

COMMUTER PARKING NEEDS ANALYSIS REPORT

Draft



**Bellevue Transit
Master Plan**

CITY OF BELLEVUE

December 2013

Transportation Department



Draft

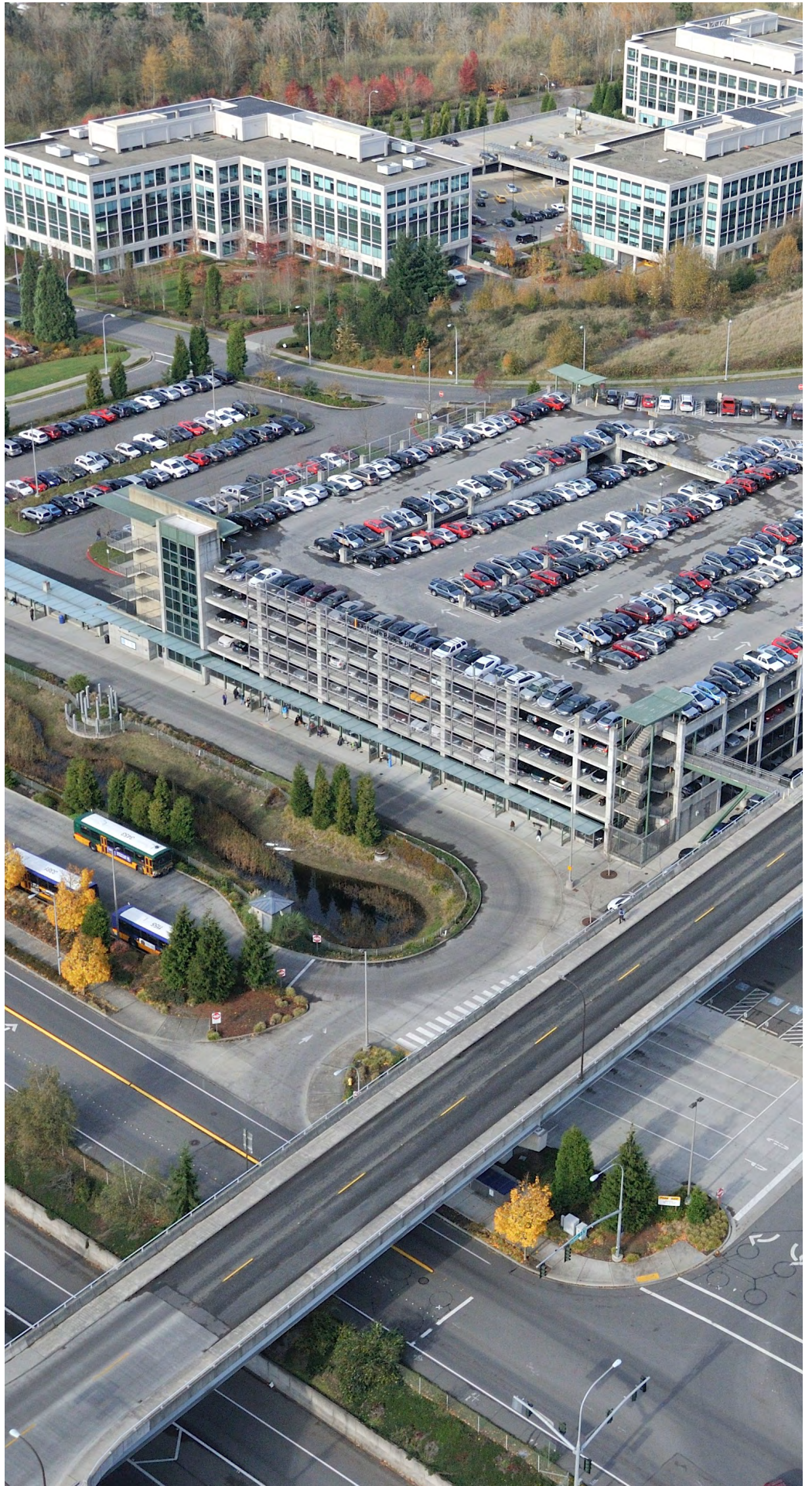


PHOTO BY WSDOT

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INTRODUCTION

Commuter parking facilities play an important role in concentrating transit rider demand, often in lower-density areas that would otherwise be unable to support frequent services. These facilities provide convenient access to transit via automobile or bicycle for people who do not live within convenient walking distance of a standard bus stop. Park-and-ride facilities also serve as a meeting place for carpool and vanpool partners.

As the regional inventory of housing and employment grows, the demand for roadway capacity increases. Because roadway capacity and the ability to expand roadways is limited, park-and-ride lots provide an important amenity that supports the use of alternatives to the single-occupant vehicle, thereby requiring less overall roadway capacity. Further, by concentrating transit boardings at a single point, a more frequent level of service can be supported. This report reviews commuter parking demand assessments for the greater Bellevue area and considers this demand in light of existing parking facilities.

Purpose

It is commonly observed that not every park-and-ride lot has the necessary capacity to meet its current demand. It will be important, moving forward, to determine the level of demand for park-and-ride lots in Bellevue in order to better plan for future system-wide parking needs. The purpose of this study is to assess the unmet park-and-ride needs in Bellevue in order to plan for expansion or other alternatives. One such alternative under consideration is expanding the use of leased lots, which are owned by other entities (e.g. churches) but contracted for use for park-and-ride purposes during off hours.

An updated assessment of commuter parking facility needs is long overdue. Although King County Metro publishes *annual reports* detailing the utilization of all 131 park-and-ride facilities operating in the Metro service area, regional needs were last studied in 2001 when the Washington State Department of Transportation (WSDOT) conducted a study of park-and-ride lots in King, Pierce, Snohomish, and Kitsap Counties (Parsons Brinckerhoff 2001). The *Puget Sound Park & Ride System Update* recommended that the study should be updated every five to ten years in order to maintain its usefulness as a planning tool. The Puget Sound Regional Council (PSRC) also stated in *Transportation 2040* that transit agencies, WSDOT, and PSRC themselves all recognize the need to re-examine the region's park-and-ride strategy.

This report analyzes capacity, use, and projected demand data for park-and-ride lots that lie along two corridors: I-405 and I-90, as defined by the 2001 WSDOT study. Consistent with the *Transit Master Plan*, the planning horizon for this study is through 2030, and projected demand is based on the transit network proposed by the 2030 Growing Resources scenario. This assumes an increase in transit service of about 47 percent from Spring 2012 to accommodate the projected near tripling of transit demand by 2030.



Figure 1 King County Metro publishes *Park-and-Ride Utilization Reports* (top left) annually in the fourth quarter, while the *Puget Sound Park & Ride System Update* (top right) by WSDOT is the last study reporting on the regional demand for park-and-ride capacity. PSRC's *Transportation 2040* (bottom left) and the TMP's *Transit Service Vision Report* (bottom right) also provide context for this report's assessment of park-and-ride capacity in Bellevue.

CONTEXT

Comprehensive Plan Policies

In recognition of the important role of commuter parking facilities in providing local and regional access to transit, consolidating demand for service, and reducing vehicle trips and traffic congestion, the City of Bellevue *Comprehensive Plan* includes several policies related to park-and-rides. The City is dedicated to providing effective commuter parking options and to working in partnership with transit providers and the State to increase capacity as needed by expanding existing facilities, developing additional facilities, and pursuing lot lease agreements with other local entities.

POLICY TR-53. Work with transit providers to maintain and improve public transportation services to meet employer and employee needs. Develop and implement attractive transit commuter options, such as park and ride facilities and local shuttle systems with sufficient frequencies to increase use of transit for commuting and reduce reliance on private automobiles.

POLICY TR-62. Work to ensure that the regional transit system includes park and ride lots to serve activity centers in the region and on the Eastside to:

1. Intercept trips by single occupant vehicles closer to the trip origins;
2. Reduce traffic congestion; and
3. Reduce total vehicle miles traveled.

POLICY TR-64. Encourage transit providers and the state to provide new and expanded park and ride lots to adequately serve city residents and to develop additional capacity outside Bellevue at other strategic Eastside locations to serve outlying residents.



Figure 2 With more than 1,600 stalls, Eastgate Park-and-Ride concentrates ridership, thereby facilitating service by multiple transit routes that provide more frequent service than would otherwise be possible in the surrounding area.

POLICY TR-65. Work with transit providers and local property owners to develop new leased park and ride lots.

POLICY TR-75.27. Provide reliable access to the system for Bellevue residents in cooperation with local and regional transit providers, by ensuring that adequate existing and new park and ride lot capacity, neighborhood bus connections and local and regional express bus services are available.

POLICY TR-75.30. Evaluate proposed new park and ride facilities and expansion of existing park and ride facilities to serve light rail transit, for their effectiveness to serve the community and the light rail system, and for their potential environmental and community impacts. New or expanded park and ride facilities should be consistent with the Comprehensive Plan vision for each specific location.

Transit Master Plan

The Transit Master Plan provides insight into the value of commuter parking facilities in relation to other components of Bellevue's transit system. In particular, the Bellevue *Transit Improvement Survey*, completed in October 2012, and the *Existing and Future Conditions Report*, completed in August 2013, provide context about the issue of commuter parking in Bellevue in terms of their use and perceived value.

According to the Bellevue Transit Improvement Survey, about 14% (264/1,886) of all survey respondents prefer investment in park-and-ride facilities over seven other alternative areas for municipal investment (see Figure 4). However, investment in park-and-ride facilities is favored less than investment in speed and reliability infrastructure and the provision of real-time information. Older survey respondents were more likely to support investment in park-and-ride facilities than younger riders, and

"...[M]ore parking needs to be made available at Park-and-Ride lots to enable more users to ride the buses. I would utilize bus service more if there was a safe place and convenient place for me to park my car!"

-Michelle, Non-Rider
Resident of Snohomish¹

"For those of us who commute into Downtown Seattle, it isn't very realistic to catch the bus from our neighborhoods and transfer. So we depend upon the Park and Rides. It is therefore crucial that adequate parking spaces be provided at the Park and Rides in order for Bellevue residents to use transit for commuting."

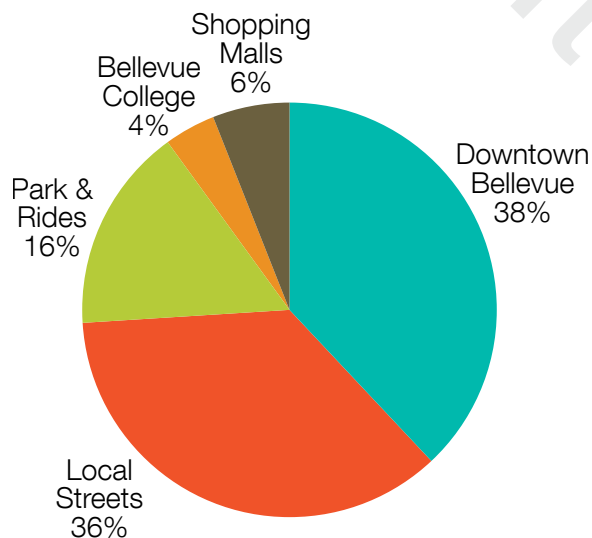
-Sarah, Work and Special Event Transit User
Resident of Bellevue¹

¹ Write-in comment from the *Transit Improvement Survey Summary Report* (2012).

those whose destinations whose destinations include Downtown Bellevue and/or Downtown Seattle favor park-and-ride investments more than those traveling to other areas.

While park-and-ride lots are clearly an important amenity supporting transit use in Bellevue, the *Existing and Future Conditions Report* indicates that the majority of people riding transit in Bellevue access transit at other types of facilities (Figure 3). In Fall 2011, about 38% (15,408/27,889) of daily ons/offers took place in Downtown Bellevue, including at the transit center; about 36% (14,523/27,889) occurred on local streets outside of Downtown Bellevue; and Park & Ride facilities, including Eastgate (2,166), South Bellevue (1,588), Newport Hills (281), Wilburton (51), and the Eastgate Direct Access Ramp (2,270), collectively accounted for about 16% of all daily boardings and alightings.

Figure 3 Transit usage patterns in Bellevue based on Fall 2011 boarding and alighting (ons/offers) data.



HOW SHOULD THE CITY INVEST?

ACCORDING TO CURRENT TRANSIT USERS



Figure 4 The third most common way current transit users think the City should invest municipal resources to improve transit service in Bellevue is by “increasing vehicle parking capacity at Park and Ride lots” (14%; 264/1,962 respondents). In addition to the options listed above, 9.9% (194/1,962 respondents) chose “other.” Percentages for current transit users who live in Bellevue are shown in parenthesis (661 respondents).

METHODOLOGY

Transit Corridors

This report uses the transit corridors that were established by WSDOT's 2001 *Puget Sound Park & Ride System Update* to provide organizational structure to the existing park-and-ride lots. Capacity needs for park-and-ride lots are intended to be considered in general—not in a lot-specific sense—allowing for more flexibility in analyzing the findings and in developing solutions.

The use of corridors allows for a high-level analysis of needs that aligns with demand projection methodology from the BKR Travel Demand Model (MP30r6.2). Corridor-level analysis allows for the capture of both local park-and-ride demand and demand that may be shifting between facilities within the corridor. Shifts between facilities, called “lot substitutions”, are caused when a transit rider travels further to reach a lot with more favorable conditions, such as higher frequency services, a wider range of destinations, or more parking lot capacity. Lot substitution is observed in Bellevue where transit riders pass park-and-ride lots closer to their homes in favor of parking at the South Bellevue Park-and-Ride, where service that is both faster and more frequent is available.

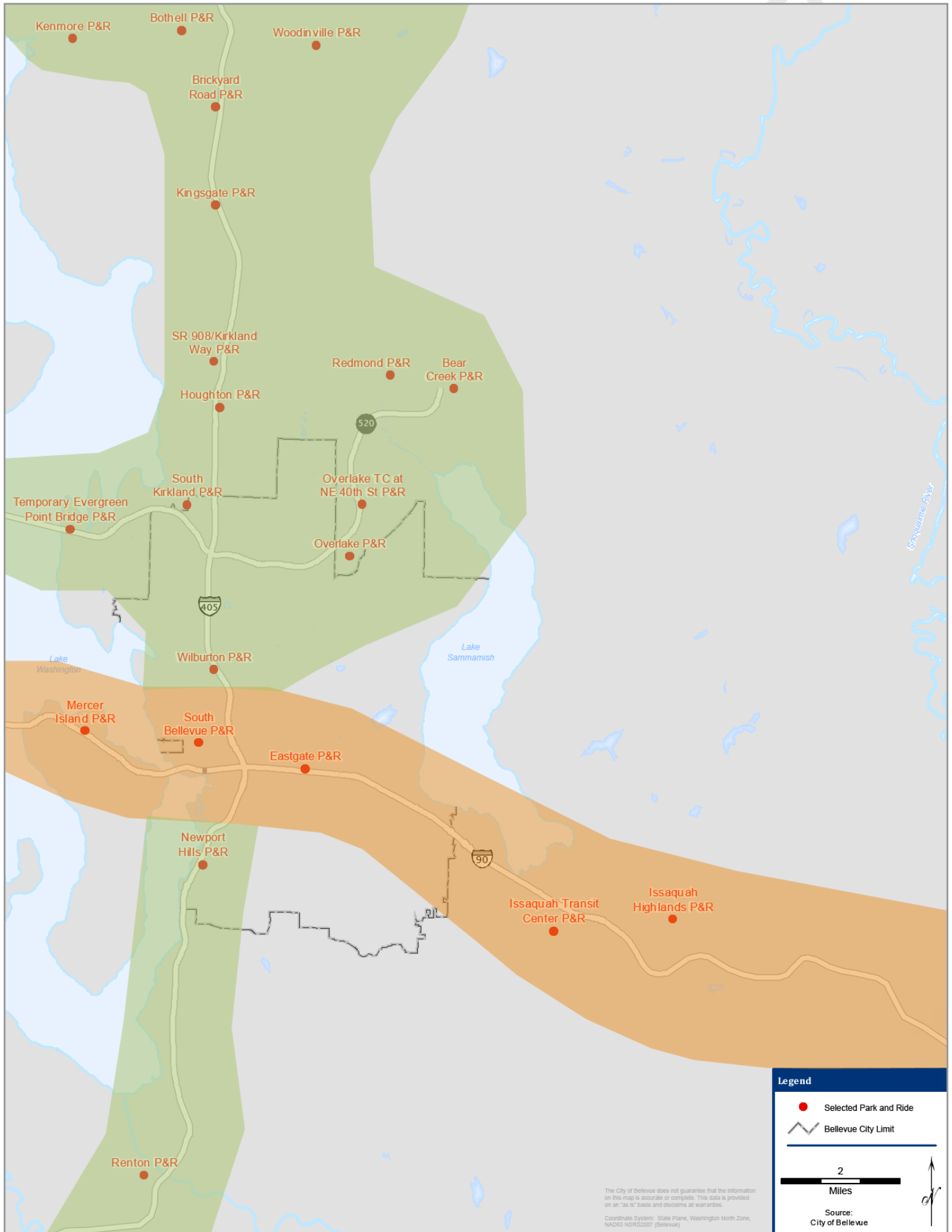
The WSDOT study established transit corridors based on a list of primary transit commuting corridors and subareas, together with input from local transit agencies. Within the City of Bellevue, the transit corridors are broadly defined by two freeways: I-90 and I-405. Figure 5 shows a map of Bellevue and its surroundings with selected park-and-ride lots located within the identified corridors.

"If the bus route came closer to where I live I wouldn't need to drive to the Park and Ride. So either the city should have a lot more Park and Ride spaces or have more bus routes in unserved parts of Bellevue."

-Pat, Shopping and Social Transit User
Resident of Bellevue¹

¹ Write-in comment from the *Transit Improvement Survey Summary Report* (2012).

Figure 5 Park-and-ride lots in the I-405 (green) and I-90 (orange) corridors.



Travel Demand Modeling

In order to quantify corridor-level park-and-ride demand, estimates for 2013 and forecasts for 2030 were developed. Demand projections used the BKR Travel Demand Model (MP0r12), which has been developed to reflect conditions in Bellevue, Kirkland, and Redmond. The demand for park-and-ride use in the City of Bellevue is estimated using all standard assumptions and sources from the model, except that the unconstrained demand estimates remove capacity as a constraint for all park-and-ride lots.

The following are standard assumptions and sources from the BKR Travel Demand Model. Baseline data is derived primarily from regional survey conducted by the Puget Sound Regional Council (PSRC). This is validated by census data and data from the PSRC regional household travel survey. According to the BKR Model Report (City of Bellevue 2011), “the base-year model platform is updated annually to reflect changes in land use and roadway network. The model is validated with observed traffic counts and transit ridership on an annual basis. As travel survey data becomes available, enhancements are made to the BKR base model to more accurately project travel demand.” It is assumed that trip assignments constrain transit capacity, and park-and-ride capacity typically constrains the mode split process. The same park-and-ride attractiveness factors are carried forward from the constrained demand projection to the unconstrained demand projection. Attractiveness factors include size and ratio of lot size to average lot size in the system, and these are represented by a proxy figure in the model. Characteristics of transit service quality, such as frequency of service at a given park-and-ride facility, are not specifically considered by the model.

In order to develop the two scenarios—constrained and unconstrained—parking demand for the I-90 and I-405 corridors are modeled for the year 2030 based

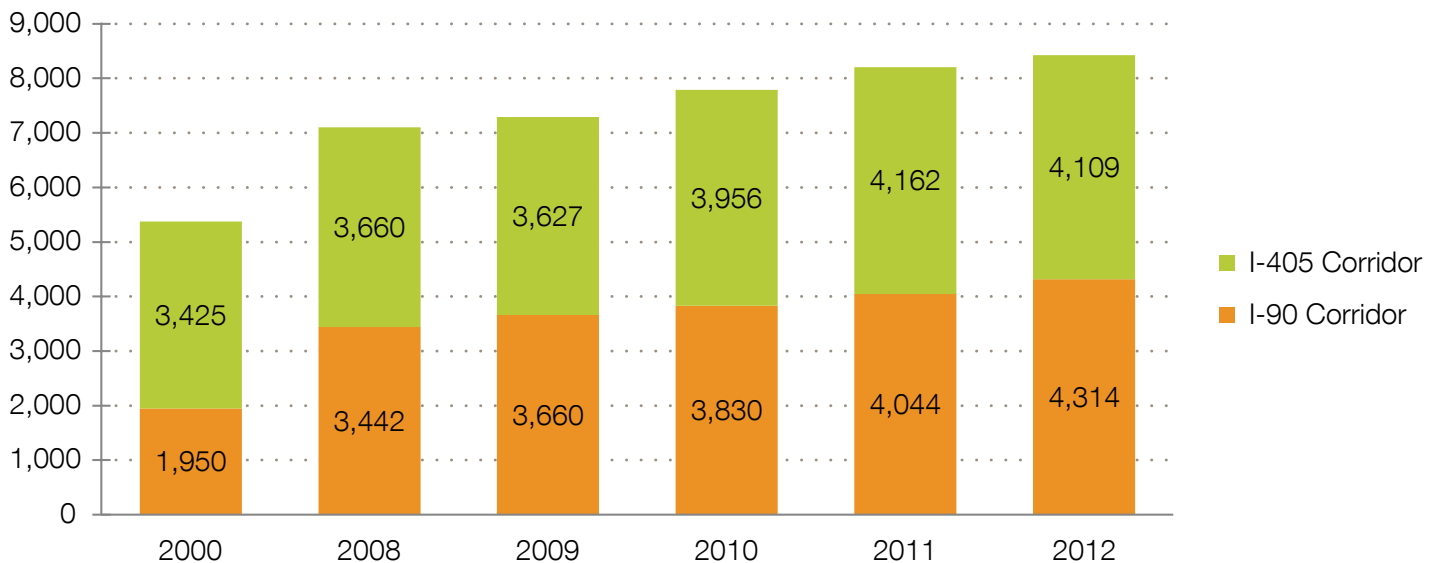
"I sometimes have to pass two Park-&-Ride lots on my route before finding a parking space. By that time, I've driven half-way to work."

-Don, All-Around Transit User
Resident of Kirkland¹

¹ Write-in comment from the *Transit Improvement Survey Summary Report* (2012).

on the Growing Resources scenario presented in the *Service Vision Report*. The constrained scenario keeps parking lot capacity consistent with 2030 projections based on approved and funded projects. The unconstrained scenario sets the model's capacity to 10,000 stalls for every lot to represent an unlimited capacity of parking stalls at each facility. WSDOT's *Puget Sound Park & Ride System Update* similarly uses unconstrained demand projections to determine demand under ideal circumstances. That study provided park-and-ride capacity for the year 2000 and unconstrained demand for the year 2020.

Figure 6 Historic utilization of park-and-ride lots for the I-405 and I-90 corridors.



PARK-AND-RIDE USE

Figure 7 Constrained and unconstrained demand for park-and-ride lots along the I-90 corridor.

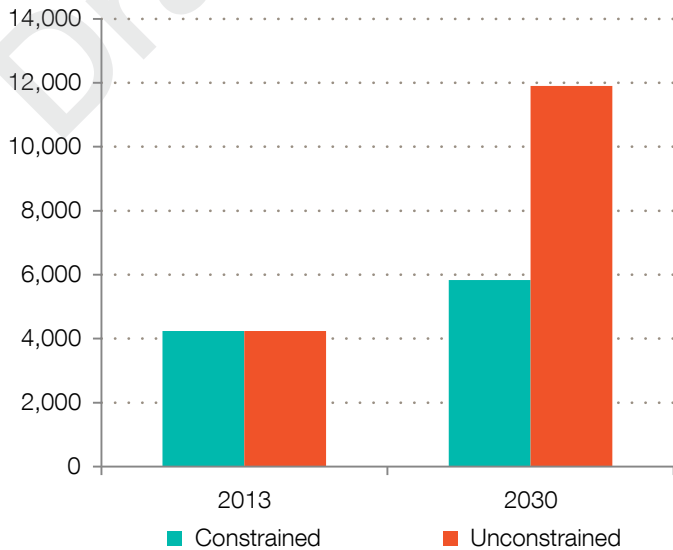
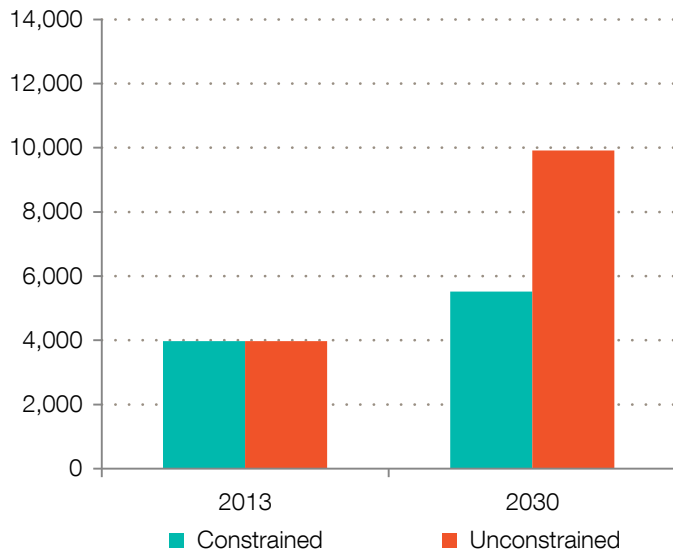


Figure 6 on page 9 presents fourth quarter park-and-ride utilization data from the past five years (King County Metro 2013) plus the utilization reported by WSDOT for 2000 (Parsons Brinckerhoff 2001). This chart reveals that park-and-ride usage rose by 121% (2,364 vehicles) for the I-90 corridor between the years 2000 and 2012, and usage in the I-405 corridor rose by 19% (684 vehicles). Refer to Appendix 1 on page 18 for the complete associated data. Likely causes of this increased use include the construction of the new 1,600-stall Eastgate Park-and-Ride facility in 2005 and the expansion of the South Kirkland Park-and-Ride. Utilization of I-90 corridor park-and-ride lots increased by 1,492 vehicles (76%) between 2000–2008. The I-405 corridor experienced an increase in utilization of 449 vehicles (12%) between 2008–2012.

Modeling Results

Figure 8 Constrained and unconstrained demand for park-and-ride lots along the I-405 corridor.



Demand for park-and-ride lots are shown for the I-90 and I-405 corridors in Figure 7 and Figure 8, respectively, based on the modeling methodology outlined in the previous section. Refer to Appendix 2 and Appendix 3 on page 18 for the complete associated data. These charts show that for the year 2030, both constrained and unconstrained demand for each of the two corridors exceed the projected lot capacity. The projected lot capacity is exceeded most in the unconstrained scenarios, particularly for the I-90 corridor. If an unlimited supply of parking were available at both the Eastgate Park-and-Ride and the South Bellevue Park-and-Ride, the model predicts that almost 3,000 additional parking stalls for each lot would be required to satisfy the demand in 2030. Model results show that unconstrained demand is approximately 200% greater than constrained demand, suggesting that new riders will likely begin using the system given increased parking availability.

Yet when existing 2013 parking utilization rates are averaged along the I-90 and the I-405 corridors, there is an oversupply of parking for each corridor. The combined I-90 lots have an oversupply of 290 stalls, with an overall average occupancy of 93 percent. The combined I-405 lots have an oversupply of 629 stalls, with an overall average occupancy of 86.4 percent. Unfortunately, this oversupply is not evenly distributed, representing unmet need for lots such as the South Bellevue and Mercer Island Park-and-Rides along the I-90 corridor.

Park-and-ride usage in Bellevue varies by the size and location of the lot. Two of the most popular lots are profiled in this report: South Bellevue Park-and-Ride and Eastgate Park-and-Ride.

South Bellevue Park-and-Ride

The South Bellevue Park-and-Ride is a surface parking lot with a 519-stall capacity. It is heavily utilized, especially by users originating a great distance from the lot. As indicated by the photos shown in Figure 9, vehicles often park along the unpaved and sloping shoulder and in other places where parking is not allowed after the lot fills. According to a license plate survey conducted by Sound Transit in August 2013, 44% of the lot's demand is generated from further than five miles from the lot. Demand calculations used in this were based on the total number of vehicles registered in Washington with addresses that are able to be recognized by Sound Transit's geographic information system (GIS), of which there were 484 vehicles. The pie chart in Figure 10 shows the distribution of park-and-ride users with origins of less than five miles from the lot. (Refer to Appendix 4 on page 19 for the complete associated data.) Only 6% of South Bellevue Park-and-Ride users commute less than one mile, 78% of



Figure 9 The South Bellevue Park-and-Ride is often over capacity, with vehicles parked along the shoulders of the driveway (circled).

Figure 10 Distances traveled by users to reach the South Bellevue Park-and-Ride.

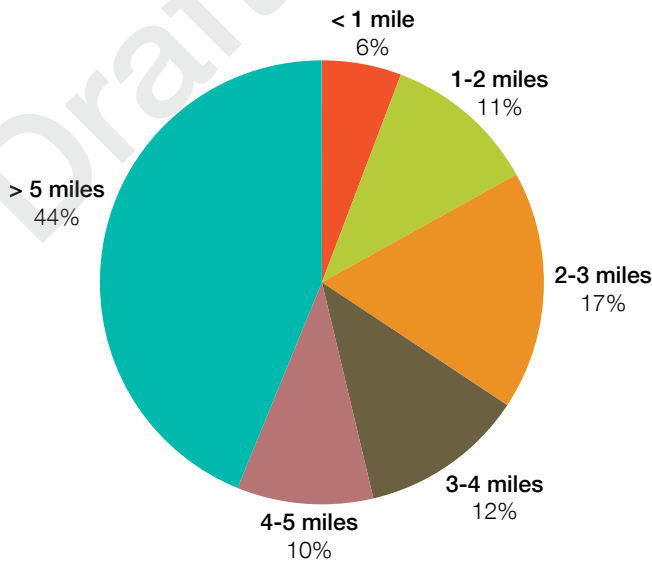
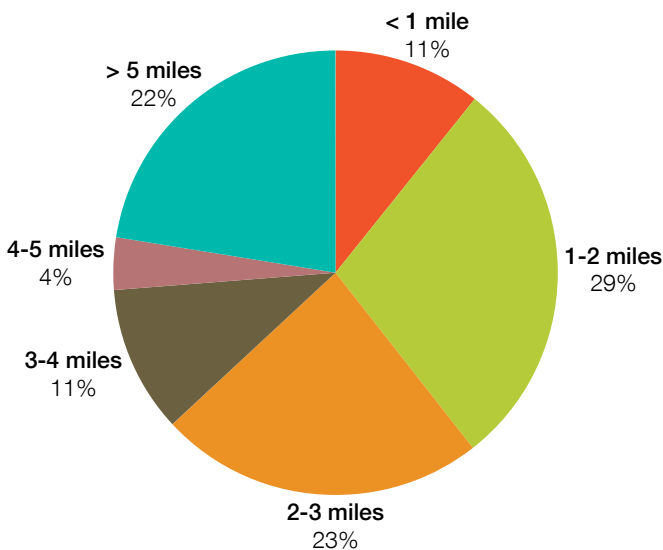


Figure 11 Distances traveled by users to reach the Eastgate Park-and-Ride.



the demand is from East King County, and only 6.8% of the demand comes from Seattle. Within East King County, the demand is generally evenly distributed, but south of Bellevue city limits, the I-5 corridor from the edge of Lake Washington to the east 2.5 miles to the east contains 30% of all users, with origins from the two cities of Renton and Newcastle. The South Bellevue Park-and-Ride's market area, as determined by Sound Transit's license plate survey, is illustrated in Figure 12.

Eastgate Park-and-Ride

The Eastgate Park-and-Ride is a five story parking structure with a capacity of 1,614 vehicles. Sound Transit also conducted a license plate survey of this facility in August 2013. When the survey was conducted, 1,078 Washington-registered vehicles were present. Of these, 89% were registered in East King County, and 52% of the users commuted between one and three miles to reach the lot. Figure 11 shows the distribution of lot usage by distance traveled. (Refer to Appendix 5 on page 19 for the complete associated data.) The pattern of distribution shows a concentration of use that forms a vertical rectangle bounded by Lake Sammamish to the east, a line extending north and south of the lot to the west, and extending three miles in both directions as shown in Figure 13 on page 14.

Figure 12 The South Bellevue Park-&-Ride user origins.

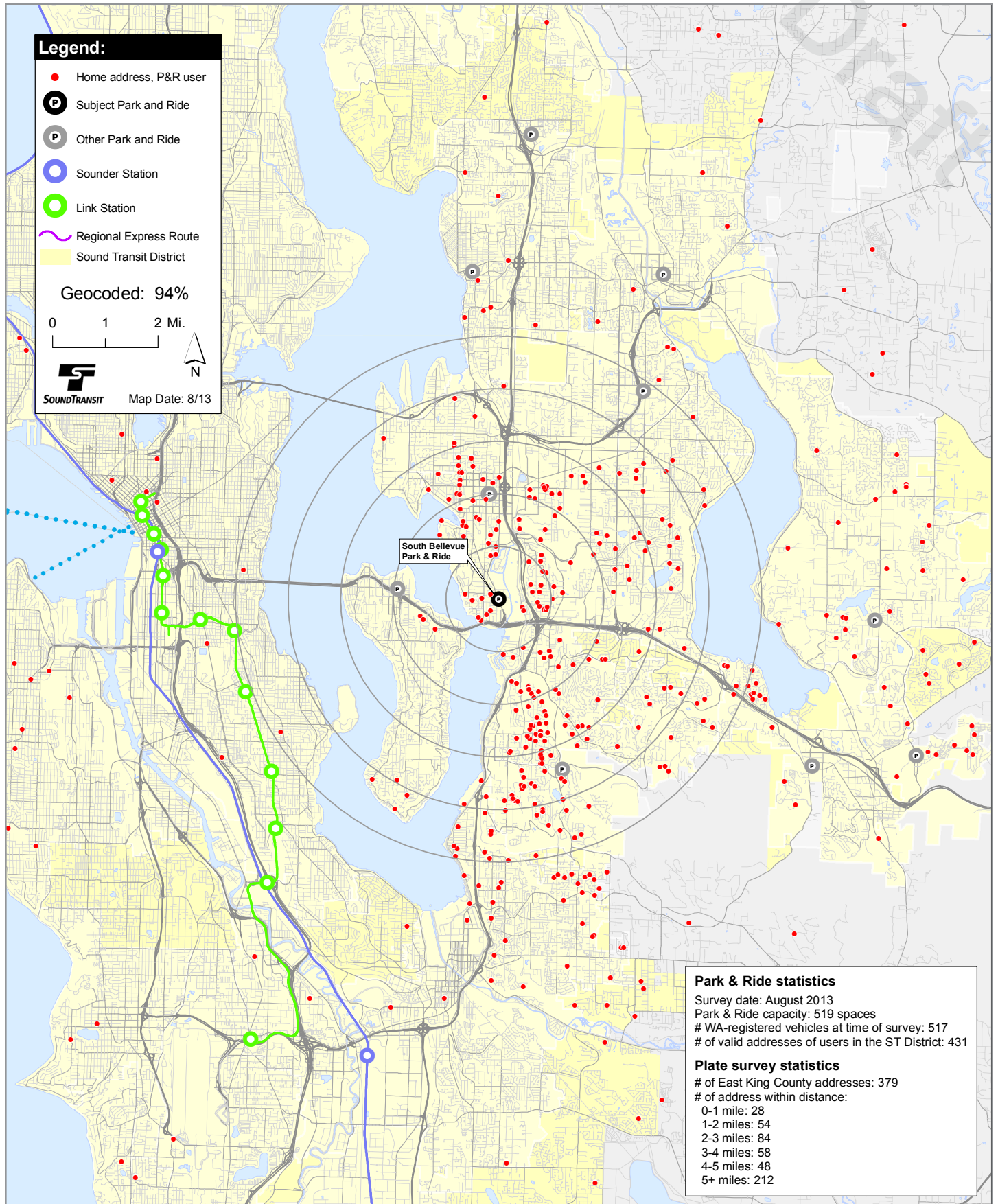
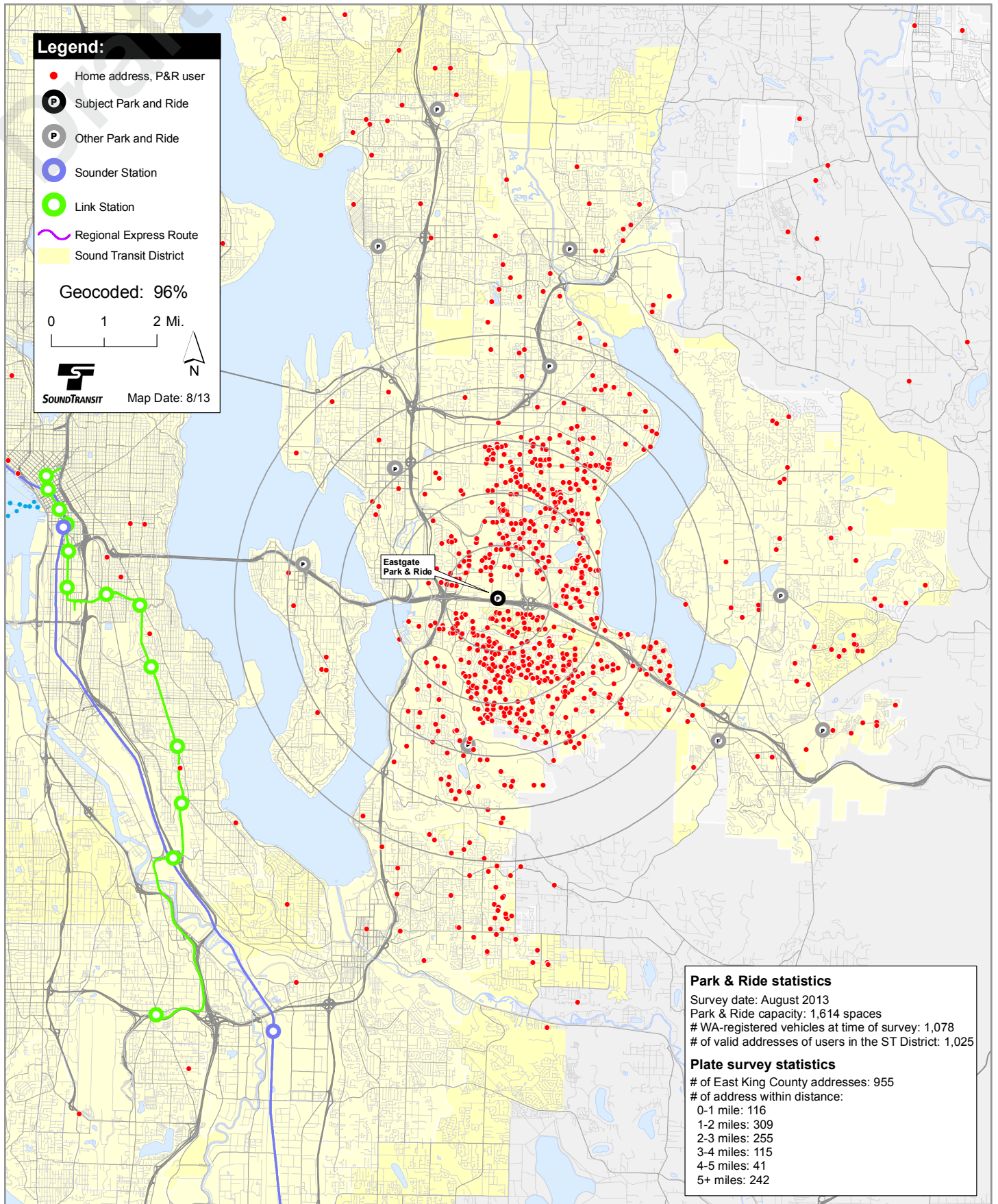


Figure 13 Eastgate Park-and-Ride user origins.



CONCLUSIONS

This assessment suggests that there is a significant shortage of commuter parking in Bellevue. As the park-and-ride usage trends indicate, commuter parking expansions have occurred in high-utility areas due to their locations in proximity to I-405 and I-90 and their central to western location within the City of Bellevue. Indeed, past experience shows that lots are quickly filled shortly after new park-and-ride facilities are built.

The constrained travel demand model indicates that there are approximately 200 stalls for each corridor that are required beyond those provided. When an unlimited supply of stalls is provided in the model— the unconstrained scenario—there is a shortage of over 6,000 stalls along the I-90 corridor and a shortage of approximately 4,600 stalls along the I-405 corridor. Thus, each corridor would need to have twice the number of stalls to keep up with the projected unconstrained demand.

Recommendations

In order to meet the needs of doubling the commuter parking system in Bellevue by 2030, it will be necessary to undertake a multiple-pronged approach involving new construction, re-use of existing facilities, and building greater efficiency into the system. It may also be possible to mitigate for unmet need through the development of leased lots. These shared lots are privately-owned by institutions that make only partial use of their parking infrastructure, such as churches. Several such lots exist in the area surrounding the most heavily-utilized park-and-ride lots. Where new construction is necessary, the cost of construction may be offset by the potential to charge fees for park-and-ride use. King County Metro is undertaking a pilot study to explore the potential for charging at park-and-ride lots.

Greater efficiency could be realized with the use and design of park-and-ride facilities by looking to technology to indicate the number of stalls available at each facility. This technology could help inform drivers of the availability of parking at sometimes hard to see leased lots or some of the smaller lots with less capacity. One such technology provides updated parking locations to handheld devices. This application is currently being used by the City of Los Angeles. Also, better bicycle and pedestrian connections could be provided to Park-and-ride lots to reduce the number of automobile passengers, and ride sharing could be encouraged.

These recommendations can help ensure that commuter parking facilities more effectively and efficiently support transit than they do today, which will be increasingly important as the region continues to grow. Respondents to Bellevue's *Transit Improvement Survey* have indicated the importance of park-and-rides to support transit; together with its regional partners, the City should strive to respond to this demand.

REFERENCES

- City of Bellevue. "BKR Travel Demand Model Report." Department of Transportation Modeling and Analysis Group. December 2011.
- City of Bellevue. "Phase 1 Outreach Report: Technical Appendix." Department of Transportation. June 2012. http://www.bellevuewa.gov/pdf/Transportation/061112_TransitPlanTechAppendix.pdf.
- Parsons Brinckerhoff. "Puget Sound Park & Ride System Update." Washington State Department of Transportation Office of Urban Mobility. February 2001. http://www.wsdot.wa.gov/NR/rdonlyres/F30205A6-DD95-4835-8813-DC0CE8326BA4/0/PSPRSUBeginning_thru_Chap3.pdf.
- King County Metro. Park-and-ride Usage. Park-and-ride Usage Accountability Center. <http://metro.kingcounty.gov/am/accountability/park-ride-usage.html>. Last updated December 18, 2013.

APPENDICES

Appendix 1 Historic utilization of park-and-ride lots for the I-405 and I-90 corridors.

	2000	2008	2009	2010	2011	2012
I-90 Corridor Park-and-Rides	1,950	3,442	3,660	3,830	4,044	4,314
I-405 Corridor Park-and-Rides	3,425	3,660	3,627	3,956	4,162	4,109
Total Number of P&R spaces used daily	5,375	7,102	7,287	7,786	8,206	8,423

Appendix 2 Constrained and unconstrained demand for park-and-ride lots along the I-90 corridor.

	2013	2030
Constrained Model	4,236	5,838
Unconstrained Model	4,236	11,901

Appendix 3 Constrained and unconstrained demand for park-and-ride lots along the I-405 corridor.

	2013	2030
Constrained Model	3,977	5,516
Unconstrained Model	3,977	9,914

Appendix 4 Distances traveled by users to reach the South Bellevue Park-and-Ride.

Place of Residence	
Survey Date: August 2013	
Park-and-Ride Capacity	519
# of Washington registered vehicles	517
< 1 mile	28
1-2 miles	54
2-3 miles	84
3-4 miles	58
4-5 miles	48
> 5 miles	212
Total	484

Note: Of the 517 Washington-registered vehicles, 6% could not be geocoded.

Appendix 5 Distances traveled by users to reach the Eastgate Park-and-Ride.

Place of Residence	
Survey Date: August 2013	
Park-and-Ride Capacity	1,614
# of Washington registered vehicles	1,078
< 1 mile	116
1-2 miles	309
2-3 miles	255
3-4 miles	115
4-5 miles	41
> 5 miles	242
Total	1078

Note: Of the 1,078 Washington-registered vehicles, 4% could not be geocoded.

Appendix 6 Summary of parking demand and capacity for park-and-ride lots in 2013 and 2030.

Park-and-Ride Facility	BKR SAZ	2013 Capacity and Use ¹		Oversupply or Shortage in 2013	2030 Capacity and Demand ²			Oversupply or Shortage in 2030	
		Lot Capacity	Use		Projected Capacity	Constrained Demand ³	Unconstrained Demand ^{3,4}	Based on Constrained Demand	Based on Unconstrained Demand
I-90 Lots									
Mercer Island	681	447	447	0	498	520	888	-22	-390
South Bellevue	686	519	555	-36	1,400	1,461	4,291	-61	-2,891
Eastgate	688	1,614	1,452	162	1,614	1,686	4,457	-72	-2,843
Issaquah	680	819	776	43	1,016	1,061	1,504	-45	-488
Issaquah Highlands	779	1,010	968	42	1,010	1,055	719	-45	291
Preston	789	53	38	15	53	55	42	-2	11
Total		4,462	4,236	226	5,591	5,838	11,901	-247	-6,310
I-405 Lots									
Kenmore	703	603	601	2	618	642	1,227	-24	-609
Bothell	705	220	215	5	220	229	409	-9	-189
Woodinville	706	438	240	198	438	456	493	-18	-55
Brickyard	701	443	362	81	443	462	993	-19	-550
Kingsgate	700	502	507	-5	502	524	1,029	-22	-527
SR 908 / Kirkland Way	813	20	17	3	20	21	18	-1	2
Houghton	694	470	203	267	470	491	406	-21	64
Redmond	696	377	375	2	385	403	814	-18	-429
Bear Creek	699	283	308	-25	283	296	609	-13	-326
Evergreen Point	690	31	38	-7	51	53	26	-2	25
S Kirkland	692	783	304	479	727	760	1,756	-33	-1,029
NE 40th / Overlake TC	832	222	222	0	369	386	1,186	-17	-817
Overlake	693	203	76	127	203	212	546	-9	-343
Wilburton	687	186	143	43	186	194	303	-8	-117
Newport Hills	683	275	218	57	275	254	53	21	222
Renton	679	150	148	2	128	133	46	-5	82
Total		5,206	3,977	1,229	5,318	5,516	9,914	-198	-4,596

1. 2013 Capacity and Use are from the King County Metro Transit, Park-and-Ride Utilization Report, Third Quarter 2013.

2. Capacity and Demand figures for 2030 are projected from Bellevue's BKR model (MP30r6.2).

3. 2030 Demand assumes TMP "Growing Resources Scenario". Demand forecast is based on future service assumptions and BKR model transit ridership growth rates.

4. In addition to the above assumptions, the 2030 Unconstrained Demand places no limitations on the total number of parking stalls available.

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