Lake Forest Park Safe Highways Planning Context Report

Prepared for:
City of Lake Forest Park

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SE17-0540

FEHR PEERS

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Introduction

The City of Lake Forest Park is a desirable suburban community that over 13,000 residents call home. True to its name, Lake Forest Park is defined by its proximity to Lake Washington and its forested, park-like ambiance. However, Lake Forest Park is also defined by two major highway corridors that traverse the community: Bothell Way (SR 522) and Ballinger Way (SR 104). While these corridors connect Lake Forest Park residents to jobs, services, and other regional opportunities, they also divide the community by their sheer size, traffic volumes, and outdated designs, which offer little in the way of accommodations for those not travelling in a car. Further, the same corridors connect the region's north and northeast areas to drivers who do not necessarily know they are coming through our community.

In 2016, the Lake Forest Park City Council adopted a Strategic Plan, which identified the need to proactively plan the SR 522 and SR 104 corridors to improve safety and community mobility.

This Strategic Plan goal came at a fortuitous time. In November 2016, regional voters passed Sound Transit 3, a $54 billion package to expand transit in the Puget Sound through 2041. Sound Transit 3 includes funding to improve SR 522 to accommodate planned bus rapid transit (BRT) service by 2024.

This Safe Highways Study is a product of the City's Strategic Plan. The Study will document preferred cross-sections and treatments along the SR 522 and SR 104 corridors. It is the City's intention that this Study's recommendations will be informative to Sound Transit in the planning of the SR 522 corridor, identification of non-BRT improvements to seek other regional investments, and provide a starting point for regional investment along SR 104.

Overall Process

The Safe Highways Study began in mid-2017. While it is an engineering study evaluating infrastructure options along SR 522 and SR 104, it is also a community-driven process. The ultimate goal of the Safe Highways Study is to identify recommendations for study of intersection treatments and corridor cross-sections of SR 522 and SR 104, which the community can support, while balancing important considerations including safety, character, and local access with regional mobility. The region will not support the needs of Lake Forest Park unless Lake Forest Park articulates them and they are broadly understandable.

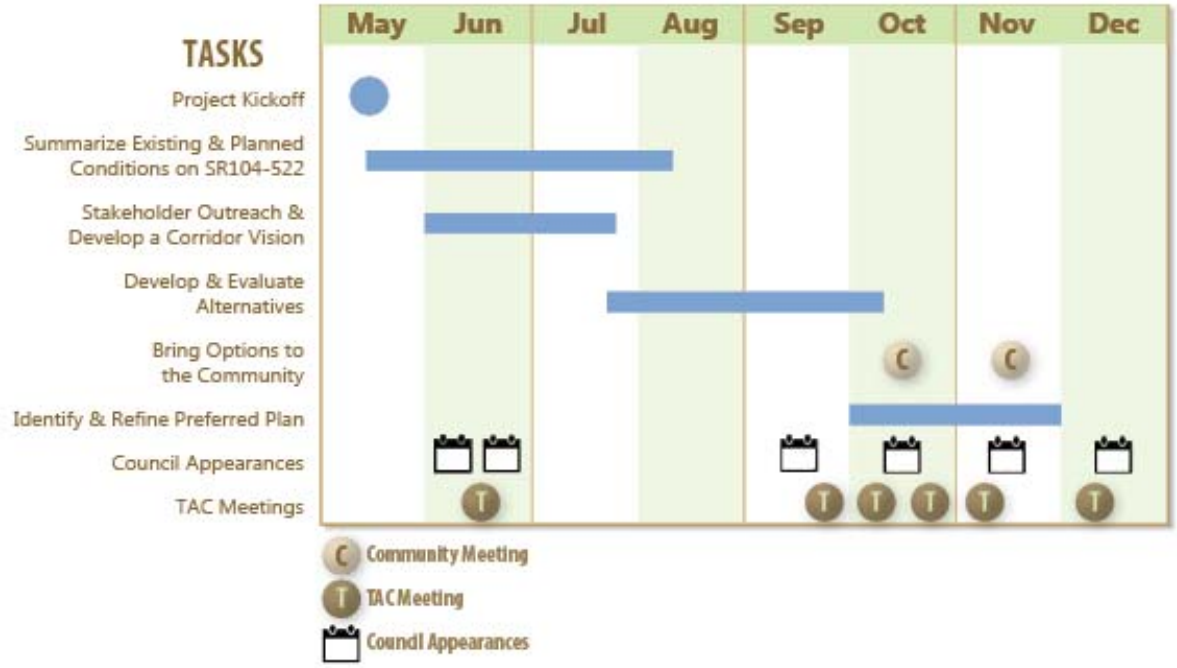
The process includes one-on-one stakeholder discussions, community workshops, a project website, multiple council discussions, and a Technical Advisory Committee

comprised of agency partners (neighboring cities, WSDOT, King County Metro, and Sound Transit) and Merlone Geier, the Lake Forest Park Town Center owner.

The Safe Highways Study recommendations will be developed over the course of Fall 2017 in advance of Sound Transit beginning its corridor planning work on SR 522 in early 2018.

Timeline

The following timeline shows the schedule for completing the Safe Highways Study. The study began in early 2017 with draft recommendations for Council by the end of 2017.



Guiding Principles

To guide this process, including the evaluation and selection of preferred corridor improvements, the Project Team began by establishing a set of guiding principles. These guiding principles are divided into three groups:

- Principles for the **overall project** apply to both corridors and how the Project Team will conduct this Study.
- Principles for **SR 522** are specific to achieving the ultimate vision of a future BRT corridor that is also a community asset.
- Principles for **SR 104** focus on realizing a corridor vision that improves safety and mobility while maintaining rural character.

Overall Project

- Engage the community and respect neighborhoods
- Recognize each corridor's role in regional mobility and local mobility access
- Coordinate with state, regional entities, and neighboring cities to identify mutually beneficial solutions
- Create equitable corridors that provide safe and inviting travel for all people, regardless of mode, age, or ability

SR 522

SR 522 Today

- Address safety for all modes
- Complete business access transit (BAT) lanes and full sidewalk connections to support both BRT and local access
- Minimize impacts on neighboring properties (e.g. right-of-way, access, noise, visibility)
- Improve non-motorized access to transit and crossing opportunities to enhance local access
- Create a corridor identity/character and enhance the natural environment
- Be a leader in identifying innovative solutions, particularly at the Bothell Way/145th Street intersection

SR 104

SR 104 Today

- Address safety for all modes
- Maintain the corridor's unique identity and natural landscape
- Take a phased approach that provides benefits over time
- Consider draw on city's financial resources in selecting design solutions; as well as positioning improvements well for regional, state and federal investment
- Protect natural environment and encourage low impact design approaches
- Plan corridor to discourage neighborhood cut-through traffic
- Minimize impacts on neighboring properties (e.g. right-of-way, access, noise, visibility)

Corridor Profile – SR 522

Introduction

State Route 522 is called a "highway of statewide significance" and this term seems to fit. It is a major artery connecting Seattle with the Eastside carrying approximately 20 percent of cross-lake trips. It is also identified as a freight corridor connection US 2 with I-5. With traffic volumes topping 50,000 vehicles on a weekday heading through Lake Forest Park, the importance of this roadway is evident. It is this heavy usage of SR 522 that makes it an appealing location for bus rapid transit: it goes where people want to go.

At the same time, SR 522 serves as a main travel route for Lake Forest Park residents, however it bisects the community, separating most residents from amenities along Lake Washington and the Burke Gilman Trail. The following corridor profile identifies the key challenges and opportunities to consider in identifying potential corridor concepts and community recommendations for this corridor.

Plans for the Corridor and Prior Studies

The following three recent studies provide information relevant to planning the SR 522 corridor.

145th Street Multimodal Corridor Study

The City of Shoreline led a multimodal corridor study of 145th Street (SR 523), which connects to SR 522 at the southwest edge of this study area. Sound Transit 2 will provide a Link light rail station just north of 145th Street at 5th Avenue by 2023. The 145th Street study considered future improvements for pedestrian, bicycle, and transit connections along the corridor to improve access to the proposed Link light rail station. Proposed improvements included widening of 145th Street at the SR 522 signal to increase capacity and improve signal timings. The preferred street cross-section is in **Figure 1.**

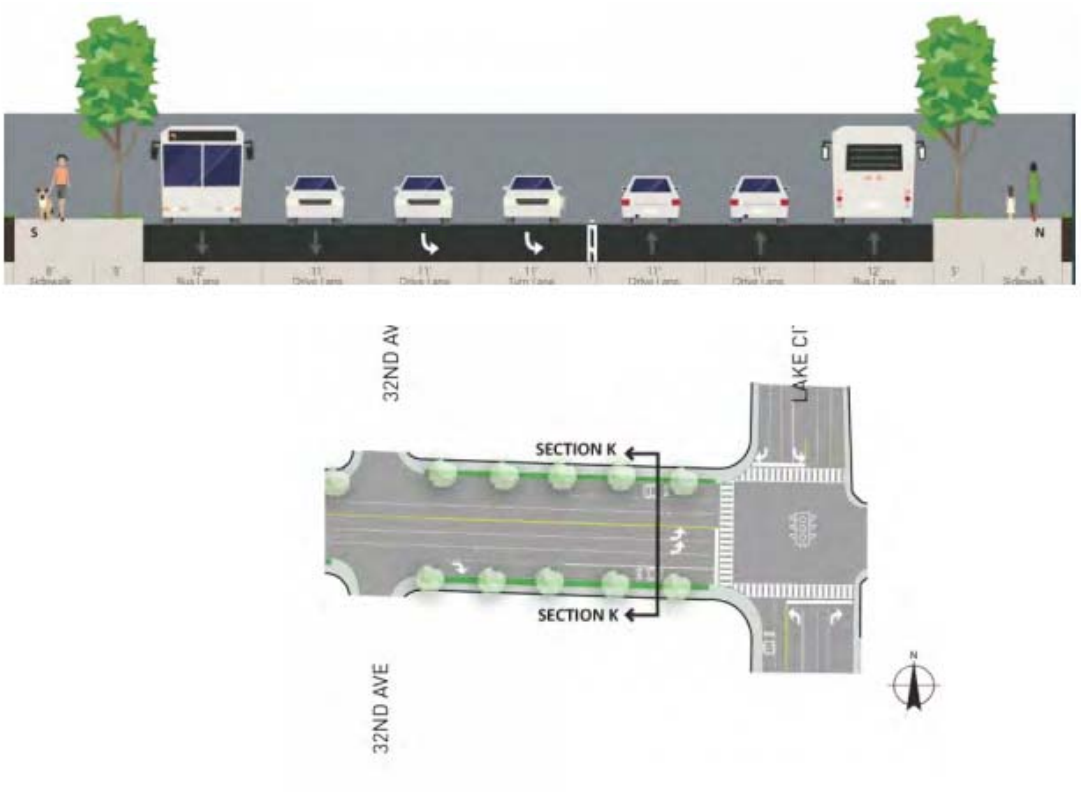


Figure 1. Preferred Concept for NE 145th Street/SR 522

Source: 145th Multimodal Corridor Study, City of Shoreline, November, 2016.

ST3 BRT Project Sheet Info

Sound Transit 3 identifies funding to implement BRT between the 145th Street light rail station in Shoreline and UW Bothell, with potential lower frequency service to Woodinville. Sound Transit estimates that this eight-mile BRT service could generate up to 10,000 daily riders. Along SR 522, the project looks to provide continuous BAT lanes and seven pairs of stations, some in Lake Forest Park and others at points east in Kenmore and Bothell. The corridor would also feature three park & ride garages, one of which is assumed to be at the Lake Forest Park Town Center. The BRT service, which would run on 10-minute headways through Lake Forest Park, would be in place by 2024.

King County Metro Connects

King County Metro Connects is a long-range vision for transit service within King County, and was adopted in January 2017. The plan includes several routes within the Safe Highways Study area. The plan envisions a Rapid Ride service line between the UW Link Light Rail System and the Bothell Transit Center along SR 522. A new frequent service route is also planned between the Shoreline Community College and the Kenmore Transit

Center by 2025. The route would use SR 522 and SR 104. It also proposes an express route between the Edmonds/Kingston Ferry Terminal, Bothell, and Redmond, which would run along both SR 522 and SR 104 by 2040.

The planned new routes within the study area are shown in **Figure 2,** below.

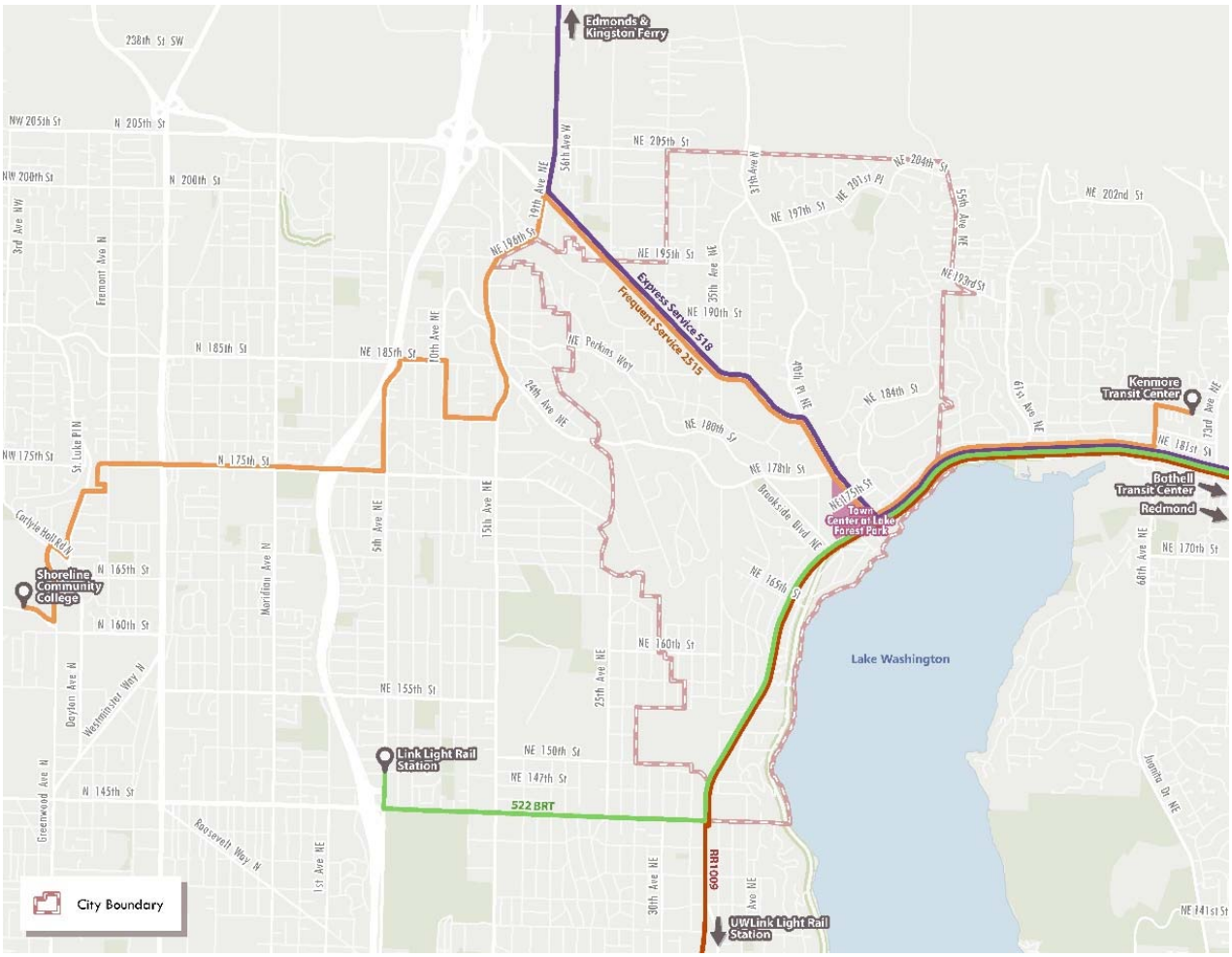


Figure 2: Planned King County Metro Service Routes

Source: Metro Connects, King County Metro, 2017

Safe Streets

The Safe Streets effort focused on making Lake Forest Park's streets safer for all users and improving connections to transit and key amenities, such as parks, schools, trails, and retail. The final report, adopted by City Council in July 2017, recommends ten public realm investments identified by the community, which are broken into two priority tiers. Safe Streets did not address SR 522 and SR 104 specifically, but several of the project recommendations will provide safer connections to transit along SR 522 for people

traveling on foot or by bicycle. For example, Project 1 adds a sidewalk on 37th Avenue NE from just south of NE 178th Street, where the existing sidewalk ends, to NE 165th Street, filling a crucial sidewalk gap used by many transit riders. Project 4 adds a variety of pedestrian amenities and traffic calming measures in the southwest region of Lake Forest Park near three schools, which people of all ages use to access transit. Additionally, Project 6 incorporates traffic calming measures on 37th Avenue NE and a small portion of NE 156th Street, which is a key pedestrian and bicycle corridor adjacent to SR 522. A summary map from the project is in **Figure 3.**

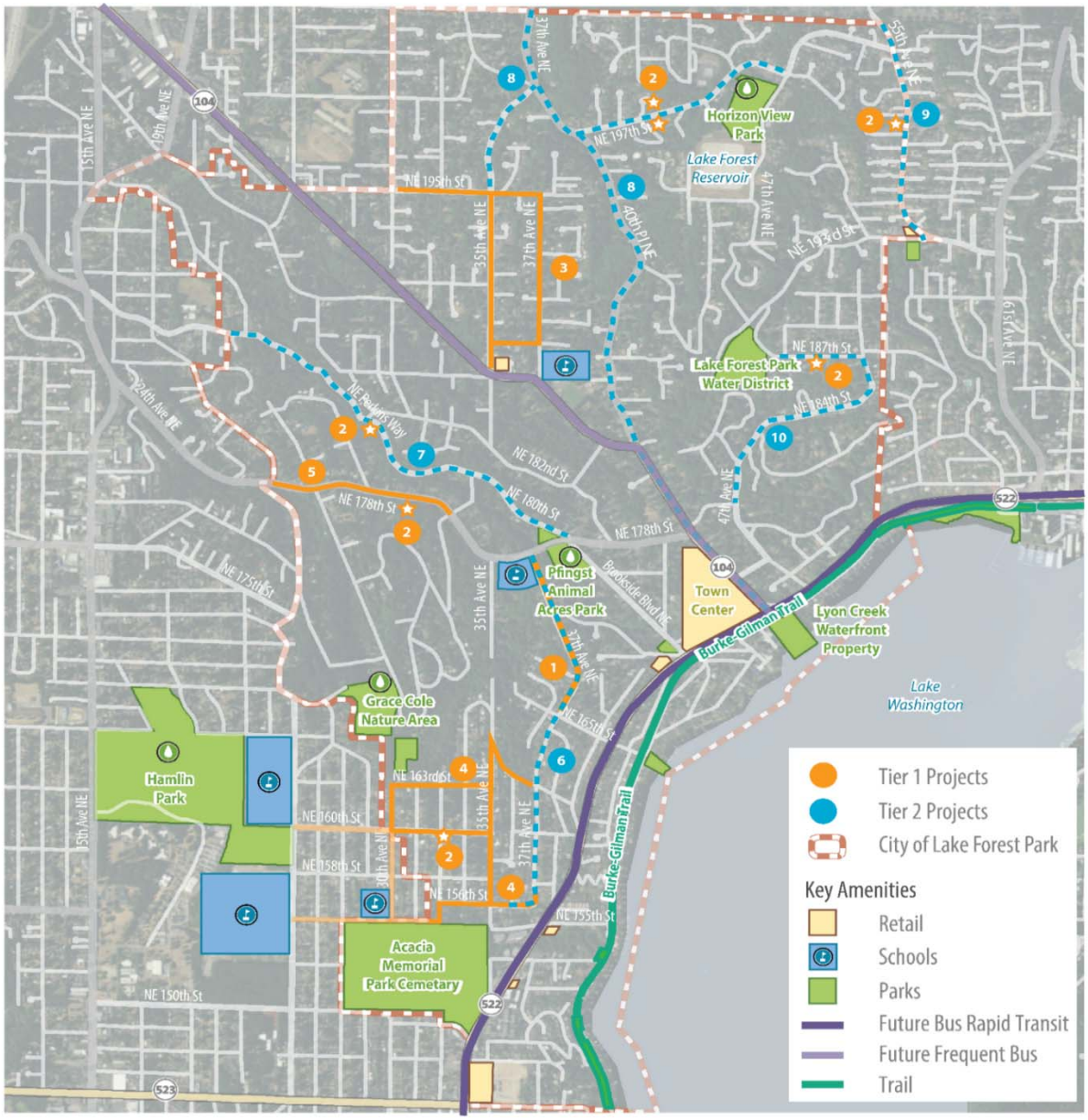


Figure 3. Safe Streets Project Recommendations.

Source: Safe Street Study, City of Lake Forest Park 2017.

Planning Context Topic Areas

The remainder of this report focuses on the two study corridors, SR 522 and SR 104. The corridor discussions are each further broken down by geographic segment and topic area. There are five geographic segments along SR 522 and four segments for SR 104 (see **Figure 4**). The figure also identifies the specific study intersections the Safe Highways Study will focus on. Additional intersections were evaluated on SR 522 as traffic operations will change under any proposed cross-sections.

Throughout this study 'northbound on SR 104' refers to travel towards Mountlake Terrace and away from the Town Center.

'Northbound on SR 522' refers to travel towards Kenmore and north of Lake Washington.

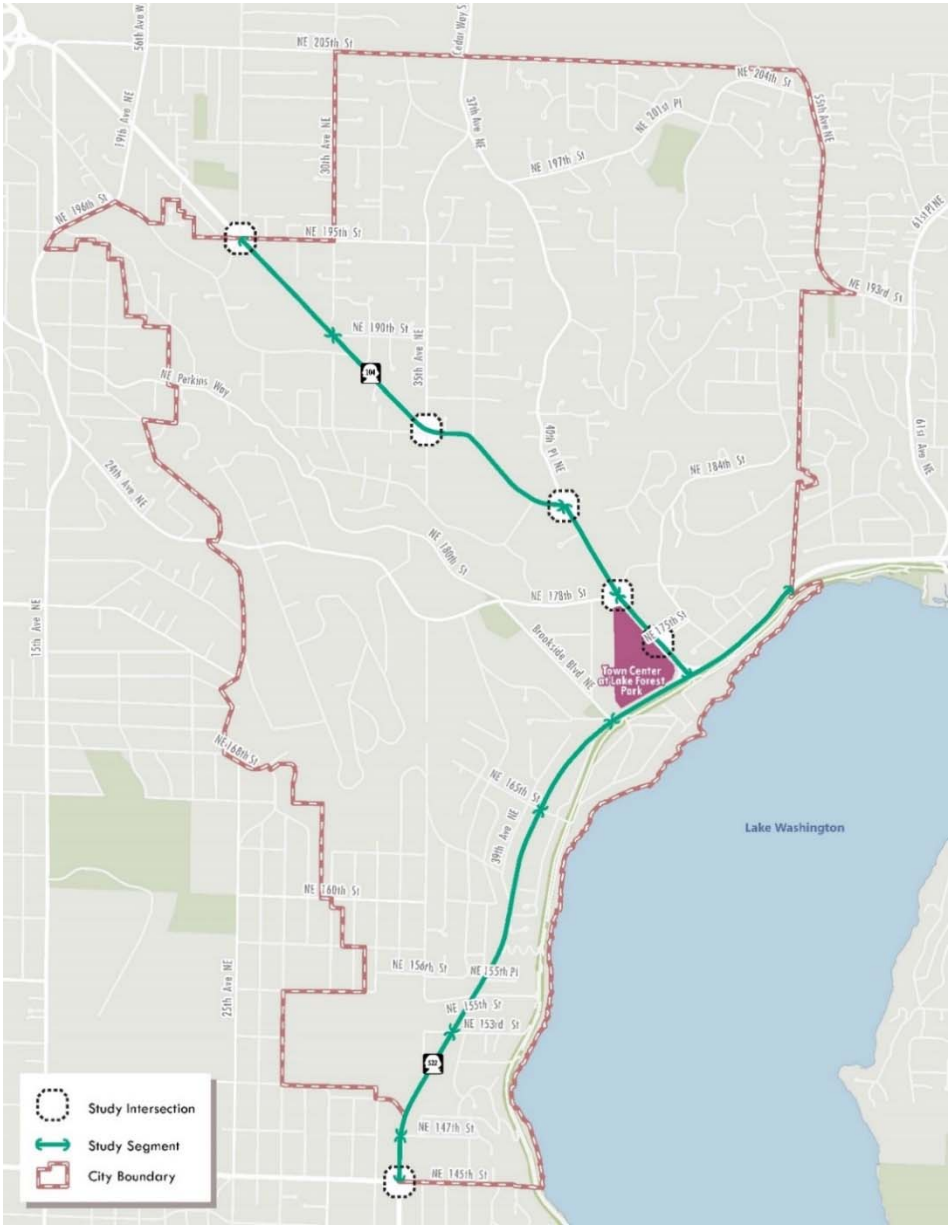


Figure 4. Study Area

For each segment, we provide discussion by topic area. Each segment then includes a summary section, which highlights the key findings in each topic area. The following provides overview information on the topic areas.

Context & Land Uses

This report will describe the land use context around each segment, including land use types (residential, commercial, etc.), future plans for redevelopment, neighborhood access, environmental conditions, as well as the jurisdiction of properties in the corridor. The best transportation facilities integrate seamlessly with their surrounding land use contexts, thus it is important to have a handle on how these conditions create opportunities and constraints within the corridors.

As shown in **Figure 5**, the City's zoning map from the Comprehensive Plan, the majority of the surrounding land uses along the study corridors is a variation of single-family homes (identified in purple, green, yellow, and light blue), and will continue to remain that way into the future. This adds to the challenge, as residential driveway consolidation or street frontage improvements on the corridor may not be implemented through redevelopment.

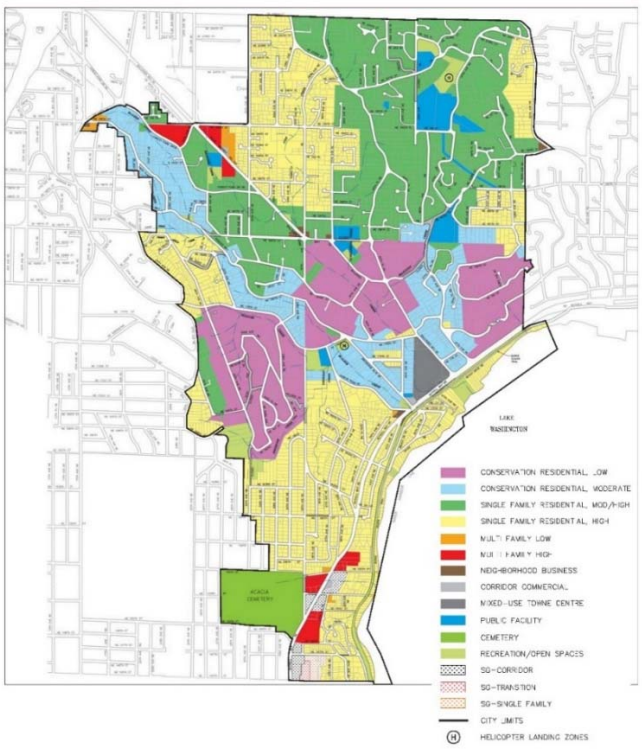


Figure 5. Land Use Map

Source: Lake Forest Park Comprehensive Plan Update, 2015.

Pedestrian/Bike Amenities

The latter sections of the report will describe conditions for walking and biking along each study segment. While each segment is unique in its accommodations for walking and biking, there are a few common themes that apply to the entirety of the SR 522 and SR 104 corridors in Lake Forest Park that can be described here.

SR 522

The Burke Gilman Trail runs parallel to SR 522. The trail is adjacent to SR 522 near the Town Center, but is almost a half-mile from SR 522 near NE 145th Street. It provides a high quality, exclusive facility for walking and biking that is offset from the SR 522 corridor. Return trips from the trail into the City can be difficult however due to the elevation difference of almost 200 feet uphill to SR 522. This regional trail extends from Seattle along the northshore through Lake Forest Park, Kenmore, and Bothell, and connects to the Lake Sammamish Trail.

Multi-use Burke-Gilman Trail

SR 104

Along SR 104, pedestrian facilities are intermittent and no bicycle facility currently exists. Today, only the most experienced riders use SR 104, with most riders routing along a system of lower speed, lower volume residential streets in Lake Forest Park.

Transit Service

This section describes overall transit services available along each corridor. While each segment is unique in terms of the transit stops and infrastructure for accessing stops, transit routes tend to serve the entirety or several segments of each corridor. **Figure 6** shows a map of existing transit routes in Lake Forest Park.

SR 522

The corridor is served by five routes:

- 308 Downtown Seattle Via I-5: directional serving southbound in the morning, and northbound in the evening.
- 309 First Hill Express: directional serving southbound in the morning, and northbound in the evening.
- 312 Downtown Seattle: directional serving southbound in the morning, and northbound in the evening.
- 372 University District Lake City: all day routes on weekdays, with headways of about 10 minutes during the peak periods
- 522 Downtown Seattle: all day routes on weekdays, with headways of about 10 minutes during the peak periods

SR 104

The area is served by three routes:

- 308 Horizon View: directional serving southbound between 6:00 AM and 8:00 AM and northbound between 4:30 PM and 6:30 PM with approximately 1-hour headways.
- 331 Shoreline City Center/Aurora Village: all day weekday service, with approximately 30-minute headways.
- 342 Shoreline Park-and-Ride/Bellevue: directional serving southbound between 4:30 AM and 7:00 AM and northbound between 4:00 PM and 6:30 PM with approximately 30-minute headways.

Average transit boardings and alighting by stop are shown in **Figure 7** and **Figure 8**. Transit stops along SR 522 have the largest number of boardings and alightings, which is reasonable given the more frequent bus service on SR 522 compared to SR 104.

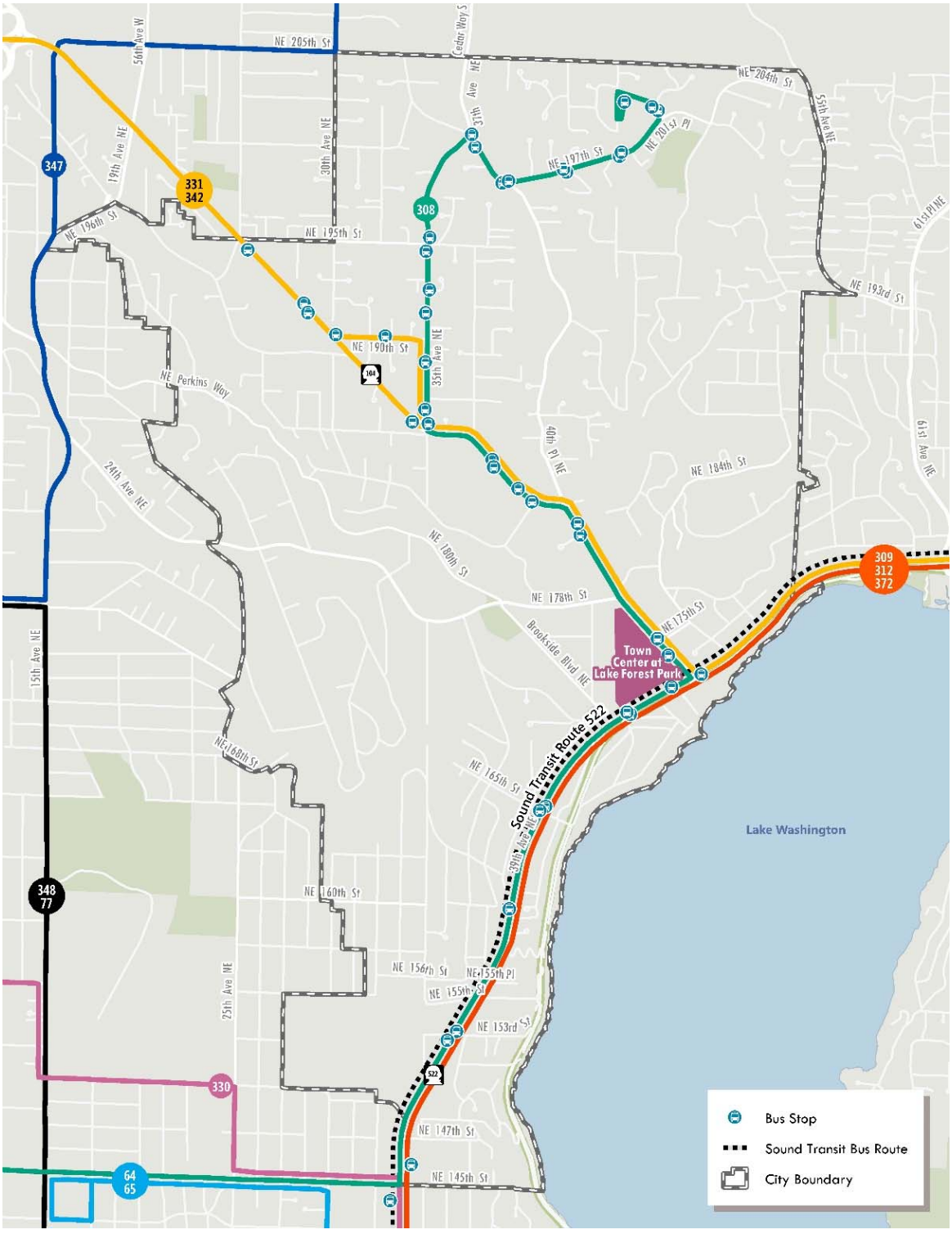


Figure 6. Existing Transit Service

Source: King County Metro, Fehr & Peers, 2017.

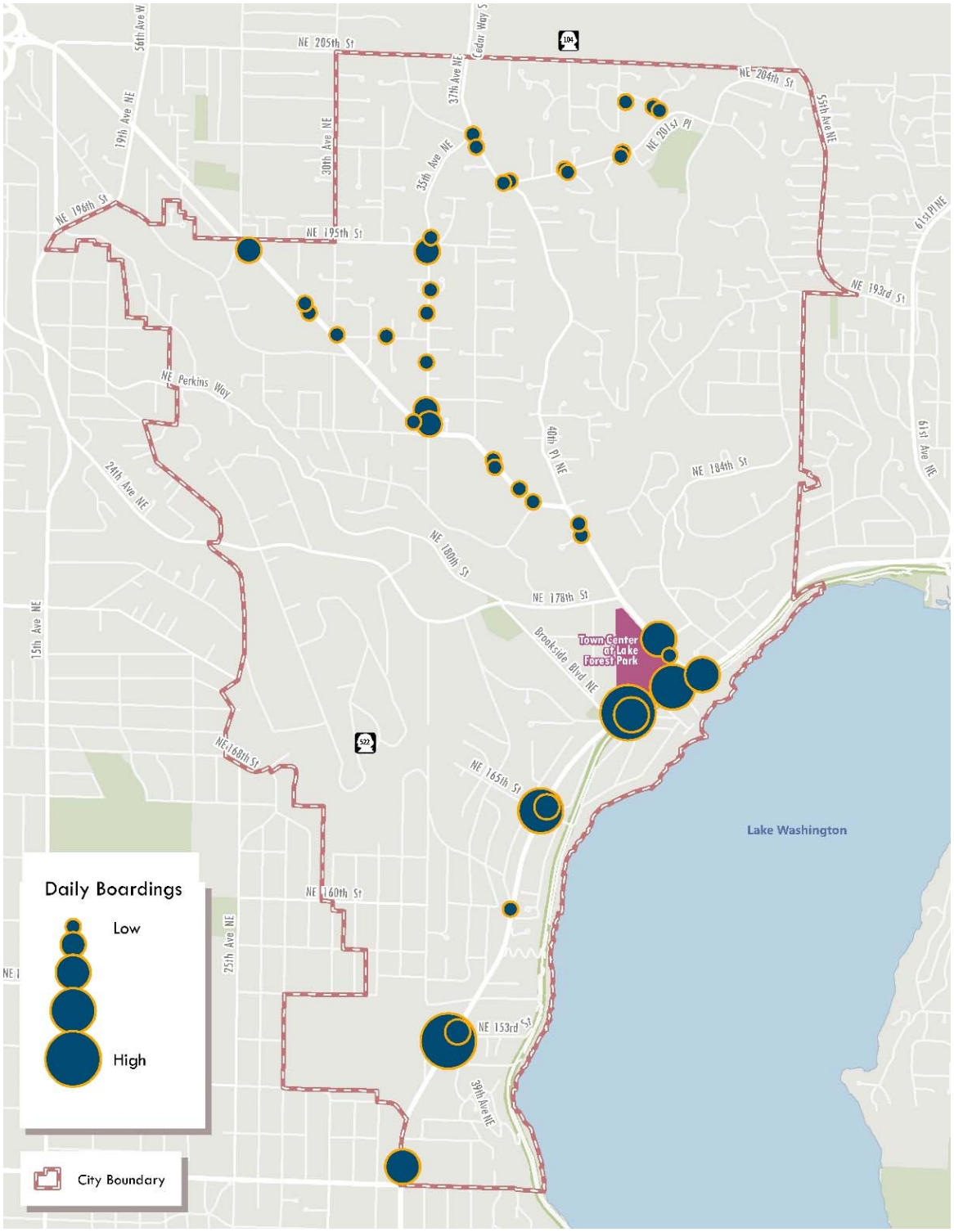


Figure 7. Average Daily Transit Stop Boardings

Source: King County Metro, Fehr & Peers, 2017.

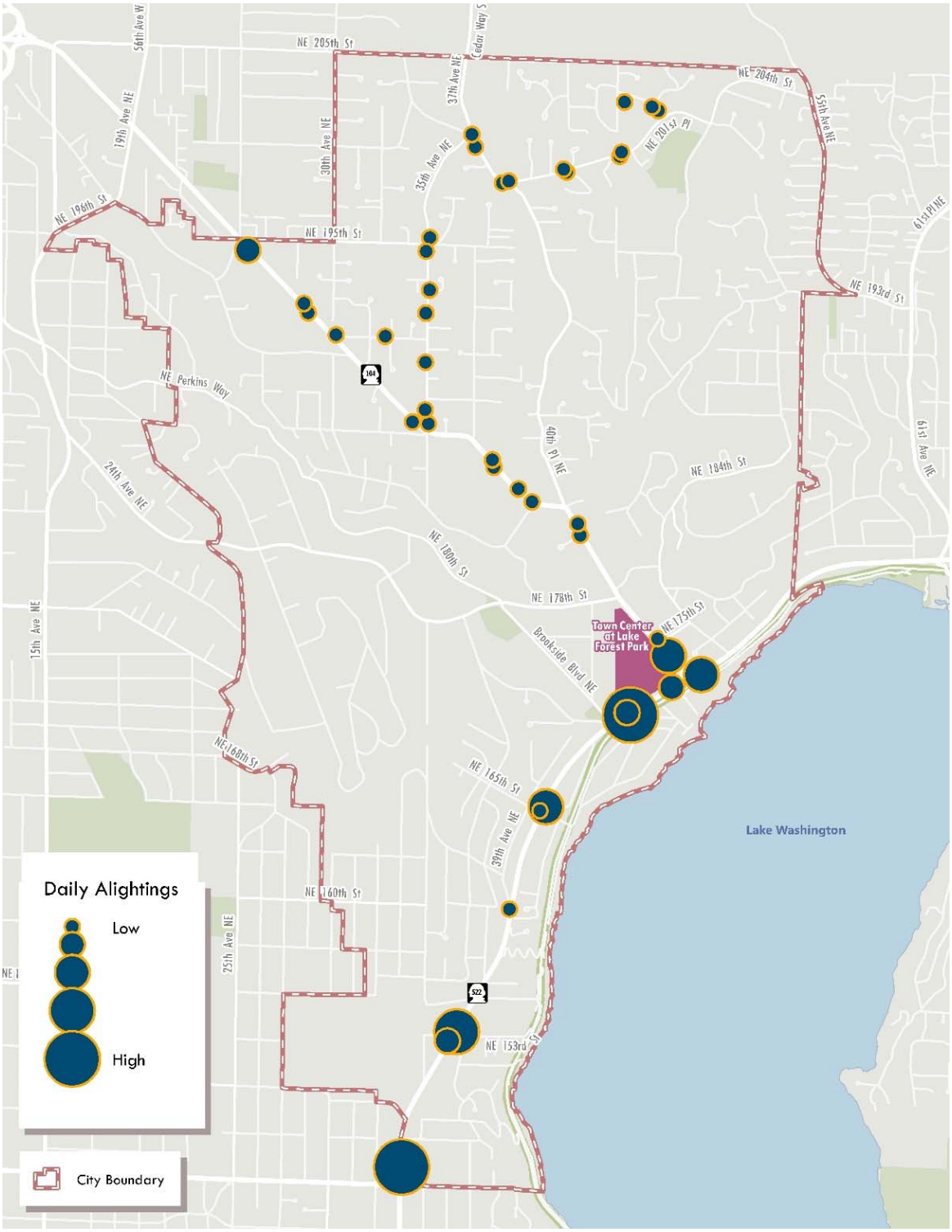


Figure 8. Average Daily Transit Stop Alightings

Source: King County Metro, Fehr & Peers, 2017.

Vehicle Operations

To evaluate vehicle operations along the two corridors, traffic counts were collected in early June 2017 before school let out for the summer. The counts included collection of traffic turning movements at study intersections identified by the study team and City Staff during the AM and PM peak hours, which included 7-9am and 4-6pm during the midweek (Tuesday through Thursday). These volumes were used to analyze the existing traffic operations within the corridor.

Vehicle operations were modeled in Synchro using Highway Capacity Manual 2000 (HCM 2000) methodologies. More current methods are available, however due to several study intersection having more than four legs, severe offsets, or unusual lane geometries that cannot be accurately modeled in later methods, the HCM 2000 was used for all study intersections to be consistent.

Future traffic volumes were forecasted for 2036 using a 0.5-percent growth rate, which corresponds to the expected growth shown in the Puget Sound Regional Council (PSRC) travel demand model. While traffic volumes increased quite a bit between 2011 and 2012 after SR 520 tolling started, traffic growth has since stabilized. Between 2012 and 2013, the traffic growth rate was about 1.5-percent, however, over the last five years (2012 to 2017) the average growth rate for in the corridor was about 0.5-percent, which corresponds to the expected growth in the PSRC model, and the assumptions made for this project.

Intersection operations today and forecast for 2036 are reported in the individual segment discussions later in this report. The Level of Service (LOS) of an intersection is reported from LOS A to LOS F, with A being free flow conditions and F being completely congested. The transportation element of the Lake Forest Park Comprehensive Plan states that the City will strive for a LOS D along SR 522 and LOS E along SR 104. Existing and forecasted 2036 turning movements for SR 522 are shown in **Figure 9** and **Figure 10.**

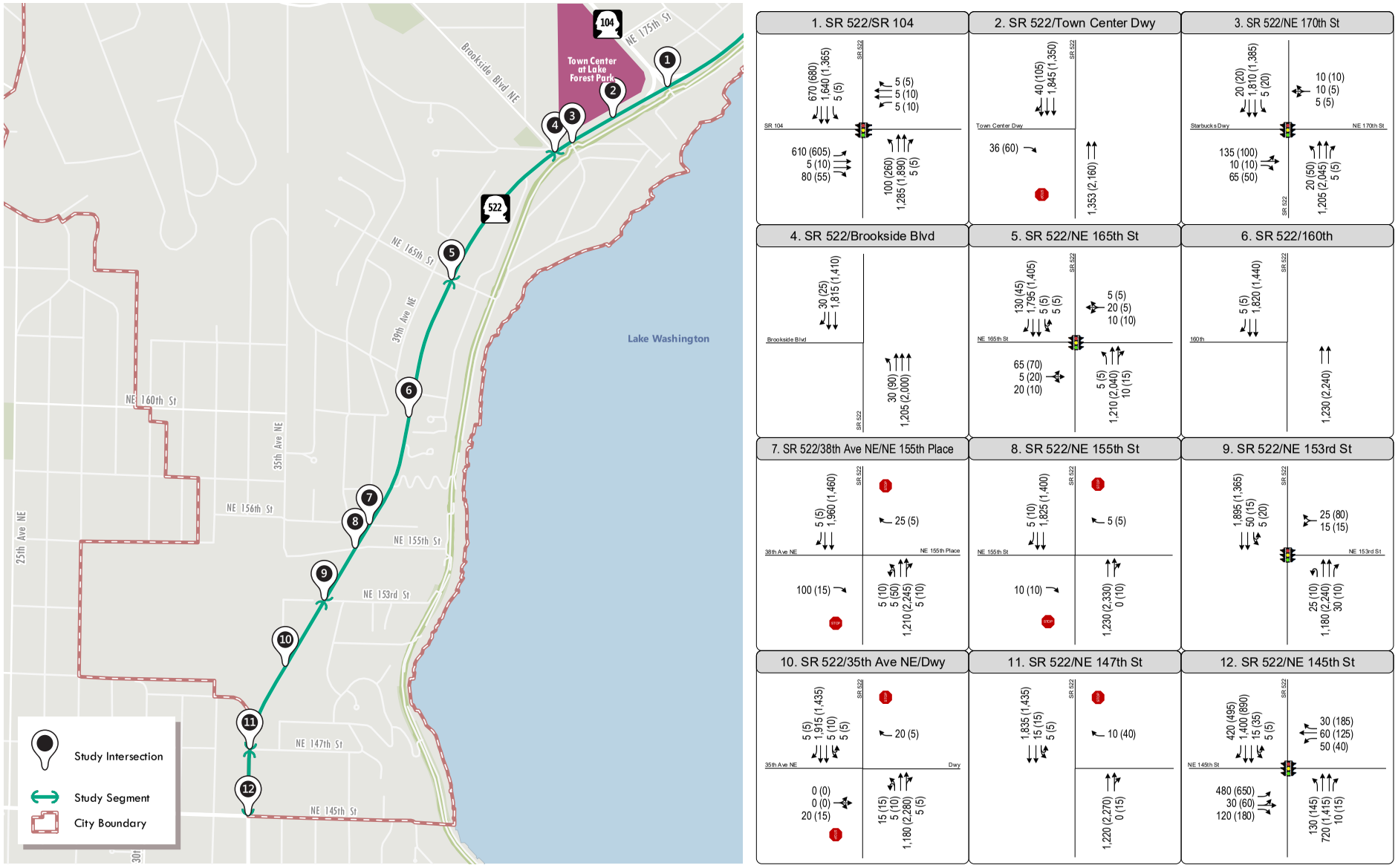
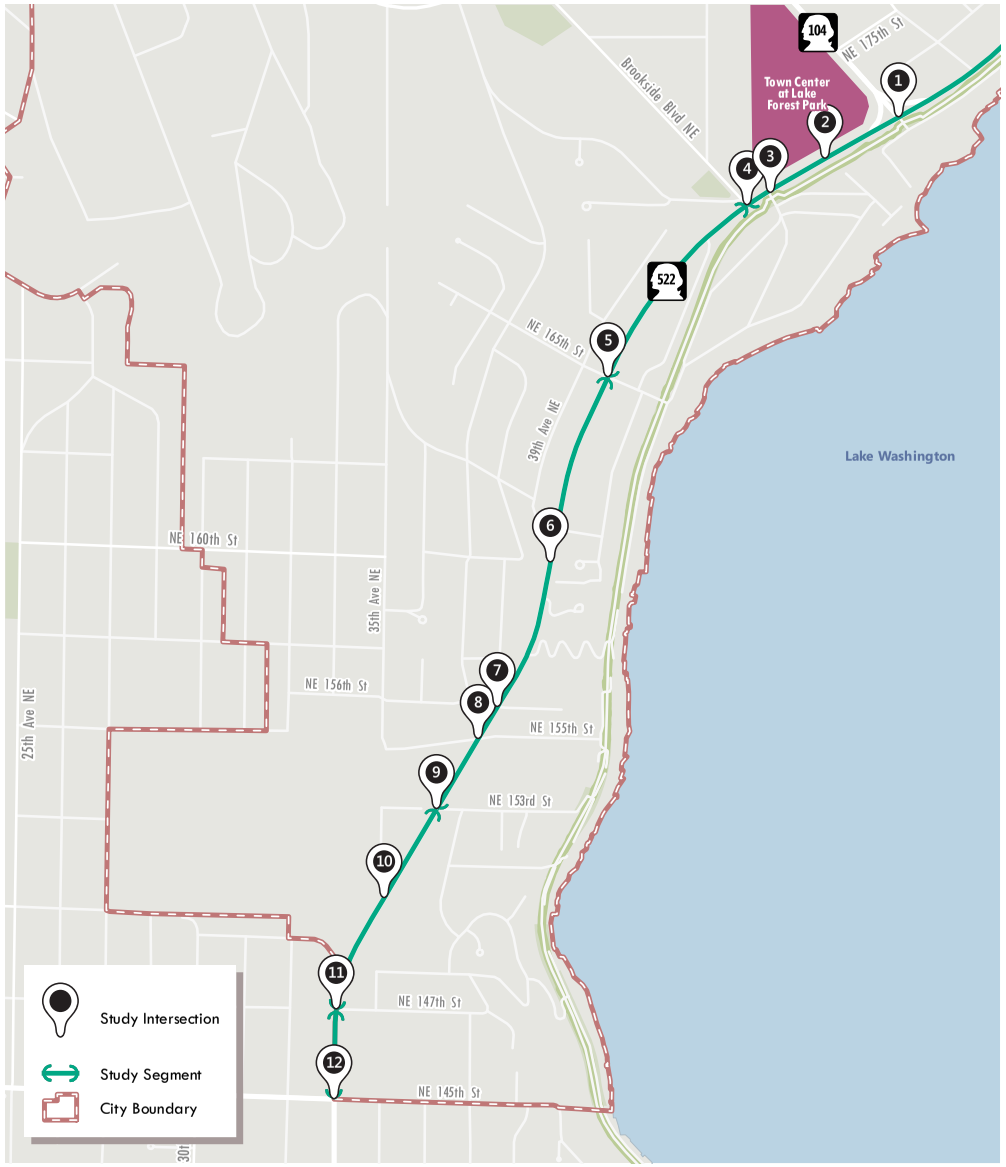


Figure 9
AM(PM) Peak Hour Volumes and Lane Configurations
Existing Conditions



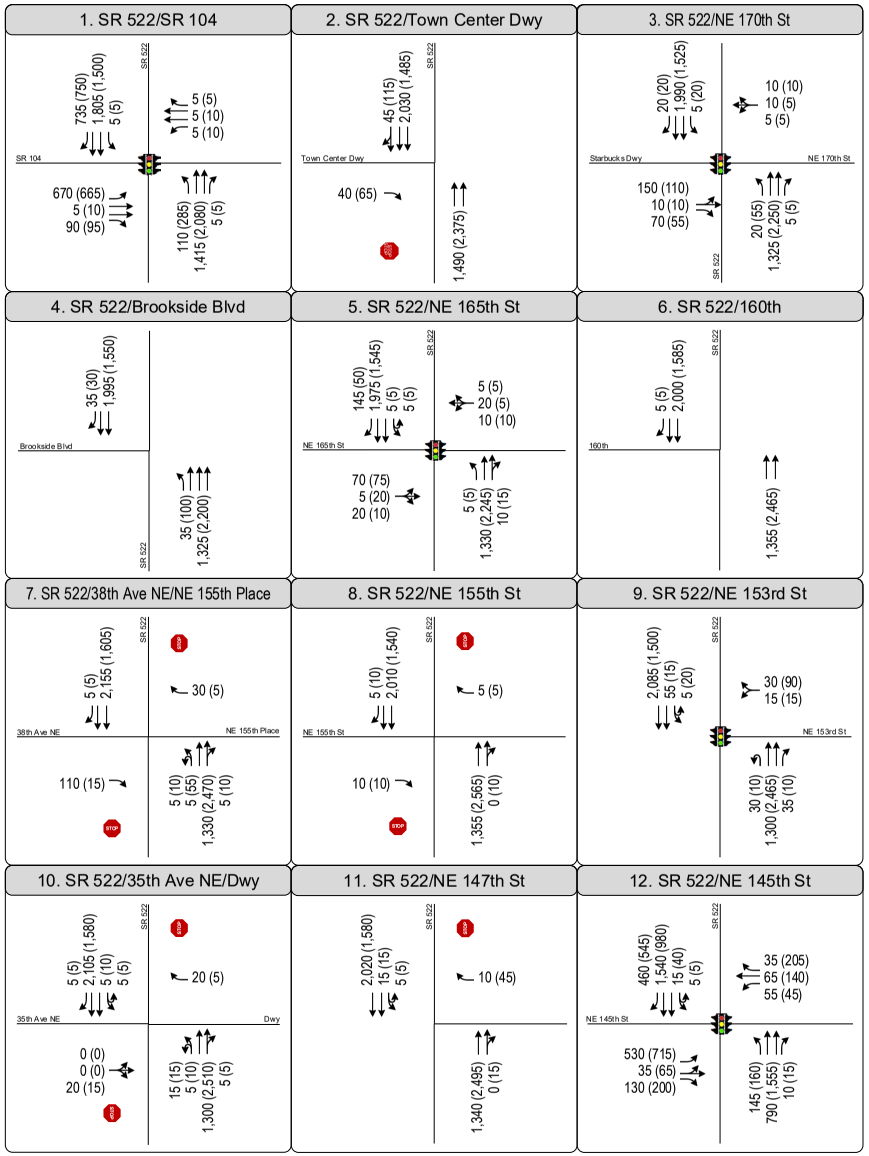


Figure 100
AM(PM) Peak Hour Volumes and Lane Configurations
Future (2036)

Safety/Collision Data

Collision data was collected for a three-year period (March 2014 to March 2017) along both corridors. A heat map of the number of collisions along both SR 522 and SR 104 corridors is in **Figure 11**. The collision history for specific segments is described later in this report.

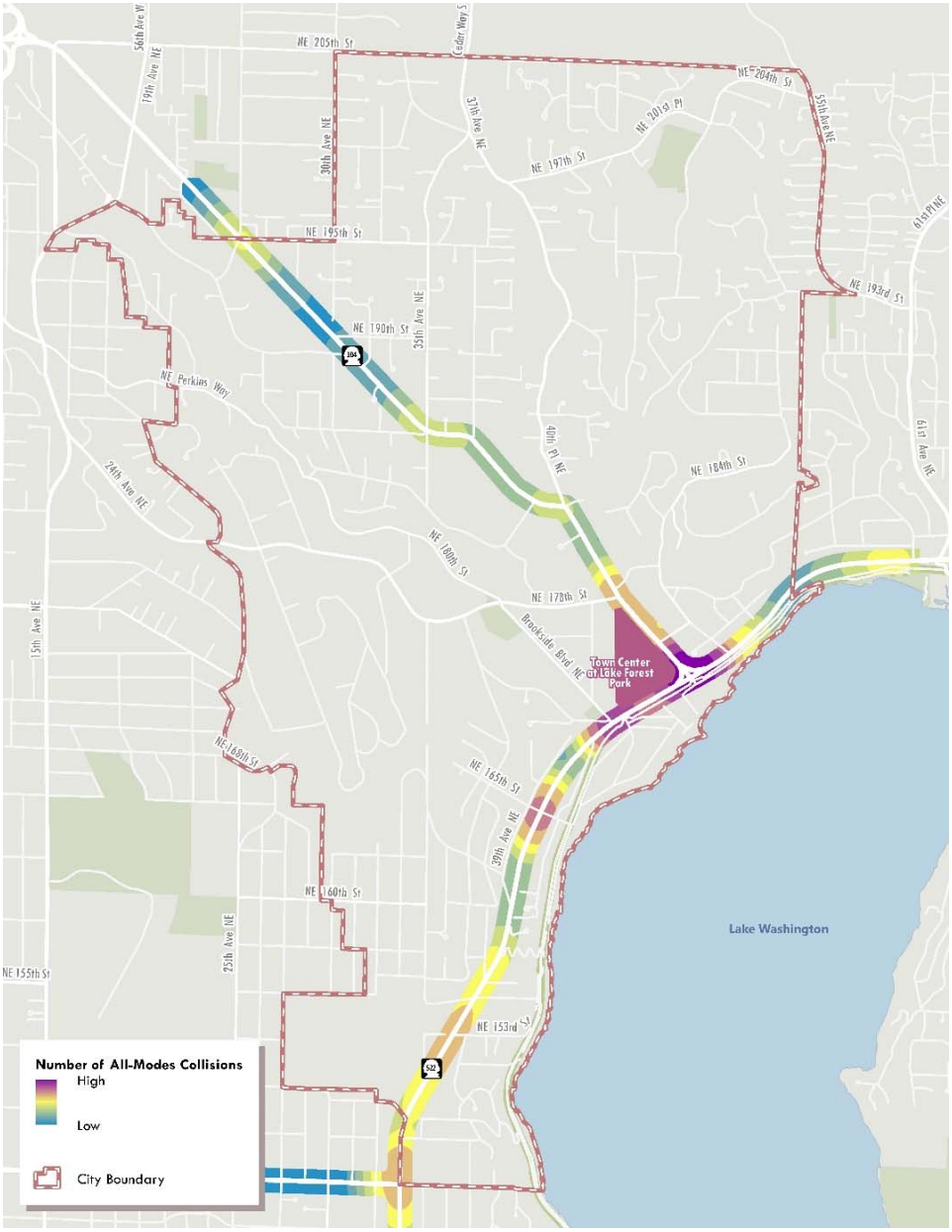


Figure 11. Three-year Collision History on SR 522 and SR 104

Source: Fehr & Peers, 2017.

Utilities, Stormwater, and Right-of-Way

Each segment area provides a description of utilities (location of utility poles and line types), stormwater collection and conveyance systems, and right-of-way considerations that will influence the feasibility of potential corridor treatments.

Town Center: Kenmore City Limits to Brookside

Context & Land Uses

This northeastern most segment of SR 522 begins at the Kenmore-Lake Forest Park border. Northeast of the SR 104 intersection, the corridor is surrounded by single-family neighborhoods that do not directly load onto the corridor.

Southwest of the SR 104 intersection, SR 522 is adjacent to the Town Center, the core retail hub of the City. This also serves as one of the major transit stops within the City, with routes that are destined for major centers like Downtown Seattle, UW Seattle, and UW Bothell. The Town Center is largely surrounded by surface parking. It has been reported that this surface parking serves as an unofficial park-and-ride for transit riders.

On the lakeside of the SR 522, there are two small businesses. Just beyond these buildings is the multi-use regional Burke-Gilman Trail.

Plans for the Town Center include addition of a park-and-ride structure with the addition of the new BRT route, as well as a branded BRT station.

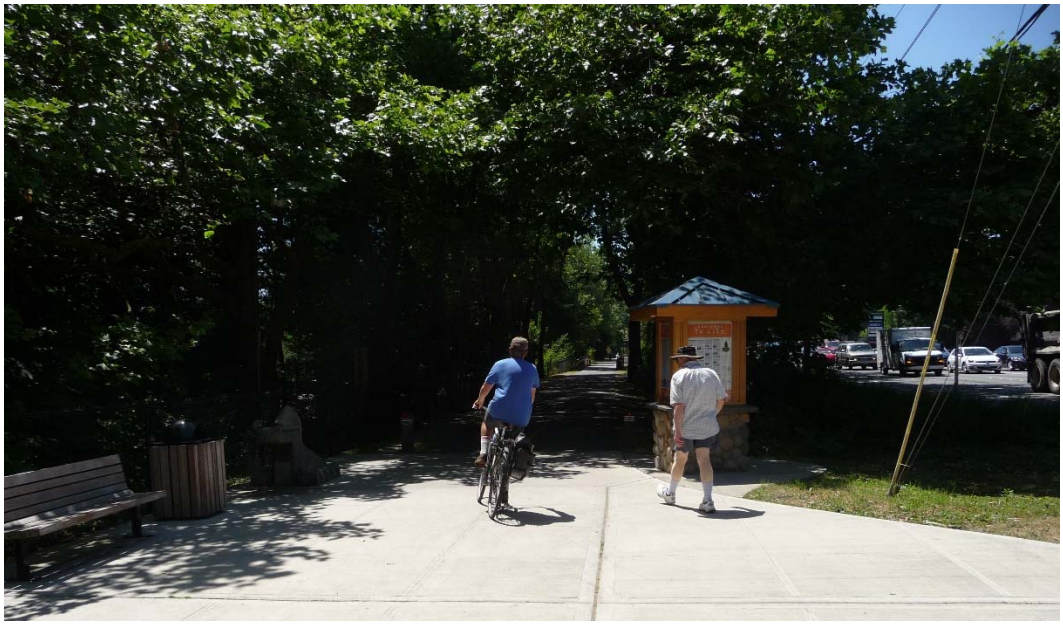
Pedestrian/Bike Amenities

Much of the pedestrian and bicycle travel in this corridor segment is on the adjacent multi-use Burke-Gilman Trail. While sidewalks exist in the residential Sheridan Beach neighborhood adjacent to the lake, There are few sidewalks on SR 522 to connect to, with a few exceptions of connections to a transit stop just north of the SR 104 intersection and just north of the NE 170th Street intersection.

Sidewalks exist on the Town Center side of SR 522 adjacent between SR 104 and NE 170th Street. There is no sidewalk or formal pedestrian pathway between NE 170th Street and Brookside Boulevard; however, a pedestrian could walk through the paved Arco Gas Station area.

In this segment, opportunities for pedestrian and bicyclists to cross SR 522 are at SR 104 (only the south side of the intersection) and at NE 170th Street (both sides of the intersection). The crosswalk on the lake side of SR 522 across NE 170th Street and at SR 104 serves as part of the Burke-Gilman Trail, so there can be high volumes of pedestrians and bicyclists. This trail extends north through Kenmore and Bothell, and connects to the

Lake Sammamish Trail. The trail extends south through various communities in Seattle including Seattle Children's Hospital, UW Seattle, Fremont, and Ballard.



Burke-Gilman Trail near SR 104.

Transit Service

This section of the corridor is served by four stops, two in each direction at either end of the Town Center. These stops serve about 800 riders per day, split evenly in each direction. The most frequently used stops are located just north of NE 170th Street. These stops are served by signalized pedestrian crossings at NE 170th Street and Ballinger Way (SR 104). All four stops are connected to sidewalks and include bus shelters.

The segment boardings and alightings are shown in **Table 1**.

Table 1. Town Center Boardings and Alightings

Stop Name	Total Daily Boardings	Total Daily Alightings
Bothell Way NE & Ballinger Way NE (SB)	114	33
Bothell Way NE & NE 170th Street (SB)	205	30
Bothell Way NE & NE 170th Street (NB)	37	253
Bothell Way NE & Ballinger Way NE (NB)	30	53
Segment Total	386	369

Source: King County Metro, Fehr & Peers, 2017.

Vehicle Operations

The street cross-section through this portion of the corridor varies between six and seven lanes, generally providing two general purpose travel lanes in each direction, dedicated bus lanes in both directions, and left-turn lane access at:

- SR 104 (Ballinger Way)
- NE 170th Street
- Brookside Boulevard NE

Table 2 summarizes operations at each of the study intersection in the segment during the AM and PM peak hours for both 2016 and 2036.

Table 2: Town Center Vehicle Level of Service and Delay

		AM				PM			
		Existing		Future		Existing		Future	
Intersection	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
SR 104 (Ballinger Way NE)	Signal	D	43	**E**	**59**	**E**	**65**	**F**	**86**
Town Center Driveway	TWSC	B	12	B	12	B	10	B	11
Brookside Blvd	TWSC	C	18	C	20	B	11	B	10

Source: Fehr & Peers, 2017. TWSC= two-way stop controlled intersection.

As the table shows, the SR 104 (Ballinger Way NE)/SR 522 (Bothell Way) intersection currently operates at below the City's LOS D standard during the PM peak hour. By 2036

AM peak hour operations are expected to degrade to LOS E ,and PM operations will further degrade to LOS F. All other intersections with the study area operate at LOS D or better.

Safety/Collision Data

Collision data was collected for a three-year period (March 2014 to March 2017). A heat map of the number of collisions along both SR 522 and SR 104 corridors is shown in **Figure 11**. The collision history for the study area is summarized below.

SR 104

- Average of 13 collisions per year; 40 collisions in the past three years
- 2 collisions involved a bicyclist. Both collisions had a vehicle making a northbound right turn failing to yield to the bicyclist.
- 1 collision involved a pedestrian, where the vehicle going northbound was distracted and failed to yield to the pedestrian.
- Majority of collisions were rear ends, followed by side-swipes from lane changes.

NE 170th Street

- Average of 12 collisions per year; 36 collisions in the past three years
- 2 collisions involved a bicyclist. One was due to bicyclist inattention; the other involved a vehicle that failed to yield when making a southbound right turn.
- 1 collision involved a pedestrian, where a vehicle making a southbound left turn failed to yield to a pedestrian.
- Approximately half of the collisions were rear-end collisions from following too closely/driver inattention.
- 8 collisions were due to making turns, 3 collisions were due to lane changes.

Brookside Boulevard

- Average of 2 collisions per year; 5 collisions in the past three years.
- 2 collisions were vehicles making a northbound left turn not yielding to oncoming cars.
- 1 collision was a rear end, and the other two collision were vehicles not yielding right-of-way while merging into traffic.

Utilities, Stormwater, and Right-of-Way

Utilities: The section of SR 522 from the Kenmore City Limits to Brookside has utility poles on the lake side of the road within the right-of-way, carrying both transmission, distributionand communication lines. The close proximity of the poles to the back of sidewalk and travel lanes is an important consideration with any widening towards the lake.

Stormwater: Recent development in this section includes storm water collection and conveyance with roadway widening to the west, with unimproved sheet flow to the east towards grass swales and ditches. Widening, as needed, will be to the east, likely including a tight line collection and conveyance system.

Right-of-Way: Right-of-way width along this section ranges from 103 to 120 feet. Established development at the shopping center and the presence of a stream paralleling the roadway on the west side of SR 522, will preclude substantial changes. In particular, there is one building housing Farmers Insurance on the east side that would be impacted by changes to the road prism or new transit amenities.

Town Center Key Findings

Segment Issues and Opportunities

- Town Center is the retail hub of the City, which will likely redevelop under the current owners.
- A new BRT station will be located here, along with a new park-and-ride within the Town Center.
- There are concerns that the Town Center parking lot serves as an unofficial park-and-ride; measures to encourage non-drive alone access to transit and protect parking for Town Center patrons would likely be needed.

- Sidewalks exist on west side of SR 522, adjacent to the Town Center.
- While there are sidewalks in the Sheridan Beach neighborhoods towards the lake, there are few sidewalks on the east side of SR 522 to connect with. Pedestrian and bicycle travel relies on the adjacent Burke-Gilman Trail.
- Signalized crossings of SR 522 are at SR 104 and at NE 170th Street. Both locations can be uncomfortable for pedestrians and cyclists due to high traffic volumes and width of SR 522.

- Stops have shelters and are connected to signalized crossings by sidewalks.
- Highest use stops within the corridor located at NE 170th Street with 525 riders per day.
- Two routes serve the area all day with 10 minute headways in the peak periods. Three additional routes provide peak direction service during the peak hour.

- The SR 104/SR 522 intersection currently operates as LOS E in the PM peak hour. Delays grow in the future with LOS E and F conditions in both peaks by 2036.
- All other intersections operate at LOS D or better.

- At SR 104 about half of collisions were rear-ends, followed by sideswipes from lane changes. 3 collisions involved a pedestrian or bicyclist where a turning vehicle failed to yield.
- At NE 170th Street, the majority of collisions were rear-ends. 3 collisions involved a pedestrian or cyclist, and 2 were turning vehicles failing to yield. The remainder of collisions were from vehicles turning and failing to yield.
- Brookside Boulevard had few collisions the past three years. This is likely because the City prohibited left turns to northbound SR 522 from Brookside Boulevard.

- Overhead utilities are located close to the east side of the road.
- Stormwater facilities are lacking on the east side of the road.
- Much of the right-of-way is used by existing development and roadway prism.

West of Town Center: Brookside to 165th

Context & Land Uses

This corridor segment is surrounded mostly by single-family homes with a handful of offices or neighborhood services, including a gas station near the Town Center. Attractions include the Sheridan Beach Club, which has a private beach and offers swimming lessons/water activities to members and nearby residents.

This segment of the corridor is challenging as many of the homes on the lake side of the corridor have their driveway access directly on SR 522. Any widening or changes to access on the road would need to consider how residential access would change. The west side of the corridor is mostly retaining walls, vegetation, and fences that delineate the residential homes that are higher elevated than the corridor. Any roadway widening on the west side of the road would need to cut into the hillside.

Pedestrian/Bike Amenities

There is one signalized pedestrian crossing of SR 522 at NE 165th Street. This crossing provides access to the Burke-Gilman Trail, the Sheridan Beach Club, and transit stops.

Pedestrian crossing and transit stop at NE 165th Street.

There are no pedestrian or bicycle facilities on this segment of SR 522. The one exception is a short sidewalk from NE 165th Street to transit stops just north of the intersection. Residents on the lake side of SR 522 generally use the Burke-Gilman Trail for trips on foot or by bicycles. Residents on the west side of SR 522 likely use lower volume residential streets that run parallel to SR 522 to access the Town Center by walking; however, there is no direct route. One observation made is that a walking path exists from the 39th Avenue NE cul-de-sac to SR 522 exiting northbound to a paved commercial lot with no sidewalks. See **Figure 12**.

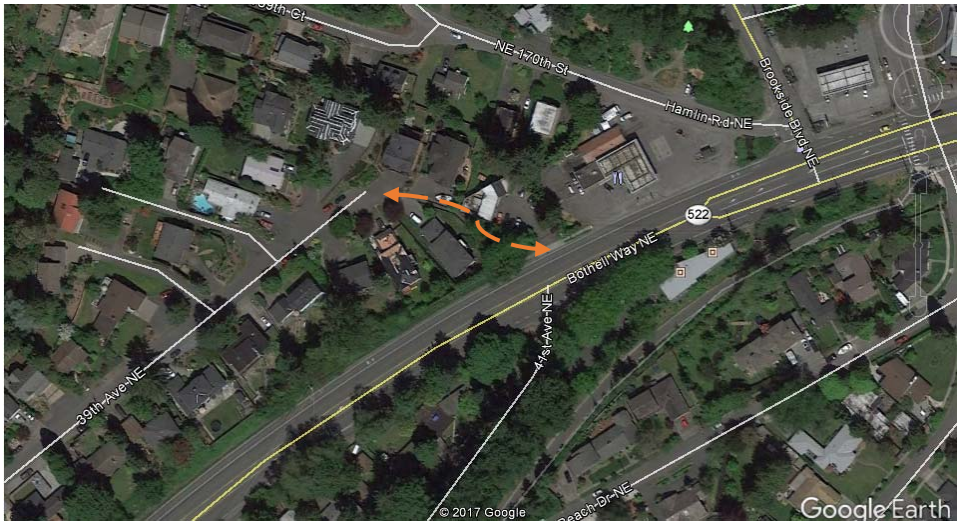


Figure 12. Walking Path on West Side of SR 522.

Source: Google Earth, 2017.

Along this segment, the west side of SR 522 is mostly vegetation, fencing, and retaining walls for residential homes that are at a higher elevation than SR 522. The east side of SR 522 has numerous driveways to access residential homes adjacent to SR 522. Along portions of SR 522, residents park vehicles on the gravel paths adjacent to the SR 522 shoulder.

There are no bicycle facilities on this segment. Bicyclists would likely navigate through one of the side streets to access the Burke-Gilman Trail.

Transit Service

This portion of the corridor is served by two stops, one in each direction located at NE 165th Street. The stops serve approximately 180 riders per day. They are served by a signalized pedestrian crossing at NE 165th Street. Both stops are connected by sidewalks

to the signal and the have side street access to the neighborhoods. The southbound stop includes a bus shelter.

The segment boardings and alightings are shown in **Table 3.**

Table 3: West of Town Center Transit Boardings and Alightings

Stop Name	Total Daily Boardings	Total Daily Alightings
Bothell Way NE & NE 165th St (SB)	11	77
Bothell Way NE & NE 165th St (NB)	83	7
Segment Total	94	84

Source: King County Metro, Fehr & Peers, 2017.

Vehicle Operations

The street cross-section through this segment varies between six and seven lanes, generally providing two general purpose travel lanes in each direction, dedicated bus lanes in both directions, and a two-way left turn lane that provides left-turn access to driveways and side streets throughout the segment. Dedicated left-turn lanes are provided at the signalized intersection of NE 165th Street.

Table 4 summarizes operations at each of the study intersections in the segment during the AM and PM peak hours for both 2016 and 2036.

Table 4: West of Town Center Vehicle Level of Service and Delay

		AM				PM			
		Existing		Future		Existing		Future	
Intersection	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
Brookside Blvd	TWSC	C	18	C	20	B	11	B	10
Beach Dr/NE 170th St	Signal	B	19	C	23	B	19	C	23
NE 165th St	Signal	B	17	B	20	B	16	B	19

Source: Fehr & Peers, 2017.

All intersections within this segment operate at a LOS D or better. Large queues propagate on SR 522 during the peak hours. In the AM peak hour, traffic queues mostly

in the southbound direction, while traffic queues mostly in the northbound direction during the PM peak hour. These queues limit the amount of traffic served at the intersections due to the constraints of upstream signals in any direction.

Safety/Collision Data

Collision data was collected for a three-year period (March 2014 to March 2017). The collision history for the study area is summarized below.

NE 165th Street Area

- Average of 9 collisions per year; 25 collisions in the past 3 years.
- More than half of the collisions were rear-ends, 6 collisions were making left turns.
- Since bike and pedestrian travel is concentrated along the Burke-Gilman Trail, no collisions involved a pedestrian or cyclist along SR 522. However, a recent incident involved a cyclist not yielding to a pedestrian at a crosswalk on the Burke-Gilman Trail at NE 165th Street.

Utilities, Stormwater, and Right-of-Way

Utilities: The section of SR 522 from Brookside to NE 165th Street includes overhead utility poles on the east side of the road quickly shift to the west side south of Brookside Boulevard and back to the east side approximately two blocks north of NE 165th Street. Within the right-of-way the overhead poles carry both transmission and distribution lines, as well as communication lines. The poles are located alternately in front of residential fencing,at the back of guardrail, and at the edge of the road shoulder. Clear zone with widening is an important consideration. Overhead lines are damaged by high winds due to downed trees occasionally during the fall and winter occasionally.

Stormwater: Extruded asphalt curb (without sidewalks) on both sides of the road create a limited stormwater collection and conveyance system. Widening, as needed, will include an improved tight line collection and conveyance system and water quality treatment.

Right-of-Way: Right-of-way width along this section is typically 100 feet. On the west side there are sections with rockeries that will be affected with widening. On the lake side, existing driveways and parallel parking (on the shoulder) will be key elements to consider with widening towards the east. There are also some locations where garbage is collected on a weekly basis.

West of Town Center Key Findings

Segment Issues and Opportunities

- Residential homes on the lake side of SR 522 have driveway access directly onto SR 522. The west side is mostly retaining walls and is not accessible.
- Main attractions include the Town Center, and the Sheridan Beach Club and Burke-Gilman Trail, which are accessible only at NE 165th Street.

- There are no pedestrian or bicycle facilities along SR 522. Most pedestrian and bicycle travel would need to occur on the Burke-Gilman Trail or parallel residential streets.
- Some homes have a paved or gravel pathway alongside SR 522, which are used to access mailboxes, garbage pick-up, or parking.
- A signalized crossing exists at NE 165th Street.

- The stops are located at NE 165th Street and serve approximately 180 daily riders.
- Both stops have shelters and signalized crosswalks serving them.
- The stops are connected to the side streets by sidewalks.

- All approaches operate at LOS D or better under existing and future conditions.
- Traffic volumes are limited due the capacity constraints at upstream signals.

- Near the 165th Street area, the majority of collisions were rear ends, followed by vehicles making a left turn.
- No collisions involved a pedestrian or cyclist, however a recent incident involved a cyclist not yielding to a pedestrian at a crosswalk at the nearby Burke-Gilman Trail.

- Overhead utilities are located close to the side of the road with clear zone requirements important for any options.
- Stormwater collection is limited to extruded curbs and shoulder collection.
- Right-of-way issues include driveways, shoulder parking, mailboxes and garbage collection (on the lake side) and rockeries (on the west).

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Sheridan Beach/Sheridan Heights: 165th to 153rd

Context & Land Uses

Similar to the previous segment to the north, the surrounding land use on SR 522 is mostly single-family homes. The west side of the corridor is a continuation of retaining wall, fence, and vegetation to separate elevated homes from the study corridor. This changes south of NE 157th Place with multi-family housing. The lake side of SR 522 has homes with driveway access directly onto SR 522. At portions of the corridor there is gravel or paved asphalt just beyond the corridor shoulder where some residents park cars, have mailboxes, and have garbage picked up. The City's comprehensive plan expects this single-family residential zoning to remain the same in the future.

Pedestrian/Bike Amenities

There are no pedestrian sidewalks on SR 522 in this segment of the corridor from NE 165th Street to 38th Avenue NE. The west side of SR 522 is mostly retaining wall, vegetation and fences that separate the higher elevated residential homes from SR 522. There is a short paved walkway on the west side of SR 522 from 39th Street to access the southbound transit stop.

The lake side of SR 522 has numerous driveways to residential homes. At some locations, there is a small raised asphalt separator between the edge of the road and the driveways. There is no continuous walking path for pedestrians through the segment; however, residents do walk on some paved asphalt or gravel shoulder just outside of the SR 522 road to access mailboxes.

South of 38th Avenue NE along the remainder of the segment, the corridor becomes more walkable with sidewalks on both sides of the street. SR 522 has one signalized pedestrian crossing at NE 153rd Street.

There are no bicycle facilities on this segment. Bicyclists likely navigate through one of the side streets to access the Burke-Gilman Trail.

Transit Service

The Sheridan Heights area is served by three stops, one in each direction located at just north of NE 153rd Street and one southbound stop located at 39th Avenue NE. The stops serve approximately 310 riders per day, with the stop at 39th Avenue NE only serving five daily riders.

The stops at NE 153rd Street are served by a signalized crosswalk and sidewalks connect them to side street pedestrian facilities. Both stops also have shelters and illumination from the adjacent signal.

There are no pedestrian crossings of SR 522 near the 39th Avenue NE stop; however sidewalks along 39th Avenue NE and a staircase up the hill from SR 522 connect the stop to pedestrian facilities in the neighborhood. The stop has no shelters or illumination.

The segment boardings and alightings are shown in **Table 5.**

Table 5: Sheridan Beach/Sheridan Heights Transit Boardings and Alightings

Stop Name	Average Daily Boardings	Average Daily Alightings
Bothell Way NE & 39th Ave NE (SB)	4	2
Bothell Way NE & NE 153rd St (SB)	152	20
Bothell Way NE & NE 153rd St (NB)	18	117
Segment Total	174	138

Source: King County Metro, Fehr & Peers, 2017.

Vehicle Operations

The street cross-section through this portion of the corridor varies between five and six lanes generally providing two general purpose travel lanes in each direction, a southbound dedicated bus lane, and a two-way left turn lane turn lanes providing left-turn access at driveways and side street throughout the segment. Dedicated left-turn lanes are provided at:

- 38th Avenue NE (northbound only)
- NE 153rd Street

The LOS for the study intersections is shown in **Table 6.**

Table 6: Sheridan Heights Vehicle Level of Service and Delay

		AM				PM			
		Existing		Future		Existing		Future	
Intersection	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
NE 165th St	Signal	B	17	B	20	B	16	B	19
NE 153rd Street	Signal	C	25	C	30	C	33	**E**	**56**
NE 155th Street	TWSC	C	20	C	23	C	16	C	17
38th Avenue NE	TWSC	**E**	**37**	**F**	**54**	C	16	C	18
NE 155th Place	TWSC	C	20	C	23	C	16	C	17
39th Ave NE	TWSC	B	12	C	16	C	15	C	17

Source: Fehr & Peers, 2017.

The intersection of SR 522/38th Avenue NE operates at a LOS E in the PM peak hour with AM operations expected to degrade to a LOS F by 2036. This intersection is side street stop controlled. The reported delays represents the difficulty for neighborhood residents entering SR 522 in the morning.

During the peak hours large queues propagate on SR 522. In the AM peak hour, traffic queues mostly in the southbound direction, while traffic queues mostly in the northbound direction during the PM peak hour. These queues limit the amount of traffic served at the intersections, due to the constraints of upstream signals in any direction.

The intersection of SR 522/NE 153rd Street degrades to LOS E during the PM peak hour in 2036. The increase in delay is caused by the increase in through traffic demand on SR 522.

Safety/Collision Data

Collision data was collected for a three-year period (March 2014 to March 2017). The collision history for the study area is summarized below.

Between 165th to 153rd Street Area

- 2 collisions involved a bicyclist, where a vehicle was turning. No additional information was provided.
- 1/3 of the collisions (10) involved left or right turning movements.

NE 153rd Street Area

- Average of 7 collisions per year; 22 collisions in the past three years.

- No collisions involved a pedestrian or cyclist.
- More than half of the collisions were rear-ends, followed by 4 collisions for turning vehicles, and 4 collisions during lane changes.

Utilities, Stormwater, Right-of-Way

Utilities: This segment of SR 522 includes a section from NE 165th to NE 160th Street without overhead poles directly in the vicinity of the road prism. Overhead poles exist on the east side at 160th Street transitioning to the west side at NE 156th Street and continue up to NE 153rd Street. The overhead poles carry both transmission and distribution lines, as well as communication lines. Some additional distribution poles are on the east side from NE 156th Street to NE 153rd Street. The poles are located in front of residential fencing in some sections, and at the edge of shoulder in other cases. Clear zone with widening is an important consideration. Overhead lines are damaged by high winds from downed trees during the fall and winter occasionally.

Stormwater: Extruded asphalt curb (without sidewalks) or shoulder collection on both sides of the road between NE 165th and NE 156th Street create a limited stormwater collection and conveyance system. Widening, as needed, will include an improved water quality treatment system and tight line collection and conveyance system, such as what exists between NE 156th and NE 153rd Street.

Right-of-Way: Right-of-way width along this section ranges from 80 to 100 feet. On the west side there are sections with rockeries and retaining walls (from NE 153rd to NE 155th Street) that will be affected with widening. On the lake side, existing (steep) driveways and fencing, parallel parking (on the shoulder), and guardrail will be key elements to consider with widening towards the east. There are also some locations housing garbage cans on a weekly basis. Multi-housing residential units and some commercial establishments (Sheridan Market) exist on the east side between NE 156th to NE 153rd Street. These establishments limit widening opportunities.

Sheridan Beach/Sheridan Heights Key Findings

Segment Issues and Opportunities

- Surrounding land use north of NE 157th Place is single-family homes. South of NE 157th Place, it transitions to multi-family homes. This is expected to remain the same in the future.
- The west side of the corridor is mostly retaining wall with few access points for pedestrians or vehicles. The east side of the road has direct driveway access to homes.
- Widening of the roadway either would encroach on residential properties on the lake side, or would require cutting into the hillside on the west side of SR 522.

- North of 38th Avenue NE, there are no sidewalks on either side of the road, except for a short paved connection from 39th Avenue NE to a southbound transit stop.
- South of 38th Avenue NE there are sidewalks on both sides of the road. There is one signalized crossing at NE 153rd Street.
- There are no bicycle facilities on this segment. Bicyclists likely navigate through side streets and challenging steep grades to access the Burke-Gilman Trail.

- The stops serve approximately 310 riders, with the majority at NE 153rd Street.
- Stops at NE 153rd Street have shelters and signalized crosswalks serving them.
- The stop at 39th Avenue NE is connected to the neighborhood via sidewalk and staircase.

- The side street stop controlled intersection at 38th Avenue NE operates at LOS E and F during the morning peak hour and is expected to degrade to LOS F in the future.
- The signalized intersection of NE 153rd Street is expected to degrade to LOS E during PM peak hour in 2036 due to increase through traffic demand.
- Traffic volumes are limited due the capacity constraints at upstream signals.

- Between NE 165th and NE 153rd Streets, half the collisions were rear-ends, followed by vehicles making improper left/right turns. 2 collisions involved a bicyclist with a turning vehicle.
- Near NE 153rd Street, no pedestrian or bicycle collisions were reported. Half the collisions were rear ends, followed by collisions from improper turns and improper lane changes.

- Overhead utilities are located close to the side of the road with clear zone requirements important for any options.
- Stormwater collection is limited to extruded curbs and shoulder collection between NE 165th and NE 156th Streets.

- Right-of-way issues include driveways, shoulder parking, mailboxes and garbage collection (on the lake side) and rockeries and retaining walls (on the west). Multi-family housing and some commercial establishments limit widening to the east near 153rd Street.

Transition Zone: 153rd to 147th

Context & Land Uses

This segment is a mixture of office, retail, and high density multi-family housing, and also includes the Acacia Cemetery. Access to housing is more consolidated with most driveways limited to right-in, right-out only. Some buildings on the east side of SR 522 are right up to the back of sidewalks, which can provide challenges if the roadway is widened for a BAT lane. Other buildings have surface parking between the corridor and the building.

Pedestrian/Bike Amenities

Sidewalks continue on both sides of the corridor through this segment. There is one parcel on the lake side of SR 522 where sidewalks are narrow just north of NE 147th Street. While sidewalks are available, the pedestrian experience may be lacking, as sidewalks are right next to the travel lanes.

There are no bicycle facilities on this segment. Bicyclists would likely navigate through side streets and extreme elevation change to access the Burke-Gilman Trail.

Transit Service

There are no transit stops in this area.

Vehicle Operations

The street cross-section through this segment of the corridor varies between five and six lanes, generally providing two general purpose travel lanes in each direction, a dedicated southbound bus lane, with a landscaped median controlling side street access. A dedicated northbound U-turn lane is provided at the signalized intersection of NE 153rd Street. Left-turn lanes are provided at:

- 35th Avenue NE
- NE 147th Street

The LOS for the study intersections is shown in **Table 7.**

Table 7: Transition Zone Vehicle Level of Service and Delay

		AM				PM			
		Existing		Future		Existing		Future	
Intersection	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
NE 153rd Street	Signal	C	20	C	23	C	16	C	17
35th Avenue NE	TWSC	C	16	C	16	D	27	D	33
NE 147th Street	TWSC	B	11	B	11	D	32	**E**	**49**

Source: Fehr & Peers, 2017.

The intersection at NE 147th Street is side street stop controlled and is expected to degrade to a LOS E during the PM peak hour in 2036. This is due to traffic congestion and queues on SR 522 in the northbound direction during the PM peak hour. These queues limit the amount of traffic served at the intersections, due to the constraints of upstream signals in any direction.

Safety/Collision Data

Collision data was collected for a three-year period (March 2014 to March 2017). The collision history for the study area is summarized below.

Between NE 153rd and NE 147th Street

- No collisions involved a pedestrian or cyclist.
- Majority of collisions (10) were rear ends. 4 collisions were from making improper left or right turns

NE 147th Street

- Average of 3 collisions per year; 9 collisions the past three years.
- More than half the collisions were rear-ends; the remainder were due to improper lane changes.
- No collisions involved a pedestrian or cyclist.

Utilities, Stormwater, and Right-of-Way

Utilities: This segment through the transition zone between NE 153rd and NE 147th Streets has overhead poles on the west side behind the sidewalk. The overhead poles carry both transmission and distribution lines, as well as communication lines. Some

additional distribution poles are on the east side of the road between NE 153rd and NE 147th Street to serve multi-family housing and commercial establishments.

Stormwater: On both sides of the roadway, stormwater collection and conveyance is at the gutter line. Widening to either side will require modification of this existing stormwater system.

Right-of-Way: Right-of-way width along this section is typically 90 feet. The section is well developed with a mixture of multi-family housing and commercial establishments. In addition, there is the existing cemetery on the west side of the road at NE 149th Street. Options for widening in this section are limited without acquiring substantial right-of-way.

Transition Zone Key Findings

Segment Issues and Opportunities

- Land use transitions to higher density multi-family housing, and lower density retail and business offices (land use was revised in 2015 with the Southern Gateway study). Many driveways are consolidated and are right-in, right-out only.
- Some buildings on the east side are adjacent to sidewalks, which can be challenging if the roadway is widened.

- Sidewalks exist on both sides of the corridor through the segment. One signalized pedestrian crossing exists at NE 153rd Street.
- The pedestrian experience may be lacking as sidewalks are right next to travel lanes.
- There are no bicycle facilities on this corridor. Bicyclists would need to navigate through side streets and steep grades to access the Burke-Gilman Trail.

- There are no transit stops in this segment

- All intersections operate at LOS D or better today.
- Under future conditions, side street delay at NE 147th Street NE may decline to LOS E due to PM peak congestion on SR 522.

- Between NE 153rd and NE 147th Streets, the majority of collisions were rear-ends, followed by improper left or right turns. No collision involved a pedestrian or cyclist.
- Near NE 147th Street, more than half the collisions were rear-ends; the remainder were due to improper lane changes.
- No collisions involved a pedestrian or cyclist.

- Overhead utilities are located behind existing sidewalk.
- Stormwater collection and conveyance is well established with the current development. Widening will require modification of the existing system.
- Right-of-way issues include established multi-family housing and commercial establishments which limit widening in this section.

Southend Area: 147th to 145th

Context & Land Uses

This last segment of the corridor is mostly auto-centric commercial retail with surface parking lots. Most businesses are right-in, right-out access as there is a median. The NE 145th Street (also known as SR 523) intersection has high traffic volumes as it is the intersection of two state routes, and 145th Street provides access to I-5 for more regional trips. It also is complex with the number of jurisdictions involved. It's a state route at the borders of Shoreline, Seattle, and Lake Forest Park, with King County overseeing a portion of it as well.

While the location is constrained for auto travel, this area will be the future site of a Sound Transit BRT station. It is expected that transit riders will be drawn to this location to board the new BRT route to transfer to the future Link Light Rail station near I-5. Agencies have stated that prioritization should be given to transit vehicles, with improved non-motorized connections.

Pedestrian/Bike Amenities

There are sidewalks on both sides of the corridor. A signalized crossing of SR 522 is at NE 145th Street. It has been reported that the very wide crossing(6 to 7 lanes)is uncomfortable for non-motorized users.

There are no bicycle facilities on this segment. Bicyclists likely navigate through side streets and steep grades to access the Burke-Gilman Trail.

Transit Service

A single stop exists within this segment, north of NE 145th Street. Approximately 410 riders use the stop per day, with a majority going northbound. It is expected that a similar volume of riders appear on the southbound stop just south of NE 145th Street, outside of the study area of this project.

The stop is connected to the signalized crossing at NE 145th Street by sidewalks along SR 522. The stop also has a shelter. SR 522 is lit via illumination mounted on utility poles along the west side of the street, but there is no transit specific illumination at the stop.

The segment boardings and alightings are shown in **Table 8**.

Table 8: Southend Area Transit Boardings and Alightings

Stop Name	Average Daily Boardings	Average Daily Alightings
Bothell Way NE & NE 145th St (NB)	57	350
Segment Total	57	350

Source: King County Metro, Fehr & Peers, 2017.

Vehicle Operations

The street cross-section through this portion of the corridor varies between five and six lanes, generally providing two general purpose travel lanes in each direction, a dedicated southbound bus lane, with a landscaped median controlling side street access. A dedicated northbound U-turn lane is provided at the signalized intersection of NE 153rd Street. Left-turn lanes are provided at:

- NE 147th Street
- NE 145th Street

The LOS for the study intersections is shown in **Table 9.**

Table 9: Southend Area Vehicle Level of Service and Delay

		AM				PM			
		Existing		Future		Existing		Future	
Intersection	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
NE 147th Street	TWSC	B	11	B	11	D	32	**E**	**49**
NE 145th Street (SR 523)	Signal	D	43	**E**	**67**	D	54	**E**	**73**

Source: Fehr & Peers, 2017.

While the NE 145th Street intersection currently operates at LOS D, it is expected to operate at LOS E during both peaks in 2036. Additional improvements are expected to improve the LOS at the intersection and to increase capacity to and from the planned transit station accessed via NE 145th Street near I-5.

The intersection at NE 147th Street is side street stop controlled and is also expected to degrade to a LOS E during the PM peak hour in 2036. This is due to traffic congestion and queues on SR 522 in the northbound direction during the PM peak hour. These queues

limit the amount of traffic served at the intersections, due to the constraints of upstream signals in any direction.

Safety/Collision Data

Collision data was collected for a three-year period (March 2014 to March 2017). The collision history for the study area is summarized below.

145th Street

- Average of 8 collisions per year; 22 collisions the past three years.
- 1 collision involved a bicyclist, where a vehicle making a right turn did not yield to the bicyclist
- About 1/3 of collisions were rear ends with the remainder of the collisions related to lane changes or improper turns.

Utilities, Stormwater, and Right-of-Way

Utilities: This segment includes overhead poles on the west side within or behind the sidewalk. The overhead poles carry both transmission and distribution lines, as well as communication lines. Widening will need to address clear zone issues. There are a few poles on the lake side of the road with distribution to commercial establishments.

Stormwater: On both sides of the roadway, stormwater collection and conveyance is at the gutter line. Widening to either side will require modification of this existing stormwater system.

Right-of-Way: Right-of-way width along this section is typically 90 feet. The section is well developed with commercial establishments. Options for widening in this section are limited without substantial right-of-way and (potentially) access impacts.

Southend Area Key Findings

Segment Issues and Opportunities

- Mostly auto-centric businesses along the corridor.
- Intersection with NE 145th Street is very busy, and will continue to be in the future as it is a planned BRT station.
- This is a complex intersection that requires coordination with many jurisdictions.

- Sidewalks exist on both sides of the corridor.
- There is one signalized crossing at NE 145th Street. This can be unpleasant as the crossing distance is 6 to 7 travel lanes wide.
- There are no bicycle facilities on this segment.

- The area is served by a single northbound stop at NE 145th Street, which serves approximately 410 riders per day. The associated southbound stop is located south of NE 145th Street.
- The stop is connected to the signalized intersection via sidewalks on SR 522.
- The stop has a shelter but no pedestrian level illumination is provided.

- NE 145th Street/SR 522 (Bothell Way) is expected to operate at LOS E without any improvements.
- Improvements are planned for the intersection to increase the capacity to and from the planned future transit station north of NE 145th Street and I-5.
- The NE 147th Street intersection is side street stop controlled and is expected see higher side street delays (LOS E) in 2036.

- Near the 145th Street, 1 collision involved a bicyclist where a right-turning vehicle did not yield to the bicyclist.
- About 1/3 of collisions were rear ends with the remainder of the collisions related to lane changes or improper turns.

- Overhead utilities are located behind or within existing sidewalk, creating some clear zone issues.
- Stormwater collection and conveyance is well established with the current development. Widening will require modification of the existing system.
- Right-of-way and access issues include established commercial buildings which limit widening in this section.

Corridor Profile – SR 104

Introduction

Lake Forest Park serves as the southern terminus for SR 104, a route that connects Shoreline, Mountlake Terrace, and Edmonds to the Kingston Ferry Terminal. From there, the state route continues along the ferry route and connects into Kitsap and Jefferson Counties, ultimately terminating at US 101 on the Olympic Peninsula.

Through Lake Forest Park, SR 104 is a winding, tree-lined route, which residents and passersby appreciate for its natural beauty. However, among the trees and curves are outdated, non-standard intersections, blind driveways, and inadequate multimodal facilities that make it a hazardous route.

Like SR 522, SR 104 serves as a main street for Lake Forest Park. It runs by schools, businesses, and homes, yet provides surprisingly few amenities for people traveling by any mode except their car. The following corridor profile identifies the key challenges and opportunities to consider in identifying potential corridor concepts and community recommendations for the roadway's ultimate form.

Plans for the Corridor and Prior Studies

Below, we describe the Safe Streets Study, which has relevance to understanding the opportunities and constraints along the SR 104 corridor.

Safe Streets

As discussed earlier, the Safe Streets effort focused on making Lake Forest Park's streets safer for all users and improving connections to key amenities, such as parks, schools, trails, and retail. Safe Streets did not address SR 104, but several of the recommended projects will provide safer connections to transit along SR 104 for people traveling on foot or by bicycle. For example, Project 3 adds a sidewalk and bike infrastructure on 35th Avenue NE, improving connections to transit near an elementary school. Project 8 adds a sidewalk or pedestrian path and bicycle infrastructure on 40th Place NE, NE 197th Street, 35th Avenue NE, and 37th Avenue NE, providing safer connections to SR 104 for much of the north part of the City. Additionally, Project 10 adds a sidewalk or pedestrian path on NE 187th Street, NE 184th Street, and a short segment of 47th Avenue NE to tie into the existing pedestrian path on NE 178th Street that connects to SR 104, filling a crucial gap in pedestrian amenities. Refer to **Figure 3** for a recommended projects map.

Town Center: SR 522 to 178th Street

Context & Land Uses

The west side of this segment is adjacent to the Town Center, the commercial and retail hub of the City. Much of the Town Center property adjacent to the corridor is surface parking. Other attractions include the transit stops, as well as access to the Burke-Gilman Trail on the other side of the intersection with SR 522. Future plans include a new park-and-ride located somewhere within the Town Center.

The east side of the segment is mostly single-family residential and is expected to remain this way in the future. Similar to portions of the SR 522 study segments, these homes have their driveway access, mailboxes, and garbage collection along SR 104. See **Figure 13**.

Figure 13: Example of Garbage Collection, Mailboxes, and Driveway Access on SR 104.

Pedestrian/Bike Amenities

Sidewalks exist the length of the entire segment on the Town Center side, which connects to signalized pedestrian crossings at SR 522 and NE 175th Street. There is only one pedestrian crossing on the Town Center side across SR 522 to connect with the Burke-Gilman Trail. The east side of SR 104 has a paved asphalt walkway/sidewalk of varying quality through the segment.

There have been comments that more prominent wayfinding signs and an identified bicycle route to reach the Burke-Gilman Trail is needed. One thought was a widened multi-use path on the Town Center side of SR 104. There are no bicycle facilities on this corridor.

Transit Service

Two stops exist in the Town Center area on SR 104 on either side of NE 175th Street. Approximately 130 riders use the stop per day. The stop is connected to the signalized crossing at NE 175th Street by sidewalks along SR 104. Both stops also have shelters. There is no transit specific illumination at either stop, but the northbound stop is adjacent to the intersection street lighting. The segment boardings and alightings are shown in **Table 10.**

Table 10: Town Center Transit Boardings and Alightings

Stop Name	Average Daily Boardings	Average Daily Alightings
Ballinger Way NE & NE 175th St (SB)	7	67
Ballinger Way NE & NE 175th St (NB)	51	8
Segment Total	58	75

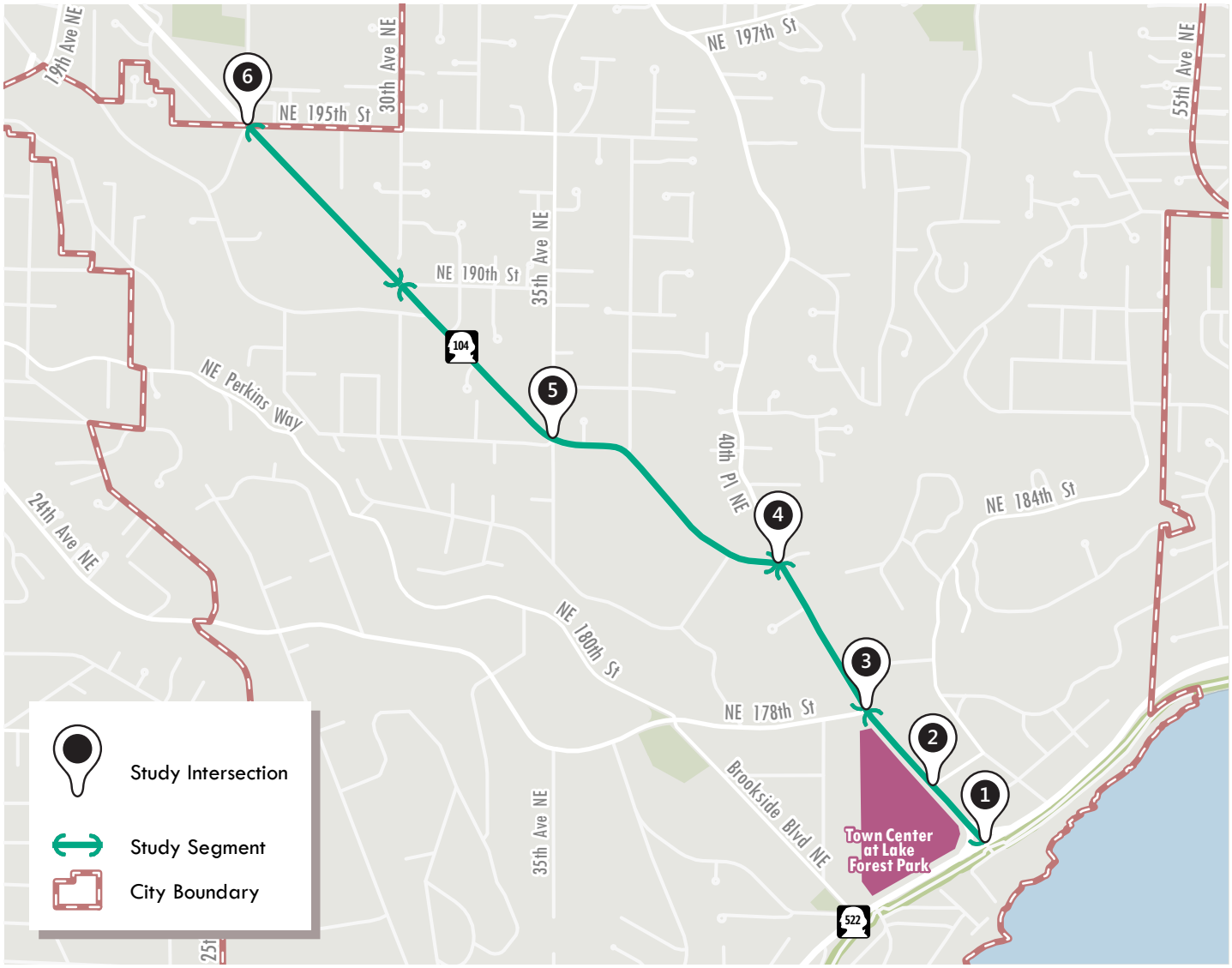
Source: King County Metro, Fehr & Peers, 2017.

Vehicle Operations

The street cross-section through this portion of the corridor varies between three and five lanes. The road is wider near SR 522 with dual left-turn lanes and channelized right-turn lanes. North of the intersection the road cross-section is one general purpose lane in each direction with a two-way left-turn lane. Dedicated left-turn lanes are provided at the intersections of

- NE 178th Street
- NE 175th Street
- SR 522 (Bothell Way).

Existing and future year vehicle turning movement counts for the SR 104 corridor during the peak hours and shown in **Figure 14** and **Figure 15**.



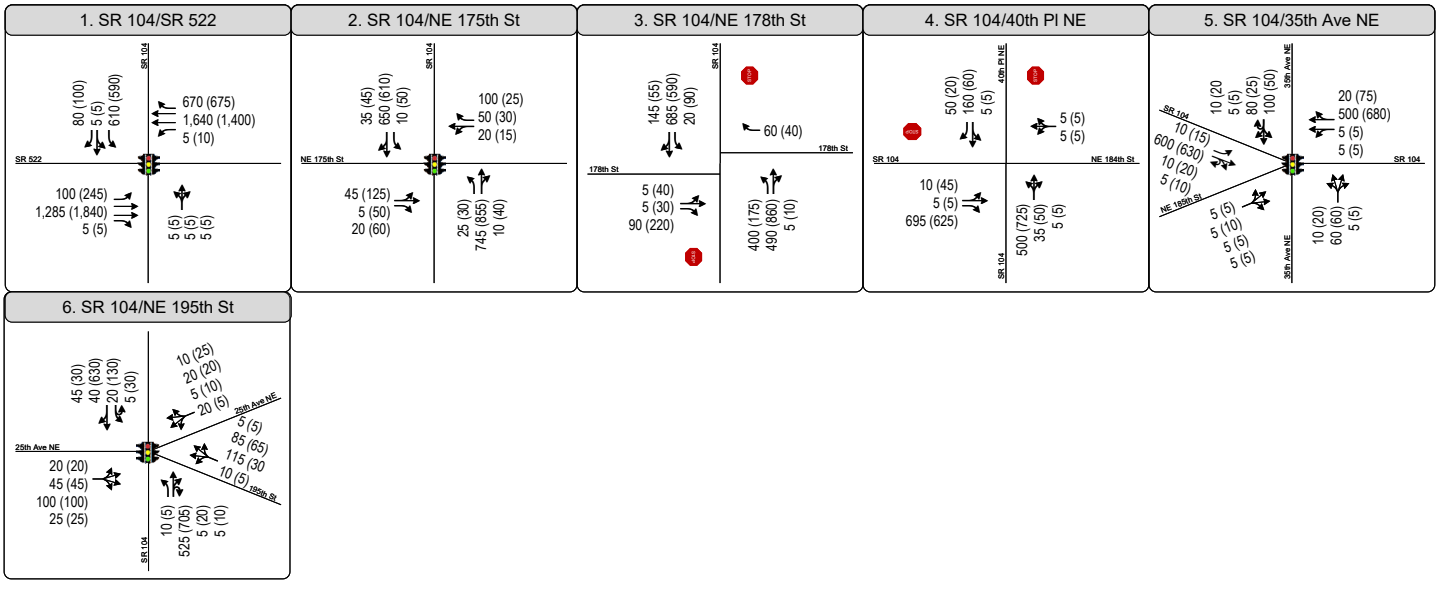
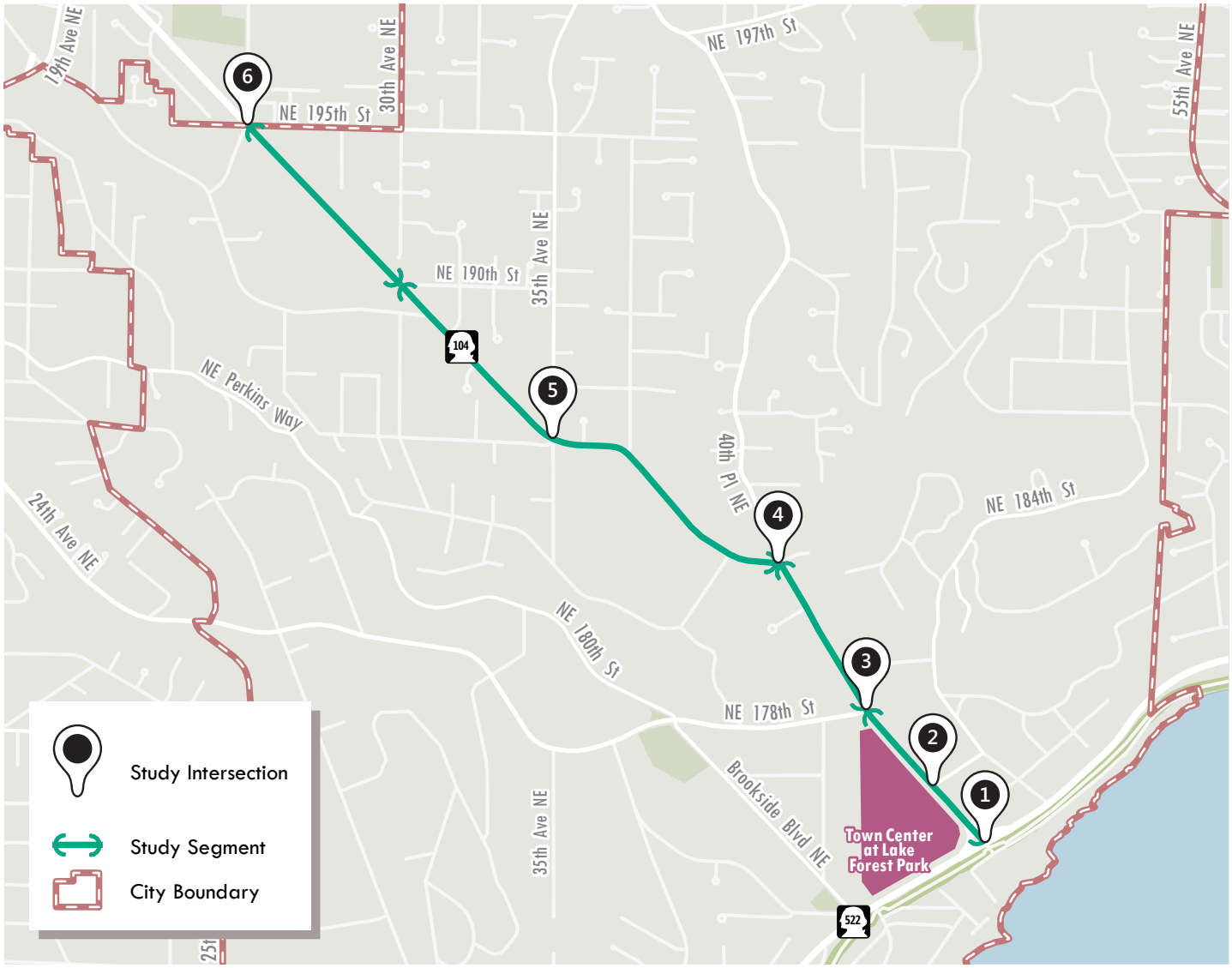


Figure 14
AM(PM) Peak Hour Volumes and Lane Configurations
Existing Conditions



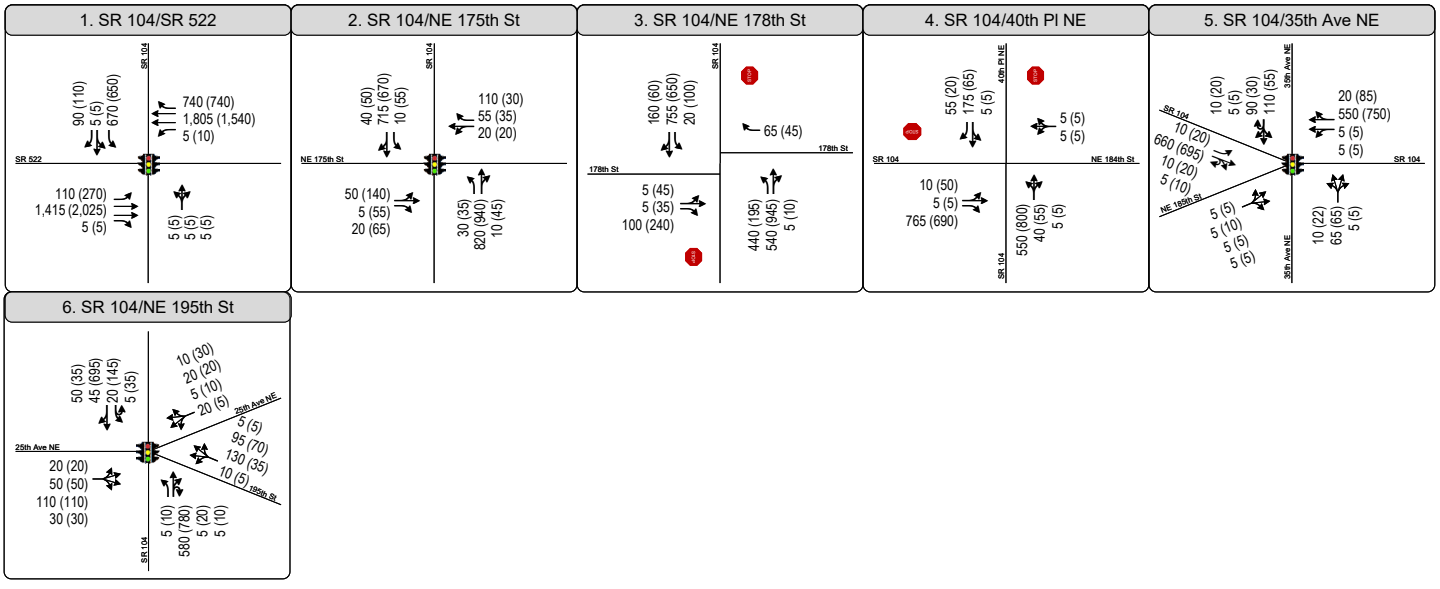


Figure 15
AM(PM) Peak Hour Volumes and Lane Configurations
Future (2036)

The SR 104 (Ballinger Way NE)/SR 522 (Bothell Way) intersection operates at LOS E in the PM peak hour but operations are expected to be more congested in the future with LOS E in the AM and LOS F in the PM peak hour by 2036.

The NE 178th Street intersection is currently an offset intersection that operates like two separate side street stop controlled intersections. The southern approach currently allows for northbound left-turns, which currently operates at LOS F in the PM peak hour. By 2036 this left-turn movement is expected to be highly congested, operating at LOS F during both peak periods.

The LOS for the study intersections is shown in **Table 11.**

Table 11: Town Center Vehicle Level of Service and Delay

		AM				PM			
		Existing		Future		Existing		Future	
Intersection	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
SR 522 (Bothell Way)	Signal	D	43	**E**	**59**	**E**	**65**	**F**	**86**
NE 175th Street	Signal	B	11	B	12	C	24	C	25
NE 178th Street (eastbound approach)	TWSC	E	49	**F**	**>100**	**F**	**>100**	**F**	**>100**
NE 178th Street (westbound approach)	TWSC	B	13	B	13	C	19	C	22

Source: Fehr & Peers, 2017.

Safety/Collision Data

Collision data was collected for a three-year period (March 2014 to March 2017). The collision history for the study intersections is summarized below.

NE 175th Street

- Average of 4 collisions per year; 12 collisions the past three years.
- Almost half the collisions were due to driver inattention and following too closely to vehicles ahead.
- No collisions involved pedestrian or bicyclists.

NE 178th Street

- Average of 7 collisions per year; 20 collisions the past three years.
- Half of the collisions were related to left turns (eastbound NE 178th Street to SR 104, and northbound SR104 to westbound NE 178th Street)

- One collision involved a bicyclist, where the bicyclist did not grant right of way to the vehicle.
- One severe collision involved a speeding vehicle colliding with aa fence while traveling southbound towards SR 522.

Utilities, Stormwater, and Right-of-Way

Utilities: This section of SR 104 includes utility poles on the east side of the road within the right-of-way carrying both transmission and distribution lines, as well as communication lines. The poles are located in front of residential fencing in some sections, and at the edge of shoulder in other cases. Clear zone with widening is an important consideration.

A waterline with hydrants runs along the east side of the SR 104 road prism, as well as along the north and south legs of NE 178th Street.

Stormwater: The Town Center side includes stormwater collection and conveyance along the curb and gutter. Intermittent curb for collection and conveyance on the east side prevents runoff from entering private properties. Widening, as needed, will require modifications to the existing storm drainage system.

Right-of-Way: Right-of-way width along this section is typically 96 feet. Widening in this section, if necessary, will need to balance impacts to the established commercial development on the Town Center side and single-family residences set back from the roadway on the opposite side. On the residential side fencing, and driveways with limited sight distance, largely due to established dense vegetation, will be key elements to consider with widening. There are also some locations where garbage is placed for collection on a weekly basis.

Intersection options for the dog-legged intersection at NE 178th Street are challenged by the right-of-way constraints, topography, road geometry, turning movements and impacts to residences including access.

Town Center Key Findings

Segment Issues and Opportunities

- Adjacent to the Town Center, the retail/commercial hub of the City.
- A new park-and-ride will be located somewhere within the Town Center.
- The other side of the corridor is single-family homes with driveways, mailbox access, and garbage collection on the edge of the corridor.

- There is a full sidewalk on the Town Center side along the segment. It connects to a signalized pedestrian crossings of SR 104 at NE 175th Street and SR 522. The SR 522 crossing connects to the Burke-Gilman Trail and transit stops.
- The residential side of the corridor has a sidewalk/paved asphalt path through the corridor. The path ends approaching SR 522, as there is no pedestrian crossing on this leg of the intersection.
- It has been commented that wayfinding signage and an identified bicycle route to the Burke-Gilman Trail is needed. One idea is a multi-use path on the Town Center side of the corridor.

- Two stops in this area serve about 130 riders per day.
- Both stops are connected to pedestrian facilities and have shelters.
- Signalized crosswalks exist at the adjacent NE 175th Street Signal.

- The SR 522/SR 104 intersection operates at LOS E during the PM Peak hour today. Conditions are expected to degrade to LOS E/F during the peak periods.
- The south leg of the NE 178th Street/SR 104 intersection currently operates at LOS F during the PM peak hour and is expected to operate at LOS F under all future conditions.

- Most collisions at NE 175th Street were rear-ends due to driver inattention. No collisions involved a pedestrian or bicyclist.
- Collisions at NE 178th Street were mostly left-turn collisions (from eastbound NE 178th Street to northbound SR 104, and from northbound SR 104 to westbound NE 178th Street)
- One collision involved a bicyclist, which did not grant right of way to the vehicle.

- Overhead utilities are located close to the east side of the road.
- Existing stormwater system will need to be modified with widening or intersection realignment.
- Widening in this section, if necessary, will need to balance impacts to the established commercial development to the Town Center side and single-family residences set back from the roadway to the other side.
- Options for intersection improvements at NE 178th Street must address right-of-way constraints, topography, road geometry, turning movements and impacts to residences including access.

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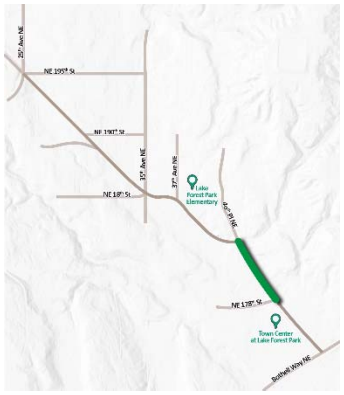

North of Town Center: 178th Street to 40th Place NE

Context & Land Uses

This tree-lined segment of the corridor is surrounded by single-family homes. These homes have their driveway, mailboxes, and garbage collection on the shoulder of the SR 104. The City expects this zoning to remain the same in the future.

Pedestrian/Bike Amenities

Accommodations for walking are better on the east side of SR 104 through this segment of the corridor given the combination of sidewalk or paved asphalt walkway. Portions of the elevated sidewalk also have a grass buffer between pedestrians and vehicles. This side of the corridor also has a wider shoulder and street lighting. The 40th Place NE intersection can be hard for both pedestrian and vehicles to navigate as the road curves and there are no marked crosswalks to identify the pedestrian realm. The skewed intersection also makes for long pedestrian crossing distances.

The west side of the corridor has no formal continuous sidewalk. There is a paved shoulder that pedestrians could walk on, but there is no separation from the vehicle travel lane. In some sections there is a grassy curb separated path for pedestrians to walk on, however it is narrow. Residents may need to walk on this side of the road to access the transit stop near NE 184th Street.

There are no marked crosswalks on this segment of SR 104. This segment of the corridor is a two-lane roadway, so crossing pedestrians may cross cautiously as needed; however this can be difficult given peak hour traffic volumes.

There are no bicycle facilities on this corridor.

Transit Service

Two stops exist in this segment of SR 104 on either side NE 184th Street. Daily ridership at the stops is less than 10 riders. The southbound stop pad connects to paved shoulders via an accessible curb ramp, but no other pedestrian facilities exist on the east side of the road. The northbound stop is served by a bus pull out and connects to a shared use trail on the east side of SR 104. The stop is located adjacent to residential driveways, which

can obscure the stop location. There are no signalized pedestrian crossings in the area. No shelters exist at either stop. The roadway is lit via luminaires mounted on utility poles, but no specific transit lighting is provided.

Existing Transit Service on SR 104

The segment boardings and alightings are shown in **Table 12**.

Table 12: North of Town Center Transit Boardings and Alightings

Stop Name	Average Daily Boardings	Average Daily Alightings
Ballinger Way NE & NE 184th St (SB)	1	1
Ballinger Way NE & NE 184th St (NB)	1	1
Segment Total	2	2

Source: King County Metro, Fehr & Peers, 2017.

Vehicle Operations

The street cross-section through this portion of the corridor is generally two lanes, providing one general purpose travel lane in each direction. A dedicated left-turn lane is provided at the intersections of

- 40th Place NE – NE 184th Street
- NE 178th Street

Operations at the NE 178th Street/SR 104 (Ballinger Way) intersection are discussed in the previous section.

40th Place NE/NE 184th Street/SR 104 (Ballinger Way) is a skewed sidestreet stop controlled intersection that currently operates at LOS F. The intersection consists of two unsignalized approaches with the through traffic bearing left northbound, and bearing right southbound. All turning movements are currently allowed at this intersection, with left turns from the stop controlled side streets operating at the lowest LOS.

The LOS for the study intersections is shown in **Table 13.**

Table 13: North of Town Center Vehicle Level of Service and Delay

		AM				PM			
		Existing		Future		Existing		Future	
Intersection	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
NE 178th Street (southern approach)	TWSC	E	49	**F**	**>100**	**F**	**>100**	**F**	**>100**
NE 178th Street (northern approach)	TWSC	B	13	B	13	C	19	C	22
40th Place NE - NE 184th Street	TWSC	**F**	**>100**	**F**	**>100**	**F**	**85**	**F**	**>100**

Source: Fehr & Peers, 2017.

Safety/Collision Data

Collision data was collected for a three-year period (March 2014 to March 2017). The collision history for the study intersection is summarized below.

40th Place NE

- Average of 4 collisions per year; 13 collisions the past three years.
- 7 collisions were vehicles hitting an obstruction (curb, retaining wall, mailbox)
- 1 collision involved a vehicle not granting right-of-way while making a left turn.
- 1/3 of collisions involved speeding.
- One collision involved a vehicle and cyclist and was not intersection related; however no additional detail was provided.

Utilities, Stormwater, and Right-of-Way

Utilities: This segment has utility poles on the east side of the road within the right-of-way, carrying both transmission and distribution lines, as well as communication lines. Some additional distribution poles are on the west side to serve residences. The poles are located in front of residential fencing in some sections, and at the edge of shoulder in other cases. Clear zone with widening is an important consideration. Overhead lines are damaged by downed trees during the fall and winter occasionally.

A waterline with hydrants runs along the west side of the SR 104 road prism as well as up NE 184th Street at the 40th Place NE intersection.

Stormwater: Just north of NE 178th Street, storm water is collected and conveyed on the east side along the intermittent curb and gutter. Closer to 40th Place NE and on the west side between NE 178th Street and 40th Avenue NE, storm runoff is sheet flowed to the adjacent properties. Widening, as needed, will include modification of this existing stormwater system and an improved water quality treatment, tight line collection and conveyance system, such as what exists further to the east on SR 104.

Right-of-Way: Right-of-way width along this section is typically 62 feet. Widening in this section will need to balance impacts to single family residences set back from the roadway on both sides of the road. On the east side, a rockery just north of 178th Street, fencing, and driveways with limited sight distance largely due to established dense vegetation, will be key elements to consider with widening. The residents also place garbage cans out for collection on a weekly basis.

Intersection options for the 40th Place NE intersection include a possible roundabout. The layout of this option will be challenged by right-of-way constraints, topography, road geometry, turning movements and impacts to residences including access.

North of Town Center Key Findings

Segment Issues and Opportunities

- Single-family zoned on both sides of the corridor. Corridor constrained by mail delivery and garbage collection on the shoulders of SR 104.
- Zoning expected to remain single-family in the future.

- The preferred walking path through the corridor is on the east side of SR 104, where there is a sidewalk/asphalt walking path and streetlights. This side also has a wider shoulder.
- Pedestrian crossings at 40th Place NE can be difficult due to the road curvature and skewed intersection layout.
- The west side of SR 104 has a narrower shoulder and at times a curb separated grass pathway. Pedestrians may need to travel on this side to access a transit stop at NE 185th Street.
- There are no bicycle facilities on this corridor.

- Two stops in this area serve less than 10 riders per day.
- There are little to no pedestrian facilities in the area.
- The stop location is unclear and difficult to locate due to driveways and foliage.

- Stop controlled side streets with permitted left-turn movements are expected to continue operating at LOS F in 2035.

- Average of 4 collisions per year near 40th Place NE area, total of 13 collisions.
- About half the collisions involved hitting an obstruction (curb, mailbox, retaining wall, traffic island)
- 1/3 of collisions involved speeding vehicles.
- 1 collision was a left turn collision.

- Overhead utilities are located close to the north side of the road.
- Existing stormwater system will need to be improved or modified with widening or intersection realignment.
- Widening in this section will need to balance impacts to the single-family residences set back from the roadway.
- Options for intersection improvements at 40th Avenue NE must address right-of-way constraints, topography, road geometry, turning movements and impacts to residences including access.

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LFP Elementary Zone: 40th Place NE to NE 190th Street

Context & Land Uses

The surrounding land use includes mostly single-family housing, but the corridor is also adjacent to Lake Forest Park Elementary School and small neighborhood businesses near 37th Avenue NE and NE 190th Street. The road transitions from a two-lane cross-section to three-lane cross-section (added two-way left turn lane) between 40th Place NE and 40th Avenue NE, and between 37th Avenue NE and NE 190th Street. The corridor continues to have trees and greenery lining the road, with a sidewalk on the east side and a paved shoulder on the west side of SR 104. There is a northbound transit stop at the elementary school, and a southbound transit stop near 40th Avenue NE.

Residential homes along the corridor have their driveway access on SR 104 with mail delivery and garbage collection on the shoulder of SR 104.

Figure 16: SR 104 and 190th Street Intersection.

Source: Fehr & Peers, 2017

Pedestrian/Bike Amenities

The east side of SR 104 continues to offer the better pedestrian accommodations with a sidewalk or paved asphalt walkway. Just north of the elementary school, there are jersey barriers or landscaped buffer on both sides of SR 104 to separate pedestrians from vehicle traffic.

There are no marked crosswalks across SR 104 except for a signalized crossing at NE 185th Street. Any crossings, such as to or from residential homes on the west side of SR 104, would have to be made cautiously by pedestrians looking both ways to find a gap in vehicle traffic to cross.

There are no bicycle facilities on SR 104 on this segment.

Transit Service

This section of the corridor serves as a crossroads for transit. Route 308 enters and exits SR 104 at 35th Avenue NE, making a westbound right turn or southbound left turn at the intersection. Routes 331 and 342 are routed off SR 104 via 35th Avenue NE and NE 190th Street, serving Lake Forest Park Elementary. Southbound routes stay on SR 104.

The area is served by several stops along NE 190th Street, 35th Avenue NE, and SR 104 near 35th Avenue. Daily ridership at the stops is approximately 60 riders. The southbound stop at SR 104 and 35th Avenue NE is located within a paved shoulder and marked inside a driveway to the Ballinger Automotive Repair Shop. The stop is not connected to any sidewalk pedestrian facilities, but a paved shoulder does connect the stop to the adjacent signalized crossing at 35th Avenue NE. There is no shelter, but illumination does exist at the stop via a utility pole mounted illumination arm.

Stops along NE 190th Street and 35th Avenue NE consist of on-street facilities. Some stops are located near school zone crosswalks, but no signalized crosswalks. Pedestrian facilities, stop shelters, or transit specific lighting exist along the corridors.

The segment boardings and alightings are shown in **Table 12**.

Table 14: LFP Elementary Zone Transit Boardings and Alightings

Stop Name	Average Daily Boardings	Average Daily Alightings
Ballinger Way NE & 40th Ave NE (NB)	1	0
Ballinger Way NE & 37th Ave NE (NB)	1	1
NE 190th St & 33rd Ave NE (NB)	1	2
NE 190th St & Ballinger Way NE (NB)	3	2
35th Ave NE & Ballinger Way NE (NB)	9	8
35th Ave NE & NE 189th Pl (SB)	2	0
35th Ave NE & Ballinger Way NE (SB)	10	0
Ballinger Way NE & 37th Ave NE (SB)	1	2
Ballinger Way NE & 40th Ave NE (SB)	0	0
Ballinger Way NE & 35th Ave NE (SB)	6	9
Segment Total	34	24

Source: King County Metro, Fehr & Peers, 2017.

Vehicle Operations

The street cross-section through this segment of the corridor is generally two lanes, providing one general purpose travel lane in each direction. A dedicated left-turn lane is provided at

- 35th Avenue NE – NE 185th Street
- 34th Avenue NE
- 40th Place NE – NE 184th Street

Operations at 40th Place NE/NE 184th Street/SR 104 (Ballinger Way) intersection are currently LOS F due to side street delay as described in the previous section.

The LOS for the study intersections is shown in **Table 15.**

Table 15: Lake Forest Park Elementary Segment Vehicle Level of Service and Delay

		AM				PM			
		Existing		Future		Existing		Future	
Intersection	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
40th Place NE - NE 184th Street	TWSC	**F**	**245**	**F**	**443**	**F**	**85**	**F**	**181**
35th Avenue NE - NE 185th Street	Signal	D	42	D	48	C	34	D	42

Source: Fehr & Peers, 2017.

Safety/Collision Data

Collision data was collected for a three-year period (March 2014 to March 2017). The collision history for the study intersection is summarized below.

190th Street

- An average of 7 collisions per year; 19 collisions in the past three years.
- Most collisions were rear-end collisions due to driver inattention.
- No collisions involved a pedestrian or bicyclist.
- 7 collisions were vehicles hitting an obstruction (utility pole, guardrail, fence, wooden sign post). Of these collisions, 5 were DUIs and/or involved speeding.

Utilities, Stormwater, and Right-of-Way

Utilities: The segment includes utility poles on the east side of the road up to approximately NE 184th Street and on the west side between NE 184th and NE 190th Streets, within the right-of-way, carrying both transmission and distribution lines, as well as communication lines. Some additional distribution poles are on the opposite sides to serve residences and businesses at 35th Avenue NE. The poles are located at back of sidewalk or asphalt path in some sections, and in planter strips and at the edge of shoulder in other cases. Clear zone with widening is an important consideration. Overhead lines are damaged by downed trees during the fall and winter occasionally.

A water line crosses the SR 104/35th Avenue NE intersection along the south side of 35th Avenue NE.

Stormwater: Drainage is characterized by intermittent asphalt curb sections and shoulder sections between 40th Avenue NE and NE 190th Street. On the shoulder sections, storm runoff is sheet flowed to the adjacent properties. Widening, as needed, will include modification of this existing stormwater system and an improved tight line collection and conveyance system.

An existing box culverted section of Lyon Creek at the 35th Avenue NE intersection is planned to be replaced and will be accounted for in intersection improvement options. The creek crosses the west leg of the intersection (SR 104) and also NE 185th Street.

Right-of-Way: Right-of-way width along this section ranges from 60 to 80 feet. Widening in this section will need to balance impacts to single-family residences set back from the roadway on both sides of the road. Rockeries (on the north side near NE 184th Street), steep slopes with jersey barrier (on the east side just north of 40th Avenue NE), fencing, and driveways with limited sight distance largely due to established dense vegetation will be key elements to consider with widening. The residences also place garbage cans along SR 104 for collection on a weekly basis.

Intersection options for the 35th Avenue NE intersection include a possible roundabout. The layout of this option will be challenging because of right-of-way constraints, adjacent commercial properties such as “Whizz Kids” and “Lake Forest Market”, topography, road geometry, turning movements and impacts to residences including access.

LFP Elementary Zone Key Findings

Segment Issues and Opportunities

- Mostly single-family residential along the corridor. There is the Lake Forest Park elementary school near 37th Avenue NE, as well as some neighborhood commercial businesses near 37th and 35th Avenue NE.
- Residential homes have driveway access on SR 104, with mail delivery and garbage collection on the shoulder of SR 104.
- There is a transit stop northbound at the elementary school and a southbound transit stop at 40th Avenue NE.

- Preferred walking path is on the east side of SR 104 where a sidewalk and paved asphalt walkway exists.
- North of the elementary school there is a jersey barrier separating the pedestrian walkway from vehicle traffic on both sides of SR 104.
- There are no marked crosswalks across SR 104, except at NE 185th Street.
- There are no bicycle facilities through this corridor.

- Northbound routes circulates around the elementary school via NE 195th Street and 35th Avenue NE.
- The segment serves approximate 60 daily riders.
- Stop at 35th Avenue NE is not connected to sidewalk pedestrian facilities.

- Stop controlled side streets with permitted left-turn movements are expected to operate at LOS F under all study conditions.

- The 190th Street area had an average of 7 collisions per year, 19 total collisions.
- Most collisions were rear ends, and no collisions involved a cyclist or pedestrian.
- 7 collisions involved hitting an obstruction, where more than half were DUIs and/or speeding.

- Overhead utilities are located close to the either side of the road.
- Existing stormwater system will need to be improved or modified with widening or intersection realignment.
- Widening in this section will need to balance impacts to the single family residences set back from the roadway.
- Options for intersection improvements at 35th Avenue NE must address impacts to commercial establishments, right-of-way constraints, topography, road geometry, turning movements, as well as impacts to residences at other locations, including access.

Northend Area: NE 190th Street to NE 195th Street

Context & Land Uses

The corridor continues to be surrounded by single-family homes with some higher density multi-family housing closer to the NE 195th Street intersection. The corridor has driveways on SR 104. Mail delivery and garbage collection is on or just past the shoulder of SR 104 for residential homes on SR 104. Garbage collection and mail delivery is not on SR 104 for the multi-family housing on the corridor as they have their own driveways.

Pedestrian/Bike Amenities

The better walking route along SR 104 continues to be the east side of the roadway where there is a sidewalk with trees and a landscape buffer between pedestrians and vehicle traffic. Some small portions are only a paved asphalt walkway. There is a signalized pedestrian crosswalk at NE 195th Street.

There are no sidewalks on the west side of SR 104 in this segment. There is a wide shoulder that pedestrians could potentially walk on, however, there is no separation between the pedestrian and vehicle traffic.

There are no bicycle facilities on this segment of the corridor.

Transit Service

The area is served by three stops, two north of NE 190th Street between two private residential driveways, and a third near 25th Avenue NE. A fourth stop, just north of NE 195th Street is just beyond the project limits. Daily ridership at the stops is approximately 40 riders, with most of riders accessing the routes via the stop located at 25th Avenue NE. The southbound stop north of NE 190th Street does not connect to any pedestrian facilities. The northbound stop consists of a pull out between residential driveways and there are connections to a shared use trail along the east side of the street. There are no shelters or transit specific lighting at either stop.

The stop near 25th Avenue NE is connected to the signalized intersection and pedestrian crossing via a wide paved shoulder. There is a shelter, but illumination does not exist at the shelter.

Transit stop on SR 104 at 25th Avenue NE.

The segment boardings and alightings are shown in **Table 16**.

Table 16: Northend Area Transit Boardings and Alightings

Stop Name	Average Daily Boardings	Average Daily Alightings
Ballinger Way NE & NE 190th St (NB)	1	3
Ballinger Way NE & 25th Ave NE (SB)	16	16
Ballinger Way NE & NE 190th St (SB)	3	3
Segment Total	20	22

Source: King County Metro, Fehr & Peers, 2017.

Vehicle Operations

The street cross-section through this portion of the corridor is generally two lanes, providing one general purpose travel lane in each direction. A dedicated left-turn lane is provided at the intersections of

- 25th Avenue NE – NE 195th Street
- 35th Avenue NE – NE 185th Street

NE 195th Street is the only study intersection in this segment and operates at LOS D or better under all study conditions.

The LOS for the study intersections is shown in **Table 17**.

Table 17: Northend Area Level of Service and Delay

		AM				PM			
		Existing		Future		Existing		Future	
Intersection	Control	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
NE 195th St	Signal	D	40	D	43	C	32	D	42

Source: Fehr & Peers, 2017.

Safety/Collision Data

Collision data was collected for a three-year period (March 2014 to March 2017). The collision history for the study intersection is summarized below.

NE 195th Street Area

- An average of 5 collisions per year; 14 total collisions in the past three years.
- 8 collisions involved making left turns.
- 4 collisions were disregarding the traffic signal.
- 4 collisions were turn related and not granting right-of-way.
- No collisions involved pedestrian or bicyclists.

Utilities, Stormwater, and Right-of-Way

Utilities: This segment includes utility poles on the west side of the road, within the right-of-way, carrying both transmission and distribution lines, as well as communication lines. The poles are located primarily at the edge of shoulder. Clear zone with widening is an important consideration. Overhead lines are damaged by downed trees during the fall and winter occasionally.

At the NE 195th intersection, water lines and sanitary sewer lines exist on both NE 195th Street and 25th Avenue NE legs.

Stormwater: Drainage is characterized by intermittent asphalt curb sections and shoulder sections between NE 190th Street and 195th Street. On the shoulder sections, storm runoff is sheet flowed to the adjacent properties. Widening, as needed, will include

modification of this existing stormwater system and an improved water quality treatment, tight line collection and conveyance system.

At the NE 195th Street intersection, a 24" x 36" corrugated metal pipe carrying a creek crosses the NE 195th Street leg. The creek crosses in a channel east of the intersection and flows downstream into a 30" x 40" corrugated metal pipe, running parallel to the east side of 25th Avenue NE.

Right-of-Way: Right-of-way width along this section is typically 90 feet. Widening in this section will need to balance impacts to single family residences set back from the roadway on primarily the west side of the road. Driveways with limited sight distance will be key elements to consider with widening. The residences also place garbage cans placed out for collection on a weekly basis.

Intersection options for the NE 195th Street intersection include a possible roundabout. The layout of this option will be challenged by the right-of-way constraints, adjacent commercial properties, culvert crossing and topography, road geometry, turning movements and impacts to residences including access.

NE 195th St intersection with utility poles on west side of SR 104

Northend Area Key Findings

Segment Issues and Opportunities

- The corridor is surrounded by single-family homes with multi-family homes closer to NE 195th Street. Residential homes have driveway access on SR 104, with mail delivery and garbage collection off the shoulder of SR 104.

- The main pedestrian walking route is on the east side of SR 104, where there is a separated sidewalk with landscaped buffer with trees.
- There are no sidewalks on the west side of SR 104. There is a wider paved asphalt shoulder.
- One signalized crossing exists at NE 195th Street, where some of the sidewalk ramps are in poor condition.
- There are no bicycle facilities on this corridor.

- Stops near NE 190th Street serve less than 10 riders per day, while the stop located at 25th Avenue NE serves roughly 30 riders per day.
- Stop at NE 190th Street is not connected to pedestrian facilities or crosswalks.
- Stop at 25th Avenue NE is connected to the signaled crossing via a widened shoulder.

- Stop controlled side streets with permitted left-turn movements are expected to operate at LOS F under all study conditions.

- NE 195th Street area has an average of 5 collisions per year; 14 collisions the past three years.
- 8 collisions involved making left turns, and 4 collisions involved not granting right-of-way.
- There were no pedestrian or bicycle involved collisions.

- Overhead utilities are located close to the west side of the road.
- Existing stormwater system will need to be improved or modified with widening or intersection realignment.
- Widening in this section will need to balance impacts to the single-family residences set back from the roadway.
- Options for intersection improvements at 195th Street must address impacts to commercial establishments, culvert crossing, right-of-way constraints, topography, road geometry, and turning movements.