

PORTLAND STREETCAR SYSTEM CONCEPT PLAN

A Framework for Future Corridor
Planning and Alternatives Analysis



Adopted September 9, 2009
by Portland City Council

This study is partially funded by the US Department
of Transportation, Federal Transit Administration



How this document will be used

This document will be used to identify and select corridors for future Alternatives Analysis and planning studies as funding becomes available. No funding plan or schedule has been identified for any of the potential streetcar projects.

Transit corridors citywide were assessed to determine which corridors have the best potential for future streetcar investment. Corridors that are shown in this document represent the best opportunities for streetcar infrastructure. Detailed corridor by corridor analysis, study and discussions with corridor neighborhoods are necessary to determine if a streetcar investment is warranted. No individual corridor can move forward without a detailed analysis and planning study to address the purpose and need of a streetcar project and to comprehensively evaluate project impacts.

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**Adopted by Portland City Council
September 9, 2009
Resolution 36732**



Acknowledgements

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About This Document

This document is intended to provide the reader with the context and background that has helped shape the Portland Streetcar System Concept Plan. Summarizing the technical research and experience to date with streetcar service in Portland and elsewhere, it is divided into the following chapters:

Chapter 1, Why a Streetcar Network, outlines the growth that the city expects and a vision that sees streetcars as a valuable means to help shape that growth. This chapter also details the goals for the Portland Streetcar System Concept Plan process and how this process relates to other planning efforts.

Chapter 2, Why Streetcars, outlines the characteristics that make streetcars unique. It then explains how streetcars fit into a range of transit services and into an overall transit system.

Chapter 3, What is a Streetcar Corridor, defines the term “streetcar corridor,” examines how streetcar corridors can both accommodate growth and protect existing neighborhoods, and introduces the concept of coordinating transportation investments with other infrastructure improvements in green corridors.

Chapter 4, Streetcar System Planning Process, outlines the measures by which the city and technical team evaluated corridors for potential streetcar expansion and the concurrent public process that supported key decisions.

Chapter 5, Streetcar System Concept Plan, describes a network of corridors that were determined to be the most viable to introduce streetcar service as the system expands in a manner to serve neighborhoods outside of the Central City. A short list of concept corridors is also defined and assembled into 6 Concept Routes.

Chapter 6, Economic Development Potential for Concept Corridors, is an overview of the influences streetcar service may have on development while respecting the unique character of Portland’s neighborhoods. A high-level summary of the economic development potential along priority streetcar corridors is included as well as a report on a Developer Roundtable review of the priority corridors.

Chapter 7, Implementation/Next Steps, discusses the funding options that are currently the most viable for the concept corridor routes as well as provides a summary of the next steps needed to move forward with concept corridors and adopting a city-wide master plan for a network of streetcar lines.

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INTRODUCTION



Portland Streetcar on SW Harrison



Passengers riding Portland Streetcar



Streetcar arrives in RiverPlace District

The City of Portland developed around its historic streetcar network, which began in 1872 with a horse-drawn line on 1st Avenue. The early streetcar lines served both as a mode of transportation and as an organizing tool for new development. They were constructed with the intent of drawing people to live in new, outlying neighborhoods. Before any new development began, developers would first extend a streetcar line into the area. Street railway companies would then add these new streetcar lines to their systems.

Between approximately 1890 and 1925, streetcar lines opened up at least 14 of Portland's historic neighborhoods for development. Over time, streetcar commercial districts evolved as the activity centers and main streets that still exist in Portland's close-in neighborhoods. For example, the Woodlawn neighborhood in North Portland was platted for streetcar accessibility, with grid-shifted streets radiating away from the streetcar station. These early transit investments allowed people to commute greater distances, from new residential developments to the industrial and employment areas in Central Portland.

The idea of reintroducing modern streetcar service in Portland first emerged as part of the 1988 Central City Plan. From its inception, the modern Streetcar strategy drew on the same land-use transportation nexus that led to the historic system; among the key goals for streetcar was "encouraging infill...and serving as a catalyst for housing development." The initial 2.4 mile streetcar alignment was selected to connect major ridership generators and employment centers: Legacy Good Samaritan Hospital and Portland State University. The line was strategically routed through the heart of the burgeoning Pearl District. Constructed at a cost of \$55 million, service began in 2001. In 2007, the line was extended through the South Waterfront District.

As a development stimulus, the streetcar has been a resounding success. By 2008, private developers had invested \$3.5 billion within two blocks of the alignment, including over 10,000 new housing units and 5.4 million square feet of office, institutional, retail and hotel construction. This represents approximately two-thirds of all development in Central Portland during that time. Notably, these developments are utilizing more of the allowed floor area ratio (FAR)* than developments not near streetcar. Developments adjacent to the streetcar have utilized over 90% of its potential FAR, compared to just over 40% for developments not near streetcar.

* Floor area ratio is the amount of floor area in relation to the amount of site area, expressed in square feet. For example, a floor area ratio of 2 to 1 means two square feet of floor area for every one square foot of site area.

Building the Portland Streetcar was one of the important transportation decisions made by the City of Portland in recent years. It has enhanced business growth, livability and housing options. Streetcar corridors are expected to play a key role in helping the city absorb some of the one million new residents Metro expects in the region by 2035. This planning effort, commissioned by the Portland Bureau of Transportation (PBOT) is documented in this report and is known as the Portland Streetcar System Concept Plan.

The Portland Streetcar System Concept Plan (SSCP) identifies potential corridors that will build upon the success of the existing streetcar system and expand service to best serve Portland's neighborhoods and business districts. It is no coincidence that some of the strongest potential corridors identified in this plan are historic streetcar corridors. The pedestrian-oriented main streets and transit supportive land use patterns established over a century ago are still vital today – and potentially strong enough to support streetcar's return. The streetcar is a key element in the city's plan for more sustainable future growth. The planning effort evaluated and compared corridors most promising for modern streetcar based on development potential, operational feasibility, transit connectivity, and public involvement. PBOT worked closely with TriMet, the Bureau of Planning and Sustainability (BPS), Metro, the Portland Development Commission and ODOT to make sure the SSCP effort was well coordinated with local and regional policies. PBOT and BPS are coordinating closely to make the SSCP an integral element of the city's update to the comprehensive land use plan, better known as the Portland Plan.

What is the Role of a Streetcar System in Portland?

- It is about accommodating growth along transit corridors while respecting the unique character of each Portland neighborhood;
- It is about providing an accessible network of transportation options that will reduce our dependency on the automobile;
- It is about promoting better health by fostering more pedestrian activity and coordinating with existing and planned bicycle connections;
- It is about promoting better air quality and conservation of our natural resources by reducing greenhouse gas emissions and controlling urban sprawl;
- It is about finding new ways to utilize our transportation corridors as the region continues to grow;
- It is about advancing a healthy and competitive local, regional and state economy;
- It is one small part of how our transportation choices will be changing in the decades to come.

Figure I-1. Historic streetcar network with Metro 2040 Main Streets and Centers.

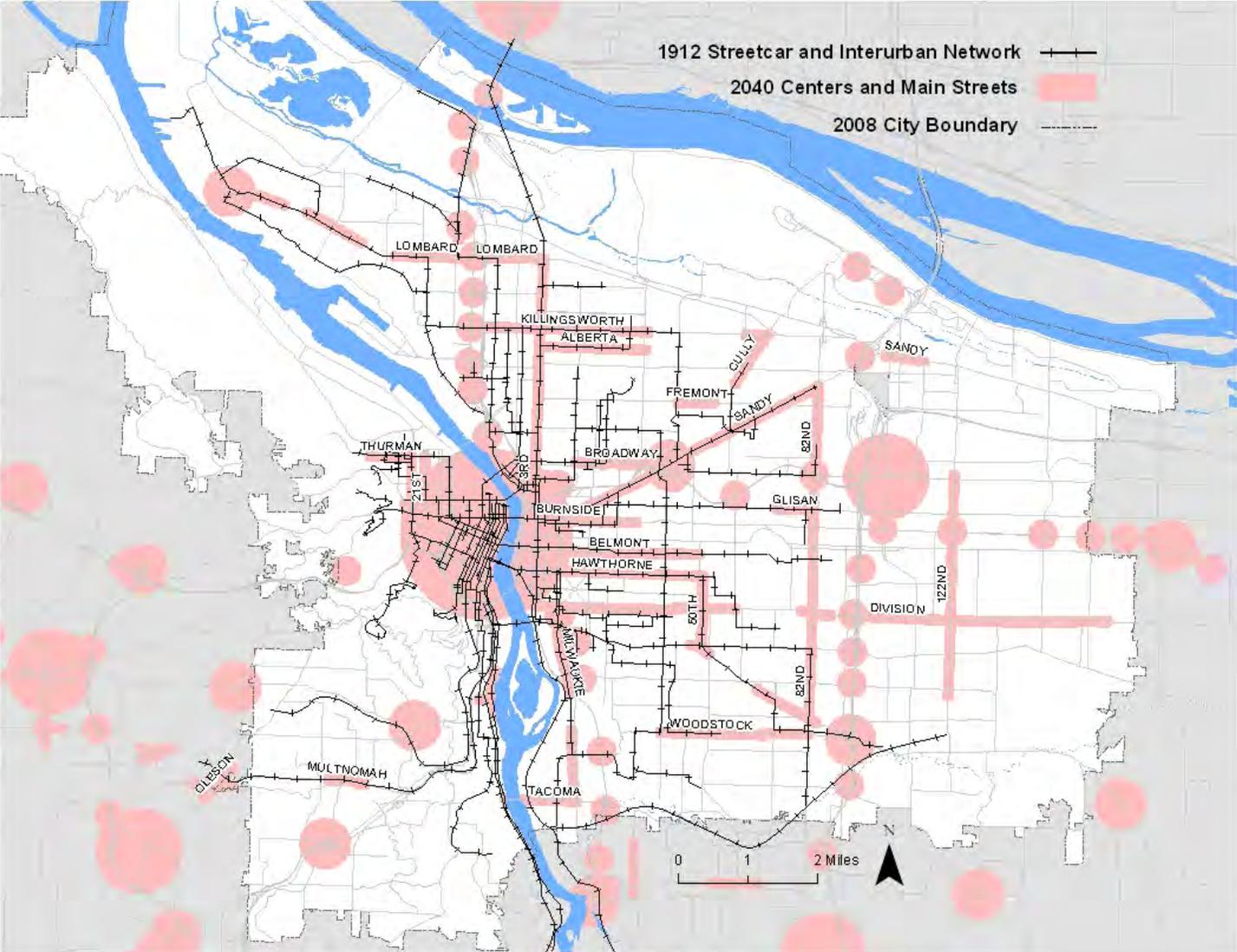
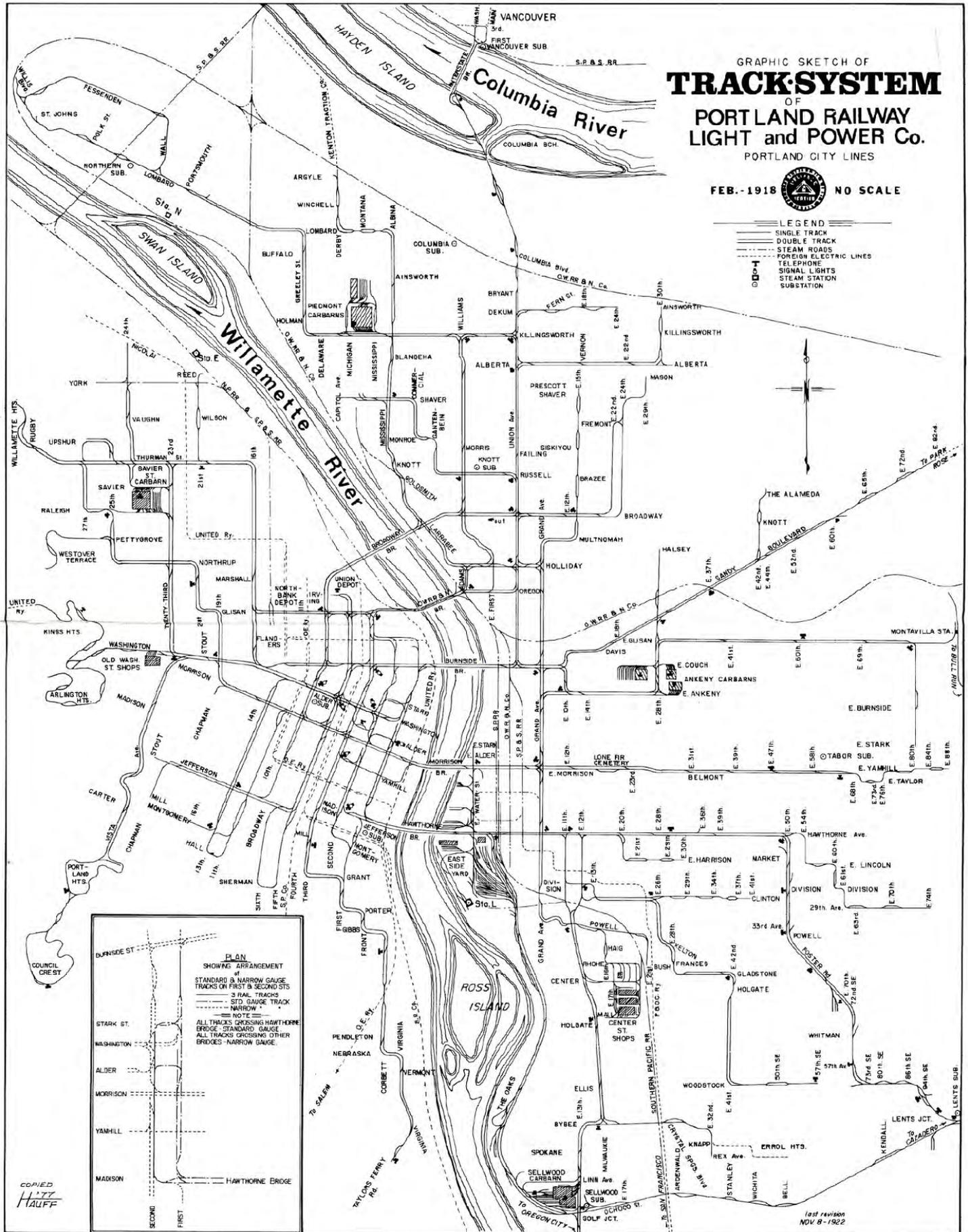


Figure I-2. Historic Portland Streetcar Corridors.



1

WHY A STREETCAR NETWORK?



The Portland Streetcar System Concept Plan (SSCP) is a strategy for an enhanced streetcar network that is a part of a broader vision by the City of Portland to sustainably accommodate future population growth in a manner that will effectively manage the consumption of our limited natural resources and reduce greenhouse gas emissions. Expanding the streetcar system into a network of corridors will help achieve this by:

- Delivering an attractive, high-quality transit service that will provide circulation along corridors, connect to and enhance the existing transit network, and link our neighborhoods with commercial districts and employment centers;
- Integrating into a comprehensive transportation system, including Portland's existing and planned pedestrian and bicycle network, which will reduce our dependency on the automobile and increase mobility for all modes of travel; and
- Fostering partnerships between neighborhoods, developers and the City to coordinate or combine sustainability initiatives for stormwater management, localized (renewable) power generation, energy conservation, and sustainable (LEED) building design, and low impact urban design that encourages walking and bicycling.

The SSCP establishes the direction for the expansion of the Portland Streetcar and expands the role of the streetcar in Portland from a central urban circulator to an interconnected citywide system of streetcar corridors integrated with the City's transportation and land use network.

Goals of the Streetcar System Concept Plan

System Goals

Goal 1: Help the City achieve its peak oil and sustainability strategies.

Goal 2: Provide an organizing structure and catalyst for the City's future growth along streetcar corridors.

Goal 3: Integrate streetcar corridors into the City's existing neighborhoods.

Streetcar Corridor Goals

Goal 1: Be a viable transit option with adequate ridership.

Goal 2: Have redevelopment potential.

Goal 3: Demonstrate community support to make the streetcar system work well with other planning goals and mixed-use street corridors.

Portland Streetcar System Concept Plan Mission Statement

The Portland SSCP can play a key role in shaping the City by:

- Reinforcing walkable neighborhoods and vibrant main streets.
- Encouraging sustainable development and infrastructure.
- Supporting reduction of vehicle trips.
- Supporting greater accessibility, housing options, employment and economic development.

Anticipated Regional Growth

Current growth projections show that Portland's population will increase significantly by 2030. The Portland Bureau of Transportation (PBOT) is undertaking the SSCP to study how streetcars can help the City accommodate increased population, provide an alternative to cars, and address global warming, while maintaining individual neighborhood identities.

Relationship to Portland Plan

The Portland Plan is a process to determine how Portland will grow and transform in the next 30 years. During this process, the city and community members will discuss issues related to healthy urban growth, including reducing the effects of climate change, creating a thriving business environment, building green infrastructure, fostering human health and safety, addressing affordable living, preserving and creating well-designed and distinctive places, ensuring equity and continuing visionary planning for a better future. The SSCP is one of the tools that will help implement the Portland Plan.

Planning for Sustainable City and Regional Growth

According to regional growth projections, the population of Portland will continue to increase at a rapid rate. As the City of Portland prepares for this growth, development opportunities that can reduce our carbon footprint, maintain Portland's valued livability, and take advantage of transit must be a part of the plan to accommodate our new neighbors.

A streetcar system can be an effective tool to help implement the City's Peak Oil Strategy. In March 2007, the Portland City Council accepted a report from the citizen-based Peak Oil Task Force. The report assesses Portland's vulnerability to increases in oil and natural gas prices and proposes ways the City can prepare to minimize the potential social and economic impacts. The City Council adopted a resolution establishing a goal of reducing local oil and natural gas use by 50 percent over the next 25 years. In order to reach this goal, alternative transportation must be expanded.

Implementation of a citywide system of streetcar corridors can help fulfill many of the Peak Oil Task Force recommendations. The recommendations emphasize land use and transportation planning to minimize fossil fuel use and stronger policies and programs to reduce energy use in buildings. Key recommendations include:

- Engaging business, government and community leaders to initiate planning and policy changes;
- Supporting land use patterns that reduce transportation needs, promote pedestrian activity and provide easy access to services and transportation options;
- Designing infrastructure to promote transportation options, facilitating efficient movement of freight, and preventing infrastructure investments that would not be prudent given fuel shortages and higher prices;
- Encouraging energy-efficient and renewable transportation choices;
- Expanding energy-efficient building programs and incentives for all new and existing structures;
- Preserving farmland and expanding local food production and processing;
- Identifying and promoting sustainable business opportunities;
- Redesigning the safety net to protect vulnerable and marginalized populations; and
- Preparing emergency plans for sudden and severe shortages of resources.



How Does the Streetcar Help Reduce Auto Trips?

Dense, mixed-use development with good transit access results in reduced auto trips. Total daily vehicle miles traveled per capita decreases significantly for residents living in mixed-use, transit-rich neighborhoods because residents have foot, bike and transit access to trip destinations within close proximity. According to Metro data, residents are almost twice as likely to walk, and are 45 percent more likely to use transit in mixed-use neighborhoods. This is because mixed-use neighborhoods have trip destinations within close proximity, making non-auto modes of travel more convenient and attractive.

Using Metro data, it has been demonstrated that areas with good transit and mixed land uses have an estimated 58 percent auto mode use compared to an overall regional average of 87 percent. This 29 percent reduction in auto trips is referred to as the “trip not taken.”

Analysis of the existing Portland Streetcar experience indicates a savings of 60 million vehicle miles traveled per year due to added urban development, when compared to a similar suburban alternative.

Table 1. Mode Split by Development Type

Land Use Type	Mode Split: Auto	Mode Split: Walk	Mode Split: Transit	Mode Split: Bike	Mode Split: Other	Daily Vehicle Miles per Capita	Auto Ownership per Household
High Frequency Transit/Mixed Use	58.1%	27.0%	11.5%	1.9%	1.5%	9.8	0.9
High Frequency Transit Only	74.4%	15.2%	7.9%	1.4%	1.1%	12.4	1.5
Remainder of Multnomah Co.	81.5%	9.7%	3.5%	1.6%	3.7%	17.3	1.7
Remainder of Region	87.3%	6.1%	1.2%	0.8%	4.5%	21.8	1.9

Source: Metro 1994 Travel Survey

This table shows data derived from the Metro 1994 Travel Behavior Survey that compares auto and non-auto mode shares. The data was analyzed by small geographic units that allowed for a comparison of areas with good transit and a high mix of uses with other parts of the region.

The Trip Not Taken

The relationship between land use and transportation choices is well documented in the U.S. and Portland. Residents living in higher density development with a mix of uses (commercial, civic, entertainment and residential) and good transit service are significantly more likely to use transit, walk, or bike than use an automobile. This net decrease in automobile use, or the “trip not taken”, reduces the need to accommodate more cars on city streets and provide parking. It has the potential to reduce development costs, in part because parking requirements may be less. The streetcar has demonstrated its ability to encourage denser development with a population that is less reliant on automobiles because destinations (e.g., home, work, services) are closer and the streetcar, along with other transportation options, are available and desirable.



Streetcar stop in Park Blocks adjacent to Portland State University (PSU). PSU is a major ridership generator.

Streetcar’s Role in Making Portland More Sustainable

How Can Streetcar Help Achieve Portland’s Sustainability Goals?

As part of the Portland Plan effort, the City of Portland BDS assembled a Sustainability Technical Working Group (TWG) comprised of representatives from the Bureaus of Planning, Water, and Environmental Services, and the Bureau of Transportation. The Sustainability TWG assessed the sustainability-related issues the City and the Region need to consider in planning for population growth and development in Portland during the next 30 years.

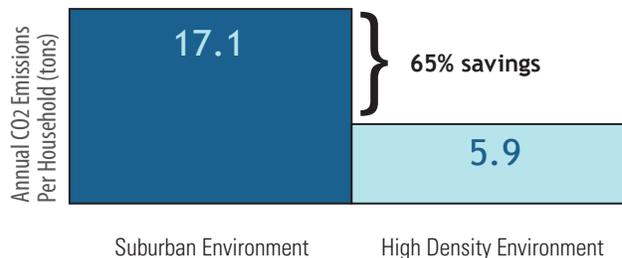
Implementing the SSCP can play a significant role in addressing the four key issues facing Portland, as identified by the Sustainability TWG.

1. Climate Change

Transportation emissions are considered responsible for nearly 40 percent of all greenhouse gas emissions; yet mobile sources are poorly regulated because of decentralized ownership and regulatory traditions. Given that the anticipated climate change will affect every part of the way we live and plan for the future, we must consider all available options to reduce the impacts generated by our current transportation system.

Portland’s streetcar system can help balance and integrate sustainable technology with the existing neighborhood characteristics to provide a comfortable, convenient transportation choice. The streetcar system would connect the dots of centers by providing an interconnected network of corridors that adds vitality to nodes, maximizes land use and integrates with evolving infrastructure. It can contribute to neutralizing the city’s carbon footprint through the overall reduction of Vehicle Miles Traveled (VMT), reduce trips by single occupant vehicles, and reduce allied greenhouse gases (GHG) through electrification of the transportation system and integration with human-powered modes. Most importantly, it would encourage denser development, which would result in fewer climate emissions from transportation as well as from housing.

Residential Footprint



Employment Footprint

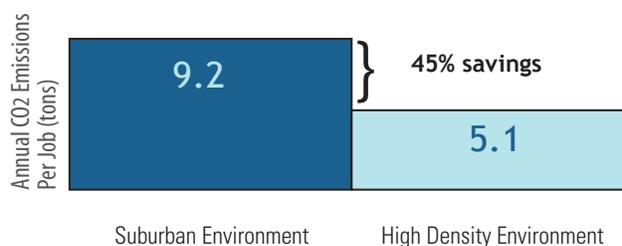


Figure 1. High-Density/Suburban Carbon Footprint Comparisons.

Carbon footprint modeling associated with the Portland Streetcar Loop Project estimated the potential for a 60 percent overall carbon footprint savings with high density urban development when compared to a suburban alternative. With employment, a 45 percent reduction in the carbon footprint was identified. (Source E.D. Hovee & Company, Memorandum on Carbon Footprint Benefits Modeling, February 2008)

2. Community Health

Human health is an aspect often overlooked in planning efforts, despite having value that is widely understood. In the last fifty years, remarkable advances in medical treatments have helped reduce the effects of illness and disease, as well as extend our life expectancies. However, as a society, we have incrementally increased our exposure to contaminants while simultaneously removing the daily activities that make us healthy, such as walking, to take care of our basic needs. Walking has ceased to be an integral part of daily activity in places that developed around the automobile.

Examining Portland's local air emissions reveals that vehicle corridors are the main source of these emissions. Proper selection of streetcar corridors may potentially reduce pollution loads from vehicles of all types, from diesel-powered buses and trucks to cars running on standard petroleum. By reviewing potential corridors in relation to existing walking and biking corridors, streetcar systems can be designed to support a truly multi-modal lifestyle with fewer emissions.

3. Social Equity and Access

Implementation of a streetcar network can provide a catalyst for greater social equity and access to an affordable society in terms of transportation, recreation, health care, housing and jobs. Encouraging a lifestyle that reduces vehicle dependency frees additional household income to apply toward better housing or a higher standard of living. By providing convenient access to basic goods and services such as food, employment and healthcare, streetcar corridors can encourage a lifestyle that reduces dependence on motor vehicles. This can in turn reduce overall transportation costs, freeing additional household income to apply toward better housing or a higher standard of living.

4. Constrained Fossil Fuel Resources

The current global energy system was developed on the presumption of a seemingly unlimited supply of fossil fuel resources such as oil, coal and natural gas. We know now that production of these resources will inevitably peak and, without careful preparation, steep increases in energy prices may disrupt our economies and society.

Secure and sustainable energy supplies are vital to Portland's future prosperity. A significant opportunity exists with the implementation of the Streetcar System Concept Plan. While the streetcar can promote and organize new compact development within a corridor, it is possible for each corridor to give rise to an expansion of green infrastructure strategies being planned by the City of Portland that will help address national, state and local energy and climate goals.

It is estimated that the new development around Portland's existing streetcar system has resulted in a 60 percent reduction in greenhouse gas emissions, as compared to what emissions would be for a similar capacity of residential and business units developed in the suburbs. This savings is realized through the reduction of motor vehicle trips, consolidation and reuse of building materials, reduction in land consumption and less private and municipal infrastructure.

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

Keeping Portland Competitive

Building Portland’s citywide streetcar system offers opportunities for economic development benefiting Portland residents and businesses. The Streetcar represents a return to the community’s heritage of development-oriented transit in a way that is responsive to the increasingly global economic challenges of the 21st century.

There is already clear evidence of the ways in which streetcar enhances the City’s built environment:

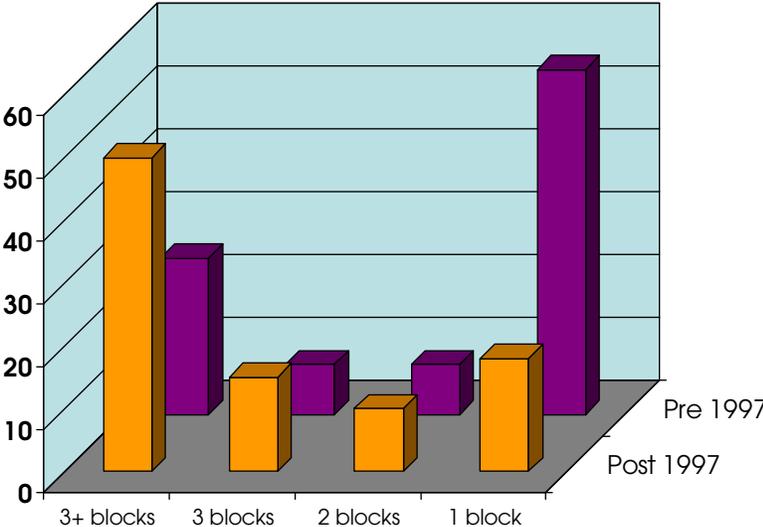
- Since 1997, the majority (55 percent) of new development within Portland’s Central City has occurred within one block of the current Portland Streetcar alignment.
- The streetcar has also stimulated more intense urban building use consistent with development capacities intended via adopted Comprehensive Plan and zoning designations.

A citywide streetcar system is instrumental in encouraging a pattern of transit-supportive, high quality urban development throughout Portland. The type and scale of development experienced will vary across the city, in synch with neighborhood specific market needs and planning objectives. Results to date demonstrate a more vibrant mix of urban residential development ranging from market rate to affordable housing together with enlivened commercial retail and employment opportunities oriented to streetcar corridors. For the metropolitan area, an important benefit is avoidance of unnecessary suburban sprawl.

Portland is quickly becoming an icon for urban vitality in the 21st century. Portland’s downtown streetcar is now recognized as a critical component of community infrastructure attracting residents as diverse as empty nesters, young creative professionals and increasing numbers of families. In this era of concerns about peak-oil, an expanded streetcar network that serves Portland’s neighborhoods has the potential to deliver the workforce to urban business locations preferred by Portland’s emerging industries as sources of future economic prosperity. These emerging industries range from software and graphic arts to apparel manufacture and green design.

Figure 2. Percentage of CBD Development Based Upon Distance from Streetcar.

A 2005 study of real estate development within streetcar-served neighborhoods tracked Portland’s development trends (pre- and post-streetcar) based on distance from the alignment. It found that after streetcar investment was secured, lots within 1 block of streetcar captured 55% of new development within neighborhoods that streetcars passed through. (Source: E.D. Hovee & Company, Portland Streetcar Development Impacts, February 2008)



There are additional benefits from investment in streetcars. These include:

- Economic analysis has shown a high return on the capital investment of streetcars (140:1 in downtown Portland and 9:1 projected in east Portland).
- Streetcars encourage development and transit use because of the visible permanence of the transit investment.
- The streetcar will play an important role in the City's Peak Oil Strategy; however, it is only one mode of an integrated transit system that will be needed. Other transit modes may include expanded LRT lines, bus rapid transit and electric trolley buses, and frequent bus service.

2

WHY STREETCARS?



The essential quality of streetcars is that they excel at shaping compact, walkable neighborhoods by connecting destinations with a high-quality transit ride over smooth rails. Most importantly, the streetcar offers predictability – the tracks are visible and permanent and won't take an unexpected turn. This results in a transit service that is more attractive to occasional riders, including visitors. It also promotes a “park-once” philosophy, in which a person may use a car to get downtown or to a neighborhood and use a streetcar to reach other destinations in the corridor. As an example, while TriMet ridership peaks during the daily commuting times, today's streetcar in Portland has ridership peaks during the work week around lunchtime and on weekends.



Why are Riders Attracted to Streetcars?

Streetcars are relatively quiet, electrically-powered zero-emission vehicles that can operate in a variety of right-of-way configurations. They offer a smoother ride than buses, as they do not weave back and forth to the curb to make stops, and are available as 100 percent low-floor vehicles for easy boarding. Visitors and tourists are more willing to ride a streetcar because they are easier to understand. When less frequent riders can see the rails in the street, they know a streetcar will come by. In contrast, a bus route is less intuitive without a map.

Because streetcars run on an identifiable trackway infrastructure, they create a sense of permanence that both encourages ridership and can influence development investments. Streetcar systems, implemented in concert with streetscape and pedestrian improvements, can improve the urban environment considerably and contribute to the development or redevelopment of neighborhoods.

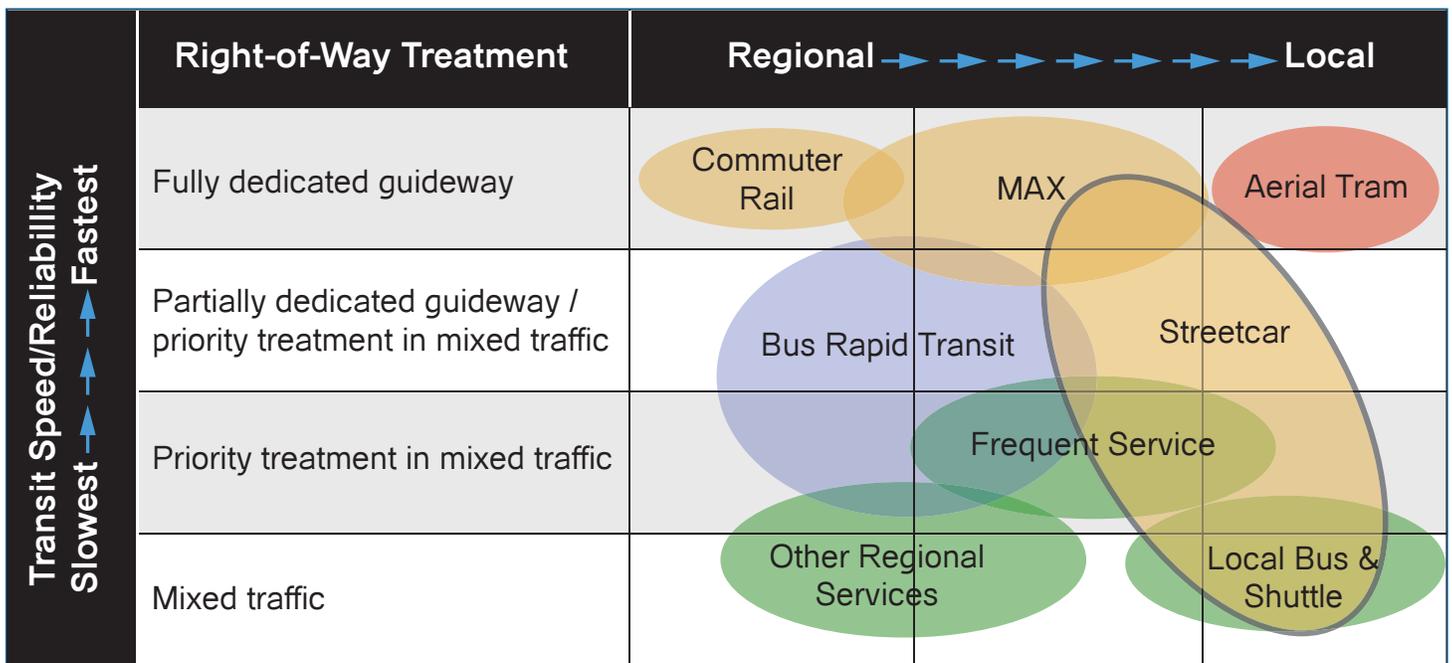
Where Does Streetcar Fit in Portland's Transit System?

Streetcar service is one of the newest transit modes in the region's transit system. Each transit mode has its own benefits, but all are necessary to achieve a comprehensive transit system. The chart below illustrates how streetcar complements the region's other transit modes in terms of speed, reliability and type of service (regional versus local). Integrating streetcar and bus operations is an essential component of making the comprehensive transit system work.

In Portland, the interaction between streetcar and buses is already in place. The streetcar shares stops and lanes with lines #15 and #51 on NW 11th Avenue and with the #77 line on NW Lovejoy and NW Northrup streets. Additionally, the streetcar line intersects with other bus lines and the three MAX lines in the downtown block bounded by SW Morrison and SW Yamhill streets and SW 10th and SW 11th streets.

Figure 3. Streetcar's flexibility is its strength.

Streetcar's ability to operate in a variety of conditions, from dedicated right-of-way to mixed traffic operations, results in service capable of responding to the various transit needs throughout Portland.



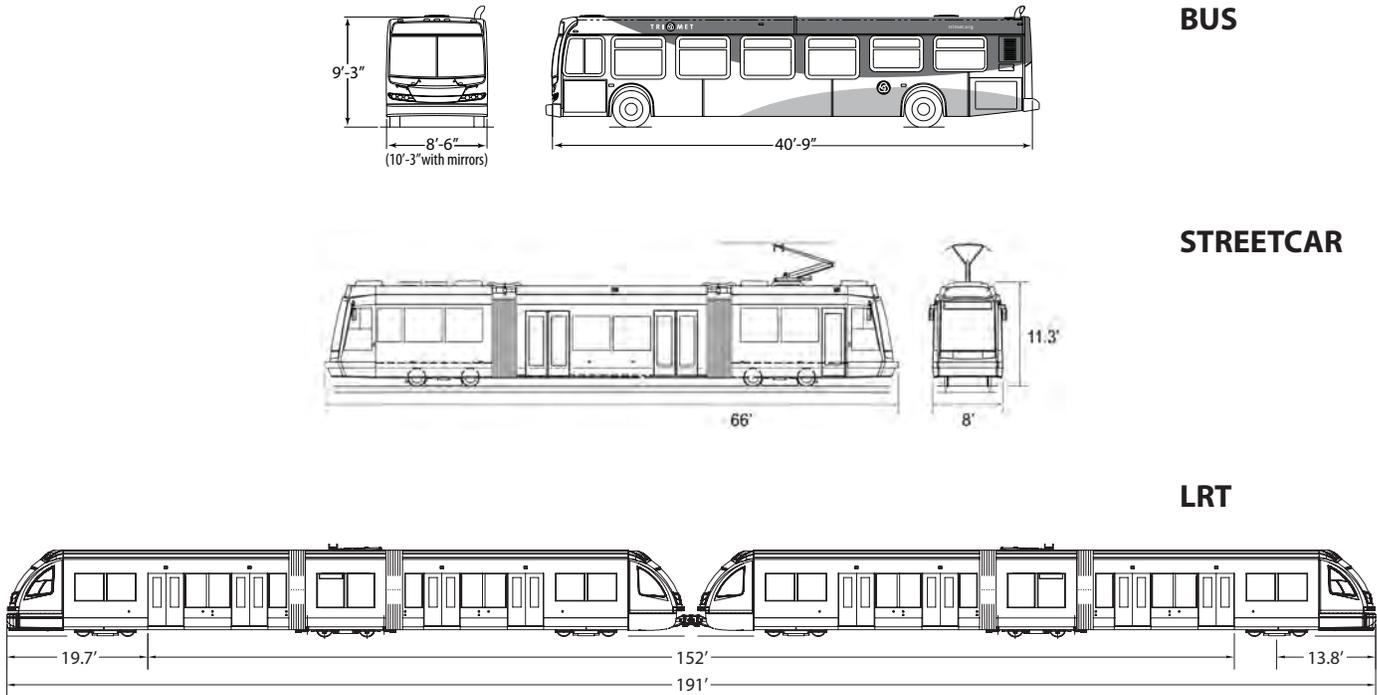
At-A-Glance: Streetcar - LRT - Bus Operational Characteristics

Streetcar, bus and light rail are the primary transit vehicles operating in Portland. The table below, which compares the operational characteristics of the three modes, illustrates streetcar's unique ability to combine the benefits of bus and light rail.

Table 2. Operational Characteristics of Three Modes

	Portland Transit Vehicle Type		
	Streetcar	Type 4 Light Rail Vehicle (LRT)	Bus (Low Floor)
Vehicle Length	66 feet long 8 feet wide	95 feet long 8.7 feet wide	40 feet long 8.5 feet wide
Power Source	Overhead wire	Overhead wire	Diesel engine
Passenger Entry	Partial low floors, Doors on both sides	Partial low floors, Doors on both sides	Partial low floors, Door on one side
Passenger Boarding	Convenient and accessible boarding	Convenient and accessible boarding	Convenient and accessible boarding
Passenger Capacity	30 seats 51 standees 81 total 110 total "crush design"*	68 seats 104 standees 172 per 1-car train (344 per 2-car train) 448 total "crush design"*	39 seats 12 standees 51 total 64 total "crush design"*
Amenities	Space for wheelchairs, bikes, strollers, etc.	Space for wheelchairs, bikes, strollers, etc.	Space for wheelchairs and bikes
Expected Vehicle Lifespan	30 years	30-35 years	15 years
Cost per Vehicle	\$3.5 million	\$4.4 million	\$430,000
	* or total "design crush load"		

Figure 4. Portland transit vehicle types.



What is the Streetcar Experience in Other Cities?

More than a dozen North American cities have streetcar systems that have either expanded or started operations in the past 15 years. Additionally, at least twice as many other cities have new systems or new lines under active planning. The primary attractions of streetcars are the ability to add a visible rail system at a relatively low capital investment, and the ability to create a highly attractive circulator that connects into a high-capacity network without requiring additional extension or expansion of a more expensive high-capacity mode. Streetcars are also popular because, as they once did, they can still fit into densely developed, pedestrian-oriented, urban neighborhoods.



In Memphis, Saturday is the highest ridership day, contrary to common transit experience. (Photo: Wikipedia)



The Toronto Transit Commission estimates that 60 percent of streetcar riders are "choice" riders - those who have a car, but choose to take the streetcar instead. (Photo: Wikipedia)



Since Tacoma began revitalizing its downtown and planning around the light rail/streetcar stops, more than 2,000 new housing units have been permitted. (Photo: <http://tacomastreetcar.org>)

Streetcars and Buses: Complementary Services

Prior to the 1950s, streetcars provided the backbone of the Portland area's transit system. In fact, many of today's bus lines operate along routes that were originally defined by where the streetcar tracks were laid in the late 1800s and early 1900s. The development patterns that followed the original streetcar tracks now define activity centers that serve as important transit markets for TriMet's bus and light rail system.

As the City and the Region consider reintroducing streetcars to serve Portland neighborhoods, choices will need to be made about how to best integrate the proposed streetcar routes with existing bus service. This streetcar/bus integration strategy provides an opportunity to create a transit system that meets the needs of neighborhoods by tailoring transit service to facilitate their unique travel requirements.

For example, adding streetcar to the inner portion of an existing radial bus route can provide an opportunity for the outer portion of the existing route to operate with limited stops on the inner portion. This operating strategy would provide a faster bus trip for the longer distance trips while providing the inner portion with streetcar service as well as connections to the bus route at key transfer points. Cost implications and the ability to find overlapping service will need to be examined for each individual project.

As planning for a streetcar system proceeds, collaboration among the City, TriMet and neighborhoods will be key to identifying and implementing transit strategies that meet local needs and optimize the attractiveness and convenience of the bus and streetcar elements of an integrated transit system.

Can I Walk Faster Than a Streetcar?

Typically, streetcars accelerate from platform stops or traffic control points and will generally reach a speed of 15 to 25 miles per hour. Factoring in platform stops and minor delays associated with mixed traffic operations, the average speed from one end to the other is between 7 and 12 miles per hour. The average speed of a person walking is 3 miles per hour. Whether a person can walk faster to a destination than taking a streetcar depends on the length of the trip and the amount of time spent waiting at a stop. By using Portland Streetcar's website, which shows real-time "next arrival" information, this wait can be minimized. The convenience of a streetcar trip will then depend more on the frequency of service, known as "headways."

Streetcar Headways

Currently, streetcars in Portland are planned to arrive every 12 to 15 minutes. Frequency will generally increase as the system expands. The implementation of any streetcar extension involves an analysis of the appropriate streetcar service and operating headways. More frequent service offers more convenience, which will encourage ridership but will increase overall operating costs. Funding is critical to the equation of providing the appropriate number of streetcars along the line at any one time.

What are the Different Kinds of Streetcar Service?

A streetcar is a smaller vehicle than those used for most light rail transit (LRT) services, and generally operates within the street right-of-way in single-car units. Streetcars can operate in both mixed traffic and reserved rights-of-way. In mixed traffic, a typical streetcar vehicle travels at speeds up to 25 miles per hour. There are typically three levels of streetcar service that can be provided:

Urban Circulator Service (like existing Portland Streetcar)

- Has frequent stops with spacing similar to a bus
- Runs in mixed traffic, usually in the right lane
- Minimal priority systems at traffic signals
- Typical operating speeds of 10 to 15 miles per hour

Enhanced Local Service (potential SSCP corridors)

- Expanded service coverage, approximately 3 to 5 miles from the core business district
- Usually runs in mixed traffic
- May introduce streetcar priority at traffic signals
- Typical operating speeds of 15 to 25 miles per hour

Rapid Streetcar (proposed Portland to Lake Oswego Streetcar)

- Has less frequent stops
- Primarily runs in a reserved right-of-way
- May have streetcar priority at traffic signals
- Typical operating speeds of 20 to 35 miles per hour

The Rapid Streetcar Concept

Are there potential corridors for Portland?

The rapid streetcar concept aims to combine the best features of streetcars and light rail transit (LRT) to achieve faster commute/travel times than streetcars and lower system costs than light rail. Streetcars are typically designed to go shorter distances in central cities, densely populated mixed-use centers and neighborhoods. Streetcars are also typically designed to operate in mixed traffic, preserving street traffic patterns.

LRT typically functions as regional high-capacity transit (HCT), generally traveling in a separated right-of-way with relatively fast-moving, larger-capacity vehicles designed to rapidly transport large numbers of people between suburban and urban centers.

The rapid streetcar concept would apply some of the LRT features to streetcars to improve travel times while keeping capital costs lower. It would combine features of a semi-exclusive transitway and transit priority features within the street right-of-way to achieve faster travel times and maintain lower system capital costs. This could introduce two new levels of service to Portland's system.

Several corridors under consideration for the Streetcar System Concept Plan are prime candidates to introduce Enhanced Local Service. These corridors are major arterials with 4 to 5 lanes and on-street parking such as NE Sandy Boulevard and SE Foster Road.

In Portland there are potential corridors for introducing priority service. Currently, the region is undertaking a study to extend the existing streetcar system along a former railroad right-of-way from the South Waterfront District, through Johns Landing and south to Lake Oswego. SE Foster Road and 122nd Avenue are also candidates where there may be sufficient right-of-way width to introduce streetcar priority lanes.

Drawing from the experiences from other cities around the world, enhancements to the streetcar operations can significantly increase average speeds:

Service	Average Speeds
Urban Circulator Service:	10 to 15 mph
Enhanced Local Service:	15 to 25 mph
Rapid Streetcar:	20 to 35 mph

The rapid streetcar concept, as seen in Tacoma, Washington. Several corridors are prime candidates to introduce enhanced local service.



San Francisco's Transit Preferential Streets Program

San Francisco's Transit Preferential Streets (TPS) Program is a citywide program designed to make surface transit lines operate more quickly and efficiently on city streets. This makes public transit more attractive to riders and uses the public's investment in transit infrastructure more effectively. Most of San Francisco's transit corridors involve mixed operations within city streets. In this environment, transit vehicles are susceptible to delays caused by automobiles and delivery trucks, and other on-street activities can cause less reliable service. The TPS Program promotes corridors that provide the most efficient transportation function for the most number of people using the street, not necessarily the most number of vehicles.

To accomplish this, San Francisco has developed a toolbox of street treatments that can be applied to streets or street segments within a TPS corridor. The toolbox of potential TPS treatments includes:

- Timing signals to match transit vehicle flow
- Signal priority systems for buses and streetcars
- Bus bulbs (sidewalk extensions at bus stops)
- Boarding islands for center lane boarding
- Transit lanes
- Contra-flow lanes
- Exclusive transit rights-of-way (raised or reserved medians or track lanes)
- Transit stop spacing and relocation
- Transit exceptions to turn restrictions

These treatments are aimed at allowing the transit vehicles to flow more smoothly and quickly between stops; however, implementation of TPS treatments often comes with trade-offs for the use of limited street space.

San Francisco's Transit-First Policy resolves these trade-offs by favoring transit needs over auto needs. In practical terms, various uses must be accommodated within the limited right-of-way, and this has been resolved in a number of ways. For instance, when bus lanes were installed for the Geary Rapid Bus Project, the number of all-day auto lanes on Geary was reduced from two lanes to one. To ensure that the street functioned effectively with this change, parking was removed at intersections to install dedicated right- or left-turn lanes in the curb lane so that traffic waiting to turn would not block the through movements. On-street parking was converted to metered truck-loading to ensure the availability of truck loading spaces so that trucks would not double park and block either the transit lane or the one remaining auto lane.

San Francisco's Transit Preferential Streets Program (TPS) is designed to make streets more transit friendly by giving public transit priority over automobiles on city streets. This is accomplished by providing exclusive right-of-way for transit, signal priority, automobile-turn restrictions, construction of curb extensions at bus stops and targeted enforcement.



3

WHAT IS A POTENTIAL STREETCAR CORRIDOR?

Successful streetcar corridors need to:

- Be a viable transit option with adequate ridership
- Have redevelopment potential
- Demonstrate community support to make the changes necessary for a successful streetcar corridor.

Potential streetcar corridors are those streets and boulevards that are best suited to introduce new modern streetcar service to Portland’s neighborhoods and business districts. They are termed “corridors” because the influence of a streetcar transit investment will extend beyond the immediate street. Based on the success of streetcar in Portland and other cities, the permanence and identity a streetcar corridor brings could help catalyze and organize in-fill development and promote more pedestrian-oriented activity along the corridor.

When a candidate corridor identified by the SSCP moves forward from planning into corridor-specific design and implementation, the orientation of streetcar tracks within the street will be determined.

Most typically, the tracks will be located in the far right or far left traffic lanes. Streetcar operations will be mixed, running with general automobile traffic. This section discusses some of the major issues that are addressed when integrating streetcar service and its infrastructure along a corridor.

STREETCARS - THEN AND NOW.

Streetcar on Belmont in the Sunnyside neighborhood, circa 1900.



Streetcar today continues to integrate with automobiles and pedestrians along bustling corridors.



Integration into the Public Right-of-Way

The SSCP public outreach effort worked with community leaders to better plan our neighborhoods, incorporating a balanced approach to transportation by including more emphasis on public transit, biking and walking.

A balanced neighborhood transportation system is one that manages the demand for circulation within and through the neighborhood while minimizing conflicts between different types of activities that share the public right-of-way. The introduction of streetcar corridors will be implemented to minimize any potential impacts to neighborhood, city, and regional circulation patterns. Streetcar tracks are generally constructed to fit within existing travel lanes. As the streetcar corridors advance into the first stages of design, the location of the streetcar infrastructure (tracks, platforms and poles) will need to integrate into the existing street to complement pedestrians, bicyclists, cars, trucks and buses.

A modern streetcar system has the capacity to enhance the overall transit network while providing circulation along a corridor and connections to local commercial districts. The availability of a streetcar provides a highly effective means to support walkable communities by providing a high quality option for the short transit trip. There are, however, many pressures to accommodate multiple uses within the public right-of-way. Automobile circulation, on-street parking, bike lanes, crosswalks and freight access are all critical for neighborhood vitality.



How Does Streetcar Reinforce Portland's Urban Form?

Portland's successful urban form is, in part, the result of a holistic strategy that integrates land use, transportation, economic development, and sustainable practices. Urban activity centers and corridors are the most distinct and significant features of Portland's urban environment. They are largely the result of the understanding that land use and transportation are inter-dependent tools that shape the city, and are key to successfully accommodating economic and population growth.

Streetcar service along some of the urban corridors will act as an organizing tool and catalyst for new development that will support the continued evolution of the city's urban form. Streetcars are a desirable mode of urban transit service because they provide a high quality ride. They integrate well into the existing activity centers because they are human scale and easy to access. By increasing pedestrian activity along the corridor, streetcar leads to higher visibility for corridor retail and businesses. Streetcar service also helps to support development of higher-density, mixed-use projects.

A fundamental concept of the Region 2040 Growth Concept is to focus housing and employment growth into higher density, mixed-use, pedestrian-friendly activity centers that are connected by high-capacity transit corridors. One of the key ingredients to success for these centers is providing a multi-modal transportation system that ensures transportation choices and continued mobility of people and goods throughout the region. Also, focusing new development into existing urbanized areas that already have most urban infrastructure (such as police and fire protection, sewer and water service, and schools) reduces the financial and environmental costs of extending those services farther out along the urban fringe, and it reduces the need to expand the urban growth boundary.

An expanded streetcar network could be a catalyst to implement numerous city and regional land use, transportation and urban growth management goals. Some of the goals that an expanded streetcar system could help realize are:

- Reduced reliance on automobiles
- Higher density, mixed-use communities
- More livable communities
- Better pedestrian environments
- More sustainable communities and transportation choices

Planning for future streetcar corridors will also require thoughtful coordination with other modal transportation planning efforts, such as those for pedestrians, bicycles, buses, HCT and freight. Conflicting demand for limited right-of-way space will require trade-offs and cooperation between competing interest groups. Ultimately the goal of creating vibrant and livable communities will lead to synergistic benefits for everyone.



Streetcar integrated with the urban environment at Portland State University.

Clean-Corridor Coordination: The 3C Concept

What is the 3C concept?

3C is an implementation strategy for Streetcar System Concept Plan corridors that aims to achieve multiple City objectives related to “clean” technologies and infrastructure. In addition to implementing streetcars, one of the lowest-emission transit options available in Portland, 3C includes working with the Bureau of Planning and Sustainability Clean Neighborhood Energy program and the Bureau of Environmental Services’ (BES) initiative for healthy urban watersheds. The 3C concept links the planning efforts for clean infrastructure investments now to establish the framework of multi-functional sustainable growth corridors for the City of the future.

Bureau of Transportation: Streetcars

Streetcar investments in Portland have helped bolster the city’s reputation for integrated land use and transportation planning. Streetcars are exceeding ridership projections and are moving more than 12,000 people per day with minimal emissions. Streetcars are also helping to create healthier neighborhoods where walking and green buildings are becoming the norm, not the novelty.

Bureau of Planning and Sustainability: Clean Neighborhood Energy

The Bureau of Planning and Sustainability Clean Neighborhood Energy program is fostering the creation of neighborhood energy districts to capture the potential to produce energy, both thermal energy and electricity, at the neighborhood scale. These districts will help to dramatically reduce emissions and our carbon footprint (after construction). Potential sources of thermal energy include solar, ground- or water-source heat exchange, and clean biomass. The thermal distribution systems can be integrated with streetcar construction by installing linear energy vaults under streetcar tracks when the street pavement is removed for construction.

Leveraging 3C Corridors

The 3C approach can be a leveraging tool for city-wide initiatives currently under consideration, including:

- Stormwater management systems and green street design
- Streetscape improvements to emphasize pedestrian and bikes as primary modes
- “LEED” Neighborhood Development building incentives
- Incentives for efficient building and construction processes through the use of green and recycled materials
- Affordable housing, affordable living, and accessibility goals
- Integrating wind and solar generation systems into public right-of-way
- Neighborhood parking strategies
- Car-sharing and other incentives to reduce automobile trips

Figure 5. Green streetcar corridor vision.



Lloyd D. Lindley, ASLA
DRAFT June 2, 2008

BES: Watershed and Sustainable Stormwater Program

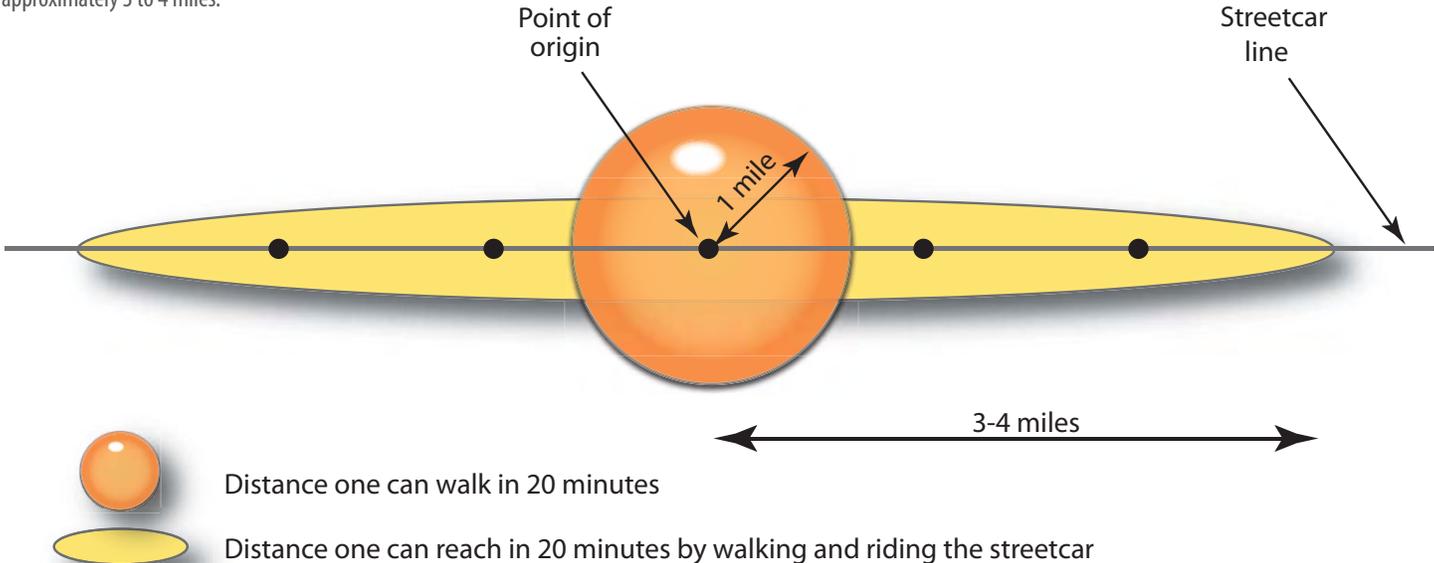
The Bureau of Environmental Services’ initiative for healthy urban watersheds focuses, in part, on restoring the watershed’s natural hydrologic function. The goal is to integrate stormwater management and development using natural systems and green infrastructure instead of relying exclusively on expensive underground pipes, culverts, inlets, and treatment plants. This is a coordinated approach with streetcar construction and streetcar related development for management of stormwater at the source and on the surface.

With strategic coordination, the Bureau of Transportation, Bureau of Planning and Sustainability, and Bureau of Environmental Services can achieve greater results than planning for implementation independently. Emission-free travel, clean energy distribution and integrated stormwater management can help to leverage more efficient, high performance green buildings, resulting in an overall healthier urban environment for the next generation.

The “20-Minute Neighborhood”: Neighborhoods That Foster Shorter Trips

Portland city planners have defined a potential urban design concept for future growth and health of neighborhoods and communities, known as the “20-minute neighborhood.” The “20-minute neighborhood” promotes an environment where one can walk, bike or take transit to essential amenities and services in 20 minutes. As illustrated in the graphic below, streetcars can support and enhance this environment by connecting 20-minute neighborhoods to each other and to the regional transit network.

Figure 6. The 20-minute neighborhood.
A 20-minute neighborhood is the area that can be reached in 20 minutes (about a 1-mile walk). A streetcar can extend the pedestrian environment up to approximately 3 to 4 miles.



The essential quality of streetcars is that they excel at shaping compact, walkable neighborhoods by connecting destinations in a permanent fashion with attractive transit service. In this manner, streetcars can improve livability for higher density environments that support public goals for urban containment, sustainable living and reduced dependence on automobiles. An expanded streetcar system will be important to serve neighborhoods because streetcar service can help:

- Create comfortable, convenient connections between housing, employment, services, and recreation
- Encourage local shopping, dining and use of neighborhood services
- Reduce automobile dependence, vehicle miles traveled and single occupant vehicle trips
- Reduce reliance on fossil fuels
- Expand the passenger rail system, and complement LRT and bus systems
- Reduce emissions and green house gases from transportation and development
- Encourage denser urban form where services already exist
- Build more walkable neighborhoods and healthier communities

4

STREETCAR SYSTEM PLANNING PROCESS

Streetcar System Concept Plan Public Involvement

Introduction

The 20+ month Streetcar System Concept Plan (SSCP) public involvement process aimed to involve citizens in discussions to evaluate transit corridors for potential citywide streetcar system expansion. The process also included discussions about how the final system concept will be integrated with TriMet's existing and planned transit system and with the Bureau of Planning and Sustainability's Portland Plan effort.

In the fall of 2007, the SSCP Project Team developed the following mission statement and project goals:

Streetcar System Concept Plan Mission Statement

The Portland Streetcar System Concept Plan can play a key role in shaping the City by:

- Reinforcing walkable and economically diverse neighborhoods and vibrant main streets.
- Encouraging sustainable and equitable development and infrastructure.
- Supporting reduction of vehicle trips.
- Supporting greater accessibility, housing options, employment, and economic development.

Streetcar System Concept Plan Goals

A successful streetcar system will:

1. Help Portland achieve its peak oil and sustainability strategies;
2. Provide an organizing structure and catalyst for Portland's future growth along streetcar corridors; and
3. Integrate streetcar corridors into Portland's existing neighborhoods.

Successful streetcar corridors need to:

1. Be a viable transit option with adequate ridership.
2. Have (re)development potential.
3. Demonstrate community support to make the changes necessary for a successful streetcar corridor.

The SSCP public involvement process was developed around this final goal – “Demonstrate community support.” The public involvement strategy engaged the public in discussions about the benefits and constraints of streetcar and how potential streetcar corridors with mixed-use development could help give shape to Portland's future growth.

Figure 7. Citywide streetcar system public involvement process. As seen in the diagram below, the public played an integral part in project oversight. Feedback from the District Working Groups and interested community groups was given to the System Advisory Committee which, in turn, advised Project Team.

CITY WIDE STREETCAR SYSTEM PUBLIC INVOLVEMENT PROCESS

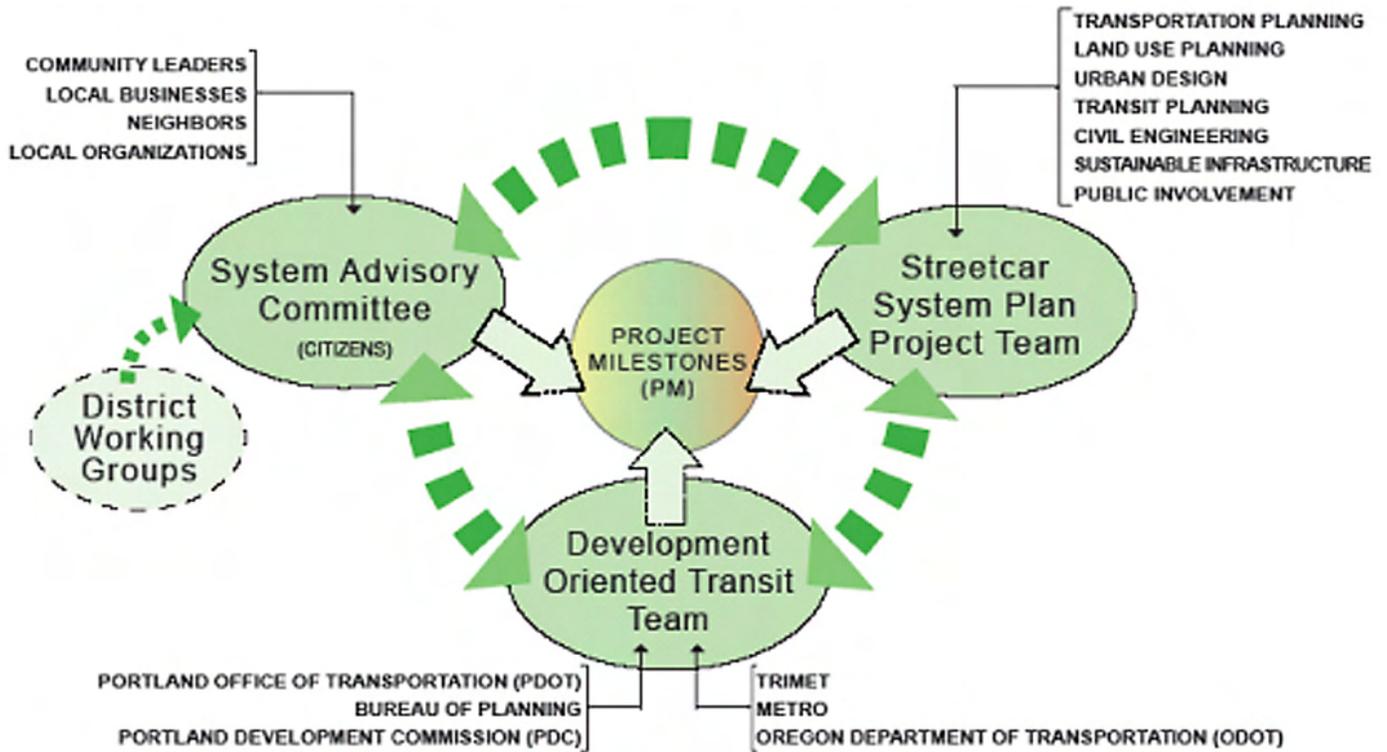
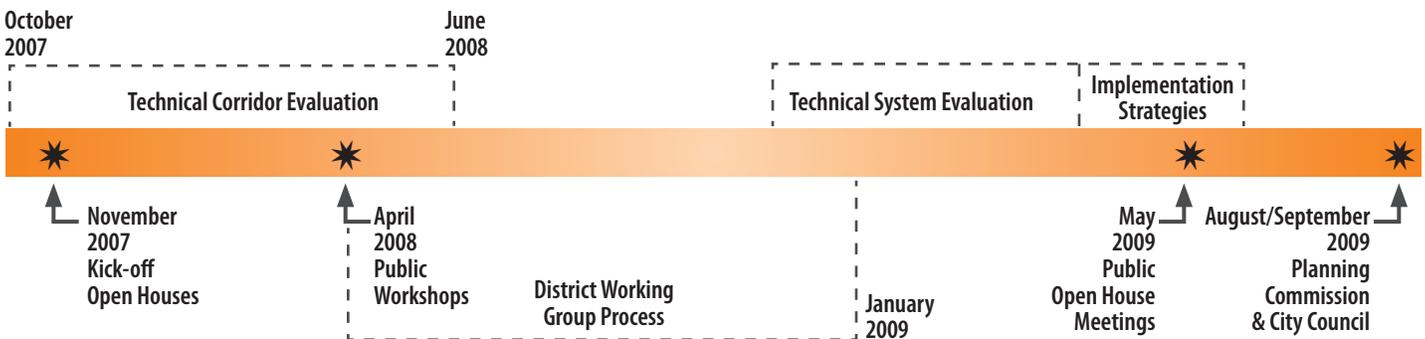


Figure 8. Public involvement timeline.



Public Involvement Milestones

The public involvement effort began in fall 2007 and will finish with the SSCP Planning Commission and City Council hearings in summer 2009. Key milestones in the timeline include:

- Kick off Open Houses: Three open house events in East, Northeast and Central City reviewed project mission and goals, historic streetcar maps and current transit service maps, and reviewed Primary Transit Index maps and report.
- December 2007: First SSCP Update for Planning Commission.
- Technical Corridor Evaluation, Part 1: The technical corridor evaluation winnowed the PTI corridors in 2 screens of a three screen evaluation process.
- April 2008 Public Workshops: The April SSCP workshops introduced the public to the Screen 2A corridor evaluation map that was the base map for District Working Group (DWG) corridor evaluation. These 5 workshops initiated the DWG process.
- District Working Group process: For 9 months five citizen groups (80-100 volunteers) met monthly and evaluated potential transit corridors in their neighborhoods. The process was extended twice at citizens' request for additional time. Each DWG created their own informal survey to assess community support for potential streetcar corridors.
- September 2008: Second SSCP update for Planning Commission.
- Presentations to Neighborhood Coalitions: During the Fall of 2008, DWG representatives, SAC members, and project staff spoke to the land use chairs at every neighborhood coalition and many business associations. Solicitation of neighborhood association and business association letters: Project staff solicited position letters from neighborhood and business associations to comment on potential streetcar corridors. Sixteen letters were received.
- DWG presentations to SAC: In January 2009, DWG coordinators presented their reports containing survey results and recommendations to the SAC for consideration in the potential streetcar system.
- SAC Corridor Evaluation: The SAC reconciled the DWG recommendations with the latest technical evaluation information to create the SAC recommended streetcar system concept map for further system evaluation and transit modeling.
- Technical Corridor and System Evaluation: Part two of the technical evaluation began as the DWG process wound down. The project team blended the SAC recommendations with DOTT corridor recommendations to develop the final draft set of corridors (Screen 3) to be modeled with Metro and TriMet staff.
- March 2009: Third SSCP update for Planning Commission.
- May 2009 SSCP Open House: These 5 open house events offered the public an opportunity to see and comment on the preliminary results of the corridor evaluation process and "next steps" for implementation.
- July 2009: Fourth update to Planning Commission.
- SAC recommendation to Planning Commission and City Council: Scheduled for summer 2009
- July 1 – August 14, 2009: Forty five day public comment period on draft Streetcar System Concept Plan final report.
- August 11, 2009: Planning Commission hearing.
- September 9, 2009: City Council hearing.

Public Comments Summary

District Working Group Process

The District Working Groups had in-depth discussions and surveyed the community about the advantages and disadvantages of streetcar. Many other community organizations also considered the issues surrounding the development of streetcar.

Throughout the process, the following advantages and disadvantages continued to be identified.

Advantages:

The streetcar could:

- Create more walkable neighborhoods
- Provide easier access to public transit
- Reduce dependence on fossil fuels
- Increase public transit ridership
- Provide a clean, sustainable transportation option
- Offer transit accessibility for elderly and disabled individuals
- Provide better access to neighborhood services and shopping
- Encourage development of mixed-use residential and retail spaces
- Improve tourism for the city
- Improve connectivity of neighborhoods around the city

Disadvantages:

The streetcar could:

- Be dangerous for bicyclists and pedestrians at streetcar track crossings
- Be perceived as unsafe to ride
- Travel slowly and inefficiently
- Disrupt other modes of transportation
- Disrupt businesses during construction
- Create air and noise pollution
- Increase property taxes to finance streetcar construction
- Decrease parking
- Increase congestion
- Reroute bike routes
- Change the neighborhood; increase density (E district), cause gentrification (NE and N districts)
- Displace local small businesses
- Disrupt existing public transit access to employment, recreation, and shopping

District Working Group (DWG) Survey Results Summary

To help gauge community support for streetcars, District Working Groups created and distributed surveys that were available both electronically and on paper. PDOT hosted the DWG surveys on line and sent links to neighborhood association leaders, the ONI distribution list, and all interested streetcar contacts from the Open Houses and Workshops. In all, the project received more than 2,000 completed surveys, including 27 surveys translated from Russian, Chinese, and Vietnamese.

The survey was distributed primarily via the internet, although paper surveys were available at each district coalition office. A number of DWG volunteers canvassed along the potential corridors to get feedback from those who would be most directly impacted by streetcar. DWG representatives and project staff also distributed paper copies and the website address to neighborhood and business association representatives throughout the city.

Summary: Southeast DWG Survey

The streetcar survey was completed by 529 people in this district.

- 84% of the respondents saw streetcar as a worthwhile investment for southeast Portland and the city as a whole.
- Although 86% of the respondents said they owned a car, walking was the top ranked form of transportation. Respondents also reported that they frequently bicycled and rode the bus.
- 60% percent of the respondents said that they are willing to participate in future streetcar planning efforts.

Priority Corridors:

1. Hawthorne/52nd
2. Belmont
3. Foster/122nd

Summary: East DWG Survey

The streetcar survey was completed by 220 people in this district.

- 66% of respondents had a “very favorable” or “favorable” opinion of a streetcar line in or near commercial areas in their neighborhood.
- 18.5% of respondents were “not favorable”, and 6% “less than favorable”

Priority Corridors:

1. Foster to Lents
2. Gateway Loop
3. 82nd Avenue

Summary: Northeast DWG Survey

The streetcar survey was completed by 603 people in this district.

- 83% of the respondents like the idea of expanding the streetcar network into northeast Portland
- 65% of the respondents said they would use a streetcar daily or frequently.
- More than 75% of the respondents are interested in participating in streetcar planning in the future and nearly 450 respondents provided contact information.

Priority Corridors:

1. Sandy Blvd.
2. Broadway-Weidler
3. Martin Luther King Jr. Blvd.

Summary: North DWG Survey

The streetcar survey was completed by 196 people in this district.

- 80% of respondents see streetcar as a worthwhile investment for north Portland.
- 65% of respondents would be willing to participate in future streetcar planning efforts and provided contact information.

Priority Corridors:

1. Lombard, St. Johns to MLK

Summary: Northwest DWG Survey

The streetcar survey was completed by 545 people in this district.

- 84% of respondents see streetcar as a worthwhile investment for the City of Portland.

Priority Corridors:

1. 18th-19th/21st-23rd
2. Raleigh/Savier
3. Thurman

Fall 2007 SSCP Kick-Off Open Houses

Of the 68 written comments, only four were not supportive of streetcar. The remainder of the comments addressed specific corridors where people would or would not like to see a streetcar or how they would like the system to function.

These early comments introduced the theme that streetcar is a way to get people out of their cars. Some participants suggested streetcar routes on Broadway to Hollywood, a Halsey/122nd loop, Sandy out to Parkrose, and a route on Foster. Others advocated against a streetcar line on Couch. Some had concerns about funding and the slow speed of the current streetcar line. Some were enthusiastic about the development and redevelopment potential on MLK Jr. Blvd.

Spring 2008 SSCP Workshops

North:

Some participants felt Lombard was the best candidate for higher-density development while others were against streetcar on Lombard due to potential conflicts, including concerns about the compatibility of freight traffic with streetcar. People were also concerned about the impact to St Johns Street Plan, which took years to develop. Participants asked for more information about how streetcar compares to other modes, particularly enhanced bus service and electric trolley buses, in terms of cost-effectiveness, and they expressed concern about emphasizing development over mobility.

Northwest

At the Northwest Workshop, some residents of the West Hills supported having a streetcar line. Many people expressed concerns about the compatibility between streetcars and bicycles. Participants also raised concerns about financing the streetcar corridor implementation and operational costs.

Northeast

Northeast Portland participants supported north-south corridors east of 82nd Ave. Many people suggested a 7th Ave. bridge for a north-south crossing over I-84. The group expressed concerns about the impact of streetcar tracks on bicycle safety, and stressed that streetcar planning should coordinate closely with bike/pedestrian planning to develop appropriate standards for safely integrating streetcar with bicycle and pedestrian facilities. They also thought it was important to maintain the existing service level provided by the bus system.

Southeast:

Participants discussed a number of corridor options, including a Holgate corridor that could fill the gap between Powell and Woodstock. They also thought a Hawthorne Bridge streetcar crossing and other crossings are needed in addition to the planned Burnside Bridge crossing for the Eastside Loop because direct access to downtown is important to making the streetcars more convenient than buses for southeast commuters going to work downtown.

Workshop attendees stressed that participants in the District Working Groups should understand what potential function different streetcar routes would serve, and what level of service/alignment type would be available along different routes. They also thought that destinations/anchors need to play a bigger role in determining corridors. Some participants did not think that streetcar should be placed on ODOT facilities.

East:

In East Portland, there was early support for the 122nd Avenue corridor and the Gateway streetcar loop. It was clear that the current priorities in East Portland are to make communities safe and livable. There was also a feeling that the city hasn't followed through with promised infrastructure and other improvements in East Portland. Participants felt that schools, public safety, and basic infrastructure needs will have to be met before it is reasonable for the community to invest in streetcar. The community said they would be more likely to support streetcar projects if they included comprehensive street improvements.

May 2009 Open Houses

The May 2009 Open Houses aimed to provide citizens with an opportunity to see the draft system plan concept and what the SSCP recommendations would be. A questionnaire was provided and 136 responses were collected from 6 open house events. The first two questions were:

1. Do you support expanding Portland's streetcar system?

A combined 83% of respondents said "Yes-enthusiastically" and "Yes-mostly".

A combined 17% of respondents said "Not sure yet" and "No".

2. Do you agree with the Tier 1 and Tier 2 streetcar corridor priorities?

A combined 75% of respondents said “Yes-enthusiastically” and “Yes-mostly”.

A combined 25% of respondents said “Not sure yet” and “No”.

An additional question relating to Tier 1 and Tier 2 priorities asked respondents to list their corridor priorities. The top 10 suggested corridors include:

1. Lombard
2. Hawthorne
3. Broadway
4. Belmont
5. Foster Road
6. MLK Blvd.
7. Sandy
8. 82nd
9. Holgate to 136th
10. 122nd

On the back of the questionnaire, respondents were asked for general comments. These comments were reviewed by the project team. Themes emerging from the comments are listed below:

- More transit options are needed in SW Portland
- Bus Rapid Transit should be a consideration
- Why not trolley bus/trackless trolley?
- Bicycle and pedestrian safety need to be integral to streetcar corridors
- Streetcars are too slow and will increase traffic congestion
- Gentrification in the city
- Dedicated lanes for streetcar can help increase speed
- Preserve/increase local jobs/economic benefits
- Streetcars should be targeted for North Portland
- Preserve bus service
- Avoid one-way couplets
- Better public outreach is needed for future streetcar planning projects
- Construction times are a concern for neighborhoods
- No more density

Neighborhood/Business Association Letters

Neighborhood Associations, Neighborhood Coalitions and Business Associations and other stakeholders were invited to submit position letters on potential streetcar corridors in their neighborhoods. Letters were received from:

- Arbor Lodge Neighborhood Association
- Belmont Business Association
- Boise Neighborhood Association
- Foster-Powell Neighborhood Association

- Gateway Regional Center Program Advisory Committee
- Hazelwood Neighborhood Association
- Irvington Neighborhood Association
- Mt. Tabor Neighborhood Association
- Northwest District Association
- Portsmouth Neighborhood Association
- Powellhurst-Gilbert Neighborhood Association
- Rose City Park
- Roseway Neighborhood Association
- St. Mary's Cathedral
- Sullivan's Gulch
- Woodstock Neighborhood Association

SAC Recommendation

Throughout the public involvement process, it has been clear that people are very supportive of streetcar in Portland. At the first Open House, the majority of comments were positive, and this has held true throughout the entire process.

Seventy-nine percent of the more than 2,000 people who completed the survey see streetcar as a worthwhile investment for the city and for their neighborhood. The majority of Streetcar System Concept Plan audiences see how expanding the streetcar system can help the city organize future growth, facilitate walkable vibrant neighborhoods, and reduce vehicle miles traveled, the use of fossil fuels and greenhouse gas emissions. A minority doesn't accept streetcar and questions the benefit of streetcar investments and expanding corridors beyond Central City.

In January 2009, at the end of the primary public involvement period, the SAC reviewed the recommendations from the District Working Groups, community surveys, neighborhood and business associations and other community organizations and made a recommendation to the technical team about which corridors to prioritize as they create an integrated system plan. The following corridors were recommended to be included in the system plan concept:

First Priority Corridors

- MLK
- NE Broadway/Weidler
- NE Sandy
- SE Belmont/50th/Foster
- SE Belmont/Stark-Washington to Gateway
- Gateway Loop
- Lombard
- 82nd between Foster and MAX Blue Line
- 122nd from Foster to Division
- Burnside/Couch from NW 23rd to 14th
- NW 23rd or NW 21st or NW 18th/19th from Burnside to Montgomery Park

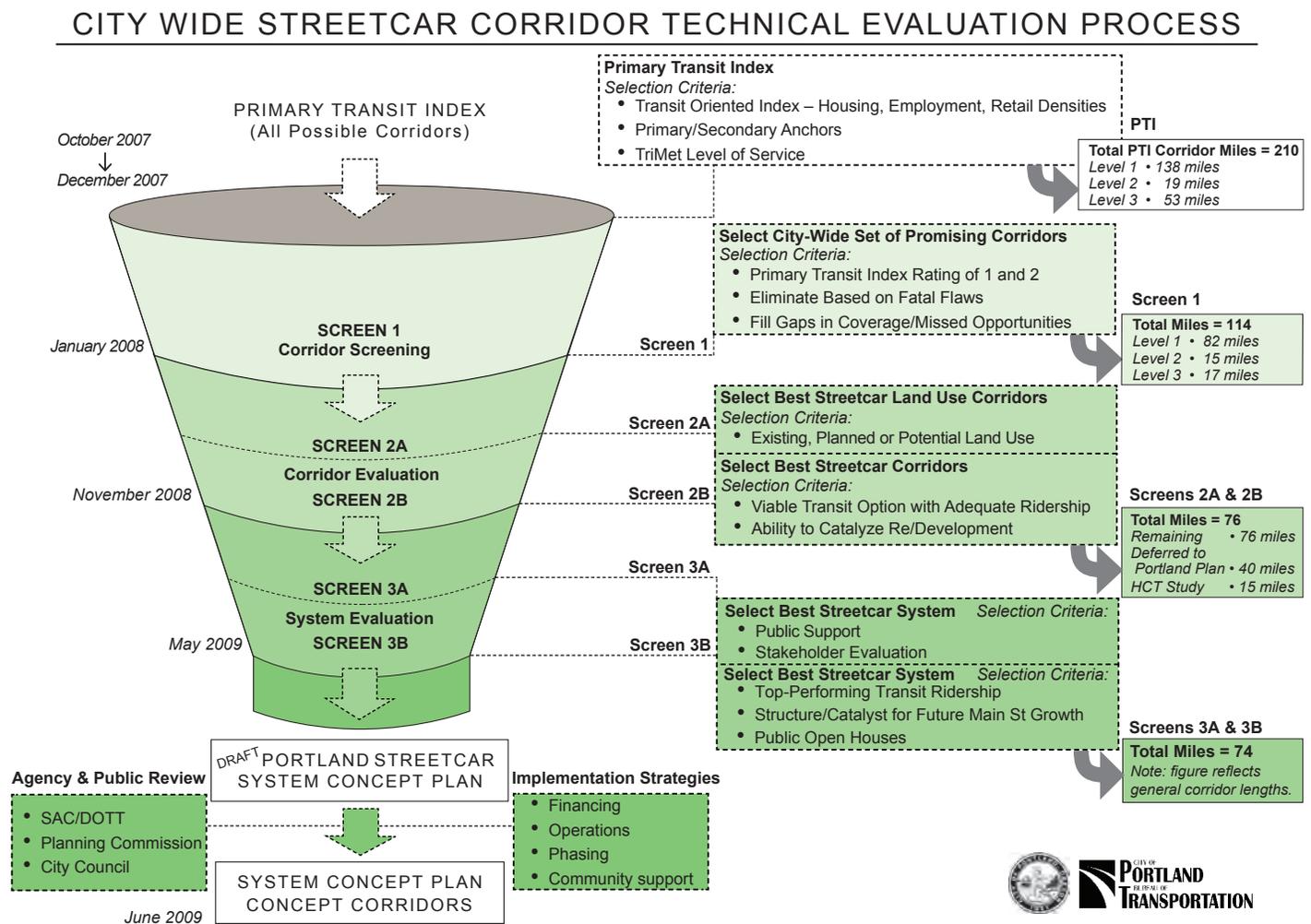
Second Priority Corridors

- NE 82nd from MAX Blue Line to Sandy
- SE 122nd from Division to Burnside
- SE Tacoma

The SAC will continue to advise the project team as they complete the technical analysis and prepare their final project recommendations for Planning Commission and City Council.

Note: The comprehensive SSCP Public Involvement Report is available at www.portlandonline.com/transportation/streetcarsystemplan as a Supplemental Technical Report.

Figure 9. City wide streetcar corridor technical evaluation process.



Technical Evaluation - Screening Summaries

The Streetcar System Concept Plan (SSCP) was created through a process that identified the top candidate corridors best suited for the development of a streetcar line. The following graphic illustrates the process created using a multi-tiered evaluation (screens), each with a set of evaluation measures that are documented in the Streetcar System Concept Plan - Screening and Evaluation Methodology Report.

Evaluation Measures

Each screen used evaluation measures to evaluate the corridors in the following general topics:

1. Public Support

Demonstrates community support and ensures that the streetcar system will work well with other planning goals and mixed-use development vitality.

2. Technology and Operations

Evaluates current bus and streetcar technologies and identifies optimal operational characteristics appropriate for a city-wide streetcar network.

3. Transportation and Transit

Identifies corridors that can provide the best transit service with adequate ridership and ensures that there are no significant gaps in the city-wide streetcar corridor coverage, that potentially competitive streets/corridors have not been overlooked, and that only corridors that are viable transit options are carried forward.

4. Economic Development

Catalyzes development around streetcar lines and provides a structure to organize the City's future growth along main streets and streetcar corridors. These measures examine vacant and under-utilized lands, development capacity as defined by current zoning, additional residential capacity, and an assessment of market conditions in the various corridors.

5. Urban Form and Land Use

Provides an organizing structure and catalyst for the city's future growth along main streets and streetcar corridors and helps to preserve the character of the city's existing neighborhoods.

6. Green Corridor

Assesses sustainable development and infrastructure related policies and development incentives that would be applicable to streetcar corridors, and incorporates sustainable practices into the system plan and individual corridors.

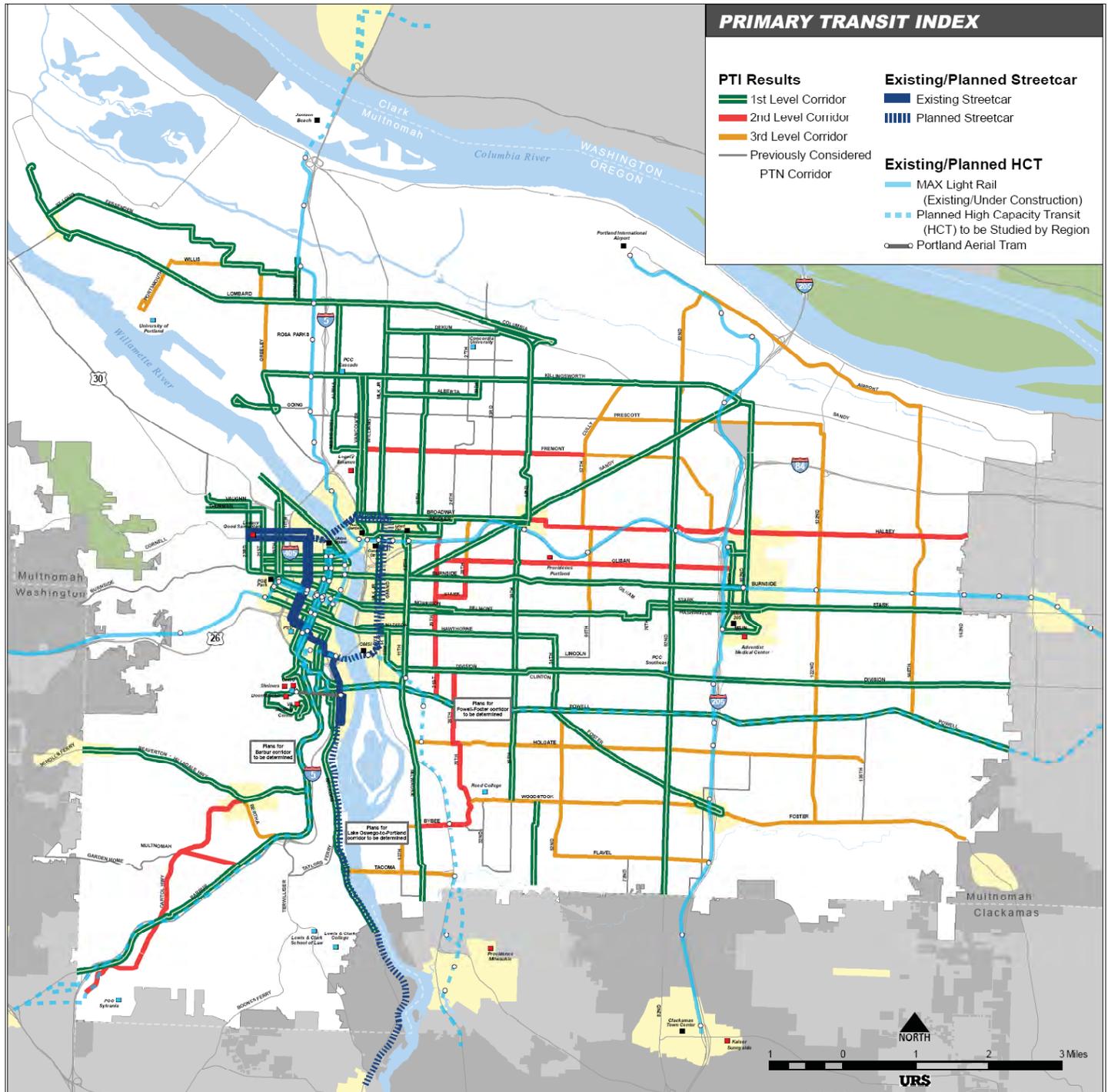
The following pages summarize the results by each screen of the technical analysis process:

The Primary Transit Index (PTI) Study

The Primary Transit Index (PTI) Study was completed by the city and consultant team in late 2007 and sets the stage for the Portland Streetcar System Concept Plan (SSCP) effort. The PTI Study categorized existing and potential transit corridors within the city using two primary measures:

1. Transit Orientation Index (TOI) score - A measure that evaluates the relative transit attractiveness of a corridor based on many factors, including density of households, density of general employment and density of retail employment.
2. Anchor Requirements - The presence and/or absence of primary or secondary transit attractors (or anchors) at the ends or within a corridor.

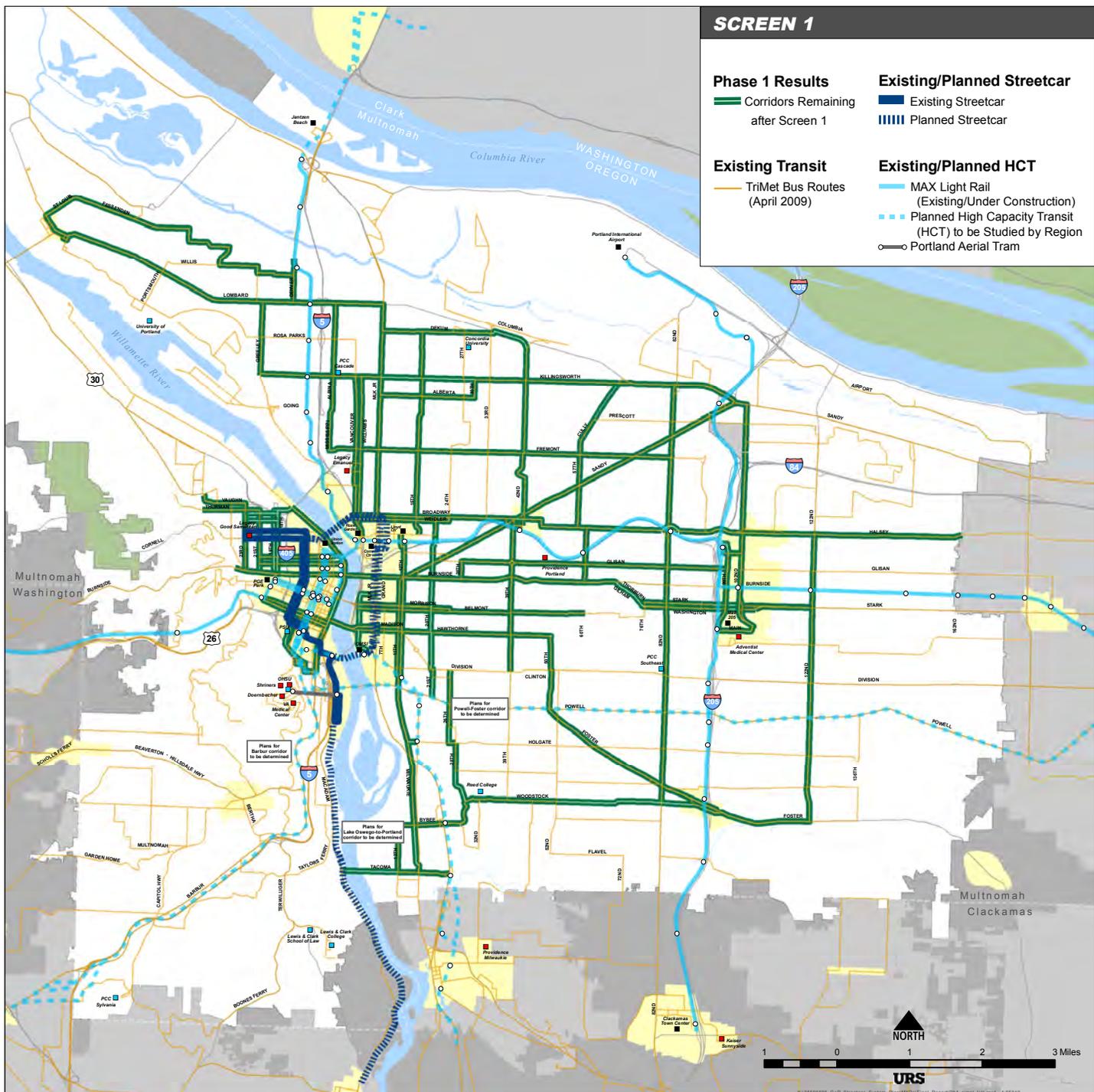
Figure 10. Primary Transit Index map.



Screen 1

Screen 1 identifies transit corridors that have reasonable potential to be included in the Streetcar System Concept Plan, eliminates PTI corridors that are not feasible as streetcar corridors (fatally flawed), and ensures that there are no major gaps in a potential citywide streetcar network. Key considerations included the PTI rankings (corridors in PTI score levels one and two were selected), streetcar engineering-feasibility corridor assessments, Metro main street designations, and service-gap assessments; all geographic districts of the city were considered.

Figure 11. Screen 1 map.

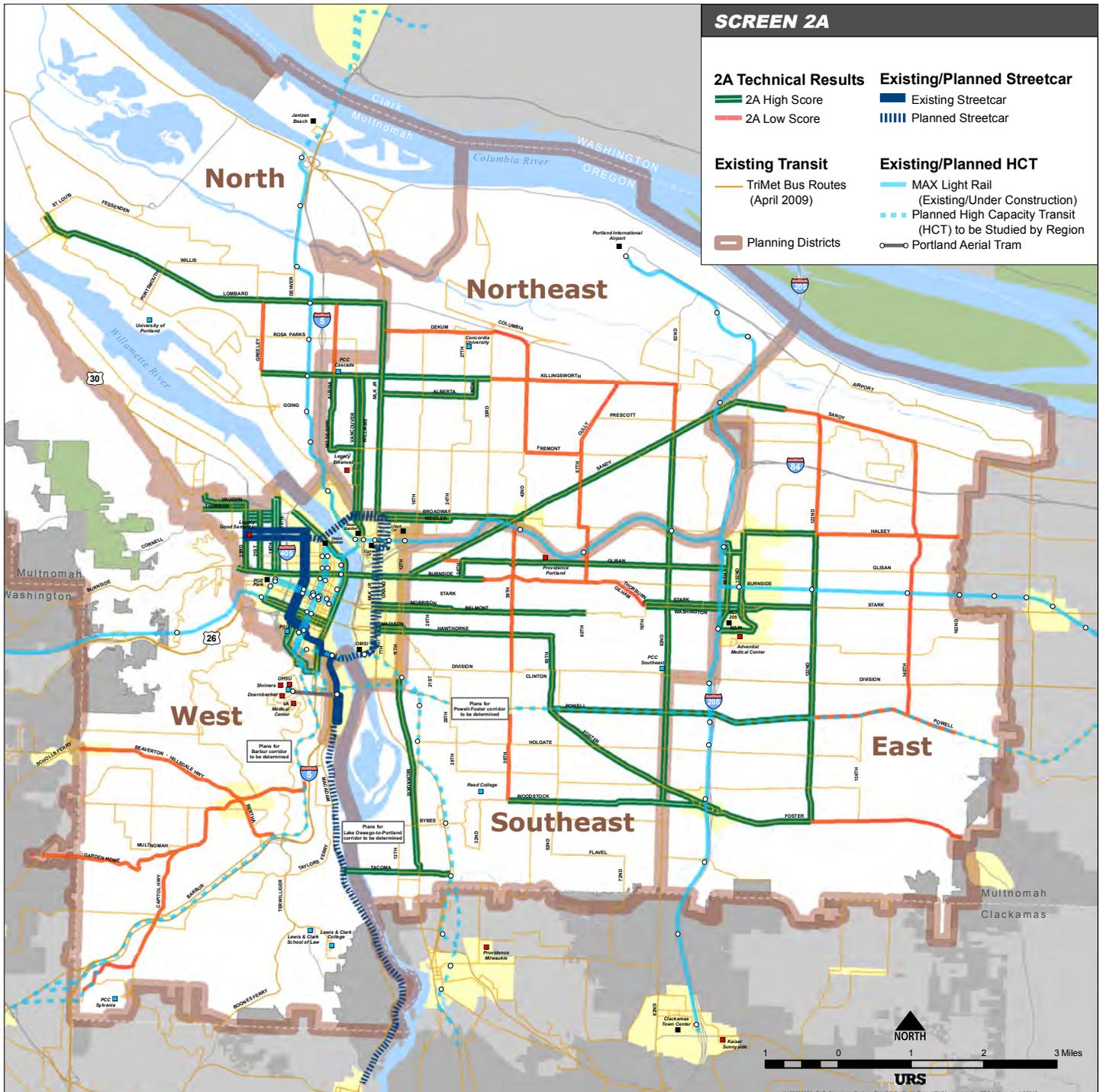


Screen 2A

In Screen 2, the project team evaluated and identified the most technically viable streetcar corridors. Screen 2A, the first of a detailed two-step process, focused mainly on the land-use designations surrounding the corridors remaining after Screen 1. Corridors with lower-density land-use zoning were identified and assessed for the likelihood that future zoning changes would allow for more intense development in the corridor. Corridors where lower-density zoning would likely remain were removed from further consideration.

Screen 2A was the base map for the public involvement process and was the point in the project where the public was invited to form District Working Groups (DWG). DWGs, comprised of citizen volunteers, formed in North, Northeast, Southeast, East and Northwest Portland. Their charge was to evaluate the potential streetcar corridors in their district, create a survey to assess public support for potential streetcar corridors, and report their findings back to the System Advisory Committee.

Figure 12. Screen 2A map.

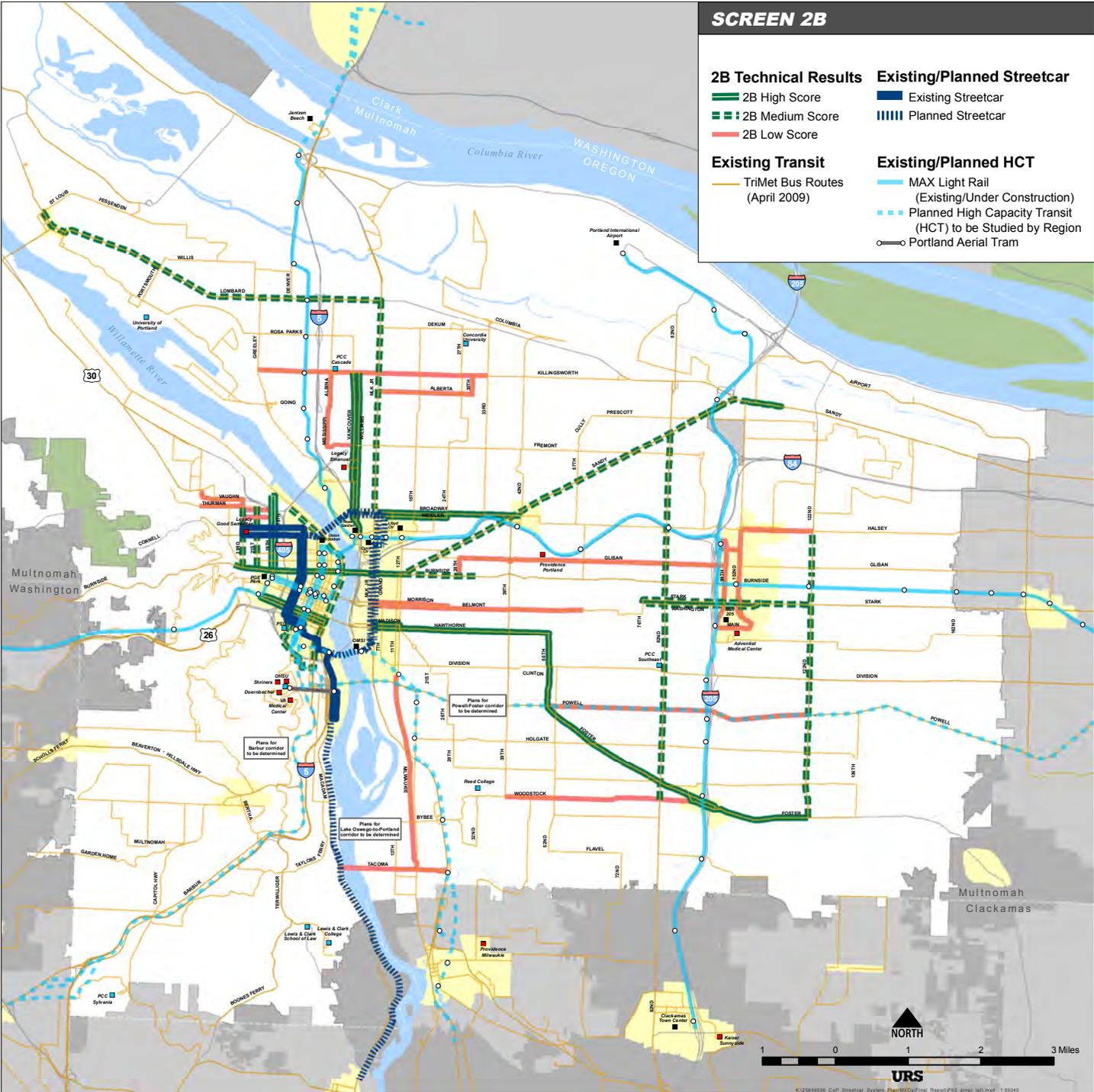


Screen 2B

Screen 2B completed the technical evaluation of the candidate corridors by identifying those that would provide:

- A viable rail-transit service along the corridor given the transportation demands upon the right-of-way (including pedestrians, bicyclists, bus, HCT, automobiles and freight)
- Additional transit ridership by providing a high-quality, time-competitive service
- Service to higher-density neighborhoods including regional centers or town centers
- A catalyst to foster new development on currently under-utilized properties within one-quarter-mile of the corridor
- Support to, or be compatible with, other city green-infrastructure initiatives

Figure 13. Screen 2B map.

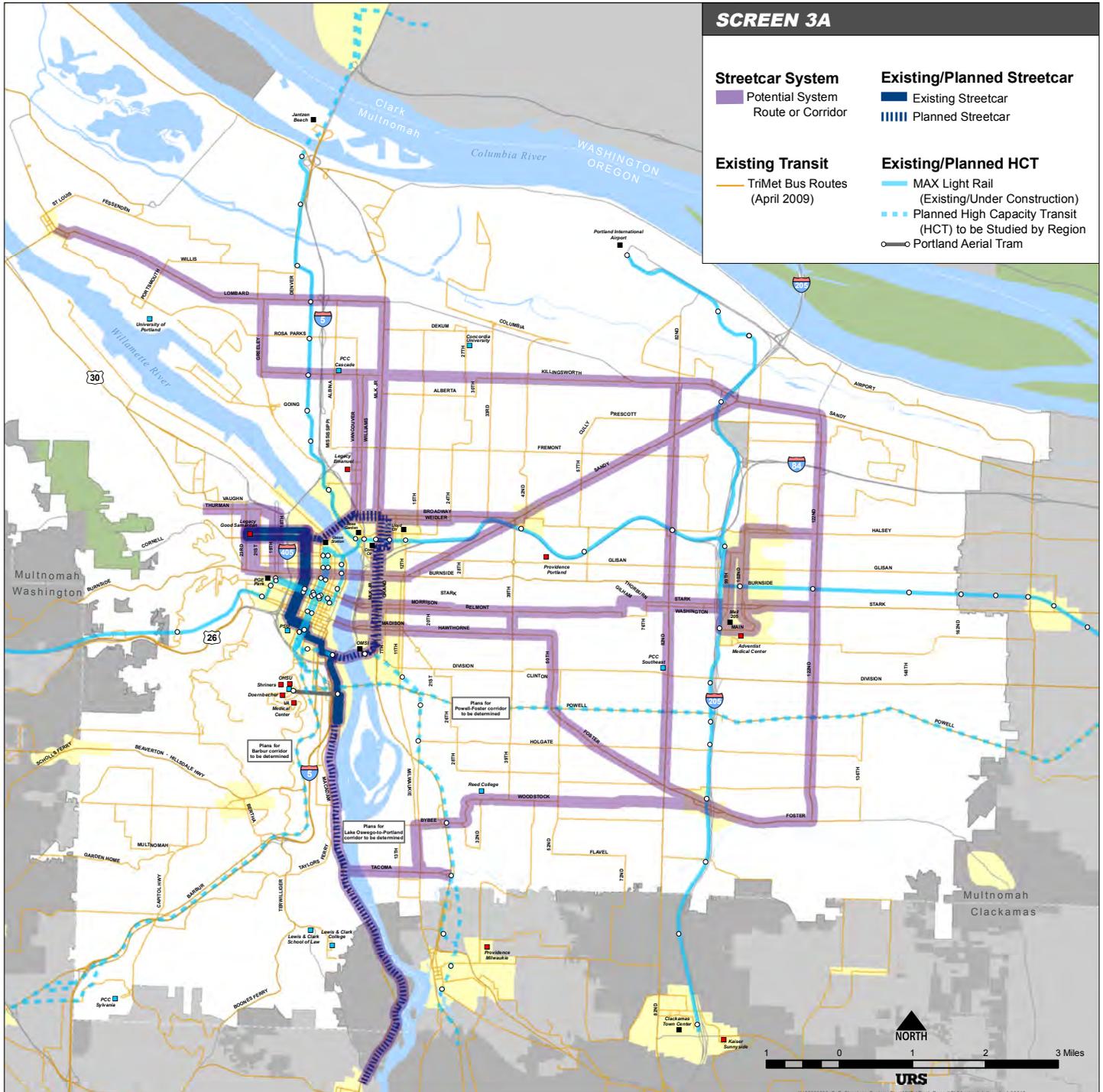


Screen 3A

Screen 3 was divided into two steps. Screen 3A combined the recommendations from the System Advisory Committee (SAC), input from the District Working Groups (DWGs) and the Development-Oriented Transit Team (DOTT). Corridors were identified that would best meet the following goals:

- Demonstrate community support for a candidate streetcar corridor
- Help the city achieve its peak oil and sustainability strategies
- Provide an organizing structure and catalyst for the city's future growth along main streets and streetcar corridors
- Help preserve the character of the city's existing neighborhoods

Figure 14. Screen 3A map.

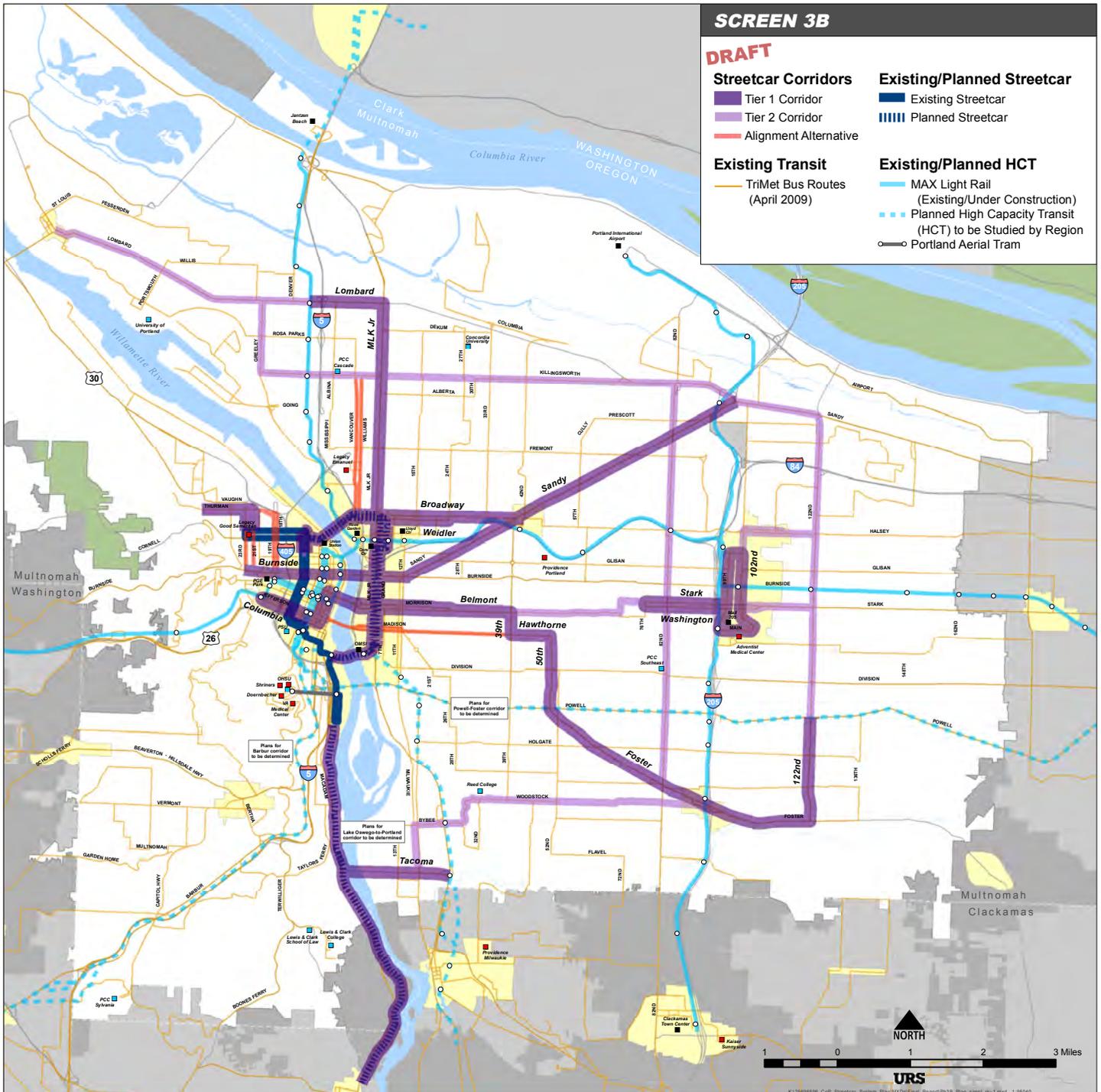


Screen 3B

Screen 3B ranked and prioritized the Screen 3A corridors based on the following factors:

- System Advisory Committee (SAC) recommendations and input of the District Working Groups (DWGs)
- Preliminary transit ridership modeling results
- Previous technical corridor evaluation process
- Ability to focus/catalyze future main street growth (development)

Figure 15. Screen 3B map.

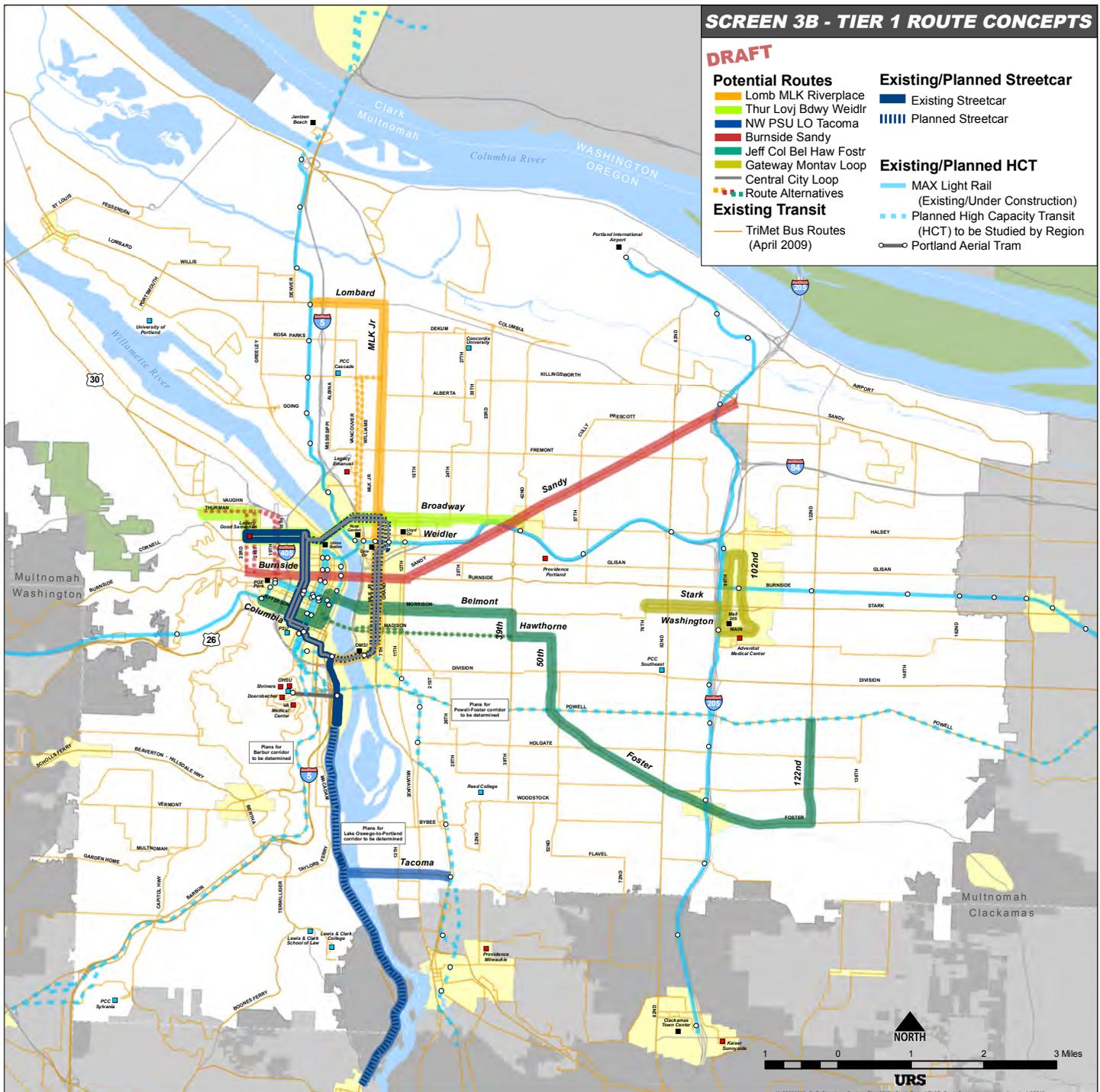


Screen 3B – Tier 1 Route Concepts

In order to gauge ridership potential and to see how an expanded streetcar system could function, route concepts were developed for each of the Phase 3B “priority corridors.” Factors used to develop the route concepts included:

- Maximizing connectivity between major origins and destinations (including regional centers, town centers and designated main streets) and with existing or planned transit services
- Maximizing directness and reliability of streetcar operations
- Minimizing duplication with existing or planned transit services
- Balancing use of public right-of-way with other transportation modes
- Balancing investments in a geographically equitable manner

Figure 16. Screen 3B - Tier 1 Route Concepts.



Modeling Results Summary

As an element of the evaluation process, the Screen 3B corridors were modeled in collaboration with TriMet planners and Metro transit modeling staff. From Screen 3B, two streetcar system scenarios were developed in order to test how well the overall streetcar system and the various streetcar route concepts could perform in attracting transit riders. The streetcar route structure, frequency, operating plan, etc. were preliminary at this phase; however, several things were accomplished by preparing a ridership analysis as part of the study, including:

- Comparing total system ridership for a transit system with extensive streetcar routes with a system that includes only the existing and committed streetcar improvements.
- Understanding the potential market for different streetcar routes.
- Testing the impact of completely replacing existing bus routes compared with making minor adjustments to headways or routing.
- Comparing the advantages/disadvantages of different streetcar routings.

The route concepts and the modeling should be considered to be conceptual. The bus route modifications associated with the various streetcar routes represented a reasonable assumption for modeling purposes. As specific streetcar routes are developed in more detail, extensive discussions would occur between the City, TriMet and the affected neighborhoods.

Methodology

The Portland Streetcar System Concept Plan modeling was prepared through a collaborative process with the Portland Bureau of Transportation (PBOT), the Bureau of Planning and Sustainability, the consultant team, TriMet and Metro. The methods and assumptions used are summarized below:

- 2035 RTP Financially Constrained network as a base
- Use the 2035 RTP population and employment allocation for all scenarios
- Include Portland Streetcar Loop with the full loop
- Include streetcar to Lake Oswego as modeled for the alternatives analysis
- Apply the light rail model constant to all streetcar routes
- Agreement on bus route modifications for modeling purpose only

Following agreement on the methods and assumptions, Metro staff coded and modeled two streetcar scenarios (see Figures 17 and 18). The model outputs produced included:

- Boarding rides by route and by segment
- Transit ridership (mode share) by district and systemwide
- Travel times between key points

The analysis included in this paper used the model data to understand how well the overall transit system and the proposed streetcar routes would perform in attracting trips to transit. Overall system data is summarized below, followed by a description of individual streetcar routes. The analysis of individual routes included both boarding rides and the impact to transit ridership geographic districts that were directly served by the streetcar route.

The district analysis did not isolate the impact of an individual streetcar line, but considered the change in transit ridership for each area based on all improvements included in each modeling scenario. In some scenarios, certain districts were served by multiple streetcar routes. In these instances, the change in district transit ridership reflected the combined influence of all new streetcar routes and other transit network modifications.

System Summary

The system summary includes the change in total transit ridership for the entire TriMet system and within the City of Portland. The City of Portland included both trips with an origin in the city and trips with a destination in the city.

The change in systemwide transit ridership with the two streetcar scenarios was as follows:

- Scenario 1 – increase of 6% over No-Build
- Scenario 2 – increase of 4% over No-Build

The change City of Portland (including trips to, from and within the city) was as follows:

- Scenario 1 – increase of 7% over No-Build
- Scenario 2 – increase of 6% over No-Build

Based on the methods used for this initial analysis, a streetcar system in the City of Portland would increase overall transit ridership by up to 7 percent. This does not take into account any changes to the 2035 population and employment forecast that could result from increased growth focused on streetcar corridors.

Key Findings

- **SE Portland Alignments: Belmont vs. Hawthorne** – An alignment via SE Belmont would have more boarding rides and more boarding rides per mile than an alignment on SE Hawthorne. This was due in part to the Belmont routing via the Morrison Bridge which provided significantly better coverage to the major employment sectors of downtown.
- **Connections to Lombard: Vancouver-Williams vs. Martin Luther King Jr. Boulevard (MLK)** – An alignment via MLK would have more boarding rides and more boarding rides per mile than an alignment on Vancouver-Williams. In part this reflects the ability to completely replace the Line #6 MLK bus with streetcar service, while bus service along portions of Vancouver-Williams was assumed to be maintained to allow Line #44 Mocks Crest and Line #4 Fessenden to operate through-routed from downtown Portland to St. Johns.
- **NW Portland Termini: Montgomery Park via 18th/19th vs. 24th & Burnside** – Scenario 1 included a segment of streetcar operations along 18th/19th between Burnside and Thurman. The ridership forecast for this segment indicated only a modest level of daily boardings. This was in part due to the extensive transit service in NW Portland included in the 2035 network (Line 17-21st Avenue, Line 15-23rd Avenue, Line 77-Broadway/Halsey and the current Portland Streetcar) which left few transit riders available to be captured by streetcar service on 18th/19th. Based on the modeling, the extension up Burnside to 24th would have a similar number of daily boardings as the longer extension to Montgomery Park via 18th/19th and Thurman.

- *NOTE: Metro's model included 2005 – 2035 household growth of over 700 in the vicinity of the proposed Conway development. However, Conway site proposals could include significantly more households. If a higher level of household growth at Conway were realized, the boarding rides for the 18th/19th segment would likely be higher.*
- **Broadway Alignment NE 7th to Hollywood** – The Broadway streetcar route would tie into the planned Portland Streetcar Loop at NE 7th Avenue and extend to Hollywood. Strong ridership was forecast on this portion of the alignment with 6,400 daily boardings and approximately 3,200 boardings per mile, making it one of the highest ridership segments.
- **Tacoma Street – Sellwood Bridge to Tacoma LRT Station** – The Tacoma Street streetcar was modeled as an extension of the planned streetcar service to Johns Landing and Lake Oswego. The route would split off from the Lake Oswego streetcar alignment and cross the Sellwood Bridge through the Sellwood business district. This extension was forecast to have 1,130 boardings per mile, placing it as having an average to low number of boardings per mile.
- **Two Large Gateway Loops vs. One Small Gateway Loop** – All of the Gateway loop streetcar route options would have relatively poor boarding rides per mile compared with other streetcar segments. Scenario 1 included a large North Loop and a large South Loop. Both loops connected to other potential streetcar routes (South Loop at Lents, North Loop at Parkrose). Scenario 2 included a Small Loop predominantly within the Gateway Regional Center with a connection to MAX at the Gateway Transit Center, but no connections to other streetcar routes. The large loops performed well on 122nd Avenue where they would replace bus service, while the Line 72 would remain on 82nd Avenue.

Figure 17. Model 1 Package.

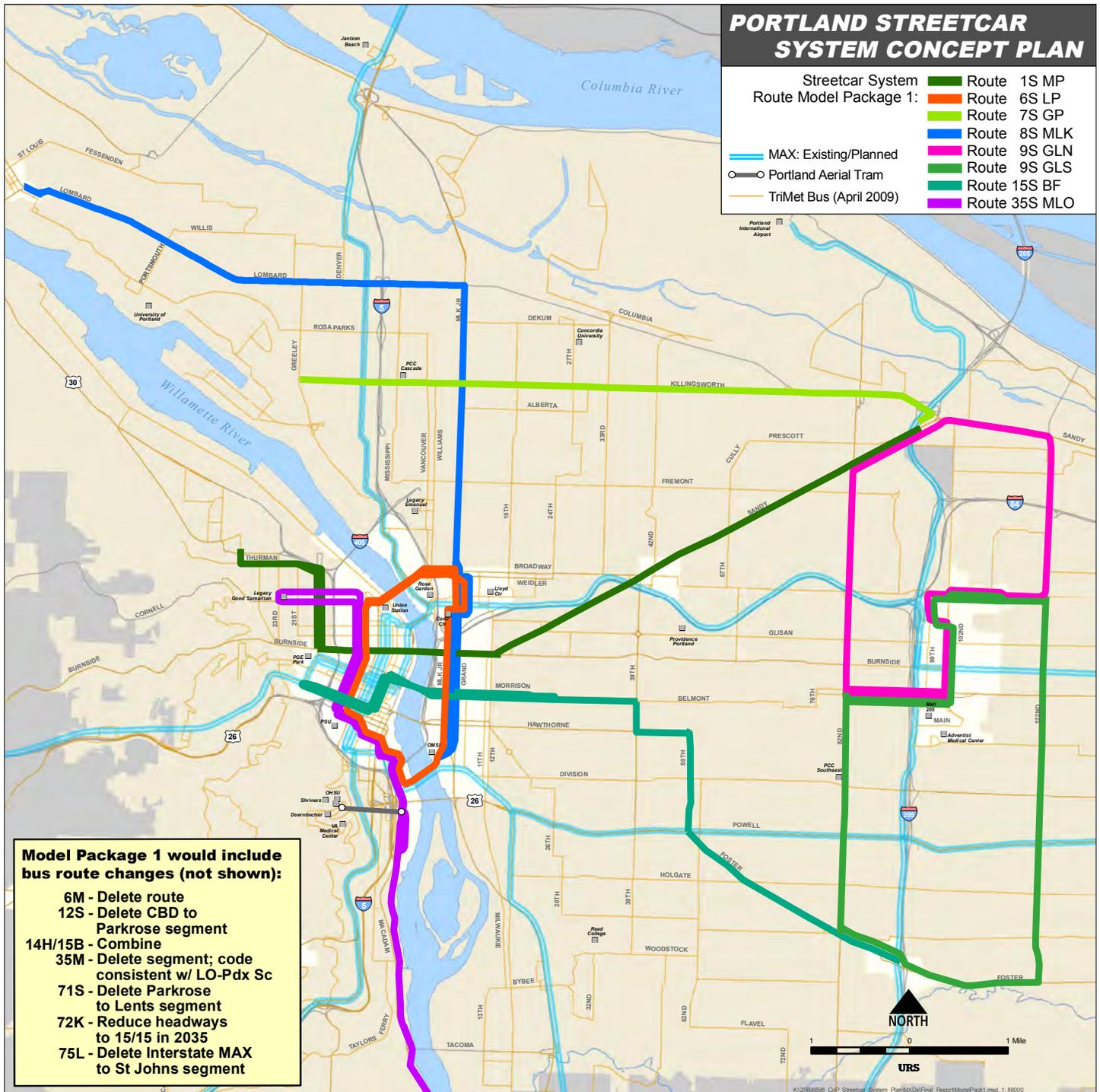


Figure 18. Model 2 Package.

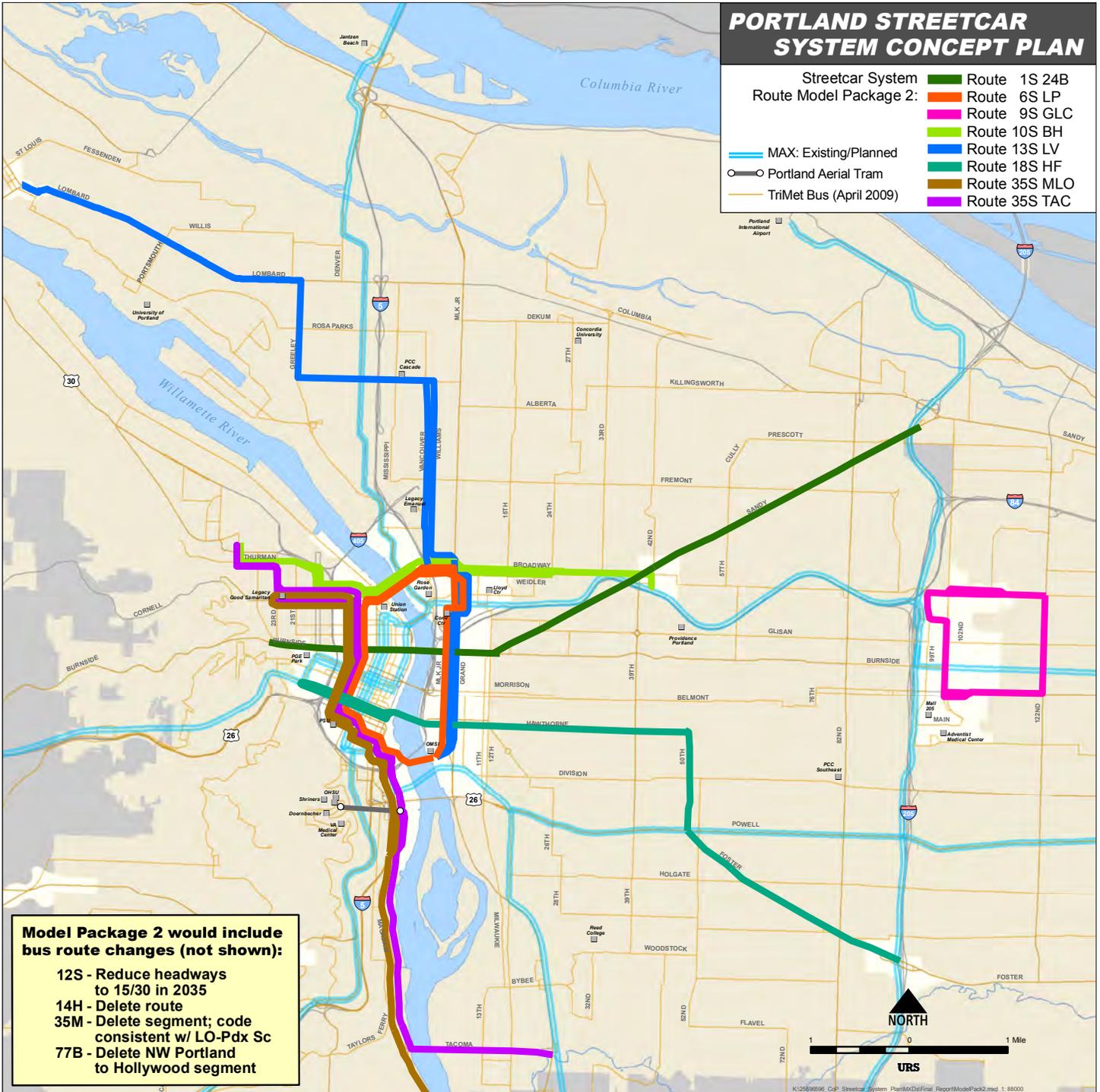
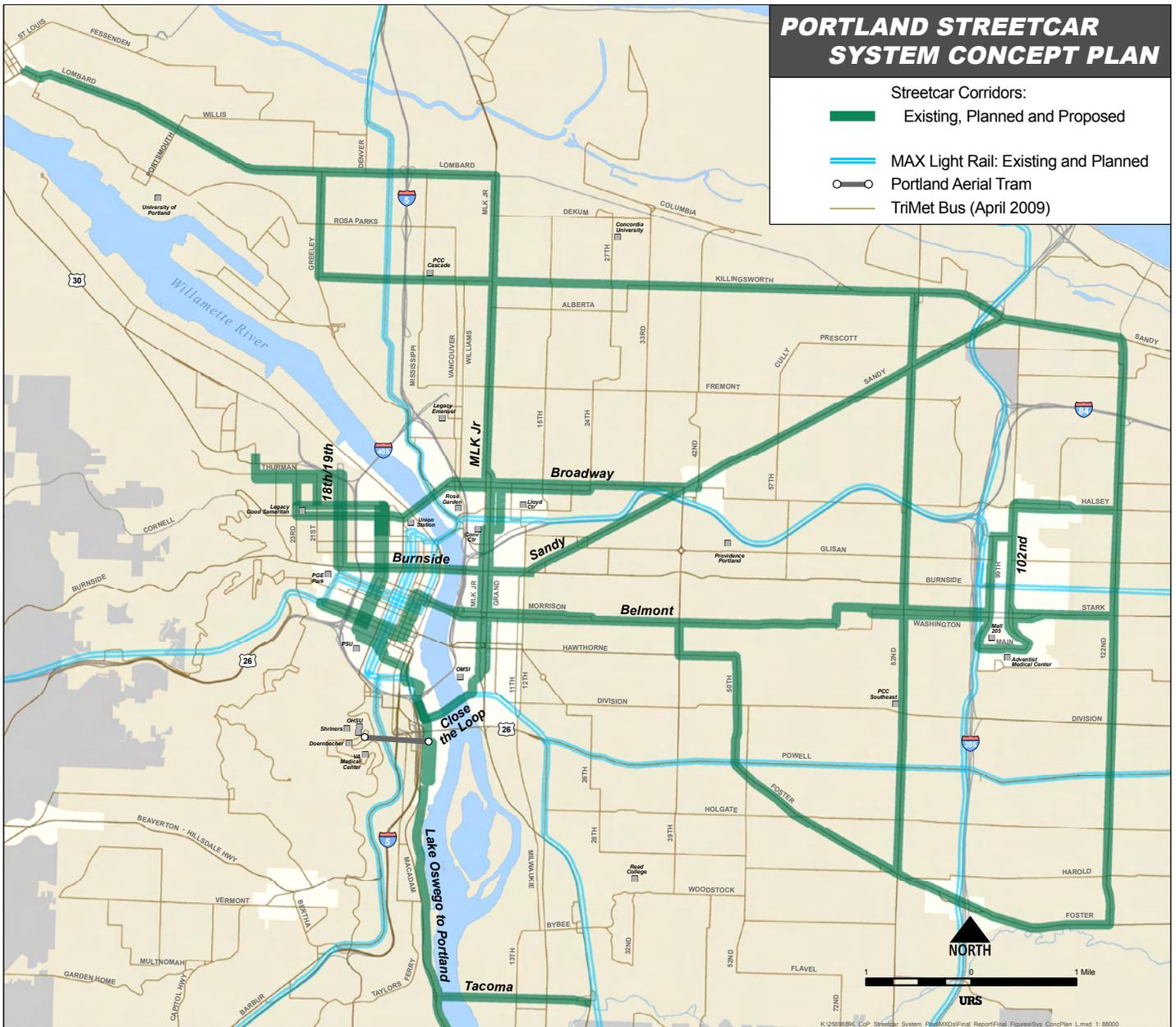


Figure 19. Long-Range Portland Streetcar System Concept Plan



5

PORTLAND STREETCAR SYSTEM CONCEPT PLAN

Streetcar System Plan Concept Summary

The long-range streetcar system concept plan was created with the results of the preceding Screen 3B with additional input from City Bureaus, regional transportation stakeholders, a development community forum, and six public open houses held in May 2009. This concept plan, illustrated below, incorporates all of the potential corridors recommended by the System Advisory Committee. Identified corridors reflect the technical results from evaluating transit ridership, existing and planned land use and transportation patterns, and corridor development opportunities. The corridors also reflect the public input from over 100 citizen volunteers who helped with the project, from the 800+ attendees of 13 public events and numerous neighborhood meetings, and from the 2000+ respondents to the District Working Group surveys. Throughout all of this, the long-range system concept plan has strived to meet the three original goals outlined for the project:

A successful streetcar system will:

- Help Portland achieve its peak oil and sustainability strategies;
- Provide an organizing structure and catalyst for Portland's future growth along streetcar corridors; and
- Integrate streetcar corridors into Portland's existing neighborhoods.

(See map Figure 19 on page 46)

Concept Corridors and Comprehensive Plan Corridors

The proposed corridors in the Streetcar System Concept Plan represent the best opportunity for potential streetcar corridors. The proposed corridors are organized into two categories: "Comp Plan Corridors" and "Concept Corridors". Generally, the Concept Corridors build incrementally from the existing streetcar system and demonstrate the greatest potential based on the current Comprehensive Plan. The Comp Plan corridors are the corridors where streetcar is more likely to have transformational impact to the surrounding land uses, but require additional planning. Incremental corridor growth building upon a system allows the combined strength of the system to support individual interconnected corridors. However, developing an independent streetcar corridor separated from the existing supporting infrastructure represents greater risk and could impact the efficiency of the whole system. Therefore, a two-tiered approach is recommended to allow incremental expansion of the existing system, while continuing to prepare other corridors for a wider expansion of the streetcar.

- Concept Corridors: The distinguishing feature of the concept corridors is that they are the most viable potential corridors for implementation in an incremental approach to expanding the streetcar network. Growing the streetcar system incrementally with extensions from the core has inherent benefits:
 - The corridors have higher land values making development-related financing easier than corridors with lower land values further away from the central City
 - Extensions are connected to the original system and its supporting infrastructure
 - Transit ridership is high in dense urban neighborhood corridors
 - Community support is higher due to residents proximity and familiarity with existing streetcar
 - The corridors have development potential and supporting infrastructure for higher density mixed-use neighborhood development

Concept corridors will need to be evaluated with the comp plan corridors to determine a streetcar corridor expansion strategy that will best meet the objectives of the Portland Plan.

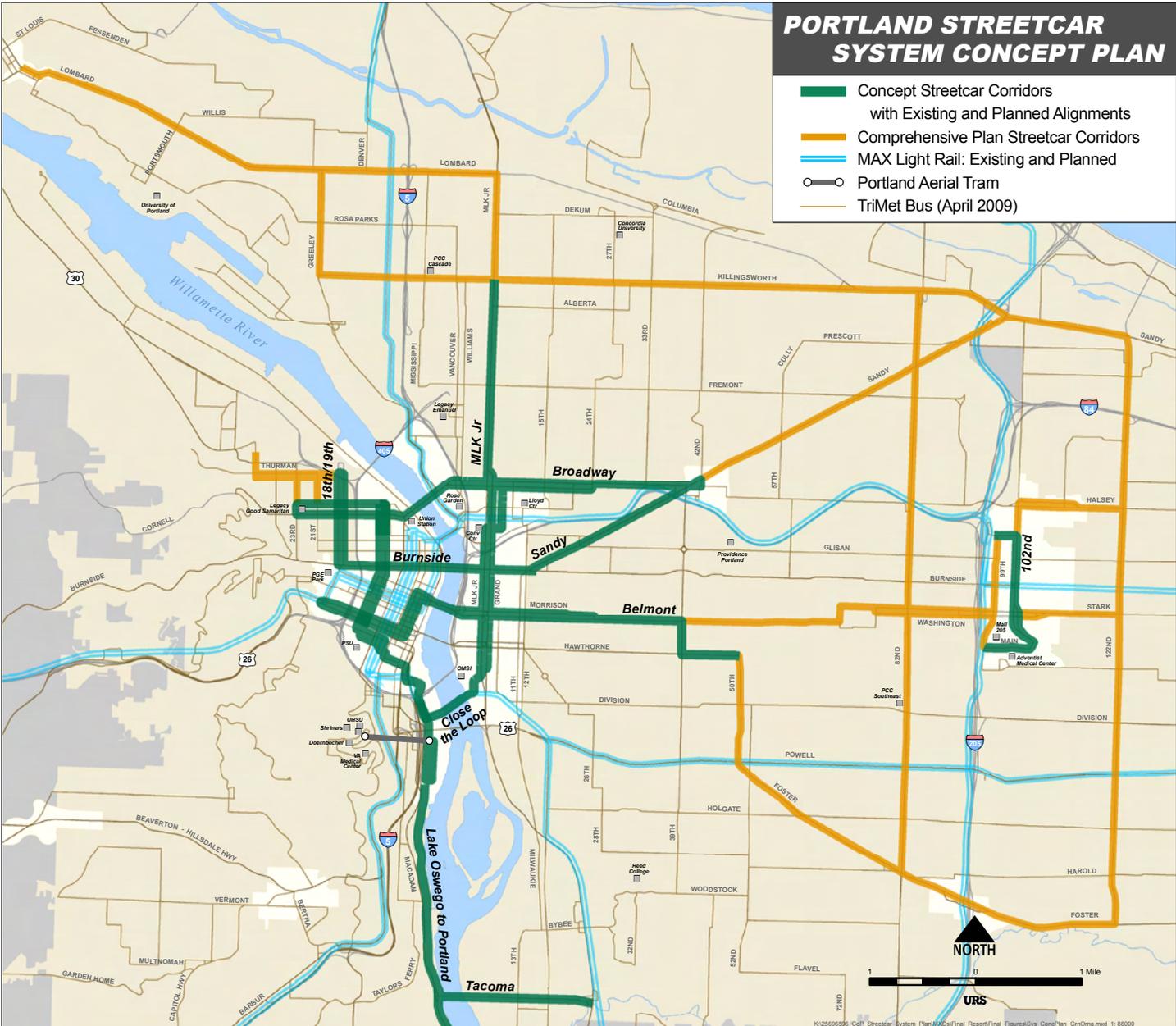
- Comp Plan Corridors: Comp Plan corridors are parts of Portland where the streetcar could leverage the most transformation, represent a greater risk, complexity and challenge to creating a successful streetcar corridor. These corridors tend to be more than two miles from Central Portland and the existing streetcar system. The Portland Plan process is an opportunity to evaluate these corridors as part of a coordinated land use-transit investment and growth strategy that will address neighborhood service needs, equitable distribution of infrastructure investments, and orienting growth to existing and potential walkable, interconnected 20-minute neighborhoods. Considerations for Comp Plan Corridors include:
 - What are the land use and transportation strategies that could make the corridor more viable for streetcar infrastructure investments?
 - How does the corridor relate to the existing streetcar system and to the regional transit system? Is it an independent line connected to MAX light rail or connected to the streetcar system? Or both?
 - What is the intent of the streetcar service? Does it link to the closest regional center (downtown or Gateway) or does it link to adjacent streetcar neighborhoods? Should it provide limited stop or local service?
 - What is the transit supportive land use strategy for this corridor? Does the zoning provide the potential for transit supportive land uses that will encourage mixed-use development, build transit ridership and sustain vital pedestrian-oriented commercial areas?

System Mileage Summary

- Existing service = 4.1 miles
- Streetcar Loop Eastside Extension = 3.5 miles
- Lake Oswego to Portland = 6.0 miles
- Close-the-Loop = 1.3 miles
- Streetcar system concept corridors = 16.8 miles
- Comp Plan corridors = 41.1 miles
- Total system miles = 72.8 miles

Expanding the streetcar system with independent Comp Plan Corridors not connected to the existing Central City streetcar may be possible but will require a significant and concerted effort by the City and potential project stakeholders. The key strategies that helped make the streetcar successful in the Central City were coordinated land use and transit neighborhood investment strategy, the right mix of zoning designations, public-private partnerships, the availability of local funding sources, market timing, and local citizens and City officials who championed the effort to see the vision of streetcar neighborhoods realized. While these key strategies are not foreign concepts for infrastructure development anywhere in Portland, they all have to come together at the same time to make streetcar corridors work. Currently Comp Plan Corridors have the potential for future streetcar investments but are missing the timing and coordinated strategies to make it happen. Further evaluation in the Portland Plan process is a necessary step to help make these corridors more viable.

Figure 20. Concept Corridors and Comp Plan Corridors



NOTE: The Barbur and Powell LRT lines are designated as "near Term Regional Priority" in Metro's Regional High-Capacity Transit Plan.

Streetcar System Plan Concept Corridors

The proposed 16.8 miles of concept corridors would increase the 14.9 miles of existing, programmed and planned regional projects to 31.7 miles. The concept corridors build on the existing service on the west side, programmed expansion to the eastside and planned regional streetcar service to Lake Oswego (see Table 1). Concept corridors represent the best potential for future investments in streetcar infrastructure. Each concept corridor would require an Alternatives Analysis process to evaluate more detailed streetcar route alignment options.

Table 3. Existing Streetcar Corridors and System Concept Corridors

	Route Miles	System Miles
Existing Service		
NW 23rd to SW Lowell St	4.1	4.1
Programmed Project		
Streetcar Loop: Eastside Extension	3.5	7.6
Planned Regional Project		
Lake Oswego to Portland: Lake Oswego to SW Lowell St	6.0	13.6
Close the Loop/SW Moody double-track	1.3	14.9
Streetcar System Concept Corridors (16.8 total miles)		
Broadway/Weidler: E 7th to Hollywood	2.0	16.9
MLK: Broadway to Killingsworth	2.0	18.9
Burnside/Couch: NW 19th to E 14th	1.8	20.7
NW 18th/19th: Burnside to Savier/Thurman	0.9	21.6
Sandy Blvd: E 14th to Hollywood	2.0	23.6
Tacoma St: Sellwood Br to Tacoma LRT station	1.5	25.1
Morrison/Belmont: SW Collins Cr to SE 50th/Hawthorne	4.7	29.8
Gateway Circulator: Gateway TC (Pacific/99th) to 102nd, to Main/99th	1.9	31.7

NOTES:

- Lake Oswego to Portland is now in the DEIS stage.
- The 0.8-mile “Close the Loop” project length is mostly shared track (0.6 mile) with Portland–Milwaukie Light Rail Project. Only approximately 0.2 mile would be unique to the streetcar system. The Moody Double-Track project would add 0.5 of second track between SW Gibbs (Portland Aerial Tram) and SW River Parkway (and replace 0.4 mile of existing single track between SW Gibbs and SW Sheridan).
- Specific implementation times of Streetcar System Concept Plan concept corridors is not determined.
- Broadway/Weidler: Streetcar would run from NW Portland to Hollywood via Broadway/Weidler. Route builds off the Eastside loop.
- MLK: Streetcar would run on MLK from Killingsworth to OMSI and South Waterfront. Route builds off the Eastside loop.
- NW 18th/19th: This route would be designed to leverage and serve the Conway development at its northern end.
- Tacoma: This route would connect streetcar from Johns Landing to the western end of the Sellwood Bridge. The City should have the County include the design of streetcar on the new Sellwood Bridge.
- Gateway Circulator: Contingent on significant redevelopment commitments.

Notes about the Foster Corridor

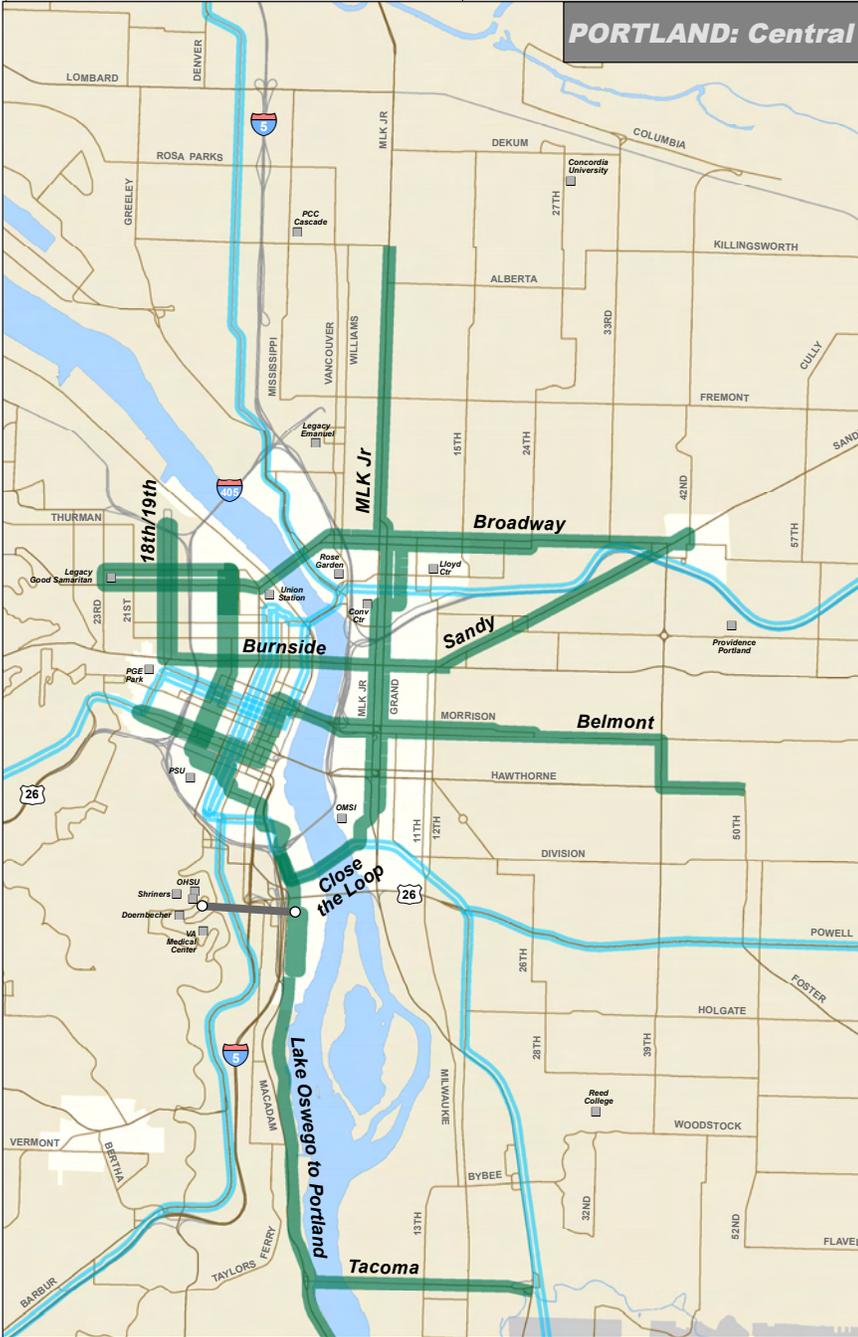
During the SSCP project, neighborhoods who were interested in streetcar were encouraged to show their support for their potential corridors. The most enthusiastic support of potential streetcar corridors during the September 9, 2009 public hearing with City Council came from east Portland for streetcar service in the Lents Town Center/Foster Corridor.

In recognition of this public support, PBOT staff has been directed by Mayor Sam Adams to work with the Lents Town Center Urban Renewal District to initiate planning studies for potential streetcar in the Foster Corridor.

The studies, at a minimum, will aim to address the following:

- Corridor viability
- Adjacent property owner support
- Neighborhood redevelopment
- Impacts to housing and businesses
- Engineering issues

Figure 21. Portland Streetcar System Concept Corridors



PORTLAND STREETCAR SYSTEM CONCEPT PLAN

Streetcar Corridors:

- Existing, Planned and Concept
- MAX Light Rail: Existing and Planned
- Portland Aerial Tram
- TriMet Bus (April 2009)



Concept Route Summaries

Broadway/Weidler (NW 23rd to Hollywood TC)

Route Summary

Segments:

NW 23rd to NW 10th:	0.8 mile (existing streetcar infrastructure)
NW 10th to NE 7th:	1.3 miles (part of Eastside Loop Project infrastructure)
NE 7th to Hollywood:	2.0 miles (new construction)

Route Length: 4.1 miles

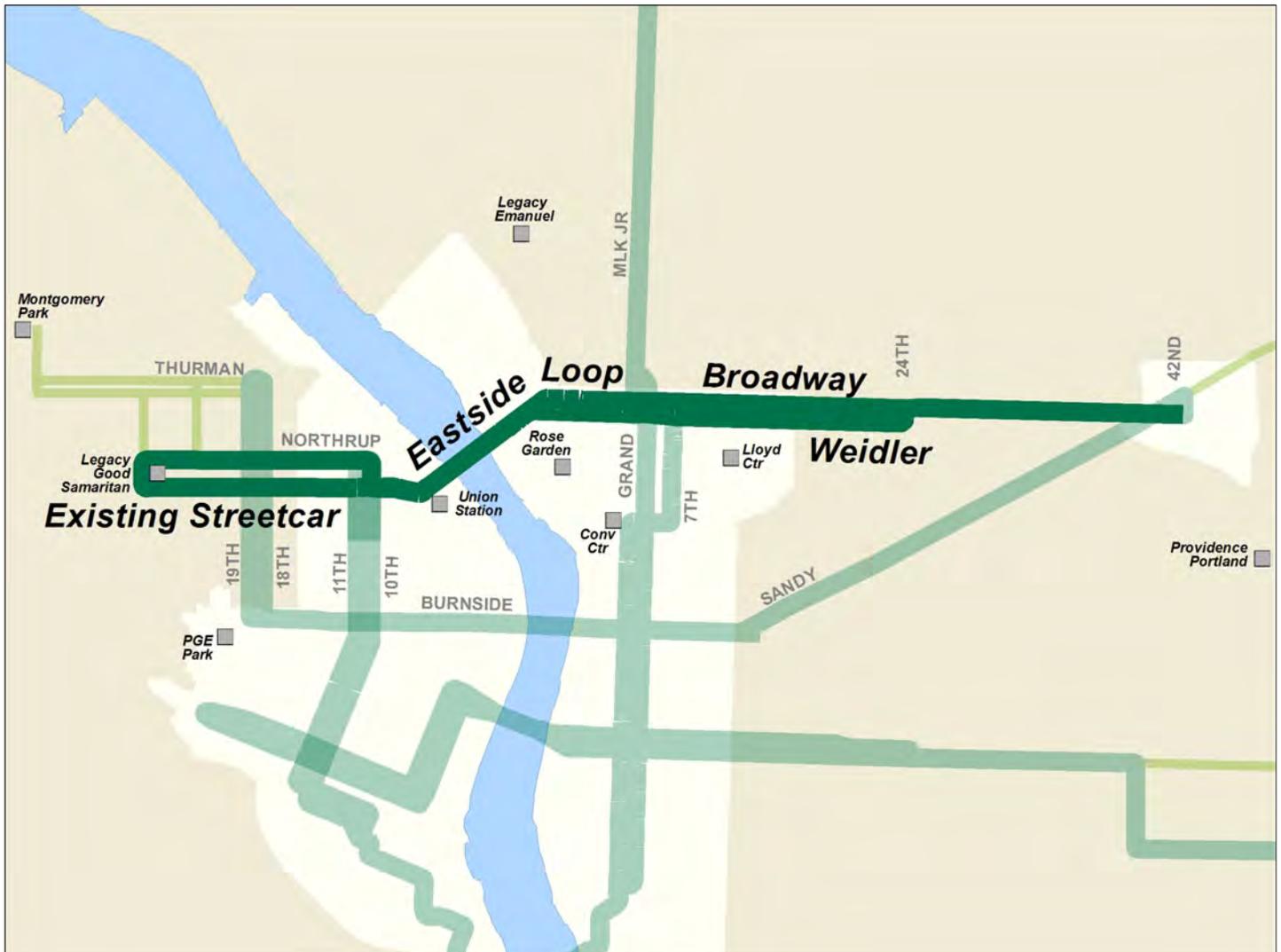
New Capital Construction Length: 2.0 miles

Order of Magnitude Capital Cost: \$60 million to \$70 million (\$2009) (6 vehicles)

Connections:

Northwest Portland neighborhood, Conway property, Pearl District, Post Office property, Union Station, MAX Yellow Line, Rose Quarter, Lloyd District, Hollywood District (town center) and Hollywood Transit Center (including MAX Red, Blue and Green Lines).

Figure 22. Broadway/Weidler Concept Route map.



Broadway/Weidler (NW 23rd to Hollywood TC)

Land Use and Development Potential

This corridor has overall strong development potential in part due to the significant portion of the alignment located on a traffic couplet configuration. The “interior” blocks between couplet streets broadens the development potential compared to a traditional two-way street corridor, through this analysis extends to NW 24th. It has good overall development potential across its full one-quarter mile study area.

This corridor has strong anchors at both ends; the Northwest Portland neighborhood on the west and the Hollywood District on the east with the Pearl District, Rose Quarter and Lloyd District in the middle. The potential of two streetcar corridors meeting in the Hollywood District (18th-19th/Burnside-Couch/Sandy and Broadway/Weidler) indicates that evaluating redevelopment potential in the Portland Plan process may be warranted. It could benefit from a more concerted effort by the city and/or more incentives to redevelop, such as establishment of an urban renewal district; however, two factors will make additional development challenging: the high value of the existing improvements and relatively low remaining FAR in the corridor.

Streetcar Operations

The streetcars will provide a local-circulation service on new and existing tracks through northwest Portland. The planned NW Lovejoy/Northrup traffic couplet in the Pearl District should significantly improve streetcar operations. The streetcar service will operate jointly on the planned Eastside Loop project tracks crossing the Broadway Bridge and along the Broadway/Weidler couplet. The last mile will have both east- and westbound tracks on NE Broadway. A left-running configuration and greater station spacing will allow for an “enhanced-local” service that will be the most compatible with bicycle access and automobile traffic operations.

Ridership Analysis

This route would extend east from the planned Eastside Loop Project streetcar alignment via Broadway/Weidler to the Hollywood Transit Center. In 2035 transit modeling analysis, this segment is forecast to have 6,600 daily boardings and be among the highest in boardings per mile of all potential streetcar corridors evaluated. The modeling analysis of this route segment limited bus service on Line 77-Broadway/Halsey only to the portion between the Hollywood TC and Troutdale. This and other transit route modifications would need to be evaluated as part of an overall operations plan.

Considerations/Potential Issues

- Potential extension to Montgomery Park through Northwest Portland neighborhood from Burnside/Couch streetcar in lieu of extending existing tracks
- Alignment/connection to Hollywood Transit Center
- Depth of potential development parcels and mixed use zoning along NE Broadway
- Need to develop transit integration strategy that minimizes the need for transfers and optimizes transit operations on an existing strong bus ridership corridor.

MLK Jr./Close the Loop (Killingsworth to RiverPlace)

Route Summary

Segments:

MLK Jr. (Killingsworth to Broadway):	2.0 miles (new construction)
MLK Jr./Grand (Broadway to OMSI):	2.2 miles (part of Eastside Loop Project infrastructure)
Close the Loop/SW Moody double track:	1.3 miles (new construction)

Route Length: 5.5 miles

New Capital Construction Length: 3.3 miles

Order of Magnitude Capital Cost (\$2009):

MLK Jr. (Killingsworth to Broadway):	\$60M to \$70M (6 vehicles)
Close the Loop Project/SW Moody double track:	\$60M to \$70M*

* Estimate being developed by Portland Streetcar Inc. and TriMet.

Connections:

Connections to Emanuel Hospital, Eastside Loop project (on NE Broadway/Weidler), Lloyd District, Holladay Street (MAX Red, Blue and Green Lines), Oregon Convention Center, Central Eastside Industrial District, major bus-transit corridors (NE Multnomah St., Burnside Bridge, Morrison Bridge, and Hawthorne Bridge routes), OMSI and Milwaukie light rail project.

Figure 23. MLK Jr./Close the Loop Concept Route map.



NE MLK Jr. Blvd./Close the Loop (Killingsworth to RiverPlace)

Land Use and Development Potential:

The NE MLK Jr. Blvd. corridor, from NE Killingsworth to NE Broadway, has had limited success from previous urban revitalization efforts. Affordable housing and some increased commercial activity has occurred, though there are still substantial gaps with vacant or underutilized property. A streetcar could be the catalyst that has been missing, but its success in energizing urban revitalization may depend on the successful redesign of the whole streetscape. This could include transforming the segment into a more pedestrian-friendly street with streetcar service rather than a heavy traffic through street. There is strong street front redevelopment potential with a moderate number of underutilized parcels. Existing surrounding residential densities are generally low with some newer moderate density projects. Densities could be increased through higher FARs on the back side of commercial uses and at key nodes and cross streets.

The OMSI to RiverPlace segment could also complement the development potential for properties near OMSI that are currently underutilized.

Streetcar Operations:

The streetcar service can provide an enhanced-local service with a potential left-lane running configuration along NE MLK Blvd. A left-running configuration will also be the most compatible with bicycle access and automobile traffic operations. The streetcar service will operate jointly on the planned tracks for the Eastside Loop project alignment along NE 7th Avenue and the NE MLK Blvd./Grand couplet.

Ridership Analysis:

This route would extend north of the planned Eastside Loop Streetcar alignment to Killingsworth. Streetcar service on this segment was analyzed as part of a longer route via Lombard to St. Johns, resulting in 2035 daily boardings of 3,200 in this segment. Service occurring south of Killingsworth would be expected to have fewer boardings than as part of a longer route to St. Johns via Lombard.

Considerations/Potential Issues:

- Potential alignment alternative along N Vancouver/Williams couplet.
- Service terminal (turn-around) at OMSI or Riverplace/South Waterfront Station.
- Depth of potential redevelopment parcels along NE MLK Blvd.
- Northern terminus needs to be determined.
- Need to develop transit integration strategy that minimizes the need for transfers and optimizes transit utility for all system users.

18th-19th/Burnside-Couch/Sandy (Thurman to Hollywood TC)

Route Summary

Segments:

NW 18th/19th:	0.9 mile (new construction)
Burnside/Couch:	1.8 miles (new construction)
Sandy Blvd:	2.0 miles (new construction)

Route Length: 4.7 miles

New Capital Construction Length: 4.7 miles

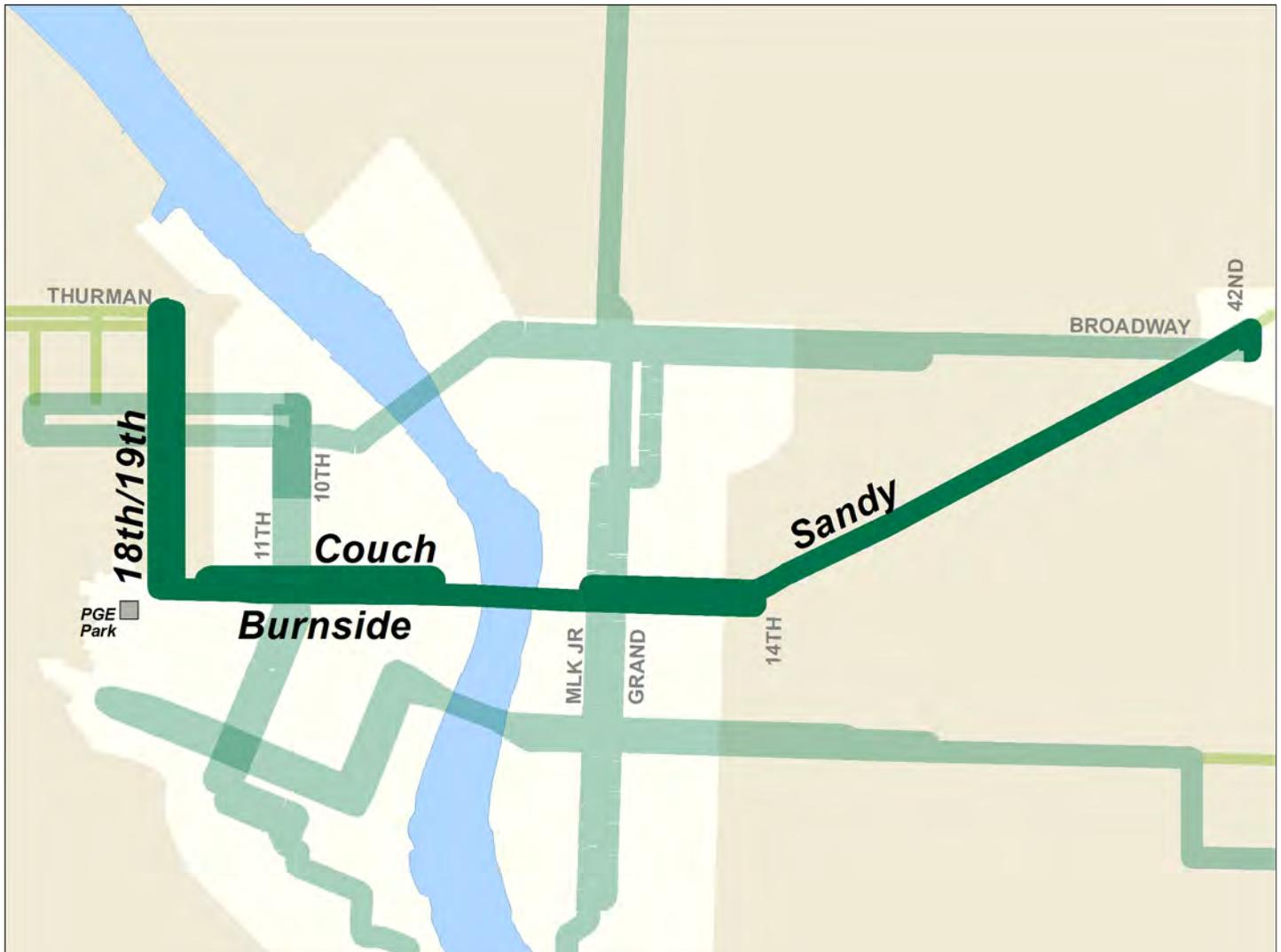
Connections:

Connections to Northwest Portland, Conway redevelopment property, downtown, 10th/11th streetcar, transit mall light rail (MAX Green and Yellow Lines), Banfield light rail (MAX Red and Blue Lines), MLK Blvd./Grand streetcar, Hollywood District (town center), Hollywood TC (MAX Red, Blue and Green Lines).

Order of Magnitude Capital Cost (\$2009):

NW 18th/19th :	\$30M to \$40M (2 vehicles)
Burnside/Couch:	\$90M to \$100M (6 vehicles)
Sandy Blvd:	\$65M to \$75M (4 vehicles)

Figure 24. 18th-19th/Burnside-Couch/Sandy Concept Route map.



18th-19th/Burnside-Couch/Sandy (Thurman to Hollywood TC)

Land Use and Development Potential:

This corridor has both higher density and mixed land uses, and good opportunities for new development and/or redevelopment. The 18th-19th segment has significant underutilized parcels including the approximately 20-acre Conway properties at the north end.

The Burnside-Couch segment also has significant underutilized parcels on both the west and east ends, with existing high-density development and infill opportunities between I-405 and Naito Parkway. The Sandy segment has development potential despite the narrow commercial strip and relatively low allowable FARs, although there are opportunities for transition of existing properties to more intense, transit-supportive uses. Rezoning at key nodes along this segment could encourage higher density and more mixed-use redevelopment.

The Hollywood anchor on the east end has good redevelopment potential but also some challenges. A public redevelopment role may be needed as a means to optimize streetcar-related mixed-use opportunities.

Streetcar Operations:

The Sandy Blvd. segment would provide local service that connects two major transit centers, downtown and Hollywood TC. Streetcar operations would likely benefit from the planned traffic couplet along Burnside/Couch and a left-lane running configuration with median streetcar stops along Sandy Blvd. A left-running configuration would also be the most compatible with bicycle access and automobile traffic operations.

Ridership Analysis:

This route would have good ridership, with up to 10,000 daily boardings forecast in 2035 for the length of the route concept from NW Thurman to the Hollywood Transit Center; however, both the Burnside segment and the Sandy segment would duplicate existing bus service in certain portions of the route. A bus/streetcar operations strategy would need to be developed with TriMet in order to maximize the effectiveness of all transit services in this corridor.

Considerations/Potential Issues:

- Potential extension to Montgomery Park through Northwest Portland.
- Integration into Burnside/Couch Streetscape Project(s).
- Retrofit Burnside Bridge to accommodate streetcar infrastructure.
- Alignment/connection to Hollywood Transit Center.
- Depth of potential development along Sandy Blvd.
- Need to develop transit integration strategy that minimizes the need for transfers and optimizes transit utility for all system users.

Tacoma Street Extension (Lake Oswego to Portland corridor)

Route Summary

Segments:

NW 23rd to SW Lowell:	4.1 miles (existing streetcar infrastructure)
SW Lowell to Sellwood Br. Project	2.0 miles (part of planned Lake Oswego Project)
Tacoma Street Extension:	1.5 miles (new construction)

Route Length: 7.6 miles

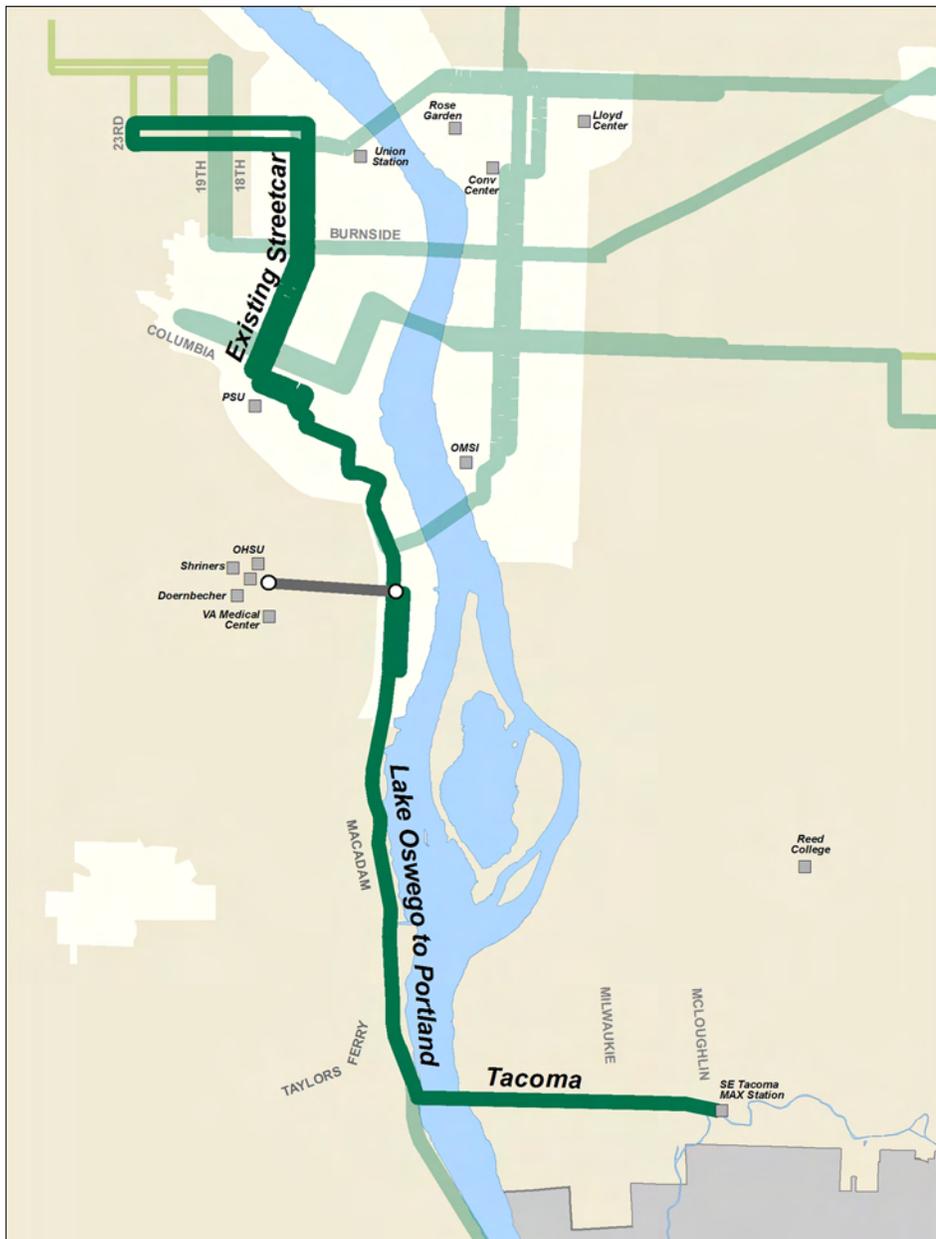
New Capital Construction Length: 1.5 miles (plus 2.0 miles for Lake Oswego Project)

Order of Magnitude Capital Cost (\$2009) \$60M to \$70M (2 vehicles)

Connections:

Downtown Portland, Portland State University, South Waterfront neighborhood, Johns Landing neighborhood, Sellwood Bridge, Sellwood neighborhood and Milwaukie light rail project.

Figure 25. Tacoma Street Extension (Lake Oswego to Portland) Concept Route map.



Tacoma Street Extension (Lake Oswego to Portland corridor)

Land Use and Development Potential

The most unique characteristic of this corridor is the key link it provides between the planned Tacoma light rail station/park and ride and the John's Landing neighborhood and South Waterfront District. As land use anchors for this corridor, both are ridership generators and have transit supportive land uses.

Another key connection in this corridor is to the neighborhood serving land uses along Tacoma. The Sellwood neighborhood is a mixed-use activity center with active ground floor commercial surrounded by primarily single-family residential. The potential for more moderately dense mixed-use commercial/residential development at key nodes along Tacoma will need to be evaluated.

Streetcar Operations

A local-circulator streetcar service would be extended from the South Waterfront District through the Johns Landing neighborhood over the (new) Sellwood Bridge to the future Tacoma LRT station. The Tacoma extension would likely be a local-circulator service along SE Tacoma Street.

Ridership Analysis

This route would be an extension of the planned Lake Oswego to Portland Transit Corridor Project. Service via Tacoma Street would operate via the existing streetcar route through the South Waterfront District, Portland State University and into downtown Portland. The Tacoma segment (from the west end of the Sellwood Bridge to the SE Tacoma Street MAX Station) is forecast to have 1,700 daily boardings in 2035. Because it would be routed onto the existing streetcar system and share the alignment through Johns Landing with the Lake Oswego to Portland streetcar, a detailed operations plan would need to be developed, accommodating service to downtown, the Central Eastside Industrial District, the South Waterfront District, Northeast Portland, Lake Oswego, Sellwood, etc.

Considerations/Potential Issues

- Mixed-running operations along SW Macadam Blvd., Sellwood Bridge, and Tacoma.
- Funding and timing of Sellwood Bridge replacement project.
- Preparation of an operations plan for streetcar services through central Portland.
- Potential operational constraints over Stephan's Creek in Butterfly Park and in the South Waterfront area between SW Gibbs and Porter.

Columbia-Jefferson/Morrison-Belmont/Hawthorne (Collins Circle to 50th)

Route Summary

Segment:

Morrison/Belmont (Collins Cr to SE 50th) 4.7 miles

Route Length: 4.7 miles

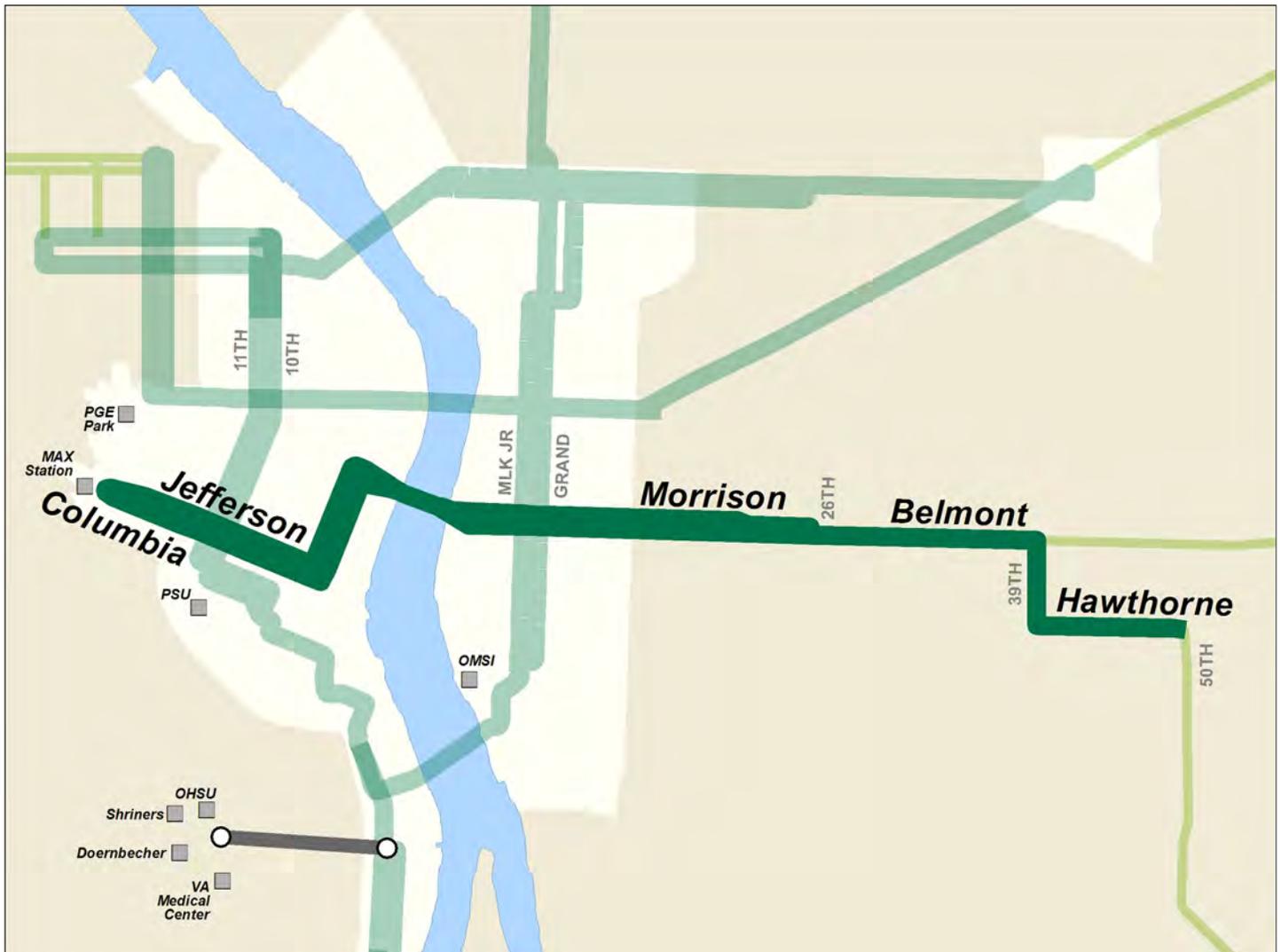
New Capital Construction Length: 4.7 miles

Order of Magnitude Capital Cost (\$2009): \$170M to \$190M (10 vehicles)

Connections:

Goose Hollow MAX Station (MAX Blue and Red Lines); 10th/11th streetcar, Mall light rail project (MAX Green and Yellow Lines), downtown Portland/central business district (CBD), Eastside Loop project, Central Eastside Industrial District, Belmont District, Hawthorne Neighborhood.

Figure 26. Columbia-Jefferson/Morrison-Belmont/Hawthorne Concept Route map.



Columbia-Jefferson/Morrison-Belmont/Hawthorne (Collins Circle to 50th)

Land Use and Development Potential

The couplet configuration of Morrison and Belmont increases the potential catalyst role that streetcar could play in shaping a greater mix of uses and increasing density in this corridor. The corridor has shallow depth commercial development and low floor area ratios (FARs).

Rethinking the zoning could add merit to potential streetcar in this corridor. This review would focus on the commercial strip and at nodes along the corridor to encourage pockets of higher density and activity. The outer end of the corridor, along 39th to Hawthorne, is a link with limited access intended to connect with the active land uses on Hawthorne and the terminus at the foot of the Mt. Tabor area. The downtown Portland segment is highly urbanized and has a mix of uses. There are high-density redevelopment opportunities along this segment, primarily on partial block areas.

Streetcar Operations

Streetcars would provide a local-circulator service through downtown Portland similar to the existing streetcar lines. It can provide an enhanced-local service along the SE Morrison/Belmont couplet and likely return to a local-circulator service along SE 39th and SE Hawthorne Blvd.

Ridership Analysis

This route would provide service from SW Collins Circle, through downtown Portland, across the Morrison Bridge (or Hawthorne Bridge), along SE Belmont, SE Morrison, SE 39th and SE Hawthorne to SE 50th Avenue. An alignment via SE Belmont is recommended because it would have more boarding rides and more boarding rides per mile than an alignment on SE Hawthorne. This is due in part to the SE Belmont routing via the Morrison Bridge which would provide significantly better coverage to the major employment sectors of downtown. Bus route modifications to consider for Line 15-Belmont could include operating with limited stops west of 39th (with local service provided by streetcar).

Considerations/Potential Issues

- Potential alignment alternative along SE Hawthorne Blvd. (evaluate in Alternatives Analysis).
- Transition from SE Belmont to SE Hawthorne along SE 39th Ave.
- Length of corridor may necessitate phasing.
- Retrofit of Morrison Bridge (or Hawthorne Bridge).
- Depth of potential development along SE Morrison, SE Belmont, and SE Hawthorne.
- Need to develop transit integration strategy that minimizes the need for transfers and optimizes transit utility for all system users.

102nd Avenue/Gateway Circulator (Gateway TC to Main/99th)

Route Summary

Segment:

102nd Ave./Gateway Circulator: 1.9 miles

Route Length: 1.9 miles

New Capital Construction Length: 1.9 miles

Order of Magnitude Capital Cost (\$2009): \$60M to \$70M (4 vehicles)

Connections:

Gateway Regional Center, Gateway Transit Center (including MAX Red, Blue and Green lines), E 102nd MAX station (MAX Blue Line), Adventist Medical Center, the Oregon Clinic, Mall 205, SE Main MAX station (MAX Green Line)

Figure 27. 102nd Avenue/Gateway Circulator Concept Route map.



102nd Avenue/Gateway Circulator (Gateway TC to Main/99th)

Land Use and Development Potential

The Gateway Regional Center, although characterized by auto dependent uses, is a designated Regional Center with high density land use designations supportive of pedestrian and transit oriented development. One of the biggest challenges to realizing the potential of Gateway is the lack of an interconnected grid of local streets. The existing pattern of superblocks limits pedestrian and neighborhood connectivity and concentrates vehicle traffic to wide arterials instead of spreading the traffic demand across an interconnected network of streets.

Streetcar in Gateway is the most challenging concept corridor in this plan. In order to make the case for a streetcar investment more viable, improvements to the transportation network will need to be implemented. PBOT and PDC are currently working on the Central Gateway Master Street Plan Update. A key strategy in the update is to provide more flexibility for connections while maintaining larger parcels for redevelopment. Greater neighborhood connectivity and increased access to higher density development parcels will help to create a more viable land use and transportation strategy for future streetcar infrastructure investments.

Streetcar Operations

The Gateway Loop would provide a local-circulator streetcar service providing a collection/distribution connection to three MAX light rail stations.

Ridership Analysis

This route concept would be a short connector between the Gateway Transit Center, the East 102nd Blue Line MAX Station, and the SE Main MAX Station on the MAX Green Line. It would connect the two commercial hubs of the Gateway Regional Center via 102nd between NE Pacific Street and SE Main Street. This portion of 102nd is forecast to have approximately 1,000 daily boardings for trips moving within the regional center and for trips connecting to the MAX system.

Considerations/Potential Issues

- Corridor is separated from existing streetcar.
- Corridor should be the focus of a future Alternatives Analysis or alignment study.
- Crossings of MAX Blue Line and I-205.
- Connection to MAX for non-revenue access to maintenance facility.
- Providing connection to SE Main light rail station (near Mall 205).
- Alignment design should consider balancing access to commercial districts and to MAX stations and consider eventual streetcar extensions.
- Need to develop transit integration strategy that minimizes the need for transfers and optimizes transit utility for all system users.

6

ECONOMIC DEVELOPMENT POTENTIAL FOR CONCEPT CORRIDORS

How a Streetcar Corridor Accommodates Growth While Respecting the Unique Character of Each Portland Neighborhood

Portland's neighborhoods are the lifeblood of the city's cultural, historical and social heart. Because of the streetcar's human scale, friendly presence and approachable design, it fits into and can contribute to each neighborhood's special personality and character. The streetcar has brought attractive, distinctive and sustainable architecture and activities that strengthen neighborhoods and create healthy places for people.

A streetcar system is a particularly effective tool to connect and shape neighborhoods. Streetcars connect neighborhoods by linking activities, destinations, and the regional transit network. They shape neighborhoods by stimulating redevelopment, supporting active uses, promoting public-private investments and creating places where people want to be. These types of neighborhoods make our community more livable and help the surrounding region by preserving farm and forest lands, protecting area rivers and streams, and reducing air pollution. They also directly reduce the threat of global warming.

Streetcar-oriented development will best integrate into the neighborhoods through careful consideration of the types and characteristics of the architectural and urban form and function of the surrounding neighborhoods. Several building design techniques can be used to reduce the impact of new development on established neighborhoods, such as incorporating elements of nearby quality buildings, including their details, massing, proportions and materials.

Many neighborhoods are already experiencing in-fill development. The streetcar can serve as a catalyst for organizing the new development along transit corridors.

Building form will be an essential means to shape new development along a streetcar corridor to provide a compatible relationship of building heights and massing with surrounding neighborhoods.

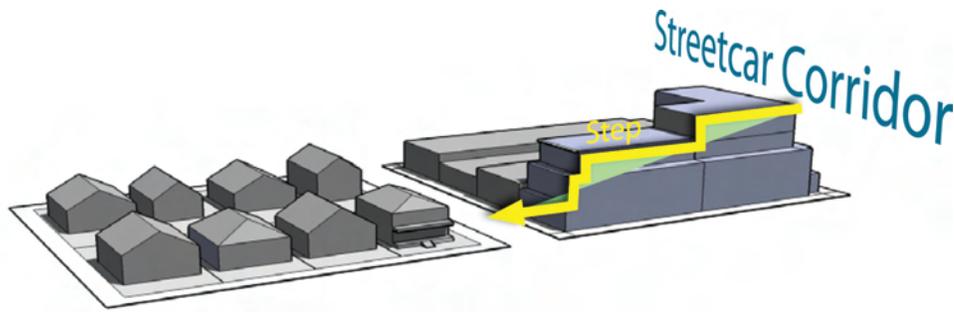


Figure 28. Streetcar corridor: Building stepbacks. Building stepbacks are an essential architectural tool for minimizing the effect of adding higher density structures adjacent to lower density land uses. Community Design Guidelines and neighborhood plans can define the framework for infill development and ensure that it fits into existing neighborhoods and respects existing neighborhood character.

Building form is particularly important for infill development. The drawings below illustrate 3 examples of adding context sensitive higher density mixed-use structures in three different commercial zones.

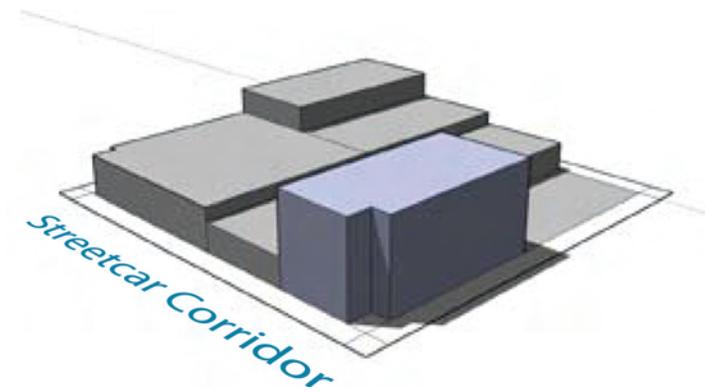


Figure 29. Streetcar corridor: 50 by 100-foot infill. 50 by 100-foot infill in Commercial Storefront zone (CS) at 45-feet in building height.

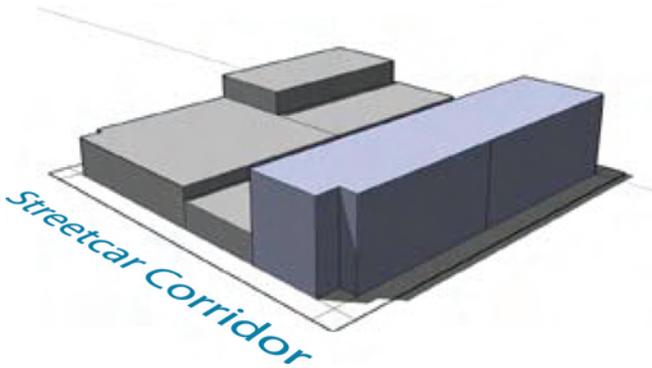


Figure 30. Streetcar corridor: 50 by 200-foot infill. 50 by 200-foot infill in Commercial Storefront zone (CS) at 45-feet in building height.

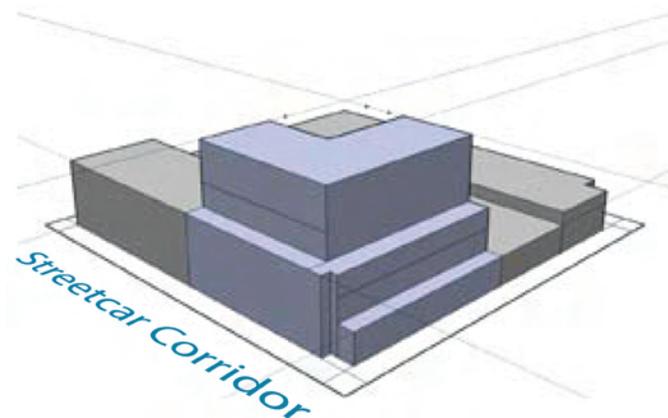


Figure 31. Streetcar corridor: 100 by 100-foot infill. 100 by 100-foot infill in Central Commercial zone (CX) at 75-feet in building height.

Scale of Development and Integration into Neighborhoods

Development along a streetcar corridor generally will be of a scale that is consistent with land-use zoning laws; however, intensifying development to the existing capacity could mean significant changes to a corridor's environment in regard to the amount of motorized and non-motorized traffic and pedestrian activity. Therefore, the recommendations for the Streetcar System Concept Plan have been developed in close coordination with the public through open houses, neighborhood meetings and district working group meetings. Further outreach to the public will be made by the Bureau of Planning and Sustainability with their update of the Comprehensive Plan (called the Portland Plan). The Portland Plan will evaluate the zoning and mix of land uses along potential streetcar corridors. Changes are likely to occur where the existing land uses and zoning are not compatible with potential streetcar infrastructure.

Central City may be best suited for additional streetcar service due to the allowable densities and their proximity to Portland's central business and entertainment districts, as is evident from the development surrounding the existing streetcar line.

Beyond downtown, Portland's neighborhoods vary by their origins, location and terrain, which will influence whether a corridor may be conducive to the introduction of modern streetcar service. Overall, there are three types of Portland neighborhoods:

Western neighborhoods would be more challenging due to lower density (single-family) neighborhoods served by more curvilinear, sometimes narrow streets. Barbur Boulevard is recommended for high capacity transit in Metro's Regional High Capacity Transit Plan.

Inner "streetcar-era" neighborhoods that were originally served by streetcars in the first half of the 20th century. The best opportunities for infill development are along the commercial corridors that border or run through these neighborhoods. Examples of former streetcar streets that are candidate corridors for modern streetcar service include NE Martin Luther King Jr. Boulevard, N Lombard, NE Broadway and Weidler, NE Sandy Boulevard, SE Belmont and SE Hawthorne Boulevard.

Eastern neighborhoods are typically east of Interstate 205. The land use patterns and uses in these areas evolved when the transportation focus was on automobiles; therefore, the resulting land uses and patterns are reflective of this auto influence. Typically, the commercial corridors in this part of town are characterized by wide thoroughfares, surface parking lots, and one- and two-story, single use buildings set back from the street. These areas often have very limited pedestrian facilities. Streetcar service could have the greatest influence on urban form in these areas, but it will require community acceptance of land use changes, including higher density mixed-use development and more pedestrian facilities. Examples of East Portland corridors are 122nd Avenue and the Gateway "Loop."

How Much Development does it take to make a Streetcar Corridor Work?

Each potential streetcar corridor has features that must be considered in planning for a successful streetcar project. For example, each corridor is a different length, has a unique mix of existing land use, has a comprehensive plan designation and zoning that is tailored for its area, and has unique neighborhood characteristics and personality. Some corridors are made up of higher density and mix of land uses and could potentially support a streetcar investment; others are lower density, may not have a mix of uses, and may be ripe for change, the kind of change that could support future streetcar investments.

The intensity of development depends on the specific features of a potential streetcar corridor, such as existing land use, the adopted zoning, and the adopted land use plan. For example, the development opportunity scenarios for the Pearl District are different than those for the 10th/11th streets segment in downtown, and from those in the South Waterfront District. For a new streetcar line to be successful it must be part of a broader effort to address a variety of issues, such as what is occurring in the Lloyd District and Central Eastside District in anticipation of the Portland Streetcar Loop project.

Another consideration is the funding of a potential streetcar project. New development can help pay for the capital cost of a project through a Local Improvement District (LID) or through Tax Increment Financing (TIF) from an Urban Renewal District. The cost of building a streetcar project will vary depending on factors such as length of the corridor, locations of existing utilities, and streetscape design features. A funding plan that is unique to each corridor must be developed. Ideally, the funding plan will include some contribution from the properties that will benefit from the project improvements.

What is Modern Streetcar's Influence on Portland's Neighborhoods?

Streetcars have significantly influenced the urban form in Portland's central city, inner eastside and other historic neighborhoods. Between 1890 and 1925 the introduction of streetcars led the early development of Portland's neighborhoods. More than 200 miles of rail lines connected the inner city, linked rural towns, and opened new lands for development. The distinct urban form created by these early streetcars is still evident in Portland's most vibrant neighborhoods. Hollywood, NW 23rd, and Belmont are some examples of places where the former streetcars' influence is still evident. The prominent urban features of these former streetcar routes are a narrow strip of retail and commercial uses along the former streetcar lines, with a mix of low to medium density residential uses behind the commercial uses.

More recent neighborhood patterns are influenced heavily by automobiles, resulting in more suburban land use patterns and neighborhoods. Since the 1950s, automobiles have been a major organizing factor for street patterns and land use. The auto-era neighborhoods are more single purpose (as opposed to mixed use), tend to be lower density, are not pedestrian friendly, and are more influenced by

topographic features such as the West Hills. In Portland some examples of auto-era neighborhoods include the West Hills and the area east of Interstate 205.

Contemporary land use planning in the Portland region consistent with Metro’s “Region 2040 Growth Concept” envisions higher density, mixed-use, pedestrian-friendly activity centers that are connected by high-capacity transit. This long range plan identifies a hierarchy of activity centers and main streets as focal points to accommodate projected growth and promote sustainable development within the Urban Growth Boundary. The City of Portland views future streetcar corridors as a significant opportunity for organizing future development to accommodate the expected growth.

In 2001 Portland began operation of the first new modern streetcar in the nation. This streetcar corridor is the centerpiece of significant new development and increased density in Portland’s central city. Several extensions of the original line have been completed and an additional extension, known as the Portland Streetcar Loop project, is planned to the eastside of the central city. This is a key element of future mobility and the ability to accommodate increased density and maintain livability in the central city.

The Portland Streetcar System Concept Plan (SSCP) is the city’s effort to identify potential extensions of the modern streetcar system that complement the light rail and bus transit systems. The SSCP will be incorporated into the city’s update of the city-wide comprehensive plan and transportation system plan. Future streetcar lines will be fundamental in the city’s efforts to organize future growth and development in Portland. The potential streetcar corridors will be the focal point for accommodating sustainable growth while maintaining the character of existing neighborhoods.

Development characteristics will include:

- Urban neighborhoods with a mix of uses (employment, housing, entertainment, open space, etc.),
- Higher density buildings that respect the context of existing neighborhoods, and
- Greater focus on pedestrian, bicycle, and transit-oriented development.

Portland’s neighborhoods will continue to evolve as the transportation system that serves them evolves. The streetcar’s influence will be incremental and unique in each neighborhood it touches. It can be a tool for revitalizing some neighborhoods and energizing others, consistent with each neighborhood’s vision and plans.

Summary of Developer Roundtable

On May 18, 2009, a forum of developers and staff met to discuss development opportunities and constraints of the draft proposed Streetcar System Concept Plan corridors. The developer participants were Vern Rifer (Rifer Development), Dennis Wilde (Gerding Edlen), and Kevin Cavanaugh (Cavanaugh and Cavanaugh). Representatives from the Mayor’s office, Portland Bureau of Transportation, Bureau of Planning and Sustainability, and the consultant team also participated.

Key observations from the roundtable are summarized below:

General Comments

- Funding should be a more critical driver (determinant) of corridor selection or priority. Key differences between the candidate corridors and downtown that affect funding include:
 - a) Prevalence of residential (not yet assessed with Local Improvement District); and
 - b) Small parcels make aggregation of Local Improvement District (LID) support more challenging.
- On long street corridors, don't necessarily expect continuous development along the line (as in downtown). Rather, development hot spots are likely to be more nodal.
- True urban villages that are already happening on their own do not need streetcar. In this view, Sandy Blvd., Martin Luther King Jr. Blvd., and Broadway-Weidler would not be true urban villages; therefore, they may be suitable for streetcar.
- Go where streetcar "can make a difference" in terms of increased ridership and/or development.
- "Build from success" placing streetcar from (and to) locations that are already working (a countervailing view).
- Gather user survey data to determine who currently uses streetcar and what kinds of trips they are taking.
- Strong support for rezoning to higher densities, especially at nodes. Go to a minimum 4:1 FAR to achieve financing and/or set aggressive height standards.

Corridor Comments

- Support to include Sandy (from the Hollywood District west). East of Hollywood should be a longer term priority.
- Support to also look at Broadway/Weidler (to Hollywood). It is "what we have going."
- Similarly, support for MLK (possibly up to Alberta or Killingsworth). Vancouver/Williams does not need streetcar as redevelopment is already happening .
- There was disagreement over including the Foster Road corridor. Reasons for inclusion are to serve as stimulus to redevelopment, the corridor's changing to a younger demographic and for city-wide equity. A reason for not including the corridor is a weak market, which may remain as such for "a long time."
- There was also disagreement over extension of MLK along Lombard into St. Johns for reasons similar to the Foster corridor.
- It was thought that the 122nd corridor is "fascinating" but should happen later.
- Macadam is a totally different corridor as the street has limited pedestrian crossings and development is concentrated at the ends with little in between. The addition of the Sellwood Bridge leg is a must (on its own and to help leverage bridge funding).

- The Gateway loop is worth doing as it is a changing corridor. There is significant underutilized property but there is also a rising tide of the type of demographics that could make it work. The “momentum is there”; however, there is concern that it would “not connect the dots” leaving Gateway isolated from the rest of the streetcar system (but not MAX).
- A NW 23rd extension is not needed. This is one place where development is continuous without definite nodes. The 18th/19th corridor offers better redevelopment opportunity.

Concept Corridor Land Use and Development Potential

The proposed system of concept corridors would generally serve former streetcar era neighborhoods, with the exception of the Gateway Loop Corridor. Existing land use and zoning along with the neighborhood land use plans and the city-wide comprehensive plan all play important roles in the character of a corridor and the potential of the corridor to become even more successful relative to a future streetcar investment. Development and redevelopment opportunities have been examined through identifying underutilized lands (value of improvements compared to value of the land) and the remaining available floor area, or difference between the FAR allowed on a parcel and the current developed FAR.

Following is a brief overview discussion about land use and development issues and opportunities in each concept corridor.

NW 18th-19th/Burnside-Couch/Sandy:

This corridor has both higher density and mixed existing land use, and good opportunities for new development and/or redevelopment. The 18th-19th segment has significant underutilized parcels including the approximately 20-acre Conway properties at the north end, and could be an opportunity to step down building heights between the tall buildings of the Pearl District and the lower height buildings in the heart of NW Portland. The Burnside-Couch segment also has significant underutilized parcels on both the west and east ends, with existing high density development and infill opportunities in the middle. The Sandy segment has limited development potential in part due to the narrow commercial strip and relatively low allowable FARs, although there are opportunities for transition of existing properties to more intense, transit-supportive uses. Rezoning at key nodes along this segment could encourage catalyst higher density and more mixed use redevelopment. The Hollywood anchor on the east end has good redevelopment potential but also some challenges. A public redevelopment role may be needed as a means to best capture streetcar related mixed use opportunities.

Gateway Circulator:

Existing land use in the Gateway Regional Center is derived from the auto era. Efforts are underway to change the land use form to a more urban character. This corridor will remain one of the more challenging proposed streetcar corridors from a development/redevelopment perspective. It has many challenges that run against typical streetcar redevelopment projects, such as the disconnected street pattern.

The existing value of improvements, such as at Mall 205, make redevelopment less feasible than areas with lower value improvements. It may emerge as a good location for affordable higher density housing more than commercial, or Class A office redevelopment in the shorter term, though lower cost business incubator space does represent more of an emerging opportunity.

South Waterfront to Lake Oswego/Tacoma Extension:

A regional project is underway that will extend streetcar from Lowell Street in South Waterfront to downtown Lake Oswego. There is transit supportive land use on both ends with limited transit-oriented development opportunity in between. The South Waterfront/North Macadam end has existing and emerging highly transit supportive land use. Johns Landing has the potential for more intensive, transit-supportive land uses. Downtown Lake Oswego as a town center also is a moderate density, mixed-use and transit-supportive activity center.

The Tacoma Extension would link the Lake Oswego line to Portland-Milwaukie light rail via Tacoma Street. Sellwood is a mixed-use activity center with an active commercial area and relatively low urban density housing surrounding it. Some moderate density has been occurring and could be further developed in key nodes on Tacoma. A stronger connection to Reed College could serve this extension well. The eastern anchor of this corridor is the planned Tacoma light rail station.

MLK Jr. Blvd./OMSI to RiverPlace:

This segment has had limited success from previous urban revitalization efforts. Affordable housing and some increased commercial activity has occurred, though there are still substantial gaps with vacant or underutilized property. Streetcar could be the catalyst that has been missing, but its success in driving urban revitalization could depend on successful redesign of the whole streetscape, including transforming it into a more pedestrian friendly street rather than a heavy traffic through street. There is strong street face redevelopment potential, with a moderate number of underutilized parcels. Existing surrounding residential densities are generally low with some newer moderate density projects. Densities could be increased through higher FARs on the back side of the commercial strip, and at key nodes and cross streets. The OMSI to RiverPlace segment could compliment the development potential for properties near OMSI that currently are underutilized.

Concept sketch showing future phases of Vanport Square development including Multnomah County building and the corner of NE Alberta and NE MLK (Vanport Square Phase I shown screened).



Broadway Line:

This corridor has overall strong development potential in part due to its couplet configuration. It has good overall development potential in the full one-quarter mile corridor; however, two factors will make it challenging: the high value of the existing improvements and relatively low remaining FAR in the corridor. It is a good corridor with strong anchors at both ends: Lloyd District on the west and Hollywood District on the east. The combination of the Sandy and Broadway lines in Hollywood indicates that a new look at the FARs and substantially upsized redevelopment opportunities may be warranted. A more focused redevelopment strategy should be considered in the Portland Plan.

Southeast line:

The Morrison and Belmont couplet configuration of this corridor adds significantly to the potential catalyst role that streetcar could play in shaping more mixed use, urban density development. The corridor has existing narrow strips of commercial development and low FARs. Adding streetcar in this corridor would merit a holistic look at the entire corridor with respect to increasing FARs focusing on the rear sides of the commercial strip and at nodes along the corridor to encourage pockets of higher density and activity. The downtown Portland segment is highly urbanized and mixed use. There are some limited high density redevelopment opportunities along this segment, primarily on partial block areas.

Sketch of streetcar on Broadway/Weidler at NE 14th.



7

IMPLEMENTATION/ NEXT STEPS

Introduction

This chapter is divided into five sections:

- 1. Introduction
- 2. Capital Financing
- 3. Future Streetcar Planning Efforts
- 4. Partnerships
- 5. Leveraging Green Initiatives

The following section provides information on historic and potential future sources for funding the capital costs of future streetcar projects. Section 3 describes the more focused planning efforts needed to implement specific corridors and a growing streetcar system. The importance of partnering with other agencies to implement an expanded streetcar system is described in Section 4. The last section provides information on how the City could leverage green investments concurrent with the development of streetcar corridors.

Capital Financing

Streetcar projects across the country have had different funding formulas. The existing Portland Streetcar system has been successfully funded using a wide variety of funding techniques for capital and operational purposes. The initial streetcar line and the subsequent extension to the South Waterfront District were both funded primarily from local sources (see below).

Figure 32. Funding sources for Portland Streetcar Phase 1 (opened 2001).

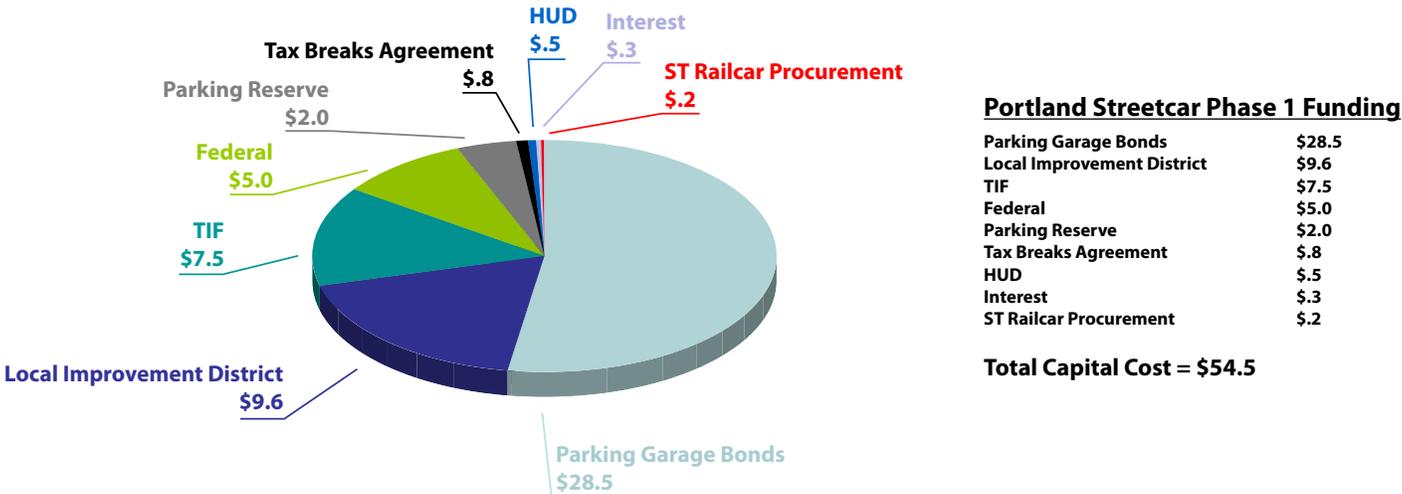
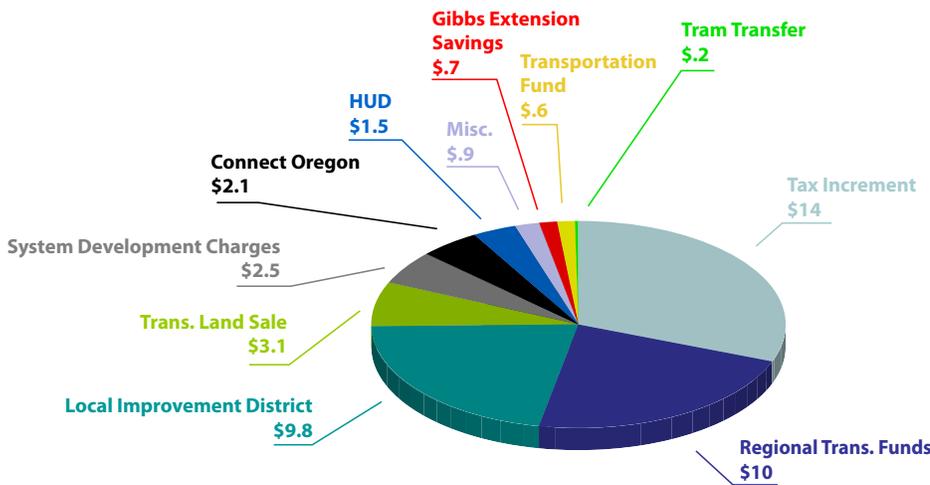


Figure 33. Funding sources for Portland Streetcar South Waterfront (opened 2007).



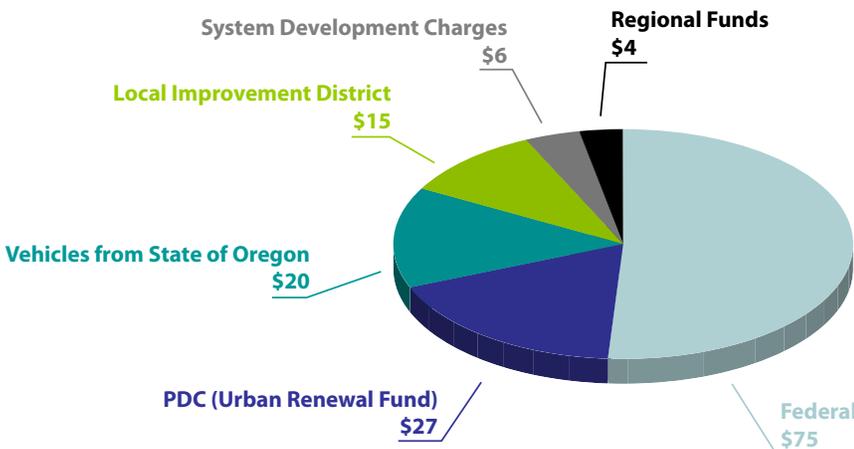
Portland Streetcar So. Waterfront Funding

Tax Increment (N Macadam URA)	\$14
Regional Transportation Funds	\$10
Local Improvement District	\$9.8
Transportation Land Sale	\$3.1
System Development Charges	\$2.5
Connect Oregon	\$2.1
HUD Grants	\$1.5
Miscellaneous	\$0.9
Gibbs Extension Savings	\$0.7
Transportation Fund	\$0.6
Tram Transfer	\$0.2

Total Capital Cost = \$45.4

In 2009, the Streetcar Loop Project received a Construction Grant Agreement from the Federal government for \$75 million which will cover half of the design and construction costs for a 3.5 mile extension to Portland’s inner-east side. This marks the first time the Federal Transit Administration (FTA) has helped fund a streetcar project via use of either the New or Small Starts funding program. As with previous Portland Streetcar segments, the local match was provided from a variety of funding sources.

Figure 34. Funding sources for Portland Streetcar Loop (estimated opening 2011).



Portland Streetcar Loop Funding

Federal	\$75
PDC (Urban Renewal Fund)	\$27
Vehicles from State of Oregon	\$20
Local Improvement District	\$15
System Development Charges	\$6
Regional Funds	\$4

Total Capital Cost = \$147

Capital Costs for Concept Corridors

Order-of-magnitude capital cost estimates (in 2009 dollars) for the concept corridors of the Portland Streetcar System Concept Plan are provided in Table 4. These cost estimates were based upon recent streetcar construction projects in Portland and Seattle and are largely based upon the length of the potential project, with considerations for major cost items including bridges. A typical operating plan served as a basis to determine the number of vehicles and maintenance facility requirements.

Table 4. Capital Cost Estimates for Concepts Corridors

Concept Corridor	Capital Cost Estimate*
Broadway Weidler Line	\$60 million to \$70 million
MLK Line (Broadway to Killingsworth)	\$60 million to \$70 million
Burnside Couch (NW 19th to NE 14th)	\$90 million to \$100 million
NW 18th/19th (Burnside to Savier/Thurman)	\$30 million to \$40 million**
Sandy Blvd (NE 14th to Hollywood)	\$65 million to \$75 million**
Tacoma Street (Sellwood Bridge to Tacoma LRT)	\$60 million to \$70 million
Morrison/Belmont (Goose Hollow to 50th /Hawthorne)	\$170 million to \$190 million
Gateway Circulator	\$60 million to \$70 million
Close the Loop (includes South Waterfront double track)	\$60 million to \$70 million***
* Order of magnitude capital cost estimates (\$2009).	
** Assumes Burnside/Couch project is in place or combined with this segment.	
*** Close-the-Loop project costs being developed by Portland Streetcar, Inc. and TriMet.	

Funding Options for Concept Corridors

The path to successfully implementing each of the Concept Streetcar Corridors is a matter of a series of choices. Every community that has successfully advanced a streetcar project, including Portland, has done so with their own unique processes and set of circumstances. To date, no two funding formulas for streetcars have been alike. Likewise, the priority corridors of the Streetcar System Concept Plan will need to draw from a variety of federal, state and local sources that best fit each project and funding source available at the time a specific project is advanced.

Federal Funding

FTA Small Starts

Currently, the most promising source of federal funds is through the FTA Small Starts program. In 2005, Congress created a new category of funding under FTA for smaller-scale transit projects such as streetcar projects. Project costs need to be less than \$250 million. The maximum federal contribution to any project is limited to \$75 million. To date, Portland's Streetcar Loop Project is the first streetcar project to receive funding under this program. Given today's limited city and state resources, it is reasonable to assume that federal funds will be a component of the funding strategy to implement each priority streetcar corridor.

FTA New Starts

The primary federal funding program for larger transit projects (greater than \$250 million) is the Section 5309 New Starts Program. This program provides funding for a share of project costs, generally around 50 percent of total costs for most projects. Portland is currently receiving funding at 60 percent of the total cost. The program allows 80 percent federal participation but FTA policy recently has pushed for 50 percent. Eligible transit projects must follow a formal planning procedure and environmental review that can take between three and six years before funding can be granted for final design and construction.

Congestion, Mitigation and Air Quality Funds (CMAQ), Surface Transportation Program (STP)

The CMAQ and STP funds are allocated to the Portland Metropolitan Area by Congress and administered by the US Department of Transportation. The funds are distributed to specific projects by the Joint Policy Advisory Committee on Transportation (JPACT) with final approval by Metro Council. Transit capital projects are eligible for CMAQ and STP funds. In recent years, CMAQ and STP funds have been allocated to city and regional streetcar projects for pre-construction activities.

Federal Earmarks

To obtain an earmark, project sponsors must make the project a local priority and obtain the support of the local congressional delegation who must in turn be effective advocates in the legislative negotiations that determine projects funded in transportation authorization and appropriations bills.

FTA/HUD Livable Communities Partnership

The US Department of Transportation (USDOT) and the Department of Housing and Urban Development initiated a partnership to enhance integration of metropolitan housing, transportation, and land use planning and investment. The departments will build on efforts under existing authorities to integrate transportation and housing planning and to encourage affordable housing near transit. The DOT's Federal Transit Administration began implementing the action plan in the 2008 FTA-HUD report to Congress, "Better Coordination of Transportation and Housing Programs to Promote Affordable Housing Near Transit."

The details of the program are still being worked out. A possible scenario for how it could work for Portland is that the city would apply for a Livable Communities Planning Grant to study corridors/projects where strategic funding is needed to develop mixed-income housing and transit. The city would then apply for construction grants to assist with housing development and implementation of streetcar service for the target housing areas. FTA Transportation Secretary Roy LaHood is spearheading this effort. Legislation for this program is currently under development with assistance from Senator Merkley, Congressman Blumenauer and PBOT staff.

State Funding

State Lottery Funds

The State of Oregon has helped fund transit projects such as Westside Light Rail Transit (LRT) and now the Milwaukie LRT through the issuance of bonds that are

backed by state lottery funds. Portland's Streetcar Loop Project is slated to receive up to \$20 million to purchase streetcar vehicles, provided that those vehicles are manufactured within the state. Oregon Ironworks has recently been selected to manufacture and deliver streetcar vehicles for the Portland Streetcar Loop Project

Connect Oregon III

The State of Oregon is establishing the third phase of a transportation funding program called Connect Oregon, which is targeted at multimodal or non-highway transportation projects. This program is primarily backed by lottery funds. Transit is one of the key program investments targeted through this program because it is recognized that supporting vital transportation alternatives will pay dividends to the communities they serve through economic development and community livability. Connect Oregon III is highly competitive with numerous high-priority projects competing for the available funds.

City of Portland/Private Funding

Tax Increment Financing (TIF)

TIF has been a critical funding mechanism for many capital projects within the City of Portland. TIF "freezes" the property tax collected by all jurisdictions at the time an urban renewal district is created. As property within the district appreciates in value and higher taxes are generated, the incremental tax revenues over the frozen tax "base" creates a stream of revenue that is used to finance the issuance of bonds. The bonds are used to finance capital expenditures.

The Portland Streetcar received \$20 million in TIF of the \$103 million required to build the existing 4.1 mile line. The Portland Streetcar Loop has received commitments of TIF funding from three different districts totaling \$27 million.

TIF funds are currently generated only within Portland's urban renewal districts. The following graphic shows that a significant portion of the priority corridors might qualify for TIF-backed bonds because much of the service and capital improvements are within Portland's current Urban Renewal Districts.

Corridor-TIF

A variation of the typical TIF mechanism will be studied as a potential funding resource along the proposed streetcar corridors. A Corridor TIF would draw the boundaries of a TIF zone within a specified area of the streetcar line. This is also known as a Tax Allocation District (TAD) in some cities and would allow flexibility for the tax increment district to be drawn as needed to support the project. One further variation to be explored would be to dedicate only the city's portion of the Tax Increment funds towards the project to ensure Multnomah County's and the Portland School District's share of the property tax is not affected. A Corridor TIF could be one of the methods of generating local funds; however, a change in the city code and/or state law will likely be necessary.

System Development Charges (SDC)

SDCs are those fees that are collected based on a formula and levied upon new development projects to support the cost of infrastructure needed to serve the proposed development. They are calculated to cover a "proportionate" share of the capital costs for that infrastructure (the portion attributed to the development). It is possible that SDCs could provide a small to modest amount of local matching

funds and should be considered in future financial planning studies for the implementation of the priority streetcar corridors. The project must be included in the project lists for SDC charges by the city. In the case of the Portland Streetcar Loop, the City of Portland has approved \$6.1 million in SDC charges to support streetcar construction. In addition to the citywide SDC, an SDC overlay district may be applied to a streetcar corridor. An SDC overlay district was recently approved by City Council for the South Waterfront District.

Local Improvement Districts (LID)

LIDs have been a key element of the Portland Streetcar project funding to date. Typically, it is an assessment on property owners adjacent to the corridor. The recent LID for the Portland Streetcar Loop on the eastside included assessments on owner occupied residential property. In the past, owner-occupied residential had been exempt. With the growth of condominiums, that option is no longer viable. Residential was assessed at 50 percent of the rate of commercial property for the Streetcar Loop. This proposal was approximately 0.7 percent of market value for housing. Housing that is located in R-1 zones was made exempt as there is little opportunity to increase its value from the streetcar. In all 36 homes were exempt from the LID

An LID petition can be initiated by a majority of the affected property owners or by City Council resolution. Property owners are assessed in reasonable proportion to the benefits derived. Properties are typically assessed on property values, the square footage of the property, or the linear frontage to the street. To date, Portland's streetcar line has included an assessment on properties located within three blocks (750 feet) of the streetcar line.

Because the priority corridors will extend beyond the Central City, the amount of R-1 zoning along the corridors will likely limit potential for LID assessments along each corridor. While they will be a significant indication of a neighborhood's support of each proposed streetcar line, the LID assessments may be such that very limited funds are derived. An example is a recent assessment of the LID potential for the Burnside/Couch (east side project), which estimates an LID could generate approximately \$500,000 (from the Willamette River east to E. 12th). There is not a lot of money in the LIDs for lower density properties.

Other Potential Resources

Utility Surcharge

Streetcar projects generally require the relocation of some underground utilities. In many cases the utility lines are upgraded during relocation. The cost of utility relocation and upgrade is considered part of the capital cost of streetcar construction. It is possible to have these costs covered by the utility ratepayers through a surcharge on the utility bills.

Carbon Funding

Streetcar operations can reduce greenhouse gas emissions (also known as carbon emissions) in several ways. One is when sufficient numbers of people take trips using streetcar that they would otherwise take using automobiles. Another is from facilitating more dense urban development, which is usually more energy efficient and would result in lower vehicle miles traveled (VMT) per person.

Modest funding is available for projects that can verifiably measure ongoing carbon reductions from “business as usual.”

Projects that verifiably reduce carbon emissions may be competitive for “carbon funding,” i.e. funding based on the amount of carbon emissions reduced by the project. There are a few existing sources of modest carbon funding, with substantially more expected if the United States adopts a carbon regulatory mechanism.

Current Carbon Funding Options

Voluntary Carbon Offsets: Some businesses and governments voluntarily purchase “offsets” to neutralize some or all of their carbon emissions. The Bureau of Transportation has sold carbon emission reductions from new or “additional” traffic signal synchronization projects to The Climate Trust, which sells the reductions in the voluntary offset market. The bureau is exploring additional opportunities for “offset” funding.

Federal Energy Funds: The American Reinvestment & Recovery Act (ARRA) authorizes \$4.2 billion nationwide for the Energy Efficiency & Community Development Block Grant (EECBG) program, for which transportation projects are eligible for both formula and competitive funds. Similarly, the ARRA authorizes \$42.2 million for Oregon’s State Energy Program (SEP); some transportation projects are eligible for SEP funding, though not construction.

Potential Carbon Funding

Federal Cap and Trade: As of June 2009, Congress is debating a “carbon cap and trade” or “climate bill.” The current bill would establish a slowly diminishing cap on national carbon emissions. “Allowances” representing 85 percent of maximum emissions would be provided to emitters; 15 percent would be auctioned. Funds from the carbon auction would be available for a wide range of renewable energy, energy efficiency and transportation efficiency projects.

Federal Transportation Funding Reauthorization: Some congressional leaders are proposing to link some Surface Transportation Act funding to carbon reduction.

State and Local Carbon Funds: There is discussion of linking state and local transportation funding, at least in part, to carbon reduction. There is also discussion of charging impact fees based on projected carbon emissions, such as a parking stall carbon impact fee to recognize the provision of additional parking stalls can increase driving and carbon emissions.

Future Streetcar Planning Efforts

General Approach

Adding streetcar infrastructure to the potential streetcar corridors identified in the system plan is part of a strategic long-term growth and economic development strategy that will need to be in synch with partner agency and bureau objectives and the general public. Streetcar is unique in that it is owned and operated by the City of Portland, but streetcar planning and federal financing is in partnership with Metro and TriMet. Local match required with federal transit funding programs will need public support. Streetcar operations are coordinated with TriMet and

streetcar operation funding is provided by the City, TriMet, and fare revenue. New extensions will require new financial plans. As the city moves forward with planning for future streetcar corridors, a strategic approach will be needed to balance city, agency and public priorities.

Each potential streetcar corridor identified in the system plan is unique. While some neighborhoods may be reintroducing modern streetcar to a historic streetcar corridor, other neighborhoods may be introducing a new form of transit infrastructure and development patterns. Either way, a planning strategy for any future streetcar corridor will need to be tailored to reflect the different land use patterns, demographics, market, financing capability, and community support in the corridor. An approach to future streetcar corridor planning should include the following elements:

- **Acknowledging Neighborhood Context:** Planning efforts between bureaus and agencies will only be successful if they are fully integrated with public involvement. Future outreach efforts should bring corridor residents and stakeholders to the table early and throughout the planning, design and implementation of the streetcar infrastructure and associated mixed-use neighborhood development. All Bureau of Transportation's future streetcar corridor planning studies following the Streetcar System Plan will need to be done in partnership with the Bureau of Planning and Sustainability to ensure the implications to existing neighborhoods are evaluated before the streetcar infrastructure is built in the ROW. Issues related to community support, urban form, intensity of development, density and diversity of housing and commercial buildings will need to be considered.

Future development in streetcar corridors will need to be strategized so existing and new residents living at mixed-income levels will have similar opportunities. City policy provides that at least 30 percent of urban renewal funds generated within designated urban renewal areas (URAs) will be spent on affordable housing development. Streetcar corridors outside of URAs will need strategic program assistance that would encourage development of integrated affordable housing options.

- **Modal Coordination:** As the city continues to grow, the pressure to accommodate multiple uses in the ROW will need to be evaluated with priorities given to the modes that can best achieve and balance the multiple objectives from neighborhood interests, planning strategies, and mobility requirements. Pedestrian, bicycle, car, truck, and bus functions will need to be accommodated in the design and location of the streetcar infrastructure. A process to develop Streetcar Corridor Design Guidelines should be initiated to study and optimize compatibility with bicycle, pedestrian, freight, transit and vehicle users. In addition, demand management strategies will be needed to manage the demand between acceptable levels of capacity and congestion with neighborhood and regional mobility through the corridor.

Integration with the Portland Plan

By 2030 the City of Portland's population is expected to increase by approximately 150,000 people, and the region's population is projected to grow by about one

million. As the city prepares for this growth, development opportunities that can take advantage of transit, including streetcar, must be a part of the solution. The Streetcar System Concept Plan (SSCP) has identified several future streetcar corridors with the highest potential to support new development and/or redevelopment. The future streetcar corridors in the SSCP are expected to play a key role in shaping the city's future by becoming a primary organizing tool for new development.

Over the next three years, the Bureau of Planning and Sustainability will be updating the 1980 citywide Comprehensive Plan and the 1988 Central City Plan in a broad planning effort referred to as the "Portland Plan." It is an inclusive citywide effort to guide the physical, economic, social, cultural and environmental development of Portland over the next 30 years. The Portland Plan will build on previous planning efforts, including the SSCP. The SSCP will also be implemented through integration into other city and regional land use and transportation planning efforts such as the Regional High-Capacity Transit Plan and the Regional Transportation Plan. Final decisions regarding when specific streetcar corridors will be built will be determined over time, as all of these plans are implemented.

The Portland Plan, when finished, will be a strategic planning document that provides guidance, direction and policy to shape future growth and transportation patterns. The SSCP recommendations going into the Portland Plan may be different than the recommended streetcar corridors after the growth scenario exercises.

The SSCP is linked to the Portland Plan in two ways:

- The SSCP will be incorporated in the Transportation System Plan (TSP); which is the transportation element of the City's Comprehensive Plan
- Streetcars are a strategic economic development tool and walkable neighborhood connector. The neighborhood development associated with the streetcar is as vital to the city as the transit infrastructure. The Portland Plan will recommend where the future streetcar neighborhood development is most appropriate, which will help orient where streetcar investments will be made. The type and scale of development allowed in streetcar neighborhoods has an impact on the implementation and operations of the streetcar. Development investments in streetcar corridors are leveraged to help pay for the streetcar infrastructure. A preliminary estimate of corridor development potential was conducted with the SSCP but was based on the existing comprehensive plan. The Portland Plan will update the comprehensive planning designations across the city and will incorporate potential streetcar corridors to ensure that development potential is sufficient to leverage city investments in additional streetcar corridors where appropriate.

Integration with the Regional Transportation Plan

In its role as the regional transportation planning agency, Metro develops and maintains the Regional Transportation Plan (RTP). The RTP meets federal requirements for a coordinated plan for funding and implementing multi-modal transportation improvements in the region. The RTP also serves a role as the regional Transportation System Plan (TSP) as required by State of Oregon. Jurisdictions within the Portland region must develop local TSPs that are consistent

with Metro’s RTP.

The Portland Streetcar System Concept Plan, when adopted by City Council, will be incorporated in the City’s TSP. In order to be eligible for federal funding (including FTA Small Starts funds), a proposed streetcar corridor will need to be included on Metro’s RTP list of regional transportation projects. The city will work with Metro and TriMet to ensure that the Portland Streetcar System Concept Plan complements the regional public transit network and merits consideration as a tool that supports regional policies for growth to be accommodated in established, transit-supportive communities.

Alternatives Analysis for Select Corridors

If a determination is made to develop a specific corridor as a potential Small Starts application, an FTA-approved Alternatives Analysis (AA) will be required. An AA will build upon the analysis and considerations prepared to date for each corridor and will need to at least consider a range of modes and potential alignment alternatives in the corridor. Three known alignment alternatives that should be considered are:

- N. Vancouver/Williams couplet alignment alternative as part of the MLK Boulevard Corridor AA
- SE Hawthorne alignment alternative (from downtown to SE 39th via the Hawthorne Bridge) as part of the Southeast Line (SE Belmont) AA.
- NW 21st and NW 23rd alignment alternatives as part of the 18th-19th/ Burnside-Couch/Sandy AA.

Public consultation is a critical part of the AA planning process and typically includes a Citizen Advisory Committee. Neighborhood and business associations within the corridor will be engaged in each step of the process.

Table 5 summarizes the process currently in place for advancing projects through the FTA Small Starts program. The schedule shows a total duration for the full development of a streetcar project (from planning through to revenue service) in the range of five to seven years. In addition to developing the local funding

Table 5. Typical Federal Funding Timeframe for Streetcar Corridor Project

Months	12	24	36	48-60
	Alternatives Analysis	Environmental and Preliminary Design	Engineering	Construction
Tasks	Analyze appropriate mode Transit modeling Ridership forecasting Concept design Federal funding application Public outreach Compare to other options	Environmental documentation Preliminary design Cost estimating Operations planning Local funding strategy Federal funding approvals Public outreach Compare to no-build	Final design Cost estimating Project cost controls Vehicle procurement Public outreach Final local funding approvals	Construction Quality assurance monitoring Project cost controls Vehicle delivery Public outreach

commitment, the primary element of schedule uncertainty under this project implementation approach is the time required to secure the numerous FTA approvals and authorizations necessary to proceed into each of the successive steps in the process. Approvals include a determination of the adequacy of the Alternatives Analysis, the adequacy of the National Environmental Policy Act (NEPA) document, and the authorization to enter both the Preliminary and Final Design phases. Each step can be met with a directive to modify or further refine the information being presented and can also result in a decision by FTA to not advance the project.

Partnerships

Coordination with Other Agencies

The Portland Streetcar Loop project is a notable departure from the previous streetcar projects in that it is being financed in part with federal funds under FTA's Small Starts Program. This effort required partnering with TriMet and Metro in the Alternatives Analysis, planning, design and engineering process. The city has a similar partnership with TriMet and Metro on the Portland to Lake Oswego Transit Corridor Project. The SSCP project has expanded the conversation about streetcar from a downtown incrementally-growing transit mode into citywide strategic economic development tool and neighborhood circulator. The distinction between downtown streetcar and a citywide streetcar system is important to consider in how coordination with Metro and TriMet occurs in the future. With an annual operational budget set to expand to over \$10 million, strategic long term financial planning is required to sustain and grow the Portland Streetcar system.

A collaborative framework needs to be developed that will enable the Portland Streetcar to grow. The city, TriMet, Metro, and ODOT need to develop a coordinated approach to streetcar corridor planning, public involvement, financing, implementation and operational funding.

Integration with TriMet

TriMet has evolved from its early days as the “bus company” into a key regional player providing a range of transportation services including special needs transportation, urban bus routes, express bus routes, shuttle routes, light rail and commuter rail. With this wide range of services, TriMet strives to meet key transportation needs of the entire metropolitan area.

The City of Portland, with its vision for a streetcar system to support vibrant, growing urban communities, needs to continue to work in partnership with TriMet to ensure that a streetcar system in the City can support and enhance the role of transit in the region. The current structure for the Portland Streetcar has the city as the system owner, with day-to-day oversight provided by the non-profit Portland Streetcar Inc. (PSI); the drivers and other personnel are provided by TriMet under contract to PSI. This operations structure has served the city and TriMet well as the Portland Streetcar has expanded beyond its original alignment to serve the South Waterfront District.

While the development of the existing system resulted in some minor bus route adjustments, the Concept Routes identified in this plan would require a

Current Initiatives Targeted for our Public Transportation Corridors:

- Combined sewer separation
- Stormwater management
- Green streets
- Water line replacements and upgrades
- Pavement restoration
- Bicycle facilities
- Streetscape improvements
- Traffic signal and streetlighting upgrades
- ADA compliance and accessibility upgrades
- District energy

significantly higher level of transit system planning and coordination. If the vision in this system plan is to be realized, the political and institutional structure for streetcar planning and operations will need to evolve.

Partnering with Other City Bureaus

Portland's streetcar projects have been successful to date partially because they were constructed within limited budgets. Factors that tend to drive up construction costs on rail-transit projects are dealing with underground utility conflicts and accommodating the competing demands upon the public right-of-way. In many cases, it is the age and condition of the existing public infrastructure that warrant replacement once affected by the proposed streetcar improvements. Likewise, new policies, guidelines or demand on existing capacity trigger the need for upgrades or public improvements.

One proposal is to form a "Green Streetcar Partnership" with city bureaus and departments to coordinate streetscape, street and utility reconstruction projects with phased streetcar corridor projects to leverage multi-bureau and department public infrastructure investments. The intent is to create a strategy to identify and encumber maintenance and roadway funds that would contribute to FTA local matching requirements.

Coordination with Multnomah County (Bridges)

Several of the Priority Corridors are proposed to cross the Willamette River on bridges currently owned by Multnomah County. One specific partnership to explore with the county is coordination of potential streetcar infrastructure requirements with programmed maintenance and upgrades to the bridges. Some of the major activities planned within the next 20 years include:

- Hawthorne Bridge: Concrete deck overlay, painting and Phase 1 seismic upgrades
- Morrison Bridge: Phase 1 and 2 seismic upgrades, east approach deck rehabilitation
- Burnside Bridge: Paint entire structure
- Sellwood Bridge: Bridge replacement

Leveraging Green Initiatives

Implementation of the streetcar corridors provides a unique opportunity to partner with city bureaus and create a combined vision to foster more sustainable infrastructure and developments within the city. The following Green Initiative concepts are suggestions for creating tools that may help leverage the strengths of individual programs and combining efforts to provide better opportunities towards implementation.

- **Combined public and private stormwater management facilities.** Currently, private stormwater facilities are prohibited within the public right-of-way. Additionally, public stormwater management is discouraged from using private properties through use-agreements. Many of the potential streetcar corridors will operate within combined sewer/stormwater system areas, which will contribute to higher processing costs. In many cases, within the constraints of inner urban areas,

public and private lands exist that are undevelopable but could serve stormwater management needs for public and private benefit. The streetcar system provides an opportunity to partner with private commercial and mixed-use development through combined stormwater management techniques. Creating a public/private management policy could provide use-agreements and private incentives to reduce streetcar-related stormwater mitigation costs, with the potential to reduce private development fees and charges.

- **Create a Green Streetcar Fund** that coordinates with agencies, bureaus and departments to apply for and manage grants for energy efficiency, renewable energy and sustainability initiatives. Opportunities include:
 - Establishing a federally capitalized revolving loan fund to provide low interest loans to green building and green infrastructure projects.
 - Identifying financial opportunities for transit projects in the State Energy Program through the Department of Energy (DOE) Energy Efficiency and Renewable Energy program.
 - Participating in the Green Building Initiative sponsored by the Kresge Foundation.
 - Obtaining tax credits through Oregon Incentives for Renewables and Efficiency.
 - Applying for Section 319 grants.
 - Considering modifications to the State of Oregon Hazardous Substances Tax to include stormwater projects similar to the State of Washington.
- **Consider using Green Streetcar Funds to leverage public/private partnerships within streetcar corridors.** Make Green Streetcar Funds available for design/technical feasibility assistance, low-interest loans and/or grants for qualified energy efficiency, renewable energy and sustainability efforts for planned development projects.
- **Create a Streetcar Corridor Green Building bonus** to award greater height and development density (FAR) as an incentive for developing green-certifiable mixed-use buildings. This bonus can target specific areas to guide new development within designated higher density nodes.
- **Provide a height and FAR bonus** for developments that use certifiable renewable energy.



SUPPLEMENTAL TECHNICAL REPORTS

See www.portlandonline.com/transportation/streetcarsystemplan for all Supplemental Technical Reports.

A - Screening and Evaluation Methodology Report

B - Screening and Evaluation Results by Phase (Matrices and Maps)

C - Transit Technology Review

D - Network Design

E - Streetcar's Influence on Portland's Neighborhoods

F - Public Involvement Report

This report includes material from several sources. The City of Portland would like to specifically recognize the following:

- Street Smart: Streetcars and Cities in the Twenty-First Century. Edited by Gloria Ohland and Shelley Poticha, Reconnecting America
- "Portland Streetcar System Plan: Working Paper - Network Design" by URS San Francisco. Authors: Mark Dorn (URS, Portland), John Cullerton (URS Portland), Sharon Kelly (URS, Portland), Duncan Watry (URS San Francisco), Irene Avetyan (URS San Francisco)
- "Portland Streetcar System Plan: Working Paper - Transit Technology Review" by URS San Francisco. Authors: Mark Dorn (URS Portland), Sharon Kelly (URS Portland), Duncan Watry (URS San Francisco), Julia Chan (URS San Francisco)
- "Portland Streetcar Development Oriented Transit" by the Bureau of Transportation and Portland Streetcar, Inc., March 2008
- "Streetcar-Development Linkage: The Portland Streetcar Loop" by E.D. Hovee & Company, LLC, February 2008
- "Central City Streetcar: Commitment, Permanence, Catalyst" by Zimmer Gunsul Frasca Partnership, August 1993

