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Eastside Transit Alternatives Analysis
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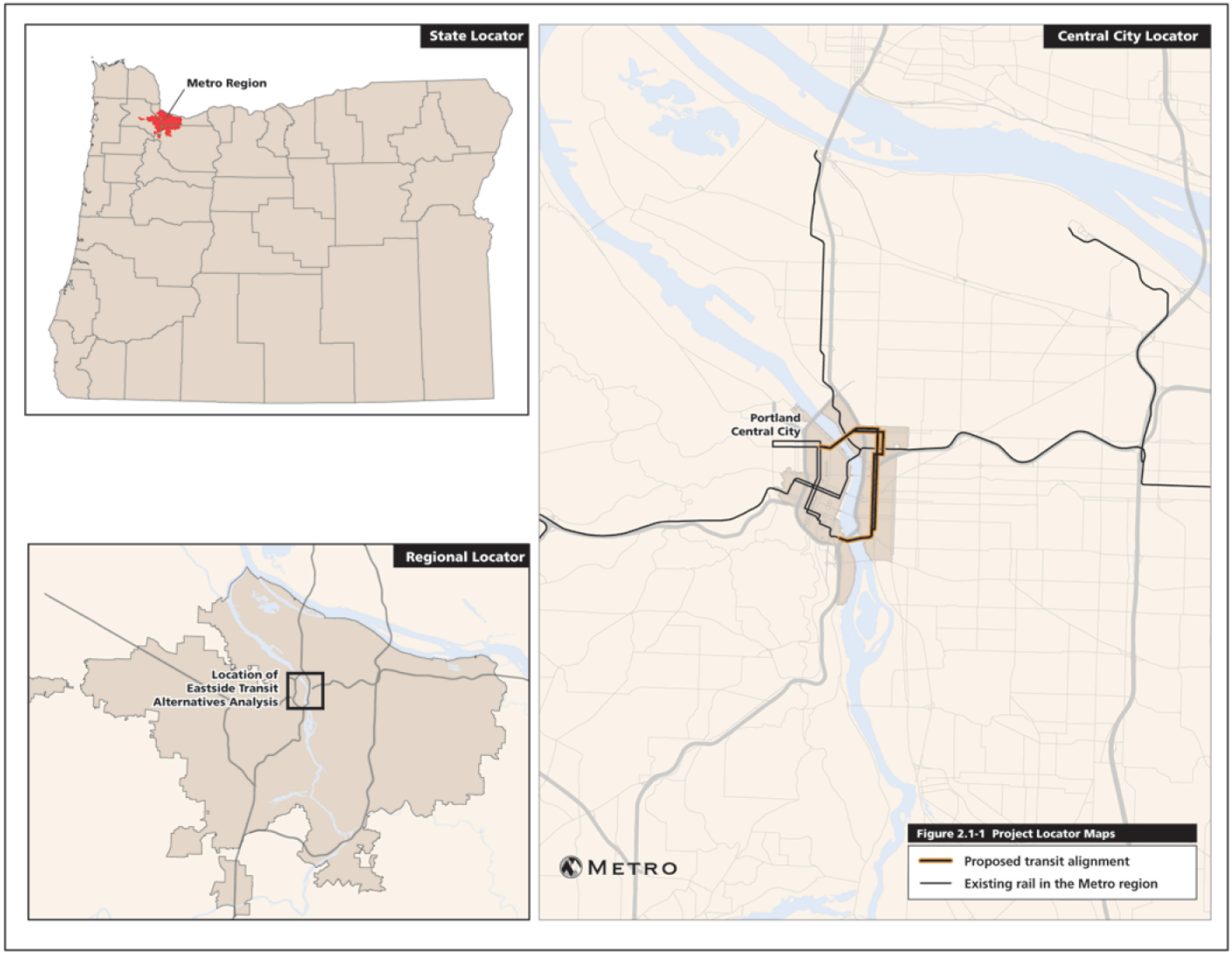
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Proposed transit alignment
Existing rail in the Metro region

Executive Summary

Overview

This Evaluation Report contains the analysis of transit alternatives for a loop circulator in Portland's Central City. This Executive Summary section presents the results of the evaluation in an abbreviated summary form. The Summary section that follows provides more detail regarding the definition of the alternatives, goals and objectives, design considerations and evaluation measures. The individual report chapters that follow provide full detail and documentation regarding this alternatives analysis. This analysis was conducted in a manner intended to be consistent with the Federal Transit Administration's (FTA) newly created Small Starts program, current guidance for Alternatives Analysis and the National Environmental Policy Act.

Definition of Alternatives

All alternatives were based on the Regional Transportation Plan's 2025 Financially Constrained network and include:

The **No-Build Alternative** fulfills the role of a **Small Starts Baseline** as it includes incremental service increases in the corridor and serves the same downtown circulation travel market as the Streetcar Alternative.

The **Streetcar Alternative** is defined as the **Full Loop** alignment, and has three **Minimum Operable Segments (MOS); Oregon Street, Morrison Street,** and at the Oregon Museum of Science and Industry **,** referred to as **OMSI.** These are shown in Figure ES-1

The **Streetcar Alternative** was analyzed using the MLK/Grand couplet alignment through the Central Eastside. The **Two-way Grand Design Option** could also be used for the Central Eastside segment of the loop, and is presented as an alternative to the MLK/Grand couplet alignment. The alternatives are presented schematically in Figures ES-2 through ES-5, showing the operating plan for each alternative. For the MOS alternatives, a connecting bus completes the full loop.

The results of key evaluation measures is presented below. A more detailed accounting of all evaluation measures is presented in the Summary, and in Chapter 3 of this report.

Transit Ridership Results

Each alternative results in an increase in Streetcar and total transit ridership compared to the 2025 No-Build Alternative, with the Full Loop resulting in the largest increase. Figure ES-5 shows this breakdown.

All of the build alternatives have over 50 percent of their ridership and at least some portion of the trip occurring in the Central Eastside. The OMSI MOS and Full Loop alternatives would exhibit the highest percentage of streetcar ridership on the eastside at approximately 75 percent.

Compared to the No-Build alternative, the Full Loop and OMSI MOS alternatives would improve transit connectivity through the Central Eastside by providing a limited stop, one-seat ride through the eastside. Streetcar alternatives would provide greater transit capacity and would result in more riders per mile of operation.

Figure ES-1
Streetcar Alternative and the Minimum Operable Segments (MOS)

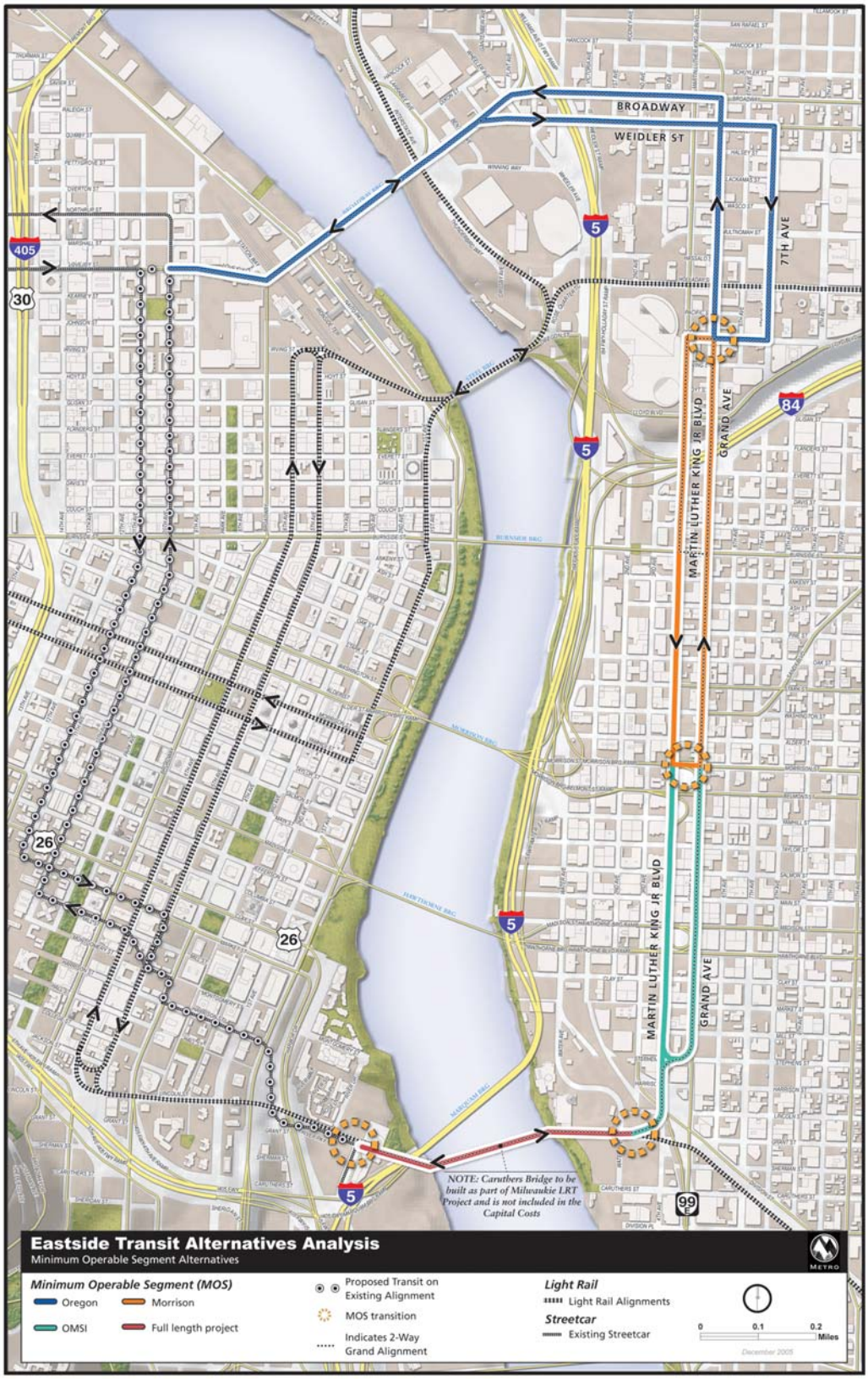


Figure ES-2
Streetcar Alternative Service Concept

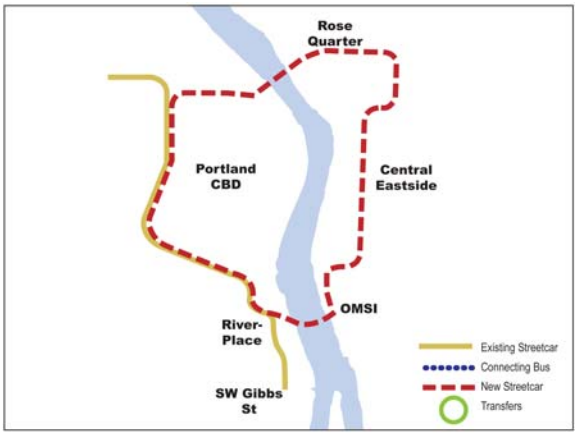


Figure ES-3
OMSI MOS Service Concept

Figure ES-4
Morrison MOS Service Concept

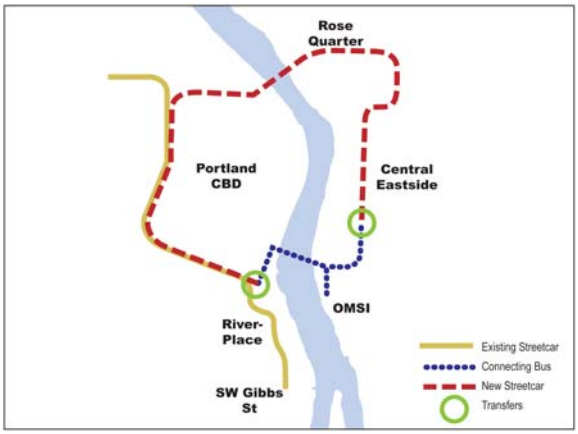
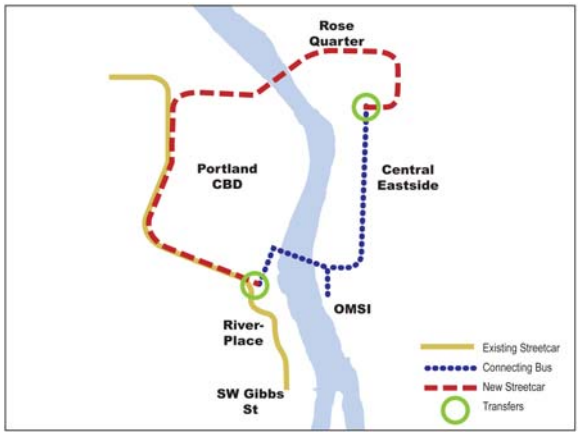
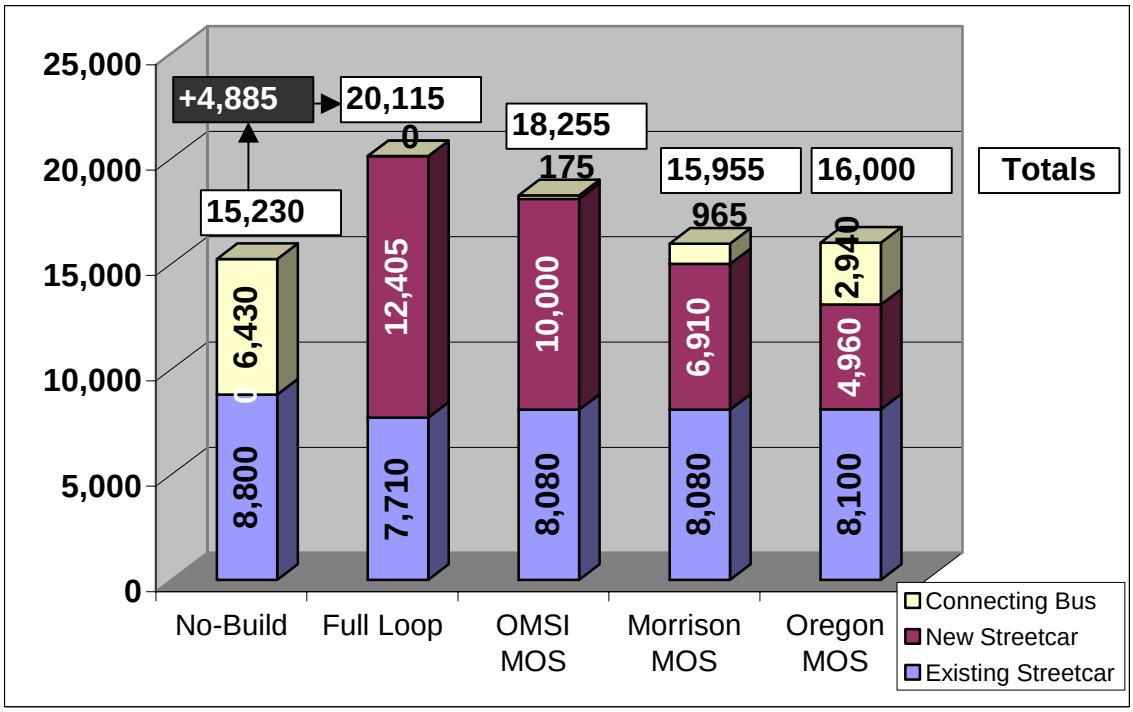


Figure ES-5
Oregon MOS Service Concept



The introduction of Streetcar service on the eastside would further complement the eastside grid system by dispersing trips across an array of destinations. The Full Loop alternative would have the best overall improvement in total transit travel times to/from and within the corridor compared to the No-Build alternative.

Figure ES-6
Streetcar and Bus Ridership Average Weekday – Year 2025



The full loop Streetcar Alternative, and to a lesser degree the MOSs, meet the project's goal of creating a Central City circulator transit project that distributes trips throughout the districts it serves.

All of the build alternatives provide improved connections between key visitor destinations in the Central City. The presence of streetcar stops, rails and catenary would make streetcar relatively more easily identifiable than standard fixed route bus service, which lacks permanent guideway improvements.

All of the build alternatives would result in reduced parking demand compared to the No-Build, because more internal transit trips within the corridor are accommodated on transit.

Land Use and Development Policy Results

All of the alternatives would be consistent with state, local and regional land use plans and policies in effect in the Central City. The Full Loop would go the farthest toward implementing specific policies regarding a Central City transit circulator and fostering transit supportive development.

The region's compact urban form, land use mix, short average trip lengths and the presence of viable alternatives to the single occupant vehicle are directly attributable to the region's land use

and transportation plans and policies. These have resulted in transit trips, including bus, streetcar and light rail, that have grown substantially more than vehicle miles traveled, a trend that is unusual compared to the rest of the country. Residents of the Central City, with it's high level of transit service and density and mix of uses, make fewer auto trips, own fewer cars, and use transit more than their counterparts in other parts of the region. Figure ES-6 summarizes this trend historically.

Economic Development Policy Results

The existing Portland Streetcar line demonstrates the impact of transit on development. This can be illustrated by the response of the private sector development community to announced plans to build a streetcar line in downtown Portland. In 1997, the City of Portland gave final approval to Portland Streetcar Inc., to proceed with construction and operation of streetcar service in downtown Portland. July 2001, streetcar operation commenced. Based on the experience of the Portland Streetcar, the private sector is willing to develop at a higher density along a streetcar line as evidenced by signed developer agreements to build to higher floor area ratios contingent on the presence of the streetcar. After 1997, those areas within one block of the streetcar experienced much greater development than areas two, three or more blocks from the alignment. Specifically, since the commitment to streetcar service was made, lands within one block of the streetcar were built to within 90 percent of allowed density (FAR), while lands within two blocks only built to a little over 70 percent and areas three blocks distant built to a little over 60 percent of allowed density.

Based on the experience of the Portland Streetcar and application of that experience to the Eastside project through analysis of existing zoning, floor area ratios, redevelopment potential and other factors, substantially more housing and mixed use development could occur on the eastside with the Full Loop Streetcar or MOSs than with the No-Build, commensurate with the length of the project. The percent of maximum floor area ratio (FAR) was used to assess what might occur on the Eastside. Given the existing zoning, an additional 3,432 housing units could be expected between 2005 and 2025 if a the OMSI MOS or Full Loop projects were built. The shorter MOSs would result in fewer additional housing units.

The Eastside has numerous proposed economic development projects that would benefit from transit and especially a streetcar because of the streetcars' demonstrated higher attraction of riders and greater passenger capacity. This larger public investment in a streetcar would likely result in greater private investments in the Eastside than would occur with the provision of bus service.

Traffic Impact Results

The proposed Eastside Streetcar route would operate in mixed traffic on existing streets within the corridor. During the PM Peak periods traffic congestion is relatively heavy along this corridor, which would in turn impact streetcar operations. The Streetcar operations are dependent on the general traffic flow of the roadway system the streetcar is operating in, and key locations where the streetcar requires signalization changes or other exclusive provisions to integrate with the general traffic flow.

Future 2009 (opening year) and 2025 PM peak hour traffic analyses were conducted at 51 intersections along the SE MLK Jr. Boulevard/SE Grand Avenue couplet and the NE Broadway/NE Weidler couplet. For the year 2009 PM peak hour traffic operations, four intersections along the proposed route are anticipated to operate at an intersection level of service (LOS) E to F, and/or a volume to capacity Ratio (V/C) greater than 1.00. For the year 2025 PM

peak hour traffic operations, 17 intersections along the proposed route are anticipated to operate at a LOS E to F, and/or a V/C greater than 1.00.

Future PM peak hour traffic conditions may have some impact on streetcar operations due to congestion along this corridor. Six of the intersections would be impacted by Streetcar operations, where general traffic is stopped for the streetcar to turn into mixed traffic through either a new traffic signal or the addition of a new phase to the existing traffic signal. These changes would not significantly alter the existing signal timing and progression of traffic along these roadways.

As part of the proposed Streetcar alignment, several signal and roadway changes are proposed to successfully integrate Streetcar into mixed traffic. Changes would include special signal phases, queue jumps, roadway widening, and striping and lane changes. These changes were incorporated into the traffic analysis for Streetcar to OMSI and are summarized in this section. Any of the MOS Alternatives would have the same improvements up to the respective terminus locations.

Design Considerations

Further investigation into potential improvements to move the streetcar through the corridor faster and more reliably as well as ways to improve the pedestrian environment should be conducted during the next phase of this study. Based on community support, engineering judgment, and the 2009 and 2025 traffic analysis, several design issues have been identified and will be evaluated further during the next phase of the project These design issues focus on streetcar operations and the pedestrian environment. Current plans in the corridor will help with the pedestrian environment and additional considerations could be made to improve on the pedestrian access and safety along the Broadway/Weidler and MLK Jr./Grand couplets.

Two Way Grand Design Option

The Two-Way Grand Design Option was developed as an alternative to the MLK Boulevard/Grand Avenue couplet to address transfer connection to radial bus lines and to improve the pedestrian environment. The Two-Way Grand Avenue Design Option has been designed so that it could be applied to any of the MOSs with the exception of the Oregon MOS which doesn't extend to the Central Eastside, and does not preclude either two-way Grand Avenue design option or the MLK/Grand couplet alignment extension to the Central Eastside.

With the Two-way Grand Avenue alignment, Grand Avenue would be converted to a two-way street. Streetcar would operate in both directions in the travel lanes with traffic. The proposed streetcar alignment would remain the same north of E Burnside Street. Southbound streetcar would turn northbound on E Burnside and southbound on SE Grand Avenue. Both northbound and southbound streetcar would operate on SE Grand Avenue. SE 7th Avenue would provide for the northbound general traffic function to replace SE Grand Avenue.

The Two-Way Grand Design Option would require extensive roadway improvements to SE 7th Avenue to carry northbound auto trips diverted from SE Grand Avenue. Transitions to and from SE Grand Avenue would be required at SE Stephens Street on the southern end and NE Couch Street on the northern end of the alignment. Additionally, roadway improvements would be needed to change NE Grand Avenue from one-way traffic operation to two-way traffic operation.

This design option would change both the function and classification of SE Grand Avenue and SE 7th Avenue. This would likely require an amendment to the City of Portland *Transportation System Plan* (TSP) and Metro's *Regional Transportation Plan* (RTP) street classification

designations. This design option would also likely result in traffic impacts, diversion of traffic into the adjacent neighborhoods, impacts to the Industrial Sanctuary, and private property impacts. During the next phase of study, if the Two-Way Grand design option were chosen as the preferred alternative, then further refinement of this design option would be needed. A full discussion of design considerations is included in Chapter 4 of the *Evaluation Report.*

Financial Feasibility

Assessing financial feasibility at the Alternatives Analysis phase of project development is a matter of comparing capital, operating and maintenance costs against proposed revenue sources. Funding sources generally solidify as a project moves through the project development process. In this section, proposed costs and revenues are presented and potential shortages and surpluses identified.

Capital cost estimates are provided in 2005 dollars and inflated to year of expenditure (YOE). The construction is assumed to be conducted from September 2007 to September 2009. Construction inflation has been assumed to be 5% per year through 2008. The cost estimates are based on a build-up of FTA cost categories and appropriate contingencies and are presented below.

Table ES-1
Capital Costs

Project Alternative	($2005 dollars)	($ YOE dollars)
Oregon MOS	$84,000,000	$100,506,000
Morrison MOS (MLK-Grand	$105,000,000	$125,632,000
Morrison MOS (Two Way Grand)	$119,000,000	$142,380,000
OMSI MOS (MLK-Grand)	$142,000,000	$169,905,000
OMSI (Two-Way Grand)	$156,000,000	$186,653,000
Full Loop	$153,000,000	$187,026,000
Full Loop (2-Way Grand)	$167,000,000	$203,774,000

Source: URS, Portland Streetcar Inc, April 2006

A preliminary inventory of funding sources indicate a potential of $100-125 million available for total project costs, which would not be sufficient to fund the entire Full Loop at this time. The Oregon MOS and Morrison MOS have listed sources (not fully committed) that could assure the completion of the project. The OMSI MOS and Full Loop require identification of $35-47 million in additional sources of funding in order to be constructed in a single project phase. Additional revenue would need to be identified if the entire project is to be constructed in one phase. Descriptions of proposed revenue sources are presented below.

- **Federal Small Starts** (60%): up to $75,000,000.
- **Committed Federal funding** (HUD, MTIP): $4,200,000.
- **Local Improvement District**: $6,000,000 to $10,000,000
- **Bridge Funds:** $9,000,000
- **Portland Development Commission Funding**: $25,000,000-$35,000,000.
- **City of Portland Funding**: $4,000,000

The Oregon MOS and Morrison MOS have listed sources (not fully committed) that could assure the completion of the project. The OMSI MOS and Full Loop require identification of $35-47 million in additional sources of funding in order to be constructed in a single project phase.

Operations and maintenance costs are presented in Table ES-2 below. These costs refer to the difference between the alternatives and the No-Build and include connecting bus and streetcar costs.

Table ES-2
Operating and Maintenance Costs ($ 2005)

Project Alternative	Operating Cost
Full Loop	$ 5,262,000
OMSI MOS	$ 5,325,100
Morrison MOS	$ 4,928,200
Oregon MOS	$ 4,642,200

Source: TriMet 2006

Operating revenue commitments have not been made for the Eastside Transit Project. However, funding mechanisms are in place that could potentially generate enough operating revenue to expand the streetcar system. More work will be required between TriMet and the City of Portland to develop a mutually agreeable funding plan, and to identify potential additional funding sources if necessary.

Cost-Effectiveness

Cost effectiveness provides a measure of how effectively the investment in capital, operating and maintenance funds that would be required for each alternative translates into ridership on the new streetcar line. The Full Loop is the most cost-effective alternative in terms of total annualized capital and operating cost per new streetcar rider, annualized federal cost per new streetcar rider and operating cost per streetcar rider. Cost-effectiveness decreases as the length of the project alternative decreases.

The Full Loop alternative, which has the highest cost, would also have the most riders, resulting in the lowest cost per streetcar rider of $4.25. The remaining MOS alternatives, with fewer additional new streetcar miles, and therefore lower cost and ridership, show a cost per rider figure commensurate with the length of the new streetcar line; the OMSI MOS cost per rider is $5.01, Morrison MOS is $5.80, and the Oregon MOS is $6.86.

The Full Loop alternative results in the lowest federal cost per streetcar rider at $1.77 per rider. The remaining MOS alternative's, show an increasing federal cost per streetcar rider commensurate with the length and ridership of the new streetcar line. Specifically, the OMSI MOS federal cost per rider is $2.03, Morrison MOS is $2.17, and the Oregon MOS is $2.39.

The Full Loop alternative would have the lowest operating cost per streetcar rider at $1.30 per rider. The remaining MOS alternatives show increasing operating cost per rider as ridership declines with each successive shorter streetcar alternative.

Project Decision Making

The outcome of the Eastside Transit Alternatives Analysis will be the adoption of a locally preferred alternative. The LPA will specify the mode, alignment, and termini of the transit project and may also set forth a phasing strategy for the project if a minimum operable segment (MOS) is chosen.

Public involvement and comment has taken place since 2005 and will continue through the LPA process. The LPA recommendation will be generated by jurisdiction senior staff that serve on the Project Management Group (PMG). The citizen committee for the project, the Eastside Project Advisory Committee (EPAC) will also generate a recommendation. The Steering Committee,

which is composed of elected officials and executive staff of Metro, TriMet, the Oregon Department of Transportation (ODOT), the Cities of Portland and Lake Oswego, and Multnomah and Clackamas Counties will review the PMG and EPAC recommendations as well as public comment and will issue a LPA recommendation. The Portland City Council, Multnomah County Commission, TriMet Board and Portland Streetcar Board will make recommendations to the Metro Council either supporting or amending the Steering Committee Recommendation. The region's MPO body, the Joint Policy Advisory Committee on Transportation will make a LPA decision recommendation to the Metro Council. The Metro Council will then make the final LPA decision. It should be noted that the Steering Committee oversees both the Eastside Transit Alternatives Analysis and the Portland to Lake Oswego Transit and Trail Alternatives Analysis.

Chapter 1. Background

Purpose
The purpose of the Eastside Transit Alternatives Analysis is to develop, evaluate and select a transit alternative that is responsive to the community needs and the travel demand in the downtown area and benefits the economic development and land uses of the area consistent with the Federal Transit Administration's (FTA) newly approved Small Starts program and the National Environmental Policy Act. This Evaluation Report provides an appraisal of alternatives that could extend existing transit service from the west side of Portland's Central City to the Eastside, providing a transit circulator.

Context
For many years the City of Portland has exerted substantial efforts to revitalize a downtown that in the 1970's was threatened by the urban crisis of dis-investment and flight that most US cities faced and with which some still struggle. A "population strategy" starting with Portland's 1972 *Downtown Plan* was created that "…emphasized public transportation, neighborhood revitalization and downtown reinvestment". More recent City plans have called for a transit circulator to provide for Central City circulation and access. In addition, plans have been adopted and implemented at region and state levels consistent with and supportive of the goal of downtown Portland revitalization. All land use and transportation policies relevant to Central City transportation, land use and economic development are documented in Chapter 3 in the land use section. Recognizing the potential transportation and economic development benefits, the 2003 Portland City Council proposed that a locally funded streetcar be extended to the Eastside with FTA assistance, an alternatives analysis, consistent with FTA requirements, was initiated to assess the feasibility of a transit circulator serving the whole Central City, including the Eastside. This report is the evaluation of alternatives.

Eastside
The Eastside, as defined in this report, is comprised of two districts - Lloyd and Central Eastside - and is the home of a variety of uses and activity centers including the Oregon Museum of Science and Industry (OMSI), the Rose Garden Arena, Memorial Coliseum, Oregon Convention Center, the Lloyd Center Mall, eight hotels, several office towers, a cluster of home improvement retailers, Portland Community College Workforce Training Center, Eastbank Esplanade, support businesses serving the Central City and government offices including: Bonneville Power Administration, State, Multnomah County, TriMet and Metro.

Figure 1-1
Looking South to the Eastside

[from the north end of the Lloyd District (approximately Broadway) with Rose Garden and Oregon Convention Center mid- photo and the Central Eastside District in the background].

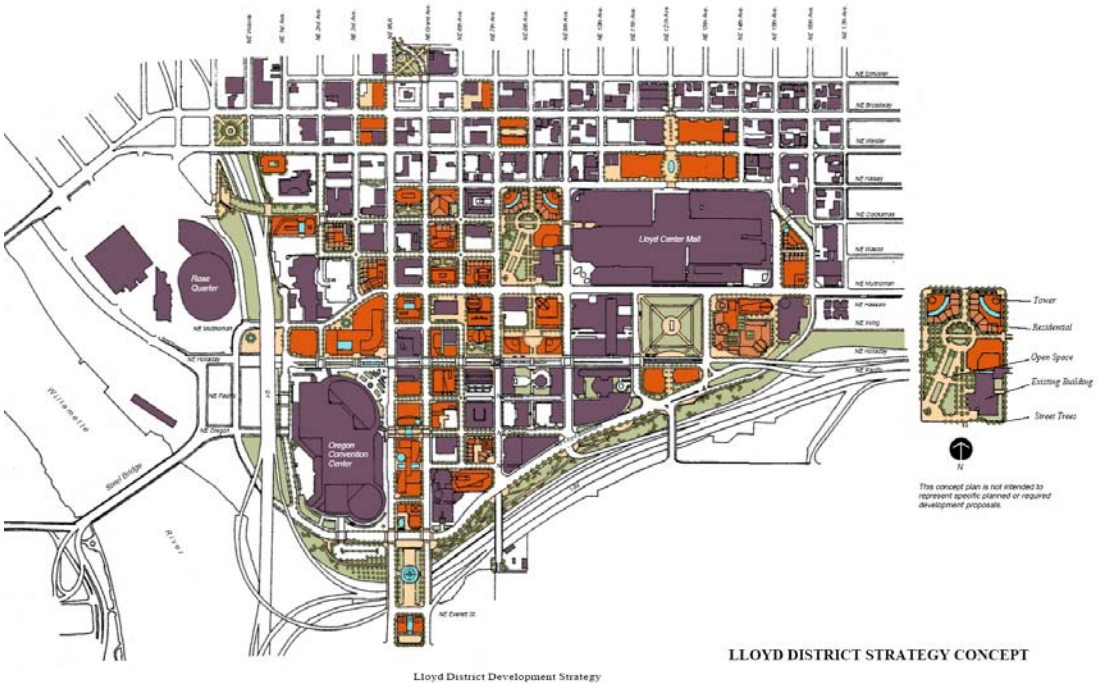
Figures 1-1, 1-2, 1-3 and 1-4 illustrate the urban environment of the Eastside Project area.

Figure 1-2
Lloyd District Plan Overview

[Looking northeast from above the Willamette River]
Source: Portland Development Commission

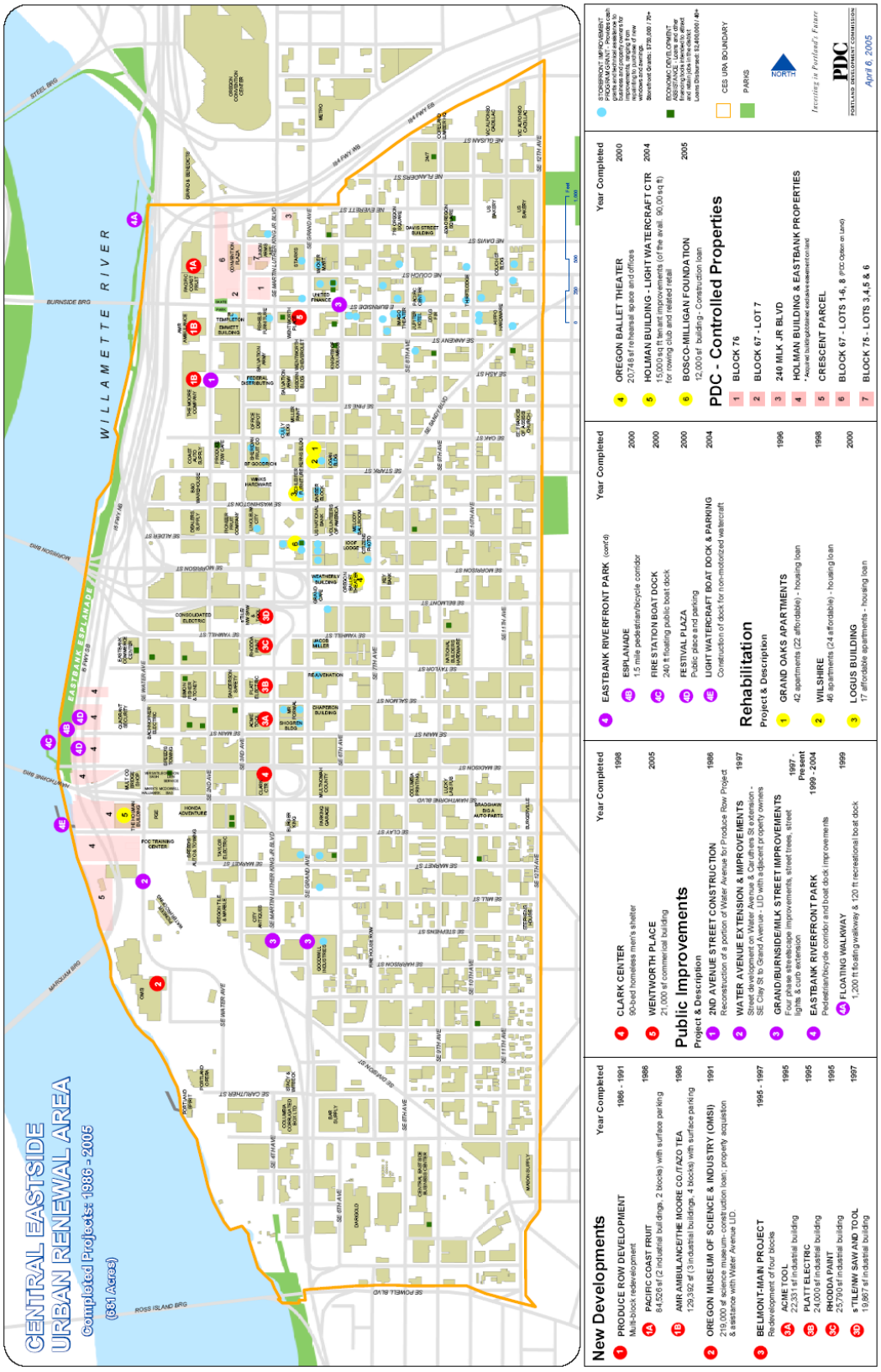
Despite the existing vibrant urban uses, the Eastside is an area also in need of revitalization. Much of the Eastside is included within one of two urban renewal areas. Many of the public and private plans for revitalization and redevelopment of the Eastside are looking to an extension of the existing streetcar to and through the area in a loop, providing an economic development spark as it did in the Pearl District, though recognizing the unique characteristics and opportunities of the Eastside and completing a transit circulator connecting the east and west sides of the Central City.

Figure 1-3
Lloyd District Plan



Source: Portland Development Commission

Figure 1-4
Eastside Urban Renewal Area and Projects



Source: PDC

Westside

Across the Willamette River lies the west side of the Central City. The Pearl, Old Town districts included in the boundaries of the Central City Plan as well as the Northwest District, a high-density district adjacent to the Central Ciyt.

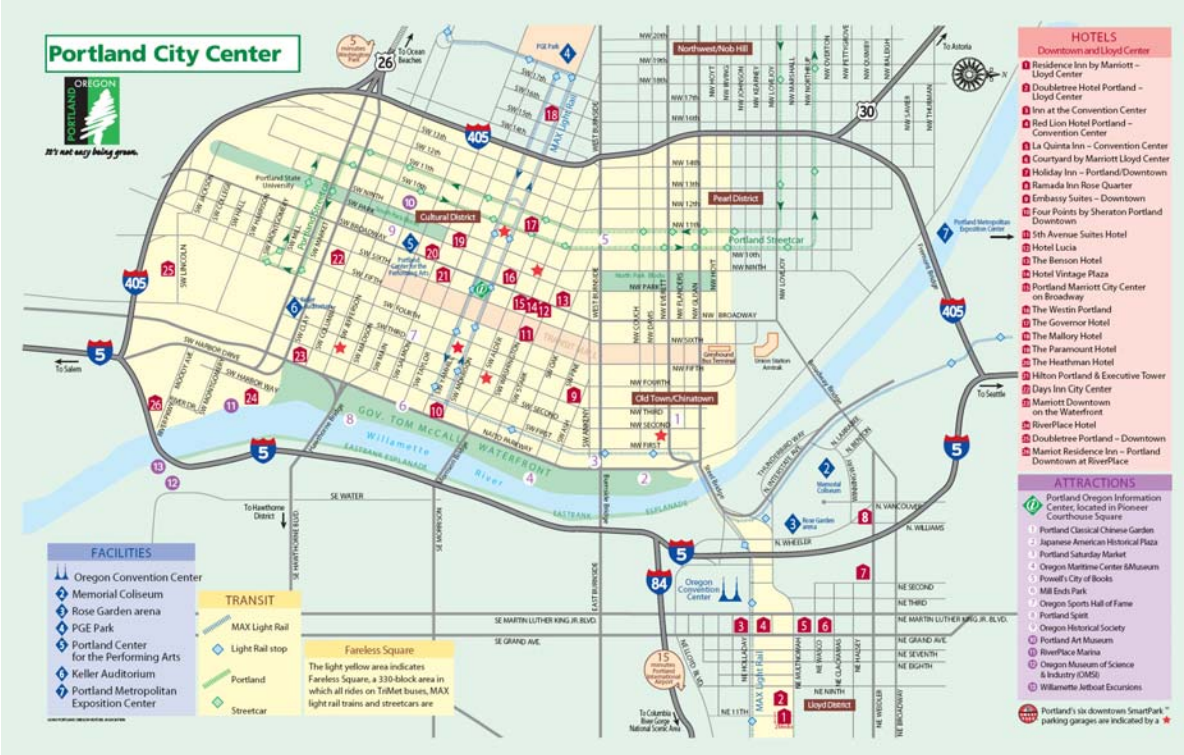
The Westside also includes many uses, activity centers and cultural resources such as the Park Blocks, Waterfront Park, 18 hotels, Central Library, Pioneer Courthouse Square, Portland Art Museum, Portland Center for the Performing Arts, Newmark Theater, Keller Auditorium, Oregon Historical Society, many art galleries as associated with the Downtown Art Gallery Association, the Northwest Film Center, and PGE Park. Cultural attractions also include eight historic places of worship.

Figure 1-5
Looking North to Portland Downtown along Willamette River.

[Eastside to right and off photo. Vacant lands in foreground now under construction.]

Also within the downtown are Portland State University with over 22,000 students and Lincoln High School with 1,400 students. Government offices include federal and county courthouses and City Hall.

Figure 1-6
Portland City Center - Attractions and Facilities



Source: Portland Oregon Visitors Association

Eastside and Westside - Central City

Together, Portland's Central City - Eastside and Westside - is the region's premier mixed use center, serving as a cultural, employment, high density housing center upon which the transit system is centered. The Central City is comprised of eight districts as shown on Figure 1-7[1]. As the downtown is bounded by the West Hills to the west and south, over time downtown growth extended across the Willamette River, creating the Central City. Between 1980 and 2000, office space in the Central City increased from about 5.2 million square feet to over 14 million - up 174 percent. During this period Central City employment increased from about 89,000 to 121,000. From 1995 to 2005, there were 6,379 new homes built in the Pearl and Old Town districts - 97 per cent of the City's 2020 target for these districts.

The Central City is anticipated to accommodate significant amounts of employment and household growth in the next 20 years based on the region's long range land use plan, Metro's 2040 Growth Concept, as well as City of Portland plans. The location of new growth is important as households in the Central City generate fewer auto trips, fewer vehicle miles traveled, and more transit and walk trips compared to locations without transit friendly conditions. These travel characteristics are important as they advance the region's adopted goals for balanced transportation, compact land use, clean air, energy efficiency and conserved environment (natural, farm and forest).

The Willamette River forms a natural constraint to travel to and from the Central City districts. There are six arterial bridges that link the west and east sides of the Central City. Existing travel demand has strained these bridges. Improvements in the 2004 Regional Transportation Plan's financially constrained system will not increase the bridges' capacity. A locally funded streetcar currently serves the Northwest, Pearl, Old Town, Downtown, University districts and will soon serve the northern portion of the South Waterfront District.

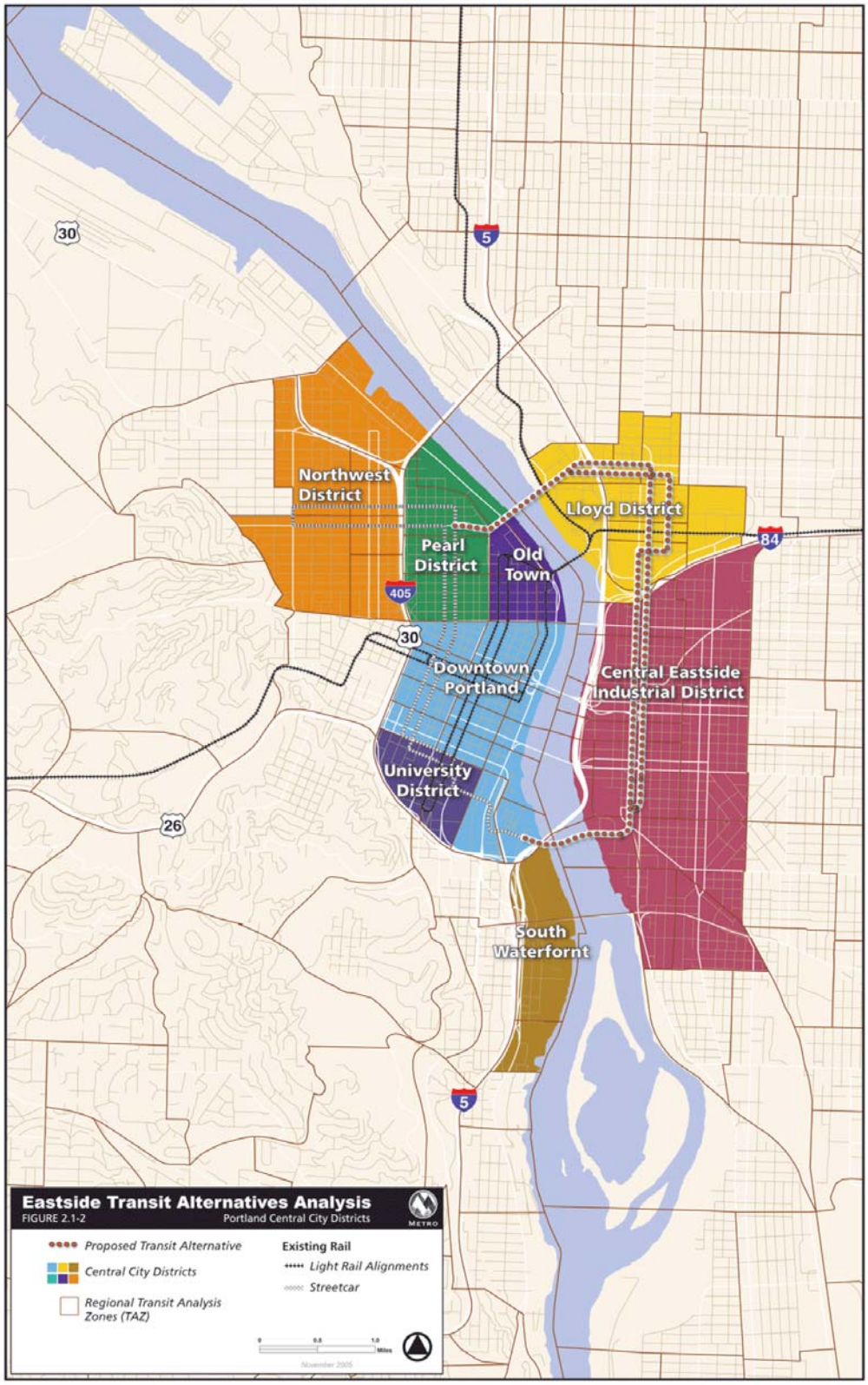
Problem Definition

As significant additional new roadway capacity is not anticipated due to the high capital and social costs that come with the construction of new highways or arterials in the downtown area, additional capacity and mobility is proposed to be addressed by increasing transit capacity and facilitating bicycle and pedestrian trips in the downtown area. A locally funded streetcar now serves the western portion of the Central City and, since the commitment to build it in 1997, substantial economic development in the form of mixed use, multi-story residential, retail commercial, office and other uses have been built. Specifically, from 1997 to 2005, over $2.28 billion has been invested within three blocks of the streetcar line, representing building permits for over 7,200 residential units and 4.6 million square feet of commercial uses (source: Portland Streetcar Inc, 2006). Further, over half (55 percent) of all new development within the City's core has been constructed within one block of the streetcar line (Source: E.D Hovee, 2005). While not the only catalyst for economic development in the Central City, the streetcar has proved a potent tool.

Based on its economic development performance and desire to better knit together the Central City with improved transit, many business owners, civic leaders and others have advocated a streetcar loop around the Central City. This transit project would connect the various districts within the central city and spur economic development - all while reducing pressure to expand the urban growth boundary, reducing the growth of vehicle miles traveled and the cost of expanding urban services.

[1] The City of Portland has designated geographic districts within the Central City. In this report, transportation analysis zones boundaries used for travel forecasting follow as closely as possible each of the City's district's, but are not exactly the same as the City Plan districts.

Figure 1-7
Central City Districts
(as defined by transportation analysis zones)



Problem (and Opportunity) Statement

The Portland Central City is comprised of eight districts in which the number of households are expected to increase by 55 percent between 2005 and 2025 (12,892 new households - without taking into consideration likely and substantial additional increases that would be induced by some types of transit improvements). Employment is forecast to increase by 35 percent (an additional 72,411 jobs - again, without considering further economic inducements likely to be created by some transit improvements).

Table 1-1
Central City - Forecast Household and Employment Increase 2005 to 2025

Central City District	2005		2025		Household Percent Change	Employment Percent Change
	Households	Employment	Households	Employment		
Lloyd District	907	20,045	2,000	33,925	121%	69%
Central Eastside	3,155	18,764	4,000	26,379	27%	41%
South Waterfront*	266	6,359	3,000	13,000	1,028%	104%
Downtown	5,550	109,656	7,900	138,500	42%	26%
University District	2,093	12,710	2,400	17,762	15%	40%
Northwest	6,276	21,069	6,612	23,415	5%	11%
Old Town	1,622	5,904	2,700	11,636	66%	97%
Pearl District	3,752	13,359	7,900	15,661	111%	17%
Total	23,620	207,867	36,512	280,278	55%	35%

Source: Metro, 2006 * Approximately 1,000 housing units are under construction today with occupancy slated for Fall 2006.

Many believe that the locally funded streetcar approved in 1997 and first opened in 2001 has been a catalyst for private development - much more than rubber-tired transit. For example, from 1997 to 2005, over $2.28 billion has been invested within two blocks of the streetcar line, representing over 7,200 new residential units and 4.6 million square feet of additional commercial space. Further, over half (55 percent) of all new development within the City's core has been constructed within one block of the streetcar line. In comparison, prior to 1997, land located within one block of the streetcar alignment totaled 19 percent of all development. Prior to 1997, land located within one block of the streetcar alignment captured 19 percent of all development. Central City districts, in addition to providing jobs and housing, also include cultural, entertainment, higher educational institutions and are important destinations. Many in the local business, civic, higher education and government sectors believe that a loop streetcar will tie together the Central City districts into a cohesive core and spark substantial additional growth in housing and jobs beyond the current forecast.

Adding transit circulation capacity acknowledges that the existing transportation picture is constrained. Looking at traffic volumes from 1980 to the year 2000, substantial increases have occurred.

Table 1-2
Central City Historic All Day Traffic Volumes

Location	1980	1990	2000	Percent change 1980 to 2000
Grand Ave at Multnomah	12,000	17,100	22,900	91%
MLK at Multnomah	15,000	18,700	22,400	49%
Hawthorne Bridge	23,562	26,154	36,249	54%
Morrison Bridge	43,092	49,000	54,950	28%
Burnside Bridge	37,879	37,426	43,113	14%

Source: Metro 2006

Key to connecting the Central City districts are the bridges that link each side of the Willamette River. In 2005, five of the six arterial bridges had volume-to-capacity (v/c) ratios greater than one - they are at capacity at peak hour and the congestion extends into a second hours of congestion. Further, volume-to-capacity ratios are forecast to get worse over time - even with the improvements included in the Financially Constrained System of the 2004 Regional Transportation Plan (with a horizon year of 2025).

Table 1-3
Arterial Bridge Capacity 2005 and 2025

Arterial Bridge Connecting East and West sides of Central City	2005 Eastbound PM Peak Hour Volume-to-Capacity Ratio	2025 Eastbound PM Peak Hour Volume-to-Capacity Ratio
Broadway Bridge	1.46	1.54
Steel Bridge	1.31	1.33
Burnside Bridge	1.15	1.15
Morrison Bridge	0.94	1.31
Hawthorne Bridge	1.24	1.29
Ross Island Bridge	1.31	1.34

Source: Metro 2006

Figure 1-8
Central City Bridges

Looking west from the Eastside with three bridges, Steel, Burnside and Morrison bridges in the background
Source: PDC

While the number of lanes on these bridges is not planned to be increased, and therefore the number of vehicles that may cross them in the peak hour is limited and at capacity, it may be possible to increase the number of people that cross the bridges by improving transit and increasing the capacity of vehicles crossing the bridges.

Regional and local land use plans and goals encourage the accommodation of growth by increasing jobs and housing in mixed use centers - such as the Central City. Analysis indicates that in such mixed use areas, vehicle miles traveled are less and more environmentally friendly travel modes, including transit, command a much larger share of total trips. The table below demonstrates that in the Portland region, areas that are walkable and have good transit and the right mix of uses can have a much higher transit mode share. The Eastside Transit Alternatives Analysis intends to assess whether additional transit could help address the desire to improve circulation within the Central City, especially the Eastside.

Table 1-4
Transportation Mode Share by Transit and Land Use Characteristics

	Mode Share						
Land Use Type	**% Auto**	**% Walk**	**% Transit**	**% Bike**	**% Other**	**Vehicle Miles per capita**	**Auto ownership per household**
Good Transit/Mixed Use	58.1%	27.0%	11. 5%	1.9%	1.5%	9.80	0.93
Good Transit Only	74.4%	15.2%	7.9%	1.4%	1.1%	13.28	1.50
Remainder of Multnomah County	81.5%	9.7%	3.5%	1.6%	3.7%	17.34	1.74
Remainder of Region	87.3%	6.1%	1.2%	0.8%	4.6%	21.79	1.93

Source: Metro 1994 Travel Behavior, 2-Jul-97

Accordingly, the Eastside Transit Problem Statement is:

> How can the transportation needs of the residents, workers and visitors located within or traveling to or within the Central City be improved?

Further, proposed FTA Small Start guidance states that:

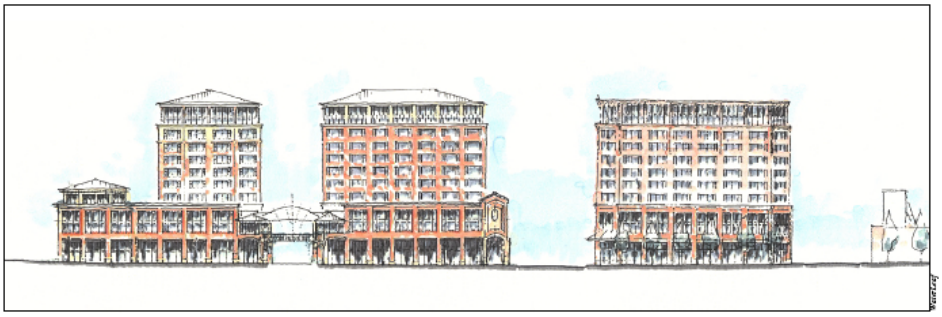
> *"Together, the evaluation measures and the narrative case for the project might consider: the nature of the problem/opportunity - because meritorious transit projects emerge from efforts to solve transportation problems and ...support economic development."*

That is, the most current (draft) FTA guidance suggests that Small Start projects might consider economic opportunities that could be created as well as how best to address transportation problems. The Eastside Transit Project is proposed as both a transit solution and as a tool to support economic development.

This Eastside economic development opportunity may be stated as:

> How much additional economic development can be achieved by providing transit improvements in the Eastside of the Central City?

Figure 1-10
Lower East Burnside Redevelopment Plan



Source: PDC

Goals and Objectives
The purpose of the Eastside Transit Project is to develop a project that garners a high level of public acceptance and community support. The following have been developed with the Eastside Policy Advisory Committee and Steering Committee and have received public review. The goals may be summarized as a project that will:

- Reduce reliance on the auto for trips to, from and within the Central City.
- Improve Central City transit circulation, capacity, connectivity and local access that facilitates economic development and promotes the vitality of the Central City, and
- Support existing and future streetcar and light rail investments in the region by expanding the system and increasing ridership in a cost-effective manner.
- Support economic development.
- Support community goals and has strong public acceptance.

The full text of the goals and objectives is as follows:

A. Reduce Reliance On Single-Occupant Vehicle Trips To and Within the Central City.

- By providing transit access between jobs and housing in the Central City, increase transit ridership and reduce growth in demand on regional road and highway facilities characteristic of suburban to Central City auto commute patterns that would occur otherwise. (Also referred to as the "trip not taken").

- Support continued and on-going growth in the 2040 Centers that encourages mixed used development in the Downtown, Pearl District, South Waterfront, Lloyd District and Central Eastside areas of the Central City that encourages pedestrian and transit trips and reduces reliance on automobile trips.

- Provide Central City transit investments that facilitate business and residential location decisions that result in an overall increase in transit trips compared to what would occur without improved transit access and mixed-use development in the Central City.

B. Improve Central City Transit Access and Circulation

- Improve transit access and circulation within the Central City by extending the rail transit system to connect destinations on the line such as the Downtown core, North Macadam, RiverPlace, the Pearl and River Districts with the Central Eastside and adjacent inner SE Portland neighborhoods, the Lloyd District and Rose Quarter.

- Serve important visitor destinations including Downtown, Rose Garden, Coliseum, Oregon Convention Center, Lloyd Mall and OMSI with a clearly identifiable fixed-route transit service.

- Link lodging opportunities in Downtown Portland with visitor destinations in the Lloyd District, Rose Quarter and Central Eastside.

- Provide possible alternatives to light rail on the Steel Bridge by adding rail crossings of the Willamette River via the Broadway Bridge to the north and eventually to a proposed new light rail bridge (Caruthers) to the south or to the Hawthorne Bridge.

- Improve north/south transit connectivity and capacity through the Central Eastside without having to travel into and out of Downtown.

- Provide increased transfer opportunities and strengthen the eastside transit grid.

- Provide better, more reliable and more identifiable transit service to residents, workers, and visitors to, from and within the central city area.

C. Support Existing and Future Transit Investments.

- Maximize the utility of existing streetcar and light rail investments by continuing to incrementally expand the system in a cost-effective manner.

- Provide future capacity to complement the Milwaukie LRT line.

- Improve direct access from the southeast part of the region through the Central Eastside to Rose Quarter, north Portland and eventually Vancouver via connections with the Interstate MAX Yellow Line.
- Serve as a "crosstown" transit line that complements the eastside transit grid.

D. Support Economic Development

- Provide economic and transportation benefits to residents, public institutions and businesses.

- Facilitate economic development in the Central Eastside, Rose Quarter and Lloyd District.

- Provide fixed public infrastructure as an anchor for new development and redevelopment.

- Leverage publicly funded transportation infrastructure improvements to spur development at higher intensity that would otherwise occur.

- Provide alternatives to auto access and reduce private development costs by reducing the demand for parking.

- Provide a transit link that would support the regional tourism industry by connecting areas currently served by the streetcar including the Downtown core, RiverPlace, PSU, the west end cultural district, the Pearl District and River District with regional destinations including the Convention Center, Rose Garden arena, Memorial Coliseum, Lloyd District, the MLK/Grand shopping and home improvement retail district, PCC and OMSI.

- Provide a strong transportation presence for future investment in the eastside area and along the existing streetcar line including the proposed Burnside bridgehead redevelopment, Lloyd District redevelopment, and continuing development in the Pearl and River Districts as well as future extensions south from RiverPlace through the North Macadam residential and employment redevelopment area including a new OHSU campus currently under construction.

D. Supports community goals and has strong public acceptance

- Alternatives should be supportive of community needs and should have strong public support.

Environmental Issues and Considerations

One important consideration with any project seeking federal transportation funding is meeting the requirements of the National Environmental Policy Act (NEPA). The transit circulator is proposed to be located wholly within existing public right-of-way along the alignment (the Full Loop would utilize a new LRT bridge, but is not included in this consideration.) It is therefore not anticipated that issues of real property acquisition, residential or business displacement or most of the possible adverse environmental impacts would be associated with a Central City circulator. (However, the Two Way Grand could involve some land acquisition associated with some turns and will likely involve more environmental analysis.) A documented Categorical Exclusion may be appropriate for the selected project, particularly if no acquisition is involved. Regardless of the acquisition issue, there are some environmental issues that will likely need further documentation, including how any in-water activity associated with improvements to the Broadway Bridge would be addressed to eliminate or greatly reduce any potential adverse impacts to the Willamette River. Further, traffic, parking and loading space analyses and historic resource assessments may be needed to complete environmental assessment of the proposed project. These considerations will be provided as part of a separate proposed Categorical Exclusion document.

It should be noted that initial consideration of transit improvements on the Eastside, specifically, extension of the existing locally funded Portland Streetcar was completed in a City of Portland process culminating in the Eastside Streetcar Alignment Study adopted by the Portland City Council June 25, 2003. However, after further consideration of the proposed project and the Federal Transit Administration's Small Starts program, it was concluded that such federal funding support should be sought. Accordingly, this required that an alternatives analysis, including at least one non-streetcar transit alternative be compared with a streetcar alternative. In addition, the National Environmental Policy Act (NEPA) needed to be addressed. This Evaluation Report summarizes the results of the Alternatives Analysis. A proposed Categorical Exclusion will be prepared separately to address the NEPA regulations.

Public Involvement

Public involvement in the proposed project is vital to ensuring that the project is understood by those it may benefit or adversely affect as well as provide opportunities for comment that could result in project changes and improvements. Regardless of earlier public involvement activities[2], it is also a required element of an FTA Alternatives Analysis.

In spring 2005, public involvement activities for the Eastside Transit AA began. Between March and August 2005 the following activities were completed:

- A flyer announcing an open house was mailed and distributed to organizations and included the notice in a Portland Development Commission mailing
- An open house was held on April 26, 2005

Between August 2005 and March 2006, the following public involvement activities were conducted:

A real property assessment along each alternative was prepared concerning:

- Drive/walk alignments
- An expanded database and map of property owners/businesses along each alternative

[2] Two public workshops were held in February and April of 2003 by the City of Portland. Over 1,400 flyers were sent to interested parties and about 110 members of the public attended one or both workshops. In addition, presentations were made to neighborhood organizations, and testimony taken before the City Council June 2003.

Stakeholder meetings

- Neighborhood and business associations were contacted concerning fall presentations
- Interviews were scheduled with property owners/key employment generators along corridor

Policy Advisory Committee (PAC) activities included:

- Inviting Burnside Bridgehead project partners, OPUS NW, to participate in Eastside PAC
- Developing and presenting a draft Eastside Transit AA Public Involvement Plan
- Presenting traffic and impact observations
- Planning a PAC tour of proposed alignments

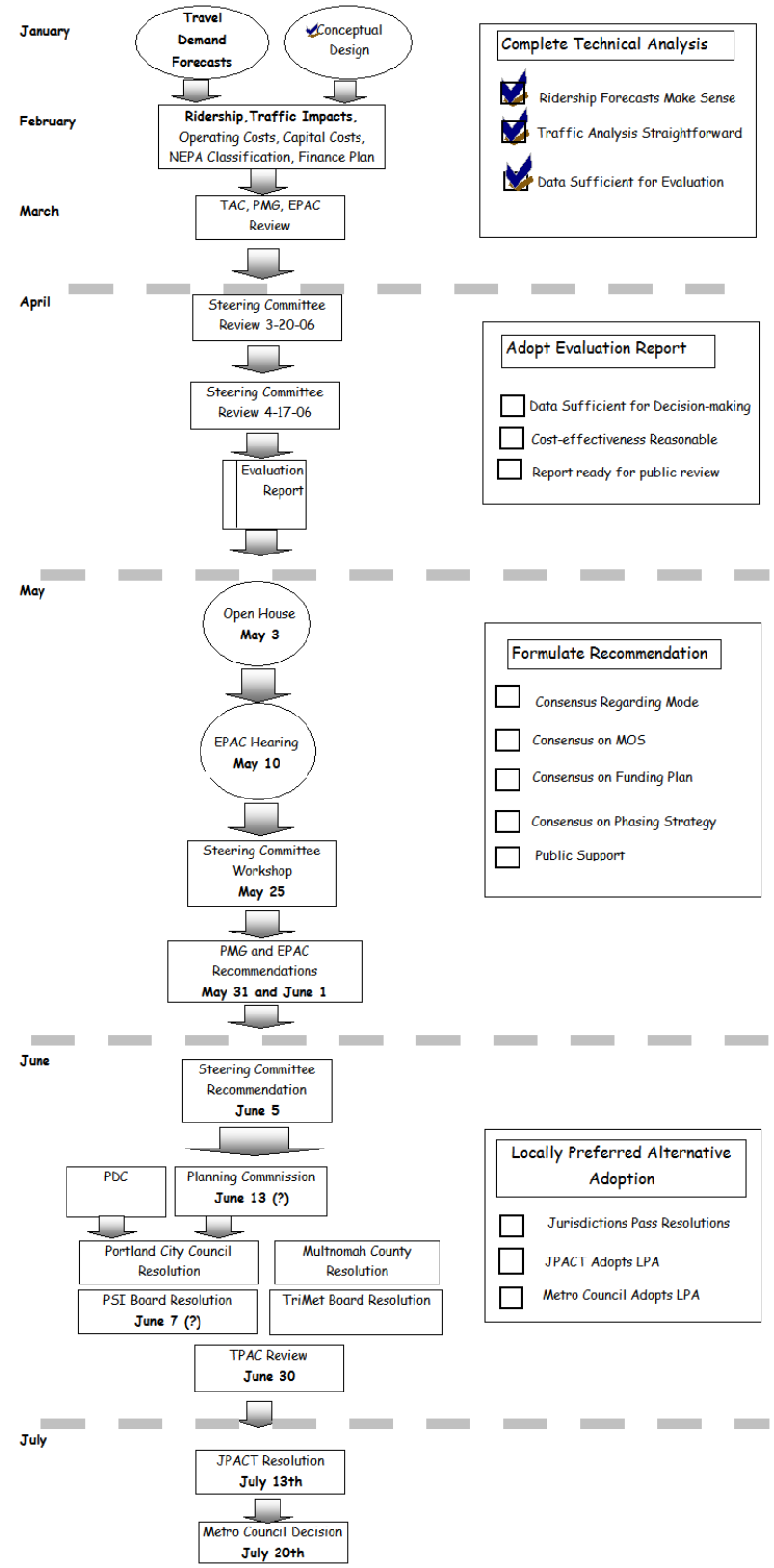
Informational Materials:

- The Web site was updated to provide the most recent project information
- Illustration of the MLK/ Grand Minimum Operable Segments was completed

Process for Decision-Making

There are several steps in the decision-making process to select a Locally Preferred Alternative (LPA) for the Eastside Transit Alternatives Analysis. These include review of this evaluation report by the Technical Advisory Committee (technical staff), the Project Management Group (senior staff) , the Eastside Policy Advisory Committee (citizen committee comprised of business, community, property owner and neighborhood representatives). Once the Evaluation Report is adopted, each of these committees, in the same order, will formulate recommendations that will be considered by the Eastside Transit AA Steering Committee (elected officials and TriMet General Manager). The Steering Committee recommendation will be forwarded to the Portland Development Commission, the City of Portland Planning Commission, then to the Portland City Council, the TriMet Board of Directors, the Multnomah County Commission, the Portland Streetcar, Inc. Board. Each of these public bodies will be requested to consider a resolution in support of the Steering Committee recommendation. After these supporting resolutions are approved, the Steering Committee recommendations will then be forwarded, after technical review by the Transportation Policy Advisory Committee to the Joint Policy Advisory Committee on Transportation (JPACT) and then the JPACT recommendation, in the form of a draft resolution, will be forwarded to the Metro Council for approval. The public will have the opportunity to provide testimony at all of these decision points.

Figure 1-11
Eastside Transit Alternatives Analysis Decision Process



Chapter 2. Description of the Alternatives

Introduction
This chapter describes detailed transit alternative characteristics such as improvements, transit service frequency, location of stops, the inter-connecting transit network and other transit features. These characteristics apply to an alignment on the Eastside in the Lloyd District along Broadway and Weidler as far as 7th Avenue and then into the Central Eastside along MLK and Grand Avenues. Alternatives include the No Build/Baseline (referred to as the No-Build Alternative from here on) alternative and a streetcar alternative including a full loop, and minimum operating segments - Oregon Street, Morrison Street and Oregon Museum of Science and Industry (OMSI). In addition, a Two-Way Grand Avenue alignment is included as a design option to the MLK/Grand alignment.

The No-Build fulfills the role of a Small Starts baseline as it includes incremental service increases in the corridor and serves the same downtown circulation travel market as the Streetcar Alternative. The No-Build provides bus service between RiverPlace, OMSI (via the Hawthorne Bridge), the Central Eastside and Lloyd Districts, connecting to downtown via frequent light rail and bus service at the Rose Quarter Transit Center.

No-Build Alternative
The No-Build Alternative is essential to compare the benefits and cost of various alternatives and existing conditions. The Federal Transit Administration requires a comparison between potential alternatives and a No-Build Alternative. The No-Build Alternative is based on the adopted Regional Transportation Plan (RTP) Financially Constrained 20-year set of highway and transit improvements. The 2025 highway and transit networks include highway and transit improvements that are achievable within "financially constrained" revenue sources. The networks have been developed consistent with the Regional Framework Plan and RTP policies. The 2025 Financially Constrained RTP network is acknowledged by the USDOT as meeting federal air quality conformity standards.

Figure 2-1
No Build (Bus) Alternative.

Source: TriMet

The 2025 Financially Constrained highway network includes a number of highway improvements throughout the region. The 2025 Financially Constrained transit network represents an incremental increase in transit service throughout the region, consistent with existing revenue sources. The bus route structure is the same as the existing system with some increase in frequency as needed to serve demand.

The average annual increase in TriMet service hours available for the Financially Constrained network is approximately 1.5 percent per year. This 1.5 percent annual growth in service hours is intended to address peak overloads and to maintain schedule reliability. The growth in service is allocated throughout the TriMet service area and also includes improved headways and a limited number of new routes. The Financially Constrained network also includes planned transit improvements such as the I-205/Portland Mall Project, South Corridor Phase II Milwaukie Light Rail Project and Washington County Commuter Rail Project.

No-Build Roadway Improvements

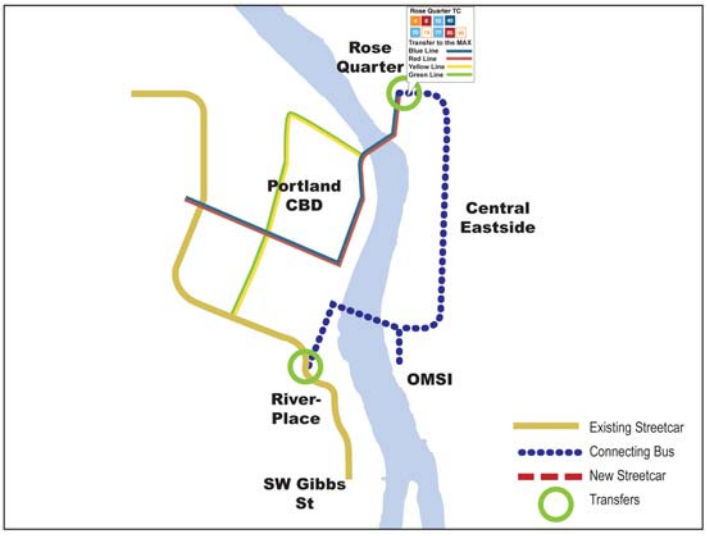
The No-Build Alternative includes the highway improvements in the corridor that would be built as part of the RTP Financially Constrained network. The RTP identifies two key changes to the transportation network: improvements to I-5 and the Broadway/Weidler/Blazer Arena and Rose Garden Area connection and new ramp connections between I-5 North and McLoughlin Boulevard south. No additional roadway improvements are anticipated above the level included in the RTP Financially Constrained network.

No-Build Transit Network

The intent of the No-Build Alternative is to provide a basis for comparison with the Streetcar Alternative. Accordingly, the No-Build Alternative service level would be equal to the service as proposed for the Streetcar Alternative. To provide an Eastside circulation function and connection to the downtown, the No Build route (Line 83-Martin Luther King (MLK) Boulevard) would start at the RiverPlace streetcar station and would cross the Hawthorne Bridge via SW River Parkway to SW Harbor Way to Naito Parkway to the Hawthorne Bridge. On the west side of the Bridge the line would use the SE Water Avenue ramps to OMSI and then from OMSI to SE Clay Street to SE Grand Avenue. The Route 83 terminates at the Rose Quarter and does not complete the full Central City loop, as numerous bus lines and LRT serve to connect the north end of the route to Downtown.

The Line 83-MLK Boulevard would provide service to OMSI, Portland Community College and Station "L", SE MLK Boulevard and Grand Avenue, the eastside development area, the Burnside Bridgehead Redevelopment, the Convention Center, and the Lloyd District.

Figure 2-2
No-Build Alternative Service Concept



Source: Metro 2006

As shown in Figure 2-2 the No-Build transit network would have ample transfer opportunities at the Rose Quarter Transit Center to transfer to 9 bus lines and four MAX lines to get to downtown and the Pearl. The No-Build would consist of transit service along the same route as the build alternative with numerous connections to bus and light rail service to downtown (See Figure 2-4 on page 2-4).

Transit Frequency and Stops

The No-Build Alternative would have similar service and coverage as the build alternatives. The No-Build Alternative would operate as a frequent bus with headways of 10 minutes during the peak and 15 minutes during the off-peak periods. Bus stops would be located approximately every 3 to 4 blocks throughout the corridor, similar to today.

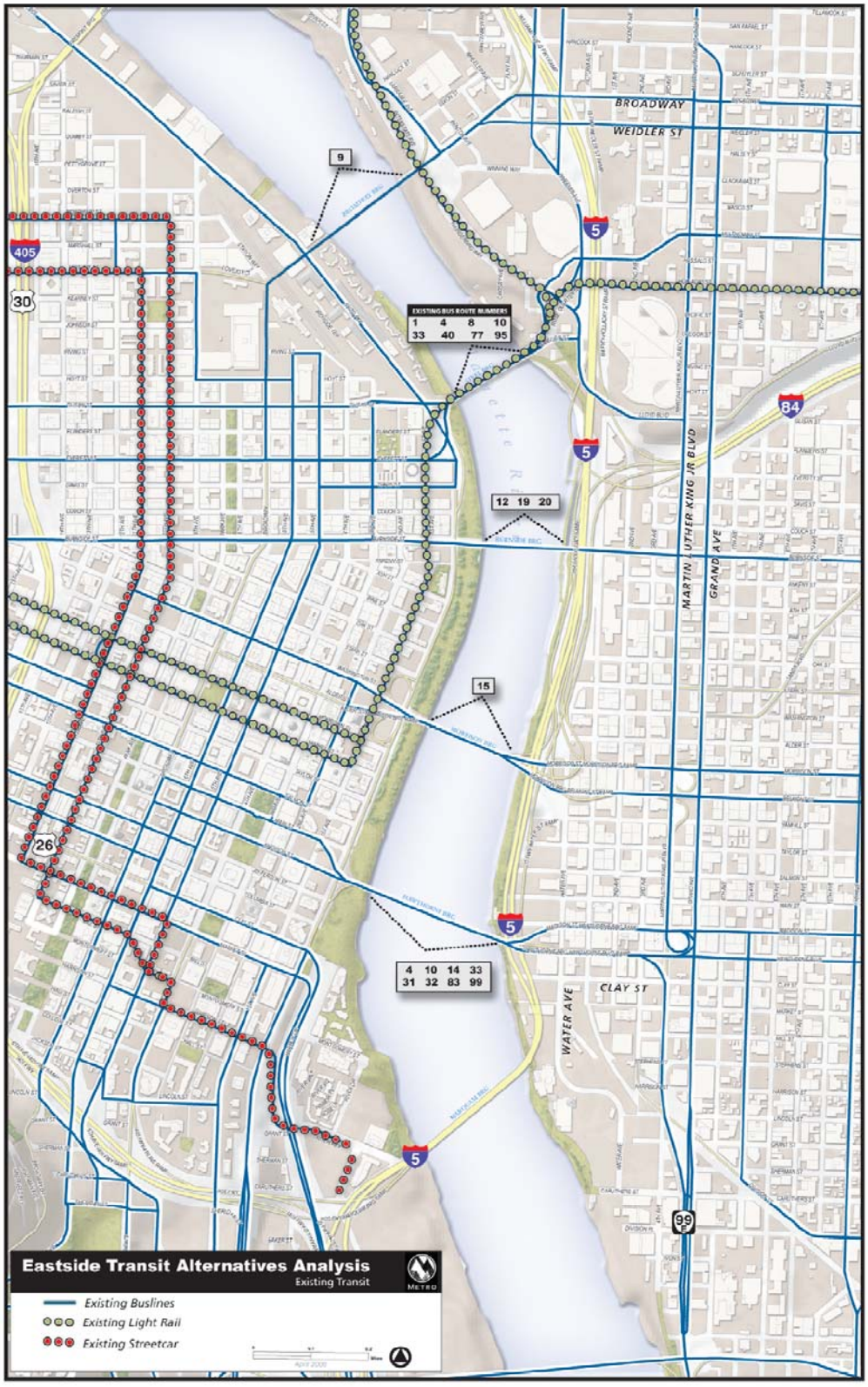
Transit Station Improvements

The No-Build Alternative does not include any transit station related capital improvements.

Transit Vehicle Definition

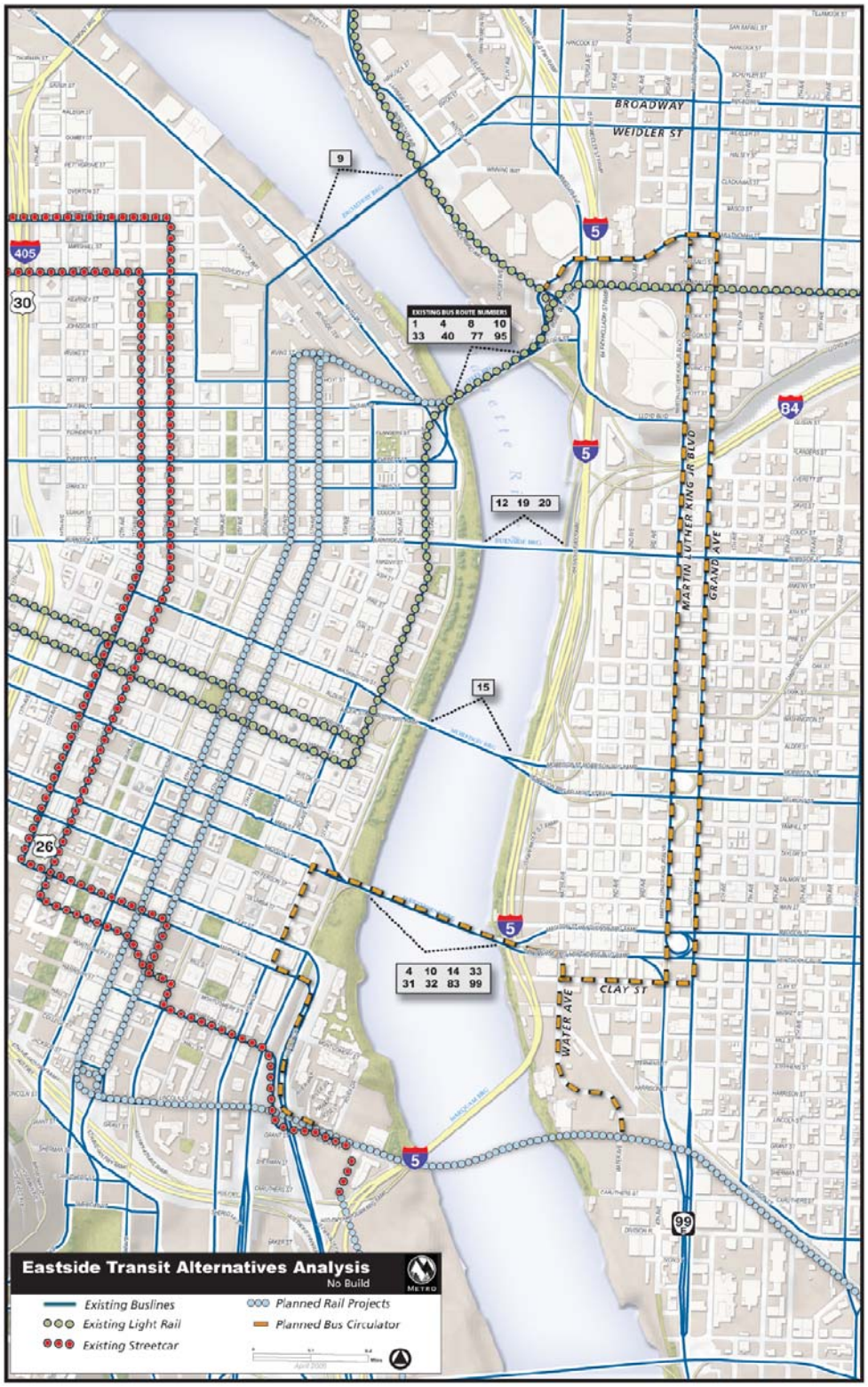
The proposed vehicle would be a low floor hybrid technology bus with a 65-passenger seated and standing capacity.

Figure 2-3
Existing Central City Bus Routes Map



Source: Metro 2006

Figure 2-4
No-Build (Bus) Alternative



Source: Metro 2006

Streetcar Alternative

Definition of the Streetcar Alternative

The streetcar alternative is defined as the complete streetcar loop, however, in order to address funding concerns, three minimum operable segments (MOS) are described. An alignment design option that would provide two-way (Two-Way Grand Design Option) streetcar service on SE Grand Avenue between E Burnside and SE Stephens is also described. This alternative would build on the design and service characteristics of the existing streetcar that operates from the Northwest district, through the Pearl district, into downtown and turning around in the South Waterfront District.

Figure 2-5
Existing Portland Streetcar Mixed Traffic Operating Environment

Transit Network

The streetcar would then operate on a couplet on the eastside with the southbound alignment on NE Seventh Avenue and MLK Jr. Boulevard. The northbound alignment would be located on Grand Avenue. Near OMSI, the alignment would connect to the proposed Caruthers light rail bridge (to be constructed as part of the Milwaukie Light Rail Project) and would connect back to the South Waterfront District via the existing streetcar alignment at SW River Parkway.

In the Central Eastside District, the Two-Way Grand design option would locate both the north and southbound streetcar alignments on SE Grand between E Burnside and SE Stephens Street. This option was developed to evaluate the trade-offs of potentially improving the streetcar/bus transfers at the bridgehead areas and to develop a streetscape more conducive to autos, streetcar, bikes and pedestrians. As part of this design option, Grand Avenue would change from one-way northbound operations to two-way traffic operations. The northbound and southbound streetcar would operate in mixed traffic on Grand Avenue. This design option would leave MLK Boulevard as one-way southbound and operate Streetcar and vehicles two-way on Grand Avenue and operate 7th Avenue as a northbound one-way traffic street that would carry the through traffic. Additional conceptual design work will need to be developed to better understand the trade-offs involved with this design option, should this option be selected to move forward.

Transit Frequency and Stops

Portland Streetcar uses single car trains that are approximately 66 feet long with a 92-person capacity. The covered stops are located approximately every three to four blocks and are equipped with transit tracker type equipment that provides an accurate forecast of the streetcar arrival. Streetcar would operate every 10-minutes during the peak and 15-minutes in off-peak periods.

Transit Vehicle Definition

Portland Streetcar uses single car trains approximately 66 feet long with a 92-person capacity.

Full Loop Streetcar Alternative
The Full Loop Streetcar Alternative would operate as a loop through the Central City, operating on the existing streetcar alignment through the downtown with a new streetcar alignment connecting the Lloyd and Central Eastside Districts. Figure 2-6 shows the proposed Full Loop Streetcar Alignment.

Streetcar Improvements
As part of the proposed Streetcar alignment, several signal and roadway changes are proposed to successfully integrate Streetcar in mixed traffic. Changes include special signal phases, queue jumps, roadway widening, and striping and lane changes.

From the existing streetcar alignment on NW 10th and 11th Avenues, the streetcar would turn and operate on NW Lovejoy Street and cross the Willamette River via the Broadway Bridge. From the Broadway Bridge the streetcar would operate westbound on NE Broadway Street and eastbound on NE Weidler Street. The streetcar would operate in the left on the NE Broadway/Weidler couplet.

The eastbound streetcar on NE Weidler Street would turn on NE 7th Avenue to travel southbound. Southbound Streetcar would operate on NE 7th Avenue between NE Oregon Street and NE Weidler Street. Streetcar would operate on NE Oregon Street to SE MLK Jr. Boulevard southbound in the right lane to SE Harrison Street.

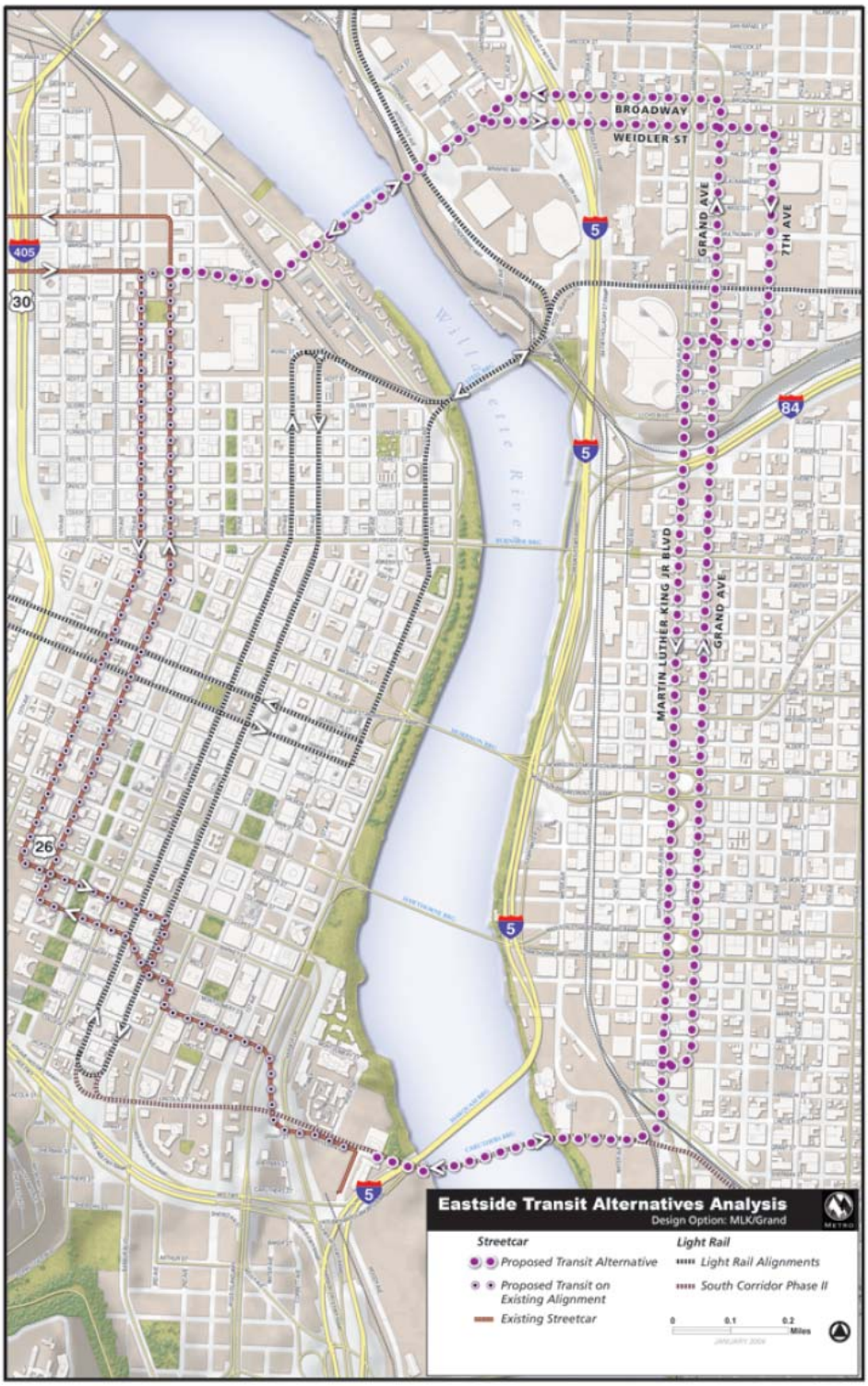
Northbound Streetcar would operate in the right lane on Grand Avenue between SE Harrison Street and NE Broadway Street. The streetcar would turn from northbound Grand Avenue to westbound NE Broadway Street to the Broadway Bridge.

At SE Harrison Street connection with SE MLK Jr. Boulevard and SE Grand Avenue, the streetcar would connect with a new streetcar only bridge over the Union Pacific Railroad to OMSI. Westbound and eastbound streetcar would connect to RiverPlace via the new Caruthers Bridge (a new light rail bridge proposed for the Milwaukie light rail extension).

Generally, the streetcar would operate in mixed traffic with the general traffic flow. However, there are some instances where streetcar would have transit priority treatments such as a transit only phase at an intersection, transit only lane or a queue jump. Minor roadway improvements are anticipated with the streetcar alternative, including re-striping of lanes or widening to add a turn lane. A number of traffic signals would be added or modified to facilitate efficient signal progression and to allow safe pedestrian access. Additional pedestrian improvements have been identified to improve pedestrian connectivity. As previously mentioned, a new streetcar bridge would be constructed over the Union Pacific Railroad. The *Eastside Transit Alternatives Analysis Streetcar Alternative Alignment Plans*, December 1, 2005 provide more detailed information regarding specific improvements and locations.

Access to the major destinations in the corridor could all be made on the streetcar without transfers. Additionally, the new streetcar service would provide connections to light rail service at the northern and southern end of the circuit and radial lines throughout the corridor.

Figure 2-6
Full Loop Streetcar Alternative

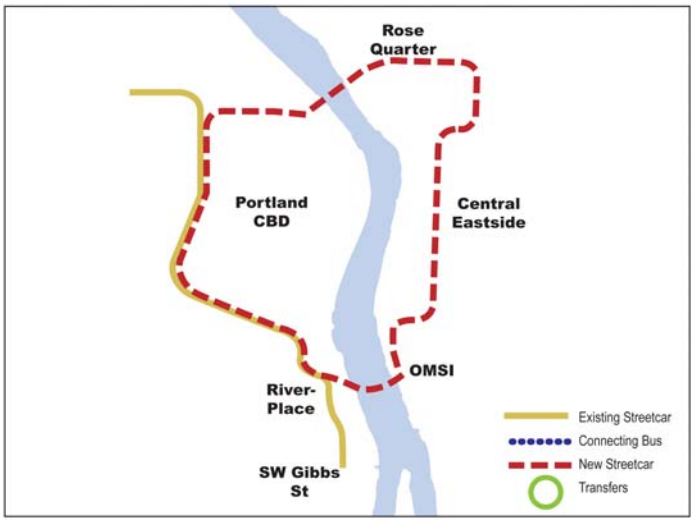


Source: Metro 2006

Streetcar Operations

The streetcar would share the existing streetcar alignment in the downtown between RiverPlace and NW Lovejoy Street. The new streetcar alignment would be constructed on the eastside of the Willamette River with connections to the existing streetcar at RiverPlace at the southern end of the loop and NW 11th and 10th Avenues at NW Lovejoy Street on the northern end of the loop, as shown in Figure 2-7.

Figure 2-7
Full Loop Streetcar Service Concept



The total estimated one-way operating length for the Full Loop Alternative is approximately 6 miles with 3.6 miles of new streetcar alignment, including approximately 0.3 miles on the new Caruthers Bridge. The new streetcar would share 2.4 miles of existing streetcar alignment between RiverPlace and NW Lovejoy Street.

The Full Loop Streetcar Alternative would operate with 10-minute headways during the peak and 15-minute headways during the off-peak periods. By introducing the new streetcar service to the Lloyd District and the Central Eastside, the composite headways on the shared downtown alignment would increase from 10-minute headways to 5-minute headways.

The existing streetcar fleet currently has 7 streetcars vehicles with three additional vehicles currently being manufactured for a total of 10 streetcar vehicles. To expand the streetcar service for the Full Loop Alternative, an additional 12 streetcar vehicles will be needed. This includes spare vehicles for routine maintenance, emergencies and breakdowns.

Bus Operations

The Full Loop Alternative would provide the complete loop for riders to circulate through the Central City on a fixed route system with no bus transfers required.

Three Minimum Operable Segments (MOS) are included in this Alternatives Analysis: the OMSI MOS, the Morrison MOS, and the Oregon MOS. Figure 2-10 (on the next page) shows each of the proposed MOS Alternatives.

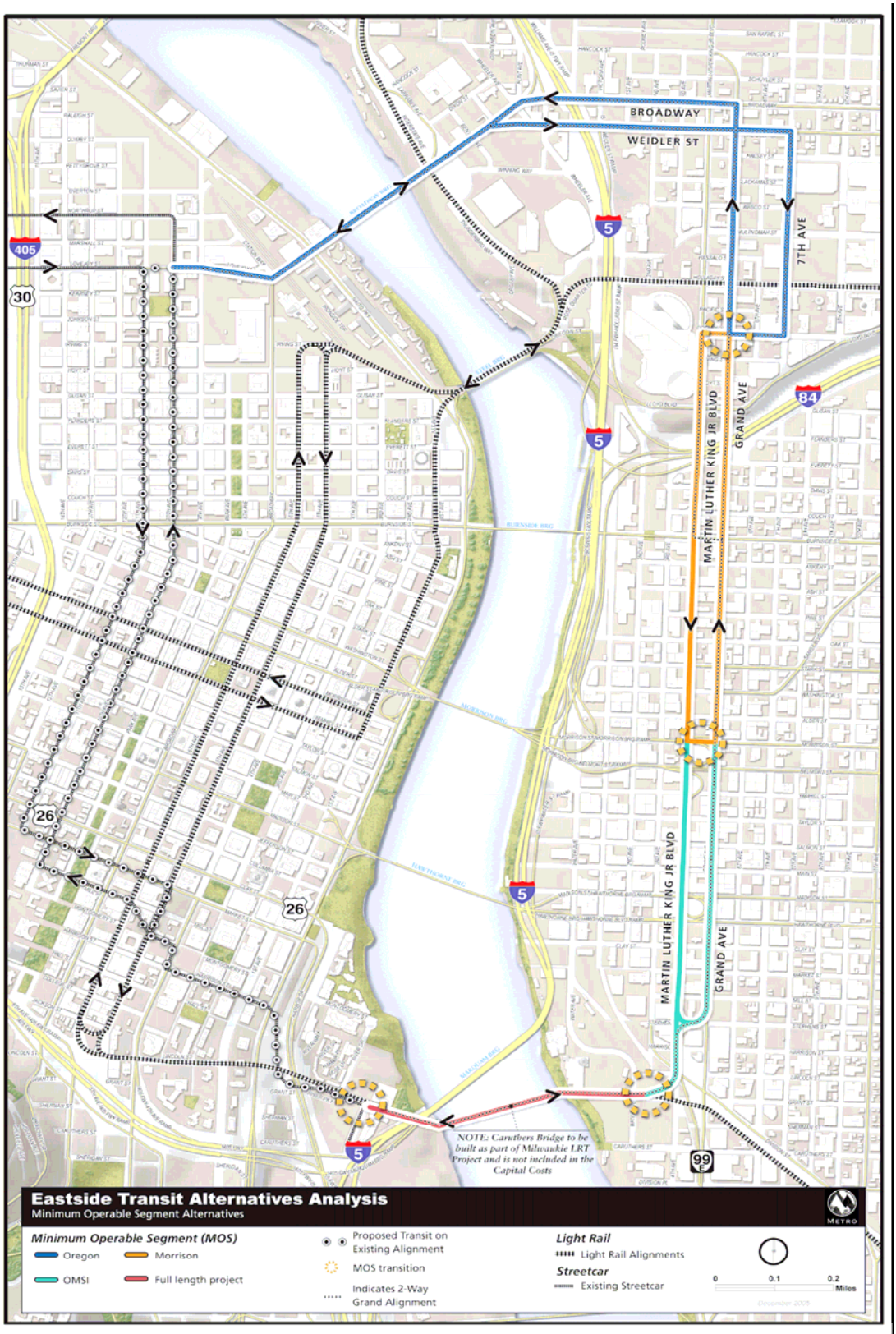
OMSI Minimum Operable Segment (MOS)

Streetcar Improvements

The OMSI Minimum Operable Segment (MOS) would include a new streetcar alignment over the Broadway Bridge from the Pearl District to serve and Lloyd and Central Eastside Districts.

From the South Waterfront District to Portland State University though downtown on 10th/11th Avenues to the Pearl District, the OMSI MOS would operate on the existing streetcar alignment. The terminus would remain on the Eastside and would be connected to OMSI by a new streetcar bridge over the existing Union Pacific Railroad.

Figure 2-9
Streetcar Alternative and MOS



Source: Metro 2006

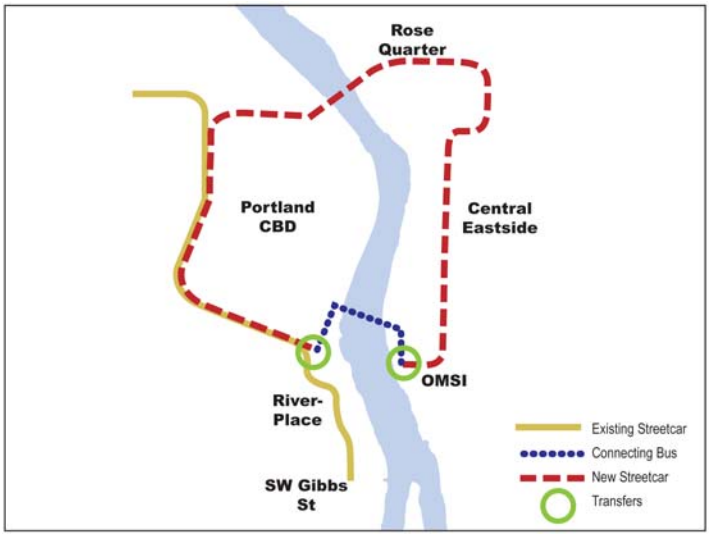
The Streetcar would include all the same streetcar and roadway improvements as the Full Loop Alternative, with the exception that it would not connect to the new Caruthers Bridge.

Access to most of the major destinations in the corridor could be made on the streetcar. Additionally, the new streetcar service would provide connections to the light rail service at the northern end of the circuit. Access to RiverPlace would require a transfer from the Eastside to the bus connector to complete the loop.

Streetcar Operations

This MOS would terminate at OMSI and a connecting bus would continue the loop from OMSI to RiverPlace via the Hawthorne Bridge, as shown in Figure 2-8.

Figure 2-8
OMSI MOS Service Concept



The total estimated one-way operating length for the OMSI MOS Alternative is approximately 5.7 miles. This is the total length to travel in one direction from RiverPlace to OMSI. The one-way operating length for the new streetcar alignment from NW Lovejoy Street to OMSI is approximately 3.3 miles and 2.4 miles shared streetcar alignment between RiverPlace and NW Lovejoy Street.

The streetcar would operate at 10-minute headways during the peak and 15-minute headways during the off-peak periods. Headways in the downtown would increase from 10-minute frequencies to 5-minutes. The connecting bus would also operate with 10-minute headways during the peak and 15 minute headway during the off-peak.

To expand the streetcar service for the OMSI MOS Alternative, an additional 10 streetcar vehicles will be needed. This includes spare vehicles for routine maintenance, emergencies and breakdowns.

Bus Operations

As previously mentioned, the OMSI MOS would terminate at OMSI with a bus connection to RiverPlace across the river to complete the loop. The approximate one-way operating length for the connecting bus from OMSI to RiverPlace via the Hawthorne Bridge is 1.4 miles.

The Bus would operate with 10-minute headways during the peak and 15-minute headways during the off-peak periods. Transfers from streetcar to bus would be provided at OMSI and RiverPlace.

Morrison Minimum Operable Segment (MOS)

Streetcar Improvements

The Morrison MOS would include most of the streetcar and roadway improvements as identified with the Full Loop and OMSI MOS alternatives. Improvements associated with the streetcar south of SE Morrison Street would not be included such as the streetcar bridge over the Union Pacific Railroad would be eliminated.

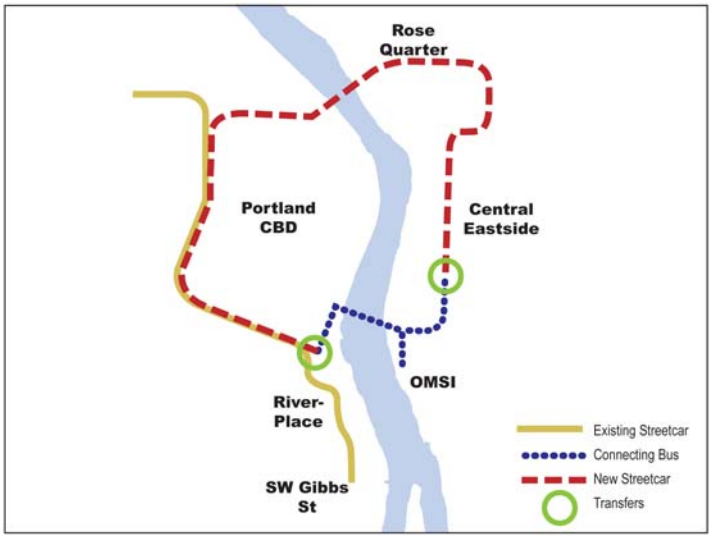
This alternative would require minor improvements at the terminus at SE Morrison Street. Currently SE Morrison Street, at this location, has one lane eastbound. With this alternative, there would still be one lane eastbound but streetcar would operate westbound. A mountable curb would be constructed to separate the auto and streetcar lanes.

The Morrison Street MOS Streetcar provides access from RiverPlace through downtown Portland, over the river, through Lloyd District and to the Central Eastside District. This MOS does not travel through the Central Eastside; therefore, portions of this district are accessible by streetcar. A bus would complete the loop from SE Morrison Street to OMSI and over the Hawthorne Bridge to RiverPlace to complete the loop. This MOS also provides direct connection to the Morrison Bridgehead and transit routes crossing the Morrison Bridge.

Streetcar Operations

The Morrison MOS would terminate at SE Morrison Street with a connecting bus to OMSI and RiverPlace via the Hawthorne Bridge, as shown in Figure 2-10.

Figure 2-10
Morrison MOS Service Concept



The total estimated one-way operating length for the SE Morrison Street MOS Alternative is about 4.8 miles. This is the total length to travel in one direction from RiverPlace to SE Morrison Street. Approximately 2.4 miles is the one-way operating for the new streetcar alignment and 2.4 miles is shared streetcar on the existing alignment between RiverPlace and NW Lovejoy Street.

The streetcar would operate with 10-minute headways during the peak and 15-minute headways during the off-peak periods. Headways in the downtown would increase from 10-minute frequencies to 5-minutes. To expand the streetcar service for the Morrison MOS Alternative, an additional 8 streetcar vehicles will be needed. This includes spare vehicles for routine maintenance, emergencies and breakdowns.

The Morrison MOS would provide access to the Lloyd and a portion of the Central Eastside Districts. A transfer to a connecting bus would be required to make the full loop and to access OMSI and RiverPlace.

Bus Operations

The Morrison MOS Alternative would terminate at SE Morrison Street with a bus connection to OMSI and RiverPlace via the Hawthorne Bridge to complete the loop. The approximate one-way operating length for the connecting bus from SE Morrison Street to OMSI and RiverPlace via the Hawthorne Bridge is 2.3 miles.

The Bus would operate with 10-minute headways during the peak and 15-minute headways during the off-peak periods to complete the loop. Transfers to the connecting bus would occur at SE Morrison Street and RiverPlace. At Morrison Street, streetcar riders would connect to the bus to OMSI or to TriMet Line 15-Belmont over the Morrison Bridge.

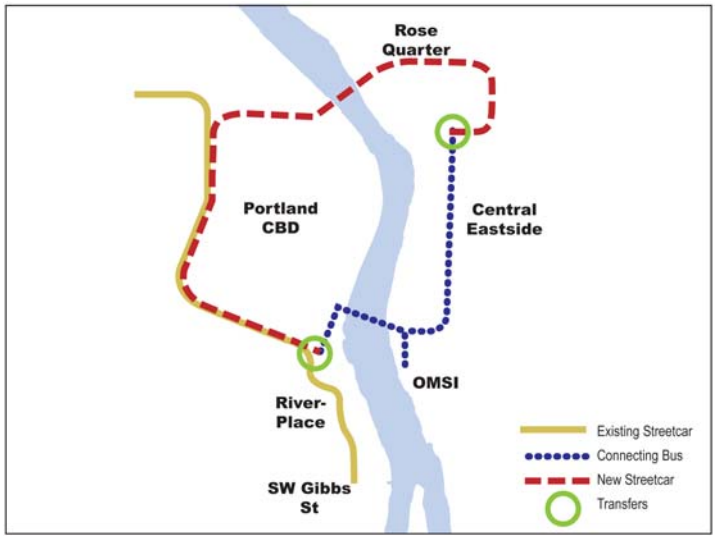
Oregon Minimum Operable Segment

Streetcar Improvements
The Oregon MOS would include a streetcar alignment that would add another route that would operate along the existing streetcar alignment from the South Waterfront District to Portland State University through downtown on 10th/11th avenues to the Pearl District where it would extend over the Broadway Bridge and operate on NE Weidler to NE 7th Avenue where the alignment would turn south to NE Oregon.

This alternative would only include those improvements north of NE Oregon Street. This alternative would not include any queue jumps or the streetcar bridge over the Union Pacific Railroad to OMSI. It would however include some roadway widening to provide for turn lanes and separate transit phases at signalized intersections for streetcar.

Streetcar Operations
The Oregon MOS would terminate at NE Oregon Street with a connecting bus to OMSI and RiverPlace via the Hawthorne Bridge, as shown in Figure 2-11.

Figure 2-11
Oregon MOS Service Concept



The total estimated one-way operating length for the Oregon MOS Alternative is 4.0 miles. This is the total length to travel in one direction from RiverPlace to NE Oregon Street. The one-way operating length of new streetcar operations is approximately 1.6 miles and the shared alignment with the existing streetcar is 2.4 miles between RiverPlace and NW Lovejoy Street.

The streetcar would operate at 10-minute headways during the peak and 15-minute headways during the off-peak periods. Headways in the downtown would increase from 10-minute frequencies to 5-minutes. To expand the streetcar service for the Oregon MOS Alternative, an additional 6 streetcar vehicles will be needed. This includes spare vehicles for routine maintenance, emergencies and breakdowns.

The Oregon MOS would provide streetcar access to the Lloyd District. A transfer to a connecting bus would be required to make the full loop and to access the Central Eastside District, OMSI and RiverPlace.

Bus Operations
The Oregon MOS provides access from RiverPlace through downtown Portland, over the river, and through Lloyd District. This MOS stops north of the Central Eastside; therefore, a bus would complete the loop. The approximate one-way operating length for the connecting bus is 3.2 miles from NE Oregon Street to OMSI and RiverPlace via the Hawthorne Bridge. Transfers to the connecting bus would occur at NE Oregon Street and RiverPlace. The Bus would operate with 10-minute headways during the peak and 15-minute headways during the off-peak periods to complete the loop.

Design Option
The Two-Way Grand Design Option was developed as an alternative to the MLK Boulevard/Grand Avenue couplet to address transfer connection to radial bus lines and to improve the pedestrian

environment. Figure 2-12 shows the proposed Two-Way Grand Design Option. With a Two-way Grand Avenue alignment, Grand Avenue would be converted to a two-way street. Streetcar would operate in both directions in the travel lanes with traffic. The proposed streetcar alignment would remain the same north of E Burnside Street. Southbound streetcar would turn northbound on E Burnside and southbound on SE Grand Avenue. Both northbound and southbound streetcar would operate on SE Grand Avenue. SE 7th Avenue would provide for the northbound function to replace SE Grand Avenue.

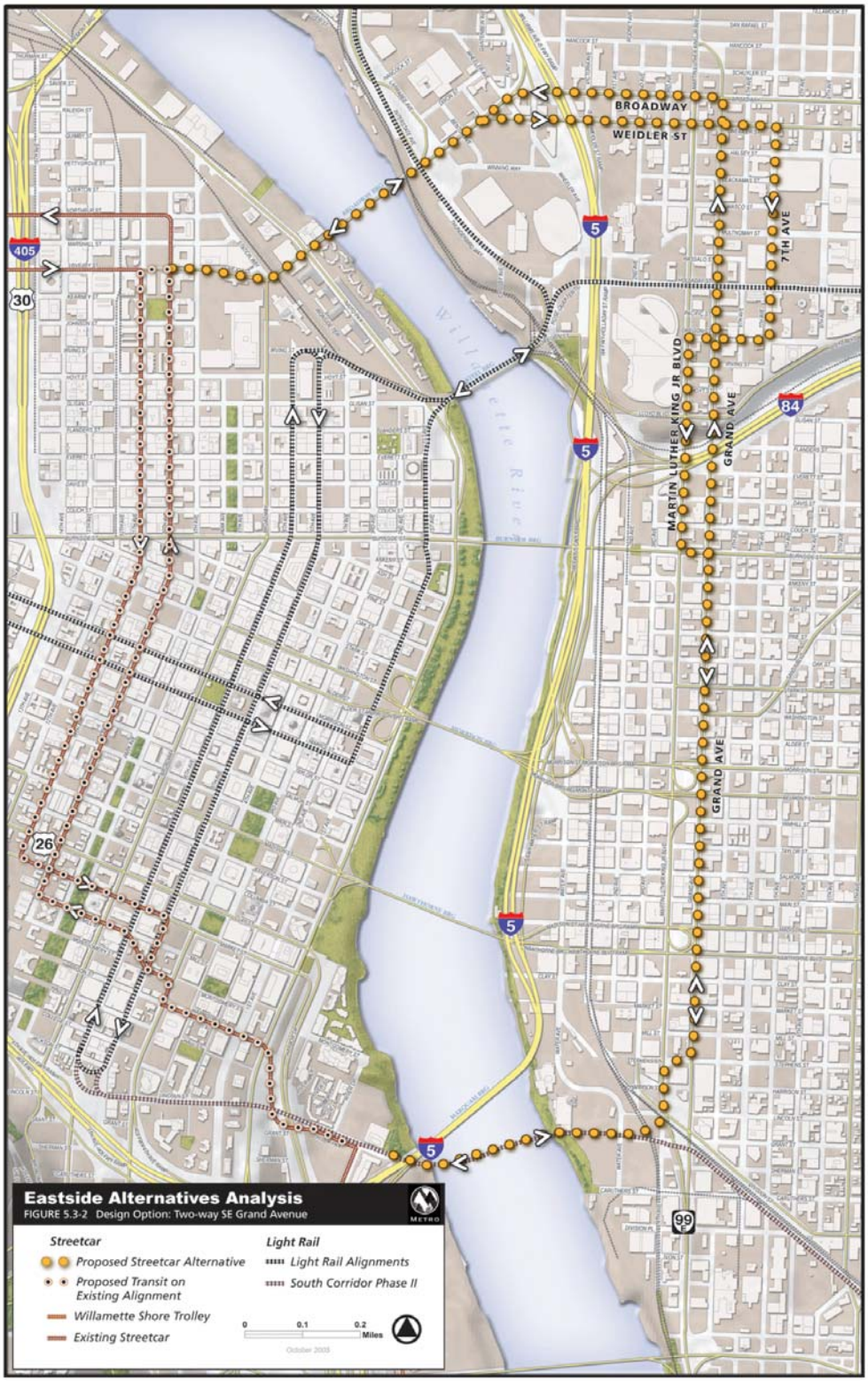
This design option would require that the lane configuration and signals be modified. A southbound lane would be introduced to Grand Ave. The number of lanes northbound on Grand would be reduced. This would require re-routing vehicle traffic from the Grand Ave Viaduct through the Central Eastside. The current proposal is to convert SE 7th Ave to one-way northbound to accommodate increased traffic volumes and serve as the couplet to MLK Blvd. Traffic would be re-routed from the Grand Ave Viaduct at SE Mill Street and back to Grand somewhere between NE Couch and NE Everett before the I-84 overpass. This conversion would require removal and relocation of one or both bike lanes on SE 7th Ave.

The Two-Way Grand Design Option would require more extensive roadway improvements to SE 7th Avenue to carry northbound auto trips diverted from SE Grand Avenue. Transitions to and from SE Grand Avenue would be required at SE Stephens Street on the southern end and NE Couch Street on the northern end of the alignment. Additionally, roadway improvements would be needed to change NE Grand Avenue from one-way traffic operation to two-way traffic operation.

The Two-Way Grand Avenue Design Option has been designed so that it could be applied to any of the MOSs with the exception of the Oregon MOS which doesn't extend to the Central Eastside, and does not preclude either two-way Grand Avenue design option or the MLK/Grand couplet alignment extension to the Central Eastside.

Summary of the Streetcar Alternative and the Minimum Operable Segments
Table 2-1, on the next page, summarizes some of the operational characteristics of each the Streetcar Alternative. The goal in defining the alternatives was to provide a similar level of service among the alternatives, while taking into account the unique characteristics of each MOS.

Figure 2-12
Two Way Grand Design Option



Source: Metro 2006

Table 2-1
Summary of Transit Characteristics by Alignment

	No-Build Bus (Line 83)	Full Loop	OMSI MOS	Morrison MOS	Oregon MOS
Streetcar Length (in miles)					
Total One-Way Length[1]		6.0	5.7	4.8	4.0
Existing/Shared Streetcar Length	2.4	2.4	2.4	2.4	2.4
New Streetcar Length	NA	3.6	3.3	2.4	1.6
Bus Connector Length[2]	3.5	NA	1.4	2.3	3.2
Headways (in minutes)					
Shared Streetcar Headways	10-min peak/15-min off peak	5-min peak/7.5 min off-peak	5-min peak/7.5 min off-peak	5-min peak/7.5 min off-peak	5-min peak/7.5 min off-peak
New Streetcar Headways	NA	10-min peak/15-min off-peak	10-min peak/15-min off-peak	10-min peak/15-min off-peak	10-min peak/15-min off-peak
Peak Bus Connector Headways	10-min peak/15-min off-peak	10-min peak/15-min off-peak	10-min peak/15-min off-peak	10-min peak/15-min off-peak	10-min peak/15-min off-peak
Peak Streetcar Vehicle Requirements[3]	NA	12	10	7	6
Bus Connector Transfer Locations	NA	NA	At OMSI and RiverPlace	At SE Morrison St and RiverPlace	At NE Oregon St and RiverPlace
Compatible with the Two-Way Grand Design Option	NA	Yes	Yes	Yes	NA[4]

[1] Estimated one-way length
[2] With the Minimum Operable Segments (MOS), transfer to a bus is required to complete the loop.
[3] This includes the total number of vehicles needed to provide the streetcar service to the Central Eastside as well as additional spare vehicles for maintenance, emergencies, and breakdowns.
[4] The Two-Way Grand Avenue Design Option has been designed so that it could be applied to any of the MOSs with the exception of the Oregon MOS which doesn't extend to the Central Eastside, but does not preclude either two-way Grand Avenue design option or the MLK/Grand couplet alignment extension to the Central Eastside.

Streetcar/Bus Alternatives Previously Considered

A full loop bus circulator was considered. However, the No-Build alternative serves the same function by providing similar service on the Eastside with ample transfer opportunities at the Rose Quarter Transit Center to nine bus lines and four MAX lines with transit access to the Westside including major visitor destinations, employment and residential areas and major redevelopment sites. A bus circulator alternative with further bus system enhancements would not garner public support because it would not have the level of demonstrated economic development impacts that would realized with streetcar.

In addition, FTA has stated in draft guidance that:

> "For the Small Starts program, a baseline alternative may be less important in both accurately determining the costs and benefits of some projects and establishing a level playing field for evaluation across the country. …a baseline alternative may not be necessary for certain kinds of projects based on their costs or other characteristics"

Accordingly, the No-Build alternative is effectively the baseline alternative and no separate baseline alternative has been included in this Alternatives Analysis.

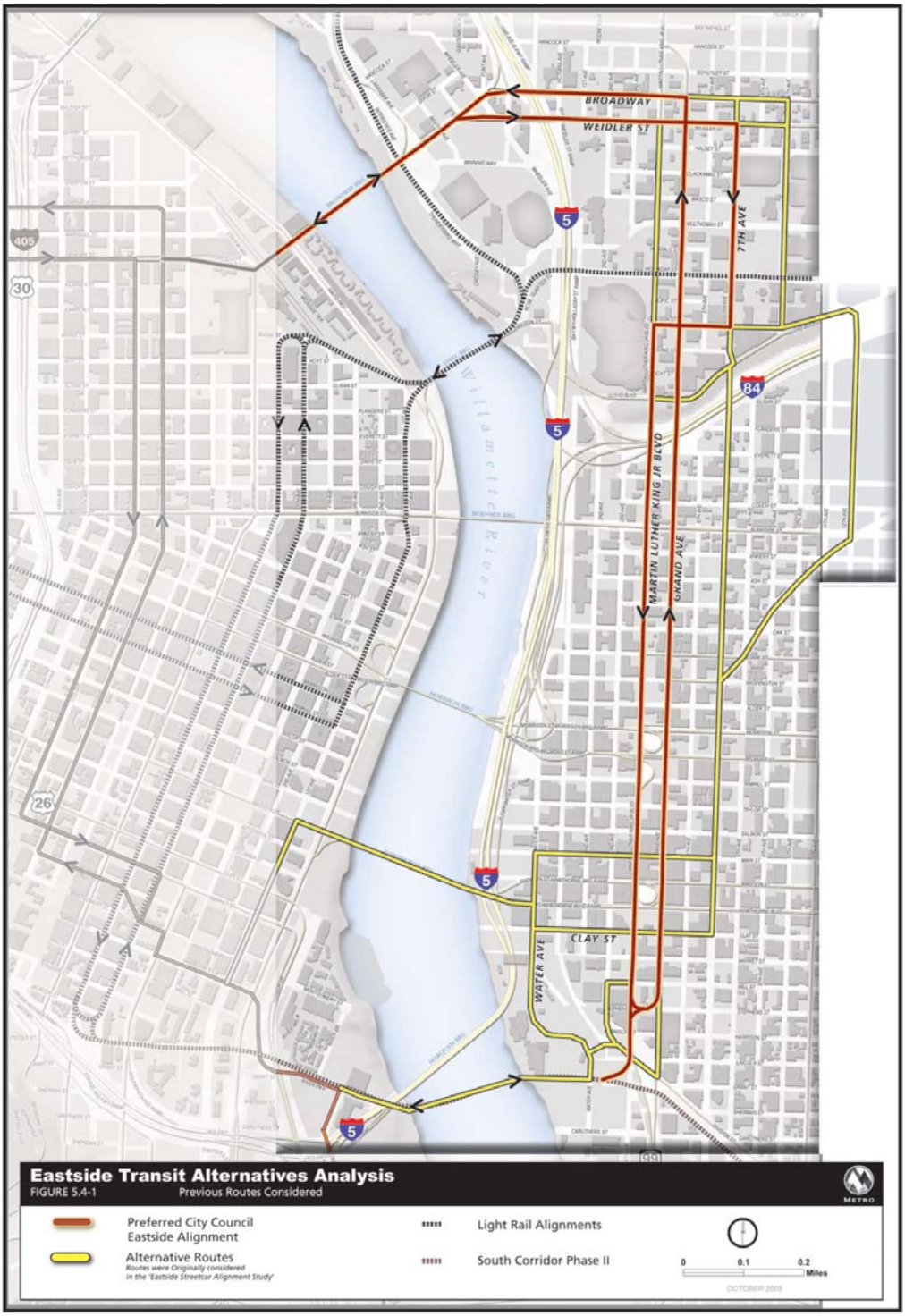
The City of Portland and Portland Streetcar Inc. completed an analysis of a number of alternative alignments for the extension of streetcar to the Lloyd and Eastside districts during 2002 and 2003 (*Eastside Streetcar Alignment Study*, City of Portland, June 2003.)

The City of Portland appointed an Eastside Steering Committee comprised of business and community leaders from the Lloyd and Eastside districts. The charge to this committee was to investigate potential streetcar alignments that could connect into the existing streetcar alignment located in the downtown district. This committee examined a number of potential alignments and recommended a preferred alignment to the Portland City Council and the Multnomah Board of Commissioners in June 2003. Potential alternatives proposed and not recommended to advance are illustrated on Figure 2-13.

Comparing 6th and 7th avenue alignments with the MLK/Grand alignment, it was concluded that service on MLK would better strengthen the existing MLK/Grand couplet, by providing more transit accessibility to all of the convention related uses, existing and planned, for the area and serving existing and potentially much greater development than other alignments. (See land use policies in Chapter 3 for more information about zoning and city policies related to development in the Central Eastside.) Proposals for using 7th Avenue south of Interstate 84 were judged to have potential impacts such as traffic diversion on nearby residential streets, potential increases in on-street parking by out of neighborhood streetcar users and potential pressure to rezone existing nearby residential areas.

Two alternative crossings of the Willamette River were also considered: the existing Hawthorne Bridge and a new bridge in a location that aligns with Caruthers Street. The Caruthers Bridge was recommended by the City in 2003 because it would provide for a direct connection to the existing streetcar alignment on the Westside. The Hawthorne Bridge alignment, though recommended for retaining as a backup option, was not recommended as it would result in out-of-direction travel for a Central City transit circulator loop configuration.

Figure 2-13 Alternatives Considered and Not Advanced



Chapter 3. Evaluation

Introduction
Evaluation of the alternatives is vital to making a deliberative, documented and fact-based selection of a Locally Preferred Alternative (LPA) and to provide the Federal Transit Administration (FTA) with validation that federal requirements and considerations have been addressed.

Evaluation criteria for the Eastside Transit Alternatives Analysis include the emerging FTA Small Starts funding criteria as well as the following criteria developed by the project team and advisory committees to address the projects' purpose and need:

Transportation Measures
- Transit access to households and jobs within ¼ mile ;
- Travel times to selected locations;
- Transit ridership;
- District to District transit trips;
- Qualitative assessment of transit connectivity;
- Qualitative evaluation of transfer opportunities;
- Qualitative appraisal of how identifiable transit alternatives are;
- Qualitative review of changes to parking demand;
- Qualitative assessment of the quality of transit links to regional tourism facilities;

Land Use Plan Measures
- Consistency with region and local land use plans and goals;
- Consistency with state-wide planning goals;

Economic Development Measures
- Additional jobs, housing, that would likely be created with some transit alternatives;
- Private investment induced;
- Tax base improvements;

Cost-Effectiveness
- Comparison of ridership and capital and operating costs;

Financial Feasibility
- Local match share sources;
- Risks and sensitivity to risks in revenue projections;

Each of these evaluation measures will be addressed in the following sections.

Transportation

Introduction

This section describes how well the alternatives meet the study transportation criteria described above. Many of the criteria are quantitative and are based on travel demand forecasts that have been developed for the year 2025. These forecasts use Metro's regional travel forecasting models that are described in further detail in the *Travel Demand Forecasting Methodology Report* prepared and submitted to FTA (March 2006).

This section also includes several criteria that are addressed with qualitative analyses. The qualitative analyses are generally based on the professional judgment of staff, the consulting team and the study's Technical Advisory Committee, made up of staff from participating jurisdictions.

As previously described, the purpose of the Eastside Transit Alternatives Analysis is to assess alternatives that would extend existing transit service from the west side of Portland's Central City to the eastside, providing a transit circulator, or loop, serving all of the Central City. By definition, the Central City corridor, which is entirely within the Central City, is quite different than a typical radial corridor that connects Portland's Central Business District (CBD) with outlying centers. Also because of its location, the Central City corridor encompasses a very transit-rich environment. Accordingly, there are numerous transit paths available for every trip. For example, Milwaukie LRT and the existing streetcar, which are included in every alternative, overlap areas served by the proposed new streetcar. Consequently, the distinction between alternatives is minor. As the system matures with increasing coverage and service levels, the connections between key locations becomes more important and plays a larger role in the performance of an alternative than in a typical radial corridor.

Transportation Analysis Methods

Metro's regional travel demand models continue to evolve and improve in their ability to forecast the future demand on the highway and transit systems. The models that were used for this Eastside Transit Alternative Analysis are based on the models recently used for the *South Corridor Final Environmental Impact Statement - November 2004* and the *I-205/Porltland Mall LRT Project* 2005 New Starts submittal and include improvements recommended by PB Consult to better forecast the streetcar mode. See *Travel Demand Forecasting Methodology Report* for a detailed description of model modifications.

The goal of modeling the Eastside Transit Alternatives was to develop information that would allow the comparison of the alternatives on a "level playing field". The inputs were defined and the networks were designed keeping this level playing field concept in mind. The transportation data presented in this report provides for a fair comparison of alternatives. This comparison is based on factors that are an inherent part of each alternative (access, travel time, etc.), and not on extraneous factors such as differing service levels or coverage areas.

Factors that Determine Ridership Differences

Modeling inputs such as parking cost and transit fares, along with demographic characteristics (age, income, auto ownership, etc.) play a major role in determining transit demand. However, those factors are required to be consistent for all of the alternatives and as a result do not play a major role in determining the transit ridership differences among the alternatives. The differences in transit ridership described later in this section are generally based on differences in travel times and connectivity.

Transit Service Levels (Frequency)

The service levels of the transit circulator routes, be they streetcar or bus, are similar among all of the alternatives at 10-minute peak hour headways and 15 minute off-peak. The No-Build alternative includes a local route, also at 10-minute peak hour headways and 15 minute off-peak, which serves RiverPlace, OMSI (via the Hawthorne Bridge), and the Central Eastside along MLK and Grand Avenue terminating at the Rose Quarter Transit Center. These headways assume the use of standard 65 passenger buses and 92 passenger streetcar vehicles. The No-Build alternative represents a 1.5% growth rate in annual transit system hours.

The peak hour transit service is sized so that it accommodates the forecast amount of peak hour transit demand. In other words, the service level on the bus or streetcar circulator route is, in part, dictated by the overall attractiveness of the mode.

Access

Each alternative was analyzed with the same underlying transit network. As indicated in Table 3-1, there are no significant differences among the alternatives with regards to which portions of the corridor have walk accessibility to the transit system. Each alternative has the same transit coverage in terms of households and employment, creating a "level playing field" for the analysis. However, there may be differences among the alternatives with regards to the quality of the transit service that can be accessed by walking, and by bus transfer. In other words, the quality of the transit service that is walk accessible differs among the alternatives and can have an influence on the performance of the alternatives. In short, some alternatives would require more transfers than others for certain origin and destination pairs. The added out-of-vehicle time required for transferring shows up in the travel times, which are described later in this section.

Table 3-1
Households and Employment within ¼ mile of Transit
P.M. Peak Hour, Year 2025

	No-Build	Full Loop	OMSI MOS	Morrison MOS	Oregon MOS
Households					
Total Corridor Households	30,700	30,700	30,700	30,700	30,700
Covered Households	30,700	30,700	30,700	30,700	30,700
Percent Households Covered	100%	100%	100%	100%	100%
Employment					
Total Corridor Employment	275,000	275,000	275,000	275,000	275,000
Covered Employment	275,000	275,000	275,000	275,000	275,000
Percent Employment Covered	100%	100%	100%	100%	100%

Source: Metro, 2006

Travel Time

Transit travel time is a significant factor in determining the level of transit demand. If one alternative can offer a travel time savings (compared to another alternative) for a variety of different trips, it will attract more transit riders. When a bus or streetcar operates in mixed traffic its travel times are based on the auto travel time along the route plus dwell time that accounts for decelerating, stopping to pick up passengers and accelerating.

Transit travel time includes two components, in-vehicle time and out-of-vehicle time. In-vehicle time is the time spent traveling in the transit vehicle, including dwell time at stops to pick up and unload passengers. Out-of-vehicle time includes time spent walking to or from the transit line and waiting for a transit vehicle and any transfer wait time, if incurred.

Measure – Improve Central City Transit Ridership

This section presents information on various measures of transit ridership for each alternative.

Total corridor ridership includes all transit trips (light rail, streetcar and buses) to, from and within the corridor. This measure compares how well each of the alternatives serves the transit trips to, from and within the corridor.

Figure 3-1 defines the eight districts in the Portland Central City that comprise the corridor or travel market for trips that would utilize the proposed transportation alternatives. The corridor includes the Downtown, University, Pearl, Northwest, Lloyd, Central Eastside and South Waterfront districts.

Figure 3-1
Central City Districts

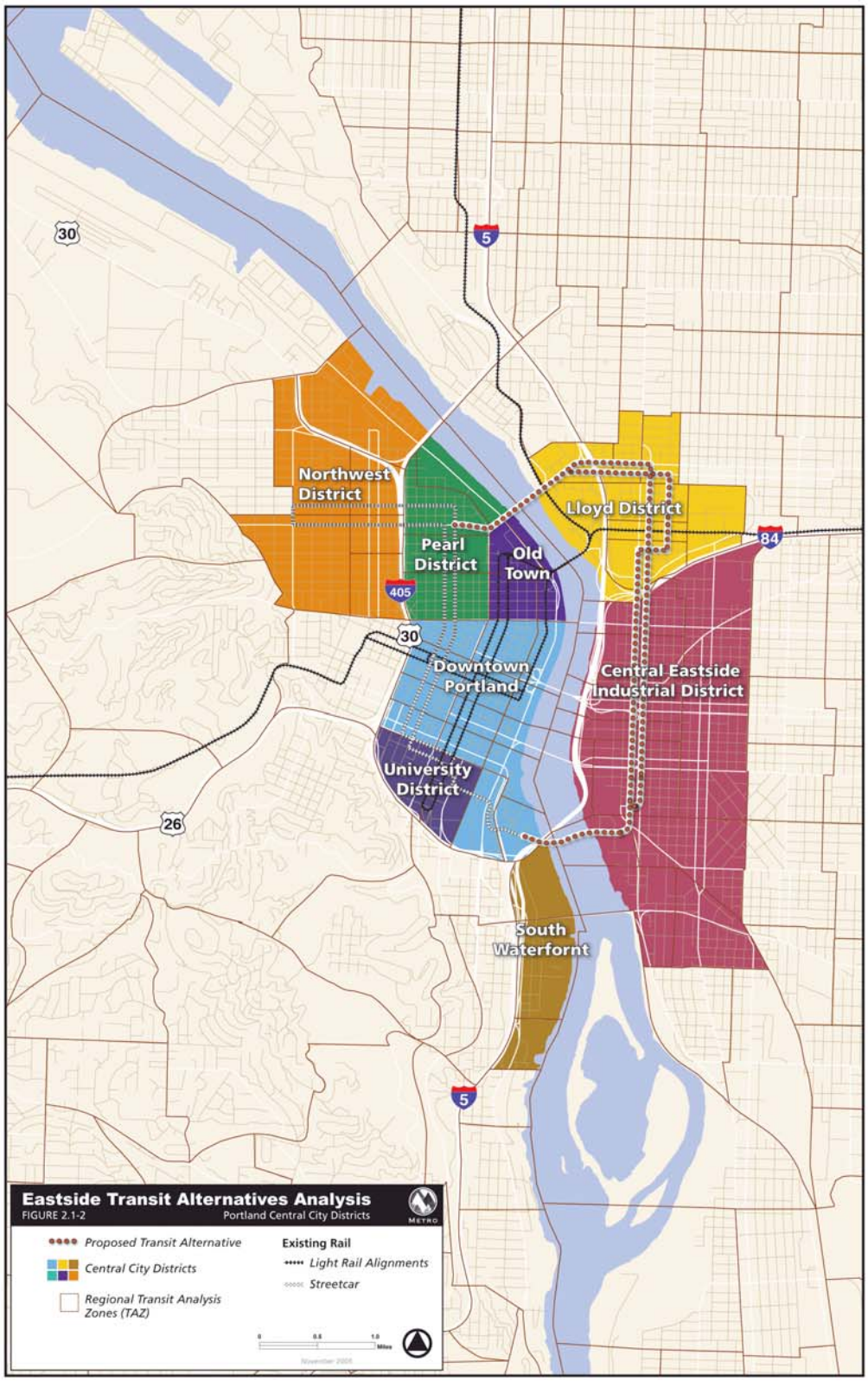
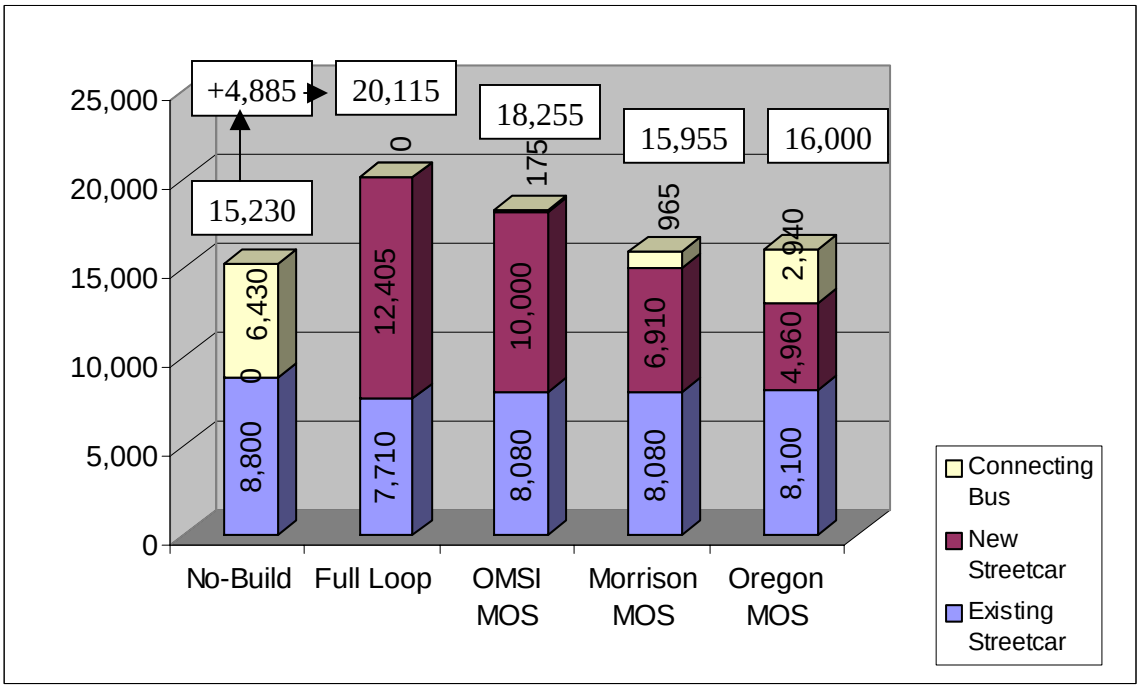


Figure 3-2
Streetcar and Bus Ridership Average Weekday – Year 2025



Source: Metro 2006

Figure 3-2 shows the daily ridership on the existing streetcar, new streetcar and connecting bus analyzed with each alternative. While it is difficult to compare among these very different alternatives, this information, coupled with the corridor transit ridership, can provide valuable information in evaluating the alternatives.

Streetcar and Bus Ridership
The No-Build alternative results in 8,800 riders on the existing streetcar and 6,430 riders on the eastside connector bus for a total of 15,230 streetcar and bus riders. There is no "new streetcar" in the No-Build alternative.

The Full Loop alternative results in 7,710 on the existing streetcar and 12,405 on the new streetcar for a total of 20,115 streetcar riders, or 4,885 more than the No-Build alternative. There is no connecting bus in the Full Loop alternative.

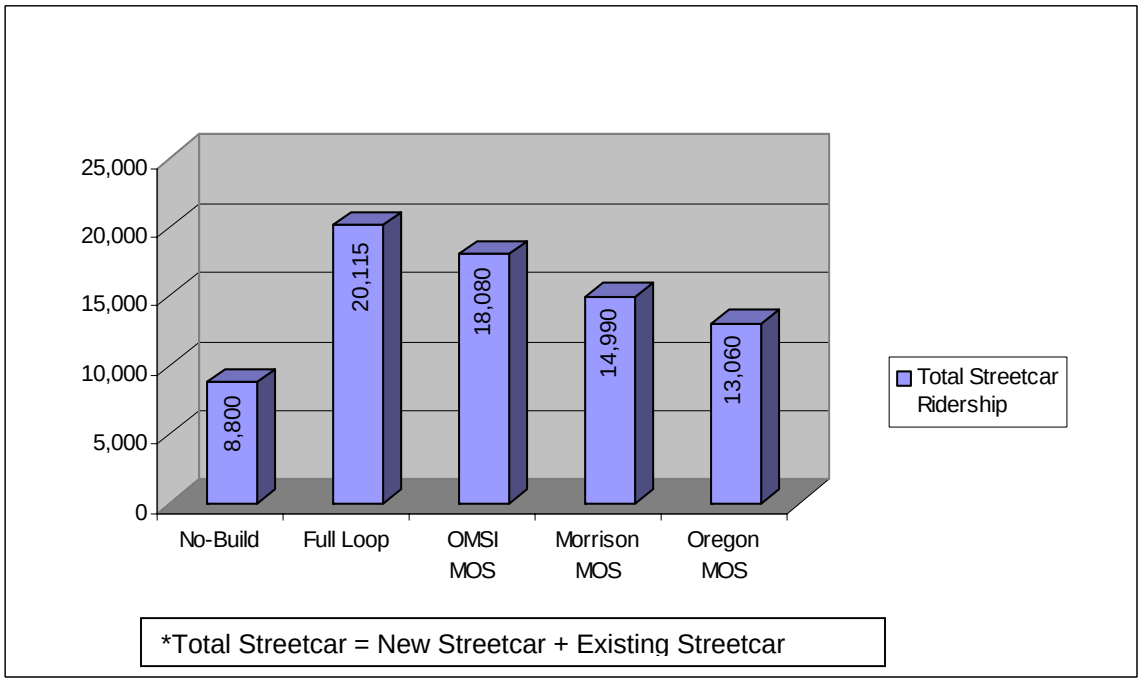
The OMSI MOS alternative produces 8,080 on the existing streetcar, 10,000 on the new streetcar, and 175 on the connecting eastside bus for a total of 18,255 bus and streetcar riders. Compared to the No-Build, this is an increase of 3,025 riders.

The Morrison MOS alternative shows 8,080 riders on the existing streetcar, 6,910 on the new streetcar and 965 on the eastside connecting bus for a total of 15,955 bus and streetcar riders, or 725 more than the No-Build alternative.

The Oregon MOS alternative produces 8,100 riders on the existing streetcar, 4,960 on the new streetcar and 2,940 on the eastside connecting bus for a total of 16,000 bus and streetcar riders, 770 more than the No-Build alternative.

Overall, all of the Build alternatives result in an increase in bus and streetcar ridership on the key routes in the corridor. The shorter MOS's, Oregon and Morrison, show a slight increase of approximately 700 riders each. The OMSI MOS shows an overall increase of approximately 3,000 bus and streetcar riders and the Full Loop alternative shows the highest increase at approximately 4,800 riders.

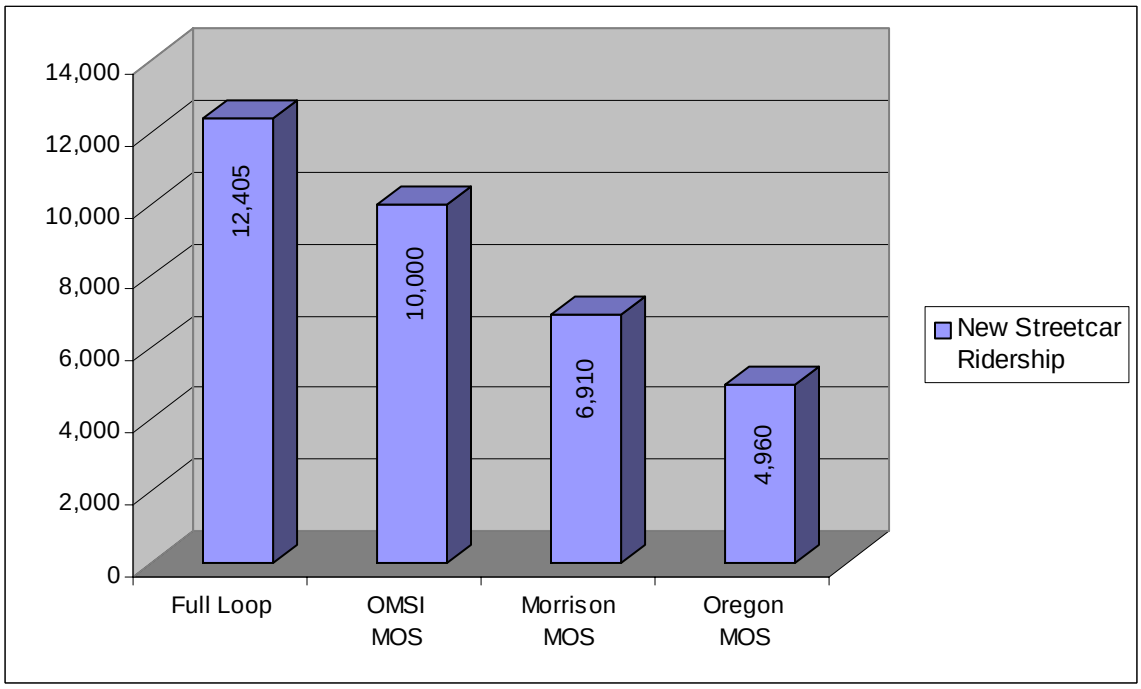
Figure 3-3
Total Streetcar* Ridership Average Weekday – Year 2025



Source: Metro 2006

Figure 3-3 focuses exclusively on the average weekday ridership on the existing streetcar and the new streetcar lines only. The No-Build alternative is forecast to carry 8,800 riders on the existing streetcar line. The Full Loop alternative, with the introduction of a new streetcar line to the eastside, is forecast to carry 20,115 riders, nearly 11,315 more than the No-Build alternative. As expected, the MOS alternatives with fewer additional new streetcar miles show ridership commensurate with the length of the streetcar line; 18,080 riders for the OMSI MOS, 14,990 for the Morrison MOS, and 13,060 for the Oregon MOS.

Figure 3-4
New Streetcar Transit Ridership Average Weekday – Year 2025



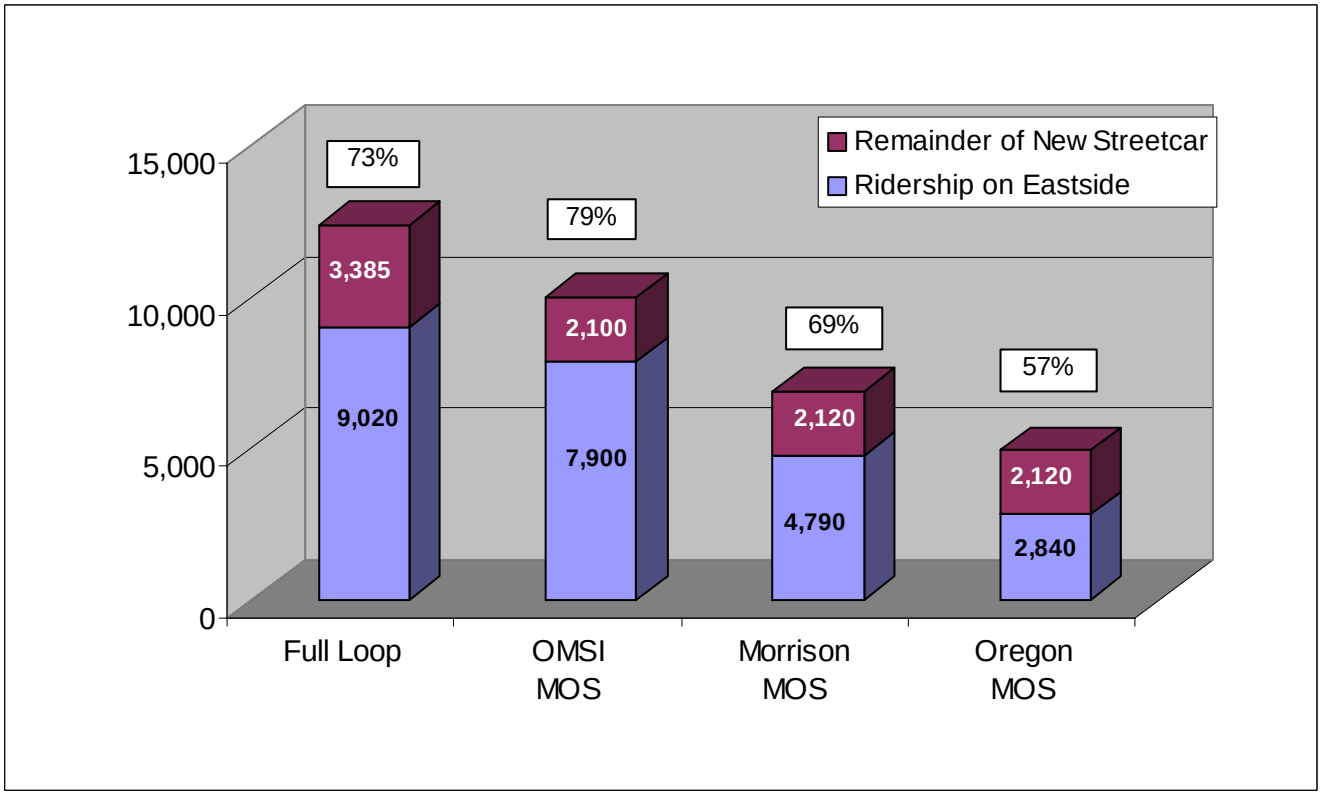
Source: Metro 2006

Figure 3-4 shows the average weekday ridership the on new streetcar line only, which includes operations on existing 10/11th from RiverPlace to Broadway Bridge in addition to new construction. The Full Loop alternative is forecast to carry 12,405 riders a day. The MOS alternatives' successively shorter additional new streetcar miles yield 9,995 riders for the OMSI MOS, 6,910 for the Morrison MOS, and 4,960 for the Oregon MOS.

Measure – Improve Eastside Transit Ridership

Another measure of comparison for alternatives is to assess new ridership within the Eastside. Table 3-5, below, shows the percentage of ridership on the new streetcar line where some portion of the trip occurs in the Central Eastside (See Figure 3-1 for district map). As shown, all of the build alternatives have over 50 percent of their ridership with at least some portion of the trip occurring in the Central Eastside. The OMSI MOS and Full Loop alternatives would exhibit the highest percentage of streetcar ridership on the eastside at approximately 75 percent, in part because in both of these alternatives streetcar traverses the entire eastside. The Morrison MOS, where streetcar traverses about ½ of the eastside, results in 69 percent of its riders with at least some portion of their trip occurring on the eastside. The Oregon MOS, which introduces streetcar to the Lloyd District, results in 57 percent of its riders with at least some portion of their trip occurring on the eastside. Also, refer to figures 3-10a and 3-10b for streetcar ridership distribution patterns.

Figure 3-5
Percentage of New Streetcar Ridership with Some Portion of Trip in the Central Eastside - Average Weekday, Year 2025



Source: Metro 2006

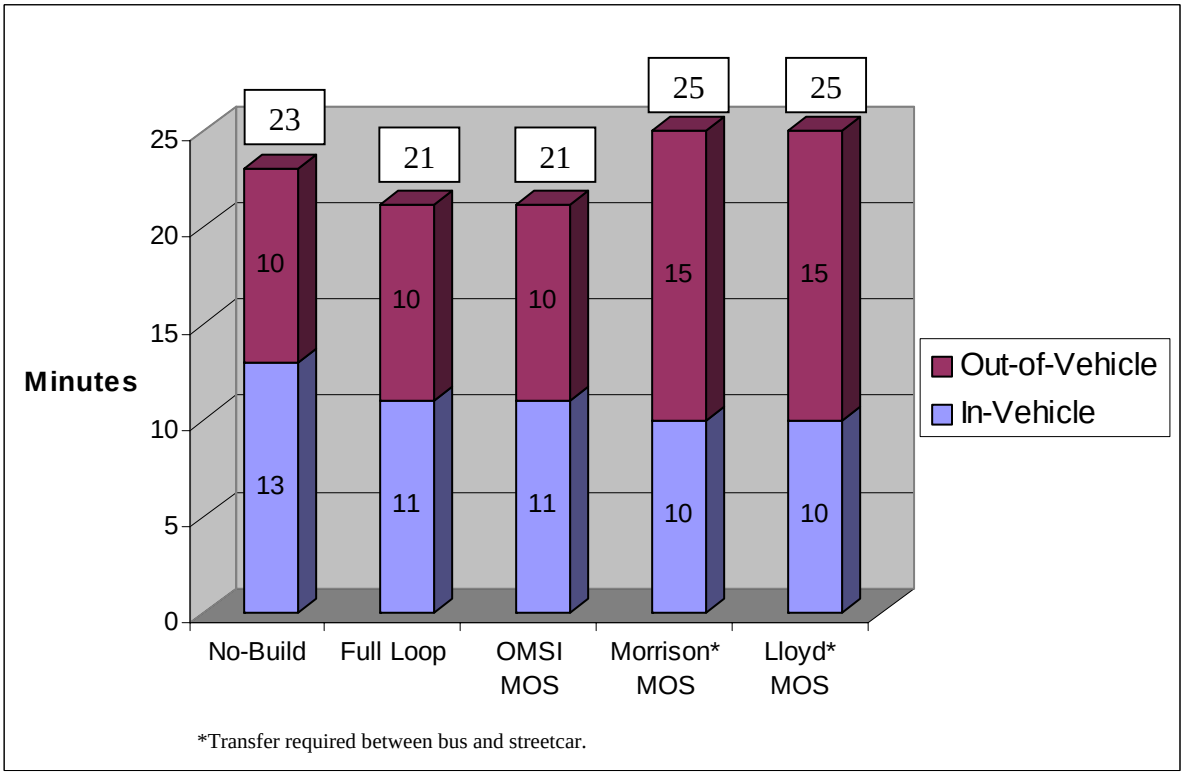
Corridor Transit Ridership and Trips

The Full Loop alternative would provide the largest improvement in corridor transit ridership with 1,000 additional transit riders in the corridor as compared to the No-Build. The OMSI MOS alternative would provide the second largest improvement at 750 additional riders followed by the Oregon MOS at 310. The Morrison MOS would result in a loss of approximately 200 transit riders in the corridor, as compared to the No-Build alternative, because of an additional transfer required for a variety of origin and destination pairs. For example, a trip traveling from the Lloyd District to SE Portland would require a single transfer in all the alternatives, the exception being the Morrison MOS, which would require an additional transfer to traverse the eastside. Refer to the travel time section for a more detailed explanation.

Total internal transit trips (light rail, streetcar and buses) within the corridor is defined as all transit trips with both trip ends occurring totally within the Central City districts as shown in Figure 3-1. All of the future year (2025) alternatives would increase the number of transit trips within the corridor as compared to the 2005 Base Year at an annual growth rate of approximately 2.7%. Compared to the No-Build alternative, the Full Loop alternative results in 700 more transit trips within the corridor at 39,240 average weekday trips. The OMSI MOS provides the second largest improvement in internal corridor transit trips at 39,030, 560 more than the No-Build alternative. The Oregon MOS and Morrison MOS alternatives are similar with 390 and 290 more transit trips within the corridor compared to the No-Build alternative, respectively.

Measure - Improve north/south transit connectivity and capacity through the Central Eastside. This section focuses on how well each alternative improves transit connectivity and capacity through the Central Eastside. As stated, transit travel time is a significant factor in determining transit demand. Any alternative that provides a travel time savings will attract more ridership. And while there are no differences among the alternatives with regards to accessibility and transit coverage, there may be differences among the alternatives with regards to the quality of the transit service that can be accessed by walking and by bus transfer.

Figure 3-6
Total Transit Travel Time between the Lloyd District (near Multnomah and 7th Avenue) and OMSI via New Streetcar and/or Bus – PM Peak, Year 2025



Source: Metro 2006

For example, Figure 3-6 shows total transit travel time for a trip entirely on the Eastside in the p.m. peak between the Lloyd District (just south of Multnomah St. between 7th Avenue and Grand Avenue) and OMSI via either the new streetcar and/or bus connector, depending on the alternative. The data indicates that in the No-Build Alternative this trip is 23 minutes, whereas in the Full Loop and OMSI MOS alternatives this trip is 2 minutes faster at 21 minutes. This is due in part because of slight variations in congestion levels and dwell time between the streetcar and the local eastside bus. In the Morrison MOS and Oregon MOS alternatives this trip takes two minutes longer than the No-Build, 25 minutes, because of a transfer required to complete the trip to OMSI.

It should also be noted that the travel times above reflect the mode or modes used to complete the trip. For example, in the No-Build alternative this trip is entirely on a local bus. In the Full Loop and OMSI MOS alternatives this trip is entirely on the streetcar. In the Morrison MOS and

Oregon MOS alternatives this trip is on both the streetcar and bus connector and requires a transfer.

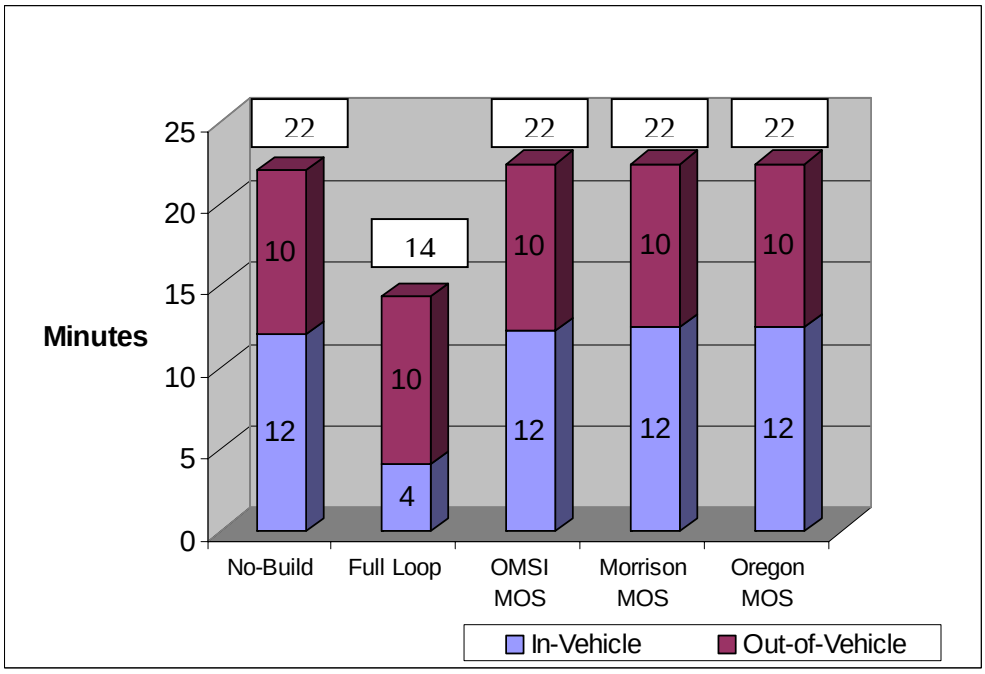
In summary, compared to the No-Build alternative, the Full Loop and OMSI MOS alternatives would improve transit connectivity through the Central Eastside by providing a limited stop, one-seat ride through the eastside. The Morrison MOS and Oregon MOS alternatives perform comparable to the No-Build because, for a majority of trips, a transfer would be required to travel through the Central Eastside.

In terms of capacity through the Central Eastside, at 10 minute peak period headways, a standard bus with a loaded capacity of 65 passengers would provide 390 seats in the p.m. one hour. A streetcar vehicle, assuming a loaded capacity of 92 passengers per vehicle, would provide 552 seats in the p.m. peak one hour through the Central Eastside. In other words, the streetcar alternatives, because of the greater carrying capacity of the vehicle, would provide more carrying capacity through the Central Eastside at equivalent headways.

Measure – Serve as a "cross-town" transit line that complements the eastside transit grid.
The eastside transit network is currently a grid network comprised of several east/west buses on streets that cross the Willamette River, including the Broadway, Burnside, Morrison, and Hawthorne Bridges. The north/south bus routes completing the grid include the #6 bus and the #70 bus. The #6 bus operates along MLK and Grand Avenue between the Hawthorne Bridge and Broadway/Weidler and continues north to the Expo Center, Jantzen Beach, and downtown Vancouver. The #70 operates north/south along 11/12th avenues terminating in Milwaukie in the south and at the Rose Quarter in the north.

The introduction of streetcar on the eastside would further complement the eastside grid system by dispersing trips across an array of destinations. In the Central City, urban circulators are needed to complete trips from the outlying transit centers and to provide for internal circulation. For example, a trip traveling from OMSI to RiverPlace today would have to take a bus downtown and transfer to the existing streetcar line to complete the trip to RiverPlace. In the No-Build alternative that same trip could be made via the bus connector, but would have to travel across the Hawthorne Bridge to complete the trip to RiverPlace. In the Full Loop alternative, that same trip could be made via the streetcar, which would continue directly to RiverPlace via the Caruthers Light Rail Bridge. Figure 3-7 shows the total transit travel time in the p.m. peak for a trip from OMSI to RiverPlace utilizing either the bus connector or streetcar. The Full Loop alternative, because it utilizes the Caruthers Bridge, saves 8 minutes of travel time by not having to cross the Hawthorne Bridge.

Figure 3-7
Total Transit Travel Time between OMSI and RiverPlace PM Peak, Year 2025



Source: Metro 2006

Travel Time Summary

The Full Loop alternative would have the best overall improvement in total transit travel times to/from and within the corridor compared to the No-Build alternative. The MOS alternatives would have somewhat less improvement, in part because of required transfers along the central eastside for some origin and destination pairs.

Measure - Improve Central City transit circulation

This section focuses on how well each alternative improves transit circulation within the Central City by extending the rail system to connect destinations such as Portland's Central Business District (CBD), RiverPlace, the Central Eastside, the Lloyd, University, and Pearl Districts, and to non-corridor locations (see Figure 3-1 for a description of the Central City districts).

Figure 3-8 displays an array of graphics that represent the distribution (calculated as a percentage) of new streetcar rider trip origins and destinations by district for each alternative.

Focusing on the district maps, there is a spatial pattern across the map that becomes evident. The Full Loop alternative, which connects the central city and the central eastside with streetcar, has a more balanced distribution pattern of origins and destinations across the study area districts. Although each district is generating a slightly lower percentage of origins and destinations, as compared to the MOS alternatives, the Full Loop alternative is serving more districts. Specifically, downtown Portland, the Lloyd, Central Eastside, and Pearl Districts show up as major origin and destinations in the Full Loop alternative, indicating a relatively equal distributions of trips in the study area.

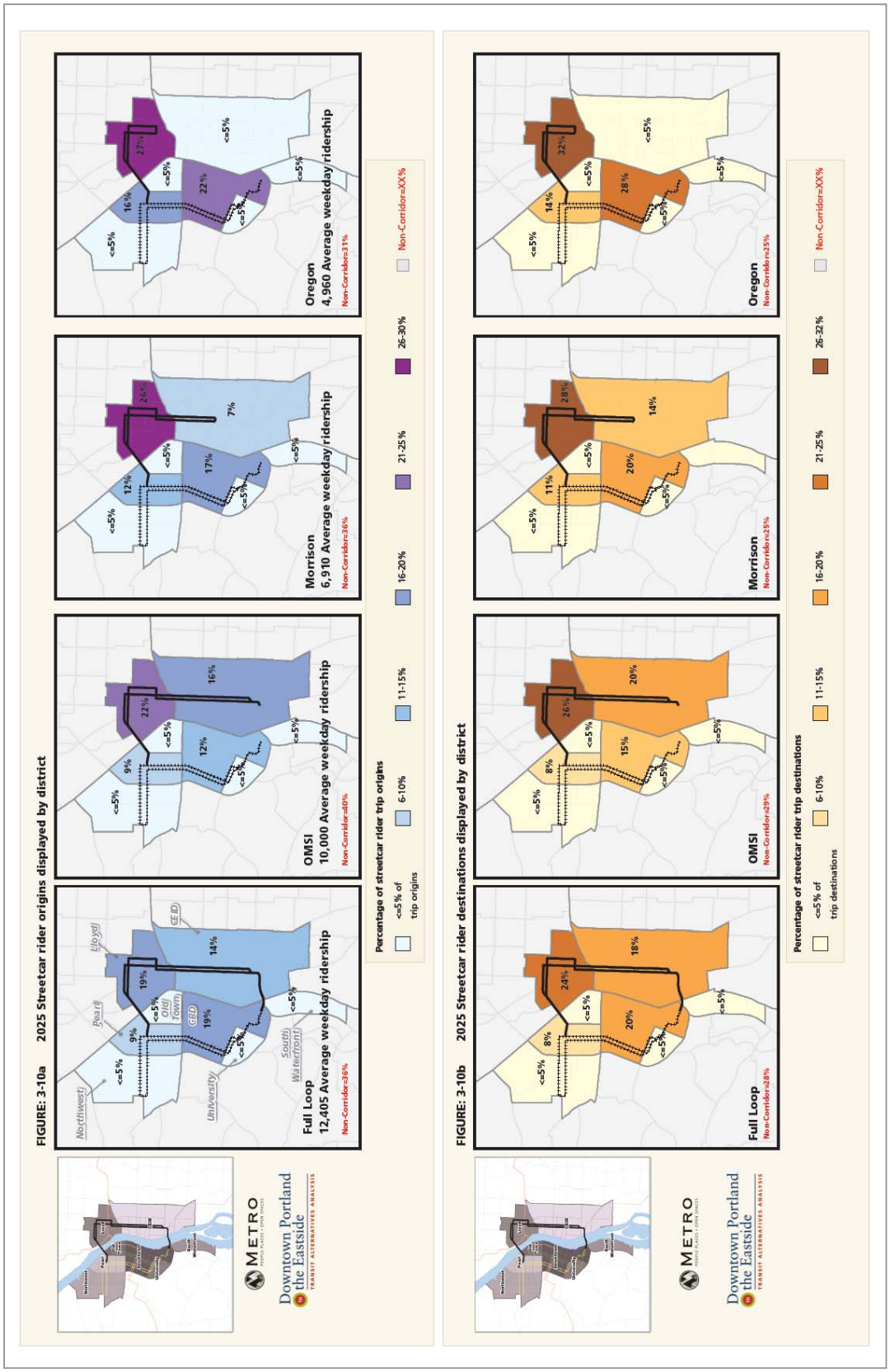
In contrast, the Oregon MOS alternative, which provides streetcar only as far as the Lloyd District, has the opposite pattern of origins and destinations. The spatial pattern reflects a more concentrated distribution of origins and destinations, with slightly higher percentage of origins

and destinations being generated by fewer districts. In the Oregon MOS, downtown Portland and the Lloyd District show up as major origins and destinations, indicating that the Oregon MOS is serving only a few districts within the corridor. The Morrison MOS does slightly better than the Oregon MOS with the Central Eastside showing up as more of an origin and destination because of the deeper penetration of streetcar into the district. The OMSI MOS is similar to the Full Loop Alternative in that a relatively equal distribution is emerging within the corridor. However, the downtown Portland district is slightly less prominent, as compared to the Full Loop alternative, in part because the OMSI MOS does not provide the connection back across the Willamette River in the southern portion of the corridor.

The district maps also exhibit other patterns among the alternatives. For example, in all the alternatives Northwest Portland, Old Town, University and South Waterfront Districts vary slightly and represent a very low percentage (< 5%) of trip origins and destinations.

On the other hand, the "non-corridor" districts, or districts outside the study area, account for a large percentage of both origins and destinations in all of the alternatives. This is due, in part, on the relatively small size of the corridor as compared to the rest of the region. In addition, approximately 1/3 of the non-corridor origins and destinations involve a district (SE Portland) just outside and adjacent to the corridor. In fact, over 2/3 of the non-corridor origins and destinations involve Multnomah County.

Figure 3-8
2025 Streetcar Rider Origins and Destinations by District



Source: Metro 2006

Another example of improved transit circulation and connectivity is an increase in the number of streetcar riders per mile of operation. As shown in Table 3-2, each alternative's extension of the streetcar line results in additional transit ridership, which results in an increase in the number of streetcar riders per mile. This indicates that, by extending the streetcar, more and more places are being connected that were not available before. For example, the Full Loop alternative extends the streetcar to the central eastside connecting the east side of the river with the downtown Portland, but also provides connections to the large number of buses crossing the Hawthorne Bridge and to Milwaukie Light Rail.

Table 3-2
Streetcar riders per Mile
Average Weekday, Year 2025

	Streetcar Riders[1]	New Streetcar Miles[2]	Streetcar Rider per Mile
Full Loop	12,405	6.0	2,068
OMSI MOS	10,000	5.7	1,754
Morrison MOS	6,910	4.8	1,440
Oregon MOS	4,960	4.0	1,240

Source: Metro, 2006
[1] Streetcar Riders on new streetcar line only.
[2]One-way miles, including portion operating on existing streetcar tracks.

Measure – Serve Important Visitor Destinations including Downtown, Rose Garden, Coliseum, Oregon Convention Center, Lloyd Mall and OMSI with a Clearly Identifiable Fixed Route Transit Service.

Portland's Central City includes many different types of uses and activity centers beyond residential and office and retail employment. These other uses include many visitor destinations including downtown Portland, the Rose Garden Arena, home of the Portland Trail Blazer NBA team, professional Lacrosse and Hockey teams as well concerts and many other events, Memorial Coliseum, the Oregon Convention Center, Lloyd Center, and the Oregon Museum of Science and Industry (OMSI). In addition, a number of hotels and lodging opportunities exist in downtown Portland and the Lloyd District. Linking these visitor attractions and hotels with an easily identifiable fixed-route transit service would attract both local and out-of-state visitors increasing transit ridership, and increasing Portland's overall attractiveness.

However, Metro's regional model does not account for such visitor trips. Consequently, a potentially substantial market is unaccounted for in the current analysis. To address the visitor market, a special-purpose non-resident model would need to be developed based on locally obtained survey data.

Measure - Appraisal of How Identifiable Are Transit Alternatives
Streetcar currently shares a number of operating characteristics with bus. The current streetcar line operates entirely at-grade, has similar hours of operation and acceleration/deceleration characteristics as a bus, and operates in mixed traffic. However, streetcar is more visible than bus, provides detailed arrival information to riders at stops and on the internet, and provides well-marked boarding platforms. Those alternatives with successively shorter additional new streetcar

miles would be less identifiable within the transit community, but all the streetcar alternatives would be more visible than the bus only alternatives.

Measure – Reduce Demand for Parking

Currently there is both surface parking and structured parking in downtown Portland and in the Central Eastside. All of the build alternatives would result in more internal transit trips within the corridor, ranging from 700 to 300 more transit trips, as compared to the No-Build alternative. Increasing transit ridership decreases auto trips, which in turn decreases the demand for parking. Reduced parking demand frees up land area for development and reduces pressure for on-street parking that could support mixed-use retail development.

Design Options

The above data is based on alternatives that assume operations on the MLK/Grand couplet. As described in Chapter 2, a design option was developed, as an alternative to the MLK/Grand couplet alignment that would operate northbound and southbound streetcar on SE Grand Avenue between East Burnside and SE Stephens Street, just north of the SE McLoughlin viaduct.

Given the constraints of a regional model, travel demand forecasts were not prepared for this design option. Travel times would be similar to the MLK/Grand couplet and the zonal detail, even in downtown and on the eastside, is not fine enough to discern differences between the two alignments. However, traffic assignments were prepared for use in the traffic analysis.

Land Use Measures

Small Starts and Project Land Use Criteria

SAFETEA-LU, the Federal legislation adopted in 2005that provides for the Small Starts program, includes proposed evaluation criteria for projects that achieve multiple benefits in addition to the traditional transportation mobility benefits. One of these criteria is "transit supportive land use". Federal Transit Administration draft guidance says that "current land use plans and policies and track record of those plans and policies" are current measures. Further, this draft guidance suggests that a project should consider the:

> *"transit friendliness of the project corridor, now and in the future to indicate the extent to which the proposed project would be conducive to its success".*

This draft guidance also indicates that considering land use is useful in risk assessment. That is, how likely is the transit project to be successful in the corridor, given the track record of the project sponsors in implementing transit supportive land use changes. Further, given that this Evaluation Report is intended to compare alternatives, any differences in the policies with regard to consistency with bus or streetcar service will also be assessed.

The Eastside Transit Alternatives Analysis Project evaluation measures for land use are similar and include the following:

- Consistency with region and local land use plans and goals;
- Consistency with statewide planning goals;

Accordingly, the land use assessment of the Eastside Transit Alternatives Analysis, the following will consist of the following:

1) defining "transit friendliness" and bus or streetcar supportiveness;
2) inventorying the land use policies and policies as they relate to transit,
3) evaluating the consistency of the project with state, regional and local plans and policies, and
4) assessing these policies track record.

Defining "Transit Friendliness"

In the document *Pedestrian and Transit Friendly Design*[1], nine essential, eight highly desirable and five additional features are identified for transit (and pedestrian) friendliness. These factors range from the micro scale, such as the width of sidewalks, to features that are the result of long term macro scale economic and regulatory features. This list of features is as follows:

Essential Features

- Medium-to-High Densities
- Mix of Land Uses
- Short to Medium Length Blocks
- Transit Routes Every Half-Mile
- Two-or Four-Lane Streets (with Rare Exceptions)
- Continuous Sidewalks Wide Enough for Couples
- Safe Crossings
- Appropriate Buffering from Traffic
- Street-Oriented Buildings
- Comfortable and Safe Places to Wait

Highly Desirable Features

- Supportive Commercial Uses
- Gridlike Street Networks
- Traffic Calming along Access Routes
- Closely Spaced Shade Trees along Access Routes
- Little Dead Space, or Visible Parking
- Nearby Parks and Other Public Spaces
- Small-Scale Buildings (or Articulated Larger Ones)
- Attractive Looking Transit Facilities

Additional Helpful Features

- Streetwalls
- Functional Street Furniture
- Coherent, Small-Scale Signage
- Special Pavement
- Public Art.

Policies and plans that address and promote these features should be expected to provide a transit friendly environment. These factors can be used to assess plans and policies as well as actual conditions.

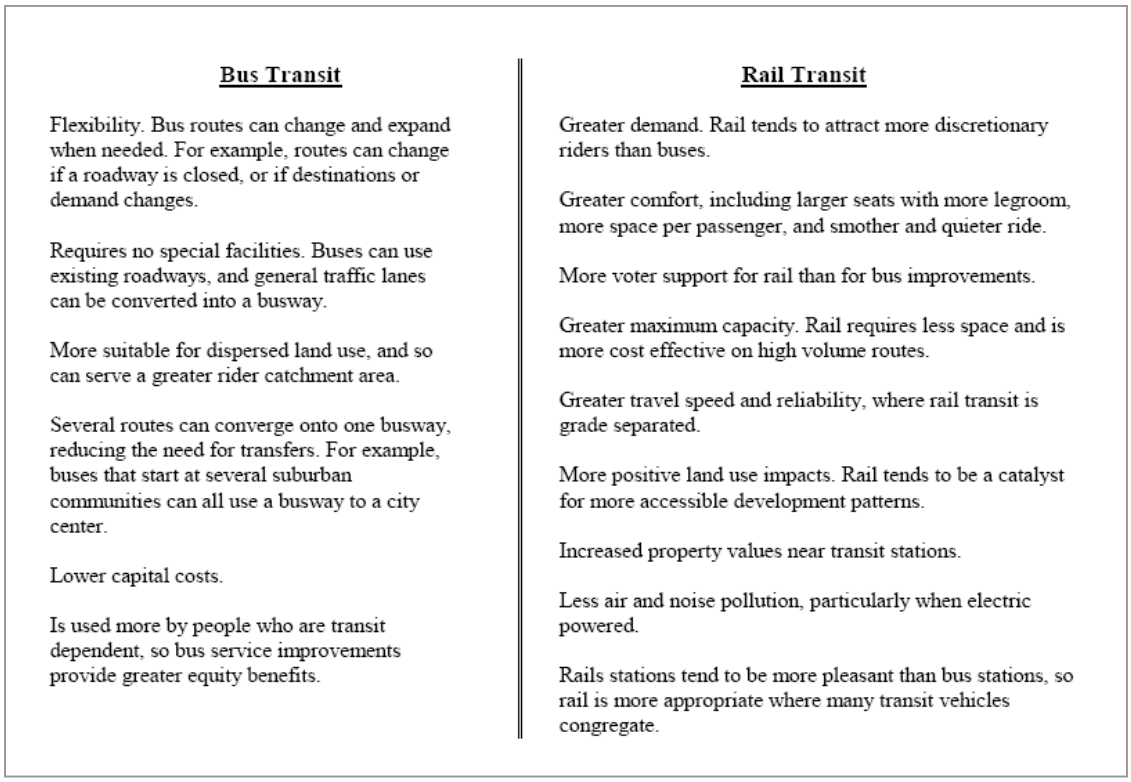
Comparing Bus and Streetcar

In addition to determining whether plans and policies are transit friendly, there is also the question about whether some policies, plans and conditions may be more favorable to either bus or streetcar service. The difference between bus and rail transit is perhaps best expressed as follows:

> *"Rather than a debate about which is better, each can be considered most appropriate in particular situations. Bus is best serving areas with more dispersed destinations and lower demand. Rail is best serving corridors where destinations are concentrated, such as large commercial centers and mixed-use urban villages. Rail can be a catalyst for creating more accessible, multi-modal communities and urban redevelopment. Rail tends to attract more riders within a given area, but buses can cover more area. Both can become more efficient and effective at achieving planning objectives if implemented with supportive policies that improve service quality, create supportive land use patterns and encourage ridership[2]."*

Figure 3-9, below, provides a side-by-side comparison of the characteristics of bus and rail transit.

Figure 3-9
Comparison of Bus and Rail



Bus Transit	Rail Transit
Flexibility. Bus routes can change and expand when needed. For example, routes can change if a roadway is closed, or if destinations or demand changes.	Greater demand. Rail tends to attract more discretionary riders than buses.
Requires no special facilities. Buses can use existing roadways, and general traffic lanes can be converted into a busway.	Greater comfort, including larger seats with more legroom, more space per passenger, and smother and quieter ride.
More suitable for dispersed land use, and so can serve a greater rider catchment area.	More voter support for rail than for bus improvements.
Several routes can converge onto one busway, reducing the need for transfers. For example, buses that start at several suburban communities can all use a busway to a city center.	Greater maximum capacity. Rail requires less space and is more cost effective on high volume routes.
Lower capital costs.	Greater travel speed and reliability, where rail transit is grade separated.
Is used more by people who are transit dependent, so bus service improvements provide greater equity benefits.	More positive land use impacts. Rail tends to be a catalyst for more accessible development patterns.
	Increased property values near transit stations.
	Less air and noise pollution, particularly when electric powered.
	Rails stations tend to be more pleasant than bus stations, so rail is more appropriate where many transit vehicles congregate.

source: Litman, 2005

Policies and plans also will be considered for their support of bus or streetcar service.

Background to Existing Land Use Policies and Plans and Transit Friendliness

To document land use policies, this report looks at the current adopted land use plans and policies at the state, regional and local levels. This multi-level approach is taken because the larger geographic jurisdiction policies set the context of what is possible for the smaller jurisdictions, both legally and functionally. That is, the state policies not only require that local jurisdictions demonstrate consistency with state policies, the state policies set the land development pattern surrounding the local jurisdictions. Accordingly, this analysis looks first at the relevant *State-wide Planning Goals*, Metro's regional plan and policies and the City of Portland's plans and policies, particularly those relating to the Central City and the Eastside.

It also should be noted that some of the transit friendly factors are the result of very long-term policies. For example, short block lengths and the resulting grid street pattern were the result of the City platting in the 1850's when pedestrian orientation was critical. Then too, much of the Central City was built in times (1890s through 1950s) when transit service was a very common means of transportation.

Statewide Planning Goals and Policies

In 1973, the State of Oregon put into place a land use planning system that included the requirement that each city and county adopt a land use plan, zoning and land-division laws.

These plans must be in accordance with the *Statewide Planning Goals*. Each city, county and region's plans must be reviewed and consistency with the *Goals* must be demonstrated.

State Planning Goals important to the Eastside Transit AA Evaluation include, Goal 9 - Economic Development, Goal 12 - Transportation, Goal 13 - Energy Conservation and Goal 14 - Urbanization.

Goal 9, Economic Development, requires that plans be based on the economic factors of the area and should include incentives as well as land use control measures and capital improvement programming.

Goal 12, Transportation, requires a transportation plan and shall consider all modes of transportation including mass transit, avoiding principal reliance upon any one mode of transportation. It also states that high density development with concentrated trip origins and destinations should be designed to be principally service by mass transit. Further, it recommends that lands adjacent to major mass transit stations be managed and controlled to be supportive of land use in the comprehensive plan.

In addition to Goal 12, Transportation, there is also an administrative rule, the Transportation Planning Rule, with more specific requirements, including building orientation to transit stops, direct pedestrian connections between transit stops and building entrances, disabled access and transit stop lighting.

State Planning Goal 13, Energy Conservation, also addresses the nexus of land use and transportation. It states that land use planning should increase density along high density transportation corridors to achieve greater energy efficiency.

The last *Statewide Planning Goal* with direct bearing on the question of land use and transit relationships is Goal 14 - Urbanization. This goal, as the energy conservation goal, speaks to the trade-offs between expanding at the periphery of an urban area on rural, farm or forest lands or accommodating growth with more intensive use and reuse of lands at the urban center. This goal requires urban growth boundaries to accommodate growth by efficiently using land.

As land use and transportation are nearly inextricable, the transportation policies of the state can either support or undermine any land use polices. The current *Oregon Transportation Plan*, states that in urban areas people should be able to choose to commute by carpool, public transit or bicycle as well as by auto and the transportation system should provide public transit and support compact urban areas.[3]

Finally, the State of Oregon recognizes that regulations have limitations and that providing support and incentives is also important to achieve goals. Accordingly, the State has a Transportation and Growth Management Program that oversees grants ($4.1 million in 2005) for local jurisdictions, as well as developing publications, creating a quick response team and other non-regulatory methods to help local jurisdictions address state goals.

Conclusions about Transit Friendliness and State Policies

Based on the facts presented above, State plans and policies provide a land use and transportation planning framework that supports urban areas, especially the Portland area, and are transit friendly. This conclusion is supported by: 1) the requirement to adopt urban growth boundaries

to provide compact urban form, 2) land use policies that call for efficient land use patterns of higher density along transit corridors, 3) urban densities and land use patterns that transit can serve, and 4) transit friendly building standards, such as those of the Transportation Planning Rule that address the relationship between transit service, transit stops, pedestrian paths and buildings. Both bus and streetcar service are supported by these policies, though a streetcar attracts more riders and can serve higher densities than a bus.

Regional Plans and Policies

Moving to the regional level in the Portland area, the Portland metropolitan area is in some ways unique in that it has a directly elected regional government that has responsibilities for both regional transportation and land use. Oregon statutes provide for the creation of metropolitan service districts and in 1979, the voters of the region approved Metro, the regional government in the Portland metropolitan area. The original state statute called for the metropolitan service district to adopt an urban growth boundary around the whole metropolitan area (now 25 cities and portions of three counties) with the intent of providing sufficient land to accommodate growth while protecting farm and forest lands. An urban growth boundary was adopted in 1979. In addition, voters approved a home rule charter for Metro in 1990, expanding the agency's land use authority and bolstering Metro's mission.

State statutes also provided that Metro adopt a regional framework plan. Further, state law required that each city and county to make land use decisions consistent with the regional framework plan.

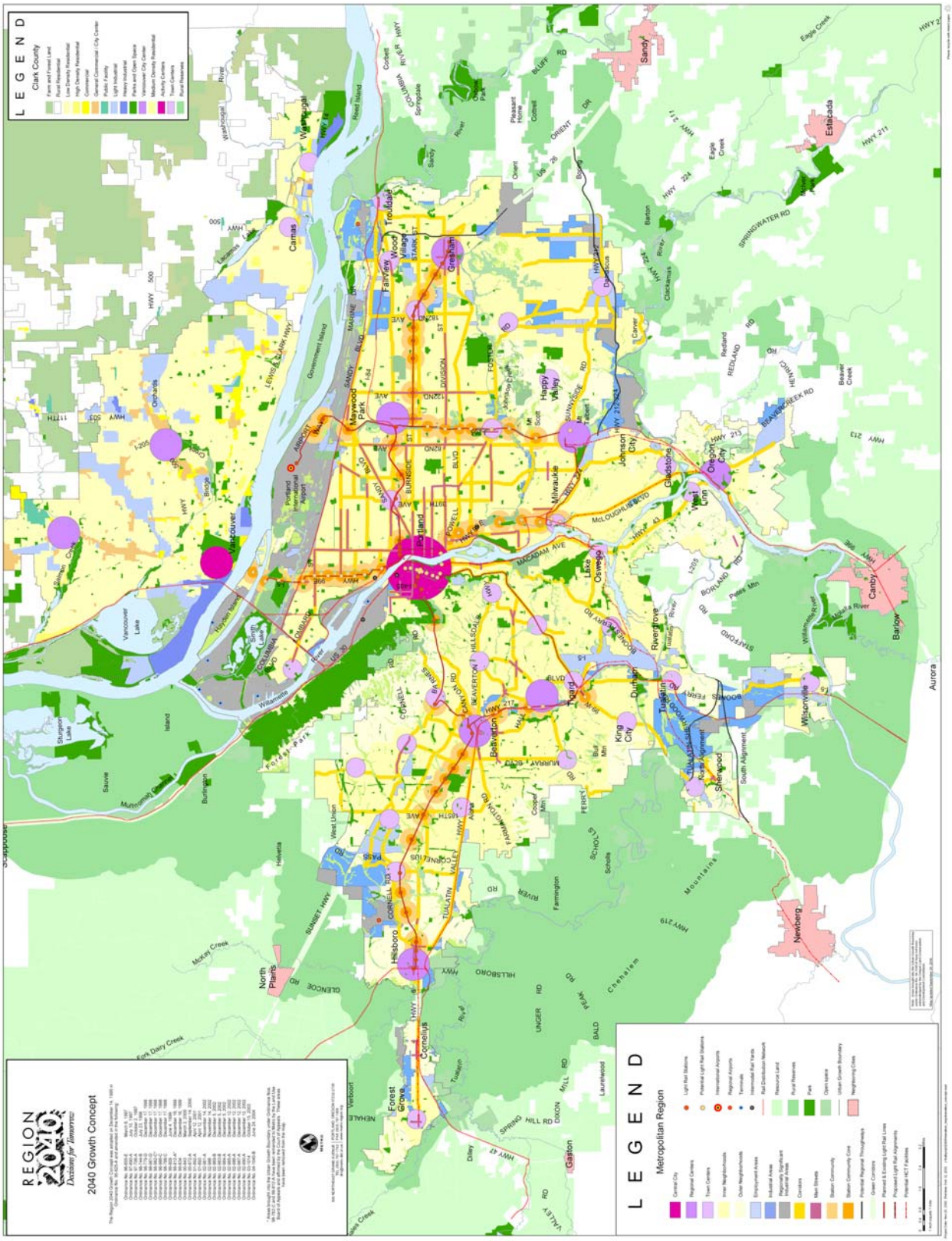
Accordingly, a regional plan was completed and approved in 1995. This plan was a concept plan that contained both policies and a map and is known as the *2040 Growth Concept*. Policies in the *2040 Growth Concept* encourage:

- efficient use of land
- protection of farmland and natural areas
- a balanced transportation system
- a healthy economy
- diverse housing options.

Mixed-use urban centers inside the urban growth boundary are keys to the *2040 Growth Concept*. These are higher density centers of employment and housing that are well served by transit to form compact areas of retail, cultural and recreational activities in a pedestrian-friendly environment. Mixed-use centers provide efficient access to goods and services, enhance multi-modal transportation and create vital, attractive neighborhoods and communities.

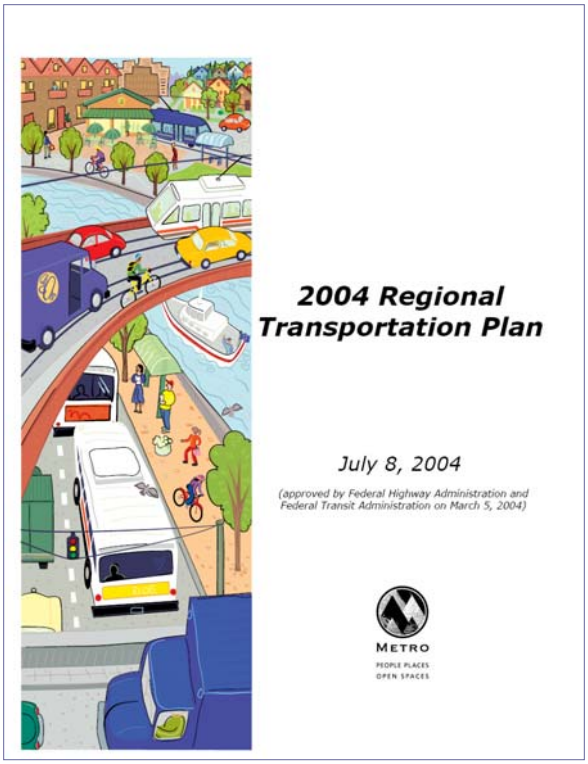
The *2040 Growth Concept* uses interrelated types of centers, of which Portland's central city is designated as the largest market area, the region’s employment and cultural hub. The *2040 Growth Concept* Map is show below, with the large circle indicating the Central City in the middle of the map.

Figure 3-9
Metro 2040 Growth Concept Map



To implement the *2040 Growth Concept*, a functional plan that required local jurisdictions to make certain changes to their plans and zoning ordinances was adopted in 1996. This plan required local jurisdictions to make changes, including accommodating higher densities in centers, reducing surface parking requirements and other measures to help ensure a compact urban form and efficient land uses.

A key element of the region's land use plan and policies is the *Regional Transportation Plan*. The RTP serves as the region's transportation system plan and forms the basis for transit capital investments, such as this Project. The RTP states:



> *"1.1 Regional Transportation Vision*
> *Adoption of the 2040 Growth Concept established a new direction for planning in the Portland metropolitan region by linking urban form to transportation. This new direction reflects a regional commitment to developing a plan that is based on efficient use of land and a safe, cost-effective and efficient transportation system that supports the land uses in the 2040 Growth Concept and serves all forms of travel.*
>
> *The unifying theme of the 2040 Growth Concept is to preserve the region's livability while planning for expected growth in this region – a principle that calls for a regional transportation system designed to meet the specific needs of each 2040 Growth Concept land use component.*
>
> *This Regional Transportation Plan seeks to protect the region's livability by defining a transportation system that:*
> - *anticipates the region's current and future travel needs*
> - *accommodates an appropriate mix of all forms of travel*
> - *supports key elements of the 2040 Growth Concept through strategic investments in the region's transportation system*
>
> *1.2 Connecting Land Use and Transportation*
> *While the 2040 Growth Concept is primarily a land use planning strategy, the success of the concept, in large part, hinges on implementation of regional transportation policies identified in this plan. The following are descriptions of each of the 2040 Growth Concept land-use components and the transportation system envisioned to serve them. The 2040 Growth Concept land-use components, called 2040 Design Types, are grouped into a hierarchy based on investment priority[4]."*

The Central City, along with regional centers, regionally significant industrial areas and intermodal facilities are listed as the highest priority for transportation investments in the region.

The RTP also addresses land use. It states:

*"**Policy 3.0. Urban Form***
Facilitate implementation of the 2040 Growth Concept with specific strategies that address mobility and accessibility needs and use transportation investments to leverage the 2040 Growth Concept.

a. Objective: Serve new development with interconnected public streets that provide safe and convenient pedestrian, bicycle and motor vehicle access.
b. Objective: Provide Street, bicycle and pedestrian connections to transit routes within and between new and existing residential, commercial and employment areas and other activity centers.
c. Objective: Encourage development that supports increased mobility and accessibility, particularly by transit, walking and bicycling.
d. Objective: Support mixed-use development to reduce travel demand. Locate housing, jobs, schools, parks and other destinations within walking distance of each other whenever possible.
e. Objective: Leverage the region's multi-modal transportation investment by supporting the development of innovative tools including transit-oriented development, the location efficient mortgage and others.

Policy 4.0. Consistency Between Land-use and Transportation Planning
Ensure the identified function, design, capacity and level of service of transportation facilities are consistent with applicable regional land use and transportation policies as well as the adjacent land use patterns.
a. Objective: Provide adequate transportation facilities to support a land use plan that implements the 2040 Growth Concept."

A critical transportation implementation partner at the regional level is TriMet, the transit agency that builds, operates and maintains the region's transit network. It prepares a rolling five-year *Transit Improvement Plan* that guides capital and operating transit investments with priorities as follows:

"*Within available financial resources, TriMet and its partners balance needs to guide where, when and how to invest transit-related dollars. The TIP priorities are to:*

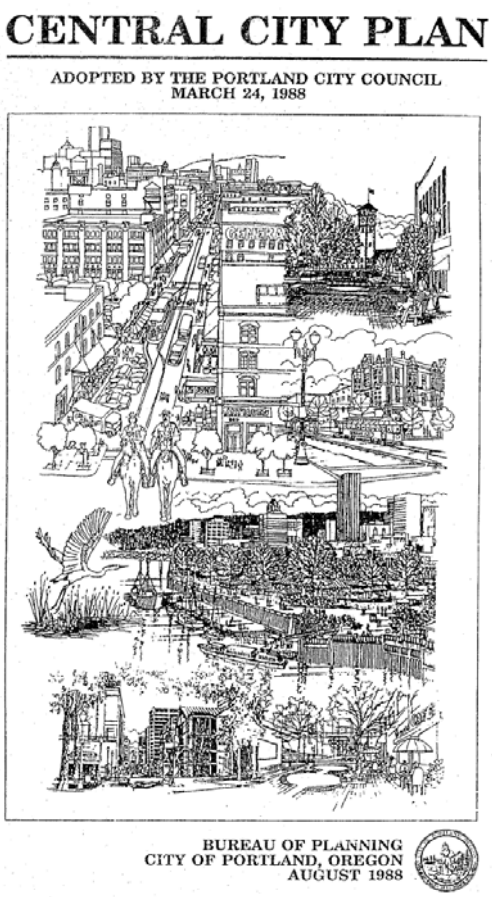
1. Build the Total Transit System – Enhance customer information, access to transit, stop amenities, frequency, reliability, passenger comfort, safety and security.
2. Expand high capacity transit – Invest in MAX Light Rail, Commuter Rail and Streetcar service along key corridors to connect Regional Centers.
3. Expand Frequent Service – Add routes to TriMet's network of bus lines than run every 15 minutes or better, every day.
4. Improve local service – Work with local jurisdictions to improve transit service in specific local areas.[5] "

Conclusion about Regional Policies and Transit Friendliness

It is concluded that regional policies are transit friendly, supporting bus or streetcar service in the Portland Central City because: 1) regional policies encourage a compact urban form through the management of the urban growth boundary, supporting high densities in the Central City; 2) the Central City is the identified regional employment and cultural hub with the highest densities and mixed uses; 3) regional polices place the Central City among the areas with the highest priority for transportation improvements in the region; 4) regional policies call for a balanced transportation system and this includes transit and supportive modes including bicycle and pedestrian modes; and 5) regional policies encourage pedestrian and bicycle connections with the transit service to ensure that potential riders have clear, safe and secure routes to transit service.

City of Portland Plans and Policies

At the local level, the City of Portland has substantial land use plans and policies that address the Eastside and the Central City. The *Central City Plan was* adopted by the Portland City Council in 1988 (with significant amendments in 1995 and 1996). The *Central City Plan* includes the Central City districts as discussed elsewhere in this document. The major concepts of the Plan include;



- *"Developing major transit corridors as spines for future growth, especially a possible trolley line and supporting extension of the light rail system…*
- *Increasing housing and employment, especially locating medium and high density commercial along the regional transit corridors…*
- *Retaining and expanding the Central City's role as the cultural and educational core for the region…"*

More specifically, the transportation element of the *Central City Plan* states (emphasis added):

> *"**Policy 4: Transportation***
> *Improve the Central City's accessibility to the rest of the region and its ability to accommodate growth, by extending the light rail system and by maintaining and improving other forms of transit and the street and highway system, while preserving and enhancing the City's livability."*

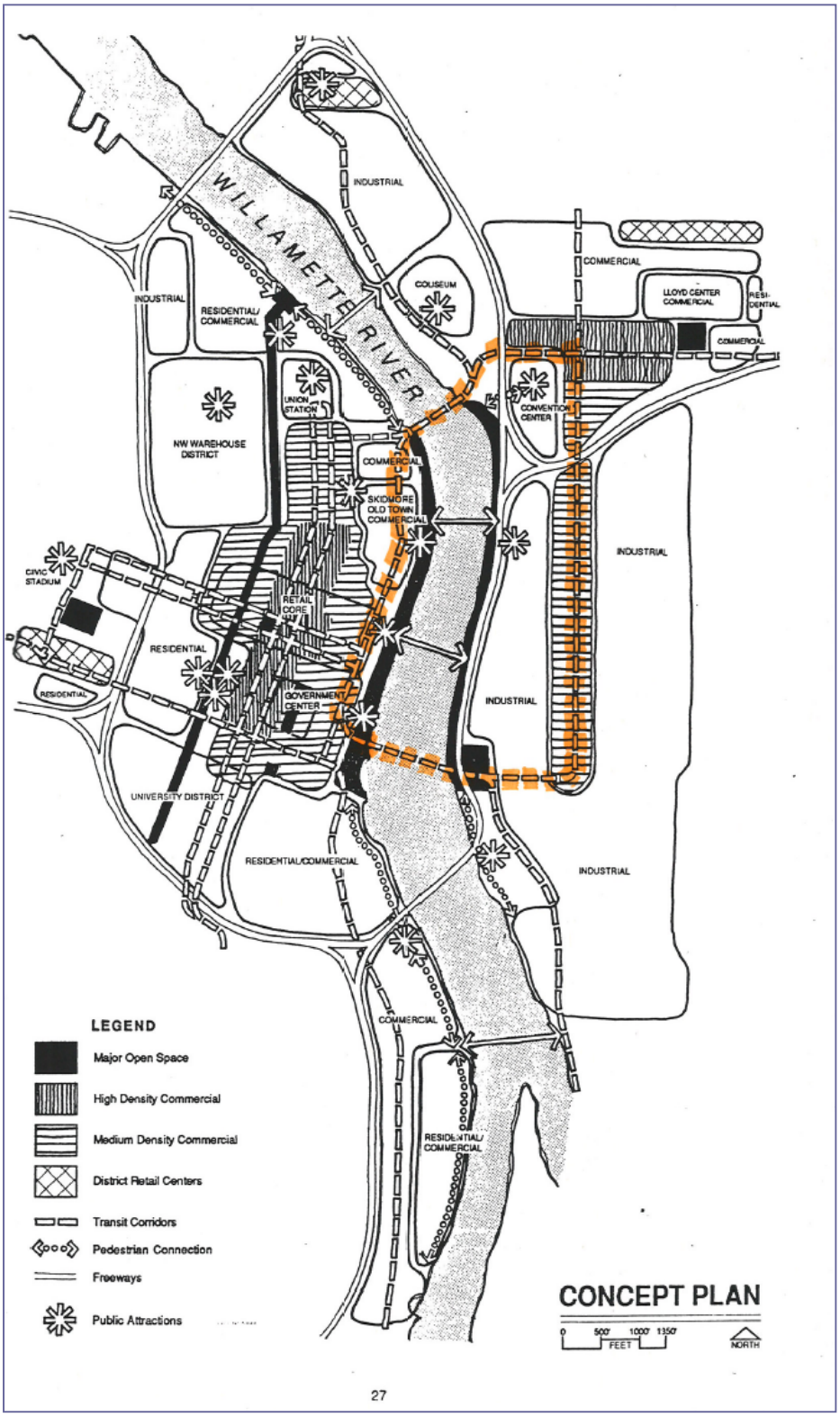
Element H of this policy states:

> *"Develop new systems and better utilize the existing transportation system to promote tourism by connecting the Ctiy's hotel, retailing, recreational, cultural and entertainment attractions."*

In addition, the accompanying action chart in the 1988 *Central City Plan* states (emphasis added):

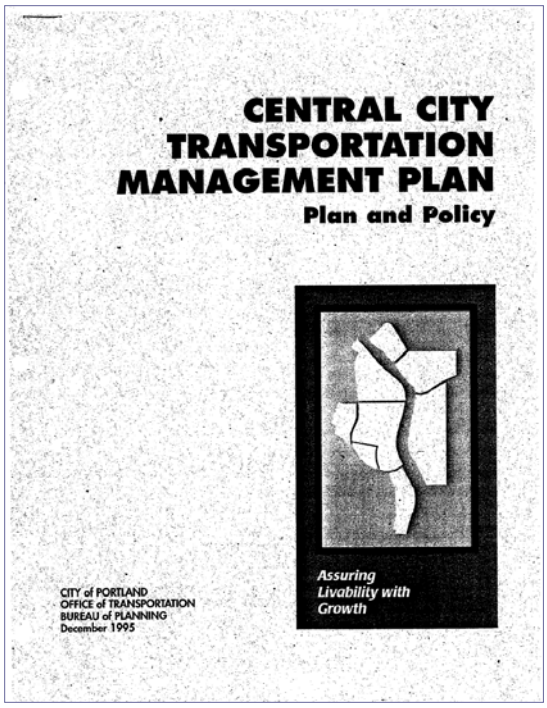
> *"T4 Plan and construct an inner city transit loop (possibly on Grand Ave.)*[6]*"*

Figure 3-10
Central City Concept Plan - (Transit Circulator Loop Emphasized)



Source: City of Portland, 1988

To implement the land use policies of the Central City Plan, the *Central City Transportation Management Plan* was adopted in 1995. This policy document, part of the City's Transportation System Plan states:



> *"An effective transit system is a key element in implementing the Central City Plan. Transit does more than provide critical access to the Central City. It also promotes higher density and diversity of both housing and commercial buildings, which in turn leads to pedestrian and bicycle travel for short distance commutes, as well as access to buses and trains. Higher density makes transit more cost-effective. All of these factors lead to minimizing auto use, improving air quality, and managing traffic congestion - all key factors in improving livability for the entire Portland region.[7]"*

The CCTMP also contains the following policies (emphasis added):

> *"**Policy 2.7: Maintain Access to Industrial Activities***
> *Maintain and/or enhance commercial and vehicle access and circulation to and within the Central City to serve industrial activities.*
>
> ***Policy 2.9 Central City Edges***
> *Protect residential neighborhoods adjacent to the Central City from adverse transportation or parking impacts caused by economic or other activities in the Central City and mitigate their impacts.*
>
> ***Policy 2.11 Grand/Martin Luther King, Jr. Corridor***
> *Enhance the multimodal transportation role of the Grand/Martin Luther King, Jr. corridor with transportation improvements that reduce congestion by increasing opportunities for transit (bus and streetcar), pedestrians, bicycles, freight movement, and traffic management.*
>
> ***Policy 3.1: Transit Mode Split***
> *Support achieving the following transit share goals for commute trips in 2010:*

Downtown	*60%*
North of Burnside	*40%*
Lloyd-Coliseum	*40%*
Northwest Triangle	*40%*
North Macadam	*20%*
Goose Hollow	*20%*
Central Eastside	*15%*
Lower Albina	*10%"*

> ***Policy 5.4: Central City Transit Circulation***
> *Improve transit service to provide better circulation and distribution within and between districts of the Central City.*

Objectives:

> *5.4.1 Increase the frequency of service and the connectivity between major bus routes and light rail to improve their function as Central City shuttles so that users would not need a system schedule.*
> *5.4.3 Establish a network of transit streets, terminals, and transit centers in the Central City.*
> *5.4.4 Identify a strategy for developing the Central City streetcar system and integrating it with other transit services.*[8]"

Further, the City of Portland has zoning ordinances that guide urban development throughout the City and especially the Central City. The Central City consists of zones that allow, if not require, high intensity uses including retail commercial, office, high density residential and often in mixed-use development. In addition, these codes have provisions that include design review as well as pedestrian standards, building street orientation, limitations on drive-through windows, street trees, ground floor windows, transit street main entrances, measures that discourage surface parking lots and other measures intended to foster the pedestrian and transit friendliness of the Central City.

As with the state and regional levels, the City of Portland has also provided incentives to help implement its plans. These programs and incentives have mainly been completed under the Portland Development Commission and are described in more detail under the economic development section of this report.

Conclusions about City Policies and Transit

City of Portland policies are concluded to be transit supportive within the Portland Central City because: 1) city plans and policies call for improved transit service for circulation within and between the districts of the Central City, 2) city policies call for a multi-modal role for MLK corridor by increasing opportunities for transit (bus and streetcar); 3) city plans promote higher density and mixed uses to increase short commute trips suitable for transit, bicycle and pedestrian travel modes; and 4) city requirements that apply in the Central City for pedestrian amenities, building/street orientation, building entrances oriented to transit service, discouragement of surface parking lots and other regulations provide a pedestrian and transit user friendly environment.

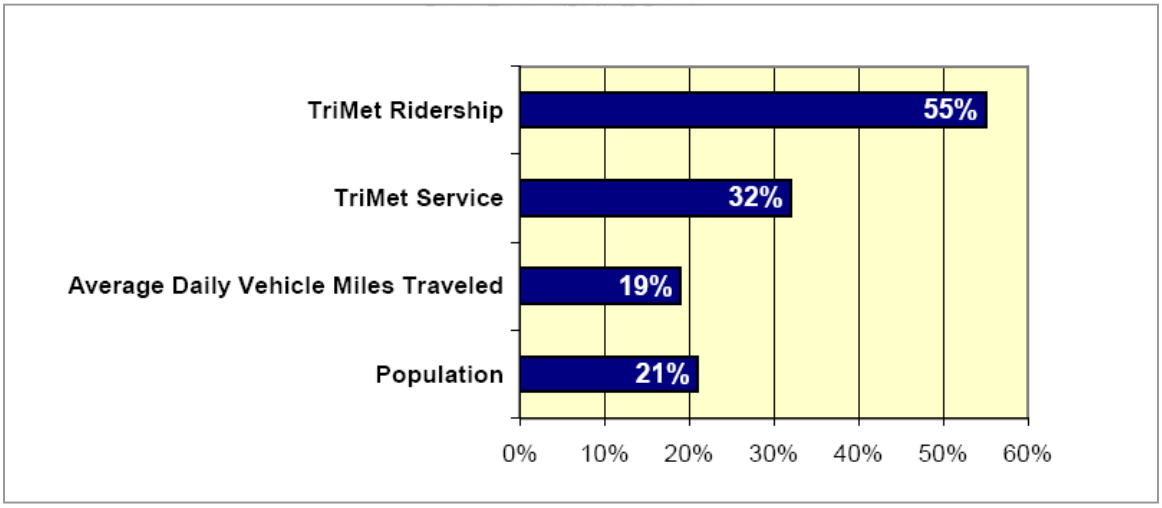
With regard to city policies and bus or streetcar service, the city policies are more supportive of streetcar service because: 1) planned densities are more consistent with streetcar service; and 2) a streetcar provide more capacity and attracts more discretionary riders than a bus, particularly in this high transit use corridor (Central City, including the Eastside); and 3) city policies call for developing a Central City streetcar system.

Effect of Land Use Plans and Policies

As noted earlier in this section, the FTA has asked for evaluation of the transit-friendliness of land use - existing and planned. That is, policies may be transit friendly, but what is the existing environment, how transit friendly is it - a reflection of how effective existing plans and policies have been.

Evidence from the region about the past shows that transit rides, including bus, streetcar and light rail, have grown substantially more than vehicle miles traveled. This trend is largely attributable to the region's compact urban form, land use mix and form, short average trip lengths and the presence of viable alternatives to the single occupant vehicle.

Figure 3-11
Comparison of Population, Vehicle Miles Traveled, Transit Service & Ridership 1993-2003



Source: TriMet

Then too, as shown in Table 3-3, below, modal split data from travel surveys shows that in the Metro region, areas such as the Central City with good transit and mixed uses garner up to 40 percent or more of all trips. Further, vehicle miles traveled per capita are less than half of those for areas of the region that do not have such land use patterns or transit service levels.

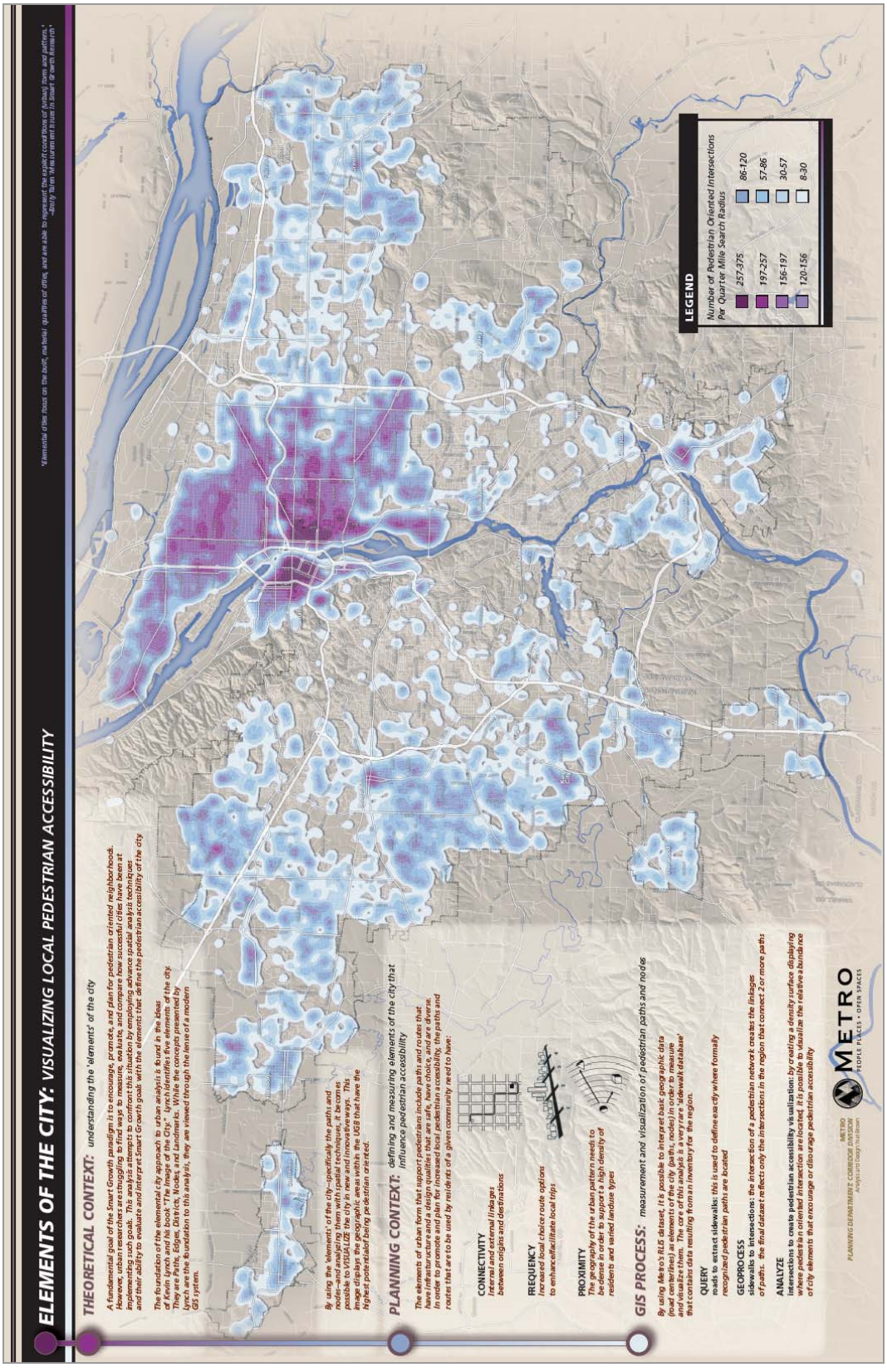
Table 3-3
Transportation Mode Share by Transit and Land Use Characteristics

	Mode Share						
Land Use Type	**Percent Auto**	**Percent Walk**	**Percent Transit**	**Percent Bike**	**Percent Other**	**Vehicle Miles per capita**	**Auto ownership per household**
Good Transit/Mixed Use	58.1%	27.0%	11. 5%	1.9%	1.5%	9.80	0.93
Good Transit Only	74.4%	15.2%	7.9%	1.4%	1.1%	13.28	1.50
Remainder of Multnomah County	81.5%	9.7%	3.5%	1.6%	3.7%	17.34	1.74
Remainder of Region	87.3%	6.1%	1.2%	0.8%	4.6%	21.79	1.93

Source: Metro 1994 Travel Survey

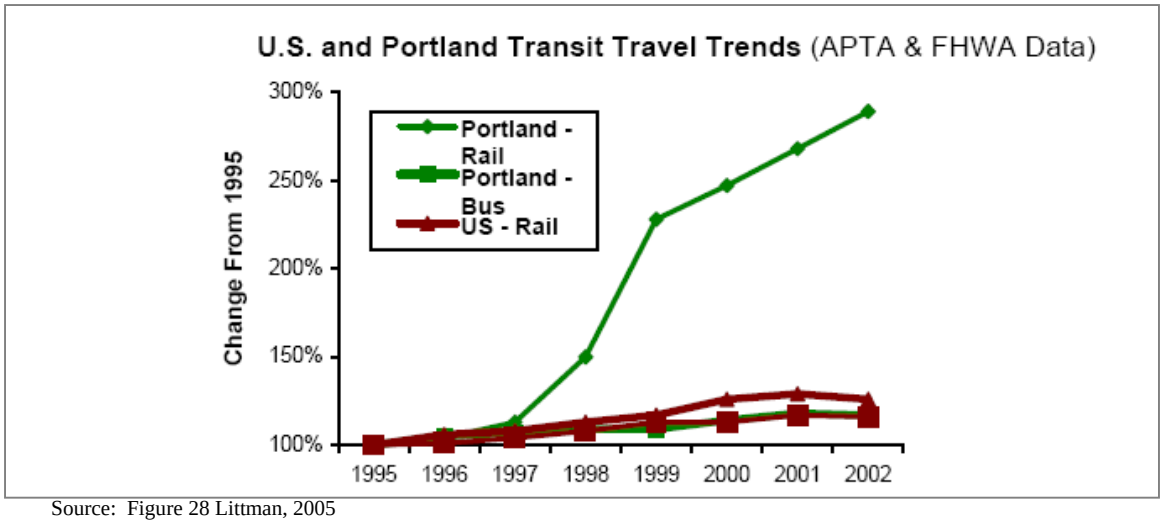
Figure 3-12 shows the effect of short blocks, dense mixed uses and continuous pedestrian network (primarily sidewalks) and the resulting pedestrian accessibility of areas within the region. As demonstrated in this figure, the Central City, including the Central Eastside is among the areas with the highest accessibility for pedestrians.

Figure 3-12
Pedestrian Accessibility in the Metro Region



Source: Nat Brown, Metro 2005

Figure 3-13
Comparison of Portland Transit To US



Source: Figure 28 Littman, 2005

Looking at the Portland region and comparing its density and vmt/capita, we find that in a comparison with metropolitan areas from throughout the country, the Portland region has medium density, but much lower daily vehicle miles traveled per capita[9]. In fact, the Portland region has comparable daily vehicle miles traveled per capita to such transit intensive cities as San Francisco and Chicago, and the Portland area has substantially less vmt/capita than Seattle and Milwaukee. Further, when looking at the Portland region's transit mode share, it meets or exceeds that of many much larger cities. In addition, Portland has been ranked as on the five best cities for walking - which again reinforces the notion that a pedestrian and transit friendly environment has been established relative to other parts of the country. Figure 3-13, shows the growth of transit in the Portland area when compared with US trends, with the growth of Portland transit rail far outstripping other areas in the country.

Conclusions about the Central City's Transit Friendliness

Accordingly, it is concluded that the existing environment in Portland and the Central City is transit friendly based on: 1) the Portland region's growth in transit ridership; 2) relatively low rate of vehicle miles traveled per capita despite only moderate density; 3) pedestrian accessibility of the Central City; and 4) mode split in areas with good mixed use and transit service, such as the Central City.

A summary of land use policies, their transit friendliness, demonstrated results and how a bus or streetcar would compare under these policies is included in Table 3-4, below.

Table 3-4
Land Use Plans and Policies Summary

	Statewide Planning Goals	Region 2040 and Regional Framework Plan	Central City Plan and CCTMP
Transit Friendly Policies	Yes	Yes	Yes
Demonstrated Results	Compact urban form	Transit ridership greater than population or vmt growth	Greater mode share in central city with its use of mixes, density and available transit
Project Consistent with Plans/Policies			
Bus	Yes	Yes	Yes
Streetcar	Yes, but likely to foster more development	Yes, but likely to foster more development	Yes, but likely to foster more development

Economic Development Measures

Background

Publicly funded transportation improvements are widely acknowledged to provide broad economic development benefits, perhaps beginning in the US with public support of canals and railroads in the 19th century and continuing with highway and transit projects in the 20th and 21st centuries. Transit (both streetcar and bus) provides mobility to users and accessibility to jobs and housing. One estimate is that every $10 invested in transit capital projects results in $30 in business sales and every $10 of transit operations generates $32 in business sales[10], a three fold multiplier.

This Evaluation Report is intended to assess the differences between Eastside Transit alternatives. In Chapter 1 of this Report, an economic development goal was described based on local desires for additional economic development in the Eastside. Further, economic development potential is included in SAFETEA-LU legislation [federal transportation law, specifically, section 3011 (e)(2)] that requires the Secretary of Transportation to provide funding assistance to a proposed Small Start project only if the Secretary finds that the project meets certain standards, including that the project is:

> *…"(B) Justified based on a review of its …effect on local economic development."*

Further, the federal statute requires the Secretary to make the following determination:

> *"…. the degree to which a project will have a positive effect on local economic development…."*

Preliminary Federal Transit Administration proposed guidance for Small Starts further suggests that:

> *"Useful measures for economic development might include vacancy rates, the value of land parcels compared to the value of current improvements on those parcels, and similar measures of development conditions in the corridor of interest."*

and,

> *"…the best available measures of likely economic development/land use benefits may be derived from the circumstances in which the projects would be implemented rather than from the forecasts of their specific development impacts. A survey of available research on the development impacts of transit suggests that increased accessibility and permanence of the transit investment are the primary transit-related characteristics of development. Those project related characteristics, plus indicators of the availability of land for development or redevelopment may provide a workable representation of likely development benefits."*

Increases in accessibility have been addressed in the transportation section of this report and are therefore not repeated in this section. In addition, vacancy rates are not recommended for use in this evaluation as they can be quite changeable from season to season and because the Portland Streetcar has been implemented concurrent with new mixed use development, new units exaggerate vacancy rates as occupancy lags construction. For example, in the South Waterfront area, there are currently about 1,000 (987) housing units under construction. While the sales contracts have been completed for the majority, if not all of these units, they could be counted as vacant. Earlier this month a proposal for six more towers, with perhaps another 1,000 housing units, was proposed. Accordingly, vacancy rates could be misleading given this high growth rate.

This suggests that to best address federal requirements the measures should be narrowed to:

- the value of land parcels compared with the value of current improvements;
- the permanence of the transit investment;
- the availability of vacant or re-developable land

In addition, during the development of the Eastside Transit Alternatives Analysis, the following evaluation measures were identified to measure economic development effects:

- Additional jobs and housing that would likely be created with some transit alternatives;
- Private investment induced; and,
- Tax base improvement (an expanded or increase in assessed value)

Further, a research project was initiated to assess data and to see if a relationship between the existing locally funded streetcar and economic development could be established. Accordingly, this evaluation of economic development will address federal regulations and guidelines as well as the stated project goals and objectives.

City of Portland Economic Development Plans and Policies

As a background to economic development in the Central City and Eastside, there are important City of Portland plans and policies for the urban center that the City has been pursuing since the early 1970s. These include the following:

> *"Policy 1. Economic Development*
> *Build upon the Central City as the economic heart of the Columbia Basin and guide its growth to further the City's prosperity and livability.*
>
> *A. Foster the development of at least 50,000 additional new jobs in the Central City by the year 2010.*
> *B. Enhance the Central City's dominance in finance, government, professional services, culture, entertainment, and as a business headquarters location.*
> *C. Strengthen the Central City's role as a retail center, tourist attractor, and center for diverse educational programs.*
> *D. Support and maintain manufacturing and distribution as significant components in the Central City economy.*
> *E. Capture the opportunities for new jobs and investment created by the new Oregon Convention Center.*
> *F. Support the retention and expansion of existing businesses while attracting and encouraging new businesses in the Central City.*
> *G. Build on and market the Central City's livability as a central component of Portland's economic development strategies.*[11]"

These goals are supported by a range of regulations and incentives provided by the City of Portland through the Portland Development Commission. [It should also be noted that these economic development goals are not the only economic development goals of the City. Several strategies have been articulated and are being implemented (for example transportation/freight hub, high technology including silicon, bio-medical and nanotechnology based systems)]

The Portland Development Commission has established the following urban renewal area goals for the Central Eastside:

> *"Goal 1: Urban Development*
> *Encourage expanded opportunities for housing and jobs while retaining the character of established residential, neighborhood and business centers.*

Promote urban diversity by encouraging a range of employment opportunities and living environments to attract and retain a stable and diversified population.

Encourage full use of vacant land, except in those areas designated as open space. Coordinate with and support goals of adjacent URAs.

Other Central Eastside goals include ones concerning business retention and new business development, revitalization and riverfront access.

Similarly, the Lloyd District portion of the Convention Center Urban Renewal Area has goals as follows:

" …to develop a vision and implementation strategy that will:
- Guide the development and livability of the Lloyd District through 2013.
- Identify public-sector capital improvements to support development.
- Coordinate private-sector stakeholders to implement the vision.
- Increase interest in and support for the Lloyd District vision.

Actual Portland Streetcar Economic Development Experience

In Portland, the locally funded streetcar provides documented demonstration of the impact of transit investment.

Figure 3-14
Existing Streetcar Service

A significant part of the economic development implementation structure of the Portland Streetcar involved development agreements. These agreements were contracts between the public and private sector stipulating that if the public sector provided certain investments, particularly streetcar construction and operation, the private sector would agree to higher development densities and intensity.

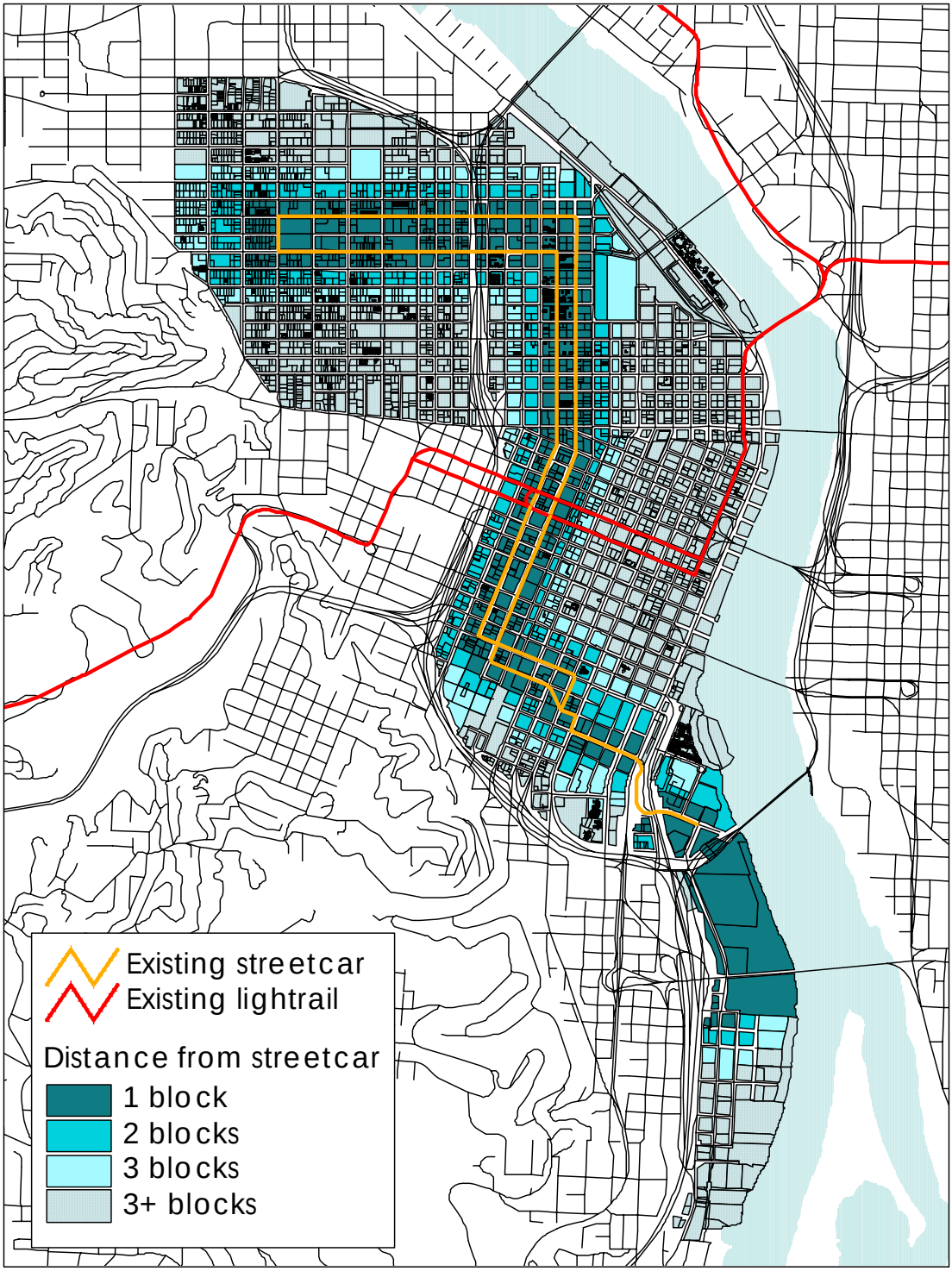
For example, the *City of Portland/Hoyt Street Properties Development Agreement*, Hoyt Street Properties (HSP) committed to building a minimum density of 109 dwelling units per acre (an addition of 22 dwelling units per acre than otherwise required) once the City commenced construction of the Portland Streetcar project in May 1999. From 1999 to 2003, HSP built 877 dwellings at an average density of 160 dwelling units per acre - plus ground level retail[1]. HSP continues to develop its remaining properties at significantly greater densities than required. And more generally, as the real estate market responded to such development, developers found that high density development in the Central City was not as risky as once thought.

The private property development sector as well as representatives of Metro, the City of Portland, TriMet and Portland Streetcar, Inc. closely watched the amount and type of urban development that occurred along the Portland Streetcar line. Many observers thought that there was more economic development occurring where streetcar service was provided than in otherwise similar areas. In addition, developers near the line have expressed interest in having streetcar service provided to their areas. Further, there was anecdotal evidence that transit riders preferred streetcar or other steel wheel transit vehicles over buses. Based on these observations, in 2005 it was hypothesized that streetcar service generates more economic development than rubber tire transit, all other variables held constant.

A literature search was completed to identify studies documenting differences in the development potential (building and occupancy of residential and commercial structures) of rubber tired transit and streetcar service and analysis methods. No rigorous analyses were found, though those studies found supported the hypothesis. Several analysis methods were identified and hedonic pricing was recommended as the most rigorous method. Recognizing budget limitations and hedonic pricing analysis cost, it was proposed that a determination of whether there was a sufficient database for hedonic pricing should be completed and a preliminary economic assessment be conducted if sufficient data were available.

After gathering and sampling the available data, E.D. Hovee & Company, the economic development consultant selected to undertake the analysis, concluded that there was sufficient data to complete a hedonic pricing analysis. The consultant also found that there was a method to do a quick test of the hypothesis. This method looked at how much development occurred in proximity to the streetcar alignment (within one block of the streetcar) and compared that to the amount of development further from the streetcar line (two and three blocks from streetcar service).

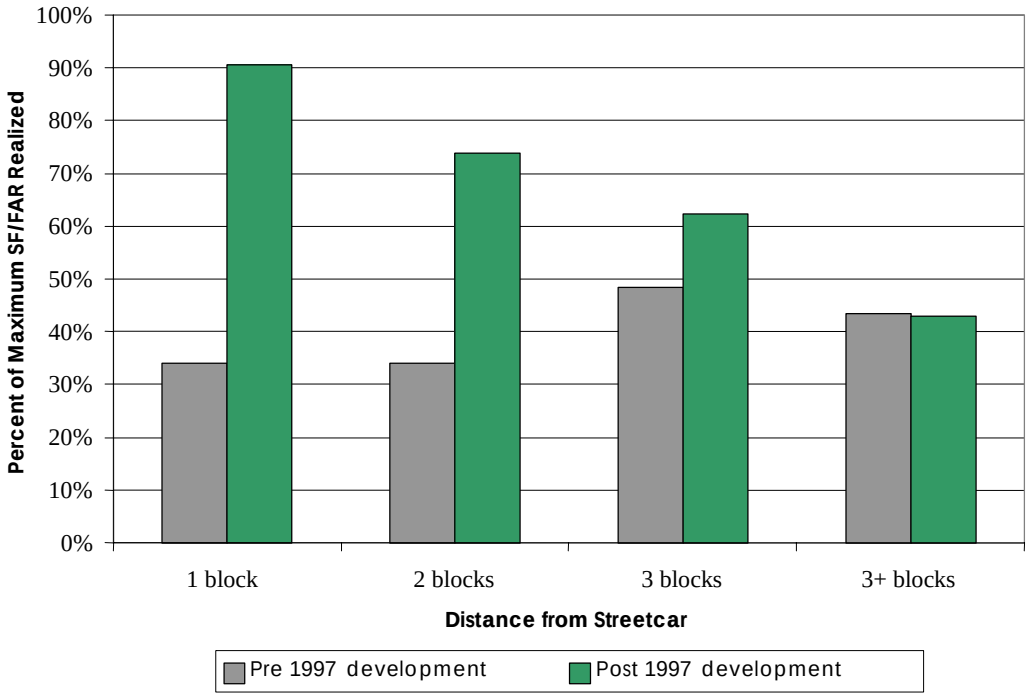
Figure 3-15
Areas within 1, 2 or 3 Blocks of Streetcar Service



Source: Portland Streetcar Development Impacts, E.D. Hovee, 2005

Actual floor area ratio (FAR) built since 1997 was compared with potential FAR (one measure of the maximum allowed density or intensity of development). Analysts found that those areas within one block of the streetcar experienced much greater development than areas two, three and three and more blocks from the streetcar. Specifically, since the commitment to streetcar service was made, lands within one block of the streetcar built to within 90 percent of allowed density (FAR), while lands within two blocks only built to a little over 70 percent and areas three blocks distant built to a little over 60 percent of allowed density (See Figure 3-16, below.)

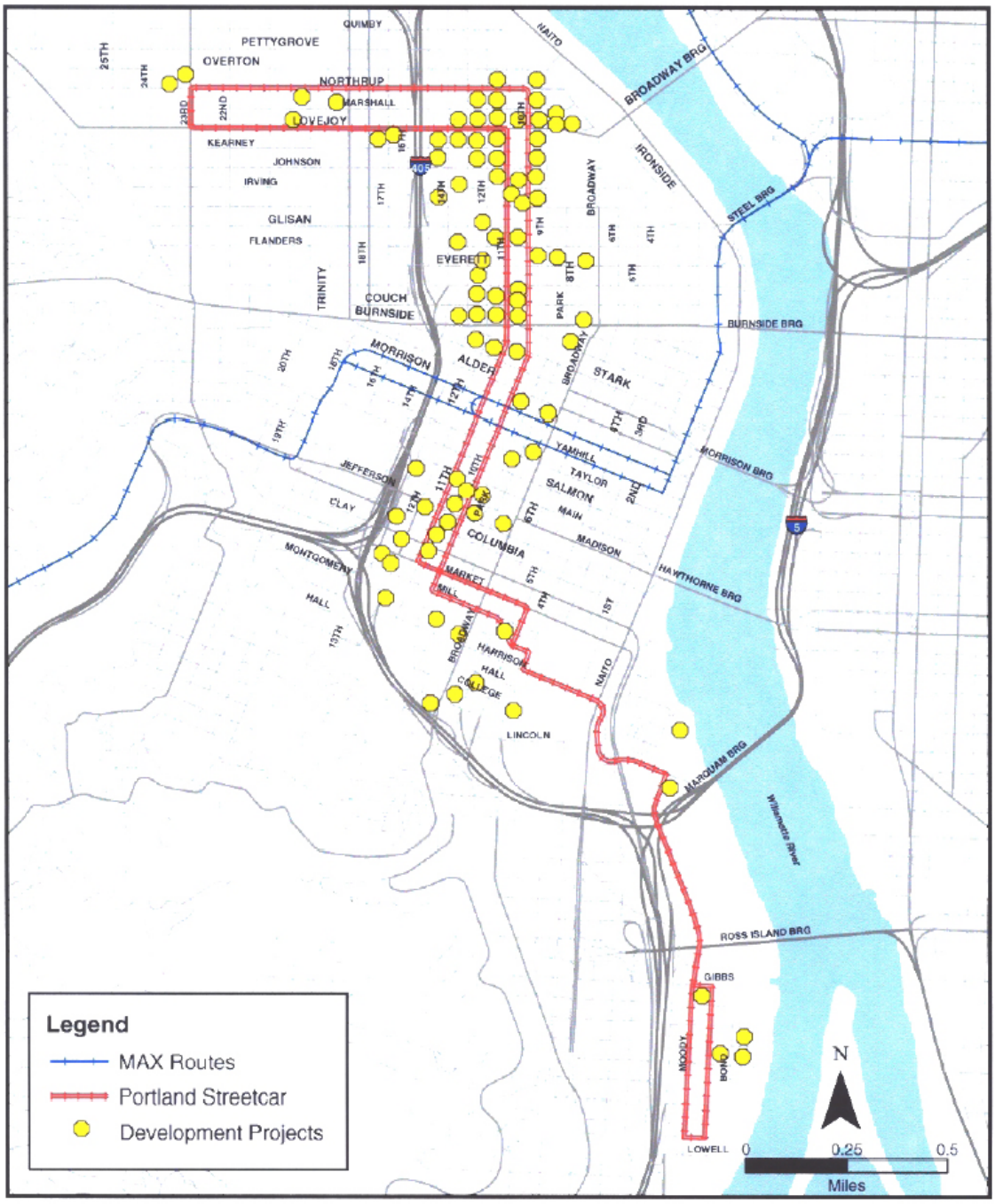
Figure 3-16
Development Potential Achieved - Block by Block



Source: Portland Streetcar Development Impacts, E.D. Hovee, 2005

This relationship is also visually demonstrated by Figure 3-17, below, which illustrates the location of development or redevelopment within the west side of the Central City.

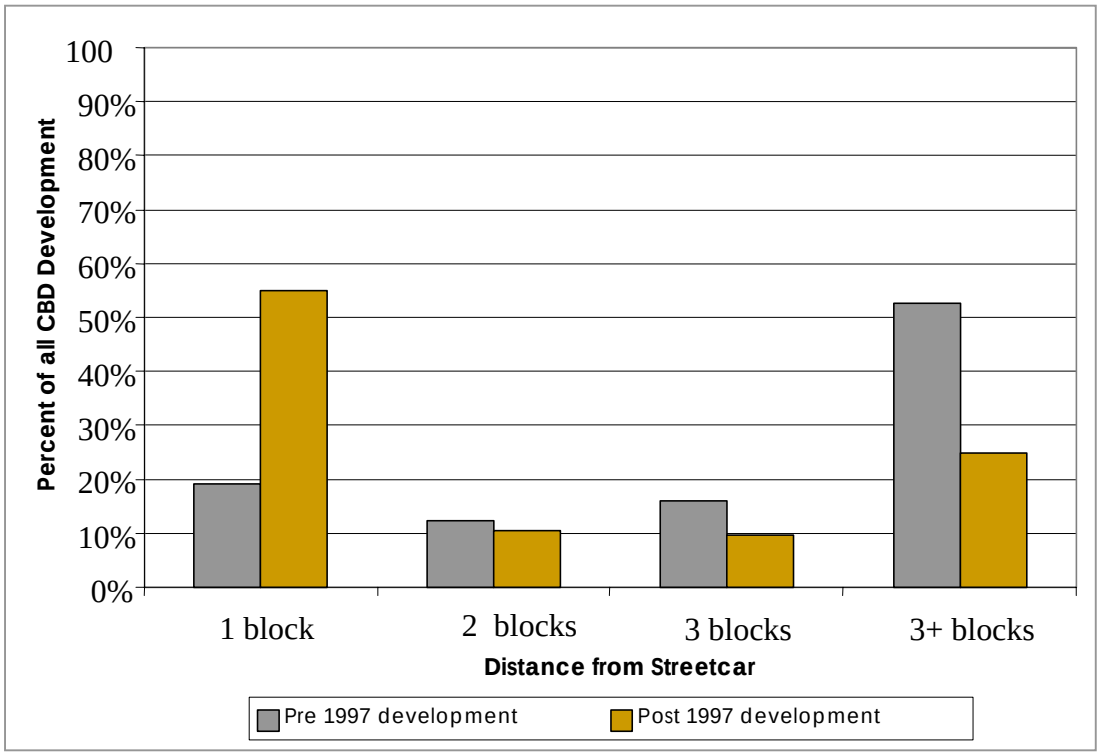
Figure 3-17
Development Activity within the Portland Streetcar Local Improvement Districts



Source: Portland Streetcar, Inc. January 2006

Streetcar influence is also demonstrated when the amount of development within one block of the streetcar as a percent of total central business district (CBD) development is compared with the percent of total CBD development in blocks two, three and more distant. A dramatic difference is revealed when pre 1997 conditions and 1997 to 2005 conditions are compared as shown in Figure 3-18, below.

Figure 3-18
Development Potential Achieved as a Percent of All Downtown Development



Source: Portland Streetcar Development Impacts, E.D. Hovee, 2005

These findings concerning the benefits of streetcar service are consistent with the City of Toronto's experience in 1997, in which comparing streetcars with buses found:

> *"The introduction of the 604 Harbourfront streetcar route was followed by an increase in transit ridership in the area, compared to the previous bus operation. Transit ridership at Harbourfront increased by approximately three times, from 2,000 weekday customer-trips on the former bus service to 5,700 customer-trips each day on the streetcar service. While this increase cannot be solely attributed to the streetcar operation, the increased service levels, transit priority, and visibility of the streetcar service are certainly responsible for a portion of the ridership increase.*[12]"

Higher ridership attributed to the presence of fixed rail transit suggests that there is more economic development potential with rail than with bus. The literature also suggests that bus service does not enhance commercial property values as fixed rail does. A FTA study in year 2000 of 2,830 commercial properties located in Washington D.C. found that:

"… other things being equal, the shorter the distance between a commercial property and a Metro Station, the higher the value of the property"[13].

Further, the same analysis found that*:*

"In our sample, the proximity of a Bus stop does not seem to enhance the value of commercial properties."

Table 3-5, below, summarizes research in other communities about this question.

Table 3-5
Economic Benefits of Urban Passenger Rail Transit

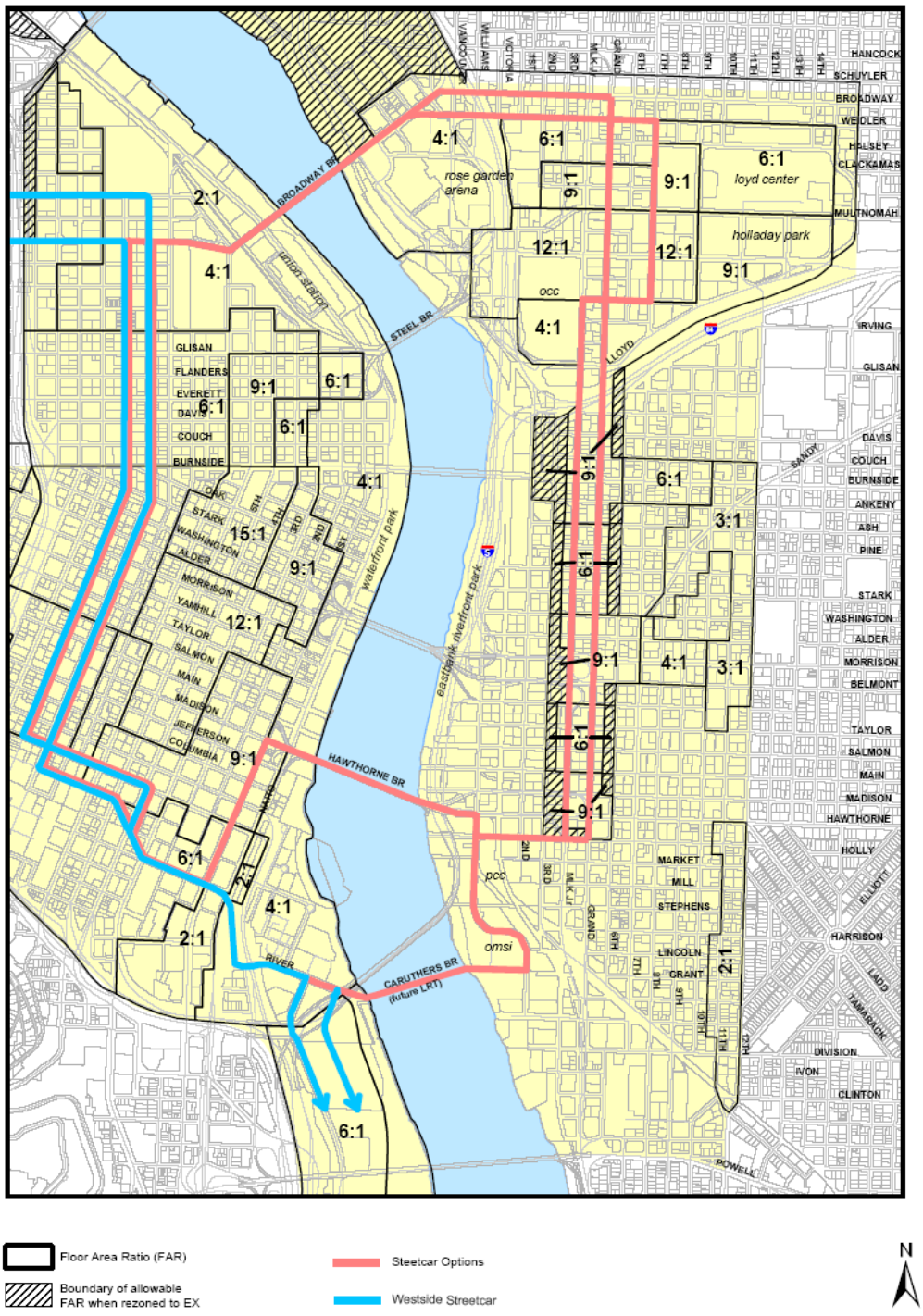
Location	Date of Analysis	Residential Property Value Change with Transit	Commercial Property Value Change with Transit
Dallas, Texas[14]	2003	39% greater value	Office commercial space 53 % greater value
Various[15] (Includes studies of Sacramento, San Diego and Santa Clara California)	2002	2-18% greater value	4-30 % greater value for office, retail and industrial
San Diego[16]	2003	17% greater value	
Washington, D.C.[10]	2000		On average, a 1,000 feet reduction in the distance to a Metro station raises the value of commercial properties by $2.3 per square foot.
San Francisco[17]	2002	"Transit-oriented developments in San Francisco… are overall the most valuable properties in the metro area, averaging a premium of 20-25 percent over comparable non-transit areas."	

Source: Metro

Forecasting An Alternative Land Use Future

The existing Portland Streetcar experience was then used to assess the possible economic development impact of streetcar service in the Eastside. The percent of maximum FAR was used to assess what might occur in the Eastside. Using this method illustrates how an alternative land use assumption might be made and how streetcar service might differ from rubber tire transit with regard to economic development. Figure 3-19, below, shows the maximum allowed FAR in the Eastside and Westside of the Central City.

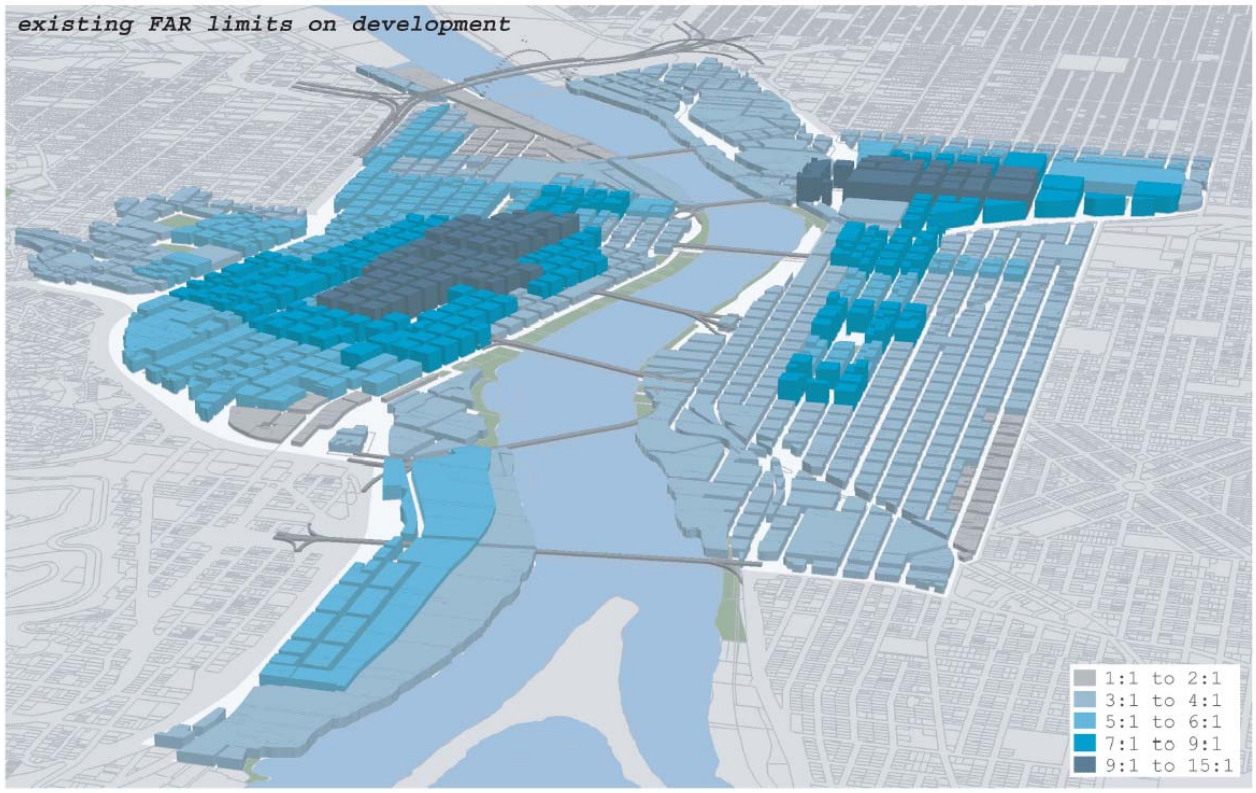
Figure 3-19
Maximum Allowed Floor Area Ratio



Source: Eastside Streetcar Alignment Study, City of Portland, 2003

Another way to understand the maximum floor area ratio, or maximum allowed intensity of land use is shown in Figure 3-20, below, where the highest intensity, or floor area ratio is located in the central core of the Westside and in the core of the Lloyd District.

Figure 3-20
Maximum Floor Area Limits on Development in the Central City



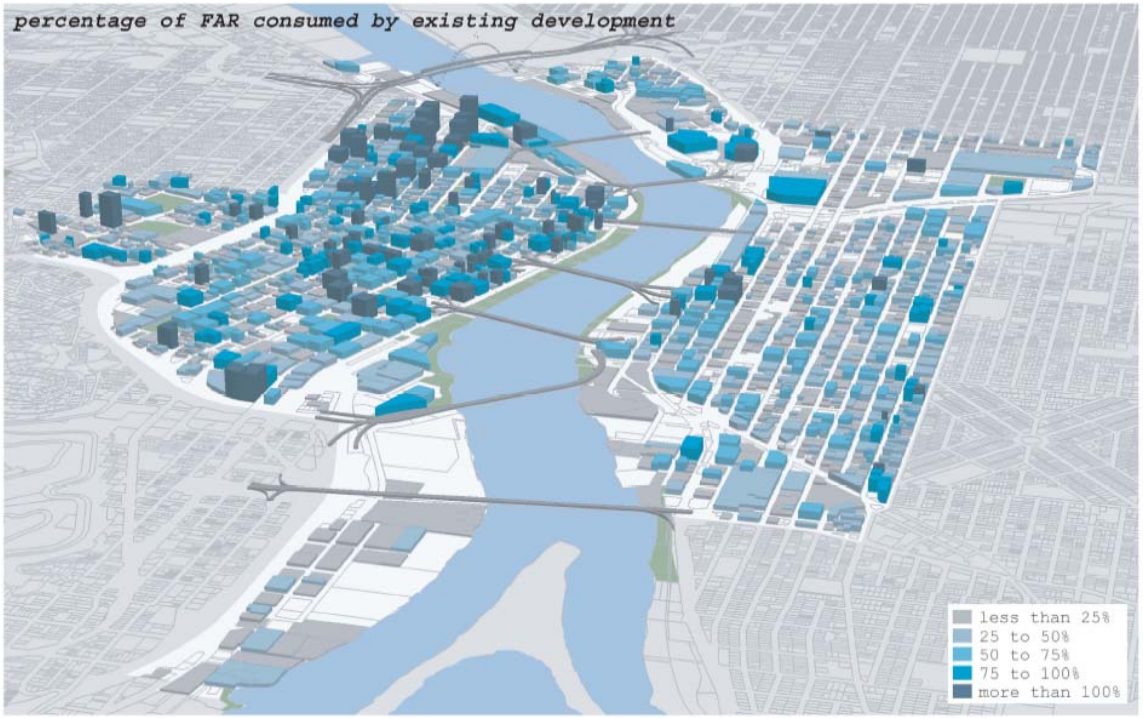
Source: Planning Bureau, City of Portland

Looking at the maximum intensity allowed and comparing that with the amount of that maximum that is in use, or has been consumed, provides a means of assessing how much capacity for additional growth is available under present policies. Figures3-21 and 3-22, below, provides a visualization of the Central City and where the most amount of development capacity exists.

Figure 3-21
Properties with Less than 20 Percent of Maximum Floor Area Ratio Consumed

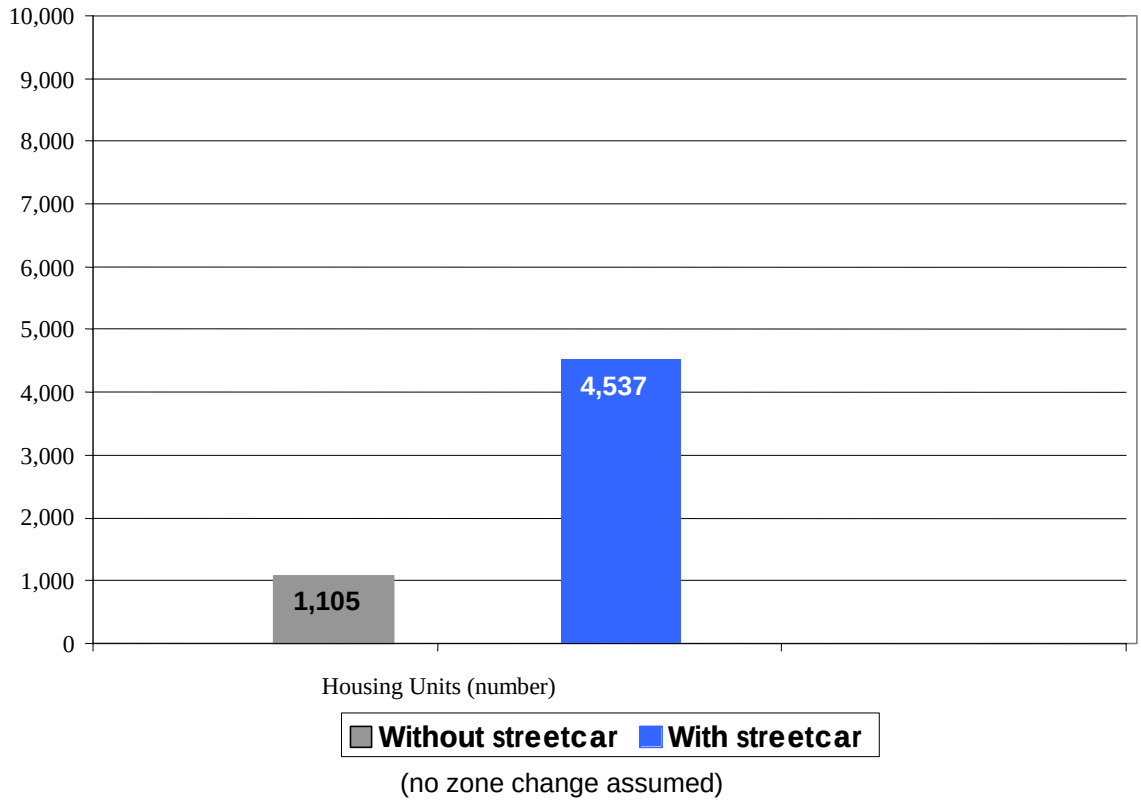
Source: Planning Bureau, City of Portland

Figure 3-22
Percentage of FAR Consumed by Existing Development



These data illustrate that in the Eastside there are areas with Maximum allowed FAR similar to those on the Westside and that there are areas with substantial additional capacity to accommodate additional growth. Figure 3-23, below, illustrates that if the same set of dynamics hold for the Eastside as have for the Westside where streetcar service was initiated, the difference in economic development could be as much as four times greater (410 percent compared with 2025 South Corridor) projections of housing. Employment is more difficult to project using this method and there were no significant differences found in the existing projections from the maximum FAR method.

Figure 3-23
Projection of Streetcar Impact on Eastside Housing Years 2007-2025

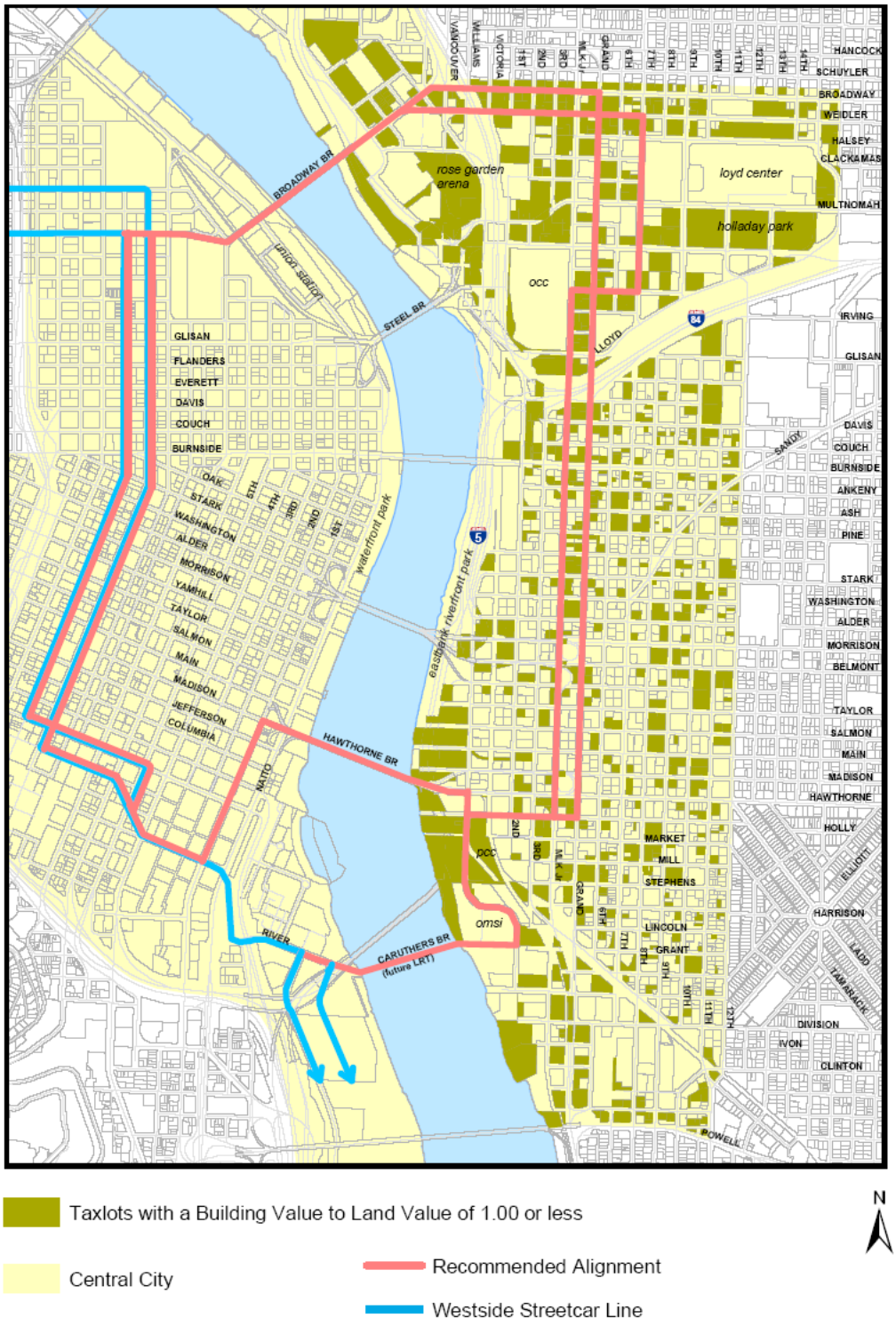


Source: Portland Streetcar Development Impacts, E. D. Hovee, 2005

While this preliminary analysis shows a strong influence of streetcar service, it only considers parcels of land that were vacant and then built upon. It does not take into consideration redevelopment of existing buildings. For example, the conversion of an old warehouse to new residential development is not taken into consideration with this method. Substantial redevelopment has occurred along the streetcar line (Brewery Blocks is one example) and therefore the methodology could likely understate the total streetcar service benefit to economic development. In addition, hedonic pricing analysis of the influence of streetcar is the most rigorous test of the hypothesis. This analytical method could be used to further corroborate both observed and measured conclusions about the economic development impact of streetcar service in mixed use areas with relatively flat topography and a well developed pedestrian network.

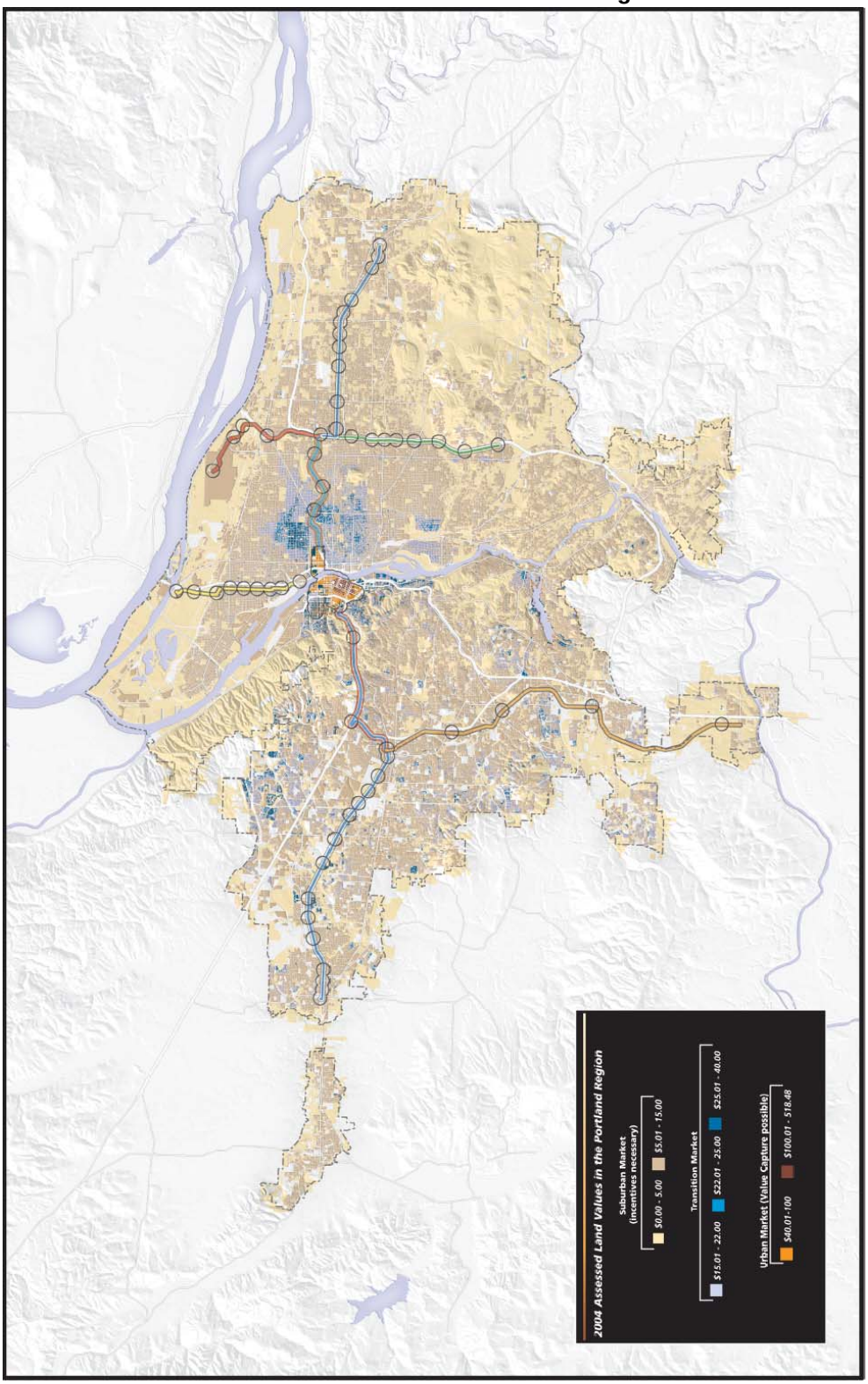
In addition to what development intensity is allowed, another driver of economic development recognized in the preliminary FTA guidance is the value of land compared with the value of structures upon land. When land is as valuable as structure upon it, this is often an indicator that redevelopment of the land to a more intensive use of the land would be possible, particularly if the land is well located and accessible to jobs and housing and nearby land with high structure values. Figure 3-24, below, shows areas with building value to land value of 1.0 or less. This is an important focus, but does not tell the whole story. The value of land relative to other places in the region is also important, as it reflects all of the locational factors of land. Figures 3-25 and 3-26 illustrate that the northern portion of the Eastside has land values comparable to many areas of the Westside of the Central City. That is, the Eastside location desirable and value is high.

Figure 3-24
Taxlots with a Building Value to Land Value of 1 or Less



Source: Eastside Streetcar Alignment Study, City of Portland, 2003

Figure 3-25
Assessed Value of Land in the Metro Region



Source: Metro 2004

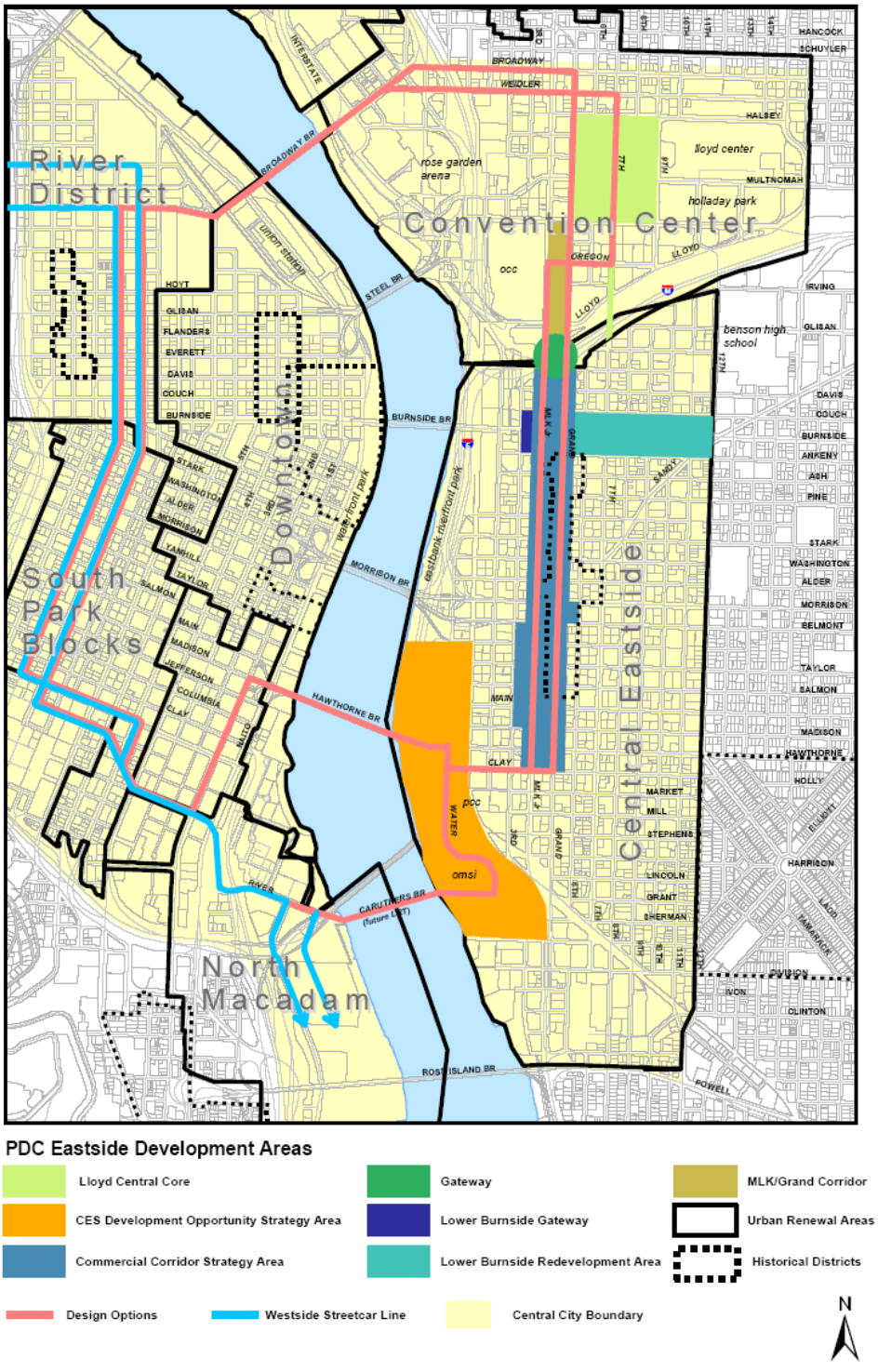
Figure 3-26
Assessed Value of Land in the Central City

Source: Metro 2004
Note: Dark lines denote areas within ¼ mile of LRT service

Private and Public/Private Development Plans

Also important to this analysis are City of Portland policies and resources. Specifically, the Portland Development Commission (PDC) is an agency of the city that works to ensure that City plans and policies are implemented. In its toolbox are several development and redevelopment tools and in particular, it manages urban renewal districts, which allow it to use tax increment financing to provide funding for a variety of public improvements in order to spark private investments. This approach was used with great success in the Pearl District with various public improvements, particularly the streetcar, but also parks and park improvements as well as street improvements to revitalize an area that had not experienced fresh investment in many years. Figure 3-27, below, shows the urban renewal areas and features of the Central City, especially the Eastside that the PDC is focused upon.

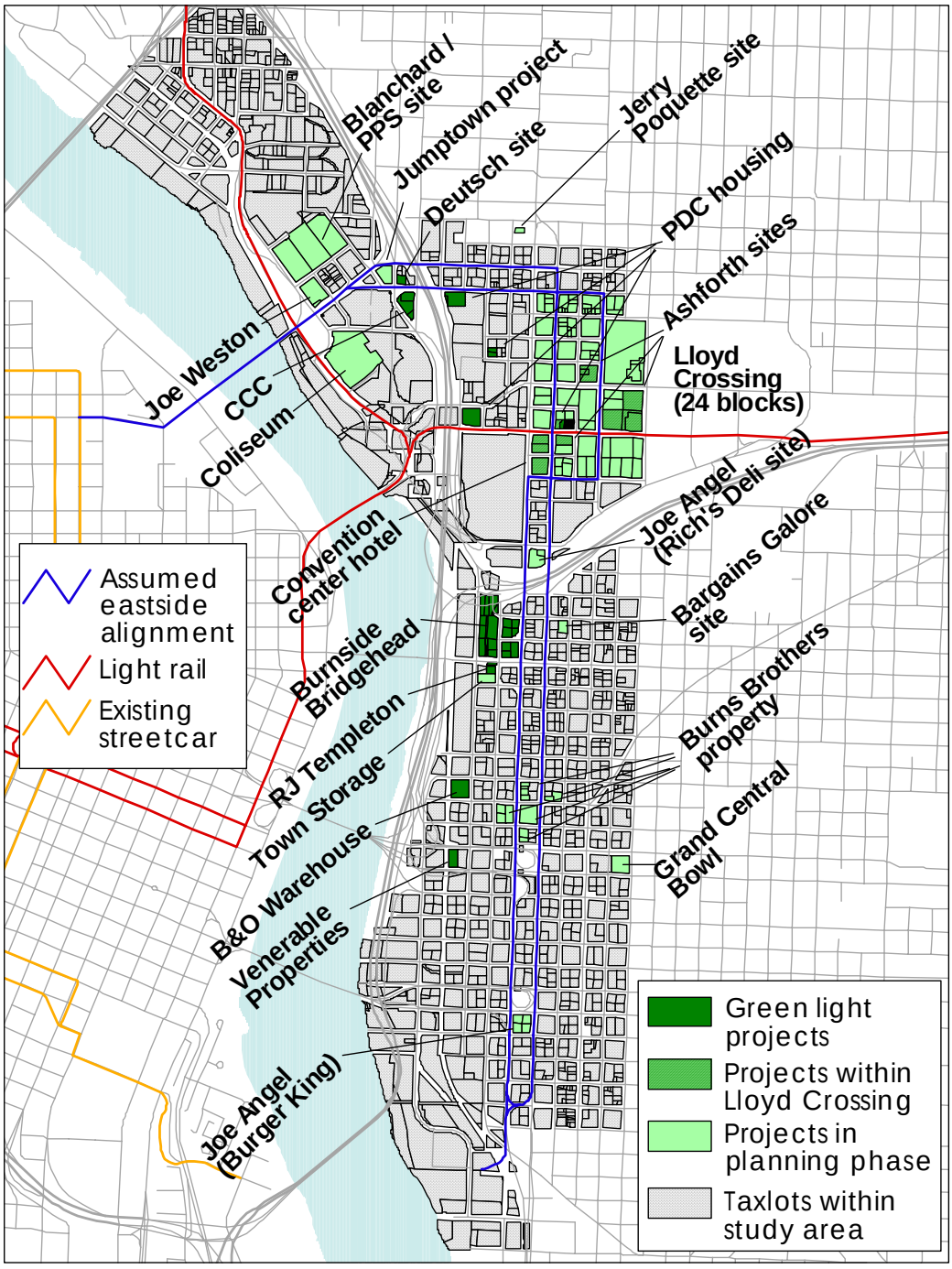
Figure 3-27
Portland Development Commission - Urban Renewal Areas in the Eastside and Vicinity



Source: Eastside Streetcar Alignment Study, city of Portland, 2003

While the above analysis is somewhat theoretical, Figure 3-28, below, provides a summary of a survey of property owners and developers with an interest in the Eastside and potential projects that they are considering on the Eastside. Property owners and developers in the Eastside area were contacted to assess what development might occur in the area. Twelve "green light" projects were identified and not included in the projection of housing, but noted on the map to indicate general development interest. This real world survey provides another method of assessing the development potential of the Eastside. Further, several of the property owners in the Eastside have cited their interest in seeing a streetcar built in order to further support their future development plans.

Figure 3-28
Assessment of Probable and Possible Eastside Development



Source: E.D. Hovee, 2005

In conjunction with PDC efforts, and consistent with the property owner survey, there are a number of private and public/private development plans that have been produced for the Eastside. One of the largest is known as the *Lloyd Crossing Sustainable Urban Design Plan & Catalyst Project*. The project is located in the northern end of the Eastside Transit AA Project area. This project includes a 35 block (each block approximately an acre in size) area and currently has approximately 2.8 million square feet of floor area - a combination of commercial (office, retail, food and hotel uses) as well as residential and substantial parking, much in structures. The potential (calculated from maximum allowed floor area ratios) is for 15.6 million square feet of building area - more than five times the existing base. According to the Lloyd Crossing plan, one mid-rise and two high rise scenarios have been completed for this site.

Figure 3-29
Three Dimensional Rendering of Catalyst Project from Lloyd Crossing

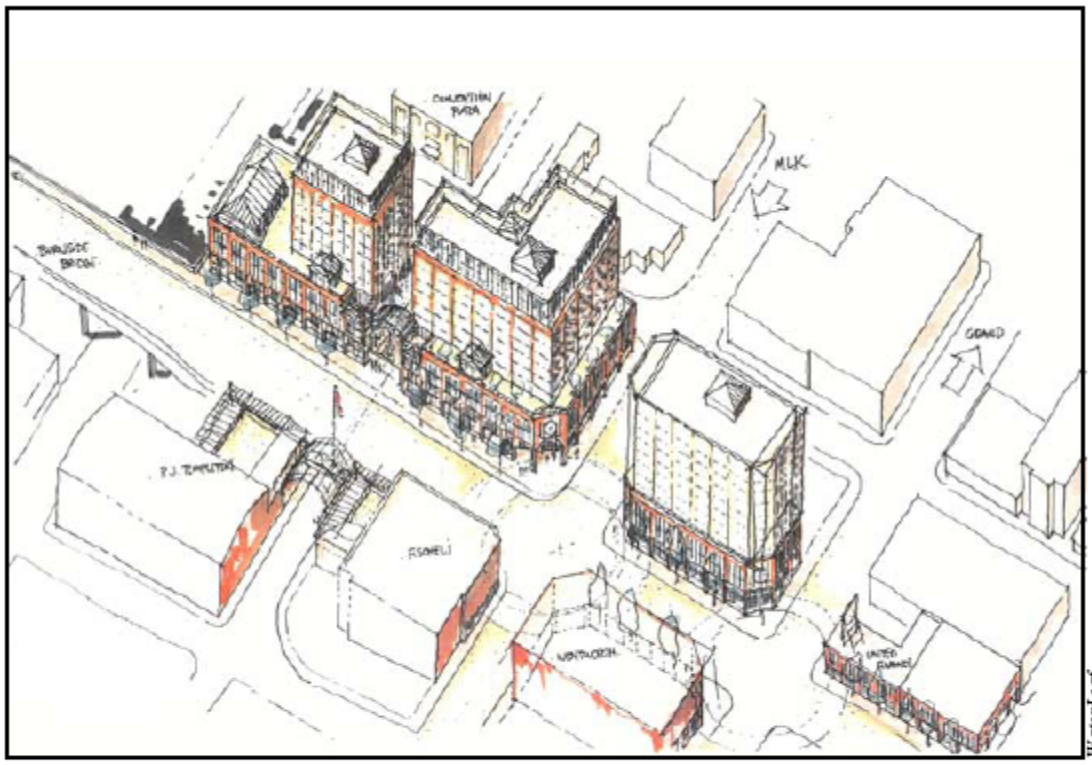
Source: Lloyd Crossing*: Sustainable Urban Design Plan & Catalyst Project*, PDC, July 2004 .

Source: PDC 2005

Drawing by Mithun Architects + Designers + Planners. For study purposes only and do not necessarily indicate development plans.

Another public/private project development plan has been created for the Burnside Bridgehead Project area (see Figure 3-30). This project is located in the lower end of the Lloyd District and again, the Eastside Transit Project alignment would provide increased accessibility to the jobs, shopping and other uses in the Bridgehead, as well as providing new residents of the Bridgehead with accessibility to the rest of the Central City via a transit circulator.

Figure 3-30
Burnside Bridgehead Project Concept

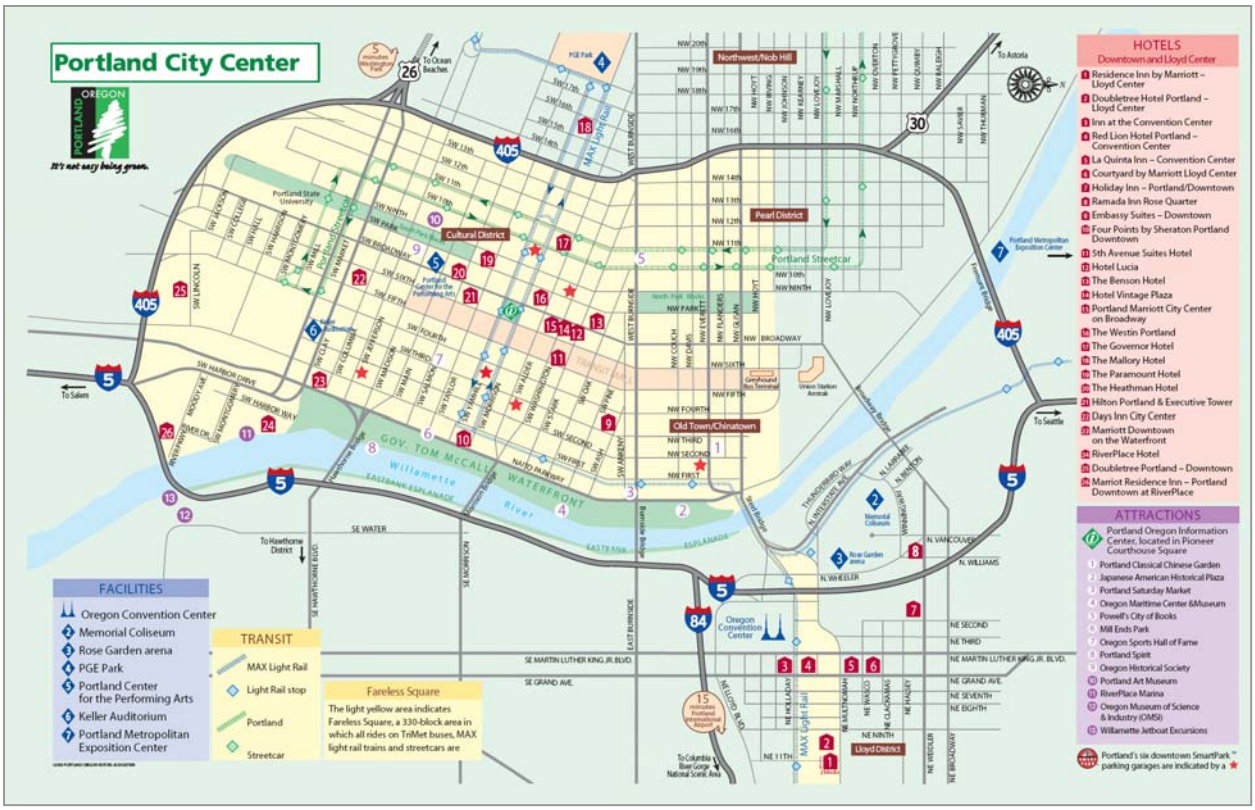


Concept sketch of 10 to 12 story buildings on Burnside at Grand and Martin Luther King Jr. Boulevard.

Also important to consider is the importance of a transit circulator to tourists and other visitors to the Central City area. As noted in this report, there are several different kinds of districts in the Central City area with differing attractions varying from art museums and galleries, theatre and similar cultural attractions to educational and learning experiences on the Portland State University campus to the restaurants and nightlife and hotels all within the Central City. Figure 3-31, below, illustrates these attractions and facilities. In addition, there is the home improvement district in the Central Eastside as well as the jobs in the support businesses, from printing to wholesale food distributors that supply the Westside businesses.

A transit circulator would serve all of these trip purposes as well the existing and new residents expected to be living within the Central City.

Table 3-31
Portland City Center - Attractions and Facilities



Source: Portland Oregon Visitors Association

Conclusions about Transit, the Eastside and Economic Development

There is a great deal of information that has been presented about transit and its value to economic development as well as the economic development climate in the Eastside. It can be concluded from the above information that:

- The City of Portland has a long stranding economic development strategy crafted to meet the characteristics of the Central City, including the Eastside and this strategy is more suited to the characteristics of a streetcar,
- The Eastside has relatively high value land, though it also has significant amounts of undervalued properties which are appropriate for redevelopment at substantially higher densities and intensities of use than those currently in existence and still be consistent with existing zoning;
- the existing and possible higher densities in the Eastside, including numerous proposed economic development projects would benefit from transit and especially a streetcar because the streetcars higher attraction of riders and greater passenger capacity.
- a streetcar is likely to spark substantially more economic development in the Eastside - perhaps on the order of 4 times more housing units than a bus.
- This larger public investment in a streetcar would likely result in greater private investments in the Eastside than would occur with the provision of bus service.
- The larger private investment in development in the Eastside consistent with a streetcar would likely result in a larger tax base than would result with the provision of bus service.

Financial Feasibility

Introduction

Assessing financial feasibility at the Alternatives Analysis phase of project development is a matter of comparing capital, operating and maintenance costs against proposed revenue sources. Funding sources generally solidify as a project moves through the project development process. In this section, proposed costs and revenues are presented and potential shortages and surpluses identified.

Capital Costs

Cost estimates are provided in 2005 dollars and inflated to year of expenditure (YOE). The construction is assumed to be conducted from September 2007 to September 2009. Construction inflation has been assumed to be 5% per year through 2008. The cost estimates are based on a build-up of FTA cost categories and appropriate contingencies and are presented below.

Table 3-6
Capital Costs

Project Alternative	($2005 dollars)	($YOE dollars)
Oregon MOS	$84,000,000	$100,506,000
Morrison MOS (MLK-Grand)	$105,000,000	$125,632,000
Morrison MOS (Two Way Grand)	$119,000,000	$142,380,000
OMSI MOS (MLK-Grand)	$142,000,000	$169,905,000
OMSI (Two-Way Grand)	$156,000,000	$186,653,000
Full Loop	$153,000,000	$187,026,000
Full Loop (2-Way Grand)	$167,000,000	$203,774,000

Source: URS, April 2006

Capital Funding Sources

Potential federal and local sources for capital funding have been identified. At this phase of project development the funding sources are general strategies to be pursued with actual funding commitments anticipated prior to a request for FTA funding. There are variations in the amount available by funding source and these assumptions are outlined below. The FTA Small Starts share controls a considerable part of the proposed funding as it is assumed that the project can receive a 60% federal share up to the maximum of $75 million allowed under the program. The total project cost cannot exceed $250 million under the FTA Small Starts program, which is not an issue for this project.

A preliminary inventory of funding sources indicate a potential of $100-125 million available for total project costs, which would not be sufficient to fund the entire Full Loop at this time. Additional revenue would need to be identified if the entire project is to be constructed in one phase. Without additional revenues, a phasing plan would be required. Descriptions of proposed revenue sources are presented below.

Federal Small Starts: $75,000,000. Recent legislation passed by Congress known as SAFETEA-LU reauthorization includes provision for Small Starts for projects costing less than $250 million and receiving a maximum of $75 million federal. The proposed project anticipates a 60% federal share.

Committed Federal: $4,200,000. Streetcar has received a $1 million MTIP commitment of Surface Transportation Program (STP) funds, $613,000 Housing and Urban Development commitment, and $2.6 million from SAFETEA-LU.

Local Improvement District: $6,000,000 to $10,000,000. A local improvement district similar to the one used for the initial streetcar is proposed with similar rates yielding $10 million for streetcar the entire district with $6 million Lloyd, $2 million Morrison and $2 million OMSI. Property owners are being asked to commit to support the LID prior to the February preferred alternative decision.

Bridge Funds: $9,000,000. The Broadway Bridge will require a major improvement estimated to cost $17 million to extend its life. It is proposed that bridge funds be sought to support $9 million of the construction from other bridge funds available to the region.

Portland Development Commission Funding: $25,000,000-$35,000,000.The entire project is in three urban renewal districts: River District, Convention Center and Central Eastside. A total contribution ranging between $25-$35 million, depending on the alternative, is proposed from the various districts benefiting from the project.

City of Portland Funding: $4,000,000 maximum The balance of the project cost is anticipated to be provided by PDOT from various sources including system development charges, one-time-only funding, New Market Tax Credits, and others. A maximum amount is set at $4 million which represents the limit on ability to secure additional funds to complete the project.

Capital Funding Feasibility

Table 3-8, below, entitled Proposed Capital Funding Plan provides sources and uses for each MOS under consideration. The Oregon MOS and Morrison MOS have listed sources (not fully committed) that could assure the completion of the project. The OMSI MOS and Full Loop require identification of $35-47 million in additional sources of funding in order to be constructed in a single project phase.

Operations and Maintenance Costs

Operating costs were developed by TriMet based on model outputs provided by Metro. The results are presented in Table 3-7 below. The costs represent the increment of cost required to operate the alternative over and above the No-Build. Costs are expressed in 2005 dollars. The Two-way Grand Design would have operating costs similar to the MLK/Grand couplet.

Table 3-7
Operating and Maintenance Costs ($ 2005)

Alternative	Operating Cost
Full Loop	$5,262,000
OMSI MOS	$5,325,100
Morrison MOS	$4,928,200
Oregon MOS	$4,642,200

Source, TriMet 2006

The operating and maintenance costs represent a blended cost of streetcar and bus. This helps to explain the seemingly counter-intuitive result that the OMSI MOS would cost more to operate than the Full Loop. In the OMSI MOS, the piece of the loop connecting OMSI to RiverPlace is

provided by a short segment of connecting bus service over the Hawthorne Bridge. In the Full Loop, the streetcar route is more direct over the Caruthers Bridge. In this instance, the difference in cost between the Full Loop and OMSI MOS streetcar segments is offset by the required bus connector in the OMSI MOS.

Operating Revenue Sources

Operating revenue commitments have not been made for the Eastside Transit Project. Two sources of revenue have been used to date for streetcar operations and each is discussed below. Some combination of these sources, and possibly additional sources, will ultimately be used to fund operations for the project. Currently, TriMet provides two-thirds of the streetcar operating revenue with the remaining third provided by the City of Portland.

TriMet Operating Revenue TriMet has raised two key issues that require additional study. The first issue is that TriMet seeks to develop a rationale for the percentage of operating costs assigned to TriMet and to the City of Portland. TriMet has proposed a review of the benefits of added streetcar service, potential savings that could be derived and development of a formula for operating cost participation.

The second issue relates to TriMet's ability to meet operating commitments prior to 2011 or 2012. TriMet is unable to commit to service expansion beyond its current commitments due to the economic situation in the region and the projected payroll tax revenues. There is a need to develop alternative funding sources in the initial years depending upon when service is projected to begin.

City of Portland Operating Revenue The City of Portland has developed a policy of supporting streetcar operations with parking meter revenues generated from the area served. Currently, the Lloyd District has parking meters in a substantial portion of the proposed service area. The Broadway Weidler Corridor from the Bridge to NE 7th Avenue currently does not have meters. The areas of the Central Eastside do not have parking meters . The City is prepared to explore the feasibility of expanding the parking meters to include the area selected for streetcar service in the first construction segment. Contributions to operations from the City of Portland are based upon the increase of parking meters in the Central City.

Operating and Maintenance Funding Feasibility

Funding mechanisms are in place that could potentially generate enough operating revenue to expand the streetcar system. More work will be required between the potential funding partners to develop a mutually agreeable funding plan, and to identify potential additional funding sources if necessary.

Table 3-8
Proposed Capital Funding Plan

	Oregon MOS	Morrison MOS MLK-Grand	Morrison MOS 2 Way Grand	OMSI MOS MLK-Grand	OMSI MOS 2 Way Grand	LOOP MLK-Grand	LOOP 2 Way Grand
Construction Costs							
Streetcar to NE Oregon	100,506,000	100,506,000	100,506,000	100,506,000	100,506,000	100,506,000	100,506,000
Oregon to Morrison		25,126,000	25,126,000	25,126,000	25,126,000	25,126,000	25,126,000
Two-Way Grand Cost			16,748,000		16,748,000		16,748,000
Morrison to OMSI				44,273,000	44,273,000	44,273,000	44,273,000
Loop Completion						17,121,000	17,121,000
TOTAL	**100,506,000**	**125,632,000**	**142,380,000**	**169,905,000**	**186,653,000**	**187,026,000**	**203,774,000**
Total Without Inflation ($ FY 05)	84,000,000	105,000,000	119,000,000	142,000,000	156,000,000	153,000,000	167,000,000
Funding Sources							
FTA 60% Grant	60,303,600	75,000,000	75,000,000	75,000,000	75,000,000	75,000,000	75,000,000
LID	6,000,000	8,000,000	8,000,000	10,000,000	10,000,000	10,000,000	10,000,000
PDC TIF - multiple districts	20,000,000	25,000,000	25,000,000	30,000,000	30,000,000	35,000,000	35,000,000
Bridge Funds	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000
HUD (committed)	613,590	613,590	613,590	613,590	613,590	613,590	613,590
MTIP (committed)	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
MTIP (SAFETEA-LU)	1,650,000	1,650,000	1,650,000	1,650,000	1,650,000	1,650,000	1,650,000
MTIP (City Request	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
City Funding (TBD)	593,155	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000
TOTAL REVENUE	**100,160,345**	**125,263,590**	**125,263,590**	**132,263,590**	**132,263,590**	**137,263,590**	**137,263,590**
SURPLUS/(DEFICIT*)	**(345,655)**	**(368,410)**	**(17,116,410)**	**(37,641,410)**	**(54,389,410)**	**(49,762,410)**	**(66,510,410)**

Source: Portland Streetcar Inc, and URS, May 2006

Note: PDC TIF funds to be determined.

*Any deficits identified would have to be eliminated prior to submittal to FTA by a combination of value engineering and/or identification of additional revenues.

Cost-Effectiveness

Introduction

Cost effectiveness provides a measure of how effectively the investment in capital, operating and maintenance funds that would be required for each alternative translates into ridership on the new streetcar line. Table 3-9 shows the cost per streetcar rider, new streetcar line only, for each alternative. The cost includes the annualized capital cost of the alternative and the annual operating and maintenance cost. The annual cost, as compared to the No-Build alternative, is compared to the annualized streetcar riders to arrive at cost per streetcar rider.

The Full Loop alternative, which has the highest cost, would also have the most riders, resulting in the lowest cost per streetcar rider of $4.25. The remaining MOS alternatives, with fewer additional new streetcar miles, and therefore lower cost and ridership, show a cost per rider figure commensurate with the length of the new streetcar line; the OMSI MOS cost per rider is $5.01, Morrison MOS is $5.80, and the Oregon MOS is $6.86.

Table 3-9
Cost per Streetcar Rider
Year 2025

	Full Loop	OMSI MOS	Morrison MOS	Oregon MOS
Annual Capital + O&M Cost[1]	$17,177,000	$16,331,100	$13,062,200	$11,095,200
Annual New Streetcar Riders[2]	4,044,030	3,260,000	2,252,660	1,616,960
Cost/Streetcar Rider	$4.25	$5.01	$5.80	$6.86

[1]Costs are in 2005 dollars.

[2]Annualized Streetcar Riders on new streetcar line only.

Table 3-10 is similar to the previous table except cost is shown as the federal share (assuming 60% federal share) of the annualized capital cost of each alternative. Operating and maintenance cost are excluded because the federal government does not pay any portion of the operating or maintenance cost.

The Full Loop alternative results in the lowest federal cost per streetcar rider at $1.77 per rider. The remaining MOS alternative's, show an increasing federal cost per streetcar rider commensurate with the length and ridership of the new streetcar line. Specifically, the OMSI MOS federal cost per rider is $2.03, Morrison MOS is $2.17, and the Oregon MOS is $2.39.

Table 3-10
Federal Cost per Streetcar Rider
Year 2025

Federal Share (60%) CEI				
	Full Loop	**OMSI MOS**	**Morrison MOS**	**Oregon MOS**
Annualized Capital Cost (60% share)[1]	$7,149,000	$6,603,000	$4,880,400	$3,871,800
Annual New Streetcar Riders[2]	4,044,030	3,260,000	2,252,660	1,616,960
Federal Cost/Streetcar Rider	$1.77	$2.03	$2.17	$2.39

[1]Federal Costs are in 2005 dollars and assume 60% maximum federal share.
[2]Annualized Streetcar Riders on new streetcar line only.

Table 3-11
Operating Cost per Streetcar Rider
Year 2025

Operating Cost/New Streetcar Rider				
	Full Loop	**OMSI MOS**	**Morrison MOS**	**Oregon MOS**
Annual O&M Cost[1]	$5,262,000	$5,325,100	$4,928,200	$4,642,200
Annual New Streetcar Riders[2]	4,044,030	3,260,000	2,252,660	1,616,960
O&M Cost/New Streetcar Rider	$1.30	$1.63	$2.19	$2.87

[1]Costs are in 2005 dollars.
[2]Annualized Streetcar Riders on new streetcar line only.

Table 3-11 shows operating cost per streetcar rider, new streetcar line only, for each alternative. The Full Loop alternative would have the lowest operating cost per streetcar rider at $1.30 per rider. The remaining MOS alternatives show increasing operating cost per rider as ridership declines with each successive shorter streetcar alternative.

Additional Cost-Effectiveness Evaluation for Opening Year

It should be noted that the Project is in the process of developing 2009 travel forecast and performance data. Further, the FTA is in the process of developing new guidance on this and other aspects of Small Starts. Accordingly, additional cost-effectiveness analysis will be completed in the near future.

Endnotes for Chapter 3

[1] *Pedestrian and Transit Friendly Design: A Primer for Smart Growth.* Reid Ewing, American Planning Association, 1997.
2 *Rail Transit in America: A Comprehensive Evaluation of Benefits,* Litman, Victoria Transport Policy Institute, April, 2005, page 34.
[3] *Oregon Transportation Plan*, 1992, Page 4, Executive Summary.
[4] *2004 Regional Transportation Plan*, July 2004, Metro. page 1-1
[5] *2005 Transit Investment Plan Executive Summary* TriMet, 2005, page 1.
[6] *Action Chart, Central City Plan*, City of Portland, March 1998, page 44.
[7] Central City Transportation Management Plan, City of Portland , 1995, pages 17 and 18.
[8] Central City Transportation Management Plan, City of Portland , 1995, page 55.
[9] *Land Use and Site Design*, Transit Cooperative Research Program, Transportation Research Board, 2003 page 15-21.
[10] *The Economic Impact of Public Transit in Oregon*, The Oregon Transit Association, January 26, 2005, citing a Cambridge Systematics study.
[11] *Central City Plan*, City of Portland, March 1988, page 38.
[12] *Opportunities for New Streetcar Routes"*, Discussion Paper, Toronto Transit Commission, January 1997. Located at: http://www.city.toronto.on.ca/ttc/schedules/ opportunities_ for_new_streetcar_routes.htm
[13] *Transit Benefits: 2000 Working Papers. A Public Choice Policy Analysis*. FTA Policy Paper. Office of Policy Development, Federal Transit Administration, U.S. Department of Transportation, Washington, D.C., 2000, p. xvi. (http://www.fta.dot.gov/library/policy/tb2/tb2analysis.pdf)
[14] *DART Light Rail's Effect on Taxable Property Valuations and Transit Oriented Development*, U Weinstein, Bernard and Clower, Terry niversity of North Texas, Center for Economic Development and Research, Dallas, Texas, January 2003, page 7.
[15] *How Will the Centerline Affect Property Values in Orange County: A Review of Literature and Methodological Approaches for Future Consideration*, Cockerill, Lee and Stanley, Denise, California State University - Fullerton, Institute of Economic and Environmental Studies, October 2002.
Also Cervero, R. and Duncan, M. "Benefits of Proximity to Rail on Housing Markets: Experiences in Santa Clara County", *Journal of Public Transportation*, Vol. 5, No. 1, p. 1-18, 2002.
[16] *Ten Principles for Successful Development Around Transit*, Urban Land Institute "Apply the Power of Partnerships" Washington, DC 2003, p. 7.
[17] *On Common Ground*: Mastaglio, Linda, "All Aboard Commuter Rail: A Growing Alternative for Metro Areas" REALTORS & Smart Growth, National Association of Realtors, Winter 2002 p. 32.

Chapter 4. Design Considerations

Introduction
The purpose of this chapter is to outline the design and traffic-related issues associated with operating a streetcar within the study area including peak hour traffic analysis with and without a streetcar, operational issues, neighborhood traffic issues, and design considerations for the next phase of this study. In addition, assessment of a design option - two way Grand Avenue - is also included in this chapter.

Traffic Issues
Introduction
The traffic analysis used the Financially Constrained 2025 RTP network for future demand and to determine growth rates for the 2009 PM peak hour traffic analysis. Historical PM peak hour turning movement counts were obtained from the City of Portland at all the traffic-controlled intersections along the Eastside Streetcar route. Then the counts were adjusted to the Year 2009 using Metro's travel demand model to obtain an average 20-year linear growth rate. A 2% per year linear growth rate was applied to the traffic counts to obtain year 2009 background traffic volumes. To increase traffic volumes for the 2025 PM peak hour analysis, Metro's model was used as a starting point. Adjustments were made to specific link locations to balance the traffic volumes through the corridor and to better represent predicted travel patterns.

For the purpose of this analysis, the OMSI MOS streetcar alignment that was chosen as a representative alignment to assess traffic impacts for the streetcar alternative. The Full Loop and OMSI MOS traffic impacts would be identical, as no additional mixed traffic operations would be required to complete the loop over the Caruthers Bridge. The OMSI MOS was chose to keep the analysis area manageable within the VISSIM model. This MOS was modeled using VISSIM, a traffic micro-simulation tool, beginning at the existing Northwest Portland Streetcar alignment at NW Lovejoy Street and ending at OMSI in southeast Portland. The analysis evaluated streetcar operations through the Lloyd District and the Central Eastside districts. The traffic analysis focused on the traffic conditions and how they would affect streetcar operations, and how streetcar operations would impact traffic.

The proposed Eastside Streetcar route would operate in mixed traffic on existing streets within the corridor. During the PM Peak periods traffic congestion is relatively heavy along this corridor, which would in turn impact streetcar operations. Today, the Streetcar operations are dependent on the following conditions:

- General traffic flow of the roadway system the streetcar is operating in, and
- Key locations where the streetcar requires signalization changes or other exclusive provisions to integrate with the general traffic flow.

2009 and 2025 PM Peak Hour Traffic Analysis
Future 2009 (opening year) and 2025 PM peak hour traffic analyses were conducted at 51 intersections along the SE MLK Jr. Boulevard/SE Grand Avenue couplet and the NE Broadway/NE Weidler couplet.

For the year 2009 PM peak hour traffic operations, four intersections along the proposed route are anticipated to operate at an intersection level of service (LOS) E to F, and/or a volume to capacity Ratio (V/C) greater than 1.00. The four intersections that have the most congestion are shown in Table 4-1.

Table 4-1
2009 PM Peak Hour Congested Intersections
Along the Proposed Streetcar Alignment

Intersection	Measure
NE Broadway St at N Vancouver Ave	LOS F
NE Martin Luther King JR Blvd at NE Lloyd Blvd	LOS E and v/c ratio of 1.13
SE Martin Luther King JR Blvd at SE Stark St	LOS E and v/c ratio of 1.21
SE Martin Luther King JR Blvd at SE Taylor Street	v/c ratio of 1.04

Source: David Evans and Associates, 2006

For the year 2025 PM peak hour traffic operations, 17 intersections along the proposed route are anticipated to operate at a LOS E to F, and/or a V/C greater than 1.00. The 17 intersections that have the most congestion are shown in Table 4-2.

Table 4-2
2025 PM Peak Hour Congested Intersections
Along the Proposed Streetcar Alignment

Intersection	Measure
NE Broadway St at NE Grand Ave	LOS E and v/c ratio of 1.02
NE Weidler St at NE Martin Luther King JR Blvd	LOS E and v/c ratio of 1.08
NE Weidler St at NE Grand Ave	LOS E and v/c ratio of 1.15
NE Martin Luther King JR Blvd at NE Lloyd Blvd	LOS F and v/c ratio of 1.37
NE Martin Luther King JR Blvd at NE Couch	LOS F and v/c ratio of 1.11
Martin Luther King JR Blvd at E Burnside St	LOS F and v/c ratio of 1.31
SE Martin Luther King JR Blvd at SE Ankeny St	v/c ration of 1.03
SE Martin Luther King JR Blvd at SE Stark St	LOS F and v/c ratio of 1.79
SE Martin Luther King JR Blvd at SE Taylor Street	LOS F and v/c ratio of 1.27
SE Martin Luther King JR Blvd at SE Clay St	LOS F
NE Grand Ave at Multnomah St	LOS E and v/c ratio of 1.13
NE Grand Ave at NE Couch St	LOS F and v/c ratio of 1.18
Grand Ave at E Burnside St	LOS F and v/c ratio of 1.24
SE Grand Ave at SE Ankeny	LOS E
SE Grand Ave at SE Stark St	LOS F and v/c ratio of 1.23
SE Grand Ave at SE Belmont St	LOS F and v/c ratio of 1.16
SE Grand Ave at SE Hawthorne Blvd	LOS E

Source: David Evans and Associates, 2006

2009 and 2025 PM Peak Hour Streetcar Operations

Future PM peak hour traffic conditions may have some impact on streetcar operations due to congestion along this corridor. Six of the intersections would be impacted by Streetcar operations, where general traffic is stopped for the streetcar to turn into mixed traffic through either a new traffic signal or the addition of a new phase to the existing traffic signal. These intersections are identified in Table 4-3 as having a Transit Phase at a signalized intersection. These changes would not significantly alter the existing signal timing and progression of traffic along these roadways.

Changes to the Transportation Network for the Proposed Streetcar Alignment

As part of the proposed Streetcar alignment, several signal and roadway changes are proposed to successfully integrate Streetcar into mixed traffic. Changes would include special signal phases, queue jumps, roadway widening, and striping and lane changes. These changes were incorporated into the traffic analysis for Streetcar to OMSI and are summarized in this section. Any of the MOS Alternatives would have the same improvements up to the respective terminus locations.

At the **NW 10th and 11th Avenues and NW Lovejoy Street** intersection, the inbound streetcar would have a separate signal phase to turn left from NW Lovejoy Street to southbound NW 11th Avenue. The outbound streetcar would turn right from NW 10th Avenue to NW Lovejoy Street. The Streetcar would operate in mixed traffic on NW Lovejoy Street.

On **NW Lovejoy Street at the NW Broadway Bridge Approach**, the inbound streetcar would have a separate signal phase to turn right from the left lane of the Broadway Bridge to the right lane on the NW Lovejoy Street ramp. The eastbound streetcar would also have a separate signal phase to turn left from the right lane on NW Lovejoy Street to the left lane on the Broadway Bridge. Once on the Broadway Bridge, the streetcar would operate in middle left lanes of the bridge. From the Broadway Bridge, the streetcar would transition into the westbound/eastbound left lanes on the N/NE Broadway/Weidler Streets couplet.

On **NE Broadway Street (westbound) approach to N Williams Street**, the roadway would be widened and lanes shifted to provide a new left turn only lane to N Vancouver adjacent to the streetcar. Currently, the left turn lane is a forced left turn only lane. On **NE Weidler Street (eastbound) approach to N Vancouver Street**, the roadway would be widened and the lanes would shift to add a new left turn lane to N Williams

New pedestrian traffic signals would be installed on **NE Broadway and NE Weidler Street at NE 2nd Avenue** and **NE Weidler Street at NE Wheeler Street** to provide safe pedestrian crossings at proposed streetcar stations.

At the **NE Weidler Street and NE 7th Avenue** intersection, the eastbound streetcar would require a separate traffic signal phase to turn right from the left lane on NE Weidler to southbound NE 7th Avenue. On NE 7th Avenue, a new traffic signal would be installed at **NE 7th Avenue and NE Halsey Street** intersection to replace the all way stop control. Southbound Streetcar would operate on NE 7th Avenue between NE Oregon Street and NE Weidler Street.

Northbound Streetcar would operate in the right lane on NE Grand Avenue between SE Harrison Street and NE Broadway Street. At the **NE Grand Avenue and NE Broadway Street** intersection, the northbound streetcar would require a separate traffic signal phase from the right lane on NE Grand Avenue to turn left to the left lane on NE Broadway Street.

From NE 7th Avenue, the streetcar would turn right on NE Oregon Street through the NE Grand Avenue and NE Oregon Street intersection to NE MLK Jr. Boulevard. At the NE MLK Jr. Boulevard and NE Oregon Street intersection, streetcar would turn left to travel southbound in the right lane on **NE MLK Jr. Boulevard**. South of NE Lloyd Boulevard, the streetcar would transition into an exclusive streetcar only lane over the I-84 overpass. The streetcar only lane would require taking on-street parking between I-84 and NE Couch Street (approximately two blocks). This would only require re-striping the existing roadway.

At **NE MLK Jr. Boulevard and NE Couch Street**, a queue jump signal would be constructed to transition the streetcar out of the streetcar only lane into mixed traffic in the southbound right lane.

On **SE MLK Jr. Boulevard just south of SE Madison Street**, streetcar would transition from operating in mixed traffic in the right lane to an exclusive streetcar only lane due to bridge clearance requirements under the SE Hawthorne Boulevard overpass. The streetcar only lane would eliminate on-street parking for this short segment between SE Madison Street and SE Clay Street.

New pedestrian traffic signals would be installed on **SE MLK Jr. Boulevard and SE Grand Avenue at SE Morrison Street, SE Belmont Street and SE Pine Street** to provide safe pedestrian crossings at proposed streetcar stations.

A new pedestrian traffic signal would be installed on **SE MLK Jr. Boulevard under the SE Hawthorne Boulevard overpass** to provide safe pedestrian crossings at proposed streetcar stations.

At the **SE MLK Jr. Boulevard and SE Clay Street and SE Hawthorne ramp** from the Hawthorne Bridge, the streetcar would have a queue jump to transition back into mixed traffic in the right lane on SE MLK Jr. Boulevard. **At SE Harrison Street**, the streetcar would turn onto a new streetcar only flyover of the railroad to OMSI.

Northbound streetcar exiting OMSI would use the new streetcar only flyover of the railroad and cross **SE MLK Boulevard** with a new traffic signal to SE Harrison Street. The streetcar would travel on SE Harrison Street to SE Grand Avenue.

A new signal would be installed at **SE Grand Avenue and SE Harrison Street** intersection for streetcar to turn left to northbound SE Grand Avenue. Streetcar would operate in the right lane of SE Grand Avenue to NE Broadway Street.

Table 4-3 summarizes the changes to the transportation system for the proposed Streetcar alignment.

2009 and 2025 Operational Issues with the Proposed Streetcar Alignment
Given future levels of congestion in the study area and based on the 2009 and 2025 traffic analysis, no significant traffic impacts are anticipated as a result of the proposed Streetcar operations. However, there are some operational issues that may require attention as they could impact existing or future traffic operations or these issues require further analysis as the project design progresses.

The following summarizes the 2009 operational issues:

At the **NW Lovejoy Street and Broadway Bridge intersection**, all traffic movements at the signalized intersections would stop to allow for both the inbound and outbound streetcar movements. Traffic stopped behind the streetcar would be required to change lanes to get around the streetcar or wait until the next signal phase for that movement.

At the **NE Grand Avenue and NE Broadway Street intersection**, the northbound streetcar would turn from the right lane on NE Grand Avenue to the left lane on NE Broadway Street. To

accomplish this, the streetcar would have to swing into the center lanes on NE Broadway Street. All traffic would be stopped to provide the opportunity for the streetcar to make this maneuver. The streetcar could be impacted by traffic queues from the NE MLK Jr. Boulevard and NE Broadway Street intersection that would extend past the trackway. The streetcar would not be able to make this movement unless all traffic queues have cleared the trackway.

Table 4-3
Summary of Proposed Signal and Roadway Improvements

Location	Traffic Signal Improvements			Roadway Improvements	
	Transit Phase	Queue Jump	New Signal[1]	New Striping	Widen/New Roadway
NW 11th Avenue at NW Lovejoy Street	X		X		
NW Lovejoy Street at the NW Broadway Bridge	X				
NW Lovejoy Street at the NW Broadway Bridge	X				
NE Broadway Street				X	X
NE Broadway Street at N Williams Street			X		
NE Weidler Street					X
NE Weidler Street at N Williams Street			X		
NE Weidler Street at NE Wheeler Street			X[2]		
NE Broadway Street at NE 2nd Avenue			X[2]		
NE Weidler Street at NE 2nd Avenue			X[2]		
NE Weidler Street at NE 7th Avenue	X				
NE 7th Avenue and NE Halsey Street			X		
NE Grand Avenue and NE Broadway Street	X				
NE MLK Jr. Boulevard				X	
NE MLK Jr. Boulevard at NE Couch Street		X			
NE MLK Jr. Boulevard				X	
NE MLK Jr. Boulevard and NE Davis Street			X		
SE MLK Jr. Boulevard at SE Morrison Street			X[2]		
SE MLK Jr. Boulevard at SE Belmont Street			X[2]		
SE MLK Jr. Boulevard at SE Pine Street			X[2]		
SE Grand Avenue at SE Pine Street			X[2]		
SE MLK Jr. Boulevard under the Hawthorne overpass			X[2]		
SE MLK Jr. Boulevard and SE Clay Street		X			
SE MLK Jr. Boulevard and Streetcar flyover			X		
New Streetcar Flyover					X
SE MLK Jr. Boulevard and SE Harrison Street	X		X		
SE Grand Avenue and SE Harrison Street	X		X		

Note: this table does not include physical modifications to existing traffic signals.
[1] Identifies locations where a traffic signal does not exist today or in the future. This does not include locations where there is a traffic signal but needs to be replaced due to modifications to operations.
[2] New Pedestrian Traffic Signal

At the **NE Weidler Street and NE 7th Avenue** intersection, the streetcar has a tight turning radius from the left lane on NE Weidler Street to the right lane on NE 7th Avenue. The streetcar would swing into the striped median on NE 7th Avenue. This is similar in operations to the existing streetcar at the SW Market Street and SW 5th Avenue in downtown.

At the **NE Oregon Street and NE MLK Jr. Boulevard** intersection, the streetcar turns from NE Oregon Street to NE MLK Jr. Boulevard to travel southbound towards OMSI. Heavy southbound traffic on NE MLK Jr. Boulevard creates traffic queues at times that extend to NE Oregon Street. In instances where traffic queues up to or past NE Oregon Street, the streetcar would not be able to turn into the lane until the queue clears.

All of the issues identified during the 2009 PM peak hour are also relevant to the 2025 PM peak hour. The following summarizes the additional 2025 operational issues:

The anticipated increase in congestion in Northwest Portland creates traffic queues that extend over the Broadway Bridge. This would impact the streetcar operations at the NW **Lovejoy Street and Broadway Bridge** intersection. The streetcar would only be able to move through the intersection as long as the traffic queues have cleared the trackway or there was a lane for the streetcar to enter.

Northbound traffic Queues on **NE Grand Avenue** would extend as far back as NE Multnomah Street. Streetcar would operate in mixed traffic along NE Grand Avenue and would be impacted by the congestion from NE Multnomah Street to NE Broadway Street.

The anticipated increase in congestion through the E Burnside Street and NE Couch Street couplet plus northbound traffic queues on **NE Grand Avenue** extending back to SE Stark Street would impact the streetcar operations.

The anticipated increase in congestion along **SE MLK Jr. Boulevard and SE Grand Avenue** south of SE Belmont and SE Morrison Streets would impact the streetcar operating in mixed traffic.

Neighborhood Traffic Impacts

The proposed streetcar would have some effect on the local street system. This section provides a discussion of these effects would impact the neighborhoods by the year 2025.

The **No-Build** alternative would not provide any major transit improvements in the corridor. There are a few major highway improvements in the corridor that are intended to help alleviate some of the anticipated future congestion. However, even with these major capital improvements in place, congestion in the corridor is expected to increase. During the 2025 PM peak hour, many of the intersections are expected to experience significant delays and operate at or over capacity and traffic queues are expected to spill back into adjacent intersections. With the high levels of congestion in the corridor, a likely outcome is neighborhood cut-through traffic to bypass the congestion.

The proposed **Streetcar Full Loop Alternative** would operate in mixed traffic with a few key locations designed to move the streetcar through the corridor reliably and efficiently. Since the streetcar would operate in mixed traffic, it is subject to the same congestion and delays as general

traffic. As congestion worsens for general traffic, travel times for the streetcar will increase. With the high levels of congestion projected for the corridor, the potential for neighborhood cut-through traffic is just as likely as it would be under the No-Build scenario. Where general traffic is impacted by separate streetcar-only phases at signalized intersections, frustrated drivers could seek new routes on adjacent streets. The Streetcar Alternative would have higher transit ridership compared to the No-Build, moving more persons through the corridor. Further investigation into the potential for neighborhood cut through should be conducted as design progresses during the next phase of this study.

Design Considerations
Further investigation into potential improvements to move the streetcar through the corridor faster and more reliably as well as ways to improve the pedestrian environment should be conducted during the next phase of this study. Based on community support, engineering judgment, and the 2009 and 2025 traffic analysis, the following design considerations to study further during the next phase include, but are not limited to streetcar operations and pedestrian access, as described below.

Streetcar Operations:
Heavy traffic volumes, queues and delays along the corridor could potentially impact the operations of the streetcar. The following list identifies potential areas of concern or issues to be considered further.

Northwest Connection: The current streetcar alignment would require modification to create a loop around NW 10th and 11th Avenues with NW Hoyt and NW Lovejoy Streets to make the connection between Northeast and Northwest Portland. Further consideration is recommended to improve the connection between the Broadway Bridge and Northwest Portland.

NW Lovejoy Street: Currently, NW Lovejoy Street provides one eastbound lane between NW 9th Avenue and the Lovejoy Street ramp to the Broadway Bridge, with two eastbound lanes on the Lovejoy ramp. NW Lovejoy Street includes one lane in each direction with turn lanes and on-street parking. On-street parking has been installed between NW 10th and NW 9th Avenues on the south side of NW Lovejoy Street. Based on the traffic analysis, it would be beneficial if the NW Lovejoy Street were striped as two eastbound lanes east of 10th Avenue.

NW Lovejoy Street Ramp and the Broadway Bridge: The Lovejoy ramp was designed for the future streetcar alignment to operate in the right lanes on the NW Lovejoy Ramp. This Alternatives Analysis conceptual design analysis has determined that the best alignment is to use the left lanes across the Broadway Bridge creating the need for the alignment to transition from the right lane on the NW Lovejoy ramp to the left lane on the bridge. The current streetcar design includes a separate streetcar phase at the NW Lovejoy Street Ramp and Broadway Bridge and NW Hoyt Street intersection for the streetcar to transition between the right lanes on NW Lovejoy Street to the left lanes on the Broadway Bridge. Traffic would be stopped to allow streetcar to move from through this intersection. The 2009 and 2025 PM peak hour traffic analysis assumed that the streetcar phase would operate as a lagging phase at this signal. Therefore streetcar would wait for the eastbound and westbound phases to and from NW Lovejoy Street before the streetcar could move through the intersection. Options to be considered further during the next phase of study include:

- Further study should be conducted to identify the feasibility of a streetcar only phase to lead instead of lag at the traffic signal. Traffic would still have to stop to allow streetcar to move through the intersection, but streetcar would have a priority and get through the intersection faster.
- Further engineering studies should be conducted to review the cost and feasibility of operating the streetcar in the left lanes on the NW Lovejoy Ramp. This option could potentially require structural modifications to the NW Lovejoy Ramp. This would eliminate the need for a streetcar only phase at this intersection, benefiting both streetcar and traffic operations.
- Further analysis of an alternative that would use NW Hoyt Street to NW Broadway Street to access the Broadway Bridge should be reviewed during the next phase of study. An alternative that travels in a clockwise loop that would begin with a right turn from NW 10th Avenue to NW Hoyt Street to NW Broadway Street. NW Broadway would then connect to the Broadway Bridge. This concept would create a small clockwise loop around the existing Post Office site. Further development of this option should include an evaluation of whether both inbound and outbound or just outbound should operate on this alignment. The feasibility of operating the streetcar on the NW Broadway Street ramp should be evaluated and a determination made as to what, if any, structural modifications would be needed. NW Hoyt Street carries less traffic volumes compared to NW Lovejoy Street, therefore would likely have less traffic conflicts.

NE Broadway/Weidler Streets Couplet: The proposed alignment recommends that streetcar operate in the left lane on NE Broadway Street and NE Weidler Street. Further consideration should be given to the potential to operate streetcar in the right lanes on NE Broadway Street and NE Weidler Street. The evaluation between left or right lane running should include streetcar operations, bicycle access, pedestrian access and safety, traffic considerations, station locations and compatibility with the transit system.

NE Broadway Street at N Williams Avenue: Traffic queuing in the right lanes turning right on to N Williams Avenue to the I-5 northbound on-ramp causes congestion on NE Broadway Street. The streetcar alignment developed in this Alternatives Analysis conceptual engineering would operate in the left lane on NE Broadway Street bypassing the congestion at the I-5 northbound on-ramp. Further study should be conducted to identify potential right of way impacts at NE Williams Street may occur by shifting lanes to add a left turn lane at N Vancouver Avenue.

NE Broadway Street at N Vancouver Avenue: The proposed streetcar alignment would operate in the left lane on NE Broadway and NE Weidler Streets. Currently the left westbound lane on NE Broadway Street is a forced left turn lane and a permitted left turn from the through lane to N Vancouver Avenue. Congestion on N Vancouver Avenue spills back onto westbound NE Broadway Street. Options to be considered further during the next phase of study include:

- The proposed streetcar design shifts the four travel lanes on NE Broadway Street to the north to add a left turn lane to N Vancouver Avenue. The streetcar would operate in the left/through lane. This alignment could be constructed without reducing capacity on NE Broadway Street. The streetcar would be impacted by the left turns from the shared left and through lane. This option is included in the capital cost estimates.
- Another option is to shift the existing lanes to the north to provide a left turn only lane from NE Broadway Street to N Vancouver Avenue and restripe the left/through lane to a left turn only lane. Streetcar would shift from the left lane to the third lane at N Williams Street or NE 2nd Avenue. This option would reduce the overall capacity of NE Broadway Street from three through lanes to two through lanes between N Williams Street or NE 2nd Avenue and N

- Vancouver Avenue. Under this option, the streetcar would operate in the through lane without conflict of the left turns from NE Broadway Street to N Vancouver Avenue.

NE Grand Avenue at NE Broadway Street: Under the conceptual streetcar design developed in this Alternatives Analysis, the streetcar operates in the right lane on northbound NE Grand Avenue and must turn left into the left lane on eastbound NE Broadway Street. The streetcar would have to make a wide turn across three lanes of traffic on NE Broadway to get to the left lane. Heavy congestion and queuing on NE Broadway Street may impact this turn movement at times. Further considerations should be made to provide special detection and signal timing plans for the streetcar to clear out the westbound queues on NE Broadway east of NE MLK Jr. Boulevard.

NE Grand Avenue between NE Multnomah/NE Holladay Street and NE Broadway Street: The streetcar alignment developed in this Alternatives Analysis conceptual engineering would operate in the right lane on Grand Avenue. Heavy congestion on NE Grand Avenue is anticipated to create delay for the streetcar operations. To reduce delay along this segment, the next phase of study should look at restriping the right lane to a right turn/streetcar only lane on NE Grand Avenue between NE Multnomah Street (or NE Holladay Street) and NE Weidler Street. On NE Grand Avenue between NE Weidler Street and NE Broadway Street, the right lane would be an exclusive streetcar only lane. This option would reduce the volume in the right lane shared with streetcar. Streetcar would likely bypass congestion along this segment improving speed and reliability for the streetcar. However, this option would reduce the capacity from four northbound through lanes to three through lanes on NE Grand Avenue.

NE Broadway Street at NE MLK Jr. Boulevard: The proposed westbound streetcar alignment would operate in the left lane on NE Broadway Street. Today and in the future, it is anticipated that there will be a heavy left turn demand from NE Broadway Street to NE MLK Jr. Boulevard that may impact the streetcar operations. Options to be considered further during the next phase of study include:

- The proposed streetcar alignment removes on-street parking on NE Broadway between NE Grand Avenue and NE MLK Jr. Boulevard to provide a new auto left turn lane. This would provide a refuge for left turning vehicles. However, it is likely that the left turns could queue back to the next signalized intersection at NE Broadway and NE Grand Avenues. Queues at this location would impact streetcar turning from NE Grand Avenue to NE Broadway Street. The streetcar makes a wide a turn from the right lane on NE Grand Avenue to the left lane on NE Broadway Street. For streetcar to make this movement safely and efficiently, the queues on NE Broadway Street between NE Grand Avenue and NE Broadway Street to clear.
- Another option would be to restripe the existing left/through lane to provide a left turn only lane on NE Broadway Street to NE MLK Jr. Boulevard, instead of widening. Streetcar would operate in the second lane with through traffic on NE Broadway Street. This option would keep the on-street parking on this block, but would reduce the capacity from four through lanes to three through lanes. Additionally, the is option would reduce the number of lanes the streetcar would have to cross to turn from NE Grand Avenue to NE Broadway Street.

NE 7th Avenue Transit Station Platforms: With the conceptual design developed through this Alternatives Analysis, the streetcar stops on NE 7th Avenue are located on the near side/sidewalk side of the signalized intersections. Consideration should be given to locating the streetcar station platforms near side/center of the street. By moving the station platforms to the center of the street, it reduces the conflict between the streetcar trackway and the bike lanes. The platforms would be

located in place of the left turns lanes. Left turns would be permitted from the through lanes. Pedestrians would cross the intersections at the crosswalk to access the sidewalks.

NE MLK Jr. Boulevard between NE Couch Street and NE Oregon Street: With the conceptual design developed through this Alternatives Analysis, the streetcar turns from westbound Oregon to southbound NE MLK Jr. Boulevard. The 2025 PM peak hour traffic analysis indicated that traffic queues on NE MLK Jr. Boulevard are expected to extend Lloyd Boulevard to NE Oregon Street, sometimes even blocking the intersection. This would require streetcar to wait or get stuck in the middle of the intersection trying to turn from NE Oregon Street to NE MLK Jr. Boulevard when the tracks are blocked by traffic queues from upstream intersections. Further considerations should be made to improve this condition. Some options include:

- The proposed designs have a streetcar only lane between NE Lloyd Boulevard and NE Couch Street to the south. Travel lanes would be restriped to add a streetcar only lane within the existing roadway width. This will improve the speed and reliability of the proposed streetcar.
- Another option recommended for study is the feasibility of extending the streetcar only lane north of NE Lloyd Boulevard to NE Oregon Street adjacent to the Oregon Convention Center. Travel lanes would be restriped to add the streetcar only lane within the existing roadway width between NE Oregon Street and NE Lloyd Boulevard. At NE Lloyd Boulevard where the sidewalk/plaza area extends out, the streetcar would operate through the plaza to connect with the proposed streetcar only lane south of the intersection. This option would need to be looked at further in the next phase to identify the potential impacts to the sidewalk/plaza area on the corner of NE Lloyd Boulevard and NE MLK Jr. Boulevard.
- Another option to study potential special timing plans for NE MLK Jr. Boulevard that extend the green time at NE Lloyd Boulevard to clear the queues from the intersection, and reduce the southbound green time at NE Oregon Street when traffic is queued on NE MLK Jr. Boulevard.

NE Grand Avenue at NE Everett Street/I-84 eastbound on-ramp: With the conceptual design developed through this Alternatives Analysis, the streetcar would operate in the right lane on NE Grand Avenue. Currently, congestion to the eastbound I-84 on-ramp queues extends into the right lane in NE Grand Avenue. Constructing a right turn lane on NE Grand Avenue to the I-84 on-ramp should be considered. Construction of this lane would likely require parking removal and some roadway widening.

Right Turn Only Lane on SE Grand Avenue at E Burnside Street: Heavy traffic congestion is anticipated on SE Grand Avenue, traffic queues are anticipated to extend as far back as SE Stark Street. It is recommended that further study be conducted to evaluate the feasibility of providing a right turn only lane on SE Grand Avenue to E Burnside Street. This option may remove a sidewalk bulb-out constructed by PDC. The right turn lane would extend back to SE Ash or SE Ankeny Streets. The right turn only lane would help reduce the queuing issues at this intersection and improve general traffic flow as well as move streetcar through the intersection faster.

Right Turn Only Lane on MLK Jr. Boulevard at E Burnside Street: Heavy congestion in the right lanes on MLK Jr. Boulevard would impact the proposed streetcar alignment operating in the right lane. Further study should identify improvements to reduce congestion in this area. One option could be to allow one westbound lane on E Burnside Street and to provide a right turn only lane on MLK Jr. Boulevard to accommodate this movement. This option would allow trips destined for the Burnside Bridge to turn on NE Couch Street or E Burnside Street. This is

different than the current plan for the Burnside Bridgehead development and would change the planned circulation for this area.

SE MLK Jr. Boulevard at SE Clay and Hawthorne Streets: The proposed streetcar on SE MLK Jr. Boulevard would have a stop at this location. Heavy southbound traffic creates a barrier for pedestrians to cross SE MLK Jr. Boulevard. To accommodate pedestrian crossings at the streetcar stop, a new pedestrian signal would be constructed under the Hawthorne Bridge ramp. Additionally, a transit only lane on MLK Jr. Boulevard between SE Madison Street ramps and the Hawthorne Street ramps, with a queue jump signal for street to transition back to mixed traffic.

SE MLK Jr. Boulevard and SE Grand Avenue at SE Harrison Street: With the conceptual design developed through this Alternatives Analysis, the proposed streetcar would use SE Harrison Street to enter or exit the station at OMSI with a streetcar only bridge over the railroad. Further considerations should be made to improve this condition. Some options include:

- Heavy northbound and southbound traffic on SE MLK Jr. Boulevard and SE Grand Avenue would create a barrier for the streetcar to exit SE Harrison Street and cross SE MLK Jr. Boulevard and turn on SE Grand Avenue. To accommodate the streetcar crossing SE MLK Jr. Boulevard and turning on SE Grand Avenue from OMSI, new traffic signals would be constructed at SE Harrison Street and SE MLK Jr. Boulevard and SE Grand Avenue.
- Adding two new signals on SE MLK Jr. Boulevard at SE Stephens Street and SE Harrison Street for the streetcar operations has been identified as potential issues with the lane configuration on SE MLK Jr. Boulevard. At this location, SE MLK Jr. Boulevard is transitioning from four to three through lanes on the McLoughlin Viaduct. Addition of the two new signals could cause further congestion at this location. Further study should look at other ways to get across SE MLK Jr. Boulevard, such as routing northbound streetcar onto southbound SE Division Street. From SE Division Street, streetcar would turn right onto SE Market Street. Streetcar would then travel north on SE Market Street through a new signalized intersection with SE MLK Jr. Boulevard to SE Grand Avenue. Streetcar would turn left onto SE Grand Avenue at a new signalized intersection at SE Grand Avenue and SE Market Street.

Streetcar Only Flyover Bridge/Connection at SE Harrison Street at the NE Grand/MLK Viaduct: Further engineering study should be conducted to confirm the grades/alignment needed for the connection of the streetcar bridge over the railroad tracks to OMSI. This effort should be coordinated with the ongoing SE MLK/Grand Viaduct Project being conducted by the City of Portland and the Oregon Department of Transportation. Once the design of the new northbound SE Grand Avenue Viaduct is complete, further analysis should be conducted regarding safety and sight distance relative to the new proposed traffic signal at SE Grand Avenue and SE Harrison Street.

MLK Jr. Boulevard/Grand Avenue Couplet: With the conceptual design developed through this Alternatives Analysis , the streetcar would operate in the right lanes on MLK Jr. Boulevard and Grand Avenue. Further consideration should be made to evaluate the potential to operate streetcar in the left lanes on MLK Jr. Boulevard and Grand Avenue. With the current streetcar alignment, the proposed project would move an existing water line located on the right side of the streets. Operating the streetcar on the left side of the streets would reduce the capital costs associated with this project. Further evaluation of this option is needed to identify the impacts to the access to the Hawthorne, Morrison, and Burnside Bridges. Streetcar would likely restrict access to the bridges or would include added delay due to queues at the bridgeheads.

Traffic Signals: At signalized intersections where the streetcar has a separate signal phase, special detection would be needed to communicate with the traffic signals. The purpose of providing a separate phase for streetcar is to stop general traffic to allow the streetcar to make a difficult turn without conflict or to transition from a streetcar only lane to mixed traffic. In addition to providing a separate phase, the traffic signal timing plans should be designed to clear the traffic queues for streetcar to enter that block.

Pedestrian Access

The proposed streetcar includes various pedestrian improvements to make the pedestrian access to the streetcar stations safer and more comfortable. However, there are still other pedestrian improvements that could be implemented to improve the pedestrian environment in the corridor. Current plans in the corridor will help with the pedestrian environment and additional considerations could be made to improve on the pedestrian access and safety along the Broadway/Weidler and MLK Jr./Grand couplets. Some potential solutions to be considered include:

- Adding curb extensions to reduce the crossing distance across the wide arterial streets.
- Plant additional street trees.
- Consolidate or reduce the width of excessive driveways, to minimize the number of disruptions to the through zone of the sidewalk.
- Construct ADA-compliant curb ramps, especially where none currently exist.
- Improve the conditions of the sidewalk along MLK beneath the Morrison and Hawthorne bridges. Currently, the area behind the sidewalk is fenced off and used as storage, leaving a narrow space between the fence and the bridge structure. The sidewalk could potentially be widened by moving the fence four feet and adding lighting could improve the pedestrian environment.
- Consider installing additional traffic signals to allow for more pedestrian crossing opportunities and potentially slowing traffic down.
- Create a plan for improvements along SE MLK Jr. Boulevard and SE Grand Avenue that integrates streetscape, street design, transit access, and redevelopment opportunities.

Two Way Grand Design Option

In the Central Eastside District, a design option was developed as an alternative to the MLK/Grand couplet alignment that would operate northbound and southbound Streetcar on SE Grand Avenue between NE Everett and SE Stephens Streets, just north of the SE McLoughlin Viaduct. This option was developed to address transfer connections to radial bus lines and to assess benefits to the pedestrian environment compared to the MLK/Grand couplet.

The Two-Way SE Grand Avenue design option would change SE Grand Avenue from a one-way major arterial to a local street that provides both northbound and southbound travel lanes. The Two-Way Grand design option would re-route the northbound through trips from Grand Avenue to SE 7th Street.

Some of the transportation system changes required by this option include diverting northbound traffic to SE 7th Avenue, changes to bridge access, traffic signal changes, and converting SE Grand Avenue from a one-way street to two-way operations. This design option would change the functional classification of Grand and 7th Avenues and would likely require amending the street classification designations in the City of Portland's TSP and Metro's RTP.

The Two-Way Grand Avenue Design Option has been designed so that it could be applied to any of the MOSs with the exception of the Oregon MOS, but does not preclude either two-way Grand

Avenue design option or the MLK/Grand couplet alignment extension to the Central Eastside. However, the following discussion compares the design option to the Full Loop Alternative.

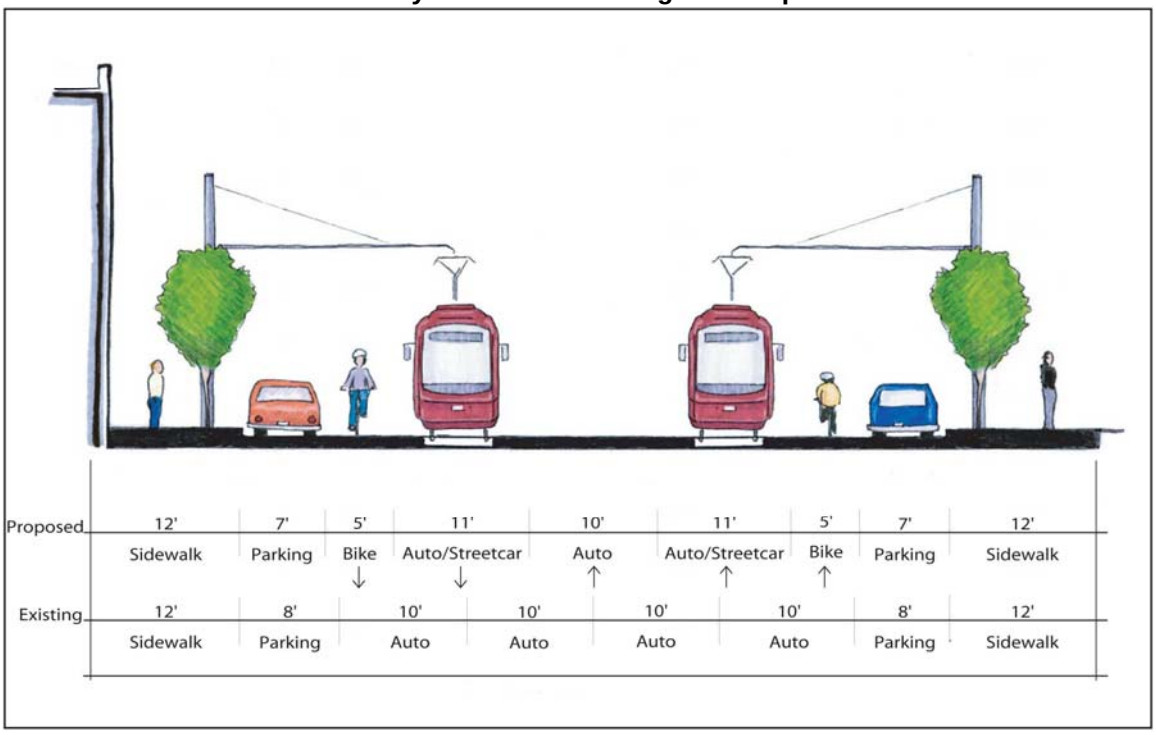
Changes to SE Grand Avenue

Currently SE MLK Jr. Boulevard and SE Grand Avenue operate as a couplet through the Central Eastside District. Each of the two streets provides four general purpose travel lanes, for a total of four southbound and four northbound travel lanes. SE Grand Avenue is designated as a Major City Traffic Street, a Major Transit Priority Street, a City Bikeway, and a Central City Transit/Pedestrian Street by the City of Portland as identified in the City's TSP. Metro's 2004 RTP designates SE Grand Avenue as Major Arterial, Rapid Bus, Regional Access Bikeway and a Transit Mixed-Use Corridor.

Under this design option, SE Grand Avenue would be changed from a one-way northbound street to provide both northbound and southbound travel lanes and northbound and southbound Streetcar operations. Figure 4-1 shows the proposed cross-section for SE Grand Avenue.

As shown in Figure 4-1, SE Grand Avenue would provide for one southbound shared streetcar lane and a shared northbound streetcar and auto lane with one northbound auto lane. Additionally, SE Grand Avenue would provide on-street parking and bike lanes.

Figure 4-1
Typical Mid-block Section of SE Grand Avenue
Two-Way Grand Avenue Alignment Option



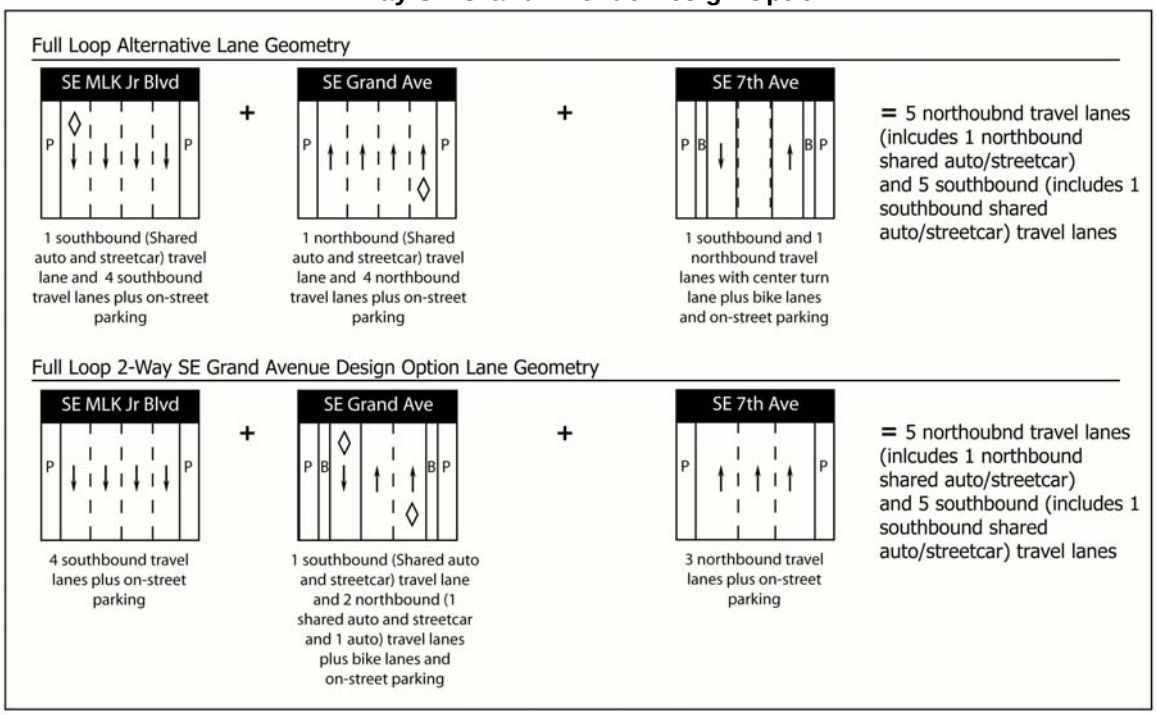
Source: URS Corporation, 2006

The proposed design of 2-way SE Grand Ave is not a typical 2-way street cross-section. A typical roadway design would be one lane (or two lanes) in each direction. SE Grand Avenue would

provide more northbound travel lanes than southbound to ensure that the total capacity between this design option and the MLK/Grand couplet alignment remain the same.

Figure 4-2 compares the proposed lane geometry for the Full Loop Alternative with the 2-Way Grand Avenue Design Option. The existing width on SE 7th Avenue prohibits it from providing four northbound travel lanes as well as on-street parking without major roadway improvements and extensive property acquisitions. Therefore, the fourth northbound travel lane is accommodated on SE Grand Avenue.

Figure 4-2
Roadway Capacity Comparison between the Full Loop Alternative and 2-Way SE Grand Avenue Design Option



Source: Metro, 2006

Under this design option, the streetcar would have direct connections with major bus lines. Transfers to major bus lines would be accommodated more efficiently and provides a reduction in the pedestrian crossing to use streetcar in both directions.

Left turns from SE Grand Avenue would be restricted where there is a conflict with streetcar platforms or to preserve on-street parking. By restricting left turn movements, there is a risk of diverting traffic to other local or neighborhood streets. Access to the bridgeheads may be reduced for auto traffic due to left turn restrictions or traffic capacity to bridgeheads would likely be reduced on SE Grand Avenue due to turning movements.

The character of this roadway would change significantly under this design option. SE Grand Avenue serves both through and local traffic needs today. Through traffic on SE Grand Avenue is traveling through the corridor destined for access to the bridges across the Willamette River or to southeast or northeast Portland. Local traffic is destined for locations on SE Grand Avenue. SE

Grand Avenue would change from a fairly high speed and high capacity roadway to become more pedestrian, bike, and transit friendly roadway, under this design option. This is a key trade-off by this design option.

Changes to SE 7th Avenue

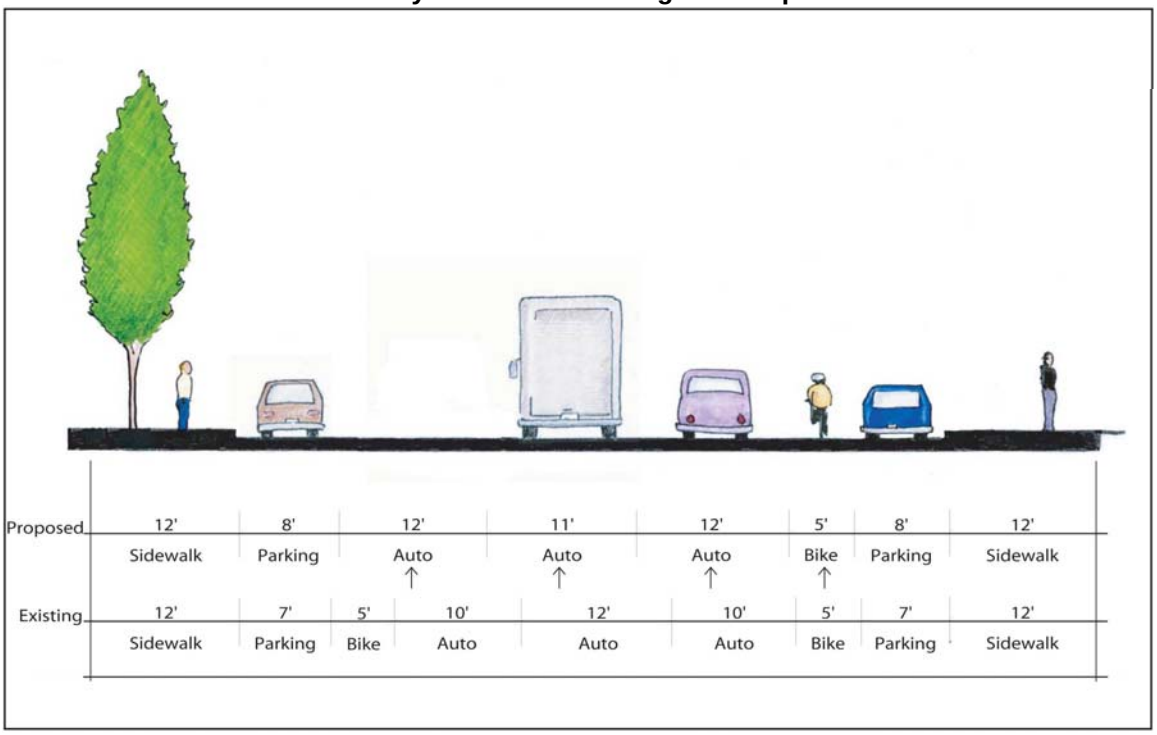
SE 7th Avenue currently provides one lane in each direction with a center turn lane, bike lanes and on-street parking. SE 7th Avenue would be changed to a one-way northbound street. SE 7th Avenue would become the northbound portion of the Highway 99E couplet with SE MLK Jr. Boulevard, which is located three blocks to the east. SE 7th Avenue is designated as a Traffic Access Street, a Transit Access Street, a City Bikeway, and a City Walkway by the City of

Portland as identified in the City's TSP. These designations are for a much less intensely used street than either MLK Jr. Boulevard or Grand Avenue. By re-routing through trips onto 7th Avenue, this would require a change to the street function in manner that is inconsistent with the existing policy in the RTP and Portland's TSP and would require amending the RTP and TSP to reflect this change. Additionally, through trips are just as likely to divert to other local or neighborhood streets.

Traffic Access Streets are not intended to carry regional through trips with no trips ends in the district. On Traffic Access Streets, reduction in motor vehicle congestion is given less priority than supporting pedestrian access and enhancing the pedestrian environment, maintain on-street parking to support land uses, accommodating transit or accommodating bicycles. Furthermore, the City discourages the acquisition of additional right of way to reduce congestion.

The existing curb-to-curb width is 64 feet, south of SE Stark Street. North of SE Stark Street, the existing curb-to-curb width is 36 feet. SE 7th Avenue would be converted to three northbound lanes and maintain on-street parking on both sides of the road. On-street parking on SE 7th Avenue would be eliminated north of SE Stark Street. The existing bike lanes would be eliminated and moved to SE Grand Avenue. Figures 4-3 and 4-4 show potential cross-sections for SE 7th Avenue.

Figure 4-3
Typical Mid-block Section of SE 7th Avenue, South of SE Stark Street
Two-Way Grand Avenue Alignment Option

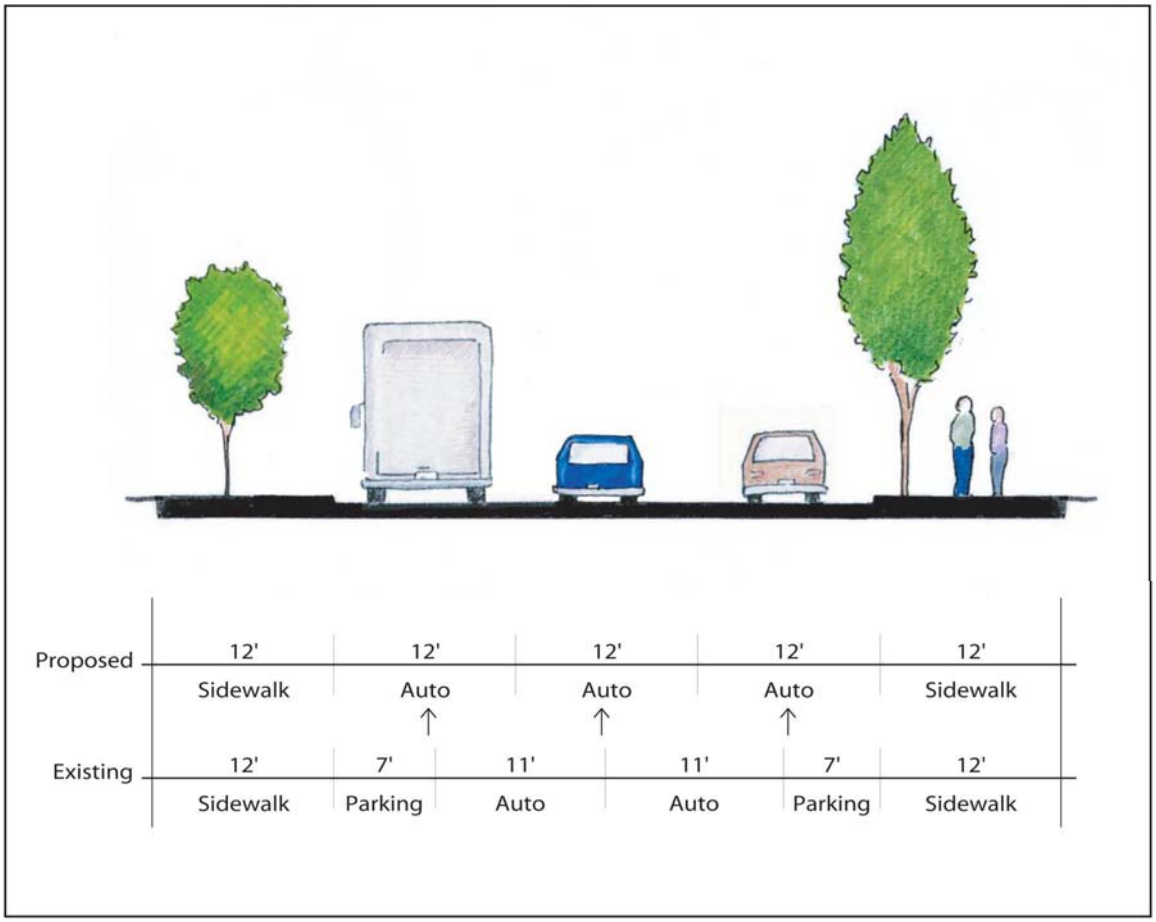


Source: URS Corporation, 2006

SE 7th Avenue south of SE Stark Street would be designed to accommodate three northbound travel lanes and on-street parking. Southbound bike lanes would be redirected to SE Grand Avenue. Several options for the northbound bike lanes have been developed including 1) keeping the northbound bike lane on SE 7th Avenue, 2) redirecting the northbound bike lane to SE Grand Avenue, or 3) creating a new bike boulevard on SE 8th or SE 9th Avenues.

On SE 7th Avenue, north of SE Stark Street, there is only enough pavement width to accommodate three northbound travel lanes. On-street parking and bike lanes would be eliminated from this section of roadway between SE Stark and NE Couch Street.

Figure 4-4
Typical Mid-block Section of SE 7th Avenue, North of SE Stark Street
Two-Way Grand Avenue Alignment Option



Source: URS Corporation, 2006

The character of SE 7th Avenue would change significantly under this design option. SE 7th Avenue serves local traffic destined to locations on or near SE 7th Avenue consistent with its classification. Potential impacts from the change in traffic flow could include changes to truck loading and unloading north of SE Stark Street and confusion in local access circulation. Local access would need to circle adjacent blocks for access from the north. Because 7th Avenue would serve the function of northbound Grand Avenue today, this change would bring more through traffic to the roadway and local traffic would be diverted to other local or neighborhood streets.

SE 7th Avenue would provide access to the bridgeheads from the south. Under this design option, one or two turn lanes from SE 7th Avenue to bridgeheads could be accommodated.

This design option includes transition points at the north and south end of the new MLK Jr. Boulevard/7th Avenue couplet. At the south, northbound vehicles coming from SE McLoughlin Boulevard would be diverted at SE Stephens Street to SE 7th Avenue. At the north end, northbound vehicles would be diverted at NE Couch to transition back to a one-way northbound SE Grand Avenue. Some property acquisition would be necessary at the north and south transition areas, as a new connector could not be accommodated in any existing right-of-way.

The Two-Way Grand Avenue design option would require amending the street classification designations of Grand and 7th Avenues in the City's TSP and likely Metro's RTP. The alignment would likely result in traffic impacts greater than the MLK/Grand couplet alternative, diversion of traffic into the neighborhood or local street network, impacts to the Industrial Sanctuary, and impacts to private property.

The Two-Way Grand design option is different than the MLK/Grand couplet alternative and additional impacts or issues. These include:

- Significant right of way impacts and cost at each of end SE 7th Avenue to transition back to a one-way northbound SE Grand Avenue.
- Impacts on adjacent local or neighborhood streets due to traffic diversion to avoid the longer travel times or confusing local access and circulation.
- Impacts to on-street parking and loading and unloading zones on SE 7th Avenue north SE Stark Street.
- Impacts to capacity particularly for trucks access the various bridgeheads.
- Impacts to bike lanes on SE 7th Avenue, where bike lanes would be redirected to either SE Grand Avenue or a bike boulevard on SE 8th or SE 9th Avenues.
- Additional capital cost associated with changing SE Grand Avenue from a one-way roadway to two-way operations and changing SE 7th Avenue from two-way operations to a one-way roadway.

2025 Traffic Volumes

Metro's travel demand model, which is based on the Financially Constrained 2025 RTP network was used to identify the future 2025 travel patterns for both the MLK/Grand couplet and the Two-Way Grand design option. The 2025 PM 2-hour peak volumes were used to identify potential travel patterns and major destinations and origins using Grand Avenue and 7th Avenue.

Travel Patterns for the MLK/Grand Couplet:

Grand Avenue serves as the primary north/south route on the east side of the river. Grand Avenue provides four northbound travel lanes and on-street parking with direct connections to each of the bridges crossing the Willamette River as well as access to eastbound I-84. Grand Avenue is expected to carry about 5,380 northbound vehicles during the 2025 PM 2-hour peak period.

The major destinations for vehicles on Grand Avenue include Lloyd District and point north (3,500 vehicles), I-84 (1,300 vehicles), and the Morrison Bridge (1,570 vehicles). Major origins for vehicles on SE Grand Avenue include SE McLoughlin Boulevard (2,650 vehicles) just south of the Ross Island Bridge, and the Burnside Bridge (1,540 vehicles).

SE 7th Avenue is a local street serving the industrial area in southeast Portland. SE 7th Avenue provides one lane in each direction with a center turn lane, bike lanes and on-street parking. This street also provides a direction connection to E Burnside and Sandy Boulevard. At SE Washington Street, SE 7th Avenue becomes Sandy Boulevard. Both E Burnside and Sandy Boulevard are major arterials providing access to east Portland.

SE 7th Avenue carries approximately 2,220 trips (1,470 southbound and 750 northbound) south of the Morrison Bridge and 2,700 (920 southbound and 1,790 northbound) vehicles on Sandy Boulevard north of SE Washington Street during the 2025 PM 2-hour peak period.

The major destinations for vehicles on 7th Avenue include the Hawthorne Bridge (580 vehicles), northbound Sandy Boulevard (1,070 vehicles), and eastbound Burnside Street (750 vehicles).

Major origins for vehicles on SE 7th Avenue include the Hawthorne Bridge (540 vehicles), Morrison Bridge (650 vehicles), I-5 (430 vehicles), southbound Sandy Boulevard (680 vehicles), and NE 12th Avenue (1,140 vehicles) north of E Burnside Street or Lloyd District:

The volumes on Grand and 7th Avenue are typical of the function for that type of roadway. 2025 PM 2-hour peak period volumes on Grand Avenue show that the trips on Grand Avenue are typically moving the through to points outside the corridor. As a major arterial, Grand Avenue serves an important function of connecting to I-84, the bridges, and providing long distance travel patterns. SE 7th Avenue provides for shorter trips distributing them to local streets and destinations within short distances.

Travel Patterns for the Two-Way Grand Avenue Design Option:
Under the Two-Way Grand design option, through traffic would be re-routed to SE 7th Avenue while SE Grand Avenue would provide for the local trip distribution function. The Metro regional travel demand model demonstrated that travel patterns would change between the two design options.

Grand Avenue would be expected to carry approximately 2,210 (1,420 northbound and 930 southbound) vehicles during the 2025 PM 2-hour peak period. The major destinations for vehicles on Grand Avenue include Lloyd District and point north (1,450 vehicles), I-84 (1,070 vehicles), and the Morrison Bridge (870 vehicles). Major origins for vehicles on SE Grand Avenue include the Morrison Bridge (970 vehicles), and the Burnside Bridge (1,680 vehicles).

SE 7th Avenue is expected to carry about 4,500 northbound vehicles during the 2025 PM 2-hour peak period. The major destination from SE 7th Avenue would include Sandy Boulevard (1,120 vehicles), Morrison Bridge (1,050 vehicles), and the Morrison Bridge (780 vehicles). Major origins for vehicles on SE 7th Avenue include the SE McLoughlin Boulevard south of Ross Island Bridge (1,900 vehicles), Hawthorne Bridge (990 vehicles), and I-5 (560 vehicles), and the Morrison Bridge (500 vehicles.

The following summarizes some changes in travel patterns between the two scenarios (MLK/Grand couplet and Two-Way Grand design option):

- Under the couplet scenario trips to I-84 were taken via Grand Avenue. Under the Two-Way Grand design option, trips wanting to access I-84 did not use SE 7th Avenue through the corridor, instead they stayed on Grand Avenue to I-84.
- From 7th Avenue, many of the trips turned onto NE Couch Street instead of using NE Everett Street to get back to NE Grand Avenue.
- With the Two-Way Grand Avenue design option, some neighborhood traffic diversion is anticipated. The most prominent diversion of traffic occurs south of the SE Madison Street.
    - Volumes would increase on I-5 northbound and access the highway via the new McLoughlin/I-5 on- and off-ramps.
    - Volumes would increase on SE 11th and 12th Avenue between SE Division Street and SE Hawthorne Boulevard.
    - Volumes would increase on SE Water Avenue between SE Division Street and SE Clay Street.
    - Volumes would increase on SE Hawthorne and SE Madison Street between the Hawthorne Bridge and SE 11th Avenue.

Two-Way Grand Avenue Design Option Considerations

During the next phase of study, if the Two-Way Grand design option is chosen as the preferred alternatives than further refinement of this design option would be needed. The following design considerations potential issues to study further during the next phase include, but are not limited to:

Transitions at the North End: The current design for SE 7th Avenue provides three northbound lanes. The transition for the through traffic from SE 7th Avenue to NE Grand Avenue would occur at NE Everett Street. Trips heading towards the Burnside Bridge would have an exclusive right turn lane from NE 7th Avenue to NE Couch Street. From NE Couch Street, NE 7th Avenue would have two northbound travel lanes to NE Everett Street and NE Grand Avenue. At the intersection of NE Everett Street and NE Grand Avenue also provide access to the eastbound I-84 ramp. Access to eastbound I-84 would be difficult under this design option. Additionally, the designs identify potential structural modifications needed to the ramp. Further study should be conducted at this location to identify other potential streets to transition at other NE Everett Street. NE Davis and SE Ankeny Streets were not proposed because they would be important access streets to the proposed development at the Burnside Bridgehead.

Streetcar Transition at E Burnside Street: The current design includes southbound streetcar transitioning from NE MLK Jr. Boulevard to two-way Grand Avenue at E Burnside Street. The streetcar would operate in the right lane on MLK Jr. Boulevard and turn left to the left lane on E Burnside. From the left lane on E Burnside, the streetcar would turn right to the right lane on Grand Avenue. The streetcar would likely need an exclusive streetcar phase at each the signalized intersection at E Burnside and MLK Jr. Boulevard and Grand Avenue. Under this scenario, all traffic would be stopped to allow streetcar through these intersections. Further evaluation of the traffic impacts to these two intersections would need to be conducted. As well, further study should be done to evaluate whether this is the best street for streetcar to use as a transition to two-way Grand Avenue.

Morrison MOS: Two-Way Grand design option could be implemented with any of the MOS designs. Further refinement of operating two-way Grand Avenue with the Morrison MOS should further evaluate streetcar operations at SE Morrison Street. It is likely the streetcar would turn right from SE Grand Avenue to SE Morrison Street without much conflict. However, for streetcar to turn left from SE Morrison Street to the SE Grand Avenue, the streetcar would need an exclusive streetcar only phase to make this maneuver. Further evaluation should be conducted to analyze the potential of allowing the through movement on SE Morrison Street to the Morrison Bridge to move while the streetcar phase at the signalized intersection is accommodated. The right turn lane on SE Morrison Street that would be used to access SE Grand Avenue or SE Morrison Street south of SE Grand Avenue would be stopped while streetcar is present.

Bike Lanes: The current cross-section for two-way SE Grand Avenue shows bike lanes on both sides of the streets. This option is not optimal for bicyclists because it creates a conflict between the streetcar and bicycles at the streetcar platforms. Streetcar platforms would extend out into the bike lanes, forcing bicyclists to use the streetcar lane. This option creates an unsafe environment for bicyclists. Other options to be studied further include the following:

- Northbound bike lanes could be accommodated on SE 7th Avenue between SE Stephens Street and SE Stark Street. North of SE Stark Street, there is only room to accommodate the three northbound travel lanes, unless the lane widths were reduced to one 11 foot and two 10 foot travel lanes.
- Southbound bike lanes could be provided on SE MLK Jr. Boulevard or SE Grand Avenue.

- SE 9th Avenue or SE 8th Avenue could potentially be redesigned to become bike boulevard streets.

SE Grand Avenue: The current design for this option provides one lane southbound and two lanes northbound on SE Grand Avenue. Further study should identify the feasibility of providing one lane in each direction and a center turn lane. The center turn lane could provide left turn refuge at key locations as well as room for center streetcar platforms. By relocating the streetcar platforms to the center of the roadway, this would improve the bike environment because this would remove the conflicts between the streetcar and bicycles.

Transitions at the South End: Under the Two-Way Grand design option, SE 7th Avenue just north of the McLoughlin Viaduct would transition from a two-way street to a one-way street at SE Stephens Street. SE Grand Avenue would transition from a one-way northbound street to providing both northbound and southbound travel. This would have to be further analyzed to evaluate if the current design could carry the potential traffic demand that is destined through the corridor and would use SE 7th Avenue.

Adding two new signals on SE MLK Jr. Boulevard at SE Mill Street and SE Stephens Street for the streetcar operations has been identified as potential issues with the lane configuration on SE MLK Jr. Boulevard. At this location, SE MLK Jr. Boulevard is transitioning from four to three to two through lanes on the McLoughlin Viaduct. Addition of the two new signals could cause further congestion at this location. Further study would need to be conducted to identify the traffic issues and potential solutions. Moving the high volumes from SE Grand Avenue to SE 7th Avenue would potentially create an unsafe pedestrian environment at SE Mill Street and SE 6th Avenue.

Traffic Analysis: Detailed traffic analysis using VISSIM was conducted for the MLK Jr. Boulevard/Grand Avenue couplet streetcar operations. However, this was not conducted for the two-way Grand design option. Many of the traffic impacts are unknown at this time and further traffic analysis would need to be conducted to identify the potential traffic impacts to:

- Providing northbound and southbound travel on SE Grand Avenue;
- Restricting SE 7th Avenue to northbound travel only;
- Prohibiting left turns from SE Grand Avenue to the bridges;
- Providing progression along SE Grand Avenue; and
- Diversion of traffic into the neighborhoods.

Chapter 5. Environmental, Social, Neighborhood and Community Impacts

Introduction
Almost any proposed transportation project, whether locally funded or state or federally assisted or requiring a federal or state permit, or whether a maintenance project or new facility will generate questions and concerns about possible adverse impacts to the residents, businesses, and physical setting within which the project is proposed. This chapter is intended to provide information about the process that will occur to assess any adverse impacts and answer any questions about the project that the public may have.

Potential Environmental Consequences
A Central City transit circulator would likely have environmental costs and benefits. By federal law, a project with federal funding support with potential adverse environmental impacts or one seeking a federal permit, must be addressed consistent with the National Environmental Policy Act, which is discussed below. In addition to potential adverse environmental impacts, there are likely environmental benefits that could result in a transit circulator.

For example, a streetcar would have very low air pollutant emissions when compared to diesel buses, even those with the newest air quality technologies and fuels. Further, a streetcar, using electricity generated from hydroelectric facilities nearby the region would help reduce reliance on non domestic fuels[1]. These aspects of streetcars, compared with diesel buses, could be considered among the other characteristics when deliberations as to the preferred alternative are made.

NEPA and Proposed Documented Categorical Exclusion
As the Eastside Transit Project is proposed as a federally assisted Small Start undertaking and may require a federal permit even if federal transportation funding were not sought, it must comply with a variety of federal regulations, including the National Environmental Policy Act (NEPA). This act mandates that a project seeking federal transportation funding support or requiring a federal permit shall identify, evaluate and disclose the potential adverse environmental consequences of that project. As projects can range from ones with very little adverse impacts to ones with substantial consequences, the NEPA (*49 CFR 771.115 Classes of actions*) provides for a range of environmental reviews as follows:

> *"There are three classes of actions which prescribe the level of documentation required in the NEPA process.*
>
> *(a) Class I (EISs). Actions that significantly affect the environment require an EIS (40 CFR 1508.27). The following are examples of actions that normally required an EIS:*
> *(1) A new controlled access freeway.*
> *(2) A highway project of four or more lanes on a new location.*
> *(3) New construction or extension of fixed rail transit facilities (e.g., rapid rail, light rail, commuter rail, automated guideway transit).*
> *(4) New construction or extension of a separate roadway for buses or high occupancy vehicles not located within an existing highway facility.*

> *(b) Class II (CEs). Actions that do not individually or cumulative have a significant environmental effect are excluded from the requirement to prepare an EA or EIS. A specific list of CEs normally not requiring NEPA documentation is set forth in 771.117(c). When appropriately documented, additional projects may also qualify as CEs pursuant to 771.117(d).*
>
> *(c) Class III (EAs). Actions in which the significance of the environmental impact is not clearly established. All actions that are not Class I or II are Class III. All actions in this class require the preparation of an EA to determine the appropriate environmental document required".*

While the Eastside Transit Project could include the new construction of a fixed rail project, the Project is proposed to operate on existing local streets, will not require acquisition of or displacement of any homes or businesses and is proposed for an area that has been urbanized for 80 or 100 years or more, so most elements of the natural landscape have long ago been removed.

On the other hand, the Project is not included in the lists of categorically exempt projects and there are some environmental, social, neighborhood and community resources that should be assessed for any potential adverse consequences in relation to a transit project in the Eastside.

Categorical Exclusions are defined as:

> " *…actions which: do not induce significant impacts to planned growth or land use for the area; do not require the relocation of significant numbers of people; do not have a significant impact on any natural, cultural, recreational, historic or other resource; do not involve significant air, noise, or water quality impacts; do not have significant impacts on travel patterns; or do not otherwise, either individually or cumulatively, have any significant environmental impacts."*

A Documented Categorical Exclusion (DCE) has been proposed as a way to address possible adverse impacts of an Eastside Transit Project at a level consistent with the possibility that such a project could have no significant adverse impacts.

Potential adverse impacts could include:

- activities in association with the reconstruction or use of the Broadway Bridge,
- traffic impacts with regard to diversion of vehicular trips into adjoining neighborhoods
- increased traffic congestion in association with any transit improvements on existing local streets, particularly arterials such as Martin Luther King Jr. Boulevard, Grand Avenue, Broadway Boulevard and Weidler Street.

This Evaluation Report does not include addressing these issues. A recommendation for a DCE will be prepared to assess the above issues - as well as any other issues that may be identified in the public involvement process for the Eastside Transit Alternatives Analysis Project. The recommendation for DCE will be submitted to the Federal Transit Administration (FTA) for consideration. Written FTA concurrence with the DCE must be obtained in order to complete compliance with the NEPA requirements.

[1] Portland is ranked sixth in the nation for readiness for an oil crisis according to *U.S. Cities Preparedness for Oil Crisis*, SustainLane, 2005 see:
http://www.sustainlane.com/article/747//U.S.+Cities%92+Preparedness+for+an+Oil+Crisis.html

Appendix

Eastside Development Projects Completed between 2000 and April 2005

(from pages 14 and 15 of the *Central City Development and Redevelopment Projects*, Portland Business Alliance, April 2005 as prepared by Heritage Consulting Group.)

The Jupiter (800 E. Burnside; completed 2005) – Tod Breslau and Kelsey Bunker transformed a dilapidated c. 1960s budget motel into a trendy 80-room inn, complemented by the "Doug Fir" lounge.

Oregon Convention Center Expansion (777 NE Martin Luther King Jr. Blvd; completed 2003) – The $98.5 million expansion increased the OCC's convention and trade show capacity by 60%. The expansion includes 350,000 square feet of new exhibitor space, divisible meeting rooms, a second ballroom, lobby and support areas that will nearly double the building's current event capacity. The program also includes a two-level, below grade parking garage, adding 1,200 new spaces, and a retail component in the link between old and new facilities. ZGF was the architect.

The Merrick (1231 NE Martin Luther King, Jr. Boulevard; completed 2005) – Trammell Crow Residential, working with Robert Leeb Architects, developed a full-block residential project on the former Lyons Restaurant site. The 6-story Merrick includes 15,000 square feet of ground floor retail, 185 residential units, and 218 ground and below grade parking spaces.

1201 Lloyd Building (1201 NE Lloyd Boulevard; completed 2002) – Transworld and Insignia, working with ZGF Architects, developed this $41 million, 222,777 square foot, 11-story office tower with adjacent 5-story parking structure.

The Cascadian (NE 6th Avenue & Holladay Street; completed 2002): Enterprise Development, working with Sienna Architects, built The Cascadian, a half-block $8 million, nine-story building with 59 condominiums ranging in size from 440 to 2036 square feet, with ground floor parking and retail. A second phase with 260 market-rate units is in the planning stage.

Oregon Ballet Theater (612 SE Morrison; completed 2000) – Holst Architects turned a 20,000 square foot bank building on a full block into two studios, an office, a ticketing desk, and locker rooms for the Oregon Ballet. The $3 million Phase I also included a seismic upgrade and re-roofing. Fundraising for Phase 2, with plans for a 20,000 square foot addition, is underway.

Architectural Heritage Center (701 SE Grand Avenue; completed 2005) – With William Hawkins as architect, the Bosco Milligan Foundation rehabilitated the 1883 West's Block Building for education and exhibit functions. The $2.3 million renovation allowed the organization to expand programming and display its collection of historical architectural artifacts, one of the largest collections in the country.

The Ritzdorf (1225 SE Belmont Street; completed 2000) –The $7 million residential project offers 90-units of permanent housing for previously homeless households. REACH is the owner and manager.

ActiveSpace (SE 9th Avenue and Main Street; completed 2003) – ActiveSpace developed this quarter-block, 4-story wood frame building for use as low cost workshop space.

Holman Building (49 SE Clay Street; completed in 2004) – PDC renovated this 1952 warehouse into a boathouse for light watercraft, complemented by offices uses on the upper floors.

Development Projects within Streetcar Improvement Districts
1997 to January 2006

PROJECTS LIST
1997 - PRESENT

All projects shown are located within the Streetcar Local Improvement District. Construction costs shown are based upon hard costs. Information sources include published project information and developer interviews.

Portland Streetcar Development Summary
January 2006

Project Name	Construction Cost	Year Complete	Residential Units	Non-resid SQ FT	Comments
10th at Hoyt 911 NW Hoyt	$20,300,000	2004	178	15,000	Apartments & ground floor retail, parking
1963 NW Overton	$3,500,000	2004	12	0	Rowhouses. 25,000 SF
8 NW 8th (Danmore) NE corner E Burnside/8th	$13,500,000	2004	180	12,000	Low-income apartments (30% MFI), 120 units transitional housing, two-floor clinic Portland Alternative Health Clinic, LEED certified
12th/13th/Washington/Stark	$130,000,000	2007	264	224,000	Five floors pkg (400 spaces), 65ksf ZGF office, 17 floors apartments, 170-room hotel, West End
Art Museum Renovation	$17,300,000	2000	0	50,000	Project for the Millennium, renovation and remodel
Atwater Place SW Gaines/River Parkway	$95,000,000	2007	212	10,300	319 parking spaces, LEED silver, S. Waterfront
Avenue Lofts 1001 NW 14th Avenue	$25,000,000	2004	166	0	Loft condominiums. 186 parking spaces
Balfour Guthrie Building 731 SW Oak	$1,200,000	2002	0	18,000	1913 building renovation for architectural office
Benson Tower 1500 SW 11th	$30,000,000	2007	143	0	27-story, 150 underground parking spaces, 13 KSF site
Bridgeport Condominiums 1130 NW 12th	$35,000,000	2003	123	8,000	Condominiums & ground floor retail
Burlington Tower Apts 900 NW Lovejoy	$27,000,000	2005	155	11,000	10 story mixed use apartment with ground floor retail. 126 u/g parking spaces, 36 surface pkg spaces
The Casey Condos 311 NW 12th Ave	$42,000,000	2007	56	4,200	16 stories, ground floor retail, LEED platinum, 194,225 GSF above and below grade, River Dist
Clyde Hotel	$1,000,000	2006	0	N/A	Boutique hotel. River Dist
Cornerstone Condominiums 1130 SW Jefferson	$3,400,000	2000	50	3,000	Condominiums with ground floor retail. 10,000 square foot site, 6-story building
Crane Building 710 NW 14th	$10,524,000	2006	32	37,000	Basement converted to 46 pkg spaces, 3 floors residential, Guardian Management office, River Dist
Cronin Block NW 12/13/Marshall/Northrup	*$50,000,000*	2007	250	N/A	335 pkg spaces, townhomes and condos, River Dist
ED Distributing/Moe's Pianos 140 NW 14th	N/A	2003	0	40,000	Retail office, light industrial with u/g parking
Edge 805 NW 14th	$27,000,000	2003	125	35,000	Condominiums & ground floor retail. 3 parking lots, one underground
Eliot SW 10th/11th/Jefferson	$60,000,000	2006	223	9,000	Condominiums and ground floor retail
Elizabeth Lofts 333 NW 9th	$38,000,000	2005	182	14,500	Condominiums & ground floor retail. 16 stories
First Presbyterian Church	$11,000,000	0	0	40,000	170-space underground parking garage and plaza. Future site for church facilities. West End
Fox Tower 805 SW Broadway	$65,000,000	2000	0	438,000	28- story office w/ approx. 400 spaces of underground parking and built-in cinema, two floors with 63,000 ft of retail, 375 ksf office

Project Name	Construction Cost	Year Complete	Residential Units	Non-resid SQ FT	Comments
Galleria 921 SW Morrison	$9,000,000	2003	0	60,000	Building renovation for Western Culinary Institute
Gregory 420 SW 10th Avenue	$29,500,000	2002	133	47,000	12 story condo project w/ 145 res units, 29,000 of office, 210 parking stalls, 18 ksf retail
Hamilton West 1212 SW Clay Street	$7,900,000	1999	152	2,500	Apartments - Housing Authority of Portland, ground floor retail
Inn at Northrup Station 2025 NW Northrup	$3,000,000	2002	0	31,000	Boutique hotel
The John Ross SW River Parkway	$118,000,000	2007	314	19,000	Ground floor retail with 4-story podium and 31-story building 404 parking spaces. LEED silver, S Waterfront
Johnson Street Townhomes 1116-1142 NW Johnson	$7,000,000	2000	13	0	Townhouses
Kafoury Commons 1230 SW Columbia	$7,100,000	2000	129	0	10-story 129 unit complex, 29 affordable
Kearney Plaza Apartments 930 NW 11th, 97209	$18,000,000	2000	139	7,500	Apartments & ground floor retail
Lexis on the Park 1125 NW 9th	$23,000,000	2004	139	9,000	Market rate apartments converted to condos in 2005, ground floor retail
Lovejoy Building Office 1624 NW Lovejoy	$2,000,000	2004	0	20,000	14 ksf office, 6ksf retail
Lovejoy Square NW Kearney/Lovejoy/13/14th	$3,200,000	2004	0	38,000	13 ksf office, 25 ksf retail
Lovejoy Station 1040 NW 10th Avenue	$18,630,000	2001	181	6,500	5 story mixed use project with 4 floors, 181 units affordable apt over 86 parking spaces, 124 apt. units, ground floor retail
Manzana Rotisserie Grill 1203 NW Glisan	$1,950,000	2002	0	20,000	Building renovation for 10 ksf ground floor restaurant and 10 ksf 2nd floor offices
Marshall Wells Lofts 1001 NW 14th Ave	$34,000,000	2002	164	0	Condominiums renovation
Maverick Sports Club 2025 NW Overton	$400,000	2002	0	18,000	Commercial renovation
McKenzie Lofts 408 NW 12th Avenue	$15,500,000	1997	68	13,500	Condominiums & ground floor retail
The Meriwether SW River Pkwy/SW Curry	$82,500,000	2006	245	11,800	347 parking spaces, LEED silver rating, S. Waterfront
The Metropolitan (Block 9) NW 10/11/Lovejoy/Marshall	$63,000,000	2007	136	18,000	230 pkgs spaces, 19 stories concierge service, common rooms and guest suites, River Dist
Mosaic 1400 SW 11th Ave	$5,700,000	2003	40	0	Condominiums
Museum of Contemporary & Modern Art. North Building	$32,000,000	2005	0	146,000	Building conversion
Museum Place 1030 SW Jefferson	$29,000,000	2003	140	48,000	Mixed income apartments, Safeway
North Park Lofts 300 NW 8th Avenue	$8,000,000	1999	66	3,000	Condominiums, redeveloped 1908 building, ground floor retail
Northrup Commons Condos 2327 NW Northrup	$3,600,000	1999	20	0	4-story residential, 65,500 SF, two levels of parking

Project Name	Construction Cost	Year Complete	Residential Units	Non-resid SQ FT	Comments
OHSU Center for Health & Healing at South Waterfront SW Moody Ave	$103,500,000	2006	0	294,400	Physical practices, outpatient surgery, wellness center, research labs, classrooms. 650 pkg sp. 3-story underground garage. LEED platinum. South
Oregon History Center 1200 SW Park	$2,750,000	2003	0	4,000	Visitor facilities and exhibit area renovation, addition and outdoor plaza
Outside In 1132 SW 13th	$3,500,000	2001	0	30,000	Youth center, 4-story building, supervised housing
Overton Park Apartments 2315 N.W. Overton	$4,000,000	2002	18	0	Apartments with ground floor retail
Paramount Hotel 808 SW Taylor	$14,000,000	1999	0	140,000	14-story 154-room hotel with street level retail
Park NW Condos 327 NW Park Avenue	N/A	2000	18	3,000	Condominiums
Park Place Condominiums 922 NW 11th	$47,000,000	2004	124	15,000	91 flats, 25 lofts, 8 penthouses, 7 townhomes, 4 of 7 live/work
Pearl Court Apartments 920 NW Kearney Street	$10,000,000	1997	199	0	Apartments - Housing Authority of Portland, affordable housing
Pearl Townhomes 602-636 NW 11th Avenue	$4,000,000	1997	10	0	Townhouses
Pearl Townhouses, Ph 2 NW 11th btwn Hoyt/Irving	N/A	2000	10	0	Townhouses
Pinnacle 1255 NW 9th	$37,000,000	2005	176	7,000	Condominiums, ground floor retail
Pacific NW College of Art 1241 NW Johnson	$1,000,000	1998	0	40,000	Full block renovation including new classrooms, library, meeting, & performance space- art college
Powell's Books 24-34 NW 11th	$5,000,000	1999	0	50,000	Building expansion and renovation--2 sites
Reed/Harris/Block 90 NW 13/14/Flanders, 322 NW 14th	N/A	2007	12	0	21 pkg spaces, River Dist
Residence Inn by Marriott 2115 SW River Pkwy	$24,500,000	2001	0	275,000	258-suite extended stay hotel, includes 58,000 SF pkg
Riverstone Condominiums 821 NW 11th	$25,000,000	1998	121	10,000	Condominiums & ground floor retail
RiverTec 1220 NW Lovejoy	$10,000,000	2000	0	75,000	Office renovation
Safeway Blocks NW 12/13/Lovejoy/Marshall	$40,000,000	2008/9	235	60,000	Rental, two buildings, 15% affordable, ground floor retail, 145-160 pkg for 40 ksf Safeway, 145 pkg for Rivertec. River Dist
St. Francis Apartments 1024 SW Main	$10,800,000	2003	132	6,000	Affordable apartments, ground floor retail
The Sitka 1115 NW Northrup	$32,000,000	2005	210	7,150	Rentals, 130 pkg spaces, 6 stories, 50-60&% MFI, ground floor retail
Station Place 1020 NW 9th	$18,000,000	2005	176	1,600	Senior affordable apartments, 150,000. Lovejoy/Marshall, 26,000 SF of retail on Marshall, east of tower 6th Avenue frontage is 5-story garage
Station Place Parking Garage	$8,800,000	2004	0	100,000	425-car parking garage
Station Place Retail	$2,400,000	**2006**	0	26,000	Two-story retail

Project Name	Construction Cost	Year Complete	Residential Units	Non-resid SQ FT	Comments
The Strand	$95,000,000	2006, 2007	216	9,700	Three towers. 100-space underground public parking garage, 160 spaces resident pkg. 2.7-acre site, destination restaurant, retail and live/work
Streetcar Lofts 1030 NW 12th Ave, 97209	$28,000,000	2002	139	9,000	Condominiums & ground floor retail
Tanner Place 1030 NW Johnson	$31,000,000	2000	120	12,000	Condominiums & ground floor retail
Telegram Building 1101 SW Washington	$5,600,000	2004	0	44,000	Renovation for two floor health club, 20 ksf of office, restaurant
Vollum Natural Cap. Ctr. 721 NW 9th Avenue	$8,000,000	2001	0	50,000	Renovation for 40 ksf office/10 ksf retail, LEED gold certification
Westin Hotel 750 SW Alder	$20,000,000	1999	0	135,500	20-story 200-room hotel
Wieden and Kennedy 1227 NW Davis	$20,000,000	1999	0	200,000	Full block renovation - 175 ksf office, 25 ksf retail and adjoining parking, PICA ground floor
Workspace Lofts 1720 NW Lovejoy	$1,100,000	2001	N/A	0	Workspace Lofts
YWCA Renovation 1111 NW 10th Avenue	$6,000,000	2003	25	63,000	Renovation
Portland State University					
Epler Hall 1809 SW 11th	$8,000,000	2003	130	0	6-story, 4 floors student housing, 1 floor classroom/office, ground floor retail
PSU Urban Center 506 SW Mill	$24,000,000	2002	0	130,000	Class space, office and public meeting space, 25,000 sf ground floor retail
Helen Gordon Child Development Center Expansion, Phase 1 1609 SW 12th	$2,600,000	2003	0	15,000	
Helen Gordon Child Development Center Expansion, Phase 2 1609 SW 12th	$2,700,000	2004	0	13,000	Historic structure renovation
Native American Student Center SW Jackson and Broadway SW corner	$2,800,000	2003	0	10,000	Academic support space
Simon Benson House 1803 SW Park	$1,400,000	2000	0	3,000	Academic support space, relocated historic structure.
Parking Expansion and Renovation South of Smith Center	$7,500,000	2002	0	100,000	349 new parking spaces, renovation of 810 spaces
Smith Memorial Union Renovation 1802 SW Broadway	$8,000,000	2006	0	220,000	Seismic upgrades and office, entry, ballroom and food court renovations
NW Center for Science Engineering and Technology Between 3rd and 4th at College	$30,000,000	2006	0	136,000	Academic classrooms, offices and labs; LEED Silver
The Broadway 621 SW Jackson St	$47,500,000	2004	384	35,000	10-story 220,000 SF; 8 floor student housing, 1 floor academic, 15 ksf ground floor retail
The Ondine Renovation	$7,700,000	2005	0	100,000	Ground floor renovation and upgrade of existing residential units in the 15-story building housing 500 residents.
Brewery Blocks	$300,000,000				
Block 1 NW 12th/13th/Burnside/Couch		2002	0	158,000	40 ksf Whole Foods and 3 floors office space, renovation
Block 2 NW 11th/12th/Burnside/Couch		2004	0	225,000	40 ksf ground floor retail with office above, renovation

Project Name	Construction Cost	Year Complete	Residential Units	Non-resid SQ FT	Comments
Bob and Diana Gerding Theater		2006	0	40,000	Performing arts space, goal of LEED platinum. $20 million
The Henry 132 NW 12th		2003	123	14,000	Luxury condominiums, 3 floors parking, ground floor retail
Block 4 NW 11th/12th/Couch/Davis		2004	0	270,000	Spec office, 20 ksf ground floor retail
South Pearl NW Couch/Davis/12th/13th		2004	240	0	16-floor Apartments
Total	$2,287,854,000		7,248	4,624,150	

Total Non-residential SF	**4,524,150**
Ground Floor Retail	886,350
Art	280,000
Education	782,000
Other Institutional	145,000
Health	290,300
Office	1,432,000
Hotel	708,500
New Construction (non-res)	3,208,150
Renovation/expansion (non-res)	1,316,000