

The Swift logo is positioned at the top of a tall, blue and green structure. It features the word "Swift" in a blue, sans-serif font, with a green swoosh underneath that curves to the right.

COMMUNITY TRANSIT TRAVEL DEMAND MARKET EVALUATION

February 2020



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PLANNING CONTEXT & DATA SOURCES

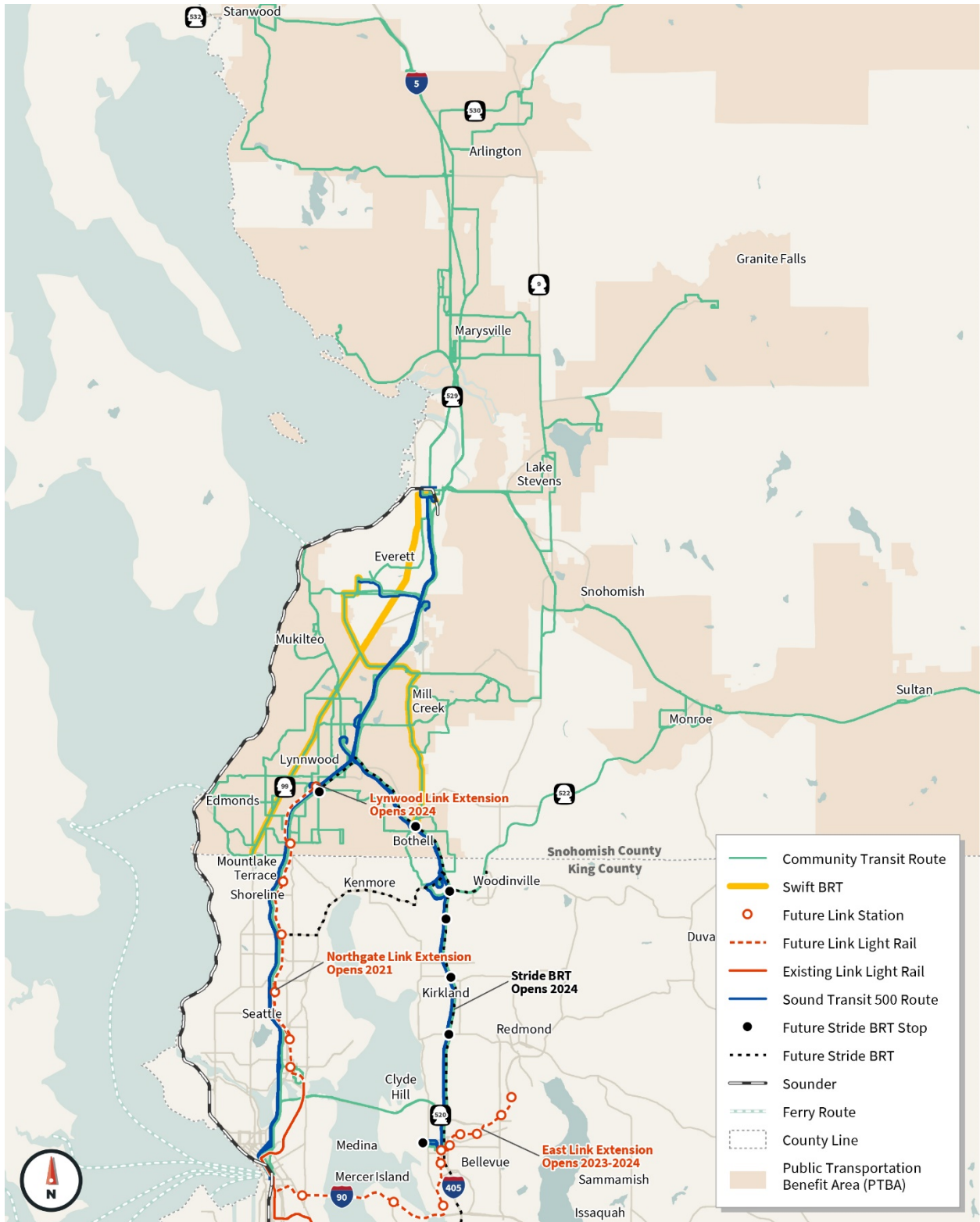


Figure I. Transit Context

HIGH CAPACITY TRANSIT EXPANSION

A transformative expansion of regional transit is underway in the Puget Sound area. By 2024, Sound Transit (ST) will open light rail extensions north to Lynnwood, south to Federal Way, and east to Redmond. An interim phase of the extension to Northgate will open in 2021. Sound Transit will also open Bus Rapid Transit (BRT) service along Interstate 405 (I-405) from Lynnwood City Center to the Bellevue Transit Center and points south as well as along State Route 522 (SR 522) from Shoreline to Bothell. In addition to ST projects, Community Transit (CT) will open the Swift Orange Line, providing more reliable east-west transit service across Interstate 5 (I-5) between Edmonds Community College and the McCollum Park Park & Ride in 2024.

With these fundamental changes in regional transit service, local agencies including CT are considering the effects on their current service structures. These include:

- **Commuter Service Restructure:** CT may reorient its current commuter service to Downtown Seattle (the 400 series) and the University District (the 800 series) to instead run shorter routes, with the 400 series potentially connecting to Northgate in 2021 and both the 400 and 800 series connecting to Lynnwood and Mountlake Terrace in 2024.
- **Local Route Reinvestment:** Service hours shifted from commuter express routes can be reallocated to better serve the CT public transportation benefit area (PTBA), leveraging the regional transit investment to improve transit access, span, and frequency within Snohomish County.

Community Transit's public transportation benefit area (PTBA) has grown from serving seven communities at its inception in 1976 to serving every incorporated city in Snohomish County except Everett.

- 587,000 residents over 1,300 square miles
- 1,700 stops on 47 bus routes
- 22 park & ride lots

GROWTH TRENDS

In addition to planning for the new regional transit services, it is important to recognize the rapid growth in Snohomish County over the past 10 years. New growth offers both opportunities and challenges for a transit agency. Increased densities, particularly in more built-out portions of the county, allow transit to operate more efficiently by moving more people per bus. However, this growth can also lead to traffic congestion that slows buses and increases cost. In less dense areas, growth can result in new transit demand, but can also be difficult to serve if the roadway network is disconnected and circuitous making access to the bus challenging.

Figure 2 shows growth in western Snohomish County since 2010. There has been a substantial amount of growth in southwest Snohomish County, which is the densest part of the county and also where many core CT routes operate. In particular, areas of north Lynnwood, Bothell, and Mill Creek had significant population growth. Other pockets of growth in the county include Monroe, western Lake Stevens, and Marysville. The area immediately east of Mill Creek and Bothell also stands out for having substantial growth outside of the PTBA. The County's urban growth area and the PTBA do not fully align as precincts must vote to join the PTBA. Some votes to bring additional areas into the PTBA have failed, most recently in 2008 and 2010.

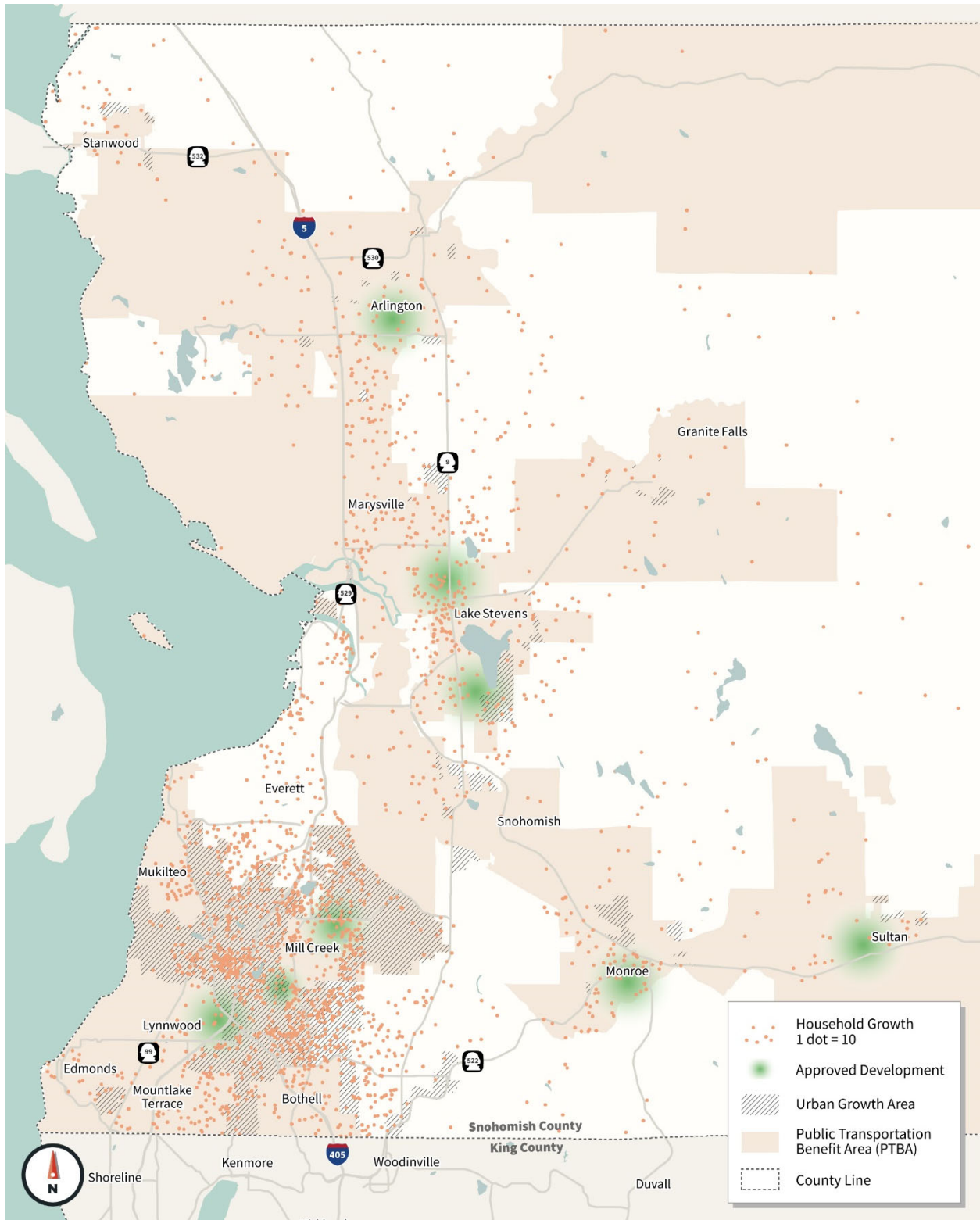


Figure 2. Growth Trends

TRAVEL PATTERN DATA

A key question raised by Community Transit at the outset of this project was how well their service aligned with the overall travel patterns in and around their service area. Historically, answering this type of question was challenging as it is difficult to observe large-scale movement patterns without a complex household travel survey.

Today, however, there are new sources of travel pattern data that rely on anonymized location records from mobile devices and navigation systems. This is a new type of “big data” that allows us to understand the movement patterns of hundreds of thousands of people through direct observations of actual (as opposed to stated) behavior.

StreetLight Data was selected as the travel pattern data vendor for this project. StreetLight aggregates the anonymized location records using a zone structure and time bins defined by the user. Time periods were defined in the following way for this study:

- Day Types
 - Weekday: Monday through Thursday
 - Weekend: Saturday and Sunday
- Time of Day Periods
 - Early AM: 12AM – 6AM
 - Peak AM: 6AM – 10AM
 - Mid-Day: 10AM – 3PM
 - Peak PM: 3PM – 7PM
 - Late PM: 7PM – 12AM

Data was downloaded for September-October 2018 and March-April 2019, consistent with the ridership data that CT provided for this study.

ZONE STRUCTURE

A zone system for travel pattern data was developed in consultation with CT staff as shown in **Figure 3**. Generally, zones are an aggregation of census tracts which cover the entire study area. Tracts were aggregated into larger zones if they had similar land uses and did not have significant barriers between them, such as I-5, waterways, or significant topography. Some zones diverge from census tract geography based on unique land uses or other characteristics.

In addition, StreetLight’s “middle filter” feature was used to see travel patterns that pass through certain points. Those included:

- Ash Way Park & Ride
- Canyon Park Park & Ride
- Mountlake Terrace Park & Ride
- Lynnwood Transit Center
- Everett Station
- Edmonds Ferry Terminal
- Mukilteo Ferry Terminal
- US 2 Trestle
- SR 9 & Airport Way
- SR 522 & Paradise Lake Road
- I-5 and SR 529 Interchange

The park & ride and transit center middle filters were used for the analysis in the Opportunities for Transfer Improvements section. Due to the complexity in multimodal activity at the ferry terminals, those locations did not provide meaningful data. Appendix A includes the maps for the remaining middle filters.

DATA VALIDATION

Before beginning data evaluation, Fehr & Peers validated the Streetlight data using three checks:

Percentage Trip Capture: Streetlight provides the total trip activity for each analysis zone. This value is compared to the total trips that are included in the zone-to-zone analysis results. The zone system used in this analysis captures over 98 percent of the travel to or from Snohomish County. The remaining 2 percent is from areas north of Whatcom County, east of the Cascade Mountains, south of Thurston County, or the Olympic Peninsula.

Trip and Land Use Proportion: each zone’s trip volume was compared with the underlying land use activity from the PSRC Travel Demand Model, measured as the sum of population and jobs. The ratios were generally consistent with a few outliers that likely have more retail and non-home-based trips such as Quil Ceda Village, the industrial area just west of Paine Field, and several other malls or commercial districts. In other words, the sampling rate for the different zones is fairly consistent, suggesting that no zones were under-sampled due to low mobile device penetration.

Origin-Destination Pattern: the StreetLight origin-destination patterns between an aggregated zone system comprised of 17 large areas (“aggregate zones”) were compared to

those found in the PSRC model. While the PSRC model is not a direct observation of travel patterns, earlier observations of both the PSRC and mobile device data indicate similar travel patterns at large geographies. This check ensures that the data sampled from StreetLight are representative of overall patterns around the region.

SCALING TO PERSON TRIPS

StreetLight’s data reflects observations of mobile devices, rather than people, throughout the entire four-month data collection period. To scale the data, the ratio of average weekday person trips in the PSRC Travel Demand Model to StreetLight observations was calculated. This factor is used throughout the analysis to scale the StreetLight data to weekday person trips and accounts for the overall sample rate and number of analysis days. **Table I** summarizes the results of some of the validation checks between the Streetlight mobile device data and the PSRC travel demand forecasting model, which is described in the next section. Overall, there is a strong agreement between the two independent data sources when reviewing the relative flows into, out of, and within the county.

TABLE I. STREETLIGHT DATA VALIDATION

Trip Type	PSRC Model Proportion of Total Trips	Streetlight Data Proportion of Total Trips
Trips Beginning and Ending within Snohomish County	76%	78%
Trips Beginning Outside and Ending within Snohomish County	12%	11%
Trips Beginning within and Ending Outside Snohomish County	12%	11%
Total	100%	100%

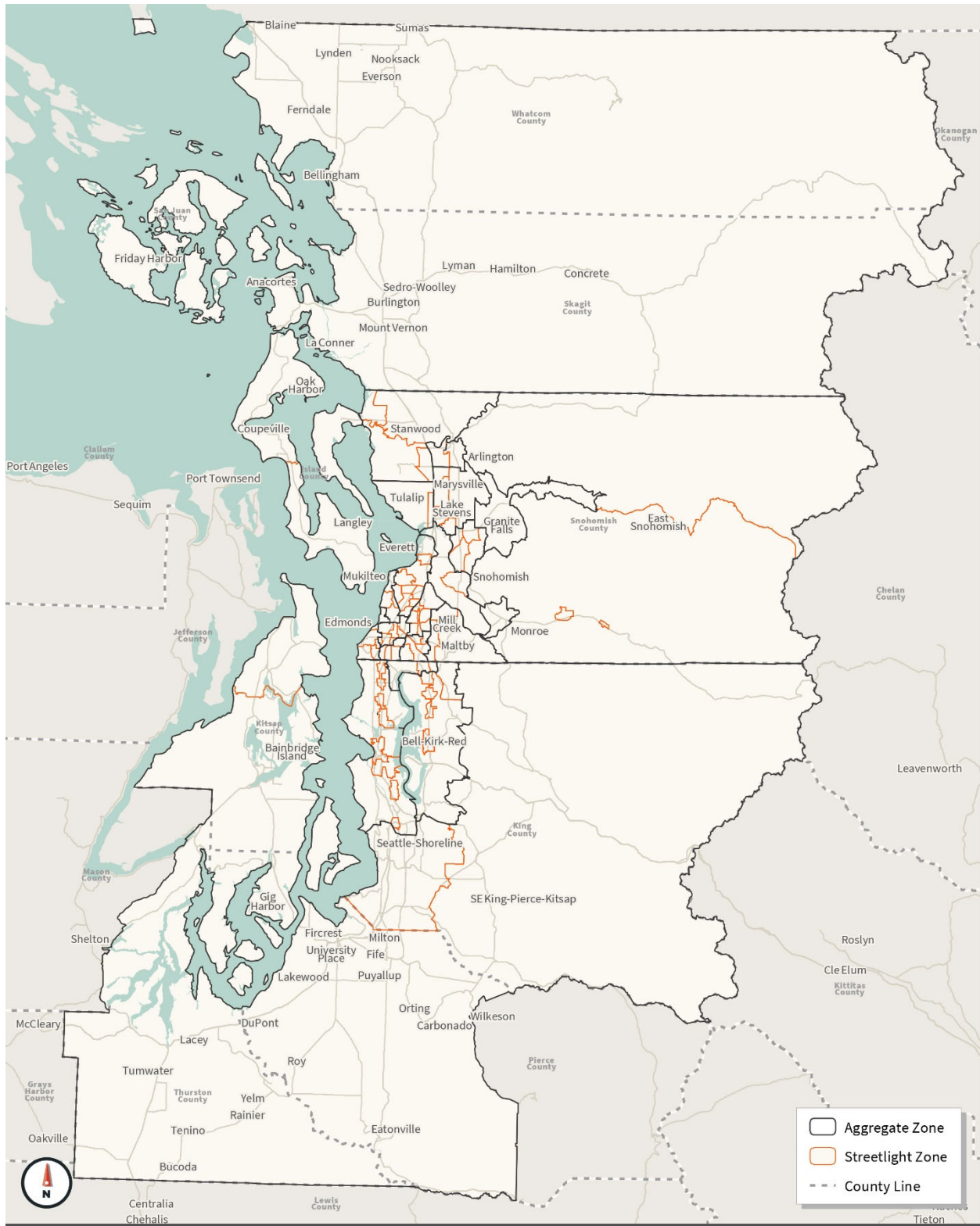


Figure 3. Streetlight Zone Structure

TRAVEL DEMAND MODELS

Puget Sound Regional Council (PSRC) maintains a regional travel demand forecasting model that is used by many agencies and jurisdictions in the region to understand travel patterns and traffic congestion levels. This model is also the most comprehensive source of future land use forecasts in the region as the PSRC works with all the cities and counties in the region to allocate regional growth forecasts. For this project, the most recent base year model (4k zone system, version 4.1.0) was used for comparison with the StreetLight data. The travel patterns of the PSRC model, derived from multi-day travel diaries of residents throughout the Puget Sound region and demographic data, are validated against arterial auto volumes. Prior to location based service data such as that provided by StreetLight, the PSRC model was the only source of travel demand data at the regional scale. As noted earlier, these model-based travel pattern data sources are not based on direct observations of travel behaviors, but rather stated trips gleaned from travel surveys.

The most recent ST base year Incremental Transit Ridership model (2016) was used to estimate current transit trip totals and mode share between zones. The ST model is based on ORCA (One Regional Card for All) trip data for agencies throughout the Puget Sound and regional household survey data. Streetlight data does not provide mode share and the PSRC model is less reliable at predicting transit trips at a sub-county level. The ST model's base year ridership was developed using passenger load data, boarding counts, on-board transit surveys, and ORCA fare card data.

Both the PSRC travel demand model and the ST ridership model include King, Snohomish, Pierce, and Kitsap Counties. Generally, the analysis zones in these models are smaller than the analysis zones used for the StreetLight analysis. A correspondence was developed in order to aggregate information from these models into the Streetlight analysis zone structure. When explicit comparisons were made between the Streetlight data and the travel models, only those zones present in all data sources were included in the analysis.

DEMOGRAPHIC DATA

American Community Survey (ACS) 2017 5-year survey data from the US Census Bureau was used to estimate household growth over the past decade.

COMMUNITY TRANSIT DATA

CT provided average daily stop-level boarding data for weekday, Saturday, and Sunday service from October of 2018 and April and September of 2019. This data was used to compare route productivity and ridership to Streetlight person trip flows.

Fehr & Peers also accessed General Transit Feed Specification (GTFS) data published by CT to build a transit network model and calculate transit travel times and compare those times to auto travel times estimated by the PSRC model (see Service Opportunities section).



CURRENT TRAVEL FLOWS

INTRODUCTION

This section describes major travel flows within the CT service area. All-day and commute flows are evaluated because those are the types of trips that transit tends to serve best. Specifically, corridors that have relatively high numbers of trips throughout the day (e.g., retail corridors like SR 99) and commute trips to dense employment areas (e.g., trips to downtown Seattle) tend to be where transit is most productive and serves the most riders. The major travel flows are compared to the CT route structure to determine if there are flows that are not served by transit. Ridership and mode share of routes are compared to overall flows to identify potentially under-served or under-performing routes.

ALL DAY AND COMMUTE PERIOD TRAVEL FLOWS

The top ten flows for daily, AM peak, and PM peak are shown in **Figures 4 through 6**. These flows were developed using the 17 aggregate zone structure that collapsed the smaller StreetLight zones into larger areas more suited to identifying major travel flows.

The flows are generally consistent between the three time periods though some top flows appear in only one time period such as between Mountlake Terrace and Lynnwood for top PM flows. The top ten flows account for 38 percent of the total daily trips, 37 percent of the total AM

period trips, and 39 percent of the total PM period trips.

Six of the top ten daily flows are contained within Snohomish County, particularly the southwest portion of the county. The commute period flows show a slightly higher concentration of trips to and from King County. Flows to job centers within the county are also slightly higher during the commute periods, in particular to and from Lynnwood and Everett.

The top origin-destination pair, Mill Creek-Everett, represents 4.7 percent of total person trips, showing that no individual zone pair represents a significant proportion of total travel. However, because of the sheer magnitude of trip-making in the county, this trip pair still represents nearly 85,000 daily trips. **Table 2** below summarizes that top 10 weekday travel flow pairs within the study area. The top flow between Everett and Mill Creek mirrors CT's Green Line service.

While much of the existing travel occurs in a north-south orientation aligning with the I-5 and SR 99 corridors, about 40 percent of the top ten flows have an east-west orientation, some of which require crossing one of the regional roadways, which tend to be congested areas with significant delays for transit. Additionally, some of the east-west travel routes do not have a direct and reliable transit pathway, for example between Canyon Park and Mountlake Terrace.

TABLE 2. TOP TEN WEEKDAY TRAVEL FLOWS

Rank	Flow Pair	Daily Person Trips	Percent of Total Daily Person Trips	Daily Transit Mode Share
1	Everett – Mill Creek	84,700	4.7%	0.7%
2	Edmonds – Seattle-Shoreline	55,700	3.1%	2.5%
3	Everett – Mukilteo	54,100	3.0%	0.9%
4	Edmonds – Lynnwood	48,300	2.7%	2.1%
5	Everett – Lynnwood	48,300	2.7%	2.6%
6	Maltby – Bell-Kirk-Red	47,700	2.7%	0.6%
7	Lynnwood – Seattle-Shoreline	46,600	2.6%	5.8%
8	Everett – Marysville	45,600	2.5%	1.8%
9	Maltby – Mill Creek	43,400	2.4%	0.3%
10	Everett – Seattle-Shoreline	37,900	2.1%	6.3%

These flows were compared with existing transit service, to identify any gaps in service for major flows. The only major flows without current transit service are between Maltby and Mill Creek and Maltby and the Bellevue-Kirkland-Redmond area. CT’s PTBA does not currently include the Maltby/SR 9 corridor, but the Streetlight data suggests that a future expansion to include that area could be warranted given the travel demand to Mill Creek and the Bellevue-Kirkland-Redmond area. Furthermore, the growth analysis presented in **Figure 2** suggests that this is a fast-growing part of the county that will continue to see growth in travel and transit demand.

The flows were also reviewed against planned transit service including CT’s visionary planned network, expanded Swift BRT, expanded Link light rail, and Stride BRT. Almost all major flows appear to be served transit service by 2024. The exceptions are the flows from Maltby to Mill Creek and Bellevue-Kirkland-Redmond. However, as described later in this report, there are opportunities to improve the efficiency and operations of these routes if local jurisdictions partner with CT on land use and infrastructure projects that enhance transit service.

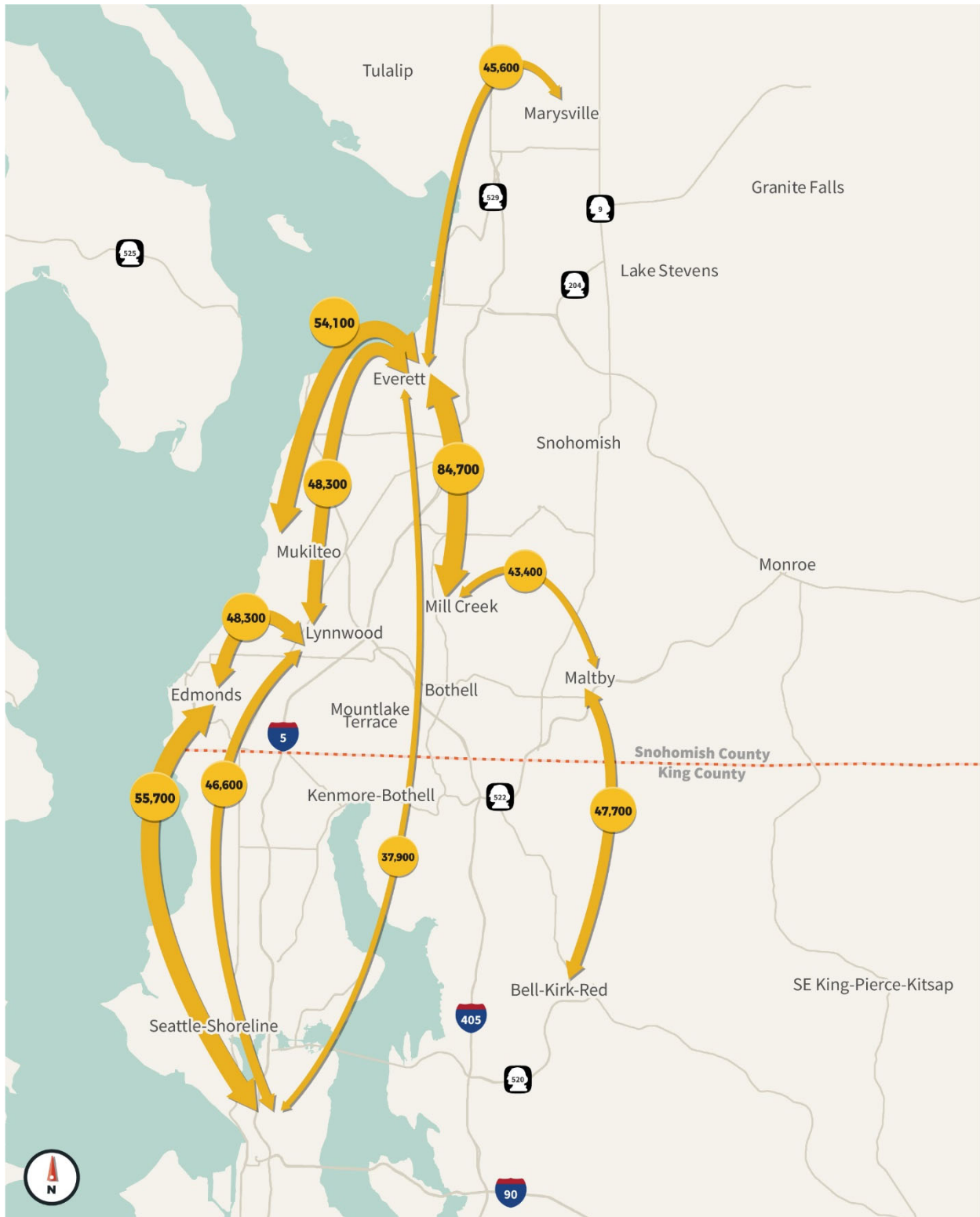


Figure 4. Top Ten Travel Flows – All Day



Figure 5. Top Ten Travel Flows – AM Peak

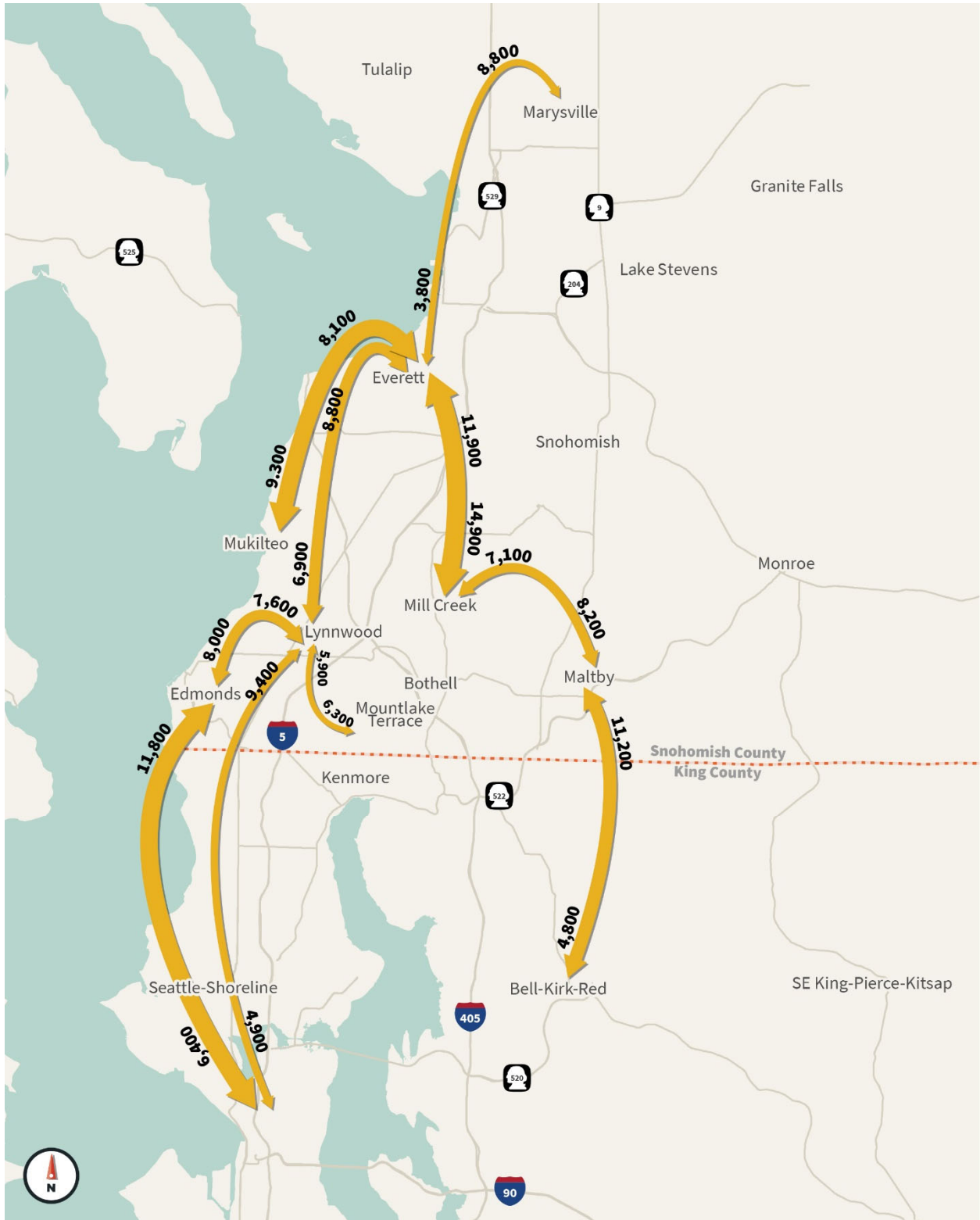


Figure 6. Top Ten Travel Flows – PM Peak

TRANSIT USE

To estimate the portion of the travel market that is currently using transit, Fehr & Peers ranked StreetLight person trip flows with at least one trip end in Snohomish County and compared them with the transit mode share from the Sound Transit Incremental Ridership Model as shown in **Table 2** (the base year model relies on ORCA data and is therefore a good source for existing transit use).

Transit use for the top ten origin-destination pairs have more significant variation than person trips overall, with transit mode shares ranging from 0.3% to 6.3%. The transit mode shares are highest between Snohomish County and Seattle-Shoreline, with much of that demand being driven by trips to downtown Seattle and the U District.

Not surprisingly, these are also the areas that have substantial parking charges and traffic congestion.

Within the county, the daily transit mode shares are relatively strong for trips to and from Lynnwood, which is the densest part of the county and has populations with characteristics supporting higher transit use. The Swift Blue line corridor between Lynnwood and Everett stands out as a strong performer.

The PSRC model estimates that daily transit use across the four-county region is approximately 3% of all person trips. Regionally, commute trips have a higher rate of 8% while non-commute trips have a lower rate of 2%.



Figure 7. Top Ten Travel Flows – Transit Use Percentage

Some of the OD pairs have relatively low transit mode shares. In particular, the largest OD flow in the county between Everett and Mill Creek has a comparatively low 0.7% transit trip share. Travel between Everett and Mukilteo is also not common via transit.

A more detailed review of the travel flows using the full StreetLight zone structure reveals that both the Everett-Mill Creek and Everett-Mukilteo OD pairs have network connectivity challenges that may constrain the ability to serve that demand.

The flow between Everett and Mill Creek shows substantial demand between the Silver Lake neighborhood and the Everett Mall area (45% of the total demand from the Silver Lake zone). While this flow is currently within Everett Transit’s jurisdiction, it highlights an important transit opportunity supported by the StreetLight data. There are no bus lines directly serving this flow and few east-west connections across I-5 requiring circuitous routing to serve this demand. The City of Everett is planning an additional east-west connection across I-5 at 100th Street that could provide an opportunity for more direct transit service.

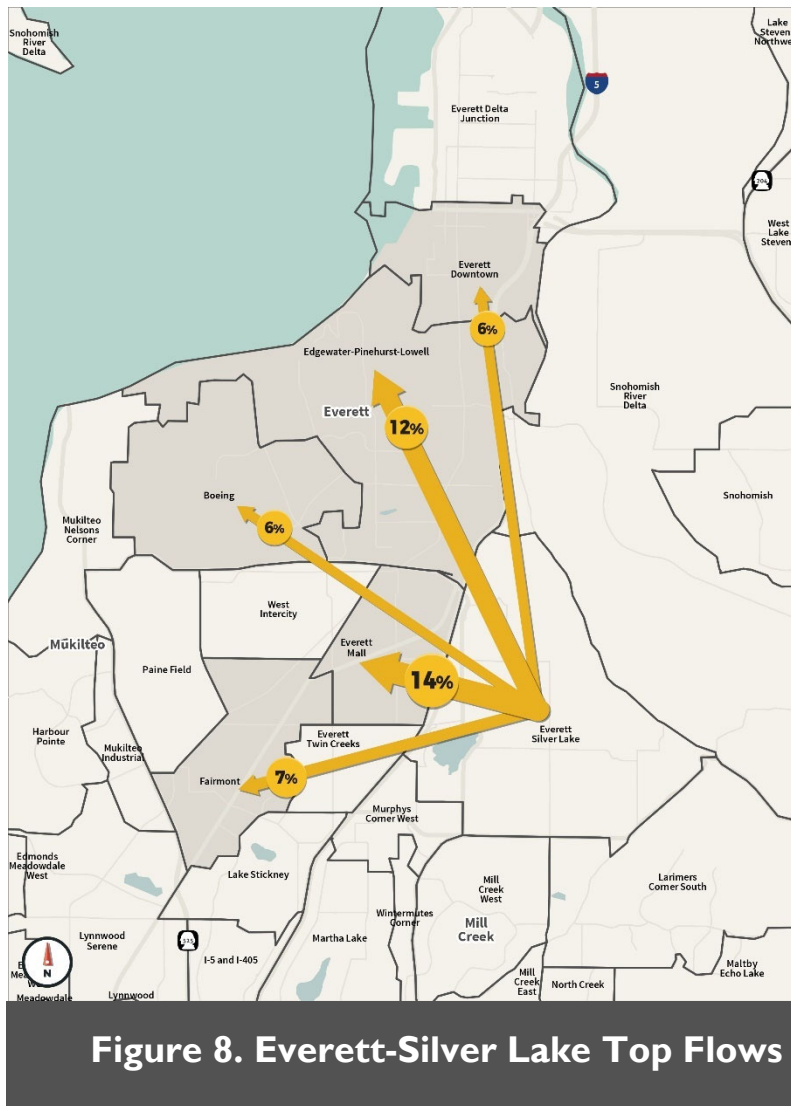


Figure 8. Everett-Silver Lake Top Flows

Serving the demand between the Everett and Mukilteo areas with transit is challenging due to limited network connectivity, topographic barriers, the presence of Boeing and other large-scale industrial facilities, and Paine Field. Additionally, parking in these areas tends to be free and relatively easy to access. The top travel pair within this submarket is between the neighborhoods surrounding Lake Serene/southern Mukilteo and the SR 99 corridor southeast of Paine Field, which has good network connectivity and is currently well served by the Swift Blue Line. Other pairs, such as the northern half of Mukilteo to central Everett, have lower network connectivity and no direct transit connections. Combining or improving the transfer between the I07 and 270/271/280 could provide more direct service for this flow and boost transit mode share.

Fundamentally, both the Everett-Mill Creek and Everett-Mukilteo areas also have a land use challenge characterized by relatively low density origin and destination trip generators. The Boeing/Paine Field Industrial Area in particular generates a lot of trips and activity but is spread over a very large area with an abundance of free parking.

It is worth noting that the transit mode share in the Everett-Mill Creek corridor should be expected to improve with implementation of the Swift Green Line, which does serve some core market areas, such as the area between Evergreen Way/I28th Street and Mill Creek Town Center. The Green Line is well supported by the large number of trips between Mill Creek and Everett. However, its performance could be further enhanced by land use changes along the corridor and realignment of local service to complement and support the Green Line.

Lastly, the transit mode share between Snohomish County and the employment centers in East King County is relatively low. Today, Sound Transit provides service between Everett and Lynnwood to Bellevue via Bothell, but the quality of that service should improve substantially when Stride BRT comes online in 2024. This new service should correspond to a better transit mode share, but is reliant on strong CT service to connect riders who do not live near Snohomish County's Stride stations to access the BRT corridor via the Lynnwood, Canyon Park, or SR 522 stations.

In addition to the transit mode share analysis, Fehr & Peers also analyzed travel patterns to Boeing to identify any opportunities to reorient service. In general, most AM trips to Boeing originated in the adjacent zones of Everett, Mukilteo, Lynnwood, and Mill Creek. However, the Early AM (12AM – 6AM) flows had more trips coming from less dense areas to the north and east such as Arlington, Marysville, Lake Stevens, and Granite Falls. The Peak AM (6AM – 10AM) flows had more trips originating from denser urbanized areas to the south such as Seattle and Shoreline. This is consistent with past research showing a difference in commuting patterns between machinists whose shifts begin in

the early morning and tend to live farther away and in more rural/suburban areas, and engineers and other office workers who begin work later in the morning and tend to live a bit closer and further south. The trips destined for Boeing are relatively evenly distributed among the top flow origins and existing service tends to align with the travel patterns to Boeing. As noted above, however, the large footprint of Boeing makes transit service challenging as transit does best when at least one end of the trip has relatively concentrated demand. Service possibilities are described in the Opportunities for Alternate Service Methods section.

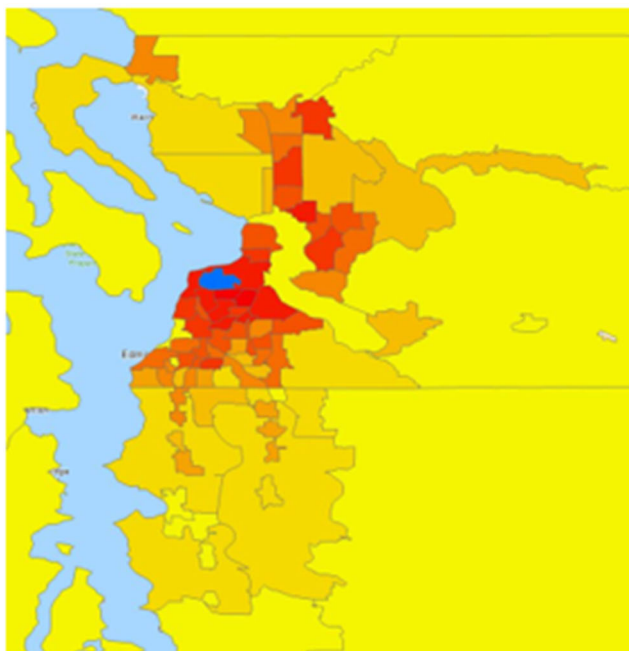


Figure 9a. Early AM Flows to Boeing

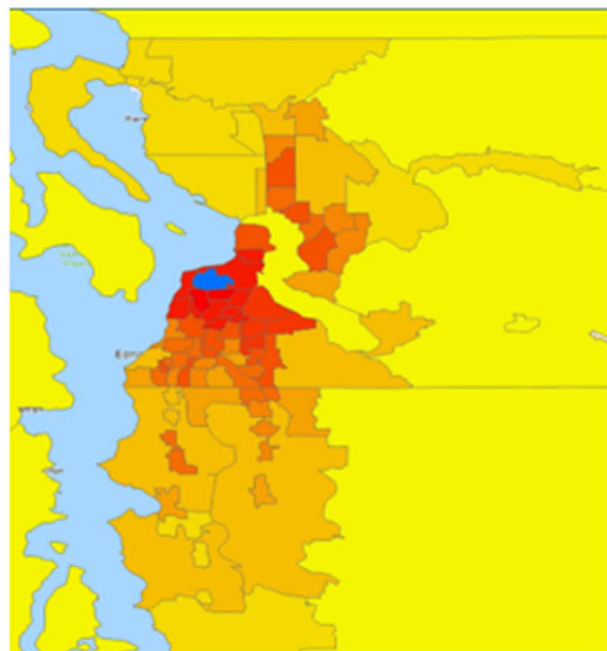


Figure 9b. 6-10 AM Flows to Boeing

TRAVEL FLOWS THROUGH PARADISE LAKE ROAD/SR 522 JUNCTION PARK

One of the questions raised by CT as part of this study was the viability of a park & ride in the vicinity of the Paradise Lake Road/SR 522 junction. Based on an analysis of StreetLight data, this area has a strong potential to be a key location to access future BRT and light rail services.

StreetLight data was analyzed to determine the number of people who travel through the Paradise Lake Road/SR 522 junction during the AM peak with an origin in Snohomish County and a destination along the Link light rail or Stride routes. As can be seen in **Table 3**, Stride BRT is

the larger of the two markets (with about 65 percent of the total weekday AM person trips). The trips to Stride and Link are distributed among Monroe, the Maltby-Echo Lake area, and the southeast StreetLight analysis zone. Given this relatively dispersed distribution and the overall size of the market, this junction would likely support a 100-300 stall park & ride facility. A key to successful utilization will be a good transfer experience between the bus routes serving the park & ride and the BRT/light rail service. Ideally, the travel and wait times would be low, otherwise travelers would likely drive to park & ride facilities on the BRT or light rail service.

TABLE 3. SNOHOMISH COUNTY WEEKDAY AM PEAK PERSON TRIPS VIA PARADISE LAKE ROAD/SR 522 JUNCTION

Origin	Link Light Rail Market		Stride BRT Market	
	Person Trips	Percent of Total	Person Trips	Percent of Total
Monroe	150	38%	320	43%
Maltby Echo Lake	140	35%	250	34%
Snohomish Southeast	80	20%	90	13%
Sultan	10	3%	30	3%
Snohomish River Delta	10	2%	10	2%
Total	390	97%	700	95%

ROUTE LEVEL ANALYSIS

CT's routes were analyzed using a combination of StreetLight and route productivity data. The following chart shows two pieces of data for each core and community route:

- the number of person trips per bus route mile made between zones served by that route; and
- the current transit share percentage based on CT boardings.

In other words, the chart shows the potential ridership for each route and the current performance of the route capturing that demand. Across the four-county region, the PSRC model estimates daily transit use is approximately 3% of all person trips.

When considering which routes would result in the highest return on investment of service hours, these data may be useful. For instance, there are four routes with transit use percentages less than the average of 1 percent, but potential demand greater than the average of 6,700 person trips per mile.

- Route 105 – Hardseson Road to Bothell
- Route 106 – Mariner Park & Ride to Bothell
- Route 109 – Ash Way Park & Ride to Lake Stevens
- Route 119 – Ash Way Park & Ride to Mountlake Terrace

Route 105 is a local overlay of the Swift Green Line, providing local access, so additional service on that route might not be a priority for CT.

Also notable are some of the routes that have high transit use rates but relatively low person trip generation along the routes. Routes 112, 113, and 120 stand out. All three of these routes provide access to the Lynnwood Transit Center, a major regional transit access point that will only grow in significance with the extension of light rail in 2024. The performance of these routes should be expected to further improve with the light rail connection. Ridership on those routes could be further improved by increasing frequencies (particularly during the peak commute periods) which are currently 30 minutes throughout most of the day and one hour in the evening.

Transit Market and Capture by Route

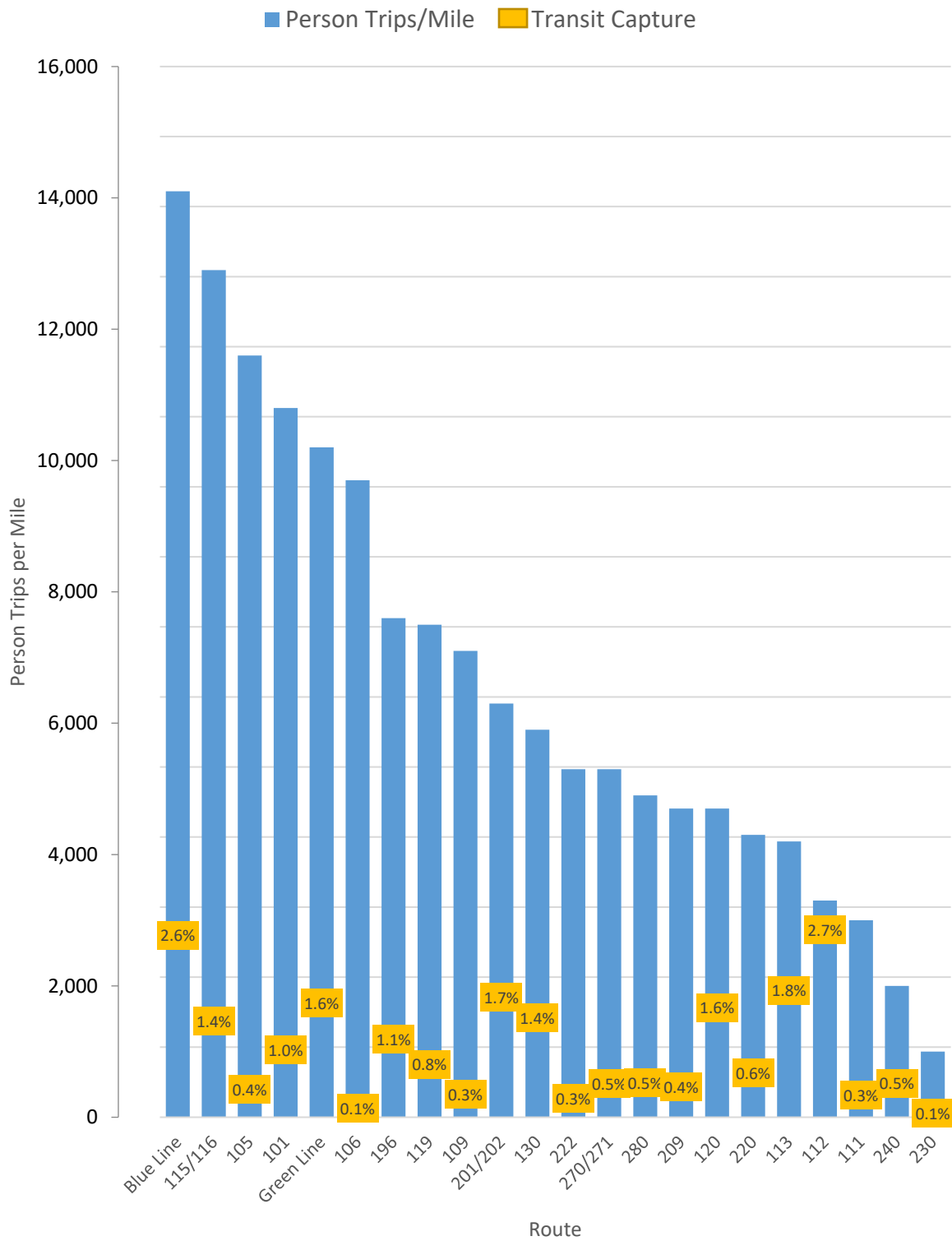


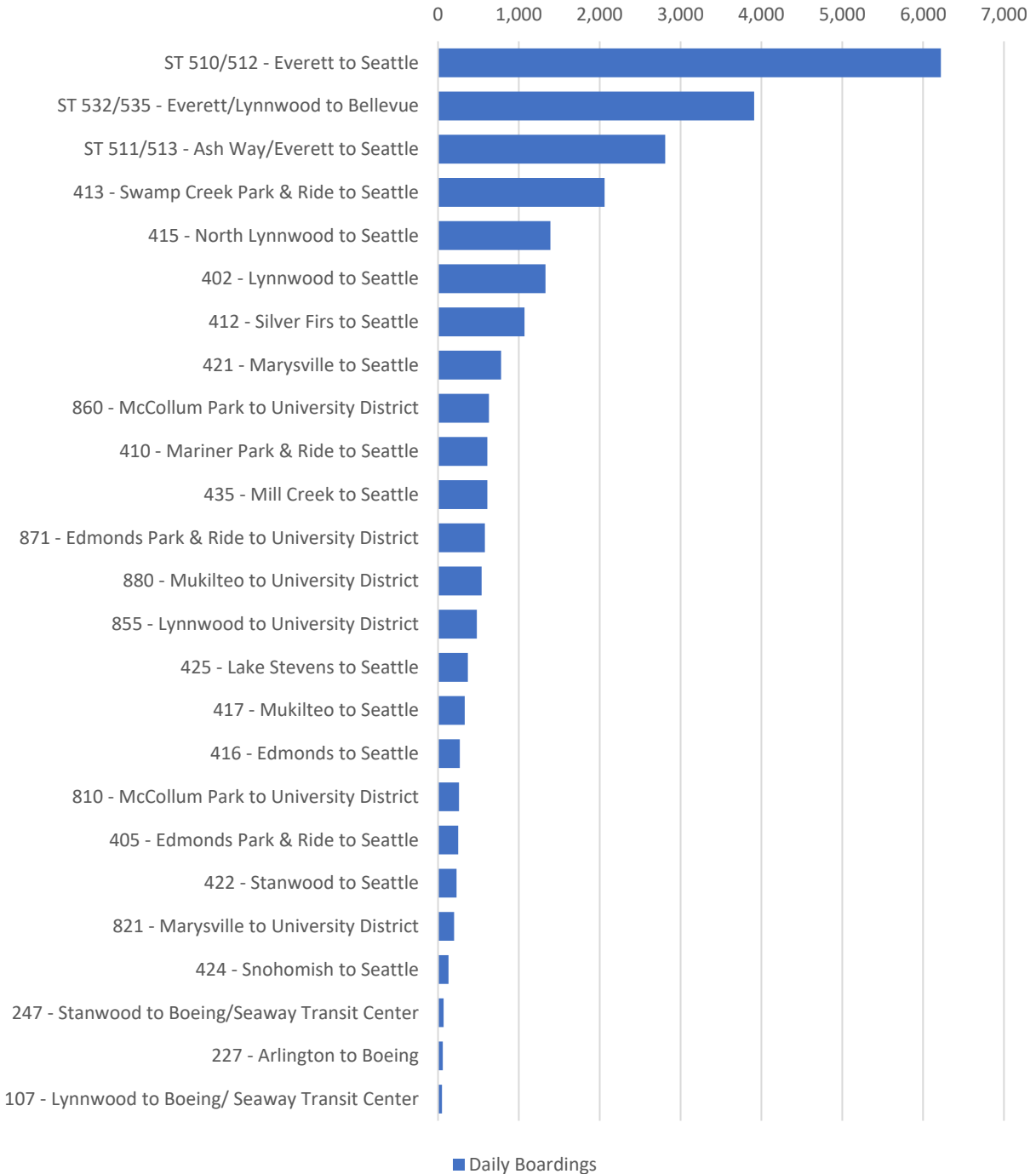
TABLE 4. ROUTE PRODUCTIVITY – CORE AND COMMUNITY ROUTES

Route	Description	Boardings per Mile	Person Trips per Mile	Transit Share
101	Mariner Park & Ride to Aurora Village	104	10,800	1.0%
105	Hardeson Road to Bothell	46	11,600	0.4%
106	Mariner Park & Ride to Bothell	12	9,700	0.1%
109	Ash Way Park & Ride to Lake Stevens	23	7,100	0.3%
111	Brier to Mountlake Terrace	9	3,000	0.3%
112	Mountlake Terrace to Ash Way Park & Ride	89	3,300	2.7%
113	Mukilteo to Lynnwood Transit Center	77	4,200	1.8%
115/116	Mill Creek to Mountlake Terrace/Edmonds	177	12,900	1.4%
119	Ash Way Park & Ride to Mountlake Terrace	57	7,500	0.8%
120	Canyon Park to Edmonds Community College	73	4,700	1.6%
130	Edmonds to Lynnwood	84	5,900	1.4%
196	Ash Way Park & Ride- Edmonds	85	7,600	1.1%
201/202	Smokey Point to Lynnwood	108	6,300	1.7%
209	Smokey Point to Lake Stevens	20	4,700	0.4%
220	Arlington to Smokey Point	27	4,300	0.6%
222	Marysville to Tulalip	15	5,300	0.3%
230	Darrington to Smokey Point	1	1,000	0.1%
240	Stanwood to Smokey Point	10	2,000	0.5%
270/271	Gold Bar to Everett	25	5,300	0.5%
280	Granite Falls to Everett	24	4,900	0.5%
Blue Line	SWIFT Blue: Everett to Aurora Village	366	14,100	2.6%
Green Line	SWIFT Green: Canyon Park to Seaway Transit Center	166	10,200	1.6%

Daily boardings on CT's commuter routes are shown in the table below. Of the roughly 25,000 daily boardings on commuter routes, 73 percent are traveling to Downtown Seattle, 15 percent are traveling to Bellevue, and 11 percent are traveling to the University District. About 21,000 riders that currently have a one-seat ride to Downtown Seattle and the University District

will instead use feeder service to Link light rail in the future. This is consistent with the changing structure of other regional transit agencies in the Puget Sound; much of the fixed route bus service currently provided will be reoriented to connect passengers to light rail rather than providing a one-seat ride to employment centers.

Daily Boardings of Commuter Routes





SERVICE OPPORTUNITIES

SERVICE OPPORTUNITIES

This section summarizes the service opportunities identified through the travel demand markets evaluation. These include the following evaluations:

1. Markets to Connect to Regional Transit
2. Opportunities for Fixed Route Expansion
3. Opportunities for Bidirectional Service
4. Opportunities for Alternate Service Methods
5. Opportunities for Land Use Advocacy
6. Park & Ride Evaluation
7. Opportunities for Transfer Improvements

HIGH LEVEL RECOMMENDATIONS

After evaluating travel demand, current major flows, and the existing CT network, the following list of high-level recommendations was developed with the aim of increasing ridership as the top priority.¹ More specific recommendations are discussed in the remainder of this section.

- **Focus on high capacity transit hubs:** With Sound Transit extending link light rail to Lynnwood in 2024, CT has the opportunity to redeploy services to be more focused within the PTBA. Focusing some of the investment on these hubs will ensure that people have convenient access to regional centers, but it can also improve service levels in the densest areas of the county,

particularly around Lynnwood. Travel patterns suggest that east-west connections have the strongest desire lines to the new regional transit services.

- **Support Swift BRT with feeder routes:** provide more feeder routes, particularly with an east-west orientation (for example SR 104 between Edmonds and Mountlake Terrace), to support CT's Swift BRT investment along north-south spines. This is particularly important for the Green Line which currently has fewer local route connections than the Blue Line.
- **Make routes more direct:** consider straightening out some routes to more directly connect with Swift and light rail stations. Transit travel times need to be shortened to better compete with autos. This could also reduce some pressure on the regional park & ride lots which are often full early in the morning. Some infrastructure projects may be required to achieve more direct routes, for example replacing the SR 524 bridge over Swamp Creek so transit can travel more directly between Lynnwood and Bothell.
- **Increase access into residential neighborhoods:** consider allocating service to corridors with better access into residential neighborhoods, particularly those that are relatively proximate to Swift and the light rail corridor (e.g., within a 10-minute ride). Many residential neighborhoods are near arterial fixed routes, but riders may have to walk a mile or more to reach the nearest bus stop, making the travel time and convenience not competitive with driving.

¹ Transit agencies have many goals other than increasing ridership. To focus the recommendations from this transit market analysis, we focus on ridership growth. This evaluation lens should be considered when comparing the recommendations in this study to other CT planning and prioritization studies.

MARKETS TO CONNECT TO REGIONAL TRANSIT

LINK LIGHT RAIL SERVICE AREA

CT has an opportunity to reallocate regional express bus service with the extension of Sound Transit’s Link light rail to Lynnwood and Mountlake Terrace in 2024. In addition to restructuring service to Downtown Seattle and the University District, CT may be able to attract more riders who have destinations along other stations served by Link light rail. For example, Northgate is a major retail and office hub and Capitol Hill is the densest residential neighborhood in Seattle and has many retail, dining, and entertainment attractions. Ensuring that current flows between Snohomish County and Link service catchment areas in King County are well served is an important consideration for reallocation of CT service.

Fehr & Peers analyzed the person trip flows between locations in Snohomish County and

station areas surrounding current and future light rail stations in King County. The Snohomish County locations were overlaid with current CT service to display the relationship between travel demand and transit access (**Figure 10**).

Most areas with high demand for destinations within the Link catchment area are adjacent to existing CT service with a direct connection to UW or Downtown Seattle. Some of these connections, especially east of I-5 to Mill Creek and the City of Snohomish, are circuitous and could benefit from more direct east-west connection to future Link stations.

One item to keep in mind when restructuring connections to light rail is frequency. Higher frequency routes attract considerably more ridership than low-frequency routes, particularly when there is a transfer involved. Redeploying service hours in a way to increase frequencies will be an important way to drive ridership increases and fully leverage the light rail connections to King County.

TABLE 5. WEEKDAY FLOWS BETWEEN SNOHOMISH COUNTY AND LINK LIGHT RAIL MARKET

Area	Person Trips	Percentage of Total Trips Between Snohomish County and Link Light Rail Market
West Bothell	6,410	6.2%
Esperance	4,410	4.3%
Edmonds	3,760	3.6%
I-5 /I-405 Junction	3,700	3.6%
East Mountlake Terrace	3,670	3.6%
Woodway – West Esperance	3,660	3.6%
South Lynnwood	3,300	3.2%
Lake Serene	3,260	3.2%
Alderwood Mall	2,930	2.8%
Everett Silver Lake	2,910	2.8%

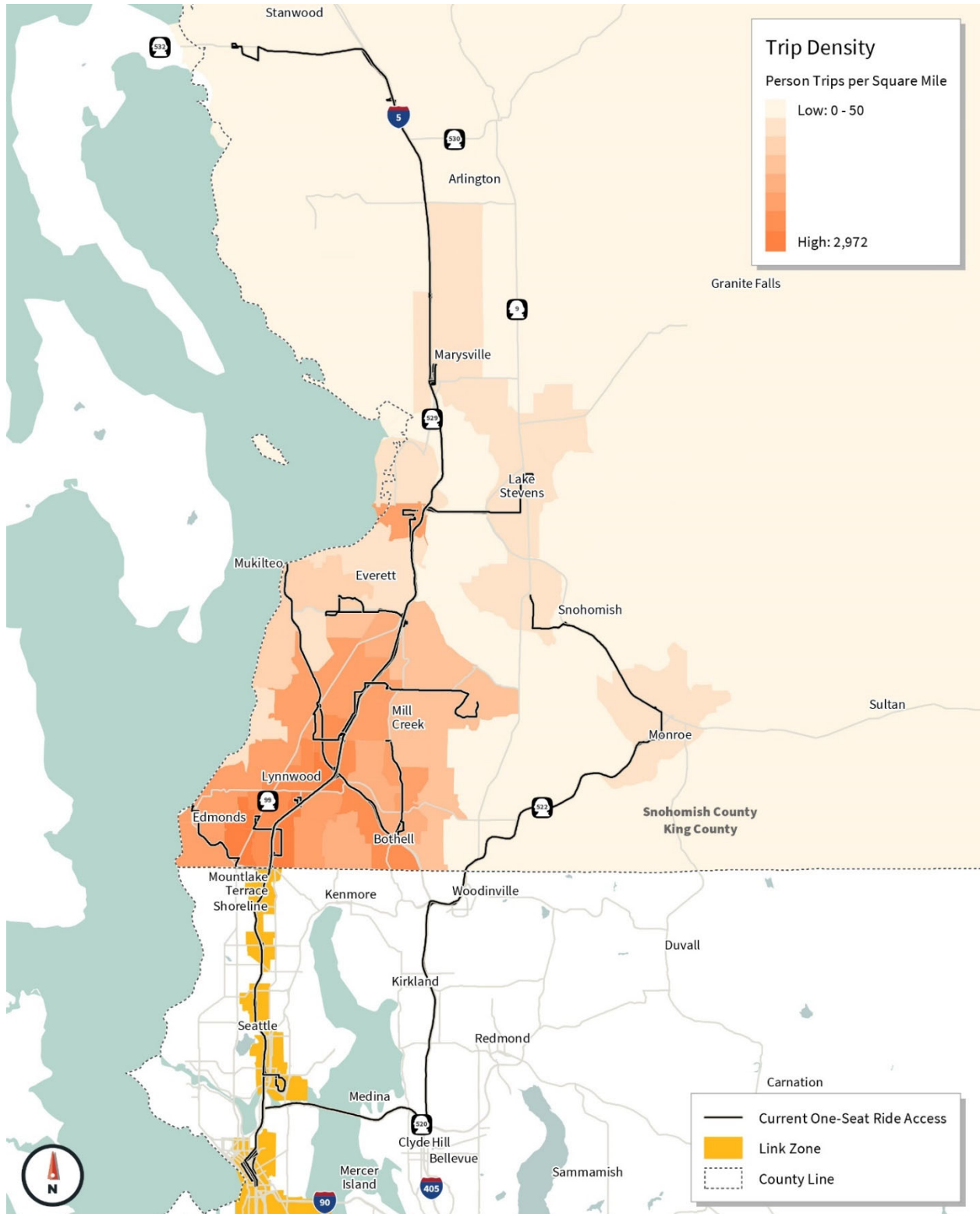


Figure 10. Market for Link Light Rail Service Area

MAJOR SNOHOMISH COUNTY MARKETS TO DOWNTOWN SEATTLE

Table 6 displays flows between Downtown Seattle and Snohomish County zones ranked by the number of person trips to identify any top flows that do not have a direct transit connection today. The relatively high transit mode shares between Snohomish County and Downtown Seattle, coupled with the relatively large number of people traveling between Snohomish County and Downtown Seattle makes this a major transit market for CT.

Today, nine of the top ten zones have nearby CT transit routes with a direct connection to Downtown Seattle. However, the top flow –

North Creek – does not have a direct CT transit connection to Downtown Seattle. This area consists of low-density residential development and lacks major east-west connections. North Creek would still lack direct transit access to Downtown Seattle in 2024 requiring at least two transfers to BRT and Link to complete this trip. This flow warrants further study to identify opportunities for transit service improvements, which at a minimum could include feeder service to the Canyon Park BRT station along the 35th/39th Avenue Southeast corridor. Targeting a park & ride facility for this relatively low-density area and/or increasing awareness and availability of existing parking spaces might also be a way to improve transit access.

TABLE 6 WEEKDAY FLOWS BETWEEN SNOHOMISH COUNTY AND DOWNTOWN SEATTLE

Area	Person Trips	Percentage of Total Trips Between Snohomish County and Downtown Seattle
North Creek	1,900	3.9%
I-5 / I-405 Junction	1,890	3.9%
West Bothell	1,840	3.7%
Everett Silver Lake	1,740	3.6%
Lake Serene	1,520	3.1%
Edmonds	1,500	3.1%
Esperance	1,460	3.0%
Larimer's Corner South (Seattle Hill Road/SR 96)	1,400	2.8%
Woodway-West Esperance	1,380	2.8%
South Lynnwood	1,260	2.6%

MAJOR SNOHOMISH COUNTY MARKETS TO THE UNIVERSITY OF WASHINGTON

Table 7 ranks flows between the University of Washington (UW) and Snohomish County zones by the number of person trips to identify any top flows that do not have a direct transit connection today. The top ten flows are fairly evenly distributed (3-5%) and account for roughly a third of the total flow between Snohomish County and UW. Unlike Downtown Seattle, only three of the top ten zones – the I-5 and I-405 interchange area, Mountlake Terrace East, and Alderwood Mall—have transit access to UW. This access is provided at major I-5 stops including Ash Way Park & Ride, Lynnwood Transit Center, and

Mountlake Terrace Transit Center (as well as 56th Avenue W through Mountlake Terrace). Providing more direct east-west feeder connections from these zones to future Link stations may help improve access to UW. However, even with existing transit service, the transit use rate is quite high, with approximately 17 percent of people traveling between Snohomish County and UW using transit. This high rate of transit usage between Snohomish County and UW presents a strong opportunity to increase ridership by leveraging the future light rail connections to allow for more direct connections between Snohomish County and UW.

TABLE 7. WEEKDAY FLOWS BETWEEN SNOHOMISH COUNTY AND UNIVERSITY OF WASHINGTON

Area	Person Trips	Percentage of Total Trips Between Snohomish County and UW
I-5 and I-405	800	5.1%
Esperance	570	3.6%
Edmonds	560	3.6%
Mountlake Terrace East	560	3.5%
Alderwood Mall	530	3.4%
Bothell West	510	3.3%
Boeing	480	3.1%
Everett Silver Lake	470	3.0%
Meadowdale	470	3.0%
Woodway-W Esperance	470	3.0%

STRIDE BRT SERVICE AREA

Along with reallocation of service toward the Link light rail extension, CT has an opportunity to provide feeder service to the future I-405 BRT corridor to serve flows between Snohomish County and Stride’s catchment areas in the Kirkland and Bellevue areas (including a connection to East Link in Downtown Bellevue). These flows are currently not as well served as the flows to Seattle along the Link corridor, with some major Snohomish County locations north of Canyon Park and west of I-5 lacking direct service to future BRT station areas. Note also that the magnitude of the person trip flows between Snohomish County and the Stride service area are quite large. However, the preponderance of free parking in many of the Stride station areas may limit the appeal of transit when compared to Downtown Seattle or UW, which have extensive paid parking at the destinations around the Link light rail stations.

The Swift Green Line will provide a good connection for areas north of Canyon Park to Stride. The high frequency of and all-day service offered by the Green Line will make this transfer particularly attractive. The lack of transit service between the Maltby-Echo Lake area stands out, although that area is outside the PTBA. However, the previously described park & ride facility near the junction of SR 522 and Paradise Lake Road could be a good option to provide transit access to Stride for this low-density area.

Given the common terminus of Stride and Link at Lynnwood Transit Center, any service that provides more frequent or rapid connections to Lynnwood benefits both the Link and Stride markets. For Stride, the most important connections are west of I-5 because those east of I-5 may have the option to use the Green Line or other routes to connect at Canyon Park.

TABLE 8. WEEKDAY FLOWS BETWEEN SNOHOMISH COUNTY AND STRIDE BRT MARKET

Area	Person Trips	Percentage of Total Trips Between Snohomish County and Stride BRT Market
West Bothell	9,530	17.3%
Maltby Echo Lake	4,250	7.7%
North Creek	3,890	7.0%
Monroe	1,970	3.6%
Canyon Park	1,850	3.3%
Larimer’s Corner South (Seattle Hill Road/SR 96)	1,770	3.2%
Kennard Corner (SR 527/196th Street SE)	1,490	2.7%
Everett Silver Lake	1,430	2.6%
Snohomish Southeast	1,190	2.1%
Brier	1,170	2.1%

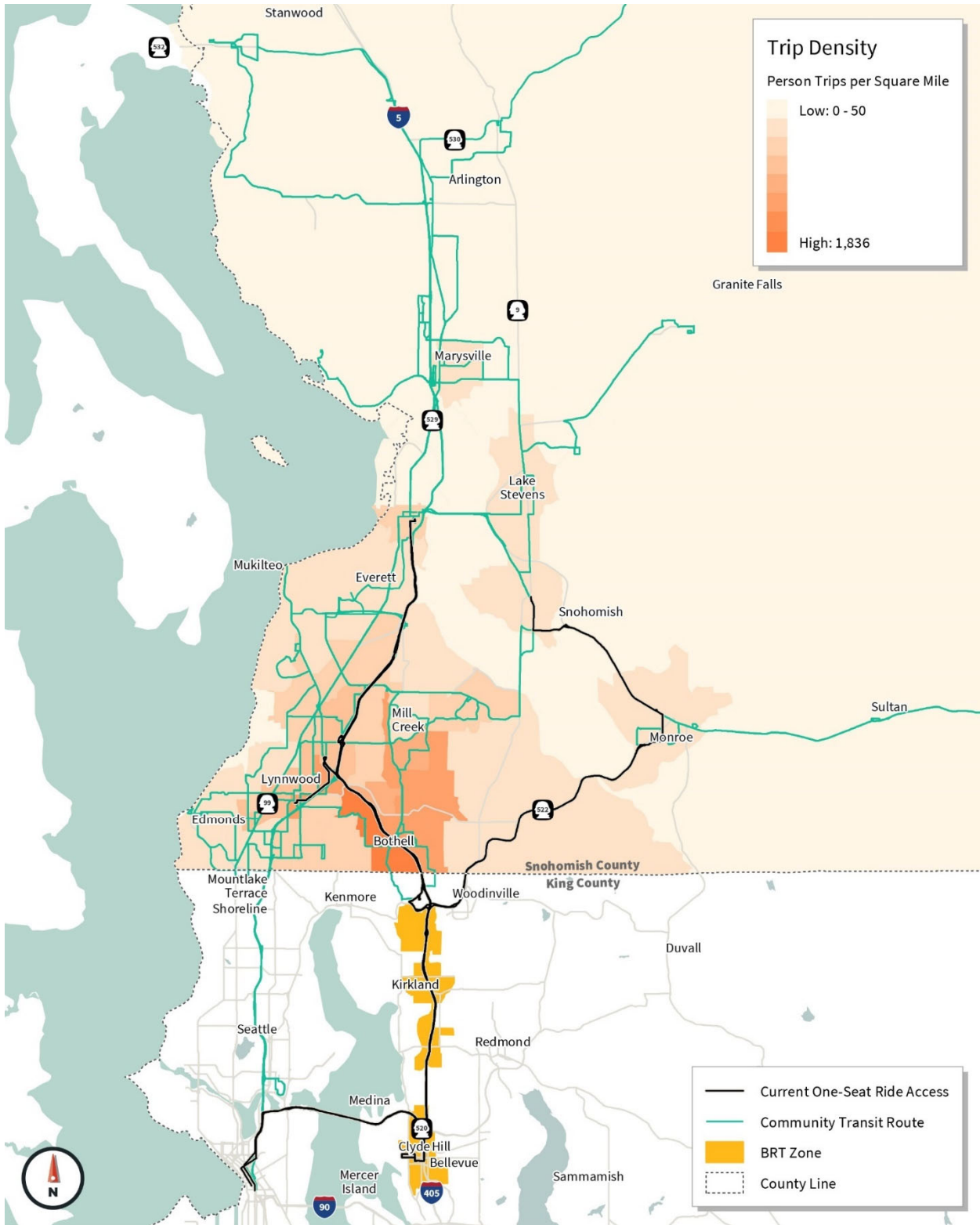


Figure 10. Market for Stride BRT Service Area

OPPORTUNITIES FOR FIXED ROUTE EXPANSION

As shown in **Figure 2**, Snohomish County has experienced substantial growth in the past decade. The southwest portion of the county has seen a large increase in household growth particularly along the I-5 corridor and east to State Route 9. This growth aligns with the densest transit coverage already provided by CT and is also located within the areas that will be served by light rail in 2024. This underscores the importance of serving this growing market with frequent feeder service focused on more convenient connections to high capacity transit.

In addition to the new developments that have already been completed, there are many large projects slated for completion in the next several years. CT staff provided a list of large recent and approved residential developments in Snohomish County. There are nearly 3,000 units currently approved for construction, with substantially more expected over the longer term:

- Lynnwood: 917 units
- Mill Creek: 382 units
- Monroe: 278 units
- Sultan: 700 units
- Arlington: 601 units

Nearly half of the large multi-family and mixed-use developments are occurring in urbanized areas that are generally well served by transit, such as Lynnwood and Mill Creek. The remaining approved units are located in more suburban communities—Arlington, Monroe, and Sultan – that currently have fewer transit options.

Each community is currently served by two to three CT routes connecting to nearby communities and job centers such as Seattle,

Everett, and Lynnwood. Due to the travel time competitiveness between transit and auto and the current loads on the existing CT routes, the growth in these outlying communities is unlikely to warrant fixed route expansion.

CT specifically inquired about service along Route 424 that connects Monroe to Kirkland, Bellevue, and Seattle. Based on an evaluation of the StreetLight data and other routes in the area, Route 424 could be restructured. We identified two options for Route 424. In one option, Route 424 could run between Monroe and the UW Bothell campus with a connection to the I-405 Stride BRT line. This option would provide a one-seat ride to the UW Bothell campus and a convenient connection to East King County destinations along the Stride route. The downside of this option is that the connection between Monroe and Downtown Seattle would require two transfers (one in Bothell to either the SR 522 Stride or I-405 Stride and another transfer to Link in Shoreline or Bellevue). Note that Monroe to Downtown Seattle is not in the top ten list for flows between Snohomish County and Downtown Seattle. To mitigate for this change in coverage, CT could consider extending route 412 to provide service to Monroe via Snohomish (it is assumed that Route 412 would be truncated at Lynnwood).

The second option for Route 424 would be service from Monroe to Downtown Bellevue via SR 522 and I-405. This would offer connections to the SR 522 Stride route at the SR 522/I-405 interchange and a one seat ride to Downtown Bellevue. At Bellevue, there would be a straightforward transfer to Link with service to Downtown Seattle. This option is less efficient from a service perspective than the first option because it duplicates Stride for about 10 miles. With either option, we do recommend

eliminating the service between Snohomish and Monroe and a restructure of Route 109 and Route 412 to provide a more frequent connection between Snohomish, Silver Firs, and the Mariner Park & Ride area to the Lynnwood Transit Center.

Given the results of the SR 522 and Paradise Lake Road park & ride analysis, if a park & ride is constructed at that location, Route 424 would be a logical route to serve the facility and provide connections to Stride in Bothell. Key to the success of this route will be relatively high frequencies (15 minutes or better in the peak period) and a long span of service to effectively meet up with the Stride (and potentially light rail) service.

While most of the recent growth has occurred within the PTBA, there are areas outside that have experienced substantial growth and may be candidates for service in the future. The Maltby area has grown in recent years and the demand to the Mill Creek and Bellevue-Kirkland-Redmond areas appeared in the list of top ten major flows. While density in Maltby is not yet high enough to support frequent service, it should be considered in the longer term as a potential expansion of the PTBA and could include service connecting Maltby to the Stride I-405 BRT corridor. The park & ride at SR 522 and Paradise Lake Road could be a good candidate to serve this area, along with a previously evaluated

park & ride at SR 9 and Cathcart Way (which would be further enhanced if Routes 109 and 412 are restructured).

Service in Stanwood could also be reconsidered given the strength of the Stanwood-Marysville market. The demand could support hourly all-day service with Route 240 extending past Smokey Point to also include a stop at Quil Ceda Village and terminate in Marysville. If feasible, consideration should be given to rerouting the service along I-5 which would substantially cut travel time making the route more competitive with driving, although that reroute may need to be paired with new service to the Warm Beach area if maintaining some coverage in that area is a major priority. To serve the employment uses in Marysville and the Cascade Industrial Center areas, CT could consider running service on 172nd Street and 67th Avenue though it is unlikely to be a high ridership route given the low employment densities and abundant parking in the Cascade Industrial Center.

On the whole, if ridership is a priority for CT when considering how to expand or reorganize service in 2024, providing additional coverage to the lower density parts of the PTBA should be a lower priority. Improving frequency in CT's core market area would yield more riders, particularly if that frequency allows both access to regional transit hubs and local destinations.

OPPORTUNITIES FOR BIDIRECTIONAL AND PEAK ONLY SERVICE

The StreetLight data provides travel flows by time of day. Specific O-D pairs can be reviewed to see if the flows are evenly split between the origin and destination or skewed in one direction. Flows that are evenly split would be well-served by all-day transit service while flows that are more skewed may be better served by peak transit service. We looked at the top 35 bidirectional O-D pairs using the aggregate zones and separated the results by service that is within

Snohomish County or commuter service outside of Snohomish County.

Table 9 shows internal flows within Snohomish County that generally have a higher directional split than 70%/30% in one of the peak periods. The overall rank of the bidirectional flow is shown as well as the split between origin and destination for the AM and PM peak periods. The routes shown in the table provide bidirectional service between these large aggregate zones throughout the day and could be candidates restructuring service to offer higher peak frequencies (through peak overlay or express overlay service) and lower off-peak frequencies.

TABLE 9. CANDIDATES FOR PEAK DIRECTION SERVICE ONLY

Origin	Destination	Origin-Destination %/ Destination-Origin %		Bidirectional Flow Rank	Bidirectional Routes
		AM	PM		
Marysville	Everett	75 / 25	30 / 70	8	201/202
Mukilteo	Lynnwood	75 / 25	40 / 60	15	101, 113, 119
Lake Stevens	Everett	80 / 20	30 / 70	17	109, 280
East Snohomish	Monroe	75 / 25	40 / 60	21	270
Lake Stevens	Snohomish	70 / 30	40 / 60	34	109

Table 10 shows external flows from Snohomish County to King County that generally have a more evenly balanced directional split than 70%/30% in one of the peak periods. Because most service to King County only operates in the traditional commute direction, the peak direction routes that serve these flows could be candidates

for all-day service operating in both directions. Note that the Lynnwood to Seattle and Lynnwood to Bellevue pairs in Table 10 are provided for information only, as they will be replaced with bidirectional service once the Link and Stride service to Lynnwood is open.

TABLE 10. CANDIDATES FOR BIDIRECTIONAL SERVICE

Origin	Destination	Origin-Destination %/ Destination-Origin %		Bidirectional Flow Rank	Peak Direction Routes
		AM	PM		
Lynnwood	Seattle-Shoreline	70 / 30	35 / 65	7	402, 405, 410, 413, 415, 421, 422, 425, 511, 810, 821, 855, 860, 871, 880
Everett	Seattle-Shoreline	65 / 35	40 / 60	11	410, 412, 417, 511, 810, 860, 880
Bothell	Kenmore-Bothell	70 / 30	45 / 55	16	
Everett	Bellevue-Kirkland- Redmond	60 / 40	45 / 55	23	532
Lynnwood	Bellevue-Kirkland- Redmond	65 / 35	35 / 65	32	535 already bidirectional

OPPORTUNITIES FOR ALTERNATE SERVICE METHODS

Transit agencies are increasingly looking to alternatives to fixed-route service to increase transit access while managing the cost per boarding. Low density areas, in particular, have been targets of new alternate service pilot projects that include:

- **Microtransit** – these are shuttles that operate on a dynamic route that changes based on where riders would like to travel; typically operates from a transit hub and requires some walking at the other end of the trip.
- **Ridehail partnership** – this is a shared ride in a sedan operated by a contractor or driver for a company like Uber, Lyft, or Via. A rider hails a vehicle using the company app, but the cost is free or subsidized as part of a connecting transit trip.
- **Transit ridehailing** – similar to the partnership above, but the transit agency operates the service or has a full-time

contractor (similar to paratransit) operating the service.

- **Micromobility** – people can take a shared micromobility device like a bicycle or scooter from a transit hub to their final destination (and return) at a subsidized rate or part of their transit fare.
- **Autonomous shuttle** – this is either a traditional fixed route/scheduled shuttle that is operated without a driver or a microtransit version where riders help to define the route of the vehicle. The advantage of microtransit is that there are no operator costs, which typically comprise 60 to 70 percent of the cost of providing transit service, although vehicle costs are higher and some are not approved for higher-speed streets. Currently 14 companies are certified to operate autonomous vehicles in Washington State including companies like Navya (which has autonomous shuttles operating in Las Vegas, Orlando, and Ann Arbor, MI) and First Transit with whom CT contracts for some of its service.

Some agencies have piloted micromobility, ridehailing, or shuttle services to provide

“first/last-mile” services to low density areas, with mixed success. One of the more successful programs is in Monrovia, California (a suburb of Los Angeles) that operates GoMonrovia, which is a partnership with the Lyft ridehailing service. The service costs a rider \$1.00 for a shared ride to or from a regional transit hub, \$3.00 for a shared point-to-point ride anywhere in the service zone, or \$5.00 for a private ride in the service area. The cost to the City of Monrovia is about \$6 per ride (which compares to about \$20 per ride for fixed-route transit).

King County Metro operates a similar first-last mile program, Via to Transit, connecting Southeast Seattle and Tukwila to Link light rail stations. Via to Transit carries nearly 1,000 riders per day and costs Metro about \$8 per ride to operate. Metro does charge a standard transit fare for the trip, but any transfer to Link or a bus route is included in the initial ORCA fare, so the trip is “free” to any transit rider. If the rider is just riding Via, the cost is a standard fare charged to the ORCA card.

In contrast to relatively successful ridehailing partnership programs, most microtransit programs have struggled. For example, King County Metro just completed one-year pilots of its Ride2 on-demand shuttle service in West Seattle (to and from the water taxi or Alaska Junction) and Eastgate (to and from the Eastgate Park & Ride). Due to the high cost per trip, Metro decided to end the service in December 2019. Together, the shuttles carried an average of 125 trips per day. Ride2 West Seattle cost approximately \$84 per trip and Ride 2 Eastgate cost approximately \$35 per trip.

One of the main cost differences between the two models is how the trip is billed to the transit agency. For ridehailing partnerships, the transit

agency agrees to pay the cost of the ridehailing trip (just as a private citizen would to using an app) and pays nothing if no trips are made. The cost per trip is negotiated with the ridehailing partner and may be higher than “retail” pricing depending on the service requirements identified by the transit agency (waiting time, wheelchair enabled vehicle availability, span of service, etc.). This model has an advantage of being highly scalable at relatively low cost for the transit agency, but some agencies have shied away from using “gig economy” drivers or are unwilling to support a service that could terminate at any time if the ridehailing partner goes out of business or changes its coverage area. One caveat – the most successful ridehailing partnerships operate in areas where ridehailing companies already provide relatively good service. The cost to have ridehailing companies operate in lower density or exurban areas where ridehailing does not serve or serves but with long wait times to hail a vehicle often does not pencil out for a transit agency.

In contrast, most microtransit services operate in the same way that paratransit operates. The transit agency contracts with a shuttle operator who provides shuttle services at a fixed price per hour regardless of ridership. Therefore, unless ridership is fairly high, the cost per trip tends to be high (similar to paratransit services). Therefore, microtransit services are only successful when the boardings per hour per vehicle are relatively high (more than 8), but as ridership increases the route length can get so long as to require additional vehicles at additional costs. In many cases, it is less expensive to extend a fixed route service to provide similar access to a microtransit shuttle.

Based on a number of pilot studies, routes with fewer than ten boardings per hour are

considered opportunities for alternate service methods, so long as the trips are relatively short. Based on the route productivity metrics provided by CT, Route 111 which operates between Brier and Mountlake Terrace could be a good candidate for being replaced by a ridehailing partnership. Another route, 230, also has low ridership; however, the average trip length on route 230 is 28 miles, which is too long for any of the alternative services that have been deployed to date. Other candidates would be neighborhoods with low density residential uses a short trip from a destination with regional transit service combined with commercial uses. Potential destinations could include Lynnwood Transit Center, Mountlake Terrace Transit Center, or the Mukilteo and Edmonds Sounder stations.

While microtransit services have struggled in residential/retail settings, they are much more common in employment areas, although they are often implemented at the expense of the employer or landlord as a condition of approval, an employee service/perk, or as a way to manage commuter traffic generated by the site. In these cases, the shuttle is often privately funded and the transit agency is not a financial partner, although transit agencies often offer in-kind services to help plan the route and ensure that schedules between the employee shuttle and fixed route transit are aligned. Employment areas are also the areas where autonomous transit shuttles are most common within the United States. One example is a partnership between Denver RTD, Easy Mile (an Autonomous Shuttle manufacturer and operator), Panasonic, and L.C. Fulenwider (the property developer). The autonomous shuttle is open to the public, but is primarily focused on moving Panasonic employees from the commuter rail station to the Panasonic office building. This site is in a low-density industrial area near the Denver airport. Another Easy Mile

autonomous shuttle operates in the Bishop Ranch office park in the East Bay Area city of San Ramon, CA. The Easy Mile shuttle provides access around the campus and to major bus stops near the perimeter of the campus. In addition to Denver and San Ramon, there are a variety of cities in the process of planning, testing, and operating autonomous shuttles including Columbus, OH; Ann Arbor, MI; Detroit, MI, Las Vegas, NV; Providence, RI, Orlando, FL; and Gainesville, FL. Funding models include public-private partnerships and state DOT grant funding. As these autonomous shuttle programs become more widespread and transit agencies share ridership and performance data, we will learn more about whether these are viable ways to improve mobility at a reasonable cost and in an equitable way.

These current examples in other cities suggest that a stronger potential market for autonomous shuttles is connecting low density “office park” type environments to adjacent high capacity transit. The Canyon Park area of Bothell is probably the best candidate in Snohomish County for an autonomous shuttle connection to both the Swift Green Line and future Stride BRT services. The concentrations of employment in Canyon Park are on-par with those seen in other communities with autonomous shuttles and the technology-oriented uses in Canyon Park are also similar to the other case studies. Moreover, the potential for future residential development in and around Canyon Park will help provide more of a two-way flow to the high capacity transit connections. However, given the experiences in other communities, an autonomous shuttle service connection in Canyon Park will likely require a financial commitment from the businesses/landowners in Canyon Park to help share costs if CT is to implement such a service. Other potential autonomous shuttle connections

could better connect the Green Line to the Paine Field Airport or the Green Line to destinations within the Boeing complex.

CT was also interested in alternative transit services to the Cascade Industrial Center in Marysville and Arlington. This regional Manufacturing and Industrial Center currently employs more than 6,000 people, representing a concentrated amount of employment, but the Industrial Center is also spread out over more than 4,000 acres. Traditionally, sprawling industrial centers are difficult to serve via transit. The large size of buildings and parcels makes it difficult to route transit through these areas and the scale of development can make a walk from the bus stop to the door of the development a barrier (particularly when compared to parking in a free lot immediately in front of the building). Shuttles are also typically not used in these settings as the circuitous routing and dispersed nature of development can make routes long and ultimately uncompetitive with a car.

It is notable that major Manufacturing and Industrial Centers in the Puget Sound Region

tend to have sparse transit service and relatively low transit mode shares, even with the job density is substantially higher than what is present in the Cascade Industrial Center. Prime examples are the SODO-Duwamish center in Seattle and the Port of Tacoma area. Paine Field and Boeing's Renton plant have relatively high transit mode shares compared to other manufacturing centers, but this is in part due to the fact that as the single tenant, Boeing has tended to concentrate parking to a few areas to accommodate expansions of the facilities. In the long run, providing alternative transit services to the Cascade Industrial Center seems unlikely outside of a few small-scale shuttles that could connect more concentrated employers to a local transit hub.

In addition to these employment areas, alternative transit services were also considered for the southwest county communities along the Puget Sound; however, the combination of very low densities, a discontinuous street network, unfavorable demographics, and relatively long distances to destinations would likely make it cost prohibitive to operate alternative transit in this area for the foreseeable future.

OPPORTUNITIES FOR LAND USE & TRANSPORTATION POLICY AND INVESTMENT PARTNERSHIPS

Some areas currently have relatively strong transit service, but the routes are underutilized because land use density is low. These are opportunities for CT to continue to work with local jurisdictions and advocate for higher densities and a greater mix of use along key transit corridors. SR 99 and the Swift Blue Line are an example of where communities have rezoned land in a way that is supportive of the BRT service. While redevelopment still has much potential along SR 99, the area is already beginning to transition from strip commercial to a more diverse mix of higher density uses. The following routes were identified as being good opportunities for CT to push for more transit-oriented land use policies with partner jurisdictions:

- **Route 109** – Along the 128th St and 132nd St corridor from I-5 to SR 9 and in Snohomish and Lake Stevens.
- **Route 116** – Silver Firs to Edmonds, particularly at strategic nodes west of SR 99

and east of SR 527. Incentivizing development within the urban center designations around Alderwood Mall and the 164th/I-5 interchange would also benefit this route and the future Swift Orange Line.

- **Route 119** – Ash Way Park & Ride to Mountlake Terrace, particularly along 220th Street near SR 99, along 148th Street, and near Ash Way.
- **Route 201/202** – Arlington and Marysville along the future Swift Red Line corridor.
- **Swift Green Line** – Seaway Transit Center to Canyon Park Park & Ride, while this corridor has relatively strong zoning, particularly around the Mariner Park and Ride and in Canyon Park, additional densities would benefit this major transit investment in Mill Creek and around Paine Field.

CT can also help jurisdictions identify projects that benefit transit riders and advocate for greater spending on slow speed access paths that connect transit to neighborhoods as well as safety improvements that help all users feel comfortable reaching and waiting for their bus. CT can encourage cities to actively manage the curb and set policies to maintain traffic mobility and designate spaces for bus zones.

PARK & RIDE EVALUATION

Many CT riders drive a short distance to a park & ride to reach regional bus service rather than using feeder transit or active modes. To convert more of these riders to use transit from their origin, transit travel times to those transit centers must be more competitive with auto drive times.²

Figures 12 through 16 show the transit to auto travel time ratios for areas surrounding five key transit centers: Everett Station, Ash Way Park & Ride, Lynnwood Transit Center, Mountlake Terrace Transit Center, and Canyon Park Park & Ride. Areas with more than a 60-minute transit trip to the closest transit station are shown in gray; the analysis take wait time for the bus and walking time into account. Transit to auto travel time ratios of less than 2 are considered to be competitive when considering the stress of driving, finding a parking space, and paying for fuel; the more time-competitive areas are marked with a cross-hatching.

The analysis found that only areas within about one mile of a transit center currently have competitive transit travel times, while other areas have quite high ratios (generally due to lack of service and thus a long walk to feeder transit) indicating riders are unlikely to take local feeder service to a transit center.

StreetLight data was used to analyze the origins and destinations of people traveling through each transit center. The analysis showed that each transit center generally serves the immediate area rather than intercepting people traveling along the corridor. A review of the areas with travel time ratios higher than 2 found that they are generally challenging to serve due to low density and poor street connectivity. Note that this pattern of relatively short drive trips to regional park & ride lots is common throughout the region with the exception of some South Sound and East King County lots that draw people from long distances. Due to the proximity of many users, CT could also consider partnering with local jurisdictions to improve walk and bike access to transit hubs.

As suggested in the following figures, improvements in frequency for key feeder routes could convert some park & ride users to feeder transit riders. There could also be the potential for a ridehailing partnership at some of these facilities, although the demand levels would need to be manageable to ensure costs do not get too high. Good potential ridehailing pilots could be at the Mountlake Terrace and Ash Way park & ride lots which are more constrained than the others and have fewer commercial uses that would take away ridehailing capacity from regional transit access.

² The schedule reliability of the feeder routes must be relatively high so that regional transit riders don't miss

connections, but that topic is not a subject of this report.

OPPORTUNITIES FOR TRANSFER IMPROVEMENTS

Opportunities for transfer improvements were studied at the five park & ride locations.

Generally, the system was found to be well timed with regional commuter routes aligning well with local feeder routes, such that a rider could plan ahead for a convenient transfer. If a rider does not plan ahead, they may have longer wait times as most commuter routes run on a 15-minute headway while the local routes tend to run on 30-minute headways.

With the opportunity to reallocate service hours from the 400 and 800 series buses currently serving Downtown Seattle and the University of Washington, local route frequencies for feeder service could be improved allowing riders even more convenient transfers to commuter routes, BRT, or light rail, particularly in the denser southwestern portion of the county. The

reinvested service hours could also combine commuter routes with existing routes to provide all-day service to Link and Swift. For example, Route 417 could be combined with Route 112 (i.e. traveling along SR 525, 164th Street SW, 44th Avenue W) to provide an all-day connection between Mukilteo and Link at the Lynnwood Transit Center. Once Link is in place, the Route 880 connecting Mukilteo and the University of Washington could be deleted and its hours reallocated to make the Mukilteo-Link service more frequent.

Another potential transfer improvement is to reroute the eastern end of Route 120 such that it travels along SR 527 and then loops through Canyon Park rather than using 228th Street SE. This would allow a better transfer from both sides of I-405 to the Swift Green Line and Stride BRT. However, it would require that WSDOT approve a stop on SR 527 north of 228th Street SE.

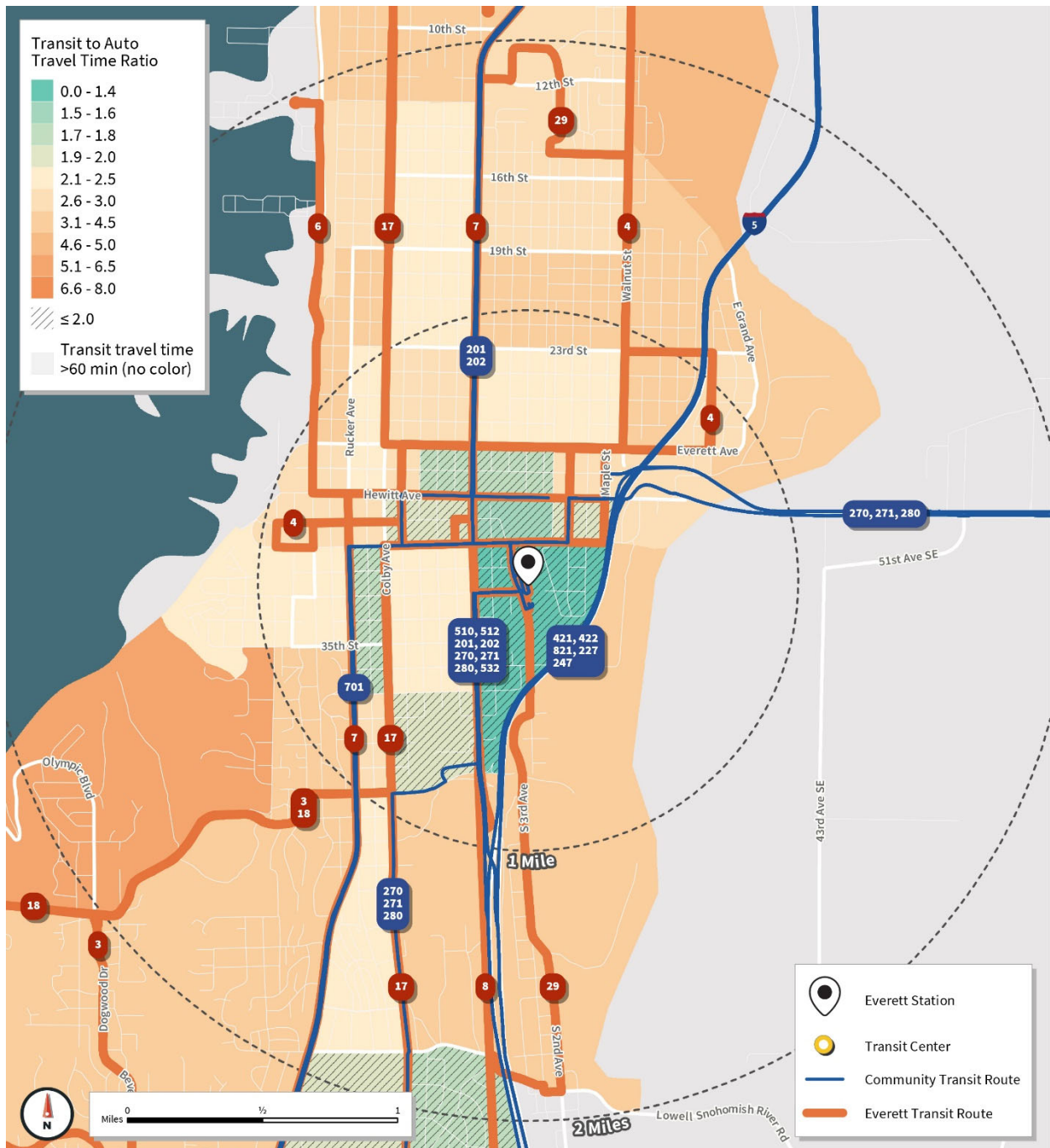


Figure 12. Access to Park & Rides – Everett Station

- Capacity of 1,076 spaces, typically 85 percent full
- ET provides additional route coverage in this area though some routes are circuitous
 - Main market is downtown and residential areas to the southwest
 - Focus on improving east-west connections to Everett Station

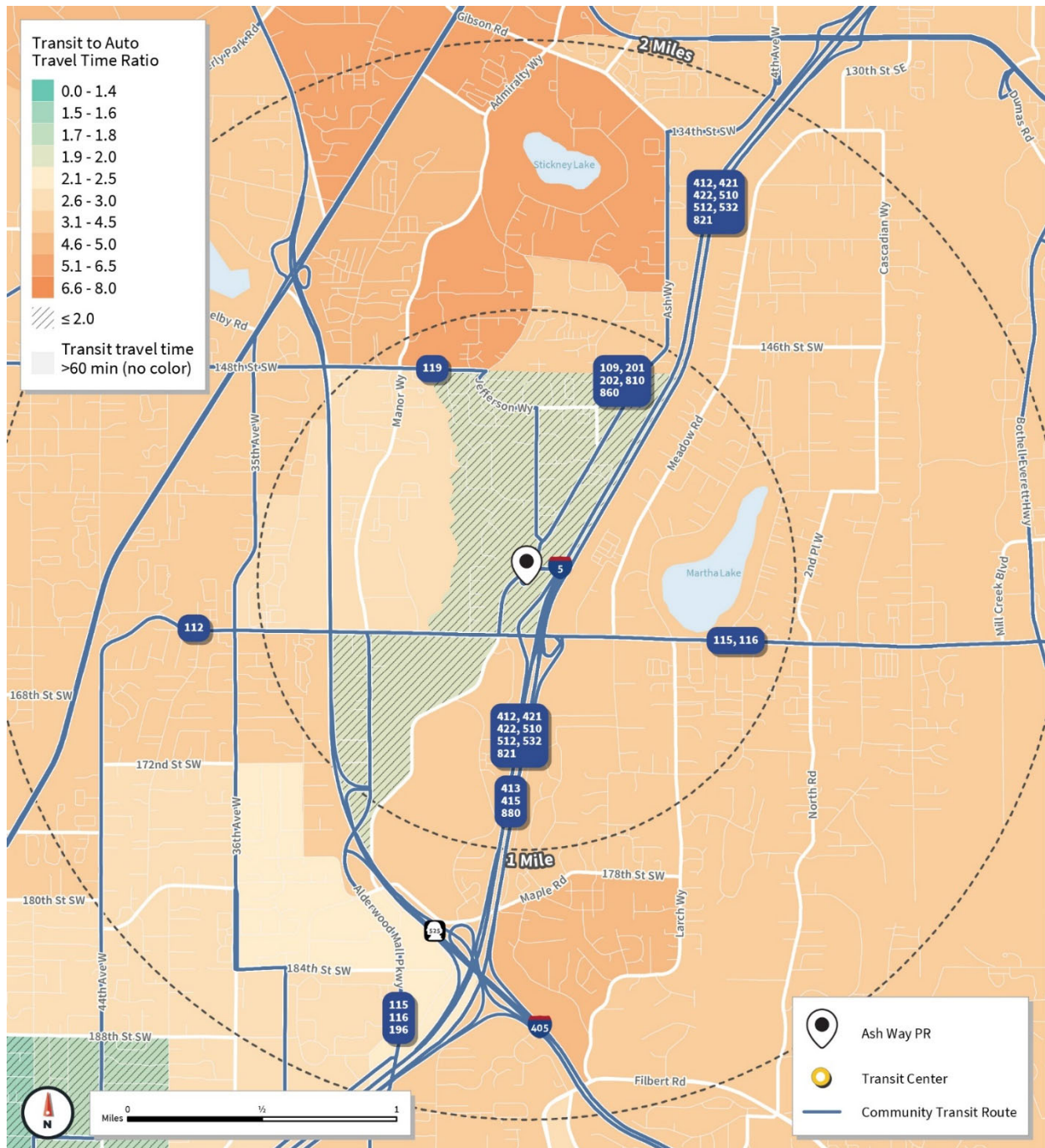


Figure 13. Access to Park & Rides – Ash Way

- Capacity of 1,039 spaces, typically 100 percent full
- Constrained location between Swamp Creek green belt and I-5
- Consider increasing frequency of feeder bus routes to 15 minutes
- Consider ridehailing partnership or less circuitous routing to the lot on Route 119

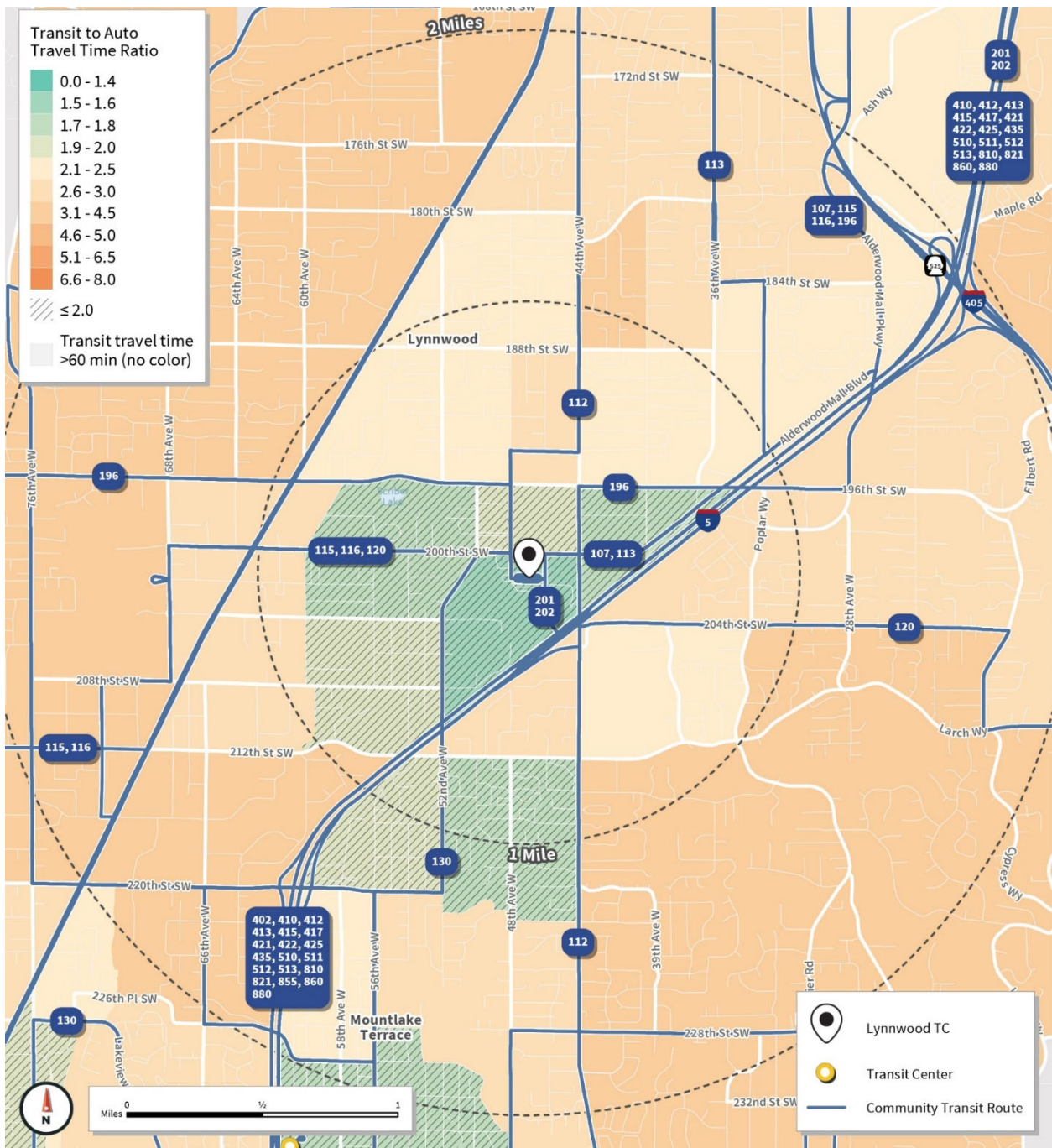


Figure 14. Access to Park & Rides – Lynnwood Transit Center

- Capacity of 1,358 spaces, typically 99 percent full
- Surrounding residential and retail uses provide strong market
- Consider increasing frequency of feeder bus routes to 15 minutes and 10 minutes on key high ridership routes
- Explore different routing or service methods into residential neighborhoods northwest and southeast of the transit center to shorten walk times to transit

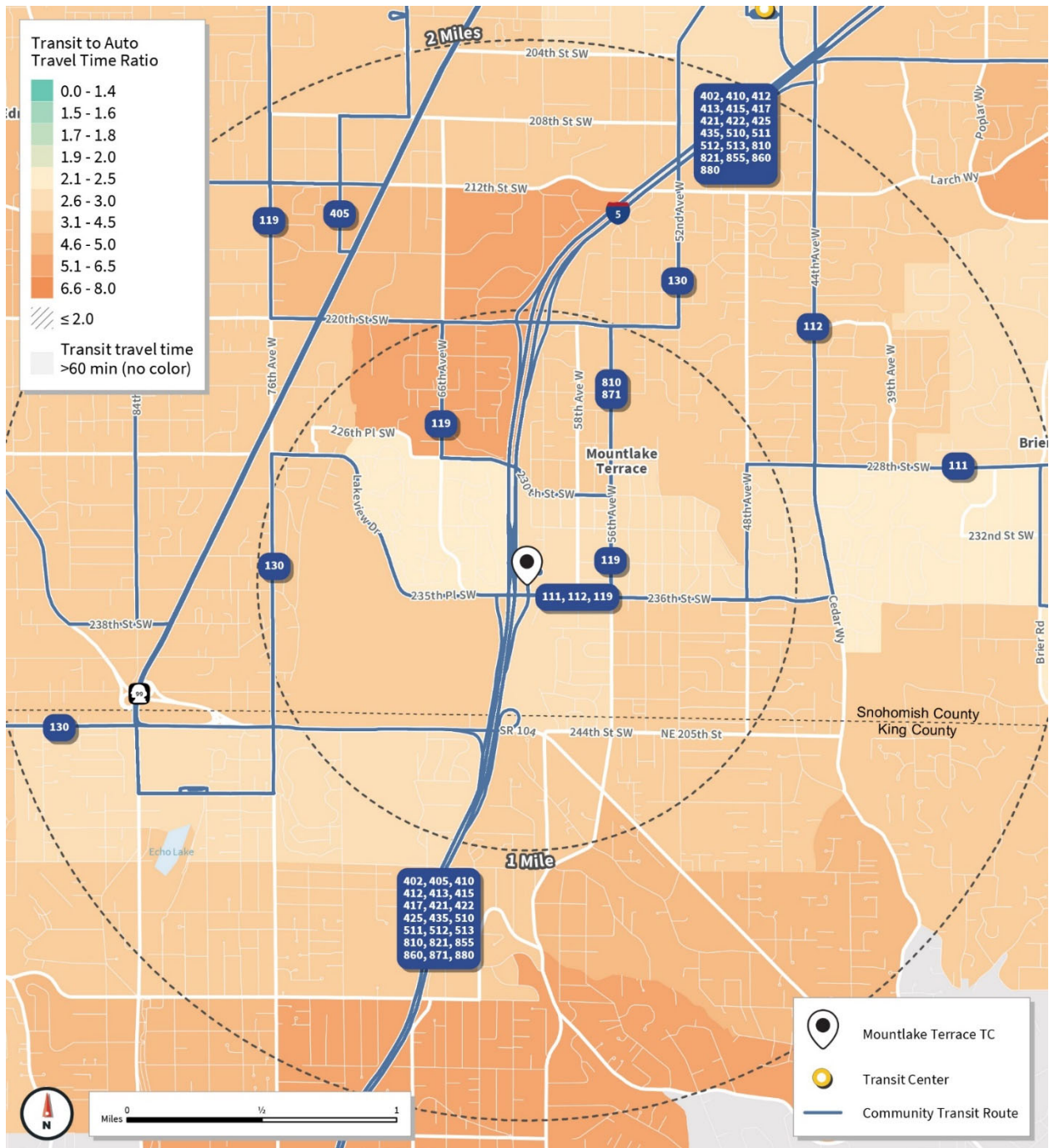


Figure 15. Access to Park & Rides – Mountlake Terrace

- Capacity of 878 spaces, typically 99 percent full
- Town Center directly to the east upzoned for increased density to support light rail
- Consider increasing frequency of feeder bus routes to 15 minutes and 10 minutes on key high ridership routes
- Consider more direct service from west side of I-5 and/or a ridehailing partnership

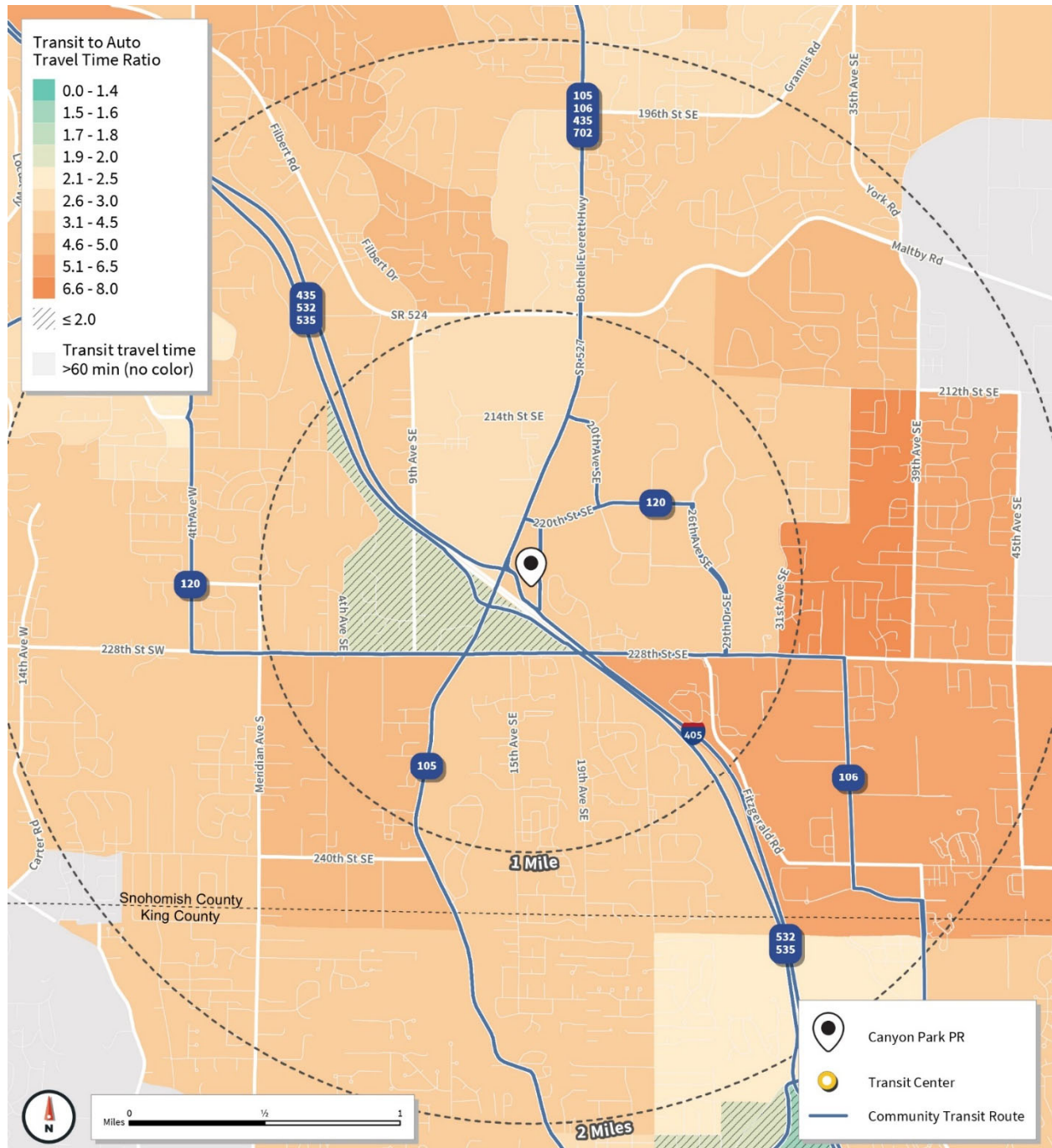


Figure 16. Access to Park & Rides – Canyon Park

- Capacity of 297 spaces, typically 98 percent full
- Business park is planned to have increased density
 - Consider increasing frequency of feeder bus routes to 15 minutes
- Consider rerouting Route 120 to more directly access the park & ride and future Stride service



RECOMMENDATIONS & NEXT STEPS

SUMMARY

CT’s service generally matches well with overall travel patterns with the exception of the Maltby/SR 9 corridor area which is outside of the current PTBA. Within the PTBA, there are opportunities to improve transit share in the Mill Creek-Everett corridor and make transit travel times more competitive. While these opportunities are present in both the rural and urban parts of the PTBA, the greatest ridership benefits would occur within the denser, southwestern portion of the county.

Some parts of the county may be better served by alternative service opportunities including ridehailing partnerships and potentially employer

or autonomous shuttles. In the residential neighborhoods, these strategies would be geared toward feeding regional transit centers to shift riders from parking at park & rides. These park & rides are generally crowded by riders living relatively close to the station, but who drive because connecting transit is not competitive. Additionally, more frequent and direct transit routes could help shift riders from driving to connect to their main transit service.

More specific recommendations are summarized below. With the StreetLight data now available to CT, these recommendations can be further explored through data analysis at a more granular level.

Type of Opportunity	Recommendation
Markets to Connect to Regional Transit	Create more direct east-west connections to future Link stations, particularly Lynnwood Transit Center which would benefit both Link and Stride.
	Explore improvements for North Creek connection to BRT and/or Link light rail or a park & ride.
Fixed Route Expansion	Explore a park & ride in the vicinity of SR 522 and Paradise Lake Road, including feeder routes to boost ridership, potentially by restructuring Route 424 service.
	Consider PTBA expansion in the Maltby/SR 9 corridor area.
Alternate Service Methods	Expand Stanwood-Marysville service with reconfigured Route 240.
	Focus investments on higher density areas in the southwestern county and service gaps in the south county area such as North Road and Meadow Road.
Land Use Advocacy	Consider replacing Brier to Mountlake Terrace service (Route 111) with a ridehailing partnership.
	If financial partnership with local businesses is feasible, consider autonomous shuttle service in Canyon Park. Autonomous shuttles may also be feasible at Paine Field and Boeing, if partners at those locations are able to share some of the costs.
Land Use Advocacy	Advocate for denser land use at strategic nodes along Route 116 west of SR 99 and east of SR 527, around Alderwood Mall, at the 164th/I-5 interchange, along the 128th and 132nd Street corridor from I-5 to SR 9, and within Snohomish, Lake Stevens, Arlington, and Marysville.
	Advocate for denser land use at along Route 119 at 220th Street near SR 99, along 148th Street, and near Ash Way.

Type of Opportunity	Recommendation
	Advocate for denser land use along the Swift Green Line in Mill Creek and around Paine Field.
Park & Ride Connections	<p>Increase feeder route frequency and improve directness and access into residential neighborhoods.</p> <p>Advocate for improved access paths for pedestrians and bicycles.</p> <p>Consider ridehailing partnerships at Mountlake Terrace and Ash Way park & rides.</p>
Transfer Improvements	<p>Reallocate service hours from 400 and 800 series buses to increase span, frequency and coverage in dense areas in the southwestern county to provide all-day connections to Link and Swift.</p> <p>Reconfigure Route 120 to travel along SR 527 before looping through Canyon Park to improve transfers to Swift Green Line and Stride BRT.</p>

APPENDIX A

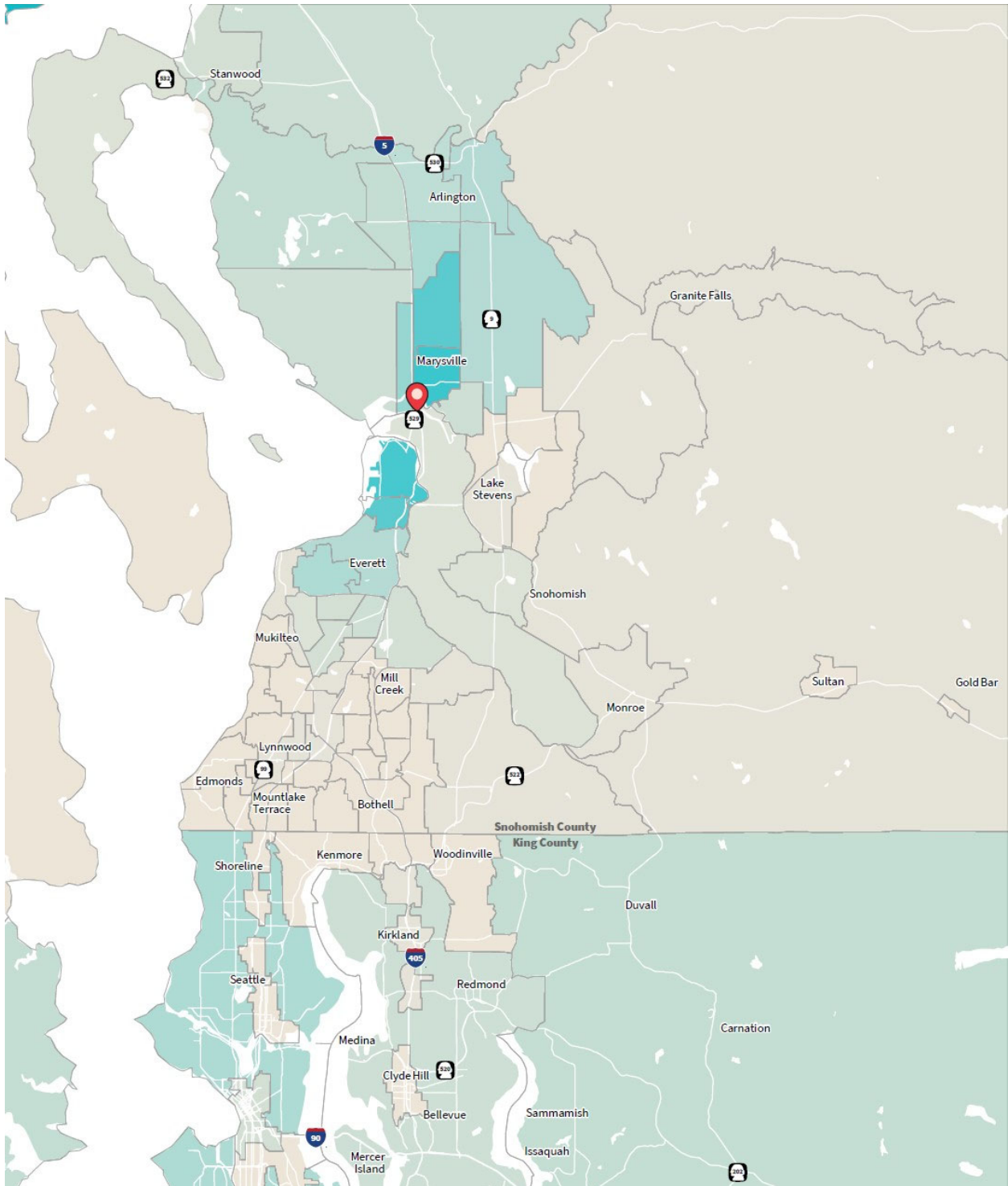


Figure A-1. Middle Filter – I-5 and SR 529

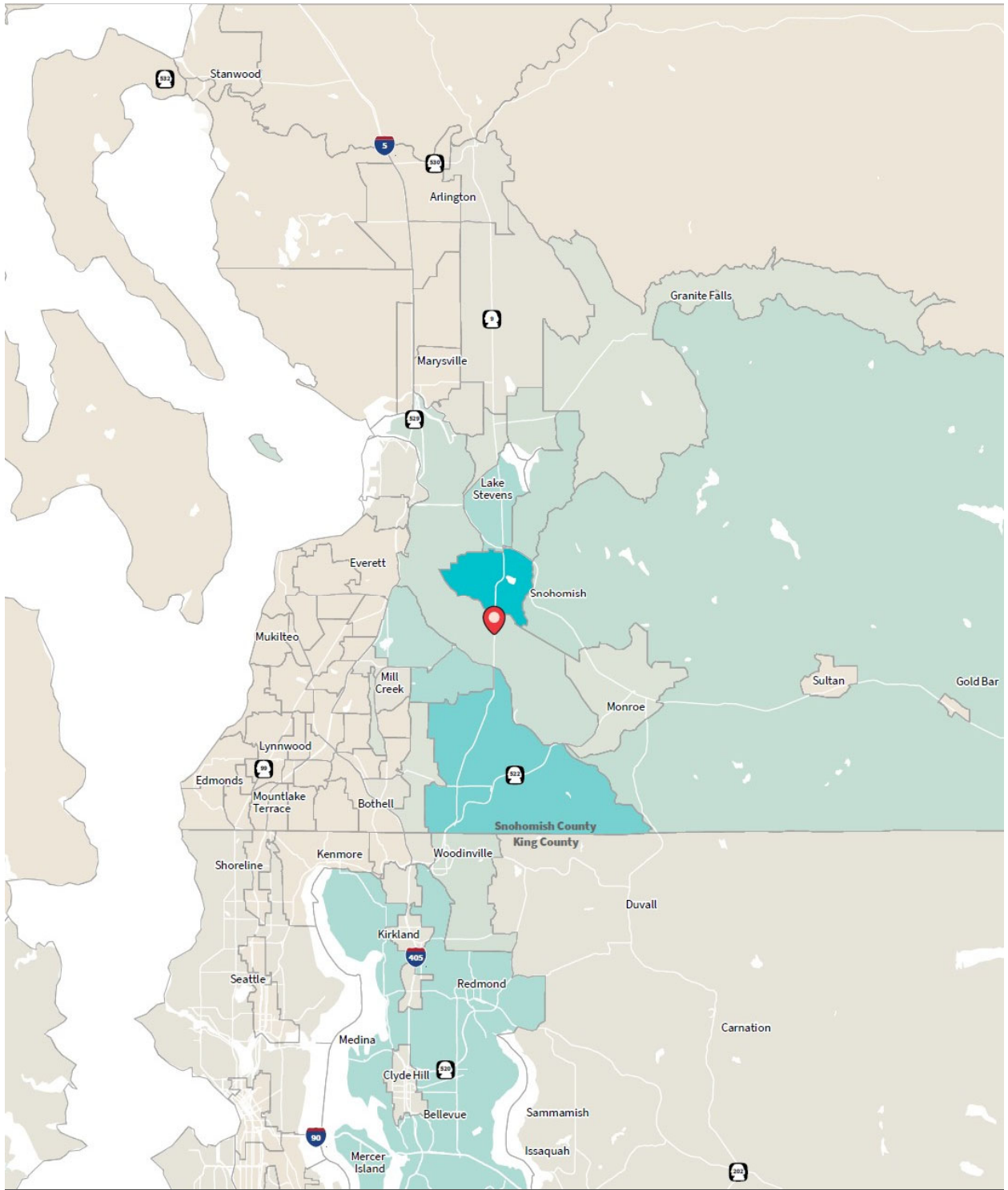


Figure A-2. Middle Filter – SR 9

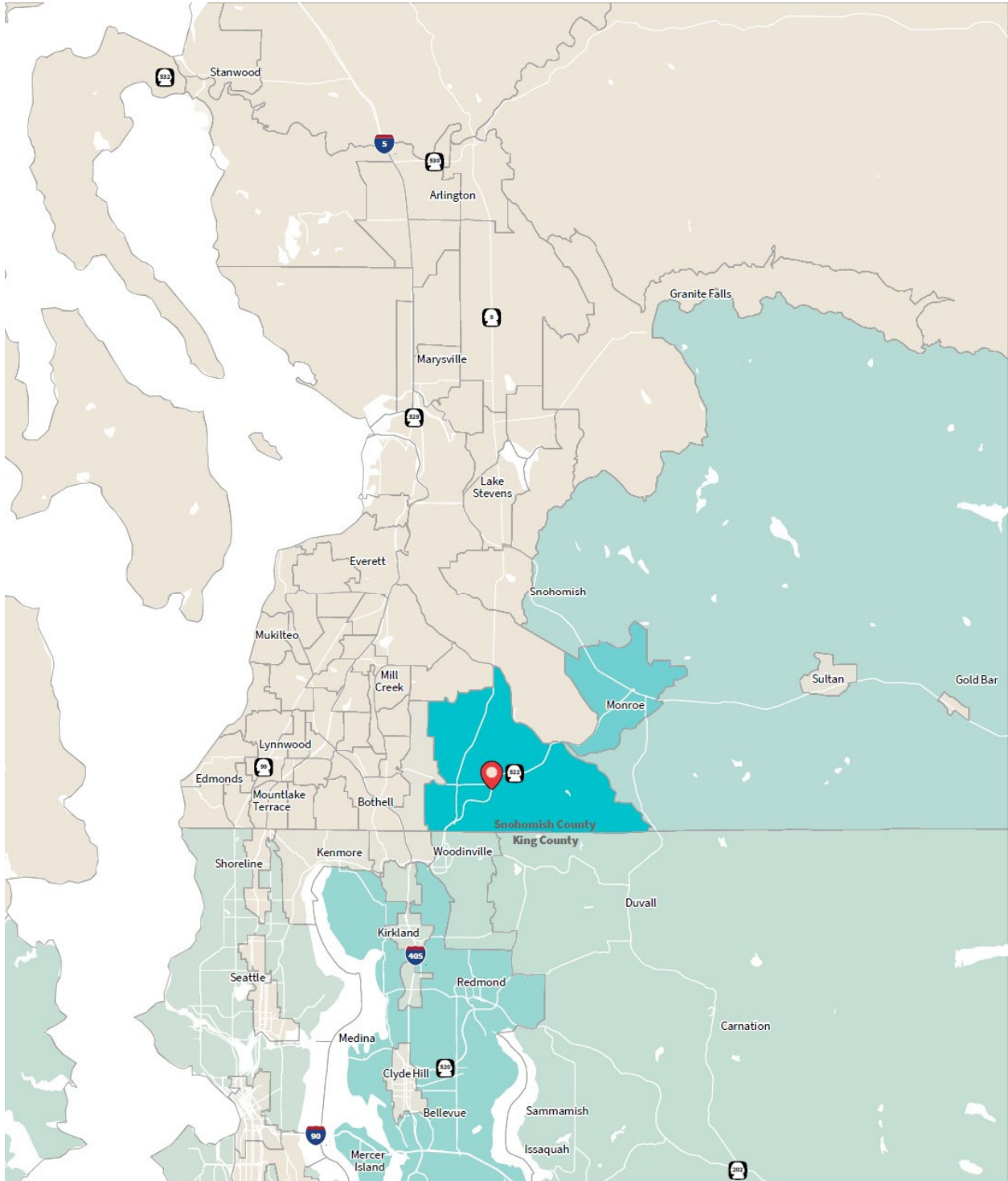


Figure A-3. Middle Filter – SR 522 & Paradise Lake Rd

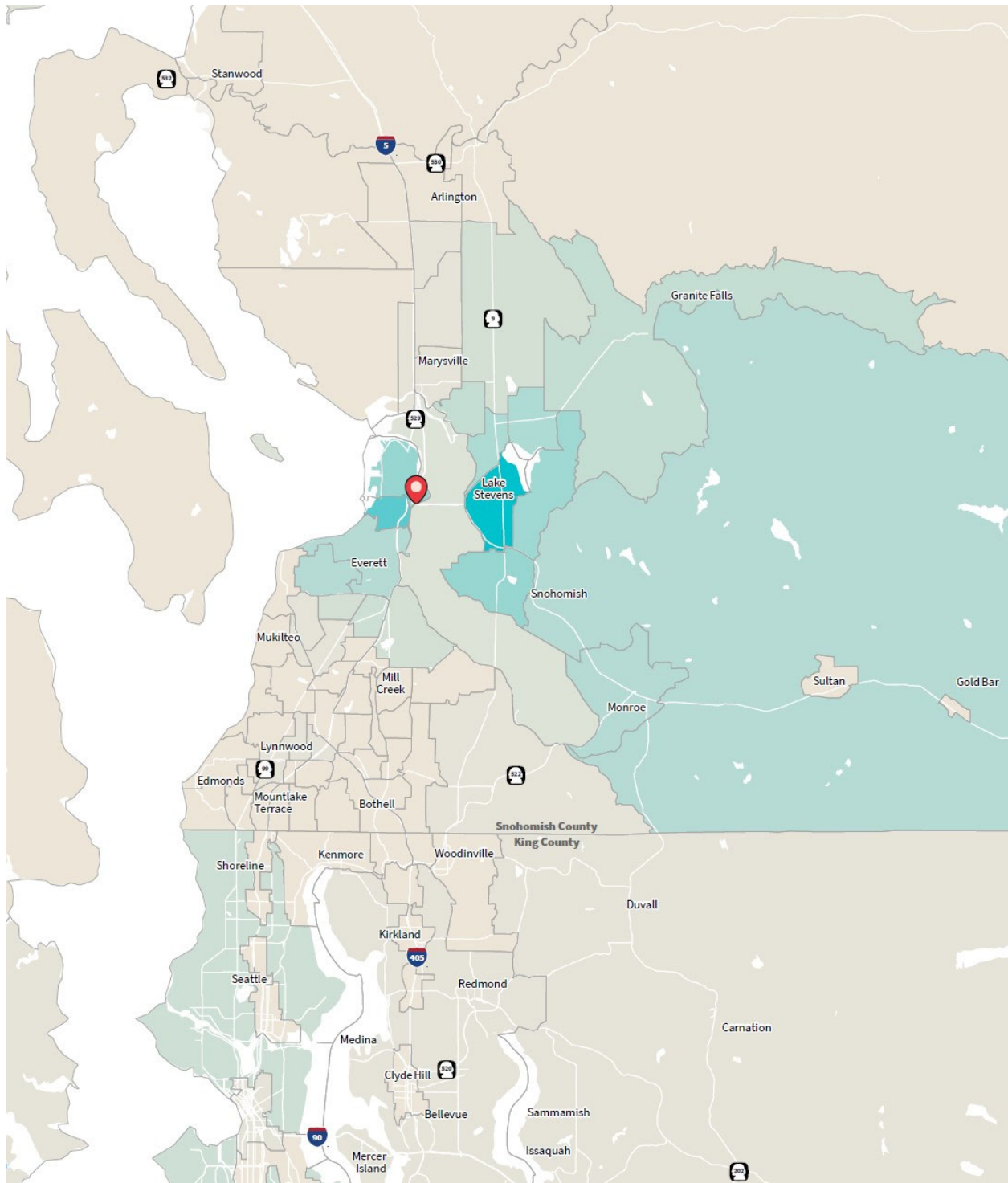


Figure A-4. Middle Filter – US-2 Trestle