The Seattle Department of Transportation

Seattle Streetcar Center City Connector

Streetcar System Operating Plan

July 2017

SDOT
Seattle Department of Transportation

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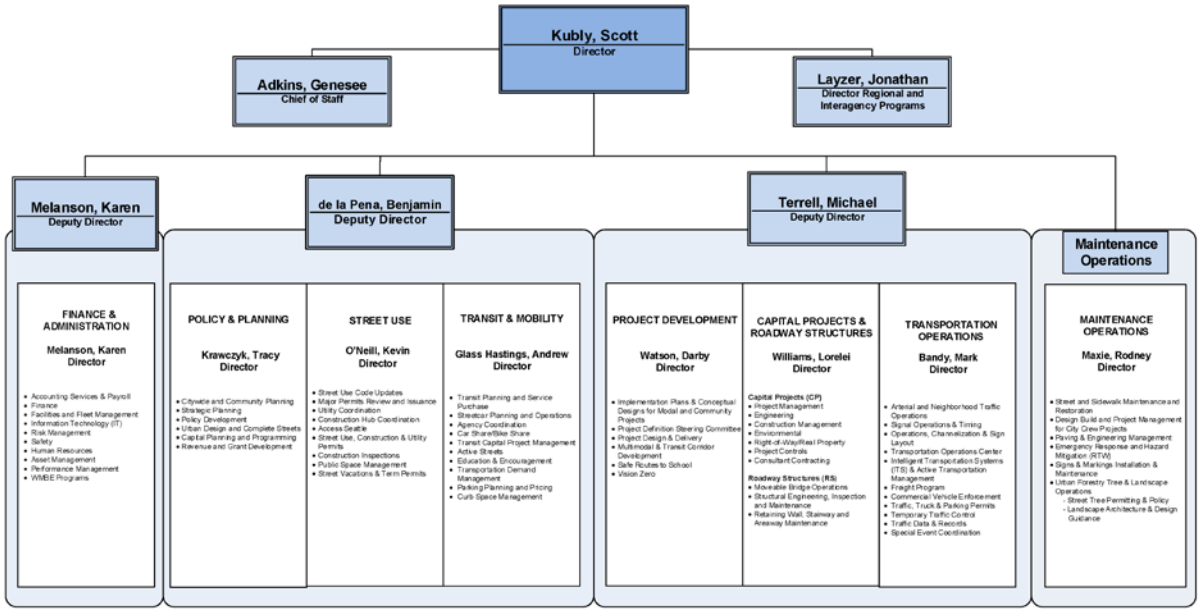
Operating Agency Description

The City of Seattle Department of Transportation (SDOT) is the lead agency responsible for the Center City Connector Project. SDOT's mission is to "deliver a high-quality transportation system for Seattle—a safe and reliable transportation system which enhances neighborhoods, the environment and the economy." SDOT's vision is for "a vibrant Seattle with connected people, places and products."

SDOT is responsible for delivering streetcar capital projects and provides oversight of streetcar operations and maintenance. Within SDOT, responsibility for the Seattle Streetcar system is primarily within the SDOT Transit & Mobility Division (see Figure 1 below).

Figure 1 SDOT Organization Chart, June 2017



The City of Seattle contracts with King County Metro Transit to operate the existing Seattle Streetcar lines through an interlocal agreement, and will expand the agreement to cover operations of the integrated Seattle Streetcar System when the Center City Connector opens.

King County Metro Transit provides supervisors and operators of the system, oversees the maintenance of the vehicles, and has the primary responsibility for the fleet of streetcar vehicles. SDOT staff provide oversight at the streetcar Operating and Maintenance Facilities (OMF). Responsibility for design, procurement, and testing predominantly rests with consultants of SDOT, including project management, design and systems engineers, for designated capital projects.

Section 3.2 of the Seattle Streetcar System Safety Program Plan (January 2016) describes King County Metro as well as SDOT roles and responsibilities in more detail.[1]

System Description

Existing System

The Seattle Streetcar system consists of two existing streetcar lines:

- The **South Lake Union line** is a 1.3 mile (end-to-end) modern streetcar line connecting the South Lake Union and Denny Triangle neighborhoods to the Commercial Core and the regional transit system. The South Lake Union line is equipped with a fleet of four Inekon Trio streetcars. These three-section, single car set, 20-meter vehicles have a seated capacity of 29 and a total capacity of 140 passengers each. This line opened in December 2007, and currently operates with up to four vehicles in the peak periods.
- The **First Hill line** is a 2.5 mile (end-to-end) modern streetcar line that initiated service in January 2016. There are 10 stops on the streetcar line. These cars are similar to the original Inekon Trio vehicles delivered for the South Lake Union line, though they feature an on-board energy storage system (OESS) that enable off-wire operation. This line is served by up to five vehicles in the peak periods.

Planned System

The 1.25 mile Center City Connector project will expand the Seattle Streetcar system by linking these existing lines, as illustrated in Figure 2.

The Center City Connector will run along Stewart Street and First Avenue, with over 85% of the new track operating in an exclusive transit lane, including all of the First Avenue alignment. The project includes a new turn-around track in the South Lake Union neighborhood (Republican Street between Westlake Avenue and Terry Avenue), crossover tracks at Union Street, and a turn-back track at the Westlake Station. The system will also take advantage of existing turn-back tracks at 6th and Jackson, 8th and Jackson, and 14th and Washington.

The Center City Connector project includes construction of five new stations along First Avenue and Stewart Street, and reconfiguration of the Occidental Station on S Jackson Street. Typical station amenities include benches, fare dispensers, and small canopy covers.

The full streetcar system will provide service from 5:00 a.m. to 1:00 a.m. Monday through Saturday, and 6:00 a.m. to 11:00 p.m. on Sundays and holidays. The Center City Connector, along with a portion of the system between the Thomas Street Station in South Lake Union and the 7th Avenue S Station in the International District, will operate with approximately 5-minute headways between 6:00 a.m. and 8:00 p.m. on weekdays, and 8:00 a.m. to 8:00 p.m. on Saturdays and Sundays (with approximately 7.5-minute headways at other times).

[1] Seattle Streetcar System Safety Program Plan, King County Metro. Version 10, January 2016. (p. 10-17)

The project will expand the Seattle Streetcar fleet with seven additional vehicles and three replacement vehicles that can operate in off-wire segments. At peak times, up to 14 of these vehicles will be in operation. The Center City Connector project will expand the existing streetcar operations and maintenance facilities to accommodate the larger vehicle fleet and higher staffing levels.

Streetcar vehicles serving the First Hill Streetcar and portions of the proposed alignment utilize on-board energy storage systems (OESS) to operate through wireless segments with no external power supply. The elimination of overhead wires in portions of the corridor reduces conflicts with existing wires for trolley buses and minimizes visual and aesthetic impacts.

The Overhead Contact System (OCS) will 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 streetcar's electrical system requires for operation. The north and south ends of the Center City Connector would be connected to the traction power systems of the South Lake Union and First Hill lines; one or two additional TPSS are needed in the middle segment.

Figure 2 Proposed Seattle Streetcar System

Vehicle and Accessibility Plan

Existing Seattle Streetcar policy outlines the protocol for maintaining vehicle accessibility for passengers with special needs with the following provision:

When requested, operators· shall assist passengers with special needs. An operator shall not ask the rider for proof of a disability based on Federal and State Civil Rights laws.[2]

On Inekon Trio vehicles at least one double-leaf door per vehicle side is equipped with an ADA-compliant platform bridging device for wheelchair access. These bridgeplates span the gap between the car floor and the station platform.[3,4] Space for at least two wheelchairs is provided in each vehicle, adjacent to the doorways with the bridging devices. Stanchions, grab bars, and handrails are provided to permit safe use of this area by standees when no wheelchairs are present. Other ADA requirements (as they apply to transit applications), such as signage and information displays, are also incorporated.

Passenger information systems and public address systems are checked daily and included in all Preventative Maintenance (PM) intervals. They must all operate properly for a car to be put into service.

Vehicle Operating Characteristics

The Center City Connector Streetcar Project will add seven new 20-meter, hybrid vehicles to the city's existing streetcar system fleet. A total of 17 vehicles are planned to operate the Seattle Streetcar system with the Center City Connector. This includes 14 peak vehicles (described in further detail below) and 3 spares (21% spare ratio). Further discussion of vehicle procurement and spare vehicle requirements is provided in the Seattle Streetcar System/Center City Connector Fleet Management Plan.

Figure 3 shows the dimensions of the current fleet vehicles. While SDOT has not yet selected the manufacturer of the next order, specifications will be similar to the existing fleet. As shown in Figure 4, the new Trio vehicle is the same length, width, and height of the previous model, but is lighter in weight, has a lower load capacity, and can travel at higher operating speeds (43.5 mph vs. 30 mph). When a manufacturer is selected, SDOT will update Figure 4 to reflect the selected manufacturer, dimensions, and attributes.

[2] Seattle Streetcar Rulebook, SDOT and Metro, 2/6/2017 (page 19)

[3] Seattle Streetcar Fleet Maintenance Plan, Metro, April 27, 2015 Rev. 6 (page 6)

[4] Center City Connector Streetcar Project Management Plan Appendix (Page 12)

Figure 3 Inekon Trio Vehicle Specifications

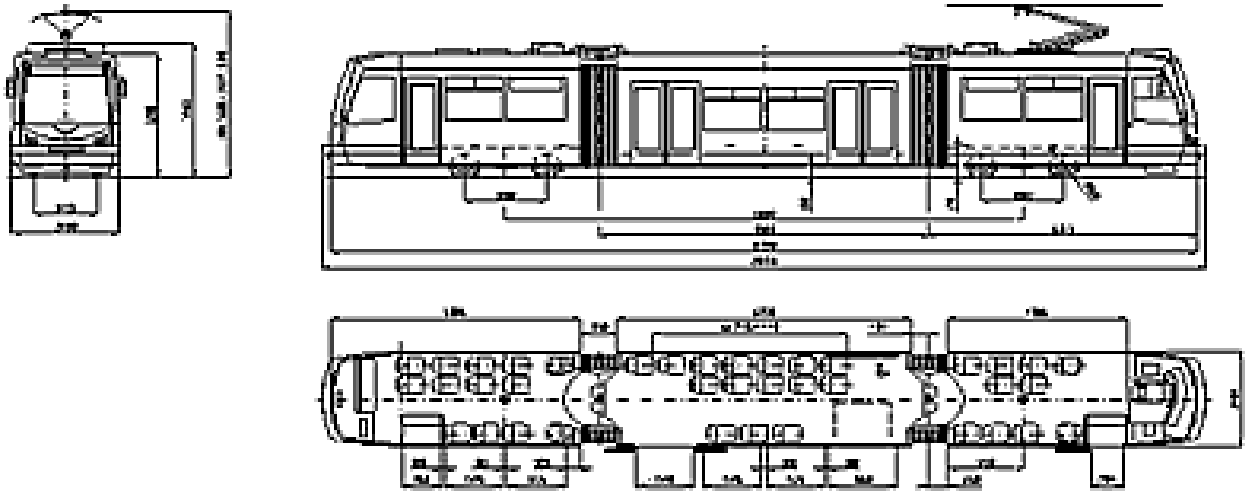


Figure 4 Vehicle Comparison

Characteristic	Inekon Trio-12 (Existing)	Inekon Trio-12 (Future)
Length	20.13 m	20.13 m
Width	2.46 m	2.46 m
Height	3.46 m	3.46 m
Number of doors	2 double-leaf, 1 single	2 double-leaf, 1 single
4 persons per sq. m (Standard load)[5]	115 (29 seats)	112
6 persons per sq. m (Crush load)[6]	158 (29 seats)	150
Maximum Gradient	8%	8%
Turning radius	18 m	18 m
Max Speed	30 mph	43.5 mph
Weight	30,000 kg (66,200 lbs)	26,000 kg ±5% (57,300 lbs)
Low-floor	50%	50%
Cost	$ 4.5 million	$5.25 million (Estimated)

[5] The Transportation Research Board defines several vehicle weight designations, including AW2 (weight with average peak-hour passenger load), and AW3 (crush loaded weight). In the US, peak-hour load is typically based on 4 passengers per square meter, while crush loads are based on 6 passengers per square meter.

[6] The crush loaded passenger capacities are calculated based on the standard load provided by each manufacturer.

Hours of Operation and Frequency

Figure 5 illustrates the operating plan concept for the integrated streetcar system with the Center City Connector, which includes two overlapping operational lines:

- **South Lake Union to Chinatown/International District**: Fairview Avenue & Campus Drive to S Jackson Street & 8th Avenue S
- **Capitol Hill-South Lake Union**: Broadway & Denny Way to Westlake Avenue & Republican Street)

The operating plan assumes both individual streetcar lines will operate with planned service levels of 10-minute peak and 15-minute off-peak headways. Trains would arrive every 5 minutes (peak) and 7.5 minutes (off-peak) in the overlapping segment between International District and Thomas Street in South Lake Union.

Figure 6 summarizes the headway by line, day of week, weekends, and time-of-day.

Figure 5 Proposed Seattle Streetcar System Operating Plan

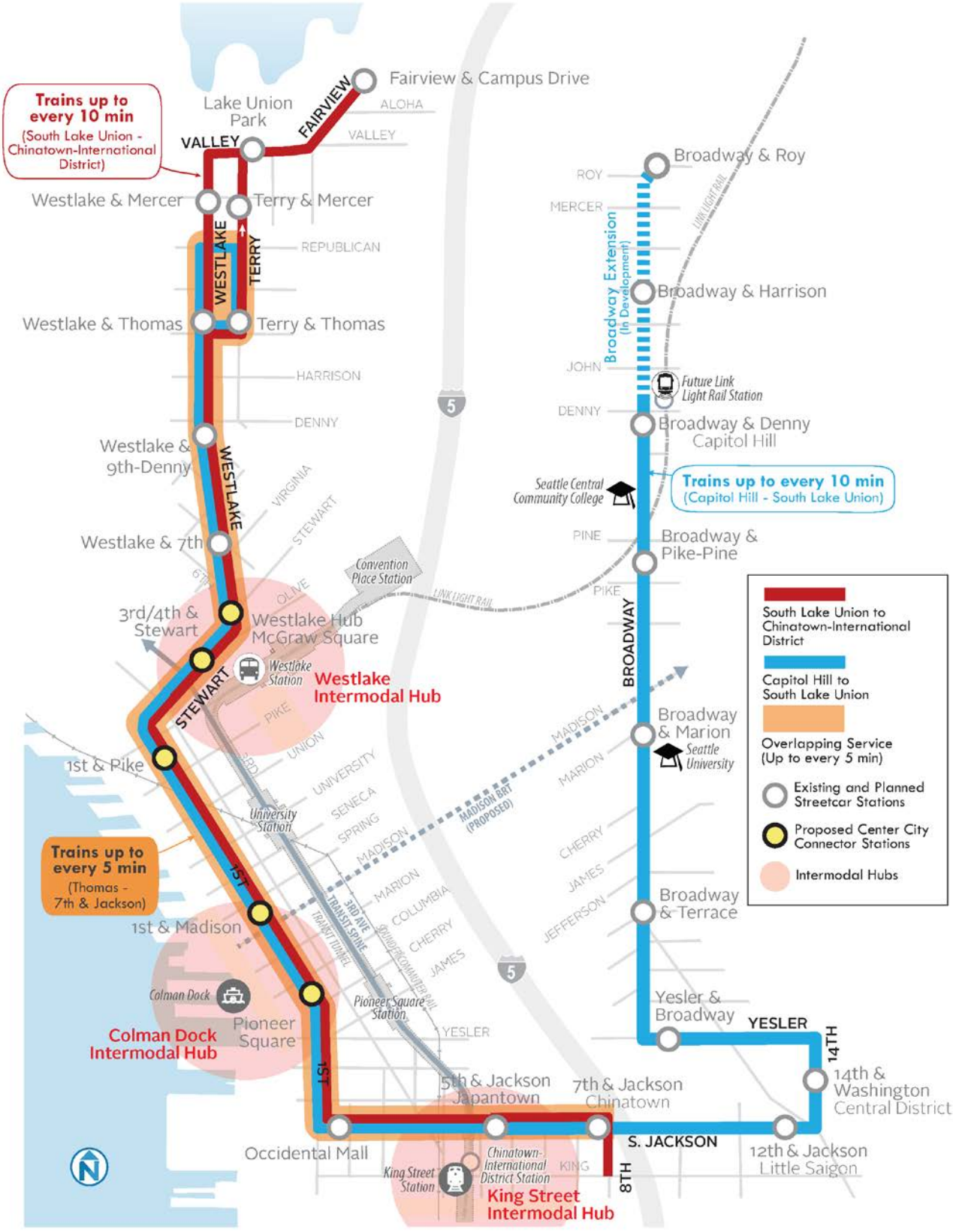


Figure 6 **Operating Plan: Assumed Streetcar Vehicles and Headway by Line and on Center City Connector Segment**

	Operating Segment		Span of Service		
			Weekdays & Saturdays		
			5 AM to 6 AM	6 AM to 7 PM	7 PM to 1 AM
Cars in Operation	South Lake Union to Chinatown/International District	Fairview & Campus Drive to 8th & Jackson	4	6	4
	Capitol Hill to South Lake Union	Broadway & Denny to Terry & Thomas	5	8	5
Headway	South Lake Union to Chinatown/International District	Fairview & Campus Drive to 8th & Jackson	15	10	15
	Capitol Hill to South Lake Union	Broadway & Denny to Terry & Thomas	15	10	15
	Center City Connector	**Westlake & Thomas to 7th & Jackson**	**7.5**	**5**	**7.5**
			Sundays/Holidays		
			6 AM to 8 AM	8 AM to 8 PM	8 PM to 11 PM
Cars in Operation	South Lake Union to Chinatown/International District	Fairview & Campus Drive to 8th & Jackson	4	6	4
	Capitol Hill to South Lake Union	Broadway & Denny to Terry & Thomas	5	8	5
Headway	South Lake Union to Chinatown/International District	Fairview & Campus Drive to 8th & Jackson	15	10	15
	Capitol Hill to South Lake Union	Broadway & Denny to Terry & Thomas	15	10	15
	Center City Connector	**Westlake & Thomas to 7th & Jackson**	**7.5**	**5**	**7.5**

Travel Times and Peak Vehicle Requirements

Travel Times

Figure 7 provides additional detail on travel time and recovery time assumptions and vehicle requirements for each time period on weekdays and weekends. It identifies the range of round trip travel times, with and without recovery time. The average recovery time for each line is based on the following assumptions

- 10% for the Center City Connector portion of the alignment, which predominantly operates with exclusive lanes that are intended to provide a high level of reliability, and
- 15% for the existing South Lake Union and First Hill streetcar alignments. The existing streetcars operate primarily in mixed-traffic, although SDOT has been planning and implementing operational enhancements to improve streetcar travel time and reliability.

Travel times estimates for the Center City Connector portion of the alignment are based on traffic modeling for the project, while assumptions for the South Lake Union and First Hill portions are based on analysis of running time data for existing streetcar operations.

For the weekday daytime hours when SDOT desires to maintain 10-minute headways in the Capitol Hill and South Lake Union portions of the system, and 5-minute headways in the overlapping Center City Connector segment, peak streetcar travel times are currently in the afternoon, due to traffic congestion on the primarily mixed-traffic streetcar right-of-way (outside the Center City Connector segment)

Peak Vehicle Requirements (Based on Planned Headway)

Figure 8 provides the range of travel times for each line and the planned number of peak vehicles to maintain the desired headways. The planned number of vehicles and rationale for each line are:

- **South Lake Union to International District line (Fairview – 8th). Six peak vehicles are planned.** It is assumed that 6 vehicles are adequate to maintain the desired headways during the AM peak period and midday. Although the fractional number of vehicles exceeds 6 in the PM peak, based on increased travel times in the South Lake Union portion of the alignment, the higher travel time is within the recovery time window. SDOT has implemented transit priority features along Westlake Avenue to mitigate the impacts of traffic congestion on streetcar reliability, and plans to continue to take steps to improve transit travel times. SDOT will also periodically gather updated operating data for the Westlake Avenue improvements and update the operating plan based on the updated analysis.
- **Capitol Hill – South Lake Union (Denny – Thomas). Eight peak vehicles are planned.** It is assumed that 8 vehicles will be adequate to maintain the desired headways, with improvements planned by SDOT on a portion of the existing First Hill Streetcar alignment that is used by this line. The fractional number of vehicles required exceeds 8 throughout the day, particularly in the PM peak (although the travel time is within the

recovery time window). This is primarily due to traffic congestion along Broadway, along the existing First Hill Streetcar alignment. When SDOT opened the First Hill Streetcar in January 2016, travel times and reliability were worse than projected. The Center City Connector operating plan assumptions were updated to reflect actual First Hill Streetcar operations in Spring 2016 and SDOT conducted further study of actions to address performance on this portion of the alignment. SDOT analyzed and is currently planning to implement travel time improvements along Broadway. A first phase of improvements is planned for implementation in Q2/3 2017 and is estimated to reduce round trip travel times by approximately two minutes. A second phase of improvements is planned for late 2017 that is estimated to reduce trip travel times by an additional 1-2 minutes. A conservative, preliminary assumption for these improvements (3 minutes, including the low-end of the Phase 2 estimate) has been assumed as part of the operating plan analysis. Evaluation of travel time savings for the second phase of improvements are initial estimates pending the completion of the full traffic analysis that is underway. SDOT will revise the operating plan based on the updated analysis, as well as analyze operating data once the improvements are implemented.

Potential Future Enhancements

SDOT may also implement one or more of several additional options to enhance reliability of streetcar travel times These options are not included as part of the Center City Connector project or currently assumed in the analysis or costs:

- Adding an additional vehicle to serve the Capitol Hill – South Lake Union line. Given its relatively long length and that it is the only line that provides service east of 8th Avenue S, it could be desirable to provide another vehicle to support operations if it is not possible to sufficiently improve existing operations on Broadway (initiatives described above). This could also be considered as part of the proposed Broadway Streetcar Extension.
- Implement an “overlay” line that would maintain headways in the Center City Connector segment. If it is not possible to sufficiently improve existing operations on Broadway, one vehicle could operate on an overlay line starting in the midday time frame (operating at up to 45 minute headways) with up to two vehicles in the PM peak period (operating at about 30 minute headways). Operation of these lines would likely be dependent on procuring additional vehicles. A sidebar below describes characteristics of a potential overlay line.

Figure 7 Travel Time and Vehicle Assumptions by Line, Day of Week, and Time Period

Operating Segment		Time of Day	Headway	Round Trip Travel Time (Min)	MPH	Min. Vehicles (Without Recovery)	Recovery Time (min, round trip)	Average Recovery %	Planned Vehicles	
									Fractional	Rounded
Weekdays										
South Lake Union to Chinatown/ International District	Fairview & Campus - Jackson & 8th	5 AM to 6 AM	15	46	7.6	3.1	6.0	13%	3.5	4
		6 AM to 7 PM	10	51–55	6.4–7.0	5.1-5.5	6.6-7.2	13%	5.7-6.3	6
		7 PM to 1 AM	15	46	7.6	3.1	6.0	13%	3.5	4
Capitol Hill to South Lake Union	Broadway & Denny - Terry & Thomas	5 AM to 6 AM	15	65	8.9	4.3	9.1	14%	4.9	5
		6 AM to 7 PM	10	71-76	7.6-8.2	7.1-7.6	9.9-10.7	14%	8.1-8.7	8
		7 PM to 1 AM	15	65	8.9	4.3	9.1	14%	4.9	5
Saturdays and Sundays										
South Lake Union to Chinatown/ International District	Fairview & Campus - Jackson & 8th	Sat: 5 AM to 6 AM Sun: 6 AM – 8 AM	15	46	7.6	3.1	6.0	13%	3.5	4
		Sat: 6 AM to 7 PM Sun: 8 AM to 7 PM	10	46	7.6	4.6	6.0	13%	5.2	6
		Sat: 7 PM to 1 AM Sun: 7 PM to 11 PM	15	46	7.6	3.1	6.0	13%	3.5	4
Capitol Hill to South Lake Union	Broadway & Denny - Terry & Thomas	Sat: 5 AM to 6 AM Sun: 6 AM – 8 AM	15	65	8.93	4.3	9.1	14%	4.9	5
		Sat: 6 AM to 7 PM Sun: 8 AM to 7 PM	10	71	8.1	7.1	10.0	14%	8.1	8
		Sat: 7 PM to 1 AM Sun: 7 PM to 11 PM	15	65	8.93	4.3	9.1	14%	4.9	5

Figure 8 Travel Time and Vehicle Assumptions, Weekdays, by Time Period and Line

Operating Segment		Travel Time with Recovery (min)				Headway (min)				Vehicles - Fractional				Vehicles - Rounded			
		AM Peak	Mid-day	PM Peak	Off-Peak	AM Peak	Mid-day	PM Peak	Off-Peak	AM Peak	Mid-day	PM Peak	Off-Peak	AM Peak	Mid-day	PM Peak	Off-Peak
South Lake Union to International District	Fairview & Campus - Jackson & 8th	57.5	59.8	62.7	52.3	10	10	10	15	5.7	6.0	6.3	3.5	**6**	**6**	**6**	**4**
Capitol Hill to South Lake Union	Broadway & Denny - Terry & Thomas	80.9	84.4	87.3	74.0	10	10	10	15	8.1	8.4	8.7	4.9	**8**	**8**	**8**	**5**
Total										**13.8**	**14.4**	**15.0**	**8.4**	**14**	**14**	**14**	**9**

Figure 9 Detailed Travel Time Assumptions by Segment – Weekday Peak

Segment	Travel Time not Including Recovery (min)				% Recovery	Travel Time with Recovery (min)			
Clockwise	**AM Pk**	**Midday**	**PM Pk**	**Off-Pk**		**AM Pk**	**Midday**	**PM Pk**	**Off-Pk**
Denny to Roy (inbound) [1]	1.4	1.4	1.4	1.4	10%	1.5	1.5	1.5	1.5
Broadway from Denny to Yesler (inbound)	8.5	8.5	9.5	7.5	15%	10.0	10.0	11.2	8.9
Yesler, 14th, and S Jackson to 8th (inbound)	7.5	7.0	7.5	6.5	15%	8.6	8.1	8.6	7.5
S Jackson from 8th to Occidental (inbound)	3.5	4.0	4.5	3.5	15%	4.0	4.6	5.2	4.0
Center City Connector (Occidental – Westlake)	10.9	10.9	10.9	10.9	10%	11.9	11.9	11.9	11.9
Westlake from Westlake Hub to Thomas (outbound)	6.0	6.0	6.5	4.0	15%	6.9	6.9	7.5	4.6
From Thomas on Terry and Fairview (outbound)	5.0	5.5	6.0	4.5	15%	5.8	6.3	6.9	5.2
Counterclockwise									
Fairview to Westlake and Thomas (inbound)	6.0	6.0	7.0	5.0	15%	6.9	6.9	8.1	5.8
Westlake from Thomas to Westlake Hub (inbound)	4.0	5.0	5.0	4.0	15%	4.6	5.8	5.8	4.6
Center City Connector (Occidental – Westlake)	10.6	10.6	10.6	10.6	10%	11.6	11.6	11.6	11.6
S Jackson from Occidental to 8th (outbound)	5.0	5.0	5.0	4.0	15%	5.8	5.8	5.8	4.6
From 8th on S Jackson, 14th, and Yesler (outbound)	7.5	9.0	8.5	7.5	15%	8.6	10.4	9.8	8.6
Broadway from Yesler to Denny (outbound)	7.5	8.0	8.5	6.5	15%	8.9	9.4	10.0	7.7
Denny to Roy (outbound) [1]	2.0	2.0	2.0	2.0	10%	2.2	2.2	2.2	2.2
Summary (Cycle Times)									
Fairview (SLU) to 8th	50.9	52.9	55.4	46.4	13%	57.5	59.8	62.7	52.3
Denny to Thomas [1]	70.9	73.9	76.4	64.9	14%	80.9	84.4	87.3	74.0

Note: Saturday and Sunday streetcar travel times are assumed to be similar to weekday off-peak travel times.

[1] Part of proposed Broadway Extension, which is assumed to open after the Center City Connector project. Not included in overall cycle times.

Potential Overlay Line

As described above, an "overlay" line between South Lake Union and the Chinatown-International District (Thomas – 8th) could be implemented to maintain headways in the Center City Connector segment, depending on SDOT efforts to maintain reliable streetcar operations in the existing mixed-traffic streetcar segments. It is assumed that one vehicle would be required on an overlay line starting in the midday time frame (operating at up to 45 minute headways). It is assumed that two vehicles would be required on the overlay line in the PM peak period (operating at about 30 minute headways).

This line is dependent on procuring additional vehicles for operations, and is not currently part of the Center City Connector project.

Overlay Line Vehicle Assumptions

Operating Segment		Time of Day	Headway	Round Trip Travel Time (Min)	MPH	Min. Vehicles (Without Recovery)	Recovery Time (min, round trip)	Recovery %	Recommended Vehicles	
									Fract.	Rounded
Weekdays										
South Lake Union to International District	Westlake & Thomas - 8th & Jackson (Overlay)	5 AM to 6 AM	-	-	-	-	-	-	-	-
		6 AM to 7 PM	30	40-42	7.3-6.9	1.3-1.4	5.2-5.4	13%	1.6	2
		7 PM to 1 AM	-	-	-	-	-	-	-	-

Overlay Line Travel Time and Vehicle Assumptions by Time Period

Operating Segment		Travel Time with Recovery (min)				Headway (min)				Vehicles - Fractional				Vehicles - Rounded			
		AM Peak	Mid-day	PM Peak	Off-Peak	AM Peak	Mid-day	PM Peak	Off-Peak	AM Peak	Mid-day	PM Peak	Off-Peak	AM Peak	Mid-day	PM Peak	Off-Peak
South Lake Union to International District	Westlake & Thomas - 8th & Jackson (Overlay)	44.8	46.6	47.7	41.4	-	45	30	-	-	0.8	1.6	-	**-**	**1**	**2**	**-**
Total										**-**	**0.8**	**1.6**	**-**	**-**	**1**	**2**	**-**

Overlay Line Travel Time Summary

Segment	Travel Time not Including Recovery (min)				% Recovery	Travel Time with Recovery (min)			
8th to Thomas (Overlay) [2]	39.9	41.4	42.4	36.9	13%	44.8	46.6	47.7	41.4

[2] Potential Overlay Line, not assumed for opening day Center City Connector operations.

Ridership

Overall Transit Ridership Changes

Figure 10 provides forecasted ridership for the Streetcar System with the Center City Connector in the projected first full year of revenue service after opening (now 2020) and the horizon year (2035). Projected ridership is up to 34,500 riders by 2035. Highlights include:

- With the Center City Connector, ridership on the full system is forecast to be 16,600 riders per day in the current year, with nearly 66% of these with some portion of their trip to/from or through the Center City Connector segment.
- In the horizon year ridership of the system is forecast to grow to 29,500 riders per day with approximately 68% of trips to/from or through the Center City Connector segment.

Figure 10 Average Streetcar System Weekday Ridership

Scenario	2020*	2035
Build Streetcar System not Including Special Markets		
South Lake Union, First Hill, Center City Connector (1)	21,700	29,500
Build Streetcar System Including Special Markets**		
Visitors [2]	3,300	5,000
Total with Special Markets	25,000	34,500

Note: * Based on ridership modeling for 2019. 2020 is now the projected opening year, or no later than March 2021. **Sporting event special market trips are not included in average weekday ridership

Sources: [1] Federal Transit Administration. 2015. *Simplified Trips-on-Project Software*. Version 1.51. [2] Seattle Center City Connector Transit Study, Detailed Evaluation Report, Appendix B: Other Rider Markets (See Attachment C)

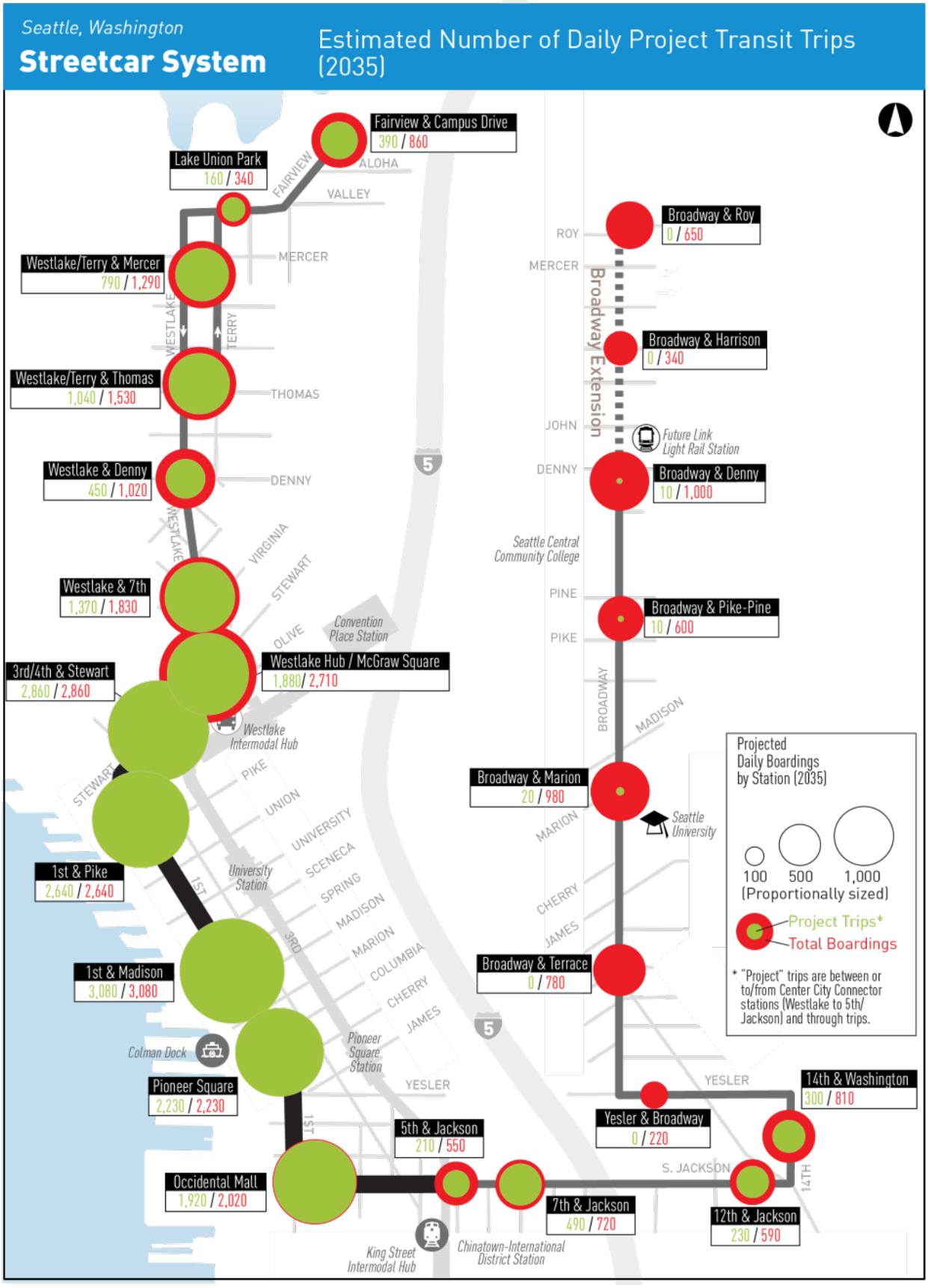
The table also provides estimates of ridership related to visitors that the Center City Connector would serve. These estimates were developed using a peer-based approach, drawing on information and data from similar cities and streetcar operations throughout the United States in conjunction with local data. Daily visitor ridership is estimated to be 2,800 to 5,000 riders, for total system ridership of 19,400 in the current year and 34,500 in the horizon year.

Ridership related to sporting events is not included in the table since it is not a daily occurrence but is estimated to range from 135 to 270 additional riders per Seahawks game, 90 to 175 additional riders per Sounders game, and 20 to 35 additional riders per Mariners game.

Figure 11 illustrated forecast project trips at each station in a 2035 horizon year in relation to total streetcar ridership (does not include special market trips).

Note: Modeled ridership includes the Broadway Extension (described above), which does not have a projected opening date. The Broadway Extension is thus considered as part of the passenger capacity analysis, but it is not included in the running time assumptions used to develop the operating plan.

Figure 11 Total Boardings and Project Trips, 2035



Proposed Schedules

Figure 12 illustrates a snapshot of a conceptual schedule for the segment between International District and Thomas Street, with regular 10-minute peak and 15-minyte off-peak headways on both lines.

Figure 12 Operating Plan Conceptual Schedules (Single Direction at Sample Station, Center City Connector Segment)

Line	Peak	Minutes between Vehicles in CCC
Capitol Hill to Thomas (SLU)	8:00 am	-
*SLU to International District**	*8:05*	*5*
Capitol Hill to Thomas (SLU)	8:10	5
*SLU to International District**	*8:15*	*5*
Capitol Hill to Thomas (SLU)	8:20	5
*SLU to International District**	*8:25*	*5*
Capitol Hill to Thomas (SLU)	8:30	5
*SLU to International District**	*8:35*	*5*
Capitol Hill to Thomas (SLU)	8:40	5
*SLU to International District**	*8:45*	*5*
Capitol Hill to Thomas (SLU)	8:50	5
*SLU to International District**	*8:55*	*5*
Capitol Hill to Thomas (SLU)	9:00	5

Line	Off-Peak	Minutes between Vehicles in CCC
Capitol Hill to Thomas (SLU)	8:00 pm	-
*SLU to International District**	*8:07*	*7*
Capitol Hill to Thomas (SLU)	8:15	8
*SLU to International District**	*8:22*	*7*
Capitol Hill to Thomas (SLU)	8:30	8
*SLU to International District**	*8:37*	*7*
Capitol Hill to Thomas (SLU)	8:45	8
*SLU to International District**	*8:52*	*7*
Capitol Hill to Thomas (SLU)	9:00	8

Notes: *Northern terminus of SLU to International District line is Fairview Avenue and Campus Drive

Passenger Loading Analysis

This section analyzes the planned operating plan, including headways and vehicle type, to ensure it is sufficient to comfortably carry the projected peak passenger ridership.

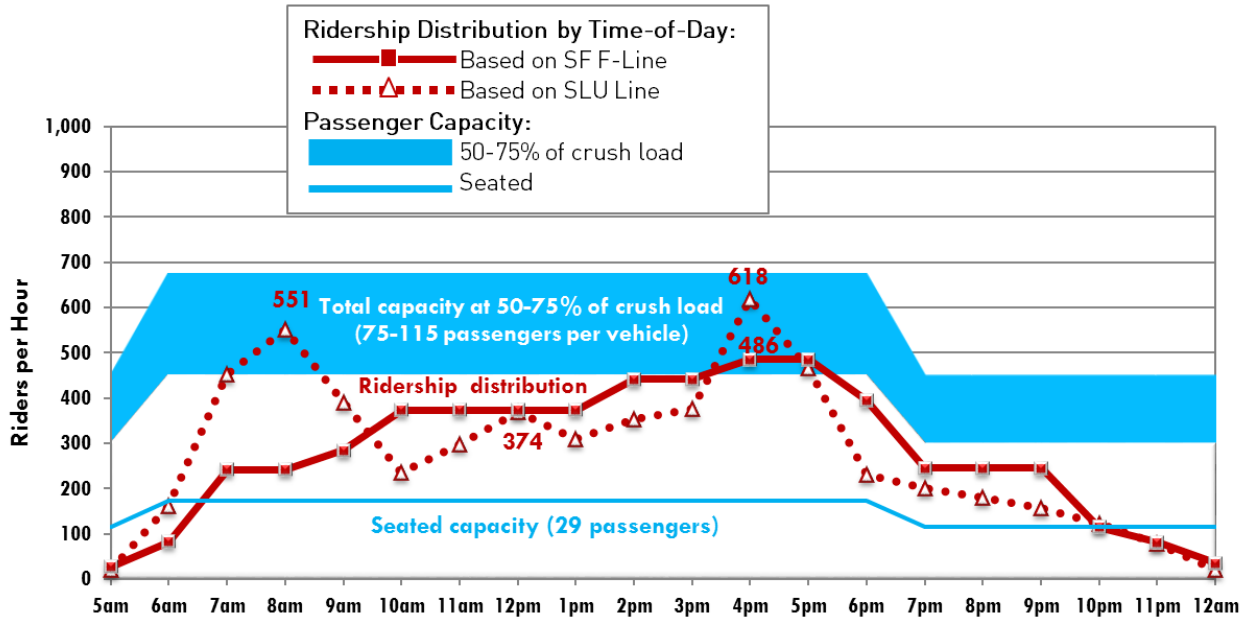
The system is projected to carry an average of 34,500 weekday riders (2035), as described above. About 5,600 daily passengers could be boarding, alighting, or traveling through the projected maximum loading point on the Center City Connector, the Madison station. Based on the South Lake Union to International District line (SLU-CCC). Because we do not yet know how these riders will be distributed throughout the day, the time-of-day distribution of ridership on this segment was estimated based on ridership on both the existing South Lake Union Streetcar and San Francisco's F-Market line.

Figure 13 compares passenger activity by hour to passenger-carrying capacity of existing modern streetcar vehicles. The light blue band represents an average of 75 to 115 passengers per vehicle (50 to 75% of "crush" passenger load—150 people—the loading standard used for analysis purposes). In the first model, ridership is distributed consistent with the existing South Lake Union Streetcar, which is characterized by morning and late afternoon peaks (dashed red line). The second distribution model, shown in solid red, is based on the San Francisco F-

Market line, which is characterized by more level all-day ridership, serving a higher proportion of tourist riders in the midday that complement the local peak period traffic.[7]

The chart illustrates that existing 20m vehicles would accommodate projected passenger loading with the planned frequency of service (every 5 minutes).

Figure 13 Passenger Capacity Analysis, 20m Vehicles, South Lake Union-Chinatown/International District Line, 2035



Note: Assumes Inekon Trio-121 vehicles, which have a slightly lower passenger capacity than the original Trio-12 vehicles.

Additional details on this analysis are included in the Seattle Streetcar/Center City Connector Fleet Management Plan.

Operating Crew Plan, Central Control and Dispatching Plan

King County Metro is in the process of updating the Operating Crew Plan, Central Control, and Dispatching Plan. Once it is available, it will be incorporated into the Seattle Center City Connector Operating Plan.

Fares, Fare Collection, and Enforcement

Current Streetcar policy focuses on fare inspection and not fare enforcement. In the future, SDOT is exploring a switch to fare enforcement and security through a new contract similar to

[7] As discussed in Appendix B of the Center City Connector Transit Study, Detailed Evaluation Report, San Francisco's F-line line was identified as a peer serving both commuters and a visitor/tourist market, comparable to the travel markets that the Center City Connector is likely to serve in Seattle. In addition, the Center City Connector would also serve the special event market, which is not accounted for in the FTA STOPS model projections and would generate high peak ridership demand. Appendix B of the Detailed Evaluation Report discusses both visitor and special event markets.

the agreement King County Metro has with Securitas (King County Metro security/fare enforcement contractor).

Fare Inspection Guidelines[8]

When assigned, Operations and Maintenance (O&M) Supervisors will equip themselves with a Platform Fare Transaction Processor (PFTP), join the first available streetcar and begin requesting verification of fare payment, keeping track of the number of fares inspected and the number of fares not paid. The O&M Supervisors will keep track of these counts on the form provided. This form will be turned in to the Base Chief after each inspection trip. The inspections are to be for one hour at a time. If the inspection is interrupted by an incident or emergency, the remainder of the hour is to be completed at the earliest opportunity the same day. Any such interruption is to be reported to the Base Chief as it occurs.

O&M Supervisors do not attempt to enforce fares or make any judgment on the compliance with the fare policy, but merely to ask passengers for proof of payment, count the number of passengers able to demonstrate payment and those who are not able to demonstrate payment, and record these numbers on the form provided.

Notes regarding the reason people are not able to demonstrate payment are not necessary and should not be included on the form. If passengers identify any equipment failure that prevented them from being able to prove their fare, this is to be reported to the Base Chief via email.

This payment may be a reading on the PFTP indicating the correct tap from an ORCA card, a Seattle Streetcar ticket, or a day pass.

The fare inspection forms are to be kept on a clipboard in the Supervisor's area and used by whichever Supervisor is assigned to inspect for any given shift. The Base Chief will collect these forms on a monthly basis and include a compilation of the results in their respective Monthly Reports.

The Base Chief will assign the inspection on either a daily or weekly basis to their respective Supervisors such that each Streetcar line has one hour of fare inspection for each shift Monday through Saturday and once each Sunday.

If the Base Chief is unable to organize this assignment for any given day, they are to conduct the inspection themselves. If there are extenuating circumstances preventing any inspection, this will be reported to the Streetcar Superintendent prior to the end of that shift.

Current Seattle Streetcar Fare Policies

The Center City Connector transit fare assumptions are based upon the current Seattle Streetcar fare structure, which is provided in Figure 14. Discounted ticket prices are available to senior citizens, other persons eligible for a Regional Reduced Fare Permit (including persons with a disability), low-income adults (ORCA Lift program, managed by King County Metro), and youth.

[8] King County Department of Transportation Standard Operating Procedure 200.11 Seattle Streetcar Fare Inspection (2015)

Figure 14 Seattle Streetcar Fare Structure

Fare Classification	Fare
Adult (19-64)	$2.25
Senior (65+)/RRFP[9]	$1.00
Youth (6-18)	$1.50
Low-Income Adult (ORCA Lift)	$1.50
Children 5 and Under	Free

Regional Fare Zones, Agreements, and Policies

The City of Seattle is a single zone in the multi-zone regional fare structure.

Seattle Streetcar and other transit providers in the Puget Sound region have signed agreements to accept the ORCA (One Regional Card for All) smart card system for fare payment.

A King County Metro fare purchased using an ORCA card provides a two-hour transfer that is available on Seattle Streetcar and other regional services, including Link light rail. Seattle Streetcar accepts transfers from King County Metro and Sound Transit bus services or Link light rail, using an ORCA card. Fares purchased on Seattle Streetcar also provide a transfer to these services. Washington State Ferries do not accept or provide transfers to other transit services.

Fare revenues when multiple services are utilized on a single fare are allocated among providers through ORCA.

Vehicle Storage and Maintenance Facilities

Existing Facilities

SDOT owns two Operation and Maintenance Facilities (OMF) that are operated and staffed by King County Metro. The OMFs are located in the South Lake Union neighborhood (Harrison Street & Fairview Avenue) and Chinatown-International District neighborhood (8th Avenue S & Charles Street). The South Lake Union OMF serves the South Lake Union line and the Chinatown/International District OMF serves the First Hill line

Expansion of South Lake Union OMF

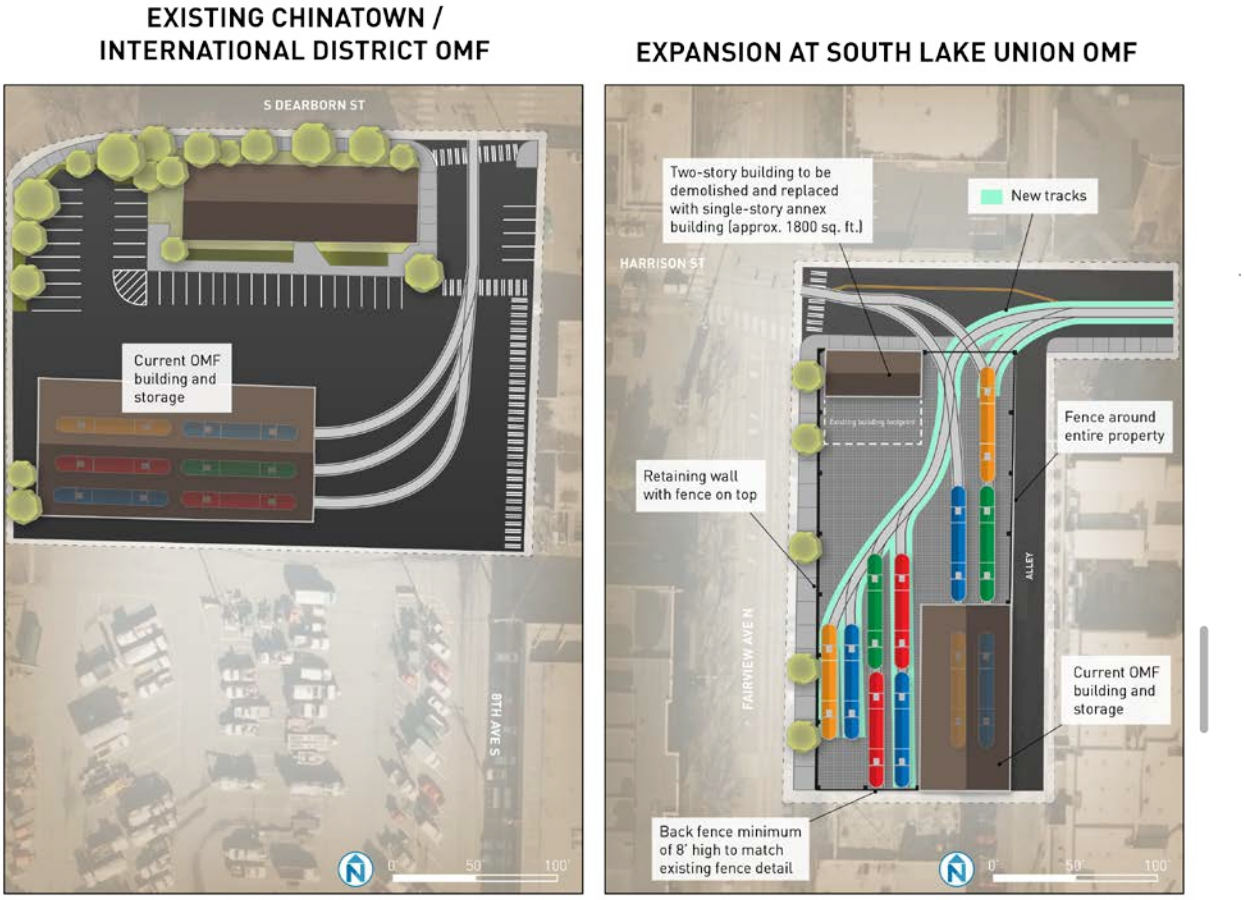
The Center City Connector Project includes the expansion of the South Lake Union OMF site, which will accommodate the additional 7 streetcars. The expansion will require the City demolish an approximately 1,900 square-foot, SDOT-owned building. The two-story building, located at the corner of Harrison Street and Fairview Avenue, will be demolished. The two-story building is currently leased to Seattle Public Utilities, as a construction office for the Denny Substation project. A single-story annex will also be constructed adjacent to the existing

[9] People 65 or older and people with disabilities can ride at a reduced rate with a Regional Reduced Fare Permit (RRFP). An RRFP is given to you on an ORCA card.

building on the southwest corner of the parcel. The lot is separated from residential units by the existing, fully enclosed OMF, though the site would be seen by nearby residents. Fencing along Fairview Avenue and Harrison Street will be compatible with the character of the neighborhood and the visual character of the current facility.

The South Lake Union OMF expansion will increase the storage capacity from 6 vehicles (currently utilized for only 4 vehicles) to 11 vehicles. Under normal operating conditions, 9 vehicles will enter daily operation from the expanded SLU OMF.

Figure 15 OMF Diagrams



Overall Planned OMF Capacity and Utilization

Figure 16 identifies total OMF storage capacity (both existing and planned) and the number of vehicles that would enter daily operation under normal operating conditions. Trains would pass along access tracks traveling to/from the OMFs primarily during off-business hours, entering service between 4:00 am and 7:00 am and returning to the OMF at approximately 7:00 pm and 1:00 am.

For the proposed system, this table provides a breakdown of vehicle storage by OMF, where 6 vehicles are stored at the Chinatown-International District OMF and 11 vehicles are stored at the South Lake Union OMF.

Figure 16 Existing and Planned OMF Vehicle Storage Capacity

	Total Storage Capacity [1]			Vehicles in Daily Operation (Weekday)		
	Chinatown-International District OMF	South Lake Union OMF	Total	Chinatown-International District OMF	South Lake Union OMF	Total
Existing OMFs	8	6	14	6	4	10
With Expansion of South Lake Union OMF	8	11	19	5	9	14

Notes: [1] Storage for only the 17 vehicles currently planned would be utilized

Vehicle and ROW Maintenance Plans

Metro Transit Scope

King County Metro Transit and the City of Seattle have entered into an Interlocal Agreement that sets out the terms under which Metro operates and maintains the Seattle Streetcar system (existing First Hill and South Lake Union streetcar lines), and this agreement will be updated for the expanded Seattle Streetcar system. Metro's Rail Section is responsible for the operation of passenger service, and the maintenance of the vehicles and track. A different Metro Transit Section, Power & Facilities, is responsible for the maintenance of substations, overhead contact system, the maintenance facility at SLU, and associated equipment. The City of Seattle is responsible for the maintenance of the stations and the facilities at FHS.

Vehicle Maintenance

Staff and Schedules

The maintenance of vehicles at the South Lake Union OMF is conducted directly by the three Streetcar Maintainers with occasional maintenance being done by the Operations and Maintenance (O&M) Supervisors. The three Maintainers cover the hours of operation plus a small amount of time before pull-out and after pull-in. There is an overlap of one hour at mid-day and days off are arranged such that there are two maintainers on duty on Wednesdays. The Maintainer position is grandfathered in at SLU and Electro-Mechanics will be hired to fill any future openings.

At the First Hill OMF, the maintenance of the vehicle is conducted directly by the four Streetcar Electro-Mechanics (EMs), with the occasional maintenance being done by the Operations and Maintenance Supervisors. The four EMs cover the hours of operation including a small time before pull-out and after pull-in. The EMs will work a 4/40 schedule and days off will align so that all four work on Wednesday to perform track maintenance.

Work that is planned and takes more than one person is scheduled for Wednesdays if possible. In cases where a task is unsafe for one person to perform, an O&M Supervisor may do this maintenance task with the Maintainer/EM to ensure their safety. There are five O&M

Supervisors assigned to each base, and two on-duty at most times. These O&M Supervisors also receive some maintenance training along with the Maintainers/EMs.

As part of the service expansion associated with the Center City Connector project, staffing will increase to 46 streetcar operators, 10 Electro Mechanics, 1 Train Controller, 10 O/M Supervisors, 1 Maintenance Chief, 1 Superintendent and management/administrative support to operations staff (based on a preliminary staffing plan).

Maintenance Areas

Preventive Maintenance (PM) is conducted to the manufacturer's recommendations, APTA Standards, and best practices. There are currently four inspection intervals: 600 miles, 5,000 miles, 30,000 miles (hydraulic fluid change only) and 120,000 miles. The checklists for the inspections are maintained on the Maintenance Management Information System (MMIS), which advises when PM's are due and provides a paper print-out of the checklist. These inspections are conducted by the Maintainers/Electro-Mechanics. The completed paperwork gets filed and the electronic work order is recorded. If defects are found during the inspections, the Maintainer/EM will enter them into MMIS as a Work Request (WR). When the repair is to be performed, the WR will then be generated into a Work Order (WO). This provides a tracking method to ensure at any given time that all cars are current with their PM's.

The Maintainers receive running repair or corrective maintenance training from Inekon Service Representatives as part of the 2-year OJT maintenance/warranty program. In this manner Maintainers and Electro-Mechanics receive hands-on direction and experience, while Metro and the City of Seattle are assured of proper execution of maintenance with the car-builder's on-site-staff oversight.

Long term overhauls begin at the 120,000 mile service milestone. A 120k inspection has been performed on each SLU TRIO 12 vehicle. SDOT and Metro will continue to evaluate options regarding in-house or contractor services to complete mid-life or other overhauls.

FRA (and Other Federal) Rules and Regulations

The Seattle Streetcar will not share right of way with the general railroad system and is not subject to the corresponding Federal Railroad Administration rules and regulations.

Special Event Operating Plan

SDOT and Metro can modify streetcar service as-needed to accommodate special events using temporary train orders and special instructions as described in the next section.

System Modification

Seattle Streetcar staff will ensure that safety concerns that require modifications to the system are addressed by a formal process of notification to Rail Operations management.[10] The changes will be captured through the Configuration Management Program or in the Corrective Action Report as appropriate.

[10] Seattle Streetcar System Safety Program Plan (SSSP), King County Metro Document (page 35)

Modifications to the physical plant, systems, and car equipment will be made in accordance with SOP #100.05: Configuration Management Program. Modifications of rules and procedures will be made in accordance with the following:

Train Orders and Special Instructions

When conditions or events require a modification of a Rule or Procedure, Rail Operations management issues a Train Order or Special Instruction.[11] These two documents may supersede Rules, SOPs and SMPs. Train Orders are issued daily to address immediate needs for direction to operating employees. Special Instructions are issued as needed. Special Instructions that are intended to become permanent rules are transferred rulebook at the next rulebook printing.

Train Orders

Train Orders will be issued daily and entries will be numbered consecutively beginning with the number 1. When a Train Order is canceled, the number may not be used again in the same calendar day.

- Train Orders shall be brief and clear. They shall specify exact locations, using readily identifiable reference points such as mileposts, stations, cross streets, switches or any other fixed point along the alignment.
- When a new Train Order or an amendment to a Train Order is required, a message will be broadcast by a Supervisor over the radio. Operators shall repeat the essential information to the Supervisor to make sure that the message is understood.
- When speed restrictions are specified by Train Orders, such restrictions supersede any designated speed in the affected area.

Special Instructions

Changes to the Special Instructions will be issued on Mondays effective at 0001 hours. If changes are required after that time, they will be carried in Train Orders for a minimum of seven (7) days until the following Monday. At that time, they will be included in the Special Instructions amendment for that date.

- When speed restrictions are specified by Special Instructions, such restrictions supersede any designated speeds in the affected area.

System Security Plan

The Seattle Police Department provides security services for the Seattle Streetcar under the current contract.

Safety functions performed by Seattle Police Department include[12]:

- Provides transit patrol services responsible for public safety along streetcar lines, law enforcement and enforcement of streetcar rules and regulations.

[11] Seattle Streetcar Rulebook, SDOT and Metro, 2/6/2017 (page 25)

[12] Seattle Streetcar SSPP (page 16)

- Provides uniformed security personnel deployed at selected rail platforms and facilities to protect life and property.
- Reviews Seattle Streetcar Security and Emergency Preparedness Plan (SEPP), which is a separate document and provides updates to WSDOT and the federal Department of Homeland Security (DHS), as necessary. Distribution of this controlled document is restricted to those having a "need-to-know."
- Provides safety training to Seattle Patrol Officers and Security Officers.
- Interacts with other security and public safety departments.

In the future, SDOT may contract with Securitas (current King County Metro Transit security contractor) for system security.

SDOT is currently updating the Safety and Security Management Plan (SSMP) based on FTA comments. Updates to this section will be incorporated once the document is finalized.

Parking Plan

No park and ride facilities are currently in operation or planned as part of the Center City Connector Project or Seattle Streetcar system generally.

2 OPERATION AND MAINTENANCE (O&M) COSTS AND FUNDING

O&M Costs

Preliminary Operations and Maintenance Cost Budget

The preliminary operations & maintenance cost budget is based on detailed cost information from the South Lake Union and First Hill Streetcar lines, with staffing levels scaled up to reflect the operating plan for the full Center City system.

Through an agreement with King County, the City has been operating service on the South Lake Union line since December 2007 and on the First Hill line since January 2016, both operated by King County's Metro Transit Division. Through experience with the operations, maintenance, and start-up of these existing streetcar system segments, SDOT has detailed information on the staffing levels and costs to provide streetcar operators, vehicle maintainers, supervision of operators and maintainers, and maintenance of the streetcar facilities and infrastructure.

To develop the preliminary operations & maintenance cost budget for the Center City system, the City first developed an operating plan to identify the peak and off-peak vehicle requirements of the system. The ratio of the peak vehicle requirements of the South Lake Union and First Hill Streetcar operating plans to the peak vehicle requirements of the full system with the Center City Connector and planned Broadway Extension was then used to scale up the staffing levels and budgets for the proposed system operating plan. For staffing and budgets that are scaled to system infrastructure rather than to operating levels of service (such as maintenance of power systems), the staffing levels and budgets for the 2.5-mile First Hill line were increased by a factor of two to capture the requirements for the expanded system.

Estimated operations and maintenance costs are described in Figure 17.

Figure 17 Preliminary Operations and Maintenance Cost Budget, 2020

Item	Detail	Budget
Streetcar Operations Staffing	Staffing to provide 46 streetcar operators, 10 electro mechanics, 1 train controller, 10 O/M supervisors, 1 maintenance chief, 1 superintendent and management/administrative support to operations staff.	$8,150,000
Power Systems O&M	Cost-allocated staff support for maintenance of overhead contact system, traction power substations, radio maintenance and Administrative costs for Audit Support	$920,000
Administrative Support	General administrative support (financial management, training, testing, insurance, M5 Parts Mgmt, etc)	$1,770,000
Operating Materials/Supplies	Office consumables (printing/copying), vehicle consumables (oil, filters, etc) & essentials to equip operators & supervisors with uniforms and cold weather gear	$290,000
Seattle Direct Costs	City of Seattle costs for fare inspection, platform and facility maintenance, utilities, program management, etc.	$900,000
SUBTOTAL		$12,030,000
Escalation	*Conversion factor to 2020 costs*	*122%*
Contingency	*10%*	*$1,460,000*
Grand Total		**$16,060,000**

Funding Considerations

Figure 18 provides a breakdown of projected operating and maintenance costs and revenue sources for (1) the streetcar system without the proposed Small Starts project, (2) incremental or net new costs with the project, and (3) the overall streetcar system with the project.

Figure 18 Projected Streetcar Operating and Maintenance Costs, 2020

	Existing		Planned	Existing and Planned	Center City Connector Small Starts Project	
	South Lake Union	First Hill Streetcar	Broadway Extension	Total without Project	Net New [1]	Total with Project
Estimated Operating Costs [2]	**$3.3 M**	**$6.7 M**	**$0.35 M**	**$10.4 M**	**$5.7 M**	**$16.1 M**
Projected Revenue Sources	**$3.6 M**	**$6.7 M**	**$0.36 M**	**$10.7 M**	**$6.5 M**	**$17.1 M**
Budgeted Fare Revenue [3]	$1.0 M	$1.3 M	$0.24 M	$2.6 M	$6.5 M	$9.02 M
FTA 5307 [4]	$0.6 M	-	-	$0.6 M	-	$0.60 M
Sponsorship Revenues [5]	$0.44 M	$0.41 M	$0.12 M	$0.97 M	$0.01 M	$0.98 M
Metro Interlocal [6]	$1.55 M	-	-	$1.55 M	-	$1.55 M
Sound Transit Interlocal [7]	-	$5.0 M	-	$5.0 M	-	$5.00 M
Net Revenue (Revenues - Costs)	**$0.3 M**	**$0.0 M**	**$0.01 M**	**$0.3 M**	**$0.8 M**	**$1.1 M**
Number of Vehicles	4	6	0	10	7	17
Farebox Recovery %	30%	20%	-	25%	-	57%

Notes:
[1] The Center City Connector operating plan increases service levels on portions of the existing South Lake Union and First Hill Streetcar lines.
[2] Based on actual King County Metro 2015 O&M Budgets for South Lake Union Streetcar and First Hill Streetcar, scaled up to projected peak operations with the Center City Connector. The proposed Small Starts project would operate as part of the overall streetcar system; costs for the Small Starts project are the incremental cost.
[3] Fare revenues for the Center City Connector are budgeted at 75% of the estimated level. Fare assumptions are described in more detail in Figure 19, and include a $2.75 adult one-way fare in 2019 and a $1.49 average fare. Ridership annualization assumptions are described in Figure 20 and Figure 21.
[4] No changes assumed from the City's minimum floor allocation and the City's internal allocation between Monorail and Streetcar.
[5] Budgeted sponsorship revenue assumes making half of the streetcar fleet available for sponsorship. Potential sponsorship of new stations is not included in the budgeted revenues, and would be additional. Station sponsorships are included in existing South Lake Union Streetcar and planned First Hill Streetcar revenues. South Lake Union Streetcar revenues also include a service contribution from Amazon.com.
[6] King County Metro contribution to South Lake Union Streetcar operating costs. The current agreement is effective through 2019, subject to extension.
[7] Sound Transit contribution to First Hill Streetcar operating costs. The current agreement is effective through 2023, subject to extension.

Current and Future Fare Assumptions

Figure 19 provides current and future average fare assumptions for the streetcar. The average Seattle Streetcar fare was $1.00 in 2013. Transit fares are assumed to keep pace with inflation and the fare structure and policy assumptions are expected to remain the same in 2019 (projected first full year of project operation) and a 2035 horizon year. Based on increased ridership and new markets served by the streetcar, a higher average fare is assumed for the full system with the Center City Connector, comparable to King County Metro trolley buses (average fare of $1.22 in 2013), motor buses (average fare of $1.24), with overall bus average fare of $1.23.

The projected average streetcar system fare is $1.49 in 2019, the projected first full year of operation for the Center City Connector. This fare is based on the projected one-way adult fare of $2.75 in the opening year (2019) and the current-year trolley bus share (54%) of the adult one-way fare.

Figure 19 Average Fare for Seattle Streetcar and Other Seattle Transit Services

System	Year	Passenger Trips	Fare Revenue	Average Fare	% of Adult Fare
Existing [1]					
South Lake Union Streetcar	2013	760,933	$761,610	$1.00	44%
King County Metro Trolley Buses	2013	19,008,029	$23,166,653	$1.22	54%
King County Metro Motor Bus	2013	99,361,977	$122,812,905	$1.24	55%
Projected [2]					
South Lake Union, First Hill, Center City Connector	2019	6,836,000	$10,150,000 [3]	$1.49	54%

Notes/Sources: [1] National Transit Database, 2013. [2] SDOT Projection. Streetcar average fare is based on a projected opening year adult one-way fare of $2.75 and the Metro Trolley Bus average share of the current adult one-way fare. [3] Fare revenues are budgeted at 75% of the fare revenue estimate provided in the table.

Annualization of Non-Special Market Trips and Visitor Trips

The proposed annualization factor for the Center City Connector project trips is 315. This annualization factor is applied to both weekday ridership projected by the STOPS model and special market visitor trips. Figure 20 documents the existing and peer system annualization factors that were used to develop this assumption.

- The current annualization factor for the South Lake Union Streetcar is 295. This existing line is more oriented to serving weekday trips, both due to its limited length and relatively limited weekend operating hours, particularly on Sundays.
- The annualization factor for the San Francisco F-Market line and Portland Streetcar are 333 and 335, respectively. Both of these systems have a longer alignment that serves a

wider variety of trips and longer hours of operation than the current South Lake Union streetcar. (An analysis of these services in comparison to Seattle was conducted as part of the planning study for the Center City Connector).

- An average of the San Francisco/Portland and South Lake Union annualization factors yields the proposed annualization factor of 315. Taking an average of these factor recognizes that ridership on the South Lake Union and First Hill portions of the system may be more commuter and weekday oriented, while the Center City Connector portion of the system serves attractions and land uses that are anticipated to attract strong ridership on weekdays and on weekends. Blending the existing South Lake Union with peer annualization factors from San Francisco/Portland takes these characteristics into account.

Figure 20 Existing and Peer Annualization Factors

	South Lake Union Streetcar	San Francisco F-Market Line	Portland Streetcar
Year / Source	2013 [1]	2012 [2]	2013 [1]
Average Weekday Riders	2,577	23,449	11,397
Annual Ridership	760,933	7,806,043	3,818,224
Annualization Factor	295	333	335

Sources: [1] National Transit Database, 2013. [2] Data provided by SFMTA.

Annualization of Sporting Event Special Market Trips

Estimated streetcar ridership from sporting events was annualized by multiplying projected ridership per game by the number of home games for each team/event (Figure 21).

Figure 21 Annualization Factors for Sporting Event Special Market Trips

Team (League/Venue)	Annualization (Number of Home Games)
Seahawks (NFL - CenturyLink Field)	10
Sounders (MLS - CenturyLink Field)	24
Mariners (MLB - Safeco Field)	81

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