-12.00,24.00,-1012.00,0,24,2
100.00,37.60,4.00,1315.00,58.270,1737,2,3
1
'SA','AG',-6.00,1000.00,-6.00,0.00,3420,10.376,0,56
1
'SD','AG',-12.00,0.00,-12.00,-1000.00,3585,10.376,0,44
2
'SQL','AG',6.00,24.00,6.00,1024.00,0,12,1
100.00,80.40,4.00,60.00,58.270,1770,2,3
2
'SQTR','AG',-12.00,24.00,-12.00,1024.00,0,24,2
100.00,35.70,4.00,3160.00,58.270,1750,2,3
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: North Shore and OR43 Willamette Shoreline 2035

```
                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

      JOB: LOPT                                                  RUN: NorthShore and OR43 Willamette Shoreline

      DATE :  2/26/10
      TIME : 15:42:36

         The MODE flag has been set to C for calculating CO averages.

       SITE & METEOROLOGICAL VARIABLES
       -------------------------------
       VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 108. CM
        U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

       LINK VARIABLES
       --------------
         LINK DESCRIPTION     *         LINK COORDINATES (FT)         *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                              *   X1        Y1        X2        Y2    *     (FT)  (DEG)           (G/MI)  (FT) (FT)       (VEH)
      ------------------------*---------------------------------------*--------------------------------------------------------------
       1. EA                  *  -707.1    -707.1       0.0      -6.0 *      996.    45. AG    130.  10.9   0.0 38.0
       2. ED                  *     0.0      -6.0     500.0      -6.0 *      500.    90. AG    200.  10.9   0.0 32.0
       3. EQT                 *   -24.0      -6.0     -26.9      -8.9 *        4.   225. AG    119. 100.0   0.0 12.0 0.17   0.2
       4. WA                  *   500.0      12.0       0.0      12.0 *      500.   270. AG    565.  10.9   0.0 44.0
       5. WD                  *     0.0      12.0    -707.1    -695.1 *     1000.   225. AG    365.  10.9   0.0 38.0
       6. WQTL                *    36.0       6.0      44.3       6.0 *        8.    90. AG    119. 100.0   0.0 12.0 0.09   0.4
       7. WQR                 *    36.0      18.0     100.4      18.0 *       64.    90. AG    119. 100.0   0.0 12.0 0.57   3.3
       8. NA                  *    18.0   -1000.0      18.0       0.0 *     1000.   360. AG   1590.  10.4   0.0 56.0
       9. ND                  *    24.0       0.0      24.0    1000.0 *     1000.   360. AG   1555.  10.4   0.0 44.0
      10. NQL                 *     6.0     -12.0       6.0     -77.0 *       65.   180. AG    128. 100.0   0.0 12.0 0.68   3.3
      11. NQTR                *    24.0     -12.0      24.0    -144.9 *      133.   180. AG    116. 100.0   0.0 24.0 0.66   6.8
      12. SA                  *    -6.0    1000.0      -6.0       0.0 *     1000.   180. AG   3420.  10.4   0.0 56.0
      13. SD                  *   -12.0       0.0     -12.0   -1000.0 *     1000.   180. AG   3585.  10.4   0.0 44.0
      14. SQL                 *     6.0      24.0       6.0      50.2 *       26.   360. AG    125. 100.0   0.0 12.0 0.24   1.3
      15. SQTR                *   -12.0      24.0     -12.0    5901.5 *     5878.   360. AG    109. 100.0   0.0 24.0 1.53 298.6
```

JOB: LOPT RUN: NorthShore and OR43 Willamette Shoreline

DATE : 2/26/10
TIME : 15:42:36

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
3. EQT	100	76	4.0	10	325	58.27	2	3
6. WQTL	100	76	4.0	20	1197	58.27	2	3
7. WQR	100	76	4.0	155	1520	58.27	2	3
10. NQL	100	82	4.0	145	1770	58.27	2	3
11. NQTR	100	37	4.0	1315	1737	58.27	2	3
14. SQL	100	80	4.0	60	1770	58.27	2	3
15. SQTR	100	35	4.0	3160	1750	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	184.0	5.9
2. 2	46.0	109.0	5.9
3. 3	46.0	34.0	5.9
4. 4	121.0	34.0	5.9
5. 5	196.0	34.0	5.9
6. 6	196.0	-22.0	5.9
7. 7	121.0	-22.0	5.9
8. 8	46.0	-22.0	5.9
9. 9	46.0	-97.0	5.9
10. 10	46.0	-172.0	5.9
11. 11	-34.0	-225.0	5.9
12. 12	-34.0	-150.0	5.9
13. 13	-34.0	-75.0	5.9
14. 14	-80.0	-128.1	5.9
15. 15	-133.0	-181.1	5.9
16. 16	-133.0	-92.1	5.9
17. 17	-80.0	-39.0	5.9
18. 18	-34.0	14.0	5.9
19. 19	-34.0	89.0	5.9
20. 20	-34.0	164.0	5.9

JOB: LOPT RUN: NorthShore and OR43 Willamette Shoreline

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM)																			
	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
10.	2.8	2.8	2.9	2.0	2.0	2.3	2.3	3.4	3.0	3.0	5.1	5.2	5.2	3.3	3.0	2.9	3.3	5.0	4.9	4.9
20.	2.2	2.2	2.2	2.0	2.0	2.3	2.3	2.6	2.4	2.2	4.7	4.9	5.0	3.4	3.1	3.0	3.4	4.7	4.7	4.7
30.	2.1	2.1	2.1	2.0	2.0	2.3	2.3	2.5	2.2	2.2	4.4	4.7	4.7	3.4	3.1	2.8	3.3	4.4	4.4	4.4
40.	2.1	2.1	2.1	2.0	2.0	2.3	2.3	2.5	2.2	2.2	4.1	4.2	4.6	3.4	2.9	2.9	3.2	4.2	4.2	4.2
50.	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.4	2.1	2.1	3.9	4.1	4.4	3.3	3.0	2.9	3.1	3.9	3.8	3.8
60.	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.4	2.1	2.1	3.6	3.9	4.1	3.3	2.9	3.0	3.4	3.8	3.7	3.7
70.	2.0	2.0	2.1	2.1	2.1	2.3	2.3	2.3	2.1	2.0	3.6	3.8	4.0	3.2	2.7	3.2	3.4	3.8	3.6	3.6
80.	2.0	2.0	2.2	2.2	2.1	2.3	2.3	2.3	2.0	2.0	3.6	3.7	4.1	3.1	2.7	3.2	3.6	4.0	3.7	3.7
90.	2.0	2.0	2.4	2.3	2.3	2.2	2.2	2.2	2.0	2.0	3.7	3.8	4.0	3.1	2.7	3.0	3.4	4.1	3.8	3.8
100.	2.0	2.1	2.7	2.4	2.3	2.1	2.2	2.2	2.0	2.0	3.6	3.6	3.9	3.1	2.7	2.9	3.3	3.8	3.8	3.7
110.	2.0	2.1	2.7	2.4	2.4	2.0	2.0	2.0	2.0	2.0	3.6	3.6	3.8	3.0	2.6	2.7	3.3	3.8	3.7	3.7
120.	2.1	2.1	2.7	2.4	2.4	2.0	2.0	2.0	2.0	2.0	3.6	3.6	3.8	3.0	2.7	2.8	3.2	4.0	3.9	3.8
130.	2.1	2.1	2.8	2.4	2.4	2.0	2.0	2.0	2.0	2.0	3.8	3.8	4.0	3.0	2.7	2.8	3.2	4.1	4.1	3.9
140.	2.2	2.2	2.6	2.3	2.3	2.0	2.0	2.1	2.1	2.1	4.0	4.0	4.1	3.1	2.7	2.8	3.3	4.4	4.4	4.2
150.	2.2	2.3	2.6	2.3	2.3	2.0	2.0	2.1	2.1	2.1	4.2	4.2	4.3	3.1	2.8	2.9	3.2	4.7	4.6	4.5
160.	2.2	2.4	2.8	2.3	2.3	2.0	2.0	2.2	2.2	2.2	4.5	4.5	4.6	3.2	2.8	2.9	3.3	4.9	4.8	4.7
170.	2.9	3.0	3.2	2.2	2.2	2.0	2.0	2.7	2.6	2.6	4.8	4.8	4.8	3.1	2.5	2.7	3.2	4.9	5.0	4.9
180.	3.8	3.9	4.2	2.5	2.3	2.1	2.3	3.6	3.4	3.4	4.2	4.3	4.3	2.6	2.3	2.5	2.8	4.3	4.3	4.3
190.	4.4	4.4	5.0	2.9	2.5	2.3	2.7	4.3	3.9	3.8	3.1	3.2	3.2	2.1	2.0	2.2	2.3	3.2	3.2	3.3
200.	4.2	4.6	4.7	3.1	2.9	2.5	2.8	4.2	4.0	3.8	2.4	2.4	2.4	2.0	2.0	2.3	2.3	2.5	2.5	2.5
210.	4.1	4.2	4.7	3.2	2.9	2.6	2.8	4.1	3.9	3.6	2.2	2.2	2.2	2.0	2.0	2.3	2.3	2.4	2.2	2.3
220.	3.9	3.9	4.3	3.3	2.9	2.6	2.9	4.0	3.8	3.5	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.2	2.2	2.1
230.	3.7	3.9	4.3	3.5	3.0	2.5	2.9	4.1	3.8	3.4	2.1	2.1	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1
240.	3.6	3.6	3.8	3.7	3.1	2.6	2.8	4.0	3.7	3.3	2.1	2.2	2.3	2.2	2.2	2.1	2.1	2.0	2.1	2.1
250.	3.5	3.5	3.8	3.4	3.1	2.6	2.9	3.9	3.7	3.3	2.1	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0
260.	3.5	3.5	3.7	3.3	3.0	2.7	2.9	3.8	3.6	3.2	2.0	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0
270.	3.6	3.6	3.7	3.1	2.8	2.7	3.0	3.8	3.6	3.2	2.0	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0

280.	*	3.5	3.5	3.7	2.9	2.6	2.9	2.9	3.9	3.6	3.2	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0
290.	*	3.5	3.5	3.6	2.7	2.7	2.9	3.2	3.9	3.8	3.3	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0
300.	*	3.6	3.6	3.7	2.8	2.6	2.9	3.1	3.7	3.7	3.3	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
310.	*	3.7	3.7	3.7	2.8	2.6	2.9	3.3	3.8	4.1	3.5	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
320.	*	3.9	3.9	3.9	2.9	2.7	3.0	3.3	4.1	4.1	3.6	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
330.	*	4.1	4.1	4.1	3.0	2.7	3.0	3.4	4.4	4.3	4.1	2.2	2.3	2.3	2.1	2.1	2.0	2.0	2.2	2.2	2.2
340.	*	4.3	4.3	4.4	3.0	2.7	3.0	3.4	4.9	4.4	4.3	2.4	2.5	2.4	2.1	2.1	2.0	2.0	2.3	2.3	2.3
350.	*	4.4	4.4	4.4	2.9	2.4	2.7	3.2	4.9	4.5	4.6	3.3	3.4	3.4	2.3	2.1	2.0	2.2	3.2	3.2	3.2
360.	*	3.7	3.8	3.8	2.4	2.2	2.5	2.7	4.3	4.0	3.9	4.6	4.7	4.7	2.9	2.5	2.4	2.8	4.5	4.4	4.3
MAX	*	4.4	4.6	5.0	3.7	3.1	3.0	3.4	4.9	4.5	4.6	5.1	5.2	5.2	3.4	3.1	3.2	3.6	5.0	5.0	4.9
DEGR.	*	190	200	190	240	250	320	330	340	350	350	10	10	10	20	20	70	80	10	170	10

THE HIGHEST CONCENTRATION OF 5.20 PPM OCCURRED AT RECEPTOR REC12.

CAL3QHC MODEL RUNS (INPUT-OUTPUT)
2035 ENHANCED BUS CONDITIONS

INPUT FILE: A Ave and OR43 Enhanced Bus 2035

```
'LOPT',60.0,108,0.0,0.0,17,0.3048,1,0
'1',46.00,196.00,5.9
'2',46.00,121.00,5.9
'3',46.00,46.00,5.9
'4',46.00,0.00,5.9
'5',46.00,-46.00,5.9
'6',46.00,-121.00,5.9
'7',46.00,-196.00,5.9
'8',-34.00,-196.00,5.9
'9',-34.00,-121.00,5.9
'10',-34.00,-46.00,5.9
'11',-109.00,-46.00,5.9
'12',-184.00,-46.00,5.9
'13',-184.00,46.00,5.9
'14',-109.00,46.00,5.9
'15',-34.00,46.00,5.9
'16',-34.00,121.00,5.9
'17',-34.00,196.00,5.9
'A Ave and OR43 Enhanced Bus 2035',11,1,0,'C'
1
'EA','AG',-1000,-12,0,-12,1830,10.872,0,56
2
'EQR','AG',-24,-24,-324,-24,0,24,2
100,76.5,4,1505,58.27,1355,2,3
2
'EQL','AG',-24,6,-324,6,0,12,1
100,76.5,4,325,58.27,1770,2,3
1
'NA','AG',18,-1000,18,0,1615,10.376,0,56
1
'ND','AG',24,0,24,1000,1270,10.376,0,44
2
'NQTL','AG',24,-36,24,-336,0,24,2
100,19.5,4,1280,58.27,841,2,3
2
'NQL','AG',6,-36,6,-336,0,12,1
100,75.5,5,335,58.27,1610,2,3
1
'SA','AG',-12,1000,-12,0,2635,10.376,0,44
1
'SD','AG',-12,0,-12,-1000,3825,10.376,0,44
2
'SQTR','AG',-12,36,-12,336,0,24,2
100,42.0,4,2635,58.27,1735,2,3
1
'WD','AG',0,24,-1000,24,985,10.872,0,44
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: A Ave and OR43 Enhanced Bus 2035

```
                 CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

      JOB: LOPT                                                  RUN: A Ave and OR43 Enhanced Bus 2035

      DATE :  2/26/10
      TIME : 15:40: 4

         The MODE flag has been set to C for calculating CO averages.

       SITE & METEOROLOGICAL VARIABLES
       -------------------------------
       VS =   0.0 CM/S      VD =   0.0 CM/S       Z0 = 108. CM
        U =  1.0 M/S        CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

       LINK VARIABLES
       --------------
         LINK DESCRIPTION     *         LINK COORDINATES (FT)          *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                              *   X1        Y1        X2        Y2     *     (FT)  (DEG)           (G/MI)  (FT) (FT)       (VEH)
      ------------------------*----------------------------------------*-------------------------------------------------------------
       1. EA                  *  -1000.0     -12.0       0.0     -12.0 *    1000.    90. AG   1830.  10.9   0.0 56.0
       2. EQR                 *    -24.0     -24.0   -5523.0     -24.8 *    5499.   270. AG    238. 100.0   0.0 24.0 3.09 279.4
       3. EQL                 *    -24.0       6.0    -293.3       6.0 *     269.   270. AG    119. 100.0   0.0 12.0 1.02  13.7
       4. NA                  *     18.0   -1000.0      18.0       0.0 *    1000.   360. AG   1615.  10.4   0.0 56.0
       5. ND                  *     24.0       0.0      24.0    1000.0 *    1000.   360. AG   1270.  10.4   0.0 44.0
       6. NQTL                *     24.0     -36.0      24.0    -302.2 *     266.   180. AG     59. 100.0   0.0 24.0 1.02  13.5
       7. NQL                 *      6.0     -36.0       6.0    -697.5 *     662.   180. AG    117. 100.0   0.0 12.0 1.16  33.6
       8. SA                  *    -12.0    1000.0     -12.0       0.0 *    1000.   180. AG   2635.  10.4   0.0 44.0
       9. SD                  *    -12.0       0.0     -12.0   -1000.0 *    1000.   180. AG   3825.  10.4   0.0 44.0
      10. SQTR                *    -12.0      36.0     -12.0    4582.2 *    4546.   360. AG    131. 100.0   0.0 24.0 1.46 230.9
      11. WD                  *      0.0      24.0   -1000.0      24.0 *    1000.   270. AG    985.  10.9   0.0 44.0
```

JOB: LOPT RUN: A Ave and OR43 Enhanced Bus 2035

DATE : 2/26/10
TIME : 15:40: 4

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EQR	100	76	4.0	1505	1355	58.27	2	3
3. EQL	100	76	4.0	325	1770	58.27	2	3
6. NQTL	100	19	4.0	1280	841	58.27	2	3
7. NQL	100	75	5.0	335	1610	58.27	2	3
10. SQTR	100	42	4.0	2635	1735	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	196.0	5.9
2. 2	46.0	121.0	5.9
3. 3	46.0	46.0	5.9
4. 4	46.0	0.0	5.9
5. 5	46.0	-46.0	5.9
6. 6	46.0	-121.0	5.9
7. 7	46.0	-196.0	5.9
8. 8	-34.0	-196.0	5.9
9. 9	-34.0	-121.0	5.9
10. 10	-34.0	-46.0	5.9
11. 11	-109.0	-46.0	5.9
12. 12	-184.0	-46.0	5.9
13. 13	-184.0	46.0	5.9
14. 14	-109.0	46.0	5.9
15. 15	-34.0	46.0	5.9
16. 16	-34.0	121.0	5.9
17. 17	-34.0	196.0	5.9

JOB: LOPT RUN: A Ave and OR43 Enhanced Bus 2035

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17
10.	2.6	2.6	2.6	2.6	2.6	2.7	2.6	5.2	5.3	6.1	4.4	4.2	2.5	2.7	4.6	4.6	4.6
20.	2.1	2.1	2.1	2.2	2.2	2.1	2.1	5.1	4.8	5.5	4.5	4.2	2.6	2.9	4.5	4.5	4.5
30.	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.6	4.5	5.1	4.6	4.2	2.5	2.9	4.1	4.1	4.1
40.	2.0	2.0	2.0	2.0	2.0	2.1	2.1	4.3	4.3	4.5	4.4	4.3	2.5	2.9	3.9	3.9	3.9
50.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.2	4.2	4.1	4.6	4.4	2.5	2.8	3.7	3.7	3.7
60.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.3	4.4	2.6	2.8	3.6	3.6	3.6
70.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.9	4.1	4.3	2.6	2.7	3.5	3.5	3.5
80.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.8	3.8	4.1	2.7	2.9	3.7	3.6	3.6
90.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.1	4.1	4.2	3.4	3.2	2.9	2.9	3.7	3.6	3.6
100.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.9	3.1	3.1	3.4	3.2	3.7	3.6	3.6
110.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.9	3.9	3.9	3.0	2.7	3.7	3.5	3.4	3.5	3.5
120.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	3.0	2.7	4.1	3.9	3.8	3.6	3.6
130.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.2	4.2	4.2	3.0	2.7	4.2	4.1	3.9	3.7	3.7
140.	2.0	2.0	2.0	2.1	2.1	2.1	2.1	4.4	4.4	4.4	3.1	2.7	4.2	4.4	4.2	3.9	3.9
150.	2.1	2.1	2.1	2.1	2.1	2.1	2.1	4.7	4.7	4.7	3.1	2.8	4.3	4.5	4.6	4.2	4.2
160.	2.1	2.2	2.2	2.2	2.2	2.2	2.2	5.0	5.1	5.1	3.1	2.7	4.0	4.3	5.4	4.9	4.6
170.	2.7	2.7	2.7	2.8	2.8	2.7	2.6	5.2	5.2	5.3	2.9	2.4	3.6	4.1	6.0	5.5	5.0
180.	3.5	3.6	3.8	3.7	3.7	3.7	3.6	4.5	4.6	4.6	2.4	2.1	3.4	3.7	5.7	4.7	4.6
190.	4.2	4.3	4.3	4.5	4.4	4.4	4.3	3.2	3.3	3.3	2.1	2.0	3.2	3.3	4.5	3.9	3.6
200.	4.2	4.1	4.4	4.4	4.5	4.5	4.5	2.4	2.4	2.5	2.0	2.0	3.2	3.2	3.5	3.0	2.9
210.	4.1	4.0	4.0	4.0	4.1	4.1	4.1	2.2	2.2	2.2	2.0	2.0	3.5	3.5	3.6	2.9	2.7
220.	3.9	3.9	3.8	3.9	3.9	3.9	3.9	2.1	2.1	2.1	2.0	2.0	3.5	3.5	3.6	2.9	2.7
230.	3.9	4.1	4.0	3.6	3.8	3.8	3.8	2.1	2.1	2.1	2.0	2.0	3.5	3.5	3.6	3.0	2.7
240.	3.7	4.1	4.2	3.9	3.7	3.7	3.7	2.1	2.1	2.1	2.0	2.0	3.6	3.6	3.7	3.0	2.6
250.	3.7	4.1	4.7	4.5	3.9	3.7	3.7	2.0	2.0	2.2	2.2	2.2	3.8	3.9	3.9	2.9	2.5
260.	3.5	3.8	4.7	5.2	4.4	3.8	3.7	2.0	2.1	2.8	2.8	2.8	3.8	3.8	4.0	2.7	2.4
270.	3.3	3.6	4.5	5.5	5.3	4.2	4.0	2.2	2.4	3.9	3.8	3.8	3.3	3.4	3.4	2.4	2.1

280.	*	3.2	3.3	3.6	4.6	5.4	4.5	4.3	2.5	2.8	4.5	4.5	4.4	2.5	2.5	2.5	2.1	2.0
290.	*	3.2	3.2	3.3	3.8	5.1	4.7	4.3	2.6	2.9	4.5	4.4	4.3	2.1	2.1	2.1	2.0	2.0
300.	*	3.2	3.2	3.2	3.5	4.3	4.5	4.2	2.6	3.0	4.2	4.1	4.0	2.1	2.1	2.2	2.1	2.1
310.	*	3.3	3.3	3.3	3.4	4.0	4.6	4.4	2.6	2.9	4.0	3.9	3.9	2.0	2.0	2.1	2.1	2.1
320.	*	3.4	3.4	3.4	3.3	3.8	4.6	4.5	2.7	2.9	3.9	3.8	3.8	2.0	2.0	2.1	2.1	2.1
330.	*	3.6	3.6	3.6	3.6	3.7	4.6	4.6	2.8	3.0	3.9	3.7	3.7	2.0	2.0	2.1	2.1	2.1
340.	*	3.7	3.7	3.7	3.7	3.8	4.4	4.6	3.1	3.2	4.1	3.6	3.6	2.0	2.0	2.4	2.4	2.4
350.	*	3.8	3.8	3.8	3.8	3.8	4.2	4.4	3.9	4.1	4.8	3.9	3.7	2.0	2.2	3.1	3.1	3.1
360.	*	3.4	3.4	3.4	3.4	3.5	3.4	3.5	4.9	5.1	5.8	4.2	3.9	2.2	2.5	4.2	4.2	4.1
MAX	*	4.2	4.3	4.7	5.5	5.4	4.7	4.6	5.2	5.3	6.1	4.6	4.4	4.3	4.5	6.0	5.5	5.0
DEGR.	*	190	190	250	270	280	290	330	10	10	10	30	50	150	150	170	170	170

THE HIGHEST CONCENTRATION OF 6.10 PPM OCCURRED AT RECEPTOR REC10.

INPUT FILE: Foothills Ave and OR43 Enhanced Bus 2035

```
'LOPT',60.0,108,0.0,0.0,17,0.3048,1,0
'1',46.00,184.00,5.9
'2',46.00,109.00,5.9
'3',46.00,34.00,5.9
'4',121.00,34.00,5.9
'5',196.00,34.00,5.9
'6',196.00,-22.00,5.9
'7',121.00,-22.00,5.9
'8',46.00,-22.00,5.9
'9',46.00,-97.00,5.9
'10',46.00,-172.00,5.9
'11',-34.00,-172.00,5.9
'12',-34.00,-97.00,5.9
'13',-34.00,-22.00,5.9
'14',-34.00,6.00,5.9
'15',-34.00,34.00,5.9
'16',-34.00,109.00,5.9
'17',-34.00,184.00,5.9
'Foothills and OR43 Enhanced Bus 2035',11,1,0,'C'
1
'WA','AG',1000,12,0,12,410,10.872,0,44
2
'WQR','AG',36,18,336,18,0,12,1
100,79.3,4,225,58.27,1528,2,3
2
'WQL','AG',36,6,336,6,0,12,1
100,79.3,4,185,58.27,1770,2,3
1
'NA','AG',24,-1000,24,0,1595,10.376,0,44
1
'ND','AG',24,0,24,1000,1615,10.376,0,44
2
'NQTR','AG',24,-12,24,-312,0,24,2
100,40.0,4,1595,58.27,1731,2,3
1
'SA','AG',-6,1012,-6,12,3825,10.376,0,56
1
'SD','AG',-12,12,-12,-988,3530,10.376,0,44
2
'SQT','AG',-12,24,-12,324,0,24,2
100,16.7,4,3345,58.27,1770,2,3
2
'SQTL','AG',6,24,6,324,0,12,1
100,74.7,4,480,58.27,1770,2,3
1
'ED','AG',12,-6,512,-6,685,10.872,0,32
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: Foothills Ave and OR43 Enhanced Bus 2035

```
                   CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

      JOB: LOPT                                                  RUN: Foothills and OR43 Enhanced Bus 2035

      DATE :  2/22/10
      TIME : 12:30:24

         The MODE flag has been set to C for calculating CO averages.

       SITE & METEOROLOGICAL VARIABLES
       -------------------------------
       VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 108. CM
        U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

       LINK VARIABLES
       --------------
         LINK DESCRIPTION     *         LINK COORDINATES (FT)         *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                              *   X1        Y1        X2        Y2     *     (FT)  (DEG)          (G/MI)  (FT) (FT)       (VEH)
      ------------------------*---------------------------------------*--------------------------------------------------------
       1. WA                  *  1000.0      12.0       0.0      12.0 *    1000.   270. AG    410.  10.9   0.0 44.0
       2. WQR                 *    36.0      18.0     180.9      18.0 *     145.    90. AG    123. 100.0   0.0 12.0 0.98   7.4
       3. WQL                 *    36.0       6.0     115.9       6.0 *      80.    90. AG    123. 100.0   0.0 12.0 0.70   4.1
       4. NA                  *    24.0   -1000.0      24.0       0.0 *    1000.   360. AG   1595.  10.4   0.0 44.0
       5. ND                  *    24.0       0.0      24.0    1000.0 *    1000.   360. AG   1615.  10.4   0.0 44.0
       6. NQTR                *    24.0     -12.0      24.0    -186.3 *     174.   180. AG    125. 100.0   0.0 24.0 0.85   8.9
       7. SA                  *    -6.0    1012.0      -6.0      12.0 *    1000.   180. AG   3825.  10.4   0.0 56.0
       8. SD                  *   -12.0      12.0     -12.0    -988.0 *    1000.   180. AG   3530.  10.4   0.0 44.0
       9. SQT                 *   -12.0      24.0     -12.0    3220.8 *    3197.   360. AG     50. 100.0   0.0 24.0 1.21 162.4
      10. SQTL                *     6.0      24.0       6.0    1549.5 *    1525.   360. AG    116. 100.0   0.0 12.0 1.36  77.5
      11. ED                  *    12.0      -6.0     512.0      -6.0 *     500.    90. AG    685.  10.9   0.0 32.0
```

JOB: LOPT RUN: Foothills and OR43 Enhanced Bus 2035

DATE : 2/22/10
TIME : 12:30:24

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. WQR	100	79	4.0	225	1528	58.27	2	3
3. WQL	100	79	4.0	185	1770	58.27	2	3
6. NQTR	100	40	4.0	1595	1731	58.27	2	3
9. SQT	100	16	4.0	3345	1770	58.27	2	3
10. SQTL	100	74	4.0	480	1770	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	184.0	5.9
2. 2	46.0	109.0	5.9
3. 3	46.0	34.0	5.9
4. 4	121.0	34.0	5.9
5. 5	196.0	34.0	5.9
6. 6	196.0	-22.0	5.9
7. 7	121.0	-22.0	5.9
8. 8	46.0	-22.0	5.9
9. 9	46.0	-97.0	5.9
10. 10	46.0	-172.0	5.9
11. 11	-34.0	-172.0	5.9
12. 12	-34.0	-97.0	5.9
13. 13	-34.0	-22.0	5.9
14. 14	-34.0	6.0	5.9
15. 15	-34.0	34.0	5.9
16. 16	-34.0	109.0	5.9
17. 17	-34.0	184.0	5.9

JOB: LOPT RUN: Foothills and OR43 Enhanced Bus 2035

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND ANGLE (DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17
	CONCENTRATION (PPM)																
10.	2.9	2.9	2.9	2.0	2.0	2.3	2.5	3.6	3.2	3.2	5.3	5.1	5.3	5.2	5.2	5.2	5.2
20.	2.2	2.3	2.3	2.0	2.0	2.3	2.5	2.9	2.7	2.3	4.8	4.8	5.1	5.1	5.0	5.0	4.9
30.	2.1	2.1	2.1	2.0	2.0	2.4	2.6	2.8	2.5	2.3	4.6	4.6	4.6	4.5	4.5	4.5	4.5
40.	2.1	2.1	2.1	2.0	2.0	2.4	2.6	2.9	2.4	2.2	4.3	4.6	4.3	4.3	4.3	4.3	4.3
50.	2.1	2.1	2.1	2.0	2.0	2.4	2.6	2.9	2.3	2.1	3.9	4.2	4.1	4.1	4.2	4.2	4.2
60.	2.0	2.0	2.0	2.0	2.0	2.6	2.7	3.0	2.2	2.1	3.8	4.0	4.1	3.8	4.1	4.0	4.0
70.	2.0	2.0	2.1	2.1	2.1	2.6	2.6	3.0	2.2	2.0	3.7	3.8	4.4	4.1	3.8	3.8	3.8
80.	2.0	2.0	2.2	2.1	2.1	2.7	2.7	2.9	2.2	2.0	3.7	3.9	4.4	4.3	4.0	3.8	3.8
90.	2.0	2.0	2.5	2.4	2.3	2.5	2.5	2.5	2.0	2.0	3.8	3.8	4.3	4.4	4.4	3.9	3.9
100.	2.0	2.1	3.0	2.7	2.5	2.3	2.3	2.3	2.0	2.0	3.6	3.7	3.9	4.3	4.4	4.0	3.8
110.	2.0	2.2	3.0	2.7	2.4	2.1	2.1	2.1	2.0	2.0	3.5	3.6	3.6	4.1	4.3	4.0	3.8
120.	2.2	2.3	3.0	2.8	2.4	2.0	2.0	2.0	2.0	2.0	3.5	3.7	3.7	3.9	4.3	4.2	4.1
130.	2.1	2.3	3.1	2.8	2.4	2.0	2.0	2.0	2.0	2.0	3.7	3.9	4.0	3.9	3.9	4.4	4.4
140.	2.2	2.4	3.1	2.7	2.4	2.0	2.0	2.1	2.1	2.1	3.9	4.1	4.1	4.1	4.1	4.8	4.5
150.	2.3	2.5	2.8	2.6	2.3	2.0	2.0	2.1	2.1	2.1	4.1	4.2	4.3	4.3	4.3	4.6	4.8
160.	2.3	2.6	3.0	2.6	2.3	2.0	2.0	2.2	2.2	2.2	4.4	4.4	4.5	4.7	4.7	4.7	5.0
170.	3.1	3.2	3.6	2.6	2.3	2.0	2.0	2.8	2.7	2.7	4.7	4.7	4.8	4.8	4.8	4.9	5.1
180.	3.7	4.1	4.6	3.1	2.5	2.1	2.3	3.7	3.6	3.4	4.1	4.2	4.3	4.3	4.2	4.3	4.4
190.	4.5	4.5	5.1	3.4	2.6	2.3	2.7	4.3	4.2	3.9	3.1	3.1	3.2	3.2	3.1	3.1	3.1
200.	4.4	4.3	4.9	3.7	2.8	2.5	2.8	4.4	4.3	3.9	2.4	2.4	2.4	2.4	2.3	2.3	2.4
210.	4.3	4.1	4.4	3.7	3.0	2.6	2.9	4.2	4.1	3.8	2.2	2.2	2.2	2.2	2.1	2.2	2.2
220.	4.0	4.1	4.0	4.0	3.3	2.6	2.9	4.0	4.0	3.7	2.1	2.1	2.1	2.1	2.0	2.1	2.1
230.	3.9	4.0	3.7	3.9	3.2	2.6	2.9	3.8	3.8	3.6	2.1	2.1	2.1	2.1	2.0	2.1	2.1
240.	3.9	3.7	3.5	3.8	3.4	2.6	2.8	3.8	3.7	3.5	2.1	2.1	2.1	2.1	2.0	2.1	2.1
250.	3.7	3.7	3.6	3.6	3.5	2.7	2.8	3.7	3.7	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
260.	3.7	3.7	3.6	3.5	3.3	2.7	2.8	3.6	3.6	3.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
270.	3.8	3.8	3.9	3.1	3.1	3.0	3.1	3.7	3.7	3.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0

280.	*	3.7	3.7	3.7	3.0	2.8	3.2	3.4	3.8	3.6	3.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
290.	*	3.7	3.7	3.7	2.8	2.6	3.4	3.5	3.9	3.6	3.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0
300.	*	3.9	3.9	3.9	2.8	2.7	3.6	3.7	3.8	3.7	3.7	2.1	2.1	2.1	2.0	2.1	2.1	2.1
310.	*	3.9	3.9	3.9	3.0	2.7	3.3	3.7	4.1	3.9	3.8	2.1	2.1	2.1	2.0	2.1	2.1	2.1
320.	*	4.1	4.1	4.1	3.1	2.7	3.3	3.9	4.3	4.0	3.9	2.1	2.1	2.1	2.1	2.1	2.1	2.1
330.	*	4.3	4.3	4.3	3.1	2.7	3.2	3.9	4.5	4.2	4.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2
340.	*	4.6	4.6	4.6	3.1	2.7	3.1	3.8	5.0	4.8	4.5	2.4	2.4	2.4	2.3	2.4	2.4	2.4
350.	*	4.6	4.6	4.7	3.0	2.4	2.8	3.6	5.2	4.8	4.8	3.4	3.4	3.4	3.3	3.3	3.3	3.3
360.	*	3.9	4.0	4.0	2.4	2.1	2.5	3.1	4.8	4.5	4.2	4.6	4.7	4.7	4.5	4.6	4.6	4.5
MAX	*	4.6	4.6	5.1	4.0	3.5	3.6	3.9	5.2	4.8	4.8	5.3	5.1	5.3	5.2	5.2	5.2	5.2
DEGR.	*	350	350	190	220	250	300	320	350	350	350	10	10	10	10	10	10	10

THE HIGHEST CONCENTRATION OF 5.30 PPM OCCURRED AT RECEPTOR REC11.

INPUT FILE: North Shore and OR43 Enhanced Bus 2035

```
'LOPT',60.0,108,0.0,0.0,20,0.3048,1,0
'1',46.00,184.00,5.9
'2',46.00,109.00,5.9
'3',46.00,34.00,5.9
'4',121.00,34.00,5.9
'5',196.00,34.00,5.9
'6',196.00,-22.00,5.9
'7',121.00,-22.00,5.9
'8',46.00,-22.00,5.9
'9',46.00,-97.00,5.9
'10',46.00,-172.00,5.9
'11',-34.00,-225.03,5.9
'12',-34.00,-150.03,5.9
'13',-34.00,-75.03,5.9
'14',-79.96,-128.06,5.9
'15',-132.99,-181.09,5.9
'16',-132.99,-92.06,5.9
'17',-79.96,-39.03,5.9
'18',-34.00,14.00,5.9
'19',-34.00,89.00,5.9
'20',-34.00,164.00,5.9
'NorthShore and OR43 Enhanced Bus 2035',15,1,0,'C'
1
'EA','AG',-707.11,-707.11,0.00,-6.00,145,10.872,0,38
1
'ED','AG',0.00,-6.00,500.00,-6.00,200,10.872,0,32
2
'EQT','AG',-24.00,-6.00,-731.11,-713.11,0,12,1
100.00,76.00,4.00,10.00,58.270,334,2,3
1
'WA','AG',500.00,12.00,0.00,12.00,565,10.872,0,44
1
'WD','AG',0.00,12.00,-707.11,-695.11,385,10.872,0,38
2
'WQTL','AG',36.00,6.00,536.00,6.00,0,12,1
100.00,76.00,4.00,20.00,58.270,1220,2,3
2
'WQR','AG',36.00,18.00,336.00,18.00,0,12,1
100.00,76.00,4.00,165.00,58.270,1520,2,3
1
'NA','AG',18.00,-1000.00,18.00,0.00,1590,10.376,0,56
1
'ND','AG',24.00,0.00,24.00,1000.00,1580,10.376,0,44
2
'NQL','AG',6.00,-12.00,6.00,-1012.00,0,12,1
100.00,82.30,4.00,145.00,58.270,1770,2,3
2
'NQTR','AG',24.00,-12.00,24.00,-1012.00,0,24,2
100.00,37.60,4.00,1315.00,58.270,1737,2,3
1
'SA','AG',-6.00,1000.00,-6.00,0.00,3450,10.376,0,56
1
'SD','AG',-12.00,0.00,-12.00,-1000.00,3585,10.376,0,44
2
'SQL','AG',6.00,24.00,6.00,1024.00,0,12,1
100.00,80.40,4.00,60.00,58.270,1770,2,3
2
'SQTR','AG',-12.00,24.00,-12.00,1024.00,0,24,2
100.00,35.70,4.00,3170.00,58.270,1748,2,3
1.0,0.0,4,1000.0,2,'Y',10.0,1,36
```

OUTPUT FILE: North Shore and OR43 Enhanced Bus 2035

```
                  CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                        PAGE  1

      JOB: LOPT                                           RUN: NorthShore and OR43 Enhanced Bus 2035

      DATE :  2/21/10
      TIME : 10:23:14

         The MODE flag has been set to C for calculating CO averages.

       SITE & METEOROLOGICAL VARIABLES
       -------------------------------
       VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 108. CM
        U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  2.0 PPM

       LINK VARIABLES
       --------------
         LINK DESCRIPTION     *         LINK COORDINATES (FT)         *    LENGTH  BRG TYPE   VPH    EF      H   W    V/C QUEUE
                              *   X1        Y1        X2        Y2     *     (FT)  (DEG)           (G/MI)  (FT) (FT)       (VEH)
      ------------------------*--------------------------------------*-------------------------------------------------------
       1. EA                  *   -707.1    -707.1       0.0      -6.0 *     996.    45. AG    145.  10.9   0.0 38.0
       2. ED                  *      0.0      -6.0     500.0      -6.0 *     500.    90. AG    200.  10.9   0.0 32.0
       3. EQT                 *    -24.0      -6.0     -26.9      -8.9 *       4.   225. AG    119. 100.0   0.0 12.0 0.17   0.2
       4. WA                  *    500.0      12.0       0.0      12.0 *     500.   270. AG    565.  10.9   0.0 44.0
       5. WD                  *      0.0      12.0    -707.1    -695.1 *    1000.   225. AG    385.  10.9   0.0 38.0
       6. WQTL                *     36.0       6.0      44.3       6.0 *       8.    90. AG    119. 100.0   0.0 12.0 0.09   0.4
       7. WQR                 *     36.0      18.0     104.6      18.0 *      69.    90. AG    119. 100.0   0.0 12.0 0.60   3.5
       8. NA                  *     18.0   -1000.0      18.0       0.0 *    1000.   360. AG   1590.  10.4   0.0 56.0
       9. ND                  *     24.0       0.0      24.0    1000.0 *    1000.   360. AG   1580.  10.4   0.0 44.0
      10. NQL                 *      6.0     -12.0       6.0     -77.0 *      65.   180. AG    128. 100.0   0.0 12.0 0.68   3.3
      11. NQTR                *     24.0     -12.0      24.0    -144.9 *     133.   180. AG    116. 100.0   0.0 24.0 0.66   6.8
      12. SA                  *     -6.0    1000.0      -6.0       0.0 *    1000.   180. AG   3450.  10.4   0.0 56.0
      13. SD                  *    -12.0       0.0     -12.0   -1000.0 *    1000.   180. AG   3585.  10.4   0.0 44.0
      14. SQL                 *      6.0      24.0       6.0      50.2 *      26.   360. AG    125. 100.0   0.0 12.0 0.24   1.3
      15. SQTR                *    -12.0      24.0     -12.0    5962.2 *    5938.   360. AG    109. 100.0   0.0 24.0 1.54 301.7
```

JOB: LOPT RUN: NorthShore and OR43 Enhanced Bus 2035

DATE : 2/21/10
TIME : 10:23:14

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
3. EQT	100	76	4.0	10	334	58.27	2	3
6. WQTL	100	76	4.0	20	1220	58.27	2	3
7. WQR	100	76	4.0	165	1520	58.27	2	3
10. NQL	100	82	4.0	145	1770	58.27	2	3
11. NQTR	100	37	4.0	1315	1737	58.27	2	3
14. SQL	100	80	4.0	60	1770	58.27	2	3
15. SQTR	100	35	4.0	3170	1748	58.27	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. 1	46.0	184.0	5.9
2. 2	46.0	109.0	5.9
3. 3	46.0	34.0	5.9
4. 4	121.0	34.0	5.9
5. 5	196.0	34.0	5.9
6. 6	196.0	-22.0	5.9
7. 7	121.0	-22.0	5.9
8. 8	46.0	-22.0	5.9
9. 9	46.0	-97.0	5.9
10. 10	46.0	-172.0	5.9
11. 11	-34.0	-225.0	5.9
12. 12	-34.0	-150.0	5.9
13. 13	-34.0	-75.0	5.9
14. 14	-80.0	-128.1	5.9
15. 15	-133.0	-181.1	5.9
16. 16	-133.0	-92.1	5.9
17. 17	-80.0	-39.0	5.9
18. 18	-34.0	14.0	5.9
19. 19	-34.0	89.0	5.9
20. 20	-34.0	164.0	5.9

PAGE 3

JOB: LOPT RUN: NorthShore and OR43 Enhanced Bus 2035

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 10.-360.

WIND * CONCENTRATION
ANGLE * (PPM)

(DEGR)	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
10.	2.8	2.8	2.9	2.0	2.0	2.3	2.3	3.4	3.0	3.0	5.1	5.2	5.3	3.4	3.1	2.9	3.3	5.0	5.0	4.9
20.	2.2	2.2	2.2	2.0	2.0	2.3	2.3	2.6	2.4	2.2	4.7	4.9	5.1	3.5	3.1	3.0	3.4	4.7	4.7	4.7
30.	2.1	2.1	2.1	2.0	2.0	2.3	2.3	2.5	2.2	2.2	4.4	4.7	4.8	3.4	3.2	2.8	3.3	4.4	4.4	4.4
40.	2.1	2.1	2.1	2.0	2.0	2.3	2.3	2.5	2.2	2.2	4.1	4.2	4.6	3.4	2.9	2.9	3.3	4.2	4.2	4.2
50.	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.4	2.1	2.1	3.9	4.1	4.4	3.3	3.0	2.9	3.1	4.0	3.8	3.8
60.	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.4	2.1	2.1	3.6	3.9	4.1	3.3	2.9	3.0	3.4	3.8	3.7	3.7
70.	2.0	2.0	2.1	2.1	2.1	2.3	2.3	2.3	2.1	2.0	3.6	3.8	4.0	3.2	2.7	3.3	3.4	3.8	3.6	3.6
80.	2.0	2.0	2.2	2.2	2.1	2.3	2.3	2.3	2.0	2.0	3.6	3.7	4.1	3.1	2.7	3.3	3.6	4.0	3.7	3.7
90.	2.0	2.0	2.4	2.3	2.3	2.2	2.2	2.2	2.0	2.0	3.7	3.8	4.0	3.1	2.7	3.0	3.4	4.1	3.8	3.8
100.	2.0	2.1	2.7	2.4	2.3	2.1	2.2	2.2	2.0	2.0	3.6	3.6	3.9	3.1	2.7	2.9	3.3	3.8	3.8	3.7
110.	2.0	2.1	2.7	2.4	2.4	2.0	2.0	2.0	2.0	2.0	3.6	3.6	3.8	3.0	2.6	2.7	3.3	3.8	3.7	3.7
120.	2.1	2.1	2.7	2.4	2.4	2.0	2.0	2.0	2.0	2.0	3.6	3.6	3.8	3.0	2.7	2.8	3.2	4.0	3.9	3.8
130.	2.1	2.1	2.8	2.4	2.4	2.0	2.0	2.0	2.0	2.0	3.8	3.8	4.0	3.0	2.7	2.8	3.2	4.1	4.1	3.9
140.	2.2	2.2	2.6	2.3	2.3	2.0	2.0	2.1	2.1	2.1	4.0	4.0	4.1	3.1	2.7	2.8	3.3	4.4	4.5	4.3
150.	2.2	2.3	2.6	2.3	2.3	2.0	2.0	2.1	2.1	2.1	4.2	4.2	4.3	3.1	2.8	2.9	3.2	4.7	4.6	4.5
160.	2.2	2.4	2.8	2.3	2.3	2.0	2.0	2.2	2.2	2.2	4.5	4.5	4.6	3.2	2.8	2.9	3.3	4.9	4.8	4.7
170.	2.9	3.0	3.2	2.2	2.2	2.0	2.0	2.7	2.6	2.6	4.8	4.8	4.8	3.1	2.5	2.7	3.2	4.9	5.0	4.9
180.	3.8	3.9	4.2	2.5	2.3	2.1	2.3	3.6	3.4	3.4	4.2	4.3	4.3	2.6	2.3	2.5	2.8	4.3	4.3	4.3
190.	4.4	4.4	5.0	2.9	2.5	2.3	2.7	4.3	3.9	3.8	3.1	3.2	3.2	2.1	2.0	2.3	2.4	3.2	3.2	3.3
200.	4.3	4.7	4.8	3.1	2.9	2.5	2.8	4.2	4.0	3.8	2.4	2.4	2.4	2.0	2.0	2.3	2.3	2.6	2.5	2.5
210.	4.1	4.2	4.7	3.3	2.9	2.6	2.8	4.1	3.9	3.6	2.2	2.2	2.2	2.0	2.0	2.4	2.4	2.4	2.2	2.3
220.	3.9	4.0	4.4	3.3	2.9	2.6	2.9	4.0	3.8	3.5	2.1	2.1	2.2	2.1	2.1	2.3	2.4	2.2	2.2	2.1
230.	3.7	3.9	4.3	3.5	3.0	2.5	2.9	4.1	3.8	3.4	2.1	2.1	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1
240.	3.6	3.6	3.8	3.8	3.1	2.6	2.8	4.1	3.7	3.3	2.1	2.2	2.4	2.2	2.2	2.1	2.1	2.0	2.1	2.1
250.	3.5	3.5	3.8	3.4	3.1	2.7	2.9	3.9	3.7	3.3	2.1	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0
260.	3.5	3.5	3.7	3.4	3.0	2.7	2.9	3.8	3.6	3.2	2.1	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0
270.	3.6	3.6	3.7	3.1	2.8	2.7	3.1	3.8	3.6	3.2	2.0	2.1	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0

280.	*	3.5	3.5	3.7	3.0	2.7	2.9	2.9	3.9	3.6	3.2	2.0	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0
290.	*	3.5	3.5	3.6	2.7	2.7	2.9	3.2	3.9	3.8	3.3	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0
300.	*	3.6	3.6	3.7	2.8	2.6	3.0	3.2	3.9	3.8	3.3	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
310.	*	3.7	3.7	3.7	2.9	2.7	3.0	3.3	3.8	4.2	3.5	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
320.	*	3.9	3.9	3.9	2.9	2.7	3.0	3.4	4.1	4.1	3.6	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.1
330.	*	4.1	4.1	4.1	3.0	2.7	3.0	3.4	4.4	4.4	4.1	2.2	2.3	2.3	2.1	2.1	2.0	2.0	2.2	2.2	2.2
340.	*	4.4	4.4	4.4	3.0	2.7	3.0	3.4	4.9	4.4	4.3	2.4	2.5	2.4	2.1	2.1	2.0	2.0	2.4	2.4	2.3
350.	*	4.4	4.4	4.4	2.9	2.4	2.7	3.2	4.9	4.5	4.6	3.3	3.4	3.5	2.3	2.2	2.0	2.2	3.2	3.2	3.2
360.	*	3.8	3.8	3.8	2.4	2.2	2.5	2.7	4.3	4.0	3.9	4.6	4.7	4.8	3.0	2.6	2.4	2.8	4.5	4.4	4.3
------	*																				
MAX	*	4.4	4.7	5.0	3.8	3.1	3.0	3.4	4.9	4.5	4.6	5.1	5.2	5.3	3.5	3.2	3.3	3.6	5.0	5.0	4.9
DEGR.	*	190	200	190	240	250	300	320	340	350	350	10	10	10	20	30	70	80	10	10	10

THE HIGHEST CONCENTRATION OF 5.30 PPM OCCURRED AT RECEPTOR REC13.