Attachment 3

Ridership Forecasts

* Please note the calculations were originally performed for a 2018 implementation date. The forecasts for 2018 are shifted to 2019 in the financial calculations in Attachment 2. *

1.1 Ridership

While ridership data is difficult to predict certain assumptions can be made in an attempt to obtain a notional rough order of magnitude (ROM) figure. Appendix A of the King County *Interim Report on Ferry Expansion Options for Marine Division* [16] was studied in detail to obtain guideline methodology; the subject report performed a detailed ridership analysis for the West Seattle Water Taxi. While the full methodology described in the King County report is outside of the scope of this study, points of note are summarized below.

- Ridership forecasts are performed separately for commuter traffic and recreational traffic. Recreational traffic will increase during the summer months.
- Commuter ridership demand is forecast by analyzing commute characteristics of the populations located in the vicinity of landing sites. Barriers to access including parking availability and transit times from bus stops will have a high impact on utilization.
- Recreational ridership is forecast using a different methodology under the assumption that all recreational trips are induced.
- New modes of transportation will have a slow growth period where commuters have to familiarize themselves with a new transportation option.
- Relative travel time competitiveness is used as the primary basis for determining the base market capture rate for each proposed route alternative. The additional time required to travel to many downtown job sites needs to be reflected in the travel time competitiveness calculations.

The following infographic visuals produced by Nelson Nygaard, a Seattle based transportation consulting firm, showcases travel patterns related to work and recreational traffic within Seattle based on regional boundaries. While the data is outdated it is helpful to see where the traffic corridors lie, higher resolution images of the infographic can be seen at the source URL provided in the list of References. The following traffic magnitudes are used as guidelines to represent the overall market between destination pairs.

Note that in the following analysis the University Campus is different from the University Village. The University Campus is the geographic location that contains UW and Sakuma Viewpoint, while the University Village is slightly farther north.

Figure 1 shows that most work related traffic leads to the downtown core of Seattle, with a flow of less than 2,500 trips per day between University Campus – Fremont, and University Campus – Eastlake zone pairs and a flow of between 2,501 and 4,000 trips per day between Fremont – Downtown and Eastlake – Downtown zone pairs.

Figure 2 shows that while recreational traffic is greatest in the downtown core of Seattle, the flow of traffic is less linear. A flow of traffic between 2,501 and 4,000 trips per day exists between the University Village – Eastlake, University Village – Downtown, and Fremont – Downtown. There is significant traffic of between 5,501 and 7,000 trips per day between University Village – Wallingford and Wallingford – Fremont destination pairs. Most interestingly, there is significant travel leading to/from South Lake Union to the Downtown, but this traffic flow does not seem to move north from South Lake Union. Tourists could potentially explain this anomaly. South Lake Union is easily accessed from downtown via walking, the

Seattle Monorail, or the South Lake Union Streetcar. Access to neighborhoods north of South Lake Union is currently much more difficult, but could be made easier with the Lake Union Ferry.

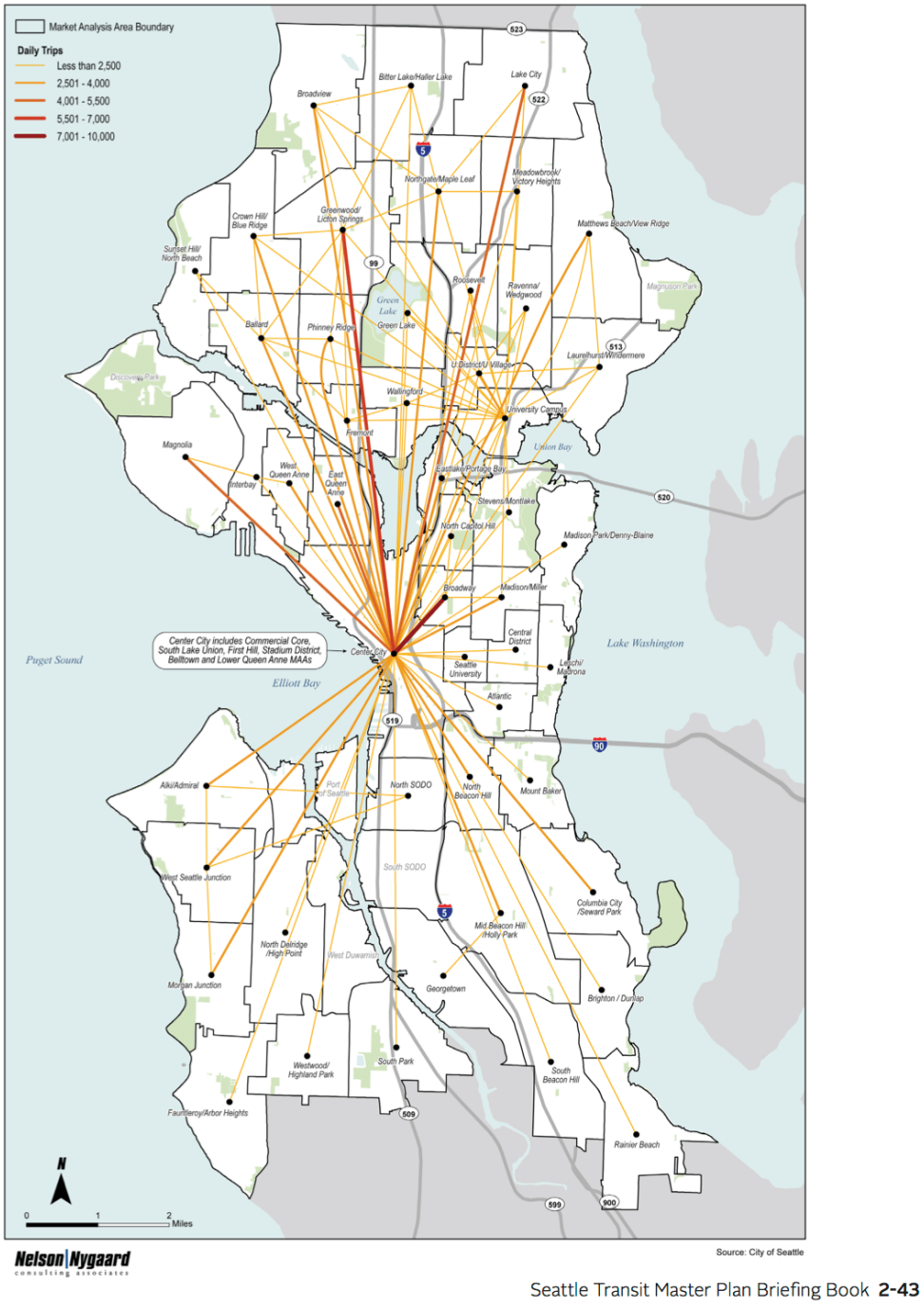


Figure 1: Work Related Traffic Magnitude by Geographic Pair [17]

Figure 2: Non-Work Related Traffic Magnitude by Geographic Pairs [17]

1.1.1 Assumptions

The following assumptions are made:

- Minimal capture of existing car commuters because of the lack of parking facilities surrounds potential landing sites.
- Minimal capture of existing bike commuters because of the lack of time competitiveness and increased cost for commuter.
- Greater capture of existing bus commuters because of existing overcrowding problems. Capture rate to be varied by time competitiveness. Fare competitiveness is unaccounted for but could have a real impact on ridership.
- Commuter traffic is only applicable to weekdays.

While the points below are not numerically quantified in the following approximations, they are reasonable assumptions that can add to the ridership forecast.

- Some capture of existing car share (Uber, Lyft, etc.) traffic.
- Surge traffic for displaced commuters during grid lock incidents.

1.1.2 Commuter Traffic

The largest target audience for commuter traffic is existing bus commuters already familiar with public transit. Current bus routes surrounding Lake Union are shown below in Figure 3.

Figure 3: Bus Routes Surrounding Lake Union

Detailed views of individual bus routes surrounding Lake Union are compiled in Appendix A and raw ridership data for each identified bus route is included in Appendix B. Note that data

was not available for all routes because published data is for the year 2014. Notable daily ridership data are summarized below in Table 1.

Table 1: Daily Ridership Data for Bus Routes in 2014

Route	Operating Description	Peak		Off-Peak Rides			
	(Relevant Segment)	Frequency	Weekday	Frequency	Weekday	Saturday	Sunday
26	Wallingford - South Lake Union	20	2,534	30	725	1,272	1,164
28	Fremont - South Lake Union	20	4,106*	30	770	1,167	1,231
31	University District - Fremont	20	1,237	30	802	820	0**
32	University District - Fremont	20	1,423	30	868	1,276	1,445
40	Fremont - South Lake Union			missing data			
49	University District - Downtown	15	3,666	15	2,696	3,982	3,719
62	Fremont - South Lake Union			missing data			
70	University District – South Lake Union	10	2,894	15	1,689	1,590	0**
E	Downtown - West Lake Union - Fremont			missing data			

**Contains ridership of Route 28EX*
*** No service provided on Sundays*

The data above is total ridership on the full length of the route. While most ridership concentrates around Lake Union and the downtown core, most riders continue on the bus beyond the perimeters of South Lake Union in one direction or another.

The other newer competitive mode of transit is the Sound Transit expansion, a map of the existing and proposed routes are shown in Figure *4*. Sound Transit's newest line of operation between the University of Washington, Capitol Hill and Downtown operates every 10 minutes with a travel time between the University District and Westlake Station of six minutes. This most likely means that the Lake Union Ferry will struggle to attract UW-Downtown commuters away from this travel option. However, the existing University of Washington and proposed South Lake Union station locations could become complementary transfer locations from Sound Transit to currently underserved destinations around Lake Union.

Figure 4: Sound Transit Expansion Map

The travel time between port destinations for the piston routes are compared in Table 2 below. Additional theoretical port pairs with strong time competitiveness are also included. Travel times were uncongested traffic estimates from Google Maps; travel times for the Lake Union Ferry assume direct travel between the listed port pairs.

Table 2: Travel Time between Destination Pairs in Minutes

Destination Pair	Vehicle	Bus	Bike	Ferry
Fremont - Lake Union Park	7	20	15	13
Lake Union Park - Sakuma	11	23	19	20
Sakuma - Fremont	7	26	12	17
Fremont - Terry Pettus	13	n/a*	22	10
Terry Pettus - Julie's Landing	12	n/a*	10	4
Julie's Landing - Westward	6	22	14	5
Westward - Terry Pettus	11	31	17	6
Fairview Park – Julie's Landing	14	33	25	8

** Bus route includes a transfer with a walk, so it is not practical*

The total target market, or number of bus commuters who travel along Lake Union, was estimated by combining daily peak ridership data for relevant bus routes on each segment. Bus riders who traveled beyond Lake Union were eliminated from the total by using a rough approximation based on on/off data for each route (Appendix B). The estimated target market and a quantification of time competitiveness on each segment is summarized below in Table 3.

Table 3: Estimated Bus Ridership Market and Time Competitiveness

Destination Pair	Total Daily Bus Ridership	% Relevant Segment	Estimated Ridership Market	Travel Time		Time Competitiveness	
				Bus	Ferry	Min.	%
Fremont – Lake Union Park*	7,106	25%	1,777	20	13	7	35%
Lake Union Park - Sakuma**	10,226	40%	4,090	23	20	3	13%

**Bus ridership for Fremont - Lake Union Park is the sum of peak ridership for route 28EX and double route 28 to account for missing data for route 40.*

*** Bus ridership for Lake Union Park - Sakuma is the sum of peak ridership for route 70 and double route 49 to account for missing data for route E.*

A trend line for market capture rates based on time competitiveness was developed based on the ridership prediction for the West Seattle Water Taxi. Specifically, the data shown in Table 4 was used to develop trend line as shown in Figure 5.

Table 4: Data of Market Capture Prediction and Time Competitiveness for West Seattle Water Taxi

Destination Pair	Time Competitiveness	Base Market Capture Rate
West Seattle - Pier 50	2%	49%
Bellevue - UW WAC*	-27%	33%
Kenmore LB** - UW WAC	17%	58%
Source from Ref [16]	*Exhibit 24*	*Exhibit 25*

** Water Activities Center*
**Log Boom Park*

Note that the above data are the base market capture rates for system maturity (Year 2025).

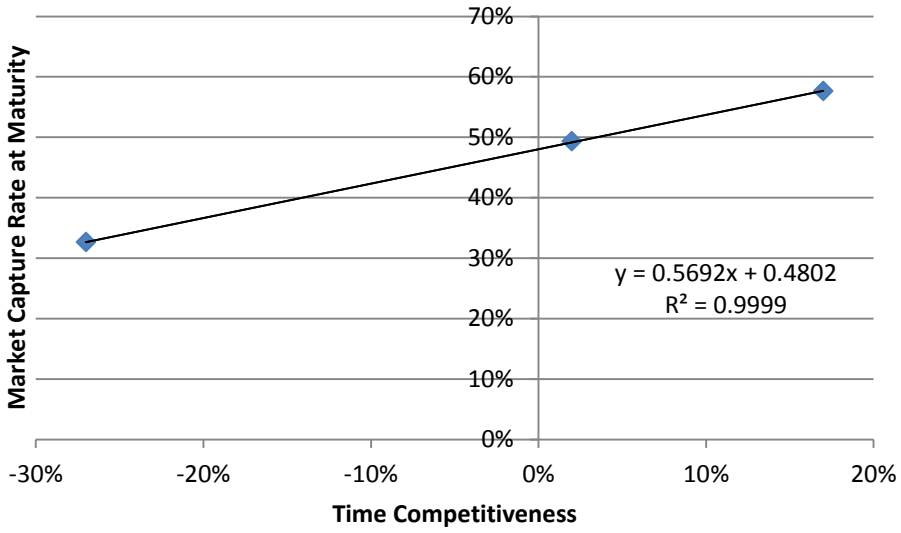


Figure 5: Trend line for Market Capture vs Time Competitiveness

While establishing a trend line from only three data points is hardly statistically significant, this formula provides some methodology to approximate ridership in the absence of a large population movement study.

Based on the estimated target ridership market, time competitiveness, and the trend line, the following ridership numbers are estimated for the piston routes.

Table 5: Estimated Daily Ridership

Destination Pair	Estimated Ridership Market	Time Competitiveness	Market Capture Rate	Estimated Ridership
Fremont - Lake Union Park	1,777	35%	68%	1,207
Lake Union Park - Sakuma	4,090	13%	55%	2,268

The above ridership estimates were then corrected for the following factors:

1) Population growth
2) Ridership increase from system infancy to system maturity
3) AM/PM variation
4) Seasonal variation

The current population growth ratio for King County is 2.3%. For simplicity, it is assumed that since the bus ridership data was obtained in 2014, the ridership increased proportionally with population growth at a constant rate of 2.3%. As it takes approximately five years for a ferry system to mature and system maturity capture rates were used, ridership estimates were adjusted to values corresponding to the year 2022.

Table 6: Estimated Daily Ridership with 2.3% Population Growth Adjustment

Destination Pair	Estimated Ridership		
	2014	2018	2022
Fremont - Lake Union Park	1,207	1,322	1,448
Lake Union Park - Sakuma	2,268	2,484	2,720

As shown in Table 7, the annual growth rate of the West Seattle Water Taxi from 2010 (considered system infancy because of terminal relocation) to 2014 was applied to the above estimated daily ridership for the year 2022.

Table 7: Estimated Ridership with System Growth Rate

West Seattle Water Taxi			Lake Union Ferry		
Year	Yearly Ridership	Percentage	Year	Daily Ridership	
				Fremont – Lake Union Park	Lake Union Park – Sakuma
2010	150,000	53%	2018	762	1,432
2011	220,000	77%	2019	1,118	2,100
2012	250,000	88%	2020	1,270	2,386
2013	255,000	89%	2021	1,295	2,434
2014	285,000	100%	2022	1,448	2,720

Morning/evening and seasonal variation in commuter traffic is estimated based on ratios of ridership on the West Seattle Water Taxi, the source data for the commuter ridership by month is provided below in Figure *6*.

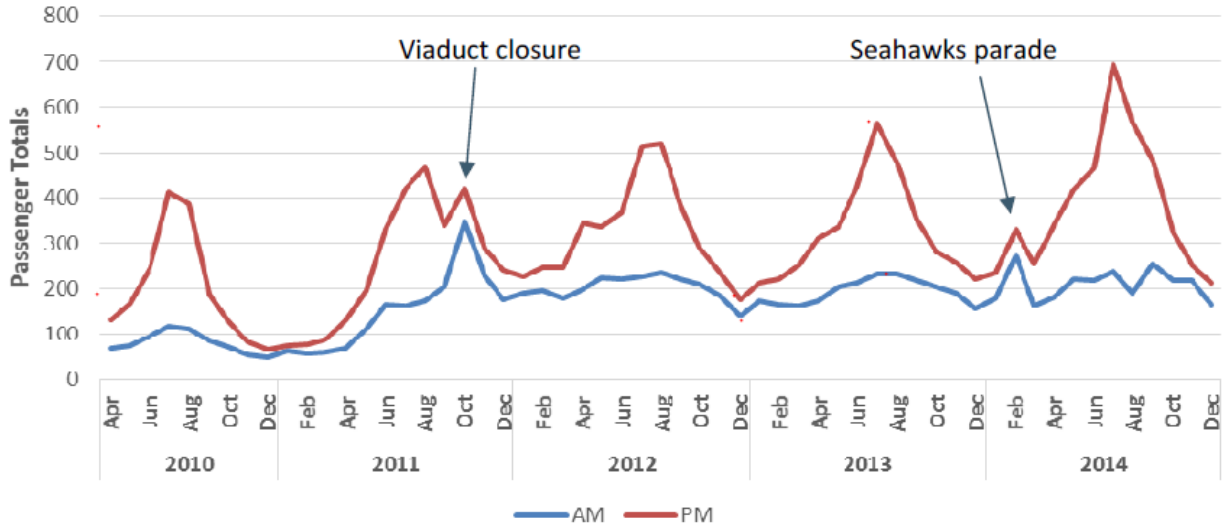


Figure 6: Commuter Ridership by Month for West Seattle Water Taxi [16]

Based on year 2013 of the above graph, the following ratios were developed.

Table 8: Commuter Ridership Ratios for West Seattle Water Taxi

RATIOS BY TIME					
No.	[1]	[2]	[3]	[4]	[5]
Name	AM	PM	TOTAL	Ratio AM	Ratio PM
Method	data	data	[1]+[2]	[1]/[3]	[2]/[3]
AUG	230	550	780	29%	71%
DEC	170	220	390	44%	56%
RATIOS BY SEASON					
No.	[6]	[7]	[8]	[9]	[10]
Name	AUG	DEC	TOTAL	Ratio Aug	Ratio Dec
Method	data	data	[6]+[7]	[6]/[8]	[7]/[8]
AM	230	170	400	58%	43%
PM	550	220	770	71%	29%

To transform the data with the above ratios, it is assumed that the estimated daily ridership represents a typical summer day. The estimated daily ridership was first split into AM/PM ridership for August, and then the seasonal decrease was applied to the AM/PM estimations, to put it simply, the above ratios highlighted in yellow were applied.

Table 9: Estimated Daily Ridership with Variation by Time and Season

	Fremont - Lake Union Park						Lake Union Park - Sakuma					
	AUGUST			DECEMBER			AUGUST			DECEMBER		
Year	TOTAL	AM	PM	TOTAL	AM	PM	TOTAL	AM	PM	TOTAL	AM	PM
2018	762	225	537	249	95	154	1,432	422	1,010	468	179	288
2019	1,118	330	788	365	140	225	2,100	619	1,481	686	263	423
2020	1,270	374	896	415	159	256	2,386	704	1,683	780	299	481
2021	1,295	382	913	423	162	261	2,434	718	1,716	795	305	490
2022	1,448	427	1,021	473	181	292	2,720	802	1,918	889	341	548

A linear trend was assumed to exist between the months of August and December. Figure 7 and Figure 8 demonstrate the commuter daily ridership forecast when such a trend is applied.

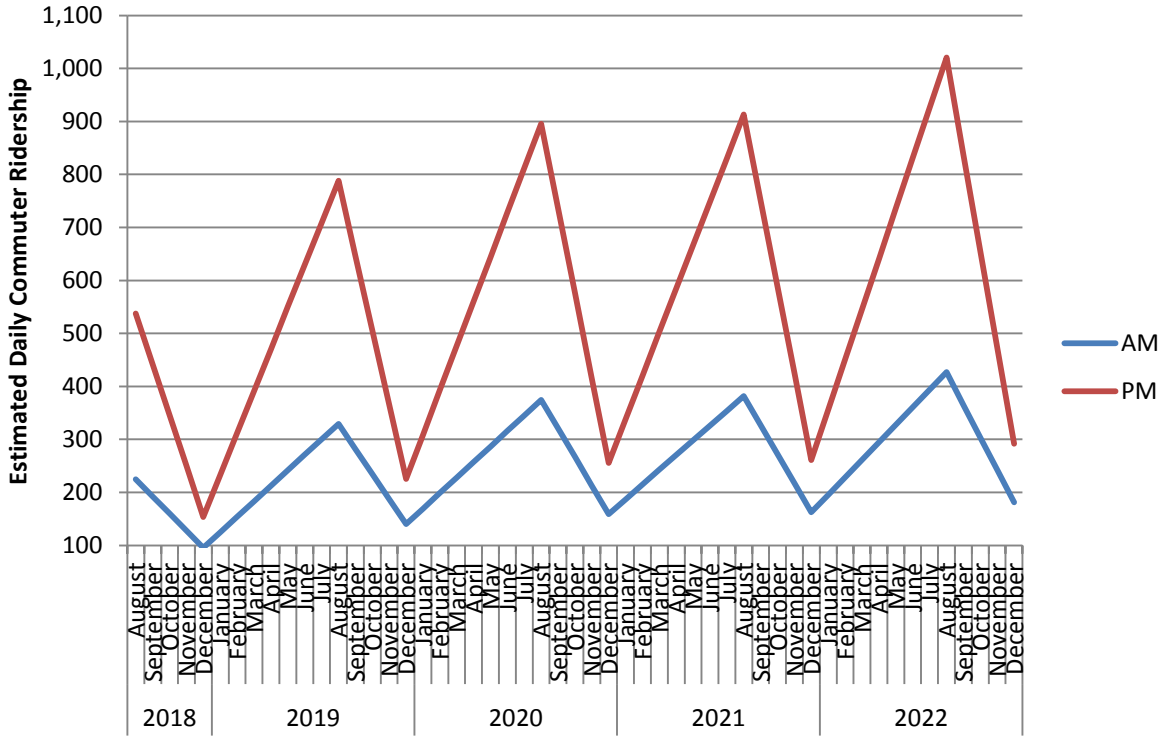


Figure 7: Estimated Daily Commuter Ridership for Fremont – Lake Union Park

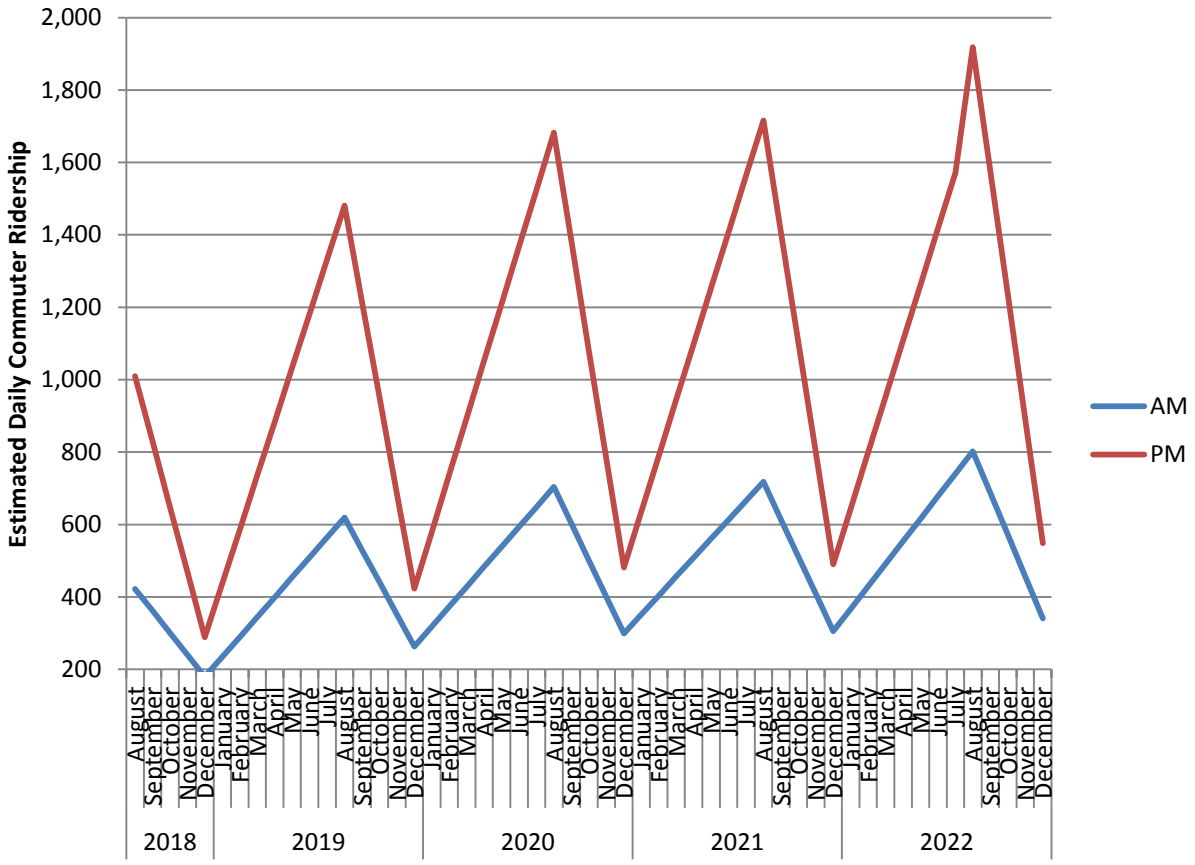


Figure 8: Estimated Daily Commuter Ridership for Lake Union Park - Sakuma

While the above estimated commuter ridership numbers are derived only from capture rates in the Metro Bus system, and do not include potential converts from vehicle, bike, or car share commuters**.**

The Lake Union Ferry's greatest competitive advantage of being able to traverse where land locked vehicles cannot, has an inverse consequence for commuters that need to continue on land to their final destinations. The competition of Sound Transit's route between University of Washington and the Downtown Core will also detract a significant numbers of commuters away from the Lake Union Park – Sakuma route. This recent shift in market share is difficult to grasp as the Metro bus ridership data is from 2014.

The above estimate also ignores a few difficult-to-quantify factors that will have an impact on commuter ridership numbers. These issues are briefly summarized in the bullet point list below.

- The current analysis does not include a fare competitiveness factor.
- Vehicle and bus travel times are theoretical and unpredictable because they depend on clear traffic. The Lake Union Ferry will have significant advantage in being able to guarantee travel time independent of road conditions.

- Any commuters that need to continue beyond the destination ports will experience additional transfer time with other modes of transportation which may negate travel time competitiveness.
- Any commuters that need to continue beyond the destination ports will experience an additional fare.

1.1.3 Recreational Traffic

Recreational traffic is largely dependent on weather, number of daily round trips and the appeal of the landing areas for recreational travel. The West Seattle Water Taxi ridership forecast assumes that recreational ridership potential decreases in direct correlation to less-frequent sailings as decreased frequency offers fewer sailing time options.

While recreational traffic is influenced less by travel time competitiveness, it should be reiterated that the travel time competitiveness of the Lake Union Ferry decreases with an increased number of stops. Time competitiveness can be regained by operating as a water taxi, or a service that takes passengers directly to their destination. However, the unpredictable routes and need to 'flag' the ferry may deter passengers.

The appeal of the landing areas results in a large spread in recreational ridership numbers. Recreational traffic forecasts for system maturity (year 2025) for the West Seattle Water Taxi is included below in Table 10 to demonstrate the variance.

Table 10: Recreational Traffic Forecast for the West Seattle Water Taxi [16]

Route	Weekday (Summer)	Weekday (Offseason)	Weekend (Summer only)
W. Seattle - Pier 50	706	61	1,540
Ballard SBM - Pier 50	223	19	N/A
Des Moines – Pier 50	111	10	N/A
Kenmore LB – Bellevue	186	16	N/A
Kenmore LB – UW WAC	87	7	N/A
Kirkland – UW WAC	124	11	N/A
Renton – Bellevue	149	13	N/A
Bellevue - UW WAC	111	10	N/A

Source: BERK, 2015

For the purposes of this feasibility study, the attractiveness of the neighborhoods and parks surrounding Lake Union are assumed to be approximately equivalent to West Seattle and the Downtown core. A market study could potentially better identify and quantify tourist traffic and demand on Lake Union.

The above numbers highlighted in grey are transformed into a timeline forecast by applying the same population growth rate and system infancy to maturity growth rates previously demonstrated in Table 6 and Table 7. The results are presented below in Table 11.

Table 11: Recreational Daily Ridership Forecast

Year	2.3% Population Growth Adjustment			System Maturity Adjustment			
	Weekday (Summer)	Weekday (Winter)	Weekend (Summer Only)	%	Weekday (Summer)	Weekday (Winter)	Weekend (Summer Only)
2018	643	56	1,403	53%	339	29	738
2019	658	57	1,436	77%	508	44	1,109
2020	674	58	1,470	88%	591	51	1,289
2021	690	60	1,505	89%	617	53	1,346
2022	706	61	1,540	100%	706	61	1,540

The above estimate confirms that there will be minimal recreational traffic during the winter months.

1.1.4 Total Ridership

Based on the ridership forecasts presented in Table 9 and Table 11; the following total ridership forecast is developed under the assumption that winter operation is limited to commuter service only. The reason for this assumption is because there will likely be little recreational traffic during the winter, but eliminating commuter service during the winter may result in less market capture because of method dependability. Weekday recreational traffic is assumed constant through the summer months of April 1st to October 31st.

The yearly average of the commuter and recreational traffic for 2018 through 2022 is shown in Table 12. Only forecasts for April through December are included in 2018.

Table 12: Average Total Daily Ridership Forecast

Year	Average Daily Ridership	
	Low-End	High-End
2018*	952	1,903
2019	1,167	2,333
2020	1,364	2,729
2021	1,414	2,827
2022	1,540	3,079

References

[16] KPFF, *Interim Report on Ferry Expansion Options for Marine Division*, King County, July 1, 2015.

[17] The Urbanist, *Light Rail in ST3: A Region Defining Decision*, Seattle WA: https://www.theurbanist.org/2015/06/19/light-rail-in-st3-a-region-defining-decision-2/, June 19, 2015.

Appendix A

Travel Time Analysis

* NOTE – GAS WORKS PARK HAS SINCE BEEN REPLACED WITH WESTWARD *

CIRCUIT ROUTE SUMMARY

FROM SAKUMA				FROM FAIRVIEW			
Destination	Travel Time CW	Travel Time CCW	Difference	Destination	Travel Time CW	Travel Time CCW	Difference
Fairview	6.82	78.23	71.4	Terry Pettus	8.78	90.04	81.3
Terry Pettus	20.60	64.44	43.8	Chandler's Cove	19.48	74.09	54.6
Chandler's Cove	31.30	53.75	22.5	Lake Union Park	25.83	48.49	22.7
Lake Union Park	37.65	47.39	9.7	Julie's Landing	37.35	37.79	0.4
Julie's Landing	49.17	33.88	15.3	Fremont	51.58	31.43	20.1
Fremont	63.40	21.64	41.8	Gas Works	78.23	17.92	60.3
Gas Works	74.09	10.96	63.1	Sakuma	90.04	5.69	84.4
FROM TERRY PETTUS				**FROM CHANDLER'S COVE**			
Destination	Travel Time CW	Travel Time CCW	Difference	Destination	Travel Time CW	Travel Time CCW	Difference
Chandler's Cove	5.70	79.36	73.7	Lake Union Park	1.36	75.81	74.5
Lake Union Park	12.05	63.40	51.3	Julie's Landing	12.87	65.12	52.3
Julie's Landing	23.57	51.58	28.0	Fremont	27.10	49.17	22.1
Fremont	37.80	37.80	0.0	Gas Works	37.79	37.35	0.4
Gas Works	48.49	27.10	21.4	Sakuma	53.75	23.57	30.2
Sakuma	64.44	20.75	43.7	Fairview	65.57	12.87	52.7
Fairview	76.26	7.23	69.0	Terry Pettus	79.35	6.51	72.8
FROM LAKE UNION PARK				**FROM JULIE'S LANDING**			
Destination	Travel Time CW	Travel Time CCW	Difference	Destination	Travel Time CW	Travel Time CCW	Difference
Julie's Landing	6.51	76.53	70.0	Fremont	7.23	83.69	76.5
Fremont	20.75	64.30	43.5	Gas Works	17.92	70.17	52.3
Gas Works	31.43	53.61	22.2	Sakuma	33.88	57.94	24.1
Sakuma	33.88	31.30	2.6	Fairview	45.70	47.25	1.6
Fairview	59.21	25.83	33.4	Terry Pettus	59.48	31.30	28.2
Terry Pettus	72.99	12.05	60.9	Chandler's Cove	70.17	19.48	50.7
Chandler's Cove	83.69	1.36	82.3	Lake Union Park	76.53	5.70	70.8
FROM FREMONT				**FROM GAS WORKS**			
Destination	Travel Time CW	Travel Time CCW	Difference	Destination	Travel Time CW	Travel Time CCW	Difference
Gas Works	5.69	79.35	73.7	Sakuma	10.96	76.26	65.3
Sakuma	21.64	72.99	51.3	Fairview	22.77	65.57	42.8
Fairview	33.46	59.48	26.0	Terry Pettus	36.56	59.21	22.7
Terry Pettus	47.24	47.24	0.0	Chandler's Cove	47.25	45.70	1.6
Chandler's Cove	57.94	36.56	21.4	Lake Union Park	53.61	33.46	20.1
Lake Union Park	64.30	20.60	43.7	Julie's Landing	65.12	22.77	42.3
Julie's Landing	75.81	8.78	67.0	Fremont	79.36	6.82	72.5

CIRCUIT ROUTE CLOCKWISE

DEPARTURE:	DESTINATION:	TRAVEL TIME:	DEPARTURE:	DESTINATION:	TRAVEL TIME:
Sakuma	Fairview	6.82	Fairview	Terry Pettus	8.78
Sakuma	Terry Pettus	20.60	Fairview	Chandler's Cove	19.48
Sakuma	Chandler's Cove	31.30	Fairview	Lake Union Park	25.83
Sakuma	Lake Union Park	37.65	Fairview	Julie's Landing	37.35
Sakuma	Julie's Landing	49.17	Fairview	Fremont	51.58
Sakuma	Fremont	63.40	Fairview	Gas Works	78.23
Sakuma	Gas Works	74.09	Fairview	Sakuma	90.04
DEPARTURE:	**DESTINATION:**	**TRAVEL TIME:**	**DEPARTURE:**	**DESTINATION:**	**TRAVEL TIME:**
Terry Pettus	Chandler's Cove	5.70	Chandler's Cove	Lake Union Park	1.36
Terry Pettus	Lake Union Park	12.05	Chandler's Cove	Julie's Landing	12.87
Terry Pettus	Julie's Landing	23.57	Chandler's Cove	Fremont	27.10
Terry Pettus	Fremont	37.80	Chandler's Cove	Gas Works	37.79
Terry Pettus	Gas Works	48.49	Chandler's Cove	Sakuma	53.75
Terry Pettus	Sakuma	64.44	Chandler's Cove	Fairview	65.57
Terry Pettus	Fairview	76.26	Chandler's Cove	Terry Pettus	79.35
DEPARTURE:	**DESTINATION:**	**TRAVEL TIME:**	**DEPARTURE:**	**DESTINATION:**	**TRAVEL TIME:**
Lake Union Park	Julie's Landing	6.51	Julie's Landing	Fremont	7.23
Lake Union Park	Fremont	20.75	Julie's Landing	Gas Works	17.92
Lake Union Park	Gas Works	31.43	Julie's Landing	Sakuma	33.88
Lake Union Park	Sakuma	33.88	Julie's Landing	Fairview	45.70
Lake Union Park	Fairview	59.21	Julie's Landing	Terry Pettus	59.48
Lake Union Park	Terry Pettus	72.99	Julie's Landing	Chandler's Cove	70.17
Lake Union Park	Chandler's Cove	83.69	Julie's Landing	Lake Union Park	76.53
DEPARTURE:	**DESTINATION:**	**TRAVEL TIME:**	**DEPARTURE:**	**DESTINATION:**	**TRAVEL TIME:**
Fremont	Gas Works	5.69	Gas Works	Sakuma	10.96
Fremont	Sakuma	21.64	Gas Works	Fairview	22.77
Fremont	Fairview	33.46	Gas Works	Terry Pettus	36.56
Fremont	Terry Pettus	47.24	Gas Works	Chandler's Cove	47.25
Fremont	Chandler's Cove	57.94	Gas Works	Lake Union Park	53.61
Fremont	Lake Union Park	64.30	Gas Works	Julie's Landing	65.12
Fremont	Julie's Landing	75.81	Gas Works	Fremont	79.36

CIRCUIT ROUTE COUNTER CLOCKWISE

DEPARTURE:	DESTINATION:	TRAVEL TIME:	DEPARTURE:	DESTINATION:	TRAVEL TIME:
Sakuma	Gas Works	10.96	Gas Works Park	Sakuma	5.69
Sakuma	Fremont	21.64	Gas Works Park	Gas Works	17.92
Sakuma	Julie's Landing	33.88	Gas Works Park	Fremont	31.43
Sakuma	Lake Union Park	47.39	Gas Works Park	Julie's Landing	37.79
Sakuma	Chandler's Cove	53.75	Gas Works Park	Lake Union Park	48.49
Sakuma	Terry Pettus	64.44	Gas Works Park	Chandler's Cove	74.09
Sakuma	Fairview	78.23	Gas Works Park	Terry Pettus	90.04
DEPARTURE:	**DESTINATION:**	**TRAVEL TIME:**	**DEPARTURE:**	**DESTINATION:**	**TRAVEL TIME:**
Fremont	Fairview	7.23	Julie's Landing	Terry Pettus	6.51
Fremont	Sakuma	20.75	Julie's Landing	Fairview	12.87
Fremont	Gas Works	27.10	Julie's Landing	Sakuma	23.57
Fremont	Fremont	37.80	Julie's Landing	Gas Works	37.35
Fremont	Julie's Landing	51.58	Julie's Landing	Fremont	49.17
Fremont	Lake Union Park	63.40	Julie's Landing	Julie's Landing	65.12
Fremont	Chandler's Cove	79.36	Julie's Landing	Lake Union Park	75.81
DEPARTURE:	**DESTINATION:**	**TRAVEL TIME:**	**DEPARTURE:**	**DESTINATION:**	**TRAVEL TIME:**
Lake Union Park	Chandler's Cove	1.36	Chandler's Cove	Lake Union Park	5.70
Lake Union Park	Terry Pettus	12.05	Chandler's Cove	Chandler's Cove	19.48
Lake Union Park	Fairview	25.83	Chandler's Cove	Terry Pettus	31.30
Lake Union Park	Sakuma	31.30	Chandler's Cove	Fairview	47.25
Lake Union Park	Gas Works	53.61	Chandler's Cove	Sakuma	57.94
Lake Union Park	Fremont	64.30	Chandler's Cove	Gas Works	70.17
Lake Union Park	Julie's Landing	76.53	Chandler's Cove	Fremont	83.69
DEPARTURE:	**DESTINATION:**	**TRAVEL TIME:**	**DEPARTURE:**	**DESTINATION:**	**TRAVEL TIME:**
Terry Pettus	Julie's Landing	8.78	Fairview	Fremont	6.82
Terry Pettus	Lake Union Park	20.60	Fairview	Julie's Landing	22.77
Terry Pettus	Chandler's Cove	36.56	Fairview	Lake Union Park	33.46
Terry Pettus	Terry Pettus	47.24	Fairview	Chandler's Cove	45.70
Terry Pettus	Fairview	59.48	Fairview	Terry Pettus	59.21
Terry Pettus	Sakuma	72.99	Fairview	Fairview	65.57
Terry Pettus	Gas Works	79.35	Fairview	Sakuma	76.26

TRIANGLE ROUTE CLOCKWISE

DEPARTURE:	DESTINATION:	TRAVEL TIME:
Sakuma	Lake Union Park	19.74
Sakuma	Fremont	35.43
DEPARTURE:	**DESTINATION:**	**TRAVEL TIME:**
Lake Union Park	Fremont	13.48
Lake Union Park	Sakuma	35.43
DEPARTURE:	**DESTINATION:**	**TRAVEL TIME:**
Fremont	Sakuma	16.96
Fremont	Lake Union Park	41.70

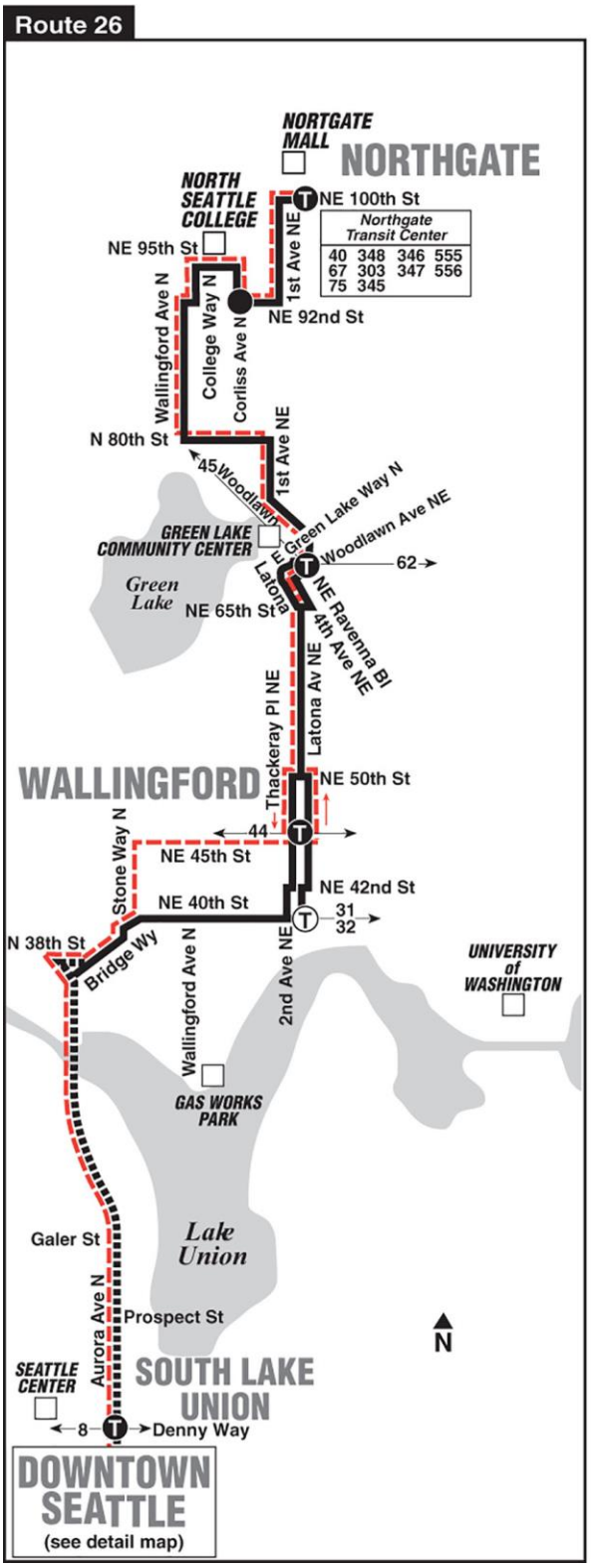
TRIANGLE ROUTE COUNTER CLOCKWISE

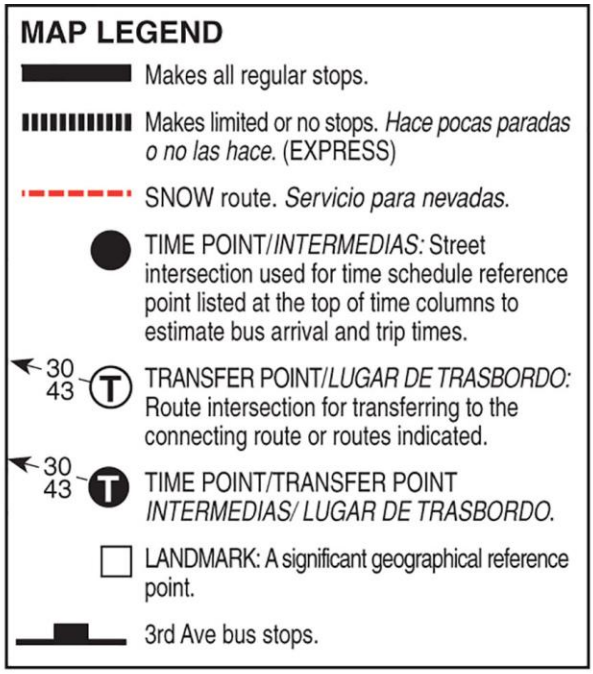
DEPARTURE:	DESTINATION:	TRAVEL TIME:
Sakuma	Fremont	16.96
Sakuma	Lake Union Park	38.22
DEPARTURE:	**DESTINATION:**	**TRAVEL TIME:**
Fremont	Lake Union Park	13.48
Fremont	Sakuma	38.22
DEPARTURE:	**DESTINATION:**	**TRAVEL TIME:**
Lake Union Park	Sakuma	19.74
Lake Union Park	Fremont	41.70

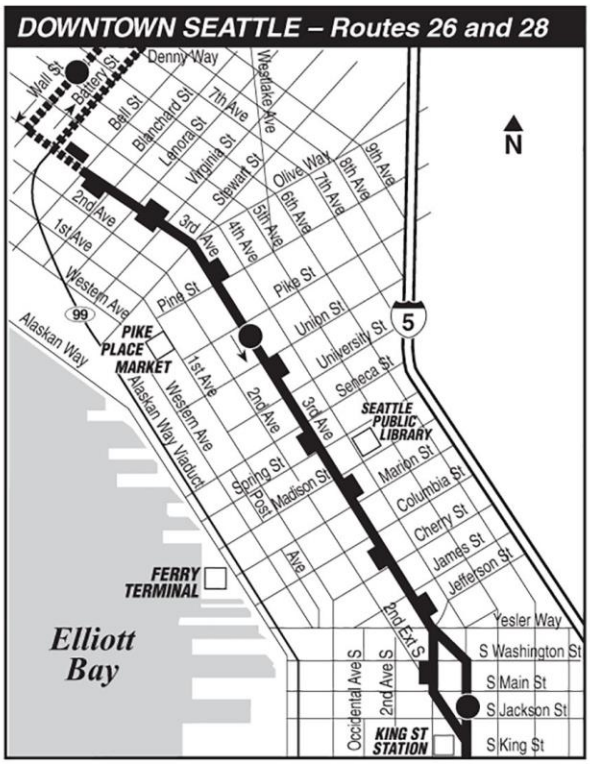
Appendix B

Bus Route Maps

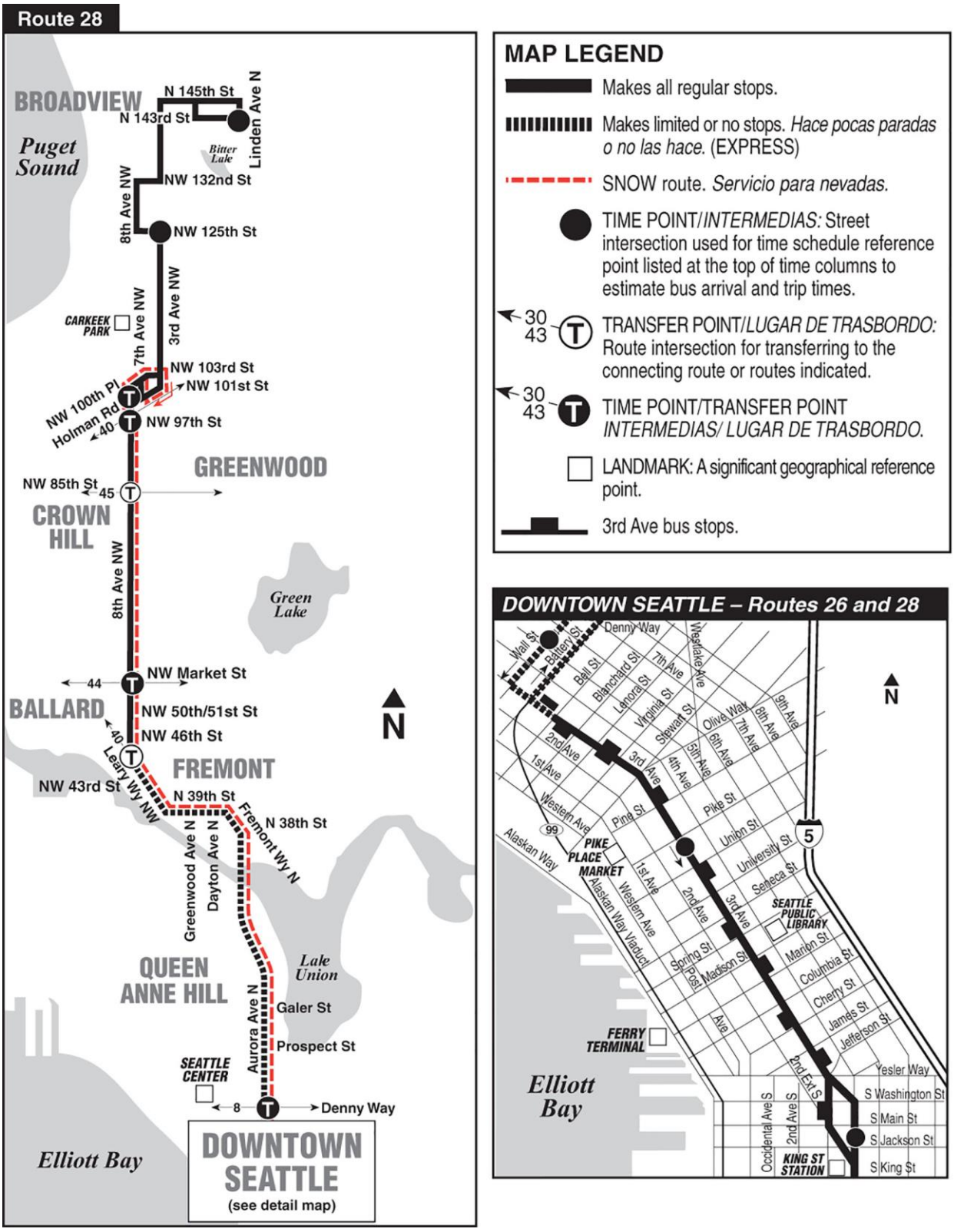
ROUTE 26


Route 26
NORTGATE MALL
NORTHGATE
NORTH SEATTLE COLLEGE
NE 100th St
Northgate Transit Center
40 348 346 555
67 303 347 556
75 345
NE 95th St
1st Ave NE
Wallingford Ave N
College Way N
Corliss Ave N
NE 92nd St
N 80th St
45
Woodlawn
Green Lake Way N
Woodlawn Ave NE
62
GREEN LAKE COMMUNITY CENTER
Green Lake
NE 65th St
Latona
NE Ravenna Bl
4th Ave NE
Latona Av NE
Thackeray Pl NE
WALLINGFORD
NE 50th St
44
NE 45th St
Stone Way N
NE 40th St
NE 42nd St
31
32
N 38th St
Bridge Wy
2nd Ave NE
UNIVERSITY of WASHINGTON
Wallingford Ave N
GAS WORKS PARK
Galer St
Lake Union
Aurora Ave N
Prospect St
N
SEATTLE CENTER
SOUTH LAKE UNION
8
Denny Way
DOWNTOWN SEATTLE
(see detail map)


MAP LEGEND
Makes all regular stops.
Makes limited or no stops. Hace pocas paradas o no las hace. (EXPRESS)
SNOW route. Servicio para nevadas.
TIME POINT/INTERMEDIAS: Street intersection used for time schedule reference point listed at the top of time columns to estimate bus arrival and trip times.
30 43
TRANSFER POINT/LUGAR DE TRASBORDO: Route intersection for transferring to the connecting route or routes indicated.
30 43
TIME POINT/TRANSFER POINT INTERMEDIAS/ LUGAR DE TRASBORDO.
LANDMARK: A significant geographical reference point.
3rd Ave bus stops.

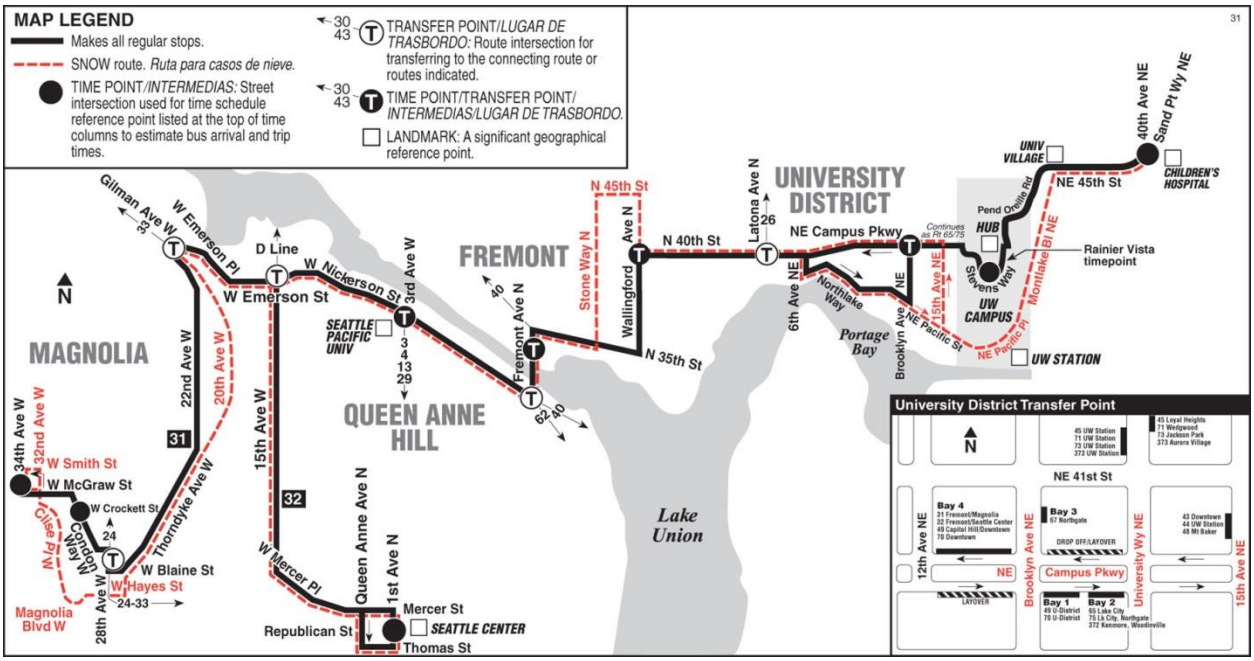

DOWNTOWN SEATTLE – Routes 26 and 28
Wall St
Battery St
Denny Way
Westlake Ave
Bell St
Blanchard St
7th Ave
Lenora St
Virginia St
Stewart St
Olive Way
9th Ave
8th Ave
7th Ave
6th Ave
5th Ave
4th Ave
3rd Ave
2nd Ave
1st Ave
Western Ave
Pine St
Pike St
Union St
University St
Seneca St
99
Alaskan Way
PIKE PLACE MARKET
Alaskan Way Viaduct
SEATTLE PUBLIC LIBRARY
Marion St
Columbia St
Cherry St
James St
Jefferson St
Spring St
Post
Madison St
Ave
FERRY TERMINAL
Elliott Bay
2nd Ext S
Yesler Way
S Washington St
S Main St
S Jackson St
S King St
Occidental Ave S
2nd Ave S
KING ST STATION
N
5

ROUTE 28

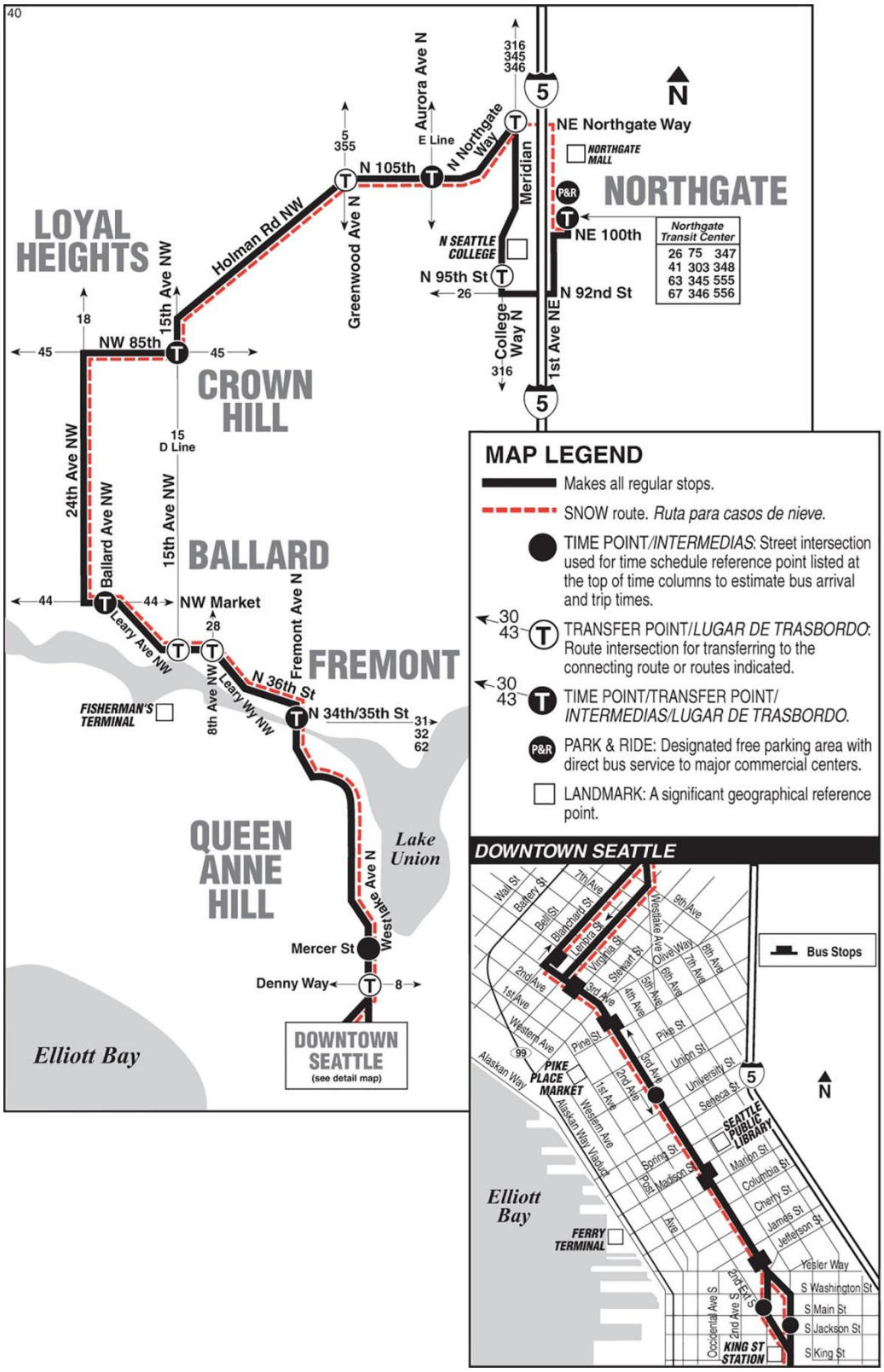

Route 28
BROADVIEW
N 145th St
N 143rd St
Linden Ave N
Puget Sound
Bitter Lake
NW 132nd St
8th Ave NW
NW 125th St
3rd Ave NW
CARKEEK PARK
7th Ave NW
NW 103rd St
NW 101st St
NW 100th Pl
Holman Rd
40
NW 97th St
GREENWOOD
NW 85th St
45
CROWN HILL
8th Ave NW
Green Lake
NW Market St
44
BALLARD
NW 50th/51st St
NW 46th St
40
Leary Wy NW
FREMONT
NW 43rd St
N 39th St
N 38th St
Fremont Wy N
Greenwood Ave N
Dayton Ave N
QUEEN ANNE HILL
Lake Union
Galer St
Aurora Ave N
Prospect St
SEATTLE CENTER
8
Denny Way
Elliott Bay
DOWNTOWN SEATTLE
(see detail map)
N
MAP LEGEND
Makes all regular stops.
Makes limited or no stops. Hace pocas paradas o no las hace. (EXPRESS)
SNOW route. Servicio para nevadas.
TIME POINT/INTERMEDIAS: Street intersection used for time schedule reference point listed at the top of time columns to estimate bus arrival and trip times.
30 43
TRANSFER POINT/LUGAR DE TRASBORDO: Route intersection for transferring to the connecting route or routes indicated.
30 43
TIME POINT/TRANSFER POINT INTERMEDIAS/ LUGAR DE TRASBORDO.
LANDMARK: A significant geographical reference point.
3rd Ave bus stops.
DOWNTOWN SEATTLE – Routes 26 and 28
Wall St
Battery St
Denny Way
Bell St
Blanchard St
7th Ave
Westlake Ave
Lenora St
Virginia St
Stewart St
Olive Way
9th Ave
8th Ave
7th Ave
6th Ave
5th Ave
4th Ave
3rd Ave
2nd Ave
1st Ave
Western Ave
Pine St
Pike St
Union St
University St
Seneca St
99
5
Alaskan Way
PIKE PLACE MARKET
Alaskan Way Viaduct
1st Ave
Western Ave
2nd Ave
3rd Ave
SEATTLE PUBLIC LIBRARY
Spring St
Madison St
Marion St
Columbia St
Cherry St
James St
Jefferson St
FERRY TERMINAL
Elliott Bay
2nd Ext S
Yesler Way
S Washington St
S Main St
S Jackson St
S King St
Occidental Ave S
2nd Ave S
KING ST STATION
N

ROUTES 31&32

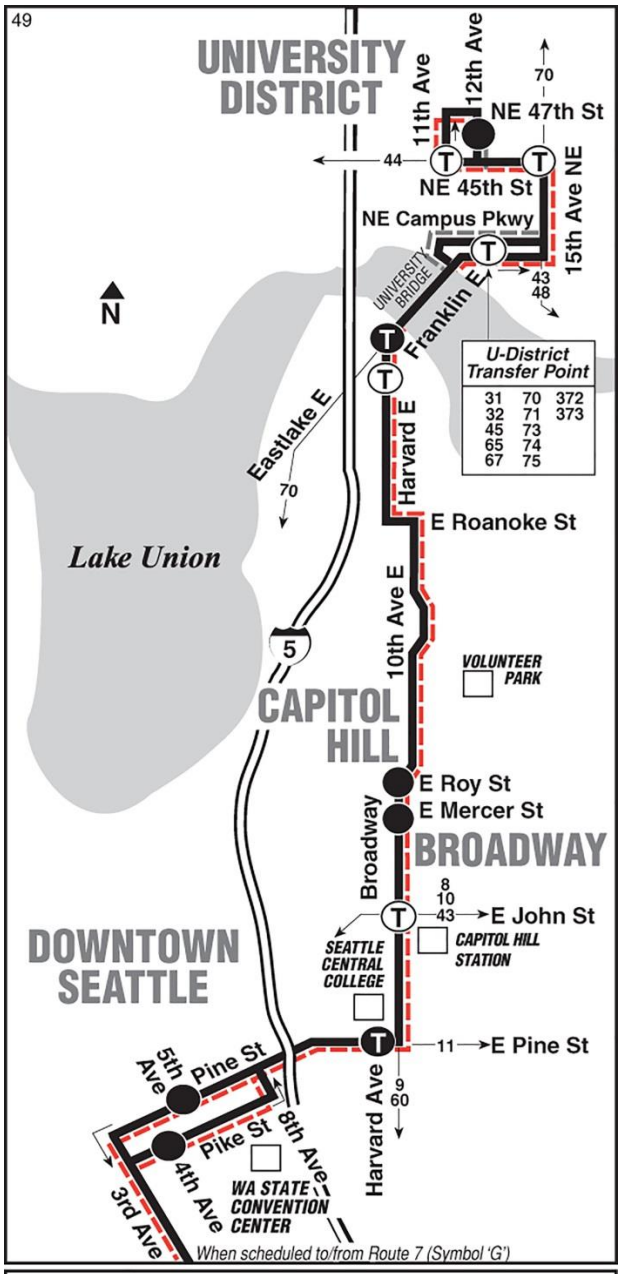
**Route 31 and 32 appear to have the same route map on the King County Metro website.*



ROUTE 40


40
LOYAL HEIGHTS
CROWN HILL
BALLARD
FREMONT
QUEEN ANNE HILL
NORTHGATE
Lake Union
Elliott Bay
NW 85th
NW Market
N 105th
NE Northgate Way
NE 100th
N 95th St
N 92nd St
N 34th/35th St
N 36th St
Mercer St
Denny Way
Holman Rd NW
15th Ave NW
24th Ave NW
Ballard Ave NW
Leary Ave NW
Leary Wy NW
8th Ave NW
Fremont Ave N
Greenwood Ave N
Aurora Ave N
E Line
D Line
N Northgate Way
Meridian
College Way N
1st Ave NE
West Lake Ave N
N SEATTLE COLLEGE
NORTHGATE MALL
FISHERMAN'S TERMINAL
DOWNTOWN SEATTLE
(see detail map)
Northgate Transit Center
26 75 347
41 303 348
63 345 555
67 346 556
MAP LEGEND
Makes all regular stops.
SNOW route. Ruta para casos de nieve.
TIME POINT/INTERMEDIAS: Street intersection used for time schedule reference point listed at the top of time columns to estimate bus arrival and trip times.
TRANSFER POINT/LUGAR DE TRASBORDO: Route intersection for transferring to the connecting route or routes indicated.
TIME POINT/TRANSFER POINT/ INTERMEDIAS/LUGAR DE TRASBORDO.
PARK & RIDE: Designated free parking area with direct bus service to major commercial centers.
LANDMARK: A significant geographical reference point.
DOWNTOWN SEATTLE
Bus Stops
PIKE PLACE MARKET
SEATTLE PUBLIC LIBRARY
FERRY TERMINAL
KING ST STATION
Elliott Bay
Alaskan Way Viaduct
Alaskan Way
Western Ave
1st Ave
2nd Ave
3rd Ave
4th Ave
5th Ave
6th Ave
7th Ave
9th Ave
Pike St
Pine St
Union St
University St
Seneca St
Spring St
Madison St
Marion St
Columbia St
Cherry St
James St
Jefferson St
Yesler Way
S Washington St
S Main St
S Jackson St
S King St
Occidental Ave S
2nd Ave S
1st Ave S
Wall St
Battery St
Bell St
Blanchard St
Lenora St
Virginia St
Stewart St
Olive Way
Westlake Ave
99

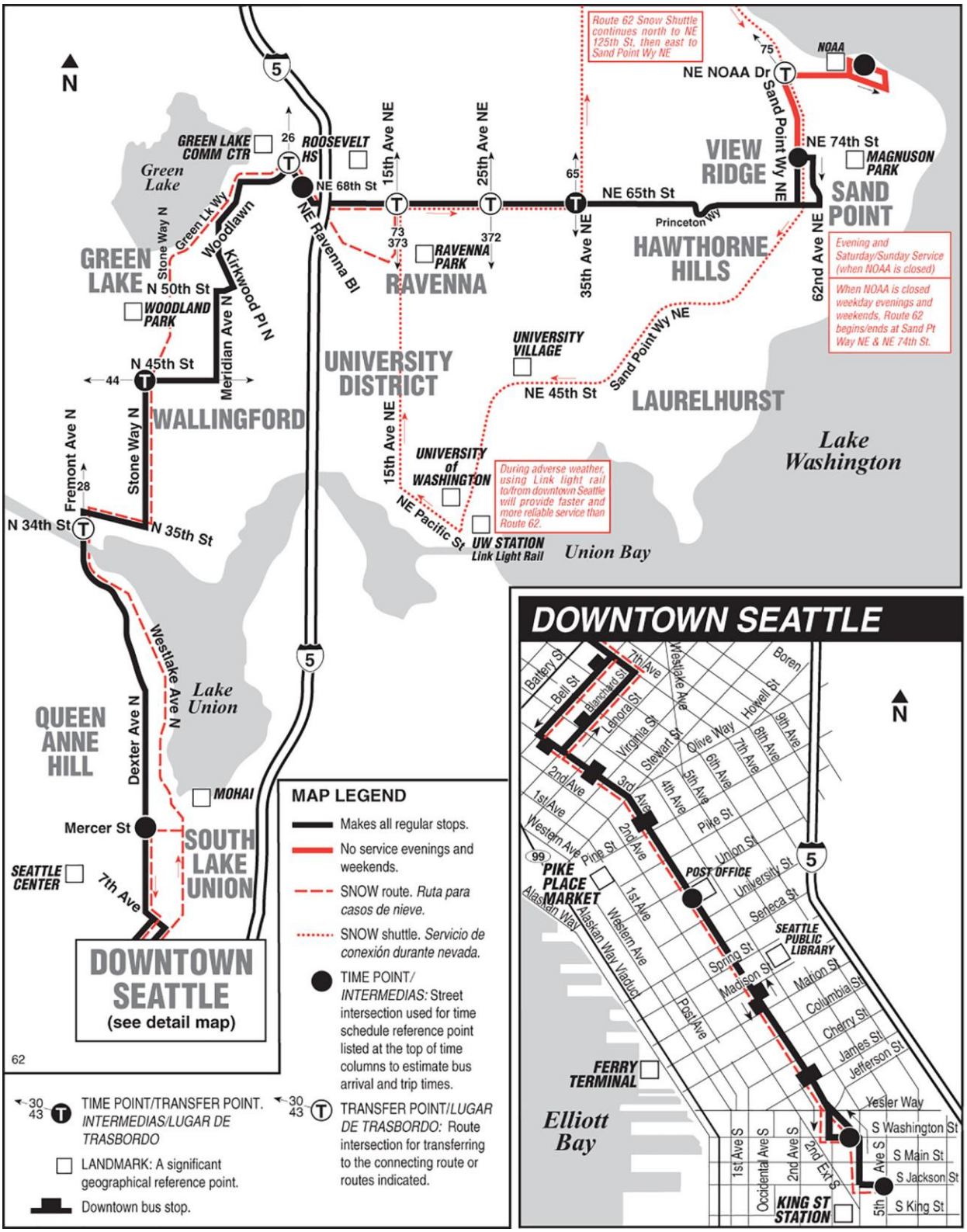
ROUTE 49



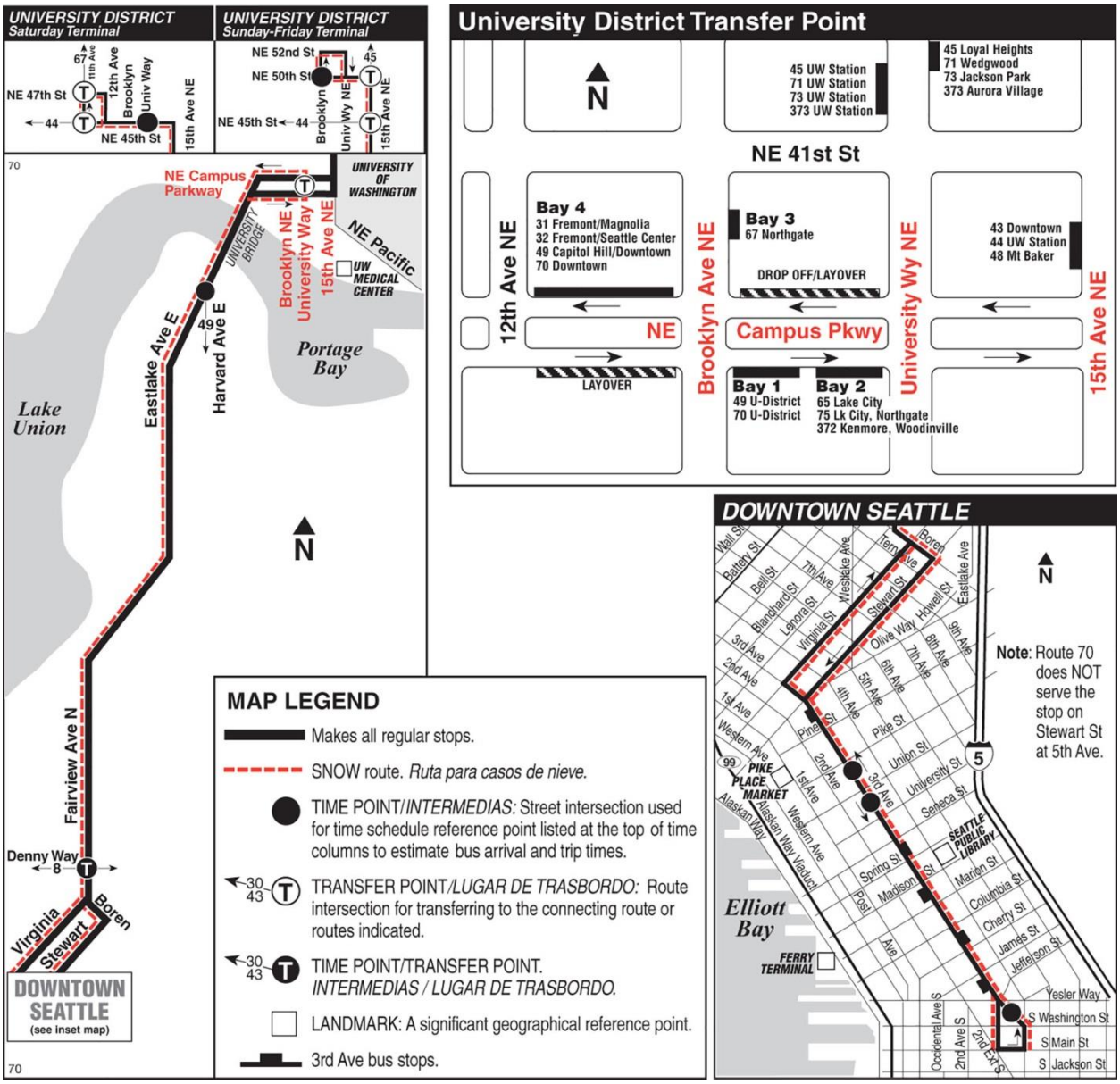
MAP LEGEND

- Makes all regular stops.
- SNOW route. *Ruta para casos de nieve.*
- TIME POINT/*INTERMEDIAS:* Street intersection used for time schedule reference point listed at the top of time columns to estimate bus arrival and trip times.
- 30 43 (T) TRANSFER POINT/*LUGAR DE TRASBORDO:* Route intersection for transferring to the connecting route or routes indicated.
- 30 43 (T) TIME POINT/TRANSFER POINT. *INTERMEDIAS/LUGAR DE TRASBORDO.*
- LANDMARK: A significant geographical reference point.

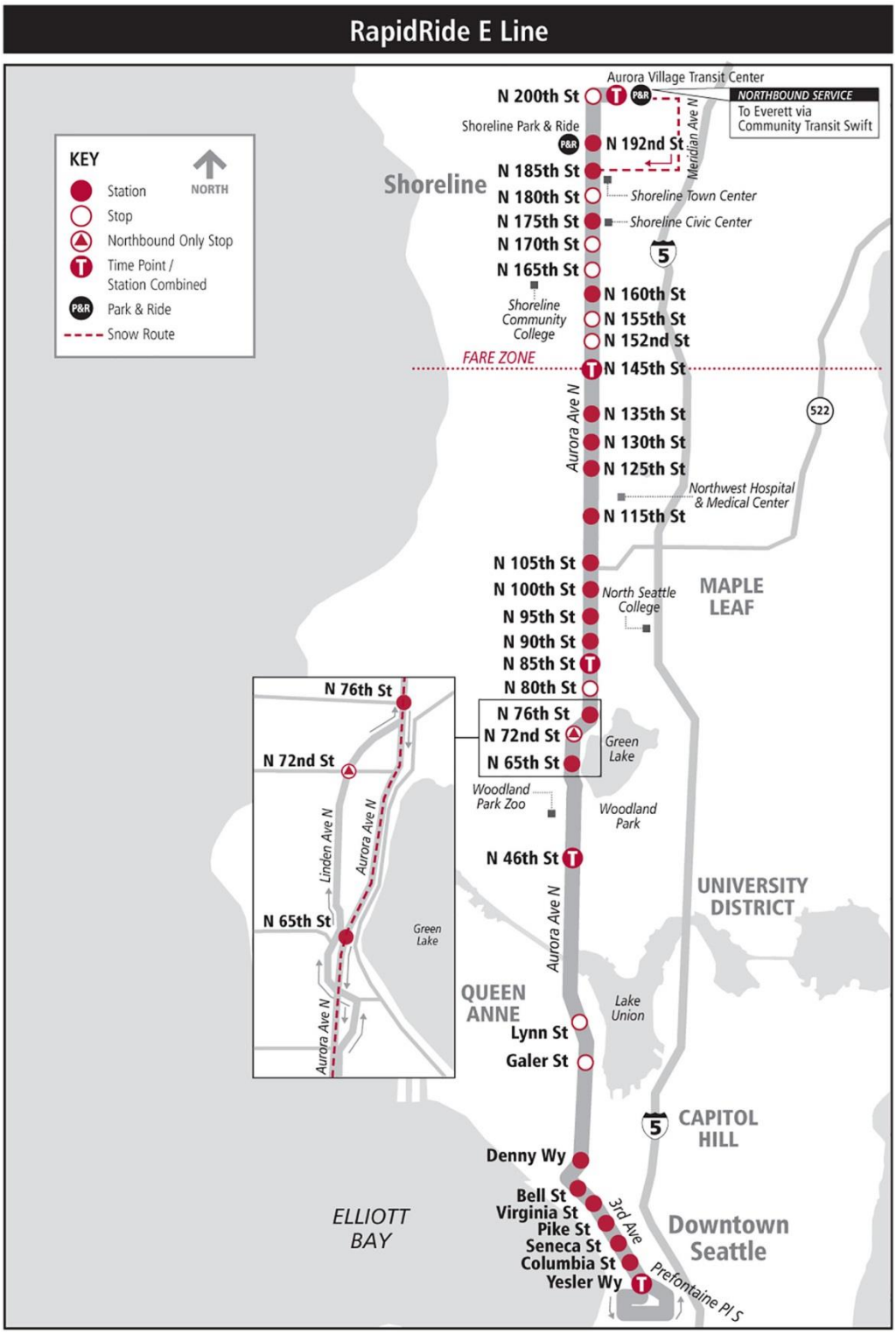
ROUTE 62


Route 62 Snow Shuttle continues north to NE 125th St, then east to Sand Point Wy NE
NOAA
NE NOAA Dr
Sand Point Wy NE
NE 74th St
MAGNUSON PARK
VIEW RIDGE
SAND POINT
GREEN LAKE COMM CTR
ROOSEVELT HS
15th Ave NE
25th Ave NE
35th Ave NE
NE 68th St
NE 65th St
Princeton Wy
62nd Ave NE
Green Lake
Green Lk Wy
Stone Way N
Woodlawn
Kirkwood Pl N
GREEN LAKE
N 50th St
WOODLAND PARK
Meridian Ave N
N 45th St
WALLINGFORD
Fremont Ave N
N 34th St
N 35th St
NE Ravenna Bl
RAVENNA PARK
RAVENNA
HAWTHORNE HILLS
Evening and Saturday/Sunday Service (when NOAA is closed)
When NOAA is closed weekday evenings and weekends, Route 62 begins/ends at Sand Pt Way NE & NE 74th St.
UNIVERSITY VILLAGE
UNIVERSITY DISTRICT
NE 45th St
LAURELHURST
Lake Washington
UNIVERSITY of WASHINGTON
During adverse weather, using Link light rail to/from downtown Seattle will provide faster and more reliable service than Route 62.
NE Pacific St
UW STATION Link Light Rail
Union Bay
Lake Union
QUEEN ANNE HILL
Dexter Ave N
Westlake Ave N
MOHAI
Mercer St
SEATTLE CENTER
7th Ave
SOUTH LAKE UNION
DOWNTOWN SEATTLE
(see detail map)
62
MAP LEGEND
Makes all regular stops.
No service evenings and weekends.
SNOW route. Ruta para casos de nieve.
SNOW shuttle. Servicio de conexión durante nevada.
TIME POINT/ INTERMEDIAS: Street intersection used for time schedule reference point listed at the top of time columns to estimate bus arrival and trip times.
TIME POINT/TRANSFER POINT. INTERMEDIAS/LUGAR DE TRASBORDO
TRANSFER POINT/LUGAR DE TRASBORDO: Route intersection for transferring to the connecting route or routes indicated.
LANDMARK: A significant geographical reference point.
Downtown bus stop.
DOWNTOWN SEATTLE
Battery St
Bell St
Blanchard St
Lenora St
Virginia St
Stewart St
Olive Way
Boren
Howell St
7th Ave
Westlake Ave
9th Ave
8th Ave
6th Ave
5th Ave
4th Ave
3rd Ave
2nd Ave
1st Ave
Western Ave
Pine St
Pike St
Union St
University St
Seneca St
PIKE PLACE MARKET
POST OFFICE
SEATTLE PUBLIC LIBRARY
Spring St
Madison St
Marion St
Columbia St
Cherry St
James St
Jefferson St
Alaskan Way
Alaskan Way Viaduct
Post Ave
FERRY TERMINAL
Elliott Bay
Yesler Way
S Washington St
S Main St
S Jackson St
S King St
1st Ave S
Occidental Ave S
2nd Ave S
2nd Ave Ext S
5th Ave S
KING ST STATION

ROUTE 70


UNIVERSITY DISTRICT
Saturday Terminal
UNIVERSITY DISTRICT
Sunday-Friday Terminal
NE 47th St
NE 45th St
NE 52nd St
NE 50th St
NE 45th St
12th Ave
Brooklyn
Univ Way
15th Ave NE
Univ Wy NE
University Transfer Point
45 UW Station
71 UW Station
73 UW Station
373 UW Station
45 Loyal Heights
71 Wedgwood
73 Jackson Park
373 Aurora Village
NE 41st St
Bay 4
31 Fremont/Magnolia
32 Fremont/Seattle Center
49 Capitol Hill/Downtown
70 Downtown
Bay 3
67 Northgate
DROP OFF/LAYOVER
43 Downtown
44 UW Station
48 Mt Baker
12th Ave NE
Brooklyn Ave NE
University Wy NE
15th Ave NE
NE
Campus Pkwy
LAYOVER
Bay 1
49 U-District
70 U-District
Bay 2
65 Lake City
75 Lk City, Northgate
372 Kenmore, Woodinville
NE Campus Parkway
UNIVERSITY OF WASHINGTON
NE Pacific
UW MEDICAL CENTER
UNIVERSITY BRIDGE
Brooklyn NE
University Way
15th Ave NE
Portage Bay
Lake Union
Eastlake Ave E
Harvard Ave E
49
Fairview Ave N
Denny Way
8
Virginia
Stewart
Boren
DOWNTOWN SEATTLE
(see inset map)
70
N
MAP LEGEND
Makes all regular stops.
SNOW route. Ruta para casos de nieve.
TIME POINT/INTERMEDIAS: Street intersection used for time schedule reference point listed at the top of time columns to estimate bus arrival and trip times.
30 43
TRANSFER POINT/LUGAR DE TRASBORDO: Route intersection for transferring to the connecting route or routes indicated.
30 43
TIME POINT/TRANSFER POINT.
INTERMEDIAS / LUGAR DE TRASBORDO.
LANDMARK: A significant geographical reference point.
3rd Ave bus stops.
DOWNTOWN SEATTLE
Note: Route 70 does NOT serve the stop on Stewart St at 5th Ave.
PIKE PLACE MARKET
SEATTLE PUBLIC LIBRARY
FERRY TERMINAL
Elliott Bay
Alaskan Way
Western Ave
Alaskan Way Viaduct
Pine St
Pike St
Union St
University St
Seneca St
Spring St
Madison St
Marion St
Columbia St
Cherry St
James St
Jefferson St
Yesler Way
S Washington St
S Main St
S Jackson St
Olive Way
Howell St
Stewart St
Virginia St
Lenora St
Blanchard St
Bell St
Battery St
Wall St
Wrestlake Ave
Eastlake Ave
Terry Ave
Boren
7th Ave
8th Ave
9th Ave
6th Ave
5th Ave
4th Ave
3rd Ave
2nd Ave
1st Ave
Occidental Ave S
2nd Ave S
2nd Ave Ext S

ROUTE E


RapidRide E Line
KEY
NORTH
Station
Stop
Northbound Only Stop
Time Point / Station Combined
Park & Ride
Snow Route
Aurora Village Transit Center
NORTHBOUND SERVICE
To Everett via Community Transit Swift
Shoreline Park & Ride
Meridian Ave N
Shoreline
Shoreline Town Center
Shoreline Civic Center
Shoreline Community College
FARE ZONE
Aurora Ave N
Northwest Hospital & Medical Center
MAPLE LEAF
North Seattle College
Green Lake
Woodland Park Zoo
Woodland Park
UNIVERSITY DISTRICT
QUEEN ANNE
Lake Union
CAPITOL HILL
Linden Ave N
ELLIOTT BAY
3rd Ave
Downtown Seattle
Prefontaine Pl S
N 200th St
N 192nd St
N 185th St
N 180th St
N 175th St
N 170th St
N 165th St
N 160th St
N 155th St
N 152nd St
N 145th St
N 135th St
N 130th St
N 125th St
N 115th St
N 105th St
N 100th St
N 95th St
N 90th St
N 85th St
N 80th St
N 76th St
N 72nd St
N 65th St
N 46th St
Lynn St
Galer St
Denny Wy
Bell St
Virginia St
Pike St
Seneca St
Columbia St
Yesler Wy