INTRODUCTION

The City of Seattle’s Department of Transportation (SDOT) is proposing the Seattle Streetcar – the Center City Connector, a modern streetcar line in Seattle’s Center City linking the existing South Lake Union and First Hill Streetcar lines (Figure 1-1). The Center City Connector would serve the City of Seattle’s three intermodal hub (transit centers) areas: Westlake Intermodal Hub, Colman Dock Intermodal Hub, and King Street Intermodal Hub. In addition, it would provide convenient transfers to the Third Avenue Transit Spine¹ at both ends of downtown Seattle, and Link Light Rail at several locations (Figure 1-1).

The Center City Connector would provide about 1.25 miles of new double trackway from the Westlake Intermodal Hub at the junction of Stewart Street and Westlake Avenue to First Avenue near Pike Place Market, south along First Avenue to connect with the First Hill Streetcar Station at Jackson Street and Occidental Street in Pioneer Square. Most of it would operate as a transit-only facility. It would also include a single track between Westlake and Terry Avenues on Republican Street, five new stations, and six new streetcar vehicles. It would also expand one or both of the existing streetcar operation and maintenance facilities (OMFs) located in (1) South Lake Union at Fairview Avenue N and Thomas Street and (2) in the Chinatown-International District at South Charles Street and Eighth Avenue South.

A City of Seattle planning effort preceded this Environmental Assessment (EA). The City determined the need for certain downtown transportation improvements, as described in Chapter 2. Then, with significant public involvement, it completed a thorough analysis of ways to achieve the project purpose, as described in Chapter 3. That analysis led to the City Council’s selection of a Locally Preferred Alternative (LPA) on July 21, 2014. Chapter 4 of this EA analyzes the LPA’s environmental impacts as required by the National Environmental Policy Act (NEPA) and its implementing regulations, and by the NEPA implementing procedures of the U.S. Department of Transportation Federal Transit Administration (FTA). FTA may be asked to fund part of the project and thus, serves as the lead federal agency on the EA. As required by NEPA, the EA also analyzes a No Build Alternative as a baseline against which to evaluate the build alternative’s impacts.

¹ The Third Avenue Transit Corridor or “Spine” becomes a transit-only roadway Third Avenue between Jackson Street in the Chinatown-International District, through the Commercial Core, to the north end of Belltown at Denny Way during peak-hour commute periods, enhancing cross-city reliability and travel-time efficiency. Third Avenue is downtown Seattle’s most heavily used transit corridor, used by more than 2,500 buses every weekday, and about 42,000 people board at bus stops on the corridor each day.
The City of Seattle and FTA will use the EA’s analysis and conclusions, augmented by any public comments on the document, in determining whether the project warrants a more detailed Environmental Impact Statement, or whether the analysis supports a finding that the project is not likely to have significant environmental effects.
Figure 1-1  Project Vicinity in Seattle, Showing Connections with South Lake Union and First Hill Streetcar Systems
2 PROJECT PURPOSE AND NEED

A purpose and need statement explains why a project is being proposed and why it is a worthwhile investment of time and money. It also helps provide context and criteria for developing a range of possible alternatives and eventually the selection of a Locally Preferred Alternative (LPA). This chapter summarizes the purpose and need for the Center City Connector. The complete purpose and need statement can be found in Appendix B1a, *Seattle Center City Connector Transit Study Volume I: LPA Report – Appendix A* (SDOT, 2014).

2.1 Project Purpose

The purpose of the Seattle Center City Connector is to serve the growing demand for Center City circulation trips with a mode and alignment that are easy to use, and to connect the existing South Lake Union and First Hill streetcar lines, providing a highly visible and effective Center City circulation system of travel between the downtown commercial core and Center City neighborhoods.

2.2 Project Need

The Seattle Department of Transportation (SDOT) has developed a city-wide Transit Master Plan (TMP). The TMP is a comprehensive, 20-year look ahead to the type of transit system that will be required to meet Seattle’s transit needs through 2030. The 2012 TMP update identified six major initiatives, one of which is to develop transit options in Seattle’s Center City to support the continued vitality of an increasingly dense, urban center city.

The need for the Center City Connector is based on:

Substantial existing population and employment and projected growth in the Seattle Center City. Seattle’s Center City neighborhoods have a high concentration of households and employment. Currently, Seattle Center City is estimated to have 200,000 workers and 69,000 residents, the highest employment and population densities citywide (Puget Sound Regional Council [PSRC], 2014). Within the Center City Connector area, PSRC projects a 35 percent increase in population and a 50 percent increase in employment, with an additional 31,000 people and 190,000 jobs expected by 2035 (PSRC, 2014). Recent increase in density zoning (“up-zoning”) amendments to the Seattle Comprehensive Plan encourage high-density residential housing to target areas near the main office core and greater office development in the downtown core.

- Growth in demand for Center City circulation trips. Within the City Center area, there is a strong market demand for short trips between the 10 neighborhoods that

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2 For the purposes of this study, Center City circulation trips would occur between and within Center City neighborhoods, which include major attractions and destinations in the Center City as well as linkages with local and regional transit services to other major destinations.

3 The project was identified in the Seattle Transit Master Plan (Seattle Department of Transportation [SDOT], 2012) as a top priority, because it would increase transit capacity, enhance transit service quality and reliability, and improve transit options for residents, workers, and visitors traveling between and within Center City neighborhoods and attractions.
comprise the Seattle Center City, including many destinations, employment sites, and services in the area (SDOT, 2011). Recent analysis found high demand for trips between Center City neighborhoods and for accommodating “last mile” connections for trips using existing and planned local and regional transit services (SDOT, 2014). Despite a high intensity of bus service in and through the Center City Connector corridor, few routes are directly oriented to Center City travel markets or “last-mile” connections from regional transit hubs to the final destination. Moreover, King County Metro bus service was rerouted from First Avenue to the Third Avenue transit way in 2011, leaving First Avenue and Alaska Way without continuous transit service through downtown. First Avenue contains many of the top tourist (e.g., Pioneer Square and Pike Place Market) and business destinations, including access to waterfront features, such as regional ferry service.

- **Constraints on expansion of Center City transportation.** There are limited north-south through streets available for transit to serve Center City destinations, and existing and planned transit will use much of the available capacity. Seattle already suffers from frequent congestion, ranking fifth among all U.S. cities in 2015 (TomTom International, 2015). Transportation capacity is already constrained in the Center City, as articulated in the following three points:
  - There is inadequate commuter access capacity within the mature transportation system, with no new available right-of-way, and a discontinuous street system must funnel traffic into five north-south Center City through streets. Reduced freeway portals (due to removal of the Alaskan Way Viaduct) will further limit how persons can move within the Center City.
  - Furthermore, increased future transit demand on the Third Avenue transit way and other transit-carrying surface streets limits capacity of inner city circulation, and a majority of these transit services are not oriented for local circulation trips.
  - Finally, ridership analysis shows that there is high passenger utilization on existing transit services serving connections between Center City neighborhoods. For example, routes traveling through the Commercial Core from Lower Queen Anne to the Chinatown-International District frequently run at 130 to 150 percent of seated capacity during peak periods (King County Metro. 2002).

- **Mobility needs of tourists and visitors in the Center City.** Approximately 10 million tourists visit Seattle each year, many seeking to use public transit as their primary means of mobility (Visit Seattle, 2013). Connections between retail districts are needed to support a vital local economy (e.g., Pioneer Square, Pike Place Market, Chinatown-International District, Belltown, and the commercial core). Downtown transit service must also meet the increased demand for access to Seattle’s entertainment and cultural centers, such as the Waterfront, Seattle Center, and the Olympic Sculpture Park.

- **Affordable transportation access to key social and human services located in the Center City.** Many social service agencies in the Center City rely on good transit connections. Seattle's Center City has the highest concentration of services for homeless and vulnerable populations in the Puget Sound region. There are over 9,000 affordable
housing units\textsuperscript{4} located throughout the Center City. There are another 5,000 affordable housing units planned within Pioneer Square District. In South Lake Union, over 11,000 additional housing units are targeted by 2031, 4,000 of which are assigned to be affordable units.\textsuperscript{5}

- **Connections for low-income Center City residents to jobs in other Center City areas.** While downtown has and continues to develop affordable housing in the City Center area, there is a growing concentration of affordable housing and low- and moderate-income jobs throughout the City. Both residents and employers require increased accessibility to take advantage of cross-community opportunities.

- **Increasing greenhouse gas emissions resulting from vehicles and traffic congestion.** Seattle’s Climate Action Plan to reduce greenhouse gas emissions cannot succeed without higher-capacity transit to support dense, mixed-use neighborhoods in the Center City. As of 2008, approximately 40 percent of Seattle’s greenhouse gas emissions came from road-related transportation sources. Transportation is the only sector in Seattle for which greenhouse gas emissions are continuing to increase, now roughly 7 percent above 1990 levels.

\textsuperscript{4} Affordable housing is intended for households those whose yearly income is 0-80 percent of the average median income.

\textsuperscript{5} Housing: South Lake Union 2012 Update:
3 ALTERNATIVES

The alternatives analysis is considered the “heart” of an environmental process. It involves reviewing a broad range of alternatives and selecting a more limited number to advance for detailed study in an environmental document, and it involves the public and agencies that have an interest in the project. This chapter summarizes the range of alternatives considered for the Center City Connector, outlines the screening process, and describes the results of that process, which led to the selection of the LPA.

3.1 Alternatives Screening Process

The City of Seattle’s Transit Master Plan, adopted in 2012, identified four corridors with the highest ridership potential and the greatest need for higher capacity transit service. One of these corridors was the Center City Connector, which runs through downtown Seattle and connects the South Lake Union and First Hill Streetcar lines. In 2013, SDOT developed, evaluated, and documented a range of alternatives for the Center City Connector. The process included strong involvement of stakeholders, other interested parties, and the general public by holding public meetings, soliciting input via notices in local newspapers and journals, and door-to-door outreach effort to businesses and property owners. The results of the screening process and public outreach activities are documented in the in the Center City Connector Transit Study: LPA Report (Volume I) (SDOT, 2014a) and Center City Connector Transit Study Detailed Evaluation Report (Volume II) and its technical appendixes (SDOT, 2014b). From this report, the environmental review began, narrowing the remaining design options to further avoid and minimize impacts. The following records this alternatives analysis and the factors that influenced the identification of a Locally Preferred Alternative.

The evaluation framework consisted of three stages of analysis: Initial Screening, Tier 1 Screening, and Tier 2 Evaluation. Figure 3-1 illustrates how that process narrowed down all reasonable alignment and mode options into an LPA to be analyzed further in this EA.

Extensive public outreach accompanied each stage of the work (see Chapter 7) and influenced the design refinements and ultimate selection of the LPA, by the Seattle City Council on July 21, 2014.

For more information about the screening and associated community outreach process, see Appendix B1 and B2 of this EA.7

6 Volumes I and II of the transit study are hereafter referred to as the “CCC Transit Study” and can be found in Appendix B1 and B2 of this EA.

7 The full study can also be found at [http://www.seattle.gov/transportation/centercityconnector.htm](http://www.seattle.gov/transportation/centercityconnector.htm).

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What is a Locally Preferred Alternative (LPA)?

An LPA is the alternative that emerges from the evaluation of mode and alignment options in project planning and is selected by leadership because it is believed to best balance the project’s needs and constraints.
3.2 Range of Alternatives Considered

The CCC Transit Study evaluated five potential transit modes and seven transit alignments recommended in the *Transit Master Plan* (TMP; SDOT, 2012). Transit modes evaluated included the following:

- Enhanced bus service
- Streetcar with exclusive transit way
- Streetcar in mixed traffic
- Light rail
- Monorail

Transit alignments evaluated included north-south alignments on Fourth/Fifth Avenues (couplet), Third Avenue and First Avenue. The project team solicited public input on these potential alignments at the February 6, 2013 open house. Several additional alignments identified by the public were among the seven alignments initially evaluated. The study then focused on narrowing alternatives in the Seattle Center City to leverage transit investments of city and regional partners by connecting existing streetcar termini at the north and south ends of the downtown area, consistent with the project’s purpose and need. Figure 3-2 shows alternatives that were carried forward to the next screening phase.
Figure 3-2  Range of Alternatives Considered
3.3 Screening Results

The following sections describe the results of the three screening phases and how the LPA was selected.

3.3.1 Initial Screening

The initial screening phase evaluated the various transit modes and a broad range of alignments against criteria derived from the project purpose and need (see Chapter 2). The following initial evaluation criteria were born out of the purpose and need:

- The consistency of an alternative or option with local and regional plans
- Whether an alternative or option met the project need of mobility and connectivity
- An alternative’s ability to serve key destinations and anchors
- Transit capacity
- Reduction in greenhouse gas emissions
- Public and stakeholder support

Monorail, light rail, and enhanced bus modes, as well as alignments that were outside the study area, were screened out. Similarly, the Third Avenue alignment would have had impacts on other transit services and would have been less accessible from the waterfront. The Fourth/Fifth Avenue and the First Avenue alignments, each with mixed traffic and exclusive streetcar modes, were advanced into the Tier 1 screening (Figure 3-2). For more details on the initial screening process, see Appendix B2 (Seattle Center City Connector Transit Study Volume II: Detailed Evaluation Report).

3.3.2 Tier 1 Screening

The intended outcome of the Tier 1 Screening process was to determine which alternatives best met the project purpose and need and also met the City of Seattle’s broader transportation goals and objectives. The following additional project objectives, consistent with City-wide transportation goals, were added:

- Enhance: Enhance the customer experience on transit

Initial Screening:

Modes: Monorail, light rail, and enhanced bus screened out: lack of continuity of travel served by South Lake Union Streetcar and First Hill Streetcars.

Alignments: Third Avenue alignment screened out: would not provide adequate service.

Tier 1 Screening:

Modes: Mixed traffic and exclusive streetcar advanced to Tier 2 Evaluation.

Alignments: Fourth and Fifth Avenue couplet alignment screened out: poor travel time and other transit service impacts.

Tier 2 Evaluation:

Modes: Mixed traffic streetcar screened out: unreliable travel time, lower ridership than exclusive-transit, and weak public support.

Alignments: East-West Design Options using Pike and Pine Streets with Fourth and Fifth Avenues design options screened out: same issues as the Fourth and Fifth Avenue alignments in Tier 1 Screening.

Locally Preferred Alternative

Mode: Streetcar in exclusive transit lanes.

Alignment: First Avenue with east-west connection using Stewart Street and Olive Way.
- Connect: Enhance connections between and access to Center City neighborhoods
- Develop: Support local and regional economic development goals
- Thrive: Strengthen downtown and Center City neighborhoods
- Sustain: Improve and sustain human and ecological health

The Tier 1 screening removed the couplet alternative on Fourth/Fifth Avenues because it fared poorly relative to travel time and impacts on current bus service as a result of the heavy use of Fourth Avenue for regional transit routes and because the street right-of-way offers limited opportunity to expand exclusive transit operations, particularly given planned bike facilities identified in the Seattle Bike Master Plan (SDOT, 2014c). The First Avenue alignment had stronger stakeholder support, served tourist and visitor mobility needs more effectively, and had lower impacts on transit, bicycles, and automobiles. The two alternatives carried forward were on one alignment, the difference being that one alternative was an exclusive-streetcar travel lane and the other was mixed streetcar with general purpose traffic flow.

### 3.3.3 Tier 2 Evaluation

The Tier 2 evaluation used many of the same evaluation measures used for the Tier 1 evaluation. However, during this phase, more detailed data and modeling were available. Based on stronger performance against the evaluation criteria and greater public support, the City Council selected the First Avenue Exclusive Streetcar as the Center City Connector LPA. However, the Council also requested further analysis of East-West Design Options for connecting First Avenue and Westlake Station (Council Resolution 31526). The East-West Design Options are described below and shown on Figure 3-3:

- **Design Option A (identified as LPA):** Travels from First Avenue east on Stewart Street and veers right onto Olive Way between Third and Fourth Avenues, before returning to Stewart Street then northbound on Westlake Avenue to reach the Westlake Station. Returning westbound from Westlake Avenue, it remains on Stewart Street to reach First Avenue. Stations would be at Third/Fourth Avenue and Stewart Street and at Westlake Avenue and Sixth Avenue.

- **Design Option B:** Travels from First Avenue east on Stewart Street, veers right onto Olive Way and turns south on Fifth Avenue. It returns westbound on Pine Street to reach First Avenue. Stations would be at Fifth Avenue and Olive Way, at Third Avenue and Stewart Street, and at Fourth Avenue and Pine Street.

- **Design Option C:** Travels from First Avenue east on Pike Street, north on Fourth Avenue and east again onto Olive Way. It returns south on Fifth Avenue before traveling westbound on Pine Street to reach First Avenue. Stations would be at Fifth Avenue and Olive Way, at Fourth and Pike Street, and at Fourth Avenue and Pine Street.

- **Design Option D:** Travels from First Avenue east on Pike Street, north on Fourth Avenue and east again onto Olive Way. It returns south entirely on Stewart Street to First Avenue. Stations would be at Fifth Avenue and Olive Way, at Fourth Avenue and Pike, and at Third Avenue and Stewart Street.
The public supported Option A, which also had the best overall transit and vehicle performance and would interfere least with dedicated bicycle and pedestrian zones. This option has been incorporated into the LPA, with minor refinements as described in Section 3.4.2.

Finally, a design option for a side platform located on Eighth Avenue S at S King Street was considered as an element of the proposed turnback operation for cars originating from the northern terminus of the streetcar system (Fairview Avenue N at Campus Drive). The proposed station would have allowed passengers to board at this location, rather than boarding at the existing Seventh Avenue S and S Jackson Street platform. The proposal was evaluated but removed from further consideration because the second boarding location for the trips returning to the Center City and South Lake Union may cause confusion for riders and add delay to the turnback operation.

3.4 Alternatives Carried Forward

Two alternatives were carried forward for detailed study in this EA: the No Build Alternative and the LPA, along with station locations and expansion of one or both of the OMFs.

3.4.1 No Build Alternative

The No Build Alternative analyzed in this EA consists of the existing transportation system with planned regional and local projects that are committed to occur within the project study area. In the Center City Connector Project’s Opening Year (2018), major infrastructure improvements assumed to be in place in the No Build Alternative include the Alaskan Way Viaduct Replacement Project, Elliott Bay Seawall Replacement Project, Waterfront Seattle Program, Seattle Streetcar Broadway Extensions, and Sound Transit’s Link Light Rail expansion. Other major infrastructure improvements assumed to be in place by the Design Year (2035) include the Seattle Multimodal Terminal at Colman Dock and further expansion of Sound Transit’s Link Light Rail system to destinations including Lynnwood to the north, Overlake to the east, and Kent/Des Moines to the south. (See Appendix H1, Transportation Technical Report, for a detailed list.) These assumptions are based on the latest information, but project dates can change. Figure 3-4 provides an overview of existing and planned transit services and facilities in the Center City.
Figure 3-4  Existing, Planned and Funded Transportation Facilities in the Study Area
Key downtown transit infrastructure includes the Third Avenue Transit Way (or spine), which is a roadway that converts to transit-only during peak commute periods; the Downtown Seattle Transit Tunnel; South Lake Union Streetcar, First Hill Streetcar, and Broadway Streetcar; and major multimodal hubs at Westlake Center, King Street, and Colman Dock.

Transit services under construction include expansion of Link Light Rail to Capitol Hill, the University District, Northgate, and South 200th (Angle Lake). Other notable existing, planned, and funded transportation-related projects included in the No Build Alternative are the Alaska Way Viaduct Replacement tunnel construction work, removal of the Alaska Way Viaduct (SR 99), improving the Alaska Way arterial, and the recent implementation of protected bike lanes on Second Avenue and Pike Street. (Refer to Appendix C to the Transportation Technical Report [Methods and Assumptions Technical Memorandum] – see Appendix H1 of this EA).

The No Build Alternative for the 2035-year analysis includes Sound Transit’s north and east expansion of the Link Light Rail system, which would limit the Downtown Seattle Transit Tunnel to light rail operations only, when all bus service that is currently inside the tunnel will be operating on surface streets at that time.

### 3.4.2 Locally Preferred Alternative

The Center City Connector LPA would add 1.25 miles of double track, connecting the South Lake Union Streetcar trackway in northern downtown Seattle at the Westlake Transit Hub with the First Hill Streetcar trackway, which currently terminates in the Pioneer Square area at S Jackson Street and Occidental Avenue S. The new trackway would be transit-only, with the exception of a few one- or two-block segment on Stewart Street where adjacent uses do not allow a restricted-use lane. In addition, the Center City Connector would include five stations, turnback tracks, and expansion of either or both of the existing streetcar OMFs. The LPA would include a single-track using the south parking lane on Republican Street to connecting existing South Lake Union streetcar tracks on Terry and Westlake Avenues. Streetcar station platforms and sidewalk crossings would be compliant with Americans with Disabilities Act (ADA) throughout the project.

**What is the No Build Alternative?**

The No Build Alternative provides a baseline for establishing and comparing the environmental impacts of alternatives. It describes what would happen if the project were not built and includes “planned” improvements that are part of the fiscally constrained long-range plan, which also includes the state DOT’s transportation improvement program and local agency’s capital improvement program.

**Project Component Definitions**

- **Turnback Track**: A short track that the streetcar uses to cross from the current track to the center of two tracks and then, upon changing direction, cross into the opposite track direction.
- **Headways**: The time between streetcar arrivals at each stop (frequency of stops).
- **Platform**: The area where passengers wait at the station. Platforms can be located on the roadside sidewalk or in the median of the road between the streetcar tracks. Platforms would be compliant with the Americans with Disabilities Act (ADA).
The Center City Connector would allow the First Hill Streetcar and South Lake Union Streetcar to operate as independent lines, with approximately 2 miles of overlapping service from Republican Street near South Lake Union to Eighth Avenue S in the Chinatown-International District (see Figure 3-5). The overlapping portion of the lines would have 5-minute headways between 7 a.m. and 7 p.m. on weekdays and Saturdays and between 8 a.m. and 7 p.m. on Sundays.

The alignment and the individual components of the LPA are described below and illustrated in Appendix G.

Beginning at the northern-most end, the streetcars would overlap starting at Republican Avenue, traveling on the existing South Lake Union trackway to a new station adjacent to the Westlake Transit Hub. From Westlake Avenue at Sixth Avenue the streetcars would travel on the new double trackway turning westbound on Stewart Street to First Avenue, except for a short one-way couplet that would use Olive Way northeast-bound between Third and Fourth Avenues. The southwest-bound streetcar trackway would remain on Stewart Street.

The LPA would continue double track in transit-exclusive center lanes of First Avenue south to Pioneer Square, where it would connect with the First Hill Streetcar Station at S Jackson Street and Occidental Avenue S (see Figure 3-5). From here, the route would use the existing First Hill Streetcar trackway, along Jackson Street to Eighth Avenue S. Streetcars would use the existing Chinatown-International District OMF access tracks on Eighth Avenue S to return the streetcars in the opposite direction. No change to the existing track on Eighth Avenue S would be necessary.

As shown on Figure 3-5, five new streetcar stations would be added along the corridor:

- **Westlake**: A center-median platform would be located on Westlake Avenue at Sixth Avenue. The existing platform on McGraw Plaza would remain and be used for events where there is demand for extra streetcar service.
- **Third/Fourth Avenues**: Located between Third and Fourth Avenues, the station would be split, with the southwest-bound platform on Stewart Street on the existing traffic island and the northeast-bound platform located on the sidewalk on Olive Way.
- **Pike**: This station would be a center-median platform on First Avenue between Pike and Pine Streets.
- **Madison**: One center-median platform would be located between Madison Street and Spring Street.
- **Pioneer Square**: A center-median platform on First Avenue would be located between Columbia and Cherry Streets.

The station platforms would range in width from 10 to 12 feet, and the length of the stations would vary to maximize accessibility. In some cases, the station would be the length of the block to provide access at either end of the block. Stations may include benches, fare dispensers, and small canopy covers and would be designed in accordance with commercial and historic district guidelines. Other urban design features could include distinctive paving for transit-exclusive travel lanes.
3.4.2.1 Roadway Operations and Transit Priority

The Center City Connector would run in transit-exclusive travel lanes between the Westlake Intermodal Hub and the King Street Intermodal Hub with a minor exception on Westlake Avenue where vehicles exiting the Bon Macy’s parking garage have a forced right turn eastbound into the lane where the Streetcar is planned. Currently, on First Avenue, the curb lanes designated for parking and loading zones become peak-hour travel lanes (see Figure 3-6). The LPA would remove these curb lanes to accommodate the exclusive double-track streetcar and station platforms. One general-purpose northbound and southbound lane would remain on either side of the center-running streetcar trackway. Example LPA trackway and station cross sections are illustrated on Figure 3-6.

There are 15 signalized intersections along the alignment on First Avenue and another five on Stewart Street between Second and Westlake Avenues (for more information see Section 4.1, Transportation). Transit signal priority (TSP) treatments (see sidebar) has been analyzed along First Avenue and where possible along the route for maximum streetcar reliability and safety.

Figure 3-7 illustrates the LPA’s TSP and turning modifications for each intersection (also see the project drawings in Appendix G, Concept Design Drawings). The LPA would eliminate six existing left-hand turns along First Avenue: four for northbound vehicles turning west toward Elliot Bay at Columbia, Union, Pine, and Stewart Streets and two for southbound vehicles turning east at Marion and Cherry Streets. Vehicles turning left at Pike, University, Spring, Madison and S Jackson Streets would receive a unique turn-signal cycle to avoid crossing in front of a moving streetcar.

3.4.2.2 Streetcar Vehicles and Overhead Contact System

Nine modern streetcar vehicles with on-board energy storage systems (OESS) would be purchased for the City of Seattle’s streetcar fleet. Three existing vehicles without OESS would be surplused, bringing the City’s total streetcar fleet to 16 vehicles. Streetcars with OESS can operate through wireless segments with no external power supply. The elimination of overhead wires in portions of the corridor would reduce conflicts with existing wires for trolley buses and minimize visual and aesthetic impacts. Figure 3-8 on illustrates the potential location of overhead contact system (OCS) wires and wireless segments along the proposed alignment. (See sidebar on Page 3-15.)
Figure 3-6  Stewart Street and First Avenue Cross Sections

Stewart Street - East of 3rd Ave, Looking East

1st Avenue - Madison to Spring, Looking North

1st Avenue - South of Yesler, Looking North
Figure 3-7  TSP and Turning Modifications for Intersection along the LPA
Figure 3-8  TPSS Locations and OCS/Wireless Segments
3.4.2.3 Traction Power System and Substations

The OCS would be powered by traction power substations (TPSS), which convert alternating current (AC) power from the Seattle City Light distribution network to direct current (DC) power at 750 volts, which the streetcars electrical system requires for operation. The north and south ends of the Center City Connector segment would be connected to the traction power systems of the South Lake Union and First Hill lines; one or two more TPSS would be added in the middle segment in locations selected during final design. The TPSS would be aboveground, enclosed structures approximately 15 feet by 30 feet (25 feet by 40 feet when including the grounding mat around the substation). Each TPSS would be located on public property in a prefabricated metal building (like the Broadway and Minor Avenue substation shown on Figure 3-9), in a custom building, or in an existing structure adjacent to the alignment, such as a private parking garage (as shown on Figure 3-10). Figure 3-8 identifies the locations of six potential TPSS sites. (See sidebar.)

3.4.2.4 Operations and Maintenance Facilities

Storage for the six vehicles added to the fleet would require expansion at either or both the South Lake Union and Chinatown-International District OMFs. Figures 3-11 and 3-12 display the maximum expansion needed at either site: the South Lake Union and Chinatown-International District OMFs respectively. The expansion would include storage tracks, switches, OCS poles and wire. To consolidate the two OMFs into a single site, SDOT would need a half-acre at either South Lake Union or Chinatown-International District; alternatively, it could expand both facilities by one-third of an acre.8 The Chinatown-International District OMF expansion area is located in an industrial zone on the southernmost portion of the existing OMF, away from residential units. Current office, shops, and support facilities at the Chinatown-International District OMF could accommodate the additional staff necessary for this expansion, but South Lake Union OMF would need an approximately 1,800-square-foot annex building.

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8 Each OMF is located on City-owned property adequate to accommodate facility expansion. No new land acquisition would be required.
Figure 3-9  TPSS as a Freestanding Structure (example located at Broadway and Minor Avenue)

Figure 3-10  TPSS Placed Inside an Existing Parking Garage (example located in Portland, Oregon)

Figure 3-11  Site Plan of the South Lake Union OMF Expansion

Figure 3-12  Site Plan of the Chinatown-International District OMF Expansion
To make room, an existing City-owned building on city property at the corner of Harrison Street and Fairview Avenue would be demolished. This lot is separated from residential units by the existing, fully enclosed OMF.

The project would include a new access track on Republican Street between Westlake Avenue N and Terry Avenue N to improve access to the South Lake Union OMF and to accommodate returning northbound to southbound streetcars. Alternatively, a crossover and storage track planned just north of the Westlake Station platform would allow First Hill streetcars to turnback rather than continue north to Republican Street. The City has adequate property at either location to expand the streetcar storage tracks or consolidate the OMF at one location. A decision would be made following public review of this EA.

### 3.4.2.5 Construction

The anticipated construction period (while influenced by several variables) could range between 12 months and 2 years. It would involve utility relocations, track work, and roadway reconstruction. Construction would be staged along the approximately 1.25-mile route, and duration of construction of any given portion of the project would typically be limited to between 6 and 8 months.

Generally, one lane of traffic in each direction would be open along the streetcar alignment during active construction periods, although full road closures may be necessary for short periods during evenings or weekends. On-street parking would be eliminated during lane closures, and loading zones would be relocated in coordination with adjacent businesses, except where street right-of-way allows loading zone pockets without blocking through lanes. Pedestrian access would be maintained on both sides of the streets, except for short periods necessary for safety purposes. Business access would be maintained throughout construction except for rare situations that would be coordinated whenever possible to occur during off-business hours.

Excavations at intersections would typically occur only at night or on weekends, with the opening covered with steel plates to allow weekday traffic. The following sections provide details on Center City Connector construction activities, phasing and staging.

### Construction Scope and Activities

Construction of the Center City Connector project would involve the following activities:

- Installation of temporary traffic control measures
- Removal of existing pavement
- Relocation, modification, or protection in-place of utilities in conflict with or affected by excavations for street-level trackwork and streetcar platforms
- Installation of trackwork, complete with preparation of track bed, track slab, rail, fasteners, communication ducts, and infill concrete
- Adaptation of surface and subsurface drainage systems, if needed
- Construction of streetcar stops using cast-in-place concrete
- Construction of TPSS with electrical power feeds
- Installation of traffic signal and streetcar control improvements
- Installation of OCS poles, wires, support brackets, and feeder cables
- Construction of station stop design finishes, such as canopies, benches, signage, trash receptacles, lighting, and other amenities necessary for a functional streetcar stop
- Signage and pavement markings

Construction would require graders, bulldozers, cranes, concrete trucks, flatbed trucks, dump trucks to haul dirt, and other equipment, as described below. Trucks would haul away spoil materials to approved disposal sites. Staging area(s) for equipment and material storage would be within the street right-of-way, with a potential for use of vacant lots near the project, with appropriate permissions and permits. These locations would be selected to minimize impacts on nearby uses. A track-welding staging area would be located inside the S Main Street right-of-way between Occidental Avenue S and Second Avenue S.

**Construction Staging and Phasing**

**Staging in Segments**

As shown on Figure 3-13, construction would be separated into four distinct geographic work segments, within which all or most of the track and roadway work would be completed:

1. **Pioneer Square:** This segment would extend from the First Hill Streetcar Station at Jackson Street and Occidental to First Avenue and Columbia Street.
2. **Madison Office Core:** This segment would run along First Avenue from Columbia Street to Union Street.
3. **Pike Place Market:** This segment would extend down First Avenue from Union Street to Stewart Street.
4. **Westlake Connection:** This segment would extend from First Avenue to the Westlake Station.
5. **Other Project Components:** Construction would also take place at the South Lake Union OMF and the Chinatown-International District OMF in parallel with segment construction. The single-track on Republican Street to support access to the South Lake Union OMF and First Hill Streetcar turnback would be installed as part of the South Lake Union OMF construction.

Within each segment, the work elements are generally grouped into utility relocation and track and platform civil work. Appendix C outlines the sequence for utility relocation, trackwork, and roadway reconstruction for each segment. The conceptual construction plans in Appendix C also describe anticipated lane closures, detours, and staging areas construction for each segment.

**Schedule Phasing**

Construction phasing will determine how long construction would take. Within each segment, a construction work area or “zone” would occupy two to eight consecutive blocks. The larger the work area or “zone,” the shorter the construction duration. Similarly, if construction activities continue through holidays and summer periods, the construction duration could also be shorter.

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9 The narrow right-of-way in this portion of the LPA would necessitate a detour route for one direction of travel during some of the construction period. A more detailed description is provided in Section 4.1.3.1 Arterial Roads, Construction Impacts.
Three schedule-phasing concepts for construction of the Center City Connector are under consideration. They are described below and shown on Figure 3-14.

- **Concept A (12 months):** This concept includes active work areas of six to eight consecutive blocks. Work in Segments 2 and 4 (Center City and Westlake) would likely have work performed during winter holidays. Work in Segments 1 and 3 (Pioneer Square and Pike Place Market) would be targeted to be completed during the winter/spring season to avoid the summer/fall peak tourism season.

- **Concept B (18 months):** This concept includes active work areas of four to five consecutive blocks. Work in Segment 2 (Center City) would be planned to be performed through the holiday periods. Work in Segment 4 (Westlake) would be conducted primarily on weekends. Work in Segments 1 and 3 (Pioneer Square and Pike Place Market) would be completed during the winter/spring season to avoid summer/fall peak tourism seasons.

- **Concept C (24 months):** This concept includes active work areas of two to three consecutive blocks. Work in Segment 4 (Westlake) would be conducted primarily on weekends. Work in Segments 1 and 3 (Pioneer Square and Pike Place Market) would continue during the holidays.

In Concepts B and C, work performed in Segment 1 (Pioneer Square) could occur in the beginning of the construction schedule, overlapping with Segment 3 (Pike Place Market), or it could be delayed to overlap with Segment 4 (Westlake) construction. This flexibility may be necessary to coordinate with other construction projects in the area.

The contractor would develop a detailed construction implementation plan before construction, including a specific construction schedule, traffic management plan, business and community coordination plan, and details on meeting permit requirements.
Figure 3-13  Construction Segments for the Center City Connector Trackway
Figure 3-14  Construction Phasing

**CONCEPT A**
- **Scenario 1**: Utilities
- **Scenario 2**: Track/Platforms/Civil
- **Scenario 3**: Utilities
- **Scenario 4**: Track/OCs/Civil

- Shortest overall duration (12 months)
- Largest work zones (6 to 8 blocks at a time)
- Work in Segments 2 and 4 continues through holidays
- Fewer summer impacts

**CONCEPT B**
- **Scenario 1**: Utilities
- **Scenario 2**: Track/Platforms/Civil
- **Scenario 3**: Utilities
- **Scenario 4**: Track/OCs/Civil

- Intermediate overall duration (18 months)
- Medium work zones (4 to 5 blocks at a time)
- Work in Segment 2 continues through holidays
- Fewer summer impacts

**CONCEPT C**
- **Scenario 1**: Utilities
- **Scenario 2**: Track/Platforms/Civil
- **Scenario 3**: Utilities
- **Scenario 4**: Track/OCs/Civil

- Longest overall duration (26 months)
- Smallest work zones (2 to 3 blocks at a time)
- Work continues through holidays and summers